

Virginia Quiet Pavement Implementation Program

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Pavement Surface Properties
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“Quiet” Pavement

What it is:

- In General – a wearing surface that minimizes tire-pavement noise production and propagation

Bad



Good



“Quiet” Pavement

Asphalt – “small-textured” porous mix (e.g., open-graded asphalt concrete)



“Quiet” Pavement

Concrete – negative-textured longitudinal grind and groove (e.g., “Next Generation Concrete Surface”)



Noise Measurement

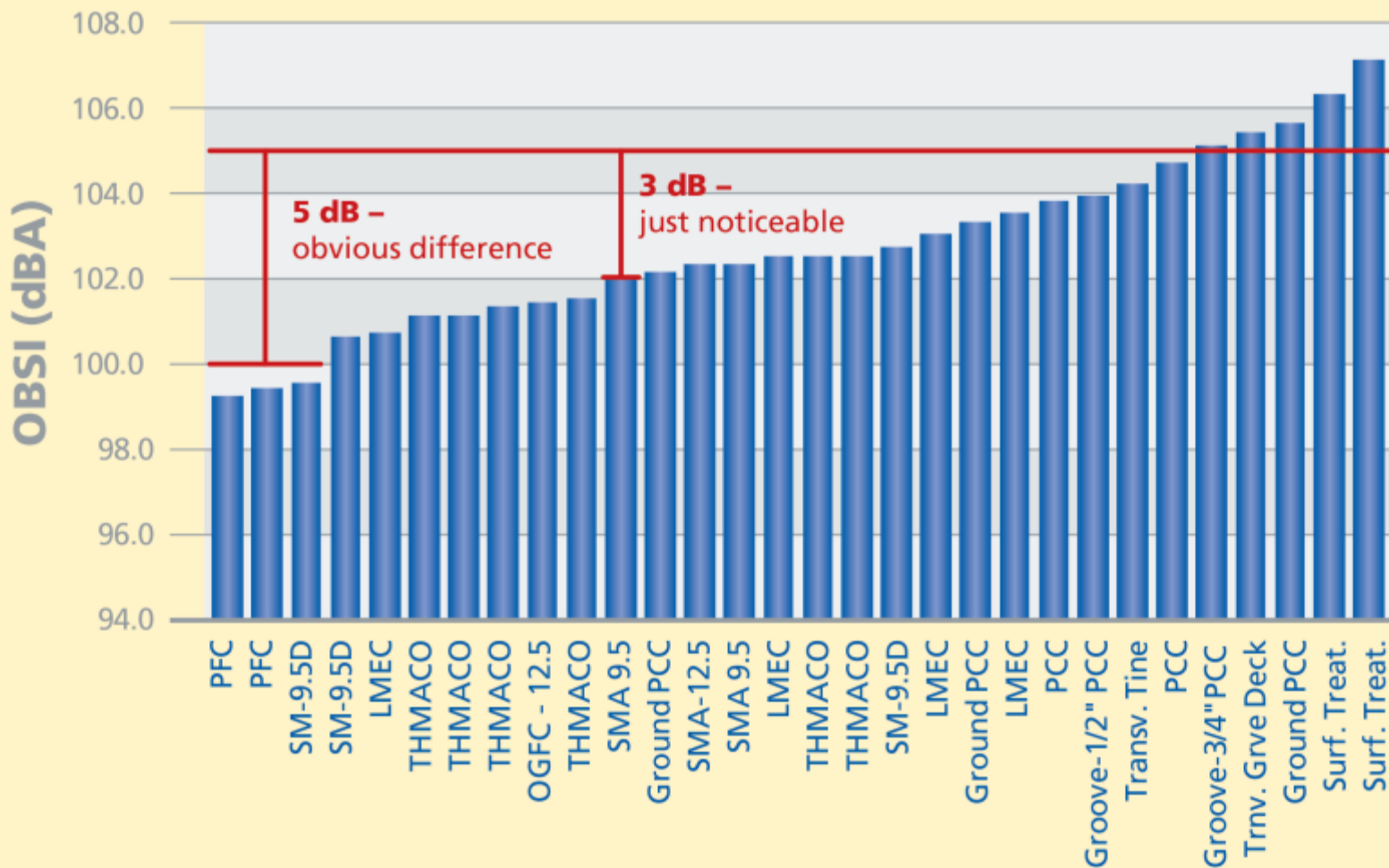
Wayside



Tire-Pavement (i.e. OBSI)



Typical Virginia Surfaces



Chapter 790 of the 2011 Virginia Acts of Assembly (*Code of Virginia* § 33.1-223.2:21)

Directs VDOT to:

- Expedite the development of QP technology by including contract specs for QP technology and sound mitigation alternatives if sound mitigation is a consideration.
- Construct demonstration projects to assess QP technologies.
- Perform assessments to evaluate functionality/safety of QP technology in Virginia's climate over two full winters.
- Provide an interim report to the Governor and the General Assembly by June 30, 2012, and a final report by June 30, 2013.
- Include in the report:
 - Results of demonstration projects,
 - Results of the use of QP in other states,
 - A plan for routine implementation of QP, and
 - Safety, cost, performance issues of the technologies.



