Dark Signals

A Report on Laws Concerning Dark, Malfunctioning or Inoperative Traffic Signals

By

Minnesota Department of Transportation

Office of Traffic Engineering

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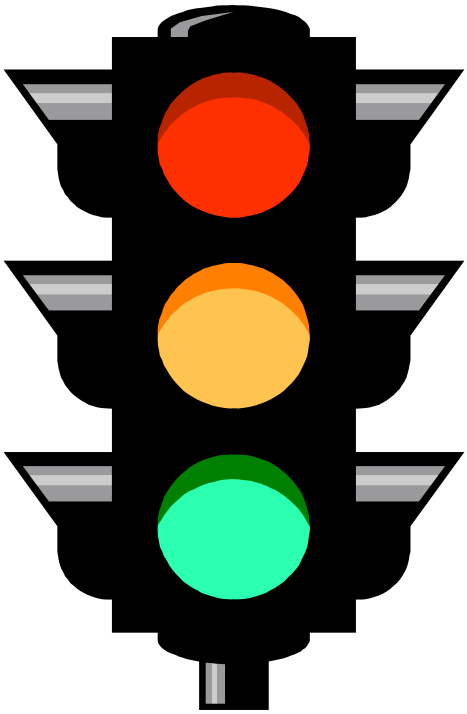

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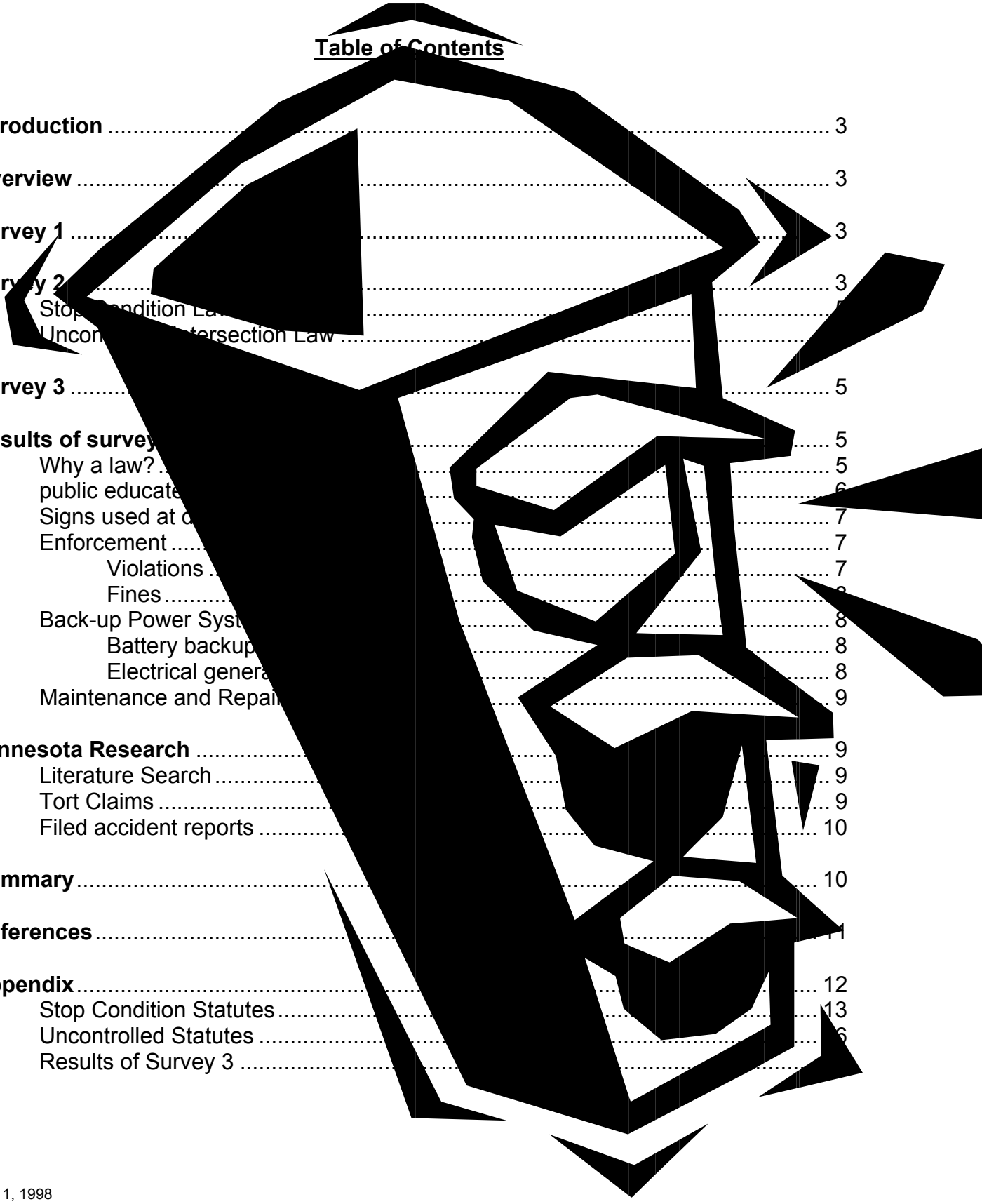

INTRODUCTION

As drivers approach a signalized intersection, they expect the traffic signal to instruct them whether to stop or go through the intersection. But what should a driver do when the signal is dark with no indications are being displayed? The majority of dark signals in Minnesota are caused by power outages and last about an hour. During that hour, the signal remains dark, unable to provide control of right of way at the intersection. How should the driver proceed? (What should the driver do?)

