



## HYDRAULIC ALUMINUM SHORING END SHORES TABULATED DATA 2 Enclosed Cylinder Sets Per Rail

### 1. General Information

- a. This End Shores Tabulated Data is based on The OSHA Safety requirements defined in 29 CFR, Part 1926, Subpart P - "Excavations and Trenches" for 2" Hydraulic Cylinders. Refer to Safe-T-Shore's Hydraulic Aluminum Shoring Tabulated Data with regards to hydraulic systems not discussed herein. This End Shores Tabulated Data shall govern when products from each system are combined.
- b. This data is to be used by a soils engineer, or a competent person. The competent person shall be experienced and knowledgeable of trenching and excavation procedures, the use of hydraulic shoring systems, soils identification, and the OSHA standards.
- c. The competent person shall continually monitor the excavation for signs of deterioration such as seepage of water or flowing soil into the excavation. Changing soil conditions may require adjustments to the shoring system.
- d. The tabulated data shall only be used for those soil conditions indicated and does not consider surcharge loads, such as, loads imposed by structures, equipment and stored materials adjacent to the trench. A two foot spoil pile may be deposited a minimum of 6 feet from the edge of the excavation. An engineered shoring design is required for conditions other than those so stated.
- e. When only the lower portion of a trench is to be shored and the remaining portion is benched or sloped at an angle steeper than three horizontal to one vertical (3H:1V), the shoring members shall be selected from the tabulated data for use at a depth which is determined from the top of the overall trench and not the toe of the sloped portion. Note that this only applies to 5' rails.
- f. The faces of the excavation shall be straight and near vertical. Shoring members must bear on firm soil. End Shores are required to bear against plywood sheeting for working depths greater than 6' deep (see diagram). Aluminum/ wood interfaces must be free from moisture, grease, and dirt. Pre-roughened surfaces or Safe-T-Shore's skid resistant bolt-on-rescue-type-rail-backers are strongly recommended for End Shores requiring plywood sheeting. Note that two sets of shoring are required for such situations, i.e., either (1) two sets of End-Shores for 4-sided pits, or (2) one set of End Shores at the end(s) of the trench and one set of Hydraulic Shores (or all End Shores may be used) at approximately 2' on centers from the End-Shores. Either system requires that both rail-sets have all four cylinders actuated and bear against the same plywood sheeting. End Shore Corrugated Sheeting shall be installed with no gap between the end of the trench (or pit) wall and the sheeting itself. Improper Backfilling is prohibited. This system is not designed for impact loadings. Contact Safe-T-Shore.
- g. Trenches shall be kept dry and free of water at all times
- h. Enclosed Cylinders shall have as a minimum 7x3x3/16 A-500 Gr.C (55 ksi yield) hollow rectangular tubing. Corrugated Aluminum Sheeting shall have as a minimum 6061-T6 with section modulus of 0.1027 cubic in. per in. Aluminum Rails shall have as a minimum 6061-T6 with section modulus of 0.7478 cubic inch.
- i. Pressurize End Shore Cylinders between 1200-1500 psi. Note that this higher pressure range shall be maintained to assure adequate thrust anchorage loads. End Shores that are required to bear against plywood sheeting (see diagram) shall have both cylinder-rail sets (all four cylinders) actuated to the 1200-1500 psi operating range and bear against the same plywood sheeting.



# HYDRAULIC ALUMINUM SHORING

## END SHORES TABULATED DATA

### 2 Enclosed Cylinder Sets Per Rail

- j. Plywood sheeting shall be 1.125" thick CDX or .75" thick, 14 ply, arctic birch. Note that the plywood is not intended as a structural member, but only for the prevention of local raveling or sloughing of the trench face between the shores.
- k. When plywood sheeting is used, it shall extend to the top of the excavation and to within 1 foot of the bottom of the excavation in Type A & B soils, and to the bottom of the trench in Type C-60 soils. See typical installation diagrams.
- l. Plywood sheeting, as referenced throughout this tabulated data may be substituted with other engineered sheeting, such as (1) 0.75 inch thick, 14 ply, white birch - Finland Form; also known as Metsaform, Wisiform and Chudoform, (2) 1.125 inch thick soft plywood, (\*3) 0.25 inch thick steel plate with a min. yield strength (fy) of 50,000 psi., (\*4) 0.3125 inch thick steel plate with a min. yield strength (fy) of 36,000 psi., (5) 0.75 inch thick, 13 ply, plywood consisting of both hardwood and soft wood veneers, known as OMNI FORM, (\*6) Efficiency 2-3/4" thick or 4-9/16" thick extruded aluminum Build-A-Box or XLAP panels (7) 0.75 inch thick Sentry Panel.

