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GLOSSARY of Road Traffic Analysis Terms

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GLOSSARY of Road Traffic Analysis Terms

Back of Queue

Maximum extent of the queue relative to the stop line or give-way (yield) line during a signal cycle or gap-acceptance cycle. The last queued vehicle that joins the back of queue is the last vehicle that departs at the end of the saturated part of green interval or the available gap interval.

Capacity

The maximum sustainable flow rate at which vehicles or persons reasonably can be expected to traverse a point or uniform segment of a lane or roadway during a specified time period under given roadway, geometric, traffic, environmental, and control conditions; usually expressed as vehicles per hour, passenger cars per hour, or persons per hour.

Circulating Flow

The vehicle flow rate in all lanes of the circulating road in front of a roundabout entry lane, determined using *Stopline Flow Rates*.

Critical Gap

The minimum time between successive vehicles in the opposing (major) traffic stream that is acceptable for entry by opposed (minor) stream vehicles.

Cycle-Average Queue

The average queue length that incorporates all queue states including zero queues as counted at regular intervals (e.g. every 5 seconds).

Control Delay

Sum of *Stop-Line Delay* and *Geometric Delay*.

Cost (Operating Cost)

A measure that includes the direct vehicle operating cost (the resource cost of fuel and additional running costs including tyre, oil, repair and maintenance as a factor of the cost of fuel) as well as the time cost of vehicle occupants.

Critical Intersection

The intersection in a coordinated signal system that operates with the highest overall degree of saturation during a given period.

Critical Lane

The lane in a lane group or approach that has the highest degree of saturation and places the highest demand on green time.

Critical Movements

The set of movements that determine the capacity and timing requirements of a signalised intersection.

Cycle

A complete sequence of signal phases.

Cycle Length (Cycle Time)

Time required for one complete sequence of signal displays (sum of phase green and intergreen times). For a given movement, cycle time is the sum of the durations of red, yellow and green signal displays, or sum of *Effective Green and Red Times*. In gap-acceptance analysis, this is the equivalent average cycle time corresponding to the *block and unblock periods* in the opposing traffic stream.

Degree of Saturation

The ratio of arrival (demand) flow rate to capacity during a given flow period. Also known as the volume to capacity ratio.

Delay

The additional travel time experienced by a vehicle or pedestrian with reference to a base travel time (e.g. the free-flow travel time).

Demand Flow (Demand Volume)

The number of vehicles or pedestrians arriving during a given period as measured at the back of queue (as distinct from departure flows measured in front of the queue). See *Stopline Flow Rate*.

Density

The number of vehicles per unit distance along a road segment as measured at an instant in time.

Design Life

The number of years into the future while the intersection operates satisfactorily considering increases in traffic demand volumes.

Detector

A device by which vehicle or pedestrian traffic registers its presence. The most common detectors are the inductive loop detectors for vehicles and the push-button detectors for pedestrians.

Downstream

In the direction of the movement of traffic.

Effective Green and Red Times

The movement green and red times for capacity and performance analysis purposes, which are determined by adjusting the displayed green and red times for Start Loss and End Gain effects.

Effective Intersection Capacity

An aggregate measure of intersection capacity determined as the ratio of total intersection demand flow to the intersection degree of saturation, where the intersection degree of saturation is the largest lane degree of saturation considering all lanes of the intersection.

End Gain

Duration of the interval between the end of the displayed green period and the end of the effective green period for a movement. This is used in signal timing and performance analysis to allow for additional departures after the end of green period.

Equivalent Stop Value

Value of a deceleration-acceleration cycle in terms of a major stop-start cycle. See *Major Stop*.

Exclusive Pedestrian Phase

The phase at an intersection during which all pedestrian displays are green and all vehicle displays are red, allowing all pedestrian movements to operate simultaneously while all vehicle movements are stopped. Also see *Scramble-Crossing Phase*.

Exclusive Lane

A lane (or length of lane) allocated for use only by a particular movement or a type of vehicle, e.g. left-turn lane, through lane, right-turn lane, bus lane, as opposed to a *Shared Lane*.

