Expansion of the Perpetual Pavement Awards

Southeastern Asphalt User/Producer Group Annual Meeting

Raleigh, NC

November 15, 2022

Grover Allen

Perpetual Pavement:

An asphalt pavement designed and built to last longer than 50 years without requiring major structural rehabilitation or reconstruction, and needing only periodic surface renewal in response to distresses confined to the top of the pavement"
(Asphalt Pavement Alliance, 2002)

Perpetual Pavements – Why?

Serves the Public well

1. Low life-cycle cost
2. Low user-delay costs
3. Low environmental impact

Perpetual Pavements Sound Expensive

Not necessarily:

- Pavement thickness may be comparable to or even less than conventionally-designed pavements
- Existing pavements may be or could become perpetual
- Costs for later rehabilitation are lower

AASHTO Pavement Design:

the pavement is designed for a specific length of time the roadway is intended to last before it reaches the end of its serviceable life and requires rehabilitation

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Miner's Law:

- iterative approach
- pavement response in terms of stresses, strains, or deflections is used to estimate the allowable number of loads to failure (N_f)
- the actual number of anticipated traffic loads (n) is divided by N_f to define the degree of damage (D).
- the point at which the damage equals one is considered failure.

Repeated bending leads to fatigue cracking

Compression

Tension

Crack occurs when tension exceeds "strain limit"

Bottom-Up Cracking

What can you do with a pavement having a profusion of bottom-up cracking?

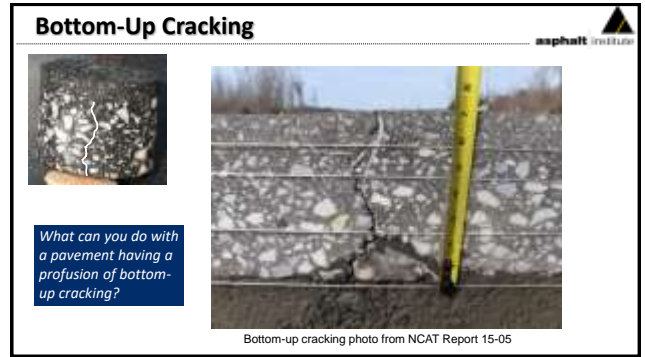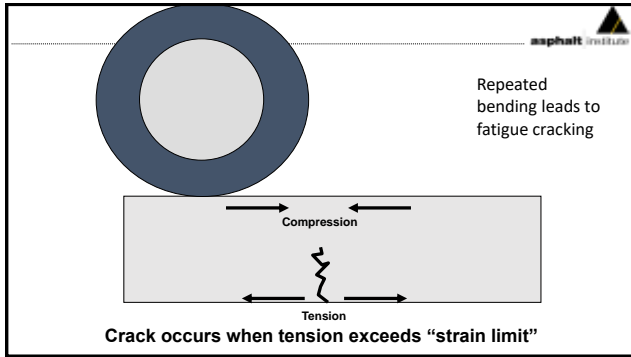Bottom-up cracking photo from NCAT Report 15-05

Perpetual Pavement Design:

the pavement is designed to last an indefinite period of time by building it to a sufficient thickness and/or stiffness that it will never experience bottom-up cracking; periodic resurfacing renews smoothness, quiet, and structural integrity to the surface lift

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Perpetual Pavement Awards – Brief History

The Asphalt Pavement Alliance (APA)

• Is a combined effort by **NAPA, AI, and SAPAs** to promote Asphalt Pavements.
• The Perpetual Pavement Awards (PPA) program started in 2001.

Perpetual Pavement **by Performance** CRITERIA:

• At least 35 years old
• Never experienced a structural failure
• Not resurfaced more frequently than once every 13 years
• No more than a total of 4 inches added during the 35 years

• Types of Pavement that can qualify:
• City, County and DOT Roads, Interstates, and Airfields
• Any reasonable traffic level
• At least 2 miles in length

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https://www.driveasphalt.org/awards/perpetual-by-performance

• 170 Awards since 2001
• 32 U.S. States
• One Canadian province

• Average age at recognition = 49.4 years
• Range in age 35 to 91 years at recognition

"One of the keys to sustainability is long life," said Amy Miller, P.E., National Director of the APA. *"Asphalt roads can be engineered to last indefinitely with only routine maintenance and periodic surface renewal."*

Two (2) new Perpetual Pavement Award (PPA) types

"by DESIGN"

"by CONVERSION"

Any newly Designed and Constructed PP, placed on subgrade or remaining AB such as; new alignment, or where the existing pavement is completely removed.

