CITY OF NOVI CITY COUNCIL
NOVEMBER 17, 2025

SUBJECT: Approval to award services to ICC-IMS through the TXShare cooperative purchasing program, in the amount of $101,865 to perform a road condition survey of the City's roads.

SUBMITTING DEPARTMENT: Department of Public Works, Engineering Division

KEY HIGHLIGHTS:

- Road condition data will be collected for approximately 245 miles of City-owned major and local roads.
- City staff recommend utilizing ICC-IMS's services as the technology used will provide more accurate data, including structural integrity.

	FY 2025/26
EXPENDITURE REQUIRED	**$ 21,391.70 Major Roads** **$ 80,473.55 Local Roads** **$ 101,865.25 Total**
BUDGET **Major Street Fund 202-449.30-805.000** **Local Street Fund 203-449.30-805.000**	**$ 24,300 Major Roads** **$ 80,474 Local Roads** **$ 104,774 Total**
APPROPRIATION REQUIRED	**$ 0**
FUND BALANCE IMPACT	**$ 0**

BACKGROUND INFORMATION:

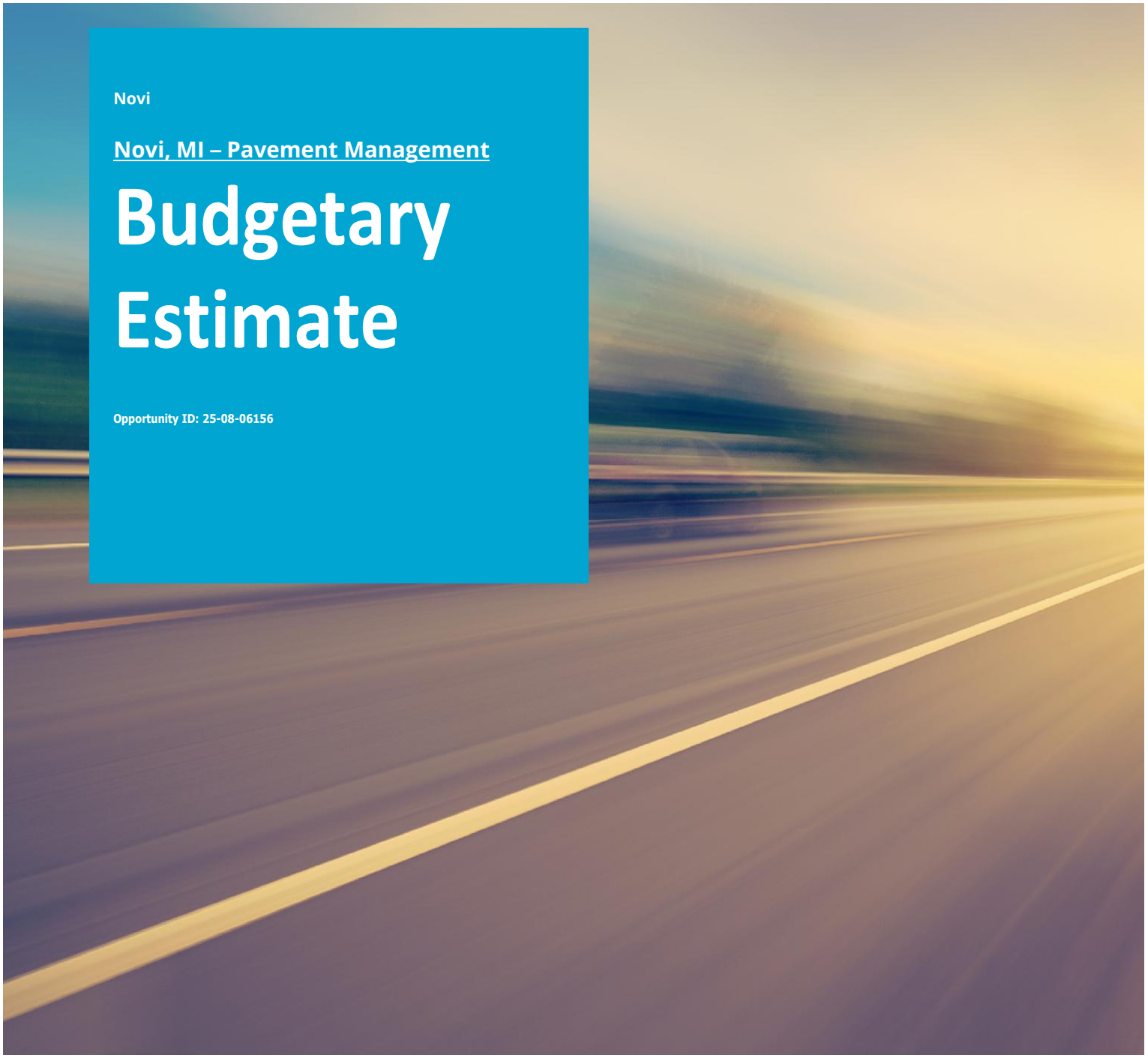
Historically, road condition data has been collected manually by the City's engineering consultants. This entails driving every City-owned road and visually rating

the roads based on the PASER (Pavement Surface Evaluation and Rating) scale. While this technique is sufficient, it is time-consuming and involves some errors. For example, one person may rate a road differently than another person, and environmental factors, such as how the sun is hitting the pavement, may obscure road defects.
Staff recently utilized ICC-IMS to collect sidewalk condition data for City sidewalks. The company, International Cybernetics and Infrastructure Management Services (ICC-IMS), also offers road condition surveys using an IrisPRO PaveTM. The IrisPRO PaveTM collects georeferenced, high-resolution 3D imagery of the pavement surface, and longitudinal and transverse profile measurements. The data can be used to quantify the type, severity, and quantity of surface distresses. All the data collected can be integrated into the City's existing GIS system. The City will have a 90-day free trial and one year paid (15 months) to use ICC-IMS's online data visualization platform, after which an annual fee would be applied to continue use of the platform ($2,262.00/year).

Additionally, a structural survey will be performed with a Fast-Falling Weight Deflectometer, which will provide data on the structural integrity of the road base course. City staff recommend utilizing ICC-IMS's services as the technology used will provide more accurate data, including structural integrity. The integrity data could help reduce and improve geotechnical investigations.

Staff obtained a proposal from ICC-IMS to collect road condition data for approximately 245 miles of City-owned major and local roads. The attached proposal outlines the scope of services and provides a budgetary estimate of $101,865.25 City engineering consultant, AECOM, recommends utilizing ICC-IMS's services as they were unable to find other comparable companies offering these services. The proposal pricing is based on the pavement analysis services awarded through the TXShare cooperative purchasing program (Agreement #2022-063). The TXShare Cooperative Purchasing program is operated by the North Central Texas Council of Governments (NCTCOG). The road survey would take one to two months to complete and would begin in the spring.

RECOMMENDED ACTION: Approval to award services to ICC-IMS through the TXShare cooperative purchasing program, in the amount of $101,865 to perform a road condition survey of the City's roads.



Novi

Novi, MI – Pavement Management

Budgetary Estimate

Opportunity ID: 25-08-06156

10630 75th Street
Largo, FL 33777

+1 727-547-0696

www.icc-ims.com

9/5/2025

Novi
Jeffery Herczeg, Director of Public Works
Email: jherczeg@cityofnovi.org

Re: Novi, MI – Pavement Management

Dear Jeffery,

IMS Infrastructure Management Services (IMS) is pleased to present this budgetary estimate for a roadway pavement condition survey including structural testing for Novi. As an industry leader with five decades of pavement and asset management experience, we enable data-driven decision-making, ensuring that your agency's maintenance and rehabilitation funding results in the highest return on investment.

Our project approach is based on four principles:

- **Starting with the end in mind.** We are committed to understanding your agency's goals and objectives for this project. We work with our clients to meet all project goals and provide high-quality deliverables on time and within budget.
- **Confident, informed decision-making.** Accurate data provides the foundation for pavement management analyses, which identify the most appropriate maintenance or rehabilitation activity for each roadway pavement.
- **Maximizing return on investment.** When you choose IMS, you gain a dedicated partner. Backed by decades of experience, our support results in better outcomes and translates to enhanced funding justification and more strategic allocation of existing funding.
- **Providing smart, end-to-end solutions.** We provide professional services powered by end-to-end software, enabling your agency to review and visualize data confidently and easily.

We look forward to delivering this project successfully. Please do not hesitate to contact me with any additional questions at +1 727-547-0696 or by email at andrewk@icc-ims.com.

