TASK ORDER

Task Order No. KPA-22-004-TO, consisting of 29 pages.

**Task Order**

In accordance with paragraph 1.01 of the Master Services Agreement between Owner and Kasberg, Patrick & Associates, LP ("Engineer") for Professional Services – Task Order Edition, dated September 14, 2021 ("Agreement"), Owner and Engineer agree as follows:

1. **Specific Project Data**

   A. Title: PCI & 5-Year Maintenance Plan & 2023-2024 Street Maintenance Projects

   B. Description: Engineering Services to develop Pavement Condition Indices and develop a 5-year Street Maintenance Program for the City of Georgetown Roadway Network. This Task Order also include 2023-2024 Street Maintenance Project and 2023 ADA Sidewalk Improvements.

   C. City of Georgetown Project Number: _____

   D. City of Georgetown General Ledger Account No.: _____

   E. City of Georgetown Purchase Order No.: _____

   F. Master Services Agreement, Contract Number: 21-0115-MSA

2. **Services of Engineer**

   *See Exhibit A, Scope of Services, attached.*

3. **Owner's Responsibilities**

   Owner shall have those responsibilities set forth in the Agreement subject to the following: *The City of Georgetown will provide records and data of the existing Pavement Management System and all information on existing utilities within remediation projects*

4. **Times for Rendering Services**

   **PCI Update & 5-year Maintenance Program**

| Phase | Completion Date |
|---|---|
| PCI Data Collection and Report | January 31, 2023 |
| 60% 5-Year MP & Report Submittal | March 15, 2023 |
| 95% 5-Year MP & Report Submittal | May 1, 2023 |
| 100% 5-Year MP & Report Submittal | June 15, 2023 |

**2023-2024 Street Maintenance & ADA Projects**

| Phase | Completion Date |
|---|---|
| Design (HPPS, HIPR) | January 15, 2023 |
| Design (ADA Improvements) | February 15, 2023 |
| Bidding (All Projects) | April 15, 2023 |
| Construction Admin (All Projects) | November 2023 |

5. **Payments to Engineer**

A. Owner shall pay Engineer for services rendered as follows:

| ***Category of Services*** | | ***Compensation Method*** | ***Lump Sum or Not to Exceed Amount of Compensation for Services*** |
|---|---|---|---|
| *Basic Services Pavement Conditions Survey & 5 Year Street Maintenance Program* | *A.* | *Lump Sum* | *$433,460.00* |
| *2023-2024 Street Maintenance & ADA Improvements Projects* | *A.* | *Lump Sum* | *$1,065,100.00* |
| | | ***Total Services*** | ***$1,498,560.00*** |

B. The terms of payment are set forth in Article 4 of the Agreement unless modified in this Task Order.

6. **Consultants:**

Kasberg, Patrick & Associates, LP – Georgetown, Texas
Applied Research Associates – Austin, Texas
All County Surveying – Georgetown, Texas

7. **Other Modifications to Agreement:**

None

8. **Attachments:**

Exhibit A – Scope of Services
Exhibit B – Fee Schedule Summary

9. **Documents Incorporated By Reference:** The Agreement effective September 14, 2021.

Terms and Conditions: Execution of this Task Order by Owner and Engineer shall make it subject to the terms and conditions of the Agreement (as modified above), which Agreement is incorporated by this reference. Engineer is authorized to begin performance upon its receipt of a copy of this Task Order signed by Owner.

The Effective Date of this Task Order is _____, 2022.

| OWNER: | | ENGINEER: | |
|---|---|---|---|
| By: | _____ | By: |  |
| Name: | _____ | Name: | Alvin R (Trae) Sutton III, PE.CFM |
| Title: | Mayor, City of Georgetown | Title: | Principal |
| | | Engineer License or Firm's Certificate No. | F-510 |
| | | State of: | Texas |
| Date: | _____ | Date: | August 12, 2022 |

APPROVED AS TO FORM:

_____

_____
City Attorney

TASK ORDER

| **Owner:**<br>**Designated Representative for Task Order:** | | **Engineer:**<br>**Designated Representative for Task Order:** | |
|---|---|---|---|
| Name: | Chris Pousson | Name: | Trae Sutton, P.E., CFM |
| Title: | CIP Manager Supervisor | Title: | Principal |
| Address: | 300-1 Industrial Ave<br>Georgetown, TX 78626 | Address: | 800 South Austin Avenue<br>Georgetown, TX 78626 |
| E-Mail Address: | Chris.pousson@georgetown.org | E-Mail Address: | TSutton@kpaengineers.com |
| Phone: | 512-930-8140 | Phone: | 512-819-9478 |
| Fax: | | Fax: | 254-733-6667 |

**EXHIBIT A**

**DETAILED SCOPE of SERVICES**

**PROVIDED BY ENGINEER**

**KASBERG, PATRICK & ASSOCIATES, LP**

**GEORGETOWN, TEXAS**

**PCI Updated and 5-year Street Maintenance Plan**

**Project Description:**

This project involves gathering data on the City of Georgetown's roadway network to develop Pavement Condition Indices (PCI) and develop a 5-year Street Maintenance Plan (SMP) for roadway maintenance. Deliverables will include reports of the City network's PCI, a 5-year Street Maintenance Plan, and a google-earth based viewing tool. The project will also include Program Management.

**Scope of Services:**

The scope of services for this project to be provided by the ENGINEER includes developing the Pavement Condition Indices and the 5-year Street Maintenance Plan for the roadways within the City of Georgetown network as well as the Program Management of these projects. The project will evaluate the City's roadway network to develop an overall PCI Score. This will include utilizing Geographic Information System (GIS) and the existing Pavement Management System (PMS) as well as other inventory sources. After all of the existing data has been analyzed, the process of collection of distress and profile data will begin. Automated Distress data will be collected on the City's road network. This process will involve collecting digital images of the pavement surface and cracking distresses extracted from the images. Rutting and ride will be recorded with laser systems that can scan the transverse and longitudinal road profiles. The distress data will be uploaded to the pavement segment surveyed. Additionally, ride index values will be developed from the International Roughness Index values recorded in the field. All of the data gathered will then be developed into a system that methodically produces organized areas of the City of Georgetown. In the field observations of each area will be reviewed to confirm the results of the data collected. This will be accomplished by inspecting the streets. Areas in question will be reviewed jointly with City Staff. There will also be an evaluation of streets that have received pavement seal and HIPR treatments since the 2018 study and evaluate how these street maintenance processes are impacting the individual street PCI scores.

