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(54) **SYSTEM AND METHOD FOR EVALUATING VEHICLE AND OPERATOR PERFORMANCE**

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G08G 1/017 (2006.01)
G08G 1/01 (2006.01)

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CPC ***G08G 1/0104*** (2013.01)

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See application file for complete search history.

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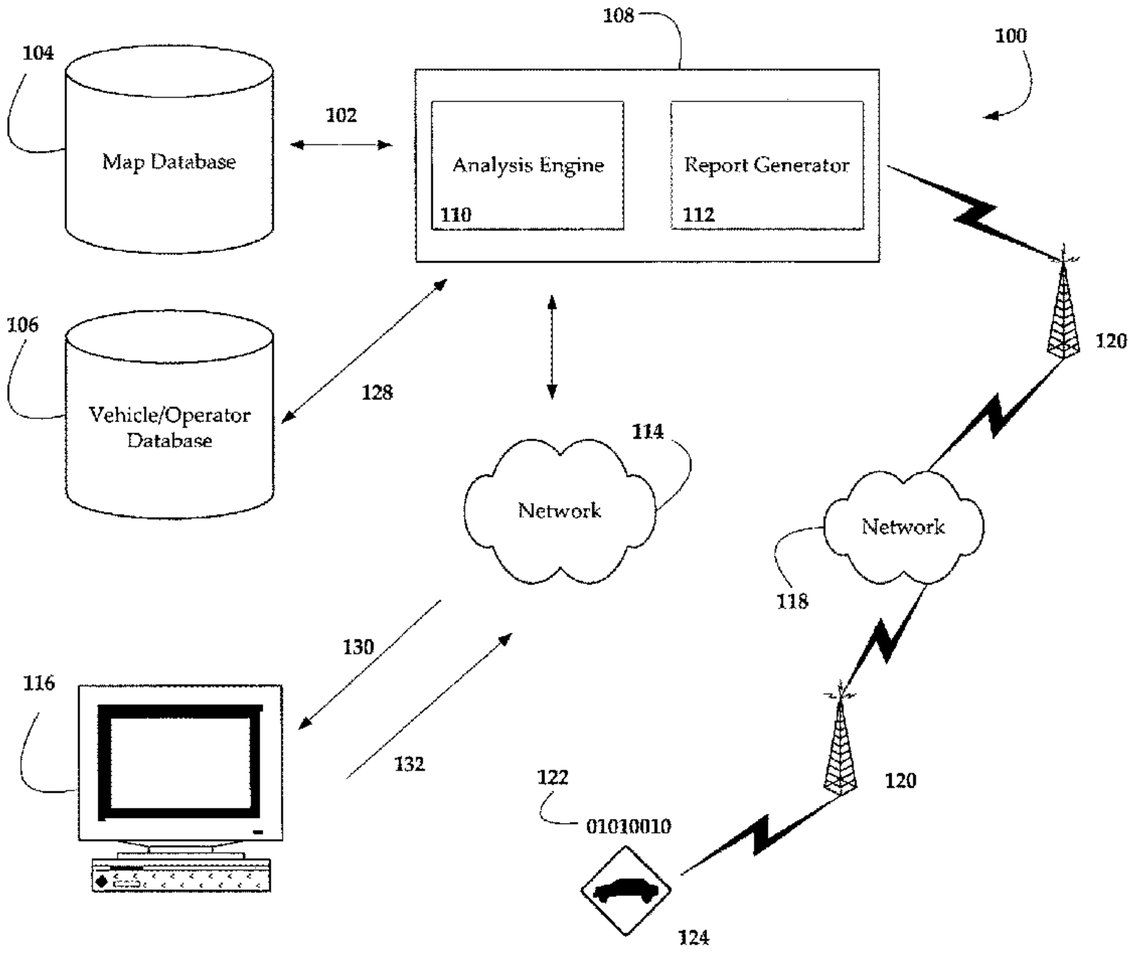
(57) **ABSTRACT**

The present invention relates to the field of safety management of one or more vehicles, and more particularly, to a system and method for analyzing information relating to a vehicle's performance characteristics such as speed against environmental attributes such as speed limits to assess a vehicle and operator's tendency to operate according to preset or other criteria.

25 Claims, 6 Drawing Sheets



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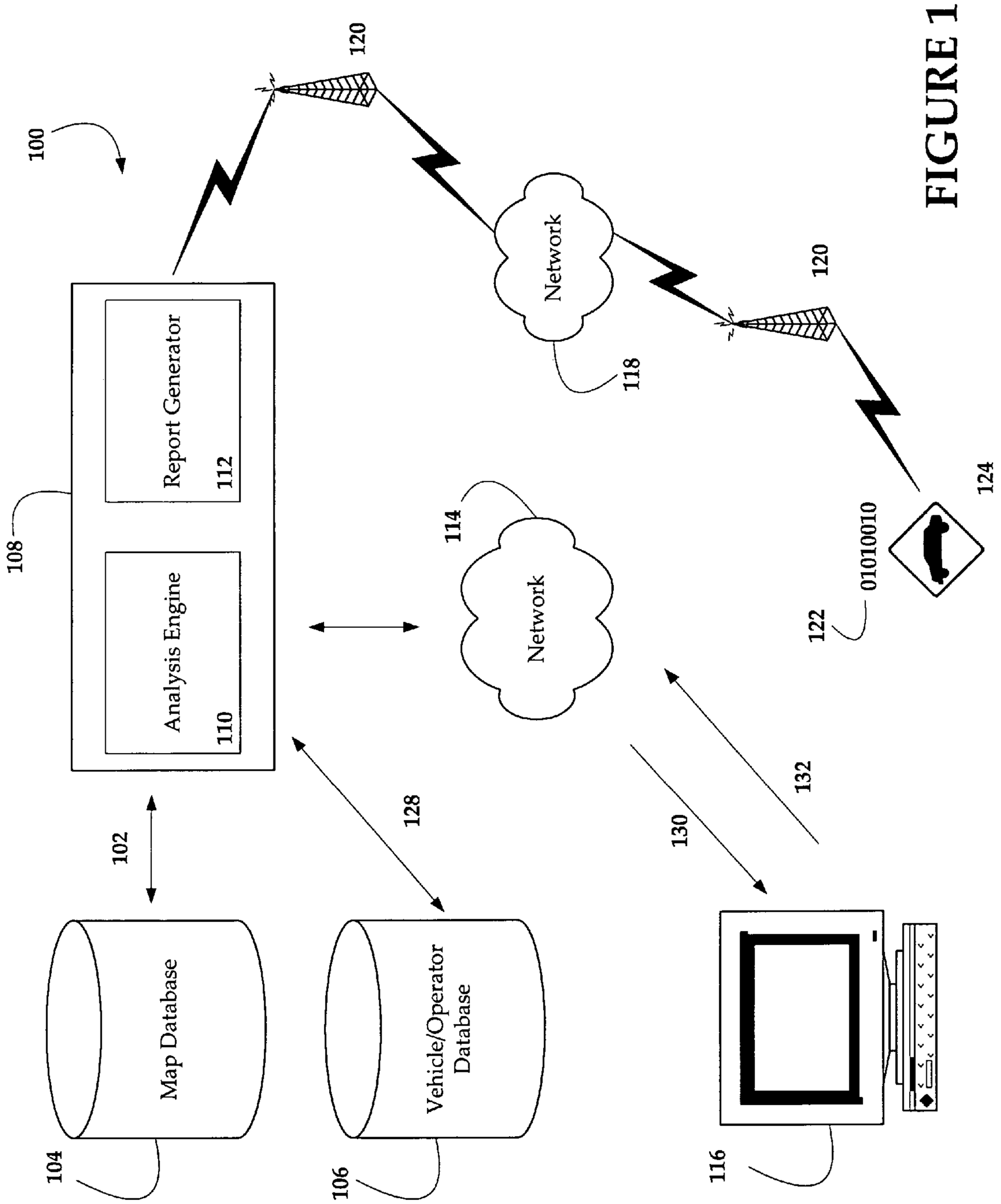

100
120
Network
118
120
124
01010010
122
108
Report Generator
112
Analysis Engine
110
114
Network
102
128
130
132
Map Database
104
Vehicle/Operator Database
106
116

