Roadway Asset Services

July 22, 2025

City of Grand Prairie
1821 S State Highway 161
Grand Prairie, Texas 75051

Attention: Leland Miller
Reference: RAS Pavement Management Services Proposal

Dear Mr. Miller,

I appreciate you and City staff for taking the time to meet and discuss the services offered by Roadway Asset Services, LLC (RAS) related to the pavement and asset management needs for the City of Grand Prairie. RAS is headquartered in Austin, Texas with a regional office in Denton County, and our team is a full-service pavement and asset management consultant that collects pavement performance data using laser based automated technologies and analyzes the data using sound financial optimization modeling. In addition, our services include the configuration of our Budget Optimization Street Selection (**BOSS™**) pavement management analysis tool that leverages Microsoft PowerBI. **In the last 3 years, RAS executive team members have managed over 100,000 miles of pavement condition and asset inventory data.**

RAS has invested in the **most sophisticated** fleet of roadway asset collection (RAC) vehicles and pavement analysis tools for automated data collection that provides a **100% linear assessment** of the roads driven. **This methodology removes the subjectivity of rating small sample areas of the road segment.** Unlike many of our competitors, RAS utilizes a ROW capture system to provide an **immersive 360° view** versus stationary independent camera views. Furthermore, RAS' RAC vehicles have **received independent inertial profiler certification for accuracy and repeatability from Texas A&M Transportation Institute (TTI). RAS has a fleet of 4 RAC vehicles** to ensure the city that we have the staff and resources to complete this assignment in a timely manner. In addition to our fleet, our strategic partnership with our equipment manufacturer allows us to mobilize **additional LCMS-2 equipped survey vehicles** should capacity need to be expanded due to weather or unforeseen mechanical delays.

RAS is an approved vendor through the NCTCOG-TXShare purchasing cooperative for Pavement Analysis services. We look forward to building a long-term relationship with the City of Grand Prairie. Our team is prepared to deliver a scope of work that is tailored to the needs and goals of the City Stakeholders. Please do not hesitate to reach out with any questions or comments regarding these services.

Sincerely,

Zac Thomason, MBA
Senior Vice President

FIRM OVERVIEW

Roadway Asset Services, LLC (RAS) is a Texas Engineering Firm (License #: F-22104) headquartered in Austin, Texas. RAS team members have managed automated data collection, performed QA/QC, developed pavement management plans, supplied GIS based deliverables, and provided imports and modeling for cities across the United States. RAS offers comprehensive experience and subject matter expertise in the fields of engineering, surveying, asset management, transportation planning, and GIS.

With Deep Texas Roots, RAS is excited to present a strong team with first-hand experience in the complexities of pavement and asset management, processing, analysis, etc., as well as the in-depth knowledge of the technology and methodology needed to complete the work. In addition to data collection, we have a comprehensive understanding of the decentralized asset maintenance process and the need for clear and consistent communication with Stakeholders throughout this project.

The RAS leadership team consists of seasoned **pavement management professionals who bring over 100 years** of database integration and pavement condition survey management. **Our team will provide prompt and relevant services as demonstrated by RAS leadership's direct involvement in each project the Firm undertakes**. Throughout their careers, the RAS leadership team has been involved in pavement condition and ROW asset surveys for similar projects including:

- Harris County, TX
- San Antonio, TX
- Austin, TX
- Bellaire, TX
- Seguin, TX
- Denton, TX
- Houston, TX
- Galveston, TX
- Friendswood, TX
- Corpus Christi, TX
- Central Texas RMA, TX
- Arlington, TX
- Bexar County, TX
- Pearland, TX
- Fort Worth, TX
- New Braunfels, TX
- Plano, TX
- Amarillo, TX

UNIQUE QUALIFICATIONS OF THE RAS TEAM

The RAS team is comprised of established industry veterans who have dedicated their careers to the field of pavement and asset management. RAS team members have performed over 200 pavement and asset management projects in the last 5 years in accordance with ASTM D6433 and AASHTO R 57, and do not anticipate any challenges or risks. RAS offers member agencies of NCTCOG and those participating in this contract across the country the most experienced data collection team to provide assurance that the collection and quality processing of data will be delivered on schedule. We have an outstanding record of completing projects ranging in size from 50 miles to 5,000 miles, on time and within budget. The RAS team advantage is as follows:

- **Municipal Texas Experience:** RAS specializes in PCI studies and pavement modeling techniques for municipalities around the Country. The RAS team has managed or is currently assisting the following Texas municipalities in pavement or ROW asset inventories: Frisco, Garland, Denton, Princeton, Celina, Rockwall, Rowlett, Burleson, Greenville, Austin, West Lake Hills, New Braunfels, Kyle, Amarillo, Galveston, Corpus Christi, Hutto, Pflugerville, Forney, Seguin, and San Antonio.

- **Unsurpassed Local Knowledge:** A unique feature of the RAS team is our local presence and local knowledge. Scot Gordon, RAS President, recently served as President of the ACEC Tarrant County Chapter and was the Senior Pavement Design Engineer at Kleinfelder. This experience enabled Scot to become familiar with the local roads, local paving materials, and soil conditions. He will be actively involved in daily pavement distress evaluations and QA/QC of the data as it is received. This starts with the pilot data review and onsite field validation that RAS conducts on all assignments. Mr. Gordon will meet with the city's staff to review the results, discuss the details of the evaluation to field verify the measured distresses, and answer any questions that may arise.

  Due to his local presence, Mr. Gordon can also be available for last-minute onsite meetings or discussions. His knowledge of paving materials and construction techniques, coupled with the experience of establishing workable maintenance plans with available funding, sets the RAS team apart.

- **Delivery of Imagery:** RAS believes all imagery from the condition assessment as pertinent to a City's quality assurance measures and final acceptance of the data. As such, RAS will deliver all right-of-way imagery views and the downward LCMS roadway images to the City.

- **Field Validation of Pilot Roads:** The importance of the field validation cannot be understated as it has become a routine milestone for the RAS Team on all pavement condition projects. The pilot allows RAS to collect, process, and review condition data with City staff to ensure accuracy with the data collection and interpretation protocols. This same pilot was performed by Scot Gordon during the following projects: Frisco, Garland, Fort Worth, Harris County, Houston, San Antonio, Corpus Christi, Burleson, Greenville, Denton, Rockwall, Hutto, Kyle, TX.

PROPOSED METHODOLOGY

PAVEMENT CONDITION SURVEY EQUIPMENT: ROADWAY ASSET COLLECTION (RAC) VEHICLES

The pavement data will be processed per road segment for the entire roadway network using the continuous and detailed 20-foot linear samples acquired by the RAC Laser Crack Measurement System (LCMS-2) vehicle. RAS will adopt the City's existing GIS linked centerlines and the detailed 20-foot LCMS samples will be processed into 2,500 sq.ft samples following the ASTM D6433 logic. These 2,500 sq.ft samples can then be loaded as sample inspections for every City segment, thus creating multiple inspections for each segment. Alternatively, RAS can also aggregate the 2,500 sq.ft samples to match the City's existing segmentation, thus creating one inspection record for every segment. The RAS approach is comprehensive and nimble enough to evolve with City expectations. The City will receive the condition and analysis results in several formats such as Excel Spreadsheets, geodatabases, and ArcGIS Online prior to the final **BOSS™** analysis activities and GIS deliverable to link with Cityworks.

