

**5-05 Cement Concrete Pavement
As of January 2022**

No.	Requirement	Yes	No	Specification
1.	Is the mix design submitted on the most current DOT Form 350-040EF? Concrete mix design forms can be accessed at the following link: DOT Form 350-040 Concrete Mix Design (wa.gov)			
2.	Is the proposed Batch Plant and Truck Mixers and Agitators prequalified? Batch Plant certification can be viewed at the following link: Certifications - NRMCA			5-05.3(3)B, 5-05.3(5), 6-02.3(4)A
3.	Is the combination of the Mix Design Number and Plant Number unique to the combination of pit source, Cementitious and admixtures sources, types of admixtures, water/Cementitious ratio, and amount of aggregates?			5-05.3(1)
4.	Cement			5-05.3(1), 9-01
	a. Is the cement source and plant participating in the Cement Acceptance Program as evidenced by being listed on the QPL?			9-01.3
	b. Is the amount of cement correct?			5-05.3(1)
	c. Is the type of cement correct? (<i>Rapid hardening hydraulic cement may be used in panel replacement, Section 5-01.3(1)A2</i>)			5-05.3(1) 9-01
	d. If required for ASR, is the cement low-alkali?			9-03.1(1)
	e. Does the mill certification match the source and plant listed on the mix design?			
	f. Are the total cementitious materials equal to or greater than 564 lb/cy?			5-05.3(1)
5.	Fly Ash			9-23.9
	a. Is the Fly Ash Type F?			5-05.3(1)
	b. Is the fly ash source and plant participating in the Fly Ash Acceptance Program as evidenced by being listed on the QPL?			9-23.9(1)
	c. Does the Fly Ash comply with 9-23.9 including optional chemical requirements in AASHTO M 295, Table 2 (available alkalis)?			9-23.9
	1. If not, do test results indicate compliance with Section 9-03.1(1)? (ASTM C 1567 expansion of 0.20% or less). A “yes” here would override section 4.c.			9-23.9
	d. Does the Fly Ash have a CaO content equal to or less than 15% by weight?			5-05.3(1)
	e. Does the quantity of Fly Ash comply with 5-05.3(1)? If used shall not exceed 35% by weight of total cementitious materials.			5-05.3(1)
	f. If both GGBFS and Fly Ash are used, is the total a maximum of 35% of the total cementitious materials?			5-05.3(1)
	g. Does the mill certification match the source and plant listed on the mix design?			
6.	Ground Granulated Blast Furnace Slag (GGBFS)			9-23.10
	a. Is the GGBFS source and plant participating in the Ground Granulated Blast Furnace Slag Acceptance Program as evidenced by being listed on the QPL?			9-23.10(1)
	b. Does the GGBFS comply with AASHTO M 302, Grade 100 or Grade 120?			9-23.10
	c. Does the quantity of GGBFS comply with 5-05.3(1)? If used shall not exceed 30% of the total cementitious materials.			5-05.3(1)
	d. If both GGBFS and Fly Ash are used, is the total a maximum of 35% of the total cementitious materials?			5-05.3(1)
	e. Does the mill certification match the source and plant listed on the mix design?			

7.	Microsilica Fume			9-23.11
	a. Is the microsilica fume from an approved source by evidence by being listed on the QPL?			
	b. Does the microsilica fume comply with AASHTO M 307			9-23.11
	c. If being used for ASR mitigation, does it comply with the optional physical requirements for Reactivity with Cement Alkalies in the AASHTO M 307, Table 3?			9-23.11
	d. Does the mix design indicate the lbs/cy of Microsilica Fume?			5-05.3(1)
	e. Does the mill certification match the source and plant listed on the mix design?			
8.	Natural Pozzolan (Metakaolin or Ground Pumice)			9-23.12
	a. Is the Natural Pozzolan from an approved source by evidence by being listed on the QPL?			
	b. Does the Natural Pozzolan comply with AASHTO M 295 Class N including the optional chemical requirements as set forth in Table 2?			9-23.12
	c. Does the mix design indicate the lbs/cy of Natural Pozzolan?			5-05.2(1)
	d. Does the mill certification match the source and plant listed on the mix design?			
9.	Fine Aggregate (skip to Item 11 if using Combined Aggregate Gradation)			9-03.1(2)
	a. Is the source approved for use as a fine aggregate for concrete?			ASA database
	b. Is ASR mitigation required for the aggregate source(s)? If “yes” see Item 12.			ASA database, 9-03.1(1)
	c. Does the fine aggregate satisfy the Deleterious Substance requirements in Section 9-03.1(2)A?			9-03.1(2)A
	d. Is Class 1 fine aggregate indicated on the mix design?			5-05.3(1)
	e. Is the lbs/cy of the fine aggregate indicated on the mix design?			5-05.3(1)
10.	Coarse Aggregate (skip to item 11 if using Combined Aggregate Gradation)			9-03.1(4)C
	a. Is the source approved for use as a coarse aggregate for concrete?			ASA database
	b. Is ASR mitigation required for the aggregate source(s)? If “yes” see item 12.			ASA database, 9-03.1(1)
	c. Does the coarse aggregate(s) satisfy the Deleterious Substance requirements in Section 9-03.1(4)A?			9-03.1(4)A
	d. Is AASHTO Grading No. 467 indicated on the mix design? AASHTO Grading No. 467 will be made up from two or more stockpiles of coarse aggregate.			5-05.3(1), AASHTO M 80
	e. Does the combined gradation of coarse aggregates meet the grading requirements of AASHTO Grading No. 467?			AASHTO M 80, 9-03.1(4)C
	f. Is the lb/cy of coarse aggregate indicated on the mix design?			5-05.3(1)

