

PROFESSIONAL SERVICES AGREEMENT

AGREEMENT BETWEEN TRANSMAP CORPORATION AND THE CITY OF ANN ARBOR FOR PROFESSIONAL SERVICES

The City of Ann Arbor, a Michigan municipal corporation, having its offices at 301 E Huron Avenue, Ann Arbor, Michigan 48103 ("City"), and Transmap Corporation ("Consultant") an Ohio Corporation with its address at 3366 Riverside Drive, Suite 103, Upper Arlington, OH 43221 agree as follows on this _____ day of _____, 20____.

The Consultant agrees to provide professional services to the City under the following terms and conditions:

I. DEFINITIONS

Administering Service Area/Unit means Public Services.

Contract Administrator means Public Services Director, acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for or delivered to City by Consultant under this Agreement

Project means Public Services Sign Inventory and Pavement Assessment.

II. DURATION

This Agreement shall become effective on _____, 20____, and shall remain in effect until satisfactory completion of the Services specified below unless terminated as provided for in this Agreement.

III. SERVICES

- A. The Consultant agrees to provide professional services ("Services") in connection with the Project as described in Exhibit A. The City retains the right to make changes to the quantities of service within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the contract sum shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.
- B. Quality of Services under this Agreement shall be of the level of professional quality performed by experts regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.
- C. The Consultant shall perform its Services for the Project in compliance with all statutory, regulatory and contractual requirements now or hereafter in effect as may be applicable to the rights and obligations set forth in the Agreement.

- D. The Consultant may rely upon the accuracy of reports and surveys provided to it by the City except when defects should have been apparent to a reasonably competent professional or when it has actual notice of any defects in the reports and surveys.

IV. COMPENSATION OF CONSULTANT

- A. The Consultant shall be paid in the manner set forth in Exhibit B. Payment shall be made monthly, unless another payment term is specified in Exhibit B, following receipt of invoices submitted by the Consultant, and approved by the Contract Administrator. Total compensation payable for all Services performed during the term of this Agreement shall not exceed \$372,490.00.
- B. The Consultant will be compensated for Services performed in addition to the Services described in Section III, only when those additional Services have received prior written approval of the Contract Administrator. Compensation will be payable according to the fee schedule in Exhibit B. The Contract Administrator shall be the sole arbitrator of what shall be considered "reasonable" under this provision.
- C. The Consultant shall keep complete records of time spent and materials used on the Project so that the City may verify invoices submitted by the Consultant. Such records shall be made available to the City upon request and submitted in summary form with each invoice.

V. INSURANCE/INDEMNIFICATION

- A. The Consultant shall procure and maintain during the life of this contract, such insurance policies, including those set forth in Exhibit C, as will protect itself and the City from all claims for bodily injuries, death or property damage which may arise under this contract; whether the acts were made by the Consultant or by any subcontractor or anyone employed by them directly or indirectly. In the case of all contracts involving on-site work, the Consultant shall provide to the City, before commencement of any work under this contract, documentation demonstrating it has obtained the policies required by Exhibit C.
- B. Any insurance provider of Consultant shall be admitted and authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-admitted insurance companies are not acceptable unless approved in writing by the City.
- C. To the fullest extent permitted by law, the Consultant shall indemnify, defend and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, from any acts or omissions by the Consultant or its employees and agents occurring in the performance of or breach in this Agreement.

VI. COMPLIANCE REQUIREMENTS

- A. Nondiscrimination. The Consultant agrees to comply and to require its subcontractor(s) to comply, with the nondiscrimination provisions of Section 209 of the Elliot-Larsen Civil Rights Act (MCL 37.2209) The Contractor further agrees to comply with the nondiscrimination provisions of Chapter 112 of the Ann Arbor City Code and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.
- B. Living Wage. The Consultant is a “covered employer” as defined in Chapter 23 of the Ann Arbor City Code and agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Consultant agrees to pay those employees providing Services to the City under this Agreement a “living wage,” as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3) and specified in Exhibit D; to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

VII. WARRANTIES BY THE CONSULTANT

- A. The Consultant warrants that the quality of its Services under this Agreement shall conform to the level of professional quality performed by experts regularly rendering this type of service.
- B. The Consultant warrants that it has all the skills, experience, and professional licenses necessary to perform the Services specified in this Agreement.
- C. The Consultant warrants that it has available, or will engage, at its own expense, sufficient trained employees to provide the Services specified in this Agreement.
- D. The Consultant warrants that it is not, and shall not become overdue or in default to the City for any contract, debt, or any other obligation to the City including real and personal property taxes.

VIII. TERMINATION OF AGREEMENT

- A. If either party is in breach of this Agreement for a period of fifteen (15) days following receipt of notice from the non-breaching party with respect to a breach, the non-breaching party may pursue any remedies available to it against the breaching party under applicable law, including but not limited to, the right to terminate this Agreement without further notice.
- B. The City may terminate this Agreement, on at least thirty (30) days advance notice, for any reason, including convenience, without incurring any penalty, expense or liability to Consultant, except the obligation to pay for Services actually performed under the Agreement before the termination date.

- C. Consultant acknowledges that, if this Agreement extends for several fiscal years, continuation of this Agreement is subject to appropriation of funds for this Project. If funds to enable the City to effect continued payment under this Agreement are not appropriated or otherwise made available, the City shall have the right to terminate this Agreement without penalty at the end of the last period for which funds have been appropriated or otherwise made available by giving written notice of termination to the Consultant. The Contract Administrator shall give the Consultant written notice of such non-appropriation within thirty (30) days after it receives notice of such non-appropriation.
- D. The remedies provided in this Agreement will be cumulative, and the assertion by a party of any right or remedy will not preclude the assertion by such party of any other rights or the seeking of any other remedies.

IX. OBLIGATIONS OF THE CITY

- A. The City agrees to give the Consultant access to the Project area and other City-owned properties as required to perform the necessary Services under this Agreement.
- B. The City shall notify the Consultant of any defects in the Services of which the Contract Administrator has actual notice.

X. ASSIGNMENT

- A. The Consultant shall not subcontract or assign any portion of any right or obligation under this Agreement without prior written consent from the City. Notwithstanding any consent by the City to any assignment, Consultant shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under the Agreement unless specifically released from the requirement, in writing, by the City.
- B. The Consultant shall retain the right to pledge payment(s) due and payable under this Agreement to third parties.

XI. NOTICE

All notices and submissions required under this Agreement shall be delivered to the respective party in the manner described herein to the address stated in this Agreement or such other address as either party may designate by prior written notice to the other.

Notices given under this Agreement shall be in writing and shall be personally delivered, sent by next day express delivery service, certified mail, or first class U.S. mail postage prepaid, and addressed to the person listed below. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; (2) the next business day when notice is sent next day express delivery service or personal delivery; or (3) three days after mailing first class or certified U.S. mail.

