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## GRANT APPLICATION SUMMARY SHEET

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**Grant Name:** Strengthening Mobility and Revolutionizing Transportation (SMART) 23-24

**Department:** NDOT

**Grantor:** U.S. DEPARTMENT OF TRANSPORTATION

**Pass-Through Grantor (If applicable):**

**Total Applied For** \$2,000,000.00

**Metro Cash Match:** \$0.00

**Department Contact:** Casey Hopkins  
8801676

**Status:** NEW


**Program Description:**

The Nashville Department of Transportation (NDOT) is committed to identifying safety incidents outside traditional crash reports, implementing targeted safety measures, and evaluating these measures in Downtown Nashville's complex multimodal environment under the city's Vision Zero Implementation Plan. Through the installation of LiDAR and video camera technologies at key intersections and mid-block segments, we plan to collect and evaluate "near-miss" data that would not be identified using traditional evaluation methods, enabling us to further protect our transportation network's most vulnerable individuals. NDOT is joined by the University of Tennessee (Chattanooga), Vanderbilt University, and Tennessee State University in this initiative

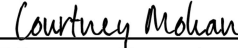
**Plan for continuation of services upon grant expiration:**

Apply for Phase 2 of SMART Grant

**APPROVED AS TO AVAILABILITY OF FUNDS:**


DocuSigned by:  
  
 Kelly Flannery  
 Director of Finance  
 11/16/2022  
 Date  
 DS DS  
 kt TE

**APPROVED AS TO FORM AND LEGALITY:**

DocuSigned by:  
  
 Courtney Mohan  
 Metropolitan Attorney  
 11/17/2022  
 Date

**APPROVED AS TO RISK AND INSURANCE:**

DocuSigned by:  
  
 Balogun Cobb  
 Director of Risk Management  
 Services  
 11/17/2022  
 Date

DocuSigned by:  
  
 John Cooper  
 Metropolitan Mayor  
 (This application is contingent upon the approval of the application by the Metropolitan Council.)  
 11/17/2022  
 Date  
 DS  
 JW

### Grants Tracking Form

**Part One**

<b>Pre-Application</b> <input type="radio"/>		<b>Application</b> <input checked="" type="radio"/>		<b>Award Acceptance</b> <input type="radio"/>		<b>Contract Amendment</b> <input type="radio"/>	
Department	Dept. No.	Contact		Phone	Fax		
NDOT	042	Casey Hopkins		8801676			
<b>Grant Name:</b>		Strengthening Mobility and Revolutionizing Transportation (SMART) 23-24					
<b>Grantor:</b>		U.S. DEPARTMENT OF TRANSPORTATION		<b>Other:</b>			
<b>Grant Period From:</b>		05/01/23	<small>(applications only) Anticipated Application Date:</small>		11/18/22		
<b>Grant Period To:</b>		11/01/24	<small>(applications only) Application Deadline:</small>		11/18/22		
<b>Funding Type:</b>		FED DIRECT	<b>Multi-Department Grant</b>		<input type="checkbox"/> <b>If yes, list below.</b>		
<b>Pass-Thru:</b>		Select Pass-Thru --- >	<b>Outside Consultant Project:</b>		<input type="checkbox"/>		
<b>Award Type:</b>		COMPETITIVE	<b>Total Award:</b>		\$2,000,000.00		
<b>Status:</b>		NEW	<b>Metro Cash Match:</b>		\$0.00		
<b>Metro Category:</b>		New Initiative	<b>Metro In-Kind Match:</b>		\$0.00		
<b>CFDA #</b>		20.941	<b>Is Council approval required?</b>		<input checked="" type="checkbox"/>		
<b>Project Description:</b>		Applic. Submitted Electronically? <input checked="" type="checkbox"/>					
<p>The Nashville Department of Transportation (NDOT) is committed to identifying safety incidents outside traditional crash reports, implementing targeted safety measures, and evaluating these measures in Downtown Nashville's complex multimodal environment under the city's Vision Zero Implementation Plan. Through the installation of LiDAR and video camera technologies at key intersections and mid-block segments, we plan to collect and evaluate "near-miss" data that would not be identified using traditional evaluation methods, enabling us to further protect our transportation network's most vulnerable individuals. NDOT is joined by the University of Tennessee (Chattanooga), Vanderbilt University, and Tennessee State University in this initiative</p>							
<b>Plan for continuation of service after expiration of grant/Budgetary Impact:</b>							
Apply for Phase 2 of SMART Grant							
<b>How is Match Determined?</b>							
<b>Fixed Amount of \$</b>		\$0.00	or	0.0%	<b>% of Grant</b>		<b>Other:</b> <input type="checkbox"/>
<b>Explanation for "Other" means of determining match:</b>							
<b>For this Metro FY, how much of the required local Metro cash match:</b>							
<b>Is already in department budget?</b>		\$0.00	<b>Fund</b>		N/A	<b>Business Unit</b>	N/A
<b>Is not budgeted?</b>		\$0.00	<b>Proposed Source of Match:</b>		N/A		
<b>(Indicate Match Amount &amp; Source for Remaining Grant Years in Budget Below)</b>							
<b>Other:</b>							
<b>Number of FTEs the grant will fund:</b>		0.00	<b>Actual number of positions added:</b>		0.00		
<b>Departmental Indirect Cost Rate</b>		18.83%	<b>Indirect Cost of Grant to Metro:</b>		\$376,600.00		
<b>*Indirect Costs allowed?</b> <input type="radio"/> Yes <input checked="" type="radio"/> No		<b>% Allow.</b>	0.00%	<b>Ind. Cost Requested from Grantor:</b>		in budget	
*(If "No", please attach documentation from the grantor that indirect costs are not allowable. See Instructions)							
<b>Draw down allowable?</b> <input type="checkbox"/>							
<b>Metro or Community-based Partners:</b>							
NDOT is joined by the University of Tennessee (Chattanooga), Vanderbilt University, and Tennessee State University in this initiative.							