A maintenance and remediation program will be developed. Different maintenance methods will be developed during the review of the streets in the field. These will include, but not be limited to sub-grade stabilization and overlay, drainage enhancement and pavement rehabilitation, hot-in-place asphalt recycling, surface treatments, asphalt rejuvenation, asphalt overlays, etc. Visual collection of data will include reviewing the street to determine if the data collection is accurate and looking at contributing issues, such as drainage, that are creating poor

PCI numbers. At this time a meeting with City Staff will be held to review the conclusions before proceeding to development of the report and the 5-year SMP. The final report and the 5-year SMP with cost estimates will be developed with graphical representation of the project.

A final meeting with City Staff will be scheduled to review the final document, reports and illustrations. After final comments the final report, illustrations and cost estimates will be delivered. Digital copies of the reports for use by the City Staff, will also be submitted.

A General Project Scope follows;

**I. Pavement Condition Surveys**

A. Develop program

B. Review Inventory

C. Data Collection, Quality Control and Upload

D. Routing

E. Equipment Calibration

F. Data Collection in the field

**II. Overall Pavement Condition Index and Inventory City Roadway Infrastructure**

A. Data Processing

B. Review and Update Current Database

C. Upload to CarteGraph

D. Develop initial strategies

E. Review all the data developed from the data collection phase of the project

F. Organize data into segments within the City

G. Develop graphical representation of the data collected.

H. Identify locations that do not meet the Council directed PCI of 85

I. Inventory roadway infrastructure

J. Review locations of undesirable PCI in the field

K. Develop exhibits that illustrate locations of questionable PCI

L. Review questionable locations with City Staff

M. Complete overall PCI and roadway infrastructure inventory

## III. Development of 5-year SMP

A. Organize deficient streets into geographical areas

B. Develop options for rehabilitation

C. Develop projects for sustainability in bidding and construction

D. Organize project and develop graphical representation

E. Prepare cost estimates for all projects in all rehabilitation methods

F. Review projects and rehabilitation methods with City Staff

G. Develop 5-year SMP projects with graphical representation and cost estimates

H. Review documents with City Staff

I. Produce preliminary draft for 5-year SMP

J. Review preliminary draft with City Staff

K. Develop final 5-year SMP, graphical representation, cost estimates, maps, etc.

L. Deliver 10 copies of the report, maps, graphical representations and cost estimates to City Staff (Editorial comment – These are a FINAL deliverable, not due until the 5-year SMP has been approved.)

A Detailed Project Scope follows;

## I. Pavement Condition Surveys

A. The ENGINEER will coordinate the project through the City of Georgetown and gather information for data collection. Confirmations of condition data will be obtained and verification of format delivery. Specific discussions and verification will be held concerning the processing and use of PMS and GIS information.

B. The ENGINEER will conduct an official inventory of the roads to be surveyed. Any inventory data identified as being required for the proposed PMS or found to be missing or inaccurate will be located or collected. This will be reviewed and consulted with City Staff.

C. The ENGINEER will assist the City in identifying and resolving discrepancies between data sets in its inventory. These data sets include any existing databases and GIS data files.

D. The ENGINEER will provide quality control checks for the GIS and PMS database.

E. The ENGINEER will collect digital images of the pavement surface and cracking distresses will be extracted from the images. Laser systems will be utilized to scan the transverse and longitudinal road profiles to determine rutting and ride.

F. The ENGINEER will upload the distress data to the pavement management system to determine a calculated Pavement Condition Index (PCI). The data collected will be on

approximately 384 test miles of the City of Georgetown's roadway network.

G. The ENGINEER will develop a routing process based on the final road listing developed.

H. The ENGINEER will perform equipment checks and calibrations to ensure the quality of the data. The data collection database will be uploaded and tested on field computers.

I. The ENGINEER will collect, store and transfer to the City digital images on portable Universal Serial Bus (USB) drives. These images can be used for subsequent evaluations and comparisons by the City.

J. The ENGINEER will perform data collection in accordance with ASTM Standard E-1656 (Standard Guide for Classification of Automated Pavement Condition Survey Equipment), utilizing a Class 1 device as defined by the specifications.

K. The ENGINEER will collect transverse profile data using a 5-sensor profiler to locate the presence of ruts and/or irregularities in the cross slope or utilize area scan lasers obtaining a full cross sectional profile. This will determine the rutting characteristics for each of the roadway segments profiled. This will be performed in accordance with ASTM Standard E-1656 (Standard Guide for Classification of Automated Pavement Condition Survey Equipment) and ASTM Test Standard E-950 (Standard Test Method for Measuring Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference). The transverse profile will be recorded every ten feet and summarized as an average "rut depth" for each wheel path over the roadway segment.

L. The ENGINEER will collect longitudinal profile data simultaneously with the transverse profile data at 0.5 foot intervals throughout the length of each section selected in each direction and summarized at 0.01 to 0.1 mile intervals to provide International Roughness Indices (IRI) throughout the network. The collected IRI values will be reported as an average IRI value for each roadway segment. This will be performed in accordance with ASTM Test Standard E950 (Standard Test Method for Measuring Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference).

## II. Overall Pavement Condition Index and Inventory City Roadway Infrastructure

A. The ENGINEER will extract the following PCC distresses, if any, from the images – 1) Cracked Slabs 2) Shattered Slabs 3) Corner Breaks 4) Faulting.

B. The ENGINEER will extract the following AC distresses from the images – 1) Alligator Cracking 2) Longitudinal Cracking 3) Transverse Cracking 4) Block Cracking.

C. The ENGINEER will extract rutting from the profile information.

D. The ENGINEER will develop IRI for each roadway and report. This will be converted to a Ride Condition Index (RCI). This will be reported on a 0 to 100 scale.

E. The ENGINEER will review and update the current database. The database will be converted to SQL/SQL Express. Microsoft Access is being phased out and no longer functions with CarteGraph versions 8.2 or greater. 8.2 is the current version. SQL databases allow for larger databases than Access.

F. The ENGINEER will upload to CarteGraph. The upload will include distress inspection and asset inventory information to the CarteGraph Software.

G. The ENGINEER will take photographs in the field by utilizing the downward pavement camera and the forward right-of-way camera. Copies will be provided to the City on USB drive. Upload of any data for distress or ride will be an update to the existing system. Upload of right-of-way and/or pavement images taken during data collection will be attached to the asset records in the Pavement View (all ROW/Pavement Images) module.