FIGURE 1

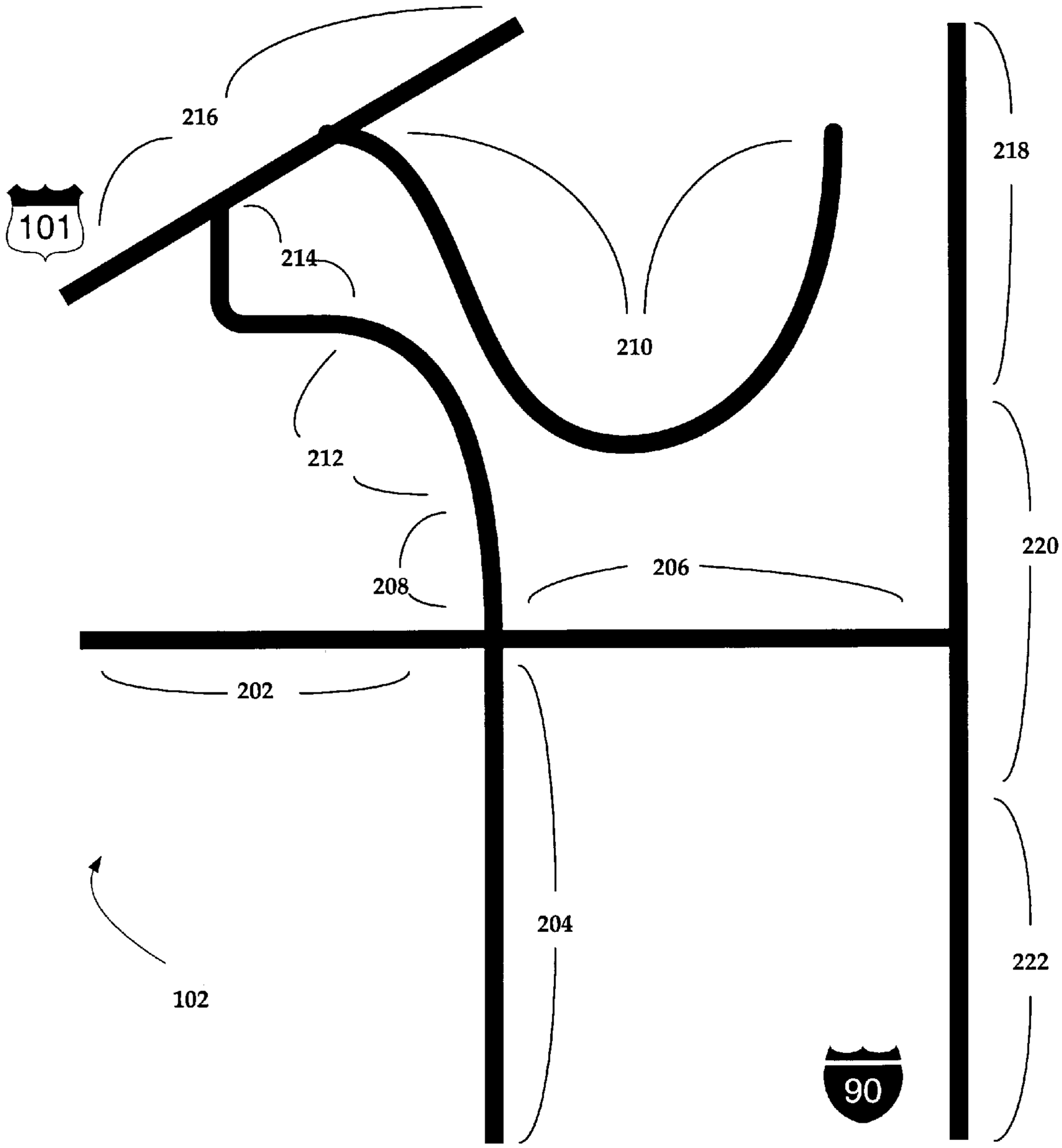


FIGURE 2A

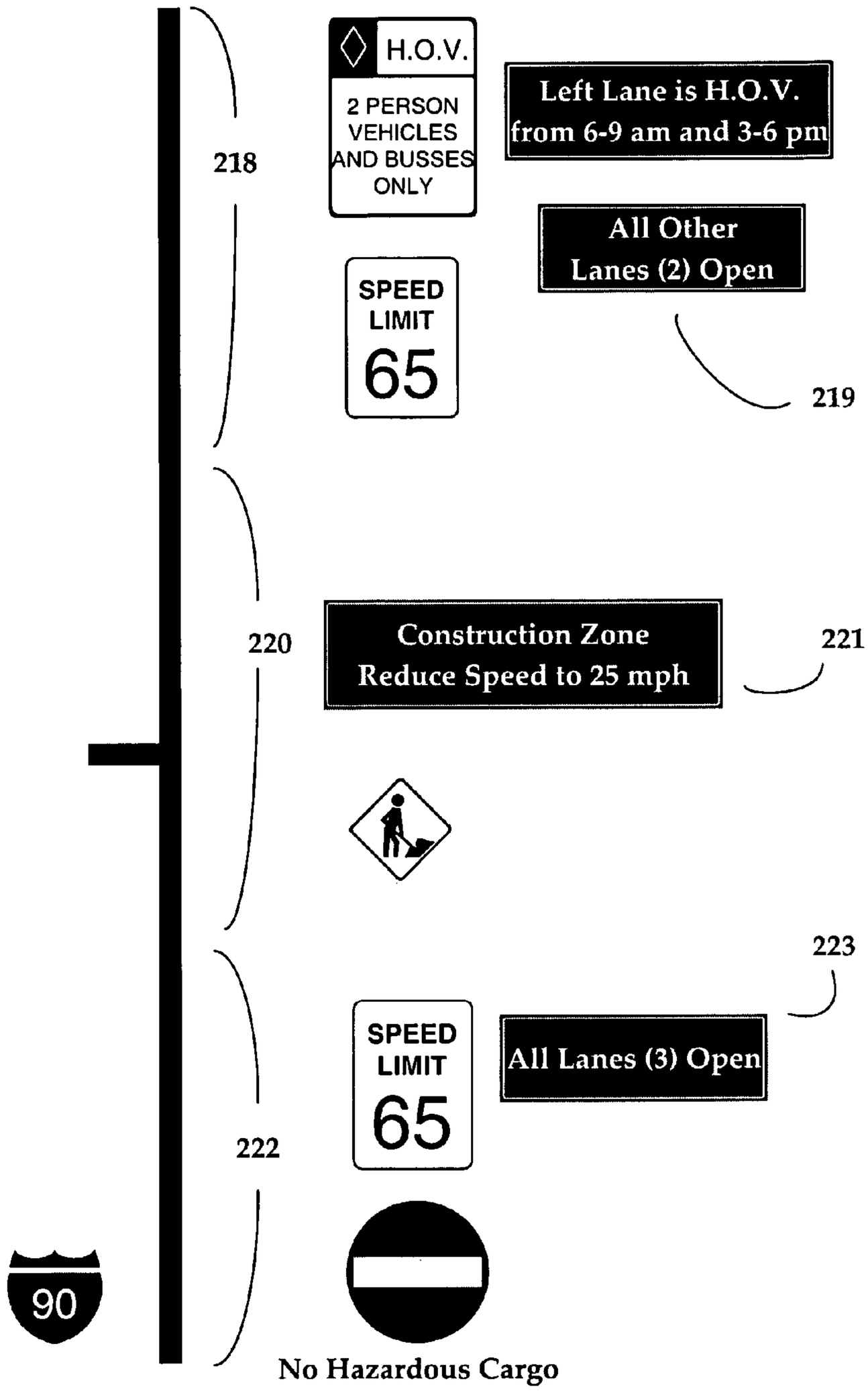
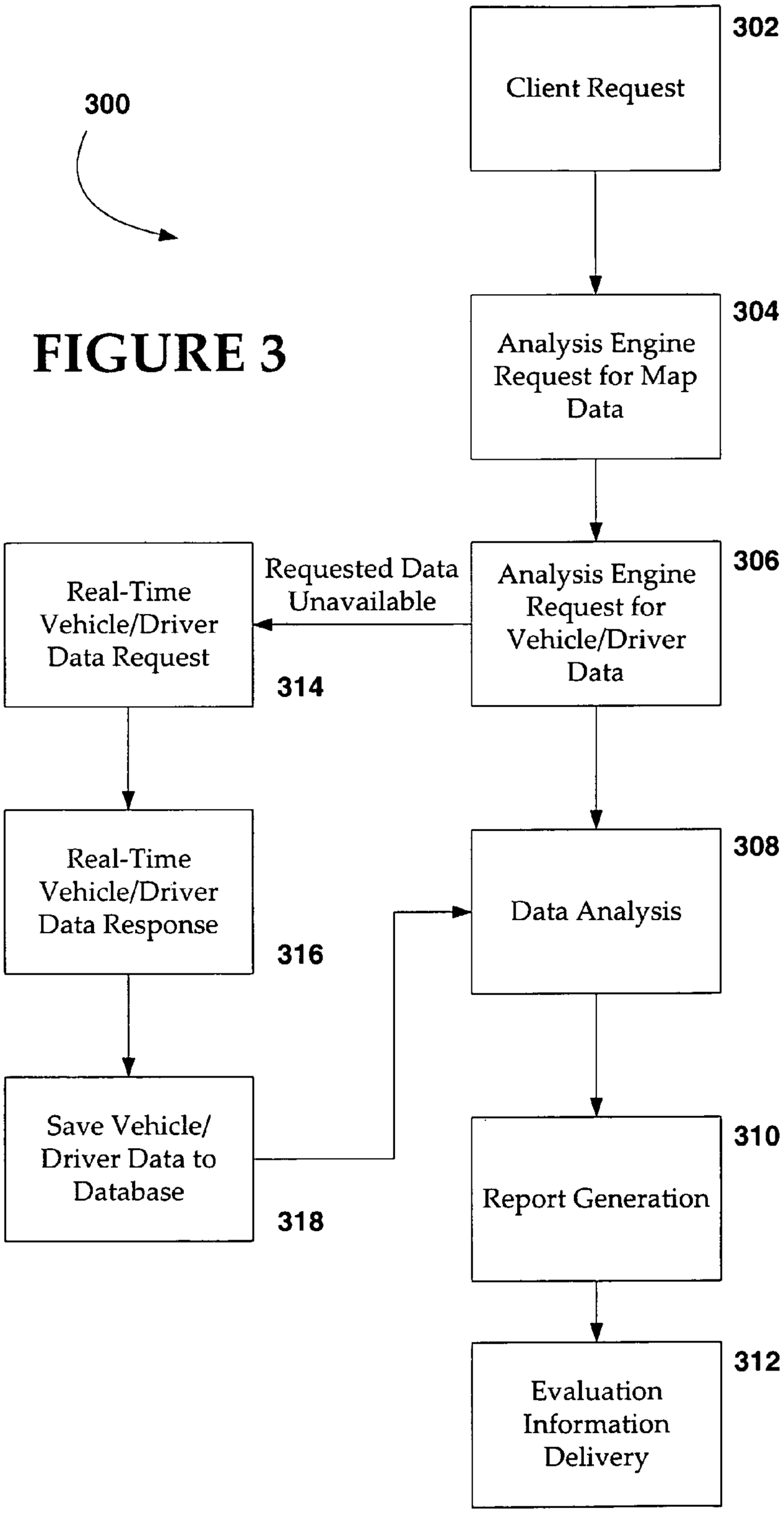

