Report On A

City of Traffic Safety Study

ANKENY, IOWA

Sponsored By:

Iowa Department of Transportation
Federal Highway Administration

Prepared By:

HWS HOSKINS-WESTERN-SONDEREGGER, INC.
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

HOSKINS-WESTERN-SONDEREGGER

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December 8, 1978

Honorable Mayor and City Council
City Hall
Ankeny, Iowa 50021

Gentlemen:

This is the final draft of our Report on the Traffic Safety Study for the City of Ankeny.

We have studied and analyzed the several subject areas which were set out in the Highway Safety Program grant for Ankeny. The Report has been prepared to cover not only the prevailing situation in those subject areas, but also to include data and information to assist in understanding some of the basic concepts and philosophies in traffic matters, all of which will help in dealing with future traffic problems.

Understandably, some of the Report's recommendations may be controversial. But, seldom, if ever, are traffic problem solutions agreeable to everyone because, often, change in time-honored conditions and traditions are proposed. It is, however, imperative that the City be aware of those things relating to traffic in which the City has definite statutory responsibilities, and the possible problems resulting from noncompliance.

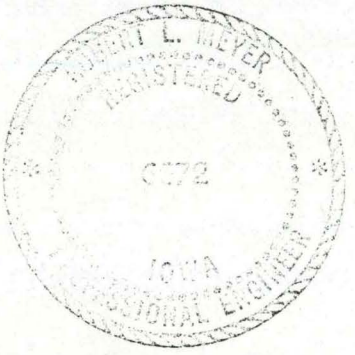
We have tried to keep foremost in mind practicality and economic feasibility in proposing ways and means of reducing Ankeny's traffic accident record and to otherwise improve traffic operation efficiency. Several of the recommendations relating to modification of existing facilities are presented in terms which are pertinent in the planning and design of new facilities. Specifically the deficiencies in Ankeny Blvd. should not be repeated in the pending improvement of First Street.

We want to express our appreciation to City Engineer Jay Schreiner, Jerry Card, Police Chief Ballard, and Ben Norman of the School District for their assistance and cooperation. We also received significant cooperation from staff members of the Iowa Department of Transportation.

Sincerely,

HOSKINS-WESTERN-SONDEREGGER, INC.

By Robert L. Meyer
Robert L. Meyer, P.E.



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Report On A

Traffic Safety Study

ANKENY, IOWA

In Cooperation With

IOWA DEPARTMENT OF TRANSPORTATION
U.S. DEPARTMENT OF TRANSPORTATION -
FEDERAL HIGHWAY ADMINISTRATION

This report was prepared through a grant provided by the United States Department of Transportation, Federal Highway Administration pursuant to the provisions of Section 402 of Title 23 of the United States Code.

The findings, conclusions, and recommendations expressed in this report are the Consultant's, and not necessarily those of the City of Ankeny, the Iowa Department of Transportation, State Office of Planning and Programming, or the Federal Highway Administration.

Prepared by

HWS HOSKINS WESTERN-SONDEREGGER, INC
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

I hereby certify that this Report, and the studies and analyses involved, were prepared by me, or under my direct personal supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Iowa.

Signed Robert L. Meyer Date Oct. 15, 1978

Robert L. Meyer, P.E.
Iowa Reg. No. 6672

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PART A

INTRODUCTION

A-1 PURPOSE OF STUDY

Prompted by a growing awareness that there were deficiencies in the safe and efficient movement of traffic in Ankeny, City officials decided to take some positive action toward an improvement program.

They applied for and received funds for a study of traffic conditions. The grant was funded by the Federal Highway Administration (FHWA) as part of the Federal Highway Safety Act of 1966, Program Standard 13 "Traffic Engineering Services". See Exhibit A-1 in Appendix.

The purpose and objectives of Standard 13 are well suited to meet the concern of Ankeny officials in attaining their desired goal, which in this case, is the safe, efficient, and economical movement of persons and goods by automotive transportation. Also of concern is the safety of pedestrians of all ages, but, especially those of elementary-school age.

The specific objectives of the Standard which are applicable in this Study are:

- To provide the needed traffic engineering expertise to develop traffic control plans and programs in all jurisdictions.
- To identify both the short-term and long-range need for traffic control devices.
- To apply warrants for the application of traffic control devices.

- To ensure that the need for new traffic control devices has been determined by adequate traffic engineering studies including school crossing safety.
- To periodically inspect and maintain all traffic control devices.
- To devise methods for correcting hazardous roadway deficiencies and for installing improved features when modifications to the roadway are made.
- To evaluate the safety adequacy of the roadway, including its capacity and efficiency.

A-2 SCOPE OF STUDY

The objective of this Project has been to make a detailed traffic engineering study of a broad spectrum of traffic operation and control throughout the City toward the attainment of more efficient movement of traffic and the reduction of the accident potential for vehicles and pedestrians.

The study area was limited to the corporate limits of the City and included all streets.

The major thrusts of the Project were directed in the following study areas:

1. Citywide Traffic Accident Experience
2. Citywide Traffic Operation
3. Inventory Evaluation of Traffic Control Devices
4. School Area and Crossing Safety
5. Railroad Grade Crossings
6. Review of Traffic Code

PART B

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

B-1 CITYWIDE ACCIDENT ANALYSIS

- During the three-year study period, 1974-1976, approximately 735 accidents were reported to the Ankeny Police Department. There were 252 persons injured and two persons were killed.
- With regard to when accidents occur in Ankeny, the experience is similar to other urban areas throughout the State insofar as day of the week, time of the day, and month of the year are concerned.
- In Ankeny, the percentage of drivers involved in accidents who are under 20 years of age is considerably higher than the statewide urban experience (32.5% to 23.4%). But the involvement of drivers over 45 years old is much less than the statewide urban average (14.1% to 25.4%).
- There were only eleven locations in the City where the average annual rate of accidents was three or more.
- Nine of these locations were at intersections and two were mid-block sections, both of which were on Ankeny Blvd.
- Almost 40% of all the accidents on public streets in Ankeny during the 3-year study period occurred on Ankeny Blvd.
- Approximately 50% of the accidents in Ankeny during the past three years occurred at intersections.
- Over 95% of the intersections involved had some type of control.

- Of those intersections, 54% were controlled by STOP signs and 46% by traffic signals.
- Ten of the eleven accident-prone locations are on Ankeny Blvd.
- The percentage of accidents involving the parking element is somewhat less than in most cities. This is likely attributable to the comparatively small size of the CBD.
- From the standpoint of numbers, the intersection of 1st Street and Ankeny Blvd. accumulated the most accidents -- 33, in the three year period. The intersection of 3rd Street and Ankeny Blvd. with 32 was next.
- From the standpoint of severity, the intersection of Ankeny Blvd. and Magazine Road is the most critical. The ten accidents there in three years resulted in injuries to 11 persons and one fatality.
- To encourage and facilitate the use of traffic accident records for engineering purposes, before and after studies, and other fact finding purposes, it is recommended that the Police Department incorporate a system of filing accident reports by location.

B-2 CITYWIDE TRAFFIC OPERATION

- Ankeny differs considerably from most cities of similar size in that there is no central business district of a size which would be characteristic of a city over 10,000 population. The surge in growth during the past decade has resulted in a new, additional business district along Ankeny Blvd., while the traditional CBD has remained almost unchanged. This situation, in turn, has produced an unusual traffic pattern which does not have a strong CBD influence.

- The traffic pattern throughout Ankeny is determined largely by the high degree of discontinuity of street alignment. There are only two streets which have sufficient continuity and are conveniently located so as to serve as crosstown arterials.
- Ankeny Blvd. (Highway US 69) is the most heavily traveled street in the City, because of its central location and the access it provides to very substantial traffic generators. It is being forced to function as both a prime land service and prime traffic service facility. Unfortunately, it does not have the proper design configuration which will allow it to serve both functions efficiently or safely.
- The principal deficiency in Ankeny Blvd. in the section north of the railroad crossing is the absence of a lane to segregate and store left-turning vehicles both at intersections and between intersections. Under prevailing conditions, the two inner lanes are functioning much of the time as left-turn lanes which means that Ankeny Blvd. is effectively only a 3-lane facility, with a significant amount of lane-changing and traffic stream turbulence.
- It is recommended that Ankeny Blvd., north of the railroad crossing, be widened so as to provide a continuous left-turn lane.

  This can be accomplished in two ways: (1) Widen seven feet on only the west side between the tracks and 1st Street to provide five 11-foot lanes, or (2) Widen six feet on each side which would provide five 12-foot lanes.
- Either of these modest additions would allow Ankeny Blvd. to operate as a complete 5-lane facility.

- The cost of (1) would be approximately $75,000 and (2) near $160,000.
- A continuous left-turn lane is also very necessary on N Ankeny Blvd. to at least the north entrance to the High School area.
- On an interim basis, a 36-foot wide, 3-lane roadway would be adequate which could be provided by adding six feet on each side of the existing 24-foot width.
- The existing traffic signal installations on Ankeny Blvd. at 1st Street, 3rd Street and Eastlawn Drive should be modified to display two vehicle signals over the roadway on all approaches and pedestrian signals for all crosswalks, and the controls should be adaptable to separate left-turn phases.
- All of the existing and future signal installations along Ankeny Blvd. should be interconnected so that coordination is possible for more efficient continuous traffic flow.
- As part of the pending installation of a traffic signal at Ankeny Blvd. and SW Ordnance Road, the intersection should be appropriately marked and the median on Ankeny Blvd. shortened slightly.
- It is recommended that a right-turn lane be constructed to serve traffic entering the Community College area from the north on Ankeny Blvd.
- It is recommended that the pending improvement project programmed for 1st Street be based on 1st Street being a 5-lane, 60-foot wide facility, with the center lane serving as a continuous 2-way left-turn lane.

- The project should include provisions for a pedestrian overpass at School Street and at the Northwest Elementary School.
- On an interim basis until W 1st Street is reconstructed, it is recommended that a temporary traffic signal be installed at the intersection with State Street and that the four approaches be marked as shown in Figures D-3 and D-4.
- To relieve W 1st Street of some of its present traffic load, it is recommended that a new arterial street be constructed between State Street and Ankeny Blvd. in the NW 9th Street corridor.
- SW Ordnance Road is functioning reasonably well under a substantial traffic load. However, there is considerable congestion and inefficiency in the area of the intersection with the east entrance road to the John Deere Plant during shift changes. It is recommended that the roadways be modified as shown in Figure D-6.
- The intersection of NW 16th Street and the road to the west entrance to the John Deere Plant is presently operating very inefficiently, primarily because of a lack of pavement markings to delineate lane alignments. It is recommended that the roadways be marked, the vehicle detector for the signal system on the east approach be relocated, and a right-turn lane be constructed for traffic entering the plant area from the south.
- The bicycle route system throughout the City is not operationally in compliance with State Laws relating to bicycle operation.

B-3 INVENTORY AND EVALUATION OF TRAFFIC CONTROL DEVICES

- There is considerable remedial work needed to bring the City's traffic signs, signals, and pavement markings into compliance with standards of design and usage as set forth in the MUTCD.
- Details on the recommendations relative to each sign throughout the City are readily obtainable from the Inventory Data Sheets and Summary Data Sheets which are a supplement to this Comprehensive Report.
- Of the 299 intersections of named public streets throughout the City, 203 (67%) have some type of control, 197 by STOP signs, none by YIELD signs, and 6 by traffic signals. The percentage of controlled intersections is somewhat higher than is generally encountered in other cities. There are a few locations where a YIELD sign would be an appropriate control.
- With regard to design and installation, the STOP sign element is very commendable.
- Of 289 STOP signs inventoried, 89% were the standard 30-inch size. The 24-inch units should be replaced.
- Only one of all the STOP signs is not properly reflectorized for nighttime effectiveness.
- The application of all-way STOP control at several intersections is highly questionable.
- There are 133 Speed Limit signs throughout the City, distributed reasonably well. There are several locations where an additional sign would be beneficial.

- 77% of the Speed Limit signs in place are the substandard 18 x 24-inch size. They should be replaced with standard 24 x 30-inch units.
- There are several locations where there is a difference between the posted speed limit and the designations stipulated in the municipal code.
- There are only 36 Movement Control signs, such as the Turn Control, One-Way, and Exclusion signs throughout the City--a comparatively small number. Very few of these signs comply with MUTCD standards.
- There are 150 classified Warning-type signs throughout the City comprised of 29 different types. With a few exceptions, most comply with design and usage standards.
- There are almost 50 signs throughout the City associated with the safety of young children. All are nonstandard and should be removed. Some can be replaced with the new symbolized Playground sign. Others serve no purpose and do not need to be replaced.
- Other than Street Name, Highway Guide, and Bike Route signs, there are comparatively few guide-type signs in Ankeny.
- The quality of Street Name signing in Ankeny is exemplary. It is suggested that additional and larger units would be very beneficial on Ankeny Blvd. and 1st Street.
- The three northernmost of the five signal installations on Ankeny Blvd. have deficiencies which are significant and justify considerable modification at each location.

- The signalized intersections along Ankeny Blvd. should be interconnected so as to coordinate their operation for more efficient movement of traffic.
- With the exception of the pavement marking done by IDOT on the highway within the City, the pavement marking efforts throughout the City are deficient. It is recommended that the City procure a small pavement marking machine which can be used to place critically needed markings on the City arterial system.

B-4 SCHOOL CROSSING AND AREA PROTECTION

- The hallmarks of the existing school crossing protection throughout Ankeny are the roll-out or temporarily positioned STOP sign, and adult crossing guards.
- There are eight locations where traffic approaching a school crossing is controlled by such a device, and five locations with adult guards.
- With the exception of those installed by the State DOT, there is almost a total absence of the standard Type S1-1 Advance School sign and Type S2-1 School Crossing sign as stipulated in Part 7 of the MUTCD.
- Traffic conditions at the five locations where adult guards are stationed justify a stop device. But, the device should be a pedestrian actuated traffic signal.
- The signals are recommended to eliminate the extreme inefficiencies resulting from the unnecessary stoppages with the roll-out STOP signs, and to ensure the availability of continual protection, which is often not the case with temporary STOP signs.

- A pedestrian signal is recommended for the crossing on W 1st Street in front of the Northwest Elementary School on an interim basis until the street is improved. At that time, the signal should be replaced with a pedestrian overpass structure.
- The traffic congestion on W 1st Street resulting from the fact that it is the only street which serves the school area, can be eased by constructing a new roadway along the west and north sides of the school area in such a way as to connect W 1st Street and NW 3rd Street.
- The Terrace Elementary School attendance area is such that three school crossing problem sites exist a considerable distance from the school facilities--on SW 3rd Street at SW School Street, on W 1st Street at School Street, and on N Ankeny Blvd. at 5th Street.
- A pedestrian signal system is recommended to replace the roll-out STOP sign at each location. When W 1st Street is reconstructed, a pedestrian overpass structure at School Street should be planned as part of the project.
- The validity of the roll-out STOP device usage on NW 5th Street at NW School Street is highly questionable.

The roll-out STOP device used at the school crossing on E 1st Street at SE Trilein Drive should be replaced with a pedestrian signal.

- The school crossing on SE Trilein Drive at SE 3rd Street should be transferred to and combined with the crossing at SE 2nd Street. To facilitate the increase in the pedestrian volume at the 2nd Street crossing, it is recommended that a pedestrian signal be installed to replace the roll-out STOP device.

- It is recommended that all vehicular traffic, with the exception of school busses, be prohibited from entering the school grounds during the morning arrival and afternoon departure periods.
- To accommodate drivers who pick up students when school is dismissed, it is recommended that parking be permitted with a 15 minute time limit along the north side of SE 3rd Street fronting the school grounds between 3 p.m. and 4 p.m.
- The traffic situation associated with the SE Elementary School is highlighted by the congestion and turbulence which exists on SE Trilein Drive when school busses and other vehicles arrive together during the morning and afternoon periods.
- The opportunities to cross SE Trilein Drive safely in the vicinity of SE 10th Street are very ample. Numerous students cross near SE 9th Street.
- SE 10th Street along the school frontage should be utilized better to solve the congestion now occurring on SE Trilein Drive during morning and afternoon periods.
- The pedestrian problems involving the 9th grade students at the Parkview School are more irksome than hazardous. Their intermingling with the Terrace Elementary students at W 1st Street and School Street compounds certain discipline problems, and the indiscriminate crossing of W 1st Street between SW School Street and SW Walnut Street violates pedestrian safety principles.

- Safety problems generated by the High School involve such matters as the diversion of High School student drivers from local streets such as NW School Street and NE Grant Street, and more security for vehicles leaving Ankeny Blvd. to enter the school area.

B-5 RAILROAD GRADE CROSSINGS

- There are presently 12 locations in Ankeny where public streets and railroad tracks intersect.
- Eight of the crossings involve the mainline of the Chicago and Northwestern line, two crossings are minor sidings, and two involve the infrequently used former Ft. Dodge-Des Moines-Western line.
- During the 3-year period, 1974-1976, there were four accidents involving contact between a motor vehicle and a train. One occurred on SW 3rd Street, and three at SE Magazine Road. Those on SE Magazine Road, one each year, occurred prior to the installation of the flashing lights and gates now in place.
- Only 3 of the 12 crossings meet or exceed the minimum signing and marking requirements stipulated in the MUTCD.
- The electric signal devices in place at the crossings on SW Walnut Street, SW Cherry Street, and SW 3rd Street are grossly inadequate.
- The use of STOP signs at Crossing No. 10 (Figure G-1) is not warranted and they should be removed. The STOP signs at Crossing No. 12 are marginally justified, but questionable.
- To reduce the nighttime hazards, high-mount illumination of a distinctive color is recommended for most of the crossings.

B-6 EVALUATION OF TRAFFIC CODE

- Chapter 21 of the Ankeny Municipal Code is generally in accord with Iowa Laws relating to motor vehicles.

There are, however, some inconsistencies, variances, and additions which warrant appropriate action.

Subject areas which should receive attention include the following:

* Regulations relating to emergency vehicles
* Speed regulations
* Various reference to specific sections of the State statutes
* The design and meaning of certain signs and signals
* The right-turn-on-red regulation
* Parking
* School zones
* Truck routes

- The City's traffic code appears to lack a desirable degree of organization and inclusiveness. It is recommended that the City utilize the resources of the National Committee on Uniform Traffic Laws and Ordinances with special reference to the Model Traffic Ordinance.

PART C

CITYWIDE TRAFFIC ACCIDENT ANALYSIS

C-1 GENERAL

A study of a city's traffic accident experience is a valuable resource in any appraisal of traffic operation and safety.

Traffic accidents result from the actual failure of the road user, the vehicle, and the roadway to discharge properly their respective functions in traffic movement. Such accidents are also an indication of traffic operation inefficiencies. Since traffic movement with safety is one of the prime objectives in our automotive transportation systems, a study of the facts surrounding traffic accidents is vitally important.

As of August, 1975, Iowa laws relating to the operation of motor vehicles, stipulate, in part, that the driver of any vehicle involved in an accident, resulting in injury to or death to any persons, or total property damage to an apparent extent of $250 or more, must contact an enforcement official and prepare a written report of the accident for submittal to the Department of Public Safety.

Frequently, conscientious, safety-minded individuals contend for some corrective device at a location where "accidents may occur". A study of the traffic-accident situation must be made realistically. Potentially, traffic accidents may, in time, occur at any intersection or section of street in the City. They are occurring presently in varying numbers at many intersections and midblock locations. There is little justification to concentrate on locations where "traffic

accidents may occur" until those places where they are actually occurring are corrected.

The interpretation of accident facts and attempts to determine causative factors are, of course, risky because of the fallibility of the usual statistical data. In the search for accident causation, there is a tendency to charge road users with violations of some preconceived notion of moral or statutory law, and thus, to establish the cause of the accident. While there may, and should, be concern about this factor, an effort should be made to search for the scientific facts which surround accidents and, if possible, find the laws of nature which may have influenced or governed the cause of accidents.

The actual cause of a traffic accident is frequently very obscure. For example, right-angle collisions at intersections controlled by traffic signals usually occur when one of the drivers violates his signal indication. Sometimes the violations are intentional and willful, in which case the real cause is likely an unsavory and improper attitude. But, the cause for the violation could be attributable to environmental factors or improper signal operation.

Unfortunately, facts pertaining to the real or actual cause of individual accidents are generally not related in the information provided on standard traffic accident reports. Very seldom is an accident witnessed by a police officer, or other individual who may be trained in accident investigation. As a general rule, the reports prepared by investigating officers are most reliable, and unbiased. But even then,

at best, the reports contain only measured and obvious uncontroversial information. Officers are understandably reluctant to report sketchy heresay facts. They are also resistant to expressing their own personal opinions because they may be challenged and discredited in court.

However, the facts derived from processing reports of a large number of accidents are useful and worthwhile. Accident-prone locations are identifiable, and the most prevalent types of accidents become evident. These data lead to valid generalizations which are indicative of probable accident-prevention action to be taken.

C-2 BASIC STATISTICS

Traffic accident records covering the 3-year period from January, 1974 through December, 1976, were made available by the Ankeny Police Department. The actual reports prepared by the investigating officers were provided.

Yearly Records

The following is a citywide summary of the accidents which occurred during the study period within Ankeny on the public streets.

	1974	1975	1976
All Accidents	277	230	228
Fatal Accidents	1	1	0
Number Killed	1	1	0
Injury Accidents	55	57	71
Number Injured	70	87	95

The base for required reporting changed in August, 1975 from $100 property damage to $250. This accounts for the change in the total number

of reports annually. However, the number of injury accidents and the number of persons injured are on a rising trend.

In addition to the accidents which occur on the public streets, numerous mishaps take place in off-street parking facilities which are provided by businesses for customer service or solely for employees. While such accidents are not legally reportable, the Police are frequantly called to investigate. Fortunately, there are seldom any injuries, but the accumulated cost in property damage is considerable.

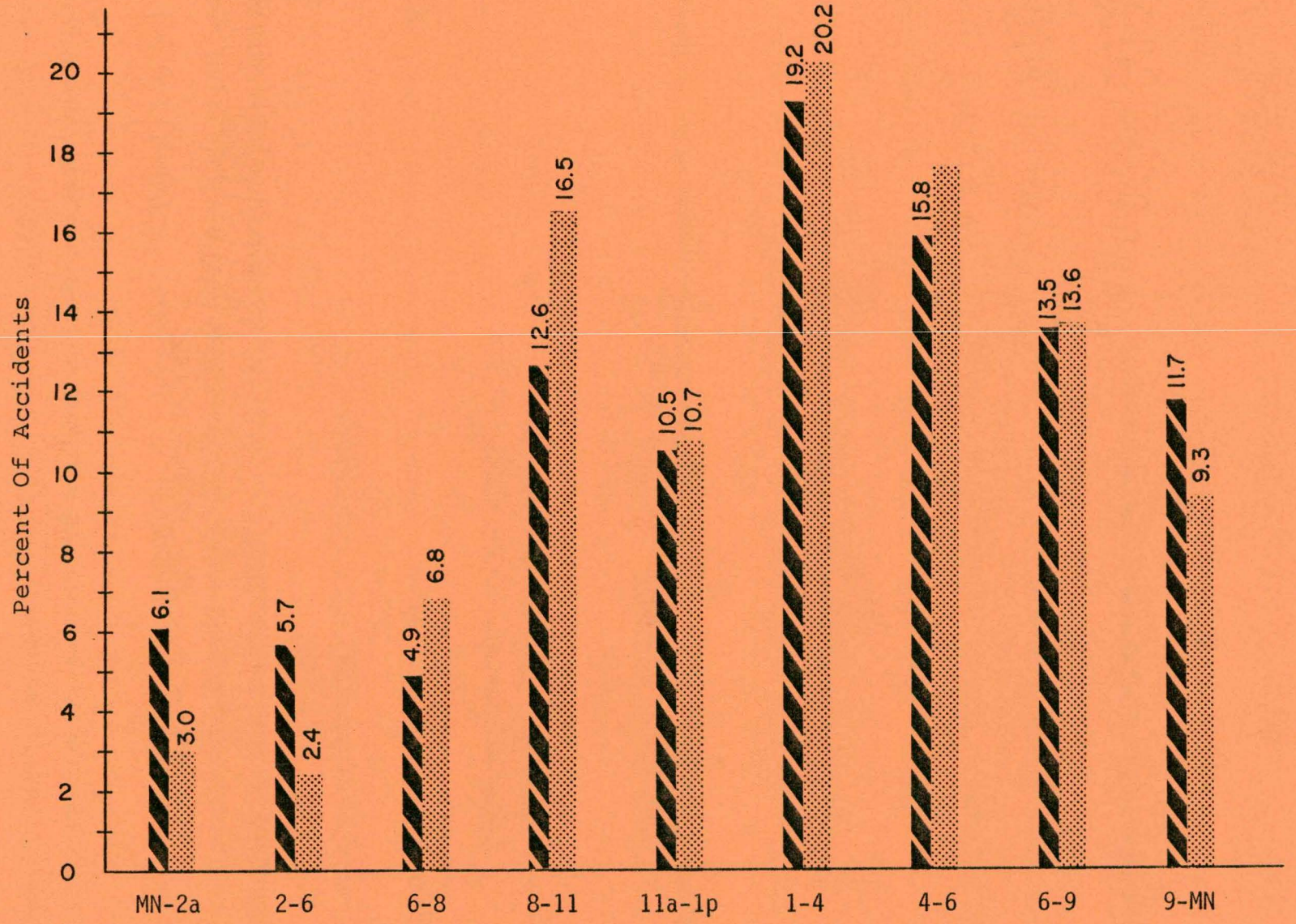
When Do Accidents Occur?

Since most of the travel in Ankeny occurs during the daylight hours, this greater degree of exposure, and hence accident potential, accounted for most of the accidents. The data shown in Figure C-1 indicate that approximately 65% of the accidents took place between 8 a.m. and 6 p.m. This compares to 58% in urban areas generally throughout the State. Figure C-2 shows Thursday and Friday are the most accident-prone days of the week in Ankeny which differs from the statewide record. The Saturday experience in Ankeny is less than might be expected.

As Figure C-3 illustrates, the monthly "distribution" of accidents in Ankeny varies somewhat from the statewide pattern.

Age of Drivers

Figure C-4 illustrates some interesting information relative to the age of the drivers involved in the accidents in Ankeny. Those under

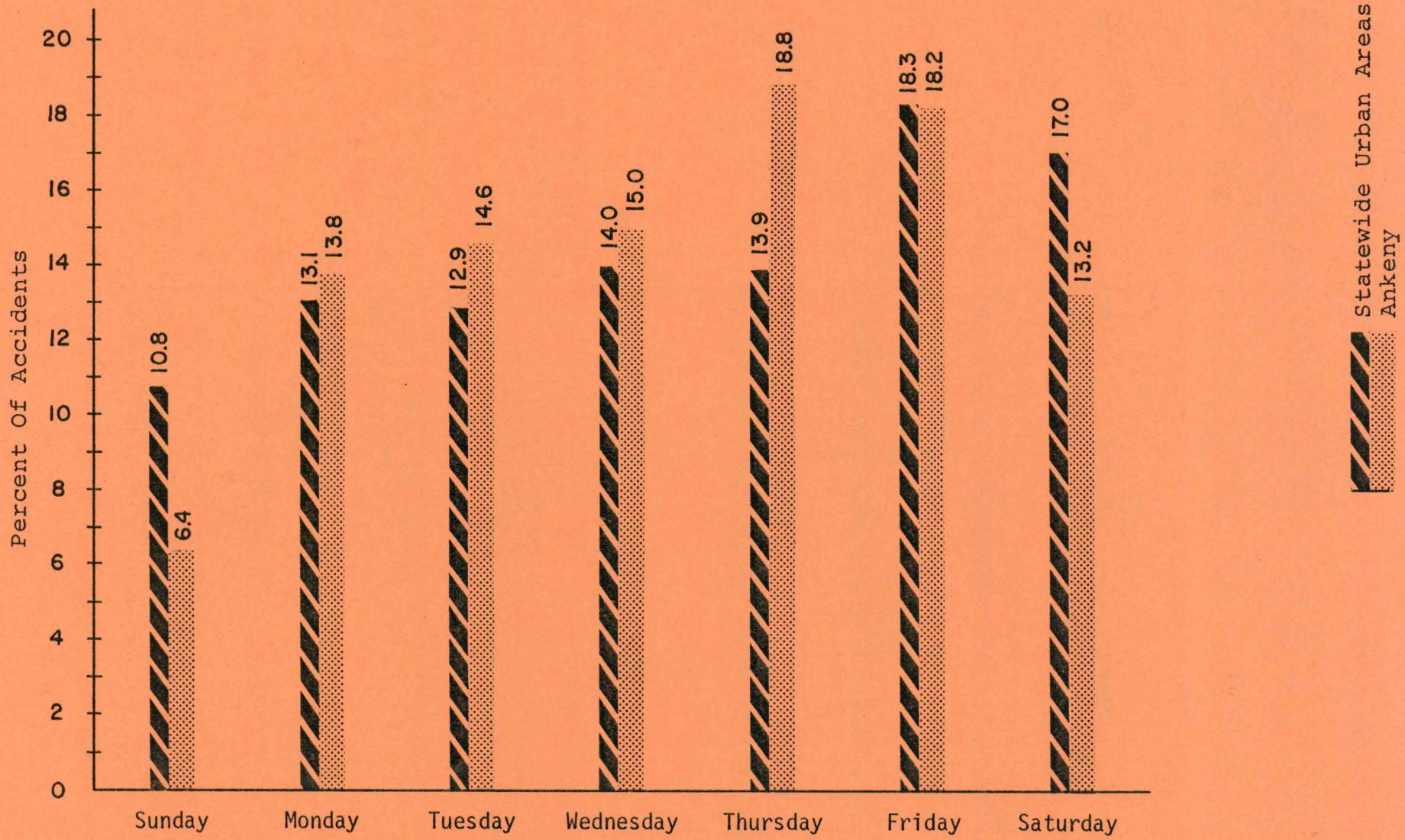


CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITYWIDE ACCIDENT STUDY
TIME OF DAY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE C-1

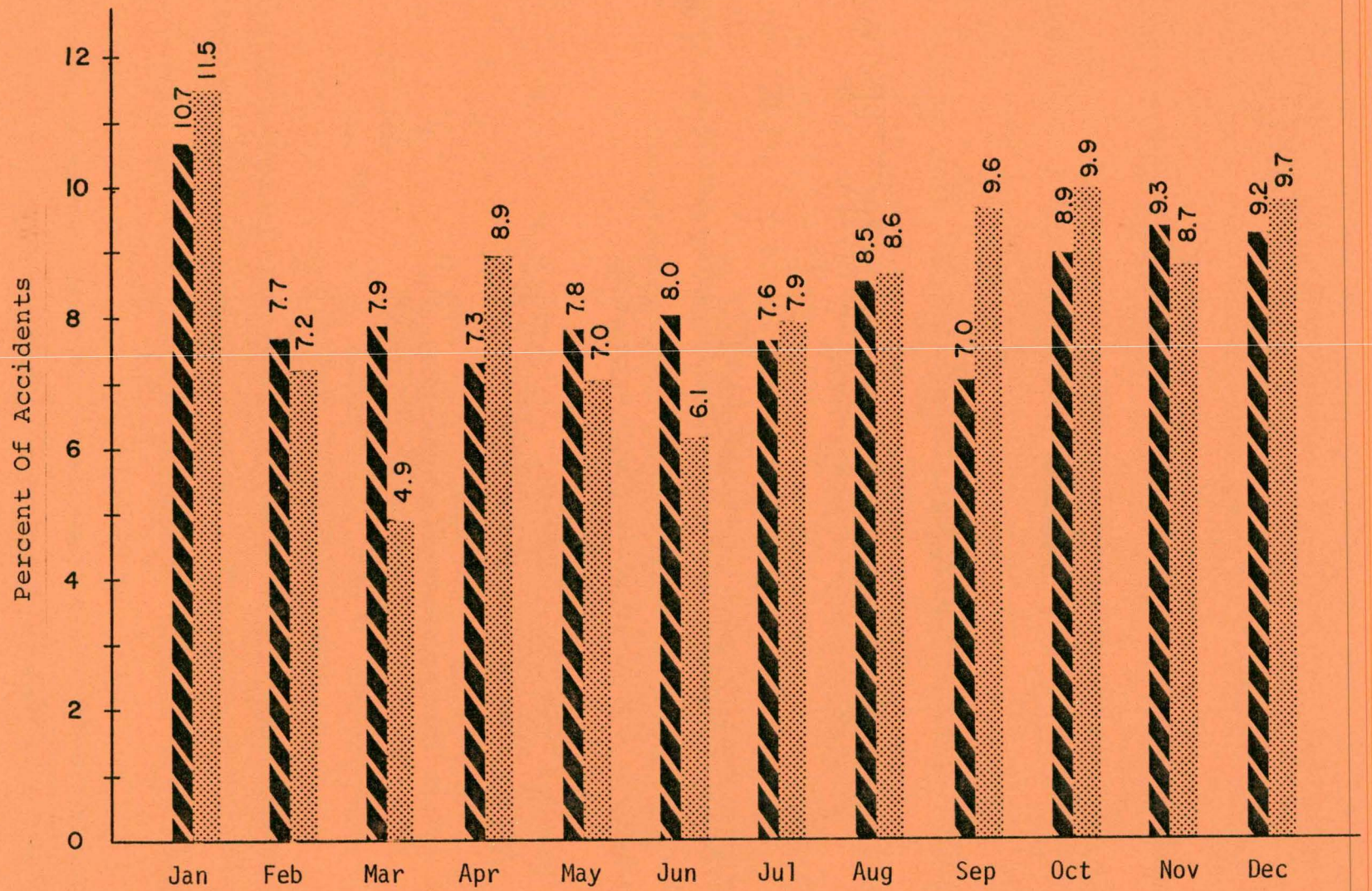


CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITYWIDE ACCIDENT STUDY
DAY OF WEEK

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE C-2

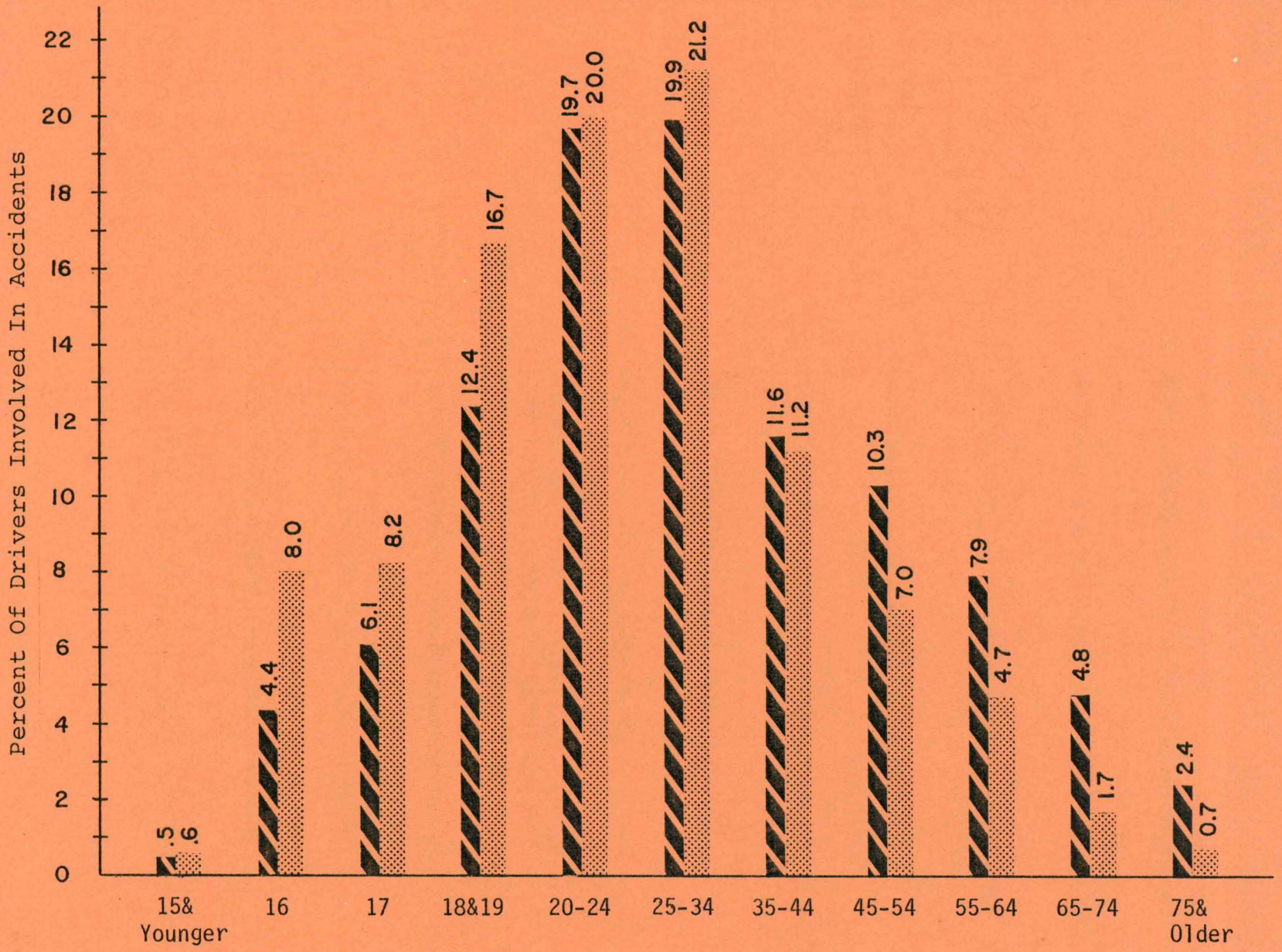


CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITYWIDE ACCIDENT STUDY
MONTH OF YEAR

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE C-3



CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITYWIDE ACCIDENT STUDY
AGE OF DRIVERS INVOLVED

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE C-4

20 years comprised about one-third of the total compared to slightly over 23% statewide in cities. The involvement of persons over 55 years, and especially over 75, is quite low. This may be attributed to the comparatively small number of older persons among Ankeny residents, according to the City's Comprehensive Development Plan Report, 1974.

Types of Accidents

Information on the types of accidents in a city may reveal something that warrants attention. Basically, there are two types of accidents--a vehicle collides with something, i.e., another vehicle, a pedestrian, a tree. The other type is a noncollision variety such as a vehicle overturning or a passenger falling from the vehicle.

A comment may be in order relative to the 11 pedestrian accidents reported during the 3-year study period. All of the pedestrians, except one, was under 15 years old. Three of the mishaps were school related. Two of them occurred near school grounds when the students darted into the street near, but not at a crosswalk, with a roll-out STOP sign in place. The other accident also took place at a remote school crossing shortly after a roll-out STOP sign had been removed. The remainder of the pedestrian accidents occurred during nonschool days or nonschool hours. Eight of the eleven pedestrians involved in accidents were under 10 years old, and in all cases, the pedestrian violated safety principles.

Table C-1 is a summary of the experience in Ankeny.

Collision of a Motor Vehicle With:	Annual Average 1974-1976
Another moving motor vehicle	184
A parked or unparking vehicle	34
Pedestrian	4
Railroad Train	1
Bicycle	6
Animal	0
Fixed object	17
Other object	4
Noncollision	10

TABLE C-1

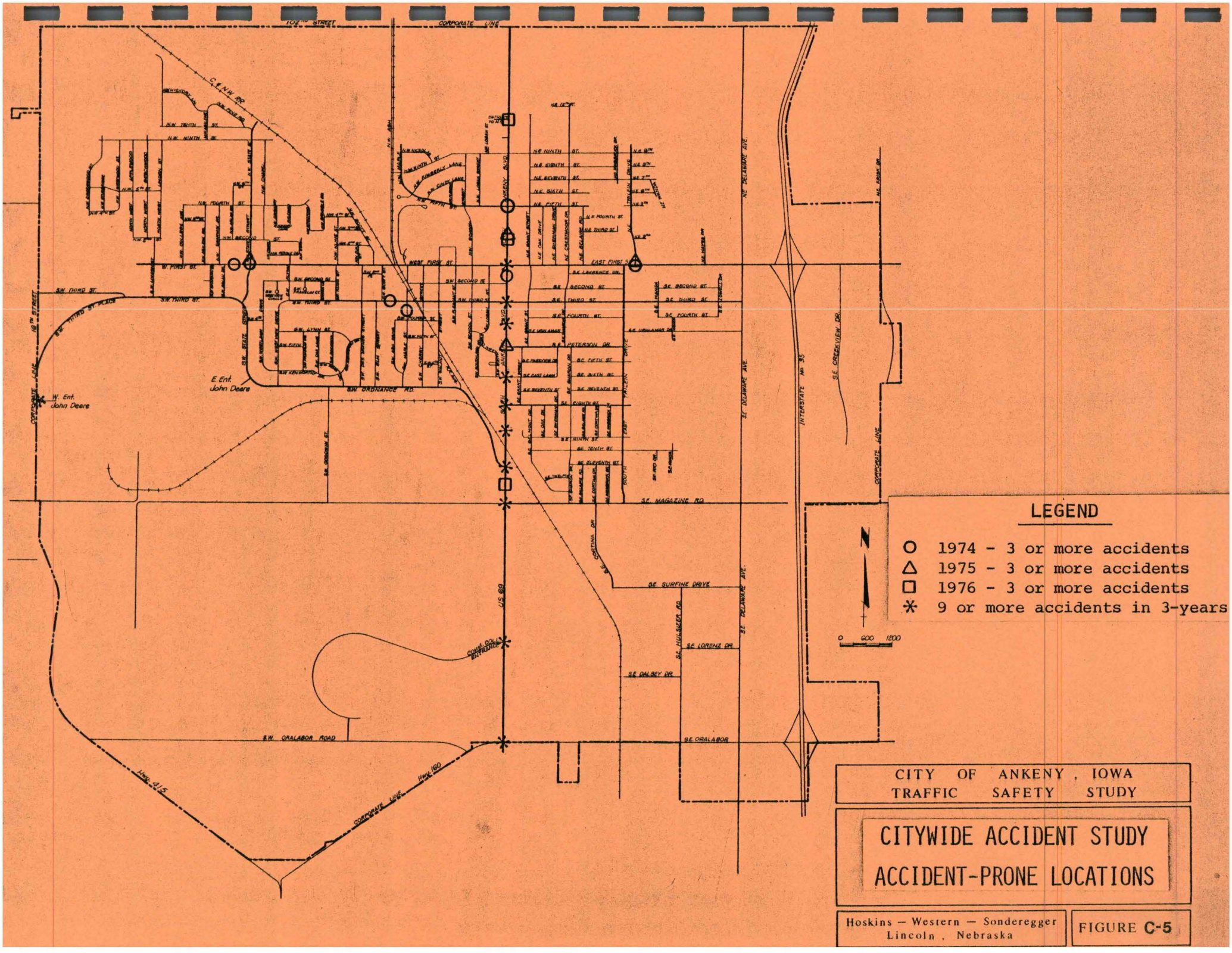
TYPES OF ACCIDENTS

Where Are Accidents Occurring In Ankeny?

One of the useful purposes or objectives of an accident study is to identify high accident locations. When such locations have been determined, further study of the accident pattern and study of traffic and physical conditions aid in developing proper corrective measures.

The identity of trouble spots can be determined by spot maps, "worst intersection" list compiled by police or engineers, and complaints. Generally, three or more accidents at one location in a year warrant an investigation in cities such as Ankeny.

During each of the three years in the study period, there were numerous locations where 3 or more accidents occurred. But not all of those locations were cited every year. Actually, 22 locations were


LEGEND
1974 - 3 or more accidents
1975 - 3 or more accidents
1976 - 3 or more accidents
9 or more accidents in 3-years
0 600 1200
CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY
CITYWIDE ACCIDENT STUDY
ACCIDENT-PRONE LOCATIONS
Hoskins — Western — Sonderegger
Lincoln, Nebraska
FIGURE C-5

pinpointed during the 3-year period but only half of them totaled nine or more accidents. The yearly "prone" locations are shown in Figure C-5. It is especially noteworthy that all but one of these locations are on one street--Ankeny Blvd.

The Intersection Element

Approximately 50% of the accidents in Ankeny during the past three years occurred at intersections. This is higher than the record of urban areas throughout the State.

It should be mentioned that of the intersections where accidents occurred, almost all had some type of control. STOP signs controlled traffic in 54% of intersection accidents and traffic signals accounted for the remaining 46%. These statistics should be supplemented by the fact that STOP signs control 194 of the 296 intersections in the City and traffic signals are in control at only 6.

The Parking Element

Approximately 45% of the nonintersection, on-street accidents in Ankeny involved the parking element, that is, a parking or unparking maneuver, or a parked vehicle. In most cities, such accidents occur predominantly in the central business district. However, the CBD in Ankeny is vastly smaller than prevails in cities of comparable population. This, of course, affects the distribution of parking type accidents, so that proportionately more of such accidents occur in residential areas.

Numerous accidents occurred in the parking lots associated with the commercial development along virtually the entire length of Ankeny Blvd.

C-3 ACCIDENT-PRONE LOCATIONS

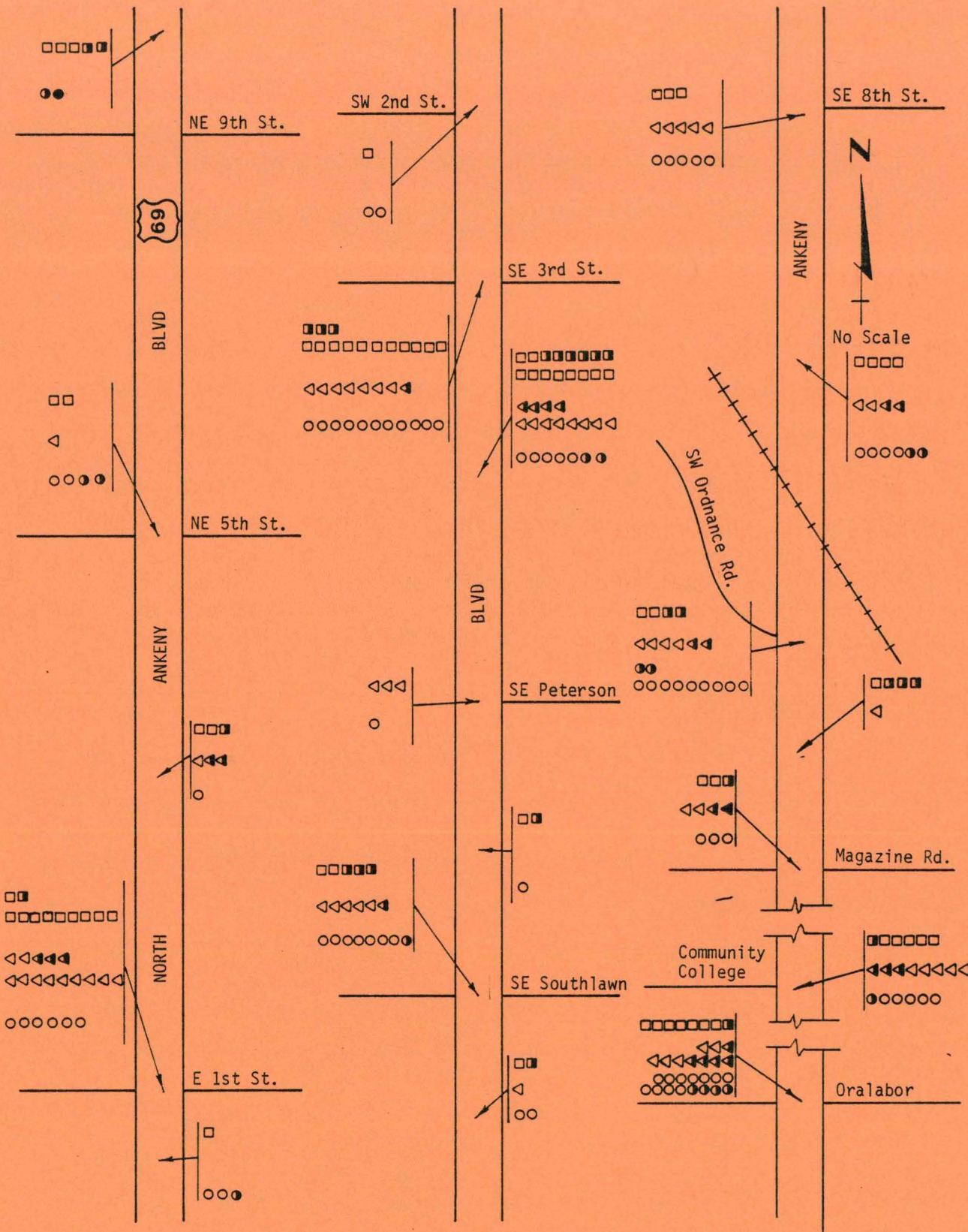
As noted previously, there are 11 locations (Figure C-5) throughout the City where there was an average of three or more accidents in each of the three years of analysis. Nine of the locations were intersections, and two were sections between certain intersections. Ten of the cited locations involve Ankeny Blvd. The remaining one is the intersection of NW 16th Street and the access road to the John Deere Plant.

Ankeny Boulevard

Over 38% of all the accidents on public streets in Ankeny during the 3-year study period occurred on Ankeny Blvd. Figure C-6 provides information on the severity and annual incidence of accidents along that heavily travelled street.

Those accidents which occurred at intersections are clearly indicated. However, the accidents between intersections have been combined for a single notation, such as those which occurred between SE Peterson Street and SE 3rd Street.

