SP-151106
(New)

SPECIAL PROVISIONS
FOR
IN-RIVER CONCRETE FORMING

Polk County
EDP-PA26(001)--7Y-77

Effective Date
December 21, 2021

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

151106.01 DESCRPTION.

This special provision covers furnishing, erecting, and removing of forms for in-river cast-in-place concrete.

151106.02 QUALITY ASSURANCE.

A. Reference Standards:

Except as noted or modified in this Section, all concrete materials, transporting, placing, finishing, and curing shall conform to requirements of the latest and current versions of following American Concrete Institute (ACI) standards:

- 117 Specification for Tolerances for Concrete Construction and Materials.
- 301 Specifications for Structural Concrete.
- 347 Guide to Formwork for Concrete.

B. Design Criteria:

1. The Contractor shall design the formwork for the loads, lateral pressures and allowable stresses outlined in Chapter 1 of ACI 347.

2. Have a Professional Engineer licensed in the State of Iowa design and certify falsework plans.

3. Materials for forms and falsework may be either new or used. It is the Contractor's responsibility to ensure that materials are suitable for the use intended. Material which the Engineer determines to be damaged, defective, or otherwise unsuitable will be rejected.

C. Maximum Allowable Tolerances:

1. Variation from Plumb:

a. Lines and surfaces of columns, piers, and walls:

1) In any 10 feet of length 1/4 inch

2) Entire length 1 inch

b. Control-joint grooves, and other conspicuous lines:

1) In any 20 feet of length 1/4 inch

2) In 40 feet or more 3/4 inch

2. Variation from level or specified grade for slabs, beams, and roof

a. In any 10 feet of length 1/4 inch

b. In any 20 feet of length 3/8 inch

c. Entire length 3/4 inch

3. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between supporting members.

4. Refer to ACI 301 for additional requirements.

151106.03 SUBMITTALS.

A. Submit product technical data including manufacturer and type of proposed form ties.

B. The Engineer may require calculations or evidence of adequacy. The Engineer may require revised plans later because of unforeseen site conditions, unusual construction procedures, or deviation from original falsework plans.

151106.04 FORM MATERIALS.

A. Where “Smooth Form Finish,” or “Grout Cleaned Finish” is specified, use prefabricated plywood panel forms, job-built plywood forms, forms lined with plywood or fiberboard, or steel forms. Where “Rough Form Finish” is specified, unlined wooden forms may be used.

B. Steel Forms: Symons “Steel-Ply,” Simplex “Industrial Steel FrameForms,” Universal “Uniform” or equivalent as approved by the Engineer.

C. Plywood Forms: Product Standard PS-1, - waterproof, resin-bonded exterior type Douglas fir.

D. Fiberboard Forms: Federal Spec LLL-B-810 - Type II tempered, waterproof, screenback, concrete form hardboard.

E. Lumber (Including Board and Batten Forms): Straight, uniform width and thickness, free from knots, offsets, holes, dents, and other surface defects. Lumber must be sufficiently sealed to prevent the absorption of water, form release agent, etc.

F. Chamfer strips: Clear white pine, surface against concrete planed.

G. Form ties:

1. Removable end, permanently embedded body type with waterstop.

2. Form ties in exposed surfaces shall be uniformly spaced and aligned in horizontal and vertical rows.

H. Polyethylene Film: Product Standard PS17; 6 mil. Thickness.

I. Form Coating:

1. Non-staining chemical release agent that will not damage the concrete surfaces and appropriate for use in potable water structures.

2. For all exposed surfaces not in contact with earth backfill use Symons Corp. "Magic Kote", L & M "Debond", Formshield WB by Euclid Chemical, or equivalent.

151106.05 CONSTRUCTION.

A. General:

1. Use forms that:
   a. Are metal, surfaced lumber, plywood, masonite, hard pressed composition board, or other approved material backed by suitable studding, walers, and so on, and
   b. Are free from knotholes, cracks, splits, warps, or other defects which would prevent it from producing the strength, accuracy, and appearance necessary in the finished concrete surface.

2. Construct forms with mortar tight joints. Use material sufficient in strength to hold concrete without bulging between supports.

3. Use metal, plywood, fiberglass, or hard pressed water resistant composition board no less than 3/16 inch thick to line wood forms for all exposed surfaces.

4. Use forms in good condition. Make joints in the lining mortar tight. Smoothly cut and break joints with the form lumber. Small irregular areas may be formed with lumber against concrete to be rubbed, provided there is no joint in lumber used on any flat surface of concrete except at angles, ribs, bevels, molding, and so on where there is a juncture between two surfaces. Place blocks, ribs, bevels, moldings, and so on for ornamental effect on lined surfaces inside the lining.

5. Erect forms substantially and sufficiently tight to prevent leakage of mortar and braced or tied to maintain the desired position, shape, and alignment before, during and after concrete placement. At vertical wall joints where forms overlay existing concrete, a mortar tight joint shall be required. Use a bead of silicone caulking or foam joint filler against concrete before placing form. Alternate methods shall be acceptable to the Engineer.

6. Use adequate walers, stiffeners and braces to ensure proper alignment and stability until the wall construction is completed.

7. Provide temporary openings at the bottom of column and wall forms and at other locations where necessary to facilitate cleaning and inspection.

8. Temporary openings in wall or column forms used to limit the free fall of concrete to a maximum of 4 feet shall be located to facilitate placing and consolidation of the concrete. Such openings in walls shall not exceed 8 feet laterally to avoid moving concrete laterally more than 4 feet.

