



## Traffic Signal Design Manual

ORIGINATOR Director, Bureau of Highway Operations	
CHAPTER -	Glossary Of Terms
SECTION -	
SUBJECT -	

This section offers terms and definitions used in the *Traffic Signal Design Manual*. For other definitions, refer to *MUTCD* Chapter 4A, Definition of Terms.

**ACCESSIBLE PEDESTRIAN SIGNAL:** A device that communicates information about pedestrian timing in non-visual format such as audible tones, verbal messages, and/or vibrating surfaces.

**ACTUATED CONTROLLER:** A traffic signal controller that receives information from vehicle and/or pedestrian detectors and provides signal timing accordingly.

**ADA:** Americans with Disabilities Act (42 U.S.C. 12181).

**AMPERE (AMP):** The unit expressing the rate of flow of an electrical current. One ampere is the current flowing through one ohm resistance with one volt pressure.

**AMPLIFIER (DETECTOR ELECTRONICS):** A solid-state device used in a vehicle detection system that produces a signal when a vehicle passes through or remains within the detection zone of a sensing element.

**ANSI:** American National Standards Institute.

**AREA DETECTION:** The continuous detection of vehicles over a length of roadway wherein the call of a vehicle in the detection area is intended to be held for as long as the vehicle remains - in the detection area. (Some detectors are not capable of holding the call indefinitely.) Frequently referred to as large-area detectors of "long-loop presence detectors."

**ARTERIAL:** A major urban roadway.

**ASTM:** The American Society for Testing and Materials.

**AUTOTURN:** A dynamic, advanced CAD-based software tool specifically created for determining vehicle turning movement paths.

**AUXILIARY EQUIPMENT:** Separate devices used to add supplementary features to a controller assembly (NEMA).

**AWG:** American Wire Gauge. The standard measurement of wire size. It is based on the circular mil system. 1 mil equals .001.

**BACKPLATE:** A strip of thin material extending outward parallel to the signal face on all sides of a signal housing to provide a suitable background for the signal indications.

**BATTER BACKUP:** A battery-powered energy backup system capable of maintaining power for signal system operation. These devices are encouraged to be placed at railroad interconnected systems, single point urban interchanges and intersections with triple-left turn lanes.

**CABLE:** A group of separately insulated wires wrapped together.

**CALL:** A registration of a demand for right-of-way by traffic at a controller unit (NEMA). The call comes to the controller from a detector that is outputting an actuation.

**CALLING DELAY:** An adjustable feature used on a specific detector amplifier that does not issue an output until the detection zone has been occupied for a period of time.

**CALLING DETECTOR:** A detector that is installed in a selected location to detect vehicles which may not otherwise be detected, and whose output may be modified by the controller unit (NEMA). This traditionally has meant a small area detector near the stop line, to detect vehicles entering the roadway from a nearby driveway during a red or yellow signal. When the signal is green the detector is disconnected so that extensions of the green can come only from the detector located upstream of the driveway.

**CAPACITANCE:** That property of a system of conductors and dielectrics which permits the storage of electricity separated charges when potential differences exist between the conductors. Its value is expressed as the ratio of an electric charge to a potential difference.

**CHANGE INTERVAL:** The yellow interval following the green signal indicating the change to a conflicting phase.

**CHANNEL:** Electronic circuitry which functions as a loop detector unit (NEMA).

**CHANNELIZING ISLAND:** Curbed or painted area outside the vehicular path that is provided to separate and direct traffic movement, which may also serve as a refuge for pedestrians.

**CIRCUIT:** A closed path followed by an electric current.

**CLEARANCE INTERVAL(S):** The interval(s) from the end of the right-of-way of one phase to the beginning of a conflicting phase. (The yellow and all red indications)

**COIL:** A coiled conductor, wound on a form or core, which uses electromagnetic induction to cause changes in a current.

**CONDUCTANCE:** The measure of ability to conduct electricity.

**CONDUCTOR:** A medium for transmitting electrical current. A conductor usually consists of copper or other materials.

**CONDUIT:** A raceway or tubing for protecting electrical wires or cables.

**CONFLICTING PHASES:** Two or more traffic phases which will cause interfering traffic movements if operated concurrently.

