Attachment A

REQUIREMENTS MATRIX

Road Profiler Data Collection Systems & On-Going Maintenance Services

Request for Proposal Number R213-22

Bidders are required to complete all forms provided in this attachment.

Forms A.1, A.2, and A.3 are to be included as part of the <u>Technical Proposal</u>.

Form A.1:   Technical Requirements Matrix (TRM)

Form A.2:   Project Requirements Matrix (PRM)

Form A.3:   Optional Equipment Matrix (OEM)

Road Profiler Data Collection System

_____   _____
Make   **Model**

Form A.1
Technical Requirements Matrix (TRM)
For
Road Profiler Data Collection Systems & On-Going Maintenance Services

Request for Proposal Number R213-22

Bidders proposing on the Road Profiler System are instructed to complete a Technical Requirements Matrix (TRM) as part of their RFP response. **Bidders must respond to each of the following statements.** Requirements listed are minimum conditions. The TRM must indicate whether and how the Bidder is able to comply with each requirement.

All items identified in the TRM are required, and Bidders must affirm that they are able to address each of the enumerated requirements. Bidders that cannot comply with one or more of the project requirements may be disqualified from further consideration.

The Bidder must ensure that the original requirement identifier and requirement description are maintained in the TRM as provided by NDOT. Failure to maintain these elements may be grounds for disqualification.

How to complete the TRM:

TRM Column Description	Bidder Responsibility
TR #	The unique identifier for the project requirement as assigned by NDOT. This column is dictated by this RFP and must not be modified by the Bidder.
Requirement Description	The statement of the requirement to which the Bidder must respond. This column is dictated by the RFP and must not be modified by the Bidder.
Resp. (Response Code)	Each of the items from the Technical Requirements Matrix of this RFP require a response of Y (Yes), C (Custom) or N (No). Below is a brief explanation of each. Bidders that are unable to meet one or more requirements may be disqualified. **Y** Yes, the system in its current release meets the requirement without manipulation or addition of functions, fields, tables, or forms to the system. **C** Yes, the system will be able to meet the requirement, with some customization required but at no additional cost. **N** No, the software does not or cannot meet the requirement.
Response	Provide a short description for each requirement that is compliant as well as an explanation of any modifications that will be required to meet the requirement and a description of how the modification will be accomplished. In cases where the requirement description has posed specific questions to the Bidder, please be sure that your responses address the questions asked. A restatement of the requirement is not considered a substantive response.

Technical Requirements Matrix (TRM) *Attach additional pages as needed.*

TR #	Requirement Description – Automated Pavement Condition and Evaluation Profilers	
TR.1 Profiler Requirements		**Resp.**
TR.1.1	Inertial Road Profiler built to ASTM E950M-09 and AASHTO M328-14 or current standards shall be provided by the Contractor. (Appendix A lists the referenced ASTM and AASHTO standards; Bidders shall meet the most current standards).	**Y / C / N**
Response:		
TR.1.2	Profiler vehicle certified as Class I Profiler per AASHTO R56-14 or current standard.	**Y / C / N**
Response:		
TR.1.3	Sensor data collected shall include the following:	
a.	Longitudinal Profile for International Roughness Index (IRI) using ASTM E950M-09, AASHTO R43-13 referenced in HPMS Field Manual.	**Y / C / N**
b.	Rutting calculated from rut-bar using methods in ASTM E1703.	**Y / C / N**
c.	Transverse Profile collected and measured in accordance with AASHTO R88-18.	**Y / C / N**
d.	Automated crack detection consistent with AASHTO R85-18.	**Y / C / N**
e.	Faulting measured from laser line scanner using AASHTO R36-17.	**Y / C / N**
f.	Latitude, longitude, and altitude from Global Positioning System (GPS).	**Y / C / N**
g.	Pitch, roll, cross slope and heading from Inertial Measurement Unit (IMU).	**Y / C / N**
h.	Traveled length measured from Distance Measuring Instrument (DMI).	**Y / C / N**
Response:		
TR.1.4	Images collected shall include the following:	

a.	High resolution (minimum 2750 x 2200) color digital images of the perspective view of the roadway.	Y / C / N
b.	High resolution (minimum 2750 x 2200) color digital image of the Right-of-Way (ROW) perspective using right facing.	Y / C / N
c.	All images must be digitally time stamped and reference GPS location in a format compatible with current NDOT network browser.	Y / C / N

Response:

TR.1.5	User interface shall include the following:	
a.	Windows interface should be in WIN 10 or most current operating system.	Y / C / N
b.	Display of real time sensor data in legible and visual format for quality assurance during collection.	Y / C / N
c.	Capable of automatic starting and ending road sections on GPS coordinates.	Y / C / N
d.	Provide voice feedback for operation, navigation, system errors and quality control of sensor data.	Y / C / N
e.	Import and export NDOT's Integrated Highway Inventory (IHI) database and Geographic Information System (GIS) Linear Referencing System (LRS) into vehicle for data collection.	Y / C / N
f.	Data transfer using solid-state removable drives to server.	Y / C / N

Response:

TR.2 Vehicle Customization (minimum requirements)	**Resp.**
TR.2.1	High top roof; minimum 63 inches inside height at headliner.	Y / C / N

Response:

TR.2.2	High-Capacity air conditioning and dedicated fans for all on-board instruments during data collection.	Y / C / N