To ensure adequate coverage and exceed ASTM D6433 requirements, the RAC vehicle will survey thoroughfare and collector roads in two directions, while single pass testing the residential roadways. This will be confirmed with the City, depending upon the selected scope and budget scenario. At the completion of the project, the roadway and right-of-way images (**provided at no cost**) and condition database for the network will be formatted for upload into **BOSS™** and the City's GIS environment. RAS will calculate an ASTM D6433 PCI score using the detailed extent and severity distress data captured in the field for every segment, for all street functional classifications, and the overall network. In addition, IRI values will be provided for all street functional classifications in accordance with the AASHTO R 57.

To complete the automated pavement condition survey, the RAS team will dedicate four RAC vehicles equipped with:

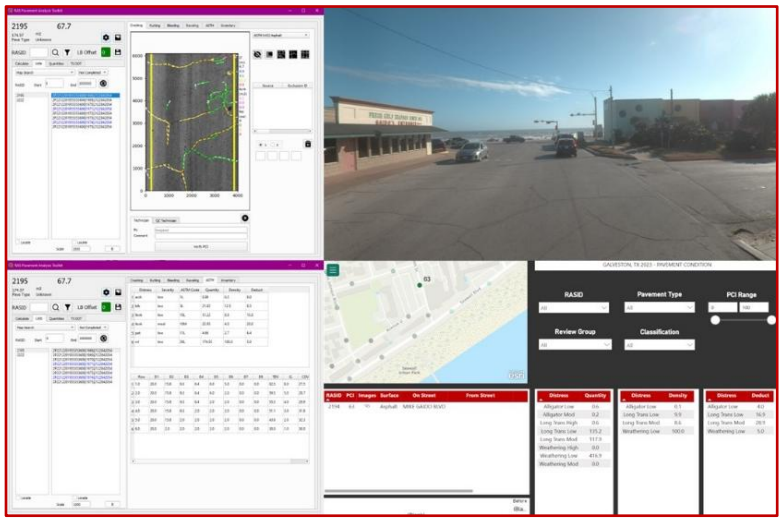
- The LCMS-2 camera is a downward-facing laser array providing images used to evaluate data that conforms with ASTM D6433 protocols, which uses **two 1-millimeter-pixel** resolution line scan cameras to **provide a customized digital condition rating system to collect user defined severity/extent-based pavement distresses and rutting.**
- The pavement distress type, density, severity, and extent are collected with the LCMS-2 and are used to calculate a Pavement Condition Index (PCI) score, between 0-100, that represents the condition of 100% of the driven lanes.
- High-Definition cameras (utilized for accurate ROW asset capture, extraction, and pavement QA/QC). These images will be supplied to the City at no additional cost as the RAS team feels they are critical for City review and acceptance.

- **Linear distance measuring to within +/-0.5%**.
- A class 1 inertial profiler for simultaneously capturing dual-wheel path (left and right) International Roughness Index (IRI) measurements to the hundredth inch and RCI measurements, in accordance with AASHTO R48. The profiler has gone through **ASTM E-950** certification and **has been independently certified (March 2024) by Texas A&M Transportation Institute (TTI).** The inertial profiler meets the requirements and will be operated in accordance with **AASHTO Standards R 57-10, M 328, R 56-10, and R43M/R43-7**.
- Applanix POS/LV with DGPS (**Provides accurate internal GPS navigation for geo-locating pavement and right of way asset information**).

The RAS team will conduct pavement survey work on dry pavement and in lighting conditions that ensure accurate crack detection. We will collect imagery during daylight hours only, with no rain, fog, or snow visibility obstructions. Any road segment(s) that exhibits low image quality due to lighting will be recollected at a later time. The industry is currently migrating toward sensor-enhanced artificial intelligence (AI) rating for 100% linear assessment of the roads, in accordance with guidelines within the **ASTM D6433, ASTM E1656, and ASTM E3303**. This methodology removes the subjectivity of rating small sample areas of the segment where the sample may not represent the condition of the entire segment.

PAVEMENT DATA PROCESSING: AUTOMATED CRACK ANALYSIS WITH ROADTRIP™

While the field data collection is on-going, the data will be uploaded to the office environment, where it is imported to the RAS AI enhanced pavement rating tool **RoadTRIP™** (Technical Rating Intelligence Program). The RAS team will be concurrently processing the field data using the RoadTRIP™ software to link, calculate distress densities, classify distress types, calculate an initial PCI, and perform a final QC of the dataset. RoadTRIP™ was programmed with sophisticated algorithms that use sound geometry and distress density to properly classify and quantify pavement distress types.

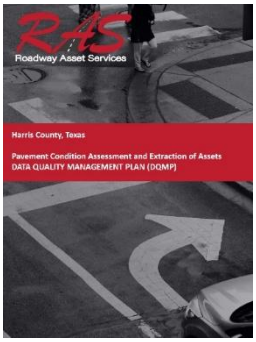


Once the data is imported into RoadTRIP™, the major data processing tasks also occur, such as generation of right-of-way and pavement image streams; calculation of profile, roughness, rutting, detection of cracks, lane-markings, man-made objects, and other distresses. The RoadTRIP™ application was designed around the ASTM D6433 data collection protocols and contains a PCI calculator that uses ASTM D6433 distress deduct curves and Q-correction in a similar manner as PAVER. This PCI is used for Quality Assurance before importing detailed extent/severity distress data into the City's desired data portal and deliverable, **BOSS**.

Sub-segment (Sample) Inspections

RAS will conduct a 100% continuous survey with each segment (block-to-block) containing a PCI. Longer segments will also have sub-segments or sample PCI's, allowing the identification of localized distresses. RAS will provide this granular PCI rating by measuring all distresses within a continuous 2,500 square foot survey sample (approximately a 200-foot-long continuous sample segment in accordance with ASTM D6433) while also rolling the sample inspections up to the segment level. This method of surveying will allow the City to review variable PCI values within a single segment and determine if distresses are concentrated in localized areas or consistent throughout the entire segment length. **The output of this approach is a localized distress heat map in ArcGIS Online that identifies localized failures in a segment that is in otherwise good condition.**

DETAILED QUALITY ASSURANCE & QUALITY CONTROL WORK PLAN



While the 10-mile pilot reviewed by RAS and City Staff will illustrate the completeness and accuracy of the RAS data stream, RAS has also developed a detailed 30-page **Data Quality Management Plan (DQMP)** to provide our clients with a systemized method for assuring data is representative of the conditions present. Included in the DQMP is a description of condition survey procedures, data collection vehicle and system calibration/verification, ranges of accuracy, roadway segment review/verification, and integration into asset management programs.

Quality Assurance Step #1 Completeness / Gap Analysis

While a simple routine in every project, the cornerstone to project initiation is conducting a complete diagnostic of the GIS inventory, including a full and thorough assessment of the City's GIS centerline and pavement database. This will include a review of the City's data requirements (i.e., what information is needed/desired) and subsequent data gap analysis (what is missing).