**Part Two**

**Grant Budget**

Budget Year	Metro Fiscal Year	Federal Grantor	State Grantor	Other Grantor	Local Match Cash	Match Source (Fund, BU)	Local Match In-Kind	Total Grant Each Year	Indirect Cost to Metro	Ind. Cost Neg. from Grantor
Yr 1	FY23	\$1,000,000.00	\$0.00	\$0.00	\$0.00	N/A	\$0.00	\$1,000,000.00	\$188,300.00	\$0.00
Yr 2	FY24	\$1,000,000.00	\$0.00	\$0.00	\$0.00	N/A	\$0.00	\$1,000,000.00	\$188,300.00	\$0.00
Yr 3	FY__									
Yr 4	FY__									
Yr 5	FY__									
<b>Total</b>		\$2,000,000.00				N/A	\$0.00	\$2,000,000.00		\$0.00
<b>Date Awarded:</b>			<b>Tot. Awarded:</b>			<b>Contract#:</b>				
<b>(or) Date Denied:</b>			<b>Reason:</b>							
<b>(or) Date Withdrawn:</b>			<b>Reason:</b>							

Contact: [juanita.paulsen@nashville.gov](mailto:juanita.paulsen@nashville.gov)  
[vaughn.wilson@nashville.gov](mailto:vaughn.wilson@nashville.gov)

GCP Rec'd  
11/15/22

GCP Approved  
11/16/22

*VW*

**Application for Federal Assistance SF-424**

* 1. Type of Submission: <input type="checkbox"/> Preapplication <input checked="" type="checkbox"/> Application <input type="checkbox"/> Changed/Corrected Application		* 2. Type of Application: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision		* If Revision, select appropriate letter(s): <input type="text"/> * Other (Specify): <input type="text"/>	
* 3. Date Received: <input type="text"/> Completed by Grants.gov upon submission.		4. Applicant Identifier: <input type="text"/>			
5a. Federal Entity Identifier: <input type="text"/>			5b. Federal Award Identifier: <input type="text"/>		
<b>State Use Only:</b>					
6. Date Received by State: <input type="text"/>		7. State Application Identifier: <input type="text"/>			
<b>8. APPLICANT INFORMATION:</b>					
* a. Legal Name: <input type="text"/> Metropolitan Government of Nashville-Davidson County					
* b. Employer/Taxpayer Identification Number (EIN/TIN): <input type="text"/> 62-0694743			* c. UEI: <input type="text"/> LGZLHP6ZHM55		
<b>d. Address:</b>					
* Street1:	<input type="text"/> 1 Public Square				
Street2:	<input type="text"/>				
* City:	<input type="text"/> Nashville				
County/Parish:	<input type="text"/>				
* State:	<input type="text"/> TN: Tennessee				
Province:	<input type="text"/>				
* Country:	<input type="text"/> USA: UNITED STATES				
* Zip / Postal Code:	<input type="text"/> 37201-5007				
<b>e. Organizational Unit:</b>					
Department Name: <input type="text"/>			Division Name: <input type="text"/>		
<b>f. Name and contact information of person to be contacted on matters involving this application:</b>					
Prefix:	<input type="text"/>	* First Name:	<input type="text"/> Casey		
Middle Name:	<input type="text"/>				
* Last Name:	<input type="text"/> Hopkins				
Suffix:	<input type="text"/>				
Title:	<input type="text"/>				
Organizational Affiliation: <input type="text"/>					
* Telephone Number:	<input type="text"/> 6158801676	Fax Number:	<input type="text"/>		
* Email:	<input type="text"/> casey.hopkins@nashville.gov				

**Application for Federal Assistance SF-424**

**\* 9. Type of Applicant 1: Select Applicant Type:**

C: City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

\* Other (specify):

**\* 10. Name of Federal Agency:**

69A345 Office of the Under Secretary for Policy

**11. Catalog of Federal Domestic Assistance Number:**

20.941

CFDA Title:

Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program

**\* 12. Funding Opportunity Number:**

DOT-SMART-FY22-01

\* Title:

Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program

**13. Competition Identification Number:**

Title:

**14. Areas Affected by Project (Cities, Counties, States, etc.):**

Add Attachment

Delete Attachment

View Attachment

**\* 15. Descriptive Title of Applicant's Project:**

Leveraging Advanced Data to Deliver Multimodal Safety

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

**Application for Federal Assistance SF-424****16. Congressional Districts Of:**\* a. Applicant \* b. Program/Project 

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment

Delete Attachment

View Attachment

**17. Proposed Project:**\* a. Start Date: \* b. End Date: **18. Estimated Funding (\$):**

* a. Federal	<input type="text" value="2,000,000.00"/>
* b. Applicant	<input type="text" value="0.00"/>
* c. State	<input type="text" value="0.00"/>
* d. Local	<input type="text" value="0.00"/>
* e. Other	<input type="text" value="0.00"/>
* f. Program Income	<input type="text" value="0.00"/>
* g. TOTAL	<input type="text" value="2,000,000.00"/>

**\* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?** a. This application was made available to the State under the Executive Order 12372 Process for review on  b. Program is subject to E.O. 12372 but has not been selected by the State for review. c. Program is not covered by E.O. 12372.**\* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)** Yes  No

If "Yes", provide explanation and attach

Add Attachment

Delete Attachment

View Attachment

**21. \*By signing this application, I certify (1) to the statements contained in the list of certifications\*\* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances\*\* and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

 \*\* I AGREE

\*\* The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

**Authorized Representative:**Prefix:  \* First Name: Middle Name: \* Last Name: Suffix: \* Title: \* Telephone Number:  Fax Number: \* Email: \* Signature of Authorized Representative:  \* Date Signed:

## DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013  
Expiration Date: 02/28/2025

<b>1. * Type of Federal Action:</b> <input type="checkbox"/> a. contract <input checked="" type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance	<b>2. * Status of Federal Action:</b> <input checked="" type="checkbox"/> a. bid/offer/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award	<b>3. * Report Type:</b> <input checked="" type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change
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**4. Name and Address of Reporting Entity:**

Prime     SubAwardee

\* Name: Metropolitan Government of Nashville and Davidson County

\* Street 1: 1 Public Square    Street 2: \_\_\_\_\_

\* City: Nashville    State: TN: Tennessee    Zip: 37201

Congressional District, if known: \_\_\_\_\_

**5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:**

<b>6. * Federal Department/Agency:</b> U.S. Department of Transportation	<b>7. * Federal Program Name/Description:</b> Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program  CFDA Number, if applicable: 20.941
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<b>8. Federal Action Number, if known:</b> _____	<b>9. Award Amount, if known:</b> \$ _____
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**10. a. Name and Address of Lobbying Registrant:**

Prefix \_\_\_\_\_ \* First Name Ana    Middle Name \_\_\_\_\_

\* Last Name Cruz    Suffix \_\_\_\_\_

\* Street 1: 601 Thirteenth St, NW, Suite 250 S    Street 2: \_\_\_\_\_

\* City: Washington    State: DC: District of Columbia    Zip: \_\_\_\_\_

**b. Individual Performing Services** (including address if different from No. 10a)

Prefix \_\_\_\_\_ \* First Name Ana    Middle Name \_\_\_\_\_

\* Last Name Cruz    Suffix \_\_\_\_\_

\* Street 1: 601 Thirteenth St, NW, Suite 250 S    Street 2: \_\_\_\_\_

\* City: Washington    State: DC: District of Columbia    Zip: \_\_\_\_\_

**11.** Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

\* Signature: Completed on submission to Grants.gov

\* Name: Prefix \_\_\_\_\_ \* First Name Casey    Middle Name \_\_\_\_\_  
 \* Last Name Hopkins    Suffix \_\_\_\_\_

