TRAFFIC ENGINEERING STUDY

FOR THE

OELWEIN, IOWA CENTRAL BUSINESS DISTRICT

C.B.D.

ASSOCIATED Engineers INC.

PLANNERS, ENGINEERS & GEOLOGISTS

1218 CENTRAL AVENUE
FORT DODGE, IOWA 50501

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1973

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OELWEIN, IOWA

CENTRAL BUSINESS DISTRICT
(CBD)

I hereby certify that this study was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

By Robert F Payer #6609

Date September 14, 1973

AEI Project #5019
September, 1973

ASSOCIATED Engineers INC.

CONSULTING ENGINEERS
GEOLOGISTS – PLANNERS

1218 CENTRAL AVENUE
FORT DODGE, IOWA 50501

TELEPHONE 573-8391
AREA CODE 515

August 27, 1973

Mayor Louis Hull and the
Honorable Members of the City Council
Oelwein, Iowa 50662

Gentlemen:

We are pleased to submit for your review preliminary copies of the Oelwein Central Business District Traffic Study accomplished by our firm. Your comments on this study are requested and most welcome.

This study presents the basic data found during our field investigations; the analysis of the above field data; cost estimates and funding sources for the proposed alternate solutions, and a summary of conclusions.

Upon concurrence with the preliminary draft, copies of the study in final form will be printed and delivered.

Please advise if there are any questions.

Respectfully submitted,
ASSOCIATED ENGINEERS, INC.

Robert F. Payer
Project Engineer

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INTRODUCTION

A. BACKGROUND

The city of Oelwein is a retail trade service center located in southern Fayette County in northeast Iowa. The city provides services to those citizens primarily in southern Fayette County, northern Buchanan County, and southeastern Bremer County.

The major highways serving the city consist of State Highways #3 and #150. Oelwein is the division headquarters for the Chicago Northwestern Railroad, which generates a considerable amount of rail movement throughout the city. The Rock Island Railroad also serves the city with a line that runs basically north-south from West Union to Cedar Rapids.

The 1970 census of population listed the number of inhabitants of Oelwein at 7,735, or a decrease of 6.6 percent from the 1960 figure of 8,282. (The 1969 Oelwein Comprehensive Plan[1] listed the city with a 1968 estimated population of 8,450.) Up until 1970 the city had been exhibiting a steady growing trend. The fact that the population decreased between 1960 and 1970 does not necessarily mean that traffic volumes in the central business district (CBD) have declined accordingly. The most recent traffic counts made by the Iowa State Highway Commission were completed in the summer of 1973. These counts were made on the two primary highways, #150 (Frederick Avenue) and #3, (Charles Street). However, the reduction of raw data and final volume estimates were not available before the printing of this study such that any increase or decrease could be ascertained.

[1] Comprehensive Plan For Oelwein, Iowa; 1969; Urban Planning Grant Project Number Iowa P-118.

B. PURPOSE OF THE STUDY

Concerned city officials have recognized the need to define, categorize and correct the deficiencies found in the city's CBD traffic system. Emphasis has been placed on the proper routing of traffic through the CBD, the physical facilities, traffic control devices, and location of on and off street parking.

This study will follow along the lines of first inventorying the existing street system in the CBD, noting the deficient areas, and finally making recommendations that include estimated improvement costs, means of financing these improvements, and a schedule of implementation.

EXISTING CONDITIONS

A. TRAFFIC FLOW

For nearly all applications of traffic engineering, the traffic demand is the essential factor. The design of any new facility or the reconstruction of an existing facility must be based on the existing and projected volumes of traffic that will use the facility. Traffic volume also furnishes a basic scale upon which to compare the relative importance of a given street.

In order to determine the estimated traffic demands on the Oelwein CBD street network, manual counts at specific intersections were made in May, 1973. In addition, estimated volumes from manual counts made by Iowa State Highway Commission personnel in 1971 were updated. Intersections counted by the ISHC included:

1. Frederick and NE 1st Street
2. Frederick and Charles
3. Charles and 1st Avenue East
4. Frederick and South 1st Street
5. Frederick and South 2nd Street

Several other locations outside the downtown study were also counted in 1971 by the Iowa State Highway Commission and these estimates were used as references for incoming and outgoing traffic flows.

Intersections counted by the Associated Engineers, Inc. included:

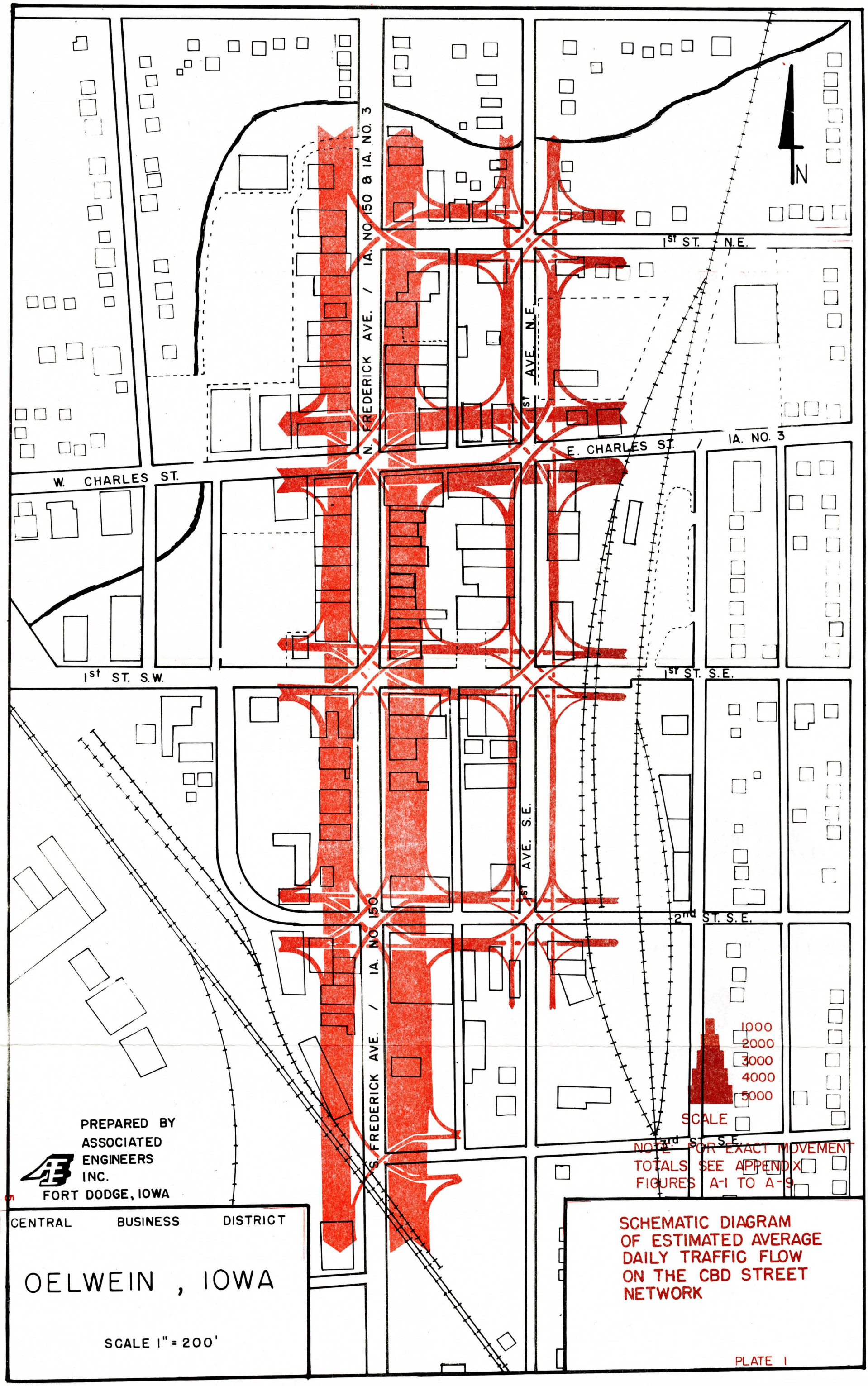
1. N.E. 1st Street and 1st Avenue East
2. 1st Avenue East and South 1st Street
3. 1st Avenue East and South 2nd Street
4. Frederick and South 3rd Street
5. Frederick and Charles

The latter was recounted to serve as a control between the 1973 counts and the updated 1971 counts.

The intersections are counted for only a portion of a day (8 hours for the ISHC counts, 12 hours for AEI counts) with the figures obtained being expanded to Average Daily Traffic (ADT) volumes. It should be recognized that these volumes are estimates only; and, considering the intersections were counted on different days - or in fact different years - the estimated volumes on any given leg can vary. Adjustments of the estimated volumes were then made to give a smooth flow throughout the network. A schematic diagram depicting the flow on the downtown street network for the estimated average day is given on Plate 1. Daily movement volumes through the nine intersections are given on Figures A-1 through A-9 in the Appendix.

It can be seen from the diagram and a review of the counts that the street network acts as a funnel with all north-south traffic passing over the railroad crossing on Frederick. In addition to the through southbound traffic on Frederick there appears to be a significant amount of local traffic coming down 1st Avenue East and then crossing over to Frederick at South 1st Street or South 2nd Street. A portion of this traffic would be diverted by a 1st Avenue East railroad crossing between South 3rd and South 6th Streets.

It was also noted during the 1973 count at Frederick and Charles that there is still a fairly large percentage of trucks that are using the Frederick and Charles route rather than the signed truck route along NE 1st Street and 1st Avenue East. For the 12 hour count period in May, 1973, for all trucks from the north 9% made the left turn to the east. For all trucks from the east, 20% still made the right turn to the north. In comparing the total number of trucks following the truck route counted on the following day, it was found that about three times as many used the signed route, or that about one out of every four do not.


N
1st ST. N.E.
E. CHARLES ST. / IA. NO. 3
W. CHARLES ST.
1st ST. S.W.
1st ST. S.E.
2nd ST. S.E.
3rd ST. S.E.
N. FREDERICK AVE. / IA. NO. 150 & IA. NO. 3
S. FREDERICK AVE. / IA. NO. 150
1st AVE. N.E.
1st AVE. S.E.
1000
2000
3000
4000
5000
SCALE
NOTE: FOR EXACT MOVEMENT TOTALS SEE APPENDIX FIGURES A-1 TO A-9
PREPARED BY
ASSOCIATED
ENGINEERS
INC.
FORT DODGE, IOWA
CENTRAL BUSINESS DISTRICT
OELWEIN , IOWA
SCALE 1" = 200'
SCHEMATIC DIAGRAM
OF ESTIMATED AVERAGE
DAILY TRAFFIC FLOW
ON THE CBD STREET
NETWORK
PLATE 1

Traffic demand and the capacity by a given facility to accommodate traffic demand are expressed in terms of vehicles per hour rather than the larger Average Daily Traffic. This is generally in consideration of the "peaks" that occur during the rush hours in the morning and afternoon. Design criteria are generally based on a "design hour volume". The generally accepted design hour is the 30th Highest Hour. If hourly volumes were ranked by order of size, the design hour volume would be exceeded only 30 times per a given year. Past experience has shown that a plot of volumes versus ranking gives a knee shaped curve such that the break is near the 30th Highest Hour. Between the highest hour and the 30th Highest Hour the volumes are abnormally high. Beyond the 30th Highest Hour the volumes tend to flatten out and become more uniform.

The 30th Highest Hour volumes for the intersections counted in 1973 were estimated based on the ADT volumes found as described above and the volumes found during the highest four consecutive 15-minute intervals. The 1971 Highway Commission counts included estimated 30th Highest Hour volumes and these were updated in proportion to the increase in estimated ADT volumes. Figures giving a breakdown by movement for the estimated 30th Highest Hour Volumes for the nine intersections included in the study are included in the Appendix as Figures A-10 to A-18.

The Directional Distribution and Percent of Trucks for each estimated 30th Highest Hour, were also determined. Directional Distribution was found by dividing the higher directional volume by the total volume of a given intersection leg. This statistic gives some idea as to the magnitude of the more heavily used lane(s) in relation to the facility as a whole. Percentage of trucks gives the ratio of vehicles larger than a passenger car or pick-up to the total vehicular volume for the given leg for the design hour. This statistic can indicate the design vehicle to be used for any proposed improvement and also determines a factor to be applied to volumes found in analyzing the capacity of the intersection.

B. EXISTING LEVEL OF TRAFFIC SERVICE

In order to determine the various Levels of Service for the traffic flow in the Central Business District of Oelwein, certain criteria and information was utilized to determine the most accurate possible picture.

The Traffic Engineering Handbook[2] gives the following definitions of the various Levels of Service for uninterrupted flow. With some modifications, the concepts behind each can be applied to suburban and urban streets.

> Level of Service A - a condition of free flow, accompanied by low volumes and high speeds. Traffic density will be low, with uninterrupted flow speeds controlled by driver desires, speed limits, and physical roadway conditions.
>
> Level of Service B - in the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation. Reductions in speed are not unreasonable, with a low probability of traffic flow being restricted. The lower limit (lowest speed, highest volume) of this level of service has been associated with service volumes used in the design of rural highways.
>
> Level of Service C - still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. Most of the drivers are restricted in their freedom to select their own speed, change lanes, or pass. A relatively satisfactory operating speed is still obtained with service volumes perhaps suitable for urban design practice.
>
> Level of Service D - approaches unstable flow, with tolerable operating speeds being maintained, though considerably affected by changes in operating conditions. Fluctuations in volume and temporary restrictions to flow may cause substantial drops in operating speeds. Drivers have little freedom to maneuver, and comfort and convenience are low. These conditions can be tolerated, however, for short periods of time.
>
> Level of Service E - cannot be described by speed alone, but represents operations at even lower operating speeds typically, but not always, in the neighborhood of 30 mph, with volumes at

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[2] Traffic Engineering Handbook; Institute of Traffic Engineers; Third Edition, 1965

or near the capacity of the highway. Flow is unstable, and there may be stoppages of momentary duration.

Level of Service F - describes a forced flow operation at low speeds, where volumes are below capacity. In the extreme, both speed and volume can drop to zero. These conditions usually result from queues of vehicles backing up from a restriction downstream. The section under study will be serving as a storage area during parts of all of the peak hour. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion.

The existing Level of Service for the Oelwein CBD was determined as per examples used in the Highway Capacity Manual[3]. For the CBD, Levels are based on two criteria, the average running speed through the area and the capacities of the intersections. The existing CBD analyzed included Frederick through Charles, South 1st Street and South 2nd Street.

LEVEL OF SERVICE	TRAFFIC FLOW CONDITIONS (APPROXIMATIONS, NOT RIGID CRITERIA)	
	DESCRIPTION	AVERAGE OVERALL SPEED (MPH)
A	Free flow (relatively; some stops will occur)	≥25
B	Stable flow (delays not unreasonable)	≥20
C	Stable flow (delays significant but acceptable)	≥15
D	Approaching unstable flow (delays tolerable)	≥10
E	Unstable flow (congestion not due to back-ups ahead)	Below 10 but moving
F	Forced flow (jammed)	Stop-and-go

TABLE 1 - LEVELS OF SERVICE FOR DOWNTOWN STREETS
(from "Highway Capacity Manual"[3])

Table 1 gives the criteria for the various Levels based on Overall Average Speed. Timed runs through the Oelwein CBD were made on an hourly basis throughout the day on May 9 and 11, 1973. The Average Overall Speeds on a block by block basis for Frederick and Charles Avenues are given on Plate 2. For the majority of the CBD on Frederick the Level would be D. For the one

[3]Highway Capacity Manual; Special Report 87; Highway Research Board; 1965

N

W. CHARLES ST.

1st ST. S.W.

1st ST. N.E.

E. CHARLES ST.

1st ST. S.E.

2nd ST. S.E.

3rd ST. S.E.

N. FREDERICK AVE. / IA. NO. 150 & IA. NO. 3

S. FREDERICK AVE. / IA. NO. 150

1st AVE. N.E.

1st AVE. S.E.

22.17 MPH NB

11.23 MPH SB

9.65 MPH WB

11.92 MPH WB

8.69 MPH EB

20.86 MPH EB

9.96 MPH SB

12.74 MPH SB

12.10 MPH NB

14.15 MPH SB

18.98 MPH NB

9.05 MPH SB

5.85 MPH SB

18.61 MPH NB

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CENTRAL BUSINESS DISTRICT

OELWEIN , IOWA

SCALE 1" = 200'

AVERAGE OVERALL
TRAVEL SPEED
FOR
DOWNTOWN OELWEIN

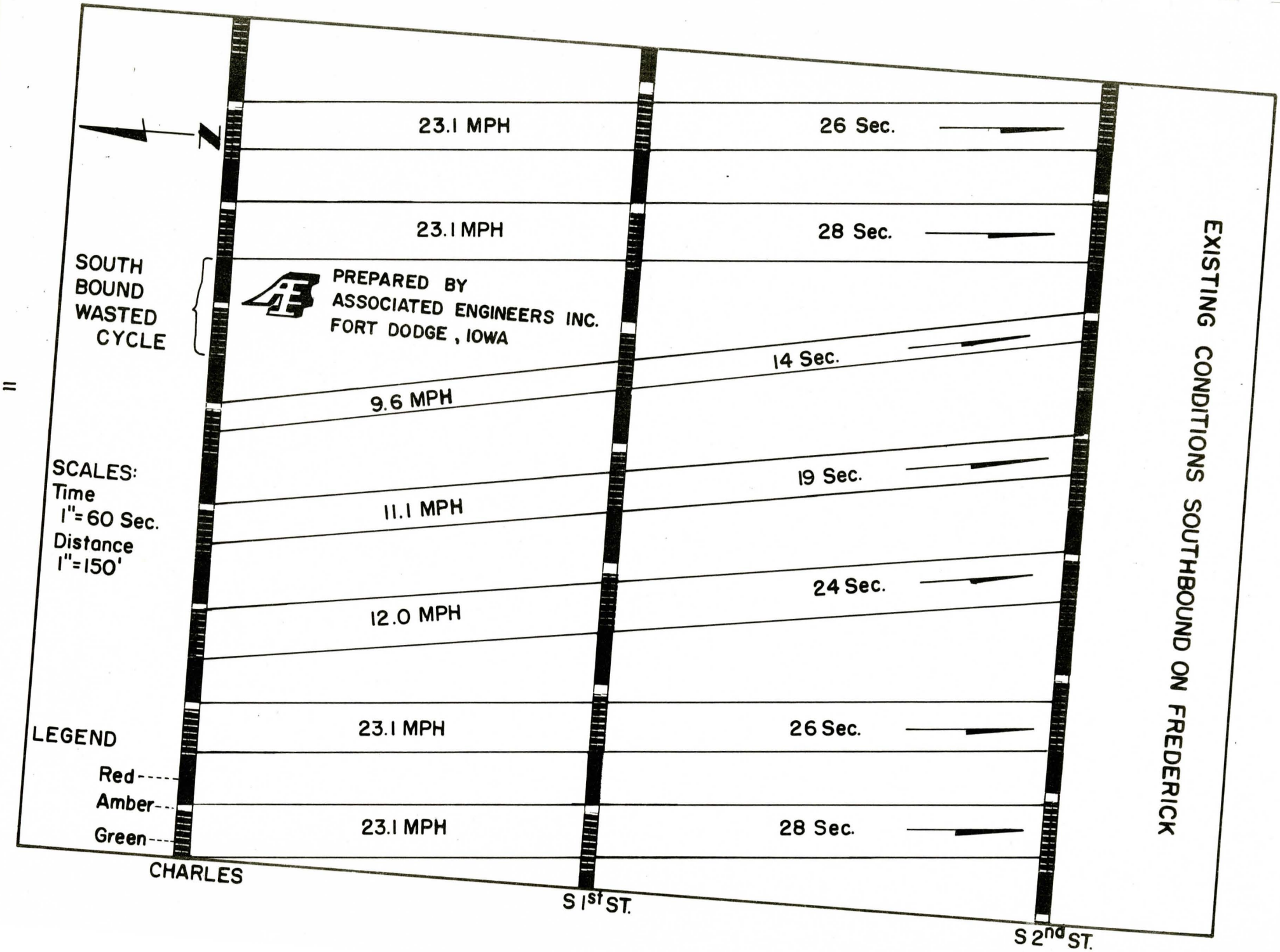
PLATE 2

block section of Charles from Frederick to 1st Avenue East the Level would be E based on travel speed.

A primary reason behind the rather slow average speeds found is the lack of coordination between the existing signals. The cycle length at Charles and Frederick is 50 seconds. The cycle lengths at Frederick and South 1st and Frederick and South 2nd are 60 seconds. The signals have fixed time controllers. Under the above situation, it is impossible to maintain any type of traffic flow progression through the CBD because the offsets between Frederick and South 1st Street continually change. Another important factor is the cycle split. Basically this means that amount of time the signal light is green, as compared to the signal time on yellow and red. If a full cycle (green, yellow and red time) is 60 seconds, and the amount of time on green is 30 seconds, this is called a 50% split. Volumes given on a vehicle per hour basis actually should be given on a vehicle per hour of green basis as movement is allowed for only 30 minutes of the hour with a 50% split.

Time-space diagrams were drawn for the existing situation to determine the "best" speeds of progression and the available band widths. Figure 1 gives the traffic flow in the southbound direction and Figure 2 gives the traffic flow in the opposite direction. As can be ascertained from the diagrams, the speeds and bands do not remain constant but do repeat every 300 seconds or 5 minutes. The speeds are relatively low for all northbound bands and vary considerably for the southbound because the offsets from South 1st to South 2nd favor the Southbound direction. Also it should be noted that every fifth cycle at Frederick is wasted because the speed required to progress to or from the intersection is either unreasonably high or low. Traffic caught in this band would have to stop at the next intersection.