Response:		
TR.2.3	Extra insulation.	**Y / C / N**
Response:		
TR.2.4	Finished walls, ceiling.	**Y / C / N**
Response:		
TR.2.5	Ceiling lighting.	**Y / C / N**
Response:		
TR.2.6	Two (2) 120 AC outlets with 20 AMP breakers.	**Y / C / N**
Response:		
TR.2.7	Aluminum, shock absorbing mounted equipment racks to safely hold computers.	**Y / C / N**

Response:		

TR.2.8	Air conditioning vents inside equipment rack.	**Y / C / N**
Response:		

TR.2.9	Oversized storage cabinet for tools and emergency equipment.	**Y / C / N**
Response:		

TR.2.10	Monitor and operational controls should be mounted on height adjustable swivel device to provide convenient use by the driver or front passenger.	**Y / C / N**
Response:		

TR.2.11	Switches and controls shall be placed in easy reach of operator and front passenger. *Operators should not be required to exit the vehicle to turn systems on.*	**Y / C / N**
Response:		

TR.2.12	When installing custom sub-systems of sensors and cameras, Contractor shall keep vehicle safety components, frame suspension, vehicle information systems in-tact and functioning. All customized systems shall be secured to vehicle frame with no movable parts during vehicle operation.	**Y / C / N**

Response:

TR.3 On-Board Computer System Hardware (minimum requirements)		Resp.
TR.3.1	Intel I7 or equivalent PC computer.	**Y / C / N**
Response:		
TR.3.2	Minimum memory: DDR 4 16 GB RAM.	**Y / C / N**
Response:		
TR.3.3	Minimum 2TB of solid-state drives and 5 TB for the 3D PC.	**Y / C / N**
Response:		
TR.3.4	Hot-swappable solid-state drives, 1TB or more, to accommodate approximately 1000 miles of data collection.	**Y / C / N**
Response:		
TR.3.5	The on-board computer runs on WIN 10 or most current windows operating system.	**Y / C / N**

Response:		
TR.3.6	The system includes remote desktop functions such that operators can attain real-time in-field diagnostic support.	**Y / C / N**
Response:		
TR.3.7	1920 x 1080 15" DVI or HDMI flat color monitor.	**Y / C / N**
Response:		
TR.4 On-Board Software (minimum requirements)		**Resp.**
TR.4.1	Real time graphic display which allows the operator to verify the accuracy of the data collected. The display shows the information in terms of synchronized images, Longitudinal and Transverse Profiles, roughness and rutting values using NDOT's Linear Referencing System (LRS).	**Y / C / N**
Response:		
TR.4.2	Real time graphic display of instrument outputs shall include the following:	
a.	Accelerometers and 3D sensors	**Y / C / N**
b.	Distance Measurement Instrument (DMI)	**Y / C / N**
c.	Global Positioning System (GPS)	**Y / C / N**

d.	Inertial Measurement Unit (IMU)		**Y / C / N**
e.	Camera systems		**Y / C / N**
Response:			
TR.4.3	Real time display of file name, vehicle speed, traveled distance, post miles, data collection set, GPS location, heading, pitch, roll, using NDOT base map and LRS.		**Y / C / N**
Response:			
TR.4.4	Contractor must be able to custom export GPS, distance, IMU data for post-processing. Post-processing is used to generate accurate geometric information, such as vertical curves, horizontal curves, and super-elevation.		**Y / C / N**
Response:			
TR.4.5	Software features shall include the following:		
a.	Loading, saving, editing records of road sections in database.		**Y / C / N**
b.	One-key manual activation of pause and run. Automatic pause and unpause when system is on but vehicle is stopped.		**Y / C / N**
c.	Menu-driven calibration system for on-board instruments.		**Y / C / N**
Response:			
TR.4.6	Voice feedback system that reports the following information:		

a.	Vehicle's approach to the end of road section and description of the completed road section.		**Y / C / N**
b.	Activation and deactivation of the data collection system.		**Y / C / N**
c.	Start and end of tested road section.		**Y / C / N**
d.	Real time system function errors and failures; detailed list of errors are in Appendix C.		**Y / C / N**
Response:			
TR.4.7	GPS mapping function must be able to overlay collected data on NDOT base map and LRS. The GPS map displays real-time GPS location of the vehicle and highlights the start and end points of current road section.		**Y / C / N**
Response:			
TR.5 On-Board Laser-Based Inertial Profile System (minimum requirements)			**Resp.**
TR.5.1	South Dakota type inertial profiler, Class I.		**Y / C / N**
Response:			
TR.5.2	Computes and validates IRI using ASTM E950-09/ASTM E1926-08 for each wheel path and AASHTO R43-13.		**Y / C / N**
Response:			
TR.5.3	Longitudinal profile stored at a frequency of 1.5 inch or smaller.		**Y / C / N**

	Response:	
TR.5.4	Storage media: real time solid state hard drive with hot-swappable removable drives for backup.	**Y / C / N**
	Response:	
TR.5.5	Collects data up to highway speeds.	**Y / C / N**
	Response:	
TR.5.6	Uses Gocator or equivalent laser capable of operation between 0–50° C.	**Y / C / N**
	Response:	
TR.5.7	Two (2) accelerometers with computer interface boards.	**Y / C / N**
	Response:	
TR.5.8	The system shall be capable of exporting profile data in the current FHWA ProVal software without manipulation.	**Y / C / N**

