CHECK LIST FOR BRIDGE DECK PLACEMENT

A) APPROVALS:
   1) PLACEMENT PROCEDURES
   2) MIX DESIGN
   3) OVERHANG FORMS AND SHOP DRAWINGS FOR S.I.P. FORMS
   4) CURING WATER

B) PRIOR TO PLACEMENT OF CONCRETE:
   1) CHECK TO SEE THAT NO FORMS OR OTHER MATERIAL IS WELDED IN THE TENSION AREAS.
   2) CHECK TO SEE THAT FORMS ARE MORTAR TIGHT
   3) CHECK CLEARANCE OF REINFORCEMENT BAR BOTTOM MAT
   4) CHECK AND RECORD CLEARANCE OF REINFORCEMENT BAR TOP MAT BY RUNNING THE PAVING MACHINE THROUGHOUT THE ENTIRE DECK AREA.
   5) CHECK FOR RIGIDITY OF THE REINFORCEMENT BAR MAT, AND EMPLOY ENOUGH CHAIRS FOR PROPER SUPPORT.
   6) CHECK FOR TIES ON REINFORCEMENT BARS AT EVERY INTERSECTION, AND CHECK THAT THE TIE IS BENT DOWN
   7) CHECK SCREED RAIL FOR THE CORRECT CAMBER, AND USE A COMPUTER PROGRAM IF APPLICABLE
   8) CHECK THE FINISHING MACHINE FOR THE CORRECT DECK TEMPLATE, AND FOR POSSIBLE WEAR ON THE UNDERSIDE (STRINGLINE THE PAVING MACHINES RAILS, MARK LEGS FOR SHACKLE DOWN 1.0’)
   9) CLEAN DECK, BLOW OUT OR WASH
   10) TOUCH UP ANY BARE STEEL OR REINFORCEMENT BARS
   11) RECORD “DRY RUN” REINFORCEMENT BAR CLEARANCES AND DEPTH CHECKS
   12) SLAB BOLSTERS 3’ C/C

C) PRIOR TO RELEASING CONCRETE:
   1) HAVE A BULKHEAD AND PLASTIC COVERS ON HAND FOR AN EMERGENCY SHUT-DOWN
   2) DOES THE CONTRACTOR HAVE ALL EQUIPMENT NECESSARY FOR THE DECK PLACEMENT, AND IS IT ALL FUNCTIONING?
   3) IS STANDBY EQUIPMENT AT THE JOB SITE, ESPECIALLY IF PUMPING?
   4) DOES THE CONTRACTOR HAVE SUFFICIENT PERSONNEL ON SITE?
   5) DO YOU HAVE AN ADEQUATE CONCRETE DELIVERY SCHEDULE?
   6) DECIDE ON THE PROPER RETARDATION REQUIRED FOR THE DECK PLACEMENT
DECK CHECK
1) RUN BIDWELL FOR CONCRETE OPERATION
2) CHECK CLEARENCE ON REBARS – DEPTH CHECKS, RECORD MEAS.
3) CHECK BIDWELL AT DAM AND ABUTMENTS
4) TOUCHUP EPOXY ON REBAR
5) CLEAN DECK – BLOW OUT OR WASH

DAY OF POUR
1) STARTING TIME
2) FINISH TIME: HOW MUCH CONC./HR. WITH PUMP
   NUMBER OF TRUCKS EA. ROUND
3) AMOUNT OF CONCRETE:
4) SPACING BETWEEN TRUCKS:
5) HOW MUCH TIME/TRUCKS:
6) IS ICE GOING TO BE ADDED?
7) ALLOWABLE HIGH TEMP. FOR CONCRETE 80F
8) TIME DISPATCHED TO TIME DISCHARGE COMPLETE: 1 ½ HOUR.
9) HOW MANY FINISHERS?
10) AREA TO PUMP GROUT, NOT IN CREEK. WHERE?
11) KEEP PUMP LOW DURING PUMPING – CLOSE TO TOP MAT OF REBAR
12) DON’T GET TOO FAR AHEAD OF BIDWELL MACHINING
    AND FINISHERS WITH PUMP/CONCRETE
13) WORKING IN 10’ OR LESS AREAS BACK AND FORTH
    ACROSS THE DECK, IN FRONT OF BIDWELL
14) BULKHEADS ON HAND?
15) LOCATION OF EQUIPMENT (PUMP, ETC.)
16) UNDERSIDE OF DECK – WASHED TO KEEP PRIMER CLEAN
17) MAINTAIN 20 L.F./HR
18) COMMUNICATION: PLANT/JOB

