

# STATE UNIVERSITY CONSTRUCTION FUND

## PROGRAM DIRECTIVES

DIRECTIVE 2-5

Issue date: July 2012

### ROCK EXCAVATION

1. General
  - a. The purpose of this Directive is to outline the Fund's minimum requirements for the consultant relative to the identification, definition and specifications for rock removal during design and construction.
  - b. The objective is to identify comprehensive and biddable quantities of rock in order to accurately identify costs related to its removal during construction.
2. Policy
  - a. The Consultant shall retain the services of a qualified geotechnical engineer and testing agency to identify, quantify and evaluate the extent and nature of rock removal associated with all aspects of a project. These investigations shall be performed for all new construction, building additions and sitework projects.
  - b. See Directive 1C-5 "Subsurface Investigation Procedure" for additional information regarding general geotechnical investigations.
  - c. It is expected that reports and recommendations generated from field investigation be bound in the Project Manual Provide soil logs and offer recommendations as to how rock removal is to be addressed during construction. In order for these recommendations to be properly considered as part of the contract requirements such information (locations, quantities, etc) and recommendations must be incorporated into the plans and technical specifications. Where rock removal is anticipated, it is expected that the soil information will permit a responsible and accurate forecast of the chance of encountering rock and the estimated amount involved. It is the Consultant's responsibility:
    - (1) To determine the need for consideration of rock excavation,
    - (2) To define what is to be considered rock, (by researching the local market and defining the rock excavating equipment in size and performance ratings that is reasonably available)
    - (3) To properly address the handling of rock in the contract documents (excavation of narrow trenches and pits requires different equipment than wider excavation areas),

# STATE UNIVERSITY CONSTRUCTION FUND

## PROGRAM DIRECTIVES

(4) To reflect the costs of the rock in his cost estimates.

### 3. Planning And Design

- a. The Consultant is to perform preliminary investigations during Conceptual Design phase as a mechanism to control and understand project costs.
- b. During the Schematic Design phase or earlier, the Consultant shall perform an extensive investigation to identify, quantify and evaluate the extent and nature of rock removal. These investigations shall incorporate all aspects of the project including building construction, sitework and utility installations.
- c. The Schematic Design Report shall describe and quantify the conservative extent of rock anticipated and costs shall be properly reflected in the construction estimate.
- d. The Consultant shall describe for the Fund all requirements of local and State agencies as related to rock removal, blasting, pre-blast, etc. Blasting is rarely permitted and must be approved by the campus before considering this approach during design.
- e. By the completion of the Design Manual phase, the Consultant must determine the amount and type of rock likely to be encountered during construction, and address these issues appropriately in the technical specifications and on drawings. Reconfirm quantities for bidding purposes by completion of the Pre Bid phase

### 4. Contract Documents

- a. The Contract Drawing and Specifications must include complete information from which an estimator and prospective bidders may make reasonable determinations of locations and quantities where rock anticipated.

Locations of borings and/or test pits shall be shown on the plans. Assumed rock elevations shall be depicted on all profiles and cross sections. The extent of rock profiles and cross sections shall be sufficient enough, given the frequency and nature of rock expected, to establish a reasonable quantity. Rock excavation shall be coordinated with all trades; where shown within a building footprint or within utility trenches for example, quantities associated with sloped lay back excavations outside the immediate footprint shall be considered as well.

# STATE UNIVERSITY CONSTRUCTION FUND

## PROGRAM DIRECTIVES

- b. The specifications should include a definition of rock, rock excavation, and various acceptable removal methods. The specification shall require that the contractor include in his bid all associated costs.
- c. The following shall define rock for this purpose. Revisions to this definition, if necessary, must be specifically approved by the Fund:
  - (1) Rock is defined as limestone, sandstone, granite or similar rocks in solid beds or masses in original or stratified position which can be removed only by continuous drilling, blasting or the use of pneumatic tools, and all boulders of 1 cubic yard in volume or larger.
  - (2) The ability to rip or excavate rock is determined by the type of excavator capable of removing it without blasting (i.e. hydraulic excavator; equipped with a short-tip-radius rock bucket; rated at not less than 120-flywheel hp with bucket curling force of not less than 25,000 lbf and stick-crowd force of not less than 18,700 lbf ; measured according to International Organization for Standardization (ISO) 6165). The specification shall include a description of a mechanical method of removal which will serve this determination.
  - (3) Material which can be loosened with a pick, frozen materials, soft laminated shale and hardpan, which for convenience or economy is loosened by drilling, blasting, wedging or the use of pneumatic tools, removal of concrete pavement and retaining walls shall not be classified as rock excavation.

*Note: For the profiles shown in the bid documents, included soft laminated shale within the rock line.*

Blasting of rock is not recommended. Blasting, if proposed, shall be subject to Fund and Campus approval.

All Fund contracts are established as lump sum bids. The Consultant's estimate and therefore contractor's bid shall include all costs for handling the quantities of rock as represented on the drawings. As such, the consultant shall take special care in developing contract documents which accurately allow the bidder to reasonably determine the location and quantity of rock. Where possible, anticipate ridges and outcroppings that may occur between bore holes, based on historical or anecdotal evidence.

# STATE UNIVERSITY CONSTRUCTION FUND

## PROGRAM DIRECTIVES

- (4) Upon release of the bid documents, the consultant shall transmit to the Fund the estimated quantity of rock reflected in the contract documents should this item be disputed during construction. Documents such as profiles and calculations supporting this estimation should also be provided.
- (5) The specifications shall advise the contractor that should his means and methods of rock excavation (i.e. widening trenches to accommodate contractor equipment) require additional excavation such addition costs shall be included in his bid.

### 5. Unit Prices (Only As Approved)

- a. The Fund may opt to provide a mechanism in the contract documents such as a unit price for rock removal in the event that subsurface conditions are substantially different from what is shown on the drawings or could be inferred by from the borings.
- b. Allowance shall be recommended by the consultant based on the estimated amount of additional rock beyond the amount shown on the profiles, cross section or drawings. The Bid Form shall be edited to include this provision.
- c. In accordance with the Information for Bidders, the spaces provided for unit prices are for the additive price and the deductive price is automatically 15% less.
- d. The specifications are to include a definition of pay limits for changes in work excavation and backfill.
- e. The Consultant's Site Representative shall record the actual quantity of rock removed by the contractor and continually compare this quantity with the quantity allowance specified in the documents.
- f. The contractor's base bid may include as an allowance the costs for handling the quantities of rock as shown on the drawings and/or inferred by the soil borings. In accordance with the Information to Bidders, the Fund may elect to accept the contractor's unit price quotations or negotiate any or all of the prices it feels do not reflect true value. The Notice of Award will state all approved unit prices.

# STATE UNIVERSITY CONSTRUCTION FUND PROGRAM DIRECTIVES

- g. The method of measurement of the rock quantity should be by standard cross-section method. However, when rock is in the bottom of a trench the Consultant may consider allowing the contractor to drill through over burden to determine the top of rock for rock quantity calculations. Frequencies of holes, type of drilling, etc. are all subject to Fund approval.
- h. Whenever the Consultant finds that subsurface conditions are substantially different from what is shown on the drawings or could be inferred by from the borings (i.e., if allowance will be exceeded), he shall immediately investigate and advise the Project Coordinator as to the remedial steps to be taken.

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