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EXHIBIT B

(IMS PROPOSAL TO CITY OF STAMFORD RFP NO. 678)

IMS IMS Infrastructure Management Services

Consultants | Engineers

Proposal for:

RFP #678 "Pavement Management Plan"

April 30, 2015 - 4:00 PM

Submitted to:

City of Stamford
Attn: Beverly Aveni, Purchasing Agent
Purchasing Division
888 Washington Boulevard
Stamford, CT 06901

IMS Office Location

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Rolling Meadows, IL 60008
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data collection
software

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April 20, 2015

City of Stamford
Purchasing Department
888 Washington Boulevard
Stamford, CT 06901

Attention: Beverly Aveni, Purchasing Agent
Reference: **Proposal for RFP #678 "Pavement Management Plan"**

Dear Evaluation Committee,

IMS Infrastructure Management Services is pleased to submit our proposal for the above referenced City of Stamford project. With over 30 years of pavement and asset management experience, we have become international leaders in the provision of data collection methodologies and software configuration, and have developed a streamlined approach to analysis of collected data. With our sole focus on pavement management services, the City of Stamford will acquire **quality** data, exemplary **service**, and **reliability** that define our commitment. This level of quality and commitment has resulted in routinely traveling across the United States and Canada to complete projects.

The authorized official for the IMS submission is Alan Sadowsky. Donald Hardt is the main point of contact for any inquiries or clarifications for the submittal.

Alan Sadowsky, Member / Manager
Don Hardt, Manager of Client Services
IMS Infrastructure Management Services, LLC
1775 Winnetka Circle, Rolling Meadows, IL 60008
Phone: (847) 506-1500 Fax: (847) 255-2938
E-mail: dhardt@ims-rst.com

We want to thank you for considering IMS as a viable solution for your pavement management needs and we will strive to become an asset and extension of the Stamford team. As you read through our submission, you will gain an understanding of how IMS is uniquely qualified to successfully implement the City's pavement management program. All requirements set forth in the scope of services will be met in their entirety and without exception. If any questions arise, please do not hesitate to contact our office.

Regards,
IMS Infrastructure Management Services, LLC

Donald L. Hardt
Manager of Client Services

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1.0 IMS QUALIFICATIONS AND UNDERSTANDING

1.1 IMS INFRASTRUCTURE MANAGEMENT SERVICES PROFILE

IMS Infrastructure Management Services is a pavement management consulting firm with over 30 years of direct experience in the industry. We are the premier automated pavement management firm in the U.S. and Canada, successfully performing ASTM D6433 data collection assignments from Key West, FL to Vancouver, BC. Our core team also includes multiple registered professional engineers. The IMS approach to developing a defensible and real world Pavement Management System starts with conducting an objective and repeatable pavement data collection survey. The IMS team performs objective, linear data collection assignments. The IMS approach ensures that the entire length of each road will be surveyed, rather than relying on a sample of select portions of the network.

IMS engineers work hand-in-hand with municipal agencies to establish Pavement Management Systems that meet FHWA and ASTM standards. IMS will operate out of the Rolling Meadows, Illinois office for the Stamford project. IMS is headquartered in Tempe, Arizona with another operational office in Cambridge, Ontario. Since our inception in 1985, IMS has progressively developed new technologies together with real-world software applications to become a recognized international leader in the field of pavement and infrastructure management. Our software solutions provide the tools required to meet the complex challenges within the modern urban and rural environment.

A brief history of IMS is as follows:

1983	1985	1997	2000	2004	2012
• Road Surface Tester (RST) technology introduced to the North American market providing automated data collection.	• IMS formed as a partnership between Novak Dempsey, Swedish National Roads Authority and Delcan, Ltd.	• Terracon purchases IMS - expands its services and expertise.	• RST capability is expanded with the addition of GPS and digital camera capabilities for asset data collection.	• Employee purchase of IMS, western United States and Canadian presence expanded.	• Data processing capability expanded through automated programs and routines.

IMS has completed more than 700 right-of-way asset and pavement management assignments for government agencies and private-sector companies throughout the United States and Canada.

- 700 city and county agencies plus 25 large-scale public works departments; ***over half of these assignments included the implementation of PavePRO.***
- Certified for ASTM D6433-11 data collection and participation in *ASTM sub-committee E1741 and TRB subcommittee AFD20* on pavement monitoring and valuation.
- Collected data for more than 15 different software platforms, ranging from our own proprietary systems, to 3rd party programs including PAVER, Lucity, Cartegraph, RoadMatrix, and others.
- Developed 4 pavement and asset management applications.
- Performed work with more than 8 databases and mapping applications.

Equipment Inventory and Capabilities

IMS operates an advanced, state-of-the-art fleet of data collection units. These units collect surface and sub-surface pavement distresses. All equipment is owned and operated by IMS. Our testing equipment and software capabilities include:

3 Laser Road Surface Testers (RST)

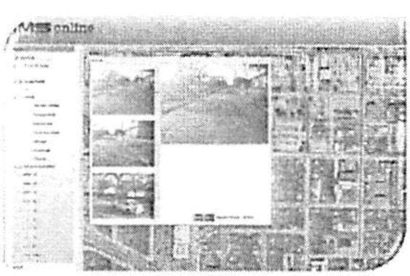
The RST is capable of collecting automated pavement condition data and a full suite of right-of-way asset information in a single pass. The RST incorporates lasers, distance measuring instruments, accelerometers and rate gyroscopes, high definition cameras positioned for forward, rear right-of-way, and side view imagery and video, and inertial navigation based GPS. The RST is equipped with ***11 laser sensors; 7 specifically dedicated to rutting and 4 high speed lasers for cracking.***

3 Dynaflects

Dynaflects provide nondestructive, multi-sensor dynamic deflection data for pavement structure analysis. Dynaflect's have a 30-year history of collecting dependable, repeatable data, and may be used on asphalt and concrete roads. Through the use of load wheels and an oscillating weight, the unit applies a nondestructive 1,000lb load to the pavement and measures the loads deflection through a series of sensors.

1 Sidewalk Surface Tester (SST)

The Sidewalk Surface Tester (SST) is a purpose built field data collection unit designed primarily for surveying municipal sidewalks, rights of way and parking lots. The SST employs the NOMAD data collection software that integrates the survey inventory (GIS), field maps, GPS and field data collection into a single platform. NOMAD may be customized for virtually any type of survey ranging from sidewalks, parking lots (following ASTM D6433) to full sign surveys.

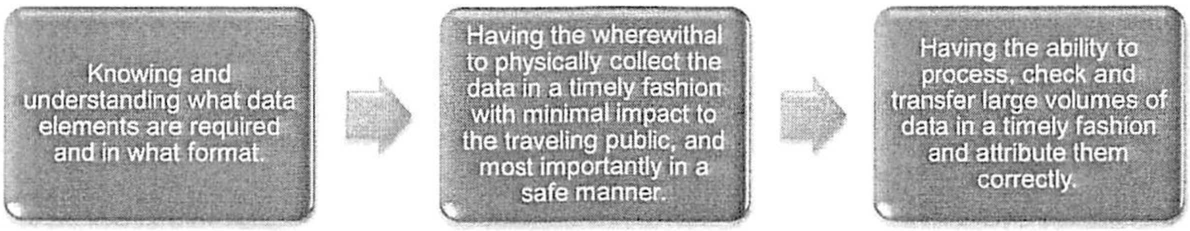


Software Engineering

IMS has been a leader amongst professional engineering firms in the development and application of pavement and asset management software solutions. The IMS staff has implemented pavement management software including PavePRO, PAVER, Lucity, Cartegraph, Deighton, StreetSaver, and many more. IMS is also the preferred data collection firm for multiple software applications. IMS has also developed in-house software applications include browser based image viewing software and engineered pavement and asset analysis tools for the development of multiple-year prioritization plans.

1.3 UNDERSTANDING DATA COLLECTION IN STAMFORD

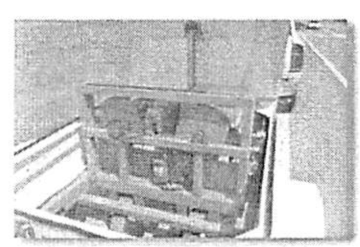
Three elements are critical to successfully completing a citywide data collection assignment:



Field Surveys

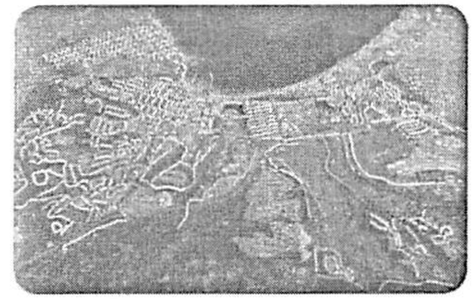
For the pavement condition surveys, the IMS team will maintain a rigorous QA/QC platform that will ensure the quality of the City's data is maintained. The City of Stamford street network inventory consists of approximately 325 centerline miles of roadway. To ensure comprehensive coverage, IMS will 2-pass test the arterial roadways resulting in 354 total survey miles.

- **ASTM D6433-11 Pavement Distress Survey –** IMS is unique to the industry, as an objective data collection effort will be completed. The Laser RST will be used to perform a surface condition assessment of all roads designated by the City of Stamford. Instead of using the subjective feet on ground or windshield sampling method, all data will be collected continuously and recorded in 100-foot intervals in the form of a detailed database complete with GPS coordinates. The detailed geodatabase will be summarized to develop the pavement condition index for each segment.
- **Innovative Automated Technology –** The ***11 laser camera array*** (LCA) is capable of collecting automated pavement condition data in the form of roughness to International Roughness Index (IRI) standards, wheel path rutting, transverse cracking, block cracking, alligator cracking and texture. The Digital Condition Rating System (DDCRS) is a touch screen based tablet computer that allows the user to define what information (distresses, attributes, and asset information) is to be collected and how it is to be quantified. The DDCRS is integrated into the data flow through time code, GPS, distance and inventory control.
- **Dynaflect Field Surveys –** IMS will mobilize a Dynaflect device to collect sub-grade condition results for inclusion in the analysis and report. The Dynaflect is a multi-sensor platform that will provide a better understanding of network's health.



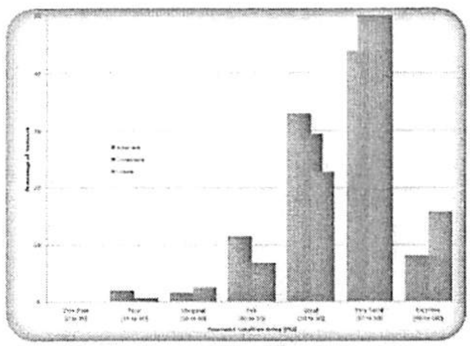
Data Format and Delivery – The condition data will be delivered to the City of Stamford into an easy to navigate and Interactive Excel Spreadsheet, complete with graphs and descriptive terms such as Good/Fair/Poor. The ASTM D6433 extent and severity distress data is also aggregated into an easy to understand 0-10 index to assist in data review. *The condition data is delivered as a geodatabase, a series of shape files, or even a Google Earth KMZ file to ensure City staff comfort with the data outputs.*

GIS Review & Visual Presentation – Before data collection, IMS will review the City's GIS street inventory and segmentation to ensure it will be suitable for pavement management purposes. The IMS surveys are tied directly to the City's existing GIS environment resulting in a seamless transition of data that is linked to a unique identifier in the City's GIS. In addition to validating each road's physical existence in the GIS, we will validate critical roadway attributes such as roadway presence, pavement type, length, and width. With the IMS data linked to the City's GIS, we can deliver the data in nearly any format such as shape files, geodatabases, AutoCAD, SDE, or even Google Earth KML files. Our deliverables are compatible with all ESRI products and most third party GIS platforms.



