TXShare
Your Public Sector Solutions Center

REQUEST FOR PROPOSALS
For
PAVEMENT ANALYSIS AND RELATED SERVICES
RFP # 2022-063

Sealed proposals will be accepted until **2:00 PM CT, Tuesday February 21, 2023,** and then publicly opened and read aloud thereafter.

Fugro USA Land, Inc.
Legal Name of Proposing Firm

Sirous Alavi, Ph.D., P.E., PTOE — Director of Pavement Engineering
Contact Person — Title

(512)977-1851 — salavi@fugro.com
Telephone Number — E-Mail Address

8613 Cross Park Drive — Austin, TX — 78754
Street Address of Principal Place of Business — City/State — Zip

8613 Cross Park Drive — Austin, TX — 78754
Complete Mailing Address — City/State — Zip

Acknowledgment of Addenda: #1 X #2 X #3 _____ #4 _____ #5 _____

By signing below, you hereby certify that the information contained in this proposal and any attachments is true and correct, and may be viewed as an accurate representation of proposed services to be provided by this organization. You agree that failure to submit all requested information may result in rejection of your company's proposal as non-responsive. You certify that no employee, board member, or agent of the North Central Texas Council of Governments has assisted in the preparation of this proposal. You acknowledge that you have read and understand the requirements and provisions of this solicitation and that the organization will comply with the regulations and other applicable local, state, and federal regulations and directives in the implementation of this contract. And furthermore that I certify that I am legally authorized to sign this offer and to submit it to the North Central Texas Council of Governments, on behalf of said offeror by authority of its governing body.

Authorized Signature

Request for Proposals (RFP) for Pavement Analysis and Related Services

Proposal | RFP # 2022-063
Due Date: February 24, 2023

Submitted to:

North Central Texas Council of Governments
Purchasing Division
616 Six Flags Drive
Arlington, TX 76011

Attention: Brent Moll
(682) 433-0479
Bmoll@nctcog.org

Submitted by:

Fugro USA Land, Inc.
8613 Cross Park Drive
Austin, TX 78754

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Tab A – Cover Sheet

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A.2 – Brief Statement of Understanding

Fugro USA Land, Inc. (Fugro) is pleased to submit our proposal to the North Central Texas Council of Governments (NCTCOG) in response to the Request for Proposal (RFP) for Pavement Analysis and Related Services. Fugro has had the privilege of providing pavement and asset data collection and assessment services to NCTCOG participating agencies for over 20 years. We have a thorough understanding of the needs and expectations of the 236 member entities spanning the 16 county metropolitan region that is the NCTCOG (Figure 1). Fugro is a Texas Engineering Registered Firm (#299) and is a qualified NCTCOG consultant for the current Pavement Analysis Services contract (i.e., TxShare.org Contract No. NCT-2016-14).

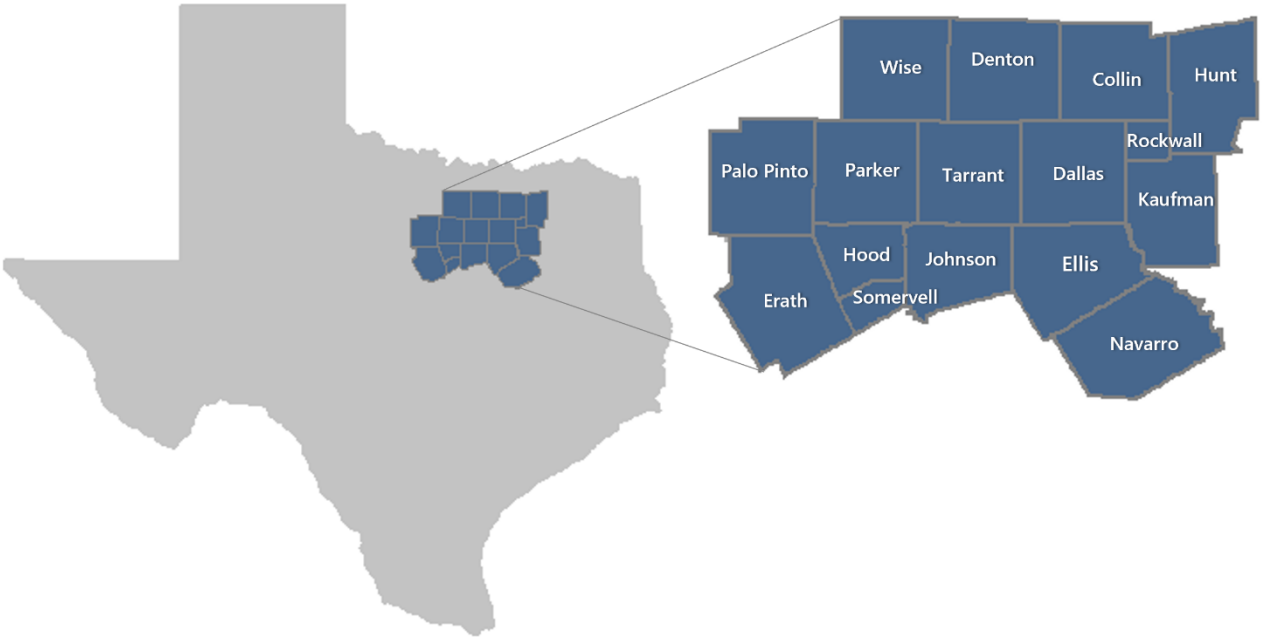


Figure 1: NCTCOG Region Map

Based on our review of the RFP, Fugro understands that the NCTCOG is seeking qualified consultants that have the resources, experience, and qualifications to perform professional pavement analysis and related services. Fugro has over 75 years of experience in pavement engineering analyses and asset management services for publicly maintained roadway networks of various functional classes (e.g., arterial, collector, residential, alley) and surface types (e.g., concrete, asphalt). This includes having the capabilities to conduct surveys of sidewalk networks and American's With Disabilities (ADA) ramps, if desired. Fugro understands that maintaining valuable assets, such as roadway infrastructure, has never been more critical and complex due to budget constraints and the growing usage of the infrastructure system.

Fugro is proposing to provide the following RFP Service Categories:

- Service Category #1: Pavement Data Collection
- Service Category #2: Asset Inventory

- Service Category #3: Pavement Management Analysis
- Service Category #4: Electronic Products
- Service Category #5: Pavement Structural Analysis
- Service Category #7: Value Added Services

As discussed later in our proposal, **Fugro will primarily use our Automatic Road Analyzer (ARAN) equipment for pavement distress and asset data collection at prevailing traffic speeds with no interruption to traffic flow.** Fugro's ARAN is designed with high precision measurement systems and relevant safety systems to exceed the expectations of roadway condition data collection. Fugro will collect geo-referenced data with our inertial aided Global Positioning System (GPS). In addition, Right-of-Way (ROW) digital images will be collected using high resolution cameras. These images can then be used to develop asset inventories such as pavement markings (linear and point), sidewalks, curbs, traffic signs, traffic signals, etc.

In addition, Fugro has a full array of equipment to evaluate the pavement structure and surface functionality. This includes Falling Weight Deflectometer (FWD), Heavy Weight Deflectometer (HWD), Ground Penetrating Radar (GPR), surface friction testing, and materials sampling and testing equipment.

Our Fugro pavement engineering group has extensive knowledge and experience in pavement evaluation, pavement design, pavement preservation, pavement management systems, and pavement research that supports clients around Texas and the worldwide. We have trusted personnel with specific skill sets in GIS services, pavement management implementation and updating, FWD analysis, GPR analysis, friction testing, formal full reporting, and formal project presentations.

Fugro understands that NCTCOG intends to make resulting contract from this RFP available to other governmental entities through its TXShare cooperative purchasing program. Fugro has been a recipient of projects through similar programs, where one agency uses an existing master contract of another agency. Fugro agrees that there are efficiencies in the ability to respond to a TXShare solicitation versus repeatedly responding to public agency RFPs.

For our proposal submittal, we have followed RFP Section 7. Our proposal provides a detailed discussion of our experience, key personnel, engineering services related to this RFP, references, pricing proposal, and required forms. Fugro will demonstrate its ability to meet the requirements specified in the RFP and exceed the NCTCOG's expectations on this important project.

Tab B – Executive Summary

B.1 – Introduction

Our Executive Summary is a high-level description of our ability to meet the requirements and exceed the NCTCOG's expectations on this important project as we have done previously. This section provides our firm's background and briefly describes our firm's approach to the project. Further detailed discussion will be provided in the Section D – Technical Proposal.

B.2 – Firm Background

- **75 years of experience**
- **17 offices across the USA**
- **Over 9,500 employees globally**
- **Federal ID No. 74-2426512**
- **Texas VID No. 1-74-2426512-6**
- **Texas Engineering Firm No. 299**
- **Texas Charter Business Cert. No. 800750681**

Founded in 1947, Fugro offers decades of knowledge and experience to support the diverse needs of our clients. We provide engineering expertise, state-of-the-art technology, and the necessary resources to ensure each project is delivered on time, within budget, and beyond the quality standards expected by our clients. We understand that the pavement network is an agency's largest and most valuable asset. We work closely with our agency partners to develop strategies to preserve and enhance their roadway networks by optimizing the use of their available resources and funds. Fugro has evolved to become the world's leading geo-data specialist, collecting, and analyzing comprehensive information about the Earth and the structures built upon it. Figure 2 shows the diversity within Fugro. Besides our Roads' professionals, we can bring in other experts as needed on any project.

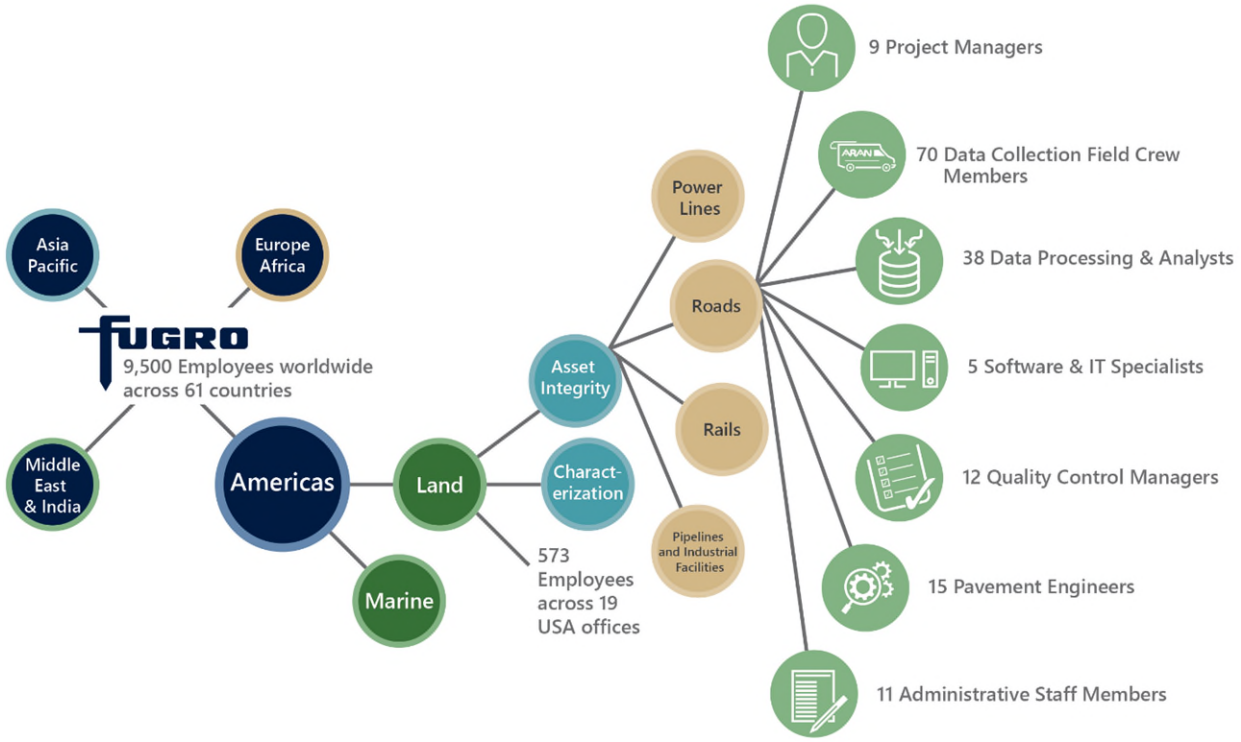


Figure 2: Fugro's Diverse Team Overview

Fugro has a proven track record of delivering innovative technical solutions and has consistently been an industry leader in pavement data collection and asset management solutions. We designed and manufactured the ARAN, the world's first automated pavement condition survey vehicle. We are continuously improving our equipment and processes ensuring that we will be the leader in quality pavement data collection and asset management services.

Working around the globe, we employ approximately 9,500 employees in 59 countries Figure 3 shows our well established North American offices spanning the continent including three offices in Texas.

As inquired in the RFP, Fugro is a well-established and publicly traded company with strong financial stability. The following are performance highlights for 2021: Revenue – € 1,461,725,000, Free cash flow – € 39,500,000, and 12 month backlog – € 1,014,000,000. Please see the following link for the annual reports from 2006 to 2021 for further financial stability confirmation, if desired. https://www.fugro.com/investors/results-and-publications/annual-reports.

Figure 3: North America Office Locations

B.3 – Project Management Approach

Fugro believes successful projects are dependent upon clear and open communication with our clients, a strong professional team and project manager, and the utilization of a detailed project management plan. Our consistent record of delivering projects exceeds the expectations of even our most complex clients' projects, both in terms of time and budget. Our proposed team has extensive experience in developing and following project management plans. We create a customized management plan at the beginning of each project. Figure 4 shows high-level items

in our typical project management plan for Pavement Management System (PMS) implementation.

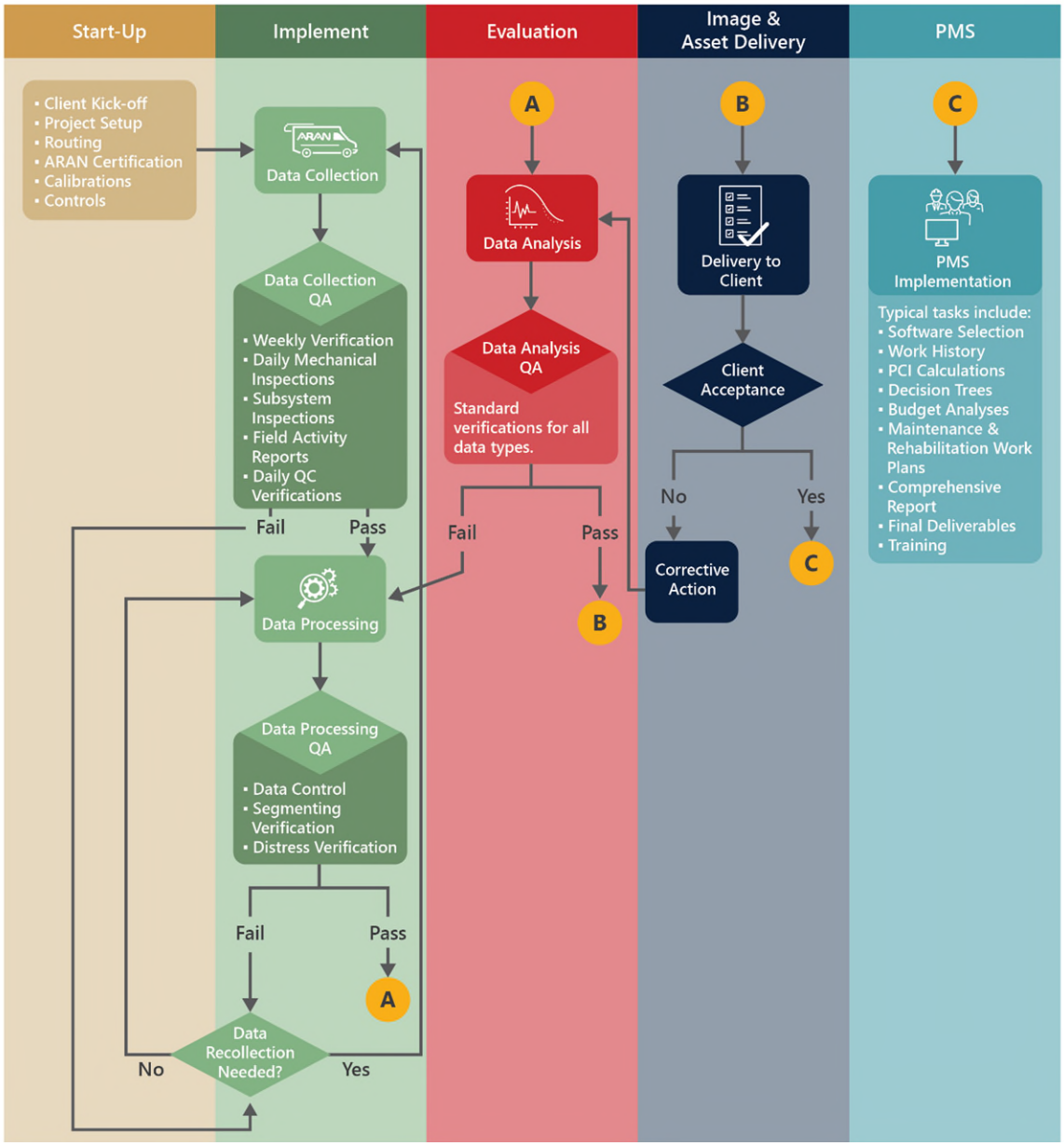


Figure 4: Example PMS Project Management Plan

The following items would be included for a PMS implementation project:

- **Start-Up –** Start-up activities such as a kick-off meeting, review of GIS shapefile, review of the communication plan, review of a customized quality control plan, and review of pavement and asset data dictionary.
- **Implement –** Data collection and delivery schedules. List of data collection vehicles, equipment, personnel, and equipment calibrations and certifications. Access to our field and data analysis tracking systems to ensure that data is delivered on or ahead of schedule.
- **Evaluation –** Analyze pavement data per distress protocol (e.g., ASTM D6433, ASTM E3033) using our processing software, Vision.
- **Image & Delivery –** Provide desired electronic products such as digital images at 25-ft intervals, distress delivery files, PMS upload files, and access to web-based viewing tool, iVision.
- **PMS –** Discussion of PMS activities including PMS software selection, pavement condition indices, preventive maintenance strategies and decision trees, unit costs for treatments, project selection optimization for various budget scenarios, formal reports and presentations.

**Similar project management plans would be developed for all each specific RFP service category.*

B.4 – Service Categories – Overview

As mentioned previously, Fugro is proposing to provide services for RFP Service Categories 1-5 and 7. We do provide Category #6 GIS related services for clean-up and support services of pavement management programs, but we are not a GIS service provider. We do not provide IMS GIS Remote Training Sessions. The following is a list of the service categories with an overview of how Fugro will complete items:

Service Category #1: Pavement Data Collection

Fugro will utilize our proprietary Automatic Road Analyzer (ARAN) vehicle to perform the majority items under this service category. The ARAN can automatically and continuously measure the pavement cracking, texture, rutting and geometrics. We can also measure rutting in both wheel paths simultaneously. The Laser Crack Measurement System (LCMS) on the ARAN will collect pavement surface distresses and structural condition information based on the types of distresses per a rating system (e.g., ASTM D6433). Our LCMS is the equivalent to up to 9 sensors. ARAN is also a non-contact Class 1 inertial profiler (per ASTM E950) that uses lasers and accelerometers mounted at the front of the vehicle over each wheel path.

Other items in this service category include friction testing and lane striping reflectivity quality. Fugro has extensive experience in network and project level friction testing for many states. Our Skid (Friction) Tester meets ASTM E 274 standards. For retro-reflectivity, Fugro would use its Laserlux® CEN 30 mobile retro-reflectometer or equivalent to measuring the retro-reflectivity of the pavement markings using a scanning laser source.

Service Category #2: Asset Inventory

For this service category, Fugro will generally use ARAN digital images (or if client desires mobile LiDAR) to develop asset inventories. Fugro has extensive experience collecting roadway assets and has extracted and delivered over 70 different asset types (including all mentioned in RFP) totaling 5.1 million unique assets over 216,000 miles of road for municipal and State agencies since 2008. Fugro's Surveyor software uses the calibrated geo-referenced images collected by the ARAN to capture, extract, measure, and store data on client's visible roadside assets.

For relocating utilities, Fugro can use its GPR with targeted coring or initial pavement structure information to develop an overview of the as-built pavement structure. Fugro has conducted such GPR surveys for some the largest agencies such as California Department of Transportation (Caltrans), Louisiana Department of Transportation and Development (LADOTD), and Virginia Department of Transportation (VDOT). We also have the GPR capabilities for determining underground utility locations.

For parking lot surveys, Fugro can survey through travel lanes and develop inventory, and geodatabase (GDB) similarly to our other roadway network data collection.

Service Category #3: Pavement Management Analysis

The Pavement Management Analysis service category is more than PMS implementation. It includes the calculation of the International Roughness Index (IRI) for each road segment per ASTM E1926. Fugro will use its ARAN to collect roughness/smoothness information using our Class 1 profiler system.

After collecting pavement data, Fugro will process and analyze the images per a distress standard such as ASTM D6433 (or ASTM E3303). For ASTM D6433, distress type, severity level, and quantity are determined. The results are then used to a Pavement Condition Index (PCI) score. All results will be then provided in GDB formation as well as electronic files that may be needed for any PMS implementation or update.

As part of many PMS, Fugro can provide a weighing system to develop overall Condition Index (OCI) values using the various indices the agency may use such as PCI, IRI, average daily traffic. Fugro will also provide analysis on various budget scenarios for meeting an agency's long-term goals at their pavement condition level. Typically, five- or ten-year maintenance and rehabilitation (M&R) plans are developed. Fugro has years of experience in developing these types of plans.

Fugro is also available to recommend computer hardware and software needed for successful implementation, potentially including recommendations for licenses of pavement management system software and other GIS software as needed. Fugro is also equipped to train agency staff and provide assistance to the Public Works and IT Department as needed for the use of data collected.

Service Category #4: Electronic Products

Because we are the world's leading geo-data specialist, we are always providing electronic products and deliverables to clients. We will provide roadway information as stated in the RFP to the agencies.

Image deliveries are a Fugro standard for every project. We will delivery digital pavement and ROW images at 25-foot (ft) intervals.

Our other electronic files would include pavement condition per the local agencies desired PMS section or segment (e.g., ASTM D6433 for 100 ft intervals). Files would also include distress types, severity levels, and quantities.

Fugro is an expert utilizing all popular state-of-practice and state-of-art PMS software. We will transform our data deliver files into files that can be uploaded into an agency's specific PMS/AMS software (e.g., StreetSaver, PAVER, Agile Assets, and Cartegraph). Fugro is a certified partner for AgileAssets PMS and also Cartegraph OMS Systems. Fugro will also provide GDB files for use in ArGIS or equivalent that shows pavement condition and other data.

With regards to assets, Fugro can utilize modules within an agency's PMS software to create M&R plans for assets. If module is not available, Fugro will use its in-house asset management tools to develop M&R plans to recommend plans for repair/rehabilitation of specific assets.

Service Category #5: Pavement Structural Analysis

For this service category, Fugro will used its FWD and GPR equipment in accordance with industry and local standards to collect and analyze pavement structural conditions. Fugro may need to collect and analyze pavement cores for improving the FWD and GPR analyses.

Service Category #6: GIS Related Services

As mentioned before, our firm is a leading geo-data specialist in the world. GIS related services are part of every project as we develop routing packages for ARANs, update roadway networks for PMS, and have meetings with agency personnel to update their GIS at the end of a successfully completed project. We will provide PMS related GIS services but not Items 37-39.

Service Category #7: Value Added Services

This category will include various services including:

1. Full Written Final Report- Preparing and submitting a written project report summarizing the work performed, dates of collection, methodology, and results.
2. Project Presentation- Preparing and presenting a written project report summarizing the work performed, dates of collection, methodology, and results to the Participant's legislative body.
3. Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey.
4. Stand-alone field operation for collection of asset inventory only, with different levels of

position accuracy and abilities to use data for attribute registration and conditions.
   a. Photogrammetry
   b. Mobile Lidar

5. Generic asset types, allowing for any item within line of sight of the collection vehicle.
   a. Above ground point asset
   b. Above ground linear asset
   c. At grade point asset
   d. At grade linear asset

6. Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map.

Detailed discussion of all service categories and our approach will be provided under Tab D Technical Proposal.

B.5 – Options / Alternatives Proposed

Fugro is not proposing any options or alternatives outside the norms of the description of desired services in the RFP.

B.6 – Requirements Not Met By Firm

Fugro does not have any major requirements that cannot be met by our firm.

Tab C – Experience & Key Personnel

C.1 – Fugro's Qualifications

In this section, Fugro describes our experience, capabilities, and other qualifications for RFP services categories. As mentioned previously in Section B.1 – Firm Background, Fugro was founded in 1947. We have changed and grown over the last 75 years. We provide engineering expertise, state-of-the-art technology, and the necessary resources to ensure each project is delivered on time, within budget, and beyond the quality standards expected by our clients. Fugro has evolved to become the world's leading Geo-data specialist, collecting, and analyzing comprehensive information about the Earth and the structures built upon it.

Fugro's unique abilities make us the most qualified firm to address the NCTCOG, participating agencies, and agencies across the country needs. **The Fugro Advantage includes:**

- **Superior technology and unrivaled experience –** Fugro developed the world-renowned ARAN for automated pavement distress/asset inventory data collection at normal traffic speeds, with no interruption to traffic flow, state-of-the-art safety features, and great accuracy in reported pavement distress and asset inventory data.
- **Experience working with NCTCOG and participating agencies –** In last six years, Fugro has worked with over 10 participating agencies with NCTCOG that included automated pavement distress/asset inventory data collection. Fugro has one designated ARAN for Texas and NCTCOG projects. However, if more data collection vehicles are needed, Fugro has the ability to mobilize over 20 ARANs from our North American fleet.
- **Long-standing and extensive experience working in the State of Texas –** Fugro has its US headquarters based in Houston, Texas. Fugro has a long history of projects in Texas ranging from marine site characterization, geotechnical investigation, surveying, data collection, etc. In addition, Fugro was a previous consultant that collected pavement data for various Texas Department of Transportation (TXDOT) roadways – approximately 11,000 – including roadways within the counties of NCTCOG.

C.2 –State Registrations, Testing Accreditations, and Equipment Certifications

Fugro is very active in several industry research organizations and committees including the Transportation Association of Canada (TAC), the Federal Highway Administration (FHWA)'s Long Term Pavement Performance (LTPP) program, the National Cooperative Highway Research Program (NCHRP), and the Transportation Research Board (TRB)'s Strategic Highway Research Program (SHRP, SHRP II). We are also a National Industry Member of the Transportation System Pavement Preservation Technical Services Program (TSP2), National Center for Pavement Preservation. The following provides a summary of the testing accreditations and certifications for the ARAN: 1) Texas Transportation Institute (TTI) Certification 2) Minnesota Department of Transportation Inertial Profiler Certification 3) United Kingdom Accreditation 4) European Union (EU) Declaration of Conformity.

C.3 – Key Personnel

Project success is always a measure of the project manager's performance and the team they surround themselves with. At Fugro, we understand the importance of a qualified and

professional team to provide our clients with quality solutions that will exceed their goals. Fugro's diversity enables us to work with all business areas within our client's organization, providing comprehensive, innovative solutions that minimize or eliminate the need to employ multiple vendors. The proposed team (Figure 5) has worked together on many statewide and municipal projects in the past. Based on the anticipated scope of services and our experience with similar sized agencies, our team diversity and size will meet the desired results requested by any agency. A typical request for a proposal is initiated by an agency. Fugro follows the agreed upon NCTCOG contract to offer services requested by the agency. Once the proposal is accepted and a contract is initiated, Fugro follows the project life cycle working closely with the agency project team. Quarterly reporting forms, documents, and fees are provided to NCTCOG per contract requirements.

In the following pages, a bio has been provided for key personnel including a brief overview of professional career, professional background highlighting relevant projects or services that have been completed and role(s) in each project or services, educational background, relevant professional activities and certifications, and years with the firm.