Under prevailing conditions, a high incidence of accidents along Ankeny Blvd. is inevitable. The traffic volume through most of the length of the roadway within the City, is well over 10,000 vehicles daily. The street serves several purposes or functions. Both sides



LEGEND

	Property Damage	Injury Acc.	Fatal Acc.
1974	○	◒	●
1975	△	▲	▲
1976	□	▣	■

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

ANKENY BLVD. (US-69)
ACCIDENT SPOT MAP

Hoskins – Western – Sonderegger
Lincoln, Nebraska

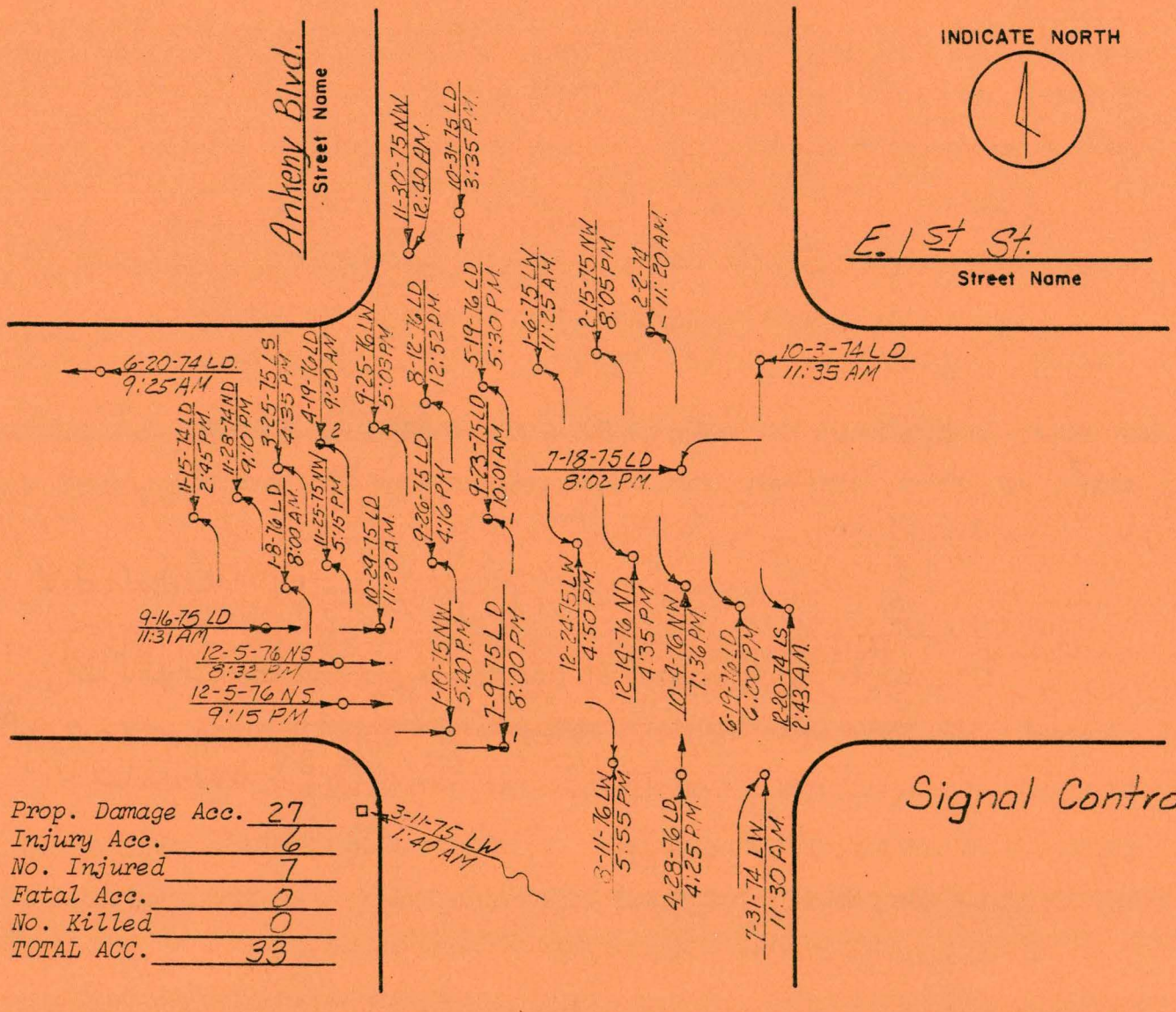
FIGURE C-6

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND 1ST ST.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc.	27
Injury Acc.	6
No. Injured	7
Fatal Acc.	0
No. Killed	0
TOTAL ACC.	33

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over
- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-7

of the road are developed commercially and, in most cases, Ankeny Blvd. is the only means of access and egress to abutting property. It is also the principal north-south route serving to distribute traffic throughout the City. And lastly, even though Interstate 35 is one mile to the east, there are approximately 4,000 vehicles daily on Ankeny that are, in effect, thru-traffic with no origins or destinations within the City.

This intermingling of various kinds of traffic with considerable ranges of speed, the turning traffic generated by the intersecting streets and the continuous ribbon of commercial development, results in a turbulence in the traffic stream that is very conducive to accidents. The prevalence of accidents at the several signalized intersections is not unusual considering certain roadway deficiencies such as the absence of left-turn lanes.

The visibility of the traffic signals at the three northernmost signalized intersections would be considerably enhanced if two vehicle signals were suspended over the roadway, rather than just one.

Intersection of Ankeny Blvd. and First Street (Figure C-7)

The 33 accidents which occurred at this intersection are more than occurred at any location in the City. However, in terms of the exposure to an accident potential based on the volume of traffic entering the intersection, the accident experience at the intersection of Ankeny Blvd. and 3rd Street, has about a 10% higher rate.

As evidenced by details shown in the collision diagram, Figure C-7, well over half of the accidents at this intersection involved collisions

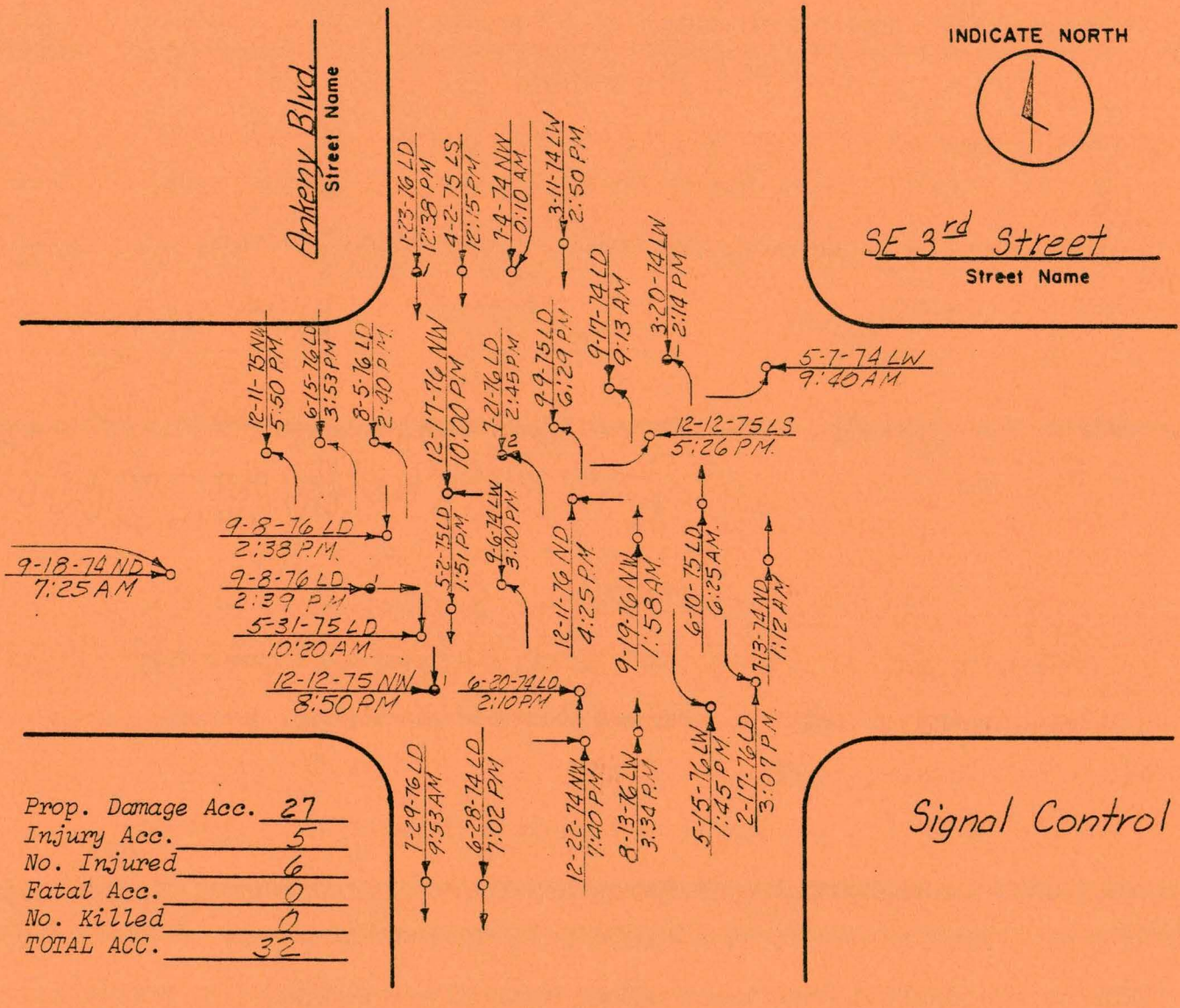
HOWARD-KIRKHAM-SCHMIDKNECHT, INC.
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND SE 3RD ST.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc. 27
Injury Acc. 5
No. Injured 6
Fatal Acc. 0
No. Killed 0
TOTAL ACC. 32

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-8

between vehicles turning left and vehicles approaching from the opposite direction. It is apparent that the problems at this intersection could be eased by providing a separate left-turn lane on Ankeny Blvd. The volume of left-turning traffic on Ankeny Blvd. frequently approaches and exceeds 100 vehicles per hour, so that there would be justification for the inclusion of a left-turn interval in the cycle of the traffic signal control at this intersection.

On roadways such as Ankeny Blvd., drivers next to the center line approaching a signalized intersection, and preparing to turn left, often have their visibility obstructed by a line of vehicles in the lane next to the center line on the opposite approach. Under those conditions, vehicles approaching in the curb lane are not easily visible and collisions frequently result.

Intersection of Ankeny Blvd. and 3rd Street (Figure C-8)

This intersection with 32 accidents was one of the two highest most accident prone locations throughout the City. Translating the number of accidents (property damage and injury accidents) which occurred in combination with the number of vehicles which entered the intersection (exposure to accident potential) reveals that rate per million vehicles is the highest of any location in the City.

There appears to be a significant degree of incompatibility between the traffic signal system and the physical characteristics of the intersection. Twelve of the accidents involved left turning vehicles colliding with oncoming traffic. There were 11 rear end collisions, many of which

involved vehicles waiting to make left turns. And, there were 7 right angle accidents which normally should not occur at signalized intersections. Five of the seven angle accidents involved vehicles approaching from the west. None of the signal indications visible on the east and west approaches are overhead, and there is only one overhead indication on the north and south approaches.

Here also, there is an obvious need for a separate left turn lane.

Intersection of Ankeny Blvd. and Eastlawn Drive (Figure C-9)

The accident pattern at this signalized intersection offers an excellent opportunity to illustrate the fact that traffic signals are not necessarily safety devices. Contrast the 19 accidents which occurred during the three year study period at this location with the 15 that occurred in the same period of time at the intersection with SE 8th Street. Almost a third of the accidents at this intersection were of the right-angle type which theoretically are not supposed to occur under signalized control. There were five accidents involving left-turning vehicles colliding with opposing through traffic and there were four rear end collisions, all of which were on the north approach.

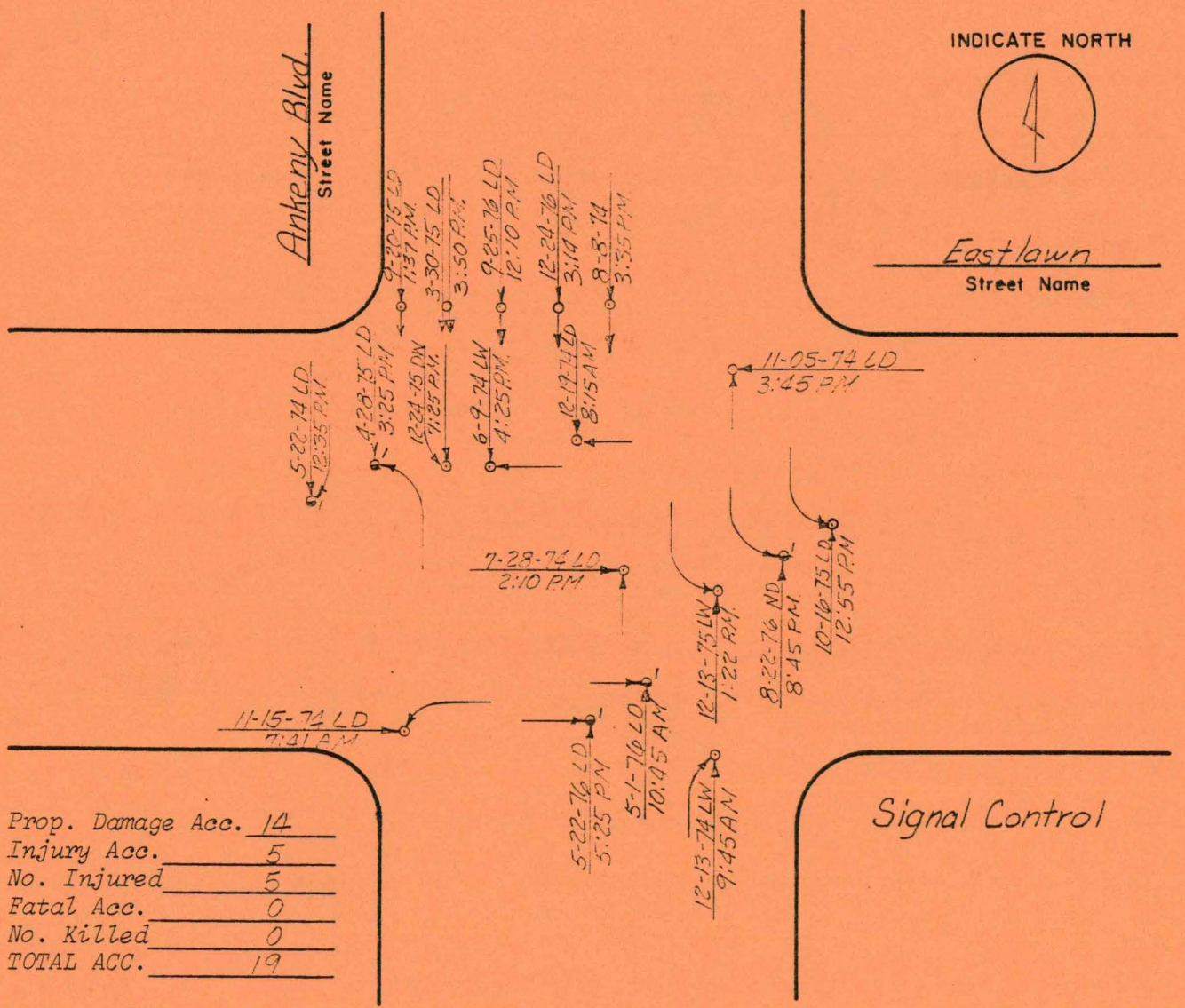
Experience at this intersection supports the need for a separate left-turn lane on Ankeny Blvd. Several of the rear end collisions involved vehicles waiting for an opportunity to turn against oncoming traffic.

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND EASTLAWN DR.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc.	14
Injury Acc.	5
No. Injured	5
Fatal Acc.	0
No. Killed	0
TOTAL ACC.	19

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-9

Intersection of Ankeny Blvd. and SE 8th Street (Figure C-10)

As shown in the collision diagram, there is an outstanding incidence of accidents between vehicles turning left from Ankeny Blvd. Five of such accidents involved vehicles from the north turning left into the path of through-traffic from the south. Much of this left turning traffic is generated by the arterial characteristics of SE 8th Street which is not likely to diminish in the future. It may actually increase as the residential development in the southeast quadrant of the City spreads.

The absence of separate left turn lanes on Ankeny Blvd. at the principal intersections north of the railroad grade crossing may very well figure in the accident experience at this intersection. While the accident reports do not relate the exact situation that may have existed in the mind of the drivers involved in those accidents at that time, it can generally be presumed that under conditions such as those on Ankeny Blvd., drivers turning left certainly sense their vulnerability to rear end collisions. Frequently in an effort to minimize this potential, drivers do not take the necessary amount of time to evaluate the nature of traffic approaching them from the opposite direction. If they were able to pause briefly in a separate left turn lane they might avail themselves of more time to evaluate approaching traffic and to reject some of the short headways they are now accepting which frequently are so short as to result in an accident.

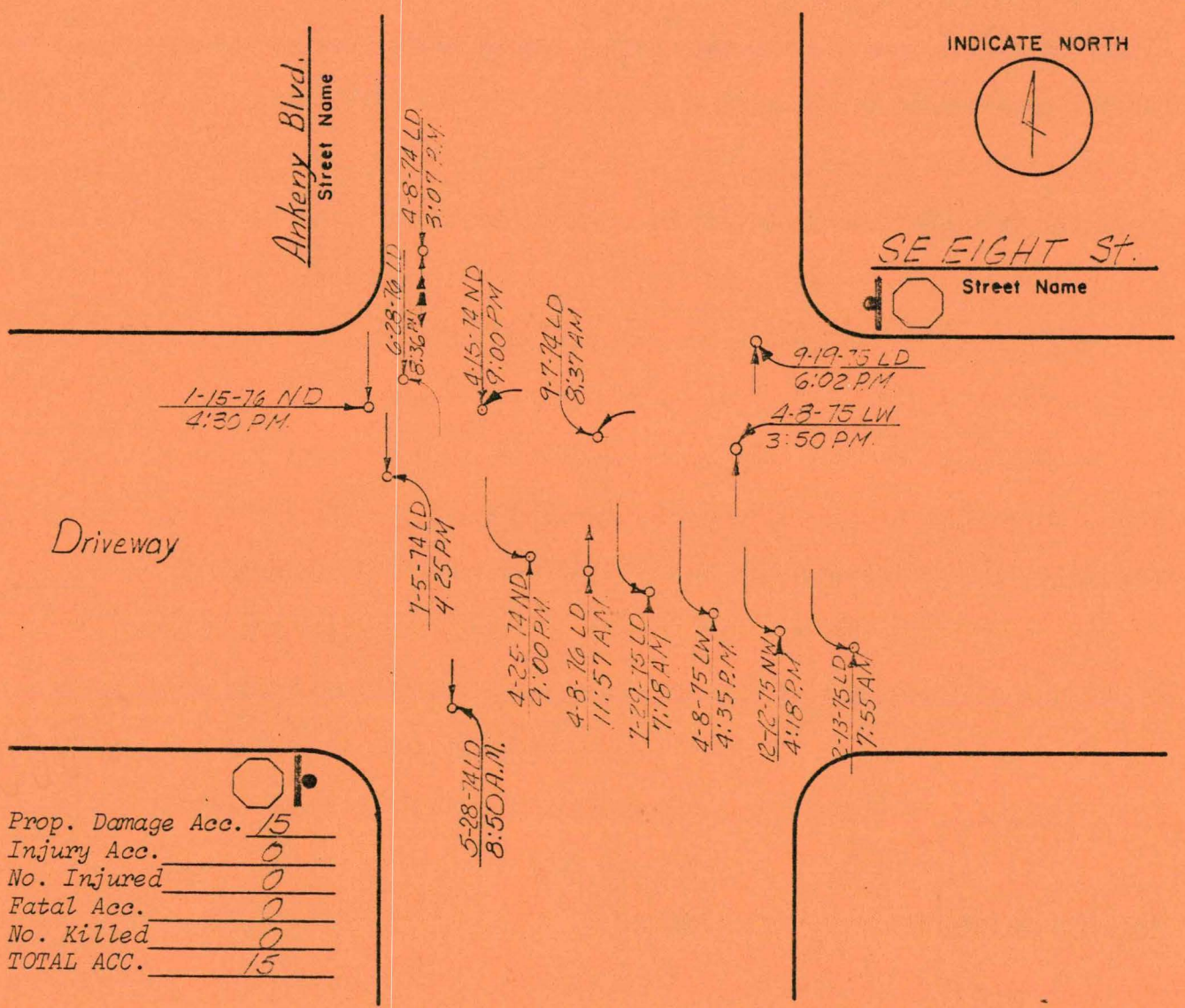
It is unusual that none of the accidents at this intersection involved any personal injuries.

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND SE 8TH ST.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc.	15
Injury Acc.	0
No. Injured	0
Fatal Acc.	0
No. Killed	0
TOTAL ACC.	15

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-10

There are no indications that the situation could be improved or alleviated with any type of traffic signal control without modifying Ankeny Blvd. to provide left turn lanes. There appears to have been some improvement during the past year because of a change in the use of the property on the west side of the intersection. The former restaurant generated considerable traffic but since it is no longer in operation and another type of business with a comparatively much lower traffic generation capability is occupying the premises.

Intersection of Ankeny Blvd. and SW Ordnance Road (Figure C-11)

At the present time, this T-intersection is controlled by a STOP sign on the west approach. The predominant flow of traffic interchanging between these two streets is between the south and west legs. About 1/3 of the traffic approaching from the south turn to the left and about 85% of the vehicles approaching from the west turn right. As shown on the collision diagram (Figure C-9), almost half of the accidents at this intersection resulted from the conflicts of the left turns from the west and through-traffic from the north. The data indicates that a traffic movement which comprises less than 4% of the total traffic volume entering the intersection during an average day, is involved in almost half of the accidents.

Actually an analysis of the accident experience at this intersection is simply an academic exercise since, within the next few months, a traffic signal system will be installed, having been authorized by IDOT

HOWARD-WESTERN-GOODENOUGH, INC.
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND SW ORDNANCE RD.

PERIOD FROM 1-1-74 TO 12-31-76

CITY

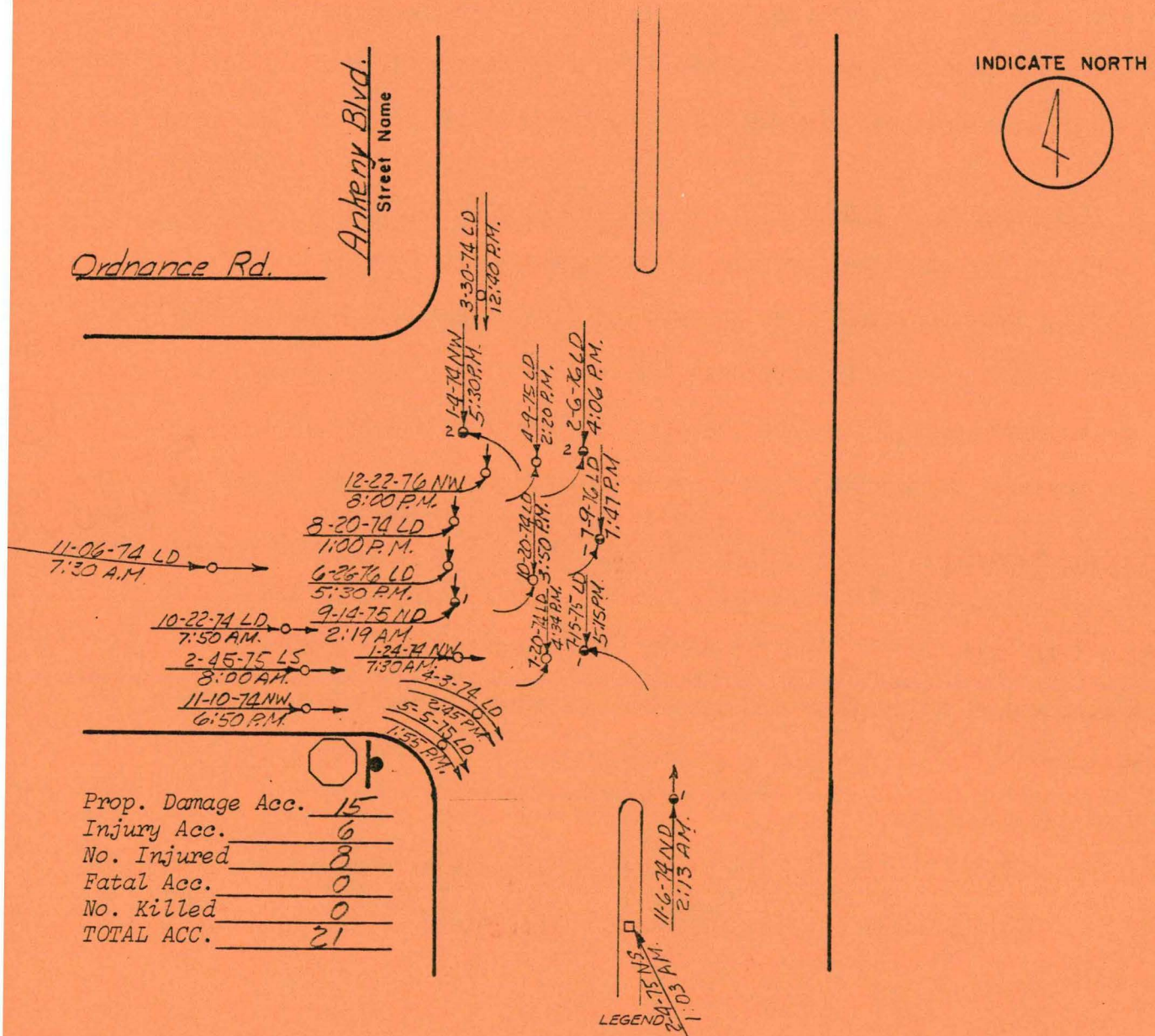


FIGURE C-11

several months ago. A recommended system of pavement marking channelization on SW Ordnance Road and a modification of the median on the north approach in connection with the signalization is discussed in greater depth in Part D.

If tradition prevails, the signalization of this intersection will not necessarily reduce the number of accidents. There should be a reduction in the angle collisions, but rearend collisions on Ankeny Blvd. are likely to increase. The offsetting factor is that rearend collisions generally result less often in personal injury than occurs in angle collisions. The location should be monitored closely for at least a year after the signal installation is completed.

Intersection of Ankeny Blvd. and Magazine Road (Figure C-12)

From the standpoint of severity, this intersection is the most critical of any location in the City. The 10 accidents which occurred during the three year study period is comparatively low in terms of total numbers, however, in those 10 accidents there were 11 persons injured, one fatally. Half of the accidents involved initial contact between vehicles from the east and from the south and all but two of the mishaps occurred during daylight hours.

This intersection is unique in that part of the time it has four approaches and at other times it has only three. The west approach involves the roadway which is frequently closed by a gate. It is conceivable that this fluctuating condition has some confusing effects on

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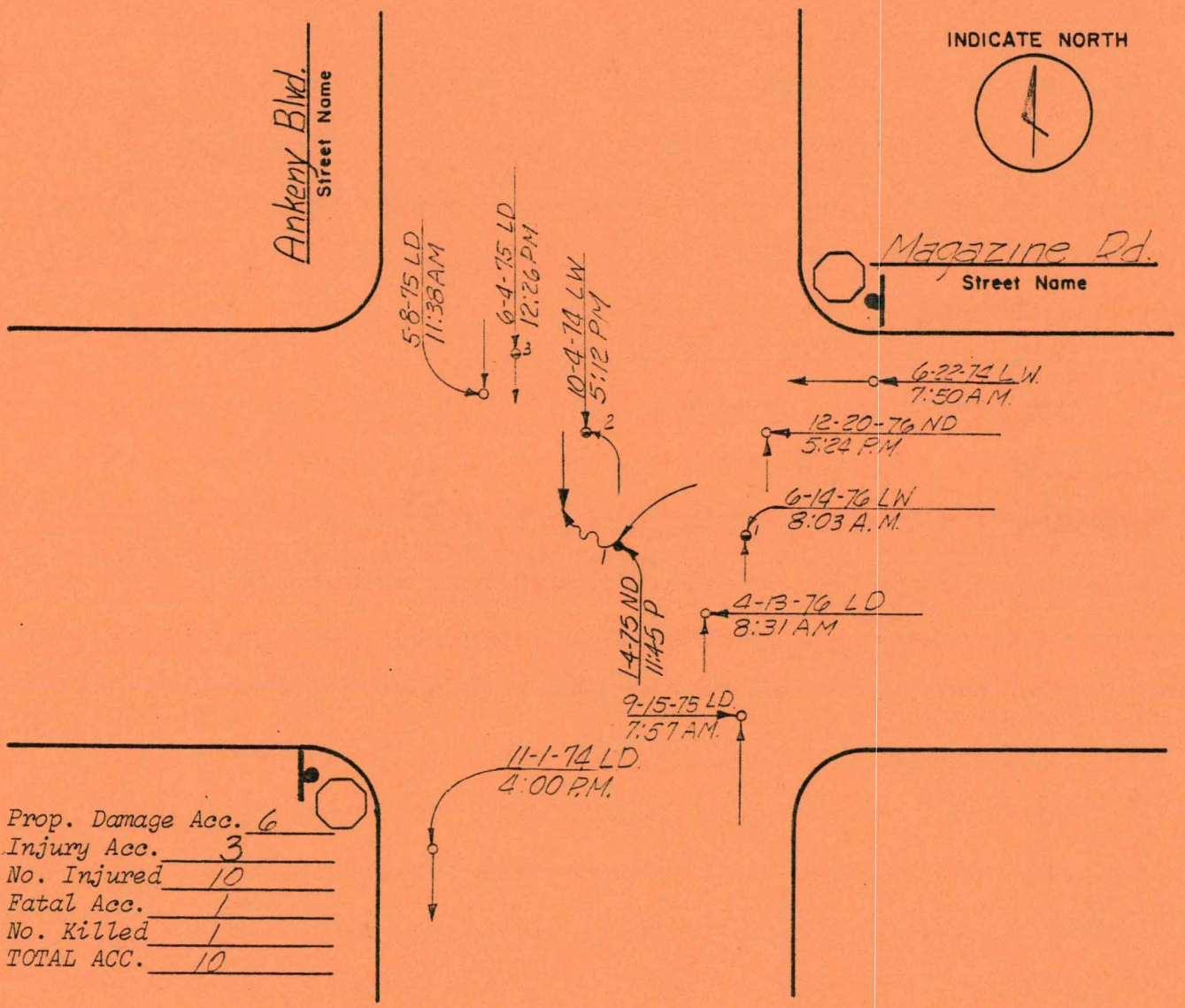
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND MAGAZINE RD.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc. 6
Injury Acc. 3
No. Injured 10
Fatal Acc. 1
No. Killed 1
TOTAL ACC. 10

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-12

drivers who may have intentions of turning to the west from Ankeny Blvd. When they find the gate closed, momentary confusion and uncertainty may generate incorrect decisions for other drivers approaching the intersection. Confusion and uncertainty are known to be prominent positive factors in many intersection accident experiences.

Because of the variation in the pattern of accidents at this intersection, there does not appear to be any remedial measures that could be applied which would significantly reduce the accident experience. While the Police Department reports on those accidents involving drivers on the east approach do not indicate any flagrant STOP sign violations, it would be reasonable to assume there was some inattentiveness or carelessness. There is no visibility problem. Drivers on the east approach to the intersection are first alerted by a STOP AHEAD warning sign. This particular sign is only a minimum 30-inch size sign rather than the standard 36-inch and its replacement with a standard size is recommended. The 30-inch STOP sign is quite visible and should be adequate. Problems apparently develop after drivers have stopped.

Intersection of Ankeny Blvd. and Entrance to Area XI Community College (Figure C-13)

The diagram of the traffic accident experience at this intersection illustrates the inconsistencies that can occur in accidents at signalized intersections. Over half of the twenty accidents which occurred at this intersection during the three year study period were of the rear end collision type. The experience is vastly different than at the intersection

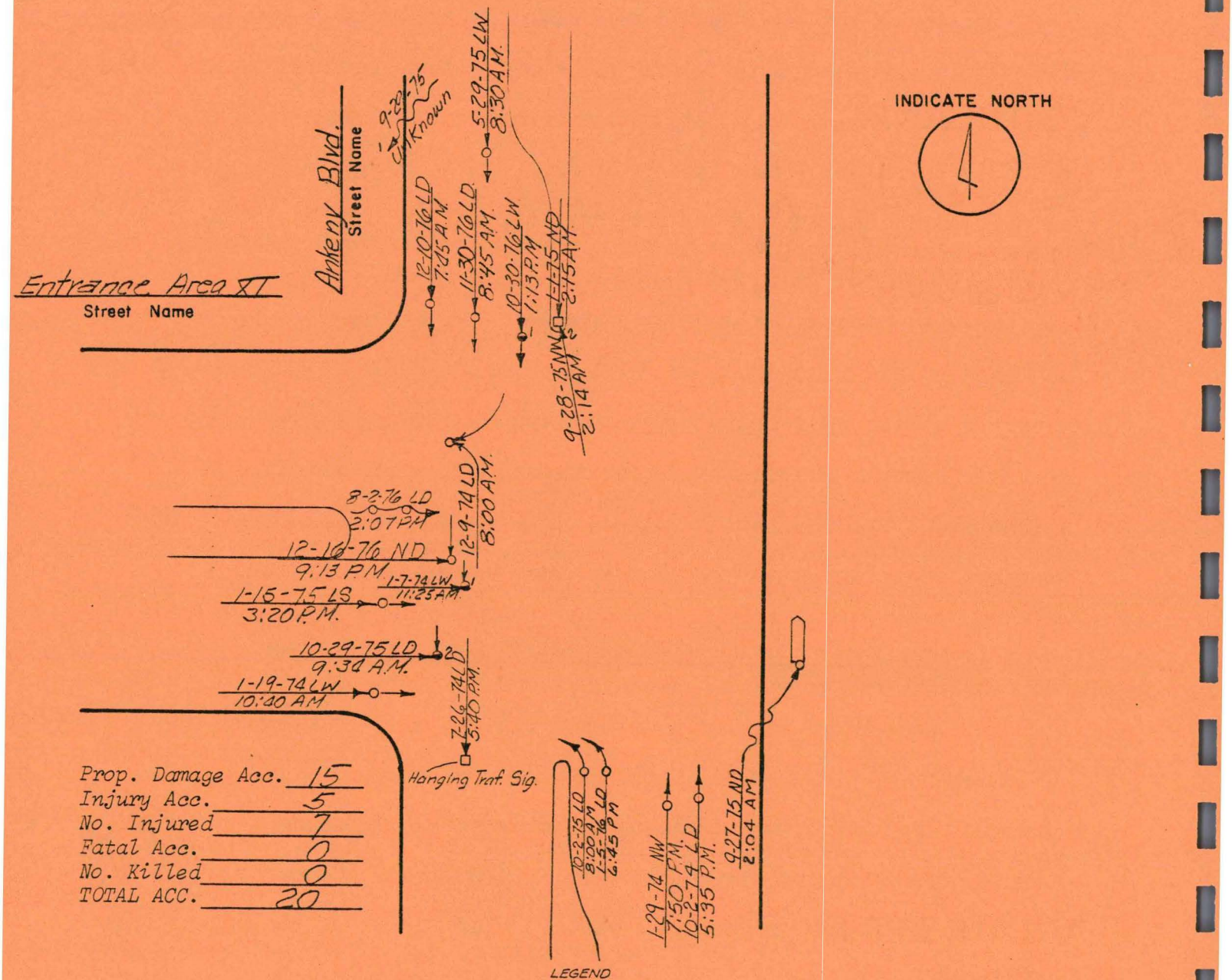
HOWARD-KIRKHAM-KIRKENDALL, INC.
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND EAST ENT. COMM. COLLEGE

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc.	15
Injury Acc.	5
No. Injured	7
Fatal Acc.	0
No. Killed	0
TOTAL ACC.	20

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-13

of Oralabor Road even though the traffic signal systems at each intersection are virtually identical in appearance and visibility. There are no apparent reasons for the high incidence of rear-end collisions at this intersection. One could speculate that the combination of the multiphased signal system and the comparatively high percentage of turning traffic may be a significant factor. The traffic accident reports do not provide any information that might account for these facts. If this pattern persists another year or two, a more concerted and in-depth analysis of the situation should be made with an effort to obtain information from the persons involved in the accidents.

Intersection of Ankeny Blvd. and Oralabor Road (Figure C-14)

The traffic accident experience of this intersection as pictured in Figure C-14 illustrates the effects of two different types of intersection control. Prior to March 1976, the intersection was controlled with STOP signs on the east and west approaches. Since that time, a vehicle actuated, three-phase signal control system has been in operation. While the accident pattern appears to have changed from predominantly right angle collisions under STOP sign control, the number of accidents appear to be continuing at the rate of about 12 per year. The incidence of rear end collisions, subsequent to signalization, is gratifyingly insignificant which indicates that the traffic signals have adequate visibility.

No particular changes are recommended for this intersection. The number of accidents is not alarmingly high considering that approximately 17,000 vehicles enter this intersection during an average 24-hour period.

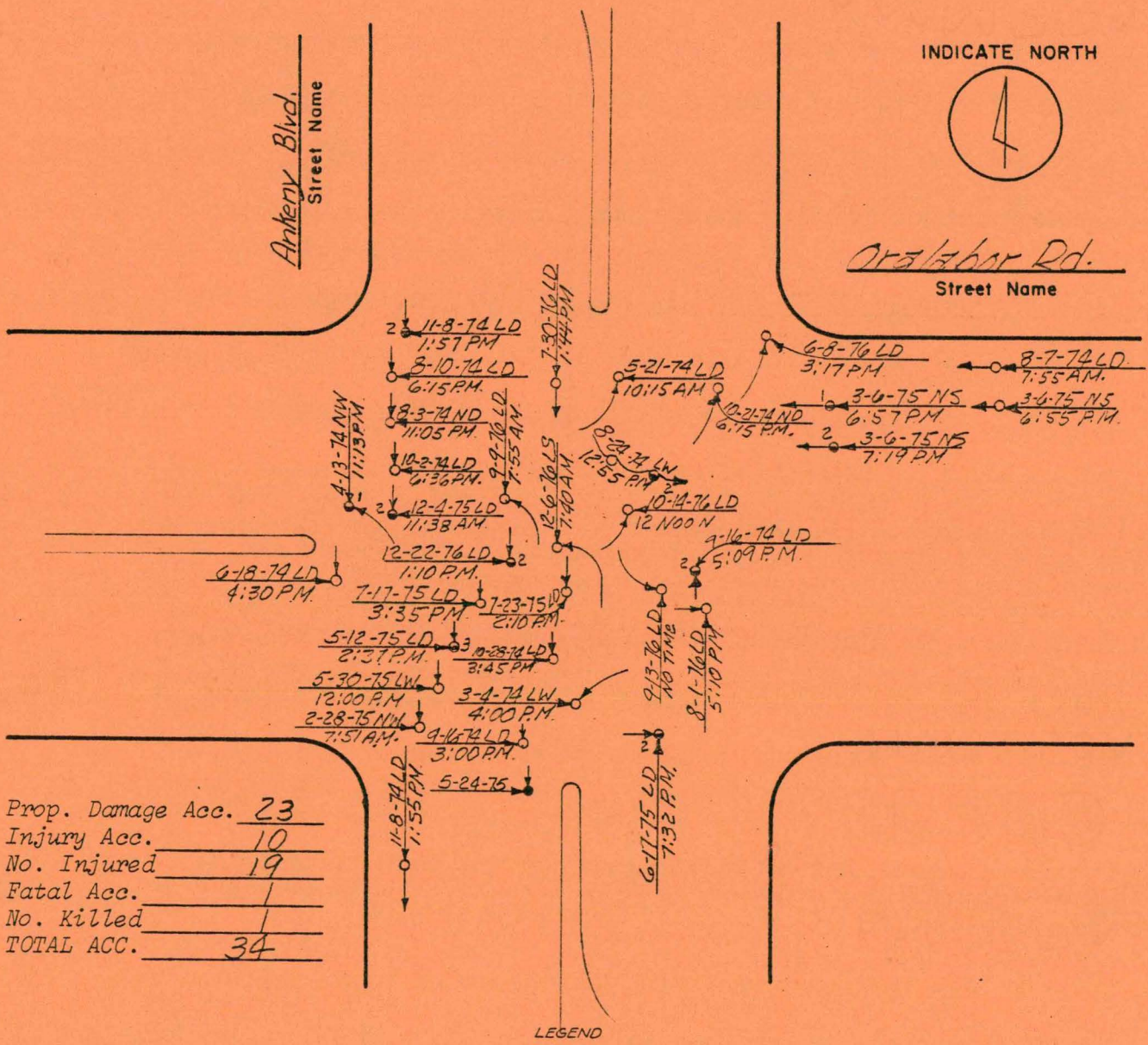
HOWARD-NEITHERCUT-ASSOCIATES, INC.
ENGINEERS ARCHITECTS PLANNERS
LINCOLN, NEBRASKA

COLLISION DIAGRAM

INTERSECTION ANKENY BLVD. (US-69) AND ORALABOR RD.

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc. 23
Injury Acc. 10
No. Injured 19
Fatal Acc. 1
No. Killed 1
TOTAL ACC. 34

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-14

Ankeny Blvd. and Mid-Block Locations

As indicated in Figure C-6, the sections of Ankeny Blvd. between the railroad and SE 8th Street and between 3rd Street and 1st Street accumulated a considerable number of accidents. Practically all of these accidents were of only two types: rear end collisions, and left-turning and thru-traffic collisions. Most of the rear end collisions involved persons waiting in the lane next to the center line to turn into a commercial establishment along the roadside. The left turning accidents in many cases, resulted when drivers sensed their vulnerability to rear-end collisions and made a left-turn in front of oncoming traffic that was too close or coming faster than anticipated. Such accident patterns are also the inevitable results of the intermingling of traffic generated by ribbon commercial development along a four-lane roadway and the faster moving thru-traffic. The solution to the situation points to the need for a separate lane for such turning traffic, in other words, a two-way left-turn lane.

Intersection of NW 16th Street and West Entrance to John Deere Plant (Figure C-15)

The only other location within the City where there were nine accidents during the 3-year study period, other than those several locations along Ankeny Blvd. as previously discussed, is this particular location. And, it barely qualifies as an accident pone location.

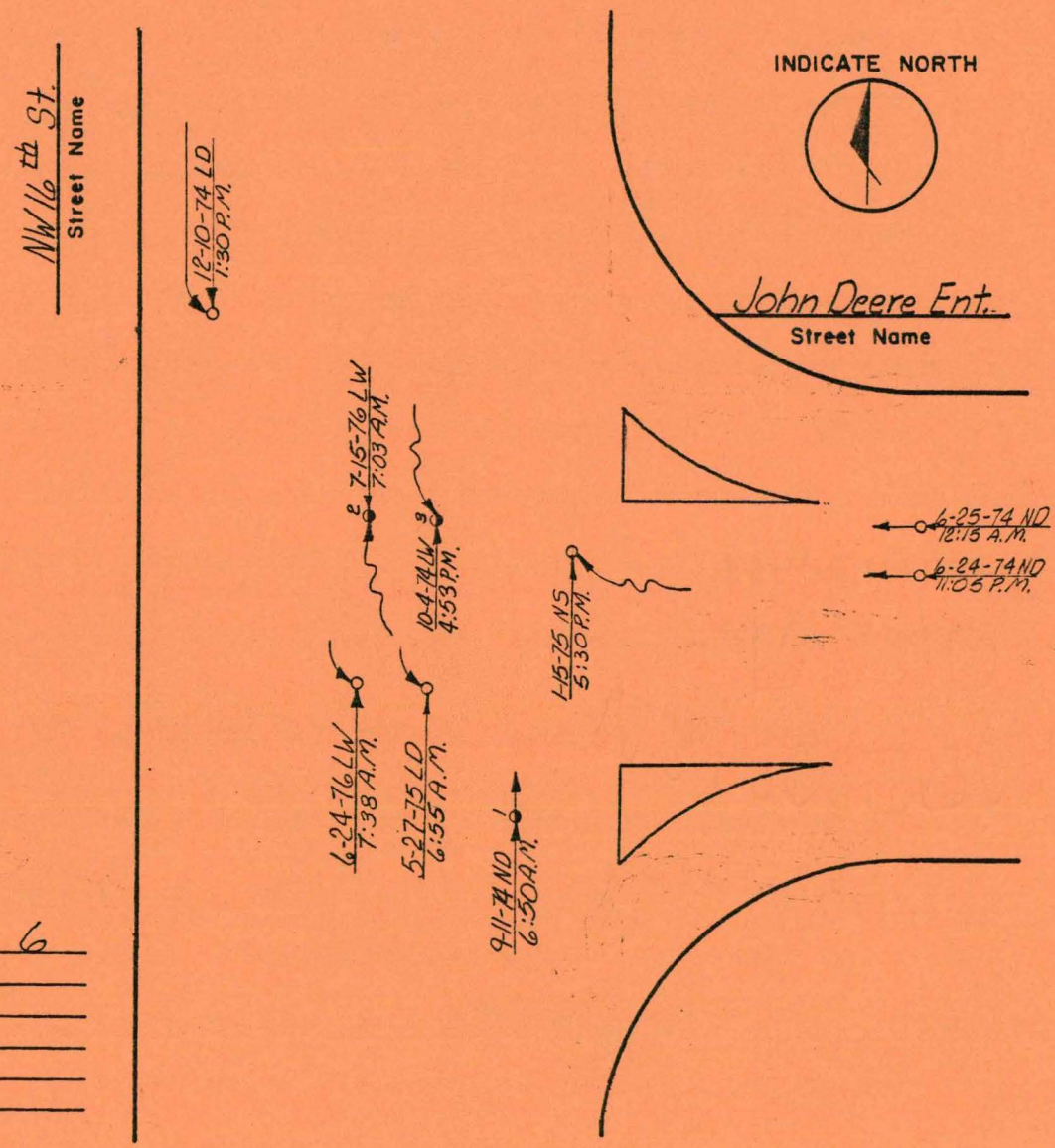
Four of the accidents involved a wet or icy roadway surface. The three rear-end collisions are typical of those that can occur at a

COLLISION DIAGRAM

INTERSECTION NW 16TH ST. AND WEST ENTR.-JOHN DEERE PLANT

PERIOD FROM 1-1-74 TO 12-31-76

CITY



Prop. Damage Acc. 6
Injury Acc. 3
No. Injured 6
Fatal Acc. 0
No. Killed 0
TOTAL ACC. 9

LEGEND

- Motor Vehicle Moving Ahead
- Motor Vehicle Backing Up
- Pedestrian
- Train
- Parked Vehicle
- Fixed Object
- Fatal Accident (Number Indicates Deaths)
- Nonfatal Accident (Number Indicates Injuries)
- Property Damage Accident
- Head-on
- Head-on Sideswipe
- Rear End
- Overtaking Sideswipe
- Broadside
- Approach Turn
- Overtaking Turn
- Out of Control
- Vehicle Turned Over

- L Daylight Hours
- N Dark Hours (Includes Dawn & Dusk)
- D Dry Road Surface
- W Wet Road Surface
- S Icy or Snowy Road Surface
- F Driver Residence Beyond 25 Miles
- R Driver Residence Less Than 25 Miles

FIGURE C-15

signalized intersection. The two mishaps involving left turns from the north indicate there is no serious problem with that particular conflict.

At the present time, traffic through the area is somewhat disorderly because of the total absence of any pavement marking. The 42-width of pavement without any center line or lane marking, induces considerable feelings of insecurity and uncertainty.

Certain proposed modifications of the roadways at this intersection are discussed in Part D. The changes should improve the efficiency of traffic movement in the area which, in turn, will reduce the accident potential.

C-4 ACCIDENT RECORDS

Traffic accident records are an especially useful resource for engineering purposes in determining accident remedial measures, then, in evaluating the effectiveness of action taken. They are also worthwhile in public relation and contact activities.

To encourage and facilitate the use of traffic accident records for engineering and accident prevention purposes, before and after studies and other fact-finding purposes, it is recommended that the Police Department incorporate a system of filing accident reports by location. This may require cross files such as driver record cards arranged alphabetically by drivers names. Presently a search of the records on the accidents at one or more specific location is very arduous and time taking with a strong element of uncertainty that all of the reports on all of the accidents for those locations may have been found.

A feasible method of filing traffic accident reports by location is presented in Exhibit C-1 in the Appendix.

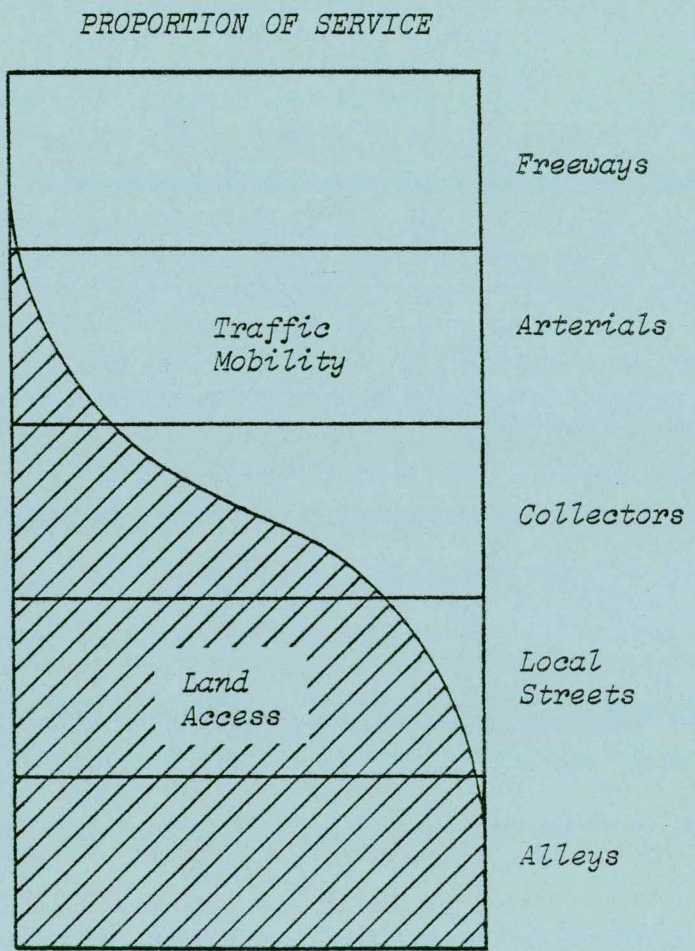
PART D

CITYWIDE TRAFFIC OPERATION

D-1 GENERAL

The supporting framework for the network of a City's street system is comprised of the arterial and collector streets. Generally, in a city such as Ankeny, approximately 50% of the vehicle miles of travel within the City take place on the arterial streets.

Service to abutting property and service to traffic mobility are the basic considerations in classifying a street. This is conceptually illustrated in the sketch below.



The various street classifications call for differing design standards and operating features. Serious problems develop when a roadway is required to provide an inordinate amount of service to both traffic mobility and land access unless the facility is properly designed to accommodate the highly diverse needs of these two basic functions of a roadway.

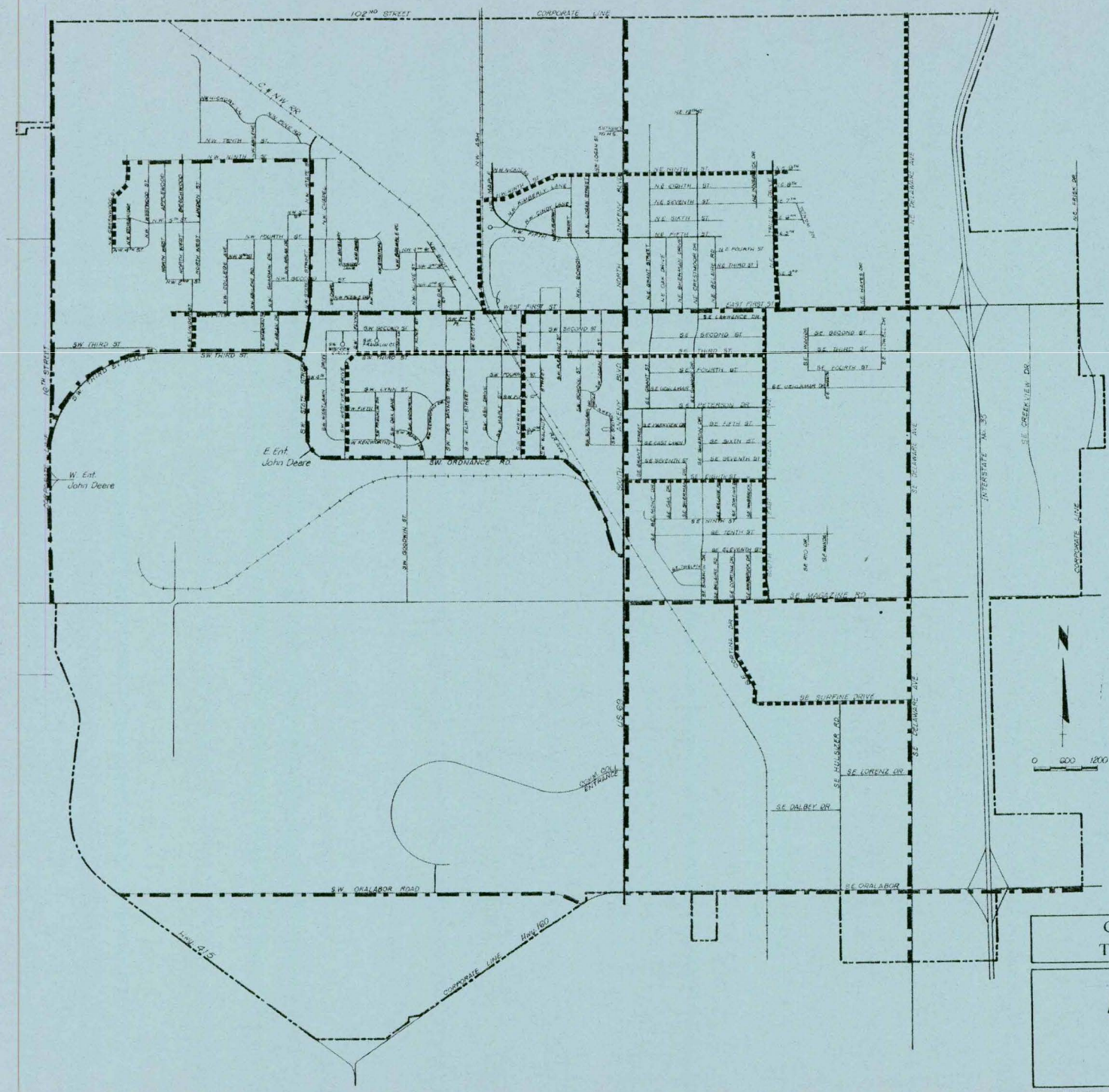
D-2 PRINCIPAL STREETS IN ANKENY

Figure D-1 illustrates the system of arterial and collector streets within Ankeny.

