

S-E Ramp West Approach - Possible Downdrag

Effective fill = 18 ft.

Assume $C_a = 300 \text{ pcf}$

Compressible layer = 12 ft.

$L = 30 \text{ ft.}$

$$Q_d = 2\pi R C_a L$$

$$= 3.14(1)(300)(30)$$

$$= 28,250 \text{ lbs} = 14.1 \text{ tons}$$

E-N Ramp East Approach

Effective fill = 27 ft.

Assume $C_a = 300 \text{ pcf}$

Compressible layer = 18 ft.

$L = 45 \text{ ft.}$

$$Q_d = 2\pi R C_a L$$

$$= 3.14(1)(300)(45)$$

$$= 42,300 \text{ lbs} = 21.2 \text{ tons}$$

PSH 1-RE over PSH 2-BD

Effect of 33' fill w/ crest at Sta. L 862+60 on Pier #14 of W-S Ramp
Settlement = 0.4' or ~ 5"

Effect of 33' fill w/ crest at Sta. L 863+10 on Pier #14 of W-S Ramp
Settlement = 0.15' or ~ 2"

poss. should be @ 863+40 +

OK

AJP/WTR 8/16/66

Layout has end @ Sta L 863+46

OK JMB

10/24/66

Fill crest @ Sta. L 862+60

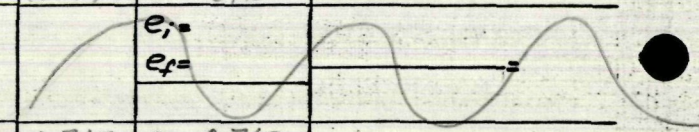
P SH* IRE SECTION Woodinville Inter. - Influence 33' fill on Pier #14 W-S RAMP STA W-S 56+86 HOLE # H-2-2

Z	D	Fill "H" = 33' @ 130 Pcf	Inact. Pres.		e _i	Z / (R+SH)	P _e / P	Act. Pres. (T _{sf})	Total Pres. (T _{sf})	e _f	Avg. e _i - e _f	Q = $\frac{e_i - e_f(D)}{1 + e_i}$	
			P _{sf}	T _{sf}									
Fill Pressure = 4280 Psf										2.14	0		
0				0	0.938					0.938	e _i = 0.913 e _f = 0.909	.004 (18) = 0.04	
6	18	γ = 125.5 Pcf 6 x 125.5 = 753										1.913	
18	18	12 x 63.1 = 757	1510	0.71	0.888		0.06	0.13	0.84	0.880	.004		
34	34	γ = 115.7 Pcf			1.126					1.115	e _i = 1.094 e _f = 1.078	.016 (34) = 0.26	
52	34	34 x 53.3 = 1812	3322	1.66	1.058		0.11	0.24	1.90	1.041	.016	2.094	
75	23	γ = 120.6 Pcf											
75	23	23 x 58.2 = 1338	4660	2.33			0.12	0.26	2.59				
110	35	γ = 122.4 Pcf			0.773					0.767	e _i = 0.762 e _f = 0.757	.005 (35) = 0.10	
110	35	35 x 60.0 = 2100	6760	3.38	0.751		0.12	0.26	3.64	0.747	.005	1.762	
		γ = _____ Pcf									e _i = e _f =		
		γ = _____ Pcf									e _i = e _f =		

Curve ①

Curve ②

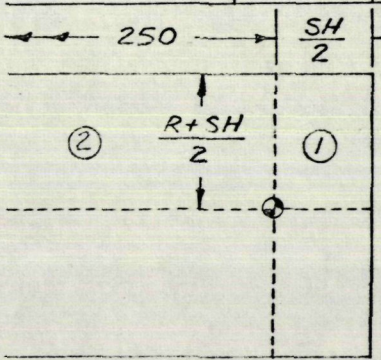
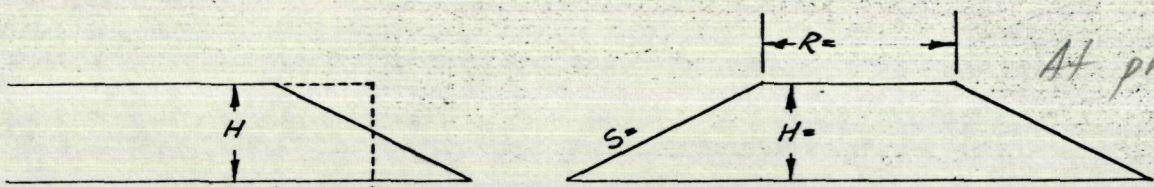
Curve ③



TOTAL Q = 0.4'

~ 5"

At proposed br. length
1-RE / 2-BO

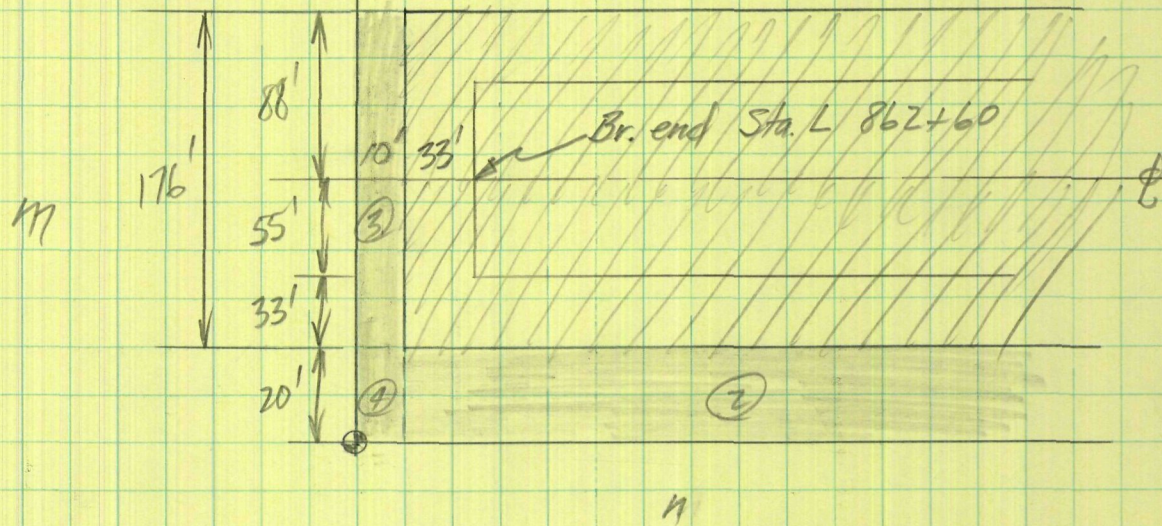


$\frac{SH}{2} = n_1 Z =$
 $\frac{R+SH}{2} = m_1 Z = m_2 Z =$
 $250 = n_2 Z$

Z	n ₁ Z = n ₁	m ₁ Z = m ₁ = m ₂	n ₂ Z = 250 n ₂	f _{w1}	f _{w2}	2f _{w1}	2f _{w2}	P _e / P

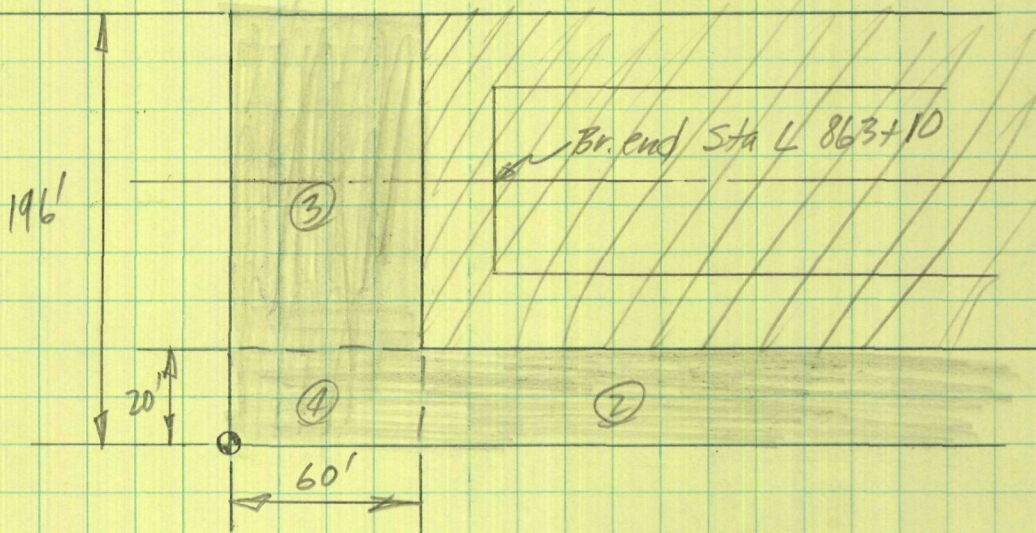
DBH 8-11-66

Influence of 33' fill on Pier #14 W-S Ramp - Fill crest @ Sta. L 862+60



Z	196	250	10	20	f_{w1}	$-f_{w2}$	$-f_{w3}$	$+f_{w4}$	f_w
18	10	10	0.556	1.11	0.234	0.158	0.106	0.087	0.057
52	3.77	4.81	0.192	0.385	0.212	0.078	0.042	0.020	0.112
75	2.61	3.33	0.133	0.267	0.197	0.057	0.029	0.011	0.122
110	1.78	2.27	0.091	0.182	0.174	0.038	0.021	0.006	0.121

Influence of 33' fill on Pier #14 W-S Ramp - Fill crest @ Sta. L 863+10



Z	196	250	60	20	f_{w1}	$-f_{w2}$	$-f_{w3}$	$+f_{w4}$	f_w
18	10	10	3.33	1.11	0.234	0.158	0.215	0.154	0.015
52	3.77	4.81	1.15	0.385	0.212	0.078	0.158	0.067	0.043
75	2.61	3.33	0.800	0.267	0.197	0.057	0.128	0.043	0.055
110	1.78	2.27	0.545	0.182	0.174	0.038	0.096	0.024	0.064

