applied pavement TECHNOLOGY

# Photographic Comparisons Over Time

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Peter-Paul Dzwilewski, P.E.

# Outline

- Background
- Asphalt-surfaced pavement subgroups
  - Climatic distresses
  - Structural distresses
  - Other situations
- Concrete pavement subgroups
  - Structural distresses
  - Climatic distresses
  - Material distresses
  - Other situations
- Note: Pavement age at first inspection increases within each subgroup

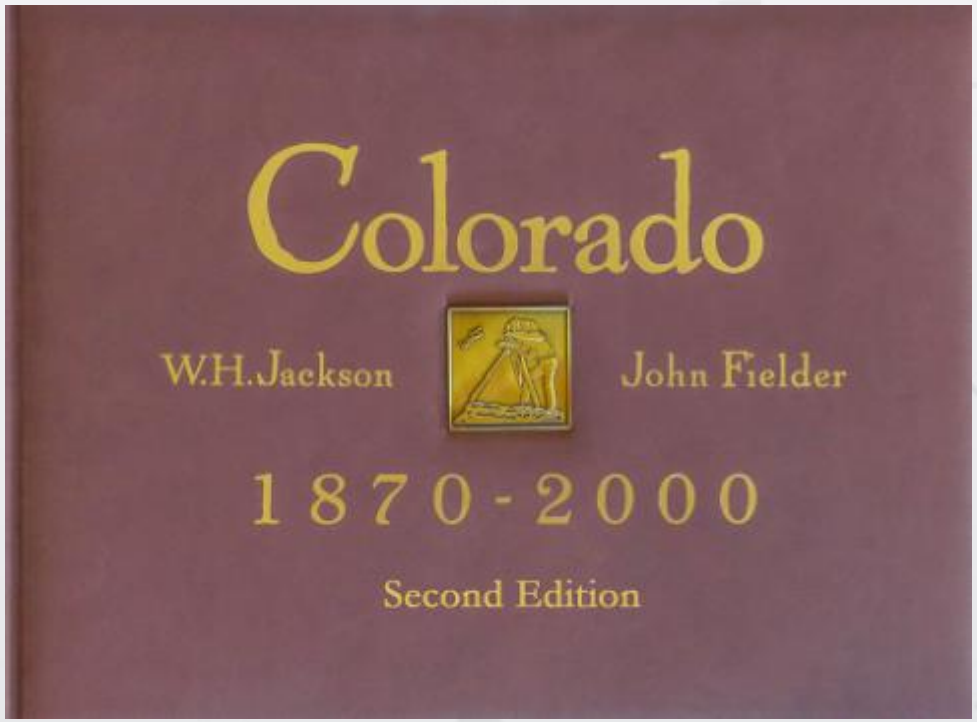
# Canadian Department of National Defence (DND)

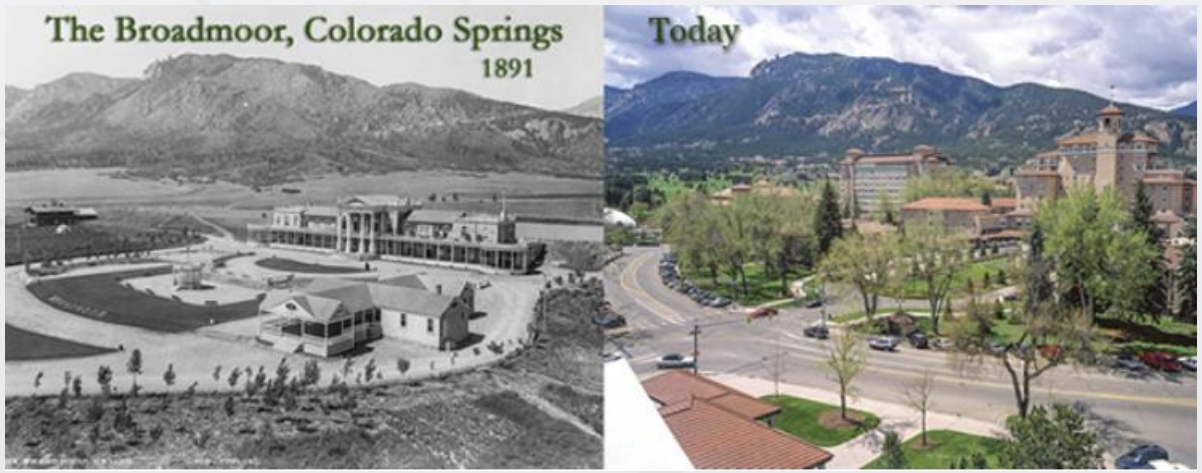
- DND has for twenty-five airfields/helidromes across Canada with varying:
  - Facility types
  - Typical aircraft and traffic patterns
  - Climates
  - Past construction history
  - Maintenance practices
- APTech has provided pavement management services for DND since 2012
  - First round of inspections in 2012 – 2013, 2015 – 2017
  - Second round of inspections in 2019, 2021 – 2023

# My Job Descriptions

- Pavement engineer
- Pavement inspector/surveyor
- Professional photographer?
- Pavement connoisseur?
- Pavement historian?

