


FUGRO ROADWARE
EXPERIENCE. INNOVATION. SERVICE

A large, colorful aerial map showing geospatial data. The map features a complex network of red and orange lines and patches, likely representing terrain or infrastructure. A prominent blue and purple area on the right side suggests a coastal or underwater environment. The overall image is a composite of various data layers, typical of geospatial analysis.

Our mission is to be the **world's leading service provider** in the collection and interpretation of **data relating to the Earth's surface and sub-surface**, and in the support of **infrastructure developments** on land, at the coast and on the seabed.

Why Pavement Management?

Optimize Use of Current Funding

- Repair and preserve more streets
- Provide higher level of service
- Reduce Complaints
- Improve safety

Justify Increased Funding

- Provide support for valuable, long-term investments
- Influence key decision-makers with factual information



Define Objectives

- Organize Files?
- Optimize Budgets?
- Optimize Maintenance and Rehabilitation Strategies?
- Documentation for Agency Administrators?

As Yogi Berra aptly said:

“If you don’t know where you’re going, you might wind up someplace else”





- 45+ years of Pavement & Asset Management Services
- Established in 1969
- 1977 – Automatic Road Analyzer (ARAN) developed
- 1995 – Automated Wisecrux Software developed
- 2011 – Vision & iVision Software developed
- 2013 – ARAN 7000 developed
- 2015 – LiDAR & 3D Vision

AUTOMATIC ROAD ANALYZER (ARAN)

> LIDAR

Mobile Laser Mapping System, an optical sensing technology, determines the position, orientation, and other characteristics of pavement and roadside objects.

> POSITIONING – INERTIAL

Provides real-time ARAN position and orientation tracking, combining data from tactical-grade fiber optic gyros, accelerometers, differential GPS and DMI.

> POSITIONING - GPS

ARANs are equipped with a differential Global Positioning System integrated with a DMI and Inertial Measurement System that will fill in the gaps in the event of lost satellite reception.

> PAVE3D TEXTURE (Option 2)

Pave3D sensors calculate full lane width texture measured in 5 AASHTO standards.

> PAVEMENT DISTRESS

The ARAN's Pave3D subsystem collects 3D profile data, which is used for automated distress detection and image display.

> RUTTING

The Pave3D System accurately measures the transverse profile of the road with 4000 points over 4 meters.

> ROUGHNESS

The Laser SDP measures longitudinal road profile in real-time Class I roughness index calculation.

>TEXTURE (Option 1)

Smart Texture measures the mean profile depth of the road surface macrotexture.

> POSITIONING - DMI

The Distance Measuring Instrument measures linear distance travelled. It also acts as a GPS position backup, in the event of a poor satellite connection, the DMI and Inertial Reference System will fill in the gaps.

> RIGHT-OF-WAY VIDEO

ARANs can be outfitted with up to six 4K cameras to capture right-of-way images, allowing a virtual road view from the comfort and safety of an office.

> GPR

Ground Penetrating Radar detects changes in road structure, including material thickness, composition and condition.