\*Note: Items so noted are for standard rails only. Not to be used with End Shores.

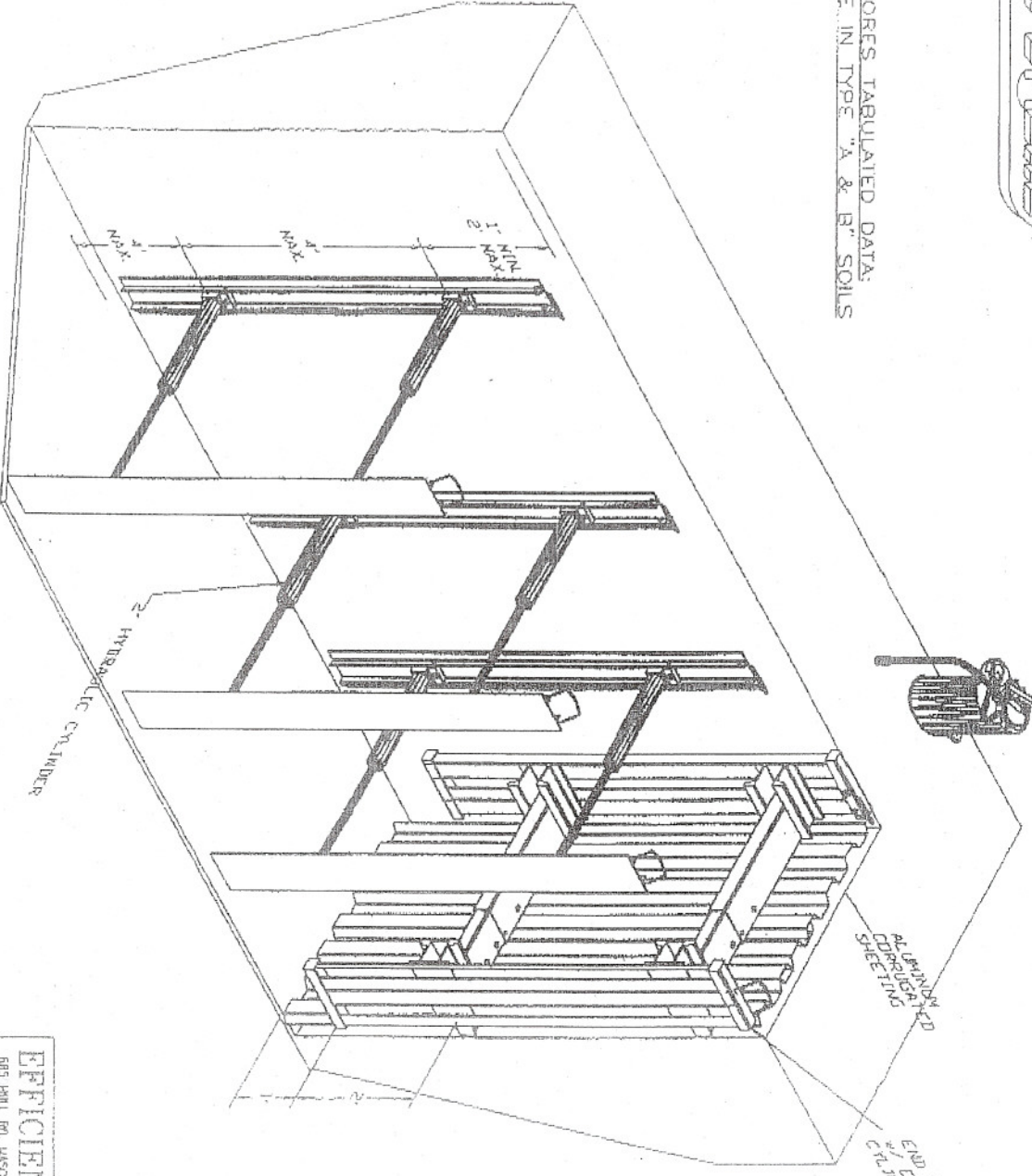
#### 2. Soil Classification

- a. The soil descriptions for OSHA Type "A", "B", & "C" soils are based on Appendix A to Subpart P of Part 1926. The Type "C-60" soil in the tabulated data represents a more stable soil condition than the Type "C" described in Appendix A.
- b. Type "A" Soil - Equivalent weight effect of 25 PSF per foot of depth.  
Description: Cohesive soil (i.e., silt, silty clay, sandy clay, clay loam) with an unconfined compressive strength of 1.5 TSF or greater; or cemented soils such as caliche and hardpan. No soil is Type A if the soil is fissured; subject to vibration from heavy traffic, pile driving or similar effects; has been previously disturbed; or part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater.
- c. Type "B" Soil - Equivalent weight effect of 45 PSF per foot of depth.  
Description: Cohesive soil with an unconfined compressive strength greater than .5 TSF but less than 1.5 TSF; and granular cohesionless soils including angular gravel, silt, silt loam, sandy loam, and in some cases, silty clay loam and sand clay loam; previously disturbed