A Joint Standard of AASHTO, ITE, and NEMA

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National Transportation Communications for ITS Protocol

Object Definitions for Ramp Meter Control (RMC) Units

November 2001

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FOREWORD

This document uses only metric units.

This document defines requirements and the definition of data elements related to ramp meter control. There is one normative annex to this document.

This document is an NTCIP Data Dictionary Standard. Data Dictionary Standards provide definitions of data elements for use within NTCIP systems.

For more information about NTCIP standards, visit the NTCIP Web Site at http://www.ntcip.org. For a hardcopy summary of NTCIP information, contact the NTCIP Coordinator at the address below.

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AASHTO – Standard Specification; February 2001
ITE – Software Standard; May 2001
NEMA – Standard; May 2001

History

From 1996 to 1999, this document was referenced as TS 3.RMC. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 1207. The technical specifications of NTCIP 1207 are identical to the former reference, except as noted in the development history below:

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NTCIP 1207:2001 v01.17. November 2001 – Prepared document for publication; updated document to NTCIP 8002 v04 Template format, added approvals and history to Foreword, and revised Foreword and Introduction.

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INTRODUCTION

This publication provides definitions of data elements for use within ramp meter control. The data is defined using the Simple Network Management Protocol (SNMP) object-type format as defined in RFC 1212.

This document defines requirements that are applicable to all NTCIP environments and also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, rmc, ramp meter, ramp metering data dictionary, and object.

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began the effort to develop the NTCIP. The Transportation Section's purpose was to respond to user needs to include standardized systems communication in the NEMA TS 2 standard, Traffic Controller Assemblies. Under the guidance of the Federal Highway Administration's NTCIP Steering Group, the NEMA effort was expanded to include the development of communications standards for all transportation field devices that could be used in an Intelligent Transportation Systems (ITS) network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards. The Joint Committee on the NTCIP formed a working group to develop a set of object definitions for Ramp Meter control units. The Working Group's first meeting was in February 1997.

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Section 1
INTRODUCTION

1.1 SCOPE

The messaging between central control entities and Ramp Meter Control (RMC) units is accomplished using the NTCIP Application Layer services to convey requests to access or modify values of RMC unit object definitions resident in the devices via an NTCIP network. An NTCIP message consists of a specific Application Layer service and a set of data objects. An NTCIP message may be conveyed using any NTCIP defined class of service, which has been specified to be compatible with the Simple Transportation Management Framework (STMF).

The scope of this document is limited to the functionality related to RMCs used within a transportation environment. The limits and descriptions of the parameters are established to give the user maximum flexibility to operate devices that either exist at the time this document was authored or may exist in the future. This publication defines objects which are specific to RMC units and also defines standardized object Groups which can be used for conformance statements.

In order to achieve the functionality described in Annex A of this document, which describes the typical operation of an RMC, some or all of the objects described in other standards must be utilized.

1.2 REFERENCES

For approved revisions, contact:

NTCIP Coordinator
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
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For draft revisions of this document, which are under discussion by the relevant NTCIP Working Group, and recommended revisions of the NTCIP Joint Committee, visit the World Wide Web at http://www.ntcip.org.

The following standards (normative references) contain provisions, which, through reference in this text, constitute provisions of this Standard. Other documents and standards (other references) are referenced in these documents, which might provide a complete understanding of the entire protocol and the relations between all parts of the protocol. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standard listed below.

1.1.1 Normative References

NTCIP 1201:1996 *NATIONAL TRANSPORTATION COMMUNICATIONS FOR ITS PROTOCOL (NTCIP) Global Object Definitions*

NTCIP 1201:1996 *NATIONAL TRANSPORTATION COMMUNICATIONS FOR ITS PROTOCOL (NTCIP) Global Object Definitions - Amendment 1*

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1.1.2 Other References

ISO/IEC 8824:1990 *Information Technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)*

ISO/IEC 8825:1990 *Information Technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*

IAB STD 3 *(RFC 1122: 1989, Requirements For Internet Hosts - Communication Layers, RFC 1123: 1989, Requirements For Internet Hosts - Application and Support)*

IAB STD 15 *(RFC 1157: 1990, Simple Network Management Protocol)*

IAB STD 16 *(RFC 1155: 1990, Structure and Identification of Management Information for TCP/IP-based Internets, RFC 1212: 1991, Concise MIB Definitions)*

IAB STD 17 *(RFC 1213: 1991, Management Information Base)*

NTCIP 1101:1996 *NATIONAL TRANSPORTATION COMMUNICATIONS FOR ITS PROTOCOL (NTCIP) Simple Transportation Management Framework*

NTCIP 2001:1996 *National Transportation Communications for ITS Protocol (NTCIP) - Class B Profile*

NTCIP 1209:1998 *National Transportation Communications for ITS Protocol (NTCIP) - Transportation Sensor Systems Object Definitions (draft standard)*

1.3 CONTACT INFORMATION

1.1.3 ISO/IEC Standards

Members of the ISO maintain registers of currently valid ISO/IEC International Standards. For the USA, the American National Standards Institute (ANSI) is the member of the ISO, which may be contacted as follows:

ANSI
11 West 42nd Street, 13th Floor
New York, NY 10036
(212) 642-4900

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1.3.2 RFC Documents

Electronic copies of RFC documents may be obtained using anonymous-FTP to the host "nic.ddn.mil" or "ds.internic.net". Printed copies are available from:

DDN Network Information Center
14200 Park Meadow Center
Suite 200
Chantilly, VA 22021
(800) 365-3642
(703) 802-4535

1.4 DEFINITIONS

This subsection defines the terms used throughout this Standard. For additional explanations, please see Annex A.

Actuated	The detector state, which indicates the presence of a vehicle in the detection zone.
Advance Warning Sign	A sign which alerts motorists of ramp meter signal operation.
Calculation Interval	The period of time over which data analysis, data averaging and data processing is performed. The length of this period is usually a fraction of 60 seconds – many agencies use 10s, 15s, 20s, or 30s.
Fractional Offset Time	A value derived from dividing 1 hour by the value of the Active Metering Rate divided by the number of metered lanes. This value is expressed in tenth of seconds.
Demand Detector	The detector on the upstream side of the metered lane stop bar. Detects vehicles demanding a green interval. Used for signal sequencing. See Figure 2.
Dependency Group	A group of metered lanes in which the signal sequencing is dependent on the other lanes in the group.
Detection Zone	The sensing area of a detector.
Detector	A device used to sense vehicles, e.g. inductive loop, video image processor, etc.
Downstream	The direction in which vehicles depart.
Event Table	A set of events that are scheduled to occur at a given time-of-day, day(s)-of-week, month(s) and/or day(s)-of-month. Each event consists of parameter IDs and values.
Excessive Queue Detector	The detector at the entrance to the metered lane. Detects the intolerable queue from the ramp meter signal. Used for queue management. See Figure 2.
Queue Override	The process that adjusts the metering rate based on traffic conditions at the queue detectors to shorten the length of the queue.
Flow Rate	The rate at which vehicles pass a detection zone, expressed in vehicles per hour per lane.
Intermediate Queue Detector	The detector midway between the metered lane stop bar and the entrance to the metered lane. Detects the queue forming from the ramp meter signal. Used for queue management. See Figure 2.

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Interval	Each part of the signal cycle during which the signal indications do not change. Valid metered lane intervals are shown in Figure 3.
Lane Average	An average based on the number of lanes contributing data. Compare with **Vehicle Average**.
Leading Detection Zone	The detection zone of the upstream detector within a mainline detector station. See Figure 2.
Long Stop	The condition which occurs when a vehicle approaching the metered lane signal stops and actuates the passage detector as well as the demand detector. Compare with **Short Stop**.
Mainline	The principal roadway. Ramp meters are designed to manage congestion on the mainline. Compare with **Metered Lane**. See **Figure 2**.
Maximum Metering Rate	The highest metering rate used by the RMC. Three maximums are defined: 1) absolute maximum, which identifies geometric and driver limitations; 2) operational maximum, which identifies mainline capacity and metered lane demand traffic constraints; and 3) system maximum, which identifies inter-agency agreements and policies. The lowest of these three metering rates will be the upper limit for the metered lane.
Merge Detector	The detector placed where the metered lane is absorbed into the mainline lanes. Used to detect a queue at the merge point. See Figure 2.
Merge Override	The process that freezes the red interval timer for each metered lane in a dependency group based upon traffic conditions at the merge detector to prevent additional vehicles from being released at the stop bar.
Metered Lane	A lane on the on-ramp that is equipped with a signal.
Metered Lane Dependency	The relationship between metered lanes under control of a single ramp meter controller. In multi-lane configurations, metered lanes may operate independently of each other, or the interval of one may depend on the interval of the others.
Metering Plan	A table of metering rates, and occupancy, speed and volume thresholds to be used for traffic responsive metering decisions.
Metering Rate	The rate at which vehicles are allowed to proceed through the metered lane signal, expressed in vehicles per hour per lane.
Minimum Metering Rate	The lowest metering rate used by the RMC. Three minimums are defined: 1) absolute minimum, which identifies geometric and driver limitations; 2) operational minimum, which identifies mainline capacity and metered lane demand traffic constraints; and 3) system minimum, which identifies inter-agency agreements and policies. The highest of these three metering rates will be the lower limit for the metered lane.
Occupancy	The percentage of time that vehicles are present in a detection zone, expressed in 0.1%.

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Passage Detector	The detector on the downstream side of the metered lane stop bar. Detects vehicles passing the ramp meter. Used for signal sequencing and metered lane volume counts. See Figure 2.
Priority Lane	The designation for special purpose metered lanes usually reserved for vehicles with a minimum number of occupants such as transit vehicles and carpools. The green interval of the priority lane will be interleaved with the green intervals of the other metered lanes in a dependency group.
Priority Red Delay	The process that extends the red interval for all non-priority metered lanes in a dependency group upon actuation of the demand detector in the priority lane of that same dependency group.
Ramp Meter Control	A system in which the entry of vehicles onto a freeway from an on-ramp is controlled by a traffic signal allowing a fixed number of vehicles to enter from each metered lane of the on-ramp during each cycle.
Red Violation	The process that extends the red interval timing for each metered lane in a dependency group upon actuation of the passage detector of the metered lane during its red interval.
Short Stop	The condition which occurs when a vehicle approaching the metered lane signal stops and fails to actuate the demand detector. Compare with **Long Stop**.
Shutdown Gap	The gap between vehicles at the demand detector required before the Shutdown Warning Interval.
Speed Trap	Two detectors in tandem that are used to measure speed of vehicles in a lane.
Speed Trap Spacing	The upstream edge-to-upstream edge spacing between the leading and trailing detectors within a mainline detection station used for measuring vehicle speed.
Startup Gap	The gap between vehicles at one queue detector required before the Startup Yellow Interval.
Station	A group of mainline lanes in the same direction of travel, used to collect composite traffic data.
Station Average Flow Rate	A lane average flow rate based on the flow rate averaged for all working mainline lanes in the station whose lane usage status contains flow rate.
Station Average Occupancy	A lane average occupancy based on the occupancy averaged for all working mainline lanes in the station whose lane usage status contains occupancy.
Station Average Speed	A vehicle average speed based on the speed averaged for all vehicles with valid speed values in all working mainline lanes in the station whose lane usage status contains speed.
Trailing Detection Zone	The detection zone of the downstream detector within a mainline detector station. See Figure 2.
Upstream	The direction from which vehicles arrive.
Vehicle Average	An average based on the number of vehicles contributing data. See **Lane Average**.
Vehicle Count	The number of vehicle that pass a detection zone, expressed in vehicles per calculation interval.

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1.5 TERMS AND ABBREVIATIONS

ISO	International Standards Organization
ITS	Intelligent Transportation Systems
km/h	kilometers per hour
m	meter (SI unit)
MIB	Management Information Base
min	Minute
NTCIP	National Transportation Communications for ITS Protocol
RMC	Ramp Meter Control
s	second (SI Unit)
TBC	Time Base Control
TMC	Transportation Management Center
TMS	Transportation Management Subsystem, term for TMC used in National Architecture
vpCI	vehicles per Calculation Interval
vph	vehicles per hour
vphpl	vehicles per hour per lane

1.6 SUPPLEMENTAL FIGURES

Four figures are shown in this section. These figures show the relationship of the RMCs in NTCIP terms, National Architecture terms and in RMC operations terms.

Figure 1 depicts the architecture that is a proposed component for the National Architecture. The architecture diagram identifies some of the terms and acronyms described above, and it identifies the focus of this standard.

Figure 2 shows the layout of a typical ramp meter installation.

Figure 3 indicates the Interval State Diagram, a visual depiction of the different intervals of a metered lane.

Figure 4 provides a pictorial representation of the Ramp Meter Control (RMC) unit Tree Structure and its location within NEMA node of the Global Tree. The tree structure identifies how the object definitions are combined under specific nodes.

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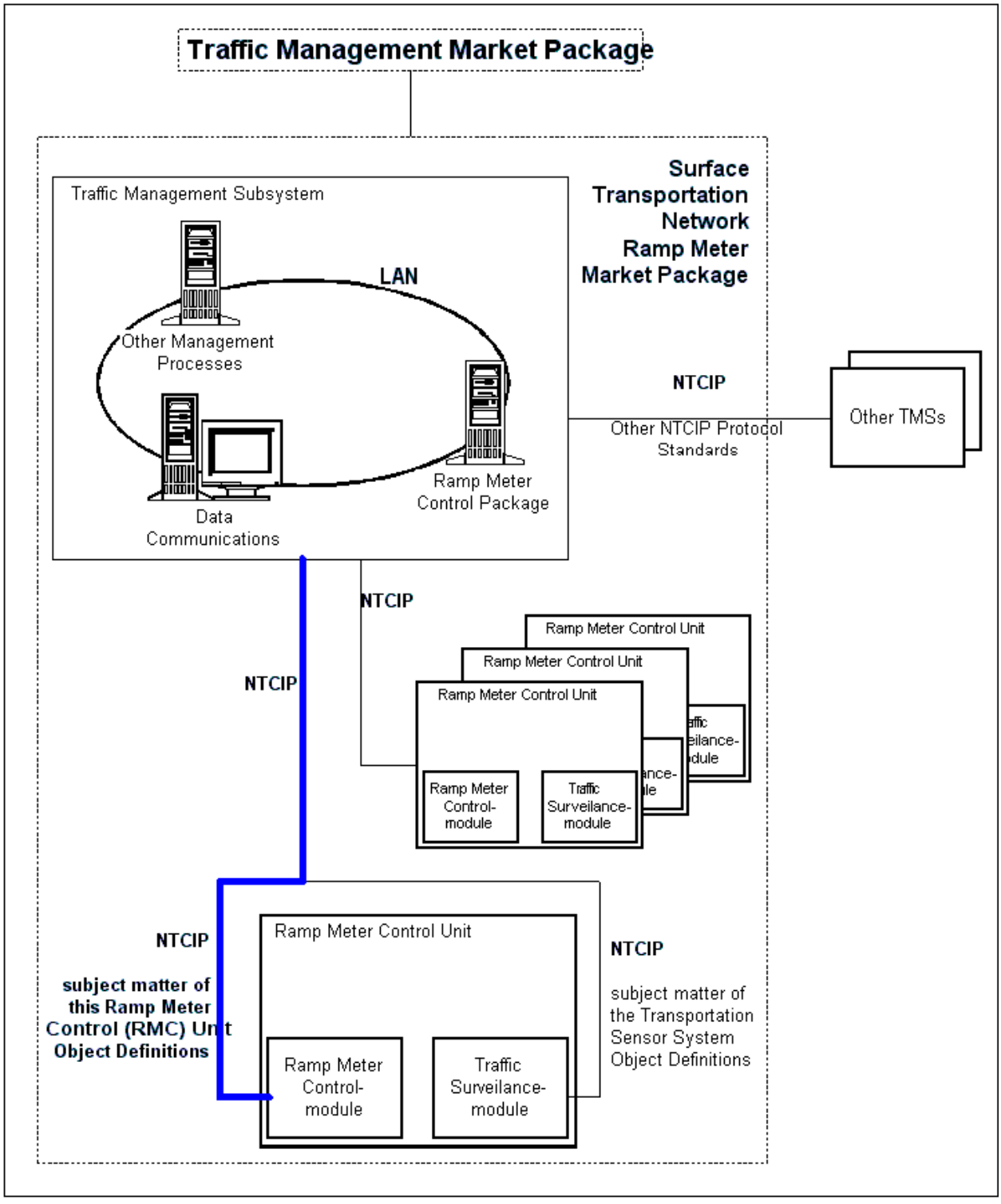


Figure 1
RMC Architectural Diagram within National Architecture

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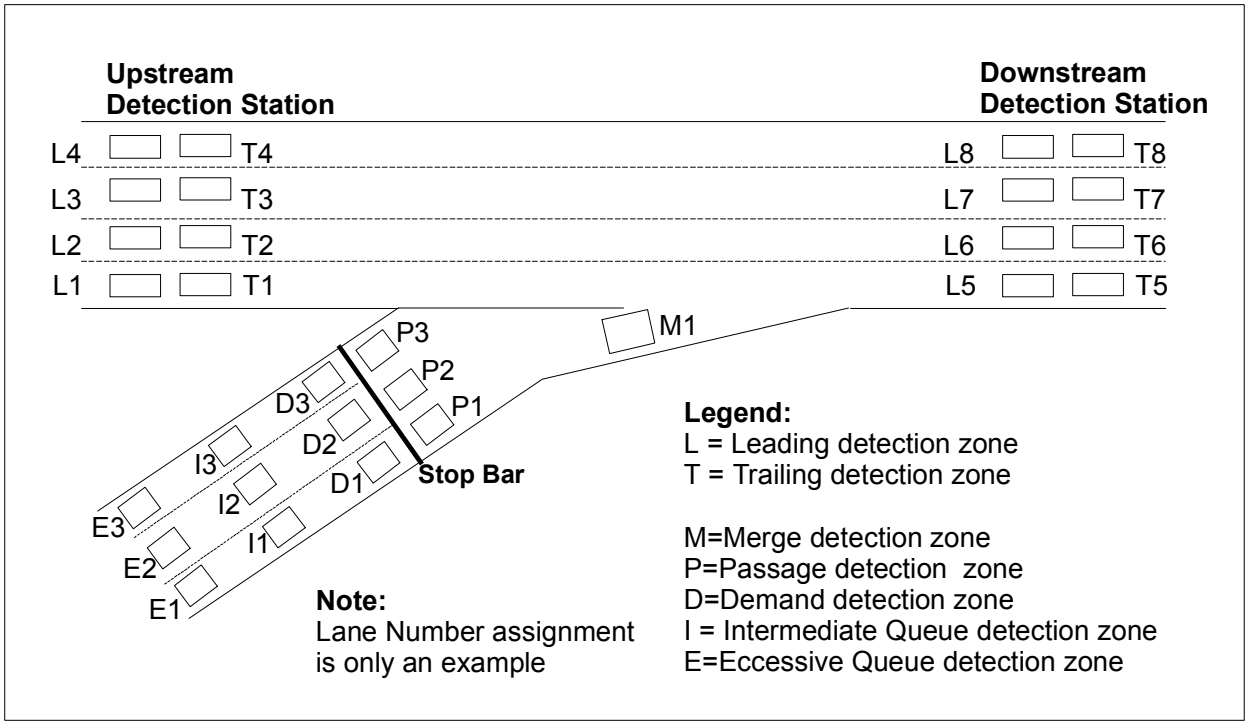


Figure 2
Typical Ramp Meter Layout

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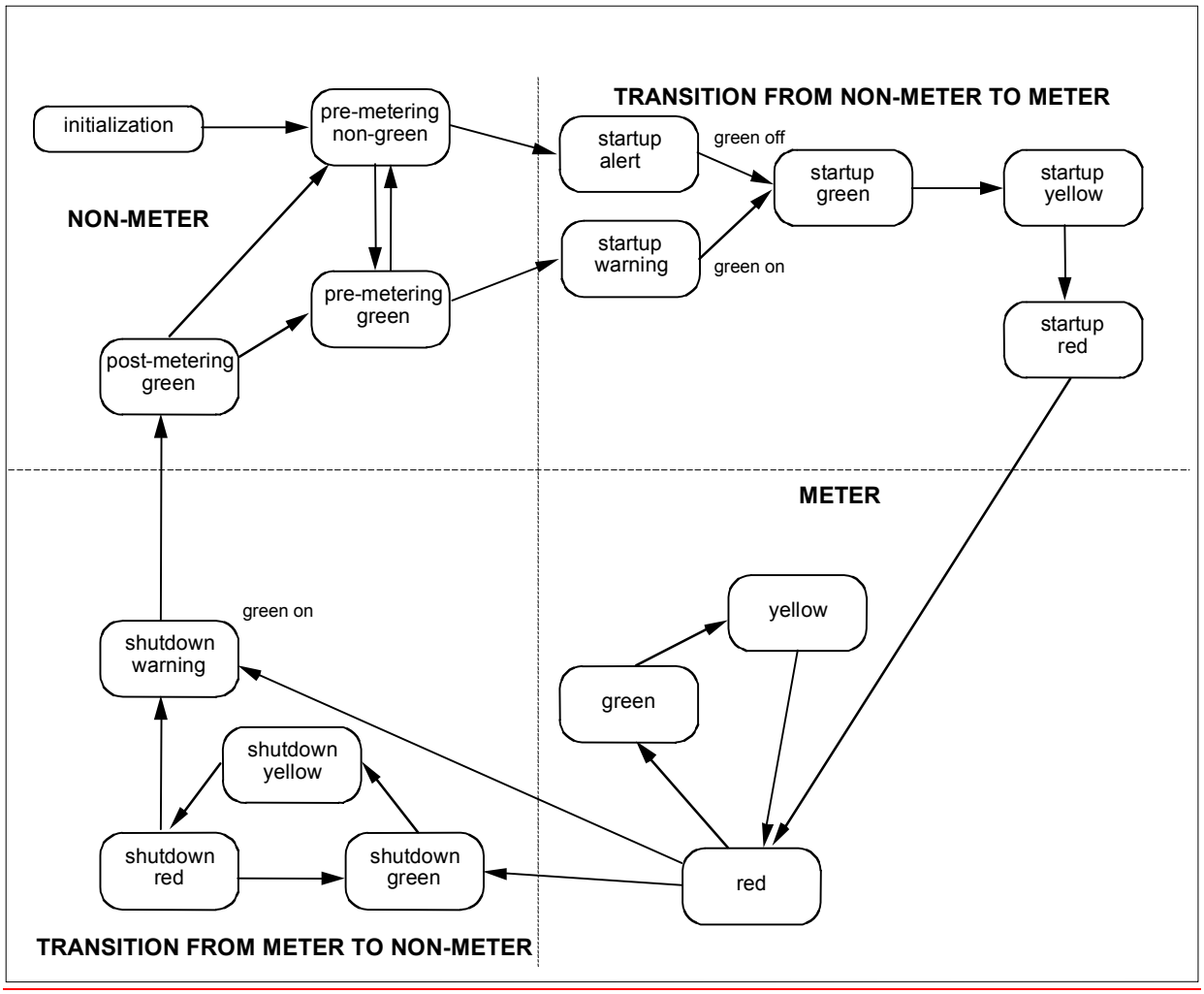


Figure 3
Metered Lane Interval State Diagram

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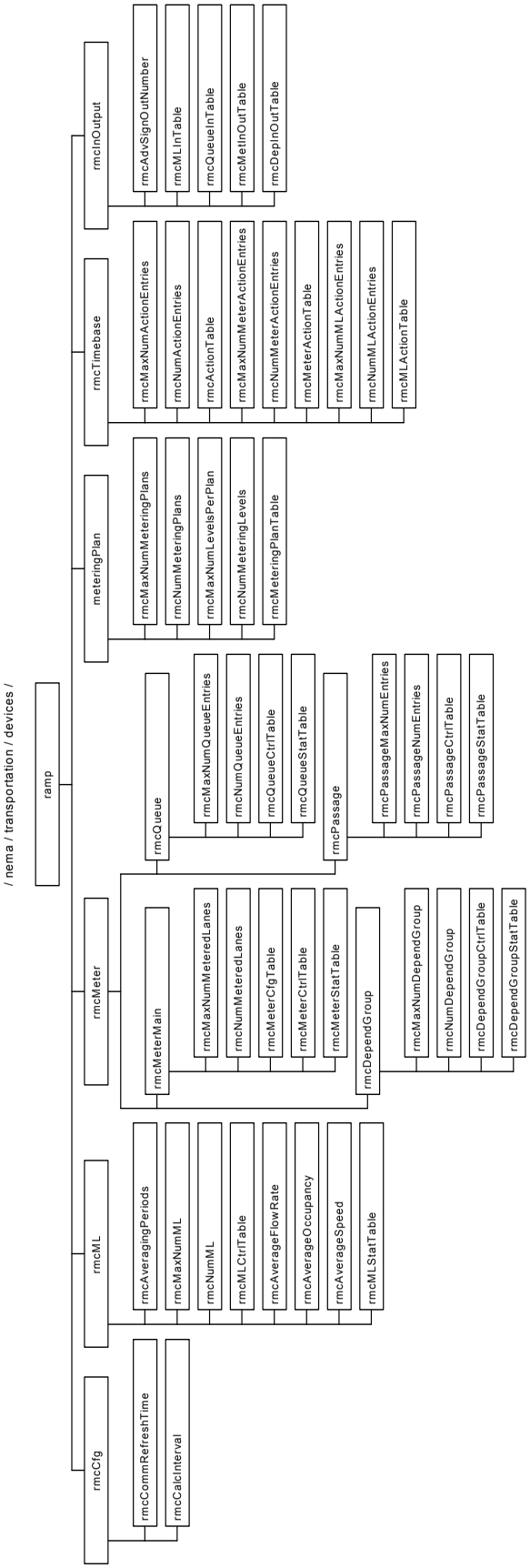


Figure 4
RMC Object Definition Tree

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Section 2
GENERAL

2.1 INTRODUCTION

A Ramp Meter Control (RMC) unit consists of the field controller, its suite of sensors, and the warning signs and signals.

To date, there have not been standards defining how these devices communicate with other related equipment. As a result, each manufacturer has developed its own protocol to meet its particular needs. To integrate systems manufactured by different companies, considerable extra work must be performed resulting in increased costs. This shortcoming limits interchangeability of components from different vendors and restricts information sharing within and between agencies.

These problems have not been limited to ramp meter control devices. Many other devices also need to exchange information. In surface transportation, examples include traffic signal controllers, dynamic message signs, bus priority sensors, etc. To address these problems, NTCIP is developing a family of open standards for communications among field devices and between field devices and TMCs.

2.2 BENEFITS OF STANDARDIZATION

As transportation systems become more sophisticated, planners, agencies, and equipment manufacturers recognize the need for system interoperability and integration. Currently, there is no common protocol with which different types of equipment can communicate. If RMCs are to be integrated with ITS, common communications standards must be established.

Before the NTCIP development started, each electronic transportation-device vendor adopted a different protocol for data communications. This made it very difficult to mix equipment from different vendors in the same system, and to communicate between systems operated by adjacent agencies. NTCIP provides a common standard that can be used by all vendors.