It becomes readily apparent after even a brief perusal of Figure D-1, why Ankeny Blvd. and 1st Street have the high traffic volumes they experience every day. Ankeny Blvd., in addition to being the route of an important part of the state highway system, is the only north-south street with adequate continuity near the central part of the City.

Delaware Avenue and NW 16th Street are too far from the developed portions of the City to provide a significant relief for Ankeny Blvd. There are long range plans to extend SW State Street to Oralabor Road, but such a project is not yet in an implementation time schedule. This would offer an access route to the western half of the City. However, the quality of travel on Oralabor Road will have to be improved.

The reasons for the present traffic load on 1st Street are readily apparent. It is the only east-west route across the City with arterial continuity. It is virtually the only means of access and egress for the northwest quadrant of the City. And, of course, it is a direct route to an interchange on I-35.



CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

ARTERIAL & COLLECTOR STREET SYSTEM

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-1

3rd Street has arterial characteristics west of Ankeny Blvd. But traffic flow between Ankeny Blvd. and Delaware Avenue is impeded by several highly questionable 4-way STOP controlled intersections.

Travel on SW Ordnance Road will probably increase after the pending signalization of the intersection with Ankeny Blvd. This may aggravate the turbulence in traffic flow in the vicinity of the east access to the John Deere Plant.

The remainder of the major street system are those collector streets such as SE 8th Street, SE Trilein Drive, etc., which are not operating with any significant distress. However, an in-depth discussion of those several cited arterials should be enlightening.

Ankeny Blvd.

It is readily obvious that Ankeny Blvd. is the most heavily traveled street within the City. The volume varies from approximately 17,000 vehicles during an average 24-hour period near the south edge of the City to approximately 6,000 during the same period near the northern edge. Traffic volume and distribution diagrams at various locations are included in the Appendix.

From 1st Street south, the roadway is at least four lanes wide. At three of the principle intersections, median channelization provides separate left-turn lanes. Between 1st Street and the railroad crossing, the width is 48 feet, which provides four lanes, but no left-turn lanes even at the three signalized intersections. About 350 feet north of 1st Street the roadway tapers to a 24-foot width.

As mentioned previously, Ankeny Blvd. is a prime example of a roadway that is having to provide a high degree of both traffic service and land service functions. The consequences of attempts to use a roadway as Ankeny Blvd. is being used, are manifested in the accident experience on this important facility. Almost 40% of all of the accidents within the City occurred on Ankeny Blvd. during a three-year study period. This experience points directly to the incompatibility of the physical features of the roadway and the type of traffic operation on it. The continuous commercial development along the route, the frequent intersections, the principle access to the community high school facilities, and service as an important link in the connections to two interchanges on I-35, all combine to generate accident causing elements.

Traffic service of all types could be improved considerably on this roadway if it could be modified to provide a separate lane in the center of the roadway from which vehicles could make left turns. Such a facility is badly needed at street intersections, but also to accommodate nonintersection turns. A turn lane could be provided by adding seven feet of width to the west side of the roadway which would allow for five 11-foot lanes across the roadway or it could be widened six feet on each side of the roadway which would allow for five 12-foot lanes. Even though the narrower lanes have slightly less capacity than 12-foot lanes, in the interest of economy they would be reasonably adequate, without sacrificing safety or operating efficiency to an unreasonable extent.

North of 1st Street, Ankeny Blvd. should be widened to a 37-foot width to provide a center lane for the segregation and storage of left turning vehicles at, as well as between, intersections to the north entrance to the High School area. Here, as on W 1st Street, when an increase in traffic justifies additional capacity, another lane could be added on each side. But there is presently a definite need for a left turn facility to alleviate the accident potential. As noted in Part C, there is an increasing incidence of accidents in that area which will undoubtedly accelerate with additional development in that part of the City, the new High School and new commercial uses.

As discussed in Part G, it is recommended that the present use of the roll-out STOP sign for the school crossing at the intersection with 5th Street be replaced with a pedestrian signal system.

An important point to keep in mind when considering the recommendation for widening this important arterial is the face that, at the present time, Ankeny Blvd. between 1st Street and the railroad crossing, is functionally operating as only a three-lane facility, even though four lanes are marked on the roadway. The center two lanes are comparably ineffective in accommodating thru traffic because all of the left turns from both directions are made from those two lanes. Thru-traffic frequently veers from these two lanes to the curb lane so as not to be impeded by a vehicle temporarily delayed in the inside lane in preparation for a left turn.

The proposed widening would allow the roadway to function as a full five-lane roadway by segregating and storing all left turns in the center lane, including both those at intersections and between intersections. Traffic distribution would be enhanced considerably with the availability of clearly separate lanes for left turns, right turns, and through traffic.

With the completion of the pending installation of a traffic signal system at the intersection with SW Ordnance Road and the possible signalization of the 9th Street intersection, there will be a series of seven signalized intersections along Ankeny Blvd. To enhance the attainment of continuous movement, which is a highly desirable feature of efficiently operating arterial roadways, it is important that the traffic signal systems along the route operate in a manner which is conducive to progressive traffic movement.

With regard to Ankeny Blvd., it would be highly desirable to interconnect and systematize the signalized intersections and provide control mechanisms which would allow the signal operation to fluctuate and respond to the traffic pattern in assigning green time to Ankeny Blvd. in a way which would allow continuous movement to every extent possible. The goal in such effort should be to allow as much traffic as possible to move along Ankeny Blvd., even the full length within the City without stopping because of a traffic signal. It should be noted, however, that such continuous movement is feasible and practical only if the left turning segment of the traffic stream can be segregated and stored when necessary,

irrespective of whether the turning movements are at intersections or at mid block locations. Systematizing the signals along Ankeny Blvd. would cost approximately $75,000.

It may be worthwhile to explain that thru-traffic is not unnecessarily meant to be just those vehicles that enter the City and travel the full length of Ankeny Blvd. and leave without stopping. Thru-traffic, in this case, is meant to be those vehicles which pass through one signalized intersection to the next one or beyond. With regard to the traffic signals presently in place at three intersections north of the railroad tracks, it is recommended that the signal displays be modified so as to show two vehicle indications supported by mast arms over both Ankeny Blvd. and the 2nd Street approaches. It is further recommended that these signals all be the twelve-inch size and that they be suspended in a horizontal position at least 17 feet above the roadway surface to obtain maximum visibility in the presence of large trucks in the traffic stream.

It was discovered in the course of the traffic signal inventory that the system at the intersection with the east entrance to the Community College area, displayed to traffic approaching from the north, a straight green arrow in both of the overhead indications. Arrow indications are meant to communicate to the motorist that he has a conflict-free right-of-way through the intersection. The principle fault with the arrow indications, in this case, is that theoretically, right turns from the north into the College area could not be legally

made except as a right-turn-on-red while the signal displayed red to drivers from the north. This was brought immediately to the City's attention and appropriate changes were made in the green lenses.

With further regard to traffic operation at this intersection, it is recommended that the north approach to the intersection be widened on the west side so as to provide a right turn lane from the north into the College area. This would considerably improve the efficiency of traffic operation through this intersection.

First Street

The comparatively low level of traffic service on 1st Street at the present time is largely attributable to several important factors. First, it is only 25 feet wide throughout its length, with a cross section that characterizes rural roadways rather than important high volume city streets. At the present time, the traffic volume on 1st Street varies from 7,500 to 8,000 during an average 24-hour period. This is considerably more than such a road can accommodate with a reasonable degree of efficiency.

There are several locations along the route where traffic flow is impeded considerably by roll-out STOP signs at several school crossings.

Next, the intersection with Ankeny Blvd. which is under signal control has only one lane of approach from the east and the west on 1st Street. This means that right turns, left turns and straight movements have to be distributed from this one single lane of approach. To do so under

signalized control becomes very difficult when the lead vehicle in the platoon of traffic waiting to enter the intersection intends to turn left.

A project is in the formative stages to widen 1st Street from I-35 to the west corporate limit. At this time, it is uncertain as to how the project will be staged and what the final cross-section design is to be. The classic 4-lane, divided arterial has been considered, in which the two directions of travel are separated by a 16-foot median. Left-turn lanes are cut into the median at intersections. Such a roadway is generally 64 feet wide and allows left turns only at intersections. The desirable right-of-way width is at least 100 feet.

The inability to be able to turn left into abutting property between intersections would pose serious roadside accessibility problems throughout the length of 1st Street because of the lack of continuity of streets within one block on either side of 1st Street.

It is accordingly recommended that 1st Street be developed into a 60-foot wide, 5-lane roadway with the center lane adapted to segregate and store left turns, both at intersections and between intersections. It is vitally important in developing the 1st Street improvement plan, that it not settle on a simple, 4-lane roadway. This would only repeat the unsavory experience of Ankeny Blvd.

If funding for the total roadway improvement would cause a lengthy deferment of completion, some of the section west of Ankeny Blvd. could conceivably be widened to a 36-foot, 3-lane width, on an interim basis,

until sufficient funds accumulate to add the remaining two lanes. Such a 3-lane facility would have a reasonable level of service for about 12,000 to 14,000 vehicles daily. This is predicated, of course, on the elimination of the gross impediments presently caused by the roll-out STOP signs by the Northwest Elementary School and at School Street. It is recommended that, as part of the total 1st Street improvement project, pedestrian overpass structures be constructed in front of the Northwest Elementary School and on the west approach at the School Street intersection.

Traffic flow on E 1st Street is very adversely affected by the current protection measures at the school crossing at the intersection with SE Trilein Drive. The roll-out STOP sign placed on E 1st Street by an adult guard during the usual morning, noon, and afternoon periods, forces the stoppage of several hundred vehicles every school day. The system should be replaced with a pedestrian signal system. The plans for the reconstruction of E 1st Street should provide for a signalized crosswalk rather than an overpass structure. There is an elementary school planned for the northeast quadrant of the City in the future which will eliminate the need for a protected crossing.

Ultimately the prevailing problems on 1st Street can be solved by the reconstruction project. But something can, and should, be done to ease some of the more serious problems until the street is rebuilt.

The traffic situation on W 1st Street generated by the Northwest Elementary School is covered in depth in Part G. Briefly, it is being

recommended that a new road be constructed along the west line of the school property to connect with NW 3rd Street. Such a road would allow access to the area to the north and the west of the school without having to return to W 1st Street. It would also allow provisions to be made for the school busses to load and unload somewhere other than on W 1st Street as they are presently doing. The need for this new road will not be eliminated by the ultimate improvement of 1st Street. A pedestrian signal system is being recommended to replace the present usage of a roll-out STOP sign as is further discussed in Part G until a pedestrian overpass is available.

Traffic flow on W 1st Street in the vicinity of the intersection with School Street is extremely inefficient on school days. The roll-out STOP sign is in place several hours of the day. Much of the time there are no schoolchildren in the area and vehicles are stopped unnecessarily. As discussed in greater depth in Part G, a pedestrian signal system is recommended for installation on an interim basis approximately 50 feet east of the intersection. This should help relieve some of the unnecessary and excessively long delays frequently encountered by traffic on W 1st Street. While both of these pedestrian signals would be temporary, even just a single year usage would more than amortize the installation costs in terms of benefits to motorists, and, more importantly, they would provide a more secure protection for young pedestrians.

When the 1st Street improvement plans are developed, the intersection with Ankeny Blvd. will certainly be given much attention for the

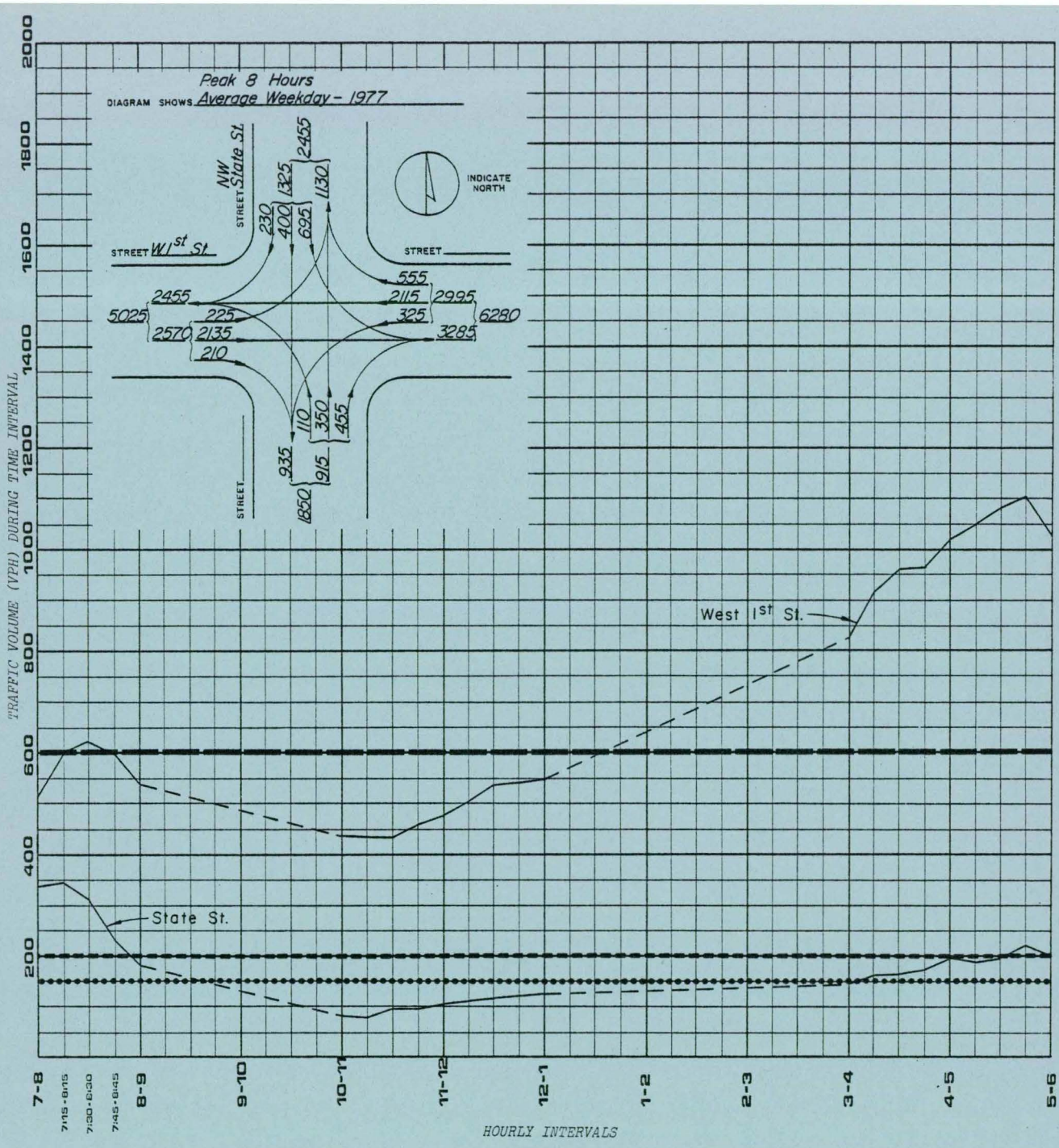
proper design so as to provide the necessary capacity. Until then, however, it would be helpful to have a 10-foot widening for about 150 feet on the east and west approaches to ease the overload on the single lane presently available.

The intersection of W 1st Street and State Street is currently the subject of much local concern. Approximately 14,500 vehicles enter the intersection during an average 24-hour period. This means that during approximately six of the peak hours, the flow is in excess of 1,000 vehicles per hour. Both streets are also part of several school bus routes.

There is justification for traffic signal control as evidenced by the data shown on Figure D-2. Undoubtedly, a system will be designed as part of the W 1st Street improvement project. However, during the interim period of possibly two years, the situation warrants some temporary measures which will minimize the accident potential and improve the quality of traffic service. The volume of data shown in Figure D-2 unfortunately does not reveal the very considerable amount of delay experienced by traffic on State Street.

It is strongly recommended that the four approaches to the intersection be marked as shown in Figure D-3. The east approach will require some widening along the south edge so that a left turn lane can be designated for traffic from the east.

It is also recommended that a traffic signal installation be made in a manner shown in Figure D-4. The system should be designed to minimize certain inherent accident causing characteristics of signalized control.



TRAFFIC VOLUME - SIGNAL WARRANT

LOCATION: City Ankeny, Iowa

Intersection of West 1st St. & State St.

Major Street West 1st St.

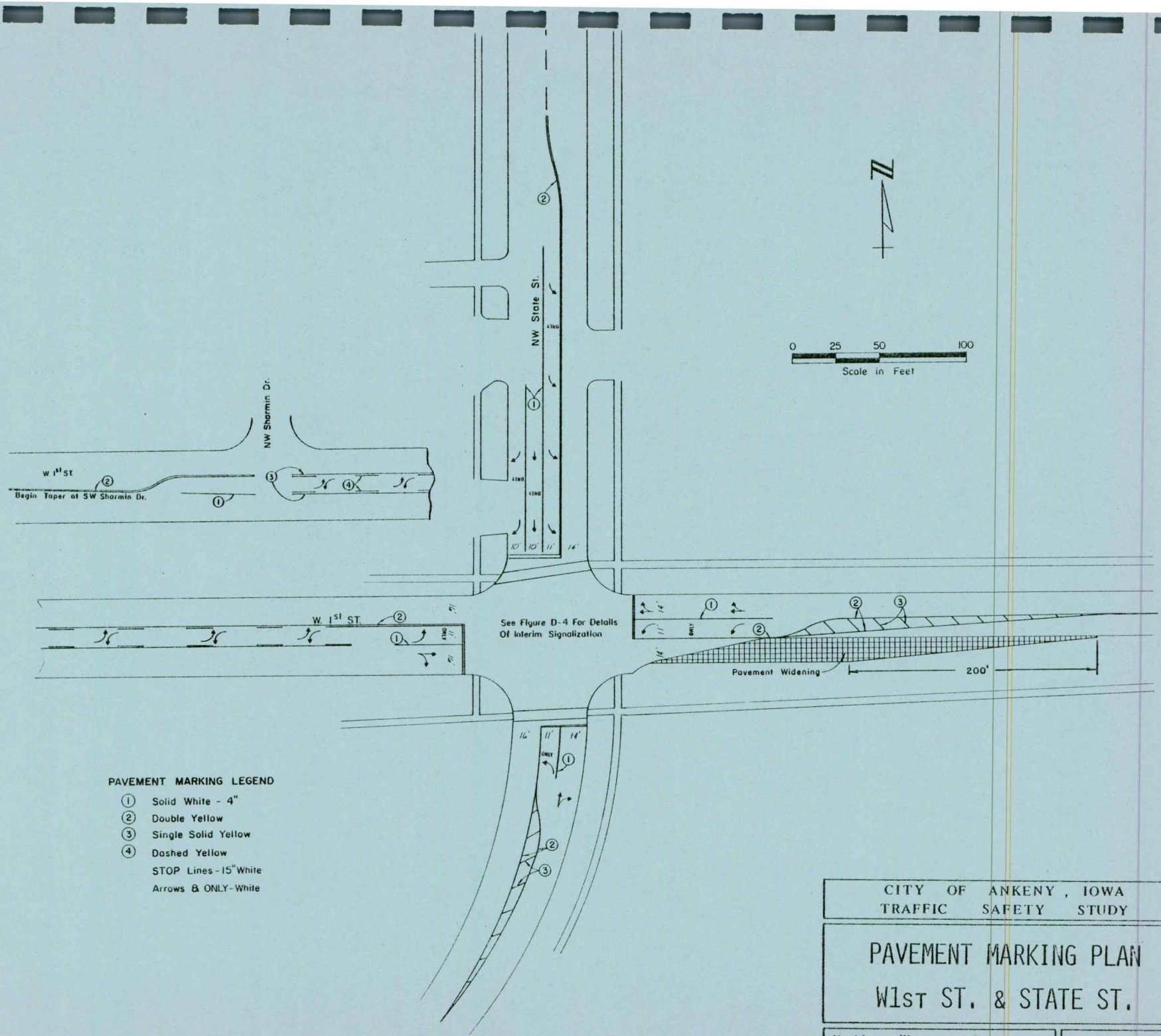
Minor Street: (N) E S W Approach of State St.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

TRAFFIC VOLUME
TYPICAL HOURLY RATE
W 1ST ST. & STATE ST.

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-2



PAVEMENT MARKING LEGEND

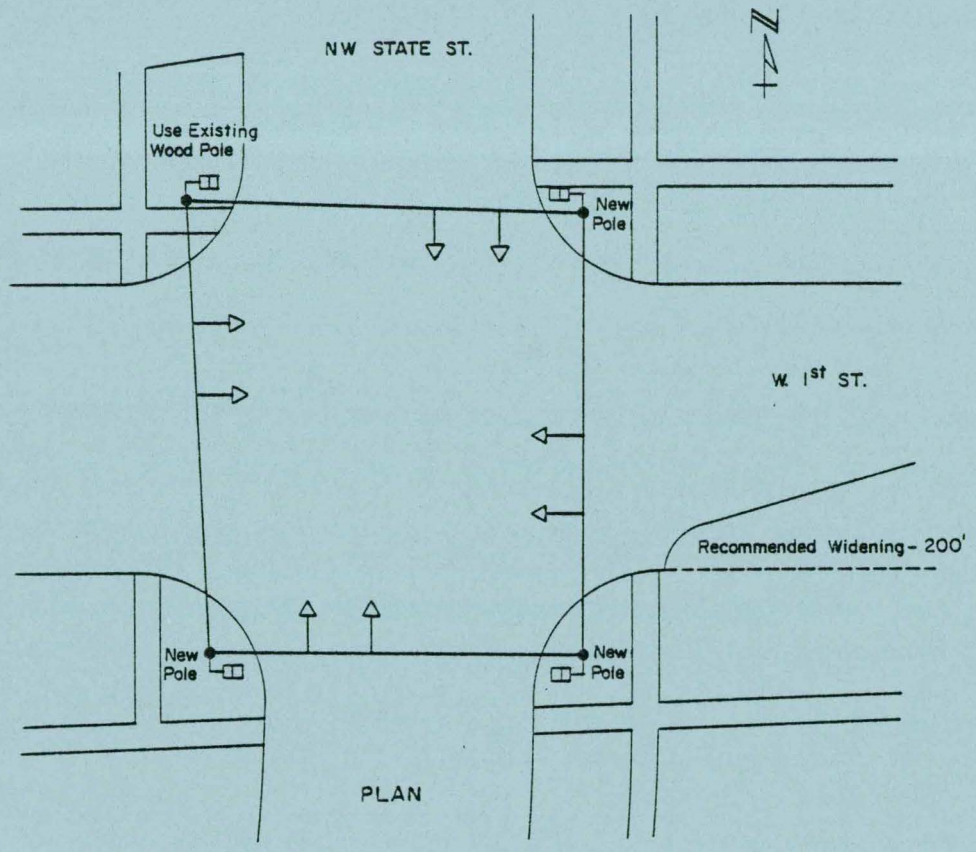
(1) Solid White - 4"
(2) Double Yellow
(3) Single Solid Yellow
(4) Dashed Yellow
STOP Lines - 15" White
Arrows & ONLY - White

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

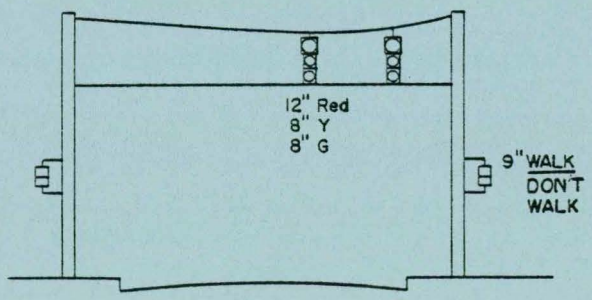
PAVEMENT MARKING PLAN
W1ST ST. & STATE ST.

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-3



See Figure D-3 For Pavement Marking Plan



ELEVATION

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHEMATIC PLAN
PROPOSED TRAFFIC SIGNAL
W 1ST ST. & STATE ST.

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-4

And, it should include provisions for the pedestrian element, at least on the north and south legs of the intersection, since there are a considerable number of school children that could avail themselves to the protection afforded by signal control.

In connection with the pavement markings, it is suggested that consideration be given to the use of plastic marking material which has considerable greater life than paint. It is important that these special markings be clearly visible throughout the year, since the proper and efficient operation of the intersection is highly dependent on the markings.

New Near North Side Crosstown Arterial

A significant portion of the traffic volume on 1st Street is attributable to the fact that it is the only means of access to much of the area in the northern half of the City. The situation could be alleviated with the availability of a street facility extending across the width of the City, somewhere generally in the corridor of 9th Street.

The need for and possibilities of developing such a facility were discussed in an advanced interim report submitted to the City for current budget and planning purposes. The essence of the report proposed the construction of a new roadway, appropriately designed between NW State Street and Ankeny Blvd. Interim Report No. 2, as submitted, is included herein as Exhibit D-1 in the Appendix.

Subsequent to the submittal of Interim Report No. 2, it was learned that NW 9th Street is included in the Federal-aid Urban System (FAUS) within the City. As such, certain Federal-aid funds can be used for

work on the street. It is also quite possible that new roadway proposed could be added to the Federal-aid Urban System so that its construction could be subsidized by FAUS funds. The present FAUS designation on NW 9th Street between Ankeny Blvd. and NW Ash Street can probably be transferred to the new street.

It is worth reiterating and emphasizing the point that the proposed new street would serve as an improved access to the Community High School area. It would undoubtedly be helpful in diverting student traffic from NW School Street where it presently causes problems in the Terrace School area.

SW Ordnance Road

SW Ordnance Road, west from Ankeny Blvd., coupled with SW State Street and SW 3rd Street, provide the only continuous route across the southern edge of the City, other than W 1st Street. The traffic volume between Ankeny Blvd. and SW 3rd Street averages about 6,500 vehicles during an average 24-hour period. Traffic moves along the street reasonably well except in the vicinity of the intersection of the access road to the east entrance of the John Deere Plant. The intersection on the center of the curve is subjected to comparatively high traffic volumes during the shift changes at the plant. The inbound traffic poses problems on the arterial since there are no provisions for left turn lanes. Congestion frequently develops when traffic from the east must wait before completing the left turn into the plant area. The geometric design of the intersection is somewhat unorthodox in that

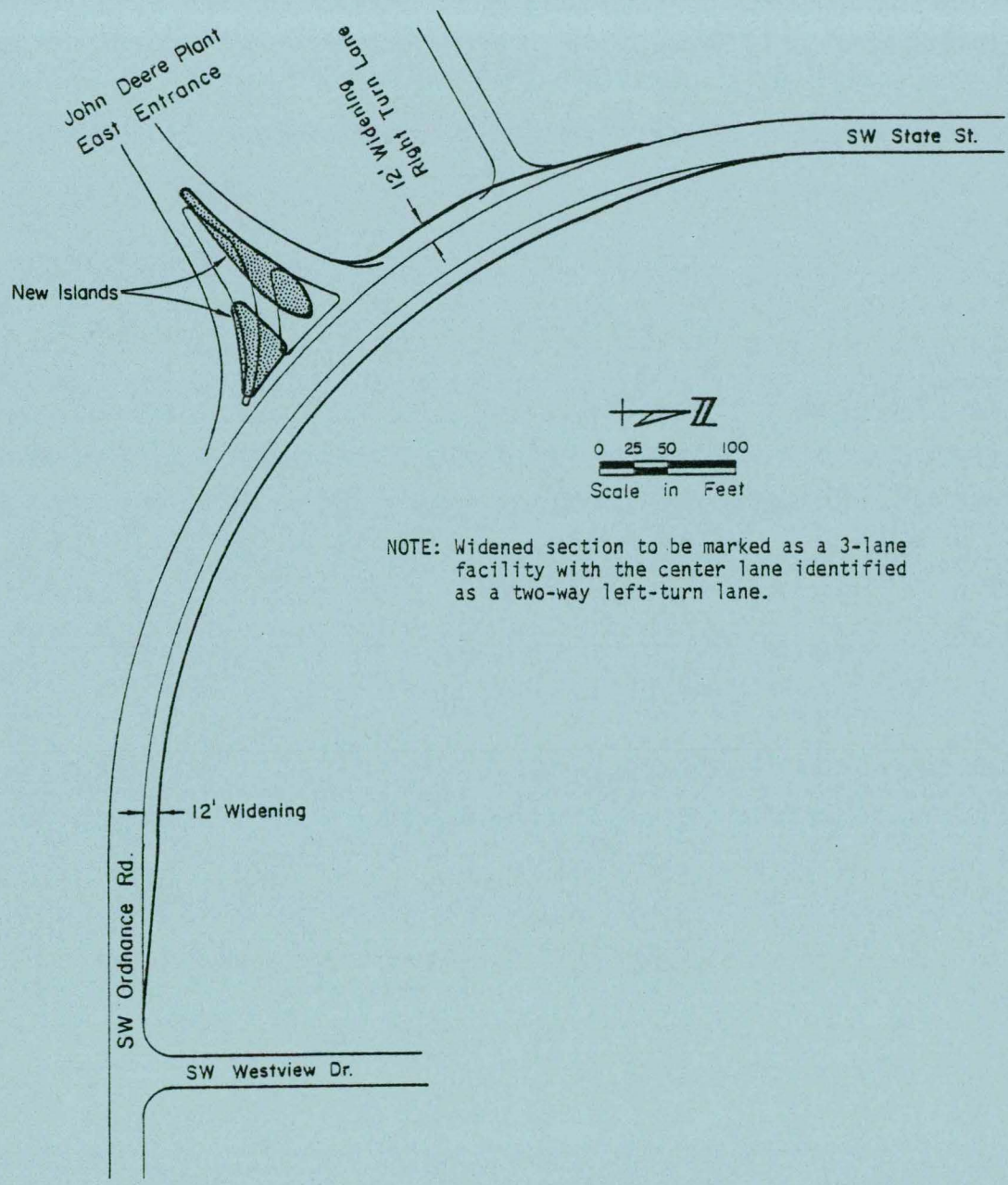
there is a multiplicity of conflict points which present control problems and accident potentials which ought to be avoided.

It is recommended that the roadways involved be modified as shown on Figure D-6. The widening along the north edge of the roadway and around the curve would allow the present westbound lane to function as a left turn storage lane, not only into the plant area, but also into the office building to the north and the other nearby commercial establishments and residences. The modification of the channelization on the plant access road would simplify control and would also make the intersection adaptable to signalized control should that become necessary in the future by a substantial increase in traffic volume.

These proposed modifications need not be deferred pending the present nebulous extension of SW State Street to SW Oralabor Road. A traffic signal system is programmed for construction at the intersection of SW Ordnance Road and Ankeny Blvd. To obtain a semblance of orderly traffic movement under signalized control, it is recommended that the intersection be treated as shown in Figure D-7.

NW 16th Street

This important roadway along the west edge of the City serves approximately 6,500 vehicles during an average 24-hour period. The principal features of traffic operation are the surges in flow generated by the west access to the John Deere Plant. To facilitate traffic movement, NW 16th Street has been widened to 42 feet and a traffic signal was installed.



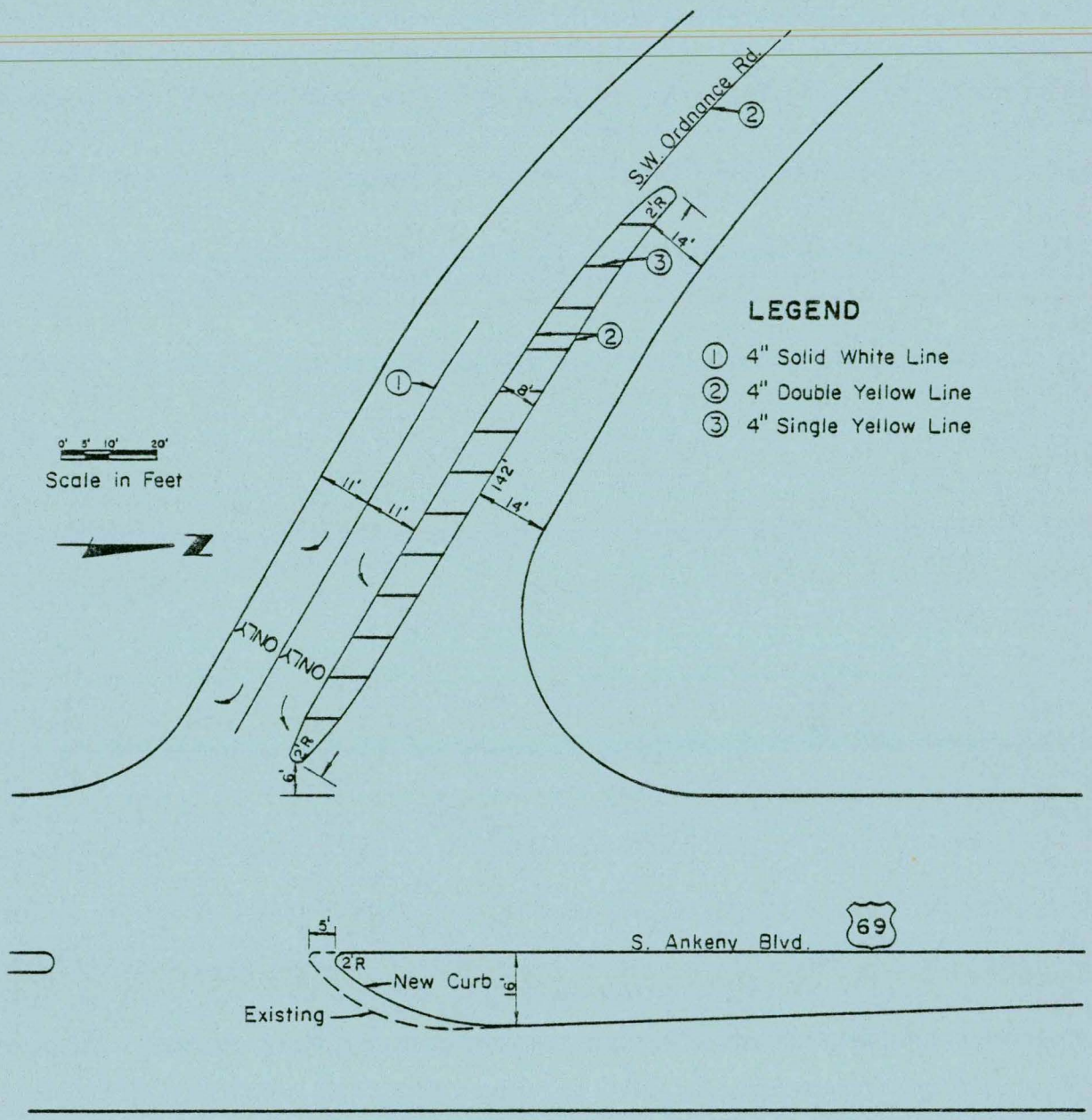
NOTE: Widened section to be marked as a 3-lane facility with the center lane identified as a two-way left-turn lane.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

PROPOSED MODIFICATIONS
SW ORDNANCE RD-J.D. ACCESS

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-6



CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

PROPOSED CHANNELIZATION
ANKENY BLVD. & SW ORDNANCE RD.

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-7

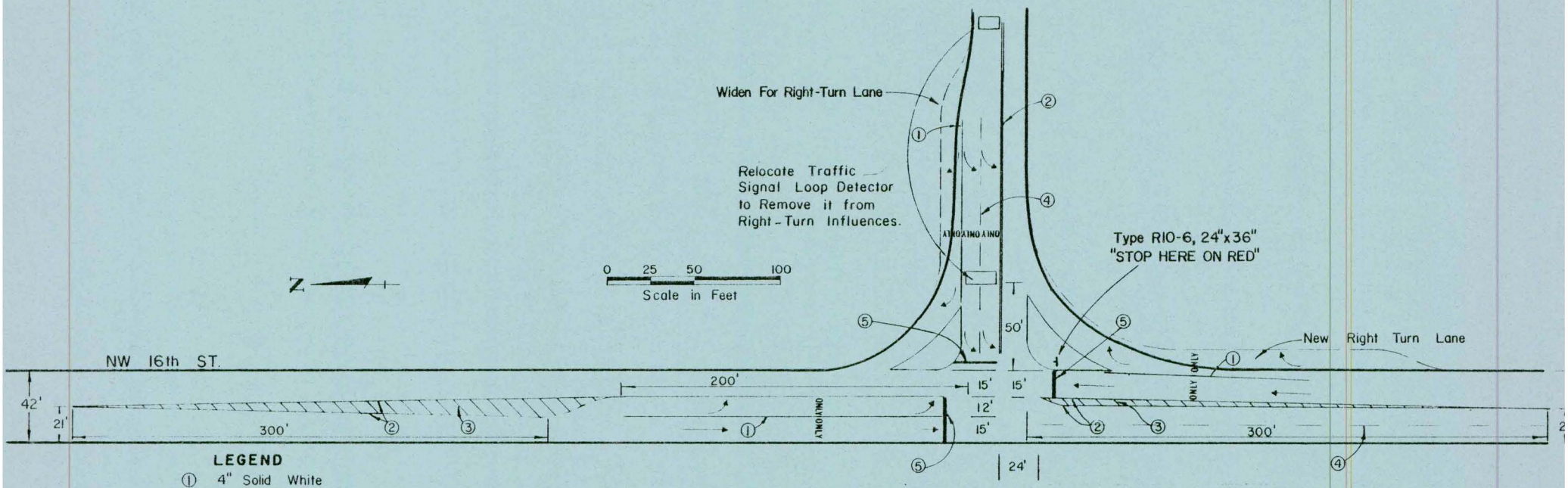
For traffic to move safely and efficiently, it is important for vehicles to be positioned properly according to their destinations. That can be accomplished only by proper pavement markings. A recommended system of markings for NW 16th Street is shown in Figure D-8. Also recommended is the construction of a right-turn lane to accommodate a very significant volume of traffic which enters the plant from the south.

The traffic signal is semi-actuated type in which the green light is transferred from NW 16th Street to the plant road only when a vehicle leaving the plant passes over a detector implanted in the surface of the roadway approximately 250 feet from the intersection. In that position, all vehicles pass over the detector. Those vehicles which turn right at the intersection should not influence the signal operation. It frequently happens, primarily during nonpeak periods, that such right turning traffic unnecessarily actuates the signal and unnecessarily stops traffic on NW 16th Street. Since only left turning traffic should be detected, it is recommended that the detector be relocated to a point about 50 feet from the intersection. Also, the access road should be appropriately marked.

There are presently in place in the intersection area several regulatory signs which are grossly in noncompliance with signing standards. These are discussed in Part E.

D-3 BICYCLE ROUTES

Recently the City implemented a system of bicycle routes as shown in Figure D-9. The routes were identified with the signs and pavement markings pictured in Figure D-10.



LEGEND

① 4" Solid White
② 4" Double Yellow
③ 4" Single Yellow
④ 4" Dashed White
⑤ 18" Stop Line

PROPOSED MODIFICATIONS AND MARKING PLAN

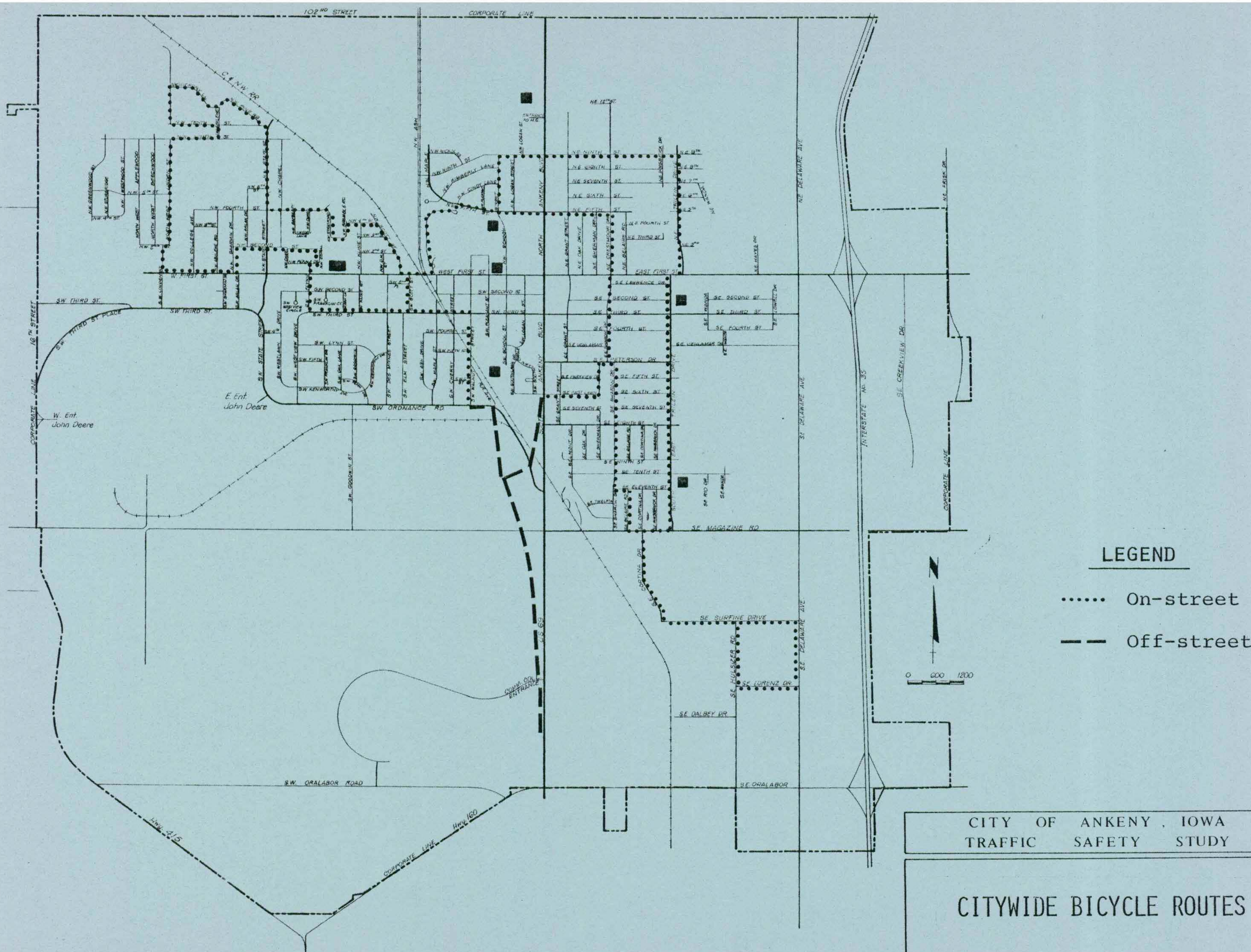
Revised 6-6-78

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

NW 16TH ST. & WEST ENTRANCE JOHN DEERE PLANT

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-8

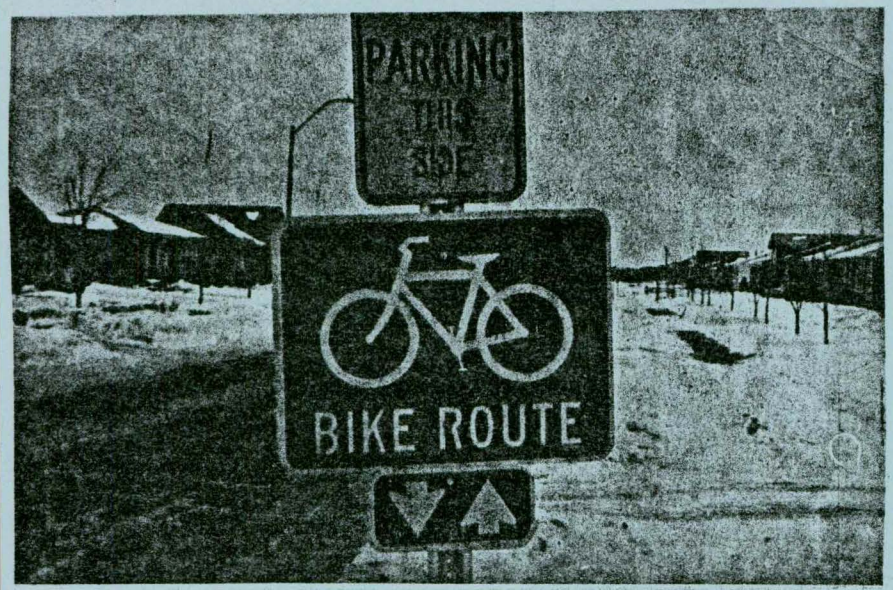


CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITYWIDE BICYCLE ROUTES

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-9



72 Bike Route signs in place throughout the City.

Standard warning sign, 21 in place on major streets.

Nonstandard symbol marking, approximately 125 in place along designated routes.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

BIKE ROUTE SIGNING & MARKING

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE D-10

The signing and marking devices indicate that the bike lane is bi-directional on only one side of the street. Almost all segments of the route take advantage of the general citywide parking regulation which bans parking along the north and east sides of most streets, which allowed the bike lanes to be placed on those sides. However, there were some variances from that pattern.

The following is an excerpt from a Department of Transportation Federal Highway Administration publication, "Bikeways - State of the Art - 1974".

> "In many states bi-directional bicycle operations on one side of the street are at least implicitly prohibited by law as the bicyclist is usually required to obey the vehicle code when operating on the street. Even if bi-directional operation in a lane is legal, motorists are apt to perceive contra-flow cyclists as riding in violation of the law.
>
> Riding against traffic has, of itself, been identified as a major causal factor in bicycle-motor vehicle accidents, yet provision of bi-directional facilities, particularly bi-directional on-street lanes, legitimizes and formalizes this unfortunate practice. Some of the more obvious deficiencies of bi-directional operations are:
>
> - Higher rates of closure resulting in decreased effective sight distances and reaction time. This is particularly critical in areas of impaired sight clearance such as on horizontal or vertical curves or in the vicinity of sight obstructions.
> - Increased potential for the more serious head-on collision.
> - Impaired or total lack of visibility of traffic control devices, particularly STOP and YIELD signs, for bicycles travelling in the against traffic direction.

- "Against traffic" bicycle flows conflicting with motorist ingrained anticipation of flow according to the "keep right" rule.

- Unpredictable and hazardous operations at transition areas where bi-directional facilities terminate and one-way (keep right) operations begin.

In addition to the negative physical factors noted above, the legitimate status which bi-directional facilities confer on travel against traffic may induce cyclists to travel against traffic even where no special facility provisions exist. In one extreme case of this type of habit formation, a bi-directional lane placed to serve an elementary school is involved. The bike lane operates only in school commute hours; at other times it is occupied by parked vehicles. Yet school children return to the area for play in hours when the lane is not in operation and, by force of habit, ride against traffic as if the bi-directional lane were in effect. There are numerous situations where the specific circumstances of access to an activity center, the configuration of linking bikeway facilities, right of way considerations and the like make bi-directional facilities in roadway corridors necessary and possibly even desirable. But as a general rule, bi-directional operations should be limited to independent pathways and sidewalk facilities where lengthy segments uninterrupted by cross streets and driveways exist. At roadway crossings of bi-directional facilities, clear signs and markings alerting motorists to bi-directional operation should be provided."

The first sentence of the above commentary is particularly applicable with regard to the Ankeny bike route system. Section 321.234 of Iowa Statutes stipulates clearly that . . ."Every person riding a bicycle . . . upon a roadway shall be subject to the provisions of this chapter applicable to the driver of a motor vehicle. . ." This can be interpreted to mean that the present bike route system in Ankeny is contrary to the State law.

An in-depth study of the validity of design or the effectiveness of the system was beyond the scope of this Project. However, it was noticeable on frequent occasions during other field studies that bike riders did not comply with the bike route procedures. Also, some young children were observed traveling on bikes against vehicular traffic on arterial streets such as W 1st Street.

The "off-street" bikeway west of Ankeny Blvd. extending to the Community College area is a very commendable effort. It fulfills the purpose of special bike facilities in the important physical separation of bicycles and motor vehicles.

D-4 RANDOM COMMENTS

- On the basis of data compiled by IDOT, the annual growth of traffic in the Ankeny area will range from 3 1/2 to 5 1/2 percent during the next few years.
- This anticipated growth in traffic will be generated by the prevailing spread of residential areas, industrial growth, an increase in recreation oriented traffic spawned by the Lake Saylorville facilities, and the Area XI Community College.
- The City should be preparing for the traffic situation which will be developed in a few years by the average daily traffic of 25,000 vehicles on Ankeny Blvd., 15,000 vehicles on 1st Street, 10,000 vehicles on NW 16th Street, 8,000 vehicles on SW Ordnance Road and 10,000 vehicles on Oralabor Road.

- It is apparent that there will be a demand for new and additional arterial streets, and the extension of some of the existing streets to connect with existing principal streets.
- There is no apparent established timetable for the planned extension of SW State Street to Oralabor Road.
- As the population increases in the Ankeny vicinity, a large shopping center is likely to develop somewhere in the periphery. Such a development would have significant effects on traffic volumes and patterns.

PART E

INVENTORY AND EVALUATION OF TRAFFIC CONTROL DEVICES

E-1 GENERAL

Traffic control devices are those official signs, signals and pavement markings used to regulate, warn, guide and inform vehicular and pedestrian traffic on all streets and highways, rural and urban.

To be effective each device should: (1) fulfill a justified need; (2) command attention; (3) convey a clear and simple meaning; (4) command respect of drivers and pedestrians; (5) give adequate time for proper response; and (6) be totally legal in all respects.

E-2 CAUSE FOR CONCERN

The design and use of traffic control devices are basically efforts in communication. As a motorist drives down an urban street or a rural road or highway, he is subject to the need for information, especially if he is in an unfamiliar area. Drivers are warned about potential hazards, made aware of rules and regulations, guided along their desired routes, and receive other information through the use of signs, signals, and pavement markings. With the exception of horns, sirens, and whistles, almost all efforts to communicate with motorists (and pedestrians) are dependent upon our visual senses.

The "communication" problem is, of course, intensified during non-daylight hours when the drivers' visual acuity is so adversely affected, not only by the low level of ambient light but also by headlight glare

from other vehicles and the sometimes overwhelming effects of extraneous lights along the roadside.

This virtually total reliance on eyesight for imparting traffic-related messages to motorists poses many problems. If the only things a driver were to see as he proceeds along his route were official traffic control devices, efforts to communicate with him would be much easier and must more simple. But, the driver's environment presents him with an almost infinite and very complex number of visual stimuli. There are literally hundreds of others who are also trying to "talk" to the motorist about a multitude of nonhighway or nontraffic subjects.

In the competitive effort to communicate with drivers, as a general rule, those agencies responsible for the use of traffic control devices do so under disadvantageous constraints. The resources and wealth of the commercial and private advertising interests are generally much greater than the public's capabilities. Also, the area along the roadside on which official traffic control devices can be placed is comparatively narrow. And, even though they can be placed closer to the traffic streams, that advantage is negated by the size and garishness of most commercial signs.

