City of Peoria Street Asset Inventory Final Scope, Fee, and Schedule

Peoria, Illinois

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providing engineering solutions to improve pavement performance

1. Introduction

Applied Pavement Technology, Inc. (APTech) is pleased to submit this final scope, fee estimate, and schedule to the **City of Peoria, Illinois** (City) for a project to collect and process condition information, and create a GIS-based data management system for the City's street assets. In the preparation of this submission, the APTech team built on the original proposal submittal and considered additional information provided by the City in the scoping meeting of February 19, 2014.

In particular, during the scoping meeting the City advised that they desired to collect pavement inventory and condition information, and street sign inventory. In addition, the City asked that the following items be included within the scope:

- Lights along roadways.
- Alley condition surveys.
- Signs in alleys.
- Lights in alleys.

The following sections of this submission provide APTech's revised and final approach, costs, and schedule for completion of the work for the City.

2. Project Approach

In coordination with the City and following a review of available information, the APTech team was able to better identify the project constraints and City expectations. The project team used GIS information provided by the City to gather additional detail about the assets and the network to be surveyed. The following tasks reflect that additional information and present the revised project scope.

Task 1 – Project Coordination and Data Dictionary

The project coordination task provides a mechanism for routine coordination and communication of project needs. In the team's proposal the first task was more focused on project initiation. The team was able to accomplish some of the proposed tasks during the February 19 scoping meeting. However, there is an ongoing requirement for coordination, requests for information, and status reports. The following activities will be accomplished under this task throughout the contract:

- Project initiation meeting/discussions.
- Routine coordination between the APTech Project Manager (PM) and the City PM.
- Requests for specific information required to populate the pavement management system.
- Requests and coordination related to the continued development of the GIS.
- Coordination of schedule and deliverables.
- Finalization and submission of the Asset Inventory Data Dictionary.

As part of the scoping process the APTech team created a draft Asset Inventory Data Dictionary. This document was discussed in the scoping meeting, and revisions were made as a result of those discussions. The current data dictionary is attached to this proposal. If additional fields are desired that will not be populated during this project's data collection and analysis efforts, they will be added and there will be no additional costs. However, if the City desires additional fields and population of those fields there may be cost implications.

Deliverables from Task 1 will include:

- Notes documenting project coordination meetings and discussions.
- A Final Asset Inventory Data Dictionary for the City of Peoria.

Task 2 – Network Definition

The pavement management system requires that network definition activities be done to facilitate storing and reporting of information and to provide a sound engineering basis for making maintenance and rehabilitation recommendations. The approach proposed by the team members assumes that the pavement network will be divided into facilities and sections in accordance with the procedures outlined in the US Army Corps of Engineers Technical Report M-90/05, *Pavement Maintenance Management for Roads and Streets Using the PAVER System*. APTech proposes to establish block-to-block sections for surveys.

APTech will work with the City to confirm the naming and classification of the facilities and sections during the network definition task to ensure consistency with any current City standards. The existing MicroPAVER database created by APTech in the past contains some facility names and this format will be used as a starting point. During the discussions in February the City PM indicated she would investigate existing naming for alleys so that any naming would be consistent with those already established for emergency services. Once this naming convention is provided it will be used for alleys. If nothing is provided the APTech team will work with the City to establish a naming convention for the alleys.

In setting up MicroPAVER for City use certain minimum information will be required. APTech will first work with the City to see if any of this information is in existing records. If it is not, efforts will be made to gather or estimate as much of this information as possible from field data collection activities. This data will include, at a minimum, the following items:

- Location information (referencing and from and to characteristics);
- Dimensions (length, width, area);
- Surface type;
- Last construction date; and
- Facility type.

Additional construction information and subgrade details will be included as available.

As part of the project scoping work the City provided available GIS information. A review of this information found many opportunities and requirements for improvement so the GIS files could be used for routing of data collection and presentation of results. Crawford, Murphy, & Tilly (CM&T) will work with the GIS files to improve and establish a base file for project work.

