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JOHN C. LODGE FREEWAY
TRAFFIC SURVEILLANCE
AND
CONTROL RESEARCH PROJECT

RESEARCH ACTIVITY PROGRESS REPORT

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For Presentation
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PREFACE

Herein is presented a progress summary of the research activity on the John C. Lodge Surveillance Project as well as the research to be continued into fiscal year 1964. In addition, a discussion of the interest generated by the Project among industry and research organizations and agencies throughout the country.

As a supplement to this report, the preliminary results of the Ramp Closure Evaluation Study have been included.

JOHN C. LODGE FREEWAY SURVEILLANCE PROJECT

RESEARCH ACTIVITY PROGRESS REPORT

The Research Activity on this Project has been directed toward four general areas. By necessity these areas have been subdivided into detailed studies in the interest of providing an efficient means of organizing and coordinating this activity. Each individual study is directed relative to its parent area and also is directly related to the overall objective of this Project. The objective of this research activity is to evaluate the effectiveness of the Television Surveillance System and the Traffic Control System in improving the operation efficiency of freeway operation. In this regard, research is being directed toward the study of freeway traffic flow characteristics for the determination of inter-relationships of traffic flow, new concepts in traffic flow characteristics, driver behavior investigation, geometric design studies and their effect on freeway operation efficiency.

The Areas of Research

- I. The Evaluation of Television System
- II. The Evaluation of the Traffic Control System
- III. The Evaluation and Application of Automatic Sensing and Computer Equipment
 - (1) for traffic data collection for research
 - (2) for freeway traffic control.
- IV. The Study of Freeway Traffic Characteristics, Driver Behavior and Geometric Design features and their effects upon freeway operation and as they are affected by the Television Surveillance and Traffic Control System.

Status of Active Studies:

Completed Reports:

Published reports have been issued thus far

1. "Shoulder Usage on an Urban Freeway"
2. "Lane Changes on an Urban Freeway"
3. "The Effect of Incidents on an Urban Freeway"
4. "Television Equipment for Traffic Surveillance"
5. "Development and Preliminary Evaluation of the
John C. Lodge Surveillance Project"

Studies Underway:

1. "Evaluation of Television System"
 - a. The initial evaluation of the television system has been completed. This evaluation covered camera characteristics, monitors, camera accessories, transmission facilities and equipment. This evaluation was presented in the report "Television Equipment for Traffic Surveillance". December, 1962.
 - b. Location of camera evaluation has been given separate treatment. By use of a movie camera, various locations of cameras have been simulated. This study investigates the location of cameras to determine if fewer cameras can be utilized from these other locations (e.g. - side of freeway) and still provide the necessary T.V. coverage. This study is to be carried over into Fiscal 1964.
 - c. Evaluation of Monitor Output to determine:
 - (1) Scope and limitations of information

(2) Accuracy of Information

(3) Observer abilities and limitations

Data collection has been completed. Statistical analysis is underway. This work will be carried over into Fiscal 1964.

d. Measure of Benefits Derived from Television

Under this category, planning has been completed to conduct the study of:

(1) "Time Saved in Detection, Evaluation and Dissemination of Information on Incidents". This study will be completed in Fiscal 1964.

2. Evaluation of Traffic Control System - Lane Signals, Speed Signs, and Ramp Controls.

- a. Preliminary Evaluation of Lane Control Signals has been completed. Results were presented in the report "Development and Preliminary Evaluation of the John C. Lodge Surveillance Project."
- b. Preliminary Evaluation of the Ramp Control Signals is underway. Results are presented elsewhere in the report.
- c. Evaluation of Supervisory Control Equipment. This study covers the control panel and confirmation panel, and circuitry and method of confirmation. Individualizing speed control and addition of two spans of lane signals require redesign of this equipment. This work is in the initial stages and will be carried over into Fiscal 1964.
- d. Development and Evaluation of the Types of Lane Signals and Speed Signs. This study is a performance evaluation

as to punch, maintenance, power requirements, etc., of the three types of lane signals; incandescent, fluorescent, and neon, based on project experience. This also includes a discussion of the development of a new "matrix" type lane signal. This new type will be used for the additional signals that have been purchased. This report has been completed and is awaiting review for publication.

3. Evaluation of Automatic Sensing and Computer Equipment

a. In this general area of research the evaluation of various detectors and specifically the sonic detector utilized on this project is underway. Data has been collected for the comparison of radar and sonic detectors. Analysis must be carried on. Evaluation of the sonic detector from project experience is part of this study.

b. Computer and Data Processing Equipment.

