

State of Illinois
Department Of Transportation

**CONSTRUCTION INSPECTOR'S CHECKLIST
FOR
BRIDGE SUPERSTRUCTURES**

This checklist has been prepared to provide the field inspector a summary of easy-to-read step-by-step requirements relative to the proper construction of all cast-in-place concrete bridge decks (Section 503). The following questions are based on and referenced to information found in the Standard and Supplemental Specifications, Highway Standards, appropriate sections of the Construction Manual ("CM") , the Manual of Test Procedures for Materials ("MTPM") and the Project Procedures Guide ("PPG").

1. PREPARATION PRIOR TO SUPERSTRUCTURE CONSTRUCTION

a. Office Review

- (1) Are you reviewing the Contract Special Provisions, Plans and the Standard and Supplemental Specifications? _____
- (2) Are you computing the volume of BD Concrete and the mass (weight) of Reinforcement Bars for comparison with the quantity shown in the bill of materials? This will satisfy part of your documentation requirements, help familiarize you with the plans and possibly find plan errors. (Not required if Form [BC 981](#), Agreement On Accuracy of Plan Quantities is jointly signed.) _____
- (3) Are you reviewing the [Project Procedure Guide](#) ("PPG") for minimum testing requirements? _____
- (4) If this contract contains the Recurring Special Provision for Quality Control/Quality Assurance (QC/QA) of Concrete Mixtures, has the district Materials office approved the Contractor's Quality Control Plan? (Special Provision) Discuss additional requirements with the district Materials office. _____
- (5) Are you determining what material must be inspected prior to incorporation into the work and what material certifications are required? _____
- (6) Have you reviewed the appropriate sections of the Construction Manual (CM): Section 500, Construction Memorandum Nos. 15, 45, 64, 72, 73, 74 and 78, Construction Inspector's Checklist for Structural Steel Bolting, Documentation Section, Project Procedures Guide (PPG), and Forms section? _____

b. Field Review

- (1) Are you checking the bearing seat elevations before and after each abutment or pier pour? Errors caught at this stage can often be corrected by grinding, shimming or adjusting elevations. _____
- (2) Are you laying out bearing lines on top of abutments and piers for beam erection and checking span lengths between abutments and piers? _____
- (3) Are the bearing areas on supporting masonry being finished within allowable tolerances? Improperly finished, deformed or irregular bearing areas shall be ground smooth, filled or otherwise corrected to within allowable tolerances to provide even bearing on the seats. (Art. 503.16(c), Art. 505.08(a), Art. 505.08(f) and CM Sec. 500) _____
- (4) Are you inspecting the material as it is delivered to the jobsite for evidence of inspection (See PPG), that the material has not been damaged due to mishandling subsequent to inspection and that it is being properly stored? _____

2. **BEAM ERECTION**

a. Pre-Erection

Before starting erection, has the Contractor submitted an erection plan detailing the proposed methods of erection and the amount, location(s) and type(s) of equipment to be used? Has the plan been approved by the Engineer? (Art. 505.08(e)) _____

If falsework is needed for the erection process, has the Contractor submitted erection falsework plans for review, or has the submittal been waived by the Engineer? (Art. 505.08(d)) _____

Have you had a pre-erection meeting with the Contractor to discuss the erection plan, bolting requirements, jobsite samples, job site testing and test equipment, etc. as applicable? (Not required, but highly recommended.) _____

Do you have proper evidence of inspection for all materials to be used? (PPG) _____

If required by Materials, has the Contractor supplied two additional bearing assemblies for testing? (Art. 1083.07, Art. 503.22) _____

b. Structural Fasteners

(1) Have you reviewed the Inspectors Checklist for Structural Steel Bolting and Construction Manual Section 500? _____

(2) Have the high strength bolts, nuts and washers been fabricated domestically from domestically produced steel? _____

Has the shipment of fastener assemblies been approved by BMPR prior to arriving at the job site? If so, you should have a copy of approval letter/email from BMPR of district Materials.

If bolting hardware has not been approved, are you obtaining three bolts of each size and length and three nuts and washers of each size per lot and submitting them to the BMPR for testing? _____

Has the Contractor given you the Mill Test Report(s), Manufacturer Certified Test Report(s), and (if applicable) the Distributor Certified Test Report(s) for each RC lot delivered to the job site? (Art. 505.04(f)(3)(f)(2)) _____

(3) Has the Contractor supplied the proper, certified equipment to perform the Rotation Capacity (RC) tests and field verification tests? (Art. 505.04(f)(2)) _____

(4) Have you performed the field RC tests on two fastener assemblies (except Lock-pin and Collar type fasteners) of each RC Lot delivered to the job site? (Art. 505.04(f)(3)(g)(1), CM Sec. 500 – Procedure for Performing Rotational Capacity Test) _____

(5) Has the Contractor supplied a representative sample of not less than 3 fasteners of each diameter, length and grade to be checked in the supplied calibration device at the job site? If any fastener fails to meet the required minimum tension, the lot it was taken from will be rejected. (Art. 505.04(f)(2), CM Sec. 500 – Procedure for Installation and Tightening of High Strength Fasteners) _____

Has each bolting crew demonstrated understanding of the procedural requirements for the fastener system selected by the Contractor? (Art. 505.04(f)(2), CM Sec. 500) _____

(6) Are bolts, nuts, and washers from each rotational-capacity (RC) lot being shipped in the same container? Is each container permanently marked with the RC lot number, both on the container and on the lid? _____

c. Structural Steel

(1) Are inaccessible areas being painted prior to erection (bottom and top of bearings, back of beams and diaphragms, top flange in non-shear stud areas, etc.)? (Art. 506.05 and Special Provisions) _____

(2) Are beams and diaphragms being handled properly to keep damage to the prime coat to a minimum? (Art. 505.08(c)) _____

(3) Once bolting hardware is opened is it being stored out of the weather or in sealed watertight containers or bags? Are the galvanized nuts lubricated with a tinted dry lubricant and plain bolts, nuts and washers lightly lubricated prior to installation? If not is an acceptable lubricant being applied before tightening? _____

(4) During erection of all structural steel members on continuous spans, are the splices being filled with a minimum of 25% bolts and 25% drift pins? No splice connection shall be tightened (snug tightened or final tightened) until the entire continuous length is in place on the substructure to permit the alignment of the beams to be at the plan profile and grade.. (Art.505.08(h) & CM Sec. 500) _____

(5) Is the Contractor using the following procedure to complete the installation of the fasteners at each splice and field connection:

First, is the Contractor removing all drift pins and filling all holes in the splice with 100% finger-tight bolts? (Art. 505.08(h)) _____

Do all high-strength bolts have a hardened washer under the element (nut or bolt head) turned in tightening? (Art. 505.04(f)) _____

Second, are the fasteners in all holes of the connection initially brought to a snug tight condition, progressing systematically from the most rigid part of the connection to the free edges in a manner minimizing relaxation of the previously tightened fasteners? (Art. 505.08(f)) _____

If using the Turn-of-Nut Method, is the contractor performing a minimum of two cycles of systematic snug tightening for connections with 25 mm (1 in.) and thicker plates to minimize relaxation of previously tightened fasteners prior to final tightening? (Art. 505.04(f)(2)(d)(1)) _____

Third, after all fasteners in the connection are snug tight, is the Contractor fully tightening the fasteners progressing systematically from the center most rigid part of the connection to its free edges? (Art. 505.04(f)(2)) _____

(6) Have you verified that all fasteners have been installed to the minimum required tension? (Article 505.04 (f)(2), CM Sec. 500 – General Procedure for Inspection of High Strength Fasteners Installation, and Construction Inspector’s Checklist for High Strength Bolting) _____

(7) Is the Contractor aware that no field welding or flame cutting will be allowed on beams or girders without permission of the Engineer? (Art. 505.08(n), Construction Memorandum 15) _____

d. Precast, Prestressed Concrete I-Beams

Upon arrival at the jobsite are you inspecting each beam for an IL OK Stamp and damage and/or cracking due to mishandling or dropping of the beam subsequent to inspection at the plant? (Art. 504.06(d)) _____

Are all PPC members maintained in upright position at all times and supported only at the ends? During lifting, they shall be supported only by the inserts provided for that purpose. (Art. 504.06(e)) _____

Damaged beams or beams with cracks exceeding those considered in the design shall not be accepted until an investigation has been made by the Bureau of Bridges and Structures for acceptability of the beam. (Art. 504.06(d)) _____

e. Bearings

Are bearings being handled properly to prevent damage? This is particularly important for Type II bearings, since the stainless steel and Teflon sliding surfaces are very easily damaged. _____

Are all bearing sliding surfaces clean before installation and kept clean after installation? _____

Are bearings being adjusted to center vertically over bearing and base plates at 10 °C (50 °F)? Anchor bolt holes should be drilled after bearings are adjusted and filled with an approved non-shrink grout. (Art. 505.08)(f)) _____

