

1 **DIVISION 600 - MISCELLANEOUS CONSTRUCTION**

2
3 Amend **Section 601 - STRUCTURAL CONCRETE** to read as follows:

4
5 **SECTION 601 - STRUCTURAL CONCRETE**

6
7
8 **601.01 Description.** This section describes structural concrete consisting of
9 Portland Cement, fine aggregate, coarse aggregate, and water. This will include
10 adding admixtures for the purpose of entraining air, retarding or accelerating set,
11 tinting, and other purposes as required or permitted. To reduce the embodied carbon
12 footprint of concrete, concrete design on the island of Oahu shall include the use of
13 carbon dioxide mineralization or equivalent technology. Other methods to reduce the
14 cement content such as use of supplementary cementitious materials (SCMs) or
15 admixtures such as C-S-H nanoparticle-based strength-enhancing admixture (CSH-
16 SEA) or equivalent may also be used to reduce the embodied carbon footprint
17 including the combination thereof the previously mentioned methods.

18
19 **601.02 Materials.**

20

21 Portland Cement	701.01
22	
23 Fine Aggregate for Concrete	703.01
24	
25 Coarse Aggregate for Portland Cement Concrete	703.02
26	
27 Admixtures	711.03
28	
29 Water	712.01

30

31 Use coarse aggregate for lightweight concrete conforming to ASTM C330
32 except Sections 5, 7 and 9.

33
34 **601.03 Construction.**

35
36 **(A) Quality Control.** Portland Cement concrete production requires
37 Contractor responsibility for quality control of materials during handling,
38 blending, mixing, curing, and placement operations.

39
40 Sample, test, and inspect concrete to ensure quality control of
41 component materials and concrete. Sampling and testing for quality control in
42 accordance with standard methods shall be performed by certified ACI
43 Concrete Field Technician Grade I. Perform quality control tests for slump, air
44 content, temperature, and unit weight during production of structural concrete
45 other than concrete for incidental construction. Submit quality control test
46 results.

47 **(B) Design and Designation of Concrete.** Design concrete mixture for
48 concrete work specified. Submit mix design using State Highways Division
49 form DOT 4-151 or an Engineer accepted equivalent form. Do not start work
50 until the Engineer accepts mix design. The Engineer will accept concrete mix
51 design using information given in Table 601.03-1 - Design of Concrete, and
52 other pertinent requirements.
53

54 Whenever 28-day compressive strength, f'_c , is 4,000 psi or greater,
55 designate concrete by required minimum 28-day compressive strength.
56

57 The 28-day compressive strength, f'_c , less than 4,000 psi listed in Table
58 601.03-1 – Design of Concrete, is for design information and designation of
59 class only.
60

61 Proportion concrete designated by compressive strength such that
62 concrete conforms to required strength.
63

64 Design concrete placed in bridge decks and pavements exposed to
65 traffic wear, with air content of 3 percent, including entrapped and entrained
66 air. Maintain air content for plastic concrete within tolerance of 1 percent air
67 content, plus or minus, during the work.
68

69 Class A concrete shall be used when type of concrete is not indicated in
70 the contract documents.
71

72 Design concrete as specified in Table 601.03-1 – Design of Concrete.
73

TABLE 601.03-1 - DESIGN OF CONCRETE (800 Maximum Cement Content lbs./c.y.)					
Class of Concrete	28-Day Strength f'_c, psi.	Minimum Cement Content lbs./c.y.	Maximum Water-Cement Ratio, lb./lb.	Minimum Cement Content with Mineralized CO₂ lbs./c.y.	Maximum Water-Cement Ratio with Mineralized CO₂ lb./lb.
A	3000	532	0.59	504	0.62
B	2500	475	0.66	450	0.70
C	2000	418	0.75	396	0.79
D	1500	380	0.85	360	0.87
SEAL	3000	610	0.55	NA	NA
Designated by Strength f'_c or f'_r	As Specified	610	0.49	NA	NA
f'_r = Specified Modulus of Rupture					

Concrete Design – Projects on Oahu will utilize CO₂ Mineralization technology or equivalent. Supplementary cementitious materials (SCMs), CSH-SEA or equivalent or combination thereof the previously mentioned methods may also be used. Concrete design shall allow a reduction of portland cement content while maintaining the concrete design strength, durability and other requirements. See Table 601.03-1 Design of Concrete specified limits for adjusted minimum cement content and water cement ratio when using CO₂ mineralization. Material certifications for the above shall include a list of at least 3 projects that used the technology, SCMs, admixtures or combination thereof.

