DPD

Director's Rule 11-2006

Applicant:	Page	Supersedes:
City of Seattle Department of Planning and Development	1 of 4	DR 26-87
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Subject: Augercast Piles: Mix, Inspection, and Reporting Requirements	**Code and Section Reference:** Seattle Building Code Chapter 17, 18, and 19	
	Type of Rule: Procedural Requirement	
	Ordinance Authority: SMC 3.06.040	
Index: Building Code/Technical and Procedural Requirements	**Approved** (signature on file) Diane M. Sugimura, Director, DPD	**Date** 12/22/06

Purpose

The purpose of this rule is to establish the minimum requirements and procedures for the installation of augercast piles as a part of the structural foundation system, and to establish the method for verifying compliance with these requirements and procedures.

Description

Augercast piles are placed by rotating a continuous flight hollow shaft auger into the ground to a designed pile depth. High strength grout is then pumped into the hole through the auger as the auger is withdrawn filling the hole with mortar. Sufficient pump pressure is maintained to prevent collapse of the hole and to cause lateral penetration of the grout into the soft or porous zones of surrounding soil. Steel reinforcement is then installed within the augercast pile while the grout is still in a semi-fluid state.

Design Requirements

1. Pile capacities shall be determined by an engineer licensed under the laws of the State of Washington who has experience in soil investigation and design (Geotechnical Engineer).

The strength of the pile itself may be required to be determined by a structural engineer licensed in the State of Washington.

2. A soils investigation report by the Geotechnical Engineer shall be submitted to the Department of Planning and Development (DPD) for approval. This report shall comply with the requirements in the Seattle Building Code, Chapter 18, and shall also contain:
   2.1. Soil boring logs.
   2.2. Results of tests performed.
   2.3. Geotechnical Engineer's analysis and recommendations including, but not limited to, dimensions and length of augercast piles; axial, lateral and uplift capacities; and minimum embedment depth within competent soil material.

Contractor Submittals

The augercast pile contractor shall submit the following data for augercast piles to the project engineer/architect and general contractor, with copies to DPD, for review and approval prior to construction:

1. The grout mix design
2. A record of the three most recent augercast pile installation jobs for this mix design
3. Any proposed equipment to be used or piling installation procedures which deviate from those contained in the project specifications (including pressure gage and pump stroke counter)
4. Grout pump calibration data

Augercast Pile Grout

Design Mix – The grout mix design shall conform to the requirements of the Seattle Building Code, Chapter 19. The consistency of the grout shall be checked by using ASTM C939 "Standard test method for flow of grout for preplaced-aggregate concrete (flow cone method)." The desired flow may be determined by tests run on the same mix on a previous project or may be determined by tests run in a laboratory trial mix.

NOTE: The special inspector shall perform flow cone tests whenever any question regarding the consistency of the grout arises, or as directed by the design team or building official.

When the minimum sacks of cement per cubic yard of grout comply with the following specifications, batch plant inspection may be waived (see inspection requirements below).

For 5,000 psi grout – 12 sacks (1128 lbs) of cement
For 4,000 psi grout – 10 sacks (940 lbs) of cement
For 3,000 psi grout – 9 sacks (846 lbs) of cement

Grout Tests – Grout tests shall be prepared and tested in accordance with ASTM C109. Two inch cube molds shall be provided with a top plate designed to restrain grout expansion and to prevent escape of water and grout.

> Exception: When standard non-expansive or gas-forming admixtures, such as water reducing admixtures, conforming to ASTM C494 are specified, 2x4 inch cylinders may be used for non-restrained specimens.

One set of compression strength tests is required for the greater of the following:

1. Every 50 yards of grout, or any portion thereof, placed each day; or
2. One sample for 10% of piles placed each day.

One cube or cylinder shall be tested at 3 days, one at 7 days, and two at 28 days.
Exception: The three day test may be omitted when approved by the building official.

Special Inspection Requirements

1. Batch Plant Inspection – Continuous inspection of weighing and mixing grout by a WABO registered special inspector in the batch plant.

2. Site Inspection – Continuous inspection of the grout placement shall be provided by a WABO registered special inspector at the job site. The special inspector shall:
   2.1. Check the weights of all materials delivered as shown on the delivery ticket with those listed on the approved mix design.
   2.2. Verify the consistency of grout is in accordance with the mix design by the use of the flow cone and by visual inspection. Water may be added to increase the fluidity of the grout once within the first 15 minutes after the truck arrives at the jobsite, provided that the consistency of the grout does not exceed fluidity of mix design.
   2.3. Keep written records of the amount of water added at the jobsite to each truck load of grout.
   2.4. Cast samples for compression tests.
   2.5. Inspect reinforcing steel for conformance with the DPD approved plans and conformance with Seattle Building Code.

3. Pile Inspection – The installation of piling shall be continuously inspected by the Geotechnical Engineer who prepared the soils report or by their representative under the Geotechnical Engineer's direct supervision. They shall verify that the piling has been installed to the depth and size specified using the prescribed methods of installation.

Reports

1. Special Inspection – In addition to general information required on all quality control reports (i.e. job name and address, inspectors name and firm, location of items inspected, etc.) the report shall include:
   1.1. Name of grout supplier
   1.2. Design weights per cubic yard
   1.3. Total yards placed
   1.4. List of grout delivery trucks and amount of water added to each at the jobsite
   1.5. Results of any tests performed
   1.6. Steel reinforcement placement

2. Any change in the mix weights or materials shall be verbally reported to DPD immediately and followed, within 24 hours, with a written report of the change.

3. The Geotechnical Engineer shall submit the complete record of all augercast concrete piles to DPD. This record shall indicate each of the following:
   3.1 Pile capacities
   3.2 Pile location
   3.3 Pile diameter
   3.4 Pile length
   3.5 Elevation of tip and top of pile
   3.7 Depth of embedment in competent soil deposits
   3.8 Volume of grout used in each pile
   3.9 Calculated volume of drilled hole

3.10 Ratio of volume of grout pumped to the calculated hole volume (as calculated in #3.9 above)
3.11 Rate of auger withdrawal versus pump capacity
3.12 All unusual conditions encountered during installation of piles