LID

RULE 5660

Date: August 15, 2006 Approved By:

DEPARTMENT OF PLANNING & DEVELOPMENT SERVICES

Rule: 5660	Standards for Construction of Pin Piles for Foundation Construction

LEGISLATIVE HISTORY: The Puget Sound Action Team (PSAT) Low Impact Development (LID) Technical Guidance Manual for Puget Sound was adopted by ordinance 06-044 as an approved alternate stormwater management technique to more closely mimic the natural hydrologic patterns after development. One integrated management practice that was identified was the use of a foundation system that employed pin piles.

SEE ALSO: NA

SCC APPLICABILITY: Chapters 30.50, 30.52A, 30.63A and 30.63C.

PURPOSE: This rule applies to selecting a Best Management Practice (BMP) described in the Low Impact Development Technical Guidance Manual for Puget Sound for foundation designs using Pin Piles, a.k.a. mini-piles, needle piles or pipe piles.

The provisions for runoff modeling this type of foundation system are found at Chapter 7.6 of the PSAT LID Manual.

RULE SUMMARY: This Director's Rule is considered a prescriptive path and a standard code alternate as provided for in the International Residential Code (IRC) at Section R104.11 and the International Building Code (IBC) at 104.11.

RULE

Snohomish Council will allow the use of pin piles for axial compressive loading only and for certain types of structures according to the requirements listed in the table below.

TABLE A

Minimum requirements for pin installation[1,2]	
Pile Size	
2 inch diameter	• Geotechnical report with analysis may be required[3] • Geotechnical inspection required • No ASTM testing required • 30 feet maximum length • 3 ton maximum capacity or 6 kips[4, 5]

[1] The minimum pile weight for 2-inch diameter pin piles shall be extra strong as noted in the AISC Steel Construction Manual. Pile weight and thickness for all other piles shall be as recommended in the geotechnical report.

[2] Piles larger than 2 inches in diameter may be designed by the geotechnical engineer for capacities greater than the tabular values provided adequate justification is submitted to Snohomish County regarding foundation subgrade conditions.

[3] For repairs, alterations or additions < 750 square feet to a single family residence or associated structures, an evaluation from a registered architect or licensed engineer may be submitted in lieu of the geotechnical report. The need for Special Inspections will be determined on a case by case basis. Examples where Special Inspections would be required include landslide stabilization projects and projects where there are critical life safety issues directly related to the use of pin piles.

[4] Holtz, R.D., Mann, G. (2006) "Recent Research on Small Diameter Driven Pipe Piles"

[5] Mann, G., Vestberg, H.G. and Holtz, R.D. (2005) "Ultimate Bearing Capacity of Small Diameter Pin-Piles and the Influence of Driving Penetration Resistance," Proceedings of the 30th Annual Conference on Deep Foundations, Chicago, Illinois, Deep Foundations Institute

Table A (cont)

Minimum requirements for pin installation [6,7]	
Pile Size	
3 inch diameter	• Geotechnical report with analysis required • Geotechnical inspection required • ASTM quick test required on minimum 3% of piles up to 5 piles maximum (1 minimum) • 6 ton maximum capacity or 12 kips
4 inch diameter	• Geotechnical report with analysis required • Geotechnical inspection required • ASTM quick test required on minimum 3% of piles up to 5 piles maximum (2 minimum) • 10 ton maximum capacity or 20 kips
6 inch diameter	• Geotechnical report with analysis required • Geotechnical inspection required • ASTM quick test required on minimum 3% of piles up to 5 piles maximum (2 minimum) • 15 ton maximum capacity or 30 kips

Geotechnical Report. A geotechnical report and analysis shall be prepared by a Washington State Registered Civil Engineer who has experience in soil investigation and pin pile design. The report shall include an analysis that addresses site conditions, driving criteria, pile size, capacity, embedment depth into bearing soil, and shows that the design concept for the foundation support will provide the prescribed pile capacity for the given site conditions. The report shall require a minimum factor of safety of 2 for pile capacity based on the tangent line method of pile load test analysis or an approved alternate. The report shall also address corrosion protection requirements for all work. A copy of the approved geotechnical report and pin-pile foundation design shall be available for the County or Special Inspector to review on the job or construction site at all times during construction. Geotechnical reports require County approval prior to permit issuance.

ASTM Testing. Whenever ASTM testing is required, it shall mean that the pile installation shall be tested in general accordance with ASTM Standard D 1143-81 for Piles under static axial compressive load. Use of the Quick Load Test Method in the Standard is the minimum required.

Geotechnical Inspection. Special inspection shall be as specified on the building permit as a special condition if required by Snohomish County. Minimum requirements include continuous monitoring of installation and testing of piles, confirming driving criteria, pile length and minimum embedment depth. (For the small diameter 2" piles; the terminal driving rate shall be at least equivalent to 60 seconds of driving using a 90 lb/40 kg jackhammer or equal until the pipe moves 1 inch or less in the last one minute of driving. For all other driving rates refer to the geotechnical engineering report for methods and materials to meet these requirements.) In addition, daily report submittals and a final summary report stamped by the design professional shall be submitted to the County Inspector for the project.

The intent of this rule is to provide a standard code alternate that provides a set of minimum requirements that more easily allows for the use of pin piles, pipe piles or mini piles that meet the design requirements of Table A.

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[6] The minimum pile weight for 2-inch diameter pin piles shall be extra strong as noted in the AISC Steel Construction Manual. Pile weight and thickness for all other piles shall be as recommended in the geotechnical report.

[7] Piles larger than 2 inches in diameter may be designed by the geotechnical engineer for capacities greater than the tabular values provided adequate justification is submitted to Snohomish County regarding foundation subgrade conditions.