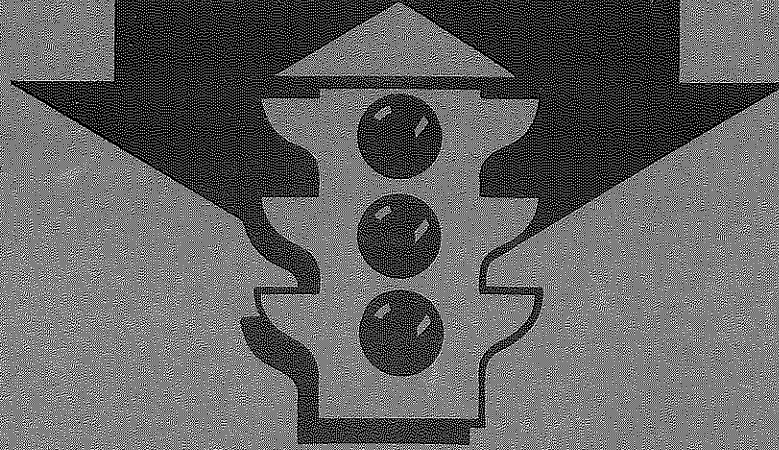


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**PROPOSED**

**TRAFFIC  
SIGNAL  
IMPROVEMENTS**



**U.S. - 10 (WOODWARD AVENUE)  
IN THE CITIES OF  
FERNDAL, PLEASANT RIDGE  
AND ROYAL OAK**

**MICHIGAN STATE HIGHWAY DEPARTMENT  
Charles M. Ziegler - State Highway Commissioner**



CHARLES M. ZIEGLER  
STATE HIGHWAY COMMISSIONER  
LANSING, MICHIGAN

April 29, 1946

The Honorable Mayor and City Commission  
City of Ferndale  
Ferndale, Michigan

Gentlemen:

At the request of the City of Ferndale the Michigan State Highway Department has studied traffic conditions on U. S. 10 (Woodward Avenue) in Ferndale, Pleasant Ridge and north to Washington Avenue in the City of Royal Oak.

I am transmitting herewith for your consideration the report of this study with recommendations.

Very truly yours,

*Charles M. Ziegler*

STATE HIGHWAY COMMISSIONER

CMZ:gw

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
Charles M. Ziegler  
State Highway Commissioner

PROPOSED TRAFFIC SIGNAL IMPROVEMENTS  
US-10 (WOODWARD AVENUE)  
IN THE CITIES OF  
FERNDALE, PLEASANT RIDGE AND ROYAL OAK

Prepared By Planning & Traffic Division

April, 1946

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PROPOSED TRAFFIC SIGNAL IMPROVEMENTS  
US-10 (WOODWARD AVENUE)  
IN THE CITIES OF  
FERNDALE, PLEASANT RIDGE AND ROYAL OAK

INTRODUCTION

This report presents the results of a study of traffic movements on and adjacent to Woodward Avenue (US-10) in the municipalities of Ferndale, Pleasant Ridge and Royal Oak. It describes the nature and characteristics of these movements and recommends measures for controlling them.

The study was undertaken at the request of the City of Ferndale which asked the aid of the State Highway Department in finding and correcting the causes of traffic disruption and disorganization on Woodward Avenue, which is its principal business and transportation artery. Since the conditions complained of were not confined to Ferndale, the area of study was extended to include the section of Woodward Avenue from Eight Mile Road (M-102) north to Washington Avenue in Royal Oak.

Traffic Engineers of the Department have made a comprehensive survey and analysis of traffic and traffic facilities. Although correction of traffic flow in this area involves other factors, this report deals only with measures for the improvement of traffic control equipment and operation.