If Notice is sent to the CONSULTANT, it shall be addressed and sent to:

If Notice is sent to the CITY, it shall be addressed and sent to:

City of Ann Arbor

301 E. Huron St., POB 8647

Ann Arbor, Michigan 48107

Attn:

XII. CHOICE OF LAW

This Agreement will be governed and controlled in all respects by the laws of the State of Michigan, including interpretation, enforceability, validity and construction. The parties submit to the jurisdiction and venue of the Circuit Court for Washtenaw County, State of Michigan, or, if original jurisdiction can be established, the United States District Court for the Eastern District of Michigan, Southern Division, with respect to any action arising, directly or indirectly, out of this Agreement or the performance or breach of this Agreement. The parties stipulate that the venues referenced in this Agreement are convenient and waive any claim of non-convenience.

XIII. OWNERSHIP OF DOCUMENTS

Upon completion or termination of this Agreement, all documents (i.e., deliverables) prepared by or obtained by the Consultant as provided under the terms of this Agreement shall be delivered to and become the property of the City. Original basic survey notes, sketches, charts, drawings, partially completed drawings, computations, quantities and other data shall remain in the possession of the Consultant as instruments of service unless specifically incorporated in a deliverable, but shall be made available, upon request, to the City without restriction or limitation on their use. The City acknowledges that the documents are prepared only for the Project. Prior to completion of the contracted Services the City shall have a recognized proprietary interest in the work product of the Consultant.

Unless otherwise stated in this Agreement, any intellectual property owned by Consultant prior to the effective date of this Agreement (i.e., preexisting information) shall remain the exclusive property of Consultant even if such Preexisting Information is embedded or otherwise incorporated in materials or products first produced as a result of this Agreement or used to develop Deliverables. The City's right under this provision shall not apply to any Preexisting Information or any component thereof regardless of form or media.

XIV. CONFLICT OF INTEREST

Consultant certifies it has no financial interest in the Services to be provided under this Agreement other than the compensation specified herein. Consultant further certifies that it presently has no personal or financial interest, and shall not acquire any such interest, direct or indirect, which would conflict in any manner with its performance of the Services under this Agreement.

XV. SEVERABILITY OF PROVISIONS

Whenever possible, each provision of this Agreement will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision of this Agreement or the application of any provision to any party or circumstance will be prohibited by or invalid under applicable law, that provision will be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the provisions of this Agreement or the application of the provision to other parties and circumstances.

XVI. EXTENT OF AGREEMENT

This Agreement, together with any affixed exhibits, schedules or other documentation, constitutes the entire understanding between the City and the Consultant with respect to the subject matter of the Agreement and it supersedes, unless otherwise incorporated by reference herein, all prior representations, negotiations, agreements or understandings whether written or oral. Neither party has relied on any prior representations, of any kind or nature, in entering into this Agreement. This Agreement may be altered, amended or modified only by written amendment signed by the Consultant and the City.

XVII. COOPERATIVE PURCHASES

The City reserves the right to extend all of the terms, conditions, specifications, and unit or other prices of any Agreement resulting from this solicitation to any and all public bodies, subdivisions, schools districts, community colleges, colleges, and universities including non-public schools. This is conditioned upon mutual agreement of all parties pursuant to special requirements, which may be appended thereto. The Contractor agrees to notify the issuing body of those entities that wish to use any Agreement resulting from this solicitation and will also provide usage information, which may be requested.

The City assumes no authority, liability or obligation, on behalf of any other public or non-public entity that may use any Agreement resulting from this solicitation. All purchases and payment transactions will be made directly between the Contractor and the requesting entity

FOR CONSULTANT

FOR THE CITY OF ANN ARBOR

By _____
Type name

By _____
John Hieftje, Mayor

Its _____

By _____
Jacqueline Beaudry, City Clerk

Approved as to substance

Steven D. Powers, City Administrator

Services Area Administrator

Approved as to Form and Content

Stephen K. Postema, City Attorney

EXHIBIT A

The following scope of services is needed to complete the sign inventory and pavement assessment project. It provides the framework for the collection of signs and sign assemblies and attributes and for the qualitative assessment of City streets.

The work plan consists of the activities listed below and described in detail herein:

Project Scope of Services Outline

- Introduction
- Project setup
 - Kick Off Meeting
 - Centerline Review
 - Mobilization
- Task 1 - Signs
 - 1a - ON-SIGHT Mobile Mapping
 - 1b - Sign Data Extraction
 - 1c - GIS-Based Database
 - 1d - Cityworks Integration
 - 1e - Nighttime Collection
 - 1f - Project Management
 - 1g - ArcGIS Online Viewer
- Task 2 - Pavement Management System (2014)
 - 2a - ON-SIGHT Mobile Mapping
 - 2b - Pavement Inspection
 - 2c - Boot Camp
 - 2d - MicroPaver Load
 - 2e - Reporting
 - 2f - Advanced Inspections
 - 2g - Project Management
 - 2h - Cityworks Interface
 - 2i - ArcGIS Online Viewer
- Task 3 - Pavement Management System (2017)
 - 2a - ON-SIGHT Mobile Mapping
 - 2b - Pavement Inspection
 - 2d - MicroPaver Load
 - 2e - Reporting
 - 2f - Advanced Inspections
 - 2g - Project Management
 - 2i - ArcGIS Online Viewer

Introduction

Transmap would like to thank the City of Ann Arbor for choosing Transmap as the provider for the Citywide Sign and Pavement Management System. This scope of services will act as the foundation for the project. Excellent project management and understanding are essential in this project to ensure that Transmap has all of the needs of the City addressed. This document will act as Transmap's project narrative to the City for the collection and analysis of signs and pavement distress.

Project Team Representatives

The following table represents the current list of project participants, along with their phone numbers and email addresses.

Name	Project Role	Telephone	Email
Ann Arbor			
David Wilburn	Project Manager/GIS	734-794-6550 ext. 45513	dwilburn@a2gov.org
Chuck Fojtik	Sign Subject Expert		cfojtik@a2gov.org
Kirk Pennington	Pavement Subject Expert		kapennington@a2gov.org
Transmap			
Howard Luxhoj	Project Principal	614-481-6799	hluxhoj@transmap.com
Craig Schorling	Account Manager	614-537-6297	cschorling@transmap.com
Chris Crocker	Project Manager	614-481-6799	ccrocker@transmap.com
Stephen Hale	Assistant Project Manager	614-481-6799	shale@transmap.com

Project Setup

The setup process is the initial step for any project. Below are the items associated with the setup for the City of Ann Arbor sign and pavement management project:

Kick Off Meeting

The project kick off meeting will be in person and on-site at the City of Ann Arbor. Transmap will have at least a project or assistant project manager at the City with appropriate personnel attending via conference call. The goals for the kickoff are to meet with technical staff members and project managers to discuss overall timeline, reporting requirements, technical exchange and team member responsibilities. The technical exchange will happen both on-site and remotely to facilitate any project materials needed

by Transmap or the City. One major goal of the kick off meeting is to ensure that all roads in the project network are scheduled to be driven. The kick off meeting is scheduled to be a high level meeting lasting from 1-2 hours.