The intersection of 1st Avenue East and Charles is presently controlled by a traffic actuated controller which is functioning as a "fixed time" con-


N
23.1 MPH
26 Sec.
23.1 MPH
28 Sec.
SOUTH BOUND WASTED CYCLE
PREPARED BY ASSOCIATED ENGINEERS INC. FORT DODGE, IOWA
14 Sec.
9.6 MPH
SCALES:
Time
1"=60 Sec.
Distance
1"=150'
19 Sec.
11.1 MPH
24 Sec.
12.0 MPH
LEGEND
Red
Amber
Green
23.1 MPH
26 Sec.
23.1 MPH
28 Sec.
CHARLES
S 1st ST.
S 2nd ST.
EXISTING CONDITIONS SOUTHBOUND ON FREDERICK

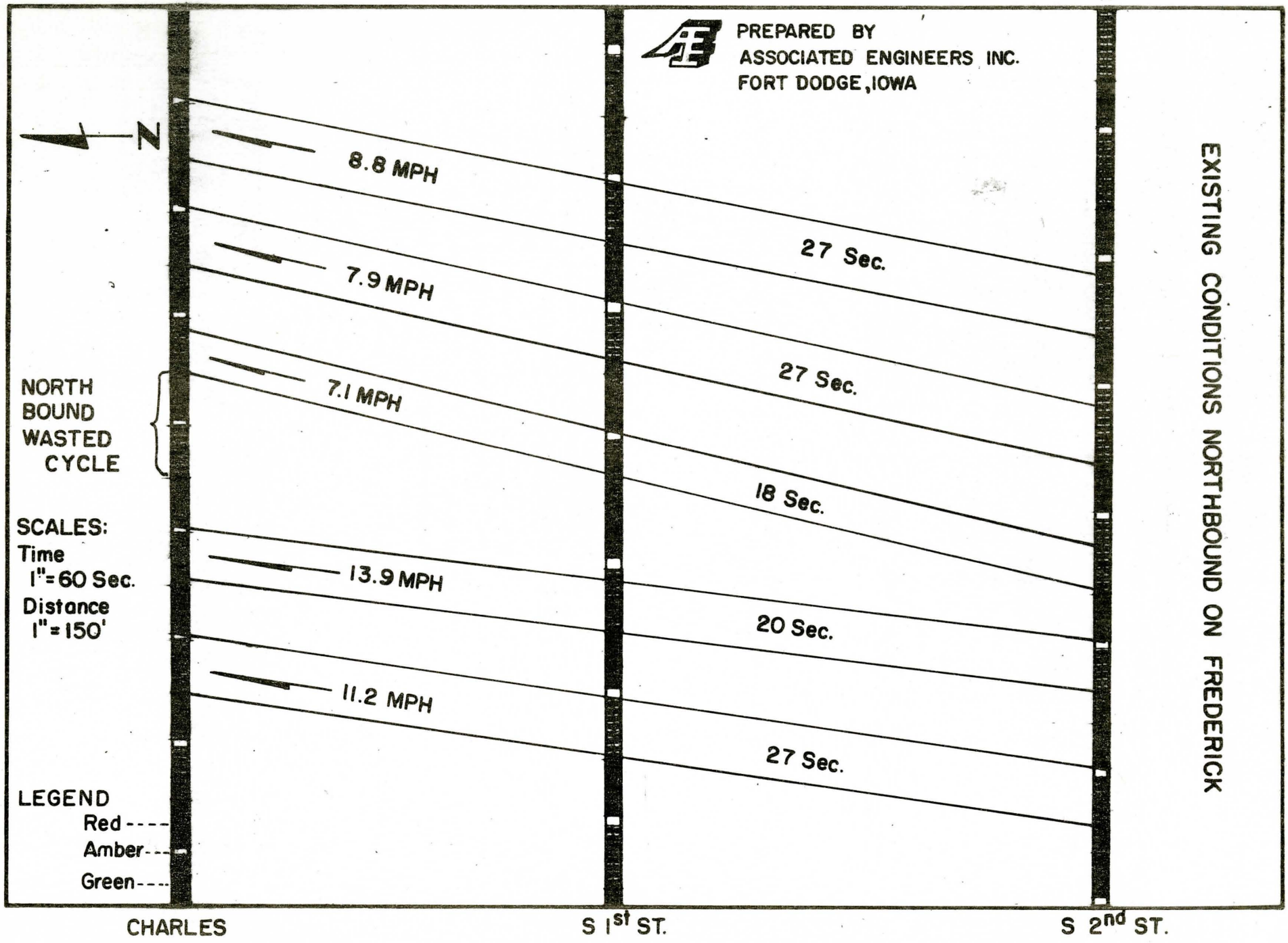

PREPARED BY
ASSOCIATED ENGINEERS INC.
FORT DODGE, IOWA
EXISTING CONDITIONS NORTHBOUND ON FREDERICK
N
8.8 MPH
27 Sec.
7.9 MPH
27 Sec.
7.1 MPH
18 Sec.
13.9 MPH
20 Sec.
11.2 MPH
27 Sec.
NORTH BOUND WASTED CYCLE
SCALES:
Time
1"=60 Sec.
Distance
1"=150'
LEGEND
Red ----
Amber---
Green----
CHARLES
S 1st ST.
S 2nd ST.

FIGURE 2

troller. Parts for the controller have been on order throughout the period of this study according to the installer. The cycle lengths timed during the field portion of the study varied considerably. This lack of coordination for the two intersections on Charles contributes to the low Overall Average Speed indicated for both directions on Plate 2.

The second factor in determining the Levels of Service for the CBD is the capacities of the intersections or more precisely the volume/capacity relationship. The Highway Capacity Manual[3] defines Levels of Service for signalized intersections based on their Load Factors. Load Factor is further defined in the Manual as "the ratio of the total number of green signal intervals that are fully utilized by traffic during the peak hour to the total number of green intervals for that approach during the same period." Table 2 gives the relationship between Levels of Service and Load Factors. Various charts in the Manual relate approach volumes to approach widths to determine the Level of Service provided based on the Load Factor/Level of Service relationship. The approach volumes used for Oelwein were the estimated "30th Highest Hours". The volumes were then adjusted for city size, location, green time/cycle length split, percent of right and left turns and percent of trucks. Presence or absence of parking and approach widths are included in the adjustment factors for the various charts.

LEVEL OF SERVICE	TRAFFIC FLOW DESCRIPTION	LOAD FACTOR
A	Free flow	0.0
B	Stable flow	≤0.1
C	Stable flow	≤0.3
D	Approaching unstable flow	≤0.7
E[a]	Unstable flow	≤1.00
F	Forced flow	—[b]

[a] Capacity.
[b] Not applicable.

TABLE 2 - LEVELS OF SERVICE VERSUS LOAD FACTORS FOR INTERSECTION APPROACHES
(from "Highway Capacity Manual"[3])

Using the above method, the approach volumes in these southbound and northbound directions at the three fixed time signalized intersections included in

[3] Highway Capacity Manual; Special Report 87; Highway Research Board; 1965

the CBD were checked for the Level of Service provided. For traffic in the southbound direction, the intersection at South 1st Street is critical, being on the borderline between Level D and E. Frederick and Charles provides Level of Service D and Frederick and South 2nd provides Level C. The reason for the reduced Level at South 1st Street is the relatively low percentage of green time available to the north-south flow in comparison to the ratio of the volumes.

For traffic in the northbound direction, the Levels provided become progressively worse. South 2nd has Level D, South 1st has borderline D and E and Frederick has borderline E and F under the estimated 30th Highest Hour volumes. The difference between southbound and northbound is due to the higher volumes from the south on Frederick because no truck route bypass is provided as is the case from the north. Also there appears to be more traffic following Iowa 150 north to Iowa 3 east than following Iowa 3 east to Iowa 150 south. The above two factors contribute to the relatively high percentage of turns at Charles and Frederick.

As a general overall statement, considering both speed and intersection capacity, the Level of Service for the CBD area for the estimated 30th Highest Hour volumes would vary between the Level D and Level E ranges.

C. ACCIDENT ANALYSIS

Traffic accidents are the result of a failure by the driver, the vehicle or the physical facility to function as intended in their role in traffic. One of the basic tools of a traffic engineer is the traffic accident data available. From this data it is often possible to determine locations where problems exist and a specific defect in the physical facility that might be contributing to the type of accident occurring.

With the above in mind, the available accident records of the Oelwein police department were researched to determine the accident history in the Central Business District. The period from January, 1971 to April, 1973 was included in the study.

The accidents were listed by the location, the cause of accident, the number and type of vehicles involved, and the severity of accident (property damage only, personal injury, or fatality). No fatal accidents occurred during the study period.

The majority of the reported accidents occurred at or near intersections. Therefore for this study, the nine locations used for more detailed analysis were the intersections of NE 1st Street Charles, South 1st Street, South 2nd Street and South 3rd Street with Frederick; and NE 1st Street, Charles, SE 1st Street and SE 2nd Street with First Avenue East.

Table 3 gives the summary of the numbers of accidents occurring at each intersection. Since "total numbers of accidents" is not the best scale by which to compare high accident locations, accident rates were also determined. The probablity of an accident increases with the amount of conflict or exposure between vehicles. For specific locations this amount of exposure can

TABLE 3

SUMMARIZATION OF

ACCIDENT RECORD REVIEW

(Includes January, 1971 to April, 1973)

Intersection	No. of Accidents	Rank	Accident Rate Per Million Vehicles	Rank
Frederick and Charles	35	1	2.581	1
Frederick and SE 2nd St.	26	2	2.359	2
Frederick and SE 1st St.	17	3	1.621	6
Charles and 1st Ave. E	16	4	1.756	4
Frederick and SE 3rd St.	12	5	1.240	7
1st Ave. SE and SE 1st St.	9	6	2.171	3
1st Ave. NE and NE 1st St.	8	7	1.645	5
Frederick and NE 1st St.	8	7	0.921	8
1st Ave. SE and SE 2nd St.	1	9	0.340	9

be given in the number of vehicles crossing the location. For intersections, the denominator becomes the number of vehicles entering the intersection. Because of the huge number of vehicles entering the intersection (5,000 - 10,000 vehicles per day for those particular intersections in the Oelwein CBD) and the relatively small numbers of accidents (5-10 per year) the common rate used is accidents per million entering vehicles or per ten million entering vehicles.

For the nine intersections found within the study area, rates were determined per million entering vehicles. This statistic was determined by dividing the number of accidents found during the study period by the estimated traffic flow through the intersection during the study period. The basic formula is as follows:

$$\text{Accident Rate} = \frac{\text{Number of Accidents (January, 1971 to April, 1973)}}{\frac{\text{ADT Entering Vehicles} \times 2\ 1/3 \text{ years} \times 366 \text{ days/year}}{1{,}000{,}000}}$$

The Average Daily Traffic (ADT) figures used were taken from the expanded May, 1973 counts accomplished for this study or from a weighted average of the above 1973 counts and 1971 counts made by the Iowa State Highway Commission. The rates calculated from the nine intersections and their ranking are also given in Table 3.

The fact that the intersections with the highest numbers of accidents also have the highest rates tends to indicate there are problems at each. However, the rates found are not excessive considering a reasonable average is approximately 1.5 accidents per million vehicles.

Each intersection was also reviewed as to any discernible accident pattern. As an overall comment, the major reason given was "failure to yield right of way". This follows accident trends given in the Traffic Engineering Handbook.[2] In table 6.6 of the Handbook the above is given as being the highest cause of accidents inurban areas involving about 18.6% of the total.

The intersection of Frederick and Charles has by far the highest number of accidents, the highest volume of entering vehicles, and the highest accident rate. It is the center of the CBD and is also the intersection of two primary highways. It is the crux of the city's traffic problem. Thirty-five accidents were found to have been reported over the 2 1/3 year study period. Of those for which a cause could be determined, eleven were due to "failure to yield or stop".

There is, however, a quite high frequency of accidents due to "improper turns" with nine of this type being found in the study period. There are two possible reasons for this type of accident. The first would be that the

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[2] Traffic Engineering Handbook; Institute of Traffic Engineers; Third Edition, 1965

left turns off of Frederick on to Charles are prohibited by sign during certain periods, primarily on Thursday evenings. People may still be making this turning movement through force of habit. The second, and perhaps more probable reason for the majority of these accidents, is the lack of delineation of lanes at this intersection. Right turns on red are permitted on all four legs and parking has been removed for a sufficient length on the three legs with parking to provide a lane specifically for these right turn movements. However, these lanes are not marked in any way, nor designated as to the movement to be performed. There have been instances where non-local or uninformed drivers have not realized there was another lane to their right and have attempted to make right turns from the inside lane with an ensuing collision.

This problem could be corrected quite readily by adding the appropriate markings and arrows. This, however, should wait until the surfacing and/or reconstruction mentioned in the alternates is completed.

The only other intersection with a discernible pattern is at SE 1st Street and 1st Avenue East. There were nine reported accidents at or near this intersection during the study period; and, of these, four were due to improper backing. There was a large hardware store in the southeast quadrant of the intersection. This had been destroyed and was being rebuilt. Right angle parking occurs along the east side of the south leg of this intersection along this store front. Although this type of parking uses the least curb space it also is the most hazardous as evidenced by the accident history. Unparking from this angle requires the most space, takes the most time and provides the least sight distance. This type of parking should be converted to parallel parking, particularly if the one-way pair alternate is selected.

For the remaining seven intersections no pattern was established. The intersection of Frederick and South 2nd Street has a high number of accidents

and a relatively high rate. Most were due to "failure to have control, or to yield, or to stop". This could be due to the fact that this is the first continuous signal facing north bound traffic and the drivers are not prepared to stop in a sufficient time. Proper signing according to the latest Unifrom Manual of Traffic Control Devices[4] would be the most effective method of preventing occurance of this type accident. For the remainder of the intersections the numbers and rates are such that no specific change for safety's sake would be warranted at this time.

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[4]Manual of Uniform Traffic Control Devices for Streets and Highways; Federal Highway Administration; U.S. Department of Transportation; 1971.

D. PARKING

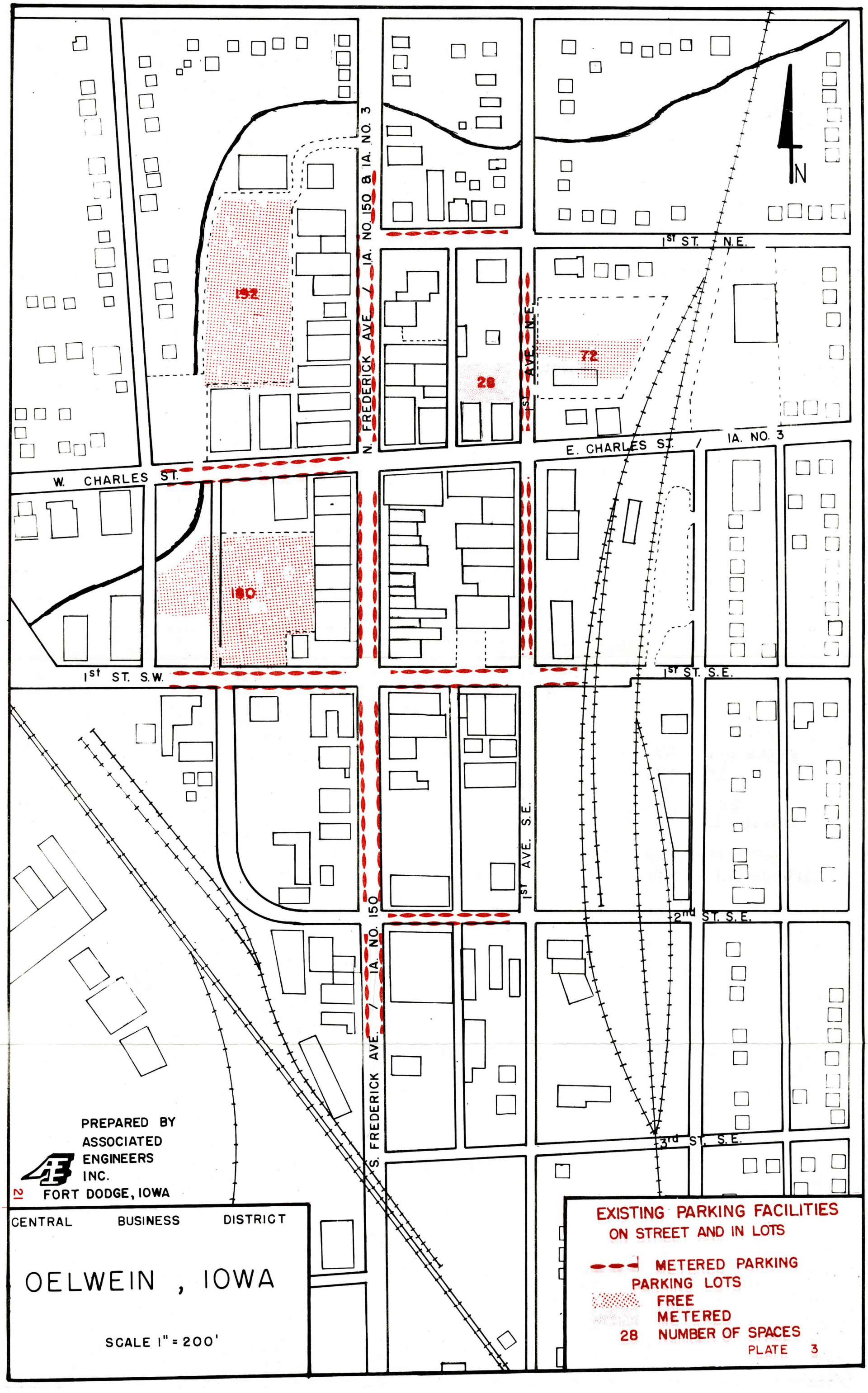
Traffic is merely a means to an end in that it is a movement from an origin to a destination. During the period when the vehicle is not in use, storage space for it is required. With this in mind the available parking in the Oelwein CBD was inventoried as to availability and usage.

The study area was limited to the downtown area for which the traffic flow was also studied, and was also confined to those spaces available to the general public. Parking reserved for store employees, truck loading zones, church lots, etc. were not included. The location of the parking places studied are shown on Plate 3. A total of 270 metered spaces were inventoried. The rate for parking is 1¢/12 min. with some hour spaces (@5¢) but with the majority being two hour spaces (@10¢). The breakdown of on-street metered parking is as follows:

West side of Frederick	54 spaces
East side of Frederick	55 spaces
West side of 1st Avenue East	24 spaces
East side of 1st Avenue East	21 spaces
North side of NE 1st Street	8 spaces
North side of Charles	15 spaces
South side of Charles	11 spaces
North side of South 1st Street	23 spaces
South side of South 1st Street	23 spaces
North side of South 2nd Street	4 spaces
South side of South 2nd Street	4 spaces

In addition to these on-street spaces, the lot on the west side of 1st Avenue East between Charles and North 1st Street is completely metered, and the lot on the east side of the above street is partially metered. For the purpose of this study, however, the latter lot was considered to be all free parking as the metered spaces were found to be rarely used.

Free parking was confined to four lots--the two large lots west of


N
1st ST. N.E.
E. CHARLES ST. / IA. NO. 3
W. CHARLES ST.
1st ST. S.W.
1st ST. S.E.
2nd ST. S.E.
3rd ST. S.E.
N. FREDERICK AVE. / IA. NO. 150 & IA. NO. 3
S. FREDERICK AVE. / IA. NO. 150
1st AVE. S.E.
1st AVE. N.E.
192
72
28
80
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INC.
FORT DODGE, IOWA
CENTRAL BUSINESS DISTRICT
OELWEIN , IOWA
SCALE 1" = 200'
EXISTING PARKING FACILITIES
ON STREET AND IN LOTS
METERED PARKING
PARKING LOTS
FREE
METERED
28 NUMBER OF SPACES
PLATE 3

Frederick with 192 and 180 spaces, the above partially metered lot with 72 total spaces and the lot adjacent to City Hall with 32 spaces. The latter receives little usage for other than persons with business at City Hall but was included because of its proximity to some of the western business establishments. A total of 476 free spaces were inventoried, giving a total of 746 spaces available on-streets and in-lots.

The procedures used in the study were to actually count the utilization of available spaces on an hourly basis throughout the daylight business hours for two typical week days. The accumulation of parkers in all spaces is depicted in Figure 3. The "two peaked" curve for 5/10/73 is typical for cities of this type, i.e. a smaller community where people can return to their homes during the noon hour. For larger cities where distances and congestion are greater, this curve levels off and eventually becomes one peak. (Source: Traffic Engineering Handbook[2]). For this study the numbers of vehicles parked reached their peak during the morning and afternoon peak business hours with the overall usage throughout the day varying from 40% to 60%.

The percent usage broken down by free spaces and meter spaces is given on Figure 4 and Figure 5, respectively. With the exception of the large deviation for the 1:30 to 3:30 p.m. period on 5/8/73, the usage of the free spaces is generally in the 45%-55% range throughout most of the day. The usage of the metered spaces tend to fluctuate somewhat, due primarily to the more rapid turnover of these parkers.

The overall usage of all metered spaces ranges from 40% to 55% throughout the day. The spaces nearest the core area have a higher occupancy rate, generally in the range of 55% to 75% throughout the day.

In addition to parking usage, the violations due to overtime parking and/or

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[2]Traffic Engineering Handbook; Institute of Traffic Engineers; Third Edition, 1965

AVERAGE DAILY PARKING ACCUMULATION
ON STREET AND IN LOTS
(746 SPACES)

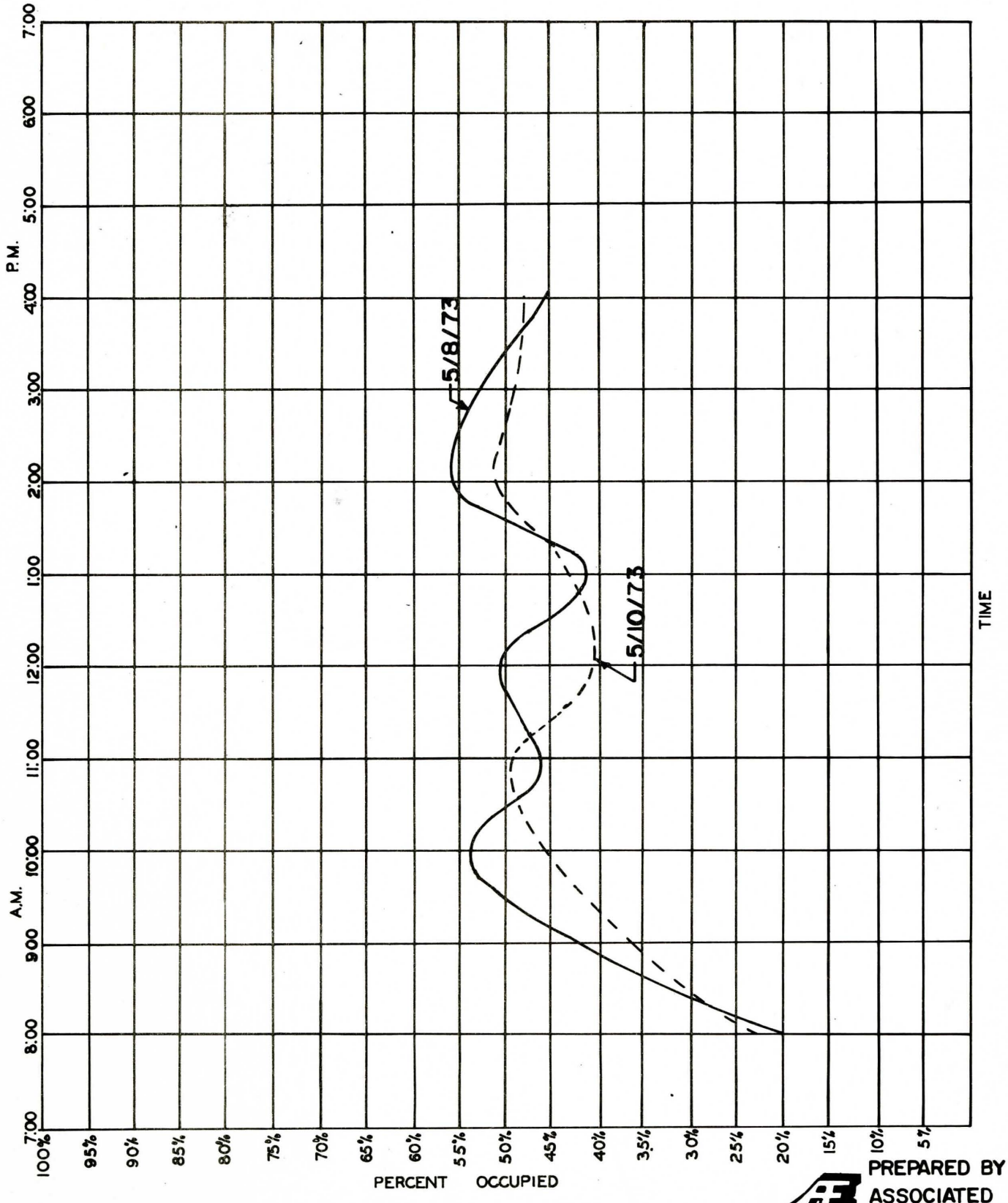

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FIGURE 3

AVERAGE DAILY PARKING ACCUMULATION
FREE (476 SPACES)