Time - Years

0 1.0 2.0 3.0 4.0

PS# No. FRE
N.B. #5 B / 2-80
Sta. 863+50
3' Fill

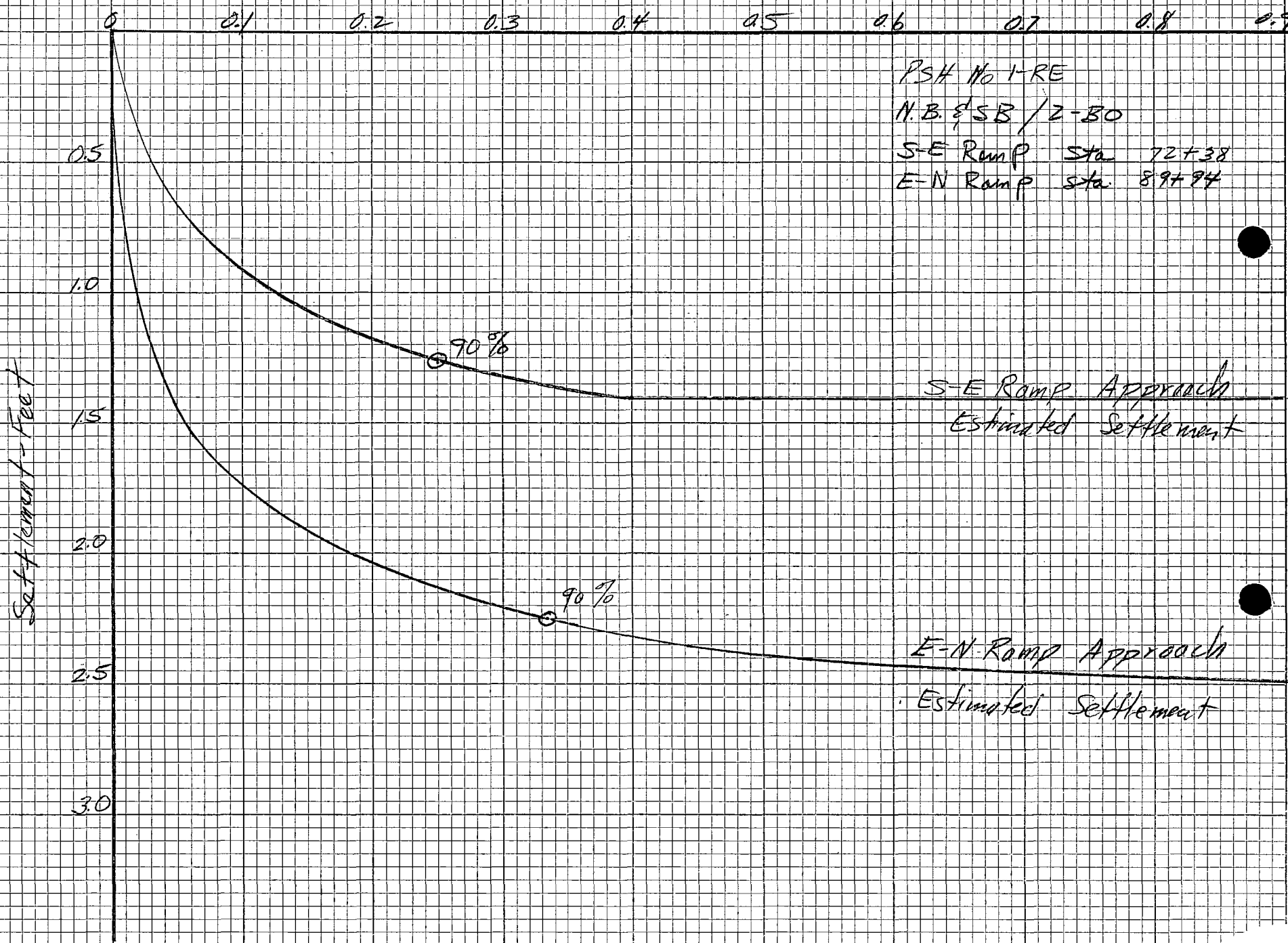
Settlement - Feet

0
1.0
2.0
3.0
4.0
5.0

90%

~~Final~~ Estimated Settlement

Time - Years



PSH No 1-RE
N.B. 8 SB / 2-50
S-E Ramp Sta. 72+38
E-N Ramp Sta. 89+94

S-E Ramp Approach
Estimated Settlement

E-N Ramp Approach
Estimated Settlement

Washington State Highway Commission
Department of Highways

SETTLEMENT ANALYSIS

Job No. _____ Control Section _____ Hole No. ^{H-25} ~~H-24~~ Sta. SE 71+50
P.S.H. No. 1 RE Section Woodinville Interchange S-E Ramp

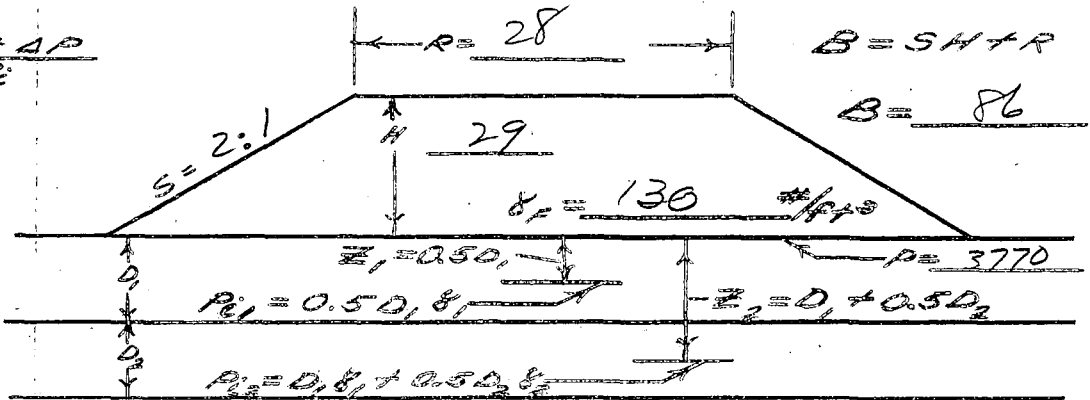
EQUATIONS:

$$s = \frac{D}{C} \log \frac{P_i + \Delta P}{P_i}$$

$$* \Delta P = \% (P)$$

Remarks:

Settlement below
end of approach
embankment @
Sta. 71+50



Soil Description	Organic Clay Silt								
Density Of Layer γ	41								
Blow Count N	10								
Depth To Mid-Layer z	5.5								
Width Of Fill B	86								
z/B	0.064								
Boussinesq %	99								
Added Pressure ΔP^*	3730								
Initial Pressure, P_i	226								
$P_i + \Delta P$	3956								
$(P_i + \Delta P)/P_i$	17.5								
$\log(P_i + \Delta P)/P_i$	1.243								
Thickness Of Layer D	11								
Hough Factor C	25								
Settlement s	0.55								
Sub-Total Settlement									

TOTAL SETTLEMENT = 0.55 ←

Washington State Highway Commission
Department of Highways

SETTLEMENT ANALYSIS

Job No. _____ Control Section _____ Hole No. ^{H-3-3} _{H-3-4} Sta. EN 9145
P.S.H.No. 1-RE Section Woodinville Interchange

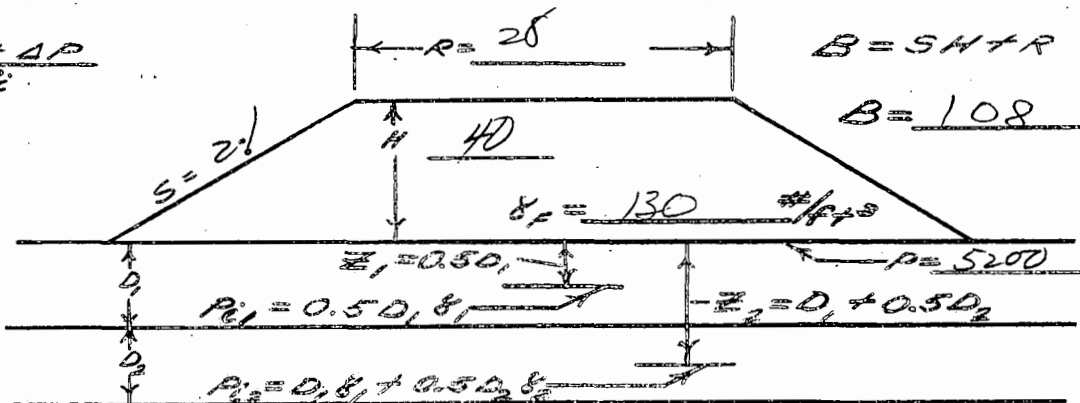
EQUATIONS:

$$s = \frac{D}{C} \log \frac{P_i + \Delta P}{P_i}$$

$$* \Delta P = \% (P)$$

Remarks:

Settlement below
end of approach
embankment @
Sta. E-N 9145

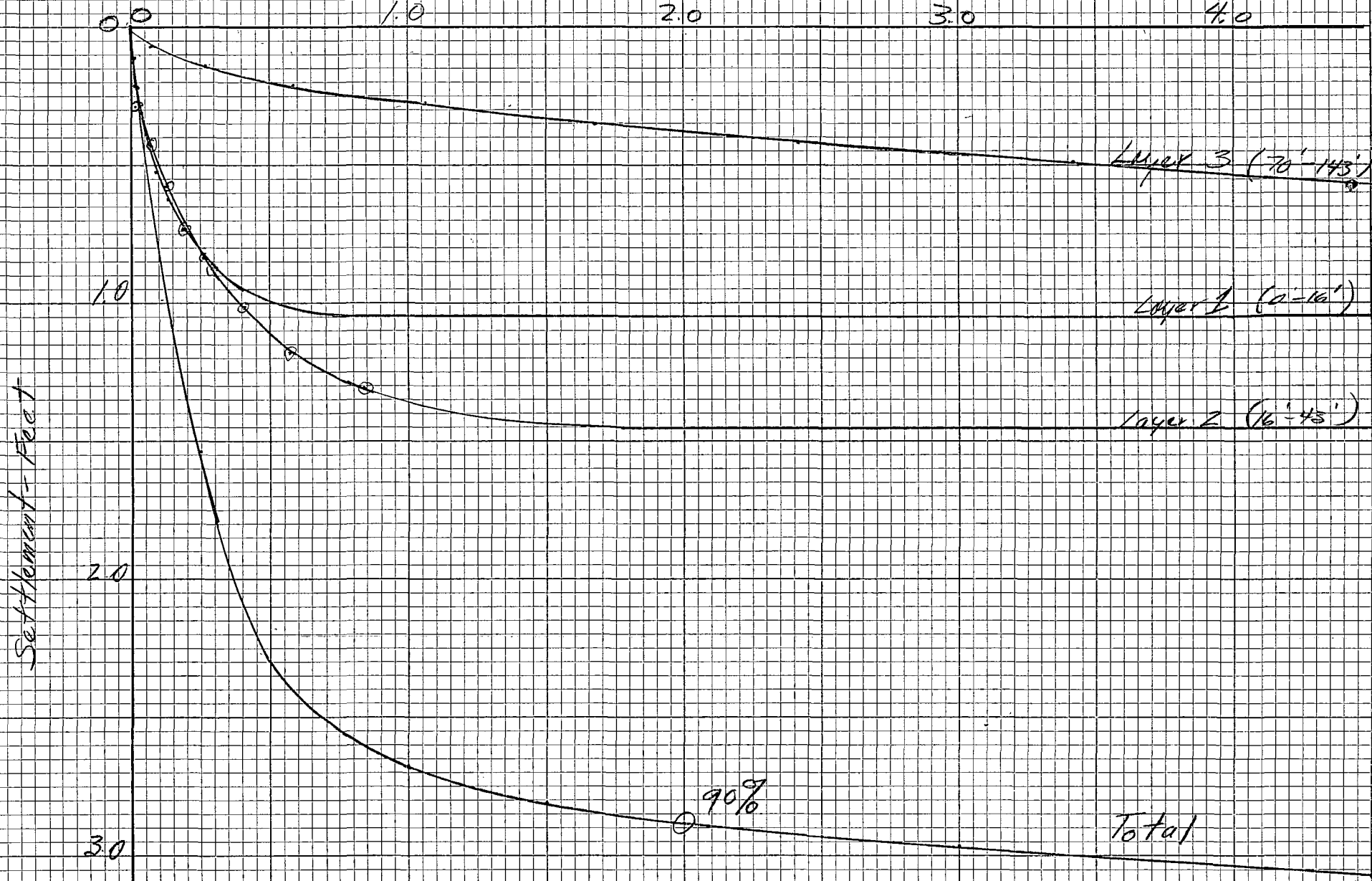


	Soil Description							
Density Of Layer γ	Organic Sandy Silty clay	34	34					
Blow Count N	Organic silt w/ Pent, F. sand	4	4					
Depth To Mid-Layer Z		3	10.5					
Width Of Fill B		108	108					
Z/B		.0278	.097					
Boussinesq %		99.5	98.5					
Added Pressure ΔP^*		5175	5120					
Initial Pressure, P_i		102	357					
$P_i + \Delta P$		5277	5477					
$(P_i + \Delta P)/P_i$		51.7	15.4					
$\log(P_i + \Delta P)/P_i$		1.714	1.186					
Thickness Of Layer D		6	9					
Hough Factor C		20	20					
Settlement s		.515	.534					
Sub-Total Settlement			1.049					

TOTAL SETTLEMENT = 1.05' ←

Time Years

N. B. & S. B. / 2-80
Sta. 863+50



TIME - SETTLEMENT COMPUTATIONS

P SH# 1-RE SECTION NB S.B. over 2-BD

STA 63+50 HOLE# 4-2

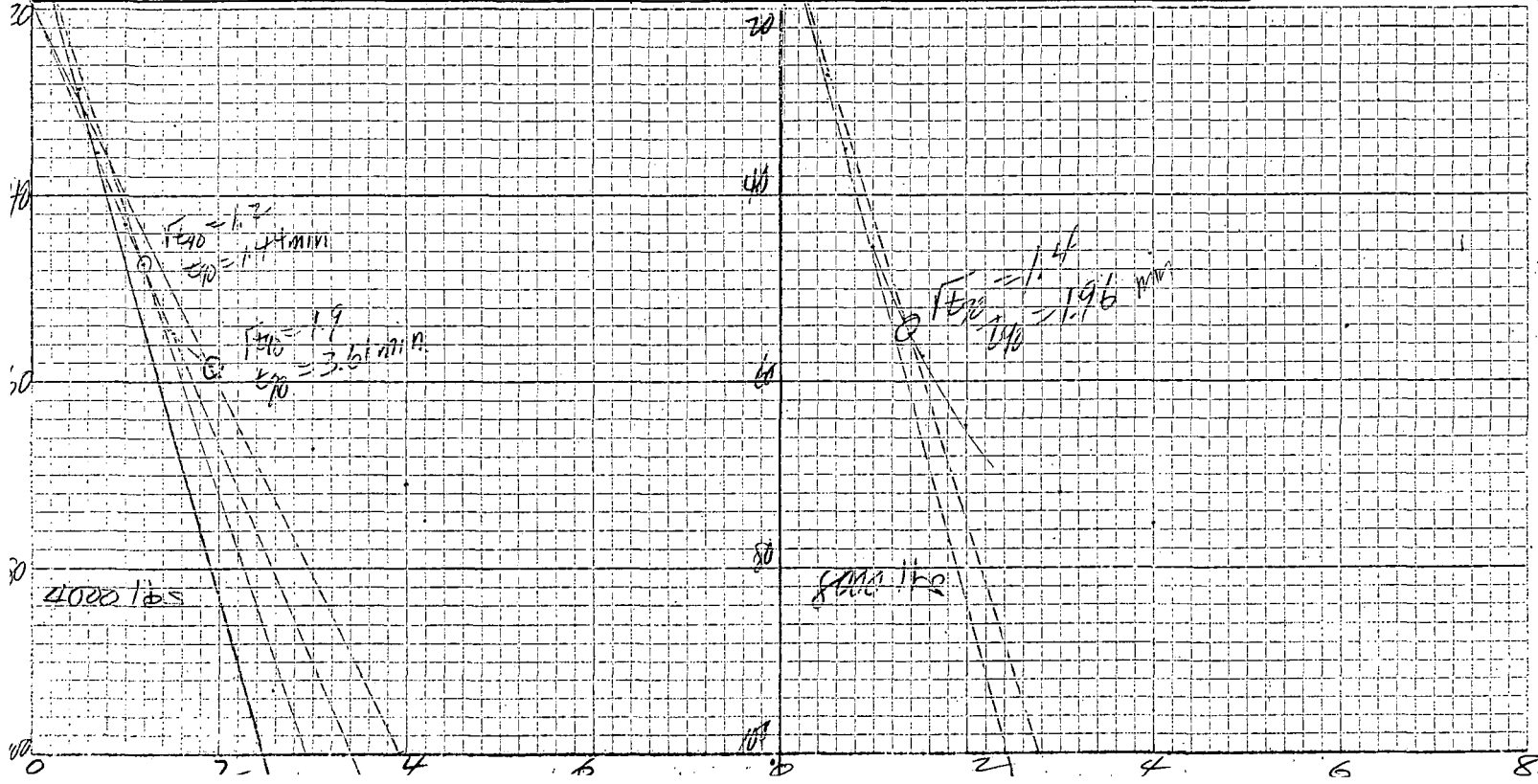
t (min)	\sqrt{t}	500	1000	2000	4000	8000
1/4	0.5				28.5	26.9
1/2	0.707				35.5	35.0
1	1				43.2	45.7
2 1/4	1.5				54.5	57.3
4	2				59.4	64.2
9	3				67.2	72.0
16	4				70.8	75.5
25	5				73.5	78.2
36	6					
49	7					

% S	S	N _i	$t = N_i \frac{.405 d^2}{c}$	N	$t = N \frac{.405 d^2}{c}$
10	.07	0.02	.07 yrs.		
20	.14	0.08	.27		
30	.21	0.17	.58		
40	.28	0.31	1.06		
50	.35	0.49	1.67		
60	.42	0.71	2.42		
70	.49	1.00	3.42		
80	.56	1.40	4.78		
90	.63	2.09	7.15		
100	.70	∞	∞	∞	∞

SAMPLE NO. LAYER 3 LAYER 70'-143'
73'

$$\frac{.405 d^2}{c} = \frac{.405 \left(\frac{73}{2}\right)^2}{158} = 3.42$$

LOAD	h_i (in)	Δh	h_f	$\frac{h_i+h_f}{4}$	$\left(\frac{h_i+h_f}{4}\right)^2$	t_{90} (min)	$c = \frac{3095}{t_{90}} \left(\frac{h_i+h_f}{4}\right)^2$ (ft ² /yr)
500	0.6250	.0151	.6099	.3087			
1000		.0083	.6016	.3038			c = @
2000		.0100	.5916	.2983			c = @
4000		.0183	.5733	.2712	.0848	1.44	183
8000		.0361	.5372	.2776	.0769	1.96	121