Centerline Review

Transmap has performed an initial review on the digital GIS centerline that was provided by the City. Transmap will produce maps for the kick off meeting for the City to accept the roads that will be driven and analyzed as part of the road network. It is very important at the start of the project to get acceptance of the roads to be driven. As of the date of this scope, the centerline review statistics are below:

Participant	# of Segments	# of Centerline Miles	Minimum Length FT	Maximum Length FT	Average Length FT	Std. Deviation FT
City of Ann Arbor	4,046	326	.46	5,189.9	425.8	348.3

Mobilization

Transmap will mobilize the ON-SIGHT™ system to the project area. In addition, the ground control network and a quality control network will be established. Mobilization activities include: Deploying a Transmap ON-SIGHT™ mapping vehicle, equipment and required staff (driver and operator) to Ann Arbor, letter about mobile mapping vehicle (authority notices sent to client), installing, configuring, and calibrating the camera equipment and on-board data management hardware/software, installing, configuring, and calibrating the on-board global positioning and inertial navigation system equipment and setting up an external Quality Control (QC) network with quality control points. Transmap will establish an external ground control network to be utilized in support of field data capture quality control efforts. The purpose of the ground control network is to provide the GPS corrections necessary to ensure GIS sub-meter accuracy throughout the project.

Deliverables:

Kick Off Meeting	Account Manager will set up the kick off meeting and deliver a recap document after the meeting
Centerline Review	Transmap will bring maps for review in the kick off meeting
Mobilization	Transmap will notify the City when the Mobile Mapping vehicle will be mobilized to the project area. We will send a notice to the City that has information about the vehicle so the City can notify the authorities and constituents about the vehicle.

Task 1 - Signs

Task 1a - ON-SIGHT Data Collection

The raw data collection portion of the project must begin before any extraction of data can begin.

Transmap will drive all roads identified in the project area using our ON-SIGHT™ HD mapping vehicle. The vehicle has new high-definition cameras and a point cloud laser (vehicle-based LiDAR). The point cloud laser gives real-time positioning of assets within the roadways. Point cloud data is useful for measuring heights, offsets and intensity values of assets. The vehicle has a robust GPS/INS solution that has dramatically improved accuracy and efficiency.

Transmap will drive an imaging vehicle along 326 centerline miles of roads within the project area of the City. The image database will be collected for each roadway specified by the City in both directions (one-way streets excluded), enabling a full 360-degree view of each roadway in the network. The image spacing will be 13.1 feet. The vehicle will make multiple passes on roads that have 3 or more travel lanes in one direction. Transmap will use a 3-camera setup to obtain the required asset data. One camera will face forward in the vehicle travel direction, one camera will have a 45-degree offset to the right for right-of-way infrastructure, and one downward rear facing camera for pavement distress data. For this project, Transmap will have an ASTM E950 class 1 pavement profiler attached to the vehicle to produce IRI, rutting information.

Transmap will QC the images obtained by the mapping vehicle to ensure that they are satisfactory and to meet the objective of the right-of-way asset and pavement inventory project. To ensure the highest quality images, image capture activities will not be performed during low-light or adverse weather conditions. In-field image quality control will be performed for the purpose of identifying groups of images that may be unacceptable for feature extraction. Unacceptable images will be re-collected.

The specified route network will be compared against that of which has been imaged to ensure that no route segments have been overlooked. Missing route segments will be re-driven and imaged. Route segments may not be imaged when they are not accessible due to construction, temporary or permanent closures, or they may not exist as indicated in the supplied base data sets (i.e. – paper streets).

Positional accuracy will be maintained and verified through the use of QC points established within the road network. Reference coordinates will be established for said QC points. QC point locations will be derived from the collected images; with discrepancies between the known reference coordinates and the measured coordinates (from the images) noted. Ninety percent of the derived horizontal coordinates within 35 feet from the imaging vehicle will fall within 1 meter of the known reference coordinates. If 10 percent or more of the selected control points do not meet the accepted accuracy criteria, corrective actions will be taken.

Task 1b - Sign Data Extraction

The City is requesting that all signs be extracted on City and State routes. The following table represents the point feature signs that will be collected on the 326 centerline miles of roads within the project area, using our ON-SIGHT imagery and ground-based LiDAR. The signs will be based on X,Y coordinates and will be delivered in an Esri geodatabase, x, y coords will be in NAD83 Michigan South State Plane International Feet Coordinate System. The sign post will receive the GPS coordinate and each sign will be a record on the post. The following attribute data will be collected for each sign and post.

Asset	Description/Attributes
Point Asset - Traffic Sign	Street name, segID, MUTCD code, post type, facing direction, daytime condition (good,fair,poor), flashers (yes,no), Nighttime assessment (adequate, marginal, poor), distance from and to intersection (determined from digitized direction), photo link, side of street (determined from digitized direction), *Assemblies with get total number of signs

Task 1c - GIS-Based Database

Transmap will ensure that all collected sign attribute data is formatted in an Esri geodatabase. The attribute data will have the intelligent information that is currently on the City GIS centerline file (street name, segID).

Task 1d - Cityworks Integration

The sign data will be formatted so the City can load the data into the current Cityworks work order management system. The standard data model for signs is such that the post is the parent that receives the x,y coordinate and the signs are records (child) that are attached to the post. The post will receive the post type as attribute data.

Task 1e - MUTCD Nighttime Sign Assessment (Reference Federal Highway Administration)

Transmap uses the MUTCD approved nighttime assessment method for determining if a regulatory or warning sign meets minimum retroreflectivity requirements. The usual method of inspecting signs at night is to use a two-person crew. While the driver focuses on the driving task, the passenger evaluates the signs and records the appropriate information. Transmap will perform a nighttime visual inspection of signs that are in need of further inspection after we perform our daytime assessment. Transmap will use one of the following nighttime assessment procedures.

The following are keys to successfully implementing the visual nighttime inspection method:

- A. Develop guidelines and procedures for inspectors to use in conducting the nighttime inspections and train inspectors in the use of these procedures.
- B. Conduct inspections at normal speed from the travel lane(s).