Due to the mass data collection capability of this sensing instrumentation on the project, an appraisal study is being conducted to determine the equipment necessary to properly and adequately accommodate their potential. Initial investigations have been made for this appraisal and reflected in the budget for Fiscal 1964. In this regard, much cooperation has been forthcoming from industry and other research organizations in assisting in the determination.

4. Traffic Operational Research

This area is directed to research in traffic characteristics, to provide base data for evaluation of the Television System and the Control System as well as for increasing the store of knowledge

and information in Freeway Traffic Flow.

a. Travel Time Studies

- (1) Report on "Measuring Travel Time from T.V. Surveillance", is underway. Analysis is complete. Final report writing remains.
- (2) A Comprehensive Travel Time Comparison for the various conditions of weather, time of day, volumes, speed, density, etc., is underway. Computer programs have been completed. Comparisons and analysis will begin in the near future.

b. Freeway Volume Study

- (1) To provide base volume data for use in evaluation of "before" and "after" comparisons related to the Control System, an extensive data collection program has been completed. A report on this data is being written for comparisons under the Control System. Volume data is being collected continuously and processed from Fisher-Porter punch tape to I.B.M. cards. The volume data is collected by lane, for 24 hours each day.
- (2) Complete Ramp Volume has been collected and is being compiled for a separate report.
- (3) Lane Distribution data is being compiled for a separate report.
- (4) Classification of Freeway and Ramp Volumes is a part of this study. Data collection has been completed for this purpose.

c. Lane Change Study

Final report on the "before" period has been published.

"After" period data collection is underway.

d. Effect of Incidents on Freeway Traffic

Final report published on this study.

e. Shoulder Usage

Final report published for "before" period. Preparations for "after" period underway.

f. Additional studies, active but held in abeyance, in lieu of priority studies.

(1) Characteristics of Stoppage Wave

Partial data collection has been completed. Additional data collection is required and is scheduled for Fiscal 1964.

(2) Prediction of Stoppage

Some data collection has been completed, however, much more is required and will be scheduled for Fiscal 1964.

(3) Constricted Flow Study

More data collection required.

Studies to be Completed by June 30, 1963

1. Freeway Volume Study - Basic Data Report
2. Development and Performance of Lane Signals
3. Preliminary Evaluation of Traffic Control System
 - a. Lane Signals
 - b. Ramp Controls
4. Measuring Travel Time from T. V. Surveillance

Research Program - Fiscal 1964

The research program for Fiscal 1964 is presented here. This research program consists of primarily the completion or extension of research activity presently underway. However, it will also include research studies which will be initiated for the first time. This program is based upon the existing staff assigned to the project for research activity. The research is presented here in order of priority.

1. Evaluation of the Traffic Control System

A complete evaluation of the Control System will be conducted as a first item of business for Fiscal 1964. This includes:

- (a) Lane Signal Control - this will cover the two additional spans of lane signals of the matrix type. The preliminary evaluation will be supplemented with the total data for this study.
- (b) Speed Signals - individualizing speed control signals will immeasurably increase the ability and flexibility for speed control of freeway traffic. Evaluation of these speed controls is a significant part of the total system evaluation. This will be directed towards determination of the best "speed" messages to produce the most efficient speed control.
- (c) Ramp Control Evaluation - the preliminary evaluation will be supplemented and the complete evaluation carried on.

2. Development of Operational Procedures for Traffic Control System -

The objective of this study is to develop criteria for the most beneficial and efficient operational procedures for operating the Control System. This will be directed toward the determination of critical traffic parameters of speed, volume and density and will

- be related to the prediction of stoppage study. Much has already been done in developing interim procedures and during the next fiscal year standard operational procedures to make maximum use of the Control System for increased freeway operational efficiency will be completed.
3. Freeway Volume Characteristics - A report presenting the basic freeway volumes will be completed by June 30, 1963. To supplement this report, additional reports covering Lane Distribution, Ramp Volumes, and Classification of Freeway Traffic, respectively, will be prepared during the year.
 4. Prediction of Stoppages - This study is to be reactivated in Fiscal 1964. The purpose of this study is the determination of parameters for critical level of traffic characteristic speeds, volumes and occupancy to anticipate congestion. This will then dictate the corrective measures to prevent such congestion.
 5. Travel Time Study - The comprehensive analysis and comparison of Travel Time as related to other traffic characteristics, as well as weather condition, location, design, etc. The rate of progress of this analysis will depend upon computer operations. Programs for this work have been completed. This is scheduled for completion during the next fiscal year.
 6. T.V. Observers Abilities and Limitations - This study was initiated early in 1962. It has been held in abeyance because of the lack of a qualified statistician working with the project. This type of personnel is now available. It is now possible to continue this research.
 7. Project Equipment Evaluation - This evaluation is a continuing effort in order to compile complete information on all instrumentation and