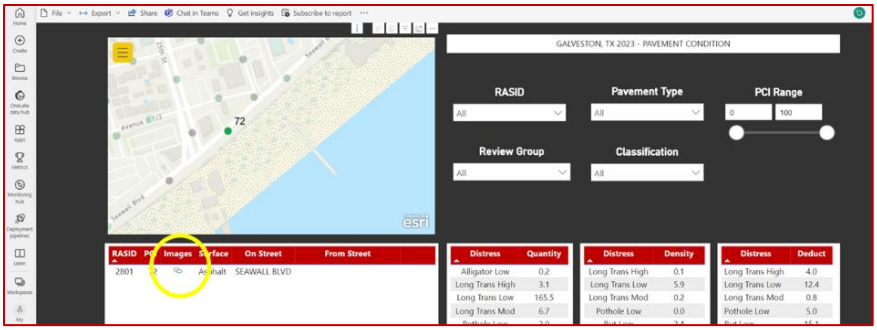
RAS will include the following in this initial review:

a. Base inventory information, (i.e., Functional Class, lengths, areas, surface type, etc.)
b. Historical condition information
c. Status of survey history
d. Construction and maintenance history
e. Review of maintenance and rehabilitation treatments and unit costs
f. Review of existing pavement deterioration curves

Quality Assurance Step #2 – Field Pilot Validation Study

The importance of the **field pilot** cannot be understated as it has become a routine milestone for the RAS Team on all pavement condition projects. The pilot allows RAS to collect, process, and review condition

data with City Staff to ensure accuracy with the data collection and interpretation protocols. The field pilot will consist of approximately 10 miles. **The review of the RAS condition data will be hosted by Senior Pavement Engineer, Scot Gordon, PE, IAM in the field, where he will review site conditions with City Staff**. Scot uses a field tablet that contains the segment PCI scores along with the deduct points assigned to each distress such that everyone understands the PCI impacts of distresses that are present.



If issues are confirmed in the field, then corrective action to the initial field pilot will be processed for City review prior to commencing the full network data processing activities. The field pilot allows the RAS team to accommodate local roadway design, soil conditions, modify the distress processing software, and proceed forward with network-level data processing. Discussions during the field visit help calibrate the actual distress conditions that trigger treatment options.

As a cornerstone to the development of quality data deliverables, Scot Gordon, PE has performed a pilot data field validation with city staff on hundreds of pavement condition surveys. Throughout his career, Scot has worked with agencies on the **field pilot data validation** including but not limited to:

- **Harris County, TX**
- **Corpus Christi, TX**
- **Chicago MAP, IL**
- **Galveston, TX**
- **Houston, TX**
- **Indianapolis, IN**
- **Fort Worth, TX**
- **Salt Lake City, UT**
- **San Antonio, TX**
- **Denver, CO**
- **Albuquerque, NM**
- **Charlotte, NC**

Quality Assurance Step #3 – Subsystem Monitoring in the Field

During the survey, the collection software monitors the GPS subsystems and alerts the operator if the GPS feed drops out or if GPS quality is compromised. It displays the satellite count, which should normally remain above four (4). If the satellite count falls below that threshold due to the vehicle entering a tunnel, driving under a bridge, or driving in a region with tall buildings, this will be displayed for the operator. The IMU will provide acceleration-based corrections during this time to ensure that GPS accuracy is maintained as much as possible. Depending on the grade of IMU used in the system, even total GPS outages of 1-3 minutes can be tolerated with almost no degradation in positional accuracy.

The collection software monitors the status of the subsystems that have been installed and enabled. A summary screen is displayed for the operator which shows representative data values and images in real-time, along with any warnings or errors being generated based on real-time diagnostics. As part of standard practice, the operator continuously monitors the validity of data being collected and reported by the quality monitoring systems.

The RAS team will also review a randomized sample of images to ensure that it complies with the requirements of the specifications throughout the course of the network matching and event QC. Upon completion of the network matching, an image report shall be generated with the total image count compared with that expected for each road.

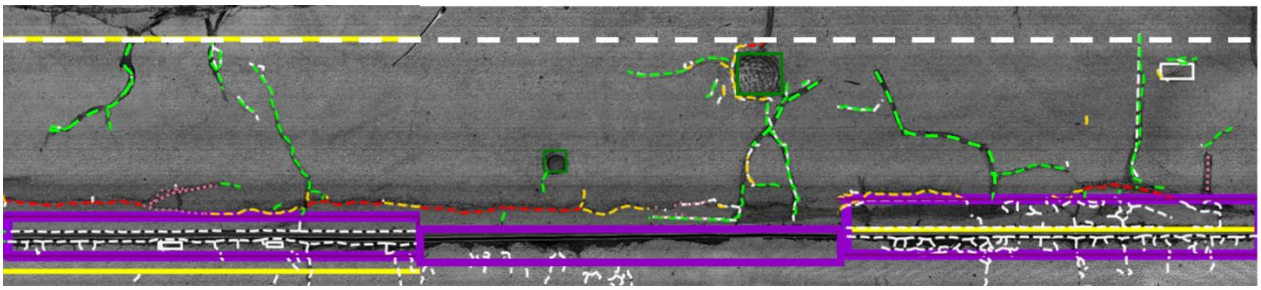
Daily internal progress reports are produced by uploading sensor, GPS, and event data and matching against the road network definition. Progress reports include the following, road sections collected, length discrepancies, and remaining sections to be completed.

Calibration of the laser profiling system includes laser sensor checks and block tests to ensure the accuracy of the height sensors, accelerometer calibration "bounce tests" to verify proper functioning of the height sensors and accelerometers, and distance calibration to ensure accuracy of the DMI. Calibration of the DMI and some accelerometers occurs during field testing, and each is checked and recalibrated on a regular basis.

Quality Assurance Step #4 – Automated Crack Analysis & Engineer Review

The automated crack analysis in **RoadTRIP™** detects cracks that are overlaid on the pavement images and offset to assist with the verification of the detected distresses. The longitudinal and transverse crack distresses, which are transformed from the LCMS-detected cracks, are used during reporting to identify where the LCMS-detected cracks are found to result in an unacceptable level of false positives. These affected distress cracks are eventually deleted. During reporting, the distress cracks are defined by road zone and accumulated according to the units defined in the client specification. The RAS data reduction routine is built into the **RoadTRIP™** software as the application was built to consume the detailed LCMS files and reduce them into individual distress extent and severity scores, based on the defined limits (ASTM D6433). The software takes this an additional step by reducing the detailed distress data into a calculated Pavement Condition Index (PCI) for each segment of roadway maintained by the City. The severity levels are verified for resolution through visual quality control checks of image files.

Senior Pavement Engineers and Principals of RAS, Mark Kramer, PE and Scot Gordon, PE, will lead a team of experienced pavement inspectors to perform a minimum 10% QC to confirm the distresses and severity of the pavement condition data collected by the automated technology. This manual quality review is performed, in accordance with the principles of the ASTM D6433 standard, using the LCMS pavement images gathered during collection with the distresses superimposed and color coded, such as what can be seen in the corresponding image.



