

Interstate 4
Orlando, FL
route summary

 **52.8 mph**
average speed

 **0.18 mi**
section

 **536**
vehicles

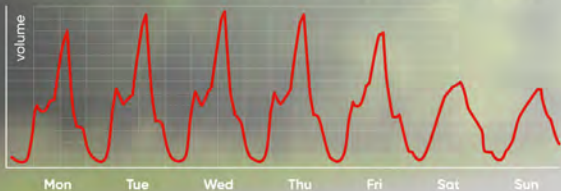
TomTom Historical Traffic Volumes

Accurate, scalable, cost-efficient
insights in an instant: Leveraging the
new age of road traffic analytics

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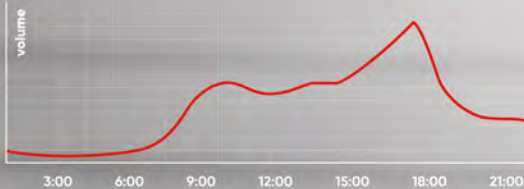
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Annual average traffic volume by hour of the day



Annual average traffic volume by hour of the day

Monday



Executive Summary

Traffic volumes are used to understand passing trade, captive markets and traffic flow. Governments, local authorities and industries such as retail, real estate, geomarketing and insurance use traffic volumes to analyze road networks and make high-impact decisions. However, these multi-billion-dollar industries have been unable to reap the benefits of advanced traffic volumes data, held back by traditional hardware-based survey methods.

Hardware is costly and time consuming. Extensive investments of time, money and manpower are required for small-scale results, making it considerably difficult to capture representative conditions across vast road networks. Consequently, time to market suffers and, moreover, inconsistent data leads to suboptimal planning and operational decisions in the public and private sectors.

TomTom Historical Traffic Volumes overcomes these barriers, introducing every industry to a new age of traffic analytics that is no longer dependent on costly, hard-to-maintain equipment and analysis. Our unique machine-learning solution combines the latest data modeling techniques with TomTom's trusted map data and widespread probe data, gathered from more than one in five vehicles on the road worldwide, and historical automatic traffic counter data.

As a result, TomTom Historical Traffic Volumes provides quick access to widespread, highly accurate volumes data almost instantly, at a fraction of the cost of traditional methods. Our solution empowers users to easily analyze historical road network dynamics at scale and take informed action to improve efficiency and use, as well as economic and environmental impacts.

Customers and partners access TomTom Historical Traffic Volumes via an API, batch delivery and TomTom Traffic Insights, with availability coming soon as a map layer and via the proprietary TomTom Move web platform. Each method enables users to analyze annual average daily traffic (AADT) and average daily traffic (ADT), opening detailed insights into road traffic patterns. Our product is currently available in the US only.

TOMTOM HISTORICAL TRAFFIC VOLUMES KEY BENEFITS

- ✓ Highly accurate data for annual, daily and hourly insights
- ✓ Enables access to extensive road network data analytics
- ✓ Fast, scalable and cost-efficient compared to limited traditional survey methods
- ✓ Access via an API, batch delivery and TomTom Traffic Insights, with availability coming soon as a map layer and via the proprietary TomTom Move web platform
- ✓ Flexible solution designed to meet customer needs.

Reading this white paper, you'll get an overview of the current market needs, learn what TomTom Historical Traffic Volumes is and how it creates opportunities across government and industry, understand the key application areas and benefits, grasp the technical advantages of TomTom's product and discover how to try it out yourself.

"Few other companies have the prevalence of data that TomTom has, and none have the history that we have of turning that data into highly valuable insights for our customers. Our Historical Traffic Volumes product takes us further as the world leader in traffic analytics data. With this launch our customers can turn to TomTom data for all their traffic analytics needs."

— Ralf-Peter Schäfer, VP Product Management of Traffic and Travel Information, TomTom

A bottleneck in the market

Traffic volumes are a key determinant of network efficiency and congestion, describing the number of vehicles passing a road section within a given time period. Thus, network-wide and reliable monitoring and prediction of traffic volumes on various time scales is an inevitable input for transport infrastructure and development planning applications across a variety of industries.

