

SECTION 03 47 13
TILT-UP CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tilt-up, site cast concrete wall panels, load, or no-load bearing, from form to final position.
- B. Supports, devices, load bearing supports, and attachments.
- C. Perimeter and intermediate joint seals
- D. Grouting under panels

1.2 REFERENCES

- A. ACI 551.1R - Tilt-Up Concrete Construction Guide
- B. ACI 301 - Specifications for Structural Concrete
- C. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete
- D. ACI 318 - Building Code Requirements for Structural Concrete
- E. ASCE 7 - Minimum Design Loads for Building & Other Structures
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products
- H. ASTM A185/A185M - Standard Specification for Steel Welded Wire, Reinforcement, Plain, for Concrete
- I. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000-PSI Tensile Strength
- J. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- K. ASTM A416/A416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
- L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- M. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar
- N. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field
- O. ASTM C33/C33M - Standard Specification for Concrete Aggregates
- P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
- Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete
- R. ASTM C150/C150M - Standard Specification for Portland Cement
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete
- T. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete
- U. AWS D1.1/D1.1M - Structural Welding Code
- V. AWS D1.4/D1.4M - Structural Welding Code - Reinforced Steel
- W. Florida Building Code (FBC)

1.3 DESIGN REQUIREMENTS

- A. Design units to withstand design loads as calculated in accordance with the FBC, ACI 318 and ASCE 7, Chapter 6.
- B. Design units to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.

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- C. Design and size components to withstand loads and sway displacement as calculated per the FBC, ACI 318 and ASCE 7 wind loads, Chapter 6.
 - D. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.
- 1.4 SUBMITTALS FOR REVIEW
- A. Section 01 33 00 - Submittals Procedures
 - B. Shop Drawings: Indicate layout, tilt-up unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings and relationship to adjacent components.
 - C. Submit signed and sealed engineered drawings to the School District Building Department for approval before fabrication of any panels.
- 1.5 SUBMITTALS FOR INFORMATION
- A. Section 01 33 00 - Submittals Procedures
 - B. Section 01 40 00 - Quality Control: Submit proposed mix design before starting work.
- 1.6 QUALITY ASSURANCE
- A. Perform work in accordance with ACI C4 and ACI 318.
 - B. Welding: AWS D1.1/D1.1M
 - C. Maintain one copy of each document on site.
 - D. Fabricator: Company specializing in performing the work of this section with minimum five years documented experience.
 - E. Design units under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Florida.
 - F. Welder: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.
- 1.7 MOCK-UP
- A. Section 01 40 00 - Quality Control: Requirements for mock-up
 - B. Construct mock-up, two full panels and corner, to include lifting devices, anchor devices, window, and glazing, doorframes and joint seals.
 - C. Locate where directed.
 - D. Mock-up may remain as part of the work.
- 1.8 PRE-INSTALLATION MEETING
- A. Section 01 31 00 - Project Management and Coordination: Pre-installation meeting
 - B. Convene two weeks prior to commencing work of this section.
- 1.9 DELIVERY, STORAGE AND PROTECTION
- A. Section 01 60 00 - Material Equipment and approved equals: Transport, handle, store and protect products
 - B. Handling Tilt-Up Units:
 - 1. Lift units to position, consistent with their shape and design.
 - 2. Lift and support only from support points.
 - C. Blocking and Lateral Support During Erection:
 - 1. Clean and non-staining, without causing harm to exposed surfaces
 - 2. Provide temporary lateral support to prevent bowing, warping, or cracking.
 - D. Protect units from staining, chipping or spalling.

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PART 2 PRODUCTS

2.1 MATERIALS

- A. Cement: ASTM C150, Type I - Normal, Type IA - Air Entraining or Type III - High Early Strength Portland Type.
- B. Concrete Materials: ASTM C33/C33m or ASTM C330/C330M; water and sand
- C. Reinforcing Steel: ASTM A615/A615M deformed steel bars or ASTM A185/A185M, welded steel wire fabric galvanized finish strength and size commensurate with tilt-up unit design
- D. Air Entrainment Admixture: ASTM C260/C260M
- E. Surface Finish Aggregate: Approval by School District Representative
- F. Grout: Non-shrink, minimum 10,000 PSI, 28-day strength

2.2 SUPPORT DEVICES

- A. Connecting and Support Devices: ASTM A36/A36M weld-steel
- B. Bolts, Nuts, and Washers: ASTM A325 high strength steel
- C. Primer: Zinc rich oil alkyd.