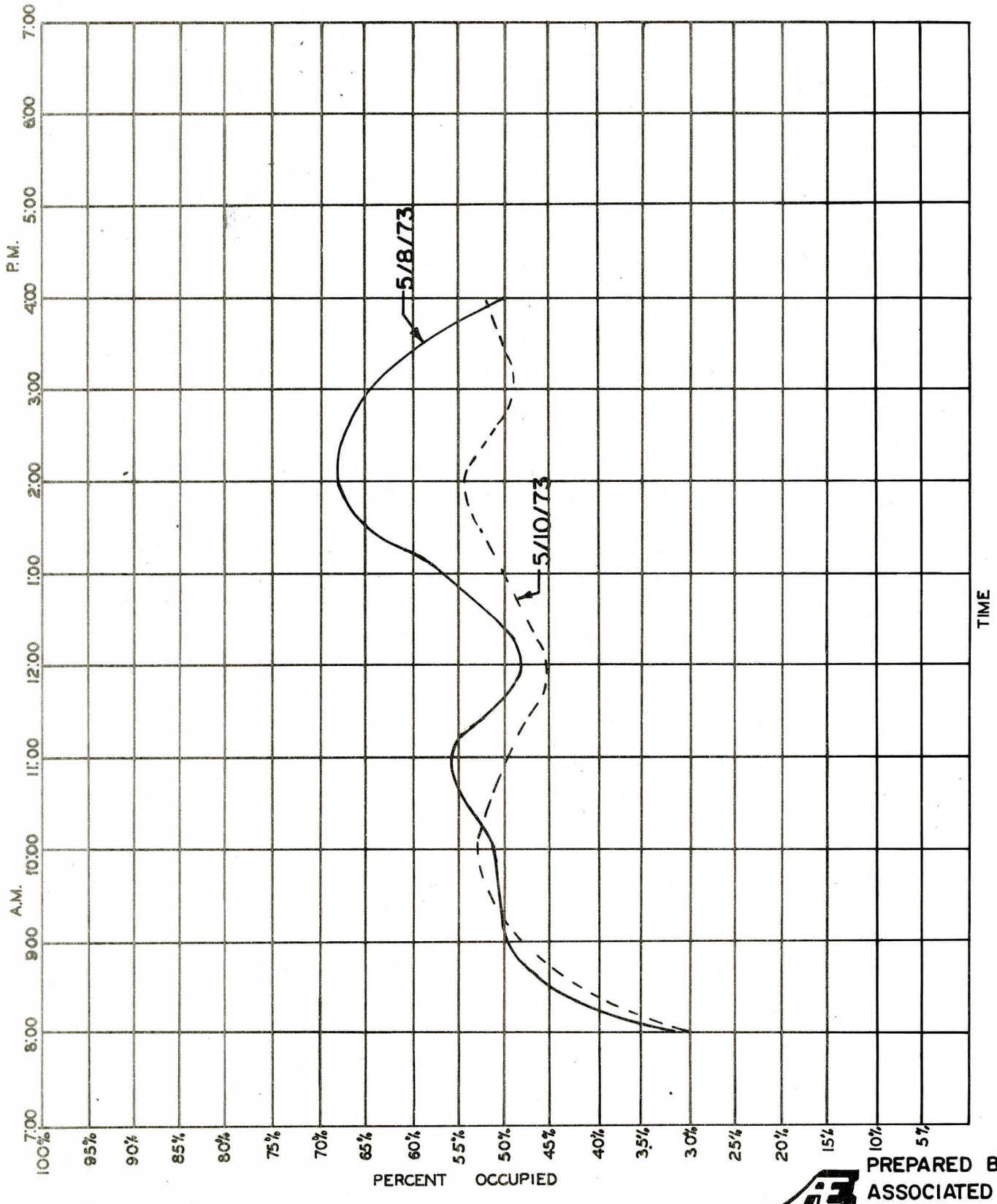

FIGURE 4

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AVERAGE DAILY PARKING ACCUMULATION
METERED (270 SPACES)

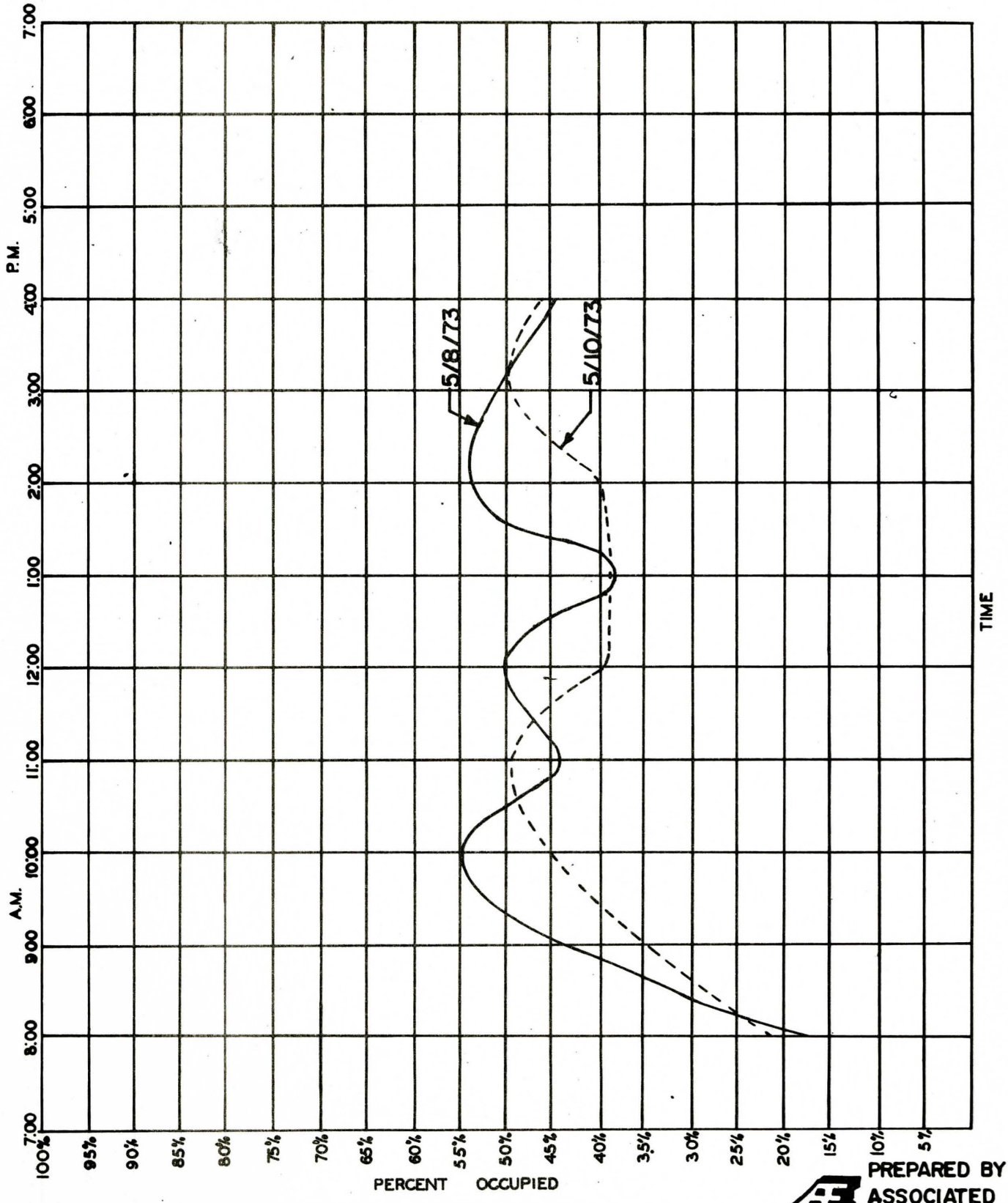

FIGURE 5

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failure to pay the meter were also recorded. The percent of violations was determined by dividing the number of violations by the number of metered spaces occupied. Figure 6 shows the percentage of violations by time. The high rate in the early morning hours was believed to be due to two factors: 1. the low total numbers of vehicles parking (generally by people having breakfast), and 2. the low probability that tickets will be issued that early with the corresponding lack of motivation to "feed the meter". Throughout the remainder of the day, the violation rate varies from 30% to 35%. This is somewhat high. The Traffic Engineering Handbook[2] gives an average for cities of this size of about 20%. These violations were noted to have generally been ticketed, and the "meter maid" was also noted during the study period to be performing her duties. This would lead to the conclusion that the fines for overtime parking might be too low in that the parkers are willing to risk a small fine so as to be able to park longer and/or to not pay the meter. The present fine schedule is 50¢/violation if paid within a 24 hour period, $1.00/violation if paid after the 24 hour period, and $1.00/violation for more than one violation per day.

In reviewing the parking availability, it would appear the spaces available are adequate for the present demand. Should the 100 plus spaces on Frederick be removed as per Alternate 1 (see Section III) than additional off street spaces would probably have to be provided. The present off street lots are located to the west of Frederick and toward the northern half of the CBD. To provide balance, a new lot; if constructed, should be to the east of Frederick and toward the southern half of the CBD. The most advantageous location would seem to be the present empty lot (empty of buildings) on the west side of 1st Avenue S.E., between 1st and 2nd Streets.

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[2] Traffic Engineering Handbook; Institute of Traffic Engineers; Third Edition, 1965

PERCENT OF METERED SPACES OCCUPIED IN VIOLATION

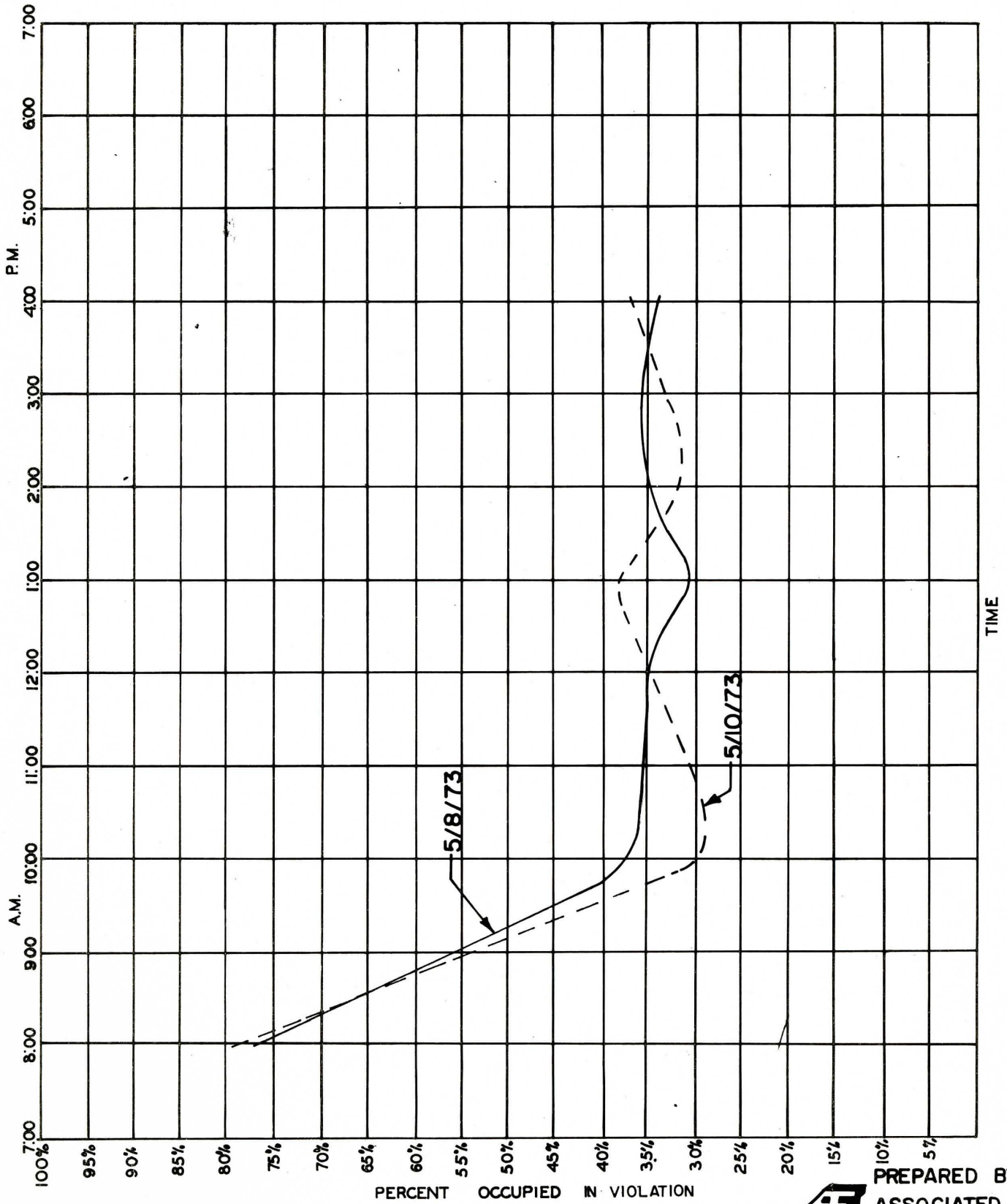

FIGURE 6

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A future consideration on parking should be the elmination of the present partial metering of the off-street lots. It is incongruant to have some metered and some free spaces for off-street lots and especially inconsistant to divide one lot. The above situation discourages usage of the metered lots or spaces; or, if they are used, parkers refrain from paying the meter. Also given the choice of a metered lot or a metered curb space, the normal parker will chose the latter which adds to the on-street congestion.

E. FISCAL DATA

One of the foremost concerns of this study is the estimate of cost for the various Alternates developed. Corresponding to this, methods of financing the proposed improvements were also to be developed. To provide background data upon which to develop sources of funds, the city's fiscal situation as it relates to the study was researched. The primary sources used in determining the above fiscal situation were the Fayette County Assessor's office, the Oelwein City Manager's office and the 1972 Official State Auditor's Report for the City of Oelwein.[5]

1. General Obligation Bonds

The General Obligation (G.O.) bond limit for a community is based on 5% of the actual value of that community. For the city of Oelwein at the close of 1972, this actual value was $47,047,226; 5 percent of which is $2,352,361 for maximum G.O. bonding capacity.

As of January 1st, 1973 the city had a total of $349,000 or approximately 15 percent of it's capacity in G.O. bonds outstanding. These bonds have been for the construction of the airport, sewers, library, fire station, and purchase of fire equipment. Shown on Table 4 is the schedule of retirement for all G.O. bonds issued prior to January 1, 1973. The amount of G.O. bonds currently outstanding for the city of Oelwein is low when compared to the city's bonding capacity.

2. Federal Revenue Sharing

In 1973, the municipalities and counties in Iowa received their first

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[5] Official State Auditor's Report; City of Oelwein, 1972.

TABLE 4
SCHEDULE OF RETIREMENT
GENERAL OBLIGATION BONDS
CITY OF OELWEIN

YEAR	AMOUNT TO BE RETIRED	BALANCE AT END OF YEAR	YEAR	AMOUNT TO BE RETIRED	BALANCE AT END OF YEAR
1972		$349,000.00	1980	$25,000.00	$144,000.00
1973	$24,000.00	325,000.00	1981	24,000.00	120,000.00
1974	24,000.00	301,000.00	1982	23,000.00	97,000.00
1975	26,000.00	275,000.00	1983	23,000.00	74,000.00
1976	26,000.00	249,000.00	1984	17,000.00	57,000.00
1977	26,000.00	223,000.00	1985	17,000.00	40,000.00
1978	27,000.00	196,000.00	1986	13,000.00	27,000.00
1979	27,000.00	169,000.00	1987	13,000.00	14,000.00
			1988	14,000.00	0

TABLE 5
SCHEDULE OF RETIREMENT
REVENUE BONDS FOR PARKING LOTS
CITY OF OELWEIN

YEAR	AMOUNT TO BE RETIRED	BALANCE END OF YEAR	YEAR	AMOUNT TO BE RETIRED	BALANCE END OF YEAR
		$120,000.00	1980	$ 8,000.00	$ 68,000.00
1973	$ 5,000.00	115,000.00	1981	8,000.00	60,000.00
1974	5,000.00	110,000.00	1982	9,000.00	51,000.00
1975	6,000.00	104,000.00	1983	9,000.00	42,000.00
1976	6,000.00	98,000.00	1984	10,000.00	32,000.00
1977	7,000.00	91,000.00	1985	10,000.00	22,000.00
1978	7,000.00	84,000.00	1986	11,000.00	11,000.00
1979	8,000.00	76,000.00	1987	11,000.00	0

Revenue Sharing checks. These checks will continue to arrive quarterly through 1976. During the first year Oelwein received $97,636. By the end of 1973 they will have received $207,801 in Federal Revenue monies. For the total five years of Revenue Sharing the city will receive approximately $554,209.

These funds will be available to help finance the proposed Central Business District street improvements, including supplementary loss of parking meter income due to the removal of these meters, if this is the avenue of approach taken. In addition, revenue funds could be used to help pay off the revenue bonds issued last year to pay for the new parking facilities.

3. Road Use Tax Fund

In the 1972 the city of Oelwein received $130,071.10 in road use tax. Of this amount they spent $54,645.24 on salaries, equipment and materials. This leaves a surplus of $75,425.86 for 1972, in addition to the previous balance of $29,708.98, for a year ending balance of $106,421.64.

If we use the figure of $60,000 for annual disbursements, an annual sum of approximately $70,000 remains to be used for street construction. A balance of roughly $175,000 will remain at the end of 1973, although this figure will depend on the construction contracts to be paid this year.

The 1973 street construction program consists of:

a. 1st Avenue S.E. from

6th St. S.E. to 10th St. S.E.

b. 8th Street S.E. from

South Frederick to 1st Avenue S.E.

c. 7th Avenue Northwest from

West Charles Street to 3rd Street N.W.

The total estimated cost for the above will be $162,571, half of which is to

come from assessments and half to be paid by the city of Oelwein. It is considered best for the city to use the monies in their road use tax fund to pay their portion of the cost of street improvements, eliminating the need to issue additional General Obligation Bonds.

4. Parking Meter Revenue

For the past three years, revenue derived from meter collections, violations, etc. has averaged $25,662.94 per year. During these same years, parking meter disbursements averaged $11,818. 50. Disbursements for lots have varied considerably over the past four years depending on the amount of construction accomplished. A typical annual disbursement for lots of $10,000 was estimated.

In 1972, $120,000.00 of Revenue Bonds were issued for new parking facilities. These will be paid off during the next 15 years using monies derived from parking meter revenue. Shown in Table 5 are the scheduled amounts to be paid annually to retire these revenue bonds.

Therefore, the financial statement for 1973 will be approximately as shown below:

Receipts	
Beginning Balance	$20,758.73 (Actual)
Meter Collections	25,662.94 (Estimated)
Other	500.00 (Estimated)
Total Receipts	$46,921.67 (Estimated)
Disbursements	
Parking Meters	$11,818.50 (Estimated)
Parking Lots	10,000.00 (Estimated)
Revenue Bonds	5,000.00 (Actual)
Total Disbursements	$26,818.50 (Estimated)
Ending Balance	$20,103.17 (Estimated)

It can be seen that if the beginning balance were eliminated, the ending balance would actually show a deficit of over $600.00. Any elimination of existing parking meters will only tend to reduce the amount of revenue received annually.

5. Street Fund

The 1972 street fund budget for the city of Oelwein was $83,467.98. This revenue was derived from a mill levy of 6.717, and is levied as part of the General Corporation levy.

The major disbursements for the street fund are salaries and wages, followed by vehicle repair, gas and oil, rock, sand, concrete, asphalt and various other miscellaneous items primarily relating to general maintenance.

The balance at the end of 1972 was $33,164.98, and the estimated budget for 1973 is $82,264, for a total of $115,429.

The primary function of the street fund is not for the construction or reconstruction of new streets, but rather for the yearly maintenance required for the existing streets. This would include snow removal and its necessary equipment, patching, grading and miscellaneous needs.

In summary, it is apparent that the general street fund should not be utilized as a source of revenue for the construction of new streets. The annual maintenance that is needed for the existing streets should not be slighted as being of secondary nature. Due to the limitations placed on the existing mill levy, expenditures beyond the present usage would be unrealistic.

DISCUSSION

OF

ALTERNATES

A. GENERAL DISCUSSION

Recognizing that the traffic congestion now found in the downtown section of Oelwein can only become worse with an expected increase in volumes on the primary highways (Iowa 3 and Iowa 150), several possible changes or improvements to the system were developed.

The possibility of a bypass of this through traffic around Oelwein, or around the CBD, was given some initial consideration. It was discarded after discussion with Iowa State Highway Commission personnel during which it was indicated that the reconstruction of sections of the primary highways in each direction from Oelwein were such that any change in the existing alinement is unlikely. It would also be inconsistent with the functions of secondary roads or municipal streets to consider routing truck traffic over existing county roads or to attempt to bypass the CBD on existing streets. It was therefore decided to work within the existing street frame work. Based on the above, three alternates were developed for more detailed consideration.

An additional factor considered in the study but not specifically looked at was the proposed at-grade railroad crossing on 1st Avenue SE along with the extension of 1st Avenue East from South 3rd Street to South 6th Street. It was assumed this crossing would be built, either in 1973 or 1974. Once constructed this crossing would divert some of the local traffic using the South Frederick crossing. As reflected in the expanded traffic counts, the north-south traffic is funneled down to the South Frederick crossing. The counts become progressively higher on each south leg for the ADT's moving

from north to south. The highest estimated volume for any leg is the south leg of the Frederick-South 3rd Street intersection. It is estimated that once this 1st Avenue East crossing is completed and opened to traffic it will divert 1000-1500 vehicles per day from Frederick.

Also included in all alternates was the reconstruction of the railroad crossings on Frederick between South 3rd and South 6th Streets. During the field inspection these crossings were in poor shape, being very rough and with numerous "potholes". The additional constraint of a periodically operated traffic signal at Frederick and South 4th Street which functions during peak periods indicate these crossings should be reconstructed and widened to four lanes.

