

SECTION 03100

CONCRETE FORMWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Formwork for cast-in-place concrete.

1.02 QUALITY ASSURANCE

- A. Design Criteria:
 - 1. Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure.
 - 2. Maintain formwork construction tolerances complying with ACI 347.
 - 3. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

1.03 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 347; Recommended Practice for Concrete Formwork.
 - 2. ACI 350: Environmental Engineering Concrete Structures.
- B. APA-Engineered Wood Association (APA): APA Grade-Trademarks.
- C. U.S. Department of Commerce Product Standards:
 - 1. PS-1 For Construction and Industrial Plywood.

1.04 SUBMITTALS

- A. Product Data: Submit data for proprietary materials and items, including forming accessories, coatings, and others as requested by Engineer.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

- A. Forms:
 - 1. Forms (Exposed Finish Concrete): Plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - a. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.

- b. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
 2. Forms (Unexposed Finish Concrete): Plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- C. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal.
 1. Provide units which will leave no metal closer than 1½" to surface.
 2. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retightening forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.
- B. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- C. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- D. Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- E. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.02 ERECTION

- A. General: Construct forms in accordance with ACI 347.
 1. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
 2. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.
 3. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in work.
 4. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

5. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- B. Exposed Corners: Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- C. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

3.03 REMOVAL OF FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

3.04 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer.

END OF SECTION