

**SECTION 2**  
**DIVISION 33**  
**UTILITIES**

## **DIVISION 33 - UTILITIES**

**Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.**

### **PRIMARY GUIDANCE**

#### **1.1 SUBSURFACE EXPLORATION:**

##### **A. Designer Responsibilities:**

Designer shall direct a soils exploration program (see N.C. Construction Manual, Section 204.1.c) as judged necessary in consultation with the University. The Designer shall contact the UPM and submit a Request for Proposals for soils exploration. UPM will provide names of pre-qualified testing companies. This will include investigative work and surveyor reports, laboratory tests (incl. test borings), soil analysis (incl. load bearing capabilities), and related site analysis. The designer shall study plans of existing underground utilities and shall locate borings to avoid these utilities. Bored holes are to be backfilled, finish graded, and seeded. Submit six copies of the site exploration report to the University.

##### **B. Information To Be Included In Contract Documents:**

Show all boring locations, cross sections, and soil conditions. Also, show all existing conduits, drains, utility lines, sewers, tunnels, cables, trees, paving, walks, foundations, and other objects or obstructions, whether used or abandoned. Facilities Management will assist with identifying existing conditions and will provide drawings as available. Clearly indicate the project boundary.

### **SECTION 33 0500 – UTILITIES**

#### **PART 1 - GENERAL**

##### **1.1 QUALITY ASSURANCE**

- A. Coordination of Divisions of Work:** Care is required in preparation of documents to assure no overlapping and no gaps between the work for the various contracts. Each contractor shall be required to perform excavation, trenching, and backfill for his installations. Materials and compaction of fill materials shall meet the requirements stipulated in Division 31, regardless of who performs this work; therefore, in Divisions 23, 24, 25, and 26 the requirements of earthwork may be best specified by making reference to Division 31.
- B. Surveyor to review and coordinate survey to assure that the survey shows all utilities.**

#### **PART 2 - PRODUCTS**

##### **2.1 MANHOLES**

Manhole frame, cover, and grate castings shall include the name and location of the manufacturer. Covers shall have cast identification markings of “storm drain”, sanitary, “steam”, “electrical”, “telephone” etc. as appropriate. Masonry manholes shall be parge coated inside and out. Manholes are considered confined spaces and appropriate safety measures should be taken when entering them.

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2.2 VALVES

- A. All valves are required to have a valve lockout device (need donut for protection).
- B. All valve covers shall have concrete collars.
- C. All water valves to operate by turning the square nut clock-wise (right) to close and counter-clockwise (left) to open.
- D. Provide all valves with extensions when grade at location is altered.

**SECTION 33 1150 – UTILITIES**

PART 1 - GENERAL

1.1 UTILITY STANDARDS

- A. All underground piping and utilities (both metallic and non-metallic), except copper pipe, shall have a separate copper tracer wire and non-metallic warning tape installed above the utility line.
- B. The tracer wire shall be tested for continuity prior to backfill, immediately upon completion of backfill and compaction, and once again during final utility location/as-built at the end of the project. This also will include landscape irrigation mains to the points of the valves. All above ground utility features such as vaults, manholes, valves, handholds, etc shall be properly labeled. Contractor shall provide an inventory of all installed outdoor utility features including type and model.

1.2 IDENTIFICATION TAPE

The 1st stage of identification shall be a buried warning tape. This tape shall provide an early warning at shallow depth excavation. The tape shall be 6" wide, and buried approximately 18" to 30" above the service pipe, but a minimum of 10" below finished grade. It shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. It shall be installed continuous from valve box to valve box or manhole to manhole, and shall terminate just outside of valve box or manhole wall. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color-coded background that conforms to APWA color code standards. The lettering on the tape should name the utility it is protecting. (i.e. Caution Buried Sewer Line Below).

1.3 TRACER WIRE

- A. The 2nd stage of identification shall be a buried tracer wire. This tracer wire shall provide pipeline identification, be fully detectable from above grade utility locators, and be able to provide a depth reference point to top of pipe.
- B. All pipe, including lawn irrigation lines, and metallic pipe with compression gasket fittings installed underground shall have a tracer wire installed along the length of the pipe. The wire shall be taped to the bottom of the pipe at a maximum of 10' intervals and not allowed to "float freely" within the backfill.
- C. Tracer wire shall be single-conductor, 12 gauge minimum, copper single-conductor wire with type "UF" (Underground Feeder) insulation, and shall be continuous along the pipeline passing through the inside of each valve box. A #12 AWG or heavier (smaller AWG number), solid, insulated (RHW, THW, or polyethylene insulation is recommended), copper wire shall be taped to pipe at 10 foot intervals. Do not wrap wire around pipe. The wire must be one continuous, unbroken length. Coil tracer wire at meter location and street end with enough wire to extend a minimum of two feet above grade.

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1.4 TRACER WIRE BOXES

Plastic gas and water services longer than 1000 feet in length from curb valve to meter riser must have tracer wire boxes installed in accordance with UNC Charlotte standards.