- C. Conduct inspections using low-beam headlights while minimizing interior vehicle lighting.
- D. Evaluate signs at typical viewing distances so that adequate time is available for an appropriate driving response

Calibration Signs Procedure (for Visual Nighttime Inspection Method)

Calibration signs have known retroreflectivity levels at or above minimum levels. These calibration signs are set up so the inspector views the calibration signs in a manner similar to nighttime field inspections. A trained inspector views calibration signs prior to conducting the nighttime inspection described in A-D above. The inspector uses the visual appearance of the calibration signs to establish the evaluation threshold for that night's inspection. During the nighttime drive-through inspection of in-service signs, if the inspector believes a sign appears to be less bright than the calibration signs viewed earlier, the in-service sign should be replaced. The following factors provide additional information on the use of this procedure:

- Calibration signs are needed for each color of sign.
- Calibration signs are viewed at typical viewing distances using the inspection vehicle.
- Calibration signs need to be properly stored between inspections so that their retroreflectivity does not deteriorate over time.

Consistent Parameters Procedure (for Visual Nighttime Inspection Method)

For this procedure, nighttime inspections described in A-D above are conducted by a trained inspector under similar factors that were used in the research to develop the minimum retroreflectivity levels. These traits include:

- Using an inspector who is at least 60 years old.
- Using a sport utility vehicle or pick-up truck from which to make the observations.
- Using a model year 2000 or newer vehicle.

The trained inspector makes a judgment call as to whether an in-service sign meets their nighttime driving needs. Those signs judged not to meet the visual driving needs should be replaced. Note, the three factors listed here are specific to this procedure and are not required for visual nighttime inspections using the calibration signs procedure or the comparison panels procedure.

Task 1f - Project Management

Transmap will create project management reports, project milestones, project goals and keep the City informed on the progress of the project. Transmap will provide monthly status reports and maps. Most project management will be done remotely except for the kick off meeting. Transmap will utilize the web, email and voice for most project management tasks. The project manager is also responsible for the allocation of staff for a timely completion of the project. The project manager reports to the account manager and project principal on the status of the project.

Task 1g - ArcGIS Online Viewer (Media Hosting)

Once the image collection process is complete and all data is processed, Transmap will post all images on our ArcGIS Online web-based image viewer. This viewer allows the City to log

on to a web page and view the basemap, orthophotography, image locations, sign layer, pavement sample data, and all extracted assets from the project. Transmap uses this site to allow the City to see the progress of the project. Transmap will host the image links (media) for up to six months after completion of the project. The City will be responsible for having the space necessary to load the Transmap media on their servers. Transmap can assist the City in setting up the media on their servers.

Deliverables:

<p>1a - ON-SIGHT Data Collection</p>	<p>Transmap will deliver the vanimage, which is a geodatabase of the vehicle path with an image link to the Transmap media site. A drive-coded geodatabase of the centerline file is also included. Transmap will deliver all images and LiDAR data on an internal SATA hard drive. A download cable (USB to SATA) can be provided.</p>
<p>1b - Sign Data Extraction</p>	<p>All measured signs will be delivered in an Esri geodatabase.</p>
<p>1c - GIS-Based Database</p>	<p>Signs will be formatted and delivered in an Esri geodatabase.</p>
<p>1d - Cityworks Integration</p>	<p>Parent/Child relationships between posts and signs will be established and formatted in the sign geodatabase.</p>
<p>1e - MUTCD Nighttime Sign Assessment</p>	<p>A field in the sign geodatabase will be labeled Nighttime and populated with "adequate, marginal, poor."</p>
<p>1f - Project Management</p>	<p>Transmap will supply the City with monthly project status reports along with maps and ArcGIS Online tracking.</p>
<p>1g - ArcGIS Online Viewer</p>	<p>Transmap will create a web link for the City to view images and data on ArcGIS Online. This can be viewed from multiple users but not edited.</p>

Task 2 - Pavement Management System (To occur in 2014)

Task 2a - ON-SIGHT Data Collection

Unique to the City of Ann Arbor project, there are two different funding sources that will be splitting the cost for the ON-SIGHT data collection. The collection is the same method as Task 1a and stated below. Pavement inspections will only be performed on City maintained roads (315.6 centerline miles)

The raw data collection portion of the project must begin before any extraction of data can begin.

Transmap will drive all roads identified in the project area using our ON-SIGHT™ HD mapping vehicle. The vehicle has new high-definition cameras and a point cloud laser (vehicle-based LiDAR). The point cloud laser gives real-time positioning of assets within the roadways. Point cloud data is useful for measuring heights, offsets and intensity values of assets. The vehicle has a robust GPS/INS solution that has dramatically improved accuracy and efficiency.

Transmap will drive an imaging vehicle along 326 centerline miles of roads within the project area of the City. The image database will be collected for each roadway specified by the City in both directions (one-way streets excluded), enabling a full 360-degree view of each roadway in the network. The image spacing will be 13.1 feet. The vehicle will make multiple passes on roads that have 3 or more travel lanes in one direction. Transmap will use a 3-camera setup to obtain the required asset data. One camera will face forward in the vehicle travel direction, one camera will have a 45-degree offset to the right for right-of-way infrastructure, and one downward rear facing camera for pavement distress data. For this project, Transmap will have an ASTM E950 class 1 pavement profiler attached to the vehicle to produce IRI, rut information.

Transmap will QC the images obtained by the mapping vehicle to ensure that they are satisfactory and to meet the objective of the right-of-way asset and pavement inventory project. To ensure the highest quality images, image capture activities will not be performed during low-light or adverse weather conditions. In-field image quality control will be performed for the purpose of identifying groups of images that may be unacceptable for feature extraction. Unacceptable images will be re-collected.

The specified route network will be compared against that of which has been imaged to ensure that no route segments have been overlooked. Missing route segments will be re-driven and imaged. Route segments may not be imaged when they are not accessible due to construction, temporary or permanent closures, or they may not exist as indicated in the supplied base data sets (i.e. – paper streets).

Positional accuracy will be maintained and verified through the use of QC points established within the road network. Reference coordinates will be established for said QC points. QC point locations will be derived from the collected images; with discrepancies between the known reference coordinates and the measured coordinates (from the images) noted. Ninety percent of the derived horizontal coordinates within 35 feet from the imaging vehicle will fall within 1 meter of the known reference coordinates. If 10 percent or more of the

selected control points do not meet the accepted accuracy criteria, corrective actions will be taken.

