

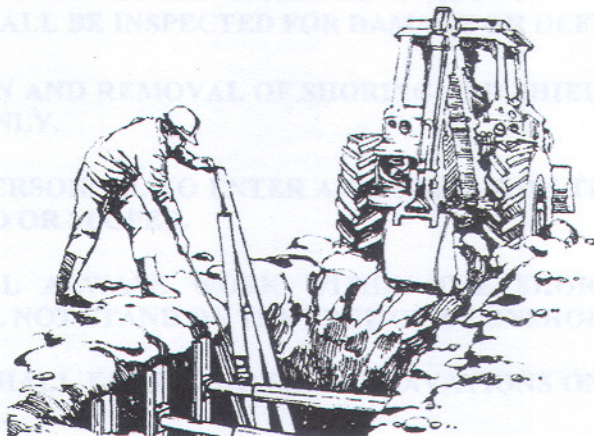
**SPEED**  **SHORE**<sup>®</sup>  
**PIONEERING TRENCH SAFETY**

**MANUFACTURERS  
TABULATED DATA**

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**VERTICAL SHORES**

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THIS SPEED SHORE TABULATED DATA IS A GENERAL SET OF GUIDELINES AND TABLES TO ASSIST THE *COMPETENT PERSON* IN SELECTING A SAFETY SYSTEM AND THE PROPER SHORING OR SHIELDING EQUIPMENT. THE *COMPETENT PERSON* HAS SOLE RESPONSIBILITY FOR JOB SITE SAFETY AND THE PROPER SELECTION AND INSTALLATION AND REMOVAL OF THE SHORING OR SHIELDING EQUIPMENT.

January 1, 1995

THIS TABULATED DATA IS NOT INTENDED TO BE USED AS A JOB-SPECIFIC EXCAVATION SAFETY PLAN, BUT SHALL BE USED BY THE *COMPETENT PERSON* TO SUPPLEMENT HIS TRAINING, HIS EXPERIENCE AND HIS KNOWLEDGE OF THE JOB CONDITIONS AND SOIL TYPE.

3330 S. SAM HOUSTON PKWY E. HOUSTON, TEXAS 77047  
Tel: (713) 943-0750 U.S.A. Toll Free: (800) 231-6662 Fax: (713) 943-8483

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## WARNING

### EXCAVATION PROCEDURES MAY BE VERY DANGEROUS

- A TRAINED *COMPETENT PERSON* SHALL: SUPERVISE ALL EXCAVATION OPERATIONS, ENSURE THAT ALL PERSONNEL ARE WORKING IN SAFE CONDITIONS, AND HAVE THOROUGH KNOWLEDGE OF THIS TABULATED DATA. THE *COMPETENT PERSON* SHALL HAVE THE AUTHORITY TO STOP WORK WHEN IT IS UNSAFE FOR WORKERS TO ENTER AN EXCAVATION.
- ALL PERSONNEL SHALL BE TRAINED IN CORRECT EXCAVATION PROCEDURES, PROPER USE OF THE PROTECTIVE SYSTEM AND ALL SAFETY PRECAUTIONS.
- EXCAVATIONS AND PROTECTIVE SYSTEMS SHALL BE INSPECTED A MINIMUM OF ONCE EACH WORKING DAY AND WHENEVER THERE IS A CHANGE OF SOIL, WATER OR OTHER JOB SITE CONDITIONS.
- ALL LIFTING AND PULLING EQUIPMENT, INCLUDING CABLES, SLINGS, CHAINS, SHACKLES AND SAFETY HOOKS SHALL BE EVALUATED FOR SUITABILITY AND CAPACITY, AND SHALL BE INSPECTED FOR DAMAGE OR DEFECTS PRIOR TO USE.
- ALL INSTALLATION AND REMOVAL OF SHORING AND SHIELDING SHALL BE FROM ABOVE GROUND ONLY.
- DO NOT ALLOW PERSONNEL TO ENTER AN EXCAVATION THAT IS NOT PROPERLY SHORED, SHIELDED OR SLOPED.
- PERSONNEL SHALL ALWAYS WORK WITHIN THE SHORING AND SHIELDING. PERSONNEL SHALL NOT STAND ON THE EDGE OF AN UNSHORED EXCAVATION.
- ALL PERSONNEL SHALL ENTER AND EXIT EXCAVATIONS ONLY WITHIN SHIELDED OR SHORED AREAS.

