Processed Drive Cycle Data for TSDC Surveys/Studies with Second-by-Second GPS Vehicle Speed Profiles

Data Dictionary for Public Download Files
National Renewable Energy Laboratory
Transportation Secure Data Center

PROCESSED DRIVE CYCLE ROUTINE

A GPS data filtration routine was developed by researchers at the National Renewable Energy Laboratory (NREL) to filter erroneous data points in individual drive cycles sourced from GPS devices mounted on board both light- and medium-/heavy-duty vehicles. The routine for analyzing GPS speed-time data for drive cycle applications consists of seven logic-based filters arranged in order of increasing complexity. They are as follows:

1. Remove duplicate records and data with negative values or differential time steps.
2. Replace outlying high/low speed values.
3. Remove zero-speed signal drift when the vehicle is stopped.
4. Replace false zero-speed records.
5. Amend the gaps in the data.
6. Repair outlying acceleration/deceleration values.
7. De-noise and condition the final signal.

For more detail on the NREL GPS data filtration routine, see *GPS Data Filtration Method for Drive Cycle Analysis Applications* by Adam Duran and Matthew Earleywine.

If a given vehicle contains an excessive amount of removed or regenerated drive cycle data points it is excluded from these processed drive cycle files. The vehicle retention rate for each of the studies containing an on-board vehicle-GPS component is outlined in the table below:

Table 1: Vehicle Retention Rate for NREL Filtration Routine

Dataset	*Veh Count*	*Retain Count*	*Retain Percent*
ARC	1653	1651	99.9%
AKDOT	282	276	97.9%
CALTRANS	2910	2903	99.8%
CAL_SCAG	249	239	96.0%
CMAP	408	363	89.0%
DVRPC	821	802	97.7%
MARC	408	392	96.1%
TXDOT	3404	3157	92.7%
TOTAL	9032	8705	96.4%

How to Cite the TSDC:

If you use TSDC data in a publication, please send a notification to **tsdc@nrel.gov** and include a citation that is consistent with the following format in your publication:

"Transportation Secure Data Center" (2015). National Renewable Energy Laboratory. |*Date TSDC data was accessed*|. *www.nrel.gov/tsdc*.

DATA DICTIONARY

The data provided to NREL are processed using a GPS data filtration routine (outlined above). The processed data can be divided into two categories: summary data and individual vehicle data. The summary data contains two tables: the "vehicles" table and the "vehicles_travel_days" table. The individual vehicle data contains two table types: daily travel tables (represented by the date of travel) and a "day_summary" table.

A text file titled "TSDC_web_*version #.txt*" has been included in each download outlining the dates of the most recent TSDC web update, the most recent data dictionary revision, and the most recent generation of the cleansed publicly available data files.

SUMMARY DATA [-]

The NREL processed drive cycle summary data contains dataset summaries of the specific vehicles and travel dates covered by the study. For each study, two tables are included: the "vehicles" table and the "vehicles_travel_days" table.

Summary Data Tables:

vehicles [-]

The "vehicles" table contains a summary of the vehicles represented in the study. Vehicle year, make, and type are included in this table.

Name	Data Type	Comment
sampno	numeric(7,0)	Unique household identifier
vehno	integer	Unique vehicle identifier
vehicle_gps	character varying(25)	GPS participant type: Diary-Vehicle or Vehicle (only)
veh_type	character varying(25)	NREL-defined vehicle type: Auto 2-seat, Auto sedan, Pick-up truck, Recreational vehicle, Sport utility vehicle, Station wagon, Van, or Unknown
model_year	integer	Vehicle model year
veh_make	character varying(25)	Vehicle make

fuel	character varying(25)	Fuel type: Diesel, Flex fuel, Gas, Hybrid, or Don't know
veh_own	character varying(25)	Vehicle ownership: Borrowed, Employer, or Ownded/Leased

vehicles_travel_days [-]

The "vehicles_travel_days" table contains the respective travel dates for each sampno/vehno combination.

Name	Data Type	Comment
sampno	numeric(7,0)	Unique household identifier
vehno	integer	Unique vehicle identifier
travel_date	date	Date of travel

INDIVIDUAL VEHICLE DATA [-]

The NREL processed individual vehicle drive cycle data contains travel summaries for each retained vehicle in a given dataset. For each vehicle, two types of tables are included: daily travel tables (represented by the date of travel) and a "day_summary" table.

