WAC 296-155-657 Requirements for protective systems. (1) **Protection of employees in excavations.**

(a) You must protect each employee in an excavation from cave-ins by an adequate protective system designed in accordance with subsections (2) or (3) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 4 feet (1.22m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(b) Protective systems must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(2) **Design of sloping and benching systems.** The slopes and configurations of sloping and benching systems must be selected and constructed by the employer or employer's designee and must be in accordance with the requirements of subdivision (a); or, in the alternative, subdivision (b); or, in the alternative, subdivision (c); or, in the alternative, subdivision (d), as follows:

(a) Option 1—Allowable configurations and slopes.

(i) Excavations must be sloped at an angle not steeper than 1 1/2 horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in item (i) of this subdivision, must be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this part.

(b) Option 2—Determination of slopes and configurations using Appendices A and B. Maximum allowable slopes, and allowable configurations for sloping and benching systems, must be determined in accordance with the conditions and requirements set forth in appendices A and B to this part.

(c) Option 3—Designs using other tabulated data.

(i) Designs of sloping or benching systems must be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data must be in written form and must include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) You must maintain at least one copy of the tabulated data which identifies the registered professional engineer who approved the data at the job site during construction of the protective system. After that time the data may be stored off the job site, but you must make a copy of the data available to the director upon request.

(d) Option 4—Design by a registered professional engineer.

(i) Sloping and benching systems not utilizing Option 1 or Option 2 or Option 3 under subsection (2) of this section must be approved by a registered professional engineer.

(ii) Designs must be in written form and must include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) You must maintain at least one copy of the design at the job site while the slope is being constructed. After that time the design need not be at the job site, but you must maintain a copy available to the director upon request.

(3) **Design of support systems, shield systems, and other protective systems.** Designs of support systems, shield systems, and other protective systems must be selected and constructed by the employer or employer's designee and must be in accordance with the requirements of subdivision (a); or, in the alternative, subdivision (b); or, in the alternative, subdivision (c); or, in the alternative, subdivision (d) as follows:

(a) Option 1—Designs using appendices A, C, and D. Designs for timber shoring in trenches must be determined in accordance with the conditions and requirements set forth in appendices A and C to this part. Designs for aluminum hydraulic shoring must be in accordance with subdivision (b) of this subsection, but if manufacturer's tabulated data cannot be utilized, designs must be in accordance with appendix D.

(b) Option 2—Designs using manufacturer's tabulated data.

(i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data must be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer must only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations must be in written form at the job site during construction of the protective system. After that time this data may be stored off the job site, but you must make a copy available to the director upon request.

(c) Option 3—Designs using other tabulated data.

(i) Designs of support systems, shield systems, or other protective systems must be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data must be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) You must maintain at least one copy of the tabulated data, which identifies the registered professional engineer who approved the data at the job site during construction of the protective system. After that time the data may be stored off the job site, but you must make a copy of the data available to the director upon request.

(d) Option 4—Design by a registered professional engineer.

(i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, must be approved by a registered professional engineer.

(ii) Designs must be in written form and must include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) You must maintain at least one copy of the design at the job site during construction of the protective system. After that time, the design may be stored off the job site, but you must maintain a copy of the design available to the director upon request.

(4) **Materials and equipment.**

(a) Materials and equipment used for protective systems must be free from damage or defects that might impair their proper function.

(b) You must use and maintain manufactured materials and equipment used for protective systems in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(c) When material or equipment that is used for protective systems is damaged, a competent person must examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then you must remove such material or equipment from service, and it must be evaluated and approved by a registered professional engineer before being returned to service.

(5) **Installation and removal of support.**

(a) General.

(i) Members of support systems must be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) You must install and remove support systems in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) You must not subject individual members of support systems to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, you must take additional precautions to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal must begin at, and progress from, the bottom of the excavation. You must release members slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling must progress together with the removal of support systems from excavations.

(b) Additional requirements for support systems for trench excavations.

(i) Excavation of material to a level no greater than two feet (.61 m) below the bottom of the members of a support system is permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system must be closely coordinated with the excavation of trenches.

(6) **Sloping and benching systems.** You must not permit employees to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are ade-

quately protected from the hazard of falling, rolling, or sliding material or equipment.

(7) **Shield systems.**

(a) General.

(i) You must not subject shield systems to loads exceeding those which the system was designed to withstand.

(ii) You must install shields in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) You must protect employees from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) You must not allow employees in shields when shields are being installed, removed, or moved vertically.

(b) Additional requirement for shield systems used in trench excavations. Excavations of earth material to a level not greater than two feet (.61 m) below the bottom of a shield is permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 16-09-085, § 296-155-657, filed 4/19/16, effective 5/20/16. Statutory Authority: Chapter 49.17 RCW and RCW 49.17.040, [49.17].050 and [49.17].060. WSR 92-22-067 (Order 92-06), § 296-155-657, filed 10/30/92, effective 12/8/92. Statutory Authority: Chapter 49.17 RCW. WSR 91-03-044 (Order 90-18), § 296-155-657, filed 1/10/91, effective 2/12/91.]