Response:		
TR.5.9	Faulting to be calculated for every joint at the left and right wheel path locations. Calculations are consistent with AASHTO R36-17.	**Y / C / N**
Response:		

TR.6 On-Board Distance Measurement Instrument (DMI) (minimum requirements)		Resp.
TR.6.1	The Distance Measuring Instrument (DMI) will reference all images and sensor data to the NDOT LRS.	**Y / C / N**
Response:		
TR.6.2	The system shall provide viewing of real time DMI and speed.	**Y / C / N**
Response:		
TR.6.3	The system shall include automated calibration and validation for the DMI.	**Y / C / N**
Response:		
TR.6.4	Calibration constants shall be computed automatically.	**Y / C / N**

Response:		
TR.6.5	The operator shall have the option to accept or decline calibration change.	**Y / C / N**
Response:		
TR.6.6	The system shall include any physical objects needed to accomplish the calibration.	**Y / C / N**
Response:		
TR.6.7	DMI shall accommodate highway speeds without affecting subsystem integrity and measurement quality. DMI operates at the following conditions:	
a.	Wheel-mounted	**Y / C / N**
b.	Distance interval: 0.75 inches	**Y / C / N**
c.	Distance accuracy: +/-0.1%	**Y / C / N**
d.	Water resistant	**Y / C / N**
Response:		
TR.7 On-Board Global Positioning System (GPS) (minimum requirements)		**Resp.**
TR.7.1	The system shall include a Global Positioning System, DGPS ready. A 12-satellite tracking receiver capable of utilizing satellite-based or beacon-based differential corrections, operating on Frequency L2 and L1.	**Y / C / N**

	Response:	

TR.7.2	System provides continuous satellite differential corrections.	**Y / C / N**
	Response:	

TR.7.3	Minimum Static Accuracy: Sub-foot.	**Y / C / N**
	Response:	

TR.7.4	Minimum Dynamic Accuracy (accuracy tied to image and linear distance measurements): less than fifteen (15) feet.	**Y / C / N**
	Response:	

TR.7.5	Software to collect latitude, longitude, altitude and synchronize position with digital images and sensor data.	**Y / C / N**
	Response:	

TR.7.6	NDOT has access to Virtual Reference Stations (VRS) in the Seiler Midwest real-time correction (RTK) network in Nebraska. Rover units are reserved for the operation of the new profilers. Please fill in overall system accuracy:	
a.	Latitude accuracy: ±_____degrees	**Y / C / N**

b.	Longitude accuracy: ±_____degrees	**Y / C / N**
c.	Elevation accuracy: -1000 to 40000 feet	**Y / C / N**
Response:		
TR.7.7	Ability to compensate for loss of GPS signal with other sensor data.	**Y / C / N**
Response:		
TR.7.8	System cabling and wiring should be tagged or labeled.	**Y / C / N**
Response:		
TR.7.9	Provide power supply.	**Y / C / N**
Response:		
TR.8 On-Board Inertial Measurement Unit (minimum requirements)		**Resp.**
TR.8.1	Please fill in overall geometric system accuracy:	
a.	Processed grade ±_____degree and cross-slope ±_____degrees	**Y / C / N**
b.	Processed vertical and horizontal curvature	**Y / C / N**

Response:		

TR.8.2	GPS with IMU capable of reporting the following:	
a.	Real time processed heading and speed.	**Y / C / N**
b.	Real time processed latitude, longitude, and altitude.	**Y / C / N**

Response:		

TR.9 On-Board Perspective, Right Shoulder, and Rear Cameras for Digital Images of Roadway (minimum requirements)		**Resp.**
TR.9.1	A system of three (3) color cameras generating forward view of roadway, Right-of-Way (ROW) view and rear-view images.	**Y / C / N**

Response:		

TR.9.2	Minimum native resolution: 2750 x 2200 pixels per camera.	**Y / C / N**

Response:		

TR.9.3	Fixed focal length and fixed iris with auto gain and auto exposure to adjust real-time during data collection for extended operating days and varying light conditions.	**Y / C / N**

Response:		

TR.9.4	Camera contains corrective filter to reduce glare, minimizing effects of the sunlight on image quality.	**Y / C / N**

Response:		

TR.9.5	The system shall allow low to high image capture rates. The minimum rate must be 100 images per mile for compatibility with NDOT browser.	**Y / C / N**

Response:		

TR.9.6	The rear-view camera is to capture left Right of Way (ROW) while traveling in the opposing direction.	**Y / C / N**

Response:		

TR.9.7	Images shall be compressed and stored in real time using the standardized Joint Photographic Experts Group (JPEG).	**Y / C / N**

Response:		

TR.10 On-Board 3D Pavement Surface Imaging System (minimum requirements)	**Resp.**
TR.10.1	System uses 3D-laser based camera/cameras, capable of capturing data at highway speeds with no misalignment of images.	**Y / C / N**

	Response:	
TR.10.2	System captures Transverse Profiles for the entire lane width, continuously.	**Y / C / N**
	Response:	
TR.10.3	System must capture simultaneously an intensity image and a 3D depth image of the entire lane width of the pavement surface.	**Y / C / N**
	Response:	
TR.10.4	Capture rate of downward surface image must be compatible with NDOT browser for a display at 100 images per mile.	**Y / C / N**
	Response:	
TR.10.5	Images must not have shadows.	**Y / C / N**
	Response:	
TR.10.6	3D System data must be stored to hard drive in real-time using lossless compression. The 3D System should require no more than 2GB of data storage per mile. The intent is not to limit data quality but to avoid files too large to be useful.	**Y / C / N**

