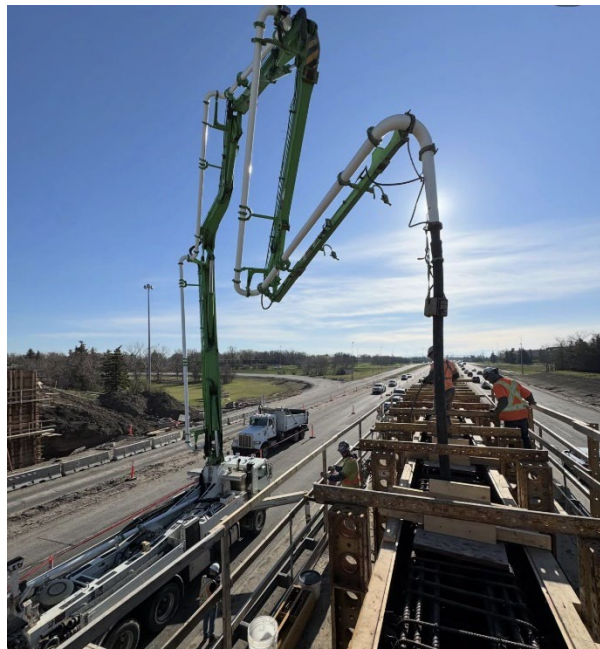




Box 696 Station Main Regina SK S4P 3A3  
306-552-5592 [www.concretesask.org](http://www.concretesask.org)

# SUMMARY OF SMHI SPECIFICATION FOR BRIDGE WORK

This document provides a summary of key testing and material requirements contained within the SMHI Specification for Bridge Work. It outlines applicable test methods, testing requirements, approximate timelines and costs, specification notes, and testing data validity for aggregates, cementitious materials, admixtures, water, trial mixes, and concrete production.



