

For Federal Highway Administration

**Separated Bike Lanes Planning and Design Guide  
Data Collection Information  
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Appendix E: Recommended Separated Bike Lane (SBL) Data Collection Protocol

This appendix contains data collection recommendations for practitioners at the local, regional, and state level that have implemented or are considering Separated Bike Lanes. It describes the counts to be collected, and the type of information that should be supplied to properly identify the location and the nature of the count. Counts should be collected at selected locations before commencing SBL construction, and again at the same location several months to a year after the facility has been opened. It is recommended that counts be repeated at periodic intervals after the facility is constructed, as usage of many facilities does not develop immediately upon project completion.

Minimum Requirements

The minimum parameters in the table on the following page will yield useful data for documenting the success of a SBL project with respect to its use and safety. The recommended parameters will generate data that will allow comprehensive evaluation of the SBL as an element in a larger network of bicycle facilities.

Best Case Scenario

In the best case scenario, discussed in the pages after the minimum data collection table, the before-and-after counting will generate data that can be imported into the forthcoming bicycle and pedestrian element of the FHWA Traffic Monitoring Analysis System (TMAS). To import data in TMAS, it must support all the critical (required) data elements laid out in the FHWA Traffic Monitoring Guide (the TMG format). The remainder of this document explains the relevant elements of the TMG format, as well as the programmatic elements required to gather high quality counts (for example, the duration of counts, and the number of days). Note that all of the information provided after the table on the following page applies to the best case scenario.

**Minimum Data Collection Before and After Construction of Separated Bike Lane**

Before and After Construction of Separated Bike Lane	Data Element	Minimum	Preferred	After Construction Data Consideration	Notes
<b>Volume of Bicyclists</b>	Manual count duration/day	4 hours/day	All Daylight Hours	Ensure compatible time periods as before counts	Suggested times: 4 hours in a row; do not split morning and evening
	Manual count days	3 days	14 Days	Ensure comparable weather conditions and days of the week as before counts	
	Automatic count duration	24 hours/day	24 hours/day	Ensure compatible time periods as before counts	
	Automatic count days	7 days	14 Days	Ensure comparable weather conditions and days of the week as before counts	
	Documentation of count locations	All	All	Same count locations as before counts	Adequate documentation of all count locations (see document text)
<b>Travel Characteristics</b>	Traveling direction	All bicyclists in any direction	Each direction separately		
	Wrong way riding	Not counted separately	"Wrong" and "Right" directions separately		Which side of the road the wrong way riders were on is essential, so there might be two counts (wrong way in each direction)
	Facility on which bicyclists are traveling	All lanes together	Each lane separately		e.g. Shared Lane, Bike Lane, Sidewalk
<b>Crashes</b>	Identify and compile all available crash records in the project vicinity	All available	All available		Ideally data will include coded locations of crashes, date/time of crashes, severity of crash, and documentation of circumstances

## Where to Count

The recommended location for counts is at a mid-block location along the alignment of the proposed Separated Bike Lane at some distance from major entry and exit points. In addition, if desired, counts may be collected mid-block on intersecting facilities near the Separated Bike Lane. If major intersections occur within the project boundary, agencies should collect counts on segments of the proposed Separated Bike Lane on each side of such intersections. Counting at intersections is not necessary if sufficiently detailed mid-block counts are collected (see the section on “What to count”). Finally, if the Separated Bike Lane is being built in a context with nearby parallel roadways (or parallel multiuse off-road trails) that may carry bicycle traffic to similar destinations and for similar purposes as the Separated Bike Lane, it will be desirable to count traffic on those parallel roadways as well, both before and after Separated Bike Lane construction. The purpose of the parallel roadway counts is to evaluate the volume of “new” traffic as well as trips that have simply re-routed from the adjacent roadway.