Response:		
TR.10.7	3D system capable of detecting cracking with the following criteria:	
a.	Cracking across entire lane width of 13 feet.	**Y / C / N**
b.	Minimum cracking width of 2 mm.	**Y / C / N**
c.	Minimum accuracy of crack depth +/- 1/50th inch.	**Y / C / N**
Response:		
TR.10.8	For safety, system includes an automated laser light shutoff triggered by a motion sensor and blinking LEDs when system is activated.	**Y / C / N**
Response:		
TR.10.9	System must include transverse plane calibration object(s).	**Y / C / N**
Response:		
TR.11 3D-Based Transverse Profile and Rutting Detection (minimum requirements)		**Resp.**
TR.11.1	3D System must display a transverse profile graph synchronized with the 3D depth image with one (1) camera that can detect cracks of 2mm or smaller and one (1) laser light in total.	**Y / C / N**

	Response:	
TR.11.2	3D System must display precise rutting depths on both wheel paths.	**Y / C / N**
	Response:	
TR.11.3	Transverse Profile must be updated as the user moves the mouse over the image.	**Y / C / N**
	Response:	
TR.11.4	Rutting must be calculated according to ASTM E1703/E1703M-10.	**Y / C / N**
	Response:	
TR.11.5	Rutting Depth Precision: 0.1 mm.	**Y / C / N**
	Response:	
TR.11.6	Virtual 6-foot straight edge to be displayed over the transverse profile graph for each wheel path.	**Y / C / N**

Response:		
TR.11.7	Software must allow the end user to define intervals for the following:	
a.	To process, export, and report transverse profile	**Y / C / N**
b.	To process, export, and report rutting	**Y / C / N**
c.	To measure and identify sections of road with rutting thresholds	**Y / C / N**
d.	To store un-processed results in files or hard copies	**Y / C / N**
Response:		

TR.12 3D-Based Faulting Detection (minimum requirements)		**Resp.**
TR.12.1	3D System must display a graphical longitudinal profile graph synchronized with the 3D depth image.	**Y / C / N**
Response:		
TR.12.2	Longitudinal Profile must be updated as the user moves the mouse over the image.	**Y / C / N**
Response:		
TR.12.3	Faulting to be calculated for every joint at the left and right wheel path locations. Calculations are consistent with AASHTO R36-17.	**Y / C / N**

Response:		
TR.12.4	Software must also allow the end user to process and report faulting in user definable intervals.	**Y / C / N**
Response:		
TR.12.5	Faulting Depth Precision: 0.1 mm.	**Y / C / N**
Response:		
TR.13 3D-Based Automated Crack Detection (minimum requirements)		**Resp.**
TR.13.1	System must automatically detect lane markings and assign wheel path location for every image.	**Y / C / N**
Response:		
TR.13.2	Crack detection must not take more than 10 seconds per image per instance on a local machine.	**Y / C / N**
Response:		
TR.13.3	System must eliminate false positives typical of automated crack detection software.	**Y / C / N**

Response:		

TR.13.4	Automated crack detection algorithm should be in line with AASHTO R85-18.	**Y / C / N**

Response:		

TR.13.5	System must capture and identify type of cracking, frequency of cracking, crack depth, width, and vertical displacement.	**Y / C / N**

Response:		

TR.13.6	Crack depth, width, pattern, and vertical displacement must be used to estimate crack severity.	**Y / C / N**

Response:		

TR.13.7	System must classify severity and extent levels automatically.	**Y / C / N**

Response:		

TR.13.8	Playback software must allow you to view the road surface in 3D with actual depth of potholes, patches, delamination, etc.	**Y / C / N**

Response:		
TR.13.9	The server grade detection application must support network level deployment.	**Y / C / N**
Response:		

TR.14 General Software Features for Data Processing		Resp.
TR.14.1	The software shall display the digital images, process sensor data, and allow photo rating of pavement surface distress per NDOT Pavement Distress Manual. The software shall:	
a.	Operate in Windows 8 or 10 or the most current Windows version that is compatible with the on-board operating system.	**Y / C / N**
b.	Export data in compatible formats for NDOT systems in Appendix B.	**Y / C / N**
c.	Integrate and display data in NDOT software such as POP.	**Y / C / N**
Response:		
TR.14.2	Process and store raw sensor data files for profile, IRI, rutting, faulting, texture, geometry, GPS, and other auxiliary sensor data.	**Y / C / N**
Response:		
TR.14.3	Display and locate roadway geometrics. The geometrics include vertical curves, horizontal curves, and super- elevation.	**Y / C / N**

Response:		

TR.14.4	Display the sensor data using dynamic graphs. User selects the variables such as IRI, rutting, faulting, texture, the distance, and the scales of the graph.	**Y / C / N**

Response:		

TR.14.5	Display, report, and custom export sensor data using user definable criteria. For example, the user can load only the road sections with roughness greater than 3.5 mm/m.	**Y / C / N**

Response:		

TR.14.6	Display, report, and custom export sensor results using user defined intervals such as 1/10th of a mile or 1/100th of a mile. Ability to create profile data in (.ERD) format or (.PPF) format used in FHWA's current ProVAL software.	**Y / C / N**

Response:		

