

XIII Seminario ALACPA de Pavimentos Aeroportuarios  
XI Taller Federal Aviation Administration  
VI Curso Rápido de Mantenimiento  
de Pavimentos de Aeródromos  
29/11 al 02/12 2016 – Ciudad de Panamá - Panamá



# Pavement Condition Index (PCI)

**Scott Murrell, P.E.**  
**Director of Commercial Airport Services**

**Lia Ricalde**  
**Senior Civil Engineer**



# PCI Development

Originally developed for the US Air Force by the US Army Corps of Engineers (1976)

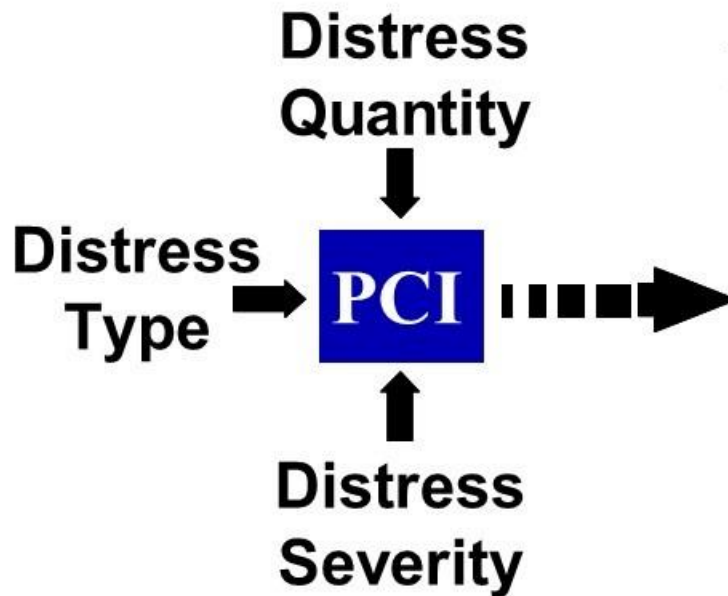
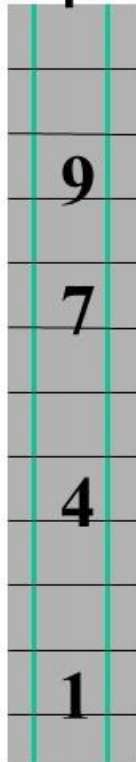
## Objectives:

- Standardized Condition Ratings
- A method for comparing the condition of different pavement sections.
- A means to provide feedback on pavement performance



# Calculating PCI

Sample Units





Designation: D5340 – 12

## Standard Test Method for Airport Pavement Condition Index Surveys<sup>1</sup>

This standard is issued under the fixed designation D5340; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of airport pavement condition through visual surveys of asphalt-surfaced pavements, including porous friction courses, and plain or reinforced jointed portland cement concrete pavements, using the Pavement Condition Index (PCI) method of quantifying pavement condition.

2.1.2 *asphalt concrete (AC) surface*—aggregate mixture with an asphalt cement binder. This term also refers to surfaces constructed of coal tars and natural tars for purposes of this test method.

2.1.3 *pavement branch*—a branch is an identifiable part of the pavement network that is a single entity and has a distinct function. For example, each runway, taxiway, and apron areas



U.S. Department  
of Transportation  
Federal Aviation  
Administration

# Advisory Circular

**Subject:** Airport Pavement Management  
Program (PMP)

**Date:** 10/10/2014

**Initiated by:** AAS-100

**AC No:** 150/5380-7B

**Change:**

“If a pavement condition index (PCI) survey is performed, as set forth in ASTM D5340, Standard Test Method for Airport Pavement Condition Index Surveys, the frequency of the detailed inspections by PCI surveys may be extended to three years”