EXISTING CONDITIONS

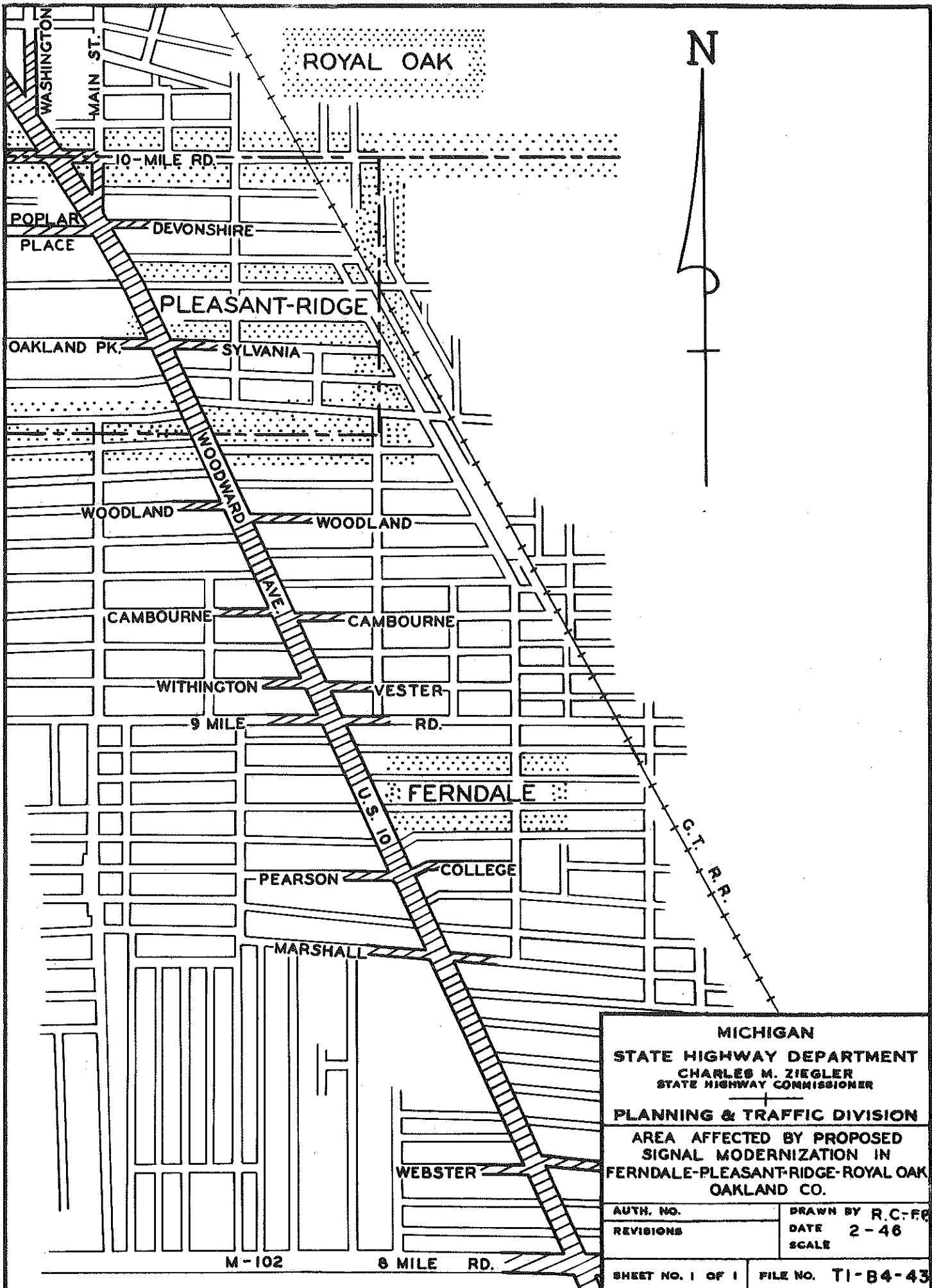
The pattern of streets and highways in the North Woodward area makes it difficult to secure efficient traffic flow. The

angle at which Woodward Avenue crosses the local street systems creates bad turning and crossing conditions at each intersection. The abutting streets are often offset from each other east and west of Woodward and this, together with their angle of crossing this artery, makes protective control for pedestrians hard to obtain. Moreover the irregular spacing of intersections raises difficulties in producing a consistent flow band for traffic control. (See Figure 1)

The existing traffic signal equipment on this section of Woodward Avenue was installed approximately twelve years ago. From Webster to Washington Avenue there are 11 semi-actuated signals supervised by 2 master controllers. The signals are inter-connected from Webster to Woodland and from Sylvan to Washington. The intervening 1900-foot gap from Woodland to Sylvan is not physically connected and this adversely affects any attempt to provide efficient progression on Woodward Avenue.

The signals at Eight Mile Road are controlled by full-actuated equipment which automatically gives the right-of-way to the street having the most vehicular traffic.

The present traffic signal equipment, in addition to being obsolete, is now practically worn out. The detectors in the pavement require constant repair and replacement. When in operating condition the system will produce a progression of traffic when volumes are low, but much of the traffic movement on Woodward is extremely heavy. In addition, shifts in population caused by the war have greatly increased the usage of most



<b>MICHIGAN</b> <b>STATE HIGHWAY DEPARTMENT</b> CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
<b>PLANNING &amp; TRAFFIC DIVISION</b> AREA AFFECTED BY PROPOSED SIGNAL MODERNIZATION IN FERNDAL-PLEASANT-RIDGE-ROYAL OAK OAKLAND CO.	
AUTH. NO.	DRAWN BY R.C.F.F.
REVISIONS	DATE 2-46
	SCALE
SHEET NO. 1 OF 1	FILE NO. T1-B4-43

FIG. 1

of the side streets where detectors are located. (See Figures 2 and 3)

As a result of all these causes and conditions, the local controllers are not adequate to provide the access needed from the side streets and at the same time provide a reasonable progression on Woodward Avenue.