Quiet Pavement Task Force

Co-Chairs:

Andy Babish, PE, **State Materials Engineer**

Richard Schreck, **Executive Vice President, VAA**

Members:

Emmett Heltzel, PE, **VDOT Maintenance Division Administrator**

Trenton Clark, PE, **VAA Director of Engineering**

David Lee, PE, **VDOT Salem District Materials Engineer and
Chairman VCTIR Asphalt Research Advisory Committee**

Paul Kohler, **VDOT Noise Abatement Section Manager**

Michael Sprinkel, PE, **VCTIR Associate Director of Research**

Kevin McGhee, PE, **VCTIR Associate Principal Scientist**

Ed Dalrymple, Vice President, **Chemung Contracting**

David Helmick, Vice President, **Superior Paving Corp.**

Bob Long, **American Concrete Pavement Association**

Del. Jim LeMunyon, **JCTA Subcommittee on Quiet Pavements**



Project Selection Criteria

- Four-lane divided, high-speed corridor
- Good overall pavement structure
- Good geometrics
- Limited at-grade intersections
- 1-mile per asphalt technology/ ½-mile for concrete
- No curb/gutter or existing sound mitigation measures



Demonstration Projects (2011)

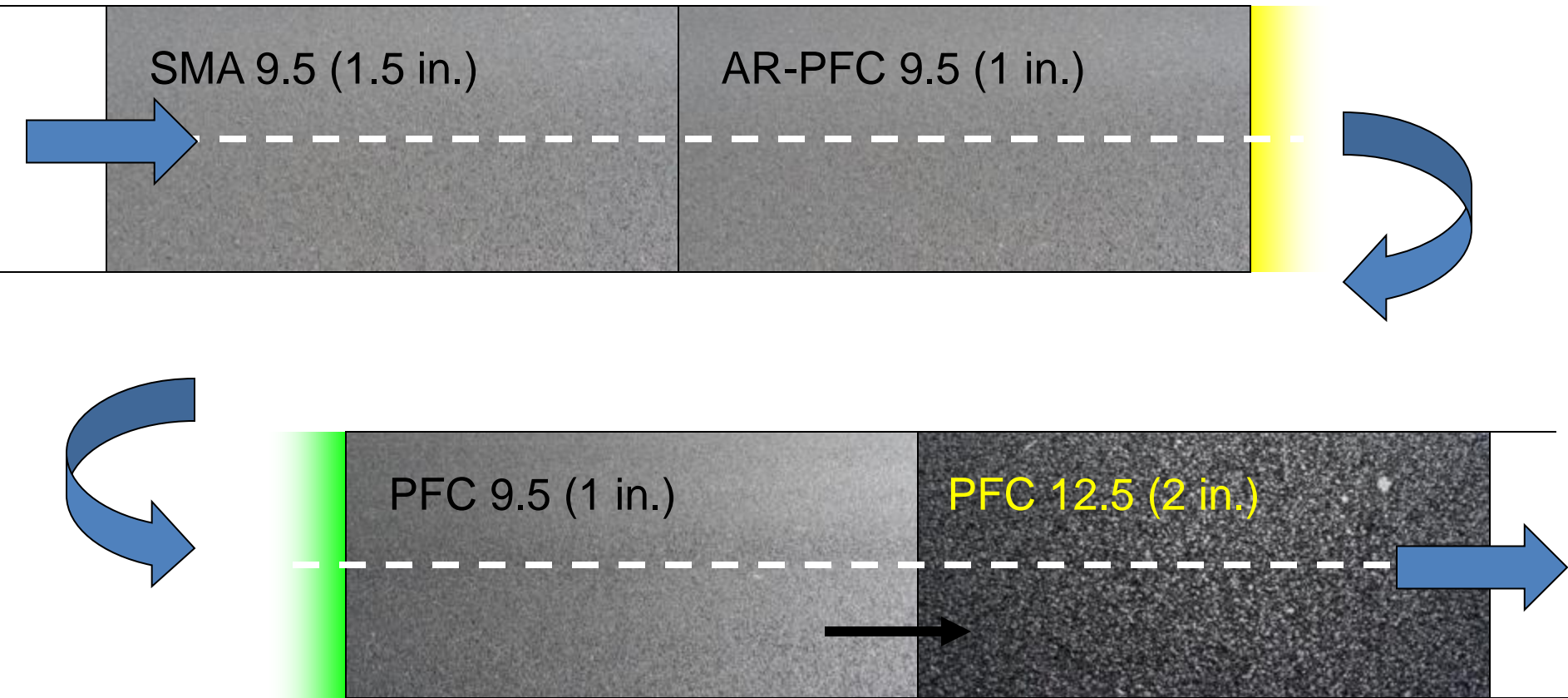
- 1 SR 7 By-Pass in Leesburg (A)
- 2 SR 199 west of Williamsburg (A)
- 3 SR 288 near Chester (A)
- 4 I-64 Virginia Beach (C)
- 5 SR 76 Richmond (C)



9/6/2012

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Demonstration Projects (Asphalt)