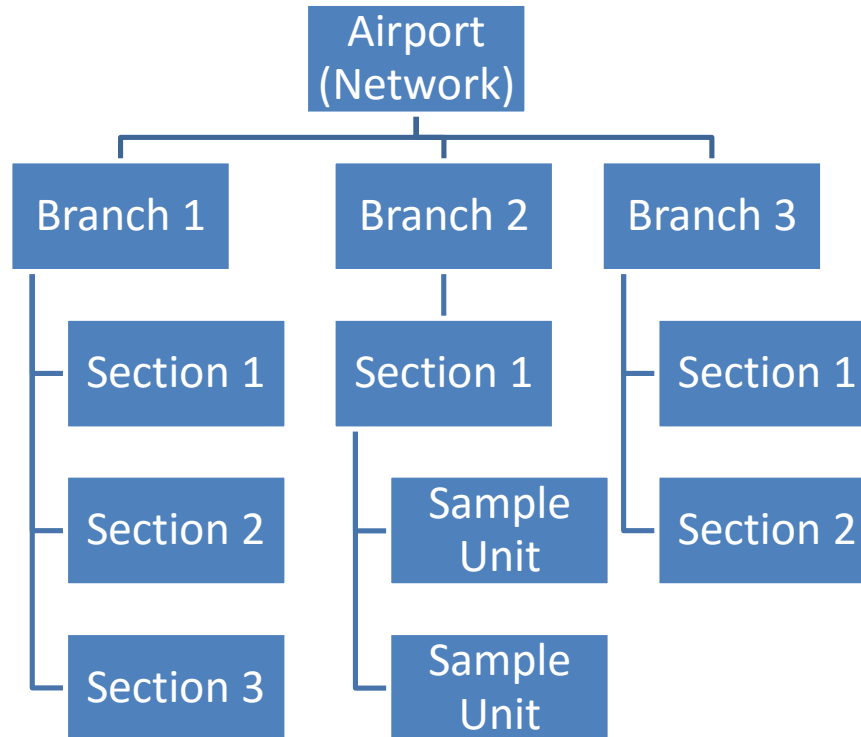


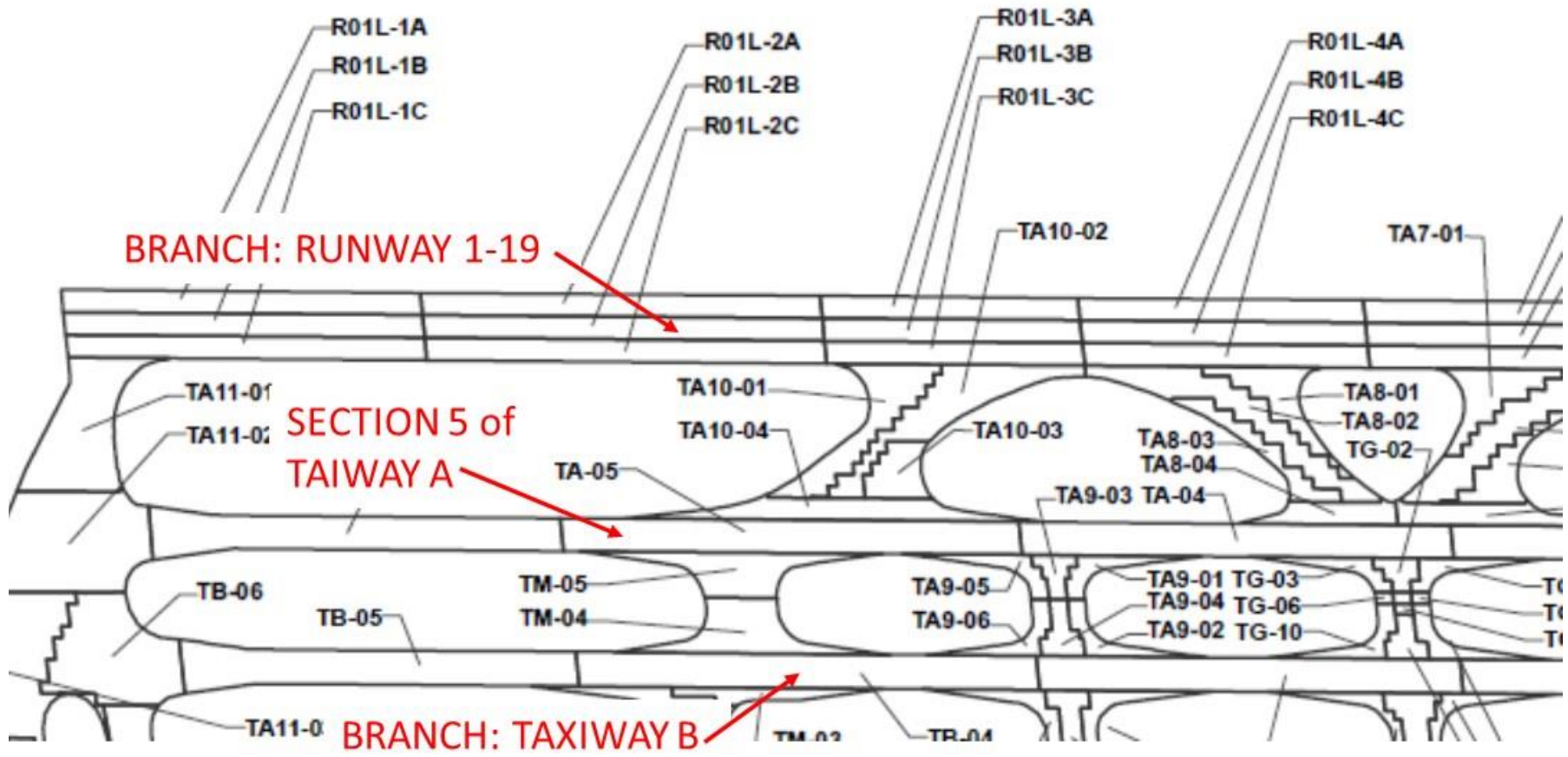
## Pavement Condition Index Determination Process (ASTM D 5340)

