

SCOTT/CLINTON/WOODLAWN

INTERSECTION REPORT

FOR

*125 W. Clinton*

CITY OF NAPOLEON

NAPOLEON, OHIO

FEBRUARY, 1991

Prepared by: Poggemeyer Design Group, Inc.

March 4, 1991

POGGEMEYER  
DESIGN GROUP

ARCHITECTS + ENGINEERS + PLANNERS

Mr. Terry Dunn  
City of Napoleon  
255 Riverview  
P.O. Box 151  
Napoleon, OH 43545

Re: Scott/Clinton/Woodlawn Intersection

Dear Mr. Dunn:

We are pleased to present herewith our report of the Scott/Clinton/Woodlawn Intersection. In this report, we discuss the existing condition of the pavement markings, signs and geometrics. We also present and analyze the existing traffic volumes along with their movements through the intersection. As part of our report we reviewed the interconnection to the Perry Street signal system which is to be funded and constructed with ODOT Funds.

Our results show that the intersection is adequate to handle the present traffic volumes. There is a need to upgrade signing, pavement markings and signals. Also our results show that this intersection can be connected to the Perry Street signal system.

It has been a pleasure to service the City of Napoleon and we look forward to working with you in the future. If you should have any questions pertaining to this report please advise.

Sincerely,

POGGEMEYER DESIGN GROUP, INC.

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REPORT  
for

SCOTT/CLINTON/WOODLAWN INTERSECTION  
NAPOLEON, OHIO

FEBRUARY, 1991

A. EXISTING CONDITIONS:

The existing geometrics, signing, pavement markings and signals are shown on the attached Dwg. 1/1. The signing, pavement markings and signals do not fully meet the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).

The present signing consists of "STOP HERE ON RED" signs on each approach. The sign is located in the proper position, adjacent to the approach stop bar. The OMUTCD also states that Lane-Use control signs are intended for use to control vehicle movements in specific lanes. Overhead signs are preferred but side mounted Lane-Use control signs may be used when overhead signs are not justified. As an example, signs in the CBD where there is congestion can be side mounted. Lane-Use signs are not required on the northwest and west approaches of Woodlawn and Clinton, respectively.

Pavement markings are used to supplement Lane-Use control signs. The present pavement markings are adequate with respect to types and sizes of words and arrows. Each approach has the following deficiencies:

Scott North Approach: Need an additional left turn arrow in the left lane and a thru/right arrow in the right lane. The channelizing line is 85' long and would need to be 90' long to accommodate the additional arrows.

Clinton East Approach: The arrows in each lane should be spread out. The distance between the arrows should be approximately 54'. The channelizing line is 100' and is adequate for the respaced arrows.

Scott South Approach: The spacing between arrows and words in the left turn lane and between arrows in the thru/right turn lane are inadequate. The spacing between the stop bar and the beginning of the arrows in each lane should be a minimum of 10'. The spacing between the arrow/word should be approximately 24'. The spacing between arrows should be approximately 54'. The channelizing line is 87' long and should be 90' long to accommodate the revised spacing.

Clinton West Approach: The approach width is approximately 16 1/2' which includes 8' wide parking stalls. This leaves only 8

The total cycle length will vary from approximately 55 seconds to 120 seconds.

Pedestrian movement control across each leg is handled in one of two ways, protected and unprotected. Pedestrians crossing the east approach of Clinton and South approach of Clinton are directed by pedestrian signals. Pedestrians crossing the North approach of Scott, west approach of Woodlawn and the west approach of Clinton do not have pedestrian signals. The pedestrian signals are push-button activated and only operate as follows:

- A. Clinton Street East Approach: The signals operate only during Phase D. The Walk indication is 12 seconds long followed by 10 seconds of flashing "Don't Walk". During all other Phases or when there is no call, the signal will indicate a steady "Don't Walk".
- B. Scott Street South Approach: The signals operate only during Phase C. The Walk indication is 10 seconds long followed by 10 seconds of flashing "Don't Walk". During all other phases or when there is no call, the signal will indicate a steady "Don't Walk".

The minimum time for pedestrians to cross these approaches are approximately 21 seconds and 19.25 seconds for the Clinton Street East Approach and Scott Street South Approach, respectively. These times reflect that the existing pedestrian timing is adequate.

B. INTERSECTION TRAFFIC:

On January 4, 1991, a field traffic count was taken by City of Napoleon personnel. The count was taken to record vehicular movements through the intersection (Figure #2, #3, #4, #5 and #6). Table #1 shows the Average Daily Traffic (ADT), Peak Hour Volume (PHV), and the Level of Service for each approach.

TABLE 1

<u>Approach</u>	<u>1991 ADT</u>	<u>% of Total Traffic</u>	<u>Peak Hour (1) Volume</u>	<u>Level of Service</u>
NORTH	4676	24.4	382	A
NORTHWEST	2971	15.5	241	B/C (2)
WEST	2444	12.7	217	C
SOUTH	4535	23.7	250	A
EAST	4544	23.7	373	A

1/2' for the eastbound through traffic lane. The total width of the street is 31'. The stop bar should be extended approximately 3 1/2' and a minimum 100' long channelizing line should be painted on the pavement. This would provide an 8' parking lane, 12' eastbound through lane and an 11' westbound lane.

Woodlawn Northwest Approach: The pavement markings are adequate on this approach.

The traffic signals meet the OMUTCD for size and orientation. The signal heads controlling thru/right turn vehicle movements on Northbound Scott and Southbound Scott do not require both the green ball and the green right-arrow indications. The green ball indication is all that is required to control vehicle movements in these lanes.

