

SECTION 03310

STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Materials and procedures for constructing structural concrete, including concrete slope protection, diversion boxes, catch basins, and cleanout boxes.

1.2 RELATED SECTIONS

- A. Section 00555: Prosecution and Progress.
- B. Section 01282: Payment.
- C. Section 02316: Roadway Excavation.
- D. Section 02317: Structural Excavation.
- E. Section 02752: Portland Cement Concrete Pavement.
- F. Section 02841: Traffic Barriers.
- G. Section 03055: Portland Cement Concrete.
- H. Section 03152: Concrete Joint Control.
- I. Section 03211: Reinforcing Steel and Welded Wire.
- J. Section 03390: Concrete Curing.
- K. Section 05832: Expansion Joints.

1.3 REFERENCES

- A. AASHTO M 111: Zinc (Hot-dip Galvanized) Coatings on Iron and Steel Products.
- B. AASHTO M 148: Liquid Membrane-Forming Compounds for Curing Concrete.
- C. AASHTO M 183: Structural Steel.

- D. AASHTO M 153: Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- E. AASHTO M 213: Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- F. AASHTO M 235: Epoxy Resin Adhesives.
- G. ASTM C 578: Rigid, Cellular Polystyrene Thermal Insulation.

1.4 SUBMITTALS

- A. Falsework Drawing: When required in the contract, submit three copies (prepared by a licensed engineer) for approval at least three weeks before construction starts.
- B. Use AASHTO Division II Section 3 (Temporary Work) for minimum design criteria.

PART 2 PRODUCTS

2.1 CONCRETE

- A. Class AA(AE) concrete, unless specified otherwise.
- B. Concrete Slope Protection: Class A(AE).
- C. Refer to Section 03055.

2.2 REINFORCING STEEL AND WELDED WIRE (COATED)

- A. Refer to Section 03211, Part 2.

2.3 JOINTS AND SEALERS

- A. Pre-Molded Joint Filler meeting AASHTO M 153.
 - 1. Concrete Slope Protection: Refer to Section 03152, Part 2, article, "Silicone Joint Sealer."
- B. Preformed Joint Filler: AASHTO M 213.

2.4 BACKER ROD

- A. Use backer rod composed of closed-cell polyethylene foam of sufficient size to prevent the sealant from passing to the bottom of the groove.
- B. Refer to Section 03152, Part 2.

2.5 WATERSTOPS

- A. Refer to Section 03152, Part 2.

2.6 RIGID PLASTIC FOAM

- A. Preformed, extruded, cellular polystyrene thermal insulation material that has a water absorption property of 0.3 or less.
- B. ASTM C 578.

2.7 CURING COMPOUND

- A. As specified. AASHTO M 148, Type I-D, Class A.

2.8 FORMS

- A. Plywood, wood, metal, glass, or a combination of these materials.

2.9 BARRIER REFLECTORS

- A. Refer to Section 02841.
- B. Comply with UDOT Standard Drawing GW 9.

2.10 PARAPET CONNECTION BARS

- A. AASHTO M 183.
- B. Galvanize as indicated on the drawings. AASHTO M 111.

2.11 PARAPET ANCHOR BOLTS

- A. Meet AASHTO M 213.

PART 3 EXECUTION

3.1 PREPARATION

- A. Falsework
 - 1. Construction:
 - a. Use materials able to sustain the stresses required by the falsework design.
 - b. Use suitable jacks or wedges to set the forms to the grade or camber required, and to prevent settling.
 - c. Produce a finished structure of the specified camber, and built to the lines and grades indicated.
 - 2. Footing Construction:
 - a. Build falsework on a solid footing that is safe against undermining, protected from softening, and capable of supporting any imposed loads.
 - b. Demonstrate that the soil bearing values do not exceed the supporting capacity of the soil. (Conduct test loads or have soils investigation conducted by a licensed engineer.)
 - c. Use piling or caissons to support falsework which cannot be founded on a solid footing.
 - d. Space, drive, and remove piles following approved falsework drawings.
- B. Forms
 - 1. Use mortar-tight concrete forms, true to the dimensions, lines, and grades of the structure, and of sufficient strength to prevent deflection during the placement of concrete.
 - 2. Discontinue using any form or forming system that produces a concrete surface with excessive undulations until modifications have been made. Undulations are excessive if they exceed either 1/8 inches or 1/270 of the center-to-center distance between studs, joints, forms, fasteners, or wales.
 - 3. Countersink all bolt and rivet holes when using metal forms for exposed surfaces so that a plane, smooth surface of the desired contour is obtained.
 - 4. Use lumber that is free of knotholes, loose knots, cracks, splits, warps, or other defects that affect the strength or appearance of the structure. Rough lumber may be used for forming surfaces if visible rough surfaces do not show on the final structure.
 - 5. Form all exposed surfaces of each element of a concrete structure with the same forming material or with such materials that produce a concrete surface that is uniform in texture, color, and appearance.