# Favorite Book in Dentist Waiting Room



# Distress – Duration Between Inspections

- First Inspection Photo

- Second Inspection Photo

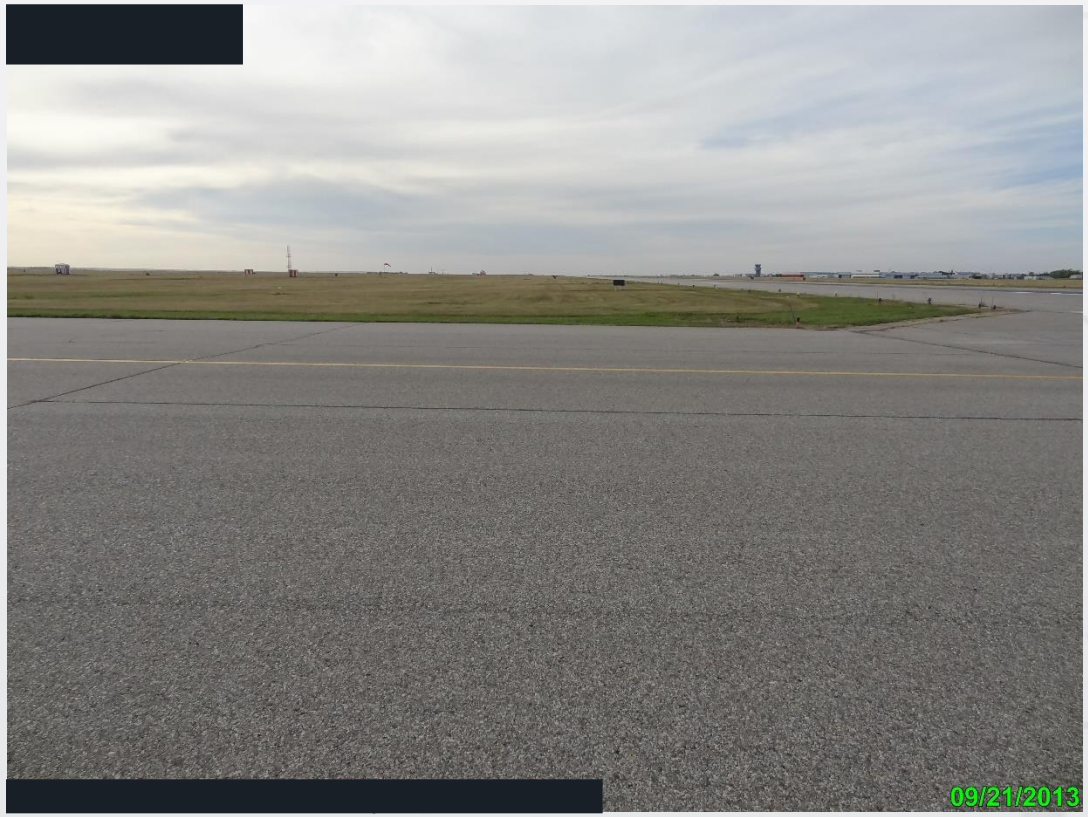
**Consider what changes are likely**

# Asphalt-Surfaced Pavement

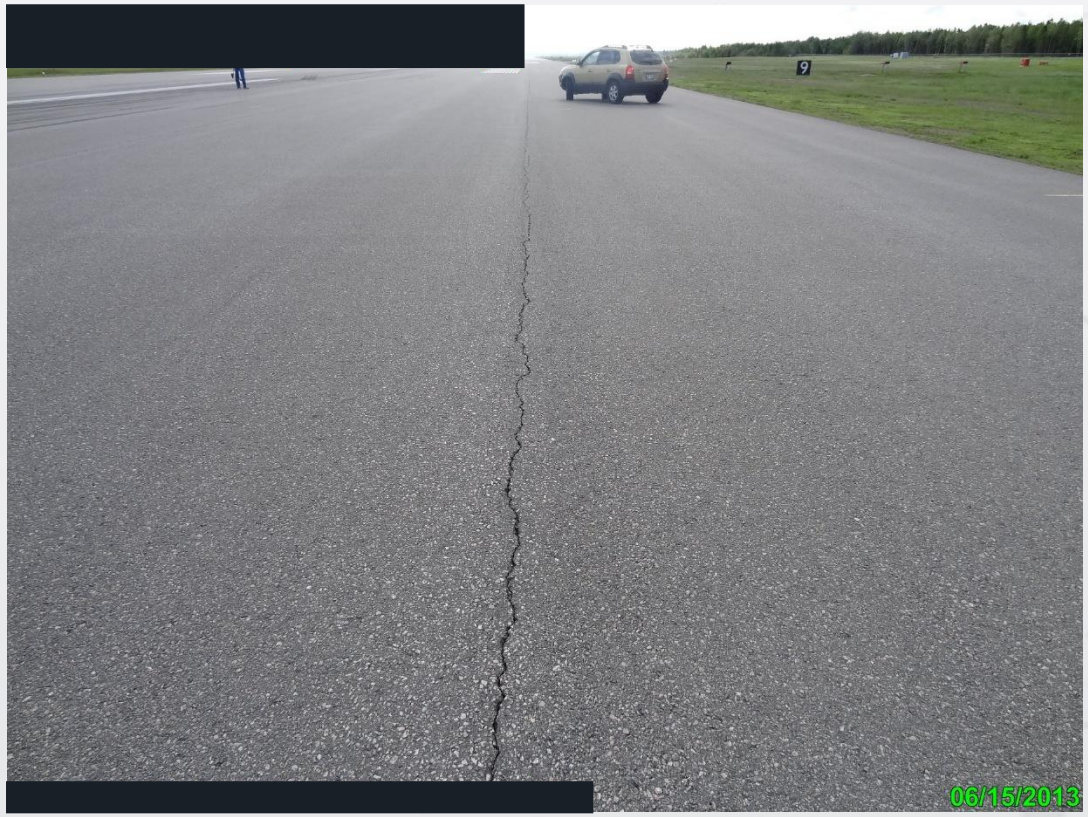
## CLIMATIC DISTRESSES

# L&T Cracking – 8 Years Later

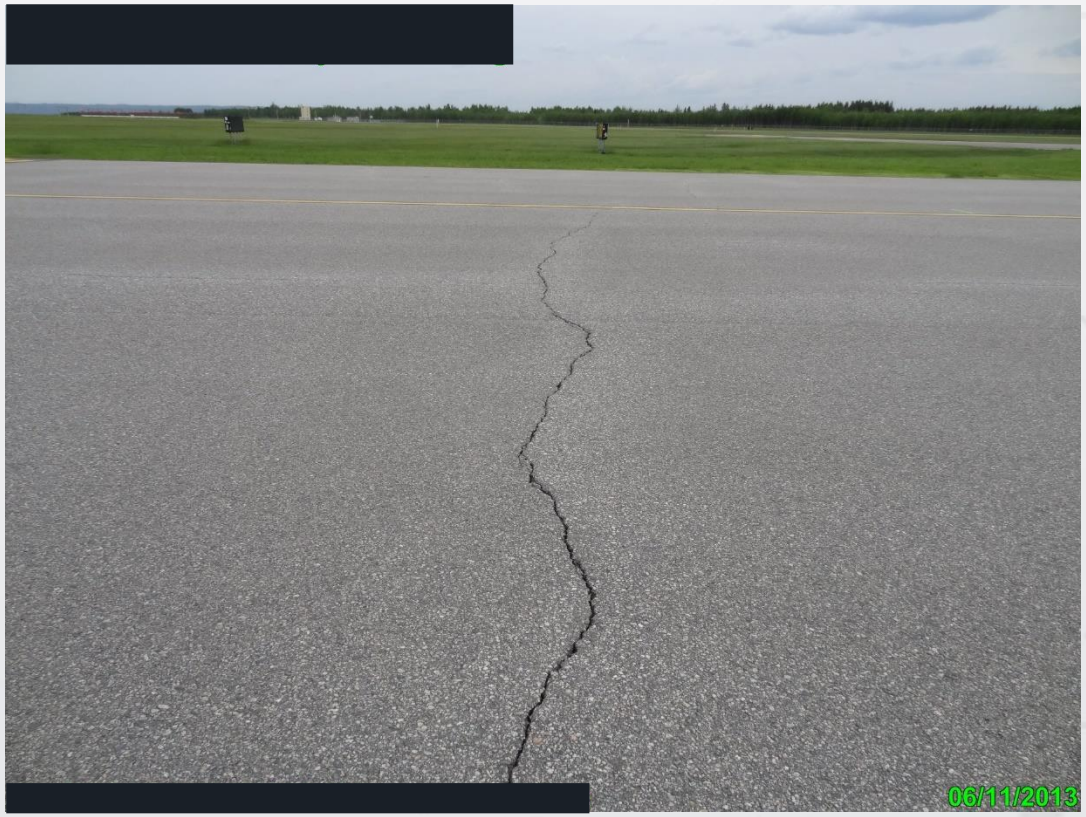

