Massachusetts Department of Transportation

Roadway Safety RFI
BD-24-1030-CP01-97703

March 28, 2024

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Massachusetts Department of Transportation
10 Park Plaza
Boston, MA 02116

To whom it may concern,

RE: BD-24-1030-CPO1-CPO1-97703 Roadway Safety RFI

On behalf of Ernst & Young, LLP (EY), we are delighted to submit a response to your Request for Information (RFI) to support the Massachusetts Department of Transportation (MassDOT or you) in understanding different technical solutions for improving road safety in the Commonwealth of Massachusetts (Commonwealth). At EY, we share your commitment to adopting a Safe System approach to the challenge of roadway safety and we appreciate this opportunity to provide insights to help materialize your goals.

Drawing from our wide spectrum of experience in similar initiatives in other states we have witnessed firsthand the impactful results of comparable pursuits. We understand the criticality of components such as choosing the right technology in alignment with defined requirements, establishing relevant policies, setting attainable and measurable goals, and building a sophisticated project management office to tie together all the parts.

We are conscious that while each technology element might bring incremental improvements, exponential benefits and accelerated timelines can only be realized when these individual elements are seen as parts of a whole, measured, and managed accordingly. At EY, we have played varied roles - consulting, technology, and program management - in the successful execution of such complex programs. Leveraging these experiences, we are aptly positioned to help MassDOT navigate the possible ups and downs, learn from past trials, and build upon these learnings.

A significant part of EY's legacy lies in Tax, Finance, and Audit, making controls a fundamental part of our DNA. We are committed to identifying and managing risks, implementing, monitoring and reporting to prevent any potential leakage.

While the RFI is focused on three diverse areas of interest (Speed Safety Cameras, Movement Telematics, and Non-digital tools & ideas), EY is fully prepared to offer comprehensive support in all necessary areas. We can assist in defining specific requirements, in identifying and procuring the most effective physical solutions like safety cameras, and in providing expert consulting knowledge to integrate these elements efficiently into a unified, overarching program.

Our Boston and Mobility teams are prepared to assist at the earliest. Following a swift evaluation of the project, we welcome the opportunity to enhance your teams and fast-track the project's execution. In recognition of our close affiliation with several vehicle OEMs, we're further demonstrating our commitment to this project by directing funds into our EY Roadway Insights initiative and its associated program management framework. Moreover, we are prepared to allocate EY resources towards a pilot initiative in partnership with MassDOT.

We are excited by the opportunity to work with you on this critical initiative. On behalf of the 1,800 members of our firm that are proud to call Massachusetts home, we look forward to the opportunity to continue to serve you on this and other critical transportation initiatives.

You have our personal commitment that we will do everything in our control to make this program a success. Please let us know if you have any questions on our proposal.

Sincerely,

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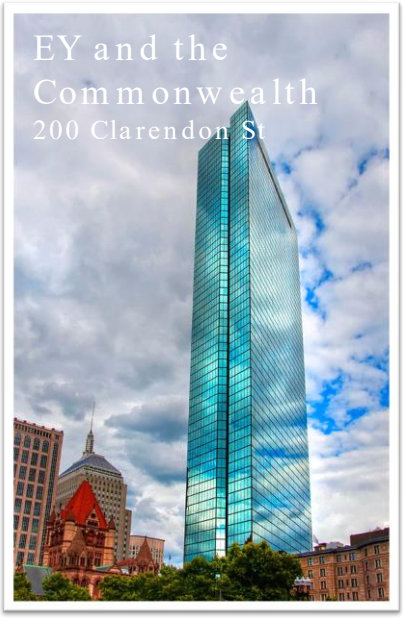
Introduction to EY

We are pleased to respond to the Commonwealth's RFI regarding highway safety solutions. Highway fatalities are a universal challenge to all DOTs in the United States, so we have taken it as our responsibility to be one of the global vendors helping to solve it. Our resources and experience with transportation, data analytics, operational controls, security, and many other areas can all be brought to the fight.

What's more, we have a stake in the future of highway safety specifically in the Commonwealth. Over 1,800 EY employees and their families call the Commonwealth home. Their safety is paramount to us. In addition, over hundreds of our clients are based in the Commonwealth, and we have a responsibility to keep them vibrant, prosperous and safe. EY has opened one of our USA Neuro-Diverse Centers of Excellence (NCoE) in Boston. Lastly, the Commonwealth government agencies are a key part of our business strategy. We have re-invested in our public sector team in Massachusetts, increasing our resources and focus. We have served almost a dozen critical Commonwealth agencies including MassDOT and MBTA with things like critical IT cyber monitoring.



For all of these reasons, we are keenly interested in collaborating with you on this critical endeavor.