Task 2b - Pavement Inspection

The City of Ann Arbor has an established pavement network. Transmap will not re-create the pavement network or sample locations. The City supplied Transmap with sample locations to extract distress data and the centerline file of the network structure. Transmap will use the following methods to analyze each sample location:

Typical Samples

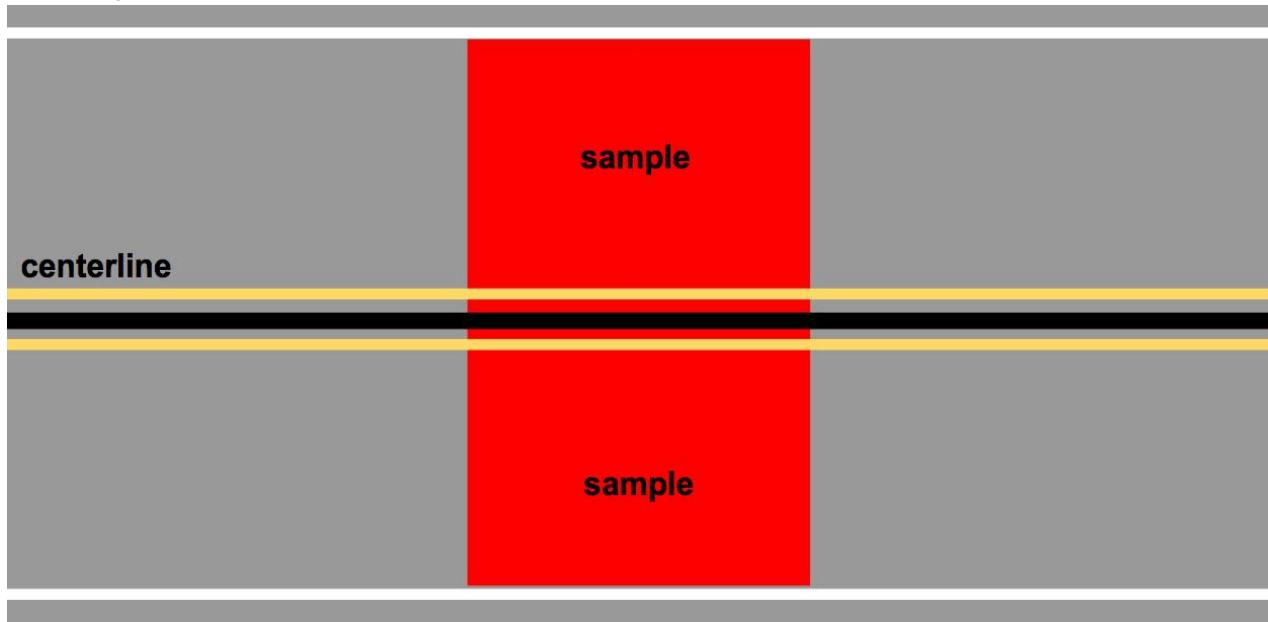
Samples are measured based on the lane configuration for each sample. For each case where there are only two through lanes in opposing directions (e.g. residential street), the entire width of the road will be measured with the corresponding length. In cases where there are multiple lanes (through or turn), Transmap will measure the rightmost through lane in the increasing milepost direction. In this case, the lane width along with total road width will be recorded and the length of the sample will be based on the lane width. If there is a median in the sample area, then the rightmost lane will be measured in the increasing milepost direction. In cases where the centerline is divided for a road, each half of the road will be treated as its own route and measuring will follow the same format as explained earlier.

Standard Roadways

	# of Lanes	Sample Width (feet)	Road Section Width (feet)
Example 1 (One Centerline)	2 through opposing directions	20	20

Standard Example 1

The following example is the standard sample layout for roads with two through lanes in opposing directions.

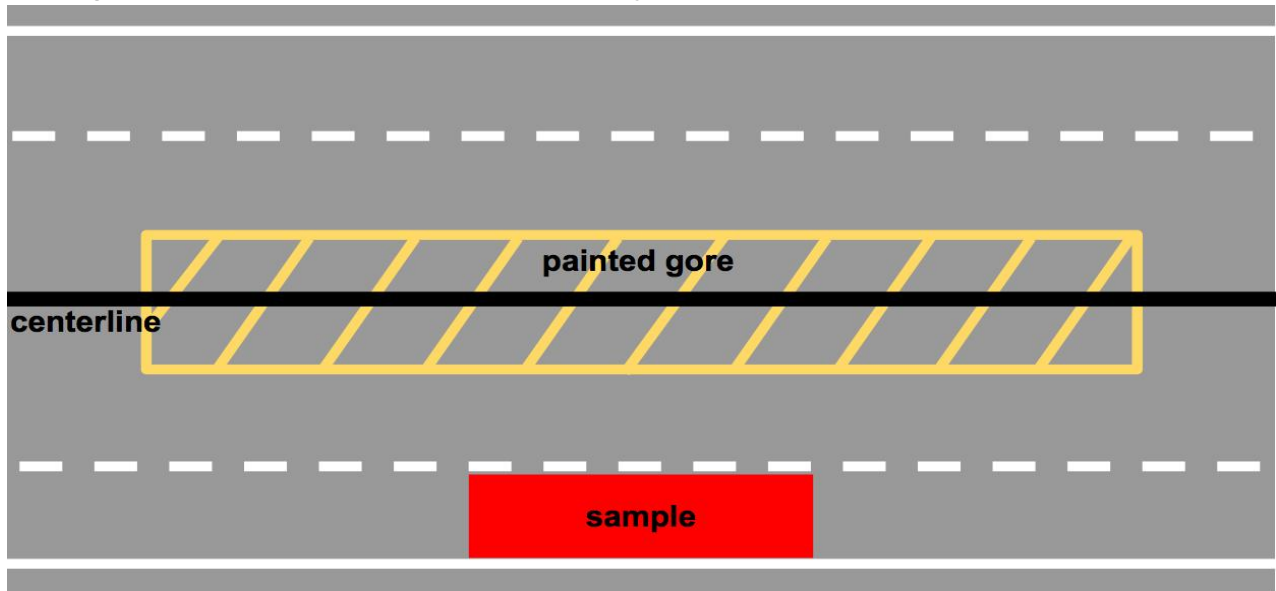


Non-Standard Roadways

	# of Lanes	Lane Width / Sample Width (feet)	Road Section Width (feet)
Example 2 (One Centerline)	4 non-divide	10	40
Example 3 (Two Centerlines)	4 median-divide	10	20