Some states have laws which address how the drivers should navigate the intersection when the signal is dark. The states which have specific laws concerning dark or inoperative traffic signals either treat them as uncontrolled intersections or require all drivers to stop.

OVERVIEW

This report presents the results of surveys regarding the problems/experiences with statutes pertaining to inoperative or malfunctioning traffic signals. All fifty states were surveyed to determine their practice at inoperative or malfunctioning traffic signals. States that had a statute that required motorists to stop for this situation were surveyed again for their experiences. Copies of their laws were requested. Items outside the scope of this report are policies of Minnesota cities, counties, and state traffic offices regarding their response to inoperable or malfunctioning traffic signals.

This report deals with traffic signals that are dark, showing no indication for the approach. Signals that were flashing yellow or red are considered operational since they are still instructing the driver on how to proceed.

SURVEY 1

In June 1992 Mn/DOT sent out the first of two surveys to 41 transportation departments within the United States, and two transportation departments in Canada (Alberta and British Columbia). This survey was conducted via the AASHTO electronic mail (e-mail) system. The e-mail survey asked the transportation departments whether or not they had a law which addressed what drivers of vehicles should do if faced with a dark signal. Eighteen of the 41 agencies surveyed responded, and sent copies of their laws if they had such laws.

SURVEY 2

A second written survey was conducted in August of 1995. This survey was sent to all the fifty state transportation departments in the United States. The survey asked whether their state had a law that instructs motorists on the procedure that should be followed when a dark signal is encountered. If the state had no law, they were instructed to return the survey. If they had a law, the survey went on to ask how a dark signal was to be treated; as an uncontrolled or a stop condition. A copy of the law was also

requested.

The survey also asked whether drivers experienced any problems with (for uncontrolled intersections) right-of-way conflicts, accidents, maintenance personnel safety, portable stop sign usage, motorist confusion; or (for stop condition) capacity problems, motorist confusion, accidents, unnoticed signals, enforcement problems.

Forty-three of the fifty states responded to this survey. The seven transportation departments that did not respond were again contacted for their practice concerning dark signals. All fifty states eventually responded.

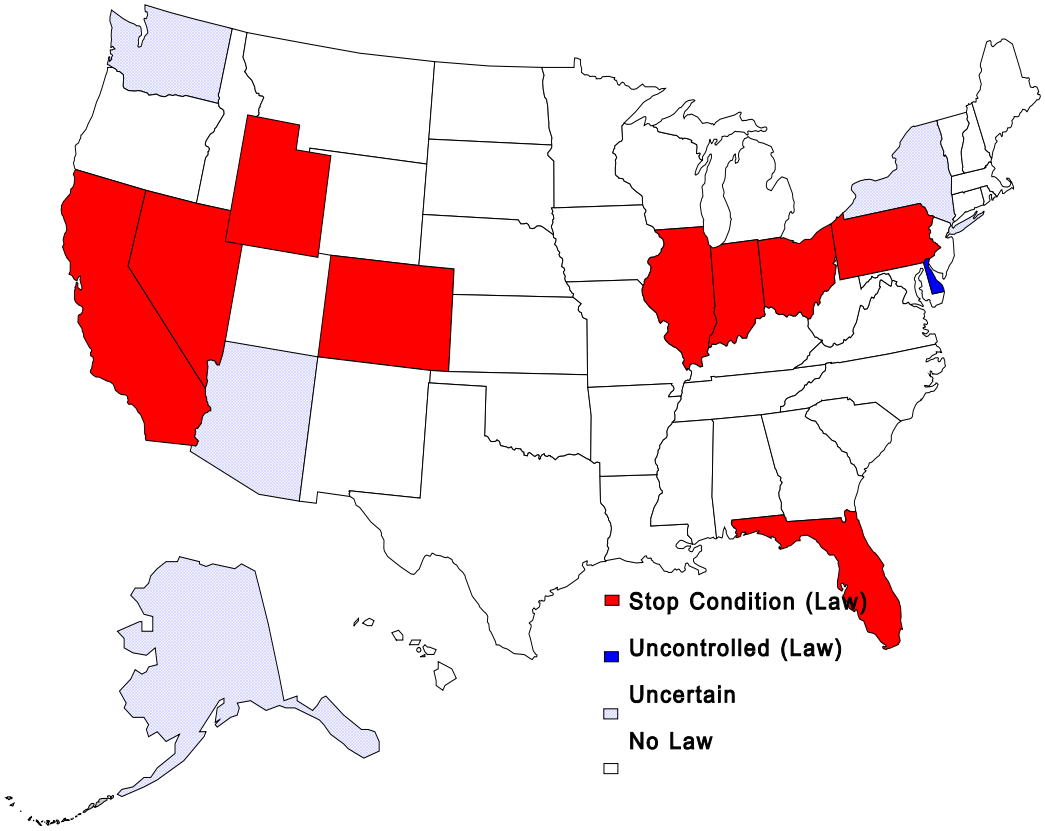

Figure 1 shows how each state handles a dark signal. Thirteen states stated that they had laws pertaining to dark signals, while thirty-seven states did not have such laws. Nine of the thirteen states with dark signal laws require drivers to stop at any intersection with a dark signal. Four states specifically require that drivers treat a dark signal as an uncontrolled intersection.

