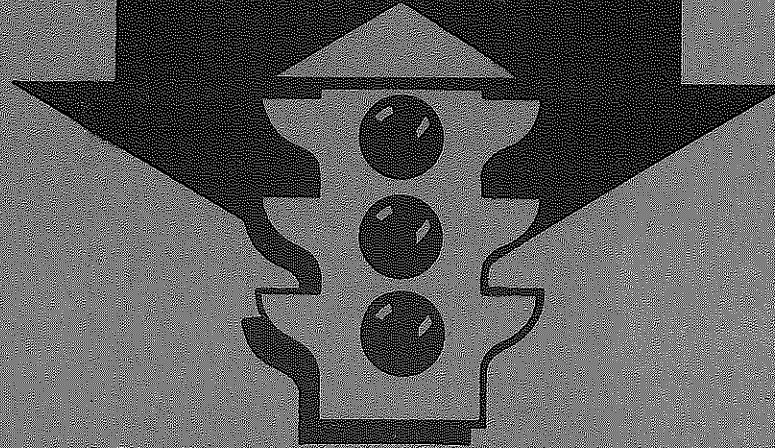


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PROPOSED

**TRAFFIC
SIGNAL
IMPROVEMENTS**



U.S. - 25 (GRATIOT AVENUE)
AND
CONNECTING STREETS
IN THE
CITY OF MT. CLEMENS

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



CHARLES M. ZIEGLER
STATE HIGHWAY COMMISSIONER
LANSING, MICHIGAN

April 8, 1946

The Honorable Mayor and City Commission
City of Mt. Clemens
Mt. Clemens, Michigan

Gentlemen:

At the request of the City of Mt. Clemens, the Michigan State Highway Department has studied the traffic conditions on US-25 (Gratiot Avenue) and its connecting arterial streets. We are transmitting our recommendations for the improvement of the traffic flow in and through the city. These recommendations are respectfully submitted for your consideration and use, and we trust that they will aid in solving your traffic problems.

Very truly yours,

Charles M. Ziegler

STATE HIGHWAY COMMISSIONER

CMZ:af

MICHIGAN
STATE HIGHWAY DEPARTMENT
Charles M. Ziegler
State Highway Commissioner

PROPOSED TRAFFIC SIGNAL IMPROVEMENTS
US-25 (GRATIOT AVENUE)
AND CONNECTING STREETS
IN THE CITY OF MT. CLEMENS

Prepared By Planning & Traffic Division

April, 1946

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PROPOSED TRAFFIC SIGNAL IMPROVEMENTS
US-25 (GRATIOT AVENUE)
AND CONNECTING STREETS
IN THE CITY OF MT. CLEMENS

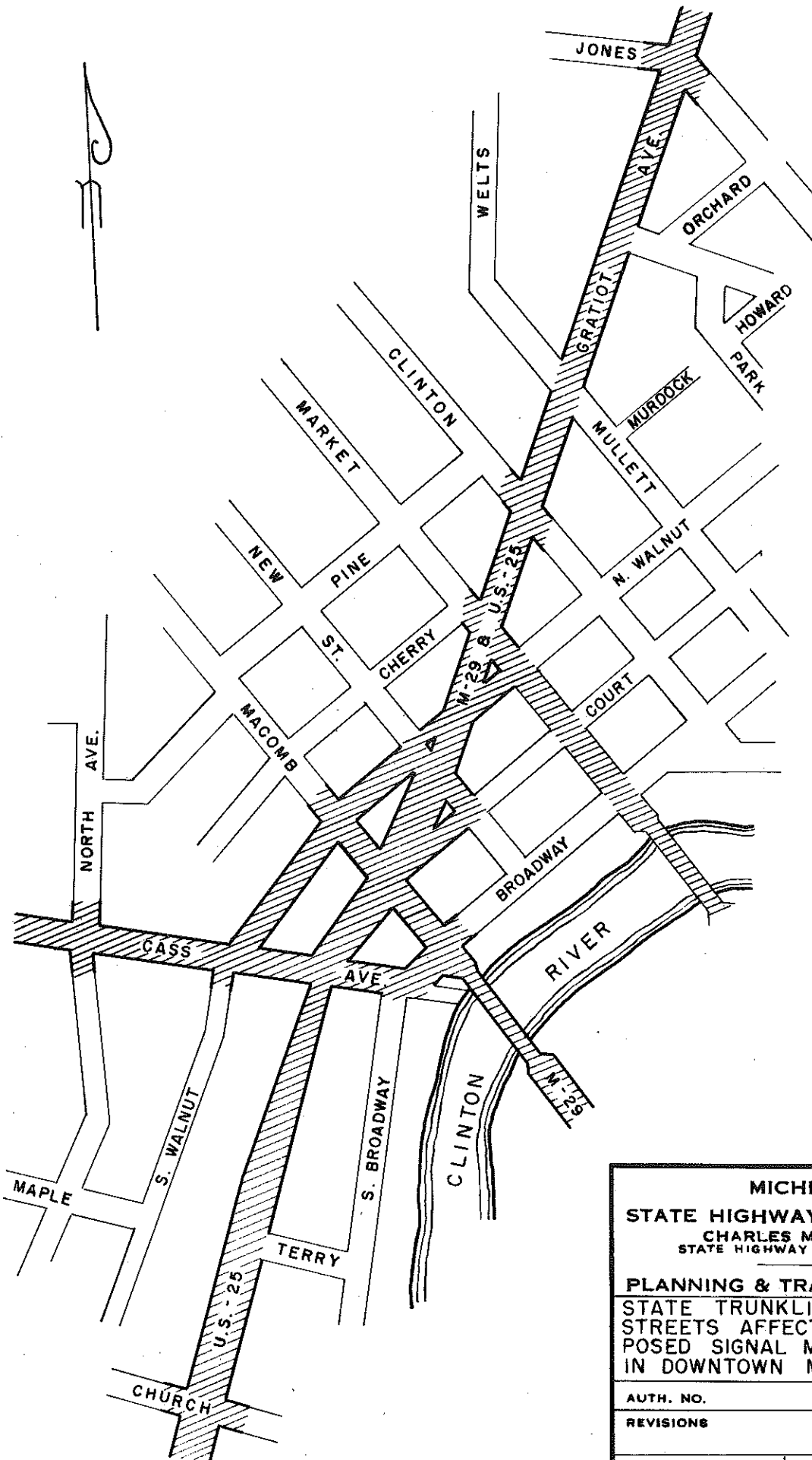
INTRODUCTION

Serious disorganization of the traffic movement on Gratiot Avenue (US-25) and connecting streets in the business district of Mt. Clemens, led the city government to request the aid of the State Highway Department in remedying the condition. Department engineers have made a comprehensive survey and analysis of traffic in the affected area. The results are presented in this report together with recommendations of traffic control measures.

EXISTING CONDITIONS

The physical layout of the city streets in Mt. Clemens makes it difficult to attain efficient traffic flow. Gratiot Avenue, which is the city's principal business street and the route of state trunkline US-25, crosses the rectangular pattern of city streets at an angle. This produces long and difficult angles of approach and crossing at intersections. In addition, intersecting streets are irregularly spaced along the main artery and this creates added difficulties in producing an effective flow band under traffic control. (Figure 1)

The present traffic signal equipment on Gratiot Avenue (US-25) is approximately 13 years old. It is comprised of supervised semi-actuated units at the principal intersections.



MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION STATE TRUNKLINES & CITY STREETS AFFECTED BY PRO- POSED SIGNAL MODERNIZATION IN DOWNTOWN MT. CLEMENS.	
AUTH. NO.	DRAWN BY J.D.P.
REVISIONS	DATE 1-4-46
	SCALE NONE
SHEET NO. OF	FILE NO T1-B4-10

FIG. 1

When installed it probably was adequate to direct and regulate local and trunkline traffic in and through the city. It is now obsolete and worn out.