# L&T Cracking – 6 Years Later



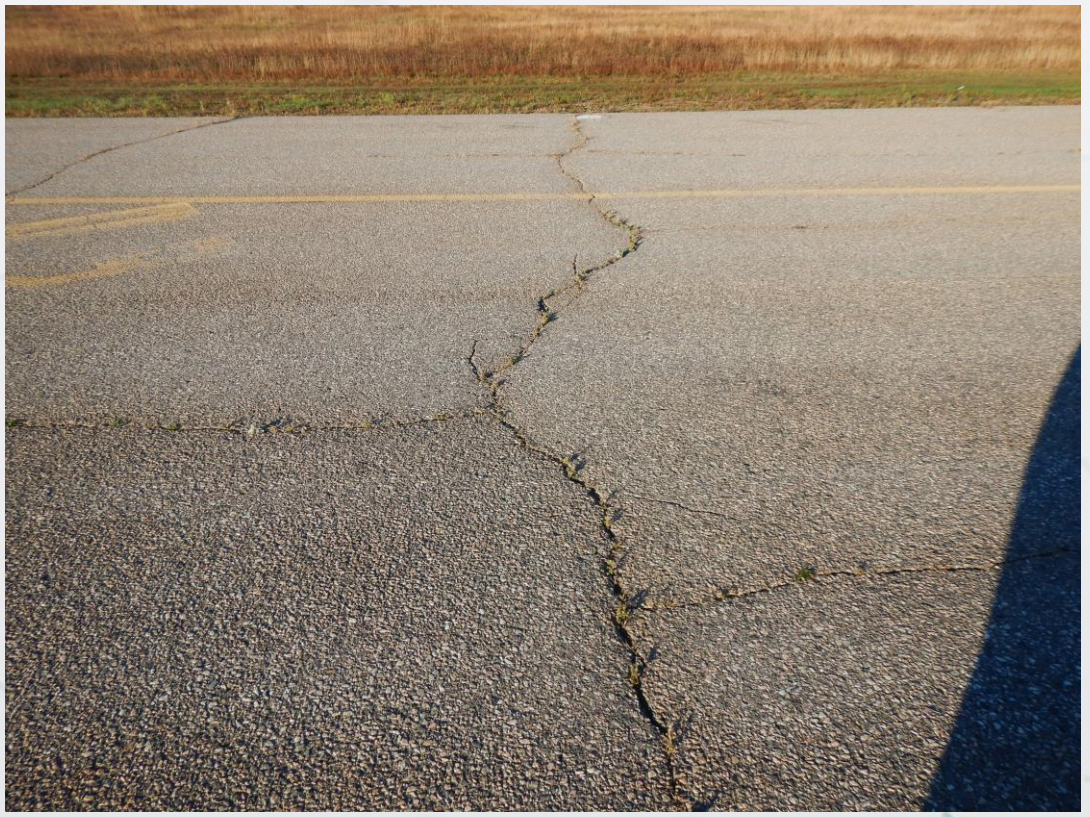

# L&T Cracking – 8 Years Later




# L&T Cracking – 8 Years Later




# L&T Cracking – 8 Years Later

# Asphalt-Surfaced Pavement

## STRUCTURAL DISTRESSES

# Alligator Cracking – 8 Years Later


# Alligator Cracking – 6 Years Later

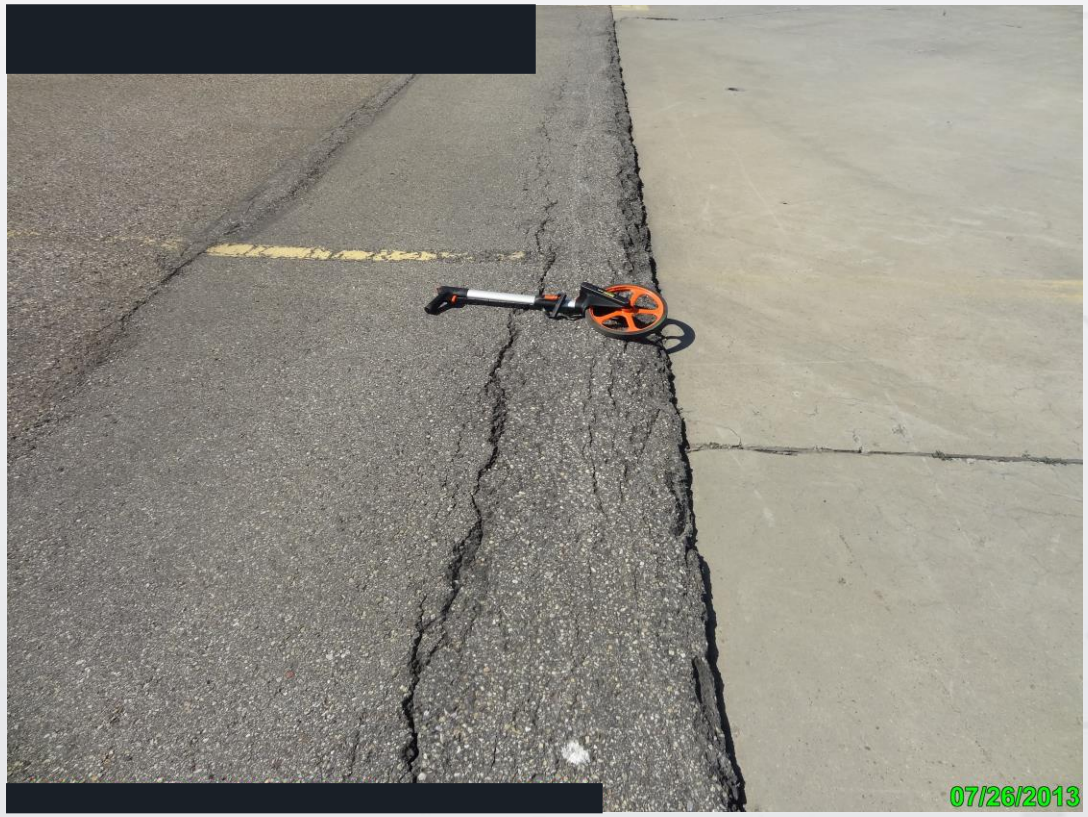

