



IMS Infrastructure Management Services

Consultants | Engineers



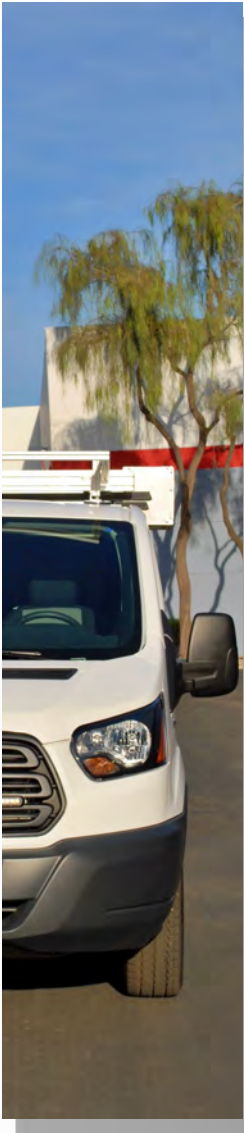
Pavement and Asset Management

consulting
engineering
data collection
software

Office Location

8380 S Kyrene Road, Suite 101
Tempe, AZ 85284
(480) 839-4347 ph
(480) 839-4348 fax

www.imsanalysis.com



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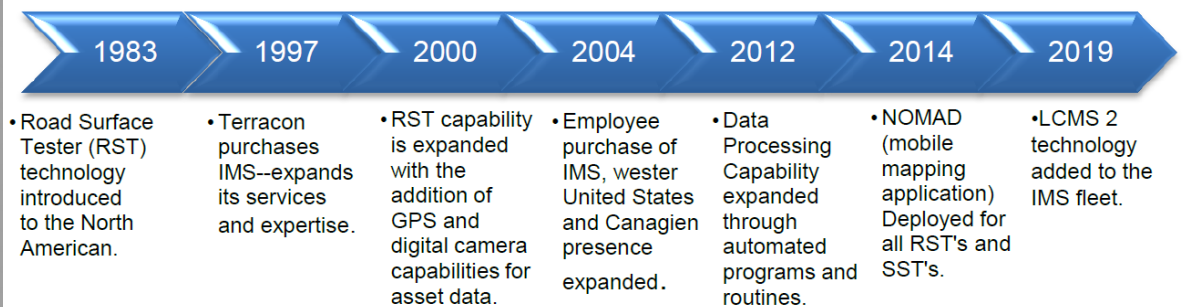
Company Profile

IMS Infrastructure Management Services has been providing professional pavement and right-of-way asset management services for government agencies and private sector companies throughout the United States and Canada for more than 35 years. We have completed over 500 projects for agencies with road networks ranging in size from a few miles to over 15,000 miles. IMS is an employee owned and managed engineering firm with a headquarters office in Arizona.

As an industry leader in infrastructure asset data collection, IMS has developed strategic partnerships with many of the leading asset management software firms. We have collected data for more than 15 different software platforms, including: **Lucity, PAVER, Cartegraph, Cityworks, MTC StreetSaver, Deighton, Easy Street Analysis, VUEWorks, RoadMatrix**, and **Infor**. We have also developed 4 pavement and asset management applications, and have performed work with more than 8 database and mapping applications.

IMS maintains relationships with municipalities all across North America.

A brief history of IMS is as follows:



Keys to Success

Our approach, and key service differentiator, is based on three, time proven fundamentals:

Answer the questions that are being asked - don't over-engineer the project or make it needlessly complicated. Databases and the application of technology are meant to simplify asset management, not make it more difficult.

Service and quality are paramount to success – the right blend of technically correct data, condition rating, and reporting will provide the agency with a long-term, stable solution. Providing effective and reliable service to the client remains our top priority.

Local understanding and communication is key – it is important that all stakeholders understand the impacts of their decision, and have the system outputs react accordingly. We excel in making ourselves readily available.



IMS Infrastructure Management Services

Data Collection, Software, and Analysis

The core functions of the IMS business model include: objective data collection, software configuration, and comprehensive analysis of results.

Specialized Focus

IMS has over 30 years of experience dedicated **specifically** to pavement and asset management solutions, providing the client an unrivalled range of expertise and service.

