

Dr. Afifi's Deposition Documents



Consumers
Power
Company

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • (517) 788-0550

November 12, 1980

Mr. William D. Paton
Counsel for NRC Staff
United States Nuclear
Regulatory Commission
Washington, D. C. 20555

Dear Mr. Paton:

Attached herewith please find copies of documents requested in connection with your deposition of Dr. Sharif Afifi. I understand that Margaret Simpson copied those documents segregated by your associates from the provided files. If you have any problems with the copies, feel free to contact me at the above phone number.

Very truly yours,

Handwritten signature of James E. Brunner.

James E. Brunner

cc: Alan Farnall
Isham, Lincoln & Beale

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PDR FOIA
RICE84-96 PDR

Trip Report

DATE: February 20-24, 1978
LOCATION: Midland Units 1 & 2
Midland, Michigan
SUBJECT: Piezometer Installation
ATTENDEE: J. B. Givens - Geotech/Soils

Attached are original boring logs, piezometer as-builts, and daily field reports for the work performed by Raymond International at the Midland dike from February 20 through February 24.

Casagrande piezometers were placed at sections through the east and northeast dikes. Piezometer work at the east dike was completed except for the concreting of guard posts, concreting of piezometer surface casing, and installation of top caps and locks. Piezometer work remaining at the northeast dike section includes the installation of two piezometers and part of another, the installation of guard posts, the installation of top caps and locks, concreting of the piezometer surface casings for the piezometers already installed, and placing bentonite seals at the tops of the grout in P2-4 and P2-5. Observation wells 1 through 20 except for those wells which had rapid water inflow were completely bailed (see attached bailing record).

Work progress was slowed Wednesday when one driller injured his hand. Only the CME 750 drill rig was able to gain access to the piezometers at the toe of the river side of the northeast dike due to the clearance limit imposed by a bridge. This in itself did not result in a loss of time because the rig was coincidentally shut down due to the illness of the helper. A total of 23 rig hours were spent bailing water wells as directed by Bill Grubich (Bechtel subcontracts, Midland) following a phone conversation with Bill, myself, Dave Anderson (Bechtel, Ann Arbor), Roger Teuteborg (Consumers Power), and Bill Wheeler (Consumers Power, Midland). However, from this phone conversation, it appeared that it was neither Bechtel's nor Raymond's responsibility to bail the wells. (Bailing had been performed by Raymond immediately after installation.) It was necessary to bail the wells before the arrival of E.R.G. personnel on Monday, February 27, to take water samples.

Temperatures were very cold except for slight warming Friday. Snow flurries were intermittent all week, and it snowed heavily Friday afternoon.

JBG/lag

OBSERVATION WELL BAILING RECORD*

<u>Well Number</u>	<u>Depth (ft)</u>	<u>Date</u>	<u>Remarks</u>
1	33	2/24/78	
2	101	2/24/78	
3	235	2/24/78	**
4	55	2/23/78	
5	220	2/23/78	**
6	33	2/22/78	
7	120	2/23/78	** Large Quantity of Natural Sand Mixed with Bailed Water ✓
✓ 8	180	2/23/78	**
9	27	2/23/78	
10	173	2/23/78	**Bailed to Within 5 ft. of Bottom
11	35	2/23/78	**
12	155	2/23/78	**Bailed to Within 2 ft. - 3 ft. from Bottom
13	195	2/23/78	**
14	33	2/23/78	
15	150	2/23/78	Hose Previously Broke and Lodged In Hole-Could not Use Bailing Bucket. ✓
16	33	2/23/78	
17	185	2/23/78	**
18	110	2/23/78	**
19	—	—	#19 was not Installed.
20	150	2/23/78	**

*Note: Holes were first blown out with compressed air and then bailed with a bailing bucket.

**Note: Could not bail completely because of rapid water inflow.

58800670



BECHTEL DAILY FIELD REPORT

JOB NO. 7220-001
 REVISION NO. 0 (92)
 DATE 2/20/73
 PAGE 1 OF 1

CONTRACTOR RAYMOND SUPERINTENDENT G ROCK
 TIME STARTED 0730 TIME STOPPED 1730 WEATHER PARTLY CLOUDY, COLD, LIGHT WIND
 BECHTEL ENGINEER/GEOLOGIST JERRY GIVENS

RIGS				RIG CREWS		REMARKS
NO.	TYPE	MAKE	RIG TIME	OPERATOR	HELPERS (No.)	
1	B-61	MOBILE	10	HAMMAN	1	PZ-5
3	750	CME	10	HOLLOMAN	1	PI-10, PI-9

HOLE NO.	SOIL DRILLING					ROCK DRILLING					SAMPLES		
	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	NO.
PI-9	AUGER	10"	0	5	5'								

MISCELLANEOUS ACTIVITY	RIG NO.	HOURS	REMARKS
MOVING - MAKING SET-UPS	3	1/2	PI-10 TO PI-9
CASING REMOVAL/INSTALLATION			
PIEZOMETER INSTALLATION (INCLUDES DRILLING)	3, 1	4.57	PI-10, PI-9 PZ-5
HAULING WATER			
TEST EXCAVATION			
BACK FILLING			
DOWNTIME			

OTHER ACTIVITIES: BEGIN AND END DAY - EACH RIG 1 HR. 1/2
 UNLOADING PIPE | GETTING CEMENT - RIG 3, 1 HR
 OVERTIME: RIG 3; 3 1/2 HRS RIG 1, 2 HRS
 STANDBY MATERIALS: RIG 3 - 1 BAG SAND, 1 BOX BENT. BALLS, 2 BAG CEMENT, 1 POROUS STONE PIEZ. (PI-10)
 RIG 1 - 1 BAG SAND, 1 BOX BENT. BALLS, 1 POROUS STONE PIEZ. (PZ-5) 25-00671

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BECHTEL INCORPORATED

BECHTEL DAILY FIELD REPORT

JOB NO. 7220-001
 REVISION NO. 0 (93)
 DATE 2/21/78
 PAGE 1 OF 1

CONTRACTOR PAYNOR SUPERINTENDENT G. ROCK
 TIME STARTED 0730 TIME STOPPED 1730 WEATHER PARTLY CLOUDY; WINDY; LIGHT SNOW;
 BECHTEL ENGINEER/GEOLOGIST JERRY B. GIVENS COLD

RIGS				RIG CREWS		REMARKS
NO.	TYPE	MAKE	RIG TIME	OPERATOR	HELPERS (No.)	
1	B-61	MOBILE	10	HAMMAN	1	PZ-5, PZ-4
3	750	CME	10	HOLLOMAN	1	P1-9, PZ-X

HOLE NO.	SOIL DRILLING					ROCK DRILLING					SAMPLES		
	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	NO.
PZ-4	AUGER	6"	0	8	8						SS	2'	1
		4"	8	28	20						SS	2"	4
P1-9	AUGER	10"	5	8.5	3						SS	2"	1
		4"	8.5	15'10"	7'4"						SS	2"	2

MISCELLANEOUS ACTIVITY	RIG NO.	HOURS	REMARKS
MOVING - MAKING SET-UPS	1 / 3	1/2 / 1	PZ-5 TO PZ-4 / P1-9 TO GUARD POSTS TO PZ-X
CASING REMOVAL/INSTALLATION			
PIEZOMETER INSTALLATION (INCLUDES DRILLING)	1 / 3	8/2 / 8	
HAULING WATER	1, 3	1/2 ea.	
TEST EXCAVATION			
BACK FILLING			
DOWNTIME			

OTHER ACTIVITIES: WELDER WAS OUT TO WORK ON CAPS, LOCKS, ETC.
 ~ 1/2 HR. CR. RIG AT ETO AND BEGINNING OF DAY

OVERTIME MATERIALS: RIG 3 - 3 BAGS CEMENT, 1 BOX BENTONITE PELLETS, 1 BAG OTTAWA SAND, 1 CAS. POR. STONE

STANDBY NOTE-2 GUARD POSTS = 21' PIEZ., 16 GUARD POSTS, 10' 6" CASING
 RIG 1 - 3 BAGS CEMENT, 1 BOX BENT. PELLETS, 1 BAG QUICK GEL, 1 BAG SAND, 2-8" CAPS, 16" CAP, 3 LOCKS, 10' 6" CASING, 1 CAS. POR. PIEZ.