**CONTINUOUS-PRESENCE MODE:** Detector output continues if any vehicle (first or last remaining) remains in the field of influence (NEMA). (This definition should not be understood to imply that the use of this mode guarantees that the output will continue for whatever length of time the vehicle remains in the detection area, as some detectors are not capable of holding a call indefinitely).

**CONTROLLER:** A device that controls the sequence and duration of indications displayed by traffic signals.

**COORDINATION:** The establishment of a definite timing relationship among adjacent traffic signals.

**CROSSTALK:** Mutual coupling of magnetic fields, producing interaction between two or more detector units in the same cabinet, when the units are operating at similar frequencies. Crosstalk results in a detector outputting an actuation in the absence of a vehicle.

**CYCLE:** In a pretimed controller unit, a complete sequence of signal indication. In an actuated controller unit, a complete cycle is dependent on the presence of calls on all phases.

**CYCLE LENGTH:** The time period in seconds required for a complete cycle.

**DELAY:** (1) A measure of the time that elapsed between the stimulus and the response; (2) the retardation of the flow of information in a channel for a definite period of time; (3) traffic delay--the time lost by vehicle(s) due to traffic friction or control devices.

**DELAYED OUTPUT:** The ability of a detector to delay its output for a predetermined length of time following the arrival of the vehicle into the zone of detection.

**DELTA L ( $\Delta L$ ):** The change in inductance.

**DEMAND:** The need for service, e.g., the number of vehicles desiring to use a given segment of roadway during a specified unit of time.

**DEMAND OPERATION:** A mode of operation in which the service provided at an intersection reflects the presence of demand for that service often without regard for background cycling.

**DENSITY:** A measure of the concentration of vehicles, stated as the number of vehicles per mile per lane.

**DENSITY CONTROLLER:** Actuated controller that has timing adjustments for selection of an allowable gap independent of the passage time. A volume-density controller and a modified density controller are types of density controller.

**DESIGN SPEED:** The speed Used as typical by the designer of the detector/controller scheme in his kinematic analysis of the scheme under free traffic flow conditions (typically 85% speeds).

**DESIGN VEHICLE:** The longest vehicle permitted by the State on that roadway. Typical intersections are designed for a WB-62 vehicle.

**DETECTABLE WARNING FIELD:** Tactile device used on curb ramps at pedestrian crossings for visually impaired users.

**DETECTION:** The process used to identify the presence or passage of a vehicle at a specific point or to identify the presence of one or more vehicles in a specific area.

**DETECTION ZONE:** That area of the roadway within which a vehicle will be detected by a vehicle detector (NEMA). Also called "ZONE OF DETECTION" or "SENSING ZONE."

**DETECTOR:** A device for indicating the presence or passage of vehicles or pedestrians (NEMA). This general term is usually supplemented with a modifier indicating type (e.g., loop detector, magnetic detector, etc.), operation (e.g. point detector, presence detector, etc.), or function (e.g. calling detector, extension detector, etc.).

**DETECTOR AMPLIFIER:** See AMPLIFIER, DETECTOR.

**DETECTOR DISCONNECT:** A controller function which when used allows detection to be ignored by the controller during a specific phase.

**DETECTOR FAILURES:** The occurrence of detector malfunctions, including non-operation, chattering, or other intermittently erroneous counting.

**DETECTOR MEMORY:** The retention of an actuation for future utilization by the controller assembly.

**DETECTOR MODE:** A term used to describe the duration and conditions of the occurrence of a detection output (NEMA, 1981).

- a. Pulse mode: Detector produces a short output pulse when detection occurs.
- b. Controlled Output: The ability of a detector to produce a pulse that has a predetermined duration regardless of the length of time a vehicle is in the field of influence.
- c. Continuous-Presence Mode: Detector output continues if any vehicle (first or last remaining) remains in the field of influence. See remarks for CONTINUOUS-PRESENCE MODE, above.
- d. Limited-Presence Mode: Detector output continues for a limited period of time if vehicles remain in field of influence.

**DETECTOR SYSTEM:** The complete sensing and indicating group consisting of the detector unit, transmission lines (lead-ins), and sensor.

**DETECTOR SETBACK:** Longitudinal distance between stop line and detector.

**DETECTOR UNIT:** The portion of a detector system other than the sensor and lead-in, consisting of an electronics assembly.

