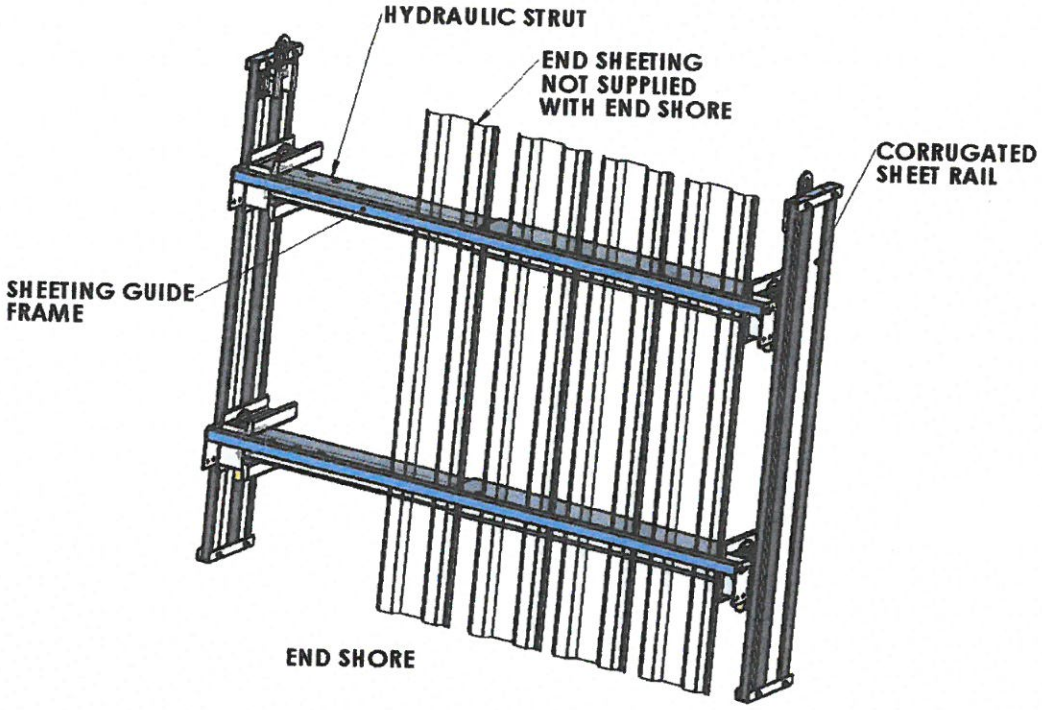
END SHORE

TABULATED DATA
Effective August 5, 2014



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Description

The Pacific Shoring End Shore is an aluminum hydraulic shoring system designed specifically for protecting workers at the ends of trench and pit excavations. The End Shore is designed to work in trenches from 4 ft to 20 ft deep and 2 ft wide to 12 ft wide. Corrugated sheeting is set behind the shore against the trench wall to prevent trench wall collapse and raveling.

The End Shore must be used in conjunction with independent linear shoring systems that protect the trench walls.

General Information for use of Pacific Shoring End Shore

1.1 The End Shore tabulated is compliant with requirements of Federal OSHA 29CFR, Part 1926, Subpart P-Excavations and Trenches

> **1926.652(c)(2)**-Option (2) - Designs Using Manufacturer's Tabulated Data.
> 1926.652(c)(2)(i) -Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

All provisions of Subpart P apply when utilizing this tabulated data. The contractor's competent person shall use this data to select allowable End Shore configuration. The competent person utilizing this tabulated data shall be experienced and knowledgeable of all requirements of Subpart P, and trained in the use and safety procedures for trench and pit shoring applications.

1.2 An adequate separately designed shoring system shall be used leading up to within 2 ft of the End Shore shoring application. Systems such as Timber, Vertical Hydraulic Shores, Waler Systems, Shoring Shields, and designs by an engineer may be used in conjunction with the End Shore.

1.3 Use of this tabulated data is dependent on first classifying the soil in accordance with OSHA Appendix A, Soil Classification. Classification shall be just prior to installing the End Shore. Soil conditions may change at a later date and require revaluation of the strength and allowable depth.

1.4 End Shores are tabulated based on the effect of a 20,000 lb surcharge load set back 2 ft from the edge of the trench and the equivalent weight effect of the OSHA soil type, see classification of soil types, 2.2.

1.5 The depth and spacing given in Tables 1 governs the use of Pacific Shoring End Shore and not tabulations given by other manufacturers. This Tabulated data applies to End Shores manufactured by Pacific Shoring. Any alterations to the shores or variance from this tabulated data shall be indicated in a site specific plan prepared and approved by a registered engineer.