Individual Vehicle Data Tables:

daily travel tables [-]

The daily travel tables are represented by the date of travel and contain a summary of the vehicle travel for a given travel day. Second-by-second speed and acceleration profiles are included in these tables. Note that zero speed points are largely excluded in order to reduce file size and to deal with inconsistencies between the original studies for distinguishing key-on idle periods from key-off parked periods. It is therefore up to you as the user of this processed data to decide how you would like to make this distinction. NREL recommends referencing the timestep data column and when the period between sections of vehicle driving ("microtrips") is less than 300 seconds (five minutes) assume that the vehicle is idling and correspondingly use periods longer than five minutes to designate trip breaks when the vehicle is assumed to be off.

Name	Data Type	Comment
timestamp	timestamp without time zone	Timestamp
cycle_sec	integer	Total seconds elapsed from first travel
timestep	integer	Time elapsed between points
speed_mph	double precision	Vehicle speed (in MPH)
accell_meters_ps	double precision	Vehicle acceleration (in meters per sec.)

day_summary [-]

The "day_summary" table contains an extensive list of summary statistics for each day of travel by each retained vehicle for a given study. Definitions for statistics such as kinetic intensity, aerodynamic speed, and characteristic acceleration can be found in the *Duty Cycle Characterization* publication by Michael O'Keefe, et al.

Name	Data Type	Comment
device_id	character_varying(9)	Device identifier generated as follows: *sampno_vehno*
start_ts	timestamp without time zone	The local timestamp of the first recorded point for the trips
end_ts	timestamp without time zone	The local timestamp of the last recorded point for the trips
absolute_time_duration_hrs	double precision	Absolute time duration in hours. This is calculated on the total number of samples collected and independent of real time duration.
speed_data_duration_hrs	double precision	Total number of hours of data collected. Includes zero speed components.
driving_data_duration_hrs	double precision	Duration of collected data while vehicle is in motion. Does not include zero speed time.
non_recorded_time_hrs	double precision	Total number of hours which were not recorded by the device. Calculated as the difference between the real time duration of the data and the collected data duration.
collected_vs_real_time_ratio	double precision	Ratio of collected sample duration to real time duration
mean_estimated_sampling_rate_hz	double precision	Computed sampling rate based on average time gap observed between samples in collected data
max_gap_between_samples_s	double precision	Maximum time gap (in seconds) observed between samples in collected data
min_gap_between_samples_s	double precision	Minimum time gap (in seconds) observed between samples in collected data
mean_gap_between_samples_s	double precision	Average time gap (in seconds) observed between samples in collected data
median_gap_between_samples_s	double precision	Median time gap (in seconds) observed between samples in collected data
std_gap_between_samples_s	double precision	Standard deviation of time gaps between samples observed in collected data
var_gap_between_samples_s	double precision	Variance of time gaps observed in collected data
gap_25th_percentile_s	double precision	Twenty Fifth percentile time gap (in seconds) between samples observed in collected data

gap_75th_percentile_s	double precision	Seventy Fifth percentile time gap (in seconds) between samples observed in collected data
gap_inter_quartile_range_s	double precision	Inter Quartile Range for distribution of time gaps between samples observed in collected data
gap_median_absolute_deviation_s	double precision	Median Absolute Deviation for distribution of time gaps between samples observed in collected data
median_estimated_sampling_rate_hz	double precision	Estimated sampling rate based on median time gap observed between samples in collected data
max_speed	double precision	Maximum observed driving speed (in MPH)
total_average_speed	double precision	Average speed (in MPH) over cycle including zero speed components
total_median_speed	double precision	Median of all observed speed data (in MPH). Includes zero speed components.
total_root_mean_cubed_speed	double precision	Root mean cubed value of all observed speed data. Includes zero speed components.
total_speed_variance	double precision	Variance of all observed speed values. Includes zero speed components.
total_speed_standard_deviation	double precision	Standard deviation of all observed speed values. Includes zero speed components.
total_speed_velocity_ratio	double precision	Total vehicle speed velocity ratio
total_speed_25th_percentile	double precision	25th percentile value for speed distribution (in MPH). Includes zero speed components.
total_speed_75th_percentile	double precision	75th percentile value for all observed speed points (in MPH). Includes zero speed components.
total_speed_inter_quartile_range	double precision	Inter quartile range for distribution including all observed speed points. Includes zero speed components.
total_speed_median_absolute_deviation	double precision	Median absolute deviation of all observed speed values. Includes zero speed components.
driving_average_speed	double precision	Average driving speed over cycle (in MPH). Does not include any zero speed components.
driving_median_speed	double precision	Median driving speed over cycle (in MPH). Does not include any zero speed components.
driving_root_mean_cubed_speed	double precision	The square root of the mean driving speed cubed
driving_speed_variance	double precision	Variance of observed driving speed. Does not include zero speed components.