**DILEMMA ZONE:** A distance or time interval related to the onset of the yellow interval. Originally the term was used to describe that portion of the roadway in advance of the intersection within which a driver can neither stop prior to the stop line nor clear the intersection before conflicting traffic is released. That usage pertained to insufficient length of timing of the yellow and/or all red intervals. More recently the term has been used also to describe that portion of the roadway in advance of the intersection within which a driver is indecisive regarding stopping or clearing, although the signal timing is long enough to permit either. That portion of the roadway in advance of the intersection within which a driver is indecisive regarding stopping prior to the stop line or proceeding into or through the intersection. May also be expressed as the increment of time corresponding to the dilemma zone distance.

**DILEMMA-ZONE PROTECTION:** Any method of attempting to control the end of the green interval so that no vehicle will be in the dilemma zone when the signal turns yellow.

**DIRECT CURRENT (DC):** An electrical current, which travels uniformly in one direction.

**DRIFT:** Change in the electrical properties of the detector system or a portion of it due to environmental changes, particularly temperature variations and rainwater.

**DUMMY INTERVAL:** A redundant interval in the cam switching mechanism incorporated so as to allow the total number of intervals in the cycle to correspond integrally with the total number of intervals provided on the cam switching mechanism.

**EFFECTIVE LOOP AREA:** See ZONE OF DETECTION.

**EMERGENCY VEHICLE PREEMPTION (EVP):** The transfer of the normal control of signals to a special control mode for emergency vehicles.

**ENCAPSULATION:** The process of filling in the saw slot with sealant to surround the wires in the slot and protect them from traffic, weather, etc.

**ENCASEMENT:** The loop wire is encased in a polyvinyl or polyethylene tube to provide protection for the wire. Often referred to as detect-a-duct or other similar commercial names.

**EPOXY:** A resin used in bonding.

**EXTENDED CALL DETECTOR:** A detector with carryover output. It holds or stretches the call of a vehicle for a period of seconds that has been set on an adjustable timer incorporated into the detector. It can be designed to begin the timing of that period when the vehicle enters the detection area, or when it leaves. See STRETCH DETECTOR.

**EXTENSION DETECTOR:** A detector that is arranged to register actuations at the controller only during the green interval for that approach so as to extend the green time of the actuating vehicles (NEMA).

**EXTENSION LIMIT:** The maximum time of the extensible portion for which actuations on any traffic phase may retain the right-of-way after actuation on an opposing traffic phase.

**EXTENSION INTERVAL:** The increment of time programmed into the Extension Stretch function.

**EXTENSION STRETCH:** Feature used in detector operations which may add green time to the current phase allowing a vehicle to pass from a point of detection to some other position.

**EXTENSION UNIT:** The timing interval during the extensible portion which is resettable by each detector actuation. The green right-of-way of the phase may terminate on expiration of the unit extension time.

**FAILSAFE (as in output relay design):** A type of output-relay design that produces a constant call, thereby keeping traffic moving, in the event that the detector unit loses power.

**FDM:** *Facilities Development Manual*, published by The Wisconsin Department of Transportation.

**FIELD OF INFLUENCE:** See ZONE OF DETECTION.

**FREQUENCY:** The number of times an alternating current repeats its cycle in 1 second.

**FTMS:** Freeway Traffic Management Systems are a network of dynamic devices controlled from a central location with the intent to actively manage traffic flow in freeway corridors. FTMS can also provide travelers real time traffic information to assist with their routing or modal choices.

**FULL-TRAFFIC-ACTUATED CONTROLLER ASSEMBLY:** A type of traffic-actuated controller assembly in which means are provided for traffic actuation on all approaches to the intersection.

**GAP:** The time interval between the end of one vehicle actuation and the beginning of the next actuation.

**GAP OUT:** Terminating of artery green due to an excessive time interval between the actuations of vehicles arriving on the green, so green may be served to a competing phase.

**GAP REDUCTION:** A feature whereby the unit extension or allowed time spacing between successive vehicle actuations on the phase displaying the green in the extensible portion of the interval is reduced (NEMA).

**GREEN EXTENSION SYSTEM:** Hardware assembly of extended call detectors and auxiliary logic. The logic can monitor the signal display, enable or disable the selected extended call detectors, and hold the controller in artery green.

**GROUND:** A conducting connection to such a position or to the earth used as a return for electric currents and as an arbitrary zero of potential

**HENRY (h):** The measure of inductance, defined as the inductance of a circuit in which a counter electromotive force of one volt is generated when the current is changing at the rate of one ampere per second.