| Summary of SMHI Specification for Bridge Work |                                     |                                          |                                 |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                        |
|-----------------------------------------------|-------------------------------------|------------------------------------------|---------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Material                                      | Standard Test Method (CSA or other) | Testing Required                         | Test Timelines (approx on lab.) | Approximate Test Cost (Lab dependent)   | Notes                                                                                                                                                                                                                                                                                                                                                                                                                          | Testing Data Validity                                                                                                  |
| Fine Aggregate                                | A23.2-1A                            | Sampling                                 | less than one day               | Discuss with specific lab doing testing | Test timelines are approximate only and will vary depending on testing firm capacity to complete<br>Not more than 45% by mass retained between any two consecutive sieve sizes,<br>Fineness Modulus between 2.3 and 3.1. Shall not vary by more than ± 0.2% from the finesess modulus of the initially approved fine aggregate used in the design mix.<br>Max 0.5% by mass ot total sample<br>Max 0.5% by mass ot total sample | Within 90 days of project start.                                                                                       |
|                                               | A23.2-2A                            | Gradation as per Table 6300.2.T1         | less than one day               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 90 days of project start. Every 500 tonnes during production                                                    |
|                                               | A23.2-5A                            | Material finer than 80 µm                | less than one day               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 3 years of project start                                                                                        |
|                                               | A23.2-3A                            | Clay Lumps                               | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 3 years of project start                                                                                        |
|                                               | A23.2-4A                            | Low Density Material                     | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 1 year of project start                                                                                         |
|                                               | A23.2-6A                            | Relative Density and Absorption          | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 4 years of project start                                                                                        |
|                                               | A23.2-9A                            | Magnesium Sulphate Soundness Loss        | two weeks                       |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 4 years of project start                                                                                        |
|                                               | A23.2-23A                           | Micro-Deval Abrasion Loss                | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 2 years of project start                                                                                        |
|                                               | A23.2-7A                            | Organic Impurities                       | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Certified by Professional Engineer registered in Saskatchewan                                                          |
|                                               | A23.2-15A                           | Petrographic Analysis                    | 1 to 2 weeks                    |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 1.5 years of project start, certified by Professional Engineer registered in Saskatchewan                       |
|                                               | A23.2-14A, 25A, 27A, 28A            | Alkali-Aggregate Reactivity              | 3 weeks to 1 year               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Prior to project start                                                                                                 |
|                                               | SMHI STP 206-5                      | Sand Equivalent                          | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                        |
| Coarse Aggregate                              | A23.2-1A                            | Sampling                                 | less than one day               | Discuss with specific lab doing testing | 40mm maximum size, gradation as per limits noted in Table 6300.2.T3<br>Gradation shall not vary by more than 5% on any one sieve size from the initially approved coarse aggregate used in the design mix.                                                                                                                                                                                                                     | Within 90 days of project start. Every 500 tonnes during production                                                    |
|                                               | A23.2-2A                            | Gradation as per Table 6300.2.T3         | less than one day               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                        |
|                                               | A23.2-5A                            | Material finer than 80 µm                | less than one day               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 3 years of project start                                                                                        |
|                                               | A23.2-3A                            | Clay Lumps                               | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 3 years of project start                                                                                        |
|                                               | A23.2-4A                            | Low Density Material                     | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 4 years of project start                                                                                        |
|                                               | A23.2-9A                            | Magnesium Sulphate Soundness Loss        | two weeks                       |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 1 year of project start                                                                                         |
|                                               | A23.2-12A                           | Relative Density and Absorption          | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 90 days of project start. Every 1000 tonnes during production                                                   |
|                                               | A23.2-13A                           | Flat and Elongated Particles             | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 4 years of project start                                                                                        |
|                                               | A23.2-29A                           | Micro-Deval Abrasion Loss                | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Certified by Professional Engineer registered in Saskatchewan                                                          |
|                                               | A23.2-15A                           | Petrographic Analysis                    | 1 to 2 weeks                    |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Less than 24 months after date of sampling. certified by Professional Engineer registered in Saskatchewan              |
|                                               | A23.2-14A, 25A, 27A, 28A            | Alkali-Aggregate Reactivity              | 3 weeks to 1 year               |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Required only if aggregate fails any test methods A23.2-4A, 5A, 9A, 16A or 29A                                         |
|                                               | A23.2-24A                           | Unconfined Freeze-Thaw                   | two weeks                       |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                | Within 4 years of project start                                                                                        |
|                                               | A23.2-16A                           | LA Abrasion                              | one day                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                        |
| Cement                                        | A3001-18, Type GU                   | Mill test reports from supplier required | N/A                             | Discuss with specific lab doing testing | GU cement required for DC Concrete<br>HS cement also specified for use but shown where<br>Total Na <sub>2</sub> O alkali content of cements ≤0.60%                                                                                                                                                                                                                                                                             | Submit with mix designs<br>Ministry must approve use of blended hydraulic Portland cement or Portland Limestone cement |
| Portland Limestone Cement (PLC)               | A3001-18, Type GUL                  | Mill test reports from supplier required | N/A                             | Discuss with specific lab doing testing | PLC cements require proportions of refernce standard limits of limestone, limestone carbonate (CaCO <sub>3</sub> ), methylene blue values,and total equivalent alkali (Na <sub>2</sub> O)<br>Limestone content shall not exceed 15%                                                                                                                                                                                            |                                                                                                                        |
| HS and HSL cements                            | A3001-18-8C, Type HS and HSL        | Mill test reports from supplier required | 1 year                          | Discuss with specific lab doing testing | Limestone content of HSL cement shall not exceed 15%. Sulphate resistance expansion testing of HSL cement required as per CSA A3001-18-8C only, not C6, reported to 3 decimal places.<br>Max. expansion of 0.045% at 6 months or 0.100% at one year.                                                                                                                                                                           |                                                                                                                        |
| Silica Fume                                   | A3001-18                            | Mill test reports from supplier required | N/A                             | Discuss with specific lab doing testing | Type SF                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                        |