218
H.O.V.
2 PERSON VEHICLES AND BUSSES ONLY
Left Lane is H.O.V. from 6-9 am and 3-6 pm
All Other Lanes (2) Open
SPEED LIMIT 65
219
220
Construction Zone Reduce Speed to 25 mph
221
223
SPEED LIMIT 65
All Lanes (3) Open
222
90
No Hazardous Cargo

FIGURE 2B

FIGURE 3


300
Client Request
302
Analysis Engine Request for Map Data
304
Analysis Engine Request for Vehicle/Driver Data
306
Requested Data Unavailable
Real-Time Vehicle/Driver Data Request
314
Real-Time Vehicle/Driver Data Response
316
Save Vehicle/ Driver Data to Database
318
Data Analysis
308
Report Generation
310
Evaluation Information Delivery
312

FLEET SUMMARY REPORT

Acme Distributing, Inc.

Fleet Speed Safety Report

Start Date: 6/15/03 12:00AM **Fleet Location:** San Francisco, Calif.

End Date: 6/16/03 12:00AM **Requested By:** T. Jameson

Speed Criteria:

20% above speed limit, minimum 10 MPH

Minimum duration: 10 seconds

							Most Serious Incident		
Vehicle ID	Driver ID	% of Route Speeding	% of Streets Speeding	Average Speed	Highest Speed (Freeway)	Highest Speed (City Streets)	Speed	Posted Speed Limit	Location
									***
Fleet Average	***	**31%**	**19%**	**39**	**64**	**52**	***	***	***
664	A. Jackson	45%	24%	44	77	62	62	30	1700 Harrison, San Francisco, CA
407	G. Apple	36%	22%	41	65	53	36	25	1600 Folsom, San Francisco, CA
961	R. Reid	35%	19%	45	72	62	35	25	Route 101, San Francisco, CA
903	J. Hubbard	35%	19%	45	72	62	35	20	Route 101, San Francisco, CA
840	F. Gupta	31%	28%	38	64	52	42	30	San Pablo Ave, Emeryville, CA
333	T. Swartz	31%	26%	38	64	52	42	30	El Camino, Menlo Park, CA
568	D. Strong	30%	15%	39	62	45	58	25	1700 Harrison, San Francisco, CA
214	R. Hill	30%	15%	39	62	45	58	30	I-880, Fremont, CA
682	K. Vlad	28%	18%	36	63	52	33	25	El Camino, Menlo Park, CA
272	A. Lions	26%	16%	37	61	45	**	**	**
789	W. Queen	26%	16%	37	61	45	**	**	**

