

STATE UNIVERSITY CONSTRUCTION FUND

PROGRAM DIRECTIVES

DIRECTIVE 1C-12

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SURVEY, MAPPING AND UTILITY LOCATING

1. General

This Directive has been developed as a general guide for the survey and mapping effort required for Fund projects. It also identifies the differing levels of utility locating requirements that may be included as a part of the project. While the scope of survey, mapping and utility locating will vary between projects, the consultant is required to review this Directive and apply the requirements outlined herein as appropriate.

2. Overall Requirements

- a. The Consultant shall be required to retain the services of a NYS licensed surveyor for the purposes of documenting existing field conditions. As part of that work, the Consultant shall be required to certify that the conditions as reflected on the plan are accurate and reflect the field conditions at the time of the survey. The Consultant should recommend and employ surveyor who can assure this level of quality and provide management oversight of the services to confirm this level of quality. Unless included in the lump sum fee or the Schedule B of the Consultant's Agreement, the services and fees related to survey, mapping and utility locating as described in this Directive may be provided through extra compensation when approved by the Fund.
- b. Where available, the Consultant shall obtain record and /or as-built mapping for the Campus and/or Fund for incorporation onto the project mapping. The Campus and Fund have aerial topographic mapping and limited utility mapping which may be made available to the Consultant.
- c. There are four utility documentation quality levels that are specifically identified and defined in the 'Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data' ASCE Standard CI 38-02. They can be generally defined as the following:
 - 1) Quality Level D – Utility documented primarily through records research and available as built mapping.

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- 2) Quality Level C – Utility locations are documented via standard topographic survey methods (ie. Surface features located and inverts, slopes, pipe materials identified where easily accessible via manhole or frame removals).
 - 3) Quality Level B – Non-destructive utility locating services (ie. Tracing lines, video inspection, etc) are performed to locate utilities.
 - 4) Quality Level A – Physical test pits are dug to confirm exact locations of utilities in area of construction.
- d. Generally, most Fund projects will require a minimum of Quality Level C, with Level B warranted in areas where conflicts may occur. Quality Level A may be used in heavily congested areas, or as required by the Project Coordinator. The Project Coordinator will verify the Quality Level required for each project, if it is not already noted in the Consultant Agreement.
5. Topographic Survey Requirements
- a. Prior to beginning survey field effort, the Consultant must provide a scaled sketch or aerial map delineating the project area to be surveyed. Map shall be scaled, with general dimensions and total acreage provided. Mapping limits shall be approved by the Fund / Campus prior to start of survey.
 - b. The surveyor shall coordinate and schedule activities with the prime Architect/Engineer and with the Campus prior to the initiation of fieldwork.
 - c. Survey shall be tied vertically and horizontally to recognized datum (i.e. NAVD, Ellipsoid WGS, etc.). Datum should be discussed with Campus and coordinated, where feasible, with other survey available on Campus. Assumed datum will not be permitted.
 - d. Project shall include a minimum of 2 permanent benchmarks. Provide traverse and bench control computations. Provide point table (hard copy and electronic file) listing XYZ location and description of all field points.
 - e. Provide a north arrow and locate magnetic north, scale, and location map showing nearby roads, buildings, towns and landmarks. Existing utilities within and around the survey area, including names, addresses and telephone numbers of utility owners. Include legend of symbols and abbreviations.

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- f. Existing surface elevations shall be documented in a square grid, with supplement spots shots provided as warranted. Size / spacing of grid may vary depending on project requirements – 20 foot grid spacing shall be standard unless otherwise noted. Contours shall be provided at a one-foot interval.
- g. Within roadways and at street intersections provide spot elevations at 10 foot intervals along centerline, edge of paving, top and bottom of curb, far side of paving. In high and low areas within pavement supplement with additional elevations as warranted.
- h. Locate building structures, first floor elevations, and heights within the survey area including overhangs and spot shots at identified doorways. It may also be appropriate to obtain vertical clearance of overhangs.
- i. Depending on the nature of the project (i.e. additions or connections), it will be necessary for the survey to obtain finished floor elevations in specific buildings, including number of stories per building, as well as prominent features such as windows.
- j. Locate all apparent overhead and underground utilities along with top of grate and invert elevations for all underground utilities including, but not necessarily limited to, sanitary, storm water, heating, cooling, electrical, fiber optic, street lighting, communications, field inlets, manholes, culverts, pull boxes, etc. Locate all watermains, gas lines, electrical lines, valves, hydrants, cleanouts, pull boxes, meters etc.
- k. Inverts for storm and sanitary sewer shall be obtained by removing cover and measuring inverts from the surface. Verify direction, size and pipe diameters.
- l. Locate all sidewalks, curbing, ramps, signage, plantings, light poles, phones, benches, flags, road lanes and striping, parking lot striping, crosswalks, pavement markings, mile markers etc.
- m. Locate retaining walls and stairs, including top of wall, bottom of walls, grades on each side, riser height, number of treads, fences, etc.
- n. Locate water bodies including wetlands as applicable. Note water elevation.