No Boundaries

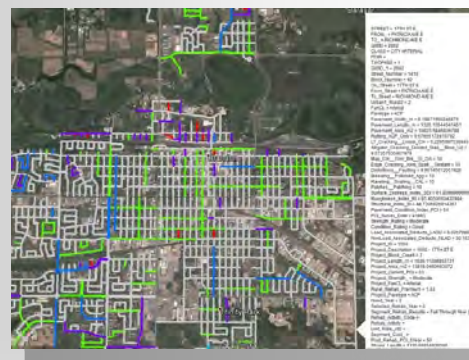
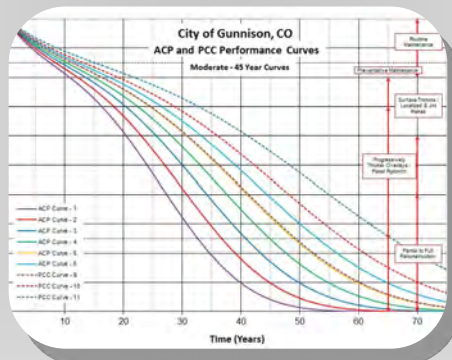
With clients ranging from Florida to British Columbia, and nearly everywhere in between, IMS excels at offering top class services to all clients, regardless of location.

Quality Assurance

Ensuring consistent quality of pavement condition data is just as important as collecting the data. Each step in the data collection process has been designed 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.

Tailored Customer Service

Not all municipal agencies are the same, nor can they implement identical solutions. IMS excels at tailoring solutions for each agency. Instead of being a discrete consultant, IMS strives to become an extension of the agency's staff. We work together to create a custom solution.



Objective Data Collection

- Laser Based Crack Quantification
- Right-of-Way Asset Inventories
- Crossfall, Grade, & Radius of Curvature
- Dynaflect & FWD Subgrade Testing
- Remaining Life Surveys
- Automated Roughness Data
- Rutting Measurements
- Road Limit & Haul Damage
- GASB 34 Surveys
- Sign Retro-Reflectivity Surveys
- Multi-View Digital Video
- GPS Coordinate & Inertial Navigation
- Sidewalk & Obstruction Surveys
- ADA Compliance

Custom Software Solutions

- Interactive Excel Spreadsheets
- 3rd Party Software Integration
- Pavement Inventory
- Pavement Analysis
- Right-of-Way Asset Management
- Right-of-Way Asset Extraction
- Image Viewer
- Sign Management Tools
- Implementation & Training
- GIS Integration

Detailed Analysis and Reports

- Budget Scenarios
- Detailed Pavement Condition Analysis
- Maintenance & Rehabilitation Reports
- Right-of-Way Asset Planning
- Acceptance Testing
- Project-Level Testing and Overlay Design
- Subgrade Analysis
- Operating Parameter Development
- ROW Asset Programs

IMS Infrastructure Management Services

Laser Road Surface Tester

The core services of IMS is based around the platform of the Laser Road Surface Tester or Laser RST. The semi-automated, objective approach to pavement and right-of-way asset data collection allows a safe work environment for the data collectors, and will not impede traffic. IMS owns and operates 4 Laser RST's.

The following list describes the principal data collection and processing equipment on-board the Laser RST for most pavement management assignments.

Laser Camera Array

11 laser sensors that objectively quantify pavement cracking, texture, rutting, roughness, cross fall, crown, grade, and radius of curvature. The lasers collect data in a severity and extent format that integrates seamlessly with ASTM standards.

Distance Measuring Instruments

Dual DMI pulse transducers that accurately collect and report vehicle distance and speed. The distance data is integrated with the inventory, GPS data flow, and time code.

GPS Acquisition

GPS technology is coupled with inertial navigation to enhance the acquisition of accurate longitude and latitude coordinates. Municipal agencies are becoming GIS-centric and thus all data must be georeferenced for plotting in a GIS environment.

HD Cameras

The Laser RST can be mounted with up to 6 digital cameras depending on each project's unique requirements. Images are largely used for: distress data validation, virtual drive deliverables, and right-of-way asset inventory development.