## What to Count

Counts of bicyclists should be conducted in sufficient detail to provide information about changes of behavior of existing cyclists as well as presence of new cyclists. It is not sufficient simply to report a count of all bicyclists traveling in all directions near the count location. At a minimum, the following counts should be provided for each direction of motorized traffic at each count location prior to constructing the Separated Bike Lane:

- Cyclists traveling in the same direction as legal traffic in the same lane
  - In lanes shared with motor vehicles
  - In a dedicated bicycle lane (if one exists)
  - On the right side sidewalk (if one exists)
- Cyclists traveling in the direction opposite to the posted direction (wrong way) as adjacent traffic
  - In lanes shared with motor vehicles
  - In a dedicated bicycle lane (if one exists)
  - On the left side sidewalk (if one exists)

It is important to record separately bicycles traveling in each direction on the “correct” or “wrong” side of the road because one of the potential benefits of Separated Bike Lanes is reduction of “wrong way” bicycling.

After the Separated Bike Lane has been constructed, the same set of counts should be performed:

- Cyclists traveling in the same posted direction as adjacent traffic
  - In lanes shared with motor vehicles
  - In the Separated Bike Lane
  - On the right side sidewalk (if one exists)
- Cyclists traveling in the direction opposite to the posted direction (wrong way) as adjacent traffic
  - In lanes shared with motor vehicles

- In the Separated Bike Lane
- On the left side sidewalk (if one exists)

Note that the direction of travel with respect to “adjacent traffic” in a two-way Separated Bike Lane should refer to intended direction of bicycle traffic on each side of that facility. Also note that if a contraflow Separated Bike Lane or bicycle lane is being counted, the adjacent traffic again refers to the intended direction of bicycle traffic in the lane. In a shared lane, the direction of adjacent traffic is the direction that motor vehicles would legally move if they were operated on the same side of the street as the bicycle. If a bicycle lane is not marked with directional indicators, the direction of adjacent traffic is determined by the direction in which legal motorized traffic would be traveling in the next adjacent lane. On a sidewalk, the direction of adjacent traffic is the direction of motorized traffic in the nearest motorized lane (not the nearest bicycle lane).

If counts are conducted on parallel roadways or trails, the same level of detail should be collected as for the Separated Bike Lane roadway. Such counts are not required, but are strongly encouraged if an anticipated effect of the Separated Bike Lane is to divert existing bicyclists from these alternate facilities.

If counts are conducted on intersecting facilities, the same level of detail may be sought as for the Separated Bike Lane facility itself, but it is not expected. Agencies may conduct more aggregate counts (e.g. all traffic without regard to lane or direction) on those facilities for limited time periods, or may elect not to do any such counts.

#### Notes on the Traffic Monitoring Guide

These recommendations are designed to support coding data in the format recommended in the current (September 2013) edition of the Traffic Monitoring Guide (TMG). While that format allows for very detailed specification of count type and location, the current format does NOT distinguish between paint-separated and physically-separated facilities (see the Crosswalk variable). A coding extension will be supplied to distinguish painted lanes from Separated Bike Lanes.

Further note that the TMG does not have formal codes to distinguish male or female riders or other observable demographic characteristics (age, helmet use, type of bicycle, auxiliary equipment such as lights or panniers, etc.). It may be interesting to collect such data for the Separated Bike Lane study, but agencies are not expected to do so as the resources required may be onerous (due to the cost of manual or video collection, and the difficulty of covering sufficient time periods as requested in the next section).

### When to Count

Counts should ideally be conducted for a 24-hour period over a consecutive stretch of two or three weeks. Such counts are generally only feasible with automated equipment (either automatic counters or video collectors). If manual counts are conducted, then at a minimum, per the Traffic Monitoring Guide, counts should be conducted for 4 hour peak periods over a full week (weekdays and weekends). The same four hours should be counted each day. Ideally, a full 24-hour count will be conducted on at least one weekday to verify that the 4-hour counts occur during reasonable peak periods of use. Site

observation may be conducted prior to the formal count to identify a reasonable peak period, but it is important to recognize that the construction of the facility may also shift the peak period (e.g. by helping bicyclists feel more comfortable riding during peak hours of motorized traffic).

### Forms for Data Collection

This section describes the information that should be gathered during data collection, and includes a sample form. The data elements support all required elements of the data format published in the September 2013 edition of the FHWA Traffic Monitoring Guide (<http://www.fhwa.dot.gov/policyinformation/tmguide/>).

