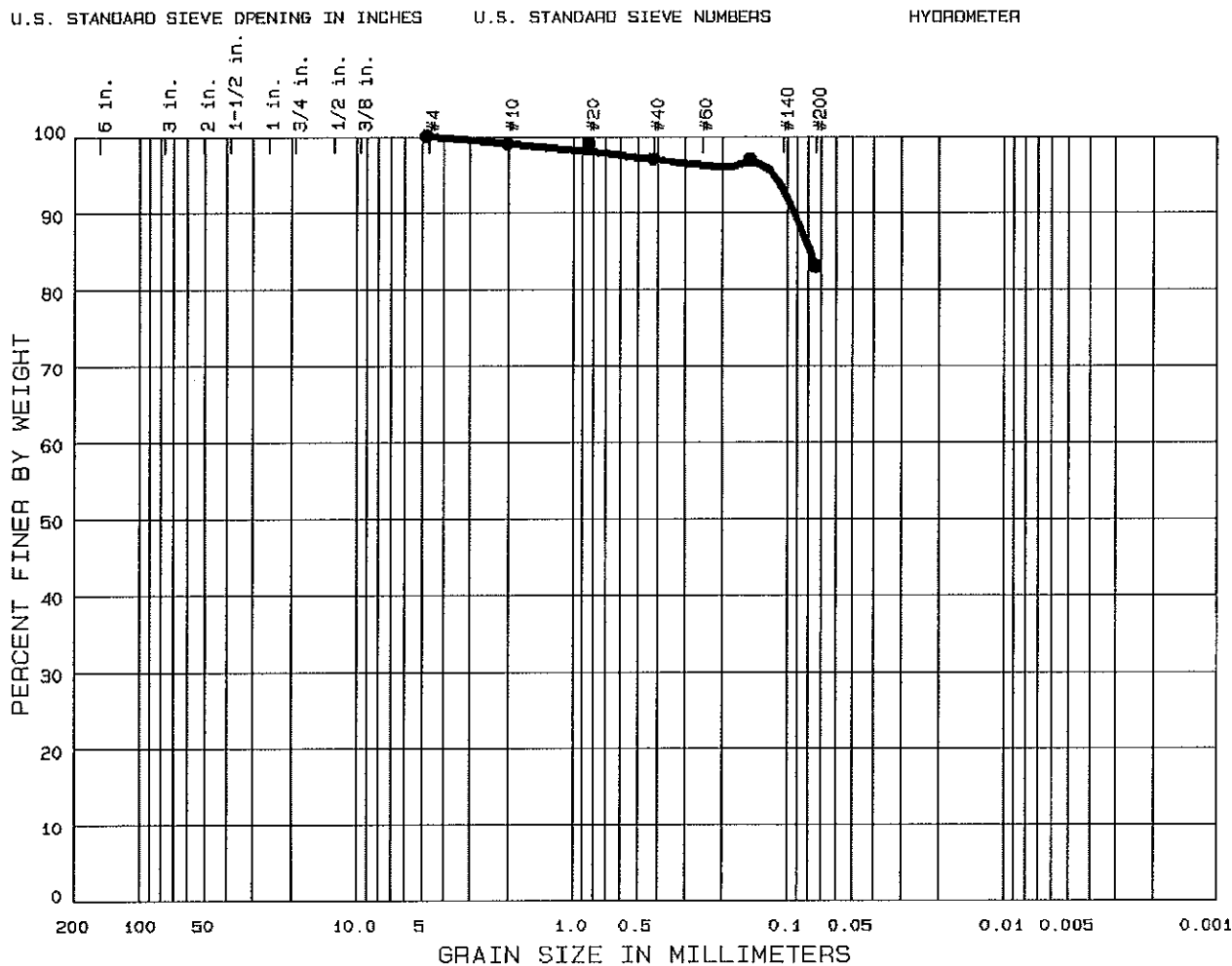


DEPARTMENT OF THE ARMY, SOUTHWESTERN DIVISION LABORATORY  
CORPS OF ENGINEERS, 4815 CASS STREET, DALLAS, TX 75235

W.O. No.  
Req. No.  
Contract No.