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BECHTEL DAILY FIELD REPORT

JOB NO. 7220-001REVISION NO. 0 (94)DATE 2/22/73PAGE 1 OF 1

CONTRACTOR RAYMOND INT'L SUPERINTENDENT G ROCK
 TIME STARTED 0730 TIME STOPPED 1730 WEATHER PTLY CLOUDY; WINDY; COLD; SNOW FLURRIES
 BECHTEL ENGINEER/GEOLOGIST JERRY GIVENS

RIGS				RIG CREWS		REMARKS
NO.	TYPE	MAKE	RIG TIME	OPERATOR	HELPERS (No.)	
1	B-61	MOBILE	3	HAMMAN	1	PZ-4 *
3	750	CME	10	HOLLOMAN	1 + 2 *	PZ-8, "BAILING" W COMPRESSED AIR (RIG NOT USED TO "BAIL")

HOLE NO.	SOIL DRILLING					ROCK DRILLING					SAMPLES		
	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	NO.
PZ-8	AUGER	12"	0	8	8						SS	2"	1
	AUGER	4"	8	15	7						SS	2"	2

MISCELLANEOUS ACTIVITY	RIG NO.	HOURS	REMARKS
MOVING - MAKING SET-UPS	3	1/2	SET UP ON PZ-8
CASING REMOVAL/INSTALLATION			
PIEZOMETER INSTALLATION (INCLUDES DRILLING)	3 / 1	2.5 / 3	
HAULING WATER			
TEST EXCAVATION			
BACK FILLING			
DOWNTIME			

OTHER ACTIVITIES: RIG 3: WAITING 2 HRS. FOR ACCESS TO PZ-8 (CLEARED BY DOZER, TWO LOADS OF SAND TRUCKED IN); S.S HAS BAILING OUT WATER WELLS 1-20.
 WELDS OUT TO MAKE ON COPS 53900573

* STANDBY NOTE: HAMMAN INJURED HIS HAND AND LEFT AT 1030. HIS HELPER COMPLETED THE DAY WITH HOLLOMAN.

MATERIALS: RIG 3 - 10' OF 6" CASING; 4 TANKS COMPRESSED AIR
 RIG 1 - 1 BOX BENT. PELLETS, 1 BAG CEMENT

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BECHTEL DAILY FIELD REPORT

 JOB NO. 7220-001
 REVISION NO. 0.95
 DATE 2/23/78
 PAGE 1 OF 1

 CONTRACTOR RAYMOND INT'L SUPERINTENDENT G. ROCK
 TIME STARTED 0730 TIME STOPPED 1730 WEATHER PFLY CLDY; COLD SNOW FLURRIES
 BECHTEL ENGINEER/GEOLOGIST JERRY S. GIVENS

RIGS				RIG CREWS		REMARKS
NO.	TYPE	MAKE	RIG TIME	OPERATOR	HELPERS (No.)	
1	B-61	MOBILE	10	HAMMAN	1	BAILING WATER WELLS
3	750	CME	10	HOLLOMAN	1	BAILING, PZ-8

HOLE NO.	SOIL DRILLING					ROCK DRILLING					SAMPLES		
	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	NO.
PZ-8	ROLLER BIT	5"	15	36	21						SS	2"	4

MISCELLANEOUS ACTIVITY	RIG NO.	HOURS	REMARKS
MOVING - MAKING SET-UPS	1/3	35/2.5	MOVING TO AND FROM WELLS
CASING REMOVAL/INSTALLATION			
PIEZOMETER INSTALLATION (INCLUDES BAILING)	3	5.5	PZ-8
HAULING WATER	3	1/2	
TEST EXCAVATION			
BACK FILLING			
DOWNTIME			

 OTHER ACTIVITIES: ⁴ RIG 3: BAILING WATER WELLS 8 HRS

RIG 1: BAILING WATER WELLS 10 HRS

OVERTIME: BULLDOZER CUT ROAD FOR RIG 1 (1 HR.) BECHTEL

STANDBY: MATERIALS: RIG 3 1 BAG REVERT

5500

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BECHTEL INCORPORATED

BECHTEL DAILY FIELD REPORT

JOB NO. 7220-001REVISION NO. 0(94)DATE 2/24/73PAGE 1 OF 1CONTRACTOR RAYMOND INT'L SUPERINTENDENT G. ROLLTIME STARTED 0730 TIME STOPPED 1530 WEATHER COLD (HARSHING); SNOWBECHTEL ENGINEER/GEOLOGIST JERRY B. GIVENS

RIGS				RIG CREWS		REMARKS
NO.	TYPE	MAKE	RIG TIME	OPERATOR	HELPERS (No.)	
1	B-61	MOBILE	3.5*	HAMMAN	1	* BAILING WATER WELLS
3	750	CME	8	HOLLOMAN	1	P2-9, P2-7

* HELPER FOR RIG 1 WAS ILL STARTING AT 1100 - ONLY 3.5 RIG HRS.

HOLE NO.	SOIL DRILLING					ROCK DRILLING					SAMPLES		
	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	FROM	TO	FEET	TYPE	SIZE	NO.
P2-7	AUGER	12"	0	8	8						SS	2"	1
	AUGER	5"	8	16	8						SS	2"	2

MISCELLANEOUS ACTIVITY	RIG NO.	HOURS	REMARKS
MOVING - MAKING SET-UPS	1 / 3	2 / 1/2	WAIT FOR CORE / P2-9 TO P2-7 TO CLEAR
CASING REMOVAL/INSTALLATION			
PIEZOMETER INSTALLATION			
HAULING WATER			
TEST EXCAVATION			
BACK FILLING			
DOWNTIME			

OTHER ACTIVITIES: RIG 1 - BAILING WATER WELLS #1, 2, 3

OVERTIME

MATERIALS: RIG 3: 20' OF 6" BLACK STEEL PIPE, 2 BAGS SAND,
3 BAGS CEMENT, 1 BOX BENTONITE PELLETS
1 CASAGRANDE POROUS STONE PIEZOMETER

35:00 P.M.

REMARKS

BORING LOG		PROJECT MIDLAND UNITS 1-2	JOB NO. 7220	SHEET NO. 1	HOLE NO. P1-9
NOTE EAST ONE STA 25+50		COORDINATES ABOUT 100' NORTH OF OUTLET STRUCT.	ANGLE FROM HORIZ. VERT.		READING —
BEGUN 2/23/73	COMPLETED 2/21/73	DRILLER D. L. SMITH	DRILL MAKE AND MODEL CME 750	HOLE DIA. 10"	OVERBURDEN (FT.) —
CORE RECOVERY (PT. %)	CORE LOSS	DEPTH TO TOP OF CASING 3	GROUND EL. ~ 60+	DEPTH TO GROUND WATER NONE	DEPTH TO TOP OF ROCK —
SAMPLE NUMBER WEIGHT/FALL 140# / 50 IN.		CASING LEFT IN HOLE: DIA. LENGTH 11" x 6" BLACK STEEL PIPE		LOGGED BY JERRY B. GIVENS	

SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE (FT.)	SAMPLER RECOVERY CORE RECOVERY (%)	SAMPLER BLOW "M"	PERCENT CORE RECOVERY	PENETRATION BLOWS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVEL, WATER RETURN, CHARACTER OF DRILLING, ETC.
					1ST 5"	2ND 5"	3RD 5"						
	25 1/8"	13"	49	12	20	29	~ 60'	35 1/5			1	0'-1' FROZEN 0'-3" BROWN HARD SILTY, VERY SANDY CLAY W ABOUT 20% GRAVEL (MAX. SIZE 1/2"), LOW PLASTICITY, LOW MOISTURE (W ~ 10%)	10" AUGER TO 3 1/2 FT., BESAM SAMPLING, W/ 55 @ 3 1/2 FT. PUSHED CASING TO 5', THEN AUGER TO 15' - NO WATER IN HOLE AFTER AUGERING (SURFACE CASING WAS 11" DIA. BLACK STEEL PIPE)
	25 1/8"	16"	100+	55	80	100 1/4		35 1/9.9			2	W ~ 25%	
	25 1/8"	18"	100+	49	63	70		35 1/15			3	1" STONE	
												TOTAL DEPTH 15' 0"	