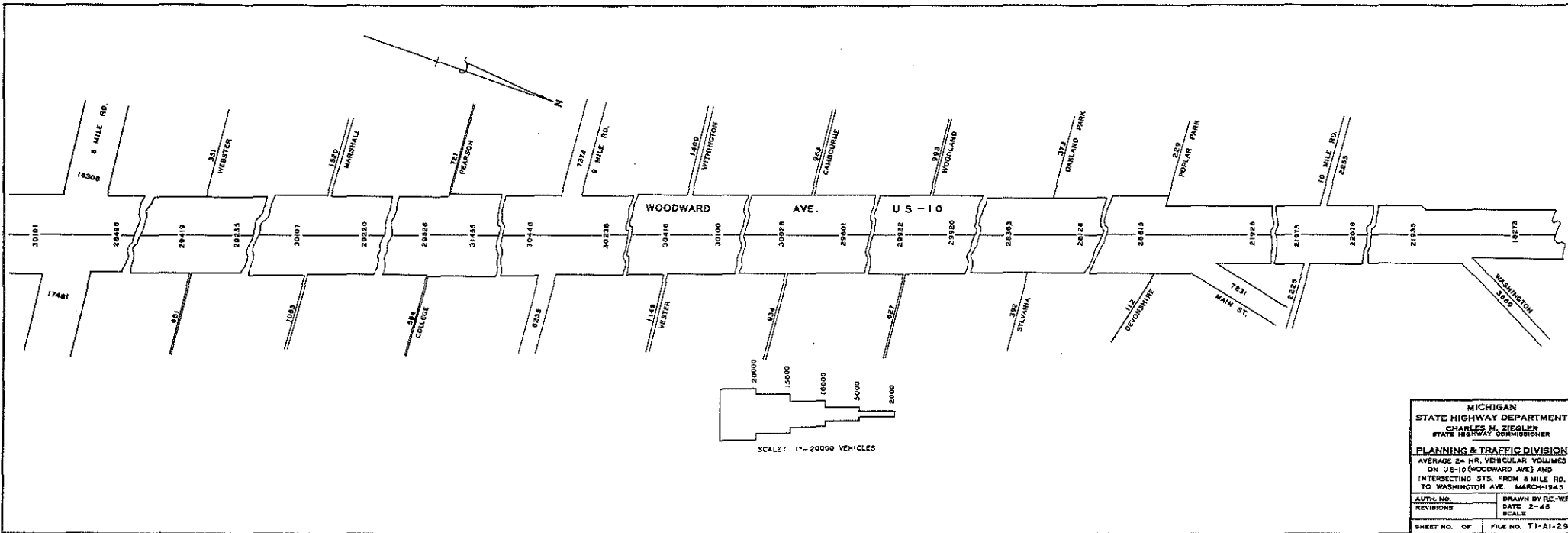
#### TRAFFIC SURVEYS AND STREET INVENTORY

In order to select the needed traffic control measures, a survey was made of each of the signalized intersections on Woodward Avenue from Eight Mile Road to and including Washington Avenue. This survey was made during March 1945, and consisted of the following:

1. Hourly directional 24-hour counts of vehicular volumes at 4 locations on Eight Mile Road east and west of Woodward Avenue, and at 48 locations on Woodward Avenue east and west of the following intersecting arteries: Webster, Marshall, College-Pearson, Nine Mile Road, Vester-Withington, Canbourne, Woodland, Sylvan-Oak Park, Main, Ten Mile Road, and Washington Avenue.
2. 24-hour vehicular counts at 20 stations east and west of Woodward on the following side streets: Webster, Marshall, College-Pearson, Nine Mile Road, Vester-Withington, Canbourne, Woodland, Sylvan-Oak Park, Devonshire-Poplar







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**PLANNING & TRAFFIC DIVISION**  
 AVERAGE 24 HR. VEHICULAR VOLUMES  
 ON U.S. 10 (WOODWARD AVE.) AND  
 INTERSECTING STS. FROM 8 MILE RD.  
 TO WASHINGTON AVE. MARCH-1945

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FIG. 3

Park and Ten Mile Road and on Main Street and Washington Avenue north of Woodward.