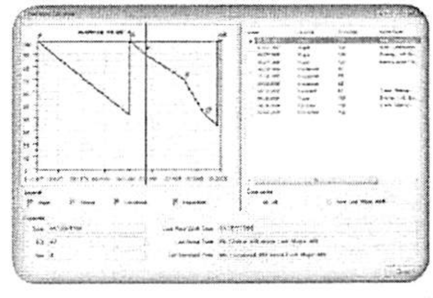
PCI Development, Analysis Configuration, & Reporting – The focus of this project is to develop a 5-year CIP that targets Stamford maintained roadways. To do so, IMS will develop the operating parameters of the CIP analysis, which is quite simply the intelligence that drives maintenance and rehabilitation activity.

Operating parameters include treatment types, cost, and effective life span, in addition to City priorities as they relate to functional classification, pavement type, structural adequacy, and districts. IMS will also introduce the concept of "Strength" that can be developed using structural testing equipment, such as the Dynaflect, and/or as the sum of load associated surface defects (alligator, longitudinal, and edge cracking; rutting, distortions, and patching/potholes). *In addition, the deterioration curves will be modeled for Stamford with the integration of critical set points that catch roadways before they fall into a more expensive treatment category.* This is how we introduce cost of deferment into municipal optimization techniques.



Software Implementation and Training – IMS will initially perform a needs assessment pertaining to software selection and implementation. Should the City select software or implement PavePRO Manager, IMS will purchase and supply the necessary licenses (if required) for the City. Upon installation on the City's network, IMS will complete data loading and database verification. We employ data formats such as Excel, Access, geodatabases, and Google Earth KML files should the City elect to postpone software configuration. The idea is to keep the data accessible for multiple end users.

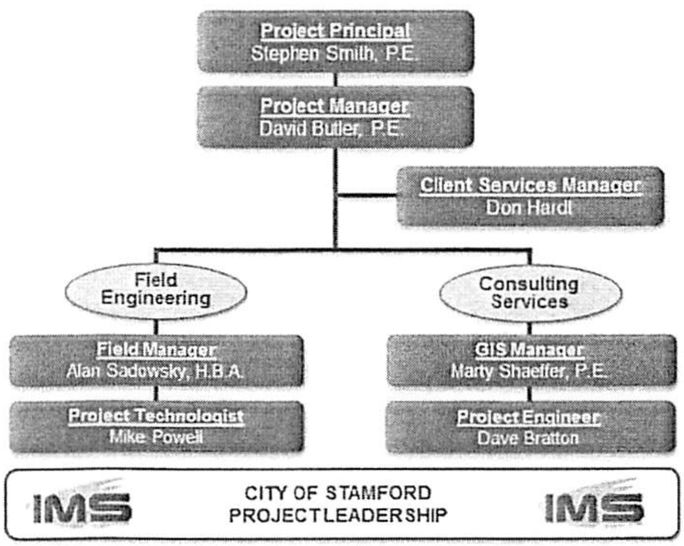
After set up and implementation, IMS will schedule a date to perform software training for City staff. Training will consist of basic navigation, data entry, report development, analysis modeling, database maintenance, and an overview of the pavement management configuration within the selected modules. Training materials and user manuals will be developed as appropriate and based upon City staff input.



2.0 PROJECT TEAM AND REFERENCES

2.1 TEAM ORGANIZATION

The IMS team is built around a core group of key project members that stay with the project from inception through to delivery of the final results. It is where decisions are assessed, implemented, and follow-up completed. The core team will be led by Project Principal Stephen Smith, P.E. and Project Manager David Butler, P.E., a participant on an ASTM Advisory Board. Don Hardt has been assigned to this project to facilitate the transition of deliverables to the City and to ensure that all goals of the project are satisfied.



The team has been structured into two streams that follow the logical work activities and flow of the project. Each work stream is headed by a specialist in their respective field of practice. For this assignment, activities relating to the pavement condition surveys will be undertaken and managed by David Butler. Dave was selected for this role due to his 300+ assignments and over 30 years dedicated to pavement management and roadway design. In addition, Dave has over 15 years of ASTM D6433 reporting and compliance experience. Activities that relate to field surveys will be managed by Alan Sadowsky. Marty Shaeffer will act as the GIS Manager. We purposefully separated the field surveys from the data management functions in order to ensure the continual flow of data from the field, through post processing and then on to the client. We believe that the person who collects the data cannot be the same one who validates the data.

The entire team will operate under the direction of Stephen Smith, IMS Principal. Stephen was selected to lead this team for a few mission critical reasons:

- As a Principal of IMS, he will be able to bring on additional resources as necessary and react to ongoing project challenges in a timely fashion. In this role, Stephen's main goal will be to ensure the City of Stamford receives the data they contracted IMS to provide, and in exchange, IMS can receive a strong client reference.
- Stephen has over 30 years engineering and project management experience with the past 17 years dedicated to pavement and right of way asset data collection assignments. His experience in roadway design, construction, municipal engineering, and pavement analysis puts him in a strong position to develop real world solutions and budgets.

2.2 KEY STAFF QUALIFICATIONS

The project roles, qualifications, and responsibilities of the key team members are summarized below. This is the same project team that is utilized for all ASTM D6433-11 data collection projects. Comprehensive resumes have been attached to Appendix I.

Team Member	Project Role & Experience
Stephen Smith, P.E. Principal Project Manager **15 Years with IMS** Commitment: 50%	Responsible for ensuring technical resources are available for data collection activities, then directly involved with the final PCI reporting. Stephen will be the direct point of contact throughout the project. • *B.S. in Civil Engineering, over 30 years private firm and municipal engineering experience.* • *P.E. in Arizona, Delaware and P.Eng. in Alberta.* • *17 years specializing in pavement and right of way asset management for cities and counties.* • *In excess of 100 pavement and right of way asset management and implementation projects in the last 5 years. Most involve development of inventories, GIS integration, analysis and reporting, and asset management systems.* • *In excess of 300,000 miles of data collection and QA/QC using automated, manual and sampling technologies.* **Recent projects include:** Columbus, Fairborn, OH; Atlanta, Dunwoody, Sandy Springs, GA; Lancaster, PA; Onondaga County, NY; Monterey, Visalia, Long Beach, San Luis Obispo, Imperial, Imperial County, Anaheim, CA.
David Butler. P.E. Project Engineer Quality Assurance Manager **32 Years with IMS** Commitment: 100%	Responsible for ensuring the quality of the inventory and performance data that will be reviewed during the initial stages of the project. Dave will also be involved in the setup of the ASTM D6433-11 distress protocols and QA/QC. • *B.S. in Civil Engineering, over 30 years of engineering experience.* • *Over 25 years specializing in pavement and right of way asset surveys, software implementation, analysis, and training.* • *P.E. in 10 states.* • *Developer of 3 pavement and right of way asset management applications and data models, complete with GIS integration.* • *Data collection, inspection and QA/QC of well over 200,000 miles of roadways in all regions of the country.* • *Participation in ASTM sub-committee E1741, TRB sub-committee AFD20 on pavement monitoring, valuation.* **Recent projects include:** Sanford, North Port, Monroe County, FL;

Salisbury, MD; Onondaga County NY; Lancaster, PA; Mississauga, Cambridge, Ottawa, ON; Buffalo Grove, Oak Park, Lake Forest, Villa Park, DeKalb, Gurnee, Lake County, IL; Fairborn, Columbus, OH; Norman, McAlester, OK.

Marty Shaeffer, P.E.
Project Engineer
GIS Manager

10 Years with IMS
Commitment: 40%

Marty is responsible for ensuring accurate network referencing and GIS maps, and for linking data to the City of Stamford's GIS environment. Marty will also ensure the data has been properly loaded to the PAVER module.

- *B.S. in Civil Engineering, 27 years engineering experience.*
- *15+ years specializing in GIS mapping.*
- *P.E. in California, New Mexico, & Arizona.*
- *Registered AutoCAD Developer and member of the American Society of Civil Engineers.*

Recent projects include: San Luis Obispo, CVAG, Imperial, Del Mar, Beverly Hills, Long Beach, CA; Lancaster, PA; Muskogee, OK; Glendale, Paradise Valley, Casa Grande, Goodyear, Scottsdale, AZ.

Don Hardt
Client Services Manager

32 Years with IMS
Commitment: 100%

Don is responsible for overall project and client management activities. He develops the project scope, schedule, team, and ensures the scope is adhered to throughout the project. Don works very closely with the Project Principal and is considered a primary point of contact for our clients.

- *B.S. in Management plus 40 years of hands on pavement management experience.*
- *36 years of project and client management experience.*
- *Strong working knowledge of multiple pavement management and asset management systems.*

Recent projects include: Onondaga County, NY; Glenview, Lake County, Lake Forest, Highland Park, Schaumburg, Northbrook, St. Charles, Deerfield, Cary, Aurora, Winnetka, IL; Columbus, Newark, Dublin, Kettering, OH;

Dave Bratton
Project Engineer
PAVER Expert

4 Years with IMS
Commitment: 75%

Dave will be involved with the initial review of the field data and the post-processing of the data. Dave will prep the data for loading to PAVER and be involved with training activities.

- *B.S. in Civil Engineering, Bradley University*
- *Registered E.I.T. in Illinois*
- ***PAVER Certified Trainer***

Recent projects include: Lake County and Lockport, IL; Leawood, Salina, Overland Park, and Johnson County, OK; Ottawa and Barrie, ON; Columbus, OH; Key West and Monroe County, FL; Beverly Hills and Long Beach, CA.

2.3 PAVEMENT MANAGEMENT EXPERTISE

In addition to our 30 years of experience dedicated to pavement management, we are also very active in the industry through participation in ASTM sub-committees, APWA seminars and software events. IMS completes approximately 35 to 45 pavement data collection assignments annually, with most projects requiring some type of software configuration, training, and optimization from IMS. Each IMS project includes the acquisition and management of roadway condition data utilizing the modified ASTM D6433 distress identification protocols that meet the specification of the RFP.

Experience with Projects of a Similar Scope:

For over 25 years, IMS has performed semi-automated pavement condition assessments on municipal roadways utilizing automated data collection. The result has been a successful integration of objective pavement condition data for the development of comprehensive CIP programs. IMS is capable of implementing the many 3rd party software solutions, including the recommended pavement management module, PavePRO Manager. IMS will deliver the pavement condition data and import the data to the appropriate modules, and complete virtual training and/or on-site courses. IMS will work directly with the City to determine what pavement and asset management solution will best fit the needs of the Stamford staff now and in the future.