Present traffic control is accomplished with the signal heads as shown on Dwg. 1/1. The signals are activated by a Model DM800 located at the southeast corner. The controller is set to provide a fully actuated intersection system on each leg. The actuation is accomplished by loop detectors in each lane. The actuation is initiated by vehicle presence in the lane. The traffic controller stores the vehicle presence and directs which lane will receive the next green indication. Traffic movement through the intersection is in four phases as shown on Fig. 1 and as follows:

Phase A - Protected Left Turns from Scott to Clinton and Woodlawn

Phase B - Westbound Traffic from Clinton to North Scott and Woodlawn and Eastbound Traffic from Woodlawn

Phase C - Westbound Traffic from Clinton to South Scott and Clinton and Eastbound Traffic from Clinton

Phase D - Northbound and Southbound Traffic from Clinton

The traffic signal timing varies depending upon the number of vehicles entering each lane. It appears that the minimum time allotted to any lane is 6 seconds to 8 seconds. These minimum times are then extended as required by vehicle storage delay in starting into the intersection. The maximum signal timing occurs when each leg of the intersection is fully loaded. The maximum signal green time as timed by the City of Napoleon is as follows:

Phase A - 30 seconds

Phase B - 30 seconds

Phase C - 25 seconds

Phase D - 25 seconds

- Total intersection ADT = 19,170  
(1) Adjusted for Daily and Seasonal Factors  
(2) Operating between B and C

A signal warrant analysis, using the traffic counts was evaluated. The intersection meets:

- Warrant #1 - Minimum Vehicular Volume
- Warrant #9 - Four Hour Volumes
- Warrant #10 - Peak Hour Delay
- Warrant #11 - Peak Hour Volume

Table 1 shows that the intersection, as presently operated, operates with minimum delay during peak hour. The northwest and west approaches are operating at near Level of Service "C". The northwest approach (Woodlawn) handles traffic from residential areas and S.R. 24/S.R. 6 northwest of Napoleon. The west approach (Clinton) handles all residential areas. A Level of Service "C" is considered to be acceptable at intersections during peak hour. During off-peak hours these approaches operate at Level of Service "A" and "B".

As part of this study, we also reviewed the intersection relative to interconnecting with signals on Perry Street (S.R. 108). The Perry Street signals are to be upgraded with Hazard Elimination Funds (HES) from the Ohio Department of Transportation (ODOT). These signals have been designed with time-base coordination so that a vehicle may proceed through the intersections without stopping. A time-space diagram (Figure #8) has been developed to incorporate the Clinton/Scott/Woodlawn intersection into the Perry Street Signal System.

The proposed phasing system (Figure #9) shows the sequence of operation necessary to coordinate with the Perry Street Signal System. The difference between the present (Figure #1) and proposed phasing is elimination of full actuation during this operation. Figure #9 shows that the sequence will go from Phase A through Phase D with no switching back and forth between phases. At present the phasing could go from Phase A to B to A to C....etc.

The Clinton/Scott/Woodlawn intersection signal timing would need to be changed from its present fully actuated configuration during the 80 seconds cycle with time base coordination. The time-space diagram shows that traffic movement from southbound Scott to eastbound Clinton would be in the traffic flow band and would proceed through all the intersections. The westbound Clinton to either northbound Scott or northwestbound Woodlawn would have a short red period before they could advance. This can be compensated by the fact that vehicles going to northbound Scott may turn on red. The signal timing for the intersection would be as follows:

<u>Phase</u>	<u>Green</u>	<u>Yellow</u>	<u>Total Sec.</u>
A	12	4	16
B	17	4	21
C	16	4	20
D	19	4	<u>23</u>
		TOTAL	80 Seconds

This phasing also allows adequate time for pedestrian signals during Phases C and D.

### CONCLUSIONS AND RECOMMENDATIONS

The intersection is operating at a Level of Service A through C during peak hour traffic volume. If the City decides that this intersection is to be connected to the Perry Street traffic system, it is recommended that it be done only during peak hours. The peak hours as identified by the traffic count is from approximately 2:30 pm to 5:30 pm. This would allow the intersection to function as a fully actuated intersection during off-peak hours. The signals would continue to give the right of way to vehicles as demanded by their presence in the individual lanes and cut down on unnecessary delay during off peak hours.

The City has no way at this time to measure the effect of the new Perry Street Signal System. At present vehicles take short cuts because of the lack of time base coordination at existing signals. The City should monitor the traffic patterns after the Perry Street signal improvements to see if any change develops in driver behavior. If a change is noted, the possibility exists that the signal timing may require adjustment.

To improve the intersection to OMUTCD standards and connect the intersection into the Perry Street system, the following improvements are recommended.

1. Install a time base coordinator in the existing controller. This will convert the controller to be the same as the Perry Street system controllers. The estimated construction is \$2,000.00.
2. Install side mounted Lane-Use signs on the south, north and east approaches. The south and north signs would be R-31A signs. The east approach would need to be a special sign showing a double right turn arrow for the right lane. The estimated construction cost is \$800.00.
3. Remove and replace pavement markings as follows:
  - Scott North Approach: Remove/replace arrows and words. Extend channelizing line.
  - Clinton East Approach: Remove/replace arrows and words.