TIME - SETTLEMENT COMPUTATION

P SH# 1-EE SECTION N.B & S.B. OVER 2 BO

STA 863+50 HOLE#

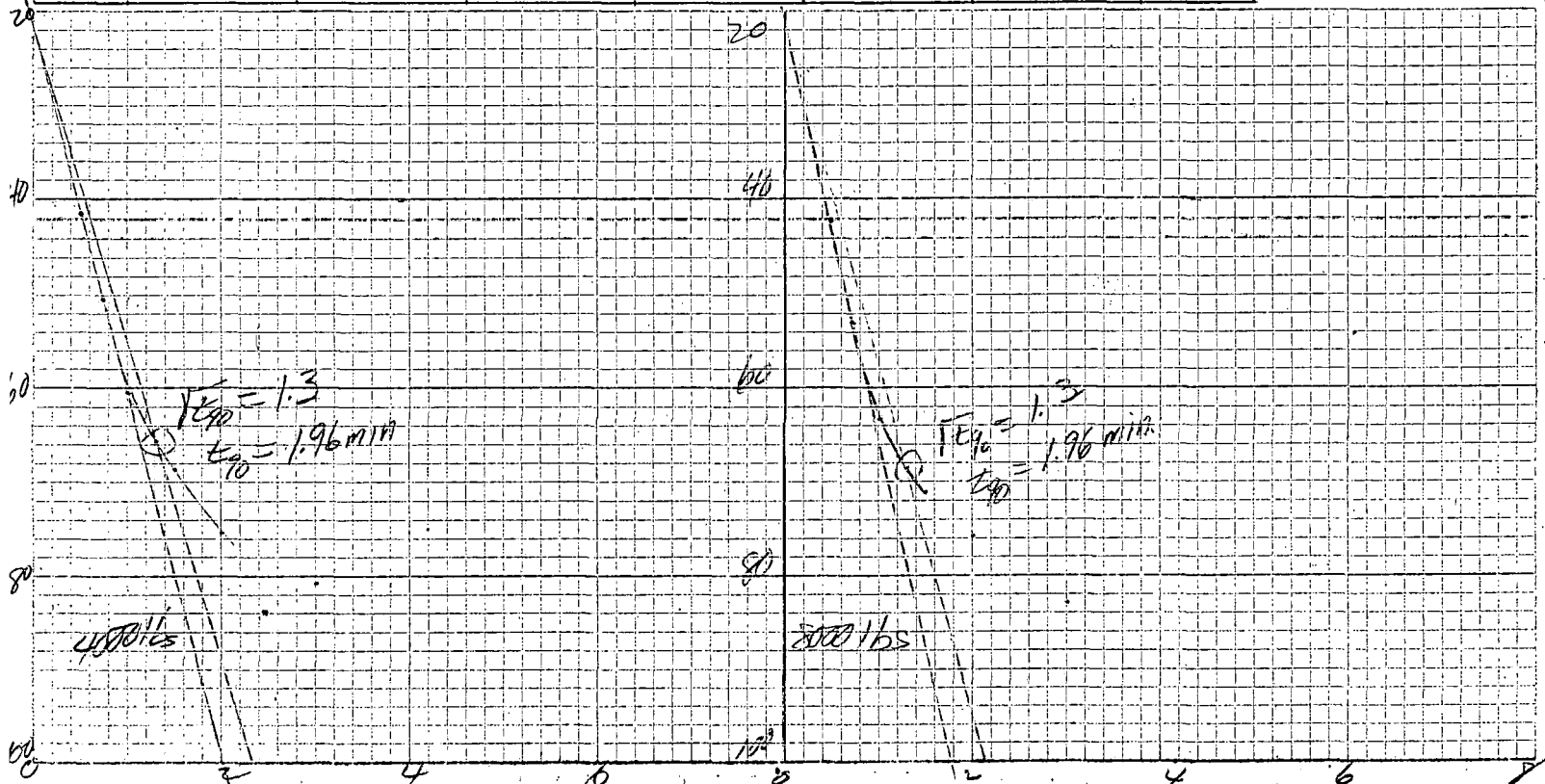
t (min)	\sqrt{t}	500	1000	2000	4000	8000
1/4	0.5				41.6	42.2
1/2	0.707				50.4	52.8
1	1				60.4	63.5
2 1/4	1.5				68.5	71.1
4	2				75.7	75.7
9	3				80.7	82.7
16	4				83.8	85.4
25	5				86.3	87.1
36	6					
49	7					

%S	S	N _i	$t = N_i \left(\frac{405d^2}{c} \right)$	N	$t = N \left(\frac{405d^2}{c} \right)$
10	.105	0.02	.004 yrs.		
20	.210	0.08	.015		
30	.315	0.17	.031		
40	.420	0.31	.057		
50	.525	0.49	.091		
60	.630	0.71	.131		
70	.735	1.00	.185		
80	.840	1.40	.260		
90	.945	2.09	.390		
100	1.05	∞	∞	∞	∞

SAMPLE NO. Layer 1 LAYER 0-16'

$$\frac{0.405 d^2}{c} = \frac{.405 \left(\frac{16}{2} \right)^2}{140} = .185$$

LOAD	h_i (in)	Δh	h_f	$\frac{h_i+h_f}{4}$	$\left(\frac{h_i+h_f}{4} \right)^2$	t_{90} (min)	$c = \frac{3095}{t_{90}} \left(\frac{h_i+h_f}{4} \right)^2$ (ft ² /yr)
500	0.6250	.0110	.6140	.3097			
1000		.0052	.6088	.3057			c = @
2000		.0064	.6024	.3028			c = @
4000		.0096	.5928	.2988	.0894	1.96	141
8000		.0134	.5794	.2931	.0859	1.96	136



TIME - SETTLEMENT COMPUTATION

P SH# 1-RE SECTION NB & SB NOV 2-80

STA 863+50

HOLE# H-2-1

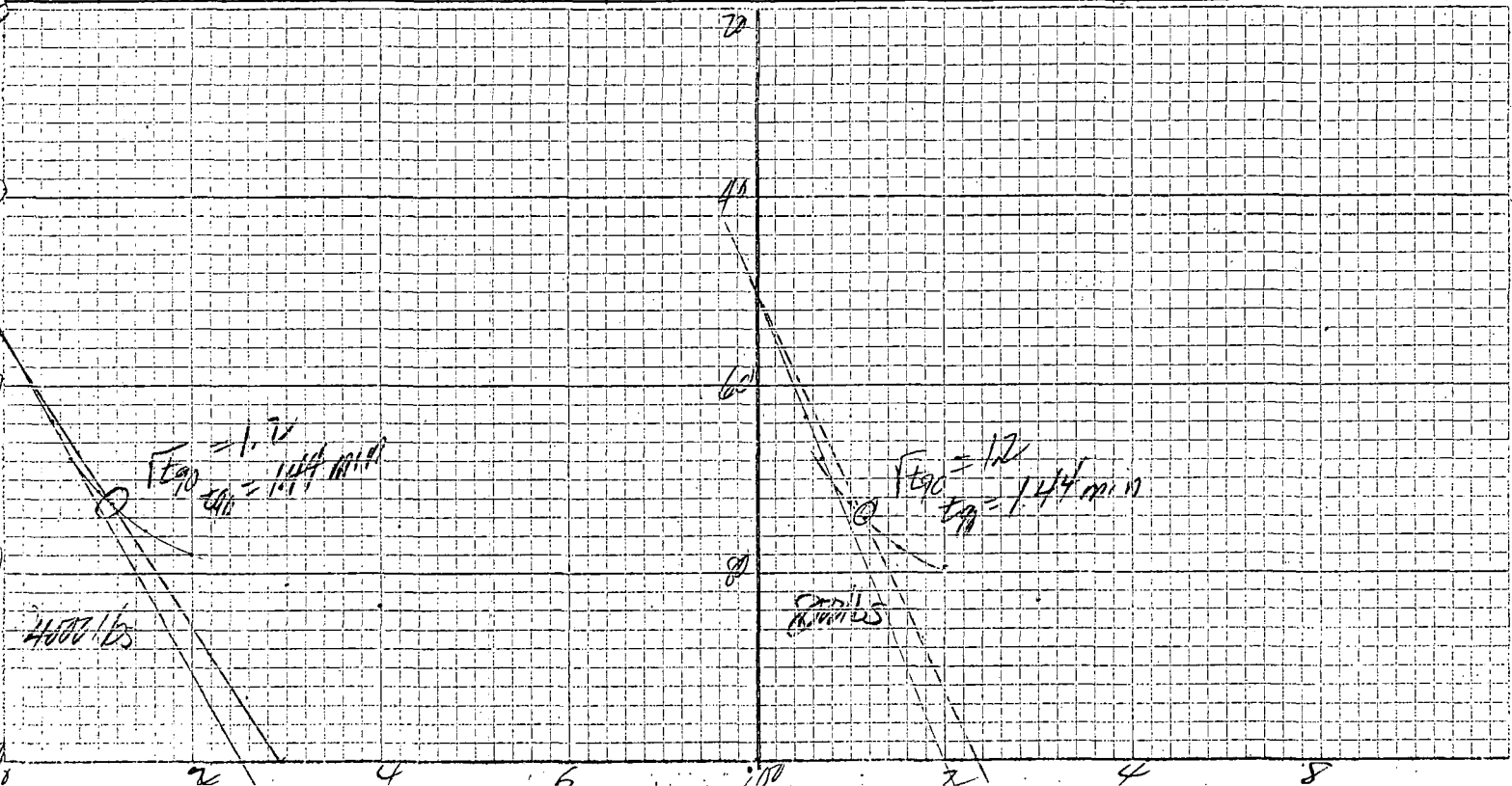
t (min)	\sqrt{t}	500	1000	2000	4000	8000
1/4	0.5				63.7	63.6
1/2	0.707				67.6	67.9
1	1				71.4	72.3
2 1/4	1.5				75.6	77.4
4	2				78.1	79.8
9	3				81.1	83.0
16	4				83.7	86.4
25	5				85.5	88.0
36	6					
49	7					