C.3.1 – Project Managers

Sirous Alavi, Ph.D., P.E., PTOE
Project Manager & Principal Engineer
salavi@fugro.com 512-977-1851

Dr. Sirous Alavi, P.E., PTOE is the proposed Project Manager and a Principal Engineer for this project. He is the Director of Pavement Engineering and Infrastructure Management for Fugro Americas. He is a graduate of the University of California at Berkeley with a Ph.D. in Civil Engineering, specializing in Pavement Engineering. He is a licensed professional engineer in 11 states, including Texas. Dr. Alavi has over 29 years of experience in the U.S. pavement engineering community. Dr. Alavi served three full terms as a member on the National Academy of Science Transportation Research Board (TRB) Committee AFD60 on Flexible Pavement Design and Committee ABJ35 on Highway Traffic Monitoring. His experience includes serving as the Principal Investigator for a number of national and state agency pavement engineering & research projects including the FHWA Long Term Pavement Performance Program (LTPP), and FHWA Next Generation Pavement Performance Measures and -Asset Management Protocols. He was the project manager for the MTC P-TAP StreetSaver projects for Rounds 18-21. He has also served as the project manager for the State of Alaska PMS update and the Government of Manitoba PMS replacement projects. He has managed over 50 pavement and asset management projects and routinely oversees many of Fugro's projects including several projects related to Cartegraph PMS in the Cities of Abilene, Buda, Bulverde, Corinth, Dallas, DeSoto, McKinney, Midlothian, Missouri City, North Richland Hills, Richardson, Rowlett, Schertz, and Waller.

Farid Motamed P.E., GE
Principal-in-charge
fmotamed@fugro.com 323-591-6204

Mr. Motamed offers 32 years of civil and geotechnical engineering experience. He has managed the geotechnical investigations for more than 250 miles of roadways and highways in Southern California as well as 200 bridges. His experience also includes overseeing the seismic retrofit of 115 air traffic control towers and air route traffic control centers throughout the state. Mr. Motamed has an excellent track record of managing multi-year, task order-based contracts. He has served as Principal-in-Charge, Project Manager, and/or Program Manager for on-call geotechnical engineering and materials testing services for the Counties of Los Angeles and Orange; Cities of Los Angeles, Irvine, and Santa Monica; and the California Department of Transportation (Caltrans). He enhances cost-effectiveness by matching the best personnel and resources to the requirements of the tasks required to complete projects. He works closely with clients to thoroughly understand project goals and he takes into consideration the scope of work and schedule requirements.

Michael P. Tavares, P.E.
Project Manager & Senior Engineer
mtavares@fugro.com 512-977-1800

Mr. Michael P. Tavares, P.E. is a Senior Engineer and designated as a Pavement Engineer for this project. He has a Master of Science Degree in Civil Engineering from The University of Texas at El Paso with over 20 years of experience in pavement engineering. He is a licensed professional engineer in California and Nevada. Mr. Tavares has been accredited at the FHWA Pavement Distress Accreditation Workshops, Orange County Transportation Authority (OCTA) Rater Certification Program, and the San Francisco Bay Area Metropolitan Transportation Commission (MTC) StreetSaver Pavement Distress Rater Certification Program. He is also certified by AgileAssets Partner's Program to carry out pavement analysis through Pavement Analyst Module of the software. He has also gone through extensive official training on Cartegraph OMS. He has extensive experience with PAVER, StreetSaver, Cartegraph, and AgileAssets PMS inventory, update, and PMP analysis and reporting working on a similar scope of services for over twenty cities in the US.

C.3.2 – Pavement Engineering

Farhang Jalali, Ph.D.
Pavement Engineer
f.jalali@fugro.com 949-287-6414

Dr. Farhang Jalali is a graduate of the National Center for Asphalt Technology (NCAT) at Auburn University with a Ph.D. in Civil Engineering, specializing in Pavement Technology. His research at NCAT involved establishing stochastic performance models for preventive treatments and quantifying the life-extending benefits. During his professional career, Dr. Jalali has worked developing and updating Pavement Management Programs (PMP's) for various agencies using StreetSaver, PAVER, AgileAssets and Cartegraph OMS. He has gone through extensive official training on Cartegraph OMS. His work involved developing pavement rehabilitation designs,

linking street inventory to GIS shapefiles, creating PCI and PMP related maps using Esri ArcGIS, updating pavement distress data into PMS software, performing field data collection, performing quality control of inspections, and producing M&R work plans. Most recently, he has worked on the PMS replacement project for the Government of Manitoba, which includes developing a PMS using AgileAssets' Pavement Analyst. Dr. Jalali is also our resident GIS Expert with extensive experience with PMS database applications. He also is experienced with various coding languages (e.g., Python).

Setare Saremi, Ph.D.
Pavement Engineer
s.saremi@fugro.com 512-977-1853

Dr. Setare Saremi has a Ph.D. in Civil Engineering (Geotechnical and Pavement) from the University of Maryland. Dr. Saremi has extensive research in pavement engineering, development of prediction models, structural evaluation, and non-destructive testing methods. As a project engineer at Fugro, her expertise in examining concrete strength by a combination of destructive and non-destructive testing methods is a major contributor to our pavement engineering group. She is also knowledgeable in civil engineering materials testing and data analysis. Throughout her academic career, she was awarded several research fellowships from the University of Maryland. Her most recent experience includes working on Cartegraph PMS updates for the Cities of Abilene, McKinney, Schertz, and Waco. She has gone through extensive official training on Cartegraph OMS.

Mainey James, P.E.
Senior Engineer
mjames@fugro.com 512-826-3021

Ms. Mainey James, P.E. has a Master of Science Degree in Civil Engineering from the University of Arkansas with over twelve years of experience in pavement engineering including pavement evaluation, design, management, and research. Her research experience includes FHWA Long-Term Pavement Performance (LTPP) study evaluating the influence of materials, climate, traffic, and pavement distresses on the long-term performance of pavements, the National Cooperative Highway Research Program (NCHRP) projects for performance based specification for pavement construction, sensitivity analysis of AASHTOWare Pavement ME Design software for materials characterization, deflection back-calculation analysis, analysis of seasonal impacts on pavement evaluation, and pavement forensic investigation. She also assisted the City of Dallas network level structural capacity testing and evaluation using FWD, remaining life analysis, and life-cycle cost analysis. She worked on the PMS update projects for the Cities of McKinney and Abilene, Texas. She has gone through extensive official training on Cartegraph OMS.

Dan Ye, P.E., Ph.D.
Senior Engineer
dye@fugro.com 512-568-5381

Dr. Dan Ye, PE, Ph.D. has a Ph.D. in Civil Engineering from Texas A&M University. Dr. Ye has 15 years of experience in the areas of pavement design, pavement evaluation & rehabilitation, civil

engineering materials characterization, and non-destructive testing. He has managed numerous transportation projects in areas for Federal, State, and local agencies and is a licensed professional engineer in Texas and North Carolina. As a project manager at Fugro, Dr. Ye oversees projects related to pavement structural evaluation and design of highways, airfields, city streets, and industrial facilities. Throughout his career he has been involved with over 70 transportation engineering projects related to innovative concrete pavement research, pavement designs, pavement rehabilitations, forensic investigations, and pavement data collection studies for cities, counties, and state agencies. Dr. Ye has authored numerous publications and has made presentations at national and international conferences.

C.3.3 – Quality Control

Lutrell Gordan, PMP, MBA
Director of Project Management & Operations, Roads
lgordon@fugro.com 814-762-4480

Mr. Lutrell Gordon brings over 12 years of industry experience including 5 years with the Department of Transportation (VDOT); arming him with a first-hand perspective into client needs for roadway condition data and management. He blends formal education in Mechanical Design Engineering Technology with a Master of Business Administration (MBA) in Project Management to offer clients value-added insight into their data collection activities. With finely-tuned organizational skills, Mr. Gordon has demonstrated the ability to manage multiple simultaneous priorities without compromising quality. An articulate communicator, he is also able to effectively translate complex technical concepts for all audiences and stakeholders.

Since joining Fugro in 2012 as a Project Manager, Mr. Gordon has quickly moved up within the company because of his proven experience, expertise and skillset. In his current role as Director of Project Management & Operations, Mr. Gordon manages Fugro's team of Project Managers, and Operations Department including field data collection and processing. He continues to strengthen and improve the company's framework for managing data collection projects. Additionally, he works to standardize and streamline processes and procedures for data processing, analysis, quality, and delivery to clients. Mr. Gordon offers a long history of successfully managing roadway condition data projects for state transportation agencies and municipalities.

James Moulthrop, P.E.
Senior Consultant
jmoulthrop@fugro.com 512-977-1854

Mr. Moulthrop has more than 55 years of experience in the pavement materials and engineering industry. He currently serves on many boards, building upon numerous years of membership in various task groups and conference committees in the states and abroad. Throughout his career, he has managed over 50 pavement assessment and research projects, including a study at a NASA facility.

Mr. Moulthrop has an extensive career in the transportation field with an emphasis in asphalt technology having worked with Exxon Chemical Americas, Lubrizol Corporation, and the Pennsylvania Department of Transportation (Penn DOT). During his 20 years at Penn DOT, his projects included land form analysis for the location of several sections of I-80 and I-79; construction quality control; management of District Materials engineers and specification development for HMA and PCC pavements. With Exxon Chemical and Lubrizol, he was involved with commercial development and application of polymers for HMA construction.

Mr. Moulthrop has been serving as a Senior Consultant for Fugro since September 2002, where he serves as both a Principal Investigator and Project Manager for a number of pavement related research projects such as the calibration and implementation of the mechanistic empirical pavement design guide (MEPDG) for Montana Department of Transportation, the development of performance based specifications for hot mix asphalt and quality based pay adjustment factors for National Cooperative Highway Research Program (NCHRP), among many others.

C.3.4 – Field Operations

Over 70 field data collection crews are available for the project. All crew offer extensive experience with automated pavement condition surveys for State DOT and City clients. Field crews are trained and certified for project requirements and conduct daily quality reviews. Fugro's field crew have in-depth experience with equipment operations, trouble-shooting, software diagnostics, and data collection best practices (e.g., best time and directions to collect data).

C.3.5 – Data Processing

David Hunter
Distress Processing Manager
dhunter@fugro.com 905-567-2066

Mr. David Hunter has over 10 years of industry experience to our team offering an exceptionally diverse set of skills that are focused on the successful delivery of data. He possesses expert-level programming skills and is responsible for our quality assurance routines. He is very knowledgeable on setting in-place analysis, quality verification, and trend tools to ensure the delivered data will stand the reasonableness test. Mr. Hunter's software training and experience is comprised of ArcGIS (including such extensions as Spatial Analyst, Geostatistical Analyst, 3D Analyst), AutoCAD, ER Mapper, Map Info Professional, and Microsoft Office Suite. Mr. Hunter represents one of our data scientist and database experts.

Suha Bsharat
Distress Rating Supervisor
sbsharat@fugro.com 905-567-2870

Ms. Suha Bsharat has over 5 years of experience with data processing, data analysis, computer engineering, and database management. She has extensive technical, software application, and Information Technology (IT) skills including SQL Server and Oracle, MS Access, ArcGIS, UNIX, and web design. Additionally, she has a proven ability with data and process modeling and resolving data integrity issues while analyzing data using multiple databases.

As a Data Analyst, Ms. Bharat is responsible for analyzing and processing roadway condition data including surface distress and sensor data, as well as pavement and roadway imagery. She well-versed in Fugro's Vision data processing software, Vision batch processors, and SQL scripts. Ms. Bharat performs quality control on the data and delivers data to clients in a variety of formats including Access databases, ArcGIS geodatabases and shapefiles, CVS files, and Fugro's iVision web-based software. Ms. Bsharat represents one of our data scientist and database experts.

Jaime Mann
Data Analyst
jmann@fugro.com 905-567-2526

Ms. Jaime Mann has over 14 years of experience with the processing, analysis, and delivery of roadway condition data. She offers superior analytical and problem-solving skills with the ability to quickly assess data integrity. She is a very knowledgeable team player, who constantly strives to ensure that tasks are completed correctly the first time. She monitors incoming data for quality and consistency, performs data processing, and creates output formats and formatting for client delivery. She works with Fugro's Project Management and Data Services teams to contribute to project setup and execution. Ms. Mann has been involved in numerous statewide data collection projects such as Colorado, South Carolina, and Pennsylvania.

C.3.6 – IT & GIS Systems

Matthew Connelly-Taylor
Director of IT, Innovations, and Development
mconnellytaylor@fugro.com 905-567-2895

Mr. Matthew Connelly-Taylor offers more than 15 years of cross-functional experience in Information Technology (IT), software development, business systems, quality control, data processing and analysis, and data collection equipment. He has extensive experience in GIS related services, and his detail-oriented approach permeates Fugro's projects with consistency and integrity, leveraging industry expertise and intuition. Mr. Connelly-Taylor is a strong leader with extensive experience coaching, training and mentoring Fugro staff to work collectively towards the delivery of innovative and client-driven solutions and products. He also excels in understanding technical specifications, with superior problem-solving and communication skills.

Mr. Connelly-Taylor currently manages a team of highly skilled subject matter experts in Business Systems, Innovation, Software Engineering/Development and IT. He provides strategic and technical direction to the company based upon industry trends and new technologies. His team supports the business by researching and developing new tools and products, hardware design and integration, database support, and testing. Mr. Connelly-Taylor has played an integral role in the development of Fugro's 3D technology, lidar collection system, iVision5 web-based analysis tool, and iVision Gateway integrations with Esri.
Prior to his promotion to Global Solutions Manager, Mr. Connelly-Taylor served in many roles within Fugro including Data Analyst, Data Services Manager, and Data Services Technical Manager.

Yaoming Gu
Database Manager
ygu@fugro.com 905-567-2889

Mr. Yaoming Gu has extensive experience in working with State DOTs and currently serves as Fugro's Database Manager. He is responsible for monitoring database systems and maintenance of database servers, as well as performing complex database troubleshooting performance analysis. He has extensive experience in GIS related services. He designs and provides tools to assist in the management of the database environments and designs and implements redundant systems including policies and procedures for disaster recovery and data archiving. He provides training and technical support to operations staff to better utilize data processing databases and installs and configures Microsoft SQL Server software and related products. Mr. Gu has been working with databases for over 20 years, and currently manages more than 1,000 databases for Fugro data collection projects. He has served as Senior Data Analyst for several state-level projects including Louisiana, Mississippi, and Iowa. Mr. Gu represents one of our data scientist and database experts.

Michael Slack
iVision Specialist
mslack@fugro.com 905-567-2882

Mr. Michael Slack offers more than 10 years of experience working with transportation agencies in the use of Fugro's data collection equipment, processing roadway condition data, and information technology (IT). He offers a thorough understanding of data and image processing, analysis and client delivery, helping to develop plans and procedures as necessary for each project. He has the ability to identify and resolve complex problems, conduct diagnostic investigations and troubleshoot software and database related issues. Additionally, he has in-depth knowledge and extensive hands-on experience with software setup, database permissions, query and analysis tools, and SQL and web services.

In his current role, he works with other Fugro Data Processing and Analysis teams to create customized data deliveries if needed, as well as Fugro's software engineers to make recommended changes to software processing tools as needed. He is responsible for analyzing client's business and technology needs, developing and conducting end-user training, creating training and learning materials, and attending client meetings as required.

C.3.7 – Additional Staff

In addition to the Fugro team members listed, there are over 150 Fugro experienced professionals including pavement engineering experts with graduate degrees (M.S. & Ph.D.), ARAN operators, data handling and processing units, administrative support, and corporate support that work closely together as one Fugro team to ensure the successful, on-time, and within-budget delivery of our project deliverables.

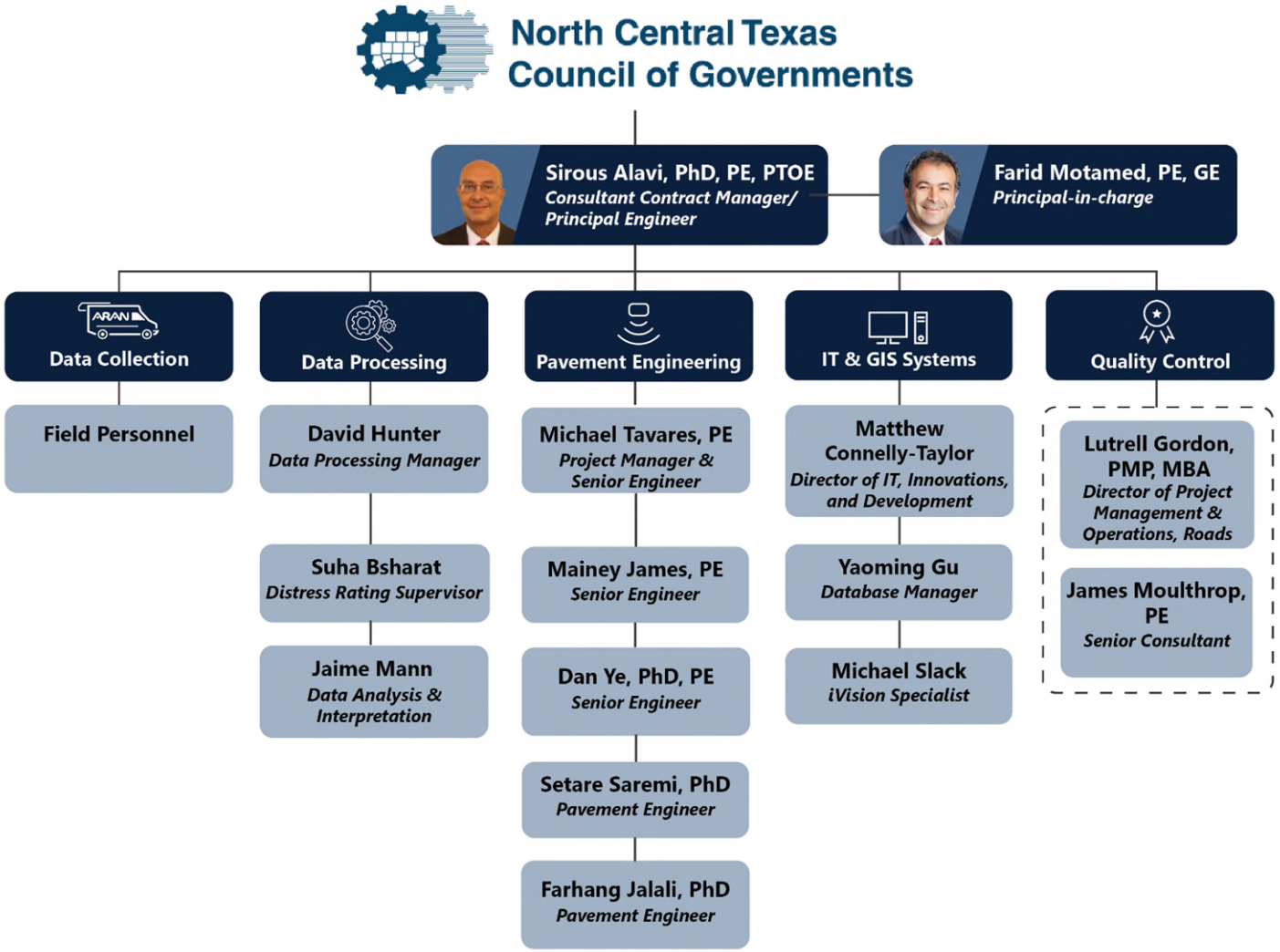


Figure 5: NCTCOG Project Team Organizational Chart

C.4 – Experience in the Last 5 Years

In the past five years, Fugro has conducted over 100 pavement condition inventory, assessment, and pavement management system updates and implementations using various PMS programs. Figure 6 is a partial list of recent clients in Texas for which Fugro has provided pavement distress inventory, pavement management system updates, and mutilid-year M&R plan updates. Members of NCTCOG appear in green.

Abilene, TX	Dallas, TX	Missouri City, TX
Addison, TX	Pflugerville, TX	North Richland Hills, TX
Baytown, TX	Irving, TX	Richardson, TX
Bedford, TX	Kerville, TX	Rowlett, TX
Buda, TX	Lancaster, TX	San Angelo, TX
Bulverde, TX	Mansfield, TX	Schertz, TX
Coppell, TX	McKinney, TX	Sugar Land, TX
Corinth, TX	Midlothian, TX	Waco, TX
		Waller, TX

Figure 6: Recent Pavement Assessment & PMS Projects for Clients in Texas

The following are four selected projects that highlight our experience in the municipal area, our ability to successfully perform similar sized projects, and our ability to successfully complete large complex projects on schedule and within budget

C.4.1 – City of Abilene – Pavement Condition Survey and Management Services

Contact: Max E. Johnson
Title: Director of Public Works
Address: 555 Walnut Street, Room 201-A, Abilene, Texas 79601
Email: max.johnson@abilenetx.gov
Phone: 325-676-6283
Project Status: 2021-2022
Scope of Work: Fugro performed an automated pavement inspection for Abilene's roadway network (approximately 650 centerline miles). Fugro previously collected their network in 2015-2016. The condition survey was conducted in accordance with ASTM D6433, and condition data was imported into Cartegraph to update the pavement management database. Fugro updated their PCI scores and IRI. Fugro also developed a 10 year M&R work plan for the City based on new decision tree. We evaluated five different budget scenarios and made recommendations. Another part of the contract included collecting FWD data for approximately 59 centerline miles of arterials to develop a Structural Strength Index (SSI) parameter for the City. Fugro prepared a comprehensive final report.

C.4.2 – City of Missouri City – Pavement Condition Survey and Management Services

Contact: Cliff Brouhard, P.E., PTOE
Title: Assistant Director of Public Works
Address: 1522 Texas Parkway, Missouri City, Texas 77489
Email: clifford.brouhard@missouricitytx.gov
Phone: 281-403-8555
Project Status: 2019-2020

Scope of Work: Fugro performed an automated pavement inspection for Missouri City's 600 lane miles of street network. Fugro performed a similar inspection for the City in 2013. The condition survey was conducted in accordance with ASTM D6433, and condition data was imported into the City' Cartegraph system to update the pavement management database. Fugro also conducted a manual sidewalk assessment survey for Missouri City. Fugro utilized a GPS data collection system capable of sub-meter accuracy to record locations of sidewalk, localized failures, and vegetation in accordance with the City's sidewalk policy. The collected sidewalk data was delivered in file formats compatible with Missouri City's GIS and Cartegraph databases. This project highlights our ability to conduct manual field surveys of assets such as sidewalk or curb ramps for ADA compliance measurements.

C.4.3 – City of Sugar Land – Street Pavement Assessment & Asset Data Collection

Contact: Mathew Douglas
Title: Operations Manager
Address: 111 Gillingham Drive, Sugar Land, Texas 77478
Email: mdouglas@sugarlandtx.gov
Phone: 281-275-2577
Project Status: 2019-2020

Scope of Work: Fugro was contracted to collect right-of-way (ROW) images and pavement condition data for approximately 1,172 lane miles of streets. Data deliverables included pavement cracking, texture, rutting, forward and rear ROW digital images, and dual-wheel path roughness data to International Roughness Index (IRI) standards. In addition, Fugro extracted assets from our Lidar data collection, which included curb ramps, traffic signals, linear pavement markings, and point pavement markings. Fugro provided the results that were compatible with the City's Geographic Information System (GIS) database as well as their PMS software, Assetic.

C.4.4 – City of Dallas – Structural Evaluation and Pavement Management Services

Contact: Jennifer Nicewander, P.E.
Title: Senior Program Manager
Address: 320 E. Jefferson Blvd, Dallas, Texas 75203
Email: jennifer.nicewander@dallascityhall.com
Phone: 214-949-4688
Project Status: 2018-2020

Scope of Work: Fugro was contracted to collect right-of-way (ROW) images and pavement condition data for approximately 11,700 lane miles of streets. Data deliverables included

pavement cracking, texture, rutting, forward and rear ROW digital images, and dual-wheel path roughness data to International Roughness Index (IRI) standards. Fugro determined the PCI for each road segment. The results were compatible with the City's Geographic Information System (GIS) database as well. In order to advance the City of Dallas' pavement management system, Fugro collected network-level structural condition data using FWD and GPR for 900 miles of arterial streets. The structural condition data was imported into the City's pavement management system. The work also included implementing new condition indices and developing work plans in Cartegraph. Pavement management strategies were enhanced to incorporate structural condition into appropriate treatment selection. In addition to the pavement evaluation, Fugro collected assets such as sidewalk, curb ramps, pavement markings, parking areas, parking meters, traffic signals, and various signs.

C.5 – Summary of Judgements or Pending Lawsuits

As required by the RFP, we disclose that there are no judgments or pending lawsuits or actions against; adverse contract actions, including termination(s), suspension, imposition of penalties, or other actions relating to failure to perform or deficiencies in fulfilling contractual obligations against Fugro USA Land, Inc.

C.6 – Claims Against the Respondent

As required by the RFP, we disclose that no claims have been submitted by our clients against Fugro USA Land, Inc. within the past two years related to the services provided by Fugro USA Land, Inc. or its key personnel.

Tab D – Technical Proposal

D.1 – Technical Expertise

Fugro USA Land, Inc. has the ability to easily meet all of the objectives laid out in EXHIBIT B Description of Desired Services for Proposed Pricing of the solicitation document except Activity 14 (Collect locations of trees, including height and spread), and Activity 39 (GIS). Fugro's experience in pavement asset data collection in Texas and working with NCTCOG puts us in a unique position to add significant value to our clients during each phase of the asset management process. In this section, we will respond to the stated objectives.

D.1.1 – Service Category #1: Pavement Data Collection

1. ***Automatically and continuously measure pavement cracking, texture, rutting and geometrics. Equipment used for rut measurement shall be capable of measuring both wheel track ruts simultaneously.***
   Fugro has state-of-the-art equipment and data control procedures to ensure that data collection efforts are conducted comprehensively, and with pinpoint accuracy. A full description of the equipment Fugro uses to perform these surveys is outlined in Section D.3 – Description of any automated systems Fugro utilizes to facilitate fulfillment of services under this RFP.

2. ***Collect pavement surface distress and structural condition information through automated means for all Participant-owned roadways.***
   Fugro rates surface distress using a combination of manual and automated means using our Vision software. Key personnel are trained in a variety of pavement distress identification methodologies including Federal Highway Administration (FHWA) LongTerm Pavement Performance (LTPP) Distress Identification Manual, Army Corps of Engineers MicroPAVER ASTM D6433, Texas Department of Transportation (TxDOT) Pavement Management Information Systems (PMIS), and Metropolitan Transit Authority (MTS) StreetSaver. Experienced personnel, along with specially developed crack detection and rut processing software ensure that surface distress information is reported with a high level of precision.

3. ***Provide a customized digital condition rating system to collect user defined severity/extent-based pavement distresses and pertinent roadway attributes to accommodate a standardized approach to collecting data.***
   A unique aspect of each pavement management software (PMS) system available on the market today is the ability to create customized condition rating systems for project prioritization and project planning. The Fugro Project Team's experience with the full spectrum of products available on the market today means that we can tailor a software implementation based on the needs of the participating agency. Whether that means using a Pavement Condition Index (PCI) based approach, Ride Condition Index (RCI), Traffic Condition Index (TCI), or a combination of these rating systems, Fugro has the knowledge to create a classification system that fits the needs of any size agency.

4. ***Collect dual-wheel path roughness data to International Roughness Index standards.***
   Fugro performs roughness data collection for many local and state agencies. Our experience collecting and delivering roughness data is unmatched in the industry and this allows us to collect, process and deliver roughness data quickly, efficiently, and tailored to the needs of our clients. More information can be found in Section B.8.5 Roughness Data.

5. ***Collect pavement performance information that includes rutting using a minimum of seven (7) sensors (include pricing for nine (9) sensors as well), fatigue cracking, transverse cracking using a minimum of four (4) sensors, and longitudinal cracking***
   Fugro's ARAN utilizes the Pave3D system that collects a minimum of 4000 points across the transverse profile. Rut calculation using seven, nine, or four sensor points can be simulated using this transverse profile data.

6. ***Perform friction testing***
   Fugro has the ability to perform both Lock Wheel Friction/Skid testing and Continuous Friction testing. The data collection is performed in accordance with ASTM E 274, ASTM E501, and ASTM E 524 where applicable.