Title: \_\_\_\_\_ Telephone No.: \_\_\_\_\_ Date: Completed on submission to Grants.gov

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## ASSURANCES - CONSTRUCTION PROGRAMS

OMB Number: 4040-0009  
Expiration Date: 02/28/2025

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0042), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

**NOTE:** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progressive reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards of merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681 1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

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Prescribed by OMB Circular A-102

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.
14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
20. Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

<b>SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL</b> <input type="text" value="Completed on submission to Grants.gov"/>	<b>TITLE</b> <input type="text" value="Grants Coordinator"/>
<b>APPLICANT ORGANIZATION</b> <input type="text" value="Metropolitan Government of Nashville-Davidson County"/>	<b>DATE SUBMITTED</b> <input type="text" value="Completed on submission to Grants.gov"/>

SF-424D (Rev. 7-97) Back



**ASSURANCES - NON-CONSTRUCTION PROGRAMS**

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

**NOTE:** Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee- 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

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Prescribed by OMB Circular A-102

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.
10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.
15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.
16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
19. Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

<p><b>SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL</b></p> <p>Completed on submission to Grants.gov</p>	<p><b>TITLE</b></p> <p>Grants Coordinator</p>
<p><b>APPLICANT ORGANIZATION</b></p> <p>Metropolitan Government of Nashville-Davidson County</p>	<p><b>DATE SUBMITTED</b></p> <p>Completed on submission to Grants.gov</p>

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**BUDGET INFORMATION - Construction Programs**

*NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.*

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
2. Land, structures, rights-of-way, appraisals, etc.	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
3. Relocation expenses and payments	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
4. Architectural and engineering fees	\$ <input type="text" value="200,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="200,000.00"/>
5. Other architectural and engineering fees	\$ <input type="text" value="700,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="700,000.00"/>
6. Project inspection fees	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
7. Site work	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
8. Demolition and removal	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
9. Construction	\$ <input type="text" value="620,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="620,000.00"/>
10. Equipment	\$ <input type="text" value="430,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="430,000.00"/>
11. Miscellaneous	\$ <input type="text" value="50,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="50,000.00"/>
12. SUBTOTAL (sum of lines 1-11)	\$ <input type="text" value="2,000,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="2,000,000.00"/>
13. Contingencies	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
14. SUBTOTAL	\$ <input type="text" value="2,000,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="2,000,000.00"/>
15. Project (program) income	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
16. TOTAL PROJECT COSTS (subtract #15 from #14)	\$ <input type="text" value="2,000,000.00"/>	\$ <input type="text"/>	\$ <input type="text" value="2,000,000.00"/>
<b>FEDERAL FUNDING</b>			
17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter eligible costs from line 16c Multiply X <input type="text" value="100"/> % Enter the resulting Federal share.			\$ <input type="text" value="2,000,000.00"/>

**BUDGET INFORMATION - Non-Construction Programs**

OMB Number: 4040-0006  
Expiration Date: 02/28/2025

**SECTION A - BUDGET SUMMARY**

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. \$2,000,000	20.941	\$	\$	\$ 2,000,000.00	\$ 0.00	\$ 2,000,000.00
2.						
3.						
4.						
<b>5. Totals</b>		\$	\$	\$ 2,000,000.00	\$ 0.00	\$ 2,000,000.00

**SECTION B - BUDGET CATEGORIES**

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	\$2,000,000				
a. Personnel	\$	\$	\$	\$	\$
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction	2,000,000.00				2,000,000.00
h. Other					
i. Total Direct Charges (sum of 6a-6h)	2,000,000.00				\$ 2,000,000.00
j. Indirect Charges					\$
k. TOTALS (sum of 6i and 6j)	\$ 2,000,000.00	\$	\$	\$	\$ 2,000,000.00
7. Program Income	\$	\$	\$	\$	\$

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SECTION C - NON-FEDERAL RESOURCES					
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS	
8. \$2,000,000	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	
9. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
10. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
11. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
12. TOTAL (sum of lines 8-11)	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	
SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
14. Non-Federal	\$ <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
15. TOTAL (sum of lines 13 and 14)	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT					
(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)				
	(b) First	(c) Second	(d) Third	(e) Fourth	
16. \$2,000,000	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	
17. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
18. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
19. <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
20. TOTAL (sum of lines 16 - 19)	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	
SECTION F - OTHER BUDGET INFORMATION					
21. Direct Charges: <input type="text"/>		22. Indirect Charges: <input type="text"/>			
23. Remarks: <input type="text"/>					

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STRENGTHENING MOBILITY AND REVOLUTIONIZING TRANSPORTATION | 2022

# Leveraging Advanced Data to Deliver Multimodal Safety

Submitted by: Nashville Department of Transportation  
In Partnership With: UTC, TSU, Vanderbilt Universities

**NDOT**



## PROJECT NARRATIVE

### OVERVIEW / PROJECT DESCRIPTION



The Leveraging Advanced Data to Deliver Multimodal Safety (LADDMS) project advances the Nashville Department of Transportation (NDOT) and Multimodal Infrastructure's Vision Zero Action Plan by improving data quality, prioritizing equity, and increasing collaboration and transparency by partnering with local Tennessee universities to provide visionary analysis for safety improvements in North Nashville.

The LADDMS project is a research collaboration effort with NDOT, University of Tennessee (Chattanooga), Vanderbilt University, Tennessee State University, Tennessee Department of Transportation (TDOT), and other local stakeholders. This project will identify safety incidents outside traditional crash reports, implementing targeted safety measures, and evaluating these measures in Nashville's multimodal environment under the city's Vision Zero Implementation Plan. This project will benefit the North Nashville area by improving safety to all transportation network users with an emphasis on pedestrians and bicyclists who have been traditionally underrepresented in safety studies.

#### Real World Issues and Challenges Addressed

Currently, NDOT relies on crash reports from the Nashville Police Department, which are

infrequent data points and often contain limited information when analyzing safety through a transportation lens. We also lack a method of tracking "near-misses" with pedestrians and cyclists. These issues then compound during the crash report evaluation process used to prioritize safety improvements.

Years of under-reported collisions with pedestrians and mobility-impaired individuals coupled with traditional methods of crash reporting have left gaps in the links between pedestrian safety and data accountability. This project addresses these challenges by using technology to work towards a safer environment for the citizens who use these streets through the identification of all conflict points within the studied area.