driving_speed_standard_deviation	double precision	Standard deviation of driving speed distribution. Does not include zero speed components.
driving_speed_velocity_ratio	double precision	Ratio of root mean cubed speed to mean total speed
driving_speed_25th_percentile	double precision	The 25th percentile for driving speed distribution (in MPH). Does not include zero speed components.
driving_speed_75th_percentile	double precision	75th percentile value for driving speed distribution (in MPH). Does not include zero speed components.
driving_speed_inter_quartile_range	double precision	Inter quartile range of observed driving speed distribution. Does not include zero speed components.
driving_speed_median_absolute_deviation	double precision	Median absolute deviation of observed driving speeds. Does not include zero speed components.
zero_seconds	double precision	Number of seconds at zero speed
zero_five_seconds	double precision	Total time spent at speeds between zero and five miles per hour
five_ten_seconds	double precision	Total time observed at speeds between five and ten miles per hour
ten_fifteen_seconds	double precision	Number of seconds spent at speeds between ten and fifteen miles per hour
fifteen_twenty_seconds	double precision	Total amount of time (in seconds) observed at speeds between fifteen and twenty miles per hour
twenty_twenty_five_seconds	double precision	Total time spent at speeds between twenty and twenty five miles per hour (in seconds)
twenty_five_thirty_seconds	double precision	Total time spent at speeds between twenty five and thirty miles per hour (in seconds)
thirty_thirty_five_seconds	double precision	Total time spent at speeds between thirty and thirty five miles per hour (in seconds)
thirty_five_fourty_seconds	double precision	Total amount of time spent at speeds between thirty five and forty miles per hour (in seconds)
fourty_fourty_five_seconds	double precision	Total amount of time at speeds between forty and forty five miles per hour (in seconds)
fourty_five_fifty_seconds	double precision	Number of seconds spent between forty five and fifty miles per hour vehicle speed
fifty_fifty_five_seconds	double precision	Total amount of time observed at speeds between fifty and fifty five miles per hour (in seconds)
fifty_five_sixty_seconds	double precision	Total time spent at speeds between fifty five and sixty miles per hour (in seconds)

sixty_sixty_five_seconds	double precision	Total amount of time spent at speeds between sixty and sixty five miles per hour (in seconds)
sixty_five_seventy_seconds	double precision	Total amount of time observed at speeds between sixty five and seventy miles per hour (in seconds)
seventy_seventy_five_seconds	double precision	Total time observed at speeds between seventy and seventy five miles per hour (in seconds)
seventy_five_plus_seconds	double precision	Total amount of time spent at speeds in excess of seventy five miles per hour (in seconds)
driving_time_seconds	double precision	Total time spent while vehicle is in motion (in seconds). Does not include zero speed time.
percent_zero	double precision	Percent of total time spent and zero speed
percent_zero_five	double precision	Percent of total time spent at speeds between zero and five miles per hour
percent_five_ten	double precision	Percent of total time spent at speeds between five and ten miles per hour
percent_ten_fifteen	double precision	Percent of total time spent at speeds between ten and fifteen miles per hour
percent_fifteen_twenty	double precision	Percent of total time spent at speeds between fifteen and twenty miles per hour
percent_twenty_twenty_five	double precision	Percent of total time spent at speeds between twenty and twenty five miles per hour
percent_twenty_five_thirty	double precision	Percent of total time spent at speeds between thirty and thirty five miles per hour
percent_thirty_thirty_five	double precision	Percent of total time spent at speeds between thirty and thirty five miles per hour
percent_thirty_five_fourty	double precision	Percent of total time spent at speeds between thirty five and forty miles per hour
percent_fourty_fourty_five	double precision	Percent of total time spent at speeds between forty and forty five miles per hour
percent_fourty_five_fifty	double precision	Percent of time spent at speeds between forty five and fifty miles per hour
percent_fifty_fifty_five	double precision	Percent of total time spent at speeds between fifty and fifty five miles per hour
percent_fifty_five_sixty	double precision	Percent of time at speeds between fifty five and sixty miles per hour
percent_sixty_sixty_five	double precision	Percent of total time spent at speeds between sixty and sixty five miles per hour
percent_sixty_five_seventy	double precision	Percent of time at speeds between sixty five and seventy miles per hour

