ASR in Delaware

Mid-Atlantic QAW - Hershey, PA

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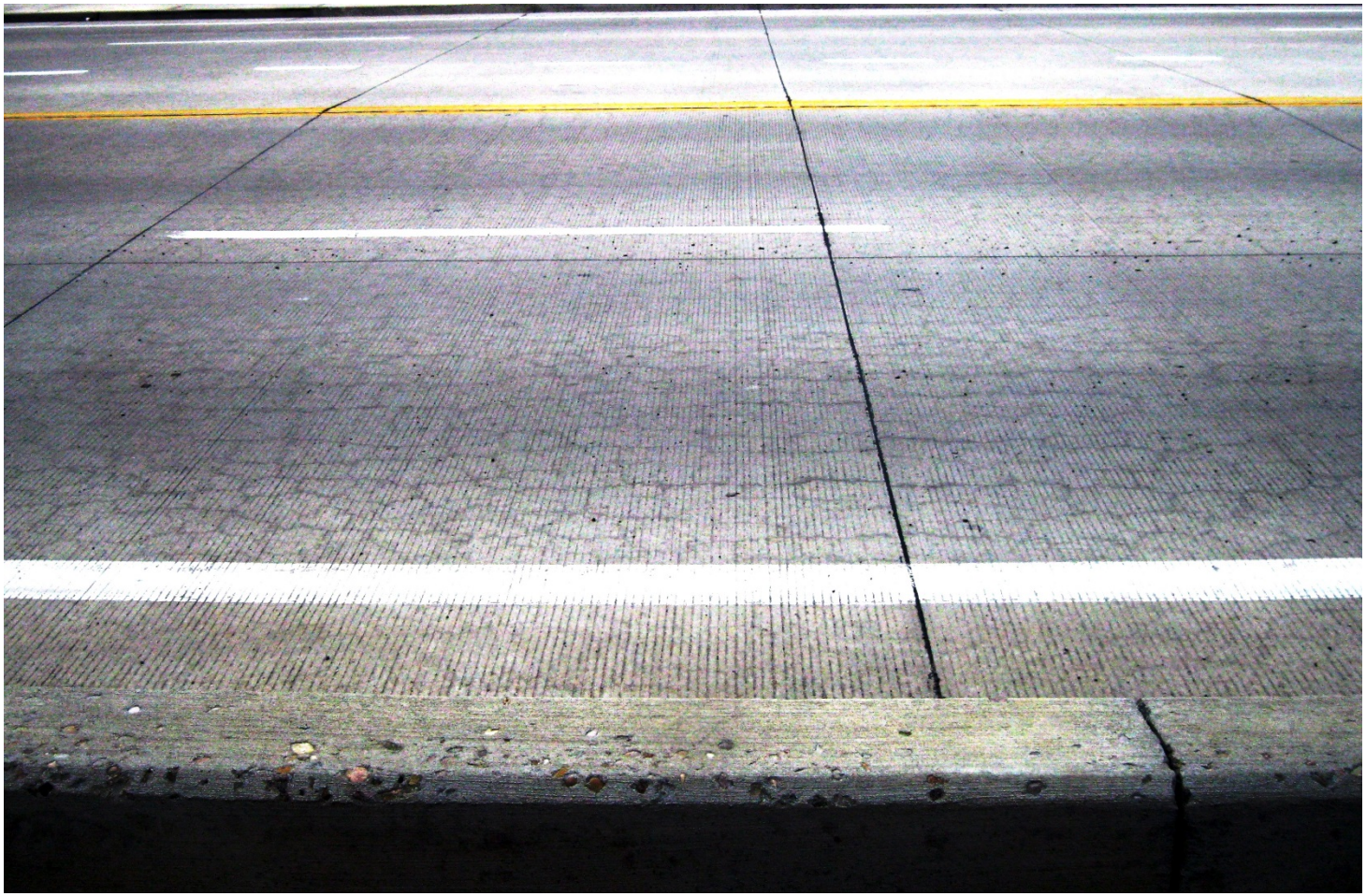
Delaware Department of Transportation