equipment utilized on this project. This includes the T.V. System, Traffic Control System and the Data Collection Equipment. As this is a continuing effort, it will be undertaken for the duration of the project.

8. Other Research Planned for Fiscal 1964 - Contingent upon completion of scheduled work or perhaps additional personnel.
 - a. Constricted Flow Study - This is the study of traffic flow under constriction when one lane or more is blocked for the purpose of evaluating the lane closure procedures and the lane control system.
 - b. Comparison of Density and Occupancy Concepts and Inter-relationships. The density concept of vehicles per mile will be compared with occupancy concept of per cent of occupancy of the roadway.
 - c. Scope and Limitation of Information from T.V. - Some work has been underway on this study. This is directed toward the determination and character of information available from T.V. Surveillance. This also will reveal the camera coverage and location of blind spots in the study section.

Research By Other Agencies and Organizations

Since the inception of this project, considerable interest has been generated among other agencies; City, State, National and International, as well as independent research organizations. In addition, numerous industrial concerns have become very interested in the instrumentation development area as well as research related to their activities.

Many research organizations, upon hearing of the laboratory for research provided by the instrumentation and project facilities, have requested permission

to perform research, independently or in cooperation with the Project, or have requested use of specific traffic data for specific analysis.

Discussion of some of this activity will be briefly presented here:

1. Bureau of Public Roads - although the Bureau is participating actively on the Project research, other personnel engaged in research requested traffic data of a specific nature. Mr. Roblee Winfrey of the Bureau requested traffic data consisting of seven days of 24 hour traffic data on speeds, total volumes, truck volumes, occupancy by lane, and for the total freeway. The purpose of this research is to determine the relation of the speeds commercial vehicles to the total freeway traffic in an effort to reveal the effect of commercial vehicles in the traffic stream. This data has been provided and the analysis is underway.
2. Institute For Research - Singer Foundation, State College, Pennsylvania -
 - a. The Institute for Research is conducting a project sponsored by the National Institute of Health in "Driver Decision Making" and the attenuating circumstances in the traffic stream resulting in errors in decision making and perhaps accidents.

They visited the Project, and in their resulting enthusiasm, requested permission to perform this research on our Project, and a mutual study design was developed for them to take time spaced movies to study the decision making of drivers when lane closures were initiated. Their analysis is continuing.
 - b. Their realization of the Project facilities as a unique research laboratory prompted their requesting permission to perform a second research project funded by the National Institute of Health, for the purpose of video recording events and circumstances leading up to accidents on the freeway study section. This project requires

the application of the latest equipment in video recording and will require the expenditure of a good sum of money for providing this instrumentation. They plan to build a library of films of accidents for use by any interested organization, national and internationally. This project is being submitted for approval by the Institute of Health in the near future.

3. General Motors Technical Center - The Transportation Research Staff at General Motors requested permission to obtain traffic data from the project consisting of vehicle volumes, bus volumes, and passenger volumes as part of a study in the passenger volume characteristics relative to vehicular flow. The entire data for this study was obtained from the instrumentation at the Project except passenger volumes. They obtained information on spacing and speed of buses relative to the total stream. They are performing the analysis on this study now.
4. Aerial Photo Study of Traffic Control System - A special study directed at the evaluation of the lane signal controls is being conducted with cooperation of Dr. T. W. Forbes of Michigan State University. The use of the aerial photo technique for study of freeway traffic flow during lane closures will be utilized. It is also anticipated that aerial photo studies will be made of surrounding surface streets during ramp closures.
5. Institute of Traffic and Transportation, Texas A. & M. College, Texas - Under Professor Jack Keese, the Institute at Texas A. & M. conducted a study of the effects of freeway accidents. For this study, personnel were brought in from the college. The technique used to record the incidents and accidents utilized a 16 mm movie camera photographing from the T.V. monitor. The analysis for this study is continuing. Professor

Keese has indicated that he would be interested in sending more staff to the Project for additional research in many areas.