H. The ENGINEER will review all of the data developed from the collection phase for the project. Data will be analyzed for PCI scores with the data being managed for areas of grouped scores above and below the required PCI of 85.

I. The ENGINEER will organize the data in to areas and segments within the City. The segments will be broken out into geographical locations to develop projects.

J. The ENGINEER will develop graphical representations of the data collected within the segments established. The streets and areas will be color coded to show PCI scores on a ten point range based on above and below the required PCI score of 85. Each ten point range will be assigned a color and streets will be reviewed in detail to deliver a score for street segments. This will create areas of interest for review.

K. The ENGINEER will review the graphical representations created with City Staff illustrating the areas that do not meet the PCI minimum of 85.

L. The ENGINEER will review and inventory the streets in the field to verify the data collected during Phase I of the project. Notes on areas of questionable data will be made with graphical representations developed. Contributing conditions will be reviewed for inclusion in the SMP development. These will include drainage issues, driveways, curb and gutter deficiencies, pavement structure, etc.

M. The ENGINEER will meet with City Staff to review the locations that are questionable. Field visits will be made to have a consensus of the PCI of these areas.

N. The ENGINEER will perform an evaluation of streets that have received pavement seal and HIPR treatments since the 2018 study and evaluate how these street maintenance processes are impacting the individual street PCI scores.

O. The ENGINEER will develop the overall PCI based on the data, field reviews and meetings. Final exhibits and maps shall be created for the City's Roadway network.

P. The ENGINEER will evaluate the financial impacts of having an overall PCI Score of 80, 85 and 90.

## III. Development of 5 Year SMP

A. The ENGINEER will organize the deficient streets developed in Phase II into geographical areas of the City. These shall focus on areas that can create projects that can be bid and constructed. Attention will be paid to traffic control issues, main thoroughfares, construction procedures, need for utility adjustments or replacements, etc.

B. The ENGINEER will provide a summary of the financial impacts of adjusting the current minimum overall PCI Score of 85 to PCI Scores of 80 and 90 respectively.

C. The ENGINEER will develop options for rehabilitation. These shall include full street re-construction, subgrade stabilization and paving, hot in place asphalt recycling, surface treatments, etc.

D. The ENGINEER will prepare cost estimates for all rehabilitation methods. These will be based on historical data and discussions with contractors. Unit prices will be developed for utilization in the development of the SMP.

E. The ENGINEER will develop and organize projects to be considered for the 5-year SMP. Projects will be created that are sustainable for bidding and construction. These will be placed into exhibits to show locations of projects and begin the exhibits that will illustrate the final 5-year SMP.

F. The ENGINEER will assign rehabilitation methods for the projects developed. These will be based on the methods developed in the beginning part of this phase of the project. These will be assigned in the exhibits. A meeting with City Staff will be scheduled to review the projects and discuss the rehabilitation methods for each area. Confirmation of the budget for each year of the 5-year SMP will be discussed and documented to develop the final 5-year SMP. All comments will be addressed and agreed upon prior to proceeding with the final documents.

G. The ENGINEER shall develop the final 5-year SMP. The budget for each year of the SMP will be the basis for project development to maximize the rehabilitation of the City's roadway network and maintain the overall City PCI. Projects will be developed and organized by method of rehabilitation and geographical area as practical. Contributing factors for poor PCI scores will be addressed within the projects and incorporated into the projects. Meetings with the City's utility project manager will occur to establish any City utilities within the project(s) limits that need to be addressed during the construction phase. Costs for rehabilitation or reconstruction of utilities will be developed for the final report, but separated such that individual budgets are established. Each year of the SMP will have projects established with estimated costs and exhibits. Water and wastewater rehabilitation needs will be determined and planned in conjunction with the Water Services Division. An overall exhibit will also be created for the 5-year SMP. A report for the 5-year SMP will be developed as well.

H. The ENGINEER shall schedule a series of meetings with City Staff to review and edit the

5-year SMP. Notes will be developed and incorporated into all documents.

I. The ENGINEER shall produce the final estimates and exhibits 5-year SMP and deliver ten sets to City Staff.

J. The ENGINEER shall produce a power point presentation and prepare to present the presentation to GTAB and City Staff for the 5-year SMP.

# 1 PROJECT UNDERSTANDING

The City of Georgetown, Texas currently utilizes the Pavement Condition Index (PCI) method as defined by ASTM 6433 for assessing the condition of city-maintained roadways. The PCI procedure is used as the basis for their pavement management program to track network condition, plan maintenance, and develop budget plans as part of managing their roadway network. This project consists of conducting an automated pavement condition assessment, PCI calculation, and production of five-year maintenance recommendations for city-maintained roadways. Our proposal also includes optional pavement management software implementation to replace the City's Cartegraph pavement management software, which has been retired by the City.

The City's road network consists of approximately 439 centerline miles, which correlates to approximately 610 test miles. Test miles are estimated by assuming that all driving lanes on arterial and collector roadways will be collected and a single lane on local roadways.

# 2 SCOPE OF SERVICES

## 2.1 TASK 1: PROJECT MANAGEMENT

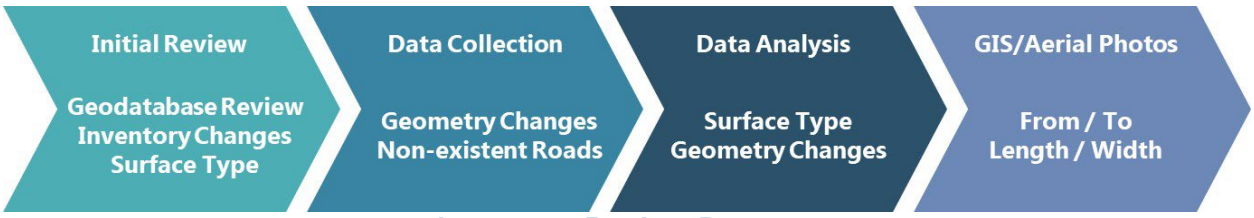
The objective of this task is to ensure the scope of work, data collection protocol, quality control/quality assurance, project schedule, traffic control plan, jurisdictional contacts, reporting requirements, and other project-specific requirements are adhered to throughout the project. In addition to the kick-off meeting and regular e-mail and telephone communications, up to three (3) additional meetings will occur throughout the project at completion of major tasks and to review the results of this study at key milestones.