ARAN POSITIONING DATA: GPS & DMI

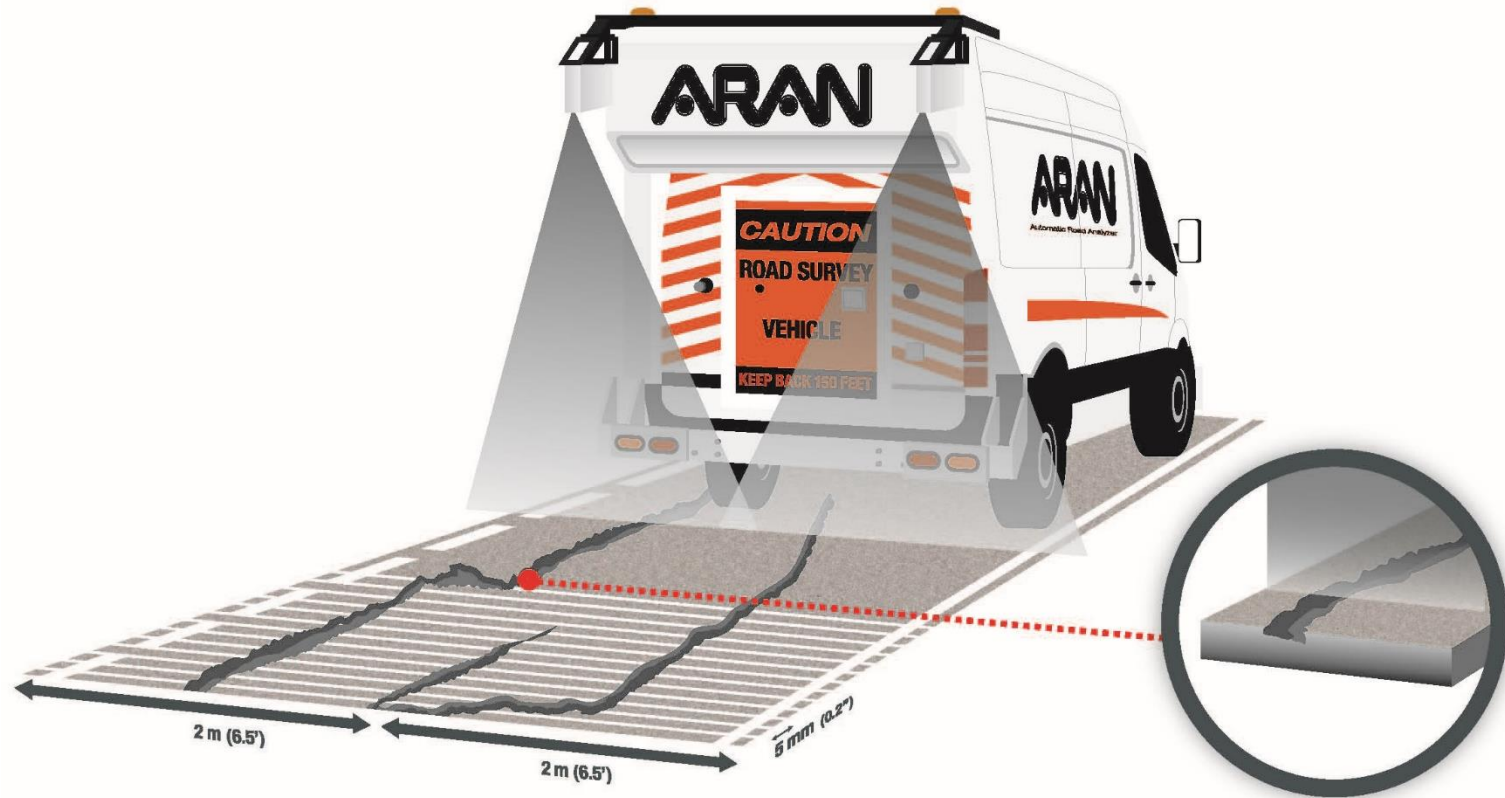


- System: Applanix
- Internal Measurement Unit (IMU)
- POS unit mounted in Rack
- Dual GPS 12-channel Antennas

- The DMI, mounted on the left rear driving wheel, utilizes a precision optical shaft encoder
- Records 2,000 pulses per revolution
- Accuracy: $\pm 0.02\%$ of the linear distance traveled