33800676

RECORDED

BORING LOG				PROJECT	JOB NO.	SHEET NO.	HOLE NO.					
NORTH-EAST OIL				MIDLAND UNITS 142	7020	10	P2-4					
DATE		COMPLETION		APPROX. LOCATION	APPROX. DEPTH	READING						
2/21/78		2/22/78		55627, E 2520 (L. M. T. 150)	VECT.	—						
DRUM	COMPLETED	DRILLER	DRILL MAKE AND MODEL		HOLE SIZE	OVERBURDEN	TOTAL DEPTH					
2/21/78	2/22/78	APPROX.	MOBILE 8-1		6" 1/2	—	28					
CORE RECOVERY (%)		CORE DEPTH (FEET)	EL. TOP OF CASING	ROUND EL.	DEPTH OF GROUND WATER		DEPTH EL. TOP OF ROCK					
—		5	~ 634	~ 632	NONE		—					
SAMPLE NUMBER HEIGHT/PAV.		SANDS LEFT IN HOLE: DIA./LENGTH		LOGGED BY:								
140 #/30 IN.		11" OF 6" BULL PIPE		JOHN B. GIERIS								
SAMPLE TYPE AND DIAMETER	SAMPLE ADVANCE LENGTH (CORE #)	SAMPLE RECOVERY (%)	PERCENT CORE RECOVERY	PENETRATION BLOWS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVEL, WATER RETURN, CHARACTER OF BORING, ETC.
				1ST	2ND	3RD						
25s 18" 18"	7	1	2	5			5' / 16.5		1	0-12.5' BROWN VERT SANDY CLAY, LOW MOISTURE (W~20%), LOW PLASTICITY (PI~20), MEDIUM STIFF (CL)	AUGER 6" OD HOLE, PLACE 11" OF 6" CASING, BEGIN AUGERING W/ 4" AUGER, 4" AUGER TO 28'	
25s 18" 13"	21	4	8	13			9' / 12.5			9-12.5' BROWN FINE TO MEDIUM SILTY SAND, LOW MOISTURE (W~15%), TRAIL TO LITTLE FINE GRAVEL (SM)	NO WATER IN HOLE AT END OF DRILLING	
25s 18" 18"	22	5	9	13			15' / 16.5		3	12.5' 25.5% FINE SANDY CLAY, LOW PLASTICITY, LOW MOISTURE (W~25%), VERT STIFF TRAIL FINE GRAVEL (CL)		
25s 18" 18"	35	5	12	23			23' / 12.5			20.5-28' BROWN SILTY SAND (FINE TO MED.) N TRAIL TO LITTLE FINE GRAVEL, LOW MOISTURE, DENSE TO VERY DENSE (SM/SP)		
25s 18" 18"	71	10	34	37			25' / 26.5		5			
											TOTAL DEPTH 28'	
											53800677	
<small>SB = SPLIT SPEND ST = SHELBY TUBS O = OILWELL P = HYDRAULIC S = OTHER</small>											MIDLAND UNITS 142	HOLE NO. P2-4

RECORD

BORING LOG		PROJECT MIDLAND UNITS 142	JOB NO. 7220	SHEET NO. 1 of 1	HOLE NO. P2-7
SITE NIGHT-EAST DIKE		COORDINATES APPROX 5500' E 2500' (EAST OF D.I.E. AT DIKE TO SOUTHWEST)		ANGLE FROM NORTH, GRAVING VERT	
REQD 2/24/78	COMPLETED 2/24/78	DRILLER HOLLOWAY	DRILL MAKE AND MODEL ONE 750	HOLE SIZE OVERSIZES (PT) 2 1/2"	TOTAL DEPTH
CORE RECOVERY (PT)	CORE RECOVERY SAMPLES	EL TOP OF CASING	GROUND EL	DEPTH TO GROUND WATER	DEPTH EL TOP OF ROCK
	3	~600	~600	11' ~ 593	
SAMPLE HANDED WEIGHT/TALS 140 = / 50 IN.		CASING LEFT IN HOLE: DIA./LENGTH 6" CASING / 10'		LOGGED BY: JERRY B. GIVENS	

SAMPLER TYPE AND NUMBER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLER RECOVERED	SAMPLER FLOW	PERCENT LOG RECOVERY	PENETRATION BLOWS			ELEVATION	DEPTH	DESCRIPTIVE LOG SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
					1ST 6"	2ND 6"	3RD 6"					
								~1.72				
255	13	13	53	13	21	37			3.5 / 5	1	0'-3.5' LIGHT BROWN VERY SANDY CLAY, LOW MOISTURE, LOW PLAST. ABOUT 15% FINE GRAVEL, MAX. SIZE ABOUT 1", HARD (CL)	AUGER 12" HOLE TO 3' 5" HOLE TO 16' SET 10' OF 6" CASING
255	18	18	60	15	24	36			3.5 / 10	6	2' GREY VERY SANDY CLAY LOW MEDIUM MOISTURE, LOW PLAST. 5 TO 10% GRAVEL, MAX SIZE 1/2", HARD (CL)	HIT WATER AT ABOUT 11'
255	17	17	100	55	70	100			13.5 / 15	3	12-16' GREY FINE TO MEDIUM SAND, MOIST, DENSE (SP)	TOTAL DEPTH = 16'

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RECNTE

BORING LOG

PROJECT: MIDLAND UNITS 1+2
 LOG NO.: 7220
 SHEET NO.: 1-1
 HOLE NO.: PZ-8

NAME: NORTHEAST DIKE
 COORDINATES: APPROX. 5527, E 2500 (AT THE END OF DIKE)
 ANGLE FROM MERID.: VERT.
 BEARING: —

DRAWN: 2/22/78
 COMPLETED: 2/24/78
 DRILLER: HOLLIMAN
 DRILL MAKE AND MODEL: CHE 750
 HOLE SIZE OVERBURDEN (IN.): 8 1/2"
 HOLES (IN.): —
 TOTAL DEPTH: 36'

CORE RECOVERY (%): —
 CORE DESCRIPTIONS: 7
 FILTER OF CASING: ~600
 GROUND EL: ~604
 DEPTH/EL. GROUND WATER: 6' (EL. 534)
 DEPTH/EL. TOP OF ROCK: —

SAMPLE HARDER WEIGHT/PALM: 140#/30 IN.
 CASING LEFT IN HOLE: 10' OF 6" CASING
 LOGGED BY: HERLI B. GIVENS

SAMPLE TYPE AND DIAMETER	SAMPLE ADVANCE LENGTH CURS	SAMPLE RECOVERY	SAMPLE BLOWS	PENETRATION BLOWS			ELEVATION	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVEL, WATER RETURN, CHARACTER OF GRILLING, ETC.
				1ST 5"	END 5"	100"						
							~604					
235	13"	18"	42	12	13	24		35.5	1	0-12.5' LIGHT BROWN VERY SANDY CLAY, ABOUT 15% FINE GRAVEL, W ~ 15%, LOW PLASTICITY, FEEL STIFF TO HARD (CL)	12" AUGER TO 8', SET 10' OF 6" CASING;	
255	13"	13"	73	23	34	39		85.5/10	2	8'-12.5' HARD, GRAY, SANDY, PEBBLES TO 1"	THEN AUGER WITH 4" AUGER	
250	17"	17"	100 ^T	22	47	100 ^S		13.5/15	3	12.5'-20.5' GRAY POORLY SORTED FINE TO MEDIUM SAND, VERY DENSE MOIST (SP)	NO WATER IN HOLE TO 15'	
255	13"	13"	100 ^T	22	53	100		18.5/20	4	13.5'-20.5' VERY FINE TO FINE	WATER IN HOLE ABOUT 6' BELOW GROUND SURFACE	
255	13"	13"	100 ^T	63	74	105		23.5/25	5	20.5'-36' GRAY VERY FINE SILT SAND TO SANDY SILT, MOIST VERY DENSE (SM/ML)	BEFORE DRILLING RESUMED ON 2/23 (HOLE CAVED IN SOME PARTS SURFACE AND ON 2/22) THIS BEGAN DRILLING WITH ROTARY AND REWER 3" - 15" (5" BIT)	
255	13"	13"	100 ^T	53	52	53		27.5/30	6		TOTAL DEPTH = 36'	
255	13"	13"	100 ^T	35	60	73		33.5/35	7			