soils except those which would otherwise be classed as Type C; soil that meets requirements for Type A, but is fissured or subject to vibration; dry rock that is unstable; and material that is part of a layered system where layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
- d. Type "C-60" Soil - Equivalent weight effect of 60 PSF per foot of depth.  
Description: Soft cohesive to moist soil with an unconfined compressive strength less than .5 TSF; moist cohesive soil or moist dense sand which is not flowing or submerged. When cut with near vertical side walls, soil can stand with unsupported vertical sidewalls long enough for shoring installation. Note that Type "C-60" represents a more stable soil condition than the Type "C" as described in Appendix A, OSHA 29 CFR Part 1926, Subpart P.



# SAFE-T-SHORE

END SHORES TABULATED DATA:  
END SHORE IN TYPE "A" & "B" SOILS



- NOTES:
- 1) SEE MANUFACTURERS TABULATED DATA FOR CYLINDER SPACING & DEPTHS
  - 2) END SHORES MAY BE STACKED TO 25' DEEP PROVIDED CYLINDER SPACING DOES NOT EXCEED 48" ON CENTER

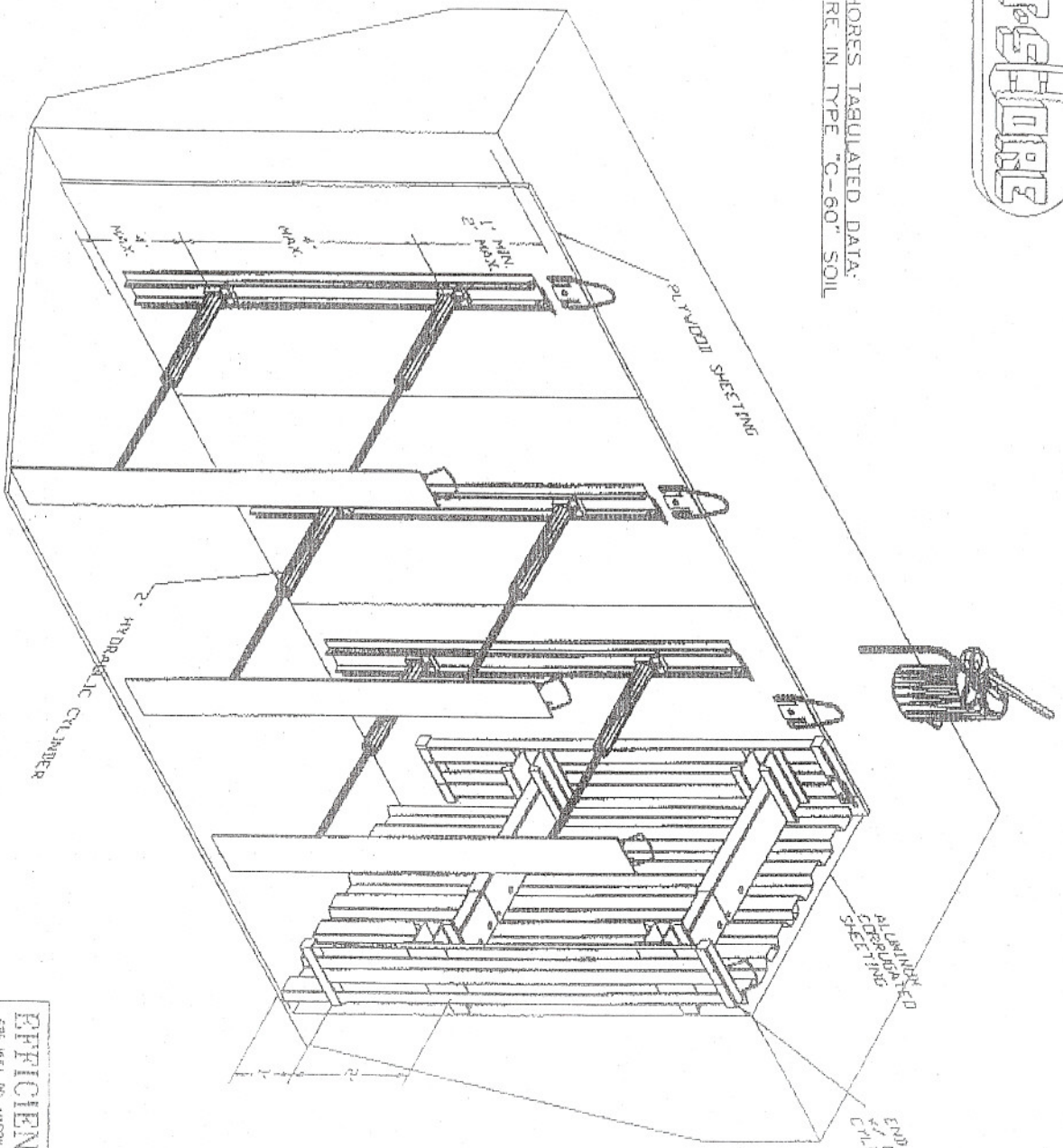
<b>EFFICIENCY PRODUCTION ID</b>	
DATE	3-29-2002
DWG. #	END SHORES
DRAWN BY	D. REHKOPP
PSF	N/A
S.O.#	N/A
PAGE	