TR.14.7	Include database management features that allow the user to open a road section database, save, export/import records, and cut/copy/paste records.	**Y / C / N**

Response:		

TR.14.8	Allow playback of digital images forward and backward by pointing and clicking on the desired record.	**Y / C / N**

Response:		

TR.14.9	Display location information for each digital image including user definable fields such as highway number, reference posts, distance, direction, lane number, etc. See Appendix B.	**Y / C / N**

Response:		

TR.14.10	Display synchronized color intensity image and 3D depth image.	**Y / C / N**

Response:		

TR.14.11	Allow users to perform X and Y measurements on the image using digital grids and perform depth measurements between any two points on the image.	**Y / C / N**

Response:		

TR.14.12	Ability to edit header/location information of raw data files before processing.	**Y / C / N**

Response:		

TR.14.13	Ability to store event markers.	**Y / C / N**

Response:		
TR.14.14	Ability to process data files using:	
a.	Event markers	**Y / C / N**
b.	User defined intervals for transverse, longitudinal directions	**Y / C / N**
Response:		
TR.14.15	An unlimited user license for NDOT server.	**Y / C / N**
Response:		
TR.14.16	Software should have a web-based deployment such that it could be viewed independently by many users around the state. The software shall:	
a.	Be able to display historic NDOT roadway collection data.	**Y / C / N**
b.	Be accessible by contractors after they have requested permission by the NDOT.	**Y / C / N**
c.	Display decreasing direction sections as if they were being driven forward on playback.	**Y / C / N**
Response:		
TR.14.17	Any new software will need to meet Nebraska OCIO security requirements.	**Y / C / N**

Response:

TR.15 Computer Server for Data Processing (minimum requirements)	**Resp.**
TR.15.1 Server shall be used for data storage and processing; hardware shall meet the following minimum requirements:	
a. Rackmount server chassis	**Y / C / N**
b. Minimum processors: (1) Latest generation Intel i7. Windows 10 Pro. NVIDIA GeForce 10GB GDDR6	**Y / C / N**
c. Minimum memory: 16GB	**Y / C / N**
d. Minimum HDD: (1) 24TB & (1) 512 SSD drives	**Y / C / N**
e. Dual hot-plug redundant power supply	**Y / C / N**
f. Dual port 4GB optical fiber channel HBA	**Y / C / N**
g. 1GB network card	**Y / C / N**
h. Internal DVD ROM	**Y / C / N**
i. Rack mount hot swappable drive bay with a minimum of 8 bays for connection to server	**Y / C / N**
Response:	

Form A.2
Project Requirements Matrix (PRM)
For
Road Profiler Data Collection Systems & On-Going Maintenance Services

Request for Proposal Number R213-22

Bidders proposing on the Road Profiler System are instructed to complete a Project Requirements Matrix (PRM) as part of their RFP response. ***Bidders must respond to each of the following statements.*** Requirements listed are minimum conditions. The PRM must indicate whether and how the Bidder is able to comply with each requirement.

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How to complete the PRM:

PRM Column Description	Bidder Responsibility
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Requirement Description	The statement of the requirement to which the Bidder must respond. This column is dictated by the RFP and must not be modified by the Bidder.
Resp. (Response Code)	Each of the items from the Project Requirements Matrix of this RFP require a response of Y (Yes), N (No) or NPA (No & Provide Alternative). Below is a brief explanation of each. Bidders that are unable to meet one or more requirements may be disqualified. **Y** Yes, the Bidder can meet this requirement as specified. **N** No, the Bidder cannot meet this requirement and will not be considered. **A** No & Provide Alternative should be used only with a narrative response in the Response section explaining in detail any deviation from the Bidder's ability to meet the requirement, and an explanation of how this would be determined to be an acceptable alternative to meeting the requirement. Alternatives must be detailed in such a way that allows such deviations to be fully evaluated. The State of Nebraska shall determine at its sole discretion whether or not the Bidder's alternative is acceptable.
Response	Provide a short description for each requirement that is compliant as well as an explanation of any modifications that will be required to meet the requirement and a description of how the modification will be accomplished. In cases where the requirement description has posed specific questions to the Bidder, please be sure that your responses address the questions asked. A restatement of the requirement is not considered a substantive response.

Project Requirements Matrix (PRM) *Attach additional pages as needed.*

PR #	Requirement Description	
PR.1 Installation		**Resp.**
PR.1.1	The installation of all profiler hardware, software, and vehicle modifications necessary to meet the specifications of this RFP, shall be performed at the Contractor's facility location. Profiler vans will be delivered by NDOT personnel to the Contractor at the agreed upon date and time following the establishment of the contract. Contractor's installation technician may move State vehicles/equipment within the perimeter of the Contractor's facility only. Any changes or modifications needed after the initial installation shall be performed at NDOT's facilities at no additional cost.	**Y / N / A**
Response:		
PR.1.2	Contractor shall be responsible for and provide as part of their bid price, the following, at no additional cost to the NDOT:	
a.	Labor and miscellaneous materials required to install profiler systems in compliance with the standard installation procedure;	**Y / N / A**
b.	Tools, instruments, and necessary equipment required to perform the installation;	**Y / N / A**
c.	Travel to and from the installation locations, to include lodging if needed;	**Y / N / A**
d.	Completed checklist and certification of installation according to standard procedures; and	**Y / N / A**
e.	Prompt rework of any noncompliance with the standard procedure.	**Y / N / A**
Response:		
PR.2 Delivery		**Resp.**
PR.2.1	Contractor shall supply and deliver road profiler systems F.O.B. Destination (including transportation and delivery charges fully prepaid by Contractor) as required by the State of Nebraska per attached specifications, terms, and conditions. NDOT's equipment shall be delivered to 5001 South 14th Street, Lincoln, Nebraska between 9:00 AM and 3:00 PM. Contractor shall notify Fleet Management a minimum of 24 hours prior to delivery on workday basis at (402) 479-4755 or 3620.	**Y / N / A**