Stop Condition Law

Nine states have statutes that require motorists to stop at an intersection that is

dark. All nine statutes made reference to signals that were “inoperative” or “malfunctioning.” Copies of the statutes are in Appendix, Stop Law Statutes.

Uncontrolled Intersection Law

Four agencies stated that their state had a statute requiring motorists to yield the right of way at dark intersections. A review of the submitted materials found that only one state, Delaware, with such a statute: “In the event that traffic signals are in place and no lighted indication is visible to an approaching driver, he shall reduce speed and prepare to yield to other vehicles in or approaching the intersection.” The three other states simply consider the intersection “uncontrolled” since the signal is not operating, as is the case in most states, including Minnesota. A copy of Delaware’s statute appears in Appendix, Uncontrolled Statutes.

Survey 3

In November 1996, a third survey was sent out to the nine state transportation departments which had stop condition statutes. The survey contained detailed questions about the legislation of the statute, related accident statistics, education, driver reactions, enforcement, violation statistics, and back up power systems. All nine state transportation departments responded to the survey.

Results of Survey

State traffic engineers were asked when their respective state legislatures had passed the stop condition statutes for drivers at a dark signal. All nine states surveyed responded to this question. The range of the dates of passed legislation varied from as early as 1965 in Colorado, to as late as 1993 in Nevada and Utah.

What prompted the legislation in most cases is unknown. Florida(1977) established the statute to “define a uniform practice for the driving public at dark intersections.” Nevada’s(1993) legislature began as a construction issue and evolved into a statute after discussions with the legislature. In 1977, a new vehicle code went into effect in Pennsylvania with a section pertaining to dark or inoperative signals. Prior to that the issue was not addressed. Ohio’s(1989) statute may have evolved from a court case. Utah’s(1993) was intended to eliminate driver confusion and safety concerns.

Why a Law?

When Utah rewrote the entire section of the statute, they decided to include the stop condition law. They did not develop any supporting data. Similarly, Pennsylvania assumed that the legislators must have agreed that it was necessary to add the stop condition provision to cover a situation that was previously undefined. Illinois felt that it was possible that there were position papers written during the legislative process, but copies of such papers could not be found in their files. Indiana could not determine what information influenced legislators to pass the statute without talking to the 1982 legislators themselves (or researching newspaper articles, law reviews, and other

sources concerning legislative history, if any exists). In general, it seems that no supporting information was used or that it is not now reasonably available, to influence the respective legislatures to pass the statutes.

Public Education

The driving public is educated or informed of the rules of the road when a dark signal occurs through various methods in the nine stop law states. The motor vehicle driver's manual contains direction for driver behavior at a dark signal in six of the nine states with a four-way stop statute. Consequently, examinees are questioned on motor vehicle written exams regarding what to do at a dark traffic signal in five of the nine states. Furthermore, Colorado, Indiana, and Utah use radio stations to inform drivers. Colorado radio traffic reporters (unofficial information) give listeners radio station traffic reports, especially during winter storms when power outages are more likely to happen, which are helpful in advising motorists that dark signals are to be treated as four-way stops. Indiana has traffic reports on radio and television, and Utah has a sky traffic watch given by local radio stations, which may report incidental dark signals. Two of the nine states educate their drivers of the four-way stop condition at a dark signal through the use of public service announcements. None of the states stated that they used educational informational signs to guide drivers at dark traffic signals.

Drivers Education of the Nine States with Stop Laws			
Source	Yes	No	Don't know
Motor vehicle drivers' manual	6	2	1
Motor vehicle written exams	5	3	1
Public Service Announcements	2	4	3
Educational or regulatory informational signs	0	5	4
Other modes of communication (explain)	3	3	3

The majority of information concerning the new driving laws comes early on in a driver's career(driver's manual & exam). The effectiveness of the educational efforts are unproven, since the states reported little or no data on how drivers actually reacted to dark signals.

In the Minnesota Drivers Manual, drivers are instructed, "In case of a power outage or traffic light failure, the intersection becomes uncontrolled. **Proceed with caution.**"

Signs Used at Dark Signals

At a dark signalized intersection, some states use temporary stop signs to control traffic until power is resumed at the signal while other states are clear about not using any stop signs. In Illinois, some local jurisdictions use folding stop signs attached to signal

posts. However, they note, but the law does not require signs. The Ohio State Highway Patrol troopers flag traffic until temporary stop signs are erected on easels by Ohio DOT crews. Indiana puts out temporary all-way stop signs. In Pennsylvania, temporary stop signs can be used. Their guidelines for traffic signal maintenance prescribe a one-hour maximum response time to verify and identify the reported problem. Repairs or replacement of failed equipment to restore the system to proper and safe operation is required within a 24-hour period. On the other hand, Colorado reports that they do not normally use temporary stop signs; but they are aware that a lawsuit was recently filed against the Colorado DOT because a local government had installed stop signs that were turned to traffic during a power outage and not turned away after power was resumed. California, Florida, Nevada, and Utah do not use any signs to help control traffic when a dark signal occurs.

Minnesota has no written policy regarding the erection of stop signs at intersections with a dark signal. Concerns exist regarding: sufficient and available crews, sufficient and available signs, mobilizing crews unnecessary during short outages, removal of signs at power resumption to prevent conflicting controls, prioritizing intersections for signs, tort liability regarding sign use. The next phase of this study, not included in this report may survey cities and counties in Minnesota on their policies.