TESTING OF CONCRETE
1) TESTING EQUIPMENT AS PER 408
2) TOTAL C.Y. FOR DECK 215. CYLINDERS NEEDED 5.
3) 2 CONCRETE TECHNICIANS AT ALL TIMES. ONE AT PUMP AND ONE ON DECK.
4) Technician will carry concrete off deck to make slump/air – level area (no movement)
5) cylinders will be made from concrete delivered to the deck
6) testing will start with the 1st truck and continue thru pour until uniformity is established. Then randomly approx. every 3rd truck or as requested by inspector.
7) Max. slump of 4” on deck during placement
8) Dep’t will conduct acceptance tests: slump, air, temp. and mound cylinders. Contractor is to perform quality control tests.

D) DURING PLACEMENT OPERATION:
   1) The contractor must have 2 qualified technicians (if pumping) and four sets of required testing equipment.
   2) Air entrainment tests must be taken on every truck
   3) Tests must be taken both at the truck and at the point of placement when pumping concrete
   4) Do not overvibrate or over finish the concrete
   5) Utilize, run!!!!, a 10’ straight edge prior to broom finish operation
   6) Broom finish one pass longitudinally in the watertable area (18” width)
   7) Confilm is to be used as an intermediate surface cure
   8) Apply curing covers as soon as possible
   9) Maintain cure throughout the curing period, keep deck and test cylinders wet. Weep hoses?
10) Record deck placement bar clearances and depth check in depth check book
11) Maintain 20 L.F./HR deck placement
12) Slump 3” ±1 (2” to 4”) 2”-5’
13) Air 6%±1 ½ (4.5 to 7.5)
14) At cylinders 4 cyl for each 50 c.y.
15) How many QC cylinders?
16) Action points? Temperature action points?
FINISH

1) TYPE OR FINISH ON DECK; ____________.
2) BROOM FINISH BOTH WATER TABLES. 18” WIDE.
3) BRIDGES: 1-FOR CURE
   1-FINISHERS

CURING

1) BEGIN WHEN CONCRETE FIRST SETS UP(TACKIE)
2) SPRAY WITH CONFILM
3) BURLAP – WET DOWN (FOG SPRAY) OR WEEPER HOSES
4) KEEP DECK SATURATED AT ALL TIMES – FOR FULL CURING PD 7 DAYS

WASH OUT AREA

1) WHERE?
2) DESIGNATED?
The contractor must submit a Quality Control Plan for the placement of any portland cement concrete bridge deck, as directed in the specifications, to the District Engineer for review. The contractor is to address the following points with the listed minimums:

**DECK PLACEMENT OPERATION**

1. **General Description of Placement Procedure**
   - Anticipated placement date(s)
   - Contractor/subcontractor performing deck placement
   - Method to seal holes in and around deck pans and deck forms
   - Advancement rate and direction, pour sequence and dimensions of anticipated pours
   - Method of concrete placement, i.e., crane and bucket, pump, conveyor, buggy. Note capacity of operation. For cranes and pumps utilizing booms, detail setup locations and reach

2. **Manpower**
   - Names(s) of supervisor(s) responsible for placement and their experience level
   - Numbers of contractor’s staff including supervisors, laborers, operators, carpenters, finisher/masons, technicians

3. **Equipment Types and Tools**
   - Type and model of specific finishing machine that will be used
   - Method that will be used to check the finishing machine grades, depths, and reinforcement clearances in the “dry run” operation, i.e., frequency of checks, tolerances, expansion dam clearances, setup method (perpendicular or degree of skew)
• Number of work bridges and their use
• List of emergency/spare equipment, motors, and spare parts in the event of breakdowns
• List of hand and power tools. Include drywall broadknife for checking rebar cover depth. A minimum of two vibrators is required