Our own journey on roadway safety

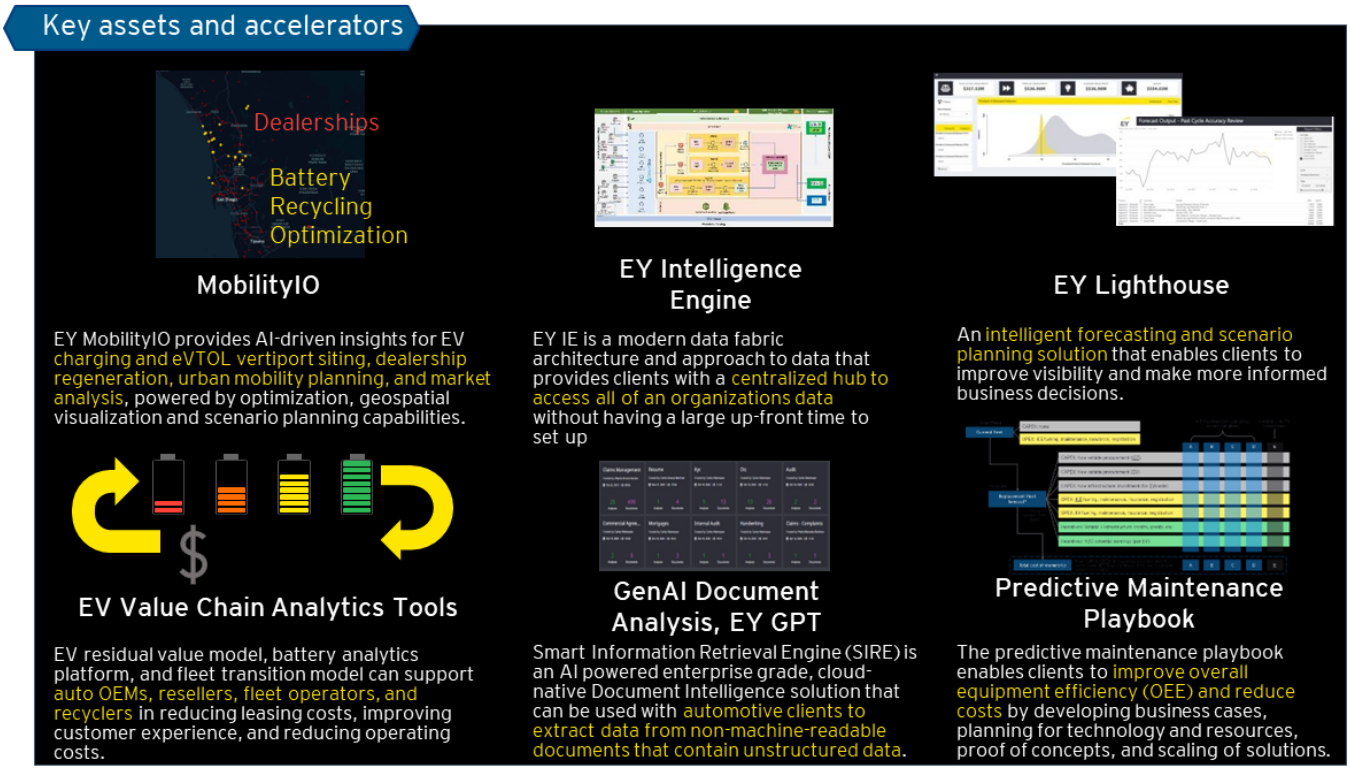
EY is one of the world's leading transportation infrastructure advisors. As such, we help DOTs in the US and abroad face their hardest challenges, including safety. Here are some milestones on our journey:

EY Infrastructure Advisors. We are one of the top strategy and financial advisors to DOTs in the nation. Much of our focus is on large highway projects. In our role, we need to understand and advise on DOT requirements and operator capabilities, including safety. We have helped many US DOTs prepare for major highway changes.

Transportation technology**.** In this area, we have several notable credentials:

- For the country's largest DOT, we play a role helping that DOT manage all of its Intelligent Transportation operations, including technology.
- We have begun implementation of a data analytics platform that produces insights, correlations, and prioritizations for DOT hot spots – be they safety, road condition or asset inventory.
- We have done numerous IT modernization implementations for the country's largest transit authorities. The demands are similar to some of the Commonwealth's challenges: resilience, integration, standards, and a relentless eye toward the key KPIs.
- EY implemented multiple transportation related pilots for state and federal transportation agencies.
- EY is a demonstrated leader in data collection and communication, developing over 100 cloud-based data dashboards and analytics tools across many different industries, including transportation, defense, aerospace, medical, biotechnology, and consumer goods.
- EY has combined its capabilities with large automotive OEMs to develop a working infrastructure monitoring product, leveraging of millions connected vehicles across the U.S. to provide data on roadway deficiencies in near real-time. The figure below showcases some of the solutions that EY leverages while working on client projects.

Figure 1 - Snapshot of EY's Mobility Solutions



DOT strategic advisory. We have helped one of the nation's largest DOTs re-work their budget strategy and prioritization strategy. In addition, we have helped this DOT keep stakeholders educated and aligned. Like the Commonwealth's collaborative approach, we helped make unlikely partners functional.

Highway and transportation system safety is not a problem unique to the United States. If we're casting the net wide for ideas, why not cast it globally? Our experiences with safety in transportation globally are numerous. Here are just a few examples:

Figure 2 - EY Transportation Experience in other Countries

Country	EY Experience
Australia	► EY personnel worked in the telematics space with vehicle safety, helping develop the framework for CAV trials. Several of our specialists, in prior roles, drove ITS projects with IoT and machine learning. ► These specialists also helped a large transport agency develop its Connected Vehicle safety assurance processes specifically for highways.
UK	► We will be providing data to a large motorway authority, feeding wayfinder apps with information that prevents known issues and is intended to contribute to accident avoidance. This applies to situations around planned an unplanned closures. Our approach creates the opportunity for "virtual roads" - supplying information for roads where there are currently no gantries by using alternative data sources like phones. ► We helped a major transit agency develop rail safety site working practices that could be applied to roads, particularly in the areas of work booking process, risks assessment, site protection methods, field worker briefing and the adoption of a controller of work site safety.