404 406 408 410 412 414

402

FIGURE 4

Single-Driver Speed Incident Map

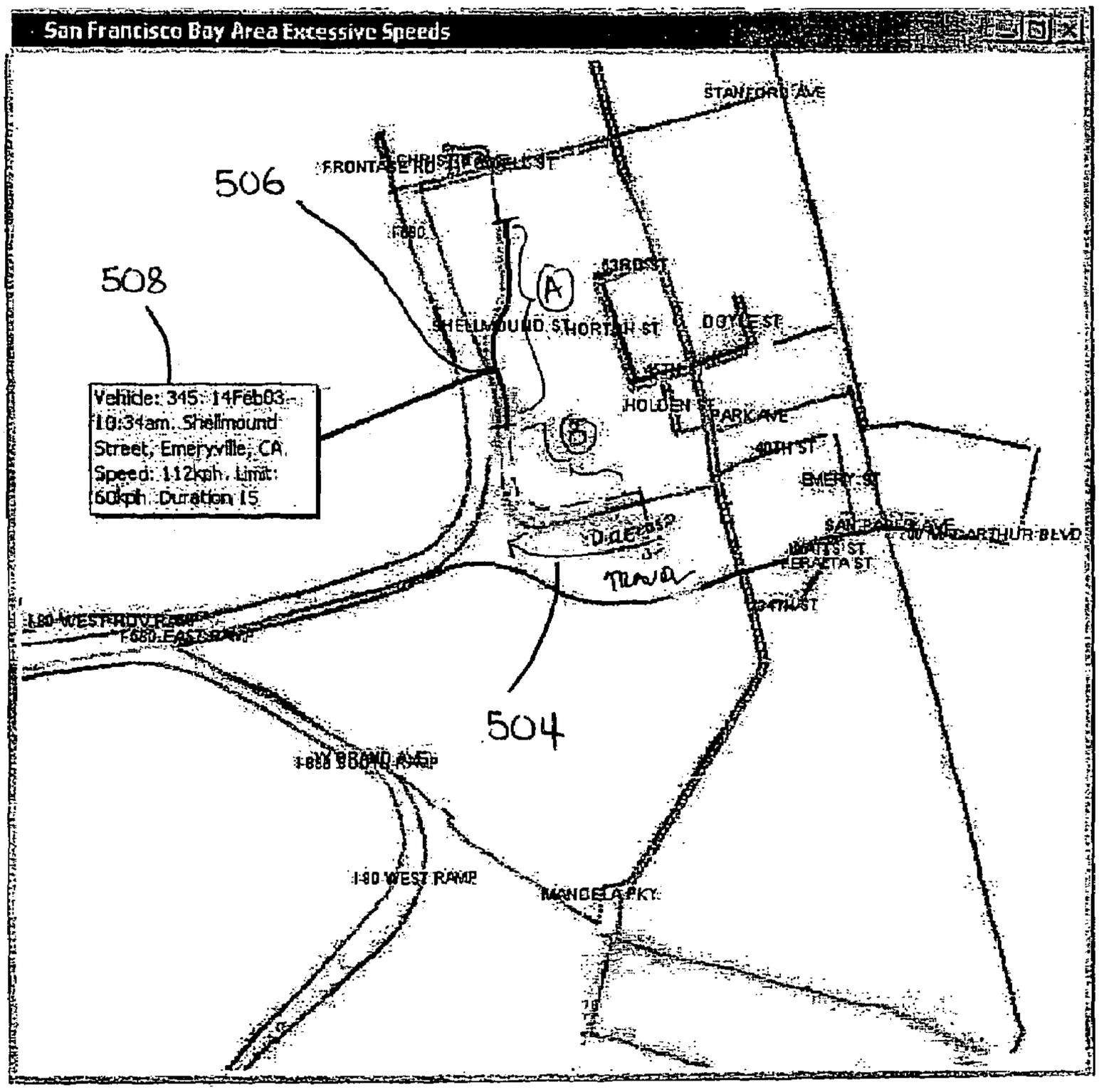


FIGURE 5

SYSTEM AND METHOD FOR EVALUATING VEHICLE AND OPERATOR PERFORMANCE

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the priority benefit of U.S. Provisional Patent Application No. 60/471,021 entitled "Method and System for Evaluating Performance of a Vehicle and/or Operator" filed May 15, 2003 [and U.S. Provisional Patent Application No. 60/490,199 entitled "System and Method for Determining and Sending Recommended Departure Time Based on Predicted Traffic Conditions to Road Travelers" filed Jul. 25, 2003]. The [disclosures of these] *disclosure of this* commonly owned and assigned [applications are] *application is* incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the field of safety management of one or more vehicles, and more particularly, to analyzing information relating to a vehicle's performance characteristics against map database attributes to assess a vehicle's tendency to operate according to a set of criteria.

2. Description of Related Art

The American trucking industry employs nearly ten million people. This includes more than 3 million truck drivers who travel over 400 billion miles per year to deliver to Americans 87% of their transported food, clothing, finished products, raw materials, and other items. Trucks are the only providers of goods to 75 percent of American communities, and for many people and businesses located in towns and cities across the United States, trucking services are the only available means to ship goods. As five percent of the United States' Gross Domestic Product is created by truck transportation, actions that affect the trucking industry's ability to move its annual 8.9 billion tons of freight have significant consequences for the ability of every American to do their job well and to enjoy a high quality of life.

With the importance of the American trucking industry in mind, it is unfortunate that workers in the American trucking industry experience the most fatalities of all occupations, accounting for twelve percent of all American worker deaths. Approximately two-thirds of fatally injured truckers are involved in highway crashes. Roughly 475,000 large trucks are involved in crashes that result in approximately 5,360 fatalities and 142,000 injuries each year. Of these fatalities, about seventy-four percent are occupants of other vehicles (usually passenger cars), three percent are pedestrians, and twenty-three percent are occupants of large trucks. As there was a twenty-nine percent increase between the years of 1990 and 2000 in the number of registered large trucks and a forty-one percent increase in miles traveled by large trucks, it is evident that the risks involved in the trucking industry are not simply going to go away. If anything, this increase in trucks on the road and miles traveled evidences that the $3 billion in lost productivity to the economy and hundreds of millions of dollars in insurance premiums caused by truck crashes may get even worse.

Studies and data indicate that driver errors and unacceptable driver behaviors are the primary causes of, or primary contributing factors to, truck-involved crashes. The Federal Motor Carrier Safety Administration reports that speeding (i.e., exceeding the speed limit or driving too fast for conditions) is a contributing factor in twenty-two percent of fatal crashes involving a truck in 2000. Additionally, National Highway Traffic Safety Administration reports that speeding is a contributing factor in twenty-nine percent of all fatal crashes in 2000. More than 12,000 people lost their lives in 2000 in part due to speed-related crashes.

With the pressure of making on-time deliveries, many drivers are willing to accept the risks of unsafe driving in order to achieve timely arrivals. Unfortunately, the primary tool for preventing unsafe driving—law enforcement—can only be present in so many places at so many times. Even when law enforcement is present, drivers can communicate with one another to inform them of 'speed traps' or other locales where law enforcement presence is high. While drivers may engage in ultra-safe driving in these areas, it does not change the fact that a vast majority of the time these drivers are on the road, they are not subject to any type of third-party supervision or accountability with regard to their driving habits. Thus, additional oversight of driver behavior is required.

Although causes of crashes are largely human, important solutions may be found in technology to facilitate and augment driver performance. For example, to minimize these costs, conventional telemetric safety solutions are used to observe and measure vehicle tendencies and patterns for improving safety. Generally, these solutions are binary in nature in that they are limited to generating simple triggering alarms, such as whether a particular characteristic is within an acceptable tolerance (e.g., whether a vehicle's speed is in compliance with a pre-set maximum authorized speed).

Such binary solutions offer only temporary notice (e.g., an audible alarm) to the driver that they are engaged in unsafe driving behavior and when that behavior abates (e.g., the cessation of the alarm). These solutions do not provide an indication of long-term or habitual unsafe driving behavior and can easily be 'muted' or otherwise disabled by the driver whereby any value offered by such an alarm solution is eliminated. These binary solutions, too, often do not inform another party, such as a fleet manager, of such unsafe driving behavior as the driver alone hears the alarm and is made aware of the unsafe behavior.

High-grade digital mapping systems offering detailed, digital models of the American highway, road, and street networks and developed for the consumer in-vehicle navigation market have provided an opportunity to combine map data with vehicle operation and location data to offer innovative software based services and solutions. Presently available digital map databases, such as those provided by NAVTEQ, can include up to 150 individual road attributes as well as individual points of interest, localities, and addresses. Continuing developments in map database technology allow for allocation of even more attributes to segments of road data including speed limit, school and construction zone information, car pool lane limitations including persons, and hours of operation, prohibitions on turns (e.g., no right turn on red between 6-9 AM), and so forth.

In the transportation industry, managers of trucking fleets worry about their vehicles and drivers speeding on arterial

and surface streets as well as in highway construction zones in addition to violating other traffic ordinances. Not only does such behavior put employees and third-parties at risk, but it is also directly proportional to the costs of insurance premiums that result in an increase in the price of transportation services that trickle-down to customers benefiting from delivery services. Being able to monitor and address unsafe driving behavior would result in a decrease of these incidents and a decrease in insurance costs.

There presently exists no user-friendly mechanism and or analytic tools for measuring a vehicle's and or a driver's performance given geographic and environmental contexts of that vehicle in determining whether that vehicle or driver is operating outside a margin of safety.

SUMMARY OF THE INVENTION

The present invention provides a system and method for analyzing certain vector and operational data received from a vehicle in the form of vehicle data against map data from a database, which includes certain road segment attributes. This analysis allows a user to assess tendencies of a vehicle or its operator to operate in an unsafe manner according to criteria defined by the user.

In an exemplary embodiment, a method provides a software-based service that combines data collected by GPS receivers in vehicles with road speed-limit information from data repositories, which can include data representing high-grade digitized maps (including graphical descriptions and geographic context characteristics describing environs of a segment of a road) in order to monitor drivers for excessive speed. This service is an easy-to-deploy method of predicting and identifying accident-prone drivers before accidents happen thereby providing fleet managers and safety experts from the insurance industry, among others, with a relatively easy-to-use and low-cost tool for improving safety management.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exemplary system in accordance with one embodiment of the present invention.

FIG. **2**A is an exemplary representation of map data reflecting existence of various road segments.

FIG. **2**B is a detailed view of road segments of FIG. **2**A wherein particular road segment attributes are shown.

FIG. **3** is a flow chart representing an exemplary method of evaluating vehicle and or operator performance.

FIG. **4** illustrates an exemplary tabular format for reporting analyzed vehicle data in accordance with an exemplary embodiment of the present invention.

FIG. **5** illustrates another exemplary format for graphically reporting analyzed vehicle data in accordance with an exemplary embodiment of the present invention.

SUMMARY OF THE INVENTION

Detailed descriptions of exemplary embodiments are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure, method, process, or manner.

In accordance with one embodiment of the present invention, a system and method analyzes vehicle operational data, vector data, and location data, for example, in conjunction with information from a map database to allow a user to assess whether a vehicle is being operated in a potentially dangerous manner. Such a determination can be made by ranking or rating different drivers and or vehicles according to their propensity for potentially dangerous operation as determined by analyzing specific sets or subsets of data representing a driver's or a vehicle's performance.