percent_seventy_seventy_five	double precision	Percent of total time observed at speeds between seventy and seventy five miles per hour
percent_seventy_five_plus	double precision	Percent of total time spent at speeds in excess of seventy five miles per hour
percent_distance_zero_five	double precision	Percent of total distance traveled at speeds between zero and five miles per hour
percent_distance_twenty_twenty_five	double precision	Percent of total distance traveled at speeds between twenty and twenty five miles per hour
percent_distance_twenty_five_thirty	double precision	Percent of total distance traveled at speeds between twenty five and thirty miles per hour
percent_distance_total	double precision	Total percentage of distance traveled at all speeds in cycle. Will always sum to 100%.
percent_distance_thirty_thirty_five	double precision	Percent of distance traveled at speeds between thirty and thirty five miles per hour
percent_distance_thirty_five_fourty	double precision	Percent of total miles traveled at speeds between thirty five and forty miles per hour
percent_distance_ten_fifteen	double precision	Percent of total distance traveled at speeds between ten and fifteen miles per hour
percent_distance_sixty_sixty_five	double precision	Percent of total distance traveled at speeds between sixty and sixty five miles per hour
percent_distance_sixty_five_seventy	double precision	Percent of total distance traveled at speeds between sixty five and seventy miles per hour
percent_distance_seventy_seventy_five	double precision	Percent of total distance traveled at speeds between seventy and seventy five miles per hour
percent_distance_seventy_five_plus	double precision	Percent of total distance traveled at speeds in excess of seventy five miles per hour
percent_distance_fourty_fourty_five	double precision	Percent of total distance traveled at speeds between fort and forty five miles per hour
percent_distance_fourty_five_fifty	double precision	Percent of total distance traveled at speeds between forty five and fifty miles per hour
percent_distance_five_ten	double precision	Percent of total distance traveled between five and ten miles per hour
percent_distance_fifty_five_sixty	double precision	Percent of total distance traveled at speeds between fifty five and sixty miles per hour
percent_distance_fifty_fifty_five	double precision	Percent of total distance traveled at speeds between fifty and fifty five miles per hour
percent_distance_fifteen_twenty	double precision	Percent of total distance traveled at speeds between fifteen and twenty miles per hour

percent_total	double precision	Percent of time spent at all speeds in cycle. Will always add up to 100%.
distance_zero_five	double precision	Total distance traveled in miles at speeds between zero and five miles per hour
distance_five_ten	double precision	Total distance traveled in miles at speeds between five and ten miles per hour
distance_ten_fifteen	double precision	Total distance traveled in miles at speeds between ten and fifteen miles per hour
distance_fifteen_twenty	double precision	Total distance traveled in miles at speeds between fifteen and twenty miles per hour
distance_twenty_twenty_five	double precision	Total distance traveled in miles at speeds between twenty and twenty five miles per hour
distance_twenty_five_thirty	double precision	Total distance traveled in miles at speeds between twenty five and thirty miles per hour
distance_thirty_thirty_five	double precision	Total number of miles traveled at speeds between thirty and thirty five miles per hour
distance_thirty_five_fourty	double precision	Total distance traveled in miles at speeds between thirty five and forty miles per hour
distance_fourty_fourty_five	double precision	Total number of miles traveled at speeds between forty and forty five miles per hour
distance_fourty_five_fifty	double precision	Total number of miles traveled between forty five and fifty miles per hour
distance_fifty_fifty_five	double precision	Total number of miles traveled between fifty and fifty five miles per hour
distance_fifty_five_sixty	double precision	Total distance traveled in miles at speeds between fifty five and sixty miles per hour
distance_sixty_sixty_five	double precision	Distance in miles traveled at speed from sixty to sixty five mph
distance_sixty_five_seventy	double precision	Total number of miles traveled between sixty five and seventy miles per hour
distance_seventy_seventy_five	double precision	Total distance traveled in miles as speeds between seventy and seventy five miles per hour
distance_seventy_five_plus	double precision	Distance in miles traveled at speeds in excess of 75 mph
distance_total	double precision	Total distance traveled in miles
total_number_of_acceleration_events	double precision	Total number of observed acceleration events
total_number_of_deceleration_events	double precision	Total number of observed acceleration events
acceleration_events_per_mile	double precision	Number of acceleration events observed per mile of distance traveled