# Alligator Cracking – 8 Years Later


# Rutting and Alligator Cracking – 8 Years Later

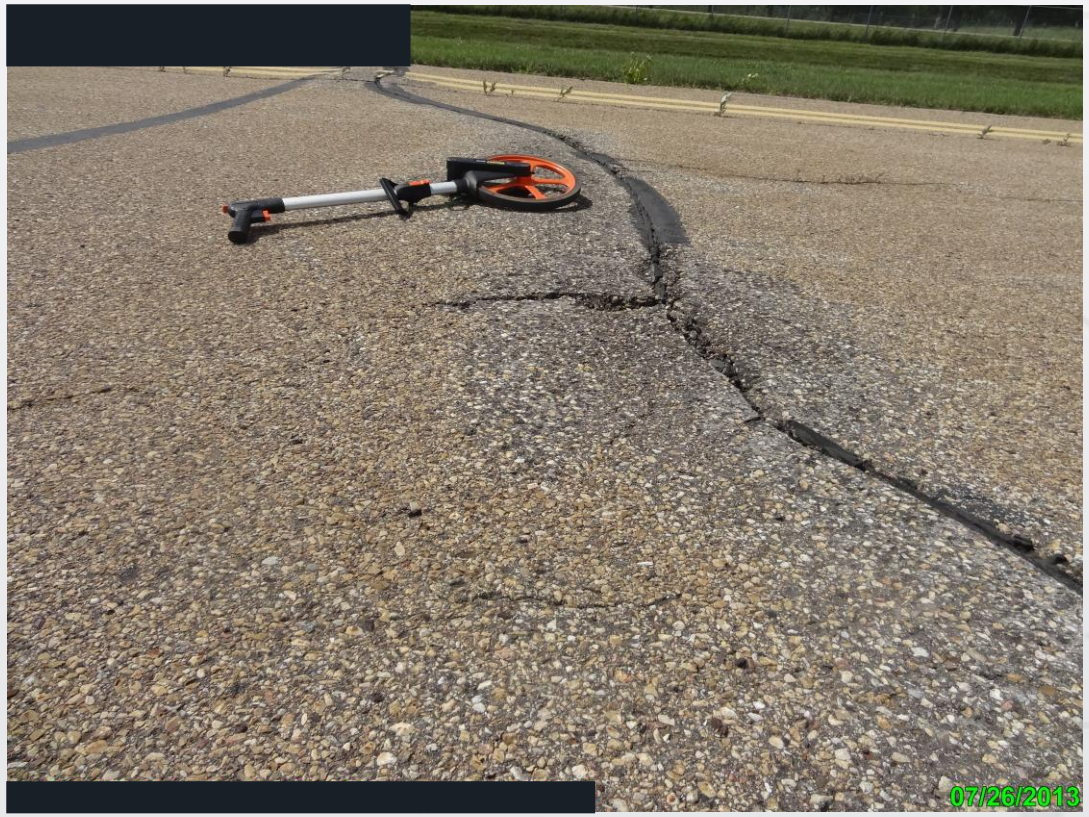

# Asphalt-Surfaced Pavement

## OTHER SITUATIONS

# Shoving – 9 Years Later




# Swelling – 9 Years Later




# Bleeding – 6 Years Later


# Shoving – 8 Years Later


# Asphalt Pavement Observations

- Development of climate-related cracking is unavoidable*
- Increase of climate-related cracking generally slows over time*
- Progression of most structural distresses is subtle*
  - Can still impact PCIs significantly
- Other distresses (e.g. shoving and swelling) can be a recurring issue if root cause is not addressed

*Observation aligns with SWIFT 2022 presentation: *Evaluating Progression of Cracking in Asphalt Concrete Pavements*