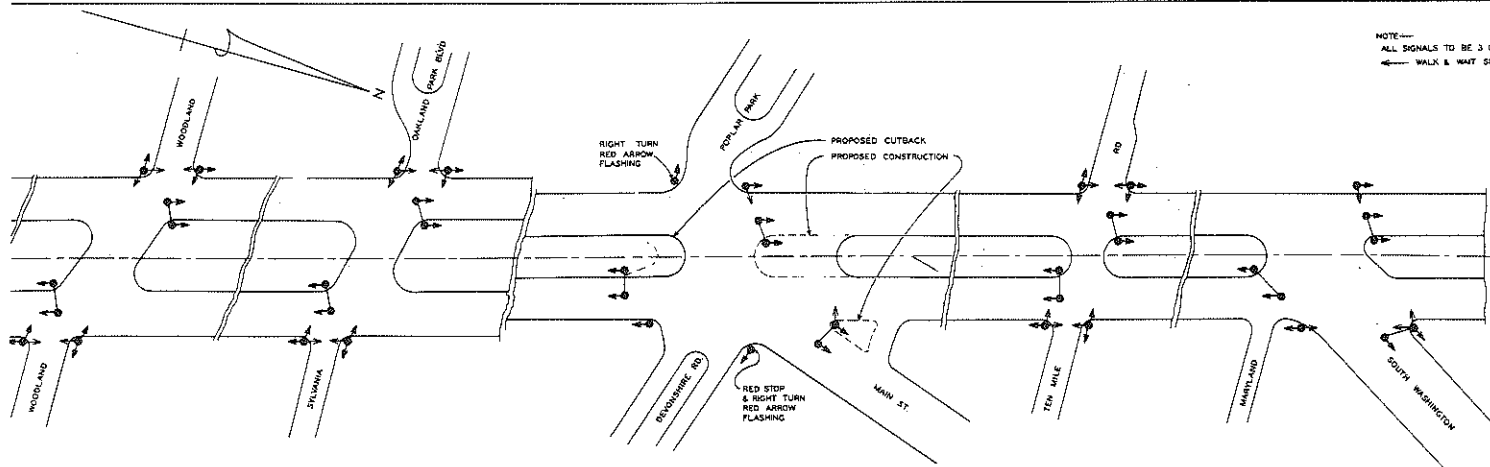
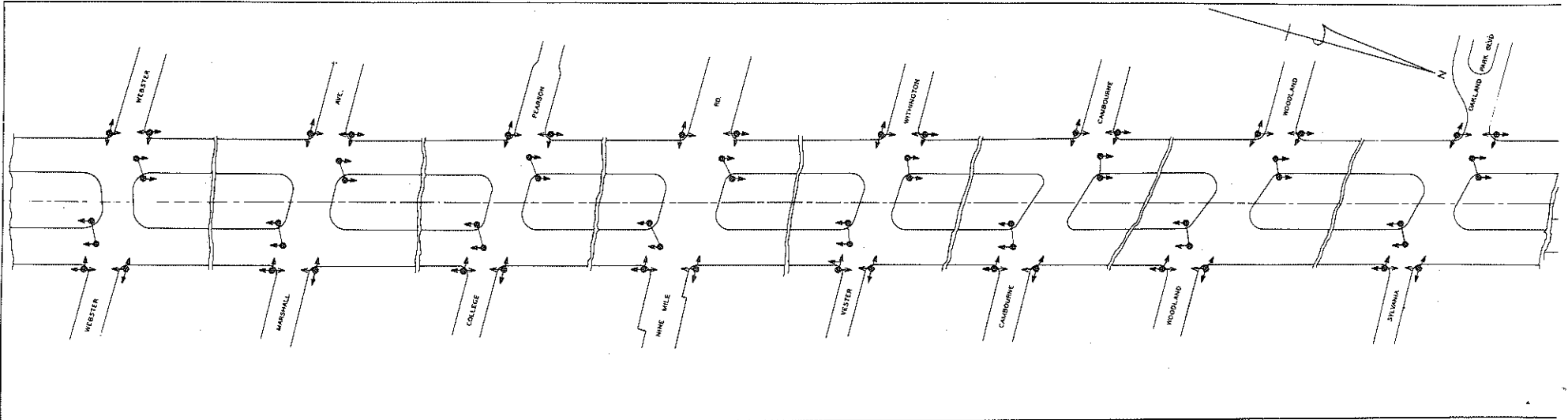
3. Vehicular turning movement counts (taken from 6:00 to 9:00 A.M. and from 3:30 to 7:00 P.M.) at the following 12 intersections with Woodward Avenue: Eight Mile Road, Webster, Marshall, College-Pearson, Nine Mile Road, Vester-Withington, Canbourne, Woodland, Sylvan, Main-Devonshire-Poplar Park, Ten Mile Road and Washington Avenue.
4. Pedestrian turning movement count at the intersection of Woodward Avenue and Nine Mile Road (taken from 6:00 to 9:00 A.M. and from 3:30 to 7:00 P.M.).
5. A vehicular speed study on southbound Woodward Avenue at the cemetery in Ferndale.
6. A road inventory along Woodward Avenue which obtained the following data:
  - a. Linear distances from Eight Mile Road to Washington Avenue showing distance to each intersection for both northbound and southbound lanes.
  - b. Road widths, including divider strips, on Woodward Avenue and the side streets.
  - c. Existing signal equipment facilities.

In addition to the above phases of the survey, observations and studies were made of parking conditions in the Eight Mile Road and Nine Mile Road sectors.

#### RECOMMENDATIONS FOR MOVEMENT ON WOODWARD AVENUE (US-10)

On the basis of a careful analysis of the data gathered in the surveys, it is recommended that a new and fully flexible progressive system of signalization be adopted and installed to replace the obsolete and worn equipment now in use. (See Figure 4) The recommended form of signalization is selected to provide the following features:

1. Continuous controlled movement of traffic to full undelayed groups of vehicles on Woodward Avenue (US-10).
2. Right-of-way to peak directional traffic at predetermined times.
3. Individual control units at each intersection which can be adjusted for maximum efficiency based on the requirements of the intersection and the main thoroughfare (Woodward Avenue).
4. Compensation for the unequal distances between existing signalized intersections can be made easier than in other types of systems; this feature is vital in the elimination of congestion in areas where some city blocks are longer than others.



NOTE—  
 ALL SIGNALS TO BE 3 COLOR EXCEPT AS NOTED  
 ← WALK & WAIT SIGNALS

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PROPOSED SIGNAL MODERNIZATION  
 FERNDALE PLEASANT-RIDGE & ROYAL OAK  
 FROM WEBSTER ST. TO S. WASHINGTON  
 U.S.-10 WOODWARD AVE. OAKLAND CO.