**HERTZ (Hz):** A term replacing cycles-per-second as an indication of frequency.

**HSIP:** Highway Safety Improvement Program

**HOLD:** A command that retains -the existing right-of-way. A command to the controller which causes it to retain the existing right-of-way.

**HOME-RUN CABLE:** See LEAD-IN CABLE.

**INCANDESCENT:** An electric lamp, which provides a source of artificial light, that works by incandescence.

**INDUCTANCE:** That property of an electric circuit or of two neighboring circuits whereby an electromotive force is generated in one circuit by a change of current in itself or in the other. The ratio of the electromotive force to the rate of change of the current.

**INDUCTIVE REACTANCE:** The reactance (ohms) of an ideal (lossless) inductor is the product of the voltage across the inductor and the sine of the phase angle (90 degrees) between inductor voltage and current divided by the inductor current assuming sinusoidal operation.

**INFRARED DETECTOR (MICROWAVE):** A detector that senses radiation in the infrared spectrum (NEMA). A detector installed over the roadway capable of being actuated by the passage of a vehicle through its field of emitted electromagnetic waves.

**INITIAL PORTION:** The first timed portion actuated controller unit:

1. Fixed Initial Portion - A preset initial portion that does not change.
2. Computed Initial Portion - An initial portion which is traffic adjusted.
3. Maximum Initial Portion - The limit of the computed initial portion.
4. Minimum Initial Portion (see "Fixed Initial Portion").
5. Added Initial Portion - An increment of time added to the minimum initial portion in response to vehicle actuation.

**INTERCONNECT:** The communication network usually consisting of electrical cable connecting the system master with local control stations; for example, intersection controllers.

**INTERVAL:** A discrete portion of the signal cycle during which the signal indications remain unchanged.

**INTERVAL SEQUENCE:** Specifies the order in which the various intervals are displayed.

**INTERVAL TIMING:** The passage of time that occurs during an interval.

**ISOLATED INTERSECTION CONTROL:** Form of signal control for a single signalized intersection through which the flow of traffic is controlled without giving any consideration to the operation of adjacent signalized intersections.

**JUNCTION BOX:** See PULLBOX.

**LARGE AREA DETECTOR:** A detector or series of detectors wired together in series, parallel, or series/parallel covering an area in the approach to an intersection. Detection area varies from 6 x 40 ft. (1.8 x 12 m) to 6 x 100 ft. (1.8 x 30 m) or larger. One of the

more common configurations is four 6- x 6-ft (1.8- x 1.8-m) loops spaced 10 ft (3 m) apart for a length of 54 ft (16.5 m).

**LOS:** Level Of Service per *Highway Capacity Manual*

**LAST CAR PASSAGE:** A selected feature of a density controller which upon gap out will cause the green to complete the timing of the passage time. The last vehicle to have been detected, known as the Last Car, will therefore retain the green until it reaches the stop line. Thus, it is assured of avoiding the dilemma zone problem and of clearing the intersection.

**LEAD-IN CABLE:** The electrical cable which serves to connect the loop detector wire to the input of the loop detector unit (NEMA). Sometimes called "home-run" cable or transmission line.

**LEAD-IN WIRE:** That portion of the loop wire between the physical, edge of the loop to the pull box for a magnetic detector, microloop, and magnetometer it is the wire, which runs from the sensor (probe) to the pull box.

**LED:** Light Emitting Diode

**LINK:** The length of roadway between two signalized intersections.

**LOCAL CONTROLLER:** A controller supervising the operating of traffic signals at a single intersection.

**LOCKING MEMORY:** A selectable feature of the circuit design for a controller phase whereby the call of a vehicle arriving on the red (or yellow) is remembered or held by the controller after the vehicle leaves the detection area until it has been satisfied by the display of a green interval to that phase.

**LOOP DETECTOR:** A detector that senses a change in inductance of its inductive loop sensor caused by the passage or presence of a vehicle near the sensor (NEMA).

**LOOP DETECTOR WIRE:** Wire used for the inductive loop detector and lead in.

**LOOP-LEAD WIRE:** The portion of the loop wire that is not a part of the loop but is in the conduit or saw slot connecting the loop to the edge of the roadway, where it is carried in conduit to the controller or to a pull box, and connected to the lead-in cable.