Response:	
PR.2.2	Upon delivery, the Contractor must produce equipment certification and the calibration verification documentation for each profiler from one of the FHWA approved centers (TTI or NCAT). The certification demonstrates that the equipment complies with applicable ASTM/ AASHTO Standards provided in *Appendix A Referenced Standards*.	**Y / N / A**
Response:		
PR.2.3	The profiler and all equipment shall be assembled, serviced and ready to be placed in service when delivered.	**Y / N / A**
Response:		
PR.2.4	*It is the expectation of the NDOT that profiler vans, complete with road profiler data collection systems, shall be delivered by within sixty (60) days of the contract start date.*	**Y / N / A**
Response:		

PR.3 On-Site System Training		**Resp.**
PR.3.1	Training shall be provided within 30 days of delivery at NDOT facilities. Training shall be considered a contract requirement; no separate cost(s) will be charged to the NDOT for training or materials. The profiler vans shall be delivered to NDOT fully functional and certified prior to the training.	**Y / N / A**

Response:		
PR.3.2	Bidder must describe their proposed strategy for three (3), five (5) day weeks of full day on-site training sessions for up to eight (8) NDOT staff at the Materials and Research facility, or nearby calibration site located in or near Lincoln, Nebraska. Training Methodology must address the Contractor's approach to provide the training session, training materials and supplemental training, if needed, to the NDOT.	**Y / N / A**
Response:		
PR.3.3	Bidder shall detail the activities for training in the proper use and operation of the road profiler equipment bid, maintenance of the equipment, demonstrations of calibrations of all systems for vehicle maintenance, demonstrations of data validation of all on-board systems, how to properly transfer data and submit data to the proposed system, how to correctly interpret the completed data and reports, and Contractor recommended quality assurance for data processing that is consistent with AASHTO standards in *Appendix A Referenced Standards* and the NDOT Data Quality Management Program for the Collection of Pavement Condition in *Appendix E*. Training shall be at no additional cost to the NDOT.	**Y / N / A**
Response:		
PR.3.4	Training materials shall be provided for the M&R staff attending training sessions. Contractor shall provide hard copy and digital leave-behind materials specific to the equipment operation, software use and reporting procedures. The Contractor shall provide, at no additional cost to the State: 1) three (3) profiler operation manuals for the data collection, including trouble shooting, check lists and online help feature, 2) three (3) sets of engineering grade wiring diagrams with part numbers and listings, and 3) three (3) sets of workstation software manuals. Upgrades to the user manuals, diagrams etc. shall be provided whenever changes are made to such documents. All manuals shall be provided and sent to the NDOT at no additional cost.	**Y / N / A**
Response:		

PR.3.5	If significant system changes or updates occur, the Contractor shall provide supplemental training for the trainer group of up to eight (8) NDOT staff at no additional cost to the NDOT. This supplemental training may occur onsite or via video conference, web portal, printed instruction/manuals, at the Contractor facility, and/or other mutually agreeable delivery method. Upgrades to the user manuals, diagrams etc. shall be provided whenever changes are made to such documents at no additional cost to the NDOT.	Y / N / A

Response:

PR.3.6	*NDOT staff shall demonstrate proficiency in the use, administration, and maintenance of the system prior to beginning Acceptance Testing.*	Y / N / A

Response:

TR.4 Acceptance Testing		Resp.
PR.4.1	Delivery of a profiler van and system shall ONLY be accepted upon successful completion of training and performance evaluation. Contractor shall prove the delivered equipment is capable of accurately gathering the required data as specified in this RFP. Prior to acceptance testing, vehicle shall already obtain certification and calibration verification log per AASHTO R56-14. All costs associated with the acceptance testing, including proof of liability insurance, shall be borne by the Contractor.	Y / N / A

Response:

PR.4.2	It is expected that testing will require two (2) days. Day 1 is setup, calibration, and field tests; Day 2 is software and data processing demonstration. The sites for testing will be located in the Lincoln area to be determined. The Contractor shall meet at 1500 Highway 2 Lincoln, Nebraska 68509-4759 on the pre-determined delivery date.	Y / N / A

Response:

PR.4.3	The testing and evaluation will consist of the following:	

a.	**1.** Calibration of the profilers for data collection.
	