AUTH. NO.	DRAWN BY R.C.-R.R.
REVISIONS	DATE 2-46
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FIG. 4

5. Control and discouragement of speeding inasmuch as a vehicle travelling faster than the predetermined progression will be forced to make stops at most intersections. Such stoppages now occur on Woodward Avenue, but this condition is not necessarily caused by speeding, but by the combination of obsolete and worn equipment, the physical characteristics of the connecting side streets and changes in traffic pattern.
6. A further advantage of the recommended system is that signals can be added between existing installations or at either extremity without necessarily decreasing the efficiency of the progression. This long range viewpoint should not be overlooked in municipal signalization.

Movement on side streets in the area is closely related to that on Woodward Avenue. Any confusion or congestion on the latter can be laid directly or indirectly to the efficiency of the traffic movement as a whole. If it becomes necessary to add signals on city streets on either side of Woodward Avenue, these signals should be installed to provide side street progression coordinated with the proposed Woodward system.

## PROPOSED RATES OF TRAFFIC PROGRESSION

The traffic characteristics of Woodward Avenue as analyzed from the traffic survey, clearly pointed out the need for signal equipment which would effectively handle the vehicular volumes at the peak periods and also normal fluctuations.

As shown on Figure 3, the average 24-hour volumes on Woodward Avenue are considerably higher than the highest cross street traffic volumes. The total volumes on Main Street (7831/24 hours) exceeds that of any other intersectional road leg. The volumes on each leg of Nine Mile Road east and west of Woodward Avenue ranked next in total volumes.

Although there has been an increase in the total volumes, both on Woodward Avenue and the adjoining streets since these volumes were recorded in March 1945 due to the end of gasoline rationing, this increase is probably proportional to the ratio of volumes as shown on Figure 2.

The distribution and vehicular turning movement characteristics of the traffic on this section of road are shown on Figures 2 and 5. Based on this information and the existing time schedule of the present control, we recommend that at least three bands of signal timing be used on Woodward Avenue to expedite and handle these volumes. We recommend that the timing be set to accommodate the southbound peak period from 5:30 to 9:30 A.M.; (See Figure 6) the northbound peak from 3:30 to 7:30 P.M. (Figure 7) and that normal operation insuring equal progression (both northbound and southbound traffic) be