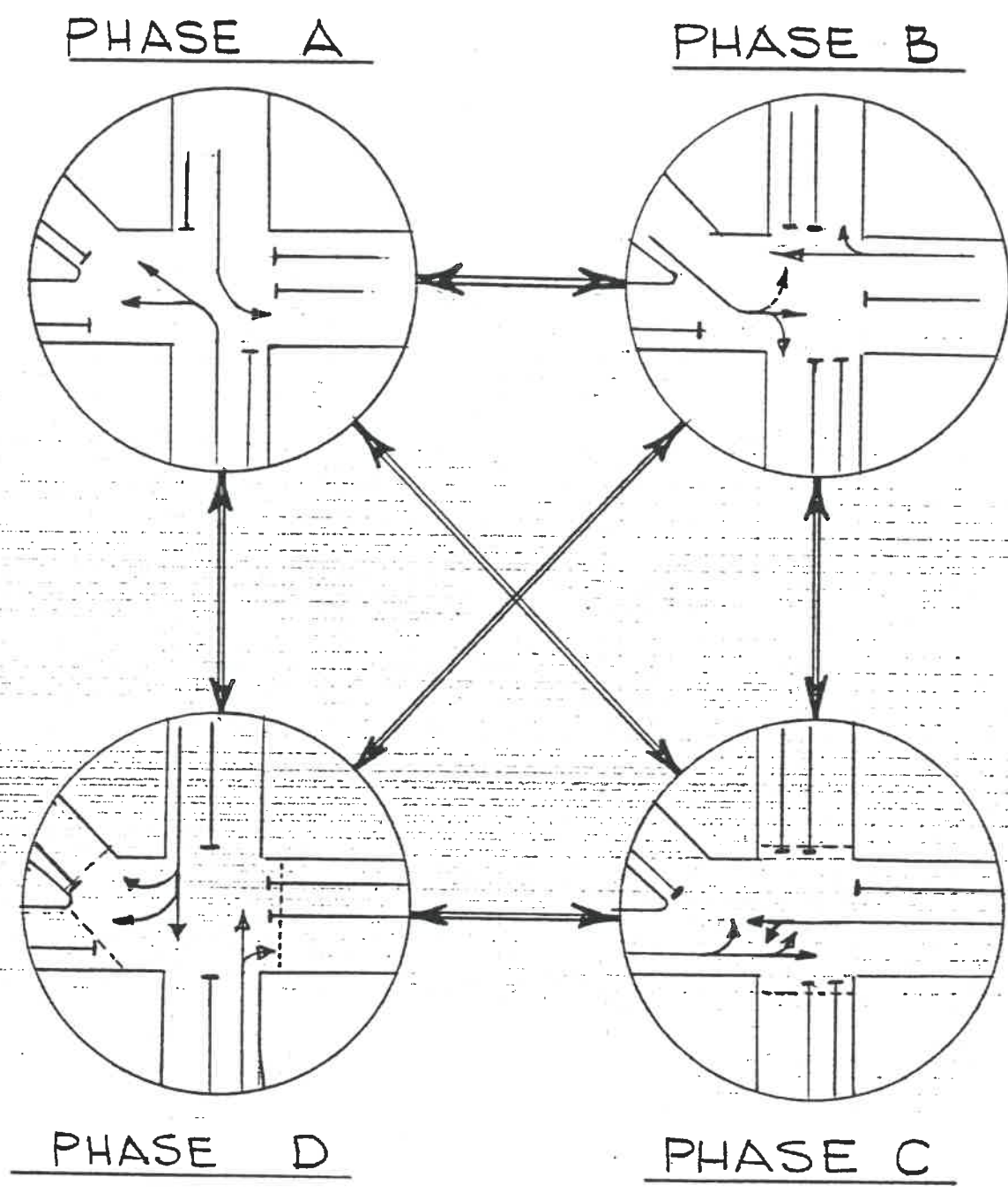


Scott South Approach: Remove/replace arrows and words. Extend channelizing line.

Clinton West Approach: Extend the stop bar approximately 3' and paint a channelizing line 100' long westward.

Estimated Construction Cost is \$4,000.00.

4. Remove the green right turn arrow signal face from the right lanes of North Scott Approach and the South Scott Approach. The estimated construction cost is \$800.00.
5. It was brought to our attention by Marc Gerken, P.E., City Engineer, that a proposed fast food restaurant was being planned for the southeast corner lot at Scott and Clinton Streets. Mr. Gerken asked that we review the plan (Figure #10) as it relates to traffic on Clinton Street. It is recommended that the westerly-most access drive closest to Scott Street be made a one-way exit. Based upon its relative close proximity to the intersection, there would be too many conflicts if the vehicle were allowed to enter off Clinton Street. Also, it is recommended that any vehicle exiting be required to turn right-only. This can be accomplished with a right turn only sign at the exit.



