**SECTION 03 47 13**

**TILT‑UP CONCRETE**

**PART 1 GENERAL**

1. SECTION INCLUDES
   1. Tilt‑up, site cast concrete wall panels, load, or no-load bearing, from form to final position.
   2. Supports, devices, load bearing supports, and attachments.
   3. Perimeter and intermediate joint seals
   4. Grouting under panels
2. REFERENCES
   1. ACI 551.1R - Tilt-Up Concrete Construction Guide
   2. ACI 301 ‑ Specifications for Structural Concrete
   3. ACI 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete
   4. ACI 318 ‑ Building Code Requirements for Structural Concrete
   5. ASCE 7 - Minimum Design Loads for Building & Other Structures
   6. ASTM A36/A36M ‑ Standard Specification for Carbon Structural Steel
   7. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products
   8. ASTM A185/A185M ‑ Standard Specification for Steel Welded Wire, Reinforcement, Plain, for Concrete
   9. ASTM A307 ‑ Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000-PSI Tensile Strength
   10. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
   11. ASTM A416/A416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
   12. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   13. ASTM A666 ‑ Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar
   14. ASTM C31/C31M ‑ Standard Practice for Making and Curing Concrete Test Specimens in the Field
   15. ASTM C33/C33M - Standard Specification for Concrete Aggregates
   16. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete
   17. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic Cement Concrete
   18. ASTM C150/C150M ‑ Standard Specification for Portland Cement
   19. ASTM C260/C260M ‑ Standard Specification for Air‑Entraining Admixtures for Concrete
   20. ASTM C330/C330M ‑ Standard Specification for Lightweight Aggregates for Structural Concrete
   21. AWS D1.1/D1.1M ‑ Structural Welding Code
   22. AWS D1.4/D1.4M - Structural Welding Code - Reinforced Steel
   23. Florida Building Code (FBC)
3. DESIGN REQUIREMENTS
   1. Design units to withstand design loads as calculated in accordance with the FBC, ACI 318 and ASCE 7, Chapter 6.
   2. Design units to accommodate construction tolerances, deflection of building structural members and clearances of intended openings.
   3. Design and size components to withstand loads and sway displacement as calculated per the FBC, ACI 318 and ASCE 7 wind loads, Chapter 6.
   4. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.
4. SUBMITTALS FOR REVIEW
   1. Section 01 33 00 - Submittals Procedures
   2. 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.
   3. Submit signed and sealed engineered drawings to the School District Building Department for approval before fabrication of any panels.
5. SUBMITTALS FOR INFORMATION
   1. Section 01 33 00 - Submittals Procedures
   2. Section 01 40 00 - Quality Control: Submit proposed mix design before starting work.
6. QUALITY ASSURANCE
   1. Perform work in accordance with ACI C4 and ACI 318.
   2. Welding: AWS D1.1/D1.1M
   3. Maintain one copy of each document on site.
   4. Fabricator: Company specializing in performing the work of this section with minimum five years documented experience.
   5. Design units under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Florida.
   6. Welder: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.
7. MOCK-UP
   1. Section 01 40 00 - Quality Control: Requirements for mock-up
   2. Construct mock-up, two full panels and corner, to include lifting devices, anchor devices, window, and glazing, doorframes and joint seals.
   3. Locate where directed.
   4. Mock-up may remain as part of the work.
8. PRE-INSTALLATION MEETING
   1. Section 01 31 00 - Project Management and Coordination: Pre-installation meeting
   2. Convene two weeks prior to commencing work of this section.
9. DELIVERY, STORAGE AND PROTECTION
   1. Section 01 60 00 - Material Equipment and approved equals: Transport, handle, store and protect products
   2. Handling Tilt-Up Units:
      1. Lift units to position, consistent with their shape and design.
      2. Lift and support only from support points.
   3. 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.
   4. Protect units from staining, chipping or spalling.