Plan View



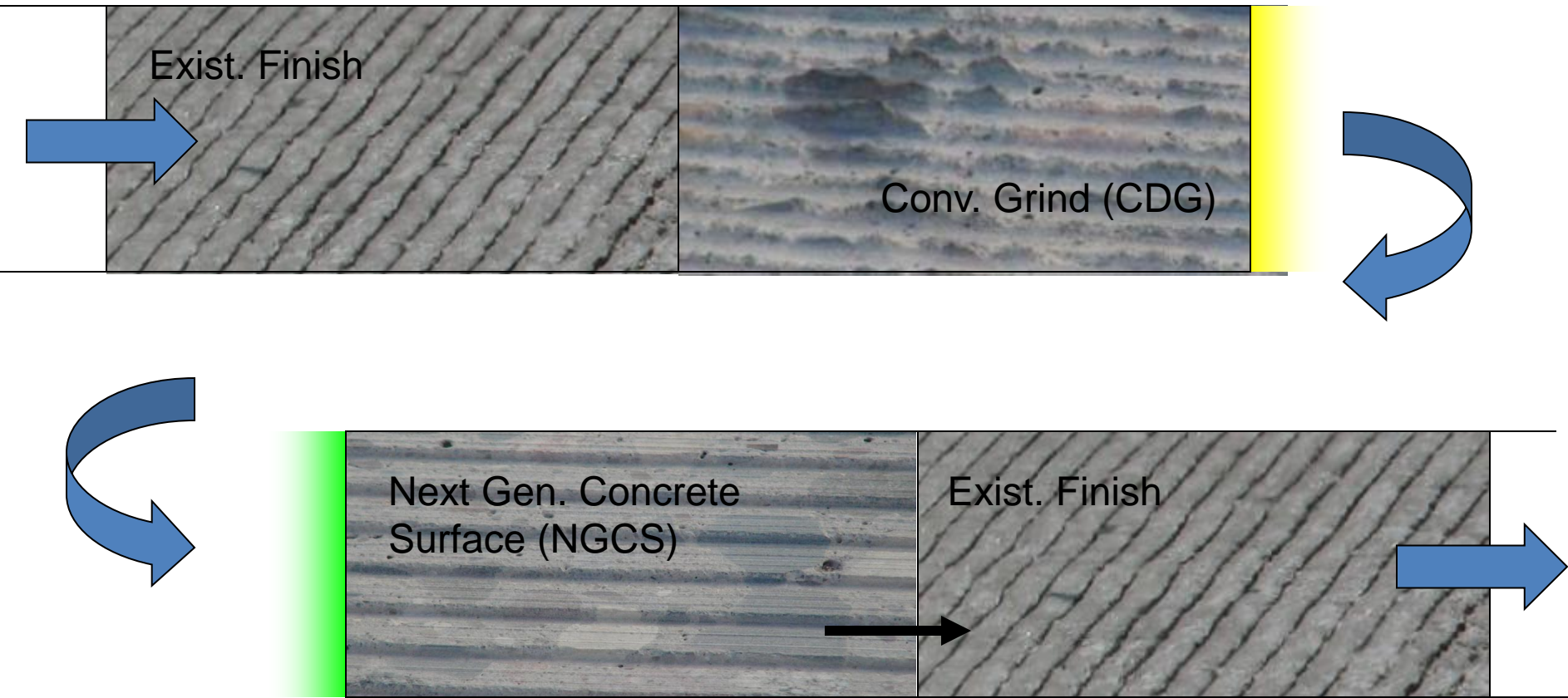


PFC 12.5



AR-PFC 9.5

Demonstration Projects (Conc)