| % COBBLES | % GRAVEL | % SAND | % SILT OR CLAY |
|-----------|----------|--------|----------------|
| 0.0       | 0.0      | 17.0   | 83.0           |
|           |          |        |                |
|           |          |        |                |

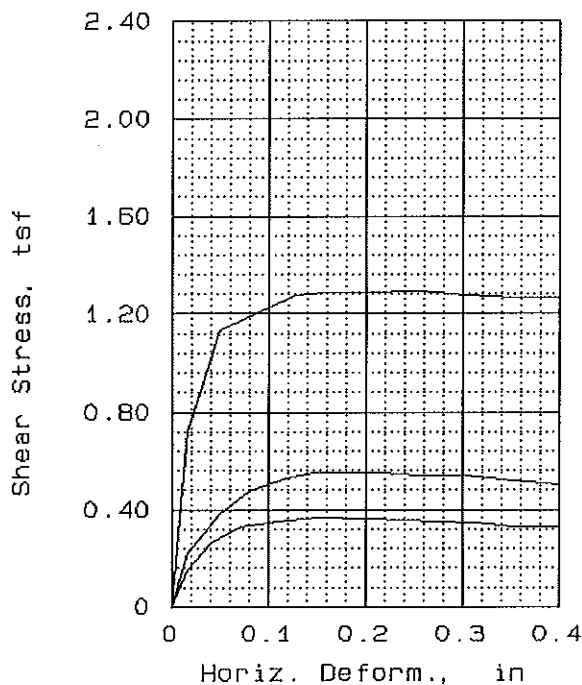
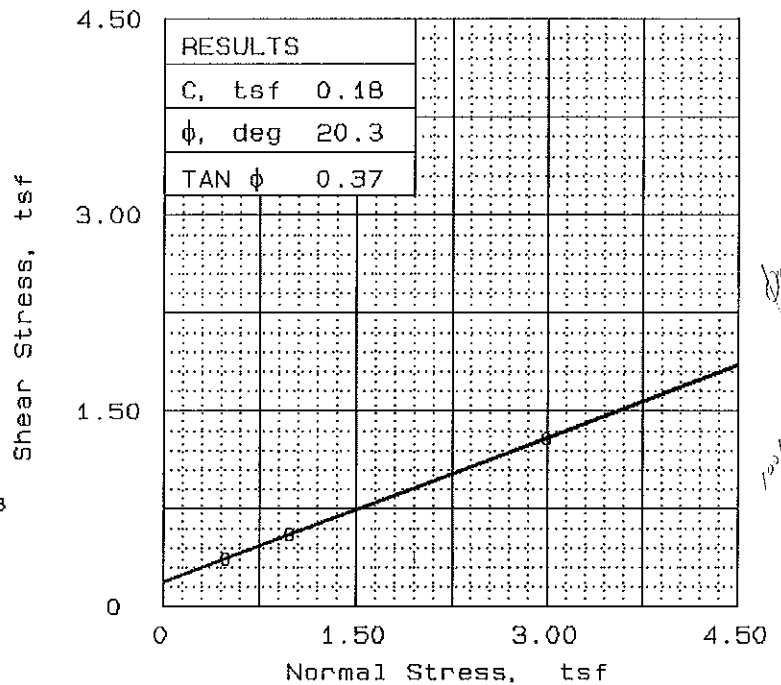
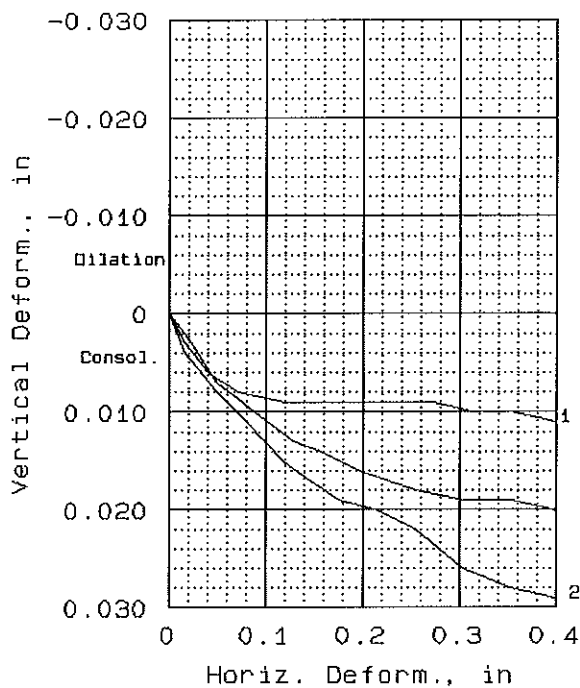
| Sample No. | Elev or Depth | Nat W% | LL | PL | PI | C <sub>c</sub> | C <sub>u</sub> |
|------------|---------------|--------|----|----|----|----------------|----------------|
| 91/2523    | 14.0-16.0     | 25.3   | 39 | 13 | 26 |                |                |
|            |               |        |    |    |    |                |                |
|            |               |        |    |    |    |                |                |