User inputs can define how to evaluate different drivers and or vehicles using vehicle attribute data (e.g., weight, width, height, length, number of axles, load type, number, and types of occupants) and time period or trips over which driver or vehicle should be evaluated. Each of these different drivers can be identified with an operator identifier, which is associated with one or more vehicle identifiers. For example, a driver having Operator ID number 1453 can be associated with truck numbers T**1**, T**4**, T**15**, and T**2**. Hence, the Operator 1453's driving behavior can be evaluated over each of the vehicles (i.e., T**1**, T**4**, T**15**, and T**22**) that the driver operates.

As described herein, vehicle data is comprised of vector data and operational data. Vector data includes positional information (e.g., x-y-z coordinates determined from GPS information, such as longitude, latitude, and elevation over sea-level), velocity information (e.g., speed, and acceleration) and any other information derived from positional-determination means as determined by, for example, a GPS receiver. Operational data includes information relating to operational parameters of the vehicle such as centrifugal force (as measured in 'G's'), rotational engine speed (as measured in 'RPMs'), torque, oil temperature, tire pressure readings, or any other sensor-generated data.

The vector and operational data received from these vehicles in the form of vehicle data can be collected in real-time and/or at some point in time where data is 'batched' or downloaded at certain intervals of time (e.g., data is downloaded from a fleet vehicle after returning to a fleet base station via infra-red or any other communication medium). This vehicle data is then relayed to a computer for analysis in comparison and/or contrast to map information (e.g., road segments and road segment attributes in a map database). The present invention also envisions a system wherein analysis of vehicle data against map information occurs in real-time wherein the computer and/or database are on-board with the vehicle generating relevant vehicle data.

The matching vehicle data (e.g., vehicle speed or vehicle weight) and the road segment attribute information (e.g., speed limit or vehicle weight restriction) are analyzed to determine how the vehicle's operation compares to a set of user-defined safety criteria, for example, a set of characteristics entered by the user to generate a report. The system and method can then rate and rank operators and or vehicles according to their propensity to violate predetermined rules set by the user (e.g., a fleet manager).

In accordance with a specific embodiment, vehicle data can be collected and/or inferred (e.g., derived) from data collected by various types of sensors including in-vehicle GPS receivers, vehicle speedometer, and/or through external inference, such as cell phone, satellite triangulation, or by other known means.

An exemplary method and system in accordance with the present invention can use a map database containing road segments and road segment attribute information. Roads (or any other thoroughfare) are stored as data in the map database and can be represented as a collection of road segments. Each road segment in the database will be asso-

ciated with road segment attributes that provide information about a specific road segment such as road type, speed limit, vehicle weight, and/or height restriction, turn restrictions, and so forth.

DETAILED DESCRIPTION

FIG. **1** illustrates an exemplary evaluation system **100**. A processor **108** of evaluation system **100** is configured to receive vehicle data **122** from a vehicle **124** via any one of relay **120** and network **118**. The processor **108** of evaluation system **100** is configured to exchange map data **102** with map database **104** as well as to exchange vehicle/operator data **128** with vehicle/operator database **106**. The processor **108** is also configured to deliver evaluation information **130** to a client **116** via local network **114** in response to a client request **132**.

Vehicle **124** can be any type of automobile, truck, or other conveyance such as a water-traversing vehicle. Vehicle **124** generally includes a position and or direction-determining device, such as a Global Positioning System (GPS) receiver, and can include additional hardware and/or software for generating, transmitting, and/or receiving data, such as vector or operational data. While one skilled in the art will appreciate exact operational details of GPS, at a more fundamental level, GPS is a navigation system that provides specially coded satellite signals that can be processed in a GPS receiver enabling the receiver to compute position, velocity, and time. The present invention envisions alternative embodiments wherein other position and/or direction-determining devices (e.g., Dead Reckoning from Qualcomm), are utilized for generating, transmitting, and/or receiving data, such as vector or operational data.

In one embodiment, at least a portion of the hardware and or software residing, in part, within vehicle **124** can function in a manner similar to DriveRight manufactured by Davis Instruments. DriveRight, and products like it, provide an on-board display console for viewing time, distance, top speed, and average speed. In particular, a portion of the hardware operates as a data port from which vector and or operational data can be retrieved for transmittal from vehicle **124** to processor **108** in the form of vehicle data **122**.

While present products like DriveRight do not take into account geographic data, such as map data from a map database, these products do use vector and/or operational data from the vehicle's own instruments through the vehicle's On-Board Diagnostic system ("OBD")—a computer-based system built into all model year **1996** and newer cars and trucks that monitors performance of the vehicle's major components and emission controls—as well as various unsafe operation sensors to to prepare vehicle data **122**.

This vehicle vector and/or operation data generated by GPS receiver and/or other resident hardware and/or software is transmitted in the form of vehicle data **122** to processor **108** for generating analytical reports in accordance with the present invention. In an exemplary embodiment, vehicle data **122** is any form of machine-readable data reflecting vehicle vector data and/or operational data such as velocity, position, RPMs, oil temperature, and so forth. Other hardware embodiments for generating vehicle vector and/or operation data can include industry-standard telemetric hardware such as @Road's FleetASAP or Qualcomm's OmniTRACS. OmniTRACS computes position by measuring the round trip delay of synchronized transmissions from two geostationary satellites separated by 12-24 degrees. The network management at the OmniTRACS hub computes the range of each satellite and derives the third measurement needed for position from a topographic model of the earth. These various hardware and/or software embodiments can be implemented at the vehicle **124** and/or remotely in evaluation system **100** as is most appropriate per design of the particular embodiment.

Relay **120** can be any relay station for receiving and transmitting signals between a vehicle **124** and a processor **108** of evaluation system **100**, such as an antenna, cellular phone tower, or any other transmission tower using known or future wireless protocols. Network **118** can be any communications network known in the art configured to transport signals between the relay **120** and the processor **108** of evaluation system **100** such as the Internet or proprietary wireless networks. In some embodiments, relay **120** can be replaced with satellites or any other suitable equivalents for operation with the adapted network **118** for communicating vehicle data **122** between the processor **108** and the vehicle **124**.

An exemplary evaluation system **100** includes, at least, the map database **104**, the vehicle/operator database **106**, and the processor **108** comprising analysis engine **110** and report generator **112**. Map database **104** and vehicle/operator database **106** can include any data structure adapted for storage and access as generated in accordance with exemplary methods of the present invention, and can include optical storage media such as CD-ROM, non-volatile memory such as flash cards, or more traditional storage structures such as a computer hard drive.

Map database **104** is configured to store and to provide map data **102**. Map data includes road segments and road segment attributes as defined by a user. Such road segment attributes can include a posted speed limit, maximum vehicle weight, road type (e.g., two-way traffic, paved, etc.), height restriction, turn restriction (e.g., no right on red during certain time periods), and so forth. Road segment attributes are limited only by an ability to identify a particular segment of road—a road segment—with some sort of empirical data or other statistical limitation such as a speed limit.

For example, consider a road passing from point A through point B to point C, where the posted speed transitions from 35 mph to 55 mph at point B. The portion of the road between points A and B is a first road segment, and similarly, the portion between point B and C is a second road segment. Road segment attributes '35 mph' and '55 mph' are associated with the related road segments and are analyzed to determine whether a driver has exceeded the posted speed limit over the road from point A to point C.

Vehicle/operator database **106** is configured to store and to provide vehicle/operator data **128**. Vehicle/operator data **128** can comprise weight, width, height, length, number of axles, load type, number and types of occupants for a particular vehicle as well as speeds traveled by a particular vehicle at various times during its scheduled deliveries. Vehicle/operator data **128**, as it pertains to a vehicle, is limited only to the extent that it is some identifiable information about a particular vehicle. Vehicle/operator data **128** can also include data for a particular operator or driver such as a 'name,' a 'driver identifier,' or 'employee number.' Like vehicle/operator data **128** relating to a vehicle, such data is limited as it pertains to a driver to the extent that it need only be information about a particular driver. Vehicle/operator database **106** also stores long-term statistical information (e.g., vehicle/operator data **128**) describing one or more vehicles' and/or operators' vector, operational, and location data over an extended period of time.

Processor **108** comprises the analysis engine **110** and report generator **112**. Processor **108**, analysis engine **110**, and report generator **112** are configured to allow access to network **118**, map database **104**, and vehicle/operator database **106**. Processor **108** is further configured to allow access by client **116**. Access configuration, in the case of the client **116**, can optionally occur via network **114**. Network **114** can be a local area network or a wide-area network. More traditional means of access configuration to client **116** may include a bus. Any means of allowing client **116** access to processor **108** is acceptable in the present invention.