Filter Turn

A turning movement that must give way to and find safe gaps in conflicting (opposing) vehicle or pedestrian traffic before proceeding, e.g. filter right turn, slip-lane left turn, left turn on red. Also see *Opposed Movement*.

Fixed-Time Control

A signal control method that allows for only a fixed sequence and fixed duration of displays.

Flow Rate

Number of vehicles or pedestrians per unit time passing (arriving or departing) a given reference point.

Flow Ratio

The ratio of arrival (demand) flow rate to saturation flow rate.

Follow-up Headway

The average headway between successive opposed (minor) stream vehicles entering a gap available in the opposing (major) traffic stream.

Free-Flow Speed

The uninterrupted traffic speed when density is approximately zero, i.e. when only few vehicles are present in the traffic stream.

Full Control

Control of a turning movement using three-aspect (red, yellow, green) turn arrows on a six-aspect signal face, where the green arrow indicates that the vehicle can turn unopposed (with no opposing vehicle or pedestrian traffic) and the red arrow indicates that the vehicle is not permitted to turn (filter turns not permitted).

Gap Acceptance

The process by which an opposed (minor) stream vehicle accepts an available gap in the opposing (major) stream for entering (departing from queue or merging).

Gap Setting

A controller setting equivalent to a predetermined space time measured between successive vehicles at the given (approach) speed, detection zone length and vehicle length values that will cause the signal controller to terminate the green display.

Geometric Delay

Delay due to physical and basic traffic control factors as experienced by a vehicle negotiating the intersection in the absence of any other vehicles (due to a deceleration from the approach cruise speed down to an approach negotiation speed, travel at that speed, acceleration to an exit negotiation speed, and then acceleration to the exit cruise speed).

Geometric Stop

The effective value of a slow-down and speed-up manoeuvre associated with *Geometric Delay*, which is measured in terms of equivalent *Major Stops*.

Green Time

Duration of the green display for a phase or a movement.

Headway

The time between passage of the front ends of two successive vehicles. See *Spacing*.

Intergreen Time

Duration of the clearance part of the phase corresponding to the period between the phase change point (the end of running intervals) and the beginning of the green display for the next phase (end of phase). Normally, it comprises Yellow Time and All-Red Time.

Intra-Bunch Headway

Average headway between vehicles in a moving queue (minimum headway in a traffic stream). This is used in order to define moving queues (bunches) of vehicles for the purpose of modelling headway distribution of vehicles.

Lane Group

A set of lanes with one or two shared lanes (e.g. Lane 1: Left Turn and Through, Lane 2: Through) or a set of exclusive turn lanes (e.g. a single Right-Turn lane).

Lane Utilisation

The distribution of vehicles among lanes when two or more lanes are available for a movement.

Lane Utilisation Ratio

Ratio of the lane degree of saturation to the highest (critical) lane degree of saturation in a *Lane Group*.

Level of Service

An index of the operational performance of traffic on a given traffic lane, roadway or intersection, based on service measures such as delay, degree of saturation, density and speed during a given flow period.

Major Stop

A drive cycle element that involves a deceleration from the approach cruise speed to zero speed and an acceleration from zero speed to the exit cruise speed.

Occupancy Time

The time that starts when the front of a vehicle enters the detection zone and finishes when the back of the vehicle exits the detection zone, i.e. the duration of the period when the detection zone is occupied by a vehicle.

Off-Peak Period

The periods that have low demand volumes of traffic during the day (24-hour period).

Offset

The difference between the start or end times of green periods at adjacent (upstream and downstream) signals.

Opposed Movement

A movement (*Filter Turn*, Permitted Turn, Minor Movement) that gives way to one or more opposing traffic streams at a signalised or unsignalised intersection.

Opposing Movement

A movement that conflicts with, and has priority over, another (opposed) movement.

Overflow

An interrupted traffic condition when a number of queued vehicles are not able to depart due to insufficient capacity during a traffic signal or gap-acceptance cycle (also known as cycle failure).

Overflow Queue

Average number of vehicles per cycle left over at the end of green periods at signals or at the end of acceptable gap (unblock) periods during gap-acceptance process.