1.6 The faces of the end and corner of the excavations shall be vertical and the end wall shall be within 6" of the sheeting. If the soil face is greater than 6" backfill the void with excavated soil or crushed rock.

1.7 End Shores may be stacked.

1.8 End Shores shall be installed and removed from outside the trench, see installation and removal procedure.

1.9 The competent person shall continually monitor the shored excavation for changed conditions such as water seepage, soil movement cracks at the surface, sloughing or raveling, proper surcharge load weight greater than 20,000 lbs and setback a minimum of 2 ft that may damage the shores.

1.10 Workers shall always enter, exit, and work inside the shored area of the trench.

1.11 End Shores may be set a maximum of 2 ft from the bottom of the excavation. The trench depth is considered the full distance to the bottom of the excavation.

1.12 Plywood sheeting used with End Shores shall be in accordance with Table 2. Plywood shall not be used in C-60 or C-80 soil below 10 ft deep.

Material	Grade Stress Level	Effective Section Modulus KS	Allowable Bending F_b
1-1/8"-2.4.1 int APA Plywood	S-2	0.840 in^3/ft	1100 psi
Finland Form ¾" All-Birch	S-1	0.4826	3600 psi

Table 2 Bending properties for OSHA Sheeting

1-13 Acceptable metal sheeting is;

- Pacific Shore Corrugated Aluminum sheeting or and aluminum sheeting with a minimum section modulus of 1.13in^3
- Steel sheeting with a minimum section modulus of 1.125 in^3 such as ¾"plate or sheet piles.

1-14 Sheeting must extend to the top of the excavation. Sheeting may be held a maximum of 2 ft off the bottom of the excavation.

1-15 Pressurize End Shore hydraulics to a minimum of 1000 psi.

Classification of Soil Types

2.1 Soil classification shall be in accordance with OSHA Appendix A and classified just prior to installing hydraulic vertical shores. Soil conditions may change at a later date and require hydraulic vertical shores to be reset at a different spacing.

2.2 The equivalent weight of OSHA soil types* is assumed to be as follows:

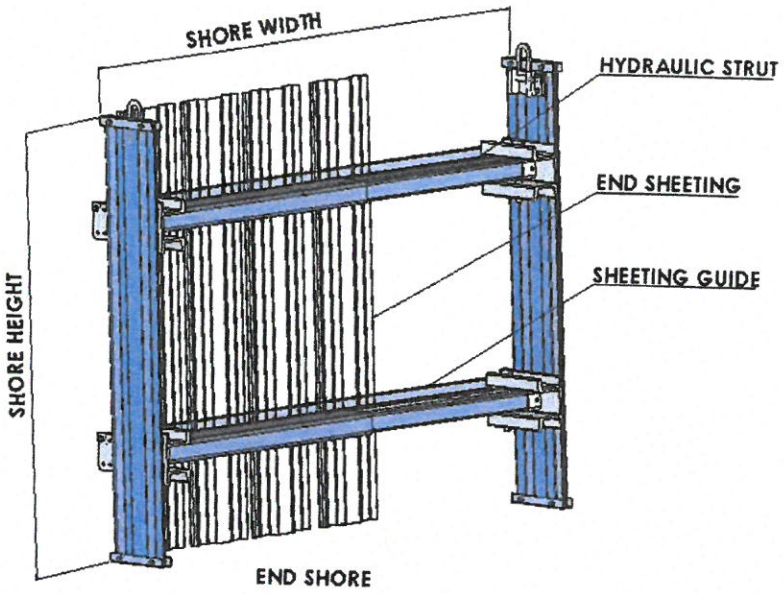
• OSHA Type "A" Soil	25 PSF per ft of depth
• OSHA Type "B" Soil	45 PSF per ft of depth
• Type "C-60" Soil	60 PSF per ft of depth**
• OSHA Type "C" Soil	80 PSF per ft of depth

* These equivalent weights were adapted from OSHA 1926 Subpart P App C, Timber Shoring for Trenches, Tables C-1.1, C-1.2, and C-1.3

** Type C-60 soil is not identified or classified in OSHA Appendix A

2.2 Type C-60 soil is soil that does not qualify as OSHA Type A, or Type B, can be cut with vertical walls and will stand up long enough to safely insert and pressurize the hydraulic shore.