This improved GIS file will provide the City with a much-improved layer representation of the roadway network that it is responsible for, including alleys.

The following deliverables will be prepared and provided to the City as part of Task 2:

- An updated MicroPAVER data base with a complete network definition for the City.
- An improved GIS base map from which to plan surveys and link resulting data.

Task 3 – Field Data Collection

Field data collection will begin once weather, road conditions, network definition, and equipment availability constraints are all resolved. Table 1 lists the asset information to be collected. Mandli Communications (Mandli) will collect information for the street pavements (assumed 1,000 lane-miles), street signs (estimated at 55,000 signs by the City), and lights (estimated at 12,000 street lights by the City) using their LiDAR-equipped data collection vehicle. CM&T will collect alley inventory information, including alley pavement condition (estimated at 55 miles of alleys), sign, and light inventory information. All of this data will be provided in a format consistent with the Asset Data Dictionary developed in Task 1. This will allow the development of a comprehensive asset inventory database for all project assets.

Table 1. Summary of planned asset data collection.

Asset Type	Attributes
Streets – Condition	a. PCI Rating b. Surface Type c. Lane Miles
Signs – Roads and Alleys	a. Location b. Type c. Condition d. Pole Type
Lights – Roads and Alleys	a. Ornamental b. Davits/roadway c. Wood pole
Alleys – Condition	a. General Condition b. Surface Type c. Length

Data collected by Mandli for street pavement condition will be transferred to APTech for data reduction to PCI values, as will be described in Task 4. Alley condition will be rated on a 1 – 10 scale, with 1 being a pavement requiring reconstruction, and 10 being a pavement requiring little to no maintenance. The City will be provided with a legend showing the rating schema for alleys.

Data collected during task 3 will feed directly into the analysis conducted in task 4, and reporting in task 5. There are no specific deliverables planned for task 3. The APTech team will provide regular status updates during operations as part of ongoing project management coordination.

Task 4 – Data Analysis

Given the different types of information being generated through this work effort, this task will involve two parallel work efforts. Generating PCI values and populating the MicroPAVER database will be done separately from compiling the street asset inventory. These are discussed separately below.

MicroPAVER Database Setup

Once data collected by Mandli is initially processed and tagged to the appropriate roadway segment, data will be transferred to APTech to conduct pavement condition surveys using image viewing software designed and developed by Mandli. The PCI survey procedure, developed by the U.S. Army Corps of Engineers and promoted by the American Public Works Association (APWA), will be used to rate the condition of each pavement management section in the database.

During the PCI survey procedure, the types of distress present on the pavement surface are quantified in terms of type, severity, and extent. The PCI surveys will be conducted to conform to the proposed PCI sampling standards presented in table 2.

Table 2. Proposed sampling rate.

Total Area (ft^2)	Total Number of Samples	Number of Samples to Inspect
1 to 12,500	1 – 5	1
12,501 to 25,000	6 – 10	2
25,001 to 37,500	11 – 15	3
37,500 to 100,000	16 – 40	4
> 100,000	41+	10%

In addition to the pavement distress data, the rutting information Mandli collects and processes will also be provided for each section. The field data will be linked to the street (branch) and section IDs provided by or created for the City. The PCI survey results will be uploaded into the MicroPAVER database and PCI values for all pavement sections will be calculated.

Once the network is established and condition data is in MicroPAVER, APTech will review performance models and treatment strategies to calibrate to the greatest extent possible the performance prediction capabilities of the pavement management system. It is expected that this will have to be refined over time and with extended use by the City.

Compilation of the Asset Inventory

Information from the asset data collection activities will be compiled into a database consistent with that defined in the Asset Database Data Dictionary introduced in task 1. Assets will be sorted by asset type in the database for easy review. Mandli will prepare an inventory of the street lights and signs from their combined ROW images and LiDAR point cloud. Where possible an indication of sign condition and light owner will be provided. Attributes planned for collection are itemized in the Asset Inventory Data Dictionary attached to this proposal.

