Non-Destructive Infrastructure Evaluation using GPR

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GSSI

COMPANY VISION

GSSI is an internationally respected corporation known for our technological advancements in the geophysical, archaeological, forensics, infrastructure, public works and transportation industries. We serve our clients with technical expertise, unsurpassed customer support and training facilities, and superior products.

GSSI products are distributed through a series of application specialists and representatives worldwide to five primary markets: concrete inspection, utility mapping and locating, road and bridge deck evaluation, geophysics and archaeology.

GPR LEADER FOR THE TRANSPORTATION INDUSTRY

GSSI has been developing innovative products to meet the needs of the transportation industry for over 30 years. We have developed products that can provide layer thickness information, bridge deck deterioration information, rebar QA/QC information, tunnel condition information (i.e., voids) and, density information of newly paved and compacted asphalt.

PaveScan® RDM 2.0

NON-DESTRUCTIVE ASPHALT DENSITY EVALUATION SYSTEM

The PaveScan® RDM 2.0 system provides on-site, real-time, and continuous full coverage information regarding the density of asphalt. The system can be used as a QC or a QA tool (or both). As a QC tool, it can provide the user with real-time information of any patterns of defects during the job. Real-time data allows users to be more pro-active with quality and increase the opportunity for project incentives.

As a QA tool, this system provides PWL information, defects, and other QA types of information. This system is ideal for uncovering inconsistencies that occur during the paving process, including poor uniformity and significant variations in density. By detecting these problems during the paving process, issues can be addressed immediately, helping to avoid such premature failures as road raveling, cracking, and deterioration along joints.

When used with an Asphalt Mix calibration file, the PaveScan system displays and outputs density information (density, %void, or %compaction, whichever is desired by the user). This innovative technology enables users to obtain critical density data for QA/QC of new pavements.

AND NO:

- Security issues
- Questioning compaction trends
- Coring (or at least reducing)
- Random spot checking
- Nuclear issues

TYPICAL USES

Non-destructive asphalt compaction testing

Quality assurance/quality control of new pavements

Determining pavement uniformity

FCC, RSS-220 and CE Certified

PAVESCAN FEATURES

Rugged Cart

- "No Tools Required" assembly and disassembly for easy deployment
- Foldable arms
- High visibility
- Accommodates up to 3 sensors
- Hot swappable batteries
- Green laser for guidance and precise location

Display

- Real-time contour map
- Real-time line graph
- Provides core locations

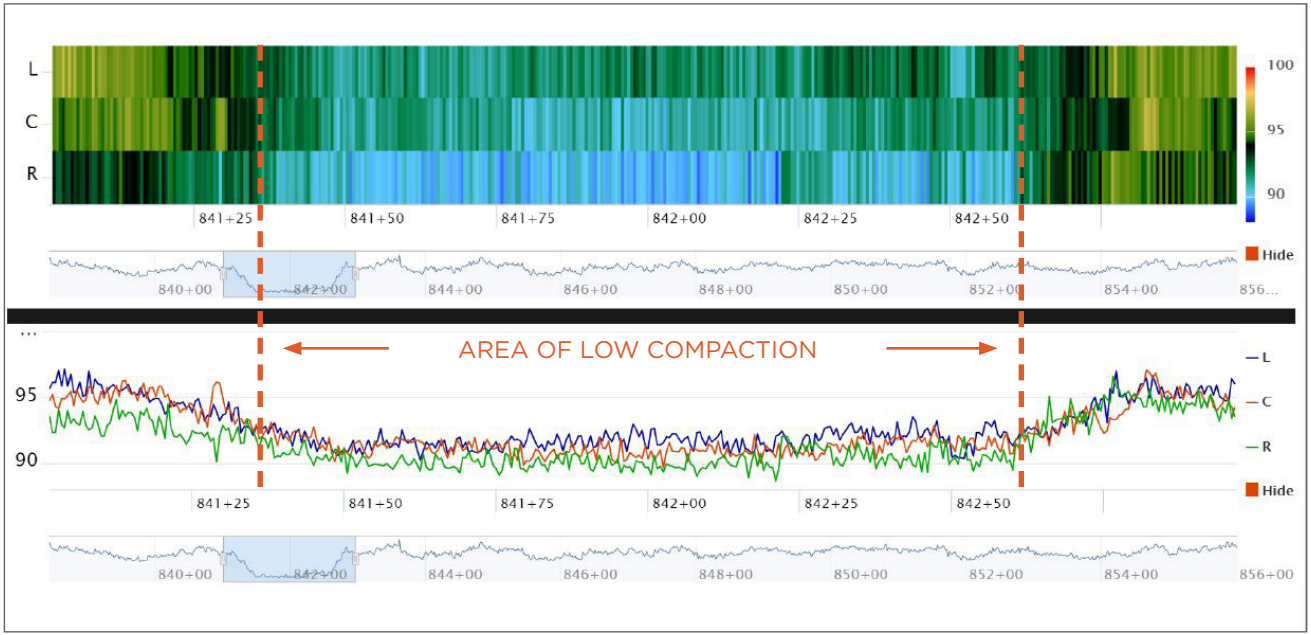
Output (CSV and KML file formats)