The exemplary processor **108** can be any computing device known in the art, such as a server, central computer, or the like. Processor **108** is able to process instructions from, at least, analysis engine **110** and report generator **112** in addition to client **116**. Processor **108** also may interact with map database **104** and vehicle/operator database **106** to the extent it is necessary to retrieve map data **102** and/or vehicle/operator data **128**, and to store new data to the databases **104** and **106**. Processor **108** may also receive vehicle data **122** from network **118** and or/relays **120** and to request certain data from a vehicle **124** via the same means.

Analysis engine **110** and report generator **112** can comprise hardware, software, or a combination thereof. Analysis engine **110** and report generator **112** may or may not be in a common housing dependent on the nature of processor **108**. Some embodiments may configure analysis engine **110** and report generator **112** on multiple processors **108** to allow for reduced workload on any single processor **108** or to provide for redundancy as to allow for fault tolerance. Any configuration is acceptable in the present invention so long as analysis engine **110** and report generator **112** are able to interact with various elements of the present invention, namely the processor **108**, to carry out their allocated responsibilities.

Analysis engine **110** and report generator **112** manage the analysis and report generation process, respectively, in accordance with an embodiment of the present invention. Client **116**, in turn, can be any variety of personal computers, workstations, or other access devices such as a personal digital assistant (e.g., a Palm Handheld from Palm, Inc. or the Blackberry from Research in Motion). Client **116** need only be able to provide the necessary input to access processor **108** and output provided by processor **108**.

Analysis engine **110**, specifically, is the software and or hardware that manages the analysis of data retrieved from the vehicle/operator database **106** and map database **104** in response to queries from a user entering input via client **116**. Such an analysis can include any Boolean and or logical, arithmetic, mathematical, or other operation for comparing data.

For instance, if a fleet manager wishes to determine the performance, in terms of speed, of each driver in a fleet of vehicles over a particular road segment, the fleet manager may input driver IDs and a road segment identifier related to that road segment via client **116**. Analysis engine **110** causes the processor **108** to fetch map data **102** from the map database **104** representing, at least, posted speed information (i.e., a road segment attribute) for that road segment (e.g., a 45 mph speed limit for a specific stretch of city street). Analysis engine **110** may also instruct processor **108** to fetch vehicle/operator data **128** for a particular group of drivers reflecting their average and maximum speed traveled over the particular road segment of interest from vehicle/operator database **106**.

If, following analysis by analysis engine **110**, the vehicle/operator data **128** for a particular driver indicates driving behavior exceeding the posted limit for a particular road segment as identified by map data **102**, an indication is generated. This indication is included in a report generated by report generator **112**. Report generator **112** is the software and/or hardware that creates and distributes reports according to criteria set by a user. FIGS. **4** and **5** illustrate exemplary report formats embodying representations of some of the map data **102** and vehicle/operator data **128** gathered by evaluation system **100**. This report is delivered to client **116** in the form of evaluation information **130**. Evaluation information **130** is machine-readable data that can be reconstructed by client **116** in a form recognizable and understandable to the user such as exemplified in FIGS. **4** and **5**. Reconstruction of evaluation information **130** can be manipulated as to depend on the particular type of user interface being utilized in client **116**.

Delivery of evaluation information **130** as prepared by analysis engine **110** and report generator **112** to client **116** can occur through a point-to-point link such as a bus or any type of network **114** such as a local area network (an Intranet) or a wide-area network **114** (e.g., a wireless network, the Internet, or a large-scale, closed proprietary network).

An alternative embodiment of the present invention provides for processor **108**, analysis engine **110**, report generator **112**, and map database **104** to be located entirely within a vehicle **124** so that driver may be notified in real-time as to whether the driver is violating any particular road segment attribute such as speed limit.

FIG. **2**A is an exemplary embodiment of map data **102** as retrieved from map database **104** (FIG. **1**). Map data **102** is comprised of road segments **202**, **204**, **206**, **208**, **210**, **212**, **214**, **216**, **218**, **220**, and **222**. Road segments are identifiable portions of road or highway. Road segments can comprise, for example, a city block or a particular stretch of highway between two mile markers. Road segments can also comprise portions of road or highway with particular or unique features such as a particular road surface (e.g., pavement or gravel), zones (e.g., school or construction), or lane limitations (e.g., no right turn on red or carpool lanes).

Road segment attributes are associated with the aforementioned road segments **202**-**222**. Road segments attributes are identifiable features of a particular road segment such as a posted speed limit, hours of limited operation, weight restrictions, specific traffic regulations, hazardous cargo requirements, and so forth. One road segment can have multiple road segment attributes. For example, one road segment (like a highway) can have a road segment attribute pertaining to speed limit and another road segment attribute as to hazardous cargo limitations.

Road segment attributes can be standard information about a particular road segment as might be provided by a commercial digital map producer such as car pool lane information or speed limits. A user can also assign specific road segment attributes through input provided by client **116** (FIG. **1**) and stored in map database **104** by the processor **108** for later access and reference.

FIG. **2**B is a detailed view of certain road segments from FIG. **2**, in particular, road segments **218**, **220**, and **222** and their related road segment attributes **219**, **221**, and **223**.

For example, road segment **218** is a particular stretch of highway. This segment of the highway, however, is subject to a 65 mph speed limit and the existence of a car pool lane whereby only passenger vehicles with 2 or persons are allowed to travel in the car pool lane between the hours of

6 and 9 AM and 3 and 6 PM. These limitations-speed limit and car pool lane hours-are the road segment attributes **219** for road segment **218**.

Road segment **220** has its own unique set of road segment attributes **221**. In this case, a particular stretch of highway has no carpool lane limitations—all three lanes are open to all forms of traffic—but there is presently construction on this stretch of highway whereby the speed limit is reduced to 25 mph. The non-existence of a carpool lane and the construction zone speed limit are the road segment attributes **221** for this particular highway segment.

By further example, road segment **222** has a 65 mph speed limit, 3 lanes, and a hazardous cargo prohibition. The speed limit, lane information, and cargo prohibition are the road segment attributes **223** for this particular road segment **222**.

A user of client **116** (FIG. **1**) can access the processor **108** and request map data **102** (FIG. **1**) from map database **104** (FIG. **1**). In particular, the user can request data for road segment **218** and its related road segment attributes **219**. User can then query vehicle/operator database **106** (FIG. **1**) for the driving information of a particular vehicle and its operator on road segment **218** on a particular date and at a particular time. Analysis engine **110** (FIG. **1**) can then determine that the particular driver happened to be driving a commercial vehicle in the carpool lane at 4.45 PM (as is prohibited and noted in road segment attribute **219**) wherein an indication would be generated. Report generator **112** (FIG. **1**) will then report the existence of this indication to client **116** in the form of evaluation information **130** (FIG. **1**). User can then, after review of the evaluation information **130**, determine whether any sort of warning need be provided to the driver.

If the vehicle/operator data **128** (FIG. **1**) as stored in vehicle/operator database **106** reflects an ongoing trend of violating local traffic ordinances, this indication will also be generated by analysis engine **110** and reported by report generator **112** in the form of evaluation information **130** to the user. The user can then determine whether any sort of disciplinary action—such as termination of the driver's employment—need be taken.

This type of information would, in the absence of the present invention, be unavailable without the issuance of a citation by local law enforcement or reporting of an illegal traffic behavior by a concerned motorist to a customer complaint line as is often offered through 'How am I Driving?' report lines advertised on backs of commercial trucking units.

An exemplary method for evaluating vehicle and/or operator performance is shown in FIG. **3**. The evaluation method **300** is initiated by a client request **302** from a user of the client **116** (FIG. **1**). The client request **302** is initiated with an intention of receiving evaluation information to perform an evaluation of a vehicle and/or driver's performance. The client request **302** can comprise any number of variables including information concerning a particular driver, a particular vehicle, a particular time of day, or a particular route. The request can include real-time information or a historical record of information as well as performance over a particular road segment or with regard to particular road segment attributes.

In response to a client request **302**, the analysis engine **110** (FIG. **1**) will make a map data request **304** via processor **108**. Map data request **304** will request specific map data **102** (FIG. **1**) from a map database **104** (FIG. **1**) in accordance with the variables of client request **302**. The map data **102** retrieved from map database **104** in response to map data request **304** is determined by the scope of the aforementioned client request **302** and can include, for example, as little as data pertaining to a particular road segment **202** (FIG. **2**A) or a larger return of data, for example, all road segments exhibiting a particular road segment attribute **223** (FIG. **2**B).