- Measurements down to 20 km/h (12.5 mph) or lower



Pave3D: LASER CRACK MEASUREMENT SYSTEM



- Crack Detection >2mm (0.08")
- 1 mm (0.04") Resolution
- 4160 point Rutting
- MacroTexture (MPD)
- 3D & 2D Data:
 - Pot Holes
 - Patching
 - Ravelling
 - Lane Markings

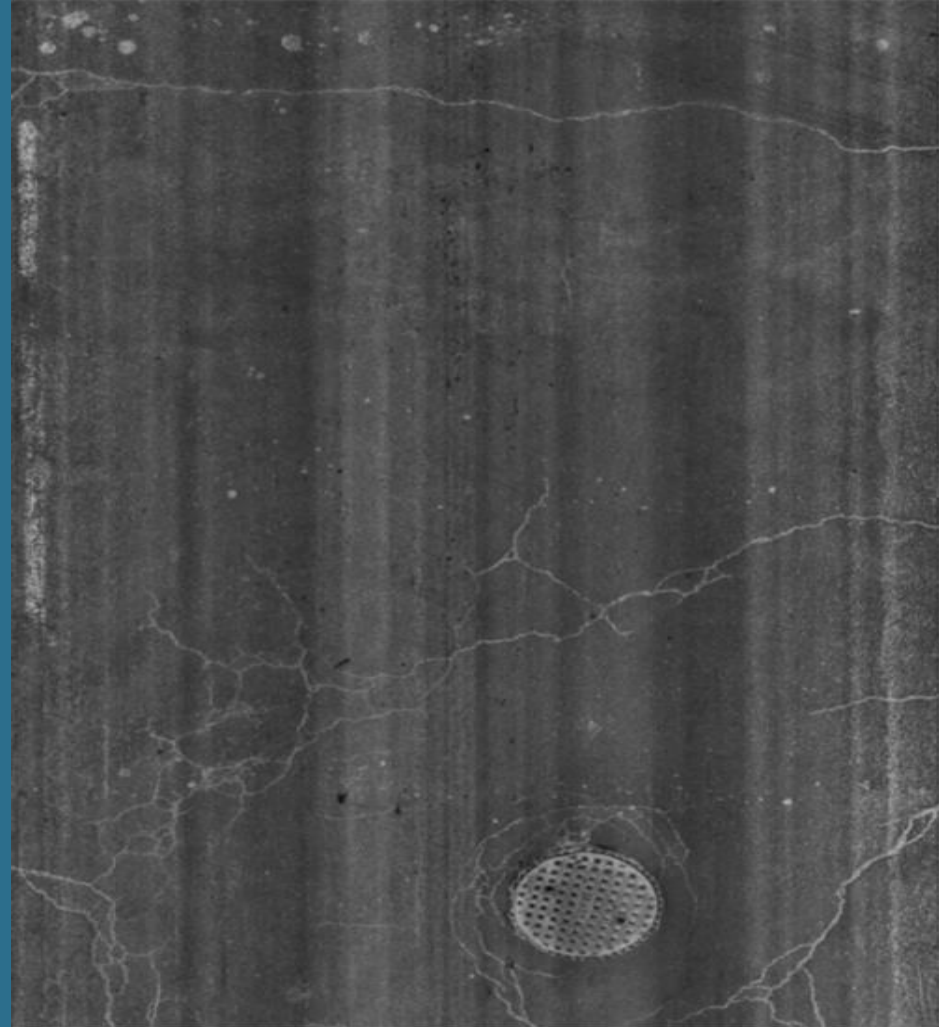
Advances in identifying crack length, width, & type