EXISTING PHASES  
SCOTT / CLINTON / WOODLAWN  
NAPOLEON, OHIO

FIGURE # 1

# VEHICULAR TRAFFIC AT THE INTERSECTION OF CLINTON / SCOTT / WOODLAWN - NAPOLEON, OHIO S.R. 108

TYPE VEHICLES OBSERVED

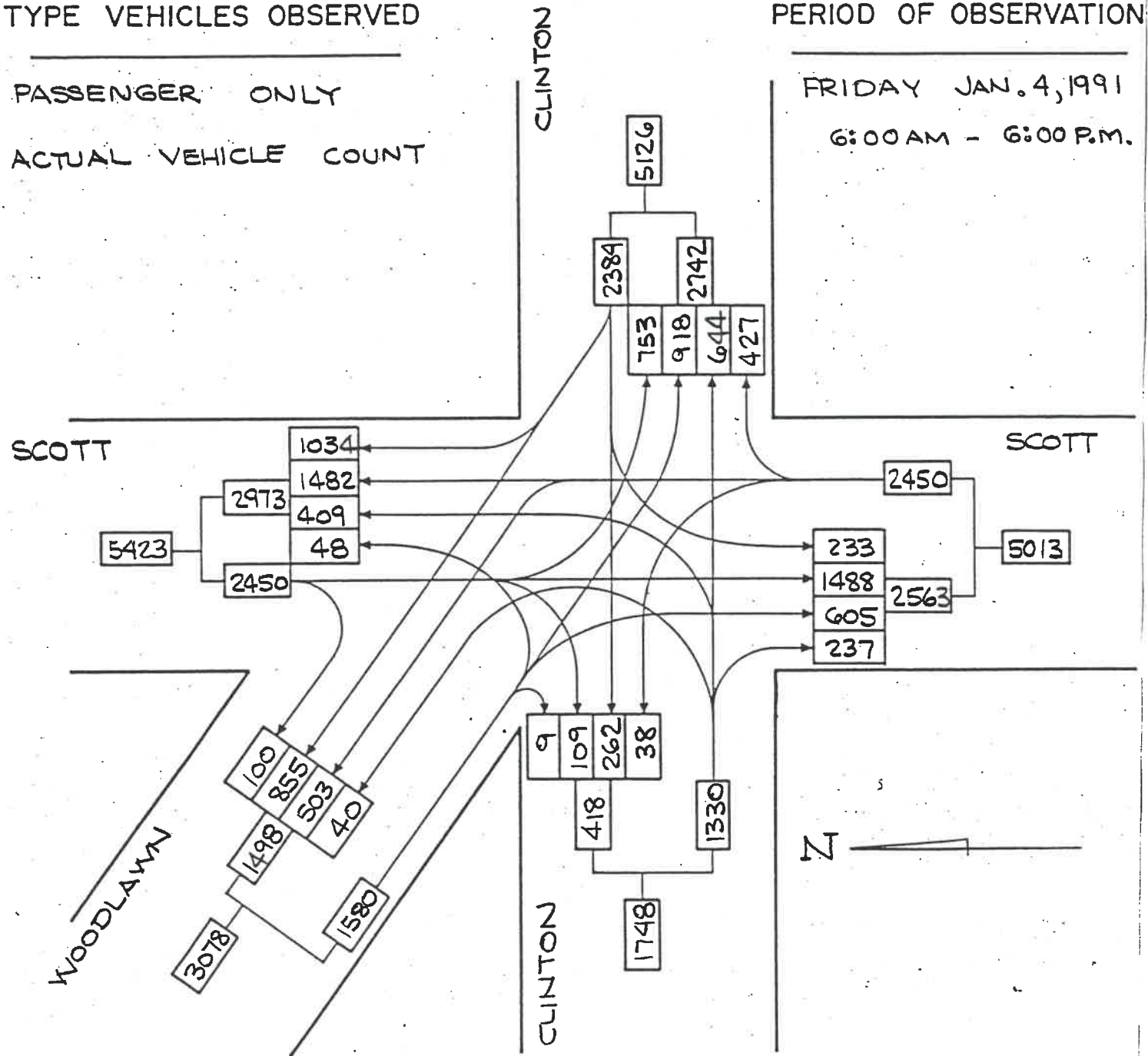
PERIOD OF OBSERVATION

PASSENGER ONLY

FRIDAY JAN. 4, 1991

ACTUAL VEHICLE COUNT

6:00 AM - 6:00 P.M.