% S	S	N _i	$t = N \left(\frac{0.405 d^2}{c} \right)$	N	$t = N \left(\frac{0.405 d^2}{c} \right)$
10	.146	0.02	.008 yrs		
20	.292	0.08	.032		
30	.438	0.17	.069		
40	.584	0.31	.126		
50	.730	0.49	.199		
60	.875	0.71	.288		
70	1.02	1.00	.406		
80	1.17	1.40	.568		
90	1.31	2.09	.848		
100	1.46	∞	∞	∞	∞

SAMPLE NO. Layer 2 LAYER 16' - 4 1/2'
27

$$\frac{0.405 d^2}{c} = \frac{.405 \left(\frac{27}{2} \right)^2}{182} = .406$$

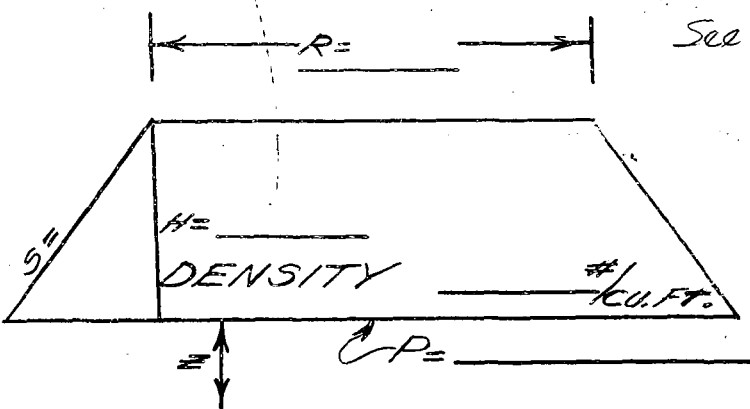
LOAD	h_i (in)	Δh	h_f	$\frac{h_i + h_f}{4}$	$\left(\frac{h_i + h_f}{4} \right)^2$	t_{90} (min)	$c = \frac{3095}{t_{90}} \left(\frac{h_i + h_f}{4} \right)^2$ (ft ² /yr)
500	0.6250	.0120	.6130	.3095			
1000		.0057	.6073	.3051			c = @
2000		.0095	.5978	.3013			c = @
4000		.0120	.5858	.2959	.0876	1.44	188
8000		.0141	.5717	.2894	.0838	1.44	180



PSHNO. PRE SECTION Woodinville Interchange: L Line Bridge # 5 STA 862+72 JOB

No. Approach

Stratum	Fill H	Inactive Pressure	Inactive Pressure	R+SH	Pz	Active Pressure	Total Pressure	e_i	Average e_i	e_f	Average e_i	$Q = \frac{e_i - e_f}{1 + e_i} (D)$
Thick	@	#/cu.ft.	#/cu.ft.	#/cu.ft.		#/cu.ft.	#/cu.ft.					
		34										
		130										
L PRESSURE			4420					2.21	2.21			
①	16	54						.974		.816	.815	$\frac{.128}{1.943} (16) = 1.05$
	16		865	.432		.842	1.86	.912	.943	.814	.815	
②	27	50	1355					1.150		1.015	1.007	$\frac{.115}{2.122} (27) = 1.44$
	43		2220	1.110		.640	1.42	1.095	1.122	.999	1.007	
	27	60	1620									
	70		3840	1.970		.496	1.10	3.07				
③	73	34	24.80					.782	.768	.758	.751	$\frac{.017}{1.768} (73) = .70$
	143		6520	3.260		.278	.62	3.88	.754	.744	.751	

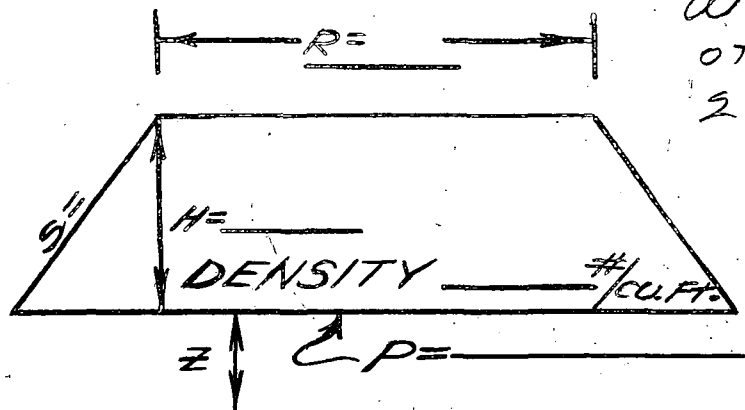


See Consol. Curves for W-S Ramp TOTAL Q 3.21
Sta 59+15

- R+SH = _____
 = _____
 = _____
- P = Fill Pressure At Ground Line
 - Pz = Pressure At Depth z Surface
 - e_i = Void Ratio At Upper Surface of Stratum
 - D = Thickness Of Stratum
 - z = Depth Below The Ground Line
 - w_u = Unit Weight of Stratum

SH. NO. 1-RE SECTION Woodville Intr. STA 862+72 JOB

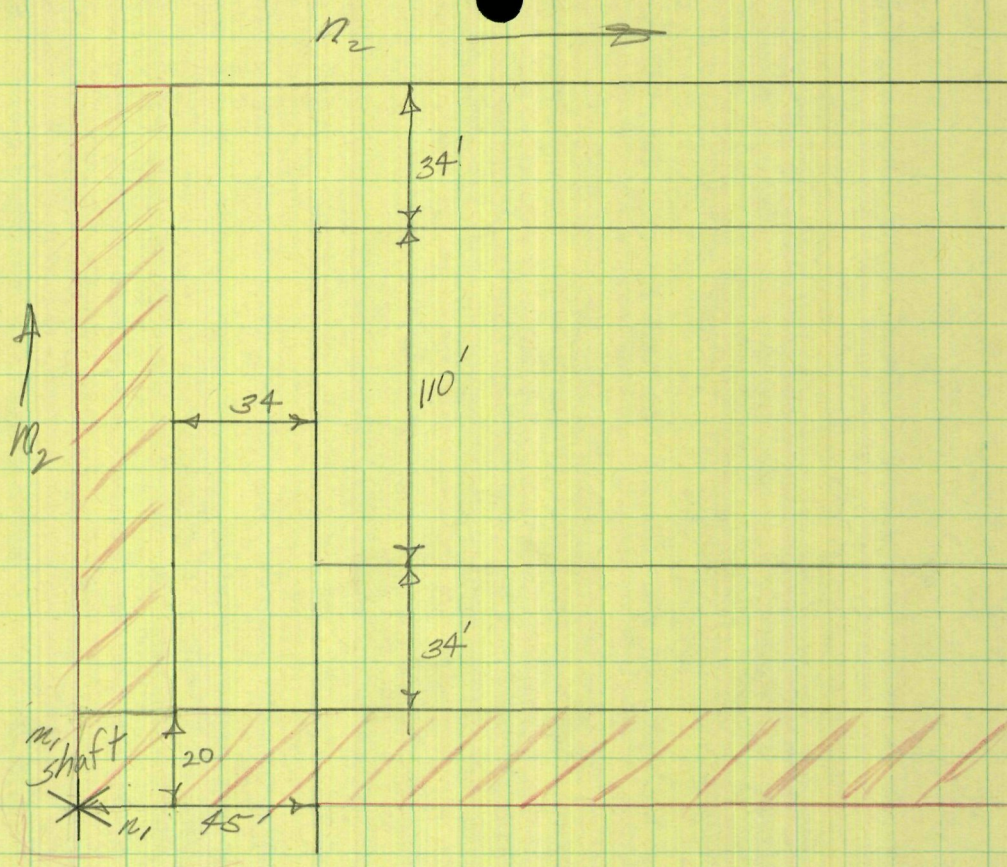
Depth Below Ground Level	Stratum Thickness	Fill H = 3 ft @ 130 #/cu ft	Inactive Pressure #/cu ft	Inactive Pressure Ton/ft ²	$\frac{z}{P}$ R+SH	$\frac{P_z}{P}$	Active Pressure Ton/ft ²	Total Pressure Ton/ft ²	e_i	Average e_i	e_f	Average e_f	$Q = \frac{e_i - e_f}{1 + e_i} (D)$
FILL PRESSURE 4.20 #/cu ft								2.21	2.21				
15		$W_u = 54$ #/cu ft											
15		810	810	0.40		0.047	0.10	0.50					
15		$W_u = 50$ #/cu ft							1.27		1.245		
30		② 750	1560	0.78		0.026	0.06	0.84	1.195	1.233	1.188	1.217	$\frac{.24}{2.233} = 0.1$
45		$W_u = 60$ #/cu ft											
75		③ 2700	4260	2.13		0.105	0.24	2.37					
94		$W_u = 60$ #/cu ft							0.780		0.775		
94		④ 1140	5400	2.70		0.111	0.25	2.95	0.767	0.774	0.768	0.768	$\frac{.114}{1.774} = 0.06$