In the US, there is a growing focus on improving infrastructure, particularly across the road network – from local streets through to major highways. This interest stems from the pressing need to enhance road conditions, which have a significant impact on a community's overall quality of life, economic well-being and access to schools, jobs and healthcare. Across the country, jurisdictions are focusing on upgrading their road networks, partly due to the Bipartisan Infrastructure Law (BIL), also known as the Infrastructure Investment and Jobs Act (IIJA), which allocates \$110 billion in funding for these improvements.

An essential metric for requesting such federal funding and for routine budgeting at the state or local level is average annual daily traffic (AADT). AADT plays a crucial role in planning and designing infrastructure, monitoring traffic patterns and congestion, estimating road safety, and allocating highway funds.

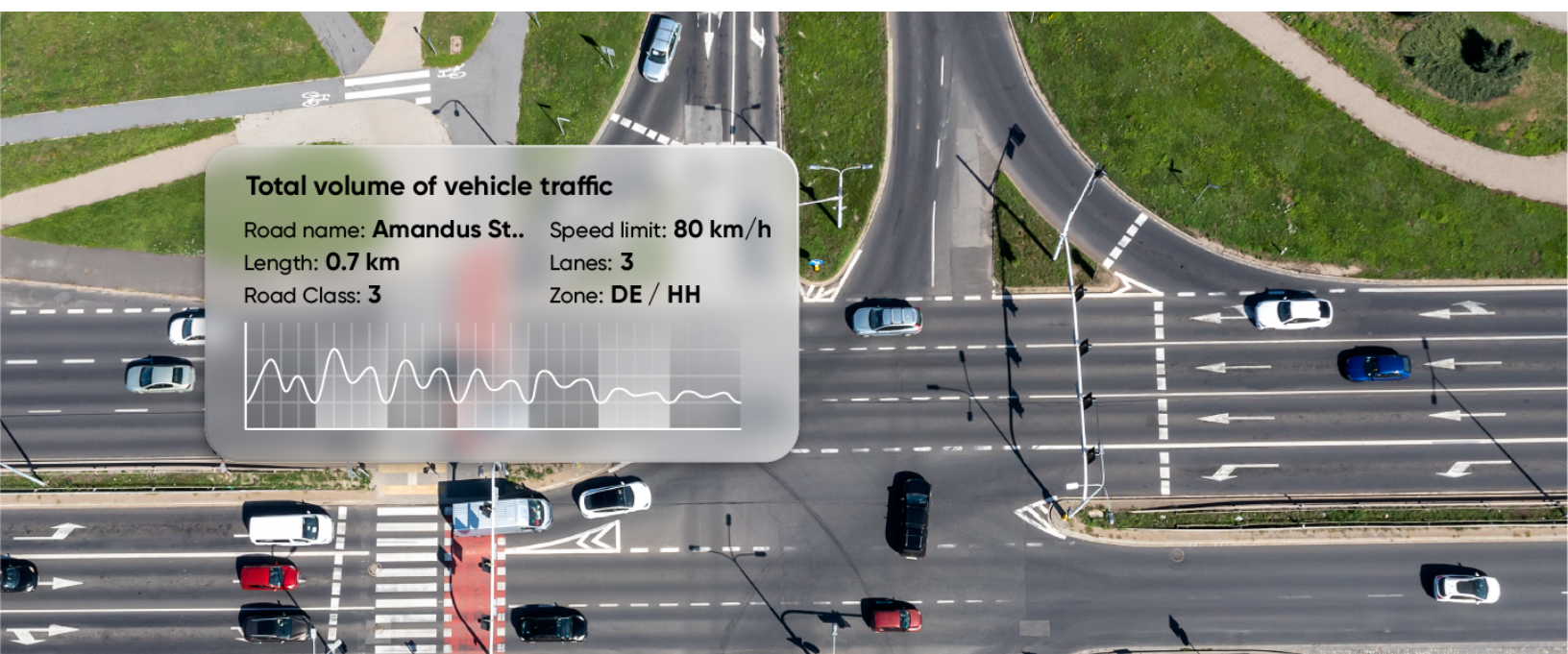
Additionally, each U.S. State Department of Transportation is required by law to report AADT to the Federal Highway Administration (FHWA) to fulfill Highway Performance Monitoring System (HPMS) and Model Inventory of Roadway Elements (MIRE) reporting requirements.