SAFE-T-SHORE  
END SHORE  
with 2 HYDRAULIC CYLINDERS  
and STN'D DUTY

# SAFE-T-SHORE

END SHORES TABULATED DATA:  
END SHORE IN TYPE "C-60" SOIL



- NOTES:
- 1) SEE MANUFACTURERS TABULATED DATA FOR CYLINDER SPACING AND DEPTHS
  - 2) END SHORES MAY BE STACKED TO 25' DEEP PROVIDED CYLINDER SPACING DOES NOT EXCEED 48" ON CENTER

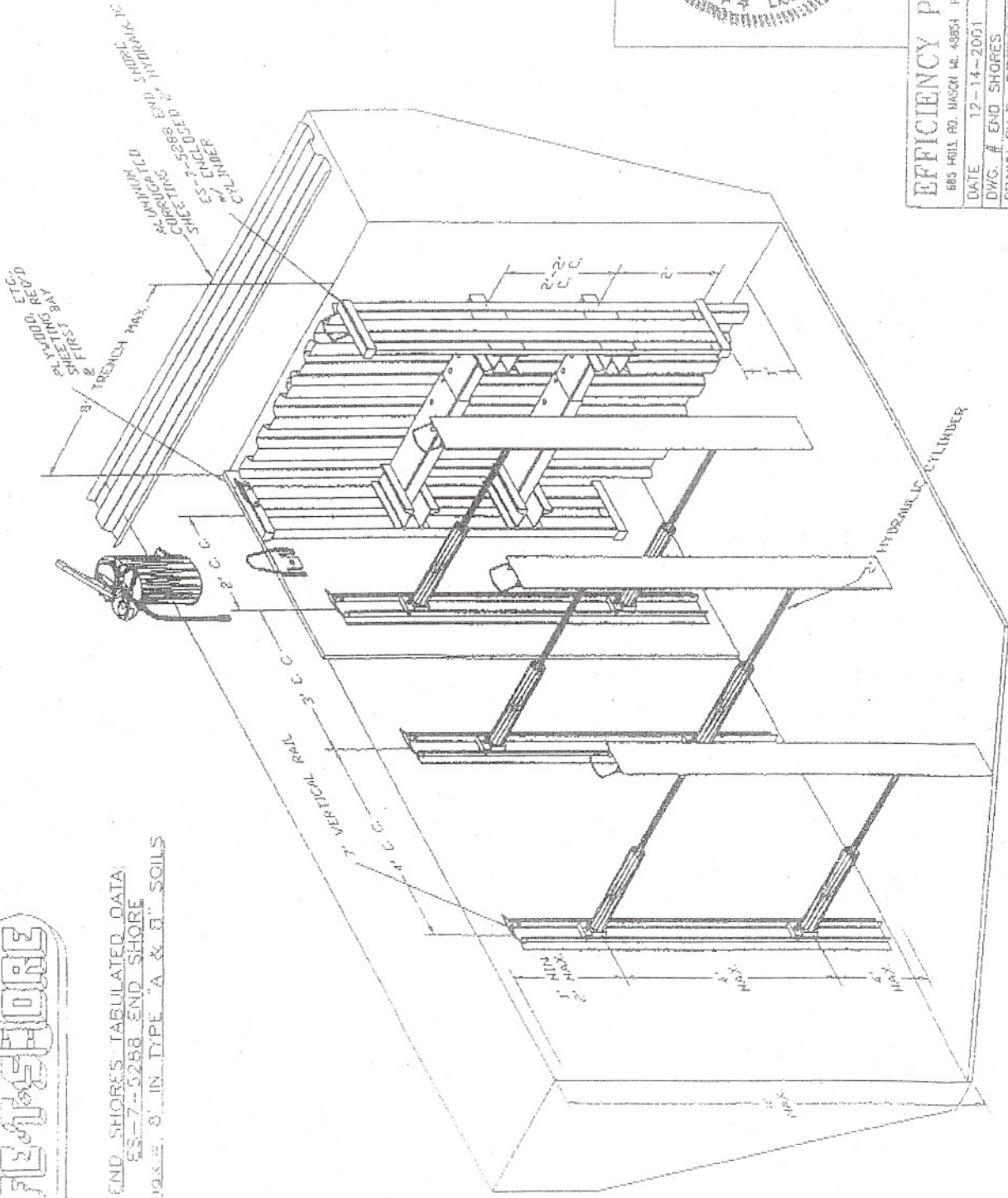
<b>EFFICIENCY PRODUCTION</b>	
655 HELL RD. SAUSD IN 43854 Ph. (517)-576-8900 FAX (517)	
DATE: 3-29-2012	
DWG. # END SHORES	
DRAWN BY D. REHKOPF	
PSF=N/A	
S.O.# N/A	PAGE:



SAFE-T-SHORE  
END SHO  
with 2 HYDRAULIC CYLINDER  
and SINO DUTY



END SHORES FABRICATED DATA:  
 SS-7-5288 END SHORE  
 DIMENSIONS 8" IN TYPE "A & B" SOILS



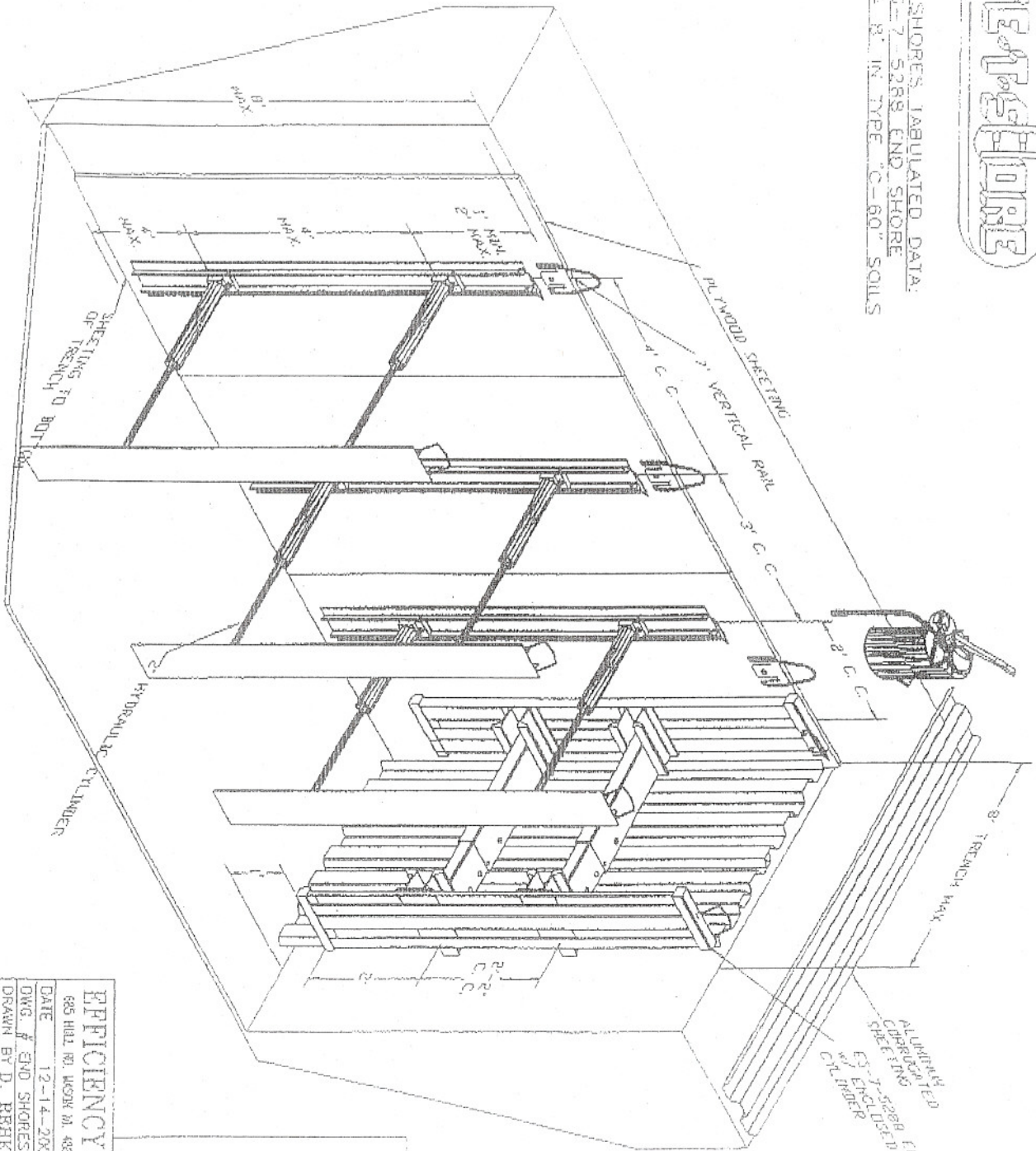
**EFFICIENCY PRODUCTION INC.**  
 685 HILLS RD. WILSON MD. 43684 Ph. (517)-676-8000 Fax (517) 676-037  
 DATE 12-14-2001  
 DWG. # END SHORES  
 DRAWN BY D. REHKOPF  
 PSF = N/A  
 S.O.F. N/A PAGE: 3

