Autonomous Vehicle Observation Zone Challenge

swbid Southwest Business Improvement District

usignite

d. District Department of Transportation

MOBILITY INNOVATION CENTER
UNIVERSITY of WASHINGTON

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

AVO Zone Challenge Participant Package

DDOT Autonomous Vehicle Observation (AVO) Zone Challenge Participant Package

1. About the Challenge

The District Department of Transportation (DDOT), the Southwest Business Improvement District (BID), and US Ignite have partnered to create the Autonomous Vehicle Observation (AVO) Zone Challenge. The Challenge seeks innovative technical solutions to help the District safely monitor the testing and operation of autonomous vehicles (AVs) on public streets.

The George Washington University (GW) and the University of Washington (UW) are academic partners to DDOT and will support the Challenge by leading the data management, analysis, and reporting during the pilot.

Background

Washington, DC currently allows testing of AVs per D.C. Official Code § 50–2352.01(d). DDOT must ensure it can effectively monitor AV test operations to safeguard public safety, understand operational impacts on the transportation system, and support data-driven policymaking. Current tools and approaches for monitoring AV testing activity, collecting operational data, and providing transparent insight into AV performance need to be evaluated.

Challenge Statement

This Challenge seeks innovative solutions that will enable DDOT to monitor AV operations, capture meaningful operational data, and enhance transparency to inform oversight, regulatory decisions, and the District's future policies on AV testing and operations.

Challenge Structure

Challenge Applicants will prepare and submit a proposal responsive to the guidance presented in this Participant Package. A panel of judges will score the proposal against the evaluation criteria to determine the final Challenge Winner.

The Challenge Winner will be eligible for a $50,000 contract with US Ignite to deploy and pilot the solution in Washington, DC for DDOT and its academic partners for up to six (6) months. Selection as Challenge Winner does not guarantee contract execution. Award is contingent on successful negotiation of scope, schedule, budget, data rights, privacy/security terms, and other standard contract requirements.

Challenge Contract Award	**$50,000**

The Challenge Winner will be included in several coordinated press releases, social media posts, and announcements with DDOT and the partner organizations.

2. Timeline

Event	Date
Challenge Open Announcement	June 4, 2026
Challenge Information Session	June 11, 2026 (4 PM ET)
Challenge Question Submission Deadline	June 19, 2026 (5 PM ET)
Question Responses posted	June 25, 2026
Challenge Closed (Submission Deadline)	July 16, 2026 (5 PM ET)
Announce Challenge Winner (Target)	August 31, 2026
Pilot Operations Start (Target 6 months duration)	January 2027
Pilot Operations End (Target)	July 2027
Program End	August 2027

3. Eligibility

The Challenge is open to entities capable of proposing, deploying, and supporting a traffic-monitoring pilot and analytics solution that is responsive to this Participant Package.

Eligible Applicants

Eligible applicants may include:

- For-profit companies
- Nonprofit organizations
- Universities and research institutions
- Startup companies
- Teams or consortia led by one eligible entity

Challenge Applicants may submit independently or as part of a team. If applying as a team or consortium, the application must identify one lead entity that will serve as the single point of contact and, if selected, will be the contracting party with US Ignite.

Challenge Applicants may be based anywhere in the United States and must demonstrate the ability to deploy, operate, and support the proposed pilot in Washington, DC, during the

anticipated pilot period. This includes working with DDOT's academic partners in the data collection and analysis.

Minimum Eligibility Requirements

To be eligible to submit a proposal, a Challenge Applicant must, at the time of submission:

- Be a legally formed entity in good standing in its state of organization.
- Have the legal authority to enter into a contract with US Ignite if selected.
- Not be suspended, debarred, or otherwise ineligible to receive contract funds under applicable federal or District law.
- Disclose any actual, potential, or perceived conflicts of interest that could affect the fairness of the Challenge or performance of the pilot.
- Demonstrate the technical and operational capacity to deliver the proposed pilot, whether directly or through identified subcontractors or partners.
- Be able to comply with all applicable laws, permits, privacy requirements, and site-specific requirements associated with deployment in the District.
- Submit a complete proposal by the stated deadline in the format required by this Participant Package.

Teams, Subcontractors, and Partners

Challenge Applicants may propose including subcontractors, academic collaborators, equipment suppliers, or other partners. The proposal must clearly identify each known team member and describe their role.

The lead applicant will remain responsible for proposal accuracy, contract negotiation, project performance, and all deliverables if selected.

4. Proposal Requirements

Challenge Applicants must submit a complete proposal using the Challenge Proposal Submission Template (Appendix A). Proposals should be concise, follow the required format, and stay within stated word limits.

Alignment with Technical Requirements

Proposals must be responsive to the Technical Requirements (Appendix B). Challenge Applicants should:

- Clearly describe how their solution meets the stated technical capabilities
- Identify any gaps, assumptions, or dependencies

- Distinguish between existing capabilities and those that would be developed or adapted for the pilot

Required Proposal Content

At a minimum, proposals must include:

- Description of the proposed solution and its level of maturity
- Relevant prior deployments and ability to demonstrate the solution if requested
- Deployment approach in Washington, DC, including integration with existing or anticipated infrastructure
- Identification of additional hardware, software, or data requirements
- Expected outcomes and performance metrics
- Project plan and timeline
- Team qualifications and experience
- High-level budget and cost structure

Budget Expectations

The total contract award will be $50,000 to support a pilot of six (6) months, and proposals must include a high-level budget and descriptions of any deployment limitations associated with the award amount.