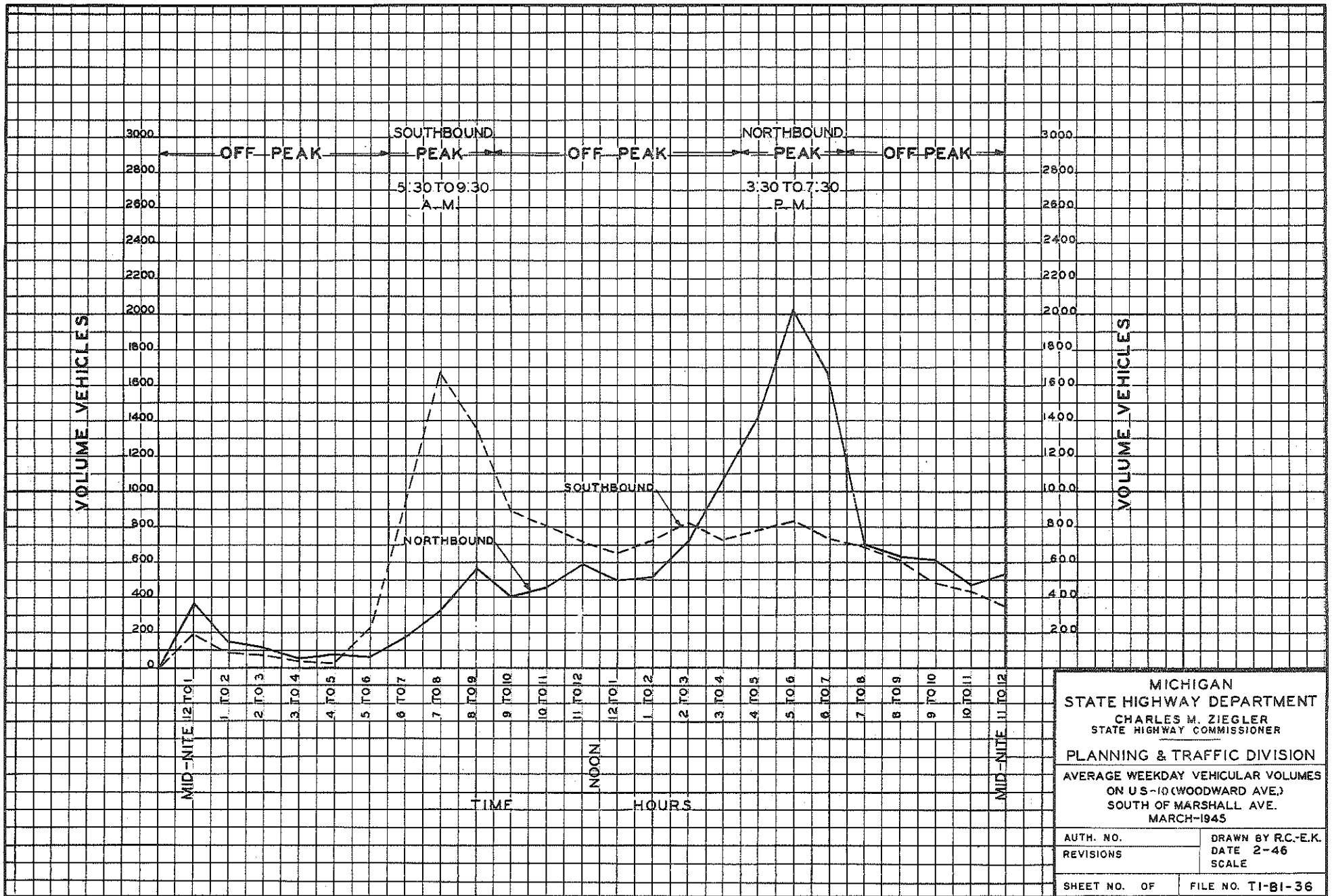
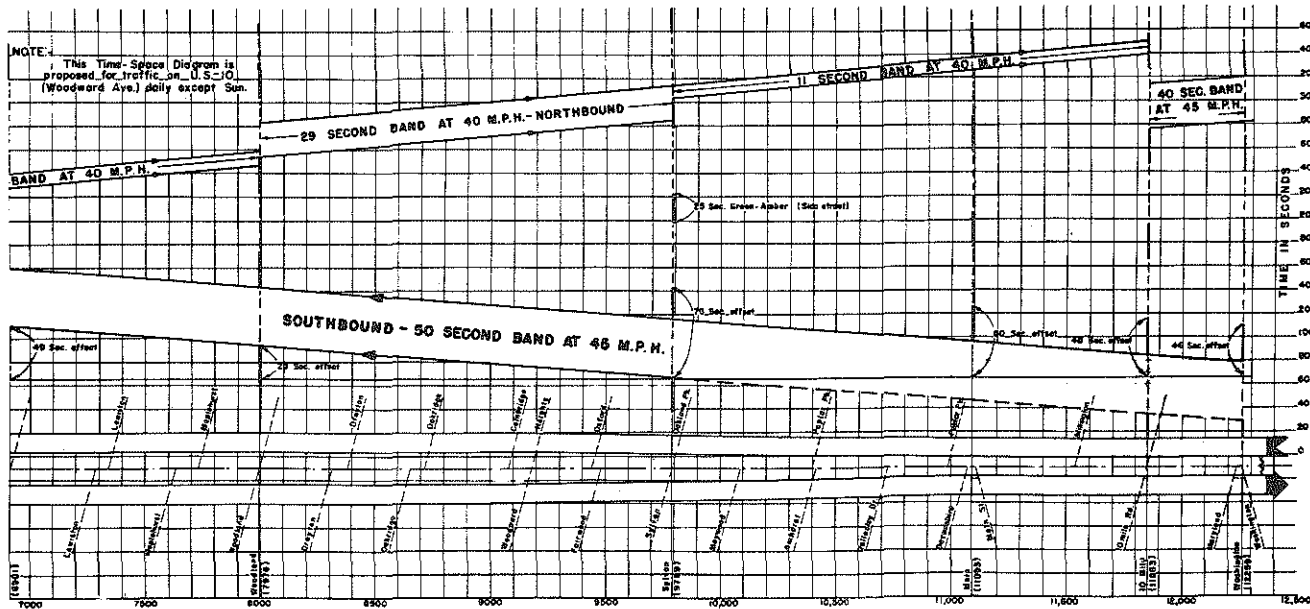
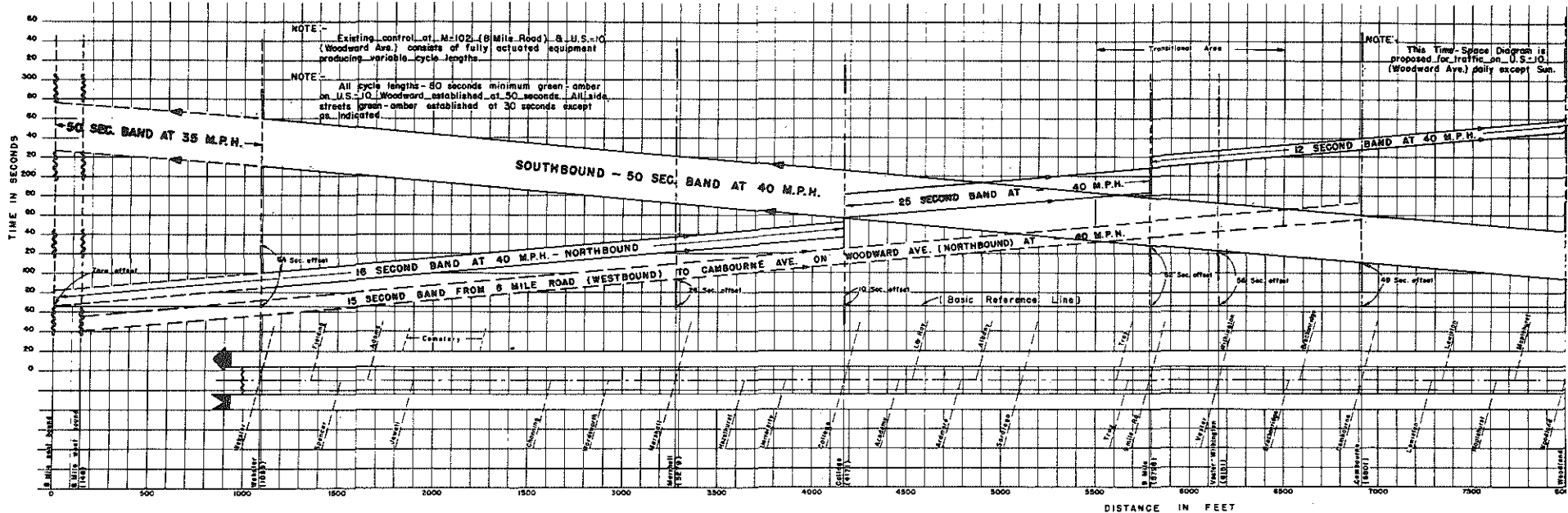