Divide Network (Airfield) into Branches ex. Runway 1, Taxiway B

Branches are Divided into Sections

Sections are Divided into Sample Units



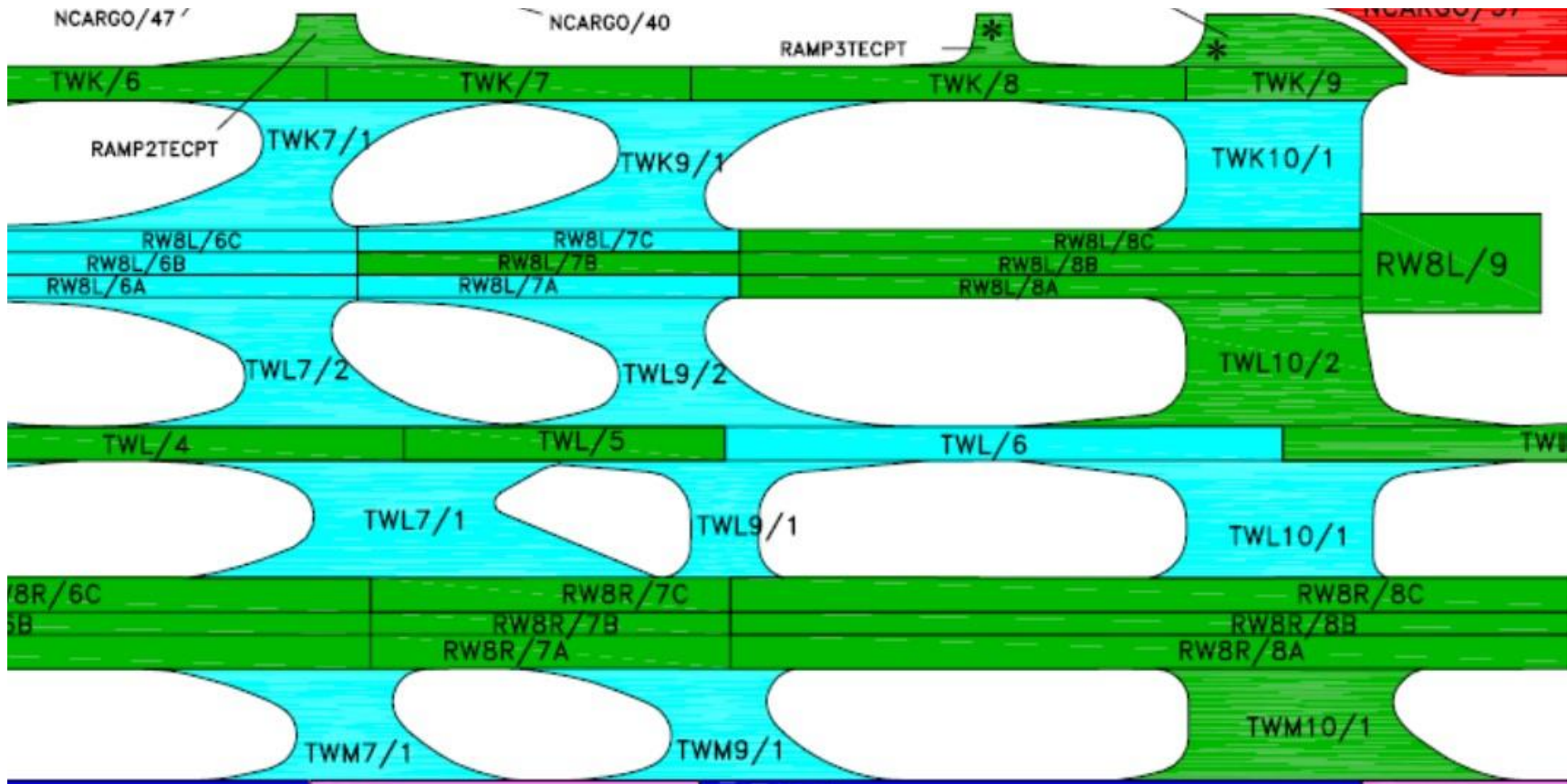




Branches  
are  
divided  
into  
sections  
based on :