Moreover, the traffic pattern in this area has changed since 1932; trunkline M-29 has been rerouted; Selfridge Field has been enlarged and the entrance to it has been relocated; new homes have been built on the streets controlled by the semi-actuated equipment. As a result, the supervision of the local signal controller is not adequate to provide access from the side streets when called, and at the same time to permit a reasonable semblance of progression on Gratiot Avenue (US-25).

TRAFFIC SURVEYS AND STREET INVENTORY

As a basis for determining and selecting suitable traffic control measures a survey was made of traffic movements and streets. This survey was taken the week of March 27-29, 1945 and comprised the following operations:

1. Count of vehicular turning movements at the ten principal intersections on Gratiot Avenue (US-25) and on parallel and connecting streets. These intersections were as follows:
 - a. Macomb and Walnut
 - b. Macomb and Broadway
 - c. Macomb and Gratiot (US-25)
 - d. Gratiot (US-25) and Church
 - e. Gratiot (US-25) and Cass
 - f. Gratiot (US-25) and Market

- g. Gratiot (US-25) and New
 - h. Cass and Walnut
 - i. Cass and North
 - j. Walnut and Market
2. Count of vehicular volumes at sixteen stations as follows:
- a. Gratiot (US-25) south of Church
 - b. Gratiot (US-25) north of Terry
 - c. Gratiot (US-25) north of Cass
 - d. Gratiot (US-25) south of New
 - e. Gratiot (US-25) south of Market
 - f. Gratiot (US-25) north of New
 - g. Gratiot (US-25) north of Market
 - h. Church east of Gratiot (US-25)
 - i. Church west of Gratiot (US-25)
 - j. Cass west of North
 - k. Crocker east of Bridge
 - l. Macomb west of Pine
 - m. Court south of New
 - n. Walnut south of Market
 - o. Market west of Pine
 - p. Dickenson east of Bridge
3. On inventory of road widths, type of parking and number of effective traffic lanes for the following areas:
- a. Gratiot Avenue (US-25) from Robertson to Jones

- b. Cass from Washington to Broadway
- c. Macomb from North to the Bridge
- d. New Street from North to Broadway
- e. Market from North to the Bridge

In addition to the above, studies were made of the parking conditions permissible in the downtown area.

RECOMMENDATIONS FOR MOVEMENT ON GRATIOT AVENUE (US-25)

On the basis of careful analysis of the data gathered in the surveys, it is recommended that a fully flexible progressive system of signalization be adopted to replace the out-dated and worn equipment now in use. The recommended form of signalization will provide the following features:

1. Give a continuous controlled movement of traffic to full undelayed groups of vehicles on Gratiot Avenue (US-25),
2. The individual control units at each intersection can be adjusted for maximum efficiency based on the requirements of the intersection and the main thoroughfare.
3. Compensation for the unequal distances between existing signalized intersections can be made much easier than in other types of systems. This feature is vital in the elimination of congestion in areas where some city blocks are considerably longer than others.

4. Speeding can be controlled and discouraged inasmuch as a vehicle moving faster than the predetermined progression is set for, will be forced to make stops at most intersections, such stoppages now occur in Mt. Clemens, but are not necessarily caused by speeding, but by the combination of obsolete equipment, change in traffic pattern, and by the physical layout of connecting city streets.
5. A continuing advantage of the recommended system is that signals can be added between existing signal locations or at either extremity without necessarily decreasing the efficiency of the progression. This long range viewpoint should not be overlooked in municipal signalization.

Inasmuch as Gratiot Avenue is the principal street in Mt. Clemens and carries the heaviest traffic volume it is considered the key in the city's transportation wheel. The proposed signal light timing for all streets in the signalized downtown area is based on the progressive timing on this main artery. At the same time, a similar progressive movement is provided on the connecting and adjacent streets through the synchronization of the grid signal system.

ONE-WAY STREETS

A progressive flow of traffic on Gratiot Avenue (US-25) requires that the use of the portions of Court Street and North Walnut Street immediately adjacent to Gratiot be restricted to one-way movement. These restrictions are made necessary by the skewed direction of the main artery which creates unfavorable conditions for the control of turning and crossing movements of vehicles coming onto Gratiot from these streets.

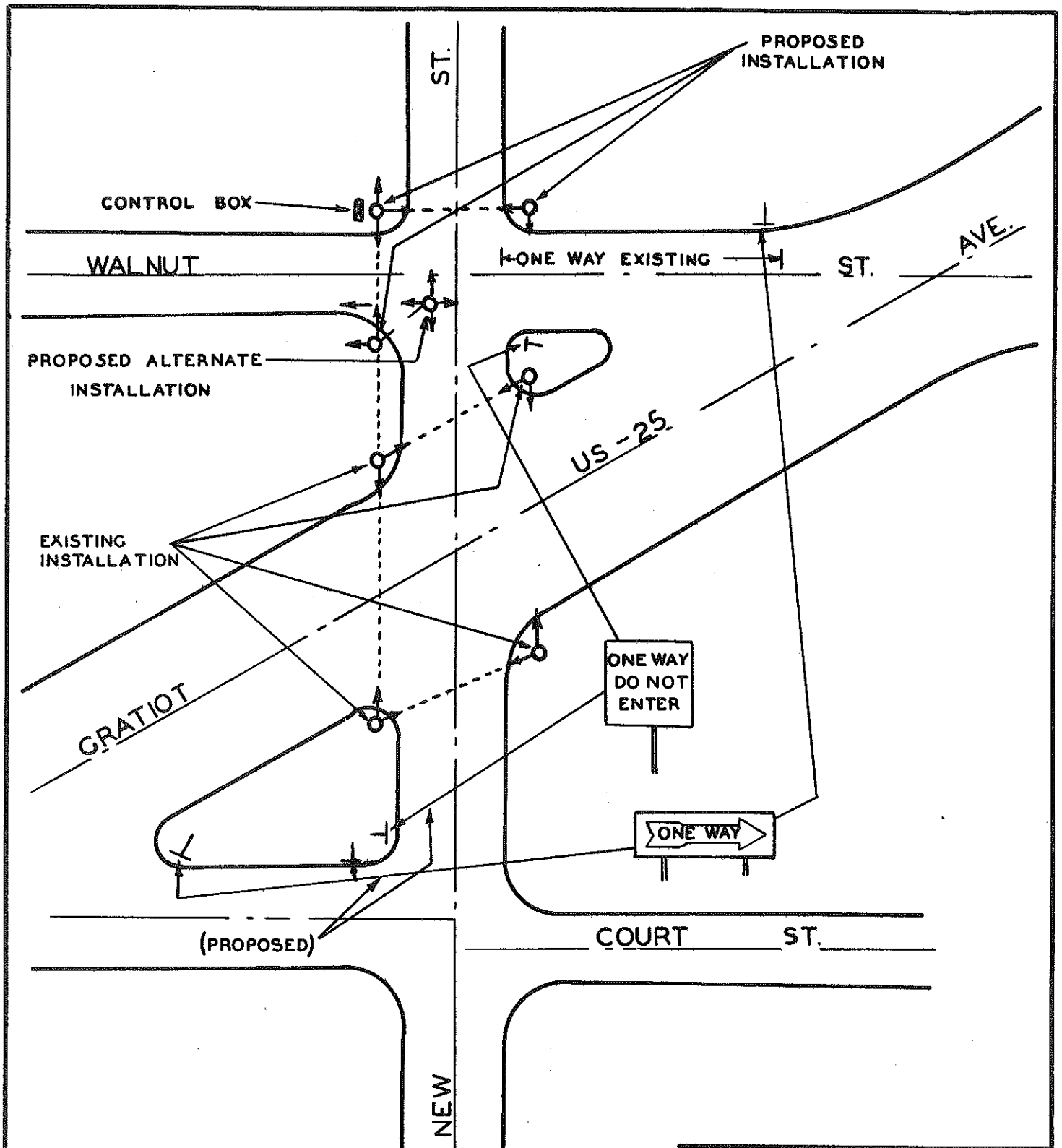
Therefore, it is recommended that the following street sections be designated and signed as one-way thoroughfares;

1. That part of Court Street from Gratiot Avenue northeasterly to New Street (Figure 2), and,
2. That part of North Walnut Street from Gratiot Avenue northeasterly to Market Street. At the present time South Walnut Street is designated and signed as a one-way street from Gratiot southeasterly to New Street.