**SAFE-T-SHORE**  
 END SHORE  
 with 7" HYDRAULIC ENCLOSED CYLINDERS  
 and STD. DUTY RAIL



# SAFE-T-SHORE

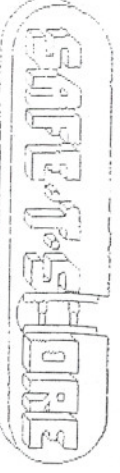
END SHORES, TABULATED DATA:  
ES-7, 52RS END SHORE  
HEIGHT = 8' IN. TYPE "C-60" SOILS



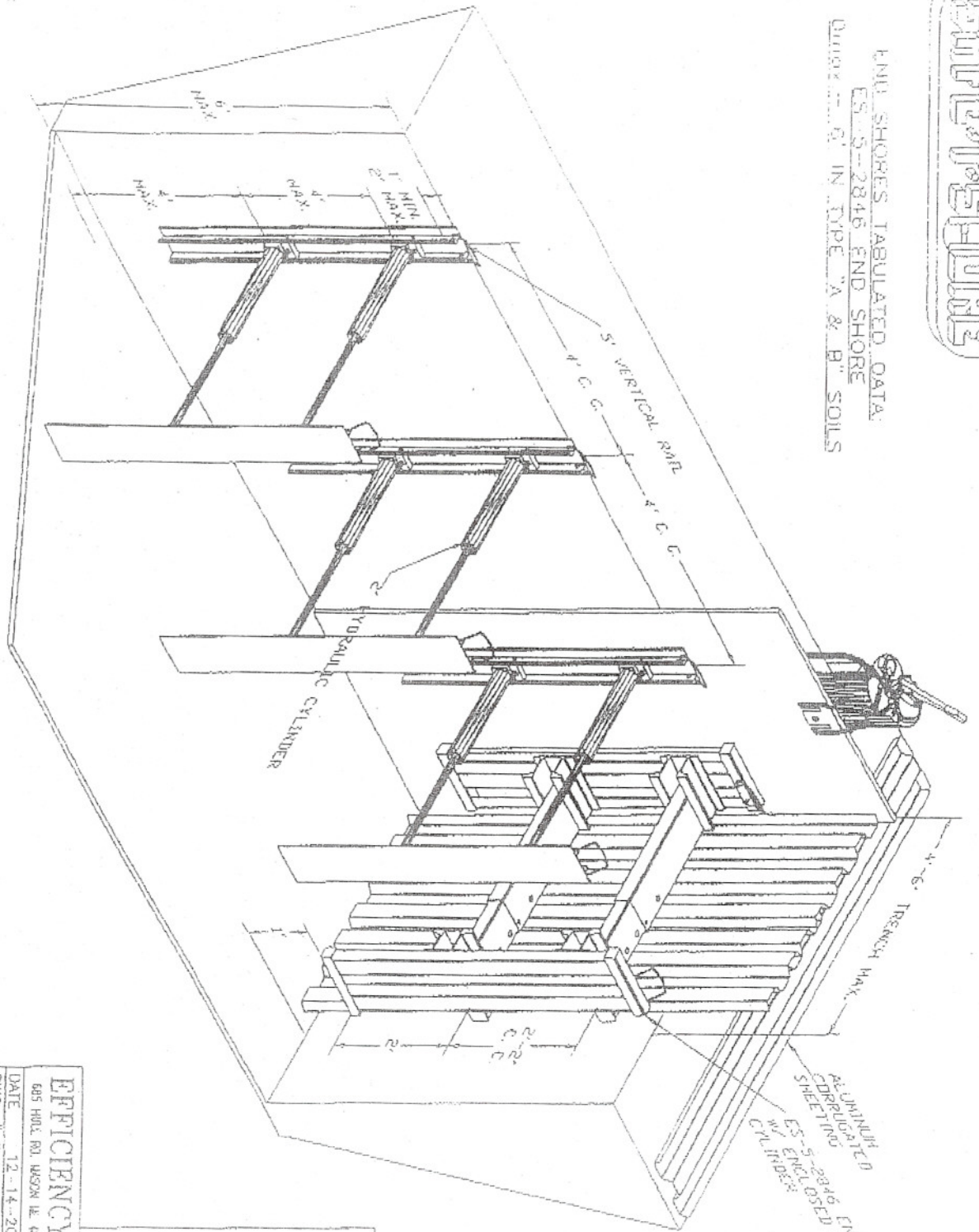
**EFFICIENCY PRODUCTION INC.**  
 685 HILL RD. WORK AL 48954 Ph. (517)-675-9900, Fax (517) 676-0  
 DATE: 12-14-2001  
 DWG. # END SHORES  
 DRAWN BY D. REBKOFF  
 P/SF=H/A  
 S.O.# N/A PAGE: 1