NTCIP offers increased flexibility and choice for agencies operating transportation systems such as RMCs. NTCIP removes barriers to inter-jurisdictional coordination and allows equipment of different types and manufacturers to be mixed on the same communications line. For these reasons, operating agencies will benefit by specifying NTCIP equipment in all future purchases and upgrades.

Benefits of adopting open standards based on the NTCIP include:

- *Avoiding Early Obsolescence*: Though it may not be practical to retrofit NTCIP support in some legacy equipment, most RMC vendors will offer NTCIP support in current and future products. An agency can ensure that its equipment remains useful and compatible long into the future by requiring NTCIP support for all future purchases and upgrades.
- *Providing Choice of Vendor*: Once an agency has RMCs that support NTCIP, RMCs from any manufacturer offering NTCIP-compatible products which will communicate with the agency's existing equipment.
- *Allowing Inter-jurisdictional Coordination*: In the future, an agency may want to communicate with RMC devices owned by other users and/or procured from different vendors. Under NTCIP, these various devices can be added onto an existing communications channel and mixed with different types of devices on the same line.

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- *Using one Communications Network for All Devices*: NTCIP also allows a TMC to communicate with a range of field devices on the same communications channel. For example, if a dynamic message sign is installed near an RMC, the TMC could communicate with the sign controller using the communications channel already in place for the RMC. The communications network is usually the most expensive component of a transportation management system, and the use of NTCIP maximizes that investment.

2.3 EXISTING STANDARDS

There are great benefits of adopting existing standards where possible. These include:
- reuse of software modules during development
- faster implementations
- reducing risks
- ability to integrate components from different manufacturers
- unambiguous meanings of terminology
- building on proven technologies

2.3.1 Internet Standards

The Internet Engineering Task Force (IETF) is responsible for developing and maintaining the standards, guidelines and procedures for communications over the Internet. This group has become increasingly important over the last few years as the Internet has gained popularity. A wide range of Internet standards exist, including:

- Point-to-Point Protocol (PPP) - which may be used for NTCIP dial-up links
- Internet Protocol (IP) - which may be used for NTCIP communications over networks
- Transport Control Protocol (TCP) - which may be used to provide connection-oriented services over NTCIP networks
- User Datagram Protocol (UDP) - which may be used to provide connectionless transport services over NTCIP networks
- Simple Network Management Protocol (SNMP) - which may be used to exchange NTCIP data elements such as those defined within this document.

2.3.2 International Standards Organization Standards

The International Standards Organization (ISO) also develops various communication standards among a wide variety of other standards. The Open Systems Interconnect Reference Model (OSI) is a widely-referenced ISO standard which defines the standard seven-layered communications model. While most implementations do not strictly conform to this standard, virtually all modern communications schemes, including NTCIP, use many of the concepts defined within the standard. In addition, NTCIP communications may use the High-Level Data Link Control (HDLC) protocol, another ISO standard, in specifying how to send a message over a single communications link.

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2.3.3 NTCIP

To support ITS developments, US DOT funded the design of a National ITS Architecture. This architecture defines major ITS subsystems and the needs for information exchange among them. The Joint AASHTO, ITE, and NEMA Committee on the NTCIP, and its working groups are now developing standards for some of these information exchanges. NTCIP recognizes that Ramp Meter control and monitoring information is vital for efficient and safe traffic operations. The family of NTCIP standards will support RMC procurement and support information sharing between the various data users. The development of NTCIP, including this RMC standard, makes use of existing standards as appropriate.

2.4 NTCIP SYSTEM DESIGN

NTCIP was initially designed to support traffic signal controllers because that was seen by the FHWA as an area of most pressing need. However, the development process planned that the protocol would be extended to other transportation environments (e.g., ITS) and, where appropriate, to other environments such as meteorology.

The NTCIP family of protocols is continually expanding to address additional needs. Work is in progress on additional protocols for computer-to-computer or center-to-center data exchange, transit communications, and communications with or between moving vehicles. NTCIP along with other US DOT standards efforts will eventually provide a comprehensive family of communications protocols covering all appropriate ITS applications.

There may also be a future demand to use the system for communications to field devices that are not transportation related; for example air quality monitors for the Environmental Protection Agency (EPA), weather stations for the National Weather Service, or reservoir monitoring systems for the Corps of Engineers. The ultimate scope of NTCIP cannot be rigidly determined. The keys are to determine how those changes might affect the system design, and to provide flexible standards to accommodate these changes.

Where possible, NTCIP uses existing telecommunications and computer industry standards.

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Section 3
RMC OBJECT DEFINITIONS

This section defines those objects, which are specifically used by Ramp Meter Control (RMC) units. The objects are defined using the OBJECT-TYPE macro as specified in RFC 1212. The text provided from Section 3.1 through the end of the section (except the section headings) constitutes the standard RMCMIB1.

The section below present the objects in lexicographical order of their OBJECT IDENTIFIERS that correspond to their physical location within the global naming tree. All of the objects defined in this document reside under the "ramp" node of the global naming tree. To aid in object management, the "ramp" node has been subdivided into logical categories, each defined by a node under the "ramp" node. The individual objects are then located under the appropriate node.

Nodes should not be confused with Conformance Groups, which are defined in Section 4. A Conformance Group is a logical grouping of objects, which is used for conformance statements. While Conformance Groups will frequently correspond to the nodal structure, a Conformance Group may contain objects, which are not lexicographically ordered or which might not even be defined in this standard.

3.1 RAMP METER CONTROL (RMC) MIB HEADER INFORMATION

```
RMC-MIB1   DEFINITIONS::=BEGIN

IMPORTS
  OBJECT-TYPE
        FROM RFC-1212
  devices
   FROM TMIB-II;


--For the purposes of this section, the following OBJECT IDENTIFIERS are used:
ramp OBJECT IDENTIFIER::= { devices 2 }
```

3.2 RMC GENERAL CONFIGURATION NODE

```
rmcCfg   OBJECT IDENTIFIER::= { ramp 1 }
-- This node is an identifier used to group all objects for the configuration of
-- general parameters that are common to all ramp meter control devices.
```

3.2.1 Communication Refresh Threshold

```
rmcCommRefreshThreshold OBJECT-TYPE
        SYNTAX   INTEGER (0..65535)
        ACCESS   read-write
        STATUS   mandatory
        DESCRIPTION
        "This is a global parameter that is being used for each metered lane. If no
        successful SET command communication has been issued to the rmcCommAction-object
```

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of a metered lane for the time indicated in this threshold, the value of the rmcCommActionStatus-object for that metered lane shall be set to 'noComm'.
A suggested usable range is 0, 20 to 14400 in 1-second increments.
A value of zero (0) shall inhibit communications refresh timing."
REFERENCE
"see Clause A.3"
::={ rmcCfg 1 }

3.2.2 Calculation Interval

rmcCalcInterval OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the duration of a single calculation interval consisting of data analysis, averaging and processing.
A suggested usable value range is 10 to 30 in 1-second increments."
REFERENCE
"See Clause A.2.1, A.2.2.1, A.2.2.2, A.2.2.3, A.2.3.1, A.4, A.8.3.1.4.2, A.8.5.3.4.2, and A.9.1"
::={ rmcCfg 2 }

3.3 MAINLINE LANE CONFIGURATION, CONTROL AND STATUS NODE

rmcML OBJECT IDENTIFIER ::={ ramp 2 }

-- This node is an identifier used to group all objects for the configuration,
-- control and status of the mainline lanes that are common to all ramp meter
-- devices.

3.3.1 Averaging Periods

rmcAveragingPeriods OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"This value indicates the number of calculation intervals over which the mainline station averages will be calculated.
A suggested usable range is 1 to 60 in 1-interval increments. "
REFERENCE
"See Clause A.4"
::={ rmcML 1 }

3.3.2 Maximum Number of Mainline Lanes

rmcMaxNumML OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of mainline lanes that can be stored in the Mainline Lane Configuration and Control Table, and, by association, in all other mainline lane tables."
REFERENCE

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"See Clause A.2.1"
::={ rmcML 2 }

3.3.3 Number of Mainline Lanes

rmcNumML OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the actual number of mainline lanes that are present in the Mainline Lane Configuration and Control Table, and, by association, in all other mainline lane tables."
::={ rmcML 3 }

3.3.4 Mainline Lane Configuration and Control Table

rmcMLCtrlTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMLCtrlEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the configuration and control information for the mainline lanes."
::={ rmcML 4 }

rmcMLCtrlEntry OBJECT-TYPE
SYNTAX RmcMLCtrlEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Configuration and control parameters of the mainline lane table. A particular row of this table can be managed using the rmMLMode-object. Whether an unused row is deleted or disabled is implementation specific."
INDEX { rmcMLNumber }
::={ rmcMLCtrlTable 1 }

RmcMLCtrlEntry ::=SEQUENCE {
rmcMLNumber INTEGER,
rmcMLMode INTEGER,
rmcMLLeadZoneLength INTEGER,
rmcMLTrailZoneLength INTEGER,
rmcMLUsageMode INTEGER,
rmcMLSpeedTrapSpacing INTEGER,
rmcMLErraticCount INTEGER,
rmcMLMaxPresence INTEGER,
rmcMLNoActivity INTEGER,
rmcVehicleLength INTEGER
}

3.3.4.1 Lane Number

rmcMLNumber OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory

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DESCRIPTION
"Enumerated listing of the mainline lanes.
This value shall not exceed the value of the rmcMaxNumML object."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 1 }

3.3.4.2 Lane Mode

rmcMLMode OBJECT-TYPE
SYNTAX INTEGER {
disabled (1),
singleEnabledLead (2),
singleEnabledTrail (3),
dualEnabled (4),
preprocessedEnabled (5)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the mode of the mainline lane. The values are:
disabled - indicates that no detector is enabled. When set to this value, the entire row may or may not be deleted.
singleEnabledLead - indicates that only the leading detector is enabled.
singleEnabledTrail - indicates that only the trailing detector is enabled.
dualEnabled - indicates that both the leading and trailing detectors are enabled.
preprocessedEnabled - indicates that no detector is enabled but traffic data is provided by another process / device."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 2 }

3.3.4.3 Leading Detection Zone Length

rmcMLLeadZoneLength OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the detection zone length of the leading detector.
A suggested usable range is 0 to 5.0 in 0.1-meters increments."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 3 }

3.3.4.4 Trailing Detection Zone Length

rmcMLTrailZoneLength OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the detection zone length of the trailing detector.
A suggested usable range is 0 to 5.0 in 0.1-meters increments."
REFERENCE

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"See Clause A.2.1"
::={ rmcMLCtrlEntry 4 }

3.3.4.5 Lane Usage Mode

rmcMLUsageMode OBJECT-TYPE
SYNTAX INTEGER {
notUsed (1),
schemeF (2),
schemeO (3),
schemeFO (4),
schemeS (5),
schemeFS (6),
schemeOS (7),
schemeFOS (8),
determinedByOther (9)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates which mainline station traffic parameters will use the data from this lane. The values are:
notUsed - the lane data will not be used to calculate any mainline station parameter.
schemeF - the lane data will be used to calculate the mainline station flow rate
schemeO - the lane data will be used to calculate the mainline station average occupancy
schemeFO - the lane data will be used to calculate the mainline station flow rate and average occupancy
schemeS - the lane data will be used to calculate the mainline station average speed
schemeFS - the lane data will be used to calculate the mainline station flow rate and average speed
schemeOS - the lane data will be used to calculate the mainline station average occupancy and occupancy speed
schemeFOS - the lane data will be used to calculate the mainline station flow rate, average occupancy and average speed
determinedByOther - the rmcMLUsageStatus-object will determine the mainline lane data usage. "
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 5 }

3.3.4.6 Speed Trap Spacing

rmcMLSpeedTrapSpacing OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the spacing between the leading and trailing detector measured from upstream edge to upstream edge of the detectors.
A suggested usable range is 2.0 to 15.0 in 0.1-m increments.
A value of zero (0) shall inhibit the calculation of speed"
REFERENCE
"See Clause A.2.1"

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::={ rmcMLCtrlEntry 6 }

3.3.4.7 Mainline Erratic Count Threshold

rmcMLErraticCount OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the vehicle count on a mainline lane detector exceeds this threshold, the rmcMLLeadStatus (or rmcMLTrailStatus) object for that detector shall be set to a value of 'erraticCount'.
A suggested usable range is 0 to 30 in 1-vpCI increments.
A value of zero (0) shall inhibit the erratic count testing."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 7 }

3.3.4.8 Mainline Maximum Presence Threshold

rmcMLMaxPresence OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input of a mainline lane detector has been continuously actuated for longer than this threshold, the rmcMLLeadStatus (or rmcMLTrailStatus) object for that detector shall be set to a value of 'maxPresence'.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the maximum presence testing."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 8 }

3.3.4.9 Mainline No Activity Threshold

rmcMLNoActivity OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input of a mainline lane detector has not been actuated for longer than this threshold, the rmcMLLeadStatus (or rmcMLTrailStatus) object for that detector shall be set to a value of 'noActivity'.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the no activity testing."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 9 }

3.3.4.10 Typical Vehicle Length

rmcVehicleLength OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION

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"Indicates the length of a typical vehicle in 0.1 m, which is used for mainline lane speed estimation with a single working detector per mainline lane .
A suggested usable range is 0, 1.5 to 10.0 in 0.1-meters increments.
A value of zero (0) shall inhibit speed estimation."
REFERENCE
"See Clause A.2.1"
::={ rmcMLCtrlEntry 10 }

3.3.5 Average Mainline Station Flow Rate

rmcAverageFlowRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the flow rate measured over the rmcAveragingPeriods-object number of preceding calculation intervals. The flow rate shall be determined by calculating the average of all mainline lanes whose rmcMLStatus-object has a value of either 'working' or 'partialFailure', AND who's rmcLaneUsageStatus-object has a value of 'schemeF', 'schemeFO', 'schemeFS', or 'schemeFOS'. Any mainline lane whose rmcMLStatus-object had a value of 'totalFailure' during the Averaging Periods shall not be used for the calculation. The value shall be expressed in vph in 1-vehicle increments. "
REFERENCE
"See Clause A.4"
::={ rmcML 5 }

3.3.6 Average Mainline Station Occupancy

rmcAverageOccupancy OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the occupancy measured over the rmcAveragingPeriods-object number of preceding calculation intervals. The occupancy shall be determined by calculating the average of all mainline lanes whose rmcMLStatus-object has a value of either 'working' or 'partialFailure', AND who's rmcLaneUsageStatus-object has a value of 'schemeO', 'schemeFO', 'schemeOS', or 'schemeFOS'. Any mainline lane whose rmcMLStatus-object had a value of 'totalFailure' during the Averaging Periods shall not be used for the calculation. The value shall be expressed in percent in 0.1-percent increments."
REFERENCE
"See Clause A.4"
::={ rmcML 6 }

3.3.7 Average Mainline Station Speed

rmcAverageSpeed OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the speed measured over the rmcAveragingPeriods-object number of preceding calculation intervals. The speed shall be determined by calculating

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the average of all mainline lanes whose rmcMLStatus-object has a value of either 'working' or 'partialFailure', AND who's rmcLaneUsageStatus-object has a value of 'schemeS', 'schemeFS', 'schemeOS', or 'schemeFOS'. Any mainline lane whose rmcMLStatus-object had a value of 'totalFailure' during the Averaging Periods shall not be used for the calculation. The value shall be expressed in km/h in 1-km/h increments."
REFERENCE
"See Clause A.4"
::={ rmcML 7 }

3.3.8 Mainline Lane Status Table

rmcMLStatTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMLStatEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the status information for a mainline lane."
::={ rmcML 8 }

rmcMLStatEntry OBJECT-TYPE
SYNTAX RmcMLStatEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Status parameters of the mainline lane status table. This table is directly correlated to the Mainline Lane Configuration and Control Table, which means that the number of rows in this table is exactly the same as the number of rows in the Mainline Lane Configuration and Control Table (AUGMENT TABLE in SNMPv2 terminology). Table management can only take place through the Mainline Lane Configuration and Control Table, while this table provides only status information about the mainline lanes."
INDEX { rmcMLNumber }
::={ rmcMLStatTable 1 }

RmcMLStatEntry ::=SEQUENCE {
rmcMLLeadStatus INTEGER,
rmcMLTrailStatus INTEGER,
rmcMLStatus INTEGER,
rmcMLUsageStatus INTEGER
}

3.3.8.1 Leading Detector Status

rmcMLLeadStatus OBJECT-TYPE
SYNTAX INTEGER {
disabled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActivity (6),
errorAtSensor (7)
}
ACCESS read-only
STATUS optional

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DESCRIPTION
"Indicates the status of the leading detector. The values are:
disabled - indicates that this detector is not used.
working - indicates that this detector has no error.
otherError - indicates an error not defined here. See Operator's Manual.
erraticCount - indicates that the vehicle count for this detector has exceeded the value of the rmcMLErraticCount-object.
maxPresence - indicates a continuous actuation for this detector that has exceeded the value of the rmcMLMaxPresence-object.
noActivity - indicates a continuous non-actuation for this detector that has exceeded the value of the rmcMLNoActivity-object.
errorAtSensor - indicates that the sensor for this detector has reported an error. See Operator's manual "
REFERENCE
"See Clause A.2.1"
::={ rmcMLStatEntry 1 }

3.3.8.2 Trailing Detector Status

rmcMLTrailStatus OBJECT-TYPE
SYNTAX INTEGER {
disabled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActivity (6),
errorAtSensor (7)
}
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the status of the trailing detector. The values are:
disabled - indicates that this detector is not used.
working - indicates that this detector has no error.
otherError - indicates an error notdefined here. See Operator's manual.
erraticCount - indicates that the vehicle count for this detector has exceeded the value of the rmcMLErraticCount-object.
maxPresence - indicates a continuous actuation for this detector that has exceeded the value of the rmcMLMaxPresence-object.
noActivity - indicates a continuous non-actuation for this detector that has exceeded the value of the rmcMLNoActivity-object.
errorAtSensor - indicates that the sensor for this detector has reported an error. See Operator's manual."
REFERENCE
"See Clause A.2.1"
::={ rmcMLStatEntry 2 }

3.3.8.3 Lane Status

rmcMLStatus OBJECT-TYPE
SYNTAX INTEGER {
working (1),
disabled (2),
partialFailure (3),
totalFailure (4)

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```
}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates  the status of the mainline lane.  The values are:
working - indicates that the rmcMLMode-object has a value of either:
     a.) 'dualEnabled', and both the rmcMLLeadStatus-object and the
rmcMLTrailStatus-object have the value of  'working', or
     c.) 'singleEnabledLead', and the rmcMLLeadStatus-object has the value of
 'working', or
     d.) 'singleEnabledTrail', and the rmcMLTrailStatus-object has the value of
 'working', or
     e.) 'preprocessedEnabled', and the device providing the traffic data has
 reported no error.
disabled - indicates that the rmcMLMode-object has a value of either:
     a.) 'disabled', or
     b.) 'singleEnabledLead', and the rmcMLLeadStatus-object has the value of
 'disabled', or
     c.) 'singleEnabledTrail', and the rmcMLTrailStatus-object has the value of
 'disabled', or
     d.) partialFailure - indicates that the rmcMLMode-object has a value of
 'dualEnabled', but the the value of one of rmcMLLeadStatus-object and
 rmcMLTrailStatus-object is NOT 'working', while the value of the other is
 'working'.
totalFailure - indicates that the rmcMLMode-object has a value of either:
     a.) 'dualEnabled', but the rmcMLLeadStatus-object and the
rmcMLTrailStatus-object both have the value of NOT 'working', or
     b.) 'singleEnabledLead', and the rmcMLLeadStatus-object has the value of
 'error', or
     c.) 'singleEnabledTrail', and the rmcMLTrailStatus-object has the value of
 'error', or
     d.) 'preprocessedEnabled', and the device providing the traffic data has
 reported an error."
REFERENCE
"See Clause A.2.1"
::={ rmcMLStatEntry 3 }
```

3.3.8.4 Lane Usage Status

```
rmcMLUsageStatus  OBJECT-TYPE
SYNTAX   INTEGER {
notUsed (1),
schemeF (2),
schemeO (3),
schemeFO (4),
schemeS (5),
schemeFS (6),
schemeOS (7),
schemeFOS (8)
}
ACCESS  read-only
STATUS   mandatory
DESCRIPTION
"Indicates which mainline station traffic parameters use the data from this
 lane.  If the value of the rmcMLUsageMode-object is NOT 'determinedByOthers',
```

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then the value is determined directly by that mode object. If, however, the value is 'determinedByOthers', then the value is determined by the TimeBaseControl mechanism. The values are:
notUsed - the mainline lane traffic parameters are not used for averaging calculation.
schemeF - the lane data will be used to calculate the mainline lane station flow rate
schemeO - the lane data will be used to calculate the mainline lane station average occupancy
schemeFO - the lane data will be used to calculate the mainline lane station flow rate and average occupancy
schemeS - the lane data will be used to calculate the mainline lane station average speed
schemeFS - the lane data will be used to calculate the mainline lane station flow rate and average speed
schemeOS - the lane data will be used to calculate the mainline lane station average occupancy and occupancy speed
schemeFOS - the lane data will be used to calculate the mainline lane station flow rate, average occupancy and average speed"
REFERENCE
"See Clause A.2.1 and A.4"
::={ rmcMLStatEntry 4 }

3.4 METERED LANE CONFIGURATION, CONTROL AND STATUS NODE

rmcMeter OBJECT IDENTIFIER ::={ ramp 3 }

-- This node is an identifier used to group all objects for the configuration,
-- control and status of the metered lanes that are common to all ramp
-- meter devices.

3.4.1 Metered Lane Main Configuration node

rmcMeterMain OBJECT IDENTIFIER ::={ rmcMeter 1 }

-- This node is an identifier used to group the main objects for the
-- configuration, control and status of
-- the metered lanes that are common to all ramp meter devices.

3.4.1.1 Maximum Number of Metered Lanes

rmcMaxNumMeteredLanes OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of metered lanes that can be stored in the Metered Lane Configuration Table, and, by association, in all other metered lane tables."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterMain 1 }

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3.4.1.2 Number of Metered Lanes

```
rmcNumMeteredLanes   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the actual number of metered lanes that are present in the Metered
Lane Configuration Table, and, by association, in all other metered lane
tables."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterMain 2 }
```

3.4.1.3 Metered Lane Configuration Table

```
rmcMeterCfgTable OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcMeterCfgEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the configuration information for a metered lane."
::={ rmcMeterMain 3 }

rmcMeterCfgEntry OBJECT-TYPE
SYNTAX   RmcMeterCfgEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration parameters of the metered lane table. This table is directly
correlated to the Metered Lane Control Table, which means that the number of
rows in this table is exactly the same as the number of rows in the Metered Lane
Control Table (AUGMENT TABLE in SNMPv2 terminology).  Table management can only
take place through the Metered Lane Control Table, while this table provides
configuration parameters for the associated metered lane."
INDEX { rmcMeterNumber }
::={ rmcMeterCfgTable 1 }

RmcMeterCfgEntry ::=SEQUENCE {
rmcMeterNumber      INTEGER,

rmcDependGroupNumber   INTEGER,
rmcDependGroupSeqNumber   INTEGER,
rmcCmdSourcePriorityOrder      INTEGER,

rmcDemandErraticCount     INTEGER,
rmcDemandMaxPresence   INTEGER,
rmcDemandNoActivity   INTEGER,

rmcMinMeterTime      INTEGER,
rmcMinNonMeterTime      INTEGER,
rmcAbsoluteMinMeterRate   INTEGER,
rmcAbsoluteMaxMeterRate   INTEGER,
rmcSystemMinMeterRate   INTEGER,
rmcSystemMaxMeterRate   INTEGER,
```

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```
rmcStartAlert        INTEGER,
rmcStartWarning      INTEGER,
rmcStartGreen        INTEGER,
rmcStartGapTime      INTEGER,
rmcStartGapQueueDetectorNum        INTEGER,
rmcStartYellow       INTEGER,
rmcStartRed        INTEGER,

rmcMinRed        INTEGER,
rmcRedViolationClearance     INTEGER,
rmcRedViolationAdjust     INTEGER,
rmcMinGreen        INTEGER,
rmcMaxGreen        INTEGER,
rmcYellow        INTEGER,
rmcShortStopTime     INTEGER,
rmcShortStopOccupancy   INTEGER,
rmcShortStopQueueDetectorNum       INTEGER,
rmcLongStopTime     INTEGER,

rmcDemandGap        INTEGER,
rmcDemandRed        INTEGER,

rmcShutNormalRate        INTEGER,
rmcShutWarning     INTEGER,
rmcShutTime     INTEGER,
rmcPostMeterGreen     INTEGER,

rmcQueueViolationFlag     INTEGER,
rmcQueueShutdownFlag   INTEGER,
rmcQueueAdjustUsage   INTEGER
}
```

3.4.1.3.1 Lane Number

```
rmcMeterNumber   OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Enumerated listing of the metered lanes
This value cannot exceed the value stated in the rmcMaxNumMeteredLanes-object."
REFERENCE
"See Clause A.2.2, A.8.3.1.3 and A.8.5.3.3"
::={ rmcMeterCfgEntry 1 }
```

3.4.1.3.2 Dependency Group Number

```
rmcDependGroupNumber OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the dependency group with which this metered lane is associated.
This value cannot exceed the value of the rmcMaxNumDependGroup-object."
REFERENCE
```

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"See Clause A.2.2 and A.2.3"
::={ rmcMeterCfgEntry 2 }

3.4.1.3.3 Dependency Group Sequence Number

rmcDependGroupSeqNumber OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the unique position of this metered lane within its dependency group which determines the Ramp Lane Sequence."
REFERENCE
"See Clause A.2.3.2"
::={ rmcMeterCfgEntry 3 }

3.4.1.3.4 Command Source Priority Order

rmcCmdSourcePriorityOrder OBJECT-TYPE
SYNTAX INTEGER {
schemeCIT (1),
schemeICT (2),
schemeTCI (3),
schemeTIC (4),
schemeCTI (5),
schemeITC (6)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the active command source priority order for this metered lane. The values are:
schemeCIT -in decreasing order: manual - communications - interconnect - timebase control - default;
schemeICT -in decreasing order: manual - interconnect - communications- timebase control - default
schemeTCI -in decreasing order: manual - timebase control - communications - interconnect -default;
schemeTIC -in decreasing order: manual - timebase control - interconnect - communications-default
schemeCTI -in decreasing order: manual - communications- timebase control- interconnect - default;
schemeITC -in decreasing order: manual - interconnect- timebase control - communications - default"
REFERENCE
"See Clause A.3"
::={ rmcMeterCfgEntry 4 }

3.4.1.3.5 Demand Detector Erratic Count Threshold

rmcDemandErraticCount OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION

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"If the vehicle count on the demand detector for a metered lane exceeds this threshold, the rmcDemandStatus-object for that metered lane shall be set to a value of 'erraticCount'.
A suggested usable range is 0 to 30 in 1-vpCI increments.
A value of zero (0) shall inhibit the erratic count testing."
REFERENCE
"See Clause A.2.2.1"
::={ rmcMeterCfgEntry 5 }

3.4.1.3.6 Demand Detector Maximum Presence Threshold

rmcDemandMaxPresence OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input on the demand detector for a metered lane has been continuously actuated for longer than the time indicated by this threshold, the rmcDemandStatus-object for that metered lane shall be set to a value of 'maxPresence'.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the maximum presence testing."
REFERENCE
"See Clause A.2.2.1"
::={ rmcMeterCfgEntry 6 }

3.4.1.3.7 Demand Detector No Activity Threshold

rmcDemandNoActivity OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input on the demand detector for a metered lane has not been actuated for longer than the time indicated by this threshold, the rmcDemandErrorStstus-object for that metered lane shall be set to a value of 'noActivity'.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the no activity testing."
REFERENCE
"See Clause A.2.2.1"
::={ rmcMeterCfgEntry 7 }

3.4.1.3.8 Minimum Metering Time

rmcMinMeterTime OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the minimum length of the metering state. This will prevent excessive cycling of the ramp meter between the metering and non-metering states.
A suggested usable range is 0 to 60 in 1-minute increments."
REFERENCE
"See Clause A.6"

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::={ rmcMeterCfgEntry 8 }

3.4.1.3.9 Minimum Non-Metering Time

rmcMinNonMeterTime OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the minimum length of the non-metering state. This will prevent excessive cycling of the ramp meter between the metering and non-metering states.
A suggested usable range is 0 to 60 in 1-minute increments."
REFERENCE
"See Clause A.5"
::={ rmcMeterCfgEntry 9 }

3.4.1.3.10 Absolute Minimum Metering Rate

rmcAbsoluteMinMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the absolute minimum metering rate.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterCfgEntry 10 }

3.4.1.3.11 Absolute Maximum Metering Rate

rmcAbsoluteMaxMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the absolute maximum metering rate.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used.
The value, if non-zero, must be greater than or equal to the value of the rmcAbsoluteMinMeterRate-object."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterCfgEntry 11 }

3.4.1.3.12 System Minimum Metering Rate

rmcSystemMinMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the system minimum metering rate.

