SB743 Overview Readme

This document includes definitions of the data included in this delivery as well as background information on the advantages and applications for StreetLight Data's SB 743 Metric. For more information, please refer to our published whitepaper.

Analysis Setup Details

Data Range: 03/01/2019 – 05/31/2019
Geographies: 2020 Census Block Groups
Unit of Measurement: Miles
Mode of Travel: All Vehicles
Data Source: Location-Based Services with Pass-through

Advantages and Applications of StreetLight SB 743 Metrics

OPR's technical advisory recommends VMT estimation to use the "best available data". A July 2020 comprehensive analysis of VMT estimation tools found that while travel demand models are the best available option among traditional methods, they frequently run into limitations:

- They have not been calibrated or updated recently
- They cannot reliably attribute granularity such as parcel-level VMT to resident, employee, and visitor travel
- Often, they don't account for travel outside the boundaries of the model
- They rely on vary small and often incomplete samples

For these reasons, Location Based Services (LBS) data serves as a powerful option for VMT estimation because:

- Estimations are based on contemporary data, collected from millions of mobile devices over 365 days a year with less demographic bias than household travel surveys
- Trips are calculated from start to finish with no boundaries
- Trips in different geographic regions can be compared apples-to-apples, without concern for whether the underlying survey methods are dissimilar

Description of Metrics

StreetLight Data's SB 743 Metric includes the two core components used to calculate VMT, **average trip lengths** and **daily person-trip rates**. Key to the California's Governor's Office of Planning and Research (OPR)'s technical advisory, both components are segmented by trip purpose and residence classification. This segmentation results in the nineteen unique metrics visualized in the matrix below (per VMT component). OPR recommends two summarizations for residential and commercial project estimation, Employee Home-Based-Work (HBW) and Resident Home-Based-All (HBx).

Zone X	W2H	W2O	H2W	H2O	O2W	O2H	O2O
Resident	HBx		HBx	HBx		HBx	
Worker	HBW		HBW				
Visitor	NA*		NA*				x

Resident Home-Based-All trips, shown in red, include VMT for all home-based trips. Employee Home-Based-Work trips, shown in blue, include VMT for trips to/from work from home.

- A resident is defined as a device that spends a majority of evenings and nights in the zone of interest. Evening/nights is defined as 7pm to 8am. Note that the device does not need to be home for the full time– if they arrive home at 10pm and leave at 6am, they will still be tagged as living in this location.
- A workplace, for our default deliveries, is defined as the place that is not the home that the device spends the most time on weekdays (defined as 11am-4pm M-F). This does not mean that someone who works 8AM – 3PM or 2pm – 10pm will not be counted as working – as long as their shift overlaps the 11am-4pm time frame they will be picked up as working there. <u>You may request a definition of worker that allows for multiple work places, at the time of ordering. If so, the prior definition in this paragraph not apply! You should receive additional documentation with your delivery.</u>
- A visitor is defined as a device that goes to a zone of interest, but is neither a resident nor a worker.

For clarity – if a device lives in one block in Sacramento, and goes on a trip to a park 5 miles away in Sacramento, it will show up as a “resident” of the block, and a “visitor” to the park (even though the park is in Sacramento and the device lives in Sacramento).

If a device lives and works in the same zone, the trip purpose will default to home-based (home trumps work) and similarly work trumps visitor status.

StreetLight Data’s SB 743 Metrics include summarized metrics for Employees and Residents, designed to meet OPR’s reporting recommendations, as well as unsummarized data, designed for customers with unique land use considerations to incorporate data from other sources with more flexibility. See the next page for a full list of metrics & definitions.

It’s important to note two ways that StreetLight’s SB743 VMT methodology is purpose-built to meet the needs of OPR’s technical advisory:

- In order to avoid spatial bias in the extremities of a zone, OPR recommends Inter-regional trips are counted fully in both the origin region and the destination region.
- In order to avoid bias by residence classification, OPR recommends that trips from a traveler that both lives and works in the same region are counted towards both resident and employee VMT.

For these reasons, it's important to be careful when summing VMTs in a region: as long as VMT is summarized within residence classes and not across them, double counting trips will not occur. Furthermore, OPR emphasizes that these steps are critical to the reliability and repeatability of VMT estimates.

Query and Sample Information

The query information organizes the data delivery by day type, data period, geography, etc.

The sample information is shared for the sake of transparency and to support users in explaining the benefits of big data, as it is often far larger (and more recent) than the sample taken from traditional means such as survey extrapolation. It can also be used in quality control – if sample trips and devices are too low, users may choose not to use a particular row of data.

Summarized Metrics

These are the metrics most of interest to most users.

Employee HBW Avg Trip Length and Resident HBx Avg Trip Length – These are the average trip lengths, in miles for the summarized trip categories. Trip lengths are always one way (not round trips). These are measured in miles, and take into account the true path of the trip. They are "absolute" values and can be compared to other sources that measure trip length.

Employee HBW VMT Index/Device and Resident HBx VMT Index/Device – This is the average sum of all the miles travelled by the relevant resident/employee class, for the relevant trip types related to a zone, divided by the sample of resident class devices. For examples, if we had 50 employee devices associated with Location A, and we had 200 HBW miles per day of trips in our sample, the Employee HBW VMT Index/Device would be 4 (200/50). These indices are internally comparable and we assume that a device is roughly comparable to one person. They allow you to know if the Employee HBW VMT/Capita at Location A is 20% more than the Employee HBW VMT/Capita for the overall region. These indices are most often used for screening and comparing locations.