Are anchor bolts being set before bolting diaphragms or crossframes over the supports? (Plan Note)

After anchor bolts are installed, have you check the upper ends of the bolts to verify proper embedment? Anchor bolt lengths should leave the exposed end projecting between 12 mm (1/2 in.) and 50 mm (2 in.) above the top of the nut. (Art. 505.08(f)) _____

Have all bearing side retainers been secured in place prior to forming the bridge floor? (Art. 505.08(f)) _____

3. PRE-DECKING

a. Fillets

- (1) Are you marking each beam at the fillet intervals as shown in the plans and preparing a field book for elevation shots? _____
- (2) Are fillet elevations being shot after all structural fasteners in a continuous steel span are final tightened? Are fillet elevations being shot before forms have been placed? The weight of the forming wood is not taken into account by the deflection diagram. _____
- (3) Are you consulting with the supervising field engineer if there are negative or excessive positive fillets? The deck grades may require adjustment. Fillets in excess of 150 mm (6 in.) may require additional reinforcement – contact the Bureau of Bridges & Structures if excessive fillets have not already been addressed in the plans. Without reinforcement, shear studs must extend at least 50 mm (2 in.) into the deck. _____
- (4) Are you marking fillets in 3 mm (1/8 inch) increments at each location? _____

b. Inspection of Delivered Epoxy Coated Reinforcement Bars

- (1) Are all the systems used for handling padded at the contact areas? (Art. 508.03) _____
- (2) Is storage on wooden or padded steel cribbing? (Art. 508.03) _____
- (3) Are rebars from a certified plant? Compare the identification marking on bars with the latest list of certified plants, from the Bureau of Materials? Reject all rebars from non-certified plants. _____
- (4) Is the epoxy coating applicator certified under the Concrete Reinforcing Steel Institute's (CRSI) Epoxy Plant Certification Program? (Special Provision for Epoxy Coatings for Steel Reinforcement) _____
- (5) Do rebars conform to the plan shape and dimensions? _____
- (6) Although rebars will be in bundles, are you making a preliminary check for damaged epoxy coating? Total damage greater than 2 percent of the bar surface in any 300 mm (1 ft.) of length of the bar or greater than 5 percent of the bar surface area covered with patching material shall be rejected. Scars greater than 5 x 5 mm (1/4 by 1/4 inch) can be repaired after placed in the deck mat. (Art. 508.05) _____

4. DECKING FOR CONCRETE PLACEMENT

a. Screed Rail Installation and No Weld Areas

- (1) Are you marking the no-weld areas on the top flange of continuous span steel structures and prohibiting the welding of pipe for screed rail supports or construction accessories to the top flange in these areas? (Construction [Memorandum No. 15](#)) _____

Generally, the no-weld zone is within one quarter of a span length from each pier. However, structure geometry may change this location. It is only safe to assume that welding to the top flange is safe in the areas where shear studs are called for and in the midspan area between the quarter-points of the span. Contact the Bureau of Bridges & Structures for any questions on no-weld zones.

- (2) Is the Contractor obtaining permission before making any field welding not detailed in the plans? Contact the Bureau of Bridge & Structures. (Plan Note – "No welding allowed anywhere", and Art. 505.08(n)) _____
- (3) On the top flange of steel beams where welding is permitted is the support pipe being welded with a 5 mm (1/4 inch) or less fillet weld continuously around the pipe? (Spot welding shall not be permitted) (Construction [Memorandum No. 15](#)) _____

b. Forms

- (1) Are forms set to correct fillet height? _____
- (2) Are form dimensions correct? _____
- (3) Are forms clean, braced, tight and sufficiently rigid to prevent distortion? Are you rejecting any forms that are not acceptable for reuse? (Art. 503.06) _____
- (4) Are wood forms being treated with oil prior to rebar placement or being saturated with water immediately before concrete is placed? (Art. 503.06) _____
- (5) Is all forming hardware that is to be incorporated into the deck galvanized or epoxy coated? (Art. 503.06) _____

c. Cantilever Forming Brackets

If the Contractor uses cantilever forming brackets on exterior beams or girders, are the following procedures being complied with to prevent beam rotation and a possible thin deck (Art. 503.06)? _____

(1) Is the resulting force of the leg brace bearing on the web within 150 mm (6 inches) from the bottom flange of the beam or girder? (Art. 503.06(a)) _____

(2) Is the top of the exterior steel beams or girders tied together with a minimum No. 15 (No. 4) rebar, or equivalent at no greater than 1.2 m (4 ft.) centers if the finishing machine rails are on the outside of the water table, or 2.4 m (8 ft.) centers if the finishing machine rails are on the top flange of the exterior beams? On stage construction, where cantilever brackets are used on only one exterior line of beams or girders, this line shall be tied to the opposite exterior line. (Art. 503.06(b)) _____

Steel beams 27 inches or shallower require special details. The finishing machine rail must be on the beam and the tie bars and blocking are to be at 1.2 m (4 ft.) centers.

Are the tie bars being placed at no greater than 2.4 m (8 ft.) centers on precast, prestressed I-beams regardless of where the finishing machine rails are placed? (Art. 503.06(b)) _____

Are tie bars being placed parallel to and have the same clearance from the deck formwork as required for the bottom transverse reinforcement? Special brackets and/or reworking existing brackets may be required to maintain proper placement. (Art. 503.06(b))

Is each tie bar furnished with an approved tie bar stabilizing system consisting of adjustable end clips, lag studs, and turnbuckles? Are the end clips and lag studs sufficiently rigid so as not to deflect during the deck pour? (Art. 503.06(b)) _____

No welding will be permitted to the structural steel or stud shear connectors for the installation of the tie bar stabilizing system. (Art. 503.06(b)) _____

After installation, are the tie bars tensioned with turnbuckles until the bars do not vary from a straight line from center of end clip to center of opposite end clip? (Art. 503.06(b)) _____

Cross frames on steel girders which do not have a top strut shall not be considered a tie. ((Art. 503.06(b)(4))

(3) Are hardwood 100 mm x 100 mm (4 inch x 4 inch) blocks or material of an equivalent strength being wedged between webs of exterior and first interior beams within 150 mm (6 inches) of the bottom flanges at each location where the top of the beams are tied together? (Art. 503.06 (c)) _____

d. Shear Studs

- (1) As soon as the fillet heights are determined are you providing the Contractor with a list of the number and length of studs necessary to provide the required minimum 50 mm (2 inch) deck embedment? (Plan detail) _____
- (2) Are you checking the Contractor's layout of the stud locations versus plan locations? _____
- (3) Has the Contractor been informed that no welding will be permitted when the flange surface is wet or the base metal temperature is below -17 °C (0 °F) without preheating the metal? Is each stud location being prepared by grinding lightly parallel to the beams longitudinal axis? (Art. 505.08(m)(2)) _____
- (4) Is the operator making a 45° bend test on the first two studs of each beam or when welding is interrupted for more than one hour? (Art. 505.08(m)(3)) _____
- (5) Are you making a 45° bend test with a heavy hammer on about 1% of the studs per beam? Are you testing suspect studs by bending the stud 15° opposite the deficiency and bending it back vertically then rejecting studs showing visual stress? (Art. 505.08(m)(3)) (It is recommended you "ping" each stud with the hammer.) _____
- (6) Are you requiring defective studs to be removed and replaced with a new stud in the same location as the defective stud, after properly grinding the vacated area to a smooth flush condition or filling depressions in the vacated area with weld metal using the shield arch process using dry low-hydrogen rods. (Art. 505.08(m)(3)) _____

NOTE: This method of repairing defective studs is appropriate only in positive moment areas. For defective studs near piers, contact the Bureau of Bridges and Structures.

e. Reinforcement Bar Placement

- (1) Are all reinforcement bars tied securely in place? Are epoxy coated rebars being tied with plastic or epoxy coated tie wire? (Floating or sticking rebars into wet concrete shall not be allowed.) (Art. 508.05) _____
- (2) Are all rebar intersections being tied? Alternate intersection tying will be allowed when spacing is less than 300 mm (1 ft.) in each direction. (Art. 508.05) _____
- (3) When epoxy coated rebars are specified to be cut in the field, are they being sawed or sheared and the cut ends painted with epoxy? (Flame cutting is not permitted.) (Art. 508.04) _____

(4) Are epoxy coated rebars handled properly to prevent damage to the rebar coating? (Use rope slings, no dragging or dropping permitted.) (Art. 508.03) _____

(5) Are all rebar laps of the specified length (plans will show splice length) and contact spliced? (Art. 508.06) _____

(6) Are the reinforcement bar chairs epoxy coated and at the required spacing? (Art. 508.05) _____

Bottom bars - Continuous chairs at 1m (3 ft.-3 inches) maximum spacing _____

Top bars - Continuous chairs at 900 mm (3 ft.) maximum spacing, or individual chairs at 600 mm (2 ft.) x 900 mm (3 ft.) maximum spacing. _____