deceleration_events_per_mile	double precision	Number of deceleration events observed per mile of distance traveled
max_acceleration_ft_per_second_squared	double precision	Maximum acceleration rate in ft per second squared
max_deceleration_ft_per_second_squared	double precision	Maximum deceleration in ft per second squared
average_acceleration_ft_per_second_squared	double precision	Average acceleration rate in ft per second squared
average_deceleration_ft_per_second_squared	double precision	Average deceleration in ft per second squared
median_acceleration_ft_per_second_squared	double precision	Median acceleration rate in ft per second squared
median_deceleration_ft_per_second_squared	double precision	Median deceleration rate in ft per second squared
std_acceleration_ft_per_second_squared	double precision	Standard deviation of acceleration in ft per second squared
std_deceleration_ft_per_second_squared	double precision	Standard deviation of observed deceleration in ft per second squared
var_acceleration_ft_per_second_squared	double precision	Variance of observed acceleration rate distribution in ft per second squared
var_deceleration_ft_per_second_squared	double precision	Variance of observed deceleration in ft per second squared
acceleration_25th_percentile_ft_per_second_squared	double precision	25th percentile for acceleration distribution. Value in ft per second squared
deceleration_25th_percentile_ft_per_second_squared	double precision	25th percentile value for deceleration rate distribution in ft per second squared
acceleration_75th_percentile_ft_per_second_squared	double precision	75th percentile value for observed acceleration rate distribution in ft per second squared
deceleration_75th_percentile_ft_per_second_squared	double precision	75th percentile value for deceleration rate in ft per second squared
acceleration_inter_quartile_range_ft_per_second_squared	double precision	Inter quartile range of acceleration in ft per second squared
deceleration_inter_quartile_range_ft_per_second_squared	double precision	Inter quartile range for deceleration distribution

acceleration_median_absolute_deviation_ft_per_second_squared	double precision	Median absolute deviation of acceleration
deceleration_median_absolute_deviation_ft_per_second_squared	double precision	Median absolute deviation of deceleration rate distribution in ft per second squared
cumulative_acceleration_duration	double precision	Total time spent accelerating (in seconds)
cumulative_deceleration_duration	double precision	Sum of time spent decelerating (in seconds)
cumulative_acceleration_cycle_duration_percent	double precision	Percent of total time spent accelerating
cumulative_deceleration_cycle_duration_percent	double precision	Percent of total time spent decelerating
absolute_time_cumulative_acceleration_duration	double precision	Sum of total time spent accelerating (in seconds)
absolute_time_cumulative_deceleration_duration	double precision	Sum of time spent decelerating (in seconds)
absolute_time_cumulative_acceleration_cycle_duration_percent	double precision	Percent of total time spent accelerating
absolute_time_cumulative_deceleration_cycle_duration_percent	double precision	Percent of total time spent decelerating
average_acceleration_event_duration	double precision	Average duration of observed acceleration events (in seconds)
average_deceleration_event_duration	double precision	Average duration of observed deceleration events (in seconds)
min_acceleration_event_duration	double precision	Minimum duration observed for an acceleration event (in seconds)
min_deceleration_event_duration	double precision	Minimum observed duration for deceleration event (in seconds)
max_acceleration_event_duration	double precision	Maximum duration of observed acceleration events (in seconds)
max_deceleration_event_duration	double precision	Maximum duration of observed deceleration events (in seconds)