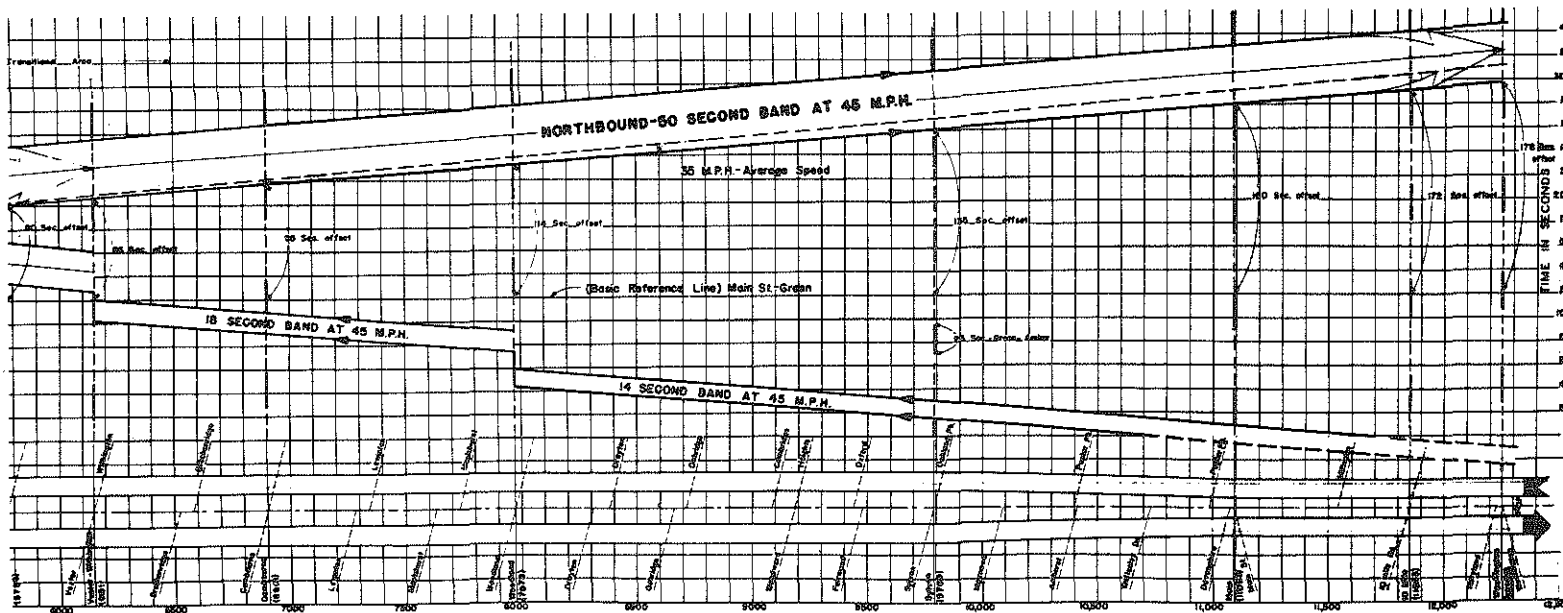
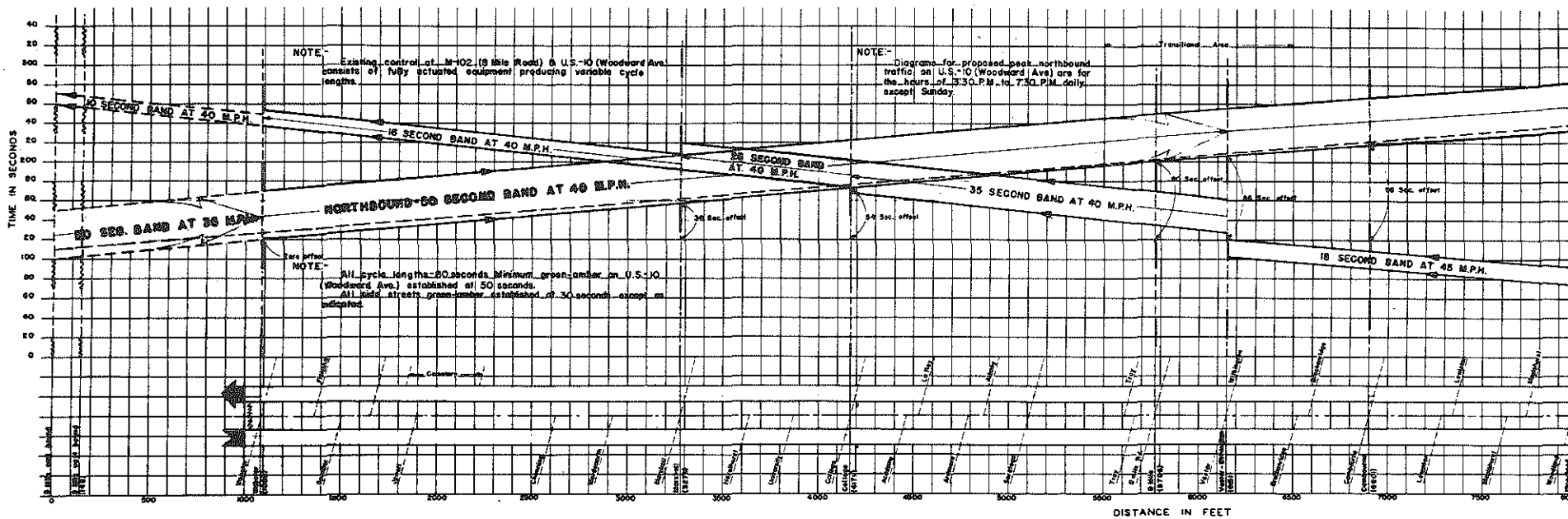