Submission Requirements

Proposals must:

- Use the template provided in Appendix A
- Address the Technical Requirements in Appendix B
- Include all required sections
- Be submitted by the stated deadline

Incomplete or non-responsive submissions may not be reviewed.

5. Technical Requirements

The technical requirements are described in detail in Appendix B, and key points are summarized below.

Pilot Location

The DDOT defined pilot deployment areas include two urban signalized intersections in Washington, DC:

- 4th Street SW and M Street SW
- New Jersey Avenue SE and M Street SE

An optional, third detection area may be identified along the M Street corridor between these two intersections. This additional pilot location may be used by Challenge Applicants to demonstrate their solution capability on a straight road segment.

All of the pilot areas provide consistent mixed-traffic urban operating conditions, including passenger vehicles, freight activity, transit operations, pedestrians, bicyclists, and expected AV fleet operations.

Pilot Operational Objectives

The purpose of the testbed is to enable DDOT and its research partners to evaluate how effectively proposed solutions can:

- Detect and monitor AVs operating in mixed urban traffic
- Observe and analyze interactions between AVs and other roadway users
- Generate operational and behavioral analytics relevant to transportation planning and public safety
- Support transparent, evidence-based evaluation of AV activity in the District

Autonomous Vehicle Detection Requirements

The solution shall detect the presence of AVs operating within the designated pilot areas. The proposed solution may use visual validation methods, including vehicle imagery or license plate capture, to verify AV detections. However:

- Applicants shall describe the primary detection methodology used to distinguish AVs from other vehicles.
- DDOT will not provide electronic identifiers associated with AVs, including transponders, onboard telemetry feeds, connected vehicle identifiers, or GPS fleet tracking devices.
- License plate recognition (LPR) or optical character recognition (OCR) methods shall not serve as the sole or primary mechanism for AV detection.
- Vehicle license plate information may be captured and used to support validation of AV detections. AVs participating in the pilot should be assumed to operate without externally visible identifiers or dedicated electronic signaling devices, including transponders, GPS fleet trackers, or other cooperative detection technologies intended to aid identification.

For purposes of this Challenge, 'AV detection' means identifying vehicles known to be part of an AV testing fleet within the observation area. The pilot does not require roadside determination of whether the AV is operating in autonomous mode, unless the applicant proposes a validated method for doing so.

Traffic Behavior Detection

The solution shall reliably detect roadway behaviors applicable to all motor vehicles within the testbed area. Behavior detections shall be:

- Objectively defined using clear event logic or thresholds
- Operationally interpretable by DDOT and research partners

Examples of acceptable behaviors include:

- Right-turn maneuvers
- Left-turn maneuvers
- Lane-change intent detection and maneuver classification
- Vehicle acceleration and deceleration profiles

Subjective, inferred, or ambiguously defined behaviors including generalized "erratic driving" or undefined "near-miss" conditions — shall not satisfy the minimum behavioral detection requirement unless accompanied by clearly documented event definitions, measurable thresholds, and validation methodology. Challenge Applicants shall define:

- Event logic and classification rules
- Detection thresholds
- Spatial and temporal resolution
- Expected accuracy metrics
- Validation methodology

6. Evaluation Criteria

Evaluation Criteria	Weight
Autonomous Vehicle Detection and Validation *Evaluates the solution's ability to detect and validate the presence of autonomous fleet vehicles within the pilot area.* • Detects AV presence within the defined observation area • Describes the basis for AV identification or classification • Provides confidence measures or validation methods • Identifies known limitations and uncertainty	20%

Multimodal Detection and Traffic Behavior Capture *Evaluates the solution's ability to observe roadway activity and capture traffic behavior in mixed urban conditions.* • Detection confidence estimation, validation methodology, and false-positive/false-negative mitigation strategies • Ability to capture traffic behaviors (turning maneuvers, acceleration profiles, etc.) • Computational efficiency, reliability • Generate high-resolution trajectories	20%
Data Quality, Security, and Governance *Evaluates the extent to which the solution produces usable, documented, and shareable data for DDOT and research partners.* • Availability of object-level, event-level, and trajectory-level outputs • Support for interoperable machine-readable formats (CSV, JSON, GeoJSON, APIs) • Metadata completeness, timestamp synchronization, and spatial referencing consistency • Protects sensitive or identifiable data per DDOT policies	20%
Pilot Execution, Operations, and Scalability/Flexibility *Evaluates the applicant's ability to deploy, operate, support, and develop the solution during the pilot* • Provides a realistic deployment and operations plan for a 6-month pilot • Addresses installation, calibration, and maintenance needs • Demonstrates ability to scale or modify solutions after deployment	20%
Team Capability and Relevant Experience *Evaluates the team's qualifications, technical expertise, and demonstrated experience with similar deployments, including prior pilots or transportation-related projects. (e.g., intelligent transportation systems (ITS), AV deployments, computer vision, sensing technologies).*	10%
Community and Public Engagement *Evaluates how the solution supports transparency, public understanding, and communication of AV testing and findings to technical and non-technical stakeholders and the community.*	10%
Total	**100%**

7. Application Process

To apply, Challenge Applicants must submit their proposal documentation to **challenges@us-ignite.org** by **July 16, 2026, at 5:00 p.m. ET**.