#### Proposed Technologies

The LADDMS project will use LiDAR, video and other sensor data to identify safety issues outside of traditional crash reports, inform safety measure implementation, and evaluate applied measures in the multimodal environments of key diverse neighborhoods. We intend to install the detection devices at key intersections and mid-block segments to collect near-misses, modal conflicts, bike and pedestrian counts, and signal operation deficiencies. The project team will use analysis and feedback to install effective, quick-build safety projects and evaluate the impacts of those safety projects for potential deployment at similar





locations city-wide. Examples of these quick-build safety projects include but are not limited to, curb extensions, pedestrian refuge islands, and rectangular rapid flashing beacons (RRFB).

The LADDMS project will install LiDAR and video camera technologies at key intersections and mid-block segments. We intend to install the video detection devices at key intersections and mid-block segments in Nashville's downtown core to collect near-misses, modal conflicts, bike and pedestrian counts, and signal operation deficiencies. The detection devices will also help the Department identify any unknown deficiencies in the transportation network, such as poor lighting or any other dangers contributing to pedestrian safety. NDOT plans to collect and evaluate "near-miss" data that would not be identified using traditional evaluation methods, enabling NDOT to further protect the transportation network's most vulnerable individuals.

Our university partners, who have been involved since before this writing, will be helping NDOT refine our concepts and evaluate our results. The University of Tennessee, Chattanooga has already implemented a similar innovative solution of their own. They have stationed LiDAR and cameras at intersections, aimed down mid-blocks that count pedestrian traffic with higher accuracy – all processed at the edge. The system provides real-time pedestrian and vehicle metrics including near-miss incidents. These incidents are used to identify localized features that contribute to recurring near-miss incidents. Thus, providing critical, otherwise unavailable, safety metrics that have enabled active and passive safety features.

#### **Desired Outcomes for Stage 2 Grant**

NDOT plans to expand and apply the successful practices to our other neighborhood segments along the city's High Injury Network, as NDOT executes the city's Vision Zero Implementation Plan. Phase II implementation projects will be expanded and applied to our other key intersections and mid-block segments. We will utilize transit ridership data from WeGo, Nashville's Metropolitan Transit Authority, to assist in our selection of future

intersections and mid-block crossings located along corridors with local route bus ridership and pedestrian traffic. These selections will be cross-referenced with WeGo transit ridership data and the Vision Zero Action Plan to ensure the needs of the most at-risk users are met. TDOT's Multimodal Division has also partnered with NDOT to enable fast action on the state highways that run through Nashville. We have already been collaborating with them to combine our safety campaigns to demonstrate a consistent strong message of our Vision Zero goals. Furthermore, NDOT has standing meetings with Metro Nashville Police Department, TDOT, and the Tennessee Department of Safety and Homeland Security to discuss data consistency and transparency.

#### **Improvement of Transportation System Status Quo**

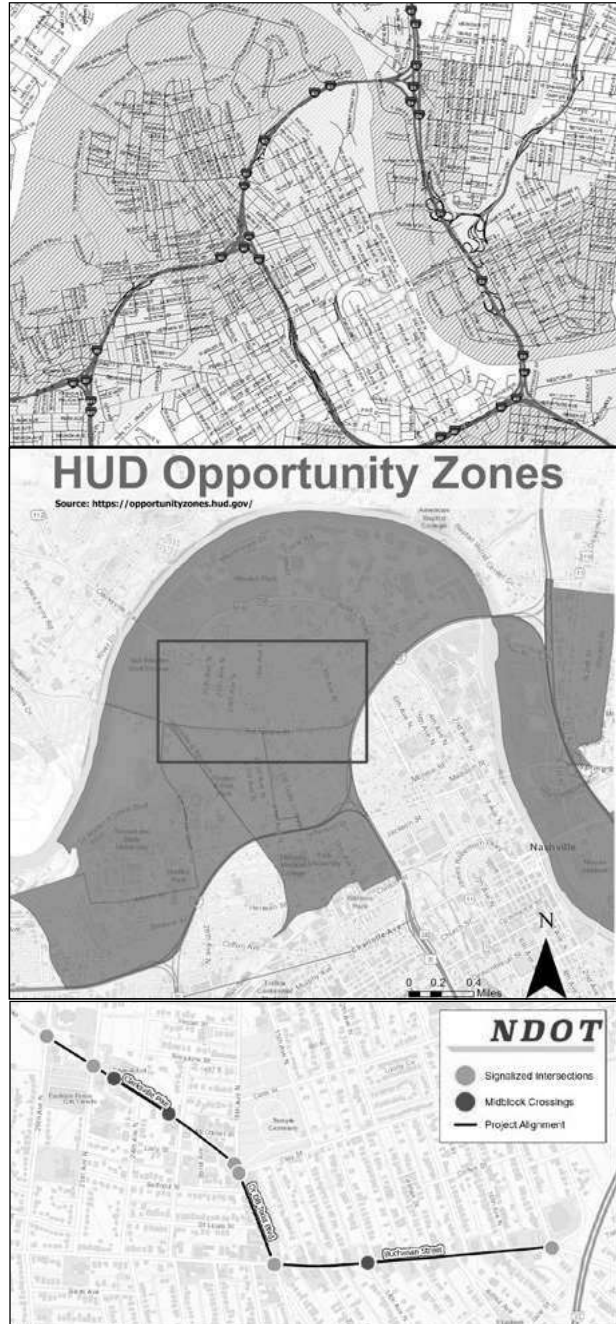
The SMART Grant will support three NDOT priorities, which are intended to improve the overall status quo of Nashville's transportation system. The first is deploying a robust fiber network to expand Smart Cities concepts throughout our downtown and along major arterials. Improving our connected/"virtual" infrastructure will enhance how the vehicular traffic network and pedestrian/other-modal users coexist safely and efficiently. Second, the Grant will support the goals of our Vision Zero Action Plan. As mentioned above, we need to investigate new ways of collecting data on near-misses, leverage emerging big data sources, and adopt innovative strategies and funding opportunities for user counts, while maintaining user counts along the Highway Improvement Network. NDOT and TDOT are currently designing/constructing arterial fiber along state highways, allowing the Departments to push larger volumes of data and providing backbone for temporary installations along the majority of the arterial network. Third, the project aims to enhance relationships with our residents and universities through a continued partnership into the Stage 2 Grant process and beyond.

“ This project is another step toward making Vision Zero a reality in Nashville. The ability to gather real-time data that NDOT can use to protect the most vulnerable roadway users is an opportunity we don’t want to pass up, and we’re grateful to Tennessee’s world-class universities for partnering with us on this important effort.