Digital Condition Rating System (DDCRS)

The touch-screen event board allows IMS to collect a wide range of data from pavement distresses to the validation of pavement attributes. The touch-screen event board can be configured in any manner we desire and conforms to the ASTM D6433 severity and extent data collection protocols.



Subsurface Analysis - Deflection Testing

Subsurface distress investigations are a valuable tool to assess the subgrade condition of a roadway. A handful of pavement management applications can be calibrated to accept this data and relate it to existing R-values and traffic loadings. IMS can ensure the structural condition of each roadway is included as a weighted index in the calculation of a final condition score. IMS owns and operates two Dynaflects.

Testing is performed at least once per pass in every street segment or in accordance with local testing procedures. Arterial and collector testing is completed at least once in each direction in every street segment (500' – 600' interval) along the outside lanes of the roadway. 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. If local roadways are to be tested, they are completed in a single direction only. IMS will record the readings of all 8 geophones for transfer into the pavement management program. These readings will be used to determine the pavement strength, load transfer capabilities, and identify properties of the base and sub-grade.



IMS Infrastructure Management Services

Laser Crack Measurement System (LCMS)

The LCMS is a 2-sensor array capable of collecting automated pavement condition data in the form of roughness to International Roughness Index (IRI) standards, dual wheel path rutting, transverse cracking, block cracking, alligator cracking and texture. The LCMS captures a 3D profile and digital image of the street and will be performed during daylight hours. The LCMS also meets the RFP scope by bundling the 3D imaging with pattern recognition software to detect features and defects. Distresses are reported as series of individual distresses composed of individual nodes.

Laser Camera Measurement System (LCMS)	2-sensor 3D profile laser array that objectively measures all pavement cracking, rutting, roughness, potholes, bleeding, pavement cracking, texture, rutting, roughness, cross fall, crown, grade, and radius of curvature.
HD Digital Cameras	The Laser RST can be mounted with up to 7 HD digital cameras depending on each project's unique requirements. HD Digital images are largely used for many purposes: data validation, virtual drive deliverables to clients, and right-of-way asset inventory development.
GPS Acquisition	GPS technology is coupled with inertial navigation to enhance the acquisition of accurate longitude and latitude coordinates. Municipal agencies are becoming GIS centric and thus all data must be georeferenced for plotting in a GIS environment and linking with the NH state plane south-zone XY coordinates.
Distance Measuring Instruments (DMI)	Dual DMI pulse transducers that accurately collect and report vehicle distance and speed. The distance data is integrated with the inventory, GPS data flow, and time code.
Hardware & Storage	The Laser RST is equipped with multiple servers and computers that store the data collected from the lasers, cameras, GPS, and touch-screen event board.
Digital Direct Condition Rating System (DDCRS)	The touch-screen event board allows IMS to collect a wide range of data from pavement attributes such as curb reveal, lip of gutter, and drainage concerns to supplemental distress data such as distortions and patching.

The main components of the LCMS-enhanced RST are:

- ◆ A 2-sensor, 3D LCMS array, rate gyroscopes, inclinometers and accelerometers to measure pavement roughness (IRI), rutting, cracking, potholes, bleeding, and geometrics.
- ◆ Automated crack profiling and production of extent-severity based pavement distresses through the 3D crack profile software that utilizes range and intensity imaging.
- ◆ Up to 7 HD digital cameras can be mounted for forward, side, rear, and right-of-way views.
- ◆ High accuracy Global Positioning System (GPS) receiver with inertial navigation for geo-locating of pavement and asset information with excellent accuracy.

The Laser RST travels at the posted speed limit. 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.