std_acceleration_event_duration	double precision	Standard deviation of acceleration event duration distribution (in seconds)
std_deceleration_event_duration	double precision	Standard deviation of deceleration event duration distribution (in seconds)
var_acceleration_event_duration	double precision	Variance of acceleration event durations
var_deceleration_event_duration	double precision	Variance of deceleration event duration distribution
median_acceleration_event_duration	double precision	Median duration of all observed acceleration events (in seconds)
median_deceleration_event_duration	double precision	Median observed duration of deceleration events (in seconds)
acceleration_event_duration_25th_percentile	double precision	The 25th percentile value for acceleration event durations (in seconds)
deceleration_event_duration_25th_percentile	double precision	The 25th percentile value for deceleration event durations (in seconds)
acceleration_event_duration_75th_percentile	double precision	75th percentile value for acceleration event duration distribution (in seconds)
deceleration_event_duration_75th_percentile	double precision	75th percentile value for deceleration event duration distribution (in seconds)
acceleration_event_duration_inter_quartile_range	double precision	Inter quartile range for acceleration event duration distribution
deceleration_event_duration_inter_quartile_range	double precision	Inter quartile range for distribution of deceleration event durations
acceleration_event_duration_median_absolute_deviation	double precision	Median absolute deviation of acceleration event duration distribution
deceleration_event_duration_median_absolute_deviation	double precision	Median absolute deviation of deceleration event duration distribution
total_stops	double precision	Number of observed stops
stops_0_30	double precision	Number of stops with dwell times between zero and thirty seconds
stops_30_60	double precision	Number of stops with dwell times between thirty and sixty seconds
stops_60_plus	double precision	Number of stops with dwell times in excess of 60 seconds
stops_300_plus	double precision	Number of stops observed with dwell times in excess of 300 seconds

stops_1800_plus	double precision	Number of stops with durations in excess of 30 minutes
stops_3600_plus	double precision	Number of stops with dwell times in excess of 3600 seconds
stops_per_mile	double precision	Number of observed stops per miles traveled
average_stop_duration	double precision	Average duration of all stops observed (in seconds)
min_stop_duration	double precision	Minimum stop dwell time observed (in seconds)
max_stop_duration	double precision	Maximum dwell time observed while stopped (in seconds)
median_stop_duration	double precision	Median dwell time of observed stops (in seconds)
mean_stop_duration	double precision	Mean observed stop dwell time (in seconds)
std_stop_duration	double precision	Standard deviation of stop dwell times (in seconds)
var_stop_duration	double precision	Variance of observed stop dwell times
stop_duration_25th_percentile	double precision	25th percentile value for stop dwell time distribution (in seconds)
stop_duration_75th_percentile	double precision	75th percentile value for stop dwell time distribution (in seconds)
stop_duration_inter_quartile_range	double precision	Inter quartile range for stop duration distribution
stop_duration_median_absolute_deviation	double precision	Median absolute deviation of observed stop dwell times
max_elevation*	double precision	Maximum observed elevation (in feet)
min_elevation*	double precision	Minimum observed elevation (in feet)
mean_elevation*	double precision	Mean elevation observed (in feet)
median_elevation*	double precision	Median elevation observed (in feet)
std_of_elevation*	double precision	Standard deviation of elevation (in feet)
var_of_elevation*	double precision	Variance of elevation data records
elevation_25th_percentile*	double precision	25th percentile value for elevation distribution (in feet)
elevation_75th_percentile*	double precision	75th percentile value for elevation distribution (in feet)
elevation_inter_quartile_range*	double precision	Inter quartile range for elevation distribution
elevation_median_absolute_deviation*	double precision	Median absolute deviation of elevation distribution
delta_elevation*	double precision	Net elevation change observed (in feet). Calculated as final elevation record minus initial elevation record.