Use the absolute volume method to proportion concrete materials in accordance with requirements of concrete designated by class, cement content in pounds per cubic yards, or specified 28-day compressive strength. Use absolute volumetric proportioning methods as outlined in the American Concrete Institute (ACI) Standard 211.1, "Recommended Practices for Selecting Proportions for Normal and Heavyweight Concrete."

Use coarse aggregate size No. 57 (one inch to No. 4) or No. 67 (3/4 inch to No. 4) for concrete. For concrete placed in bottom slabs and stems of box girders, use No. 67 size aggregate. Smaller size aggregates may be permitted when encountering limited space between forms and reinforcement or between reinforcement when accepted by the Engineer in writing. Maximum aggregate size shall not be greater than 1/3 of the space between reinforcing

steel bars or reinforcing steel and the form.

Use the following standard methods in Table 601.03-2 – Standard Methods for determining compliance with requirements indicated in this subsection:

TABLE 601.03-2 – STANDARD METHODS	
Sampling Fresh Mixed Concrete	AASHTO T 141
Mass Per Cubic Meter (Cubic Foot) Yield and Air Content (Gravimetric) of Concrete	AASHTO T 121
Slump of Hydraulic Cement Concrete	AASHTO T 119
Air Content of Freshly Mixed Concrete by the Pressure Method	AASHTO T 152
Specific Gravity and Absorption of Fine Aggregate	AASHTO T 84
Specific Gravity and Absorption of Coarse Aggregate	AASHTO T 85
Temperature of Freshly Mixed Portland Cement Concrete	ASTM C1064
Making and Curing Concrete Test Specimens in the Field	AASHTO T 23
Compressive Strength of Molded Concrete Cylindrical Specimens	AASHTO T 22 (4 inch by 8 inch or 6 inch by 12 inch cylinders)
Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)	AASHTO T 97

When concrete is designated by compressive strength, f'_c , or flexural strength, f'_r , or includes CO₂ Mineralization technology, CSH-SEA or SCMs, the Engineer will require prequalification of materials and mix proportions proposed for use before placing such concrete. The Engineer will prequalify concrete based on past performance records using statistical computations of population sizes and (n-1) weighting, or trial batch test reports in compliance with computed minimum average strength for material and mix proportions. The Engineer will determine minimum average strength on probability of not more than one in 20 tests falling below specified strength for the following conditions:

- (1) When past performance records are available, furnish the

following documented performance records:

(a) Minimum of 15 consecutive 28-day strength tests from projects having same materials and mix proportions.

(b) Two groups totaling 30 or more test results representing similar materials in which mix proportion strengths are within 20 percent of specified strength, from data obtained within one year of proposed use.

The Engineer will analyze performance records to establish standard deviation.

(2) When sufficient past performance records are not provided, the Engineer will assume current standard deviation to be 500 psi for compressive strength, f'_c , and 50 psi for flexural strength, f'_r .

Unless sufficient performance records are available from other projects at DOT Materials Testing and Research Branch, submit test performance records or trial test reports for prequalifications, based on data of most recent tests made on concrete of proposed mix design, and data obtained within one year of proposed use.

When shrinkage reducing admixtures are used, submit test results showing compliance to the Contract Documents' requirements.

Include the following information in test data and trial batch test reports: date of mixing; mixing equipment and procedures used; size of batch in cubic yards and weight, type, and source of ingredients used; slump of concrete; air content of concrete when using air entraining agent; age at time of testing; and strength of concrete cylinders tested.

Show that concrete strength tests equal or exceed minimum average strength in trial test reports. Test is average 28-day test results of five consecutive concrete cylinders or concrete beams taken from single batch. No cylinder or beam shall have strength less than 85 percent of minimum average strength.

Submit test data and trial test reports signed by official of firm that performed tests.

The Engineer reserves the right to stop work when a series of low strength tests occur. Do not continue concrete work until cause is established and the Engineer is informed of and accepts, necessary corrective action to be taken.