## 2.2 TASK 2: INVENTORY REVIEW & ROUTING

An important step of this project that will take place prior to the data collection is an evaluation of the City's current roadway and pavement management inventory datasets to efficiently plan data collection. The City will need to provide the following information to facilitate the analyses to be performed by ARA:

- Pavement management database
- Shape files of road centerlines
- Support to resolve inventory discrepancies between current and historic GIS information and historic PCI information in the legacy Cartegraph database.

This task is continuous throughout the project, incorporating inventory discrepancies that may be found in later stages of the project based on actual field conditions. This full vetting of the City's inventory will start before data collection begins and continue until all final analyses and reporting are complete. Our approach to the inventory review task is shown in the figure below.




**Inventory Review Process**

### *2.2.1 Missing or Mismatched Segment IDs*

There are 2,318 road segments, accounting for 172 centerline miles of roadway, from the 2022 inventory that do not have Segment IDs. ARA will coordinate with City personnel in populating this missing information in the street inventory GIS file. Additionally, there are 75 miles of roadway, accounting for 930 road segments, from the 2018 inventory that do not have a match in the 2022 inventory. The Segment IDs will need to be reconciled and populated into the official street inventory and ***must be maintained in the master City GIS file for future projects***. If the Segment IDs are not maintained this will require additional effort and costs on future projects. We will coordinate with City personnel on this task. The two tables below show the initial comparison of the 2018 to 2022 roadway inventory information and provide an estimate of the amount of inventory reconciliation that will need to be performed.

***2022 Centerline Miles Comparison***

| 2022 CLM | Status |
|---|---|
| 267 | Matched to 2018 |
| 172 | mismatched/missing to 2018 |
| 439 | total |

***2018 Centerline Miles Comparison***

| 2018 CLM | Status |
|---|---|
| 266 | Matched to 2022 |
| 75 | no 2022 match |
| 341 | total |

### *2.2.2 Missing Roadway Widths*

Additionally, roadway width information that is not available will need to be populated. Reconciling the Segment IDs will allow for as many roadway widths as possible to be obtained from historic inventory information, however, we estimate that approximately 100 centerline miles will require ARA to measure roadway widths from aerial imagery and coordinate with City personnel to obtain this missing roadway attribute information.

### *2.2.3 Street Names & Functional Classification Discrepancy Checks*

From a preliminary comparison of the street names between the 2018 and 2022 inventories. There are 11 Segment IDs with completely different street names, and one record with a potential spelling issue. We will need to confirm with the City the correct street names for these roadways prior to starting data collection. The listing of these roadways is shown in the table below. This comparison does not account for roadways where there was no Segment ID relationship between the 2018 and 2022 inventories, so the list in the table below may be much larger after we are able to spatially match the segments that overlap where no Segment ID relationship exists.

***Street Name Inventory Verification***

| SEG ID | 2022 Name | 2022 FC | 2018 Name | 2018 FC |
|---|---|---|---|---|
| **1005351** | SUN CITY BLVD | MINOR ARTERIAL | FIELDSTONE DR | MINOR ARTERIAL |
| **1002681** | CATERPILLAR LN | LOCAL | CATERPILLER LN | LOCAL |
| **1004844** | SPORT CLIPS WAY | MINOR COLLECTOR | BRIARWOOD DR | MINOR COLLECTOR |
| **1005353** | SUN CITY BLVD | MINOR ARTERIAL | FIELDSTONE DR | MINOR ARTERIAL |
| **1002099** | SCENIC LAKE DR | LOCAL | SOUTHWESTERN BLVD | MINOR ARTERIAL |
| **1001437** | DAISY CUTTER XING | MINOR COLLECTOR | ROCKRIDE LN | MAJOR COLLECTOR |
| **1001437** | DAISY CUTTER XING | MINOR COLLECTOR | ROCKRIDE LN | MAJOR COLLECTOR |
| **1002798** | CATTLEMAN DR | MINOR COLLECTOR | GRANITE PEAK CV | LOCAL |
| **1002798** | CATTLEMAN DR | MINOR COLLECTOR | GRANITE PEAK CV | LOCAL |
| **1002798** | CATTLEMAN DR | MINOR COLLECTOR | GRANITE PEAK CV | LOCAL |
| **1002798** | CATTLEMAN DR | MINOR COLLECTOR | GRANITE PEAK CV | LOCAL |
| **1004347** | NORTHWOOD DR | LOCAL | RIVER BEND DR | MINOR COLLECTOR |

* FC = Functional Classification

### *2.2.4 Routing*

Once inventory records have been reconciled, ARA will then “route” our collection plan. ARA’s route-optimization programs minimize data collection times in the field and facilitate data processing once data has been submitted to the office. Based on our preliminary review of the City’s roadway inventory, we estimate approximately 610 test miles representing 439 centerline miles of roadway.

## 2.3 TASK 3: DATA COLLECTION

ARA proposes to provide automated data collection using the ARA Multi-Functional Vehicle (MFV) equipped with a 3D Laser Crack Measurement System (LCMS). During data collection, this vehicle is driven at posted speed limits (up to 60 mph.) We do not anticipate any traffic control requirements. Our MFV is equipped with appropriate flashing lights and sign markings for additional safety. Additionally, all vans used for collection are marked with the company name.

The MFV is equipped with the latest sensors and hardware required for accurate, high-quality pavement data collection, including:

- Pavemetrics Laser Crack Measurement System: The imaging systems provides very high-resolution pavement images. The system is configured to capture 4m (approximately 13 ft.) pavement width with 2mm resolution and can operate at speeds up to 60 mph. In addition to the pavement imagery, the 3D imaging system allows for rutting measurements to be obtained.
- Dynatest Model RSP-5051 Mark III High-Speed Laser Profiler: The Road Surface Profiler (RSP) is equipped with 7 lasers and 2 accelerometers and is a Class I (highest standard) profiler. In addition to pavement profile measurements, the RSP is capable of calculating IRI and rutting in real time.
- High-definition Right of Way (ROW) cameras: The system includes two UniBrain cameras capable of capturing color images in 1920x1080 format or higher. Images are acquired and stored every 20 ft. and all images are geotagged.
- Inertial Measurement Unit (IMU) and GPS: The MFV is equipped with an Applanix POS LV V5 inertial navigation system for recording sub-meter accuracy GPS coordinates. In addition, our system also captures pavement geometry including cross slope, radius of curvature and longitudinal grade.

The LCMS allows automated detection of pavement distresses including various types of cracks, raveling, edge drop-offs, potholes, macrotexture, and rutting. The system also automatically determines the presence of paint stripes which help in identifying the pavement lane.