Best Regards,
IMS Infrastructure Management Services

Andrew Karasauskas, Client Services Manager

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Project Overview

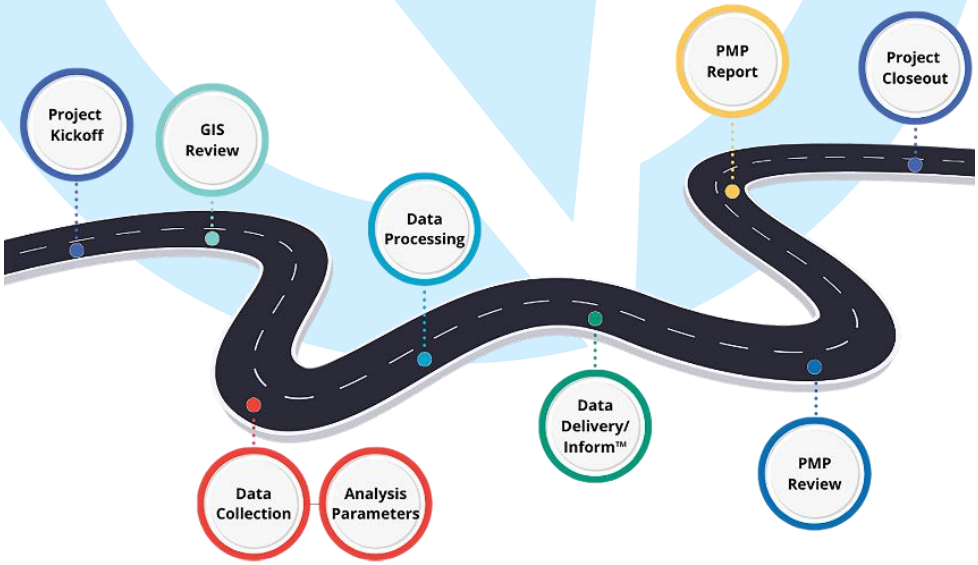
The primary objective of this project is to collect 245 test miles of roadway condition data and 245 of roadway structural integrity data. To ensure adequate coverage across the roadway network, we survey major roads (typically defined as greater than 3 lanes) in both directions and all remaining roads in one direction. Our project roadmap, shown in the figure below, has evolved over the years and reflects our team's collective experience of successfully delivering thousands of similar projects. (*See Appendix A for more details on each step in our project roadmap.)*

The pavement condition survey will be performed with an IrisPRO Pave™ data collection system. The IrisPRO Pave™ collects georeferenced, high-resolution 3D imagery of the pavement surface, spherical right-of-way imagery, and longitudinal and transverse profile measurements.

Collected data are processed to quantify the type, severity, and quantity of pavement surface distresses, including cracking and rutting. Pavement roughness values are reported following the International Roughness Index (IRI) method. Processed data are delivered in both an Excel spreadsheet and a geodatabase. Roadway imagery is published to our Inform™ online data visualization platform for easy review and reference by agency staff.

Our data collection approach provides 100% coverage of all collected lanes, 100% rating of all pavement (no sampling), and no reliance on field operators/crew to perform manual rating or supplemented with "windshield surveys." This approach meets stringent industry standards (ASTM and AASHTO) and state DOT reporting requirements. We are the only vendor bringing our fifty-year legacy of state DOT pavement condition survey experience, quality, accuracy, and repeatability to municipal agencies.

The structural survey will be performed with a Fast-Falling Weight Deflectometer (FastFWD).



Deliverables (Roadway Condition Survey)

01

Roadway Pavement Condition Data

Reported in an Excel spreadsheet and a geodatabase.

02

Easy Street Analysis (ESA) of Roadway Pavements

- Easy Street Analysis (ESA) pavement management spreadsheet
- Customizable prioritization and deferred cost analysis (refer to **ESA Overview** for specified customizations and optional value add enhancements)
- ESA training session (two hours) via Teams

03

Five (5) Year, Network-Level Pavement Management Plan via ESA

04

Inform™ Online Data Viewer

Enables convenient, browser-based viewing of collected data and imagery. *(Note: 90 days of hosting for unlimited agency users is included from the time of implementation **for new/first-time instances only**.)*

05

Additional Value-Added Services

If applicable, based on our discussions with you, this budgetary estimate includes information and pricing on additional value-added services, described in more detail below.

Deliverables (Structural Testing)

Core deliverable – *the expected format you will receive our data in based on requested data processing options*

01	**Structural Pavement Assessment Data** Reported in an Excel spreadsheet and a geodatabase* **Unless otherwise specified in fee breakdown (e.g., raw data or other format).*

Deliverable Options – *if chosen/applicable, will be distinctly listed as separate line items in the fee schedule*

A	**Structural Number Effective (SNeff)** Represents the overall current effective structural rating of the pavement
B	**Structural Number Required (SNreq)** Represents the *required* structural number based on average daily traffic (ADT) analysis. This requires providing ADT data to us for analysis.
C	**Color Coded GIS Map – Based on Structural Index (SI) (PDF)** A color coded map to visually display the structural index based on the results/scoring from collected and processed FastFWD data.
D	**Additional Consulting/Customized Reporting** Consulting or customized reporting options are available. We will ensure a scoping meeting has occurred to properly scope and price the deliverable. Any additional consulting or customized deliverables will be represented separately in the fee schedule.

Budgetary Estimate – Novi, MI

(Note: The final fee and scope of work depends on confirmation of test miles to be surveyed and analysis and reporting requirements.)

Budgetary Estimate					
Name	Qty.	Units	Price	Disc.	Total Price
Project Setup and Kickoff	1	Lump Sum	$2,500.00		**$2,500.00**
Project Management	1	Lump Sum	$1,500.00		**$1,500.00**
GIS Review and Survey Extents Verification	203	Centerline Miles	$15.00		**$3,045.00**
Mobilization/Calibration	1	Lump Sum	$2,925.00		**$2,925.00**
Field Data Collection - IrisPRO Pave	245	Test Miles	$92.00		**$22,540.00**
Data Processing: Enhanced ASTM D6433 (Including QC/QA) - According to Standard Data Dictionary	245	Test Miles	$31.45		**$7,705.25**
Condition Data Delivery (Standard Geodatabase/Tabular Format Only)	1	Lump Sum	$500.00		**$500.00**
Easy Street Analysis (ESA) Pavement Management Plan/Analysis - Draft	1	Lump Sum	$9,500.00		**$9,500.00**
Draft Pavement Management Report	1	Lump Sum	$2,400.00		**$2,400.00**
Final Pavement Management Report and Analysis Results	1	Lump Sum	$500.00		**$500.00**
Inform - <400 lane miles- 90 Day Free Trial (Price reflects annual fee if opt in after trial)	1	Per Year	$2,000.00	100%	**$0.00**
Inform Web Hosting- 90 Day Free Trial (Price reflects annual fee if opt in after trial)	245	Per year per mile	$1.20	100%	**$0.00**
Mobilization/Calibration (FFWD)	1	Lump Sum	$3,000.00		**$3,000.00**
Field Data Collection - Fast Falling Weight Deflectometer (FFWD) - PER MILE	245	Test Miles	$150.00		**$36,750.00**
Data Processing: Standard FFWD (Including QC/QA)	1	Lump Sum	$3,000.00		**$3,000.00**
Calculate Structural Number (SNeff)	1	Lump Sum	$5,000.00		**$5,000.00**
Color Coded GIS Map - Based on Structural Index (SI) (PDF)	1	Lump Sum	$1,000.00		**$1,000.00**
			Total Price:		**$101,865.25**