(7) Are the rebars in the tops of slabs being securely held in place by plastic or epoxy coated 3.8 mm (No. 9) wire ties, or other devices fastened to the structural steel, falsework, or other structural component? (Every 7.6 m (25 ft.) longitudinally and 4.5 m (15 ft.) transversely) (Art. 508.05) _____

(8) After epoxy coated rebars are in place, are you inspecting the rebars for damage to the coating and requiring the Contractor to repair all scars greater than 5 x 5 mm (1/4 by 1/4 inch)? Are rebars being rejected that have either a total damage greater than 2% of the bar surface in each 300 mm (1 ft.) length of bar or greater than 5 percent of the bar surface area covered with patching material? (Art. 508.05) _____

(9) For longitudinal or transverse joints in the deck with rebars protruding through the pour, has the Contractor constructed a platform outside the joint, above the protruding bars, and supported on the lower slab form? Personnel will not be permitted to stand or walk on the projecting reinforcement bars until the concrete has hardened. (Art. 503.09) _____

f. Screed Rails

Are you checking the screed rail elevation from the fillet points and checking the rail for a smooth curve through all the grade points by eyeballing? _____

g. Longitudinal Bonded Construction Joints

(1) Are the longitudinal bonded construction joint forms being set at the required location? With the approval of the Engineer, the Contractor may be allowed to pour the deck out-to-out. (Art. 503.09(b)) _____

- (2) Is the grade of the longitudinal construction joint form, or the temporary screed bars, being set with an instrument and check measured against the designed deck slab thickness? _____

- h. Deck Drainage Openings
 - (1) Are required drainage openings in the proposed deck at the proper location, elevation and positioned so as to prevent the discharge of drainage water against any portion of the structure, or directly onto any railroad, highway, or unprotected earth below? (Art. 503.12) _____

 - (2) Make sure the floor drains and scuppers are not placed partially under the parapet location. Note that the edge of the deck is moved 50 mm (2 in.) if the parapet slip form option is used. _____

- i. Expansion Joints
 - (1) When plates, angles or other structural shapes are specified, are they set to correct position, elevation and rigidly attached to bulkheads set to provide plan opening at 10 °C (50 °F) prior to concrete placement? (Art.503.10(c)) _____

 - (2) When a neoprene expansion joint is specified, are you checking the blockout form to see if it is in the correct position, rigid enough to withstand displacement during vibration and concrete placement, contain enough air vent holes and is holding the anchor bolts in correct horizontal and vertical position in accordance with the manufacturer's approved drawing? (Art. 503.10(d)) (CM [Section 500](#)) _____

 - (3) If temporary expansion joint bulkheads are attached to adjacent deck slabs or abutments for support, is the Contractor cutting the attachments as soon as the concrete has set to prevent joint damage due to horizontal expansion? _____

5. PRE-POUR MEETING

Prior to (preferably the day before) placement of deck concrete, a meeting will be held with the Contractor to review the following deck placement procedures (see Attachment 1 for sample pre-pour meeting agenda):

- a. Mix
 - (1) Have you discussed the properties of the proposed concrete mix (retarder, strength, water/cement ratio, etc.) with the District Materials Engineer and the Contractor? _____

 - (2) Have you discussed with the Contractor the air, slump and strength requirements for deck concrete and the location for a suitable site to run tests? _____

b. Concrete Delivery

- (1) Is the delivery commitment from the ready mix supplier adequate so that the operations of placing and finishing will be continuous? (Art. 503.07, Art. 1020.11(d)(9)) _____
- (2) Does the Contractor have sufficient equipment and labor to maintain continuous concrete placement operation between expansion or construction joints specified? (503.17) _____

c. Pumped Concrete (Construction [Memorandum No. 74](#))

- (1) The mortar used to provide initial lubrication for the line shall be wasted and not allowed to be placed in the deck? _____
- (2) When the horizontal placement method is used, the line shall have a piece of plywood placed under each pipe joint to prevent damage to the epoxy coated rebars and to catch concrete which oozes from the line when the joint is disconnected? Concrete dropping onto rebars shall be removed. It sets up rapidly and if paved over creates a weak spot in the deck. _____
- (3) Will the pump be at lower elevation than the concrete trucks to facilitate discharge from the truck without excessive water additions? Constructing near level ramps or excavating an area for the pump is helpful. _____
- (4) No water shall be added to the pump hopper. If water is added by the Contractor to help remove a line blockage, this concrete must be wasted. _____
- (5) The use of aluminum pipes or tubes is strictly prohibited. _____
- (6) Does the discharge end of the pump have attached an "S" shaped flexible or rigid conduit, a 90 degree elbow with a minimum of 3 m (10 ft.) of flexible conduit placed parallel to the deck, or a similar configuration approved by the Engineer? (Special Provision for Bridge Deck Construction) _____

d. Finishing Equipment & Requirements

- (1) On skewed bridges exceeding 45° are you checking the General Notes of the structure plans to determine if the deck concrete must be struck off and finished parallel to the skew? _____
- (2) Does the finishing machine transversely finish the surface with either a rotating cylinder(s) or a longitudinal oscillating screed? Is it in good mechanical condition and the crown checked? Has the "dry" run been made to check rebar clearance? (Art. 508.05, Art. 1103.13(a)) _____

- (3) Are adequate foot bridges for finishing, texturing and applying cotton mat curing blankets and available for the concrete finishers? (Art. 503.17(c), Art. 1020.13(d)(3), Art. 1103.17(d)). _____
- (4) Are there enough vibrators to adequately consolidate the concrete? (Art. 503.07, Art. 1103.17(a)) _____
 Are the vibrators equipped by the manufacturer with a non-metallic head? Slip-on covers are not allowed. (Special Provision for Hand Vibrator) _____
- (5) Are long handled floats not less than 1 m (3 ft.) in length and 150 mm (6 inches) in width or hand operated floats not less than 3 m (10 ft.) in length and 150 mm (6 inches) in width provided? (Art. 503.17(c)(1)) _____
- (6) Is a burlap or astro turf carpet drag being furnished for the initial surface texturing? (Art. 503.17(c)(4)) _____
- (7) Where longitudinal joints or transverse joints are constructed, will platforms supported on the lower slab form be constructed so workers will not be permitted to stand or walk on projecting reinforcement bars.? _____
- (8) If the Engineer determines workability cannot be obtained, will a device be available to apply water to the deck in a fine mist? (Art. 503.17(c)(1)) _____
- (9) Has the Contractor provided temperature, relative humidity, and wind speed measuring equipment? (Special Provision for Bridge Deck Construction) _____
- (10) Has the Contractor provided fogging equipment meeting the specifications? (Special Provision for Bridge Deck Construction) _____

e. Manpower

Will the Contractor have adequate supervision and enough manpower to place and finish the deck concrete and place curing covering in the specified manner? Has the Contractor designated a person responsible for placing the curing covering? _____

f. Deficiency Checklist

Have you informed the Contractor of any deficiencies not previously taken care of? (Forms, reinforcement, epoxy touch up, grade, equipment etc.) _____

g. Curing

If curing according to the Standard Specifications, are there adequate burlap, polyethylene and water on the jobsite to cure the deck? (Art. 1020.13)

If curing according to the Special Provision, are there adequate cotton blankets and polyethylene sheeting or burlene on the jobsite to cure the deck? Does the contractor have sufficient soaker hoses and an adequate water supply available on the job site? (Special Provision for Curing and Protection of Concrete Construction)

h. Pour Sequence

If the plans specify a deck pour sequence (or no pour sequence), are you ensuring that sequence is followed?

If the Contractor wishes to use an alternative deck pour sequence, are you getting permission from the Bureau of Bridges and Structures? (Construction Memo. 64)

6. **CONCRETE DECK PLACEMENT**

a. Revolution Requirements for Truck Mixers

(1) Are you immediately inspecting the batch counter on all arriving truck mixers to ensure that the required number of revolutions at mixing speed has been obtained? (Art. 1020.11(d)(2))

(2) Does the number fit within the allowable number of revolutions shown in the table below?