~ Diana Alarcon, NDOT Director


## PROJECT LOCATION

The project location is within Davidson County, Tennessee in the subarea of North Nashville and straddles the communities of Cumberland Gardens, Buena Vista Heights, Jones Buena Vista, and Elisabeth Park. The project corridor is roughly 2 miles from the downtown Nashville urban core with predominately single- and multi-family residential housing and commercial businesses. The roughly 2-mile project corridor starts at the intersection of Clarksville Pike and 26th Avenue North and travels southeast along Clarksville Pike to Dr. D.B. Todd Junior Boulevard. The project corridor then turns east onto Buchanan Street and ends at the intersection of Buchanan and 9th Street North. There are existing fiber optic lines beneath these streets that will be utilized for this project. In 2016, the US Department of Housing and Urban Development (HUD) assigned Nashville a Promise Zone designation, which encompasses the North Nashville neighborhood where our project is located. The Nashville Promise Zone’s mission is to foster intensive partnerships among Nashville’s organizations that serve high poverty neighborhoods, improve the collective impact of their service and address revitalization in a collaborative way. The project corridor has six signalized intersections and three midblock crossing locations. On the project location map legend at right, green circles indicate intersections and red circles indicate mid-block crossings. The North Nashville area is a midsized, urban part of the greater Nashville Metropolitan area. An area of interest within or adjacent to the project corridor is a large Nashville Metropolitan Development and Housing Agency residential




*The study area census tracts are located in one of Tennessee’s Federally Designated Community Development Zones.*

area. Other notable corridor locations include the local Save-A-Lot grocery store at the corner of Clarksville Pike and 24th Street that serves as a community anchor, Temple Cemetery sites at the tri-corner of Clarksville Pike, 18th Avenue North, and Clay Street, and Jones Paideia Elementary Magnet School at the end of the project corridor.

**COMMUNITY IMPACT**


The LADDMS project will provide direct safety improvements to the North Nashville area, a Historically Disadvantaged Community. This community will benefit by seeing less frequent and less severe crashes involving vehicles, pedestrians, and bicyclists as a result of applying state-of-the-art technology. Being the first neighborhood in Nashville to receive the proposed innovative safety technologies will also provide a visible example of equity in action in line with the City's Vision Zero Initiative to include leveraging some of Tennessee's top universities to directly address concerns in their neighborhood. For example, Tennessee State University, a historically black land grant university located within the project area's neighborhood, is Carnegie-designated a "high research" school with undergraduate and graduate degrees in engineering, technology, and computer science, among many others. The utilization of new technology will be a learning process for stakeholders within the project area and NDOT. Acknowledging that community members may have concerns about monitoring through surveillance, NDOT is committed to an educational component with the community and ensure any concerns are addressed through a community engagement process. Recently, an ordinance (BL2022-1470) passed unanimously through Metro Council amending the Code of Law to authorize the use of data collection and video technologies solely for the purpose of traffic monitoring and management by the Metropolitan Department of Information Technology Services and the Nashville Department of Transportation and Multimodal Infrastructure. The ordinance provides that this technology would be used for non-law enforcement purposes only. Through this learning process we hope to build trust and a sustainable partnership to support the city's long term vision of a people-first transportation system that works for everyone.

**TECHNICAL MERIT OVERVIEW**


One challenge in traffic safety analysis is the difficulty of data collection. Even though crash reports can provide a summary of the crash, the detailed accident scene cannot be restored. Traditional approaches of collecting crash data include driving simulation, naturalistic driving studies (NDS), and field observation. However, these approaches are subject to limitations such as personal privacy issues, data processing, and performance degradation due to weather or illumination conditions. Thanks to sensing technology, advanced traffic detection sensors deployed at smart infrastructure is a promising step towards addressing these challenges.

Of the many sensor options, video cameras and LiDAR are among the most popular for traffic data collection and detection. Video cameras are good for scene interpretation but, in addition to privacy issues, the detection performance is affected by weather and illumination. LiDAR sensors have the capability of scanning objects in 3D space and reporting their locations with great accuracy under different illumination conditions; however, they do not capture color and their scene interpretation is less sophisticated and straightforward than video cameras. Nowadays, image processing techniques from camera data can more accurately detect, classify, and track different road users using deep-learning methods such as YOLO (detection) and DeepSORT (tracking). The procedure of processing point clouds from LiDAR sensors is similar, i.e., in the order of background filtering, object detection (clustering), object classification (classifier training), and object tracking (Kalman filter). The obtained all-traffic trajectories store the position, speed, and direction. information of each road user at a high frequency, which is a valuable dataset for traffic safety analysis.

However, considering the pros and cons of each sensor as well as application requirements (project cost, detection range and accuracy, computational

cost, and environmental conditions), sensor fusion is a more promising approach for producing an adaptive, cost-effective, reliable, robust, information-rich, and user-friendly infrastructure-based traffic sensing system compared to either sensor functioning alone. Data fusion can be executed at data-level, feature-level, or decision-level based on the requirements and goals of a project. Major tasks include: 1) Data collection from multiple sensors simultaneously and separately for different traffic scenarios – the configuration and calibration process of sensors is required in a new environment; 2) Develop processing algorithms for individual sensors; We will leverage our existing work on video and point cloud analytics to accelerate the development of machine learning algorithms for detection, classification, tracking, and speed estimation of vehicles, pedestrians, and cyclists; 3) Develop algorithms for data fusion from multiple sensors; and 4) Evaluate the quality/accuracy of key measurements (e.g., traffic volume, classification, and speed) obtained from various scenarios with different combinations/priorities of sensors.

The primary benefit of this project is to provide NDOT with 24/7 high-resolution, high-accuracy traffic data for traffic-related analyses such as near-misses, modal conflicts, bike and pedestrian counts. Using near-misses as an example, researchers and traffic engineers could study vehicle interactions at multiple scales to define and extract near-miss events, identify traffic safety issues, and recommend countermeasures without waiting for historical crash records. Other benefits of available near-miss datasets include: before-and-after safety assessment of specific sites, and identifying the site with the highest vehicle-to-pedestrian crash risk from the site pools. In addition, our solution will also help automate the process of sensor configuration and integration, data visualization, analysis, and assessment, and will create an interoperable and transferable traffic sensing system that will not require NDOT personnel to deploy.

## PROJECT READINESS OVERVIEW

### Feasibility of Workplan

Our team is prepared to implement the project as soon as possible. NDOT and our university experts have been anticipating action items and can begin work immediately. We have generated a tentative timeline that will ensure progress is made and deadlines are met throughout. We have allocated contingency into our scheduling to account for any challenges or obstacles that may slow progress, such as inclement weather, technical difficulties, longer than expected lead times or other traffic disruptions and special events brought to our attention by local stakeholders in the area). Furthermore, UT-Chattanooga's previous installation of LiDAR and camera devices in their neighborhoods has paved a familiar path for us to apply our work in North Nashville. They have shared their experiences and local regulations that were applied to the work to account for legal permissions and community sensitivity. We expect our work to be carried out with minimal disturbance to all roadway network users, residents, and businesses at our project location. NDOT and university staff will also appoint community relations staff who will address any on-site concerns from members of the public during the time we are in the community.