(Figure 3)

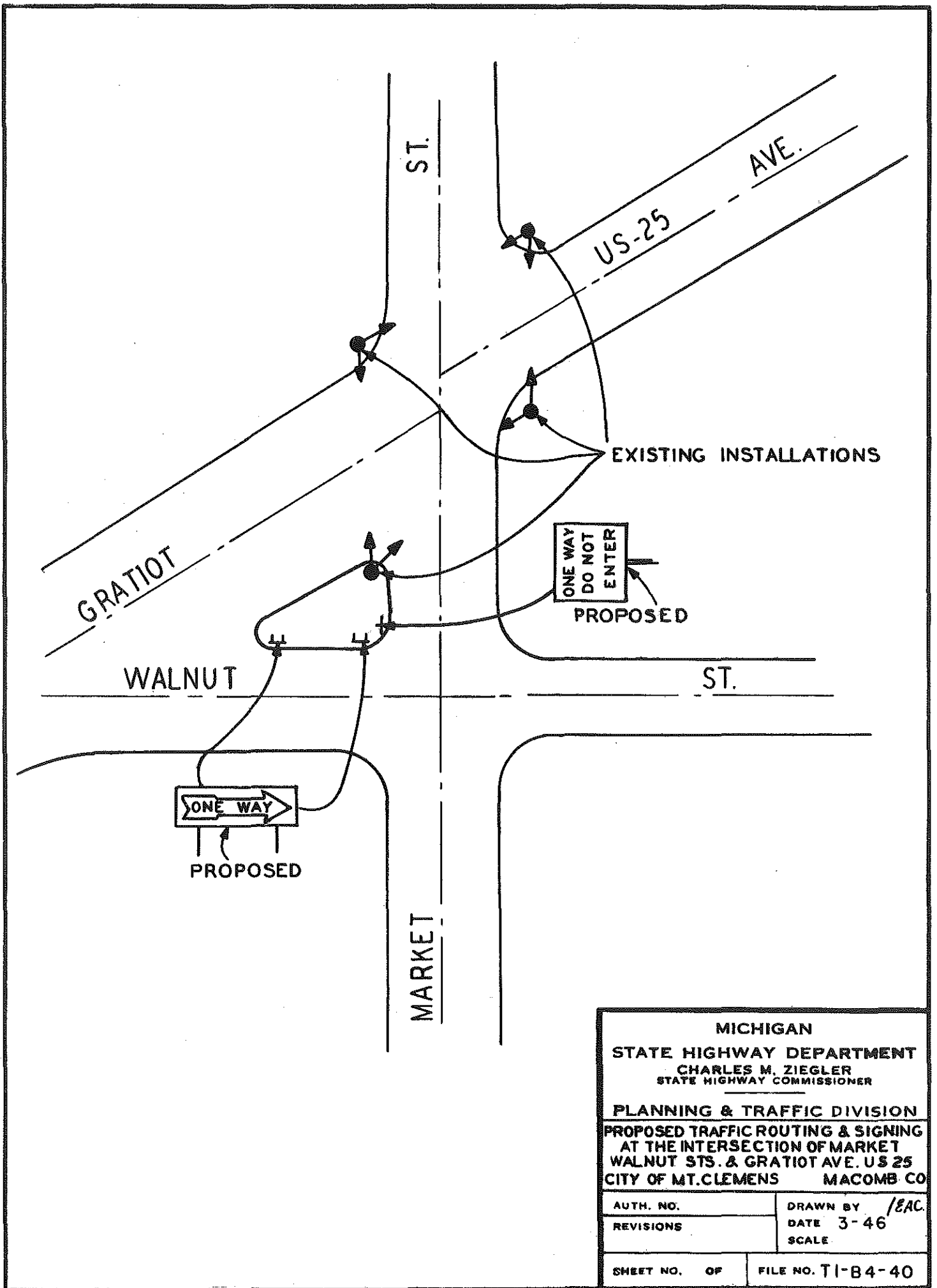
With these restrictions, southbound vehicles on Court Street will turn right into New Street and then turn left under signalized control onto Gratiot Avenue. Southbound vehicles on North Walnut Street similarly will turn right into Market Street and then left onto Gratiot Avenue.

This revised and controlled movement of traffic will eliminate the existing hazards caused by southbound vehicles on Court Street and North Walnut Street breaking into and



PROPOSED TRAFFIC ROUTING, SIGNALIZATION AND SIGNING AT THE INTERSECTION OF COURT, WALNUT & NEW ST WITH GRATIOT AVE.

MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION	
CITY OF MT. CLEMENS MACOMB COUNTY	
AUTH. NO.	DRAWN BY - C. T.
REVISIONS	DATE 3-46
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SHEET NO. OF	FILE NO. T1-B4-39



MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION PROPOSED TRAFFIC ROUTING & SIGNING AT THE INTERSECTION OF MARKET WALNUT STS. & GRATIOT AVE. US 25 CITY OF MT. CLEMENS MACOMB CO	
AUTH. NO.	DRAWN BY <i>/EAC</i>
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. T1-B4-40

FIG. 3

across the path of northbound traffic on Gratiot Avenue. It will provide needed protection to both motorists and pedestrians crossing Gratiot Avenue. It will make possible a progressive traffic movement not only on Gratiot Avenue, but also on connecting and adjacent local streets.