6. Clean the inside surface of forms of all dirt, mortar, and foreign material before concrete placement.
 7. Use form oil that permits the ready release of the forms and does not discolor the concrete.
 8. Do not place concrete in the forms until:
 - a. All work connected with form construction has been completed.
 - b. All embedded materials have been placed.
 - c. All dirt, chips, sawdust, water, and other foreign materials have been removed.
 - d. Inspection and approval have been obtained.
 9. Do not use stay-in-place deck forms.
- B. Footings
1. Earthwork: Refer to Section 02316.
 2. The Engineer may direct written changes in dimensions or elevations necessary to secure a satisfactory foundation.
 3. Do not dewater by pumping during concrete placement, or for 24 hours thereafter, unless pumping is outside the enclosure. Do not use well points to dewater footing.

3.2 GIRDERS SLABS, AND COLUMNS

- A. Slab Span: Place concrete in one continuous operation.
- B. Cast-In-Place T-Beams:
1. Place concrete in one or two continuous operations: The first to the top of the girder stems and the second to completion.
 2. Obtain a bond between the stem and slab that is positive and mechanical, and secured by means of shear keys in the top of the girder stem.
- C. Concrete in columns:
1. Place concrete in one continuous operation.
 2. Allow concrete to set at least 2 days before placing caps.
 3. Do not place concrete in the superstructure until the columns have been stripped and approved.
 4. Do not place the superstructure load on the bents until it has been in place a minimum of 14 days.
- D. Through-Girder Superstructures:
1. Place concrete in one continuous operation unless otherwise specified.
 2. If otherwise specified, provide special shear anchorage to assure monolithic action between girder and deck.

3.3 BOX CULVERTS

- A. Allow base slab and footing to cure for 24 hours before the remainder of the culvert is constructed.
- B. Construct side walls and top slab monolithically unless the wall height exceeds 10 ft. Keep the construction joints vertical and at right angles to the axis of the culvert.
- C. When side walls and top slab are not placed monolithically, construct shear keys in the top of the side walls for anchoring the top slab.
- D. Construct wingwalls monolithically.

3.4 CONCRETE SLOPE PROTECTION

- A. Preparing subgrade:
 - 1. Prepare the area to be paved by smoothing and shaping the berms and slopes and excavating for the cut-off walls.
 - 2. Fill and compact all depressions and humps.
 - 3. Furnish extra material to properly finish the slopes when required.
 - 4. Compact all soft and yielding material resulting in a firm and substantial subgrade of uniform density.
 - 5. Thoroughly sprinkle the area with water before placing the concrete.
 - 6. Have the Engineer approve all surfaces before placing concrete.
- B. Placing concrete:
 - 1. Do not place concrete upon spongy, frozen, or unstable surfaces.
 - 2. Provide concrete of a consistency that it can be placed on the slopes without deformation.
 - 3. Complete all scoring as indicated on the plans.
 - 4. Complete the entire pavement in one placement if possible, or terminate the placement with a construction joint located in a scoring or at the junction of the slope and the abutment.
 - 5. Finish and cure concrete using a Floated Surface Finish. Refer to this Section, Part 3, articles, "Concrete Surface Finishing Classifications," and "Curing Structures."
- C. Sealing joints and closures:
 - 1. Furnish 1 inch thick, rigid plastic foam (styrofoam) for all expansion joints located between structural members and the slope protection.
 - 2. Place the rigid plastic foam material against the surface of all structural members before placing the concrete slope protection.

3. Anchor the rigid plastic foam in place with a compatible adhesive or other approved methods.
4. Seal this area just before final inspection.
5. Remove curing compounds, oil, grease, dirt, and any other foreign materials from concrete surfaces and grooves by sandblasting or other permitted methods.
6. Place the backer rod and sealant after the concrete has properly cured.
7. Apply the backer rod and sealant to clean and dry concrete surfaces.
8. Place sealant with hand or power-operated caulking guns after placing the backing materials.
 - a. Limit the depth of sealant in the groove to 3/8 inch.
 - b. Start the placement at one side and proceed to the other side on horizontal grooves and from top to bottom on vertical grooves.
 - c. Use a concave pointing tool with soap solution to tool the sealant.
9. Do not place the sealant unless temperatures are at least 50 degrees F and rising.