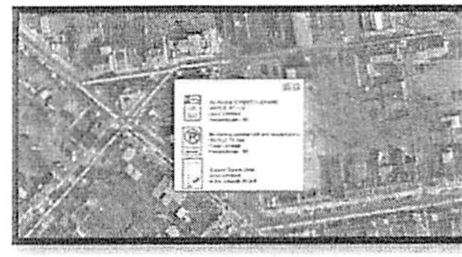
With respect to completing pavement management projects for agencies that required software implementation services, IMS has recently completed or been awarded assignments for Onondaga County, NY (and local municipalities), Columbus, OH, Atlanta, GA, Chesapeake, VA, Glenview and Evanston, IL. All IMS assignments are completed utilizing the modified version of the ASTM D6433 protocols and included the deflection surveys with a Dynaflect. IMS also developed multi-year pavement management plans for each client. The IMS team has been intact for over 10 years; therefore, the City can be confident in IMS's ability to meet all requirements and specifications in this request for proposal.

In regards to the developing pavement management reports, IMS understands the requirements that the local municipalities must meet to receive full program funding. It is important that the analysis of the network be completed using the latest and most current version of the GASB 34 reporting requirements. IMS will evaluate and modify the current City's rating system for the roadway and alley networks to be compatible with the latest ASTM protocols. Because IMS maintains numerous clients across the map, the City will be able to access the IMS team's unique perspective of how other roadway networks are being maintained across the country. IMS can compare the Stamford results against other similarly sized networks and those with similar weather patterns in the Midwest, Ontario, and Pacific Northwest.

2.4 PROJECT PROFILES

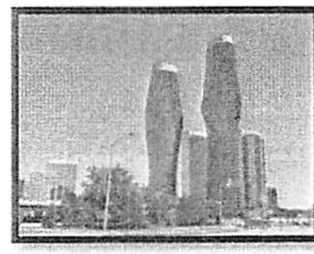
The following projects utilized the ASTM D6433-11 protocols and were completed within the last 5 years.

City of Lancaster, PA (2011)



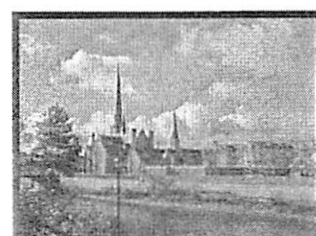
In 2011 IMS was awarded the pavement management program project for the City of Lancaster. The project included pavement distress data collection of the City's entire roadway network covering 150 survey miles. The IMS team completed data processing and format for load to the Lucity module. Lancaster was also one of the firms IMS clients to implement the browser based data viewer, IMSvue. The data viewer includes right-of-way asset inventory data for traffic signs, sidewalks, ADA ramps, pavement markings and striping, catch basins, and curb & gutter. All data was linked to GIS.

City of Mississauga, ON (2009 & 2012)



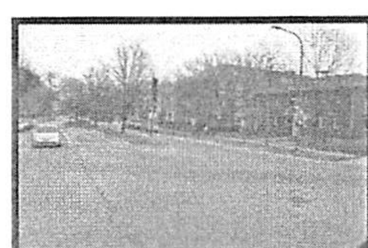
In 2009, IMS teamed with the City of Mississauga to complete a 3 to 4 year update of the current condition of the City's roadway network. This has been an ongoing process for almost two decades, and originated with IMS. That latest agreement was in 2012 as the City requested a full network data collection and analysis. The network consists of 895 miles of 2-lane streets and an additional 205 miles of major streets, for a network total of 1,100 centerline miles. IMS performed a detailed life cycle analysis broken down by the functional classes and included curve development; again broken down by the functional classes. The network covers the southern portion of Peel County. The City uses the Hansen software as a data repository.

City of Cambridge, ON (2009 & 2012)



IMS completed a network update for the City of Cambridge in 2009 and most recently in 2012. Each project kicked off with on-site calibrations and control section testing. The RST surveyed approximately 305 miles and that data was processed and delivered to the client along with Shapefiles. As the RST surveyed the roads, it also collected high resolution video which was then processed and delivered to the City as still images to support the network inventory.

City of Salisbury, MD (2007 – 2013)



This project consisted of a RST-based comprehensive surface condition survey on 160 miles of roadway. It included digital images, GIS linkage, software implementation and training, report generation and presentation. ROW asset extraction for curb & gutter, sidewalks, ADA ramps, driveway aprons, storm water inlets, manholes and valve boxes was performed the following year using the RST's continuous GPS referenced video. A recent pavement data collection update was completed in 2013.

2.5 REFERENCES

The following projects are provided as references for IMS as a testament to our ability to provide quality pavement and asset management services. All projects were completed using the U.S Army Corps of Engineers data collection protocols, commonly referred to as a modified ASTM D6433.

City of Columbus, OH (2005, 2008, 2010, & 2013)
Transportation Division, 109 N. Front Street, 2nd Floor, Columbus, OH 43215
Alan Moran, Pavement & Bridge Program Manager (614) 645-7061

In a partnership stretching over 10 years, IMS completed a pavement performance update and right of way asset survey as part of the 2013 Columbus surveys. The project consisted of testing approximately 2,300 miles of roadway using the Laser RST. Two camera views were mounted to the RST for use as a deliverable to client in the form of a virtual drive down a roadway and the confirmation of previous asset inventories including: curb/gutter, sidewalk, ADA ramp, guardrail, crosswalks, on-street parking, and parking meters. All pavement condition and digital images are linked to the City's GIS environment. IMS also performs software maintenance for the City's pavement management application, PavePRO.

Lake County, IL (1990-2014)
600 W. Winchester Road, Libertyville, IL 60048
Darrell Kuntz, P.E., Project Engineer, (847) 377-7459

IMS has tested 25% of the 780 mile road network each year. The survey includes RST surface condition surveys, deflection testing and GIS linkage for the IMS PavePRO Manager software. Special studies have been performed for parking lots and special grants and funding programs. Each project includes an updated report for the section of the network that was surveyed.

County of Onondaga, NY (2011, 2013, & upcoming 2015)
John H. Mulroy Civic Center, 421 Montgomery St., 11th Floor, Syracuse, NY 13202
David Cooper, Civil Engineer II, (315) 435-3176

IMS has performed multiple pavement management program updates for Onondaga County. IMS collected the pavement distresses on approximately 300 test miles, and completed a pavement analysis and report with the RoadMatrix software. All data was linked to GIS with previous projects including ROW inventory development, additional data collection for local towns, and image deliverables.

City of Anaheim, CA (2001, 2003, 2005, 2007, 2010, & 2014)
200 S. Anaheim Boulevard, MS#276, Anaheim, CA 92807
Karl Francis, Principal Civil Engineer, (714) 765-5175

IMS and the city of Anaheim have over 20 years of experience working on pavement management assignments. In 2006 IMS completed a detailed review for the City's Pavement Management Systems (PMS) Program for the City's AHS and LSS. In 2010/11 IMS completed another AHS/LSS survey that consisted of 156 AHS centerline miles and the LSS survey consisted of 422 miles. The project also included detailed MicroPAVER rehabilitation analysis, GIS integration, software installation and training and reporting. The deliverables were a detailed 7-year plan and annual budgets. Recently, IMS was again awarded the PMP updates for the City's AHS/LSS networks utilizing PAVER and Lucity.

3.0 PROJECT APPROACH AND METHODOLOGY

3.1 INNOVATIVE APPROACH TO ASTM D6433-11 DATA COLLECTION

For this survey, we propose to use our Laser Road Surface Tester (RST) enhanced with an integrated Digital Condition Rating Subsystem (DDCRS) that supplements the RST data for ASTM distress data elements, quality assurance and inventory information. The RST configuration also includes digital cameras and GPS capabilities. The RST, with its **11 laser sensors** is capable of collecting a full array of ASTM D6433 condition data in real time, complete with high accuracy GPS coordinates and multiple view digital images for both rigid and flexible pavements, as it traverses the roadway. Specialized data processing, using GIS as its backbone, allows the pavement data to be quickly checked for completeness and quality.

The main components of the Laser-RST include:

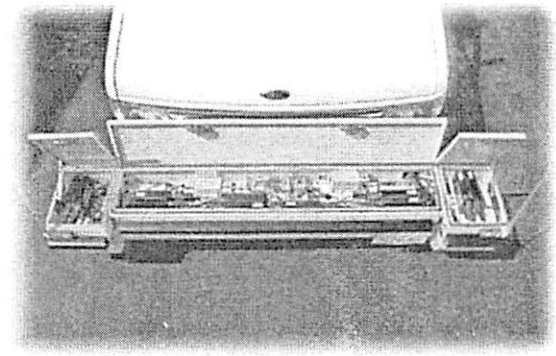
- **11 Laser-Camera Array (LCA)** system with integrated lasers, cameras, rate gyroscopes, inclinometers and accelerometers to automatically and continuously measure pavement cracking, texture, roughness, rutting, and geometrics.
- **Digital Condition Rating System (DDCRS)** that may be customized to collect user defined severity/ extent based pavement distresses and a variety of roadway attributes.
- Ability to collect dual-wheel path rutting, as well as roughness to International Roughness Index (IRI) standards.
- Configuration of up to 5 high definition cameras that can be used for QA/QC purposes and for the provision of a right of way video-log; the camera angles include panoramic dual forward, side/ditch, and rear facing views.
- High accuracy Global Positioning System (GPS) receiver with inertial navigation for geo-locating of pavement and asset information with excellent accuracy.
- Dual distance measuring instruments to measure linear distances to within +/- 0.5%.
- Built-in software and on-board processors to develop roadway inventories, time code integration, and system monitors.

Laser RST Configuration for ASTM D6433 assignments:

The RST is operated by 3 highly trained crew technicians. The Laser RST travels at the posted speed limit and thus does not affect the free flow of traffic. This is important as it allows IMS to:

- Collect data in a timely fashion without having to trade-off accuracy for production.
- Work from a safe, protected environment without risk to the data collectors.
- Eliminate the need to implement traffic control, close lanes or attempt to collect the data from the sidewalk or dodge traffic.
- Collect, validate and safeguard large volumes of data without the need for transposing data from portable data collection units or paper.

Data Collection – Pavement Distress Details:



Roughness – Dual wheel path International Roughness Index (IRI) data is calculated in real time from continuous longitudinal profile data collected by the RST. Data is simultaneously obtained from three devices to determine the road profile; a pulse transducer based distance-measuring instrument (DMI), laser sensors operating at 32 kHz, and an accelerometer in conformance with ASTM E 950. Each of our RST units conform to a Class I profiling device and are equipped with laser sensors and accelerometers in both wheel paths so that ¼ car IRI calculations can be performed for each wheel path. The RST can also "pause" over non-valid roadway sections such as localized maintenance activities and not affect the overall IRI value.