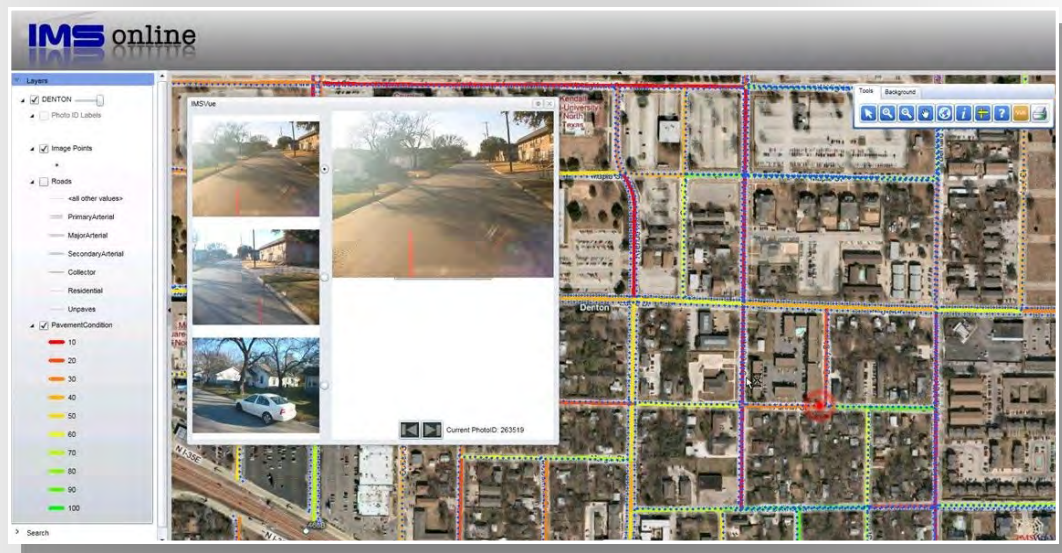
IMS Infrastructure Management Services

GIS Integration and Image Viewing

The role of GIS in pavement management cannot be overstated. It is a powerful tool that provides the ability to handle & present vast amounts of data in an efficient manner.

IMS is an experienced integrator of pavement management information and software with mapping and GIS programs such as ESRI's ARC/INFO® and Intergraph's Microstation MapInfo Products. IMS is an ESRI certified ARC/INFO® Application Developer and Business Partner.

The Laser RST incorporates inertial navigation based GPS and high resolution digital video. The cameras can be oriented to collect right of way panorama, sign views, ditch views and pavement views. Downward, dual forward, shoulder and rearward view images can be collected at client specified distances (i.e. 10', 25' 50').



IMSvue - Browser Based Viewing Tool

IMSvue is a browser based GIS image and data viewing tool based in Microsoft Silver light but also leverages the ESRI Silverlight API. It is compatible with Microsoft Internet Explorer and therefore will run in multiple versions of Windows. The software is also currently being transition to HTML5, allowing for greater access and more stability. This solution can be hosted on an Intranet provided the Agency has a web server, or alternatively, IMS can host it as well.

Users dictate how they want to view collected images from the RST vehicle. Options include a map tip where the image is displayed when the User hovers over the point. Users can also view the pictures on the data attribute window. In the second case, Users can view a video of the RST trace at the selected location.

All options are configured externally using an XML file and can be changed by the end User as desired. IMSvue can use standard Google or Bing background street and aerial maps. If the User has an ESRI ArcServer, customized maps can be created.

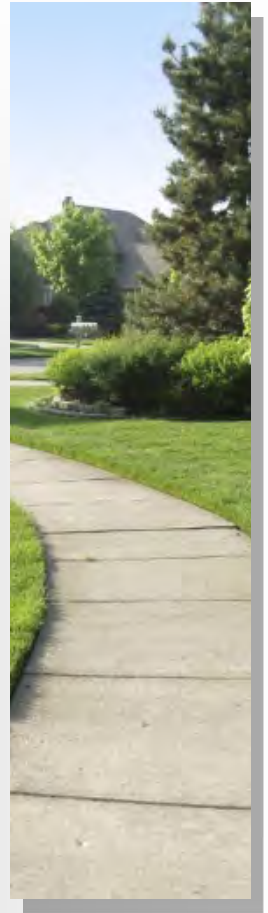
IMS Infrastructure Management Services

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 is also utilized for ADA and Handicap Ramp compliance inspections. The SST is equipped with the following:

- Front & rear strobe lights, safety signage, plus a fire extinguisher, air pump and tool kit.
- E-Prance HD Camera with remote on/off.
- Toughbook computer complete with touch screen and GPS.
- Tilt and grade meters, fault meter (adjustable between $\frac{3}{4}$ " to 1 $\frac{1}{2}$ " faults).
- 6" and 24" digital levels plus a 32" obstruction baton.
- On-board 450W power inverter for cell phones, notebook, HD camera and radio.
- Tow vehicle and trailer.