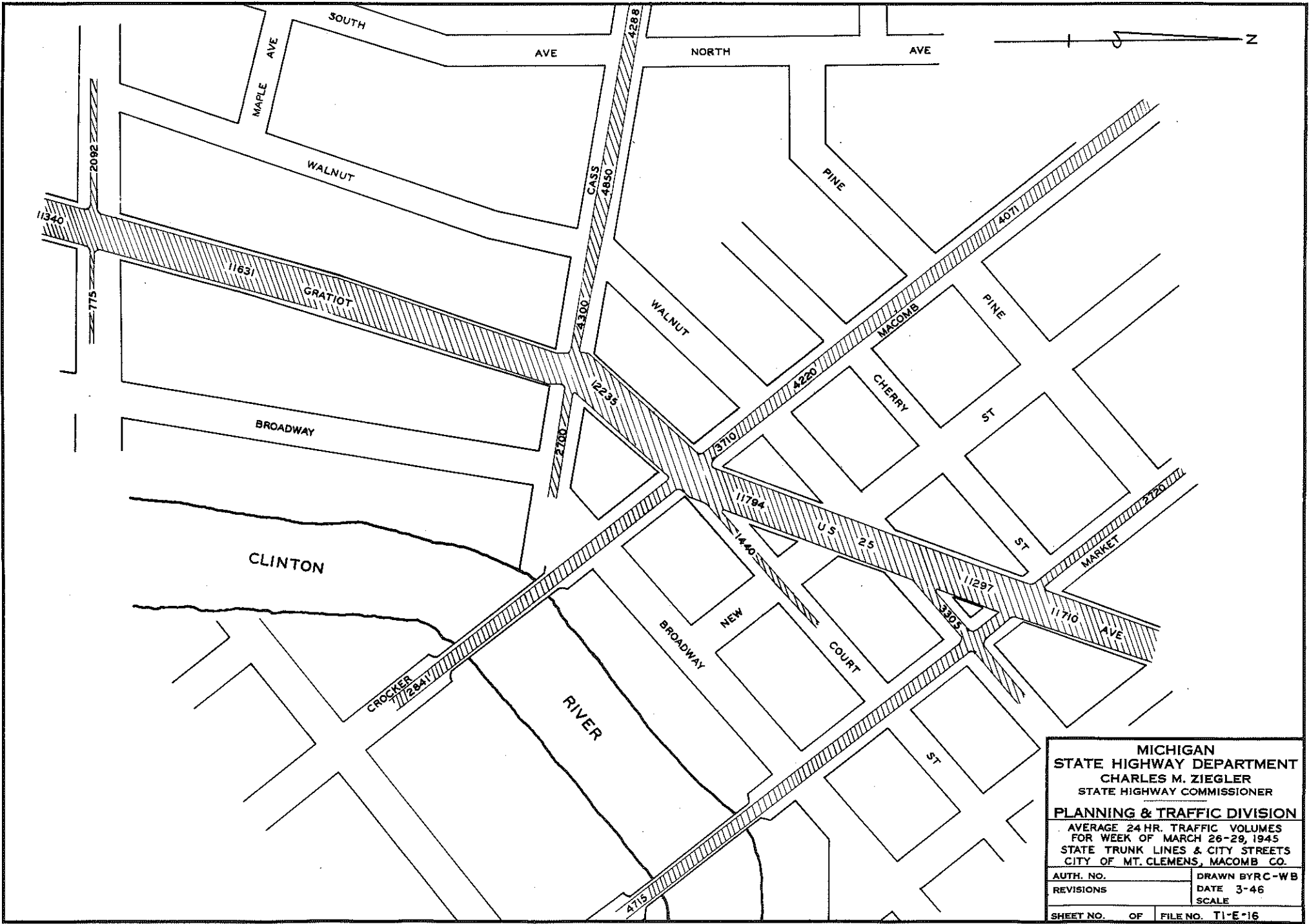
Relative traffic volumes revealed by the survey justify the rerouting of Court Street and North Walnut Street traffic to permit and protect orderly progressive traffic flow on Gratiot Avenue. (Figure 4)

As shown in Figure 5, the volume on Gratiot approximates 11,650 vehicles in 24 hours. By contrast, the 24-hour volumes of 1,440 vehicles on Court Street and of 3,305 vehicles on North Walnut Street are only about 12 percent and 28 percent, respectively, of the volume on the main artery.

Due to the lifting of gasoline rationing, traffic volumes are probably higher today than when the survey was made in 1945, but the increase undoubtedly has been proportional to the volumes then found.

RATES OF PROGRESSION

With the proposed changes of street use in effect, a satisfactory progressive flow of traffic can be obtained on Gratiot Avenue (US-25). With the recommended equipment, the flow timing will accommodate directional characteristics of traffic occurrence. If desired, preference can be given to northbound or to southbound traffic for certain periods of the day as conditions demand. Such a system is being installed on



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STATE HIGHWAY DEPARTMENT
 CHARLES M. ZIEGLER
 STATE HIGHWAY COMMISSIONER
PLANNING & TRAFFIC DIVISION
 AVERAGE 24 HR. TRAFFIC VOLUMES
 FOR WEEK OF MARCH 26-29, 1945
 STATE TRUNK LINES & CITY STREETS
 CITY OF MT. CLEMENS, MACOMB CO.

AUTH. NO.	DRAWN BY RC-WB
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. T1-E-16

FIG. 5

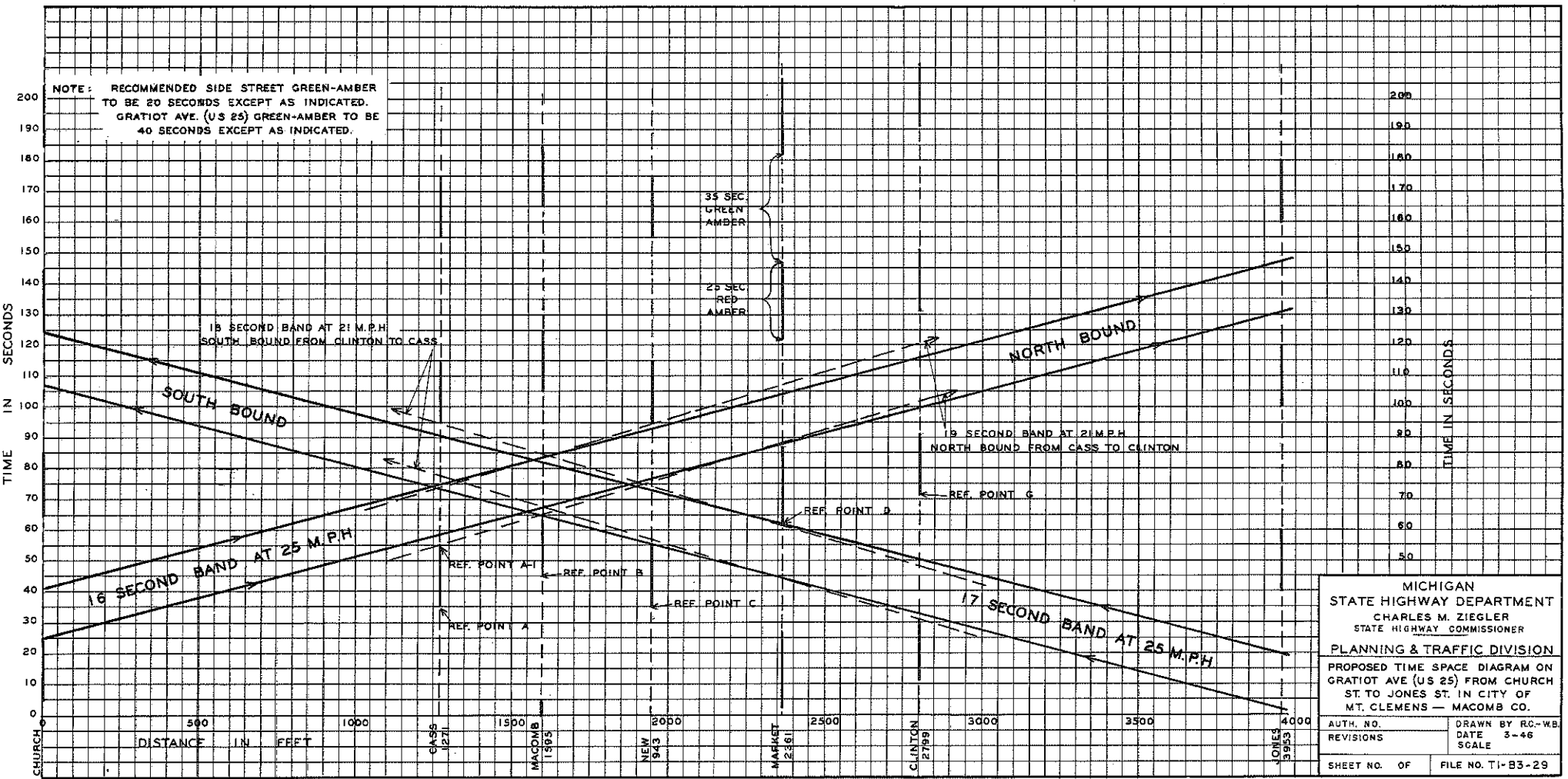
US-112 in Dearborn where peaks of traffic are definitely directional at certain times of the day.

The diagrams accompanying this report show only the intermediate band which can be actuated in the proposed signal system. All related city time-space diagrams are also based on this band.