Traditional survey methods have limitations, including time-consuming operation, high costs and a lack of geographic coverage. Furthermore, short-term survey methods fail to capture seasonal traffic patterns and pose safety hazards for personnel in the field, who manually conduct measurements and position, maintain and repair equipment.

Historically, the traffic management industry has relied on hardware-based methods, such as inductive loop counters, Bluetooth detectors and ANPR cameras, to detect and measure traffic. However, the stated limitations of hardware-based methods make it challenging to fully capture and utilize traffic volumes data.

The high cost of traditional survey methods has rendered it uneconomical to survey the broader road network and maximize data accuracy, leading to sub-optimal traffic network infrastructure and services. This inadequacy leads to challenges like demand exceeding capacity and services such as traffic signals not being adapted to demand.

As a consequence, there are additional costs to road users, the environment and the wider economy. Industries that rely on traffic volumes for price and location decisions are put at a disadvantage.



Traffic volumes data is highly valued, however, due to the nature and cost of survey methods, industries have been unable to take advantage of advanced traffic volumes data. Like the traffic management industry, businesses seek to understand local traffic volumes to make better data-driven business decisions that positively impact financial outcomes.

Overcoming the challenges of traditional methods puts industries at an advantage. Quick access to accurate, robust traffic volumes data over time helps industries ensure that better decisions are made far faster and easier, helping to save time and costs while maximizing gains. For example, here's how many industries use, and stand to benefit from, advanced traffic volumes data.

- ✔ **Retail:** Retailers and their real estate experts analyze traffic volumes data to determine the customer base for retail stores. Traffic volumes data supports better decision-making, helping ensure that new store locations are accessible and convenient for a large number of potential customers to maximize sales opportunities.
- ✔ **Commercial Real Estate:** Traffic volumes can influence property values for commercial real estate. Real estate companies and their brokers use traffic volumes data to evaluate the accessibility and visibility of properties, making informed decisions with less effort and guesswork.
- ✔ **Geo-marketing:** Companies advertising out of home use traffic volumes and traffic speeds as key metrics to select locations with the most visibility and highest potential effectiveness. Measuring the effectiveness of outdoor advertisements is traditionally hard to achieve. Access to traffic volumes data over time, along with traffic stats such as speed, helps maximize exposure and measure effectiveness.
- ✔ **Insurance:** Insurance companies assess risk when setting premiums for auto insurance policies. Areas with higher traffic volumes may correlate with higher congestion levels and accident rates. By analyzing historical traffic volumes, insurance companies can identify higher-risk areas and adjust premiums accordingly. They can also use this data to refine models that predict the likelihood of accidents in different locations.
- ✔ **Fleet and Logistics:** Fleet management system providers and firms operating large commercial fleets may wish to route their drivers on roads that are less congested and busy, with respect to capacity and lower speed roads, to save fuel, minimize risk and benefit insurance premiums. Traffic volumes data helps inform these routing decisions and day-to-day schedules. Access to hourly volumes data also allows for avoiding routes at busy times and taking advantage of quieter times when traffic is flowing more freely.
- ✔ **Transport and Traffic Modeling:** Traffic volumes are a key input to the development and application of transport models, long-term investment planning and the alleviation of congestion hotspots or prioritization of improvements to signage, signals and safety. Access to hourly traffic volumes data allows for before and after analyses, road network performance evaluation and the creation of higher quality, more effective and representative road traffic models that resemble reality more closely.

Product Overview: The power of traffic volumes

Due to the nature and cost of traditional survey methods, any industry attempting to understand traffic movement and road use has been unable to take advantage of robust traffic volumes data. TomTom Traffic Volumes is designed to solve this problem, opening opportunities by providing faster, easier, deeper insights into actual road use and vehicle movement for specific times, dates, areas and road segments at scale.

TomTom built Historical Traffic Volumes using data modeling techniques combined with its extensive vehicle probe data and highly accurate spatial map data to achieve the highest detail of the road network. With these three inputs, TomTom produces accurate road traffic volume estimations with high fidelity and refresh rate, without the need for extensive survey methods. Analytics insights are available almost instantly at a fraction of the cost, with high coverage on road networks across the US.