Submission Checklist:

- ☐ Follow the Proposal Template in Appendix A
- ☐ Submit AVO Zone Challenge Proposal as PDF, DOCX, or both
- ☐ Include "AVO Zone Challenge Proposal" in the subject line of the email
- ☐ Apply by the deadline; late submissions will not be accepted
- ☐ Receive confirmation email from US Ignite after submission

Submission Deadline	**July 16, 2026, at 5:00 p.m. ET.**
Send Proposals To	**challenges@us-ignite.org**

8. Contact Us for Additional Questions

If you have any questions or require any accommodation(s), please feel free to reach out to us at challenges@us-ignite.org.

US Ignite will post responses to questions on the Challenge website.

Appendix A - Challenge Proposal Submission Template

Section 1 is excluded from the page count.
Section 2 may not exceed 1 page.
Sections 3–10 together may not exceed 15 pages.

Section 1: Challenge Applicant Information *(not included in page count)*

1.1 Primary Contact

- Name:
- Title:
- Organization:
- Email:
- Phone:

1.2 Lead Applicant Organization

- Organization Name:
- Organization Type (select one):
    - Company
    - Startup
    - Nonprofit
    - University / Research Institution
    - Other: _____
- Headquarters Location (City, State):
- Website:
- Team or Company Logo:

1.3 Team Information

- Team Name (if applicable):
- Is this a team submission? (Yes/No)
- If yes, list partner organizations and roles

1.4 Solution Overview

- Solution / Product Name:
- Technology Category (describe all that apply):
    - Computer Vision

- AI / Machine Learning
- Edge Computing
- Traffic Analytics
- Connected Infrastructure
- Other: _____

Section 2: Executive Summary *(1-page maximum)*

Provide a clear and concise description of the proposed solution, how it addresses the Challenge statement, and why it is a strong candidate to be selected as the winner for the DDOT AVO Zone Challenge.

Section 3: Proposed Technical Solution *(15-page limit for remaining sections)*

Describe the proposed solution and its core capabilities. This section explains how the solution detects autonomous vehicles (AVs), captures multimodal roadway activity, generates usable data, and supports validation of results during the Challenge pilot. Responses in this section will be used to score the technical evaluation criteria by the Challenge judges.

3.1 Solution Overview and Architecture

Provide a concise overview of the proposed solution, including the core technology, sensing approach, system components, and overall architecture. Identify the primary sensing modalities used, major hardware and software components, and whether processing occurs at the edge, in the cloud, or through a hybrid architecture.

Indicate whether the proposed solution is an existing product, a configured version of an existing product, or a capability that would need to be developed or adapted for this pilot. Identify any major technical assumptions, dependencies, or required external inputs needed for the solution to operate as proposed.

3.2 Autonomous Vehicle Detection and Validation

Describe how the solution will detect and validate the presence of AVs within the designated observation area. Explain the primary basis for AV identification and clarify whether the solution detects known AV fleet vehicles, vehicles operating in autonomous mode, or another defined AV detection target.

Applicants should explain how the solution operates without DDOT-provided transponders, onboard telemetry, connected vehicle identifiers, GPS fleet tracking data, or dedicated electronic signaling devices. If vehicle imagery, license plate information, visual review, DDOT coordination, or other supporting data are used for validation, describe how they support detection confidence.

Detection approach

- Primary AV detection method and basis for identification or classification.
- Defined AV detection target, such as known AV fleet vehicles, vehicles operating in autonomous mode, or another target.
- Required assumptions, training data, or external dependencies.

Validation and confidence

- Validation approach, including manual review, ground-truth comparison, sample validation, audit workflow, post-event review, DDOT coordination, or license plate record coordination.
- Confidence scoring or uncertainty methodology, including expected accuracy, false positive rates, and false negative rates, where available.
- Known limitations, edge cases, site conditions, and minimum operating period or sample size needed for meaningful validation

3.3 Multimodal Detection and Traffic Behavior Capture

Describe how the solution will observe roadway activity and capture traffic behavior in mixed urban conditions. The response should explain how the solution detects and classifies roadway users and how it measures or derives traffic behaviors, movements, and events relevant to DDOT and its research partners.

Address the following:

- Roadway users the solution can detect and classify: passenger vehicles, pedestrians, bicyclists, micromobility users, freight vehicles, transit vehicles, emergency vehicles, and other relevant users.
- Traffic behaviors, movements, or events the solution can detect or derive, such as turning movements, speeds, acceleration/deceleration, lane changes, queueing, delay, stop compliance, signal interaction, curb activity, conflicts, or other operational and safety-relevant measures.
- How proposed behaviors or events are measured, inferred, classified, or derived, including any event definitions, thresholds, logic, or analytic methods used.
- Spatial, temporal, and tracking capabilities, including whether outputs are available as object tracks, trajectories, event detections, interval summaries, aggregated analytics, or other data products.
- Known limitations that may affect multimodal detection or behavior capture, such as occlusion, lighting, weather, congestion, sensor placement, or roadway geometry.

3.4 Data Outputs, Quality, and Interoperability

Describe the data products and technical outputs the solution will generate during the pilot. The response should explain what information DDOT and its research partners will receive, how it will be delivered, and how the applicant will ensure the data is usable, documented, research-ready, and suitable for analysis.