2.3 MIX

- A. Mix concrete in accordance with ACI 301.
- B. Deliver concrete in accordance with ASTM C94/C94M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 31 00-Project Management and Coordination: Verify existing conditions prior to start of work.
- B. Verify building structure, anchors, devices, and openings are ready to receive work of this Section.

3.2 PREPARATION

- A. Provide for erection procedures and induced loads during erection.
- B. Maintain temporary bracing until final support is in place.

3.3 SITE FABRICATION

- A. Maintain environmental records and quality control program during production of tilt-up units.
 - 1. Make records available upon request.
- B. Use rigid forms, constructed to maintain tilt-up units uniform in shape, size, and finish.
- C. See specification section 08 51 13 – 3.1 B Sill & Buck for windowsill requirements.
- D. Maintain consistent quality during manufacture.
- E. Fabricate connecting devices, plates, angles; items fit to steel framing members, inserts, bolts, and accessories.
 - 1. Fabricate to permit initial placement and final attachment.
- F. Embed reinforcing steel, anchors, inserts, plates, angles, and other cast-in items as indicated.
- G. Place recessed flashing reglets continuous and straight.
- H. Locate hoisting devices to permit removal after erection.
- I. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- J. Minor patching is acceptable, providing structural adequacy and appearance is not impaired.

3.4 FINISH - TILT-UP UNITS

- A. Architect provides description**

3.5 SITE FABRICATION TOLERANCES

- A. Maximum Out of Square: $\frac{1}{8}$ " in 10', non-cumulative

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- B. Variation from Dimensions Indicated on Shop Drawings: Plus or minus $\frac{1}{8}$ "
- C. Maximum Misalignment of Anchors, Inserts, and Openings is $\frac{1}{8}$ "
- D. Maximum Bowing of Units: Length of bow /360
- E. Location of Reglets: $\frac{1}{4}$ " from true position

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Control: Concrete mix testing
- B. Take concrete test cylinders in accordance with ASTM C31/C31M.
- C. Take slump tests for every six-test cylinders in accordance with ASTM C143/C143M.
- D. Take one air-entrainment test cylinder for each set of exterior concrete test cylinders taken.

3.7 ERECTION

- A. Erect units without damage to shape or finish, replace or repair damaged panels.
- B. Do not lift prior to 75% of 28-day strength.
- C. Erect all members' level and plumb within allowable tolerances.
- D. Align and maintain uniform horizontal and vertical joints as erection progresses.
- E. When members require adjustment beyond design or tolerance criteria, discontinue affected work; advise A/E.
- F. Fasten and weld units in place perform welding, including tack welds, per AWS D1.1/D1.1M
- G. Touch-up field welds and scratched or damaged galvanized surfaces.
- H. Patch holes, cut-off anchors, surface defects, and damaged corners to match panel with epoxy/cement paste adhesive.
- I. Seal perimeter and intermediate joints in accordance with Section 07 92 00 Joint Sealants.

3.8 ERECTION TOLERANCES

- A. Maximum Variation from Plane of Location: $\frac{1}{4}$ " in 10' and $\frac{3}{8}$ " in 100', non-cumulative
- B. Maximum Offset from True Alignment between Two Connecting Members: $\frac{1}{4}$ ".
- C. Joint Tolerance: Plus or minus $\frac{1}{4}$ "

3.9 ADJUSTING

- A. Section 01 77 00 - Contract Closeout: Adjusting installed work.
- B. Adjust units so that joint dimensions are within tolerances.

3.10 PROTECTION OF FINISHED WORK

- A. Section 01 77 00 - Contract Closeout: Protecting installed work.
- B. Protect units from damage.
- C. Provide non-combustible shields during welding operations.

END OF SECTION