Enforcement

Eight of the nine states with the stop law said that police would direct traffic at the intersection if available. Colorado and Florida statutes' are in effect until the police are present and they then become the traffic control. If enforcement is available, the most critical intersections are handled first. The focus is on safety first, with citations issued secondarily, after traffic control is established and working properly. Police will direct traffic until the signal is back on line.

Violations

None of the states had data regarding the percentages of drivers making the required stop at dark signals. The information is not available or is unknown. Colorado did offer data on citations issued at dark signal intersections.

Colorado Traffic Violation Citations			
	1992	1993	1994
Total	478,850	480,313	485,292
Total at signalized intersections	6,437	5,675	5,022
Total at dark signals	8	21	11

Fines

The dollar amount of the fine for violation of the stop condition law at a dark signal intersection in the states of Illinois and Ohio is $75.00. In Colorado, the fine is $43.00. In Pennsylvania, the fine is $90.50. The fine would be doubled in a work zone.

Back-up Power Systems

Battery backup

Seven of the nine states said they do not use battery back-up or un-interruptible power supplies(UPS). In Ohio, it is considered too costly to build one big enough to do the job right. The state transportation department in Illinois does not use battery backup, although other agencies in that state may. Only in Florida is a battery back-up under evaluation. But a policy on its use has not been developed, so specific questions cannot be answered yet, such as: intersection prioritization for UPS back-up; the length of time UPS can operate before power is drained from it; whether the signal head will flash or be full control when UPS is in operation; the UPS manufacturers used in the state; the types of UPS used; and the cost effectiveness. Florida did say that one of the minimum UPS specification requirements is that the initial operation evaluation will be done in flash mode.

Mn/DOT has installed a battery type UPS system at a location that is interconnected with a railroad grade crossing (TH 61 and 12th Street in Newport). The intersection is preempted about sixty times a day. It was felt that since the railroad equipment has a backup power source the signal should also. The intersection has LED signal indications allowing it to operate normally for over four hours, then the signal would flash until the battery dies, about 12 hours. This is just an evaluation of the technology and will be assessed in the future. Clearly more power conservative technology, such as LEDs, and better UPS systems, will influence the future use of such backup.

Electrical generators

Of the nine states with stop condition laws at dark signals only some of Ohio's districts use electrical generators to power dark signals. They are portable and brought to the intersection once they are notified of an outage. The length of

time that it takes to get a signal operating depends on the distance from the district/ county garage to intersection involved. Only a few generators per district are available for use at dark signals. The intersections are prioritized for generator back-up by route type interstate, freeway, expressway, major standard, and standard.

Maintenance and Repair Crews

If a maintenance crew is dispatched to a traffic signal during a power outage to perform maintenance and repairs, the effects of stop condition statutes on the workforce would be minimal according to the surveys.

MINNESOTA RESEARCH

Literature Search

A literature search was performed around the words “dark signal”, “a black signal”, and “inoperative signal”. The documents or articles that matched the search mainly pertained to backup power systems, batteries or generators.

Tort Claims

Since 1990, there have been four claims against the State of Minnesota concerning crashes at signals that were not operating, one of which was a fatal. In each of the cases the traffic signal was dark due to the loss of power feeding the traffic signals.

(1) Two vehicles, one traveling east to west, and the other traveling west to east through an intersection were struck by another northbound traveling vehicle. East/west drivers stated that the intersection was dark; The northbound driver said that the indications were green. The maintenance log indicated the intersection was without power.

(2) A driver approached a familiar signalized intersection and looked for the lighted indications. A pedestrian(fatal) was struck while in the roadway. Mn/DOT was cleared of any liability.

(3) An intersection was dark due to a power failure. A westbound vehicle approached and stopped at the intersection, and then proceeded but was struck by northbound vehicle which did not stop. Mn/DOT cleared if any liability.

(4) A driver stated that the red indication “disappeared”, so he accelerated into the intersection and struck another vehicle. Witnesses contradicted his statement. Mn/DOT cleared if any liability.

Filed accident reports

A search of the statewide accident accounting system was conducted for crashes that occurred at intersections where the signal was “non-working”. No conclusion could be drawn from the data obtained.

SUMMARY

This report was to investigate other state’s statutes in regards to dark or malfunctioning traffic signals. Each state was surveyed as to how their drivers are to handle signals that are dark or malfunctioning. Surveys were received from all fifty states. States with a stop condition, a law requiring motorists to stop at a dark signal, were sent a follow up questionnaire.

Nine states have a law requiring drivers to stop at a dark signal. Delaware was the only state with a specific law stating a dark signal was an uncontrolled intersection. Four states said that they had a law treating the dark signal as uncontrolled but no law could be found.

This report was presented to the Signal Committee of the North Central Section of the Institute of Transportation Engineers for comment and review. The group feeling is that the accident data didn’t seem to show a significant problem. Local agencies that were present at the meeting would welcome a law instructing driver on the proper operation. The larger agencies(City of St. Paul & Minneapolis, Hennepin & Ramsey Counties) say it is not feasible to place stop signs at dark signals, they do not have the manpower or signs.