Plan View



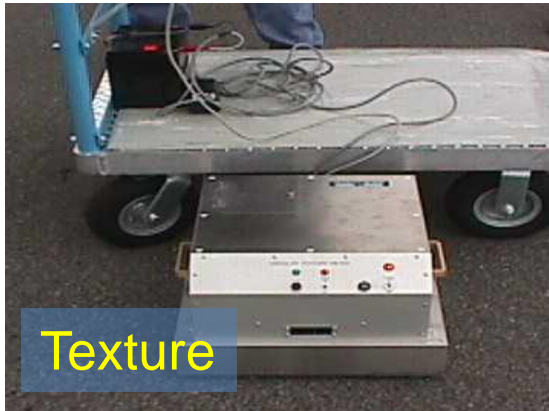
NGCS



Conventional Grind



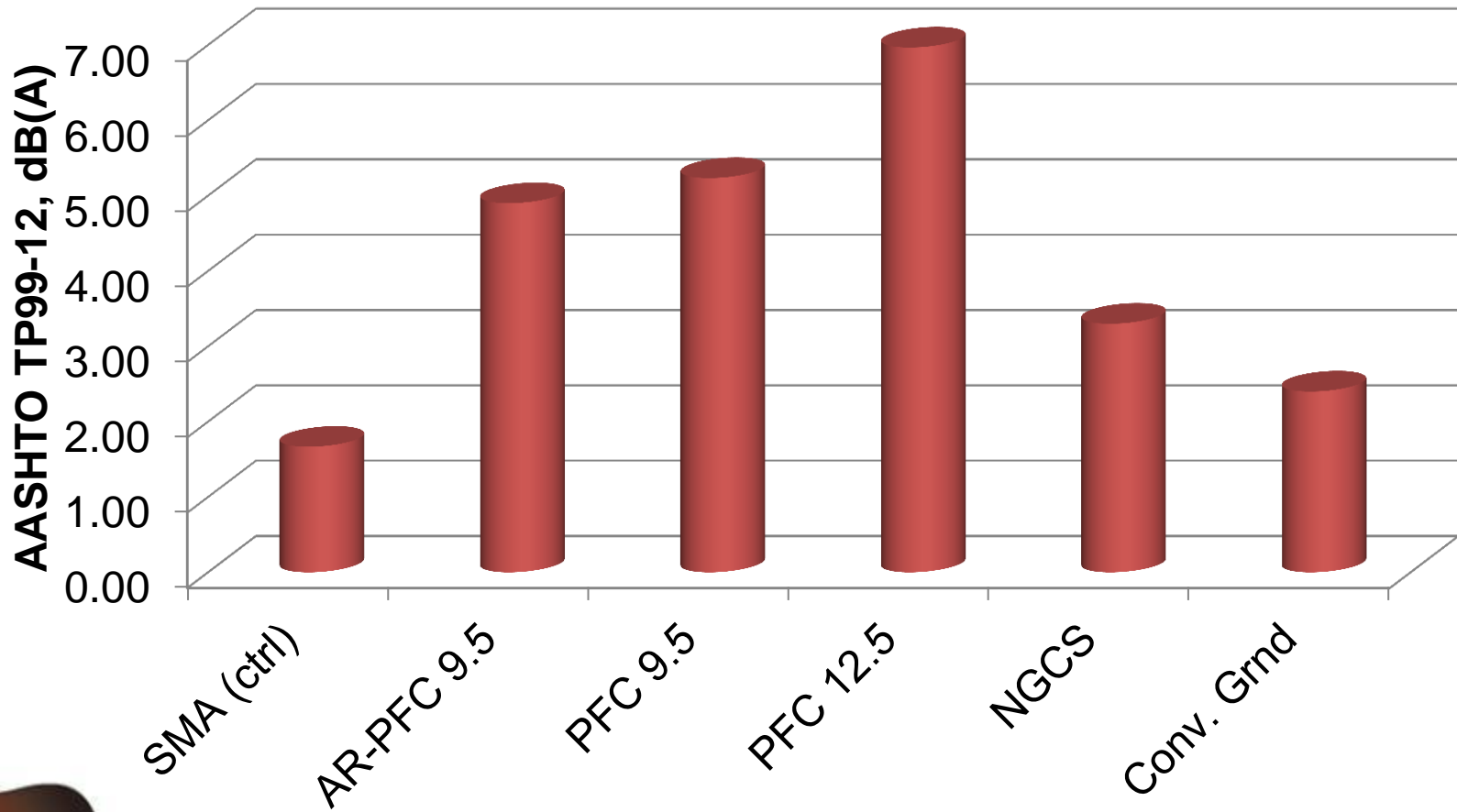
Functional Evaluation



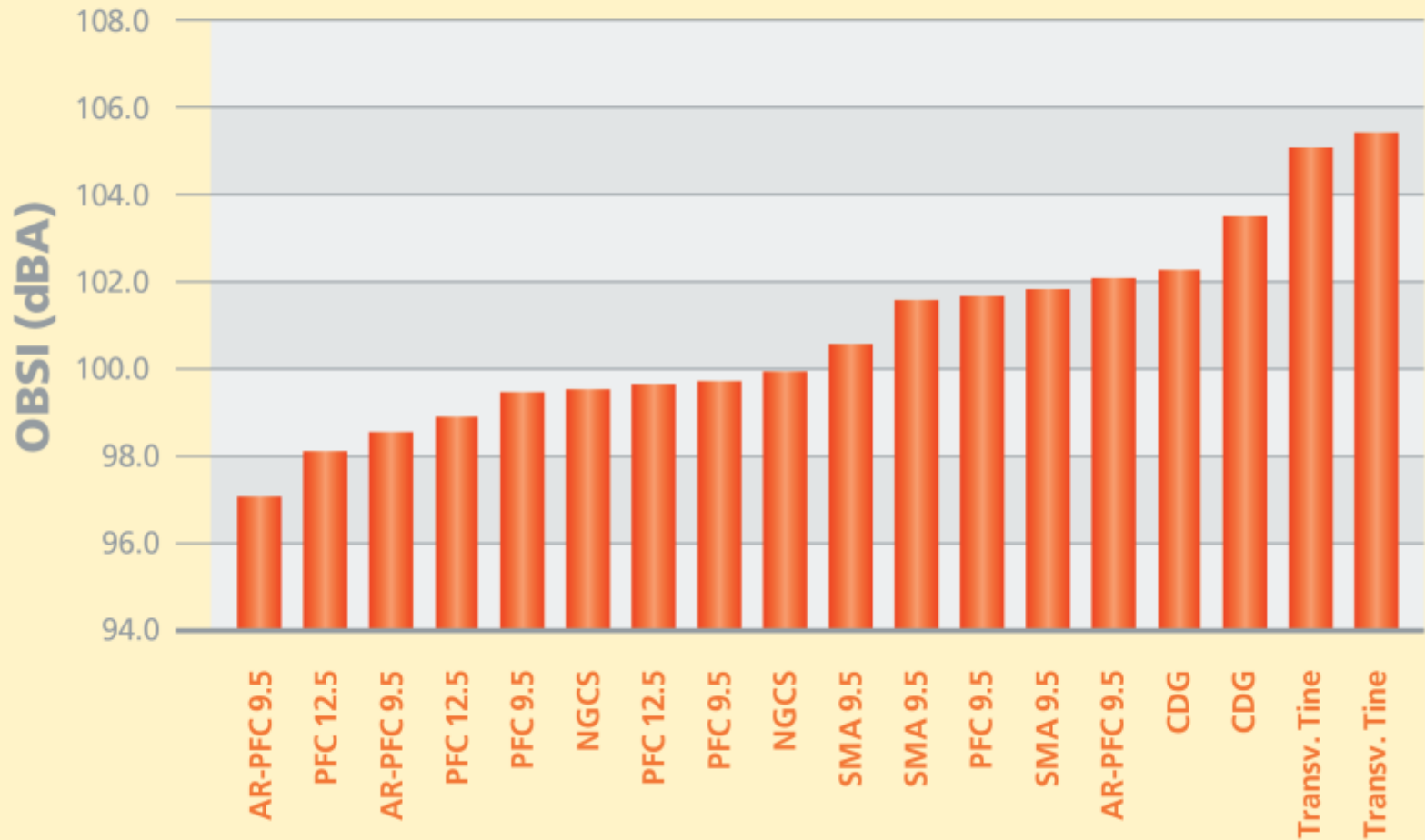
Preliminary Findings - “new” materials and treatments