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A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterCfgEntry 12 }

3.4.1.3.13 System Maximum Metering Rate

rmcSystemMaxMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the system maximum metering rate.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used.
The value, if non-zero, must be greater than or equal to the value of the rmcSystemMinMeterRate object."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterCfgEntry 13 }

3.4.1.3.14 Startup Alert Time

rmcStartAlert OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the startup alert interval.
A suggested usable range is 0 to 60.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.2.1"
::={ rmcMeterCfgEntry 14 }

3.4.1.3.15 Startup Warning Time

rmcStartWarning OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the startup warning interval.
A suggested usable range is 0 to 60.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.2.2"
::={ rmcMeterCfgEntry 15 }

3.4.1.3.16 Startup Green Time

rmcStartGreen OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION

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"Indicates the length of the startup green interval.
A suggested usable range is 0 to 60.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.2.3"
::={ rmcMeterCfgEntry 16 }

3.4.1.3.17 Startup Gap Time

rmcStartGapTime OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time between successive actuations of the detector identified by the rmcStartGapQueueDetectorNum-object necessary to terminate the startup green interval.
A suggested usable range is 0, 1.0 to 15.0 in 0.1-second increments.
A value of zero (0) indicates that queue detector gaps shall not be used to terminate the startup green interval."
REFERENCE
"See Clause A.8.2.3"
::={ rmcMeterCfgEntry 17 }

3.4.1.3.18 Startup Gap Queue Detector Number

rmcStartGapQueueDetectorNum OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the queue detector that is used for startup gap calculations.
The value of this object cannot be larger than the value of the rmcNumQueueEntries-object."
REFERENCE
"See Clause A.8.2.3"
::={ rmcMeterCfgEntry 18 }

3.4.1.3.19 Startup Yellow Time

rmcStartYellow OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the startup yellow interval.
A suggested usable range is 0, 2.0 to 10.0 in 0.1-second increments.
A value of zero (0) indicates that the startup yellow interval shall be skipped"
REFERENCE
"See Clause A.8.2.4"
::={ rmcMeterCfgEntry 19 }

3.4.1.3.20 Startup Red Time

rmcStartRed OBJECT-TYPE
SYNTAX INTEGER (0..255)

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ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the startup red interval.
A suggested usable range is 2.0 to 10.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.2.5"
::={ rmcMeterCfgEntry 20 }

3.4.1.3.21 Minimum Red Time

rmcMinRed OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the minimum length of the red interval.
A suggested usable range is 1.0 to 15.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.3.1.1 and A.8.5.3.1"
::={ rmcMeterCfgEntry 21 }

3.4.1.3.22 Red Violation Clearance Time

rmcRedViolationClearance OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time that has to elapse during the red interval before
a red light violation can be detected.
A suggested usable range is 0 to 5.0 in 0.1-second increments.
A value of zero (0) indicates that no red light violations shall be detected."
REFERENCE
"See Clause A.8.3.1.2 and A.8.5.3.2"
::={ rmcMeterCfgEntry 22 }

3.4.1.3.23 Red Violation Adjustment Time

rmcRedViolationAdjust OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time by which the current red interval will be extended
for each red light violation.
A suggested usable range is 1.0 to 5.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.3.1.2 and A.8.5.3.2"
::={ rmcMeterCfgEntry 23 }

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3.4.1.3.24 Minimum Green Time

```
rmcMinGreen   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the minimum length of the green interval.
A suggested usable range is 1.0 to 5.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.3.2.2 and A.8.5.1.2"
::={ rmcMeterCfgEntry 24 }
```

3.4.1.3.25 Maximum Green Time

```
rmcMaxGreen   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the maximum length of the green interval.
A suggested usable range is 1.0 to 15.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.3.2.3"
::={ rmcMeterCfgEntry 25 }
```

3.4.1.3.26 Yellow Time

```
rmcYellow   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the length of the yellow interval.
A suggested usable range is 0, 0.5 to 5.0 in 0.1-second increments.
A value of zero (0) indicates that the yellow interval shall be skipped."
REFERENCE
"See Clause A.8.3.2.1, A.3.3, A.85.1.1 and A.8.5.2"
::={ rmcMeterCfgEntry 26 }
```

3.4.1.3.27 Short Stop Time

```
rmcShortStopTime   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the length of time that has to elapse after the red interval has
expired before a short stop condition can be detected.
A suggested usable range is 0, 1.0 to 120.0 in 0.1-second increments.
A value of zero (0) indicates that no short stop conditions shall be detected."
REFERENCE
"See Clause A.8.3.1.4.2 and A.8.5.3.4.2"
::={ rmcMeterCfgEntry 27 }
```

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3.4.1.3.28 Short Stop Occupancy Threshold

rmcShortStopOccupancy OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the occupancy threshold at the detector identified by the rmcShortStopQueueDetectorNum-object, meaning that this detector is used to detect short stop conditions.
A suggested usable range is 0 to 100.0 in 0.1-percent increments."
REFERENCE
"See Clause A.8.3.1.4.2 and A.8.5.3.4.2"
::={ rmcMeterCfgEntry 28 }

3.4.1.3.29 Short Stop Queue Detector Number

rmcShortStopQueueDetectorNum OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the queue detector that is used for short stop calculations.
The value of this object cannot be larger than the value of the rmcNumQueueEntries-object."
REFERENCE
"See Clause A.8.3.1.4.2"
::={ rmcMeterCfgEntry 29 }

3.4.1.3.30 Long Stop Time

rmcLongStopTime OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time that has to elapse after the red interval has expired before a long stop condition can be detected.
A suggested usable range is 0, 1.0 to 10.0 in 0.1-second increments.
A value of zero (0) indicates that no long stop conditions shall be detected."
REFERENCE
"See Clause A.8.3.1.4.3 and A.8.5.3.4.3"
::={ rmcMeterCfgEntry 30 }

3.4.1.3.31 Demand Gap Time

rmcDemandGap OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time that has to elapse after the green interval has expired without actuation of the demand detector before a demand gap condition can be detected.
A suggested usable range is 1.0 to 5.0 in 0.1-second increments."

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REFERENCE
"See Clause A.8.3.1.4.4 and A.8.5.3.4.4"
::={ rmcMeterCfgEntry 31 }

3.4.1.3.32 Demand Red Time

rmcDemandRed OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time by which the current red interval will be extended once the demand detector is actuated after the detection of a demand gap condition.
A suggested usable range is 0, 1.0 to 15.0 in 0.1-second increments.
A value of zero (0) indicates that no time shall be extended."
REFERENCE
"See Clause A.8.3.1.4.4 and A.8.5.3.4.4"
::={ rmcMeterCfgEntry 32 }

3.4.1.3.33 Shutdown Normal Metering Rate

rmcShutNormalRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the metering rate during shutdown when the rmcImplementAction-object has a value of either 'dark' or 'restInGreen'.
A suggested usable range is 120 to 1800 in 1-vph increments."
REFERENCE
"See Clause A.6.1"
::={ rmcMeterCfgEntry 33 }

3.4.1.3.34 Shutdown Warning Time

rmcShutWarning OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the shutdown warning interval.
A suggested usable range is 0 to 60.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.5.4"
::={ rmcMeterCfgEntry 34 }

3.4.1.3.35 Shutdown Time

rmcShutTime OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the maximum length of shutdown metering.

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A suggested usable range is 0 to 600 in 1-second increments."
REFERENCE
"See Clause A.8.5.3.5"
::={ rmcMeterCfgEntry 35 }

3.4.1.3.36 Post-metering Green Time

rmcPostMeterGreen OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of the Post-metering Green interval.
A suggested usable range is 0 to 60.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.6.1"
::={ rmcMeterCfgEntry 36 }

3.4.1.3.37 Queue versus Violations Flag

rmcQueueViolationFlag OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates whether queue adjustment will supersede red violations.
0=false - indicates that both queue and red violation adjustments may be performed simultaneously.
1=true - indicates that queue adjustment will supersede red violation adjustment."
REFERENCE
"See Clause 8.3.1.2"
DEFVAL
{ 0 }
::={ rmcMeterCfgEntry 37 }

3.4.1.3.38 Queue versus Shutdown Flag

rmcQueueShutdownFlag OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates whether queue override takes precedence over shutdown metering.
0= false - allows the transition to the non-metering state regardless of queue override adjustments.
1= true - requires the queue override adjustments be completed before the transition to the non-metering state can begin. "
REFERENCE
"See Clause A.6"
::={ rmcMeterCfgEntry 38 }

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3.4.1.3.39 Queue Adjustment Usage

```
rmcQueueAdjustUsage   OBJECT-TYPE
SYNTAX   INTEGER {
   additive (1),
   additiveXI (2),
   priorityXI (3)
   }
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates which queue adjustments are made.
additive= indicates that a queue adjustment shall be made for each queue
detector (both excessive and intermediate queue detectors) whose rmcQueueFlag-
object has a value of 'true'.
additiveXI =  indicates that a queue adjustment shall be made for each queue
detector whose rmcQueueType-object has a value of 'excessive' and whose
rmcQueueFlag-object has a value of 'true'.  If no such detectors exist, a queue
adjustment shall be made for each queue detector whose rmcQueueType-object has a
value of 'intermediate' and whose rmcQueueFlag-object has a value of 'true'.
priorityXI =  indicates that a queue adjustment shall be made for the highest
entry (lowest index value) queue detector whose rmcQueueType-object has a value
of 'excessive' and whose rmcQueueFlag-object has a value of 'true'. If no
detector exists that fulfills these requirements, aqueue adjustment shall be
made for the highest entry (lowest index value) queue detector whose
rmcQueueType-object has a value of 'intermediate' and whose rmcQueueFlag-object
has a value of 'true'."
REFERENCE
"See Clause A.9.2"
::={ rmcMeterCfgEntry 39 }
```

3.4.1.4 Metered Lane Control Table

```
rmcMeterCtrlTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcMeterCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the control information for a metered lane."
::={ rmcMeterMain 7 }

rmcMeterCtrlEntry   OBJECT-TYPE
SYNTAX   RmcMeterCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Control Parameters of the metered lane table. A particular row of this table
can be managed using the rmMeterMode-object.  Whether an unused row is deleted
or disabled is implementation specific. "
INDEX { rmcMeterNumber }
::={ rmcMeterCtrlTable 1 }

RmcMeterCtrlEntry ::=SEQUENCE {
rmcMeterMode        INTEGER,
rmcManualAction   INTEGER,
```

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```
rmcManualPlan         INTEGER,
rmcManualRate         INTEGER,
rmcManualVehiclesPerGrn   INTEGER,

rmcIntercoAction   INTEGER,
rmcIntercoPlan        INTEGER,
rmcIntercoRate        INTEGER,
rmcIntercoVehiclesPerGrn   INTEGER,

rmcCommActionStatus   INTEGER,
rmcCommPlan        INTEGER,
rmcCommRate        INTEGER,
rmcCommVehiclesPerGrn   INTEGER,

rmcDefaultAction   INTEGER,
rmcDefaultPlan        INTEGER,
rmcDefaultRate        INTEGER,
rmcDefaultVehiclesPerGrn   INTEGER,

rmcDemandMode      INTEGER
}
```

3.4.1.4.1 Lane Mode

```
rmcMeterMode   OBJECT-TYPE
SYNTAX   INTEGER (0..1)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the mode of the metered lane.  The values are:
0 = disabled - the metered lane is not used.
1 = enabled - the metered lane is used. "
REFERENCE
"See Clause A.2.2"
::={ rmcMeterCtrlEntry 1 }
```

3.4.1.4.2 Manual Action

```
rmcManualAction   OBJECT-TYPE
SYNTAX   INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6)
}
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the requested action if the metered lane is commanded by manual
entry.  The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-
Green interval.
restInGreen - indicates that the metered lane will advance to  the Pre-Metering
```

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Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcManualRate-object.
trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcManualPlan-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 2 }

3.4.1.4.3 Manual Plan

rmcManualPlan OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering plan number if the metered lane is commanded by manual entry and the rmcRequestAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of the rmcMaxNumMeterPlans-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 3 }

3.4.1.4.4 Manual Rate

rmcManualRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering rate if the metered lane is commanded by manual entry and the rmcRequestAction-object has a value of 'fixedRate'.
A suggested usable range is 120-1800 in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 4 }

3.4.1.4.5 Manual Vehicles-Per-Green

rmcManualVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested number of to pass during the green and yellow intervals of one cycle while the metered lane is commanded by manual entry (value of the rmcImplementedCommand object is 'manual').

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The suggested usable range is 1 to 5 in 1-vehicles-per-green increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 5 }

3.4.1.4.6 Interconnect Action

rmcIntercoAction OBJECT-TYPE
SYNTAX INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6)
}
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested action if the metered lane is commanded by interconnect. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcIntercoPlan-object.
trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcIntercoPlan-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 6 }

3.4.1.4.7 Interconnect Plan

rmcIntercoPlan OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering plan number if the metered lane is commanded by interconnect and the rmcRequestAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of the rmcMaxNumMeterPlans-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 7 }

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3.4.1.4.8 Interconnect Rate

rmcIntercoRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering rate if the metered lane is commanded by interconnect and the rmcRequestAction-object has a value of 'fixedRate'.
A suggested usable range is 120 to 1800 in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 8 }

3.4.1.4.9 Interconnect Vehicles-Per-Green

rmcIntercoVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested number of vehicles to pass during the green and yellow intervals of one cycle while the metered lane is commanded by interconnect.
(value of the rmcImplementedCommand object is 'interconnect').
A suggested usable range is 1 to 5 in 1-vehicles-per-green increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 9 }

3.4.1.4.10 Communications Action Status

rmcCommActionStatus OBJECT-TYPE
SYNTAX INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6)
}
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the last received SET on the rmcCommAction from the TMC. However, if the device lost communications to the TMC, the value of the rmcCommActionStatus object is used to decide which value of the rmcRequestCommandSource object is going to be implemented. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcCommRate-object.
trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcCommPlan-object.

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emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 10 }

3.4.1.4.11 Communications Plan

rmcCommPlan OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering plan number if the metered lane is commanded by communications and the rmcRequestAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of the rmcMaxNumMeteringPlans-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 11 }

3.4.1.4.12 Communications Rate

rmcCommRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested metering rate in vehicles per hour (vph) if the metered lane is commanded by communications and the rmcRequestAction-object has a value of 'fixedRate'.
A suggested usable range is 120 to 1800 in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 12 }

3.4.1.4.13 Communications Vehicles-Per-Green

rmcCommVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the requested number of vehicles that are allowed to pass during the green and yellow intervals of one cycle while the metered lane is commanded by communications (value of the rmcImplementedCommand object is 'communications').
A suggested usable range is 1 to 5 in 1-vehicle-per-green increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 13 }

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3.4.1.4.14 Default Action

```
rmcDefaultAction   OBJECT-TYPE
SYNTAX   INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5)
}
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the requested action if the metered lane is commanded by default
settings.  The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-
Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering
Green interval.
fixedRate - indicates that the metered lane will operate using the value of the
rmcDefaultRate-object.
trafficResponsive -indicates that the metered lane will operate using mainline
station traffic conditions and the value of the rmcDefaultPlan-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown
Warning interval without entering the Shutdown Green, Shutdown Yellow or
Shutdown Red intervals when the metered lane is NOT in the Non-metering state.
The metered lane will advance to the Pre-Metering Green interval when the
metered lane is in the Non-metering state."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 14 }
```

3.4.1.4.15 Default Plan

```
rmcDefaultPlan   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the requested metering plan number if the metered lane is commanded
by default settings and the rmcRequestAction-object has a value of
'trafficResponsive'. This value cannot exceed the value of the
rmcMaxNumMeteringPlans-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 15 }
```

3.4.1.4.16 Default Rate

```
rmcDefaultRate   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
```

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"Indicates the requested metering rate if the metered lane is commanded by default settings and the rmcRequestAction-object has a value of 'fixedRate'. A suggested usable range is 120 to 1800 in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 16 }

3.4.1.4.17 Default Vehicles-Per-Green

rmcDefaultVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles that are allowed to pass during the green and yellow intervals of one cycle while the metered lane is commanded by default settings (value of the rmcImplementedCommand object is 'default'). A suggested usable range is 1 to 5 in 1-vehicle-per-green increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterCtrlEntry 17 }

3.4.1.4.18 Demand Detector Mode

rmcDemandMode OBJECT-TYPE
SYNTAX INTEGER {
recalled (1),
enabledCall (2),
enabledStop (3)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the mode of the demand detector.
recalled - indicates that the demand detector will constantly place a call even without a vehicle being present in its detection zone.
enabledCall - indicates that the demand detector is ready to detect, and shall constantly place a call when it has failed.
enabledStop - indicates that the demand detector is ready to detect, and shall exit the Metering state when it has failed."
REFERENCE
"See Clause A.2.2.1, A.8.3.1.4, A.8.3.1.4.1 and A.8.5.3.4.1"
::={ rmcMeterCtrlEntry 18 }

3.4.1.5 Metered Lane Status Table

rmcMeterStatTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMeterStatEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the status information for a metered lane."
::={ rmcMeterMain 8 }

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```
rmcMeterStatEntry   OBJECT-TYPE
SYNTAX   RmcMeterStatEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Status parameters of the metered lanes status table. This table is directly
correlated to the Metered Lane Control Table, which means that the number of
rows in this table is exactly the same as the number of rows in the Metered Lane
Control Table (AUGMENT TABLE in SNMPv2 terminology).  Table management can only
take place through the Metered Lane Control Table, while this table provides
status information for the associated metered lane."
INDEX { rmcMeterNumber }
::={ rmcMeterStatTable 1 }

RmcMeterStatEntry ::=SEQUENCE {
rmcRequestCommandSource      INTEGER,
rmcImplementCommandSource      INTEGER,
rmcImplementAction   INTEGER,
rmcImplementPlan         INTEGER,
rmcImplementRate         INTEGER,
rmcImplementVehiclesPerGrn   INTEGER,

rmcRequestAction   INTEGER,
rmcRequestPlan         INTEGER,
rmcRequestRate         INTEGER,
rmcRequestVehiclesPerGrn   INTEGER,

rmcCommAction   INTEGER,

rmcBaseMeterRate  INTEGER,
rmcActiveMeterRate      INTEGER,

rmcTBActionStatus   INTEGER,
rmcTBPlanStatus      INTEGER,
rmcTBRateStatus      INTEGER,
rmcTBVehiclesPerGrnStatus   INTEGER,

rmcActiveInterval      INTEGER,

rmcTBCMinMeterRateStatus      INTEGER,
rmcTBCMaxMeterRateStatus      INTEGER,
rmcOperMinMeterRateStatus      INTEGER,
rmcOperMaxMeterRateStatus      INTEGER,
rmcDemandStatus      INTEGER
}
```

3.4.1.5.1 Requested Metering Command Source

```
rmcRequestCommandSource   OBJECT-TYPE
SYNTAX   INTEGER {
manual (1),
communications (2),
interconnect (3),
timebaseControl (4),
default (5)
```

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```
}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the command source that requests control of this metered lane.  The
values are:
manual - the metered lane is requested to be controlled locally at the site.
communications - the metered lane is requested to be controlled by the central
system. This usually means that the entire RMC is controlled centrally.
interconnect - the metered lane is requested to be controlled by an on-street
master controller.
timebaseControl - the metered lane is requested to be controlled using values as
selected via the Timebase Control Action table.
default - indicates that the metered lane is requested to be controlled using
default settings."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 1 }
```

3.4.1.5.2 Implemented Metering Command Source

```
rmcImplementCommandSource   OBJECT-TYPE
SYNTAX   INTEGER {
manual (1),
communications (2),
interconnect (3),
timebaseControl (4),
default (5)
}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the command source that currently controls this metered lane.  The
values are:
manual - the metered lane is currently controlled locally at the site.
communications - the metered lane is currently controlled by the central system.
 This usually means that the entire RMC is controlled centrally.
interconnect - the metered lane is currently controlled by an on-street master
controller.
timebaseControl - the metered lane is currently controlled using values as
selected via the Timebase Control Action table.
default - indicates that the metered lane is currently controlled using default
settings."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 2 }
```

3.4.1.5.3 Implemented Action

```
rmcImplementAction   OBJECT-TYPE
SYNTAX   INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
```

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emergencyGreen (5),
holdMeter (6),
holdNonMeter (7),
holdRestInGreen (8)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the action that is active for the metered lane. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcImplementRate-object.
trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcImplementPlan-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
holdMeter - indicates that the metered lane will remain in the metering state restrictions such as minimum metering times.
holdNonMeter - indicates that the metered lane will remain in the non-metering state regardless of the requested action (rmcRequestedAction-object) due to restrictions such as minimum non-metering times.
holdRestInGreen - indicates that the metered lane was forced into the Pre-Metering Green interval because another lane within this Dependency Group is NOT in the non-metering state."
REFERENCE
"See Clause A.3, A.5.1, A.5.2, A.6.1, A.6.2, A.6.3 and A.7.2"
::={ rmcMeterStatEntry 3 }

3.4.1.5.4 Implemented Plan

rmcImplementPlan OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the metering plan number that is implemented if the rmcImplementAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of the rmcMaxNumMeteringPlans-object."
REFERENCE
"See Clause A.5.2 and A.7.2"
::={ rmcMeterStatEntry 4 }

3.4.1.5.5 Implemented Rate

rmcImplementRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION

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"Indicates the base metering rate if the rmcImplementAction-object has a value of 'fixedRate', in 1-vph increments."
::={ rmcMeterStatEntry 5 }

3.4.1.5.6 Implemented Vehicles-Per-Green

rmcImplementVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles that are currently allowed to pass during the green and yellow intervals of one cycle, in 1-vehicle-per-green increments."
REFERENCE
"See Clause A.3, A.8.3.2 and A.8.5.1.1"
::={ rmcMeterStatEntry 6 }

3.4.1.5.7 Requested Action

rmcRequestAction OBJECT-TYPE
SYNTAX INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5)
}
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the action that is requested for this metered lane. The values are:
dark - indicates that the metered lane is requested to advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane is requested to advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane is requested to operate using the value of the rmcRequestRate-object.
trafficResponsive -indicates that the metered lane is requested to operate using mainline station traffic conditions and the value of the rmcRequestPlan-object.
emergencyGreen - indicates that the metered lane is requested to advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 7 }

3.4.1.5.8 Requested Plan

rmcRequestPlan OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION

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"Indicates the metering plan number that is requested if the rmcRequestAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of
the rmcMaxNumMeterPlans-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 8 }

3.4.1.5.9 Requested Rate

rmcRequestRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the metering rate that is requested if the rmcRequestAction-object
has a value of 'fixedRate', in 1-vph increments."
::={ rmcMeterStatEntry 9 }

3.4.1.5.10 Requested Vehicles-Per-Green

rmcRequestVehiclesPerGrn OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles that has been requested to pass during the
green and yellow intervals of one cycle, in 1-vehicle-per-green increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 10 }

3.4.1.5.11 Communications Action

rmcCommAction OBJECT-TYPE
SYNTAX INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6),
noComm (7)
}
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the requested action if the metered lane is commanded by
communications. If the value of this object is NOT 'noComm', then the action is
directly determined by the value of the rmcCommAction object. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcCommRate-object.

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trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcCommPlan-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object.
noComm - indicates that communications to the device is lost (device timed out based on the value of the rmcCommRefreshThreshold-object); the action associated with this state is that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 11 }

3.4.1.5.12 Base Metering Rate

rmcBaseMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the metering rate for this metered lane PRIOR to any RATE adjustments, in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 12 }

3.4.1.5.13 Active Metering Rate

rmcActiveMeterRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the metering rate for this metered lane AFTER all RATE adjustments, in 1-vph increments."
REFERENCE
"See Clause A.3"
::={ rmcMeterStatEntry 13 }

3.4.1.5.14 Timebase Control Action Status

rmcTBActionStatus OBJECT-TYPE
SYNTAX INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6)
}

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ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the action that may be active if the metered lane is controlled by timebase control. This object is used to indicate the status of the entry, while the rmcTBActionCtrl-object allows to control the entry. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-Green interval.
restInGreen - indicates that the metered lane will advance to the Pre-Metering Green interval.
fixedRate - indicates that the metered lane will operate using the value of the rmcTBRateStatus-object.
trafficResponsive -indicates that the metered lane will operate using mainline station traffic conditions and the value of the rmcTBPlanStatus-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals when the metered lane is NOT in the Non-metering state. The metered lane will advance to the Pre-Metering Green interval when the metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 14 }

3.4.1.5.15 Timebase Control Plan Status

rmcTBPlanStatus OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the requested metering plan number if the metered lane is commanded by timebase control and the rmcRequestedAction-object has a value of 'trafficResponsive'. This value cannot exceed the value of the rmcMaxNumMeterPlans-object. This object is used to indicate the status of the entry, while the rmcTBPlanCtrl-object allows control of the entry. "
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 15 }

3.4.1.5.16 Timebase Control Rate Status

rmcTBRateStatus OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the requested metering rate if the metered lane is commanded by timebase control and the rmcRequestAction-object has a value of 'fixedRate', in 1-vph increments. This object is used to indicate the status of the entry, while the rmcTBPlanCtrl-object allows control of the entry."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 16 }

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3.4.1.5.17 Timebase Control Vehicles-Per-Green Status