E-3 A COMMON LANGUAGE

The success of any communicative effort is almost totally dependent upon the comprehensibility of the "language" or communicating device used. Efforts to communicate with motorists through the means of signs, signals, and pavement markings must have a high degree of comprehensibility.

There must also be a high level of universality in the meaning and function of the devices. In other words, a particular device must have the same meaning and be used under the same kinds of conditions for the same reasons, irrespective of the provincial, state, or national location. Uniformity is the key word--uniformity in design, uniformity in meaning, uniformity in use, and uniformity in purpose.

E-4 ADDITIONAL IMPETUS FOR UNIFORMITY

Legal Action

The prevention of accidents and the attending human miseries should be sufficient cause to motivate those who are responsible for application of traffic control devices to adopt the principles and concepts set forth in the MUTCD. However, if additional urging is needed, there is the spector of legal action being brought against not only official agencies but also individual officials by persons who have suffered injury or financial loss in a traffic accident in which a traffic control device's nonconformity, deficiency, or inadequacy was a causative or contributing factor.

In most states now, including Iowa, governmental agencies and officials no longer are immune to tort suit in a civil court. There is an increasing number of such court actions involving claims, often in the hundreds of thousands of dollars. And, in increasing incidence, the courts are acting in favor of the plaintiff. One adverse judgment can easily cost many times over the cost of replacing all of the traffic control devices in a city.

Federal Aid Allocations

The Congress in its various Acts relating to Federal Aid for Highways, beginning in 1944, has clearly stipulated that all the traffic control devices installed on public roads on which any part of the construction costs involved Federal Aid funds must comply with the latest edition of the MUTCD. The Department of Transportation has the legal authority to condition Federal Aid allocations on the extent of noncompliance with prescribed standards for traffic control devices. This authority has also been interpreted to concern the manner in which traffic control devices are applied on those public roads which are not part of any Federal Aid System.

E-5 STUDY GOAL

One of the primary missions of the study was to observe each and every traffic control device on all streets within the corporate limits of the City. The individual devices were analyzed to compare their design and installation features with the standards and warrants prescribed in the MUTCD. Each device was also appraised to evaluate the propriety and correctness of its use. The study also included observation and notation of those locations and situations where judgment indicated a particular device should be applied but where none now exists.

Presently, there are approximately 90 miles of public roadways within the corporate limits of Ankeny. Slightly under 4 miles involve State highway routes.

None of the route markers, arrow plates, and other assorted guide signs associated with the State highway designations were included in the evaluation and inventory. All regulatory and warning signs on the portion of State Highways within the corporate limits were included in the study, even though those devices are the responsibility of the Iowa Department of Transportation.

E-6 STUDY TECHNIQUES

Signs

Every traffic sign was viewed by an observer traversing the street system in a car on a predetermined route plan.

A commentary on certain features of each sign according to a coded set of criteria was recorded on Inventory Data Sheets (Exhibit E-1 in the Appendix). These sheets along with a special summary analysis will be turned over to the City to facilitate necessary changes. These data and a street directory for the Data Sheets provide a quick and simple means of identifying the location and condition of each sign individually as well as collectively by type.

The data recorded on each sign related to the following features or elements:

Visibility, including source of visibility obstructions
Sign size and shape
Background and legend design and colors
Surface composition
Quality of reflectorization
General sign condition
Elements of noncompliance with MUTCD
Mounting height
Longitudinal and lateral position
Type of remedial work needed

The standards for evaluation are as stipulated in the MUTCD with regard to:

- Size
- Shape
- Color
- Reflectorization
- Legend
- Mounting height
- Location

The reference for sign size is a Federal Highway Administration publication, Standard Highway Signs, 1972, along with the MUTCD. This design reference illustrates and lists all the dimensional details of all the standard signs. The various size categories are defined as Minimum, Standard, Expressway, Freeway, Special. Only the Minimum, Standard, and Special sizes are pertinent to this Study. The Standard dimensions have been the size criteria applied in the evaluation of signs in this Study for all arterials, collector streets, and on other lesser streets when the situation involved a street of a higher rating. The determination of the acceptable size for the various signs also included the element of personal judgment of the observer, taking into account the prevailing conditions and surroundings, along with some intuitive judgment based on experience. The Minimum dimensions were deemed acceptable only on obviously low-volume streets. The specific size criteria for the various kinds of signs involved in this Study are shown in Table E-1.

TABLE E-1 - TYPE OF SIGNS AND SIZE CRITERIA

TYPE OF SIGN	SIZES		
	Minimum	Standard	Special
STOP	24"	30"	36" & 48"
YIELD	30"	36"	48"
Speed Limit	18"x24"	24"x30"	36"x48"
Turn Control	24"x24" 24"x30"	24"x24" 24"x30"	30"x30" 36"x48"
Lane-Use Control	30"x36" 30"x30"	30"x36" 30"x30"	- -
Alignment	18"x24"	24"x30"	36"x48"
Exclusion	30"x30"	30"x30"	36"x36"
One Way	36"x12" 18"x24"	36"x12" 18"x24"	54"x18" 24"x30"
Parking Series - Urban	12"x18"	12"x18"	18"x24"
Miscellaneous Regulatory	18"x24"	24"x30"	30"x36"
Weight Limit	24"x30"	24"x30"	36"x48"
Warning	24"	30"	36"
Large Arrow	36"x18"	48"x24"	60"x30"
Railroad Crossing	30"	36"	48"
School Area	30"	30"	36"

To every extent possible, each sign was identified on the Inventory Data Sheet by the generic number set forth in the MUTCD, such as R1-1

for STOP signs, R2-1 for Speed Limit signs, S2-1 for the new standard 5-sided school-related signs. For those signs which could not be assigned such a designation, a diagrammatic sketch was made on the reverse side of the Inventory Data Sheet.

To facilitate comprehension of the discussion, photographs of each type of sign and legend variation were taken and then assembled for the report in a montage format according to sign classification.

Traffic Signals

Each of the seven locations where traffic is signal controlled was studied. The signal equipment was checked to evaluate its condition and adequacy with regard to the number, size, location, and visibility of signal heads. The design and operation of each system was evaluated, including the phasing and time duration of the various intervals and coordination with adjacent signalized intersections. All evaluation was based on the standards and warrants prescribed in Part IV of the MUTCD.

Pavement Markings

The prevalence or need for center line and lane line markings, crosswalks, stop bars, railroad crossing markings, etc. on the arterial system were appraised. The quality of existing lines was checked for day and night service along with the need for appropriate markings where none are now in place. The review was based on Part III of the MUTCD.

E-7 REGULATORY SIGNS

Regulatory signs inform drivers of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent. Obviously, signs are not necessary in the case of the more common and general rules of the road. However, the laws in some states specify that certain regulations are enforceable only when made known by official signs.

Regulatory signs normally are erected at those locations where the pertinent regulations apply. The sign message should be clear, uncluttered, and understandable. And, it should be readily visible to a normally observant person.

There are a variety of Regulatory signs which can be readily classified into groups according to function:

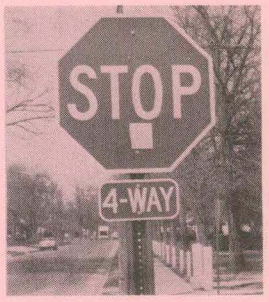
1. Right-of-way series--STOP and YIELD signs
2. Speed series
3. Movement series--Turn regulations and Lane-Use Control, Alignment, Exclusion, and ONE WAY signs
4. Parking series--Prohibitory and Time-restriction signs
5. Pedestrian series
6. Miscellaneous series--Regulations associated with traffic signals, Weight Limit signs, Road Closure signs

Typical examples of regulatory signs in Ankeny are shown in Figure E-1.

RIGHT-OF-WAY SERIES

STOP Signs - General

The standard STOP sign, irrespective of size, has an octagonal shape with white legend and border on a red background. Because of



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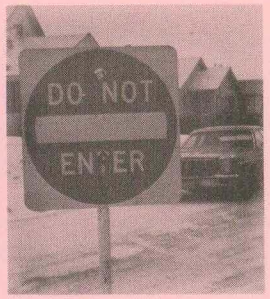

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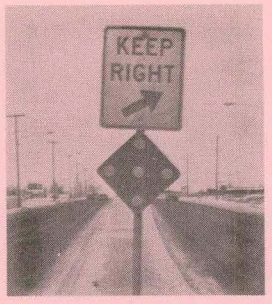

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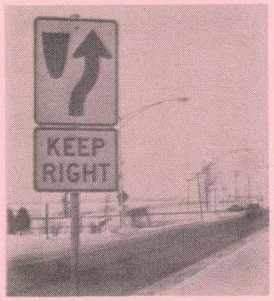

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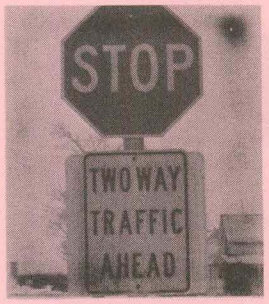

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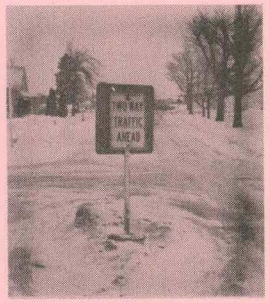

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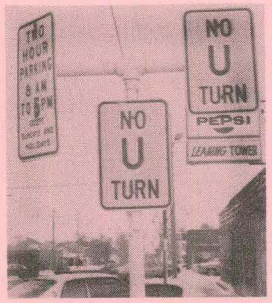

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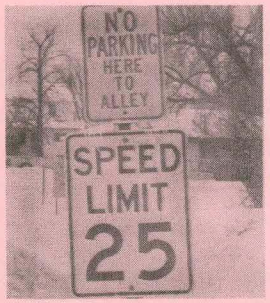

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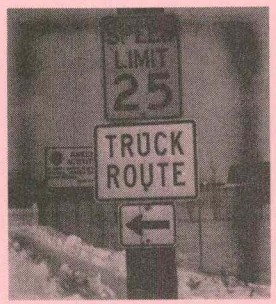

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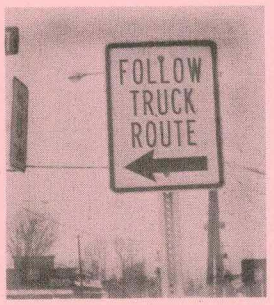


P

Q

R

S

T

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

EXAMPLES OF
REGULATORY DEVICES IN PLACE

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE E-1

COMMENTARY ON FIGURE E-1

A	STOP sign. Standard size, 30" - 24" size used only for minimal conditions.
B	New symbolized sign, AOK.
C	Obsolete and not reflectorized.
D	Should be a Sign B.
E	An obsolete version of R4-7 sign. The 5-button Object Marker should have 9 buttons.
F	New symbolized version of R4-7 sign with panel. This unit on S Ankeny Blvd. should include a 9-button Object Marker.
G	Lower sign is nonstandard, should use a W6-3 warning sign on far side of intersection.
H	This assembly on SW Walnut Street can be eliminated with new signing arrangement as described in Sign Inventory Data Sheet #75.
I	These signs near the Library should be replaced with a single R5-1 (Sign B).
J	A single standard 24" R3-4 sign would be much more effective than these substandard 12" x 18" units.
K	77% of the Speed Limit signs in Ankeny are the substandard 18" x 24" size. They should be 24" x 30".
L	Green and white is incorrect color for Speed Limit signs, as used in Hawkeye Park.
M	These signs should be replaced with 12" x 36" R6-1 signs positioned closer to corners and mounted higher.
N	The need for this nonstandard sign (at W John Deere Plant entrance) is highly questionable.
O & P	These signs on W 1st Street and SW Ordnance Road must be confusing to strangers. What does the Truck Route connect with?
Q & R	Sign R is an alternate to the R5-2 symbolized version; however, 2 of 9 such signs in Ankeny are not reflectorized, as they should be. Sign Q is nonstandard - should be replaced.
S & T	Even though technically these brown and yellow signs are on a private road, they should conform to prescribed design and usage standards for such signs.

the need for nighttime visibility and legibility, both the background and legend must be reflectorized.

Since a STOP sign imposes such a substantial effect on motorists, it should be used only where warranted. Section 2B-5 of the MUTCD describes several conditions which may warrant or justify the application of STOP sign control. Briefly some of them are:

1. Intersection of a less important road with a main road where application of the normal right-of-way rule is unduly hazardous.
2. Street entering a through highway or street.
3. Unsignalized intersection in a signalized area.
4. Other intersections where a combination of high speed, restricted view, and serious accident record indicates a need for control by the STOP sign.

Where two principal streets intersect, the STOP sign or signs should normally be posted on the minor street to stop the lesser flow of traffic.

STOP signs should not be used as a subterfuge in attempts to control speeds. Properly established speed limits, appropriately signed and enforced, rather than unwarranted STOP signs, is a more effective way of coping with speed problems. Nor should STOP signs be installed impulsively after a spectacular accident. And, STOP signs should not be political pawns or pressure palliatives to prevent accidents that allegedly might occur "if something is not done". A point worth mentioning is the fact that approximately 67% of the intersections in Ankeny are controlled by a STOP sign or a traffic signal.

Recent events arising from the energy crisis provide additional impetus to require the stoppage of traffic flow only when there is a

proven, valid, or urgent need. Unwarranted STOP signs impose unnecessary stoppage and thereby impose an unnecessary wastage of motor fuel. It is well established that there is a significant amount of additional fuel consumed by a motor vehicle in the process of decelerating to a stop, pausing, then accelerating to the initial speed. And, it is during the deceleration, idling, and acceleration stages that a motor vehicle emits the greatest amount of air pollutants. Concern in this aspect of the problem is justified in the concern for improving the quality of our environment.

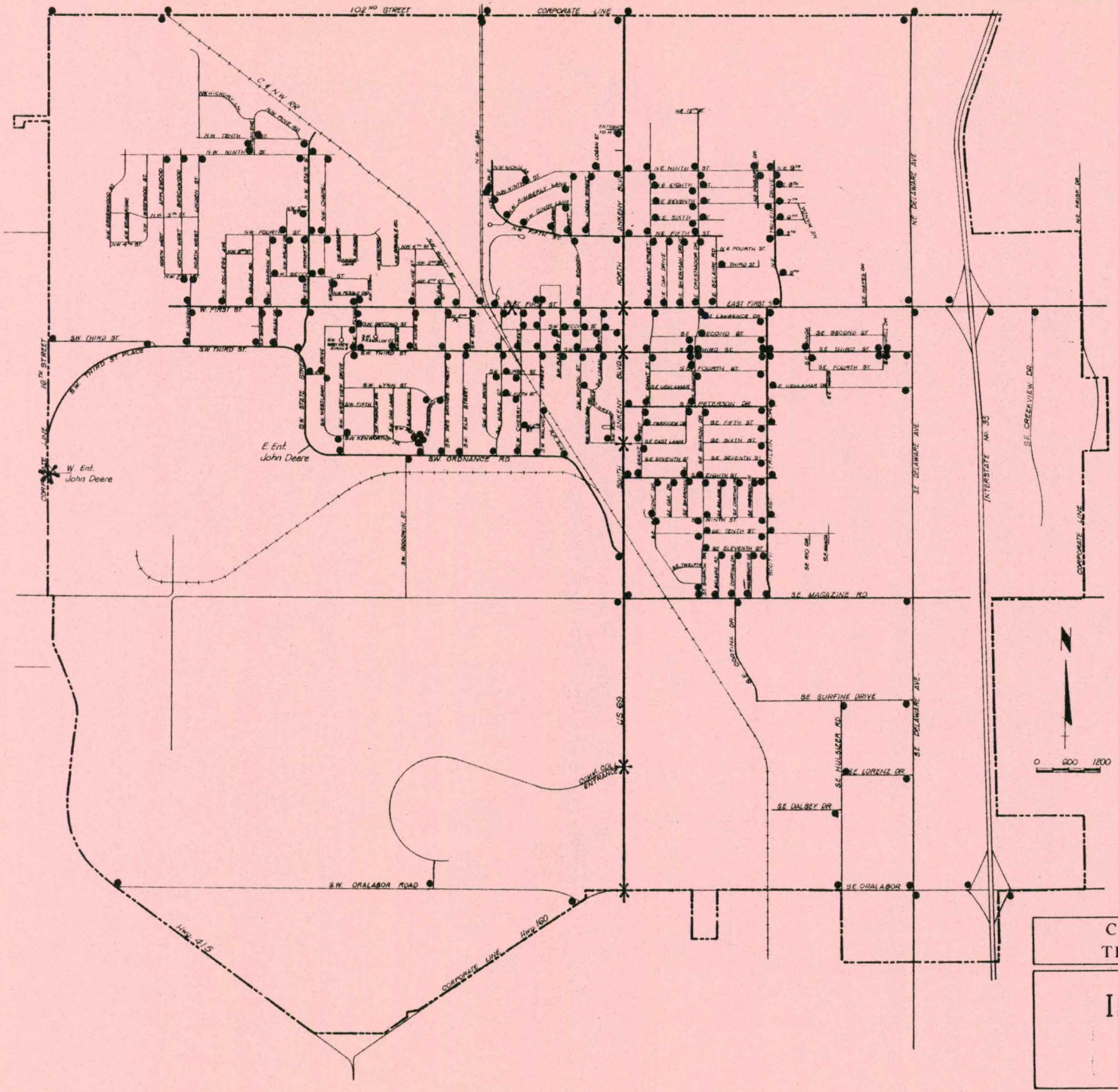
STOP signs on all the approaches to an intersection can be a worthwhile safety measure at some locations. Unfortunately, such control is frequently misapplied.

STOP Signs in Ankeny

At the time of the inventory, there were 299 intersections of named public streets throughout the City. Six of the intersections are controlled by traffic signals, 197 with STOP signs, and none with YIELD signs.

A total of 289 STOP signs were inventoried and inspected. The locations are shown on Figure E-2. Eighty-nine percent of the STOP signs complied with the 30-inch size standard.

Thirty-two of the STOP signs are the minimum 24-inch size. All but one are properly reflectorized, however. All of the 24-inch signs should be replaced with 30-inch units.



LEGEND

- ● STOP Sign
- ✳ Traffic control signal

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

INTERSECTION CONTROL INVENTORY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE E-2

The remaining 257 STOP signs are the 30-inch size, 32 of which have surface deterioration to an extent requiring replacement. Those locations are identified in the Sign Inventory Data (SID) sheets.

There were four locations where STOP signs appear to be needed, but none are now in place. Those locations are also identified in the SID sheets.

Even though there are a few signs with surface deterioration which affects nighttime visibility, none of the STOP signs in the City are without reflectorization. Such a situation is highly commendable and a rarity among cities.

With rare exceptions, the visibility of STOP signs in Ankeny is unobstructed. The mounting height generally is proper and the signs are positioned correctly.

The principal concern with STOP sign usage in Ankeny should center on the application of "All-way" STOP control. STOP signs on all the approaches to an intersection often seem to be a simple solution to intersection problems. Unfortunately such control is frequently misapplied. As pointed out in Part C, at almost every intersection where an accident had occurred in Ankeny, STOP sign control was in effect. Except under conditions involving restricted visibility, comparatively high volumes and a reasonably even balance of volume on the intersecting streets, all-way STOP control is no more effective than 2-way control in preventing accidents. And, as mentioned previously, STOP signs should never be used as a speed control measure.

Section 2B-6 of the MUTCD stipulates certain minimum conditions relating to accidents and traffic volume which should prevail before All-Way STOP control is a valid consideration.

There are presently four intersections in Ankeny where each of the approaches is controlled by a STOP sign. They are:

SE 3rd Street and SE Sharon Drive

SE 3rd Street and SE Trilein Drive

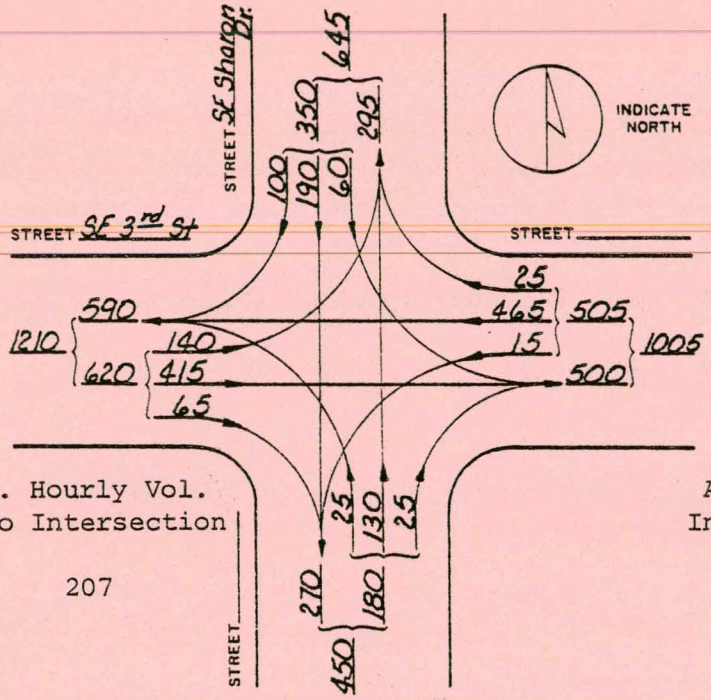
SE 3rd Street and SE Lowell

SW Fehn Street and SW Kenworthy Drive

The traffic pattern at each of these intersections, as shown in Figure E-3, when compared to the warranting criteria set forth in the MUTCD, indicates such control is not justified at any of the locations. The original impetus or reason for the application of 4-way STOP control at those particular locations is not apparent. It appears that 2-way control, properly applied, would be adequate.

Without supportive data, speculation points to use of STOP signs at the three locations on SE 3rd Street as an attempt to either control speed or to discourage an arterial type of operation. At the intersection with SE Trilein Drive, the proximity of the Elementary School may have had some influence.

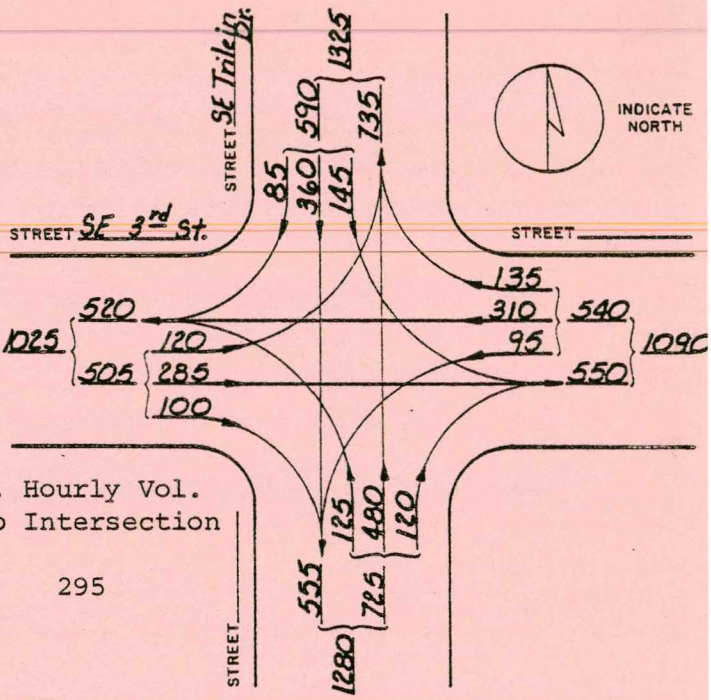
Assigning STOP sign control at these four intersections in compliance with prescribed procedures, and analyzing the traffic data at each location, reveals that during the 24 hours of an average weekday, approximately 5,700 vehicles are stopped unnecessarily. Applying certain



Av. Hourly Vol.
Into Intersection

207

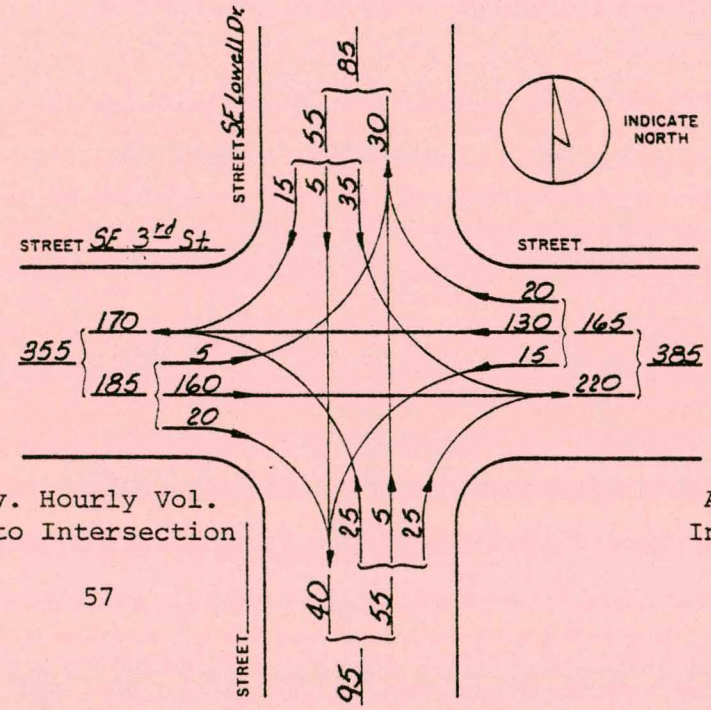
SE 3RD ST. & SE SHARON DR.



Av. Hourly Vol.
Into Intersection

295

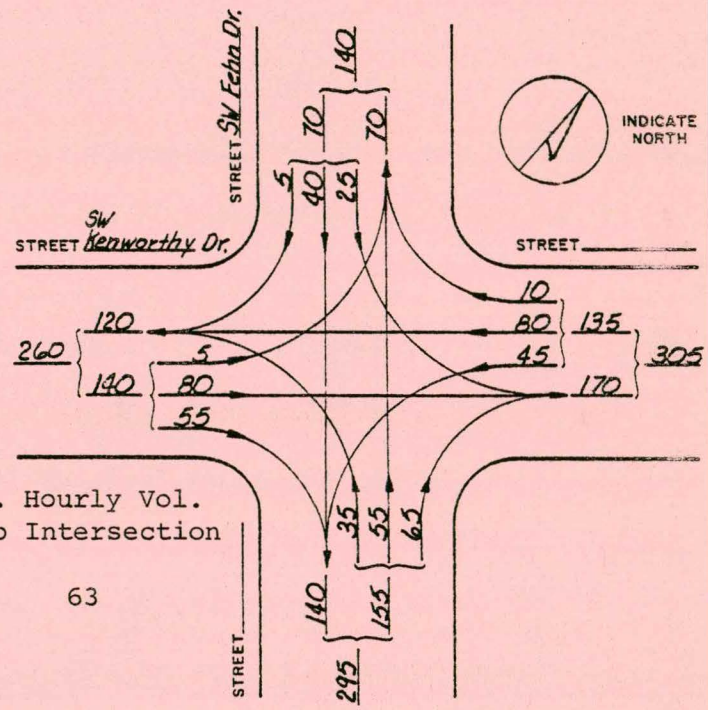
SE 3RD ST. & SE TRILEIN DR.



Av. Hourly Vol.
Into Intersection

57

SE 3RD ST. & SE LOWELL DR.



Av. Hourly Vol.
Into Intersection

63

SW FEHN DR & SW KENWORTHY DR.

PEAK 8 HOURS

AVERAGE WEEKDAY-1977

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

TRAFFIC VOLUME DATA
4-WAY STOP LOCATIONS

Hoskins — Western — Sonderegger
Lincoln, Nebraska

FIGURE E-3

adjustment factors to interpolate the actual experience, it develops that in the course of one year, approximately 1,900,000 vehicles are affected by the STOP signs unnecessarily. This adds about $90,000 annually to the cost Ankeny drivers incur in passing through these four intersections. In other words, the majority of the volume is being "taxed" that much extra to provide some nebulous benefits to an abstract beneficiary.

In consideration of the cited facts, and in the interest of traffic operation efficiency and the quality of the environment, it is recommended that STOP signs be removed:

On SE 3rd Street at SE Sharon Drive

On SE Trilein Drive at SE 3rd Street

On SE 3rd Street at SE Lowell Drive

On SE Kenworthy Drive at SW Fehn Drive -- and that those on SW Fehn Drive be replaced with YIELD signs (36-inch size)

For those who may contend that the STOP signs on SE Trilein Drive at 3rd Street are needed to protect the school crossing at that point, it should be mentioned that the children who cross SE Trilein Drive should do so at the crossing at SE 2nd Street where a roll-out STOP sign is used. The merits of imposing STOP control on SE Trilein Drive traffic at SE 3rd Street for 8,760 hours of a year when a need may exist for less than 600 hours, are highly questionable.

To reduce the hazards usually prevalent when there is a change in a traffic control system, drivers on those streets still with STOP signs must be made aware that vehicles on the cross street do not stop. It is recommended that a sign, at least 30 inches square, be installed below each STOP sign with the legend CROSS TRAFFIC DOES NOT STOP. The sign should be displayed for at least 90 days for local drivers to adjust to the change.

There is one other all-way STOP location in the City, that being at the intersection of SE 3rd Street and SW Westview Drive and SW Flynn Street. This is a "T"-intersection with STOP signs on the north, west and east approaches.

This is an unusual situation in that the STOP signs on the east and west approaches are apparently intended only to minimize the accident potential in the conflict between traffic turning from the west-to-north and traffic proceeding from east-to-west. This particular effort is unfortunately requiring the stoppage of a considerable number of vehicles which are not part of any conflicting movement so long as traffic from the north on SW Flynn Street is under STOP sign control.

It is recommended that for a trial period of six months, that STOP signs be removed from the west and east approaches, and that a sign be installed approximately 75 feet east of the intersection to inform drivers from the east to SIGNAL YOUR TURN. This would be a white sign with black message. It should be at least 36" x 42" in size. This recommendation is made in the interest of allowing traffic to move with as little control as may be necessary to prevent accidents.

YIELD Signs - General

For practical purposes, a YIELD sign functions in the same manner as a STOP sign. It assigns the right-of-way at an intersection, but it allows movement on the controlled approach to continue if there is no cause for stoppage. However, they are not meant to be a widespread substitute for STOP signs. YIELD signs are most effective when used at isolated locations, and sparingly.

But, as with STOP signs, they should not be applied without study and deliberation. Section 2B-8 of the MUTCD lists several situations in which YIELD sign usage may be warranted.

YIELD Signs in Ankeny

There are no YIELD signs presently in place in Ankeny. However, it is recommended that a YIELD sign be installed on NW 5th Street on the approach to NW Linden Street and on SE Dalbey Road on the approach to SE Hulsizer Road.

Speed Limit Signs - General

The MUTCD in Section 2B-10 stipulates that:

> "The Speed Limit sign shall display the limit established by law, or by regulation, after an engineering and traffic investigation has been made in accordance with established traffic engineering practices. The speed limits shown shall be in multiples of 5 miles-per-hour."

The MUTCD further stipulates that:

"The standard Speed Limit sign shall be 24 inches by 30 inches."

The minimum size, 18 by 24 inches, is permissible for only relatively minor situations. Also, because the regulation prevails during dark hours, all Speed Limit signs shall be reflectorized. Considering the relatively small difference in cost of the material and labor involved in the installation of standard- and minimum-sized Speed Limit signs, coupled with the problems of stocking a supply of various sizes (along with the possibility of using the wrong size in the wrong place), it would seem to be advisable to use only the standard size for all locations.

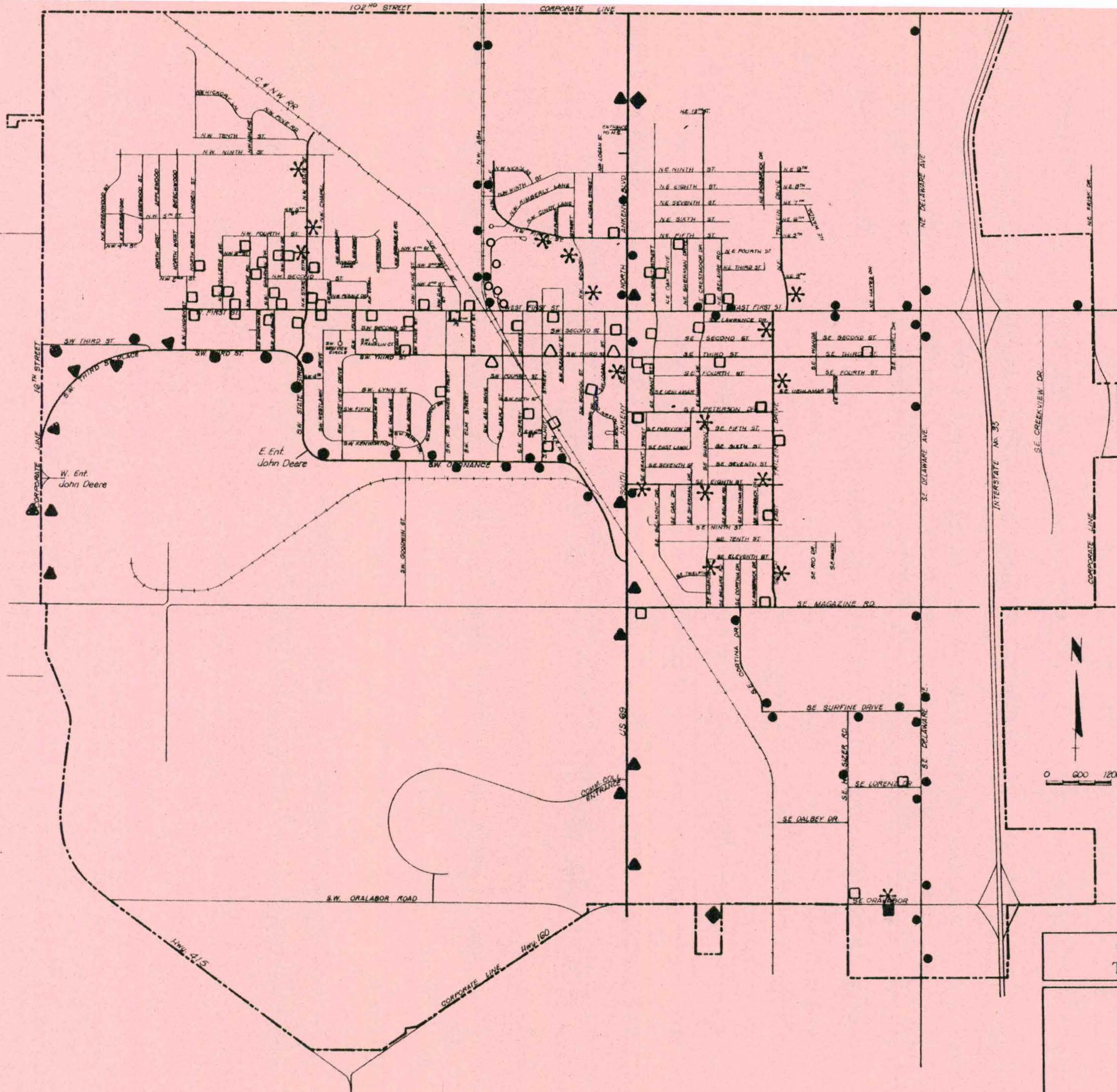
Speed Limit Signs in Ankeny

The posted speed limits in Ankeny vary from 10 m.p.h. to 55 m.p.h. There is a total of 133 signs throughout the City, distributed as shown in Figure E-4.

The various aspects of all the speed limit signs are shown in Table E-2.

As noted, over 76% of the speed limit signs are the substandard 18 x 24-inch size. Most of those should be replaced with standard 24 x 30-inch units, especially those on arterials.

While there appears to be an abundance of speed limit signs distributed reasonably well throughout the City, there are several locations, as noted on Figure E-4, where speed limit signs would be beneficial.



LEGEND

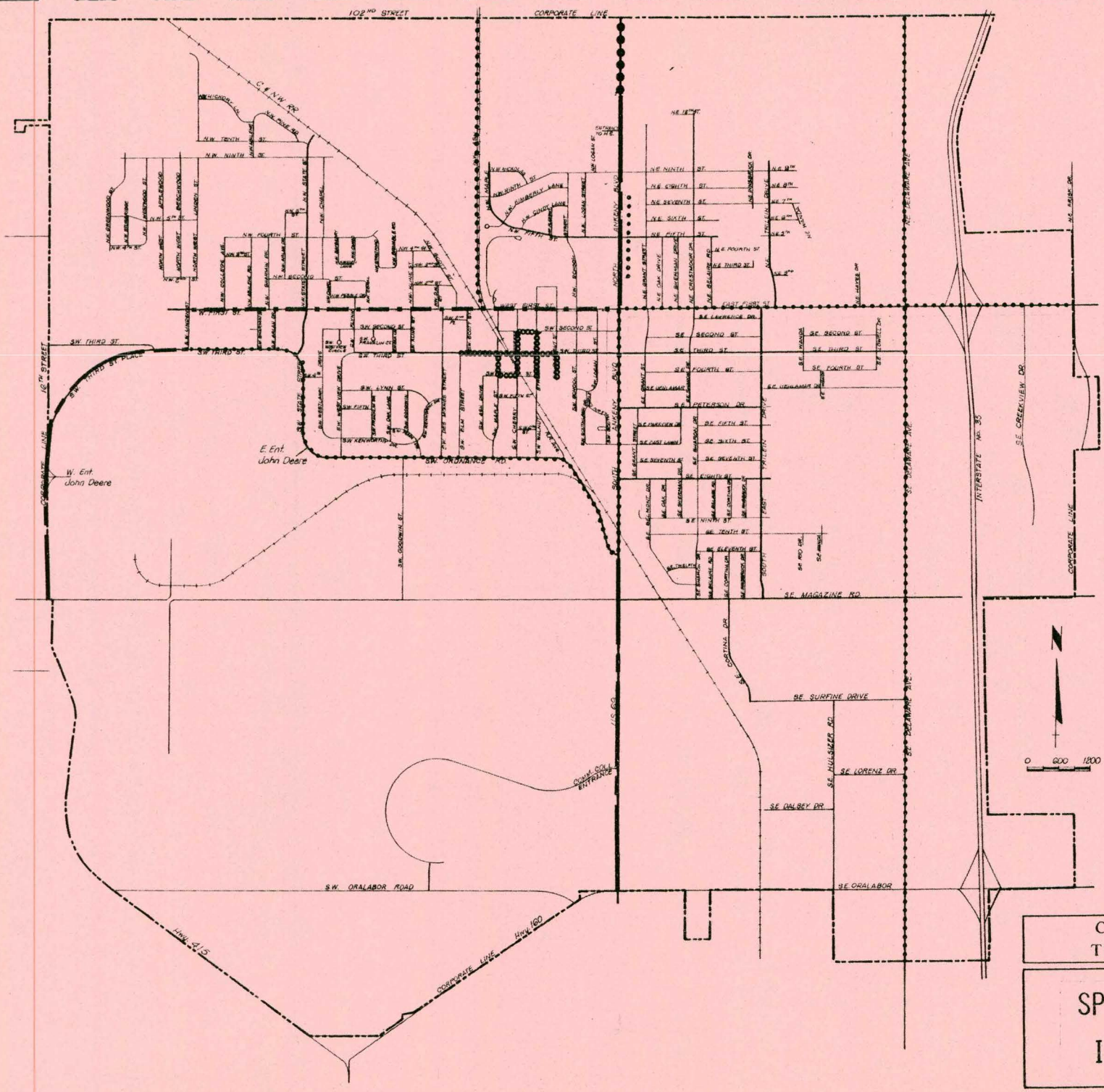
- o 10 MPH
- △ 20 MPH
- □ 25 MPH
- ● 35 MPH
- ▲ 45 MPH
- ■ 50 MPH
- ◆ 55 MPH
- ✳ Statutory Limit Sign to be added

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SPEED LIMIT
SIGN INVENTORY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE **E-4**



LEGEND

- 20 MPH
- 25 MPH
- 35 MPH
- 45 MPH
- 55 MPH

All unmarked streets are 25 MPH.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SPEED LIMITS STIPULATED IN THE MUNICIPAL CODE

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE E-5

TABLE E-2

SUMMARY OF SPEED LIMIT SIGNS

Speed Limit MPH	Sign Size	No. of Signs	Design and Fabrication*		Physical Condition	
			OK	NOT OK	OK	NOT OK
10	18" x 24"	5	0	5	100%	0%
20	18" x 24"	1	1	0	100%	0%
20	24" x 30"	2	2	0	100%	0%
25	18" x 24"	53	48	5	74%	26%
25	24" x 30"	2	2	0	100%	0%
35	18" x 24"	38	37	1	92%	8%
35	24" x 30"	13	11	2	77%	23%
35	36" x 48"	1	1	0	100%	0%
45	18" x 24"	5	1	4	0%	100%
45	24" x 30"	5	5	0	100%	0%
45	36" x 48"	5	5	0	100%	0%
50	24" x 30"	1	0	1	0%	100%
55	24" x 30"	1	1	0	100%	0%
55	36" x 48"	1	1	0	100%	0%
	Total	133	115	18	76.7%	23.3%

*According to MUTCD Standards

It should be noted that there are several variances between the posted speed limits and the speed limits stipulated in the City Traffic Ordinance. Figure E-5 shows the various speed limits set forth in the Ordinance. There is no provision for the 50 MPH limit posted on SE Oralabor Road, and the 35 MPH signs on SE Cortina Drive, SE Surfine Drive and SE Hulsizer Drive.

The validity of the 35 MPH limit posted on most of NW Ash Drive, and most of NE and SE Delaware Avenue is questionable. It does not appear to be in compliance with well founded principles and concepts involved in establishing reasonable and proper speed limits.

All arterial and collector streets should have the speed limit posted at least every four blocks in both directions. However, appropriate speed studies should be made to determine the proper speed limit.

Movement Series

Regulatory signs in this series are intended to provide drivers with information on turn controls, land usage, and other regulations that are pertinent, other than speed control, while the vehicle is in motion.

Movement Signs in Ankeny

Examples of this series of signs in Ankeny are shown in Figure E-1. There is a total of approximately 36 signs of this category throughout the City. The most prevalent relate to the NO U TURN regulations. All of the NO U TURN signs are the substandard 12 x 18-inch size with the

old-style word legend. All are reflectorized. It is recommended that all of these signs be replaced with the new standard symbol sign, 24 x 24-inch size.

The assortment of ONE-WAY signs at the intersection of SW 3rd Street and SW Walnut Street are not correct in design or location. They should be replaced with 36 x 12-inch, Type R6-1 signs installed closer to the corner and mounted higher as detailed on the reverse side of SID Sheet 100. A similar set of signs is recommended for the intersection one block north.

At the present time, there is one Type R5-1 symbolized DO NOT ENTER sign and one obsolete DO NOT ENTER sign in the City. Both are at the intersection of SW Walnut Street and SW 2nd Street. It is recommended that the obsolete DO NOT ENTER sign be replaced with a symbolic R5-1 and the existing R5-1 be moved from the center of the street to the edge. A sketch of the recommended signing plan can be seen on the reverse side of SID Sheet No. 75.

Miscellaneous Regulatory Signs

Parking Series

Parking signs and other signs which govern the stopping and standing of vehicles cover a wide variety of regulations. Many word combinations are necessary to fit local conditions. Logically, only general specifications can be prescribed. As stipulated in the MUTCD, the legend on parking signs shall state whatever regulation applies, but the design of the signs shall conform to the prescribed standards of shape, color, location, and

use. Furthermore, there should be uniformity in legend on those signs pertaining to a particular regulation. The general design specifications of parking signs are set forth in detail in Section 2B-29 of the MUTCD.

One of the important features of parking control signs relates to the time and space limitations of a particular regulation. If the regulation is required only during certain parts of the day and certain days of the week, the sign should impart that information. The use of single-headed and double-headed arrows is advisable to clarify the portion of the street on which the regulation is in effect or the extent of the restricted zone.

An in-depth evaluation of parking control signs was not made because of the large number of such signs in place and the diversity of situations. It was noticed, however, that many of the signs are nonstandard--some do not appear to be official.

Practically every block of streets in the City has some type of parking control. The general pattern throughout the residential areas, parking is banned on the east and north sides of the streets. It is prohibited on both sides on several of the more heavily traveled arterials. There are approximately 3400 signs relating to parking control throughout the City.

The approach ends of the medians at the several channelized intersections on S Ankeny Blvd. are delineated with a KEEP RIGHT sign and supplemented with a Type 3, 18-inch diamond shape Object Marker. Only one of the KEEP RIGHT signs is the new symbolized standard Type R4-7.

The other four are an older standard but are in reasonably acceptable condition. All of the object markers are a 5-button, yellow-on-black variety which is not in compliance with the standard calling for 9 buttons. The south approach to the median at the Oralabor Road intersection does not have any Object Marker.

There is a variety of 17 signs throughout the city relating to truck traffic. Six of the signs pertain to some sort of truck route on SW Cherry Street between W 1st Street and SW Ordnance Road. The present signing at either end of SW Cherry Street provides no information as to the destination of the truck route. In other words, on W 1st Street the sign should include information that the route connects with SW Ordnance Road, and conversely, on Ordnance Road the guide sign should relate to the W 1st Street connection.

There is also a truck route guide sign on SW 3rd Street near the intersection with SW Cherry Street that serves no purpose.

The other 11 signs relating to trucks are intended to ban truck traffic on certain streets. None of these signs are the new symbolized truck-exclusion signs. Nine of them are the old standard. Seven are properly reflectorized and two have no reflectorization. The nonreflectorized units should be replaced with the new symbolized units.

E-8 WARNING SIGNS

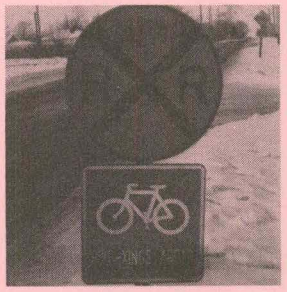
Warning signs are used when it is deemed necessary to warn traffic of existing or potentially hazardous conditions on or adjacent to the roadway. Warning signs require caution on the part of the driver and

may call for a reduction in speed or an appropriate maneuver. Because of the critical nature of the intent and purpose of warning signs, the respect of the motorist is a vital factor in the sign's performance. And, driver respect is attainable only from the proper use of the correct sign. However, the use of warning signs should be kept to a minimum, because the unnecessary use of them to warn of conditions which are readily apparent tends to depreciate the effectiveness of warning signs and, to some extent, helps foster disrespect for all signs.

Warning Signs in Ankeny

There are presently approximately 150 classified warning signs in place throughout the City, comprised of about 29 different series. Most of the various types of warning signs in the City are shown in Figure E-6. Several other warning type signs are in place but they are associated with school crossings and area protection and are discussed in Part G.

Most of the existing warning signs throughout the City are in reasonably good condition, properly designed, and have an adequate reflective surface. Most are also properly used and fulfill a need. However, there are several which are not correctly used, or are not properly placed with relation to the condition they pertain to. Some of the signs are unnecessary because the roadway features they relate to are visible and obvious, and accordingly, these signs are not needed. An example is the SIGNAL AHEAD warning signs when the traffic signals are clearly visible even before the warning sign is noticeable.



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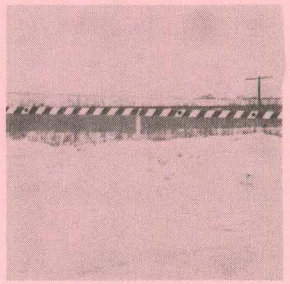

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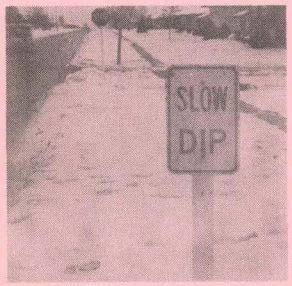

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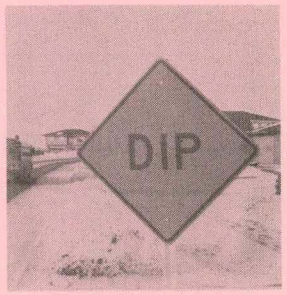

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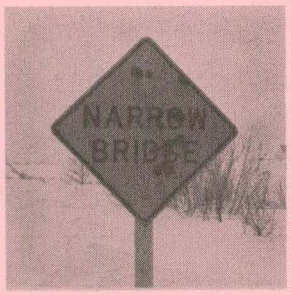

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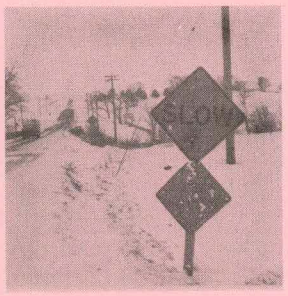


M

N

O

P

Q

R

S

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

EXAMPLES OF
WARNING DEVICES IN PLACE

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE E-6

COMMENTARY ON FIGURE E-6

A Top sign is proper W10-1 Railroad Advance warning sign, 36" standard, but not correct height. There are several locations in the City where this sign is improperly missing. The bottom sign, white on green, is nonstandard and unnecessary, should be removed. The correct standard (Sign C) is a short distance beyond.

B New symbolized SLIPPERY WHEN WET sign, AOK. There are 18 such assemblies throughout the City. The near sign DANGEROUS INTERSECTION is virtually worthless and should be removed.

C New symbolized sign, AOK. There are 19 such assemblies throughout the City.

D Many of the 11 such signs in the City are not properly used. All are substandard 24" size. Most would be better replaced with W14-2 NO OUTLET version.

E Nonstandard size, shape, and nonreflectorized.

F Typical barricades at street ends. Orange and white nonreflectorized panel, with 3 or 4 red reflector buttons. Panels should be reflectorized.

G Nonstandard, black on white. Should be W14-2 NO OUTLET.

H Type W3-1, AOK.

I This sign is OK but Type W4-2 symbolized version would be better.

J There are 9 such nonstandard 12" x 18" units, 5 are black-on-white, 4 are red-on-white. Should be as Sign K. DIP signs are not needed when traffic is stopped.

K Standard sign, OK.

L Should be replaced with new symbolized version.

M SLOW sign is not an accepted standard message. This assembly serves no actual need.

N Type W9-1L, AOK, but should be followed by W4-2 symbolized width transition sign.

O Assembly on SE Delaware Avenue is OK.

P Several such signs on S Ankeny Blvd., some are very deteriorated. Type W6-1 symbolized DIVIDED HIGHWAY is often used for similar situations.

Q This sign is unnecessary when traffic signal is clearly visible for a sufficient distance.

R The MUTCD indicates that these two signs should be displayed on separate posts.

S The need for this sign, on E 1st Street, is questionable. If there is a pedestrian crossing, the sign should be the Type W11-2 symbol form, a crosswalk should be marked on the pavement, and a companion sign installed for westbound drivers.

The sign inventory data compiled for each of the warning signs includes any necessary information where remedial action of a particular kind is recommended for those locations which are not totally in compliance with standards of design or usage.

As a result of the rapidly expanding street system throughout the City, there are numerous "stub end" streets 50 to 100 feet in length. Most of these dead-end situations are delineated with a single 6-inch by approximately 20 foot barricade panel. The panel is composed of white and orange diagonal stripes. Neither color is reflectorized. Some reflectorization is provided at a few of the locations with three or four red three-inch reflex buttons. This amount of reflectorization and the color are not in compliance with barricade standards. Instead, the entire surface of the panel should be reflectorized.

At a few of the locations, DEAD END signs are used at the terminal end of the roadway. This is a misuse of that particular sign which is intended to be an advance warning sign. The proper treatment for the termination of a street with no outlet is an 18 x 18-inch diamond shape sign with nine three-inch red reflectors on a black background or a solid red reflectorized surface. At some locations, the DEAD END signs are correctly used; however, many of these are the substandard 24-inch size. It is suggested that rather than use the DEAD END message on a warning sign for this particular situation, the legend NO OUTLET would be a much less ominous message.