	    a. Pitch and roll calibration
	    b. Distance
	    c. IRI
	    d. 3D Camera
	    e. Rutting
	    f. Faulting
	    g. Accelerometers
		Y / N / A

b.	**2.** Equipment evaluation shall consist of the following:
	
	    a. Initiate all systems and conduct system checks.
	    b. Demonstrate voice feedback functions.
	    c. Show adequate power supply for all systems.
	    d. Bring vehicle to maximum collection speed at test location; use auto-triggering and manual triggering to begin collection.
	    e. Display geo-positioning data in real-time, i.e., distance traveled, latitude and longitude, heading and velocity.
	    f. Display rut-bar and 3D sensor data in real-time, showing longitudinal and transverse profiles, rut, and fault depths.
	    g. Collect pavement images for:
	        a. Standard View: forward view, left and right shoulder, and left and right ROW perspectives
	        b. 3D View: Pavement distress, Rear View: Left pavement view
		Y / N / A

c.	Transfer data to server	Y / N / A
d.	Use software to manipulate and process sensor data into 1/10th and 1/100th mile averages.	Y / N / A
e.	Pavement images will be played back and reviewed.	Y / N / A
f.	Run automated crack detection in line with item 52 of HPMS Field Manual 2016.	Y / N / A
g.	Export and print reports of collected data in any custom 1/10th mile intervals. Report will match format found in *Appendix D Custom Export Examples*.	Y / N / A
h.	Ability to upload custom routes and maps.	Y / N / A
Response:		
PR.4.4	Three (3) runs on the two (2) test sections will be used for performance evaluation. Electronic files of processed data for each test section in tenth (10th) of mile intervals will be submitted to NDOT for review. The IRI and rutting results of the new profilers should fall within a standard deviation of existing NDOT data.	Y / N / A

Response:

PR.4.5	The electronic files derived from the measurements of all the test sections will be used in FHWA's Current ProVAL Software for repeatability analysis and data validation.	Y / N / A

Response:

PR.5 Warranty		Resp.
PR.5.1	The warranty period shall last a minimum of 18 months following the completion of acceptance testing and deployment of the Vehicle Road Profiler Collection Systems as defined herein and in *Attachment A Requirements Matrix*.	Y / N / A

Response:

PR.5.2	Contractor shall honor the warranty on all software and hardware of the Solution.	Y / N / A

Response:

PR.5.3	Technical Support, as listed above, shall be available during normal business excluding the following holidays: • New Year's Day • Martin Luther King Jr. Day • President's Day • Arbor Day • Memorial Day • Juneteenth • Independence Day • Labor Day • Indigenous People's Day • Thanksgiving Day • Christmas Day	Y / N / A
Response:		

PR.5.4	The warranty shall include, but not be limited to, the following services:	
a.	Managed Services: Any software provided must be supported by the Contractor.	Y / N / A
b.	Technical Support: The Contactor is required to assist or provide technical support to the NDOT as needed.	Y / N / A
c.	Training Updates: The Contractor is required to provide updated training to NDOT as stated above for system enhancements or significant system updates.	Y / N / A
d.	Software Updates: Contractor is responsible for providing updates to all software it provides, as warranted, including version updates.	Y / N / A
e.	Maintaining compliance with required standards.	Y / N / A
Response:		

PR.6 Technical Support	Resp.

PR.6.1	Contractor shall provide phone and/or online technical support to the Nebraska Department of Transportation (NDOT) during the normal business hours of Monday through Friday, 8:00 a.m. to 5:00 p.m. CST, excluding Nebraska State holidays, for the duration of the contract and warranty period, including renewal years. Technical Support shall be defined as any equipment or technical issues which may arise to include, but not limited to, upload issues, report issues, format issues, and equipment operation. Requests for technical support shall be answered within twenty-four (24) hours and a solution within 72 hours of report to Contractor from the NDOT.	Y / N / A
Response:		

PR.7 On-Going Maintenance Services	Resp.
PR.7.1	On-going maintenance services shall commence after expiration of the warranty period.	Y / N / A
Response:		
PR.7.2	On-going maintenance services shall include, but not be limited to, software upgrades/updates, interfaces, hardware service, updated training, and technical support (as stated above).	Y / N / A
Response:		
PR.7.3	Contractor shall provide on-going maintenance services for any onboard system related to collection and any proprietary software, hardware, or hardware supporting structures such as racks and mounts.	Y / N / A
Response:		
PR.7.4	Maintenance agreement shall include annual tune-up, calibration, and/or replacement of all cameras, sensors, and computers for the profiler system, and repairs and common parts replacement due to typical usage or defects. A list of recommended parts and services shall be provided for items not covered by the maintenance agreement.	Y / N / A

Response:

PR. 8 Repair Requirements and Replacement Parts	Resp.
PR.8.1 Instances which require repair outside of normal maintenance will be completed by the Contractor upon notification to and approval from the NDOT. Any repairs or defects shall be reported to the NDOT submitted on a report and approved by the agency <u>prior</u> to the Contractor commencing work on such repairs.	**Y / N / A**
Response:	
PR.8.2 Contractor shall supply NDOT with a list containing repair parts for the Road Profiler Data Collection System and pricing for the repair parts shall be according to the manufacturer's parts price list at cost. The NDOT will pay for repair/replacement materials/parts used in the repair and maintenance of road profiler systems according to this parts lists as submitted.	**Y / N / A**
Response:	
PR.8.3 Labor for repairs shall adhere to the hourly rate as submitted by the Contractor within this contract for work completed during normal business hours, after hour service repairs, or emergency service repairs accordingly.	**Y / N / A**
Response:	
PR.8.4 Since the continuous operation of this vehicle is of the utmost importance and sometimes of an emergency nature, it is necessary that the successful bidder be in a position to render prompt parts and service. Parts inventory shall be of sufficient size and variety to offer ninety five percent (95%) of parts and shipped over-night from time of notification by NDOT or have a local location in or within a 1-hour drive from Lincoln from which the part(s) can be picked up.	**Y / N / A**