delta_elevation_cumulative*	double precision	Net total elevation change (in feet). Sum of all elevation change records.
absolute_delta_elevation_cumulative*	double precision	Cumulative absolute change in elevation (in feet). Sum of absolute value of differential elevation changes observed.
total_elevation_gained*	double precision	Sum of total elevation gained (in feet)
total_elevation_lost*	double precision	Sum of elevation lost (in feet)
average_absolute_elevation_rate_change*	double precision	Average rate of elevation change regardless of sign (in ft/s)
max_climbing_rate*	double precision	Maximum observed climbing rate (in ft/s)
average_climbing_rate*	double precision	Average climbing rate of vehicle (in ft/s)
median_climbing_rate*	double precision	Median observed climbing rate (in ft/s)
max_descending_rate*	double precision	Maximum observed descending rate (in ft/s)
average_descending_rate*	double precision	Average observed descending rate (in ft/s)
median_descending_rate*	double precision	Median descending rate observed (in ft/s)
climbing_rate_25th_percentile*	double precision	25th percentile value for observed climbing rate distribution (in ft/s)
descending_rate_25th_percentile*	double precision	25th percentile value for descending rate distribution (in ft/s)
climbing_rate_75th_percentile*	double precision	75th percentile value for climbing rate distribution (in ft/s)
descending_rate_75th_percentile*	double precision	75th percentile value for descending rate distribution (in ft/s)
climbing_rate_inter_quartile_range*	double precision	Inter quartile range for climbing rate distribution
descending_rate_inter_quartile_range*	double precision	Inter quartile range for descending vehicle rate
climbing_rate_median_absolute_deviation*	double precision	Median absolute deviation of vehicle climbing rate
descending_rate_median_absolute_deviation*	double precision	Median absolute deviation of descending rate distribution
max_road_grade*	double precision	Maximum observed road grade
min_road_grade*	double precision	Minimum road grade observed
mean_road_grade*	double precision	Mean observed road grade
median_road_grade*	double precision	Median observed road grade
std_of_road_grade*	double precision	Standard deviation of observed road grade

var_of_road_grade*	double precision	Variance of road grade observed
road_grade_25th_percentile*	double precision	25th percentile value for road grade distribution
road_grade_75th_percentile*	double precision	75th percentile value for observed road grade distribution
road_grade_inter_quartile_range*	double precision	Inter quartile range for observed road grade distribution
road_grade_median_absolute_deviation*	double precision	Median absolute deviation for road grade distribution
maximum_kinetic_power_density_demand	double precision	Maximum demanded kinetic power density (in W/kg)
total_kinetic_power_density_demand	double precision	Sum of demanded kinetic power density (in W/kg)
average_kinetic_power_density_demand	double precision	Average demanded kinetic power density (in W/kg)
variance_kinetic_power_density_demand	double precision	Variance of kinetic power density demanded
standard_deivation_kinetic_power_density_demand	double precision	Standard deviation of demanded kinetic power density (in W/kg)
maximum_kinetic_power_density_regen	double precision	The maximum single sample regenerative kinetic power density (in W/kg)
total_kinetic_power_density_regen	double precision	The sum of regenerative kinetic power density observed (in W/kg)
average_kinetic_power_density_regen	double precision	Average regenerative kinetic power density (in W/kg)
variance_kinetic_power_density_regen	double precision	Variance of regenerative kinetic power density (in W/kg)
standard_deivation_kinetic_power_density_regen	double precision	Standard deviation of regenerative kinetic power density (in W/kg)
maximum_potential_power_density_demand	double precision	Maximum demanded potential power density (in W/kg)
total_potential_power_density_demand	double precision	The sum of demanded potential power density (in W/kg)
average_potential_power_density_demand	double precision	Average demanded potential power density (in W/kg)
variance_potential_power_density_demand	double precision	Variance of demanded potential power density