A

B

C

D

E

F

G

H

NOTE: Signs A through G are nonstandard in design and usage. They vary in size, 12"x18", 18"x24", 24"x24". All are in residential areas, none are associated with schools. Sign H is the new Type W15-1 PLAYGROUND warning sign, and "...may be used only in advance of a designated childrens' play area..." MUTCD Ruling Sn-205.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

NONSTANDARD WARNING SIGNS IN PLACE RELATING TO YOUNG PEDESTRIANS

Hoskins — Western — Sonderegger
Lincoln, Nebraska

FIGURE E-7

Figure E-7 illustrates a variety of signs relating to "playing children" used at approximately 44 locations throughout the City. None of these signs are standard in design or usage. All of the signs are in residential areas and none are associated with schools. The intent of the sign probably is to warn motorists that they may encounter children playing in the street. The solution to that particular hazard, of course, is not to allow the children to play in the street. And, it is grossly wrong to entrust their safety to the very questionable effectiveness of a small sign along the side of the street. It is recommended that all of these signs be removed and that they not be replaced.

There are, however, several locations which are designated children play areas such as parks. It is recommended that on the approaches to those facilities, a new Type W15-1 symbolized PLAYGROUND warning sign be installed. The general details of this sign are illustrated in Figure E-7(H).

In addition to those warning signs which are presently in place, there are a variety of conditions and situations which should be called to the motorists attention with an appropriate warning device but where none are presently in place. Those locations and situations call for approximately 101 devices of various types. The types of devices and the locations where they are needed are defined in the SID Sheets and the Summary Sheets.

E-9 GUIDE SIGNS

Guide signs are those devices which inform the motorist along his route of other intersecting highways or routes, cities, towns, recreational facilities, historical sites, educational and other institutional facilities, and other important destinations. In cities, typical official guide signs relate to business districts, hospitals, parking facilities, recreational facilities, and street names.

For many drivers, the most important guide sign is the Street Name sign. Yet, it is one of the least effective signs in most cities. The design of the signs is frequently inadequate--the letters and numbers are too small, and the units are not reflectorized. Drivers often report the inability to utilize turn lanes properly because of a lack of advance notification. One of the most frustrating experiences a driver can have is to search for a particular street at night in an unfamiliar city without adequate Street Name signs. An adequate sign would be one that is legible under headlight illumination from a point which would allow the driver time and space to position himself properly for any necessary turning maneuver. On high volume arterials, the Street Name signs should be larger than the traditional units. In business districts and on other principal streets, there should be at least two assemblies placed on diagonally opposite corners, preferably on the far right-hand side for drivers on the major street. A complete set of signs on each corner of the intersection of two or more major roads can be very helpful.

Street Name signs throughout Ankeny are of excellent quality. The installations are neat and the mounting heights are proper. Considering the large volume of traffic and the prevailing operating pattern on Ankeny Blvd., street name guidance would be enhanced considerably with larger than standard-sized signs with assemblies on the near-right corners.

E-10 TRAFFIC CONTROL SIGNALS - GENERAL

A properly designed, operated and maintained traffic signal can be a very valuable device for the control and the safe facilitation of vehicle and pedestrian traffic. In most cases, a signal installation will operate quite definitely to either the advantage or disadvantage of the vehicles and persons controlled. Consequently, it is of the utmost importance that the selection and use of such an important control device be preceded by a thorough study of roadway and traffic conditions by an experienced engineer.

Signals which are installed for intersection control and crosswalk protection must comply with the pertinent requirements in the MUTCD relative to warrants for design and operation.

Traffic Signals in Ankeny

As shown in Figure E-2, there are seven locations within the City where traffic is controlled by a signal system. Six of the installations are at intersections and one is a crosswalk protection system. Five of the signalized intersections are along Ankeny Blvd., the sixth is at the

intersection of NW 16th Street and the west access to the John Deere Plant. A signal installation is scheduled for construction in the near future at the intersection of Ankeny Blvd. and SW Ordnance Road.

Along Ankeny Blvd.

The three northernmost installations on Ankeny Blvd., at 1st Street, 3rd Street, and Eastlawn Drive, have certain physical similarities but they are also different in some respects. The signals facing drivers approaching from both directions on Ankeny Blvd. consist of one over-the-roadway indication suspended on a mast-arm, and a far right and far left bracket-mounted signal supported on the mast-arm poles.

The overhead signals are comprised of three 12-inch sections, and the side mounted units have 12-inch red sections and 8-inch yellow and green sections.

The same combination of displays are provided for drivers approaching from both directions on 1st Street.

At the 3rd Street intersection, all of the indications for traffic on 3rd Street, are on a side mounted position in far-right and far-left locations. There is a mixture of indications in which some of the red sections are 12-inch and some are 8-inch.

At Eastlawn Drive, the Eastlawn approaches are the same as those on Ankeny Blvd.

With regard to pedestrian WALK - DONT WALK signals, there are none for any of the crosswalks at the 1st Street intersection. They are in place at both ends of all four crosswalks at 3rd Street and at each end for only the crosswalks on Ankeny Blvd. at Eastlawn Drive.

The control systems at all three of these intersections are the 2-phase, full vehicle-actuated type with pedestrian push-buttons for the pedestrian interval at the 3rd Street and Eastlawn Drive intersections. At the time of the inventory, only the system at 1st Street was operating in the actuated mode. The controller at 3rd Street and Eastlawn Drive were in a recall mode in which the controls operate on a continual pre-timed basis.

The cycle length varies at the 1st Street intersection according to the arrival of traffic. The dial settings at 3rd Street distributed approximately a 47-second cycle between the two streets with about 49% of the green time assigned to Ankeny Blvd. and 42% to 3rd Street. At the Eastlawn Drive intersection, the total cycle was approximately 40 seconds long with 60% of the green time assigned to Ankeny Blvd. and 40% to Eastlawn Drive. At the latter two intersections, the pedestrian phases were not operable at the time of the inventory. It was noted, however, that at both intersections the control system did not provide for a flashing DONT WALK interval which is the prescribed and required pedestrian clearance interval under current standards. At each of the intersections, the yellow interval was followed by a 2 to 3-second "all red" interval. The yellow clearance intervals throughout were 3 to 3 1/2-seconds long which generally is adequate for the prevailing conditions.

As discussed in Part C in connection with the traffic accident experience at these three intersections on Ankeny Blvd., there are

indications that the situation might be improved if signal visibility could be enhanced by displaying at least two indications over the roadway on each approach. This includes the side street approaches at each of the intersections also.

As part of the proposed modifications of the roadway on Ankeny Blvd. as discussed in Part D, it is recommended that the traffic signal systems at these three intersections be modified with regard to not only the overhead position of the vehicle signals but the installation of pedestrian signals at 1st Street for all crosswalks and for the two crosswalks on Eastlawn Drive.

The signal system modification should also include provision for a signal for the left turn lane at each of the intersections so as to provide for a protected left-turn movement with a separate signal interval if left-turn lanes are provided.

The signal installations on Ankeny Blvd. at the intersections with the east entrance to the Community College area and at Oralabor Road, are a high type, modern installation. At both intersections, two vehicle signals on each approach on Ankeny Blvd. are mounted on mast arms over the roadway, and are very visible to approaching traffic. There is only one overhead indication on the crossroad approaches at each intersection supplemented by a far-right bracket-mounted assembly. At both intersections, the control systems are fully actuated with special protected left-turn signals on Ankeny Blvd. The controls are designed to allow concurrent movement of compatible phases of operation.

At the time of the inventory, at the Community College access road intersection, the green indications for traffic approaching from the north consisted of straight green arrows in both overhead signals. This technically meant that traffic could not turn right from the north into the College area without violating, except against the red light while the green was displayed to the west. The incorrectness of the situation was brough to the City's attention and the lenses were promptly changed to solid green lenses.

With the completion of the pending installation at the intersection of SW Ordnance Road and Ankeny Blvd. and the possible installation of a system at the 9th Street intersection at some time in the near future, there could be seven signalized intersections along Ankeny Blvd. If Ankeny Blvd. is widened to provide the five lanes as recommended, the segregation of left turning vehicles throughout the length of the route would be possible. It would then be possible for traffic to travel the full length of the roadway within the City without stopping, provided the controls at the signalized intersections were interconnected and coordinated for progressive movement.

It is, accordingly, recommended that as part of the overall improvement of Ankeny Blvd., a system of interconnection be installed which will allow the coordinated timing of all of the intersections in such a way that traffic can possibly move through all of the intersections without stopping. It is estimated that such a system would cost approximately $75,000, which would include complete, new control systems for the three northernmost existing installations.

This investment toward the attainment of efficient traffic operation on Ankeny Blvd., for what appears to be an ever increasing amount of traffic volume, could be amortized over a comparatively short period of time in terms of benefits to the motorists in time and fuel consumption and a likely reduction in accidents. Also, the environment would benefit from a decrease in the emission of air pollution by vehicles which is accentuated during the acceleration, idling and acceleration stages of operation.

NW 16th Street and West Access to John Deere Plant

The signal installation at this intersection is reasonably adequate. The display of signals on each of the three approaches consist of one mast-arm supported unit and one pole-bracket mounted head. The overhead units are 12-inch sections and the bracket mounted heads are 8-inch sections. The overhead unit facing north has four sections. The bottom section contains a left green arrow which is not operating at this time.

The control is a semi-actuated type with the vehicle detector on the Plant access road, approximately 210 feet east of the intersection. In that location, both right and left turning traffic passes over the detector. Actually, only the left turns should be detected since right turning vehicles do not need the signal to assist them. The present situation frequently results in right turning traffic unnecessarily stopping southbound traffic. In connection with a plan to improve the efficiency of traffic movement through the area, it is recommended that the detector be relocated as shown in Figure D-8, Part D.

W 1st Street near SW Maple Street

This installation is a pedestrian, push-button actuated system for the protection of the crosswalk on W 1st Street near the Municipal swimming pool. The vehicle signals consist of two pedestal-mounted pole heads displaying 12-inch red indications and 8-inch yellow and green indications on each approach. Nine-inch pedestrian signals are on each end of the crosswalk.

The electric service was disconnected at the time of the inventory and there has been no opportunity to evaluate the system operation. In any event, experience indicates that much more security results with the vehicle signals displayed over the roadway.

In Part F in connection with school crossing protection, pedestrian signals are recommended for several crosswalks. The type of installation proposed is shown in Figure F-2. It is recommended that the system at this location be modified to place the vehicle signals over the roadway and to assure it functions in the prescribed interval sequence as described in Figure F-2.

E-11 PAVEMENT MARKINGS - GENERAL

Markings have definite and important functions to perform in a proper scheme of traffic control. In some cases, they are used to supplement the regulations or warnings of other devices such as traffic signs or signals. In other instances, they are used alone and produce results that cannot be obtained by the use of any other device. In

such cases they serve as a very effective means of conveying certain regulations and warnings that cannot otherwise be made clearly understandable.

Markings which are to be effective at night must be reflectorized. And to be satisfactorily effective at all times, the line should be refurbished with sufficient frequency to be bright continually.

The pavement markings most common to cities are center lines and lane lines, crosswalks, arrows and approaches to railroad crossings. Center lines on two-way roadways can assume two different configurations. First, on a two lane, two-way road, the center line is a dashed yellow line. On a two-way, multi-lane road, the center line is a double yellow road. Lane lines on multi-lane roadways are dashed white lines.

Pavement Markings in Ankeny

The inventory of pavement markings in Ankeny revealed that there is an alarming shortage of the basic markings on the major streets throughout the City. The markings on Ankeny Blvd. were in compliance with standards of design and usage but they were in need of refurbishing at the time of the inventory which was in the spring prior to the advent of the new striping season. Oralabor Road between I-35 and Ankeny Blvd. was properly marked but, there too, the markings needed refurbishing.

Center line and lane line markings were noticeably lacking on all of the other major streets throughout the City. Crosswalk lines were evident at some locations but were weak in appearance in most cases.

In connection with the intersection of W 1st Street and State Street a special marking plan has been developed and discussed in Part D. A special marking plan was also devised for the intersection of NW 16th Street and the intersection with the access road to the west entrance to the John Deere Plant and, also, the west approach to the intersection of SW Ordnance Road and Ankeny Blvd. Section 3B-16 of the MUTCD requires that certain prescribed pavement markings be placed on paved approaches to all railroad-highway (street) crossings, except at minor crossings in urban areas if an engineering study indicate other devices in place provide suitable protection. Proper markings are in place in connection with only two of the several crossings in Ankeny. The subject is covered in depth in Part G.

There is one pavement marking that is exclusive to the City of Ankeny. This is the silhouette of the bicycle and the two directional arrows painted on the roadway surface frequently along the designated bicycle routes throughout the City. The symbolism in the marking shown in Figure D-10 does not comply with recommended standards with regard to design, which includes the silhouette of the bike rider.

As mentioned previously, pavement markings are going to be only efficient and effective as they are visible to the motorist. Their absence can result in a serious gap in the information that drivers must have in order to use the street system safely.

PART F

SCHOOL CROSSING AND AREA PROTECTION

F-1 GENERAL

Certainly, a prominent part of any comprehensive traffic safety program in a city must be the safety measures involved in school areas and crossings.

The responsibilities of providing protection at school crossings are very significant when they are fully realized. The accountability is complicated by the interplay of numerous, but little understood factors. But the subject matter -- the safety of young children -- warrants urgent attention to a study of all possible knowledge and experience on it.

It is readily understandable that whenever the newspapers or other news media carry an account of a traffic accident in which a child was struck by a motor vehicle, a great deal of concern is expressed. If the child happens to be going to or coming from school, a hue and cry arises from parents, PTA groups, and others with a demand for signs, signals, or anything to "protect" the children. This reaction is also readily understandable. However, sentiment and emotion too often to not allow the realities of a situation to reveal the true nature of this kind of problem.

F-2 SCHOOL CROSSINGS AND THE TRUE PROBLEM

Since schoolchildren must often cross vehicular traffic at intersections which seem especially hazardous, it has become common practice

to designate these intersections as "school crossings" and to provide some method of traffic control as extra protection at that point. It is felt that the child of elementary-school age is not yet sufficiently mature to be held responsible for his own safety; hence, traffic control is installed to augment the child's immature judgment. This is especially true for children in the first four grades.

Possibly as evidence of the effectiveness of this theory, less than one-fourth of all traffic accidents involving school-aged children occur during the hours that this extra protection is in effect. Yet, this one statistic points out equally well that school protection alone is not the answer to the problem of the child's safety at all times.

Walking to and from school is not the only occasion during which a child is exposed to the potential hazard of vehicle traffic. He may cross streets to go to a friend's house, the playground, swimming pool, or for any one of a myriad of reasons. During the summer months and vacations, and after school hours, the "schoolchild" is in the same position as any adult pedestrian. It is for this reason that the child must be regarded as a young pedestrian at all times.

We adults are often very inconsistent in our thinking and actions in matters of traffic safety involving our young children. How else do we account for the frequent occasions when a complaint is made by parents that their child cannot safely walk across a street because of heavy or high speed traffic, but the same child has a bicycle and rides on the same street among the same traffic.

F-3 THE PROBLEM IN PERSPECTIVE

In dealing with problems involving the welfare of small children, it is very difficult to maintain a completely objective approach. As a result, many schemes of school protection have been devised in an emotional reaction to a traffic accident in which a small child was involved. Based only on a desperate desire to insure the safety of the schoolchild, these attempts have generally only shifted all or most of the responsibility to the motorist. While this emotional reaction may be completely natural, no traffic problem can be solved by mere delegation of responsibility in the case of an accident.

Another phase of this emotional approach occurs late each August or during the first part of September. The reasons for this annual "uprising" are quite apparent and, again, quite natural. At these times, parents and school officials are becoming aware that school will soon open and the children will again be crossing traffic on their way to and from school. The objective, of course, is to make certain that the children will be as safe as possible. The irony in this situation is that the same children whose safety is such a great issue in August and September are, in the main, the same children who have been ignored throughout the summer when no "school protection" could logically be given. School protection is in effect for only a few hours a day and, then, only during the days when the child is in school. It must be recognized that every street is potentially dangerous at all times.

In order to better understand the overall nature of the problem in more definitive perspective, the following summary of a few pertinent facts are derived from recent records of the Iowa Department of Public Safety. The purpose of these data is not to minimize the importance of the school crossing but, rather, to point out the broad range of the problems involving the safety of young pedestrians, rather than thinking just in terms of "schoolchildren".

- Slightly over 50% of all pedestrians involved in accidents were under 15 years old.
- Almost half of those were in the 5 to 9 age-group.
- Only about 11% of the "under-15-year-olds" were involved while crossing a road at an intersection.
- Generally 70 to 75 percent of the accidents involving pedestrians under 15 years old occurred during those days and hours when children are not normally going to or coming home from school.

The main point of these data is that the "protection" problem extends far beyond those occasions involving school attendance. Every street, every intersection, and every approaching vehicle is, at all times, a potential hazard. It follows, then, that the protection provided for the "schoolchild" should include elements which contribute to the child's safety training and which foster good pedestrian habits so that the child is better prepared for his citizen's role of a pedestrian.

Most schoolchild-protection systems involve attempts to control only vehicular traffic, generally to stop it. It is believed by many

that by stopping vehicular traffic, the ultimate in safety has been achieved. In any system which is based on the stopping of vehicular traffic, it is absolutely necessary that every single vehicle come to a stop. The lone violator is just as hazardous to the child as if there were numerous violators. The very real possibility of such a violation should be sufficient reason to question the merits and adequacy of this system. Unfortunately, it is a fact that no stop sign or stop device has been found which will assure the stoppage of 100% of the vehicles 100% of the time that it is in effect. Another point for consideration is that a system based on vehicle stoppage contributes nothing to the training of the child. Under such a system, the sole responsibility for the child's safety at the particular location is assigned to the motorist. The child does not have to judge or evaluate the traffic stream to determine if it is safe to cross. The system fosters a false sense of security in that the children have a tendency to step off the curb without looking in either direction because they think that they are protected by a stop sign or signal and that we adults are going to do as we are told. This becomes a habit which carries over to other intersections or crossings not so protected.

The stop system is also inconsistent in that the protection is afforded at only a few, not all, crossing points; only during certain days, not every day; and during only approximately three hours of such days. At all other times and places, the child is on his own.

The stop system has contributed considerably in developing the ill feeling and disrespect which many motorists have toward traffic

control devices. The requirement to stop at a school crossing when no child is in sight is an imposition which every motorist justifiably condemns. Numerous studies at school crossings reveal that from 80 to 95% of the traffic that is stopped does so unnecessarily.

There is another element which is generally not recognized as existing in connection with the stop system. The sudden and unexpected stopping of vehicles in the path of normally free-flowing traffic is a very prominent cause of accidents. Serious accidents have resulted at school crossings when one vehicle unexpectedly stopped and was hit in the rear by another which was following. This practice, wherein we attempt to eliminate one type of accident but actually promote and encourage another type, is most inconsistent with the community interest toward increased traffic safety.

There is probably no aspect of traffic control and safety that, over the years, has promulgated a more diversified array of designs of signs and signals, and combinations of them, than in the efforts to develop ways and means of protecting children on their way to and from school. The constant search for better and more secure protection has produced many devices which are gross deviations from established standards. Numerous ones have the appearance of "Rube Goldberg" contraptions. In too many instances, such devices have not been removed when it became apparent that they had failed in their intended purpose. It is quite probable also that an objective study of the effectiveness of some of the systems was never made.

In any event, too many of the nonstandard, ineffective devices remain in use, and rather than promote safety, they have fostered attitudes and actions on the part of both drivers and pedestrians which have had deleterious effects.

The importance of uniformity in traffic control devices, or the use of similar controls for similar situations, is a well-established principle in the attainment of safety for vehicles and pedestrians.

Nationwide efforts in matters pertaining to uniformity in the design and application of traffic signs, signals, and pavement markings are manifested in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). This 375-page document sets forth standards of design, application, warranting criteria, and maintenance for all types of devices used for the purpose of informing, warning, guiding, and regulating drivers and pedestrians.

In recognition of the importance and the vital and sensitive nature of school area and schoolchild protection, the Manual contains a separate, but complete part on this subject.

The need for standards is succinctly spelled out in the introductory statement to Part 7:

> "Traffic control in school areas is a highly sensitive subject. If all the demands of parents and others were met, there would have to be many more police and adult guards for school duty; and many more traffic signals, signs, and markings. Such demands, however, are not always in line with actual needs.

"Analyses often show that at many locations, school crossing controls requested by parents, teachers, and other citizens are unnecessary and costly and tend to lessen the respect for controls that are warranted. It is, therefore, important to stress the point that regardless of the school location, safe and effective traffic control can best be obtained through the uniform application of realistic policies, practices, and standards developed through engineering studies.

"Pedestrian safety depends in large measure upon public understanding of accepted methods for efficient traffic control. This principle is never more important than in the control of pedestrians and vehicles in the vicinity of schools. Neither schoolchildren nor motorists can be expected to move safely in school zones unless they understand both the need for traffic controls and the ways in which these controls function for their benefit.

"Nonuniform procedures and devices cause confusion among pedestrians and motorists, prompt wrong decisions, and can contribute to accidents. In order to achieve uniformity of traffic control in school areas, comparable traffic situations must be treated in the same manner. Each traffic control device and control method described in this part fulfills a specific function related to specific traffic conditions.

"The type of school area traffic control used, either warning or regulatory, must be related to the volume and speed of traffic,

street width, and the number of children crossing. For this reason, the traffic controls necessary in a school area located on a major highway would not be needed on a residential street away from heavy traffic. Yet, the important point to be made is that a uniform approach to school area traffic controls must be developed to assure the use of similar controls for similar situations (which promotes uniform behavior on the part of motorists and pedestrians)."

One of the important provisions of Iowa laws pertaining to motor vehicles, specifically Section 321-252, stipulates that all agencies responsible for the installation and maintenance of traffic control devices shall do so in compliance with the standards prescribed in the cited Manual. There is the implication in both State and Federal regulations regarding the assignment of street and highway construction funds that compliance with the MUTCD is mandatory.

As was pointed out, the school crossing problem cannot be stereotyped to the extent that the same type of control can be applied at every school crossing location. The ultimate treatment of a school crossing problem should be based on measured facts, soundly interpreted on an engineering basis. This means that any school crossing problem must be investigated and studied to determine, first, if a problem actually exists, secondly, the extent of the problem, and next, the type of control which should be applied as determined by the facts.

Inevitably, delving into the problems of schoolchild protection raises such questions as: When or under what conditions are we justified

in using devices which stop vehicular traffic--and--What kind should they be and how should the system function?

It is basic and logical reasoning that the only time it is necessary to stop or interrupt the flow of traffic on a street or highway to allow a pedestrian to cross is when the traffic on that street or highway is so heavy that there are no intervals or gaps between vehicles which are adequately long so that the pedestrian can cross safely, or when adequate intervals or gaps arrive so infrequently that the waiting would cause intolerable delay. The basic element is the time interval between vehicles arriving at the crosswalk. This is illustrated by the fact that a pedestrian on a corner, waiting to cross a street seeks the answer to only one question -- "Do I have time to cross before the next car arrives?" In essence, then, whenever we walk across a street, our first effort (if we proceed prudently) is directed toward any approaching vehicles. Our "mental" calculator estimates the width of the street and divides that by our assumed walking speed to estimate how much time we will require to cross the street. These, of course, are not deliberate arithmetical calculations with definite numbers. It is quite an abstract process, but it does provide us with a basis for making a decision in comparing our assumed crossing time and the amount of time we have "calculated" before the arrival of the next vehicle from either direction. In making those "calculations", we call on our experience in estimating how far away the approaching vehicle probably is. And, equally important, we try to approximate its speed. This gives us the necessary gap information.

Obviously, experience plays an important part in making pedestrian-survival decisions. It is, of course, vitally important that young children develop this ability as soon as possible, because they are not protected at every point on a walking trip.

F-4 SCHOOLCHILD--OR YOUNG PEDESTRIAN?

When we objectively take into account the traffic accident facts as regards the involvement of children of school age, it appears that the problem has been mislabeled in calling it a "schoolchild" problem, thereby inferring the problem is prompted by school attendance. Perhaps more could be accomplished toward preventative and corrective measures if these children were regarded not as schoolchildren but rather as "young pedestrians".

We must bear in mind at all times that school attendance accounts for only one of the many occasions when children become part of the traffic stream, and the problem exists regardless of the occasion.

As young pedestrians, they should be trained in and imbued with the principles of traffic safety to such an extent that the presently predominent accident causations such as crossing against traffic signals, crossing from between parked cars, and playing in the roadway are minimized. Also, it is a fact, not generally recognized, that many children are injured, and in too many instances are killed, when they run into the sides of moving vehicles.

Actually, the concept of coping with this problem in terms of dealing with young pedestrians appears to be the only logical concept if we are ever to reduce the accident toll involving young people.

The solution to the problem, therefore, does not rest predominantly in the strict control of street or highway vehicular traffic. The solution lies more in the development of an informed child as to proper walking habits and as to the hazards which exist on every street and highway. A sound safety educational program in both the school and the home will contribute much toward the protection of our children through the development of their own initiative and their own vigilance.

F-5 EVALUATING THE CROSSING AND DETERMINING THE NECESSARY DEGREE OF PROTECTION

The basic questions to be explored are (1) what is a School Crossing? and (2) when should a sidewalk projection across a street become a designated School Crossing?

Theoretically, every street crossed by a child enroute to or from school is a school crossing. Obviously, not every crossing point can be a designated and protected crossing. To do so would be overusing, and thereby misusing, the various protection devices and systems.

The issue essentially resolves into one of vehicle volumes and the number of school children involved at any particular location. The degree of protection which can be justified is balanced against the number of vehicle-pedestrian conflicts, along with the effects of a few other factors such as vehicle speeds, sight distance and roadside development.

The range in the degree of protection which may be considered varies from:

- None, except for the regular statutory pedestrian rights-to;
- Painted crosswalk and supplemental crossing and advance warning signs-to;
- A designated crossing supplemented by an adult guard during peak periods-to;
- Temporarily placed STOP signs during peak periods-to;
- A traffic signal control especially adapted to pedestrian protection-to;
- The complete separation of vehicles and pedestrians with an overpass or underpass structure.

Economic feasibility is, of course, always a strong influencing consideration. Accordingly, many cities have developed a school crossing protection policy.

In evaluating a crossing situation to determine whether or not there is a pedestrian problem, one of the primary elements studied is one of vehicle headways or the time-space measurement between vehicles passing through the intersection from both directions. Also considered are pedestrian volumes, the extent of the intermingling of different student-age groups, vehicle speed, and sight distance for both drivers and pedestrians.

A frequently overlooked factor which generates some serious "built-in" problems is the situation that develops when a school crossing is used by students of all ages. The protection needs and pedestrian

demeanor is vastly different for elementary-, junior high-, and high school-age students. The older students simply will not comply with safety provisions which they may regard as intended for just the "little kids". Unfortunately, the little kids are greatly influenced by the older children and often try to emulate them, which can cause trouble since the younger ones lack pedestrian experience and judgment. Generally, protection deemed necessary and provided for children under 10 years old will be regarded with disdain by older students. This interplay of different standards of pedestrian conduct at a school crossing site can, and generally does, have very detracting effects in any effort to protect young children.

The study of the time and space between vehicle arrivals at the crossing point is made by actual measuring and recording of the time in seconds between vehicles. A representative and statistically valid sample of the traffic stream is measured during the critical periods of the day. The procedure includes the calculation of the minimum length of a gap in traffic which will permit the safe crossing of a roadway of a specified width. This factor is known as the Adequate Gap Time (AGT). It includes both the perception and reaction time normally required to appraise the traffic situation and the time needed to walk across the roadway without a hazardous conflict. A perception and reaction time of three seconds is usually sufficient for a child to check both directions, make a decision, and start to walk. A walking speed of 3.5 feet per second is used in determining crossing time.

After the Adequate Gap Time has been established, the array of vehicle headways is studied to determine how frequently an AGT arrives.

When the delay between adequate gaps becomes excessive, children may become impatient and endanger themselves by attempting to cross the street during a gap too short to be safe. The maximum delay a child should be expected to accept willingly should be no greater than he would have to wait if the intersection was signalized and he arrived at the beginning of a RED or DONT WALK interval. As a general rule, but there may be exceptions, some form of stop control is deemed essential when the number of adequate gaps in the traffic stream, during the period when the children are using the crosswalk, is less than the number of minutes in that period of time. In other words, safe gaps arriving less frequently than one per minute represent an unsatisfactory situation.

If it is found that there is a shortage of safe gaps or that there are other conditions which warrant a programmed stoppage of vehicles, then a system using standard traffic signal equipment should be applied and adapted to the situation.

F-6 SCHOOL RELATED SAFETY PROBLEMS IN ANKENY

General

One of the initial efforts in this phase of the total traffic study was a conference with school officials including the Principals of the four public elementary schools so as to have the benefit of their input relative to the nature and scope of any specific problems.

Subsequently, a Young Pedestrian Safety Questionnaire was distributed to the parents of all elementary-school students.

Next, all school areas and designated school crossings were studied in depth, existing protective measures were inventoried and evaluated. Examples of the various devices presently being used along with others that are proposed are shown in Figure F-1. Data on vehicular and pedestrian traffic was compiled at some of the locations where stop devices are presently being used to determine the validity of a regulation.

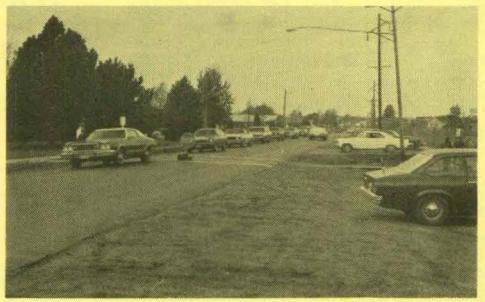
There are several features of the existing protection system generally prevalent throughout the city. First, with the exception of those devices installed by the State DOT forces on Ankeny Blvd. north of 1st Street, there is almost a total absence of standard Type S1-1 Advance School signs described for designated school crossings and school areas, and Type S2-1 School Crossing signs. Secondly, there is a liberal use of roll-out STOP signs. Such devices are used at eight locations. Adult guards are stationed at five of the crossings involving high volume arterials during the morning and afternoon periods. These guards place and remove the roll-out STOP signs. At the other three locations, which are near the schools, student patrol members place and remove the roll-out STOP devices.

Traffic conditions at only five of the eight locations appears to be such that some type of stop device is justified in the interest of providing safe crossing opportunities for young students. It is recommended that the roll-out device at each of those five locations identified

A Assembly recommended for approaches to designated school crossings--36" S1-1 sign and 24" panel.

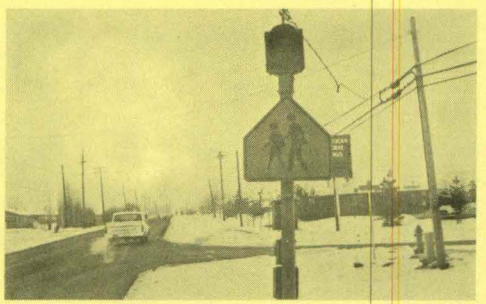
B 36" Type S1-1 Advance School sign for use on approaches to school areas.

C 36" Type S2-1 School Crossing sign for use at designated crossing point.

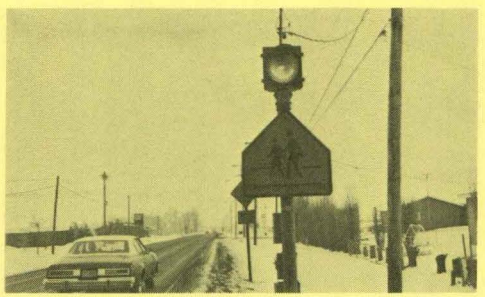


D Typical roll-out STOP sign used at 8 locations in Ankeny.

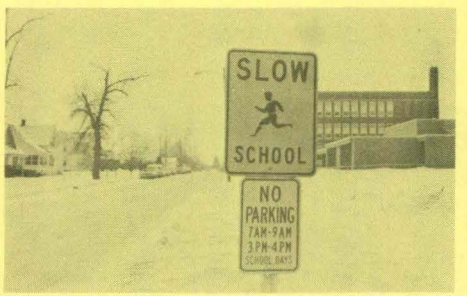
E Nonstandard sign on W 1st St.-should be 36" Type S1-1.



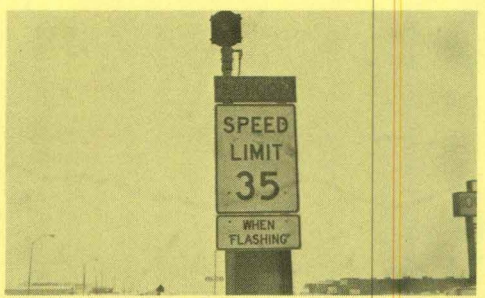
F Assembly on E 1st St., 30" Type S1-1 sign should 36" size and add panel as in Sign A. Yellow flasher operates correctly-morning, noon, afternoon periods.



G Assembly on E 1st St., 30" Type S2-1(incorrect usage) should be Sign A assembly. Flashing beacon is on continuously-incorrect usage.



H Nonstandard sign near Junior-High--Should be 36" Type S1-1(Sign B).



I Assembly on N Ankeny Blvd. Operates on Schooldays 7-9am, 11am-1pm and 3-5pm.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL RELATED
TRAFFIC DEVICES

Huskins — Western — Sonderegger
Lincoln, Nebraska

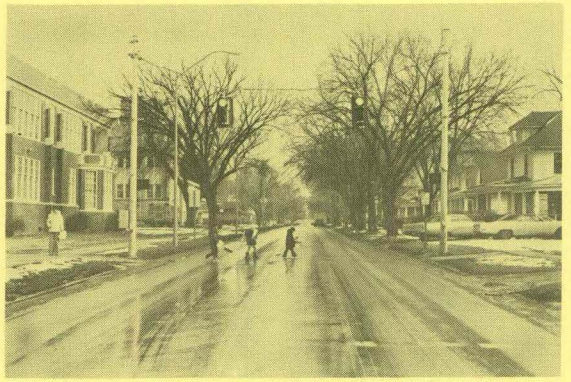
FIGURE F-1

in Section F-7 be replaced with a pedestrian-actuated traffic signal system. MUTCD warrants for such control are fulfilled at each location with regard to pedestrian ramp size, and the lack of adequate gaps in the traffic stream. Typical installation and some of the details of the recommended type of system are shown in Figure F-2. See Addendum F-1, page F-54.

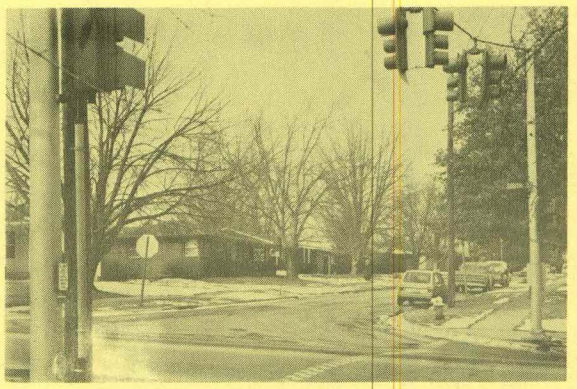
Pedestrian signals, installed as recommended and properly operated, will eliminate several serious problems generally associated with roll-out STOP signs:

- Roll-out STOP signs are often not in place for children arriving at the crossing early or late. The signal is always there, ready to provide protection, any time of the day--even for nonschool purpose during nonschool days and months.
- Vehicular traffic is stopped only when a child--or even adult--is present to begin a crossing.
- A roll-out STOP sign in the center of the road is not where drivers expect to find a control device. Generally, the sign is visible only to the first driver in a line of vehicles which is a potential source of rear-end collisions. Traffic signals are much more visible.
- Drivers are understandably resentful of having to stop for roll-out devices when there are obviously no children in view. It is not uncommon for drivers to violate such devices when it is apparent a stop is unnecessary. A system which generates willful violations is a very questionable means of attaining traffic safety. It is not unusual to encounter roll-out STOP signs in use during hours when it is obvious the person responsible forgot to remove them or was involved in some other "more important" activity.

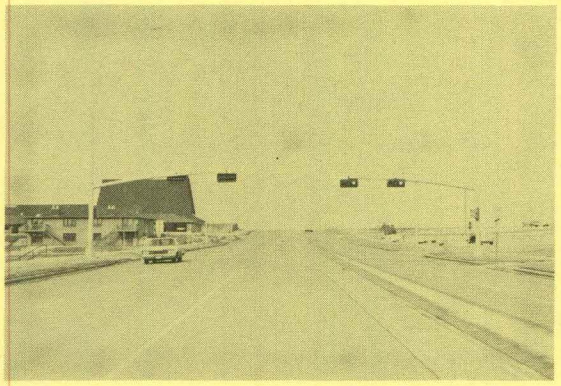
A Typical span-wire supported school crossing signal on a two-lane arterial, approximately 75 feet from intersection.



B Midblock location adjacent to school building.



C View showing some assembly details of a typical installation.



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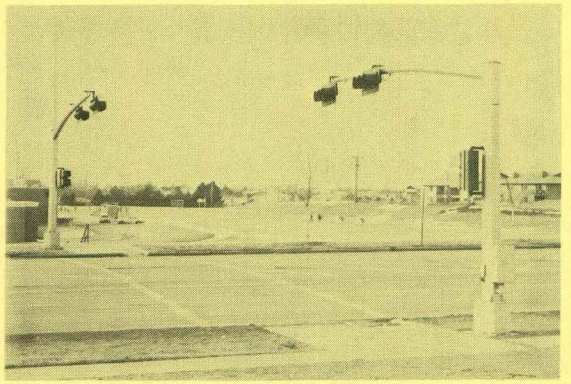

E

A high-type installation near a school on a 4-lane divided arterial.

PEDESTRIAN SIGNAL SYSTEM
CONTROL DETAILS

INTERVAL	VEH. SIGNAL		PED.SIGNAL	
	Shows	Time*	Shows	Time*
1-REST	G	45(1)	DW	
2	Y	3	DW	
3	R	3	DW	
4	R	10	W	10
5	R	9	F/DW	9
1	G	45	DW	

* Typical interval lengths(seconds) for 31' street and 70-second cycle.

(1) Minimum time before control will respond to a pedestrian call(push-button actuation). Repeated calls will not extend length of the WALK interval.

CITY OF ANKENY, IOWA
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EXAMPLES AND DETAILS OF
TYPICAL SCHOOL CROSSING SIGNALS

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FIGURE F-2

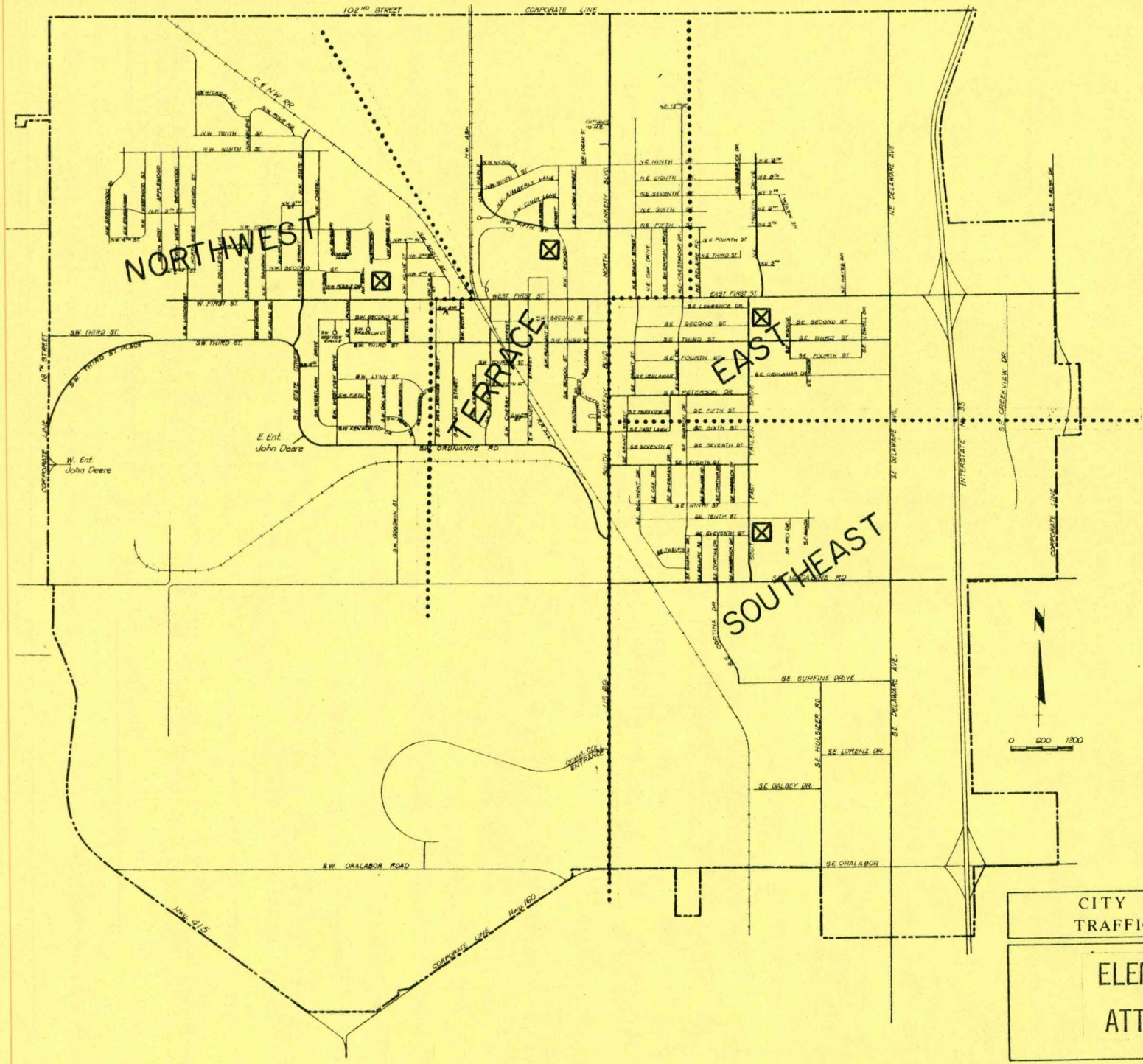
- Young people develop bad pedestrian practices where roll-out devices are used. They have a tendency to be much more inattentive--a habit which carries over to other locations and times where such "protection" is not available to them.
- The placement and removal of roll-out devices requires time, and if a school custodian or hired adult crossing guard is involved, translates into costs.
- The City presently is expending approximately $10,000 annually for adult guards at five locations for security which is not always available. Pedestrian signals could reduce that expense.

F-7 INDIVIDUAL SCHOOL AREAS - CRITIQUE

A discussion of the situations specifically at each of the school facilities follows. The attendance area of each school is shown in Figure F-3. The crossing and area protection devices both existing and recommended as shown in the area signing plan for each school are identified according to the illustrations in Figure F-1.

Northwest Elementary School (Figure F-4)

The traffic safety problems associated with this area are centered on W 1st Street, principally directly in front of the school. The only designated crossing in the area is in front of the school, and the only identification of this crossing is the roll-out STOP sign which is placed in the center of 1st Street during the morning, midday, and afternoon periods to provide for the surges of student traffic. The traffic scene during these periods is one of extreme congestion because of the



CITY OF ANKENY, IOWA
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ELEMENTARY SCHOOL ATTENDENCE AREAS

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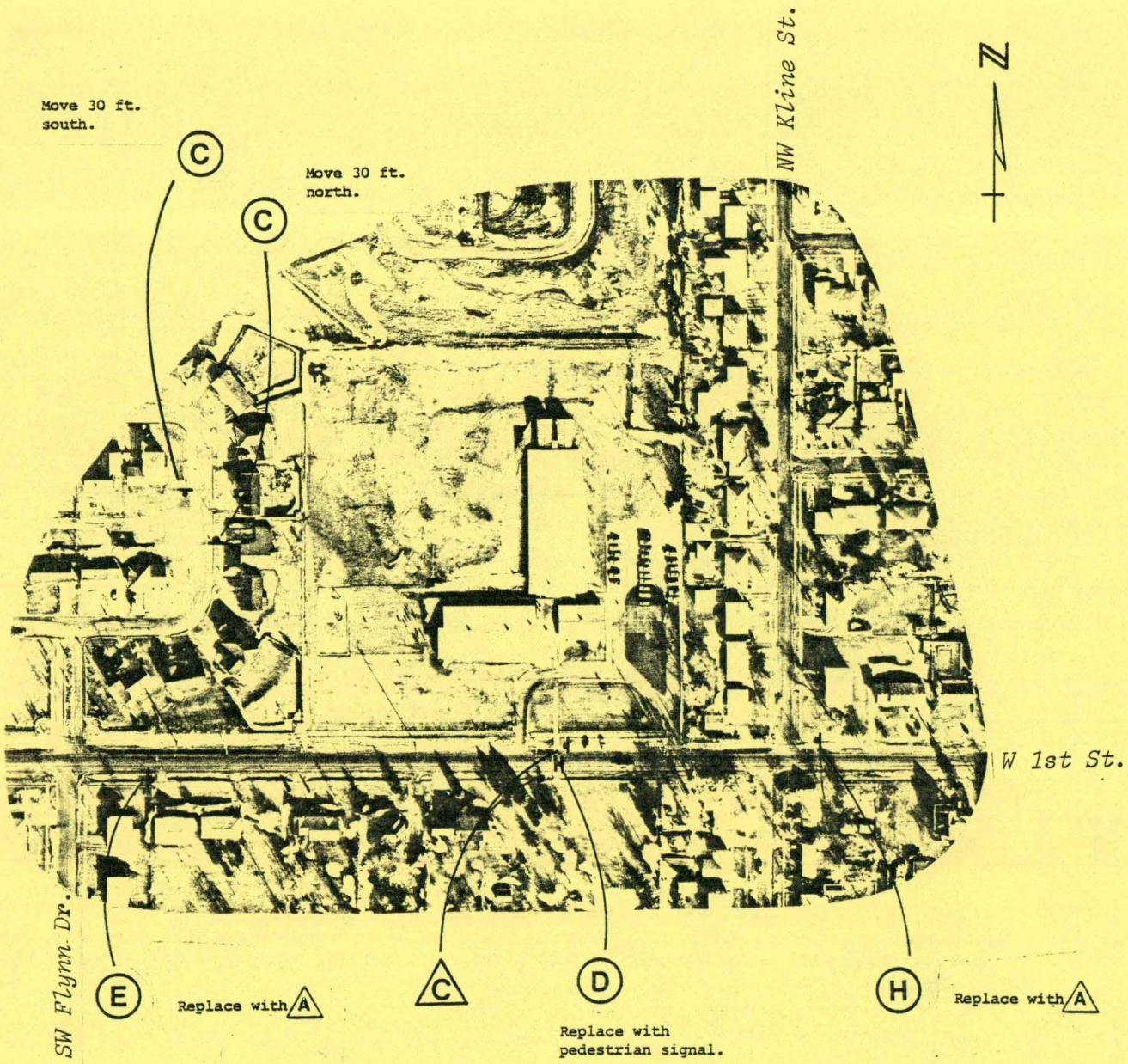
FIGURE F-3



LEGEND

A Device now in place.

B Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
NORTHWEST ELEMENTARY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-4

comparatively high traffic volume on W 1st Street and the requirement that each vehicle stop at the crossing even though there may be no child waiting or in the process of crossing there at the moment. The crossing is monitored during the morning and afternoon periods by an adult guard who performs commendably in collecting and dispatching the children across the street. However, there is no guard or STOP sign during the 11:30-1:00 period. There are no Type S2-1 School Crossing signs at the crossing point, nor are there Type S1-1 Advance School signs on the approaches to the school area. The present nonstandard devices should be replaced with new standard units. The two small Type S2-1 signs, which help in designating the mid block crosswalk on NW Coral Street, should each be moved approximately 30 feet closer to the crossing point.

A series of daily events combine to generate extreme congestion and considerable accident potential in this school area.

- While the temporary STOP sign is in place, the number of vehicles per minute arriving in the area is somewhat more than the number departing, which means they accumulate.
- The congestion is aggravated when eastbound busses stop to unload or load.
- The comparatively small gravelled area between the street and the sidewalk is inadequate to accommodate the number of vehicles which arrive in the afternoon to pick up students. It is not unusual for vehicles to be parked on the south side of the street. The U-shaped service road in front of the school

should not be used as a parking or pick-up facility. Safety in the area would be enhanced if the service road could be closed with a portable barricade during those periods when children are arriving or leaving.

This location is one of those where it is recommended that the roll-out STOP device be replaced with a pedestrian crossing signal system. Other signing required is shown in Figure F-4.

A substantial number of Northwest Elementary School students live west of NW State Street. Many cross NW State Street at, or near, NW 2nd Street, where there are no warning or protective devices. Rather than attempt to designate and attempt to protect a crossing at that point, it is recommended that the students go to the crosswalk on the north leg of the intersection with W 1st Street where there presently is a STOP sign but where a traffic signal may be installed as discussed in Part D.

As alluded to previously, part of the problem in this school area is the fact that all of the vehicular traffic generated by the school converges on 1st Street. There are no alternate routes to or away from the school area. The solution to the problem points to a need for another roadway in the school area which will allow traffic to approach the area and to disperse without having to negotiate any part of W 1st Street. Because one of the possibilities for such a road would result in the need for early planning so as to avoid development on property that might be needed for such a facility, an Interim Report No. 1 was provided to

the City so that a particular proposal could be considered and appropriate action taken before the weather improves sufficiently to allow a resumption of residential construction activity. Interim Report No. 1 is included as Exhibit F-1 in the Appendix.

Terrace Elementary School (Figure F-5)

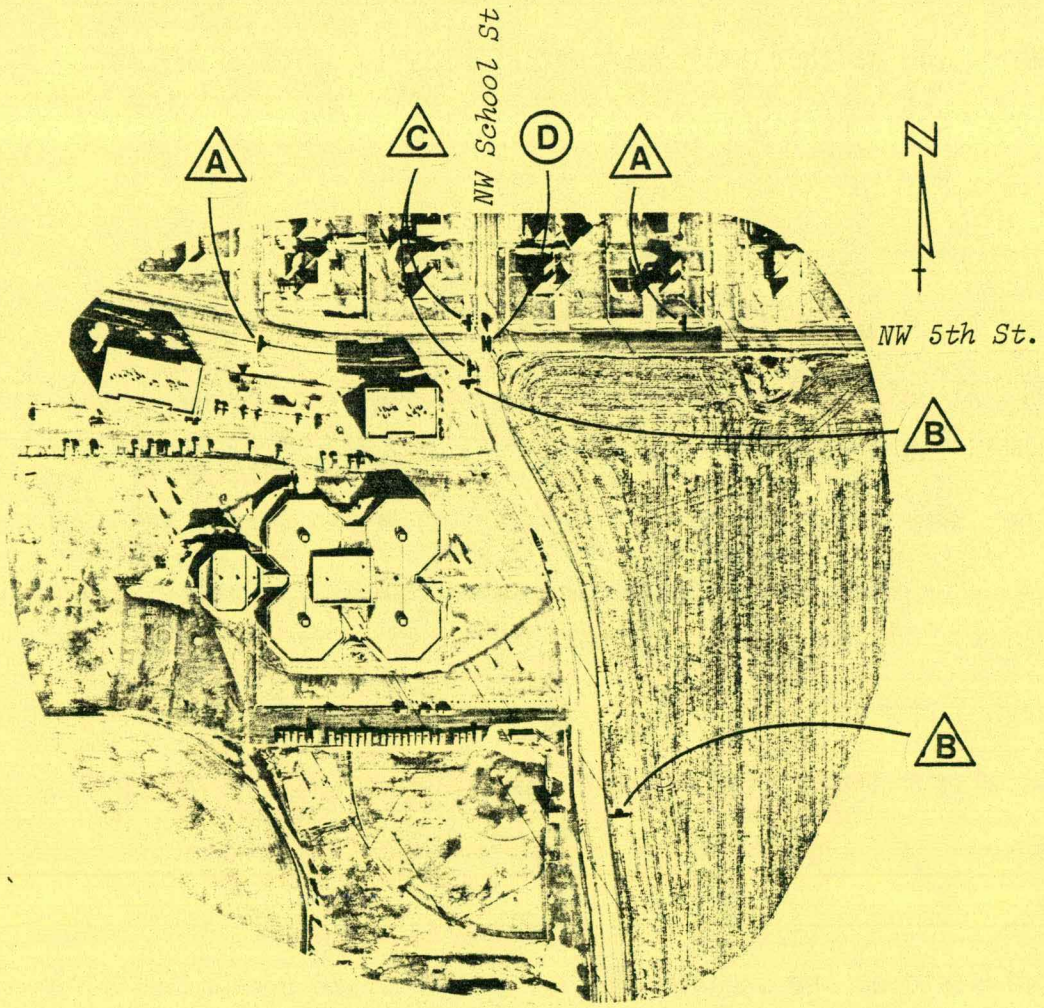
The area of the City served by this school generates at least three traffic situations which are a considerable distance from the school facilities. Those students who live in the south part of the Terrace attendance area gravitate to the crossing of SW 3rd Street at SW School Street. The same children also have to cross W 1st Street at SW School Street.