BOSS™: PAVEMENT MANAGEMENT ANALYSIS AND REPORTING

BOSS™
Budget Optimization Street Selector

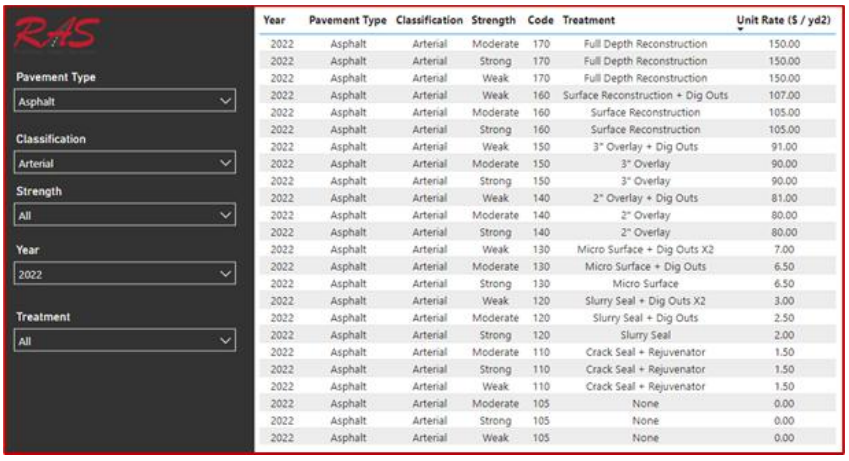
As we understand, the City is interested in implementing the RAS developed pavement management program, **BOSS™**, for the development of budget scenarios, maintenance and rehabilitation plans, custom deterioration curves, and financial optimization using "cost of deferral" analysis. **BOSS™** is an ESRI compatible, cloud-based application with powerful pavement management algorithms behind it, that is capable of exporting the results of the pavement analysis to a user friendly interface such as **Microsoft PowerBI, ESRI storyboard maps, or Excel spreadsheets.**

BOSS™ is a fully functioning pavement management program that integrates an agency's segment level GIS centerline's, develops real world and actionable projects, runs budgetary models, forecasts to establish trends, financially optimizes the multi-year plan using sound "cost of deferral" constraints, and produces a final 5-year maintenance and rehabilitation plan for review.

RAS will work with the City's staff to establish the maintenance and rehabilitation activities, PCI trigger points, costs, decision trees, reset PCI values, completed rehabilitation work since the survey, planned work, existing budgets, pavement deterioration curve development/assignment, and inflation priorities. RAS will assist staff with determining the right treatment (prescription) at the right time by reviewing the city's existing maintenance and rehabilitation strategies and recommending others that may be a good fit. The scope will include developing at least 10 profile budget runs to establish the budget model trend and 5-year pavement analysis.

The RAS analysis involves the following sequences and client engagements during the process:

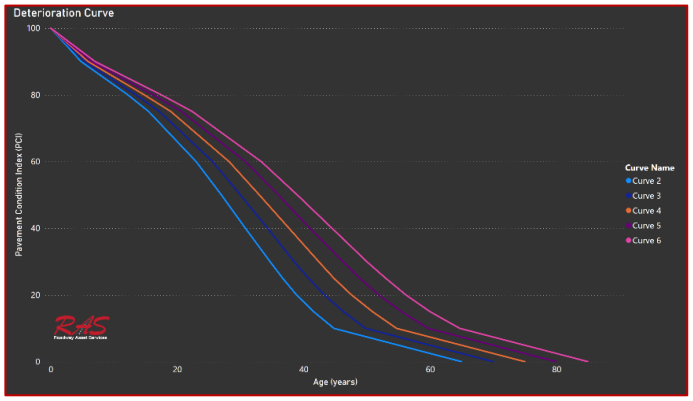
- **Current Database Review:** most issues can be resolved at the beginning of a project by completing a brief review of the city's existing GIS. Any recommended changes to the segmentation or budgetary model configuration will be discussed during this stage.
- **Maintenance & Rehabilitation Setup:** to ensure the results of the budget model runs meet the City's expectations, RAS will discuss the current Maintenance and Rehabilitation operation and recommend updates. Our staff is well versed with the application of pavement rehabilitation techniques, Min/Max PCI, Breakpoint PCI, decision trees for treatments, costs, real-world impact to PCI, reset PCI values, and life cycles.



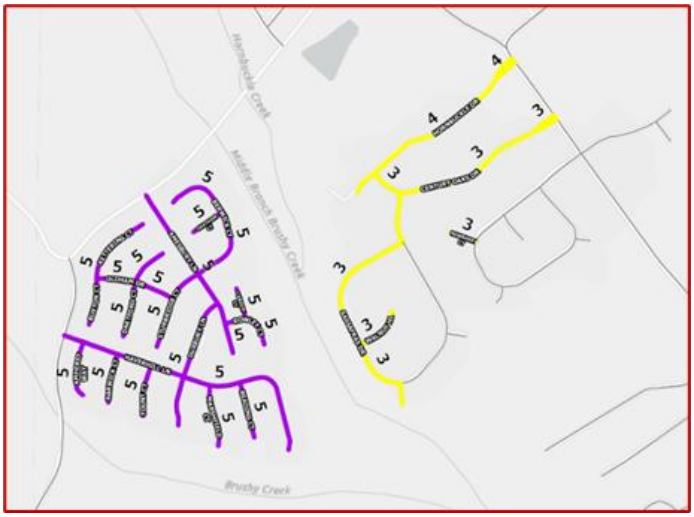
Year	Pavement Type	Classification	Strength	Code	Treatment	Unit Rate ($ / yd2)
2022	Asphalt	Arterial	Moderate	170	Full Depth Reconstruction	150.00
2022	Asphalt	Arterial	Strong	170	Full Depth Reconstruction	150.00
2022	Asphalt	Arterial	Weak	170	Full Depth Reconstruction	150.00
2022	Asphalt	Arterial	Weak	160	Surface Reconstruction + Dig Outs	107.00
2022	Asphalt	Arterial	Moderate	160	Surface Reconstruction	105.00
2022	Asphalt	Arterial	Strong	160	Surface Reconstruction	105.00
2022	Asphalt	Arterial	Weak	150	3" Overlay + Dig Outs	91.00
2022	Asphalt	Arterial	Moderate	150	3" Overlay	90.00
2022	Asphalt	Arterial	Strong	150	3" Overlay	90.00
2022	Asphalt	Arterial	Weak	140	2" Overlay + Dig Outs	81.00
2022	Asphalt	Arterial	Moderate	140	2" Overlay	80.00
2022	Asphalt	Arterial	Strong	140	2" Overlay	80.00
2022	Asphalt	Arterial	Weak	130	Micro Surface + Dig Outs X2	7.00
2022	Asphalt	Arterial	Moderate	130	Micro Surface + Dig Outs	6.50
2022	Asphalt	Arterial	Strong	130	Micro Surface	6.50
2022	Asphalt	Arterial	Weak	120	Slurry Seal + Dig Outs X2	3.00
2022	Asphalt	Arterial	Moderate	120	Slurry Seal + Dig Outs	2.50
2022	Asphalt	Arterial	Strong	120	Slurry Seal	2.00
2022	Asphalt	Arterial	Moderate	110	Crack Seal + Rejuvenator	1.50
2022	Asphalt	Arterial	Strong	110	Crack Seal + Rejuvenator	1.50
2022	Asphalt	Arterial	Weak	110	Crack Seal + Rejuvenator	1.50
2022	Asphalt	Arterial	Moderate	105	None	0.00
2022	Asphalt	Arterial	Strong	105	None	0.00
2022	Asphalt	Arterial	Weak	105	None	0.00

In addition, the RAS analysis retains the ability to use the density of load associated distresses to trigger additional structural patching or an entirely different rehabilitation activity. For example, segments that have greater than a 10% density of load related distresses are generally catagorized as weak, with moderate strength between 2%-10%, and strong less than 2% density.