Optional Value Added Service Fees/Rates

Optional Value-Added Service Activities - Cost Estimates				
Name	**Qty.**	**Units**	**Price**	**Total Price**
FastFWD Structural Testing - Recommended 2-Pass Test for Major Roads				
a. Mobilization/Calibration (FFWD)	1	Lump Sum	$ 3,000.00	$ 3,000.00
b. Field Data Collection - Fast Falling Weight Deflectometer (FFWD)	TBD	Test Miles	$ 150.00	TBD
c. Traffic Control for Deflection Testing (if applicable/necessary)	TBD	Hours	$ 150.00	TBD
d. Data Processing: Standard FFWD (Including QC/QA) - *$1,750/hour fee + $5/mile for networks >100 miles*	1	Lump Sum	$ 2,475.00	$ 2,475.00
e. Calculate Structural Number (SNeff) - Used for Network Level Analysis - *$1,000/hour fee + $5/mile for networks >100 miles*	1	Lump Sum	$ 1,725.00	$ 1,725.00
f. Optional - Calculate Structural Number Required (SNreq) Based on ADT and Provide Structural Index - *$1,000/hour fee + $5/mile for networks >100 miles*	1	Lump Sum	$ 2,725.00	$ 2,725.00
g. Optional - Color Coded GIS Map - Based on Structural Index (SI) (PDF)	1	Lump Sum	$ 1,000.00	$ 1,000.00
Right of Way (ROW) Asset Extraction - *Using Standard Data Dictionary Attributes*				
Crosswalks	245	Test Miles	$ 19.00	$ 4,655.00
Curb & Gutter	245	Test Miles	$ 23.00	$ 5,635.00
Curb Markings	245	Test Miles	$ 22.00	$ 5,390.00
Drainage Ditches	245	Test Miles	$ 23.00	$ 5,635.00
Drainage Structures (Inlets)	245	Test Miles	$ 33.00	$ 8,085.00
Driveway Aprons	245	Test Miles	$ 39.00	$ 9,555.00
Fence	245	Test Miles	$ 23.00	$ 5,635.00
Fire Hydrants	245	Test Miles	$ 22.00	$ 5,390.00
Guardrail/Guiderail	245	Test Miles	$ 23.00	$ 5,635.00
Landscaping	245	Test Miles	$ 49.00	$ 12,005.00
Manhole Covers	245	Test Miles	$ 29.00	$ 7,105.00
Pavement Striping - Linear	245	Test Miles	$ 32.00	$ 7,840.00
Pavement Markings - Point	245	Test Miles	$ 22.00	$ 5,390.00
Retaining Walls	245	Test Miles	$ 23.00	$ 5,635.00
Pedestrian Curb Ramps	245	Test Miles	$ 26.00	$ 6,370.00
Sidewalks	245	Test Miles	$ 23.00	$ 5,635.00
Signs	245	Test Miles	$ 63.00	$ 15,435.00
Sign & Supports - Combined - Discounted Rate	245	Test Miles	$ 75.00	$ 18,375.00
Sound/Noise Barriers	245	Test Miles	$ 23.00	$ 5,635.00
Street Furniture	245	Test Miles	$ 33.00	$ 8,085.00
Street Lights	245	Test Miles	$ 46.00	$ 11,270.00
Traffic Signals and Flashers	245	Test Miles	$ 29.00	$ 7,105.00
Trees	245	Test Miles	$ 56.00	$ 13,720.00
Utility Poles	245	Test Miles	$ 46.00	$ 11,270.00
Valves	245	Test Miles	$ 39.00	$ 9,555.00
Pavement Story Map for External Viewers, Standard, With Hosting for 1 year	1	Lump Sum	$ 7,500.00	$ 7,500.00
a. Years 2 - 4 Annual Updates of Rehabs; + *hosting fees of $1.20 per mile (if applicable)*	3	Lump Sum	$ 2,000.00	$ 6,000.00
Pavement Condition Dashboard for Client Internal Viewing, Standard, With Hosting f	1	Lump Sum	$ 5,500.00	$ 5,500.00
a. Years 2 - 4 Annual Updates of Rehabs; + *hosting fees of $1.20 per mile (if applicable)*	3	Lump Sum	$ 2,000.00	$ 6,000.00
City Council/County Commission Presentation - Virtual	1	Lump Sum	$ 3,500.00	$ 3,500.00
a. Add for an Onsite Presentation	1	Lump Sum	$ 2,500.00	$ 2,500.00
Non-Standard Written Report (Min. 8-Hours; beyond at Hourly Rate)	8	Hours	$ 150.00	$ 1,200.00
Additional or Specialty Maps for Reporting (In Addition to Maps in Standard Report)	1	Lump Sum	$ 750.00	$ 750.00
Additional Printed/Hard Copies of the Standard Final Report	1	Lump Sum	$ 200.00	$ 200.00
Sidewalk Condition Survey via Sidewalk-Surface Tester (SST) Data Collection	(Available Upon Request)			
Pedestrian Curb Ramp Non-Compliance Survey & Analysis via Mobile Lidar Data Collection	(Available Upon Request)			
Year to Year Data Comparisons - Prior Data Collected by Other Firm (QC/QA Team)	245	Test Miles	$ 10.00	$ 2,450.00
Year to Year Data Comparisons - Prior Data Collected by ICC-IMS > 3 Years Ago (QC/QA Tea	245	Test Miles	$ 7.50	$ 1,837.50
Year to Year Data Comparisons - Prior Data Collected by ICC-IMS < 3 Years Ago (QC/QA Tea	245	Test Miles	$ 5.00	$ 1,225.00
Easy Street Analysis (ESA) - Pavement Management Plan/Analysis	1	Lump Sum	$ 9,500.00	$ 9,500.00
a. "ESA - Easy Street Analysis" Pavement Management Spreadsheet Software	Included in Base Activities (ESA)			
b. Customizable Prioritization & Cost-Benefit Analysis				
c. Unlimited Access - Training Library				
d. Online ESA Spreadsheet Training via Teams				

Company Profile

IMS Infrastructure Management Services – now powered by International Cybernetics Company (ICC) – has revolutionized roadway infrastructure management since 1975. With the 2022 merger of IMS and ICC, the IMS team of infrastructure consultants is now backed by ICC's industry-leading data acquisition technologies. We take pride in having one of the industry's largest fleets of advanced pavement, sidewalk, and right-of-way asset data collection systems.

Over the past five years, we have made a $5 million investment in enhancing our Unify™ software suite, solidifying our position as an industry leader in providing fully integrated, end-to-end data collection, processing, and visualization tools. Our advanced systems – combined with our rigorous approach to quality control – empower us to generate unparalleled data quality while setting the industry benchmark for the fastest turnaround time. The actions that we have taken over the past five years illustrate our continued commitment to improving data quality while simultaneously reducing data collection costs for our clients.

We offer the following pavement management services:

- Automated and semi-automated pavement condition assessments.
- Non-destructive pavement testing and analysis.
- Pavement management system implementation and training.
- Pavement management plan development and presentation.

In addition to pavement management services, IMS offers complementary services such as:

- Right-of-way asset inventory development using 360-degree imagery and mobile Lidar.
- Sidewalk and Americans with Disabilities (ADA)/PROWAG non-compliance surveys.
- Data visualization services using dashboards, StoryMaps, and web applications built on GIS.

Welcome to the new era of infrastructure management, where consulting services are powered by advanced technologies. ***Together, IMS – now powered by ICC – are paving the way forward!***

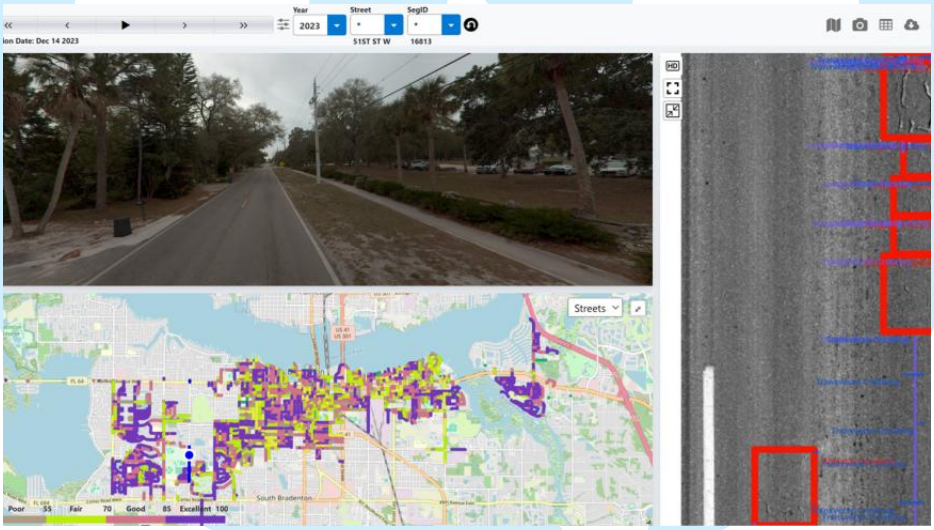
Industry-Leading Technologies

IrisPRO Pave™

The pavement condition survey will be performed using an IrisPRO Pave™ data collection system. The IrisPRO Pave™ is equipped with industry-leading data acquisition technologies, including an inertial profiler, a second-generation Laser Crack Measurement System (LCMS-2), a FLIR Ladybug5+ 30MP 360-degree camera, and an iXBlue A7 or OxTS INS with DGPS.

Inform™ Online Data Viewer

The Inform™ data viewer is an easy-to-use, browser-based, cloud-hosted tool for reviewing pavement condition data and associated imagery. Inform™ presents the data in a map-based environment, enabling agencies to review all collected pavement data, including cracking, rutting, and roughness. The Inform™ viewer is fast, intuitive, and reduces the need for field visits. Inform™ provides color coded roads by condition values like PCI, PSCI, Roughness (IRI), Rutting Index and more. This allows for insights at a glance and effective reporting to decision makers.



"Inform has not only met but also surpassed our expectations. It is quick, exceptionally responsive, requires no IT involvement, and is incredibly user-friendly for individuals of all levels."

– Robert Bush, Program Manager, Arizona DOT

Fast-Falling Weight Deflectometer (FastFWD)

The FastFWD enables agencies to identify issues in the subgrade, sub-base, and base layers, in addition to the surface layer, providing a comprehensive view of pavement health.

Subsurface distress investigations are a valuable tool to assess the structural health of a roadway. The FastFWD provides several key indices, including:

- Effective Structural Number (SNeff)
- Surface Curvature Index (SCI)
- Elastic Modulus (stiffness) of
    - Subgrade
    - Sub-base or base
    - Asphalt or Concrete
- Structural Index (SI)

Fast Falling Weight Deflectometer (FastFWD)

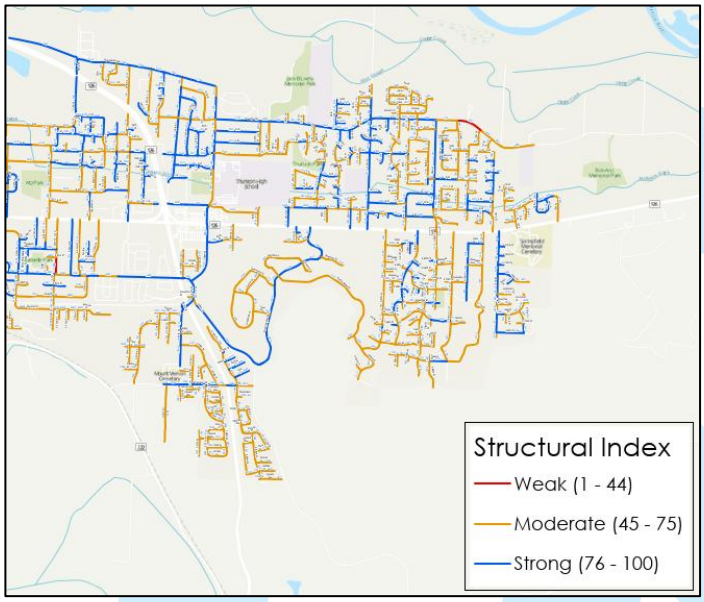
Since obtaining the above indices sometimes require addition inputs such as accurate pavement thickness, IMS has developed a new and proprietary tool called Intelligent Structural Analyzer (**ISA$^{TM)}$**. This tool can calculate SNeff without the need for thickness, eliminating the need for GPR testing or Coring. By knowing the SNeff, agencies not only get an accurate estimate of their pavement structural health but also can design the exact pavement thickness required for reconstruction or overlay, down to decimal-level accuracy.