Northbound vehicles on Gratiot Avenue can travel at a rate of 25 m.p.h. from Cass Avenue to Clinton Street without being stopped, provided they enter the Gratiot-Cass intersection not more than 20 seconds after the light has turned green on Gratiot. However, vehicles entering the intersection later than 20 seconds after the green transfer at Cass Avenue will be forced to make a stop at New Street. (Figure 6)

This and like concessions affecting progression on Gratiot Avenue have been made in order to produce a balanced traffic flow on all the streets of the downtown area, local and trunkline alike. For example, southbound vehicles on Gratiot Avenue passing Market Street intersection within 25 seconds after getting the green signal at that point can proceed southwesterly on South Walnut Street to Cass Avenue at a speed of 14 m.p.h. (Figure 7)

Similar cross street movements can be effected on Macomb Street and Cass Avenue. On Macomb Street (Figure 8) vehicles can proceed from North Street to Pine Street, or vice versa, at a speed of 25 m.p.h. and then travel through the lights to Broadway at a speed of 20 m.p.h. Figure 9 shows a similar



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 CHARLES M. ZIEGLER
 STATE HIGHWAY COMMISSIONER

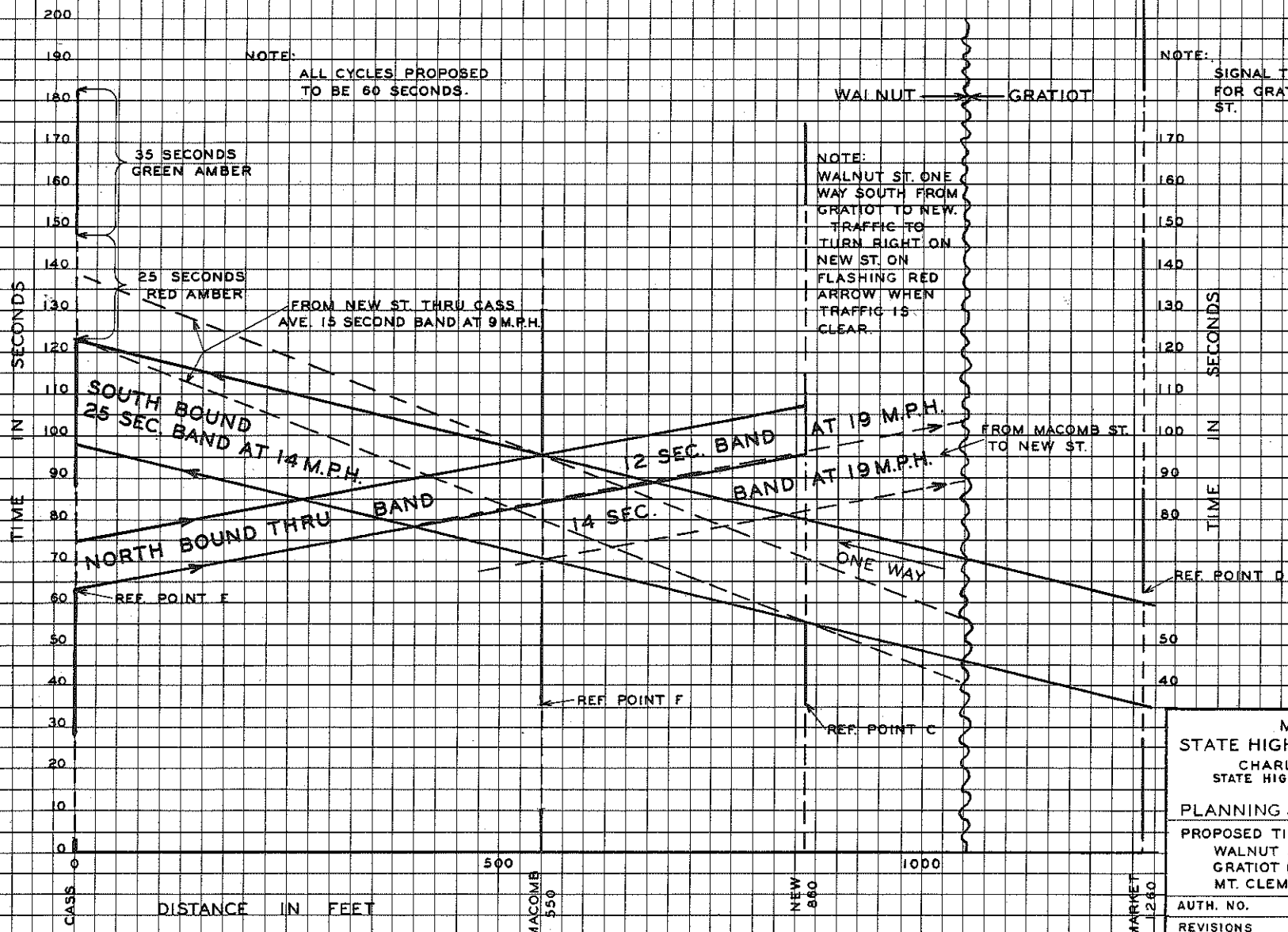
PLANNING & TRAFFIC DIVISION

PROPOSED TIME SPACE DIAGRAM ON
 GRATIOT AVE. (U.S. 25) FROM CHURCH
 ST. TO JONES ST. IN CITY OF
 MT. CLEMENS — MACOMB CO.

AUTH. NO.	DRAWN BY RC-WB
REVISIONS	DATE 3-46
	SCALE

SHEET NO. OF FILE NO. T-1-B3-29

FIG. 6



NOTE:
ALL CYCLES PROPOSED
TO BE 60 SECONDS.

NOTE:
SIGNAL TIMING AS SHOWN
FOR GRATIOT (US-25) & MARKET
ST.

NOTE:
WALNUT ST. ONE
WAY SOUTH FROM
GRATIOT TO NEW.
TRAFFIC TO
TURN RIGHT ON
NEW ST. ON
FLASHING RED
ARROW WHEN
TRAFFIC IS
CLEAR.