165 **(C) Batching.** Measure and batch materials in accordance with the
166 following provisions:
167

168 **(1) Portland Cement.** Either sacked or bulk cement may be used.
169 Do not use fraction of sack of cement in concrete batch unless cement
170 is weighed.
171

172 Weigh bulk cement on weighing device accepted by the Engineer. Seal
173 and vent bulk cement-weighing hopper properly to preclude dusting
174 during operation. Do not suspend discharge chute from weighing
175 hopper. Arrange discharge chute so that cement will not lodge in
176 hopper or leak from hopper.
177

178 Batching accuracy shall be within 1 percent, plus or minus, of
179 required weight.
180

181 **(2) Water.** Measure water by volume or by weight. Use readily
182 adjustable device for measurement of water, with accuracy within 1
183 percent, plus or minus, of quantity of water required for batch. Arrange
184 device so that variable pressure in water supply line does not affect
185 measurements. Equip measuring tanks with outside taps and valves or
186 other accepted means to allow for checking calibration.
187

188 **(3) Aggregates.** When storing and stockpiling aggregates, avoid
189 separation of coarse and fine particles within each size, and do not
190 intermix various sizes before proportioning. Protect stored or stockpiled
191 aggregates from dust or other foreign matter. Do not stockpile together,
192 aggregates from different sources and of different gradations. When
193 transporting aggregates from stockpiles or other sources to batching
194 plant, ensure uniform grading of material is maintained. Do not use
195 aggregates that have become segregated or mixed with earth or foreign
196 matter. Stockpile or bin aggregates at least 12 hours before batching.
197 Produce or handle aggregates by hydraulic methods and wash and
198 drain aggregates. If aggregates exhibit high or non-uniform moisture
199 content, the Engineer will order storage or stockpiling for more than 12
200 hours.
201

202 Proportion aggregates by weight, with the exception that
203 aggregates in concrete for minor structures, curbs, and sidewalks may
204 be proportioned by either volume or weight. For volumetric
205 proportioning, use measuring boxes of known capacity to measure
206 quantity of each aggregate size.
207

208 Use batch weight based on dry materials plus total weight of
209 moisture (both absorbed and surface) contained in aggregate.
210 Measure individual aggregates to within 2 percent, plus or minus, of

required weight, and total weight of aggregates to within 1 percent, plus or minus, of required weight.

(4) Admixtures. All admixtures shall be compatible with each other. Admixtures which significantly increase the drying shrinkage or creep in the concrete may be rejected by the Engineer. Store, proportion, and dispense admixtures in accordance with the following provisions:

(a) Liquid Admixtures. Dispense chemical admixtures, air entraining admixtures, and corrosion inhibiting admixtures in liquid form. Use mechanical dispensers for liquid admixtures with sufficient capacity to measure prescribed quantity for each batch of concrete. Include graduated measuring unit in each dispenser to measure liquid admixtures to within 5 percent, plus or minus, of prescribed quantity for each batch. Read graduations accurately from point of measuring unit, and control proportioning operations to permit visual check of batch accuracy before discharging. Mark each measuring unit clearly for type and quantity of admixture.

Arrange with supplier to provide sampling device consisting of valve located in safe and accessible location for sampling admixtures.

When using more than one liquid admixture for concrete mix, use separate measuring unit for each liquid admixture and dispense separately to avoid interaction that may interfere with admixture efficiency and adversely affect concrete. Dispense liquid admixture by injecting so as not to mix admixture at high concentrations.

When using liquid admixtures in concrete that is completely mixed in paving or continuous mixers, operate dispensers automatically with batching control equipment. Equip such dispensers with automatic warning system that shall provide visible or audible signals at points where proportioning operations are controlled, when the following occurs:

- a. Quantity of admixture measured for each batch of concrete varies from pre-selected dosage by more than 5 percent; or
- b. Entire contents of measuring unit from dispenser is not emptied into each batch of concrete.

257 Unless liquid admixtures are added to batch with
258 pre-measured water, discharge liquid admixtures into stream of
259 water that disperses admixtures uniformly throughout batch. An
260 exception is that air-entraining admixtures may be dispensed
261 directly into moist sand in batching bins, provided adequate
262 control of concrete air content can be maintained.

263
264 Measure and disperse special admixtures, as
265 recommended by admixture manufacturer, and as accepted by
266 the Engineer. Special admixtures include high-range water
267 reducers requiring dosages greater than capacity of
268 conventional dispensing equipment. For site-added, high-range
269 water reducers, use calibrated, portable dispenser supplied by
270 manufacturer.

271
272 **(b) Mineral Admixtures.** Protect mineral admixtures from
273 exposure to moisture until used. Pile sacked material of each
274 shipment to permit access for tally, inspection, and identification.

275
276 Provide adequate facilities to ensure that mineral
277 admixtures meeting specified requirements are kept separate
278 from other mineral admixtures and that only specified mineral
279 admixtures are allowed to enter into the work. Provide safe and
280 suitable facilities for sampling mineral admixtures at weigh
281 hopper or in feed line immediately in advance of hopper.