Time <u>Minutes</u>	60 Mixing Revs. Req'd. <u>(Simultaneous Charging)</u>		70 Mixing Revs. Req'd. <u>(Separate Charging)</u>		
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>	
10	60	119	70	119	
15	66	144	72	144	Agitating Speed
20	76	169	82	169	2-5 rev/min.
25	86	194	92	194	
30	96	219	102	219	Mixing Speed
35	106	244	112	244	5-16 rev/min.
40	116	269	122	269	
45	126	294	132	294	
50	136	319	142	319	
55	146	344	152	344	
60	156	369	162	369	

Whenever water or admixtures are added to the truck at the jobsite or the revolutions on the truck are not within the above chart, an additional 40 revolutions at mixing speed shall be put on the truck. _____

b. Time of Haul

- (1) If the temperature of the air or concrete is 18 °C (65 °F) or higher, is a retarding admixture being used? (Art. 1020.05(b)) _____
- (2) Is all concrete which is being hauled in truck mixers or truck agitators being deposited within 60 minutes from the time stamped on the tickets? (Art. 1020.11(d)(8)) _____

When the air or concrete temperature is below 18 °C (65 °F), the allowable haul time is 90 minutes. (Art. 1020.11(d)(8))

When the air or concrete temperature is at or above 18 °C (65 °F), retarding admixture must be used, which brings the maximum haul time up to 90 minutes. (Art. 1020.05(b), Art. 1020.11(d)(8))

(3) If central-mixed concrete is being hauled in nonagitator trucks, is the concrete being deposited within 30 minutes? (Art. 1020.11(d)(8)) _____

c. Concrete Temperature

Are temperature checks of the plastic concrete being taken? The allowable limits for structural concrete are 10 °C (50 °F) to 32 °C (90 °F). When insulated forms or blankets are used: 10 °C (50 °F) to 25 °C (80 °F). (Art. 1020.14(b)) _____

d. Air Content Determination

Is an air content test (MTPM) made on every load of delivered concrete (Sampling Schedule 3, PPG or Special Provisions) or when mix water or air entrainment admixture is added at the jobsite? _____

Note that a slump test and air test is required when a strength specimen is made.

Allowable air content in place = (5% - 8%) (1020.04) _____

If a pump or conveyor is used for placement, is an air loss correction factor being established and used according to the following: _____

- (1) Test the first three truck loads delivered before and after transport by the pump or conveyor.
- (2) Once the correction factor is determined, it shall be rechecked after an additional 40 m³ (50 cu yd) is pumped, or an additional 80 m³ (100 cu yd) is conveyed.
- (3) Checks for air loss due to pumping shall be repeated every 40 m³ (50 yd.³) or when significant changes in temperature, distance, pump or conveyor arrangement, etc., have occurred.
- (4) When air loss requires that the air content at the pump or conveyor hopper exceed specification limits, air tests shall be made at the discharge end to ensure that the correction factor remains valid and that the concrete being placed is within specification limits.
- (5) Record the actual test results. For before and after tests used to establish the correction factor, record both sets of tests, but report only the on-the-deck tests to the MISTIC system. Once the correction factor has been established, record the air tests results at the truck, as well as the correction factor used in accepting the truck's air content, but report only the corrected air content to the MISTIC system.

e. Slump Test

On non-QC/QA jobs, is a slump test (MTPM) made at least once each 40 m³ (50 cu. yd.) min. (Sampling Schedule 3, PPG) or when mix water is added at the jobsite? _____

Note that a slump test and air test is required when a strength specimen is made.

On QC/QA jobs, the sampling and testing frequency is in accordance with the applicable Special Provision and stand-alone documents.

Allowable slump (Art. 1120.04): 50 - 100 mm (2-4 inches) for Class BD & SI Concrete without high-range water reducing admixture.

The maximum slump may be increased to 175 mm (7 inches) when a high range water-reducing admixture is used. (Art. 1020.05(b))

f. Water/Cement Ratio Control

Has the Proportioning Technician or QC personnel at the plant communicated to you and the jobsite QC personnel, the permissible amount of water which can be added at the jobsite without exceeding the allowable water/cement ratio for the concrete mix? The specification requirement for a 100 mm (4-inch) slump still remains in effect and must be considered when adding water. (Art. 1020.04) _____

g. Adding Water or Admixture to Trucks at Jobsite

When water or admixtures are added to the ready-mix truck at the jobsite, is the concrete to be mixed 40 additional revolutions at mixing speed to assure proper mixing? Concrete that is modified at the jobsite after testing so as to alter test results significantly, shall be re-tested for acceptance. _____

h. Strength Test

On non-QC/QA jobs are either concrete test beams or cylinders being cast at the site of work and the following requirements met? (Art.1020.09) _____

(1) Modulus of Rupture (150 x 150 x 750 mm (6 x 6 x 30 inches) beam):

Cast 2 beams per pour. (Sampling Schedule 3, PPG) _____

Are the beams being made, cured, and tested in accordance with the methods given in the Manual of Test Procedures for Materials (MTPM)? _____

Designed flexural strength 4,650 kPa (675 p.s.i.) in 14 days. (4418 kPa (640 p.s.i.) when mix contains fly ash) (Art. 1020.04, Art. 1020.05)

Record beam tests in "Field Record Book of Modulus of Rupture Tests of Concrete Beams," Form LW-3.

- (2) Compressive Strength 150 mm (6 inch) diameter x 300 mm (12 inch) cylinder: Cast 2 cylinders in lieu of each beam, i.e. 4 cylinder per pour. (Sampling Schedule 3, PPG)

Are the cylinders being made, cured, and tested in accordance with the Manual of Test Procedures for Materials?

Designed compressive strength 27,500 kPa (4000 p.s.i.) in 14 days (25,650 kPa (3800 p.s.i.) when mix contains fly ash) (Art. 1020.04, Art. 1020.05)

Note: Submit MISTIC Form MI-655 - "P. C. Concrete Strengths," to the District Materials Engineer

It is highly recommended to make additional beam or cylinder test specimens, in case of damage to specimens or low strength test results.

i. Concrete Delivery Tickets

- (1) Are all truck tickets being collected and retained?

- (2) Do concrete tickets show section number, time of batch, batch quantity, truck number, etc.?

The QC/QA Special Provision requires the following information to be printed on the delivery ticket: ticket number, producer name, contract number, name of Contractor, date, time batched, truck number, quantity batched, and mix design number.

- (3) Are you recording on each truck ticket the inspector's initials, the results of air/slump tests, concrete temperature checks, time of discharge, water or admixtures added, drum revolutions of transit mix trucks upon arrival and strength specimens taken?

- (4) Are all jobsite air, slump, water or admixture additions and beam test results being submitted to the proportioning technician daily for posting on MISTIC Form [MI 654](#), Concrete, Air, Slump Quantity and Form [MI 655](#), P. C. Concrete Strengths.

j. Placing Concrete

- (1) Is the concrete being bucketed, conveyed, pumped or otherwise placed in such a manner as to avoid segregation and is not being allowed to drop more than 1.5 m (5 ft.)? (503.07)

Note: Bridges skewed less than 45° and not struck off and finished on the skew should have the concrete placed on the skew provided plasticity throughout the screeding operation and the uniformity of the tining can be maintained satisfactorily.

(2) If the distance between the placement of concrete and the covering of the finished concrete exceed 10.5 m (35 ft.), or 7.5 m (25 ft.) for deck widths greater than 10.5 m (50 ft.), are you ensuring placement of concrete is halted until the curing operation catches up? (Special Provision for Bridge Deck Construction) _____

(3) Are you checking the evaporation rate based on measurements of air temperature, humidity, and wind speed? When the evaporation rate is 0.5 kg/sq m/hour (0.1 lb/sq ft/hour), or when required by the Engineer, is the fogging equipment in operation? (Special Provision for Bridge Deck Construction) _____

Make sure that the fogging equipment is functioning properly and does not accumulate water on the surface of the concrete. _____

(4) If there is a delay of more than ten minutes during concrete placement, is wet burlap used to protect the concrete until operations resume? (Special Provision for Bridge Deck Construction) _____

k. Consolidation

(1) Is all concrete being compacted with hand operated spud vibrators immediately after it has been placed? (503.07) Over-vibration causes segregation and loss of entrained air. _____

(2) At expansion angles or expansion joint blockouts is the concrete being vibrated through the vent holes to release as much trapped air as possible? _____

l. Strike-Off and Finishing

(1) Is the finishing machine in proper adjustment and producing the specified surface? _____

(2) A vibrating screed may be used to strike off concrete on bridges less than 100 feet in length. The vibrator must shut off when the speed is stopped so air will not be vibrated out of the concrete and excess mortar will not be brought to the surface. (503.17(c)) _____

A vibrating screed may be used on bridges greater than 100 feet in length with permission of the central Bureau of Construction. (Construction Memo. 73) _____

- (3) Are you ensuring that the concrete surface at parapets, curbs, sidewalks and medians are struck off during the deck pour and excess material from the finishing machine is not incorporated into these areas? (Special Provision for Bridge Deck Construction) _____

m. Depth Checks

- (1) Are you checking the deck thickness and rebar depth at frequent intervals behind the finishing machine and recording these measurements in your deck pour field book? _____
- (2) If deck thickness or rebar depth deficiencies are found, is the Contractor immediately notified so corrective action can be taken? _____

n. Longitudinal Finishing and Testing

- (1) When required, are 3 m (10 ft.) long longitudinal hand floats being used parallel to the bridge centerline and passed gradually over the deck surface filling depressions and cutting down high areas. ((503.17(c)(1)) _____

Note: If the above longitudinal hand floating reveals the finishing machine is producing a surface smoothness comparable to that which can be obtained by the above hand floating, hand finishing may not be required if the finishing machine produces a floor surface of uniform texture, free from porous areas. Occasional checks with the 3 m (10 ft.) longitudinal float should be made to assure smoothness is maintained.