***Data Collection Vehicle***

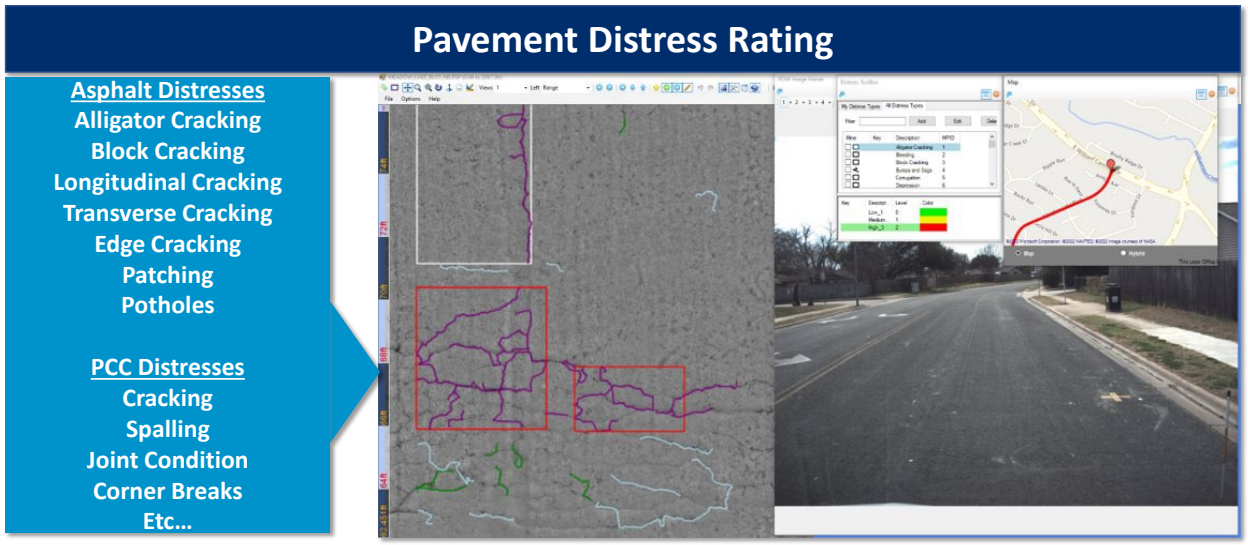
## 2.4 TASK 4: DATA PROCESSING, DISTRESS RATING, AND DATA MIGRATION

### *2.4.1 Data Processing & Distress Rating*

Data acquired with the Laser Imaging system allows the automated detection/identification of various types of distresses including all types of cracking, rutting, raveling, potholes, edge drop-off, sealed cracks, lane markings, and macrotexture. However, it should be noted that for PCI calculation purposes, the ASTM D 6433 standard includes 20 distress types for both asphalt and concrete surface types. Due to the complexity of separating all distresses into the 20 distress types, we believe it is prudent to follow a two-step approach for distress rating, where a combination of fully automated computer-based crack type determination and a semi-automated rating process performed by an experienced pavement inspector. ARA will determine the most suitable approach to ensure quality results for the City.

Quality control and quality assurance are an integral part of our methodology. We incorporate QC/QA measures in all aspects of data collection, verification, analyses and reporting. During data collection, all data streams are verified on a daily basis as part of a comprehensive QC/QA program to ensure that all required data elements are being collected. It also serves to ensure that no segment is left untested, unless for a reason beyond ARA control at the time of data collection (ex. road closures or construction activity).

All acquired data will be analyzed through distress rating software, Dynatest Explorer/Dynatest Rating Module (DE/DRM). Distresses will be categorized by type, severity, and quantity the results including location and extent. ARA will utilize a distress rating subcontractor, Nix Engineering to assist with the distress rating task on this project.




***Distress Rating Process***

International Roughness Index (IRI) values will also be reported for each roadway segment. IRI quantifies the ride quality (rough or smooth) that the traveling public experiences on the roadway. A 0 to 100 ride condition index will be calculated for each road segment based on the IRI values. The rutting measurements on each roadway are measured by the 3D-LCMS camera and will be reported individually as well as included as part of the Pavement Condition Index calculation.

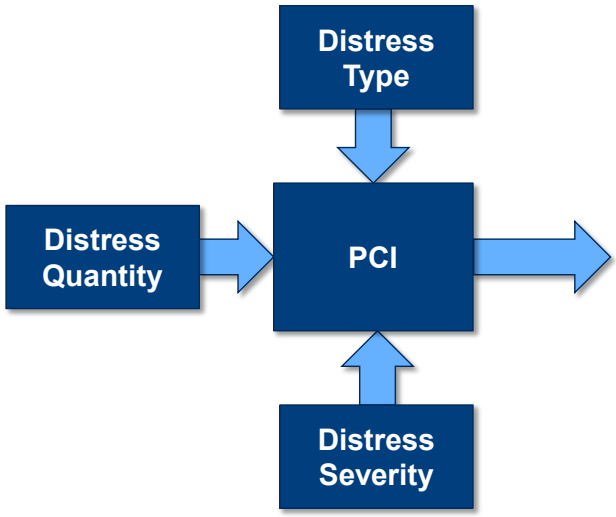
### *2.4.2 Data Migration*

To perform a proper update and maintain the integrity the City's pavement management program, ARA will need to migrate the historic PCI scores to the pavement management database that will be used for calculating the PCI scores and projecting future pavement conditions. The data migration of maintaining the historic PCI scores is required so that the pavement performance models for the City's roadway network can properly be calibrated. Accurate pavement performance models are important as to not over- or under-deteriorate roadways when estimating future pavement conditions, required maintenance treatments, and required budgets.

We fully understand that the City has discontinued use of the Cartegraph pavement management software, however, to keep with best industry practices, ARA will have to migrate the legacy data and upload the new inspection data to a pavement management software to perform the analysis, engineering, and reporting tasks this project. This will also keep all the data organized for future use. ARA will use a software (or multiple) suitable to fit the City's needs.