282
283 Incorporate mineral admixtures into concrete using
284 equipment conforming requirements for Portland Cement weigh
285 hoppers and charging and discharging mechanisms specified in
286 ASTM C94 and Subsection 601.03(C) - Batching.

287
288 When concrete is completely mixed in stationary paving
289 or continuous mixers, weigh mineral admixture in separate
290 weigh hopper. Introduce mineral admixture and cement
291 simultaneously into mixer, proportionately with aggregate.

292
293 When interlocks are required for cement-charging
294 mechanisms, and cement and mineral admixtures are weighed
295 cumulatively, interlock their charging mechanisms to prevent
296 introduction of mineral admixture until mass of cement in weigh
297 hopper is within tolerances specified in Subsection 601.03(C)(1)
298 - Portland Cement.

299
300 In determining maximum quantity of free water that may
301 be used in concrete, consider mineral admixture and
302 supplementary cementitious materials (SCMs) to be cement.

(5) Bins and Scales. At batching plant, use individual bins, hoppers, and scale for each aggregate size. Include separate bin, hopper, and scale for bulk cement and fly ash.

Except when proportioning bulk cement for pavement or structures, cement weigh hopper may be attached to separate scale for individual weighing or to aggregate scale for cumulative weighing. If cement is weighed cumulatively, weigh cement before other ingredients.

When proportioning for pavement or structures, keep bulk cement scale and weigh hopper separate and distinct from aggregate weighing equipment.

Use springless-dial or beam-type batching scales. When using beam-type scales, make provisions to show operator that required load in weighing hopper is approaching. Use devices that show condition within last 200 pounds of load and within 50 pounds of overload.

Maintain scale accuracy to 0.5 percent throughout range of use. Design poises to lock to prevent unauthorized change of position. Use scales inspected by the State Measurement Standards Branch of the Department of Agriculture to ensure their continued accuracy. Provide not less than ten 50-pound weights for testing scales.

Batching plants may be equipped to proportion aggregates and bulk cement by automatic weighing devices.

(6) Batching and Hauling. When mixing is to be performed at work site, transport aggregates from batching plant to mixer in batch boxes, vehicle bodies, or other containers of adequate capacity and construction. Use partitions to separate batches and prevent spilling from one compartment to another while in transit or during dumping.

Transport bulk cement to mixer in tight compartments carrying full quantity of cement required for batch. Once cement is placed in contact with aggregates, batches shall be mixed and placed within 1-1/2 hours of contact. Cement in original shipping packages may be transported on top of aggregates. Ensure that each batch contains number of sacks required by job mix.

Deliver batches to mixer intact. Charge each batch into mixer without loss of cement. When carrying more than one batch on truck, charge batch into mixer without spilling material from one batch

349 compartment into another.

350
351 **(D) Mixing.** Mix concrete in mechanically operated mixers.

352
353 Use stationary or truck mixers that distribute materials thoroughly and
354 produce concrete uniform in color and appearance. When there is variation in
355 mixed concrete attributable to worn pickup or throw-over blades, the Engineer
356 will inspect mixer. If inspection reveals that blades are worn more than one
357 inch below original height of manufacturer's design, repair or replace blades.
358 Upon request, make copy of manufacturer's design, showing dimensions and
359 arrangement of blades.

360
361 Charge batches into central or truck mixers so that portion of mixing
362 water enters ahead of cement and aggregates. Deliver uniform flow of water.
363 Place entire amount of batch water in mixer by end of first quarter of mixing
364 period. When mixers with multiple compartment drums are used, time
365 required to transfer material between compartments will be included as mixing
366 time. Use drum rotation speed as designated by manufacturer. If mixing does
367 not produce concrete of uniform and smooth texture, provide additional
368 revolutions at same speed until thorough mixing of each concrete batch is
369 attained. Begin measuring mixing time from time cement, aggregates, and 60
370 percent of water are in drum. Do not exceed manufacturer's rated capacity for
371 volume of concrete mixed in each batch.

372
373 Equip central or truck mixers with attachment for automatically timing
374 mixing of each concrete batch. Timing device shall include automatic feature
375 for locking discharge chute and device for warning operator when required
376 mixing duration has been met. If timing or locking device fails to operate,
377 immediately furnish clock or watch that indicates seconds, to mixer operator. If
378 timing device is not repaired within three days after becoming inoperative, shut
379 down batching operation until timing device is repaired.