**LOOP SYSTEM:** A combination of loop of wire connected through transmission lines (lead-ins) to the detector input terminals.

**LUMINAIRE:** A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply.

**MAGNETOMETER:** A detector that measures the difference in the level of the earth's magnetic forces caused by the passage or presence of a vehicle near its sensor (NEMA). A device capable of being activated by the magnetic disturbance caused by the passage or presence of a vehicle. A magnetic flux generator/sensor is installed in the roadway and connected to sensor amplifier electronics. Not to be confused with a magnetic detector.

**MAST ARM:** A structural support extending over the roadway from a pole, for the purpose of supporting signal heads.

**MASTER (PRIMARY):** A control device for supervising a system of secondary controllers, maintaining definite time interrelationships, and/or accomplishing other supervisory functions. In the case of traffic-responsive systems, the master generally includes computation equipment and recording equipment, and can be quite extensive.

**MAXIMUM GREEN INTERVAL:** The maximum green time after an opposing actuation, which may start in the initial portion.

**MEMORY:**

- a. Detector Memory: The retention of an actuation for future utilization by the controller assembly. The phrase might better be detection memory to make it clearer that the memory is within the controller, not the detector.
- b. Non-Locking Memory: A mode of actuated-controller unit operation which does not require memory (NEMA). In this mode of operation the call of a vehicle arriving on the red (or yellow) is forgotten or dropped by the controller as soon as the vehicle leaves the detection area.

**MEMORY OFF:** A selectable feature of an actuated controller, synonymous with non-locking detection memory.

**MINIMUM GREEN INTERVAL:** The shortest green time of a phase. If a time setting control is designed as "minimum green," the green time shall not be less than that setting.

**NEMA:** The National Electrical Manufacturers Association.

**NEMA CONTROLLER:** A signal controller designed to meet or exceed the NEMA-TS1 standards and timing functions.

**OVERLAP:** An overlap is a set of outputs associated with two or more phase combinations. In some instances, right-turn movements operating in exclusive lanes can be assigned to more than one phase that is not conflicting. The overlap forms a separate movement that derives its operation from its assigned phases (also called parent phases). For example, overlap A (OL A) is typically assigned to phase 2 (the adjacent through phase) and phase 3 (the nonconflicting left-turn phase from the cross street). During a transition between two parent phases, the overlap will remain green.

**PEDESTRIAN COUNTDOWN TIMER:** A dynamic display that supplements standard pedestrian signal indications with the same section. The display is used to indicate the time remaining during the pedestrian clearance interval.

**PEDESTRIAN DETECTOR:** A detector that is responsive to operation by or the presence of a pedestrian (NEMA). This traditionally has been of the push-button type, installed near the roadway and operated by hand. Preferably it should have some form of pilot light to indicate upon actuation that the unit is operating, but this is rarely provided because of susceptibility to vandalism.

**PEDESTRIAN PHASE:** A traffic phase allocated to pedestrian traffic which may provide a right-of-way indication either concurrently with one or more vehicular phases, or to the exclusion of all vehicular phases.

**PHASE:** A part of the cycle allocated to any traffic movements receiving the right-of-way or to any combination of traffic movements receiving the right-of-way simultaneously during one or more intervals.

**PHASE SEQUENCE:** The order in which a controller cycles through all phases.

**POINT DETECTION:** The detection of a vehicle as it passes a point or spot on a street or highway.

**PORKCHOP:** See CHANNELIZING ISLAND.

**PREEMPTION:** The term used when the normal signal sequence at an intersection is interrupted and/or altered in deference to a special situation such as the passage of a train, bridge opening, or the granting of the right of way to an emergency or mass transit vehicle.

**PRESENCE DETECTION:** The sensing of a vehicle passing over a detector. True presence is when the pulse duration is equal to the actual time the vehicle remains in the detector field of influence.

**PRESENCE MODE:** Detector output continues for a limited period of time if vehicles remain in field of influence (NEMA).

**PRESET GAP:** See PASSAGE TIME.

**PROBE:** The sensor form that is commonly used with a magnetometer-type (microloop) detector (NEMA).

**PROGRESSION:** Coordinated movement along an arterial at a given speed is termed progressive flow.

**PULLBOX:** A container, usually at least 1 cubic foot in size, that is placed underground with a removable cover flush with the ground surface. Splices between lead-in cable and loop-lead wire are located here.