6. Cornell Aeronautical Laboratory - The Highway Research Board through the National Highway Cooperative Research Pool has awarded a grant to this organization to conduct a project on Surveillance Methods and Ways and Means of Communicating with Drivers. The objective of this project is to develop, practice, and evaluate various methods of surveillance and means of communicating with drivers. The staff on this project have embarked on inspection of active projects in the field of surveillance. They have visited the T.V. Project and are greatly interested in becoming acquainted with the tremendous research potential this laboratory of instrumentation affords. It would be mutually beneficial to have this organization make use of the Project facilities and discussions were carried on in this regard. Cornell Laboratory personnel will meet again with Project staff to determine how cooperative research can be performed to assist in their project as well as the total objective of the project research.
7. Interested Industry in Project Instrumentation Development - The potential of collecting mass traffic data available in this project necessitates the investigation into data logging and processing equipment for this purpose. Many companies have expressed a great deal of interest in assisting the Project in this regard. I.B.M. and Lear Seigler of Grand Rapids, who are eminently qualified in this area of methodology in research and data processing and logging have indicated a willingness to assist in many ways. The redesign of the Control System Console is required with the individualizing of speed sign control and new spans of lane signals, and the addition of speed, volume, and occupancy meters

providing traffic data from presence detectors for control.

Lear Siegler Company have been engaged in the development of instrument consoles for aircraft and spacecraft. Their experience and competence in this type of development will be available to the Project.

The foregoing discussion is a testimonial of the research potential this Project possesses. The national and international attraction manifested by the interest of research organizations and agencies as well as industry in the field of electronic instrumentation has surpassed any initially conceived estimate. The laboratory for research is present; the research opportunities and needs exist; the generosity and cooperation of industry and research organization is available; the contribution to freeway traffic research and control can be unlimited.

Project Equipment Requirements for Fiscal 1964

The research program outline for Fiscal 1964 will necessitate supplemental instrumentation and equipment. This is required for the performance of the research as well as implementing the Control System to bring it up to ultimate operational status. The maximum benefit from the Control System will then be possible.

Project equipment requirements and cost estimates are presented here and also the operational cost estimate for a one year period.

1. Presence Detector Equipment - A prime responsibility of this Project must be to optimize the use of the Traffic Control System to provide the maximum improvement to freeway traffic. It is imperative that the control operator have immediately at hand traffic information which will definitely and completely characterize the traffic flow under control. Then, and only then, can the Control System be utilized to its fullest potential.

To provide basic traffic information to the control operator in order to obtain maximum use of the Control System, a network of presence detectors must be obtained. This network of presence detectors will provide the operator with traffic information at many locations on the freeway. This system will present to the operator, in an instrumented panel, the levels of volume, speed, and occupancy to enable the operator to obtain more accurate, realistic operation and to make maximum use of the Control System to improve traffic flow. These presence detectors of the sonic type would be located equidistant along the study section and would continually transmit traffic data to the display panel for scrutiny by the operator at all times. Thus, corrective action by the operator could be rendered in a more intelligent manner. This would permit particularly increased efficient use of the speed control. The lack of this equipment has severely limited the ability of the Control System to provide assistance to the freeway traffic. This equipment, including detectors, transmission lines, installation, controls and display panel is estimated to cost around \$50,000.00.

2. Data Logging and Processing Equipment - To perform the planned research for the coming year and to make full use of the opportunity to obtain unlimited traffic data, efforts must be extended to obtain data processing equipment. This equipment is required to process the raw traffic information to computer operation for analysis. This has been a very critical area on this project and has significantly limited the research program. The ability to process mass traffic data will enhance this research program immeasurably as computer operation of mass data provides unlimited analysis. This equipment includes a data logger, punching directly to

Ramp Closure Evaluation Study

The study was planned to determine the effect on freeway traffic that closing of entrance ramps would provide. Nine ramp closure signs were installed in the three mile study area in January 1963. Four of these are at locations in the outbound, or northbound, direction and five are in the inbound direction. These are located at points where it is desirable at times to restrict normal traffic from entering at a particular ramp. The use of these signs would normally be limited to peak directions of traffic, except at such times as a vehicle is stalled at the foot of a ramp or on a ramp, an accident or congestion with stoppages at the bottom of a ramp such that traffic could not enter. The ramp signs were operated on this basis for approximately a month prior to our study week.