References

1. Rankin, W. W., and Rosenbaum, M. J. “Problems Associated With Power Failures at Signalized Intersections,” Public Roads, Vol. 44, No. 1, June 1980, pp.18-25

2. Muller, C. A., and Miller, M. E., “FAIL SAFE: A Sign of the Times,” IMSA Signal Magazine, January - February 1974, pp. 5-8

3. Higgins, A. N., “ Conditioned and Battery Standby Power for Traffic Light Systems,” ITE Journal, October 1989, pp. 35-39

4. Waight, V. H., “Backup Power for Traffic Signals,” ITE Journal, March 1990, pp. 45-46

5. Waight, V. H., “Backup Power for Traffic Signals,” ITE Journal, August 1994, pp. 25

Appendix

1. Stop Law Statutes
    a. California
    b. Colorado
    c. Florida
    d. Illinois
    e. Indiana
    f. Nevada
    g. Ohio
    h. Pennsylvania
    I. Utah

2. Uncontrolled Statutes
    a. Alaska
    b. Arizona
    c. Delaware
    d. New York
    e. Washington

3. Results of Survey 3

1. Stop Condition Law

a. California

21800 Right of Way

(d)(1) The driver of any vehicle approaching an intersection which has official traffic control signals that are inoperative shall stop at the intersection, and may proceed with caution when it is safe to do so.

b. Colorado

42-4-612

When signals are inoperative or malfunctioning. (1) Whenever a driver approaches an intersection and faces a traffic control signal which is inoperative or which remains on steady red or steady yellow during several time cycles, the rules controlling entrance to a through street or highway from a stop street or highway, as provided under section 42-4-703, shall apply until a police officer assumes control of traffic or until normal operation is resumed. In the event that any traffic control signal at a place other than an intersection should cease to operate or should malfunction as set forth in this section, drivers may proceed through the inoperative or malfunctioning signal only with caution, as if the signal were one of flashing yellow.

42-4-703

Entering through highway - stop or yield intersection. (1) The department of transportation and local authorities, within their respective jurisdictions, may erect and maintain stop signs, yield signs, or other official traffic control devices to designate through highways or to designate intersections or other roadway junctions at which vehicular traffic on one or more of the roadways is directed to yield or to stop and yield before entering the intersection or junction. In the case of state highways, such regulations shall be subject to the provisions of section 43-2-135 (1) (g), C.R.S.

(2) Every sign erected pursuant to subsection (1) of this section shall be a standard sign adopted by the department of transportation.

(3) Except when directed to proceed by a police officer, every driver of a vehicle approaching a stop sign shall stop at a clearly marked stop line, but if none, before entering the crosswalk on the near side of the intersection, or if none, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering it. After having stopped, the driver shall yield the right-of-way to any vehicle in the intersection or approaching on another roadway so closely as to constitute an immediate hazard during the time when such driver is moving across or within the intersection or junction of roadways.

c. Florida

316.1235 Vehicle approaching intersection in which traffic lights are inoperative.

The driver of a vehicle approaching an intersection in which the traffic lights are inoperative shall stop in the manner indicated in s. 316.123(2) for approaching a stop intersection. In the event that only some of the traffic lights within an intersection are inoperative, the driver of a vehicle approaching an inoperative light shall stop in the above-prescribed manner.

316.123 Vehicle entering stop or yield intersection. ---
(2)(a) Except when directed to proceed by a police officer or traffic control signal, every driver of a vehicle approaching a stop intersection indicated by a stop sign shall stop at a clearly marked stop line, but if none, before entering the crosswalk on the near side of the intersection or, if none, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection. After having stopped, the driver shall yield the right-of-way to any vehicle which has entered the intersection from another highway or which is approaching so closely on said highway as to constitute an immediate hazard during the time when the driver is moving across or within the intersection.
(b) At a four-way stop intersection, the driver of the first vehicle to stop at the intersection shall be the first to proceed. If two or more vehicles reach the four-way stop intersection at the same time, the driver of the vehicle on the left shall yield the right-of-way to the vehicle on the right.

d **Illinois**

5/11-305 Obedience to a required traffic control devices
-(e) The driver of a vehicle approaching a traffic control signal on which no signal facing such vehicle is illuminated shall stop before entering the intersection in accordance with rules applicable in making a stop at a stop sign.

e. **Indiana**

IC 9-21-3-7 Sec. 7.(4)
No indication or conflicting indications means the following:
(a) Vehicular traffic facing an intersection having a signal that displays no indication or conflicting indications, where no other control is present, shall stop before entering the intersection.
(b) After stopping, vehicular traffic may proceed with caution through the intersection and shall yield the right-of-way to traffic within the intersection or approaching so closely as to constitute an immediate hazard.

f. **Nevada**

Vehicle approaching or entering intersection.

4. When a vehicle enters an intersection controlled by a traffic-control signal which is installed and has its vehicular signals uncovered, but is inoperative at the time the vehicle enters the intersection, the driver of the vehicle shall proceed as if a stop sign had been erected at each entrance to the intersection and shall stop at a clearly marked stop line or, if there is none, before entering the crosswalk on the near side of the intersection or, if there is none, at the point nearest the intersection where the driver has a view of approaching traffic on the through highway. After making such a stop, the driver shall proceed cautiously, yielding to vehicles which have previously completed a stop or are within the intersection.

g. Ohio

Section 4511.132

The driver of a vehicle, streetcar, or trackless trolley who approaches an intersection where traffic is controlled by traffic control signals shall do all of the following, if the signal facing him either exhibits no colored lights or colored lighted arrows or exhibits a combination of such lights or arrows that fails to clearly indicate the assignment of right-of-way:

(a) Stop at a clearly marked stop line, but if none, stop before entering the crosswalk on the near side of the intersection, or, if none, stop before entering the intersection;

(b) Yield the right-of-way to all vehicles, streetcars, or trackless trolleys in the intersection or approaching on an intersecting road, if the vehicles, streetcars, or trackless trolleys will constitute an immediate hazard during the time the driver is moving across or within the intersection or junction of roadways; Exercise ordinary care while proceeding through the intersection.

h. Pennsylvania

3112 Inoperable or malfunctioning signal. - If a traffic-control signal is out of operation or is not functioning properly, vehicular traffic facing a:

(1) Green or yellow signal may proceed with caution as indicated in subsection (a)(1) and (2).