| Summary of SMHI Specification for Bridge Work |                                                                                                                       |                                                                                                             |                                         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Material                                      | Standard Test Method (CSA or other)                                                                                   | Testing Required                                                                                            | Test Timelines (approx on lab.)         | Approximate Test Cost (Lab dependent)   | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Testing Data Validity                                                                                                                                                                                                                                                                                                                                                                               |
| Flyash (Coal Ash)                             | A3001-18                                                                                                              | Mill test reports from supplier required                                                                    | N/A                                     | Discuss with specific lab doing testing | Type F<br>Minimum total SiO <sub>2</sub> plus Al <sub>2</sub> O <sub>3</sub> plus Fe <sub>2</sub> O <sub>3</sub> content ≥ 70%<br>Maximum Na <sub>2</sub> O equivalent 4%<br>Flyash with greater than 4% Na <sub>2</sub> O equivalent may be used provided it is effective at mitigating AAR in accordance with CSA A23.2-27A. Expansion of test prisms shall be less than 0.040% after 2 yrsrs as per CSA A23.2-14A.<br>Maximum flyash content for DC Concrete is 15%, All other concrete is 25%<br>Type CH and Type CI coal ash shall not be used                                                                                                                                                                                                                                                                                                                                                                           | Submit with mix designs and testing data for A23.2-28A                                                                                                                                                                                                                                                                                                                                              |
| Metakaolin                                    | A3001-18                                                                                                              | Mill test reports from supplier required                                                                    | N/A                                     | Discuss with specific lab doing testing | Type N<br>Minimum total SiO <sub>2</sub> plus Al <sub>2</sub> O <sub>3</sub> plus Fe <sub>2</sub> O <sub>3</sub> content ≥ 70%<br>Maximum moisture content 3%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Submit with mix designs                                                                                                                                                                                                                                                                                                                                                                             |
| Admixtures                                    | ASTM C260M, ASTM C494M<br>ASTM C494 Type A, Type F, ASTM C1017M Type I, ASTM C494 Type S, ASTM C494M Type B or Type D | Discuss with admixture suppliers                                                                            | N/A                                     | N/A                                     | Ministry must approve all proposed admixtures prior to use in concrete. All approved admixtures must be compatible with all other admixtures and mix constituents. Calcium chloride or any admixture containing chloride ions shall not be used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Ministry must approve use of all admixtures. All approved admixture shall be compatible with all other admixtures and constituents used in the mixes. Calcium Chloride or any admixture containing chloride ions shall not be used. If requested, a written statement form the manufacturer stating the admixture contains no intentially added calcium chloride shall be provided to the Ministry. |
| Water                                         | CSA A23.1                                                                                                             |                                                                                                             | 1 day                                   | Discuss with specific lab doing testing | Clear and free of injurious amounts of oil, acid, alkali, organic matter, sediment or any other dleterious substance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Submit results a minimum of 2 weeks before palcing any concrete.                                                                                                                                                                                                                                                                                                                                    |
| DC Concrete Trial Testing                     | A23.2- 1C, 3C, 4C, 5C, 6C, 9C                                                                                         | Slump, Air Content, Temperature<br>Cylinders, Density and Yield<br>Slump Retention<br>Air Content Retention | one day                                 | Discuss with specific lab doing testing | Minimum cement content of 360 kg/m³<br>6% to 8% Silica Fume required<br>DC concrete maximum amount of aggregate of 35% passing the 5mm sieve of total mass of aggregate<br>12% to 16% metakaolin allowed in lieu of Silica Fume<br>Maximum of 15% flyash by mass of cementitious allowed<br>Maximum SCM's addition of 20% of total cementitious allowed in mix<br>Slump of 50mm ± 20mm before addition of superplasticizer<br>Slump of 100±20mm after addition of superplasticizer<br>Slump retention of superplasticized concrete shall be 75% of initial slump, 45 minutes from the initial batch time<br>Air content retention shall be 70% of initial air content, one hour after initial batching time<br>Average RCP (Rapid Chloride Permeabilty) shall be less than 1250 coulombs and not to exceed 1500 coulombs at 56 days.<br>Hardened Air Void spacing Factor to be ≤ 230µm and no individual test to exceed 260µm | Testing conducted by CCIL Certified Lab                                                                                                                                                                                                                                                                                                                                                             |
|                                               | A23.2-23C/ASTM C1202                                                                                                  | RCP                                                                                                         | one day after submitting to lab         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                               | ASTM C457                                                                                                             | Hardened A/V                                                                                                | one day after submitting to lab         |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                               | ASTM C672 (Withdrawn 2021)<br>CSA A23.2-22C                                                                           | Salt Scaling Resistance                                                                                     | ASTM = 16 to 20 weeks<br>CSA = 36 weeks |                                         | Salt Scaling shall be less than 0.4 kg/m³ surface loss after 30 cycles<br>CSA A23.2-22C, 50 cycles, 5 days = 1 cycle or 250 days total (36 weeks minimum)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                     |
| Concrete Production for Project               | A23.2-1C, 3C, 4C, 5C, 6C, 9C                                                                                          | Slump, Air Content, Density, Yield, Compressive Sterength of Cylinders, Hardened A/V, RCP                   | Project duration                        |                                         | Test every 35m³ for slump, air content, and cylinders<br><br>Density and yield each pour<br>RCP testing per each type of concrete<br>Hardened Air Void Test per each concrete type during project as directed by engineer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Testing conducted by CCIL Certified Lab                                                                                                                                                                                                                                                                                                                                                             |