### Station Location

The following information should be gathered for each count location (or in traffic monitoring parlance, for each “station”). Some of these elements will be constant for the entire project and may not need to be collected on a location-by-location basis. The acronym “HPMS” in this discussion refers to the “FHWA Highway Performance Monitoring System”. The reader is referred to the TMG for additional information on detailed coding of each field, including valid field values.

- State and County (TMG “L” fields 2 and 3)
  - Valid codes for State and County are described in the TMG and derive from FIPS standards used to describe Census geography
  - Additional jurisdiction information such as City or Town may be included if relevant
- Longitude and Latitude (TMG “L” fields 25 and 26)
  - GPS coordinates of the location where the data collection master device (or person) is placed
  - This is NOT sufficient to fully describe the location of tubes or individual sensors. The individual collection locations must also be described structurally using fields explained in the following sub-section (“Subject of Count”)
  - **Note:** Longitude and latitude may be provided separately for each subject of count at the agency’s discretion. However only a single set of longitude and latitude values to identify the overall station location is required.
- Station ID (TMG “L” field 4)
  - A six-character identifier for this geographic location; this ID is arbitrary but should be unique within a given State and County
  - If counting on a wide street, there may be a perceptible difference in longitude or latitude from one side to the other. The Station ID is used to unite counts of different uses at the same “place”.
- Direction of Route (TMG “L” field 6)
  - This is a conventional compass direction (N, NE, E, SE, S, SW, W, NW) describing the orientation of the adjacent motorized roadway; it does NOT imply a direction of travel (see the “Subject of the Count” section below)
  - For one-way facilities it is the posted direction of travel. For two-way facilities, it is the increasing “milepost” direction which can be obtained from the HPMS Linear Reference System (preferred if available), from physical mileposts on the roadside, or from the direction of increasing house or block numbers on the roadway.

- If the count is on a trail or road with no conventional direction (such as mileposts), the direction is arbitrary but the same choice should be used for counts taken later at the same location (e.g. after the Separated Bike Lane is constructed)
- Functional Classification of the Roadway (TMG “L” field 5)
  - A table of valid codes is presented in the TMG, including a code for off-road trail facilities that might be counted as a parallel facility

The following station location elements are optional, but strongly encouraged if they are available:

- Posted Speed Limit (TMG “L” field 21)
  - Speed posted in miles per hour on the adjacent motorized roadway
- National Highway System (TMG “L” field 24)
  - True or false if the road is part of the National Highway System
- Posted Route Signing (TMG “L” field 27)
  - TMG contains a table of valid codes
  - Code the highest classification route number appearing on signs posted along the facility
- Route Number (TMG “L” field 28)
  - Record the route number appearing in the posted sign (previous field)
- HPMS Segment Identification (TMG “L” fields 29 and 30)
  - See the TMG and HPMS documentation for the LRS segment identification format
  - Useful if motorized counts on this roadway segment are also collected for HPMS
- Station Location (TMG “L” field 31)
  - A short (50 character) plain English description of the location
- Other Information (TMG “L” field 32)
  - Any special circumstances can be documented.

Note that the TMG allows entry of up to five “Factor Groups” which are used to identify comparable facilities when factoring short term counts to seasonal or annual averages. Factor Groups are a “future enhancement” and need not be collected for the Separated Bike Lane studies. If reported, however, they will be recorded.

## Subject of the Count

The “Subject of the Count” data elements describe in detail what counts are going to be collected at the station location. The actual numeric counts reported are technically the counts of these “subjects”. As noted above in the Section “What to Count”, bicyclists traveling in different directions or positions on the roadway are considered different “subjects” and separate count sets should be reported for each.

