A HELICOPTER EVACUATION SYSTEM FOR BATON ROUGE, LOUISIANA

A Problem Solving Project Report

Submitted to the Faculty of

Baylor University

In Partial Fulfillment of

Requirements for the Degree

of

Master of Hospital Administration

By

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August, 1970

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ABSTRACT

A HELICOPTER EVACUATION SYSTEM FOR BATON ROUGE, LOUISIANA

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By Major Charles F. Clark, MSC

August, 1970 60 Pages

A copy of this document may be obtained on loan from the United States Army Medical Field Service School, Brooke Army Medical Center, Fort Sam Houston, Texas.

The object of this study was to determine an optimum system of utilizing helicopters as a means of evacuating highway accident victims to a health care facility and to determine the personnel and the equipment required to support this system in the Baton Rouge, Louisiana, area. Data were collected by interviewing persons experienced in helicopter evacuation and highway accidents and by sending letters of inquiry to noted authorities in the field. Analysis of the deaths and the injuries on the highways in Baton Rouge, Louisiana, reveals that the public must devise additional means of assuring accident victims a better chance for survival and recovery, with less probability of permanent impairment. The conclusion can, therefore, be drawn that a helicopter evacuation system, which derives its effectiveness from speed, range, and independence of surface features, can reduce deaths and injuries significantly. It is recommended that this helicopter evacuation system be implemented.

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CHAPTER I

INTRODUCTION

General Information

In 1966 the Congress of the United States enacted two significant laws that will affect vitally every American living today. These are the Highway Safety Act and the Motor Vehicle Safety Standards Act. Their purpose is to reduce the appalling loss of life and property and the tragic injuries occurring daily on the nation's highways. The Department of Transportation has been charged with implementing these acts, and the National Highway Safety Bureau was created to administer them.[1]

These two acts direct that far-reaching steps be taken to improve both the driver and the automobile, as well as the total environment in which they operate. Already, standards for making the vehicle safer have been promulgated to the automobile manufacturers.

In March, 1968, President Johnson, in his message entitled "Health in America," directed the Secretary of Transportation, the Secretary of Defense and the Secretary of Health, Education, and Welfare, to devise a test program to help the states and the local communities develop effective rescue systems for victims of all types

of accidents. The Department of Transportation has taken the lead in implementing the president's request. Its main interest is the transporting of highway accident victims to health care facilities capable of treating the specific injuries.[2]

United States Army experience indicates that helicopter evacuation of the wounded has been the most significant factor in reducing the death rate per hundred wounded from 4.5 in World War II to 2.5 in Korea and, now, to less than 1 in Vietnam.[3] This dramatic decrease in the military death rate suggests a promising innovation for reducing the number of deaths and permanent injuries resulting from motor vehicle accidents. If the earliest possible first-aid, rescue, emergency transportation, and definitive medical care can be provided for victims involved in vehicle accidents, it is projected that the fatality and the permanent injury rates could be significantly reduced.

General Spurgeon H. Neel recently stated:

> The American public is entitled to the best emergency service should they [sic] become involved in an automobile or other type of accident. The image of cities and states can be substantially improved by accepting the responsibility for providing adequate protection to their citizens and visitors. The "right to live" is a basic right in our society.[4]

Conditions Which Prompted the Study

Because of the impact of population expansion, health legislation, and technological advances, an urgent need for

a coordinating and planning agency for hospitals and related health services has developed. The Louisiana Capital Area Health Planning Council was established to ascertain the complete health needs of the ten-parish area surrounding Baton Rouge (see Appendix A). At the same time, the council was charged with establishing the priority health needs for the community and recommending the most fruitful expenditures for its health dollars. This council has recognized the problems associated with highway accidents and has requested that a study be made in this area.

Traditionally, local, state, and federal government response has been focused primarily upon means to prevent accidents. Numerous programs to improve highway design and maintenance, traffic flow, law enforcement, and vehicle design have effectively reduced the death rate, but the absolute number of persons killed or injured continues to increase. This concentration on the pre-accident problems has reached a point of diminishing returns.

It is estimated by the Safety Council of Greater Baton Rouge that more than 78 persons will be killed and 5,450 will be injured in automobile accidents in the city of Baton Rouge and in East Baton Rouge Parish during 1969. Of those injured, at least 443 will suffer permanent disability. Even without considering the humanitarian aspects, the total cost to the economy of Baton Rouge and the state of Louisiana will exceed 19 million dollars.[5]

Despite our best efforts toward accident prevention, people will continue to be involved in motor vehicle accidents. We must, therefore, devise additional means of assuring the accident victims of a better chance to survive and recover, with less probability of permanent impairment. This approach requires a thorough investigation of the post-accident problem, a problem which has not received the attention it merits.

The problem that exists in Baton Rouge exists as well in every community that does not have a helicopter evacuation system. The conditions which prompted this study have implications and their possible resolutions have applications to other communities with a similar problem.

Statement of the Problem

The problem is to determine the optimum system of utilizing helicopters as a means of evacuating highway accident victims to a health care facility and to determine the personnel and the equipment required to support this system in the Baton Rouge, Louisiana, area.

Objectives

The objectives of this paper are:

1. To analyze the highway accident problem.
2. To explain the concept of helicopter operation.
3. To describe the personnel and the equipment to be used in this system.

4. To define the mission of the helicopter evacuation system.

Criteria

In a recent article published in Journal of the American Medical Association, General Spurgeon H. Neel proposed that a civilian helicopter evacuation system should provide:

1. A quicker response to highway accidents than can be attained with conventional ambulance services, while maintaining operational compatibility with those services.

2. An operational capability during daylight or darkness and under a wide variety of weather conditions.

3. The adaptation to requirements caused by expanding population centers and advanced technology.[6]

Factors Bearing on the Problem

Factors bearing on the problem are:

1. Hospital heliports must meet the Federal Aviation Agency standards.

2. Baton Rouge presently has no air evacuation system.

Assumptions

For the purpose of this study, the following assumptions are made:

1. The determined number of appropriate personnel such as pilots, medics, and rescue specialists will be available.

2. The determined number and type helicopters will be available.

3. The procedures for employment of helicopters will be modified as operational requirements dictate.

4. The trend levels of geographical density of highway accidents will be determined by analyses of historical data. This implies that established density patterns of highway accidents are dependent upon environmental conditions and will not change appreciably until the environment is modified.

Research Methodology

Data were collected by interviewing persons experienced in the helicopter evacuation field and the highway accident problem to determine the scope and the magnitude of this study. A traffic survey was conducted to determine the peak traffic load. Data thus obtained were recorded and evaluated in the light of information gained through research of the literature. In addition, personal experience and knowledge gained from actual association with the employment of the Army's concepts and tactics concerning aviation have been drawn upon to synthesize operational procedure.

Literature Review

A review of the current literature reveals a limited number of articles on the helicopter evacuation of highway accident victims. The concepts described are often nothing more than novel variations outlining a specific approach to solving a local problem. The majority of these articles deal with local police and fire departments and are concentrated in a few technical journals. These articles are extremely basic in nature and concentrate upon methods and procedures of how, when, and where a system could be employed. Of the articles reviewed, only two dealt with a civilian system that is in operation at the present time.[7]

Although there is a definite lack of material directly applicable to the problem area, the available literature does offer general information on the subject and provides valuable sources for the researcher. In the following paragraphs, the intent is to summarize briefly the main ideas encountered as a whole, while concentrating upon the basic principles generalized from various articles, letters of inquiry, and personal interviews.

Each article refers to the efficiency of helicopters as air ambulances. This efficiency is abundantly documented, particularly in reference to the Army's experience in Southeast Asia.[8] Helicopter reliability is excellent, and flexibility of utilization is outstanding. Each helicopter system derives its effectiveness from speed, range, and

independence of surface features. This system permits the evacuation of the injured to a health care facility that can best give definitive treatment to the patients.

Many of the writers indicate that the lifesaving endeavors of helicopters increase in incidence each year. It is significant that, when transportation is bogged down because of floods, snow storms, or traffic congestion, helicopters can do the job. The helicopters will not replace the ground ambulance but will be used to supplement the present system.[9]

A definite tendency is appearing within the civilian communities to use helicopters to perform a variety of essential missions, such as traffic surveillance, fire patrol, and personnel transportation, but the mission with the highest priority is always the evacuation of injured persons.[10]

Footnotes

[1]U. S., Congress, House, Highway Safety Act of 1966, 89th Cong., 2d sess., Journal, July 15, 1966.

[2]U. S., Department of Defense, Developing Effective Rescue System, memorandum for the secretaries of the military departments (Washington, D. C.: Government Printing Office, March 23, 1968).

[3]James H. Winchester, "Dust-Off! Dust-Off! Lifeline Home from Vietnam," Reader's Digest, XXCVIII (May, 1966) 5.

[4]Spurgeon H. Neel, "Army Aeromedical Evacuation Procedures in Vietnam," Journal of American Medical Association, CIV (April 22, 1968), 313.

[5]Interview with Paul Ray Day, Managing Director, Safety Council of Baton Rouge, Louisiana, May 5, 1969.

[6]Neel, "Army Aeromedical Evacuation Procedures," p. 312.

[7]Ray F. Kunkel, "Civilian Air Evacuation Practices," Rocky Mountain Medical Journal, LXV (July, 1968), 43; "The Air Age Arrives for Michigan Hospitals," Michigan Hospitals, December, 1967, p. 6.

[8]"Use of Military Copters for Civilian Ambulances," St. Louis Post-Dispatch, December 28, 1967, p. 6A.

[9]"Airborne Ambulance on the Rise," Medical World News, X (April 18, 1969), 12.

[10]"Use of Military Copters for Civilian Ambulances," p. 6A.

CHAPTER II

DISCUSSION

General

This chapter is organized into two areas of discussion: the problem as it exists in the community and the issues involved in solving the problem. The purpose is to develop procedures and tasks upon which to base requirements for man and machine combinations that, hopefully, can operate at near optimum performance levels. The types and the numbers of men and equipment required for a helicopter team will be considered and specified.

An analysis of the highway accident problem has revealed the following pertinent facts: the number of motor vehicles on the highways of the United States has increased from 62.7 million to 99.9 million in the past fourteen years.[1] There are approximately 52,500 persons killed annually in motor vehicle accidents, and by 1972, the death toll in highway accidents will probably rise to 75,000 deaths yearly. It is estimated that one out of every two Americans born that year will be either killed or injured in an automobile.[2]

Since 1961, the rate has steadily risen to its present

level of 26.8 persons killed per 100 thousand population, and the actual number of individuals killed annually has increased by approximately 20,000 in the same period. Even with the vast effort and money expended to prevent accidental death, the number of persons killed and maimed by motor vehicles has increased on an average of 2,500 every year since 1961. This dramatic increase in deaths can be attributed to the fact that the number of motor vehicles has increased at an average of approximately 3 million per year over the same period of time.[3]

In 1968, the number of persons injured in motor vehicle accidents reached 1,980,000. Of those injured, 165,000 suffered permanent physical impairment.[4] In addition to this irretrievable loss, the monetary cost to all parties, including local, state, and federal governments, exceeds the 15-billion-dollar level yearly.[5] This figure does not include the full cost of continuing support and assistance to those permanently maimed or the loss of earning power of those injured.

This evidence suggests that the absolute number of deaths and injuries from vehicle accidents is at least partially a function of the number of vehicles on the roads. From the figures given above, it can be anticipated that the increase in the number of vehicles on the highways will be accompanied proportionately by an increase in the

number of persons killed and injured annually.

The Problem as It Exists in the Community

Highway accidents are the leading cause of death, and more accident victims occupy hospital beds than do cancer and heart victims combined. The epidemic of deaths and injuries can well be described as carnage. Yet, it is a matter about which the average citizen, as well as his government, has for too long been strangely complacent.

A fatal crash on the highway, a daily event, does not have the sensational public impact of a plane crash or a vessel's sinking. Nevertheless, the number of persons killed each year in water and air accidents is smaller than a monthly toll of highway deaths. An analysis of motor vehicle density patterns within the city of Baton Rouge during 1968 is illustrated in Appendix B.

It is assumed that a variety of complicating factors such as scope of the mission, controlling agent, establishment of heliports, standards for ambulance services, training requirements, and the communication system would have to be resolved before a helicopter evacuation system could be established. None of these represent an overwhelming obstacle. The benefits derived would more than compensate for any difficulties encountered. The use of surface ambulances is reaching a point of diminishing returns because of such factors as traffic congestion and

inadequate highway systems; these factors conspire to enhance the concept of helicopter ambulances utilizing proven equipment and techniques.

Mr. Walter Gutkowski, President of Superior Ambulance Service, has said:

> Our helicopter can carry two persons in its litters and is capable of maintaining a cruising speed of 90 miles per hour with a top speed of 105 miles per hour. With its night-flying equipment and our capability of flying in almost any weather, with exception of icing conditions, our service provides dependable emergency transportation.[6]

No attempt is made to demonstrate specific cost, convenience, or other comparisons of helicopter versus surface ambulance services. In considering the benefits from this system in the performance of that most basic medical mission, the reduction of suffering and the saving of life, it is impossible to equate necessity with lowest cost. At the battlefront, the duration of time between injury and definitive treatment has proven to be crucial in the reduction of morbidity and mortality, and it may be presumed to be significant on the highway.

Issues Involved in Solving the Problem

The operation can be viewed simply as a man-machine combination designed to carry out the functions derived from the mission. The system should be comprised of some optimum combination of men and machines, with each performing those tasks they do best.