Address the following:

- Data outputs produced by the system, such as counts, classifications, speeds, trajectories, event records, safety metrics, metadata, imagery, clips, dashboards, reports, API outputs, or other deliverables.
- Supported export and delivery formats, such as CSV, JSON, GeoJSON, Parquet, shapefiles, APIs, database extracts, or other machine-readable formats.
- Level of data granularity, including whether outputs are raw, near-raw, object-level, event-level, trajectory-level, interval-based, aggregated, or summarized.
- Data quality controls, including timestamp synchronization, spatial referencing, confidence values, field definitions, metadata completeness, and documentation.
- Any proprietary, licensing, access, retention, or redistribution limitations associated with the proposed data products.

3.5 Data Privacy, Security, and Governance

Describe how the solution will protect, manage, and govern data generated during the pilot. The response should explain how the applicant will handle sensitive or identifiable information, secure data systems, and support appropriate access by DDOT, US Ignite, and authorized research partners.

Address the following:

- Privacy protections for video, imagery, license plate information, object tracks, or other potentially identifiable data, including minimization, redaction, anonymization, retention limits, or edge processing.
- Data storage, access, and protection methods, including encryption, user authentication, role-based access, audit logging, and safeguards for remote administration.
- Data sharing approach for DDOT, US Ignite, and authorized research partners, including any restrictions on access, sublicensing, redistribution, republication, or public release.
- Data ownership, licensing, and usage rights for raw data, processed data, derivative analytics, reports, and software-generated outputs.
- Data retention and disposition procedures, including how source data, processed data, clips, imagery, and analytic outputs will be retained, deleted, returned, or archived at the end of the pilot.

- Any privacy, security, proprietary, contractual, or technical limitations that may affect DDOT's or research partners' ability to use the data for evaluation, reporting, policy analysis, or public communication.

3.6 Technology Readiness and Demonstration Capability

Describe the maturity of the proposed solution and its readiness for deployment in the Challenge pilot. The response should help reviewers understand which capabilities are already available, which would require configuration or adaptation, and whether the solution can be demonstrated during proposal evaluation.

Address the following::

- Current stage of the solution: concept, prototype, pilot-tested, or commercially deployed.
- Existing capabilities that are ready for pilot deployment.
- Capabilities that would need to be developed, configured, trained, integrated, or adapted for this pilot.
- Prior testing, validation, or deployment evidence that supports the solution's readiness.
- Whether a live or recorded demonstration can be provided if requested.
- Proposed demonstration format, such as a live demo, recorded demo, dashboard walkthrough, sandbox environment, sample data review, or prior deployment case study.

Section 4: Pilot Deployment, Operations, and Scalability

Describe how the proposed solution would be deployed, operated, maintained, and adapted during the Challenge pilot in Washington, DC. This section should demonstrate that the applicant can execute a realistic pilot at the designated locations and support reliable operations for the pilot period.

4.1 Pilot Deployment Approach

Describe how the solution would be deployed at the designated pilot locations in Washington, DC. The response should explain the proposed deployment model, the installation or integration approach, and how the solution would operate in the required observation areas.

Address the following:

- Proposed deployment model, such as fixed, portable, temporary, semi-permanent, software-based, infrastructure-based, or hybrid.
- How the solution would cover the required intersections and, if proposed, the optional road segment.
- Site-specific assumptions related to field of view, mounting location, sensor placement, cabinet access, line of sight, or observation zones.

- Flexibility to adapt the deployment approach based on available DDOT infrastructure and site conditions.

4.2 Infrastructure, Power, and Connectivity Requirements

Describe the infrastructure, power, communications, software, and third-party services required to fully operate the proposed solution during the pilot. This includes mounting location, mounting method, mounting height, equipment weight, orientation, clearance, line-of-sight, cabinet access, and any need for traffic control during installation or maintenance.

The response should clearly distinguish between applicant-provided components and any support requested from DDOT, US Ignite, academic partners, or other stakeholders.

Address the following:

- Required hardware, software, sensors, edge devices, cloud services, data services, or third-party tools.
- Power requirements, communications needs, bandwidth expectations, latency considerations, and data buffering capabilities.
- Whether the solution can operate without access to DDOT CCTV feeds or other existing camera feeds.
- Required versus optional components, including any assumptions about DDOT-provided poles, traffic cabinets, power, fiber, cellular access, or other infrastructure.
- Any infrastructure constraints or dependencies that could affect deployment feasibility, cost, schedule, or performance.

4.3 Installation, Commissioning, and Calibration

Describe how the solution would be installed, tested, commissioned, and calibrated before steady-state pilot operations begin. The response should explain how the applicant will verify that the system is operational and producing usable data.

Address the following:

- Installation sequence, including mobilization, equipment preparation, field installation, configuration, calibration, testing, and commissioning.
- Support needed from DDOT or other partners for installation, site access, traffic control, cabinet access, equipment mounting, or field coordination.
- Commissioning checks used to confirm that devices are operational, calibrated, communicating, and producing data in the expected format.
- Initial validation activities needed before regular pilot data collection begins.

4.4 Operations, Maintenance, and Support

Describe how the solution would be operated and supported throughout the pilot period. The response should explain how the applicant will maintain system performance, respond to issues, and coordinate with DDOT, US Ignite, and research partners.