7. ***Measure lane striping reflectivity quality***
   Stripe Retro-reflectivity Collection of Stripe Retro-reflectivity will be conducted via Fugro's Laserlux G7 Mobile Retroreflectivity Unit (MRU). The 400 measurements per second Optical Head Technology meets all ASTM standards for reflectivity readings and is perfect for both daytime and nighttime data collection. The Laserlux G7 will be mounted to a Fugro vehicle and data will be captured at speeds up to 60 MPH.

D.1.2 – Service Category #2- Asset Inventory

8. ***Collect sidewalk data to include location, length, width, location in relation to curb and if greenspaces exist between curb and sidewalk, and sidewalk condition to create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.***
   Fugro offers asset inventories using the ARAN digital images as well as mobile LiDAR. The advantage of digital image or LiDAR based asset extractions is the safety of employees versus traditional manual field-based inventories. Fugro has extensive experience collecting roadway assets and has extracted and delivered over 70 different asset types totaling 5.1 million unique assets over 216,000 miles of road for municipal and State agencies since 2008.

9. ***Collect sidewalk Barrier Free Ramp data to include location, configuration, presence of truncated domes or other detectable warning feature, and condition and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.***
   See detail for service #8 (sidewalks).

10. ***Collect roadway sign data to include type and location and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.***

See detail for service #8 (sidewalks).

11. ***Collect photos of Barrier Free Ramps, sidewalks, curb condition, drive approach, and/or roadway signs inventoried under items 8, 9, and 10 above.***
    See detail for service #8 (sidewalks).

12. ***Collect location of curb and gutter and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.***
    See detail for service #8 (sidewalks).

13. ***Collect location and type of visible in-pavement features such as valves, manhole covers, etc. and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.***
    See detail for service #8 (sidewalks).

14. ***Collect locations of trees, including height and spread***
    Fugro will not propose services for this task.

15. ***Collect bike lane locations, including width, length, and associated signage and striping.***
    See detail for service #8 (sidewalks).

16. ***Utilize Ground Penetrating Radar for relocating utilities (for maintenance plans)***
    Ground penetrating radar (GPR) surveys, supported by targeted coring, provide the engineer or asset manager with a cost-effective and comprehensive overview of the as-built structure with minimal disruption to road users. Fugro conducts GPR surveys using the GSSI SIR-30 system utilizing a combination of air-launched (2 GHz) and ground-coupled (900 MHz) antennae.

17. ***Collect data on location and surface condition of bridge approaches***
    The ARAN uses ROW and Pavement facing images to determine the location and surface condition of bridge approaches. For non-driven pavements like shoulders, additional cameras can be installed at optimal angles to view and assess the adjacent right of way or pavement.

18. ***Collect information on bridge deck condition***
    See detail for service #17 (bridge deck).

19. ***Perform Parking Lot Pavement Condition Assessment (Thru-Travel Lanes) w/ Inventory, Attribute, & Geodatabase Development***
    See detail for service #8 (sidewalks).

20. Right of Way Assets Database Development (GPS & Camera Configuration):

a. Sign & Support Database Development
b. Markings & Striping Database Development
c. Traffic Signals/ Flashers. Controllers Database Development
d. Street Lights Database Development
e. Drop Inlets Database Development
f. Drivepads Database Development
g. Bridges Database Development
h. Speed Humps Database Development
i. Street Furniture Database Development
j. Cattle Guards Database Development
k. Guardrails & Roadside Pedestrian Fence Database Development
l. Culverts and Ditches
m. Cabinets
n. Utility Poles
o. Fire Hydrant
p. Medians Database
q. Valves
r. Manhole Covers
s. Trees
t. Catch Basins/ Drainage Inlets from Master Drainage Plan
u. Sidewalk Database Development
v. Curb & Gutter Database Development

D.1.3 – Service Category #3- Pavement Management Analysis

21. Calculate the International Roughness Index (IRI) for each road segment in accordance with ASTM E1926. Provide results compatible with the Participant's GIS database, if applicable.

Fugro performs roughness data collection for a number of local and state agencies. Our experience collecting and delivering roughness data is unmatched in the industry and this allows us to collect, process and deliver roughness data quickly, efficiently, and tailored to the needs of our clients. More information can be found in Section D.3.1.3 Longitudinal Profile/Roughness

22. Calculate a Pavement Condition Index (PCI) score for each road segment using an approved pavement management system and in accordance with ASTM D6433 or ASTM E3303. Provide results compatible with the Participant's GIS database, if applicable.

Each PMS software package calculates PCI in a slightly different way. As part of each data collection and implementation project, Fugro conducts extensive field surveys of pavement surface distress to guarantee the accuracy of PCI score calculations. As an additional benefit, Fugro will invite the Participating Agency staff along for these field

surveys, to help clarify the differences in PCI scores, and how each distress factors into the overall condition rating.

23. ***With input from Participant's staff, devise a weighing system taking into account PCI, IRI, average daily traffic for thoroughfares (traffic count raw data provided by Participant), public safety emergency routes, and apply this 0-100 numeric index to the roadway information collected for the entire jurisdiction. Provide results compatible with the Participant's GIS database, if applicable.***
    Each PMS software package has different capabilities for ranking or prioritizing streets for maintenance and rehabilitation treatments. Based on the Participant's needs, Fugro will determine the level of software sophistication necessary to meet the needs of the Participant, in the most efficient manner. This could be a small municipality ranking solely on PCI, or a large City that needs to consider emergency evacuation routes, ride quality, disaster evacuation routes, etc. This 0-100 numeric index will be applied to the roadway information collected for the entire jurisdiction and is used by the software in determining appropriate maintenance and rehabilitation treatments.

24. ***Estimate the annual budget required to meet the long-term goals regarding desired pavement condition levels.***
    Each PMS software allows for the creation of an infinite number of budget funding scenarios. Fugro will work with the client to determine the budget necessary to accomplish the agency's asset management goals; whether this means maximizing conditions based on limited resources, or determining the needs for maintaining or achieving a particular condition. Fugro has helped many different clients achieve higher network condition scores, secure additional funding as needed for maintenance, and maintain their network without requiring an increase in budget

25. ***Create a five-year and ten-year pavement rehabilitation plan with input from Participant's staff.***
    The Fugro project team includes personnel with extensive backgrounds in cost-benefit analysis, maintenance and rehabilitation techniques, budget optimization, and project level work plan development. With input from the Participating agency and based on the current and projected levels of funding, Fugro will generate a number of multi-year budget funding scenarios to ensure that the Participating Agency's long-term pavement preservation needs are met. Scenarios can be generated based on PCI or condition score goals, separated maintenance and capital improvement budgets, multi-year bond cycles, and a variety of other factors.

26. ***Recommend the computer hardware and software needed for successful implementation, potentially including recommendations for licenses of pavement management system software and other geodatabase software as needed.***
    Based on the size of the Participating Agency, the available budget, the performance requirements of the software, and many other factors, Fugro will develop a customized software recommendation for maintaining a comprehensive asset management

database. In most circumstances, all that is required is training to develop familiarity with current software capabilities. The Fugro Project Team's relationship with each of the leading PMS software manufacturers means that software licensing, implementation and maintenance can be performed entirely in-house.

27. ***Train Participant staff and provide assistance to the Public Works and IT Department as needed for the use of data collected through the fully automated system.***

    Fugro believes that software training should include more than just training the client on how to use the software, but on the role each pavement management component plays in achieving proper results, year after year. Fugro employs a large staff of database management personnel, customer support staff, and software developers to ensure that our products and services are used to their fullest potential, and provide the Participating Agency with significant value for years to come.

D.1.4 – Service Category #4- Electronic Products

28. ***Roadway information that shall be collected and provided to the Participant at a minimum includes:***
    a. ***Street Name***
    b. ***Endpoint One, Endpoint Two, and Segment ID***
    c. ***Segment Length and Pavement Width***
    d. ***Inventory Date***
    e. ***Pavement Type***
    f. ***Segment Functional Classification***
    g. ***Pavement condition scored depending on the requirements of local government Participant(s) (Example: Pavement condition scored as one of the ASTM 20 surface distress codes with corresponding unit of measure scored every 100 feet longitudinally)***
    h. ***Pavement performance information that includes rutting, fatigue cracking, transverse cracking, and longitudinal cracking***
    i. ***Pavement age (if necessary to develop pavement life curves)***

    Each PMS software package has different requirements for network inventory information. Fugro's experience with the full spectrum of products provides us with the insight to know, well in advance, what inventory items are necessary for the collection, management, and improvement of an agency's pavement network, and the experience to integrate this information with the agency's currently available Geographic Information System (GIS) or database systems. The Fugro project team will use this experience to ensure that either a comprehensive inventory is created, or an existing inventory is optimized to the degree necessary for implementation into the participating agency's desired PMS software. We are official partners of AgileAssets Pavement Analyst/Pavement Express ad Cartegraph OMS pavement management systems.

29. ***Collect digital images at 25-foot intervals of the road surface condition and link to a geodatabase (minimum forward facing imagery).***
    Fugro standard practice is to collect Right-of-Way (ROW) images at 25-foot intervals, and a continuous image of the pavement surface. Images are used for surface distress detection and specifically, ROW images, are used for roadway asset assessment. What sets Fugro apart from our competitors is the ability for us to host these geo-referenced images in our cloud-based iVision5 software. This software allows instant access to the entire roadway network from any internet-enabled device.

30. ***Load assessment data for all Participant-maintained pavements into a pavement management system required by local government Participant(s), if applicable. (Example: MicroPaver). The assessment data shall include visual observations, photographs and measurements collected by instrumentation.***
    The Fugro Project team has extensive experience in each of the industry standard Pavement Management System (PMS) software packages currently available, including: MicroPAVER, Cartegraph, AgileAssets, Deighton, StreetSaver, etc. Our unbiased approach to implementation means that Fugro will recommend a software package with the needs of each individual Participant in mind. For example, a Participant with a network of 700 miles will have significantly different budget, software and maintenance needs than one with 100 miles of pavement. The Fugro Project Team has the experience needed to ensure that each Participant is getting a customized recommendation based on their particular circumstances. A further discussion of the Fugro approach for software is outlined in Section D.2 Process For Responding To An Order For Services.

31. ***Implement map module so that pavement condition and other data can be integrated, displayed, and accessed through the map interface in a format consistent with the Participant's horizontal and vertical control network system, if applicable.***
    Each PMS software package has different mapping functionality built-in, Fugro has experience with each system and performs comprehensive software testing and training with each client. This ensures that not only does each module of the PMS software function properly, but that the Participating Agency is trained and competent in its use

32. ***Provide to the Participant the pavement condition data in a pavement management system database approved by Participant. Coordinate with the Participant's IT department to provide pavement condition data in a format compatible with the Participant's Environmental Systems Research Institute (ESRI) GIS database, if applicable.***
    All of the data that Fugro collects is georeferenced for integration with industry standard GIS software including the ESRI suite. Fugro's diverse client-base uses a variety of geo-referencing software and this gives our team valuable experience on the methods of integrating asset collection data with each of these software packages.

33. ***Asset management tools or systems (not just collection) (i.e. 15-year plan about how to fix or repair assets).***

Fugro uses all the major PMS and AMS software and is a partner with Cartegraph and Agile Assets asset management systems. The Fugro Project team has extensive experience in each of the industry standard Pavement Management System (PMS) software packages currently available, including: MicroPAVER, Cartegraph, AgileAssets, Deighton, StreetSaver, etc. Our unbiased approach to implementation means that Fugro will recommend a software package with the needs of each individual Participant in mind.

D.1.5 – Service Category #5- Pavement Structural Analysis:

34. Collect and analyze pavement structural condition information through the use of a falling weight deflectometer in accordance with industry standards on designated participant-owned roadways.

Section D.2.10 discusses our ability to successfully provide this service.

35. Collect and analyze pavement structural condition information through the use of Ground Penetrating Radar (GPR) in accordance with industry standards on designated participant-owned roadways.

Section D.2.11 discusses our ability to successfully provide this service.

36. Collect and analyze pavement structural condition information through the use of pavement cores in accordance with industry standards on designated participant-owned roadways (traffic control included).

Section D.2.11 discusses our ability to successfully provide this service.

D.1.6 – Service Category #6- GIS Related Services:

37. GIS Clean-Up Services

Fugro will not propose services for this task.

38. GIS Support Services

Fugro will not propose services for this task.

39. GIS Remote Training Sessions from GIS Manager/ Expert (2-Hour Sessions)

Fugro will not propose services for this task.

D.1.7 – Service Category #7- Value Added Services:

40. Full Written Final Report- Firm shall prepare and submit a written project report summarizing the work performed, dates of collection, methodology, and results.

Fugro will prepare a comprehensive final report which will include the following:

- Executive summary
- Study objectives
- Description of methodology

- Inventory of all roads
- Current pavement conditions for each street functional classification
- Total amount of centerline and lane miles surveyed
- Network OCI & PCI

41. Project Presentation

Fugro will prepare and present a written project report summarizing the work performed, dates of collection, methodology, and results to the Participant's legislative body.

42. Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey.

Fugro has the capability to dispatch field crews to survey the curb ramp condition. Fugro would work with the participating agency to finalize the observations that would be recorded and what actions would be considered. The types of observations could include type of curb ramp (e.g., perpendicular, parallel), slope measurements (e.g., ramp running slope, ramp cross slope, flare slope), physical measurements (e.g., ramp width, top landing and lower landing clear space, elevation change), and physical observations (e.g., detectable warnings, presence of any features)

43. Stand-alone field operation for collection of asset inventory only, with different levels of position accuracy and abilities to use data for attribute registration and conditions.

Assets Data Collection By Photogrammetry

All cameras will be calibrated for the ability to extract roadside assets to a positional accuracy of 3.3 feet and dimensional measurements to accuracy of 1 foot. The images will be clear and have the ability to easily be used to inventory guardrails, guardrail terminals, signs, pavement markings, unpaved shoulders and any other items visible within the right of way. Captured images will allow for condition rating along the shoulder.

All data elements, including all roadway imagery, are synchronized within the ARAN Collection Software, ensuring that each image is tied to a GPS location as well as a linear reference; allowing all images to be tied back to each other, all condition data as well as to the LRS reference system. Shoulder Data and Roadside Asset Extraction from Imagery
Fugro will use a combination of the right of way (ROW) images collected by the ARAN and our iVision5 asset extraction tool to develop an asset inventory. Lidar data collection is another method that could be used for asset inventory and is explained in further detail within Section 15 of this proposal.

All ROW cameras will be calibrated for the extraction of roadside assets to a positional accuracy of 3.3 feet and dimensional measurements to accuracy of 1 foot. The asset extraction tool within iVision5 allows our team to easily and precisely locate and measure assets within the ROW. Attributes for roadside assets including type, position (linear and GPS), basic condition, dimension measurements and a picture of the asset. These are recorded quickly and efficiently using the asset extraction tool and written in real time to

a relational database from which reports are later generated. Attribute data is input through mouse interactions with customizable drop-down menus and through the keyboard (e.g., for comments and condition rating information pertaining to a sign or an extent of damaged guardrail).

Care will be taken during collection to avoid poor lighting, sun glare and any other condition that may degrade the image and make it unfit for use in asset identification and classification.
Fugro will gather and inventory data for selected assets including, but not limited to; traffic signals, guardrail, guardrail terminals, pavement markings, signs, sound walls and unpaved shoulders. Fugro will confirm the asset inventory list with the DOT prior to data collection. Once calibration of the cameras is performed at the start of the project, this data is automatically collected and available for asset extraction at any time in the future.

Fugro's asset extraction tool includes built-in templates for asset type identification, an asset editor, video playback tools, measurement of width, height, length and offset, interactive data tools, pop up asset browser, etc.

Fugro's team will create a detailed asset marking guide to ensure consistency and quality, we will demonstrate the accuracy of our process by conducting a pilot data delivery. This approach allows for improved flexibility to New Mexico DOT's changing needs, and for the easy implementation of new concepts.

Pavement Markings and Edge of Pavement

By using photogrammetry or laser-based measuring systems onboard the ARAN, pavement markings and edges of pavement assets can be collected and delivered as line attributes or resolved into polygons by our team utilizing GPS Trace, GPS Start and GPS End points within Vision. This process has been applied to resolving medians, shoulders and sidewalks in previous projects for the purpose of calculating mowable areas and reporting elements of safety data with respect to shoulders. The identical logic, tools and processes can be used for DOT selected roadway assets. The onboard Trimble GPS system as well as the POS LV system onboard the ARAN will ensure data extracted at the highest accuracy as possible.

Feature Inventory Application

Fugro utilizes our in-house Surveyor software for asset extraction. Attributes for roadside assets including type, position (linear and GPS), dimension measurements and a picture of the asset, are recorded quickly and efficiently using this application.

Our sofware has the ability to report:

- Sidewalk data to include location, length, width, location in relation to curb and if

- greenspaces exist between curb and sidewalk, and sidewalk condition to create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
- Sidewalk Barrier Free Ramp data to include location, configuration, presence of truncated domes or other detectable warning feature, and condition and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
- Roadway sign data to include type and location and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
- Photos of Barrier Free Ramps, sidewalks, curb condition, drive approach, and/or roadway signs inventoried.
- Location of curb and gutter and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
- Location and type of visible in-pavement features such as valves, manhole covers, etc. and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
- Locations of trees, including height and spread.
- Bike lane locations, including width, length, and associated signage and striping.
- Data on location and surface condition of bridge approaches
- Information on bridge deck condition
- The Parking Lot Pavement Condition Assessment (Thru-Travel Lanes)

The database Fugro can provide will include:

- Sign & Support Database Development
- Markings & Striping Database Development
- Traffic Signals/ Flashers. Controllers Database Development
- Street Lights Database Development
- Drop Inlets Database Development
- Drivepads Database Development
- Bridges Database Development
- Speed Humps Database Development
- Street Furniture Database Development
- Cattle Guards Database Development
- Guardrails & Roadside Pedestrian Fence Database Development
- Culverts and Ditches
- Cabinets
- Utility Poles
- Fire Hydrant
- Medians Database
- Valves
- Manhole Covers
- Trees
- Catch Basins/ Drainage Inlets from Master Drainage Plan

- Sidewalk Database Development
- Curb & Gutter Database Development

Asset Collection by LiDAR

For an addition cost, Fugro offers asset inventory with our advanced LiDAR system, which is based upon the Riegl VUX-1HA LiDAR sensor. This sensor has the highest resolution in the industry. The LiDAR system includes a fully integrated and calibrated laser scanner, IMU/GNSS navigation system, and optional camera sub-system. This system reduces post-processing efforts to create a seamless workflow from data acquisition to highly accurate survey-grade 3D point cloud in common global and local coordinate systems.

Fugro's Mobile Laser Mapping System provides low-noise, gapless 360º profiles at a measurement rate of 300 to 1,000 kHz and a scan rate of 250 lines / second. Multi-target capability based on echo digitization and online waveform analysis offers superior measurement capabilities (bridge clearances, etc.) even under adverse atmospheric conditions. Figure 7 represents a schematic of our LiDAR mapping.

With a maximum measurement range of 490 to 1,312 feet; an accuracy / precision of 5/16 and 3/16 of an inch respectively, Fugro's Mobile Laser Mapping System is the ultimate tool for mobile data acquisition. Roadway asset data would be processed using Fugro's LiDAR system software and you will be provided with a geospatial database with of all the assets, and .LAS files which can be viewed with ESRI GIS products, Fugro's Viewer tool, or any of the additional LiDAR viewer tools currently available in the marketplace.

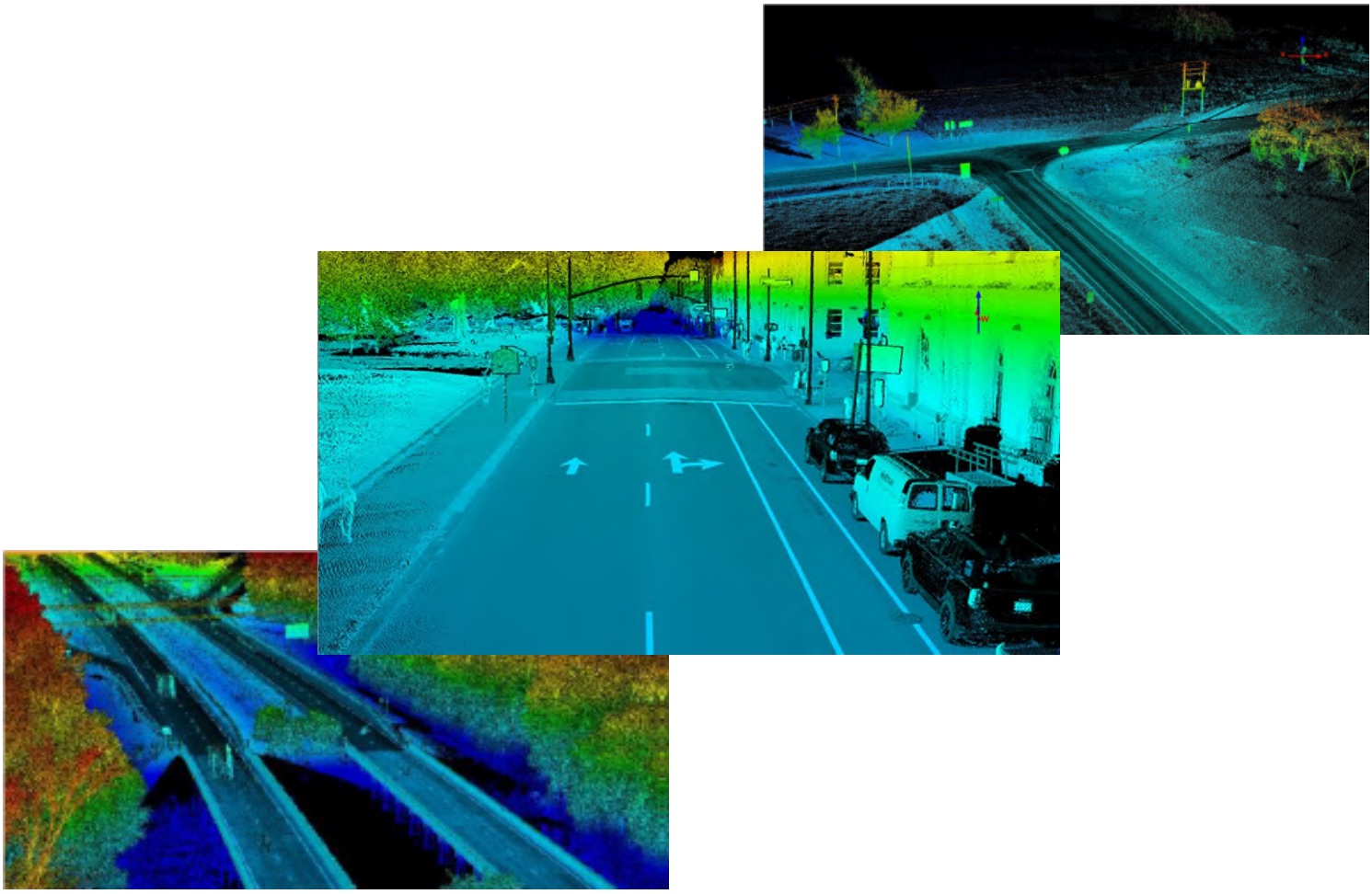


Figure 7: Example of LiDAR Imagery

44. Generic asset types, allowing for any item within line of sight of the collection vehicle.

- ***a. Above ground point asset***
- ***b. Above ground linear asset***
- ***c. At grade point asset***
- ***d. At grade linear asset***

Using ARAN imagery, we are able to data from any point of linear item within the line of sight above ground or at grade. The accuracy of locations or attribute measurements will likely decrease as the distance between the object and ARAN vehicle increase.

45. Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map.

After the inventory is completed Fugro can note a start and end-point linear feature for all missing sidewalks.

D.2 – Process For Responding To An Order For Services

This section describes our proposed scope of services including those necessary to complete the project.

D.2.1 – Project Initiation

For the project initiation, Fugro recommends a kick-off meeting. Upon receipt of the notice to proceed (NTP), Fugro will work with the participating agency's Project Manager to schedule a project kick-off meeting that will include both key members of Fugro's Project Team and agency staff. During the meeting, the draft scope of services or work plan, project schedule, budget, project documents, project goals, and format of deliverables, will be reviewed in detail to ensure that all adhere to the participating agency's specific requirements. Roles and responsibilities will also be covered.

During the kick-off meeting, Fugro will request and/or confirm:

1) Review of project schedule including data collection, processing, and all data delivery milestones and their prioritization.
2) Shapefile of the participating agency's current GIS roadway network.
3) Access to the participating agency's PMS software (e.g., Cartegraph OMS Test or Sandbox environment)
4) Historical M&R activities.

D.2.2 – Review Existing GIS Mapping / Cartegraph OMS (or Current AMS Software)

Once Fugro has received the shapefile of the participating agency's GIS roadway network, Fugro will review the shapefile for accuracy and verify the sections that will be collected with the participating agency. All data streams collected with Fugro's ARAN are geotagged and synchronized within 2 milli seconds (msec). This precise synchronization allows Fugro's data to be linked to any GIS system. If needed and with the participating agency's approval, Fugro will modify the database as necessary to sectionalize the roadway network into adequate management sections. For example, arterial streets with 6 lanes or greater (3 lanes in each direction) will be sectionalized to differentiate the direction of travel. This assumption will be discussed and confirmed with participating agency prior to testing.

D.2.3 – Network Referencing

Fugro will develop survey routing maps and ensure the linkage of the road sections to the participating agency's pavement/asset management system database and GIS. Fugro will also review the sectioning to verify that the pavement management sections align with the participating agency's sectioning practices. We will perform both completeness and logic checks to ensure that all necessary data attributes are available. Prior identification of discrepancies

reduces difficulties in identifying roadways during the data collection effort and reduces the amount of time required to process collected data.

D.2.4 – Pavement Condition Data Collection

Fugro will conduct the automated pavement condition surveys on the participating agency roadway network using our ARAN vehicle(s). Fugro's ARAN collects distress/asset data at prevailing traffic speeds, with no interruption to traffic flow, state-of-the-art safety features, and great accuracy in reported pavement distress data. Unlike manual and windshield surveys data collection, no sampling methods will be used for pavement rating and 100% of ARAN traveled lane will be distress surveyed and reported. Hence, the resulting PCI value will be due to the pavement distresses for the entire traveled lane and not based on some random samples (as is the case with manual surveys). For this project, Fugro will collect data during daylight hours with no adverse weather conditions.

D.2.4.1 – Fugro's Automatic Road Analyzer (ARAN)

For full ARAN specifications and details, please see section D.3.1.

D.2.5 – Data Processing and Analysis

Fugro is a pioneer in developing data processing and visualizing software products. Fugro's Vision and iVision5 software are customized to be used in combination with ARAN for efficient data processing and asset extraction processes. Fugro's engineers have developed sophisticated and proven algorithms to greatly improve the detection, classification, rating, and reporting of data. For this task, we have described the distress standards to be used, the processing software, and our QA/QC protocols.

D.2.5.1 – Distress Standards & Pavement Condition Index (PCI)

The images provide a visual representation of various cracking types, surface defects, patches, and other distresses along the roadway. Fugro will identify the distresses as defined in American Society for Testing and Materials (ASTM) D6433-20, Standard Practice for Roads and Parking Lots Pavement Condition Index Survey. The ASTM D6433 standard is used by many municipalities worldwide to calculate Pavement Condition Index (PCI) for their roadway networks. PCI uses a scale from 0 to 100, where 0 represents a completely failed pavement and 100 represents a pavement in perfect condition, as seen in Figure 8. PCI is calculated based on the type, severity, and extent of surface distresses. Each distress type includes a severity level (i.e., low, medium, and high) and has a different impact or "deduct" value for pavement condition depending on its quantity (i.e., extent). Since each distress type has a different impact on pavement performance, deduct values are specific to individual distresses in accordance with the ASTM D6433 standard. High severity distresses and/or high distress quantities result in more reductions in PCI scores. In general, deduct values for fatigue cracking are higher than deduct values of other types of cracking. Presence of load related fatigue cracking results in lower PCI scores, when compared with similar severities and extents for cracking associated with environmental conditions such as

transverse cracking. Table 1 and Table 2 present the asphalt and concrete pavement distresses and their classifications.