Settlement of Pier of TOTAL Q

W-S Ramp in corner of 1-RE fill @ 2-B0 xing R+SH

- P = Fill Pressure At Ground Li.
- P_z = Pressure At Depth z
- e_i = Void Ratio At Upper Surface of Stratum
- e_f = Void Ratio At Lower Surface of Stratum
- D = Thickness of Stratum
- z = Depth Below the Ground Line
- W_u = Unit Weight of Stratum



z	M_1	N_1	M_2	N_2	M_1	N_2	M_2	N_1
15	1.33	1.33	10+	10+	1.33	10+	10+	1.33
30	0.67	0.67	6.60	8.35	0.67	8.35	6.60	0.67
75	0.27	0.27	2.64	3.33	0.27	3.33	2.64	0.27
94	0.21	0.21	2.11	2.66	0.21	2.66	2.11	0.21

$M_1 = \frac{20}{z}$	$N_1 = \frac{20}{z}$	$M_2 = \frac{198}{z}$	$N_2 = \frac{280}{z}$
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z	f_{w_1}	f_{w_2}	$f_{w_{1,2}}$	$f_{w_{2,1}}$	f_w
15	.141	0.25	.172	.172	0.047
30	.077	0.228	.159	.120	0.026
75	.021	0.197	.057	.056	0.105
94	.013	0.185	.044	.043	0.111

$$f_w = f_{w_2} - (f_{w_{1,2}} - f_{w_1}) - (f_{w_{2,1}} - f_{w_1}) - f_{w_1}$$

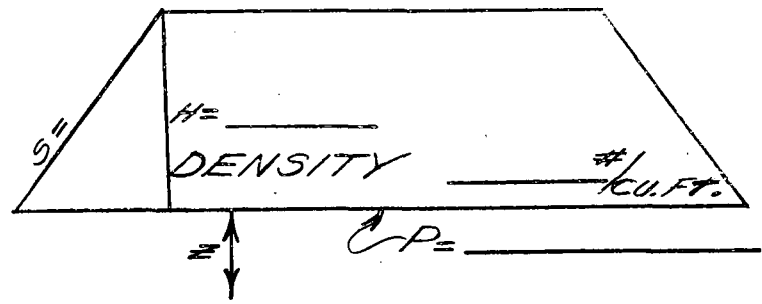
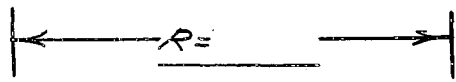
$$= f_{w_2} - f_{w_{1,2}} + f_{w_1} - f_{w_{2,1}}$$

f_w

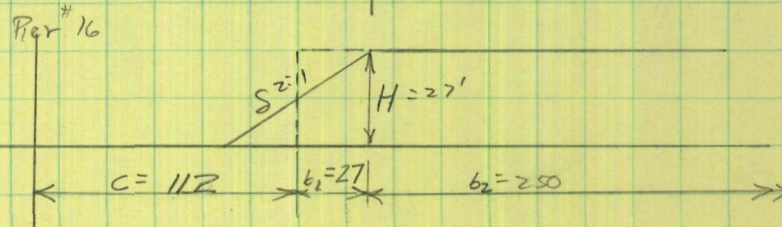
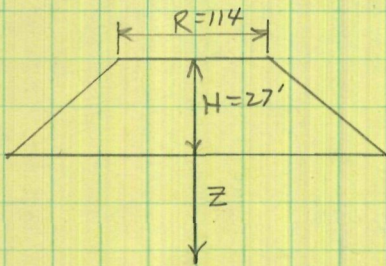
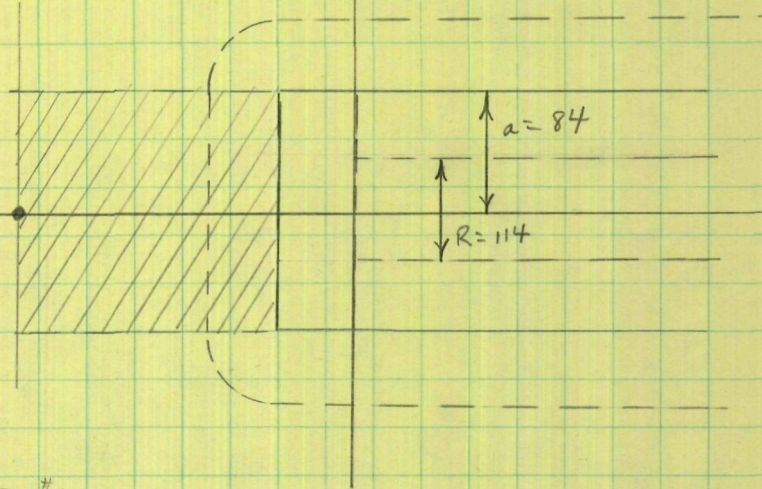
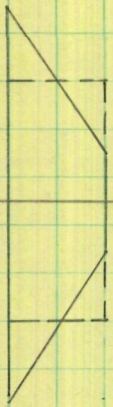
P.S. NO. 1 RESECTION Woodinville Interc. So. Approach Br #5 STA L 859+70 JOB

Stratum W Thick- ness	Fill H: 38 @ 130 #/ft'	Inactive Pressure #/ft'	Inactive Pressure Ton/ft ²	$\frac{R}{P}$ R+SH	$\frac{P}{Z}$ P	Active Pressure Ton/ft ²	Total Pressure Ton/ft ²	e_i	Average e_i	e_f	Average e_i	$Q = \frac{e_i - e_f}{1 + e_i} (D)$
L PRESSURE		4940	#/ft'			2.47	2.47					
6	$W_u = 60$ #CU.FT											
6	$W_u = 48$ #CU.FT	360	.180			.920	2.27	2.45				
4835 4839	14	672						1.475		1.055		
20		1032	.516			.828	2.05	2.57	1.310	1.392	1.045	$(1.392 - 1.050) / 4 = 2.0$ 2.392
	$W_u =$ #CU.FT											
	$W_u =$ #CU.FT											
	$W_u =$ #CU.FT											
	$W_u =$ #CU.FT											
	$W_u =$ #CU.FT											
	$W_u =$ #CU.FT											

TOTAL Q 2.0



- R+SH = _____
 - = _____
 - = _____
- P = Fill Pressure At Ground Line
 P_z = Pressure At Depth z Surface
 e_i = Void Ratio At Upper Surface
 OF Stratum
 D = Thickness Of Stratum
 z = Depth Below The Ground Line
 W_u = Unit Weight Of Stratum



$$a_1 = a_2 = \frac{R + SH}{2} = \frac{114 + 2(27)}{2}$$

$$= 84$$

$$b_1 = \frac{2(27)}{2} = 27$$

$$b_2 = 250$$

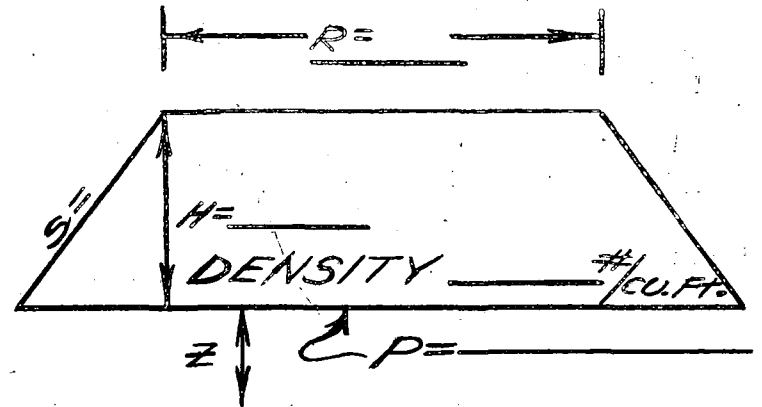
$$C = 112$$

$$b_3 = 250 + b_1 + C = 389$$

$$b_4 = C = 112$$

Z	m ₁	m ₃	fw ₃	$\frac{m_1 m_3}{3}$	m ₄	fw ₄	2fw ₃	2fw ₄	(2fw ₃ - 2fw ₄)
16	5.25	10	.225	5.25	7	.223	.450	.446	.004
43	1.94	9	.194	1.94	2.6	.180	.388	.360	.028
70	1.20	5.5	.164	1.20	1.6	.145	.328	.290	.038

Depth Below Ground Level	Stratum Thickness	Fill H = 34 @ 130 #/ft ³	Inactive Pressure #/ft ²	Inactive Pressure Tons/ft ²	$\frac{z}{R+SH}$	$\frac{P_z}{P}$	Active Pressure Tons/ft ²	Total Pressure Tons/ft ²	e_i	Average e_i	e_f	Average e_f	$Q = \frac{e_i - e_f}{1 + e_i} (D)$
FILL PRESSURE 4420 #/ft ³								2.21	2.21				
0	15	$W_u = 54$ #/cu.ft							0.797		0.740		
	15	①	810	810	0.405	0.85	1.88	2.28	0.768	0.782	0.740	0.740	$\frac{0.630}{1.782} = 0.35$
	28	$W_u = 50$ #/cu.ft							1.281		1.057		
	43	②	1400	2210	1.105	0.64	1.42	2.53	1.152	1.216	1.040	1.049	$\frac{4.676}{2.216} = 2.11$
	27	$W_u = 60$ #/cu.ft											
	80	③	1620	3830	1.915	0.49	1.08	2.99					
	10	$W_u = 60$ #/cu.ft							0.788		0.760		
	80	④	600	4430	2.215	0.45	1.00	3.22	0.780	0.784	0.752	0.756	$\frac{0.28}{1.784} = 0.16$
	10	$W_u = 60$ #/cu.ft							0.780		0.752		
	90	④	500	5030	2.515	0.41	0.91	3.42	0.770	0.775	0.749	0.751	$\frac{0.024(10)}{1.775} = 0.14$
	10	$W_u = 60$ #/cu.ft							0.770		0.749		
	100	④	600	5630	2.815	0.38	0.84	3.65	0.762	0.766	0.742	0.746	$\frac{0.020(10)}{1.766} = 0.11$
	10	$W_u = 60$ #/cu.ft							0.762		0.742		
	110	④	600	6230	3.115	0.35	0.77	3.88	0.756	0.759	0.739	0.741	$\frac{0.018(10)}{1.759} = 0.10$