3.5 PLACING CONCRETE

- A. Remove struts, stays, and braces that hold the forms in correct shape and alignment when no longer necessary.
- B. Mix and place concrete within the limitations specified in Section 03055.
- C. Do not deviate from the placement schedule without written approval.
- D. If the concrete cannot be protected during adverse weather, the Engineer may postpone placement operations.
- E. Observe the following precautions when handling concrete:
 1. Avoid segregation of the ingredients.
 2. Arrange chutes, troughs, or pipes used as aids in placing concrete so the concrete does not separate.
 3. Use metal or metal-lined chutes and troughs. (Do not use aluminum.)
 4. Equip chutes with baffle boards or a reversed section at the end of the outlet when placing on steep slopes.
 5. Extend open troughs and chutes down inside the forms or through holes left in the forms; terminate the ends in vertical downspouts.
 6. Thoroughly flush all chutes, troughs, and pipes with water before and after each placement.
 7. Do not allow the free-fall of concrete to exceed 10 ft for thin walls (maximum 10 inch thickness) or 5 ft for other types of construction without the use of a tremie or a flexible metal spout.

8. Use flexible metal spout sections composed of conical sections not more than 3 ft long, with the diameter of the outlet and the taper of the various sections such that the concrete does fill the outlet and retards concrete flow.
- F. Observe the following precautions when placing concrete:
1. Deposit concrete as close as possible to its final position, without allowing it to flow laterally in the form.
 2. Spread fresh concrete in horizontal layers with thickness not greater than what can be compacted with vibrators.
 3. Do not use vibrators to flow concrete laterally.
 4. Limit placement interruptions to 45 minutes.
 5. Place and compact each layer before the preceding layer has taken initial set.
 6. Do not place concrete in water flowing under head within the area of a footing.
 7. Pass the screed over the area with a screed face device to measure the cover before concrete placement.
 8. Relocate and tie reinforcing steel that projects above the specified level before placing the concrete.
 9. Raise and support reinforcing steel that is more than 1/4 inch below the specified level before placing the concrete.
 10. Firmly support screed rails for bridge deck slabs to prevent movement during concrete placement. When using a finishing machine, support the machine rails on the bridge beams. (Do not place the machine rails on the forms unless the form supports have been strengthened and the Engineer gives written approval.)
- G. Observe the following precautions when compacting concrete:
1. Use high frequency internal vibrators to compact all concrete for structures (except concrete placed under water).
 2. Supply enough vibrators to compact the fresh concrete to the desired degree within 15 minutes after it is deposited in the forms.
 3. Supply at least two vibrators for structures involving more than 25 cubic yards of concrete.
 4. Do not attach vibrators to or against the forms or the reinforcing steel.
 5. Do not allow vibrators to penetrate layers of concrete that have taken initial set.
 6. Use spades or wedge-shaped tampers to secure a smooth and even texture of the exposed surface.

3.6 PLACING CONCRETE UNDER WATER

- A. Place and deposit concrete under water when specified on the plans.
- B. Seal the forms or cofferdams watertight.
- C. Do not pump water while placing concrete or disturb the concrete until it has set at least 24 hours, or attained at least 50 percent of its design strength.
- D. Regulate placing to keep surfaces approximately horizontal at all times.
- E. Place the concrete by beginning at one end of the form and progressing in a zig-zag movement from side to side across the length of the form.
- F. Place the concrete using a tremie or concrete pumping equipment.
- G. Observe the following steps when placing concrete with a tremie:
 - 1. Use a 8 inch to 12 inch diameter steel tube tremie constructed with watertight connections, a hopper to receive concrete, and a device at the bottom to exclude water from entering the tube.
 - 2. Use support that permits the discharge end to move over the entire top work surface and permits the tremie to be rapidly lowered to stop or retard flow when necessary.
 - 3. Minimize the number of tremie location shifts for continuous placement.
 - 4. Keep the tremie tube full to the bottom of the hopper during placement.
 - 5. Slightly raise the tremie when a batch is dumped into the hopper, but do not raise it out of the concrete at the bottom until the batch discharges to the bottom of the hopper. If the concrete seal around the tube is lost, re-plug the end and refill the tube with concrete.