SOURCE OF INFORMATION -  
OHIO DEPARTMENT OF TRANSPORTATION

FIGURE # 3

# VEHICULAR TRAFFIC AT THE INTERSECTION OF CLINTON / SCOTT / WOODLAWN

- NAPOLEON, OHIO

S.R. 108

TYPE VEHICLES OBSERVED

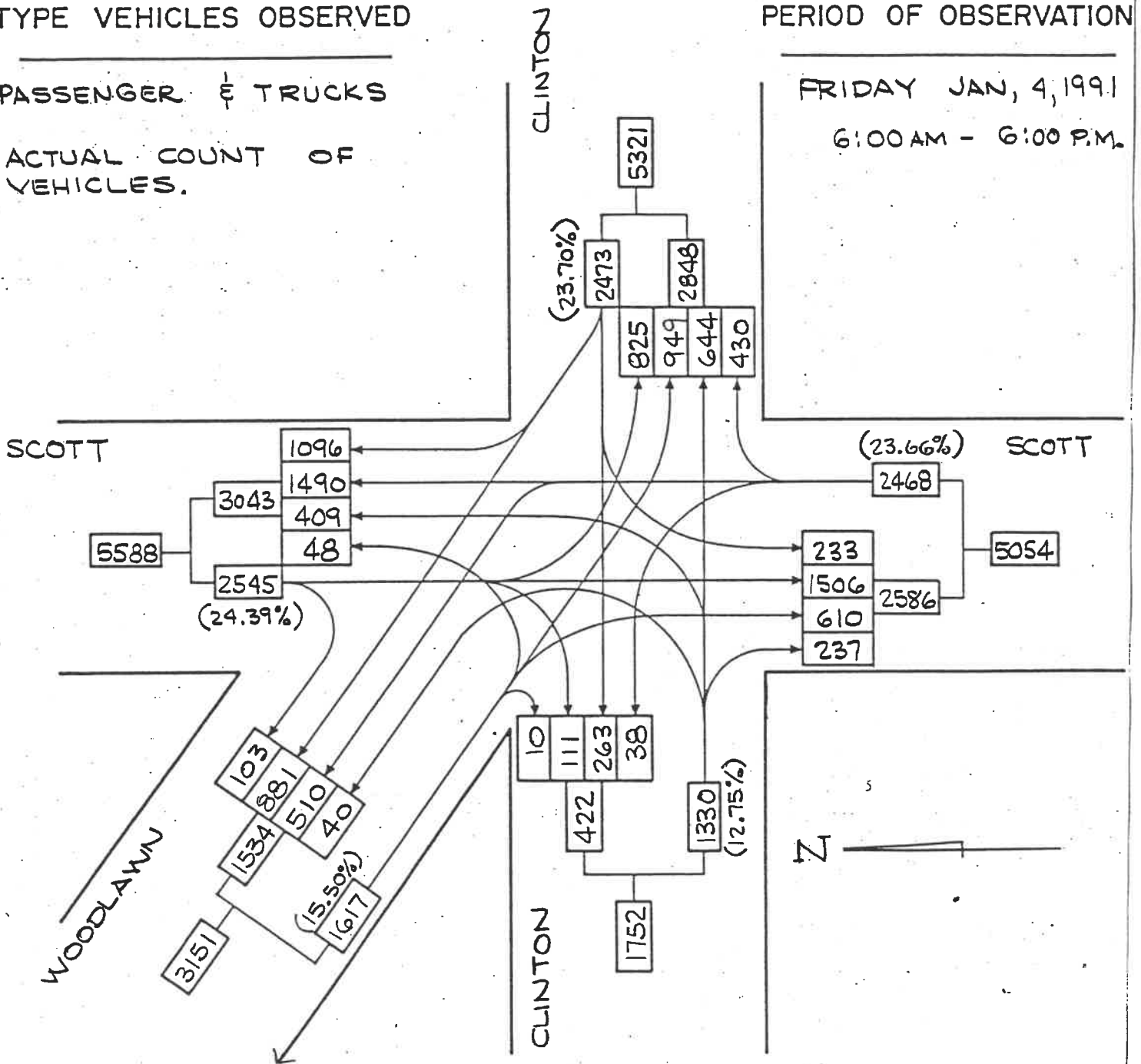
PERIOD OF OBSERVATION

PASSENGER & TRUCKS

FRIDAY JAN, 4, 1991

ACTUAL COUNT OF VEHICLES.

6:00 AM - 6:00 P.M.



SOURCE OF INFORMATION -  
OHIO DEPARTMENT OF TRANSPORTATION

FIGURE # 2

# VEHICULAR TRAFFIC AT THE INTERSECTION OF CLINTON / SCOTT / WOODLAWN - NAPOLEON, OHIO S.R. 108

TYPE VEHICLES OBSERVED

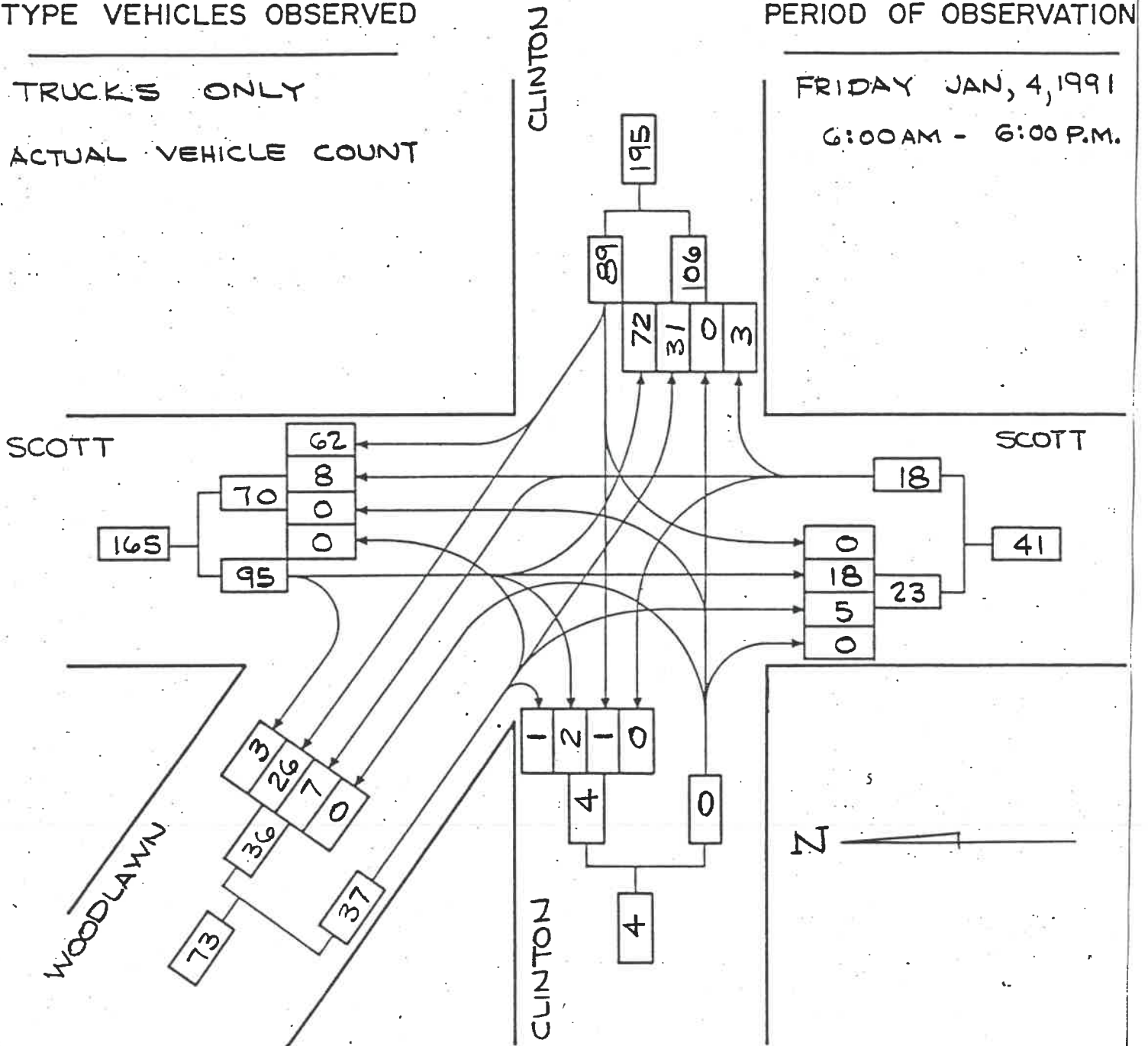
PERIOD OF OBSERVATION

TRUCKS ONLY

FRIDAY JAN, 4, 1991

ACTUAL VEHICLE COUNT

6:00 AM - 6:00 P.M.