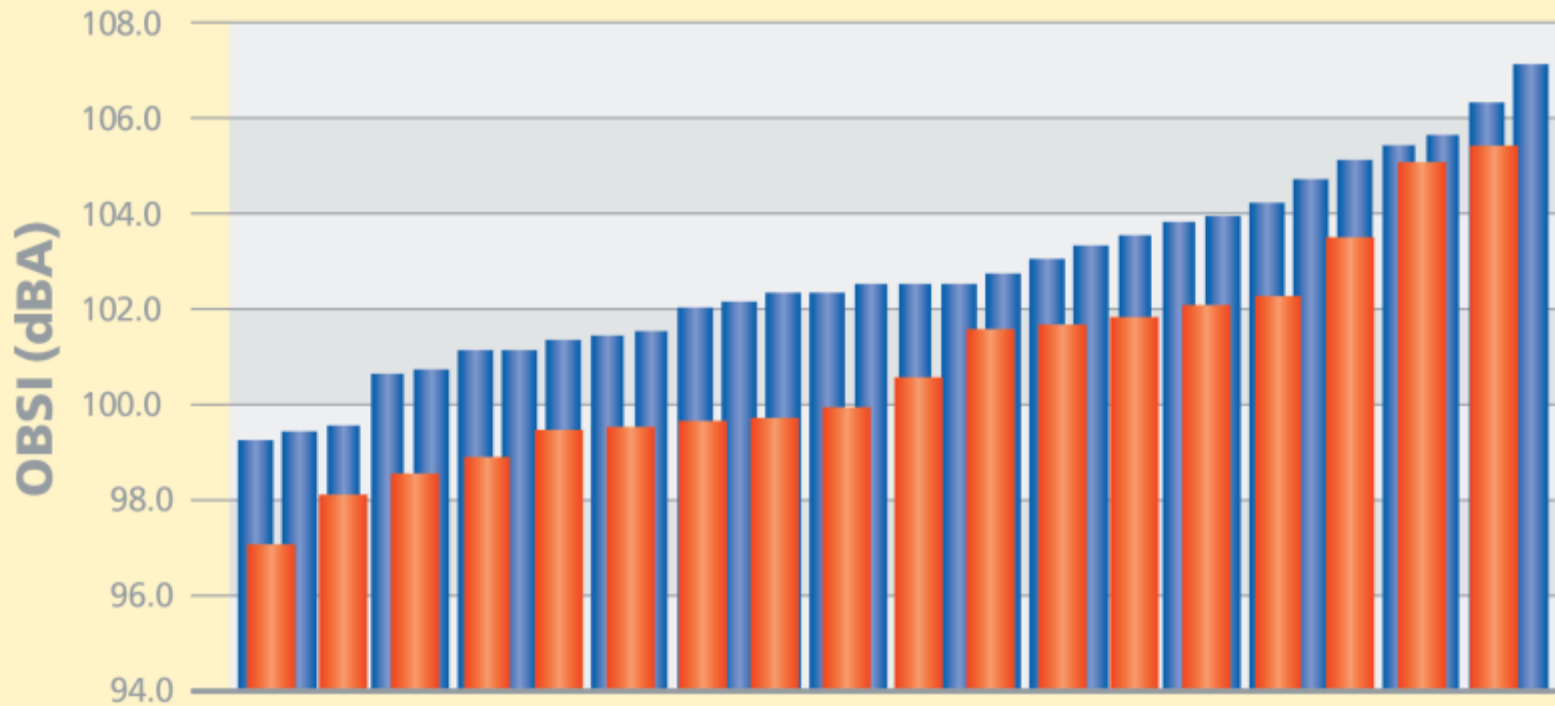
Wayside Noise (“Reduction”)



QP Demonstration Projects – Spring 2012



Typical Virginia Pavements vs. QP Demonstration Projects



2010 OBSI Survey - Typical Virginia Pavements

QP Demonstration Projects - Spring 2012





Locked-Wheel System (LWS)