Rutting – Wheel track rutting is calculated in real time from transverse profile data collected by the RST. Each of our RST units is equipped with ***11 laser cameras*** that fire simultaneously to collect continuous - transverse profile data at 4-inch intervals at highway speed. This configuration is far superior to other types of vehicles that utilize three lasers or sonic transducers to calculate "relative rutting". Even five sensor units are extremely sensitive to driver error since it is essential in this case that the driver keep the data collection vehicle's wheel exactly in the rutted wheel tracks (assuming that they fit).

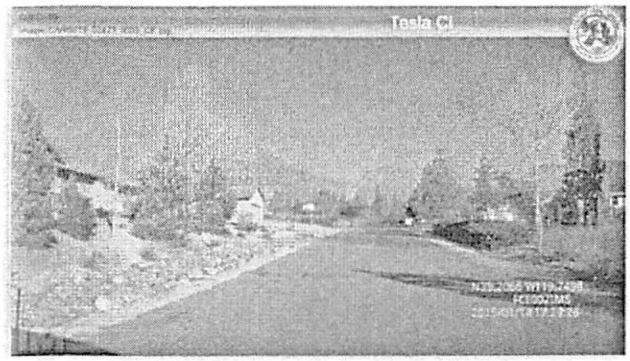
The wire method is used to calculate the rut depth in both the right and left wheel track on essentially a continuous basis. Either the right or deeper of the two-wheel path ruts may be used for rut depth calculations with the average rut depth for that wheel path reported for each section. *Rut depth results, quantified by 3 - 4 severity thresholds (with break points at user-defined levels such as 0.25, 0.50 and 0.65 inches) and percentage of section will be provided for every segment.*

Cracking, Faulting, & Texture – The RST allows IMS to conduct an objective crack survey, thus increasing the accuracy of an otherwise subjective manual survey. High-speed lasers and an on-board processing computer, accurately measure the surface profile of the road. Included in this profile are all cracks and faults as small as 1/8" (2 mm) wide that pass beneath the lasers. Processing software then reduces and filters this information to determine the *total number of cracks, crack width, as well as the crack interval*, plus faulting information. From this information, quantified crack data can be determined at both the survey and summary intervals.

IMS collects transverse, longitudinal, alligator, map, and edge cracking data by extent and severity though the use of high-speed lasers and digital condition rating systems (DDCRS).

Distortions, Raveling, Potholes, Scaling, Spalling, & Other ASTM D6433 Distresses – RST platform can be configured to collect nearly any pavement distress, attribute, or other associated data using a Digital Condition Rating System (DDCRS). By means of a touch screen based tablet computer, highly trained IMS technicians input changes in observed distress severities and extents, or identify specific roadway assets or attributes. The DDCRS is integrated into the data flow through time code, GPS, DMI distance and inventory control. The DDCRS data is then post processed in the office to generate extent quantities for each observed distress severity level throughout every surveyed road section.

3.2 CAMERAS & EQUIPMENT CONFIGURATION



IMS can mount up to five HD cameras on the RST platform depending on the required views or right-of-way assets to be inventoried. Prior to commencing the field surveys, our team will confirm the necessary right-of-way views for collection. The potential views are a forward oriented (driver front), right of way oriented (passenger front), right and left sides (building fronts or sidewalks), and an adjacent right of way view (driver rear). As an example of pavement imagery, the image above illustrates a forward-facing camera configuration of the Laser RST.

Based on our understanding of this assignment, IMS proposes a minimum configuration of **at least three HD video cameras** as depicted in the RST image below. The camera views should be proofed out at the calibration stage, as it may be desirable to relocate or change the orientation of a camera. Should the City request image deliverables (like the example above), the images would be linked to the City's existing GIS and is provided as a personal geodatabase with image hyperlinks. Rather than simply housing the images as a layer in GIS, IMS can also load the images to the pavement management module. This will link with the pavement condition data, analysis results, and other attributes. The three cameras will be oriented to collect right-of-way asset features should the City desire to develop asset inventories.

Our experience has been that not all roads require two pass testing as local roads can be passed in one direction. On select roadways, sufficient information may be collected in a single pass through the use of a rear-facing camera. This rear-facing camera, orientated to collect information on the face of signs in the other direction, is also sufficient for collection of traffic signs, sidewalk, shoulder, striping, and other features. The cameras are environmentally enclosed for weather and temperature protection and are equipped with moisture sensors to prevent operation when humidity may affect quality

The adjacent image illustrates the proposed minimum 3-camera configuration for this project:

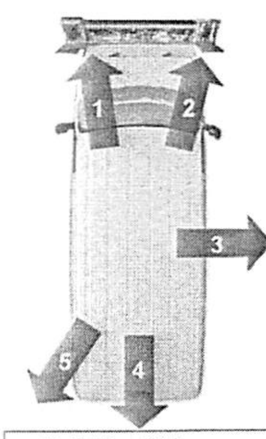
Camera 1: Left front offering a panoramic right of way view.

Camera 2: Right front used for 180 degree forward view and for right-of-way asset data extraction. Camera is oriented to capture most signs and not too much horizon.

Camera 3: Right side/ditch camera. Camera can be oriented to capture mainly ditch, shoulder, and sidewalk imagery, or elevated up to collect building fronts.

Camera 4: This is an optional pavement/roadway or left side view. The camera is oriented to collect an optional reverse viewing angle or left side view.

Camera 5: Left rear camera to collect reverse facing signs and shoulder images for small local roadways.



Multi-View HD Imagery

3.3 GIS INTEGRATION & MAPPING

The role of GIS in pavement management cannot be overstated. It is a powerful tool that provides the ability to handle and present vast amounts of data in an efficient manner. Not only does GIS allow an agency to visually plot textural data, it also establishes an easy access portal to the data through an efficient integration with many 3rd party pavement and asset management applications.

IMS kicks off every project by completing a brief review of the agency's GIS environment to assess suitability for network referencing, survey map preparation, and pavement and right of way asset management purposes. IMS also compares the existing roadway inventory within the current GIS environment and the City's condition database. If they do not match, we will work with the City to determine the correct referencing information.

The data collected by IMS is linked to the existing GIS environment and is supplied as a personal geodatabase, spatial database engine, Auto CAD files, or a series of shape files. IMS collects XY coordinates for all data elements using GPS technology coupled with inertial navigation and integrates with most 3rd party GIS applications, including ESRI.

For this assignment, GIS will be used in four key areas of work:

1. GIS will be used to verify the streets to be surveyed and to create the routing maps for use during the field surveys.
2. The survey productivity will be tracked through the plotting of the GPS data collected during the field surveys. This will allow IMS to review all streets that have been covered, identify anomalies in the referencing, and spot missed streets.
3. GIS will be used in processing the distress and inventory data. By plotting the data, we can QA the data and identify data exceptions in addition to proofing out the GIS.
4. Personal geodatabases, spatial database engines, shape and/or KML files, can be created for the visual presentation of condition data and analysis results.

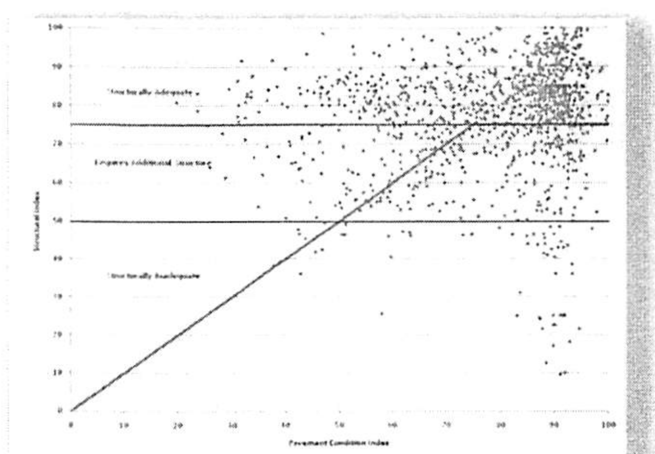
To supplement a personal geodatabase or spatial database engine, the KMZ files serve as an easy access point for data. While not everyone is a GIS or ESRI expert, everyone can double click on a data file. Upon clicking, the file opens the Google Earth application, with the City's pavement condition as a layer. The file can be viewed at the summarized project level or the detailed 100-foot level. The user can then left click on any street and view the textural data such as the inventory and distress details. The result is an easy to use and access data review process for the public works department.

3.4 SUB-SURFACE DISTRESS INVESTIGATIONS

Subsurface distress investigations are a valuable tool to assess the sub-grade condition of a roadway. As a part of the project deliverables, IMS integrates the Structural Index (SI) as a component of each roadways final PCI score. To assess the subgrade strength of a roadway, a Dynaflect can be utilized for Asphalt and Concrete roadways.

Deflection testing can be performed using a Dynaflect or Falling Weight Deflectometer, in accordance with ASTM standards and IMS' 30+ years of experience. While deflection testing can be conducted on all roadways, generally IMS recommends that network-level testing be completed on the high traffic routes such as arterials and collectors. Deflection testing is typically completed at least once in each direction in every street segment (every 300 feet) along the outside lanes of the roadway on major roads. Testing shall be altered to an inside lane when it appears to be in a worse condition than the outside lane of the segment based on site observations. IMS will record the readings of a series of geophones for inclusion in the overall pavement condition rating. These readings will be used to determine the pavement strength, load transfer capabilities, and identify properties of the base and sub-grade.

Upon completion of the deflection survey a structural analysis is performed. Dynaflect's apply a known load to the pavement and measure the pavement response to the load. The structural adequacy of a road is expressed as a 0 to 100 score with several key ranges: roadways with a Structural Index greater than 75 are deemed to be structurally adequate for the loading and may be treated with lightweight surface treatments or thin overlays; those between 50 and 75 typically reflect roads that require additional pavement thickness; and scores below 50 typically require reconstruction and increased base and pavement thickness.



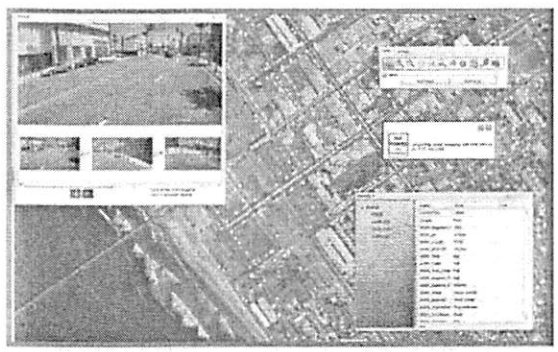
The adjacent graph presents a sample structural adequacy plot of a recent client's roadway network against its average pavement condition.

The diagonal blue line separates roadways that are performing above expectations (above the line), from those that are not, (below the line). The small number of roadways falling below the diagonal line indicates this particular agency has a high percentage of roadways that are structurally inadequate for their design load. This is typically the result of insufficient base and structural materials during the original construction, or the application of overlays that were too thin during the lifetime of the roadway.

3.5 NEEDS ASSESSMENT & SOFTWARE EVALUATION

The main goal of this project is not only to perform data collection, but to implement a comprehensive pavement management system that meets the current and growing needs of the Stamford staff. The IMS team understands the City's desire to have an application with robust analysis and reporting tools. We are well positioned to lead all software implementation activities to the selected management system.