- (2) Are you prohibiting long handled floats with short length blades 1 m (3 ft.) from being used over the entire deck surface? These floats should only be used when necessary to smooth and fill in open textured areas as these floats create bumps in the deck surface. (Art. 503.17(c)(1)) _____

o. Controlling Finish Water

- (1) Are you prohibiting water from being applied to the deck surface unless it can be demonstrated that workability cannot be obtained? (Art. 503.17(c)(1)) _____
- (2) If water is permitted is it being applied in a fine mist from a hand sprayer and not by brushes or other methods which concentrates water? (Art. 503.17(c)(1)) _____

p. Surface Texturing

- (1) Is the deck surface being textured with either a burlap drag or an artificial turf drag in the plastic state? (Art. 503.17(c)(4)) _____

Note: On skewed structures tining must be perpendicular to the bridge centerline and not along the skew.

- (2) After the required curing and protection, the deck shall be grooved by a mechanical saw device. (Art. 503.17(c)(4b)) _____
- (3) Is the grooving being stopped 300 mm (12 inches) from the face of the curblines? _____

q. Curing Bridge Floors

Per the Standard Specifications:

- (1) If the deck is placed between April 15 and October 15 of the same year is Type II membrane curing compound being applied to the deck surface immediately after the texturing operation? (Art.1020.13(d)(3)) _____

(Note: Deck concrete with retarder containing Hydroxylated Carboxylic Acid (HCA) may on occasion promote bleeding. If bleeding does occur, scaling can be prevented by delaying the application of membrane curing until immediately after the bleed water disappears.)

- (2) Is the initial covering of wetted burlap being applied once the deck concrete obtains its initial set, is not easily marked and if applied, the membrane curing is dry? _____
- (3) Is the top surface of the bridge floor being cured for 7 days but not more than 10 days with two layers of burlap being kept wet by means of a mechanical sprinkling system or with a impermeable covering (polyethylene)? (Art. 1020.13(a)(3)) _____

Per the Special Provision for Bridge Deck Construction:

- (1) Is a separate foot bridge available for the placement of the cotton mats? _____
- (2) Is the Contractor placing dry cotton mats as soon as the surface of the concrete has been finished and textured? Is it being placed in a manner which will not mar the concrete surface? _____

Make sure the distance between placement of the concrete and the placement of the cotton mats does not exceed the allowable distances of 10.5 m (35 ft.) or 7.5 m (25 ft.). _____

- (3) Immediately after placement, are the cotton mats being wetted thoroughly with a gentle spray of water? Are the mats maintained in a wetted condition until the soaker hoses can be placed? _____

- (4) When the concrete has hardened sufficiently, are soaker hoses being placed at a maximum 1.2 m (4 ft.) spacing? _____
- (5) After placement of the soaker hoses, are the cotton mats being covered with white polyethylene sheeting or burlene? _____
- (6) For areas inaccessible to the cotton mats, is curing being done using the burlap method as per Art. 1020.13(a)(3)? _____

r. Bonded Construction Joints

- (1) Is the surface of the existing concrete (or hardened concrete from the first pour) being properly prepared in accordance with Art. 503.09(b)? _____
 - (a) Is the surface being prepared by washing with water under pressure or by sandblasting to expose clean, well bonded aggregate? _____
 - (b) Removal of cement paste from the first pour may be facilitated by coating the form of the first pour with approved surface retarder, or applying surface retarder directly to the exposed surface of the first pour. _____
- (2) Are transverse and longitudinal bonded construction joints specified for bridge floors being constructed as specified in Art. 503.09(b)(1) (Supplemental Specifications)? _____
 - (a) Is the prepared concrete surface covered thoroughly and uniformly with a coating of 1:1 mortar immediately prior to the second pour? _____
 - (b) Is any mortar that is allowed to dry prior to the pour being removed and replaced at the contractor's expense? _____
- (3) Are horizontal construction joints, when specified between the top of the bridge floor and the curbs, parapets and sidewalks being constructed in accordance with Art. 503(b)(2)? _____
 - (a) Is the prepared surface of the existing concrete being wetted a minimum of one hour before application of the new concrete? _____
 - (b) Immediately before placing the new concrete, is any excess water being removed? _____

s. Protection

Is all deck concrete which is placed during the winter period (Dec. 1 thru March 15) being protected in accordance with one of the following methods? _____

- (1) Method I. The concrete and forms completely covered with insulating material enclosed on sides and edges with an approved waterproof liner. (Art. 1020.13(e)(1)) _____
- (2) Combination Method I & II. The top of the deck shall be covered with insulating material. The sides and bottom of the deck shall be enclosed in adequate housing for 7 days. The air surrounding the concrete shall be kept between 10 °C (50 °F) and 27 °C (80 °F). _____

Note: If the concrete is placed outside the winter period and the forecast for temperature is below 7 °C (45 °F), the concrete shall be protected as above. (Art. 1020.13(e))

t. Parapets and Railings

- (1) General
 - (a) Are you not allowing placement of concrete until the falsework for the span has been released, rendering the span self-supporting? (Art. 503.17(e)) _____
 - (b) Are you checking the locations for all expansion joints, handrail post bolts, and chamfer strips before permitting the Contractor to place concrete? (Art. 503.17(e)) _____
 - (c) Has the deck surface under the parapet been properly prepared for a horizontal bonded joint? Is the prepared surface soaked for an hour before the pour, and is excess water being removed immediately prior to placing concrete? (Art. 503.09) _____
- (2) Formed Parapets and Railings
 - (a) Are you ensuring all forms have good surface quality? Air pockets vibrated out of the concrete tend to cling even more to the sloped surfaces of parapet forms and a rough form surface worsens this situation. _____
 - (b) Are you checking the forms prior to placement to ensure they are of the correct dimension, tight fitting, and properly aligned. (Art. 503.17) _____
 - (c) Are you ensuring the proper clearance from the faces of the concrete _____
 - (d) Is the contractor placing the concrete in continuous horizontal layers and thoroughly vibrating the concrete in each layer to ensure internal consolidation and minimize air pockets and honeycombing on the surface of the parapet? (Art. 503.07) _____

(e) Are you rechecking the alignment of forms and grade of the top chamfer strips immediately after the placing of concrete in the forms to ensure all corners in the finished work shall be true, sharp and clean cut? (Art. 503.17) _____

(f) Are the parapets being cured 7 days with waterproof paper, polyethylene sheeting, wetted burlap or cotton mats? (Art. 1020.13, Special Provision for Curing and Protection of Concrete Construction) _____

On non-traffic surfaces receiving a normal finish, a linseed oil emulsion curing compound meeting Art. 1022(a) requirements may be permitted provided it is applied with a mechanical sprayer meeting Art. 1101.09(b) requirements. (Art. 1020.13(d)(4)) _____

(g) Are all depressions resulting from the removal of ties, rods or bolt anchorages and all air pockets or rough places larger than 15 mm (1/2 in.) being carefully and neatly pointed with matching mortar? (Art. 503.16) _____

(1) Normal Finish. Are all surfaces that will be exposed to view after completion of the work (except floors, sidewalks, curbs and medians on bridges) being given a normal finish consisting of the removal of all fins, rough spots, stains, hardened mortar or grout, and form lines by rubbing with a #16 carborundum stone or equal? (Art. 503.16(a)) _____

(2) If the surface of concrete is oil-stained or is otherwise not of uniform color, are you requiring a grout rub (1:1 1/2) be applied as specified in Art. 503.16(a)? _____

(3) Slip Formed Parapets

NOTE: On July 1, 2004, a temporary moratorium was placed on the slipforming option for placing parapets. Contracts subject to this moratorium included a Special Provision eliminating the slipform option. Under no circumstance is slipforming to be allowed on contracts that include this Special Provision. However, the slipforming option is allowed on contracts that do not include this Special Provision.

(a) Is the rebar cage tied as necessary to ensure it will remain rigid during the slipforming operation? The contractor may perform additional tying or add additional stiffening reinforcement bars to prevent movement of the required reinforcement bars during pouring. (Art. 503.17(a)) Significant movement of the

cage during slipforming will be cause for immediately ceasing the slipforming operation. _____

- (b) Are you checking the slipform equipment to make sure the proper dimensions will be placed? (At. 503.17(a)) _____

In particular, are you making sure the breakline between the base of the parapet and upper portion of the parapet on the face of the parapet does not exceed the plan dimension? This dimension is critical. _____

- (c) Has the contractor performed a dry run for the full distance of the anticipated pour, checking for the proper clearance between the rebar and the slipform? (Art. 503.17(a)) _____

- (d) Are the ends of the parapet formed and the forms securely braced? Are parapet sections at light standards formed for a minimum distance of 1.2 m (4 ft) on each side of the exception? (Art. 503.17(a)) _____

- (e) Is the vertical surface at the base of the barrier being toveled true after passage of the slipform machine? Are all superficial holes and honeycombing being patched immediately? Is the entire surface receiving a light vertical brush finish before final set? (Art. 503.17(a)) _____

Evidence of lack of internal consolidation shall be cause for removal and replacement of the affected section of parapet.

