

SECTION 033053 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including the following:
  - 1. Reinforcement
  - 2. Concrete materials
  - 3. Mixture design
  - 4. Placement procedures
  - 5. Finishes

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittal:
  - 1. Design Mixtures: For each concrete mixture.

1.3 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Comply with ACI 301 (ACI 301M).
- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301 (ACI 301M).

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

## 2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, **Type I/II**
- B. Normal-Weight Aggregate: ASTM C 33, graded, 1" nominal maximum aggregate size.
- C. Water: ASTM C 94/C 94M.

## 2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.5 CURING MATERIALS

- A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B.

## 2.6 CONCRETE MIXTURES

- A. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301 (ACI 301M), as follows:
  - 1. **3000 psi** at 28 days or as specified on foundation design drawings.
  - 2. Maximum Water-Cementitious Materials Ratio: **0.45**
  - 3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  - 4. Slump Limit: **4 inches**.
  - 5. Air Content: Maintain within range permitted by ACI 301 (ACI 301M).

## 2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

A. Design, construct, erect, brace, and maintain formwork according to ACI 301 (ACI 301M).

### 3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.3 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

### 3.5 CONCRETE PLACEMENT

- A. Comply with ACI 301 (ACI 301M) for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment.

### 3.6 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm).

### 3.7 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
  - 1. Do not further disturb surfaces before starting finishing operations.
- C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

### 3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:

1. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301 (ACI 301M).
  1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m) but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
  2. Testing Frequency: One composite sample shall be obtained for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.

### 3.10 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.
- B. Maintain concrete free of stains, discoloration, dirt, & other foreign material.

END OF SECTION 033053

## SECTION 100001 – SELF-SUPPORTING COMMUNICATION TOWER

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes self-supporting tower made from structural steel.
- B. Owner-Furnished Material: n/a

## 1.3 ACTION SUBMITTALS

- A. Product Data: For Tower.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes.
- B. Shop Drawings: For Tower.
  - 1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support. Include section, and details of foundation system.
- C. Delegated-Design Submittal:
  - 1. Foundation – Foundation shall be mat type foundation with allowable bearing capacity as stated in supplied geotechnical reports in specifications. Foundation design shall be sealed by a professional engineer registered in the State of Delaware.
  - 2. Tower – Tower design shall be sealed by a professional engineer registered in the State of Delaware.
  - 3. Geotechnical Report – Geotechnical report is included elsewhere in the project manual. Neither the engineer nor the owner makes any guarantees as to the accuracy of the report. The report is provided for the contractor's reference only. If the contractor believes additional evaluations are required prior to preparation of the submittals, he shall make such evaluations within the lump sum price bid.

## 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For tower to include in operation and maintenance manuals.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Carefully handle components during delivery, storage and assembly to prevent damage.
- B. All work shall be coordinated with other trades on the site; any conflicts shall be resolved by the project manager in order to proceed with the work as rapidly and efficiently as possible. Coordinate storage and work space with owner prior to commencement of work.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis – of – Design Product: Subject to compliance with requirements. Provide product indicated on drawings or approved equal.
- B. Source Limitations: Obtain tower as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer. The tower vendor shall maintain in-house control over the design, fabrication and galvanizing.
- C. The tower vendor shall be a manufacturer, primarily and continuously involved in the design and production of communication towers for a period of at least ten years.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, to design tower and foundation. Design shall comply with ANSI/TIA-222-G.
- B. Structural Performance: Tower assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
  - 1. Wind Loads:
    - a. Basic wind speed: 105 mph no ice, 40 mph  $\frac{3}{4}$ " radial ice
    - b. Structure class: Importance Class 2
    - c. Exposure Category: B
    - d. Topography Category: Category 1 – No abrupt topography changes immediately surrounding the tower.
    - e. Site Class: See Geotechnical Report

- f. Antenna: Tower shall be designed for 150% of proposed antenna and transmission cable area.
  - i. Basis-of-Design Product: Andrew Solutions DB420-B antenna and transmission line mounted at apex and at 120' level of tower. Mounting at 120' level shall be on 3' side arm.