CM&T will inventory signs and lights for the alleys. This information will be combined with the inventory from Mandli to create a comprehensive inventory of the signs and lights. Layer shape files will be provided for each, showing attribute information.

Where appropriate, a reference file name for a JPEG image showing a photo of the asset will be included in the database, with JPEG files named accordingly, so the City has both a description of the asset in the database and a corresponding photo taken at the time of data collection.

Deliverables from task 4 will feed directly into the preparation and presentation of results planned in task 5. As such there are no specific project deliverables scheduled upon completion of task 4.

Task 5 – Preparation and Presentation of Results

This task involves the final compilation and quality assurance review of all required information, and submittal of this information to the City for its review. At this point these deliverables are expected to include:

- An asset inventory database, with a separate file containing JPEG images of assets sorted by type.
- An improved City GIS roadway network definition.
- Mandli Workstation Software (2 installations).
- GIS layers (shape files) with street asset information. One layer will be provided for each asset type so that the City may overlay these in their GIS system and view them as desired.
- An updated MicroPAVER database containing PCI values from the street surveys, and a summary report showing current network condition.
- A draft proposed set of budget scenarios for improving street conditions (where required) to achieve a PCI rating of 80.

The list of deliverables above will be submitted to the City in electronic format for review. Given the amount of information involved, it is anticipated that review of this information will require some time. Without an understanding of the staffing resources available at the City to complete this review, it would be presumptive to assign a specific time for review. APTech will work with the City to coordinate the reviews and develop the final project deliverables based on feedback from the City.

Task 6 – Presentation of Final Deliverables and City Meetings

The final task of the project incorporates City review comments into the deliverables, and includes submittal of final deliverables to the City and participation in meetings with the City and with the City Council to explain the project process, the results of the effort, and budgetary

considerations to achieve City goals for its street assets. If desired, APTech will work with the City to prepare an agenda for the presentation that will explain the results of the project clearly and succinctly to the City Council, utilizing graphics wherever possible to show current and future network condition given potential budgetary decisions.

3. Estimated Project Costs

Table 3 below provides APTech's final proposed project costs, including the added asset inventory items. Line item costs are provided by asset type as requested by the City in the scoping meeting.

Table 3. Proposed costs for base project.

Tasks	Cost Item	Cost ($)
Task 1 – Project Coordination	Initiation, coordination, communication	$19,371
Task 2 – Network Definition	Establish network and GIS base map	$26,598
Task 3 – Field Data Collection	Streets – Condition and Signs (1,000 lane-miles)	$153,750
	Streets – Sign Inventory (55,000 signs)	$112,750
	Streets – Lights (12,000 lights)	$41,000
	Alleys – Condition (55 miles)	$16,103
	Alleys – Signs and Lights (55 miles)	$18,307
Task 4 – Data Analysis	Prepare MicroPAVER, compile asset inventory.	$47,931
Task 5 – Data Preparation and Presentation	Development of draft deliverables for City Review	$34,236
Task 6 – Final Deliverables and Meetings	Submittal of final deliverables, meetings, training	$18,696
	Total Proposed Project Cost	**$488,742**

4. Approximate Project Schedule

Figure 1 provides the proposed approximate project schedule. It is anticipated that the project will begin on or about the first of April, and should be substantially complete by August 1. The schedule is indicated as approximate due to the possibility of delays beyond our control. It is acknowledged that this project will provide information into City planning and budgetary

decisions, which will be under way in the summer. Time is of the essence, and every effort will be made to complete project activities on or before the times shown on the schedule in figure 1.