Some of the primary issues are to provide a centralized control system, establish adequate and reliable communication, determine methods for locating and reporting casualties, and obtain skilled medical personnel who will provide medical attention at the site of injury, during flight, and upon arrival at the destination hospital.

In order to insure maximum effectiveness of the system, centralized control could be provided by the Louisiana State Police. A central communication center could be established by the state police and could be allowed to select the mode of evacuation (ground versus air) required by the injury. The central communication center, all ambulances (air ground), rescue vehicles, and all emergency hospitals could be linked by a two-way communications system. The request for ambulance evacuation could be initiated by any person observing or becoming directly involved in a highway accident. This request would be directed to the police department or the hospital; these agencies would ultimately notify the central communication center, which would dispatch the appropriate means of evacuation.

The helicopter, if not on ground alert, could be dispatched to patrol certain routes which historical data have identified as having a high accident rate. In order

to provide current and realistic information, these data should be analyzed on a monthly basis. On takeoff, the pilot should call the central communication center, which would be managed by the state police, and these two elements should remain in constant communication in the event that requests for other missions should arise.

At the time an alert is received, the helicopter might be either on patrol or on ground alert. Whichever is the case, all actions unrelated to the response to the emergency would immediately be relegated to secondary importance. Priority would be given to expeditious movement to the accident site. In order to accomplish such movement, the pilot would have to be able to identify quickly the accident location. It must be recognized that flying in certain weather conditions and night operations over rugged terrain are hazardous. The problem of wires over and adjacent to the highways is well recognized, as is the inherent danger in landing near crowds without proper crowd control. The final approach and movement of the helicopter about the accident area might be particularly critical under some circumstances. For these reasons, operational procedures for final approach assistance and approach without landing are proposed in detail below.

In most instances, the pilot would not require final

approach assistance in order to land quickly and safely. In some situations, such as in heavy traffic congestion, or with high obstacles near the landing point, fire at the accident scene, or adverse weather, final approach assistance might become necessary. Helicopter evacuation must be integrated with all other aspects of the emergency situation, including police and fire agencies. Hence, central control and effective air-ground communications are required. Each agency could be of great assistance to the other. Nonmedical agencies could help by locating casualties and initiating the emergency notification, by assisting in traffic control at the site of an accident, by controlling fire, if present, and by helping the helicopter to land. Highway patrolmen, police, and other law enforcement personnel who might normally be expected to appear at the scene of an accident should be trained to know the minimum approach requirements for helicopters. They must be able to determine the wind direction, the best landing position and approach, as well as standard arm and hand signals. With that knowledge, they could assist the pilot effectively to make a safe landing during daylight or darkness.

If the accident occurs in an area which is not directly accessible, the helicopter might be unable to land near the accident scene. In such an instance, the helicopter would hover above the accident scene and lower rescue personnel on the

hoist. The pilot may choose to land at a point near the accident scene and allow the rescue personnel to move to the site on foot. Upon arrival, the rescue crew should provide necessary extraction and emergency first-aid to sustain life and limb and to prepare the patient for evacuation. The casualties might be carried by litter to the selected landing area or be lifted to the hovering helicopter by the internal rescue hoist.

In order to gain access to the injured and remove them from the wreckage or further immediate danger, it is necessary that the rescue team be prepared for a number of tasks. It is presumed these tasks would be required only if the victim were still living. The primary rescue tasks would be: (1) suppressing vehicle fires, (2) freeing persons pinned in the vehicles or (3) removing the injured from positions in which they had come to rest without further compounding injuries.

Emergency medical treatment at the accident site should be directed toward saving life, sorting injured by priority for evacuation, and preparing the injuried for movement to the hospital. It is important that a medical survey of all persons involved be made as soon as possible and that appropriate lifesaving first-aid be administered concurrently. Medical treatment enroute to the hospital should be oriented toward preservation of life and

minimization of long-term effects from injuries.

An appropriate tagging system could be used to identify the nature and the extent of injuries at the time the victim was found and the drugs or the treatments administered.

The helicopter system, which derives its effectiveness from speed, range, and independence of surface features, permits the evacuation of the injured to the health care facility that can best provide definitive treatment to the patient. Thus, the patient would not necessarily be evacuated to the hospital which happens to be nearest to the accident site. The pilot, therefore, would have to be aware of the emergency and the specialized treatment capabilities of each hospital in the area. Through direct two-way radio communication with the central communication center, the pilot could relay information about the number and the type of patients plus their condition and the expected arrival time at the hospital to which the patients are being delivered. This alert would permit the emergency room to prepare for the arrival of the patients so that immediate attention could be devoted to the injuries.

Organization Structure

This section will explain (1) the functions of the cooperating agencies and facilities and (2) the coordination

between the area's public safety agencies and health care facilities involved in dealing with highway accidents. A proposed organizational chart is illustrated in Appendix C.

The Louisiana Department of Public Safety will provide the funds to purchase helicopters that will be utilized by the state police for traffic surveillance and evacuation of highway accident victims.

The state police department will furnish the helicopter crews and the required equipment and will provide a central communication center linking patrol headquarters, participating hospitals, Baton Rouge police, other law enforcement agencies, and other such agencies that would logically become involved in rescue and evacuation missions. The state police will establish patrol routes and schedules on selected highways for surveillance and patrol missions. plus any administrative procedures related to the operation and functions of the helicopter. The state police will contract the required maintenance to a Federal Aviation Agency-approved helicopter maintenance facility.

The hospitals that can provide emergency services in the Baton Rouge area are Earl K. Long, Our Lady of the Lake, and Baton Rouge General. They have agreed to construct an approved landing pad and to install adequate communication equipment to receive and transmit patient information.

If an emergency should arise, state, city, and other police, hospitals, and public safety agencies should contact the central communication center to receive the services of the helicopter teams.

Personnel Required

The helicopter team consists of three highly trained individuals, a pilot, an aeromedic, and a rescue specialist.

The pilot must have a current commercial helicopter pilot's license, an instrument card, and a medical certificate that meets the Federal Aviation Agency's requirements.[7] He is responsible for all aspects of surveillance and rescue; he must exercise supervision over the helicopter and the crew members; therefore, he must be competent in both medical and aviation aspects of the operation. His primary function is to fly the helicopter in a safe and efficient manner. The pilot is responsible for preparing flight plans and for determining the suitability of weather conditions and other safety factors as related to flying. He must maintain the helicopter's maintenance forms and records. In order to accomplish the mission of the helicopter team, the pilot must be a graduate of the state police academy, which will provide him with the knowledge and the procedures required to perform traffic control and surveillance.

The rescue specialist must be qualified to perform

minor maintenance on the helicopter to complete the daily inspection and minor repairs in case the helicopter happens to break down while away from the airfield. This individual should be trained in traffic control and surveillance techniques to enable him to lend invaluable assistance to the pilot. He will manage the rescue operations at the accident site, to include using special tools and expedient measures to gain access to victims and free them from the wreckage and subsequently to move them to the helicopter. To increase the overall efficiency of the system, he must have a basic knowledge of first-aid and vehicular fire fighting.

Ideally, the aeromedic should be a physician, but the uncertain availability of professional personnel would necessitate the employment of Red Cross qualified instructors or equivalent trained personnel to provide medical attention at the site of the injury and during the flight to the health care facility. The term "aeromedic," as used herein, has been coined to describe the duties performed and the situational environment of this individual.

The aeromedic is responsible for examining the accident victims to determine the extent of injury and then, to sort, treat, and prepare the patients for evacuation. The aeromedic must provide lifesaving first-aid to the patient from the time the patient is located until the time he is seen by a physician. Such care may include control

of hemorrhage and shock and application of dressings and splints. The aeromedic should be cross-trained in vehicular fire fighting to provide greater proficiency in rescue operations.

The strenuous demands both physical and mental, upon rescue personnel, require that the rescue specialist and the aeromedic be in good physical condition and to have remarkable emotional stability.

Equipment Required

Certain basic equipment such as medical, rescue, and fire suppressive items should be aboard the helicopter in order to accomplish the objectives of this system. As the system becomes operational, the list of equipment may be modified to meet the needs established by the experience and the recommendations of the helicopter team. Technological developments may result in changes to equipment requirements, so that the entire area of equipment is dynamic in response to the operational and the technological environment.

The equipment needed to implement this system is a basic helicopter with a standard equipment group. This group consists of engine instruments, navigational aids, and a flight instrument group. The cabin compartment of the helicopter should be large enough to accomodate a minimum of two litters, with sufficient space to permit

treatment of the patient while enroute to the health care facility. The landing light should be of the type that can be swiveled by the pilot's control. The radio should be capable of clear transmission and reception between the helicopter and the communication center or between the helicopter and other aircraft, or police cars. The intercommunication system that is used between members of the rescue team should consist of a transceiver installed in the inner liner of each member's helmet. These transceivers have a special voice-operated microphone to eliminate the need for pushing a switch while talking to the other members of the team. Thus, each person is able to perform his assigned duties without interference.

The flight instrument group should include a radar altitude warning system that is feasible for low altitude helicopter operations. At present this system is a compact thirteen-pound radar altimeter that can be programmed to alert a pilot to the fact that he has passed through low altitude limits or that he is descending too rapidly to make a safe landing.

In order to reach the scene of an accident, normal navigational procedures over a straight-line route are all that are required in the majority of circumstances. Some types of weather and terrain may necessitate more elaborate navigational procedures. There are several aids available

that can fulfill the need for navigation by instruments. One of the simpler systems is the homing radio which is capable of tuning to highway patrol and other police radio frequencies. There is also the possibility of the future development of inexpensive crash-actuated signal emitters that could be mounted as standard or optional equipment in automobiles. This would allow direct homing on an accident, even if no one had discovered the wreckage.

Police radio transmitters, or, perhaps, an emergency car radio system similar to that previously mentioned, could be used to guide the pilot directly over the accident in any type of flying weather. In order to pin-point the accident location under good visibility conditions, a variety of items could be used by ground personnel, such as flares similar to those commonly employed by the railroad industry, colored chemical smoke, red rotating lights on emergency vehicles, or a bright colored cloth used as a flag.

A hoist, a rescue net, and a rope could be carried in the cabin compartment for emergency use when landing is not feasible. With these pieces of equipment the rescue can normally be effected.

Fighting vehicular fires cannot be considered a major task for the helicopter team. However, it is appropriate for the helicopter to carry fire suppression

equipment that will enable the team to cope with any type of fire that might threaten the victims. A hand-carried carbon dioxide or chemical extinguisher should be adequate.

Before the victims pinned in vehicles are extracted, lifesaving first aid should be administered. The situations under which persons must be freed from the wreckage vary with each accident. Certainly, the helicopter would not be able to carry the vast number of tools and heavy equipment required for some conceivable tasks. The team could carry sufficient hand tools to be effective in all but the most unusual cases. In those instances, the aeromedic could give emergency medical treatment until suitable heavy equipment could move the wreckage.

The helicopter should be equipped with a variety of medical items. The aeromedic should have a portable aid kit which he would take with him each time he left the helicopter. For the contents of the kit, see Appendix D. The helicopter should have a blanket set, inflatable splints, oxygen supply with resuscitation equipment or portable resuscitator, some intravenous fluids, and two stretchers of the Stokes litter design (tubular steel with wire mesh bottom) which could be used with the hoist. Supplies and equipment would be dependent upon the ability of the crew and the variation in needs for specific first aid treatment.

Necessity of Heliports

The use of the helicopter in emergency medical care in the United States is on the increase.[8] The problem now is: where will the helicopter land? Of the 7,850 general hospitals in the United States, only 147 have heliports.[9] This means that the health care industry must accept the fact of helicopter evacuation as an up-and-coming method and prepare for it. New hospitals should incorporate a heliport into their plans. Established hospitals should be looking for a place to put a helipad.

The Earl K. Long and Our Lady of the Lake hospitals have the facilities to establish a ground level heliport near their emergency rooms. The Baton Rouge General Hospital has been surveyed to establish a rooftop heliport.

This section is not intended to explore the many possible or ideal heliport designs. These designs are available from the Federal Aviation Agency.[10] Rather, the purpose of this part is to stress the need for maximum exploration of and preparation for a superior method of patient movement by the health care industry. Granted, a heliport without helicopter service makes little sense, but in New Orleans, during Hurricane Betsy, the hospitals were suddenly invaded by 2,029 patients delivered by helicopters.[11] This indicates that helicopters and heliports should be incorporated into future plans to expand emergency medical services.

Performance Characteristics of Helicopters

The helicopter to be used for this system should have the following characteristics:

1. Sufficient capacity--The ideal helicopter should have a capability for carrying three crewmen, two litter patients, and approximately 300 pounds of fire suppression, crash rescue, and medical equipment.

2. Rapid starting and takeoff--The helicopter should not require engine warm-up before takeoff.

3. High speed--The helicopter should have a minimum cruising speed of 100 knots, which will allow it to travel to the accident site faster than any ground ambulances.

4. Adequate flying time--The fuel range of the helicopter should be such as to allow a flight endurance of approximately three hours.

5. Broad operating specifications--The helicopter should have the capability of operating in a wide variety of weather conditions.

Summary

Because of the need for increased effective highway accident medical aid, it is suggested that emergency service be organized around a helicopter evacuation system. Such a service reduces the number of deaths and the degree of injury. This reduction is accomplished by utilizing the

advantages of speed, direct access to the victim, and operational flexibility.

In order to facilitate this service, certain equipment and personnel are necessary. Initially, this would include a single helicopter with a standard equipment group, plus basic medical rescue and fire suppressive items. Also, heliports at health care facilities would be a necessary part of the overall plan for emergency service.