- Full data coverage
- Defects only
- PWL
- VETA

PaveScan® RDM 2.0

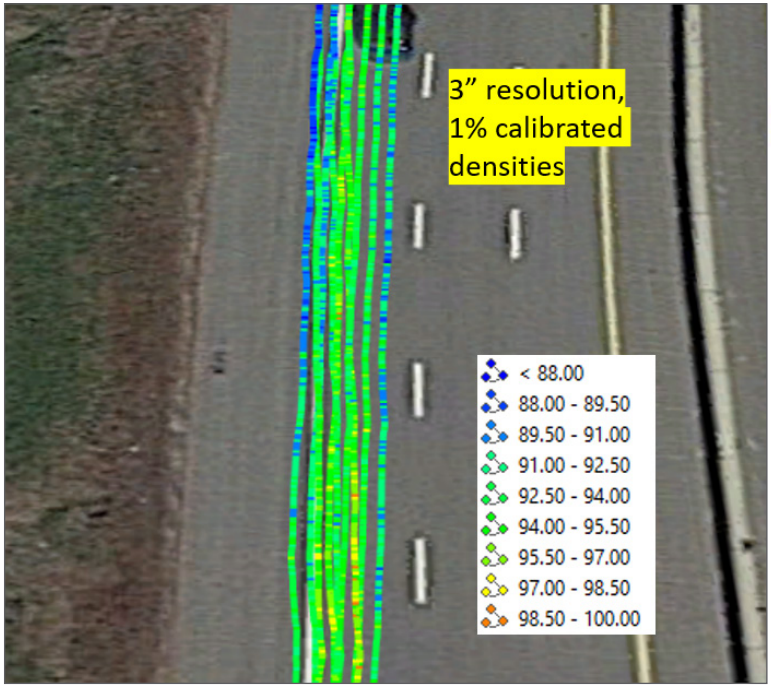
ASPHALT COMPACTION INFORMATION – ONSITE

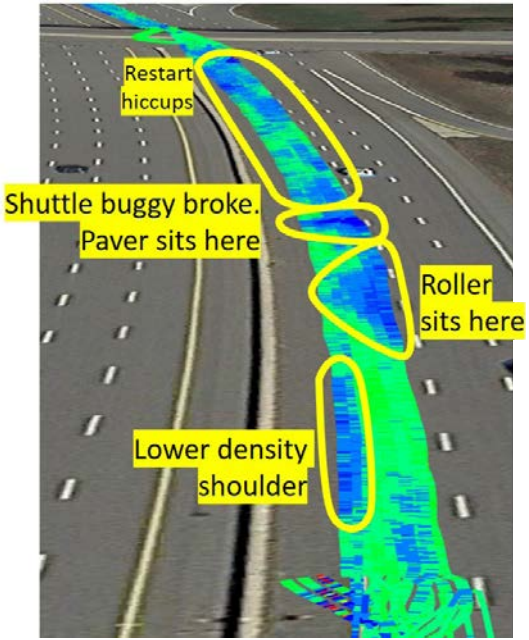
3-Channel System - Actual Display in Real-time