3D Scanning Laser:

- Similar to conventional process, but with added detail to reduce errors

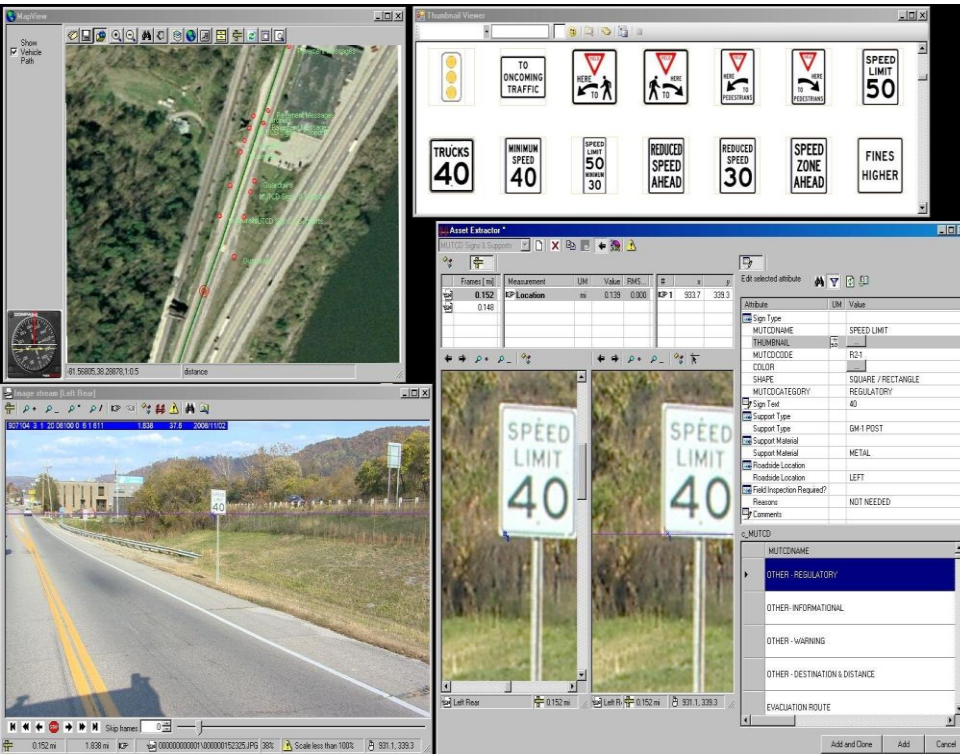
Conventional:

- Flat images
- Automatic crack detection
- Manual Intervention





- True High Definition (1920 x 1080) 3 Sensor Broadcast Quality Cameras
- Continuous Imaging at Various Intervals
- Wide angle HD images (Field of View 90° +)
- Shutter speed, 1/1000 of a second, to capture crisp image at posted roadway speeds
- Multiple configurations



ASSET MANAGEMENT:

- Complete roadside *Asset Inventories* extracted from specially-calibrated digital videolog images
- Can include type, location (GPS & linear), condition, measurements, unique identifiers, etc.
- Export to GIS or AMS software

The screenshot displays the iVISION web application interface. At the top, there is a browser address bar showing 'http://aran.cio.gov.ns.ca/ivision/#/Home'. Below the browser, the application has a menu bar with 'File', 'Edit', 'View', 'Favorites', 'Tools', and 'Help'. A toolbar includes 'Workspaces', 'Map', 'Cameras', 'Tables', 'Charts', and 'Sync'. The main interface is divided into several panels:

- Map Panel:** Shows a map of a region with various roads highlighted in different colors. A popup window displays metadata for a selected asset:
 - Collection name: Roads_2017
 - IDAsset: 7007
 - Status: Planned
 - Duration: Single-Year
 - Const_Type: Repaving 100 S
 - Descriptio: Highway 102: fr
 - Publicatio: 2016-2017
 - Capital_Ex:
- ROW 2014 Panel:** Shows a perspective view of a road labeled 'Ivy 102' with a distance of 4.989 kms.
- LCMS3D Panel:** Shows a cross-section of the road surface with elevation markers ranging from 4.992 to 4.996.
- Ruts (Segments) Panel:** A line graph showing 'Primary' values on the y-axis (0.000 to 30.000) against 'Chainage' on the x-axis (0 to 40000).
- Table Panel:** A table listing bridge assets with columns for Structure#, Structure#, LocationDe, Watercours, MainSpanCo, Constructe, AADT, Status, Duration, and Const_Type.