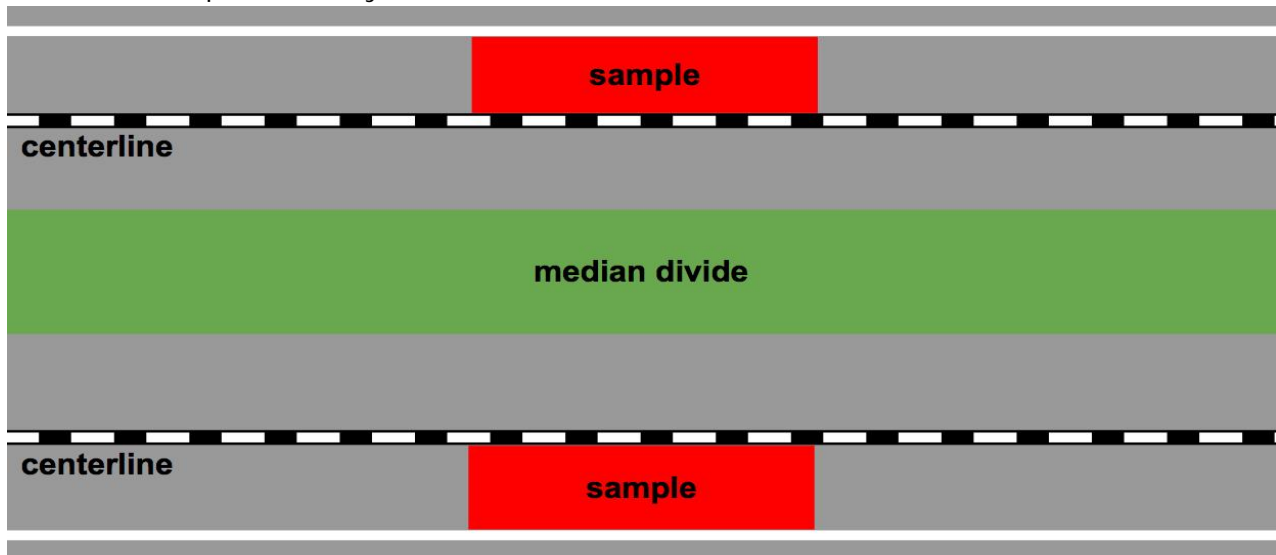
Four Lane Non-Divide Example 2

The following example has the sample in the increasing milepost direction on the rightmost through lane. The centerline is represented by one line.



Median-Divide Example 3

The following example has samples on both of the rightmost through lanes because the centerline is represented by two lines.



Sample Analysis from The City

Transmap has reviewed the City GIS centerline file and sample file sent to us from the City. The City has a total of 315.6 centerline miles of City roads to analyze for pavement extraction. Transmap will analyze the sample locations that the City has supplied us using the methods listed in the previous examples. There are 8,959 sample locations.

Inspection Data

Transmap works closely with APWA to ensure pavement data is collected and implemented using ASTM standards (D6433). Transmap uses the US Army Corps of Engineers Paver Distress Identification Manual as a guideline for pavement inspections. Pavement conditions for each segment will be documented through the use of a digital pavement condition rating form designed to capture the distress type, severity, and frequency directly within the established pavement condition data mode. Transmap uses a unique *hybrid* approach to capture the pavement distress data. Through the use of photogrammetry, Transmap can measure widths, lengths and square footage of all surface distress data.

Transmap will collect distress information along 315.6 miles of asphalt/concrete roadway. Surface distress types will be captured and interpreted from digital imagery for designated centerline miles of roadway imaged by the Transmap vehicle. Additional IRI ride quality and rutting measurements will be provided by the laser profiler.

The following table reflects the distress types that Transmap will collect for the project:

Asphalt Pavement Distresses	
Distress	Description
Alligator Cracking	Fatigue cracking that consists of a series of interconnecting cracks formed by repeated traffic loading
Potholes	Holes that are formed from alligator cracking
Transverse/Longitudinal Cracking	Cracks that are longitudinal or transverse in nature, which form for a variety of reasons
Edge Cracking	Cracking along the edge of the roadway
Weathering	The wearing away of the asphalt binder and fine aggregate
Raveling	The dislodging of coarse aggregate particles
Block Cracking	Interconnected cracks that form blocks typically caused by the hardening of the asphalt surface
Patching & Utility Cut Patching	An area that has been replaced with new material to repair existing pavement
Shoving	Permanent displacement of a localized area of the pavement surface caused by traffic loading. Traffic pushes against the

	pavement and produces a short, abrupt wave
Swell	An upward bulge in the pavement surface, a long gradual wave more than 10ft long
Road Profiler Collection	
Rutting	A surface depression in the wheel path caused by repeated traffic load
Ride Quality	Vehicle vibrations

Concrete Collection	
Distress	Description
Slab Count	Number of slabs present within section
Slab Width	Width of concrete slabs
Slab Length	Length of concrete slabs
Corner Breaks	Edges of slabs broken
Patching	Patching present in concrete
Divided Slab	Slabs divided into four or more pieces
Linear Cracking	Transverse/Longitudinal cracks that are divided into two or more pieces

Pavement Distress Data QA/QC

Through Transmap's many projects, we have adopted a walkout field verification method to ensure accurate distress data analysis. This method uses additional inspections when needed. Transmap will use boots-on-the-ground when samples are flagged for additional verification and inspection. Samples will be flagged in areas where pavement distress is excessive and high.

Task 2c - Pavement Boot Camp

The boot camp is customized for every client and is designed as a fact-finding two half day meetings on-site with the client. The boot camp gives the client and Transmap an understanding about which pavement reports the client needs and which legacy data Transmap needs to collect to achieve these reports. Transmap has successfully managed a boot camp for many customers. This process is considered necessary in establishing a

proper PMS project from the beginning. During the boot camp, we will review any current maintenance and rehabilitation (M&R) practices that the City is using. The main focus will be to gather information on M&R practices and pricing. Transmap will suggest some preventative treatments that might best fit the project area. Transmap will use this information to gather regional cost data for the alternative methods of pavement practices. The boot camp will be the foundation for the reporting task.

The following list represents examples of which information Transmap will discuss in the boot camp:

- **Functional class** - The class or group of roads that the road belongs to. MicroPAVER uses the following classes: Principal, Arterial, Collector, Industrial, Residential, Primary, Secondary, Tertiary
- **Traffic count data**
- **Budgets** - Current pavement rehabilitation budgets
- **Material costs** - Typical costs of materials for rehabilitation
- **M&R practices** - Types of rehabilitation or reconstruction practices the City is performing: Some examples are: Microsurfacing, Cape seal, Slurry Seals, Hot-In-Place Recycling, etc.
- **ArcGIS Online site** - Transmap media site. Transmap will host the geodatabase data in the cloud. The site is created to assist in the tracking of the project deliverables
- **Overall digital centerline file** - We will review the final centerline file that was provided to Transmap by the City
- **Construction dates**- Approximate or actual major M&R dates per roadway segment

Task 2d - MicroPAVER Load

Transmap has written scripts for automated loading of the City's centerline file and distress data into MicroPAVER. We understand that the City has existing data in MicroPAVER and that our data will just be another inspection analysis date in MicroPAVER. Transmap loads MicroPAVER twice during the project. Once the initial pavement analysis is complete, Transmap will run results through MicroPAVER to establish a raw Pavement Condition Index (PCI). Transmap can deliver the raw PCI values but does not recommend using these results for final budgets. After the initial load, Transmap will perform our field verification walkout. After the walkout, distress data may be updated and re-run through MicroPAVER to establish a final PCI for delivery. The second time will be after the walkout is complete and after all of the ride quality and rut data has been processed.