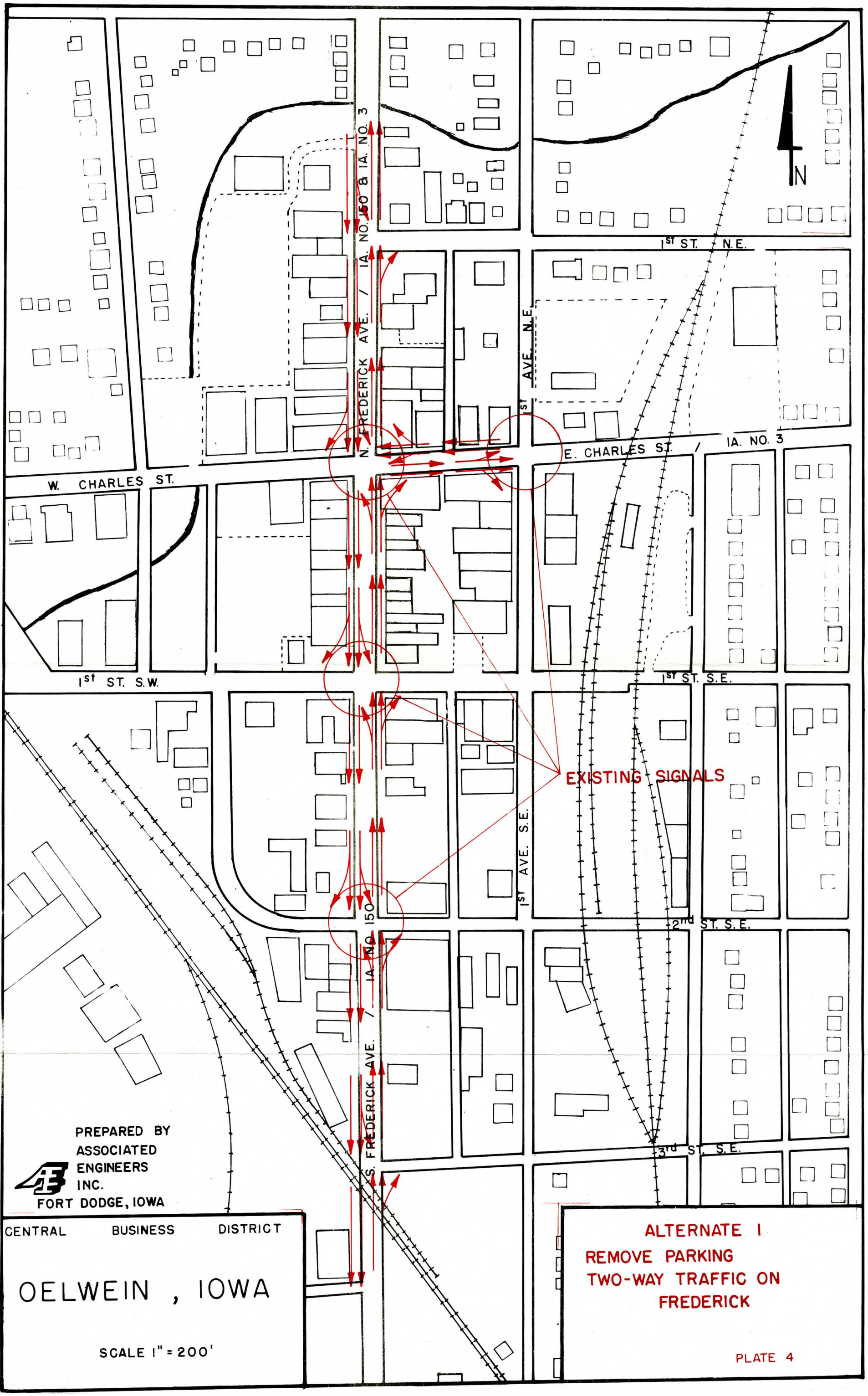
B. ALTERNATE 1

Alternate 1 consists of removing existing parking along Frederick from NE 1st Street to beyond South 2nd Street and widening the existing facility to four lanes, two in each direction. Reconstruction or resurfacing would be required from NE 1st Street to South 4th Street. The existing 24' of Portland Cement concrete for the interior two lanes would be retained. The exterior lanes presently used for parking may or may not need reconstruction depending on the structural adequacy of the brick. The entire width would then have an asphaltic concrete overlay. Traffic flow for this Alternate is depicted schematically on Plate 4.

In addition the signal system would be changed to reflect that given Figure 7. The cycle lengths would be changed to 50 seconds and new offsets would be established such that balanced progression would be attained. The timing layout gives 15 mph progression and a band width of 25 seconds which would provide service for about 10 vehicles per cycle.

A new parking facility would have to be constructed to compensate for the 109 curb spaces removed. See Section II-D for the discussion on parking and a proposed location.

Estimated costs of this alternate to include construction of a new parking lot and retirement of existing bonds are given on Table 6.



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CENTRAL BUSINESS DISTRICT

OELWEIN , IOWA

SCALE 1" = 200'

ALTERNATE I

REMOVE PARKING
TWO-WAY TRAFFIC ON
FREDERICK

PLATE 4

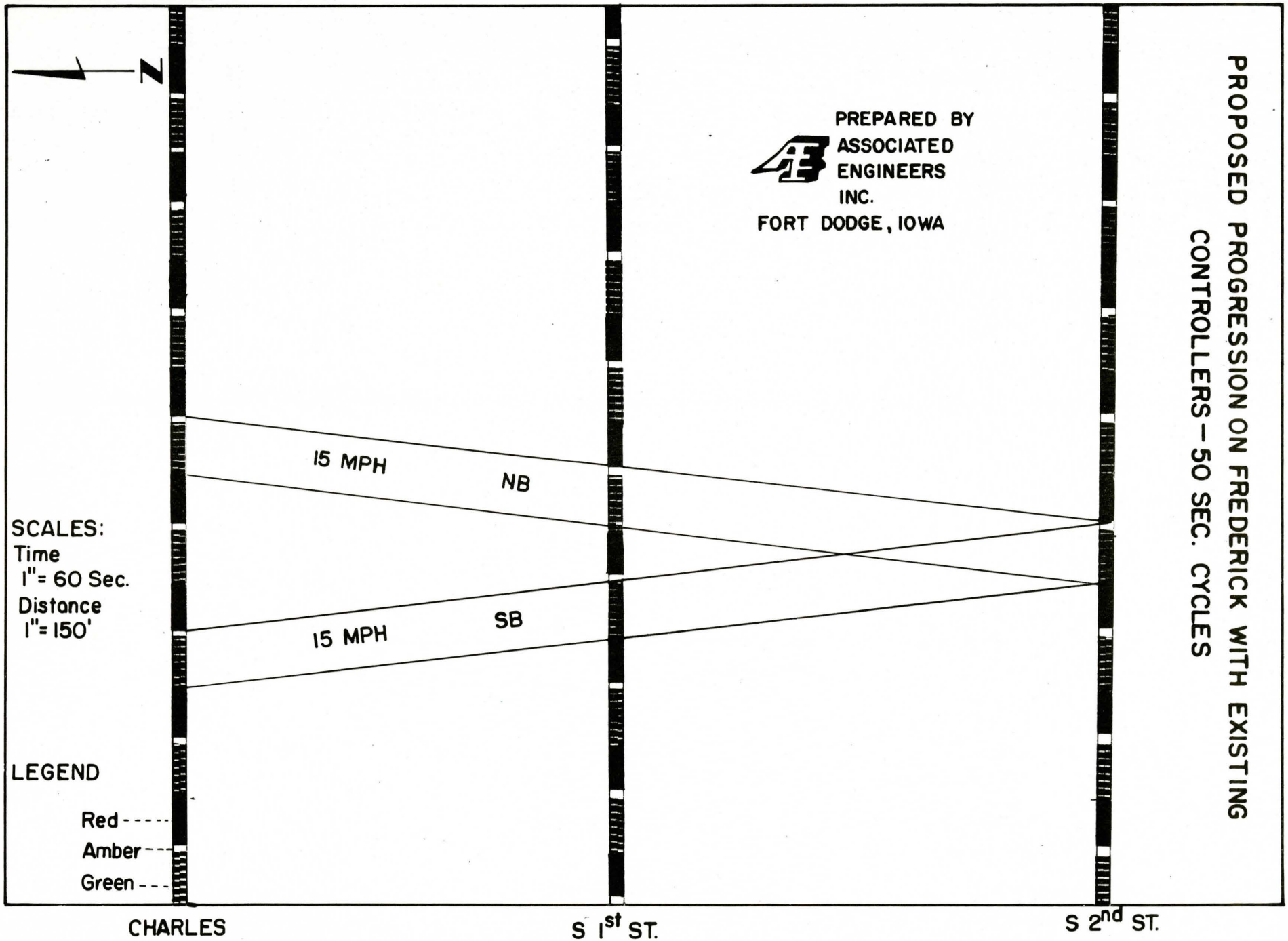
PROPOSED PROGRESSION ON FREDERICK WITH EXISTING CONTROLLERS — 50 SEC. CYCLES
PREPARED BY ASSOCIATED ENGINEERS INC.
FORT DODGE, IOWA
N
15 MPH
NB
15 MPH
SB
SCALES:
Time
1"= 60 Sec.
Distance
1"= 150'
LEGEND
Red
Amber
Green
CHARLES
S 1st ST.
S 2nd ST.

FIGURE 7

C. ALTERNATE 2

Alternate 2 consists of establishing two sets of one-way pairs with the retention of parking on Frederick. Frederick would become one way southbound from North 1st Street to South 2nd Street. First Avenue East would become northbound from South 2nd Street to North 1st Street. South 2nd Street would become one way eastbound from Frederick to First Avenue East. North 1st Street would become one way westbound from 1st Avenue East to Frederick. Traffic flow on this network is depicted schematically on Plate 5.

This alternate would require the resurfacing of Frederick from NE 1st Street to South 2nd Street. Frederick would have to have the exterior brick lanes removed with additional resurfacing from South 2nd Street to South 4th Street. South 2nd Street and North 1st Street would have to be reconstructed or resurfaced from Frederick to 1st Avenue East. First Avenue East would require widening and reconstruction from South 2nd Street to South 1st Street and reconstruction and/or resurfacing from South 1st Street to North 1st Street. In addition, three additional intersections would require traffic signal control. These would be North 1st, South 1st and South 2nd on 1st Avenue East. It would be anticipated that the existing signal at Charles and 1st Avenue East would be converted to a fixed time signal to be compatible with the remainder of the system. A schematic diagram of a possible timing layout is given on Figure 8. With a one way system any desired speed and band can be built into the network. The actual timing used then depends on side street considerations. For the diagram on Figure 8 a 20 mph speed was assumed along with a 25 second band (the minimum green time in the direction of progression). The critical side street becomes South 1st Street where the offsets

N

1st ST. N.E.

N. FREDERICK AVE. / IA. NO. 150 & IA. NO. 3

1st AVE. N.E.

E. CHARLES ST. / IA. NO. 3

W. CHARLES ST.

EXISTING SIGNALS

1st ST. S.W.

1st ST. S.E.

PROPOSED SIGNALS

1st AVE. S.E.

2nd ST. S.E.

S. FREDERICK AVE. / IA. NO. 150

3rd ST. S.E.

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FORT DODGE, IOWA

CENTRAL BUSINESS DISTRICT

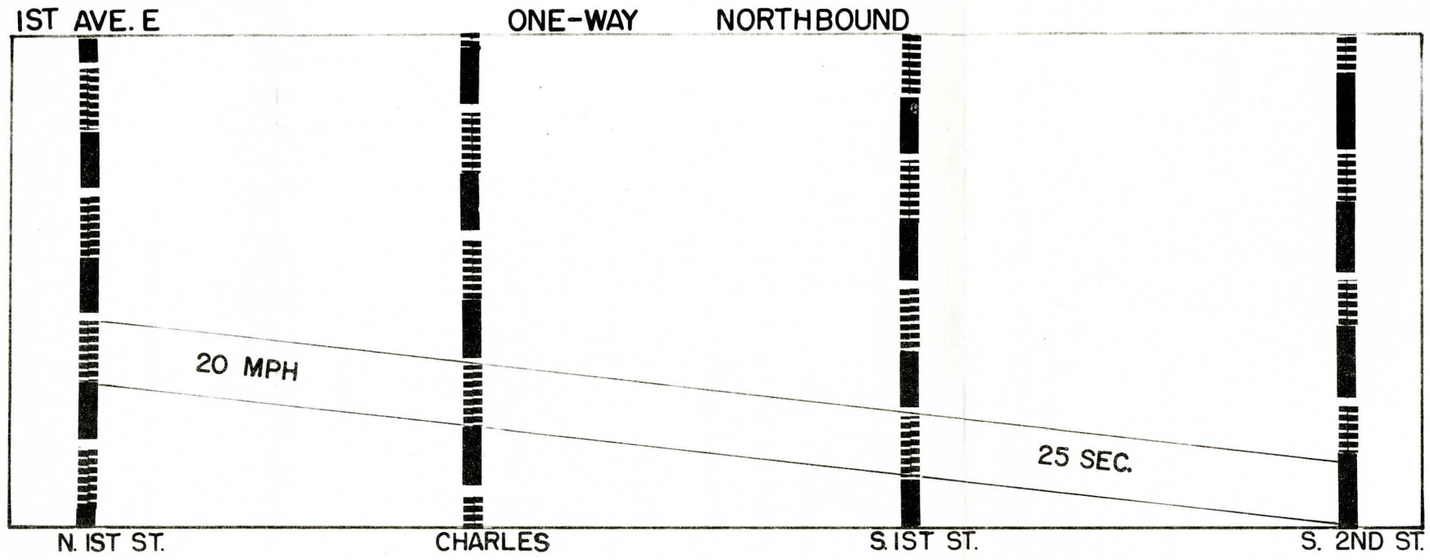
OELWEIN , IOWA

SCALE 1" = 200'

ALTERNATE 2
RETAIN PARKING
ONE-WAY PAIRS
FREDERICK & 1ST AVE. E.
S. 2ND ST. & N. 1ST ST.

PLATE 5

POSSIBLE PROGRESSIVE SYSTEM WITH NEW & EXISTING CONTROLLERS
50 SEC. CYCLES



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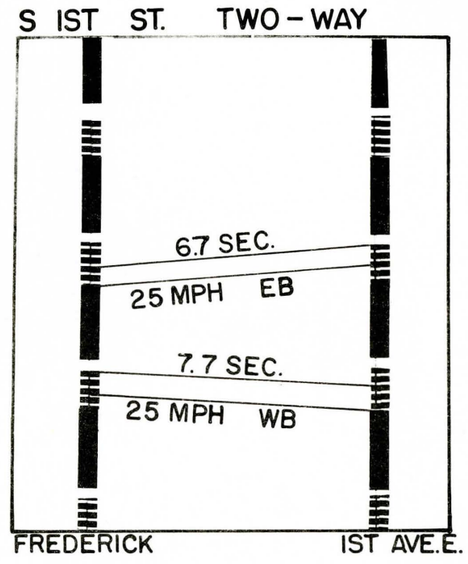
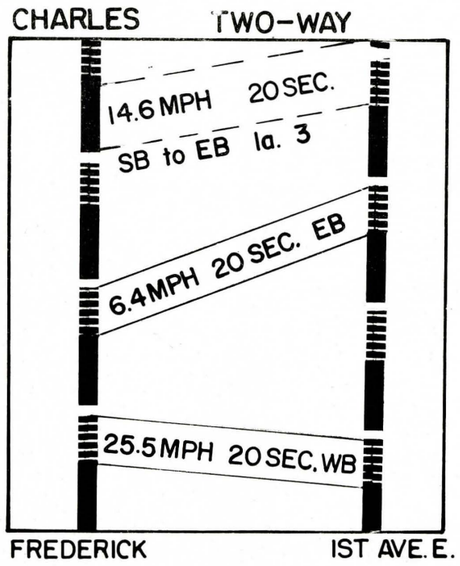
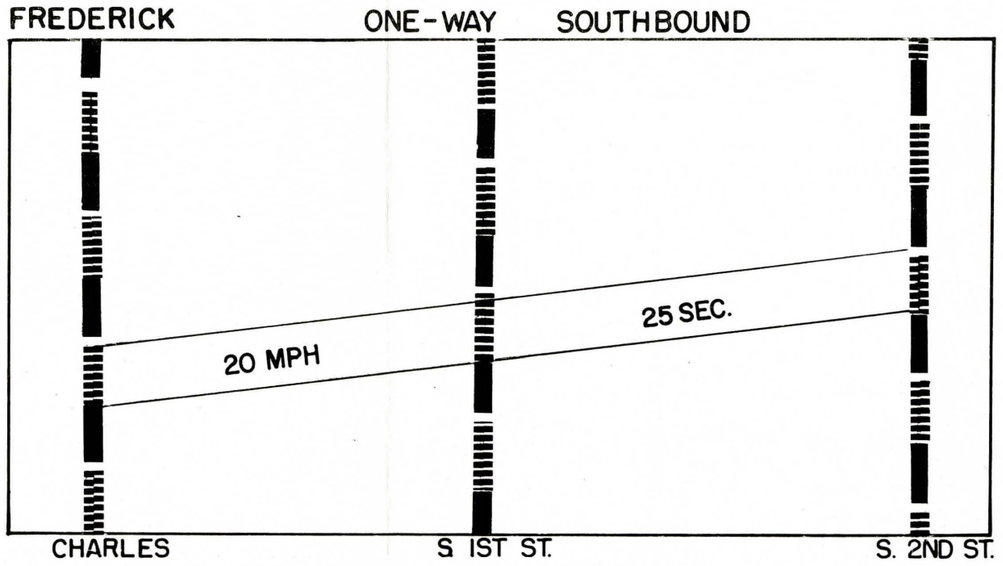
SCALES
Time: 1" = 60 Sec.
Distance: 1" = 200'







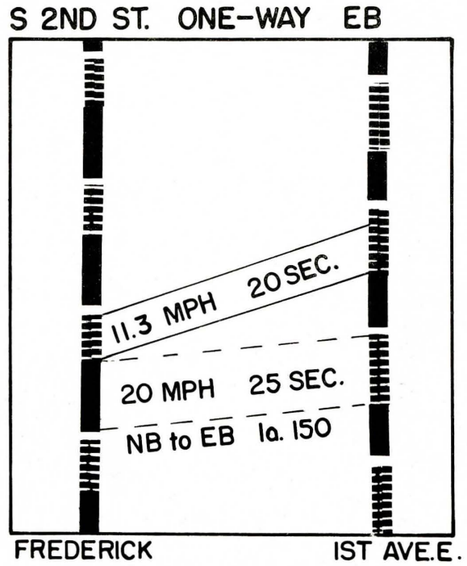


FIGURE 8

at Frederick and 1st Avenue East are almost identical. In this situation we have either a relatively high speed with a narrow band or a very slow speed with a maximum band width. An advantage to having offsets equal or exactly opposite would be the possible elimination of a controller. One controller could control both intersections under the above situation. The above network is only a proposed layout to be used as an example and would require some refinement prior to actual implementation.

It is further anticipated that additional metered curb spaces would be added under this alternate. The right angle parking on 1st Avenue East mentioned in Section II-C would be replaced by metered parallel parking.

This alternate differs from that put forth in the Oelwein Comprehensive Plan in that the southern end of the one-way pair has been moved north a block. The intersection of Frederick and South 3rd Street along with the railroad crossing is such that installation of traffic signals would have to be coordinated with the railroad adding to the cost. The lack of a west leg at this intersection and the lack of a feasible location for a future leg means that traffic from the south toward the city hall or the northwest portion of the CBD would have to take a circuitous route. Beginning the one way pair at South 2nd Street provides for better traffic flow to the above locations. Additional considerations were the lack of existing width and right of way on South 3rd Street. There is an electrical facility presently located in the southeast quadrant of the intersection such that it might require relocation if South 3rd Street were to be widened.

The estimated cost of Alternate 2 to include reconstruction, widening, resurfacing, installation of new signals, etc. is given on Table 7.

D. ALTERNATE 3

Alternate 3 consists of removal of existing parking along the west side of Frederick with the additional space being utilized for alternating left turn storage lanes. Reconstruction of the existing brick lane from NE 1st Street to South 2nd Street would be required. The above section would then be resurfaced with an asphaltic concrete overlay. The same type of reconstruction proposed under Alternate 1 would also apply for the section from South 2nd Street to South 4th Street. Similarly the signal timing layout given on Figure 7 would also apply to this alternate with its two way traffic. Although left turn storage lanes are to be provided no separate left turn phase for the signals would be warranted based on existing and projected traffic. Therefore the same basic cycle lengths, splits and offsets as those used from Alternate 1 can be used for Alternate 3. A schematic diagram for the traffic flow for Alternate 3 is given on Plate 6.

Since the parking would be removed only from the west side of Frederick; and, because there is more than adequate parking behind the commercial establishments along two of the three blocks from North 1st to South 2nd Street, no new facility would be required initially under this alternate. Estimated costs for Alternate 3 to include construction and retirement of existing bonds are given on Table 8.

N

W. CHARLES ST.

E. CHARLES ST. / IA. NO. 3

1st ST. N.E.

1st ST. S.W.

1st ST. S.E.

2nd ST. S.E.

3rd ST. S.E.

N. FREDERICK AVE. / IA. NO. 150 & IA. NO. 3

S. FREDERICK AVE. / IA. NO. 150

1st AVE. S.E.

EXISTING SIGNALS

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CENTRAL BUSINESS DISTRICT

OELWEIN , IOWA

SCALE 1" = 200'

ALTERNATE 3
REMOVE PARKING ON WEST
SIDE OF FREDERICK
ADD LEFT TURN STORAGE
LANES

PLATE 6

E. ESTIMATED COSTS

In attempting to estimate costs for the various Alternates it was recognized that there were many variables beyond just the construction costs. Unless off-street spaces were metered, removal of parking would reduce the meter revenue upon which overhead costs and bond retirement are based. Removal of 109 curb spaces would significantly reduce the availability of parking in Oelwein's CBD; and, it was assumed that a like amount of spaces would be constructed to replace those taken.

If no additional meters were added to off-street lots and/or the meter rates were not raised, the city could expect about a 50% decrease in revenue from the meters. Although the spaces on Frederick comprise only 109 of the nearly 300 total metered spaces, they are by far the most heavily used. Construction of an additional lot would also add additional maintenance costs. In reviewing the Parking Revenue Statement given in Section II-E-4 it can readily be seen that a rise in cost coupled by a loss in revenue will generally wipe out the anticipated funds to be used to retire the bonds issued in 1972. For Alternates 1 and 3, therefore, the estimated costs include a $115,000 figure for use in retiring the above bonds.

Replacement or reconstruction of municipal utilities such as sewer lines, water pipes, etc., in conjunction with any of the alternates should definitely be considered. However, the extent to which these types of improvements would be feasible was felt to be beyond the scope of this study. Before any of the alternates is implemented it is definitely recommended that any utility reworking required be coordinated.

The structural adequacy of the brick base found on most of the streets is of questionable value. Its adequacy to support high volume primary traffic would not be determined by the Iowa State Highway Commission because of the prohibitive cost until one of the Alternates is definitely decided upon.

Construction cost estimates for Alternates 1 and 2 were therefore made under two different assumptions. The first was that the brick base was adequate and some type of asphaltic concrete overlay with minor full depth patching would suffice. This gave minimum construction cost values for these Alternates. The second assumption was that the brick base was inadequate and would be replaced by layers consisting of a subgrade, an asphaltic concrete base course, and a full width surface mat. For Alternate 2, it was assumed that the side streets would all require reconstruction with the new streets being 50' back to back Portland Cement concrete with curb and gutter. These figures gave the maximum estimated construction costs for the Alternates. For Alternate 3 only one estimate was made recognizing that resurfacing only would be the same as the minimum estimate for Alternate 1. For the maximum estimate, the brick base along the east side of Frederick from North 1st Street to South 2nd Street would be retained and overlaid for continued use as parking. Along the west side the brick would be removed and replaced with a subgrade-base course-surface mat treatment. From South 2nd to South 4th the Section would be the same as Alternate 1.

Ranking by order of construction costs, Alternate 2 is by far the most expensive, with Alternates 1 and 3 being comparable depending on the amount of reconstruction required. The cost of new signals and the anticipated reconstruction and widening for at least portions of 1st Avenue East in conjunction with the resurfacing required for Frederick contribute to the larger total for Alternate 2. For the other two Alternates the reconstruction is confined to an existing primary extension where the present pavement was considered to

be structurally adequate and would not require replacement. Also the present right of way throughout the study area was judged to be sufficient for the proposed alternates. The estimated costs and other considerations are given on Tables 6, 7 and 8. Maximum construction costs are given.

F. SOURCES OF FUNDING

The sources of funds for each of the alternates would include the following:

1. General Obligation Bonds
2. Federal Revenue Sharing Monies
3. Road Use Tax Funds
4. Special Assessments
5. Iowa State Highway Commission participation under their "2601" policy.

The latter would be more applicable to Alternates 1 and 3. It would apply to Alternate 2 only for that portion of the improvement proposed on Frederick as covered by the guidelines set forth in the policy. Excerpts from the complete ISHC "2601" policy as they apply to Class III and IV highways - the classifications given Iowa #3 and #150 - are included in the appendix.