```
rmcTBVehiclesPerGrnStatus   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   optional
DESCRIPTION
"Indicates the requested number of vehicles to pass during the green and yellow
 intervals of one cycle while the metered lane is commanded by timebase control,
 in 1-vehicle-per-green increments. This object is used to indicate the status
 of the entry, while the rmcTBVehiclesPerGrnCtrl-object allows control of the
 entry."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 17 }
```

3.4.1.5.18 Active Interval Status

```
rmcActiveInterval   OBJECT-TYPE
SYNTAX   INTEGER {
   initialization (1),
   preMeteringNonGreen (2),
   preMeteringGreen (3),
   startupAlert (4),
   startupWarning (5),
   startupGreen (6),
   startupYellow (7),
   startupRed (8),
   red (9),
   green (10),
   yellow (11),
   shutdownGreen (12),
   shutdownYellow (13),
   shutdownRed (14),
   shutdownWarning (15),
   postMeteringGreen (16)
   }
ACCESS   read-only
STATUS   optional
DESCRIPTION
"Indicates the interval in which the metered lane is currently running.  See the
 State Diagram (Figure 3) as displayed in Section 1.4 and Annex A for further
 explanations of the different values."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterStatEntry 18 }
```

3.4.1.5.19 Timebase Control Minimum Metering Rate Status

```
rmcTBCMinMeterRateStatus   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-only
STATUS   optional
```

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DESCRIPTION
"Indicates the operational minimum metering rate, in vph. This object is used to
 indicate the status of the entry, while the rmcTBCMinMeterRateCtrl-object
 allows control of the entry.
A value of zero (0) indicates this parameter is not used."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 19 }

3.4.1.5.20 Timebase Control Maximum Metering Rate Status

rmcTBCMaxMeterRateStatus OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the operational maximum metering rate, in vph. This object is used to
 indicate the status of the entry, while the rmcTBCMaxMeterRateCtrl-object
 allows control of the entry.
A value of zero (0) indicates this parameter is not used.
The value, if non-zero, must be greater than or equal to the value of the
 rmcOperMinMeterRateStatus-object."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterStatEntry 20 }

3.4.1.5.21 Operational Minimum Metering Rate

rmcOperMinMeterRateStatus OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the operational minimum metering rate, in vph. This object indicates
 the minimum of the maximum metering rate objects (rmcAbsoluteMaxMeterRate,
 rmcSystemMaxMeterRate, rmcTBCMaxMeterRateStatus) that is currently active of
 this metered lane."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterStatEntry 21 }

3.4.1.5.22 Operational Maximum Metering Rate

rmcOperMaxMeterRateStatus OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-only
STATUS optional
DESCRIPTION
"Indicates the operational maximum metering rate, in vph. This object indicates
 the maxmum of the minimum metering rate objects (rmcAbsoluteMinMeterRate,
 rmcSystemMinMeterRate, rmcTBCMinMeterRateStatus) that is currently active of
 this metered lane."
REFERENCE
"See Clause A.2.2"
::={ rmcMeterStatEntry 22 }

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3.4.1.5.23 Demand Detector Status

```
rmcDemandStatus   OBJECT-TYPE
SYNTAX   INTEGER {
recalled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActivity (6),
errorAtSensor (7)
}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the status of the demand detector. The values are:
recalled - indicates that the value of the rmcDemandMode object is 'recalled'.
working - indicates that this detector has no error.
otherError - indicates an error not defined here.  See Operator's manual.
erraticCount - indicates that the vehicle count for this detector has exceeded
 the value of the rmcDemandErraticCount-object.
maxPresence - indicates a continuous actuation for this detector that has
 exceeded the value of the rmcDemandMaxPresence-object.
noActivity - indicates a continuous non-actuation for this detector that has
 exceeded the value of the rmcDemandNoActivity-object.
errorAtSensor - indicates that the sensor for this detector has reported an
 error.  See Operator's manual."
REFERENCE
"See Clause A.2.2.1, A.8.3.1.4.1 and A.8.5.3.4.1"
::={ rmcMeterStatEntry 23 }
```

3.4.2 Metered Lane Dependency Group Configuration, Control and Status Node

```
rmcDependGroup  OBJECT IDENTIFIER ::={ rmcMeter 2}
```

3.4.2.1 Maximum Number of Dependency Groups

```
rmcMaxNumDependGroup   OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the maximum number of dependency groups that can be stored in the
 rmcDependGroupCtrlTable-object, and, by association, in all other dependency
 group tables.  At least one dependency group must be defined."
REFERENCE
"See Clause A.2.3"
::={ rmcDependGroup 1 }
```

3.4.2.2 Number of Dependency Groups

```
rmcNumDependGroup   OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-write
STATUS   mandatory
```

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```
DESCRIPTION
"Indicates the actual number of dependency groups that are present in the
 rmcDependGroupCtrlTable-object, and, by association, in all other dependency
 group tables."
REFERENCE
"See Clause A.2.3"
::={ rmcDependGroup 2 }
```

3.4.2.3 Dependency Group Configuration and Control Table

```
rmcDependGroupCtrlTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcDependGroupCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the configuration and control information for a dependency
 group."
::={ rmcDependGroup 3 }

rmcDependGroupCtrlEntry   OBJECT-TYPE
SYNTAX   RmcDependGroupCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration and control parameters of the dependency group table. At least
 one dependency group must be defined. A particular row of this table can be
 managed using the rmDependGroupMode-object.  Whether an unused row is deleted
 or disabled is implementation specific.
There is a one-to-one relationship between the values of the
 rmcDependGroupNumber object within the rmcMeterCfgTable-object and the number
 of rows within this table. Each different value represents one row of this table."
INDEX { rmcDependGroupNumber }
::={ rmcDependGroupCtrlTable 1 }

RmcDependGroupCtrlEntry ::=SEQUENCE {
rmcDependGroupMode     INTEGER,
rmcSignalServiceMode      INTEGER,
rmcShutGapTime      INTEGER,
rmcShutGapReductTime     INTEGER,
rmcShutGapReductValue     INTEGER,
rmcGreenOffset   INTEGER,
rmcMinFractionalOffset      INTEGER,
rmcPriorityLaneNum      INTEGER,
rmcPriorityRedDelay      INTEGER,
rmcMergeMode         INTEGER,
rmcMergeGap         INTEGER,
rmcMergeDelay         INTEGER,
rmcQueueMergeFlag   INTEGER,
rmcMergeErraticCount         INTEGER,
rmcMergeMaxPresence         INTEGER,
rmcMergeNoActivity   INTEGER
}
```

3.4.2.3.1 Dependency Group Mode

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```
rmcDependGroupMode   OBJECT-TYPE
SYNTAX   INTEGER (0..1)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates whether the associated dependency group is used.
0 = disabled - the dependency group is not used.
1 = enabled - the dependency group is used.  "
REFERENCE
"See Clause A.2.3"
::={ rmcDependGroupCtrlEntry 1 }
```

3.4.2.3.2 Signal Service Mode

```
rmcSignalServiceMode   OBJECT-TYPE
SYNTAX   INTEGER {
none (1),
mutex (2),
fixedOffset (3),
fractionalOffset (4)
}
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the signal service mode associated with this dependency group.  The
 values are:
none - there is no dependency between the lanes within this dependency group.
mutex - one and only lane in the dependency group shall display (or
 indicate)green at any given time during the Metering state.
fixedOffset - the start of the green interval for any lane will occur no sooner
 than indicated in the value of the rmcGreenOffset-object after the start of a
 previous green interval for a lane in the same dependency group.
fractionalOffset - the start of the green interval for any lane will occur no
 sooner than indicated in the value of the rmcRequestCycleLength object divided
 by the number of metered lanes in the dependency group, after the start of a
 previous green interval for a lane in the same dependency group."
REFERENCE
"See Clause A.2.3.2, A.3, A.8.2.2, A.8.3.1.3, A.8.3.1.4.1, A.8.5.3.3,
 A.8.5.3.4.1, A.8.5.3.5 and A.8.6.3"
::={ rmcDependGroupCtrlEntry 2 }
```

3.4.2.3.3 Shutdown Gap Time

```
rmcShutGapTime   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the length of time between successive actuations of demand detectors
 necessary to terminate the shutdown metering.
A suggested usable range is 0, 1.0 to 10.0 in 0.1-second increments.
A value of zero (0) indicates that demand detector gaps shall not be used to
 terminate shutdown metering."
REFERENCE
"See Clause A.8.5.3.5"
```

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::={ rmcDependGroupCtrlEntry 3 }

3.4.2.3.4 Shutdown Gap Reduction Time

rmcShutGapReductTime OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the amount of time between reduction iterations for the shutdown gap time.
A suggested usable range is 1.0 to 20.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.5.3.5"
::={ rmcDependGroupCtrlEntry 4 }

3.4.2.3.5 Shutdown Gap Reduction Value

rmcShutGapReductValue OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the amount of time that the shutdown gap time is reduced for each iteration.
A suggested usable range is 1.0 to 10.0 in 0.1-second increments."
REFERENCE
"See Clause A.8.5.3.5"
::={ rmcDependGroupCtrlEntry 5 }

3.4.2.3.6 Green Offset Time

rmcGreenOffset OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time between the beginning of successive green intervals for metered lanes that have the same value for the rmcDependGroupNumber-object (combined in the same dependency group) and a value of 'fixedOffset' for the rmcSignalServiceMode-object.
A suggested usable range is 0.5 to 10.0 in 0.1-second increments."
REFERENCE
"See Clause A.2.3.2"
::={ rmcDependGroupCtrlEntry 6 }

3.4.2.3.7 Minimum Fractional Offset Time

rmcMinFractionalOffset OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the minimum length of time between the beginning of successive green intervals for metered lanes that have the same value for the

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rmcDependGroupNumber -object (combined in the same dependency group) and a value of 'fractionalOffset' for the rmcSignalServiceMode-object.
A suggested usable range is 0, 0.5 to 5.0 in 0.1-second increments.
A value of zero (0) indicates that there is no minimum length of time."
REFERENCE
"See Clause A.2.3.2"
::={ rmcDependGroupCtrlEntry 7 }

3.4.2.3.8 Priority Lane Number

rmcPriorityLaneNum OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates which metered lane in the dependency group lane sequence shall be treated as a priority lane. The value cannot exceed the value of the rmcMaxNumMeterLanes-object.
A value of zero (0) indicates the absence of a priority lane in this dependency group."
REFERENCE
"See Clause A.2.3.2, A.8.3.1.3 and A.8.5.3.3"
::={ rmcDependGroupCtrlEntry 8 }

3.4.2.3.9 Priority Lane Red Delay Time

rmcPriorityRedDelay OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the minimum length of the red interval for each metered lane in the dependency group (if is NOT marked as the priority lane), when the demand detector of the priority lane is actuated. The purpose of this object is to give a vehicle in the priority lane a headway of at least the time indicated in this object. For each actuation of the demand detector in the priority lane and each metered lane, the value of this object shall only apply once.
A suggested usable range is 0 to 5.0 in 0.1-s increments."
REFERENCE
"See Clause A.8.3.1.3 and A.8.5.3.3"
::={ rmcDependGroupCtrlEntry 9 }

3.4.2.3.10 Merge Detector Mode

rmcMergeMode OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the mode of the merge detector . The values are:
0 = disabled - indicates that the merge detector does not exist for this dependency group.
1 = enabled - indicates that the merge detector is ready to detect for this dependency group."
REFERENCE

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"See Clause A.2.3.1"
::={ rmcDependGroupCtrlEntry 10 }

3.4.2.3.11 Merge Gap Time

rmcMergeGap OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time between successive actuations of the merge detector necessary to terminate the merge override condition(value of the rmcMergeFlag-object is set to 'false'). .
A suggested usable range is 0 to 25.5 in 0.1-s increments."
REFERENCE
"See Clause A.8.4.1"
::={ rmcDependGroupCtrlEntry 11 }

3.4.2.3.12 Merge Delay Time

rmcMergeDelay OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the length of time for continuous presence on the merge detector necessary to identify the merge override condition. If presence is detected for a duration equal to or greater than indicated by the value of this object, the value of the rmcMergeFlag-object will be set to 'true', which will inhibit the termination of the red interval for all metered lanes in this dependency group.
A suggested usable range is 0 to 25.5 in 0.1-s increments."
REFERENCE
"See Clause A.8.4.1"
::={ rmcDependGroupCtrlEntry 12 }

3.4.2.3.13 Queue versus Merge Flag

rmcQueueMergeFlag OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates if queue override adjustments are given priority over merge override adjustment.
0 = false - merge override adjustment is given priority over queue override adjustments.
1 = true - queue override adjustments are given priority over merge override adjustment."
REFERENCE
"See Clause A.8.3.1.4.1, A.8.3.1.4.2, A.8.4.1, A.8.5.3.4.1 and A.8.5.3.4.2"
::={ rmcDependGroupCtrlEntry 13 }

3.4.2.3.14 Merge Detector Erratic Count Threshold

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```
rmcMergeErraticCount   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"If the vehicle count on the merge detector for a metered lane exceeds this
 threshold, the rmcMergeStatus-object shall be set to a value of 'erraticCount'.
A suggested usable range is 0 to 30 in 1-vpCI increments.
A value of zero (0) shall inhibit the erratic count testing."
REFERENCE
"See Clause A.2.3.1"
::={ rmcDependGroupCtrlEntry 14 }
```

3.4.2.3.15 Merge Detector Maximum Presence Threshold

```
rmcMergeMaxPresence   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"If the input on the merge detector for this metered lane has been continuously
 actuated for longer than the time indicated by this threshold, the
 rmcMergeStatus-object shall be set to a value of 'maxPresence'.
A  suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the maximum presence testing."
REFERENCE
"See Clause A.2.3.1"
::={ rmcDependGroupCtrlEntry 15 }
```

3.4.2.3.16 Merge Detector No Activity Threshold

```
rmcMergeNoActivity   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"If the input on the merge detector for this metered lane has not been actuated
 for longer than the time indicated by this threshold, the rmcMergeStatus-object
 shall be set to a value of  'noActivity'.
A  suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the no activity testing."
REFERENCE
"See Clause A.2.3.1"
::={ rmcDependGroupCtrlEntry 16 }
```

3.4.2.4 Dependency Group Status Table

```
rmcDependGroupStatTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcDependGroupStatEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the status information for a dependency group."
::={ rmcDependGroup 4 }
```

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```
rmcDependGroupStatEntry   OBJECT-TYPE
SYNTAX   RmcDependGroupStatEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Status information of the dependency group table. This table is directly
 correlated to the Dependency Group Configuration and Control Table, which means
 that the number of rows in this table is exactly the same as the number of rows
 in the Dependency Group Configuration and Control Table (AUGMENT TABLE in
 SNMPv2 terminology).  Table management can only take place through the
 Dependency Group Configuration and Control Table, while this table provides
 status information for the associated dependency group."
INDEX { rmcDependGroupNumber }
::={ rmcDependGroupStatTable 1 }

RmcDependGroupStatEntry ::=SEQUENCE {
rmcMergeFlag         INTEGER,
rmcMergeStatus       INTEGER
        }
```

3.4.2.4.1 Merge Override Flag

```
rmcMergeFlag   OBJECT-TYPE
SYNTAX   INTEGER (0..1)
ACCESS   read-only
STATUS   optional
DESCRIPTION
"Indicates whether a override conditions exist.
0 = false - indicates that no merge override conditions exist
1 = true - indicates that merge override conditions exist."
REFERENCE
"See Clause A.8.3.1.4.1, A.8.3.1.4.2, A.8.4.1, A.8.5.3.4.1 and A.8.5.3.4.2"
::={ rmcDependGroupStatEntry 1 }
```

3.4.2.4.2 Merge Detector Status

```
rmcMergeStatus   OBJECT-TYPE
SYNTAX   INTEGER {
disabled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActivity (6),
errorAtSensor (7)
}
ACCESS   read-only
STATUS   optional
DESCRIPTION
"Indicates the status of the merge detector.  The values are:
disabled - indicates that this detector is not used.
working - indicates that this detector has no error.
otherError - indicates an error not defined here.  See Operator's manual.
erraticCount - indicates that the vehicle count for this detector has exceeded
 the value of the rmcMergeErraticCount-object.
```

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maxPresence - indicates a continuous actuation for this detector that has
exceeded the value of the rmcMergeMaxPresence-object.
noActivity - indicates a continuous non-actuation for this detector that has
exceeded the value of the rmcMergeNoActivity-object.
errorAtSensor - indicates that the sensor for this detector has reported an
error. See Operator's manual."
REFERENCE
"See Clause A.2.3.1"
::={ rmcDependGroupStatEntry 2 }

3.4.3 Queue Detector Configuration, Control and Status Node

rmcQueue OBJECT IDENTIFIER ::={ rmcMeter 3 }

-- This node is an identifier used to group the objects for the configuration,
-- control and status of the queue detectors parameters that are common to all
-- ramp meter devices.

3.4.3.1 Maximum Number of Queue Detectors

rmcMaxNumQueueEntries OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of queue detectors that can be stored in the Queue
Detector Configuration and Control Table, and, by association, in the queue
detector status tables."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueue 1 }

3.4.3.2 Number of Queue Detectors

rmcNumQueueEntries OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the actual number of queue detectors that are present in the Queue
Detector Configuration and Control Table, and, by association, in the queue
detector status tables."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueue 2 }

3.4.3.3 Queue Detector Configuration and Control Table

rmcQueueCtrlTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcQueueCtrlEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the queue detectors that can be selected based on the
metered lane number. "
::={ rmcQueue 3 }

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```
rmcQueueCtrlEntry   OBJECT-TYPE
SYNTAX RmcQueueCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration and control parameters of the queue detector table.  The entry
 with the lower index value will be considered the highest priority queue
detector.
A particular row of this table can be managed using the rmcQueueDetectMode
object.  If that object has a value of 'disabled', the associated row is not
used.  Whether an unused row is disabled or deleted is implementation
specific."
INDEX { rmcMeterNumber, rmcQueueNum }
::={ rmcQueueCtrlTable 1 }


RmcQueueCtrlEntry ::=SEQUENCE {
rmcQueueNum    INTEGER,
rmcQueueType     INTEGER,
rmcQueueDetectMode      INTEGER,

rmcQueueLengthUpLimit   INTEGER,
rmcQueueLengthLowLimit   INTEGER,

rmcQueueOccUpLimit   INTEGER,
rmcQueueOccUpDelay   INTEGER,
rmcQueueOccLowLimit   INTEGER,
rmcQueueOccLowDelay   INTEGER,

rmcQueueQOccUpLimit   INTEGER,
rmcQueueQOccUpDelay   INTEGER,
rmcQueueQOccLowLimit   INTEGER,
rmcQueueQOccLowDelay   INTEGER,

rmcQueueAdjustMode   INTEGER,
rmcQueueAdjustRate      INTEGER,
rmcQueueAdjustRateLimit   INTEGER,
rmcQueueAdjustRateDelay   INTEGER,
rmcQueueAdjustRateIter   INTEGER,

rmcQueueAdjustLevel   INTEGER,
rmcQueueAdjustLevelLimit   INTEGER,
rmcQueueAdjustLevelDelay   INTEGER,
rmcQueueAdjustLevelIter   INTEGER,

rmcQueueReplaceRate   INTEGER,

rmcQueueErraticCount   INTEGER,
rmcQueueMaxPresence   INTEGER,
rmcQueueNoActivity   INTEGER
}
```

3.4.3.3.1 Queue Detector Number

```
rmcQueueNum   OBJECT-TYPE
```

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SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the secondary index into the table. The value of this object serves as a unique identifier for every queue detector, regardless of the value of the rmcQueueType object, that is associated with the metered lane described in the primary key."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueueCtrlEntry 1 }

3.4.3.3.2 Queue Type

rmcQueueType OBJECT-TYPE
SYNTAX INTEGER {
other (1),
intermediate (2),
excessive (3)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates whether the queue detector is an intermediate or excessive. The values are:
other -other queue detector type than specified below. See Operator's Manual.
intermediate - indicates that this detector is an intermediate queue detector.
excessive - indicates that this detector is an excessive queue detector."
REFERENCE
"See Clause A.2.2.3 and A.9.2"
::={ rmcQueueCtrlEntry 2 }

3.4.3.3.3 Queue Detection Mode

rmcQueueDetectMode OBJECT-TYPE
SYNTAX INTEGER {
disabled (1),
count (2),
occupancy (3),
quickOccupancy (4)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the mode that is being used to determine the existence of a queue. The values are:
disabled - no queue detection shall occur.
count - the existence of a queue shall be determined using the difference between vehicle counts on the queue and passage detectors. ANNEX A describes in detail how an queue can be determined using 'counts'.
occupancy - the existence of an queue shall be determined using the occupancy measured at the queue detector over the number of calculation intervals as specified in the rmcQueueOccUpDelay and rmcQueueOccLowDelay objects. ANNEX A describes in detail how an queue can be determined using 'occupancy'.
quickOccupancy -- the existence of an queue shall be determined using the

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occupancy measured at the queue detector over the period of time as specified
in the rmcQueueQOccUpDelay and rmcQueueQOccLowDelay objects. ANNEX A describes
in detail how a queue can be determined using 'quickOccupancy'."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 3 }

3.4.3.3.4 Queue Length Upper Limit

rmcQueueLengthUpLimit OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles stored on the metered lane that, if exceeded,
defines the existence of a queue if the rmcQueueDetectMode-object has a value
of 'count'. This count is obtained by summing the differences between the
vehicle counts at the passage and queue detectors over successive calculation
intervals.
A suggested usable range is 5 to 100 in 1-vehicle increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 4 }

3.4.3.3.5 Queue Length Lower Limit

rmcQueueLengthLowLimit OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles stored on the metered lane that, if not
exceeded, defines the non-existence of a queue if the rmcQueueDetectMode-object
has a value of 'count'. This count is obtained by summing the differences
between the vehicle counts at the passage and queue detectors over successive
calculation intervals intervals.
A suggested usable range is 5 to 100 in 1-vehicle increments.

This threshold should be less than or equal to the value of the
rmcQueueLengthUpLimit-object."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 5 }

3.4.3.3.6 Queue Occupancy Upper Limit

rmcQueueOccUpLimit OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the occupancy of a queue detector that, if exceeded, defines the
existence of an queue when the rmcQueueDetectMode-object has a value of
'occupancy'.
A suggested usable range is 0 to 100.0 in 0.1-percent increments."

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```
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 6 }
```

3.4.3.3.7 Queue Occupancy Upper Delay

```
rmcQueueOccUpDelay   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the number of calculation intervalsthat the occupancy of the queue
 detector must exceed the value of the rmcQueueOccUpLimit-object to define the
 existence of a queue, if the rmcQueueDetectMode-object has a value of
 'occupancy'.
A  suggested usable range is 0 to 30 in 1-interval increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 7 }
```

3.4.3.3.8 Queue Occupancy Lower Limit

```
rmcQueueOccLowLimit   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the occupancy of a queue detector that, when not exceeded, defines
 the non-existence of a queue when the rmcQueueDetectMode-object has a value of
 'occupancy'.
A  suggested usable range is 0 to 100.0 in 0.1-percent increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 8 }
```

3.4.3.3.9 Queue Occupancy Lower Delay

```
rmcQueueOccLowDelay   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the number of calculation intervalsthat the occupancy of the queue
 detector does not exceed the value of the rmcQueueOccLowLimit-object to define
 the non-existence of a queue if the rmcQueueDetectMode-object has a value of
 'occupancy'.
A suggested usable range is 0 to 30 in 1-interval increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 9 }
```

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3.4.3.3.10 Queue Quick Occupancy Upper Limit

```
rmcQueueQOccUpLimit   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the occupancy of a queue detector that, if exceeded, defines the
 existence of an queue when the rmcQueueDetectMode-object has a value of
 'quickOccupancy'.
A  suggested usable range is 0 to 100.0 in 0.1-percent increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 10 }
```

3.4.3.3.11 Queue Quick Occupancy Upper Delay

```
rmcQueueQOccUpDelay   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the length of time that the occupancy of the queue detector exceeds
 the value of the rmcQueueOccUpLimit-object to define the existence of a queue,
 if the rmcQueueDetectMode-object has a value of 'quickOccupancy'.
A  suggested usable range is 0 to 30.0 in 0.1-second increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 11 }
```

3.4.3.3.12 Queue Quick Occupancy Lower Limit

```
rmcQueueQOccLowLimit   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the occupancy of a queue detector that, when not exceeded, defines
 the non-existence of a queue when the rmcQueueDetectMode-object has a value of
 'quickOccupancy'.
A suggested usable range is 0 to 100.0 in 0.1-percent increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 12 }
```

3.4.3.3.13 Queue Quick Occupancy Lower Delay