IMS is proposing to complete a software evaluation as a part of the scope of services to ensure Stamford selects an application that meets the needs of the staff and management. *While IMS has established ourselves as the leading pavement management firm since 1985, we are also third party software consultants who frequently implement applications such as **Lucity, Deighton, Cartegraph, and many others.*** We go beyond software installation and training to ensure the operating parameters of the system are setup and configured to produce reliable pavement analysis routines and reports. While there is no "one-size-fits-all" when it comes to pavement management, IMS can ensure the selection of software that will meet current and future needs of Stamford staff.



The primary objective of this project is to provide Stamford staff with the tools, skills and information to manage their roadway network in the most cost effective manner that provides the ratepayers of Stamford with the optimal blend of level of service and annual expenditures. To accomplish this goal, IMS Infrastructure Management Services will conduct a needs assessment and full evaluation on industry standard programs. This will provide a solid understanding of the status and needs of the roadway and network. It can also include right-of-way assets. IMS will then train the Stamford staff on the system functionality, allowing for the development of comprehensive multiple-year road rehabilitation plans that optimize pavement quality and minimize annual expenditures.

Software Review and Selection

IMS will review Stamford's existing pavement data, its level of implementation, and user skill set. Our engineers then evaluate Stamford's needs and compare them against each application. While the evaluation will include approximately seven options, IMS will work with Stamford staff to narrow the selection to 2-3 for live demonstrations. Upon completion of the demos, the Stamford staff will select an appropriate application. Selection should be based on three factors - flexibility of the software (ease of use), satisfaction with the analysis and subsequent outputs (GIS, reports, budgets, etc.) and the quality of the software support and maintenance activities.

The importance of a strong and robust pavement management program is crucial for this project. The purpose of such a program is to inventory, analyze, and report on the condition data loaded into the application. It is imperative that Stamford choose a program that will best fit the needs of the transportation authorities, elected officials, responsible departments, and last but not least, the citizens. A solid pavement management program can allow you to perform simple functions such as roadway look-ups and attribute identification all the way to performing a cost benefit optimization analysis.

3.6 RECOMMENDED SOFTWARE – PAVEPRO

While the results of the survey will certainly be documented and bound into a final report that illustrates the findings of the survey, it is imperative that City staff have access to the pavement condition and analysis results without having to become software experts. While IMS is a leading expert with most 3rd party pavement management applications, we have engineered a pavement management program to meet and exceed all specifications listed in the RFP.

- As the developer of PavePRO Manager software, IMS will efficiently load the update survey data, transfer existing historical data, and conduct on-site software training
- Module for right-of-way asset extractions of ADA ramps, pavement striping, pavement markings, guard rails, bike racks, and trash containers using GPS referenced video from the RST survey.

Of the 700+ city and county pavement management programs completed by IMS, more than half involved PavePRO Manager-based implementations or updates.

While IMS is recommending PavePRO Manager at this stage, it will be imperative to review the actual needs of the City staff, as mentioned in section 3.5. IMS will review the street conditions, software training requirements and support activities that will be necessary for this project.

PavePRO Manager is a robust management analysis tool that can provide the City with quality 5-year maintenance and rehabilitation plans. The IMS developed PavePRO Manager Software is the most comprehensive analysis program in the industry. Because it provides such a large amount of useful information, it needs specific field data properly configured as input for the software. PavePRO provides a wealth of inventory and condition data. Individual street sections are rated as to their existing condition and projected future performance. Problems are identified whether they are surface related or hidden in the base or subgrade.

Because it fully uses multi-sensor Dynaflect data in the software analysis, it identifies the cause of the failures and formulates the optimum rehabilitation strategy and time for implementation. Cracking distresses and support conditions are assessed to determine whether a strategy will work and how much added life it will provide. Pavement condition measurements and ratings are combined with other factors such as drainage, traffic, environmental factors affecting performance, strategy options, costs and many other inputs to develop 5-year programs and budgets. Due to the nature of the software, it is imperative to utilize the automated data collection methodology for field surveys. It is equally important to use the same processing tools for future updates. This will allow for an objective comparison of data and insure that staff has the tools they need to effectively manage the roadway network.

As a full service pavement management firm, IMS will ensure that the proper pavement management module has been configured for the City of Stamford, be it PavePRO or an alternative solution.

3.7 DEVELOPING A WORLD-CLASS PAVEMENT MANAGEMENT SYSTEM

Immediately following the completion of the field survey's IMS will begin processing the pavement distress severity and extent scores in an effort to develop a Pavement Condition Index (PCI) for each roadway segment. The condition results can then be analyzed by a team of IMS engineers, who would develop a City of Stamford 5-year pavement management plan. This section provides a brief summary of the functionality of the IMS pavement analysis in order to emphasize our implementation expertise as well as the abilities and constraints within a pavement analysis if selected to be completed by the City.

The purpose of pavement management is to produce cost effective maintenance programs that maximize available resources and roadway life. By incorporating key components of a cost benefit analysis into the analysis operating parameters, we can develop a game plan that is optimized to meet the needs of Stamford. In addition, the analysis operating parameters described within this section will be delivered in an easy to use Interactive Excel Spreadsheet including the segment PCI data, pavement deterioration curves, triggers (priority weight factors), and the prioritized 5-year plan. Everything is linked to GIS in the form of simple shape files or even a personal geodatabase.

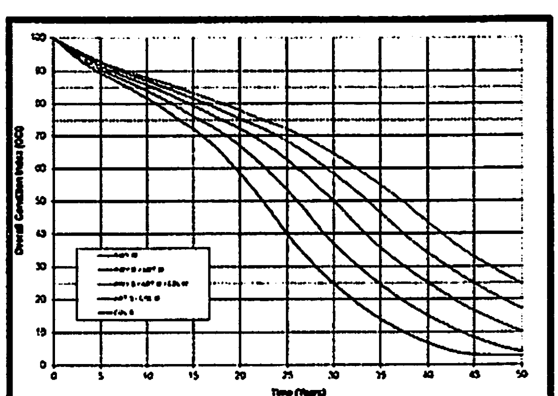
Field Inspection Data and Pavement Condition Index (PCI)

The IMS analysis allows you to store information regarding your pavements, including surface types, number of lanes, patching estimates, cross slopes, and sidewalk & curb types with replacement estimates. Pavement condition data including surface distress, roughness, and deflection results can be stored and analyzed. Using an in-house Pavement Manager Setup module, we can develop customized condition elements, distress types (load & non-load), Indices (SDI, RI, & SI), weightings, and overall PCI calculations.

In addition to the yearly programs, the net impact each budget scenario has on the expected condition of the road network over time can be determined. This budget impact can be illustrated both in terms of the yearly increase or decrease in the average network PCI score, PCI distribution, or % Backlog of roads that were not selected by the budgets. IMS converts the difficult to understand FHWA and ASTM D6433 data to a 0-10 distress rating scale with distress weighted factors (DWF), where DWF = {Area under D6433 deduct curves/3000}.

Modeling and Performance Curves

With an IMS analysis, you can forecast various budget scenarios to help you determine your ideal maintenance and rehabilitation schedule. The IMS approach will help you decide what rehab activities should be performed, when and where to perform them, and an ideal budget for your system to maintain it at a specific level of service.



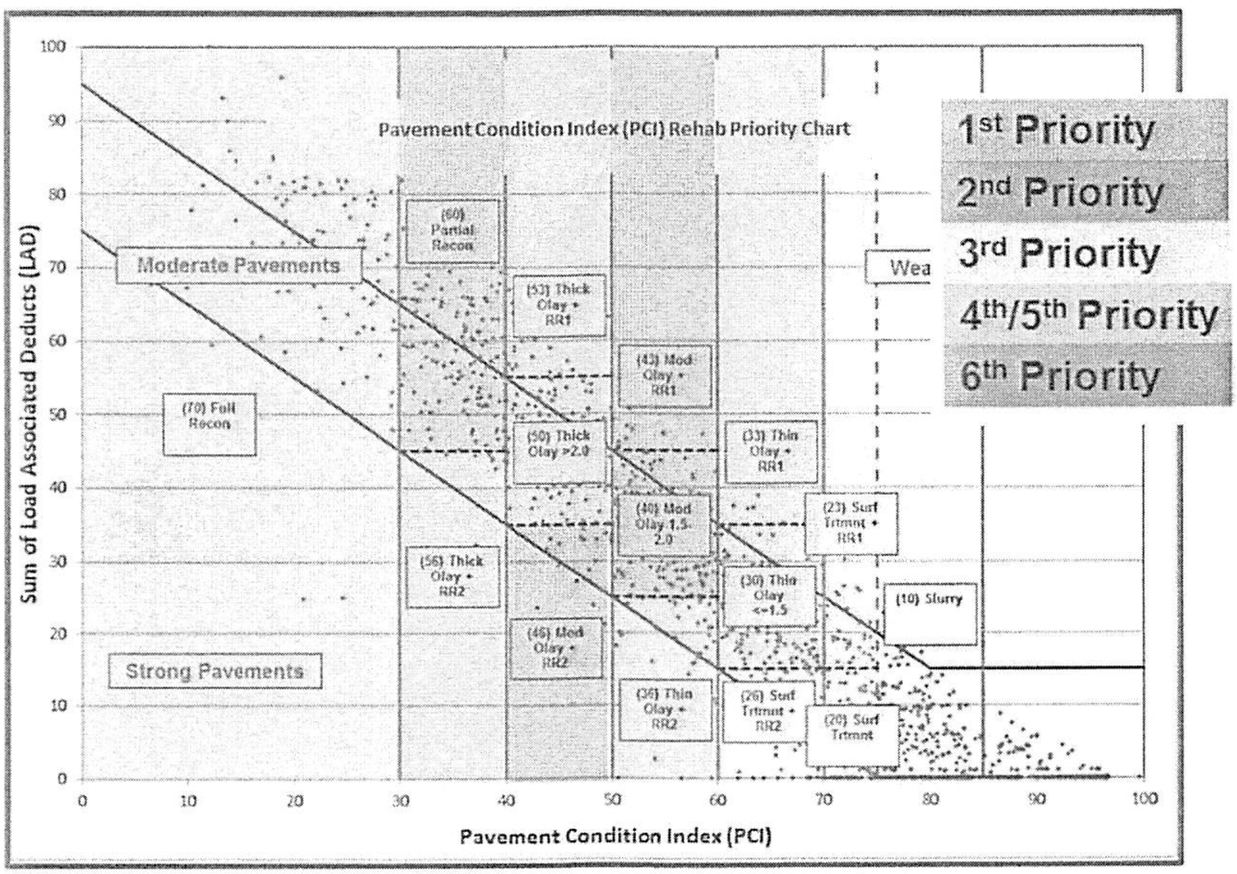
IMS engineers use pavement deterioration models that can be customized to reflect the climatic conditions and structural characteristics of Stamford's road network. As a result, performance curves can be developed on factors such as functional class, pavement type and sub-grade strength.

Set Points and Operating Parameters

One of the most important aspects of the IMS approach is determining the 'set points' or thresholds of the performance curves and other factors. In general, these set points determine what type of treatment will be selected given the current or predicted condition of a road segment over time.