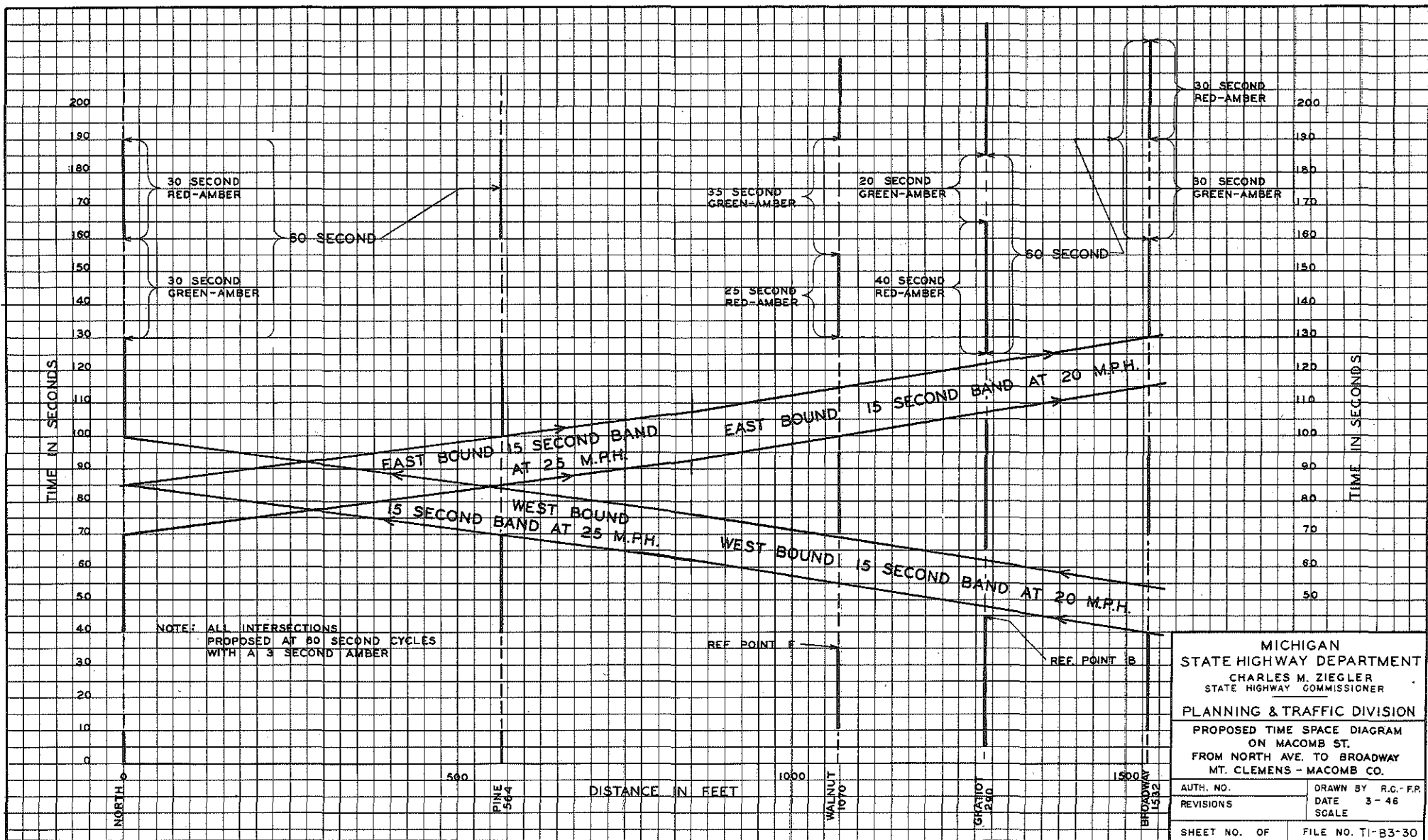
MICHIGAN
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CHARLES M. ZIEGLER
STATE HIGHWAY COMMISSIONER

PLANNING & TRAFFIC DIVISION

PROPOSED TIME SPACE DIAGRAM ON
WALNUT ST. FROM CASS TO
GRATIOT (US-25) IN CITY OF
MT. CLEMENS—MACOMB CO.

AUTH. NO.	DRAWN BY R.C.-WB
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. TI-BI-34

FIG. 7



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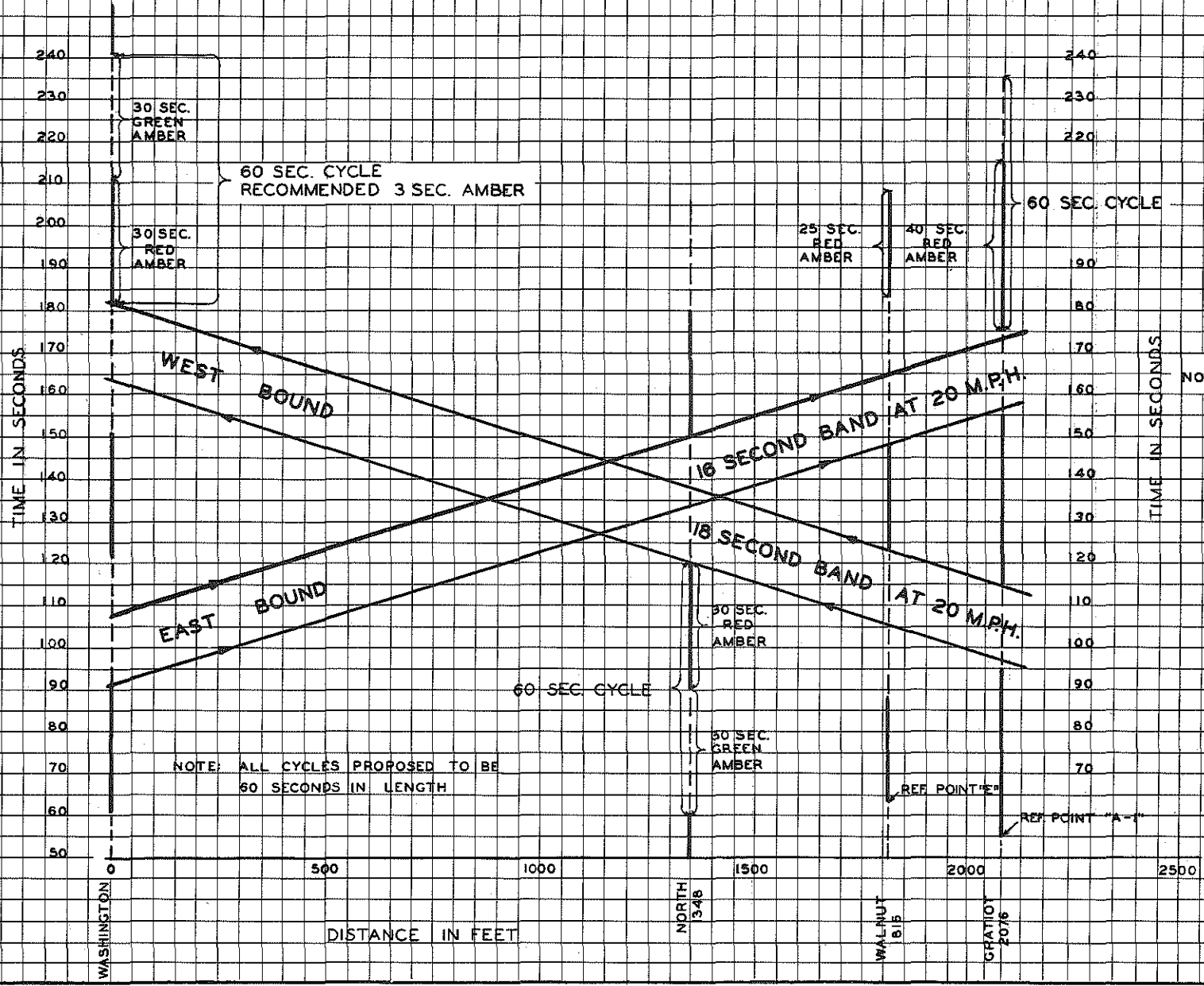
PLANNING & TRAFFIC DIVISION

PROPOSED TIME SPACE DIAGRAM
ON MACOMB ST.
FROM NORTH AVE. TO BROADWAY
MT. CLEMENS - MACOMB CO.

AUTH. NO.	DRAWN BY R.C.F.P.
REVISIONS	DATE 3-46
	SCALE

SHEET NO. OF FILE NO. T-83-30

FIG. 8



NOTE: THIS PROPOSED TIME SPACE DIAGRAM IS CORRELATED WITH THE U.S.-25 (GRATIOT) TIME SPACE DIAGRAM

MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION	
PROPOSED TIME SPACE DIAGRAM ON CASS AVE. FROM WASHINGTON TO BROADWAY MT. CLEMENS - MACOMB CO.	
AUTH. NO.	DRAWN BY R.C.-E.D.
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. TI-BI-35

FIG. 9

time-space diagram on Cass Avenue from Washington Avenue east to Broadway.

Parked vehicles and vehicles in the act of parking are important traffic factors since they tend to slow the rate of moving vehicles. This factor has been considered and is reflected in the slow-up of signal timing on streets approaching a congested area.