- Pavement Design
- Construction History
- Traffic (Volume, Type)
- Condition

# Branches are Divided Into Sample Units





# Create Sample Units

Divide pavement sections into sample units for inspection

Asphalt

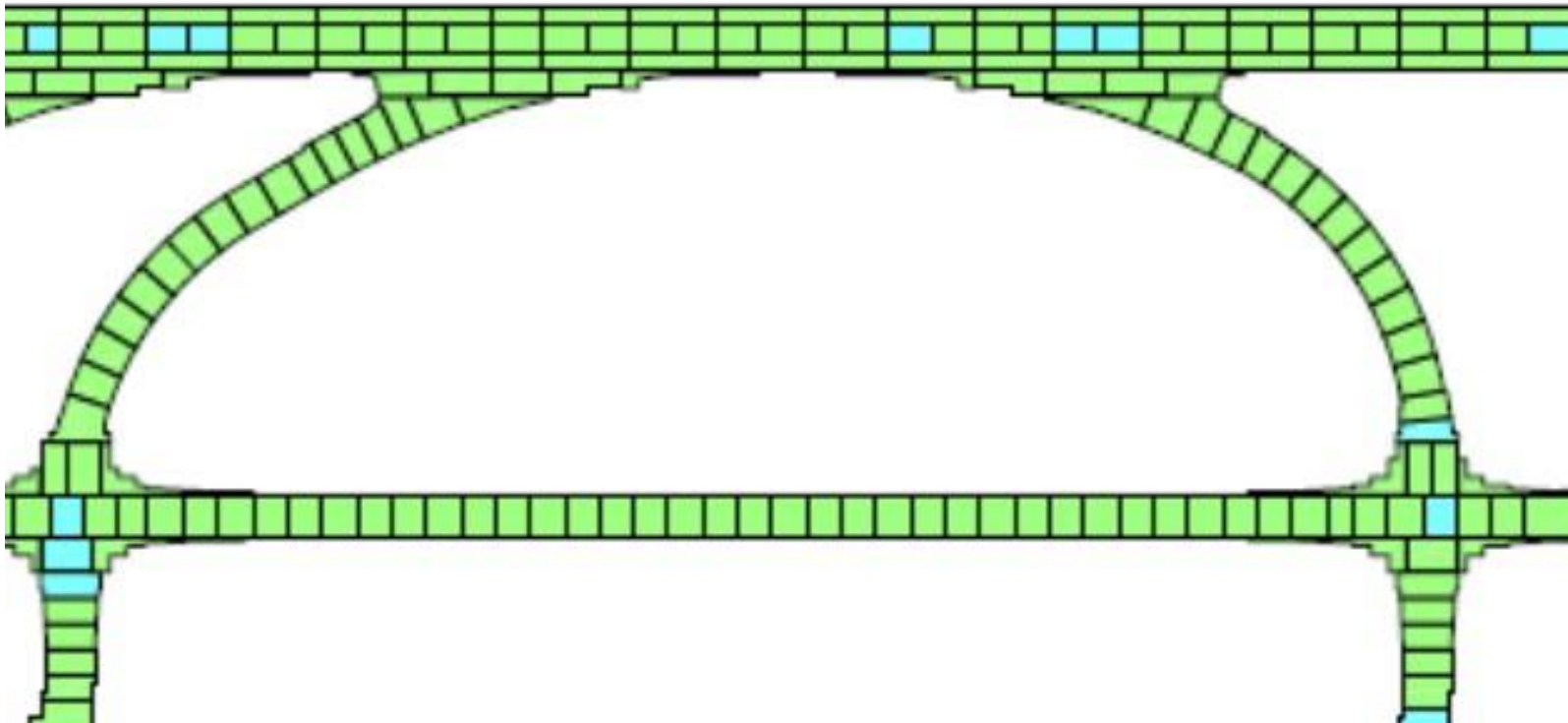
Subdivide into sample units consisting of 5,000 ft<sup>2</sup> / 500 m<sup>2</sup> of contiguous area ( $\pm$  2,000 ft<sup>2</sup> / 200 m<sup>2</sup>)

Concrete

Subdivide into sample units consisting of 20 contiguous slabs ( $\pm$  8 slabs)



# Divide Section Into Sample Units





# Determine Number of Sample Units to Inspect

## Total Sampling

- Total sampling is desirable for project analysis
- May not be feasible due to manpower, funds, and time required

## Partial Sampling

- Calculate the minimum number of random sample units  $n$  that must be surveyed to obtain a 95% confidence level

$$n = \frac{Ns^2}{\left(\left(\frac{e^2}{4}\right)(N-1) + s^2\right)}$$

# Perform Pavement Distress Survey on Sample Units





## Asphalt Distress Types

1. Alligator Cracking

2. Bleeding

3. Block Cracking

4. Corrugation

5. Depression

6. Jet Blast

7. Joint Reflection (PCC)

8. Long. & Trans. Cracking

9. Oil Spillage

10 Patching

11. Polished Aggregate

12. Raveling

13. Rutting

14. Shoving from PCC

15. Slippage Cracking

16. Swell

17. Weathering



## Portland Cement Concrete Distress Types

|                                     |                                    |
|-------------------------------------|------------------------------------|
| 1. Blow up                          | 9. Pumping                         |
| 2. Corner Break                     | 10. Scaling / Map Crack / Crazeing |
| 3. Long / Trans / Diagonal Crack    | 11. Settlement / Fault             |
| 4. Durability "D" Crack             | 12. Shattered Slab                 |
| 5. Joint Seal Damage                | 13. Shrinkage Crack                |
| 6. Patching (Small)                 | 14. Spalling-Joints                |
| 7. Patching (Large) and Utility Cut | 15. Spalling-Corner                |
| 8. Popouts                          | 16. Alkali Silica Reaction (ASR)   |