StreetLight's sample does not capture 100% of trips every device makes. Thus, we expect the VMT Index/Device to be lower than the actual VMT/Capita.

Optional Add-Ons

You may have requested optional add-ons that impact your metrics and the definitions provided herein. A description should be provided in a separate document. Please consult the order form and contact your StreetLight representative if you have any questions.

Glossary and Unit Terms

This folder contains SB 743 metrics for the zones within the named analysis.

OUTPUT UNIT TERMS
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StreetLight Sample Trip Counts: StreetLight sample trip counts for the zone (or set of zones) for all days in the entire data period.

*Note that, while most output units are represented as an average day per its day type definition, Trip Counts are not converted to an average day. For example, a Trip Count value of 100 for O-D pair A and B for average weekday in March 2017 means that the sum of all trips used from StreetLight data set from all the weekdays in March 2017 is 100.

OPTIONAL ADD ONS USED IN THIS PROJECT
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Second work location – if a device has a strong (20%+) second work location detected which is over 1km away from their primary work location, it will also be used for their Employee status and for Work-classified trip endpoints

FILES
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*.csv
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These files contain the SB 743 metrics.

Summarized SB743 Metrics - Data Dictionary		
Category	Name	Description
Query Information	Geography ID	Name or ID of geography
	Data Period	Period of analysis
	Day Type	Weekday, Weekend, All Week
Sample info	Total Trip Sample Count	# device-trips in all sample
	Resident, Employee, Visitor Trip Sample Count	# device-trips in sample per residence class
	Total Device Sample Count	# of unique devices generating the device-trips in the sample
	Resident, Employee, Visitor Device Sample Count	# of unique devices generating the device-trips per residence class
	Employee Second Workplace Device Sample Count	# of unique devices generating employee device-trips which have a second workplace (if 2nd workplace option

		selected)
	Total Daily Volume	The estimated daily volume as calculated by StreetLight Data's machine learning algorithm.
	Resident, Employee, Visitor Daily Volume	The estimated daily volume per residence class as calculated by StreetLight Data's machine learning algorithm.
Summarized Metrics	Employee HBW Trips per Device Day	Average number of Employee HBW device-trips each sampled device produced on each active day. An active day is one in which at least one device-trip was produced matching the relevant device-trip classification (ie Resident HBx). This may be lower than actual values as some device-trips on active days may be missed by the device.
	Employee HBW Avg Trip Length	Avg HBW device-trip length for Employee devices. This can be compared to matching data from other sources, such as surveys.
	Employee HBW VMT per Device Day	The product of the previous two columns.
	Resident HBx Trips per Device Day	Average number of Resident HBx device-trips each sampled device produced on each active day. An active day is one in which at least one device-trip was produced matching the relevant trip classification (ie Resident HBx). This may be lower than actual values as some device-trips on active days may be missed by the device.
	Resident HBx Avg Trip Length	Avg HBx device-trip length for Resident devices. This can be compared to matching data from other sources, such as surveys.
	Resident HBx VMT per Device Day	The product of the previous two columns
Flags	Resident sample size flag	If the number of resident device-trips is below 50, this flag is “RED”, if it is between 50 and 300, this flag is “YELLOW.” Greater than 300 has no flag.
	Employee sample size flag	If the number of employee trips is below 50, this flag is “RED”, if it is between 50 and 300, this flag is “YELLOW.” Greater than 300 has no flag.

Unsummarized SB743 Metrics - Data Dictionary		
Category	Name	Description
Query Information	Geography ID	Name or ID of geography
	Data Period	Period of analysis

	Day Type	Weekday, weekend, etc.
Sample info	Total Trip Sample Count	# device-trips in all sample
	Resident, Employee, Visitor Trip Sample Count	# device-trips in sample per residence class
	Total Device Sample Count	# of unique devices generating the device-trips in the sample
	Resident, Employee, Visitor Device Sample Count	# of unique devices generating the device-trips per residence class
	Total Daily Volume	The estimated daily volume as calculated by StreetLight Data's machine learning algorithm.
	Resident, Employee, Visitor Daily Volume	The estimated daily volume per residence class as calculated by StreetLight Data's machine learning algorithm.
Unsummarized Outputs	Trip Sample Count - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	# of device-trips sampled in this class-purpose bucket
	Device Sample Count - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	# of devices sampled in this class-purpose bucket
	Employee Second Workplace Device Sample Count by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	# of unique devices generating employee device-trips which have a second workplace in this class-purpose bucket (if 2nd workplace option selected)
	Average Trip Length - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	Average route distance for all device-trips in class-purpose bucket
	Trips per-Device per-Active Day - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	Average number of device-trips each sampled device produced on each active day in the class-purpose bucket
	VMT per-Device per-Day - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	The product of the previous two columns
	Daily Volume - by class (resident, employee, visitor), and by purpose (H2W, W2H, H2O, O2H, W2O, O2W, O2O)	The estimated daily volume per residence class-purpose bucket as calculated by StreetLight Data's machine learning algorithm.

*Note: If a device is determined to live and work in the same zone, it will contribute to both the resident and employee metrics.

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These files comprise the shapefiles for the analysis's zone sets.

A shapefile consists of the following several files:
.shp file contains the feature geometries and can be viewed in a geographic information systems application such as QGIS.
.dbf file contains the attributes in dBase format and can be opened in Microsoft Excel.
.shx file contains the data index.

.prj file contains the projection information.
.cpg file contains the encoding applied to create the shapefile.

These shapefiles have the following attributes/columns:
- An ID column for each zone following the Census naming convention.