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Standard Practice for Acquiring Intersection Turning Movement Traffic Data[1]

This standard is issued under the fixed designation E2667; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice for intersection turning movement data acquisition was developed to improve its quality by specifying the data items to be collected and a procedure for documenting the results. Such a practice will provide the ability to compare these data over time within governmental agencies and among different governmental agencies. While there are national and international standards for road segment traffic data, there is not a practice for intersection turning movement data acquisition.

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

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E2300 Specification for Highway Traffic Monitoring Devices

E2532 Test Methods for Evaluating Performance of Highway Traffic Monitoring Devices

3. Terminology

3.1 *Definitions:*

3.1.1 *base data integrity, n*—retention of original collected data in uncorrupted form.

3.1.2 *truth in data, n*—description of how data are collected, summarized, reported and retained so potential data users can recalculate summary statistics from the original collected data.

3.1.3 *vehicle count (volume), n*—total number of vehicles observed or predicted to pass a point on a lane or roadway during a specified time interval (see Specification E2300 and Practice E2532).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *adaptive control, n*—a traffic signal controller that continuously changes the timing of signal phases based on interpretation of traffic information received from multiple sensors.

3.2.2 *beacon, n*—a flashing signal at an intersection that may be constant or actuated.

3.2.3 *intersection turning movement, n*— vehicle movement by lane to and through an intersection.

3.2.4 *intersection turning movement count, n*—total number of vehicles observed or predicted to move by lane to and through an intersection during a specified time interval.

3.2.5 *intersection turning movement count, n*—total number of vehicles observed or predicted to move by lane to and through an intersection during a specified time interval.

3.2.6 *pretimed control, n*—a traffic signal controller that changes signal phases based on a fixed time period.

3.2.7 *total intersection traffic, n*—total number of vehicles in all lanes observed to pass to and through an intersection during a specified time interval.

4. Significance and Use

4.1 This practice will permit various agencies to compare intersection turning movement data using two foundational principles, truth in data and base data integrity. These two principles help ensure that intersection turning movement counts can be correctly interpreted and appropriately used to improve the safe and efficient operation of intersections. The principles may be summarized as follows:

4.1.1 *Truth in data principle*—The truth in data principle provides information that assists potential data users to understand what the data do and do not mean. The opportunity to collect data that advise safe and efficient transportation carries with it the obligation to report how the data were collected, edited, summarized, and reported.

4.1.2 *Base data integrity principle*—The principle of base data integrity retains the field data collected. In keeping with the principle of base data integrity, it is possible to look at the

[1] This practice 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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[2] 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.

original data to verify any subsequent changes to the data. In intersection turning movement and other data collection activities, field data may be edited, adjusted, and then summarized and reported. Whatever steps are taken to ensure the quality of the data summarized, the base data must not be corrupted. In keeping with the principle of truth in data, editing and adjustments are documented.

5. Procedure

5.1 The following information will be provided for each intersection turning movement count. If the information sought is not applicable, "NA" should be entered. If the information sought was not collected, "NC" should be entered. A response to each item is required for the turning movement count to be accepted.

5.1.1 *Intersection Type*

5.1.1.1 Intersection Diagram:

(1) Approach:

(A) Location (point of reference):

(i) Physical description of the intersection

(ii) Global positioning system (GPS) location:

(a) Device type

(b) Measurement error

NOTE 1—The maximum acceptable error is ±10 ft (3 m).

(B) Bearing angle

NOTE 2—The maximum acceptable error is ±10°.

(C) Lanes

(D) Traffic control:

(i) Unsignalized:

(a) No control

(b) Sign

(c) Beacon

(ii) Signalized:

(a) Pretimed control

(b) Actuated control

(c) Adaptive control

5.1.1.2 Land use:

(1) Institute of Transportation Engineers (ITE) land-use code:[3]

(A) The land use is coded for each intersection approach.

(B) Land-use location is based on the physical description of the intersection in 5.1.1.1*(1)(A)(i)*

(2) Nearest curb cut to the intersection for each approach:

(A) Distance is measured from the closest edge of the curb cut to the intersection corner.

(B) The intersection corner is formed by the side of the street on which the nearest curb cut is located and a point on line with the intersecting street curb.

NOTE 3—The maximum acceptable error is ±10 ft (3 m).

5.1.2 *Count Context*

5.1.2.1 Person(s) simultaneously recording the turning movements based on the number of concurrent movements to count:

(1) Number of persons

(2) Positioning of persons:

(A) Intersection quadrant

(B) GPS location

5.1.2.2 Technology used to record the turning movements:

(1) Device type(s), serial number(s), and software version(s)

(2) Number of devices

(3) Positioning of devices

(4) Manufacturer guidance on number of devices and positioning

5.1.2.3 Confirmation of representative traffic conditions:

(1) Date and time

(2) Incident(s) during count period one major intersection in each direction

(3) Street construction during count period three major intersections in each direction

5.1.2.4 Weather:

(1) Impact on the traffic data from specific weather during the intersection turning movement count

(2) Impact on the traffic data from seasonal weather characteristics (such as time of sunrise and sunset for obscuring some technology based observations)