The crossing on SW 3rd Street (west leg) is protected by a roll-out STOP sign and is also monitored by an adult guard during the morning and afternoon periods.

The traffic volume on SW 3rd Street is comparatively high, so that a large number of vehicles are stopped when no children are present at the crossing. Such stoppages are very excessive during the midday period.

It is recommended that the temporary STOP sign be replaced with a pedestrian signal system. The standard signs required for this crossing are shown in Figure F-10 in connection with the Junior High area.

The crosswalk on W 1st Street at School Street is particularly troublesome. The stoppage of the high volume of traffic on W 1st Street results in considerable congestion and delay. During the morning period, the line of stopped vehicles frequently extends to SW Walnut Street. On



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
TERRACE ELEMENTARY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-5

one recorded occasion, the lapse time from the stop at the end of the line near SW Walnut Street to clearing the intersection at School Street was three minutes and ten seconds.

This crossing includes an element that is not so prevalent at other principal crossings in the City. A large number of the 9th grade students at the Parkview School also cross W 1st Street at this point. This intermingling of the younger and the older students poses some problems because the protection needs of the elementary-aged students are vastly different. The type of security needs required for the young students is generally considered with disdain and disregard by the older students.

It is recommended that at such time W 1st Street is reconstructed and widened that the project include a pedestrian overpass on the west leg of the intersection with School Street. The roadside should be insulated in such a way that all pedestrian crossings would have to be made on the separation structure, and not at grade.

Until such time that a separation structure can be provided, it is recommended that a pedestrian traffic signal system be installed on the west leg of this intersection, approximately 50 feet from the intersection. To every extent possible, the older students should be encouraged to use the crossing facility along with the younger students to avoid any display of two standards of pedestrian conduct.

The children who live east of Ankeny Blvd. gravitate to NE 5th Street and cross Ankeny Blvd. at that point. That crossing is secured

by a roll-out STOP sign which is placed and removed by an adult guard. Additionally, the speed limit on Ankeny Blvd. is reduced during the morning, midday, and afternoon periods from 45 mph to 35 mph by means of two sets of devices as shown in Figure F-1 (I). Additionally, this crossing is secured by the prescribed placement of standard Type S1-1 and S2-1 Advance and Crossing signs. The adult guard at this crossing carries out his assignment commendably. He is apparently sensitive to the unnecessary stoppage of vehicular traffic, when, near the end of the morning and afternoon surges of pedestrian traffic, he removes the STOP signs and makes a special effort to escort the late arrivals. There are frequent occasions, some of which were observed, when students arrived after the guard had departed.

Because of the comparatively high level of volume on Ankeny Blvd. in this area, a large number of vehicles are unnecessarily stopped by the roll-out STOP signs. It is readily apparent that the situation would be more secure for the young pedestrian, and more favorably accepted by motorists if the STOP sign was replaced by a pedestrian signal system. There are indications that numerous High School student drivers are avoiding the STOP sign at 5th Street by diverting to other streets, such as 9th Street, NW School Street and NW Grant Street where they have become a source of concern according to the comments several parents expressed in the Young Pedestrian Safety Questionnaire. If there was a chance that they might not have to stop at a signalized crossing, they might stay on Ankeny Blvd. instead of gravitating to residential streets.

Signing details for this crossing are shown on Figure F-12 in connection with the High School area signing.

One other controlled crossing facility in this area is at the intersection of NW 5th Street and NW School Street where a student patrol monitors the crossing and places a roll-out STOP sign in the center of that intersection to control traffic on NW 5th Street.

As noted in Figure F-5, there are none of the prescribed Advance School and Crossing signs in place where they are required in the Terrace School area. On several occasions when this intersection was observed during the periods with an influx of children in the area, it appeared that the temporary STOP signs on NW 5th Street were unnecessary. They appeared to be actually fostering some noticeably bad pedestrian practices, such as failing to look for vehicular traffic even though it has to stop. These observations were verified by a gap-blockade study. The pertinent findings of this study are illustrated in Figure F-6. The data clearly indicates no problem from the standpoint of the availability of safe crossing opportunities. If all factors are considered, the use of the roll-out STOP sign probably is more harmful than helpful.

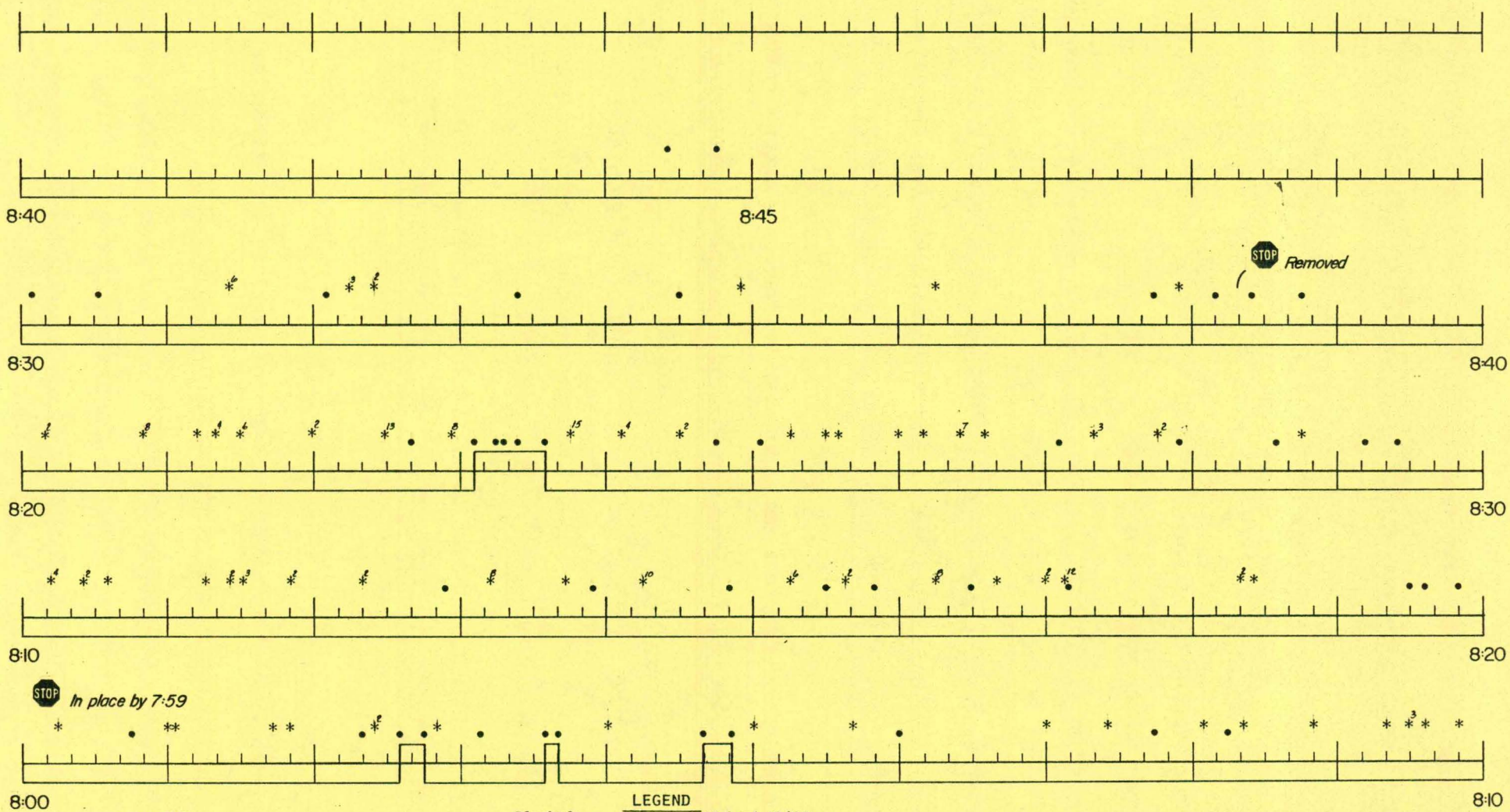
Student delivery and pick up by parents is especially troublesome at this school. See Interim Report No. 3 (Appendix Exhibit F-2) for proposed remedial action.

East Elementary School (Figure F-7)

This school area, as with the preceding ones, is also almost totally devoid of the required standard Advance School and Crossing signs. There are two designated crossings in the area.

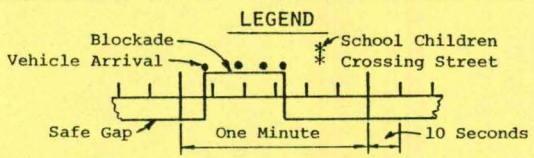
The crossing on E 1st Street at the intersection of SE Trilein Drive is protected by a roll-out STOP sign and two advance warning devices. Each

HWS



SUMMARY

SAFE GAP LENGTH- - - - - - - - - 12 sec.
NUMBER OF SAFE GAPS- - - - - - - 5
RANGE IN LENGTH OF GAPS- - - - - 3-360 sec.
AVERAGE LENGTH OF BLOCKADES- - - 10 sec.
MAXIMUM BLOCKADE LENGTH- - - - - 17 sec.



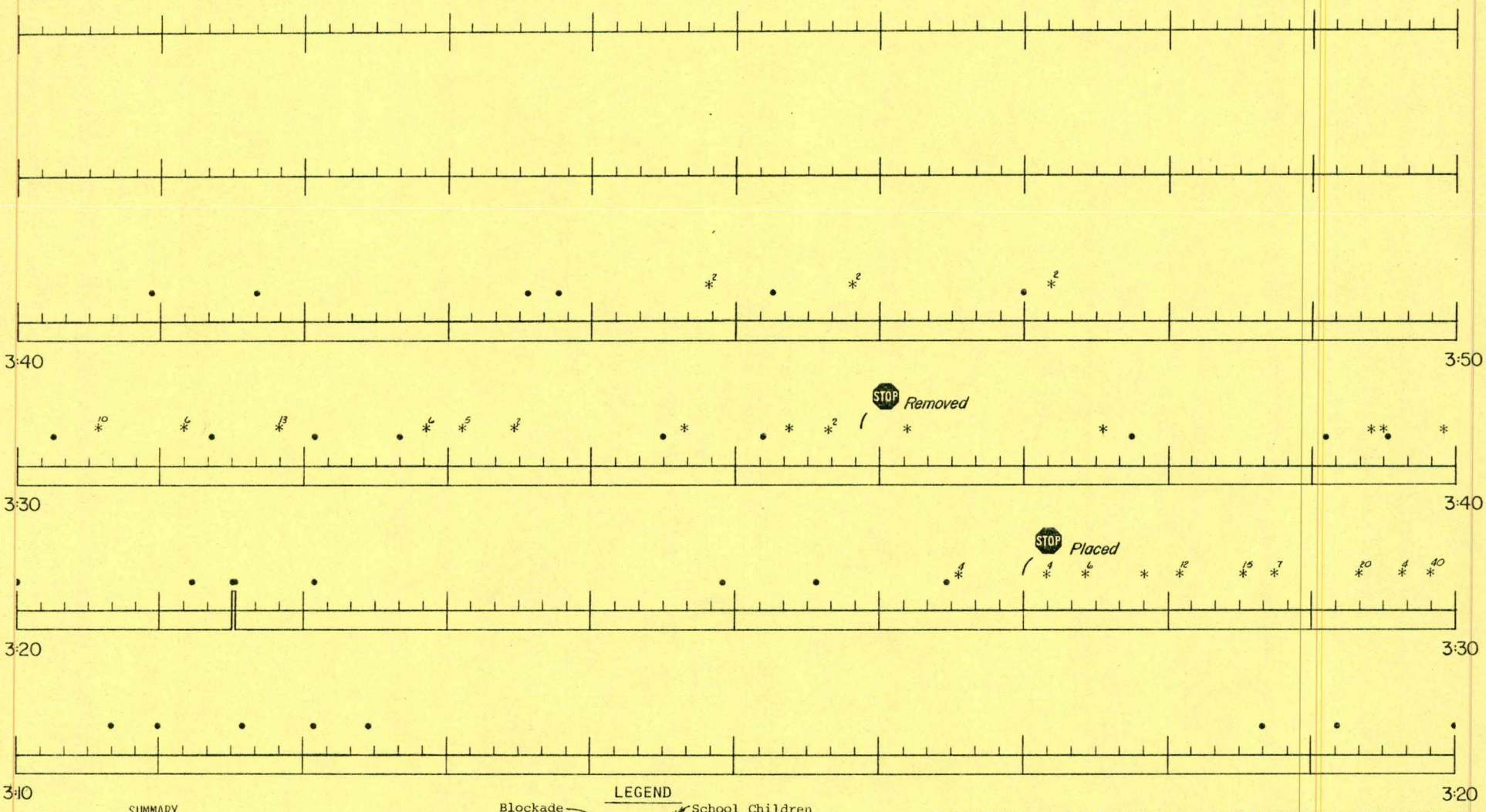
SCHOOL CROSSING PROTECTION STUDY

SAFE GAP - BLOCKADE ANALYSIS

Location NW 5TH ST AT NW SCHOOL ST.

FIGURE F-6

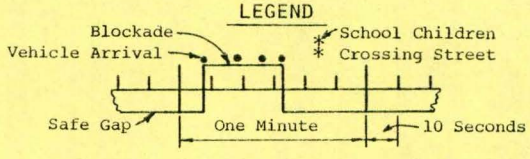
HWS



SUMMARY

SAFE GAP LENGTH	12 sec.
NUMBER OF SAFE GAPS	2
RANGE IN LENGTH OF GAPS	1-372 sec.
AVERAGE LENGTH OF BLOCKADES	1 sec.
MAXIMUM BLOCKADE LENGTH	1 sec.

LEGEND

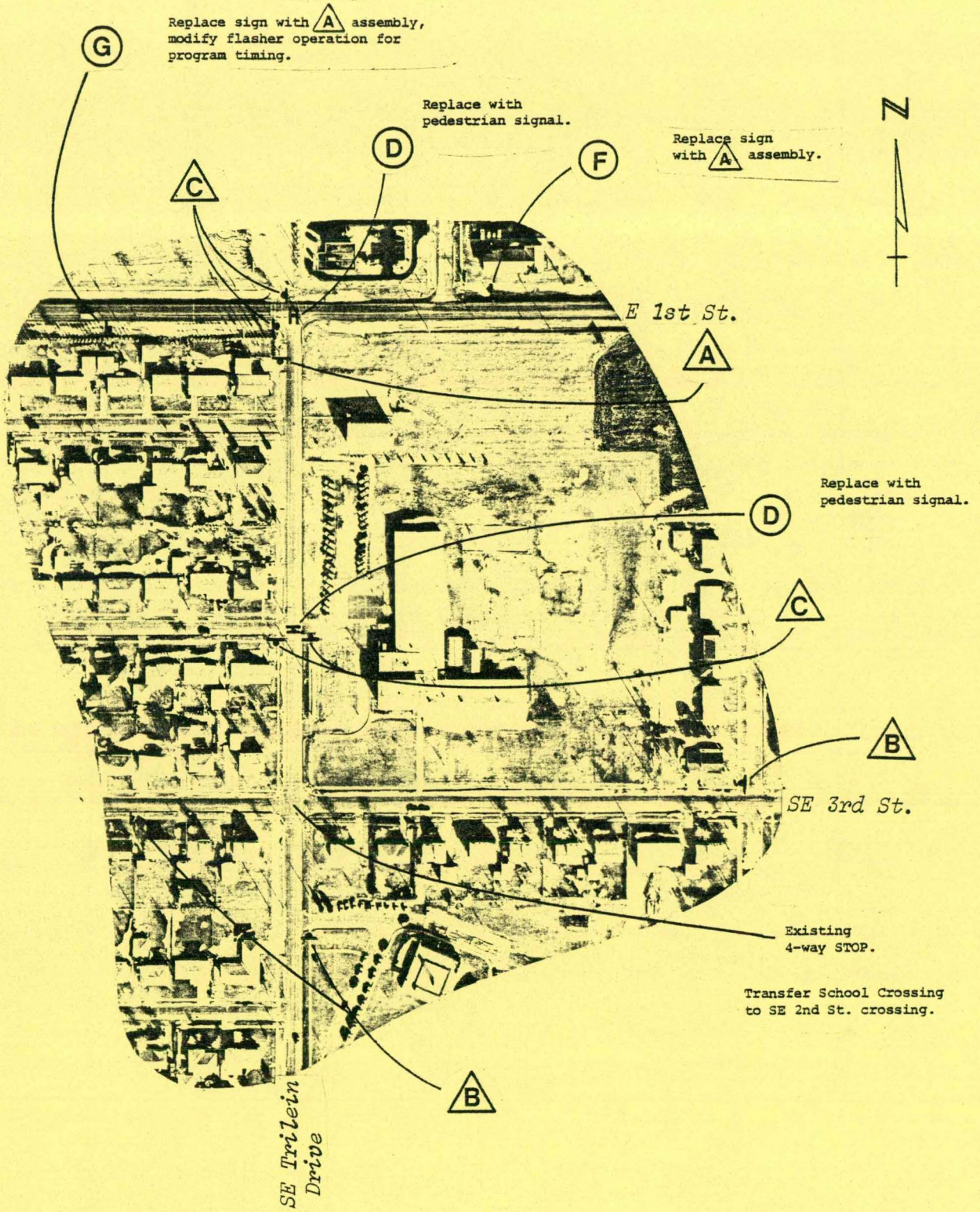


SCHOOL CROSSING PROTECTION STUDY

SAFE GAP - BLOCKADE ANALYSIS

Location NW 5TH ST AT NW SCHOOL ST.

FIGURE F-6₂



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
EAST ELEMENTARY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-7

of these advance warning signs is surmounted by a 12-inch flashing yellow beacon. The assembly on the east approach includes a 30-inch Type S1-1 sign (Figure F-1F). It is recommended that this sign be replaced with a 36-inch size, and that it be supplemented with a 24-inch SCHOOL XING AHEAD panel (Figure F-1A). The flashing beacon at this assembly is programmed to operate only during the morning, midday and afternoon periods.

The advance assembly on the west approach displays, in addition to the flashing beacon, a 30-inch Type S2-1 sign (Figure F-1G) which is incorrect for this particular location. It should be replaced with a 36-inch Type S1-1 sign and also supplemented with a 24-inch SCHOOL XING AHEAD panel. The flashing beacon at this location operates continuously throughout the day. The controls should be modified to function only during the three periods of the day when children are apt to be crossing the roadway.

The roll-out STOP sign is placed and removed at each of the three periods by an adult guard. As might be expected, because of the comparatively high traffic volume on E 1st Street, this type of control imposes a very high degree of inefficiency on traffic operations because there are numerous vehicle stoppages when there are no children present to cross the street. To illustrate the point, in one 30-minute period of observation during a midday period, almost 200 vehicles were stopped while only five children crossed the highway. To eliminate this type of inefficiency and to derive improved protection qualities, it is

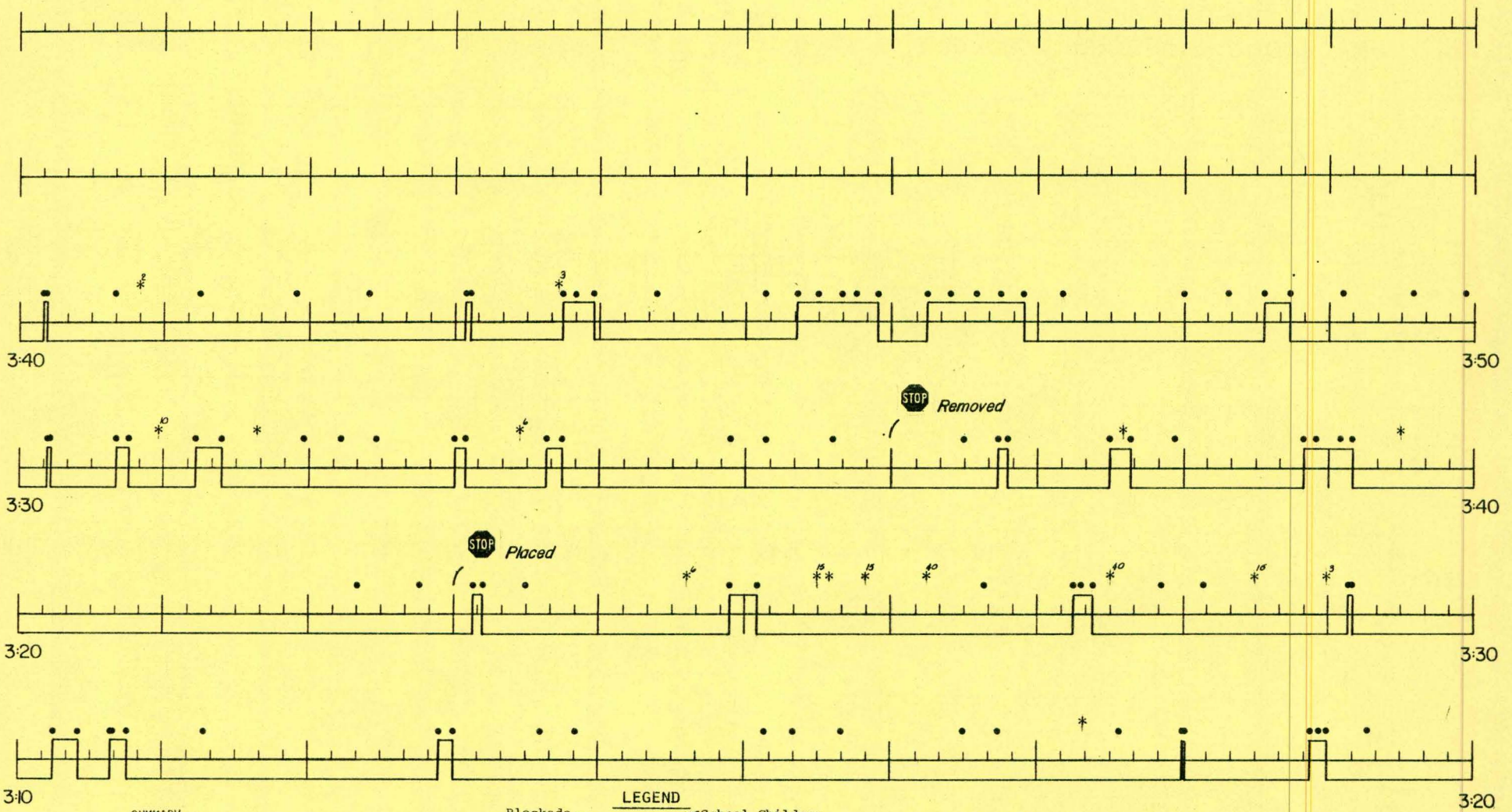
recommended that a pedestrian signal system be installed at a point approximately 50 feet west of the intersection.

The other designated crossing is on SE Trilein Drive at the intersection with SE 2nd Street. The only designation features are crosswalk lines on the south leg of the intersection and a roll-out STOP sign placed by student patrol members. There are no Type S2-1 crossing signs as there should be. While the roll-out STOP sign is in place only a comparatively short time during the three periods of student pedestrian surges, and is in place only while there are apt to be children crossing, it would seem to be a comparatively innocuous measure. However, it seems to generate a degree of congestion which has certain hazardous aspects. A safe gap-blockade study was made and the pertinent results are shown in Figure F-8. This data, coupled with other compiled traffic volume data, indicates that there is a very adequate supply of safe crossing opportunities. The student patrol places and removes the roll-out STOP sign, then imposes a degree of control over the children by delaying their crossing until a group has collected. Incidentally, these delays were frequently criticized by parents in the Young Pedestrian Safety Questionnaire.

SE Trilein Drive is crossed also by many students at SE 3rd Street, primarily on the north crosswalk. There is no valid reason why these crossings should not be made at the SE 2nd Street crossing.

As discussed in Part D, a recommendation has been made to eliminate STOP sign control on SE Trilein Drive at SE 3rd Street because the

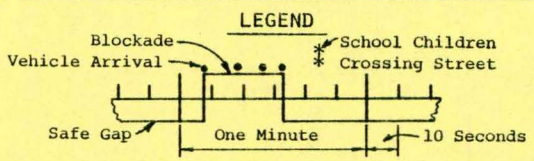
HWS



SUMMARY

SAFE GAP LENGTH- - - - - - - - - 12 sec.
NUMBER OF SAFE GAPS- - - - - - - 24
RANGE IN LENGTH OF GAPS- - - - - 1-183 sec.
AVERAGE LENGTH OF BLOCKADES- - - 11.2 sec.
MAXIMUM BLOCKADE LENGTH- - - - - 75 sec.

LEGEND



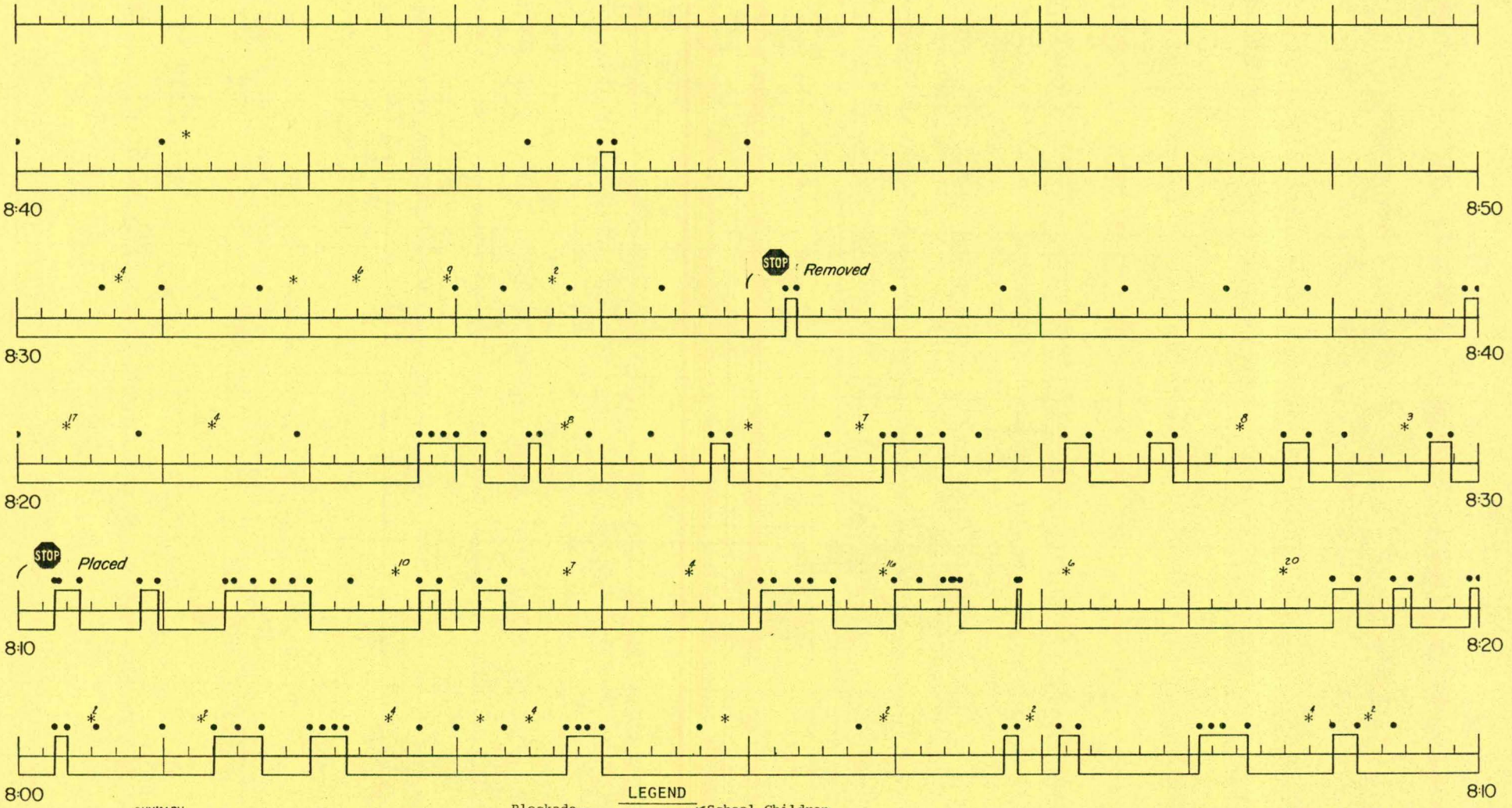
SCHOOL CROSSING PROTECTION STUDY

SAFE GAP - BLOCKADE ANALYSIS

Location SE TRILEIN DR. AT SE 2ND ST.

FIGURE F-8

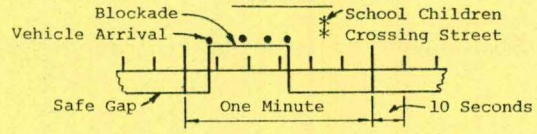
HWS



SUMMARY

SAFE GAP LENGTH- - - - - - - - -	12 sec.
NUMBER OF SAFE GAPS- - - - - - -	31
RANGE IN LENGTH OF GAPS- - - - -	1-170 sec.
AVERAGE LENGTH OF BLOCKADES- - -	126 sec.
MAXIMUM BLOCKADE LENGTH- - - - -	35 sec.

LEGEND



SCHOOL CROSSING PROTECTION STUDY

SAFE GAP-BLOCKADE ANALYSIS

Location SE TRILEIN DR. AT SE 2ND ST.

FIGURE F-8$_2$

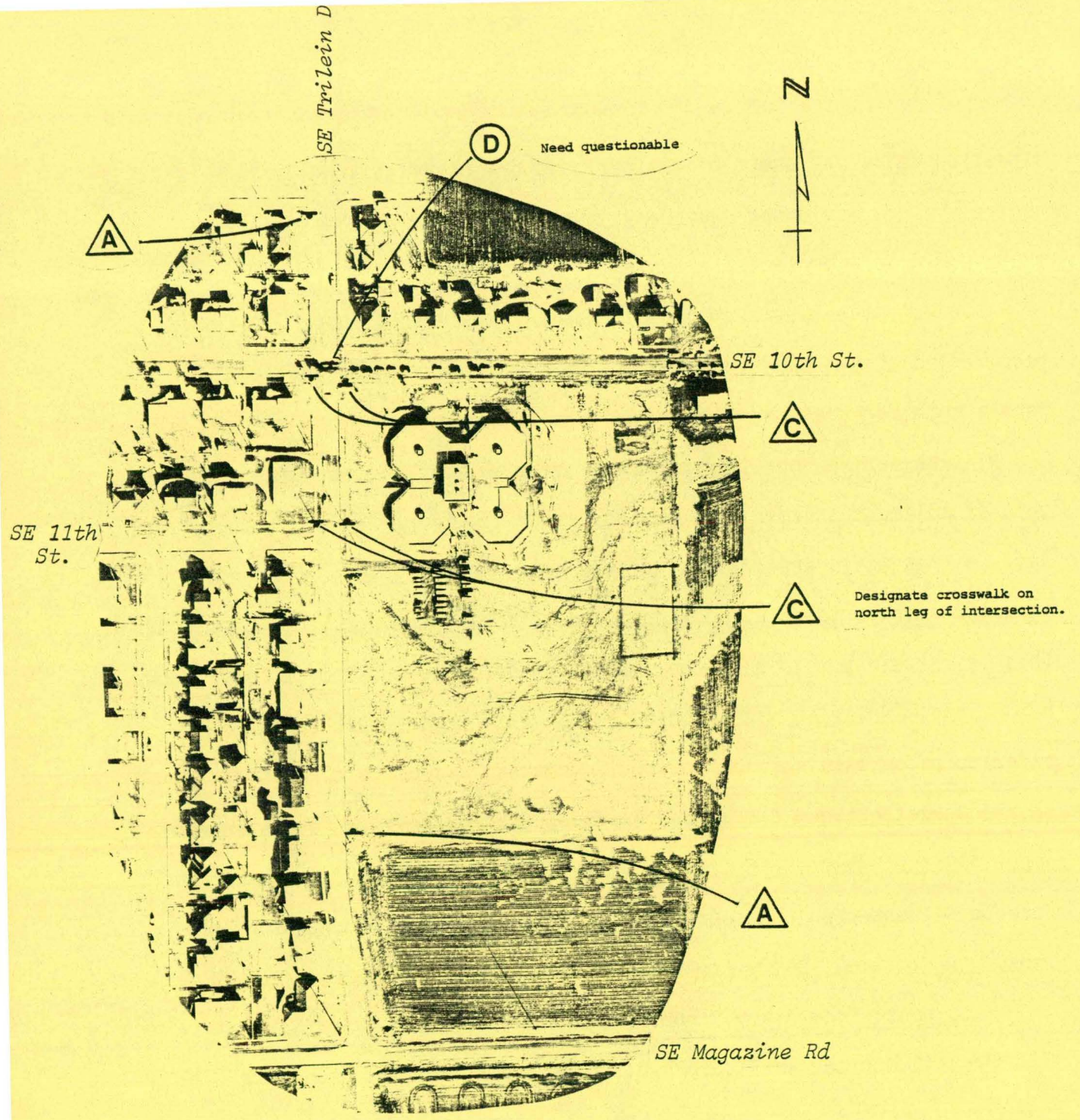
situation falls far short of the warrants or justification for such control. This would not cause any young pedestrian problems since there would be a protected crossing at SE 2nd Street.

To accommodate the combined crossing at SE 2nd Street, it is recommended that a pedestrian signal be installed. The signal would handle both vehicles and pedestrians (in larger groups) more efficiently.

An objective appraisal of the traffic situation associated with this school must concern the very hazardous intermingling of students and vehicles which are driven into the area along the west side of the school when parents pick their children up during the afternoon dismissal. This is certainly not in the best interest of student safety as it is now being done. While it might not be as convenient, it would certainly be safer to allow parking, limited to 15 minutes, along the north side of SE 3rd Street between 3 p.m. and 4 p.m. on school days for a distance of about 400 feet east of SE Trilein Drive. During that time, parking may have to be banned on the south side to prevent hazardous midblock crossings.

Southeast Elementary School (Figure F-9)

As illustrated in Figure F-9, there are not any of the signs normally prescribed for school. The only apparent effort to provide for pedestrian traffic is the placement of a roll-out STOP sign by student patrol members on SE Trilein Drive at the intersection with SE 10th Street. There is a crosswalk marked on the pavement but unsigned on the south approach to the intersection with SE 11th Street.



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
SOUTHEAST ELEMENTARY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-9

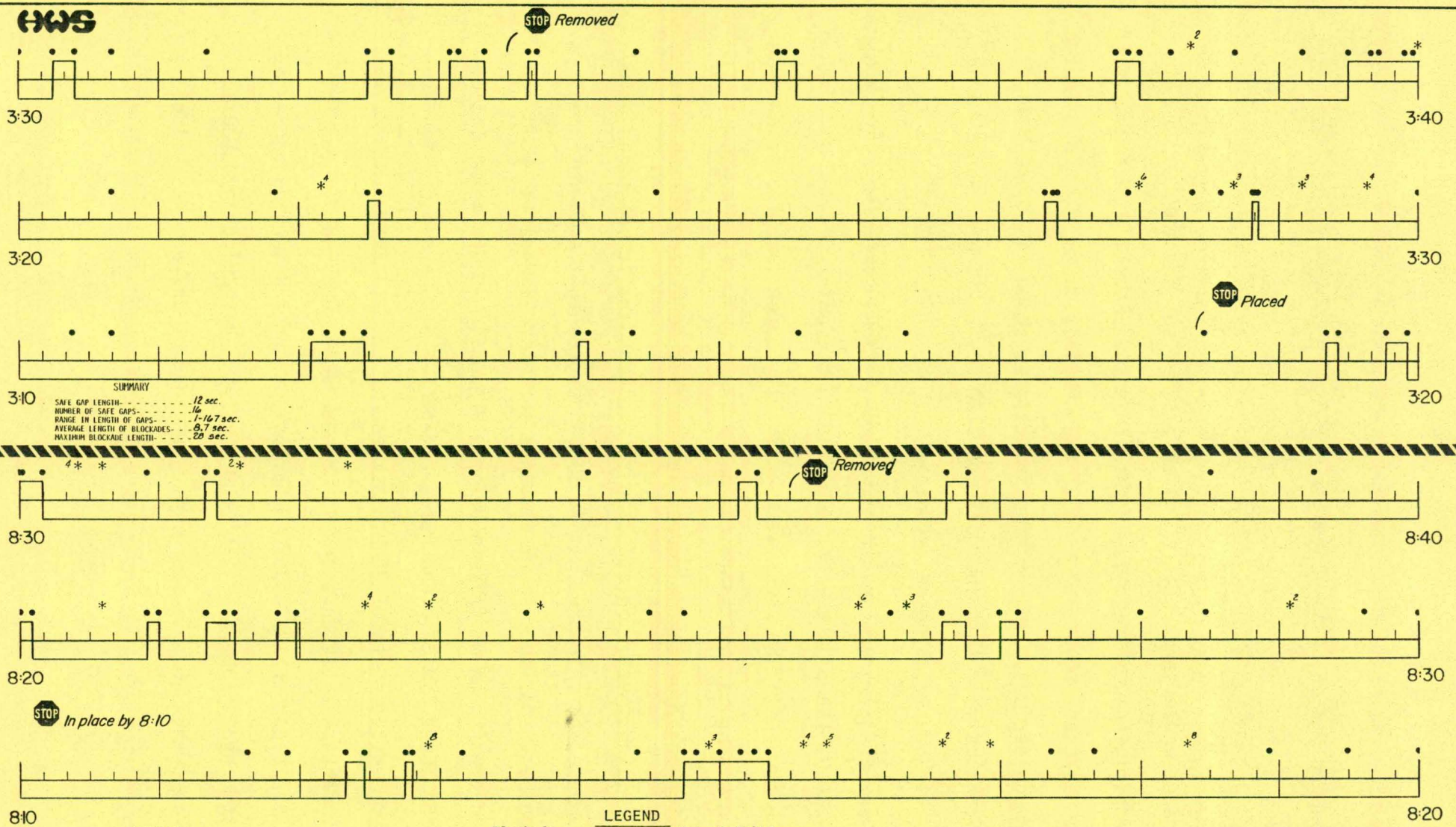
The need for stopping vehicular traffic is questionable. Actually, there are a considerable number of children who cross S Trilein Drive at 9th Street during both the morning and the afternoon periods. The children apparently sense that it is safe to do so, and they would rather avoid the influence of the student patrol at the SE 10th Street crossing. A safe gap-blockade study was made at the crossing during typical morning and afternoon periods. The pertinent facts, as shown in Figure F-10, indicate conclusively that the roll-out STOP device is not needed because of a lack of safe crossing opportunities.

It appears that a properly signed and marked crosswalk at SE 10th Street, without the STOP device, would be sufficient.

With regard to the crosswalks at SE 11th Street, it is recommended that the crossing be shifted to the north approach which conceivably would better accommodate any pedestrian traffic generated on the north side of SE 11th Street. In addition to the standard school signs which are recommended in this area, it is also proposed that a 25 mph Speed Limit sign be installed a short distance north of SE Magazine Road for northbound traffic on SE Trilein Drive. Presently, there is no indication of the speed limit in that area except for a substandard sign for southbound traffic north of SE 9th Street.

As might be expected there is considerable turbulence on SE Trilein Drive in the close proximity of the school during the morning and afternoon periods when parents deliver and pick up their children. The situation is compounded when busses arrive and load or unload the children

HWS



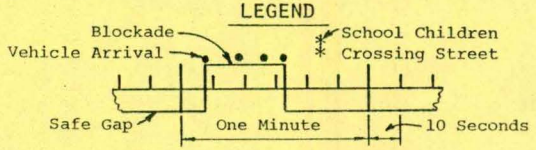
SUMMARY

SAFE GAP LENGTH-	12 sec.
NUMBER OF SAFE GAPS-	14
RANGE IN LENGTH OF GAPS-	1-167 sec.
AVERAGE LENGTH OF BLOCKADES-	9.7 sec.
MAXIMUM BLOCKADE LENGTH-	20 sec.

SUMMARY

SAFE GAP LENGTH-	12 sec.
NUMBER OF SAFE GAPS-	14
RANGE IN LENGTH OF GAPS-	1-183 sec.
AVERAGE LENGTH OF BLOCKADES-	9.8 sec.
MAXIMUM BLOCKADE LENGTH-	36 sec.

LEGEND



SCHOOL CROSSING PROTECTION STUDY

SAFE GAP-BLOCKADE ANALYSIS

Location SE TRILEIN DR. AT SE 10TH ST.

FIGURE F-10

along the east side of the street. Most parents attempt to park on the east side of the street; however, a few will stop briefly on the west side of the street. This means, of course, that their children have to cross at a point other than a designated crosswalk, often it is from in front of or behind a vehicle parked on the east side of the street.

All of this turbulence, of course, has some adverse effects on the safety and security of the children having to walk across SE Trilein Drive, either at SE 11th Street or SE 10th Street. This may be one of the reasons why some of the children persist in crossing at SE 9th Street. They may not want to cope with the traffic congestion and the regulation exerted by the student patrol at the SE 10th Street crossing.

To every possible extent, school related activities should not be carried on along SE Trilein Drive where convenience and security are not compatible in carrying out a particular activity such as loading and unloading busses. Preference, of course, should be given to the element of security. In that regard, it is recommended that facilities be provided on the schoolground for the busses to load and unload. Busses standing along SE Trilein Drive adversely affect traffic movement. It is also recommended that the off-street parking lot provided for the school staff be enlarged so that those staff members who park along the south side of SE 10th Street can leave that convenient space available to parents who deliver or pick up their children. A small turn around facility can be provided near the east edge of the school property to assist drivers to return to the west on SE 10th Street. Accordingly, there should be no deliveries or pick ups by parents on SE Trilein Drive.

Junior High School (Figure F-11)

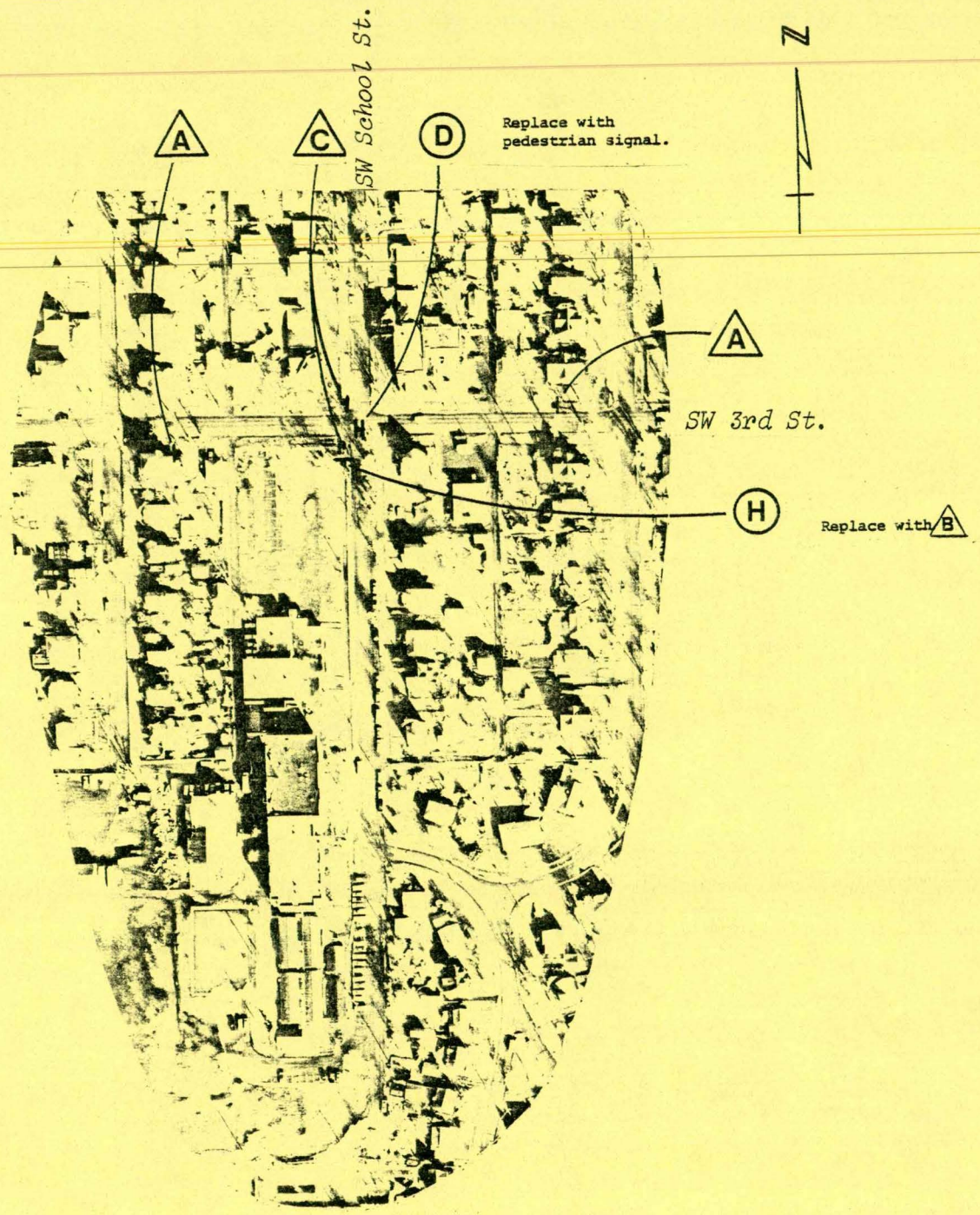
Because of its comparatively secluded location, the Junior High School area requires very little school area signing. The only device required is an Advance School sign Type S1-1 on the west side of SW School Street, a short distance south of SW 3rd Street. There is presently a nonstandard device at that location (Figure F-1H). The designated crossing, primarily for elementary-school children on SW 3rd Street, on the west leg with the intersection of SW School Street, has been discussed in connection with the Terrace Elementary School area. However, the signing needs for this particular crossing are shown in Figure F-10.

Generally, junior-high age young pedestrians do not require extra protective measures. Most are actually disdainful toward anything they regard as unnecessary, or which attempts to exert some control or regulation over them.

The traffic signal installations on Ankeny Blvd. at 3rd Street, and at Eastlawn Drive, especially the latter, are intended to provide protection for Junior-High students living in the southeast quadrant of the City. However, the signals at those two intersections are not functioning properly with regard to the pedestrian interval as discussed in Part E.

Parkview School (Figure F-12)

This school presently provides facilities for all of the 9th-grade students in the District, and the 5th-grade and 6th-grade students from



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

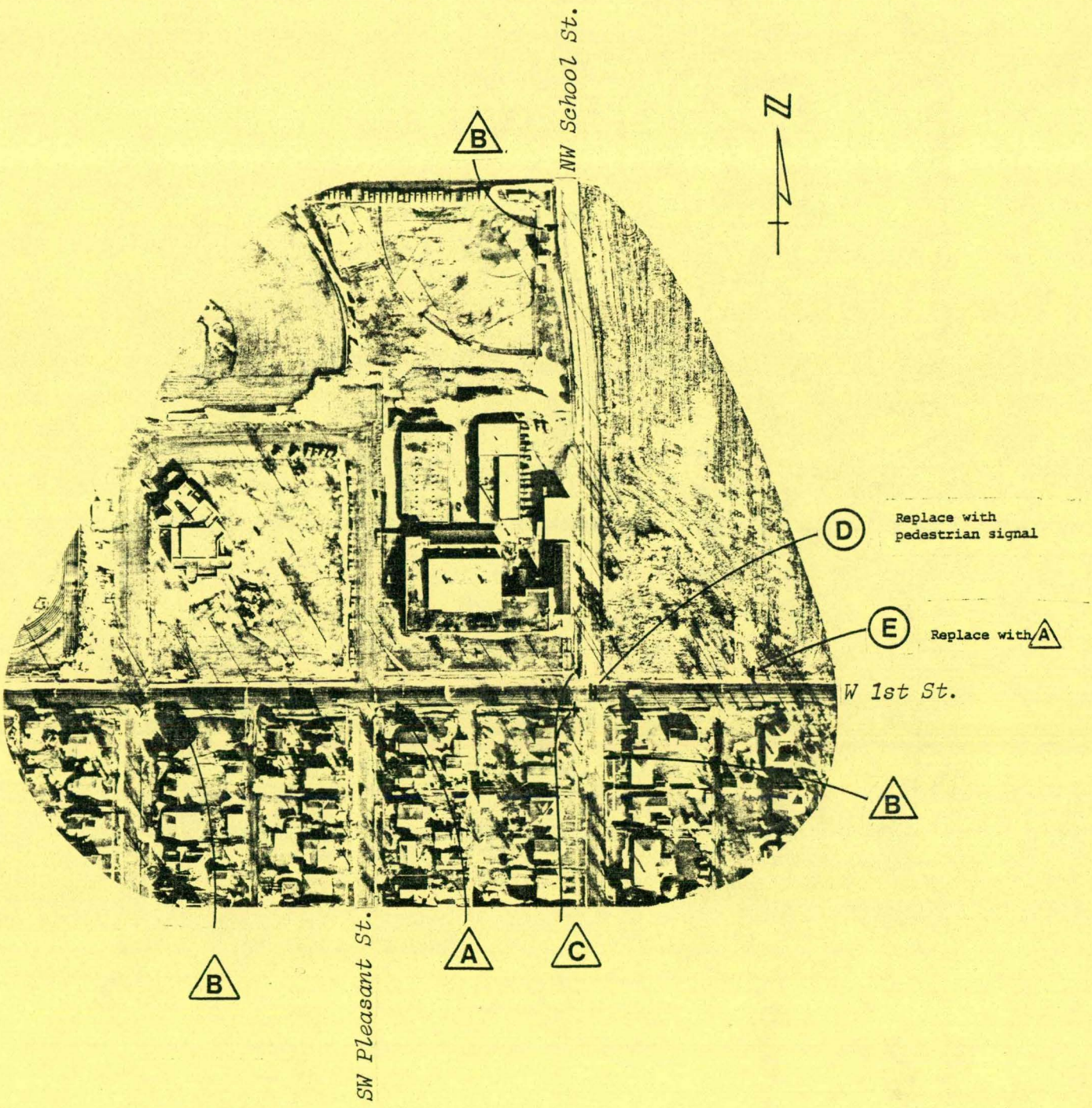
Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
JUNIOR HIGH

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-11



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
PARKVIEW

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-12

the Northwest Elementary School attendance area. Most of the latter are transported to and from school by bus.