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. The unit may be staffed by one or two field technicians depending on the complexity and size of the project.



Sidewalk Surface Tester

Modified gas powered and lifted golf cart or quad carrying the NOMAD survey application and field maps, GPS, cameras, electrical power, safety equipment and field testing equipment.

Equipped with tilt and grade meters, fault meter (the red wheel slung below the SST), safety signage and lights, computer (NOMAD survey application and map), GPS and HD camera. The SST is able to climb 8" curbs with ease.

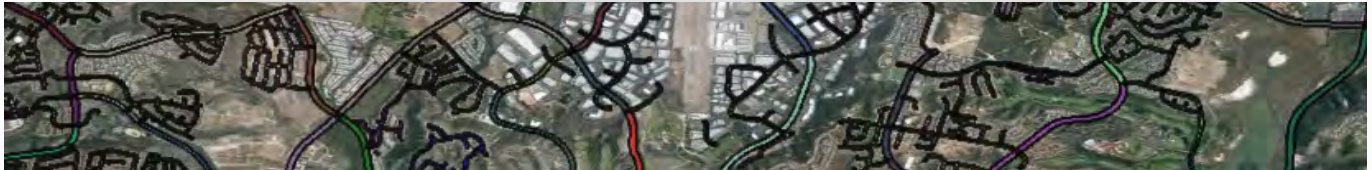


IMS Infrastructure Management Services

Pavement and Asset Management Software

With over 30 years of experience with software implementations & consulting services, IMS can assist your agency in the selection of the most appropriate solution that will meet the needs of the engineers & end-users, the council members, and the citizens.

IMS can provide full evaluation and implementation services including; system selection, network definition, data requirements & gap analyses, system training, M&R decision tree development, pavement modeling, system engineering & on-site training, budgets, and yearly M&R program development.

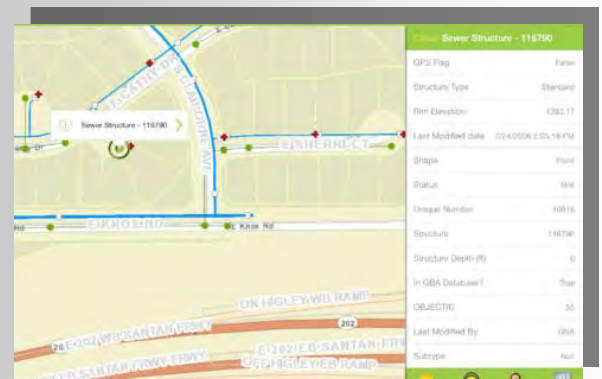


What is the benefit of Pavement Management Software?

The purpose of such a program is to inventory, analyze, and report on the condition data loaded into the application. A solid pavement management program can allow you to perform simple functions such as street look-ups and attribute identification all the way to performing a cost benefit analysis.

The Benefits of Software Analysis Tools

- Street Ownership and Inventory/Attribute Report
- Present Condition Ranking (Each Street and Network-Wide)
- Budget Analyses (Multiple Scenarios)
- Integration of Capital Projects and Master Plans
- Multi-Year Rehabilitation and Prioritized Paving Plans
- Set Points & Unit Rates & Performance Curves
- Rehabilitation Strategies & Cost-Benefit Optimization Analyses



Engineered Systems

ESA
Deighton
VUEWorks

These are the applications that are dedicated to pavement management. They have the highest level of optimization and present the best program based on funding and constraints. Unlike enterprise applications, they tend to be stand-alone.



Enterprise Modules

Lucity
Cartegraph
Cityworks

Typically these are software applications that cater to multiple divisions within an agency, such as, streets, sewers, & parks. They are generally well coded, integrate with GIS easily, and are very flexible. They typically require some configuration to work well.



Public Domain

PAVER
MTC StreetSaver
Roadsoft (PASER)

Generally these applications are very affordable, and are easy to setup and maintain. They tend to be best suited for a one-size-fits-all approach.