#### CLASSIFICATION

● LEAN CLAY WITH SAND (CL)

|          |                                                                                         |
|----------|-----------------------------------------------------------------------------------------|
| Remarks: | Project BRAYS BAYOU<br>FLOOD DAMAGE REDUCTION PROJECT<br>Lab No. SWDED-GL RPT NO. 15363 |
|          | Area                                                                                    |
|          | Boring No. 91-84      Date AUGUST 1991                                                  |

#### GRADATION CURVES



| SAMPLE NO.          |                  | 1     | 2     | 3     |
|---------------------|------------------|-------|-------|-------|
| INITIAL             | WATER CONTENT, % | 24.4  | 24.5  | 23.2  |
|                     | DRY DENSITY, pcf | 101.9 | 101.7 | 101.2 |
|                     | SATURATION, %    | 100.7 | 100.5 | 94.2  |
|                     | VOID RATIO       | 0.654 | 0.658 | 0.666 |
|                     | SIDE LENGTH, in  | 3.00  | 3.00  | 3.00  |
|                     | HEIGHT, in       | 1.00  | 1.00  | 1.00  |
| AT TEST             | WATER CONTENT, % | 23.7  | 23.3  | 23.0  |
|                     | DRY DENSITY, pcf | 105.1 | 106.2 | 107.1 |
|                     | SATURATION, %    | 106.1 | 107.3 | 108.1 |
|                     | VOID RATIO       | 0.604 | 0.587 | 0.574 |
|                     | SIDE LENGTH, in  | 3.39  | 3.39  | 3.39  |
|                     | HEIGHT, in       | 0.97  | 0.96  | 0.95  |
| NORMAL STRESS, tsf  |                  | 0.50  | 1.00  | 3.00  |
| MAX. SHEAR, tsf     |                  | 0.37  | 0.55  | 1.29  |
| STRAIN RATE, %/min. |                  | 0.002 | 0.002 | 0.002 |
| ULT. SHEAR, tsf     |                  |       |       |       |

#### SAMPLE DATA

SAMPLE TYPE: UNDISTURBED  
DESCRIPTION: LEAN CLAY WITH  
SAND (CL)

LL= 39 PL= 13 PI= 26.0

SPECIFIC GRAVITY= 2.70

REMARKS: SPECIFIC GRAVITY  
ESTIMATED.

CLIENT: US ARMY CORPS OF ENGINEERS  
GALVESTON DISTRICT

PROJECT: BRAYS BAYOU FLOOD DAMAGE  
REDUCTION PROJECT, HOUSTON, TX.

SAMPLE LOCATION: BORING: 91-84, CTN-8,  
15.2'-16.0', SWD LAB NO. 91/2523

PROJ. NO.: 15363

DATE: AUGUST 1991

DIRECT SHEAR TEST

**CORPS OF ENGINEERS - SOUTHWESTERN**

FIG. NO.