5.1.3 *Count*

5.1.3.1 Count day, time, and period

5.1.3.2 Count type:

(1) Manual:

(A) Paper data entry

(B) Computer data entry and summarization interval

(2) Machine data summarization interval by device type

5.1.3.3 Break or interruption of the count:

(1) Time

(2) Duration

(3) Cause

5.1.3.4 Data type:

(1) Volume

(2) Classification:

(A) Passenger car and truck

(B) Federal Highway Administration (FHWA) 13 vehicle classification[4]

(C) Other

(3) Pedestrian

(4) Bicycle

(5) Other

5.1.3.5 Base data retention:

(1) Period

(2) Format:

(A) Electronic

(B) Print

5.1.4 *Count Consistency with Reference Dataset*

5.1.4.1 Reference dataset:

(1) Data type:

(A) Volume

(B) Classification:

[3] *Trip Generation*, 7th Edition, Institute of Transportation Engineers, Washington, D.C., 2003.

[4] *Heavy Vehicle Travel Information System Field Manual*, Office of Highway Policy Information, Federal Highway Administration, March 2002, www.fhwa.dot.gov/policyinformation.

(i) Passenger car and truck
(ii) Federal Highway Administration (FHWA) 13 vehicle classification
(iii) Other
(C) Pedestrian
(D) Bicycle
(E) Other
(2) Period:
(A) Short-term traffic monitoring by approach
(B) Continuous traffic monitoring at one or more approaches
(C) Other
(3) Method:
(A) Pneumatic tube
(B) Inductive loop
(C) Camera:
(i) Video recording for manual post-processing identification of turning movements
(ii) Video image processing for computerized, real-time identification of turning movements
(D) Other

5.1.4.2 Measurement Comparison:
(1) Difference between the total intersection turning movement count and the reference dataset

NOTE 4—The maximum difference between the intersection turning movement count and the reference dataset is ±10 % of total intersection traffic for the complete count period.

(2) Difference between the total intersection AM peak hour turning movement count and the reference dataset

NOTE 5—The maximum difference between the intersection turning movement count and the reference dataset is ±10 % of total intersection traffic in the AM peak hour.

(3) Difference between the total intersection PM peak hour turning movement count and the reference dataset

NOTE 6—The maximum difference between the intersection turning movement count and the reference dataset is ±10 % of total intersection traffic in the PM peak hour.

5.1.5 *Turning Movement Count Repeatability*
5.1.5.1 Personnel:
(1) Method of establishing repeatability of manual counts (for example, post-training or other side-by-side counts of the same intersection turning movements)
(2) Repeatability of manual counts by type of intersection

NOTE 7—The maximum acceptable difference is ±10 % for the total turning movement count, the AM peak hour, and the PM peak hour.

5.1.5.2 Technology:
(1) Manufacturer estimate of error (for example, ±5 % for 95 % of the data summarization intervals during a 24-h period)
(2) Field errors:
(A) Method of establishing repeatability of technology based counts:
(i) Visual comparison
(ii) Side-by-side count
(iii) Other
(B) Repeatability of technology based counts by type of intersection:
(i) At the specific intersection
(ii) By intersections grouped on the basis of:
(a) Traffic volume
(b) Number of approaches
(c) Functional classification
(d) Other

5.1.6 *Data Reduction*
5.1.6.1 Data assessment:
(1) Missing data
(2) Inaccurate data (see 5.1.4.2)
5.1.6.2 Data construction:
(1) Data completion
(2) Data modification
5.1.6.3 Data representation:
(1) Summary statistics
(2) Tabular presentation
(3) Graphic presentation
(4) Images
(5) Words
5.1.6.4 Data reduction retention:
(1) Period
(2) Format:
(A) Electronic
(B) Print

5.1.7 *Count Narrative*
5.1.7.1 Personnel:
(1) Who conducted the count:
(A) Organization
(B) Names of personnel
(2) Who prepared this report for submittal:
(A) Name
(B) Title
(C) Contact information
5.1.7.2 Observation of uncounted intersection movements:
(1) Avoidance of intersection by cutting through adjacent property:
(A) Count:
(i) Time
(ii) Location
(B) Uncounted approximation:
(i) Time
(ii) Location
5.1.7.3 Observation of illegal intersection movements:
(1) Vehicle:
(A) Description of movement
(B) Description of vehicle or vehicles
(C) Count
(D) Uncounted approximation
(E) Time
(F) Location
(2) Bicycle:
(A) Description of movement
(B) Description of vehicle or vehicles
(C) Count
(D) Uncounted approximation
(E) Time

(F) Location
(3) Pedestrian:
(A) Description of movement
(B) Count
(C) Uncounted approximation
(D) Time
(E) Location

5.1.7.4 Other observations that clarify the count

5.1.7.5 Other observations that clarify the safety and operation of the intersection

6. Report

6.1 The person responsible for collecting the turning movement data or their designated representative shall prepare a written report when data acquisition is complete. The report shall include the information enumerated in Section 5 that describes the intersection, methodology, and traffic data collected.

7. Keywords

7.1 base data integrity; intersection turning movement data; traffic intersection; traffic monitoring; truth in data