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SPEED SHORE  
TABULATED DATA

## 1.0 SCOPE

- 1.1 Speed Shore's Tabulated Data complies with the O.S.H.A. standards as stated in the Code of Federal Regulations 29, Part 1926, Subpart P - Excavations, Section 1926.652(c)(2). This data shall only be used by the contractor's *competent person* in the selection of Speed Shore Vertical Shores. The *competent person* shall be experienced and knowledgeable in trenching and excavation procedures, soil identification and in the use of Speed Shore Vertical Shores.
- 1.2 All personnel involved in the installation, removal and use of Vertical Shores shall be trained in their use and advised of appropriate safety procedures.
- 1.3 Table VS-1, VS-2 and VS-3 is based upon requirements stated in CFR 29, Part 1926 and applicable portions of CFR 29, Part 1910. The *competent person* shall know and understand the requirements of those parts before using this data.
- 1.4 Whenever there is a variance between this Tabulated Data and CFR 29, Part 1926, Subpart P - Excavations, this Tabulated Data shall take precedence. Whenever a topic or subject is not contained in this Tabulated Data, the *competent person* shall refer to CFR 29, Part 1926, Subpart P - Excavations.
- 1.5 This data refers to the Code of Federal Regulations, 29, Parts 1910 and 1926. In states that have their own state O.S.H.A. refer to similar regulations in the current construction rules published by the state office of Occupational Health and Safety.
- 1.6 Tables VS-1, VS-2 and VS-3 shall be used only in excavations with soil conditions as noted. Table VS-1, VS-2 and VS-3 are for depths to 25 feet. For other soil and excavation conditions and depths, site-specific engineered designs are required. Contact Speed Shore Corporation for assistance.
- 1.7 This Tabulated Data is applicable for standard products manufactured exclusively by Speed Shore and may only be used with Speed Shore manufactured products. Any modification or repair of Speed Shore products not specifically authorized by Speed Shore Corporation voids this data.

## 2.0 DEFINITIONS (RE: CFR 29, Part 1926.32 Definitions) - RESTATED FOR EMPHASIS

- 2.1 1926.32 (f) "competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees; and who has authorization to take prompt corrective measures to eliminate them.
- 2.2 1926.32 (p) "Shall" means mandatory.
- 2.3 1926.32 (q) "Should" means recommended.

## 3.0 SOIL CLASSIFICATIONS

- 3.1 In order to use the data presented in Tables VS-1, VS-2 and VS-3 the soil type, or types, in which the excavation is cut shall first be determined by the *competent person* according to the O.S.H.A. soil classifications as set forth in CFR 29, Part 1926, Subpart P, Appendix A.
- 3.2 Table VS-3 is also for use in Type C-60 soil (see 3.3 for definition).
- 3.3 Type C-60 soil is a moist, cohesive soil or a moist dense granular soil, which does not fit into Type A or Type B classifications, and is not flowing or submerged. This material can be cut with near vertical sidewalls and will stand unsupported long enough to allow the Vertical Shores to be properly installed. The *competent person* must monitor the excavation for signs of deterioration of the soil as indicated by, but not limited to, freely seeping water or flowing soil entering the excavation around or below the sheeting. An alternate design for less stable Type C soil will be required where there is evidence of deterioration.