	Response:	

PR.8.5	In the case of heavy vehicle damage, the following may need to be purchased from the Contractor:	
a.	Extra DMI encoders	**Y / N / A**
b.	Replacement IRI sensors	**Y / N / A**
c.	3D Cameras	**Y / N / A**
d.	On-Board Cameras	**Y / N / A**

Response:		

PR.8.6	Contractor shall complete required repairs within one (1) week after the work has begun. If the work is unable to be completed within the designated time frame, the Contractor shall work closely with the NDOT to set a schedule for completion that is reasonable to both parties.	**Y / N / A**

Response:		

PR.8.7	All repair and replacement parts shall meet or exceed the requirements as listed herein. The work of removal and disposal of all non-working components will be considered inclusive as part of the repair and/or replacement work being performed. Any work performed outside of this scope of work or without prior approval by NDOT will not be considered for payment.	**Y / N / A**

Response:		

Form A.3
Optional Equipment Matrix (OEM) for Road Profiler Data Collection System

Request for Proposal Number R213-22

Bidders proposing on the **Road Profiler** System are instructed to complete the Optional Equipment Matrix (OEM) as part of their technical proposal submittal. This matrix includes equipment that is not required but may nonetheless be of interest to the NDOT. Bidders are required to indicate whether they can provide the equipment and if it meets or exceeds the

How to complete the OEM:

OEM Column Description	Bidder Responsibility
OE #	The unique identifier for the described optional equipment as assigned by NDOT. This column is dictated by this RFP and must not be modified by the Bidder.
Equipment Description	The description of the optional equipment to which the Bidder must respond. This column is dictated by the RFP and must not be modified by the Bidder.
Resp. (Response Code)	Each of the items from the Optional Equipment Matrix of this RFP require a response of Y (Yes), N (No) or NPA (No & Provide Alternative). Below is a brief explanation of each. Bidders that are unable to meet one or more requirements may be disqualified. **Y** Yes, the Bidder can meet this requirement as specified. **N** No, the Bidder cannot meet this requirement and will not be considered. **A** No & Provide Alternative should be used only with a narrative response in the Response section explaining in detail any deviation from the Bidder's ability to meet the requirement, and an explanation of how this would be determined to be an acceptable alternative to meeting the requirement. Alternatives must be detailed in such a way that allows such deviations to be fully evaluated. The State of Nebraska shall determine at its sole discretion whether or not the Bidder's alternative is acceptable.
Response	Provide a short description for each item that is available as well as an explanation of any modifications that may be required. In cases where the description has posed specific questions to the Bidder, please be sure that your responses address the questions asked.

Optional Equipment Matrix (OEM) *Attach additional pages as needed.*

OE.1 Mobile Cellular Signal Booster (minimum requirements)	Resp.
OE.1.1 Cell phone antennae to increase cell service signal in a 50-mile radius.	**Y / N / A**
Response:	
OE.1.2 +70dB Gain (mobile) / 100 dB (stationary)	**Y / N / A**
Response:	
OE.1.3 Compatible 5G & 4G LTE Networks: AT&T, Verizon 4G, T-Mobile, Sprint, US Cellular	**Y / N / A**
Response:	
OE.1.4 Max Uplink Power: 20-22 dBm	**Y / N / A**
Response:	
OE.1.5 Impedance: 50 Ohm	**Y / N / A**
Response:	

OE.1.6	Number of Devices Boosted Simultaneously: Multiple	Y / N / A
Response:		

OE.1.7	LTE Bands Supported: 12(17), 13, 5, 4, 2	Y / N / A
Response:		

OE.1.8	Mountable Exterior Antennae with SAME Male Connectors (3.2" x 2.4" x 2.4")	Y / N / A
Response:		

OE.1.9	Power: 9.6 – 16.5 DC	Y / N / A
Response:		

OE.1.10	Power Consumption: 16W nominal	Y / N / A
Response:		

OE.1.11	Warranty: 2 years	Y / N / A

Response:		

OE.2 LIDAR System Accessories (minimum requirements)		**Resp.**
OE.2.1	Wiring and attachments for future LIDAR system.	**Y / N / A**
Response:		

OE.3 On-Board Perspective, Right Shoulder, and Rear Cameras for Digital Images of Roadway (minimum requirements)		**Resp.**
OE.3.1	A system of three (3) color cameras generating forward view of roadway, Right-of-Way (ROW) view and rear-view images.	**Y / N / A**
Response:		
OE.3.2	Minimum native resolution: 2750 x 2200 pixels per camera.	**Y / N / A**
Response:		
OE.3.3	Fixed focal length and fixed iris with auto gain and auto exposure to adjust real-time during data collection for extended operating days and varying light conditions.	**Y / N / A**
Response:		

OE.3.4	Camera contains corrective filter to reduce glare, minimizing effects of the sunlight on image quality.	Y / N / A
Response:		

OE.3.5	The system shall allow low to high image capture rates. The minimum rate must be 100 images per mile for compatibility with NDOT browser.	Y / N / A
Response:		

OE.3.6	The rear-view camera is to capture left Right of Way (ROW) while traveling in the opposing direction.	Y / N / A
Response:		

OE.3.7	Images shall be compressed and stored in real time using the standardized Joint Photographic Experts Group (JPEG).	Y / N / A
Response:		