Figure 3 - EY Capabilities and Experience with Other Government Agencies

Capability	EY Experience
Vehicle and roadway data collection	► Developed mature vehicle-based sensor data collection capabilities with connected vehicles in the target MassDOT districts, a Mobility Services Platform to collect roadway asset data, and models that detect degradation of lane markers, potholes, and ride quality. Many of these capabilities have been demonstrated through field operational tests in all 50 US States and are ready for commercial deployment, and additional capabilities are regularly being added based on customer interest. ► Demonstrated planning and execution of automated vehicle data collection methods in highway environments to support advanced inspection and screening processes for FMCSA. ► Led research on roadway data collection via vehicle sensors to support crowdsourced HD map updates for the National Highway Traffic Safety Administration (NHTSA), completing a state-of-the-art assessment and design failure mode and effect analysis (DFMEA). ► Supported development of the USDOT Work Zone Data Exchange which collects and communicates data on work zones where roadway asset maintenance is occurring, working closely with state DOTs to provide data feeds from 16 different jurisdictions.
Data processing and visualization	► Implemented global pipelines to manage, visualize, and replay OEM vehicle sensor data through Software-in-the-Loop Simulation and Hardware-in-the-Loop Simulation (SILS/HILS) on the order of petabytes, including sensor data used for monitoring roadway asset conditions. ► Developed connected vehicle aggregation protocols and data dashboards to analyze OEMT vehicle real-world usage, performance, and environmental conditions based on measurements from thousands of vehicles. ► Led research for NHTSA to analyze impacts of data pathway intervention devices to vehicle data processing, safety, cybersecurity, and data privacy. ► Created customized data visualization tool for SAE International, enabling users to interactively slice data to understand CAV industry trends and prioritize resources effectively.
Agile digital product development	► Developed over 100 cloud-based databases with dashboards and analytics in many different industries, including transportation, defense, aerospace, medical, biotechnology, and consumer goods. ► Led agile development of digital geographic tool providing a user-friendly interface with data analytics to support mobility infrastructure monitoring and planning, including travel behavior, investment prioritization, and impacts assessments of different actions. ► Defined user personas and associated value propositions to drive development of a user-friendly interface for the USDOT VOICES digital platform, enabling visualization of real-world vehicle data collection to support over 50 transportation stakeholders that included OEMs, state DOTs, Infrastructure Owners and Operators (IOOs), and researchers. ► Developed detailed data dashboard for SAE International to monitor activity of users across data visualization tools, identifying and meeting requirements related to functionality, accessibility, user access, and data refresh rate. ► Created digital product supporting a large OEM to evaluate the ability of vehicles to detect and respond to road signage and markings in a variety of different rural and urban environments.

Area of Interest 1: Speed Safety Cameras

EY does not design, produce, or distribute speed safety cameras. However, we can support you in the development of an overall solution and work with you to procure, install, and manage them.

Area of Interest 2: Movement Telematics

Introduction to EY Roadway Insights

Most DOT professionals dealing with road safety and congestion are already versed in vehicle telematics or connected vehicle data. As your RFI states, MassDOT has world-class telematics companies and research institutions right in the Commonwealth. Our approach to telematics is to create a flexible technology platform that further empowers those professionals, allowing them to:

Work with any number of data sources

Work with any number of data sources at the same time to exploit correlations. For instance, hard braking data is important and when mixed with close-to-car temperature and road slickness data, the combination becomes critical.

Insight Engine

Plug this "insight engine" into any existing systems, most notably an Intelligent Transportation System (ITS) operation.

Our research suggests that ITS operations will become the landing point for most or all emerging data-driven decision-making for real-time roadway management, including EV, AV, and RUC.

Get insights in different ways

AI natural language co-pilots are a possibility. Mobile messages and two-way field communication are essential. Our platform can trigger proactive alerts based on specific KPI tolerances that are close to being exceeded.

This technology platform is called **EY Roadway Insights**, and we're eager to show it to you in a live demonstration as a part of a workshop that we are proposing in the telematics service question no#6.