3.7 PUMPING CONCRETE

- A. Place concrete with a concrete pump in good operating condition. Replace pump that causes excessive or erratic loss of air entrainment.
 - 1. Use a pump that produces a continuous stream of concrete without air pockets.
 - 2. Do not add water to the concrete in the pump hopper.
- B. Do not allow pump vibrations to damage freshly placed concrete.
- C. Do not use concrete contaminated by the priming or cleaning of the pump.

3.8 LIMITATIONS

- A. Place all concrete possible in daylight.
- B. If either mixing, placing, or finishing occurs after daylight hours, light the work site so all operations are plainly visible. Refer to Section 00555, article, "Limitation of Operations."
- C. Keep all traffic off concrete bridges and culverts for 21 days after final concrete placement.
- D. Hot and Cold Weather Limitations: Refer to Section 03055, Part 3.

3.9 EXPANSION JOINTS

- A. Refer to Section 05832, Part 3.
- B. Adjust bearing positions and joint widths as directed when steel or concrete is installed at temperatures above 68 degrees F and below 50 degrees F.

3.10 CONSTRUCTION JOINTS

- A. Make construction joints where shown on plans or in the placing schedule.
- B. Obtain Engineer's written approval when additional construction joints are desired and meet the following requirements:
 - 1. Place and construct without impairing strength and appearance.
 - 2. Place in planes perpendicular to the principal lines of stress and at points of minimum shear.
 - 3. Make monolithic structures by extending the reinforcing across the joint.
 - 4. Avoid construction joints through paneled wing walls or large surfaces which are to be treated architecturally.
 - 5. Make a straight line joint across the face of the pour for the full width of the bridge deck.
 - 6. Leave a rough surface to increase the bond with the concrete placed later.
 - 7. Form tapered sections with an insert so that the succeeding layer of concrete ends in a section at least 6 inches thick.
 - 8. Place a bulkhead from the surface to the top mat of steel to ensure a straight vertical face. Shape the concrete below the top steel to a near vertical face in line with the bulkhead.
 - 9. When a bulkhead cannot be placed, establish a straight vertical face by saw cutting to a minimum depth of 1 inch. Shape the concrete below the saw cut to a near vertical face.

- C. Before resuming concrete placement, meet the following:
 - 1. Re-tighten forms.
 - 2. Roughen the surface of hardened concrete without leaving loosened particles or damaged concrete.
 - 3. Clean off concrete surface of foreign matter and laitance by sandblasting.
 - 4. Saturate concrete surface with water.
 - 5. Apply epoxy adhesive as specified to face of construction joints.

3.11 CONCRETE SURFACE FINISHING CLASSIFICATIONS

- A. Ordinary Surface Finish: A true and uniform finished surface.
- B. Rubbed Finish: A surface smooth in texture and uniform in appearance, free of all form marks or irregularities.
- C. Wire Brush or Scrubbed Finish:
 - 1. A finished surface with the cement surface film completely removed and the aggregate particles exposed leaving an even-pebbled texture.
 - 2. An appearance ranging from fine granite to coarse conglomerate depends on the size and grading of the aggregate used.
- D. Floated Surface Finish:
 - 1. For flat work: strike off and use a floated surface finish.
 - 2. For bridge decks and approach slabs: machine finish only.

3.12 CONCRETE SURFACE FINISHING

- A. Give all formed concrete surfaces at least an Ordinary Surface Finish except as specified otherwise.
- B. Use other types of finishes as required in addition to the Ordinary Surface Finish.
- C. Provide a Rubbed Finish for all surfaces that cannot meet Ordinary Surface Finish requirements due to irregularities, honeycombing, excessive surface voids, discoloration, and other defects.

3.13 CONCRETE SURFACE FINISHING PROCEDURES

- A. Ordinary Surface Finish:
 - 1. After removing forms, remove all fins and projections.
 - a. Clean, point, and true all honeycomb spots, broken corners or edges, cavities made by form ties, and other holes and defects.