# Alligator Cracking - High

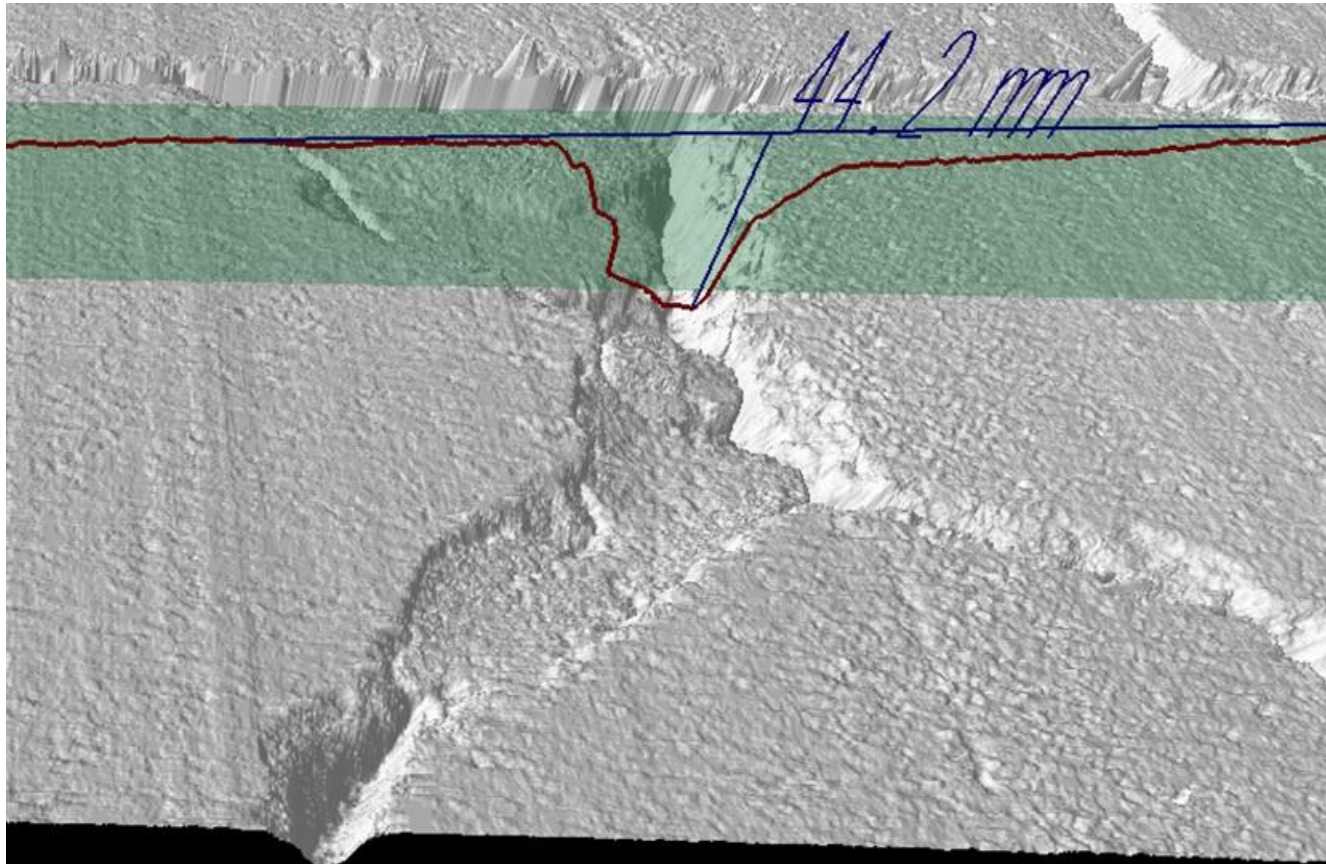




# Raveling - High



# 3D Laser Image







# QUESTIONS?

[smurrell@ara.com](mailto:smurrell@ara.com)

[lricalde@ara.com](mailto:lricalde@ara.com)