Figure 4 - Snapshot of EY's Movement Telematics Solution

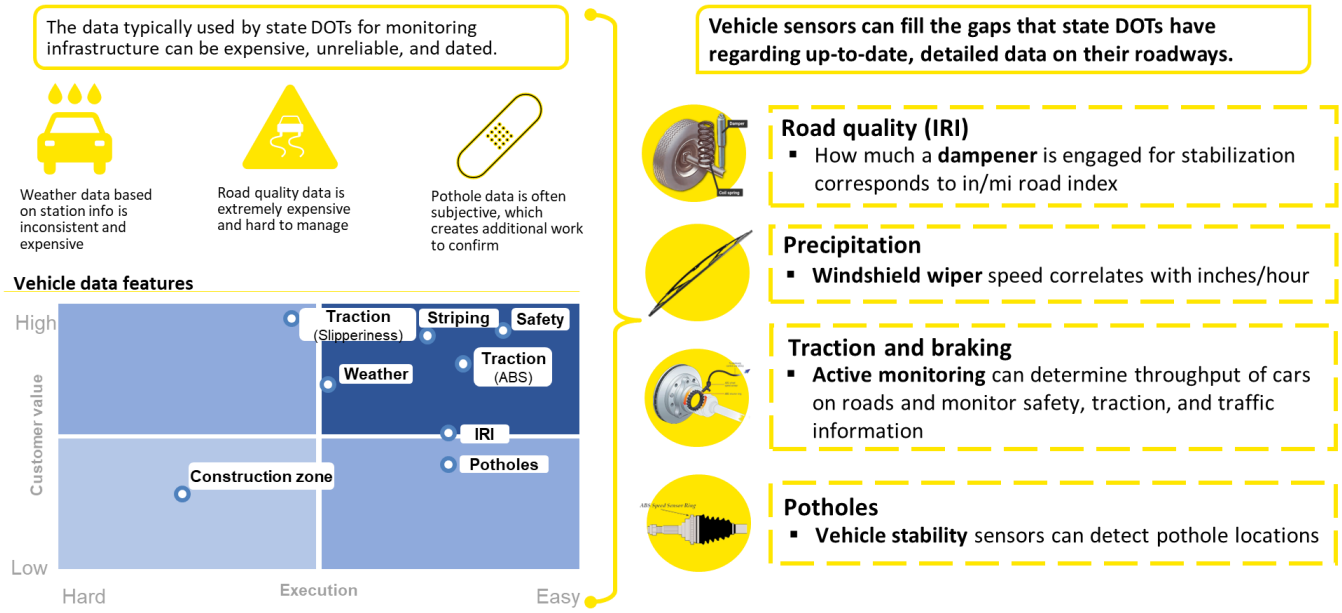
EY has a cross-functional team with demonstrated abilities to pilot successful roadway data collection and reporting initiatives with transportation agencies, as well as to deliver functional dashboards to enable effective decision-making and planning. The EY team has extensive experience working in connected automated vehicle (CAV) technologies, including field data collection planning and execution, sensor data processing, and digital and physical infrastructure enablers for CAV, data engineers, transportation engineers. EY brings a deep background in mobility data analytics and visualization, having delivered over one hundred digital tools and dashboards to clients across the government and commercial sectors. In addition to providing a wealth of experience with vehicle and roadway data collection. Together, EY can complement MassDOT's capabilities to provide extensive knowledge and experience across data collection and communication.

We would welcome the opportunity to provide you with more details on our solution, which can address Movement Telematics, particularly: (i) Unsafe driving behaviors, including distracted driving; and (ii) Roadway condition.

EY Roadway Insights Platform Description

The amount of data collected on roadways using vehicle sensors continues to grow, it will be critical to have advanced systems in place to quickly process and draw insights from the plethora of available road data. One of the ways that this can be accomplish ed is through using Artificial Intelligence (AI) and Machine Learning algorithms. AI represents a huge shift forward in real-time data processing and can support organizations like MassDOT with categorizing and understanding large amounts of data that would otherwise require high manual effort and specialized skillsets.

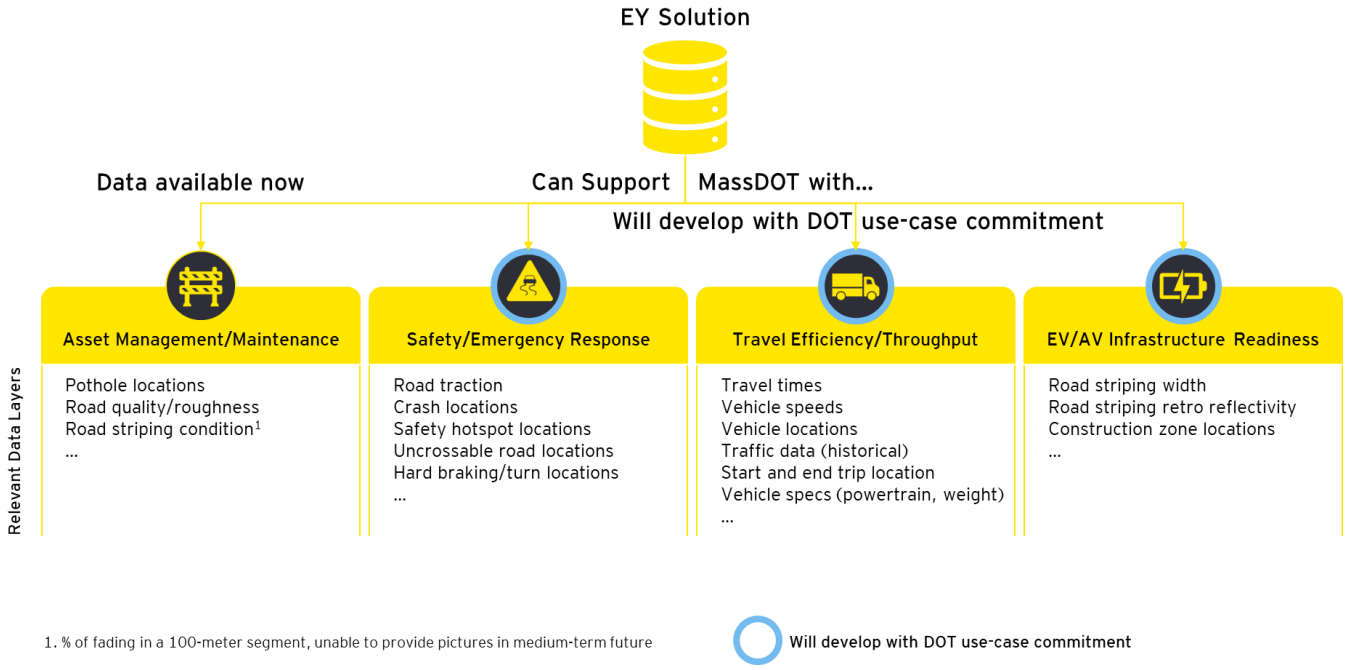
Figure 5 - EY understands how connected vehicle data can be leveraged to resolve some of state DOT's toughest problems