RECOMMENDATIONS FOR MOVEMENT ON LOCAL STREETS

In addition to making sections of Court Street and Walnut Street "One-Way," certain other traffic movements are desirable in order to efficiently improve the traffic flow on the city streets. We recommend that right-hand turns after a stop on the flashing red arrow be allowed at the following locations in order to effect this movement:

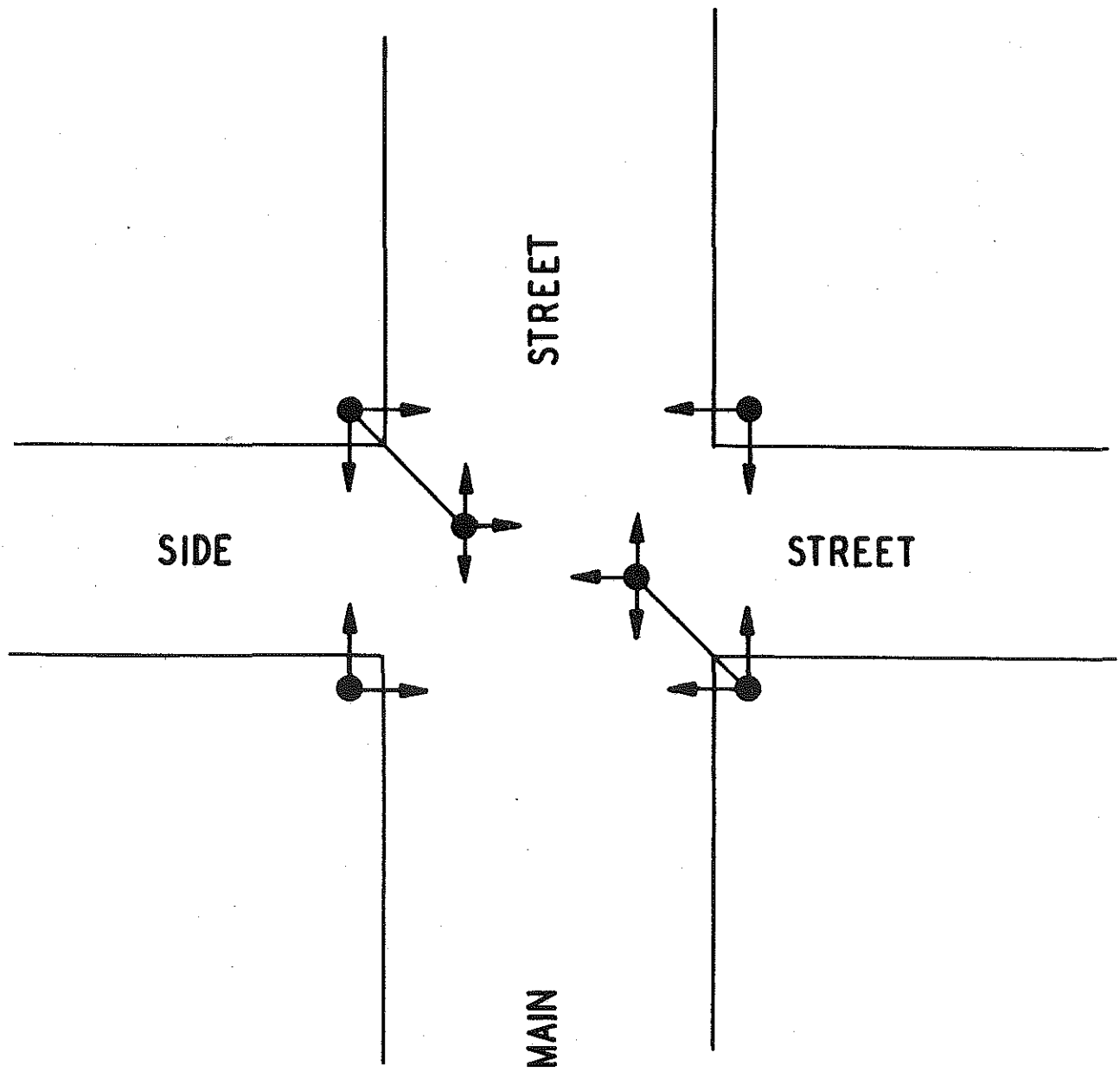
<u>Proposed Arrow Installation</u>	<u>Recommended Turn</u>
On Clinton Street	From Clinton west to Gratiot south
On Market Street	From Market west to Gratiot south
On New Street	From New west to Gratiot south
On Walnut Street	From Walnut south to New east
On Macomb Street	From Macomb west to Gratiot south
On Walnut Street	From Walnut north to Cass west

These proposed installations will fit into the proposed time-space signal diagrams and will allow the movement of vehicles stopped at the above intersections when traffic on Gratiot Avenue and the other affected streets are at a minimum. To further eliminate congestion on Gratiot Avenue, it is recommended

that "No parking at any time" regulations be established and enforced from Clinton north to Jones. This will open the bottleneck at this end of the business section which will permit a free movement of vehicles into and from this area under the supervision of signalized control.

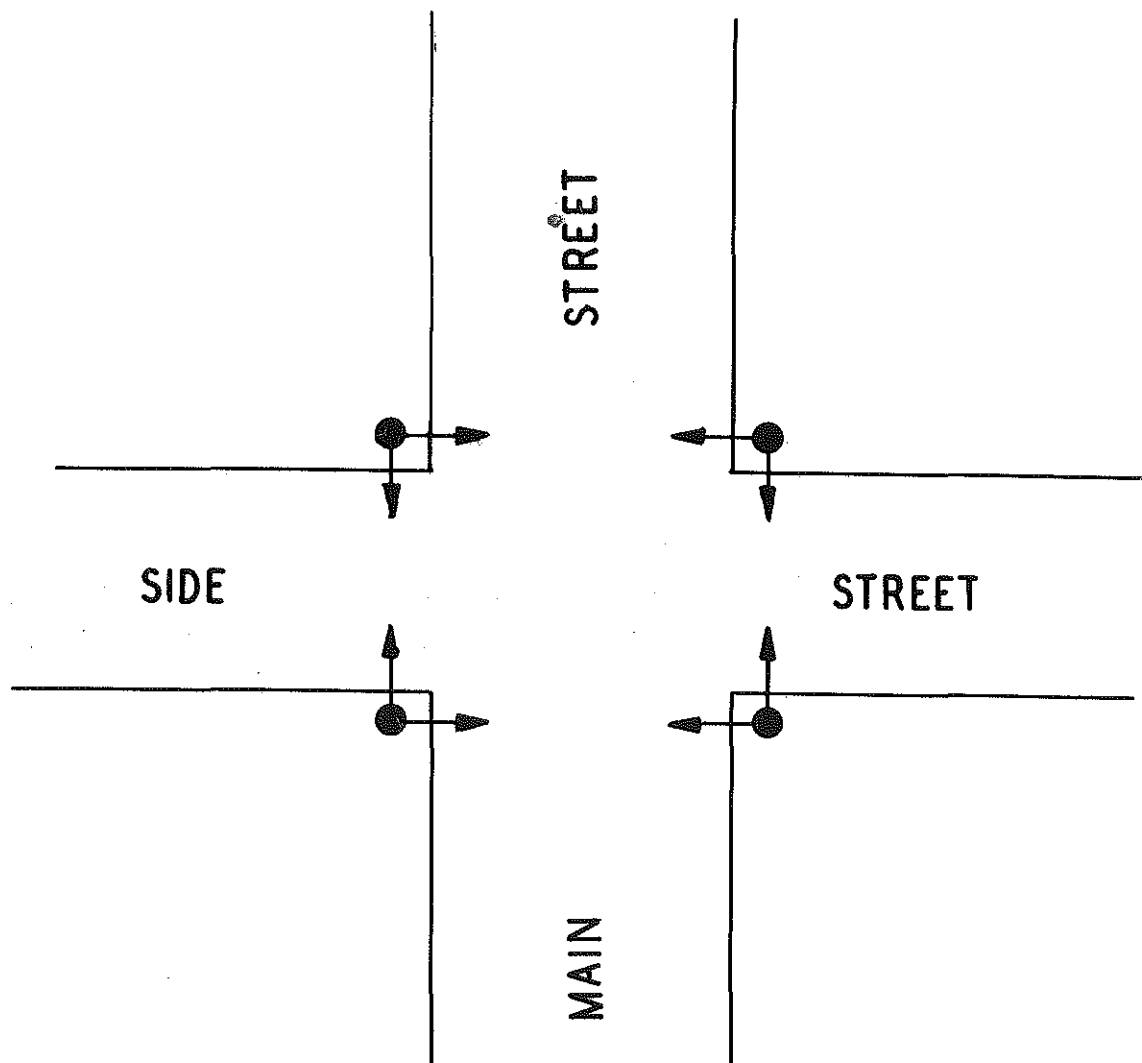
To further improve the traffic flow on the lateral city streets, it is recommended that the city install a signal at the intersection of Walnut Street and Market Street. This intersection carries the traffic from the Dickenson bridge, which should be controlled before entering Gratiot Avenue. In addition the northbound volume on Walnut Street undoubtedly will increase with the adoption of the one-way street from Gratiot Avenue to Market Street.