# Concrete Pavement

## STRUCTURAL DISTRESSES

# LTD Cracking – 7 Years Later


# Corner Break – 7 Years Later


# LTD Cracking – 6 Years Later


# Shattered Slab – 9 Years Later


# LTD Cracking – 6 Years Later

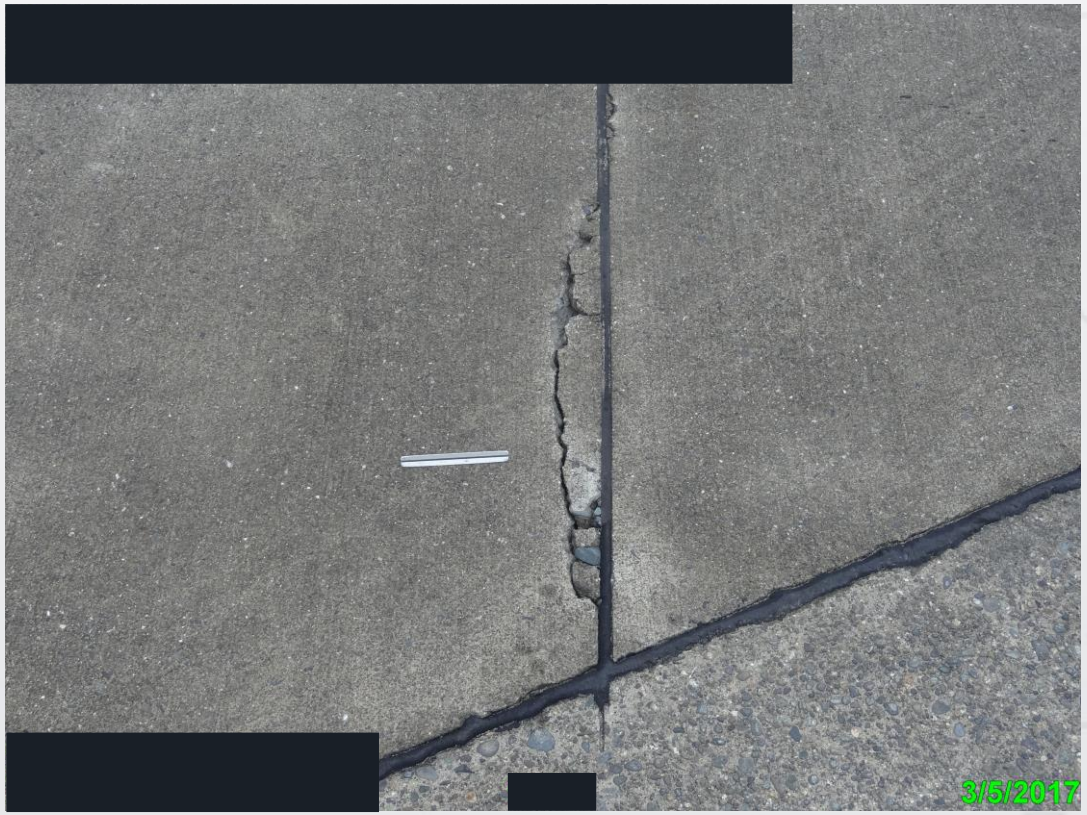

# LTD Cracking – 6 Years Later


# Concrete Pavement

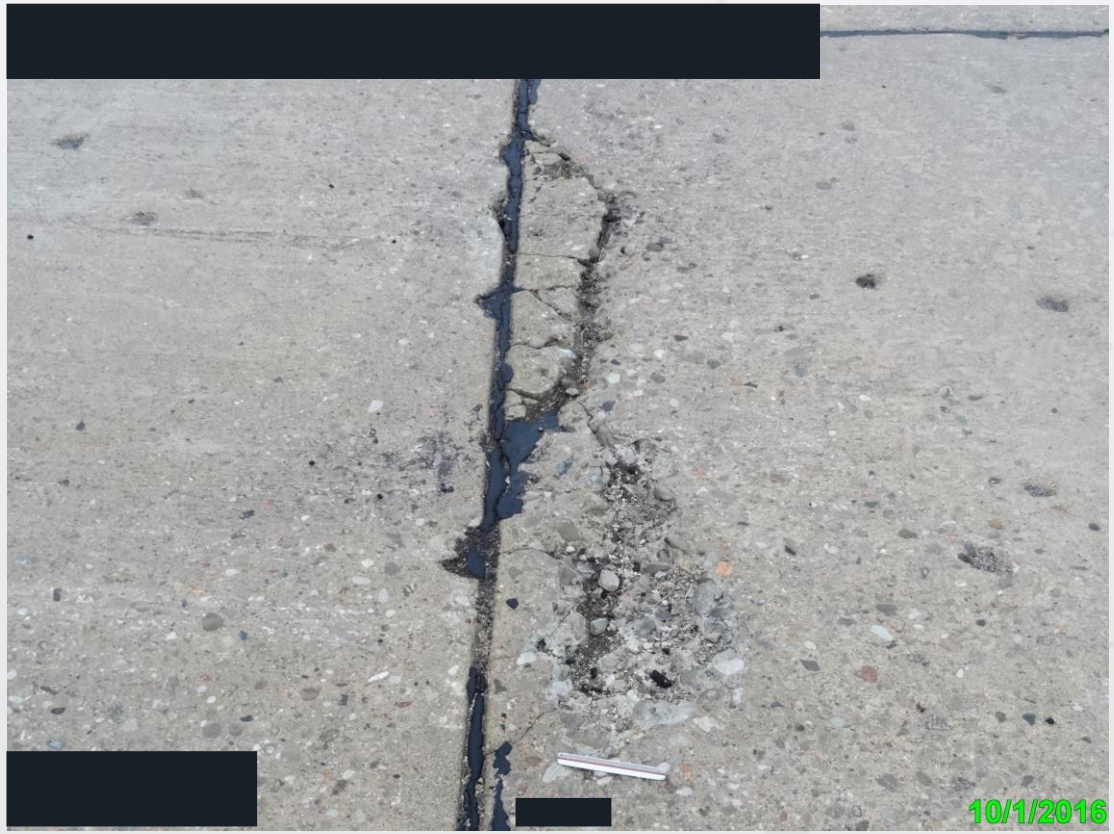
## CLIMATIC DISTRESSES

# Joint Spall – 7 Years Later


# Joint Spalling – 6 Years Later




# Joint Spall – 6 Years Later




# Concrete Pavement

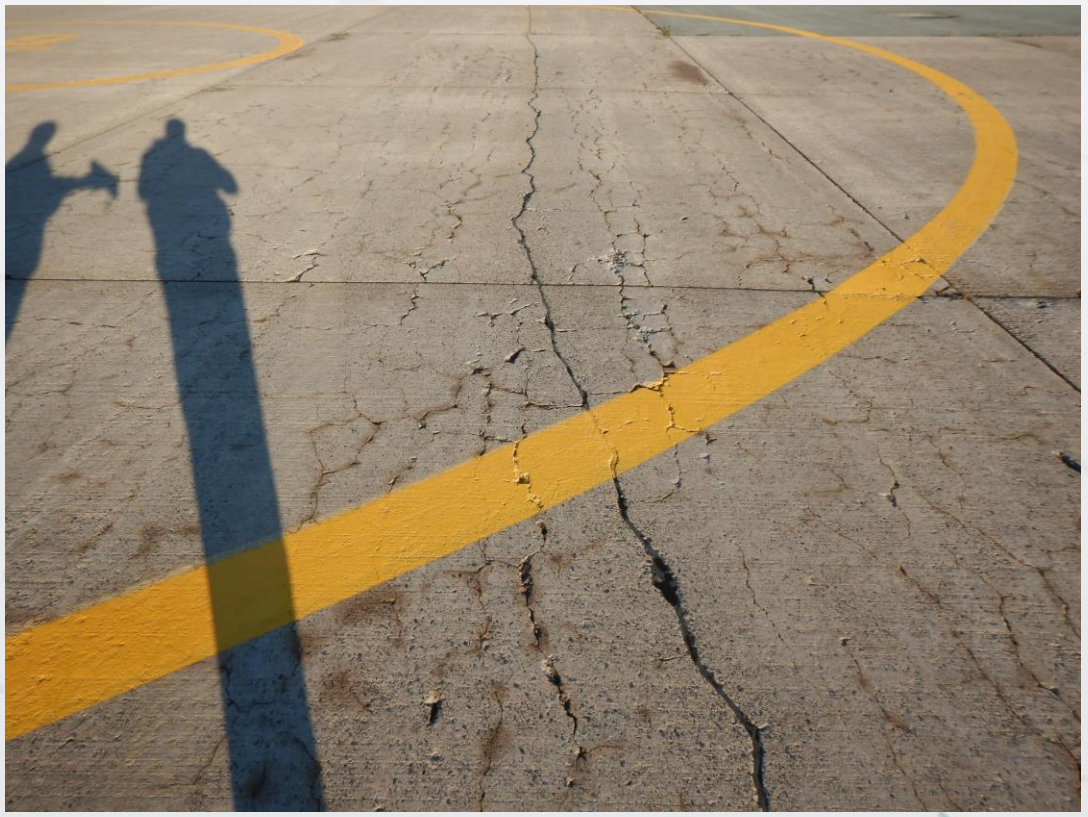
## MATERIAL DISTRESSES

# Possible ASR – 8 Years Later


# Possible ASR – 6 Years Later


# Scaling – 6 Years Later


# ASR – 8 Years Later

# ASR – 6 Years Later


# ASR – 9 Years Later

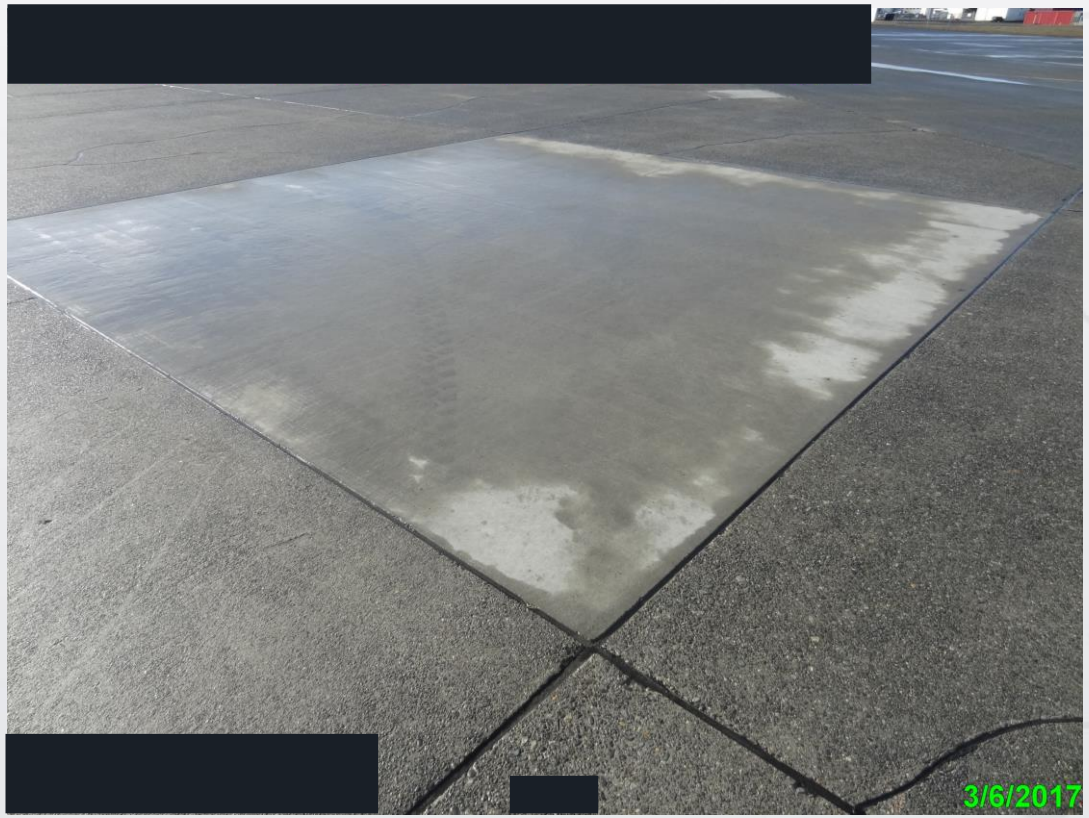

# Concrete Pavement

## OTHER SITUATIONS

# Paste Pockets – 7 Years Later

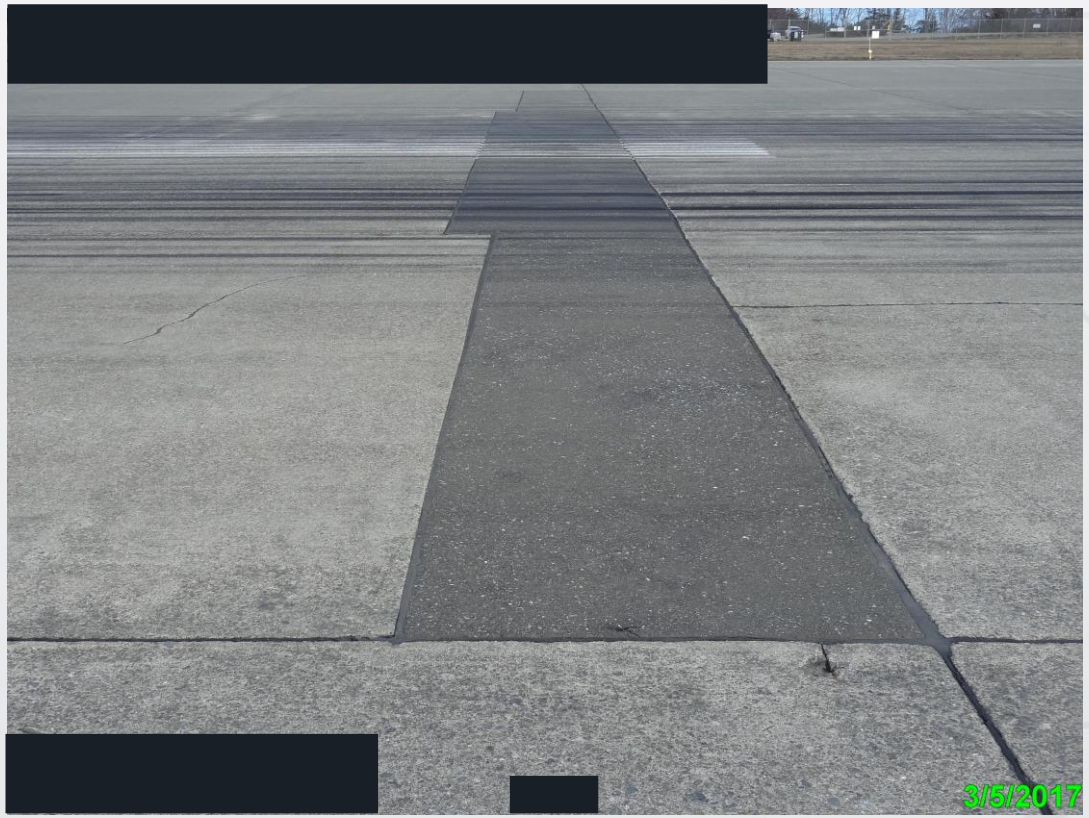