- **Deterioration Curves:** forecasting pavement conditions requires a detailed set of pavement deterioration curves for each roadway traffic classification, pavement material type, and strength rating as designated by the pavement management system. Our team will review the existing deterioration curves to ensure they reflect realistic degradation rates in the city. If necessary, our team will work with the legacy data along with the collected data from this project, to develop updated and further refined deterioration curves for each combination of street classification and pavement surface type, representative of the climate.



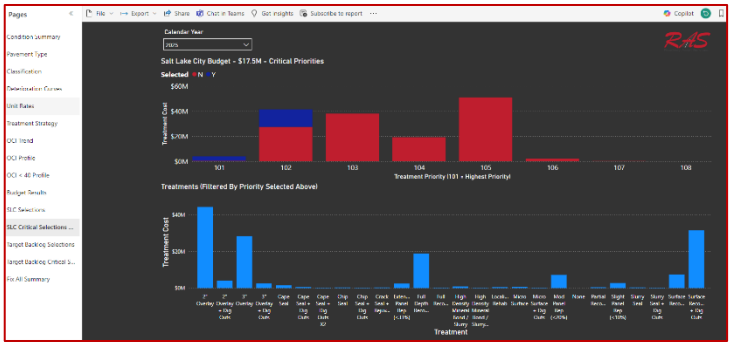
- **Management Section Development (Spatial Optimization):** the RAS analysis includes stitching segments (blocks) together to form a logical project, also known as a "management section" or "supersegment". RAS will work with City staff to review the initial model results and begin "stitching" segments together to form logical projects that best meet the needs of the city.



The benefit of utilizing management sections is that the RAS analysis runs the budgetary scenario at the project level, producing real-world rehabilitation plans that are ready for review, modification, or action. Our team will also provide recommendations for best practices in developing practically sized management sections to yield model results that can be acted upon. A Microsoft Access database of final configuration, setup, model, etc. will be provided to the city. In addition, independent projects can be linked to trigger at the same time, allowing for two different rehabilitation activities to take place within a single subdivision if desired.

- **Financial Optimization & Prioritization:** RAS' analysis uses sound engineering and economic logic to prioritize which street candidates are selected throughout the multi-year plan. While most pavement management programs will prioritize by roadway traffic and condition, an RAS analysis

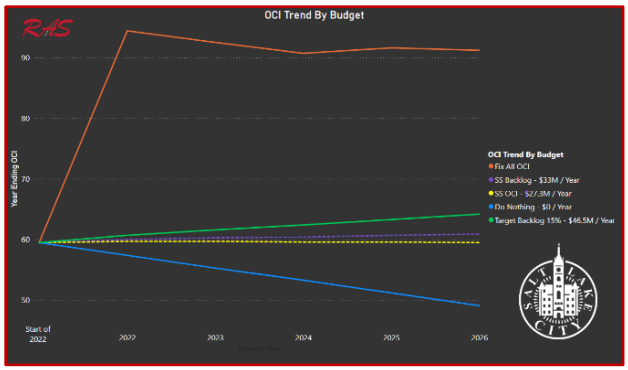
takes it a step further and introduces financial optimization into candidate selection through the use of a "Need Year" analysis that identifies each segment's cost of deferral. Understanding the "Cost of Segment Deferral" allows the analysis to maximize the city's limited funds in the best manner possible. As seen in the adjacent image, the RAS Microsoft PowerBI Dashboard outputs several graphics that illustrates where the City's funds are being spent and how many "critical" selections were actually achieved. Critical roadways are simply those that are within 2-4 PCI points of dropping into the next rehabilitation activity.



Budget Model Development

The RAS Team separates itself from our competition through our devotion to the most critical aspect of the project, which is collaborating with an agency on how to take the objective condition data and utilize it to make meaningful decisions involving the city's infrastructure.

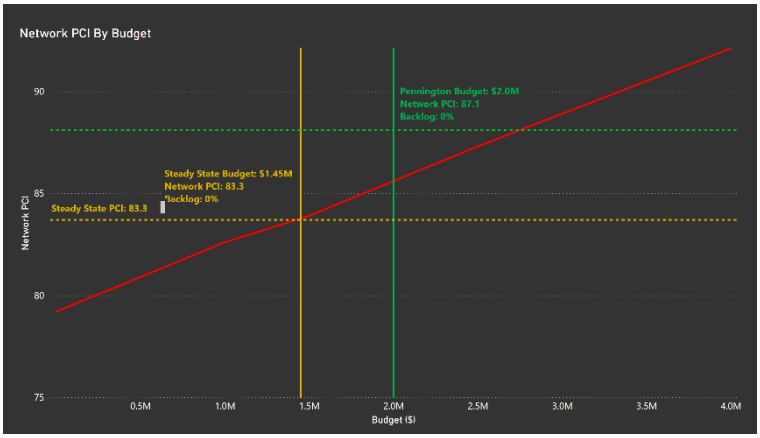
RAS follows the "AASHTO Transportation Asset Management Guide – A Focus on Implementation" which provides a framework for organizations to utilize and update the management of their assets to improve decision-making, monitor performance, and support integrated decisions in programming projects. The observed distresses and calculated PCI values will be used within the RAS analysis to rank projects using distress types indicating load, non-load, and environmental related causes of each distress.



Running budgetary models within a pavement management system requires a deep understanding of the database structure behind the application. The RAS approach to budgetary modeling will involve up to 10 pavement management scenarios using different philosophies, budget levels, and distributions. While **RAS will define the scenarios to be run with city staff, at a minimum the following questions should be answered with the scenarios:**

- What will the overall average pavement condition be if current funding levels remain unchanged for the next three, five, or ten years?
- What funding will be necessary on an annual basis to ensure an average overall pavement condition of 65, 70, 75, or 80 PCI?
- What budget is required to maintain my existing network PCI?
- What budget is required to control the growth in backlog?
- What are the recommended pavement strategies?

RAS will also consult with City staff to develop models utilizing different types of rehabilitation strategies (worst first, best first, most economic, need year, etc.). RAS understands that getting buy-in from City administrators and elected officials means developing a long-range rehabilitation plan that considers local priorities. The RAS team will ensure that already approved rehabilitation work is programmed into the budgetary models for selection during the run. In addition, RAS will consult with City staff to identify the total cost (mill, overlay, traffic control, striping, etc.) of each rehabilitation method.