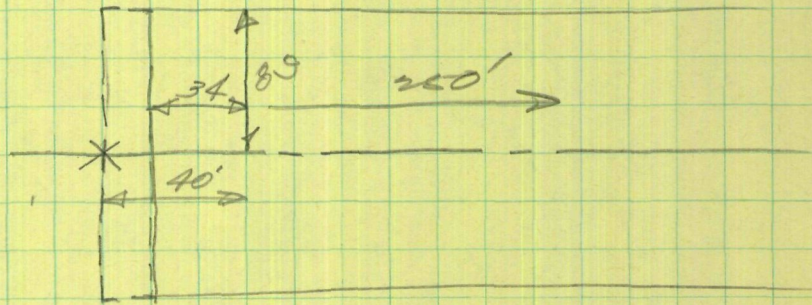
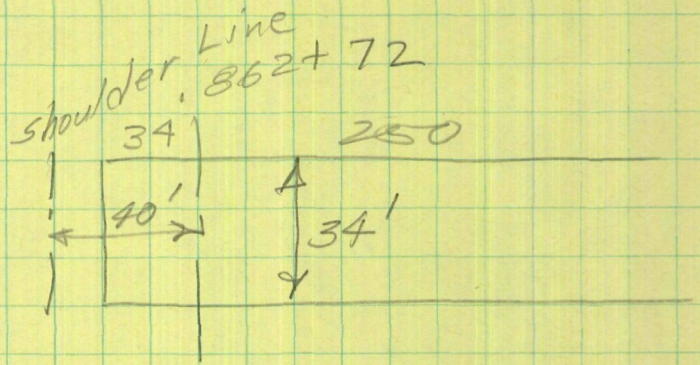
R+SH = _____
 = _____
 = _____

TOTAL Q

- ~~P_z = Fill Pressure At Ground Li.~~
- ~~P_z = Pressure At Depth~~
- ~~e_i = Void Ratio At Upper Surface Of Stratum~~
- ~~e_f = Void Ratio At Lower Surface Of Stratum~~
- ~~D = Thickness Of Stratum~~
- ~~z = Depth Below The Ground Line~~
- ~~W_u = Unit Weight Of Stratum~~

Compute Settlement PSHIRE O'ring 2-B0

settlement of 2-B0
due to abutting fill



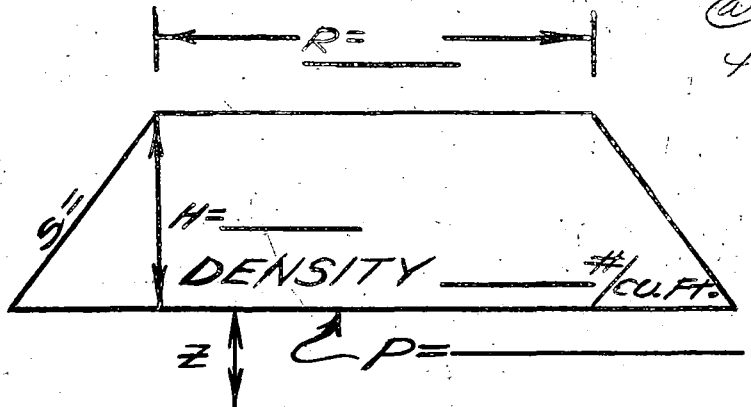
Z	m_1	n_1	m_2	n_2	f_{w1}	f_{w2}
15	10+	5.92	10+	5.92	0.227	0.227
34	8.5	2.62	8.35	2.62	0.203	0.203

$$m_1 = \frac{290}{Z} \quad n_1 = \frac{89}{Z} \quad m_2 = \frac{284}{Z} \quad n_2 = \frac{89}{Z}$$

Depth Below Ground Level	Stratum Thickness	Fill H = 34 @ 130 #/cu ft	Inactive Pressure #/cu ft	Inactive Pressure Tons/cu ft	$\frac{z}{R+SH}$	$\frac{P_z}{P}$	Active Pressure Tons/cu ft	Total Pressure Tons/cu ft	e_i	Average e_i	e_f	Average e_f	$Q = \frac{e_i - e_f (D)}{1 + e_i}$
FILL PRESSURE 4420 #/cu ft								2.21	2.21				
15		$W_u = 54$ #/cu ft											
15		810	810	0.405		454	1.01	1.40					
19		$W_u = 50$ #/cu ft							1.268		1.124		
34		② 950	1760	0.88		406	0.90	1.78	67 1.181	1.214	33 1.107		2.09 0.107(19) 2.214 = 0.92
		$W_u =$ #/cu ft											
		$W_u =$ #/cu ft											
		$W_u =$ #/cu ft											
		$W_u =$ #/cu ft											
		$W_u =$ #/cu ft											
		$W_u =$ #/cu ft											

Settlement of 2-B0 @ shoulder line due to 1-RE

TOTAL Q 0.92



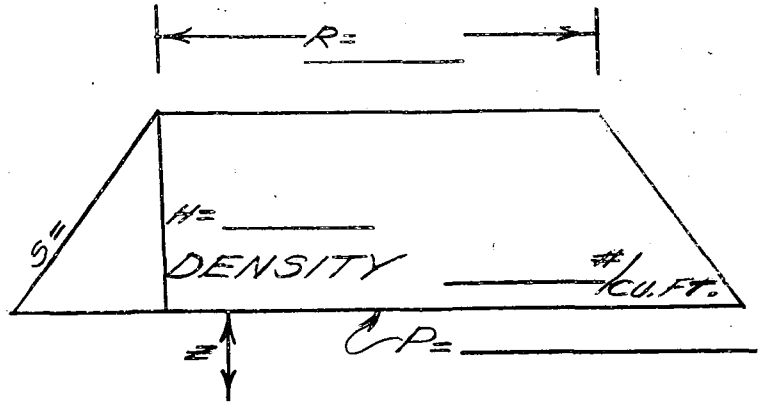
R+SH = _____
 = _____
 = _____

- P = Fill Pressure At Ground L.
- P_z = Pressure At Depth z
- e_i = Void Ratio At Upper Surface of Stratum
- e_f = Void Ratio At Lower Surface of Stratum
- D = Thickness of Stratum
- z = Depth Below The Ground Line
- W_u = Unit Weight of Stratum

P.S.H. NO. 1-RESECTION Woodville Inter. No Approach BY STA 2856+09 JOB #4

STATION	THICKNESS	Fill Pressure	Inactive Pressure	Inactive Pressure	Z	P/Z	Active Pressure	Total Pressure	e_i	Average e_i	e_f	Average e_j	$Q = \frac{e_i - e_f}{1 + e_i} (D)$
#	#/ft	#/ft	Tons/ft	Tons/ft	ft	/ft	Tons/ft	Tons/ft					
L PRESSURE		5200					2.60	2.60					
AVE.	24	$W_u = 43$ #/cu.ft.							1.932				
	24		1030	.515		.792	2.06	2.58	1.700			1.816	$(1.816 - 1.340) \frac{24}{2.816} = 4.04$
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											
		$W_u =$ #/cu.ft.											

TOTAL Q 4.04



- RISH = _____
 - = _____
 - = _____
- P = Fill Pressure At Ground Line
 P_Z = Pressure At Depth Z Surface
 e_i = Void Ratio At Upper Surface of Stratum
 D = Thickness Of Stratum
 Z = Depth Below The Ground Line
 W_u = Unit Weight of Stratum

Washington State Highway Commission
Department of Highways
TIME-SETTLEMENT COMPUTATIONS

Job No. _____ Control Sect. _____ Hole No. H-4-5 Sta. L 856+09
P.S.H. No. TR Section _____ Bridge # 4 No Approach _____

t min.	\sqrt{t}	500 (#/F+3)	1000	2000	4000	8000
0				C	0	0
1/4	0.5				56 1/2	55 1/2
1/2	0.707				62 1/2	59 3/4
1	1				66 3/4	63 3/4
2 1/4	1.5				70 1/4	69 1/2
4	2				72 1/4	74
9	3				76 1/2	78 1/2
16	4				78 1/2	80 3/4
25	5					
36	6					
49	7					
64	8					

*Symbols
 h_i = Initial Height of
 Consol Sample
 $h_f = h_i - \Delta h$
 C = Coef. of Consol.
 S = Settlement
 $d = D$ or $0.5D$
 Where 'D' is the
 Thickness of
 Layer