Special assessments are included because of their applicability to Alternates 2 and 3. Considering the expressed local sentiment by the businesses located along Frederick for the retention of "out front" curb parking, it would seem to be equitable for a portion of the cost of any Alternate considered, such that parking remain, be born directly by the establishments desiring this retention and benefitting from it.

Road Use Tax Funds could be used for any of the Alternates. However, this source also provides for any other street construction throughout the city, along with special assessments. It is therefore recommended that this source be used only as a last resort so that needed local street improvements would not suffer in relation to the downtown area.

The bulk of the city's funds for any of the Alternates would therefore come from either the Federal Revenue Sharing funds or from issuance of General Obligation bonds. As can be seen in Sections II-E-1 and II-E-2 the city would have sufficient capacity in either to finance any of the Alternates. Federal Revenue Sharing may be more applicable to this sort of project as it is of the one time, non-recurring type. General Obligation bonds would be more applicable to city wide, recurring projects such as sewage treatment and water supply facilities. With this in mind, a reasonable breakdown might be to use the Revenue Sharing for the street improvements and use the bonding capability for any utility relocation or reconstruction accomplished in conjunction with the proposed street improvements. Any of the above would depend on the priorities set forth by the city officials.

Since all Alternates include a proposed reconstruction of the South Frederick railroad crossing, railroad participation in a portion of the cost of the reconstruction is another possible source. The railroad might participate voluntarily; or the city, if it has adopted the appropriate sections of the 'Home Rule Act', could bill the railroad for the appropriate portion of the reconstruction of the crossing. This item is mentioned as a possible source although it was not included in the final breakdown of funding.

Possible sources of funding for each of the Alternates are included along with the estimated costs on Tables 6, 7 and 8.

TABLE 6
ESTIMATED
COSTS AND FUNDING
FOR ALTERNATE 1

I.	COSTS	
	A. Construction Costs	
	1. Paving Costs	
	Includes Pavement Removal, Subgrade, Base Course, Surface Mat and Railroad Crossing	$ 51,125
	2. Additional Costs	
	Includes signing and painting, Reworking of Traffic Signals and Removal of Meters	$ 6,000
	3. Additional 10% for Contingencies	$ 5,713
	4. Engineering and Legal	$ 9,425
	SUBTOTAL FOR CONSTRUCTION COSTS	$ 72,263
	B. Estimated cost of a 100 space lot along 1st Avenue near South 2nd Street (to include land purchase and construction)	$ 89,534
	C. Retirement of Existing Bonds	$115,000
	TOTAL ESTIMATED COSTS FOR ALTERNATE I	$276,797
II.	FUNDING	
	A. Iowa State Highway Commission Participation	$ 59,338
	B. City of Oelwein From Revenue Sharing or G.O. Bonds	$217,459
	TOTAL FUNDING FOR ALTERNATE I	$276,797

TABLE 7
ESTIMATED
COSTS AND FUNDING
FOR ALTERNATE 2

I. COSTS	
A. Construction Costs	
1. Paving Costs	
Includes Pavement Removal, New Pavement, Resurfacing Frederick and Railroad Crossing	$152,422
2. Installation of Signals	$ 32,925
3. Additional Costs	
Including Signing, Painting, Reworking Existing Signal System	$ 3,500
4. Additional 10% Contingencies	$ 18,570
5. Engineering and Legal	$ 31,112
TOTAL ESTIMATED COSTS FOR ALTERNATE 2	$238,529
II. FUNDING	
A. Iowa State Highway Commission Participation	$ 22,911
B. City of Oelwein From Revenue Sharing or G.O. Bonds	$204,718
C. Special Assessment 109 Meters @ $100 each	$ 10,900
TOTAL FUNDING FOR ALTERNATE 2	$238,529

TABLE 8
ESTIMATED
COSTS AND FUNDING
FOR ALTERNATE 3

I.	COSTS	
	A. Construction Costs	
	1. Paving Costs	
	Includes Pavement Removal, Subgrade, Base Course, Surface Mat and Railroad Crossing	$ 50,078
	2. Additional Costs	
	Includes Signing, Painting, Reworking of Existing Signals and Removal of Meters	$ 4,750
	3. Additional 10% for Contingencies	$ 5,483
	4. Engineering and Legal	$ 9,046
	SUBTOTAL FOR CONSTRUCTION COSTS	$ 69,357
	B. Retirement of Existing Bonds	$115,000
	TOTAL ESTIMATED COSTS FOR ALTERNATE 3	$184,357
II.	FUNDING	
	A. Iowa State Highway Commission Participation	$ 41,331
	B. City of Oelwein From Revenue Sharing of G.O. Bonds	$137,526
	C. Special Assessment 55 Meters @ $100 each	$ 5,500
	TOTAL FUNDING FOR ALTERNATE 3	$184,357

G. IMPROVED LEVELS OF TRAFFIC SERVICE

The primary objective of any reconstruction or relocation of the street system would be to improve the service provided by the system. Included in this improved service would be a decrease in delays, a reduction in accidents and a reduction in road user costs associated to the above delays and accidents.

Levels of Service were defined in Section II-B and the Levels provided by the existing system were determined. As noted then, the Level of Service for a downtown system is dependent on the average running speed of the traffic using the facility and the intersection "Load Factor" which is a measure of consistant usage versus capacity.

Using the arbitrary guidelines given by Table 1, Alternates 1 and 3 would be limited to Level C based on average speed. The cycle lengths required for the combination of balanced progression plus an average speed of 20 mph would be relatively short. As speed of progression is much more flexible with a one way system it is possible to attain Level B or better under Alternate 2.

The various Alternates were also analyzed for capacity using the methods put forth in the Highway Capacity Manual[3] and used to analyze the existing system. For each, the three block segment from Frederick to South 2nd Street was considered using estimated existing volumes. For Alternates 1 and 3, the 30th Highest Hour volumes estimated from the actual counts were used. For Alternate 2, it was recognized that there would be an increase in southbound traffic switching from 1st Avenue East to Frederick with the implementation

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[3] Highway Capacity Manual; Special Report 87; Highway Research Board; 1965

of a one way system. Also the left turns at Frederick and Charles would increase considerably due to the addition of the present southbound to eastbound traffic that follows NE 1st Street to 1st Avenue East and 1st Avenue East to Charles.

Capacity analyses were performed at the intersections of Charles, South 1st Street and South 2nd Street along Frederick. Alternates 1 and 3 were checked for both northbound and southbound traffic. Alternate 2 was checked for southbound only. For each intersection, the service volumes available at Levels of Service B, C, and D were calculated. Adjustments were made for city size, location within the city, the phase/cycle length split, percent of turning movements and percent of trucks. Fifty second cycles were assumed for all traffic signals. In addition a factor giving the ratio of the calculated service volume to the estimated design hourly volume was determined. This factor in effect gives the percentage increase in the existing design hour traffic that can occur with the intersection still retaining the given Level of Service. Factors less than 1.0 indicate that the given Level of Service could not be attained even under existing estimated design hour traffic.

The service volumes and the above factors calculated for the appropriate Levels of Service for the three Alternates for each intersection in the southbound directionare given in Table 9. The service volumes and factors for the given Levels of Service for Alternates 1 and 3 in the northbound direction are given in Table 10.

Alternate 2 provides by far the best traffic service for the system. The elimination of the turning conflicts and the increased speed on progression along with the widest possible band allows for much larger service volumes.

TABLE 9
INTERSECTION CAPACITIES
SOUTHBOUND ON FREDERICK

Alternate	Level of Service	Frederick and Charles Service Volume	Factor*	Frederick and S. 1st St. Service Volume	Factor *	Frederick and S 2nd St. Service Volume	Factor*
	B	518	1.295	628	1.282	631	1.227
1	C	570	1.425	691	1.410	694	1.350
	D	648	1.620	785	1.602	789	1.535
	B	928	1.657	928	1.345	928	1.318
2	C	1035	1.825	1035	1.500	1035	1.470
	D	1258	2.246	1258	1.823	1258	1.787
	B	586	1.465	691	1.410	667	1.298
3	C	611	1.528	722	1.473	697	1.356
	D	652	1.630	773	1.578	746	1.451

*Factor = Service Volume ÷ Estimated Existing Demand (30th Highest Hour)

TABLE 10
INTERSECTION CAPACITIES
NORTHBOUND ON FREDERICK

Alternate	Level of Service	Frederick and Charles Service Volume	Factor *	Frederick and S. 1st St. Service Volume	Factor *	Frederick and S. 2nd St. Service Volume	Factor *
	B	494	.943	640	1.270	640	1.190
1	C	543	1.036	704	1.397	704	1.309
	D	618	1.179	880	1.746	880	1.636
	B	666	1.271	699	1.387	682	1.268
3	C	692	1.321	730	1.448	713	1.325
	D	787	1.406	780	1.548	763	1.418

*Factor = Service Volume ÷ Estimated Existing Demand (30th Highest Hour)

SUMMARY

A. CONCLUSIONS AND RECOMMENDATIONS

Many variables enter into the comparison of the three proposed Alternates. Included in the analysis was first and foremost the cost of each. Corresponding to this, the available methods of financing were reviewed as applicability to each. Anticipated reduction in accidents and the improved service to traffic were also of a primary concern. The effect on parking and the local sentiment for retention of existing curb parking were considered. Also the loss of parking meter revenue was found to be highly significant.

In looking at the "costs" of each Alternate it becomes obvious that the City has more to consider than just the construction costs involved. Removal of the metered spaces would have an immediate effect on revenue requirements for the retirement of the existing bonds. It might have a secondary effect on the general economy of the city by the discouraging of potential shoppers. The latter could very well be offset, however, by the encouraging effect of a more efficient downtown street network. Funding of any of the proposed three alternates would appear to be feasible considering the amounts available from either the Federal Revenue Sharing monies or the General Obligation bonding capacity. These sources must provide funds for other projects; however, and the priorities for these other projects as opposed to any downtown street improvements must be determined by city officials.

In reviewing the estimated costs given in Tables 6, 7 and 8; which include the retirement of bonds for Alternates 1 and 3 and the construction of a new parking lot for Alternate 1, the ranking in order of cost to the city is Alternate 1 - highest, Alternate 2 - intermediate and Alternate 3 - the lowest. If the lower estimated construction costs were used, the order would be Alter-

nate 1 - highest, Alternate 3 - intermediate, and Alternate 2 - lowest. If the parking lot and retirement of Revenue Bonds are excluded from the calculations and special assessments for the meters are neglected, the ranking of costs for the City funds Alternate 2 - highest by almost fifteen times as much as Alternate 1. Alternate 3 would be in second place being about two times as large as Alternate 1.

In reviewing the Levels of Service provided by the various Alternates, the one-way pair is by far the best. An approximate 50% increase in the present estimated design hour traffic would be required to drop the Level of Service to C and there would have to be an 80% increase to drop the Level to D.

Alternates 1 and 3 provide approximately the same Levels of Service for the volumes used. The critical intersection for each is at Charles and Frederick for northbound traffic. For Alternate 1, the provision of two lanes is approximately the same situation as that existing. However, the removal of parking and delineation would provide better weaving upstream. Alternate 3 is better than Alternate 1 at this particular location in that it provides an additional lane for the northbound traffic. A comparison of Alternates 1 and 3 for all intersections in both directions shows that 3 generally has higher service volumes at Levels B and C and that Alternate 1 has higher service volumes at Level D. A general statement describing the above would be that Alternate 3 will function better under lighter traffic but the system will tend to "break down" or become congested more rapidly than Alternate 1. Alternate 3 would be more of an intermediate step and would probably require some reworking in the future depending on traffic volume increases.

B. IMPLEMENTATION

The Level of Service provided by the existing CBD street network generally fall to Levels D or E with the accompanying congestion and delays. The accident numbers and rates for some intersections in the study, while not excessively high, are above average and therefore warrant corrective action.

It is assumed the City would wish to expedite any Alternate chosen. Since the streets involved include two primary extensions, the first step after decision as to Alternate should be to obtain concurrence from the Iowa Highway Commission. Funding for each of the Alternates includes some participation by the Highway Commission. Efforts should be made to have the appropriate funds committed as soon as possible. Also once the final Alternate is selected field testing by the Highway Commission as to the structural adequacy of the existing streets should be requested.

If an early 1974 construction date is desired preparation of the final design plans should be accomplished over the winter months. At this time also, the city officials should decide upon the extent of utility reconstruction or relocation that is to be accomplished in conjunction with the street construction.

One of the first items to be covered by the design engineer should be coordination with the railroad for the crossing at South 3rd Street. Railroad approval for any crossing generally takes a relatively long time. It might be expedited somewhat in that Oelwein is a district headquarters for the railroad in question.

Reworking of the signal system to go to the proposed 50 second cycle

lengths would have to be coordinated with the Highway Commission. The retiming of the signals on Frederick should be a minor effort requiring only change in the gearing mechanism of the controllers. The offsets could be adjusted very easily also. This adjustment of the signal system would depend on the Alternate chosen and could be accomplished separately from any reconstruction.

If either Alternate 1 or Alternate 3 are chosen plans should be available for 1974 construction. Likewise if Alternate 2 were decided upon, plans should be available for a 1974 starting date. However, Alternate 2 is envisioned as a two stage project. The first stage would be the reconstruction of the streets for northbound traffic. During the second stage traffic would be switched to the reconstructed streets while Frederick is resurfaced. Installation of signals could be accomplished throughout the project; but, because they would be directional, signing would be utilized during the second phase.

Depending on the availability of funding from the Highway Commission, the implementation of any of the Alternates could be accomplished by a year from the date of this study.

APPENDIX

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Frederick & NE 1st Street City: Oelwein

Date: May, 1973

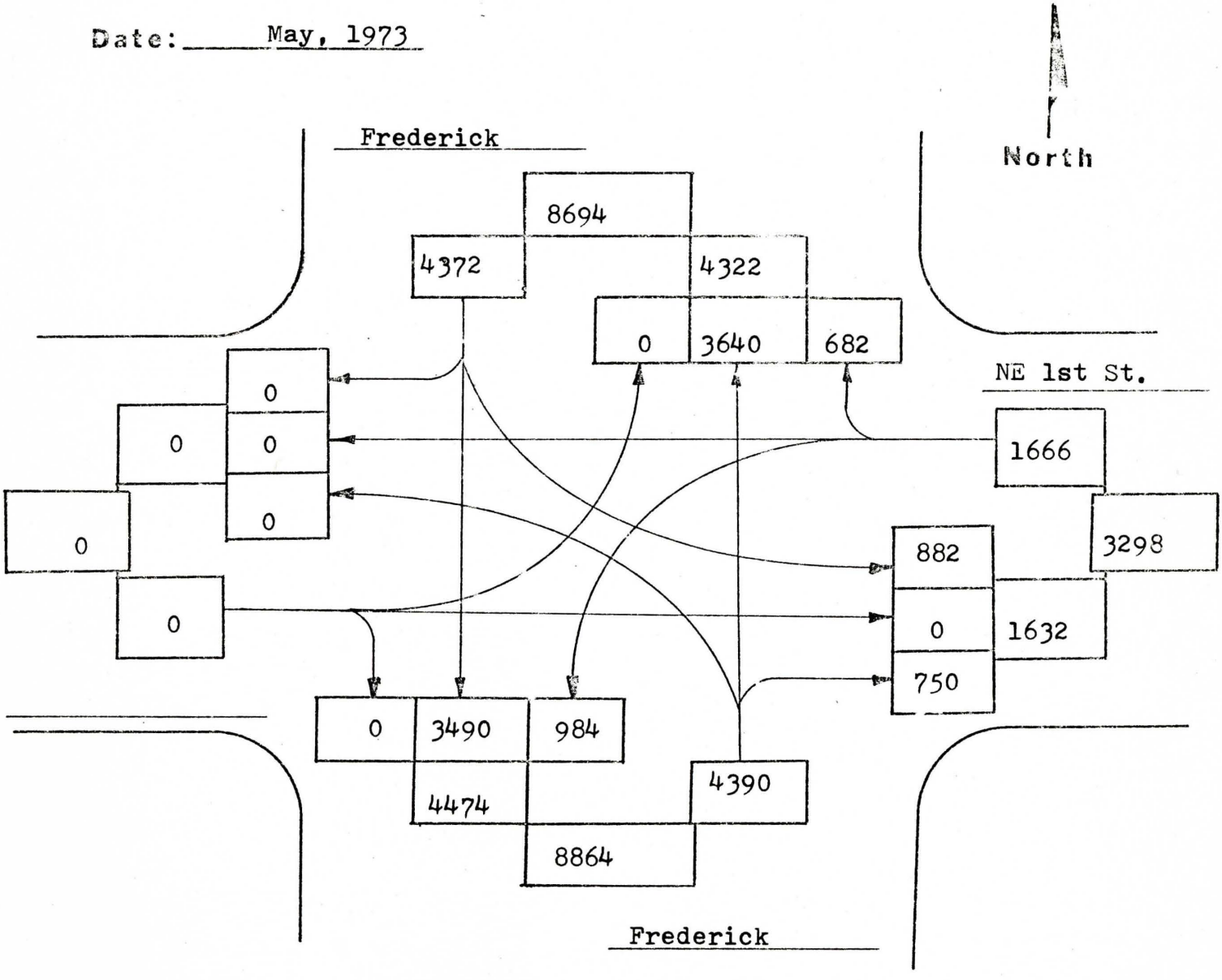

Figure A-1

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: 1st Ave. NE & NE 1st Street City: Oelwein

Date: May, 1973

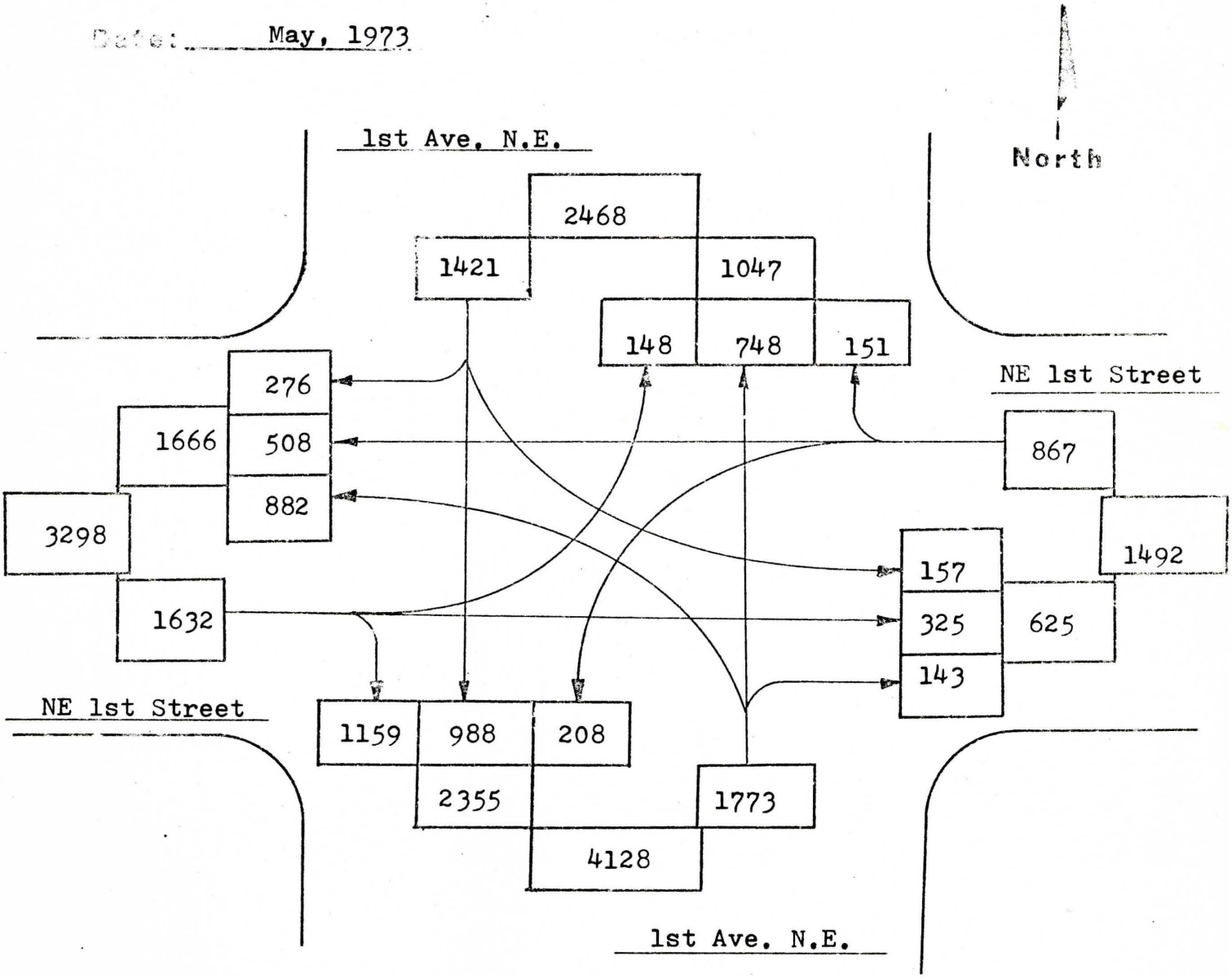

Figure A-2

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Frederick & Charles City: Oelwein

Date: May, 1973

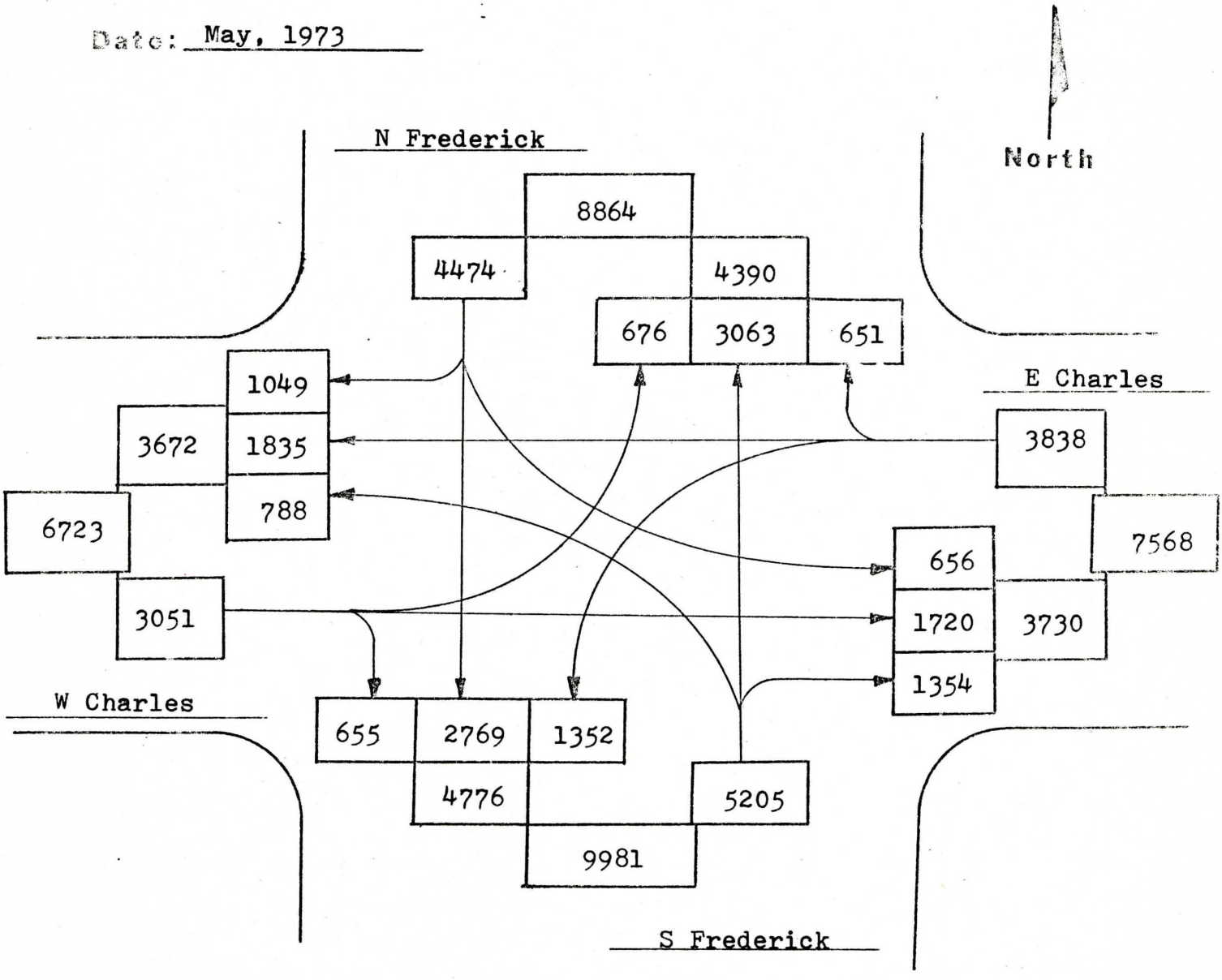

Figure A-3

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Charles & 1st Ave. E. City: Oelwein