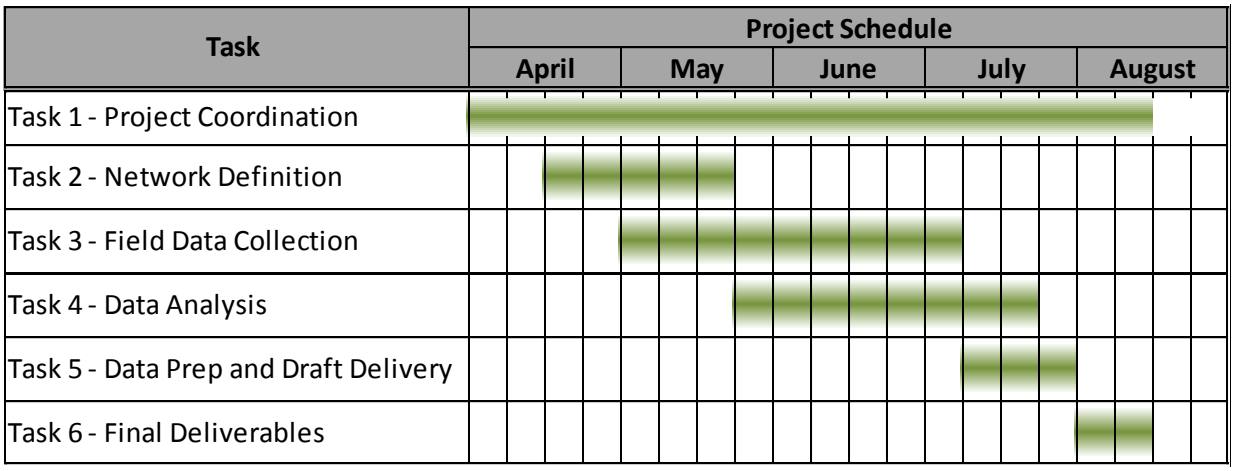

Figure 1. Proposed approximate project schedule.

Attachment

City of Peoria

Proposed Asset Inventory Data Dictionary

Data Dictionary

Road Signs Face

Reported Attributes:

	Attribute	Description
1	ID	Universally Unique Identifier
2	Route ID	Unique Route Identifier
3	Direction	Direction of Travel (+ or -)
4	Mile Point	LRS Mileage of Asset Location
5	Latitude	Location of Asset
6	Longitude	Location of Asset
7	Elevation	Location of Asset
8	Frame	Frame Number of the Image That is Closest to the Asset
9	Collected Date	Field Collection Date
10	Condition	Sign Face Condition (Good, Fair or Poor)
11	Condition Comment	Basis of Condition Rating if Fair or Poor (based on agreed upon pick list)
12	Sign Code	MUTCD Code or City Defined Code
13	Facing Direction	Cardinal Direction that Sign Faces (N, NE, E, SE, S, SW, W, or NW)
14	Rear Facing	Flagged if Sign is Meant for Opposite Direction of Travel

Road Sign Support

Reported Attributes:

	Attribute	Description
1	ID	Universally Unique Identifier
2	Route ID	Unique Route Identifier
3	Direction	Direction of Travel (+ or -)
4	Mile Point	LRS Mileage of Asset Location
5	Latitude	Location of Asset
6	Longitude	Location of Asset
7	Elevation	Location of Asset
8	Frame	Frame Number of the Image That is Closest to the Asset
9	Collected Date	Field Collection Date
10	Mount Type	Sign Support Type (based on agreed upon pick list)
11	Sign Count	Number of Sign Faces on Support

Streetlight

Reported Attributes:

	Attribute	Description
1	ID	Universally Unique Identifier
2	Route ID	Unique Route Identifier
3	Direction	Direction of Travel (+ or -)
4	Mile Point	LRS Mileage of Asset Location
5	Latitude	Location of Asset
6	Longitude	Location of Asset
7	Elevation	Location of Asset
8	Frame	Frame Number of the Image That is Closest to the Asset
9	Collected Date	Field Collection Date
11	Light Type	• Based on agreed upon pick list
12	PoleType	• Based on agreed upon pick list
13	Identification	Owner/Operator text on asset (if visible). • Text “SL” followed by 7 digit numerical code