Observation of traffic at the intersection of New Street and Walnut Street and New Street and Gratiot Avenue shows that the eastbound vehicles on New Street cause considerable congestion at both intersections. Therefore, we further recommend that the city install signal heads at the Walnut-New intersection as shown on Figure 2. These indications will control the traffic west of Walnut Street, allowing southbound Walnut Street traffic to get into its traffic band and establish orderly movement of traffic at all the intersections. Similarly, the traffic on New Street, after being stopped west of Walnut Street can proceed across Walnut Street to Gratiot Avenue in an orderly manner. Typical signal installations for intersections are shown on Figures 10 and 11.



MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION	
TYPICAL STANDARD FOR ERECTION OF TRAFFIC SIGNALS BRACKET TYPE INSTALLATION WITH PEDESTRIAN INDICATIONS	
AUTH. NO.	DRAWN BY <i>JAC</i>
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. T1-84-41

FIG. 10



MICHIGAN STATE HIGHWAY DEPARTMENT CHARLES M. ZIEGLER STATE HIGHWAY COMMISSIONER	
PLANNING & TRAFFIC DIVISION TYPICAL STANDARD FOR ERECTION OF TRAFFIC SIGNALS. PEDESTAL INSTALLATIONS FOR PEDESTRIAN AND VEHICULAR PROTECTION	
AUTH. NO.	DRAWN BY <i>/EAC</i>
REVISIONS	DATE 3-46
	SCALE
SHEET NO. OF	FILE NO. T1-84-42

FIG. 11

It is recommended that at the intersections where the flashing red arrows for right turns are proposed, sufficient space be provided to make these turns by prohibiting parking on the respective streets for a distance of at least 20 feet from the ends of the designated or traveled crosswalks.

RECOMMENDED EQUIPMENT AND ESTIMATED COSTS

Establishment of controlled and orderly traffic movement on Gratiot Avenue (US-25) and on adjacent and connecting local streets as recommended in this report will require the replacement of much equipment now in place and the installation of control devices in some new locations.

The cost of the complete modernization of traffic control equipment in Mt. Clemens as indicated herein, is estimated at \$15,647. However, this estimate includes several individual improvements which could and probably would be made subsequent to the initial installation.

GRATIOT AVENUE (US-25)

The existing control equipment on Gratiot Avenue must be replaced to provide proper operation of the recommended progressive grid signal system. It is proposed to remove the present controllers and install new ones at the intersections with Cass Avenue, Macomb Street, New Street, and Market Street. New installations are recommended at the Church Street and Clinton Street intersections.

The new equipment includes a master controller to supervise not only the signal timing on Gratiot Avenue, but the side

street progressions as well. This controller has features which will provide directional traffic flow as directed by a synchronous timing device.

The replaced controllers will be kept for future use on other trunkline locations when they have been reconditioned. This equipment, which the Department put in when the semi-actuated system was installed, has a salvage value of \$150 for each complete controller unit including cabinet. A salvage or credit value of \$60 will be allowed for units consisting of integral cabinet and post mounting. The latter type of unit with the post passing through the controller cabinet, is easy to install but is very inconvenient to maintain or repair because of the small cabinet space.

The estimated total cost of modernizing signals on Gratiot Avenue is \$8,813. Of this amount, \$5,813 is the estimated cost of signal and controller installations on Gratiot Avenue in the central business district, and includes the cost of the two 4-way - 3-color suspended units estimated at \$1,328 and located at Church Street and Clinton Street, respectively, as specifically recommended in this report. The balance, or \$3,000, is the estimated cost of extending the interconnection from Cass Avenue to Church Street and from Clinton Street to Jones Street, should these extensions become desirable.

LOCAL CITY STREETS

The equipment for and the cost of signal installations on local city streets will depend on how completely the city

decides to synchronize connecting and adjacent street movement with the timing on Gratiot Avenue.

To insure the execution of the progressive grid signal system, the city streets--namely; Walnut Street, New Street, Macomb Street and Cass Avenue--must have a fixed time relationship with Gratiot Avenue. This can be accomplished either by physical interconnection or by the installation of synchronous timers at each intersection of the above named streets with Gratiot. However, to effect a progressive coordinated transfer when a directional movement of traffic is desired on Gratiot, it is necessary that simultaneous correction of the side street controllers be made.

The existing 2-period single-offset controllers now in use on affected streets will not produce this change if connected to the proposed triple-offset controllers on Gratiot Avenue. Therefore, estimates of cost for signaling the local city streets are made on the basis of new equipment. Such new equipment will provide a complete modernization of the city signal system in an area within a radius of approximately 1/4 mile of the business section.

In addition to the replacements of existing equipment, it is necessary to signalize three additional downtown locations. These are at the Walnut-Market, the Court-Market, and the Walnut-New intersections. Control of traffic at these locations will correct the conditions now existing at the intersections themselves and is definitely essential to the orderly

movement of traffic on Gratiot Avenue and the other key streets in the area. The estimated cost of equipment for these three intersections is tabulated below:

Walnut-Market	1	4-way - 3-color suspended	\$ 950
Court-Market	1	4-way - 3-color suspended	\$ 952
		Optional	
Walnut-New	1	4-way - 3-color mast arm	\$1000
		or; Corner pedestals 2-way	\$ 815
		or; 1 4-way - 3-color suspended	\$ 950

The cost of flashing red arrows which are recommended for installation at signalized intersections on Clinton Street, Market Street, New Street, Macomb Street, and Walnut Street (2) is estimated to be \$35 each.

It is estimated that the total cost of proposed and recommended replacements and installations on local city streets would be approximately \$6,834. This figure represents a complete modernization of the traffic signal system in downtown Mt. Clemens exclusive of the improvements and installations proposed on Gratiot Avenue.

The work covered by this estimate can be undertaken and performed in stages at the convenience of the City of Mt. Clemens. Its completion would mean the interconnecting of the various signal locations shown on the time-space diagrams (Figures 7, 8, 9) so that the entire downtown signal grid would be integrated and correlated with Gratiot Avenue.

CONCLUSION

It is recommended that this modern type of traffic control be installed on the critical trunkline and local streets of Mt. Clemens as the means to remedy existing traffic congestion. It is proposed to make the initial installation of this equipment on Gratiot Avenue. The other improvements recommended in this report can be scheduled according to the availability of funds and equipment. However, it must be pointed out that the complete efficiency of the system cannot be realized until it is in operation in its entirety.

If the proposed system is installed with equipment capable of producing simultaneous changes in cycle lengths, directional flows, etc., throughout the crucial downtown area, practically any reasonably heavy traffic situation can be handled without causing inconvenience either to local motorists and pedestrians or to through traffic on the city's principal trunkline artery.