The EY team's safety solution, which is currently under development, enables users to quickly interact with datasets sitting in multiple different systems with a no-code interface that generates plots, insights, and even optimized strategies to effectively manage road safety and efficiency. Prompts/responses can range from locating safety hot spots for pedestrians and vehicle crash locations with bicyclists, distilling large amounts of collected data down to actionable insights. The team's roadmap for development of the AI based solution includes this spectrum of use cases. By applying EY's safety solution, MassDOT can better understand the road environment and make informed decisions to enable a transportation system that is safer, more efficient, and easier to maintain.

The figure below showcases the overall existing and potential data layer that our solution can leverage to run data models to provide the predictive recommendation that can help MassDOT make informed decisions on roadway planning and roadway safety.

Figure 6 – EY Solution Data Layers



Safe and efficient transportation is at the epicenter of economic, social, and political prosperity for citizens. However, effectively monitoring and maintaining road systems enabling robust transportation can be extremely resource intensive. The amount of traffic sensors and cameras on roadways creates enormous data sets which present significant challenges for processing and understanding the roadways at a tactical level. To support state agencies with making sense of such a large road dataset, the EY team can provide a Generative Artificial Intelligence (GenAI)-based solution to derive actionable insights and provide a user-friendly interface for operators.

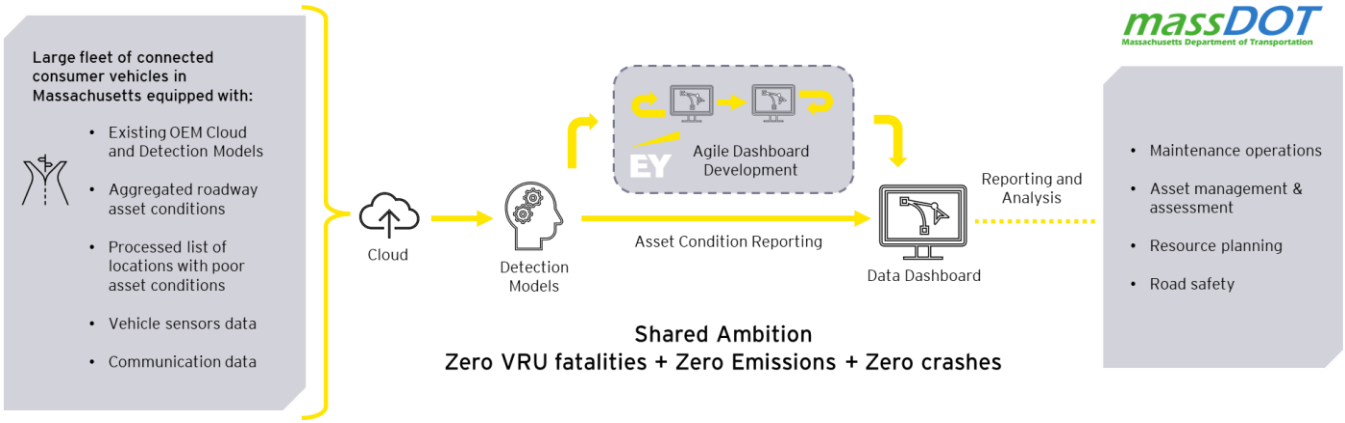
The benefits of GenAI to this use case can be easing user burden in performing manual searches, data synthesis and summarization. For instance, the solution can help the user understand hot spot areas for traffic safety issues (e.g., collisions with VRUs) and suggest improvements to traffic safety measures by retrieving relevant information from manuals. The GenAI solution can also offer a natural language interface for routine tasks such as deciding when to invoke a specific function. This could include tasks as varied as triggering notifications to emergency services or Large Language Model (LLM)-native tasks such as the drafting or generation of incident reports. This would serve to unburden the end user from these routine tasks.

These machine learning models can be regularly activated for monitoring in real-time or near-real-time, which can support quick alerts and responses for roadway issues that may arise (e.g., alternate routing due to crash or extreme weather). The extensive array of use cases identified in the project objectives and sample questions can be arranged into various data domains or functions such as pedestrians, bicyclists, vehicular traffic, scooters, and more. Each domain can be managed by a distinct agent, tuned, and provided the relevant solution to cater to end-user queries and facilitating interactions within that specific domain.

Whenever feasible, the EY team recommends capitalizing on existing data, query procedures, machine learning models, and tools. More intricate machine learning models encompass methodologies such as non-linear optimizations, regressions, or classifications with complex decision boundaries. Certain machine learning models, particularly those in the realm of computer vision, could incorporate multimodal LLMs like GPT-4V, employing few-shot examples for classification tasks, such as traffic pattern recognition. However, superior outcomes for distinct machine learning cases can often be achieved by training leaner, more focused models.