(2) Red or completely unlighted signal shall stop in the same manner as at a stop sign, and the right to proceed shall be subject to rules applicable after making a stop at a stop sign as provided in section 3323 (relating to stop signs and yield signs).

I. Utah

41-6-24. Traffic-control signal -- At intersections -- At a place other than intersection -- Color of light signal -- Inoperative traffic-control signals.

(6) The operator of a vehicle approaching an intersection that has an official traffic-control signal that is inoperative shall stop before entering the intersection and shall yield the right-of-way to any vehicle as required under Section 41-6-72.

41-6-72. Right-of-way between vehicles -- Unregulated intersection.
(1) The operator of a vehicle approaching an intersection not regulated by an official traffic-control device shall yield the right-of-way to any vehicle that has entered the intersection from a different highway.
(2) Except as specified in Subsections (3) and (4), when more than one vehicle enters or approaches an intersection from different highways at approximately the same time and the intersection:
(a) is not regulated by an official traffic-control device;
(b) is not regulated because the traffic-control signal is inoperative; or is regulated from all directions by stop signs, the operator of the vehicle on the left shall yield the right-of-way to the vehicle on the right unless otherwise directed by a peace officer.

2. Uncontrolled Statutes

Alaska, Arizona, New York and Washington reported that they have an uncontrolled law at dark intersections but in each case no law could be found.

a. **Delaware**
Title 21 Motor Vehicles, Part III Operation and Equipment, Chapter 41, Section 41082, “In the event that traffic signals are in place and no lighted indication is visible to an approaching driver, he shall reduce speed and prepare to yield to other vehicles in or approaching the intersection.”

3. Results of Survey 3

1. When did the legislature pass the stop condition statute at a dark (inoperative) signal in your state?

CA: 1987, Effective January 1, 1988
CO: 1965
FL: Initial Legislation 1977
IL: October 1977
IN: February 24, 1982
NV: July 1, 1993
OH: The legislation was signed on 4-24-89 and became effective on 7-25-89.
PA: June 17, 1976, P.L. 162, No. 81. Effective July 1, 1977.
UT: 1993

2. What prompted the legislature to begin discourse for the creation of a stop condition statute at a dark signal in your state?

CA: Don't know.
CO: Not Available.
FL: To define a uniform practice for the driving public at dark [signal] intersections.
IL: Unknown.
IN: ... the Indiana General Assembly does not keep any kind of congressional record which would record committee discussions, floor debates, draft legislation, voting records, and so forth. Therefore, without talking to the 1982 legislators themselves (or perhaps researching newspaper articles, law reviews, and other sources concerning legislative history, if any exist), it would be impossible to know what prompted their discussion...
NV: Began as a construction issue. Evolved into the statute after discussion in the Legislature.
OH: We are not certain, but we believe it was court cases.
PA: On July 1, 1977, a completely new Pennsylvania Vehicle Code went into effect. Prior to that, we did not have a section dealing with inoperable or malfunctioning signals.
UT: Driver confusion and elimination of safety concerns.

3. Describe the information that influenced the legislature to pass the statute. Please send copies of any reports or data used.

CA: Don't know.
CO: Not available.
FL: NA (20 years ago)
IL: It is possible there may have been position papers written during the legislative

process. However, copies of such papers could not be found in our files.
IN: ... the Indiana General Assembly does not keep any kind of congressional record which would record committee discussions, floor debates, draft legislation, voting records, and so forth. Therefore, without talking to the 1982 legislators themselves (or perhaps researching newspaper articles, law reviews, and other sources concerning legislative history, if any exist), it would be impossible to know... what information influenced them to pass the statute.
NV: Not available.
OH: See copy of ORC 4511.132 attached.[Author's note:I believe question was misunderstood. The statute referenced does not describe the influencing information, nor is it a report or data.]
PA: We assume they just agreed that it was necessary to add these provisions to cover a situation that was previously undefined.
UT: We rewrote the entire section of the statute and decided to include it in the rewrite. We did not develop any supporting data.

4. Explain the benefits that the public gained after the legislature passed the statute.

CA:Don't know.
CO: Motorists know what their rights and responsibilities are at dark signalized intersections.
FL: Safer (4-way stop) at dark intersections.
IL: Clarified action to be taken.
IN: Uniformity.
NV: Not available.
OH: Increased safety.
PA: Driver responsibilities at inoperable or malfunctioning signals were defined.
UT: With the statute in place, there is a clear direction of what is required of the motorist when a signal is black.