A realistic workplan and timeline for completing our project is summarized below:

#### Months 1-4:

- Stakeholder outreach, notice of project implementation to surrounding neighborhood organizations, and businesses (NDOT, Universities, local stakeholders + Jones Paideia Elementary Magnet School)
- Begin enrolling local staff in workforce training sessions/classes to support tasks of the project (special consideration given to residents located in project area and students at TSU, the university in closest proximity to the project area)

**Months 5-7:**

- Incorporate feedback and data into project management plan (NDOT, Universities)
- Training sessions begin (virtual sessions followed by on-site instruction)

**Months 8-15:**

- Begin installation of LiDAR and camera devices at identified intersections and mid-block crossings (NDOT, Universities)
- Project lead staff, employees, and student workers implement majority of project tasks, including device installation, data collection practices, and quality control
- Training of local staff

**Months 16-18:**

- Monitor devices, ensure smooth operations of data connection and feedback mechanisms

**Community Engagement and Partnerships**

The LADDMS project is a research collaboration effort with NDOT, University of Tennessee (Chattanooga), Vanderbilt University, Tennessee State University, Tennessee Department of Transportation, and other local stakeholders. NDOT will be reaching out to local stakeholders, such as Jones Paideia Elementary Magnet School Coding Club, WalkBike Nashville, Nashville Civic Design Center, Metro Nashville Police Department, the Equity Alliance, GNRC, TN Department of Health, and others, to gain their support. NDOT has a project website <https://www.nashville.gov/departments/transportation/traffic-management-center/smart-grants-program> to provide the public information regarding the project throughout its life.

NDOT will develop a public information campaign including stakeholders and the general public. As communities continue to diversify, we have placed emphasis on hiring multilingual staff who can more effectively communicate with our growing limited English proficiency populations. We plan to exceed the application requirements by targeting more than 40% of our budget and infrastructure to benefit our over-burdened populations. We anticipate the project benefits to most effectively reach our low-income residents, transit riders, bicyclists, and pedestrians (especially the large

number of individuals experiencing homelessness) in the North Nashville area. NDOT will also reach out to historically disadvantaged community members for opportunities for employment or mentorship with this project. Senators Blackburn and Hagerty and Representative Cooper have provided Letters of Support.

**Leadership and Qualifications**

NDOT, under Director Diana Alarcon, will lead this effort. She has identified Derek Hagerty, PE as the Project Manager. Mr. Hagerty leads NDOT's Traffic Management section with a focus on safety and efficiency for all users, primarily through the application of technology. He is the day-to-day lead on standing up Nashville's first Traffic Management Center to include detection and performance metrics for all transportation modes.

As part of our research collaboration our university partners will also have leadership positions for this project.

Mina Sartipi, PhD, IEEE with the Center for Urban Informatics and Progress, will lead the efforts of the University of Chattanooga. Dr. Sartipi is the Guerry Professor of Computer Science and Engineering and Founding Director of the Center for Urban Informatics and Progress (CUIP) at the University of Tennessee at Chattanooga. She has conducted research on intelligent transportation, data analysis, and data acquisition for more than 20 years and has expertise in smart city applications. Her expertise includes intelligent mobility, CAV, data curation (data transmission, ingestion, storage, and analysis), computer vision, and predictive modeling. Dr. Sartipi has participated in securing over \$14M funding from federal/state/regional government agencies, foundations, and industries in the past few years. These projects cover a variety of applied research related to smart transportation.

Austin Harris is the Testbed Manager for CUIP with expertise in big data, low latency systems,

and systems integration. He has designed and developed a real-time data infrastructure for data collection along the testbed that ingests two billion plus events daily. He is also a Municipal & Industry Partner and coordinates collaboration efforts for the MLK Smart Corridor.

The Vanderbilt University team will be led by Dr. Dan Work, Chancellor Faculty Fellow, Civil and Environmental Engineering, Institute for Software Integrated Systems. Dr. Work pioneered methods for monitoring and controlling road traffic using vehicles, rather than fixed infrastructure, to sense and control road congestion. He and his collaborators were the first to experimentally demonstrate that “phantom” traffic jams, which seemingly occur without an obvious cause but are due to human driving behavior, can be eliminated via control of a small fraction of automated vehicles in the flow. Dr. Work received a 2018 Gilbreth Lectureship from the National Academy of Engineering a 2014 CAREER Award from the National Science Foundation.

Dr. Kamrul Hasan is the Assistant Electrical and Computer Engineering Professor at Tennessee State University. He is researching developing verified, transferrable, and trusted AI/ML-aided models for intelligent transportation systems. Recently, Dr. Hasan secured two grants to build predictive models for road capacity planning and safety-empowered railroad crossing design from the National Science Foundation (NSF) and Federal Highway Administration (FHA), respectively.

Veda Nguyen, PE has worked in both the Engineering Bureau and the Environment and Planning Bureau at TDOT and has gained a breadth of knowledge of the various functions within TDOT. Her main responsibility in the Engineering Bureau was to manage the Intelligent Transportation System Office. The ITS Office is responsible for the planning and design of ITS projects. Her current responsibility in the Environment and Planning Bureau is to manage the Multimodal Planning Office including the Pedestrian Road Safety Initiative (PRSI) program.

**APPENDIX I – RESUMES****DIANA ALARCON**

Director, NDOT

**Years of Experience:** 27**Education:** Senior Executive Institute (SEI), ICMA, University of Virginia; Environmental Sustainable Management System, IS) 14001, Virginia Tech; BS, Business Administration, University of Florida

Ms. Alarcon is NDOT's Director and has overseen the transformation from a public works department to a high achieving department of transportation with an emphasis on safety, complete streets, and modernization. She has launched Nashville's Vision Zero Implementation Plan, Parking Modernization, and Traffic Management Center. Ms. Alarcon previously served as the Director of Transportation & Mobility for the City of Tucson, AZ and Fort Lauderdale, FL.

**Career Highlights:**

- ☑ Responsible for a \$221.4M budget and over 300 employees
- ☑ Developed the NDOT Vision Zero action plan and five-year implementation plan
- ☑ Partnered with local nonprofits on education initiatives to benefit Metro Nashville Public Schools and region
- ☑ Established the MoveTucson Multimodal Masterplan to weave all modes of transportation through a Complete Street lens
- ☑ First city leader in Florida to adopt a Vision Zero program towards a goal of zero roadway fatalities during her time with the City of Fort Lauderdale

**BRAD FREEZE, PE**

Chief Engineer, NDOT

**Years of Experience:** 19**Education:** MS, Civil Engineering, University of Tennessee; BS, Civil Engineering, Tennessee Technological University**Registrations:** Professional Engineer: TN

Mr. Freeze has served as NDOT's Chief Engineer for the past year following nearly a decade as the Tennessee Department of Transportation's Director of Traffic Operations. He has extensive experience in managing advanced Intelligent Transportation Projects and extensive ties to both the academic and private sector.

