APPENDIX E: Recommendations for Improving Current and Emerging Test Methods

Appendix E of *NCHRP Research Report 1083: Alkali-Silica Reactivity Potential and Mitigation: Test Methods and State of Practice* (NCHRP Project 10-103)

AASHTO T 380

General

The miniature concrete prism test (AASHTO T 380) was originally developed with ASTM C 150 Type I ordinary portland cements. While a precision and bias statement does not exist for AASHTO T 380 it is recommended to establish one using portland limestone cements (PLCs).

It is also recommended to use the word prevention when discussing methods that may reduce deleterious ASR rather than the word mitigation. Mitigation is used when structures or concrete elements are already suffering from ASR and mitigation methods are aimed at slowing, reducing, or stopping future expansion.

In Section 3

It is recommended to change the aggregate reactivity class in Table 1 to:

Table 1 - Proposed Criteria for Characterizing the Aggregate Reactivity in the MCPT Protocol

Degree of Reactivity	Expansion at 56 Days, % (8 weeks)	~~Average 2-Week Rate of Expansion from 8 to 12 Weeks~~[a]
R0	≤0.030	~~N/A~~
~~R0~~	~~0.031–0.040~~	~~≤0.010% per 2 weeks~~
~~R1~~	~~0.031–0.120~~	~~>0.010% per 2 weeks~~
R1	0.031-0.120	~~N/A~~[b]
R2	0.121-0.240	~~N/A~~[b]
R3	>0.240	~~N/A~~[b]

[a] *Example calculation for averaged rate of expansion from 8 to 12 weeks:*
If the average expansions of the three prisms at 8, 10, and 12 weeks are 0.035 percent, 0.046 percent, and 0.059 percent, respectively, then the average rate of expansion between 8 to 12 weeks is equal to (0.059 – 0.037)/2 = 0.012 percent per 2 weeks.
[b] *Not applicable.*

It is recommended to change the expansion limits in Table 2 to:

Table 2—Proposed Criteria for Characterizing Effectiveness of ASR Preventive Measures in MCPT Method

Efficiency of Mitigation	Expansion at 84 Days, % (12 Weeks)
Effective	< 0.025
Ineffective	≥ 0.025

AASHTO T303, ASTM C1260, and ASTM C1567

The accelerated mortar bar test was originally developed with ASTM C 150 Type I ordinary portland cements. The precision and bias statements were also established with these cements. The recent widespread adoption of PLCs within the United States means that these precision and bias statements need to be reevaluated with PLCs.

A round robin is currently underway at ASTM within subcommittee ASTM C09.50 to establish the necessary data. These results may be referenced by AASHTO T303 to update requisite sections within this test method.

ASTM C1293

1. Revise ASTM C1293 to be a one-year test for assessing aggregate reactivity. The following note can be added regarding SCM efficacy:
    a. *The 2-year concrete prism test has been found to be ineffective in predicting replacement percentages or dosage rates for SCMs or lithium nitrate, respectively, for high alkali loading mixtures (e.g. 5.25 kg/m^3 (8.85 lb/yd^3 Na_2O_{eq}). As such, this test should not be used for evaluating the efficacy of preventive measures.*
2. The concrete prism test was originally developed with ASTM C 150 Type I ordinary portland cements. The precision and bias statements were also established with these cements. The recent widespread adoption of PLCs within the United States means that these precision and bias statements need to be reevaluated with PLCs.
3. A round robin study is recommended to establish this necessary data.
4. Add these references:
    a. Drimalas, T., Folliard, K.J., Ideker, J.H., Parashar, A., Fournier, B., Ghanizadeh, A. and Thomas, M.D.A., "Improving Guidance of AASHTO R 80/ASTM C1778 for Alkali-Silica Reactivity (ASR) Potential and Mitigation," NCHRP Project Report 10-103, submitted for review March 31, 2023, 74 pp.

ASTM C595

1. It is recommended to require reporting of alkali content of all constituent materials including limestone.