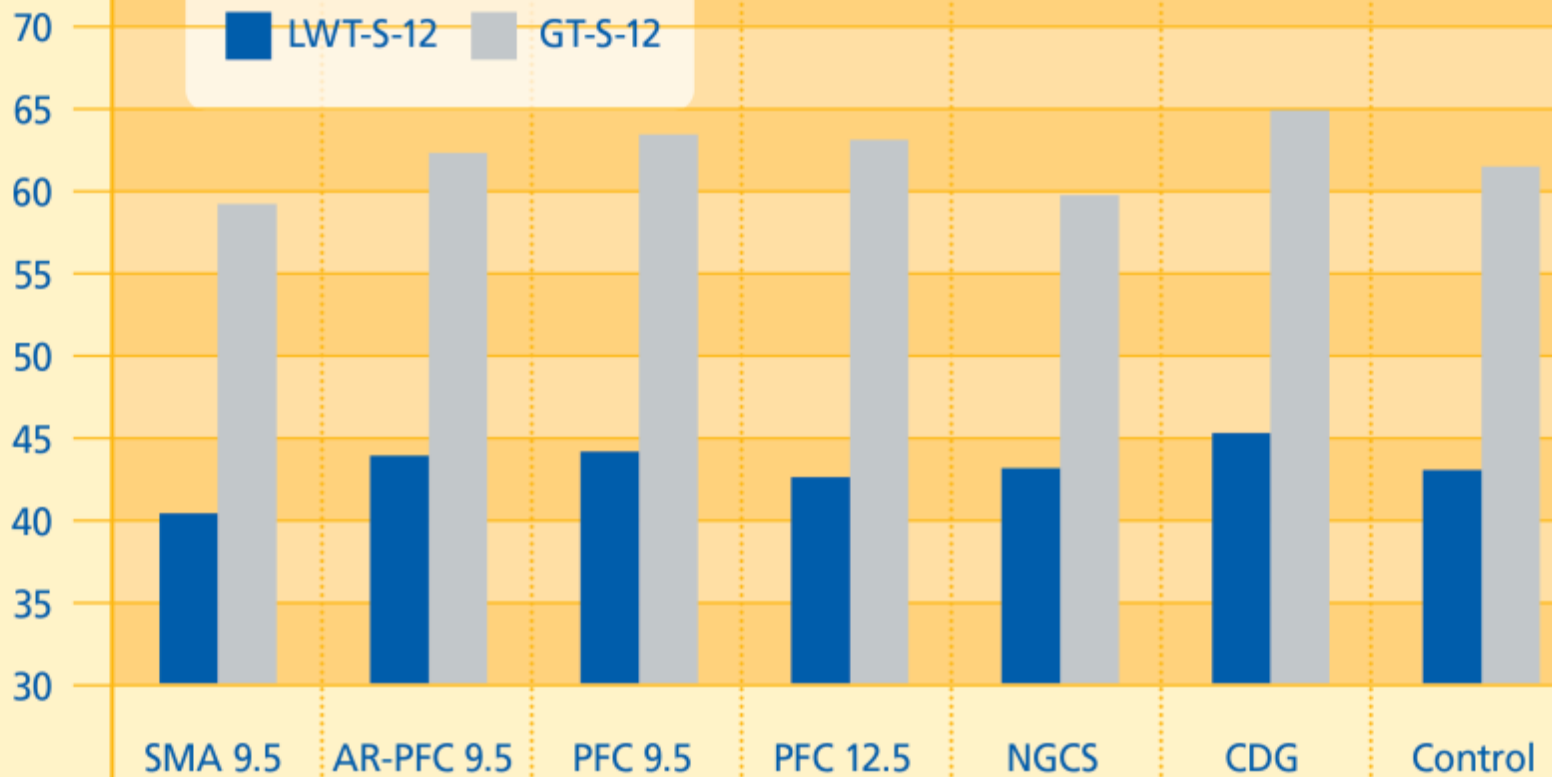


GripTester (GT)