Address the following:

- Routine monitoring, preventive maintenance, corrective maintenance, recalibration, troubleshooting, and technical support.
- Expected service response times and support availability during the pilot.
- Process for identifying, documenting, and resolving system outages, data gaps, sensor issues, or performance degradation.
- Roles and responsibilities of the applicant, DDOT, US Ignite, academic partners, subcontractors, or other support entities.
- Decommissioning approach, including equipment removal, site restoration, and final transfer or disposition of data and documentation.

4.5 Adaptability and Scalability

Describe how the solution can be modified, adapted, or scaled during and after the pilot. The response should explain whether the solution can adjust to changing site conditions, expanded coverage needs, additional data requirements, or future DDOT use cases.

Address the following:

- Ability to modify sensor placement, detection zones, analytic outputs, reporting formats, or data delivery methods during the pilot.
- Scalability to additional intersections, corridors, neighborhoods, or District-wide deployments.
- Cost, infrastructure, staffing, or operational considerations that would affect broader deployment.
- How lessons learned from the pilot would inform DDOT's future deployment or long-term implementation.
- Considerations for meeting the Build America, Buy America Act (BABA) requirement for future procurement contracts, if scaled.

Section 5: Use Case Alignment and Public Value

Describe how the proposed solution supports the goals of the Challenge and how pilot results could be useful to DDOT, US Ignite, research partners, and the public.

5.1 Challenge Alignment and Expected Outcomes

Explain how the solution supports AV observation, traffic safety, multimodal operations, curb or corridor management, and evidence-based decision-making. Identify the key findings, insights, or outcomes the pilot is expected to produce and any assumptions that may affect those outcomes.

5.2 Public and Stakeholder Communication

Describe how the applicant can help translate pilot findings for non-technical audiences. Identify any public-facing materials, summary reports, dashboards, graphics, visualizations, or stakeholder briefing support the applicant can provide, while protecting sensitive, proprietary, or identifiable information.

Section 6: Performance Measurement and Pilot Evaluation

Describe how the applicant will measure pilot success and report progress during the DDOT AVO Zone Challenge pilot.

6.1 Success Measures and Evaluation Approach

Identify the key performance indicators, data collection methods, validation methods, and comparison or baseline approaches that will be used to evaluate pilot performance. Measures should address AV detection, multimodal detection, data quality, deployment reliability, and usefulness to DDOT and research partners.

6.2 Reporting and Final Deliverables

Describe the proposed reporting cadence and format, such as dashboards, written summaries, data quality reports, validation summaries, or final reports. Identify the final materials that will be delivered at the conclusion of the pilot, including performance results, key findings, known limitations, lessons learned, and recommendations for future deployment.

Section 7: Project Plan & Timeline

Provide a concise project plan for completing the Challenge pilot. The response should identify the major phases of work, key milestones, estimated schedule, and any dependencies that could affect implementation, operations, or final delivery.

Applicants should include a timeline that covers major activities, including project kickoff, site coordination, procurement, installation, commissioning, calibration, pilot operations, reporting, decommissioning, and final deliverables. The pilot is expected to include deployment and commissioning in January 2027, followed by approximately six months of operations, ending in July 2027.

Key Milestones

Milestone	Description	Date or Duration
Example	*System deployment*	*Month 1*

Section 8: Team & Experience

8.1 Team Qualifications

Explain why your team is well-positioned to deliver this solution. Include relevant past deployments, technical expertise, or domain experience.

8.2 Key Personnel

Name	Role	Organization	Relevant Experience

Section 9: Budget & Cost Estimate

9.1 Use of Award Funds (Table Format)

Provide a high-level estimate of how the $50,000 contract award would be used.

Cost Category	Description	Estimated Cost

9.2 Cost Structure & Sustainability

Provide estimated costs beyond the pilot, including:

- Cost per location
- Monthly or ongoing operational cost
- Any scaling cost considerations

9.3 Budget Constraints & Gaps

If the $50,000 contract award is insufficient to fully execute a 6-month pilot:

- Clearly describe limitations
- Identify what additional resources or funding would be required

- Indicate any cost-sharing or partnership opportunities
- Proposed a scaled solution that meets the budget

Section 10: Additional Information (Optional)

Supporting Materials

Provide web links to:

- Demo videos
- Product documentation
- Case studies
- Technical architecture diagrams

Appendix B - Technical Requirements

1. General System Requirements

Purpose

The Challenge Applicant shall provide an autonomous vehicle (AV) sensing solution capable of detecting and identifying AVs operating at up to two DC intersections and provide DDOT and its academic partners data that supports the detection, observation, and audit of AV fleet operations within the District.

Functional Objective

The solution shall support the collection and management of data on both autonomous vehicle and conventional traffic activity within the designated test area, enabling DDOT and its research partners to evaluate roadway operations, traffic interactions, and safety-related conditions.

Solution Form

The solution may consist of field-deployed hardware, software operating on existing DDOT infrastructure, vendor-furnished sensing devices, third-party data integration, or a hybrid architecture, provided that the proposal clearly identifies all dependencies, assumptions, and limitations. Real-time data delivery is not required; delayed or batch delivery is acceptable if latency, cadence, and data quality are clearly described.