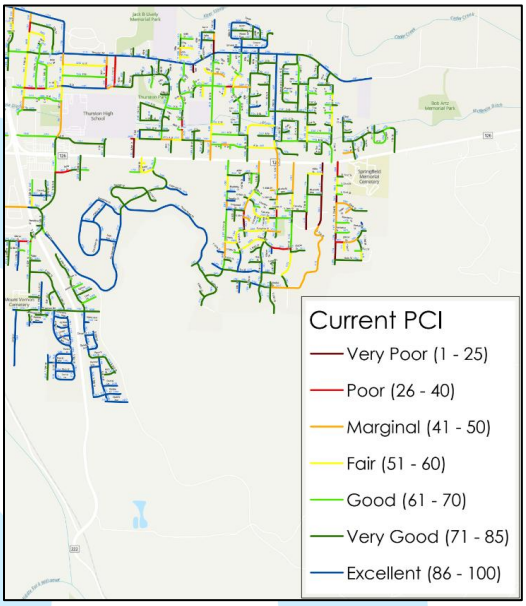
Another use case of structural testing is optimizing pavement management decisions. The matrix below, originally proposed by the Virginia Department of Transportation (VDOT), highlights the importance of combining structural and surface condition assessments, such as PCI or PCR. Relying solely on one metric can lead to suboptimal decisions. For example, if surface conditions are poor (e.g., PCI near 0), a Pavement Management System (PMS) might recommend full reconstruction (RC). However, structural testing may reveal that reconstruction is unnecessary, and corrective maintenance (CM) could suffice. Combining these metrics enables agencies to implement the **right solution, at the right time, in the right location**, delivering on the promise of holistic pavement management.

Surface Condition Recommendation \ Structural Condition Recommendation	DN	PM	CM	RM	RC
DN	DN	DN	DN	DN	DN
PM	PM	PM	DN	DN	DN
CM	CM	CM	CM	RM	RC
RM	CM	CM	CM	RM	RC
RC	CM	CM	RM	RC	RC

DN: Do Nothing
PM: Preventative Maintenance
CM: Corrective Maintenance
RM: Rehabilitation Maintenance
RC: Reconstruction

An example of the final deliverables is shown below, featuring a map that highlights locations categorized as having Weak, Moderate, or Strong structural condition. By overlaying structural testing results with surface condition data, the map provides a holistic view of the roadway network, as demonstrated below.





Deflection testing is performed using a Fast FWD, in accordance with ASTM D4694-09 (2020) standards for paved roadways. The IMS team can conduct a structural assessment of all designated roadways. Deflection testing is usually completed at least once in each direction in every street segment (every 300 - 500 feet) along the outside lanes of the roadway. A series of geophones records deflection readings for each section of pavement tested. These readings are 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. FastFWDs apply a known load to the pavement and measure the pavement response to the load. The structural adequacy of a street is expressed as a 0 to 100 score with several key ranges: roadways with a Structural Index greater than 75 are generally 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 streets that require additional pavement thickness; and scores below 50 typically require reconstruction and increased base and pavement thickness.

By using this data-driven approach, maintenance, and rehabilitation efforts are more accurately targeted, enhancing the overall efficiency of your pavement management program.

Easy Street Analysis (ESA) Overview

Pavement Management Plan and Included Deliverables

ESA integrates the core analysis capabilities of the most powerful pavement management systems within a familiar Microsoft® Excel environment. It is a pavement management tool designed to provide agencies with easy access to pavement condition data and analysis results. It is often used to enhance the use of traditional licensed-based software.

ESA was engineered as a simple solution that eliminates the need for users to become pavement management software experts before they can leverage their survey results. ESA is an interactive spreadsheet that contains deterioration curves, functional classes, pavement types, pavement strength rating, city-specific rehabilitation methods and costs, associated rehab resets, budget information, and other city-specific parameters. Our interactive ESA spreadsheet is fully customizable to the needs of our clients and programmed to develop multi-year M&R plans built around practical prioritization techniques and financial optimization, typically as cost of deferral analyses. Results can be visualized using both ESRI GIS software and Excel-based mapping tools. IMS has deployed ESA successfully on hundreds of government agencies across North America.

ESA offers the following key scenarios for analysis:

- Annual funding required to maintain current pavement conditions.
- Annual funding required to maintain the current network backlog.
- Funding projections needed to achieve and sustain a target PCI over the next five years.
- Funding projections needed to achieve and sustain a target backlog over the next five years.
- Minimum funding level required to avoid falling below control PCI limit.
- Minimum funding level required to avoid falling below control backlog limit.
- Future network performance predictions, including the network average PCI and segment level PCI, if current funding levels remain unchanged over five years.
- Strategic rehabilitation recommendations for pavement treatments based on the current budget.

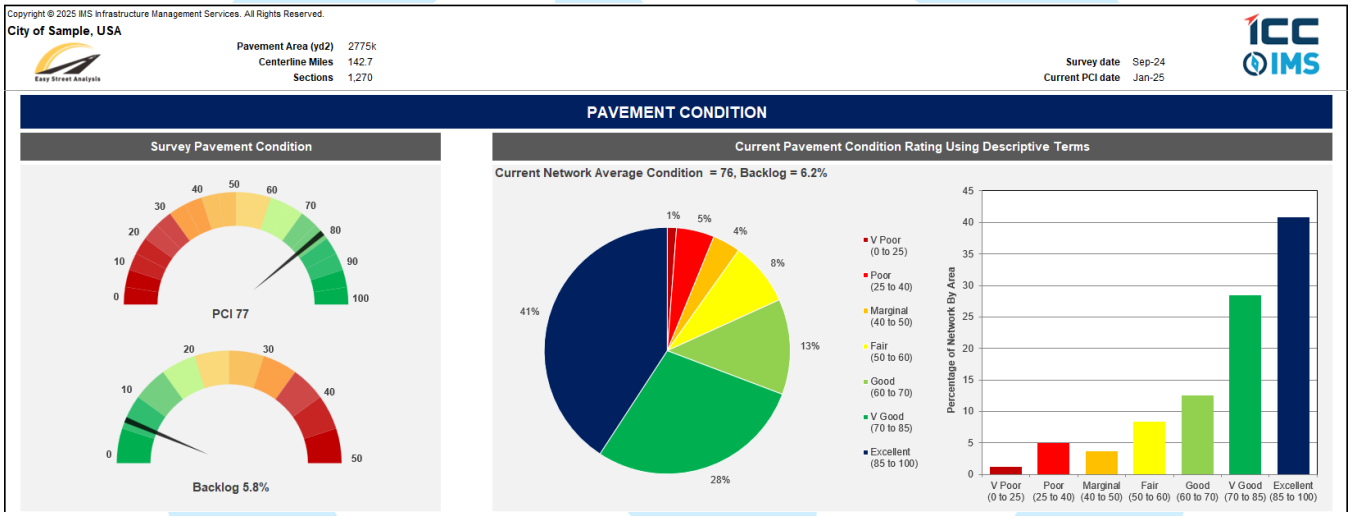
For the pavement analysis results to be practically useful to the agency, IMS endeavors to work closely with every client agency to select appropriate parameters. The IMS pavement engineer will work with the client to select and define the analysis parameters. These include:

- Analysis period (standard is 5 years)
- Road maintenance budget (one value in $/YR; can vary over the years)
- Rehab types and unit rates (in $/SY)
- Completed work (rehab type and rehab date for any work done after survey but before analysis start date), provided in a GIS-compatible format (shapefile, geodatabase, or list of GISIDs)
- Planned work (rehab type and rehab date for any work to be done after analysis start date; e.g., CIP, future work etc.), provided in a GIS-compatible format (shapefile, geodatabase, or list of GISIDs)

- Project groupings by proximity, functional classes, pavement types, and similar conditions (PCI spread of 20 and PCI below 40)
- *If structural testing using the Fast-Falling Weight Deflectometer (FFWD) is involved: traffic data (AADT, %Trucks, and/or ESALs), provided in a GIS-compatible format (shapefile, geodatabase, or list of GISIDs). Default traffic count will be used if requested data is one of the specified formats.

Additional parameters and customizations are possible and can be discussed with the pavement engineer during the analysis initiation. IMS pricing includes up to 2 iterations (back-and-forths) of the analysis. Additional iterations or parameters will incur an additional cost. Also, any analysis parameter inputs such as completed or planned work lists provided in non-GIS or non-digital formats will incur an extra cost.

The following snapshots showcase some of the highlights of ESA:



ESA dashboard, providing overview of network condition. ESA offers a detailed evaluation of the network's PCI, with the ability to breakdown analyses by pavement type, functional classes, and index, delivering valuable insights into the overall network condition. The distribution of network area by pavement type and functional classes is displayed.