**SAFE-T-SHORE**  
 END SHORE  
 with 2 HYDRAULIC ENCLOSED CYLINDERS  
 and STAND DUTY RAILS





END SHORES TABULATED DATA:  
 ES-S-2846 END SHORE  
 DIMENSIONS: 6" IN TYPE "A" & "B" SOLES



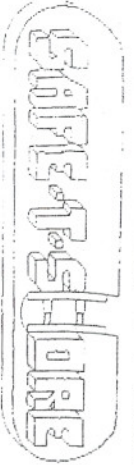
ES-S-2846 END SHORE  
 DIMENSIONS: 6" IN TYPE "A" & "B" SOLES

<b>EFFICIENCY PRODUCTION IN</b>	
DATE	12-14-2001
DWG. #	END SHORES
DRAWN BY	D. BEHKOPF
PSF	N/A
S.O. #	N/A
PAGE	5

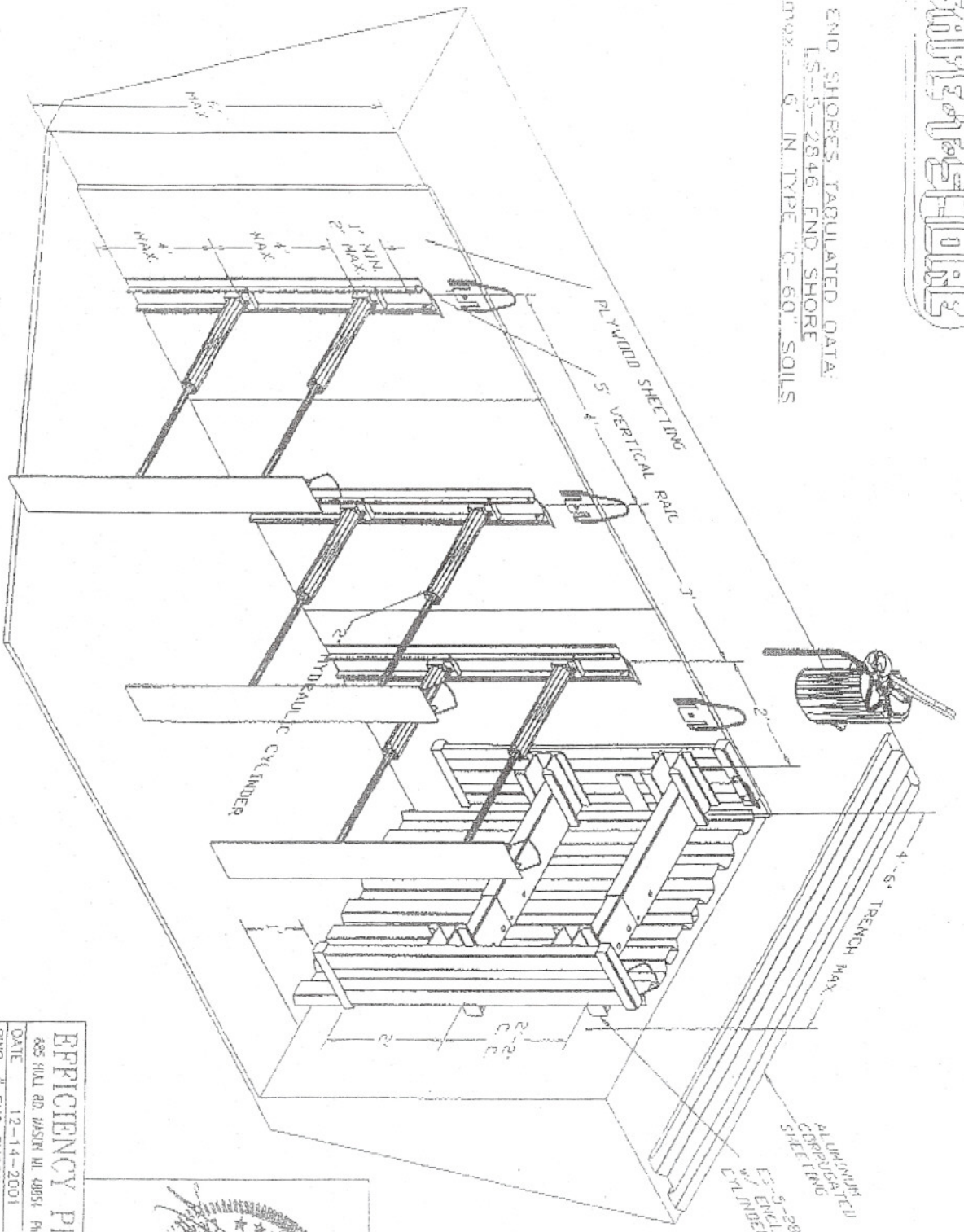


SAFE-T-SHORES  
 END SHORE  
 with 2" HYDRAULIC CYLINDER  
 and SIM'D DUTY F





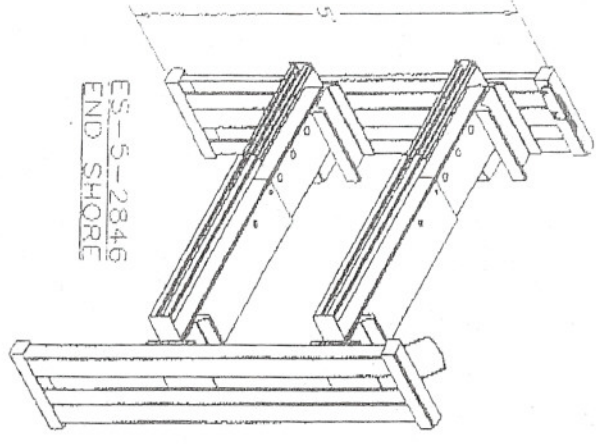
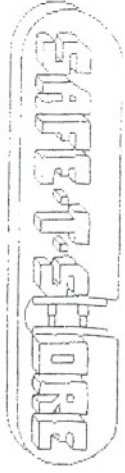
END SHORES, TABULATED DATA  
 L.S. = 5-2846 END SHORE  