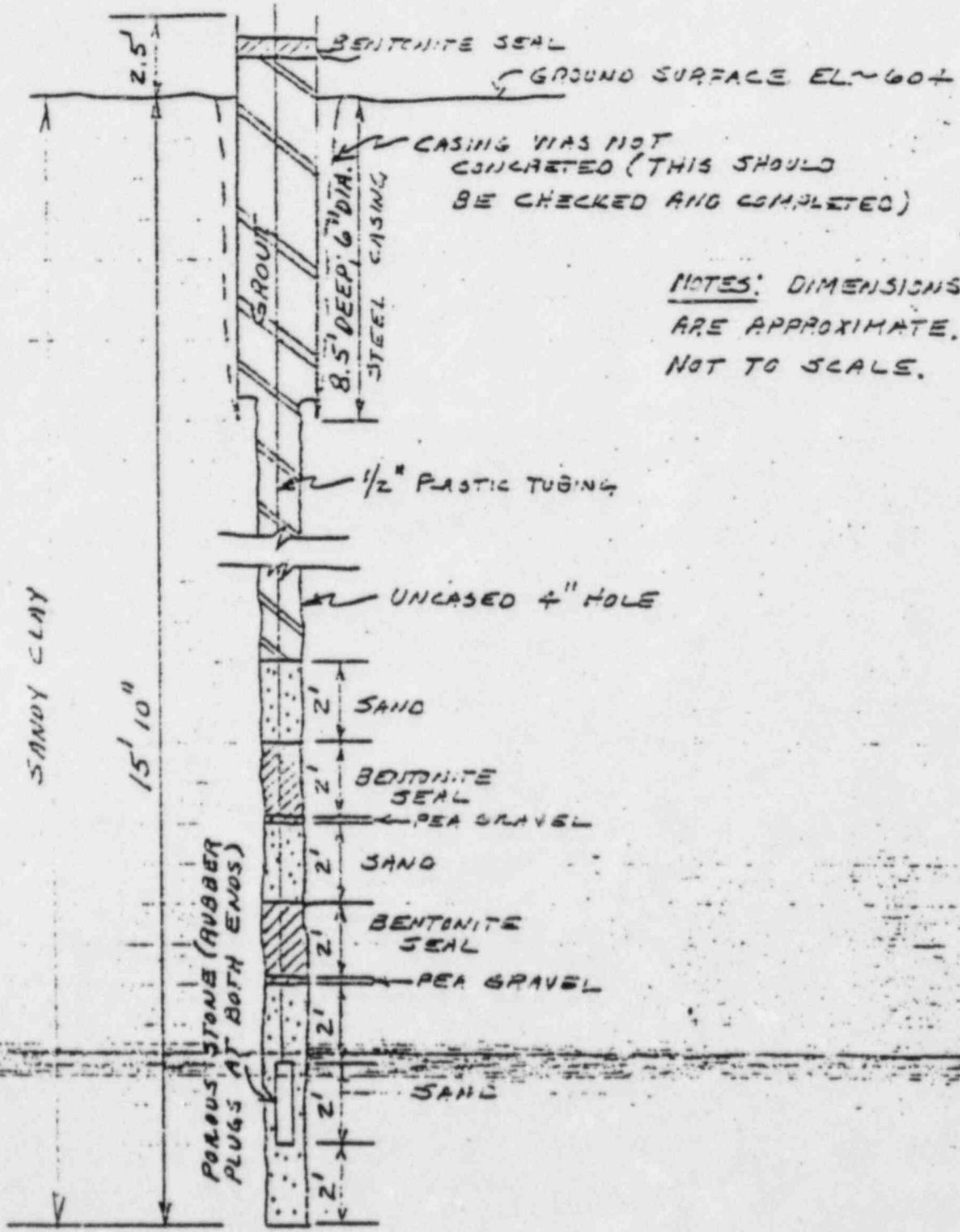
57800679

CASAGRANDE PIEZOMETER NO. PI-9

MIDLAND UNITS I AND II

PIERD. LOCATION: ABOUT 30' FROM TOE
OF THE RIVER SIDE OF THE EAST DIKE

JERRY B. GIVENS. INSTALLED: 2/20/73-2/21/73



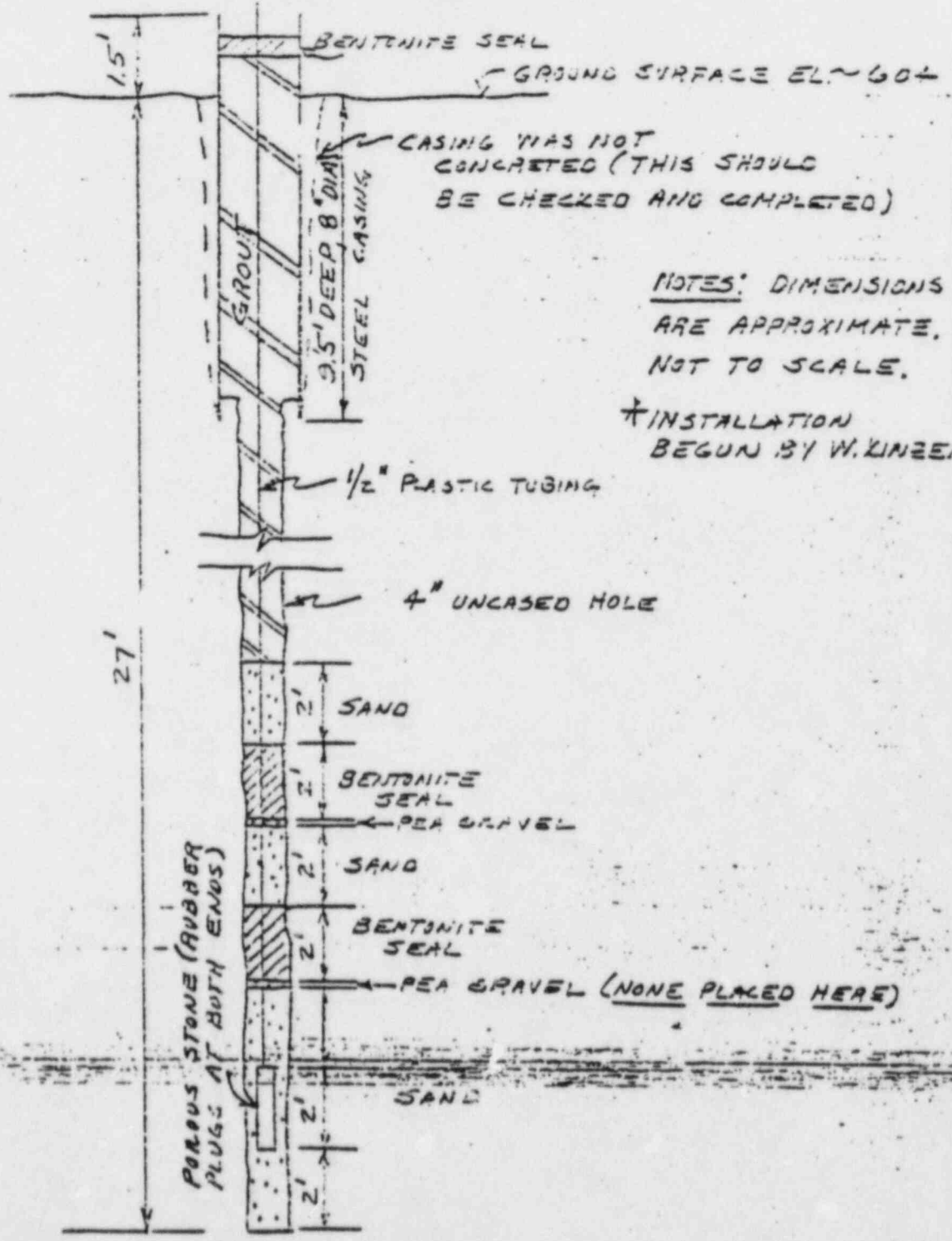
NOTES: DIMENSIONS ARE APPROXIMATE, NOT TO SCALE.

CASAGRANDE PIEZOMETER NO. P1-10

MIDLAND UNITS 1 AND 2

PIEZO. LOCATION: ABOUT 30' FROM TOE
OF THE RIVER SIDE OF THE EAST DIKE

JERRY B. GIVENS* INSTALLED: 2/17/78-2/20/78



CASING WAS NOT
CONCRETED (THIS SHOULD
BE CHECKED AND COMPLETED)

NOTES: DIMENSIONS
ARE APPROXIMATE,
NOT TO SCALE.