SOURCE OF INFORMATION -  
OHIO DEPARTMENT OF TRANSPORTATION

FIGURE # 4



# VEHICULAR TRAFFIC AT THE INTERSECTION OF CLINTON / SCOTT / WOODLAWN - NAPOLEON, OHIO S.R. 108

TYPE VEHICLES OBSERVED

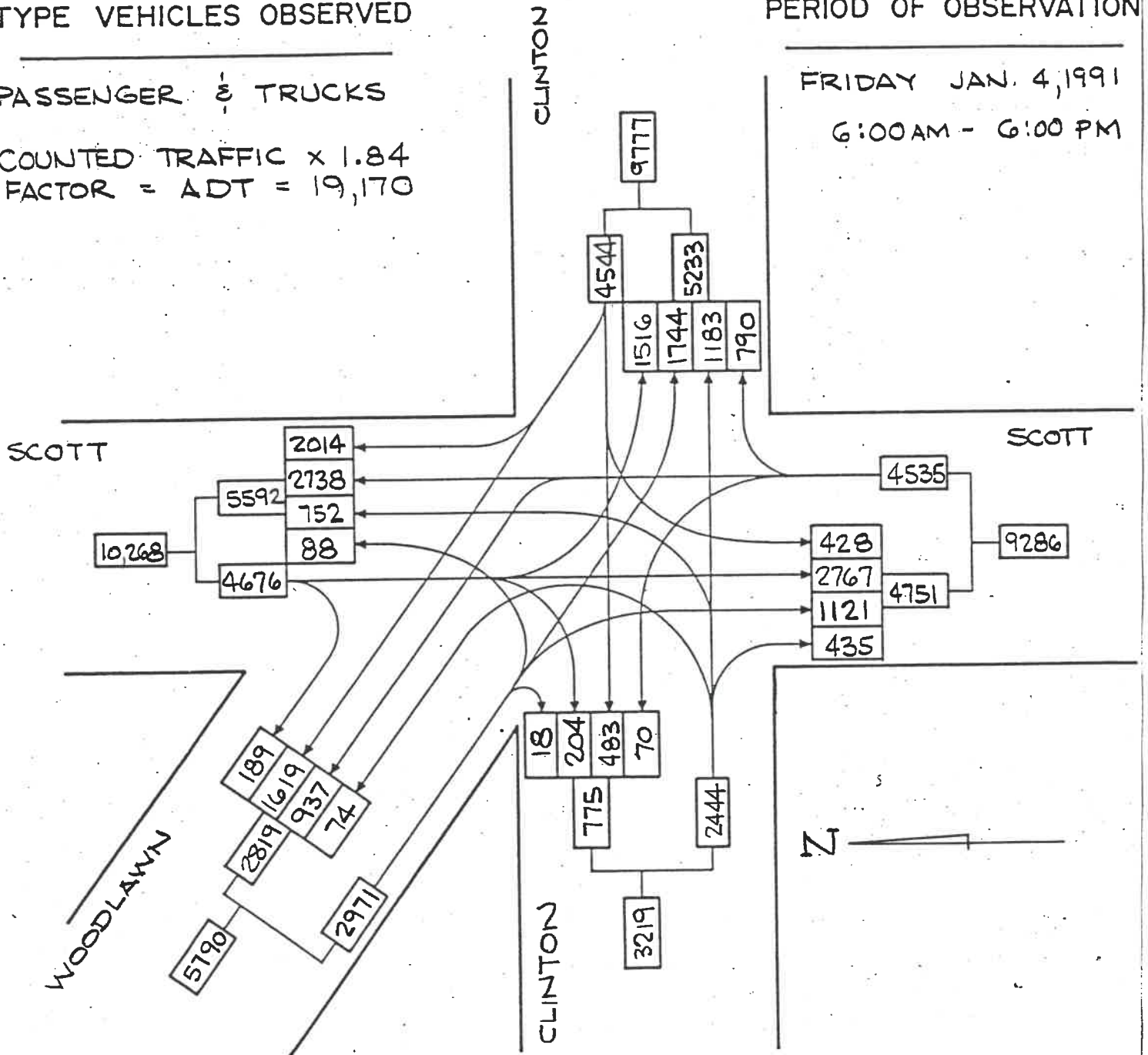
PASSENGER & TRUCKS

COUNTED TRAFFIC x 1.84  
FACTOR = ADT = 19,170

PERIOD OF OBSERVATION

FRIDAY JAN. 4, 1991

6:00 AM - 6:00 PM



SOURCE OF INFORMATION -  
OHIO DEPARTMENT OF TRANSPORTATION

FIGURE # 5

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POGEMEYER DESIGN GROUP, INC.  
ENGINEERS ARCHITECTS PLANNERS  
121 E. WOOSTER STREET BOWLING GREEN, OHIO 43402  
201 E. SECOND STREET. DEFIANCE, OHIO 43512