Vacation Pictures
I Go on Vacation, ASR Does Not

Overpass Deck



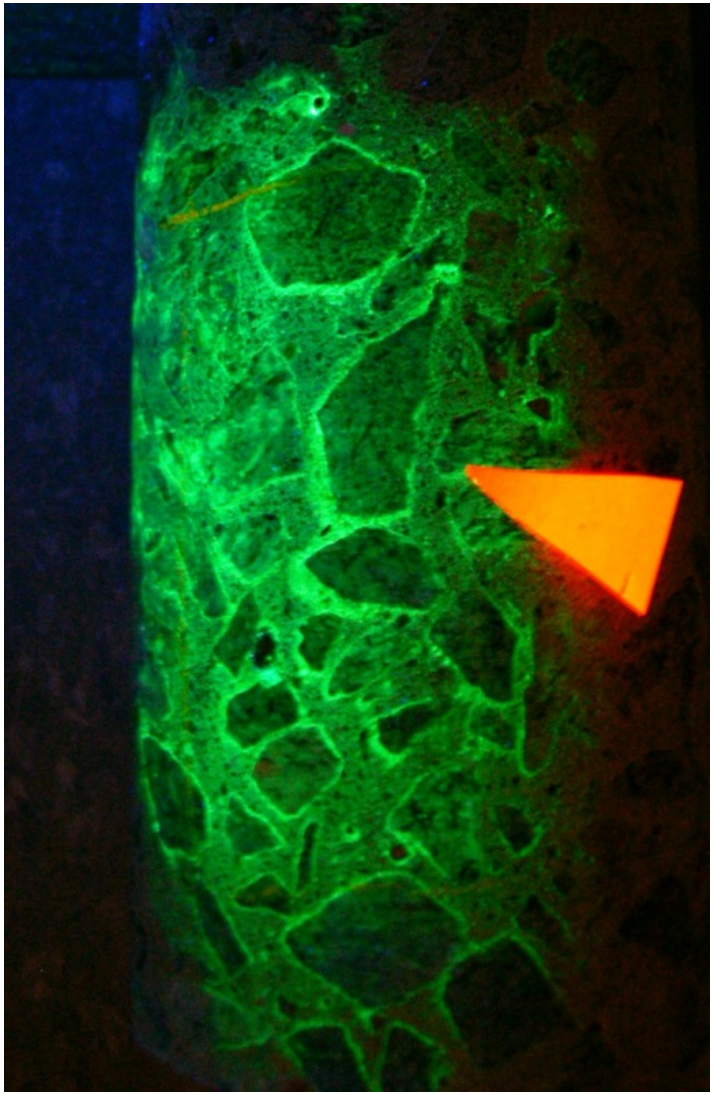
The Tale of Two Bridges

Compare

Constantly Wet – Note Algae Growth