The following elements are required to define the subject of a count:

- Roadway Facility (TMG “L” field 9)
  - TMG calls this field “Crosswalk”
  - This field identifies which part of the roadway is being counted: bike lane/Separated Bike Lane, lanes shared with motor vehicles, a sidewalk, or a separate off-road facility. The field will also identify crosswalks, overpasses or underpasses, though none of those are likely relevant to the Separated Bike Lane study.
- Direction of Facility (TMG “L” field 7)
  - TMG calls this “Location of Count Relative to Roadway Orientation”

- This element records which “side” of the road the counted Roadway Facility is on (same or opposite).
- To determine Direction of Facility: Face in the Direction of Route. If the Roadway Facility is “on the right” it is “same” direction, and if it is “on the left” it is “opposite” direction
- TMG supports crossing counts, but parallel counts are recommended for the Separated Bike Lane study
- TMG also supports “both” directions, which would be appropriate if you were counting a trail that did not have a directional center stripe, or a narrow neighborhood street without a center line.
- Direction of Travel (TMG “L” field 8)
  - To determine Direction of Travel: Face in the Direction of Route. Record “same” if the bicyclists you are counting in front of you are traveling in the direction of route (away from you), and “opposite” if the bicyclists will be traveling opposite the direction of route (toward you).
  - Notice that this element has nothing to do with the Direction of Facility (the distinction is “actual” direction of travel in this field, versus “intended” direction of travel in the Direction of Facility field).
  - TMG can accept counts of “both” travel directions, but it is recommended that directional counts be collected (same/opposite), even on facilities such as trails that are intrinsically bi-directional.
  - If Direction of Travel is opposite the Direction of Facility, the bicyclist is traveling the “wrong way”
- Type of Count (TMG “L” field 11)
  - TMG supports “bicyclists” or “pedestrians” or “both” (future TMG extensions may allow for “male/female/either sex/indeterminate”, and those subjects may be counted separately if desired). For the Separated Bike Lane study, only “bicyclists” are required.
- Sensor Installation Type (TMG “L” field 12)
  - TMG calls this field “Method of Counting”
  - This should be “permanent”, “portable” or “manual” and describes how the Type of Sensor technology is installed. Permanent counters are built into the physical environment and intended to operate continuously over long periods. Portable counters are installed just for the duration of the count study. Manual counts are conducted by human beings holding portable equipment (clipboards, tablets, smartphones, etc.)
  - Note that video counts (type of sensor) should be either “permanent” or “portable” unless the video was recorded by a hand-held camera (which is unusual)
- Type of Sensor (TMG “L” field 13)
  - This element states whether a manual or automated count was collected, and what specific kind of technology was used. The TMG has a table of valid codes for different technologies and methods.
  - It is legitimate to collect manual and automated counts of the same facility at the same location, but these counts should be reported as separate “subjects”.

**Note:** The TMG data format is new, and there may be some situations that can’t be fully accounted for using the directional elements described here. Such situations will be rare in practice. Contact FHWA project staff if you cannot figure out how to collect data for your particular situation.



## Count Information

The following data items should be reported to describe and submit the counts:

- Station Location
  - This can be all the items in the first sub-section above (“Station Location”), or a conventional identifier can be used to refer to another page that contains the required information
- Subject of Count
  - This can be all the items in the second sub-section above (“Subject of Count”), or a conventional identifier can be used to refer to another page that contains the required information
- Date of Count (TMG “N” fields 17, 18 and 19)
- Duration of reported intervals (TMG “N” field 21)
  - Only certain interval durations are acceptable: 5 minute, 10 minute or 15 minute. Counts should be collected for the shortest feasible intervals (shorter if automated equipment is used, longer if manual counts are conducted)
  - Ideally, all count subjects will be counted over the same intervals (that is, if any type of bicycle traffic is counted in 5 minute intervals, then all counts should be reported in 5 minute intervals)
- Start time of first Count Interval (TMG “N” field 20)
  - Start times for each interval can be reported if desired
  - **Important:** If a count session continues past midnight, a new form with a new date should commence at midnight.
- Counts for each interval (TMG “N” fields 21 through 309 as appropriate)
  - The number of distinct “subjects” observed during the interval

The following elements are optional but strongly encouraged:

- Precipitation (TMG “N” field 14)
  - Was it raining or snowing during any count interval?
- High Temperature (TMG “N” field 15)
  - The highest temperature recorded at the station location during any count interval
- Low Temperature (TMG “N” field 16)
  - The highest temperature recorded at the station location during any count interval