## 2.5 TASK 5: PAVEMENT CONDITION INDEX CALCULATION

A Pavement Condition Index (PCI) score in accordance with the ASTM D6433 Standard for each City-maintained roadway block-to-block segment will be calculated. ARA will utilize industry standard software to calculate the PCI scores, which are often classified into various condition categories (customizable) as shown in the figure below.




| PCI Category | PCI Range |
|---|---|
| Good | 86-100 |
| Satisfactory | 71-85 |
| Fair | 56-70 |
| Poor | 41-55 |
| Very Poor | 26-40 |
| Serious | 11-25 |
| Failed | 0-10 |

***Pavement Condition Index***

## 2.6 TASK 6: PAVEMENT ANALYSIS

This task will consist of the configuration, set-up, and analysis of the pavement inspection data to produce budget and pavement condition projections suitable for the development of a five-year pavement work plan. This task will also involve configuring the pavement management software to ensure that the projected conditions are accurate. This will involve several steps.

1) Update Work History – upload completed work since last condition survey to PMS database
2) Evaluate M&R Treatments – look at current treatments and add/remove if there are changes.
3) Update Unit Costs – obtain current unit costs for M&R Treatments after toolbox is finalized.
4) Update Performance Curves – after PCI is calculated, adjust performance curves based on the multiple years of pavement inspections. Create new performance model families if needed.
5) Update Decision Trees – review current decision trees and adjust if needed.

Budget analysis will be based on PCI as the driving input parameter for treatment selection. The PCI will deteriorate from year to year. As such this will be accounted for in the Budget Analysis steps outlined below. The final product will be a vetted list of candidate roadways for KPA to group into projects for the 5-year work plan. The following steps are required to produce this list of candidate roadways.

1) Unlimited Budget Analysis – Run unlimited budget analysis to determine relative ratios for funding different treatment categories
2) Do Nothing Analysis – series of Do Nothing followed by Unlimited Budget analysis for each year of the work plan.
3) Deferred Maintenance Analysis – determine “critical” sections within each maintenance bucket by comparing consecutive years of the “Do Nothing” analysis – this will show where funding needs to be targeted as to avoid a more expensive treatment in the successive year
4) 5-Year Budget Analysis – finally, based on the Do Nothing and Deferred Maintenance analyses – determine the optimal distribution of funding each year for each treatment type. This will require the City to provide the budget level that the analysis will be performed at. We will confirm that the budget distribution recommended is acceptable by the City prior to moving on to the next step.
5) Preliminary Work Plan – based on the 5-year budget analysis and approved budget distribution, prepare list of prioritized roadways to KPA for practical project grouping and shifting of treatment years
6) Final Work Plan – incorporate any comments from the City and KPA and repeat step 5 as necessary up to three iterations.

The following analyses are not included in our scope of work:

1) Alternate Budget Analyses – Analysis on only one funding level will be performed. We will not run budget analyses at +/- % of current budget or any alternate funding levels. The only "alternate" budget analysis that will be provided is the "Do Nothing" analysis which shows the maximum theoretical network deterioration.
2) Target PCI Analysis – This analysis will not be performed. Only one budget analysis at one funding level as provided by the City will be performed.

### 2.7 TASK 7: FINAL REPORT

This involves preparing a final report that will document all fieldwork, ride statistics, distress information, and the maintenance and rehabilitation recommendations. This report will include the following:

- Summary of fieldwork
- Summary of network conditions
- Exceptions report – roadways that could not be tested and why
- GIS maps summarizing roadway condition scores (PCI, IRI)
- Spreadsheet and GIS database summaries of network condition and recommended maintenance/repair activities

A draft of the report will be prepared and provided to KPA and the City for review. Upon inclusion of KPA and City comments and acceptance of the report by the City, ARA will finalize the report. Should more detailed project level analyses need to be performed, additional fees will be applicable and will be addressed with KPA and the City at that time. It should also be noted, that due to future circumstances, the recommendations presented to the City in this report is subject to change at the City's discretion. Additional requested revisions to the analysis or report may entail additional fees.

## 2.8 TASK 8: VIEWING TOOL

ARA will provide the City a Google Earth-based viewing tool that will allow for reviewing video and condition scores of the roadways. No special software installation is required to utilize this tool, only server space to save the images collected with the data collection vehicle. The Google Earth based solution is extremely intuitive to use and requires minimal training and resources on the City's end to use.

## 3 PROJECT SCHEDULE

Completion of the project will take approximately 5 months from mobilization for field data collection, assuming timely feedback from the City on deliverables requiring KPA and the City's approval/input.

## 4 DELIVERABLES

ARA will provide the following deliverables:

| Deliverable | Due Date |
|---|---|
| **Pavement Condition Index (PCI) for each roadway** | 2-3 months from mobilization |
| **Update pavement database with current conditions** | 3-4 months from mobilization |
| **Engineering Analysis and Reporting** | 3-5 months from mobilization |
| **Viewing Solution** | 5 months from mobilization |

**EXHIBIT A – DETAILED PROJECT SCOPE**

**SERVICES PROVIDED BY ENGINEER**

**KASBERG, PATRICK & ASSOCIATES, LP**

**GEORGETOWN, TEXAS**

**2023-2024 Street Maintenance Projects**

**Project Description:**

This project involves final design, bidding, construction administration and onsite representation services for the City of Georgetown's 2023-2024 Street Maintenance Projects. The project consists of two (2) different street maintenance methods: hot in place recycling (HIPR) and high-performance pavement seal applications, as well as the 2023 ADA Sidewalk Improvements. Each project will also include the evaluation of all existing pedestrian ramps along the proposed project route to determine if the ramps are ADA compliant. Any pedestrian ramp that identified as non-compliant will be removed and replaced in conjunction with this project.

This project will also include Onsite Representation Services for the high-performance pavement seal application. This service will be provided during the construction phase of these projects and will consist of construction observation, daily construction reports, product installation evaluation, project communication with the City, and general conformance with plans and specifications by the contractor and replaced in conjunction with this project

For the hot in place recycling (HIPR Process) application, each street location will include the evaluation of the existing pedestrian ramps along the proposed project route to determine if the ramps are ADA compliant. Any pedestrian ramp that identified as non-compliant will be removed and replaced in conjunction with this project. The streets that are proposed to receive the HIPR treatment can be found on the attached Exhibit C.

The high-performance pavement seal application is a high-density mineral bond asphalt emulsion that includes a blend of fine aggregates. The application limits oxidative damage to the roadway that is a result of sun exposure and moisture. The streets proposed for high performance pavements seals in this year's project are identified on the attached Exhibit C.

The FY23 ADA Sidewalk Improvements Project will include sidewalk and ADA improvements at various locations identified in the Citywide ADA study. The services for this project shall include the performing of topographic surveys, preparation of plans and technical specifications, bidding services, product submittal review and construction administration services. Services also include Environmental Phase I Investigations. Exact locations for the sidewalk improvements will be determined by City Staff prior to performing topographic surveys.