Friction – LWT & GT

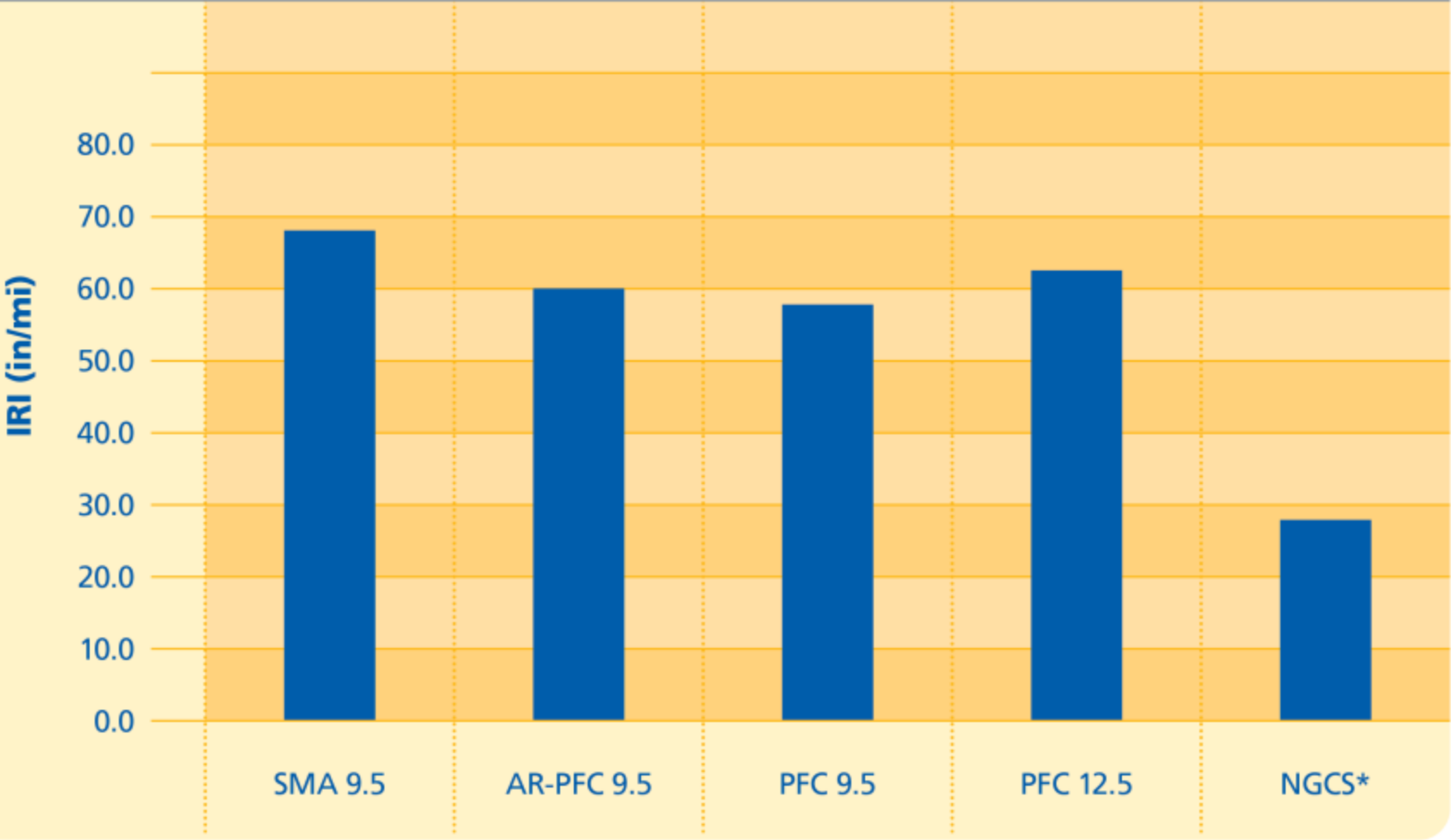
Skid (SN) & GT*100 coefficients



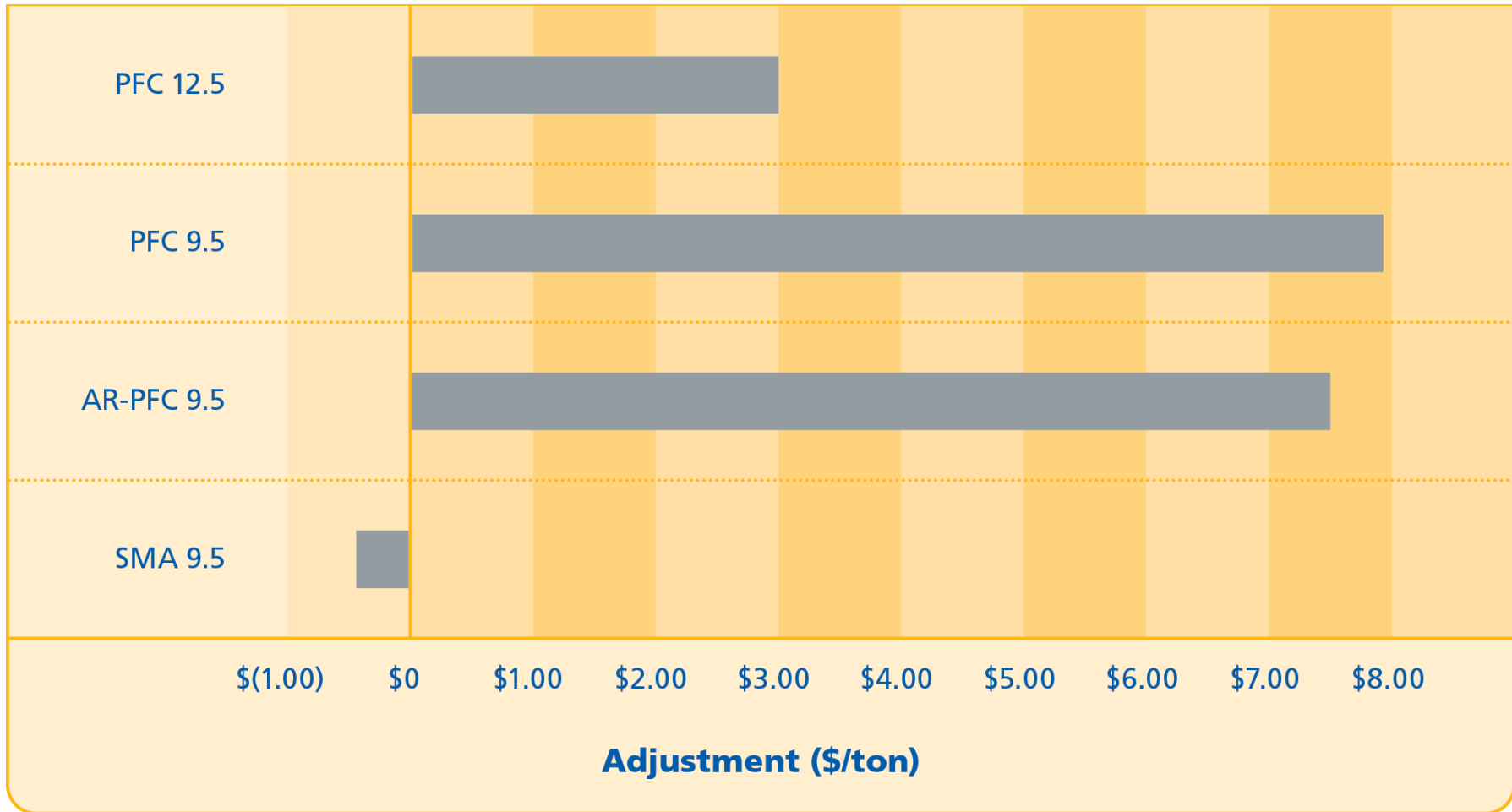
Pavement Type



Ride Quality (IRI)