Date: May, 1973

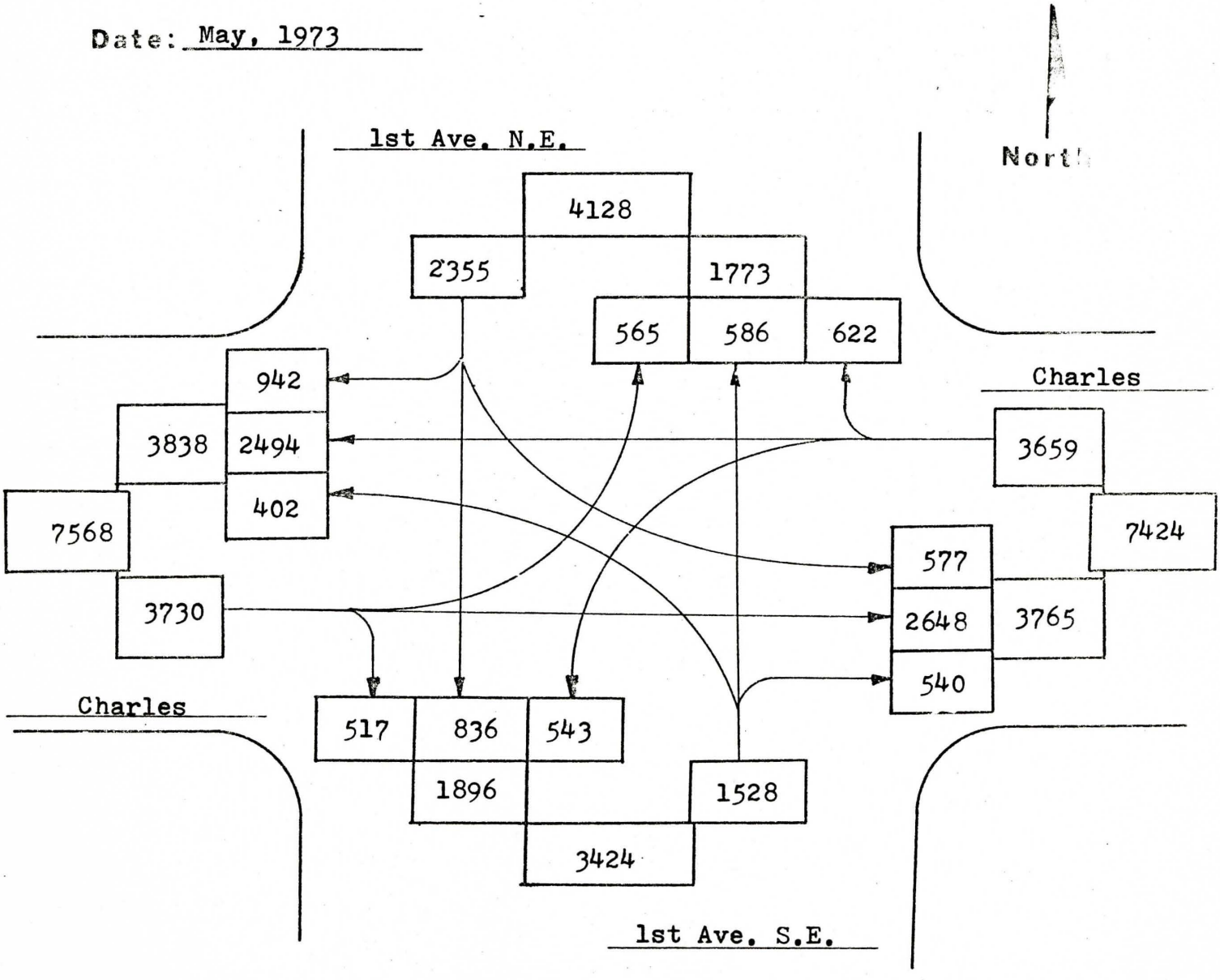

Figure A-4

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Frederick & S. 1st St. City: Oelwein

Date: May, 1973

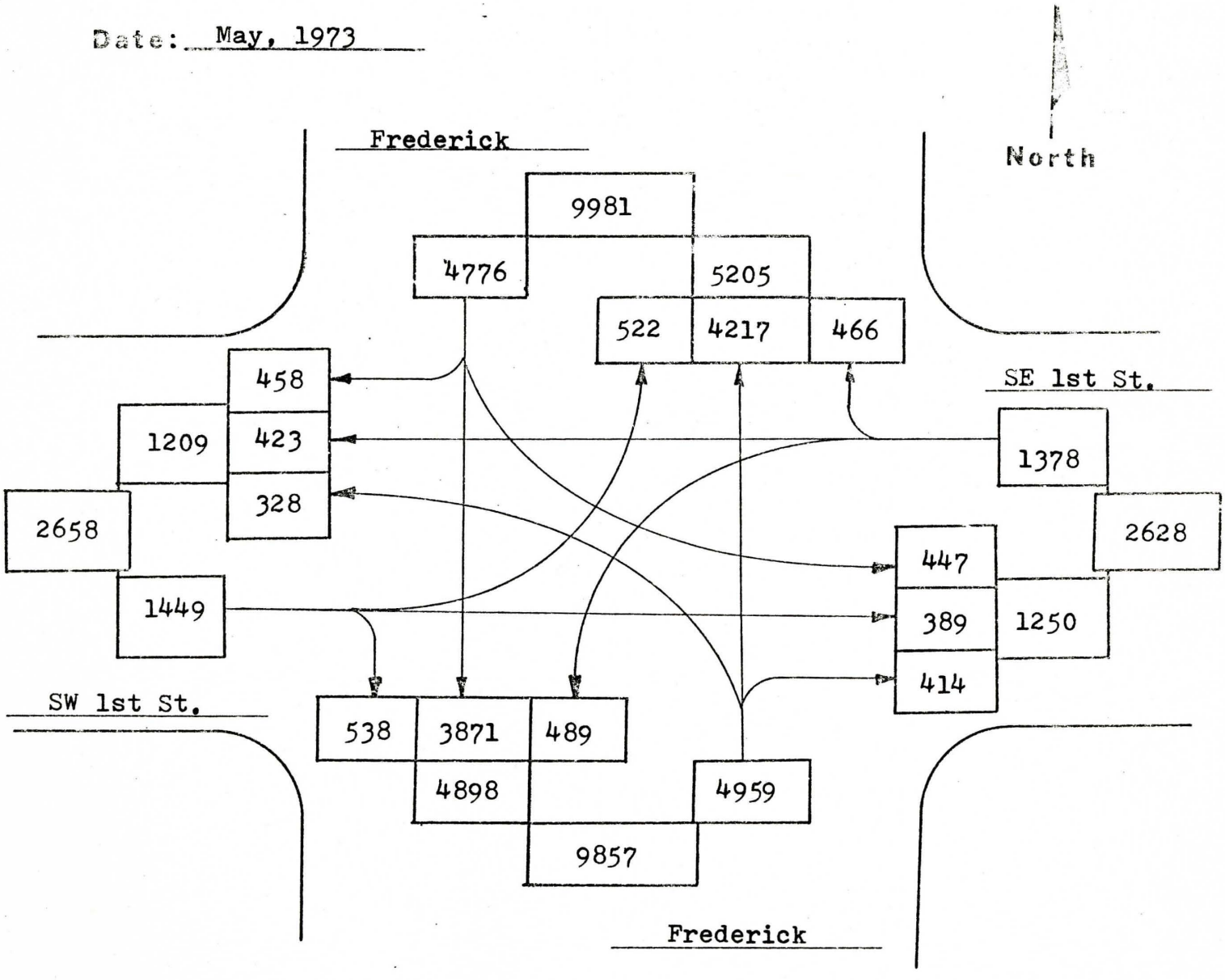

Figure A-5

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: 1st Ave. S.E. & S.E. 1st St. **City:** Oelwein

Date: May, 1973

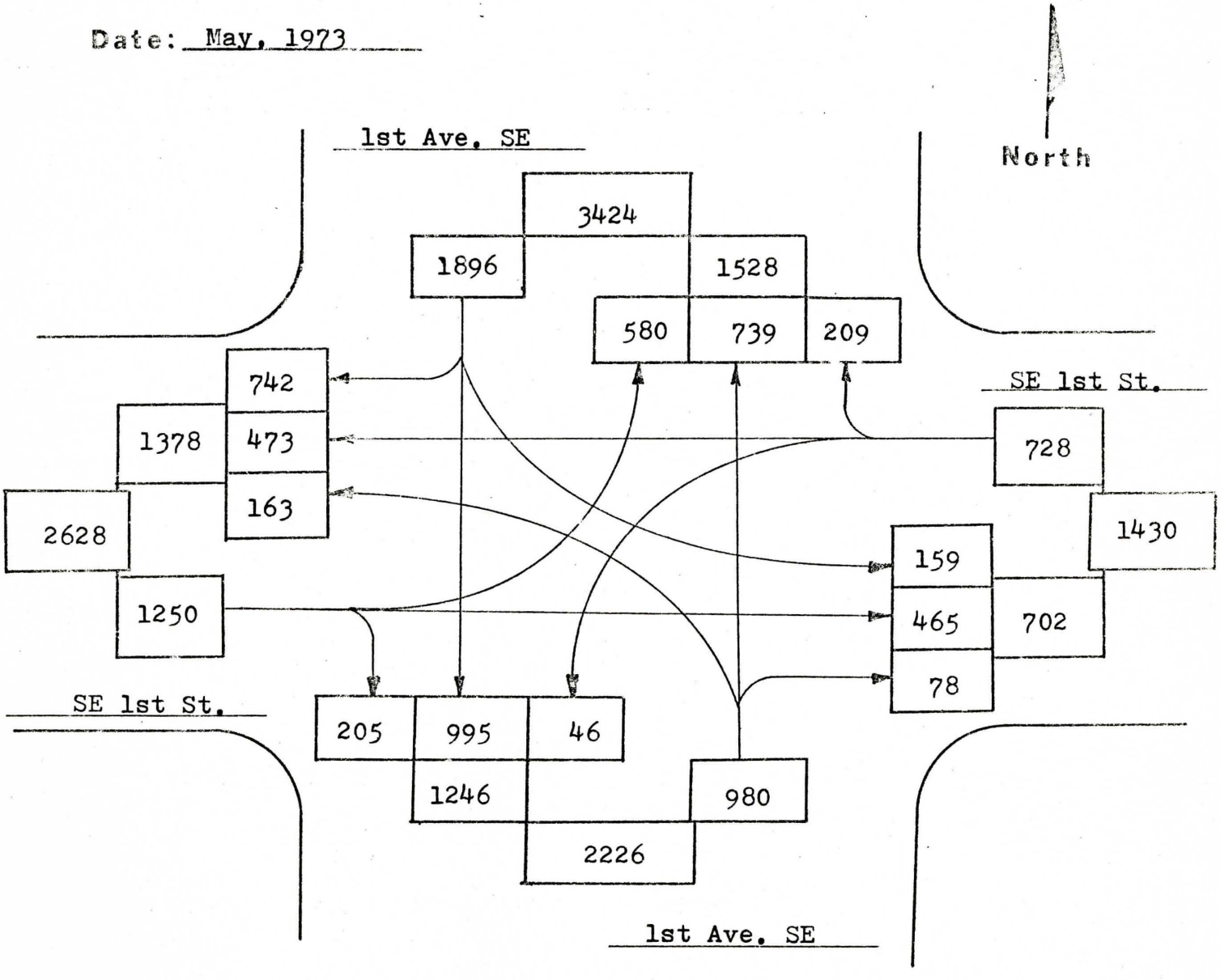

Figure A-6

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Frederick & S. 2nd St. City: Oelwein

Date: May, 1973

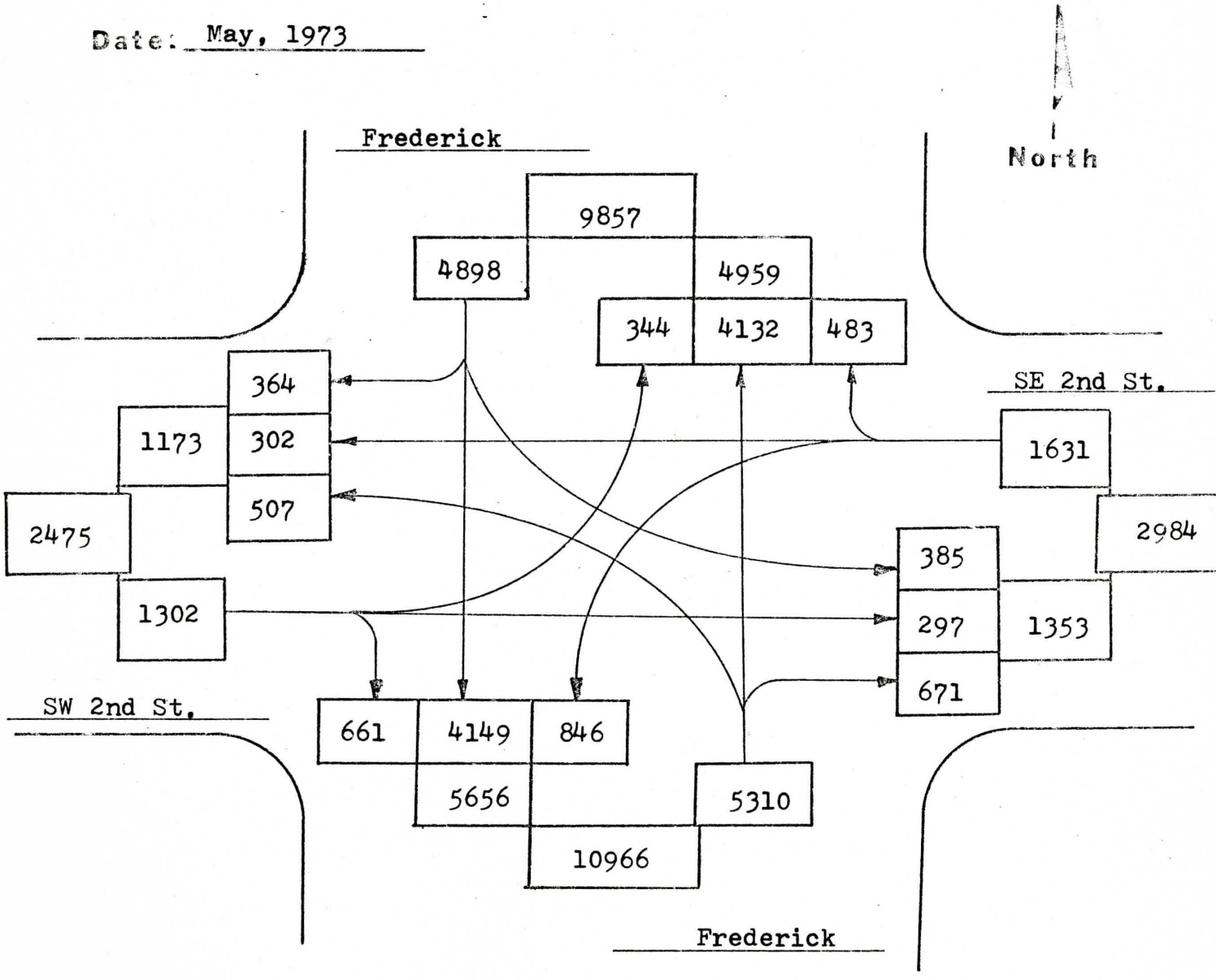

Figure A-7

VEHICULAR TURNING
MOVEMENTS

AVG. DAILY TRAFFIC

Location: 1st Ave. SE & SE 2nd St. **City:** Oelwein

Date: May, 1973

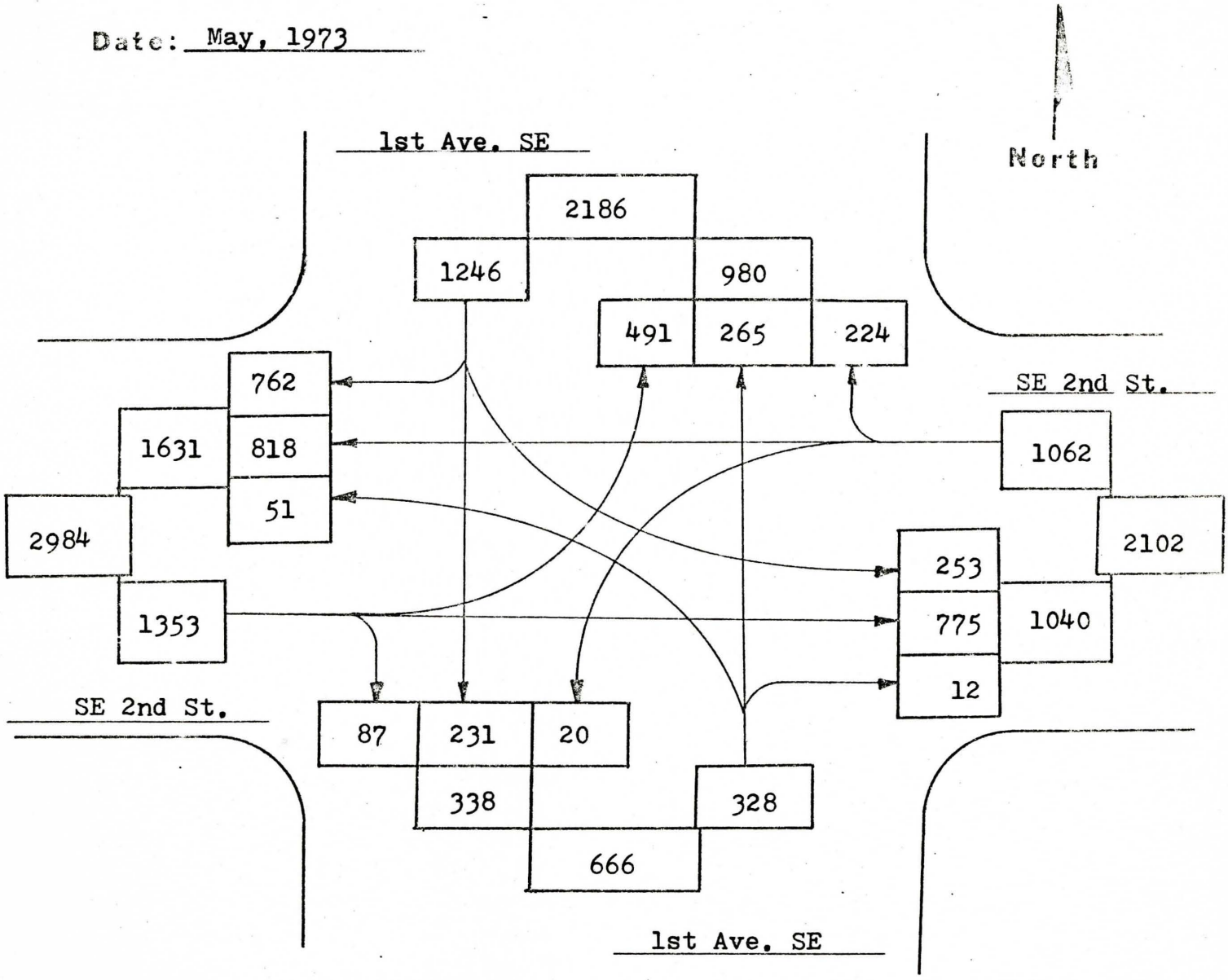

Figure A-8

VEHICULAR TURNING MOVEMENTS

AVG. DAILY TRAFFIC

Location: Frederick & SE 3rd St. City: Oelwein

Date: May, 1973

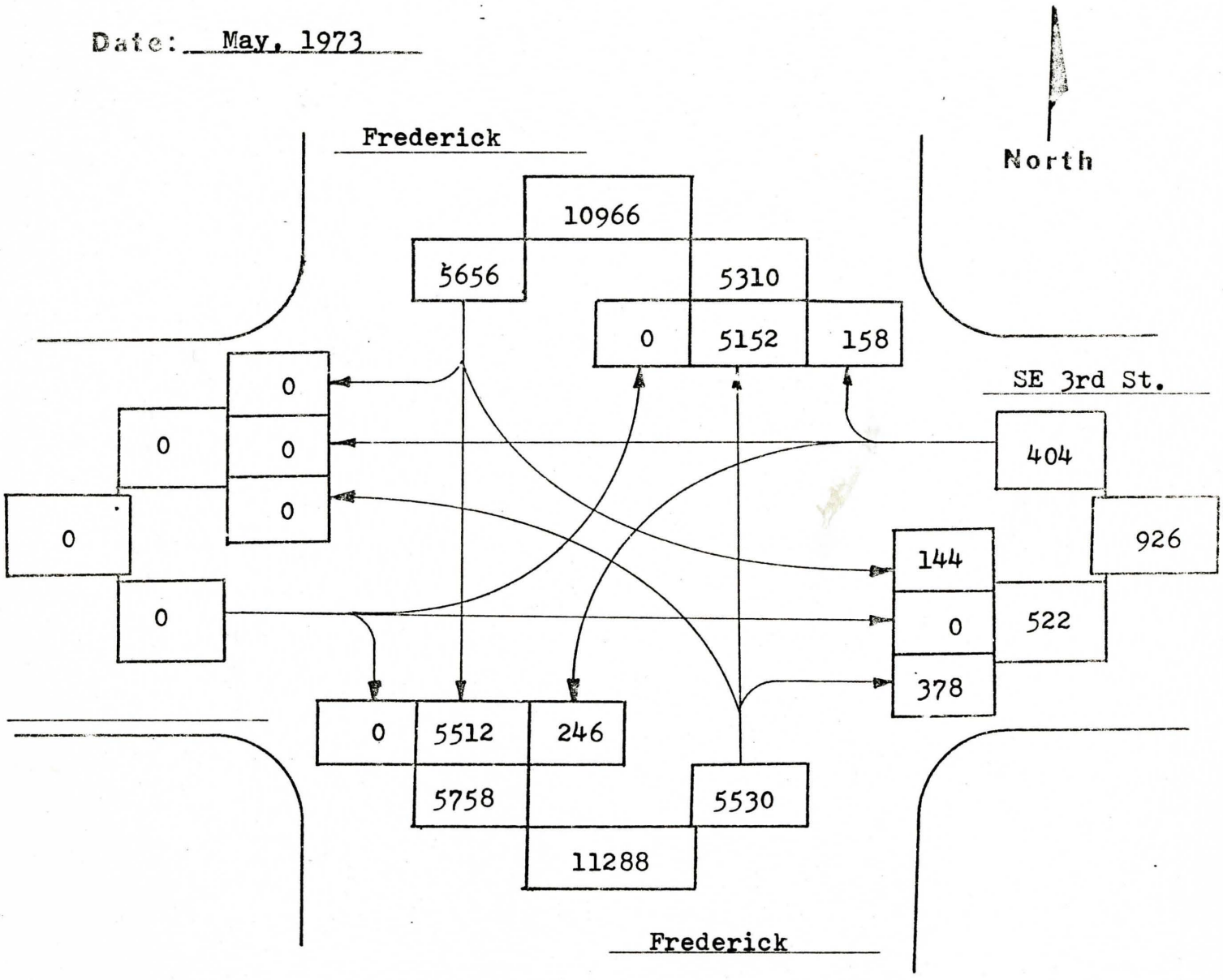

Figure A-9

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Frederick and NE 1st St. **City:** Oelwein