```
rmcQueueQOccLowDelay   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the length of time that the occupancy of the queue detector does not
 exceed the value of the rmcQueueOccLowLimit-object to define the non-existence
 of a queue, if the rmcQueueDetectMode-object has a value of 'quickOccupancy'.
```

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A suggested usable range is 0 to 30.0 in 0.1-second increments."
REFERENCE
"See Clause A.9.1"
::={ rmcQueueCtrlEntry 13 }

3.4.3.3.14 Queue Adjustment Mode

rmcQueueAdjustMode OBJECT-TYPE
SYNTAX INTEGER {
other (1),
rate (2),
level (3),
fixed (4)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the process used to override the queue. The values are:
other - other source of control than specified below. See Operator's manual;
rate - the queue will be overridden by increasing the current metering rate. For details, see ANNEX A.
level - the queue will be overriden by decreasing the current metering level. This mode shall only be usable while the rmcImplementAction-object has a value of 'trafficResponsive'. For details, see ANNEX A.
fixed - the queue will be overriden by replacing the current metering rate with the rate indicated in the rmcQueueReplaceRate-object. For details, see ANNEX A."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 14 }

3.4.3.3.15 Queue Adjustment Rate

rmcQueueAdjustRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the rate by which the current metering rate will be increased if a queue has been detected AND the rmcQueueAdjustMode-object has a value of 'rate'.
A suggested usable range is 0, 5 to 1800 in 1-vph increments.
A value of zero (0) indicates that no adjustments are made to the current metering rate."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 15 }

3.4.3.3.16 Queue Adjustment Rate Limit

rmcQueueAdjustRateLimit OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION

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"Indicates the highest metering rate at which the metered lane will be metered
if a queue has been detected AND the rmcQueueAdjustMode-object has a value of
'rate'.
A suggested usable range is 0, 120 to 1800 in 1-vehicle increments.
A value of zero (0) indicates this parameter shall not be used."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 16 }

3.4.3.3.17 Queue Adjustment Rate Delay

rmcQueueAdjustRateDelay OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of time between successive queue override rate
adjustments.
A suggested usable range is 20 to 240 in 1-second increments."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 17 }

3.4.3.3.18 Queue Adjustment Rate Iterations

rmcQueueAdjustRateIter OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of queue override rate adjustments which can be
made during the existence of a single queue.
A suggested usable range is either
- 0, or
- 1 to 20 iterations in 1-iteration increments for queue detectors whose
rmcQueueType-object has a value of 'intermediate', or
- 1 iteration for queue detectors whose rmcQueueType-object has a value of
'excessive'.
A value of zero (0) indicates that the current metering rate is not increased
after a queue has been detected."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 18 }

3.4.3.3.19 Queue Adjustment Level

rmcQueueAdjustLevel OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the number of levels by which the current metering level will be
decreased if a queue has been detected AND the rmcQueueAdjustMode-object has a
value of 'level'.
A suggested usable range is 0, 1 to 5 in 1-level increments.

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A value of zero (0) indicates that no adjustments are made to the current
metering level."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 19 }

3.4.3.3.20 Queue Adjustment Level Limit

rmcQueueAdjustLevelLimit OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the lowest metering level at which the metered lane shall be metered
if a queue has been detected AND the rmcQueueAdjustMode-object has a value of
'level'.
A suggested usable range is 0, 1 to 5 in 1-level increments.
A value of zero (0) indicates this parameter shall not be used."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 20 }

3.4.3.3.21 Queue Adjustment Level Delay

rmcQueueAdjustLevelDelay OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the length of time between successive queue override level
adjustments.
A suggested usable range is 20 to 240 in 1-second increments."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 21 }

3.4.3.3.22 Queue Adjustment Level Iterations

rmcQueueAdjustLevelIter OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of queue override level adjustments which can be
made during the existence of a single queue.
A suggested usable range is either
- 0, or
- 1 to 5 iterations in 1-iteration increments for queue detectors whose
rmcQueueType-object has a value of 'intermediate', or
- 1 iteration for queue detectors whose rmcQueueType-object has a value of
'excessive'.
A value of zero (0) indicates that the current metering level is not decreased
after a queue has been detected."
REFERENCE
"See Clause A.9.2"

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::={ rmcQueueCtrlEntry 22 }

3.4.3.3.23 Queue Replacement Rate

rmcQueueReplaceRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the metering rate at which the metered lane will be metered if a queue has been detected AND the rmcQueueAdjustMode-object has a value of 'fixed'.
A suggested usable range is 0, 600 to 1800 in 1-vehicle increments.
A value of zero (0) indicates that no adjustments to the metering rate are made when the rmcQueueAdjustMode-object has a value of 'fixed'."
REFERENCE
"See Clause A.9.2"
::={ rmcQueueCtrlEntry 23 }

3.4.3.3.24 Queue Detector Erratic Count Threshold

rmcQueueErraticCount OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the vehicle count on a queue detector whose rmcQueueType-object has a value of 'excessive' exceeds this threshold, the rmcQueueStatus-object for that detector shall be set to 'erraticCount'.
A suggested usable range is 0, 2 to 10 in 1-vpCI increments.
A value of zero (0) shall inhibit the erratic count testing on this type of queue detector."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueueCtrlEntry 24 }

3.4.3.3.25 Queue Detector Maximum Presence Threshold

rmcQueueMaxPresence OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input on a queue detector whose rmcQueueType-object has a value of 'excessive' has been continuously actuated for longer than the time indicated by this threshold, the rmcQueueStatus-object shall be set to 'maxPresence' for that detector.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the maximum presence testing on this type of queue detector."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueueCtrlEntry 25 }

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3.4.3.3.26 Queue Detector No Activity Threshold

```
rmcQueueNoActivity   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"If the input on a queue detector whose rmcQueueType-object has a value of
 'excessive' has not been actuated for longer than the time indicated by this
 threshold, the rmcQueueStatus-object shall be set to 'noActivity' for that
 detector.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the no activity testing on this type of queue
 detector."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueueCtrlEntry 26 }
```

3.4.3.4 Queue Detector Status Table

```
rmcQueueStatTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcQueueStatEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the status information for queue detectors."
::={ rmcQueue 10 }

rmcQueueStatEntry   OBJECT-TYPE
SYNTAX RmcQueueStatEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Status parameters of the queue detector table. The entry with the lower index
 value will be considered the higher priority queue detector. This table is
 directly correlated to the Queue Detector Configuration and Control Table,
 which means that the number of rows in this table is exactly the same as the
 number of rows in the Queue Detector Configuration and Control Table (AUGMENT
 TABLE in SNMPv2 terminology).  Table management can only take place through the
 Queue Detector Configuration and Control Table, while this table provides
 status information for the associated queue detector."
INDEX { rmcMeterNumber, rmcQueueNum }
::={ rmcQueueStatTable 1 }

RmcQueueStatEntry ::=SEQUENCE {
rmcQueueFlag      INTEGER,
rmcQueueStatus      INTEGER
       }
```

3.4.3.4.1 Queue Detected Flag

```
rmcQueueFlag   OBJECT-TYPE
SYNTAX   INTEGER (0..1)
ACCESS   read-only
STATUS   mandatory
```

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```
DESCRIPTION
"Indicates whether a queue has been detected
0 = false - indicates that no queue has been detected.
1 = true - indicates that a queue has been detected.
."
REFERENCE
"See Clause A.6, A.8.3.1.2, A.8.4.1, A.8.5.3.5, A.9.1 and A.9.2"
::={ rmcQueueStatEntry 1 }
```

3.4.3.4.2 Queue Detector Status

```
rmcQueueStatus   OBJECT-TYPE
SYNTAX   INTEGER {
disabled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActitity (6),
errorAtSensor (7)
}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the status of the queue detector.  The values are:
disabled - indicates that this detector is not used.
working - indicates that this detector has no error.
otherError - indicates an error not defined here. See Operator's manual;
erraticCount - indicates that the vehicle count for this detector has exceeded
 the value of the rmcQueueErraticCount-object;
maxPresence - indicates that a continuous actuation for this detector has
 exceeded the value of the rmcQueueMaxPresence-object;
noActivity - indicates that a continuous non-actuation for this detector has
 exceeded the value of the rmcQueueNoActivity-object;
errorAtSensor - indicates that the sensor for this detector has reported an
 error.  See Operator's manual."
REFERENCE
"See Clause A.2.2.3"
::={ rmcQueueStatEntry 2 }
```

3.4.4 Metered Lane Passage Detector Configuration, Control and Status Node

```
rmcPassage  OBJECT IDENTIFIER ::={ rmcMeter 5 }

-- This node is an identifier used to group the objects for the configuration,
-- control and status of the passage detectors parameters that are common to all
-- ramp meter devices.
```

3.4.4.1 Passage Detector Configuration and Control Table

```
rmcPassageCtrlTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcPassageCtrlEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
```

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"A table containing the configuration and control information for a passage
detector."
::={ rmcPassage 1 }

rmcPassageCtrlEntry OBJECT-TYPE
SYNTAX RmcPassageCtrlEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Configuration and control parameters of the passage detector table.
The number of rows within this table must be the same as within the Metered Lane
Configuration Table. If this table is supported, there shall be a passage
detector for each metered lane.
The rows within this table cannot be managed following the same principles
applied to other tables. It is anticipated that, if passage detectors are
utilized within an implementation, each metered lane will have one passage
detector. However, not every metered lane might have a physical passage
detector and must therefore be set into 'recalled' using the rmcPassageMode
object in order to utilize the passage detection functionality."
INDEX { rmcMeterNumber }
::={ rmcPassageCtrlTable 1 }

RmcPassageCtrlEntry ::=SEQUENCE {
rmcPassageMode INTEGER,
rmcPassageErraticCount INTEGER,
rmcPassageMaxPresence INTEGER,
rmcPassageNoActivity INTEGER
}

3.4.4.2 Passage Detector Mode

rmcPassageMode OBJECT-TYPE
SYNTAX INTEGER {
recalled (1),
enabledCall (2),
enabledNoCall (3)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the mode of the passage detector. The values are:
recalled - indicates that the passage detector shall constantly place a call,
even without a vehicle being present in its detection zone.
enabledCall - indicates that the passage detector is ready to detect, and shall
constantly place a call when it has failed.
enabledNoCall - indicates that the passage detector is ready to detect, and
shall NOT place a call when it has failed."
REFERENCE
"See Clause A.2.2.2"
::={ rmcPassageCtrlEntry 1 }

3.4.4.3 Passage Detector Erratic Count Threshold

rmcPassageErraticCount OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write

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STATUS optional
DESCRIPTION
"If the vehicle count on the passage detector for this metered lane exceeds this
threshold, the rmcPassageStatus-object shall be set to a value of
'erraticCount'.
A suggested usable range is 0, 5 to 10 in 1 vpCI increments.
A value of zero (0) shall inhibit the erratic count testing."
REFERENCE
"See Clause A.2.2.2"
::={ rmcPassageCtrlEntry 2 }

3.4.4.4 Passage Detector Maximum Presence Threshold

rmcPassageMaxPresence OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input on the passage detector for this metered lane has been
continuously actuated for longer than the time indicated by this threshold, the
rmcPassageStatus-object shall be set to a value of 'maxPresence'.
A suggested usable range is 0 to 1500 in 1-minute increments.
A value of zero (0) shall inhibit the maximum presence testing."
REFERENCE
"See Clause A.2.2.2"
::={ rmcPassageCtrlEntry 3 }

3.4.4.5 Passage Detector No Activity Threshold

rmcPassageNoActivity OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"If the input on the passage detector for this metered lane has not been
actuated for longer than the time indicated by this threshold, the
rmcPassageStatus-object shall be set to a value of 'noActivity'.
A suggested usable range is 0 to 1500 in 1 minute increments.
A value of zero (0) shall inhibit the no activity testing."
REFERENCE
"See Clause A.2.2.2"
::={ rmcPassageCtrlEntry 4 }

3.4.4.5.1.1 Passage Detector Status Table

rmcPassageStatTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcPassageStatEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the status information for a passage detector."
::={ rmcPassage 2 }

rmcPassageStatEntry OBJECT-TYPE
SYNTAX RmcPassageStatEntry
ACCESS not-accessible

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```
STATUS   mandatory
DESCRIPTION
"Status parameters of the passage detector table. This table is directly
 correlated to the Passage Detector Configuration and Control Table, which means
 that the number of rows in this table is exactly the same as the number of rows
 in the Passage Detector Configuration and Control Table (AUGMENT TABLE in
 SNMPv2 terminology).  Table management can only take place through the Passage
 Detector Configuration and Control Table, while this table provides status
 information for the associated passage detector."
INDEX { rmcMeterNumber }
::={ rmcPassageStatTable 1 }

RmcPassageStatEntry ::=SEQUENCE {
rmcPassageStatus      INTEGER
}
```

3.4.4.5.2 Passage Detector Status

```
rmcPassageStatus   OBJECT-TYPE
SYNTAX   INTEGER {
recalled (1),
working (2),
otherError (3),
erraticCount (4),
maxPresence (5),
noActitity (6),
errorAtSensor (7)}
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the status of the passage detector.  The values are:
recalled - indicates that the value of the rmcPassageMode object is 'recalled'.
working - that this detector has no error.
otherError - indicates an error not defined here. See Operator's manual.
erraticCount - indicates that the vehicle count for this detector has exceeded
the value of the rmcPassageErraticCount-object.
maxPresence - indicates a continuous actuation for this detector that has
exceeded the value of the rmcPassageMaxPresence-object.
noActivity - indicates a continuous non-actuation for this detector that has
exceeded the value of the rmcPassageNoActivity-object.
errorAtSensor - indicates that the sensor for this detector has reported an
error.  See Operator's manual."
REFERENCE
"See Clause A.2.2.2"
::={ rmcPassageStatEntry 1 }
```

3.5 METERING PLAN NODE

```
meteringPlan   OBJECT IDENTIFIER  ::={ ramp 4 }
-- This node is an identifier used to group all objects for the configuration of
-- the metering plans that are common to all ramp meter devices.  Each defined
-- metering plan can be used with any metered lane by association within the
-- rmcMeterCtrlTable.
```

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3.5.1 Maximum Number of Metering Plans

rmcMaxNumMeteringPlans OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of metering plans that can be stored in the Metering Plan Table. A suggested minimum number of plans is four (4)."
REFERENCE
"See Clause A.7.1"
::={ meteringPlan 1 }

3.5.2 Number of Metering Plans

rmcNumMeteringPlans OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the actual number of metering plans that are present in the Metering Plan Table."
REFERENCE
"See Clause A.7.1"
::={ meteringPlan 2 }

3.5.3 Maximum Number of Levels per Metering Plan

rmcMaxNumLevelsPerPlan OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of metering levels that can be stored in EACH metering plan. A suggested minimum number of levels per metering plan is three (3)."
REFERENCE
"See Clause A.7.1"
::={ meteringPlan 3 }

3.5.4 Number of Metering Levels

rmcNumMeteringLevels OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the actual number of levels that are present in the ENTIRE metering plan table."
REFERENCE
"See Clause A.7.1"
::={ meteringPlan 4 }

3.5.5 Metering Plan Table

rmcMeteringPlanTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMeteringPlanEntry
ACCESS not-accessible

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```
STATUS   mandatory
DESCRIPTION
"A table containing the configuration information for a metering level entry in
a metering plan. "
::={ meteringPlan 5 }

rmcMeteringPlanEntry   OBJECT-TYPE
SYNTAX   RmcMeteringPlanEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration parameters of the metering plan table.  A particular row of this
table can be managed using the rmcMeteringRate object. A level within a metering
plan is unused when the value of the rmcMeteringRate-object has been set to '0'.
Whether an unused row is deleted or disabled is implementation specific.
The entries in this table are intended for use by every metered lane, if the
associated command action is 'trafficResponsive'.  The associated rmcXxxxPlan
object (Xxxx is a placeholder for all mentioned possible metering plans) will
point to a particular metering plan number."
INDEX { rmcMeteringPlanNumber, rmcMeteringLevel }
::={ rmcMeteringPlanTable 1 }

RmcMeteringPlanEntry ::=SEQUENCE {
  rmcMeteringPlanNumber   INTEGER,
  rmcMeteringLevel      INTEGER,
  rmcMeteringRate      INTEGER,
  rmcFlowRateThreshold      INTEGER,
  rmcOccupancyThreshold   INTEGER,
  rmcSpeedThreshold      INTEGER
}
```

3.5.5.1 Metering Plan Number

```
rmcMeteringPlanNumber   OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Primary key into this table defining an enumerated listing of row entries that
indicate the number of metering plans stored for this RMC unit. This value
cannot exceed the value of the rmcMaxNumMeteringPlans - object.
This is the object pointed to by all rmcXxxxPlan-objects."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 1 }
```

3.5.5.2 Metering Level

```
rmcMeteringLevel   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Secondary key into this table defining an enumerated listing of row entries
that indicate the number of metering levels stored for this RMC unit and the
```

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associated metering plan. This value cannot exceed the value of the rmcMaxNumLevelsPerPlan - object."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 2 }

3.5.5.3 Metering Rate

rmcMeteringRate OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the metering rate which corresponds to this metering level.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates that the ENTIRE level shall not be used during traffic responsive metering, including queue override adjustment."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 3 }

3.5.5.4 Flow Rate Threshold

rmcFlowRateThreshold OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the average flow rate threshold, which corresponds to this metering plan and level.
A suggested usable range is 0, 1000 to 3600 in 1-vph increments.
A value of zero (0) indicates that this threshold shall NOT be used with flow rate during traffic responsive metering."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 4 }

3.5.5.5 Occupancy Threshold

rmcOccupancyThreshold OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the average occupancy threshold, which corresponds to this metering plan and level.
A suggested usable range is 0, 5.0 to 30.0 in 0.1-percent increments.
A value of zero (0) indicates that this threshold shall NOT be used with occupancy during traffic responsive metering."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 5 }

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3.5.5.6 Speed Threshold

```
rmcSpeedThreshold   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the average speed threshold, which corresponds to this metering plan
 and level.
A suggested usable range is 0, 15 to 100 in 1-km/h increments.
A value of zero (0) indicates that this threshold shall NOT be used with speed
 during traffic responsive metering."
REFERENCE
"See Clause A.7.1"
::={ rmcMeteringPlanEntry 6 }
```

3.6 SCHEDULING ACTION OBJECTS

```
rmcTimebase  OBJECT IDENTIFIER ::={ ramp 5 }
-- This node is an identifier used to group all ramp meter control device-
-- specific objects supporting
-- timebased scheduling.
```

3.6.1 Maximum Number of TBC Actions

```
rmcMaxNumTBCActions   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the maximum number of timebase control actions that can be stored in
the (Timebase Control) Action Table."
REFERENCE
"See Clause A.3.1"
::={ rmcTimebase 1 }
```

3.6.2 Number of TBC Actions

```
rmcNumTBCActions   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the actual number of timebase control actions that are present in the
(Timebase Control) Action Table."
REFERENCE
"See Clause A.3.1"
::={ rmcTimebase 2 }
```

3.6.3 Timebase Control Action Table

```
rmcActionTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcActionEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
```

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```
"A table containing the actions that can be selected based on a time based
 scheduler.  The scheduler will determine when an action shall be selected.  The
 dayPlanTable of the scheduler (see Global Object Definitions) points to a row
 in this table to identify the action to be activated. "
REFERENCE
"TS3.4-1996, timebase-node"
::={ rmcTimebase 3 }

rmcActionEntry   OBJECT-TYPE
SYNTAX   RmcActionEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Parameters of the Timebase Control Action Table. A particular row of this table
 can be managed using the rmcActionMode-object. An action described within a row
 is unused when the value of that object has been set to '0'.  Whether an unused
 row is deleted or disabled is implementation specific."
INDEX { rmcActionNum }
::={ rmcActionTable 1 }

RmcActionEntry ::=SEQUENCE {
rmcActionNum      INTEGER,
rmcActionMode      INTEGER,
rmcMeterActionNum      INTEGER,
rmcMLActionNum      INTEGER
}
```

3.6.3.1 Action Number

```
rmcActionNum   OBJECT-TYPE
SYNTAX   INTEGER (1..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Enumerated listing of row entries.  The value of this object cannot exceed the
 value of the rmcNumTBCActions - object.  This is the object to which the
 dayPlanAction object within the Global Object Definitions (TS3.4-1996) points."
REFERENCE
"See Clause A.3.1"
::={ rmcActionEntry 1 }
```

3.6.3.2 Action Mode

```
rmcActionMode   OBJECT-TYPE
SYNTAX   INTEGER (0..1)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates whether this row is used.
0 = false - this row is NOT used.
1 = true - this row is used."
::={ rmcActionEntry 2 }
```

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3.6.3.3 Metered Lane Action Number

```
rmcMeterActionNum   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"This object is used to point to a value of the rmcMeterActionIndex object.
A value of zero (0) indicates that there are no Metered Lane action items
 associated with this Action Index."
::={ rmcActionEntry 3 }
```

3.6.3.4 Mainline Lane Action Number

```
rmcMLActionNum   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"This object is used to point to a value of the rmcMLActionIndex object.
A value of zero (0) indicates that there are no Mainline Lane action items
 associated with this Action Index."
::={ rmcActionEntry 4 }
```

3.6.4 Maximum Number of Metered Lane TBC Actions

```
rmcMaxNumMeterTBCActions   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the maximum number of metered lane timebase control actions that can
 be stored in the Metered Lane Timebase Control Action table."
::={ rmcTimebase 4 }
```

3.6.5 Metered Lane TBC Actions

```
rmcNumMeterTBCActions   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-only
STATUS   mandatory
DESCRIPTION
"Indicates the actual number of metered lane timebase control actions that are
 present in this Metered Lane Timebase Control Action table."
::={ rmcTimebase 5 }
```

3.6.6 Metered Lane Timebase Control Action Table

```
rmcMeterActionTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcMeterActionEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the metered lane actions that can be selected based on a
 time-based scheduler.  The rows within this table are pointed to by the
 rmcMeterActionNum-object within the rmcActionTable.
This table is double indexed describing what action to execute for which metered
 lane."
```

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::={ rmcTimebase 6 }

rmcMeterActionEntry OBJECT-TYPE
SYNTAX RmcMeterActionEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Parameters of the Timebase Control Action Table for a metered lane.
A particular row of this table can be managed using the rmcMeterActionMode-
object. An action described within a row is unused when the value of that object
has been set to '0'. Whether an unused row is deleted or disabled is
implementation specific."
INDEX { rmcMeterActionIndex, rmcMeterNumber }
::={ rmcMeterActionTable 1 }

RmcMeterActionEntry ::=SEQUENCE {
rmcMeterActionIndex INTEGER,
rmcMeterActionMode INTEGER,
rmcTBActionCtrl INTEGER,
rmcTBPlanCtrl INTEGER,
rmcTBRateCtrl INTEGER,
rmcTBVehiclesPerGrnCtrl INTEGER,
rmcTBCMinMeterRateCtrl INTEGER,
rmcTBCMaxMeterRateCtrl INTEGER
}

3.6.6.1 Metered Lane Action Index

rmcMeterActionIndex OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Primary index to this double indexed table showing an enumerated listing of row
entries. The value of the rmcMeterActionNum-object is pointing to THIS object,
not to a particular row. All rows that are associated with this primary key
will be activated if the scheduler points to the appropriate row within the
rmcActionTable.
The value of this object cannot exceed the value of the rmcNumMeterActionEntries
- object."
::={ rmcMeterActionEntry 1 }

3.6.6.2 Metered Lane Action Mode

rmcMeterActionMode OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates whether this row is used.
0 = false - this row is NOT being used.
1 = true - this row is used."
::={ rmcMeterActionEntry 2 }

3.6.6.3 Timebase Action Control

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```
rmcTBActionCtrl   OBJECT-TYPE
SYNTAX   INTEGER {
dark (1),
restInGreen (2),
fixedRate (3),
trafficResponsive (4),
emergencyGreen (5),
skip (6)
}
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the action that may be active if the metered lane is controlled by
 timebase control.  This object is used to control the entry, while the
 rmcTBActionStatus-object indicates the status. The values are:
dark - indicates that the metered lane will advance to the Pre-Metering Non-
Green interval.
restInGreen - indicates that the metered lane will advance to  the Pre-Metering
 Green interval.
fixedRate - indicates that the metered lane will operate using the value of the
 rmcTBRateCtrl-object.
trafficResponsive -indicates that the metered lane will operate using mainline
 station traffic conditions and the value of the rmcTBPlanCtrl-object.
emergencyGreen - indicates that the metered lane will advance to the Shutdown
 Warning interval without entering the Shutdown Green, Shutdown Yellow or
 Shutdown Red intervals when the metered lane is NOT in the Non-metering state.
The metered lane will advance to the Pre-Metering Green interval when the
 metered lane is in the Non-metering state.
skip - indicates that the next-lower level command source shall be considered as
 specified by the rmcCmdSourcePriorityOrder-object."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterActionEntry 3 }
```

3.6.6.4 Timebase Plan Control

```
rmcTBPlanCtrl   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the metering plan number that to be used if the metered lane is
 commanded by timebase control and the rmcImplementAction-object has a value of
 'trafficResponsive'. This value cannot exceed the value of the
 rmcMaxNumMeterPlans-object. This object is used to control the entry, while the
 rmcTBPlanStatus-object indicates the status."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterActionEntry 4 }
```

3.6.6.5 Timebase Rate Control

```
rmcTBRateCtrl   OBJECT-TYPE
SYNTAX   INTEGER (0..65535)
ACCESS   read-write
STATUS   mandatory
```

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DESCRIPTION
"Indicates the metering rate that to be used if the metered lane is commanded by
timebase control and the rmcImplementAction-object has a value of 'fixedRate'.
This object is used to control the entry, while the rmcTBRateStatus-object
indicates the status.
A suggested usable range is 120 to 1800 in 1-vph increments."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterActionEntry 5 }

3.6.6.6 Timebase Vehicles-Per-Green Control

rmcTBVehiclesPerGrnCtrl OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the number of vehicles that are allowed to pass during the green and
yellow intervals of one cycle while the metered lane is commanded by timebase
control. This object is used to control the entry, while the
rmcTBVehiclesPerGrnStatus-object indicates the status.
A suggested usable range is 1 to 5 in 1-vehicle increments."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterActionEntry 6 }

3.6.6.7 Timebase Control Minimum Metering Rate Control

rmcTBCMinMeterRateCtrl OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the operational minimum metering rate. This object is used to control
the entry, while the rmcTBCMinMeterRateStatus-object indicates the status.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used."
REFERENCE
"See Clause A.3.1"
::={ rmcMeterActionEntry 7 }

3.6.6.8 Timebase Control Maximum Metering Rate Control

rmcTBCMaxMeterRateCtrl OBJECT-TYPE
SYNTAX INTEGER (0..65535)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the operational maximum metering rate. This object is used to control
the entry, while the rmcTBCMaxMeterRateStatus-object indicates the status.
A suggested usable range is 0, 120 to 1800 in 1-vph increments.
A value of zero (0) indicates this parameter shall not be used.
The value, if non-zero, must be greater than or equal to the value of the
rmcTBCMinMeterRateCtrl-object."
REFERENCE
"See Clause A.3.1"

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::={ rmcMeterActionEntry 8 }

3.6.7 Maximum Number of Mainline TBC Actions

rmcMaxNumMLTBCActions OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the maximum number of timebase control actions that can be stored in
the Mainline Lane Timebase Control Action Table."
::={ rmcTimebase 7 }

3.6.8 Mainline TBC Actions

rmcNumMLTBCActions OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Indicates the actual number of timebase control actions that are present in the
Mainline Lane Timebase Control Action Table."
::={ rmcTimebase 8 }

3.6.9 Mainline Timebase Control Action Table

rmcMLActionTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMLActionEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"A table containing the actions for mainline lanes that can be selected based on
a time based scheduler. The rows within this table are pointed to by the
rmcMLActionNum-object within the rmcActionTable object. This is a double
indexed table describing what action to execute for which mainline lane."
::={ rmcTimebase 9 }

rmcMLActionEntry OBJECT-TYPE
SYNTAX RmcMLActionEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Parameters of the Timebase Control Action Table for A mainline lane.
A particular row of this table can be managed using the rmcMLActionMode object.
An action described within a row is unused when the value of that object has
been set to '0'. Whether an unused row is deleted or disabled is
implementation specific."
INDEX { rmcMLActionIndex, rmcMLNumber }
::={ rmcMLActionTable 1 }

RmcMLActionEntry ::=SEQUENCE {
rmcMLActionIndex INTEGER,
rmcMLActionMode INTEGER,
rmcTBMLUsageMode INTEGER
}

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3.6.9.1 Mainline Lane Action Index

rmcMLActionIndex OBJECT-TYPE
SYNTAX INTEGER (1..255)
ACCESS read-only
STATUS mandatory
DESCRIPTION
"Primary index to this double indexed table showing an enumerated listing of row entries. The value of the rmcMLActionNum-object is pointing to THIS object, not to a particular row. All rows that are associated with this primary key will be activated if the scheduler points to the appropriate row within the rmcActionTable.
The value of this object cannot exceed the value of the rmcNumMLTBCActions - object."
::={ rmcMLActionEntry 1 }

3.6.9.2 Mainline Lane Action Mode

rmcMLActionMode OBJECT-TYPE
SYNTAX INTEGER (0..1)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates whether this row is used. The values are:
0 - false. This row is NOT being used
1 - true. This row is being used."
::={ rmcMLActionEntry 2 }

3.6.9.3 Timebase Control Lane Usage Mode

rmcTBMLUsageMode OBJECT-TYPE
SYNTAX INTEGER {
notUsed (1),
schemeF (2),
schemeO (3),
schemeFO (4),
schemeS (5),
schemeFS (6),
schemeOS (7),
schemeFOS (8)
}
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates which mainline station traffic parameters will use the data from this lane based on time of day. This object shall take precedence over the value entered in the rmcMLUsageMode object (defined in the rmcMLCtrlTable). This precedence shall be reflected in the rmcMLUsageStatus object (defined in the rmcMLStatTable). The values are
notUsed - the lane data will not be used to calculate any mainline station parameter.
schemeF - the lane data will be used to calculate the mainline station flow rate
schemeO - the lane data will be used to calculate the mainline station average occupancy

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schemeFO - the lane data will be used to calculate the mainline station flow
rate and average occupancy
schemeS - the lane data will be used to calculate the mainline station average
speed
schemeFS - the lane data will be used to calculate the mainline station flow
rate and average speed
schemeOS - the lane data will be used to calculate the mainline station average
occupancy and occupancy speed
schemeFOS - the lane data will be used to calculate the mainline station flow
rate, average occupancy and average speed."
REFERENCE
"See Clause A.3.1"
::={ rmcMLActionEntry 3 }

3.7 PHYSICAL INPUT / OUTPUT OBJECTS

rmcInOutput OBJECT IDENTIFIER ::={ ramp 6 }
-- This node is an identifier used to group all ramp meter control device-
-- specific objects supporting remote setting of input and output
-- definitions.