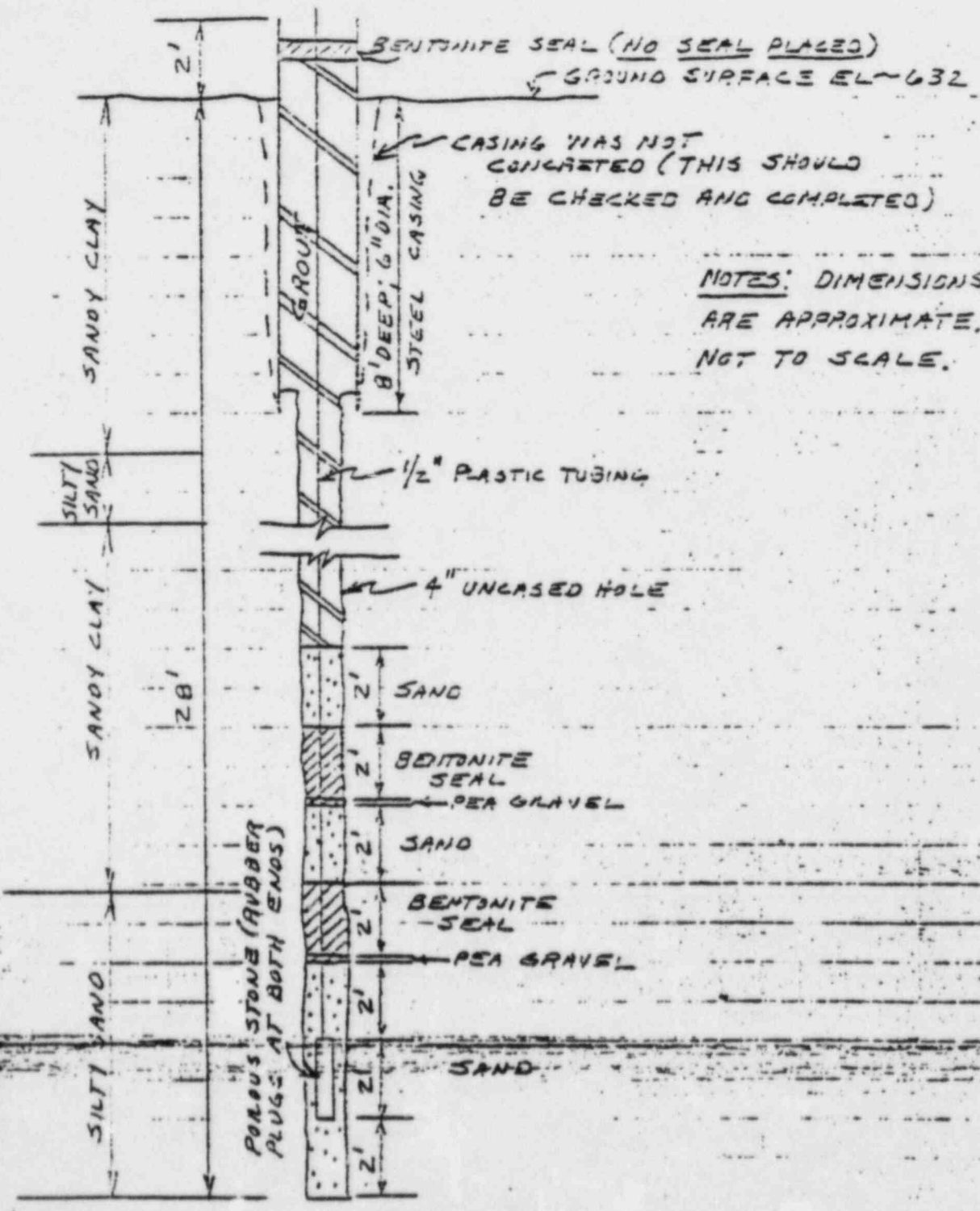
*INSTALLATION
BEGUN BY W. KINEER

CASPIAN PIEZOMETER NO. PZ-4

MIDLAND UNITS 1 AND 2

PIEZO. LOCATION: AT NORTHEAST EDGE
OF TOP OF NORTHEAST DIKE

JERRY B. GIVENS INSTALLED: 2/2/79-2/22/79



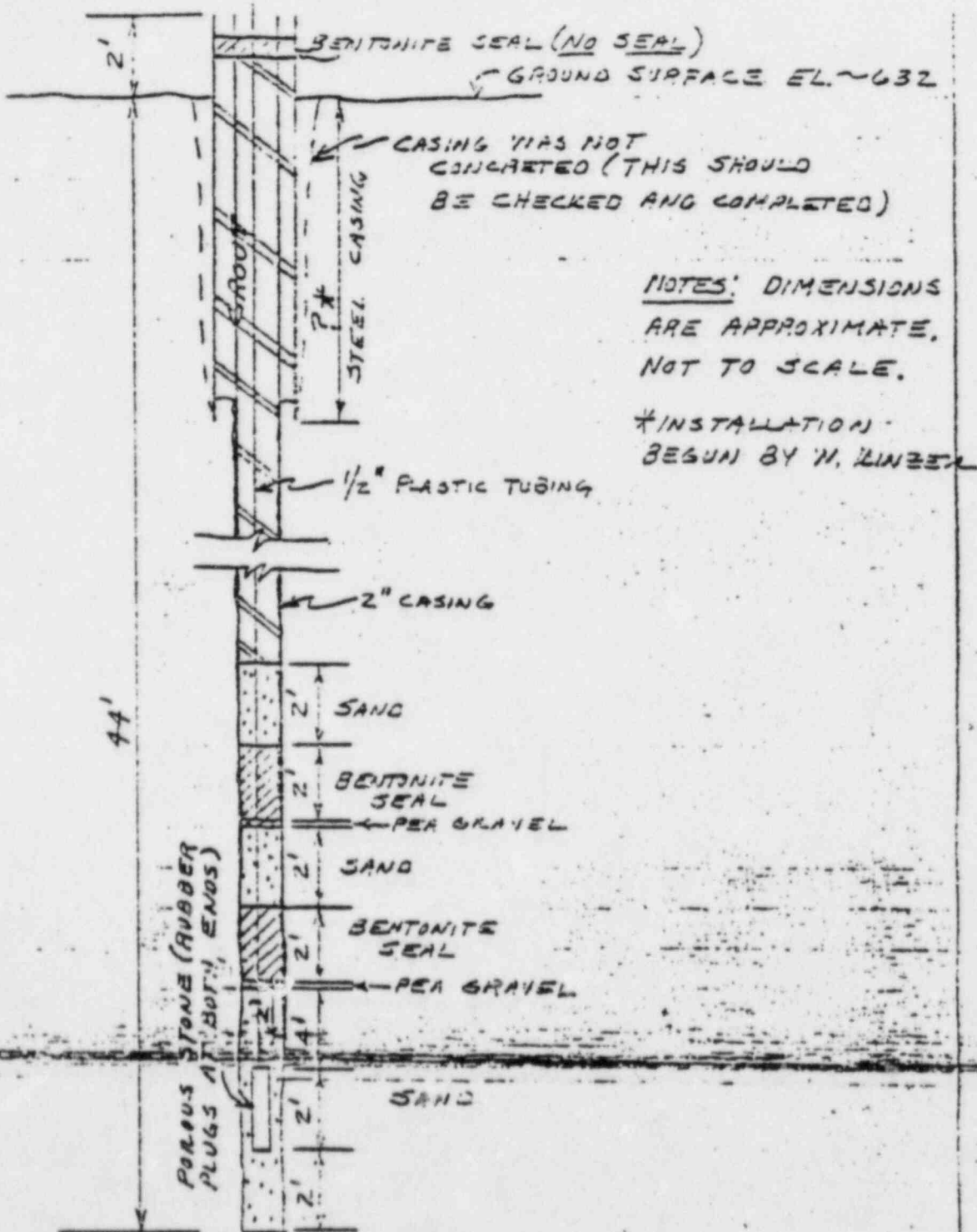
NOTES: DIMENSIONS ARE APPROXIMATE, NOT TO SCALE.

CASAGLIANI PIEROMETER NO. PZ-5

MIDLAND UNITS 1 AND 2

PIEZO. LOCATION: NORTHEAST EDGE OF
TOP OF NORTHEAST DIKE

JERRY B. GIVENS* INSTALLED: 2/17/78-2/21/78



NOTES: DIMENSIONS
ARE APPROXIMATE,
NOT TO SCALE.