The following figure shows the basic architecture of our solution. It depicts how data can flow from connected consumer vehicles to a data dashboard that can be accessed by MassDOT users. This architecture combines the strengths of existing connected vehicle data collection and processing capabilities with EY's deep experience in Artificial Intelligence and Machine Learning (AI/ML) based dashboard development and user-friendly data visualization to deliver a proven and comprehensive solution for roadway asset data monitoring.

Figure 7 – EY Overall Solution Architecture



EY Roadway Insights Development Approach

The EY team can work with MassDOT to build a pilot with high temporal and geospatial coverage of diverse roadway conditions to enable MassDOT to assess the best way to leverage vehicle-based sensors in for their programs. In addition to lane marking conditions, there are multiple other key roadway asset conditions of interest to monitor in this effort, including pothole development, ride quality, guardrail deficiencies, road sign deficiencies, and berm conditions.

By monitoring multiple common roadway asset deficiencies, MassDOT can assess the utility of road condition monitoring systems across multiple asset types, which the EY team has proven methods for completing. Additionally, MassDOT can augment its understanding of how road condition monitoring system performance varies in rural and urban environments. Furthermore, for the pilot to provide value across MassDOT, the EY team can build a user-friendly dashboard interface so users can visualize the collected roadway asset condition data and its analysis. The data dashboard can enable MassDOT stakeholders across multiple MassDOT divisions to quickly and easily understand when roadway deficiencies emerge to effectively plan maintenance activities and manage resources.

By following a structured approach and identifying key factors to measure success for this effort, the EY team can provide a safety solution that effectively meets the needs of MassDOT stakeholders. It can be crucial for the EY and MassDOT teams to interact closely during the development and implementation of the EY Roadway Insight solution to enable ease of use and accessibility for end-users. The EY team has the experience and capabilities in place to deliver a robust safety solution, and its partnerships allow to provide additional value as well. Through close relationships with OEMs, the EY team can also potentially provide supplemental data from on-road vehicle telematics, if of interest to MassDOT.

Civic Research Questions on Telematics

1. *What are we able to learn about the relationship between distracted driving and land use (or other variables)?*

The correlation between distracted driving and land use involves several factors, such as urbanization levels, infrastructure character in specific locations, and socio-demographics. In areas with high population density, for instance, there can be numerous advertisements billboards, increasing distractions for drivers and possibly resulting in accidents. The condition of the pavement and the kind of traffic control devices can also influence distracted driving.

2. *Is there a geographic correlation between different types of poor driving behavior (speeding, distraction, harsh braking, etc.)?*

Various types of poor driving behavior can depend on where the vehicles are traveling (e.g., rural vs. dense urban environments). For example, historical seatbelt engagement data has shown that drivers on rural roads are typically using their seatbelts less than drivers on urban roads. Furthermore, most harsh braking events are linked to external stimuli on the road such as changing traffic light phases or traffic patterns, which are much more common in urban settings than rural.

3. *How might we use telematics to inform traffic signal timing and phasing to improve safety for Vulnerable Road Users*

By analyzing large amounts of vehicle telematics data, traffic patterns at intersections can be understood, identifying bottlenecks that can be alleviated by adjusting traffic signal timing and phasing. In addition to improving bottlenecks for traffic, telematics data can also identify short traffic signal timing that may cause issues for allowing Vulnerable Road Users (e.g., pedestrians) adequate time to safely cross the road. For slower moving pedestrians due to disabilities or old age, it is critical to make sure that traffic signal timing is set appropriately to allow them enough time to cross.

4. *How might we use telematics information, such as driver distraction or seatbelt use, to inform driver education activities and campaigns?*

Some of the US states currently rely on state workers to manually conduct visual roadside surveys of seatbelt usage for meeting federal data reporting requirements. With the use of CV-based telematics seatbelt sensors, we can automatically pull seat belt data to meet federal reporting requirements. This can help reduce the manual labor needs and can also avoid any potential harm to roadside workers collecting this data. Some potential telematics data can be also pulled to see in what geographical area drivers are taking their hands off the steering wheel more often.

5. *Beyond aggregated and anonymized driver behaviors, can vehicle data like low tire pressure, brake wear, or wiper information be used in creative ways to improve safety?*

Modern vehicles are equipped with sensor-enabled wipers, which can provide near-instantaneous data. This information is invaluable to weather stations and maintenance crews, alerting them to hazardous conditions in specific locations without having to wait for a weather station to update their systems and notify the Department of Transportation (DOT) or emergency responders. The DOT can then provide real-time weather updates to drivers on the affected roads. Tire sensors, on the other hand, can aid drivers in improving their driving and gather information about road conditions. The data collected by these sensors can help the DOT prioritize road maintenance, potentially preventing worsening conditions rather than waiting for annual surveys. Additionally, the information from tire sensors can assist drivers in maintaining their vehicles properly.

6. *What are the societal benefits of better pavement condition for non-motorists?*

Better pavement conditions can provide more usable environments for many other modes of transportation, including walking and bicycling, allowing people to safely get to work, school, and other locations to support their well-being and development.

7. *How do you envision MassDOT might use ubiquitous telematics data to supplement: our existing (annually refreshed) pavement condition collection program that informs our resurfacing plan, data to make spot improvements (e.g. a pothole finder), information for snow/ice operations, or ways to capture roadway marking quality*

The assembly of road data through vehicular sensor technologies could enhance the conventional methods of monitoring road conditions and identifying hazardous locations. By implementing this monitoring system, MassDOT can reduce the expenditure associated with manual pavement collection programs and take proactive measures to repair potholes and deteriorating road conditions before they worsen.