Infusing Innovative Multi-Constraint Optimization into the Analysis

Optimization is a broad-based term that has many different definitions. For most pavement management systems, optimization is the ability to prioritize a multi-year rehabilitation plan using several different factors that are important to an agency and based on sound engineering constraints. To further enhance upon optimization, RAS President and Senior Pavement Engineer, Scot Gordon looks forward to visiting with City staff on other **innovative considerations** to pavement management such as **including PCI of curb and gutter in selecting roads for maintenance; whether or not to deduct for potholes if the City has a pothole repair crew; how to get all council districts above a specific PCI threshold; and focused analysis on top traveled corridors where you are improving the level of service on the roads receiving the greatest traffic while also analyzing the impacts to the remainder of the network.**

For example, Scot performed additional analysis scenarios for the City of San Antonio to identify variable funding needs to achieve and maintain the set goals for each Council District (minimum PCI of 70), based on pavement condition performance. To accomplish this, Mr. Gordon worked with the City to determine the proper mix between preservation and reconstruction within each of the 10 Council Districts to achieve the minimum baseline number of a PCI of 70 per district.

For example, in the City of Fort Worth, Scot worked with City Staff to incorporate curb and gutter as a factor in street selection for maintenance. In addition, the previous evaluation deducted for potholes in their PCI score, while the most recent survey reversed this decision as their crews were repairing these distresses daily and a preference to not have potholes influence the PCI value were expressed.

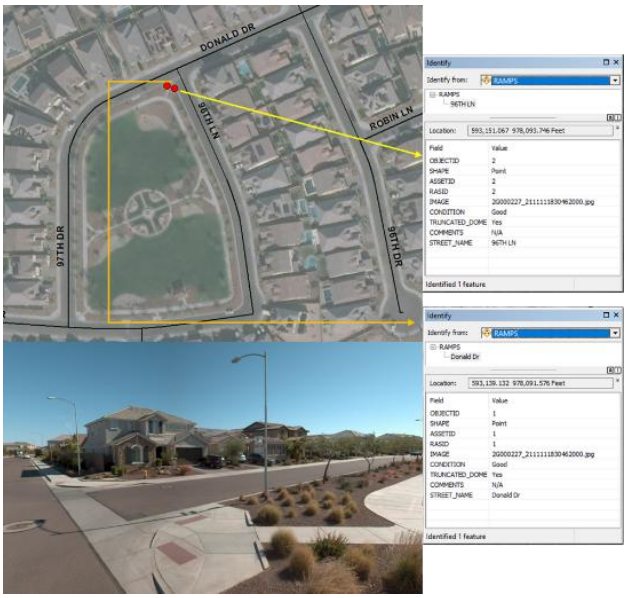
For the City of Durham, North Carolina we used the most recent census data and the City's Federal Information Processing Series (FIPS) codes to review social-economic factors such as median household income and racial diversity to further factor optimization to ensure equal spread of street maintenance across the City.

Each of the examples above were combined with sound financial optimization that allowed for a truly customized multi-year plan that met the needs of local constituents, elected officials, and City staff.

RIGHT-OF-WAY ASSET INVENTORIES

All collected pavement and ROW imagery will be provided in appropriate state plane coordinates, while being collected in one continuous pass on residential roads and two pass testing thoroughfare and collector roads (or as scoped per the provided scenarios). **The images will be collected at roughly 20-foot intervals, including forward, rearward, and downward pavement viewing images.** All views of high-resolution imagery will be processed in 20-foot intervals along with the downward LCMS for the RAS QC program and for photogrammetry right-of-way asset extraction activities. The imagery can be delivered in .jpeg format, on a hard drive, associated with a Personal Geodatabase, and/or web-hosted image and data viewing application designed to consume the detailed right of way and pavement imagery.

Each image will be electronically tagged with location information for plotting within a spatial environment and delivered via a shapefile (.shp). The HD images can be post-processed using RAS software to collect attributes for each asset type captured. **The City is interested in inventories of pavement markings (point), pavement striping (linear), and signs (point).**



The RAS asset extraction system is not limited to the assets identified above as we can inventory and extract attributes on nearly any asset that can be identified in the images. Other common roadside features for capture include: sidewalks, pedestrian curb ramps, sidewalk obstructions, curb & gutter, traffic signals, streetlights, fire hydrants, bus stop shelters, medians, drop inlets, speed humps, cabinets, utility poles, medians, manhole covers, culverts, cattleguards, and many others.

Deliverable: RAS will provide the inventories as ESRI compatible file geodatabase with image hyperlinks.

Sample Data Dictionary

Sign & Support Data Dictionary

Feature Class	Attribute	Format	Structure Example	Description
Signs	AssetID	Integer	100000	Unique GIS identifier for each asset (ID for each sign on support)
	XY Location	Integer	41.40338, 2.17403	GPS location in decimal degrees
	Street Name	Text	Michigan Ave.	Name of the roadway the asset is located on
	Photo Image Link	Text	Hyperlink	Link to the imagery (provided via external hard drive)
	MUTCD Code	Text	R1-1	MUTCD code (see Tab with Standard Codes)
	Sign Text	Text	Stop	Auto populated from MUTCD Manual
	Condition	Text	Fair	Visual rating of the condition of the structure: 1-Good, 2-Fair, 3-Poor
	Sign Face Direction	Text	S	Direction of the sign face: E-W-N-S-NW-NE-SW-SE
	Legend Color	Text	White	From MUTCD Manual
	Back Color	Text	Red	From MUTCD Manual
	Support Structure Type	Text	Post	Construction method of support structure: Post (Freestanding), Bridge, U-Channel, Utility Pole, Mast Arm, Streetlight, Signal
	Post Total	Integer	3	Number of signs affixed to support structure
	Comments	Text	Faded Text	Comments generated from GIS technician

Condition Rating Criteria
1-Good: sign is visible, not faded, straight/upright, legible, no graffiti
2-Fair: sign has minor to no visual defects with good visibility, not faded, straight/upright, legible, no graffiti = sign that may need replacement after 5 or more years
3-Poor: sign has many visual defects with poor visibility faded, bent, or pushed over (sign panel or post), heavy graffiti; obstructed; not visible or legible = sign needs immediate replacement

Pavement Striping (Linear) Data Dictionary

Feature Class	Attribute	Format	Structure Example	Description
Striping	AssetID	Integer	100000	Unique GIS identifier for each asset
	Length	Integer	128.59	The measurement in feet from the GIS technician based on the linework
	Street Name	Text	Michigan Ave.	Name of the street the asset is located on
	Photo Image Link	Text	Hyperlink	Link to the imagery (provided via external hard drive)
	Type	Text	Double	The type of striping e.g. continuous left, double, hash, solid, skip, etc.
	Color	Text	White	The color of striping e.g. white, yellow, green, etc.
	Condition	Text	Fair	Visual rating of the condition of the asset: 1-Good, 2-Fair, 3-Poor
	Comments	Text	None	Comments generated from GIS technician

Condition Rating Criteria
1-Good: striping is visible, not faded
2-Fair: striping has minor visual defects with good visibility, beginning to show signs of wear
3-Poor: striping has many visual defects with poor visibility, faded or shows heavy wear

Pavement Markings (Point) Data Dictionary

Feature Class	Attribute	Format	Structure Example	Description
Markings	AssetID	Integer	100000	Unique GIS identifier for each asset
	XY Location	Integer	41.40338, 2.17403	GPS location in decimal degrees
	Street Name	Text	Michigan Ave.	Name of the street the asset is located on
	Photo Image Link	Text	Hyperlink	Link to the imagery (provided via external hard drive)
	Type	Text	LANE	The type of marking e.g. left arrow, ONLY, BIKE, merge right arrow, etc.
	Color	Text	White	The color of marking e.g. white, yellow, green, etc.
	Condition	Text	Fair	Visual rating of the condition of the asset: 1-Good, 2-Fair, 3-Poor
	Comments	Text	Faded Text	Comments generated from GIS technician

Condition Rating Criteria
1-Good: marking is visible, not faded
2-Fair: marking has minor visual defects with good visibility, beginning to show signs of wear
3-Poor: marking has many visual defects with poor visibility, faded or shows heavy wear

PROJECT DELIVERABLES

Below you will find a summary of the deliverables associated with project. RAS will schedule a project kick-off meeting and will deliver bi-weekly progress reports and schedule updates as a function of project management activities.