3.7.1 Advanced Warning Sign Output Number

rmcAdvSignOutNumber OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS optional
DESCRIPTION
"Indicates the physical output number of the advanced warning sign for the
entire RMC.
A value of 255 indicates that there is no physical output for this function."
REFERENCE
"See Clause A.10.1"
::={ rmcInOutput 1 }

3.7.2 Mainline Lane Physical Input Table

rmcMLInTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcMLInEntry
ACCESS not-accessible
STATUS optional
DESCRIPTION
"A table containing the configuration information for mainline lane physical
inputs."
::={ rmcInOutput 2 }

rmcMLInEntry OBJECT-TYPE
SYNTAX RmcMLInEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Configuration parameters of the mainline lane physical input table. This table
is directly correlated to the Mainline Lane Configuration and Control Table,
which means that the number of rows in this table is exactly the same as the
number of rows in the Mainline Lane Configuration and Control Table (AUGMENT

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TABLE in SNMPv2 terminology). Table management can only take place through the Mainline Lane Configuration and Control Table (rmcMLCfgTable), while this table defines the associated physical input and outputs."
INDEX { rmcMLNumber }
::={ rmcMLInTable 1 }

RmcMLInEntry ::=SEQUENCE {
rmcMLLeadInNumber INTEGER,
rmcMLTrailInNumber INTEGER
}

3.7.2.1 Leading Detector Input Number

rmcMLLeadInNumber OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the physical input number of the leading detector for this mainline lane.
A value of 255 indicates that there is no physical input for this function."
::={ rmcMLInEntry 1 }

3.7.2.2 Trailing Detector Input Number

rmcMLTrailInNumber OBJECT-TYPE
SYNTAX INTEGER (0..255)
ACCESS read-write
STATUS mandatory
DESCRIPTION
"Indicates the physical input number of the trailing detector for this mainline lane. A value of 255 indicates that there is no physical input for this function."
::={ rmcMLInEntry 2 }

3.7.2.3 Queue Detector Physical Input Table

rmcQueueInTable OBJECT-TYPE
SYNTAX SEQUENCE OF RmcQueueInEntry
ACCESS not-accessible
STATUS optional
DESCRIPTION
"A table containing the configuration information for metered lane physical inputs and outputs."
::={ rmcInOutput 3 }

rmcQueueInEntry OBJECT-TYPE
SYNTAX RmcQueueInEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"Configuration parameters of the metered lane queue detector physical input table. This table is directly correlated to the Queue Detector Configuration and Control Table, which means that the number of rows in this table is exactly the same as the number of rows in the Queue Detector Configuration and Control

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```
 Table (AUGMENT TABLE in SNMPv2 terminology).  Table management can only take
 place through the rmcQueueDetectMode-object within Queue Detector Configuration
 and Control Table (rmcQueueCtrlTable), while this table defines the associated
 physical input."
INDEX { rmcMeterNumber, rmcQueueNum }
::={ rmcQueueInTable 1 }

RmcQueueInEntry ::=SEQUENCE {
rmcMetQueueInNumber        INTEGER}
```

3.7.2.3.1 Queue Detector Input Number

```
rmcMetQueueInNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the physical input number of the queue detector for the associated
 metered lane and queue detector number.
A value of 255 indicates that there is no physical input for this function."
::={ rmcQueueInEntry 1 }
```

3.7.2.4 Metered Lane Physical Input/Output Table

```
rmcMeterInOutTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcMeterInOutEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"A table containing the configuration information for metered lane physical
 inputs and outputs."
::={ rmcInOutput 4 }

rmcMeterInOutEntry   OBJECT-TYPE
SYNTAX   RmcMeterInOutEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration parameters of the metered lane physical input/output table. This
 table is directly correlated to the Metered Lane Control Table, which means
 that the number of rows in this table is exactly the same as the number of rows
 in the Metered Lane Control Table (AUGMENT TABLE in SNMPv2 terminology). Table
 management can only take place through the Metered Lane Control Table
 (rmcMeterCtrlTable), while this table defines the associated physical input and
 outputs."
INDEX { rmcMeterNumber }
::={ rmcMeterInOutTable 1 }

RmcMeterInOutEntry ::=SEQUENCE {
rmcMeterDemandInNumber        INTEGER,
rmcMeterPassageInNumber       INTEGER,
rmcMeterRedOutNumber          INTEGER,
rmcMeterYellowOutNumber       INTEGER,
rmcMeterGreenOutNumber        INTEGER,
rmcMeterAdvSignOutNumber      INTEGER}
```

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3.7.2.4.1 Demand Detector Input Number

```
rmcMeterDemandInNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the physical input number of the demand detector for this metered
 lane.  A value of 255 indicates that there is no physical input for this function."
::={ rmcMeterInOutEntry 1 }
```

3.7.2.4.2 Passage Detector Input Number

```
rmcMeterPassageInNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the physical input number of the passage detector for this metered
 lane.  A value of 255 indicates that there is no physical input for this function."
::={ rmcMeterInOutEntry 2 }
```

3.7.2.4.3 Red Indication Output Number

```
rmcMeterRedOutNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the physical output number of the red indication for this metered
 lane.
A value of 255 indicates that there is no physical output for this function."
::={ rmcMeterInOutEntry 3 }
```

3.7.2.4.4 Yellow Indication Output Number

```
rmcMeterYellowOutNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the physical output number of the yellow indication for this metered
 lane.
A value of 255 indicates that there is no physical output for this function."
::={ rmcMeterInOutEntry 4 }
```

3.7.2.4.5 Green Indication Output Number

```
rmcMeterGreenOutNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   mandatory
DESCRIPTION
"Indicates the physical output number of the green indication for this metered
```

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```
 lane.  A value of 255 indicates that there is no physical output for this
 function."
::={ rmcMeterInOutEntry 5 }
```

3.7.2.4.6 Advanced Warning Sign Output Number

```
rmcMeterAdvSignOutNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the physical output number of the advanced warning sign for this
 metered lane.  A value of 255 indicates that there is no physical output for
 this function."
REFERENCE
"See Clause A.10.3"
::={ rmcMeterInOutEntry 6 }
```

3.7.2.5 Dependency Group Physical Input/Output Table

```
rmcDependInOutTable   OBJECT-TYPE
SYNTAX   SEQUENCE OF RmcDependInOutEntry
ACCESS   not-accessible
STATUS   optional
DESCRIPTION
"A table containing the configuration information for dependency group physical
 inputs and outputs."
::={ rmcInOutput 5 }

rmcDependInOutEntry   OBJECT-TYPE
SYNTAX   RmcDependInOutEntry
ACCESS   not-accessible
STATUS   mandatory
DESCRIPTION
"Configuration parameters of the dependency group physical input/output table.
 This table is directly correlated to the Dependency Group Configuration and
 Control Table, which means that the number of rows in this table is exactly the
 same as the number of rows in the Dependency Group Configuration and Control
 Table (AUGMENT TABLE in SNMPv2 terminology).  Table management can only take
 place through the Dependency Group Configuration and Control Table
 (rmcDependGroupCtrlTable), while this table defines the associated physical
 input and outputs."
INDEX { rmcDependGroupNumber }
::={ rmcDependInOutTable 1 }

RmcDependInOutEntry ::=SEQUENCE {
rmcDependMergeInNumber        INTEGER,
rmcDependAdvSignOutNumber        INTEGER}
```

3.7.2.5.1 Merge Detector Input Number

```
rmcDependMergeInNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
```

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```
DESCRIPTION
"Indicates the physical input number of the merge detector for this dependency
 group.  A value of 255 indicates that there is no physical input for this
 function. "
::={ rmcDependInOutEntry 1 }
```

3.7.2.5.2 Advanced Warning Sign Output Number

```
rmcDependAdvSignOutNumber   OBJECT-TYPE
SYNTAX   INTEGER (0..255)
ACCESS   read-write
STATUS   optional
DESCRIPTION
"Indicates the physical output number of the advanced warning sign for this
 dependency group.  A value of 255 indicates that there is no physical output
 for this function."
REFERENCE
"See Clause A.10.2"
::={ rmcDependInOutEntry 2 }