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- o. Locate test borings and elevation at top of holes.
 - p. Locate trees, vegetation and tree lines. For trees 3 inches and over locate (as measure from 4 feet above grade) within one-foot tolerance and identify species (English and botanical terms). When directed by the Architect / Engineer, the canopy of trees may require measurements as well.
 - q. Identify materials of surface features (i.e. asphalt, concrete, grass, granite curbing) and utilities (i.e. precast concrete, pipe materials).
 - r. Identify boundaries, recorded or otherwise known easements, right-of-ways, street monuments, etc as applicable. Identify owners of adjacent properties, names of street and buildings.
5. Mapping Requirements
- a. Provide one continuous electronic file in AutoCAD format. The survey shall be delivered to the Consultant on the same platform and version as the anticipated Architect / Engineer's plans.
 - b. Layering and plotting requirements shall be coordinated with the Architect / Engineer to desired format.
 - c. Surveyor shall provide a scaleable drawing(s) which includes a NYS Certified Surveyor's stamp and signature, map references, date of field survey, and other pertinent information. This plan will be included in contract documents for the purposes of describing existing conditions. Provide additional plans re-centered on match line area(s) where significant congestion of features and utilities occurs.
5. Utility Locating Requirements
- a. Typical Requirements for Quality Level C:
 - 1) Conduct utility records research within the project limits. Sources of information may include, but are not limited to (project- and scope-dependent):
 - i. NYSDOT, County or other public agency of non-Campus owned properties in the vicinity of the project.
 - ii. One-call notification center.

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- iii. Internet or computer database search.
 - iv. Utility owner's records.
 - v. "As-builts" and record drawings.
 - vi. County, city, utility owner or other geographic information system databases.
 - vii. Distribution / Transmission maps
 - viii. Oral histories of Facilities Staff.
- 2) Identify and survey surface features on the topographic plan and ground surface that are surface appurtenances of existing subsurface utilities. Survey inverts, sizes and slopes of those utilities that are accessible through the removal of a manhole cover, grate, etc.
 - 3) Correlate applicable utility records to surveyed features, taking into account the geometries and indications on the records of these surface features. Consider the function of each utility and show assumed routes of subsurface utilities, e.g., show a water line connection to a Campus building known to have water service even if the lateral water line is not recorded on any existing plan or survey. In this example, a reasonable assumption would be to show a reputed water line from the known building entrance to an assumed connection point on a water line near the known building entrance. Determine when records, functional intent and features do not agree and resolve discrepancies.
- b. Typical Requirements for Quality Level B:
- 1) Perform all tasks associated with Quality Level C.
 - 2) Propose and discuss with the Campus and Fund an appropriate array of geophysical methods to search for utilities within the project limits. Such methods generally are understood to include all non destructive testing / locating services. These include, but are not limited to, the following methods:
 - i. magnetic, sonic, and acoustic technologies
 - ii. ground penetrating radar
 - iii. CCTV of storm / sanitary sewers
 - 3) Perform the utility locating services selected above. The utilities shall be marked out in the field using colors and labeling standard

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to the industry. Survey all markings to the accuracies and precision dictated by the project's survey control.

- 4) Utility locations shall be added to the project mapping and associated depths, inverts, etc. shall be marked on a separate layer in the document for clarity.

c. Typical Requirements for Quality Level A:

- 1) Perform all tasks associated with Quality Level B and C. Determine where test pits are warranted to resolve conflicting data or where data was unattainable due to field conditions.
- 2) Excavate test holes exposing the utility to be measured in such a manner that protects the integrity of the utility to be measured. Exposure is typically performed via minimally intrusive excavation.
- 3) Determine the following at each test pit excavated:
 - i. horizontal and vertical location of the top and/or bottom of the utility
 - ii. the elevation of the existing grade over the utility at a test hole
 - iii. the outside diameter of the utility and configuration if applicable (ie. non-encased, multiconduit systems)
 - iv. the utility structure material composition, when reasonably ascertainable
 - v. the paving thickness and type, where applicable
 - vi. the general soil type and site conditions
 - vii. any other pertinent information

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