#### 4.0 PRESENTATION OF INFORMATION

- 4.1 Information is presented in tabular form in Tables VS-1, VS-2 and VS-3. Each table presents the maximum vertical and horizontal spacing that may be used with Vertical Shores for indicated soil types. Table VS-1 is for O.S.H.A. Type A Soil, Table VS-2 for O.S.H.A. Type B Soil and Table VS-3 is for Vertical Shore use in Type C-60 soil (see 3.3 for definition).
- 4.2 Tables VS-1, VS-2 and VS-3 are not considered adequate when loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by 3 feet of soil surcharge. The term "adjacent" as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.
- 4.3 Using the appropriate table, the *competent person* selects the horizontal spacing of the vertical shores and the sheeting required, if any. The selection is based on the depth and width of the trench in varying soil conditions. In these tables, the vertical spacing of the cylinders is held constant at a maximum of 4 feet on center. The horizontal spacing of the hydraulic cylinders is the same as the horizontal spacing of the vertical rails.

#### 5.0 BASIS AND LIMITATIONS OF THE DATA

- 5.1 Sheeting is used only to prevent local raveling or sloughing of the trench face between the Vertical Shores. Sheeting shall be one of the following or an approved equal.
  - 5.1.1 Aluminum: Speed Shore's Aluminum Sheeting
  - 5.1.2 Steel: 0.5 inch or thicker Steel Plate
  - 5.1.3 Plywood:
    - 3/4 inch Finn Form
    - 3/4 inch Omni Form
    - 3/4 inch Combi Exterior Plywood
    - 3/4 inch Plyform American Plywood Association, Plyform, B - B, Class I Exterior
    - 3/4 inch HDO American Plywood Association, High Density Overlay, Exterior
    - 3/4 inch 14 Ply Artic White Birch
    - 1 1/8 inch CDX
    - Two sheets of 3/4 inch thick CDX Plywood.
- 5.2 When sheeting is used, it shall extend to the top the excavation and to within 2 feet of the bottom of the excavation; except in Table VS-3 for excavation depths 0 - 25 feet, where the sheeting shall extend to the bottom of the excavation. If there is an indication of a possible loss of soil from behind or below the support system, sheeting must extend to the bottom of the excavation.
- 5.3 All spacings indicated are measured from center to center of the members.
- 5.4 The center line of the top hydraulic cylinder shall be a minimum of 12 inches and a maximum of 24 inches below the top of the excavation.
- 5.5 The center line of the bottom hydraulic cylinder shall be a maximum of 4 feet above the bottom of the excavation.
- 5.6 In excavations 6 feet deep or less, only 1 hydraulic cylinder (Single Shore) is required in each vertical plane. The cylinder shall be no more than 4 feet above the bottom of the excavation, and no more than 2 feet below the top of the excavation. In excavations 6 feet to 10 feet deep there shall be a minimum of 2 hydraulic cylinders in each vertical plane. The horizontal spacing shall be as shown in the tables.
- 5.7 The vertical rails directly behind each hydraulic cylinder pad must bear on firm soil or a solid and stable filler to distribute the cylinder load to the face of the excavation. Do not butt rails back to back across an excavation.
- 5.8 Two single shores may be substituted for a vertical shore.
- 5.9 The aluminum rails are designed to be used vertically, however they may be orientated horizontally or diagonally if all other provisions of this data are satisfied.
- 5.10 The maximum vertical spacing between center lines of hydraulic cylinders shall be 4 feet.
- 5.11 The faces of the excavation must be cut near vertical and straight