**Scope of Services:**

**2023-2024 Street Maintenance Projects Scope of Services:**

The scope of services associated with these projects is as follows:

## I. Design Phase

a. Data Collection, Permits, and Utility Coordination

i. The ENGINEER will utilize existing topographic information and City data to develop surfaces for the proposed street maintenance streets.
ii. The ENGINEER will determine areas within the project that require tree pruning and care. Details and procedures will be developed, coordinated, and approved by the City of Georgetown arborist.
iii. The ENGINEER will coordinate with utility companies and other City departments to identify any possible conflicts and/or proposed utility improvements on the proposed street maintenance projects.
iv. The ENGINEER will investigate general Drainage within the project area and conveyance to positive flow at the connection points of the project to existing conditions. Any areas of concern or non-conveyance will be reported to the City of Georgetown Staff and discussed.
v. The ENGINEER will review curbs, Driveways, etc. to determine conflicts with existing private property connections to the project.
vi. The ENGINEER will conduct a review of all pedestrian ramps to determine their ADA compliance status along the project routes.
vii. The ENGINEER will incorporate City of Georgetown imagery into the GIS data and integrate the two as a model.

b. Develop Design Plans

i. The ENGINEER will utilize any existing topographic data and surface model to develop plan sheets identifying project limits for each street maintenance application. The plan sheets shall identify locations of existing water valve, fire hydrant, wastewater manholes and other existing utilities located within the project limits.
ii. The ENGINEER will develop plan sheets with elevation call outs for in-house curb and gutter replacement projects.
iii. The ENGINEER will develop erosion control/sedimentation/tree protection plans.
iv. The ENGINEER will develop traffic control, striping and signing plans for each street maintenance application location.
v. The ENGINEER will develop all standard and special details for each construction method.
vi. The ENGINEER will develop plan sheets identifying non-compliant ADA pedestrian ramps that are to be replaced as part of this project. The plan sheets will identify location, ramp type and any sidewalk improvement required to bring the ADA ramp into compliance.
vii. The ENGINEER will develop a quantity take-off and an estimate of probable construction cost for each street maintenance method.

c. Develop Bidding Documents for the Project

   i. The ENGINEER will develop detailed technical specifications for each street maintenance method.
   ii. The ENGINEER will develop a detailed quantity take off for work to be performed for each street maintenance method. The ENGINEER will utilize this detailed quantity take off to prepare a bid schedule for the project.
   iii. The ENGINEER will prepare the contract document project manual.

d. Review Plans with City Staff, Incorporate Comments

   i. The ENGINEER will schedule a meeting with City Staff to review the plans at the 50%, 75% and 90% design stages to discuss issues and report any dilemmas that have been encountered.
   ii. The ENGINEER will receive all City Staff comments and incorporate into the plans. Once comments have been incorporated the ENGINEER will schedule a second meeting with City Staff to review the revised plans.
   iii. The ENGINEER will submit the five sets of final plans to City Staff.

## II. Bidding

a. The ENGINEER will develop the invitation to bid and deliver to City Staff for advertising the project for public bidding. The ENGINEER will also solicit bids from past contractors to acquire as competitive a bidding process as possible;
b. The ENGINEER will manage and distribute bidding documents;
c. The ENGINEER will prepare for the Pre-Bid Conference, develop an agenda and sign in sheet, conduct the Pre-Bid Conference, take notes at the conference, prepare minutes and incorporate into the addenda;
d. The ENGINEER will receive all questions from bidders, log the questions and answer in the form of an addenda;
e. The ENGINEER will conduct the bid letting, receive all bids, tabulate the bids and certify them;
f. The ENGINEER will research the low bidder(s) qualifications and recommend award to the City of Georgetown.

## III. Construction Administration

a. The ENGINEER will prepare contract documents; forward those to the contractor awarded the project by the Georgetown City Council. Once the contractor has executed the contract documents, they will be checked for proper documentation and forwarded to the City of Georgetown for execution;
b. The ENGINEER will schedule and conduct the Pre-Construction Conference. Minutes from the conference will be taken and distributed;
c. The ENGINEER will receive and review all submittals and material samples for the project. Documentation for the submittals will be generated and distributed to the City of Georgetown and the contractor;
d. The ENGINEER will hold regularly scheduled construction progress meetings. These meetings will include meeting agendas covering project specifics and schedules. Notes will be taken by the ENGINEER at the meetings. Minutes will

then be developed and distributed to the City of Georgetown Staff and the contractor;

e. The ENGINEER will make periodic visits the project site. These site visits are utilized to perform a general overview of the project and answer any questions the contractor may have. The City of Georgetown will provide daily on-site representation for the project;
f. The ENGINEER will develop pay estimate forms for the project. These will be distributed to City Staff and the contractor. The ENGINEER will review the pay requests with City Staff;
g. The ENGINEER will conduct a final walk through of the project. Punch list items will be generated during this review. A letter addressed to City Staff will be generated discussing the findings of the walk through. The contractor will be copied on this letter as well;
h. The ENGINEER will develop final record Drawings for the City of Georgetown Staff. The record Drawings will be presented in the form of a DVD with pdf of each plan sheet and a full 11x17 hard copy.

**IV. Onsite Representation**

a. The ENGINEER will observe equipment and materials for compliance with the plans and specifications and approved shop drawing submittals;
b. The ENGINEER will verify installed quantities and materials on hand for monthly pay estimates to Contractors.
c. The ENGINEER will confirm and note changes on as-built plans submitted by Contractors.
d. The ENGINEER will prepare written daily reports on the City of Georgetown Inspection Form. The information provided will include construction activities summarizing work performed, quantities installed, number of laborers on site, equipment used, weather conditions and significant activities and test results (if required).