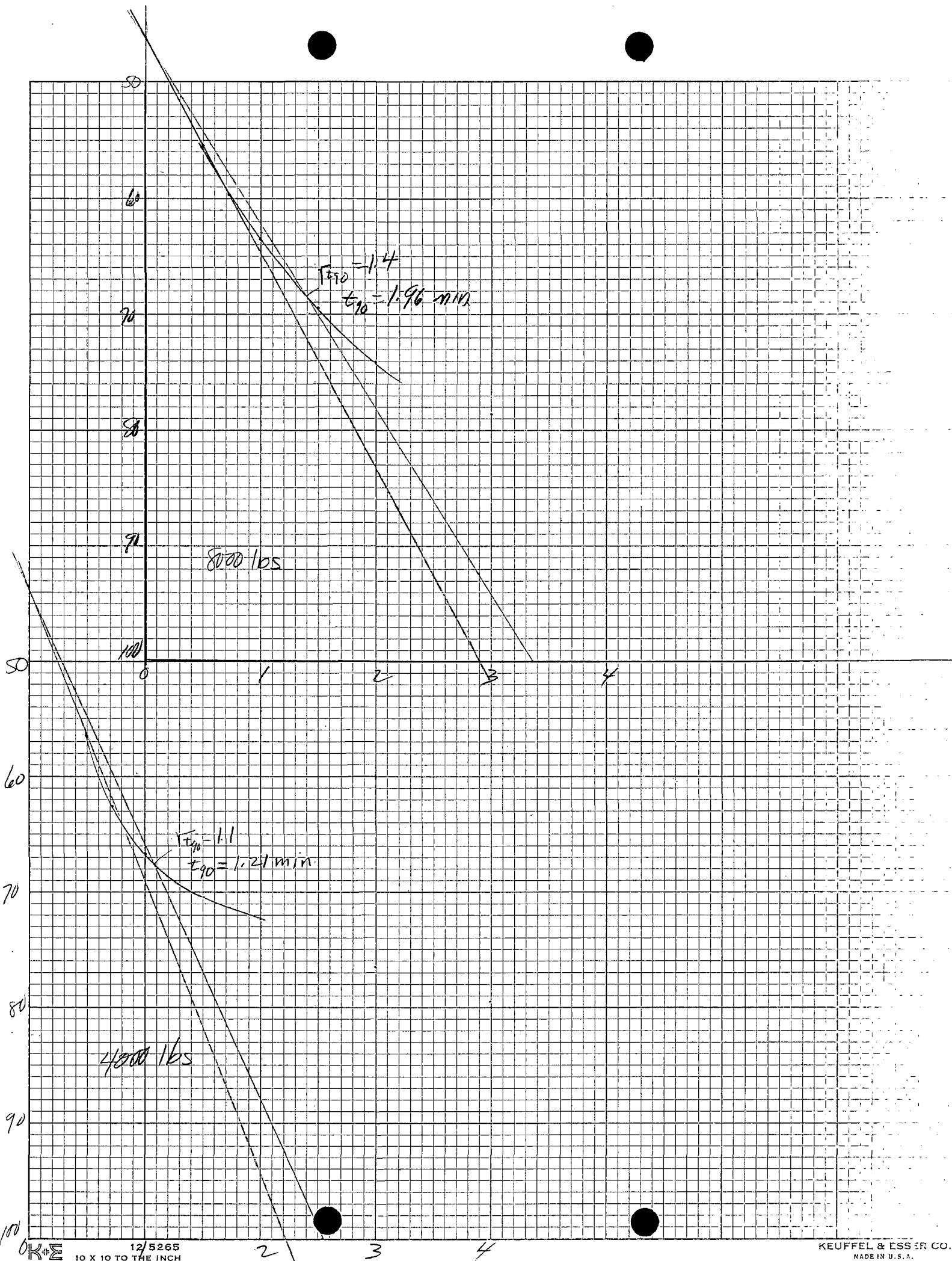
Remarks

B4871
73
75
77

Load	h_i^* (In.)	Δh	h_f^*	$\frac{h_i + h_f}{4}$	$\frac{(h_i + h_f)^2}{4}$	t 90 (min)	* $C = \frac{500S}{(h_i + h_f)^2}$ (#/F+3) @ 90
500	0.6250	0.0230	0.6020				
1000	0.6020	0.0136	0.5884				
2000	0.5884	0.0204	0.5680				
4000	0.5680	0.0273	0.5407	0.2772	0.0768	1.96	121 = 137.5 @ 5180
8000	0.5407	0.0283	0.5124	0.2633	0.0693	1.21	177

(2 Drainage Faces) (1 Drainage Face)

% S	S* (FE)	C (Ft ² /yr)	$\frac{d^2}{2.47C}$	$\frac{d^2}{2.47C}$	N_1	$t = N_1 \left(\frac{d^2}{2.47C} \right)$ (yr)	N	$t = N \left(\frac{d^2}{2.47C} \right)$
0	0	137.5	100	.294				
10	0.4				0.02	.006		
20	0.8				0.08	.024		
30	1.2				0.17	.050		
40	1.6				0.31	.091		
50	2.0				0.49	.144		
60	2.4				0.71	.208		
70	2.8				1.00	.294		
80	3.2				1.40	.411		
90	3.6				2.00	.614		
100	4.0				∞			



Washington State Highway Commission
Department of Highways
TIME-SETTLEMENT COMPUTATIONS

Job No. _____ Control Sect. _____ Hole No. _____ Sta. _____
S.H. No. _____ Section _____

t min.	\sqrt{t}	500 ($\frac{h_i}{F+3}$)	1000	2000	4000	8000
0						
1/4	0.5				84	91
1/2	0.707				102.8	111.8
1	1				121.8	130.3
2 1/4	1.5				139.8	149.5
4	2				150.3	166.5
9	3				166.8	189.0
16	4				179.3	199.5
25	5				192.2	211.5
36	6				202.0	214.5
49	7				207.8	220.3
64	8				212.8	224.8

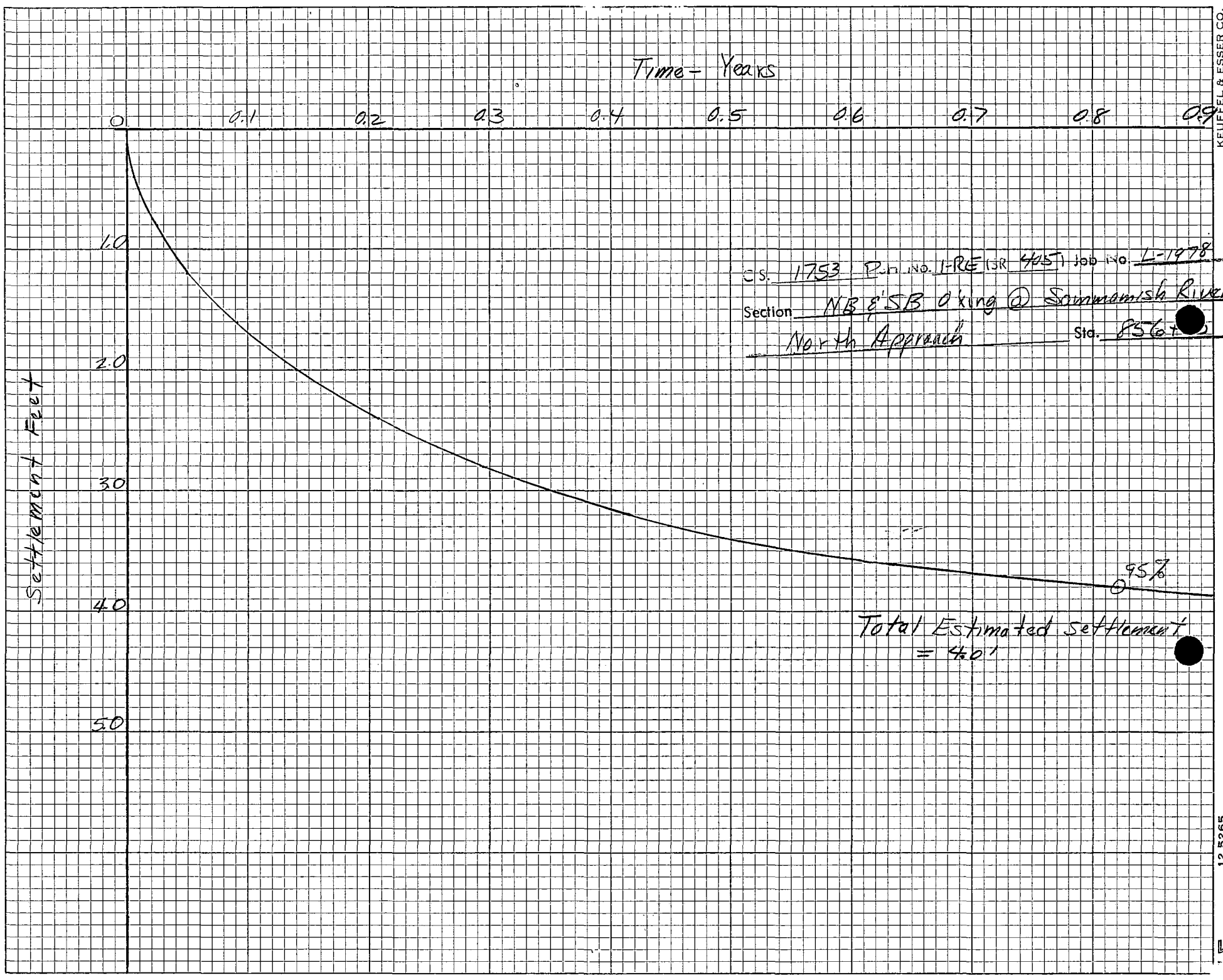
*Symbols
 h_i = Initial Height of Consol Sample
 h_c = $h_i - \Delta h$
 C = Coef. of Consol.
 S = Settlement
 d = D or $0.5D$
 where 'D' is the Thickness of Layer

Remarks

Load	h_i * (In.)	Δh	h_c *	$\frac{h_i + h_c}{4}$	$\frac{(h_i + h_c)^2}{4}$	t 90 (min)	* $C = \frac{5005}{F+30} \left(\frac{h_i + h_c}{4} \right)^2$
500							
1000							
2000							
4000							
8000							

(2 Drilling Faces) (1 Drilling Face)

% S	S * (Fc)	C (Fc ² /yr)	$\frac{d^2}{C}$	$\frac{d^2}{2.47C}$	N_1	$N_1 = N \left(\frac{d^2}{2.47C} \right)$ (yr)	N	t = N $\left(\frac{d^2}{2.47C} \right)$
0								
10					0.02			
20					0.06			
30					0.11			
40					0.31			
50					0.49			
60					0.71			
70					1.00			
80					1.40			
90					2.90			
100					∞			



CS. 11753 P. No. 1-RE (SR 405) Job No. L-1978
 Section NB & SB d'ring @ Sannamish River
North Approach Sta. 856+

Total Estimated Settlement
 = 4.0'