Table 1. Data Format Description

|  |  |  |
| --- | --- | --- |
| Column Name (Number) | Explanation | Note |
| Vehicle ID (0) | ID number for each vehicle. | ID may not be continuous, but is unique for each vehicle in each dataset. |
| Global Time (s) (1) | Time in seconds referenced to 12:00:00 AM. |  |
| Frame ID (2) | Frame number in the corresponding video. | The beginning portion of the video with severe vibrations might be cut until the frame becomes stable. |
| Local X (ft) (3) | Position in the cross-section direction. | The reference point is this vehicle’s center location. |
| Local Y (ft) (4) | Position in the direction along the road. | The reference point is this vehicle’s center location. |
| Global X (Longitude) (5) | Vehicle’s GPS longitude location. |  |
| Global Y (Latitude) (6) | Vehicle’s GPS latitude location. |  |
| Width (ft)(7) | Vehicle width. |  |
| Length (ft)(8) | Vehicle length. |  |
| Class (1 motor; 2 auto; 3 truck)(9) | Vehicle class. | (motorbikes are not detected in the case study videos) |
| Speed (ft/s)(10) | Vehicle speed. | Calculated by the moving average method (2s interval). |
| Acceleration (ft/s2)(11) | Vehicle acceleration. | Calculated by the moving average method (2s interval). |
| Lane Num(12) | Lane number. | Ramp is 0, then 1,2,3 to the other side. |
| Preceding Vehicle ID(13) | Preceding Vehicle ID | -1 when there is no leading vehicle or the leading vehicle is out of scope. |
| Space Headway (ft)(14) | Distance between this vehicle’s front bumper to its preceding vehicle’s front bumper. | -1 when there is no leading vehicle or the leading vehicle is out of scope. |

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## Appendix

1. How we convert local locations to GPS coordinates

To convert local locations to GPS coordinates accurately especially when a road segment is in a curved shape, a polynomial curve fitting method is applied to the datasets. For each dataset, a polynomial curve fitting function is firstly used to fit GPS coordinates of the location. For example in Figure 1, a sample GPS of coordinates of the road segment captured by a video are selected to generate a polynomial curve fitting function . Then an array of points of local moving distance and GPS coordinate can be calculated with the Equation /, where is the parameter of unit conversation between GPS coordinates to feet. Therefore, another polynomial curve fitting function can be applied to fit , .



Figure 1. GPS Coordinates of Sample Points of a Segment of I-95

The format of local locations of vehicles are shown in Figure 2. As shown in the figure and Table 1, Local X is vehicles' center location in the direction perpendicular to the lane and Local Y is vehicles' center location in the direction parallel to the road. By considering local Y as the moving distance of vehicles, the fitting function can be used to calculate the GPS coordinate , . Then the GPS coordinate can be calculated with function . So that the GPS coordinates are obtained with the proposed method.

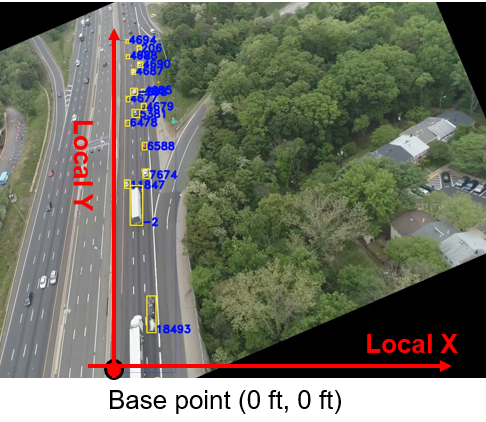


Figure 1. Format of Local Locations of Vehicles