Analysis engine **110** also makes a vehicle/operator data request **306** via processor **108** of the vehicle/operator database **106** (FIG. **1**) seeking particular vehicle/operator data **128**. The vehicle/operator data request **306** is made in accordance with the variables of the client request **302**. The vehicle/operator data **128** retrieved from vehicle/operator database **106** is determined by the scope of the aforementioned client request **302** and can include, for example, as little as data pertaining to a particular vehicle/driver on one day or a larger return of data, for example, a vehicle/driver's performance over several weeks.

Retrieval of data from map database **104** and vehicle operator database **106** by the processor **108** on behalf of the analysis engine **110** in response to a client request **302** can occur serially or in parallel. The present invention is not limited by one field of data being retrieved prior to the second.

Upon retrieval of data by the processor **108** on behalf of an analysis engine **110**, analysis engine **110** will perform an analysis of the various fields of data **308** in accordance with the client request **302**. This analysis **308** can include any Boolean and/or logical, arithmetic, mathematical, or other operation for comparing data in response to the client request **302**.

Following an analysis **308**, the report generator **112** will take the analyzed data and any indications to generate a report **310**. The report is generated in accordance with criteria set by the user in its client request **302**. Such a report can include, for example, a particular driver's highest speed along a particular route or a particular driver's time spent traveling above the posted speed limit (speeding) for a particular road segment. The scope of the report generated **310** by a report generator **112** is limited only by the scope of the client request **302** and the available data in a map and vehicle/operator database.

Following generation of a driver/vehicle report, evaluation information **130**, often in the form of a chart or graph, is delivered **312** by the processor **108** on behalf of the report generator **112** to the user making the initial client request **302**. Examples of evaluation information are exemplified in FIGS. **4** and **5**.

The method also allows for retrieval of real-time vehicle/operator information concerning a particular vehicle or driver that may not be immediately available in vehicle/operator database **106**. There can exist instances where the processor **108** is unable to retrieve the data requested by an analysis engine **110** because the vehicle/operator data **128** is in real-time and/or has not yet been transmitted to the processor **108** and/or stored in the vehicle/operator database **106**. In these instances, the processor **108**, on behalf of analysis engine **110**, can make a real-time request **314** to a particular vehicle **124** (FIG. **1**) via any number of relays **120** (FIG. **1**) and or network **118** (FIG. **1**) as is necessary. Upon receiving this request, the operative data-collecting component in vehicle **124** will deliver the requested vehicle data **122** via a real-time response **316** through any number of relays **120** and or network **118**, as is necessary, to the processor **108** and analysis engine **110**.

Processor **108** can, either serially or in parallel, store the newly received data from the real-time response **316** via a storage step **318** as it is being analyzed **308** by an analysis

engine **110**. Completion of the evaluation method **300** would then continue via report generation **310** and delivery of evaluation information **312**.

FIG. **4** illustrates a representative format for reporting, in a table, analyzed map and vehicle/operator data in accordance one embodiment of the present invention. In this exemplary Fleet Summary Report **402**, a fleet manager can quickly determine a rank of each of the drivers in a fleet. This report draws the fleet manager's attention to potential problematic drivers who may need closer supervision or training. Exemplary rankings include: percentage of route speeding (**404**); percentage of streets speeding (**406**); average speed (**408**); highest speed on a freeway (**410**); highest speed on city streets (**412**); most significant speed related incident (**414**); and other criterion defined by a user.

FIG. **5** illustrates another representative format for graphically reporting analyzed map and vehicle/operator data in accordance with one embodiment of the present invention. The exemplary Graphical Fleet Summary Report **502** shown in FIG. **5** is designed to draw attention to potentially dangerous incidents. This report **502** graphically presents a detailed path of a vehicle **504**, and uses colors or any other visual representation to highlight driver incidents **506**. When the user places a computer mouse over the path **504** a window **508** appears giving detailed information on the corresponding incident **506**. For example, after obeying the speed limit over segment B (e.g., hence no indications to the contrary), the driver over segment A is shown to be traveling at 112 kph in a 60 kph zone for that road segment. A user utilizing the evaluation method exemplified in FIG. **3** can obtain this information in real-time or post-transmission.

By utilizing the exemplary reports of FIGS. **4** and **5** or any other report generated by the system a fleet supervisor can get a comparative overview of all his drivers according to criteria (pre-set or otherwise). This driver ranking report can then be used to highlight those drivers most in need of closer supervision or training. Insurance companies can encourage their fleet manager clients to use the system and method to lower loss ratios or, in other words, reduces crashes and save lives.

In addition to the report outlined in FIGS. **4** and **5**, other delivery formats such as e-mail-based reports can be used to provide information to a user.

In some embodiments, known probabilistic approaches can be applied to predict a vehicle's or an operator's future tendencies because embodiments of the present invention overcomes the shortcomings in data quality that traditional binary approaches cannot. Importantly, exemplary methods described herein assess the "geographic context" to telemetric reporting by taking into account, for example, changing speed limit information. In other embodiments, specific weather/construction conditions relating to a specific road segment is considered in the calculus of ranking drivers (e.g., whether it was raining at, or in the vicinity of, a specific road segment, where such meteorological data is retrieved from other databases containing such information).

One having ordinary skill in the art should appreciate that the methodologies discussed herein take into account that sensor error occurs and underlying map attribute data may be outdated or erroneous (e.g., a speed limit may be been changed). In some embodiments, these errors are detected or accommodated by the system via manual updates to the map database **104** (e.g., a new batch of map information introduced via a CD-ROM or entered manually by hand) or, in some embodiments, by data reported by the driver of a vehicle **124** during transmission of vehicle data **122**, which can include data pertaining to new or changed road segment attributes. Some map databases **104** might be connected to an outside network (not shown) to automatically obtain new map data **102** via an Internet connection to a third-party server providing regularly updated map data **102**.

Additionally, more than one type of underlying map database **104** can used to adapt to differences in sets of map data **102** and be used to test the effect of map quality on the report results as maps from some providers contain more attribute error than others.

In some embodiments, a database can be used to provide information regarding trip time, location, weather, congestion, road construction, types of cargo, etc. to refine the data collected to generate more meaningful reports. That said, an exemplary report in accordance with the present invention could highlight specific incidents and can have a strong deterrent effect and discourage irresponsible driving habits when used by a fleet manager as part of a safety program.

In other embodiments, additional report elements outlined above can further include inferred vector versus reported vector. Most in-vehicle GPS receivers calculate and record speed but some only record latitude and longitude. The present invention may infer latitude and longitude from speed.

The above description is illustrative and not restrictive. Many variations of the present invention will become apparent to those of skill in the art upon review of this disclosure. The scope of the present invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

What is claimed is:

1. A system for evaluating performance of an operator of a vehicle, the system comprising:

a processor;

a map database **[**configured to provide**]** *that provides* map data, wherein the map data comprises a plurality of thoroughfares, at least one of the plurality of thoroughfares including a plurality of road segments, *wherein each of the plurality of thoroughfares includes at least one of the plurality of road segments,* and wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction in use of the road segment*;

a vehicle/operator database **[**configured to provide**]** *that provides* vehicle and operator data, wherein the vehicle data includes information acquired during operation of the vehicle, *the information acquisition triggered following the start of vehicle operation along a first route, wherein vehicle and operator data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

an analysis engine **[**configured to analyze**]** *that, upon execution of instructions corresponding to the analysis engine by the processor, analyzes* data from the map database, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment, *wherein* the analysis engine further **[**configured to generate**]**

generates an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator, the at least one road segment and the at least one road segment attribute are identified as part of a user request; and

a report generator [configured to generate] *that, upon execution of instructions corresponding to the report generator by the processor, generates* evaluation information in accordance with the indication generated by the analysis engine, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request[,] the evaluation information indicating performance over a time period identified by the user request.

2. The system of claim **1** further comprising a client device for making the user request for evaluation information from the report generator, and wherein the report generator is further configured to deliver the user requested evaluation information to the client device.

3. The system of claim **2**, wherein vehicle data includes data generated at the vehicle and transmitted via at least one relay and a network to the vehicle/operator database in real time, wherein the at least one relay includes a satellite and the network includes a proprietary network.

4. The system of claim **2**, wherein vehicle data includes data generated at the vehicle and transmitted via at least one relay and a network to the vehicle/operator database at a certain interval of time, wherein the at least one relay includes a satellite and the network includes a proprietary network.

5. The system of claim **1**, wherein the user request further identifies another operator and the analysis engine is further configured to generate an indication of operator performance of the vehicle for the another operator with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, and wherein the report generator is further configured to rank the operator and the another operator with respect to operation of a series of vehicles and with respect to the at least one road segment and the associated at least one road segment attribute over the time period identified by the user request.