A three man team is required: a pilot, a rescue specialist and an aeromedic. The pilot would command the team, fly the helicopter, and coordinate surveillance, rescue and evacuation. The rescue specialist would be responsible for rescue operations at the accident site and would determine the use of special tools and expedient measures to gain access to victims to free them and move them to a selected facility. The aeromedic would examine the patient-victim, determine extent of injury and provide first aid.

Modifications are to be made as the system becomes operational and as technological developments change.

The entire evacuation system is dependent on coordination with local agencies and division of responsibilities. The Department of Public Safety would administer and provide the adequate funds. The state police would furnish the helicopter crews, equipment, provide a central communication

system, establish patrol routes and schedules and contract for helicopter maintenance. The hospitals would provide the necessary emergency services, construct helicopter landing pads and install adequate communications equipment.

This evacuation system would reduce the rapidly rising price of human life and suffering that we pay for motor vehicle accidents.

Footnotes

[1]Luman H. Long, ed., The World Almanac (Cleveland: Newspaper Enterprise Association, Inc., 1968), p. 109.

[2]John M. Waters, Jr., "Saving the Lives of 10,000 Accident Victims a Year," Verti-Flite, XIII (November, 1967), 3.

[3]Long, World Almanac, p. 759.

[4]Ibid.

[5]Marjorie Dale, "Casualty Care and Transportation in Non-Metropolitan Missouri," Missouri Medicine, May, 1966, p. 352.

[6]"Air Age Arrives for Michigan Hospitals," p. 7.

[7]Federal Aviation Agency, Medical Standards and Certification, Federal Aviation Regulations, Part 67 (Washington, D. C.: Publishing and Graphics Branch, FAA, March 20, 1965).

[8]"Airborne Ambulance on Rise," p. 6.

[9]John T. Foster, "Helicopters Make Sense in Medical Care," Modern Hospital, CXII (February, 1969), p. 79.

[10]Federal Aviation Agency, Heliport Design Guide, Advisory Circular No. 150/5390-1 (Washington, D. C.: Government Printing Office, November, 1964).

[11]Jean Ross Howard, "Helicopters Expand Hospital Service Area," Modern Hospital, CV (November, 1965), p. 103.

CHAPTER III

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In view of data presented in this study, the following conclusions are made:

1. The optimum system of utilizing helicopters as a means of evacuating highway accident victims to a health care facility in the Baton Rouge, Louisiana, area is to have the Louisiana state police integrate medical evacuation procedures into routine helicopter traffic surveillance operations.

2. The state police should provide at least two pilots (graduates of the State Police Academy), rescue specialists, and aeromedics plus the equipment listed in Appendix D to support this system.

3. The state police should finance, control, and operate a minimum of two patrol helicopters.

4. The ground alert helicopters should be located in a central position to provide communications with a central communication center.

Recommendations

It is recommended that:

1. The Louisiana state police integrate medical evacuation procedures into the routine helicopter traffic surveillance operations.

2. The Louisiana state police be given the responsibility of operating, financing, and controlling the evacuation system.

3. A minimum of two helicopters with crews be provided by the Louisiana state police to insure the reliability of this system and to meet peak and emergency requirements.

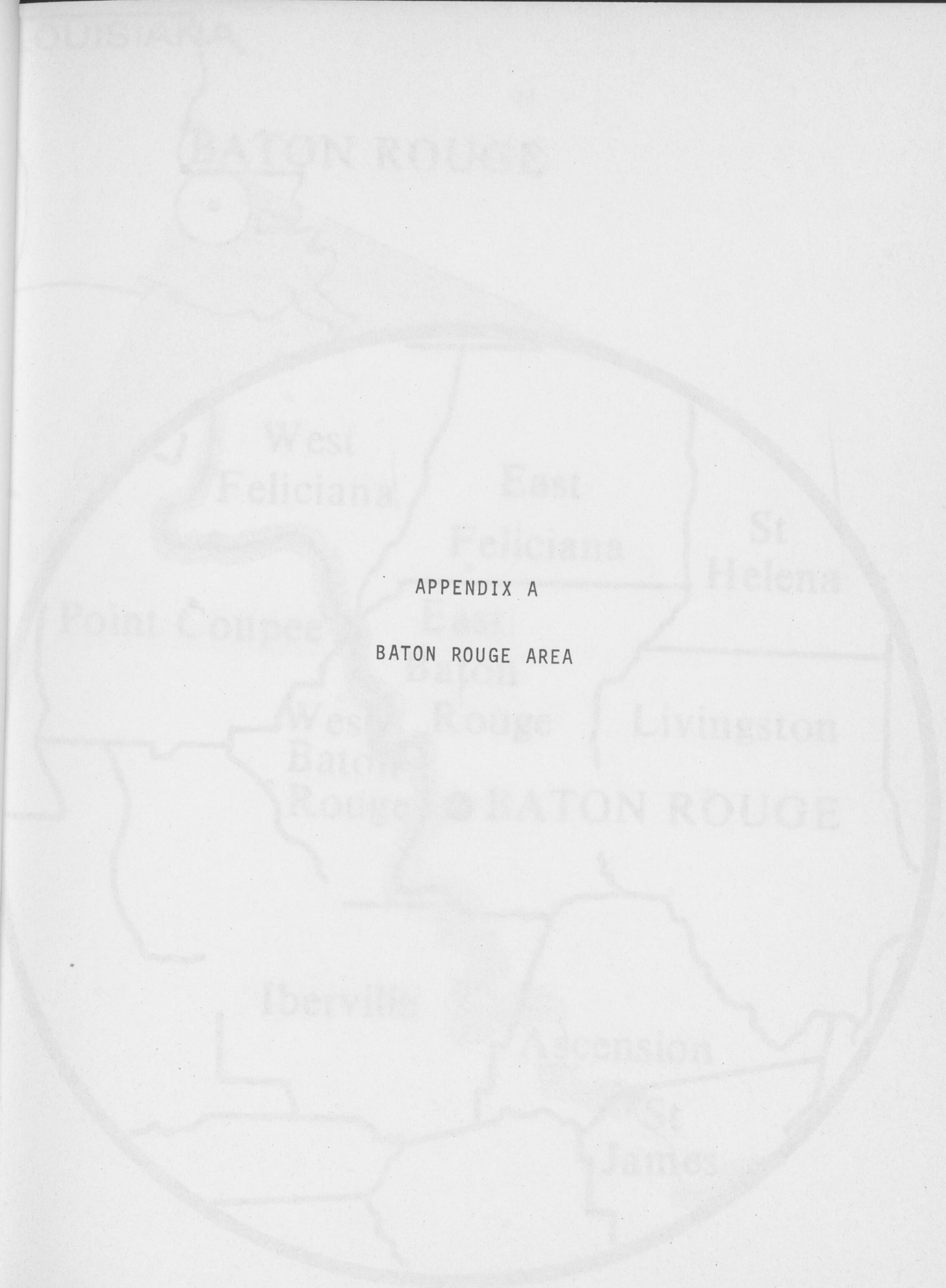
4. The Louisiana state police establish a central communication center through which they can provide centralized control over the evacuation system.

5. A perpetual briefing and training program be conducted by the Louisiana state police for personnel in police, fire, rescue, ambulance, hospital, and other emergency oriented agencies and businesses.

6. The ground alert helicopters be located at the Downtown Airport in Baton Rouge, Louisiana.

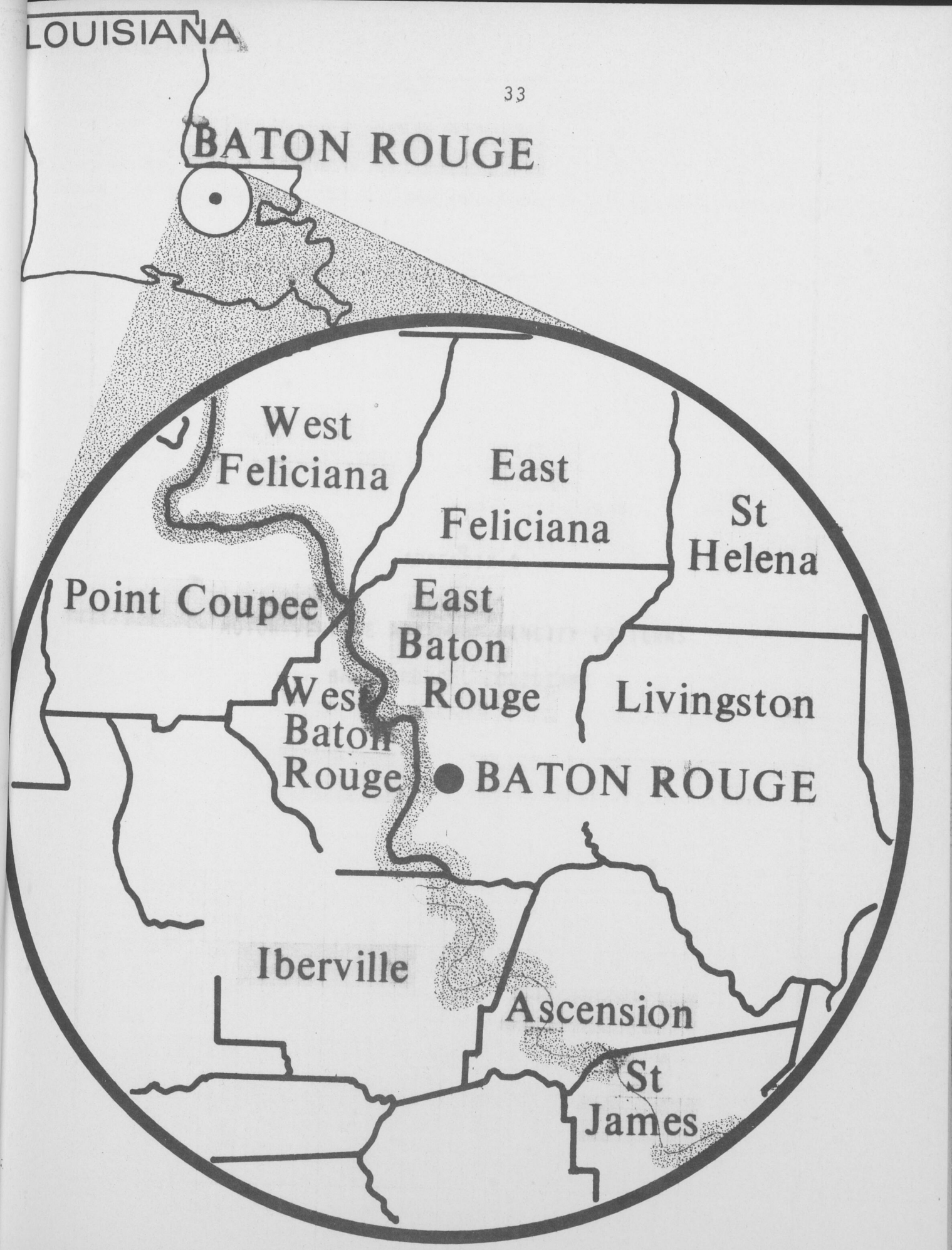
7. An area wide public information program be conducted during the employment of this system to gain the confidence and the cooperation of the general public, business, government, and private agencies and institutions.

8. A further study be conducted to establish the type of system most efficient for intercommunication with all agencies involved.



APPENDIX A

BATON ROUGE AREA


LOUISIANA
BATON ROUGE
West Feliciana
East Feliciana
St Helena
Point Coupee
East Baton Rouge
West Baton Rouge
Livingston
BATON ROUGE
Iberville
Ascension
St James

APPENDIX B

MOTOR VEHICLE ACCIDENT DENSITY PATTERNS

BATON ROUGE, LOUISIANA

STANDARD SUMMARY OF MOTOR VEHICLE TRAFFIC ACCIDENTS

National Safety Council
Chicago

City BATON ROUGE State LOUISIANA Month ANNUAL 19 68

Report prepared by Chief E. O. Bauer, Jr. by: Major Howard A. Kidder

1. TYPE OF ACCIDENT	Number of Accidents							Number of Persons				
Motor Vehicle:	All Accidents	Fatal	Non-Fatal				Property Damage	Total Killed	Injured			
			Total	a	b	c			Total	a	b	c
1. Ran off road	528	4	524	48	97	59	320	4	282	63	128	91
2. Overturned on road	30	0	30	3	9	7	11	0	22	3	12	7
3. Pedestrian	144	9	135	26	61	44	4	9	136	27	61	48
4. Motor vehicle in traffic	7421	16	7405	223	529	1085	5568	20	3048	314	794	1940
5. Parked motor vehicle	802	0	802	10	36	22	734	0	78	11	39	28
6. Railroad train	32	3	29	1	7	1	20	3	13	3	8	2
7. Bicyclist	41	0	41	4	22	14	1	0	43	5	24	14
8. Animal	1	0	1	0	1	0	0	0	1	0	1	0
9. Fixed object	126	2	124	11	24	11	78	3	62	14	34	14
10. Other object	9	0	9	0	1	0	8	0	3	0	3	0
11. Other non-collision	14	0	14	2	5	2	5	0	9	2	5	2
12. Others	4	0	4	0	1	1	2	0	3	0	1	2
Totals	9152	34	9118	328	793	1246	6751	39	3700	442	1110	2148

Collision of Motor Vehicle with:

2. TYPE OF ACCIDENT	Comparative Totals								
	Same Month Last Year			This Year to Date			Same Period Last Year 1967		
Motor Vehicle:	All Accidents	Persons Killed	Persons Injured	All Accidents	Persons Killed	Persons Injured	All Accidents	Persons Killed	Persons Injured
1. Ran off road				528	4	282	459	8	244
2. Overturned on road				30	0	22	26	0	24
3. Pedestrian				144	9	136	156	10	156
4. Motor vehicle in traffic				7421	20	3048	6999	14	3238
5. Parked motor vehicle				802	0	78	847	1	87
6. Railroad train				32	3	13	15	1	14
7. Bicyclist				41	0	43	62	1	55
8. Animal				1	0	1	1	0	0
9. Fixed object				126	3	62	109	0	55
10. Other object				9	0	3	10	0	1
11. Other non-collision				14	0	9	8	0	8
12.				4	0	3	16	0	1
Totals				9152	39	3700	8708	35	3883

Collision of Motor Vehicle with:

3. STREET CLASSIFICATION	A. Trafficways Administered by Governmental Agencies: State Highway Department, county, city, etc.						B. Trafficways Administered by Independent Agencies: Turnpike, parkway, military, freeway authorities and commissions, etc.					
	Number of Accidents				Number of Persons		Number of Accidents				Number of Persons	
	Total	Fatal	Non-Fatal	Property Damage	Killed	Injured	Total	Fatal	Non-Fatal	Property Damage	Killed	Injured
Controlled access hwy.	0	0	0	0	0	0						
2. State routes	0	0	0	0	0	0						
3. County routes	0	0	0	0	0	0		None			None	
4. Other local streets	9152	34	2367	6751	39	3700						
Totals	9152	34	2367	6751	39	3700						

4 AGE OF CASUALTY	Persons Killed									Persons Injured								
	Total Killed			Pedestrians			Bicyclists			Total Injured			Pedestrians			Bicyclists		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1. 0 - 4	1	0	1	1	0	1	0	0	0	115	74	41	21	15	6	1	1	0
2. 5 - 9	0	0	0	0	0	0	0	0	0	137	69	68	32	17	15	19	11	8
3. 10 - 14	2	2	0	0	0	0	0	0	0	156	92	64	23	14	9	19	18	1
4. 15 - 19	13	13	0	0	0	0	0	0	0	678	378	300	15	12	3	2	2	0
5. 20 - 24	1	0	1	0	0	0	0	0	0	657	349	308	7	5	2	0	0	0
6. 25 - 34	6	6	0	1	1	0	0	0	0	684	408	276	10	7	3	1	0	1
7. 35 - 44	5	2	3	2	1	1	0	0	0	499	239	260	8	7	1	1	1	0
8. 45 - 54	5	4	1	2	2	0	0	0	0	383	204	179	6	5	1	0	0	0
9. 55 - 64	2	2	0	2	2	0	0	0	0	255	130	125	7	3	4	0	0	0
10. 65 - 74	2	2	0	0	0	0	0	0	0	89	47	42	2	0	2	0	0	0
11. 75 & older	2	2	0	1	1	0	0	0	0	31	14	17	2	0	2	0	0	0
12. Not stated	0	0	0	0	0	0	0	0	0	16	7	9	1	0	1	0	0	0
Totals	39	33	6	9	7	2	0	0	0	3700	2011	1689	134	85	49	43	33	10

Form Traffic 11-A

Stock No. 321.14

5. TIME Hour Beginning	Total Accidents		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Not stated	
	All	Fatal	All	Fatal	All	Fatal	All	Fatal	All	Fatal	All	Fatal	All	Fatal	All	Fatal	All	Fatal
0. Midnight	248	1	14	0	24	0	22	0	18	0	22	0	74	0	74	1	0	0
1. 1:00	204	4	6	0	14	0	15	1	17	1	25	0	63	1	64	1	0	0
2. 2:00	107	1	4	0	8	0	13	0	9	0	7	0	50	1	16	0	0	0
3. 3:00	60	1	6	0	3	0	5	0	9	0	8	0	12	0	17	1	0	0
4. 4:00	41	1	0	0	7	1	1	0	6	0	2	0	16	0	9	0	0	0
5. 5:00	69	0	9	0	8	0	12	0	8	0	8	0	14	0	10	0	0	0
6. 6:00	182	1	28	0	36	0	28	1	30	0	33	0	16	0	11	0	0	0
7. 7:00	445	0	90	0	80	0	79	0	79	0	80	0	28	0	9	0	0	0
8. 8:00	436	0	78	0	83	0	69	0	62	0	76	0	51	0	17	0	0	0
9. 9:00	316	0	54	0	47	0	50	0	43	0	51	0	50	0	21	0	0	0
10. 10:00	389	0	65	0	59	0	56	0	63	0	63	0	51	0	32	0	0	0
11. 11:00	500	1	93	0	69	1	57	0	68	0	89	0	91	0	33	0	0	0
12. Noon	557	0	99	0	73	0	66	0	82	0	94	0	103	0	40	0	0	0
13. 1:00	543	1	91	0	80	0	74	0	67	0	75	0	111	1	45	0	0	0
14. 2:00	533	4	78	0	75	1	63	0	90	1	86	1	93	1	48	0	0	0
15. 3:00	750	1	117	0	117	0	95	0	110	0	154	0	99	0	58	1	0	0
16. 4:00	885	4	129	0	125	0	124	1	146	0	210	2	98	0	53	1	0	0
17. 5:00	797	0	118	0	114	0	115	0	114	0	182	0	99	0	55	0	0	0
18. 6:00	454	4	63	1	61	1	50	0	58	1	109	1	71	0	42	0	0	0
19. 7:00	381	2	46	1	45	0	42	0	45	0	67	1	80	0	56	0	0	0
20. 8:00	347	0	46	0	41	0	43	0	56	0	58	0	58	0	45	0	0	0
21. 9:00	295	2	24	0	34	0	37	0	35	0	75	1	58	1	32	0	0	0
22. 10:00	281	2	27	0	27	0	35	0	30	1	73	0	57	0	32	1	0	0
23. 11:00	315	4	21	0	31	1	42	1	33	1	86	0	75	1	27	0	0	0
24. Not stated	17	0	3	0	2	0	0	0	2	0	3	0	4	0	3	0	0	0
Totals	9152	34	1309	2	1263	5	1193	4	1280	5	1736	6	1522	6	849	6	0	0

6. DIRECTIONAL ANALYSIS

An accident consisting of a series of collisions, overturning, etc., is classified according to the first event.

A. TWO MOTOR VEHICLE INTERSECTION ACCIDENTS	All Accidents	Fatal Accidents	Non-Fatal Injury Acc.	Property Damage Accidents
1. Entering at angle	1812	8	571	1233
2a. From same dir.-both going straight	511	1	95	415
b. Same-one turn, one straight	411	0	68	343
c. Same-one stopped	41	0	12	29
d. Same-all others	55	0	5	50
3a. From opposite dir.-both going straight	31	0	8	23
b. Same-one left turn, one straight	453	2	146	305
c. Same-all others	18	0	2	16
4. Not stated	0	0	0	0
Totals	3332	11	907	2414

B. TWO MOTOR VEHICLE NON-INTERSECTION ACCIDENTS	All Accidents	Fatal Accidents	Non-Fatal Injury Acc.	Property Damage Accidents
1. Going opposite dir.-both moving	359	2	98	259
2. Going same dir.-both moving	2240	1	431	1808
3a. One car parked	731	0	47	684
b. One car stopped in traffic	238	0	61	177
4a. One car entering parked position	0	0	0	0
b. One car leaving parked position	56	0	5	51
5a. One car entering alley or driveway	0	0	0	0
b. One car leaving alley or driveway	0	0	0	0
6. All others	659	0	71	588
7. Not stated	1	0	0	1
Totals	4284	3	713	3568

C. PEDESTRIAN ACCIDENTS	All Pedestrian Accidents	Fatal Accidents			Non-Fatal Injury Accidents		
		Total Fatal Accidents	Inter-section	Non Inter-Section	Total Non-fatal Injury Acc.	Inter-section	Non-Inter-section
1. Car going straight	128	9	0	9	116	23	93
2. Car turning right	4	0	0	0	4	2	2
3. Car turning left	6	0	0	0	5	1	4
4. Car backing	4	0	0	0	4	0	4
5. All others	2	0	0	0	2	0	2
6. Not stated	0	0	0	0	0	0	0
Totals	144	9	0	9	131	26	105

D. ALL OTHER ACCIDENTS	All Accidents	Fatal Accidents	Non-Fatal Injury Acc.	Property Damage Accidents
1a. Collision with non-motor veh., train streetcar, bicycle, etc.-at intersection	35	2	24	9
b. Same-not at intersection	34	1	22	11
2a. Collision with fixed object in roadway-at intersection	24	1	12	11
b. Same-not at intersection	99	1	33	65
3a. Overturned in roadway-at intersection	8	0	8	0
b. Same-not at intersection	22	0	11	11
4. Left roadway-at intersection	80	0	29	51
5. Left roadway-at curve--not at intersection	82	1	43	38
6. Left roadway on straight road--not at intersection	342	3	123	216
7. Fell from moving vehicle	11	0	9	2
8. All others	639	2	299	339
9. Not stated	16	0	4	12
Totals	1392	11	616	765

7. PEDESTRIAN ACTIONS BY AGE	Pedestrians Killed	Pedestrians and Injured									
		Age									
		Total	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 44	45 -64	65 & older	Not Stated
1a. Crossing or entering roadway-at intersection	1	22	2	5	3	2	2	1	4	2	1
b. Same-not at intersection	7	89	19	23	12	5	3	14	11	2	0
2a. Walking in roadway-with traffic	1	6	0	0	2	3	0	1	0	0	0
b. Same-against traffic	0	3	0	0	1	1	1	0	0	0	0
3. Standing in roadway	0	6	0	0	2	2	0	1	0	1	0
4. Getting on or off other vehicle	0	1	0	0	0	0	0	1	0	0	0
5. Pushing or working on vehicle in roadway	0	1	0	0	0	0	0	1	0	0	0
6. Other working in roadway	0	1	0	0	0	0	0	0	1	0	0
7. Playing in roadway	0	3	1	2	0	0	0	0	0	0	0
8. Other in roadway	0	2	0	1	0	0	0	1	0	0	0
9. Not in roadway	0	7	1	0	2	2	1	1	0	0	0
10. Not stated	0	2	0	1	1	0	0	0	0	0	0
Totals	9	143	23	32	23	15	7	21	16	5	1

(Excluding drivers of cars in proper parking locations)

8. AGE OF DRIVER	All Accidents	Fatal Accidents	Non-Fatal Injury Acc.
1. 15 & younger	287	1	109
2. 16	438	2	86
3. 17	592	2	170
4. 18-19	1570	9	418
5. 20-24	3280	13	866
6. 25-34	3607	9	992
7. 35-44	2768	5	751
8. 45-54	2117	10	566
9. 55-64	1301	3	356
10. 65-74	543	3	141
11. 75 & older	103	0	21
12. Not stated	625	0	61
Totals	17231	57	4537

9.SEX OF DRIVER			
1. Male	11845	49	3168
2. Female	4828	8	1320
3. Not stated	558	0	49
Totals	17231	57	4537

10. RESIDENCE OF DRIVER			
1. Local resident	13494	44	3674
2. Residing elsewhere in state	2672	11	687
3. Non-resident	477	2	122
4. Not stated	588	0	54
Totals	17231	57	4537

11. CONTRIBUTING CIRCUMSTANCES INDICATED			
1. Speed too fast	314	3	126
2. Failed to yield right of way	3145	7	740
3. Drove left of center	365	1	64
4. Improper overtaking	244	0	54
5. Passed stop sign	233	1	114
6. Disregarded traffic signal	380	3	154
7. Followed too closely	1485	0	452
8. Made improper turn	380	0	54
9. Other improper driving	183	0	39
10. Inadequate brakes	77	0	25
11. Improper lights	9	0	5
12. Had been drinking	321	1	136
Totals	7136	16	1963

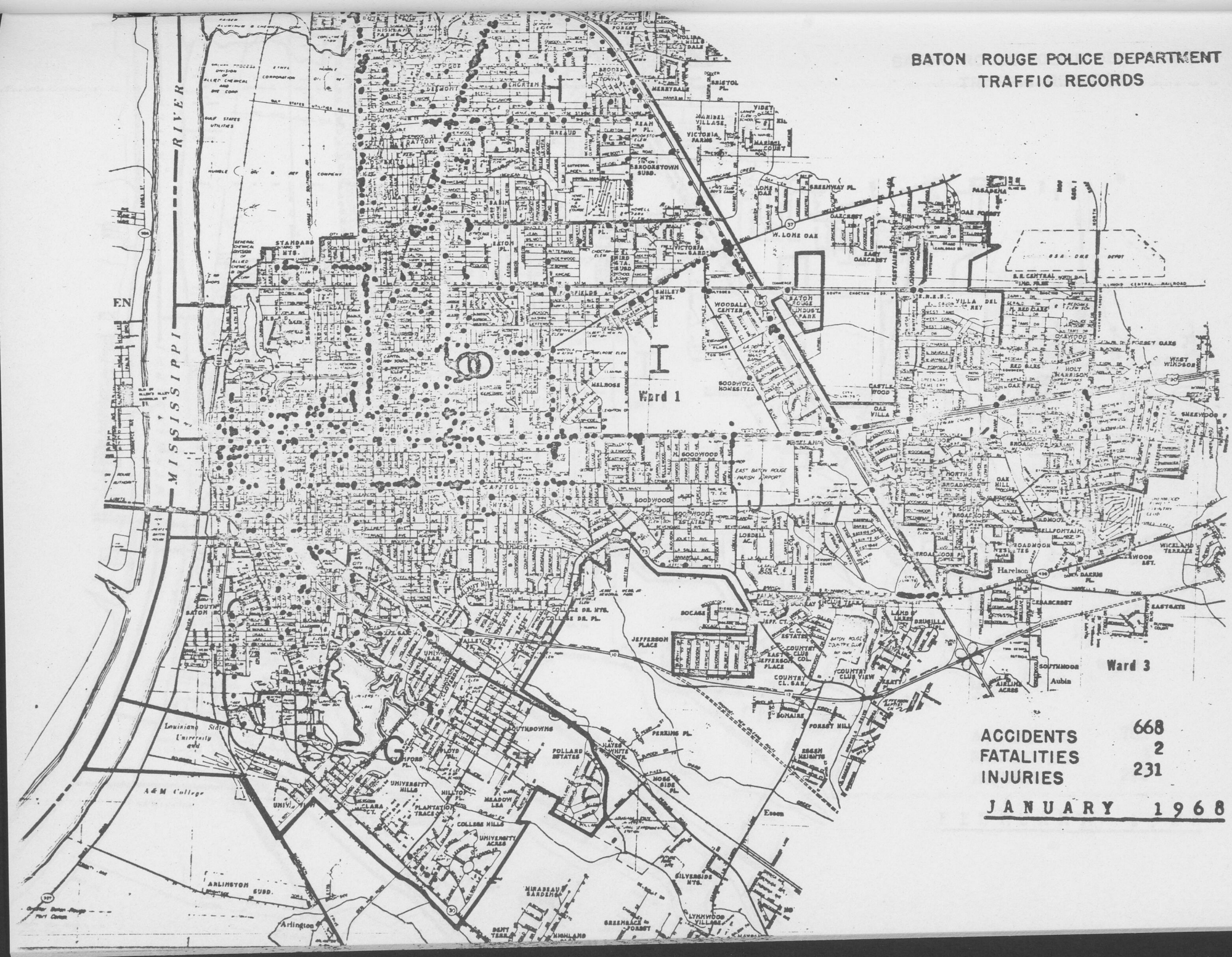
(Including cars in proper parking locations)