Structure#	Structure#	LocationDe	Watercours	MainSpanCo	Constructe	AADT	Status	Duration	Const_Type
CUM118	MALAGASH STA	Malagash Station Road - 0.1 km south from Malagash Station Road	Dewer River	Steel Fence & Post	1912	0	Planned	Single-Year	Other Bridge Pr
YAR005	Salmon River Bridge	Trunbk 1			0	850	Planned	Single-Year	Major Bridge Pr
YAR069	Cape Forchu Bridge	Route 304			0	350	Planned	Single-Year	Other Bridge Pr

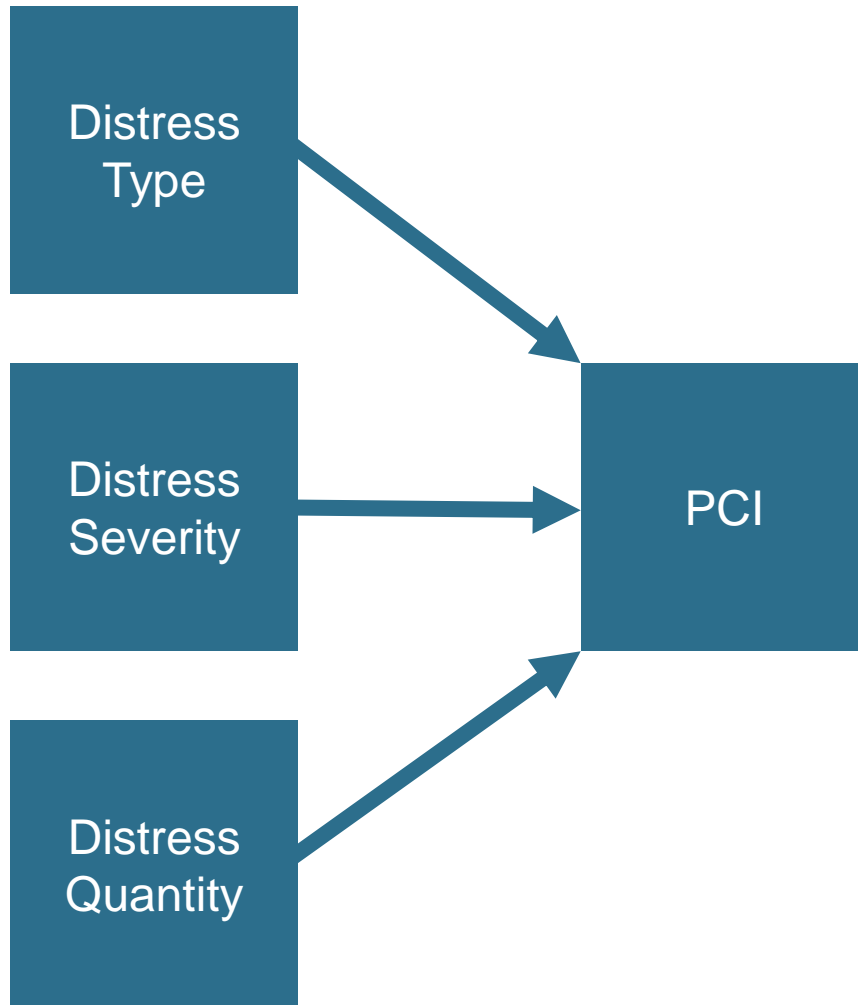
- ## FEATURES OFFERED:
- Web Application
 - Synchronized Viewing
 - Right-of-Way Images
 - Pavement Images
 - Assets & Performance
 - User Management
 - Thematic Mapping

PAVEMENT MANAGEMENT

- Longitudinal Profile & Roughness
- Transverse Profile & Rutting
- Surface Distress Rating
(Cracking, Potholes, etc.)
- Rated according to any protocol
(MTC, ASTM D6433
(MicroPaver), FHWA, etc.)
- Able to upload into any PMS
(CartêGraph, MicroPaver,
Cityworks, etc.)