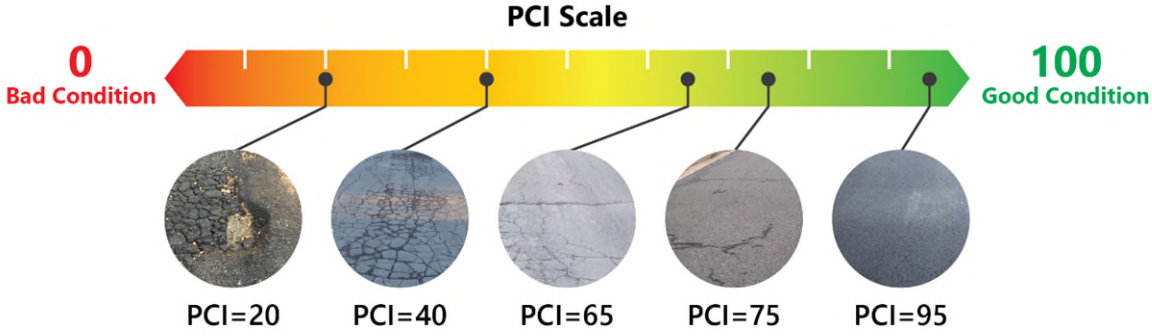


Figure 8: Pavement Condition Index (PCI) Scale

Table 1: Asphalt Concrete Pavement Distresses and Classification

ID #	Load Related	ID#	Climate/Durability Related	ID#	Other Related
1	Alligator Cracking	**3**	Block Cracking	**2**	Bleeding
7	Edge Cracking	**8**	Joint Reflection Cracking	**4**	Bumps & Sags
13	Pothole	**10**	Longitudinal/Transverse Cracking	**5**	Corrugation
15	Rutting	**19**	Raveling	**6**	Depression
		20	Weathering	**9**	Lane/Shoulder Drop Off
				11	Patch/Utility Cut
				12	Polished Aggregate
				14	Railroad Crossing
				16	Shoving
				17	Slippage Cracking
				18	Swell

Table 2: Concrete Pavement Distresses and Classifications

ID #	Load Related	ID#	Climate/Durability Related	ID#	Other Related
22	Corner Break	**21**	Blow Up	**25**	Faulting
23	Divided Slab	**24**	Durability Cracking	**27**	Lane/Shoulder Drop Off
28	Linear Cracking	**26**	Joint Seal Damage	**29**	Large Patch/Utility Cut
34	Punchout	**37**	Shrinkage Cracking	**30**	Small Patch
		38	Corner Spalling	**31**	Polished Aggregate
		39	Joint Spalling	**32**	Popouts
				33	Pumping
				35	Railroad Crossing
				36	Scaling

D.2.5.2 – Data Processing Software - Vision

Vision software is considered an integral part of data processing and QC methodology in Fugro's pavement condition assessment approach. Vision was developed by Fugro to ensure a simple and accurate process for analyzing ARAN data. The software facilitates the entire data processing workflow including key modules for data upload, georeferencing and segmentation, video and sensor data quality analysis, and pavement distress analysis. It synchronizes all of the data (imagery along with sensor and map data) allowing the analyst to virtually drive on the road to assess quality, investigate anomalies, and confirm locations and conditions.

Automated & semi-automated algorithms are incorporated in Vision for pavement distress detection, classification, and rating. Digital pavement images collected by the ARAN serve as input to the distress rating process. ROW images are also used to enhance the distress-rating accuracy. Each distress can be identified in terms of location, severity, exact dimensions, and other characteristics. The software also allows for customized distress rating protocol. Moreover, Vision's Report Generator module facilitates the creation of custom reports and data deliveries using post-processed collection of all pavement performance parameters. This module allows Fugro staff to modify and apply reporting templates to ensure that data conforms to client requirements. Figure 9 provides a screenshot of Fugro's Vision software.

Crack Detection - WiseCrax

Accurate and consistent crack measuring starts with a good foundation. In this case, the good foundation is our ARANs equipped with LCMS, supplying a superior laser-based image for the identification of true cracking. This allows for easy determination of cracking versus other elements such as texture in the pavement. Fugro builds upon its superior hardware used to collect the raw data with our world leading Vision software. WiseCrax offers a customizable surface distress setup for classification and severity rating, continuous full-lane or zone rating, zone detection, and crack maps for quality control of the distress rating. Our distress technicians use this module to easily quantify each pavement crack by the software's automatic determination of a crack's beginning, end, width, depth, and orientation. Measuring cracks is conducted using a three phase process. The following provides an overview of each phase as shown in Figure 10:

- 3D Laser Image – The Foundation for Proper Crack Measurement: The 3D laser image provides the ability to easily distinguish cracking from anomalies on the road surface by using depth.
- Detection: Extraction of crack maps on 3D pavement imagery. Depth is used in the detection of cracks on the 3D image.
- Classification: Analysis of the crack map. For some projects, Fugro would place detected cracks into various categories such as longitudinal, transverse, or alligator. Fugro could also detect crack lengths and widths and place them in five zones per ASTM E3303.
- Rating: Fugro would report the various metrics based on ASTM Standard D6433-20 and data dictionary requirements such as length of cracking, width of cracking, and crack density.

The WiseCrax editor allows our technicians to easily input specific distress severity and extent criteria such as:

- Number of cracks and their respective severity per cracking type (e.g., Alligator, Block, Edge, Longitudinal, Transverse, etc.).
- Location and orientation of the cracking across the lane width.
- The total length of a given crack and its orientation.
- Total crack lengths per distress type and severity summarized on a pavement image and segment/network basis.

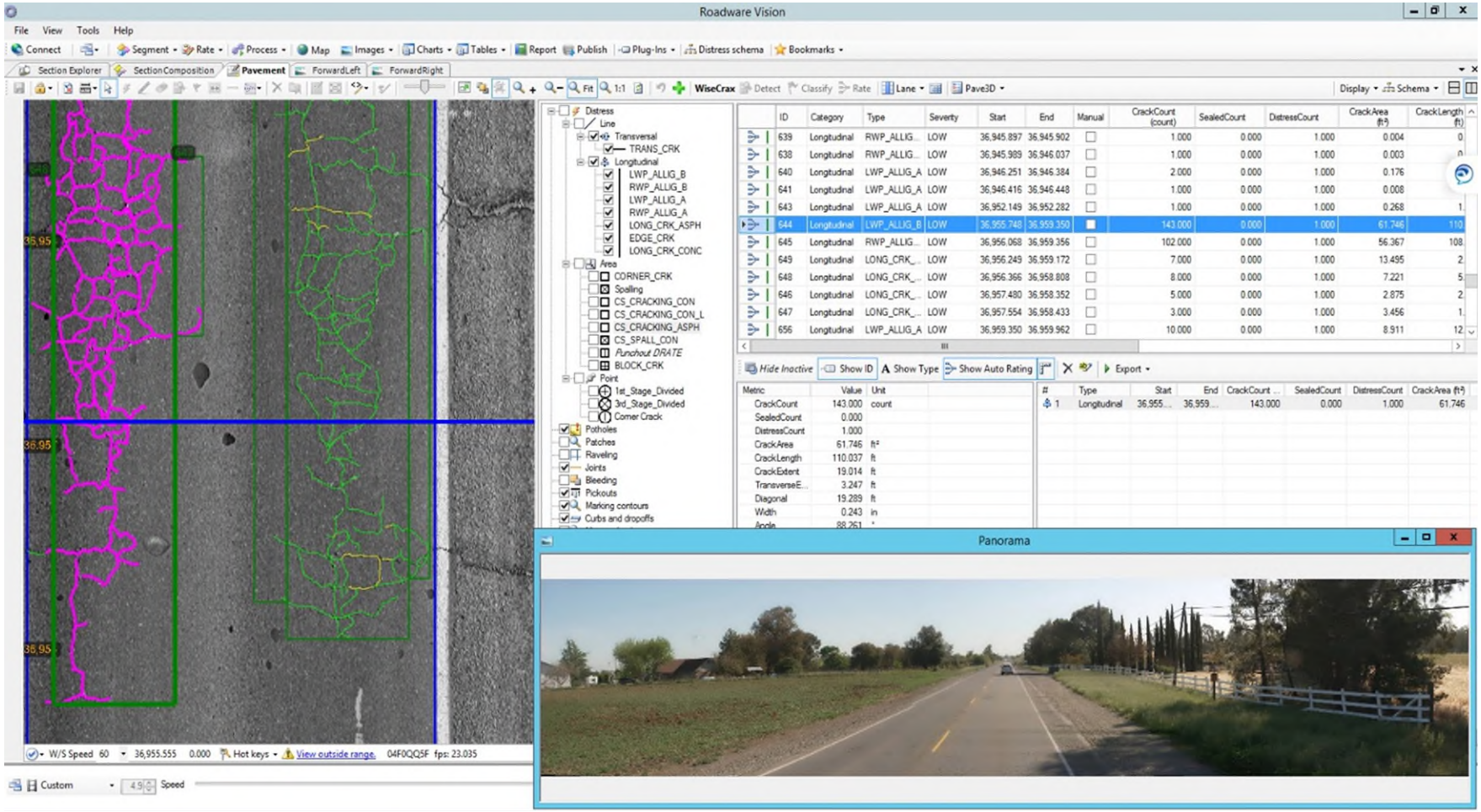


Figure 9: Fugro's Vision Processing Software

- Visual representation of pavement crack location on a given pavement image; color-coded according to its allocated severity state. (Cracks can be manually overwritten or deleted by the distress technicians.)
- Automated determination of pavement line markings, which can be used to restrict and classify pavement cracking.
- Automated statistic reports displaying summary graphs and tables of the entire collection (network) or defined section.

The distress information in WiseCrax is visually overlaid on the pavement imagery to facilitate the manual validation of the automated distress rating and to add in any distresses that require manual intervention.

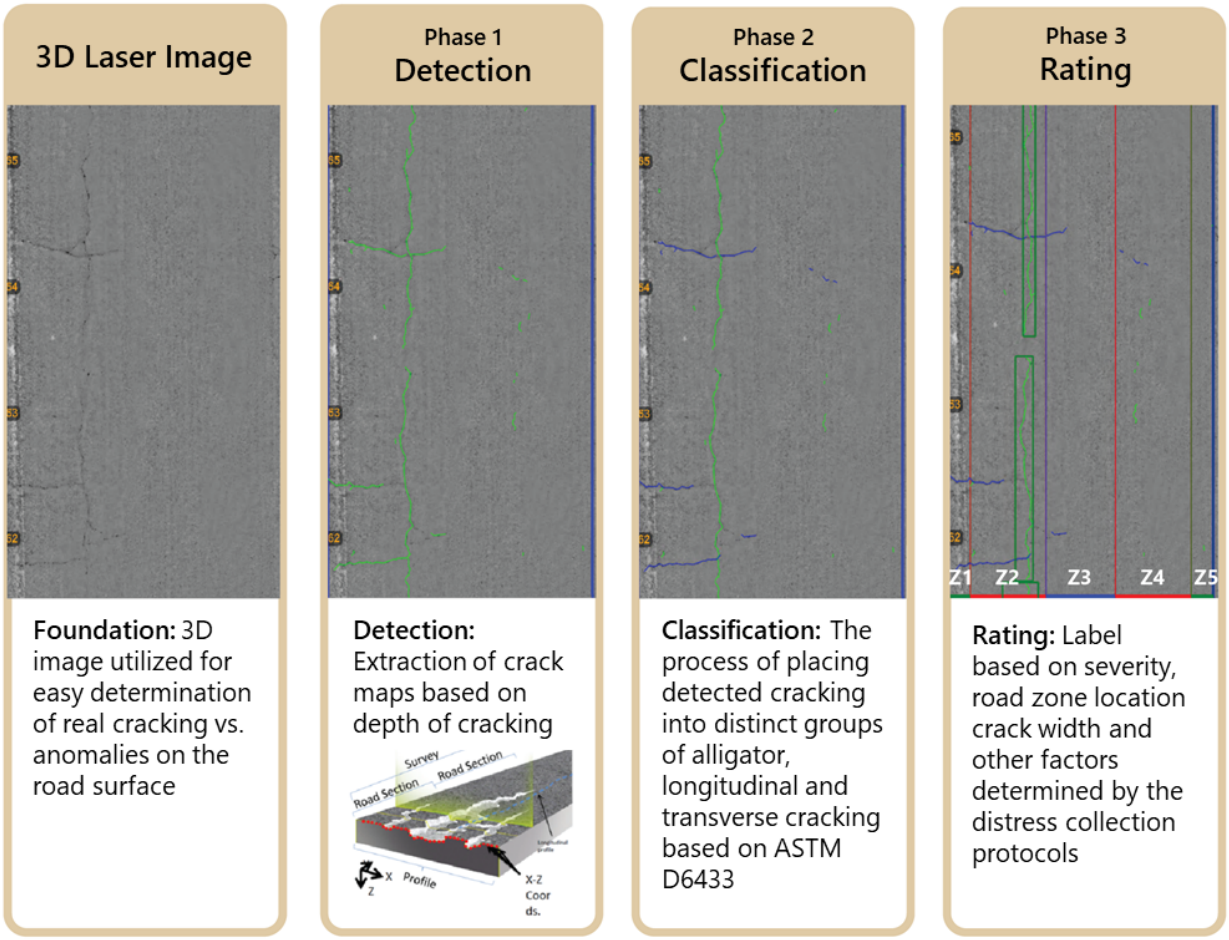


Figure 10: Fugro's Three Phase Approach for Measuring Cracks & Reporting

D.2.5.3 – Data Viewing Software – iVision5

Fugro's iVision5 viewing software provides the participating agency with a powerful tool to review collected images and asset data in a synchronized, GIS-based environment. iVision5 is hosted by Fugro and available on any device with access to the internet, this meets a remotely positioned

workforce's needs. Fugro will upload all raw images and data to our Vision processing software, data will be processed by our team, and post processed data will be synchronized with iVision5.

iVision5 contains a user-friendly interface that seamlessly integrates the collected data and imagery, GPS, distress and asset calculation tools, and mapping layers. The software's dashboard is fully customizable to meet the unique needs of each DOT's requirements. iVision5 offers open data schemas that enable customized data querying, extraction, and linking with other systems to provide maximum flexibility and data-synchronization capabilities. These advanced data sharing and integration mechanisms allow the application to be launched and linked to multiple different asset management applications.

Figure 11 provides an example of one display option for iVision5's rich dashboard layout. This dashboard is customizable to the user's preferences and needs. All displayed data is playing in a synchronized view as the user navigates along the roadway on the GIS-based map. The participating agency will be then provided with multiple licenses to use the software for one year at no additional cost. After one year, licenses can be renewed annually for an additional cost.

Figure 11: iVision5 Dashboard Example

D2.5.4 – Data Quality Management Plan (DQMP)

Fugro understands that the quality of collected pavement distress data is the key to the successful implementation and maintenance of any asset management system. Fugro will develop a formal Data Quality Management Plan (DQMP). Figure 12 shows an example quality checks from start up to data delivery. The DQMP will use reasonable quality control and manage the data collection and delivery process to effectively provide data that meets or exceeds the participating agency's expectations. Fugro understands that data quality is imperative for all transportation agencies.

Fugro's International Standards Organization (ISO) 9001:2008 Quality Management System (QMS) includes Standard Operating Procedures (SOPs) with proven calibration and quality control processes and principles. Fugro has developed SOPs for controlling quality both in the field and office. These SOPs ensure each task is performed with consistency and discipline resulting in high quality work. The following are some of Fugro's Standard Operating Procedures and Plans:

- Location-Referencing Standard Operating Procedure
- Adverse Weather Standard Operating Procedure
- Initial Data Screening Standard Operating Procedure
- International Roughness Index Standard Operating Procedure
- Rut Depth Standard Operating Procedure
- Pavement Imagery Standard Operating Procedure
- Distress Data Reduction Standard Operating Procedure
- Roadway Photo Imagery Standard Operating Procedure
- Roadway Characteristics and Asset Data Standard Operating Procedure.
- Roadway Pavement Structural Composition/ Thickness Data Standard Operating Procedure

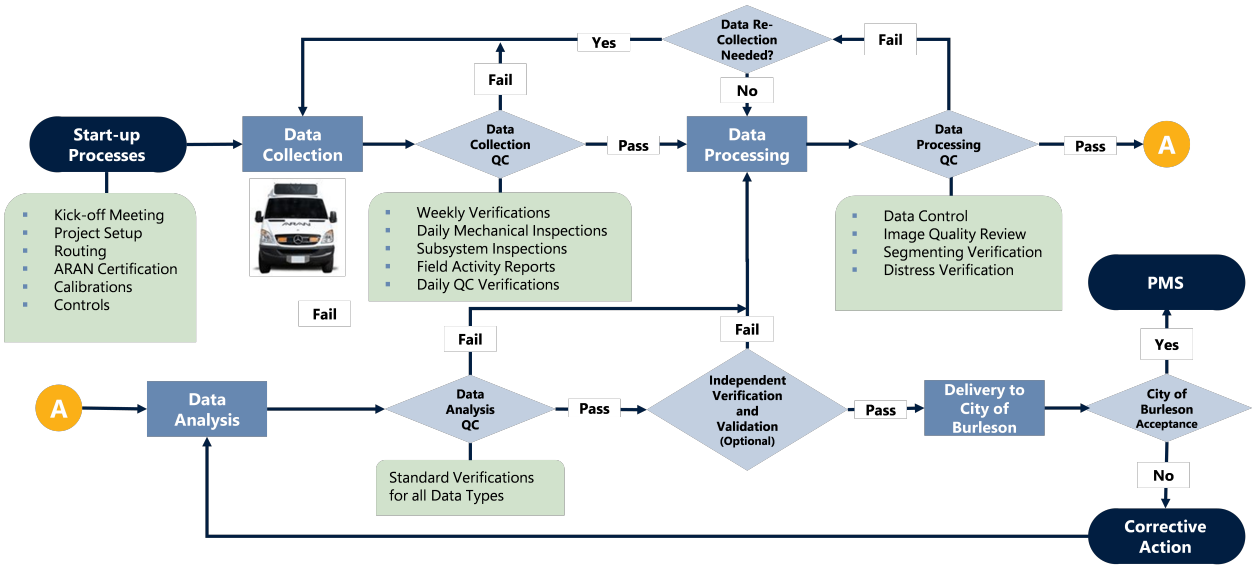


Figure 12: Example of Quality Checks for the participating agency

D.2.6 – Data Formatting and Loading

Data needs to be formatted for loading into a participating agency's pavement management system. Fugro is currently a Data Partner with Cartegraph and AgileAssets but can work within any of the major softwares. We have been utilizing Cartegraph with our clients for many years. The following is a brief discussion on how we load new pavement data into Cartegraph OMS. A similar process applies to other softwares.

D.2.6.1 – Create Import Files

Fugro will transform our distress delivery file into import files for the Cartegraph OMS upload. The import files include an inventory file (e.g., section, sample, IRI) and inspection files for asphalt distresses and concrete distresses. The inventory file will need to have task and inspection levels. Some important items to note before importation. A pavement record should exist for the data that is being loaded. Values such as pavement type in Cartegraph should be reviewed and should match with the inventory file. Before importing the inspection, a task must be defined.

For the inspection files with distresses, the extent of the distress needs to be determined. For asphalt distresses, it is the quantity of the distress divided by the area. For concrete distresses, it will be the number of slabs.

D2.6.2 – Importing Data into the participating agency's PMS

The following tasks are the typical approach to loading the pavement inspection data directly into Cartegraph OMS:

- **Step 1: Import Tasks (Open Status) –** Fugro will create import tasks by creating a format file. We will check "Include Field Names" in properties and confirm the fields status as "Planned" or "In Progress."
- **Step 2: Open Inspection –** Fugro will create the inspections, where the samples will be imported.
- **Step 3: Import Samples –** Fugro will create the samples, where the distress will be imported.
- **Step 4: Import Distresses –** Fugro will import the distresses into the samples. The distresses will be in terms of extent.
- **Step 5: No Distress Import –** Fugro will create samples where no distresses were recorded. We have to mark sections without distress otherwise there may be errors after importation.
- **Step 6: Close Inspection –** Fugro will then close the inspections by creating a close the inspection item for all inspections.
- **Step 7: Close Task –** Fugro will create a close task for the import process. In properties, we would check "Include Field Names" and save records without errors. The fields status should be changed to "Completed."

D.2.6.3 – Deliverables

After our data processing and analysis, Fugro will provide the following deliverables:

- **Geodatabase Delivery –** Fugro will deliver ESRI compatible geodatabase with distress data, PCI, IRI, RCI, OCI values, and other attribute data. The geodatabase will be compatible to participating agency's GIS system including street, from and to, functional class, pavement type, length, width, and area. Fugro is highly experienced in providing similar information to its clients as part of its pavement and asset data collection projects.

- **Data Delivery Files –** Fugro will provide electronic files (e.g., Excel or CSV) with segment information. It will include the distresses, PCI, IRI, RCI, and OCI.
- **PMS Electronic Files –** Fugro will deliver the Cartegraph import files that will be uploaded into Cartegraph OMS.
- **Updated Cartegraph OMS Database –** Fugro will update the participating agency's Cartegraph OMS database with the inspected data. The participating agency will review and provide approval before data is entered into the production environment.
- **Image Delivery –** Fugro will deliver all the collected images (ROW) to the participating agency on a hard drive. These will be linked to the geodatabase delivery.
- **iVision5 access -** Images will be available on Fugro's iVision5 dashboard.

D.2.7 – Asset Extraction

Agencies are increasingly seeking to inventory and assess the condition of in-road and roadside assets. We offer asset inventories using the ARAN digital images as well as mobile LiDAR. The advantage of digital image or LiDAR based asset extractions is the safety of employees versus traditional manual field-based inventories. Digital images and mobile LiDAR used for asset inventory and other analytics are dependent upon "line-of-sight" measurements, which means obstructions such as buses, parked vehicles, garbage canisters, and vegetation can impact the "line-of-sight" measurements and image collection. Fugro has extensive experience collecting roadway assets and has extracted and delivered over 70 different asset types totaling 5.1 million unique assets over 216,000 miles of road for municipal and State agencies since 2008.

Fugro's Surveyor software uses the calibrated geo-referenced images collected by the ARAN to capture, extract, measure, and store data on client's visible roadside assets. Assets can be provided to clients via geodatabases for incorporation into the client's GIS system. Figure 13 shows a screen capture of Surveyor's Asset Attribute Editor. Fugro staff use a triangulation method with two successive images to determine an asset's location. Field assessment crews will only be deployed if additional condition assessment is required (e.g., ADA ramps), saving both time and money. ADA ramp (Activity #42) has been selected as "no-bid" as Fugro typically prices this item per unit of "ramp" and not per unit of "participant" as specified in the pricing proposal Attachment A.

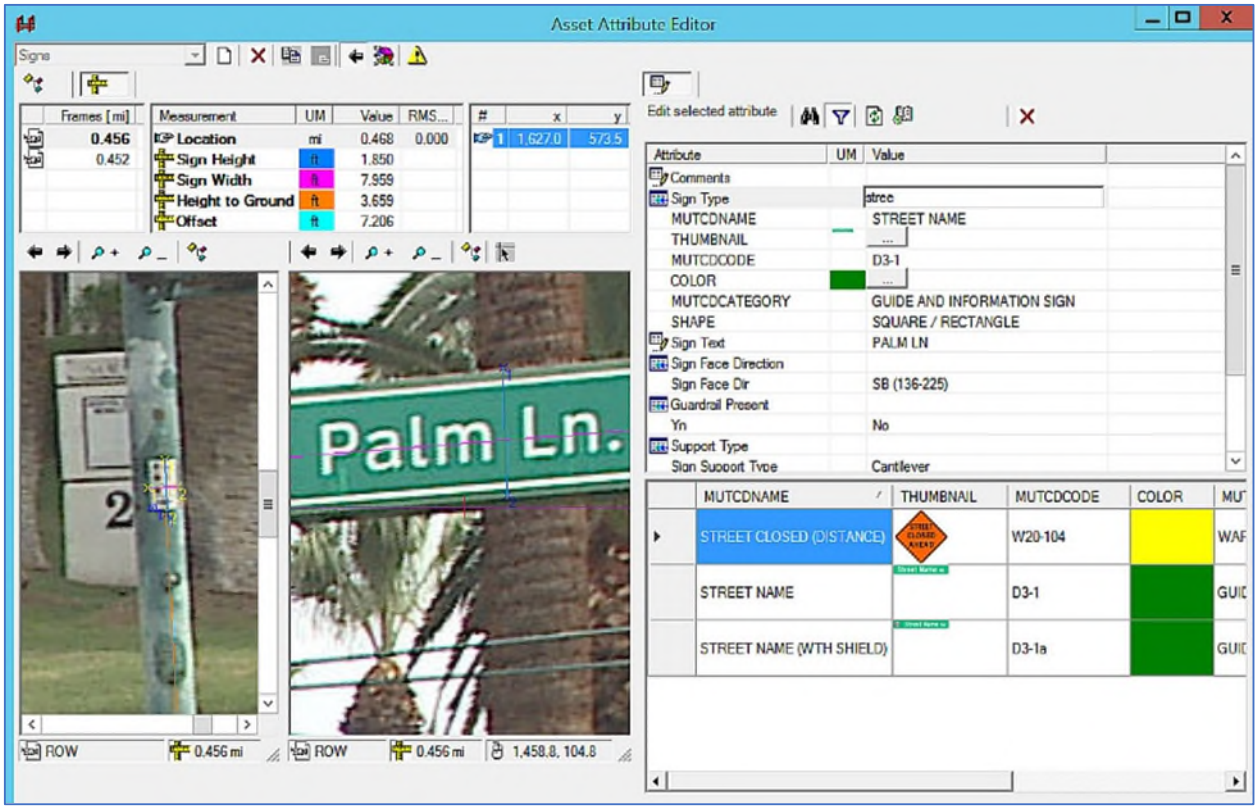


Figure 13: Screen Capture of Surveyor

The following is a list of point and linear assets that Fugro can extract using photogrammetry:

- Bicycle Lanes
- Bridges
- Brush & Tree Control
- Cable Barriers
- Cattle Guards
- Cemetery
- Church
- Concrete Barriers
- Curbs
- Driveways & Access Points
- Drop Inlets / Catch Basins
- Emergency Call Boxes
- Fences
- Fire Hydrants
- Fire Station
- Gates
- Guard Walls
- Guardrails
- Lighting
- Hospital
- HOV Lanes
- Intersections
- ITS Devices
- Lane Widths
- Linear Pavement Markings
- Low Water Crossings
- Manholes
- Median Openings
- Medians
- Meters
- Mile Markers
- MUTCD Signs
- Number of Lanes
- On Route Parking
- Overpasses
- Paved Ditch
- Plowable Markers
- Point Pavement Markings
- Police Station
- Post Office
- Railroad Crossings
- Raised Pavement Markings
- Red Light Cameras
- Retaining Walls
- Rock Slide Protections
- Rumble Strips
- School Zones
- Schools
- Shoulder Widths
- Shoulders
- Sidewalk Ramps
- Sidewalks
- Sight Distance (Passing Lanes)
- Sign Supports
- Slopes
- Snow Fences
- Sound Barriers
- Speed Cameras
- Speed Limit Signs
- Toll Plazas
- Traffic Count Stations
- Traffic Lights
- Trees
- Tunnels
- Turf Condition
- Turn Lanes
- Unpaved Ditches
- Utility Poles
- Water Valves

A GDB file will be provided to the participating agency with the various assets and will be compatible with the participating agency's GIS system. Figure 14 shows a screen capture of ArcGIS of an agency where we extracted traffic sign poles, traffic sign heads, point pavement markings like arrows or legends, linear pavement markings like striping, curbs, and curb ramps.