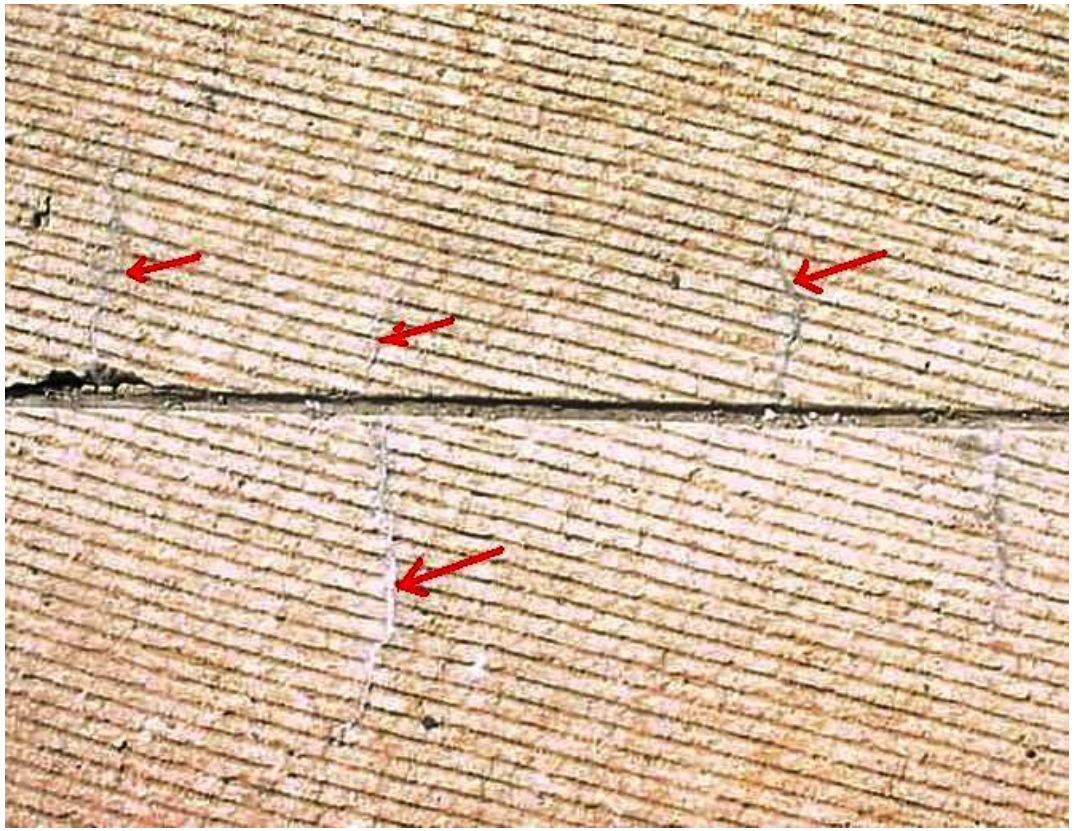
Delaware in not Immune from ASR

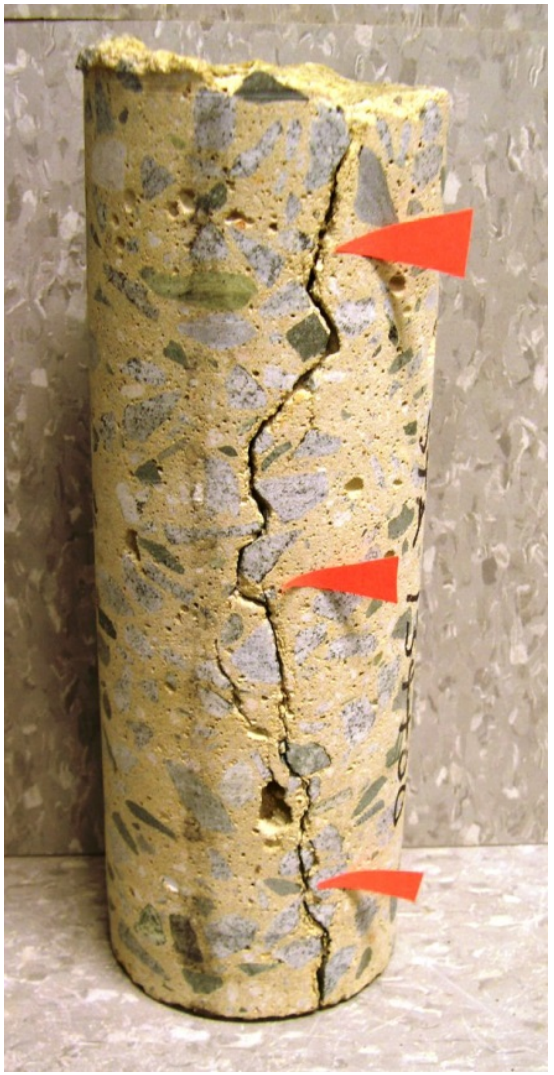
Typical Rimmed Aggregate Using Indicator Under UV Light



