

PRESSURE GROUTING

1. APPLICABILITY

Construction Specification 14 is applicable to the drilling and pressure grouting of structure foundations with suspension grouts.

2. MATERIAL SPECIFICATIONS

Material Specification 522 and 531 are complementary to Construction Specification 14.

3. ITEMS TO BE INCLUDED IN CONTRACT SPECIFICATIONS AND DRAWINGS

- a. Plan and profile of the grouting layout. Include region to be grouted, location and spacing of lines and holes. Show the depth of holes, location, and logs of drill holes used in the geologic investigation.
- b. Mode of drilling (rotary, percussion, or rotary-percussion) and diameter of grout holes.
- c. Inclination of holes (angle to vertical) if inclined holes are required.
- d. Designate the location and distance for transport of core boxes into storage.
- e. Number and depth of check holes to be drilled and mode of drilling.
- f. Details of testing and sampling in over burden, if required. Include method of measurement and payment.
- g. Location and placement details of capping concrete or concrete slabs, if required.
- h. Method of grouting (packer or stage). As a rule, packer grouting is the preferred method unless rock conditions prohibit the seating of packers in the hole. If analysis shows stage grouting must be used, the reasoning for the decision should be documented.
- i. Area boundaries and depth of stages for stage grouting. Depth intervals (lifts) for packer grouting.
- j. Criteria for split spacing (cubic feet of dry solids per linear foot of hole, usually 0.5 cubic foot per foot of hole).
- k. Sequence in which grout hole rows are to be grouted, usually upstream row first.
- l. Design pressures at the collar for various grout mixes and various depth intervals, see chart in Section 13 of the specification.
- m. Limitations and requirements on the sequence of drilling and grouting, usually 50 feet.

- n. Minimum distance to be maintained between grouting and drilling operations, and minimum age of grout at which drilling in grouted holes or adjacent to grouted holes will be permitted, normally 12 hours.
- o. Specify the minimum distance between grouted area and blasting site and maximum allowable blasting intensity. Criteria: Particle velocity maximum of 1 inch per second at the location of the grouted rock.
- p. Minimum distance between grout and water injections, concrete structures, and drains.
- q. Specify type of cement to be used in grout mix and specify starting ratios if different from Section 14.
- r. Specify to which gradation sand is to conform as per gradation limits in Section 2.
- s. Type and quality of admixtures. If calcium chloride is to be used, specify that it shall conform to ASTM D 98. Specify: "high sodium, Wyoming grade bentonite", if bentonite is specified in Section 18.
- t. Type and quality of bulk fillers. (Specify Section 2 gradation limits or other numerical gradation. Note approval of fly ash source, if applicable.)
- u. Pollution Control Measures (PCM) When Construction Specification 5, Pollution Control, does not provide guidance for the grouting operations, include requirements in this specification. PCM are to be installed and maintained by the Contractor to prevent waste grout materials, chemical wastes, and soil from entering the stream. A plan for pollution control is to be submitted by the Contractor to the Engineer for review prior to installation of any measures. After grouting has been completed, pollution control measures are to be removed. A minimum of one sediment basin will usually be required. Cross reference these requirements with Construction Specification 5.
- v. The quantity variation clause applies to pressure grouting. Quantity estimates should not include token amounts but should reflect the best estimate of expected grout take based on site exploration data and engineering geology.
- w. Bid items for mobilization for pressure grouting, if applicable. A separate bid item should be considered if mobilization for grouting equipment will involve a significant amount of work, and grouting is not the principal item of construction work under the contract. If grouting is the main job, a general mobilization item using Construction Specification 8 should be used for all mobilization.
- x. If Construction Specification 94, Contractor Quality Control, is not a part of the contract and this specification is being used in a federal contract, and the Contractor is required to keep detailed records for quality control, modify Section 15, RECORDS by inserting in Section 18, Items of Work and Construction Details, the altered roles of the Engineer and Contractor.

- y. Alternate to (x) above, use Construction Specification 94 and detail the Contractor's Quality Control activities that are required.

4. DISCUSSION OF METHODS

No Methods are outlined in the Specification.

Section 18 shall provide a clear statement of the items listed under Section 17, Measurement and Payment, that will apply to work requirements for measurement and payment purposes.