### 2.3 STEEL TOWER

- A. Steel Tower: Steel tower fabricated from ASTM A36, ASTM A500, ASTM A572 or ASTM A53 structural steel.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Tylon Super Titan MAX or comparable product by one of the following:
    - a. Rohn Products.
- B. Exposed Height: 150 feet
- C. Construction and Fabrication
  - 1. Provide self-aligning, snug-fitting joints.
  - 2. Construct tower in sections.
  - 3. Flanged leg connections shall utilize a minimum of four bolts per leg.
  - 4. Tubular leg members shall maintain an open interior diameter through the flange plate at least as large as the inside diameter of the pipe and electrically welded internally and externally.
  - 5. Each structural member shall be identified by a part number and any parts with the same number must be interchangeable.
  - 6. Tower manufacturer shall be AISC Quality Certified.
  - 7. AWS certified welders shall be used for fabrication.

### 2.4 ADDITIONAL MATERIALS

- A. The following shall be supplied with and incorporated in the tower design as required by ANSI/TIA-222-G
  - 1. Step Bolts (one leg)
  - 2. Fall Safety Cable system without trolley and harness
  - 3. Transmission line support ladders / brackets
  - 4. Antenna Mounts
  - 5. Obstruction warning lights and/or paint (if required by FAA permit)
  - 6. Grounding Materials

### 2.5 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

- B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

## 2.6 STEEL FINISHES

- A. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123/A 123M.