 DIMS = 6" IN. TYPE "C-60" SOILS



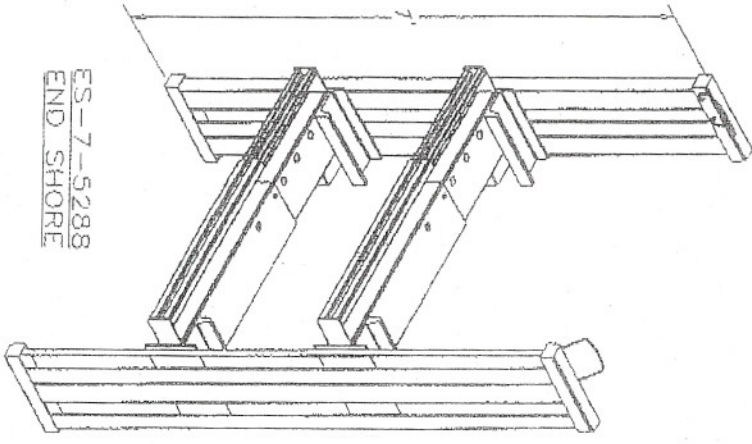
**EFFICIENCY PRODUCTION INC.**  
 805 HILL RD. WASTON MI 48854 Ph. (517)-676-8000 FAX (517) 676-007  
 DATE 12-14-2001  
 DWG. # END SHORES  
 DRAWN BY D. REHXOPF  
 PSF=N/A  
 S.O.F. N/A PAGE 1

**SAFE-T-SHORE**  
 END SHORE  
 with 7' HORIZONTAL CYCLOPS CHIM and STD. DUTY RAIL





ES-5-2846  
END SHORE



ES-7-5288  
END SHORE



EFFICIENCY PRODUCTION INC	
635 MILL RILL WAGON LA 48854 Ph. (517)-970-8800, Fax (517) 676-0	
DATE	12-14-2001
DWG. #	END SHORES
DRAWN BY	D. REHKOPP
PSF	N/A
S.O.P.	M/A
PAGE	7
SAFE-T-SHORE	
END SHORE	
with 1' RISE/SHOULDER SLOTTED ORG	
and STD. D. DUTY RA	