ASPHALT COMPACTION INFORMATION – OUTPUT EXAMPLE

KML File Using Google Earth





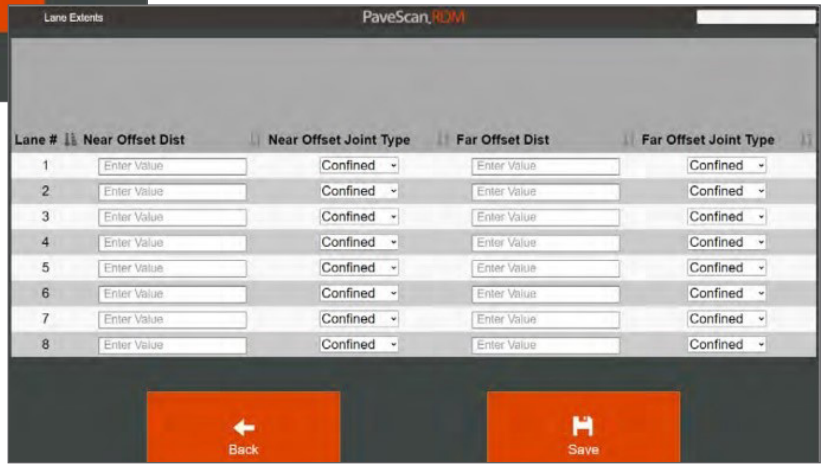
PaveScan Data

ASPHALT COMPACTION INFORMATION – OUTPUT EXAMPLE

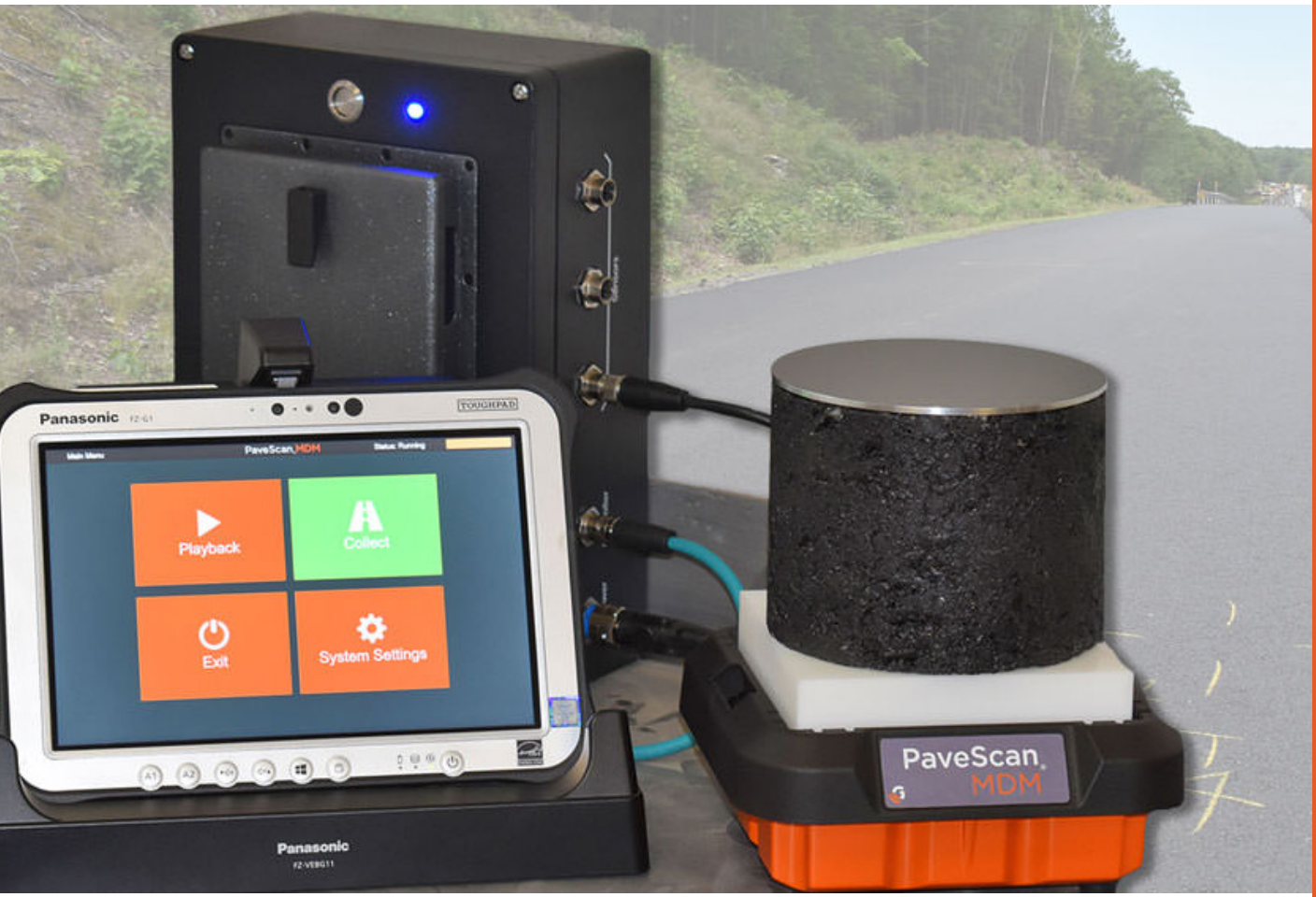
PWL Report

User-selected Upper and Lower Limits

The user has an option to produce PWL reports by entering user-specified limits that will be used to produce the reports.



Displayed Report



PaveScan® MDM

AN ESSENTIAL TOOL FOR QA/QC LABS

With the PaveScan Mix Design Module (MDM), paving contractors can now be alerted immediately to changes in the mix. Since PaveScan MDM is sensitive to subtle changes in aggregate, mix, and moisture, comparing daily samples against approved mix designs makes any deviations apparent and helps to fix any problems before the mix is deployed in the field. With one five-minute lab test, users can accurately reveal problems before any need for silo dumps or other costly remediation.