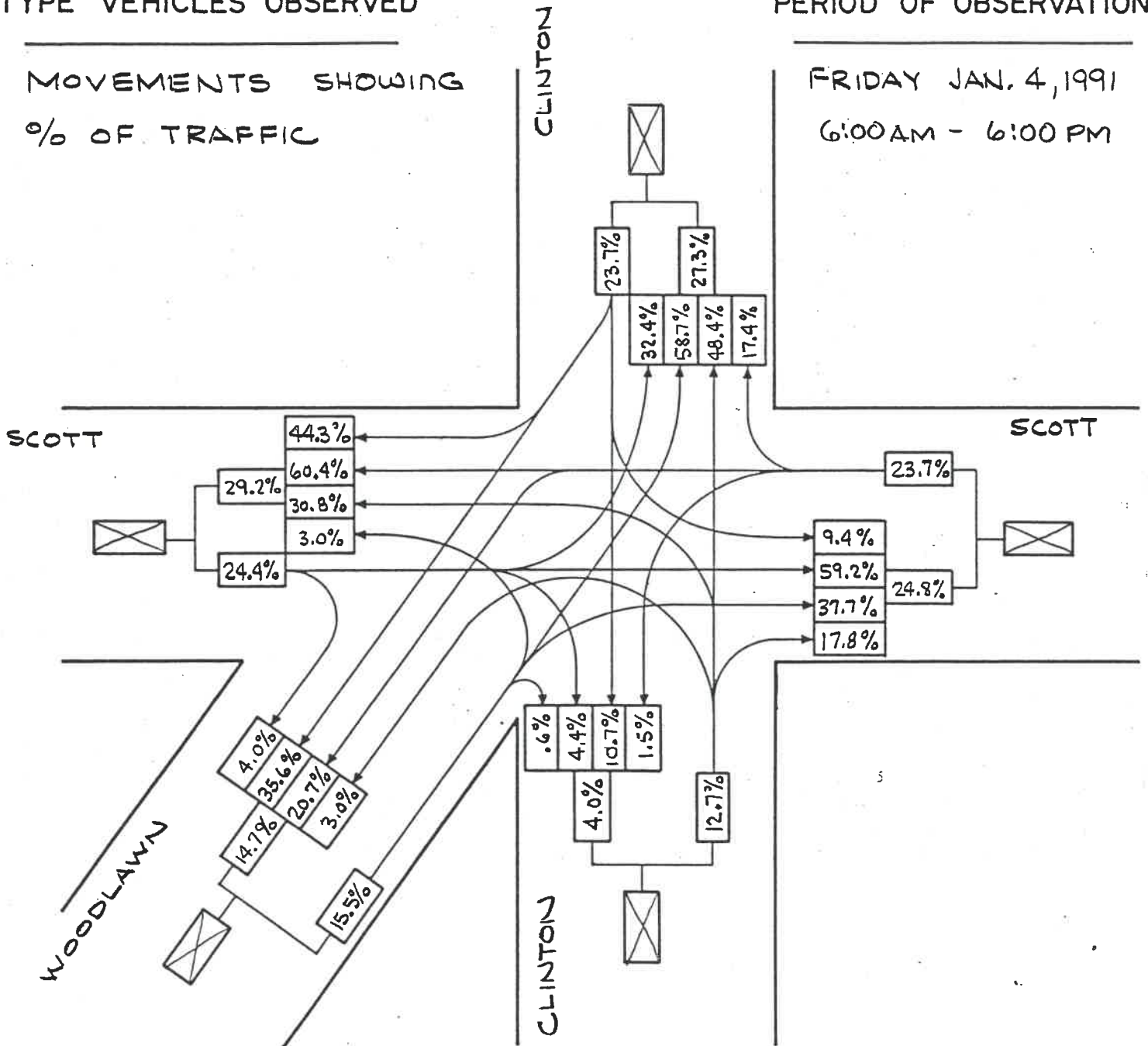
# VEHICULAR TRAFFIC AT THE INTERSECTION OF CLINTON / SCOTT / WOODLAWN - NAPOLEON, OHIO SR 108

TYPE VEHICLES OBSERVED

PERIOD OF OBSERVATION

MOVEMENTS SHOWING  
% OF TRAFFIC

FRIDAY JAN. 4, 1991  
6:00 AM - 6:00 PM



SOURCE OF INFORMATION -  
OHIO DEPARTMENT OF TRANSPORTATION

FIGURE # 6



**POGEMEYER DESIGN GROUP, INC.**  
ENGINEERS ARCHITECTS PLANNERS  
121 E. WOOSTER STREET BOWLING GREEN, OHIO 43402  
201 E. SECOND STREET DEFIANCE, OHIO 43512

# SIGNAL WARRANT

INTERSECTION: SCOTT / CLINTON / WOODLAWN  
 LOCATED IN CITY / VILLAGE / RURAL: NAPOLÉON  
 NO. OF LANES PER APPROACH: N: 2 S: 2 E: 2 W: 1 N.W. 1  
 PRESENTLY SIGNALIZED? YES-NO: YES DOES 70% WARRANT APPLY? YES  
 MAINTAINING AGENCY: CITY OF NAPOLÉON

CO: HEAVY RTE 108 SECT:  
 CONSULTANT: POGGEMEYER  
 CALC BY: REW C.D. BY: —

ADDITIONAL ITEMS ATTACHED

SKETCH OR DRAWING: \_\_\_\_\_  
 VEHICULAR VOLUME COUNT: \_\_\_\_\_  
 TRAFFIC PROJECTION: \_\_\_\_\_  
 ACCIDENT DATA: \_\_\_\_\_  
 PEDESTRIAN COUNT: \_\_\_\_\_  
 GAP ANALYSIS: \_\_\_\_\_

SPEED DATA: \_\_\_\_\_  
 DELAY ANALYSIS: \_\_\_\_\_  
 TIME/SPACE DIAGRAM: \_\_\_\_\_  
 GROUND PHOTOGRAPHS: \_\_\_\_\_  
 AERIAL PHOTOGRAPHS: \_\_\_\_\_  
 DOCUMENTATION / EXPLANATION: \_\_\_\_\_

OTHER (DESCRIBE): \_\_\_\_\_

COND. NO. TYPICAL LANE	ADJUSTED HOURLY VOLUMES				WARRANT # 1			WARRANT # 2			WARRANT # 3		
	MAJOR ST 2-WAY	MINOR 1-WAY	MINOR 1-WAY	MINOR 1-WAY	100% MAJ MIN	80% MAJ MIN	100% MAJ MIN	80% MAJ MIN	100% MAJ MIN	80% MAJ MIN	100% VEH/PEP	80% VEH/PEP	
	1	2	1	1	500 300	400 200	750 450	600 300	750 450	600 300	600 300	400 200	
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WARRANT # 4 (SCHOOL CROSSING)  
 On approved school route? ..... YES -  NO -   
 Gap analysis made during period from \_\_\_\_\_ to \_\_\_\_\_  
 Number of vehicles during analysis period: .....  
 Pedestrian crossing time (t): .....  
 Number of gaps greater than (t) during period: .....  
 Approximate vehicular speed: .....  
 Number of children crossing during period: .....  
 Warrant Satisfied? ..... YES -  NO -