12. TYPE OF MOTOR VEHICLE	All Accidents	Fatal Accidents	Non-Fatal Injury Acc.
1. Passenger car	15466	48	3935
2. Passenger car and trailer	1	0	0
3. Truck or truck tractor	1973	5	489
4. Truck tractor and semi-trailer	15	0	1
5. Other truck combination	2	0	0
6. Farm tractor and/or farm equip.	4	0	2
7. Taxicab	48	0	14
8. Bus	47	0	13
9. School bus	27	0	5
10. Motorcycle	180	2	137
11. Motor scooter or motor bicycle	6	1	4
12. Others and not stated	466	3	81
Totals	18235	59	4681
Special vehicles included above.			
13. Emergency vehicle (including privately owned)	0	0	0
14. Military vehicles	3	0	0
15. Other publicly owned vehicles	182	0	53

13. ROAD SURFACE CONDITION			
1. Dry	7223	26	1884
2. Wet	1872	7	471
3. Snowy or icy	27	0	6
4. Other	14	1	3
5. Not stated	16	0	3
Totals	9152	34	2367

14. KIND OF LOCATION			
1. Apartments, stores, factories	6803	24	1684
2. One family homes	2116	8	605
3. Farms, fields	50	0	14
4. No marginal development	163	2	59
Not Stated	20	0	5
Totals	9152	34	2367

15. LIGHT CONDITION			
1. Daylight	6438	13	1532
2. Dawn or dusk	233	1	69
3. Darkness	2424	20	750
4. Not stated	57	0	16
Totals	9152	34	2367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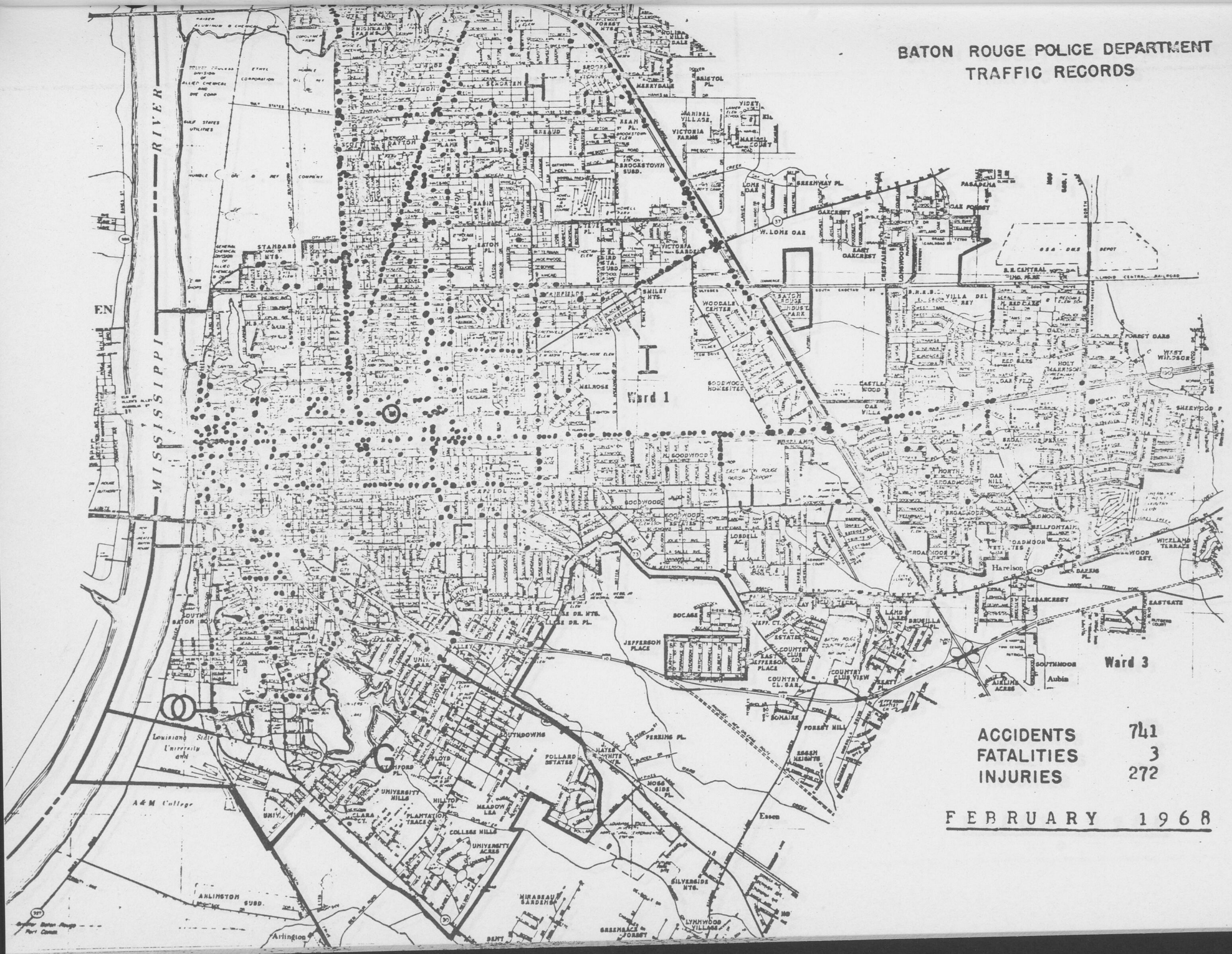
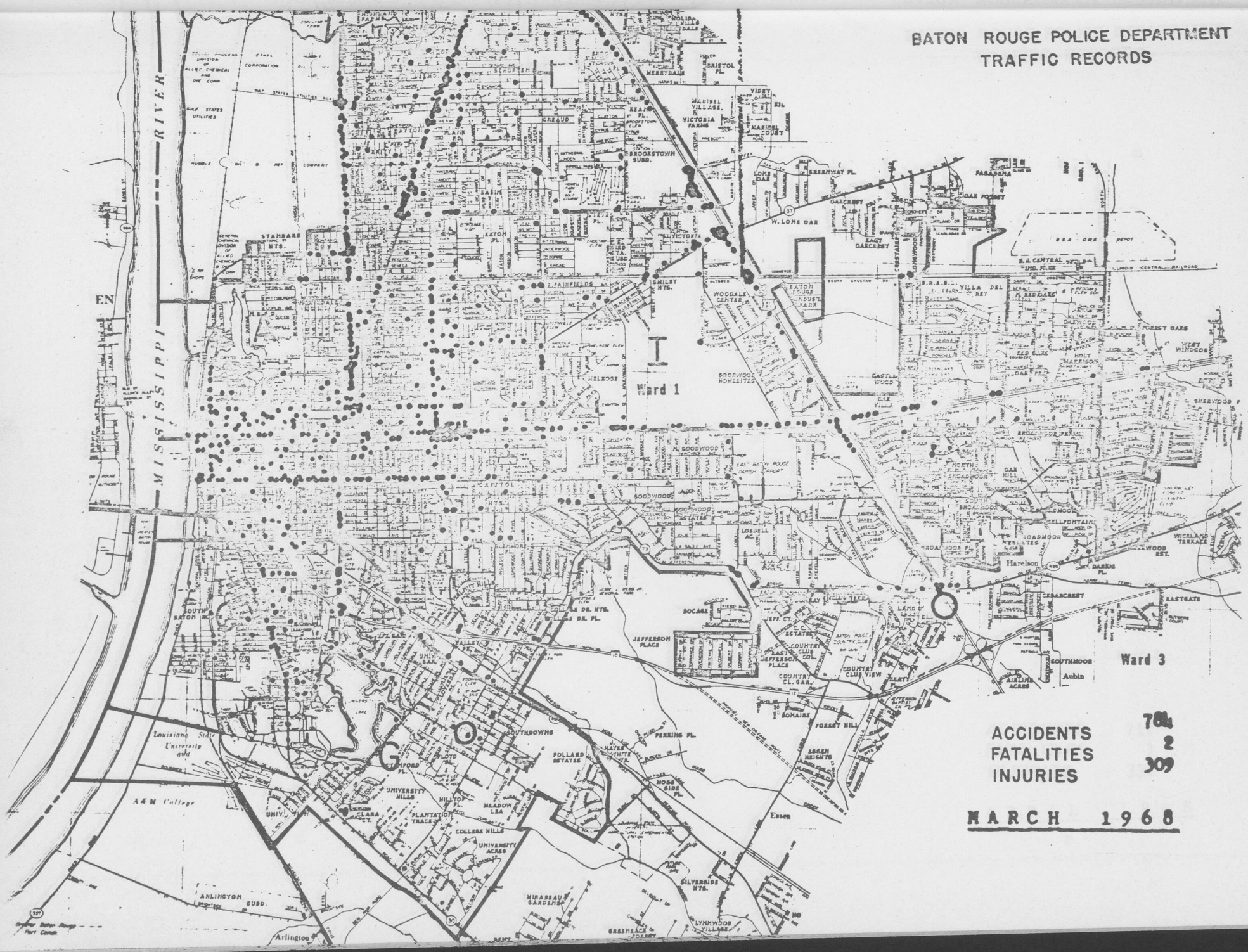
TRAFFIC RECORDS
MISSISSIPPI RIVER
Ward 1
Ward 3
ACCIDENTS 668
FATALITIES 2
INJURIES 231
JANUARY 1968