Our product enables customers to analyze annual average daily traffic (AADT) and annual average daily hourly traffic (AADHT) to see daily road use across the year, as well as average daily traffic (ADT) and average daily hourly traffic (ADHT) across specific date ranges and hours. This data empowers customers to gain detailed insights into the effects of seasonality and peak travel patterns at a daily level – all without the need to plan surveys or the usual operational and hardware overhead.

Data is available within minutes (up to one hour depending on the data set) for any road segment or set of road segments. Customers can also access volume data from the past, which isn't possible with traditional methods that must be planned in advance and carried out in real time. TomTom Traffic Volumes data is made available in three forms via three delivery methods, as shown in Figure 1.

	Minimum scale	Date/ Time periods	Values per segment	Delivery method	Market segment
Volume metric: AADT					
	State	Annual Average Daily Traffic & MAPE*	1	Map layer Traffic Insights	Location and traffic Analytics Retail Geomarketing/OOH
Volume metric: AADHT					
	Region/ State	Annual Average Daily Hourly Traffic & MAPE	24	Map layer Traffic Insights Batch** TomTom Volumes API***	Traffic management Financial analytics Retail Geomarketing/OOH Insurtech
Volume metric: ADT or ADHT					
	Custom area/ route	Average Daily Traffic & Average Daily Hourly Traffic. Custom for areas & date/ hours	Up to 24x number of date ranges	TomTom Volumes API/ Move Portal only	Location and traffic Analytics Traffic management

Figure 1

*MAPE, or mean absolute percentage error, is a commonly used quality measure. It is scale-independent, allowing for comparison between datasets with different scales, as is the case with volumes on roads across the road network.

**Batch Provides OSM Way ID and map agnostic OpenLR referenced volume data at a state or country level, delivered via a cloud repository with flexible update frequency.

***API Enables analysis of city-wide areas or multiple site locations. The API also supports queries at a county, ZIP code or Traffic Analysis Zone (TAZ) area size.



If you're analyzing city-wide areas or multiple retail sites, use the Traffic Volumes API to efficiently report on statistics for specific locations. The API also supports queries at a county, ZIP code or Traffic Analysis Zone (TAZ) area size.

The batch delivery method delivers weekly AADHT at state or country level, supporting large-scale data querying and deep integration into existing product and technology stacks. Companies and agencies requiring state- or country-wide data are served by the batch delivery method, which makes efficient work of transferring large data sets. Our product is designed to be flexible to suit the customer's needs.

Traffic Volumes will soon be available in the TomTom Move web portal, home to TomTom's suite of traffic analytics products, including Junction Analytics, Traffic Stats, Origin/Destination (O/D) and Route Monitoring. Customers can sign up for an evaluation account at move.tomtom.com to try out Traffic Volumes and see the impact TomTom's data insights can make for themselves.

Features

Powered by 600+ million connected devices, including more than one in five vehicles on the road globally

Available at country, regional, route or custom area level, depending on application

Provides hourly, daily, weekly, monthly and annual aggregation levels

Variety of formats available

Low latency

Historical data

Country-wide coverage

Benefits

Access highly accurate volume estimations without the need for costly survey methods and extensive planning

Enjoy flexible analysis options designed to suit your needs

Understand the effects of seasonality and peak/off-peak travel patterns and improve forecasting

Choose the format and delivery method that works best for your needs

Get accurate, robust data far faster and easier than traditional methods, at a fraction of the cost

Access deep insight into traffic volumes data over time

Get data where you need it, when you need it



Applications areas: Great gains for government and industry



Traffic management

Prioritize network management and inform operational decision-making



Traffic planning and modelling

Perform before and after analyses, evaluate road network performance and build more robust and representative road traffic models



Businesses

Drive informed decisions that positively impact financial outcomes



Geomarketing/out of home advertising (OOH)

Use highly detailed traffic volume
Determine optimal locations for marketing assets and generate the most visibility and impact



Insurance companies

Incorporate road network use into risk models to offer competitive premiums



Financial markets

Access leading indicators for data-driven financial and investment decision-making