Task 2e - Pavement Reporting

Reports should not only be words on paper but large maps with multiple colors that depict different scenarios. It is this style that has supported many Transmap customers when requesting budgets that can achieve the standard level of M&R required by their constituents. Transmap will have an understanding of which reports the City needs from the boot camp. Transmap will need information on maintenance and rehabilitation activities. This information, along with construction dates, will be loaded into MicroPAVER to help produce candidate maps that will predict what future PCI results will look like in a "do

nothing" scenario. These reports will allow the City to see how creating logical candidate lists and maps will help in evaluating treatments based on PCI and deterioration models instead of windshield studies or resident phone calls.

Transmap has the ability to link the MicroPAVER data to the digital centerline file to produce maps of various maintenance scenarios. For example, PCI maps can be broken out based on roadway classification to evaluate how traffic count affects PCI value. Once all maintenance practices and costs have been determined, Transmap can start building reports over time based on how long certain treatments extend the life of the pavement. Transmap prefers to have different reporting styles and will not simply produce standard text reports. All reporting data will be integrated to the centerline file to produce plots for City review.

Task 2f - Advanced Inspections

A unique element of the Transmap *hybrid* approach to capture the pavement distress is how the ride quality and rut measurements will be provided by the laser profiler. The E950 approach uses a standard pavement profilometer which records the profile of the traveled surface. This method uses measurements of the distance between an inertial plane of reference and the traveled surface; along with the acceleration of the inertial platform in order to detect changes in elevation of the surface. Transmap uses International Cybernetics Corporation (ICC) sensors for our vehicle Rut and Ride equipment. We have worked together for over 10 years. ICC has met or exceeded all State Highway Class 1 testing requirements.

The International Roughness Index (IRI) and rut data will be collected for the left wheel track, the right wheel track, and the average of the two wheel tracks in a manner which meets all ASTM E950 standards. The equipment captures continuous pavement data as the vehicle drives along a roadway at user specified intervals (1" up to 18"). Lasers are placed in each wheel path and in the center of the wheel paths to give the rut depth. The rut depth will be delivered as minimum, maximum, and average per wheel path. The IRI data will be delivered as a value over the whole section of pavement. The IRI data represents the total anticipated vertical movement a vehicle would experience over a given stretch of road. The data acquired from the profiler will be processed and loaded into MicroPAVER and delivered as a field in the centerline file segment by segment as listed in the table above.

Task 2g - Project Management

Transmap will create project management reports, project milestones, project goals and keep the City informed on the progress of the project. Transmap will provide monthly status reports and maps. Most project management will be done remotely except for the kick off meeting. Transmap will utilize the web, email and voice for most project management tasks. The project manager is also responsible for the allocation of staff for a timely completion of the project. The project manager reports to the account manager and project principal on the status of the project.

Task 2h Cityworks Interface Software

Transmap will purchase a seat of the Cityworks interface software for use by the City. The initial purchase of the software comes with one year of technical support from Azteca Cityworks. All support on the use of the software will be provided by Cityworks.

Task 2i - ArcGIS Online Viewer (Media Hosting)

Once the image collection process is complete and all data is processed, Transmap will post all images on our ArcGIS Online web-based image viewer. This viewer allows the City to log on to a web page and view the basemap, orthophotography, image locations, pavement sample data, and all extracted assets from the project. Transmap uses this site to allow the City to see the progress of the project. Transmap will host the image links (media) for up to six months after completion of the project. The City will be responsible for having the space necessary to load the Transmap media on their servers. Transmap can assist the City in setting up the media on their servers.

Task 3 - Pavement Management System (To occur in 2017)

Task 3a - ON-SIGHT Data Collection

As described in task 2a

Task 3b – Pavement Inspection

As described in task 2b

Task 3c – MicroPaver Load

As described in task 2d

Task 3d – Reporting

As described in task 2e

Task 3e – Advanced Inspections

As described in task 2f

Task 3f – Project Management

As described in task 2g

Task 3g – ArcGIS Online Viewer

As described in task 2i

Deliverables

2a, 3a - ON-SIGHT Data Collection	Transmap will deliver the vanimage, which is a geodatabase of the vehicle path with an image link to the Transmap media site. A drive-coded geodatabase of the centerline file is also included. Transmap will deliver all images and LiDAR data on an internal SATA hard drive. A download cable (USB to SATA) can be provided.
2b, 3b - Pavement Inspections	Transmap will deliver a geodatabase of the polygon inspection areas with analyzed distress data as attributes.
2c - Pavement Boot Camp	Transmap will be on-site at the City for the boot camp. We will prepare an agenda and a meeting recap will be delivered to the City.
2d, 3c - MicroPAVER Load	Transmap will deliver a complete .e6x export file from MicroPAVER to the City.
2e, 3d - Reporting	Transmap will post all reporting in the cloud so the City can review. After the City review, Transmap will print the official report and supporting maps for delivery.
2f, 3e - Advanced Inspections	The data acquired from the pavement profiler will be processed and the rutting data will be loaded into MicroPAVER. The following maps will be delivered to the City: IRI, rutting and average section IRI. The following Shapefiles will also be delivered: Rut, Ride and average Section IRI.
2g, 3f- Project Management	Transmap will supply the City with monthly project status reports along with maps and ArcGIS Online tracking.
2h - Cityworks Interface	Transmap will work with Cityworks to activate the MicroPAVER interface license. The license will be part of your existing maintenance program with Cityworks.
2i, 3g - ArcGIS Online Viewer	Transmap will create a web link for the City to view images and data on ArcGIS online. This can be viewed from multiple users but not edited. Transmap will only be responsible to keep the viewer active for 6 months after completion of the project.