End Shore Dimensions



End Shore Length and Weight					
Model	Height (ft)	Struts (qty)	Strut Spacing (ft)	Approx Weight (lbs min)	(lbs max)
PSH 2	2	1	4.0	160	300
PSH 4	4	2	2.0	180	330
PSH 5	5	2	2.3	190	340
PSH 6	6	2	3.0	200	350
PSH 8	8	2	3.8	215	365
PSH 10	10	2	5.0	235	385

Weight varies with cylinder size
All shores come in widths from 30" to 95"
Longer lengths available on request
End Shores may be Stacked

Actual Shore Width		
Power Strut Model	Collapsed (in)	Extended (in)
17-27	24.50	34.50
22-36	29.00	43.00
28-46	35.25	53.25
34-55	41.00	62.00
40-64	46.75	70.75
52-88	59.00	95.00
72-108	83.00	119.00
108-144	112.00	148.00

Allowable Depth for Hydraulic Aluminum End Shores

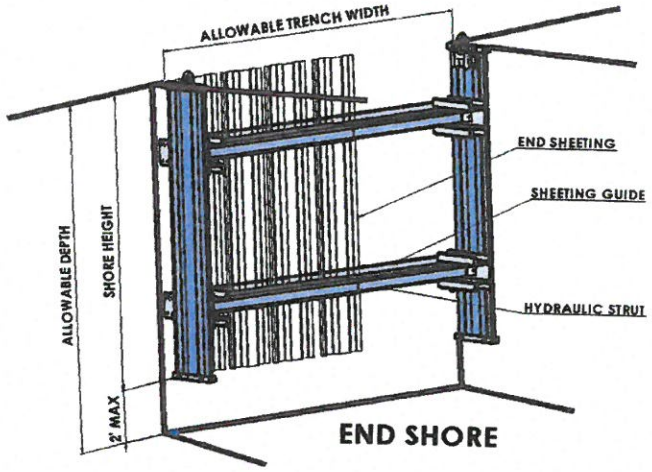


Table 1-END SHORE ALLOWABLE DEPTH (ft)

Model	Height	Struts	Maximum Trench Width =12 ft				Maximum Trench Width =8 ft				Maximum Trench Width =5 ft			
			OSHA Soil Type				OSHA Soil Type				OSHA Soil Type			
	(ft)	(qty)	A-25	B-45	C-60	C-80	A-25	B-45	C-60	C-80	A-25	B-45	C-60	C-80
PSH 2	2	1	20	11	9	8	20	16	10	6	20	16	16	12
PSH 4	4	2	20	11	9	8	20	20	16	12	20	20	16	12
PSH 5	5	2	20	11	9	5	20	20	16	8	20	20	16	12
PSH 6	6	2	18	11	6	5	20	20	12	8	20	20	16	12
PSH 8	8	2	15	7	6	-	20	16	10	6	20	16	16	12
PSH 10	10	2	15	7	-	-	20	10	8	-	20	10	16	12

Notes to Table 1

1. Pressurize End Shore Hydraulics to minimum 1000 psi
2. The End Shore must be used in conjunction with a shoring system designed for the remaining trench walls.
3. Tabulated Depths are limited to 20 ft deep. Additional depth may be achieved when the design is by a registered civil engineer.
4. The End Shore system must be fully installed from outside the excavation
5. End Sheeting may be spaced maximum 12" between sheets; however, in all cases it must prevent sloughing and raveling.
6. Smaller shores can be substituted in cases where stacking a larger shore would cause the total height to exceed allowable depth. Allowable depth must be determined using the largest shore in use.

End Shore Installation and Removal

Installation Procedure

- End Shores must be assembled prior to setting inside the trench.
- The trench shoring system leading up to the End Shore system must be in place prior to workers entering the excavation

Step 1 Set End Shore inside the excavation using appropriately sized lifting equipment and rigging as determined by a competent person.

Step 2 Pressurize hydraulics to minimum 1000 psi

Step 3 Set End Sheeting in place through the sheeting guide across the end of the trench

Step 4 The End Sheeting must be within 6" of the trench end. If the spacing is greater than 6", backfill between the sheeting and the trench wall with excavated soil or crushed rock.

Installation Procedure

Step 1 Rig End Shore for lifting

Step 2 Remove End Sheeting from outside the excavation

Step 3 Lift End Shore out using appropriately sized lifting equipment and rigging as determined by a competent person.

Safe Handling and Use of End Shore System

- When End Shores are set in trenches that are sloped above, extend the Shore 18" above the hinge point. Slopes shall be in accordance with OSHA Appendix B sloping and benching.
- When there is sloping beyond the top of the End Shore the excavation is limited to 20 ft without a design by a registered engineer.
- Provide safe access such as ladders for workers to enter and exit the shoring system.
- Use cables and slings for lifting that have a 5:1 factor of safety. A competent person is to determine the total lift weight.
- The trench shoring system leading up to the End Shore system must be in place prior to workers entering the excavation