END
```

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Section 4
CONFORMANCE GROUP DEFINITIONS

A conformance group is defined in NTCIP1101, Simple Transportation Management Framework (STMF), clause 3.3.5, as a basic unit of conformance.

Conformance groups are defined as either mandatory or optional. If a conformance group is mandatory, all of the objects and subgroups with STATUS "mandatory" that are part of the conformance group shall be present for a device to claim conformance to the MIB defining the Conformance group. If a Conformance group is optional, all of the objects and subgroups with the STATUS "mandatory" that are part of the conformance group shall be present if the device supports the Conformance group. Optional objects with the STATUS "optional" may be supported.

When a table is included in a conformance group, all objects contained in the table are included by reference. This is because a table is defined as a SEQUENCE OF { SEQUENCE }. Thus, all objects listed in the sequence are defined as an integral part of the table. Tables are defined as either mandatory or optional. If a table is mandatory, all of the objects with STATUS "mandatory" shall be present. If a table is optional, all of the objects with the STATUS "mandatory" shall be present if the device supports the table. Optional objects within a table with the STATUS "optional" may be supported.

Support for objects within a Subgroup are handled in the same fashion as tables. This is summarized in Table 4-1.

TABLE 4-1: OBJECT SUPPORT REQUIREMENTS

OBJECT STATUS	TABLE STATUS	CONFORMANCE GROUP STATUS	OBJECT SUPPORT
mandatory	mandatory	mandatory	mandatory
mandatory	mandatory	optional	mandatory, if conformance group is supported
mandatory	optional	mandatory	mandatory, if table is supported
mandatory	optional	optional	mandatory, if both the conformance group and table are supported
optional	mandatory	mandatory	optional
optional	mandatory	optional	optional
optional	optional	mandatory	optional
optional	optional	optional	optional

The Conformance Group definitions for ramp meter control units (RMCs) are defined in this section. A ramp meter control unit has multiple functions; thus, Conformance Groups are defined for each function.

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The following Conformance Groups may contain objects that are part of table not listed in that same Conformance Group. If one of these objects is supported, it is implied that the table structure objects (table, entry and index) that contain this object are also supported. These types of objects are annotated with an asterisk.

4.1 GENERAL CONFIGURATION CONFORMANCE GROUP

The Ramp Meter General Configuration Conformance group consists of a variety of RMC objects related to general configuration and capability information. The Ramp Meter General Configuration Conformance group shall consist of the following objects and tables:

Object or Table Name	Reference
rmcCommRefreshThreshold	NTCIP 1207
rmcCalcInterval	NTCIP 1207

4.2 TRAFFIC RESPONSIVE CONFORMANCE GROUP

4.2.1 Mainline Lane Conformance group

The Mainline Lane Conformance Group consists of a variety of RMC objects related to configuration, control and status of mainline lane parameters. This Conformance Group shall consist of the following objects and tables:

Object or Table Name	Reference
rmcAveragingPeriods	NTCIP 1207
rmcMaxNumML	NTCIP 1207
rmcNumML	NTCIP 1207
rmcMLCtrlTable	NTCIP 1207
rmcMLNumber	NTCIP 1207
rmcMLMode	NTCIP 1207
rmcMLLeadZoneLength	NTCIP 1207
rmcMLTrailZoneLength	NTCIP 1207
rmcMLUsageMode	NTCIP 1207
rmcMLSpeedTrapSpacing	NTCIP 1207
rmcMLErraticCount	NTCIP 1207
rmcMLMaxPresence	NTCIP 1207
rmcMLNoActivity	NTCIP 1207
rmcVehicleLength	NTCIP 1207
rmcAverageFlowRate	NTCIP 1207
rmcAverageOccupancy	NTCIP 1207
rmcAverageSpeed	NTCIP 1207
rmcMLStatTable	NTCIP 1207
rmcMLLeadStatus	NTCIP 1207
rmcMLTrailStatus	NTCIP 1207
rmcMLStatus	NTCIP 1207
rmcMLUsageStatus	NTCIP 1207
rmcMLLeadInNumber*	NTCIP 1207
rmcMLTrailInNumber*	NTCIP 1207

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4.2.2 Metering Plan Conformance group

The Metering Plan Conformance group consists of a variety of metering plan related objects that identify metering plans. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcMaxNumMeteringPlans	NTCIP 1207
rmcNumMeteringPlans	NTCIP 1207
rmcMaxNumLevelsPerPlan	NTCIP 1207
rmcNumMeteringLevels	NTCIP 1207
rmcMeteringPlanTable	NTCIP 1207
rmcMeteringPlanNumber	NTCIP 1207
rmcMeteringLevel	NTCIP 1207
rmcMeteringRate	NTCIP 1207
rmcFlowRateThreshold	NTCIP 1207
rmcOccupancyThreshold	NTCIP 1207
rmcSpeedThreshold	NTCIP 1207

4.3 METERED LANE CONFORMANCE GROUPS

4.3.1 Metered Lane Main Conformance Group

The Metered Lane Main Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcMaxNumMeteredLanes	NTCIP 1207
rmcNumMeteredLanes	NTCIP 1207
rmcMeterCfgTable	NTCIP 1207
rmcCmdSourcePriorityOrder	NTCIP 1207
rmcMinMeterTime	NTCIP 1207
rmcMinNonMeterTime	NTCIP 1207
rmcAbsoluteMinMeterRate	NTCIP 1207
rmcAbsoluteMaxMeterRate	NTCIP 1207
rmcSystemMinMeterRate	NTCIP 1207
rmcSystemMaxMeterRate	NTCIP 1207
rmcStartAlert	NTCIP 1207
rmcStartWarning	NTCIP 1207
rmcStartGreen	NTCIP 1207
rmcStartYellow	NTCIP 1207
rmcStartRed	NTCIP 1207
rmcMinRed	NTCIP 1207
rmcMinGreen	NTCIP 1207
rmcMaxGreen	NTCIP 1207
rmcYellow	NTCIP 1207
rmcShutNormalRate	NTCIP 1207
rmcShutWarning	NTCIP 1207
rmcShutTime	NTCIP 1207
rmcPostMeterGreen	NTCIP 1207
rmcMeterCtrlTable	NTCIP 1207
rmcMeterMode	NTCIP 1207
rmcManualAction	NTCIP 1207

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rmcManualPlan	NTCIP 1207
rmcManualRate	NTCIP 1207
rmcManualVehiclePerGreen	NTCIP 1207
rmcIntercoAction	NTCIP 1207
rmcIntercoPlan	NTCIP 1207
rmcIntercoRate	NTCIP 1207
rmcIntercoVehiclePerGreen	NTCIP 1207
rmcCommAction	NTCIP 1207
rmcCommPlan	NTCIP 1207
rmcCommRate	NTCIP 1207
rmcCommVehiclePerGreen	NTCIP 1207
rmcDefaultAction	NTCIP 1207
rmcDefaultPlan	NTCIP 1207
rmcDefaultRate	NTCIP 1207
rmcDefaultVehiclePerGreen	NTCIP 1207
rmcDemandMode	NTCIP 1207
rmcMeterStatTable	NTCIP 1207
rmcRequestCommandSource	NTCIP 1207
rmcImplementCommandSource	NTCIP 1207
rmcImplementAction	NTCIP 1207
rmcImplementPlan	NTCIP 1207
rmcImplementRate	NTCIP 1207
rmcImplementVehiclePerGreen	NTCIP 1207
rmcRequestAction	NTCIP 1207
rmcRequestPlan	NTCIP 1207
rmcRequestRate	NTCIP 1207
rmcRequestVehiclePerGreen	NTCIP 1207
rmcCommActionStatus	NTCIP 1207
rmcBaseMeterRate	NTCIP 1207
rmcActiveMeterRate	NTCIP 1207
rmcActiveInterval	NTCIP 1207
rmcOperMinMeterRateStatus	NTCIP 1207
rmcOperMaxMeterRateStatus	NTCIP 1207
rmcDemandStatus	NTCIP 1207
rmcPassageMode*	NTCIP 1207
rmcPassageStatTable	NTCIP 1207
rmcPassageStatus	NTCIP 1207

4.1.1.1 Demand Detector Conformance Group

The Demand Detector Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcDemandErraticCount*	NTCIP 1207
rmcDemandMaxPresence*	NTCIP 1207
rmcDemandNoActivity*	NTCIP 1207
rmcMeterDemandInNumber*	NTCIP 1207

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4.1.1.2 Demand Gap Conformance Group

The Demand Gap Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcDemandGap*	NTCIP 1207
rmcDemandRed*	NTCIP 1207

4.1.1.3 Startup Gap Conformance Group

The Startup Gap Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcStartupGapTime*	NTCIP 1207
rmcStartupGapQueueDetectorNum*	NTCIP 1207

4.1.1.4 Shutdown Gap Conformance Group

The Shutdown Gap Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcShutGapTime*	NTCIP 1207
rmcShutGapReductTime*	NTCIP 1207
rmcShutGapReductValue*	NTCIP 1207

4.1.1.5 Red Violation Conformance Group

The Red Violation Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcRedViolationClearance*	NTCIP 1207
rmcRedViolationAdjust*	NTCIP 1207
rmcQueueViolationFlag*	NTCIP 1207

4.1.1.6 Short Stop Conformance Group

The Short Stop Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcShortStopTime*	NTCIP 1207
rmcShortStopOccupancy*	NTCIP 1207
rmcShortStopQueueDetectorNum*	NTCIP 1207

4.3.2 Dependency Group Conformance Group

The Dependency Group Conformance Group consists of objects related to the configuration, control and status of dependency group supported functions. This Conformance Group shall consist of the following objects:

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Object or Table Name	Reference
rmcDependGroupNumber*	NTCIP 1207
rmcDependGroupSeqNumber*	NTCIP 1207
rmcMaxNumDependGroup	NTCIP 1207
rmcNumDependGroup	NTCIP 1207
rmcDependGroupCtrlTable	NTCIP 1207
rmcDependGroupMode	NTCIP 1207
rmcSignalServiceMode	NTCIP 1207
rmcGreenOffset	NTCIP 1207
rmcMinFractionalOffset	NTCIP 1207

4.3.2.1 Priority Lane Conformance Group

The Priority Lane Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcPriorityLaneNum	NTCIP 1207
rmcPriorityRedDelay	NTCIP 1207

4.3.2.2 Merge Detector Conformance Group

The Merge Detector Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcMergeMode	NTCIP 1207
rmcMergeGap	NTCIP 1207
rmcMergeDelay	NTCIP 1207
rmcQueueMergeFlag	NTCIP 1207
rmcMergeErraticCount	NTCIP 1207
rmcMergeMaxPresence	NTCIP 1207
rmcMergeNoActitity	NTCIP 1207
rmcDependGroupStatTable	NTCIP 1207
rmcMergeFlag	NTCIP 1207
rmcMergeStatus	NTCIP 1207
rmcDependMergeInNumber*	NTCIP 1207

4.3.3 Queue Detection Conformance Group

The Queue Detection Conformance Group consists of objects related to the configuration, control and status of supported intermediate and excessive queue detection functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueShutdownFlag*	NTCIP 1207
rmcQueueAdjustUsage*	NTCIP 1207
rmcMaxNumQueueEntries	NTCIP 1207
rmcNumQueueEntries	NTCIP 1207
rmcQueueCtrlTable	NTCIP 1207
rmcQueueNum	NTCIP 1207

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rmcQueueType	NTCIP 1207
rmcQueueDetectMode	NTCIP 1207
rmcQueueAdjustMode	NTCIP 1207
rmcQueueErraticCount	NTCIP 1207
rmcQueueMaxPresence	NTCIP 1207
rmcQueueNoActivity	NTCIP 1207
rmcQueueStatTable	NTCIP 1207
rmcQueueFlag	NTCIP 1207
rmcQueueStatus	NTCIP 1207
rmcMetQueueInNumber*	NTCIP 1207

4.3.3.1 Length-based Queue Detection Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueLengthUpLimit	NTCIP 1207
rmcQueueLengthLowLimit	NTCIP 1207

4.3.3.2 Occupancy-based Queue Detection Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueOccUpLimit	NTCIP 1207
rmcQueueOccUpDelay	NTCIP 1207
rmcQueueOccLowLimit	NTCIP 1207
rmcQueueOccLowDelay	NTCIP 1207

4.3.3.3 Quick Occupancy-based Queue Detection Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueQOccUpLimit	NTCIP 1207
rmcQueueQOccUpDelay	NTCIP 1207
rmcQueueQOccLowLimit	NTCIP 1207
rmcQueueQOccLowDelay	NTCIP 1207

4.3.3.4 Rate-adjusted Queue Adjustment Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueAdjustRate	NTCIP 1207
rmcQueueAdjustRateLimit	NTCIP 1207
rmcQueueAdjustRateDelay	NTCIP 1207
rmcQueueAdjustRateIter	NTCIP 1207

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4.3.3.5 Level-adjusted Queue Adjustment Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueAdjustLevel	NTCIP 1207
rmcQueueAdjustLevelLimit	NTCIP 1207
rmcQueueAdjustLevelDelay	NTCIP 1207
rmcQueueAdjustLevelIter	NTCIP 1207

4.3.3.6 Fixed Rate Queue Adjustment Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcQueueReplaceRate	NTCIP 1207

4.3.4 Passage Detection Conformance Group

The Passage Detection Conformance Group consists of objects related to the configuration, control and status of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcPassageCtrlTable	NTCIP 1207
rmcPassageErraticCount	NTCIP 1207
rmcPassageMaxPresence	NTCIP 1207
rmcPassageNoActivity	NTCIP 1207
rmcMeterPassageInNumber*	NTCIP 1207

4.3.4.1 Long Stop Conformance Group

The Long Stop Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcLongStopTime*	NTCIP 1207

4.4 SCHEDULING CONFORMANCE GROUP

The Scheduling Conformance Group consists of the RMC-specific objects related to scheduling operation. This Conformance Group shall consists of the following objects:

Object or Conformance Group Name	Reference
rmcMaxNumTBCActions	NTCIP 1207
rmcNumTBCActions	NTCIP 1207
rmcActionTable	NTCIP 1207
rmcActionNum	NTCIP 1207
rmcActionMode	NTCIP 1207

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4.4.1 Metered Lane Scheduling Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcTBActionStatus*	NTCIP 1207
rmcTBPlanStatus*	NTCIP 1207
rmcTBRateStatus*	NTCIP 1207
rmcTBVehiclesPerGrnStatus*	NTCIP 1207
rmcTBCMinMeterRateStatus*	NTCIP 1207
rmcTBCMaxMeterRateStatus*	NTCIP 1207
rmcMeterActionNum	NTCIP 1207
rmcMaxNumMeterTBCActions	NTCIP 1207
rmcNumMeterTBCActions	NTCIP 1207
rmcMeterActionTable	NTCIP 1207
rmcMeterActionIndex	NTCIP 1207
rmcMeterActionMode	NTCIP 1207
rmcTBActionCtrl	NTCIP 1207
rmcTBPlanCtrl	NTCIP 1207
rmcTBRateCtrl	NTCIP 1207
rmcTBVehiclesPerGrnCtrl	NTCIP 1207
rmcTBMinMeterRateCtrl	NTCIP 1207
rmcTBMaxMeterRateCtrl	NTCIP 1207

4.4.2 Mainline Scheduling Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcMLActionNum	NTCIP 1207
rmcMaxNumMLTBCActions	NTCIP 1207
rmcNumMLTBCActions	NTCIP 1207
rmcMLActionTable	NTCIP 1207
rmcMLActionIndex	NTCIP 1207
rmcMLActionMode	NTCIP 1207
rmcTBMLUsageMode	NTCIP 1207

4.5 PHYSICAL INPUT/OUTPUT CONFORMANCE GROUP

The Physical Input/Output Conformance Group consists of the RMC-specific objects related to defining input and output assignments. This Conformance Group shall consists of the following objects:

Object or Conformance Group Name	Reference
rmcAdvSignOutNumber	NTCIP 1207

4.5.1 Metered Lane Output Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

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Object or Table Name	Reference
rmcMeterInOutTable	NTCIP 1207
rmcMeterRedOutNumber	NTCIP 1207
rmcMeterYellowOutNumber	NTCIP 1207
rmcMeterGreenOutNumber	NTCIP 1207
rmcMeterAdvSignOutNumber	NTCIP 1207

4.5.2 Dependency Group Output Conformance Group

This Conformance Group consists of objects related to the configuration of supported functions. This Conformance Group shall consist of the following objects:

Object or Table Name	Reference
rmcDependInOutTable	NTCIP 1207
rmcDependAdvSignOutNumber	NTCIP 1207

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Section 5
CONFORMANCE STATEMENTS

Ramp Meter devices shall adhere to the conformance requirements specified in Table 5-1 as a minimum to claim compliance to this standard. Additional objects or groups may be supported without being non-compliant with RMC objects or NTCIP. Minimum and maximum ranges of objects that differ from the values of the object's SYNTAX field may be enforced by an application running on a device. A device which enforces range limits within the bounds specified by the values of the object's SYNTAX field shall not be categorized as being non-compliant with RMC objects or NTCIP. A device which supports a subset of enumerated values for a given objects shall not be categorized as being non-compliant with RMC objects or NTCIP.

TABLE 5-1: CONFORMANCE TABLE

CONFORMANCE GROUP	REFERENCE	CONFORMANCE REQUIREMENT
Configuration	NTCIP 1201	mandatory
Database Management	NTCIP 1201	optional
Time Management	NTCIP 1201	optional
Timebase Event Schedule	NTCIP 1201	optional
Scheduling	NTCIP 1207	optional
Metered Lane Scheduling	NTCIP 1207	mandatory*
Mainline Lane Scheduling	NTCIP 1207	optional
Report	NTCIP 1201	optional
STMF	NTCIP 1201	optional
PMPP	NTCIP 1201	optional
General Configuration	NTCIP 1207	optional
Traffic Responsive	NTCIP 1207	optional
Mainline Lane	NTCIP 1207	optional
Metering Plan	NTCIP 1207	optional
Metered Lane	NTCIP 1207	mandatory
Metered Lane Main	NTCIP 1207	mandatory
Demand Detector	NTCIP 1207	optional
Demand Gap	NTCIP 1207	optional
Startup Gap	NTCIP 1207	optional
Shutdown Gap	NTCIP 1207	optional
Red Violation	NTCIP 1207	optional
Short Stop	NTCIP 1207	optional
Dependency Group	NTCIP 1207	optional
Priority Lane	NTCIP 1207	optional
Merge Detector	NTCIP 1207	optional
Queue Detection	NTCIP 1207	optional
Length-based Queue Detection	NTCIP 1207	optional
Occupancy-based Queue Detection	NTCIP 1207	optional
Quick Occupancy-based Queue Detection	NTCIP 1207	optional
Rate-based Queue Adjustment	NTCIP 1207	optional

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Level-based Queue Adjustment	NTCIP 1207	optional
Fixed Rate Queue Adjustment	NTCIP 1207	optional
Passage Detection	NTCIP 1207	optional
Long Stop	NTCIP 1207	optional
Physical Input/Output	NTCIP 1207	optional
Metered Lane Output	NTCIP 1207	optional
Dependency Group Output	NTCIP 1207	optional

* If “Timebase Event Schedule” Conformance Group is supported.

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Annex A
RAMP METER CONTROL UNIT OPERATIONS DESCRIPTION

(Informative)

The operations description contained in this annex was used and is the basis for the object definitions shown in Section 3.

A.1 GENERAL

The requirements in this document respond to the need for functional interoperability of Ramp Meter Control (RMC) units.

All flow rates and metering rates shall be expressed in vehicles per hour per lane (vphpl).
All vehicle counts shall be expressed in vehicles per Calculation Interval (vpCI).
All speeds shall be expressed in kilometers per hour (km/h).
All occupancies shall be expressed in 0.1%.

A.2 DETECTORS

A.2.1 MAINLINE DETECTOR STATION

The RMC shall have a **Maximum Number of Mainline Lanes** parameter, and a **Number of Mainline Lanes** parameter to indicate how many mainline lanes are currently enabled. Each lane shall have a **Lane Number** parameter identifying which lane it represents.

Each lane shall have a **Speed Trap Spacing** (0-15.0 m in 0.1-m increments) parameter indicating the upstream edge-to-upstream edge spacing between the leading and trailing detectors. A value of zero (0) shall inhibit the speed calculation for the associated mainline lane.
Each lane shall have a **Leading Detection Zone Length** (0-5.0 m in 0.1-m increments) parameter indicating the length of the detection zone of the leading detector. A value of zero (0) shall inhibit the speed estimation for this zone of the mainline lane.
Each lane shall have a **Trailing Detection Zone Length** (0-5.0 m in 0.1-m increments) parameter indicating the length of the detection zone of the trailing detector. A value of zero (0) shall inhibit the speed estimation for this zone of the mainline lane.

Each lane shall have a **Typical Vehicle Length** (0-10.0 m in 0.1-m increments) parameter. A zero value shall inhibit speed estimation for the mainline lane.

The RMC shall use the **Speed Trap Spacing** parameter to calculate the average speed in that lane. Speed calculation will only work when **Lane Mode** is **'Dual Enabled'** and **Lane Status** is **'Working'**. The RMC shall estimate the average speed only when it cannot calculate same based on inappropriate parameters or status as noted above.

The RMC shall use the **Typical Vehicle Length,** and **Leading Detection Zone Length** or **Trailing Detection Zone Length** parameters, as well as the occupancy to estimate average speed in the mainline lane. The RMC shall utilize the **Leading Detection Zone Length** and occupancy, when the **Leading Status** is **'Working'**, otherwise it shall utilize the **Trailing Detection Zone Length** and occupancy.

Each lane shall have a **Lane Mode** parameter, which shall operate as follows:

a. Disabled - no physical input shall be monitored and no traffic data will be calculated for this lane.

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b. Single Enabled Lead - only the physical input from the leading detection zone shall be monitored and used to calculate traffic data for this lane.

c. Single Enabled Trail - only the physical input from the trailing detection zone shall be monitored and used to calculate traffic data for this lane.

d. Dual Enabled - two physical inputs shall be monitored and used to calculate traffic data for this lane.

e. Pre-processed Enabled - no physical input shall be monitored but traffic data will be provided for this lane.

Each lane shall have a **Leading Detector Status** parameter. This status shall be as follows:

1. Disabled - the leading detector is disabled.
2. Working - no error was detected on the leading detector.
3. Other Error - an unknown error was detected on the leading detector.
4. Erratic Count - the vehicle count on the leading detector measured over the preceding calculation interval is greater than the **Mainline Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the leading detector has been continuously actuated for **Mainline Maximum Presence Threshold** (0-1500 min in 1-minute increments).
6. No Activity - the leading detector has been continuously non-actuated for **Mainline No Activity Threshold** (0-1500 min in 1-minute increments).
7. Error At Sensor - the sensor for the leading detector reported an error based on an internal diagnostic.

Each lane shall have a **Trailing Detector Status** parameter indicating the status of the trailing detector. This status shall be as follows:

1. Disabled - the trailing detector is disabled.
2. Working - no error was detected on the trailing detector.
3. Other Error - an unknown error was detected on the trailing detector.
4. Erratic Count - the vehicle count on the trailing detector measured over the preceding calculation interval is greater than the **Mainline Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the trailing detector has been continuously actuated for **Mainline Maximum Presence Threshold** (0-1500 min in 1-minute increments).
6. No Activity - the trailing detector has been continuously non-actuated for **Mainline No Activity Threshold** (0-1500 min in 1-minute increments).
7. Error At Sensor - the sensor for the trailing detector reported an error based on an internal diagnostic.

Each lane shall have a **Lane Usage Mode** parameter indicating which station traffic parameters, if any, will use the data from this lane.

Each lane shall have a **Lane Usage Status** parameter indicating which mainline traffic parameters from this lane, if any, are currently being used. If the **Lane Usage Mode** is set to **'Determined by Other'**, the **Lane Usage Status** will be determined from the **Timebase Control Action Table**.

Each lane shall have a **Lane Status** parameter, which shall operate as follows:

1. Working -
   the **Lane Mode** is **'Single Enabled Lead'** and
   the **Leading Detector Status** is **'Working'** and
   the **Lane Usage Status** is NOT **'Not Used'**.
   or
   the **Lane Mode** is **'Single Enabled Trail'** and
   the **Trailing Detector Status** is **'Working'** and

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the **Lane Usage Status** is NOT **'Not Used'**.

or

the **Lane Mode** is **'Dual Enabled'** and
the **Leading Detector Status** is **'Working'** and
the Trailing Detector Status is **'Working'** and
the Lane Usage Status is NOT **'Not Used'**.

or

the **Lane Mode** is **'Pre-processed Enabled'** and
the **Leading Detector Status** is **'Working'** and
the **Lane Usage Status** is NOT **'Not Used'**.

2. Disabled –
   the **Lane Mode** is **'Disabled'**, or
   the **Lane Usage Status** is **'Not Used'**.

3. Partial Failure -
   the **Lane Mode** is **'Dual Enabled'** and
   the **Leading Detector Status** is **'Working'** and
   the Trailing Detector Status is NOT **'Working'**.

   or

   the **Lane Mode** is **'Dual Enabled'** and
   the **Leading Detector Status** is NOT **'Working'** and
   the Trailing Detector Status is **'Working'**

4. Total Failure -
   the **Lane Mode** is **'Single Enabled Lead'** and
   the **Leading Detector Status** is NOT **'Working'**,

   or

   the **Lane Mode** is **'Single Enabled Trail'** and
   the **Trailing Detector Status** is NOT **'Working'**,

   or

   the **Lane Mode** is **'Dual Enabled'** and
   the **Leading Detector Status** is NOT **'Working'** and
   the **Trailing Detector Status** is NOT **'Working'**,

   or

   the **Lane Mode** is **'Pre-processed Enabled'** and
   the device providing the data has reported an error.

A.2.2 METERED LANES

The RMC shall have a **Maximum Number of Metered Lanes** parameter, and a **Number of Metered Lanes** parameter to indicate how many metered lanes are currently enabled. Each lane shall have a **Lane Number** parameter identifying which metered lane it represents.

Each metered lane consists of one passage detector, one demand detector, and a variable number of queue detectors.

Each metered lane shall have a **Lane Mode** parameter, which shall be either '**Disabled'** or '**Enabled'**.

Each metered lane shall have a **Dependency Group Number** parameter indicating the group of metered lanes with which this lane will be operated in a dependent fashion.

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Each metered lane shall have an **Active Interval Status** parameter indicating in which interval the metered lane currently resides. Valid metered lane intervals are as follows and are also shown on the Metered Lane Interval State Diagram (see Figure 3).

a. Initialization – During the non-metering state this interval indicates that the RMC is just being powered up.

b. Pre-Metering Non Green –During the non-metering state, the green indication within the signal head(s) is OFF during this interval.

c. Pre-Metering Green –During the non-metering state, the green indication within the signal head(s) is ON during this interval.

d. Startup Alert – This interval is used when the metered lane signal is in transition from the non-metering state to the metering state.

e. Startup Warning – This interval is used when the metered lane signal is in transition from the non-metering state to the metering state.

f. Startup Green – The green interval during the transition from the non-metering state to the metering state.

g. Startup Yellow – The yellow interval during the transition from the non-metering state to the metering state.

h. Startup Red – The red interval during the transition from the non-metering state to the metering state.

i. Red – An interval during the metering state requiring motorists to stop.

j. Green – The interval during the metering state allowing motorists to cross the stopbar.

k. Yellow – An interval during the metering state requiring motorists to prepare to stop.

l. Shutdown Warning – Following the metering state, this interval is used when the signal operation is changing to the non-metering state.

m. Shutdown Green – The green interval during transition from the metering state to the non-metering state.

n. Shutdown Yellow – The yellow interval during transition from the metering state to the non-metering state.

o. Shutdown Red – The red interval during transition from the metering state to the non-metering state.

p. Post-metering Green – This interval is used to when the metered lane signal is in transition from the metering state to the non-metering state. The green indication within the signal head(s) is ON during this interval.

Each metered lane shall have an **Absolute Maximum Metering Rate** parameter indicating the absolute maximum metering rate allowed for the metered lane. A value of zero (0) indicates that this parameter does not represent a constraint.

Each metered lane shall have an **Absolute Minimum Metering Rate** parameter indicating the absolute minimum metering rate allowed for the metered lane. A value of zero (0) indicates that this parameter does not represent a constraint.

Each metered lane shall have a **System Maximum Metering Rate** parameter indicating the maximum metering rate allowed for the metered lane. A value of zero (0) indicates that this parameter does not represent a constraint.

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Each metered lane shall have a **System Minimum Metering Rate** parameter indicating the minimum metering rate allowed for the metered lane. A value of zero (0) indicates that this parameter does not represent a constraint.

Each metered lane shall have a **Timebase Control Maximum Metering Rate Status** parameter indicating the maximum metering rate allowed for the metered lane (determined by the **Timebase Control Maximum Metering Rate Control** parameter within the **Timebase Control Action Table)**.

Each metered lane shall have a **Timebase Control Minimum Metering Rate Status** parameter indicating the minimum metering rate allowed for the metered lane (determined by the **Timebase Control Minimum Metering Rate Control** parameter within the **Timebase Control Action Table)**.

Each metered lane shall have an **Operational Maximum Metering Rate** parameter indicating the minimum of the maximum metering rate values (Absolute, System, TBC) that is currently active for the metered lane.

Each metered lane shall have an **Operational Minimum Metering Rate** parameter indicating the maximum of the minimum metering rate values (Absolute, System, TBC) that is currently active the minimum metering rate allowed for the metered lane.

A.2.2.1 Demand Detector

Each metered lane shall have a **Demand Detector Mode** parameter, which shall operate as follows:

1. 'Recalled' - indicates that the demand detector will constantly place a call even without a vehicle being present in its detection zone
2. 'Enabled Call' - indicates that the demand detector is ready to detect, and shall constantly place a call when it has failed
3. 'Enabled Stop' - . indicates that the demand detector is ready to detect, and shall exit the Metering state when it has failed

Each metered lane shall have a **Demand Detector Status** parameter indicating the status of the demand detector. This status shall be as follows:

1. Recalled - indicates that the **Demand Detector Mode** is **'Recalled'**.
2. Working - no error was detected on the demand detector.
3. Other Error - an unknown error was detected on the demand detector.
4. Erratic Count - the vehicle count on the demand detector measured over the preceding calculation interval is greater than the **Demand Detector Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the demand detector has been continuously actuated for **Demand Detector Maximum Presence Threshold** (0-1500 min in 1-min increments).
6. No Activity - the demand detector has been continuously non-actuated for **Demand Detector No Activity Threshold** (0-1500 min in 1-min increments).
7. Error At Sensor - the sensor for the demand detector reported an error based on an internal diagnostic.

A.2.2.2 Passage Detector

Each metered lane shall have a **Passage Detector Mode** parameter, which shall operate as follows:

1. Recalled - indicates that the passage detector shall constantly place a call, even without a vehicle being present in its detection zone.
2. Enabled Call - indicates that the passage detector is ready to detect, and shall constantly place a call when it has failed.

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3. Enabled No Call - indicates that the passage detector is ready to detect, and shall NOT place a call when it has failed.

Each metered lane shall have a **Passage Detector Status** parameter, which shall operate as follows:

1. Recalled - indicates that the **Passage Detector Mode** is **'Recalled'**.
2. Working - no error was detected on the passage detector.
3. Other Error - an unknown error was detected on the passage detector.
4. Erratic Count - the vehicle count on the passage detector measured over the preceding calculation interval is greater than the **Passage Detector Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the passage detector has been continuously actuated for **Passage Detector Maximum Presence Threshold** (0-1500 min in 1-min increments).
6. No Activity - the passage detector has been continuously non-actuated for **Passage Detector No Activity Threshold** (0-1500 min in 1-minute increments).
7. Error At Sensor - the sensor for the passage detector reported an error based on an internal diagnostic.

A.2.2.3 Queue Detectors

The RMC shall have a **Maximum Number of Queue Detectors** parameter to indicate the number supported by the RMC, and a **Number of Queue Detectors** parameter to indicate the number currently defined.

Each queue detector shall have a **Queue Detector Number** identifying the queue detector it represents. The **Queue Detector Number** will be used to prioritize the queue detectors of each queue type for queue override, where lowest number represents the highest priority.

Each metered lane shall support multiple queue detectors. Each queue detector shall have a **Queue Type** parameter, which shall be either '**Other**', '**Excessive'** or '**Intermediate'**. Excessive queue detectors are usually considered equal or higher priority than intermediate queue detectors. Queues on excessive queue detectors are usually overridden with one adjustment, while queues on intermediate queue detectors are usually overridden with a series of iterative adjustments implemented over time. If more than one 'Excessive' or more than one 'Intermediate' queue detector is defined for a metered lane, then the numerically lower queue detector number shall take precedence.

Each queue detector shall have a **Queue Detector Status** parameter, which shall be as follows:

1. Disabled - the queue detector is disabled.
2. Working - no error was detected on the queue detector.
3. Other Error - an unknown error was detected on the queue detector.
4. Erratic Count - the vehicle count on the queue detector measured over the preceding calculation interval is greater than the **Queue Detector Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the queue detector has been continuously actuated for **Queue Detector Maximum Presence** (0-1500 min in 1-minute increments).
6. No Activity - the queue detector has been continuously non-actuated for **Queue Detector No Activity Threshold** (0-1500 min in 1-minute increments).
7. Error At Sensor - the sensor for the queue detector reported an error based on an internal diagnostic.

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A.2.3 DEPENDENCY GROUP

The RMC shall have a **Maximum Number of Dependency Groups** parameter to indicate the number supported by the RMC, and a **Number of Dependency Groups** parameter to indicate the number currently supported by the RMC. Each group shall have a **Dependency Group Number** parameter identifying which group it represents.

Each dependency group shall have a **Dependency Group Mode** parameter that shall either be '**disabled**' (group is not used) or '**enabled**' (group is used).

Actions for each metered lane in a dependency group are usually the same.

Each dependency group may contain one merge detector.

A.2.3.1 Merge Detector

Each dependency group shall have a **Merge Detector Mode** parameter indicating the mode of its merge detector. This mode shall be either '**Disabled'** or '**Enabled'**.

Each dependency group shall have a **Merge Detector Status** parameter, which shall operate as follows:

1. Disabled - the **Merge Detector Mode** is **'Disabled'**.
2. Working - no error was detected on the merge detector.
3. Other Error - an unknown error was detected on the merge detector.
4. Erratic Count - the vehicle count on the merge detector measured over the preceding calculation interval is greater than the **Merge Detector Erratic Count Threshold** (0-30 vehicles in 1-vehicle increments).
5. Maximum Presence - the merge detector has been continuously actuated for **Merge Detector Maximum Presence Threshold** (0-1500 min in 1-minute increments).
6. No Activity - the merge detector has been continuously non-actuated for **Merge Detector No Activity Threshold** (0-1500 min in 1-minute increments).
7. Error At Sensor - the sensor for the merge detector reported an error based on an internal diagnostic.

A.2.3.2 Signal Sequence

Each dependency group shall have a **Signal Service Mode** parameter that shall operate as follows:

a. None - each metered lane in the dependency group shall cycle independently of all other lanes.
b. Mutex (mutually exclusive) - one and only lane in the dependency group shall display green at any given time during the **Metering** state or during Shutdown metering.
c. Fixed Offset - the start of the **Green** interval for any lane will occur no sooner than the **Green Offset** time (0-25.5 s in 0.1-s increments) after the start of a previous **Green** interval for a lane in the same dependency group.
d. Fractional Offset - the start of the **Green** interval for any lane will occur no sooner than the fractional offset time after the start of a previous **Green** interval for a lane in the same dependency group. This time shall be no shorter than the **Minimum Fractional Offset Time** (0, 0.5-5.0 s in 0.1-s increments).

Each dependency group shall have a **Priority Lane Number** parameter indicating which metered lane in the dependency group shall be treated as a priority lane. A zero entry shall indicate the absence of a priority lane in this dependency group.

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For each dependency group whose **Signal Service Mode** is not '**None'**, the **Ramp Lane Sequence** is defined as the monotone increasing **Dependency Group Sequence Number** until the highest **Dependency Group Sequence Number** for that dependency group is reached, at which time the sequence shall repeat.

For each dependency group whose **Signal Service Mode** is not '**None'** and whose **Priority Lane Number** is 0, the metered lanes in that dependency group shall transition into the **Green** interval based on the **Ramp Lane Sequence**.

For each dependency group whose **Signal Service Mode** is not '**None'** and whose **Priority Lane Number** is not 0, the metered lanes in that dependency group shall transition into the **Green** interval based on the **Ramp Lane Sequence**, 1:1 interleaved with the Priority Lane.

A.3 COMMAND SOURCE PRIORITY

Each metered lane shall have five metering command sources, which are **Manual, Communications, Interconnect, Time Base Control** and **Default.**

These five command sources allow for a priority-based mechanism to control the RMC. Manual commands are entered into the RMC locally through front panel, laptop or other user interface; fixing this at the highest priority indicates that an authorized user at the RMC may need to take complete control. Communications commands are issued by the Transportation Management Center or other control center. Interconnect commands are peer-to-peer communications from other field controller(s) which may have more knowledge of local conditions or may contain the mainline detectors instead of the RMC. Time Base Control commands use the NTCIP global plan and event tables and are executed on a regular basis or for special events / holidays. Default commands are implemented in the absence of any other mode or upon initial startup.

The following Metering Command Source / Action combinations are not recommended:

1) Manual / Traffic Responsive,
2) Time Base Control / Emergency Green,
3) Default / Emergency Green.