Pilot Suitability

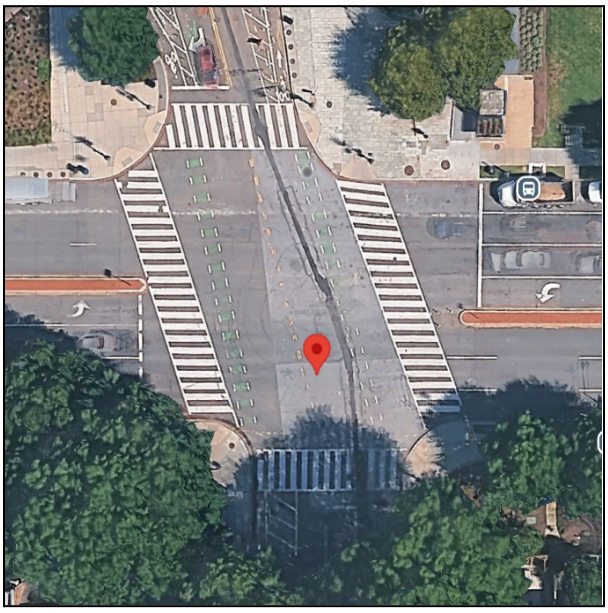
The solution shall be suitable for a pilot period lasting a minimum of three (3) months and up to the District's desired duration of six (6) months, with the goal to collect sufficient data to provide meaningful results. This requirement reflects the market reality that comparable pilots range from rapid intersection studies to multi-month operational deployments.

2. Deployment and Infrastructure Requirements

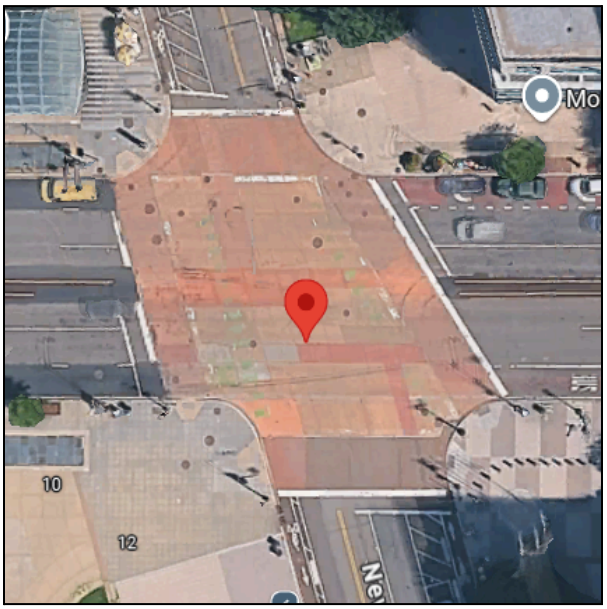
Deployment Locations

DDOT has identified the following two intersections and an optional road segment for deployment of the solution.

4th Street SW and M Street SW



New Jersey Avenue SE and M Street SE



Optional Straight Road Segment

The Challenge Applicant may propose to deploy their solution at an additional, optional location, along a straight road segment on M Street, between 4th Street SW and New Jersey SE Avenue. The purpose of this additional deployment is to demonstrate the solution's ability to detect and monitor AVs traveling along a continuous roadway.

District-Furnished Elements

DDOT is providing access to the District-owned equipment as follows.

- Vertical signal poles and combination signal and streetlight poles are available for mounting equipment. Horizontal mast arms are not available for use. Standalone streetlight poles are also not available for use.
- Traffic equipment cabinets with power and limited fiber optic connections.
- Two Ouster LiDAR sensors installed at New Jersey Avenue SE and M Street SE

Only DDOT staff or their designated contractors are permitted to install equipment on the District-owned infrastructure. The Challenge Winner is not required to rent specialized equipment, such as a bucket truck, for the installation of their equipment.

While DDOT does have closed-circuit TVs (CCTV) at these pilot locations, access to the camera feeds will not be permitted for this pilot. CCTV compatibility information is requested to inform possible future deployments.

The Ouster LiDAR sensors are available for use by the Challenge Winner and DDOT will provide the technical support in accessing these devices as needed.

Existing Infrastructure Compatibility

Where the solution relies on existing infrastructure, the solution shall identify compatibility with existing CCTV cameras, traffic signal cabinets, controllers, communications assets, poles, or other roadside infrastructure. The proposal shall identify any minimum camera resolution, frame rate, camera angle, network access, controller interface, or cabinet condition required for operation. This information will provide DDOT additional background information that may be used in planning future deployments. The proposal shall identify if and how access to signal phasing and timing information is required.

Deployment Approach

The Challenge Applicant shall define the proposed deployment model, including whether the solution is fixed, portable, temporary, semi-permanent, or hybrid.

Field Installation

The Challenge Applicant shall identify all field installation requirements, including mounting location, mounting method, mounting height, equipment weight, orientation, clearance, line-of-sight, cabinet access, and any need for traffic control during installation or maintenance. DDOT will provide technical assistance and staff to the Challenge Winner in the solution deployment planning.

Installation Schedule

The Challenge Applicant shall provide an installation schedule showing mobilization, procurement, field installation, commissioning, calibration, validation, steady-state operation, and decommissioning. January 2027 is the current target date for launching the pilot which is expected to be completed by the end of July 2027.

Site Commissioning

The Challenge Applicant shall perform site commissioning and shall document that each deployed location is operational, calibrated, communicating, and producing data in the required format. The university partners will confirm the delivery and quality of the data provided.

3. Power and Communications Requirements

Power

The Challenge Applicant shall define all power requirements, including voltage, current, typical power draw, peak power draw, grounding requirements, surge protection requirements, and any battery backup or alternative power options. DDOT will provide the Challenge Winner with a detailed description of the power available in the roadside traffic equipment cabinets.