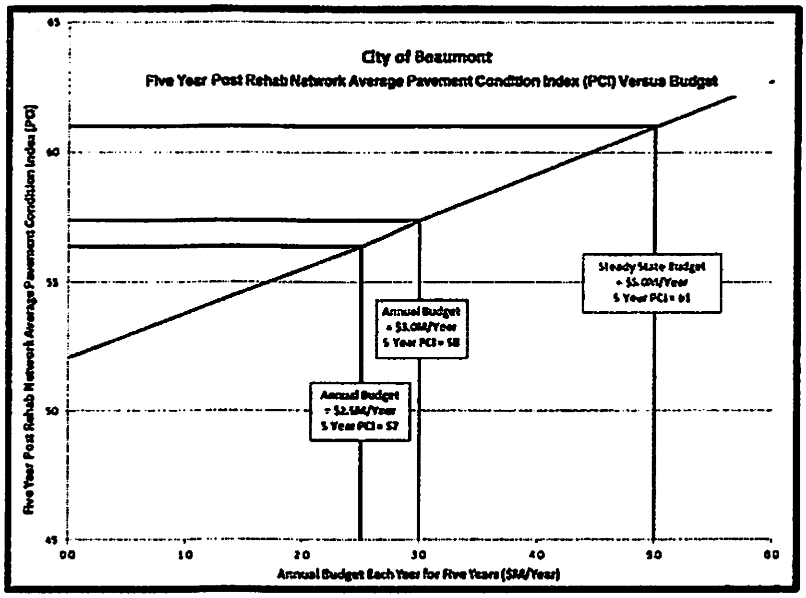
For example, the scatter plot displayed below illustrates a potential rehab selection process that may be incorporated for Stamford. Each dot represents the outcome of a pavement condition assessment on each segment in the road network. The X-axis is the pavement condition score while the Y-axis is a Structural Index (will be developed with deflection data). The boundaries created by the intersection of the vertical green lines and horizontal dashed black lines represent the potential rehabilitation strategy for those given conditions. Each maintenance and rehabilitation strategy is programmed to take place in the most optimal year for each roadway segment.

The color bands are also an effective way of illustrating the activity priorities through an analysis that takes into account critical PCI drops, also known as "cost of deferral." The IMS analysis specifically targets "critical segments", which is defined as segments that will drop into a more expensive treatment category if they are not selected now. By presenting the rehab strategies in a visual format such as this, the user, City staff, management, and Councils can easily understand, follow and potentially modify the results with confidence.



Rehabilitation Analysis

An unlimited number of pavement maintenance and rehabilitation strategies can be defined within our system. An analysis is then run, incorporating the performance curves, set points, filter criteria and rehab alternatives to identify the overall need in terms of rehab strategies and costs for the City's road network, for today as well as year on year for the next 5 years.



The IMS approach allows you to input any number of "what if" budget scenarios and produce prioritized yearly rehab programs based on those funding levels over a 5-year analysis period. Typical budget scenarios include Budget $/Year, Unlimited Budget $, "Do Nothing" Budget, and a Target PCI Budget.

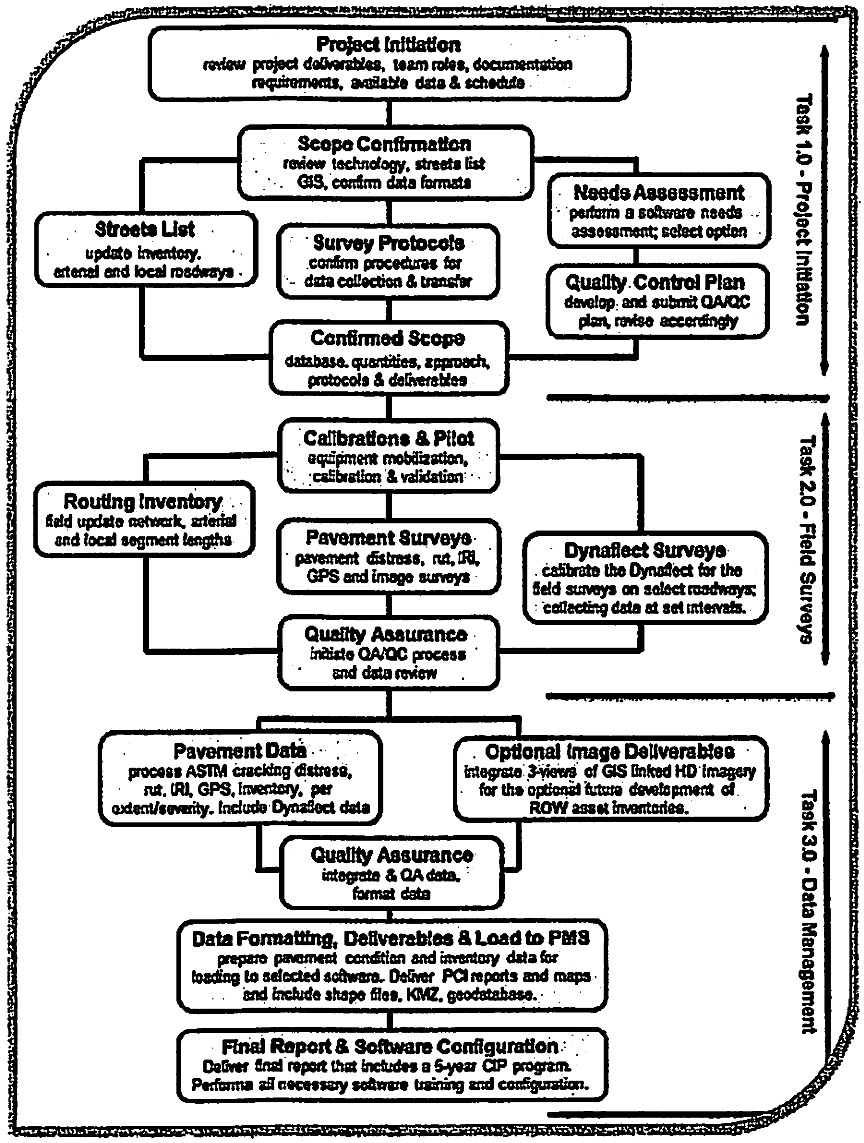
What is included in an IMS analysis & report?

- *Street ownership and inventory/attribute report*
- *Present condition ranking* – detailed and summary condition data including; Good/Fair/Poor, Load Associated Distresses (LAD), Non-LAD, and Project reviews of each street in the network, as well as the network as a whole.
- *Fix all budget analysis* – this identifies the upper limit of spending by rehabilitating all streets assuming unlimited funding.
- *Do nothing analysis* – this identifies the effects of not performing roadway rehabilitation projects.
- *Steady state rehabilitation life cycle analysis* – this identifies the minimum amount of rehabilitation that must be completed in order to maintain the existing level of service over 3, 5, or 10 years.
- *PCI & funding levels* – what funding will be necessary to maintain a PCI of 75, 80, & 85.
- *Plus or minus 50% and other additional runs* – additional budget runs are completed at rates of +50% and -50% of the suggested steady state analysis. Up to 10 budget scenarios will be run.
- *Integration of capital projects and Master Plans* – ongoing and proposed projects that affect roadway rehabilitation planning will be incorporated into the analysis.
- *Draft 5-year rehabilitation and prioritized paving plans* – based on need, available budget and level of service constraints; a minimum of three budget runs will be completed.
- *Final prioritized paving plan* – incorporating feedback from stakeholder departments and utilities, complete with budget and level of service constraints.

3.8 PROJECT WORK PLAN

Over the course of implementing and collecting roadway and asset data for over 700 transportation and municipal agencies, IMS has developed a logical sequence of activities to effectively obtain the greatest efficiency for each project. IMS will use a series of **Task Activities** to define a work plan and then assign appropriate resources to fulfill the contractual requirements, schedule, and budget. The tasks are used to monitor perfomance and productivity, and link them directly to a contract unit of measure.

For this assignment, we have developed three tasks, each with numerous activities and deliverables within them. The three tasks are:



Project Initiation – this task will set the tone for the overall assignment, as well as document the scope, deliverables and formats.

Field Surveys – this task is the heart of the project and encompasses all activities relating to the image surveys. Starting with the equipment calibration, the field surveys have been designed to collect the most data in the most efficient manner possible. Field surveys will also be used to undertake quality assurance activities that relate to coverage and image validation.

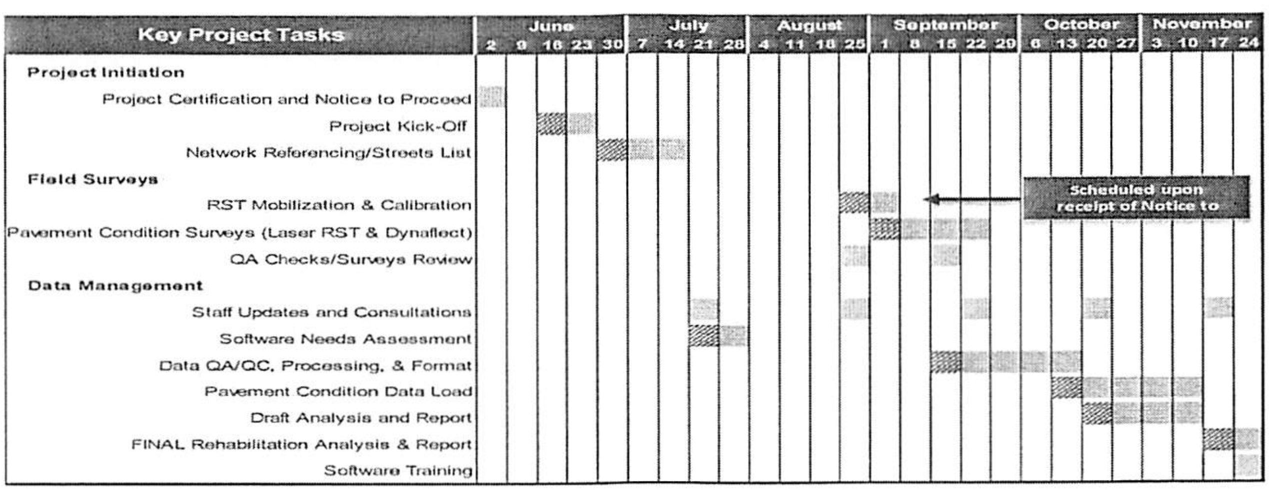
Data Management – this is the task that takes the raw information collected in the field, and processes it into a series of deliverables. This task will also complete the quality assurance and quality control, processing, formatting, delivery, and the analysis and reporting activities. All software training activities will be completed during this task.

3.9 PROJECT SCHEDULE

Currently IMS has the survey capacity for approximately 2,500 miles/month, so completing the City of Stamford surveys in a timely fashion is not an issue. Field surveys are expected to progress at a rate of 25 to 30 miles per day and are expected to proceed at 6 days per week depending on weather. Elapsed time for the City of Stamford field surveys is estimated at **2 weeks** for the surface distress data collection. Field surveys for deflection testing will commence in conjunction with the Laser RST surveys. IMS anticipates mobilizing a Laser RST in September of 2015 (depending on receipt of the notice to proceed). IMS has the available staff, equipment, and resources to manage a timely project for the City of Stamford.