**Career Highlights:**

- ☑ Reorganized the NDOT engineering division to function as a safety-first data forward team
- ☑ Stood up the TDOT Traffic Management Center (TMC) and Traffic Incident Management (TIM) programs
- ☑ Extensive publication history of Intelligent Transportation Systems research
- ☑ Speaks frequently at educational institutions to highlight and encourage careers in the transportation sector
- ☑ Serves as the Technical Advisory Committee Chair for the National Operations Center of Excellence

**DEREK HAGERTY, PE**  
Transportation Engineer, NDOT**Years of Experience:** 9**Education:** MS, Civil Engineering, University of Tennessee; BS, Civil Engineering, Iowa State University**Registrations:** Professional Engineer: TN

Mr. Hagerty leads NDOT's Traffic Management section with a focus on safety and efficiency for all users primarily through the application of technology. He is the day-to-day lead on standing up Nashville's first Traffic Management Center to include detection and performance metrics for all transportation modes.

**Career Highlights:**

- Currently managing four ITS grant funded capital projects totaling \$14M through the ATCMTD and CMAQ programs
- Represented Metro Nashville on state DOT safety projects to protect the cities most vulnerable users

**VEDA NGUYEN, PE**  
Civil Engineering Manager 2  
Multimodal Division, TDOT**Years of Experience:** 15**Education:** MS, Civil Engineering, Vanderbilt University; BS, Civil Engineering, Vanderbilt University**Registrations:** Professional Engineer: TN

Ms. Nguyen has worked in the Engineering Bureau and the Environment and Planning Bureau and has gained a breadth of knowledge of the various functions within TDOT. Her main responsibility in the Engineering Bureau was to manage the Intelligent Transportation System Office. Her current responsibility in the Environment and Planning Bureau is to manage the Multimodal Planning Office

**Project Experience:**

- I-24 Smart Corridor, Phase 1 and 2, TDOT, Nashville, TN
- Various ITS Expansions along Interstates, TDOT, Tennessee Statewide
- Various Pedestrian Road Safety Initiative Projects, TDOT, Tennessee Statewide

**AUSTIN HARRIS**  
Testbed Manager, Center for Urban Informatics and Progress (CUIP)**Years of Experience:** 7**Education:** MS, Computer Science, University of Tennessee at Chattanooga; BS, Computer Science, University of Tennessee at Chattanooga

Mr. Harris is the Testbed Manager for CUIP with expertise in big data, low latency systems and systems integration. He has designed and developed a real-time data infrastructure for data collection along the testbed that ingests two billion plus events daily. He is also a Municipal & Industry Partner and coordinates efforts for the MLK Smart Corridor.

**Project Experience:**

- Feasibility of Real-Time Infrastructure-Driven Intervention for Improving Pedestrian Safety, TDOT, TN
- Emerging Transit Solutions for Underserved Communities, NSF, Nashville, TN
- Decision Support System for Integrated Transportation and Smart Grid Mgmt, USDOT, Chattanooga, TN





**MINA SARTIPI, PhD**  
Director of the Center for Urban Informatics and Progress, UTC

**Years of Experience:** 20

**Education:** PhD, Electrical and Computer Engineering, Georgia Institute of Technology; MS, Electrical and Computer Engineering, Georgia Institute of Technology; BS, Electrical Engineering, Sharif University of Technology

Dr. Sartipi is the Guerry Professor of Computer Science and Engineering and Founding Director of the Center for Urban Informatics and Progress at UTC. She has conducted research on intelligent transportation, data analysis, and data acquisition and has expertise in smart city applications. She has participated in securing \$14M funding from federal/state/regional government agencies, foundations, and industries.

**Project Experience:**

Feasibility of Real-Time Infrastructure-Driven Intervention for Improving Pedestrian Safety, TDOT, Chattanooga, TN

Harnessing Emerging Transit Solutions for Underserved Communities, NSF, Nashville-Chattanooga, TN



**DANIEL WORK, PhD**  
Professor, Civil & Environmental Engineering, Vanderbilt University

**Years of Experience:** 12

**Education:** PhD/MS, Civil and Environmental Engineering, University of California Berkeley; BS, Civil and Environmental Engineering, Ohio State University

Dr. Work is a Chancellor Faculty Fellow and professor at Vanderbilt University. He pioneered methods for monitoring and controlling road traffic using vehicles, rather than fixed infrastructure, to sense and control road congestion. He is a recognized transportation expert whose work has appeared in media outlets including Good Morning America, Reuters, Wired, and MIT Technology Review.

**Project Experience:**

USDOT, I-24 MOTION Test Bed  
 USDOT, ATCMTD Project

US Department of Energy, Congestion Impact Reduction via CAV-in-the-loop Lagrangian Energy Smoothing CIRCLES



**KAMRUL HASAN, PMP, PhD**  
Assistant Professor, Electrical and Computer Engineering, TSU

**Years of Experience:** 6

**Education:** PhD, Computational Modeling and Simulation Engineering, Old Dominion University; MS, Computer Information and Systems Engineering, TSU; BS, Electrical and Computer Engineering, Bangladesh University of Engineering and Technology

Dr. Hasan is the Assistant Electrical and Computer Engineering Professor at Tennessee State University. He is researching developing verified, transferrable, and trusted AI/ML-aided models for intelligent transportation systems. Recently, Dr. Hasan secured two grants to build predictive models for road capacity planning and safety-empowered railroad crossing design from the NSF and FHA, respectively.

**Project Experience:**

Preparing Minority Scholars for Railroad-Highway Safety Workforce (RH-SAW)

Analytically-based Frameworks for AI Model Verification and Improvement in Cyber-physical Systems (AI verification model for transportation traffic Mgmt.)