8. *What sustainability metrics (like fuel consumption) are you able to provide insight into that could also correlate to safety improvements?*

EY can help provide roadway striping condition, hotspot locations, EV/AV infrastructure details, road roughness that could add onto safety improvements.

9. *Show us something unique about your work that would provide new actionable insight for MassDOT in helping us prioritize resources.*

EY's analytical models provide data that helps determine the priority of roadway portions that need to get fixed first before DOT can send out resources to the location that might not require work for another few years. Some of the predicated models can help DOT determine the impact on traffic by any future roadway construction and can also provide recommendation on best way to possible to detour the affected traffic.

10. *How would your tool support insights in both heavily populated areas and more rural areas in Massachusetts?*

The coverage of the consumer connected vehicle fleet that the EY team would use for extracting telematics data extends across the state in both rural and urban areas, and the solution would include geographic visualization and analysis focusing on all counties across the state of Massachusetts.

11. *How could your tool be leveraged to support the work of cities and towns in making their roadways safer through annual construction project planning?*

The EY Roadway Insights solution can provide up-to-date information on the state of the road infrastructure for road asset management and maintenance activities, including identification of potholes, lane striping deficiencies, and road quality issues. Furthermore, analysis involving other factors (e.g., average traffic/speed where road issue emerged) can be used to prioritize maintenance activities and construction resources needed.

12. *or bring your own research question and answer it using your data and platform to generate useful insights.*

See section above on EY Roadway Insights.

Telematics services questions

1. *Demonstrate that you can conflate your data insights to MassDOT's road inventory file (see MassDOT Assets below) and to Open Street Map or describe in some detail the process required to do this for roadway segments and the estimated time involved to do so.*

EY can work with MassDOT to gather additional information on roadway usage and design including traffic volume, speed limits, high-maintenance incidents, and accident rates to further refine the list of potential roadways. This process would involve coordinating with MassDOT representatives to obtain additional data and analyzing it to determine the most suitable roadways for data collection. These additional criteria are important to provide added context to help optimize and prioritize where repairs can ultimately be needed and to consider the potential impact on roadway maintenance processes and safety.

Utilizing ArcGIS Network Analyst or similar road network analysis tools, the team can evaluate and identify potential roadways based on factors described above. Upon finalizing the list of roadways for vehicle data collection and incorporating the findings from the road network analysis, the EY team would present the list to MassDOT review and approval.

By focusing on diverse vehicle data collection scenarios across rural and urban environments, the EY team can effectively evaluate and interpret data quality, ultimately contributing to safer and better-maintained roads for all users. The time to do this data gathering can be estimated based on suggested pilot location and scope.

[EY was not able to export the data file from the provided RFI PDF]

2. *Please describe how you protect and preserve privacy with your product.*

We have a proprietary, industry-leading methodology for implementing successful application security programs based on secure software development lifecycle processes (SSDLC). The EY team can follow all MassDOT specific cyber security and compliance guidelines to reduce project risks, where possible. Utilizing a shift-left approach, security is embedded in our approach beginning with the design to help ensure that our solution is architected adhering to segregation of duties and the principle of least privilege from the beginning.

3. *Please explain your business model or models for working with government transportation authorities.*

Our Government and Public Sector (GPS) practice comprises multidisciplinary teams consisting of professionals who have a range of technical experience. These professionals bring the skill sets, experience, and relevant working knowledge of serving governments like the Commonwealth. We employ professionals who are former policymakers or senior executives or who have served as department heads within government agencies. This group of professionals keeps close tabs on government trends of the industry they serve through a variety of networks to make certain we deliver current, relevant advice to our clients. Over the last few years, EY US has served and continues to serve a wide range of the Commonwealth of Massachusetts independents, constitutionals, authorities, and agencies.

4. *If relevant, please share how MassDOT would be involved in developing the product or if there are any opportunities for customization.*

The EY can work with MassDOT to develop a clear understanding and consistent usage of the roadway safety solution by end users at MassDOT. The team can work closely with MassDOT personnel to set up and integrate the EY solution in a way that is easy and convenient for the designated personnel to use. This would include solution customization and presentation to users for feedback, initial training on software functionality, and development of user guide materials. The factor that would demonstrate success in this effort is measuring improvements in speed and accuracy of data insight generation. Instead of requiring users to manually compile data and research other sources for supporting documents (e.g., manuals), our EY Roadway Insight solution can return relevant information in real-time, drastically reducing time and effort. The EY team can measure the amount of time reduced through usage of the solution and the accuracy of responses from the solution to understand the scale of impact on MassDOT processes and workflow.

See EY Roadway Insights section for further information. As specified in question 6, we can develop a workshop to showcase our solution to MassDOT.

5. *Please indicate the monthly volume of drivers/vehicles reflected in your data for Massachusetts roadways and the estimated percentage of drivers out of all of those on the roadway represented in your dataset.*

We do not have the exact number since the incoming data fluctuates based OEM's data dump for any period of analysis, a conservative estimate would be 10k+ vehicles in the state.

