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Standard Specification for Archiving ITS-Generated Traffic Monitoring Data¹

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1. Scope

1.1 This specification describes data elements and schema for an archived data management system for intelligent transportation system (ITS)-generated traffic monitoring data, including conventional traffic monitoring data, data collected directly from ITS systems, and travel-time data from probe vehicles. It establishes the names of the data elements, their interrelationships, and their procedural definitions. These procedural definitions include data collection instrumentation and methodology as well as recommended procedures for calculating traffic statistics.

1.2 This specification is intended for primary use by archived data management system (ADMS) developers and administrators. It also can be used by traffic operations and planning stakeholders who need to understand the contents of the ADMS. ITS systems exist across a variety of governmental levels, and the data archived in such a system would be available to all levels of government and the private sector, making this specification applicable to all levels of government and the private sector.

1.3 Many users might wish to develop integrated archived traffic data management systems that include both ITS-generated data and data collected from conventional traffic-monitoring programs. The latter use requires a superset of data elements to meet the articulated nature of a conventional traffic-monitoring program. This specification will describe a basic set of data elements applicable to ITS-generated traffic data and the additional data elements required for conventional traffic-monitoring programs. In the following discussion, the specification for the system for ITS-generated data will be referred to as the “basic system,” and the one for ITS plus conventional traffic-monitoring data will be denoted the “extended system.” Travel-time data from probe vehicles are stored in separate tables that can be linked through the roadway link identifiers.

1.4 This specification is applicable to traffic data collected by ITS and stored in an ADMS. Similarly, this specification

¹ This specification is under the jurisdiction of ASTM Committee E17 on Vehicle - Pavement Systems and is the direct responsibility of Subcommittee E17.52 on Traffic Monitoring.

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also can be used with other types of historical and monitored traffic data collected and stored in an ADMS, including travel-time data from probe vehicles.

1.5 The applications of “near-real-time” traffic data, such as an automated transit information system (ATIS), are not addressed in this specification. In many cases, traffic data to be archived will be provided by a real-time system, but these systems are considered data sources rather than data repositories.

1.6 This specification specifies a logical data structure for an archived traffic data management system.

1.7 Metadata requirements are specified for these systems. Actual metadata are provided for the elements defined in this specification. Placeholders are included for the metadata elements that are specific to a given installation. All metadata specifications follow the requirements of Practice E2468.

1.8 This specification assumes the existence of quality-checked data. The quality checks to be applied should be, at a minimum, those specified in the AASHTO Guidelines for Traffic Data Programs (1),² where applicable. As quality checks are developed for ITS-generated traffic data, they should be used. All checks used should be specified in the metadata for the archive.

1.9 The summary statistics stored in the archive are assumed to have been calculated in a standard way by the software that “feeds” the archive. These standard calculations should be those specified in the AASHTO Guidelines for Traffic Data Programs (1). Any exceptions to these computational methods should be defined in the metadata for the archive.

1.10 This specification assumes the existence of a road network database but does not specify the nature of this database. Both traffic and travel-time measurements occur on a road network, but the specification of that network is outside the scope of this specification. The entities defined in this specification will specify a “link location” or “link description” entity that will contain foreign keys to an unspecified road network entity.

² The boldface numbers in parentheses refer to the list of references at the end of this standard.

1.11 This specification assumes the existence of a location-referencing system and does not specify a standard for location referencing.

1.12 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.13 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.14 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*³

E867 Terminology Relating to Vehicle-Pavement Systems

E2259 Guide for Archiving and Retrieving Intelligent Transportation Systems-Generated Data

E2468 Practice for Metadata to Support Archived Data Management Systems

2.2 *IEEE Standard:*⁴

IEEE 1489 Standard for Data Dictionaries for Intelligent Transportation Systems

2.3 *ITE Standard:*⁵

TM 1.03 Standard for Functional Level Traffic Management Data Dictionary (TMDD)

2.4 *ISO Standard:*⁶

ISO 14817 Transport Information and Control Systems—Requirements for an ITS/TICS Central Data Registry and ITS/TICS Data Dictionaries

2.5 *NTCIP Standards:*⁷

NTCIP 1206 Object Definitions for Data Collection

NTCIP 1209 Data Element Definitions for Transportation Sensor Systems (TSS)

3. Terminology

3.1 *Definitions*—For definitions relating to vehicle-pavement systems, see Terminology **E867**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *aggregate, v*—to process or combine like items into a category, for example, adding together 30 s traffic volume counts or averaging speeds from lane-by-lane detectors that are parts of the traffic data-counting station to be the total traffic volume or average speed at that traffic-counting station for a 5 min time period.

3.2.2 *aggregation, n*—resultant set of aggregated data associated with an aggregating process.

3.2.3 *archived data management subsystem, n*—subsystem of the National ITS architecture that provides a means for several organizations to collect, store, and subsequently analyze and retrieve data from ITS data sources, usually by way of one or more ITS centers.

3.2.4 *archived data management system, n*—specific implementation of an archived data management subsystem within the context of a local, regional, or statewide ITS architecture.

3.2.5 *archived data user service (ADUS), n*—one of the ITS user services that defines the scope of the National ITS architecture with regard to archiving and retrieving ITS-generated data.

3.2.6 *attribute, n*—defined property or characteristic; subset of an entity.

3.2.6.1 *Discussion*—In common terms, an attribute is typically a column in a relational database or a property in an object-oriented environment.

3.2.7 *compound element, n*—group or combination of groups of metadata elements.

3.2.7.1 *Discussion*—All compound elements are described by metadata elements either directly or through intermediate compound elements. Compound elements represent higher-level concepts that cannot be represented by individual metadata elements.

3.2.8 *data, n*—quantitative or qualitative representation that is observed, measured, collected, or gathered that characterizes some static or dynamic attribute of the physical world or the use of it by individuals or groups of people and is suitable for communication, interpretation, or processing by humans or machines.

3.2.9 *data dictionary, n*—information construct that describes the particular data stored in a database typically in terms of a common set of attributes that include the meaning, concept, and use; see IEEE 1489.

3.2.10 *data element, n*—data item that is a basic building block of a data dictionary which is a formal representation of some single unit of information of interest with a singular instance value at any time about some entity of interest.

3.2.11 *data quality, n*—fitness of data for all purposes that require them.

3.2.11.1 *Discussion*—Examples of data quality measures include accuracy, completeness, coverage, and timeliness.

3.2.12 *data set, n*—logical collection of data that supports a user function and could include one or more data tables, files, or sources.

3.2.13 *database, n*—collection of related data typically organized in a computerized record-keeping system that is part of

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ Available from IEEE, Publications Office, 10662 Los Vaqueros Circle, P.O. Box 3014, Los Alamitos, CA 90720-1264.

⁵ Available from the Institute of Transportation Engineers, 1099 14th St., NW, Suite 300 West, Washington, DC 20005-3438.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁷ Available from the National Transportation Communications for ITS Protocol (NTCIP), www.ntcip.org.