Rt 1 Near Christiana Mall
No Abatement 1990 - 1998

Rt 896 Near Glasgow
25% Slag 1991 - 2003

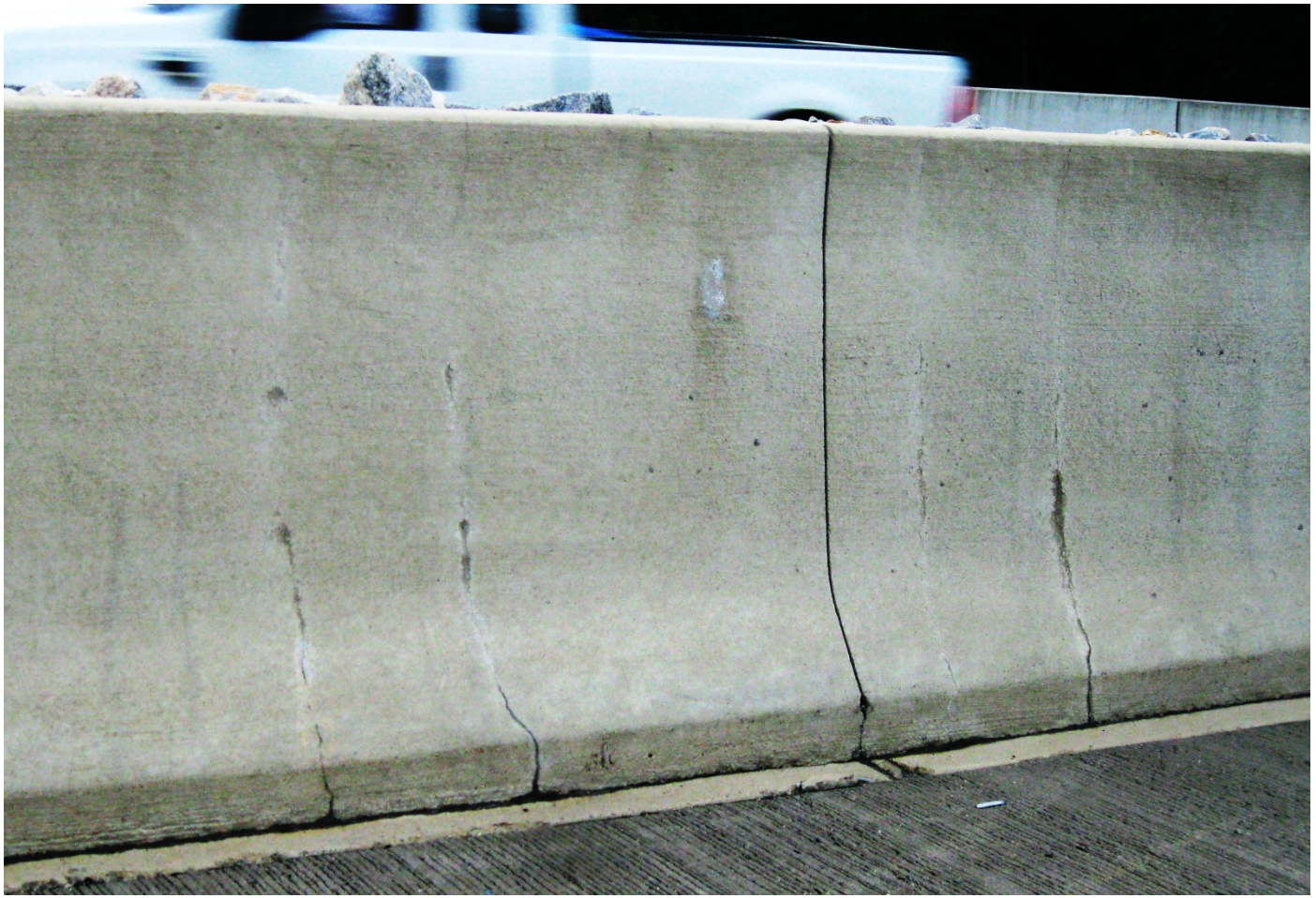




Field Experience and Abatement

- 1992 – 35% Slag, or 15% Class F Fly Ash, or Lithium, or Low Alkali Cement.
- ~ 2000 Low Alkali cement not effective and no longer considered suitable for abatement.
- 2007 C1260 non-reactive </= 0.08% @ 28d
- ~ 2010 45-50% Slag, or 20% Fly Ash, or lithium

Parapet Rt 1 Flyover – Christiana Mall Abatement Unknown 2014 -2016



Is There a Cure for ASR?

AASHTO PP-65

Standard Practice for Determining the Reactivity of Concrete Aggregates and Selecting Appropriate Measures for Preventing Deleterious Expansion in New Concrete Construction

AASHTO Designation: PP 65-11 (2016)[1]

Release: Group 1 (April 2016)

AASHTO

8. SELECTING PREVENTIVE MEASURES FOR ALKALI-SILICA REACTION (ASR)—PRESCRIPTIVE APPROACH

8.1. The level of prevention is determined by considering the class, size, and exposure condition of the structure; the degree of aggregate reactivity and the level of alkalis from the portland cement (when SCMs are used as preventive measures). Worked examples using the prescriptive approach are given in Appendix X4.

8.2. Aggregate Reactivity:

8.2.1. The degree of alkali-silica reactivity of an aggregate is determined by testing the aggregate in the concrete prism test (Section 6.5) and using the expansion value at 1 year. If data from the concrete prism test are not available, the degree of reactivity may be determined by testing the aggregate in the accelerated mortar-bar test (Section 6.4). If data are not available from either