*INSTALLATION
BEGUN BY W. LINZEL

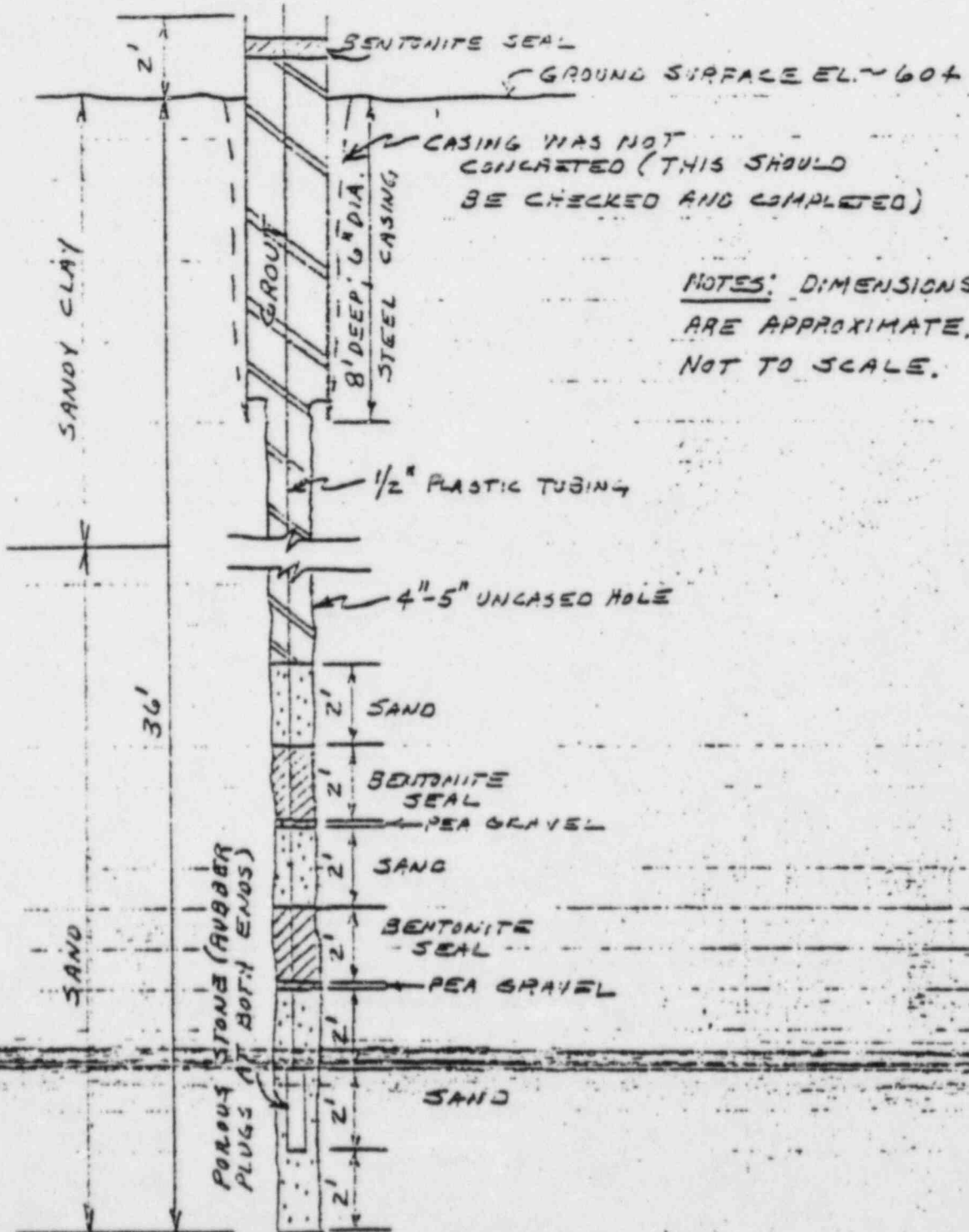
CASAGRANDE PIEZOMETER NO. PZ-8

MIDLAND UNITS 1 AND 2

PIEZO. LOCATION: AT EAST TOE OF
NORTHEAST DIKE

JERRY B. GIVENS

INSTALLED: 2/22/73-2/24/73



NOTES: DIMENSIONS ARE APPROXIMATE, NOT TO SCALE.

Bechtel Associates Professional Corporation

Inter-office Memorandum

To R. L. Castleberry Date 16 August 1974

Subject Midland Units 1 & 2, Job 7220 From ~~XXXXXXXXXX~~

Elastic Moduli of Plant Foundation Soils Of Geotechnical Services

Copies to J. H. Allen K. Wiedner At Ann Arbor - E

J. C. Hink C. Yan

R. Rixford 1320,3410

N. J. Tuholski

This is in response to your memo of July 18, 1974 requesting information on the stress-strain relationship for long term static analysis to be used for a finite element computer run. The material contained herein was transmitted informally on August 8, 1974.

Thus far, we evaluated the moduli from the consolidation tests and also empirically from the unconfined compression test results in Dames & Moore's Preliminary Foundation Investigation (June 28, 1968).

Composite stress-strain plots of the constrained modulus of elasticity (D) for soils above and below Elevation 550 are attached. These were derived from the consolidation tests. A conversion curve for evaluating Young's modulus E from the constrained modulus D is also attached. We recommend that a poisons ratio of 0.4 be used for the insitu clayey soils in this conversion. It is noted that the shape of the stress-strain curves attached are partly imposed by the nature of the consolidation test.

Young's modulus of elasticity (E) has also been shown to be approximately equal to 600 times the undrained shear strength. Based on this, Young's modulus can be taken as 3000 ksf above Elevation 550 and 5000 ksf below Elevation 550. A bilinear stress-strain relation cannot be produced in this case.

We have also contacted Dames & Moore to obtain the stress-strain curves derived from triaxial and unconfined shear strength testing. We anticipate receiving these data at any time. The modulus of elasticity evaluated from these tests may provide a more reliable estimate for the insitu soils. We will transmit these data and our evaluation as soon as they are complete.

We believe this information is adequate for your parametric evaluation for now. We anticipate further discussions after you have had the opportunity to make you initial runs.

Shaw S. Affi
S. S. Affi

POISSON'S RATIO μ

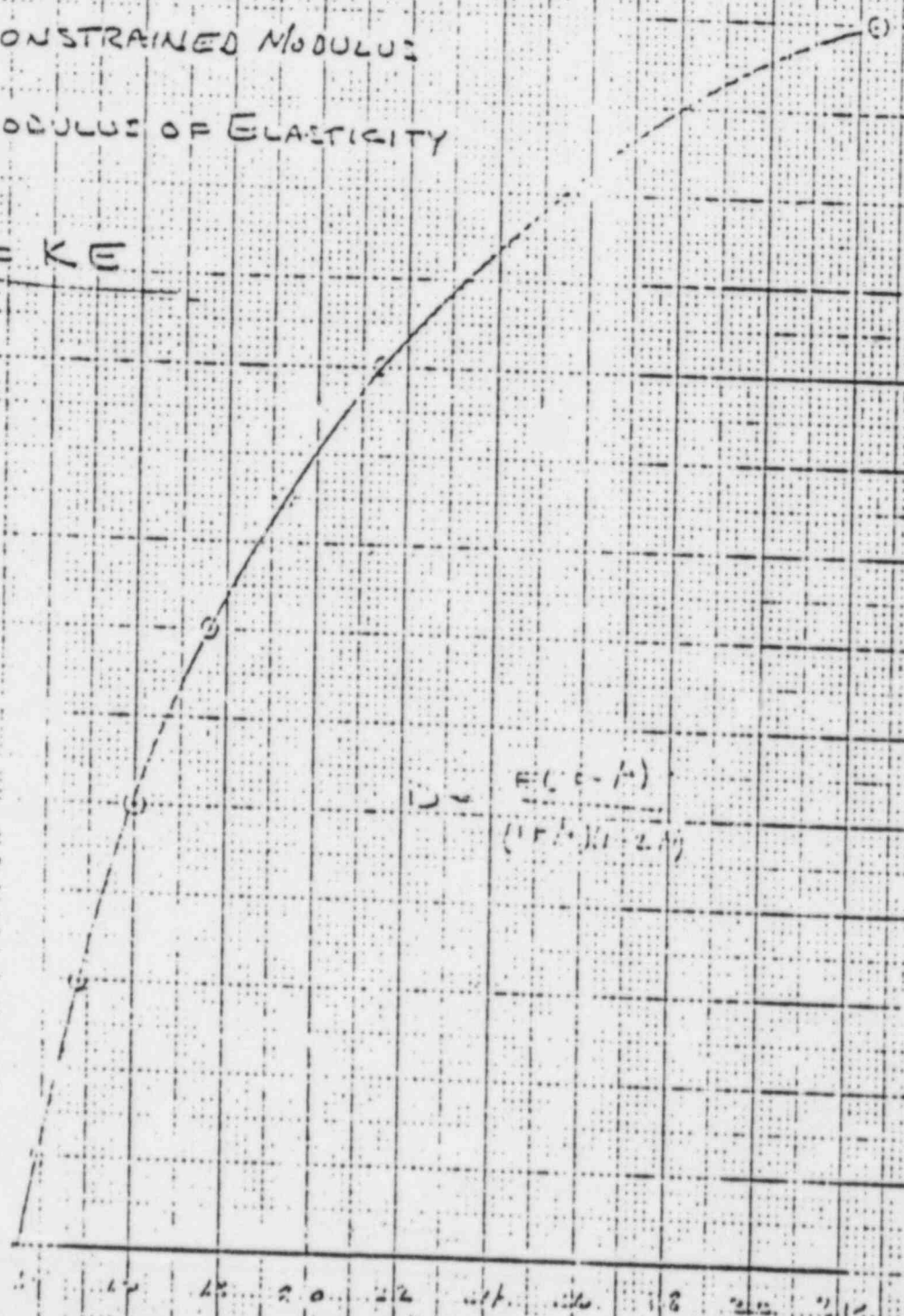
$\mu = 0.19 - 1.11$
 $\mu = 0.20 - \infty$