If any cracks of any size are evident in the plastic concrete, the affected section of the wall shall be removed and replaced.

- (f) Is the specified clearance between the rebar and the slipform being maintained without external force throughout the pour? _____

If proper clearance cannot be maintained without external force, the slipform operation shall stop until the rebar cage is adjusted to obtain the proper clearance.

Failure to obtain the proper clearance in the slip-formed wall shall be cause for removal and replacement of the affected section of the parapet. Lack of clearance shall not be corrected by applying additional mortar to the face of the affected surface.

- (g) Are you checking that the rebar cage is not moving longitudinally during the slipform operation? _____

Excessive movement of the rebar cage during the slipform operation shall be cause for removal and replacement of the affected section.

- (h) Are abrupt changes in actual alignment of 13 mm in 3 m (1/2 in. in 10 ft) being removed and replaced? (Art. 503.17(a)) _____
- (i) Are parapets having dimensions outside the tolerance limits being removed and replaced? (Art. 503.17(a)) _____
- (j) Are all surfaces being checked with a 3 m (10 ft) straight edge furnished and used by the Contractor as the concrete is extruded from the slipform? (Art. 503.17(a)) _____
- (k) Are irregularities greater than 6 mm in 3 m (1/4 in. in 10 ft) being corrected immediately? Continued variations in the barrier surface exceeding 6 mm in 3 m (1/4 in. in 10 ft) will not be permitted and remedial action shall immediately be taken to correct the problem. (Art. 503.17(a)) _____
- (l) Are any deformations or bulges remaining after initial set being removed by grinding after the concrete has hardened? (Art. 503.17(a)) _____

v. Surface Variations

- (1) At the end of the curing or protection period, are you testing the surface of the deck with a 3 m (10 ft.) rolling straightedge? ((503.17(c)) _____
- (2) Are variations greater than 3 mm (1/8 inch) being removed by grinding or cutting? (Art. 503.17(c)) _____

w. Neoprene Expansion Joint Installation

- (1) Are the concrete surfaces on which the joint sets, dry, clean and free of dirt, grease, loose concrete and contaminants? (Art. 503.10(d)) _____
- (2) Is the concrete surface level and sound (no broken or spalled concrete) with adjacent joints in a straight line with one another? If not are the surfaces corrected by grinding or epoxy grout? (Art. 503.10(d)) _____
- (3) Are neoprene surfaces in contact with the sealant cleaned with acceptable solvent or buffed with a wire brush prior to installation and approved sealant applied over the entire blockout? (Art. 503.10(d)) _____

- (4) Are nuts torqued to 90 Nm (65 ft.-lbs.) and after 24 hours of initial installation are the nuts retorqued to 90 Nm (65 ft.-lbs.)? (Art. 503.10(d)) _____
- (5) Are bolt wells, joints between units, around connecting bolts and cavity plugs cleaned and sealed with black flexible epoxy sealant? (Art. 503.10(d)) _____
- (6) Upon completion of the joint, are uneven end butt connections being ground flush? (Art. 503.10(d)) _____

Preformed Elastomeric Compression Joint Seals

- (1) Is the seal installed with suitable hand or machine tools and secured in place in a clean joint with approved adhesive which covers both sides of the seal in contact with the sides of the joint? (Art. 503.10(d)) _____
- (2) Is the seal installed in one continuous piece with no more than one manufacturer's splice? (Art. 503.10(d)) _____

x. Protective Coat

- (1) Is PROTECTIVE COAT, when specified, being applied to the entire top surface of the bridge deck, sidewalks, and hub guards and to the tops and inside vertical faces of the sidewalk parapets, posts, and wings? (Art. 503.19) _____
- (2) Is the linseed oil mixture being applied in 2 applications at 11m²/L (50 sq. yds. per gal.) when the temperature is above 10 °C (50 °F) and on clean concrete which is at least 14 days old? (Art. 503.19) _____

y. Field Painting of Structural Steel

Is the steel being cleaned, spot painted and given the application of the additional paint coatings required by the contract? (Art. 506.05) _____

z. Waterproofing Membrane System

If WATERPROOFING MEMBRANE SYSTEM is specified in the contract, is the Contractor preparing the deck and applying the specified waterproofing materials as specified in Art. 503.18? _____

7. DOCUMENTATION OF FINAL CONTRACT QUANTITIES

CONCRETE STRUCTURES- Cubic Meters (Cubic Yard)

CONCRETE SUPERSTRUCTURE - Cubic Meters (Cubic Yards)

REINFORCEMENT BARS - Kilograms (Pounds)

REINFORCEMENT BARS, EPOXY COATED - Kilograms (Pounds)

a. Are computations based on plan dimensions in a permanent file to verify plan quantities? _____

If your computations are not reasonably close to plan quantity, within 0.2m³ (0.3 cu. yd.) for Concrete and 4.5 kg (10 lbs.) for Reinforcement Bars) are your calculations being checked by another person to verify the revised quantity? _____

Are you indicating in your records that the structure was "Built to plan dimensions." Otherwise, are you showing revised dimensions? _____

Are you computing the weight of reinforcing bars using the theoretical weight as listed in Art. 508.07? _____

b. In lieu of all of the above, do you have a jointly-signed Form [BC 981](#) agreeing to plan quantities to document the final pay quantity? _____

PROTECTIVE COAT - Square Meters (Square Yards)

WATERPROOFING MEMBRANE SYSTEM - Square Meters (Square Yards)

NEOPRENE EXPANSION JOINT - Meter (Foot)

PREFORMED JOINT SEAL - Meter (Foot)

a. Field measurements of all authorized areas. _____

Computations retained in permanent file. _____

- b. In lieu of all of the above, do you have a jointly-signed Form [BC 981](#) agreeing to plan quantities for appropriate pay items to document the final pay quantity? _____ |

FURNISHING STRUCTURAL STEEL - Lump Sum

ERECTING STRUCTURAL STEEL - Lump Sum

FURNISHING & ERECTING STRUCTURAL STEEL - Lump Sum

FURNISHING & ERECTING STRUCTURAL STEEL - Kilograms (Pounds)

(Minor Items)*

ELASTOMERIC BEARING ASSEMBLY - Each

- * The kilograms (pounds) of structural steel shall be determined using the approved shipping mass (weight) or by measuring on an approved platform scale. (505.12)

FURNISHING & ERECTING PRECAST, PRESTRESSED CONCRETE

I-BEAMS (Depth Specified) - Meter (Foot)

In determining the total length to be paid for, the specified overall length of the individual beams will be used. (Art. 504.07) This total length may be agreed to on Form [BC 981](#) agreeing to plan quantities. _____

DECK PREPOUR MEETING AGENDA

(Rev. 4/7/00)

Length _____ Width _____

Date: _____

Time: _____

Contact: _____

AGENDA

What is the scheduled date of the pour? _____ Time? _____

1. EQUIPMENT

a. Bidwell? _____ Gomaco? _____ Screed? _____

(1) Discuss auger height (1/8 to 1/4" above roller)

(2) Discuss roller (1/8" higher in back)

(3) Discuss roller rotation

b. Skew placement?

c. Dry run...when?

(1) check rebar clearance _____ Inch

(2) check deck thickness _____ Inch

(3) check deck drain clearance _____ Inch

d. FOGGING SYSTEM – Highly recommended to increase humidity at deck surface
plastic shrinkage cracking is caused by high temperature, and wind

e. Fogging can...no baptizing!

f. Bridges – 2 required

(1) Finishers

(2) Curing/burlap

g. Burlap drag (OK to attach burlap to the pan)

h. Air meter - How many _____ have correlated / have backup?

i. Pumper

- (1) Waste initial mortar
- (2) Plywood under pipe joints
- (3) No water hosed into hopper
- (4) No aluminum pipes
- (5) Air test required at both ends to determine air loss (first 4 loads+1 per hr)
- (6) RECOMMEND curved outlet hose to control air lose
- (7) What is breakdown procedure?

j. Conveyer

- (1) Adequate covering to collect spilled concrete
- (2) DO NOT run conveyer out over placed concrete (spillage)

k. 10 foot straight edges...how many? _____

l. 10 foot float OK, but only if necessary – NO small float

m. Bonded joints

- (1) What type and where?
- (2) Approved materials? _____
- (3) How to apply?

n. Phone available to call plant?