380
381 For stationary mixers, use mixing time between 50 seconds and 5
382 minutes. Select mixing time, as necessary, to produce concrete that meets
383 uniformity criteria when tested in accordance with Section 11.3.3 of ASTM
384 C94. The Contractor may designate mixing time for which uniformity tests are
385 to be performed, provided mixing time is not less than 50 seconds or more
386 than 5 minutes. Before using concrete for pavements or structures, mix
387 concrete to meet specified uniformity requirements. The Contractor shall
388 furnish labor, sampling equipment, and materials required for conducting
389 uniformity tests of concrete mixture. The Engineer will furnish required testing
390 equipment, including scales, cubic measure, and air meter; and will perform
391 tests. The Engineer will not pay separately for labor, equipment, materials, or
392 testing, but will consider the costs incidental to concrete. After batching and
393 mixing operational procedures are established, the Engineer will not allow
394 changes in procedures without the Contractor re-establishing procedures by

conducting uniformity tests. Repeat mixer performance tests whenever appearance of concrete or coarse aggregate content of samples is not conforming to requirements of ASTM C94. For truck mixers, add four seconds to specified mixing time if timing starts as soon as skip reaches its maximum raised position.

Unless otherwise indicated in the contract documents or accepted by the Engineer, concrete shall be mixed at proportioning plant. Operate mixer at agitating speed while in transit. Concrete may be truck-mixed only when cement or cement and mixing water are added at point of delivery. Begin mixing truck-mixed concrete immediately after introduction of mixing water to cement and aggregates, or introduction of cement to aggregates.

Inclined-axis, revolving drum truck mixers shall conform to Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards TMMB 100-01, 15th Revision, published by Truck Mixer Manufacturers Bureau. Truck mixers shall produce thoroughly mixed and uniform mass of concrete and shall discharge concrete without segregation.

Manufacturer's standard metal rating plate shall be attached to each truck mixer, stating maximum rating capacity in terms of volume of mixed concrete for various uses and maximum and minimum mixing speeds. When using truck mixers for mixing, adhere to maximum capacity shown on metal rating plate for volume of concrete in each batch.

Operate truck mixers at mixing speed designated by manufacturer, but at not less than 6 or more than 18 revolutions per minute. Mix truck-mixed concrete initially between 70 and 100 revolutions at manufacturer-designated mixing speed, after ingredients, including water, are in mixer. Water may be added to mixture not more than two times after initial mixing is completed. Each time that water is added, turn drum an additional 30 revolutions or more at mixing speed until concrete is mixed uniformly.

When furnishing shrink-mixed concrete, transfer partially mixed concrete at central plant to truck mixer. Apply requirements for truck-mixed concrete. The Engineer will not credit number of revolutions at mixing speed for partial mixing in central plant.

When accepted by the Engineer, hand mixing may be allowed. The entire concrete placement at one location shall not exceed 1/3 cubic yard. It shall be hand mixed on a watertight, level platform. Use no aluminum to construct platform. Measure proper amount of coarse aggregate in measuring boxes and spread on platform. Spread fine aggregate on that coarse aggregate layer. Limit coarse and fine aggregate layers to total depth of one foot. Spread dry cement on this mixture. Turn whole mass not less than two times dry. Add sufficient clean water, distributed evenly.

Turn whole mass again, not less than three times, not including placing in carriers or forms.

(E) Transporting Mixed Concrete. Transport central-mixed concrete to delivery point in truck agitators or truck mixers operating at speed designated by equipment manufacturer as agitating speed; or in non-agitating hauling equipment, provided consistency and workability of mixed concrete upon discharge at delivery point is suitable for placement and consolidation in place; and provided mixed concrete after hauling to delivery point conforms to uniformity criteria when tested as specified in ASTM C94.

For revolving drum truck mixers transporting central-mixed concrete, limit concrete volume to manufacturer's rated capacity for agitator operation. Maintain agitating speed for both revolving drum mixers and revolving blade type agitators as designated on manufacturer's data plate. Equip truck mixers or truck agitators with electrically or mechanically actuated counters. Actuate counters after introducing cement to aggregates.

Bodies of non-agitating hauling equipment shall be smooth, watertight, metal containers equipped with gates to permit control of concrete discharge. Protect open-topped haul vehicle against weather with cover accepted by the Engineer.

When hauling concrete in non-agitating trucks, complete discharge within 30 minutes after introducing mixing water to cement and aggregates.