- 5.12 There shall be a minimum of 3 consecutive shores in a row, at the horizontal spacing indicated (or less), to form a shoring system. In trenches over 12 feet deep, and whenever possible, a minimum of 4 shores should be used. For excavations that are too short to place 3 or 4 shores at the required spacing, the shores shall be placed at the required spacing from end to end of the excavation with a minimum of 2 shores. There shall be a shore within 2 feet of each end of the excavation
- 5.13 The ends of trenches shall be shored or sloped in accordance with Appendix B of CFR 29, Part 1926 Subpart P Excavations.
- 5.14 No vertical or lateral loads shall be applied to the cylinders.
- 5.15 Water flowing into an excavation, from either above or below ground, will cause a decrease in the stability of the soil. Therefore, the *competent person* shall take action to prevent water from entering the excavation and remove any water that accumulates in the excavation. Closer monitoring of the soil is required under wet conditions, particularly in less cohesive (weaker) soil conditions. A small amount of water, or flowing conditions, may downgrade the soil classification to a less stable classification. A large amount of water, or flowing conditions, may downgrade all soils to O.S.H.A. Type C. Speed Shore shoring and shielding systems may be used safely in wet conditions when the excavation is monitored by the *competent person*. Example: When repairing a leak in utility lines, it is often difficult or even impossible, to keep water out of the excavation.
- 5.16 If shores are installed on the seam between 2 adjacent sheets of plywood, each plywood sheet shall bear a minimum of 4 inches on each vertical rail.
- 5.17 Tables VS-1, VS-2 and VS-3 shall be used only for selecting the spacing and excavation depths for Single Shores, Vertical Shores and Multi-Shores. Normally, a Single Shore has 1 hydraulic cylinder, a Vertical Shore has 2 hydraulic cylinders and Multi-Shores have 3 or more hydraulic cylinders. All three types may be used and may be mixed if the provisions of this Tabulated Data are followed.

## 6.0 INSPECTION

- 6.1 The *competent person* must evaluate the soils to assure the rated capacity of the Vertical Shores is not exceeded by the lateral pressure of the soil. Soils shall be evaluated in accordance with Part 3.0.
- 6.2 The *competent person* shall monitor all phases of the assembly, installation and use of this product to evaluate and eliminate methods, which could endanger employees utilizing this product.
- 6.3 Daily inspections of the Vertical Shores and accessories must be performed by the *competent person* and deficiencies corrected.
- 6.4 Inspections shall be conducted as necessary for hazards associated with water accumulation, changing soil conditions, or changing site weather conditions.

### 7.0 EXAMPLE TO ILLUSTRATE THE USE OF TABLES VS-1, VS-2 and VS-3:

Problem: Design a trench safety system using Speed Shore Vertical Shores for an excavation 8 feet deep and 4 feet wide in O.S.H.A. Type B soil.

Study tables: Select Table VS-2 for Type B soil. Look in the column "Depth of Excavation" on line 0 to 15 feet. Next, read across and find under "Hydraulic Cylinders", "Maximum Horizontal Spacing" at 8 feet and "Maximum Vertical Spacing" at 4 feet. Next, locate the hydraulic cylinder size under "Width of Excavation", 0 to 8 feet": 2 inch diameter. Finally, under "Sheeting", Notes 2 and 3 apply.

Conclusion: Install Speed Shore Vertical Shores with 2 inch diameter cylinders at 8 feet intervals with or without plywood sheeting, depending upon the *competent person's* judgment of the raveling or sloughing of the excavation face. (See Notes 2 and 3).

TABLE VS-1 TYPE "A" SOIL

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) FEET	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 15	8	4	2" dia.	2" dia.	2" dia. (Note 1)	(Note 2)
0 to 25	8	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 2)

TABLE VS-2 TYPE "B" SOIL

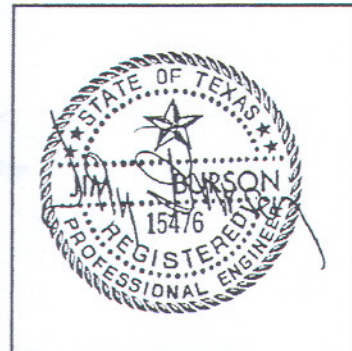
Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 3)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) FEET	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 10	8	4	2" dia.	2" dia.	2" dia. (Note 1)	(Note 2)
0 to 20	6	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 2)
0 to 25	5	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 7)

TABLE VS-3 TYPE "C-60" SOIL (See 3.3 for definition of C-60 Soil)

Depth of Excavation FEET	HYDRAULIC CYLINDERS					Sheeting (Note 4)
	Maximum Horizontal Spacing (FEET)	Maximum Vertical Spacing (Note 6) FEET	Width of Excavation FEET			
			0 to 8	8 to 12	12 to 15	
0 to 10	6 (Note 5)	4	2" dia.	2" dia.	2" dia. (Note 1)	(Note 2)
0 to 20	4	4	2" dia.	2" dia. (Note 1)	2" dia. (Note 1)	(Note 7)
0 to 25	4	4	2" dia.	2" dia. (Note 1)	N/A	(Note 7)