9. If tremies of proper length are used for depositing concrete in walls or columns, temporary openings for concrete placement will not be required.

10. Whenever the top of a wall will be exposed to weathering, do not extend the forms on one side above the top of the wall; bring to true line and grade.

11. At other locations, bring forms to a true line and grade, or provide a wooden guide strip at the proper location on the forms so that the top surface can be finished with a screed or template for concrete which is to have a specified elevation, slope, or contour.
12. At horizontal construction joints in walls, do not extend the forms on one side more than 2 feet above the joint. Horizontal construction joints shall not be used in walls of water retaining structures or exposed walls, unless reviewed and accepted by the Engineer.

13. Where concrete is placed against rock, remove all loose pieces of rock, and clean the exposed surface with a high pressure hose.

14. Design and construct forms so that they may be removed without damage to the concrete. Remove blocks and bracing with the forms. In no case leave any portion of wood forms in the concrete.

15. Construct forms so that the finished concrete is of the form and dimensions shown in the contract documents, and true to line and grade. Fillet forms 3/4 inch at all sharp corners (90 degrees or sharper). Give a draft in the case of all projections, such as girders, copings, and so on, sufficient to insure their easy removal. Ties and bracing shall be sufficient to support the expected load.

16. When forms appear to be insufficiently braced or unsatisfactorily constructed either prior to or during placement of concrete, the Engineer will order the work stopped until defects have been corrected.

17. Coat forms with an approved form release agent prior to the placement of concrete. Thoroughly wet forms with water immediately prior to concrete placement. Thoroughly clean reused forms and ensure they are free of bulges, splits, warps, or bends.

18. Sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders.

19. Guy, shore, and/or brace forms for walls and columns to withstand wind loads and to prevent alignment shift resulting from construction live load.

20. When cones are provided on the outer ends the permanently embedded portion shall be back a minimum of one inch from concrete surface.

21. Permanently embedded type without threaded ends shall be so constructed so that removable ends are readily broken off (one inch back from concrete surface) without damage to the concrete.

B. Embedded Items:

1. Anchor bolts, castings, steel shapes, conduits, sleeves, waterstops, masonry anchorage and other materials that are to be embedded in the concrete shall be accurately positioned in the forms and securely anchored.

2. Install conduits in walls or slabs with reinforcement in both faces between the two faces of reinforcing steel.

3. In walls or slabs which have only a single mat of reinforcing steel, place conduits near the center of the wall or slab.

4. Unless installed in pipe sleeves, provide anchor bolts with sufficient threads to permit a nut to be installed on the concrete side of the form or template.

5. Install a second nut on the other side of the form or template and adjust the two nuts so the bolt will be held rigidly in proper position.

6. Assure embedments are clean when installed.

7. After concrete placement, clean surfaces not in contact with concrete of concrete mortar and other foreign substances.

C. Preparation of Form Surfaces:

1. Remove mortar, grout, and other foreign material from form surfaces.

2. Coat form surfaces with form coating material before either the reinforcing steel or concrete is placed. Ensure that dimension lumber board and batten forms are properly sealed so that they do not absorb form coating or water.

3. Do not allow form coating to:
   a. Stand in puddles in the forms.
   b. Come in contact with the reinforcing steel.
   c. Come in contact with adjacent hardened concrete against which fresh concrete is to be placed.

D. Edges and Corners:

1. Place chamfer strips in forms to bevel exposed edges and projecting corners. Tool the top edges of walls and slabs not indicated on the plans to be beveled.

2. Form beveled edges for all vertical and horizontal corners of equipment bases unless indicated otherwise on the plans.

3. Chamfer strip shall be 3/4 inch unless indicated otherwise on the plans.

E. Joints:
Joints shall be flat, not keyed, with adhesive waterstops, unless otherwise shown on plans.

F. Removal:

1. Do not remove or disturb forms until the concrete has attained sufficient strength to safely support all dead and live loads.

2. For beams, slabs, and similar sections the shores and supports shall remain in place until the concrete has reached its specified 28 day strength, unless otherwise specified or permitted by the Engineer. Determine strength from pullout tests in accordance with ASTM C 900 or job cured cylinder breaks. Cylinders shall be job cured in same manner as the formed concrete.

3. Retain shoring in place and reinforce as necessary to carry out construction equipment, materials, or other loads in excess of cured strength. Brace walls and columns after removal of forms to resist wind and construction loads.

4. Use care in form removal to avoid surface gouging, corner, or edge breakage, and other damage to the concrete.

5. Do not commence form removal for concrete not yet supporting loads, earlier than the following schedule, unless field cured cylinders and/or maturity meters indicate the concrete has reached 85% of the specified 28 day strength:
   a. Walls and columns — 16 hours
   b. Vertical sides of beams and girders — 24 hours
   c. Bottom forms and shoring for nonprestressed slabs, beams and girders under 10 feet clear span between permanent supports. — 7 days
   d. Bottom forms and shoring for nonprestressed slabs,

	beams and girders between 10 and 20 feet clear span between permanent supports.	14 days
e.	Bottom forms and shoring for on prestressed slabs, beams and girders over 20 feet clear span between permanent supports.	21 days
f.	Refer to ACI 347, Chapter 2, for additional requirements.	

151106.06 MEASUREMENT OF MEASUREMENT.
The work covered in this Special Provision shall be considered incidental to Structural Concrete (Misc.) – Smooth, Sculpted Type I and Sculpted Type II.

151106.07 BASIS OF PAYMENT.
The work covered in this Special Provision shall be considered incidental to Structural Concrete (Misc.) – Smooth, Sculpted Type I and Sculpted Type II.