BATON ROUGE POLICE DEPARTMENT
TRAFFIC RECORDS



ACCIDENTS	741
FATALITIES	3
INJURIES	272

FEBRUARY 1968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FATALITIES 2
INJURIES 309
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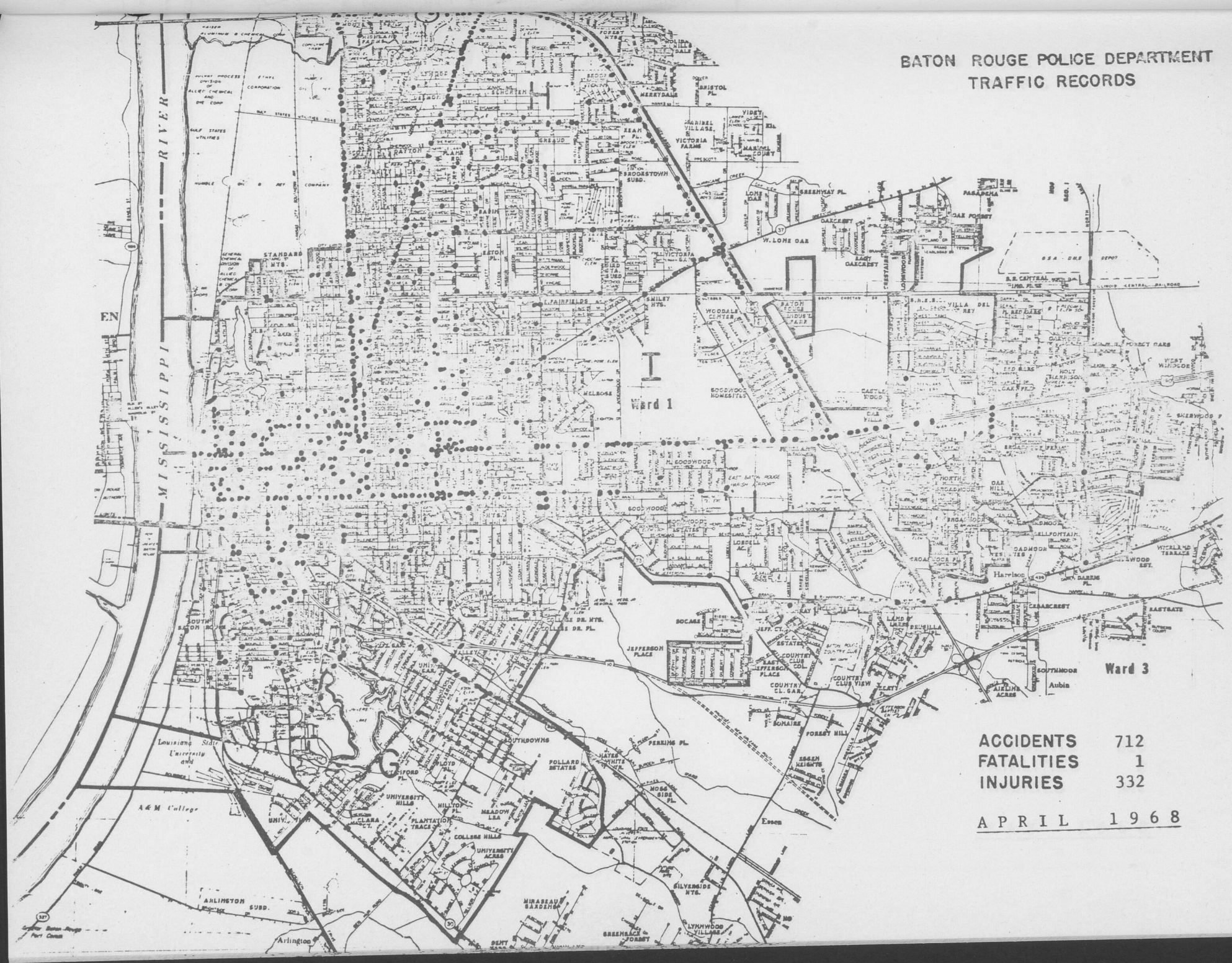
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FATALITIES 1
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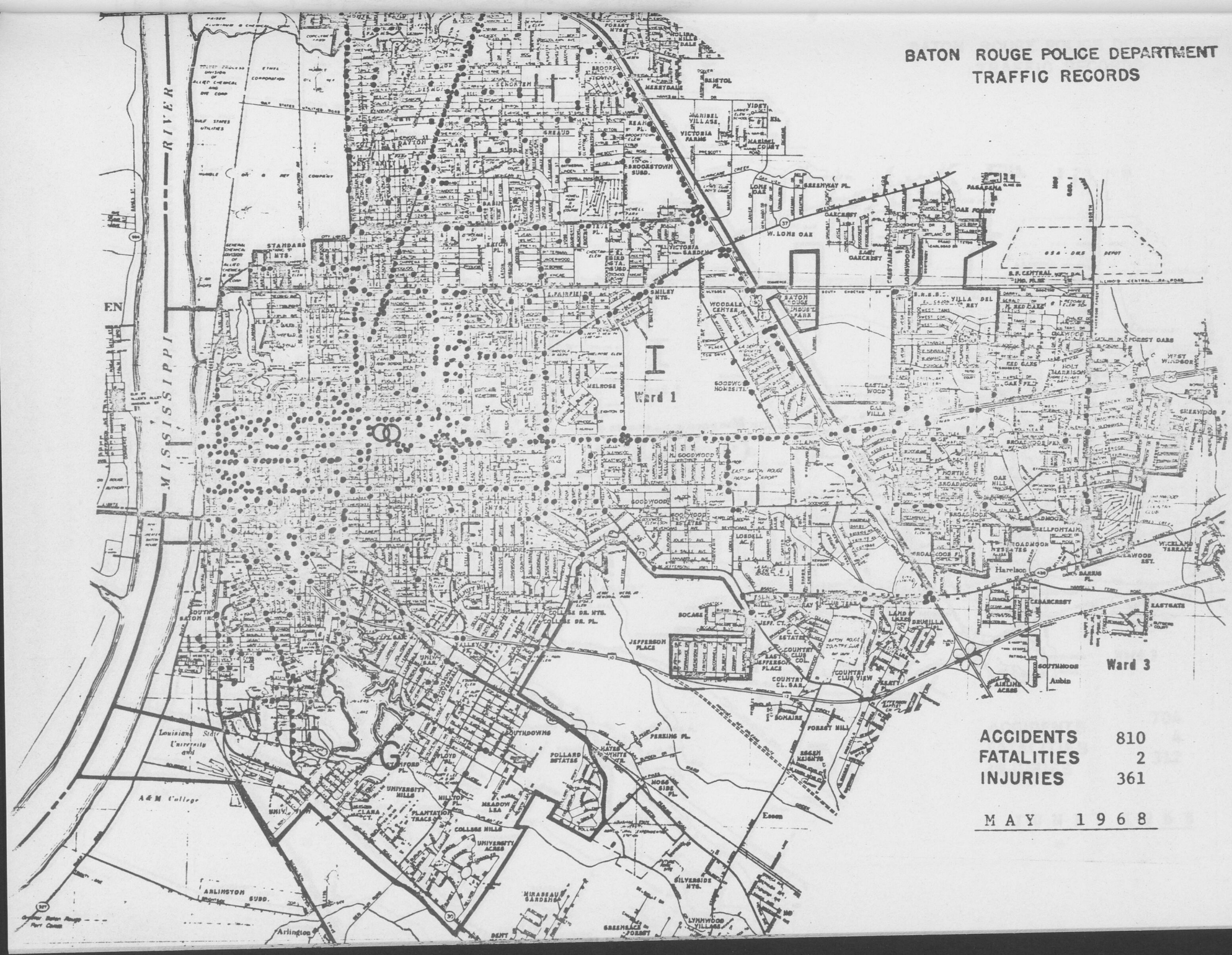
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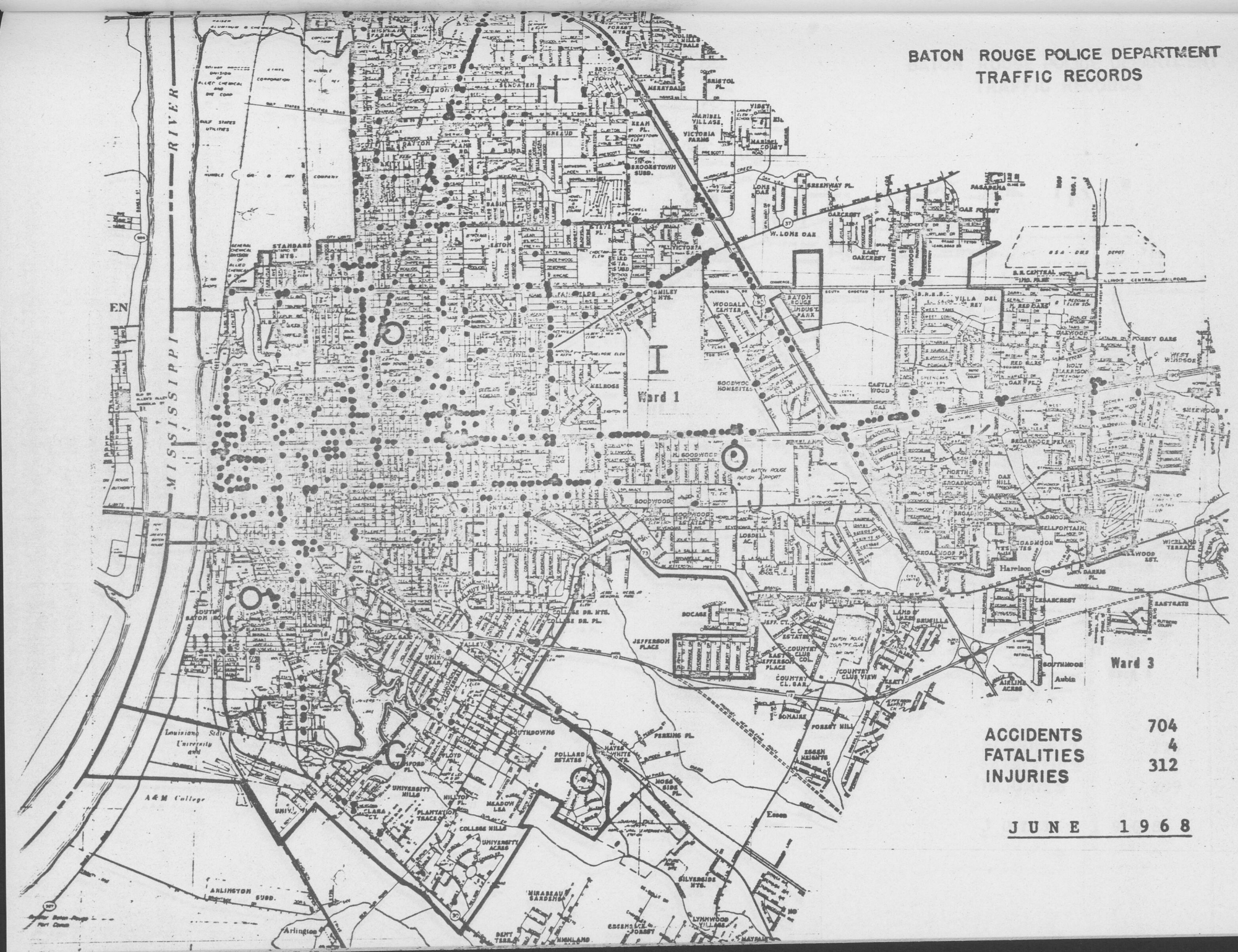
Ward 3
ACCIDENTS 810
FATALITIES 2
INJURIES 361
MAY 1968