On all projects three rate-determining functions rise to the top as being critical in maintaining the proposed project schedule. In general, it is not the surveys that take the longest time, but rather handling the data that cause project schedules to slide. The three steps we wish to highlight, so they can be addressed by the City are:

- Finalizing the inventory and maps to be used for the field surveys. The delay in this step usually occurs in obtaining the maps or GIS topology, confirming the streets list and then validating the limits of the surveys.
- Review of the field data and exceptions reports delivered to the client. As part of the QA/QC process, only quality data can pass through to the analysis. Thus, it is critical that once the data passes through the IMS QA/QC process, it be accepted and signed off by the client.
- Obtaining feedback and acceptance of the final format and load. No matter how much planning work goes into a schedule, the bottom line is Council's operate on their own timetable and the project must be able to conform to their schedules.



Staffing Disciplines

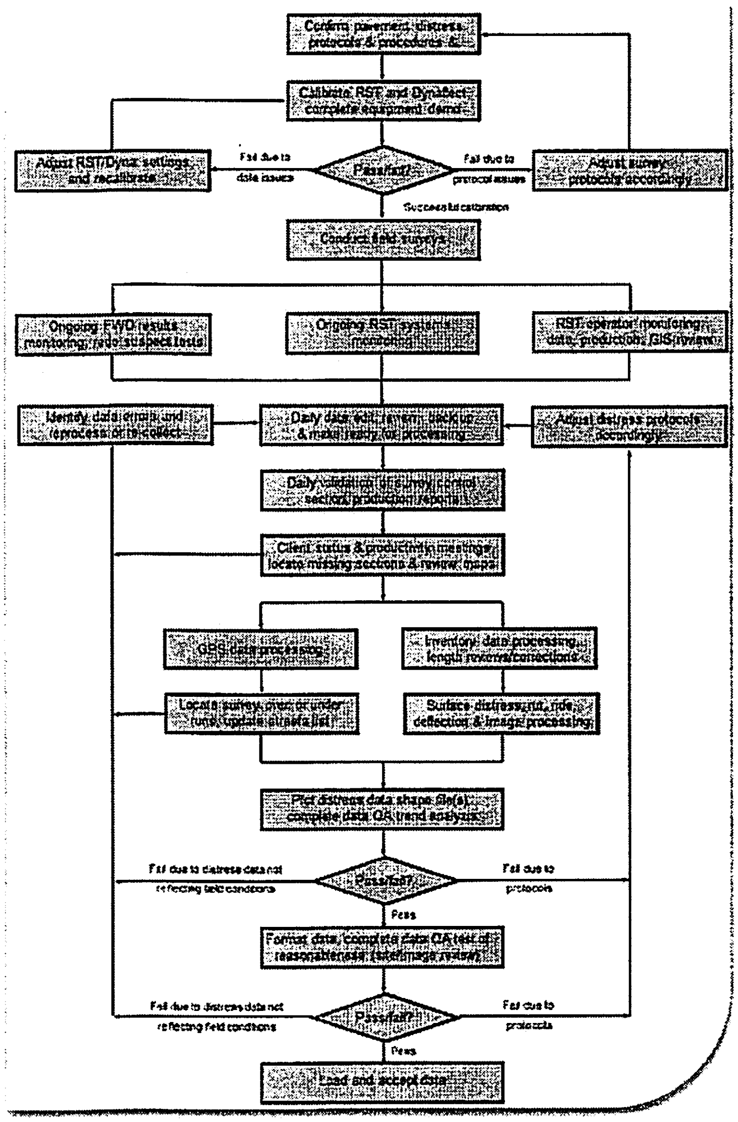
IMS maintains a team of 28 employees, including: **8 Staff Professionals, 14 Technologists, and 6 Support Personnel.** Section 2.2 describes the roles and qualifications of the key project participants.

4.0 QUALITY ASSURANCE PROGRAM

Ensuring consistent quality of pavement condition data is just as important as collecting the data. Each step in the data collection process (presented in the flow chart) has been designed as to require the data to pass a certain standard or validation before moving on to the next stage, or be returned to the source for correction.

Calibrations & Demo: All laser-camera arrays, DMI units, switch-input keys, GPS, and digital camera subsystems are calibrated prior to data collection, and then daily during the project.

Daily Survey Control: Each day, selected roadway sections will be re-tested to confirm repeatability of the performance data. Suspect deflection results are deleted and the section re-tested on the spot.



Validations: Range limits and data validation routines are integrated in the on-board processors and post processing routines. Validation checking routines monitor "out of range" data, extraneous data, and missing data.

Inventory & GIS Review: All data is plotted and compared to the City's GIS. This will identify new streets, missed streets, duplicates and Non-city Streets.

Length Reviews: All section lengths are compared against published values to identify survey under/over runs. Streets that are too long or too short will be noted in an exceptions list and presented to the client for review.

Test of Reasonableness: Process and compare RST data and digital image data at specified reporting interval. Compare individual distress and overall condition ratings. Identify non-compatible data locations and reprocess accordingly. Site visits to select sections will also be part of the test of reasonableness.

QA - Reports

A series of Quality Control reports are generated by both field, and office personnel, on a regular basis to ensure a quality product is produced. The following QA reports are produced for each project:

- Equipment Calibration Report – documents calibration results.
- Vehicle Condition Report – records vehicle, camera/sensor configuration and condition.
- Set List Report – documents data collection set points for crack widths, rut depths, tolerance. etc.
- Field Surveys Daily Activity Report – documents survey progress and any problems encountered.
- Data Processing Quality Checklist – results of QA/QC process.

QA - Field Data Collection

In addition to the QA procedures discussed herein, specific survey protocols are followed:

- Pavements are only surveyed when there is sufficient daylight and they are dry and free of debris.
- Pavements are surveyed in a single lane to provide true, consistent data. Lane changes are made only when absolutely necessary, and the location of the lane change is noted.
- Every effort is made to collect data during off peak times on heavily traveled roadways to minimize variations in speed. Sun angle is also considered during the field surveys.
- Re-inspections will be performed randomly as required by the PMPGM. In addition to the start and stop points, intermediate tie-in points such as intersecting roads, bridge locations, railway crossings, etc., are noted.

IMS Field Safety Plan

In conjunction with the IMS Employee Policy Manual, all field operators are required to implement the following field safety procedures when operating the RST survey vehicle.

- All IMS RST vehicles must be fitted with seat belts, safety lights (flashing and/or strobe), vertical guide sticks on the front RUT bar, "Caution" sign placard, and fire extinguisher.
- Daily RST "circle checks" are to be conducted to ensure equipment maintenance.
- Seat belts must be worn at all times while operating the vehicle.
- Driver cell phone use while the vehicle is moving strictly prohibited.
- Field surveys are to be conducted within the vehicle at all times.
- Obey all signs and traffic laws.
- RST is to travel at or near posted speed limits so as not to impede traffic.
- Conduct survey in the curb or shoulder lane. Lane changes are made only when absolutely necessary to avoid obstacles or other safety concerns.
- If required to pull over to the shoulder, the RST is completely off the travel lane.
- If operators are required to get out of the vehicle to make vehicle repairs or adjustments, a reflective safety vest or shirt must be worn.
- Avoid collecting data during high peak times on heavily traveled roadways.
- Cease survey operations during rain, snow or other poor weather conditions.

5.0 FEE PROPOSAL

The project will be completed using a combination of unit rate based tasks activities and lump sum activities. The spreadsheet presented below is based on the IMS work plan and deliverables. It represents a realistic budget to complete the work, and we are confident we can maintain an on-time, on-budget approach to the assignment.

Task	Activity	Quant	Units	Unit Rate	Total
	Project Initiation				
1	Project Initiation	1	LS	$3,000.00	$3,000.00
2	Network Referencing & GIS Linkage	354	T-Mi	$20.00	$7,080.00
	Field Surveys				
3	RST Mobilization/Calibration	1	LS	$3,000.00	$3,000.00
4	RST Field Data Collection - Pavements	354	T-Mi	$115.00	$40,710.00
5	Dynaflect Mobilization	1	LS	$2,500.00	$2,500.00
6	Dynaflect Surveys - Deflection Testing (Arterial Roads Only)	354	T-Mi	$145.00	$51,330.00
	Data Management				
7	PavePRO Manager Implementation (Install, Configuration, Training)	1	T-Mi	$9,000.00	$9,000.00
8	Data QA/QC, Processing, & Format (Excel; Shapefile; KML)	354	T-Mi	$20.00	$7,080.00
9	Pavement Condition Data Load to PavePRO	1	LS	$3,250.00	$3,250.00
10	Pavement Analysis, Budget Development, & 5-Year Report	1	LS	$8,000.00	$8,000.00
11	Project Management	1	LS	$9,522.00	$9,522.00
				Project Total:	**$144,472.00**
	Alternative Software Selection Process (Optional)				
1	Software Evaluation	1	LS	$3,000.00	$3,000.00
2	Pavement Management Software Install and Configuration				
	a. PAVER Software Install, Configuration, and Data Load	1	LS	$10,000.00	$10,000.00
	b. Lucity Software Install, Configuration, and Data Load	1	LS	$25,000.00	$25,000.00
	c. StreetSaver Software Install, Configuration, and Data Load	1	LS	$13,000.00	$13,000.00
3	Software Training (Onsite Training - Subject to Change)	2	EA	$2,500.00	$5,000.00
4	Software Training (Offsite Training - Subject to Change)	8	HR	$175.00	$1,400.00
	Supplemental Activities:				
1	Council Presentation	1	LS	$3,500.00	$3,500.00
2	Delivery of Digital Images (Per View)	354	T-Mi	$14.00	$4,956.00
3	Web Hosted Digital Image Viewer	1	LS	$7,500.00	$7,500.00
4	ROW Asset Data Collection (GPS & Camera Configuration)	354	T-Mi	$25.00	$8,850.00
	a. Curb & Gutter Database Development	354	T-Mi	$50.00	$17,700.00
	b. Sign & Support Database Development	354	T-Mi	$95.00	$33,630.00
	c. Sidewalk Database Development	354	T-Mi	$55.00	$19,470.00
	d. ADA Ramp Database Development	354	T-Mi	$60.00	$21,240.00
	e. Pavement Striping Database (Linear Features)	354	T-Mi	$45.00	$15,930.00
	f. Pavement Markings Database Development (Point Features)	354	T-Mi	$45.00	$15,930.00

APPENDIX I

Staff Resumes

STEPHEN J. SMITH, P.E., P.ENG.
PRINCIPAL & SR. PROJECT MANAGER

Background

Mr. Smith fills two critical mission-oriented roles for IMS, as a principal of the firm; he has the responsibility of ensuring the long-term health of client relationships. Second, as a senior manager and pavement engineer, Mr. Smith provides project management capabilities on assignments where his background in integrated infrastructure management and municipal engineering is best suited. Mr. Smith has fulfilled the role of project manager and engineer on over 150 pavement, infrastructure and engineering assignments.