11.	Combined Aggregate Gradation (skip if using separate fine and coarse aggregate gradations – see Items 9 and 10)			9-03.1(5)
	a. Are the aggregate sources approved for fine and/or coarse aggregate for concrete?			ASA database
	b. Is ASR mitigation required for the aggregate source(s)? If “yes” see Item 12.			ASA database, 9-03.1(1)
	c. Does the combine aggregate satisfy the Deleterious Substance requirements in Section 9-03.1(5)A?			9-03.1(5)A
	d. Is the NMS of the aggregate indicated on the mix design?			5-05.3(1)
	e. Is the NMS of the aggregate correct for the Class of Concrete? NMS should be equal to or greater than 1½”			5-05.3(1)
	f. Are the percentages and lbs/cy of each component indicated on the mix design?			5-05.3(1)
	g. Are the gradations for each component and the combined gradation included in the gradation chart?			9-03.1(5)B
	h. Is the combined gradation calculated correctly?			9-03.1(5)B
	i. Does the combined gradation meet the requirements for the indicated NMS?			9-03.1(5)B
12.	Alkali Silica Reactivity (ASR) See page 4 on guidance ASR mitigation.			9-03.1(1)
	a. Is ASR mitigation required for the aggregate source(s)? If “no” skip to item 13.			ASA database, 9-03.1(1)
	b. Is the proposed mitigation measure included with the mix design?			
	c. Does the proposed mitigation measure comply with the specification, or is it the same as that approved by the State Materials Laboratory?			9-03.1(1)
13.	Admixtures			9-23.6
	a. Do the proposed admixtures meet the appropriate specifications?			9-23.6
	b. Are they listed on the QPL?			QPL
	c. Are the proposed dosages (oz/cy) with the manufacturer’s recommended limits?			Catalog Cuts
	d. Type S Specific Performance Admixture			9-23.6(9)
	1. Does the mix design indicate the use of a Type S Admixture? If “No” here proceed to No. 14.			
	2. Is the Type S Admixture being used for either ASR-mitigating, viscosity modifying, shrinkage reducing, rheology-controlling, and workability-retaining admixtures?			9-23.6(9)
	3. Does the mix design contain a report on the performance characteristics of the Type S Admixture?			9-23.6(9)
14.	Water			9-25
	a. Is the maximum lbs/cy of water indicated on the mix design?			5-05.3(1)
	b. Does the mix design indicate water/cementitious ratio equal to or less than 0.44?			5-05.3(2)
	c. Is the maximum water/cementitious ratio provided equal to the total water divided by the total cementitious materials indicated on the mix design?			5-05.3(1)
	d. If reclaimed water is proposed for use, does it comply with 9-25.1?			9-25.1

15.	Design Performance			
	a. Method of Test for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)			WSDOT T 802
	1. Are statistically analyzed flexural strength results for five – 14 day beams shown on the mix design? Flexural strength should be equal to or greater than 650 psi.			5-05.3(1)
	2. Is the quality level of the beam specimens greater than 80%?			5-05.3(1), 1-06.2(2)D
	b. Compressive Strength of Cylindrical Concrete Specimens.			WSDOT FOP for AASHTO T 22
	1. Are the results of five sets of 28 day compressive strength cylinders provided?			5-05.3(1)
	2. Does the compressive strength data indicate average compressive strength of 4000 psi or greater?			5-05.3(1), 5-05.3(4)A
	c. Air Content of Freshly Mixed Concrete by the Pressure Method			WSDOT FOP for WAQTC T 152
	1. Does the mix design indicate air content between 3 – 7%?			5-05.3(4)A

ASR Mitigation Section 9-03.1(1)

If the ASA database indicates “ASR Mitigation Required” and the **ASR – 14 Day** test results is 0.21 to 0.45% the design must include at least one of the following:

1. Low Alkali Cement per Section 9-01.2(1)A.
2. Fly Ash Class F, 25% minimum by weight of the total cementitious materials.
3. An alternative mitigation measure that has been approved by the State Materials Laboratory – Submit proposed mitigation measures to the Materials Quality Assurance Section for review and approval.

If the ASA database indicates “ASR Mitigation is Required” and the **ASR – 14 Day** test results is greater than 0.45%, the design must include both of the following:

1. Low Alkali Cement per Section 9-01.2(1)A.
2. An alternative mitigation measure that has been approved by the State Materials Laboratory – Submit proposed mitigation measure to the Materials Quality Assurance Section for review and approval.

Unless otherwise indicated in the ASA database, no mitigation is required with **ASR – One Year** test results less than 0.04%. **The on-year results override the 14 – Day results.**