BATON ROUGE POLICE DEPARTMENT
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FATALITIES 4
INJURIES 312
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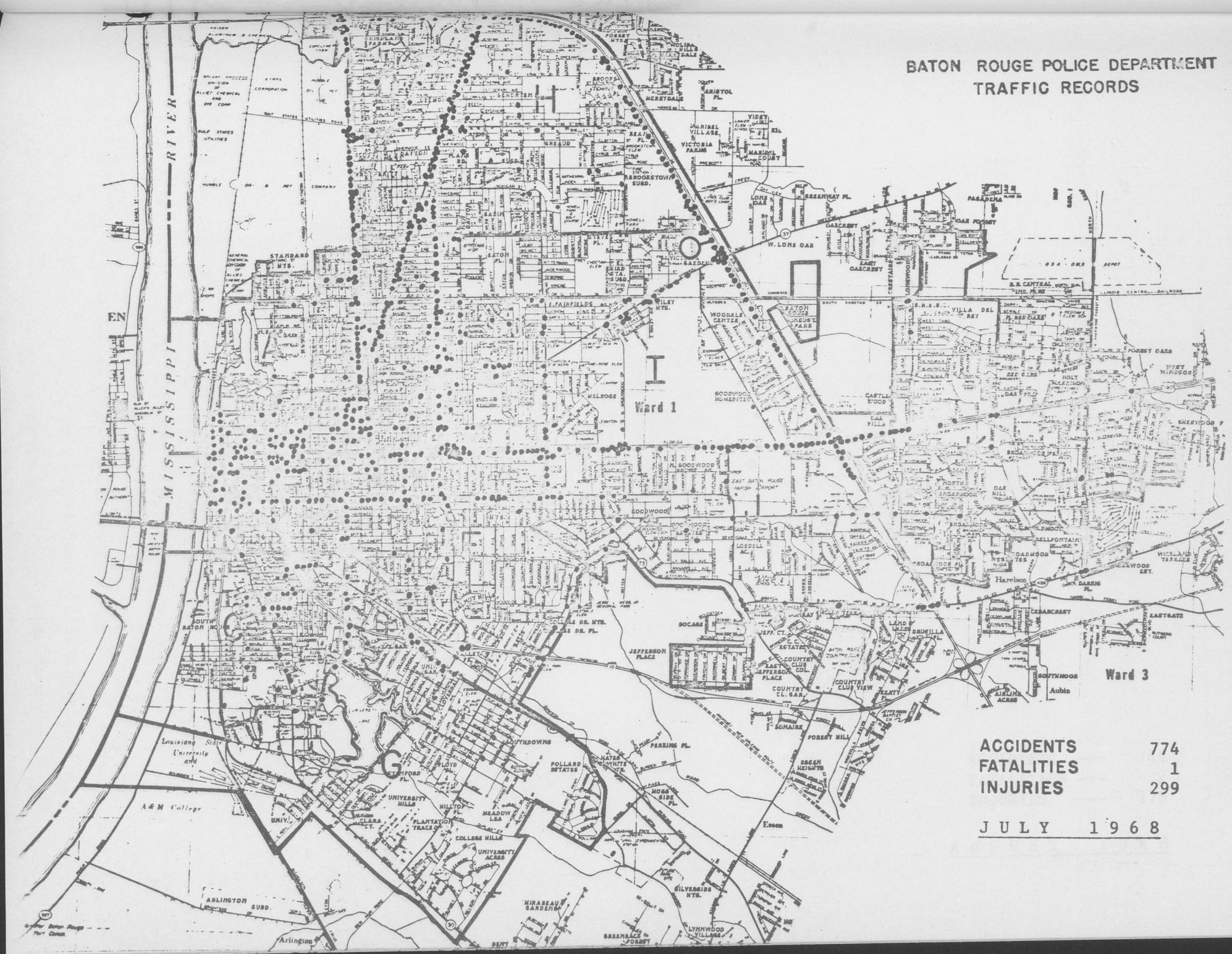
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ACCIDENTS 774
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INJURIES 299
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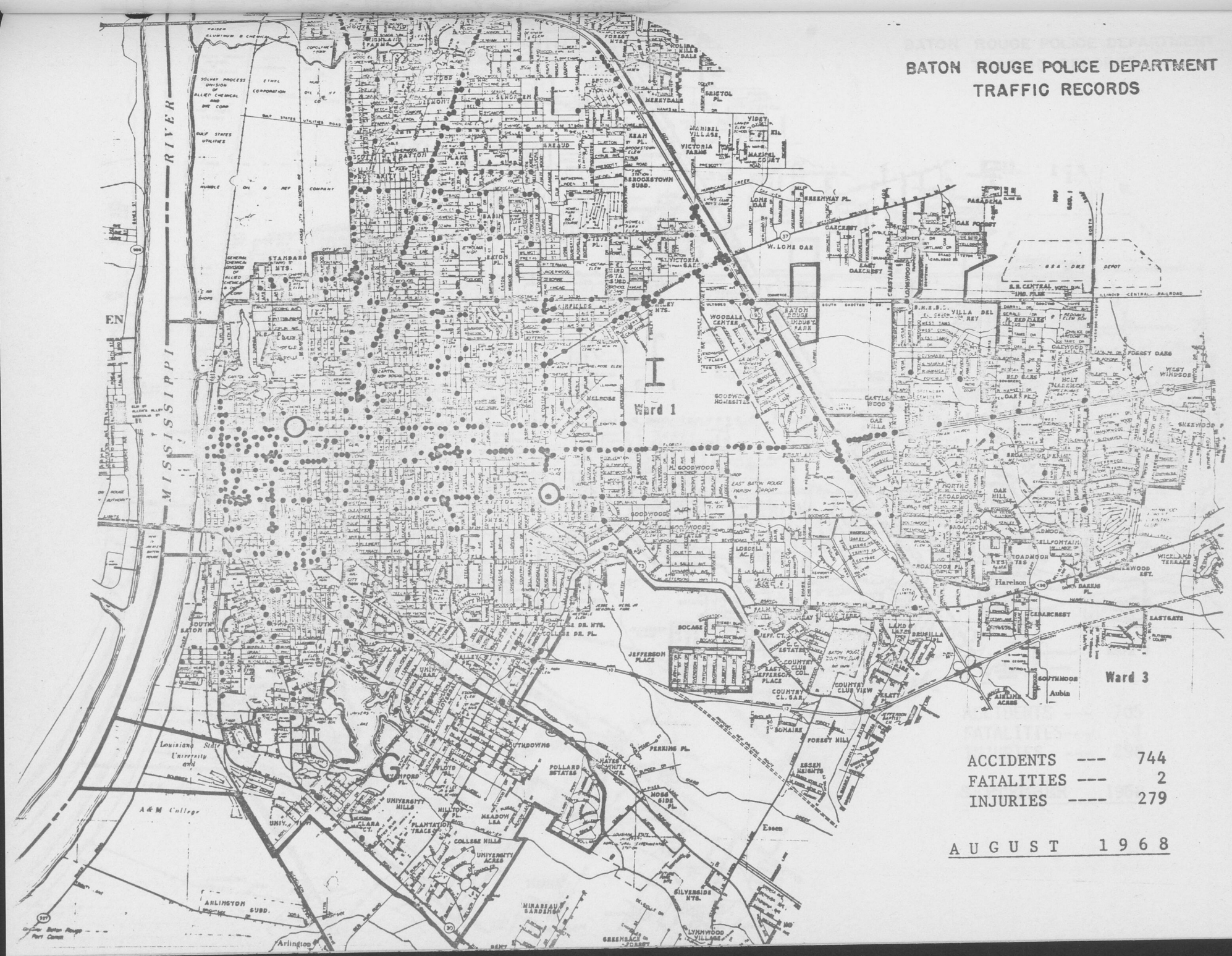
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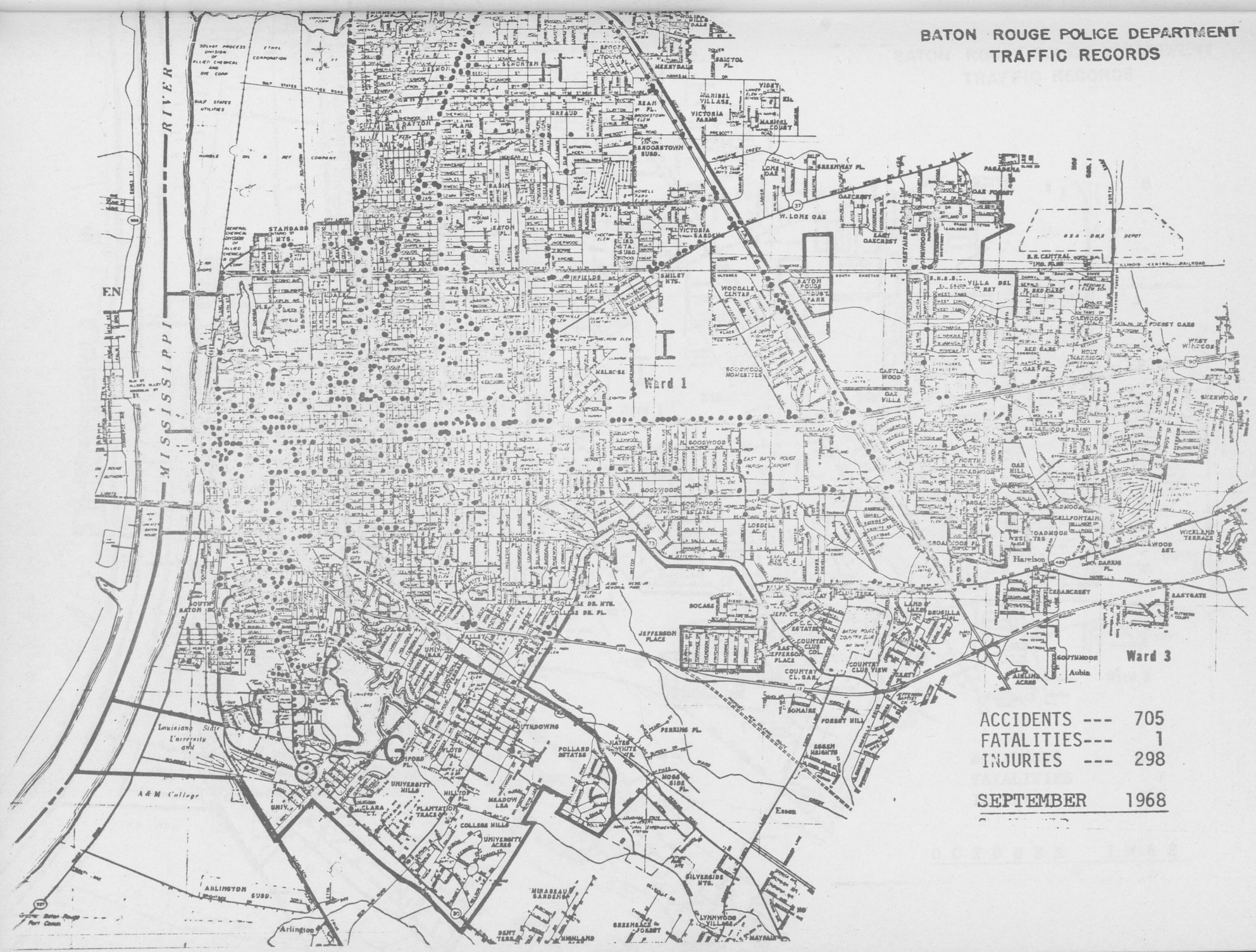
TRAFFIC RECORDS
MISSISSIPPI RIVER
Ward 1
Ward 3
ACCIDENTS --- 744
FATALITIES --- 2
INJURIES ---- 279
AUGUST 1968

BATON ROUGE POLICE DEPARTMENT
TRAFFIC RECORDS



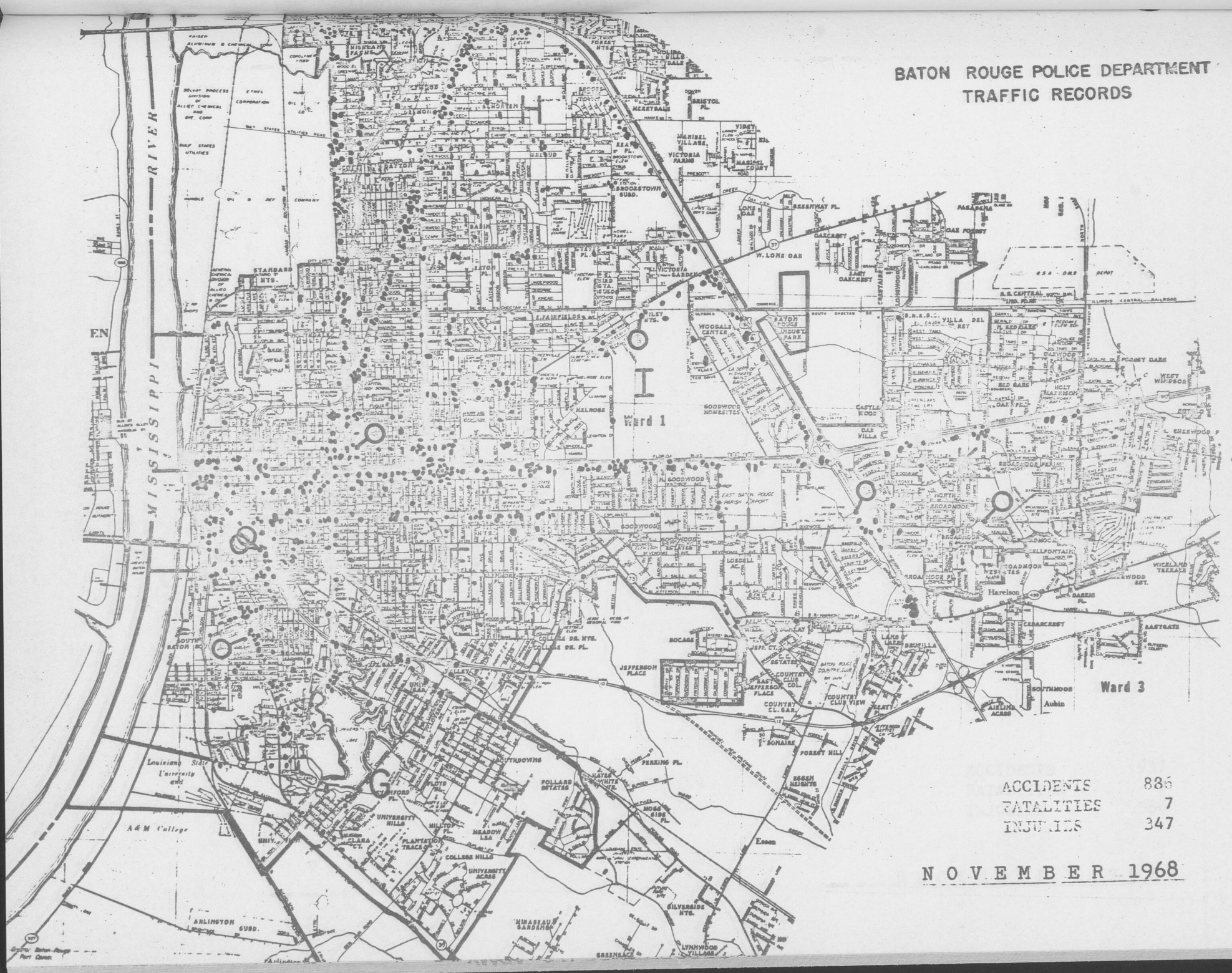
ACCIDENTS --- 705
FATALITIES--- 1
INJURIES --- 298