- b. Keep all areas to receive mortar saturated with water for at least 30 minutes before mortar placement.
 2. For pointing, use a mortar of cement and fine aggregate, not more than 1 hour old, mixed in the proportions used in the grade of concrete being finished.
 3. Cure the mortar patches and rub to blend with surrounding concrete.
 4. Tool and free all joints of mortar and concrete. Leave the full length of the joint filler exposed with clean and true edges.
- B. Rubbed Finish:
 1. Wet the surface of concrete while still green, paint with grout, and rub with a wooden float until the surface is covered with a lather of cement and water.
 - a. A thin grout (1 part cement, 1 part fine sand) may be used in the rubbing.
 - b. Let this lather set for at least 5 days, then rub lightly with a fine carborundum stone until smooth.
 2. For hardened concrete, use a mechanically operated carborundum stone to finish the surface at least 4 days after placing.
 - a. Finish in the same manner as above; however, let the lather set for at least 15 days before lightly rubbing with a fine carborundum stone until smooth.
 3. Commercial grade rubbing mortar may be used if approved by Engineer.
- C. Wire Brush or Scrubbed Finish:
 1. After the forms are removed and the concrete is green, scrub the surface with stiff wire or fiber brushes using a solution of muriatic acid (1 part acid, 4 parts water).
 2. Once the scrubbing produces the desired texture, wash the entire surface.
 3. Use water mixed with 5 percent by volume ammonium hydroxide to remove all traces of the acid.
- D. Floated Surface Finish on flat work other than bridge decks and approach slabs:
 1. Striking Off:
 - a. After compaction, carefully rod and strike off the surface with a strike board following the cross sections and grades shown on the plans.
 - b. Allow for camber as required.
 - c. Operate the strike board longitudinally or transversely and move it forward with a combined longitudinal and transverse motion, ensuring that neither end is raised from the side forms during the process.

- d. Keep a slight excess of concrete in front of the cutting edge at all times.
2. Floating:
 - a. Use longitudinal, or transverse floating, or both to create a uniform surface.
 - b. Longitudinal floating is required except in places where it is not feasible.
3. Longitudinal Floating:
 - a. Work the longitudinal float, operated from foot bridges, with a sawing motion while holding it parallel to the road centerline.
 - b. Pass gradually from one side of the pavement to the other. Move the float forward one-half of its length and repeat operation.
 - c. Substitute machine floating, if equivalent results are produced.
4. Transverse Floating:
 - a. Operate the transverse float across the concrete surface by starting at the edge and slowly moving to the center and back again to the edge.
 - b. Move the float forward one-half of its length and repeat the operation.
 - c. Preserve the crown and cross section of the concrete surface.
5. Straightedging:
 - a. Test the concrete surface for trueness with a straightedge after the longitudinal floating has been completed and the excess water has been removed, but while the concrete is still plastic.
 - b. Furnish and use an accurate 10 ft straightedge held parallel to the road centerline in contact with the surface.
 - c. Check the entire area, immediately filling depressions with freshly mixed concrete, then strike off, consolidate, and refinish.
 - d. Cut down and refinish high areas.
 - e. Continue the straightedge testing and re-floating until the concrete surface is at the required grade and contour.
- E. Floated Surface Finish for bridge decks and approach slabs:
 1. Machine-finish exposed surfaces unless otherwise permitted.
 2. Finish concrete by striking off and floating the surface.
 3. Allow the Engineer enough time to inspect finishing machines during daylight hours before concrete placement.
 4. Stop finishing operations hampered by darkness unless lighting facilities are provided.
 5. Extend finishing machine rails beyond both ends of the scheduled placement, and allow sufficient distance to permit the float to fully clear the concrete.

6. Use adjustable rails set to elevations established by the Engineer, installed to prevent springing or deflection under the weight of the finishing equipment, and placed to operate without interruption.
 7. Place screed machine parallel to the abutments and bents within 10 degrees.
 8. Support screed rails to prevent movement during placing of the concrete.
 9. Either support finishing machine rails on the bridge beams or on form supports stiffened to prevent deflection.
 - a. Obtain written approval before using form supports.
 - b. This may require load tests.
 10. Attach a measuring device to the screed face and pass it over the area.
 11. Before placing concrete, relocate and tie reinforcing steel that projects above the specified level, and raise and support steel that is more than 1/4 inch below the specified level.
 12. Place concrete in a uniform heading approximately parallel to the screed machine.
 13. Limit the rate of placing to allow enough time to finish the surface before initial set.
 14. Continuously place concrete the full length of the structure or superstructure unit unless otherwise shown or approved.
 15. Provide sufficient material, equipment, and manpower to place deck concrete at a minimum rate of 25 cubic yards per hour.
 16. Strike off the surface to the required elevations with the finishing machine immediately after placing and consolidating the concrete.
 17. Do not add water to the concrete in front of or behind the screed.
 18. Have the strike-off method and equipment approved. Maintain satisfactory performance. Use equipment capable of finishing concrete within the surface tolerances specified. Maintain satisfactory consolidation and surface tolerance to prevent shutdown and rejection of the equipment.
 19. Furnish a 10 ft straightedge to check the surface tolerance, placed both longitudinally and transversely, immediately behind the screed machine and hand-finished areas.
 20. Correct irregularities greater than 1/8 inch from the straightedge, before additional placement, and immediately fill depressions with concrete, and refinish.
 21. Cut down and refinish high areas.
 22. Continue straightedge testing and corrective measures until the entire surface is free of observable departures from the straightedge.
- F. Final texturing for bridge decks and approach slabs: (a textured hardened finish):
1. After floating, do not texture finish concrete deck surfaces which are to be covered by a water-proofing membrane system.