standard_deivation_potential_power_density_demand	double precision	Standard Deviation of the demanded potential power density (in W/kg)
maximum_potential_power_density_regen	double precision	Maximum regenerative potential power density (in W/kg)
total_potential_power_density_regen	double precision	Sum of regenerative potential power density (in W/kg)
average_potential_power_density_regen	double precision	Average regenerative potential power density (in W/kg)
variance_potential_power_density_regen	double precision	Variance of observed regenerative potential power density
standard_deivation_potential_power_density_regen	double precision	Standard deviation of regenerative potential power density (in W/kg)
maximum_aerodynamic_power_density_demand	double precision	Maximum demanded aerodynamic power density (in W/kg)
total_aerodynamic_power_density_demand	double precision	The sum of demanded aerodynamic power density (in W/kg)
average_aerodynamic_power_density_demand	double precision	Average demanded aerodynamic power density (in W/kg)
variance_aerodynamic_power_density_demand	double precision	Variance of demanded aerodynamic power density
standard_deivation_aerodynamic_power_density_demand	double precision	Standard deviation of demanded aerodynamic power density (in W/kg)
maximum_aerodynamic_power_density_regen	double precision	Maximum regenerative aerodynamic power density (in W/kg)
total_aerodynamic_power_density_regen	double precision	Sum of regenerative aerodynamic power density (in W/kg)
average_aerodynamic_power_density_regen	double precision	Average regenerative power density from aerodynamics (in W/kg)
variance_aerodynamic_power_density_regen	double precision	Variance of regenerative aerodynamic power density
standard_deivation_aerodynamic_power_density_regen	double precision	Standard deviation of regenerative aerodynamic power density (in W/kg)

maximum_rolling_power_density_demand	double precision	Maximum demanded rolling power density (in W/kg)
total_rolling_power_density_demand	double precision	The sum of demanded rolling power density (in W/kg)
average_rolling_power_density_demand	double precision	Average demanded rolling power density (in W/kg)
variance_rolling_power_density_demand	double precision	Variance of demanded rolling power density
standard_deivation_rolling_power_density_demand	double precision	Standard deviation of power density demand from rolling resistance (in W/kg)
maximum_rolling_power_density_regen	double precision	Maximum regenerative rolling power density (in W/kg)
total_rolling_power_density_regen	double precision	Sum of regenerative rolling power density (in W/kg)
average_rolling_power_density_regen	double precision	Average regenerative rolling power density (in W/kg)
variance_rolling_power_density_regen	double precision	Variance of regenerative rolling power density
standard_deivation_rolling_power_density_regen	double precision	Standard deviation of regenerative rolling power density (in W/kg)
maximum_instantantaneous_potential_energy_density	double precision	Maximum potential energy density (in J/kg)
average_instantantaneous_potential_energy_density	double precision	Average potential energy density (in J/kg)
cumulative_instantaneous_potential_energy_density	double precision	Sum of potential energy density (in J/kg)
maximum_instantantaneous_kinetic_energy_density	double precision	Maximum single sample kinetic energy density (in J/kg)
average_instantantaneous_kinetic_energy_density	double precision	Average kinetic energy density (in J/kg)
cumulative_instantaneous_kinetic_energy_density	double precision	Sum of kinetic energy density (in J/kg)

maximum_instantaneous_aerodynamic_energy_density	double precision	The maximum single sample aerodynamic energy density (in J/kg)
average_instantaneous_aerodynamic_energy_density	double precision	Average single sample aerodynamic energy density (in J/kg)
cumulative_instantaneous_aerodynamic_energy_density	double precision	Sum of aerodynamic energy density (in J/kg)
maximum_instantaneous_rolling_energy_density	double precision	Maximum rolling energy density (in J/kg)
average_instantaneous_rolling_energy_density	double precision	Average rolling energy density (in J/kg)
cumulative_instantaneous_rolling_energy_density	double precision	Sum of rolling energy density (in J/kg)
characteristic_acceleration	double precision	Characteristic Acceleration (in m/s^2)
characteristic_deceleration	double precision	Characteristic Deceleration – Energy while decelerating (in m/s^2)
aerodynamic_speed	double precision	Aerodynamic Speed (in m/s)
kinetic_intensity	double precision	Kinetic Intensity (1/km)
ca_standard	double precision	Characteristic Acceleration reported in standard units (in ft/s^2)
cd_standard	double precision	Characteristic Deceleration reported in standard units (in ft/s^2)
as_standard	double precision	Aerodynamic Speed reported in standard units (in ft/s)
ki_standard	double precision	Kinetic Intensity reported in standard units (1/mile)

Click the "[-]" to hide detail.

* Indicates that the column has been redacted from cleansed datasets available at www.nrel.gov/tsdc. It has been determined that the column contains sensitive data that must be viewed within the TSDC's secure portal environment.