Date: May, 1973

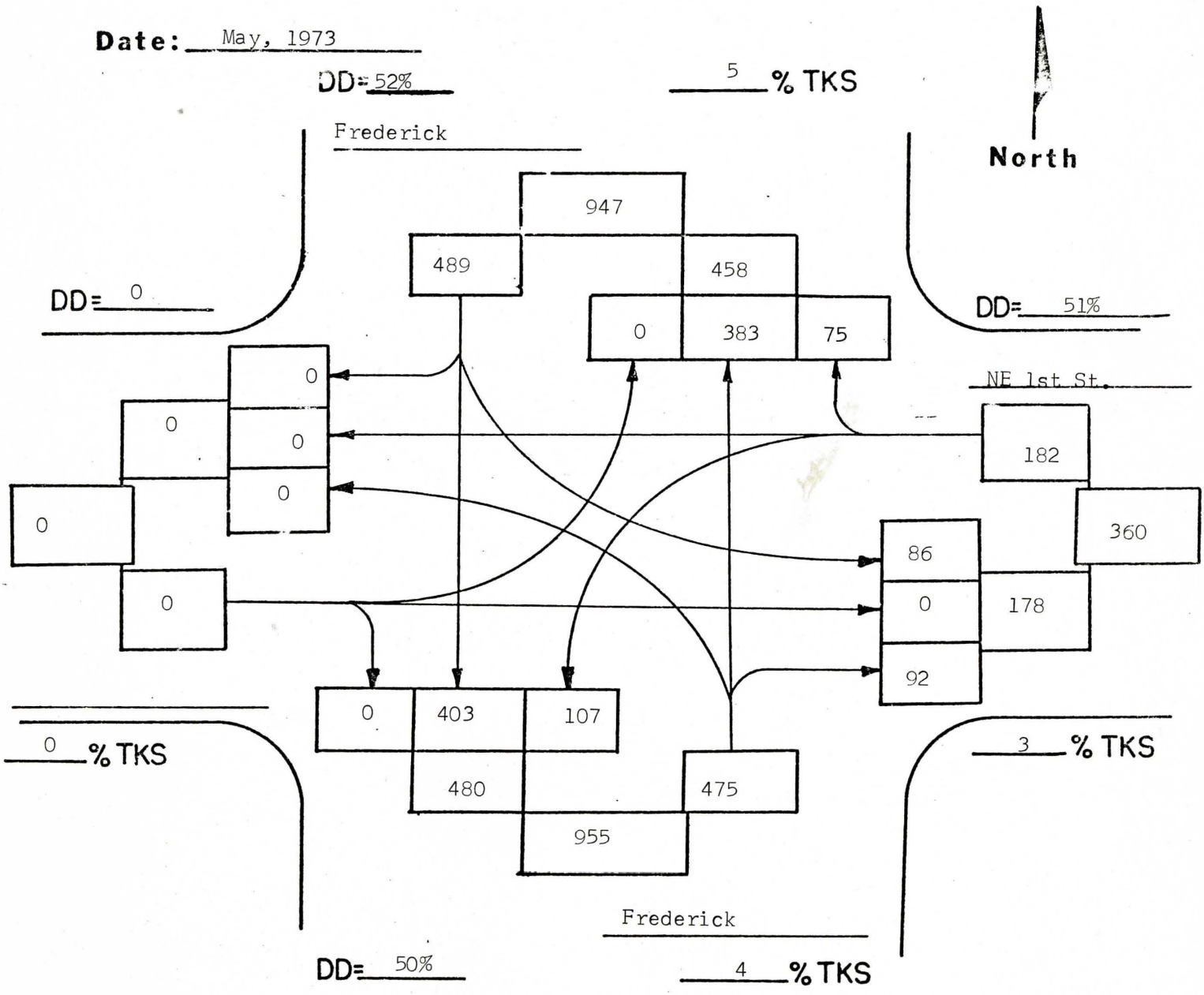

Figure A-10

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: 1st Ave. NE & NE 1st St. **City:** Oelwein

Date: May, 1973

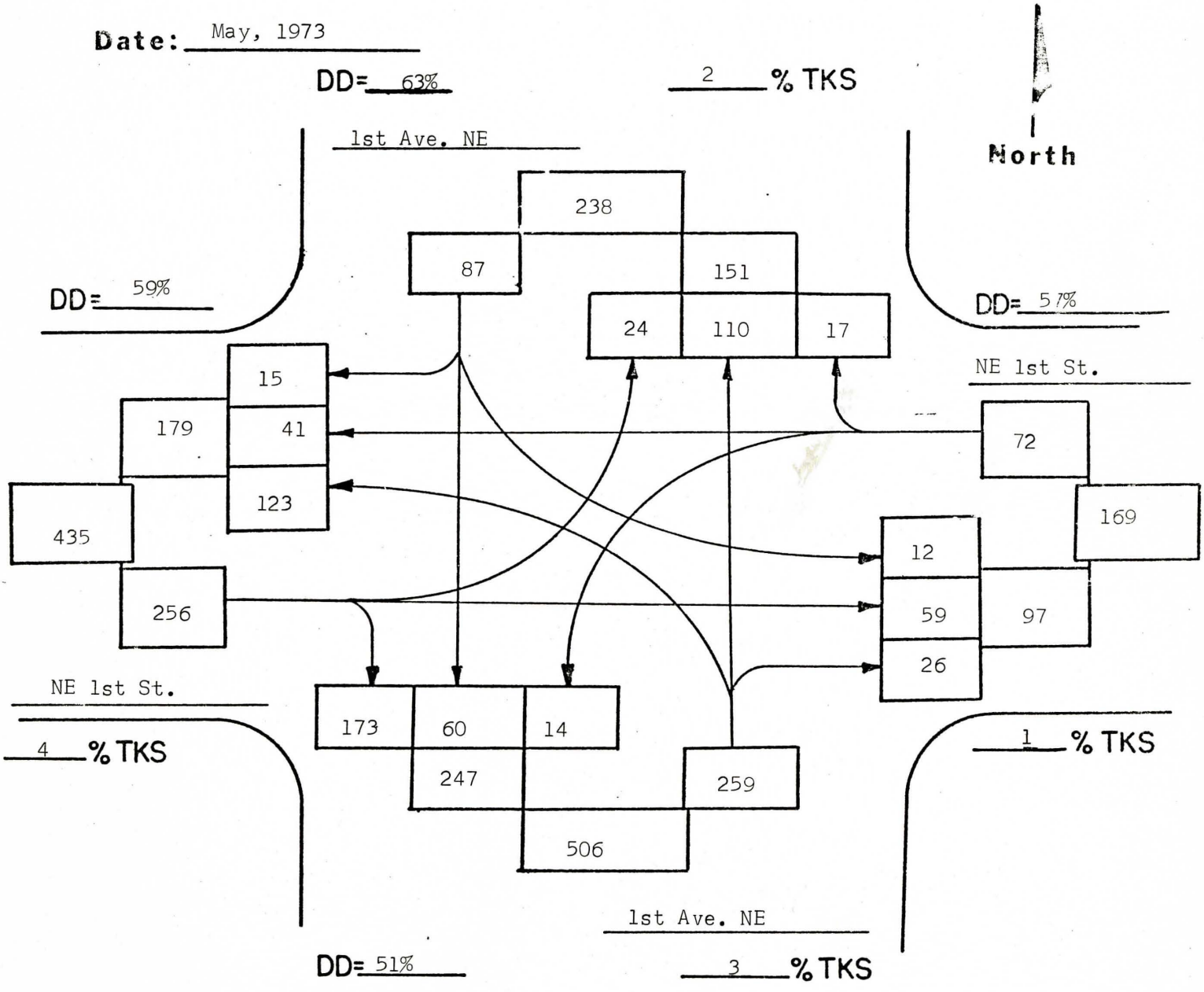

Figure A-11

VEHICULAR TURN MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Frederick & Charles **City:** Oelwein

Date: May, 1973

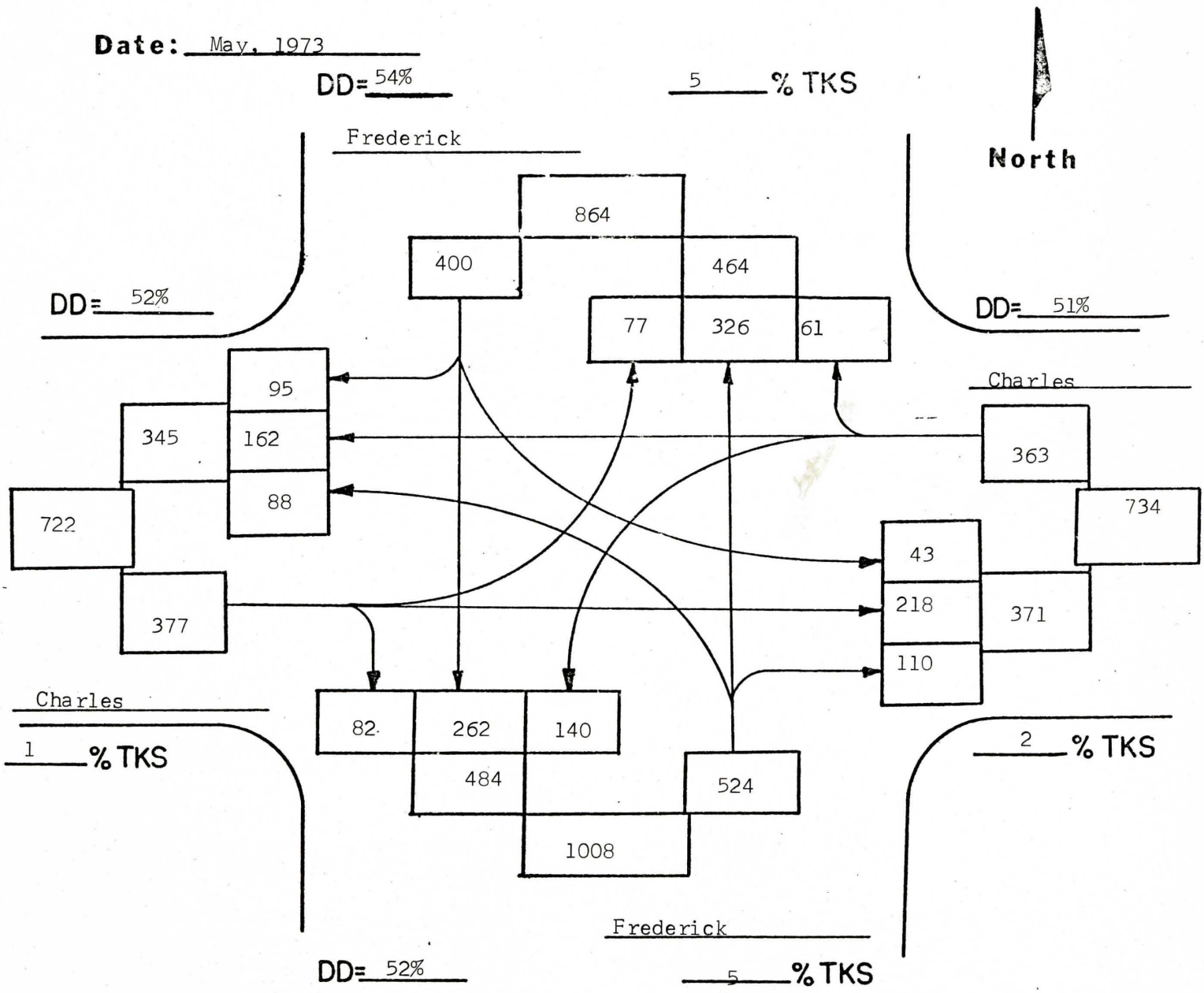

Figure A-12

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Charles & 1st Ave. E **City:** Oelwein

Date: May, 1973

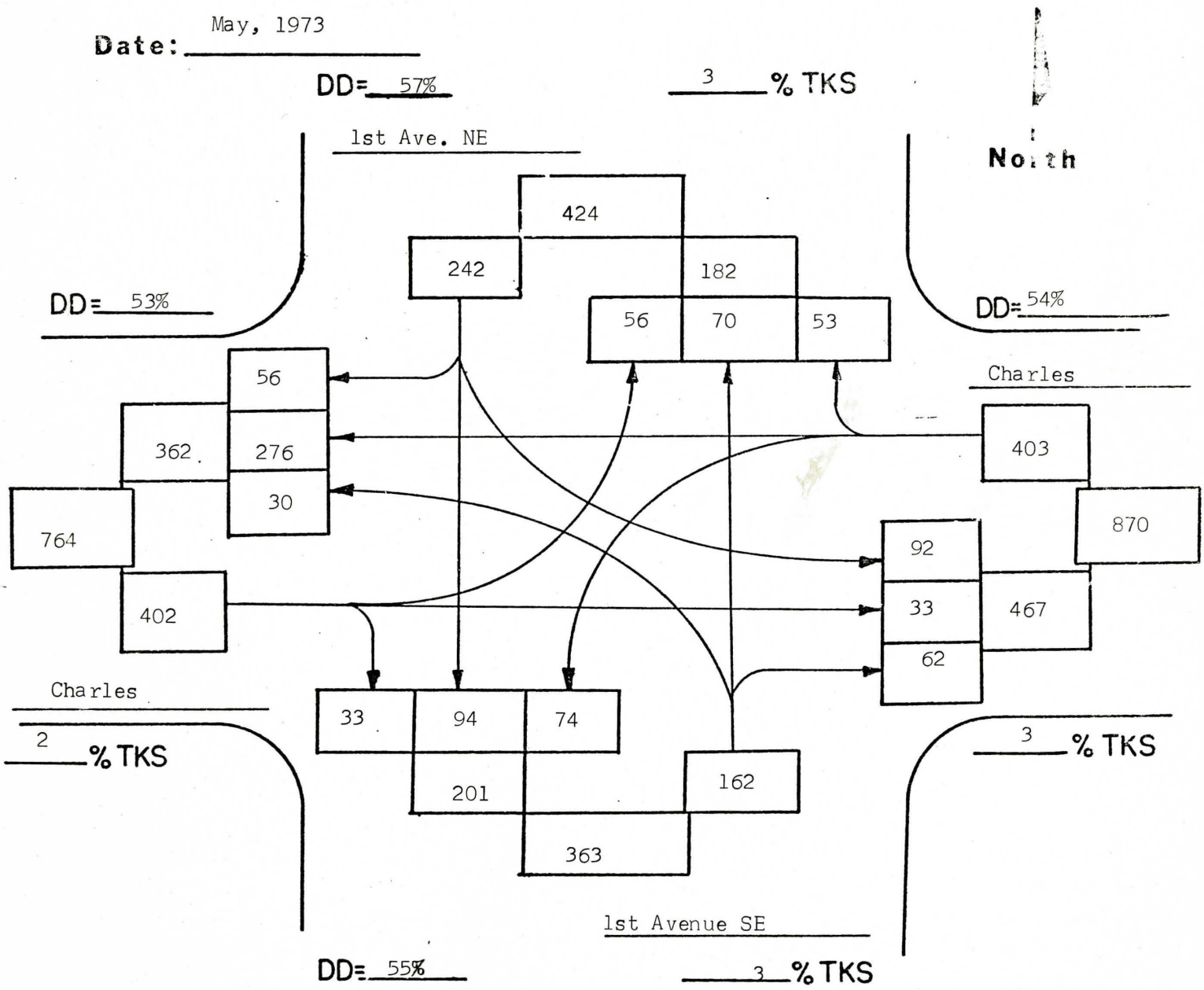

Figure A-13

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Frederick & S. 1st St. **City:** Oelwein

Date: May, 1973

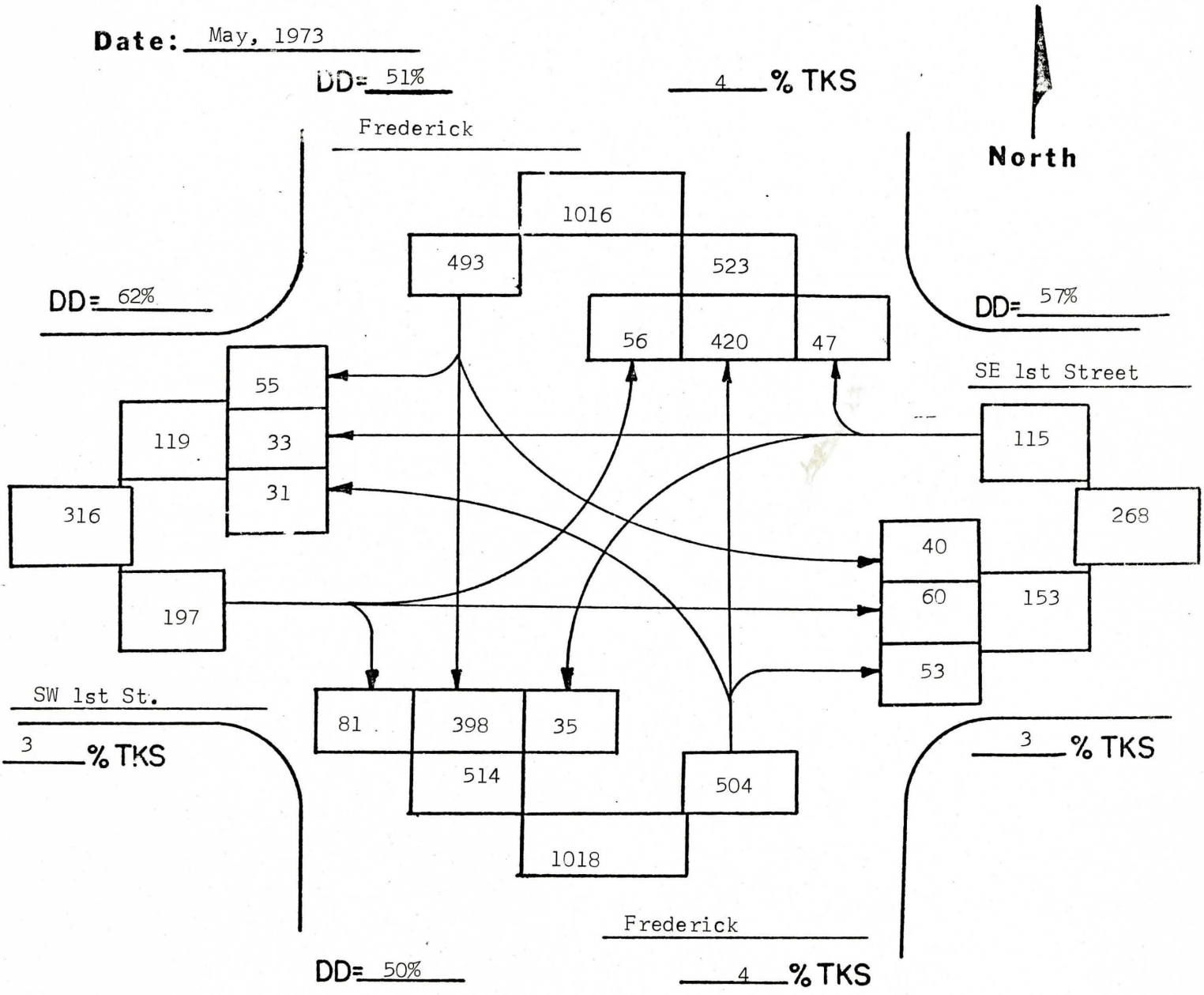

Figure A-14

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: 1st Ave. E and SE 1st St. **City:** Oelwein

Date: May, 1973

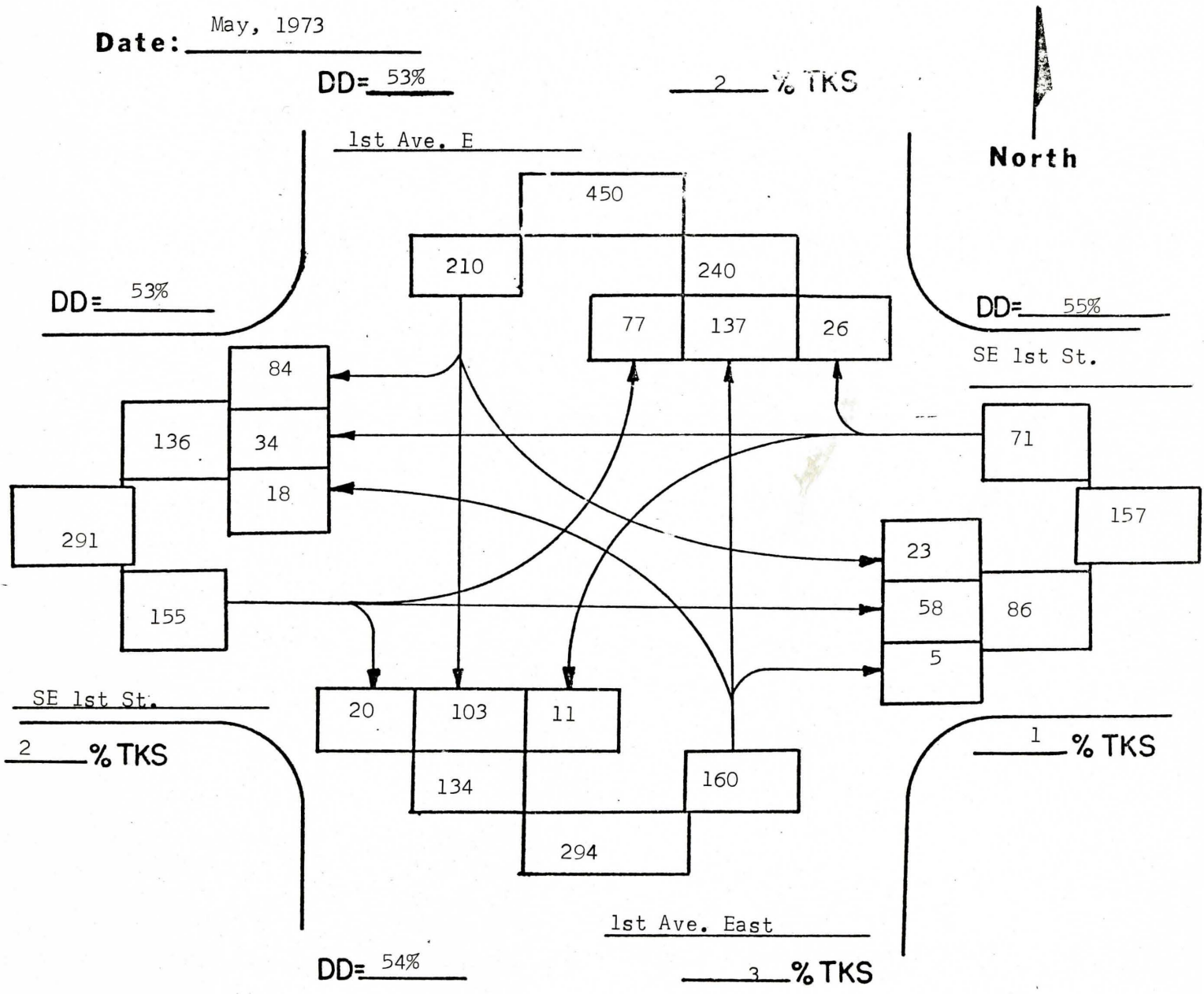

Figure A-15

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Frederick & S. 2nd St. **City:** Oelwein