**PART 2 PRODUCTS**

1. MATERIALS
   1. Cement: ASTM C150, Type I ‑ Normal, Type IA - Air Entraining or Type III ‑ High Early Strength Portland Type.
   2. Concrete Materials: ASTM C33/C33m or ASTM C330/C330M; water and sand
   3. 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
   4. Air Entrainment Admixture: ASTM C260/C260M
   5. Surface Finish Aggregate: Approval by School District Representative
   6. Grout: Non‑shrink, minimum 10,000 PSI, 28-day strength
2. SUPPORT DEVICES
   1. Connecting and Support Devices: ASTM A36/A36M weld-steel
   2. Bolts, Nuts, and Washers: ASTM A325 high strength steel
   3. Primer: Zinc rich oil alkyd.
3. MIX
   1. Mix concrete in accordance with ACI 301.
   2. Deliver concrete in accordance with ASTM C94/C94M.

**PART 3 EXECUTION**

1. EXAMINATION
   1. Section 01 31 00-Project Management and Coordination: Verify existing conditions prior to start of work.
   2. Verify building structure, anchors, devices, and openings are ready to receive work of this Section.
2. PREPARATION
   1. Provide for erection procedures and induced loads during erection.
   2. Maintain temporary bracing until final support is in place.
3. SITE FABRICATION
   1. Maintain environmental records and quality control program during production of tilt‑up units.
      1. Make records available upon request.
   2. Use rigid forms, constructed to maintain tilt‑up units uniform in shape, size, and finish.
   3. See specification section 08 51 13 – 3.1 B Sill & Buck for windowsill requirements.
   4. Maintain consistent quality during manufacture.
   5. Fabricate connecting devices, plates, angles; items fit to steel framing members, inserts, bolts, and accessories.
      1. Fabricate to permit initial placement and final attachment.
   6. Embed reinforcing steel, anchors, inserts, plates, angles, and other cast‑in items as indicated.
   7. Place recessed flashing reglets continuous and straight.
   8. Locate hoisting devices to permit removal after erection.
   9. Cure units to develop concrete quality, and to minimize appearance blemishes such as non‑uniformity, staining, or surface cracking.
   10. Minor patching is acceptable, providing structural adequacy and appearance is not impaired.
4. FINISH ‑ TILT‑UP UNITS

# **Architect provides description**

1. SITE FABRICATION TOLERANCES
   1. Maximum Out of Square: ⅛" in 10', non-cumulative
   2. Variation from Dimensions Indicated on Shop Drawings: Plus or minus ⅛"
   3. Maximum Misalignment of Anchors, Inserts, and Openings is ⅛"
   4. Maximum Bowing of Units: Length of bow /360
   5. Location of Reglets: ¼" from true position
2. FIELD QUALITY CONTROL
   1. Section 01 40 00 - Quality Control: Concrete mix testing
   2. Take concrete test cylinders in accordance with ASTM C31/C31M.
   3. Take slump tests for every six-test cylinders in accordance with ASTM C143/C143M.
   4. Take one air-entrainment test cylinder for each set of exterior concrete test cylinders taken.
3. ERECTION
   1. Erect units without damage to shape or finish, replace or repair damaged panels.
   2. Do not lift prior to 75% of 28-day strength.
   3. Erect all members’ level and plumb within allowable tolerances.
   4. Align and maintain uniform horizontal and vertical joints as erection progresses.
   5. When members require adjustment beyond design or tolerance criteria, discontinue affected work; advise A/E.
   6. Fasten and weld units in place perform welding, including tack welds, per AWS D1.1/D1.1M
   7. Touch‑up field welds and scratched or damaged galvanized surfaces.
   8. Patch holes, cut-off anchors, surface defects, and damaged corners to match panel with epoxy/cement paste adhesive.
   9. Seal perimeter and intermediate joints in accordance with Section 07 92 00 Joint Sealants.
4. ERECTION TOLERANCES
   1. Maximum Variation from Plane of Location: ¼" in 10' and ⅜" in 100', non‑cumulative
   2. Maximum Offset from True Alignment between Two Connecting Members: ¼".
   3. Joint Tolerance: Plus or minus ¼"
5. ADJUSTING
   1. Section 01 77 00 - Contract Closeout: Adjusting installed work.
   2. Adjust units so that joint dimensions are within tolerances.
6. PROTECTION OF FINISHED WORK
   1. Section 01 77 00 - Contract Closeout: Protecting installed work.
   2. Protect units from damage.
   3. Provide non‑combustible shields during welding operations.

END OF SECTION