**NOTES TO TABLES VS-1, VS-2 and VS-3**

1. Two inch diameter cylinders shall have a structural steel tube oversleeve 3.5 x 3.5 x 0.1875 inches extension (installed over the aluminum oversleeve extension) or a steel tube oversleeve 3 x 3 x 0.1875 inch extension (installed without the aluminum oversleeve) that extends the full retracted length of the cylinder. CAUTION: In either case, the aluminum load transfer plug and the aluminum innersleeve shall be used or a steel load transfer plug shall be welded securely in place inside the steel oversleeve to transfer the load through the steel oversleeve to the socket pad. Other Speed Shore approved oversleeves may be used.
2. The bottom of the sheeting shall extend within 2 feet of the bottom of the excavation. If there is an indication of a possible loss of soil from behind or below the support system, sheeting must extend to the bottom of the excavation.
3. Four feet wide sheeting is required at each Vertical Shore if raveling or sloughing of the excavation face appears likely to occur.
4. Four feet wide sheeting shall be used.
5. When 4 feet horizontal spacing is exceeded, the open spaces between the sheeting must be monitored for sloughing and raveling of the excavation face.
6. The bottom hydraulic cylinder shall be a maximum of 4 feet above the bottom of the excavation.
7. Sheeting shall extend to the bottom of the excavation.



EXAMPLES OF TYPICAL INSTALLATION

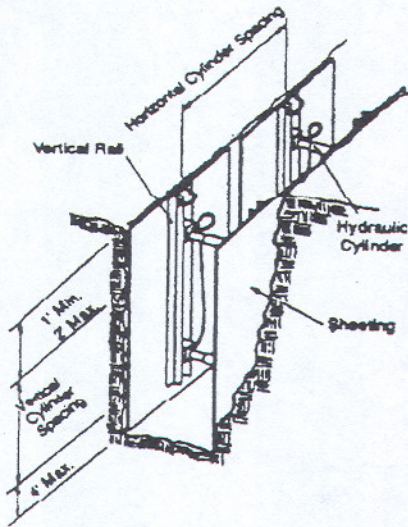


FIG. 1  
WITH SHEETING

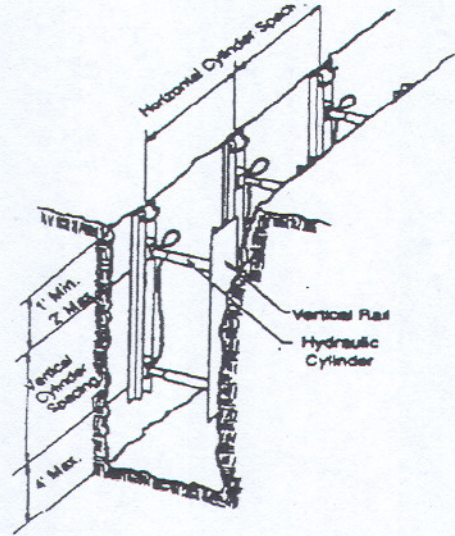


FIG. 2  
WITHOUT SHEETING

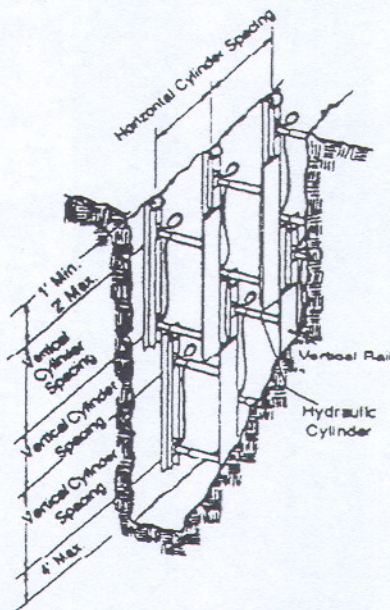


FIG. 3  
STACKED