EXHIBIT B

Transmap Corporation		City of Ann Arbor, MI Exhibit B Pricing		November 4, 2013				
1) Signs								
Task	Description	Comments	Transmap Units	Transmap Price	Total			
1a	*ON-SIGHT™ Raw Data Collection (units = centerline miles - City and State Routes)	Raw roadway data and image capture. 360-degree image view of all roadways (ROW) with dedicated pavement camera and ground-based LIDAR (100% roadway coverage) Transmap will utilize a Class 1 device for additional ride data	326	\$49.50	\$16,137.00			
1b	Sign Data Extraction (units = centerline mile - City and State Routes)	Transmap will collect attributes stated in RFP	326	\$74.00	\$24,124.00			
1c	GIS-Based Database (units = hours)	Transmap will ensure all collected data is formatted for the City's GIS system	14	\$99.00	\$1,386.00			
1d	Cityworks Integration (included)	Transmap will make sure all sign data will be formatted for the standard Cityworks data model	0	\$0.00	\$0.00			
1e	Nighttime Collection (units = hours)	Nighttime Reflectivity Assessment (Rating Critical, Fair, Good)	86	\$99.00	\$8,514.00			
1f	Transmap Project Management (units = hours)	Project management includes detailed monthly status reports (including maps and ArcGIS online, on site kickoff, staff allocation, etc)	34	\$99.00	\$3,366.00			
1g	ArcGIS Online Web-Based Image Viewer (free access for 6 months after project completion, units = 6 month term)	Transmap will set up the City to view all collected images in ArcGIS Online web environment with orthophotography and GIS basemap layer (web-based reporting)	0	\$875.00	\$0.00			
<i>Subtotal</i>					\$53,527.00			
2) Pavement Management								
Task	Description	Comments	Transmap Units	Transmap Price	Total			
2a	*ON-SIGHT™ Raw Data Collection (units = centerline miles - City and State Routes)	Raw roadway data and image capture. 360-degree image view of all roadways (ROW) with dedicated pavement camera and ground-based LIDAR (100% roadway coverage) Transmap will utilize a Class 1 device for additional ride data	326	\$49.50	\$16,137.00			
2b	Pavement Inspection (units = samples - City Roads Only)	Detailed surface distress analysis using Transmap's Pavement Management 2.0 approach. Vehicle automated collection using a combination of lasers, images and field walkout, pavement width included at sample area (price includes field verification) Transmap uses ASTM D6433 compliant methods. Transmap will inspect the samples areas provided by the City.	8,959	5.88	\$52,678.92			
2c	Pavement Management Practice Definition - Boot Camp (price is per day)	Transmap will meet with City staff to review maintenance/rehabilitation activities, analysis procedures, and collect any existing information on roadways (ADT data, construct dates, maintenance dates, etc.)	2	\$1,750.00	\$3,500.00			
2d	MicroPAVER Load (units = hours)	Formatting/integrating pavement data for mass load into MicroPAVER	11	\$99.00	\$1,089.00			
2e	Reporting (units = hours)	5 year network level pavement plan with maps (includes M&R treatment recommendations and pricing per square yard if supplied by City)	44	\$125.00	\$5,500.00			
2f	Advanced Inspections (units = lump sum)	Ride and Rut processing - Transmap can add additional value by processing our laser profilometer to get an automated result for Rut and Ride data. We use ASTM E950 compliant methods	1	\$4,998.00	\$4,998.00			
2g	Transmap Project Management (units = hours)	Project management includes detailed monthly status reports (including maps and ArcGIS online, on site kickoff, staff allocation, etc)	107	\$99.00	\$10,593.00			
2h	Cityworks Interface (units = lump sum)	Transmap's partner (Cityworks) has provided a quote for the MicroPAVER interface	1	\$4,995.00	\$4,995.00			
2i	ArcGIS Online Web-Based Image Viewer (free access for 6 months after project completion, units = 6 month term)	Transmap will set up the City to view all collected images in ArcGIS Online web environment with orthophotography and GIS basemap layer (web-based reporting)	0	\$875.00	\$0.00			
<i>Subtotal</i>					\$99,490.92			
<p>*ON-SIGHT is a rate of \$99 per mile. If the City does not choose both Tasks 1&2 then this rate will apply.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> State Roads 134 Segments 10.7 Miles Min - 46 ft. Max - 2719.8 ft. Avg - 422.4 ft. Std Dev - 391.6 ft. </td> <td style="width: 33%; vertical-align: top;"> City of Ann Arbor 3912 Segments 315.6 Miles Min - 0.46 ft. Max - 5189.9 ft. Avg - 426 ft. Std Dev - 346.7 ft. </td> <td style="width: 33%; vertical-align: top;"> All Roads 4046 Segments 326.3 Miles Min - 0.46 ft. Max - 5189.9 ft. Avg - 425.8 ft. Std Dev - 348.3 ft. </td> </tr> </table>						State Roads 134 Segments 10.7 Miles Min - 46 ft. Max - 2719.8 ft. Avg - 422.4 ft. Std Dev - 391.6 ft.	City of Ann Arbor 3912 Segments 315.6 Miles Min - 0.46 ft. Max - 5189.9 ft. Avg - 426 ft. Std Dev - 346.7 ft.	All Roads 4046 Segments 326.3 Miles Min - 0.46 ft. Max - 5189.9 ft. Avg - 425.8 ft. Std Dev - 348.3 ft.
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City of Ann Arbor, MI
Exhibit B Pricing 2017 Re-Inspection

3) Pavement Management Re-Inspection

Task	Description	Comments	Transmap Units	Transmap Price	Total
3a	*ON-SIGHT™ Raw Data Collection (units = centerline miles - City Roads only)	Raw roadway data and image capture. 360-degree image view of all roadways (ROW) with dedicated pavement camera and ground-based LIDAR (100% roadway coverage) Transmap will utilize a Class 1 device for additional ride data	316	\$79.95	\$25,264.20
3b	Pavement Inspection (units = samples - City Roads Only)	Detailed surface distress analysis using Transmap's Pavement Management 2.0 approach. Vehicle automated collection using a combination of lasers, images and field walkout, pavement width included at sample area (price includes field verification) Transmap uses ASTM D6433 compliant methods. Transmap will inspect the samples areas provided by the City.	8,959	5.88	\$52,678.92
3c	MicroPAVER Load (units = hours)	Formatting/integrating pavement data for mass load into MicroPAVER	7	\$99.00	\$693.00
3d	Reporting (units = hours)	5 year network level pavement plan with maps (includes M&R treatment recommendations and pricing per square yard if supplied by City)	22	\$125.00	\$2,750.00
3e	Advanced Inspections (units = lump sum)	Ride and Rut processing - Transmap can add additional value by processing our laser profilometer to get an automated result for Rut and Ride data. We use ASTM E950 compliant methods	1	\$4,998.00	\$4,998.00
3f	Transmap Project Management (units = hours)	Project management includes detailed monthly status reports (including maps and ArcGIS online, on site kickoff, staff allocation, etc)	84	\$99.00	\$8,316.00
3g	ArcGIS Online Web-Based Image Viewer (free access for 6 months after project completion, units = 6 month term)	Transmap will set up the City to view all collected images in ArcGIS Online web environment with orthophotography and GIS basemap layer (web-based reporting)	0	\$875.00	\$0.00
<i>Subtotal</i>					\$94,700.12

*ON-SIGHT discount rate for Re-Inspection