Retail and commercial real estate

Improve site evaluation, marketing and property valuations



Lawmakers and policy makers

Inform budgeting and prioritize transport budgets and projects



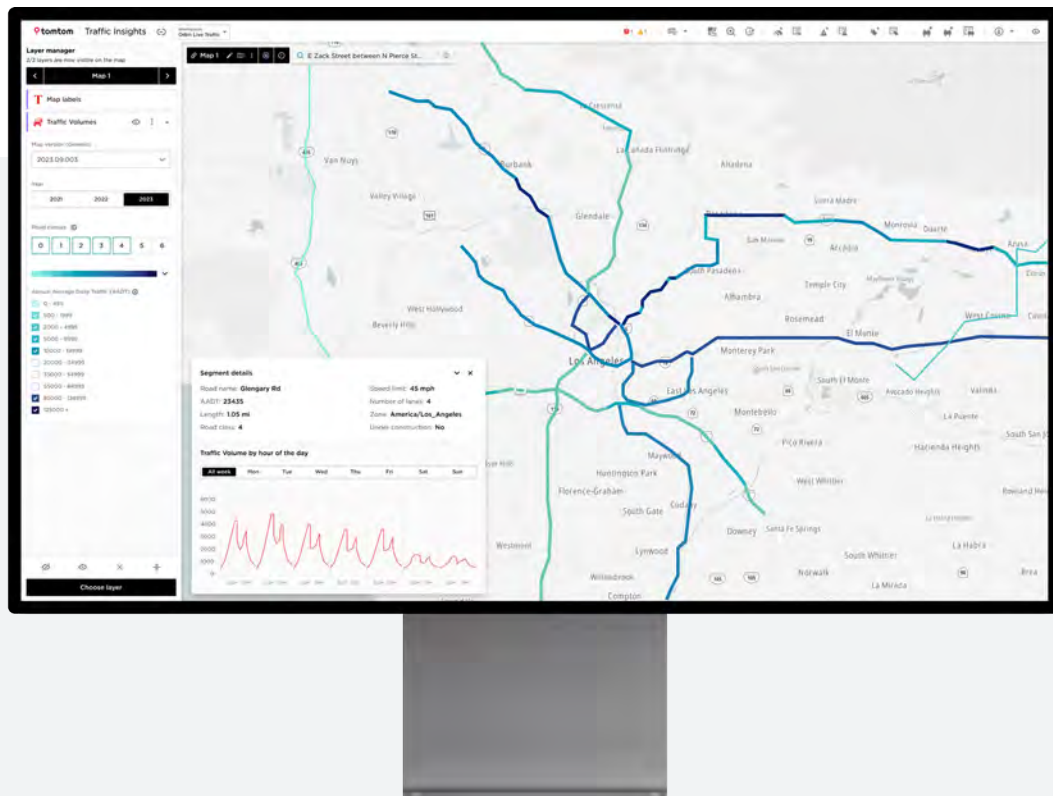
Fleet and logistics

Optimize routes and operations



Ride hailing

Boost efficiency for ride planning



Technical Benefits: A unique approach beyond hardware

TomTom created robust traffic volumes software as a service by integrating probe vehicle data into its product to estimate historical average volumes at road segment level. We also leverage our highly detailed map data to add spatial road network information. Our unique approach produces a range of technical benefits over traditional survey and expansion methods.

- ✓ **Sourcing at scale:** Probe vehicle data is ubiquitous, allowing estimation of volumes for most public roads and avoiding the need for expensive, isolated day-long surveys and ambitious extrapolation to AADT.
- ✓ **Unrivalled accuracy (>90%):** The mean absolute percentage error (MAPE) provides a scale-independent measure that allows for comparison between datasets with different scales. The lower the error value, the better. Below 20% is considered good. Our average MAPE value is less than 10% for all road categories, delivering accuracy for AADT greater than 90%.
- ✓ **Weekly, daily and hourly volume estimates:** Probe vehicle data enables us to build detailed estimates of average traffic volumes, by week, day and hour, without needing extended surveys or loop counter deployments that risk unreliability and failure.
- ✓ **Multiple delivery methods:** Our approach gives us the ability to distribute data in different forms to customers. Customers in different sectors may use the data together with the map at country level, or via our API services, enabling extraction of custom area or route level data.
- ✓ **Rapid validation:** Machine learning and improvements in computational availability in the cloud facilitate rapid experimentation with different model structures and validation datasets.
- ✓ **From road capacity to road improvement:** TomTom is unique in having both a map to provide spatial context and extensive probe vehicle data. This enables modeling and estimation of road network capacity based on a range of map attributes and real-world road features such as urban/rural context, number of lanes, intersections and stop lines, existence of traffic signals and the function a road segment plays in the wider network.
- ✓ **Low-cost expansion across networks:** After volume estimation at road segment level, a key step is validation against loop counter data in test areas, followed by expansion/application across each country. This process of estimation, calibration and validation can be repeated relatively quickly across territories with minimal loop counter data at a limited number of heterogeneous locations.