PaveScan MDM also turns our PaveScan RDM system into a powerful new QC tool for asphalt density assessment. PaveScan MDM creates a correlation between the dielectric value of the mix at different percent voids. This correlation is used by PaveScan RDM to show accurate density variability within the asphalt mat. This degree of process control means bridge decks and longitudinal joints can now be rolled to specification in real-time.

Improve Quality - Save Time & Money

Improving the durability and longevity of your roads reduces maintenance costs and repaving cycles. If compaction problems occur from delays or paving train stoppages, QC managers can now fix pavement defects before it's too late, saving time and money in the field. Avoid costly penalties, rip-ups and repaving with PaveScan technology.

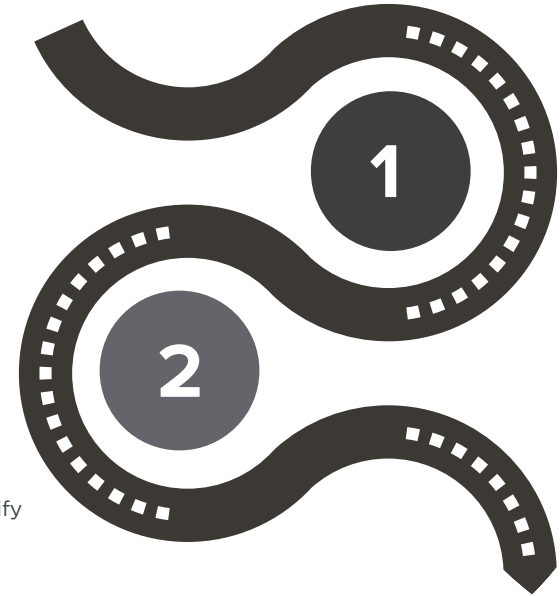
Improve Safety

Using PaveScan MDM and RDM gives paving contractors a comprehensive and accurate view into pavement quality without the expense, risk, and errors from spot coring. More importantly, reducing the need to core exposes fewer workers to the dangers of work zones.