6. The system of claim **5**, wherein the operator and the another operator are ranked according to a propensity to violate a predetermined rule associate with the at least one road segment attribute associated with the at least one road segment.

7. The system of claim **6**, wherein the report generator provides the ranked evaluation information as part of report displaying the violated predetermined rule and a number of time that the predetermined rule was violated over the time period identified by the user request.

8. The system of claim **1**, wherein the analysis engine is further configured to predict future performance of the operator based on a trend for the operator identified over the time period identified by the user request.

9. The system of claim **1**, wherein the analysis engine is further configured to request real-time vehicle data from the vehicle operated by the operator of the vehicle if the vehicle data is not presently available in the vehicle/operator database.

10. The system of claim **1**, wherein [e] *the* analysis engine is further configured to request a batch of vehicle data from the vehicle operated by the operator at a regular interval.

11. The system of claim **1**, wherein the report generator is further configured to display the evaluation information as part of a map based report indicating a violated predetermined rule, the time and date the predetermined rule was violated, and a location of the violation of the predetermined rule on the map.

12. The system of claim **1**, wherein the evaluation engine is further configured to indicate performance of the operator with respect to operation of a series of vehicles.

13. A method for evaluating performance of a vehicle operator, the method comprising:

retrieving map data from a map database, wherein the map data comprises a plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of a plurality of road segments and* at least one of the plurality of thoroughfares [including a] *includes the* plurality of road segments [and], wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

retrieving vehicle data and vehicle operator data from a vehicle/operator database, wherein the vehicle data includes information acquired during operation of the vehicle, *the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

analyzing the vehicle data and vehicle operator data against the map data, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request.

14. The method of claim **13** further comprising receiving vehicle data generated at the vehicle to the vehicle/operator database in real time, wherein the real-time vehicle data is added to the vehicle/operator database for subsequent analysis against the map data.

15. The method of claim **13**, further comprising:

receiving an identification of another operator in a user request and generating an indication of operator performance of the vehicle for the another operator with

respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment; and

ranking the operator and the another operator with respect to operation of a series of vehicles and with respect to the at least one road segment and the associated at least one road segment attribute over the time period identified by the user request.

16. The method of claim **15**, wherein the operator and the another operator are ranked according to a propensity to violate a predetermined rule associate with the at least one road segment attribute associated with the at least one road segment.

17. The method of claim **13**, further comprising predicting future performance of the operator based on a trend for the operator identified over the time period identified by the user request.

18. The method of claim **13**, wherein the evaluation information further includes an indication of performance of the operator with respect to operation of a series of vehicles.

19. A method for evaluating performance of an operator of a vehicle, the method comprising:

receiving vehicle data at a vehicle/operator database, the vehicle data including information acquired during operation of the vehicle, *the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to a plurality of road segments is acquired along the first route from among a plurality of thoroughfares,* the vehicle data being associated with operator data that identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator;

retrieving map data from a map database, wherein the map data comprises **[**a**]** *the* plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of the plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment, the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

analyzing the vehicle data and vehicle operator data against the map data, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator of the vehicle, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator and another operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request, wherein the evaluation information ranks the operator against the other operator with respect to a propensity to violate a predetermined rule associated with the at least one road segment attribute associated with the at least one road segment.

20. A method for evaluating performance of the operator of a vehicle, the method comprising:

retrieving map data from a map database, wherein the map data comprises a plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of a plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

attempting to retrieve vehicle and operator data from a vehicle/operator database, wherein the vehicle data includes information acquired during operation of the vehicle*, the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator having been identified as part of a user request, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator*, the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

determining that the vehicle/operator database does not include the vehicle data corresponding to the entire instance of vehicle operation by the operator identified as a part of the user request;

requesting vehicle data from the vehicle in real-time, the vehicle corresponding to the vehicle identified as a part of the user requests, wherein the identified operator is currently operating the identified vehicle;

storing the vehicle data at the vehicle/operator database, the vehicle data having been received in response to the request for the vehicle data;

analyzing the vehicle data and vehicle operator data against the map data in real-time, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator of the vehicle, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request.

21. The method of claim **20**, wherein the evaluation information ranks the operator against another operator with respect to a propensity to violate a predetermined rule associate with the at least one road segment attribute associated with the at least one road segment.

22. A system for evaluating performance of an operator of a vehicle, the system comprising:

means for providing map data, wherein the map data comprises a plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of a plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

means for providing vehicle and operator data, wherein the vehicle data includes information acquired during operation of the vehicle, *the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

means for analyzing map data, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment, the means for analyzing further configured to generate an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator, the at least one road segment and the at least one road segment attribute are identified as part of a user request; and

means for generating evaluation information in accordance with the indication generated by the means for analyzing, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request.

23. A *non-transitory* computer-readable storage medium having embodied thereon a computer program, the program being executable by a processor to perform a method for evaluating performance of a vehicle operator, the method comprising:

retrieving map data from a map database, wherein the map data comprises a plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of a plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

retrieving vehicle data and vehicle operator data from a vehicle/operator database, wherein the vehicle data includes information acquired during operation of the vehicle, *the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

analyzing the vehicle data and**[**,**]** vehicle operator data against the map data, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request.

24. A *non-transitory* computer-readable storage medium having embodied thereon a program, the program being executable by a processor to perform a method for evaluating performance of an operator of a vehicle, the method comprising:

receiving vehicle data at a vehicle/operator database, the vehicle data including information acquired during operation of the vehicle**[**;**]**, *the information acquisition triggered following the start of vehicle operation along a first route, wherein data corresponding to a plurality of road segments is acquired along the first route from among a plurality of thoroughfares,* the vehicle data being associated with operator data that identifies an operator of the vehicle during vehicle operation, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

retrieving map data from a map database, wherein the map data comprises **[**a**]** *the* plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of the plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road*

segments is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

analyzing the vehicle data and vehicle operator data against the map data, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operator performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator of the vehicle, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator and another operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request, wherein the evaluation information ranks the operator against the other operator with respect to a propensity to violate a predetermined rule associate with the at least one road segment attribute associated with the at least one road segment.

25. A *non-transitory* computer-readable storage medium having embodied thereon a program, the program being executable by a processor to perform a method for evaluating performance of the operator of a vehicle, the method comprising:

retrieving map data from a map database, wherein the map data comprises a plurality of thoroughfares, *wherein each of the plurality of thoroughfares includes at least one of a plurality of road segments and* at least one of the plurality of thoroughfares **[**including a**]** *includes the* plurality of road segments **[**and**]**, wherein at least one road segment *of the plurality of road segments* is associated with at least one road segment attribute *associated with a restriction for vehicles along the road segment*;

attempting to retrieve vehicle and operator data from a vehicle/operator database, wherein the vehicle data includes information acquired during operation of the vehicle, *the information acquisition triggered following the start of the vehicle operation along a first route, wherein data corresponding to the plurality of road segments is acquired along the first route from among the plurality of thoroughfares,* and *wherein* the operator data identifies an operator of the vehicle during vehicle operation, the vehicle and operator having been identified as part of a user request, the vehicle and operator data encompassing an entire instance of vehicle operation by the operator, *the entire instance of the vehicle operation being reflected in vehicle and operator data that includes information for the vehicle from the beginning of the first route to the end of the first route*;

determining that the vehicle/operator database does not include the vehicle data corresponding to the entire instance of vehicle operation by the operator identified as a part of the user request;

requesting vehicle data from the vehicle in real-time, the vehicle corresponding to the vehicle identified as a part of the user request, wherein the identified operator is currently operating the identified vehicle;

storing the vehicle data at the vehicle/operator database, the vehicle data having been received in response to the request for the vehicle data;

analyzing the vehicle data and vehicle operator data against the map data in real-time, the map data including the at least one road segment attribute associated with the at least one road segment with respect to the provided vehicle and operator data, the vehicle and operator of the vehicle having traversed the at least one road segment;

generating an indication of operation performance of the vehicle with respect to the at least one road segment and the at least one road segment attribute associated with the at least one road segment, wherein the operator of the vehicle, the at least one road segment and the at least one road segment attribute are identified as part of a user request;

generating evaluation information in accordance with the generated indication, the evaluation information indicating performance of the operator with respect to the at least one road segment and the associated at least one road segment attribute identified by the user request, the evaluation information indicating performance over a time period identified by the user request; and

delivering the evaluation information to a client device in response to the user request.

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