During the study week of March 4, 1963, ramps were studied to determine the dispersal of traffic desiring to enter at a certain point, along with attempted use of the ramp closures to eliminate or reduce lane stoppages throughout the study area and maintain a smooth maximum flow of freeway traffic. Ramps were closed one at a time and also in various combinations to attempt to secure the greatest effect for free movement on the freeway. Prior to the study, directional signs were placed throughout the area which direct motorists to the next entrance point when a particular entrance ramp is closed. For approximately two-thirds of the study area an adjacent service drive provided ready movement to the next available entrance point. In the areas outside the service drive, motorists were directed to the first available through street to carry them to the next entrance point in the area.

For a three week period prior to the study week, volumes were recorded on the freeway along with volumes on surface streets at 48 locations such that a

pattern of traffic movements in the area prior to any ramp closures could be obtained and used for comparison.

During these three weeks, lane stoppages were also recorded for the peak directions from 7:00 to 9:00 AM and from 3:00 to 6:00 PM. No lane stoppages were recorded when caused by a stalled vehicle or unusual incident that set up a series of stoppages. Stoppages were recorded only due to traffic volume congestion. During the study week these were also recorded along with average flow speeds and per cent of occupancy at the Chicago and Calvert detectors. Speeds were also taken in areas directly related to ramp closures using a speed trap. Lane changes were recorded in four camera views in each direction covering the areas most critical in their relationship to the ramps being closed. Travel times of vehicles through the 13 camera area were also taken during each of the study periods of the study week.

The first day of the study week was devoted to familiarizing the numerous new men with performing their various duties towards gathering data for the study. For this reason, we are not including this first day's data as part of the week's study. Whenever a ramp closure was made, a police officer was standing by to insure complete compliance to the closure, so that the full effect of a positive closure at these various points and also the surface street distribution of this diverted traffic could be studied.

It was found during the weeks' study that the closing of ramps at critical traffic periods materially benefitted freeway traffic movement. During the out-bound period from 3:00 to 6:00 PM, the congestion period was shortened up to one hour, and during the morning inbound period from 7:00 to 9:00 the congestion period was shortened approximately one-half hour when compared to previous normal operation with no ramps being closed during these peak periods.

A review of Table I relates freeway volume comparisons during the study week to the previous three week average. As the table shows, during the three hour

outbound period, traffic was increased on the freeway by 3.5 to 5 per cent for the four days observed. During the two hour inbound period in the morning, traffic increases in volumes ranged from 4.75 per cent to 13 and 13.7 per cent. These volumes were accomplished by greatly reducing lane stoppages throughout the study area and thereby better able to maintain higher uniform speeds, resulting in a greater number of vehicles moving through the area in the same length of time.

Table II relates individual lane stoppages with the previous three weeks compared to the study week for each direction of peak traffic. Here again, we find a great improvement using this gauge to determine the effectiveness of closing ramps at critical locations. During the outbound periods the average reduction in lane stoppages ranged from 51 to 92.5 per cent less lane stoppages for the study week than for an average day without using ramp signals. Considering only the periods when a ramp was closed, as against the same periods previously, the lane stoppages are down even further from 65 to 92.5 per cent reduction. For the inbound period from approximately 7:00 to 9:00 AM the stoppages were reduced by 22 to 54 per cent and again considering the ramp closure periods only, the percentage is increased to 26 to 65 per cent reduction in lane stoppages.

The travel time data taken from the television monitors throughout the area during the study further bear out the effect of being able to change ingress points within the study section. Normal average travel times through the area during peak periods usually average 20 to 28 miles per hour as opposed to the study week period averaging essentially between 30 and 40 miles per hour with some full closure periods averaging very close to 40 miles per hour throughout the whole study area.

The typical condition at the John C. Lodge and Edsel Ford interchange during the afternoon peak period has stoppages and restrictions at the north end of the

interchange almost continuously throughout the late afternoon peak period. By changing ingress points, it was possible to eliminate this congestion at the north end of the interchange completely for extended periods.

Not only is it possible to maintain free, smooth movement through the area during peak normal conditions, but during an unusual condition such as a stalled vehicle occurring during the peak period, the ability to restrict entering traffic during these times is extremely beneficial. In one afternoon peak period a vehicle stalled all three lanes of traffic, which quickly filled in almost two miles. Traffic in three lanes, and four lanes in part of the area, came to a complete standstill. By the use of two ramp closures after the stalled vehicle was removed to the shoulder, all of the accumulated traffic was cleared out and moving in 22 minutes. Normally, an incident such as this occurring shortly after 5:00 PM would continue congestion and very slow moving traffic until approximately 6:30 at night, when volumes would drop to the point where it could clear itself out.