Communications

The Challenge Applicant shall define all communications requirements, including cellular, Ethernet, fiber, Wi-Fi, serial, or hybrid connectivity requirements; expected bandwidth consumption; latency expectations; and the effect of degraded or intermittent connectivity on system performance.

DDOT-owned fiber optics communication lines may be available for the pilot. Challenge Applicants are encouraged to elaborate on what they can and can not do without fiber access.

Communications Resilience

The Challenge Applicant shall identify whether field devices can continue collecting or buffering data during temporary communications outages and shall state the maximum duration of data buffering supported.

Remote Access

The Challenge Applicant shall identify all requirements for remote device access, monitoring, configuration, firmware updates, and remote diagnostics.

4. Sensing and Detection Requirements

Sensing Modalities

The Challenge Applicant shall identify all sensing modalities used in the proposed solution, which may include video, LiDAR, radar, thermal imaging, connected vehicle data, probe data, existing signal/controller data, or fused multi-source architectures.

Required Detection Class

The solution must be capable of detecting the presence of an AV operated by a fleet operator where the solution is deployed. DDOT does not mandate the use of electronic transponders, GPS trackers, or similar devices to aid in the detection of the AVs.

The Challenge Applicant is encouraged to request any training data that may be required for their solution to function. This may include photos, videos, 3-D scanner data, or similar needed to train the detection algorithm.

Preferred Additional Detection Classes

The solution should, to the maximum extent practicable, detect and classify pedestrians, bicyclists, micromobility devices, transit vehicles, freight vehicles, and other roadway users relevant to the deployment area. This refinement reflects the fact that comparable urban deployments increasingly emphasize multimodal monitoring rather than vehicle-only counts.

Traffic Behavior Detection

The solution shall identify which roadway behaviors it can detect or derive, including turning movements, speeds, trajectories, lane changes, queue length, delay, arrivals on red, stop compliance, signal phase interaction, curb activity, and other operational or behavioral measures.

Spatial Resolution

The solution shall identify the level of spatial resolution at which detections and analytics are available, including lane-level, crosswalk-level, stop-bar-level, intersection-level, corridor-level, or network-level outputs, as applicable.

Temporal Resolution

The solution shall identify the temporal resolution of the generated data, including whether outputs are event-level, object-level, second-by-second, interval-based, or otherwise aggregated.

Tracking Capability

The solution shall state whether it provides individual object tracks, object trajectories, event detections, aggregated interval summaries, or a combination thereof.

5. Autonomous Vehicle Monitoring Requirements

AV-Relevant Monitoring

The solution shall support analysis relevant to AV operations in mixed traffic and shall describe how the system will help DDOT observe AV behavior in relation to roadway context and surrounding traffic.

Mixed-Traffic Context

The solution shall provide sufficient data to compare roadway conditions and AV behaviors with those of conventional vehicles in the same test area.

Interaction Analysis

The solution should, where technically feasible, support the analysis of interactions among AVs, conventional vehicles, pedestrians, bicyclists, and other roadway users.

Anomaly and Event Support

The solution should identify whether it can flag or support review of unusual, anomalous, or safety-relevant operating conditions associated with roadway activity.

6. Safety Analytics

Safety Analytics Capability

The solution shall identify all safety analytics supported by the proposed system, including but not limited to conflict detection, near-miss detection, risky crossing behavior, red-light-running indicators, speeding indicators, and incident precursors, if available.

Definitions and Thresholds

The Challenge Applicant shall define all event classes, safety metrics, thresholds, and business rules used to generate safety analytics.

Explainability

Where the solution generates safety scores, risk indices, or inferred events, the proposal shall describe how those outputs are derived and how users can interpret them.

Reviewability

The solution should support post-event review through trajectories, visualization, clips, snapshots, or other evidentiary outputs, subject to privacy and retention controls.

7. Data Requirements

Data Management and Sharing

The George Washington University (GW) will serve as the central data hub for the Challenge pilot and support the secure storage, management, and sharing of project data generated through the pilot. The project team will establish the infrastructure and governance processes necessary to support standardized, privacy-conscious, and research-ready data management. The Challenge Winner will be expected to provide the raw and processed data, including high-resolution trajectory data, traffic and event data, sensor-derived outputs, and related contextual information such as roadway characteristics, signal timing, weather, and lighting conditions.

To support interoperability and research collaboration, GW will provide controlled access to data for DDOT and authorized partners through a secure data portal and/or cloud-based access to downloadable datasets. Data access will follow a tiered framework, with restricted access to raw data for authorized personnel, de-identified datasets available for approved research purposes, and aggregated or anonymized data potentially approved by DDOT for public release. Automated quality-control and validation checks may be applied to support data completeness and consistency. All shared datasets will be managed by GW using secure infrastructure and applicable privacy and governance requirements. Processed datasets made available for research or broader sharing are expected to be de-identified and will not contain Personally Identifiable Information (PII).

Data Outputs

The solution shall identify all data products generated by the system, including counts, classifications, speeds, occupancy, trajectories, event records, derived safety metrics, metadata, imagery, clips, or other outputs.

Data Granularity

The solution shall identify the minimum and maximum data granularity available for delivery, including raw, near-raw, object-level, event-level, interval-based, and summarized formats.

Data Formats

The solution shall identify all supported export and delivery formats, including CSV, JSON, GeoJSON, Parquet, shapefiles, API responses, database extracts, or other machine-readable formats.