2. **FRAMING, RAILS AND REBAR**

a. 4x4's @ 8' c-c

b. #4 epoxy tie bars @ 8' c-c

- (1) Place with bottom load of steel
- (2) No slack
- (3) Use fabricated brackets
- (4) What type of fasteners through longitudinal joint?
- (5) ALTERNATE METHOD: Tie inside top exterior flange to bottom flange of #2 beam

c. Cantilever brackets within 6" of bottom flange

- d. All accessories epoxy coated or galvanized
 - (1) Except rail supports
- e. Rebars
 - (1) Discuss epoxy coating inspection procedure
 - (2) Repair nicks and cuts
 - (3) Cut skew rebar...Shear cut – No flame cutting allowed
 - (4) 100% ties? Less than 12" spacing, alternate intersections o.k. OK
 - (5) #9 tiedown wire @ 25' longitudinal & 15' transverse
 - (6) Chairs...continuous 3' bottom or top. 2'x3' spacing for top mat OK
- f. Rail supports
 - (1) Where – outside of pour
 - (2) Avoid rails over beams within pour
 - (3) Avoid having to stand in mix to finish
 - (4) Where to weld? (no welds in tension area)
 - (5) Where to epoxy?
 - (6) center to center distance? _____
 - (7) Rigid rail?
- g. Plywood walkways on 4x4 supports?
 - (1) Walking on rebars next to the longitudinal form can fracture the concrete after the initial set

3. **CURING**

- a. Type 2 curing compound (check type day before pour)
 - (1) 2 applications (watch for non-uniform coverage)
 - (2) Mechanical spraying required (good idea: use angled wand to control spray and avoid blowing compound)
 - (3) April 15 to October 15 only
 - (4) How many gallons required? _____
 - (5) No membrane on rebars – use shield

- (6) No protective coat until after curing period
 - b. 2 layers wetted burlap
 - (1) Wetted prior to placement (do not place dry) SOAKER HOSE SYSTEM – highly recommended
 - c. Blankets < 45 degrees
 - d. What equipment available to spray compound?
 - (1) Mechanical, not Hudson sprayers
 - (2) Bridges
 - (3) Long handle spray devices (recommend curved wands to control spray)
 - 4. **POUR**
 - a. Wet the deck prior to concrete placement
 - b. Compressor available to blow off dried concrete
 - c. Remove concrete from rebars – burlap
 - d. Probe & Record thickness
 - e. Air & Slump
 - (1) Need test area
 - (2) No fly dumping
 - (3) Test each load
 - (4) Pumper & deck – plywood for deck air test
 - f. Tining
 - (1) Grooved?
 - (2) If not, assure proper tool
 - (3) Depth of groove? _____
 - g. Delays over 20 minutes
 - (1) Fresh joint protection (wetted burlap available)
 - (2) Header available
- MOVE PAGES 27 & 28 UP ???h. WATCH OUT FOR:
- (1) Non-uniform loading (do not spread mix on the deck erratically)

- (2) Hydraulic fluid leaks from pump on rebars
- (3) Poor spud vibration technique (vertical insertion of spud – 3 seconds)
- (4) Concrete splatter on bars
- (5) Aggregate segregation from pumper hose or mortar segregation
- (6) Rebar damage from conveyer section stacking or pumper hose dragging
- (7) Standing in mix to finish (concrete begins to set up)
- (8) Mud on rebars
- (9) Loose rail supports (never a good idea to have to pick the spreader out of the mix)
- (10) Curing compound in unmarked containers

5. **DELIVERY OF MIX**

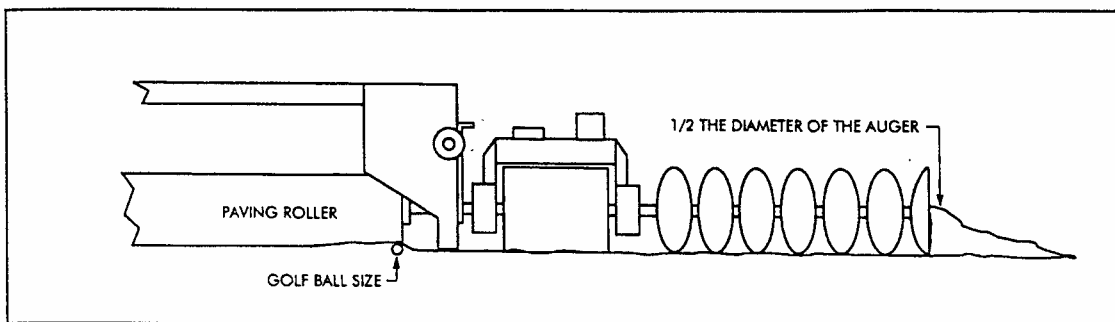
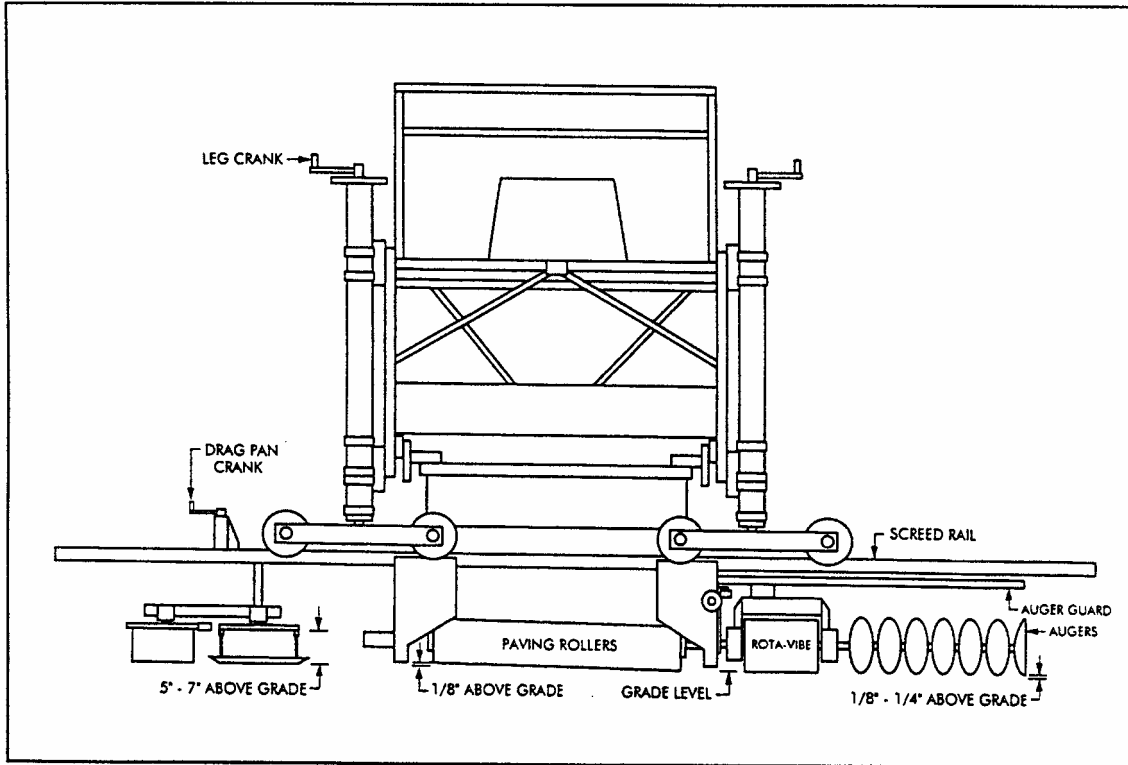
- a. Scheduled time for start of pour?
- b. How much material is going to be needed?
 - (1) At what rate? (Minimum 30 cy/hr)
- c. What slump do you want at the deck?
 - (1) How is concrete being placed
- d. All concrete trucks must have working rev counters and sight tubes. Counters will be reset for each load.
- e. Each ticket will be stamped!
- f. All trucks will reverse their drums prior to loading.
- g. The trucks will put 60 – 100 revs to assure mixing.
- h. If superplasticizer is used...NO water will be allowed – retempering will be with super only. Water/cement ratio will be sent with 3rd load.
- i. Retarder will be used if the concrete or ambient temperature is above 65 degrees.
- j. The maximum time limit is 1 hour. 15 minutes additional will be allowed for testing at the plant. (1½ hour with retarder)
- k. No concrete will be poured above 90 degrees.
- l. Need correlation of air loss to be determined.
 - (1) An air test will be performed on every load at the jobsite.

6. WEATHER CONCERNS

- a. Hot and/or windy (and/or DRY)
 - (1) AVOID pouring (prime cause of plastic shrinkage cracking)
 - (2) Add a fogging system to the spreader
 - (3) Pour at night
 - (4) Start very early in the morning
- b. Rain in forecast
 - (1) AVOID pouring – why chance removal?
 - (2) Rain hitting the surface raises the water/cement ratio and causes scaling, and marring of the surface and ultimately a shorter deck life

(Excerpt from "Machine Setup, Models 2450-3600-4800 Concrete Paving Machine," Bid-Well, Division of CMI Corporation, Canton, SD)

ADJUST ROLLERS AND DRAG PAN – After the pour has started and the machine has moved out from the end bulkhead or has passed over the bulkhead the full length of the paving roller, raise the back of the machine 1/8 of an inch by turning the leg cranks 1/2 turn counterclockwise (See figures below). This will keep the rear of the paving rollers from digging in and leaving a small ridge of concrete. It may be necessary to readjust the augers, up or down, to obtain or reduce the roll of concrete. Optimum is golf ball size in diameter at the front of the paving roller. As the machine progresses into the pour and clears the bulkhead or end dam, attach the burlap or astrograss drag to the drag pan.