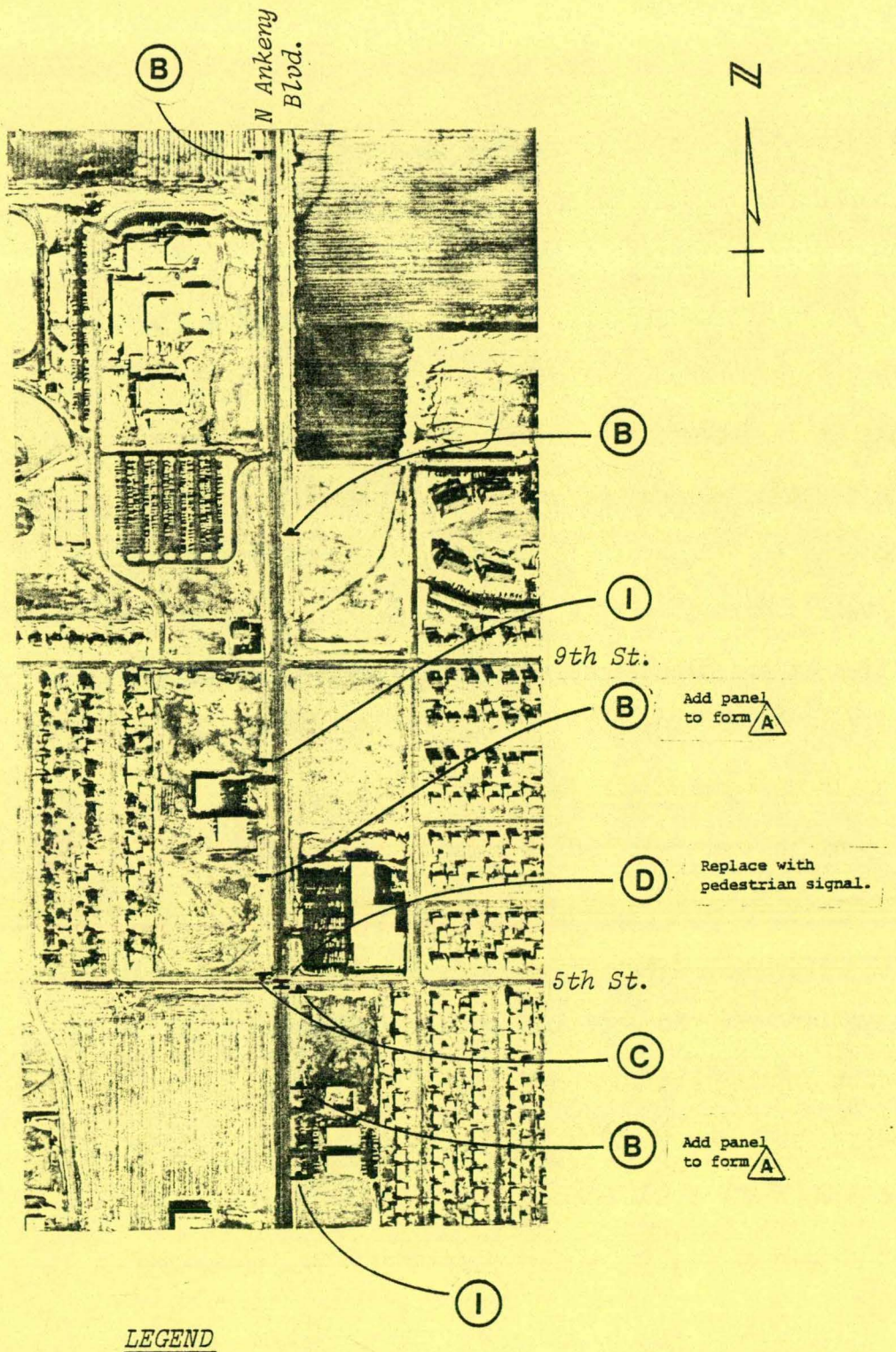
The school area protection needs generated for this facility were generally covered in discussion of the needs for the Terrace Elementary School. There are, however, certain standard advance warning and crossing point signs which are missing and should be provided.

It was noticed on several occasions that there is a considerable amount of midblock crossing by the older students between SW Pleasant Street and SW Walnut Street. While there is obviously an element of hazard, realities of the situation indicate that the students will probably persist in such practices. However, it is recommended that a school crossing be designated with crosswalk lines and Type S2-1 signs on the east leg of the intersection of W 1st Street and SW Pleasant Street.

During the afternoon dismissal period, the caravan of school busses which departs enmass from the west side of the school is assisted onto W 1st Street at the intersection with SW Walnut Street by a police officer. This is a regular assignment, and he is on the scene to assist in controlling traffic for only a few minutes. This is probably the best and most efficient manner of dealing with the situation and no change is proposed.

High School (Figure F-13)

As might be expected, the High School area safety problems do not involve pedestrian problems to any serious degree. Those students who



LEGEND

(A) Device now in place.

(B) Device recommended-none there now.

Refer to Fig F-1 for device description.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

SCHOOL AREA SIGNING
SENIOR HIGH

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE F-13

live east of Ankeny Blvd. gravitate across that roadway at a variety of locations with no particular problems.

The most plaguing problems in the area involve the morning and afternoon surges of vehicular traffic generated by the students who drive to school. The vulnerability of rear-end collisions on Ankeny Blvd. at the two entrances to the school area are most pronounced. The number of accidents in the area north of 9th Street has been increasing each year since the school became operational. The intermingling of the left turning traffic and the higher speed through-traffic on Ankeny Blvd. obviously results in a serious accident potential. The speed limit through the area is 45 mph which is not excessive considering the openness of the area and the nature of the roadside.

The need to widen Ankeny Blvd. north of 1st Street so as to provide for the various types of traffic on the street was discussed in Part D. To the extent that Ankeny Blvd. can be made safe and efficient for an increasing volume of traffic, drivers will not divert to other streets which are not intended to serve a large number of vehicles.

The High School area is properly signed and no additions are proposed. The school crossing facilities on N Ankeny Blvd. in the vicinity of the 5th Street intersection are discussed in depth in connection with the Terrace Elementary School area.

F-8 YOUNG PEDESTRIAN SAFETY QUESTIONNAIRE

To tap a worthwhile source of very useful information, a questionnaire was distributed to all the parents of all elementary students. Over 1280 parents responded. The questionnaire was oriented in the interest of traffic safety and numerous were the comments received. Many of the parents utilized the opportunity to comment also on a wide range of items which they feel jeopardize the welfare of their children in addition to certain traffic safety aspects. The questionnaires will be returned to the City and school officials for appropriate action on those items of complaint or concern. Following are a few of the more frequently mentioned subject matters which apparently concerned more than just a few parents among the several schools.

- Many of the parents are very concerned about the apparently frequent occasions when their children arrive at protected crossings before the crossing guards arrive or after they leave.
- There were frequent complaints of student patrols delaying the children an unduly long time especially during cold weather.
- Some parents complained (rightly so) about the hazards of personal vehicles entering the school grounds for pick-up at dismissal time.
- There were numerous complaints of high speed near schools attributed mainly to High School students.
- The absence of crossing guards at certain places during the midday period was mentioned frequently.

YOUNG PEDESTRIAN SAFETY QUESTIONNAIRE

IN THEIR CONTINUING EFFORTS TO PROVIDE SAFETY AND SECURITY FOR YOUNG PEDESTRIANS, ANKENY CITY AND SCHOOL OFFICIALS ARE IN NEED OF SOME BASIC INFORMATION. AS PART OF OUR CITY COMPREHENSIVE TRAFFIC STUDY, WE ARE ASKING YOU, AS PARENTS, TO PROVIDE INFORMATION ON THE ATTACHED QUESTIONNAIRE CONCERNING YOUR CHILD'S OR CHILDREN'S TRIPS TO AND FROM SCHOOL.

WE ARE CONCERNED IN HAVING THIS INFORMATION ON EVERY CHILD IN THE ELEMENTARY SCHOOLS. THIS, UNFORTUNATELY, MEANS THAT THOSE OF YOU WHO HAVE MORE THAN ONE CHILD OF AN ELEMENTARY AGE WILL NEED TO COMPLETE A QUESTIONNAIRE FOR EACH CHILD. THIS IS NECESSARY BECAUSE THE DATA FOR THE VARIOUS CHILDREN IN THE FAMILY MAY BE DIFFERENT; FOR EXAMPLE, THE OLDER CHILDREN MAY RIDE BICYCLES AND THE YOUNGER CHILDREN MAY WALK, OR THE BEGINNERS MAY BE TAKEN AND PICKED UP WHILE THE OLDER CHILDREN MAY WALK.

PLEASE RESPOND TO THE VARIOUS QUESTIONS AND HAVE YOUR CHILD RETURN THIS QUESTIONNAIRE TO THE ASSIGNED TEACHER BY FEBRUARY 1, 1978. THE INFORMATION REQUESTED PERTAINS TO ELEMENTARY SCHOOL CHILDREN ONLY. NO NAMES ARE REQUIRED. YOUR COOPERATION AND ASSISTANCE IN THIS IMPORTANT EFFORT WILL BE APPRECIATED VERY MUCH. THANK YOU.

OLLIE WEIGEL, MAYOR
KEITH HOPKINS, SUPERINTENDENT OF SCHOOLS

---

1. NAME OF SCHOOL YOUR CHILD ATTENDS _____.
2. IN WHICH GRADE IS YOUR CHILD PRESENTLY ENROLLED? _____.
3. WHAT IS THE APPROXIMATE DISTANCE FROM YOUR HOME TO THE SCHOOL? _____.
4. MY CHILD -- A. WALKS TO AND FROM SCHOOL PRACTICALLY ALL THE TIME _____ ☐
   B. RIDES A BICYCLE MOST OF THE TIME _____ ☐
   C. IS TAKEN BY CAR -- EVERYDAY _____ ☐
   OCCASIONALLY _____ ☐
   ONLY DURING INCLEMENT WEATHER _____ ☐
   D. IS PICKED UP BY CAR -- EVERYDAY _____ ☐
   OCCASIONALLY _____ ☐
   ONLY DURING INCLEMENT WEATHER _____ ☐
   E. IS PICKED UP AND BROUGHT HOME BY BUS _____ ☐
5. WE PARTICIPATE IN A SCHOOL CAR POOL. YES _____ NO _____
6. MY CHILD -- A. COMES HOME FOR LUNCH -- EVERYDAY _____ ☐
   OCCASIONALLY _____ ☐
   RARELY _____ ☐
   B. ON THOSE OCCASIONS, HE/SHE -- USUALLY WALKS _____ ☐
   RIDES A BICYCLE _____ ☐
   IS USUALLY PICKED UP _____ ☐
7. DO YOU HAVE ANY THOUGHTS, FEARS, SUGGESTIONS, OR RECOMMENDATIONS REGARDING YOUR CHILD'S SAFETY IN WALKING TO AND FROM SCHOOL _____
8. IS THERE A PROBLEM INVOLVING THE ABSENCE OF SIDEWALKS ON ANY PART OF YOUR CHILD'S ROUTE TO AND FROM SCHOOL? YES _____ NO _____. COMMENT, PLEASE. _____
9. DO YOU HAVE ANY OPINIONS ON THE SCHOOL SAFETY PATROL PROGRAM? _____
10. PLEASE SHARE ANY THOUGHTS OR COMMENTS YOU MAY HAVE ON ANY ASPECT OF THIS WHOLE SUBJECT _____

(Use reverse side if you need more space for any of the questions)

- Many of the parents were disturbed about the harassment of young children by the older students.
- Apparently, many people are lax in removing snow from sidewalks.
- Some parents were critical of the manner in which other parents delivered and picked up their children by car.
- There was an interesting and revealing statistic derived from the questionnaire regarding the childrens' travel to and from school. During an average day, the students walk an accumulated total of approximately 640 miles involving over 8000 crossings of intersections (and numerous mid-block crossings).

F-9 THE ROUTE TO SCHOOL

One of the most vital elements in a school child-safety program is the route a young pedestrian travels between his home and school.

It is suggested that a school route for each child below junior high level and for each elementary school (public and parochial) be developed.

School routes are designed for the individual child, and at the same time, for all the children combined.

A school route plan for each school serving elementary and kindergarten students is useful in developing uniformity in the use of school area traffic controls. The plan, developed by the school and traffic officials responsible for school-pedestrian safety, consists of a simple map showing streets, the school, existing traffic controls, established

school routes, and established school crossings. A typical school route plan map is shown on Page F-52.

The preferred routes should have sidewalks available, should be planned to take advantage of existing traffic control devices and, if feasible, school boundaries should be revised if a change would eliminate a hazardous crossing. The school plan should provide maximum protection for children at a minimum cost to the taxpayer.

The plan permits the orderly review of school area traffic control needs and the coordination of school-pedestrian-safety education and engineering activities.

Children should be discouraged from crossing major highways at many different intersections. Instead, wherever possible, routes should converge at a single crossing point, preferably a location already equipped with traffic controls. This may require some children to walk longer distances. Nevertheless, it is safer for children to cross at a single well-controlled intersection than to use scattered crossing points.

The physical characteristics and traffic conditions that affect pedestrian safety along a route must be considered when preparing maps. Some typical considerations include the following:

Availability of traffic control at strategic locations.

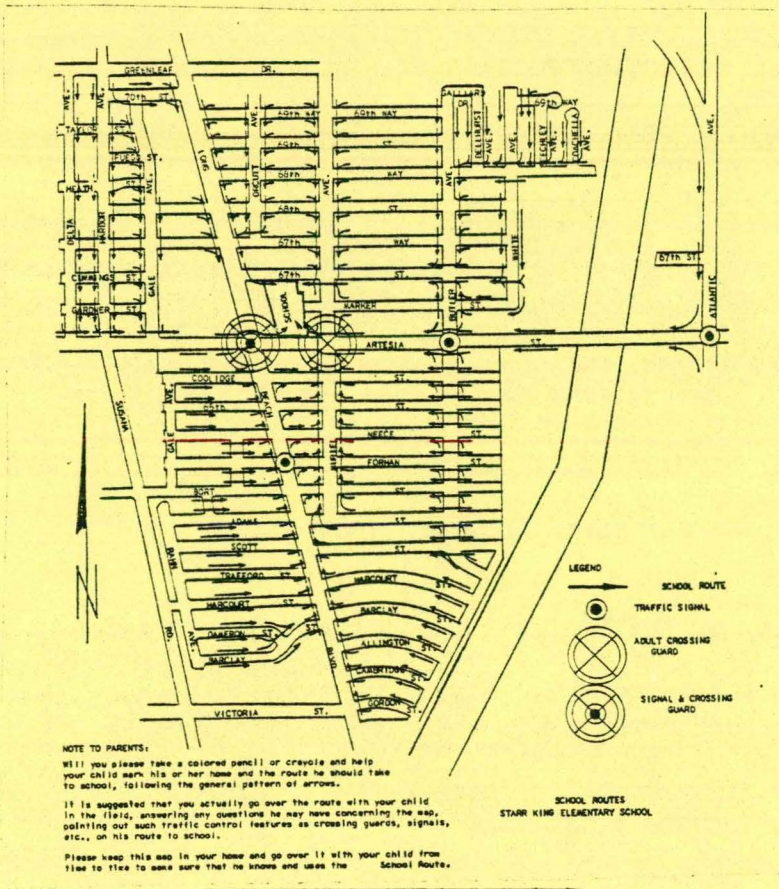
Availability of sidewalks--Streets without sidewalks should be used only when necessary.

Visibility at street crossings--Parking controls may be needed to permit adequate visibility.

Heavy traffic over sidewalks from alleys and driveways--Streets with frequent conflicts between pedestrians and vehicles should be avoided.

The completed map is taken home by the child for review of his parents. It is desirable for one of the parents of beginning students to walk the route with his child and instruct him in the use of the map.

The first step toward a school route program is the preparation of a large-scale plan or map of the area served by each school. The route "arterials" can readily be designated. Then, the best route for each child can be determined by the teacher and his parents according to the above criteria.



Typical School Route Plan

There are several publications which provide excellent guidance and instruction in the development of a School Route Plan. Recommended highly are:

A Program for School Crossing Protection - Institute of Transportation Engineers, P. O. Box 9234, Arlington, VA 22209, $2.00.

Procedural Manual for Preparing a School Route Plan - Missouri State Highway Department, Highway Building, Jefferson City, MO 65101.

School Trip Safety and Urban Play Areas, Vol. V.

Guidelines for the Development of Safe Walking Trips and School Maps, Report No. FHWA-RD-75-108, Federal Highway Administration. Available from National Technical Information Service, Springfield, VA 22161.

ADDENDUM F-1

Roll-out STOP signs are presently in use for school crossing protection at 8 locations in Ankeny. At the following locations, pedestrian signal systems of the design shown in Figure F-2 have been recommended and are warranted by MUTCD criteria:

1. West 1st Street - in front of the Northwest Elementary School.
2. West 1st Street - west of NW School Street.
3. North Ankeny Blvd. - north of 5th Street.
4. East 1st Street - west of SE Trilein Drive.
5. SE Trilein Drive - south of SE 2nd Street.
6. SW School Street - west of SW School Street.

In a conference with IDOT officials and the Consultant it was determined that additional commentary was necessary regarding the design of the installation at some of the above locations.

At all but the first location, the signal system proposed involves signal control on the major street and the continuation of STOP sign control on the minor street approaches.

This particular design concept has been ruled by the Federal Highway Administration as being not in compliance with certain provisions in the MUTCD. The ruling has been appealed by several states and cities where such designs have been very successful in coping with pedestrian crossing problems.

The matter is now being deliberated by the National Advisory Committee on Uniform Traffic Control Devices and a clarifying decision is expected in early 1979.

Because of the indecisiveness in the issue, it has been recommended herein that the signals be installed 50 to 75 feet from the intersection which qualified the installation for a midblock design. However, IDOT officials question if such locations would be sufficiently far from the intersection.

In deference to IDOT, it is proposed that any effort by the City toward the installation of signals at any of the cited locations be deferred until the issue is cleared by a new ruling of the FHWA within the next few months.

PART G

RAILROAD GRADE CROSSING STUDY

G-1 GENERAL

A study and analysis of the traffic safety aspects of the intersections of streets and railroad tracks throughout Ankeny was specified as one of the major topics in the Project description.

Accidents that occur at railroad-highway (street) grade crossings, although a numerical small part of the overall highway accident problem, are usually severe in terms of fatalities, personal injuries, and property damage. To illustrate this point, in Iowa during the past several years, railroad crossing accidents were ten times more likely to result in injuries or fatalities than other types of accidents.

In an analysis of railroad highway grade crossing accidents in urban areas, the daily train and traffic volumes, the corner site triangle, the number of distractions along the roadside on the approaches to the crossing, and the type of crossing protection in place are the important factors in the explanation of potential hazards.

G-2 CROSSING PROTECTION SYSTEMS

There are basically two types of protection systems for motorists approaching railroad crossings--active and passive. The active types of protection are those which provide the driver with a positive indication of the approach of a train. Such devices would include sign assemblies adjacent to the railroad and the roadway with a pair of flashing red

lights which are actuated into operation by the approach of a train. Other such devices include gates which are lowered across the roadway upon the approach of a train.

Passive warning systems involve only static signs and pavement markings. These only inform the motorist of the existence and location of a crossing. It is the driver's responsibility to determine independently whether a train is approaching and whether it is safe to cross. The minimum inclusion in a passive signing and marking system is a Type W10-1 advance warning sign which is the 36-inch diameter round, black and yellow sign, and the Type R15-1 Railroad Crossbuck. Both of these signs should be in place on each approach to an unsignalized grade crossing. Additionally, the MUTCD stipulates, also, that on those paved roadways, approaching grade crossings shall be marked with a standard type of pavement marking where the vehicular traffic and train traffic would appear to warrant such treatment. Generally, all crossings other than those involving primarily switching tracks would be so marked and signed.

This whole subject is strongly influenced by the element of economics. Active devices utilizing flashing lights or gates are quite costly, ranging from $25,000 to $75,000 depending upon the type of roadway and number of tracks involved. Obviously, such costly systems can be applied only where there is a significant amount of vehicular and train traffic. It is generally conceded that for those situations involving two or fewer trains per day and less than 500 vehicles per day, economic justification for other than minimum types of warning such as static signs does not appear feasible.

G-3 GRADE CROSSINGS IN ANKENY

Locations

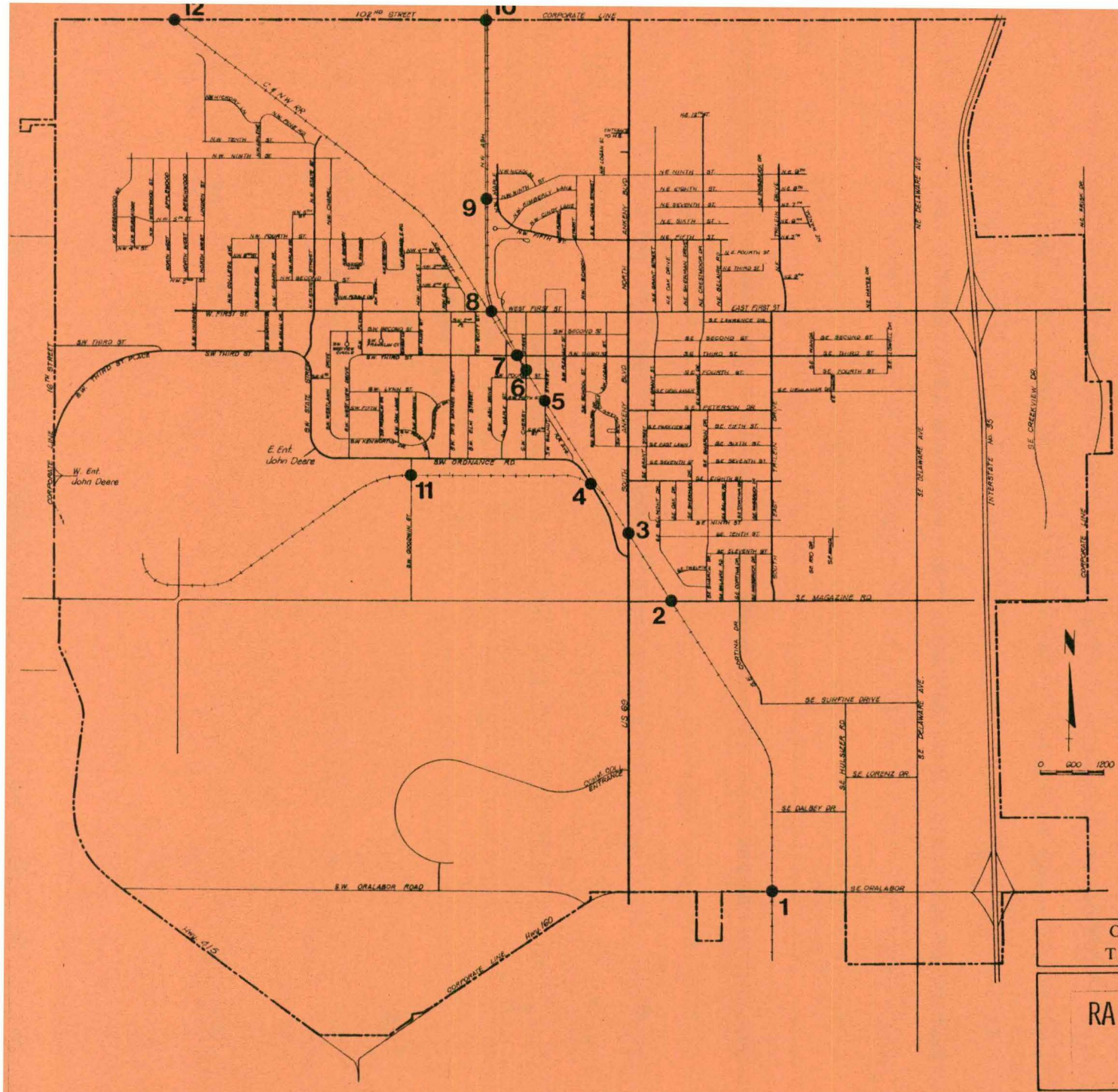
At the present time, there are 12 locations where public streets and railroad tracks intersect within the corporate limits. The locations of these crossings and their identifying number are shown in Figure G-1.

Three of the locations involve the old Fort Dodge-Des Moines-Southern trackage from W 1st Street north to NW 18th Street (102 Avenue). This line has been essentially abandoned and a considerable amount of it within the corporate limits has been removed. There is a segment, however, north of W 1st Street to a small community of Alleman about six miles north of Ankeny which has been taken over by the Chicago and Northwestern Railroad. The trackage north of W 1st Street and running parallel to NW Ash Drive is used principally for railroad car storage. On rare occasions, amounting to only a few times a year, a switch engine which is stationed in Ankeny will go to Alleman to pick up some grain shipments.

The siding which serves the John Deere Plant and some of the commercial establishments along SW Ordnance Road crosses SW Ordnance Road and SW Goodwin Street. This trackage is used very seldom and the sited crossings are relatively insignificant.

Accidents

During the three year period, 1974-1976, there were only four accidents involving contact between a motor vehicle and a train. Three



Numbers identify order of analysis in the Report text.

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

RAILROAD GRADE-CROSSING PROTECTION STUDY

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE G-1

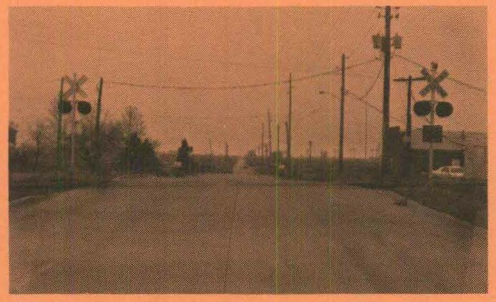
of the mishaps occurred at the crossing on SE Magazine Road and one occurred on the SE 3rd Street crossing. There were two mishaps at the crossing on Ankeny Blvd. neither of which involved vehicle-train conflicts. In one of the accidents, there was contact between two vehicles waiting for the crossing gates to raise. In the other, the gate mechanism malfunctioned and the gates came down again after having raised when the train plassed, dropping onto the hood of a vehicle which had just entered the crossing. At the Magazine Road crossing, there was one accident in each of the three study years and they all occurred prior to the installation of the flashing light signal system illustrated in Figure G-2.

There was only one person injured in the four accidents, and no fatalities. The four grade crossing accidents represent approximately 0.5 percent of the total number of accidents which occurred throughout the City during the three-year period.

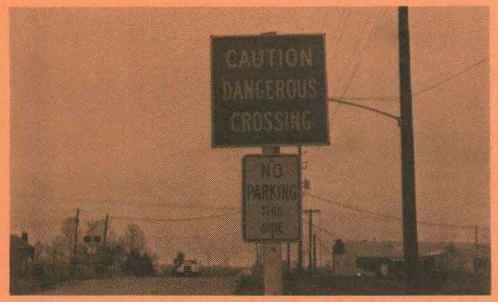
Railroad Traffic

The area dispatcher for the Chicago and Northwestern Railroad indicates, that under prevailing conditions in this area, the traffic on their tracks through Ankeny will generally be about three southbound and three northbound trains daily. These trains are approximately 100 cars in length, half of them during the daylight hours and the other half during dark hours. There may be some increased traffic during the late summer months generated by shipments of small grain. There is also some local switching traffic generated by businesses and industries in the area. The volume of train traffic in future years is very speculative.

A ORALABOR ROAD--Looking West

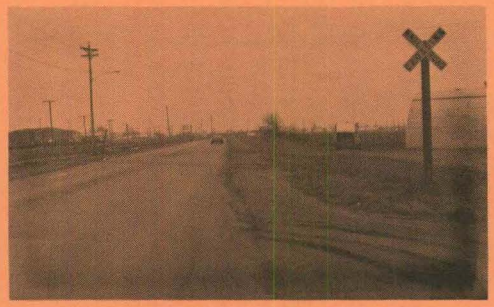


B·1 MAGAZINE ROAD--Looking West



B·2 MAGAZINE ROAD--White/Red Nonstandard Sign

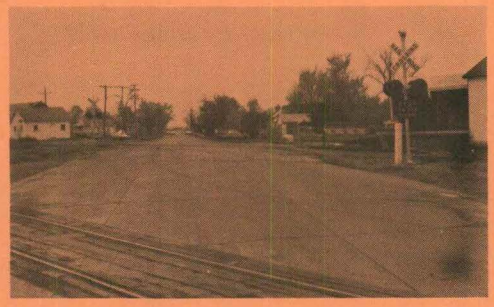
C SOUTH ANKENY BLVD.(US-69)--Looking North



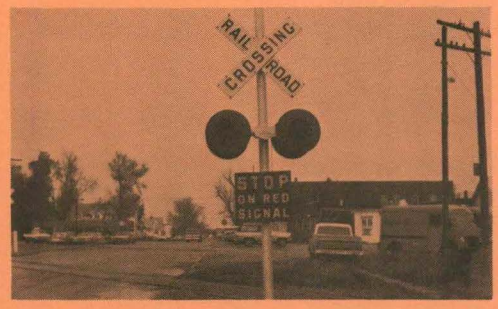
D SW ORDNANCE ROAD--Looking South

E·1 SW WALNUT STREET--Looking North

E·2 SW WALNUT STREET--Deteriorated Crossbuck



F·1 SW CHERRY STREET--Looking South



F·2 SW CHERRY STREET--Deficient Reflectorization

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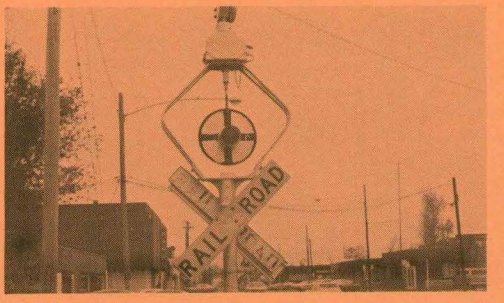
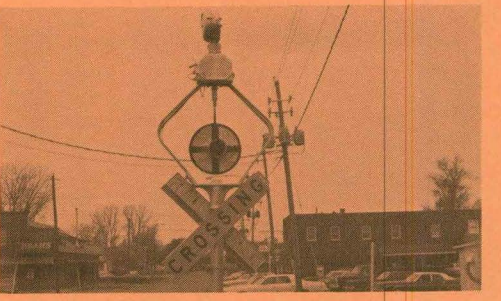
FIGURE G-2

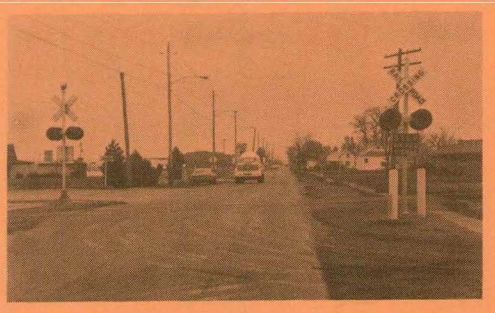
G-1 SW 3rd STREET--Looking East



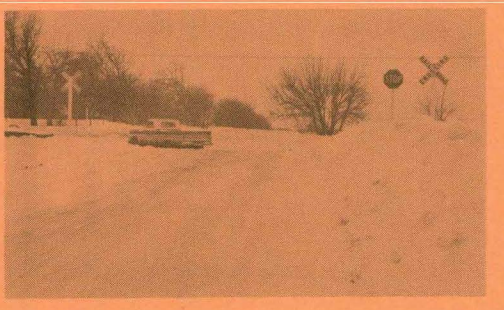
G-2 SW 3rd STREET--Deficient Maintenance Of Substandard Equipment



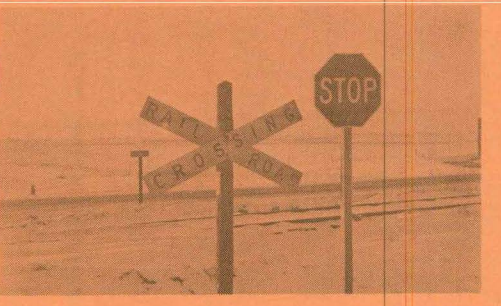
G-3 SW 3rd STREET--Same Comment



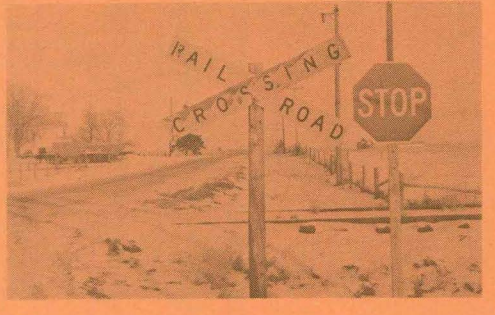
H WEST 1st STREET--Looking East



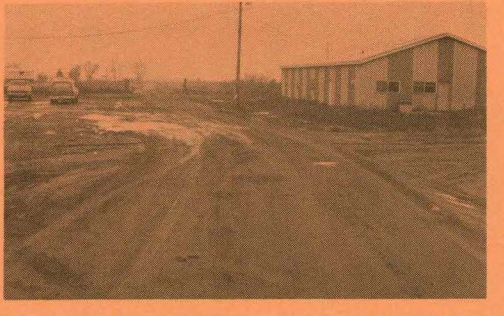
I NW 9th STREET--Looking West At NW Ash St.



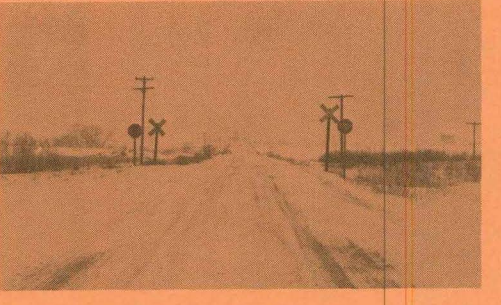
J-1 102nd STREET--Looking West At NW Ash St.



J-2 102nd STREET--Looking East At NW Ash St.



K SW GOODWIN STREET--Looking South



L 102nd STREET-East of NW 16th St.--Looking West

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FIGURE G-2

Lighting

In order to minimize the hazards which are prevalent at grade-crossings during dark hours, it is recommended that two luminaires be installed at the higher volume crossings, and at least one luminaire be placed at all of the others. Luminaires should be mounted at least 40 feet above the road surface, and to further enhance the possibility of highlighting the crossing, it is recommended that the luminaires have a distinctive color different from other street lighting in the City. A sodium-vapor lamp would serve that purpose quite well.

Protection Deficiencies

Only 3 of the 12 grade crossings which were appraised meet or exceed the minimum signing and marking requirements stipulated in the MUTCD. Those are crossing No. 1 on Oralabor Road, crossing No. 3 on Ankeny Blvd. and crossing No. 12 on 102nd Street. Each of the other nine crossings are deficient in one or more of the minimum signing and marking requirements. Several of those which should have standard pavement markings on the approaches have none. Most are without the required advance warning sign Type W10-1. A couple have very deficient Type R15-1 Crossbucks; they are either badly deteriorated or the incorrect design. Two of those that are signalized are deficient so far as the signals themselves are concerned.

- Crossing No. 1 - Oralabor Road (Figure G-2A)

This crossing is protected with a full range of pavement markings, advance warning signs, and automatic flashing lights and gates. While

the crossing is generally adequate, it is recommended that it be illuminated with two luminaires as described previously. As noted in Figure G-2A, the signing associated with the gate standards includes the panel indicating that there are two tracks at the crossing. Since one set of rails has been removed, these signing panels should be also removed. No accidents were reported at this crossing during the three-year study period. Almost 6,000 vehicles pass over this crossing during an average weekday. A significant portion of this traffic takes place during dark hours, hence the need for illumination.

- Crossing No. 2 - SE Magazine Road (Figure G-2B)

The automatic flashing signals at this crossing were installed in 1976, after the third of three accidents which occurred within a three-year period. There is presently no Type W10-1 advance warning sign on the east approach. A standard 36-inch sign of this type should be in place 400 to 500 feet east of the crossing. There is a Type W10-1 sign on the west approach. It has some surface deterioration but it is generally acceptable. There are no standard railroad approach pavement markings on either approach. It is recommended that such markings be applied. Apparently, in an effort to reduce the accident potential at this crossing prior to signalization, the signs shown in Figure G-2B(2) were installed east and west of the crossing. The signs are 24 by 24-inch with white reflectorized letters on a red reflectorized background. The signs are nonstandard in all respects and accordingly, should be removed. Such an ominous warning is probably not called for now that

the automatic signals are in place. It is recommended that the crossing be illuminated with two of the special luminaires. Approximately 2,500 vehicles pass over this crossing during an average day and much of it is during dark hours.

- Crossing No. 3 - Ankeny Blvd. (Figure G-2C)

The protection system at this crossing is highlighted by flashing lights and gates and includes all the other required advance warning signs and pavement markings. There is street lighting along Ankeny Blvd., and there are two luminaires in the vicinity of the crossing, but both of them are on the south approach. There are no units adequately close on the north approach. It is recommended that the special luminaires previously mentioned be installed at this crossing. The gate and sign standards or supports include a panel indicating that there are two tracks when in fact there is only one. These panels should be removed. The Type W10-1 advance warning sign on the south approach is only a 30-inch size. Since it is in very poor condition, it should be replaced soon with a standard 36-inch unit.

- Crossing No. 4 - SW Ordnance Road (Figure G-2D)

This particular track is an industrial siding. Train traffic is comparatively infrequent and generally during daylight hours. The existing crossing protection consists of a pair of Type R15-1 crossbuck signs. The post supporting the unit on the south approach is not plumb. It should be straightened. There are no Type W10-1 advance warning signs

on either approach. These signs should be installed approximately 250 feet from the crossing on each approach. While most of the train operation on this crossing probably takes place during the daylight hours, it is possible that there might be some switching operation at night and for that reason it is recommended that at least one of the recommended types of luminaires be installed close to this crossing.

- Crossing No. 5 - SW Walnut Street (Figure G-2E)

The only protection at this crossing is shown on Figure G-2E. The view in E-1 is to the north of the crossing, and E-2 is to the south of the crossing. It is immediately evident that the only automatic signal is on the wrong side of the road for southbound drivers, and is not visible to northbound drivers if there happens to be a train on the crossing. The automatic signal is a relatively inadequate unit. The flashing light is very substandard by modern standards, with a low level of intensity and very little angularity. The sign portions of the unit have no reflectorization, either in the legend or in the background. It is recommended that that unit be removed and replaced by a more modern unit and that it be supplemented with a comparable unit on the right side of the south approach.

The R15-1 crossbuck sign on the south approach is also on the wrong side of the street, and as indicated in the illustration, it has excessive surface deterioration. Until a new automatic signal can be installed on the south approach, it is recommended that this particular crossbuck sign

be removed, and that a new, properly reflectorized unit be installed on the east side of the street south of the crossing. There are no Type W10-1 advance warning signs on either approach to this crossing. These should be installed as soon as possible.

There are none of the standard pavement markings presently in place. It is recommended that they be applied either in the form of paint or with some of the commercially available precut plastic units which are fastened to the pavement with a mastic glue. While these are originally more expensive than paint, they have considerable more durability, and in the long run, are more economical than paint.

While the approximate 900 vehicles a day which pass through this crossing is comparatively light, some of it does take place at night when there also may be some train traffic. Since there are no street light units in the close vicinity of this crossing, it is recommended that at least one of the special luminaires previously described be installed at this crossing.

- Crossing No. 6 - SW Cherry Street (Figure G-2F)

The Cherry Street crossing protection is reasonably adequate. The automatic signals are positioned properly with respect to the main line track; however, there is a siding south of the main line so that conceivably, visibility of the automatic signal on the south approach could be blocked by switching operations through the crossing.

There are no Type W10-1 advance warning signs on either approach to this crossing as there should be. The north approach poses a problem

for such a sign because of the short distance between the crossing and SW 3rd Street. However, one should be installed even though the longitudinal distance from the crossing would be less than the recommended distance. The standard set of pavement markings should be applied on both approaches. The siding track south of the main line should probably also be identified with a set of Type R15-1 crossbuck signs; at least there should be one on the south approach. Since there are approximately 1,100 vehicles over this crossing during an average day, the crossing should be illuminated at night with the recommended special luminaires.

- Crossing No. 7 - SW 3rd Street (Figure G-2G)

The only warning or protection at this crossing is a single automatic signal device pictured in Figure No. G-2G (1, 2, 3). This particular device is a very antiquated unit. The flashing light is very faint, and the cone of visibility on 3rd Street is exceedingly narrow. With the only signal at the crossing being on the east approach, it would, of course, be invisible from the west when there is a train crossing. The situation is especially bad at night. The close up views of the device indicate a very inadequate attempt to improve the equality of the crossbuck sign. All of the panels should be removed, and the proper unit installed. A whole new set of automatic signals should be installed.

At the present time, there are no Type W10-1 advance warning signs on either approach, and there are no railroad approach pavement markings as there should be. Because of the comparatively high traffic volume

(approximately 5,000 vehicles during an average day) the crossing justifies the recommended special illumination.

There are frequent occasions when vehicles park in a position such as shown in Figure G-2G (1). This seriously affects the visibility distance in the vicinity of the crossing. Parking should be prohibited in that particular area.

- Crossing No. 8 - W 1st Street (Figure G-2H)

If the grade crossing at this location consisted solely of 1st Street and the main line tracks of the Chicago and Northwestern tracks system of protection would be comparatively simple. The automatic flashing lights which are presently in place are on the main line. But the situation is complicated by the presence of another track approximately 100 feet east of the main line track with the intersection of NW Ash Street between the two tracks. This track has no identification.

The automatic signal devices for the main line are reasonably adequate; however, during one occasion of surveillance, it was noticed that the lights continued to operate almost two minutes after a southbound freight train had cleared the crossing and was several blocks south of W 1st Street. At the present time, there is a 30-inch Type W10-1 advance warning sign about 200 feet east of the crossing. This unit should be replaced with a 36-inch sign and moved approximately 75 feet farther east. There is no advance warning sign on the west approach.

There should be a pair of Type R15-1 crossbuck signs installed on both approaches to the east track. Also, a Type W10-1 advance warning sign should be installed on NW Ash Street about 200 feet north of the intersection with W 1st Street. As there are about 8,000 vehicles on W 1st Street during an average 24-hour period, the situation at the crossing justifies the installation of a high mount special illumination as previously described.

- Crossing No. 9 - NW 9th Street (Figure G-2I)

Because of the nature of this railline and its usage, this is actually a comparatively minor crossing; however, there are some remedial measures needed. The crossing is properly identified with a pair of Type R15-1 crossbuck signs. However, the situation is complicated by the very close proximity of NW Ash Drive. Traffic approaching from the east on NW 9th Street is under STOP sign control at the intersection with NW Ash Drive. However, the STOP sign is east of the railroad crossing. To a person not familiar with the situation, this could mean that he must stop before passing over the crossing, then he could enter the intersection with NW Ash Street without stopping. It is therefore recommended that the STOP sign be moved west of the crossing and that it be mounted at least seven feet above the surface of the roadway to overcome the higher level of the railroad grade crossing. There should be a Type W10-1 advance warning sign in place for westbound traffic a short distance west of the intersection with NW Maple Street.

- Crossing No. 10 - 102nd Street (Figure G-2J)

There is little, if anything, that can be said favorably about the protection at this crossing. First, the two crossbuck signs are an old superseded design and size, the surface is deteriorated considerably and they are mounted too low. Secondly, the presence of the STOP signs which presumably are meant to stop vehicles before crossing the tracks is a gross misuse of the STOP sign, considering the fact that there are periods of many days duration when there is no train traffic. To stop all of the vehicle traffic under these conditions is totally wrong. It is accordingly recommended that the existing crossbucks be replaced with the current standard and that the STOP signs be removed. Also, Type W10-1 advance warning signs should be installed on 102nd Street approximately 500 feet east and west of the crossing. Nighttime illumination does not appear to be warranted.

- Crossing No. 11 - SW Goodwin Street (Figure G-2K)

This crossing, involving the industrial siding running east from the John Deere area, is a comparatively obscure crossing. Goodwin Street is unimproved and at the present time there are no signs whatsoever to delineate the presence of this particular grade crossing. Considering the development of the area and the comparatively short distance between the crossing and SW Ordnance Road, and the gated fence a short distance south of the crossing, there is inadequate longitudinal spacing for Type W10-1 advance warning signs. But there should be, at least, a pair of Type R15-1 crossbuck signs. Nighttime illumination is not warranted.

- Crossing No. 12 - W 102nd Street (Figure G-2L)

The city plat indicates that only the westbound lane of this roadway is within the city limits; however, the average motorist probably is not aware of that distinction. This is a very skewed crossing with an angle of approximately 30^{o} between the tracks and the roadway. There were no accidents reported during the three-year study period.

The protection system consists entirely of passive signing on each approach. There are 36-inch W10-1 Advance Warning signs in good condition and properly displayed on each approach. At the crossing there are two R15-1 railroad crossbucks. Both crossbucks are somewhat deteriorated. The one facing west has been damaged by gun fire. STOP signs, 30-inch size, are in place on each approach at the crossing and are supplemented by 36-inch W3-1 STOP AHEAD signs. All of these signs are in good condition.

The validity of stopping vehicular traffic at this crossing is certainly less questionable than a similar practice at the crossing near NW Ash Street. However, considering the comparative infrequency of train traffic, there are apparently several hundred vehicles stopped at this crossing every day when there is obviously no train conflict. While an in-depth study was not made of the general compliance with the STOP signs at this crossing, from experience in studies at numerous other grade crossings with such control, it can be presumed that there are numerous violations of the regulation by people who are familiar with the situation.

The use of STOP signs at railroad grade crossings is highly controversial since considerable research indicates the effectiveness of such control is very questionable. STOP signs should be considered only for temporary use on an interim basis until a more positive and active system can be installed. It is not proposed that the STOP signs at this crossing be removed since the visibility for drivers is less than desirable.

It is recommended that a high-mount luminaire be installed as close as possible to the crossing to illuminate the area during dark hours since there is some train traffic at night.

G-4 GUIDELINES FOR EVALUATION OF RAILROAD-STREET GRADE CROSSINGS

As mentioned previously, although accidents that occur at railroad-highway (street) grade crossings are numerically a very small part of the overall traffic accident problem, they usually are severe in terms of fatalities, personal injuries and property damage. It is understandable, therefore, that there is special concern in the interest of preventing accidents at grade crossings.

Obviously, not every grade crossing can be equipped with a costly active system of protection. The question then arises as to how to determine which protection system should be applied at any particular crossing. To reconcile a solution involving a variety of variables, rating systems have been developed to determine the relative degree of accident potential of grade crossings. There are several rating formulas which include such factors as train and vehicle volumes, train and vehicle speeds, angle of crossing, type and number of tracks (mainline, siding), and visibility.

The Iowa Department of Transportation-Highway Division recently issued a Policy (No. 620.07) on "Guidelines for Evaluation of Rural RR-Highway Grade Crossings" (see Appendix Exhibit G-1). There is no comparable guideline for application in urban areas. However, certain portions of the DOT policy, such as the rating formula, are logically applicable to urban areas.

Using the pertinent data acquired on such factors as train and vehicle volumes in Ankeny, along with the other factors cited in the Policy, the ratings for crossings in Ankeny are derived from the formula:

Rating = (Highway /street/ Volume ADT) x (Daily Train Volume) x (Crossing Angle Factor) x (Highway Speed Factor) x (Train Speed Factor) x (Number and Kind of Tracks Factor).

	Crossing	Rating
#1	Oralabor Road	22,080
#2	Magazine Road	8,847
#3	Ankeny Blvd.	48,384
#4	Ordnance Road	842
#5	SW Walnut Street	3,917
#6	SW Cherry Street	4,774
#7	SW 3rd Street	29,886
#8	W 1st Street	48,964
#9	NW 9th Street	13.5

	Crossing	Rating
#10	102nd Street (near NW Ash Street)	21.6
#11	Goodwin Street	3.4
#12	102nd Street (east of NW 16th Street)	1,958

The State DOT Policy proposed that some type of regulatory measure may be warranted, depending on conditions when the rating derived from the formula is 1500 or greater. It should be noted that this rating relates primarily to rural situations. Perhaps a higher cutoff for a rating value would be more pertinent for urban areas. In addition to the six elements which are factors in the rating there are several other elements which may have more bearing in an urban environment. Restricted view at the crossing, high ambient noise level, rough crossing condition and past accident experience are important elements which perhaps should be assigned greater scrutiny in evaluating urban grade crossings.

Section 321.342 of Iowa laws clearly indicates the minimum degree of protection which must be applied. Reference to the MUTCD is now supplemented with the recent issuance by the Federal Highway Administration of PART VIII. Traffic Control Systems for Railroad and Highway Grade Crossings.

PART H

EVALUATION OF THE CITY TRAFFIC CODE

H-1 GENERAL

If the public is to understand, remember, and observe traffic rules and regulations in moving from state to state, or even between cities within the same state, such rules and regulations should, to every extent possible, be exactly the same, even word for word. Uniformity also makes easier the tasks of police officers, judges, traffic officials, motor vehicle administrators and educators. The concept of "uniform laws" does not of course mean that all laws on all aspects of motoring be the same everywhere, but that situations similar in nature should be treated similarly. Thus, it is not inconsistent with the principle of uniformity that laws may provide special exceptions for those cases deserving special treatment. Substantial but not necessarily verbatum uniformity is a clear necessity especially in regard to Rules of the Road.

An adequate set of local ordinances and traffic regulations should contain provisions for the following principal subject areas.

1) Obedience to traffic laws
2) Traffic control devices
3) Use of the roadway overtaking and passing, driving on the right or left side of the roadway
4) Rules determining the right-of-way at intersections and private driveways

5) Pedestrian rights and duties

6) Turning and starting, and signals on stopping and turning

7) Special stops required

8) The regulation of speed

9) Provisions for serious traffic offenses

10) Rules on stopping, standing, and parking

11) The operation of bicycles

12) Rules for motorcycles

13) Miscellaneous regulations

H-2 LOCAL TRAFFIC CODE

Chapter 21 of the Municipal Code of Ankeny was reviewed and compared with regard to content and substance to the State of Iowa laws pertaining to motor vehicles. The Ankeny Traffic Code is patterned very closely to the State Code, consequently many aspects of the usual traffic code are provided for in the Ankeny Code. There are, however, some shortcomings and inconsistency which should be considered for additions or modifications in the interest of better administration.

- Section 21.4 - Emergency Vehicles

The latest version of Section 321.231 of the Iowa Code has been broadened in scope and revised in such a way that Section 321.232 was repealed which in effect will also cause modification of Section 21.5 of the Ankeny Code.

- It would seem advisable for Ankeny officials to include in the local code provisions, State Code, Section 321.233 relating to the exemption of certain road users as it would apply to city street and utility employees.

- Section 21.8 - Traffic Control Devices

It is a small point, but the reference to the Iowa State Highway Commission probably should be changed to Iowa Department of Transportation.

Section 21.17 - Minimum Speed

- This section should be revised to include all of the provisions of Section 321.294 of the State Code, so as to more clearly spell out a prescribed course of action in the event of a need for enforcement of the regulation.

- Section 21.18 - Emergency Vehicles - Speed

This section can be repealed since its provisions would be set forth in the revisions of Section 21.4.

- Somewhere between Section 21.13 and 21.17, provision should be made for the present 35 MPH speed limits on SE Cortina Drive, SE Surfine Drive, and a portion of SE Hulsizer Road, and the 50 and 55 MPH speed limits on those portions of SE Oralabor Road which are within the City. Also, there are no provisions for the speed limit on SW Oralabor Road.

- Section 21.19 - Reckless Driving

  Reference to the State Code should be changed to Section 321.277.

- Section 21.19.1 - Drag Racing Prohibited

  In reference to the State Code should be changed to Section 321.278.