FIG. 5





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<b>PLANNING &amp; TRAFFIC DIVISION</b>	
<b>TIME-SPACE DIAGRAM FOR PEAK</b> <b>SOUTHBOUND TRAFFIC FROM 5:30 A.M.</b> <b>TO 9:30 A.M. ON U.S.-10 (WOODWARD AVE.)</b> <b>FROM 8 MILE RD. TO WASHINGTON AVE.</b>	
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REVISIONS	DATE 3-6-48
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STATE HIGHWAY DEPARTMENT  
CHARLES M. ZIEGLER  
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PLANNING & TRAFFIC DIVISION

PROPOSED TIME-SPACE DIAGRAM FOR PEAK NORTHBOUND TRAFFIC ON U.S. 10 (WOODWARD AVE.) FROM 8-MILE RD. TO WASHINGTON AVE.

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REVISIONS	DATE 3-8-68
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FIG. 7

maintained the balance of the day (Figure 8). If other peaks are originated due to other industrial and business shift changes, the directional peak movement of vehicles by hours can be ascertained and the controls immediately set to handle them. Variations of the above proposed diagrams can be used for Sunday, holiday and for recreational volumes as traffic dictates.

The proposed timing of traffic signals as shown on Figures 6, 7 and 8, maintain a cycle change of 80 seconds. This is set so that a 50 second minimum is given to Woodward Avenue and a 30 second to the cross streets. The cross street interval is shortened in several cases so as not to interfere with the progressive time band. However, the traffic at these several points is light in volume and duration and therefore should not be allowed to interfere in the efficiency of the proposed progression.

Inasmuch as the existing cycle is now operating at approximately 75 seconds, it is believed that the proposed 80 second cycle will, by effecting increased capacity and traffic flow on both Woodward Avenue and the side streets, materially eliminate the congestion now existing. The 80 second cycle provides a 50 second continuous flow of traffic on Woodward Avenue for directional peak hours as shown on Figures 5, 6 and 7. During the off-peak or normal hours, this cycle length provides the same maximum flow of traffic in both directions. To decrease the cycle length will materially reduce the number of



vehicles that can travel through the area at the designated speed. However, this system is flexible and can be changed as conditions warrant, a feature not available in the existing or other types of signalization.

#### RECOMMENDED EQUIPMENT AND ESTIMATED COSTS

The modernization and establishment of controlled and orderly traffic movement on US-10 (Woodward Avenue) and intersecting streets as recommended in this report will require replacement of some equipment now in place and the installation of new controls in other locations.

In order to produce a standard point of obedience at each intersection along Woodward Avenue (both northbound and southbound), identical signal installations are proposed, (Figure 4). This standard is comprised of a mast arm installation suspended on the center of the 4-lane highway, supplemented by post indications, located on the near side of the intersection. "Walk-Wait" indications are proposed for pedestrians crossing the intersecting streets parallel with Woodward Avenue. This combination will provide the necessary protection for pedestrians and establish a standard near side point of obedience for both northbound and southbound vehicular traffic.

The cost of the complete modernization of traffic control equipment as outlined in this report is estimated at \$22,125.00. Based on the number of intersections and length of project, costs in each municipality is as follows: Ferndale \$12,775.00; Pleasant Ridge \$6,225.00; and Royal Oak \$3,125.00.

## CONCLUSION

The modern type of traffic signal control recommended for installation on US-10 (Woodward Avenue) through the municipalities of Ferndale, Pleasant Ridge and Royal Oak should go far to remedy and eliminate unnecessary traffic congestion and to safely expedite the flow of vehicles through this region. As previously stated in this report other factors are involved in the problem.

Signals can be added on city streets intersecting with Woodward Avenue and can be easily made to fit into a progressive band coordinated with the proposed system. In addition, signals can be added on Woodward when necessary within and at the ends of this section without necessarily decreasing the efficiency of the system.

If this system is installed with equipment capable of producing simultaneous changes in cycle lengths, directional flows, etc., practically any traffic situation likely to be encountered can be handled without creating inconvenience either to local motorists and pedestrians or to through traffic on Woodward Avenue.