4. **Material**

• Approved mix design
• Concrete source of supply
• Concrete delivery plan, i.e. number of trucks, spacing, haul time, delivery capacity, etc.
• Specifics of mix including retarder and dosage, high-range water reducer, low alkali cement, etc.
• Intermediate bridge deck curing agent

5. **Reaction Plans**

• Bulkhead of appropriate length and height. District should denote locations where no bulkhead will be permitted
• Method of rain protection and how much area of protection will be provided
• Plant breakdown
• Field equipment breakdown
• Foul weather

6. **Texture**

• Method to be used to determine when texturing is to be applied, by whom
• Method (type of equipment) and orientation
• Denote plastic surface texture or mechanical method

7. **Cure and Protection**

• Curing method including water supply source, and cool/cold weather provisions when necessary. Include in detail, whether using blankets, heaters (type, size, number, location), enclosures, etc.
• Monomolecular film curing agent manufacturer and method
• High/low thermometers
ATTACHMENT NO. 1

TESTING

1. **Deck**

   - Straight edge testing method and frequency. Furnish one straight edge a minimum of ten feet in length with suitable handles for the Department’s use. Furnish all finishers with a straight edge when performing hand finishing.
   - Frequency of overall concrete depth and reinforcement bar cover depth checks

2. **Concrete**

   Either submit a separate, approved Concrete QC/Testing plan or submit a detailed Concrete QC plan as a part of this plan. The following items will be addressed.

   A. **General Description of Testing Operations**

      - Where testing will take place
      - Manpower
         - how many technicians and names
         - who authorizes changes to the mix based on field testing
         - who has authority to reject material and/or suspend operations
      - How will QC test results be recorded. Where will compressions test specimens be tested (plant or project).
      - Who will conduct QC tests and witness acceptance tests

   B. **Equipment**

      - Number and type of all concrete testing equipment
      - Communications

   C. **Frequency of Tests**

      - How often will QC tests be performed after mandatory first three
      - Number of QC cylinders to molded
      - Where cylinders will be molded
      - Cylinder curing method/procedure

   D. **Concrete Acceptability**

      - Action points and target values (slump, air, temperature)
      - Procedure after action points reached

P.O.M. C. 10.8 END
Prior to the actual placement operation, a pre-placement meeting is strongly recommended. The project inspection staff should conduct a meeting with the principal participants for the contractor to discuss many of the items listed. It is in everyone’s best interest to discuss these items and any associated problems several days in advance of the placement rather than waiting until a couple of hours or minutes before concrete arrives on the project or a problem develops. Specification section references are provided where appropriate.

**PRE-RELEASE**

Prior to the release of concrete for any bridge deck placement, the inspector should check and review the following items:

- a QC Plan for concrete testing and acceptance has been submitted by the contractor, reviewed by the District Construction Office, and is on file at the project. Air meter has been calibrated within past two weeks. 704.1(d)3., 1001.2(a), P.O.M. B.6.5-1
- a concrete mix design reviewed by the D.M.E. is on file at the project. 704.1(c)
- a QC Plan for the deck placement has been submitted by the contractor, reviewed by the District Structure Control Engineer, and is on file at the project. 1001.1
- discuss concrete delivery with the contractor to assure a sufficient number of trucks are scheduled in the queue to meet the advancement requirement of 20 L.F. per hour (6m/hr.), and appropriate delay has been set between trucks. Also, determine that suitable retarder dosage has been established for the predicted weather conditions at the time of the proposed placement. 1001.3(k)5.
- all holes in the deck pans and forms have been patched properly. Any aluminum flashing used to patch holes has been properly coated to prevent reaction with the plastic concrete. 1001.3(a)2., 1001.3(k)1.
- certifications are available for reinforcement bars, expansion dams, S.I.P. forms, etc. 709.5, 1105.01(e), 1001.2(h)
- the deck is clean and beams are free of any contamination. 1001.3(a)1
- a dry run has been performed by the contractor and witnessed by inspection staff with results documented in the F.I.D.
- the contractor has all the necessary tools and equipment on the project including but not limited to:

  - sufficient hoses and water supply. 1001.3(p)3.b
  - two functional vibrators of adequate size. 1001.3(k)2
  - concrete rakes and shovels (no garden rakes)
  - ten foot (3050 mm) straight edge and straight edge for each finisher. 1001.3(k)5
  - broad knife or other tool to check cover over reinforcement and overall depth. 1001.3(b)1
  - finishing tools. 1001.3(k)5
  - tine rake. 1001.3
  - cure materials including monomolecular spray cure if appropriate 1001.3(p)3.c
  - bulkhead. 1001.3(k)5
  - mason tools.
  - sufficient plastic is available to cover deck in the event of rain during placement
  - burlap is wet but free of excess water. 1001.3(p)3.b
  - all reinforcement is tied to each intersection and the top mat is secured to lower mat and sufficient chairs used to stabilize mats. Splice lengths are adequate. 1001.3(b)1
  - epoxy touch-up completed and cured as required. 709.1(d)
  - sufficient rebar clearances available. 1001.3(b)1
  - contractor’s planned pour sequence meets approved plan. 1001.3(k)5
  - relative humidity above 35%. 1001.3(k)5
  - the contractor has an operational water supply system. 1001.3(p)3.b

### PREPLACEMENT

After releasing the concrete for the deck, the inspector should check for the following:

- water system is operational
- the contractor has moistened the beams to prevent them from absorbing water from the mix. 1001.3(a)1
- concrete technician has test equipment ready including second set for acceptance use. 704.1(d)2

DURING PLACEMENT

Once the contractor has begun placing concrete the inspector should perform the following duties as a minimum level of inspection.

- check that concrete is being consolidated sufficiently to remove entrapped air and footprints in advance of the finishing machine. 1001.3(k)5
- ensure that finishers are straight edging their work in the gutter line, when coming off of bulkheads, and expansion dams. 1001.3(k)5
- witness the checks that the contractor is making with the ten-foot straight edge and that the contractor is meeting the frequency of checks as established in the QC plan. 1001.3(k)5
- check the overall depth of concrete in the deck and the depth of cover over the top mat of reinforcement. The latter test is easily performed using a drywall broad knife to locate the top of the rebar and then measure the mortar on the blade surface. Tests results may be recorded in the Concrete Inspectors Daily Record Book (Form CS 472) in the “Wire Mesh Depth Check” section. A check should be made for every 50 S.F. (5m2) of bridge deck placed. 1001.3(b)1
- witness the required QC tests and perform the acceptance tests on concrete as required. Concrete is to be sampled at the point of placement; therefore, any project using a concrete pump must sample from the discharge hose. 704.1(d)3
- contractor is maintaining beams surfaces in moist condition. 1001.3(a)1
- minimum advancement rate of 20 L.F. per hour is being achieved. If not, contractor taking appropriate corrective action or proceeding to bulkhead. 1001.3(k)5
- after surface is floated and finished, appropriate texture applied. 1001.3(k)5
- after texture applied to surface, intermediate curing compound applied and then reapplied as needed due to surface drying. 1001.3(p)3.c
- double layer of damp burlap applied as soon as it can be applied without marring texture but prior to surface drying. Soaker hoses applied to surface without plastic cover unless cool/cold weather curing covers required. 1001.3(p)3.b
POST PLACEMENT

After the curing cover is in place, the inspector needs to assure proper curing conditions are maintained:

- burlap covers are maintained in damp condition. 1001.3(p)
- suitable cure temperatures are maintained. Cure covers, blankets, tents, heaters, etc. are maintained as required. Assure that cool/cold weather curing system does not exceed maximum allowable temperature. 1001.3(p)
- record of daily curing temperatures is made. 1001.3(p)
- gradually lower temperatures within heated enclosure over three-day period when cure is discontinued. 1001.3(p)
- unsuitable dead or live loads is not applied to uncured deck. 1001.3(q)

NOTE – All specification section references are for Pub 408M dated 1996.