1.5 FINAL AS-BUILT SURVEY

- A. The As-Built Survey is a survey conducted several times during a construction project to verify, for the designer/project manager (not the contractor), which the work authorized, was completed to the specifications set on the Plot Plan or Site Plan. This entails a complete survey of the site to confirm that the structures, utilities, and roadways proposed were built in the proper locations authorized in the Plot Plan or Site Plan. As-builts are done a minimum of 2-3 times during the construction project; once after the foundation has been poured; once after the walls are put up; and at the completion of construction.
- B. Prior to project punch-list the engineer shall have the As-Built survey finalized by a licensed surveyor and locating company. Any problems found in the survey should be included in the punch-list. The final As-Built survey shall locate and inventory all utilities and also survey the existing conditions. The survey of the site shall also include 1' contours, manhole elevations, inverts, building footprint, and all aspects of the site.
- C. The surveyor will identify any untraceable utilities and relay missing information to designer/project manager in order to coordinate repairs with contractor. Surveyor shall relocate and resurvey missing data after repair. Survey will extend a minimum of 50' past site construction to tie data into existing campus utility plans. Digital (CAD) and stamped survey (1 PDF and 1 Mylar) to be delivered to UNC Charlotte within 20 business days of punch list acceptance.

**SECTION 33 4100 – STORM DRAINAGE**

PART 1 - GENERAL

- A. SUMMARY
  - 1. Drainage systems are to be designed with minimal visual impact.
  - 2. Surface Drainage
    - a. Surface drainage shall be designed to flow away from all buildings and entrance plazas. Drainage shall sheet flow away from the building and be collected in grass swales and drain to natural drainage-ways or drainage inlets.
    - b. Lawns and mulch areas are encouraged when possible around new building areas to increase natural percolation and decrease impervious run-off.
    - c. Surface drainage shall be directed away from planting areas when possible. Subsurface drainage may be required in new planting areas with poor soils.
  - 3. Natural Drainage
    - a. Natural drainage-ways shall be utilized and maintained where ever possible. The vegetative area 50 feet from each side the centerline of the swale or stream shall be maintained whenever possible to provide for greater natural percolation and pollutant filtering. When a natural drainage course is required to be diverted due to site improvements the following shall be considered,
    - b. The vegetative area adjacent to the new drainage course shall be re-planted to its original condition or improved with lawn and/or tree plantings.
    - c. If sub-surface drainage is required within lawn or landscape areas the outfall shall be to the nearest downstream existing drainage structure or into a natural drainage-way such as a creek.
- B. Sub-surface Drainage: Sub surface drainage shall be incorporated into the site improvement design to ensure that surface runoff is removed as quickly as possible. Ponding of water is not

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acceptable. Oversized grates can reduce the visual quality of the campus and are to be avoided.

1. The size of inlet shall be designed according to the drainage area. The minimum size grate acceptable shall be 8 inches square. Drainage grates in lawn areas within 25 feet of a walkway shall be designed to have a 2.0 percent slope from the edge of the walk to the storm drainage rim.
2. Drainage grates within brick walks and plazas shall comply with the campus standard. Alternative types of drainage grates must be submitted to the Facilities Landscape Architect for approval. The number of grates shall be determined by grading and storm drainage design.
3. New sub-surface drainage shall tie into existing storm drainage systems where possible following acceptable engineering practices. Flared end sections and headwalls should be avoided.
4. Bee-Hive type drainage grates shall be used in mulched planting areas.
5. In gathering areas such as plazas or quads small grates are preferred rather than large grates in order to reduce a negative visual impact.

1.2 QUALITY ASSURANCE

Erosion Control measures for new construction shall follow the North Carolina Department of Natural Resources Sedimentation and Erosion Control Manual.

PART 2 - PRODUCTS

2.1 FLARED END SECTIONS

1. If the new storm drain system cannot be tied into an existing drainage structure Flared End Sections shall be installed with the following criteria,
  - a. Outlet into natural drainage ways such as grassed swales or creeks.
  - b. At locations that are in remote areas away from heavy pedestrian or vehicle use.
  - c. The designer shall discuss with the Facilities Landscape Architect conditions that shall not allow the new storm drainage to be tied into an existing system and potentials for screening by grading or planting.
  - d. The use of riprap is to be avoided. The following are preferred methods to prevent erosion at Flared End Sections,
    - 1) Naturally weathered stone equal to NCDOT classified riprap.
    - 2) Vegetation with appropriate erosion control matting.
    - 3) The combination of 1 and 2 above.

2.2 HEADWALLS

- A. The appearance of exposed concrete headwalls in highly traveled areas can lessen the aesthetic value of the campus. Therefore the location and treatment of headwalls are to be considered carefully.
  1. Headwalls shall use brick or stone veneer and be determined on a case by case basis
  2. Slope and creek bed stabilization methods other than riprap should be considered in conjunction with veneered headwalls. (See DLS 404:P1)

2.3 DRAIN OPENING PROTECTION

- A. Install removable bars or grills at open end of culverts, drains, and pipes 10 inch diameter and larger.
- B. In stairwells, areaways and similar locations where leaf clogging of conventional drains would be expected provide scupper or dome type drains.