IMPROVING PROCESS CONTROL WITH PAVESCAN TECHNOLOGY

PRODUCTION MONITORING

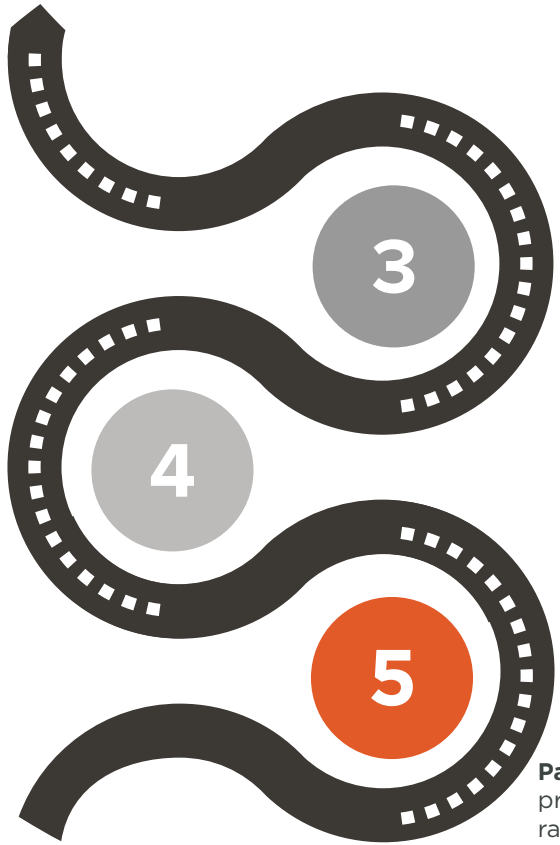
Monitor your asphalt production using existing gyratory samples.
Use this data to quickly identify production issues.



CREATE MIX DESIGN DIGITAL LIBRARY

Use **PaveScan MDM** to create a digital record of your mix designs.

PaveScan® MDM



FIX PROBLEMS IN REAL-TIME

Spot and fix low density areas while the mat is still hot.

ENSURE PROPER COMPACTION WITHOUT CORING

Input calibration data into **PaveScan RDM** to accurately map density variability in the field.

BETTER QUALITY, LONGER LASTING ROADS

PaveScan technology helps avoid premature road failures such as raveling, cracking and deterioration along poorly compacted joints.

RoadScan™ 30

COMPLETE GPR SYSTEM FOR ROAD INSPECTION

The RoadScan$_{TM}$ 30 system is a non-destructive evaluation tool for quickly and accurately determining pavement layer thickness. RoadScan 30 can collect data at high resolution not obtainable using other labor-intensive methods. RoadScan data can be acquired at highway speeds, eliminating the need for lane closures and providing a safer working environment.

The RoadScan Advantage

The RoadScan system, with available accessories, includes all the components necessary to evaluate subsurface layers of roads. The SIR® 30 control unit is a configurable multi-channel system, allowing users the ability to operate one to eight antennas simultaneously at posted speeds. With RoadScan, users can collect data every 6 inches instead of coring every few thousand feet on the road. RoadScan provides more consistent information about the pavement thickness and subsurface conditions than traditional coring, leading to better planning and budgeting for repairs.

MAX DEPTH 91 cm (3 ft)	**ANTENNA OPTIONS/ ANTENNA FREQUENCY** 2 GHz, 1 GHz
WEIGHT 49.8 kg (110 lbs)	**STORAGE CAPACITY** 250 GB
OPTIONAL SOFTWARE RADAN 7, RADAN 7 RoadScan Module	**ACCESSORIES** Antenna vehicle front mount, Antenna vehicle trailer mount, Multiple GPS options

ROADSCAN FEATURES

Non-Destructive Pavement Testing RoadScan can quickly collect pavement layer thickness data. This system acquires data at high speeds, which eliminates the need for lane closures and provides a safer working environment. Evaluating failures of the road subsurface to ensure the road is repaired in the correct spots will help reduce coring.