**2023 ADA Sidewalk Improvements Scope of Services:**

The scope of services associated with this project is as follows:

**I. Design Phase**

a. Data Collection, Permits, and Utility Coordination
    i. The ENGINEER will obtain and develop detailed topographical survey for each area.
    ii. The ENGINEER will coordinate with utility companies and other City departments to identify any possible conflicts and/or proposed utility improvements on the proposed roadway rehabilitations.
    iii. The ENGINEER will investigate general drainage within the project area and conveyance to positive flow at the connection points of the project to existing conditions. Any areas of concern or non-conveyance will be reported to the City of Georgetown Staff and discussed.
    iv. The ENGINEER will review curbs, driveways, etc. to determine conflicts with existing private property connections to the project.

v. The ENGINEER will conduct a review of all pedestrian ramps to determine their ADA compliance status along the project routes.
vi. The ENGINEER will incorporate City of Georgetown imagery into the field surveys and integrate the two as a model.

b. Develop Design Plans
   i. The ENGINEER will utilize the survey data and surface model to develop plan and profile sheets for the proposed curb and gutter replacement projects. The ENGINEER will illustrate all proposed slopes, typical sections, plan/profiles, and improvement locations.
   ii. The ENGINEER will develop plan/profiles for the following:
      a. Sidewalk Improvements.
      b. Pedestrian Ramps.
   iii. The ENGINEER will develop erosion control/sedimentation/tree protection plans.
   iv. The ENGINEER will develop traffic control, striping and signing plans if required.
   v. The ENGINEER will develop all standard and special details for each construction method.
   vi. The ENGINEER will develop a quantity take-off and an estimate of probable construction cost for each project.

c. TDLR Clearances
   i. The ENGINEER will submit the final design plans to TDLR for project review and registration. The fee associated with project review, registration and inspection is included in Exhibit B of this Task Order.

d. TCEQ Clearances
   i. The ENGINEER shall prepare an Exception Request based on the sidewalk improvements being located within the downtown water quality pond drainage area.
   ii. The ENGINEER will develop plans, reports and other required documents to submit to TCEQ an Exception Request for Edwards Aquifer clearances. The TCEQ fee for this type of approval has been included in Exhibit B of this Task Order;

e. Develop Project Details
   i. The ENGINEER will develop details for the project to include:
      1. Sidewalk Details
      2. Curb & Gutter Details (If Required)
      3. Drainage Details (If Required)
      4. Misc. Details

f. Develop Technical Specifications for the Project
   i. The ENGINEER will develop detailed technical specifications for the Project.

g. Review Plans with City Staff, Incorporate Comments
   i. The ENGINEER will schedule a meeting with City Staff to review the plans at the 60% and 90% design stages to discuss issues and report any dilemmas that have been encountered.

ii. The ENGINEER will receive all City Staff comments and incorporate into the plans. Once comments have been incorporated the ENGINEER will schedule a second meeting with City Staff to review the revised plans.
iii. The ENGINEER will submit the five sets of final plans to City Staff.

**II. Bidding**

a. The ENGINEER will develop the invitation to bid and deliver to City Staff for advertising the project for public bidding. The ENGINEER will also solicit bids from past contractors to acquire as competitive a bidding process as possible.
b. The ENGINEER will manage and distribute bidding documents.
c. The ENGINEER will prepare for the Pre-Bid Conference, develop an agenda and sign in sheet, conduct the Pre-Bid Conference, take notes at the conference, prepare minutes and incorporate into the addenda.
d. The ENGINEER will receive all questions from bidders, log the questions and answer in the form of an addenda.
e. The ENGINEER will conduct the bid letting, receive all bids, tabulate the bids and certify them.
f. The ENGINEER will research the low bidder(s) qualifications and recommend award to the City of Georgetown.

**III. Construction Administration**

a. The ENGINEER will prepare contract documents; forward those to the contractor awarded the project by the Georgetown City Council. Once the contractor has executed the contract documents, they will be checked for proper documentation and forwarded to the City of Georgetown for execution.
b. The ENGINEER will schedule and conduct the Pre-Construction Conference. Minutes from the conference will be taken and distributed.
c. The ENGINEER will receive and review all submittals and material samples for the project. Documentation for the submittals will be generated and distributed to the City of Georgetown and the contractor.
d. The ENGINEER will hold regularly scheduled construction progress meetings. These meetings will include meeting agendas covering project specifics and schedules. Notes will be taken by the ENGINEER at the meetings. Minutes will then be developed and distributed to the City of Georgetown Staff and the contractor.
e. The ENGINEER will make periodic visits the project site. These site visits are utilized to perform a general overview of the project and answer any questions the contractor may have. The City of Georgetown will provide daily on-site representation for the project.
f. The ENGINEER will develop pay estimate forms for the project. These will be distributed to City Staff and the contractor. The ENGINEER will review the pay requests with City Staff.
g. The ENGINEER will conduct a final walk through of the project. Punch list items will be generated during this review. A letter addressed to City Staff will be generated discussing the findings of the walk through. The contractor will be copied on this letter as well.
h. The ENGINEER will develop final record drawings for the City of Georgetown Staff.

**EXHIBIT B FEE SCHEDULE**

**Pavement Conditions Survey and 5 Year Street Maintenance Plan (SMP)**

**Summary of Professional Services Fee**

**August 9, 2022**

| COST SUMMARY | Summary of Hours | | |
|---|---|---|---|
| | KPA | ARA | TOTAL |
| **Pavement Condition Survey & 5 Year Street Maintenance Plan** | | | |
| **1. Project Mangement & Coordination** | $ 43,100.00 | $28,400.00 | $ 71,500.00 |
| **2. Overall PCI & Inventory City Roadway Infrastructure** | $ 69,800.00 | $124,000.00 | $ 193,800.00 |
| **3. Development of Five Year Street Maintenance Plan (SMP)** | $ 89,460.00 | $78,700.00 | $ 168,160.00 |
| **TOTAL PROFESSIONAL SERVICES TOTAL** | **$ 202,360.00** | **$ 231,100.00** | **$ 433,460.00** |

**Subconsultants:**

Applied Research Associates, Inc. (ARA) - Data Collection/Street Inventory/Pavement Condition Index

**EXHIBIT B FEE SCHEDULE**
**2023-2024 Street Maintenance Projects**

**August 9, 2022**

## Summary of Proposed Project Costs

| Bid Package | Roadway Repair Method | Proposed Professional Services Fee | Opinion of Probable Construction Costs | Total Project Cost |
|---|---|---|---|---|
| 1 | Hot in Place Recycling (HIPR) | $ 578,000.00 | $ 4,622,000.00 | $ 5,200,000.00 |
| 2 | High Performance Pavement Seal (HPPS) | $ 282,000.00 | $ 2,518,000.00 | $ 2,800,000.00 |
| 3 | Onsite Representation - HPPS | $ 75,100.00 | | $ 75,100.00 |
| 5 | 2023 ADA Improvements | $ 130,000.00 | $ 870,000.00 | $ 1,000,000.00 |
| | **Total Project Costs** | **$ 1,065,100.00** | **$ 8,010,000.00** | **$ 9,075,100.00** |