Pay Adjustments for Smoothness

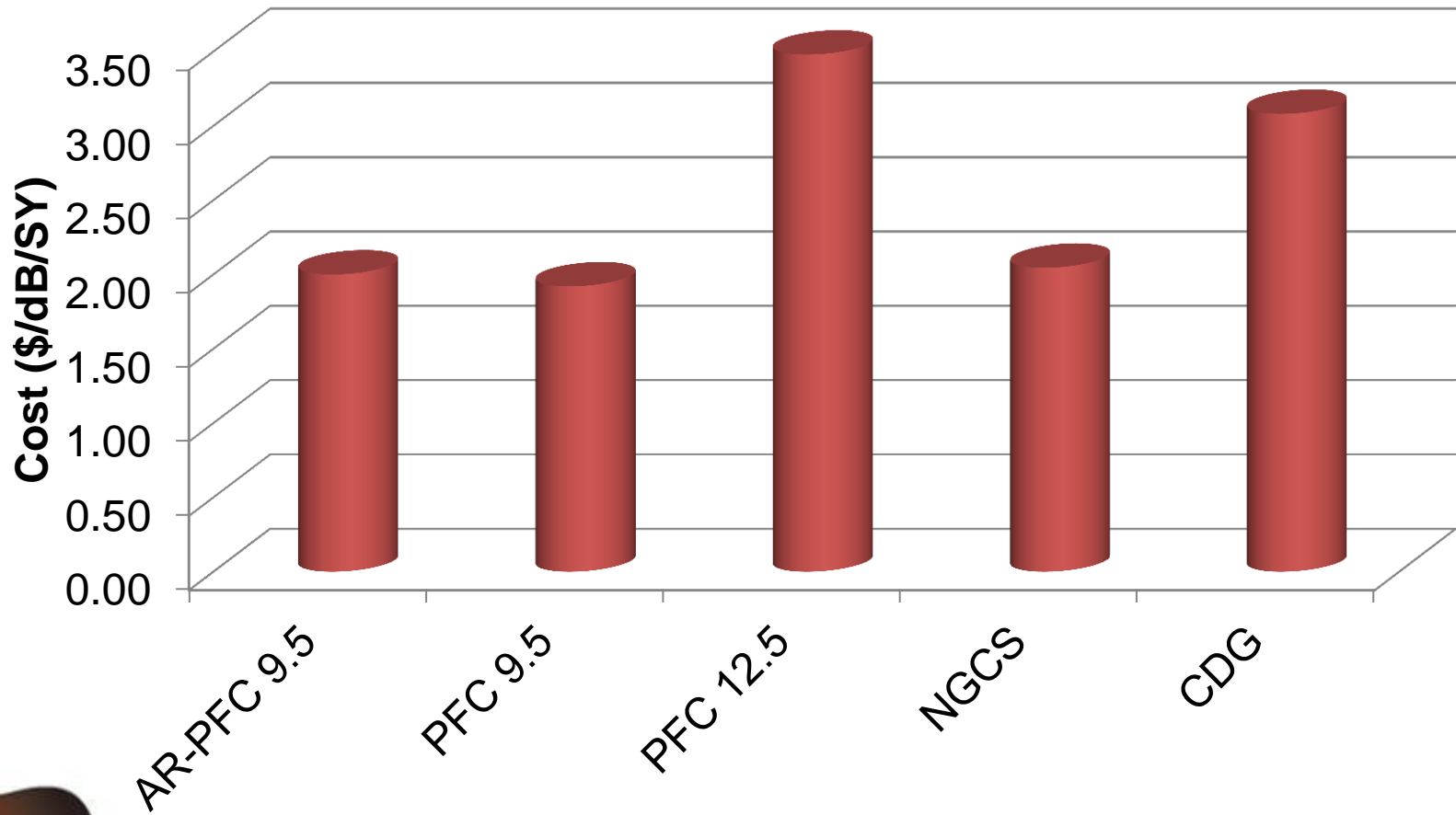


Technology Costs

| Pavement Description | Average Costs | |
|----------------------|---------------|------------------|
| | Per Ton (\$) | Square Yard (\$) |
| SMA 9.5 (Control) | 108.50 | 9.20 |
| AR-PFC 9.5 | 125.81 | 5.77 |
| PFC 9.5 | 116.00 | 5.32 |
| PFC 12.5 | 110.33 | 10.11 |
| Diamond Grind | N/A | 6.86 |
| NGCS | N/A | 10.84 |



Effectiveness (Noise Reduction)



Splash and Spray



Conventional



Experimental



Misc. Observations



PFC's with Parallel
Conventional Pavement

Failing Concrete in
Quiet Concrete Section



Summary (Tire-Pavement Noise)

- Quiet asphalt technologies *measurably* less noisy on average than control (note: control technology NOT noisy)
- Next Generation Concrete Surface (NGCS) *noticeably* less noisy than control
- None of the surfaces became louder over the winter (note: milder than normal winter)



Summary (Other Properties)

- Ride quality is critical to quiet pavements and excellent ride quality was achieved in the projects.
- The QP technologies exhibit good resistance to skidding
- The QP technologies have reduced splash and spray with improved wet-weather visibility
- There were no reports of compromised safety during winter weather with QP



Next Steps

- Two most promising asphalt technologies to be tested at NCAT – starting fall 2012
- Two most promising technology components (rubber modified binder & PFC 12.5) to be installed summer 2012
- Noise (and other) testing continues
- Costs will continue to be evaluated
 - Life-cycle cost models to be developed



Life Cost Model Components

- Allowable substitution – will FHWA permit QP strategy in lieu of noise barriers?
- “Acoustic longevity” – QP replacement cycle?
- Additional maintenance costs – winter and periodic cleaning/vacuuming
- Value of other functional benefits – e.g., reduced rolling resistance, improved safety & comfort, etc.



For more information:
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Links to Interim Report:
<http://leg2.state.va.us/dls/h&sdocs.nsf/0/e0a4b50ad340248c8525787e0057d09a?OpenDocument>
http://www.virginiadot.org/VDOT/Projects/asset_upload_file884_5721.pdf