Through his work in the infrastructure and pavement management industry, Mr. Smith brings to each project a unique blend of hands-on implementation and project management skills combined with the ability to integrate various software platforms, GIS and operating systems. He also is well versed in various state-to-the-art data collection technologies. In addition to management systems, Mr. Smith has extensive experience in the area of subdivision design, municipal engineering and highway design and construction.

Education & Registrations

Bachelor of Science, Civil Engineering, 1982, University of Calgary
Professional Engineer: Arizona (2005), Delaware (2000), Alberta (1985)
American Public Works Association
American Council of Engineering Companies
American Society of Civil Engineers

Project Leadership Roles

Pavement and Right of Way Asset Management Assignments - Project experience includes participating in the planning, management, training, data collection, and implementation of systems for many public and private sector clients.

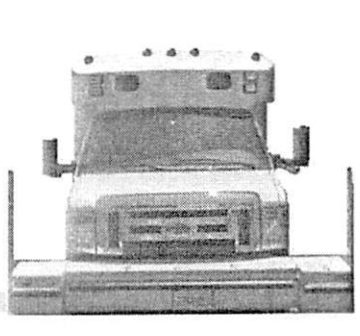
Municipalities: Anaheim, Downey, Lemon Grove, Thousand Oaks, Chula Vista, Manhattan Beach, La Mesa, Fontana, Yucaipa Lancaster, and Roseville, CA; Glendale, Goodyear, Phoenix, Prescott, Scottsdale and Chandler, AZ; Centennial, Aurora, and Thornton, CO; Casper, Grand Junction, Cheyenne, Green River, WY; Salt Lake City, UT; North Las Vegas, NV; Sandy Springs, Johns Creek, Dunwoody, Marietta and Milton, GA; Denton, Keller and Weatherford, TX; Bartlesville, OK; Northport, FL; Kelowna, Saanich, Langley, Chilliwack, Surrey, Delta, North Vancouver, Kamloops, Nanaimo, Burnaby, BC; Lloydminster, Ft. Saskatchewan, Leduc, Red Deer, Airdrie, Medicine Hat, Saskatoon, AB.

Counties and MPO's: Bonner County, ID; Stanislaus County Association of Governments, Coachella Valley Association of Governments, Los Angeles County, CA; Jefferson County, Arapahoe County and Boulder County, CO; Los Alamos County, NM; Clark County, NV; Travis County, TX, Denver Regional Council of Governments, CO.

State/Provincial: Caltrans HPMS, New Mexico, Delaware HPMS, British Columbia and Alberta.

Professional Work History

IMS Infrastructure Management Services	Principal & Sr. Project Manager, 2004-Present Vice President, 1999-2004
ITX Stanley (Stantec)	Manager of Business Development, 1997-1999 Regional Manager, 1995-1997
Stanley Associates Engineering Limited	Senior Project Manager, 1989-1995
Tritec Engineering	Project Engineer, 1988-1989
Northwest Territories and Alberta, DOT	Project Engineer, 1982-1987



DAVID E. BUTLER, P.E.

MANAGER OF ENGINEERING SERVICES & SR. PROJECT MANAGER

Background

As a pavement management specialist David has designed several Pavement Management computer programs that are in use by many agencies across North America. Over the past 15 years, he has implemented over 80 installations of programs and systems and has provided comprehensive reports for over 350 other agencies. The training of agency personnel in pavement management theory and the application of information derived from programs and systems has been one of Mr. Butler's primary responsibilities.

Based on his background in pavement management, Mr. Butler has been responsible for the quality control of field data collected using the Road Surface Tester for pavement surface distress and the Dynaflect for pavement structure. He has been responsible for the quality of data on well over a million pavement sections in North America. Through practical experience, Mr. Butler has gained a working knowledge of pavement distress and its effect on pavement deterioration. He also has extensive knowledge of deflection theory and how it relates to pavement life expectancy.

Education & Registrations

Bachelor of Science, Civil Engineering, 1981, Brigham Young University
Professional Engineer: Illinois (1989), Colorado (1990), Texas (1990), Ohio (1990), Florida (1990), North Carolina (2009)
American Public Works Association
Transportation Research Board
American Society for Testing and Materials Committee E.17 – Subcommittee Chairman & Recording Secretary

Project Leadership Roles

Project Management Experience - Mr. Butler's pavement management project experience includes implementation projects of a varied scope and scale for numerous cities, counties, and states.

Hillsborough County, Florida – Project manager for the implementation of the Hansen pavement management system, data collection and analysis on over 3000 miles of County roads.

Utah, New York State, Vermont and Oklahoma DOT's – Technical and Quality Assurance Manager for the automated pavement distress data collection on state highways totaling 20,000 miles.

Oakland, CA – Engineering Manager for the implementation of a pavement management system, video logging and GIS integration.

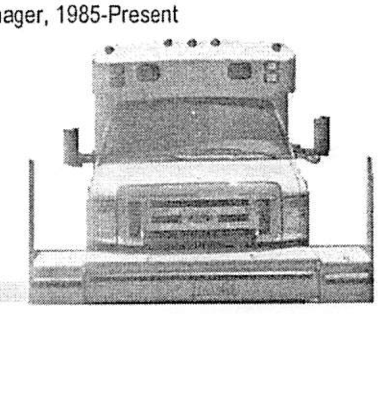
Addison IL; Lake Forest, IL; Boulder County, CO; Los Angeles County, CA – Project Engineer for pavement performance data collection and processing for a variety of software applications.

Columbus, OH – Engineering Manager for implementation of pavement management system, bridge inventory system, and GIS integration.

Bonner County, ID; Ponderay, IL; Hampton, VA – Project Engineer for implementation of the GBA Master Series pavement management system.

Professional Work History

IMS Infrastructure Management Services	Manager of Engineering Services & Sr. Project Manager, 1985-Present
Novak, Dempsey & Associates, Inc.	Director of Engineering, 1983-1985
	Field Inspector & Project Engineer, 1981-1983



ALAN SADOWSKY, H.B.A.

PRINCIPAL & SR. PROJECT MANAGER

Background

Mr. Sadowsky heads up the technology and operations side of IMS. His extensive work experience in the software development industry, as well as his history in working directly with pavement management companies, allows him to oversee projects ensuring that adequate and sufficient resources are applied. The unique expertise he brings from former positions gives him the ability to direct many aspects of IMS projects including pavement management, data management, and field surveys.

Mr. Sadowsky has been involved in projects for many government agencies. These projects have focused on the managing the infrastructure owned by these agencies. The common factor in all of these projects has been to effectively manage the assets owned by the agency, making sure they used efficiently for the benefit of the general public. In order to supply the best possible product, Mr. Sadowsky has worked with the end user, right up to the highest level of management to better understand the overall needs and requirements.

Education & Registrations

Honors Bachelor of Arts, 1979, Wilfrid Laurier, ON, Dale Carnegie – Personal Development
GITA (Formerly AM/FM International), Ontario Chapter
Canadian Information Systems Professions
American Council of Engineering Companies

Project Leadership Roles

Pavement and Asset Management Experience – Mr. Sadowsky has worked with many of the leading pavement and right of way asset management firms and a wide array of software systems. These projects have included performing feasibility studies and needs studies with large public agencies. The studies have lead to the design, development and deployment of custom systems to meet the agencies' unique requirements.

Pavement Performance Data Collection – Arapahoe County, CO; Ft Collins, CO; Scottsdale, AZ; Lansing, MI; Genesee County, NY; Boulder County, CO; Sandy, UT.

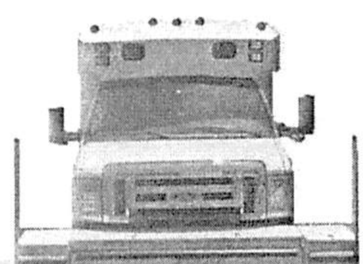
Data Management & Systems Support – Idaho, British Columbia, Alberta, Nova Scotia DOT.

Asset Management, System Upgrade & Implementation, & Data Collection – Toronto, ON; Downey, CA; Mount Prospect, IL; Lemon Grove, CA; Allegheny County, PA; Los Alamos County, NM.

Software Development – participated in the development of market leading pavement management applications used by over 100 local agencies. These packages provide clients with "off the shelf" solutions for managing their road networks. The projects include the migration of existing systems, data integration and structure development for combining with other software tools, and the formulation of high level analytical and reporting tools.

Professional Work History

IMS Infrastructure Management Services	Principal & Sr. Project Manager, 2004-Present
Sadowsky Consultants	Principal, 1999-2004
ITX Stanley (Stantec)	Senior Software Developer & Manager, 1990-1999
Federal Technical Surveys	Manager Support Systems 1987-1990
Muirhead Technologies and Mondecan	Software Developer, 1984-1987
Pavement Management Systems (Stantec)	Manager Support Systems, 1979-1984



E. MARTIN SHAEFFER, P.E.

SENIOR GIS PROJECT MANAGER

Background

Mr. Shaeffer is a registered Civil Engineer that has specialized in the digital mapping, conversion and modeling of utility system for the past 17 years. The conversion of as-built drawing into a usable infrastructure management system suitable for modeling is an evolving technology and Engineering Mapping Solutions has been a leader in this field for many years and has mapped thousands of miles of municipal infrastructure and integrated dozens of engineering data models. In addition Mr. Shaeffer has assisted IMS in the integration of GIS and pavement analysis and asset collection and management on more 50 projects.

As a developer of industry leading mapping solutions, Mr. Shaeffer has provided innovative products and services that give confidence to IMS clients in a dynamic industry. Through his association with IMS Mr. Shaeffer has developed many methods and tools to streamline the use and integration of each client's GIS data with the pavement management system.

Education & Registrations

Bachelor of Science, Civil Engineering, 1985, Texas Tech University
Professional Engineer: Arizona, New Mexico, California
American Society of Civil Engineers
ESRI Business Partner
Autodesk Registered Developer

Project Leadership Roles

Pavement Management Experience – Project experience with IMS includes participating in the data collection, data analysis and implementation of systems for many public and private sector clients.

Municipalities: Anaheim, Berkeley, Downey, Fontana, Glendale, Yucaipa CA; Phoenix, Glendale, Goodyear, Scottsdale and Chandler, AZ; Grand Junction, Centennial, CO; Salt Lake City, UT; North Las Vegas, NV;.

Counties: Boulder County, Jefferson County CO; Los Alamos County, NM,

State/Provincial: New Mexico

Asset Management Assignments - Project experience includes participating in the data mapping, GIS integration, and implementation of the asset management systems.

New Mexico DOT, NM - 24,000 miles of roadway, right of way asset, GPS and geometrics data collection complete with digital images.

City of Glendale Arizona and Lancaster California, - agency wide pavement, right of way asset, GPS and digital image data collection.

Professional Work History

Engineering Mapping Solutions, Inc.	President, 1995-Present
Boyle Engineering, Inc.	Technical Director of Geographic Information, 1993-1994
	Project Engineer, 1985-1993