P.O.M. C. 10.10

END
MEASURING DEPTH OF COVER/TOTAL DEPTH OF PLASTIC CONCRETE ON BRIDGE DECKS

The following policy is required to standardize the inspection and documentation procedures for measuring the total deck thickness and the concrete cover over the top mat of reinforcing steel when performing the inspection of bridge deck construction. The inspection measurements must be entered directly into an approved source document and included in the permanent project records. It is recommended that the “Wire Mesh Depth Check” section in the rear of Form CS 472, the Concrete Inspectors Daily Record Book or a “black field book” be used to record all measurements in a format similar to the accompanying example.

Report all measurements in a table format. (Refer to examples attached) Identify the Contract Number; Structure Number, Span; Pour Sequence; starting, ending and test station; and the location of all piers and deck joints. Show and label bridge girder, edge of deck and grade break point locations. For long or wide spans, the table can be continued on as many pages are required. On the left side of the table, indicate the test location stations.

A. “Dry Run” Inspection

The “dry run” inspection of the finishing machine should be checked at longitudinal intervals not exceeding 10 feet along the length of the bridge deck. Place permanent test station markings on the vertical edge formwork to be used as reference points during the concrete placement operation. The stationing should be easily visible.

During the “dry run” check, measure the distance from the bottom of the finishing machine rollers(s) to the top of the deck formwork to obtain the total deck thickness, and measure the distance from the bottom of the roller(s) to the top of the top mat of reinforcing steel to obtain the depth of concrete cover.

As a minimum, perform “dry run” depth checks at each 10 ft. test station: at each end of the transverse span between girders; at grade break points; and adjacent to the outside girder and gutterline of the overhang formwork. In addition, measure the total deck width at each test station.
During the “dry run” inspection, run the finishing machine transversely along the entire length of all expansion dams, bulkhead forms, etc., to check the grade and profile.

Record all measurements directly into the corresponding table location in the source document. Compare the “dry run” measurements against the contract drawings and specification tolerances. In accordance with Pub 408, Section 1001.3(b)1., “Place reinforcement so the indicated cover clearance does not deviate from position by more than +/- ¼ inch”. The contractor must adjust the grade of the screed rail or bar supports (slab bolsters or rebar chairs) as required to meet the specification requirements.

Recheck the entire area where grade adjustments are performed and enter the new depth check measurements in the table. Continue to perform the “dry run” inspection until no further adjustments are required.

B. Plastic Concrete Depth Checks

During the concrete placement operation, the inspector must perform random plastic concrete depth checks at each 10-ft. test station. As a minimum, perform three depth checks to measure the total deck thickness and reinforcing steel cover at the same location checked during the inspection of the “dry run”. The depth checks should be performed at the location of the finishing machine. Record the measurements directly into the table below the corresponding “dry run” measurements.

A wide blade putty knife works well to measure the concrete cover over the top mat of reinforcing steel. The knife blade should be turned perpendicular to the longitudinal direction of the upper reinforcing bar to obtain an accurate measurement.

A small diameter metal rod works well for measuring the total deck thickness. The rod should have sufficient rigidity to avoid bending while taking measurements. The rod may have to be inserted at several adjacent locations to assure the measurements are to the top of the formwork and not in a valley.

Different tools can be used to perform the plastic concrete depth checks as long as accurate measurements are obtained.

The purpose of performing the plastic concrete depth checks is to check that the actual deal load camber deflection of all the girders is occurring as anticipated and in proper relationship to each other. The plastic concrete depth checks also assure that the top mat of reinforcing steel remains in proper position during the concrete placement operation.

If significant deficiencies are encountered, the placement operation should be stopped and the situation must be investigated to determine possible causes. If corrective action cannot be taken, a bulkhead form should be placed and the operation stopped.
C. Hardened Concrete Testing

After the concrete has hardened, and after the completion of the specified curing period, the depth of the top mat of reinforcing steel may be measured by use of a pachometer, in accordance with PTM No. 419.

Pachometer testing should be performed at deck locations where concrete cover deficiencies are identified by the plastic concrete depth check measurements or as directed by the Engineer.

When required, the total depth of the hardened deck can be determined by obtaining full depth cores in areas suspected of having deficient deck thickness. Record all measurements directly into the corresponding area of the table.

P.O.M. C.10.9-1