Network Analysis Summary - Five Year Rehab Plan Development

Current PCI Date: 1/1/2025 | Annual Budget Increase (%/yr): 0.00 | % of Budget Dedicated to Surface Treatments: 0

Analysis Start Date: 1/1/2025 (MM/DD/YYYY) | Unit Rate Inflation (%/yr): 0.00

Program Year	Annual Budget ($)		Calendar Year	Block Count	Annual Expenditure ($)	Pavement Costs ($)	Peripheral Concrete Costs ($)	Miles (mi)	PCI	Backlog (%)
Avg:	1,380,000	1,380	2024	1,270	19,006,510	19,006,510	0	142.7	76	6.2
1	1,380,000		2025	25	1,379,910	1,379,910	0	3.7	76	
2	1,380,000		2026	30	1,379,402	1,379,402	0	3.9	75	
3	1,380,000		2027	20	1,379,960	1,379,960	0	2.6	75	
4	1,380,000		2028	31	1,379,804	1,379,804	0	3.2	74	
5	1,380,000		2029	30	1,379,919	1,379,919	0	3.8	74	4.5
			Totals:	136	6,898,995	6,898,995	0	17.1		

Refresh

Run ESA

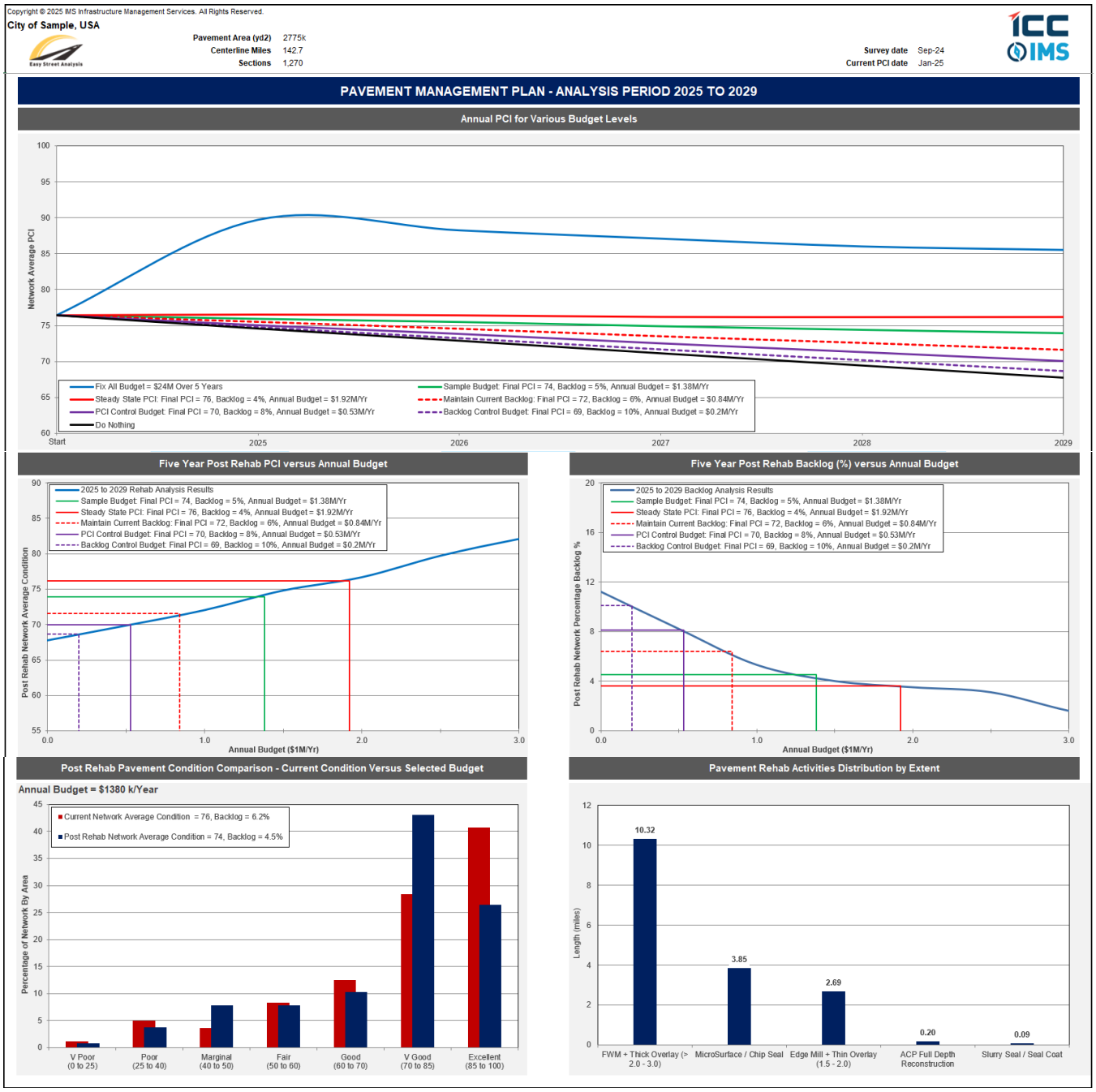
Agency Budget

Inventory and Rehab Plan

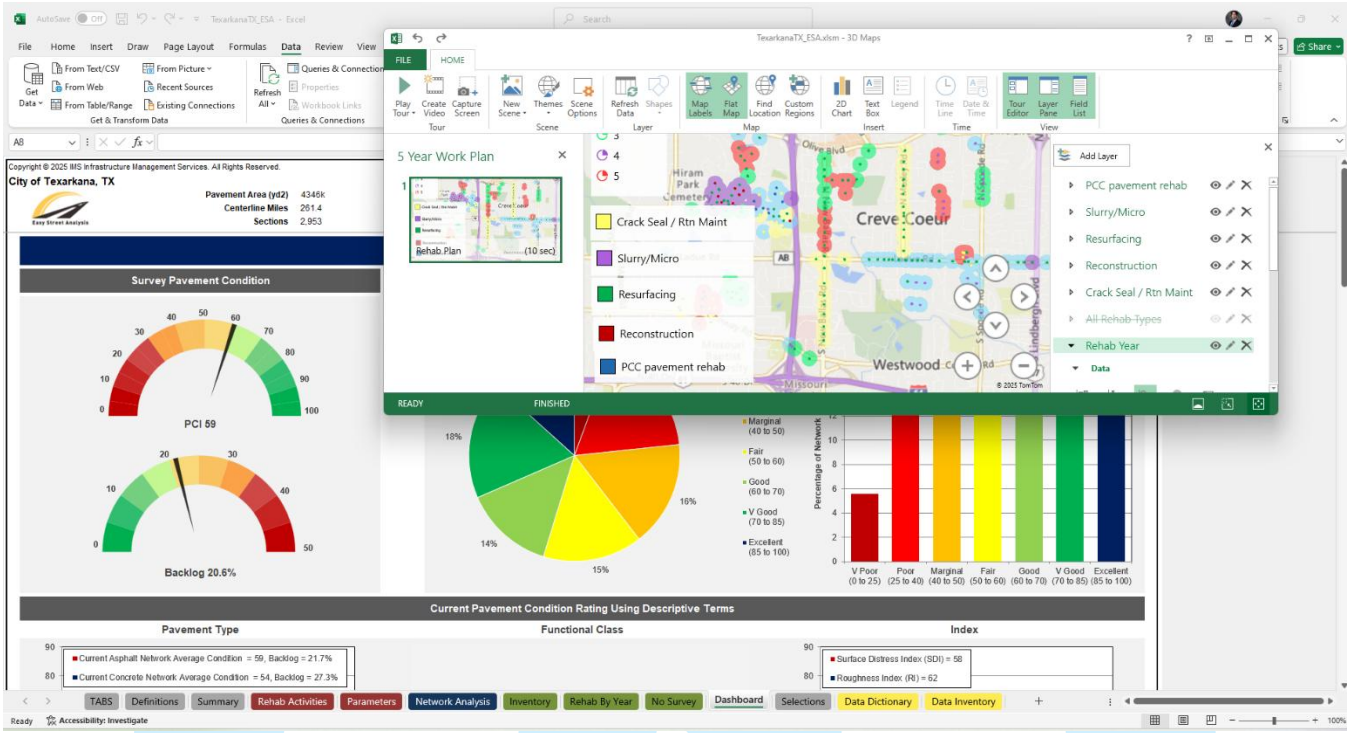
Easy Street Analysis

Need Year	Committed Year	Year of First Selection	Segment Rehab Results	Rehab Activity Code	Rehab Activity	Avg Unit Rate ($/yd2)	Segment Peripheral Concrete Costs ($)	Segment Pavement Cost ($)	Segment Total Cost ($)	Project Cost ($)	Five Year Post Rehab PCI
4	0	0	Fall Thru Yr 4						0	0	79
4	0	4	Selected Yr 4	56	FWM + Thick Overlay (> 2.0 - 3.0) + Strctrl Ptch	29.00	0	73,863	73,863	169,302	94
4	0	4	Selected Yr 4	56	FWM + Thick Overlay (> 2.0 - 3.0) + Strctrl Ptch	29.00	0	49,880	49,880	169,302	94
4	0	4	Selected Yr 4	56	FWM + Thick Overlay (> 2.0 - 3.0) + Strctrl Ptch	29.00	0	45,559	45,559	169,302	94
6	0	0	Not Selected						0	0	84
1	0	0	Fall Thru Yr 1						0	0	52
3	0	0	Fall Thru Yr 3						0	0	42
3	0	0	Fall Thru Yr 3						0	0	45
3	0	0	Fall Thru Yr 3						0	0	44
4	0	5	Selected Yr 5	30	Edge Mill + Thin Overlay (1.5 - 2.0)	15.25	0	31,293	31,293	258,107	92
4	0	5	Selected Yr 5	30	Edge Mill + Thin Overlay (1.5 - 2.0)	15.25	0	57,813	57,813	258,107	92
4	0	5	Selected Yr 5	30	Edge Mill + Thin Overlay (1.5 - 2.0)	15.25	0	169,001	169,001	258,107	92
3	0	3	Selected Yr 3	50	FWM + Thick Overlay (> 2.0 - 3.0)	27.00	0	41,526	41,526	149,715	91
3	0	3	Selected Yr 3	50	FWM + Thick Overlay (> 2.0 - 3.0)	27.00	0	48,519	48,519	149,715	91
3	0	3	Selected Yr 3	50	FWM + Thick Overlay (> 2.0 - 3.0)	27.00	0	59,670	59,670	149,715	91
2	0	0	Fall Thru Yr 2						0	0	37
2	0	0	Fall Thru Yr 2						0	0	41