$D =$ CONSTRAINED MODULUS

$E =$ MODULUS OF ELASTICITY

$$D = K E$$

$$K = \frac{E(1-\mu^2)}{(1+\mu)(1-2\mu)}$$

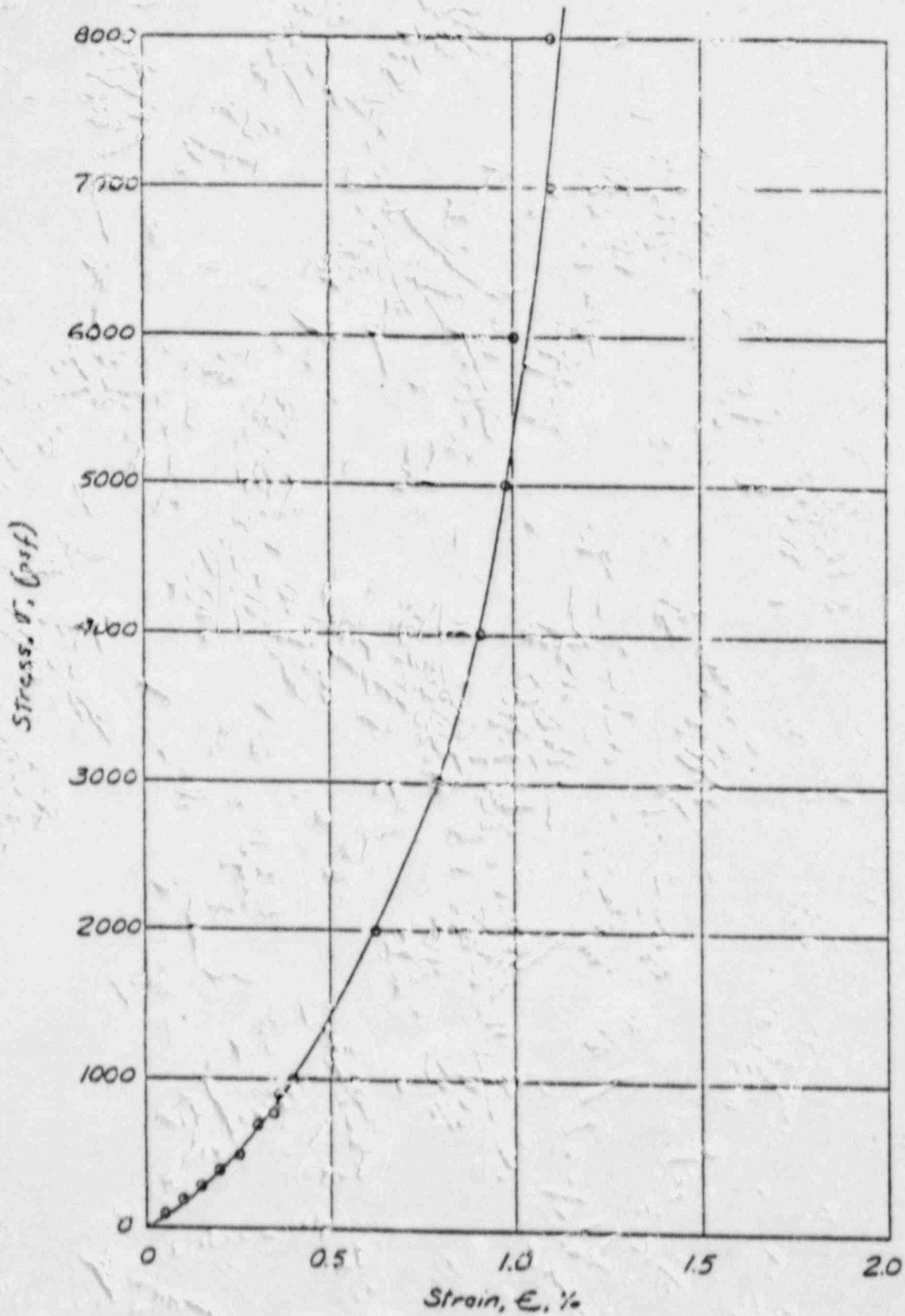


"K" FACTOR

SBS00240

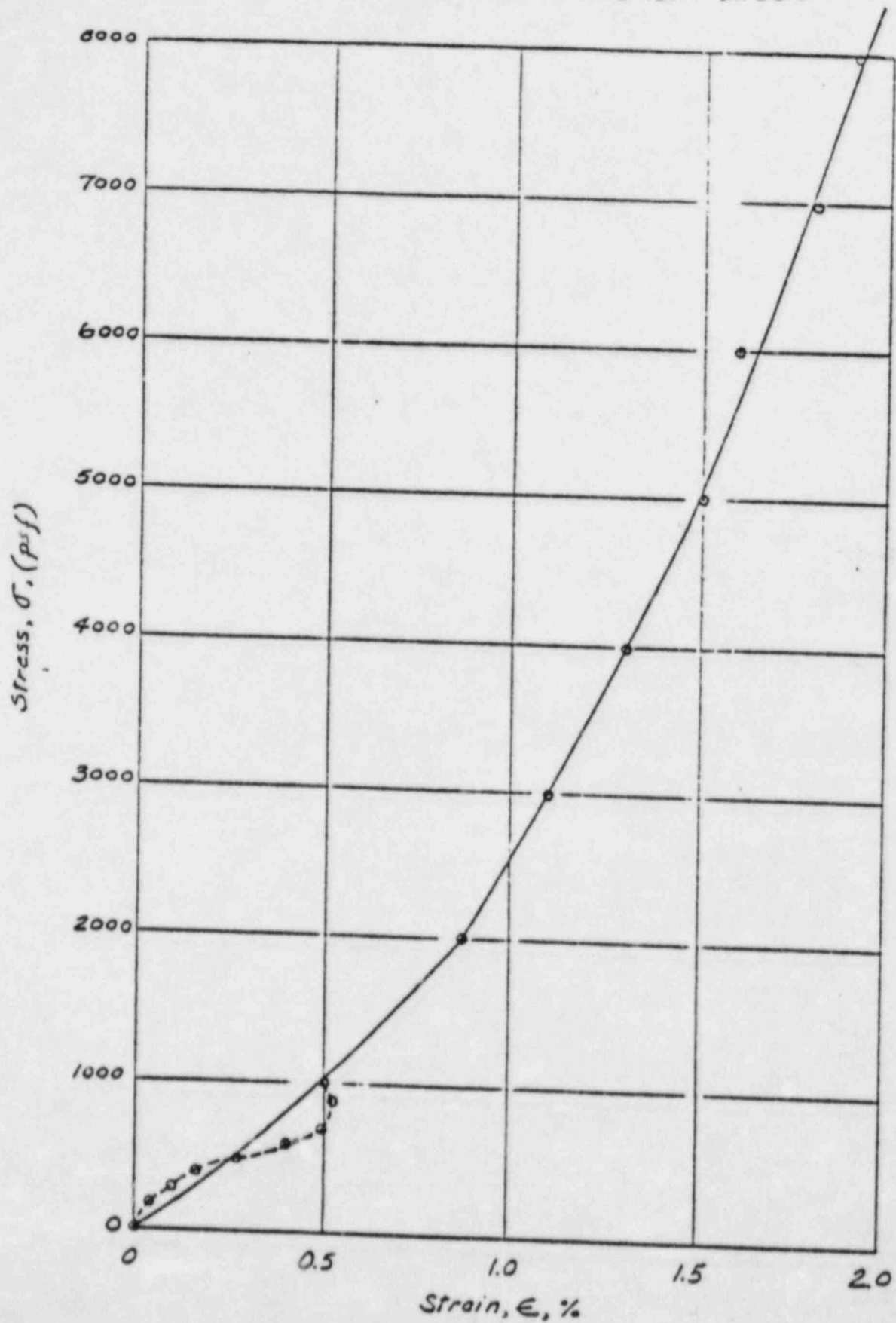
Stress-Strain Curves

Evaluated from the Computed Modulus of Elasticity from
One-dimensional Consolidation Tests on Soils below El. 550