City to Provide

- GIS Centerline (including district/ward polygons if necessary for analysis)
- Participation in meetings: kickoff, analysis parameters (may require multiple meetings), analysis results, and project close.

RAS to Deliver

- Network-level mobile data collection of roadway imagery and pavement distress for approximately 888 test miles (assuming driving two directions for arterial and collectors, and one direction for local/residentials and alleys.)
- ASTM D6433 compliant pavement rating and assessment for approximately 888 test miles.
- Inventory the following items: Geodatabase of distresses containing the Type, Severity and Extent of distresses along the road segment as defined by the ASTM D6433 methodology.

Functional Class		CL-Mi	Passes	Test-Mi
ARTERIAL		71.75	2	143.5
COLLECTOR		73.18	2	146.36
HIGHWAY		0.09	2	0.18
LOCAL		422.05	1	422.05
MAJOR ARTERIAL		76.19	2	152.38
MINOR ARTERIAL		3.16	2	6.32
NONE		0.76	1	0.76
PARK		12.7	1	12.7
PRIVATE RD		3.24	1	3.24
Totals		**663.12**		**887.49**
*Gravel and Unpaved roads will not be collected.				
Lane Miles	1326.24	(2x Centerline for ROW Assets)		

- ROW imagery and downward pavement imagery at 20-ft intervals
- On-site field validation of pilot roads (5-10 miles)
- Optimize the pavement rehabilitation model parameters utilizing the BOSS™ program.
    - Deliver PCI Triggers for appropriate treatment options, including suggested PCI improvement per treatment, and estimate unit costs for treatments.
    - Identify appropriate treatment options based upon deterioration curves and pavement conditions.
    - Develop optimized, logical projects (management sections) utilizing the PCI data.
    - Configure a pavement analysis incorporating concepts of cost of deferral, financial optimization to build out a 5-year pavement maintenance and rehabilitation plan with budget scenarios.
    - If requested, summarize and aggregate the PCI data at the District Level.
- Import data and analysis results to **BOSS™** via a secure, RAS hosted, PowerBI portal with condition results, analysis results, and financial charts.
- Right-of-way asset inventories via geodatabase: Signs, Pavement Markings, Pavement Striping
- Final PDF Report and ArcGIS Online Access to Maps.

Assumptions

- Data Collection is to commence in summer/fall 2025 in conjunction with other field surveys in the DFW Metroplex.
- Roadways to be surveyed when free of standing water, debris and in temperatures below 95°F

COST PROPOSAL

Below you will find a summary of the budget associated with the services discussed during our meeting and in this document. In addition to the pavement management analysis services listed below, we have also provided costs for the development of optional right-of-way asset inventories and other supplemental services. The RAS services are available for procurement on the local **TX Share - NCTCOG** purchasing co-operative. The link to the RAS contract documents can be reviewed at this link: https://txshare.org/available-contracts/pavement-analysis-services/roadway-asset-services-llc

The budget summary below lists the total fee for performing a pavement condition assessment and implementing BOSS™ pavement management portal, and the pavement performance analysis and budget scenarios. The scope also includes right-of-way asset inventories with a GIS deliverable.

The summary table below has been derived from the NCTCOG budget sheet approved by NCTCOG. The sheet for the selected services has been appended to this proposal.

City of Grand Prairie: Survey All Roadways & Alleys
Pavement Condition Assessment: $198,288.00
ROW Asset Inventories: $192,270.00
Total: $390,558.00

To simplify the complexity of the NCTCOG fee sheets, the key tasks included in the RAS approach as milestones are listed below.

Task	Milestone Activity
1	**Kickoff & Centerline Identification**
2	**Field Set-Up & GPS Network Creation**
3	**Collect Street Network** (888 Test Miles)
4	**Roadway Asset Inventory - ASTM D6433 surveys (PCI+IRI)** (888 Test Miles)
5	**Onsite RAS Data Validations of Pilot Roads**
6	**BOSS™ Optimized Pavement Analysis and Budget Scenarios**
7	**ROW Asset Inventories: Signs, Markings, Striping**
8	**Final Report, PowerBI Dashboard & ArcGIS Online Access**

Task Correlation to NCTCOG Fee Schedule

To simplify the complexity of the NCTCOG fee sheets, the Activity # from the NCTCOG sheet is correlated to the RAS tasks in the table below.

Task	Milestone Activity	NCTCOG Activity #
1	**Kickoff & Centerline Identification**	**28**
2	**Field Set-Up & GPS Network Creation**	**3,28**
3	**Collect Street Network** (888 Test Miles)	**1,2,4,5**
4	**Roadway Asset Inventory - ASTM D6433 surveys (PCI+IRI)** (888 Test Miles)	**21,22,23,29**
5	**Onsite RAS Data Validations of Pilot Roads**	**31**
6	**BOSS™ Optimized Pavement Analysis and Budget Scenarios**	**24,25,30,31**
7	**ROW Asset Inventories: Signs, Markings, Striping**	**ALT – 20a, ALT 20-b**
8	**Final Report, PowerBI Dashboard & ArcGIS Online Access**	**32,40**

Optional Services Fee Schedule

The following table includes the costs for City requested services, including retro-reflectivity surveys for warning & regulatory signs and Cityworks/GIS consulting services.

Task	Description	Units	Unit Cost	Fee
1	Warning and Regulatory Sign Retro-reflectivity Survey (Units = Lane Miles)	1326	$98	$129,948
2	Cityworks Consulting/Implementation Services (Units = Estimated Hours)	80	$210	$16,800

Note:

1. Retro-reflectivity surveys to be performed upon completion of sign inventory. Will only include warning and regulatory signs included in the database. Guide signs can be included for an additional fee.
2. Cityworks consulting services could include the implementation of a working link between the RAS database and the Cityworks software. The base scope of work includes all RAS attribution from the pavement surveys being tied to the Cityworks centerline for each unique Asset ID / Facility ID.