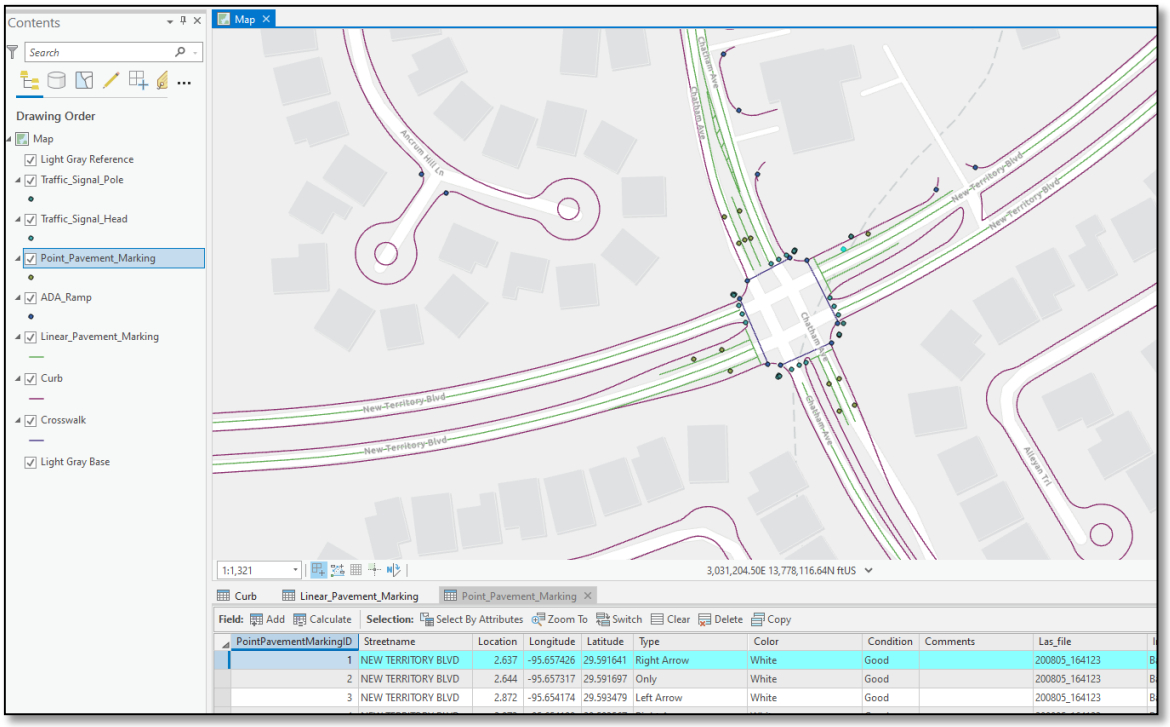


Figure 14: Screen Capture of ArcGIS with Extracted Assets

D.2.8 – Sidewalk Condition

Fugro can extract location and general condition of the sidewalks that are visible from our ROW images. If the participating agency desires a more detailed survey, Fugro has the capability to dispatch field crews to measure distresses on the sidewalk. Fugro has reviewed the Public Rights-of-Way Accessibility Guidelines (PROWAG) for 2005 and 2011, and American with Disabilities Act Accessibility Guidelines (ADAAG) for "best practices." Fugro would work with the participating agency to finalize the observations that would be recorded and what actions would be considered. The following describes observations that could be recorded:

1. Horizontal displacement
    - Record horizontal displacement greater than 0.5 inch.
2. Vertical displacement
    a. Record vertical displacement greater than 0.5 inch.
    b. Record vertical displacement between 0.25 inch and 0.5 inch.
3. Surface deficiencies (e.g., holes and cracks)
    a. Record holes greater than 1 inch diameter and 0.5 inch or more in depth.
    b. Record panels with 50% or more of surface cracks.

   c. Record panels with spalling over 50% of panel (depth of 0.25 inch or greater).
   d. Record panels with 100% spalling.
4. Features and vegetation (e.g., poles, bollards, grate, tree roots, vegetation)
   a. Record any obstructions such as poles that restrict the operating width to less than 3 feet (36 inches).
   b. Record tree roots that cause visually observed change in slope of sidewalk. .
   c. Record any overhead obstructions that are lower than 7 feet (84 inches).
5. Missing sidewalk
   - Record gaps in sidewalk along block.
6. Sidewalk width
   - Minimum of 4 feet (48 inches) or at least 3 feet (36 inches) at an obstruction. Record sidewalk width less than 48 inches that is not due to obstruction.
7. Other
   - Add comments to describe observation.

D.2.9 – Curb Ramp Condition

Fugro can extract location and general condition of the curb ramps that are visible from our ROW images. If the participating agency desires a more detailed survey with respect to ADA compliance, Fugro has the capability to dispatch field crews to survey the curb ramp condition. Fugro would work with the participating agency to finalize the observations that would be recorded and what actions would be considered. The types of observations could include:

1. Type of Curb Ramp (e.g., perpendicular, parallel)
2. Slope measurements (e.g., ramp running slope, ramp cross slope, flare slope)
3. Physical measurements (e.g., ramp width, top landing and lower landing clear space, elevation change)
4. Physical observations (e.g., detectable warnings, presence of any features)

D.2.10 – Structural Index Assessment

Fugro has conducted structural testing of pavements using deflection testing devices for over 25 years. This experience includes Falling Weight Deflectometer (FWD) testing, which is a non-destructive test method that simulates the impact of traffic on a pavement section. During FWD testing, a heavy load is applied to the pavement, and the response to the load is recorded by measuring the pavement's deflection at various distances from the applied load. The deflection data can then be analyzed to approximate the stiffness of the pavement structure as well as the subgrade. Fugro's FWD equipment is shown in Figure 15.

Dr. Alavi is an expert in the non-destructive testing field. He developed a national synthesis of best practices for FWD usage. The synthesis reports on the state of practices of FWD usage as it involves state departments of transportation (DOTs) using these devices to measure pavement deflections in response to a dynamic load. The data obtained are used to evaluate the structural capacity of pavements for research, design, rehabilitation, and pavement management practices.

Figure 15: FWD Testing along City Arterial Roadway

D.2.11 – Subsurface Void Detection

Ground penetrating radar (GPR) surveys, supported by targeted coring, provide the engineer or asset manager with a cost-effective and comprehensive overview of the as-built structure with minimal disruption to road users. Fugro has been building inventories of pavement structure using GPR and coring for over 15 years and has undertaken some of the largest data collections of this type ever conducted including:

- California Department of Transportation: 51,250 miles
- Louisiana Department of Transportation and Development: 20,000 miles
- Virginia Department of Transportation: 1,800 miles

For the participating agency, Fugro would use its GPR to detect subsurface voids and obtain pavement layer thickness information while running at traffic speeds. Fugro conducts GPR surveys using the GSSI SIR-30 system utilizing a combination of air-launched (2 GHz) and ground-coupled (900 MHz) antennae (Figure 16).

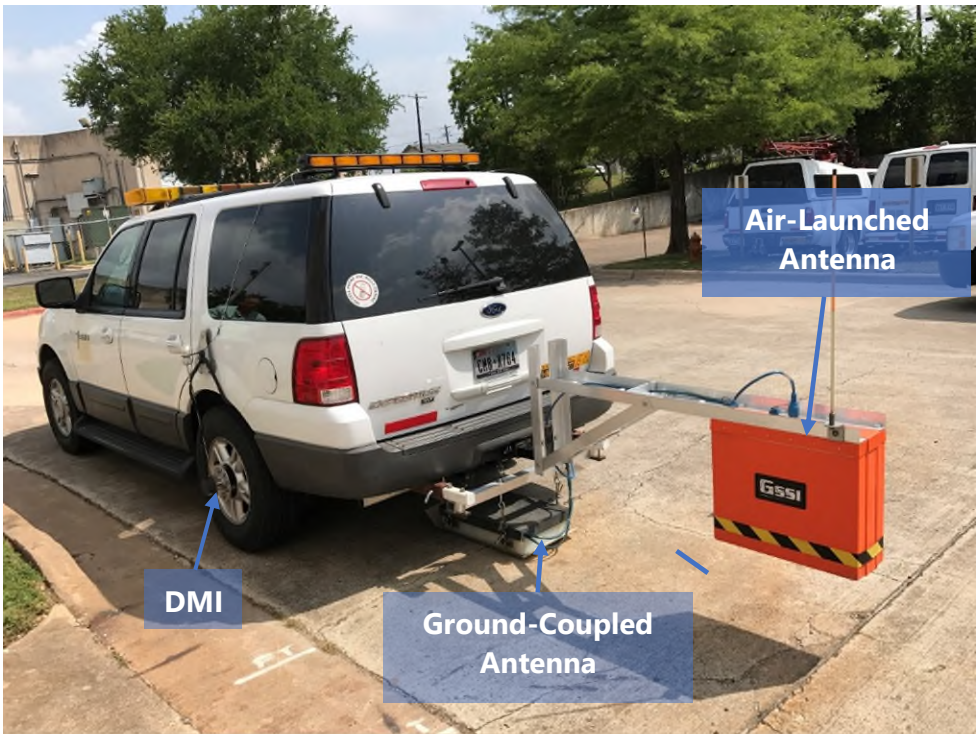


Figure 16: GPR Setup

Fugro would process the GPR data using GSSI RADAN software. The software illustrates the pavement layer interfaces graphically and provides the layer thickness information based on the electromagnetic theories. The amplitude of the reflected GPR signals, amplitude-phase (i.e., positive or negative), and layered dielectric properties will be employed by Fugro to investigate the subsurface pavement anomalies.

GPR data analysis is typically calibrated using a limited number of cores, but in the absence of actual cores, we could utilize historic coring data, as-built drawings or local engineering information related to the number of layers, material types, etc. Continuous pavement layer thicknesses could be summarized in the generic major layer types such as asphaltic/concrete material, granular or bound base, and subbase. The raw data could be summarized for every 50-100 ft. reporting intervals depending on the participating agency's input.

D.2.12 – Friction Testing

D.2.12.1 – Locked Wheel Friction/Skid Testing

Fugro's in-house skid measuring system consists of a trailer with two test wheels towed by a pickup truck, which is equipped with the data collection computer. Each wheel of the trailer is equipped with a transducer to measure the vertical and horizontal load experienced by the wheel. The trailer is also equipped with water dispensing nozzles, which spray water on the pavement ahead of the test wheel to simulate the wet weather conditions. The data collection is performed in accordance with ASTM E 274 and ASTM E 524.

D.2.12.2 – Continuous Friction Testing

For Continuous Friction Testing Fugro will utilize the GripTester MK2. This equipment is in compliance with:

- ASTM E274, the Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire
- ASTM E501 Standard Rib (Tread) Tire Specification
- ASTM E524 Standard Smooth (Blank) Tire Specification.

This is the world's number one trailer-based continuous friction measuring equipment and works on a principle of measuring the skid resistance of a surface by running a measuring wheel that slips or skids compared to two drive tires. The single measuring wheel is braked by 15% and the load and drag on this wheel are continuously measured. The friction coefficient (load/drag), known as the GripNumber, is transmitted to a data collection computer held in the cab of the towing vehicle. Fugro will utilize the Roadbase software when collecting the friction data. This software is designed specifically for use on roads and highways and quickly and easily allows for the collection of skid resistance data as well as the input of investigatory levels. Roadbase generates easy to read reports as well as giving real time data displays to our operator during surveys. By outputting data in csv format, skid resistance data can be easily viewed. The data is easily converted to shp files, allowing the data to be overlaid within Fugro's iVision5 data viewing software. Data can also be converted into HMDF format for insertion into Pavement Management Systems.

Fugro will provide certification of calibration and correlation conducted at a nationally recognized certified friction measuring system evaluation site such as Central/Western Field Test and Evaluation Center located in College Station, TX or Eastern Field Test and Evaluation Center located in East Liberty, OH upon start of contract.

Deliverables for this task include:

- Separate Friction data table, with the same data as identified in the "Friction" Data Dictionary.
- Continuous skid testing data shall include the date and time of collection

The data will include the location of each test shall include control section, LRS-ID, direction of travel and LRS-ID logmile. Also to be recorded with each test will be the friction number, test speed, tire type used, wheel path (right or left) and the pavement surface type.
Report/record i it is determined at the time of collection that tests could not be performed on all or a portion of a section because of construction, unsafe condition or other factor. GPS coordinates reported for the beginning, at every tenth (0.100) mile increment, at every testing location and at the end of each section.

D.2.13 – Retroreflectivity

Collection of Stripe Retro-reflectivity will be conducted via Fugro's Laserlux G7 Mobile Retroreflectivity Unit (MRU). The 400 measurements per second Optical Head Technology meets all ASTM standards for reflectivity readings and is perfect for both daytime and nighttime data collection. The Laserlux G7 will be mounted to a Fugro vehicle and data will be captured at speeds up to 60 MPH. Deliverables include 10th mile reflection readings, ROW Imagery and a Final Retro-reflectivity report.

Stripe Retro-reflectivity Data Delivered and Customer Use of Delivered Data

Fugro has successfully collected and delivered over 30,000 stripe miles in less than 3 months to the State of West Virginia. West Virginia DOT received a 10th mile report, ROW imagery and Final Retro-reflectivity report on all line types in color on the their NHS system. They utilized the data to create and update their stripe reflectivity inventor as well as provide incentive or disincentive to paint contractors in the state. The graphics to the right are examples of the final report as well as the ROW imagery.

D.2.14 – Pavement Management Services (Optional)

In addition to just uploading the data into a pavement management system, Fugro can provide pavement management services. As stated previously, Fugro is currently a Data Partner with Cartegraph and Agile Assets.

Fugro can develop a 5 or 10 year work plan based on various budget scenarios to improve the participating agency's pavement quality. If this deliverable is selected, the following activities will take place.

D.2.14.1 – Deterioration Standards

Fugro will configure deterioration curves for each functional classification and pavement surface type. Fugro will provide models to the participating agency for approval.

D.2.14.2 – Maintenance and Rehabilitation Strategies

Fugro will first work with the participating agency to develop or update their M&R decision strategies for different functional classes, different surface types (e.g., AC, PCC, etc.), and condition categories. Fugro would review various treatments such as slurry seals, microsurfacing, crack seals, thin overlays, mill & overlay, and total reconstruction. Fugro will also discuss the possible pavement preservation techniques with the participating agency. Fugro will be interested in what strategies have been used in the past and what has worked for the participating agency. The final M&R decision tree will incorporate the participating agency's M&R treatments and PCI threshold values for triggering those M&R strategies.

D.2.14.3 – Treatment Costs

Fugro will work with the participating agency to assign unit costs to each treatment type in the M&R decision tree for the development of the M&R plan.

D.2.14.4 – Budgetary Analyses

Budget analyses will be performed to develop a work plan (e.g., 5 or 10 year work plan) for M&R. Fugro is highly experienced at performing various budget analyses for agencies. Fugro would first compute the "Budget Needs" analysis for the participating agency. The budget needs analysis represents the "ideal world" or unconstrained funding levels. Based on the participating agency's M&R strategies and the condition indices of the sections, the PMS program would select an M&R action and compute the total costs over a period of time. The results of the budget needs analysis can then be compared with several "what-if" budget analyses (i.e., budget or target-driven scenarios). The budget and target driven scenarios will be selected based on close consultation with the participating agency.

Fugro will prepare several budget scenarios that are either "budget" driven or "target" driven. Under a "budget" driven scenario, Fugro will utilize the PMS program to evaluate the impact of a given (predetermined) annual "existing budget" for the M&R program on the overall network PCI value with time. Under a "target" driven scenario, Fugro will utilize the PMS program to determine the annual M&R budget needed for maintaining (or improving) the overall network PCI value by a predetermined target value (e.g., maintaining current PCI, improving current PCI by 5 points, improve current PCI to regional target PCI). Each budget scenario will show future pavement maintenance needs and future rehabilitation needs Figure 17. And with all budget analyses, Fugro will provide charts and graphics to depict the results.

D.2.14.5 – Final M&R Work Plan

Based on the budgetary analyses and in consultation with the participating agency, a scenario would be selected that fits the City's current and upcoming funds the best. The treatment plan would indicate which treatments would be applied to each pavement section based on the M&R decision tree and the associated costs.

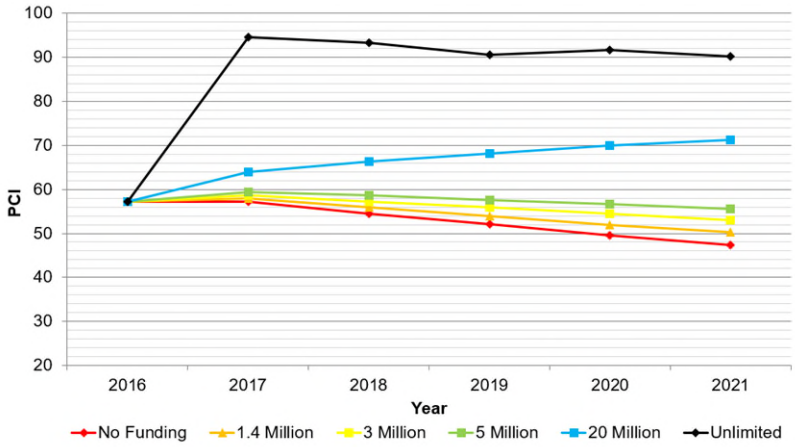


Figure 17: Example of a Budget Scenario Graph

D.3 – Overview of Automated Equipment

D.3.1 – Fugro's Automatic Road Analyzer (ARAN)

Developed in 1977, our ARAN was the first automated data collection vehicle available in the market and continued to evolve with the latest technology and equipment. Figure 18: The Automatic Road Analyzer (ARAN)Figure 18 shows our current sixth generation ARAN. The ARAN includes cutting-edge gyroscopes, sensors, cameras, computers, software, and related equipment, all designed to withstand the rigors of collecting seven days a week, 365 days a year in all landscapes and climates. Fugro's experience and industry knowledge have allowed us to be innovative and responsive to the changing economic conditions facing transportation agencies, balancing reduced budgets, and staffing with the demands for maintaining a safe, reliable, and efficient transportation network.

Currently, we are working with over half the North American DOTs and many municipalities providing a full range of innovative custom roadway management solutions including data collection, PMS services, and M&R work plan development. Client satisfaction and trust are top priorities for us. We have developed many long-standing clients with this sound approach. We are working with over twenty (20) States/Provinces in North America

Figure 19 describes some of the specific ARAN subsystems that are pertinent to the project.

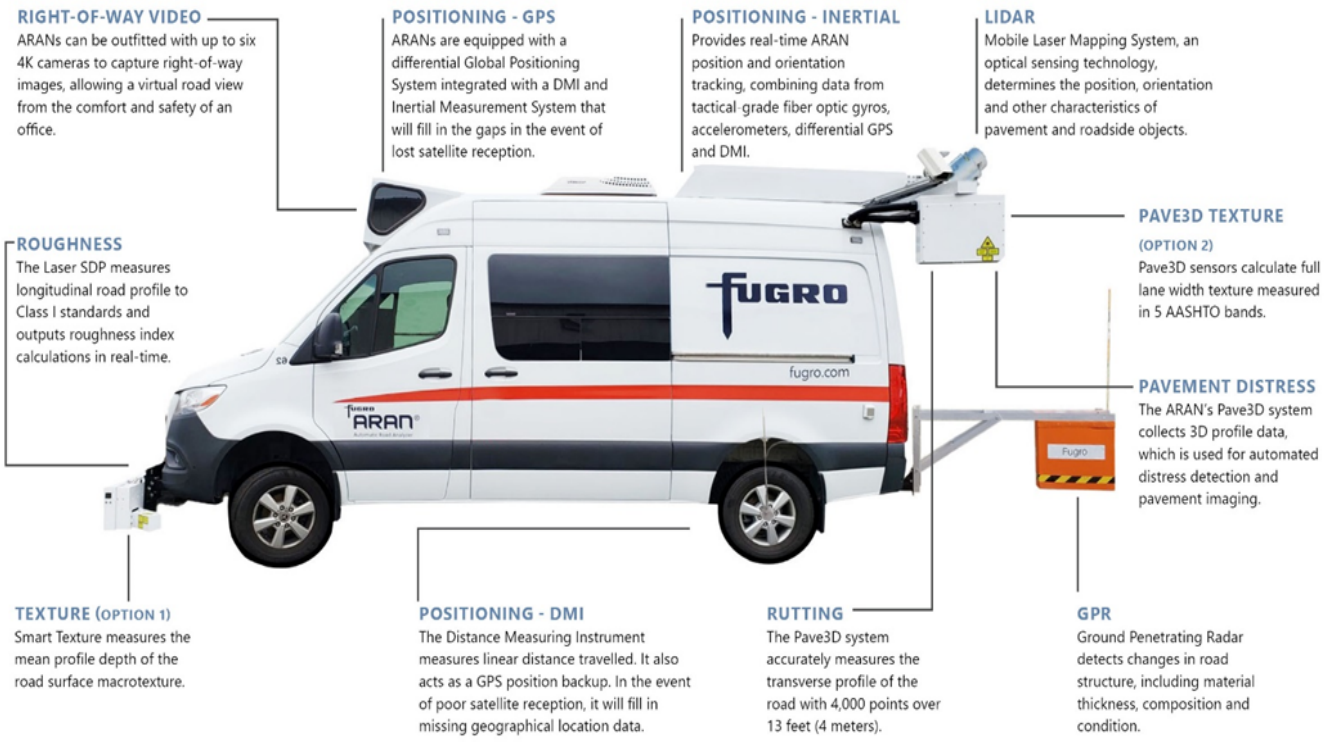


Figure 18: The Automatic Road Analyzer (ARAN)

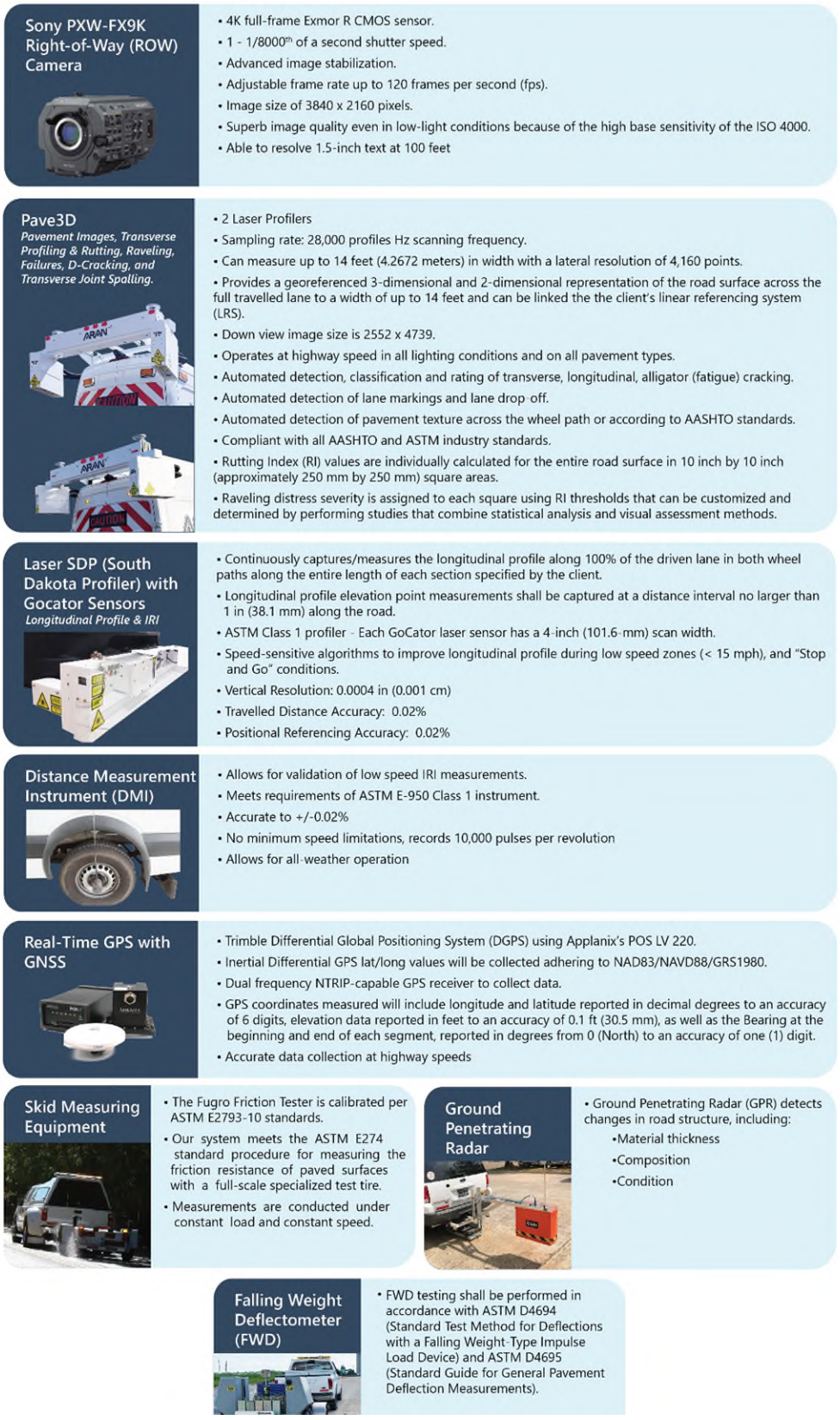


Figure 19: Detailed ARAN Subsystems Chart

D.3.1.1 – Locational Referencing and Positioning

The ARAN is equipped with a Distance Measuring Instrument (DMI) mounted on the driver's-side rear wheel as shown in Figure 20. The DMI is used to provide distance based triggers to the ARAN subsystems and translate wheel revolutions into measurements of velocity and linear distance traveled. The DMI meets the Class 1 requirements per ASTM E950, Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference.

Figure 20: Distance Measuring Instrument (DMI)

The ARAN also incorporates a Differential Global Positioning System (DGPS) using Applanix's POS LV 220. The POS LV is Global Navigation Satellite System (GNSS)-aided inertial technology that mitigates the real-world effects of GPS outage.

The POS LV 220 tracks and reports the position (latitude, longitude, and elevation) and orientation (heading) of the ARAN in real-time using complementary locating technologies. The GPS corrects any drift evident in the inertial sensor over time, while the inertial sensor ensures that accurate positioning will be continuously available, even during periods of GPS outage due to tree canopy, mountainous terrain, tunnels, or urban canyons. Figure 21 is an image of the Applanix POS LV system.

Figure 21: Applanix POS LV

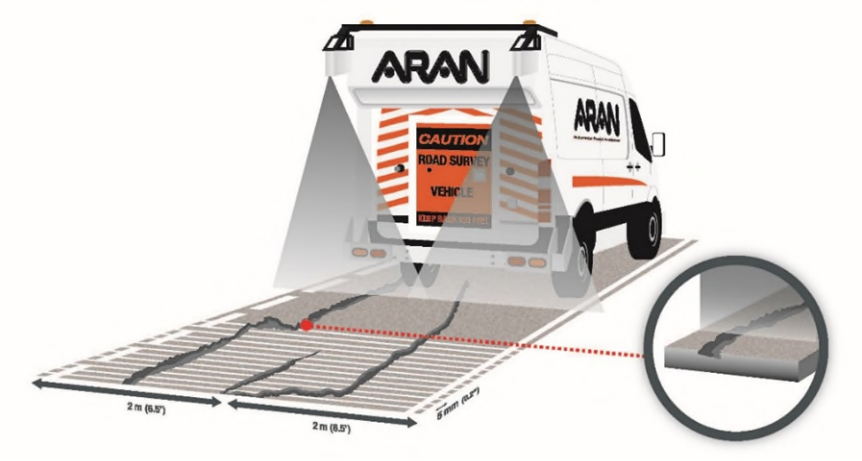


Figure 22: Downward Scanning Capabilities

D.3.1.2 – Downward Pavement Image Collection

Fugro's Pave3D uses downward-facing high-speed cameras, custom optics, and laser line projectors to output range and intensity data, which derive a 3D image of the pavement surface as seen in Figure 22. These capabilities improve performance of post-processing techniques resulting in superior accuracy for identifying pavement crack severity. These images facilitate automated and manual crack identification methods.

Figure 23 depicts the range, intensity, and 3D views captured by Fugro's Pave3D system. The range image represents depth in grayscale; lower elevations due to defects like cracks, potholes, corner breaks, etc., appear dark. A range image means only actual pavement distress is detected and no other artifacts on the road like oil, skid marks, or dampness in hairline cracks. The intensity image is a more "traditional" camera image showing the surface as the human eye would see it. An intensity image is essential for the visual verification of non-crack-related distresses like raveling. The 3D view combines the Range and Intensity images to provide an enhanced image of the roadway that is ideal for visual rating and quality control of the cracking detected by the automated distress tool. Using both range and intensity information matched pixel for pixel, we can better determine the exact locations of cracks based on width, depth, texture, color, and other surrounding features.