SBS00241

Stress Strain Curve
Evaluated from the Constrained Modulus of Elasticity from
One-dimensional Consolidation tests on Soils above U. 550



To TCCooke, Midland

From JLCorley/DEMorn, Midland

Date November 1, 1977

Subject MIDLAND PROJECT - FAILING
 NON-Q SOIL TESTS NOT CLEARED
 File: 16.0 Serial: 186FQA77

CC WRBird, JSC-216B
 GSKeeley, P14-408B
 BWMarguglio, JSC-220A

Consumers
 Power
 Company

INTERNAL
 CORRESPONDENCE

During Audit No. F-77-32 "Soil Placement Records," the following non-Q test reports were found to have failing results and did not indicate being cleared by passing tests.

Plant Area Fill

<u>Test No.</u>	<u>Date Sampled</u>	<u>Compaction</u>	<u>Moisture</u>	
			<u>Actual</u>	<u>Optimum</u>
MD 1153	10-21-76	61.6% of Relative Density		
1155	10-21-76	73.5% of Relative Density		
1191	11-03-76	74.6% of Relative Density		
1194	11-02-76	75.4% of Relative Density		
1321	5-09-77	94.0% of Maximum Density		
1337	5-17-77		12.4%	15.2%
1388	6-02-77		9.8%	15.2%
1393	6-03-77		11.1%	13.4%
1398	6-03-77		11.2%	13.4%
1404	6-03-77		10.2%	13.4%
1415	6-07-77		9.9%	13.4%
1498	6-15-77	88.2% of Maximum Density	14.5%	10.0%
1509	6-16-77		12.9%	15.2%

Structural Backfill

MDR 625	10-12-76	51.5% of Relative Density
663	11-11-76	53.0% of Relative Density
664	11-11-76	72.3% of Relative Density
667	11-11-76	67.5% of Relative Density
680	11-23-76	60.0% of Relative Density
682	11-24-76	70.6% of Relative Density
688	11-24-76	77.1% of Relative Density
721	3-14-77	60.0% of Relative Density
734	3-17-77	34.0% of Relative Density
736	3-18-77	79.0% of Relative Density
737	3-18-77	41.9% of Relative Density

SB 00736

Structural Backfill (Contd)

<u>Test No.</u>	<u>Date Sampled</u>	<u>Compaction</u>	<u>Moisture</u>	
			<u>Actual</u>	<u>Optimum</u>
MDR 738	3-18-77	72.4% of Relative Density		
739	3-18-77	70.6% of Relative Density		
740	3-18-77	69.3% of Relative Density		
741	3-21-77	77.8% of Relative Density		
744	3-21-77	56.2% of Relative Density		
746	3-21-77	54.9% of Relative Density		
757	3-23-77	68.7% of Relative Density		
768	3-30-77	66.9% of Relative Density		
770	3-30-77	65.0% of Relative Density		
785	4-07-77	69.3% of Relative Density		
799	4-12-77	78.8% of Relative Density		
826	4-19-77	70.4% of Relative Density		
843	4-28-77	66.8% of Relative Density		
845	4-29-77	70.4% of Relative Density		
889	5-13-77	56.5% of Relative Density		
914	5-24-77		9.0Z	11.8Z
922	5-26-77	75.7% of Relative Density		
925	5-27-77		11.4Z	15.2Z
938	6-08-77	56.5% of Relative Density		
940	6-08-77	78.6% of Relative Density		
993	6-25-77	60.2% of Relative Density		
998	6-25-77	77.4% of Relative Density		

SB 00537

H&CF DIVISION



BECHTEL INCORPORATED

DESIGN REVIEW NOTICE

DISCIPLINE Ann Arbor - Soils

JOB NO. 7220-37

REVISION NO. 0

DATE October 28, 1977

PAGE 1 OF 1

TO REVIEW AUTHORITY H. H. Surka/W. R. Ferris

LINE NO.

1-3

DOCUMENT IDENTIFICATION

Design Control Check List - Rev. 1
Midland Project - Job 7220-001 - Soils

INITIAL SUBMITTAL

RESUBMITTAL (ATTACH COPY OF REVIEW NOTICE FORM PREVIOUSLY SUBMITTED)

REVIEW MADE BY:

REVIEW TECHNIQUE:

GENERAL COMPLIANCE

COMPARISON WITH PROVEN STANDARDS OF DESIGN

DETAILED CHECK

DESIGN REVIEW MEETING (NOTES ATTACHED)

STATUS:

APPROVED

APPROVED WITH COMMENTS

NOT-APPROVED (SEE COMMENTS AND RESOLUTION)

COMMENTS:

SB 00538

Handwritten	<u>10/27/77</u>	<u>SLJ</u>	<u>10/31/77</u>				
ORIGINATOR	DATE	ENGINEERING GROUP SUPV.	DATE	PROJECT ENGINEER	DATE	REVIEW AUTHORITY OR CHIEF ENG.	DATE

H&CF DIVISION



BECHTEL INCORPORATED

DESIGN CONTROL CHECK LIST

DISCIPLINE Soils - Ann ArborJOB NO. 7220REVISION NO. 1DATE October 28, 1977PAGE 1 OF 1

LINE NO.	DOCUMENT IDENTITY NO.	DESCRIPTION	REVIEW AUTHORITIES
1		Soil Temperature Profile With Depth Over Borated Water Line (submitted)	H. H. Burke/ W. R. Ferris
2		Liquefaction Evaluation - Site Response Analysis (hold)	H. H. Burke/ W. R. Ferris
3		Draft Technical Specification for Subcontract for Installation of Piezometers on Cooling Pond Dikes	



SB.00539

Bechtel Corporation

Inter-office Memorandum

To John Eden
Subject Consumers Power Company
Midland Plant Units 1 & 2
Job No. 7220
Earthwork
File: 0290, S/C-C-10 (Y)
Copies to H. H. Burke/ w2/a

Date July 30, 1969
From J. H. Blasingame
Of Power & Industrial Division
At 50 Beale/9th Floor

Reference your July 14, 1969 memo pursuant to Canonie's proposed compaction equipment to be used on the earthwork subcontract 7220-C-10. Our review indicates the proposed rollers to be relatively light and not in accordance with the specifications which assumed the use of heavier equipment more appropriate to a job of this type. However, paragraph 14.7.1 permits alternate equipment "provided that the Subcontractor shall, at its expense, demonstrate that such substituted equipment will achieve equal or better" compaction than the equipment specified. Any demonstration to prove equal or better compaction should include the range of soils occurring at the site and permitted for use by the specification. For ease of control, only one type of roller should be permitted for each type of material zone.

Of the proposed vibratory compactors, we believe Raygo #600 as the most suitable of the three types proposed. Again, use of this equipment is predicated on the subcontractor successfully proving this equipment to provide equal or better compaction than specified.

We believe that the proposed sheeps foot and tamping foot rollers are uneconomical for this type of job. For example, use of the sheeps foot or tamping foot roller would require limiting the layer thickness to approximately 8 inches and require as many as 10 or 12 passes, which is considerably more rolling than the 12 inch layer thickness and 4 passes specified for the 50 ton rubber tired roller.

The proposed Bros 450 Roll-O-Pactor for proof-rolling and embankment foundation preparation also does not meet the specification because the wheels are not loaded individually (as per 14.7.2). Again, this equipment should be used only if the subcontractor can successfully demonstrate that this equipment does an equal or better job than the specified rollers. Proof of equivalence can be limited to verifying that this roller does not leave behind uncompacted soft pockets in the foundation. The Bros 450 Roll-O-Pactor will also do a satisfactory job on the fill, but will not be able to work near the edges with safety.

SB500086

J. H. Blasingame
J. H. Blasingame
Project Engineer

RECEIVED
JUL 31 1969
BECHTEL CORPORATION
HYDRO DEPARTMENT

JCH:d1