5. If available, please provide the following statistics in the DOT's statewide jurisdiction:

CA:

Description of statistic	Before statute	After statute

Annual total accidents at dark signals	Don't know	Don't know
Annual total accidents at signalized intersections	16,000 AVG 87-88	13,000 AVG 88-95
Annual total accidents	Don't know	Don't know
Total signalized intersections	3,000	4,000

CO:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Not available	Not available
Annual total accidents at signalized intersections	Not available	Not available
Annual total accidents		38,869 AVG 92-94
Total signalized intersections	Not available	Not readily obtainable

FL:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Not available	Not available
Annual total accidents at signalized intersections	Not available	Not available
Annual total accidents	Not available	Not available
Total signalized intersections	Not available	Not available

IL:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Unknown	Unknown
Annual total accidents at signalized intersections	Unknown	Unknown
Annual total accidents	Unknown	Unknown
Total signalized intersections	Unknown	Unknown

IN:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Unknown	Unknown
Annual total accidents at signalized intersections	Unknown	Unknown
Annual total accidents	Unknown	Unknown
Total signalized intersections	Unknown	Unknown

NV:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	19	35
Annual total accidents at signalized intersections	13,317	13,409
Annual total accidents	44,612	45,866
Total signalized intersections	1,862	2,038

OH:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Unknown	Unknown
Annual total accidents at signalized intersections	Unknown	58,306 AVG 91-95
Annual total accidents	Unknown	364,231 AVG 91-95
Total signalized intersections	Relatively	Unchanged

PA:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Unknown	Unknown
Annual total accidents at signalized intersections		
Annual total accidents		136,804

Total signalized intersections		12,500

UT:

Description of statistic	Before statute	After statute
Annual total accidents at dark signals	Not available	Not available
Annual total accidents at signalized intersections	Not available	Not available
Annual total accidents	Not available	Not available
Total signalized intersections	Not available	Not available

6. How is the public educated regarding rules to be followed when a dark signal occurs?

CA:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams	x		
Public Service Announcements			x
Educational or regulatory informational signs			x
Other modes of communication (explain)			x

CO:

Source	Yes	No	Don't know
Motor vehicle drivers' manual		x	
Motor vehicle written exams		x	
Public Service Announcements		x	
Educational or regulatory informational signs		x	

Other modes of communication (explain)	x		

Radio traffic reporters (unofficial info.) Radio station traffic reports, especially during winter storms when power outages are more likely to happen, are helpful in advising motorists that dark signals are to be treated as a four-way stop.

FL:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams	x		
Public Service Announcements	x		
Educational or regulatory informational signs			x
Other modes of communication (explain)			x

IL:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams	x		
Public Service Announcements		x	
Educational or regulatory informational signs		x	
Other modes of communication (explain)		x	

IN:

Source	Yes	No	Don't know
Motor vehicle drivers' manual		x	
Motor vehicle written exams		x	
Public Service Announcements		x	
Educational or regulatory informational signs		x	

Other modes of communication (explain)	x		

Traffic reports on radio / TV

NV:

Source	Yes	No	Don't know
Motor vehicle drivers' manual			x
Motor vehicle written exams			x
Public Service Announcements			x
Educational or regulatory informational signs			x
Other modes of communication (explain)			x

OH:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams		x	
Public Service Announcements	x*		
Educational or regulatory informational signs		x	
Other modes of communication (explain)		x	

The Ohio dept. Of Public Safety agreed to be the agency that would advise and inform the public. * when enacted

PA:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams	x		
Public Service Announcements		x	
Educational or regulatory informational signs		x	
Other modes of communication (explain)		x	

UT:

Source	Yes	No	Don't know
Motor vehicle drivers' manual	x		
Motor vehicle written exams	x		
Public Service Announcements			
Educational or regulatory informational signs			
Other modes of communication (explain)			

Most of the education has been through sky traffic watch. By the local radio stations.

7. How do out-of-state drivers react to a dark signal in your state? _____

CA: Don't know.
CO: No study has been conducted on subject.
FL: Hopefully non-resident drivers are aware of Florida driving laws.
IL: Unknown. We are not aware of any problems associated with the law and believe that it works well. We are also unaware of any attempts to modify the law during the almost twenty years since it was enacted. As a consequence, we have not performed any studies regarding the law's effectiveness. For these reasons, we were unable to answer many of the specific questions on your survey form.
IN: [They] follow what driver ahead does.
NV: 41,016,106 visitors each year (Fiscal '95-'96). Hard to tell if they exist at all.
OH: Unknown
PA: We have not done any studies to determine this.
UT: Have not had any feedback.

8. If the luminaries are not present, or are dark simultaneously with a dark signal, can drivers correctly identify and react to a dark signal? _____

CA: Don't know.
CO: No known problems.
FL: Appears to be understood and practiced by Florida drivers.
IL: Depends on layout of intersection.
IN: Yes. Signal heads are placed in cone of vision.
NV: Not available.
OH: Some can, but not all our signals have an advanced warning signs. Limited consideration is being given to placing advance signing at all signalized intersections. A

study is in progress; no decision has been made yet.
PA: We have not done any studies to determine this.
UT: Has not been shown to be a problem. The signals are noticeable in most cases.

9. When a dark signal occurs, are there any signs used to help control traffic? (E.g., pop-out signs, temporary stop signs)

CA: No.
CO: Not normally, but we are aware that a lawsuit was recently filed against CODOT because a local government had installed stop signs that were turned to traffic during a power outage and not turned away after power was resumed.
FL: NO!
IL: Some local jurisdictions use folding stop signs attached to signal posts. However, law does not require signs.
IN: Put out temporary all -way stop signs.
NV: No.
OH: State Highway Patrol troopers flag until temporary stop signs are erected on easels by ODOT crews.
PA: Temporary stop signs can be used. Our guidelines for traffic signal maintenance prescribe a one-hour maximum response time to verify and identify the reported problem and also to institute repairs or replacement of failed equipment to restore the system to proper and safe operation within a 24-hour period.
UT: No.