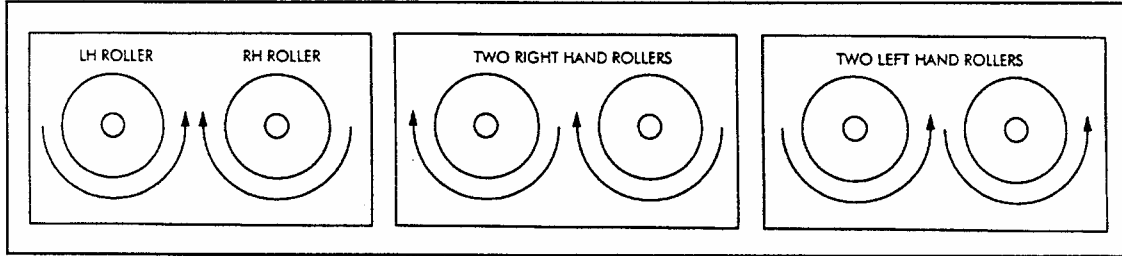


NOTE: The burlap drag should be wet. If new burlap is being used the burlap should soak in water for at least 24 hours. This will remove all oils in the burlap and make it more absorbent.

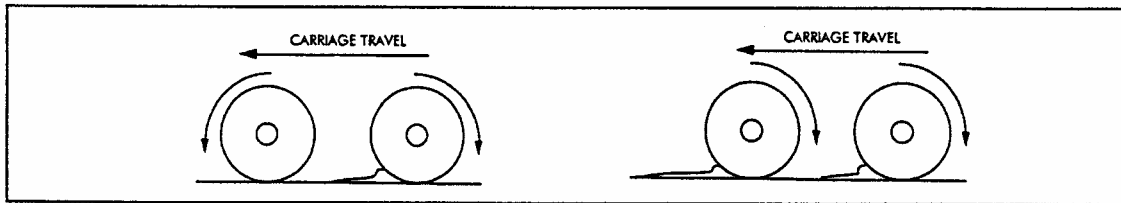
The texture given by the burlap can be easily adjusted. If the burlap is dragging too hard, remove one of the retaining tubes and roll up the burlap so that the drag is not so heavy. If the burlap does not seem to drag enough, increase the length of the burlap so that it hangs down more.

NOTE: If the drag pan H-Frame is too high or the chains are hooked too tight, the pan will have a tendency to hop as it is being dragged across the deck.

ROLLER ROTATION – The two paving rollers can rotate in the same direction (either clockwise or counter-clockwise) or they can rotate in opposite directions (See figure below).

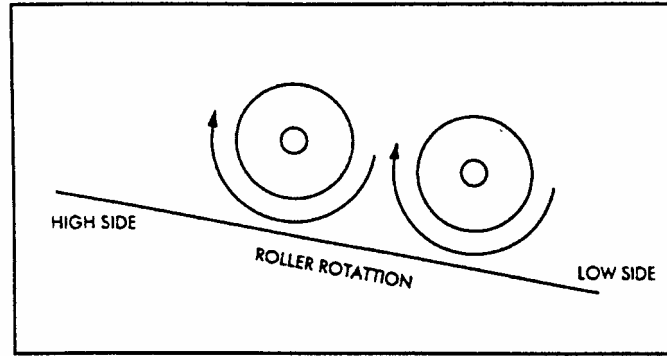


At the beginning of a pour it is recommended that you rotate the rollers in the same direction for the first couple of passes. Using the Roller Directional Valves, position the two valve levers in the same direction. Facing the augers, both rollers turn clockwise when the carriage travels to the left and counterclockwise when the carriage travels to the right. Put the Automatic Roller Reversing Valve in the "Reversing" position. The "Reversing" position will change the roller direction with each pass of the carriage. After a couple passes, change the direction of one roller. Which one will depend on the direction of the carriage travel (See figure below).



Put the Automatic Roller Reversing Valve in the "Non-Reversing" position. The "Non-Reversing" position does not change the roller direction with each pass of the carriage. Facing the augers, the right roller turns clockwise and the left roller turns counterclockwise. This allows the leading roller to consolidate the concrete and the trailing roller to pave the surface. Normally, when pouring a flat bridge deck or slab, this roller rotation will provide the best overall production and sealed finish. However, due to "mix," slump and other concrete variables one roller rotation option may work better than another. The paver's automatic pivot device will keep the excess material that the paving rollers carry moving out the front of the paving rollers instead of trailing off to the rear of the paving rollers. The pivot device can be adjusted for quickness by turning the set screws on the Automatic Roller Reversing Valve.

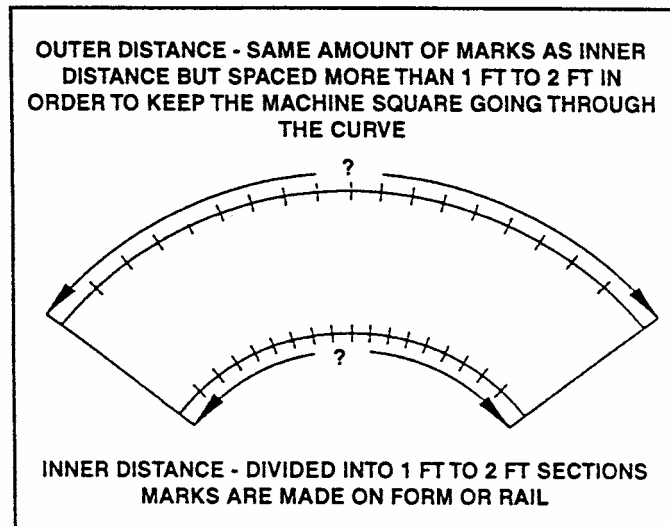
SUPER ELEVATIONS – When paving super elevated slabs, bridge decks or skewed decks both rollers must be turning in the same direction and the Automatic Roller Reversing Valve should be set in the "Non-Reversing" position. The concrete should be pushed from the low side to the high side of the elevation and roll over the concrete going down the super elevation (See figure, p. 30)



The roller direction will depend on the direction of the pour and what side is the high side.

PAVING UP & DOWN GRADES – When paving up a grade, the rear of the paving rollers may need to be raised higher (approximately 1/8" to 1/4"). Raise the back of the machine 1/8 of an inch by turning the leg crank 1/2 turn counterclockwise. The augers may need to be adjusted lower. Adjusting the augers with the Auger Adjusting Crank (Handle). These adjustments will counteract the tendency of excess concrete from moving downhill toward the paving rollers. When paving down a grade, the augers may need to be raised higher to provide the proper amount of concrete to the paving rollers. The rear of the paving rollers may not need to be raised but be sure that there is close to total contact with the deck or slab. When paving down hill, you want maximum surface contact with the concrete but not allow any ridge or line of concrete to come off the rear of the paving rollers.

PAVING CURVES – Given the known length or distance of the inside and outside curve, mark an equal number of spaces on the inner curve (1 to 2 feet in length). Count the number of spaces on the inner curve and mark the same number of spaces on the outer curve. The length of these spaces will vary with the length of the outer curve section (See figure below).



To negotiate the inner curve, the operator will at times place the Machine Direction Control Lever in the neutral position allowing a longer amount of travel for the outer curve and the machine. Keep the front wheels of both the inner and outer ends aligned with the marks placed on the rail or curb.

MACHINE ADVANCEMENT – The advancement of the machine at the end of each pass is based on the rate of concrete being poured. The operator should pace the machine advancement so that the physical placement of the concrete is no more than 6 to 8 feet in front of the machine. Normal advancement of the machine will vary from 3 to 6 inches (up to 12 inches) for each carriage pass. This will insure that fresh concrete will move into the paving rollers before dehydration of the concrete occurs. This is particularly true in hot, windy weather. The decking and sub-base material should also be kept wet in hot, windy weather to aid in the slowing down of the drying process.

CARRIAGE TRAVEL SPEED – At times it may be advantageous to slow down the carriage travel speed. Slowing the carriage travel will allow the paving rollers to have longer contact with the surface. Slowing the carriage travel speed may be beneficial when paving Super Plasticized Concrete or Latex Modified concrete. The carriage speed can be reduced by slowing down the engine or by using the carriage speed control located on the operator's console. The operating speed of the engine should run 2800 to 3200 RPM. At these speeds the carriage will travel approximately 85 to 90 feet per minute transversely across the machine.