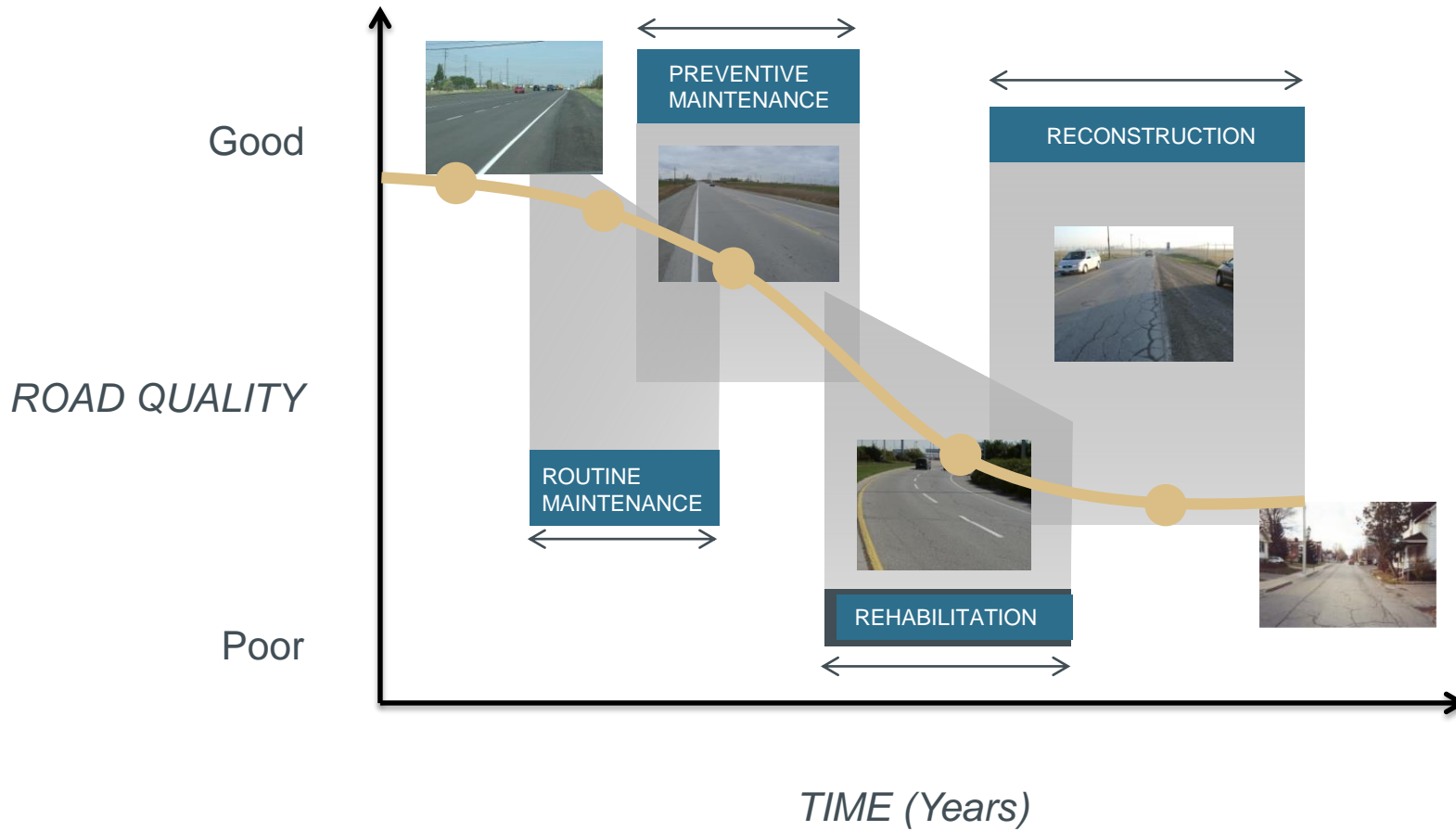


PAVEMENT CONDITION INDEX

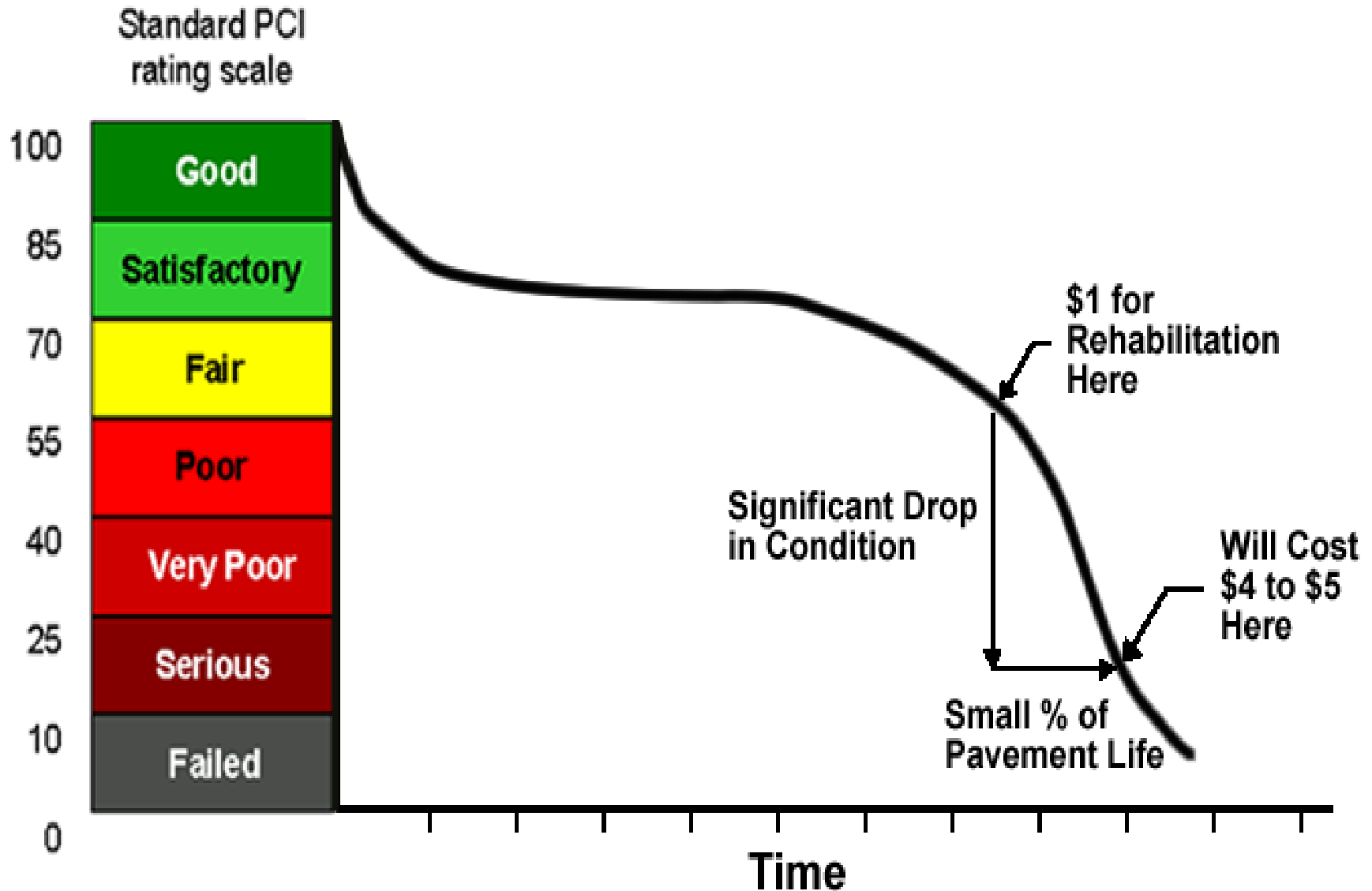


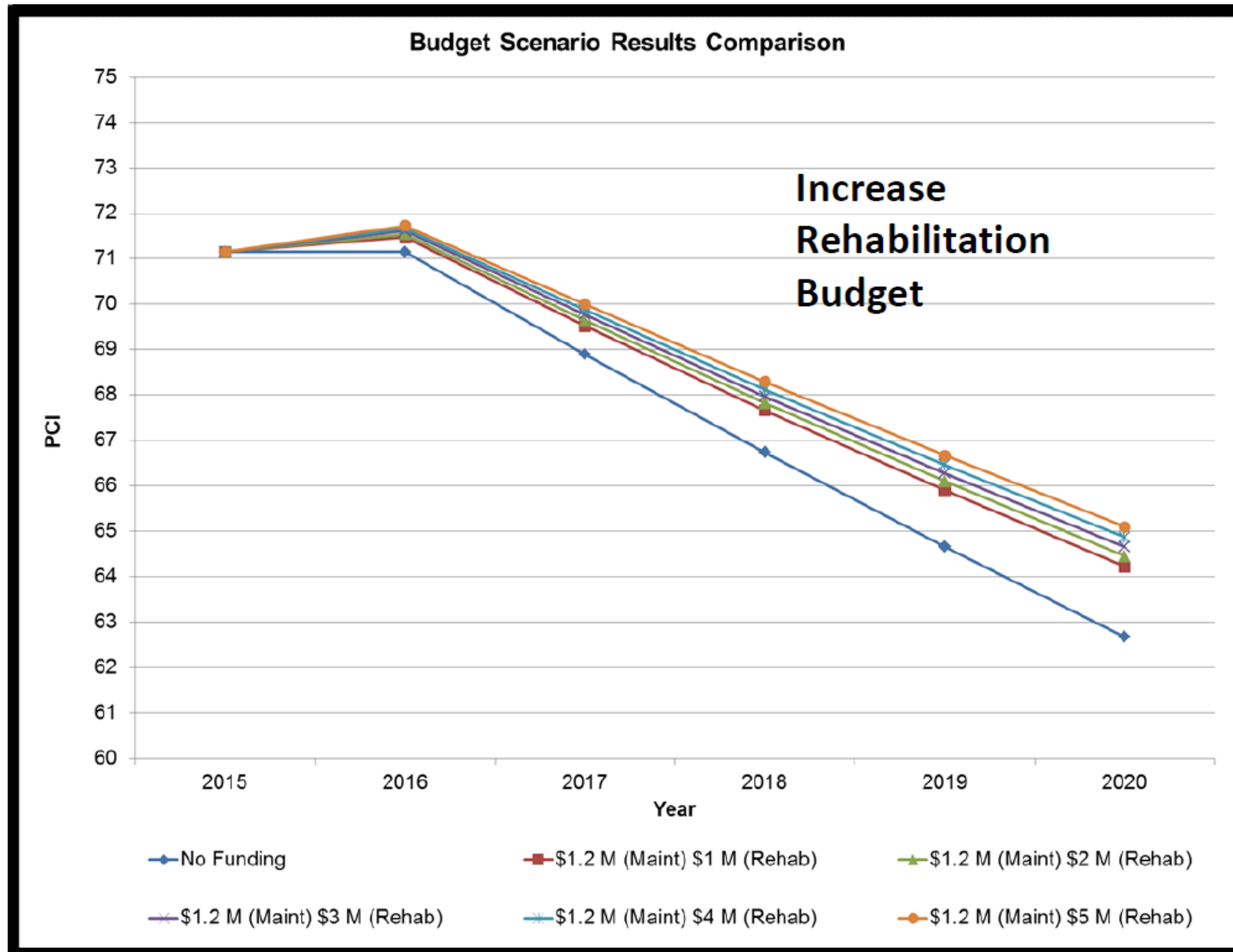
PCI	Pavement Rating
85-100	Good
70-85	Satisfactory
55-70	Fair
40-55	Poor
25-40	Very Poor
10-25	Serious
0-10	Failed