Quantifiable Data Ground penetrating radar (GPR) offers users a quick and effective way to determine pavement layer thickness. Inspecting with RoadScan prior to beginning a project will ensure better inspection and a fuller picture of the road from sublayer to top mat. Since this system can see 18 inches down to evaluate base and sub-base layers, you'll be able to identify potential issues that aren't visible on the surface.

Deliver Pavement Evaluation Results Data can be easily exported as ASCII output files for simple data transfer to other software programs. Or, migrate data results as a Google Earth .kml file for enhanced visualization.

TYPICAL USES

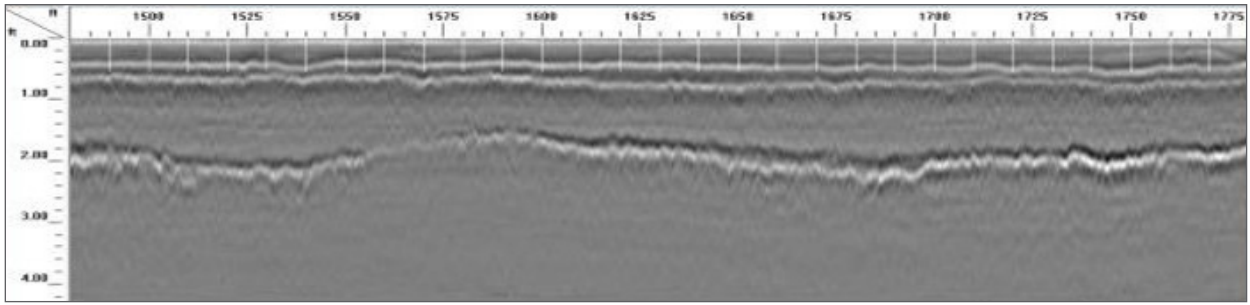
- NDT road evaluation
- Measure pavement thickness
- Evaluate base and sub-base conditions
- Measure asphalt prior to milling operations
- Determine areas to core

FCC, RSS-220 and CE Certified

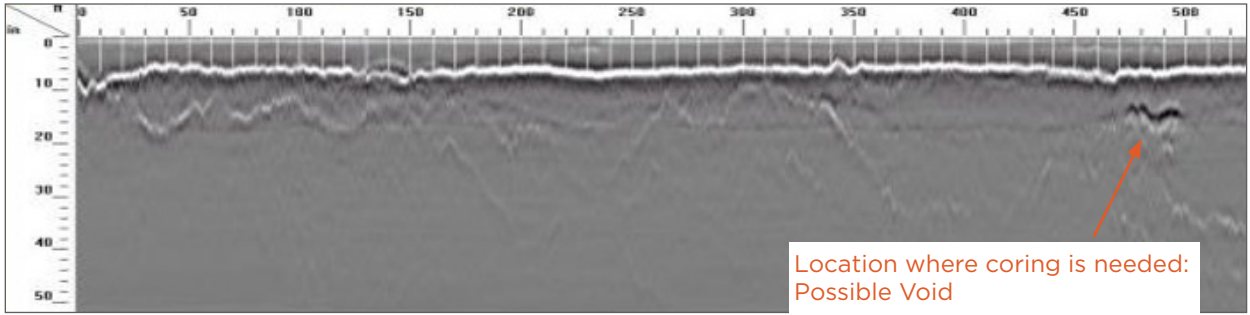
RoadScan™ 30

EVALUATING ROADSCAN DATA

Locating Areas of Concern for Further Investigation



Data example above shows a road in relatively good condition.
Note the clean interfaces between layers.



Data example above shows a road that needs further evaluation.
Interfaces between layers are rugged and missing in places.

BridgeScan™

GPR BRIDGE INSPECTION EQUIPMENT

The BridgeScan™ is a complete, affordable GPR system that provides an effective tool for quickly determining the condition of aging bridge decks, parking structures, balconies and other concrete structures. This system is also used to obtain accurate concrete cover depth on new structures.