TABLE 1

## RESULTS OF TESTS OF DISTURBED AND UNDISTURBED SOIL SAMPLES

SWDED-GL REPORT NO. 15363 BRAYS BAYOU - FLOOD DAMAGE REDUCTION PROJECT

| BORING | NO. | SWD NO. | FLD NO. | DEPTH, FT   | GR | SA | FI | LL | PL | PI | LS | WC, % | PCF | MAJOR TESTS | DESCRIPTION OF MATERIAL                                                                                                                                                                          |
|--------|-----|---------|---------|-------------|----|----|----|----|----|----|----|-------|-----|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 91     | 77  | 91/2518 | CTN-5   | 8.0 - 10.0  | 2  | 17 | 81 | 67 | 16 | 51 |    | 18.0  | 110 | DS          | CH - FAT CLAY WITH SAND, GRAYISH BROWN MOTTLED WITH BROWNISH GRAY AND GRAY, MOIST, HARD(>4.0), NON-CALCAREOUS, IRON-OXIDE DEPOSITS, CALCAREOUS POCKETS, CALCAREOUS NODULES TO 1/2" IN BOTTOM 2". |
| 91     | 79  | 91/2519 | CTN-3   | 4.0 - 6.0   | 3  | 15 | 82 | 60 | 13 | 47 |    | 20.2  | 106 | DS          | CH - FAT CLAY WITH SAND, LIGHT GRAYISH BROWN MOTTLED WITH YELLOW AND GRAY, MOIST, VERY STIFF(2.0-2.5), NON-CALCAREOUS, IRON-OXIDE DEPOSITS, CALCAREOUS NODULES THROUGHOUT.                       |
| 91     | 79  | 91/2520 | CTN-10  | 18.0 - 20.0 | 0  | 24 | 76 | 35 | 12 | 23 |    | 18.3  | 110 | DS          | CL - LEAN CLAY WITH SAND, REDDISH YELLOW, MOIST, VERY STIFF(2.25), NON-CALCAREOUS, POCKETS OF GRAY VERY FINE SILTY SAND.                                                                         |
| 91     | 82  | 91/2521 | CTN-3   | 4.0 - 6.0   | 1  | 23 | 76 | 57 | 14 | 43 |    | 19.5  | 107 | DS          | CH - FAT CLAY WITH SAND, LIGHT GRAYISH BROWN MOTTLED WITH GRAY, MOIST, VERY STIFF(3.25), NON-CALCAREOUS, IRON-OXIDE DEPOSITS, CALCAREOUS NODULES AND GRAVELS TO 1".                              |
| 91     | 82  | 91/2522 | CTN-12  | 22.0 - 24.0 | 1  | 14 | 85 | 37 | 13 | 24 |    | 21.3  | 106 | DS          | CL - LEAN CLAY WITH SAND, LIGHT BROWN AND LIGHT GRAY, MOIST, VERY STIFF(2.25), NON-CALCAREOUS, A FEW GRAVELS, CALCAREOUS NODULES THROUGHOUT.                                                     |
| 91     | 84  | 91/2523 | CTN-8   | 14.0 - 16.0 | 0  | 17 | 83 | 39 | 13 | 26 |    | 25.3  | 98  | DS          | CL - LEAN CLAY WITH SAND, YELLOW AND GRAY, MOIST, SOFT(0.5), NON-CALCAREOUS, CALCAREOUS NODULES, SEAMS AND POCKETS THROUGHOUT, VERY SANDY IN TOP 1".                                             |
| 91     | 87  | 91/2524 | CTN-3   | 4.0 - 6.0   | 1  | 10 | 89 | 95 | 22 | 73 |    | 39.1  | 80  | DS          | CH - FAT CLAY, GRAY, MOIST, STIFF(1.5), NON-CALCAREOUS, IRON-OXIDE DEPOSITS, CALCAREOUS NODULES.                                                                                                 |
| 91     | 87  | 91/2525 | CTN-8   | 14.0 - 16.0 | 1  | 16 | 83 | 64 | 20 | 44 |    | 28.2  | 96  | DS          | CH - FAT CLAY WITH SAND, LIGHT GRAY AND BROWN AND OLIVE SPOTS, MOIST, VERY STIFF(2.25), NON-CALCAREOUS CALCAREOUS NODULES TO 1 1/2", IRON-OXIDE DEPOSITS, INDURATED THROUGHOUT.                  |