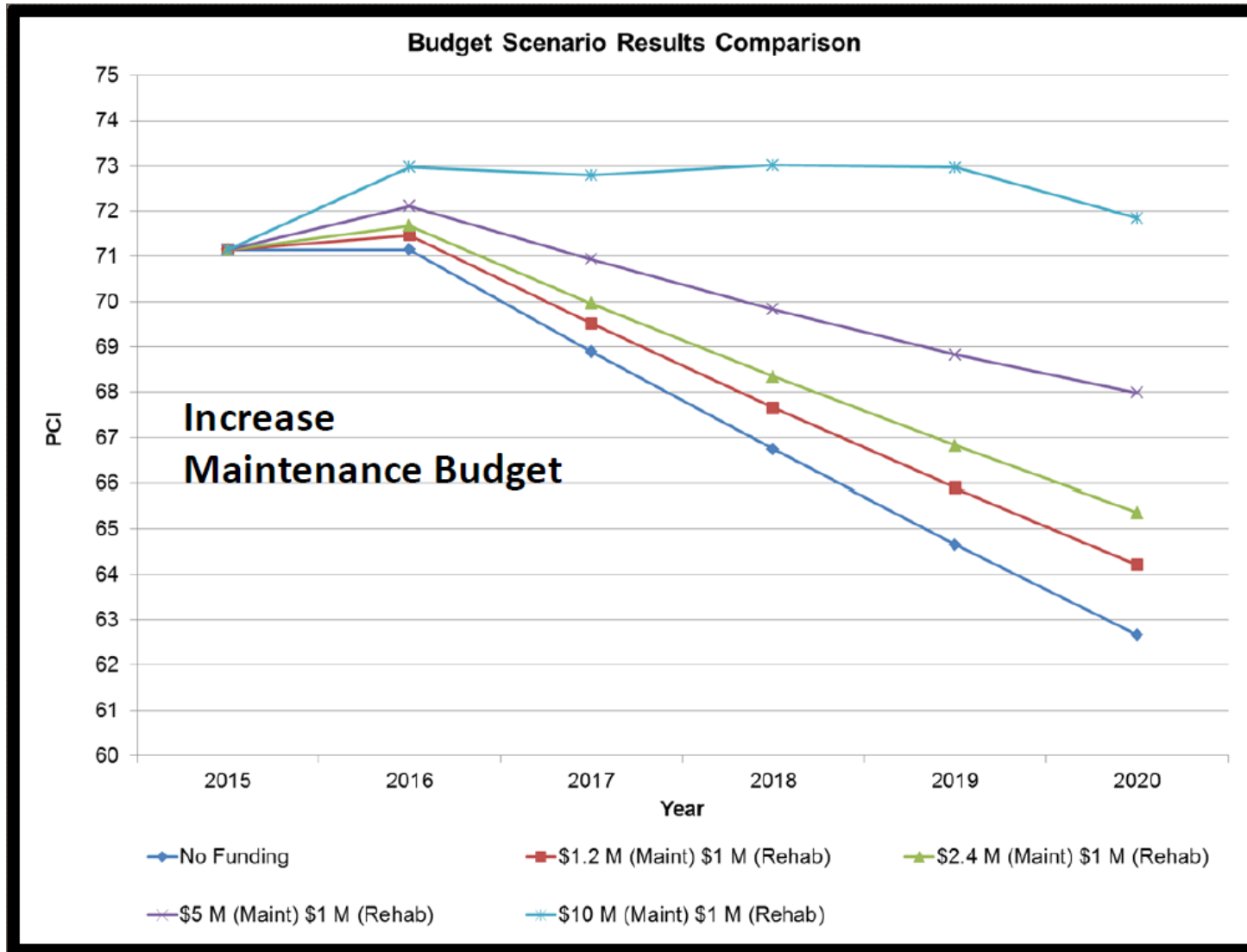
COST EFFECTIVE MAINTENANCE

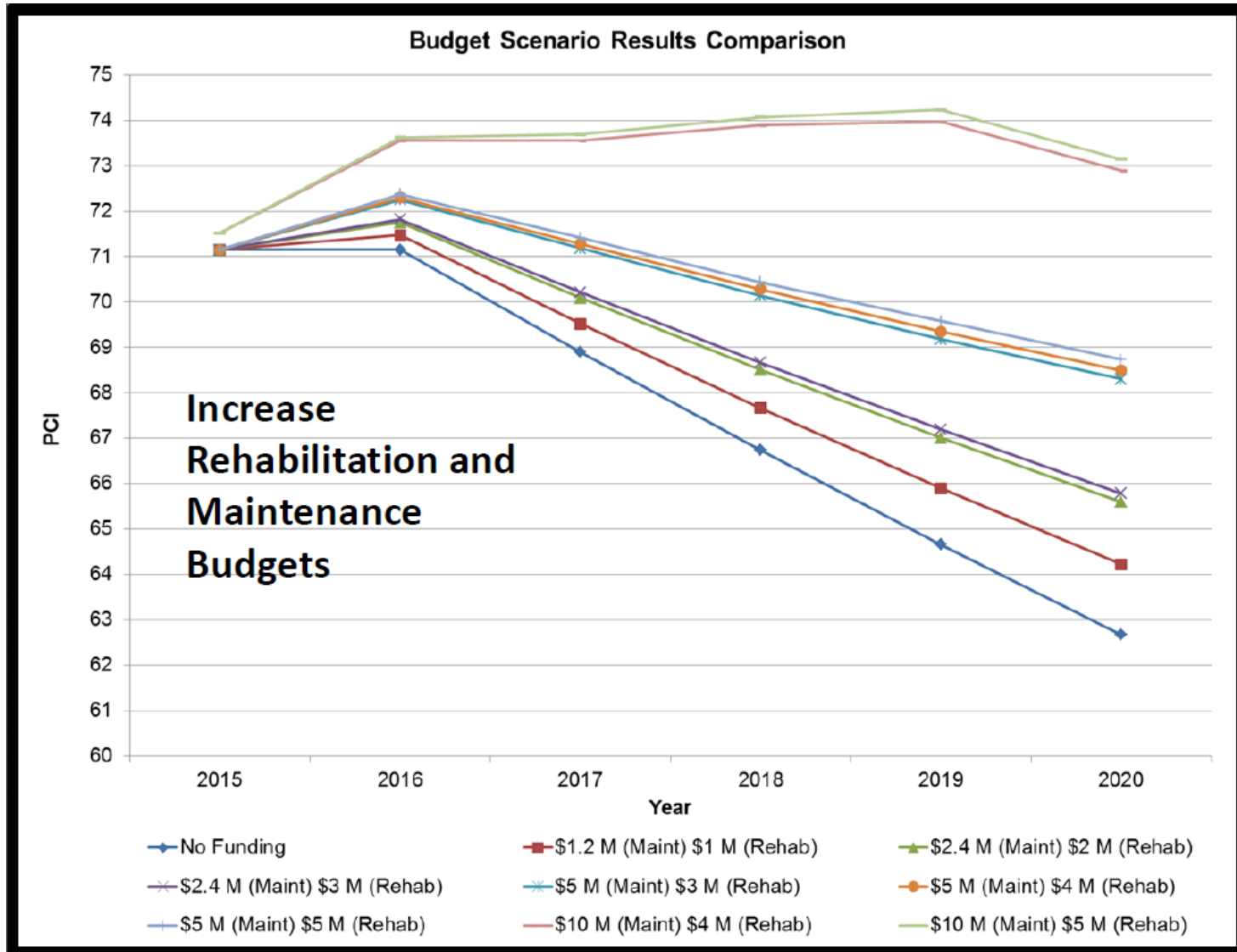


IMPACT OF TIMING ON COST









Contact **Fugro Roadware** to see how we can help with your
Pavement or Asset Management needs!



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Questions?