

**6-02.3(2)A1 Concrete Class 4000D – Mix Design Checklist
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)			6-02.3(2)A
2	Is the proposed Batch Plant prequalified? Batch Plant certification can be viewed at the following link: Certifications - NRMCA			6-02.3(4)
3	Is the Concrete Class appropriate for the Bid Item(s) indicated?			6-02.3(1)
4	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	Are the total water soluble or acid soluble chloride ion contents provided?			6-02.3(2)
6	Cement			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 type of cement correct?			6-02.3(2), 6-02.3(2)A1 9-01
	c. Does the mix design indicate the lbs/cy of cement?			6-02.3(2)A
	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?			
7	Fly Ash			9-23.9
	a. 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)
	b. 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 7.b.			9-23.9
	c. Does the mix design indicate the lbs/cy of fly ash?			6-02.3(2)A
	d. Does the mill certification match the source and plant listed on the mix design?			
8	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 mix design indicate the lbs/cy of GGBFS?			6-02.3(2)A
	d. Does the mill certification match the source and plant listed on the mix design?			

9	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?			6-02.3(2)A
	e. Does the mill certification match the source and plant listed on the mix design?			
10	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?			6-02.3(2)A
	d. Does the mill certification match the source and plant listed on the mix design?			
11	Combined Aggregate Gradation			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 14.			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?			6-02.3(2)
	e. Is the NMS of the aggregate correct for the Class of Concrete? (NMS shall be 1 ½”)			6-02.3(2)A
	f. Are the percentages and lbs/cy of each component indicated on the mix design?			6-02.3(2)A
	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 5 on guidance ASR mitigation.			9-03.1(1)
	a. Is ASR mitigation required for the aggregate source(s)? If “no” skip to item 15.			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. If required by the Class of concrete, are the appropriate admixtures included in the mix design?			6-02.3(2)A
	b. Do the proposed admixtures meet the appropriate specification?			9-23.6
	c. Are they listed on the QPL?			QPL
	d. Are the proposed dosages within the manufacturer's recommended limits?			
	e. If the admixtures are from different sources has the Contractor, the included test reports complying with ASTM C 457 indicating that the air void system of the hardened concrete has not been adversely affected?			6-02.3(3)
	f. 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. 16.			
	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?			6-02.3(2)A
	b. Is the maximum water/cementitious ratio provided equal to the total water divided by the total Cementitious materials indicated on the mix design?			6-02.3(2)A
	c. If reclaimed water is proposed for use, does it comply with 9-25.1?			9-25.1
15	Design Performance			
	a. Compressive Strength			6-02.3(2)A
	1. Are the break data and ACI equations supporting the concrete class attached?			6-02.3(2)A
	2. Does the calculated average compressive strength meet the requirements for the concrete class?			ACI 301, Chapter 4 Section 4.2.3.3
	b. Permeability			AASHTO T 277
	1. Does the mix design indicate the permeability of 2,000 coulombs or less at 56 days?			6-02.3(2)A1
	c. Freeze-thaw Durability , the mix design should indicate one of the following:			
	1. Does the mix design indicate an air content between 4.5 – 7.5%? or			6-02.3(2)A1
	2. Resistance of Concrete to Rapid Freezing and Thawing			AASHTO T 161 Procedure A
	o Does the mix design indicate a durability factor of 90% minimum, after 300 cycles?			6-02.3(2)A1
	o Does the mix design indicate an air content equal to or greater than 3.0%?			6-02.3(2)A1
	d. Length Change of Hardened Hydraulic Cement Mortar and Concrete			AASHTO T 160
	1. Does the mix design indicate a length change (shrinkage) at 28 days less than or equal to 0.032%?			6-02.3(2)A1

	e. Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete			ASTM C 138
	1. Does the mix design indicate the density?			6-02.3(2)A1

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.**