Some of the advantages of using the Pave3D system over conventional pavement images include:

- Uninterrupted operation in all lighting conditions during the day and at night without the need for artificial pavement illumination.
    - Sun and shadows and various pavement types ranging from dark asphalt to light-colored concrete can be measured at highway survey speeds and on roads reaching 14 feet in width and still achieve the 0.19 inches longitudinal resolution.

- Continuous collection of pavement images along the roadway's length with no interruptions.

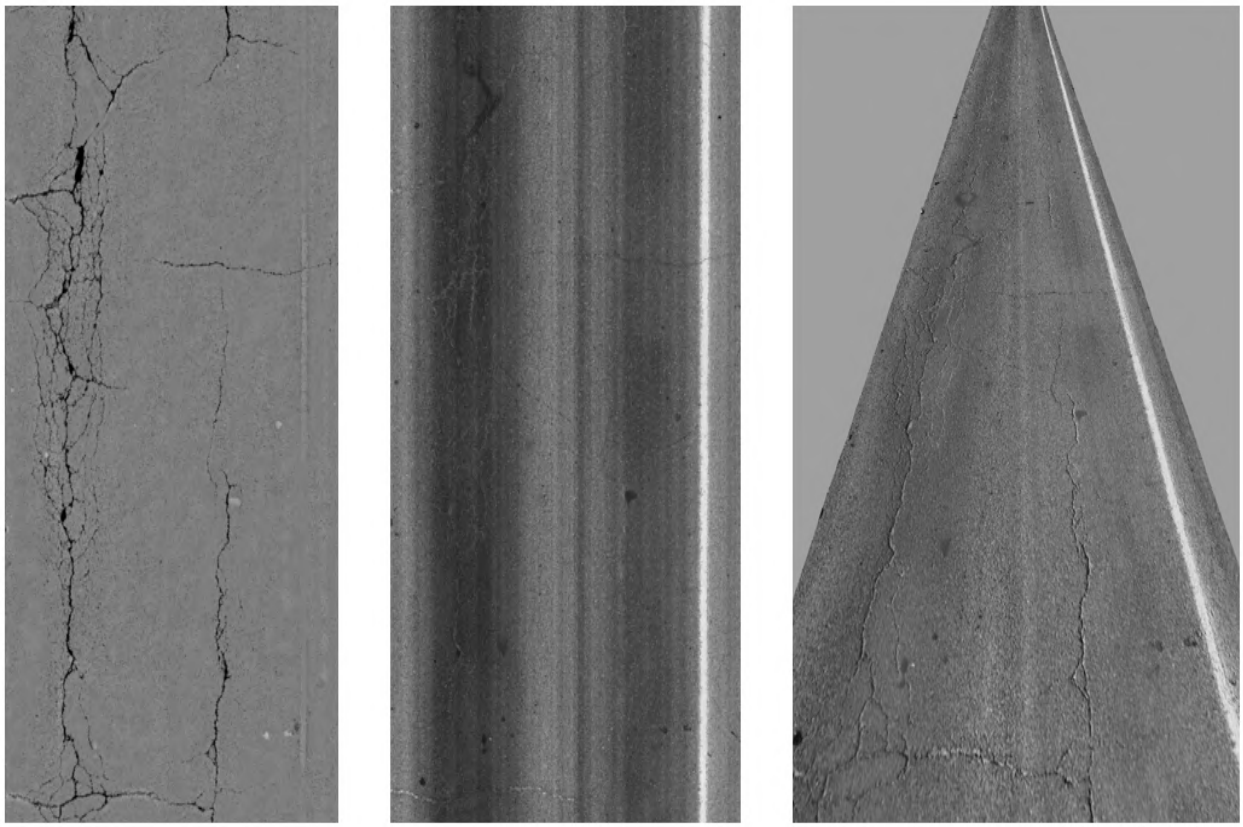


Figure 23: Range View (left), Intensity View (middle), and 3D View (right)

- This feature allows the user to select their desired reproduction interval length of generated pavement images, which align with predetermined right-of-way image intervals. The high-definition images are processed for various condition and distress ratings within Fugro's Vision software.

D.3.1.3 – Longitudinal Profile/Roughness

Fugro's Laser SDP (South Dakota Profiler) system shown in Figure 24 is a non-contact Class 1 inertial profiler (per ASTM E950) that uses lasers and accelerometers mounted at the front of the vehicle over each wheel path. The system measures the longitudinal profile for 100% of all lane miles to calculate International Roughness Index (IRI) and Ride Condition Index (RCI) for maximum accuracy. The equipment conforms with AASHTO R 57 "Standard Practice for Operating Inertial Profiling System" and the 2018 Caltrans Standard Specifications.

The ARAN saves raw longitudinal profile data for every one (1) inch of pavement in both wheel paths along with the standard deviations of each. The result is computed IRI values (in inches/mile) for each tenth (0.10) mile segment (528 feet) for both the left and right wheel paths. Highlights of Fugro's Laser SDP system for IRI data collection include:

- Equipped with GoCator dispersion lasers providing a full 100mm (4-inch) line of data across the road surface (like that of a tire footprint). This offers improved consistency, repeatability, and accuracy in the collection of the longitudinal profile.
- Ability to collect at variable testing speeds while maintaining a bias of less than 5%.
- Allowance for testing at low speed and "Stop and Go" conditions.
- High accuracy; measurements within ± 5% of all popular manual profiling techniques.

Figure 24: ARAN Laser SDP

- High repeatability with standard deviation for repeat runs within ± 5% of the mean. GoCator sensors' use further improves on this consistency, regardless of the testing surface type or condition.
- Real-Time IRI reporting for immediate operator identification of system issues.
- Two standard conformance tests, one static, and the other dynamic, ensure that both the laser and accelerometer components of the system are operating as intended
- Multiple parameters reported, including mean and max IRI and standard deviation by segment.

Fugro has developed reliable, speed-sensitive algorithms to improve the accuracy of the longitudinal profile calculated in low speed zones. These algorithms reduce the impact of the unwanted frequencies in the accelerometer signal that affect profile and IRI calculations. Since the low-speed algorithms are non-casual, meaning that they incorporate future data into the calculation, the low speed roughness feature recalculates the longitudinal profile and IRI during the processing stage for maximum accuracy and repeatability.

D.3.1.4 – Right-of-Way (ROW) Images

With our long history of working with States, Counties, and municipalities, we understand the value that transportation agencies receive from high quality digital images that offer a clear, focused view of the roadway and surrounding area. We have taken great care to source, calibrate, and maintain the best cameras in the industry. The image collection for this project will include both continuous ROW and downward facing pavement imaging. Collection will be performed on dry pavement and when weather and light do not inhibit visibility of pavement and ROW.

ROW cameras will capture the lane of travel and ROW. These images shall be captured at a minimum interval (e.g., 25 feet), at typical City speeds, and will provide 100% and continuous coverage of the ROW in full-frame with a high pixel resolution. The ARAN will collect ROW images utilizing Sony FX9 HD cameras that offer a resolution up to 3840 x 2160 pixels at 16:9 aspect ratio.

Figure 25 provides an example of Fugro's superior ROW image quality collected for one of our current clients. Each image is tied to a GPS location as well as a linear reference, which allows all images to be tied back to each other. All images can then be used to extract visible assets now or in the future.

Figure 25: Example of Fugro's Superior ROW Image Quality

D.5 – Quality Assurance/Quality Control

Quality assurance and control (QA/QC) is a crucial aspect of every successful project. All data that is collected and processed becomes a critical component for any management system it is uploaded to, and will ultimately contribute to important and critical decisions that DOT will make. The DOT expectations are consistent with our philosophy and our commitment to industry leading methods and tools. Fugro respects the intrinsic value of delivering correct, repeatable, and ready to use data to our clients. To meet these challenges **Fugro performs manual QA/QC checks on 100% of our data**. In addition, for multi-year projects we complete year-to-year comparisons to ensure the highest quality data delivery to our clients.

Included in Fugro's internal QC plan is a comprehensive set of SOPs for controlling quality, both in the field and in-house. These SOPs ensure each task is performed with consistency and discipline. These documents are presented and shared with DOT during the initial Project Definition and Work Plan meetings.

Fugro is well-positioned to continue to assist the DOT in meeting the FHWA's requirements outlined in the DOT's DQMP. Fugro practices quality control and assurance and works within an ISO 9001 registered Quality Management System (QMS).

Fugro follows a **four-step program** to meet our client's data quality expectations. This method, explained below, has been derived from years of data collection experience and lessons learned completing similar-scoped projects of all sizes.

Step 1 - Custom Agency Specific Data Quality Management Plan (DQMP):

Before any data collection commences, all operators and equipment will be calibrated and certified. Fugro will provide a copy of the processed data results of the calibration test runs to our client. Fugro will be responsible for all traffic control as per the U.S. Department of Transportation - Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD) and safety-related procedures for the mutual protection of our personnel, our client's employees, and the public. We will provide a seat for our client's staff in the ARAN if needed.
Specific calibrations and verifications are:

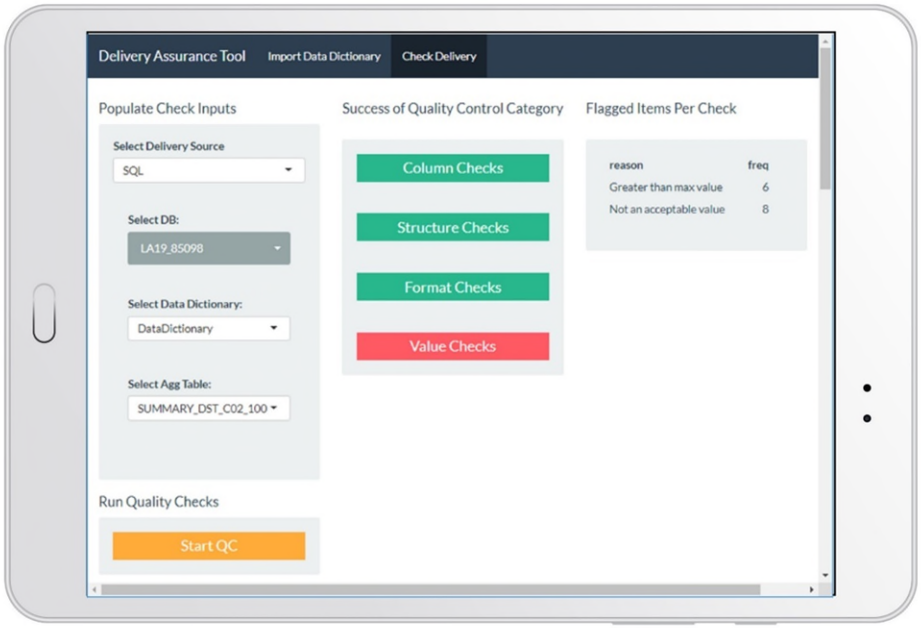
- Control Sites.
- Measurement differences (IRI, rutting and faulting data) of 5% or less between vehicles.
- Driver/Operator Verification.
- Distress Rater Verification.
- Daily Equipment Checks.
- Daily Quality Checks of Data.
- Weekly Equipment Calibrations Test Results (i.e. DMI, Laser Profiler, video footprint, etc.) Submitted on a Monthly Basis.
- Collect and provide IRI and rutting data on QC verification sections established by the client every week for each ARAN (if required by client).
- Weekly Electronic Sensor Verification Results Submitted on a Monthly Basis.

For added data quality assurance, Fugro includes the following Standard Operating Procedures:

- The ARAN runs the verification sites weekly. The weekly runs supplement the Monthly Control runs by ensuring the ARAN collects the same road segment data and then runs it weekly to verify the systems are giving the same values.
- The completion of Exit Control Runs. As a standard, Fugro requires all ARANs to run the same Control Sites used for entry and monthly validation before leaving the project. These runs ensure that no data collected since the last Control Run has any reason to be suspect.
- Our team provides a comprehensive Exception Report. The exception report flags any unexpected deviations in data elements accompanied by an explanation to eliminate the need for an agency to find anomalies.

Step 2- Aggregated Automated QC/QA:

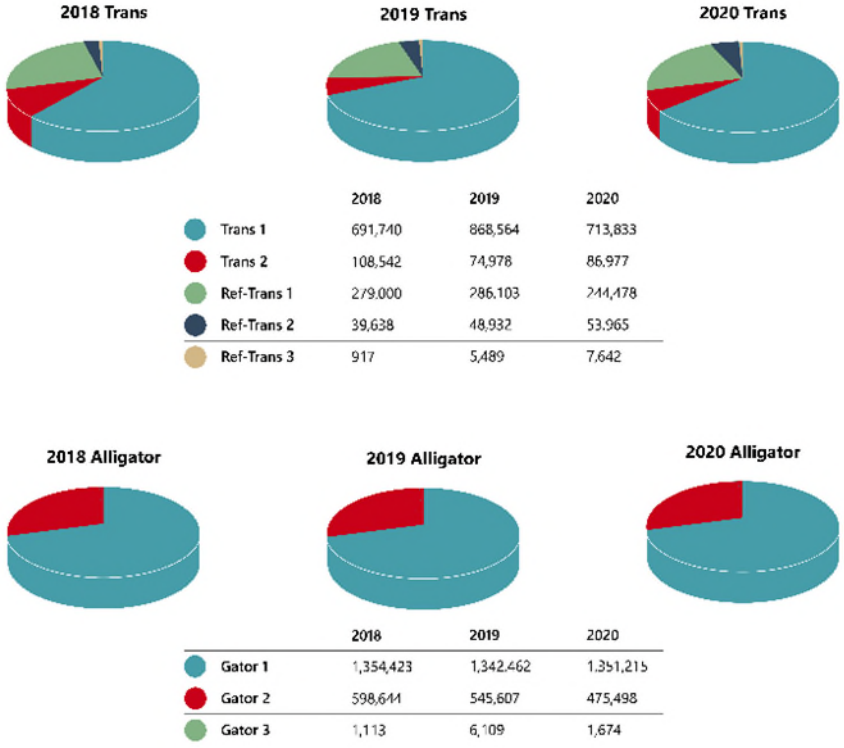
Our QA/QC tool is customized for each client and automatically reviews every data element to validate against approved metrics. The tool works by (1) Certifying table structure (2) ensuring correct column order & column spelling (3) confirming data formatting and (4) validating acceptable value ranges against the client agreed upon data dictionary. Any data items falling outside of the acceptable range are flagged and errors are provided in a summary report. The tool does not pass the deliverable until all quality metrics are met.



Step 3 - Distress Distribution Report:

Fugro can provide our clients with a Distress Distribution Report, which provides a snapshot of their pavements' health using the distribution for cracking and sensor data. This detailed report also facilitates easy identification of data that fall outside of expected trends. Fugro understands the importance to the DOT of examining year-over-year changes in pavement condition using defensible data and reporting methods.

An example of our Pavement Condition Report is seen in Figure 26, in this example, the pie charts are a clear view of changes that would require investigation and discussion between Fugro and the DOT.



	2018	2019	2020
Trans 1	691,740	868,564	713,833
Trans 2	108,542	74,978	86,977
Ref-Trans 1	279,000	286,103	244,478
Ref-Trans 2	39,638	48,932	53,965
Ref-Trans 3	917	5,489	7,642

	2018	2019	2020
Gator 1	1,354,423	1,342,462	1,351,215
Gator 2	598,641	545,607	475,498
Gator 3	1,113	6,109	1,674

Figure 26 Fugro's Pavement Condition Report Example

Step 4 - Distress, Sensor, and Global Positioning System (GPS) Year-to-Year Report:

Fugro's automated year-to-year comparison tool provides confidence in the delivered pavement condition data confirming data consistency between consecutive data collection cycles. The tool spatially aligns tenth (0.1) mile sections to ensure the year-to-year comparison on the same roadway section. We investigate and act upon any data item falling out of acceptable. Once all corrections are verified, we produce a final report. We achieve geospatial alignment and eliminate unwarranted data spikes in cracking and sensor data by utilizing this tool.

We have received consistent client feedback that this year-to-year report significantly reduces the time and effort of staff to verify data changes Our client's benefit from accurate, repeatable data used for modeling, trend analysis, and treatment selection. In cases when consecutive cycles are not a year apart, the "year-to-year" checks are still valid, but the parameters for flagging data checks are appropriately adjusted. Figure 27 shows a typical Year-to-Year analysis report.

Section-by-Section Year-to-Year Analysis Report Example													
ROUTE_NAME	CHTRIS_ID	LOCATOR2	ROUTE_TO_MEASURE	ROUTE_FROM_MEASURE	NLANE	CDIVIDED	LEVEL	DESCRIPTION	DATA_ITEM	CURRENT	PREVIOUS	DIFF	ERROR
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DEDUCT	Alligator1	ALIG_1_DEDUCT	8.117	8.152	-0.035	CHANGE 000%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DISTRESS	Alligator Cracking Severity 1	NA_CR1_SF	2842	2855	-13	CHANGE 000%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DEDUCT	Alligator2	ALIG_2_DEDUCT	2.034	1.363	0.671	CHANGE 049%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DISTRESS	Alligator Cracking Severity 2	NA_CR2_SF	497	332	165	CHANGE 050%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DEDUCT	Rutting	FINAL_RUT_DEDUCT	2.355	0	2.355	CHANGE 002%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DISTRESS	Average Deeper Rut (Straight-edge)	NRUT_S_AVG	0.13	0.08	0.05	CHANGE 062%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DEDUCT	Delamination	DEL_DEDUCT	0.006	0	0.006	CHANGE 000%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DISTRESS	Delamination Area	ndelam_sf	2	0	2	CHANGE 002%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DEDUCT	LinearCracking1	DEDUCT_1_CRACKING	3.303	1.654	1.649	CHANGE 100%
R-VA SR00016NB	005R00016N	1-092-005R00016N	52.419	50.57	2	0	DISTRESS	Transverse Cracking Severity 1	nt_cr1_lf	311	186	125	CHANGE 067%

Figure 27: The Year-to-Year Report Example

D.6 – Assumptions

1. Pricing for Activity 7 (Measure lane striping reflectivity quality) requires Activity 1 to be performed.
2. Pricing for Activities 9-13 are in price per lane mile/linear feet.
3. Pricing for Activity 16 (Utilize Ground Penetrating Radar for relocating utilities) requires Activity 1 to be performed.
4. Pricing for Activity 18 (Collect information on bridge deck condition) includes collection of the entire bridge deck area.
5. Pricing for Activity 20 individual components can be selected to a combined maximum price of $5,000.
6. Pricing for Activity 43 is based on using LiDAR data collection.
7. Pricing for Activity 44 is based on using LiDAR data collected under Activity 43.
8. Fugro is not proposing services for Activity 14 (Collect locations of trees, including height and spread) and Activities 37-39 (GIS Services)

D.7 – Any Exceptions to the Requirements

Fugro explicitly states that no exceptions are taken to any part of this RFP. Fugro is in compliance with the stated terms and conditions.

D.8 – Any Special Features or Services

Fugro is not proposing any special features or services.

Tab E – References

E.1 – Verifiable References

The following is a table of our references for whom we provided similar services to those requested in NCTCOG's RFP. These services are described in detail in Section C.4 Experience in the Last 5 Years.

Table 3: Verifiable References

Organization	Address	Contact	Title	Phone Number	Email Address
City of Abilene	555 Walnut Street, Room 201-A, Abilene, Texas 79601	Max E. Johnson	Director of Public Works	325-676-6283	max.johnson@abilenetx.gov
City of Missouri City	1522 Texas Parkway, Missouri City, Texas 77489	Cliff Brouhard, P.E., PTOE	Assistant Director of Public Works	281-403-8555	clifford.brouhard@missouricitytx.gov
City of Sugarland, TX	111 Gillingham Drive, Sugar Land, Texas 77478	Mathew Douglas	Operations Manager	281-275-2577	mdouglas@sugarlandtx.gov
City of Dallas	320 E. Jefferson Blvd, Dallas, Texas 75203	Jennifer Nicewander, P.E.	Senior Program Manager	214-949-4688	jennifer.nicewander@dallascityhall.com

Tab F – Proposal Pricing

RFP 2022-063 Pavement Analysis and Related Services

Attachment A (per Exhibit D) - Pricing Proposal Form

Proposed prices shall include all field inspectors, vehicles, tools, equipment, traffic control, contractor maintenance, and customer service support necessary to provide the desired services. Respondents must not include mobilization fees in their pricing and may not include them in any contract(s) that result from this RFP.

If a respondent elects to submit a percentage discount off their catalog pricing for any or all of their services, the corresponding price for each numbered activity listed in Attachment A must account for the proposed discount listed in Exhibit C. If you are not proposing a percentage-discount, please use your established list price for each for each numbered pavement analysis and related services activity.
[Example: If your catalog price is $100 per unit, and you indicate a 5% discount from catalog pricing in Exhibit C, your pricing form in Attachment A should reflect a unit price of $95.
Conversely, if your catalog price is $100 per unit, and you indicate a 0% discount or N/A in Exhibit C, your pricing form in Attachment A should reflect a unit price of $100.]

Service Category #1: Pavement Data Collection

			Provide Price Per Tiered Group				A	B	C=AxB
Activity #	Activity Description	Unit	Unit Base Cost ($)	Unit Cost ($) 0-200 Lane Miles	Unit Cost ($) 201-700 Lane Miles	Unit Cost ($) 700+ Lane Miles	Total Units	Agreed Upon Cost ($)/Unit	Total Agreed Upon Cost ($)
1	Automatically and continuously measure pavement cracking, texture, rutting and geometrics. Equipment used for rut measurement shall be capable of measuring both wheel track ruts simultaneously.	Lane Mile [1]		$__130	$__130	$__130			0
2	Collect pavement surface distress and structural condition information through automated means for all Participant-owned roadways.	Lane Mile [1]		$__78	$__78	$__78			0
3	Provide a customized digital condition rating system to collect user defined severity/extent based pavement distresses and pertinent roadway attributes to accommodate a standardized approach to collecting data	Lump Sum	$__2,600						0
4	Collect dual-wheel path roughness data to International Roughness Index standards.	Lane Mile [1]		$__13__	$__13__	$__13__			0
5	Collect pavement performance information that includes rutting using a minimum of seven (7) sensors (include pricing for nine (9) sensors as well), fatigue cracking, transverse cracking using a minimum of four (4) sensors, and longitudinal cracking	Lane Mile [1]		$__26	$__26	$__26			0
6	Perform friction testing	Lane Mile [1]		$____66.67____	$____66.67____	$____66.67____			0
7	Measure lane striping reflectivity quality	Lane Mile [1]		$___75 (requires collection cost from item 1)_____	$___75 (requires collection cost from item 1)_____	$___75 (requires collection cost from item 1)_____			0

Service Category #2: Assest Inventory

			Provide Price Per Tiered Group				A	B	C=AxB
Activity #	Activity Description	Unit	Unit Base Cost ($)	Unit Cost ($) 0-200 Lane Miles	Unit Cost ($) 201-700 Lane Miles	Unit Cost ($) 700+ Lane Miles	Total Units	Agreed Upon Cost ($)/Unit	Total Agreed Upon Cost ($)
8	Collect sidewalk data to include location, length, width, location in relation to curb and if greenspaces exist between curb and sidewalk, and sidewalk condition to create shape (.shp) files for incorporation into the Participant's GIS system, if applicable	Lane Mile [1]		$___95	$___95	$___95			0
9	Collect sidewalk Barrier Free Ramp data to include location, configuration, presence of truncated domes or other detectable warning feature, and condition and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable	Lane Mile 1	$___95						0
10	Collect roadway sign data to include type and location and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Lane Mile 1	$___95						0
11	Collect photos of Barrier Free Ramps, sidewalks, curb condition, drive approach, and/or roadway signs inventoried under items 8, 9, and 10 above.	Lane Mile 1	$___95						0
12	Collect location of curb and gutter and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Linear Feet	$___95						0
13	Collect location and type of visible in-pavement features such as valves, manhole covers, etc. and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Lane Mile 1	$___95						0
14	Collect locations of trees, including height and spread	Lane Mile 1	$(no bid item)_						0
15	Collect bike lane locations, including width, length, and associated signage and striping.	Linear Feet	$___95						0
16	Utilize Ground Penetrating Radar for relocating utilities (for maintenance plans).	Linear Feet	$___0.55__						0
17	Collect data on location and surface condition of bridge approaches	Each	$___95						0
18	Collect information on bridge deck condition	Each	$__130__(assuming entire bridge deck needs to be collected)						0
19	Perform Parking Lot Pavement Condition Assessment (Thru-Travel Lanes) w/ Inventory, Attribute, & Geodatabase Development	Square Yard	$__0.55___						0
20 (a-v) below:	Right of Way Assets Database Development (GPS & Camera Configuration):								
20a	Sign & Support Database Development	Each	$____1,000_(not to exceed $5,000 for any number of 20a-v)___						0
20b	Markings & Striping Database Development	Each	$__1,000__						0
20c	Traffic Signals/ Flashers and Controllers Database Development	Each	$__1,000__						0
20d	Street Lights Database Development	Each	$__1,000__						0
20e	Drop Inlets Database Development	Each	$__1,000__						0
20f	Drivepads Database Development	Each	$__1,000__						0
20g	Bridges Database Development	Each	$__1,000__						0
20h	Speed Humps Database Development	Each	$__1,000__						0
20i	Street Furniture Database Development	Each	$__1,000__						0
20j	Cattle Guards Database Development	Each	$__1,000__						0

20k	Guardrails & Roadside Pedestrian Fence Database Development	Each	$__1,000__						**0**
20l	Culverts and Ditches Database Development	Each	$__1,000__						**0**
20m	Cabinets Database Development	Each	$__1,000__						**0**
20n	Utility Poles Database Development	Each	$__1,000__						**0**
20o	Fire Hydrant Database Development	Each	$__1,000__						**0**
20p	Medians Database Development	Each	$__1,000__						**0**
20q	Valves Database Development	Each	$__1,000__						**0**
20r	Manhole Covers Database Development	Each	$__1,000__						**0**
20s	Trees Database Development	Each	$__1,000__						**0**
20t	Catch Basins/ Drainage Inlets from Master Drainage Plan Database Development	Each	$__1,000__						**0**
20u	Sidewalk Database Development	Each	$__1,000__						**0**
20v	Curb & Gutter Database Development	Each	$__1,000__						**0**
Service Category #3: Pavement Management Analysis									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
21	Calculate the International Roughness Index (IRI)for each road segment in accordance with ASTM E1926. Provide results compatible with the Participant's GIS database, if applicable.	Lane Mile [1]		$_6.5_____	$_6.5_____	$_6.5_____			**0**
22	Calculate a Pavement Condition Index (PCI) score for each road segment using an approved pavement management system and in accordance with ASTM D6433 or ASTM E3303. Provide results compatible with the Participant's GIS database, if applicable.	Lane Mile [1]		$_____19.6___	$_____19.6___	$_____19.6___			**0**
23	With input from Participant's staff, devise a weighing system taking into account PCI, IRI, average daily traffic for thoroughfares (traffic count raw data provided by Participant), public safety emergency routes, and apply this 0-100 numeric index to the roadway information collected for the entire jurisdiction. Provide results compatible with the Participant's GIS database, if applicable. **Cost includes base cost plus lane mile unit cost.**	Lane Mile [1]	$____6,500____	$__13___	$__13_____	$__13_____			**0**
24	Estimate the annual budget required to meet the long-term goals regarding desired pavement condition levels. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____7,800___	$_____13___	$_____13___	$_____13___			**0**
25	Create a five year and ten year pavement rehabilitation plan with input from Participant's staff. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____7,800___	$_____13___	$_____13___	$_____13___			**0**
26	Recommend the computer hardware and software needed for successful implementation, potentially including recommendations for licenses of pavement management system software and other geodatabase software as needed.	Each Participant	$__4,450_____						**0**
27	Train Participant staff and provide assistance to the Public Works and IT Department as needed for the use of data collected through the fully automated system. **(20 person maximum per class)**	Day	$__4,450_____						**0**
Service Category #4: Electronic Products									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
28	Roadway information that shall be collected and provided to the Participant at a minimum includes items a. through i. in Exhibit B	Lane Mile [1]		$__26_____	$__26_____	$__26_____			**0**
29	Collect digital images at 25-foot intervals of the road surface condition and link to a geodatabase (minimum forward facing imagery).	Lane Mile [1]		$___13_____	$___13_____	$___13_____			**0**
30	Load assessment data for all Participant-maintained pavements into a pavement management system required by local government Participant(s), if applicable. (Example: MicroPaver). The assessment data shall include visual observations, photographs and measurements collected by instrumentation. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
31	Implement map module so that pavement condition and other data can be integrated, displayed, and accessed through the map interface in a format consistent with the Participant's horizontal and vertical control network system, if applicable. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
32	Provide to the Participant the pavement condition data in a pavement management system database approved by Participant. Coordinate with the Participant's IT department to provide pavement condition data in a format compatible with the Participant's Environmental Systems Research Institute (ESRI) GIS database, if applicable. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
33	Provide asset management tools or systems (not just collection) (i.e., 15-year plan about how to fix or repair assets). **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
Service Category #5: Pavement Structural Analysis									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
34	Collect and analyze pavement structural condition information through the use of a falling weight deflectometer in accordance with industry standards on designated participant-owned roadways.	**							**0**
35	Collect and analyze pavement structural condition information through the use of Ground Penetrating Radar (GPR) in accordance with industry standards on designated participant-owned roadways.	**							**0**
36	Collect and analyze pavement structural condition information through the use of pavement cores in accordance with industry standards on designated participant-owned roadways (traffic control included)[2]	**							**0**
Service Category #6: GIS Related Services									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
37	GIS Clean-Up Services	Each Participant	$(no bid item)_						**0**

38	GIS Support Services	Each Participant	$(no bid item)_						0
39	GIS Remote Training Sessions from IMS GIS Manager/ Expert (2-Hour Sessions)	Each Participant	$(no bid item)_						0
Service Category #7: Value Added Services									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
40	Full Written Final Report- Firm shall prepare and submit a written project report summarizing the work performed, dates of collection, methodology, and results.	Each Participant	$__10,000						0
41	Project Presentation- Firm shall prepare and present a written project report summarizing the work performed, dates of collection, methodology, and results to the Participant's legislative body.	Each Participant	$___4,000__						0
42	Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey	Each Participant	(no bid item)***						0
43	Stand-alone field operation for collection of asset inventory only, with different levels of position accuracy and abilities to use data for attribute registration and conditions. **Cost includes base cost plus lane mile unit cost.** a.Photogrammetry b.Mobile Lidar	Lane Mile [1]	$__15,000__	$___150_____	$___150__	$___150_____			0
44	Generic asset types, allowing for any item within line of sight of the collection vehicle. Asset types include items a. through d. in Exhibit B. **Cost includes base cost plus lane mile unit cost.**	Lane Mile [1]	$_10,000_	$___95_____	$___95___	$___95_____			0
45	Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map	Hour	$___165_____						0
						TOTAL			0

[1] Lane mile is to be defined as a mile traveled as

1. **A single pass on alleyways**
2. **A centered single pass on residential streets**
3. **Includes the outside lane in each direction for collectors and arterials (2 total).**

[2]Spacing for pavement cores to be negotiated with each participant.