2. Use a texture process that produces regular 1/8 inch wide transverse grooves spaced randomly from 1/2 inch to 3/4 inch on centers and 1/8 inch deep.
3. Keep the finished surface free from porous spots and surface irregularities.
4. Furnish a work bridge that follows the finishing machine to facilitate texturing and application of the membrane-curing compound.
5. Check the surface smoothness for acceptance after the concrete has hardened.
6. If the surface deviates more than 1/8 inch from a 10 ft straightedge, remove irregularities by grinding following Section 02752.

3.14 CURING STRUCTURES

- A. Refer to Section 03390, Part 3.

3.15 FORM REMOVAL

- A. Obtain approval before removing forms.
- B. Remove all forms from the concrete surfaces.
- C. Do not use any method of form removal likely to cause overstressing of the concrete.
- D. Remove supports to permit the concrete to uniformly and gradually take the stresses due to its own weight.
- E. Do not remove forms used in ornamental work, railings, parapets, and exposed vertical surfaces for at least 6 hours after placement.
- F. To determine the condition of columns, always remove forms before removing shoring from beneath beams and girders.
- G. Removing falsework:
 1. Do not remove until the backfill at the abutments have been placed up to the bottom of the approach slab.
 2. Do not remove falsework supporting the deck of rigid frame structures until the fill has been placed in back of the vertical legs.
 3. Keep falsework and forms in place under slabs, beams, and girders for 14 days after the day of last concrete placement. Forms for slabs having clear space of less than 10 ft may be removed after 7 days.
 4. In cold weather, keep forms and falsework in place as approved in the written plan for cold weather concrete.

- H. Patch formed surfaces within 24 hours after form removal:
1. Cut back and remove all projecting wire or metal devices used for holding the forms in place and that pass through the body of the concrete at least 1 inch beneath the surface of the concrete.
 2. Remove lips of mortar and all irregularities caused by form joints.
 3. Fill all small holes, depressions, and voids with cement mortar mixed in the same proportions as that used in the body of the work.
 4. To patch larger holes or honeycombs, obtain a solid uniform surface by chipping away coarse or broken material.
 5. Cut away feathered edges to form faces perpendicular to the surface.
 6. Cover with epoxy-adhesive coating as specified. AASHTO M 235, Type II
 7. Fill the cavity with stiff mortar composed of 1 part Portland Cement to 2 parts sand thoroughly tamped into place.
 8. Pre-shrink the mortar by mixing it approximately 20 minutes. Vary the time according to manufacturer's recommendations, temperature, humidity, and other local conditions.
 9. Float the surface of this mortar with a wooden float before initial set.
 10. Keep the patch wet for 5 days.
 11. After curing, rub patches on exposed surfaces to blend them with surrounding concrete.
 12. Add coarse aggregate to the patching material when patching large or deep areas.
 13. Make a dense, well-bonded, and properly cured patch.
- I. Areas with honeycomb will be rejected. After receiving written notice of rejection, remove and rebuild the structure in part or wholly, as specified, at no additional cost to the Department.

3.16 MISCELLANEOUS CONSTRUCTION

- A. Drainage and weep holes:
1. Construct drainage and weep holes at locations indicated on the plans or as directed.
 2. Place ports or vents for equalizing hydrostatic pressure below low water.
 3. Use non-corrosive materials for weep hole forms.
 4. Remove wooden forms after the concrete is placed.
 5. Paint exposed surfaces of metal drains as indicated on the plans.
- B. Anchor Bolts: Securely and accurately set all necessary anchor bolts in piers, abutments, or pedestals as the concrete is being placed.

- C. Bearing plate areas:
 - 1. Finish bridge seat bearing areas high and rub or grind to grade within a tolerance of $\pm 1/16$ inch.
 - 2. Do not grout under bearing plates.

3.17 CLEANING

- A. Clean up by removing all falsework and falsework piling, (down to 2 ft below the finished ground line) rubbish, and temporary building materials before final inspection.

END OF SECTION