Academic Access

The solution shall identify the extent to which data can be shared directly with DDOT's academic partners for independent analysis. The proposal shall state any restrictions on direct access, sublicensing, redistribution, or republication.

Proprietary Data Limitations

Where any data element cannot be shared because it is proprietary, licensed, or otherwise restricted, the Challenge Applicant shall identify that restriction explicitly and shall identify the closest substitute data product that can be made available.

Metadata

The solution shall provide sufficient metadata to allow downstream users to understand file structure, timestamps, units of measure, spatial references, confidence values, and field definitions.

Data Ownership and Licensing

The Challenge Applicant shall define ownership of raw data, processed data, derivative analytics, and any software-generated outputs delivered during the pilot.

Data Retention

The Challenge Applicant shall define retention periods for all source data, processed data, clips, imagery, and analytic outputs, as well as procedures for deletion, return, or archival at the conclusion of the pilot.

Data Delivery Schedule

The Challenge Applicant shall define when data shall be available, including whether delivery is on-demand, daily, weekly, monthly, or near-real-time. Because DDOT has stated that real-time delivery is not required, delayed or batch delivery shall be acceptable provided the proposal clearly states latency and cadence.

8. Privacy, Security, and Data Governance Requirements

Data Classification Alignment

The Challenge Applicant shall describe how data generated by the system can be handled in a manner consistent with DDOT's data classification policy and other applicable data governance requirements.

Privacy Protections

The Challenge Applicant shall describe privacy protections, including anonymization, redaction, minimization, edge processing, retention limits, and restrictions on use of personally identifiable information, if any.

Video and Image Handling

Where video, still imagery, or identifiable object tracks are created, the Challenge Applicant shall describe how those records are stored, protected, accessed, and deleted.

Cybersecurity

The Challenge Applicant shall identify user authentication controls, role-based access, encryption in transit, encryption at rest, audit logging, remote administration safeguards, and patching or update processes.

9. System Architecture and Processing Requirements

Processing Location

The Challenge Applicant shall identify which functions occur at the edge, which occur in the cloud, and which occur in any central software platform.

Edge Processing

Where edge processing is used, the Challenge Applicant shall identify what data reduction, inference, anonymization, buffering, or event generation occurs before transmission.

Cloud and Hosted Services

Where hosted or cloud services are used, the Challenge Applicant shall identify hosting model, dependencies, uptime assumptions, and user access methods.

Hybrid Architectures

Hybrid edge-cloud architectures shall be permitted.

10. Integration and Interoperability Requirements

External System Integration

The Challenge Applicant shall identify all supported external integrations, including data platforms, GIS tools, research environments, signal systems, controller data, and third-party analytics tools.

API Availability

Where application programming interfaces are available, the Challenge Applicant shall identify supported APIs, authentication methods, rate limits, and documentation availability.

Research Use

The solution should support extraction or transfer of data in forms usable by researchers without requiring exclusive reliance on a proprietary dashboard interface.

11. Performance and Validation Requirements

Performance Metrics

The Challenge Applicant shall identify the performance metrics used to characterize the system, including detection accuracy, classification accuracy, tracking accuracy, event detection accuracy, uptime, and false positive or false negative rates, as applicable.

Validation Methodology

The Challenge Applicant shall describe how the proposed solution has been validated, whether through field deployments, agency pilots, manual ground truth, independent testing, or other means.

Comparable Deployments

The Challenge Applicant shall identify comparable deployments or pilots of similar scope, especially those involving urban intersections, corridor analytics, multimodal monitoring, safety analytics, or connected vehicle infrastructure.

Pilot Acceptance

The Challenge Applicant should identify a practical acceptance-testing approach for the pilot, including commissioning checks, validation samples, and verification of required data outputs.

12. User Interface and Reporting Requirements

User Access

The solution shall provide authorized users with access to system outputs through one or more interfaces, which may include a dashboard, map interface, data portal, exported reports, or API access.

Visualization

The solution should provide visualizations sufficient to interpret roadway activity, including charts, timelines, maps, object traces, event logs, or corridor/intersection summaries.

Reporting

The solution shall support generation of reports summarizing pilot results, operational findings, and safety-related findings.

13. Pilot Operations and Support Requirements

Assumptions

The Challenge Applicant shall state all assumptions regarding infrastructure availability, permits, power, communications, site access, and operational support.

Operations Support

The Challenge Applicant shall identify all support required from DDOT during deployment, operation, troubleshooting, and removal.

Maintenance

The Challenge Applicant shall describe preventive maintenance, corrective maintenance, recalibration, monitoring, and service response expectations during the pilot.

Decommissioning

The Challenge Applicant shall describe how equipment shall be removed, how sites shall be restored, and how data and documentation shall be transferred or dispositioned at the end of the pilot.

14. Innovation and Differentiation Requirements

Innovative Approach

The Challenge Applicant shall describe any innovative or non-traditional features of the proposed approach, including novel sensing methods, use of existing infrastructure, fusion of heterogeneous data, AV-focused analytics, or deployment methods suited to short pilot durations.

Unique Value

The Challenge Applicant shall identify any unique capabilities that provide value beyond conventional traffic counts or signal performance measures.

Future Scalability

The Challenge Applicant shall describe how the proposed pilot approach could be scaled, adapted, or extended in a future follow-on implementation.