The approximate percentages of diverted entrance ramp traffic of the volumes moving on the freeway ranged from 9 per cent on Tuesday to 17 per cent on Friday for the three hour outbound periods. In the main, these percentages of diverted traffic merely had to proceed to the next available entrance ramp to continue in the desired direction and get on the John C. Lodge freeway. In the morning period from 7:00 to 9:00 AM, the various closures diverted from 5 to 8.8 per cent of the through volume on the freeway during this time. In other words, by shifting the entrance point for relatively few vehicles, it was possible to improve the movement throughout the whole study area, and these diversions, for the most part, did not stagnate surface street movements. Most times the surface street volumes would move steadily through the area between signal changes. Much of the surface street data concerning volumes at the many locations will require further analysis not complete at this time, as well as some correlation of data to certain happenings

during the study week to attempt to find a relationship between some of the other variables concerned with this study.

This preliminary review of the weeks' study definitely shows a great gain is possible by the use of the ramp closure system, provided that it is used wisely and prudently as conditions warrant, and further provided driver adherence to the sign indications remains at a high level.

This study already shows the need for a reassessment of the existing signal system such that it will be capable of adapting to heavy surges of traffic on short notice. In addition, a few areas will require an automatic direction marker change such that when a certain ramp, or ramps, are closed, traffic is automatically directed to the next available entrance.

Further analysis and additional study will also show what ramp closings or combinations, at what times, provide the greatest area benefit. This, coupled with freer movement on the surface areas can maximize the freeway travel to a point where jam ups could be a thing of the past.

Some exit ramp signals could also be very beneficial at critical times such as has happened when a gasoline tanker overturned and blocked the freeway for an extended period.

This study has also pointed out three design weaknesses in the area. One involves a 1.9 per cent upgrade of approximately 1500 feet that regularly initiates stoppages due to drivers unconsciously reducing speeds up to 8 miles per hour.

The curve areas in the vicinity of Hamilton also cause stoppages due to speed reductions in this area.

A third condition produces a severe throttling effect on inbound flow at the Davison interchange where westbound Davison traffic merges on the left in a short distance with inbound John C. Lodge traffic.

RAMP CLOSURE STUDY

Table I

Freeway Volume Comparisons

| | 3-Hour Outbound Volumes 3:00-6:00 p.m. | | | 2-Hour Inbound Volumes 7:00-9:00 a.m. | | |
|-----------|---|-------------------------|---------------|--|-------------------------|---------------|
| | Previous 3-week Average | Study Week 3-5-63 | % Increase | Previous 3-week Average | Study Week 3-5-63 | % Increase |
| Tuesday | 16490 | 17320 | 5% | 10998 | 11521 | 4.75% |
| Wednesday | 15378 | 15954 | 4% | 10807 | 11456 | 6% |
| Thursday | 16248 | 17067 | 5% | 9998 | 11365 | 13.7% |
| Friday | 16575 | 17155 | 3.5% | 10845 | 11542 | 6.5% |

RAMP CLOSURE STUDY

Table II

Freeway Lane Stoppage Comparisons

| | Outbound | | | | Inbound | | | |
|-----------|----------------------------------|-------------------------|---------------------------|------------------------------------|----------------------------------|-------------------------|---------------------------|------------------------------------|
| | Lane Stoppages 3:00-6:00 p.m. | | % Difference | | Lane Stoppages 7:00-9:00 a.m. | | % Difference | |
| | Previous 3-week Average | Study Week 3-5-63 | 3-hour Study Period | Ramp Closure Periods Only | Previous 3-week Average | Study Week 3-5-63 | 2-hour Study Period | Ramp Closure Periods Only |
| Tuesday | 67 | 33 | Down 51% | Down 65% | 43.5 | 34 | Down 22% | Down 36% |
| Wednesday | 114 | 26 | Down 77% | Down 82% | 67 | 31 | Down 54% | Down 65% |
| Thursday | 90 | 9 | Down 90% | Down 90% | 58 | 28 | Down 52% | Down 54% |
| Friday | 94 | 7 | Down 92.5% | Down 92.5% | 40.5 | 30 | Down 26% | Down 26% |