The **Manual** command shall always have the highest priority. The **Default** command shall always have the lowest priority. Each metered lane shall have a **Command Source Priority Order** parameter indicating the sequence of decreasing priority for the **Communications, Interconnect** and **Time Base Control** command sources.

Each metering command source shall have four parameters which are **Action, Rate, Plan** and **Vehicles-per-Green.**

Each **Action** parameter shall operate as follows:

a. Skip - the next highest priority command shall be considered.
b. Fixed Rate - the metered lane shall meter at the rate contained in the Rate parameter.
c. Traffic Responsive - the metered lane shall meter or not meter using the metering plan # contained in the Plan parameter using those parameters.
d. Emergency Green - the metered lane shall advance to the Shutdown Warning interval without entering the Shutdown Green, Shutdown Yellow or Shutdown Red intervals.
e. Rest-in-Green - the metered lane shall advance to the Pre-metering Green interval.
f. Dark - the metered lane shall advance to the Pre-metering Non-green interval.

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Each metered lane shall have a **Requested Metering Command Source** parameter indicating the highest priority metering command source whose Action is not Skip.

Each metered lane shall have a **Requested Action** parameter, which shall be the Action parameter of the **Requested Metering Command Source**. Each metered lane shall have a **Requested Rate** parameter, which shall be the rate parameter of the **Requested Metering Command Source**. Each metered lane shall have a **Requested Plan** parameter, which shall be the plan parameter of the **Requested Metering Command Source**. Each metered lane shall have a **Requested Vehicle-per-Green** parameter, which shall be the vehicle-per-green parameter of the **Requested Metering Command Source**.

Each metered lane shall have an **Implemented Metering Command Source** parameter indicating the metering command source which commands the metered lane.

Each metered lane shall have an **Implemented Action** parameter, which shall operate as follows:

a. Fixed Rate - the **Requested Action** is '**Fixed Rate**' and the metered lane has no other timing constraints which prevent it from implementing Fixed Rate metering.

b. Traffic Responsive - the **Requested Action** is '**Traffic Responsive**' and the metered lane has no other timing constraints that prevent it from implementing Traffic Responsive metering.

c. Emergency Green - the **Requested Action** is '**Emergency Green**' and the metered lane has no other timing constraints which prevent it from advancing to the **Shutdown Warning** interval.

d. Rest-in-Green - the **Requested Action** is '**Rest-in-Green**' and the metered lane has no other timing constraints which prevent it from advancing to the **Pre-metering Green** interval.

e. Dark - the **Requested Action** is '**Dark**' and the metered lane has no other timing constraints which prevent it from advancing to the **Pre-metering Non-green** interval.

f. Hold Meter - indicates that the metering lane will remain in the metering state regardless of the Requested Action due to restrictions such as minimum metering times.

g. Hold Non-meter - indicates that the metering lane will remain in the non-metering state regardless of the Requested Action due to restrictions such as minimum non-metering times.

h. Hold Rest-in-Green - the **Requested Action** is '**Dark**' but another metered lane in the same dependency group, whose **Signal Service Mode** is not '**None**' and whose interval is not in the non-metering state.

If the Implemented Action is 'Hold Meter' or 'Hold Non-meter', then the Implemented Rate, Implemented Plan and Implemented Vehicles-per-Green shall not change; otherwise, the Implemented Rate shall be set to the Requested Rate, and the Implemented Plan shall be set to the Requested Plan and the Implemented Vehicle-Per-Green shall be set to the Requested Vehicle-per-Green. Each metered lane shall have a **Base Metering Rate** parameter indicating the metering rate for the metered lane prior to any adjustment.

Each metered lane shall have an **Active Metering Rate** parameter indicating the current metering rate for the metered lane.

If the **Communication Refresh Threshold** time (0, 20-1440 s in 1-s increments) elapses without a SET operation to the **Communications Action** for a metered lane, the **Communications Action** parameter for that metered lane shall be set to **Skip**. A zero entry shall disable the timeout.

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If there is no valid **Action** parameter for any metering command source other than **Default**, that **Action** parameter shall be set to **Skip**.

If there is no valid **Default Action** parameter, the **Default Action** parameter shall be set to **Dark**.

A.3.1 ACTION TABLE

Use of action tables requires the support of the Timebase Event Scheduler from the Global object definition set.

The RMC shall have a **Maximum Number of TBC Actions** parameter and a **Number of TBC Actions** parameter to indicate the number of entries in this *main action table*. Each entry shall have an **Action Number** parameter identifying which entry it represents.

Each **TBC Action** entry shall have a **Mainline Lane Action Number** and a **Metered Lane Action Number**.

The RMC shall have a **Maximum Number of Mainline Lane TBC Actions** parameter and a **Number of Mainline Lane TBC Actions** parameter to indicate the number of entries in the *mainline lane table*. Each entry shall have an **Action Number** parameter identifying which entry it represents.

Each **Mainline Lane TBC Action** entry shall have a **Timebase Control Lane Usage Mode** parameter for each mainline lane.

The RMC shall have a **Maximum Number of Metered Lane TBC Actions** parameter and a **Number of Metered Lane TBC Actions** parameter to indicate the number of entries in the *metered lane table*. Each entry shall have an **Action Number** parameter identifying which entry it represents.

Each **Metered Lane TBC Action** entry shall have a **Timebase Action Control** parameter for each metered lane.

Each **Metered Lane TBC Action** entry shall have a **Timebase Plan Control** parameter for each metered lane.

Each **Metered Lane TBC Action** entry shall have a **Timebase Rate Control** parameter for each metered lane.

Each **Metered Lane TBC Action** entry shall have a **Timebase Vehicles-per-Green** Control parameter for each metered lane.

Each **Metered Lane TBC Action** entry shall have a **Timebase Control Maximum Metering Rate Control** parameter for each metered lane.

Each **Metered Lane TBC Action** entry shall have a **Timebase Control Minimum Metering Rate Control** parameter for each metered lane.

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A.4 CALCULATION OF MAINLINE TRAFFIC PARAMETERS

The RMC shall provide an **Averaging Periods** parameter (1-60 intervals in 1-interval increments) to indicate the number of calculation intervals over, which station averages will be calculated.

The station shall have traffic data consisting of **Average Mainline Station Flow Rate, Average Mainline Station Occupancy** and **Average Mainline Station Speed** parameters. These parameter values will be determined over the number of preceding calculation intervals as defined in the **Averaging Periods** parameter for those lanes whose **Lane Status** parameter was NOT **'Total Failure'** or **'Disabled'.** Additionally, lanes that have a **Lane Usage Status** that does not contain a particular parameter (e.g., Flow Rate) shall not be used for the calculation of that parameter (e.g., **Average Mainline Station Flow Rate**).
The RMC shall calculate the **Average Mainline Station Flow Rate** and **Average Mainline Station Occupancy** parameters using lane averages. The RMC shall calculate the **Average Mainline Station Speed** parameter using a vehicle average.

A.5 STARTING METERING

Following a **Metering** state, the duration of a **Non-Metering** state shall be no shorter than the **Minimum Non-Metering Time** parameter (0-60 min in 1-minute increments). Immediately after initialization, this duration shall not apply. Once this interval has been met, the metered lane will be allowed to start metering.

A.5.1 FIXED RATE

If the **Implemented Action** is **Fixed Rate**, then the transition from the **Non-Metering** state to the **Metering** state will begin immediately.

A.5.2 TRAFFIC RESPONSIVE

If the **Implemented Action** is **Traffic Responsive**, then the **Average Mainline Station** traffic parameters will be used with metering level 1 of the metering plan that is indicated in the **Implemented Plan** to determine whether to start metering.

If the threshold is exceeded on any of the station average traffic parameters corresponding to those traffic parameters, then the transition from the **Non-Metering** state to the **Metering** state shall begin immediately. If no threshold is exceeded, then metering will not make this transition. The value of an actual metering rate is moot because the startup sequence does not need a metering rate; therefore, only metering level 1 is used to determine whether to start metering.

A.6 STOPPING METERING

The duration of a **Metering** state shall be no shorter than the **Minimum Metering Time** parameter (0-60 min in 1-minute increments). Once this interval has been met, the metered lane will be allowed to stop metering.

If the **Queue versus Shutdown Flag** is '**True'** and any **Queue Detected Flag** is '**True'**, the metered lane will not be allowed to stop metering. This will prevent shutdown during queue override.

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A.6.1 DARK OR REST-IN-GREEN

If the **Implemented Action** is '**Dark'** or **'Rest-in-Green'**, then the transition from the **Metering** state to the **Non-Metering** state will begin immediately. The lane shall meter at the **Shutdown Normal Metering Rate** (120-1800 vph in 1-vph increments).

A.6.2 TRAFFIC RESPONSIVE

If the **Implemented Action** is '**Traffic Responsive'**, then the **Average Mainline Station** traffic parameters will be used with metering level 0 of the metering plan that is indicated in the **Implemented Plan** to determine whether to stop metering.

If none of the chosen traffic parameters exceeds its threshold, then the transition from the '**Metering'** state to the '**Non-Metering'** state shall begin immediately. The lane shall meter at the metering rate corresponding to level 0 of the identified metering plan; if any one of the thresholds is exceeded, then metering will not make this transition.

A.6.3 EMERGENCY GREEN

If the **Implemented Action** is '**Emergency Green'**, then the transition from the **Metering** state to the **Non-Metering** state will begin immediately. The metered lane shall bypass the '**Shutdown Green', 'Shutdown Yellow'** and '**Shutdown Red'** intervals; advance directly to the '**Shutdown Warning'** interval; and remain in the '**Shutdown Warning'** interval as long as the **Implemented Action** is '**Emergency Green'**. This shall supersede queue override.

A.7 STEADY-STATE METERING

A.7.1 METERING PLAN

The RMC shall have a **Maximum Number of Metering Plans** parameter to indicate the number of metering plans (4-100) supported by the RMC, and a **Number of Metering Plans** parameter to indicate how many metering plans are currently defined. Each plan shall have a **Metering Plan Number** parameter identifying which plan it represents.

The RMC shall have a **Maximum Number of Levels per Metering Plan** parameter to indicate the number of levels (2-50) in each plan supported by the RMC, and a **Number of Metering Levels** parameter to indicate how many metering levels are currently defined

Each Metering Level shall consist of:

1. **Metering Rate** (0, 120-1800 vph in 1-vph increments).
2. **Occupancy Threshold** (0, 5.0-30.0 percent in 0.1-percent increments).
3. **Flow Rate Threshold** (0, 1000-3600 vph in 1-vph increments).
4. **Speed Threshold** (0, 15-100 km/h in 1-km/h increments).

All **Flow Rate Threshold** and **Occupancy Threshold** entries in each metering plan shall be non-decreasing for increasing **Metering Levels**. All **Speed Threshold** and **Metering Rate** entries in each metering plan shall be non-increasing for increasing **Metering Levels**.

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A.7.2 METERING RATE

If the criteria listed above to make the transition from the **Metering** state to the **Non-Metering** state are not met, then the metering rate for each metered lane shall be recalculated every **Calculation Interval**.

If the **Implemented Action** is '**Fixed Rate'**, then metering will continue at the **Requested Rate**.

If the **Implemented Action** is '**Traffic Responsive'**, then the **Average Mainline Station** traffic parameters will be used with metering levels greater than 0 of the metering plan that is indicated in the **Implemented Plan** to determine the **Requested Rate**; then the most restrictive (lowest) metering rate shall be chosen as the **Requested Rate**.

A.8 SIGNAL SERVICE

A.8.1 INITIALIZATION

Each metered lane shall initialize in the **Non-Metering** state and the **Pre-metering Non-green** interval.

A.8.2 TRANSITION FROM NON-METERING STATE TO METERING STATE

A.8.2.1 Startup Alert

The **Startup Alert** interval shall terminate when the **Startup Alert** time (0-60.0 s in 0.1-s increments) has elapsed.

All other metered lanes in the same dependency group whose **Signal Service Mode** is not '**None**' and who remain in the **Non-Metering** state shall be placed in the **Pre-metering Green** interval.

A.8.2.2 Startup Warning

The **Startup Warning** interval shall terminate when the **Startup Warning Time** (0-60.0 s in 0.1-s increments) has elapsed.

All other metered lanes in the same dependency group whose **Signal Service Mode** is not '**None**' and who remain in the **Non-Metering** state shall be placed in the **Pre-metering Green** interval.

A.8.2.3 Startup Green

The **Startup Green** interval shall terminate when the **Startup Green Time** (0-60.0 s in 0.1-s increments) has elapsed and a gap in excess of the **Startup Gap Time** (0-25.5 s in 0.1-s increments) has been detected on the queue detector whose **Queue Detector Number** is the **Startup Gap Queue Detector Number**.

When the **Startup Gap Time** is zero, the termination of the **Startup Green** interval is dependent only on **Startup Green Time**.

A.8.2.4 Startup Yellow

The **Startup Yellow** interval shall terminate when the **Startup Yellow Time** (0-10.0 s in 0.1-s increments) has elapsed.

A.8.2.5 Startup Red

The **Startup Red** interval shall terminate when the **Startup Red Time** (0-10.0 s in 0.1-s increments) has elapsed.

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A.8.3 METERING OPERATION

Upon completion of the **Startup Red** interval, the **Metering** state shall begin.

A.8.3.1 Red

A.8.3.1.1 Minimum Red

The **Red** interval shall not terminate until the **Minimum Red Time** (1.0-15.0 s in 0.1-s increments) has elapsed.

A.8.3.1.2 Red Violation

When the **Red** interval has been active for **Red Violation Clearance Time** (0, 0.1-5.0 s in 0.1-s increments) and the passage detector changes to actuated, the **Red** interval shall be extended by the **Red Violation Adjustment Time** (1.0-5.0 s in 0.1-s increments). This adjustment shall be disabled when the **Red Violation Clearance Time** is zero, or when any **Queue Detected Flag** is '**True'** and the **Queue versus Violations Flag** is '**True'**.

A.8.3.1.3 Priority Red Delay

For each metered lane in a dependency group whose **Signal Service Mode** is not '**None'** and whose **Lane Number** is not the **Priority Lane Number**, the higher of the time remaining in the '**Red'** interval and the **Priority Lane Red Delay Time** (0-25.5 s in 0.1 s increments) shall be used as the time remaining in the **Red** interval when the demand detector is actuated for the **Priority Lane Number**. This delays the issuance of the green for the next lane in the sequence when there is demand on the priority lane.

A.8.3.1.4 Termination of Red

A.8.3.1.4.1 Normal Termination of Red

For each metered lane in a dependency group whose **Signal Service Mode** is '**None'**, the **Red** interval will be terminated when:

1. The **Red** interval has expired, and

2. The demand detector is actuated,
   or
   the **Demand Detector Status** is '**Recalled'**,
   or
   the **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

3. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Mutex'**, the **Red** interval will be terminated when:

1. The **Red** interval has expired, and

2. No other metered lane in the dependency group is in the '**Green'** interval, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

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4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Fixed Offset'**, the **Red** interval will be terminated when:

1. The **Red** interval has expired, and

2. No other metered lane in the dependency group has begun its '**Green'** interval within **'Green Offset** time, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Fractional Offset'**, the **Red** interval will be terminated when:

1. The **Red** interval has expired, and

2. No other metered lane in the dependency group has begun its **Green** interval within the higher of the **Minimum Fractional Offset Time** (0, 0.5-5.0 s in 0.1-s increments) and the fractional offset time, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

A.8.3.1.4.2 Short Stop

When the **Short Stop Time** (0, 1.0-120.0 in 0.1-s increments) is non-zero, the **Red** interval shall be terminated when:

1. The **Red** interval has expired, and

2. The demand detector is not actuated, and

3. The **Short Stop Time** has expired, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**, and

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5. The **Queue Detector Status** is '**Disabled'**,
   or
   the **Queue Detection Mode** is '**Occupancy'** and the occupancy on the queue detector whose **Queue Detector Number** is the **Short Stop Queue Detector Number** for the preceding calculation interval exceeds the **Short Stop Occupancy Threshold** (0-100.0 percent in 0.1-percent increments).

This allows for either time- or occupancy-based short stop.

A.8.3.1.4.3 Long Stop

If the **Red** interval has expired and the passage detector is actuated, the **Red** interval shall be extended by the **Long Stop** Time (0, 1.0-10.0 s in 0.1-s increments). At the end of this extended **Red** interval, the **Red** interval shall be terminated.

A.8.3.1.4.4 Demand Gap

When the **Demand Red** Time (0, 1.0-15.0 s in 0.1-s increments) is non-zero, if the demand detector is not actuated for the **Demand Gap Time** (1.0-5.0 s in 0.1-s increments) after the **Red** interval has expired, the **Red** interval shall be extended by the **Demand Red Time** after the demand detector becomes actuated. At the end of this extended **Red** interval, the **Red** interval shall be terminated.

A.8.3.2 Green

A.8.3.2.1 Termination of Green

For each metered lane whose **Implemented Vehicles-per-Green** is 1, the **Green** interval will be terminated upon one actuation on the passage detector.

For each metered lane whose **Implemented Vehicles-per-Green** is greater than 1 and whose **Yellow Time** is non-zero, the **Green** interval will be terminated upon distinct actuations on the passage detector equal to one less than the **Implemented Vehicles-per-Green** parameter.

For each metered lane whose **Implemented Vehicles-per-Green** is greater than 1 and whose **Yellow Time** is zero, the **Green** interval will be terminated upon distinct actuations on the passage detector equal to the **Implemented Vehicles-per-Green** parameter.

A.8.3.2.2 Minimum Green

If these distinct actuations on the passage detector occur prior to the timing of the **Minimum Green Time** (1.0-5.0 s in 0.1-s increments), the **Green** interval shall not terminate until the **Minimum Green Time** has elapsed.

For each metered lane whose **Passage Detector Status** is not ''**Working**' and whose **Implemented Vehicles-per-Green** is '1', the **Green** interval shall terminate when the **Minimum Green Time** has elapsed.

A.8.3.2.3 Maximum Green

If these distinct actuations on the passage detector do not occur prior to the timing of the **Maximum Green Time** (1.0-15.0 s in 0.1-s increments), the **Green** interval shall terminate.

For each metered lane whose **Passage Detector Status** is not ''**Working**' and whose **Implemented Vehicles-per-Green** is greater than '1', the **Green** interval shall terminate when the **Maximum Green Time** has elapsed.

A.8.3.3 Yellow

The **Yellow** interval shall terminate when the **Yellow Time** (0, 0.5-5.0 s in 0.1-s increments) has elapsed. A zero entry for the **Yellow Time** shall cause the metered lane to bypass the **Yellow** interval.

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A.8.4 STOP TIMING CONDITIONS

A.8.4.1 Merge Override

When the merge detector of a dependency group is actuated for longer than the **Merge Delay Time** (0-25.5 s in 0.1-s increments), the **Merge Override Flag** for that dependency group shall be '**True'**. A zero entry for the **Merge Delay Time** shall force the **Merge Override Flag** to be '**False'**.

Each metered lane in that dependency group shall remain in the **Red** interval as long as the **Merge Override Flag** is '**True'**.

When the merge detector of that dependency group is not actuated for longer than the **Merge Gap Time** (0-25.5 s in 0.1-s increments), the **Merge Override Flag** shall be '**False'**.

The **Merge Override Flag** shall be '**False'** when the **Queue Detected Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

A.8.5 TRANSITION FROM METERING STATE TO NON-METERING STATE

The metering rate used during the Shutdown Green, Shutdown Yellow and Shutdown Red intervals is discussed in A.6.1 and A.6.2 above.

A.8.5.1 Shutdown Green

A.8.5.1.1 Termination of Shutdown Green

For each metered lane whose **Implemented Vehicles-per-Green** is 1, the **Shutdown Green** interval will be terminated upon one actuation on the passage detector.

For each metered lane whose **Implemented Vehicles-per-Green** is greater than 1 and whose **Yellow Time** is non-zero, the **Shutdown Green** interval will be terminated upon distinct actuations on the passage detector equal to one less than the **Implemented Vehicles-per-Green** parameter.

For each metered lane whose **Implemented Vehicles-per-Green** is greater than 1 and whose **Yellow Time** is zero, the **Shutdown Green** interval will be terminated upon distinct actuations on the passage detector equal to the **Implemented Vehicles-per-Green** parameter.

A.8.5.1.2 Minimum Shutdown Green

If these distinct actuations on the passage detector occur prior to the timing of the **Minimum Green Time**, the **Shutdown Green** interval shall not terminate until the **Minimum Green Time** has elapsed.

For each metered lane whose **Passage Detector Status** is not ''**Working**' and whose **Implemented Vehicles-per-Green** is '1', the **Shutdown Green** interval shall terminate when the **Minimum Green Time** has elapsed.

A.8.5.1.3 Maximum Shutdown Green

If these distinct actuations on the passage detector do not occur prior to the timing of the **Maximum Green Time**, the **Green** interval shall terminate.

For each metered lane whose **Passage Detector Status** is not ''**Working**' and whose **Implemented Vehicles-per-Green** is greater than '1', the **Shutdown Green** interval shall terminate when the **Maximum Green Time** has elapsed.

A.8.5.2 Shutdown Yellow

The **Shutdown Yellow** interval shall terminate when the **Yellow Time** has elapsed. A zero entry for the **Yellow Time** shall cause the metered lane to bypass the **Shutdown Yellow** interval.

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A.8.5.3 Shutdown Red

A.8.5.3.1 Minimum Shutdown Red

The **Shutdown Red** interval shall not terminate until the **Minimum Red Time** has elapsed.

A.8.5.3.2 Shutdown Red Violation

When the **Shutdown Red** interval has been active for **Red Violation Clearance** time and the passage detector changes to actuated, the **Shutdown Red** interval shall be extended by the **Red Violation Adjustment Time**.

A.8.5.3.3 Priority Shutdown Red Delay

For each metered lane in a dependency group whose **Signal Service Mode** is not '**None'** and whose **Lane Number** is not the **Priority Lane Number**, the higher of the time remaining in the **Shutdown Red** interval and the **Priority Lane Red Delay Time** shall be used as the time remaining in the **Shutdown Red** interval when demand detector is actuated for the **Priority Lane Number**. This delays the issuance of the green for the next lane in the sequence when there is demand on the priority lane.

A.8.5.3.4 Termination of Shutdown Red

A.8.5.3.4.1 Normal Termination of Shutdown Red

For each metered lane in a dependency group whose **Signal Service Mode** is '**None'**, the **Shutdown Red** interval will be terminated when:

1. The **Shutdown Red** interval has expired, and

2. The demand detector is actuated,
   or
   the **Demand Detector Status** is '**Recalled'**,
   or
   the **Demand Detector Status** is not '**Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

3. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Mutex'**, the **Shutdown Red** interval will be terminated when:

1. The **Shutdown Red** interval has expired, and

2. No other metered lane in the dependency group is in the **Shutdown Green** interval, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is **'Enable Call'**, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Fixed Offset'**, the **Shutdown Red** interval will be terminated when:

1. The **Shutdown Red** interval has expired, and

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2. No other metered lane in the dependency group has begun its **Shutdown Green** interval within **Green Offset Time**, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'** and the **Demand Detector Mode** is '**Enable Call'**, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

For each metered lane in a dependency group whose **Signal Service Mode** is '**Fractional Offset'**, the **Shutdown Red** interval will be terminated when:

1. The **Shutdown Red** interval has expired, and

2. No other metered lane in the dependency group has begun its **Shutdown Green** interval within the higher of the fractional offset time and the **Minimum Fractional Offset Time**, and

3. The metered lane is the next lane in the **Ramp Lane Sequence** whose demand detector is actuated,
   or
   whose **Demand Detector Status** is '**Recalled'**,
   or
   whose **Demand Detector Status** is NOT **'Working'**, and the **Demand Detector Mode** is **'Enable Call'**, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**.

A.8.5.3.4.2 Shutdown Short Stop

When the **Short Stop Time** is non-zero, the **Shutdown Red** interval shall be terminated when:

1. The **Shutdown Red** interval has expired, and

2. The demand detector is not actuated, and

3. The **Short Stop Time** has expired, and

4. The **Merge Override Flag** is '**False'**,
   or
   the **Merge Override Flag** is '**True'** and the **Queue versus Merge Flag** is '**True'**, and

5. The **Queue Detector Status** is '**Disabled'**,
   or
   the **Queue Detection Mode** is '**Occupancy'** and the occupancy on the queue detector whose **Queue Detector Number** is the **Short Stop Queue Number** for the preceding calculation interval exceeds the **Short Stop Occupancy Threshold**.

This allows for either time- or occupancy-based shutdown short stop.

A.8.5.3.4.3 Shutdown Long Stop

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If the **Shutdown Red** interval has expired and the passage detector is actuated, the **Shutdown Red** interval shall be extended by the **Long Stop Time**. At the end of this extended **Shutdown Red** interval, the **Shutdown Red** interval shall be terminated.

A.8.5.3.4.4 Shutdown Demand Gap

When the **Demand Red Time** is non-zero, if the demand detector is not actuated for the **Demand Gap Time** after the **Shutdown Red** interval has expired, the **Shutdown Red** interval shall be extended by the **Demand Red Time** after the demand detector becomes actuated. At the end of this extended **Shutdown Red** interval, the **Shutdown Red** interval shall be terminated.

A.8.5.3.5 End of Shutdown Metering

Shutdown metering shall terminate when:

1. The **Shutdown Time** (0-600 s in 1-s increments) has elapsed, and
2. The **Queue Detected Flag** is '**False**' for each queue detector, and
3. A gap in excess of **Shutdown Gap Time** (0, 1.0-10.0 s in 0.1-s increments) has been detected on the demand detector for each metered lane in the dependency group whose **Signal Service Mode** is not '**None**'.

While each **Queue Detected Flag** is '**False**', the shutdown gap time shall be reduced by **Shutdown Gap Reduction Value** (0-10.0 s in 0.1-s increments) every **Shutdown Gap Reduction Time** (0-20 s in 1-s increments). If a queue is detected, gap reduction shall be suspended. When the queue is cleared, gap reduction shall resume.

When the initial value of **Shutdown Gap Time** is zero, the termination of shutdown metering is dependent only on **Shutdown Time**.

A.8.5.4 Shutdown Warning

The **Shutdown Warning** interval shall terminate when the **Shutdown Warning Time** (0-60.0 s in 0.1-s increments) has elapsed unless the **Implemented Action** is '**Emergency Green'**.

A.8.6 NON METERING OPERATION

Upon completion of the **Shutdown Warning** interval, the **Non-Metering** state shall begin.

A.8.6.1 Post-metering Green

The **Post-metering Green** interval shall terminate when the **Post-metering Green Time** (0-60.0 s in 0.1-s increments) has elapsed.

A.8.6.2 Pre-metering Green

If the **Implemented Action** is '**Traffic Responsive'** or **'Rest-in-Green'**, then the metered lane shall enter the **Pre-metering Green** interval.

A.8.6.3 Pre-metering Non-green

If the **Implemented Action** is '**Dark'**, then the metered lane shall enter the **Pre-metering Non-green** interval.

If any other metered lane in the same dependency group has a **Signal Service Mode** of NOT **'None'** and is in a state other than the **Non-Metering** state, then the metered lane shall enter the **Pre-metering Green** interval. In this case, the **Implemented Action** shall be '**HoldRestInGreen**' and shall remain there until either

a.) the **Requested Action** is NOT '**Dark**', or

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b.) all the other remaining metered lanes in the same dependency group enter the **Non-Metering** state.

A.9 QUEUE OVERRIDE

A.9.1 QUEUE DETECTION

The **Queue Detection Mode** parameter shall operate as follows:

a. Disabled - no queue detection shall occur and the **Queue Detected Flag** shall be '**False'**.

b. Count - when the **Queue Detected Flag** is '**False'** and the difference between the vehicle counts at the queue detector and the passage detector exceeds the **Queue Length Upper Limit** (0-100 vehicles in 1-vehicle increments), the **Queue Detected Flag** shall be set to '**True'**; otherwise, it shall remain '**False'**.

When the **Queue Detected Flag** is '**True'** and the difference between the vehicle counts at the queue detector and the passage detector is below the **Queue Length Lower Limit** (0-100 vehicles in 1-vehicle increments), the **Queue Detected Flag** shall be set to '**False'**; otherwise, it shall remain '**True'**.

c. Occupancy - when the **Queue Detected Flag** is '**False'** and the preceding calculation interval occupancy at the queue detector exceeds the **Queue Occupancy Upper Limit** (0-100.0 percent in 0.1-percent increments) for **Queue Occupancy Upper Delay** time (0-30 intervals in 1-interval increments), the **Queue Detected Flag** shall be set to '**True'**; otherwise, it shall remain '**False'**.

When the **Queue Detected Flag** is '**True'** and the preceding calculation interval occupancy at the queue detector is below the **Queue Occupancy Lower Limit** (0-100.0 percent in 0.1-percent increments) for **Queue Occupancy Lower Delay** time (0-30 intervals in 1-interval increments), the **Queue Detected Flag** shall be set to '**False'**; otherwise, it shall remain '**True'**.

d. Quick occupancy - when the **Queue Detected Flag** is '**False'** and the occupancy at the queue detector exceeds the **Queue Quick Occupancy Upper Limit** (0-100.0 percent in 0.1-percent increments) for **Queue Quick Occupancy Upper Delay** time (0-30.0 s in 0.1-s increments), the **Queue Detected Flag** shall be set to '**True'**; otherwise, it shall remain '**False'**.

When the **Queue Detected Flag** is '**True'** and the occupancy at the queue detector is below the **Queue Quick Occupancy Lower Limit** (0-100.0 percent in 0.1-percent increments) for **Queue Quick Occupancy Lower Delay** time (0-30.0 s in 0.1-s increments), the **Queue Detected Flag** shall be set to '**False'**; otherwise, it shall remain '**True'**.

A.9.2 QUEUE ADJUSTMENT

The **Queue Adjustment Mode** parameter shall operate as follows:

a. Rate - the **Queue Adjustment Rate** (0, 5-1800 vph in 1-vph increments) shall represent an increase to the current metering rate. The **Queue Adjustment Rate Iterations** (0, 1-20 iterations in 1-iteration increments) shall identify the maximum number of times the **Queue Adjustment Rate** will be added to the current metering rate. This adjustment shall occur every **Queue Adjustment Rate Delay** time (20-240 s in 1-s increments) while the **Queue Detected Flag** is '**True'**. The **Queue Adjustment Rate Limit** (0, 120-1800 vph in 1-vph increments) shall represent the highest metering rate at which the metered lane shall be metered. If the current metering rate is greater than the **Queue Adjustment Rate Limit**, then no adjustment shall be made.

When the **Queue Detected Flag** is '**False'**, the reverse process shall occur. The **Queue Adjustment Rate** shall be subtracted from the current metering rate. This decrease shall take place every **Queue Adjustment Rate Delay** time until the appropriate metering rate is reached.

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b. Level - the **Queue Adjustment Level** (0, 1-5 levels in 1-level increments) shall represent a decrease to the current metering level. The **Queue Adjustment Level Iterations** (0, 1-5 iterations in 1-iteration increments) shall identify the maximum number of times the **Queue Adjustment Level** will be subtracted from the current metering level. This adjustment shall occur every **Queue Occupancy Level Delay** time (20-240 s in 1-s increments) while the **Queue Detected Flag** is '**True'**. The **Queue Adjustment Level Limit** (0, 1-5 levels in 1-level increments) shall represent the lowest metering level at which the metered lane shall be metered. If the current metering level is less than the **Queue Adjustment Level Limit**, then no adjustment shall be made.

   When the **Queue Detected Flag** is '**False'**, the reverse process shall occur. The **Queue Adjustment Level** shall be added to the current metering level. This decrease shall take place every **Queue Adjustment Level Delay** time until the appropriate metering level is reached.

   Level Adjustment Mode can only be used when the **Implemented Action** is '**Traffic Responsive'**. If the **Implemented Action** is NOT '**Traffic Responsive'**, no adjustment will be made.

c. Fixed - the **Queue Replacement Rate** (0, 600-1800 vph in 1-vph increments) shall represent a replacement of the **Base Metering Rate** while the **Queue Detected Flag** is '**True'**. When the **Queue Detected Flag** is '**False'**, the reverse process shall occur. The **Queue Replacement Rate** shall be replaced with the **Base Metering Rate**.

Each metered lane shall have a **Queue Adjustment Usage** parameter indicating the process by which adjustments will be combined from each of its queue detectors. This parameter shall operate as follows:

a. Additive - the queue override adjustment from each queue detector whose **Queue Detected Flag** is '**True'** shall be combined into one adjustment.

b. AdditiveXI - the queue override adjustment from each queue detector whose **Queue Detected Flag** is '**True'** and whose **Queue Type** is '**Excessive'** shall be combined into one adjustment. If there are no such detectors, the queue override adjustment from each queue detector whose **Queue Detected Flag** is '**True'** and whose **Queue Type** is '**Intermediate'** shall be combined into one adjustment.

c. PriorityXI - the queue override adjustment from the highest priority queue detector whose **Queue Detected Flag** is '**True'** and whose **Queue Type** is '**Excessive'** shall be applied. If there is no such detector, the queue override adjustment from the highest priority queue detector whose **Queue Detected Flag** is '**True'** and whose **Queue Type** is '**Intermediate'** shall be applied.

A.10 PHYSICAL OUTPUTS

Physical input or output numbers set to a value of 255 shall not be used.

A.10.1 RMC GLOBAL

The RMC shall have an Advance Warning Sign Output Number**. When all metered lanes of the RMC are in the** Non-Metering **state, the RMC advance warning sign shall be OFF; otherwise, it shall be ON.**

A.10.2 DEPENDENCY GROUP

Each dependency group shall have a **Merge Detector Physical Input Number**.

Each dependency group shall have an **Advance Warning Sign Physical Output Number**. When all metered lanes of the dependency group whose **Signal Service Mode** is not '*None*' are in the **Non-**

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Metering state, the dependency group advance warning sign shall be OFF; otherwise, it shall be ON.

A.10.3 METERED LANES

Each metered lane shall have a **Demand Detector Physical Input Number** and a **Passage Detector Physical Input Number**.

Each queue detector shall have a **Queue Detector Physical Input Number**.

Each metered lane shall have a **Red Physical Output Number**, a **Yellow Physical Output Number** and a **Green Physical Output Number**. The signal indications shall operate as shown in Figure 3.

Each metered lane shall have an **Advance Warning Sign Physical Output Number**. When the metered lane is in the **Non-Metering** state, the metered lane advance warning sign shall be OFF; otherwise, it shall be ON.

A.10.4 MAINLINE LANES

Each mainline lane shall have an **Upstream Detector Physical Input Number** and a **Downstream Detector Physical Input Number**.

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