Overlap Movement

A movement that runs in consecutive phases without stopping during the associated intergreen period(s).

Parallel Pedestrian Movement

A signalised pedestrian movement that runs at the same time as the parallel vehicle movement (s) that are controlled by circular green displays.

Peak Flow Factor (PFF)

Ratio of the average demand flow rate in the Total Flow Period (e.g. one hour) to the demand flow rate in the Peak Flow Period (e.g. 15 minutes). This is equivalent to the more traditional term Peak Hour Factor (PHF) when the Total Flow Period is one hour.

Peak Period

The period that has the highest demand volume of traffic during the day (peak hour, peak half hour, etc).

Pedestrian Clearance Period

The Flashing Don't Walk period that immediately follows the termination of pedestrian Walk display to enable pedestrians, who have just stepped off the kerb at the commencement of this period, to complete their crossing to the nearest kerb or refuge.

Pedestrian Crossing

A transverse strip of roadway marked for the use of pedestrians crossing the road (midblock or at intersections) at a place with a pedestrian crossing sign, and with or without alternating flashing twin yellow lights. Also called *Zebra Crossing* where indicated by parallel white stripes on the road surface.

Pedestrian Minimum Green Time

Minimum time required for both Walk and Flashing Don't Walk displays, but excluding any overlaps with terminating intergreen displays.

Performance Index

A measure that combines several performance statistics such as delay, number of stops and queue length.

Phase

That part of a signal cycle during which one or more movements receive right of way subject to resolution of any vehicle or pedestrian conflicts by priority rules. A phase is identified by at least one

movement gaining right of way at the start of it and at least one movement losing right of way at the end of it.

Phase Sequence

The order of phases in a signal cycle.

Phase Split

Duration of each phase (*Green Time* and *Intergreen Time*) within a signal cycle. It is normally expressed as a percentage of cycle length.

Platoon

A group of vehicles or pedestrians travelling together because of signal control, geometric conditions or other factors.

Platoon Ratio

Ratio of the average arrival flow rate during the green period to the average arrival flow rate during the signal cycle.

Practical Degree of Saturation

A target, or maximum, degree of saturation that corresponds to an acceptable level of traffic performance.

Practical Spare Capacity

The amount of increase possible in the demand flow rate to obtain a degree of saturation equal to the practical (target) degree of saturation.

Progression

Progression is a time-relationship, between adjacent traffic signals, which allows vehicle platoons to be given a green signal as they pass through the sequence of intersections.

Progression Factor Method

A simple technique to determine signal coordination effect on delay, queue length, stop rate, etc. where detailed platoon patterns generated at upstream signals are not available.

Proportion Queued

Proportion of traffic that is queued due to the effects of traffic control and the existence of other vehicles. This is related to the *Major Stops* or *Slow Downs* from the approach cruise speed.

Queue

A line of vehicles or pedestrians waiting to proceed through an intersection. Slowly moving vehicles or pedestrians joining the back of the queue are usually considered part of the queue. The internal queue dynamics can involve starts and stops. A faster-moving line of vehicles is often referred to as a moving queue or a platoon. See *Back of Queue* and *Cycle-Average Queue*.

Queuing Delay

Part of the *Stop-Line Delay* that includes the Stopped Delay (while vehicle is idling at near-zero speed) and the Queue Move-up delay (while a queued vehicle accelerates towards the stop-line but stops again, e.g. because the signal display changes to red).

Queue Storage Ratio

The ratio of the queue length to the available queue storage distance.

Red Time

Duration of the red signal display for a phase or a movement.

Saturation Flow Rate

The maximum departure (queue discharge) flow rate achieved by vehicles departing from the queue during the green period at traffic signals. See *SCATS Maximum Flow*.

SCATS Maximum Flow (MF)

A maximum departure flow rate during a fully saturated green period averaged over the green and intergreen times as a special measure of saturation flow rate. See *Saturation Flow Rate*.

Scramble-Crossing Phase

An *Exclusive Pedestrian Phase* at an intersection where pedestrians are allowed to cross in any direction including diagonally within the limits of the crosswalk lines.