**APPENDIX II – SUMMARY BUDGET NARRATIVE****ARCHITECTURE AND ENGINEERING FEES****\$50,000**

- 2 In-person meetings facilitated by NDOT staff (printed paper materials and surveys for gathering public feedback, venue fee at minority-owned restaurant serviced by Metro WeGo Bus Route 22)
- 2 virtual public meetings facilitated by NDOT staff
- Workforce development-related tasks of training and assigning activities to students and local community members who will be working in the project area

**OTHER ARCHITECTURE AND ENGINEERING FEES****\$350,000 - University of Tennessee – Chattanooga**

- Senior Personnel (including Dr. Sartipi and her co-faculty) to lead research, planning activities, expertise in smart infrastructure, data analytics, artificial intelligence applied to structural engineering, transportation analysis, intelligent transportation systems, and human factors and safety in transportation to assist the project team with the deployment of the testbed. A 3% increase in has been added to account of an anticipated annual increase in costs of materials and labor
- Other personnel (including students and CUIP Testbed Manager Austin Harris) will be responsible for assisting with algorithm development and data integration, data infrastructure, and coordinating with project team in Nashville on technical aspects of sensor deployment and installation
- Fringe benefits (salaries and health insurance) and travel expenses for UTC staff and students

**\$175,000 - Tennessee State University**

- Senior professors will be responsible for the coordination and integration of students and residents into device installation and data management
- Due to proximity to project location, TSU staff will also facilitate the recruiting of local workforce for training and organized programming of local workforce
- Fringe benefits (salaries and health insurance) and travel expenses for TSU staff and students

**\$175,000 - Vanderbilt**

- Senior research and faculty will assist all project partners in tasks and activities related to the deployment of devices, data analysis, and training classes and workforce development of local community members for their participation in this project
- Fringe benefits (salaries and health insurance) and travel expenses for Vanderbilt staff and students

**\$200,000 - Design**

- Final plans, Systems Engineering Analysis, and NEPA

**\$620,000 - Construction**

- Scoping, building costs, materials, utilities, transportation signals infrastructure integration, and any rollover funds from Design

**\$430,000 - Equipment**

- Sensors and sensor deployment, all technical equipment and supplies, coordination of utilities and all smart infrastructure

## **APPENDIX III – LETTERS OF COMMITMENT**

On the following pages you will find Letters of Commitment from the Nashville Department of Transportation and the Tennessee Department of Transportation.



**METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY**

**JOHN COOPER  
MAYOR**

**NASHVILLE DEPARTMENT OF TRANSPORTATION  
AND MULTIMODAL INFRASTRUCTURE**

November 18, 2022

Secretary Pete Buttigieg  
U.S. Department of Transportation  
1200 New Jersey Avenue, SE  
Washington, DC, 20590

**Subject: Certification of Financial Contribution 2022 SMART Grant Application: Leveraging  
Advanced Data to Deliver Multimodal Safety (LADDMS)**

Dear Secretary Buttigieg,

The NASHVILLE DEPARTMENT of TRANSPORTATION and Multimodal Infrastructure (NDOT) wishes to express its full support for the Leveraging Advanced Data to Deliver Multimodal Safety (LADDMS) project under the United States Department of Transportation's SMART Discretionary Grant Program. The LADDMS project is a research collaboration effort with NDOT, University of Tennessee (Chattanooga), Vanderbilt University, Tennessee State University, Tennessee Department of Transportation, and other local stakeholders. This project will identify safety incidents outside traditional crash reports, implementing targeted safety measures, and evaluating these measures in Downtown Nashville's complex multimodal environment under the city's Vision Zero Implementation Plan. This project will benefit the North Nashville area by improving safety for all transportation network users with an emphasis on pedestrians and bicyclists who have been traditionally underrepresented in safety studies.

If awarded, the LADDMS project will install LiDAR and video camera technologies at key intersections and mid-block segments. NDOT plans to collect and evaluate "near-miss" data that would not be identified using traditional evaluation methods, enabling NDOT to further protect our transportation network's most vulnerable individuals. NDOT plans to expand and apply the successful practices to our other neighborhood segments along the High Injury Network (HIN), as NDOT executes the city's Vision Zero Implementation Plan.

Thank you for your consideration of the LADDMS project for the 2022 SMART Discretionary Grant Program. If NDOT can be of any further assistance, please do not hesitate to contact the NDOT Project Manager Derek Hagerty at (615) 862-8645 or via e-mail at [Derek.Hagerty@nashville.gov](mailto:Derek.Hagerty@nashville.gov).

Sincerely,

A handwritten signature in black ink that reads "Diana W. Alarcon".

Diana Alarcon

Director, Nashville Department of Transportation and Multimodal Infrastructure



**STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION**

**COMMISSIONER'S OFFICE**  
SUITE 700, JAMES K. POLK BUILDING  
505 DEADERICK STREET  
NASHVILLE, TENNESSEE 37243-1402  
(615) 741-2848

**BUTCHELEY**  
DEPUTY GOVERNOR &  
COMMISSIONER OF TRANSPORTATION

**BILL LEE**  
GOVERNOR

November 14, 2022

The Honorable Pete Buttigieg  
U.S. Department of Transportation  
1200 New Jersey Avenue, SE  
Washington, DC 20590

RE: 2022 SMART Grant Application Letter of Support  
Leveraging Advanced Data to Deliver Multimodal Safety (LADDMS) – Nashville, TN

Dear Secretary Buttigieg,

I am pleased to provide this letter of support for funding through the United States Department of Transportation's Strengthening Mobility and Revolutionizing Transportation (SMART) Discretionary Grant Program.

The Leveraging Advanced Data to Deliver Multimodal Safety (LADDMS) project is a research collaboration effort with Metro Nashville-Davidson County, the University of Tennessee (Chattanooga), Vanderbilt University, Tennessee State University, the Tennessee Department of Transportation (TDOT), and other local stakeholders. This project, via the use of LiDAR and video camera technologies, will identify safety incidents outside traditional crash reports, implementing targeted safety measures, and evaluating these measures in complex multimodal environments under the City's Vision Zero Implementation Plan.

The location associated with this grant request is in North Nashville which includes Clarksville Pike and Buchanan Street, major westbound-eastbound arterial roadway connections, connecting Northwest Nashville to I-65 in Nashville-Davidson County. This area has high transit ridership and will soon have a new North Transit Center at 26th Avenue North and Clarksville Pike. The area has a high level of pedestrian activity, several pedestrian mid-block crossing areas, and is along a corridor Metro Nashville-Davidson County has designated as a High Injury Network (HIN). This project will benefit the North Nashville area by improving safety to all transportation network users with an emphasis on pedestrians and bicyclists who have been traditionally underrepresented in safety studies.

I am confident that this proposal firmly aligns with the goals of the SMART Grant Program and I thank you for your consideration of Nashville's application.

Sincerely,

A handwritten signature in cursive script, appearing to read "Howard H. Eley".

Howard H. Eley  
Commissioner of Transportation



**APPLICATION FOR Strengthening Mobility and Revolutionizing (SMART)  
Grant**

**METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY**

DocuSigned by:  
  
CCA6046554B9461

\_\_\_\_\_  
Diana W. Alarcon, Director  
Department of Transportation and  
Multimodal Infrastructure

11/14/2022

\_\_\_\_\_  
Date