Any newly Designed and Constructed PP, placed on top of an existing pavement after preparation treatments, such as local repairs, Crack & Seat, or Rubblization.

Reason for the (2) new Perpetual Pavement Award (PPA) types

The original Perpetual Pavement Award recognized the project only after 35 years, long after the persons involved have been retired.

The two new Perpetual Pavement Awards will not only recognize the project, but also honor those involved in it's Design and Successful Construction.

Details can be found at the following links:

https://www.driveasphalt.org/

https://www.driveasphalt.org/awards/perpetual-by-performance
https://www.driveasphalt.org/awards/perpetual-by-design
https://www.driveasphalt.org/awards/perpetual-by-conversion

Number of PPAs By SEAUPG States

STATE AGENCY	PPA BY PERFORMANCE	PPA BY DESIGN	PPA BY CONVERSION
ALDOT	11		
ARDOT	13	1	1
FDOT	12		
GDOT			
KYTC	4		
LaDOTD			
MDOT	6		
NCDOT			
OKDOT	4		
SCDOT	10		
TDOT	17		
TxDOT	3		
VDOT	2		1
WVDOT			

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https://eng.auburn.edu/research/centers/ncat/newsroom/2017-fall/perroad.html

"Perpetual Pavements are **NOT just thicker but SMARTER designed** pavements, where each layer is designed specifically for the stresses and strains it will encounter in use."

Goal is to eliminate "Bottom-up cracking" and only require infrequent maintenance of the surface.

https://www.driveasphalt.org/resources/perpetual-pavement

Free Design software available on-line   (PaveXpress and PerRoad)

Design method: Can be any recognized procedure/software such as:

PAVEXpress

PAVEXpress is a free web-based pavement design tool available for use by local agencies, engineers, and architects who need a reliable way to quickly determine the necessary pavement thickness for a given section of roadway or project. PAVEXpress creates technically sound pavement structural designs for both asphalt and concrete pavements based on widely accepted industry standards from the American Association of State Highway Transportation Officials (AASHTO).

PAVEXpress was designed to be an extension of AASHTO 93/98 and has been adopted by public agencies such as the Washington State Department of Transportation as an accepted tool to help assess, scope, and design pavements. PAVEXpress has expanded to help users design asphalt overlays, porous asphalt sections, perform life cycle cost and layered elastic analyses, as well as perpetual pavement design incorporating PerRoad.

https://www.driveasphalt.org/resources/perpetual-pavement

To Apply for 2022 PPAs:

driveasphalt.org/awards

Steps to submit a Perpetual Pavement Award Candidate

For the PPA "by Performance"
• Locate one or more potential candidate(s)
• Provide construction and maintenance history (with dates)
• An estimation of traffic loading since opening (ESALs or other)
• Current traffic level
• Add a few pictures
• And a summary of what makes this project worthy of receiving this award

For the 2 new Awards add:
• Starting date and entity performing the Perpetual Pavement design
• Completion date and main entity performing the Construction

• For details go to the Awards tab at:
https://www.driveasphalt.org/

Candidates are evaluated by Engineers from NCAT

Perpetual Pavement Resources

Perpetual Asphalt Pavements – A Synthesis (2010)

NCHRP Report 646 – Validating the Fatigue Endurance Limit for Hot Mix Asphalt (2010)

Transportation Research Circular – Perpetual Bituminous Pavements (2011)

NCHRP Report 762 – Laboratory Evaluation of an Endurance Limit for Asphalt Pavements (2013)

NCAT Report 15-05 – Refined Limiting Strain Criteria and Approximate Ranges of Maximum Thicknesses for Designing Long-life Asphalt Pavements (2015)

https://www.driveasphalt.org/

To preserve and expand the Asphalt Market

Thank you to our AI Members for supporting our efforts.

Questions?

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