Shared Lane

A lane allocated for use by two or more movements, e.g. shared through and right-turn lane, as opposed to an *Exclusive Lane*.

Short Lane

A lane of limited length, e.g. a turn bay or part of a lane available downstream of parked vehicles.

Signalised Crossing

An area of the road used by pedestrians when crossing the road with the guidance of pedestrian signals at a midblock or intersection location, and can be used by cyclists if bicycle signals are provided.

Signal Phasing

Sequential arrangement of separately controlled groups of vehicle and pedestrian movements within a signal cycle to allow all vehicle and pedestrian movements to proceed.

Slip Lane

A turning movement lane separated from an adjacent lane by a triangular island.

Slow Down

A drive cycle element that involves a deceleration from the approach cruise speed to a non-zero intermediate speed and an acceleration from the intermediate speed to the exit cruise speed.

Space Length (Gap Distance)

The following distance between two successive vehicles as measured between the rear end of one vehicle and the front end of the next vehicle in the same traffic lane (*spacing less vehicle length*).

Space Time

The time between the detection of two consecutive vehicles when the presence detection zone is not occupied.

Spacing

The distance between the front ends of two successive vehicles in the same traffic lane.

Speed

Distance travelled per unit time. In a time-distance diagram, the slope of the time-distance trace of a vehicle is its speed. *Approach Speed* is the uninterrupted (midblock) cruise speed of vehicles before being affected by traffic signals. This can be represented by the speed limit. *Negotiation Speed* is the safe speed of a vehicle moving through the controlled area of the intersection. For turning vehicles, this can be determined as a function of the negotiation radius. *Running Speed* is the average speed including the effect of delays due to interrupted conditions but not including any stopped (idling) times. *Travel Speed* is the average speed including the effect of all delays.

Staged Signalised Crossing

A system by which a long signalised crossing is divided or “staged” into several time-separated sections, each being a separate group controlled by individual signals.

Start Loss

Duration of the interval between the start of the displayed green period and the start of the effective green period for a movement. This is used in signal timing and performance analysis to allow for queue discharge time losses at the start of green period due to vehicles accelerating to saturation speed, or due to giving way to opposing vehicle or pedestrian movements.

Stop-Line Delay

Delay determined by projecting vehicle time-distance trajectories from the approach and exit negotiation speeds to the stop line (or give-way / yield line), which includes the *Queuing Delay* and the deceleration and acceleration delay associated with the negotiation speeds.

Stopline Flow Rate

Departure flow rate measured at the stop line (or give-way / yield line), which is the same as the demand (arrival) flow rate for undersaturated cases, and is limited to the capacity rate for oversaturated cases. See *Demand Flow*.

Stop Rate

Average number of all acceleration-deceleration manoeuvres including the queue move-ups, partial stops and geometric stops, expressed in terms of equivalent *Major Stops*.

T-Intersection

An intersection where two roads meet (whether or not at right angles) and one of the roads ends.

Traffic-Actuated Control

A control method that allows a variable sequence and variable duration of signal displays depending on vehicle and pedestrian traffic demands.

Traffic Volume

The number of vehicles or pedestrians passing a given point on a lane or roadway during a specified period of time.

Total Delay

Sum of delay experienced by all vehicles or pedestrians (vehicle-hours per hour or pedestrian-hours per hour). Obtained as the product of average delay per vehicle or pedestrian and the flow rate.

Traffic Delay

Delay that results when the interactions between vehicles cause drivers to reduce speed below the free-flow speed.

Total Travel Distance

Sum of distance travelled by all vehicles (vehicle-kilometres per hour or vehicle-miles per hour). Obtained as the product of travel distance per vehicle and the flow rate.

Uninterrupted Flow

A condition in which vehicles travelling in a traffic stream do not have to stop or slow down for reasons other than those caused by the presence of other vehicles in that stream.

Unopposed Turn

A left-turn or right-turn movement at a signalised intersection that is made with no opposing or conflicting vehicular or pedestrian flow allowed.

Upstream

In the direction opposite to the movement of traffic.

Walk Time

Duration of the Walk display (steady green person) for pedestrians.

Yellow Time

Duration of the yellow display for a phase or a movement.

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