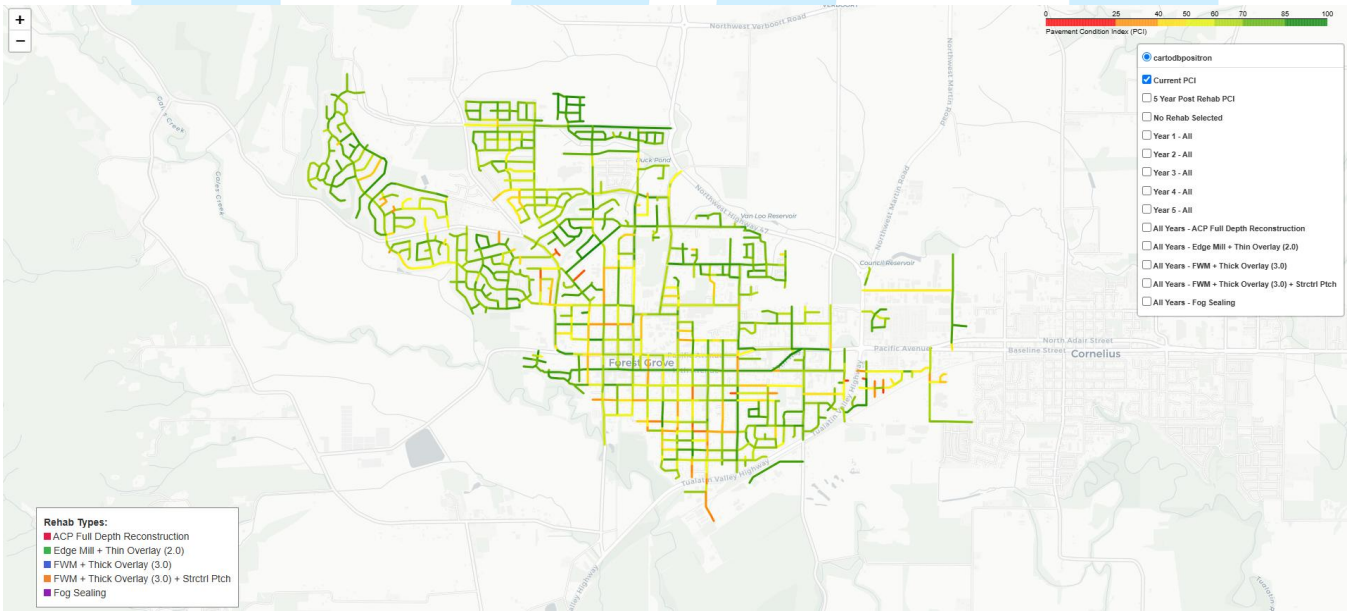
ESA has a straightforward design with simplified buttons to allow for agile review of recommended solutions for selected segments. The total budget and annual breakdown of each year of the respective analysis and network-level evolution of PCI and backlog are summarized.



ESA dashboards, presenting PCI and backlog values after a 5-year analysis is generated under various budget scenarios and summarizing the recommended rehabilitation activities by extent.



ESA contains embedded GIS maps, allowing users to open GIS maps within the Excel interface.



ESA viewer, provides a map-based view of the pavement condition before and after applying recommended treatments. Various options can be accessed and filtered from this view. Clicking any segment on the map displays detailed information such as GISID, PCI, year, and more.

Optional Value-Added ESA Enhancements

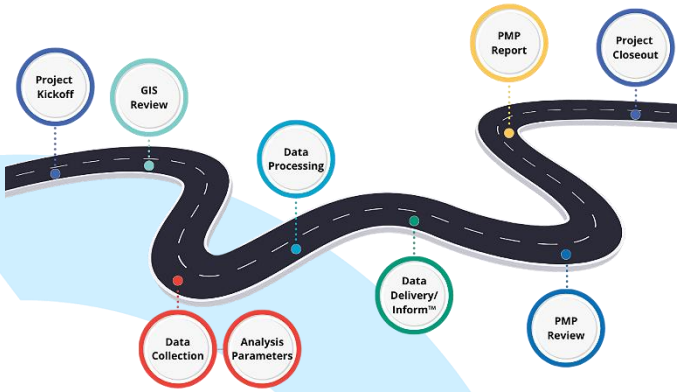
- Increase analysis period from 5 years to 10 years (ESA fee is multiplied by two (2))
- Additional budget breakdowns, other than one value in $/YR *(specific scoping required by pavement engineer)*
- Conversion of rehab unit rates to $/SY *(specific scoping required by pavement engineer)*
- Conversion of completed work (rehab type and rehab date for any work done after survey but before analysis start date) from any format other than a GIS-compatible format (shapefile, geodatabase or list of GISIDs) to an acceptable format for ESA *(specific scoping required by pavement engineer)*
- Conversion of planned work (rehab type and rehab date for any work to be done after analysis start date e.g., CIP, future work etc.), provided in a GIS-compatible format (shapefile, geodatabase, or list of GISIDs) to an acceptable format for ESA *(specific scoping required by pavement engineer)*
- Inclusion of project groupings by any other approach such as groupings by subdivisions, zones, neighborhoods, etc. *(specific scoping required by pavement engineer)*
- Conversion of traffic data for integration of FFWD data into ESA *(specific scoping required by pavement engineer)*
- Client GIS 1-to-1 synchronization with ESA via one of our trusted partners, NewEdge.
- ESA Viewer - Full GIS Map, Allows for Client Updating of Map Scenarios from 5-Year Plan *(Priced as a $2,000 one-time cost add-on; a lightweight software installation is required that allows for regeneration of maps of your pavement management plan. As part of the core ESA deliverable, a map is generated. ESA Viewer allows for unlimited map refreshing if you make updates to the plan. Allows for viewing in any current web browser).*

APPENDIX

Appendix A – Typical Project Roadmap

Step 1: Project Kickoff

The IMS project manager schedules a kickoff meeting with your agency's project team to review the project scope, schedule, and fee. The IMS project manager ensures that the IMS team and agency stakeholders clearly understand the goals and objectives of the project.



Step 2: GIS Linkage and Survey Map Development

Following the kickoff meeting, IMS' GIS team reviews the agency's roadway network and verifies the roadways to be collected. The agreed-upon roadway network is loaded into ICC Drive™ software, which defines the pavement network segmentation and attribution to be collected and delivered.

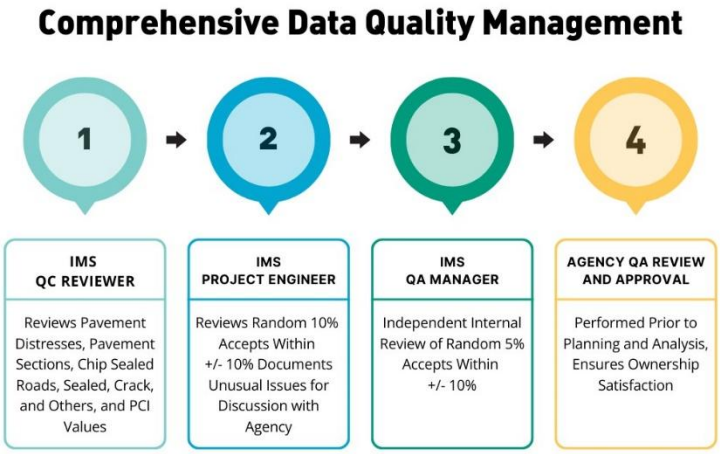
Step 3: Data Collection

The pavement condition survey is performed with an ICC IrisPRO Pave™ data collection system. Georeferenced, high-resolution 3D imagery of the pavement surface, spherical right-of-way imagery, and longitudinal and transverse profile measurements are collected. The structural testing survey is performed with a FastFWD, deployed separately from the IrisPRO Pave.

Step 4: Data Processing

The collected data are processed using ICC Connect™ software to quantify the type, severity, and quantity of pavement surface distresses, including cracking and rutting. Pavement roughness values are reported using the International Roughness Index (IRI) method. Structural testing data is processed, delivered and incorporated based on client requirements as reflected in the fee schedule. Structural data is incorporated into ESA for pavement management planning purposes.