10. What are the enforcement procedures routinely practiced at an intersection with a dark signal?

CA: Police control.
CO: A police officer is authorized to direct traffic.
FL: If enforcement is available, most critical intersections will be handled first.
IL: Unknown.
IN: Unknown, but police may direct traffic.
NV: Nevada Highway Patrol did not know this law was on the books.
OH: Focus is on safety first. State Highway Patrol's initial concern is for safe operation. Citations issued only after control is established and working properly.
PA: ...police control is commonly used.
UT: If law enforcement is able, they will direct traffic until the signal is back on line.

11. If available, please provide the following statistics in the DOT's statewide jurisdiction:

CA; FL; IL; IN; NV; UT

Percentage of vehicles that make the legally required stop at an intersection during a signal outage	Don't know; N/A; Unknown; Unknown; N/A; N/A
Annual total traffic violation citations issued at dark signal intersections	Don't know; N/A; Unknown; Unknown; N/A; N/A
Annual total traffic violation citations issued at signalized intersections	Don't know; N/A; Unknown; Unknown; N/A; N/A
Annual total traffic violation citations	Don't know; N/A; Unknown; Unknown; N/A; N/A
Dollar amount of fine for violation of stop condition at a dark signal intersection	Don't know; N/A; $75; Unknown; N/A; N/A

Comments:UT: this information may be available through Public Safety.

CO:

Percentage of vehicles that make the legally required stop at an intersection during a signal outage	Not available.
Annual total traffic violation citations issued at dark signal intersections	1992: 8; 1993: 21; 1994: 11
Annual total traffic violation citations issued at signalized intersections	1992: 6,437; 1993: 5,675; 1994: 5022
Annual total traffic violation citations	1992: 478,850; 1993: 480,313; 1994: 485,292
Dollar amount of fine for violation of stop condition at a dark signal intersection	State fine in county court. Fine: $39.00 surcharge: $4.00

Comments: All highways, not just state highways.

OH:

Percentage of vehicles that make the legally required stop at an intersection during a signal outage	Unknown.
Annual total traffic violation citations issued at dark signal intersections	Only cited if crash occurs. Citation code is ORC 4511.12
Annual total traffic violation citations issued at signalized intersections	Citation code is ORC 4511.12
Annual total traffic violation citations	825,000
Dollar amount of fine for violation of stop condition at a dark signal intersection	Fine $25.00; Costs $50.00

Comments:Most of the above information is not available.

PA:

Percentage of vehicles that make the legally required stop at an intersection during a signal outage	Unknown.
Annual total traffic violation citations issued at dark signal intersections	Unknown.
Annual total traffic violation citations issued at signalized intersections	
Annual total traffic violation citations	
Dollar amount of fine for violation of stop condition at a dark signal intersection	$25 fine plus an additional $65.50 for costs, fees, and surcharges. Fine would be doubled if in a work zone

12. Does your State use a battery back-up Uninterrupted Power Supply (UPS)?

CA: No.
CO: No.
FL: Currently under evaluation.
IL: No. It is possible that some jurisdictions may.
IN: No.

NV: No.
OH: No. It is considered too costly to build one big enough to do job right.
PA: No.
UT: No.

If yes, then answer the following:

a. How are intersections prioritized for UPS backup? _____

FL: Policy not developed yet.

b. What is the length of time UPS can operate before power is drained from it? _____

FL: Policy not developed yet.

c. Will the signal head flash or be full when UPS is in operation? _____

FL: Policy not developed yet.

d. Name the UPS manufacturer(s) used in your state. _____

FL: None.
e. List the types of UPS used. _____

FL: None.
f. List some minimum UPS specification requirements. _____

FL: Initial operation evaluation will be in 'flash' mode.

g. Is UPS cost effective? Explain. _____

FL: N/A

13. Does your state use electrical generators to power dark signals? _____

CA: No.
CO: No.
FL: No.
IL: No.
IN: No.
NV: No.
OH: Some field districts do.
PA: No.

UT: No.

If yes, then answer the following:

a. How are intersections prioritized for generator backup?

OH: By route type - Interstate, freeway, expressway, major standard, standard.

b. Are generators permanent or portable?

OH: Portable, but some of our controller cabinets are equipped with quick connect / disconnect access ports for power generators. See enclosed drawing.

c. If they are permanent, do they start automatically at a power outage?

OH: Not applicable.

d. If they are portable, how long does it take from power out to restart operation?

OH: It depends on location, distance from district / county garage to intersection involved.

e. How many generators are available?

OH: No definite data available; a few per district that use generators for dark signals.

14. How does the stop condition at a dark signal intersection affect maintenance and repair of signals during outages?

CA: [no answer]
CO: [no answer]
FL: Depends on condition that caused outage, i.e. lightning or knockdown!
IL: No significant effect. Signals brought on - line first with flashing red phase.
IN: Outages are rare and not related to equipment.
NV: Not available-we use local law enforcement to provide traffic control (flagging).
OH: Maintenance / repair work at dark signals is not affected by outage. Electrician would be with generators when deployed.
PA: No significant effect.
UT: It is very difficult to perform and maintain without any power. We have not seen this to be a critical issuesue. The work would proceed when power is restored.

Name
Title
Address
State
Phone
E-mail
Fax