Into the machine learning model

TomTom has built an advanced machine learning model that uses features from both the map and traffic conditions observed on the road network.

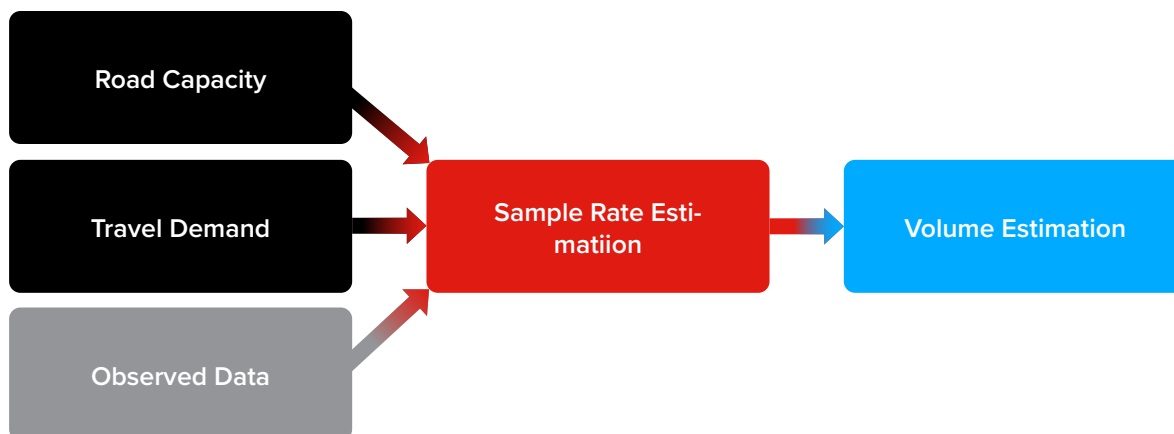


Figure 2. Illustration of the machine learning pipeline.

The different feature categories allow the model to learn to scale accurately while capturing the complex variance of the penetration rate of probe vehicle data.

We generate the features and supplement them with additional traffic and map attributes, including maximum probe count, free flow speeds, number of lanes, functional road class (FRC), population density and the per capita income of a region. These features are integrated with ground truth data from roadside equipment to train a CatBoost model, chosen for its balance of performance and accuracy.

Our integrated methodology supports a scalable, machine-learning-driven approach to traffic modeling. It effectively addresses the complexity of traffic data while meeting essential quality requirements. The model's robustness across large areas without equivalent observed data from roadside infrastructure underscores its potential for wide applicability to provide a range of reliable key volume measures.

Summary

Traffic volumes insights provide key data inputs into traffic management and high-impact decision-making. Governments, local authorities and a wide range of industries have been held back by limited data provided by traditional hardware methods, which are uneconomical, unscaleable and lack accuracy.

TomTom Historical Traffic Volumes provides a robust software-based solution, opening access to almost instant data insights at a fraction of the cost. The data is highly accurate, customizable and scalable, delivered to customers in the format of their choice.

TomTom's unique approach to traffic volumes combines the latest machine learning models, detailed spatial TomTom map data and extensive TomTom probe data, together creating a powerful and reliable product that gives customers easy access to highly valued, previously hard-to-get data.

TomTom Historical Traffic Volumes is available* to customers via an API, batch delivery and TomTom Traffic Insights, with availability coming soon as a map layer and via the user-friendly TomTom Move web platform – home to TomTom's suite of traffic analytics products, including Junction Analytics, Traffic Stats, Origin/Destination and Route Monitoring. Our developer-friendly

Are you a (potential) customer? Request a trial evaluation of TomTom Historical Traffic Volumes to see the impact you can make firsthand. Reach out to your TomTom sales rep or [contact our sales team](#) to get started.

**Currently available for the US only, with North America to follow. Further expansion will focus on availability for new and existing TomTom customers. TomTom will continue updating the product, adding expanded features and capabilities.*