NCTCOG PRICING PROPOSAL FORM

See Attachment

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]		$147	$121	$97	888	$97.00	$ 86,136.00
2	Collect pavement surface distress and structural condition information through automated means for all Participant-owned roadways.	Lane Mile [1]		$1	$1	$1	888	$1.00	$ 888.00
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	$2,500				1	$2,500.00	$ 2,500.00
4	Collect dual-wheel path roughness data to International Roughness Index standards.	Lane Mile [1]		$1	$1	$1	888	$1.00	$ 888.00
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]		$1	$1	$1	888	$1.00	$ 888.00
6	Perform friction testing	Lane Mile [1]		$200	$200	$200			$ -
7	Measure lane striping reflectivity quality	Lane Mile [1]		$70	$65	$60			$ -

Service Category #2: Asset 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]		$50	$45	$40			$ -
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	$50						$ -
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	$75						$ -
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	$1						$ -
12	Collect location of curb and gutter and create shape (.shp) files for incorporation into the Participant's GIS system, if applicable.	Linear Feet	$0.02						$ -
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	$40						$ -
14	Collect locations of trees, including height and spread	Lane Mile 1	$85						$ -
15	Collect bike lane locations, including width, length, and associated signage and striping.	Linear Feet	$0.02						$ -
16	Utilize Ground Penetrating Radar for relocating utilities (for maintenance plans).	Linear Feet	$2.35						$ -
17	Collect data on location and surface condition of bridge approaches	Each	$10.00						$ -
18	Collect information on bridge deck condition (must include Activity # 20g)	Each	$5.00						$ -
19	Perform Parking Lot Pavement Condition Assessment (Thru-Travel Lanes) w/ Inventory, Attribute, & Geodatabase Development	Square Yard	$0.15						$ -

20 (a-v) below:	Right of Way Assets Database Development (GPS & Camera Configuration):								
20a	Sign & Support Database Development	Each	$3.00						$ -
20b	Markings & Striping Database Development	Each	$4.00						$ -
20c	Traffic Signals/ Flashers and Controllers Database Development	Each	$2.50						$ -
20d	Street Lights Database Development	Each	$2.25						$ -
20e	Drop Inlets Database Development	Each	$2.25						$ -
20f	Drivepads Database Development	Each	$2.25						$ -
20g	Bridges Database Development	Each	$4.00						$ -
20h	Speed Humps Database Development	Each	$2.50						$ -
20i	Street Furniture Database Development	Each	$2.75						$ -
20j	Cattle Guards Database Development	Each	$2.50						$ -
20k	Guardrails & Roadside Pedestrian Fence Database Development	Each	$4.00						$ -
20l	Culverts and Ditches Database Development	Each	$2.75						$ -
20m	Cabinets Database Development	Each	$4.00						$ -
20n	Utility Poles Database Development	Each	$2.25						$ -
20o	Fire Hydrant Database Development	Each	$2.25						$ -
20p	Medians Database Development	Each	$4.00						$ -
20q	Valves Database Development	Each	$2.25						$ -
20r	Manhole Covers Database Development	Each	$2.25						$ -
20s	Trees Database Development	Each	$3.50						$ -
20t	Catch Basins/ Drainage Inlets from Master Drainage Plan Database Development	Each	$2.50						$ -
20u	Sidewalk Database Development	Each	$3.00						$ -
20v	Curb & Gutter Database Development	Each	$3.00						$ -

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]		$1	$1	$1	888	$1.00	$ **888.00**
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]		$29	$29	$29	888	$29.00	$ **25,752.00**
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] ($7,500 base cost + lane mile unit cost)	$7,500	$0	$1	$2	888	$2.00	$ **9,276.00**
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	$5,000	$0	$1	$2	888	$2	$ **6,776.00**
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	$2,500	$0	$1	$2	888	$2	$ **4,276.00**
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	$1,500						$ -
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	$3,000						$ -

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]		$12	$10	$8	888	$8.00	$ 7,104.00
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	$10	$8	888	$8.00	$ 7,104.00
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.**	Lane Mile [1] ($5,000 base cost + lane mile unit cost)	$5,000	$1	$5	$7	888	$7.00	$ 11,216.00
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.**	Lane Mile [1] ($7,000 base cost + lane mile unit cost)	$7,000	$1	$5	$10	888	$10.00	$ 15,880.00
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.**	Lane Mile [1] ($2,500 base cost + lane mile unit cost)	$2,500	$5	$7	$7	888	$7.00	$ 8,716.00
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	$7,500	$5	$10	$12			$ -

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.	**							$ -
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)[2]	**							$ -

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	$4,500						$ -
38	GIS Support Services	Each Participant	$4,500						$ -
39	GIS Remote Training Sessions from GIS Manager/ Expert (2-Hour Sessions)	Each Participant	$500						$ -

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				1	$10,000	$ 10,000.00
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	$3,000						$ -
42	Provide Curb Ramp and ADA/Barrier Free Ramp Compliance Survey	Each Participant	$5,000						$ -

43a	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	Lane Mile [1]	$6,500.00	$123	$105	$95			$ -
43b	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.** b.Mobile Lidar	Lane Mile [1]	$4,000	$173	$160	$147			$ -
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. (Use for Retro-reflectivity survey)**	Lane Mile [1]	$4,500	$130	$115	$100			$ -
45	Provide consultancy services to develop linework in GIS for missing sidewalks in order to quantify and identify on a map	Hour	$150						$ -
ALT - 20a	Sign & Support Database Development	Lane Mile 1	$75.00				1326	$75.00	**$ 99,450.00**
ALT - 20b	Markings & Striping Database Development	Lane Mile 1	$70.00				1326	$70.00	**$ 92,820.00**
ALT - 20c	Traffic Signals/ Flashers and Controllers Database Development	Lane Mile 1	$30.00						$ -
ALT - 20d	Street Lights Database Development	Lane Mile 1	$30.00						$ -
ALT - 20e	Drop Inlets Database Development	Lane Mile 1	$30.00						$ -
ALT - 20f	Drivepads Database Development	Lane Mile 1	$45.00						$ -
ALT - 20g	Bridges Database Development	Lane Mile 1	$30.00						$ -
ALT - 20h	Speed Humps Database Development	Lane Mile 1	$30.00						$ -
ALT - 20i	Street Furniture Database Development	Lane Mile 1	$40.00						$ -
ALT - 20j	Cattle Guards Database Development	Lane Mile 1	$25.00						$ -
ALT - 20k	Guardrails & Roadside Pedestrian Fence Database Development	Lane Mile 1	$35.00						$ -
ALT - 20l	Culverts and Ditches Database Development	Lane Mile 1	$80.00						$ -
ALT - 20m	Cabinets Database Development	Lane Mile 1	$30.00						$ -
ALT - 20n	Utility Poles Database Development	Lane Mile 1	$30.00						$ -
ALT - 20o	Fire Hydrant Database Development	Lane Mile 1	$25.00						$ -
ALT - 20p	Medians Database Development	Lane Mile 1	$60.00						$ -
ALT - 20q	Valves Database Development	Lane Mile 1	$25.00						$ -
ALT - 20r	Manhole Covers Database Development	Lane Mile 1	$25.00						$ -
ALT - 20s	Trees Database Development	Lane Mile 1	$100.00						$ -
ALT - 20t	Catch Basins/ Drainage Inlets from Master Drainage Plan Database Development	Lane Mile 1	$80.00						$ -
ALT - 20u	Sidewalk Database Development	Lane Mile 1	$50.00						$ -
ALT - 20v	Curb & Gutter Database Development	Lane Mile 1	$55.00						$ -
								SUB-TOTAL:	**$ 390,558.00**

PMP	$	198,288.00
ROW	$	192,270.00

[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."**