**** The awarded Contractor(s) shall provide all necessary field inspectors, vehicles, tools, equipment, traffic control and other services required to perform this work. No engineering services are available under this contact. Any activities that Participant and/or Contractor deem to require the service(s) of an engineer must be procured separately and are the sole responsibility of that party."**

*****Fugro typically bids Activity #42 per unit of "ramp" (at $80/ramp) and not per "participant" as the quantity will be unknown.**

Tab G – Required Attachment

REQUIRED ATTACHMENT CHECKLIST

Please utilize this checklist to ensure that all required attachments are included with your proposal. IF AN ATTACHMENT DOES NOT APPLY, PLEASE MARK AS "**NOT APPLICABLE**" AND SUBMIT WITH THE PROPOSAL. FAILURE TO SUBMIT **ALL REQUIRED DOCUMENTS** MAY NEGATIVELY IMPACT YOUR EVALUATION SCORE.

- ☒ Page X - Cover Sheet
- ☒ Page XX - Attachment I: Instructions for Proposals Compliance and Submittal
- ☒ Page XX - Attachment II: Certification of Offeror
- ☒ Page XX - Attachment III: Certification Regarding Debarment
- ☒ Page XX - Attachment IV: Restrictions on Lobbying
- ☒ Page XX - Attachment V: Drug-Free Workplace Certification
- ☒ Page XX - Attachment VI: Certification Regarding Disclosure of Conflict of Interest
- ☒ Page XX - Attachment VII: Certification of Fair Business Practices
- ☒ Page XX - Attachment VIII: Certification of Good Standing Texas Corporate Franchise Tax Certification
- ☒ Page XX - Attachment IX: Historically Underutilized Businesses, Minority Or Women-Owned Or Disadvantaged Business Enterprises
- ☒ Page XX - Attachment X: Attestation of Contracts Nullifying Activity
- ☒ Page XX - Exhibit A: Service Area Designation Forms
- ☒ Page XX - Exhibit B: Description of Desired Services for Proposed Pricing
- ☒ Page XX - Exhibit C: Service Questionnaire
- ☒ Page XX - Exhibit D: TXShare Pricing Proposal Instructions
- ☒ Respondent recognizes that all proposals must be submitted electronically through Public Purchase by the RFP due date and time. All other forms of submissions will be deemed nonresponsive and will not be opened or considered.

TXShare
Your Public Sector Solutions Center

REQUEST FOR PROPOSALS
For
PAVEMENT ANALYSIS AND RELATED SERVICES
RFP # 2022-063

Sealed proposals will be accepted until **2:00 PM CT, Tuesday February 21, 2023,** and then publicly opened and read aloud thereafter.

Fugro USA Land, Inc.
Legal Name of Proposing Firm

Sirous Alavi, Ph.D., P.E., PTOE — Director of Pavement Engineering
Contact Person — Title

(512)977-1851 — salavi@fugro.com
Telephone Number — E-Mail Address

8613 Cross Park Drive — Austin, TX — 78754
Street Address of Principal Place of Business — City/State — Zip

8613 Cross Park Drive — Austin, TX — 78754
Complete Mailing Address — City/State — Zip

Acknowledgment of Addenda: #1 X #2 X #3 _____ #4 _____ #5 _____

By signing below, you hereby certify that the information contained in this proposal and any attachments is true and correct, and may be viewed as an accurate representation of proposed services to be provided by this organization. You agree that failure to submit all requested information may result in rejection of your company's proposal as non-responsive. You certify that no employee, board member, or agent of the North Central Texas Council of Governments has assisted in the preparation of this proposal. You acknowledge that you have read and understand the requirements and provisions of this solicitation and that the organization will comply with the regulations and other applicable local, state, and federal regulations and directives in the implementation of this contract. And furthermore that I certify that I am legally authorized to sign this offer and to submit it to the North Central Texas Council of Governments, on behalf of said offeror by authority of its governing body.

Authorized Signature

ATTACHMENT I:
INSTRUCTIONS FOR PROPOSALS COMPLIANCE AND SUBMITTAL

Compliance with the Solicitation

Submissions must be in strict compliance with this solicitation. Failure to comply with all provisions of the solicitation may result in disqualification.

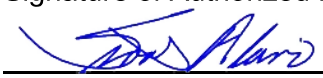
Acknowledgment of Insurance Requirements

By signing its submission, Offeror acknowledges that it has read and understands the insurance requirements for the submission. Offeror also understands that the evidence of required insurance may be requested to be submitted within ten (10) working days following notification of its offer being accepted; otherwise, NCTCOG may rescind its acceptance of the Offeror's proposals. The insurance requirements are outlined in Section 6.04.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:



Date: February 23, 2023

ATTACHMENT II:
CERTIFICATIONS OF OFFEROR

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:

Date: February 23, 2023

ATTACHMENT III:
CERTIFICATION REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

This certification is required by the Federal Regulations Implementing Executive Order 12549, Debarment and Suspension, 45 CFR Part 93, Government-wide Debarment and Suspension, for the Department of Agriculture (7 CFR Part 3017), Department of Labor (29 CFR Part 98), Department of Education (34 CFR Parts 85, 668, 682), Department of Health and Human Services (45 CFR Part 76).

The undersigned certifies, to the best of his or her knowledge and belief, that both it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency;

2. Have not within a three-year period preceding this contract been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction, violation of federal or State antitrust statues or commission of embezzlement, theft, forgery, bribery, falsification, or destruction of records, making false Proposals, or receiving stolen property;

3. Are not presently indicated for or otherwise criminally or civilly charged by a government entity with commission of any of the offense enumerated in Paragraph (2) of this certification; and,

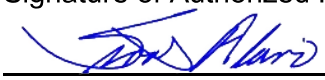
4. Have not within a three-year period preceding this contract had one or more public transactions terminated for cause or default.

Where the prospective recipient of federal assistance funds is unable to certify to any of the qualifications in this certification, such prospective recipient shall attach an explanation to this certification form.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:



Date: February 23, 2023

ATTACHMENT IV:
RESTRICTIONS ON LOBBYING

Section 319 of Public Law 101-121 prohibits recipients of federal contracts, grants, and loans exceeding $100,000 at any tier under a federal contract from using appropriated funds for lobbying the Executive or Legislative Branches of the federal government in connection with a specific contract, grant, or loan. Section 319 also requires each person who requests or receives a federal contract or grant in excess of $100,000 to disclose lobbying.

No appropriated funds may be expended by the recipient of a federal contract, loan, or cooperative agreement to pay any person for influencing or attempting to influence an officer or employee of any federal executive department or agency as well as any independent regulatory commission or government corporation, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered federal actions: the awarding of any federal contract, the making of any federal grant, the making of any federal loan the entering into of any cooperative agreement and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

As a recipient of a federal grant exceeding $100,000, NCTCOG requires its subcontractors of that grant to file a certification, set forth in Appendix B.1, that neither the agency nor its employees have made, or will make, any payment prohibited by the preceding paragraph.

Subcontractors are also required to file with NCTCOG a disclosure form, set forth in Appendix B.2, if the subcontractor or its employees have made or have agreed to make any payment using nonappropriated funds (to include profits from any federal action), which would be prohibited if paid for with appropriated funds.

LOBBYING CERTIFICATION
FOR CONTRACTS, GRANTS, LOANS, AND COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge or belief, that:

1. No federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an officer or employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal loan, the entering into of any cooperative Contract, and the extension, continuation, renewal, amendment, or modification or any federal contract, grant, loan, or cooperative contract; and

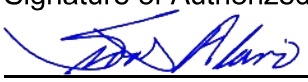
2. If any funds other than federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this federal contract, grant, loan, and or cooperative contract, the undersigned shall complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying", in accordance with the instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers and that all sub-recipients shall certify accordingly.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:



Date: February 23, 2023

ATTACHMENT V:
DRUG-FREE WORKPLACE CERTIFICATION

The Fugro USA Land, Inc. (company name) will provide a Drug Free Work Place in compliance with the Drug Free Work Place Act of 1988. The unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited on the premises of the Fugro USA Land, Inc. (company name) or any of its facilities. Any employee who violates this prohibition will be subject to disciplinary action up to and including termination. All employees, as a condition of employment, will comply with this policy.

CERTIFICATION REGARDING DRUG-FREE WORKPLACE

This certification is required by the Federal Regulations Implementing Sections 5151-5160 of the Drug-Free Workplace Act, 41 U.S.C. 701, for the Department of Agriculture (7 CFR Part 3017), Department of Labor (29 CFR Part 98), Department of Education (34 CFR Parts 85, 668 and 682), Department of Health and Human Services (45 CFR Part 76).

The undersigned subcontractor certifies it will provide a drug-free workplace by:

Publishing a policy Proposal notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the workplace and specifying the consequences of any such action by an employee;

Establishing an ongoing drug-free awareness program to inform employees of the dangers of drug abuse in the workplace, the subcontractor's policy of maintaining a drug-free workplace, the availability of counseling, rehabilitation and employee assistance programs, and the penalties that may be imposed on employees for drug violations in the workplace;

Providing each employee with a copy of the subcontractor's policy Proposal;

Notifying the employees in the subcontractor's policy Proposal that as a condition of employment under this subcontract, employees shall abide by the terms of the policy Proposal and notifying the subcontractor in writing within five days after any conviction for a violation by the employee of a criminal drug abuse statue in the workplace;

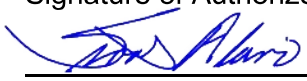
Notifying the Board within ten (10) days of the subcontractor's receipt of a notice of a conviction of any employee; and,

Taking appropriate personnel action against an employee convicted of violating a criminal drug statue or requires such employee to participate in a drug abuse assistance or rehabilitation program.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:



Date: February 23, 2023

ATTACHMENT VI:
CERTIFICATION REGARDING DISCLOSURE OF CONFLICT OF INTEREST

The undersigned certifies that, to the best of his or her knowledge or belief, that:

"No employee of the contractor, no member of the contractor's governing board or body, and no person who exercises any functions or responsibilities in the review or approval of the undertaking or carrying out of this contract shall participate in any decision relating to this contract which affects his/her personal pecuniary interest.

Executives and employees of contractor shall be particularly aware of the varying degrees of influence that can be exerted by personal friends and associates and, in administering the contract, shall exercise due diligence to avoid situations which give rise to an assertion that favorable treatment is being granted to friends and associates. When it is in the public interest for the contractor to conduct business with a friend or associate of an executive or employee of the contractor, an elected official in the area or a member of the North Central Texas Council of Governments, a permanent record of the transaction shall be retained.

Any executive or employee of the contractor, an elected official in the area or a member of the NCTCOG, shall not solicit or accept money or any other consideration from a third person, for the performance of an act reimbursed in whole or part by contractor or Department. Supplies, tools, materials, equipment or services purchased with contract funds shall be used solely for purposes allowed under this contract. No member of the NCTCOG shall cast a vote on the provision of services by that member (or any organization which that member represents) or vote on any matter which would provide a direct or indirect financial benefit to the member or any business or organization which the member directly represents".

No officer, employee or paid consultant of the contractor is a member of the NCTCOG.

No officer, manager or paid consultant of the contractor is married to a member of the NCTCOG.

No member of NCTCOG directly owns, controls or has interest in the contractor.

The contractor has disclosed any interest, fact, or circumstance that does or may present a potential conflict of interest.

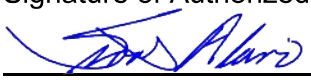
No member of the NCTCOG receives compensation from the contractor for lobbying activities as defined in Chapter 305 of the Texas Government Code.

Should the contractor fail to abide by the foregoing covenants and affirmations regarding conflict of interest, the contractor shall not be entitled to the recovery of any costs or expenses incurred in relation to the contract and shall immediately refund to the North Central Texas Council of Governments any fees or expenses that may have been paid under this contract and shall further be liable for any other costs incurred or damages sustained by the NCTCOG as it relates to this contract.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:



Date: February 23, 2023

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

FORM CIQ

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

Fugro USA, Land Inc.

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

N/A

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☒ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☒ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

N/A

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

Signature of vendor doing business with the governmental entity

February 23, 2023

Date

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

...

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

ATTACHMENT VII:
CERTIFICATION OF FAIR BUSINESS PRACTICES

That the submitter has not been found guilty of unfair business practices in a judicial or state agency administrative proceeding during the preceding year. The submitter further affirms that no officer of the submitter has served as an officer of any company found guilty of unfair business practices in a judicial or state agency administrative during the preceding year.

Name of Organization/Contractor(s):

Fugro USA Land, Inc.

Signature of Authorized Representative:

Date: February 23, 2023

ATTACHMENT VIII:
CERTIFICATION OF GOOD STANDING
TEXAS CORPORATE FRANCHISE TAX CERTIFICATION

Pursuant to Article 2.45, Texas Business Corporation Act, state agencies may not contract with for profit corporations that are delinquent in making state franchise tax payments. The following certification that the corporation entering into this offer is current in its franchise taxes must be signed by the individual authorized on Form 2031, Corporate Board of Directors Resolution, to sign the contract for the corporation.

The undersigned authorized representative of the corporation making the offer herein certified that the following indicated Proposal is true and correct and that the undersigned understands that making a false Proposal is a material breach of contract and is grounds for contract cancellation.

Indicate the certification that applies to your corporation:

X — The Corporation is a for-profit corporation and certifies that it is not delinquent in its franchise tax payments to the State of Texas.

_____ — The Corporation is a non-profit corporation or is otherwise not subject to payment of franchise taxes to the State of Texas.

Type of Business (if not corporation):

- ☐ Sole Proprietor
- ☐ Partnership
- ☐ Other

Pursuant to Article 2.45, Texas Business Corporation Act, the North Central Texas Council of Governments reserves the right to request information regarding state franchise tax payments.

Sirous Alavi
(Printed/Typed Name and Title of Authorized Representative)


Signature

Date: February 23, 2023

ATTACHMENT IX:
HISTORICALLY UNDERUTILIZED BUSINESSES, MINORITY OR WOMEN-OWNED OR DISADVANTAGED BUSINESS ENTERPRISES

Historically Underutilized Businesses (HUBs), minority or women-owned or disadvantaged businesses enterprises (M/W/DBE) are encouraged to participate in the solicitation process. Representatives from HUB companies should identify themselves and submit a copy of their certification.

NCTCOG recognizes the certifications of both the State of Texas Program and the North Central Texas Regional Certification Agency. Companies seeking information concerning HUB certification are urged to contact:

State of Texas HUB Program
Texas Comptroller of Public Accounts
Lyndon B. Johnson State Office Building
111 East 17th Street
Austin, Texas 78774
(512) 463-6958
http://www.window.state.tx.us/procurement/prog/hub/

NOT APPLICABLE

Local businesses seeking M/W/DBE certification should contact:

North Central Texas Regional Certification Agency
624 Six Flags Drive, Suite 100
Arlington, TX 76011
(817) 640-0606
http://www.nctrca.org/certification.html

Submitter must include a copy of its minority certification documentation as part of this solicitation. If your company is already certified, attach a copy of your certification to this form and return with your proposal.

Indicate all that apply:

N/A Minority-Owned Business Enterprise

N/A Women-Owned Business Enterprise

N/A Disadvantaged Business Enterprise

ATTEST TO Attachments of Certification:

_____
Authorized Signature

_____ _____
Typed Name Date

Subscribed and sworn to before me this _____day of _____ (month), 20__ in

_____ (city), _____ (county), _____ (state).

SEAL

Notary Public in and for _____ (County),
State of _____ Commission expires: _____

ATTACHMENT X
ATTESTATION OF CONTRACTS NULLIFYING ACTIVITY

The following provisions are mandated by Federal and/or State of Texas law. Failure to certify to the following will result in disqualification of consideration for contract. Entities or agencies that are not able to comply with the following will be ineligible for consideration of contract award.

PROHIBITED TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT CERTIFICATION

This Contract is subject to the Public Law 115-232, Section 889, and 2 Code of Federal Regulations (CFR) Part 200, including §200.216 and §200.471, for prohibition on certain telecommunications and video surveillance or equipment.

Public Law 115-232, Section 889, identifies that restricted telecommunications and video surveillance equipment or services (e.g. phones, internet, video surveillance, cloud servers) include the following:

A) Telecommunications equipment that is produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliates of such entities).

B) Video surveillance and telecommunications equipment produced by Hytera Communications Corporations, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliates of such entities).

C) Telecommunications or video surveillance services used by such entities or using such equipment.

D) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, Director of the National Intelligence, or the Director of the Federal Bureau of Investigation reasonably believes to be an entity owned or controlled by the government of a covered foreign country.

The entity identified below, through its authorized representative, hereby certifies that no funds under this Contract will be obligated or expended to procure or obtain telecommunication or video surveillance services or equipment or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as a critical technology as part of any system prohibited by 2 CFR §200.216 and §200.471, or applicable provisions in Public Law 115-232 Section 889.

☒ The Contractor or Subrecipient hereby certifies that it does comply with the requirements of 2 CFR §200.216 and §200.471, or applicable regulations in Public Law 115-232 Section 889.

SIGNATURE OF AUTHORIZED PERSON: 

NAME OF AUTHORIZED PERSON: Sirous Alavi, Ph.D., P.E., PTOE

NAME OF COMPANY: Fugro USA Land, Inc.

DATE: February 23, 2023

-OR-

☐ The Contractor or Subrecipient hereby certifies that it cannot comply with the requirements of 2 CFR §200.216 and §200.471, or applicable regulations in Public Law 115-232 Section 889.

SIGNATURE OF AUTHORIZED PERSON: _____

NAME OF AUTHORIZED PERSON: _____

NAME OF COMPANY: _____

DATE: _____

DISCRIMINATION AGAINST FIREARMS ENTITIES OR FIREARMS TRADE ASSOCIATIONS

This contract is subject to the Texas Local Government Code chapter 2274, Subtitle F, Title 10, prohibiting contracts with companies who discriminate against firearm and ammunition industries.

TLGC chapter 2274, Subtitle F, Title 10, identifies that "discrimination against a firearm entity or firearm trade association" includes the following:

A) means, with respect to the entity or association, to:
   I. refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association; and
   II. refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or
   III. terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association.

B) An exception to this provision excludes the following:
   I. contracts with a sole-source provider; or
   II. the government entity does not receive bids from companies who can provide written verification.

The entity identified below, through its authorized representative, hereby certifies that they have no practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association; and that they will not discriminate during the term of the contract against a firearm entity or firearm trade association as prohibited by Chapter 2274, Subtitle F, Title 10 of the Texas Local Government Code.

☒ The Contractor or Subrecipient hereby certifies that it does comply with the requirements of Chapter 2274, Subtitle F, Title 10.

SIGNATURE OF AUTHORIZED PERSON: 

NAME OF AUTHORIZED PERSON: Sirous Alavi, Ph.D., P.E., PTOE

NAME OF COMPANY: Fugro USA Land, Inc.

DATE: February 23, 2023

-OR-

☐ The Contractor or Subrecipient hereby certifies that it cannot comply with the requirements of Chapter 2274, Subtitle F, Title 10.

SIGNATURE OF AUTHORIZED PERSON: _____

NAME OF AUTHORIZED PERSON: _____

NAME OF COMPANY: _____

DATE: _____

BOYCOTTING OF CERTAIN ENERGY COMPANIES

This contract is subject to the Texas Local Government Code chapter 809, Subtitle A, Title 8, prohibiting contracts with companies who boycott certain energy companies.

TLGC chapter Code chapter 809, Subtitle A, Title 8, identifies that "boycott energy company" means, without an ordinary business purpose, refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with a company because the company:

I. engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; and
II. does business with a company described by paragraph (I).

The entity identified below, through its authorized representative, hereby certifies that they do not boycott energy companies, and that they will not boycott energy companies during the term of the contract as prohibited by Chapter 809, Subtitle A, Title 8 of the Texas Local Government Code.

☒ The Contractor or Subrecipient hereby certifies that it does comply with the requirements of Chapter 809, Subtitle A, Title 8.

SIGNATURE OF AUTHORIZED PERSON: 

NAME OF AUTHORIZED PERSON: Sirous Alavi, Ph.D., P.E., PTOE

NAME OF COMPANY: Fugro USA Land, Inc.

DATE: February 23, 2023

-OR-

☐ The Contractor or Subrecipient hereby certifies that it cannot comply with the requirements of Chapter 809, Subtitle A, Title 8.

SIGNATURE OF AUTHORIZED PERSON: _____

NAME OF AUTHORIZED PERSON: _____

NAME OF COMPANY: _____

DATE: _____

EXHIBIT A
Service Area Designation Forms

RFP 2022-063	Texas Service Area Designation or Identification		
Respondent Name:	Fugro USA Land, Inc.		
Notes:	**Indicate in the appropriate box whether you are proposing to service the entire State of Texas**		
	Will service the entire State of Texas	Will not service the entire State of Texas	
	Yes		
	If you are not proposing to service the entire State of Texas, designate on the form below the regions that you are proposing to provide goods and/or services to. By designating a region or regions, you are certifying that you are willing and able to provide the proposed goods and services.		
Item	**Region**	**Metropolitan Statistical Areas**	**Designated Service Area**
1.	North Central Texas	16 counties in the Dallas-Fort Worth Metropolitan area	
2.	High Plains	Amarillo Lubbock	
3.	Northwest	Abilene Wichita Falls	
4.	Upper East	Longview Texarkana, TX-AR Metro Area Tyler	
5.	Southeast	Beaumont-Port Arthur	
6.	Gulf Coast	Houston-The Woodlands-Sugar Land	
7.	Central Texas	College Station-Bryan Killeen-Temple Waco	
8.	Capital Texas	Austin-Round Rock	
9.	Alamo	San Antonio-New Braunfels Victoria	
10.	South Texas	Brownsville-Harlingen Corpus Christi Laredo McAllen-Edinburg-Mission	
11.	West Texas	Midland Odessa San Angelo	
12.	Upper Rio Grande	El Paso	

RFP 2022-063	Nationwide Service Area Designation or Identification Form		
Respondent Name:	Fugro USA Land, Inc.		
Notes:	Indicate in the appropriate box whether you are proposing to provide service to all Fifty (50) States.		
	Will service all Fifty (50) States	Will not service Fifty (50) States	
	Yes		
	If you are not proposing to service to all Fifty (50) States, then designate on the form below the States that you will provide service to. By designating a State or States, you are certifying that you are willing and able to provide the proposed goods and services in those States. If you are only proposing to service a specific region, metropolitan statistical area (MSA), or city in a State, then indicate as such in the appropriate column box.		

Item	State	Region/MSA/City	Designated as a Service Area
1.	Alabama		
2.	Alaska		
3.	Arizona		
4.	Arkansas		
5.	California		
6.	Colorado		
7.	Connecticut		
8.	Delaware		
9.	Florida		
10.	Georgia		
11.	Hawaii		
12.	Idaho		
13.	Illinois		
14.	Indiana		
15.	Iowa		
16.	Kansas		
17.	Kentucky		
18.	Louisiana		
19.	Maine		
20.	Maryland		
21.	Massachusetts		

22.	Michigan		
23.	Minnesota		
24.	Mississippi		
25.	Missouri		
26.	Montana		
27.	Nebraska		
28.	Nevada		
29.	New Hampshire		
30.	New Jersey		
31.	New Mexico		
32.	New York		
33.	North Carolina		
34.	North Dakota		
35.	Ohio		
36.	Oregon		
37.	Oklahoma		
38.	Pennsylvania		
39.	Rhode Island		
40.	South Carolina		
41.	South Dakota		
42.	Tennessee		
43.	Texas		
44.	Utah		
45.	Vermont		
46.	Virginia		
47.	Washington		
48.	West Virginia		
49.	Wisconsin		
50.	Wyoming		

EXHIBIT B
Description of Desired Services for Proposed Pricing

Responses to this Exhibit should be addressed in Tab D: Technical Proposal.

Respondents should furnish a proposal that specifies pricing (as **Exhibit D**) for the services they propose.

Responses are encouraged from vendors who can only provide a handful of products and services. Respondents are not expected to be able to provide the entirety of the desired services, though are welcome to if they are able!

The following categories of pavement analysis services comprise the essential elements of the desired services:

- Pavement Data Collection
- Asset Inventory
- Pavement Management Analysis
- Electronic Products
- Pavement Structural Analysis
- GIS Related Services
- Value Added Services

Service Category #1: Pavement Data Collection
Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #1:

1. Automatically and continuously measure pavement cracking, texture, rutting and geometrics. Equipment used for rut measurement shall be capable of measuring both wheel track ruts simultaneously.
2. Collect pavement surface distress and structural condition information through automated means for all Participant-owned roadways.
3. Provide a customized digital condition rating system to collect user defined severity/extent-based pavement distresses and pertinent roadway attributes to accommodate a standardized approach to collecting data.
4. Collect dual-wheel path roughness data to International Roughness Index standards.
5. Collect pavement performance information that includes rutting using a minimum of seven (7) sensors (include pricing for nine (9) sensors as well), fatigue cracking, transverse cracking using a minimum of four (4) sensors, and longitudinal cracking
6. Perform friction testing
7. Measure lane striping reflectivity quality

Service Category #2- Asset Inventory:
Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #2:

8. Collect sidewalk data to include location, length, width, location in relation to curb and if greenspaces exist between curb and sidewalk, and sidewalk condition to create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.

9. Collect sidewalk Barrier Free Ramp data to include location, configuration, presence of truncated domes or other detectable warning feature, and condition and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.