Date: May, 1973

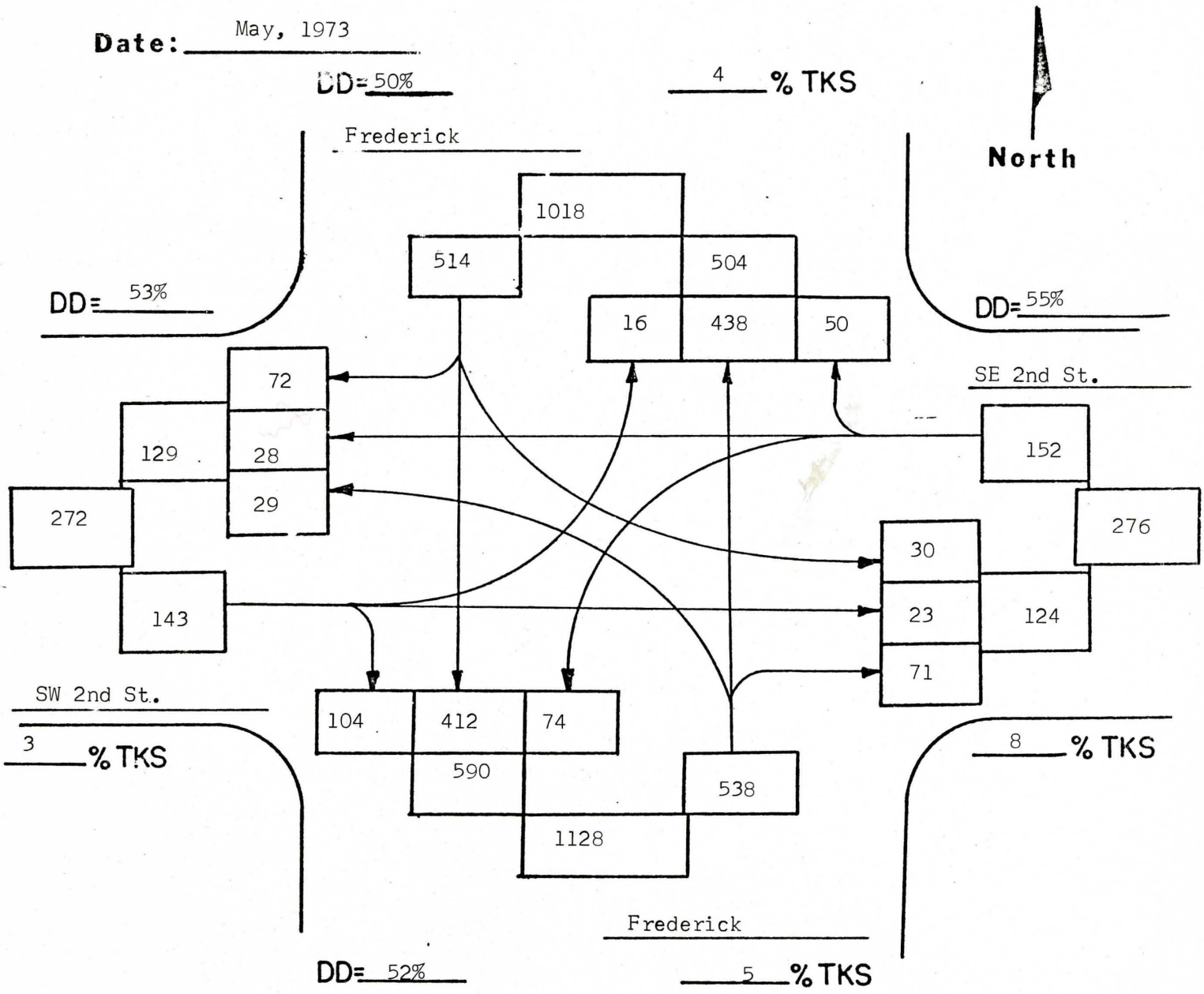

Figure A-16

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: 1st Ave. SE & SE 2nd St. **City:** Oelwein

Date: May, 1973

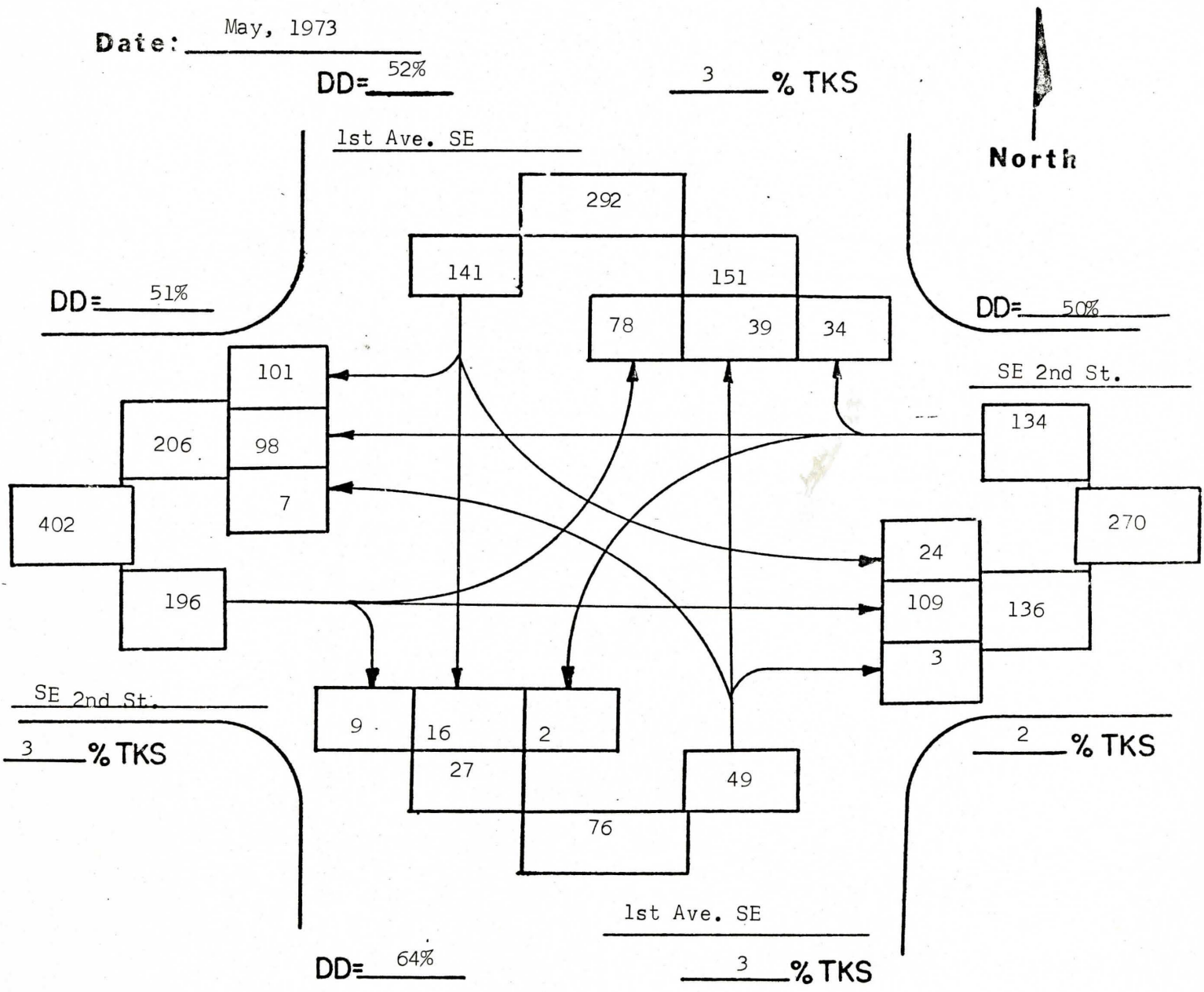

Figure A-17

VEHICULAR TURNING MOVEMENTS

30TH HIGHEST HOUR TRAFFIC

Location: Frederick & SE 3rd St. **City:** Oelwein

Date: May, 1973

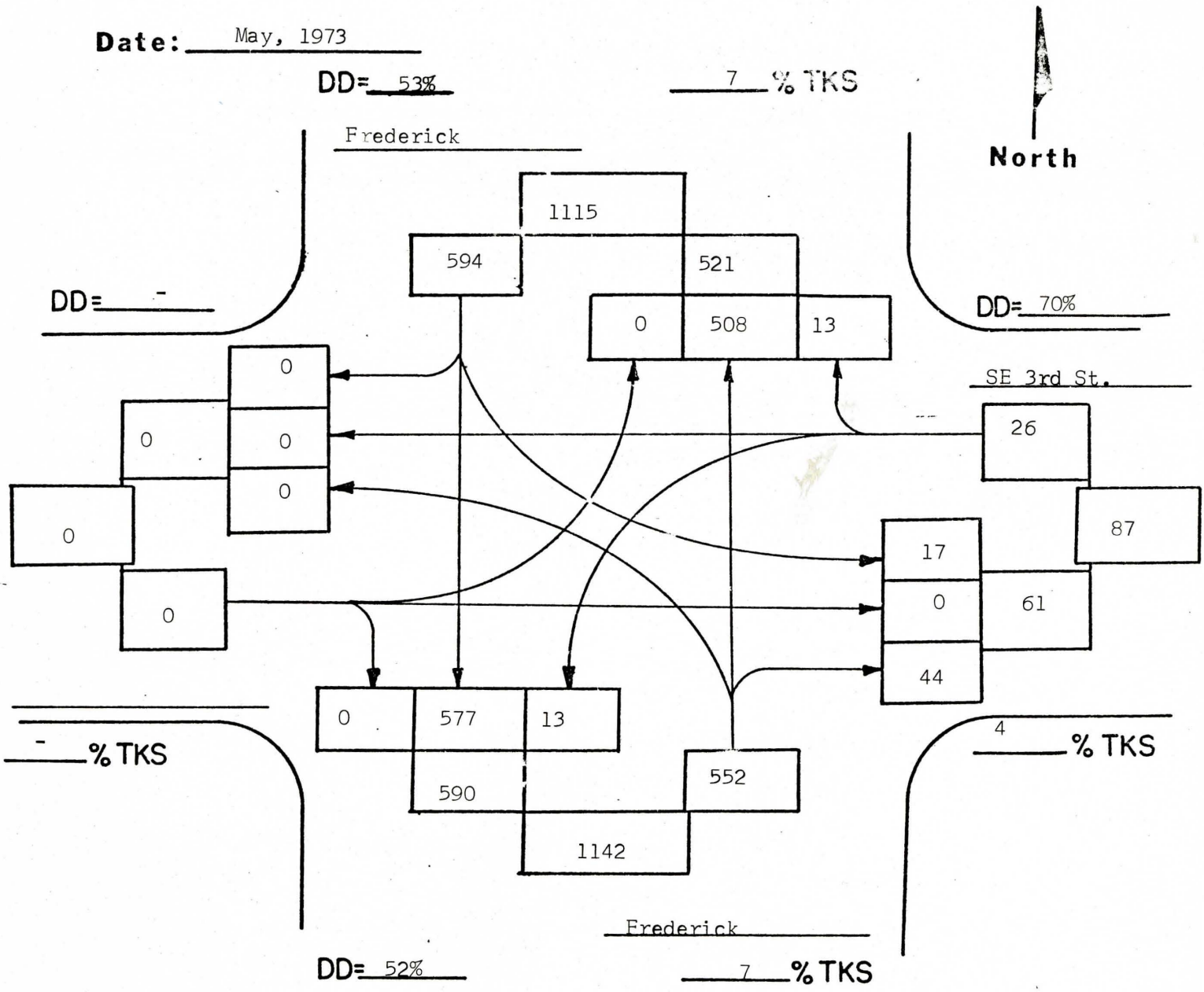

Figure A-18

EXCERPTS FROM

IOWA STATE HIGHWAY COMMISSION

POLICY NO. 2601 FOR

IMPROVEMENTS AND MAINTENANCE ON URBAN EXTENSIONS OF THE PRIMARY SYSTEM

In order for the Commission to plan, design, construct and maintain the urban extensions of the primary road system in an equitable and relatively uniform manner in all municipalities, the Commission Staff and the individual municipalities involved shall use the following guidelines to determine the financial responsibilities for primary road extensions.

The Iowa State Highway Commission shall at all times reserve the right to make exceptions to any and all rules and regulations where the exercise of sound and reasonable judgment indicates that the literal enforcement of any such rules or regulations would effect an undue hardship on any interested party, and the Commission shall, in the enforcement thereof, use extraordinary care to see that no undue hardship or injustice results to any affected party, the community or State.

Class III Highways (Major Arteries)

1. Construction

   a. The State shall be responsible for the right of way and construction costs.

   b. The City shall be responsible for providing, without cost to the State: (1) all right of way which involves; (a) dedicated streets or alleys, and (b) other City-owned lands, subject to the condition that the State shall reimburse the City for the value of improvements situated on such other City-owned lands, and (2) a land-fill area for disposal of waste materials not incorporated in the project.

   c. The State shall be responsible for the costs of construction of longitudinal and outlet storm sewers in the proportion that the street right of way of the primary extension bears to the total drainage area served by the proposed sewers: The City will be responsible for the remainder of the costs, except that the total cost to the City for longitudinal storm sewers on any project shall not exceed three times the road use tax allocated to that city for the year the expenditures are expected to be made and which shall be designated in the preliminary resolution.

   d. The State shall be responsible for one half the right of way and construction costs of local service roads only when such local service roads are developed as a part of the initial construction of the through traffic lanes. The State share shall be determined on the basis of actual expenditures from public funds.

   e. The City shall be responsible for one half the cost of such local service roads in addition to the required participation for storm sewer work for the through traffic lanes.

   f. Unscheduled projects shall be considered for earlier action on their individual merits, taking into consideration the amount of city participation in addition to the above requirements.

2. Maintenance

   a. The State shall be responsible for the cost of maintenance of the primary road extension either by contract with the City or by its own forces in accordance with established maintenance procedures.

   b. Upon completion, local service roads shall become a part of the City street system.

3. Lighting

   a. The City shall be responsible for the installation and maintenance costs of lighting on Class III Highways on primary road extensions.

   b. At corporation line primary road junctions, the lighting shall be installed by the State in accordance with Highway Commission warrants. The State shall be responsible for the installation costs. The energy and maintenance costs shall be shared by the City and State in proportion to the number of luminaires in each jurisdiction as established by the corporation line. When and if the corporation line is extended to include any part of the lighting installation or a greater proportion of luminaires, the proportionate costs for maintenance and energy shall be redetermined on the basis of the number of luminaires in each jurisdiction as established by the new location of the corporation line.

   c. At rural type primary road extension junctions within the city or town, the lighting shall be installed by the City in accordance with the Highway Commission warrants. The State will reimburse the City for the installation costs. The City shall be responsible for the energy and maintenance costs.

   d. Lighting on rural-type junctions either within or adjacent to a city or town shall be based upon Highway Commission warrants and priority schedules.

   e. Intersection lighting projects either rural or municipal which are initiated by the City for earlier consideration and are not within the priority schedule as developed by the Highway Commission shall be considered on their individual merits taking into consideration the amount of city participation for the installation, maintenance, and energy costs in addition to the above cost requirements.

4. Traffic Signals

   a. All traffic signal installations shall meet the standards and volume warrants as established in the Iowa Manual on Uniform Traffic Control Devices.

   b. The State shall participate in the installation costs of new and modernized traffic signals on Class III Highway primary road extensions in the proportion which the entering traffic volume on the affected primary routes at the corporation line, or at the external corporation line, has to the total volume of vehicles

through the intersection to be signalized.

c. The City shall be responsible for the remainder of the installation costs and all of the maintenance and energy costs, shall award the contract, and shall supervise the installation.

d. The State shall participate in the cost of signals at public street intersections only and shall not participate in the cost for signals for pedestrian use only.

e. The signal phasing shall be coordinated between the State and the City.

Class IV Highways

1. Construction

a. The State shall be responsible for the right of way and construction costs.

b. The City shall be responsible for providing, without cost to the State: (1) all right of way which involves; (a) dedicated streets or alleys, and (b) other City-owned lands, subject to the condition that the State shall reimburse the City for the value of improvements situated on such other City-owned lands, and (2) a land-filled area for disposal of waste materials not incorporated in the project.

c. The State shall be responsible for the costs of construction of longitudinal and outlet storm sewers in the proportion that the street right of way of the primary extension bears to the total drainage area served by the proposed sewers. The City will be responsible for the remainder of the costs, except that the total cost to the City for longitudinal storm sewers on any project shall not exceed three times the road use tax allocated to that city for the year the expenditures are expected to be made and which will be designated in the preliminary resolution.

d. The State shall be responsible for one half of the right of way and construction costs of local service roads only when such local service roads are developed as a part of the initial construction of the through traffic lanes. The State share shall be determined on the basis of actual expenditures from public funds.

e. The City shall be responsible for one half the cost of such local service roads in addition to the participation required for storm sewer work for the through traffic lanes.

f. Unscheduled projects shall be considered for earlier action on their individual merits, taking into consideration the amount of city participation in addition to the above cost requirements.

2. Maintenance

a. The State shall be responsible for the cost of maintenance of the primary road extension either by contract with the City or by its own forces in accordance with established maintenance procedures.

b. Upon completion, local service roads shall become a part of the City street system.

3. Lighting

a. The City shall be responsible for the installation and maintenance of all lighting on Class IV Highways on primary road extensions.

b. At corporation line primary road junctions, the lighting shall be installed by the State in accordance with established warrants. The State shall be responsible for the installation costs. The energy and maintenance costs shall be shared by the City and the State in proportion to the number of luminaires in each jurisdiction as established by the corporation line. When and if the corporation line is extended to include any part of the lighting installation on a greater number of luminaires, the proportionate costs for maintenance and energy shall be redetermined on the basis of the number of luminaires in each jurisdiction as established by the new location of the corporation line.

c. At rural-type primary road extension junctions within the city or town, the lighting shall be installed by the City in accordance with Highway Commission warrants. The State will reimburse the City for the installation costs. The City shall be responsible for the energy and maintenance costs.

d. Lighting on rural-type junctions either within or adjacent to a city or town shall be based upon Highway Commission warrants and priority schedules.

e. Intersection lighting projects either rural or municipal initiated by the City for earlier consideration and not within the priority schedule as developed by the Highway Commission shall be considered on their individual merits, taking into consideration the amount of participation by the City for installation, maintenance, and energy costs in addition to the above cost requirements.

4. Traffic Signals

a. All traffic signal installations shall meet the standards and volume warrants as established by the Iowa Manual on Uniform Traffic Control Devices.

b. The State shall participate in the installation costs of new and modernized traffic signals on Class IV through highways in the proportion which the entering traffic volume on the affected primary routes at the corporation line, or at the external corporation line of cities with common corporation lines, has to the total volume of vehicles through the intersection.

c. The City shall be responsible for the remainder of the installation costs and all of the maintenance and energy costs, shall award the contract, and shall supervise the installation.

d. The State shall not participate in the signalization of Class IV primary road stub routes which terminate within the city or town. The State shall participate in the cost of signals at public street intersections only and shall not participate in the cost for signals for pedestrian use only.

e. The signal phasing shall be coordinated between the State and the City.

General

1. Signing

a. The State shall be responsible for all traffic control signing on all classes or primary road extensions except signs which regulate parking as to time, hours and days of the week.

b. The City shall be responsible for street name signs and any regulatory parking signs which denote special regulations as may be determined by the City in cooperation with the State.

c. The City shall be responsible for signs facing traffic on the primary road extensions which regulate traffic movements on city cross streets (one-way traffic).

d. The City shall cause the removal of all existing private signs and prevent the erection of any future private signs within the public right of way. Existing signs, awnings, marquees, etc., supported entirely outside the right of way but overhanging the right of way shall be allowed to remain where they do not interfere with sight distance and safety. No overhanging sign shall be allowed to remain where it interferes with signt distance and safety. No overhanging sign shall be permitted within two feet of the inside edge of the curb. Overhead "Business District" signs on primary road extensions may be permitted upon application by the City to the State providing for minimum clearance and mounting standards.

2. Sidewalks

a. The State shall replace all existing sidewalks when it is necessary to remove the sidewalks for construction.

b. The City will be responsible for maintenance (including snow removal) of all sidewalks and the area between the street curb and right of way line and/or freeway fence except where the Highway Commission has title to real property outside the right of way lines.

3. Utilities

a. Except as otherwise provided by Paragraph 3b, hereof, the City shall relocate, without cost to the State, all utilities necessary for construction when such utilities are within the existing street or alley right of way. The State will reimburse the owner of a utility which is located on private right of way for the costs of relocation or removal, including the costs of installation in a new location.

b. Sections 306A.10, Code of Iowa, authorizes the Highway Commission to pay the cost of relocation or removal, including the costs of installation in a new location, of such utilities within existing street right of way as shall be determined as necessary for the construction of a project on routes of the National Systems of Interstate and Defense Highways. No reimbursement shall be made for any relocation or removal of facilities under this division unless funds to be provided by federal aid amount to at least ninety percent of each reimbursement payment.

c. The term "utility" shall include all privately, publicly, municipally or cooperatively owned systems for supplying water, sewer, electric lights, street lights and traffic lights, gas power, telegraph, telephone, transit, pipeline, heating plants, railroads and bridges, or the like service to the public or any part thereof if such system be authorized by law to use the streets or highways for the location of its facilities.

4. Pedestrian Crossings (overpass)

a. When the pedestrian volumes and topographic conditions warrant the construction of a separation, the State shall pay fifty percent of the cost of construction.

5. Preliminary Resolution

a. As early as possible after an urban project is included in the Highway Commission Five-Year Construction Program, a planning report of the project shall be developed and shall be reviewed with the officials of a city or town. Prior to a public hearing, a preliminary resolution shall be submitted to the city officials which shall outline the general concepts of the project in regard to the number of traffic lanes, traffic signals and the maximum amount of city financial participation.

b. The resolution shall include sections that detail the parking and access control restrictions to be applied to the project.

6. Project Agreement

a. The Highway Commission will maintain a close liaison with the municipality during the development of the plan so all parties will be fully informed of the details involved in the proposed improvement.

b. When the plan is sufficiently complete to provide typical cross sections, plan and profile drawings and incidental details, the Highway Commission shall submit to the municipality a project agreement on approval of the plan for the project and consenting to the improvement in accordance with the plan. Terms for the reimbursement to the State of the local financial participation shall be stated in this agreement.

7. Reversions

When a primary road extension is to be reverted to the city or town

either by relocation or by elimination by agreement, the State shall make every effort to put the extension in good and sufficient condition "for the traffic thereon", prior to its removal from the system. The District Engineer and the City Engineer shall inspect the extension to determine what is necessary to place the extension in good condition. Upon request the State shall apply the estimated cost required to place the extension in good condition to an improvement project initiated by the City on the street.