**PULSE MODE:** Detector produces a short output pulse when detection occurs (HEMA). The pulse lasts only about 100 ms, even if the vehicle remains in the detection zone for a longer time.

**QUADRUPOLE:** A loop configuration that adds a longitudinal saw slot along the center of the rectangle, so that the wire can be installed in a figure-eight pattern, thereby producing four electromagnetic poles instead of the normal two. The design improves the sensitivity to small vehicles and also minimizes adjacent lane pick up.

**QUEUE DETECTOR:** Component of a traffic control system which senses the presence (or number) of vehicles waiting in a queue.

**QUEUE LENGTH:** Number of vehicles that are stopped or slowly moving in a line where the movement of each vehicle is constrained by that of the lead vehicle.

**RADAR DETECTOR:** A vehicle detector installed above or adjacent to the roadway capable of being activated by the passage of a vehicle through its field of emitted microwave energy.

**RADIO-FREQUENCY DETECTOR:** A vehicle detector consisting of a loop of wire embedded in the roadway that is tuned to receive a pre-selected radio frequency from a transmitter located on a vehicle.

**REAL TIME CONTROL:** The processing of information or data in a sufficiently rapid manner so that the results of the processing are available in time to influence the process being monitored or controlled.

**RECALL:** An operational mode for an actuated intersection controller whereby a phase, either vehicle or pedestrian, is displayed each cycle whether demand exists or not. Usually a temporary or emergency situation.

**RED CLEARANCE INTERVAL: (ALL RED INTERVAL)** A clearance interval which may follow the yellow interval during which both the terminating phase and the next right-of-way phase displayed red (NEMA).

**RELAY:** An electromagnetic switching device, having multiple electrical contacts, energized by electrical current through its coil. It is used to complete electrical circuits.

**RESISTANCE:** The opposition that a device or material offers to the flow of direct current, equal to the voltage drop across the element divided by the current through the element.

**RESPONSIVE MODE:** A system operation wherein the selection of signal timing programs is based on current traffic data as input by vehicle sensors within the network.

**SAMPLING DETECTOR:** Any type of vehicle detector used to obtain representative traffic flow information (NEMA). See also SYSTEM DETECTOR.

**SEALANT:** The material used in a saw slot of a loop detector to seal the wires in the slot.

**SELF-TUNING LOOP DETECTOR UNIT:** One that is capable of adapting its operation to the resonant frequency of the loop and lead-in wire without any manual adjustment required. The term applies particularly to the start-up of the detector's operation, upon turn-on. Compare SELF-TRACKING DETECTOR.

**SEMI-ACTUATED CONTROLLER ASSEMBLY:** A type of traffic-actuated controller assembly in which means are provided for traffic actuation on one or more but not all approaches to the intersection.

**SENSITIVITY:** As it relates to a loop system the change in total inductance of a system caused by a minimum vehicle at one loop, expressed as a percentage of the total inductance. As it relates to a detector, is the minimum inductance change in percent required at the input terminals to cause the detector to actuate.

**SPLIT PHASE:** Portion of a traffic phase that is separated from the primary movement to provide a special phase that is related to a parent phase and characterized by the inability to rest in a minor phase.

**SYSTEM DETECTOR:** Traffic detection devices (detectors) that permit the system master or a local controller to obtain information as to the traffic flow characteristics in the area of the sensor. (See DETECTOR.) NEMA limits the meaning of "sensor" to the sensing element of a detector.

**SERIES-PARALLEL:** Type of electrical interconnection of four 6-foot x 6-foot (1.8- x 1.8-m) loops, usually 9 feet (2.7 m) apart and installed in a line in one lane to give a 51-foot (15.3-m) length of detection area. This interconnection scheme gives a combined inductance close to optimum.

**SERVICEABLE CONFLICTING CALL:** A call which:

- a. Occurs on a conflicting phase not having the right-of-way at the time the call is placed.
- b. Occurs on a conflicting phase which is capable of responding to the call.
- c. When occurring on a conflicting phase operating in an occupancy mode, remains present until given its right-of-way (NEMA).

**SHIELD:** A conductive material surrounding the pair of lead-in wires of a loop detector installation, so that outside electrical interferences will not induce noise onto them.