SEPTEMBER 1968

BATON ROUGE POLICE DEPARTMENT
TRAFFIC RECORDS

ACCIDENTS	687
FATALITIES	7
INJURIES	294

OCTOBER 1968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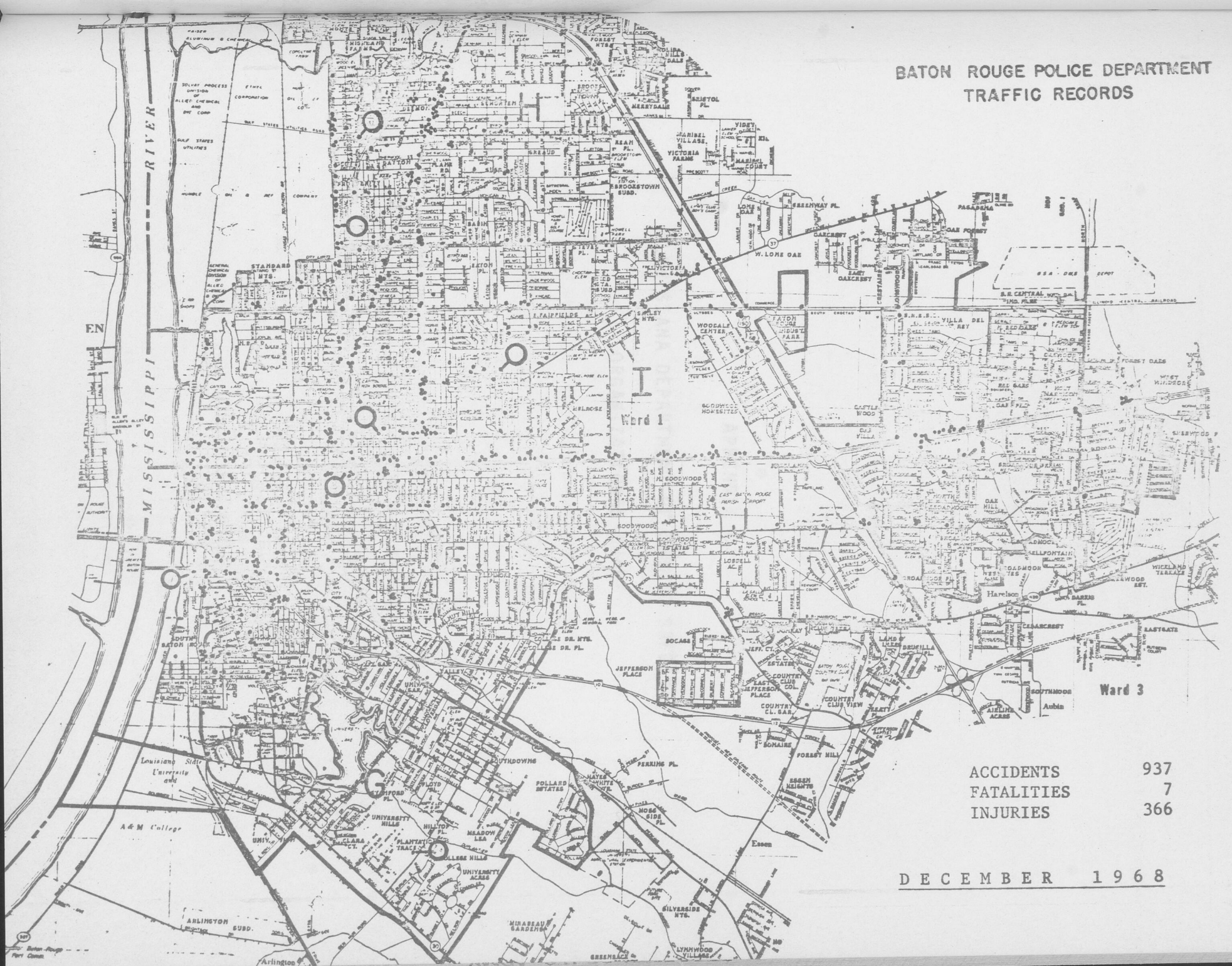
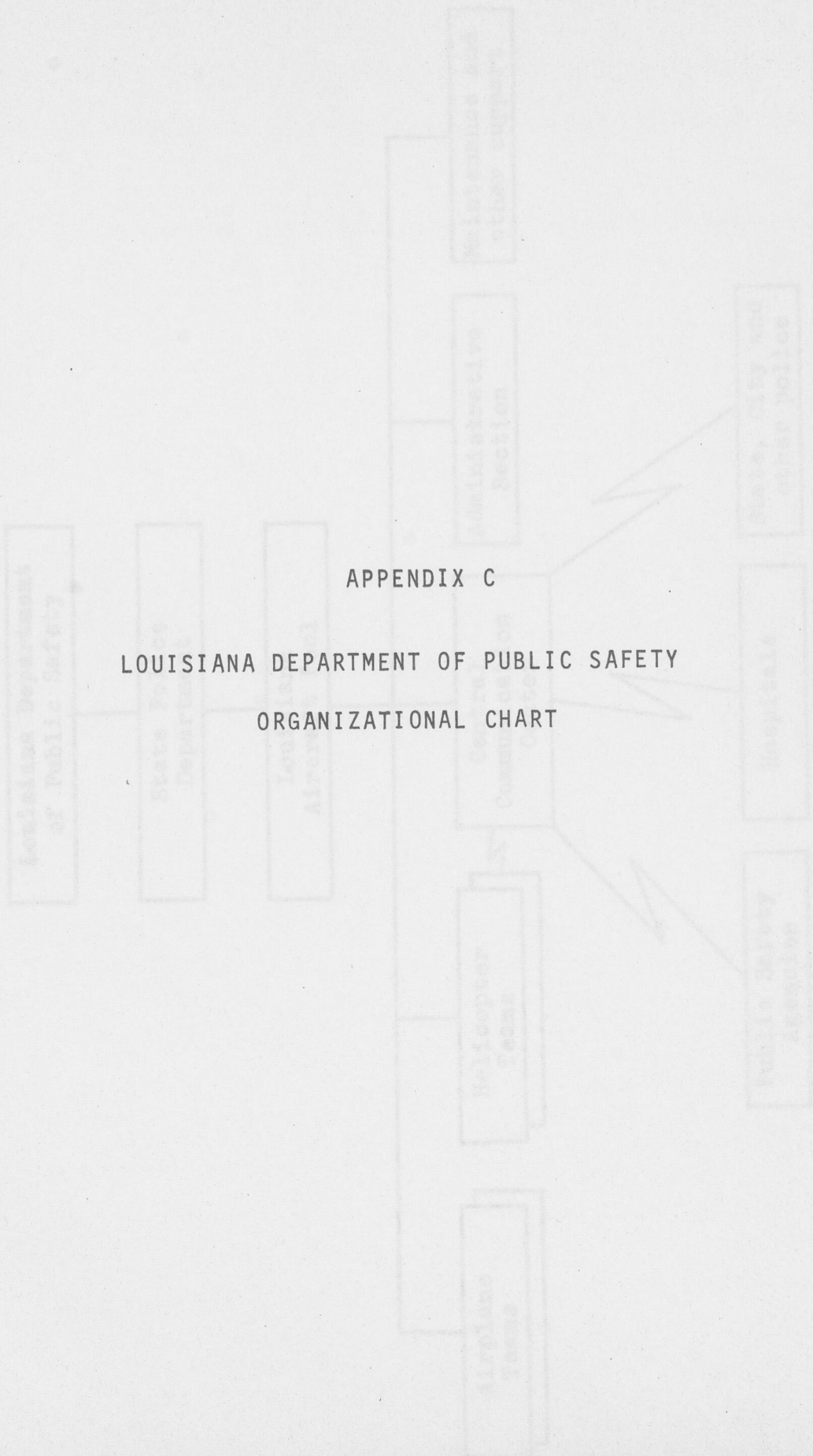
MISSISSIPPI RIVER
Ward 1
Ward 3
ACCIDENTS 886
FATALITIES 7
INJURIES 347
NOVEMBER 1968


BATON ROUGE POLICE DEPARTMENT
TRAFFIC RECORDS
MISSISSIPPI RIVER
Ward 1
Ward 3
ACCIDENTS 937
FATALITIES 7
INJURIES 366
DECEMBER 1968

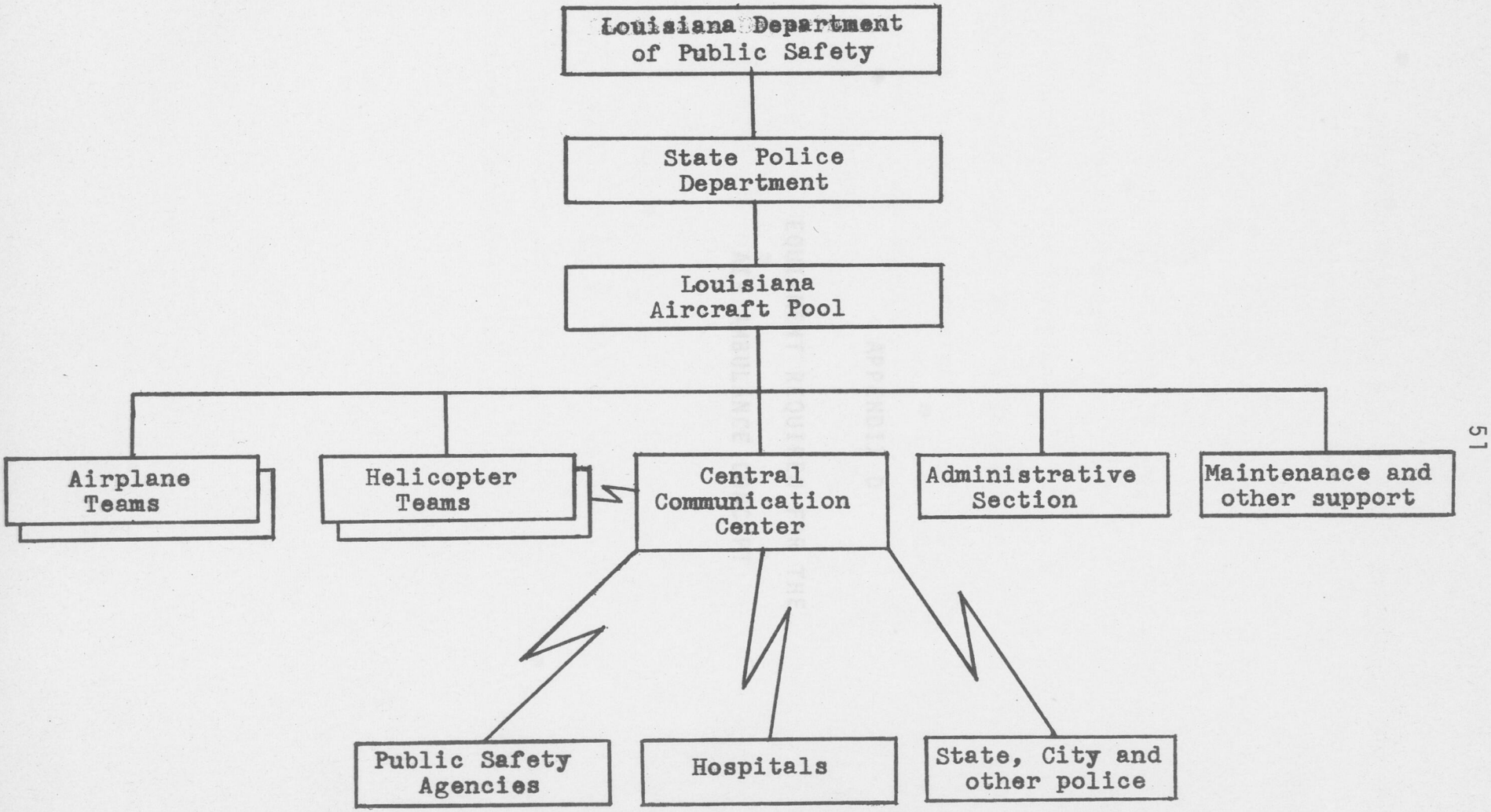
APPENDIX C

LOUISIANA DEPARTMENT OF PUBLIC SAFETY

ORGANIZATIONAL CHART



LOUISIANA DEPARTMENT OF PUBLIC SAFETY
ORGANIZATIONAL CHART



APPENDIX D

EQUIPMENT REQUIRED FOR THE AIR AMBULANCE CONCEPT

EQUIPMENT REQUIRED FOR THE AIR AMBULANCE CONCEPT

Item	Quantity
Basic helicopter	1
Blankets, cotton	4
Crash entry kit (see list, p. 54)	1
Hoist, personal rescue	1
Intercom system (transceiver)	1
Intravenous fluids and injection sets	2
Litter rack configuration	1
Litter, Stokes design	2
Oxygen, bottle	1
Portable aid kit (see list, p. 55)	1
Radar altitude warning system	1
Radio	1
Resuscitator	1
Rope, nylon, 1/2" x 100'	1
Splints, inflatable arm	6
Splints, inflatable leg	6

EQUIPMENT REQUIRED FOR THE CRASH ENTRY KIT

Item	Quantity
Axe, metal, crash/rescue	1
Bar, wrecking	1
Blade, hacksaw, 10"	1
Cutter, bolt, #14	3
Hacksaw, high speed, metal	1
Hook, grappling	1
Knife, survival	1
Pliers, visegrip	1
Saw, keyhole	1
Saw, metal, #21	1
Screwdriver kit, 8"	1
Shovel, entrenching, folding handle	1

EQUIPMENT REQUIRED FOR THE PORTABLE AID KIT

Item	Quantity
Adhesive tape, surgical, 3in x 5yd roll	1
Airway, Pharynegeal, plastic, adult-child	1
Ammonia inhalants, package	1
Aspirin tablets, USP, 0324gm 5gr, 100s btl	2
Bag, plastic airsick	25
Bandage, absorbent, adhesive, 3/4" x 3", 18s, packages	2
Bandage, gauze, 3" x 6 yd	2
Bandage, muslin, 37" x 37" x 52"	2
Benzalkonium Chlor Tinc, tinted, 1:1000, 10cc, 3s, package	1
Dressing, first-aid, field, 4" x 7"	8
Dressing, first-aid, field, 7-1/2" x 8"	2
Form for reporting treatment by aeromedic	25
Pencil, black, lead, hard with eraser, 12s	6
Pins, safety, curved, orthopedic, med, 12s	1 cd.
Scissors, bandage, angular, heavy, 8"	1
Tetracaine Opthalmic Ointment, 5%, 1/8oz, 12s, bx	1/12
Thermometer, clinical, human, oral	1
Tourniquet, nonpneumatic, camouflaged, 1-1/2" x 42"	4
Wire fabric, 5-1/4" x 36"	1 rl.

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BIBLIOGRAPHY

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BIOGRAPHICAL SKETCH

Charles F. Clark [redacted] graduated from Marion Military Institute, and received a Bachelor of Science degree from Jacksonville State University in Alabama. Upon graduation in July, 1960, he was commissioned a second lieutenant in the Medical Service Corps of the United States Army. On July 29, 1960, he entered on active duty in the Army at Fort Sam Houston, Texas. He has served in various assignments that include: supply, motor, and mess officer of a medical company; operations and commanding officer of a medical company (air ambulance); and supply officer and evacuation pilot with a medical detachment (air ambulance) employed in South Vietnam. Major Clark attended the following service schools: Medical Service Corps Officer Orientation Course, in 1960; Basic Airborne School, in 1960; Jump Master School, in 1961; Army Helicopter School, in 1963; Medical Officer's Career Course, in 1966; and Hospital Administration Course, in 1969. He married Miss Huey Lee of Wedowee, Alabama. They have two children, Tara Lee and Kevin. Major Clark served a one-year residency in Hospital Administration during 1969-1970 at Letterman General Hospital, Presidio of San Francisco.