- Section 21.24.1 - No U TURN

  The last sentence of this section should be deleted since it calls for a sign which is not in accordance with current standards of design for that particular regulatory device.

- Section 21.26 - Turning Signal

  Since there are a variety of speed limits within the City of Ankeny, it may be worthwhile to include the provisions of Section 321.315 of the State Code dealing with the duration of the turn signal.

- Section 21.38.2 - Entering the Intersection - Right Turn on Red Prohibited

  It would be better if the right-turn-on-red regulation was covered in general rather than refer specifically to the one cited intersection by including in the local code the provisions in Section 321.257 of the State Code, so that the regulation could be readily applied at other intersections as may be needed by simply installing the appropriate sign based on a Council resolution rather than amend an ordinance.

- Section 21.39 - Pedestrian - Traffic Control Signals

  This section should be modified to include provisions for pedestrian WALK - DONT WALK signals and their various modes of operations such as the flashing DONT WALK clearance indication.

- Section 21.58 - Parking - Angle

Subsection (2) relating to Cherry Street is not in accordance with what actually exists. The same is true in the case of Walnut Street as stipulated in Subsection (3).

- Section 21.66 - School Zones

Subsection (2) should be modified to stipulate that this is the school zone for Parkview School. Another subsection should be added to provide for the location of the new high school along N Ankeny Blvd.

- Section 21.67 - School Zones - No Parking

Subsection (2) should be modified to delete Ankeny High School and a new section should be added as it would relate to the high school area. Also, a new section should be added to provide for Southeast Elementary School.

- Section 21.79 - Truck Route Designated

This section should probably be updated to provide for permissible truck traffic on Delaware Avenue, SE Magazine Road, SE Cortina Drive, SE Surfine Street, SE Lorenz Drive, SE Hulsizer Road, SE Dalby Road and Oralabor Road.

- While most of the important aspects of motor vehicle regulations are provided for in Chapter 21 of the Ankeny Municipal Code, and are generally in accordance with State statutes, the format of the chapter seems to lack a desirable degree of organization and relativity.

It is recommended that the City consult with the National Committee on Uniform Laws and Ordinances and obtain their assistance relative to the provisions of the Model Traffic Ordinance.

PART I

IMPLEMENTATION, COSTS, AND PRIORITIES

I-1 GENERAL

Analyzing traffic problems and developing feasible solutions often is the least troublesome part in a program to improve traffic operation and safety. Implementation of the approved action program can be fraught with difficulties in funding the costs and assigning priorities so as to accrue the potential benefits as soon as practicable.

I-2 FUNDING

Most traffic problems can be solved if the financial resources are unlimited. The realities of the situation are, of course, sobering. Street needs are increasing, along with the cost of new construction and maintenance. Unfortunately, the sources of funds are not keeping pace. More fuel-efficient vehicles are consuming less taxable fuel, while at the same time, State, County, and City officials are struggling to maintain road systems which are deteriorating at an increasing rate. Careful and judicious planning in the utilization of funds available are prime responsibilities of all officials.

The principal sources of funds which are available to the City for implementing the selected recommendations are: Federal-aid programs, State-aid, and local funds. It is recommended that City officials confer with IDOT representatives to determine which funds and how much, may be available for implementing the various recommendations.

Federal-aid, which is administered by the IDOT, is available through a variety of programs or classifications. Most require some local matching participation varying from 10% to 30%.

The Federal-aid Urban System (FAUS) is allocated to cities throughout the State on a formula bases for use in projects involving those streets on the Federal-aid urban System.

The Safer-Off-Systems program funds may be available for sign betterment and construction on those streets which are not part of the Federal-aid urban system. The several recommendations involving pavement marking primarily may be subsidized by the PMS program (Pavement Marking-Safety). There is a High Hazard-Safety program which might be applicable to some of the projects. Other Highway Safety funds may be available for signing work.

The widening and intersection modification recommended for locations involving State Highway routes would undoubtedly be of prime concern to the Iowa Department of Transportation and any project would likely be administered by that organization with some type of Federal-aid funding. The extent of any local participation is uncertain at this time.

The IDOT last year implemented the Urban-State Traffic Engineering Program (U-STEP) which is ----"a cooperative program to provide an upward step in traffic operations, safety, and energy efficiency on primary road

urban extensions by improving traffic flow." The construction costs of qualified projects are shared equally by the City and State. The basic features of the Program are related in a collection of questions and answers compiled by the IDOT and included herein in the Appendix as Exhibit I-1.

Local funds are derived mainly from State sources, consisting primarily of taxes on motor fuel and vehicle registration fees. The State allocates the funds to the cities according to a formula. Other city funds for street purposes may accrue from property taxes and special assessments.

I-3 PRIORITIES, SCHEDULING AND COSTS

The principal considerations or factors in assigning a priority rating are urgency in fulfilling the City's legal requirements regarding traffic control responsibilities, the attainment of an optimum degree of accident reduction potential for the costs involved, and improvements in the efficiency of traffic operation which will benefit the environment, and road-user costs. Several of the recommendations throughout the Report are not listed below. They call for very little, if any, implementation expense, and can be put into effect without priority scheduling such as all-way STOP sign removals, and traffic code modernization, better traffic handling on school grounds. The priority assignment shown as follows is influenced by the relative degree of the inadequacy or deficiency involved in providing a more secure and comfortable environment for motorists and pedestrians. This has the beneficial by-products of safer and more efficient traffic operation.

The various recommendations herein have been classified into three time frames of implementation--immediate action, short-term, and long-term projects. The immediate-action proposals are those which should be completed within the next 3 to 6 months. Generally, the various proposals are not too controversial, and will not require time-taking planning procedures, and costs are comparatively small.

The short-term projects should be programmed for completion during the next 1 to 3 years.

The long-range projects should be completed within the next 5 years.

The priorities which have been assigned to those proposals in the various time frames are, of course, flexible and at the discretion of the City. The projects may be combined if it will facilitate funding.

The point to keep foremost in mind is that City officials are required by State Law to comply with certain standards regarding traffic control devices. Bringing the City into compliance should receive early scheduling.

IMMEDIATE ACTION RECOMMENDATIONS
3-6 MONTHS

Suggested Priority	Recommendations	Estimated Cost
1	Complete all necessary sign work indicated by Code #3, 6, and 8 in Column S on the SID sheets	$11,500
2	Install pedestrian signals at six recommended locations	$21,000
3	Apply special pavement markings at NW 16th Street and W John Deere entrance	$ 4,400
	Relocate signal loop detector	$ 200
	Construct right-turn lane	$ 5,000
4	Install temporary traffic signal at W 1st Street and State Street	$ 8,000
	Apply special pavement markings at W 1st Street and State Street	$ 7,500
	Widen east leg of W 1st Street and State Street	$ 7,000
5	Apply special pavement markings on SW Ordnance Road approaching Ankeny Blvd.	$ 1,400
	Shorten median	$ 750
6	Parking Bay at Terrace School and modify NW School Street	$18,000
7	Acquire R-O-W for service road for Northwest Elementary School	
8	Arrange for R-O-W for Near Northside Arterial	
9	Construct right-turn lane on Ankeny Blvd., north approach to Community College entrance	$ 6,000

SHORT-RANGE RECOMMENDATIONS
6 MONTHS-3 YEARS

Suggested Priority	Recommendations	Estimated Cost
1	Construct service road for Northwest Elementary School	$ 25,000
2	Widen Ankeny Blvd. between RR crossing and 1st Street	$ 80,000
	Modify 3 signal installations	$ 70,000
3	Widen Ankeny Blvd. between 1st Street and High School area	$155,000
4	Construct pedestrian overpass on W 1st Street at Northwest Elementary School and at School Street	$160,000
5	Interconnect Ankeny Blvd. signals	$ 35,000
6	Install railroad crossing illumination	
7	Procure a self-propelled pavement marking machine so as to improve street marking program	$ 10,000

LONG-RANGE RECOMMENDATIONS
WITHIN 5 YEARS

Suggested Priority	Recommendations	Estimated Cost
1	Construct Near Northside arterial	$400,000
2	Widen SW Ordnance Road in vicinity of east entrance to John Deere Plant	$ 25,000

APPENDIX

APPENDIX

APPENDIX

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

HIGHWAY SAFETY PROGRAM MANUAL

VOLUME	13 - TRAFFIC ENGINEERING SERVICES	TRANSMITTAL 43
CHAPTER	I. INTRODUCTION	February 1974

Par. I. General
II. Highway Safety Program Standard 13
III. Highway Safety Program Manual

I. GENERAL

Traffic engineering measures and traffic control devices, when applied in accordance with accepted standards, help motorists and pedestrians to use highways more safely.

The importance of traffic engineering services and uniformity of traffic control devices was recognized by Congress in the committee reports on the Highway Safety Act of 1966. (H. Rept. No. 1700, 89th Cong., 2d Sess. (1966), pp. 18, 19, 23; S. Rept. No. 1302, 89th Cong., 2d Sess. (1966), pp. 5, 11.)

II. HIGHWAY SAFETY PROGRAM STANDARD 13

A. Purpose.

The purpose of the Traffic Engineering Services Standard is to ensure the full and proper application of modern traffic engineering principles and uniform standards for traffic control in order to reduce the likelihood and severity of traffic accidents.

B. Specific Objectives.

Standard 13 (Appendix A) covers items which are essential for effective traffic engineering services, including the design, installation, and maintenance of traffic control devices. Specific objectives are

EXHIBIT A-1

1. To provide the needed traffic engineering expertise to develop traffic control plans and programs in all jurisdictions.

2. To identify both the short-term and long-range need for traffic control devices.

3. To apply warrants for the application of traffic control devices.

4. To periodically upgrade existing traffic control devices on all streets and highways to conform with standards issued or endorsed by the Federal Highway Administrator.

5. To ensure that the need for new traffic control devices has been determined by adequate traffic engineering studies.

6. To periodically inspect and maintain all traffic control devices.

7. To devise methods for correcting hazardous roadway deficiencies and for installing improved features when modifications to the roadway are made.

8. To provide the necessary authority, personnel, equipment, and facilities for carrying out these efforts.

9. To evaluate the safety adequacy of the roadway, including its capacity and efficiency.

C. Legislative Authority.

Highway Safety Program Standard 13, Traffic Engineering Services, is authorized by 23 U.S.C. 402(a) which provides in pertinent parts as follows:

> "Each State shall have a highway safety program approved by the Secretary, designed to reduce traffic accidents and deaths, injuries, and property damage resulting therefrom. Such programs shall be in accordance with uniform standards promulgated by the Secretary . . . to improve driver. . . and. . . pedestrian performance. In addition, such uniform standards shall include, but

not be limited to, provisions for. . . highway design and maintenance (including. . . markings. . .) (and) traffic control. . . Such standards as are applicable to State highway safety programs shall, to the extent determined appropriate by the Secretary, be applicable to federally administered areas where a Federal department or agency controls the highways or supervises traffic operations."

D. Standard revision.

Standard 13, entitled "Traffic Control Devices" was issued June 27, 1967. It was revised and retitled "Traffic Engineering Services" and reissued on November 19, 1971 (See Appendix A).

E. Applicability to Federal agencies.

On November 24, 1970, Standard 13 was declared to be applicable to highways open to public travel in federally administered areas where a Federal department or agency controls the highways or supervises traffic operations (35 FR 18009).

III. HIGHWAY SAFETY PROGRAM MANUAL

A. Purpose.

This volume of the Highway Safety Program Manual is a guidebook for explaining Federal policy on program activities. It is intended to clarify and supplement Standard 13 and to provide information useful to those responsible for its implementation. References cited in the following paragraph to specific policies are included to call attention to their existence.

B. The Manual on Uniform Traffic Control Devices.

1. The Manual on Uniform Traffic Control Devices (MUTCD) is the standard for all devices used on roads open to public travel. This was established as policy on November 13, 1970, by the Federal Highway Administrator in accordance with 23 U.S.C. 109(b), 109(d), and 402(a).

2. Target dates for compliance with the MUTCD were established in Federal Highway Administration Policy and Procedure Memorandum (PPM) 21-15, dated February 8, 1973 (paragraph 7). These dates are:

   a. Pavement Markings - December 31, 1972.

   b. Signs - December 31, 1974.

   c. Traffic Signals - December 31, 1976.

3. A schedule for compliance with the MUTCD pertaining to traffic control on street and highway construction and maintenance operations (Part VI) also was established by PPM 21-15. Compliance is mandatory on Federal-aid construction projects authorized after January 1, 1973. The same date was established as the target date for compliance on roads and streets off the Federal-aid system which are open to public travel.

HOSKINS-WESTERN-SONDEREGGER

ENGINEERS • ARCHITECTS • PLANNERS 825 J ST. • P.O. BOX 80358 • LINCOLN, NEBRASKA 68501 • (402) 475-4241

February 20, 1978

Mr. Wm. Jay Schreiner, P.E.
City Engineer
211 S.W. Walnut Street
Ankeny, Iowa 50021

Interim Report No. 2

Dear Jay:

Consideration of the traffic problems associated with the Northwest Elementary School pointed toward other problems in that quadrant of the City. In discussions with several concerned persons, the feeling which emerged repeatedly was - "If we only had another access route to Ankeny Blvd. without having to travel on or cross West First Street..." The solution is, of course another crosstown arterial. This Interim Report discusses our investigations into the feasibility of such a facility.

THE PROBLEM - GENERAL COMMENTS

At the present time West First Street is the focal point in the accessibility to that portion of the City north of West First Street and west of the C&NW railroad tracks. This obviously accounts for much of the very considerable traffic load on West First Street and virtually mandates that there be another east-west route with some crosstown continuity approximately 1/2 mile north of West First Street.

The 1974 Comprehensive Plan pictures a connection between the stub end connection of NW 9th Street west of the railroad tracks and NW 9th Street at the intersection with NW Ash Street. The Plan proposes that this route be classified as a collector street and as such it would be 31 feet wide with parking permitted on one side.

That Plan has several detractions. NW 9th Street east of NW Ash Street poses some problems beginning with the intersection of those two streets. There is a potentially troublesome grade differential between the level of the intersection and the level of 9th Street further east. The railroad grade crossing is considerably higher and causes some sight distance problems. The 1977 condition inventory of Ankeny streets indicates that NW 9th Street in that area has some structural deficiencies which would indicate that any increase in traffic volume on the street could lead to costly maintenance problems. Also, there are over 40 driveways in that half mile section which would generate numerous conflicts.

EXHIBIT D-1(1)

NEW ARTERIAL RECOMMENDATION

Considering the comparatively rapid and apparently continuous growth in Ankeny's residential development, construction in the presently undeveloped land north and east of the railroad tracks is a virtual certainty. The City should definitely plan to preserve the space needed for an eventual across-town route in this area. Accordingly, any potential land developers should be aware of this need. The situation can be dealt with on a piecemeal basis as the area is developed. But such a facility is needed now.

The proposal for the alignment of a new arterial street shown in the attached sketch has several features and advantages. The proposed location is further north which would make it directly accessible to more of the presently undeveloped land. The curvilinear alignment of the roadway approaching the railroad crossing affords good sight distance on the track approaches. The crossing is at the preferred right angles rather than at an undesirable skewed angle. The alignment east between NW Ash Street and Ankeny Boulevard runs along the back property line in that area which would enhance access control and provide for minimizing numerous driveways.

The configuration as shown between Logan Street and Ankeny Boulevard is suggested in order to better provide for the surges of traffic generated by the High School during normal hours and by extra curricular activities such as athletic events. The cul-de-sac arrangement is recommended so as to minimize the possibility of driveways in the close vicinity of the intersection with Ankeny Boulevard.

It is possible to provide a 35 MPH operation on the new street between Ankeny Boulevard and NW Chapel Street.

In the interest of economy and still provide a comparatively high level of operating efficiency accommodating both through traffic and local traffic which might be generated by future land development, it is proposed that the street be 37 feet wide providing three lanes. The two outside lanes would serve through traffic and right turns. The center lane would accommodate left turns at and between intersections. Parking would be banned on both sides.

Such a cross section would be virtually equal to a four-lane roadway. In any event it is recommended that the section between Ankeny Boulevard and NW Logan Street which leads to the high school parking lot be made a four-lane roadway to provide additional storage area on the approach to the Ankeny Boulevard intersection. It is presumed that this intersection will be signalized.

The proposed alignment would certainly facilitate accessibility between the High School and the western part of the City.

The two alternate arrangements for crossing the railroad tracks near the western end of the road are shown to illustrate that efficient operational continuity will require what may seem to be an excessive amount of space, irrespective of location. Alternate No. 1 is preferred in that it offers better access to the area south of the tracks. The area north of the tracks

can be served by a properly designed street system at such time that there is development in that area. Alternate No. 2 offers a lesser degree of service to the area south of the tracks and may actually pose more problems for land uses between the roadway and the track right-of-way.

IMPLEMENTATION

The engineering and planning problems connected with developing a new roadway such as this one are not particularly difficult. The more troublesome and perplexing aspects of such proposals arise in the procedures involved in actually programming the roadway construction. Since virtually all of the entire alignment passes through undeveloped land, its construction would either have to wait until the land is being developed, or it could be constructed as a separate entity and not part of any subdivision procedures. The problems of construction prior to area development center on programming, financing, and the assignment of benefits.

In any event the new street is needed now to serve existing operational problems and traffic distribution and circulation needs. The welfare of the whole city obviously could be better served if the roadway could be completed in total in one complete construction project. If it was tied to and phased with the area development, there may be discontinuous sections and long delays in completion of the entire route.

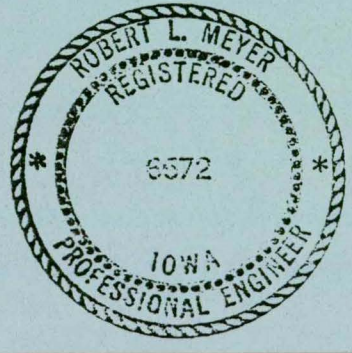
The need for an arterial as proposed is quite apparent. Immediate planning and the development of an action program geared toward early construction are imperative if the possible benefits of the new street are to be realized. Any prolonged delay, especially in planning, could cancel the best of possibilities.

Sincerely,

HOSKINS-WESTERN-SONDEREGGER, INC.

By R. L. Meyer
Robert L. Meyer, P.E.
Traffic Engineer

RLM/fl
#4547-4



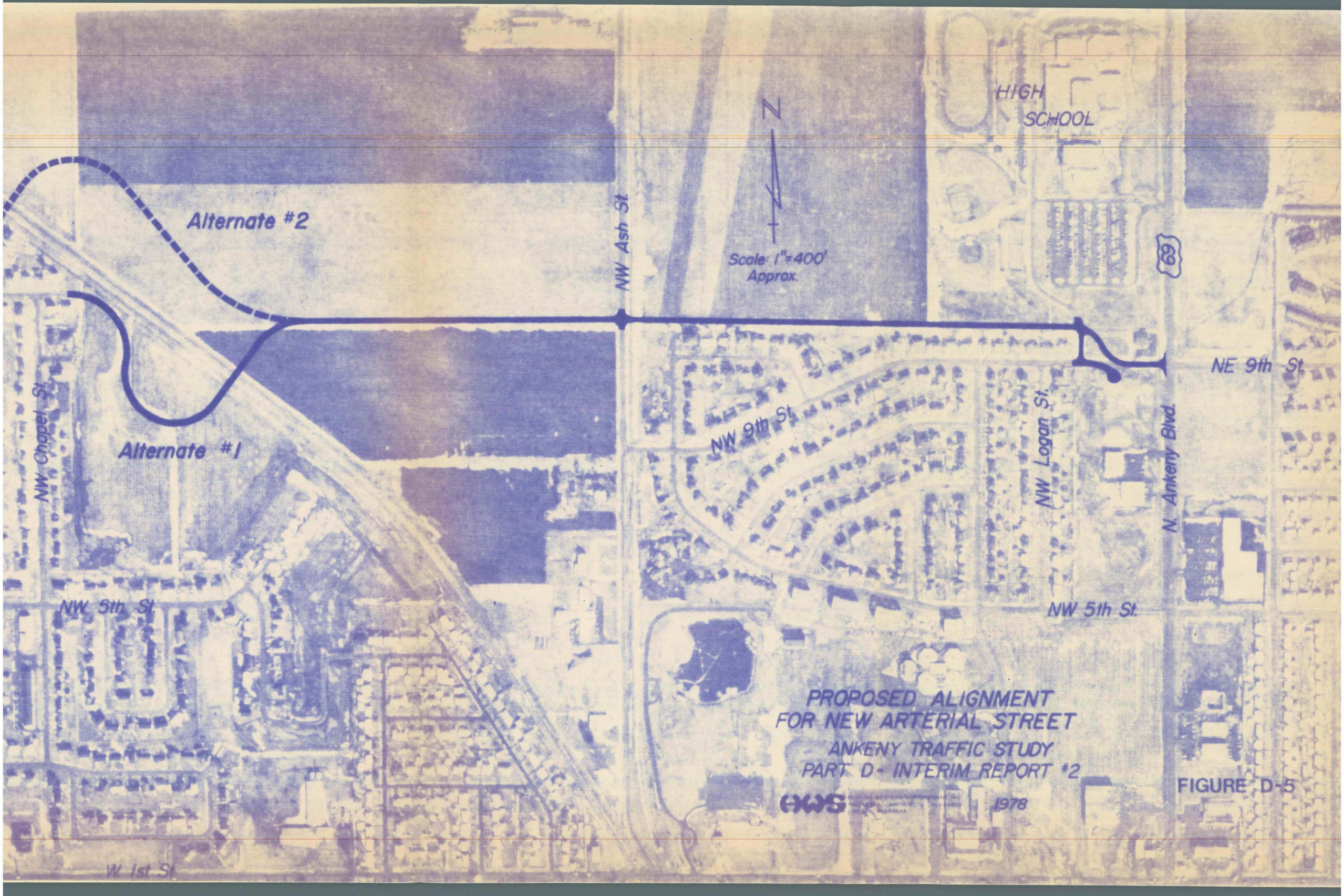

HIGH
SCHOOL
N
Scale: 1"=400'
Approx.
NW Ash St.
Alternate #2
Alternate #1
NW Chapel St.
NW 9th St.
NW Logan St.
N. Ankeny Blvd.
69
NE 9th St.
NW 5th St.
NW 5th St.
W 1st St.
PROPOSED ALIGNMENT
FOR NEW ARTERIAL STREET
ANKENY TRAFFIC STUDY
PART D - INTERIM REPORT #2
HWS
1978

FIGURE D-5

SIGN INVENTORY DATA SHEET

Location________________________

Date____________________

Recorder____________________

A	B		C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T		
							SIGN								POSTS					SIGN SIZE		
STREET	FROM - TO	DIR. OF TRAV.	INTERSECTION WITH	SIGN # ON ROUTE	SIGN FACING	SIGN CODE # (MUTCD)	VISIBILITY	COLORS	SURFACE MAT.	BASE MAT.	REFL. COND.	SIGN COND.	MUTCD COMPL.	NONCOMPL.	HEIGHT	LATERAL	TYPE	CONDITION	WORK NEEDED	Hor.	Vrt.	REMARKS DESCRIPTION

EXHIBIT E-1(1)

SIGN INVENTORY

CODE INSTRUCTIONS FOR OBSERVERS AND TAPE TRANSCRIBERS

NOTE: Observers should identify names of intersecting streets as they are crossed in the course of a run.

Use a separate line on the Inventory Data Sheet for each sign.

FIELD

A Name of street on which signs are being inventoried. Begin run at south end or west end of street.

B Name of streets or other boundary lines which identify limits or beginning and end points of run.

C Identify intersecting street when sign is part of intersection control or guidance.

D Signs to be numbered consecutively from beginning point of each run, irrespective of street side. If a sign is part of a multisign assembly, each sign in assembly is given a separate number.

E Assign Code 1 if sign is facing observer on run; Code 2 if sign is facing opposite direction. Add "B" if sign is on left side.

F Assign generic number as set forth in MUTCD (W2-1, R1-1, S1-1, etc.). For Speed Limit signs, use last two columns to denote designated speed limit.

G VISIBILITY

0 - Can be easily seen
1 - Hidden by official sign
2 - Hidden by advertising sign
3 - Lost among clutter of commercial signs
4 - Hidden by tall weeds or tree branches
5 - Hidden by parked vehicles
6 - Hidden because of hill
7 - Hidden because of curve
8 - Hidden by curbside mailboxes
9 - Hidden - Other reasons (Remarks)

H COLORS

1 - Black on white
2 - White on red
3 - Black on yellow
4 - White on black
5 - Red on white
6 - White on green
7 - Green on white
8 - Red, white, blue
9 - White on blue
0 - Other

I SURFACE COMPOSITION

1 - Background and legend painted
2 - Reflective sheeting - legend painted
3 - Reflective sheeting - Background and legend
4 - Beads on paint
5 - Other (Comment)

J BASE MATERIAL

1 - Aluminum
2 - Steel
3 - Wood
4 - Other (Comment)

K REFLECTIVITY

0 - Good
1 - Fair
2 - Poor
3 - Practically none
4 - Nonreflective

L SIGN CONDITION

0 - Good
1 - Acceptable
2 - Bent and unsightly
3 - Defaced - spray paint, stickers, scratched, etc.
4 - Surface deteriorated
5 - Rusty - corroded
6 - Gunfire damage

M MUTCD COMPLIANCE

0 - Basic design complies
1 - Certain aspects do not comply

N ELEMENT OF NONCOMPLIANCE

1 - Incorrect color, background, or legend
2 - Incorrect size
3 - Incorrect legend or shape
4 - Incorrect mounting height
5 - Incorrect lateral position
6 - Incorrect usage
7 - Should be reflectorized, but is not
8 - Incorrect longitudinal position
9 - Other (Comment)

O MOUNTING HEIGHT

0 - Complies with MUTCD
1 - Mounted too low
2 - Mounted too high
3 - Other (Comment)

P LATERAL POSITION

0 - Position OK
1 - Too far from street edge
2 - Too close to street edge

Q TYPE OF SUPPORT

1 - Standard U-channel signpost
2 - Wood - 4"x4"
3 - Wood - 4"x6"
4 - Steel pipe
5 - Metal lightpole
6 - Wood utility pole
7 - Other (Comment)

R SUPPORT CONDITION

1 - OK
2 - Bent or twisted
3 - Not plumb
4 - General deterioration, needs paint
5 - Other (Comment)

S WORK NEEDED

0 - None
1 - As previously described
2 - Remove - sign not needed
3 - Replace with new standard or larger size
4 - Needs new post
5 - Raise
6 - Replace with new sign
7 - Other (Comment)
8 - Needs designated device-none in place

T SIGN SIZE

Horizontal and vertical dimensions in inches

HWS

HOSKINS-WESTERN-SONDEREGGER

ENGINEERS • ARCHITECTS • PLANNERS 825 J ST. • P.O. BOX 80358 • LINCOLN, NEBRASKA 68501 • (402) 475-4241

February 2, 1978

Mr. Wm. Jay Schreiner, P.E.
City Engineer
211 Southwest Walnut Street
Ankeny, Iowa 50021

Interim Report No. 1

Dear Jay:

This will be an "interim report" on a matter we discussed on the phone regarding the general traffic situation in the vicinity of the Northwest Elementary School.

During each of the several occasions that I have observed traffic operation and the procedures involved in securing safety for the students at this school, it appeared that all the various undesirable features of the situation, to some extent, centered around the school area accessibility. West First Street is the only street that serves the school. All student deliveries and pickups are made on First Street which of course is intermingled with the comparatively high volume of traffic on the street. Parents who pick their children up at noon or when school is out in the afternoon frequently jam the roadside along the school frontage. School buses also load and unload on the street.

It appears that the situation could be eased significantly if there was another facility for vehicles to use in the close proximity of the school. The attached sketch illustrates one possibility. Actually, it may be the only feasible possibility of providing relief. A 20-foot roadway with parking permitted on only the east side and one-way operation northbound would provide parking for approximately 35 to 40 vehicles at one time and it would serve to distribute traffic back to the northwest part of the City without it having to get on to First Street.

We are proposing that this new roadway be one-way northbound so as to eliminate any possibility of it becoming a regular city street. Actually, it would be nothing more than a school-area service road and its one-way operation would deemphasize the possibility of it being used for anything but school servicing. Incidentally, I suggest also that school buses which serve this school also load and unload at some point along the service road rather than on First Street. If it is desired that the buses not circulate through the neighborhood north of the school, they can get back to First Street by going south along the east side of the school.

EXHIBIT F-1(1)

As shown in the sketch, a 4-foot sidewalk should be included along the east and south edges of the road.

Two alternate arrangements for connecting with NW 3rd Street are shown. The preferred arrangement is dependent upon the availability of right-of-way.

Someone may be concerned about possible conflicts with the walkway extending east from NW Coral. A crosswalk should be designated with Type S2-1 signs at that point on the new road, and parking prohibited within 25 south of the crosswalk. Since all the traffic on the new road will be school oriented, we should expect exemplary driving practices.

I defer to your resources in determining a precise cost estimate for this proposal as I am not aware of what your design and construction standards are. Without a more definitive basis, we can expect the roadway and sidewalk construction to cost about $25,000 for Alternate Connection #1 and $33,000 for Alternate #2, plus right-of-way.

You should, of course, explore the availability of any federal safety funds. There are certain programs funds for which this project might be eligible, such as the Safer Off-System Roads Program. For information, you should contact:

Mr. Dwight Stevens
Local Systems Engineer
IDOT, District #1
1020 So. 4th Street
Ames, Iowa 50010
Phone: 296-1421

Because of the rapidity of residential development in this part of the City, action should be taken promptly to insure that the space needed for this new facility would be available. For that reason primarily, I didn't feel the matter could wait for our completion of the whole traffic study report.

I won't presume to suggest how this matter should be handled between the City and the School District. But, the seriousness of the situation in that area along First Street and the dire need for some sort of remedial measures should generate the necessary cooperation regarding financing and construction, if it is agreed that the proposal is worth pursuing. This project, of course, is something that can be done now and isn't dependent upon any future modification of West First Street. Everyone should understand that improving First Street will not ease the problem we are attempting to solve.

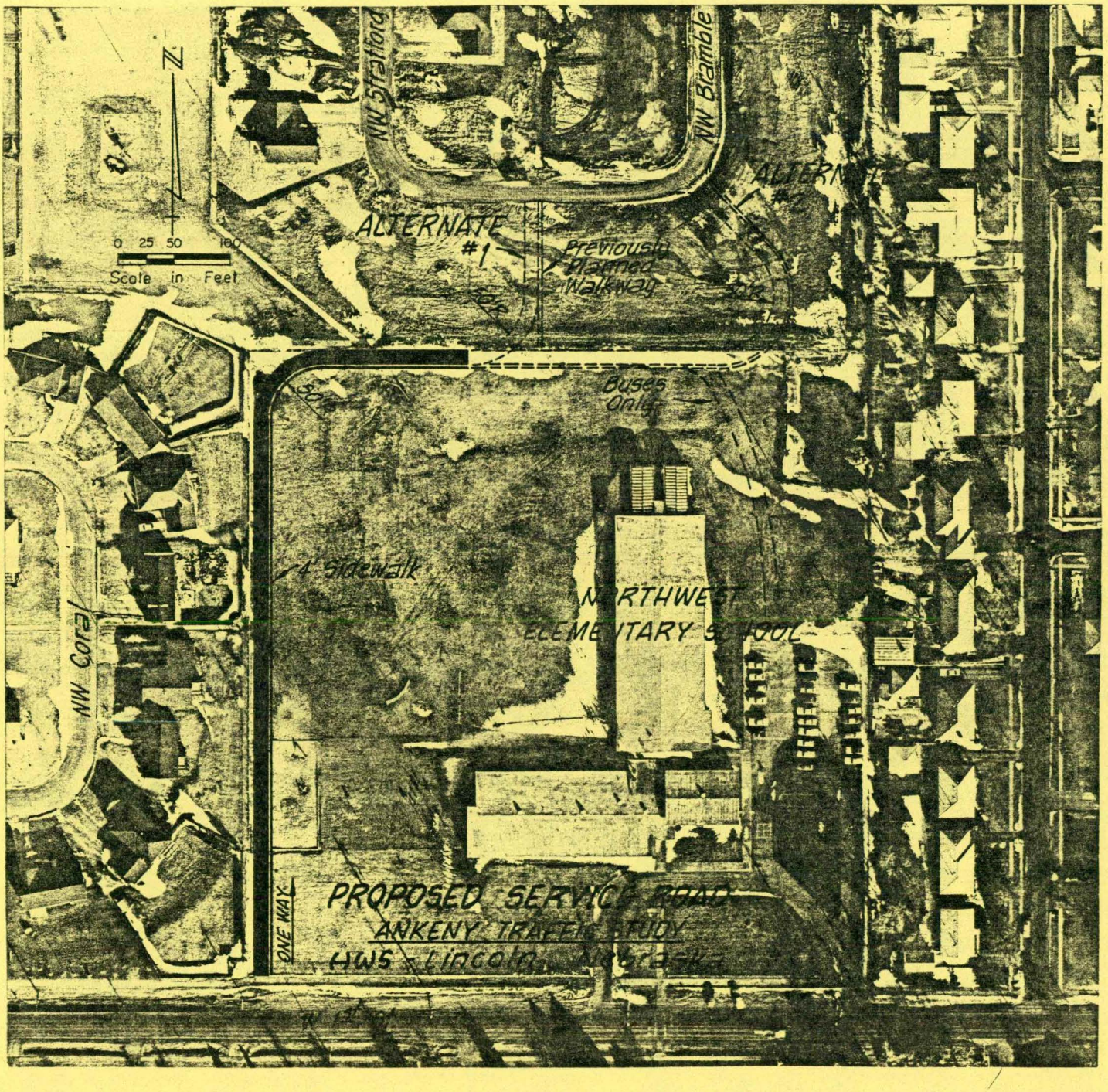
I will be interested in learning what reaction you get in discussing this proposal with others.

Sincerely,

HOSKINS-WESTERN-SONDEREGGER, INC.

By Bob
Robert L. Meyer, P.E.

RLM/cb
4547
cc: Bob Andresen


N
0 25 50 100
Scale in Feet
NW Stratford
NW Bramble
ALTERNATE #1
Previously Planned Walkway
Buses Only
4' Sidewalk
NW Coral
NORTHWEST
ELEMENTARY SCHOOL
ONE WAY
PROPOSED SERVICE ROAD
ANKENY TRAFFIC STUDY
HWS - Lincoln, Nebraska

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March 8, 1978

Mr. Wm. Jay Schreiner, P.E.
City Engineer
211 Southwest Walnut Street
Ankeny, Iowa 50021

REFERENCE: Interim Report No. 3

Dear Jay:

Since you requested that we provide you with information as soon as possible on those things which may involve an expenditure of funds so that they can be given early consideration in your budget procedures, I am reporting on the traffic situation in the vicinity of the Terrace Elementary School.

The traffic situation generated by parents who deliver and pick up their children at practically every elementary school prevails to a significant degree in the vicinity of the Terrace School. Parents drive from both directions on NW School Street and, in spite of clearly posted regulatory signs, park on both sides of this 31-foot street. Congestion is rampant and the potential for an accident is too great as the children dart across the street. They persist in doing this because there simply are no alternatives. The only other public street in the area is Northwest 5th Street which is not conveniently close. Even the comparitively inadequate off-street parking lot for the school staff has little, if any, capabilities of contributing to relief.

In order to provide a reasonably adequate and safe facility to accommodate parents who deliver and pick up their children, it is proposed that a parking bay be cut into the school frontage along the west side of NW School Street. So as to accommodate the maximum number of vehicles, angle parking is recommended. It appears that 30 spaces are possible.

To weaken the inherent accident potential of angle parking, it is recommended that NW School Street be modified as shown in the accompanying figure. By separating the two directions of travel, and by restricting the width of each lane to approximately 14 feet, and by further making the parking bay approximately 25 feet deep, any undesirable characteristics of angle parking can be softened. The comparatively narrow width of the through-lanes on NW School Street are suggested to minimize the tendency for people to park on the street. The divided configuration should maintain the integrity of the overall operating plan much better than simply widening the existing roadway.

EXHIBIT F-2(1)

One of the prime considerations in developing this plan is the need to eliminate the possibility of children having to cross the roadway. The present situation where the children run from between cars parked on the west side of the street to reach those that may be parked on the east side obviously is most unsafe.

To enhance the possible effectiveness of the parking bay toward its principal purpose, the parking time limit should be 15 minutes from 8 A.M. to 9 A.M. and from 3 P.M. to 4 P.M. on school days.

In developing the suggested street modification, due care was given to the need for additional right-of-way along the east side of the street. The design was influenced considerably by the need for smoothness in lane alignment and the need for storage of at least one vehicle in the median opening south of the intersection. The increase in the radius in the northeast corner of the intersection is deemed necessary to facilitate the south-to-north movement on NW School Street.

The cost of the modification as pictured would be approximately $18,000 plus any additional right-of-way costs which probably would be a comparatively small cost.

This cost may appear to be more than can be justified to some but due attention should be given to the need for some time of short time parking facilities in the vicinity of the school and, more importantly, any parking that is provided should serve its purpose in the safest possible manner. The proposal pictured in the sketch should accomplish that purpose in an economically feasible manner.

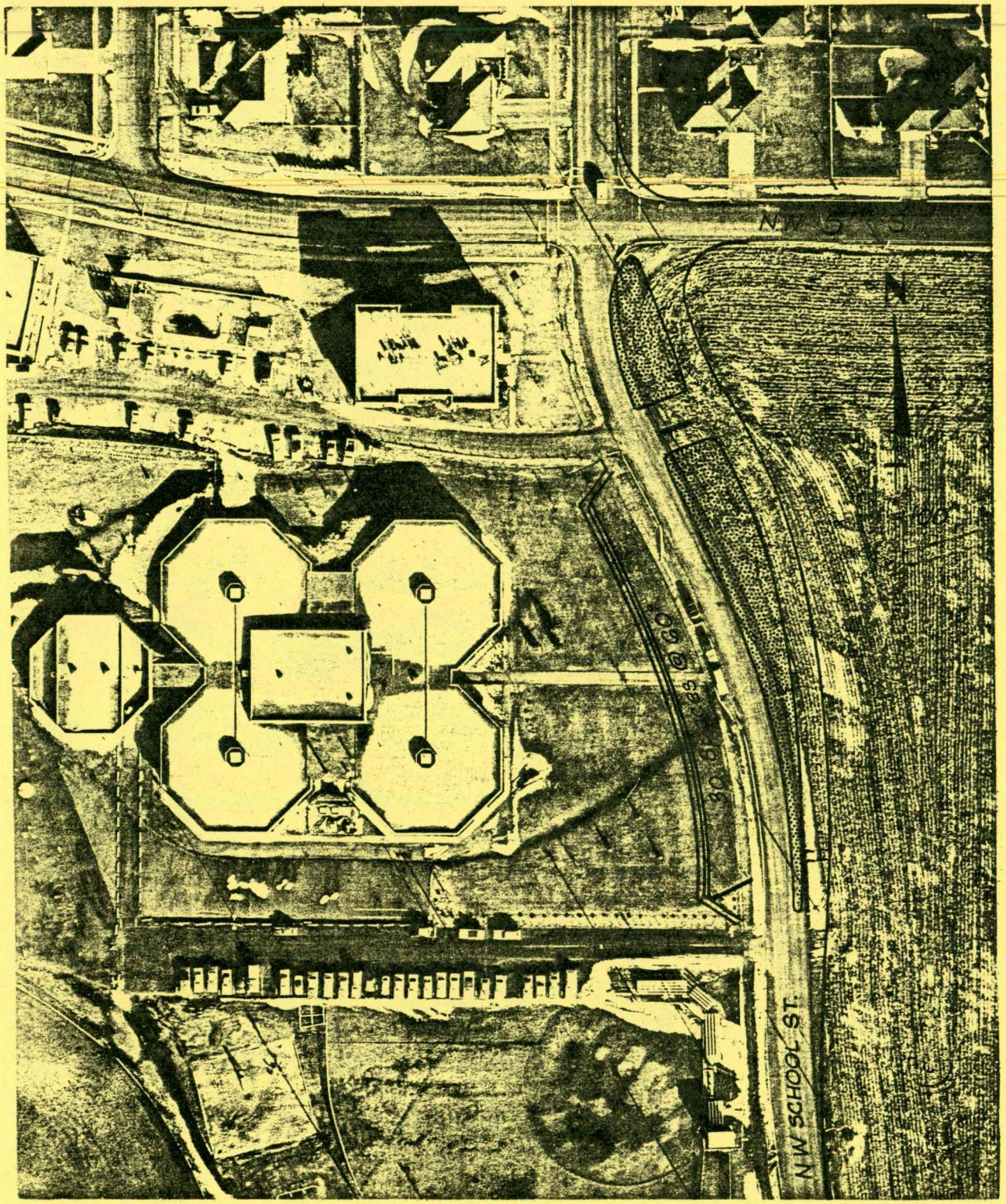
Respectfully submitted,

HOSKINS-WESTERN-SONDEREGGER, INC.

By R. L. Meyer
Robert L. Meyer, P.E.

RLM/cb
77/4547
cc: Bob Andresen

EXHIBIT F-2(2)



Width of Lanes 14 feet
Parking Bay Depth 25 feet

CITY OF ANKENY, IOWA
TRAFFIC SAFETY STUDY

TERRACE ELEM. AREA

NW SCHOOL ST. MODIFICATION

Hoskins – Western – Sonderegger
Lincoln, Nebraska

FIGURE

EXHIBIT F-2(3)

Iowa Department of Transportation

POLICIES AND PROCEDURES MANUAL

SUBJECT: Guidelines for Evaluation of Rural RR-Highway Grade Crossings

POLICY NO.: 620.07

RESPONSIBLE DIVISION(S), OFFICE(S): Highway Division

RELATED POLICIES & PROCEDURES:

EFFECTIVE / REVISION DATE: 4/5/78

APPROVAL(S): D. P. McLean

I. Affected Division(s), Office(s): Highway Division - Offices of Maintenance and Secondary Roads.

II. Policy Statement and Purpose: It is the policy of the Highway Division to provide guidelines for the uniform evaluation of safety at rural railroad-highway grade crossings, and application of traffic control and/or warning devices that may be required in addition to existing crossbuck and advance warning signs.

III. Authority: This policy is established by the authority of the Director of the Highway Division in compliance with Section 321.342 of the Code of Iowa, 1977 and Senate File 167 of the 67th General Assembly, 1st Session.

IV. Definitions: None

V. Summary of Responsibilities:

A. Office of Maintenance: Grade crossings on rural primary highways shall be reviewed and evaluated based upon the guidelines and procedures outlined in this policy.

1. Should it be determined additional control and/or warning is warranted at a crossing, stop signs may be installed with appropriate advance warning signs and public notice of such action. The signs shall be maintained until a more permanent solution in the form of signals can be accomplished.

2. Rumble strips may be installed as an auxiliary warning device to supplement special controls at the crossing if the crossing is judged to have an unusually high potential for accidents or in fact has an established accident experience. When used alone (in conjunction with crossbucks and standard advance warning signs), the limited sight distances and related posted speeds contained in this policy shall be applicable.

B. Office of Secondary Roads: The guidelines and procedures contained in this policy shall be distributed to County authorities for use and application at their discretion.

EXHIBIT G-1
3 Pages

VI. Procedures:

A. Elements that might make a crossing "particularly dangerous":

1. High train volume (number of trains per day).

2. High highway traffic volume (average annual daily traffic).

3. A crossing angle of less than 60°.

4. More than one mainline track.

5. High train speed.

6. High highway speed.

7. Restricted view at the crossing. (The view up or down the track is blocked by trackside development or other obstructions to the extent a motorist must proceed beyond the normal stopping point approximately 15 feet from the nearest rail to see an approaching train).

8. High noise level at the crossing. (When the ambient noise level outside the vehicle in the vicinity of the crossing is so high that it renders audio train signals ineffective).

9. The crossing is in a dangerous state of disrepair. (When the crossing is in such condition or state of disrepair that it results in the complete attention of the driver being focused at all times on the crossing so that an approaching train might be missed, or it presents the potential for a vehicle to become stalled on the crossing).

10. Past accident experience. (An average of one or more accidents every two years).

B. The first six elements listed under "A" are combined (multiplied) in a crossing rating formula as follows:

Rating = (Highway AADT) x (Number of Trains) x (Crossing Angle Factor) x (Train Speed Factor) x (Highway Speed Factor) x (Number of Tracks Factor)

Highway AADT: Average Annual Daily Traffic

Number of Trains: Number of Trains Per Day

Crossing Angle Factor: 0°-29° = 2.0
30°-59° = 1.2
60°-90° = 1.0

Train Speed Factor:	60 MPH+	= 1.0
	40-59 MPH	= 0.9
	25-39 MPH	= 0.8
	Below 25 MPH	= 0.7
Highway Speed Factor:	45-55 MPH	= 1.0
	35-40 MPH	= 0.8
	25-30 MPH	= 0.6
	Below 25 MPH	= 0.5

Number of Tracks Factor:

Two or More Mainline Tracks	= 1.0
One Mainline Plus Other	= 0.85
One Mainline	= 0.8
Other	= 0.675

C. Application of Traffic Control Devices:

1. If the rating value derived from the formula is 1500 or greater, or other conditions at the crossing indicate the location may be classified as a particularly dangerous crossing, the authority having jurisdiction over the highway may elect to install any one of the following traffic control devices: stop signs (section 321.342), flashing signals or flashing signals with gates.

2. Rumble strips may be used (section 321.342) to either supplement stop signs, flashing signals or flashing signals with gates, or may be used alone when the view of a crossing on the approaching highway is less than the following distances for the indicated posted speed limits:

Posted Speed Limit (MPH)	Distance (Feet)
35	500
40	600
45	700
50	800
55	1000

Note: Rumble strips, when used, should be the grooved rather than the raised design, and shall allow a clear path for bicycle travel in conformance with Iowa DOT standards. Rumble strips should not be employed at locations where the posted speed is less than 35 MPH.

URBAN STATE TRAFFIC ENGINEERING PROGRAM

(U-STEP)

Questions and Answers

1. Q WHAT IS THE PURPOSE OF U-STEP?

   A To provide a specific program and funding source through which the state and city can solve traffic operation and safety problems on the primary road extension in Iowa's cities.

2. Q WHO PAYS FOR THE IMPROVEMENT?

   A The construction cost of qualified projects will be shared equally between the city and state. (See Question 14)

3. Q HOW LARGE IS THE PROGRAM?

   A The DOT Commission has authorized a reserve of $2 million for each year of the next five-year program beginning with 1978. If fully matched by applicant cities, a total effort of $4 million per year can be achieved.

4. Q HOW LONG WILL THIS PROGRAM CONTINUE?

   A As long as city interest is present and the effectiveness of the projects are worthy of the cost.

5. Q WILL THERE STILL BE A COOPERATIVE TRAFFIC SIGNAL PROGRAM?

   A No. This program will be phased out and such traffic signal projects will qualify as U-STEP projects.

6. Q WHAT TYPES OF PROJECTS ARE ELIGIBLE UNDER THE U-STEP PROGRAM?

   A Eligible projects include but are not necessarily limited to: widening for turn lanes; widening to eliminate bottlenecks; install, upgrade or modernize signals; increase turning radii; improve sight distance; pavement marking, signing and resurfacing to improve traffic operations. Any improvement of limited scope that will improve traffic flow or eliminate accident potential will be considered.

7. Q WHAT KIND OF SUPPORTING INFORMATION IS NEEDED TO QUALIFY A PROJECT?

   A An engineering analysis of a problem area with basic information about the nature of the problem, traffic and accident data and the recommended improvement including a cost estimate should be submitted. If you need assistance in reviewing data available from past studies or compiling data from other sources, contact your District Local Systems Engineer.

8. Q HOW WILL PROJECTS BE SELECTED?

   A All candidate projects will be given a ranking based upon analyses done by the Office of Traffic Engineering. Final project recommendation will be made by a panel with members from the Highway and Planning Divisions.

9. Q WHAT IS THE SEQUENCE OF EVENTS FOR A TYPICAL U-STEP PROJECT?

   A In general, the sequence is as follows:

Event	Responsibility
Traffic Engineering Study	City
Identify and Define Project	City
Review Project	District Off. (Trans. Planner/Loc. Sys. Engr.)
Submit Project for Evaluation	Planning & Res. Div. (Dist. Trans. Planner)
Evaluate and Rank Projects	Highway Div. (Off. of Traffic Engr.)
Select Projects for Accomplishment Program	Highway & Planning Divisions
Approval for Funding	DOT Commission
Complete Project Agreement	Highway Div. (Off. of Urban Sys. & Dist. Office)
Prepare Project Plans, Specs. & Estimates	City - Per Agreement
Review Project Plans, Specs. & Estimates	Highway Div. (District Office)
Award Contract (if applicable)	City - Per Agreement
Project Construction & Inspection	City - Per Agreement
Final Inspection	City & Highway Div. (Dist. Off.)
Final Payment	Highway & Admin. Divisions
As Built Plans	City - Per Agreement
End of Project	City & Highway Div. (Dist. Off.)

10. Q WHEN MUST CANDIDATE PROJECTS BE SUBMITTED TO BE CONSIDERED FOR PROGRAMMING?

   A The normal cycle will be to include U-STEP projects in the Accomplishment Program published in June for the following year. Projects for 1978 should be submitted as soon as possible. In subsequent years the projects should be submitted by March 1 to allow for evaluation prior to program publication.

11. Q WHO WILL PREPARE THE PROJECT AGREEMENT?

   A The Office of Urban Systems will have primary responsibility for preparation of the project agreement ready for signature by the City and the State. The District Office (Local Systems Engineer) will provide liaison between the City and the Office of Urban Systems in the development and submittal of the terms of the agreement and in the execution of the agreement.

12. Q WHO WILL PAY THE COST OF DEVELOPING PROJECT PLANS, SPECIFICATIONS AND ESTIMATES AND CONSTRUCTION INSPECTION?

A The City will be responsible for all costs related to project development and construction inspection.

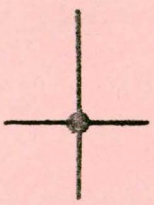
13. Q CAN A U-STEP PROJECT BE DONE BY FORCE ACCOUNT?

A Yes. The project agreement will state whether the project will be constructed by city forces or by contract.

14. Q SUPPOSE A PROPOSED PROJECT IS AT AN INTERSECTION OF A CITY STREET ON THE FEDERAL URBAN SYSTEM AND THE CITY WANTS TO USE FAUS FUNDS FOR THE PROJECT?

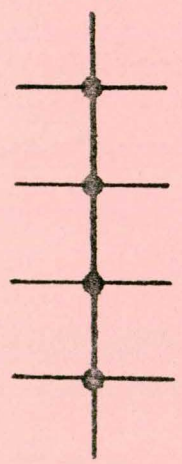
A In general, the U-STEP program would then pay the 30 percent match for that part of the project affecting the Primary System intersection. Following are examples:

Example #1: Single Intersection Project



Intersection	Project Cost	FAUS	City	State
A	$100,000	$70,000	-	$30,000

Example #2: Multiple Intersection Project



Intersection	Project Cost	FAUS	City	State
A	$100,000	$70,000	$ -	$ 30,000
B	50,000	-	30,000	120,000*
C	100,000	-		
D	50,000	-		
TOTAL	$300,000	$70,000	$80,000	$150,000

* Determined so that the total State funding equals 50 percent of the total project cost.

15. Q WILL THERE BE FOLLOW-UP EVALUATIONS OF THE EFFECTIVENESS OF U-STEP PROJECTS?

A Yes. Selective "before and after" studies will be made to show cost/benefit which will be needed to justify continuing the program. An annual report will be prepared for the information of the Commission and the public about the program.

Source: G. W. Anderson
Office of Program Management
515/296-1265
May 2, 1977