10. Collect roadway sign data to include type and location and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
11. Collect photos of Barrier Free Ramps, sidewalks, curb condition, drive approach, and/or roadway signs inventoried under items 8, 9, and 10 above.
12. Collect location of curb and gutter and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
13. Collect location and type of visible in-pavement features such as valves, manhole covers, etc. and create shapefiles (.shp) for incorporation into the Participant's GIS system, if applicable.
14. Collect locations of trees, including height and spread
15. Collect bike lane locations, including width, length, and associated signage and striping.
16. Utilize Ground Penetrating Radar for relocating utilities (for maintenance plans).
17. Collect data on location and surface condition of bridge approaches
18. Collect information on bridge deck condition
19. Perform Parking Lot Pavement Condition Assessment (Thru-Travel Lanes) w/ Inventory, Attribute, & Geodatabase Development
20. Right of Way Assets Database Development (GPS & Camera Configuration):
    a. Sign & Support Database Development
    b. Markings & Striping Database Development
    c. Traffic Signals/ Flashers. Controllers Database Development
    d. Street Lights Database Development
    e. Drop Inlets Database Development
    f. Drivepads Database Development
    g. Bridges Database Development
    h. Speed Humps Database Development
    i. Street Furniture Database Development
    j. Cattle Guards Database Development
    k. Guardrails & Roadside Pedestrian Fence Database Development
    l. Culverts and Ditches
    m. Cabinets
    n. Utility Poles
    o. Fire Hydrant
    p. Medians Database
    q. Valves
    r. Manhole Covers
    s. Trees
    t. Catch Basins/ Drainage Inlets from Master Drainage Plan
    u. Sidewalk Database Development
    v. Curb & Gutter Database Development

Service Category #3- Pavement Management Analysis:

Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #3:

21. Calculate the International Roughness Index (IRI) for each road segment in accordance with ASTM E1926. Provide results compatible with the Participant's GIS database, if applicable.
22. Calculate a Pavement Condition Index (PCI) score for each road segment using an approved pavement management system and in accordance with ASTM D6433 or ASTM E3303. Provide results compatible with the Participant's GIS database, if applicable.
23. With input from Participant's staff, devise a weighing system taking into account PCI, IRI, average daily traffic for thoroughfares (traffic count raw data provided by Participant), public safety emergency routes, and apply this 0-100 numeric index to the roadway information

collected for the entire jurisdiction. Provide results compatible with the Participant's GIS database, if applicable.

24. Estimate the annual budget required to meet the long-term goals regarding desired pavement condition levels.
25. Create a five-year and ten-year pavement rehabilitation plan with input from Participant's staff.
26. Recommend the computer hardware and software needed for successful implementation, potentially including recommendations for licenses of pavement management system software and other geodatabase software as needed.
27. Train Participant staff and provide assistance to the Public Works and IT Department as needed for the use of data collected through the fully automated system.

Service Category #4: Electronic Products

Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #4:

28. Roadway information that shall be collected and provided to the Participant at a minimum includes:
    a. Street Name
    b. Endpoint One, Endpoint Two, and Segment ID
    c. Segment Length and Pavement Width
    d. Inventory Date
    e. Pavement Type
    f. Segment Functional Classification
    g. Pavement condition scored depending on the requirements of local government Participant(s) (Example: Pavement condition scored as one of the MicroPaver 19 surface distress codes with corresponding unit of measure scored every 100 feet longitudinally)
    h. Pavement performance information that includes rutting, fatigue cracking, transverse cracking, and longitudinal cracking
    i. Pavement age (if necessary to develop pavement life curves)
29. Collect digital images at 25-foot intervals of the road surface condition and link to a geodatabase (minimum forward facing imagery).
30. Load assessment data for all Participant-maintained pavements into a pavement management system required by local government Participant(s), if applicable. (Example: MicroPaver). The assessment data shall include visual observations, photographs and measurements collected by instrumentation.
31. Implement map module so that pavement condition and other data can be integrated, displayed, and accessed through the map interface in a format consistent with the Participant's horizontal and vertical control network system, if applicable.
32. Provide to the Participant the pavement condition data in a pavement management system database approved by Participant. Coordinate with the Participant's IT department to provide pavement condition data in a format compatible with the Participant's Environmental Systems Research Institute (ESRI) GIS database, if applicable.
33. Asset management tools or systems (not just collection) (i.e. 15-year plan about how to fix or repair assets).

Service Category #5- Pavement Structural Analysis:

Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #5:

34. Collect and analyze pavement structural condition information through the use of a falling weight deflectometer in accordance with industry standards on designated participant-owned roadways.

35. Collect and analyze pavement structural condition information through the use of Ground Penetrating Radar (GPR) in accordance with industry standards on designated participant-owned roadways.
36. Collect and analyze pavement structural condition information through the use of pavement cores in accordance with industry standards on designated participant-owned roadways (traffic control included).

Service Category #6- GIS Related Services:
Respondents should detail their specific skill sets and/or range of capabilities for carrying out the Following related activities in their proposal for Service Category #6:

37. GIS Clean-Up Services
38. GIS Support Services
39. GIS Remote Training Sessions from GIS Manager/ Expert (2-Hour Sessions)

Service Category #7- Value Added Services:
Respondents should detail their specific skill sets and/or range of capabilities for carrying out the following related activities in their proposal for Service Category #7:

40. Full Written Final Report- Firm shall prepare and submit a written project report summarizing the work performed, dates of collection, methodology, and results.
41. Project Presentation- Firm shall prepare and present a written project report summarizing the work performed, dates of collection, methodology, and results to the Participant's legislative body.
42. Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey.
43. Stand-alone field operation for collection of asset inventory only, with different levels of position accuracy and abilities to use data for attribute registration and conditions.
    a. Photogrammetry
    b. Mobile Lidar
44. Generic asset types, allowing for any item within line of sight of the collection vehicle.
    a. Above ground point asset
    b. Above ground linear asset
    c. At grade point asset
    d. At grade linear asset
45. Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map.

The awarded Contractor(s) shall provide all necessary field inspectors, vehicles, tools, equipment, traffic control and other services required to perform this work. No engineering services are available under this contact. Any activities that Participant and/or Contractor deem to require the service(s) of an engineer must be procured separately and are the sole responsibility of that party.

EXHIBIT C
Service Questionnaire

Respondents are encouraged to consider that cooperative contracts are able to be offered to any public-sector agency that can benefit from them, anywhere in the nation.

For any or all of their services, respondents may therefore provide a percentage discount off of catalog pricing. A 0% discount must still be denoted on the line item(s) with the number zero. Respondents are **not** required to propose a discount.

Indicate the services you are able to offer, as well as any proposed discounts. If you are not proposing a percentage-discount, please mark that field N/A.

Category #	Description	Yes	No	Proposed % Discount
1	Pavement Data Collection	X		0 %
2	Asset Inventory Management	X		0 %
3	Pavement Management Analysis	X		0 %
4	Electronic Products	X		0 %
5	Pavement Structural Evaluations	X		0 %
6	GIS Related Services		X	0 %
7	Value Added Services	X		0 %

Respondents should address the following items in Tab D: Technical Proposal if they are applicable for the service(s) being proposed.

- Respondents are asked to identify services that they are able to provide.
- Respondents are not required to be able to respond to all services in order to provide a proposal to this RFP.
- Those Respondents that are capable of providing more than a single service, indicate which in the table above, and provide an individual narrative relating to the needs of each Service Category as described in Exhibit B.
- Responses should consist of detailed descriptions of what a Respondent's firm is capable of providing to the TXShare Public Purchasing Cooperative. The numbered activities in each Service Category must be addressed, but Respondents are encouraged to provide additional detail about their operation and capabilities.
- Respondents who wish to propose additional services or pavement analysis services are encouraged to do so by attaching additional (as many as necessary) to describe said products or services and their associated pricing structures.

Note: Respondent is not required to complete any questions that are not applicable to the services you are bidding.

EXHIBIT D
Pricing Proposal/Attachment A Instructions

Submissions must include Attachment A, RFP 2022-063 Pricing Proposal Form, which is located on the Public Purchase project page. Respondents may provide pricing that is the most compatible with their business model if they maintain consideration for geographic coverage for TXSHARE participants and evolution of the service throughout the contract lifecycle

Attachment A contains predetermined criteria for your firm to price. Respondents are to provide tiered pricing based on the base cost and/or range of lane miles for each numbered pavement analysis and related services activity.

**Respondents must not include mobilization fees in their pricing and may not include them in any contract(s) that result from this RFP.

If a respondent elects to submit a percentage discount off their catalog pricing for any or all of their services, the corresponding price for each numbered activity listed in Attachment A must account for the proposed discount listed in Exhibit C. If you are not proposing a percentage-discount, please use your established list price for each numbered pavement analysis and related services activity.

Example: If your catalog price is $100 per unit, and you indicate a 5% discount from catalog pricing in Exhibit C, your pricing form in Attachment A should reflect a unit price of $95. Conversely, if your catalog price is $100 per unit, and you indicate a 0% discount or N/A in Exhibit C, your pricing form in Attachment A should reflect a unit price of $100.

RFP 2022-063 Pavement Analysis and Related Services

Attachment A (per Exhibit D) - Pricing Proposal Form

Proposed prices shall include all field inspectors, vehicles, tools, equipment, traffic control, contractor maintenance, and customer service support necessary to provide the desired services. Respondents must not include mobilization fees in their pricing and may not include them in any contract(s) that result from this RFP.

If a respondent elects to submit a percentage discount off their catalog pricing for any or all of their services, the corresponding price for each numbered activity listed in Attachment A must account for the proposed discount listed in Exhibit C. If you are not proposing a percentage-discount, please use your established list price for each for each numbered pavement analysis and related services activity.
[Example: If your catalog price is $100 per unit, and you indicate a 5% discount from catalog pricing in Exhibit C, your pricing form in Attachment A should reflect a unit price of $95.
Conversely, if your catalog price is $100 per unit, and you indicate a 0% discount or N/A in Exhibit C, your pricing form in Attachment A should reflect a unit price of $100.]

Service Category #1: Pavement Data Collection

			Provide Price Per Tiered Group				A	B	C=AxB
Activity #	Activity Description	Unit	Unit Base Cost ($)	Unit Cost ($) 0-200 Lane Miles	Unit Cost ($) 201-700 Lane Miles	Unit Cost ($) 700+ Lane Miles	Total Units	Agreed Upon Cost ($)/Unit	Total Agreed Upon Cost ($)
1	Automatically and continuously measure pavement cracking, texture, rutting and geometrics. Equipment used for rut measurement shall be capable of measuring both wheel track ruts simultaneously.	Lane Mile [1]		$__130	$__130	$__130			0
2	Collect pavement surface distress and structural condition information through automated means for all Participant-owned roadways.	Lane Mile [1]		$__78	$__78	$__78			0
3	Provide a customized digital condition rating system to collect user defined severity/extent based pavement distresses and pertinent roadway attributes to accommodate a standardized approach to collecting data	Lump Sum	$__2,600						0
4	Collect dual-wheel path roughness data to International Roughness Index standards.	Lane Mile [1]		$__13__	$__13__	$__13__			0
5	Collect pavement performance information that includes rutting using a minimum of seven (7) sensors (include pricing for nine (9) sensors as well), fatigue cracking, transverse cracking using a minimum of four (4) sensors, and longitudinal cracking	Lane Mile [1]		$__26	$__26	$__26			0
6	Perform friction testing	Lane Mile [1]		$____66.67____	$____66.67____	$____66.67____			0
7	Measure lane striping reflectivity quality	Lane Mile [1]		$___75 (requires collection cost from item 1)_____	$___75 (requires collection cost from item 1)_____	$___75 (requires collection cost from item 1)_____			0

Service Category #2: Assest Inventory

			Provide Price Per Tiered Group				A	B	C=AxB
Activity #	Activity Description	Unit	Unit Base Cost ($)	Unit Cost ($) 0-200 Lane Miles	Unit Cost ($) 201-700 Lane Miles	Unit Cost ($) 700+ Lane Miles	Total Units	Agreed Upon Cost ($)/Unit	Total Agreed Upon Cost ($)
8	Collect sidewalk data to include location, length, width, location in relation to curb and if greenspaces exist between curb and sidewalk, and sidewalk condition to create shape (.shp) files for incorporation into the Participant's GIS system, if applicable	Lane Mile [1]		$___95	$___95	$___95			0
9	Collect sidewalk Barrier Free Ramp data to include location, configuration, presence of truncated domes or other detectable warning feature, and condition and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable	Lane Mile 1	$___95						0
10	Collect roadway sign data to include type and location and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Lane Mile 1	$___95						0
11	Collect photos of Barrier Free Ramps, sidewalks, curb condition, drive approach, and/or roadway signs inventoried under items 8, 9, and 10 above.	Lane Mile 1	$___95						0
12	Collect location of curb and gutter and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Linear Feet	$___95						0
13	Collect location and type of visible in-pavement features such as valves, manhole covers, etc. and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Lane Mile 1	$___95						0
14	Collect locations of trees, including height and spread	Lane Mile 1	$(no bid item)_						0
15	Collect bike lane locations, including width, length, and associated signage and striping.	Linear Feet	$___95						0
16	Utilize Ground Penetrating Radar for relocating utilities (for maintenance plans).	Linear Feet	$___0.55__						0
17	Collect data on location and surface condition of bridge approaches	Each	$___95						0
18	Collect information on bridge deck condition	Each	$__130__(assuming entire bridge deck needs to be collected)						0
19	Perform Parking Lot Pavement Condition Assessment (Thru-Travel Lanes) w/ Inventory, Attribute, & Geodatabase Development	Square Yard	$__0.55___						0
20 (a-v) below:	Right of Way Assets Database Development (GPS & Camera Configuration):								
20a	Sign & Support Database Development	Each	$____1,000_(not to exceed $5,000 for any number of 20a-v)___						0
20b	Markings & Striping Database Development	Each	$__1,000__						0
20c	Traffic Signals/ Flashers and Controllers Database Development	Each	$__1,000__						0
20d	Street Lights Database Development	Each	$__1,000__						0
20e	Drop Inlets Database Development	Each	$__1,000__						0
20f	Drivepads Database Development	Each	$__1,000__						0
20g	Bridges Database Development	Each	$__1,000__						0
20h	Speed Humps Database Development	Each	$__1,000__						0
20i	Street Furniture Database Development	Each	$__1,000__						0
20j	Cattle Guards Database Development	Each	$__1,000__						0

20k	Guardrails & Roadside Pedestrian Fence Database Development	Each	$__1,000__						**0**
20l	Culverts and Ditches Database Development	Each	$__1,000__						**0**
20m	Cabinets Database Development	Each	$__1,000__						**0**
20n	Utility Poles Database Development	Each	$__1,000__						**0**
20o	Fire Hydrant Database Development	Each	$__1,000__						**0**
20p	Medians Database Development	Each	$__1,000__						**0**
20q	Valves Database Development	Each	$__1,000__						**0**
20r	Manhole Covers Database Development	Each	$__1,000__						**0**
20s	Trees Database Development	Each	$__1,000__						**0**
20t	Catch Basins/ Drainage Inlets from Master Drainage Plan Database Development	Each	$__1,000__						**0**
20u	Sidewalk Database Development	Each	$__1,000__						**0**
20v	Curb & Gutter Database Development	Each	$__1,000__						**0**
Service Category #3: Pavement Management Analysis									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
21	Calculate the International Roughness Index (IRI)for each road segment in accordance with ASTM E1926. Provide results compatible with the Participant's GIS database, if applicable.	Lane Mile [1]		$_6.5_____	$_6.5_____	$_6.5_____			**0**
22	Calculate a Pavement Condition Index (PCI) score for each road segment using an approved pavement management system and in accordance with ASTM D6433 or ASTM E3303. Provide results compatible with the Participant's GIS database, if applicable.	Lane Mile [1]		$_____19.6___	$_____19.6___	$_____19.6___			**0**
23	With input from Participant's staff, devise a weighing system taking into account PCI, IRI, average daily traffic for thoroughfares (traffic count raw data provided by Participant), public safety emergency routes, and apply this 0-100 numeric index to the roadway information collected for the entire jurisdiction. Provide results compatible with the Participant's GIS database, if applicable. **Cost includes base cost plus lane mile unit cost.**	Lane Mile [1]	$____6,500____	$__13___	$__13_____	$__13_____			**0**
24	Estimate the annual budget required to meet the long-term goals regarding desired pavement condition levels. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____7,800___	$_____13___	$_____13___	$_____13___			**0**
25	Create a five year and ten year pavement rehabilitation plan with input from Participant's staff. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____7,800___	$_____13___	$_____13___	$_____13___			**0**
26	Recommend the computer hardware and software needed for successful implementation, potentially including recommendations for licenses of pavement management system software and other geodatabase software as needed.	Each Participant	$__4,450_____						**0**
27	Train Participant staff and provide assistance to the Public Works and IT Department as needed for the use of data collected through the fully automated system. **(20 person maximum per class)**	Day	$__4,450_____						**0**
Service Category #4: Electronic Products									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
28	Roadway information that shall be collected and provided to the Participant at a minimum includes items a. through i. in Exhibit B	Lane Mile [1]		$__26_____	$__26_____	$__26_____			**0**
29	Collect digital images at 25-foot intervals of the road surface condition and link to a geodatabase (minimum forward facing imagery).	Lane Mile [1]		$___13_____	$___13_____	$___13_____			**0**
30	Load assessment data for all Participant-maintained pavements into a pavement management system required by local government Participant(s), if applicable. (Example: MicroPaver). The assessment data shall include visual observations, photographs and measurements collected by instrumentation. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
31	Implement map module so that pavement condition and other data can be integrated, displayed, and accessed through the map interface in a format consistent with the Participant's horizontal and vertical control network system, if applicable. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
32	Provide to the Participant the pavement condition data in a pavement management system database approved by Participant. Coordinate with the Participant's IT department to provide pavement condition data in a format compatible with the Participant's Environmental Systems Research Institute (ESRI) GIS database, if applicable. **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
33	Provide asset management tools or systems (not just collection) (i.e., 15-year plan about how to fix or repair assets). **Cost includes base cost plus lane mile unit cost.**	Each Participant	$_____6,500__	$_____6.5__	$_____6.5__	$_____6.5__			**0**
Service Category #5: Pavement Structural Analysis									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
34	Collect and analyze pavement structural condition information through the use of a falling weight deflectometer in accordance with industry standards on designated participant-owned roadways.	**							**0**
35	Collect and analyze pavement structural condition information through the use of Ground Penetrating Radar (GPR) in accordance with industry standards on designated participant-owned roadways.	**							**0**
36	Collect and analyze pavement structural condition information through the use of pavement cores in accordance with industry standards on designated participant-owned roadways (traffic control included)[2]	**							**0**
Service Category #6: GIS Related Services									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
37	GIS Clean-Up Services	Each Participant	$(no bid item)_						**0**

38	GIS Support Services	Each Participant	$(no bid item)_						0
39	GIS Remote Training Sessions from IMS GIS Manager/ Expert (2-Hour Sessions)	Each Participant	$(no bid item)_						0
Service Category #7: Value Added Services									
			Provide Price Per Tiered Group				**A**	**B**	**C=AxB**
Activity #	**Activity Description**	**Unit**	**Unit Base Cost ($)**	**Unit Cost ($) 0-200 Lane Miles**	**Unit Cost ($) 201-700 Lane Miles**	**Unit Cost ($) 700+ Lane Miles**	**Total Units**	**Agreed Upon Cost ($)/Unit**	**Total Agreed Upon Cost ($)**
40	Full Written Final Report- Firm shall prepare and submit a written project report summarizing the work performed, dates of collection, methodology, and results.	Each Participant	$__10,000						0
41	Project Presentation- Firm shall prepare and present a written project report summarizing the work performed, dates of collection, methodology, and results to the Participant's legislative body.	Each Participant	$___4,000__						0
42	Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey	Each Participant	(no bid item)***						0
43	Stand-alone field operation for collection of asset inventory only, with different levels of position accuracy and abilities to use data for attribute registration and conditions. **Cost includes base cost plus lane mile unit cost.** a.Photogrammetry b.Mobile Lidar	Lane Mile [1]	$__15,000__	$___150_____	$___150__	$___150_____			0
44	Generic asset types, allowing for any item within line of sight of the collection vehicle. Asset types include items a. through d. in Exhibit B. **Cost includes base cost plus lane mile unit cost.**	Lane Mile [1]	$_10,000_	$___95_____	$___95___	$___95_____			0
45	Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map	Hour	$___165_____						0
						TOTAL			0

[1] Lane mile is to be defined as a mile traveled as

1. **A single pass on alleyways**
2. **A centered single pass on residential streets**
3. **Includes the outside lane in each direction for collectors and arterials (2 total).**

[2]Spacing for pavement cores to be negotiated with each participant.

**** The awarded Contractor(s) shall provide all necessary field inspectors, vehicles, tools, equipment, traffic control and other services required to perform this work. No engineering services are available under this contact. Any activities that Participant and/or Contractor deem to require the service(s) of an engineer must be procured separately and are the sole responsibility of that party."**

*****Fugro typically bids Activity #42 per unit of "ramp" (at $80/ramp) and not per "participant" as the quantity will be unknown.**

North Texas SHARE
Your Public Sector Solutions Center

ADDENDUM TO THE REQUEST FOR PROPOSALS Pavement Analysis and Related Services

ADDENDUM NO. 1 DATE ISSUED: February 14, 2023

REQUEST FOR PROPOSALS NUMBER: NCT-2022-063
ORIGINAL RFP SUBMISSION DATE: February 21, 2023
REVISED RFP SUBMISSION DATE: February 24, 2023 (Revised)

RFP NCT-2022-063, dated January 20, 2023, is hereby amended to incorporate in full text the following provisions:

Section 1.1: Purpose
Section 1.1, Paragraph Two is hereby struck and replaced with the following:

> Qualified respondents must be able to conduct, instruct, and/or implement Pavement Analysis Analyses and/or Asset Management Inventory for publicly-maintained roadways, including arterial and collector streets, streets with concrete, asphalt, and/or dirt/gravel, and alleyways. Qualified Respondents must also be able to conduct surveys of sidewalk networks and ADA ramps, if applicable. Qualified firms are invited to submit proposals, based on the information provided in this RFP. NCTCOG intends to establish one or more contracts that will maximize the resources of all parties to most effectively meet the needs of NCTCOG and public sector entities of the TXShare Cooperative.

Section 4.5 Proposal Evaluation Criteria
Typographical Error – The “Description” field for Technical Proposal lists a total of “0%” as the maximum points. This is hereby corrected to 30% to match the data to the right in the ‘Points’ field.

Attachment A – Price Proposal
Service Category II – Asset Inventory: Unit modification from “each” to “lane mile”. Items 9, 10, 11, 13, and 14 are hereby so modified. Attachment A has been updated in Public Purchase as Attachment A Revised. Please utilize this document for your proposal purposes.

Questions and Answers

The following questions were submitted by potential proposers and are answered below. Questions are indicated by standard type and answers indicated by **bold-face type.**

Question #1
Must the vendors provide services using a van? What if we have an alternative type of collection, like using vehicles that are already on the road?

Answer 1: As long as your collection method meets the standard described within the RFP, it should not be a disqualifying factor.

Question #2
Mobilization is not anticipated in this RFP, isn't that correct?

Answer 2: That is correct – mobilization fees are not to be included in this offering.

Question #3
Don't activities in Service Category 3 constitute engineering services?

Answer 3: No, those do not.

Question #4
there are multiple service areas you can select which ones you're going to respond to and tabs B there's an executive summary. I would assume that would be an overarching, but some of the Tab D specifically technical proposal. Would there be a tab for each service area that one is proposing, or would there be a tab that covers all service areas that one is proposing on?
Answer 4: Please provide a single Attachment A for all service areas you are able to provide to. Please be advised that you may provide services wherever you are capable fo doing so – but you are not obligated to service areas simply because you've listed them on your RFP response. For example, if your Firm cannot provide services today in Washington State, but you identify that you will service all 50 states because you anticipate expansion in the future – that is fine. You cannot be obligated to perform services in an area that you are not physically present in, but it may be a benefit to have that option during the multiple-year long term of the contract.

Question #5
In regards to Service Category 1, #1. Can you define what is meant by "geometrics"?

[Automatically and continuously measure pavement cracking, texture, rutting and geometrics. Equipment used for rut measurement shall be capable of measuring both wheel track ruts simultaneously.]

Answer 5: "Geometrics" refers to the dimensions and arrangements of roadway features, including, but not limited to, width, presence of curb, shoulders, and intersections.

Question #6
In regards to category 4, #28. After the bid is awarded, can the selected vendor(s) receive historical data on inventory date and pavement age?

Answer 6: Existing TxShare Member Entities who are former consumers of this project may elect to provide their historical data to any awarded firm that they select to provide services. The NCTCOG does not possess or maintain any data related to the delivery of Pavement Analysis services delivered to TxShare Member Entities under these contracts.

Question #7
In regards to category 7, #44. What is meant by point asset vs. linear asset?

1. [From Exhibit B in narrative: Generic asset types, allowing for any item within line of sight of the collection vehicle.

a. Above ground point asset

b. Above ground linear asset

c. At grade point asset

d. At grade linear asset]

Answer 7: A point asset exists in one location and does not extend to an additional location. An example would be a stop sign. A linear asset extends between multiple points. An example would be striping.

Question #8
Is a Texas engineering registration required to submit a proposal or is this something we can acquire after award?

Answer 8: Engineering services are not included as a part of this solicitation or any resulting Master Services Agreement.

Question #9
Is it possible to seek an extension of proposal submission timeline by a week?

Answer 9: NCTCOG will extend the proposal submission timeline to 2:00 PM CT, February 24, 2023.

Question #10
Does NCTCOG have a tangible project for any of the service categories?

Answer 10: The Pavement Analysis Services program allows TXShare-participating entities to choose from selected vendor/s to contract for pavement analysis services. This service has been provided by NCTCOG for more than five years and has been utilized by multiple member governments. NCTCOG itself will not procure services from the vendor/s.

Question #11
Can we have access to the recording of the Pre-Proposal Meeting from January 27th? It is currently saved on the NCTCOG SharePoint and is inaccessible to members outside of NCTCOG.
Answer 11: The recording can be sent to entities who request a copy of it. It is 400 megabytes in size – so it will have to send using FTP transfer.

Question #12
NCTCOG has provided RFP Attachment A, Pricing Proposal Form. The unit used for said Excel file is either Lane Mile, Linear Foot, Each, etc. These units can be unclear for agencies and vendors. The term lane miles does not correlate to "test miles" because for some functional classes, we would only collect one pass, while on others we would collect two passes. It is easier to come up with the number of test miles when working with the agency and finalizing a contract. In the previous contract, some vendors had a unit of test mile. Can we provide price per test mile rather than lane mile?

Answer 12: Please see the footnote 1. Lane miles are the selected choice of measurement.

Question #13
With regards to collecting assets, it is difficult to calculate cost based on a unit of "each." Most agencies do not know the number of assets (e.g., trees, curb ramp, etc.) at the start of a project. Typically, this is the first time they are doing an asset type inventory and we would not know the number of assets to finalize a contract with an agency. In the previous contract, some vendors had the unit of test mile for assets as well. Can we provide price per test mile rather than per each asset?

Answer 13: Please see revised Attachment A, which modifies some activities to use a unit of “lane miles” instead of “each.”

Question #14

In RFP Exhibit B, Service Category #1, Item 5, the RFP states that pavement performance information such as rutting should have a minimum of seven sensors (include pricing for nine sensors as well) fatigue cracking, transverse cracking using a minimum of four sensors, and longitudinal cracking.

Most vendors use LCMS to automatically geo-tag, measure, detect, and quantify all key functional parameters of pavement in a single pass, including (but not limited to): cracking, rutting, texture, potholes, bleeding, shoving, raveling, and roughness. With regards to rutting, we would only use the LCMS system (two sensors to calculate rutting for each wheel track ruts. Similarly, for fatigue cracking, transverse cracking, and longitudinal cracking, we use our LCMS system. Please provide clarification.

Answer 14: If LCMS provides with two sensors output that is equivalent to output of the seven and four sensors described above, please document this in the proposal.

Craigan Johnson
Senior Purchasing Manager

Proposers: Please acknowledge and return a copy of this Addendum with your proposal.

COMPANY NAME: Fugro USA Land, Inc.

SIGNATURE: 

NOTE: Company name and signature must be the same as on the RFP documents.