6. *Indicate if you have a demonstration with Massachusetts-based data that you would like to present in a workshop with MassDOT staff. Please include the topic you'd like to address and a few sentences on what you want to share.*

EY would like to propose a workshop with MassDOT and show the demo that we will be creating with the Massachusetts dataset. In this workshop we would go over the overall capabilities of EY Roadway Insight Solution, multiple data layers and its relation to highway safety, and potential solution ideas.

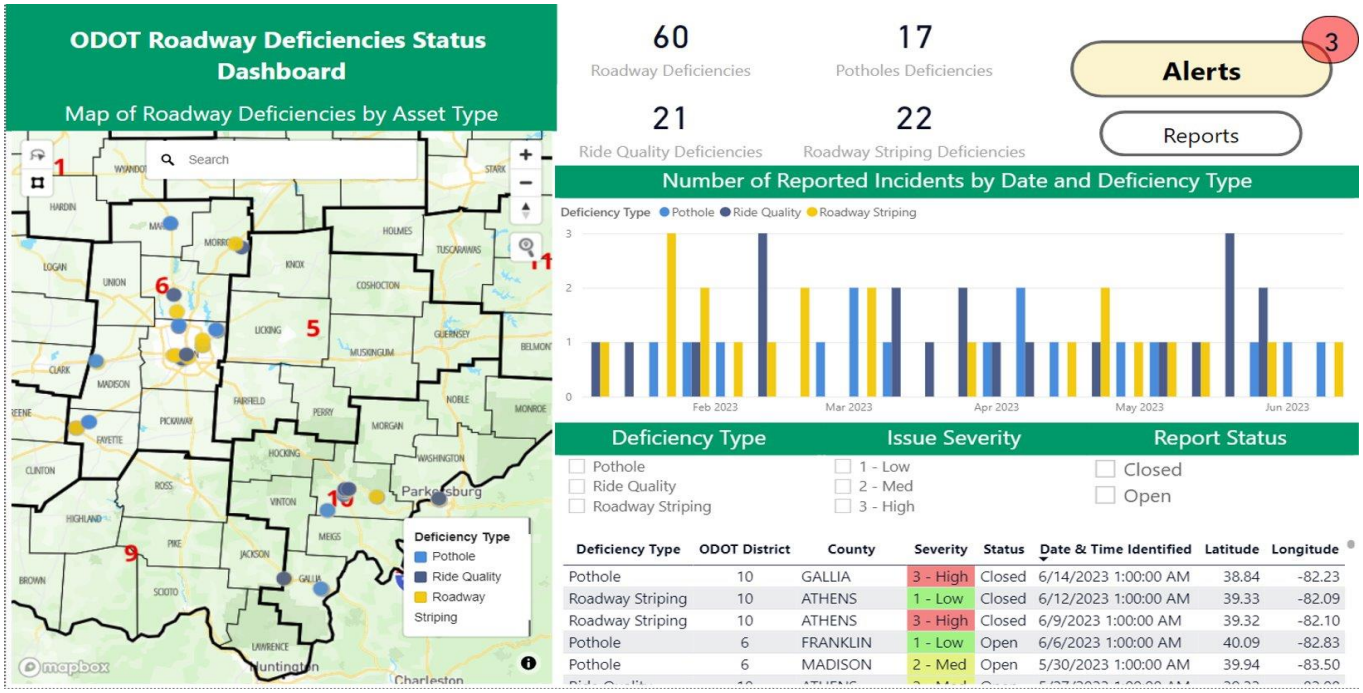
Below are a few examples of how EY Roadway Insights can process consumer connected vehicle data to create actionable insights and enhance existing MassDOT processes:

- Processing signals from vehicle perception sensors such as front cameras and radar to quickly identify infrastructure maintenance needs (e.g., faded lane lines), flag pulled-over vehicles, and report accidents

- Processing vehicle dampener signals to determine IRI road quality measures that correlate very closely (0.86) with the output of dedicated LiDAR vans at a fraction of the cost
- Processing vehicle stability and ABS braking signals to detect development of potholes on the roadway, including size, depth, and location to support faster awareness and pothole repair
- Processing vehicle temperature, windshield wiper, and ABS braking engagement signals to quickly identify safety-impacting road weather events and support appropriate emergency response

The following figure shows the concept dashboard of EY Roadway Insight Solutions. As an example, the figure shows the severity of roadway deficiency, locations, number of incident reported in the particular map area. This is just conceptual dashboard. EY can work with MassDOT to customize this dashboard based on commonwealth requirement.

Figure 8 - Notional Data Dashboard of EY Roadway Insight



Here is a partial list of topics that we would like to discuss during a potential workshop:

- EY Roadway Insight Solution Introduction & Demo
- Discussion on customization of solution dashboard design (Shown in Figure above)
- MassDOT roadway safety use cases
- Existing data layers and its impact on roadway safety
- Other specific data layers of interest (e.g Airbag deployment, lane departure data, roadway asset condition)
- Potential Gen-AI based solution ideas
- EY PII Solution (License plate obfuscation)
- AI based plugin into our solution for user to import data to analyze

Area of Interest 3: Non-digital tools & ideas

EY has vast experience with improving highway safety outcomes leveraging a variety of tools, technologies, policy, people, and infrastructure.

We would be glad to have an in-depth discussion and share or insights.

EY | Building a better working world

EY exists to build a better working world, helping to create long-term value for clients, people and society and build trust in the capital markets.

Enabled by data and technology, diverse EY teams in over 150 countries provide trust through assurance and help clients grow, transform and operate.

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

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