The BridgeScan Advantage

The American Society of Civil Engineers reported that as of 2016, the average bridge in the U.S. is 43 years old and an increasing number of bridges will soon need major rehab or retirement (ASCE, 2017). Traditional bridge deck inspection methods, like hammer soundings and chain dragging, rely on a person to interpret acoustical feedback to determine good and bad areas of concrete.

The application of BridgeScan provides an accurate condition assessment of a bridge deck as well as other reinforced concrete structures.

MAX DEPTH 30 cm (12 in)	**ANTENNA FREQUENCY** 1600 MHz
WEIGHT 24.9 kg (55 pounds)	**STORAGE CAPACITY** 32 GB
SOFTWARE RADAN® 7 & Bridge Assessment Module	**ACCESSORIES** No accessories needed

BRIDGESCAN FEATURES

Acquire Data BridgeScan can identify areas of deterioration inside reinforced concrete bridges. The GPR system makes overlay thickness and concrete cover depth measurements easy to achieve and automatically accommodates for the bridge skew angle.

Cost Effective Bridge Surveys With BridgeScan, repair costs can be estimated accurately, saving project time and money for Departments of Transportation and pavement contractors.

Record Results Data can be easily exported as ASCII .csv output files for simple data transfer to other software programs. Or, migrate data results as a Google Earth™ KML file for enhanced visualization.