# Small Patch – 6 Years Later


# Replacement Slab – 6 Years Later




# Large Patch – 5 Years Later


# Large Patch – 6 Years Later




# Concrete Pavement Observations

- Load-related distresses frequently form in “distinctive” locations
- Load-related distresses in older pavement are often stable if not overloaded
- Individual spalls are generally stable
- Progression of ASR or suspected ASR is generally not predictable based on a visual inspection
- Patching and slab replacement techniques are vital for performance

# General Observations

- Tracking pavement data important but visual monitoring can be insightful
- Some distresses become severe over a few years
- Some distresses stabilize after formation
- Some distresses are recurring (maintenance may not address the cause)
- Pavement is unique and performance is determined by many factors
  - Pavement structure
  - Traffic
  - Material properties
  - Environment
  - Maintenance performed
- Re-creating distress photographs can be difficult

# Acknowledgements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  - Myron Thiessen, M.Sc., P.Eng.
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  - Katherine Gauthier, P.E
  - Other photographers and pavement historians

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# Thank you!

PETER-PAUL DZWILEWSKI, P.E.
PDZWILEWSKI@APPLIEDPAVEMENT.COM

# Additional Comparsions

## TIME PERMITTING

# Settlement – 5 Years Later


# Patch – 9 Years Later


# Joint Reflection Cracking – 6 Years Later


# Milling – 6 Years Later


# Durability Cracking– 5 Years Later


# Faulting– 5 Years Later


# Small Patch – 6 Years Later


# Popout – 8 Years Later