test, the aggregate may be considered as very highly reactive (R3). Aggregate-reactivity classes are given in Table 1. Where the coarse and fine aggregates are of different reactivity, the level of prevention should be selected for the most reactive aggregate.

Table 1—Classification of Aggregate Reactivity

Aggregate-Reactivity Class	Description of Aggregate Reactivity	1-Year Expansion in CPT, %	14-Day Expansion in AMBT, %
R0	Nonreactive	≤0.04	≤0.10
R1	Moderately reactive	>0.04, ≤0.12	>0.10, ≤0.30
R2	Highly reactive	>0.12, ≤0.24	>0.30, ≤0.45
R3	Very highly reactive	>0.24	>0.45

8.3. Risk of ASR:

8.3.1. The risk of ASR occurring in a structure is determined by considering the aggregate reactivity and the exposure conditions using Table 2.

Table 2—Determining the Level of ASR Risk

Size and Exposure Conditions	Aggregate-Reactivity Class			
	R0	R1	R2	R3
Nonmassive concrete[a] in a dry environment[b]	Level 1	Level 1	Level 2	Level 3
Massive elements[a] in a dry environment[b]	Level 1	Level 2	Level 3	Level 4
All concrete exposed to humid air, buried or immersed	Level 1	Level 3	Level 4	Level 5
All concrete exposed to alkalis in service[c]	Level 1	Level 4	Level 5	Level 6

DelDOT's Proposed Simplification

- **Table 2: Determining Level of ASR Risk**
  - Concrete exposed to alkalis (We salt everything)
- **Table 4: Structure Classification**
  - Pavements, Culverts, 40-75 yrs, = S3
- **Table 1: Aggregate Reactivity – Modified**
  - **28-day** AMBT (C1260), not 14-day. Generally R1 0.1-0.3 % expansion.
- **Table 3: Level of Protection = Y**

Thank You

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