Step 5: Multi-step QC/QA IMS has developed a unique approach to pavement condition surveys by coupling the power of automated algorithms with manual review of distress data by trained and certified pavement raters. All data is manually reviewed by our QC team, then reviewed by our QA manager, and lastly, submitted to the agency for final review and acceptance. This rigorous QC/QA process provides an added measure of confidence that the pavement condition data is accurate.



Step 6: Data Analysis & Reports

- **Comprehensive Analysis**
  Our data analysis is thorough and tailored to provide insights that drive decision-making.
- **Detailed Reporting**
  We deliver comprehensive reports that are clear, concise, and customized to your reporting standards.

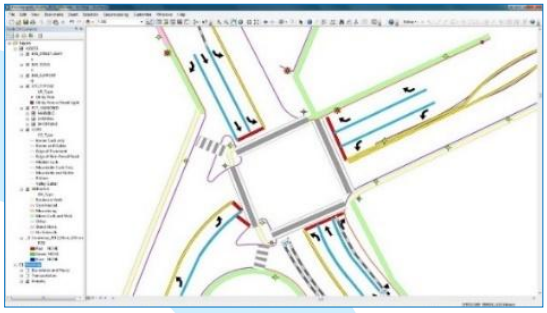
Step 7: Project Closeout

Project deliverables will be sent to you for final approval and acceptance. Once accepted, we will facilitate a final project close-out meeting with you, where we will present our findings and recommendations. This workshop-style meeting is an opportunity to clarify any final questions and discuss other ways IMS can support your pavement management program in the future.

Appendix B – Additional Value-Added Services

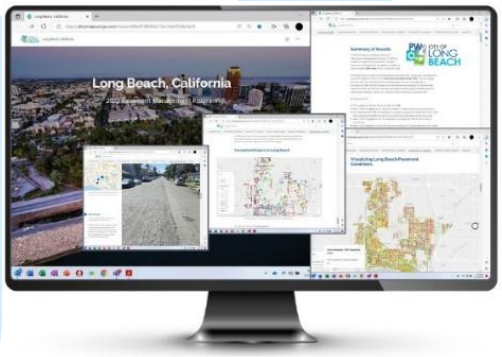
Right of Way (ROW) Asset Collection (e.g., signs, markings, curb, and gutter, etc.)

Imagery collected during the pavement condition survey can be used to build ROW asset inventories and condition assessments for signs, sign supports, curb and gutter, sidewalks and multi-use trails, pedestrian curb ramps, pavement markings and striping, traffic signals, trees, and many others. Our ability to leverage the high resolution 360-degree imagery already collected makes this a frequently used add on service by our clients.



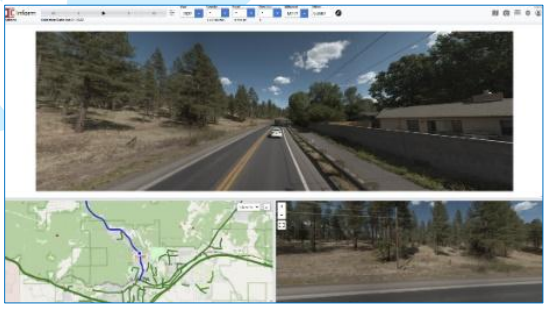
Web-based GIS Visualization via StoryMaps and Dashboards

Easy-to-use and easy-to-maintain web-based, geocentric StoryMaps and Dashboards can be built to serve not only internal staff but also constituents. These tools provide a dynamic way to present complicated information visually. StoryMaps and Dashboards may be configured for use within the agency for coordinating projects across departments or for presentation to the public to promote transparency and trust.



Inform™ Web Based Viewing Software, Including Thematic Maps

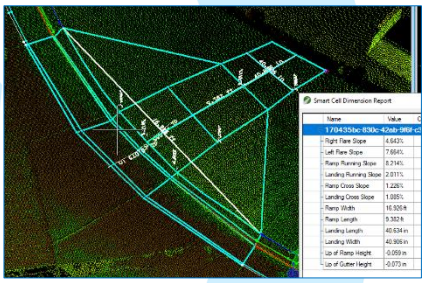
IMS offers a convenient, web-based tool for reviewing pavement condition data and associated imagery. Our cloud-hosted visualization and analysis software Inform™ enables agencies to review collected pavement and asset data. The software is fast, intuitive, and is the simplest way to make valuable photolog images available to every user. **Ninety (90) days of complimentary hosting is included with all IMS projects.** Competitive pricing for data hosting in year two and beyond is available upon request.



Sidewalk, Trail, and Parking Lot Surveys with a Sidewalk Surface Tester (SST)

We deploy our Sidewalk Surface Testers (SST) for capturing sidewalk inventory and condition data, SSTs may also be deployed to collect data for narrow alleys, parking lots, bike paths, and multi-use trails. SST surveys yield comprehensive sidewalk condition data that may be used in combination with lidar pedestrian curb ramp data to develop detailed ADA non-compliance identification. With the evolving PROWAG requirements, it is critical for agencies to have a plan in place for routinely assessing the condition of and proactively maintaining their pedestrian walkways.

Mobile Lidar for Pedestrian Curb Ramp Assessments



Mobile Lidar is deployed to supplement ROW inventory surveys by creating a 3D point cloud from which measurements can be extracted. Our mobile lidar system (a Riegl VMQ-1HA) collects 1.2 million points per second, resulting in extremely dense point clouds. The integrated Ladybug 5+ camera captures high-resolution spherical imagery at defined intervals. Using the lidar point cloud, IMS can efficiently take detailed measurements of pedestrian curb ramps to identify non-compliance.

Roadway Friction Testing

Friction testing is a critical element of roadway safety inspections. Adequate friction can help reduce accidents and save lives. In the last five years alone, we have successfully completed over 200 friction testing projects. The friction of the pavement surface is measured in accordance with ASTM E274 and incorporates a ribbed tire in accordance with ASTM E501 for studies of the left wheel path at each site.

In-Person (or Virtual) Council Presentations

IMS is often asked to develop and deliver a council presentation to educate council members and the public on the concepts of pavement management and the results of the surveys, health of the roadway network and recommendations as a value-added service. We work collaboratively with agency staff to develop highly focused presentations that layout the existing state of the agency's roadways and the funding required to meet the agency's goals and objectives.

Customized Written Reports and Specialty Maps

IMS will prepare all project documentation, including a draft and final summary report of the findings and conclusions as part of the project. Additional analyses and specialty maps may be added to the final report to enhance the ability of the agency to communicate existing pavement conditions, forecasted conditions, and M&R needs and priorities.

Appendix C – Enhanced ASTM D6433 Data Dictionary

The following pages outline the standard measurements that will be reported from our collected and processed data for roadways. We refer to this as a data dictionary, to clearly outline to our clients all data points we will be collecting and reporting data for. While this is the most typical data dictionary for municipal/county agencies, we can offer modifications to this. We additionally offer data dictionaries for other standards, such as ASTM E3303, FHWA LTPP, and more.

Column	Field Name	Units	Pavement Type	Format	Dec	Example Value	Description
A	SegmentID			xxxxxxxxxx		6539	Unique Segment ID as per the client provided network GIS
B	Road			xxxxxxxxxx		Wilson Ave	Road name as per the client provided network GIS
C	Primary_Direction_Collection			xxxxxx		TRUE	True where collection matches digitized direction of GIS, False where collected opposite.
D	Direction			x		N	Predominant direction of travel, N/E/S/W based upon average heading value of the segment.
E	PavementType			xxxxx		ASP	Predominant pavement type observed over reporting interval
F	StartChain	Miles		x.xxx	3	2.653	Start chainage as defined for segment by the shp file
G	EndChain	Miles		x.xxx	3	2.751	End chainage as defined for segment by the shp file
H	Length	Feet		xxx	1	517.1	Chainage Length of the Segment in feet
I	ROWImagePath			xxxxxxxxxx		M:/Raw/Images/image1.jpg	This is the internal path to the first image of each segment
J	ASP_Percent	%	Flexible	xx.x	1	95.7	Percentage of segment that is ASP and not affected by any Event Flags
K	ASP_Area	Square Feet	Flexible	xx.x	1	5762	Total accessible pavement area that is ASP and not affected by any Event Flags
L	Other_Percent	%	Other	xx.x	1	96.6	Percentage of segment that is Other and not affected by any Event Flags
M	JCP_Percent	%	Rigid	xx.x	1	4.3	Percentage of segment that is JCP and not affected by any Event Flags
N	JCP_Area	Square Feet	Rigid	xx.x	1	291.2	Total accessible pavement area that is JCP and not affected by any Event Flags
O	Valid_Percent	%		xx.x	1	88.9	Percentage of the segment length containing valid data and not affected by any Event Flags
P	EventFlag					Bridge	Flag indicating presence of either Construction, Bridge, Railroad etc for which the data is invalidated
Q	AssessableLength	Feet		xx.x	1	439.8	Assessable pavement length captured from IrisPRO Pave not affected by any Event Flags
R	AssessableWidth	Feet		xx.x	1	13.1	Assessable pavement width captured from IrisPRO Pave not affected by any Event Flags
S	AssessableArea	Square Feet		xx.x	1	5762	Assessable pavement area captured from IrisPRO Pave not affected by any Event Flags