TYPICAL USES

Bridge deck condition assessment

Void detection and location

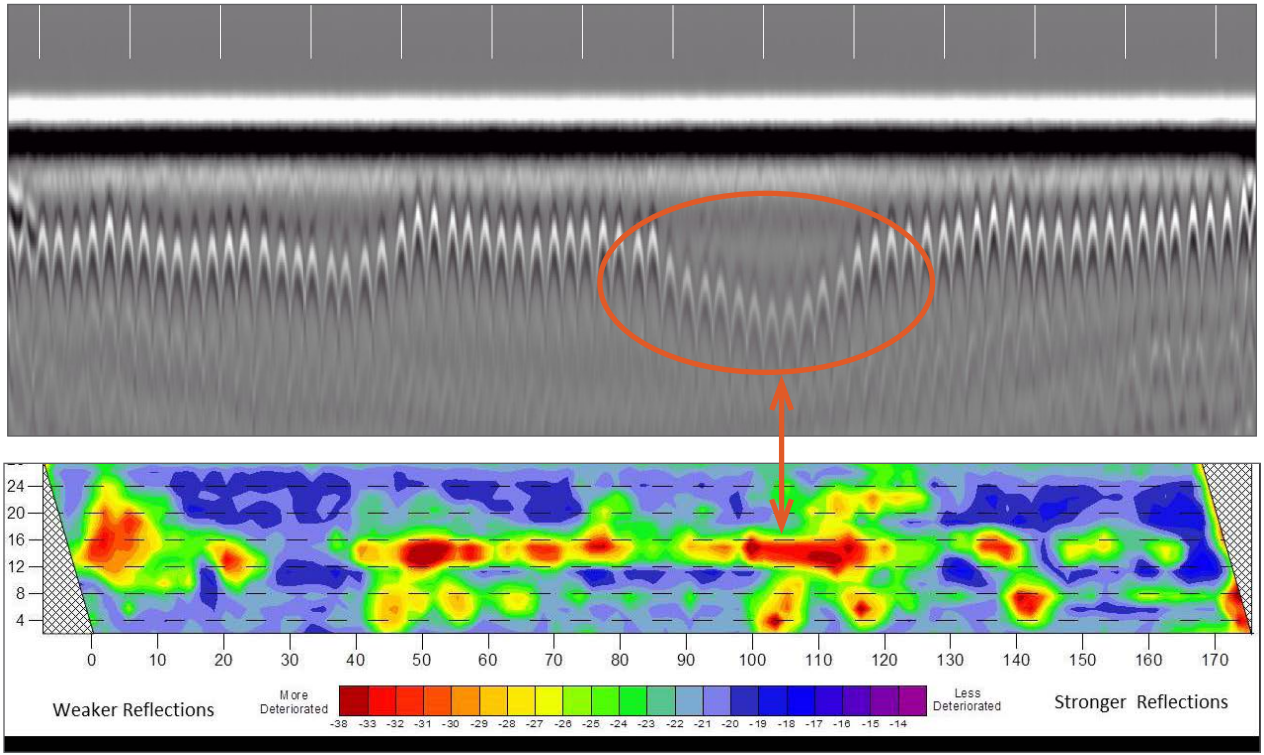
Measure concrete thickness

Inspection of other reinforced concrete structures

FCC, RSS-220 and CE Certified

BridgeScan™

DETERIORATION MAP



Data example on top shows the correlation between the raw data (very dim rebar) and the output to third party contour mapping software program. This shows areas of more deterioration (red, yellow..) and less deterioration (blue, light blue..)

StructureScan™ Mini XT

COMPLETE GPR SYSTEM FOR CONCRETE INSPECTION

The StructureScan™ Mini XT is the tool designed for today's professional concrete scanner and built to handle all your job site and survey needs. This rugged system is designed with an integrated display for single operator data collection and interpretation. Reduce safety risks, financial exposure, and costly delays and provide the full range of services to your customers by adding this concrete scanner to your toolbox.

The Mini XT Advantage

The StructureScan Mini XT is ideal for concrete inspection and evaluation. Easily and accurately locate the position and depth of metallic and non-metallic objects in concrete structures, including rebar, conduit, post-tension cables, pan decking, voids and service utilities.

MAX DEPTH 50 cm (20 inches)	**ANTENNA FREQUENCY** 2700 MHz
WEIGHT 1.8 kg (4 pounds)	**STORAGE CAPACITY** 14.5 GB
OPTIONAL SOFTWARE RADAN 7 for StructureScan Mini	**ACCESSORIES** Palm XT Antenna, LineTrac XT, Accessory Pole

STRUCTURESCAN MINI XT FEATURES

Enhanced Target Visualization

The StructureScan Mini XT provides excellent near-surface resolution while also maintaining the ability to see deeper targets. The Mini XT provides multiple modes for data collection and interpretation:

Scan EZ: With the press of just one button, this mode provides the ideal amount of information with 2D data views for efficient mark-and-go surveys

Scan Max: Focus mode is designed to simplify the data to better highlight embedments, locate voids and see closely spaced targets

Scan 3D: 3D visualization is often used in complicated structural scenarios where the survey area may contain multiple levels of targets. This mode helps the user visualize congested areas and non-linear targets

Increase Job Site Efficiency with Mini XT Kit

Today's professional scanners need a variety of tools to conquer all job site obstacles. For large survey areas, the extension pole allows for better ergonomics and ease of use. Using the Mini XT harness and Palm XT antenna together allows the user to collect data with one-hand operation ensuring you maintain three points of contact to comply with OSHA regulations.

TYPICAL USES

Find Rebar, Post Tension, Conduits, and Non-metallic Objects

Measure Slab Thickness and Void Location

Concrete Scanning and Imaging

Condition Assessment

Structure Inspection

FCC, RSS-220 and CE Certified

StructureScan™ Mini XT

ACCESSORIES

2300 MHz – Palm XT Antenna

Palm XT gives users the ability to scan tightly spaced areas and between obstacles. The survey wheel orientation can quickly be rotated between three positions for increased survey flexibility. This feature also makes it simple to switch between standard and cross polarized data collection.

- Cross Polarization scanning can reduce the top layer of mesh from view and assist with material discrimination
- Full keypad control via the antenna top provides remote control of the user interface

LineTrac XT

LineTrac XT adds the ability to detect AC power present in conduits. This accessory detects low amplitude AC signals associated with difficult to locate conduits.

- Seamless fusion with GPR data
- Aids in target discrimination
- Detection at 50/60 Hz
- Rugged, IP65 rated enclosure

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07.25.2023
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