## PART 3 - EXECUTION

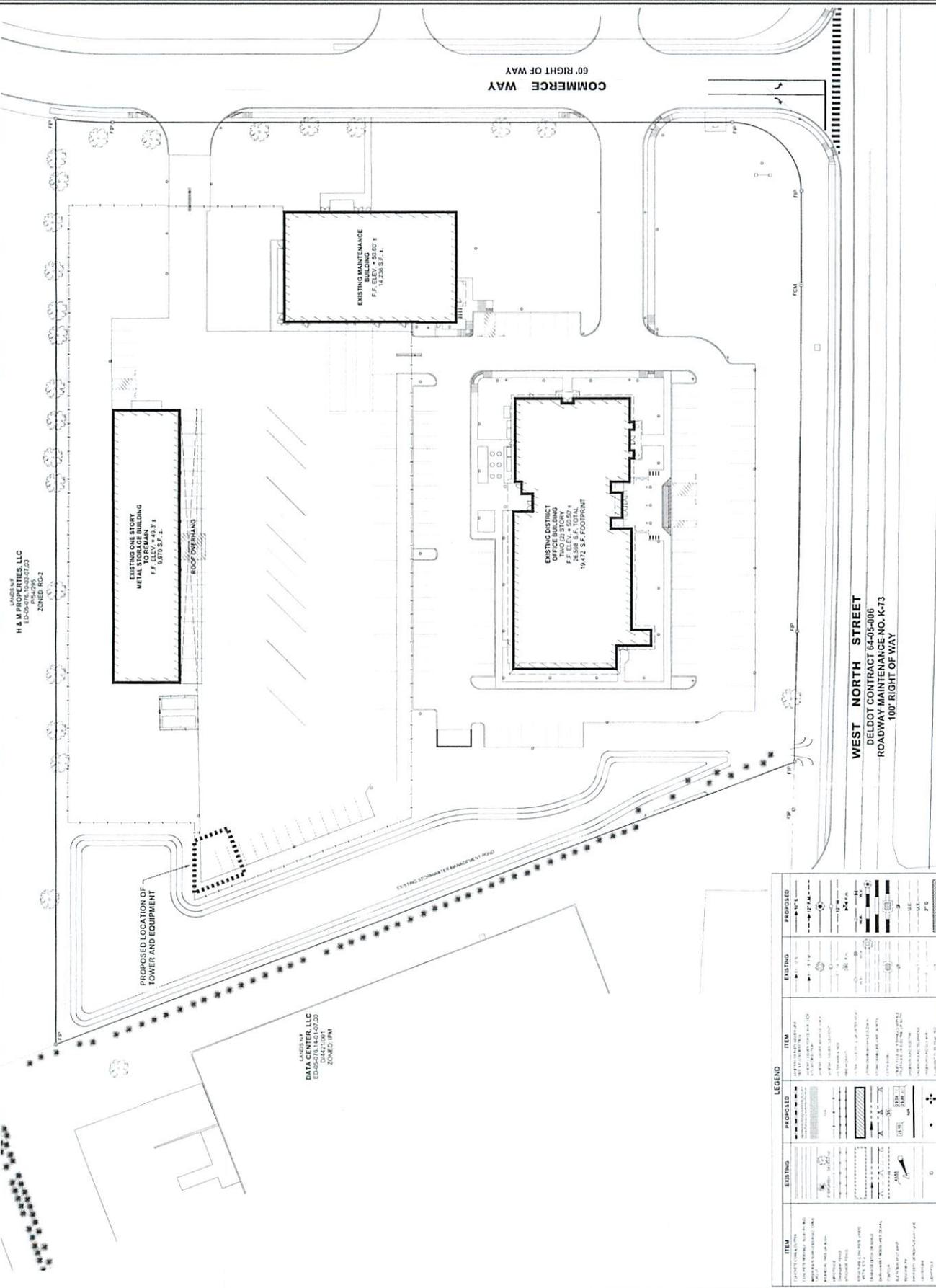
### 3.1 PREPARATION

- A. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom. Field verify assumed bearing capacity by licensed geotechnical engineer.
- B. Provide forms where required due to unstable soil conditions and for perimeter of foundation at grade. Secure and brace forms to prevent displacement during concreting.
- C. Anchor Bolts: Locate and secure anchor bolts in forms with templates and by tying to reinforcement.
- D. Place concrete, as specified **Section 033053 "Miscellaneous Cast-in-Place Concrete."** Compact concrete in place by using vibrators.
- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

### 3.2 TOWER INSTALLATION

- A. General: Install tower where indicated and according to Shop Drawings and manufacturer's written instructions.
- B. Orientation: Tower shall be oriented on the property with one leg at true north, or as shown on site drawings. Confirm orientation with owner.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until tower is plumb. After tower is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

END OF SECTION 100001



H & M PROPERTIES, LLC  
ED-06-076, 150-02-07-03  
ZONED RG-2

EXISTING ONE STORY  
METAL STORAGE BUILDING  
F.F. ELEV. = 49.371  
5970 S.F. ±

EXISTING MAINTENANCE  
F.F. ELEV. = 20.007  
11,228 S.F. ±

EXISTING DISTRICT  
OFFICE BUILDING  
F.F. ELEV. = 20.007  
24,208 S.F. TOTAL  
19,472 S.F. FOOTPRINT

PROPOSED LOCATION OF  
TOWER AND EQUIPMENT

LANDS OF  
DATA, INC., LLC  
ED-06-076, 150-02-03-03  
ZONED RM

60' RIGHT OF WAY  
COMMERCE WAY

WEST NORTH STREET  
DELDOT CONTRACT #L&R-008  
ROADWAY MAINTENANCE NO. R-73  
100' RIGHT OF WAY

**CAPITAL SCHOOL  
DISTRICT  
PROFESSIONAL  
DEVELOPMENT &  
ADMINISTRATION  
FACILITY &  
MAINTENANCE  
COMMUNICATION  
TOWER**  
156 COMMERCE WAY  
CITY OF DOVER  
KENT COUNTY, DELAWARE

EXISTING  
CONDITIONS



PROJECT NO.:	2010052108
DATE:	06/17/13
SCALE:	1" = 30'
DRAWN BY:	B.L.G. (P/07), K.O.N. (S/13)
CHECKED BY:	
DATE:	
PROJECT:	
SHEET:	C-001