Column	Field Name	Units	Pavement Type	Format	Dec	Example Value	Description
A	SegmentID			xxxxxxxxxx		6539	Unique Segment ID as per the client provided network GIS
B	Road			xxxxxxxxxx		Wilson Ave	Road name as per the client provided network GIS
C	Primary_Direction_Collection			xxxxxx		TRUE	True where collection matches digitized direction of GIS, False where collected opposite.
T	Speed	mph		xx.x	1	75.4	Average speed of collection through segment
U	MinSpeed	mph		xx.x	1	35.8	Minimum speed of collection through segment
V	MaxSpeed	mph		xx.x	1	90.7	Maximum speed of collection through segment
W	IRI_Left	in/mi		xxx.x	1	222.8	Lane left IRI where speed is greater than 12.5mph (Average); capped at 500
X	IRI_Right	in/mi		xxx.x	1	205.8	Lane right IRI where speed is greater than 12.5mph (Average); capped at 500
Y	IRI_Avg	in/mi		xxx.x	1	214.3	Lane average IRI where speed is greater than 12.5mph; capped at 500
Z	IRI_PercentInvalid	%		xx.x	1	13.3	Percentage of segment where IRI has been invalidated due to low speed or Event Flags
AA	Rutting_Left	Inches	Flexible	x.xx	2	0.17	Left wheelpath rut depth (Average)
AB	Rutting_Right	Inches	Flexible	x.xx	2	0.19	Right wheelpath rut depth (Average)
AC	Alligator_Low	Square Feet	Flexible	xx.x	1	23.5	Total area of low severity Alligator Cracking as defined by ASTM D6433
AD	Alligator_Mod	Square Feet	Flexible	xx.x	1	27.9	Total area of moderate severity Alligator Cracking as defined by ASTM D6433
AE	Alligator_High	Square Feet	Flexible	xx.x	1	12.2	Total area of high severity Alligator Cracking as defined by ASTM D6433
AF	LongTrans_Low	Feet	Flexible	xx.x	1	23.5	Total length of low severity Longitudinal & Transverse Cracking as defined by ASTM D6433
AG	LongTrans_Mod	Feet	Flexible	xx.x	1	27.9	Total length of moderate severity Longitudinal & Transverse Cracking as defined by ASTM D6433
AH	LongTrans_High	Feet	Flexible	xx.x	1	12.2	Total length of high severity Longitudinal & Transverse Cracking as defined by ASTM D6433
AI	PatchingUtilityCuts_Low	Square Feet	Flexible	xx.x	1	23.5	Total area of low severity Patching & Utility Cuts as defined by ASTM D6433
AJ	PatchingUtilityCuts_Mod	Square Feet	Flexible	xx.x	1	27.9	Total area of moderate severity Patching & Utility Cuts as defined by ASTM D6433

Column	Field Name	Units	Pavement Type	Format	Dec	Example Value	Description
A	SegmentID			xxxxxxxxxx		6539	Unique Segment ID as per the client provided network GIS
B	Road			xxxxxxxxxx		Wilson Ave	Road name as per the client provided network GIS
C	Primary_Direction_Collection			xxxxxx		TRUE	True where collection matches digitized direction of GIS, False where collected opposite.
AK	PatchingUtilityCuts_High	Square Feet	Flexible	xx.x	1	12.2	Total area of high severity Patching & Utility Cuts as defined by ASTM D6433
AL	Pothole_Low		Flexible	x	0	10	Count of low severity Potholes as defined by ASTM D6433
AM	Pothole_Mod		Flexible	x	0	6	Count of moderate severity Potholes as defined by ASTM D6433
AN	Pothole_High		Flexible	x	0	3	Count of high severity Potholes as defined by ASTM D6433
AO	Raveling_Mod	Square Feet	Flexible	xx.x	1	27.9	Total area of moderate severity Raveling as defined by ASTM D6433
AP	Raveling_High	Square Feet	Flexible	xx.x	1	12.2	Total area of high severity Raveling as defined by ASTM D6433
AQ	Rutting_Low	Square Feet	Flexible	xx.x	1	27.9	Total area of low severity Rutting as defined by ASTM D6433
AR	Rutting_Mod	Square Feet	Flexible	xx.x	1	12.2	Total area of moderate severity Rutting as defined by ASTM D6433
AS	Rutting_High	Square Feet	Flexible	xx.x	1	23.5	Total area of high severity Rutting as defined by ASTM D6433
AT	CornerBreak_Low		Rigid	xx	0	10	Count of low severity Corner Break as defined by ASTM D6433
AU	CornerBreak_Mod		Rigid	xx	0	6	Count of moderate severity Corner Break as defined by ASTM D6433
AV	CornerBreak_High		Rigid	xx	0	3	Count of high severity Corner Break as defined by ASTM D6433
AW	DividedSlab_Low		Rigid	xx	0	10	Count of low severity Divided Slab as defined by ASTM D6433
AX	DividedSlab_Mod		Rigid	xx	0	6	Count of moderate severity Divided Slab as defined by ASTM D6433
AY	DividedSlab_High		Rigid	xx	0	3	Count of high severity Divided Slab as defined by ASTM D6433
AZ	Faulting_Low		Rigid	xx	0	10	Count of low severity Faulting as defined by ASTM D6433
BA	Faulting_Mod		Rigid	xx	0	6	Count of moderate severity Faulting as defined by ASTM D6433
BB	Faulting_High		Rigid	xx	0	3	Count of high severity Faulting as defined by ASTM D6433
BC	Linear_Low		Rigid	xx	0	10	Count of low severity Linear Cracking as defined by ASTM D6433
BD	Linear_Mod		Rigid	xx	0	6	Count of moderate severity Linear Cracking as defined by ASTM D6433

Column	Field Name	Units	Pavement Type	Format	Dec	Example Value	Description
A	SegmentID			xxxxxxxxxx		6539	Unique Segment ID as per the client provided network GIS
B	Road			xxxxxxxxxx		Wilson Ave	Road name as per the client provided network GIS
C	Primary_Direction_Collection			xxxxxx		TRUE	True where collection matches digitized direction of GIS, False where collected opposite.
BE	Linear_High		Rigid	xx	0	3	Count of high severity Linear Cracking as defined by ASTM D6433
BF	Patching_Large_UtilityCuts_Low		Rigid	xx	0	10	Count of low severity Patching (Large) & Utility Cuts as defined by ASTM D6433
BG	Patching_Large_UtilityCuts_Mod		Rigid	xx	0	6	Count of moderate severity Patching (Large) & Utility Cuts as defined by ASTM D6433
BH	Patching_Large_UtilityCuts_High		Rigid	xx	0	3	Count of high severity Patching (Large) & Utility Cuts as defined by ASTM D6433
BI	Patching_Small_Low		Rigid	xx	0	10	Count of low severity Patching (Small) as defined by ASTM D6433
BJ	Patching_Small_Mod		Rigid	xx	0	6	Count of moderate severity Patching (Small) as defined by ASTM D6433
BK	Patching_Small_High		Rigid	xx	0	3	Count of high severity Patching (Small)as defined by ASTM D6433
BL	CornerSpalling_Low		Rigid	xx	0	6	Count of low severity Corner Spalling as defined by ASTM D6433
BM	CornerSpalling_Mod		Rigid	xx	0	3	Count of moderate severity Corner Spalling as defined by ASTM D6433
BN	CornerSpalling_High		Rigid	xx	0	10	Count of high severity Corner Spalling as defined by ASTM D6433
BO	SlabCount		Rigid	xx	0	5	Count of slabs within the segment, not affected by any Event Flags
BP	PCI			xx	0	85	Pavement Condition Index (PCI)
BQ	PSCM		Flexible	x.xxx	3	0.15	ASTM Pavement Surface Cracking Metric (Crack Length * Crack Width / Interval Area) as defined by ASTM E3303
BR	PSCI		Flexible	xx.x	1	97.5	ASTM Pavement Surface Cracking Index as defined by ASTM E3303
BS	PSCPRM		Flexible	x.xxx	3	0.234	Pavement Surface Cracking, Potholes and Repair Metric is a variation of the PSCM which also includes patches, potholes and sealed cracks
BT	PSCPRI		Flexible	xx.x	1	92.4	Pavement Surface Cracking, Potholes and Repair Index is a variation of the PSCI which also includes patches, potholes and sealed cracks
BU	Start_Coords__LAT_	Decimal Degrees		xx.xxxxxxxx	8	27.88503861	Latitude at start of segment in decimal degrees (WGS84)

Column	Field Name	Units	Pavement Type	Format	Dec	Example Value	Description
A	SegmentID			xxxxxxxxxx		6539	Unique Segment ID as per the client provided network GIS
B	Road			xxxxxxxxxx		Wilson Ave	Road name as per the client provided network GIS
C	Primary_Direction_Collection			xxxxxx		TRUE	True where collection matches digitized direction of GIS, False where collected opposite.
BV	Start_Coords__LON_	Decimal Degrees		xx.xxxxxxxx	8	-82.4893195	Longitude at start of segment in decimal degrees (WGS84)
BW	End_Coords__LAT_	Decimal Degrees		xx.xxxxxxxx	8	27.8841875	Latitude at end of segment in decimal degrees (WGS84)
BX	End_Coords__LON_	Decimal Degrees		xx.xxxxxxxx	8	-82.489277	Longitude at end of segment in decimal degrees (WGS84)
BY	SurveyDate	Date		mm/dd/yyyy		12/21/2023	Date of data collection.