WARRANT # 5 (PROGRESSIVE MOVEMENT)  
 Major street is: ..... ONE WAY - TWO WAY  
 Distance to nearest signal in each direction on major street: \_\_\_\_\_ and \_\_\_\_\_  
 Time space diagram (attached) shows that this location can be implemented into a system: ..... YES -  NO -

Warrant Satisfied? ..... YES -  NO -

WARRANT # 6 (ACCIDENT HAZARD)  
 Adequate trial of less restrictive measures: ..... YES -  NO -   
 Number of accidents per year of a type which could be prevented by signalization: .....  
 80% of warrant #1 or #2 satisfied: ..... YES -  NO -   
 Will signalization disrupt progressive movement? ..... YES -  NO -   
 Warrant Satisfied? ..... YES -  NO -

WARRANT # 7 (SYSTEMS)  
 Both streets are considered major routes: ..... YES -  NO -   
 At least 800 V.P.H. during weekday peak hour: ..... YES -  NO -   
 At least 800 V.P.H. for any 5 hours on a Saturday or Sunday: ..... YES -  NO -   
 Warrant Satisfied? ..... YES -  NO -

WARRANT # 8 (COMBINATION)  
 Warrants numbered \_\_\_\_\_ and \_\_\_\_\_ are each met of the 80% level: ..... YES -  NO -

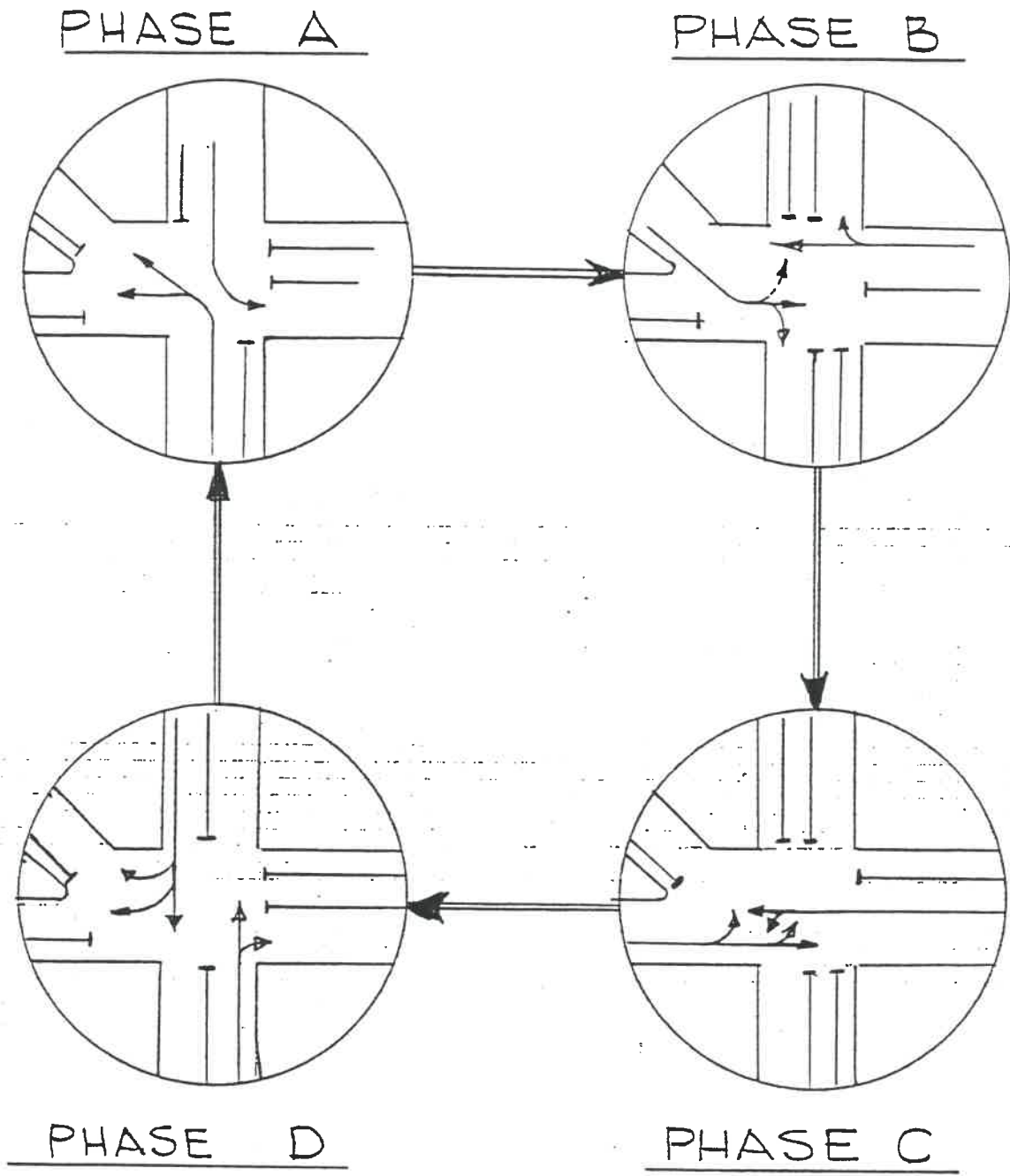
WARRANT # 9 YES  
 WARRANT # 10 YES  
 WARRANT # 11 YES

Actual Traffic Count X 1.23 FACTOR  
 Factor is for Daily and Seasonal  
 Fluctuations

D.S. Form S-1

FIGURE # 7





PROPOSED PEAK HOUR PHASES  
SCOTT / CLINTON / WOODLAWN  
NAPOLEON OHIO

FIGURE # 9