**SIDE-FIRE DETECTOR:** A vehicle detector with its sensor located to one side of the roadway (NEMA), such as on a pole, rather than directly over the roadway.

**SECONDARY:** A local control device whose interval timing and sequence of operation are controlled by a submaster (primary controller) in a distributed system.

**SMALL-AREA (POINT) DETECTOR:** A detector intended to detect vehicles at a spot location upstream of the stopline. They may detect more than one lane. The 6-foot (1.8-m) loop detector is a prominent example. Also, included are ultrasonic and radar units, whose detection areas may be as long as 20 to 30 feet (6 to 9 m), because the length of time the moving vehicle is in the detection zone is not used in the intersection control logic.

**SPLIT:** A percentage of the cycle length allocated to each of the various phases in a signal sequence.

**SPUI:** Single point urban interchange; turning movements are arranged around a single point with fewer conflict points. This allows for safer and smoother traffic movement with more efficient signal timing.

**STRETCH DETECTOR (EXTENDED CALL DETECTOR):** A detector with a carryover output. It holds or stretches the call of a vehicle for a period of seconds that has been set on an adjustable timer incorporated into the detector. It can be designed to begin the timing of that period when the vehicle enters the detection area, or when it leaves. The latter design is much more common.

**SYSTEM DETECTOR:** Detector located to provide information to central control computers selecting appropriate control programs to meet the traffic demands.

**TEOpS:** *Traffic Engineering Operations and Safety Manual*, published by the Wisconsin Department of Transportation.

**THRESHOLD:** A preset level of value of a parameter which indicates that a change of activity will occur if the current value is above or below this level.

**TIME HEADWAY:** The time separation between vehicles approaching an intersection, measured from front of vehicle to front of vehicle.

**TRAFFIC DETECTOR:** A device by which vehicles, streetcars, trolley buses, or pedestrians are enabled to register their presence with a traffic-actuated controller (ITE).

**TRAFFIC PHASE:** Those right-of-way and clearance intervals in a cycle assigned to any independent movement(s) of traffic.

**TRAFFIC RESPONSIVENESS SYSTEM:** A system in which a master controller (analog or digital) specifies cycle and offset based on the real-time demands of traffic as sensed by vehicle detectors.

**TRAILING CAR:** The vehicle behind the last car upon gap-out of a density controller. Gap out occurs because the time headway between the last car and trailing car exceeds the allowable gap imposed by the controller.

**URNS:** Used to describe the placement of loop wire around a detector. One turn is equivalent to one complete revolution around the loop

**TWISTED PAIR:** Two insulated conductors twisted together and coded.

**TWO-COIL MAGNETIC DETECTOR:** Describes a magnetic detector with two coils and capable of being a directional detector.

**TYPE 170 (179) CONTROLLER:** One of the two major types of traffic signal controllers. Hardware is standardized with the actual control being provided by specialized software, which uses input from loop detectors, magnetic detectors, or magnetometers.

**UL:** Underwriters' Laboratories, Inc. is chartered as a non-profit organization to maintain and operate laboratories for the examination and testing of devices, systems, and materials relative to life, fire and casualty, hazards, and crime prevention.

**UL-APPROVED:** A product that has been tested and approved to Underwriters' Laboratories standards.

**VARIABLE INITIAL INTERVAL:** A controller design feature which adjusts the duration of initial interval for the number of vehicles in the queue.

**VEHICULAR PHASE:** A traffic phase allocated to vehicular traffic.

**VIDEO DETECTION SYSTEM:** A detection system which analyzes a video image of an approach and identifies and classifies (optional) vehicles in that approach. See also WIDE AREA DETECTION SYSTEM.

**WEC:** *Wisconsin Electrical Code*, published by the Wisconsin Electrical Manufacturers Association. This manual consists of a supplement to the *National Electrical Code* (NEC), and the Wisconsin supplement.

**WIRE GAUGE:** See AWG.

**WisMUTCD:** *Wisconsin Manual on Uniform Traffic Control Devices*, published by the Wisconsin Department of Transportation.

**YELLOW CHANGE INTERVAL:** The first interval following the green right-of-way interval in which the signal indication for that phase is yellow.

**YIELD COMMAND:** See HOLD.

**ZONE OF DETECTION (SENSING ZONE):** That area of the roadway within which A vehicle is detected by a vehicle detector system (NEMA).