When truck mixer or agitator is used for transporting central-mixed concrete to delivery point, complete discharge within 1-1/2 hours, or before 250 revolutions of drum or blades, whichever comes first after introduction of mixing water to cement and aggregates, or cement to aggregates. For truck-mixed concrete, complete concrete discharge within 1-1/2 hours, or before 300 revolutions of drum or blades, whichever comes first. These limitations are permitted to be waived if concrete is of such slump after the 1-1/2 hour time or 300-revolution limit has been reached, that it can be placed, without addition of water to the batch.

Submit delivery tickets from manufacturers of truck-mixed concrete and central-mixed concrete with each truckload of concrete before unloading at jobsite. Printed, stamped, or written delivery ticket shall include the following information:

- (1) Name of concrete plants.
- (2) Serial number of ticket.
- (3) Date and truck number.

- 487
488 (4) Name of Contractor.
489
490 (5) Specific project, route, or designation of job (name and location),
491 and truck overweight permit number when required.
492
493 (6) Specific class or designation of concrete in accordance with
494 contract documents.
495
496 (7) Quantity of concrete in cubic yards.
497
498 (8) Time of loading batch or mixing of cement and aggregates.
499
500 (9) Water added by receiver of concrete and receiver's initials.
501
502 (10) Information necessary to calculate total mixing water added by
503 producer. Total mixing water includes free water on aggregates, water,
504 and water added by truck operator from mixer tank.
505
506 (11) Readings of non-resettable revolution counters of truck mixers
507 after introduction of cement to aggregates, or introduction of mixing
508 water to cement aggregates.
509
510 (12) Supplier's mix number or code.

511
512 Furnish additional information designated by the Engineer and required
513 by job specifications upon request.
514

515 **(F) Consistency.** Regulate quantity of water used in concrete mixes so
516 that concrete consistency, as determined by AASHTO T 119 test method, is
517 within nominal slump range specified in Table 601.03-3 - Slump for Concrete
518 or as stated on the accepted concrete mix design. If concrete slump exceeds
519 nominal slump, adjust mixture of subsequent batches. If slump exceeds
520 maximum slump, the Engineer may reject concrete unless deemed satisfactory
521 for its use.
522

523 The Engineer may also reject harsh or unworkable concrete that cannot
524 be properly placed. Remove rejected concrete at no increase in contract price
525 or contract time.
526

527 Slump for concrete shall be as specified in Table 601.03-3 – Slump for
528 Concrete.
529

TABLE 601.03-3 - SLUMP FOR CONCRETE		
Type of Work	Nominal Slump Inches	Maximum Slump Inches
Concrete Pavements	0 – 3	3-1/2
Reinforced Concrete Structures:		
Sections Over 12 Inches	0 – 4	5
Sections 12 Inches Thick or Less	2 – 5	6
Non-Reinforced Concrete Facilities	1 – 3	4
Concrete Placed Underwater	6 – 8	9
Bridge Decks	6 – 8	9

If the slump of the ready mix concrete upon delivery is below the design slump, water may be added provided:

(1) Water shall not be added to the concrete if more than ¼ cubic of concrete has been discharged from the mixer.

(2) Water may be added only up to 30 minutes after the average travel time to the jobsite.

(3) The maximum slump, the maximum water/cement ratio, and the maximum water per cubic yard shall not be exceeded.

(4) Not more than 1 ½ gallons of water per cubic yard shall be added to the concrete, but not more than the amount of “held-back” water.

(5) The amount of “held-back” water from the approved mix design shall be shown on the delivery ticket.

In adverse or difficult conditions that may affect placement of concrete, the above slump limitations may be exceeded for placement workability, with the addition of admixture conforming to Subsection 711.03 - Admixtures, if accepted by the Engineer in writing and provided water-cement ratio is maintained. Provide additional cement and water, or admixture at no increase in contract price or contract time.

(G) Forms. Construct forms in accordance with applicable sections.

(H) Placing Concrete. Place concrete in accordance with applicable sections.

563 **(I) Finishing Concrete Surfaces.** Finish concrete surfaces in accordance
564 with applicable sections.

565
566 **(J) Curing Concrete.** Cure concrete in accordance with applicable
567 sections.

568
569 **601.04 Measurement.** The Engineer will measure concrete in accordance with the
570 applicable sections.

571
572 **601.05 Payment.** The Engineer will pay for the accepted concrete under the
573 applicable sections.

574
575
576 **END OF SECTION 601**