

DS #3 SEE LAYOUTS FOR LENGTH

DEPTH @ EXISTING DI = 359.40 - 354.0 = 5.4' + 1'
 DEPTH @ NEW CB = 359.00 - 350.0 = 9.0' + 1'
 DEPTH @ HEADWALL = 358.00 - 346.0 = 7.0' + 1'

WIDTH 3.75'
 DIST 34'
 25'

TRENCH EARTH = $\left[(5 + 59) + \frac{(0.4 + 4)(34)(1.5)}{2} + \frac{(4 + 2)(25)(1.5)}{2} \right] (3.75) \times \frac{1}{27} = 72.18 \text{ cy}$

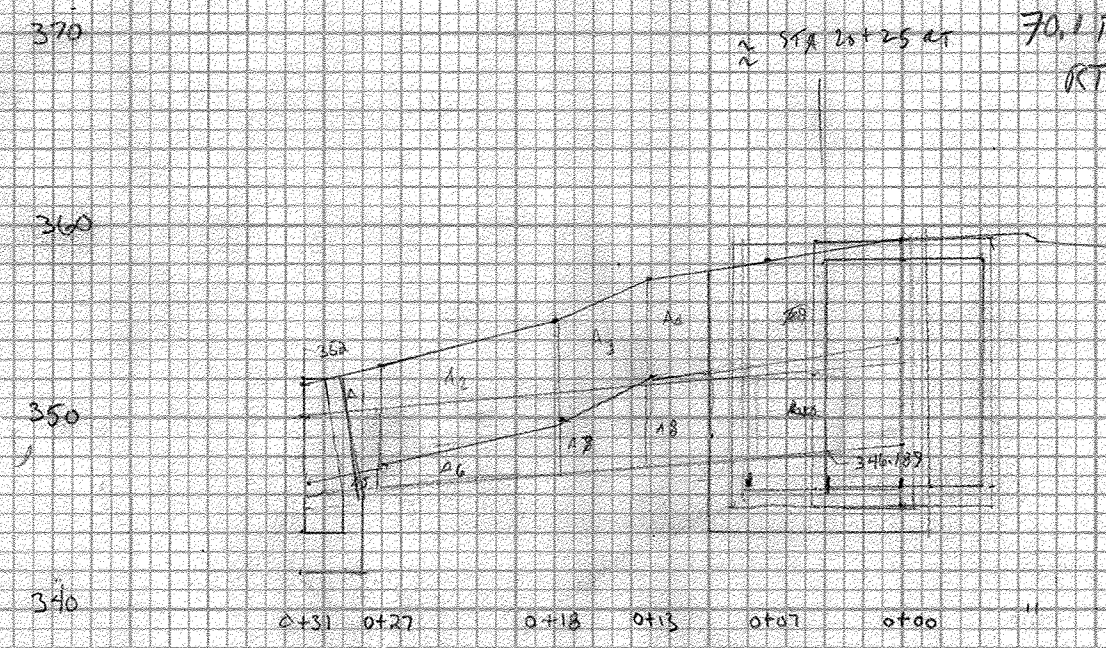
GRAV BIFL = $\left[(1 + 0.875)(3.75) - \frac{(0.875^2 \times \pi)}{2} \right] \times 59 \times \frac{1}{27} = 12.71 \text{ cy}$

CONCRETE HEADWALL

204.30 = 4.44 cy SEE MSP DAILY TBG 08/20/07

TRENCH EARTH

204.20 = 42.22' SEE MSP DAILY
 * - 6.01'
 36.21' cy CUB 08/02/10
 RCD 1/25/11



DS-2

TRENCH EARTH FOR PIPE 4.5' DIA
 $A_1 = 5' \times 4.5' \times 1' = 22.5 \text{ SF}$
 $A_2 = 5' \times 3.5' \times 1' = 17.5 \text{ SF}$
 $A_3 = 5' \times 2.5' \times 1' = 12.5 \text{ SF}$
 $A_4 = 5' \times 1.5' \times 1' = 7.5 \text{ SF}$
 TOTAL = 60 SF

TRENCH EARTH FOR PIPE 5' DIA
 $A_5 = \left[(0.5' \times 10') + \frac{(3.5' \times 2.5')}{2} \right] \times 1' = 19.38 \text{ SF}$
 $A_6 = \left[(0.5' \times 2.5') + \frac{(0.5' \times 1.5')}{2} \right] \times 1' = 1.54 \text{ SF}$
 $A_7 = \left[(1.5' \times 1.5') + \frac{(1.5' \times 0.5')}{2} \right] \times 1' = 1.54 \text{ SF}$
 $A_8 = \left[(1.5' \times 0.5') + \frac{(1.5' \times 0.5')}{2} \right] \times 1' = 0.77 \text{ SF}$
 TOTAL = 33.23 SF

TRENCH EARTH FOR STRUCTURE 15' DIA
 $A = 5' \times 15' \times 1' = 75 \text{ SF}$

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GRAVEL BACKFILL UNDER STRUCTURE
 $= \pi (3.75')^2 \times 1' \times 1.25 = 5.62 \text{ cy}$

* COMMON EXCAVATION FOR DITCH IN FRONT OF HEADWALL & WINGWALLS

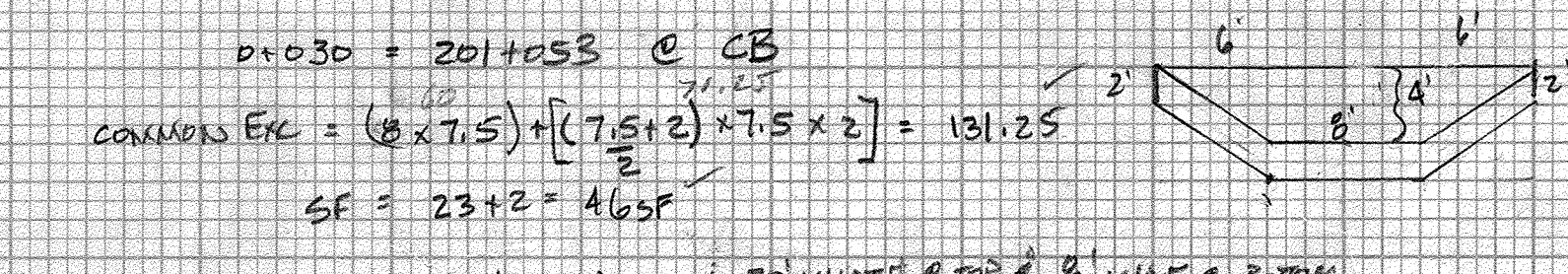
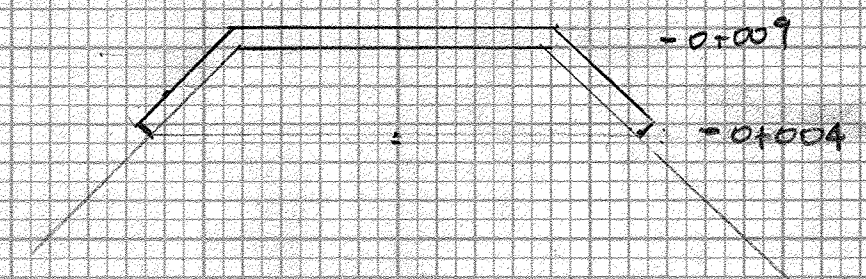
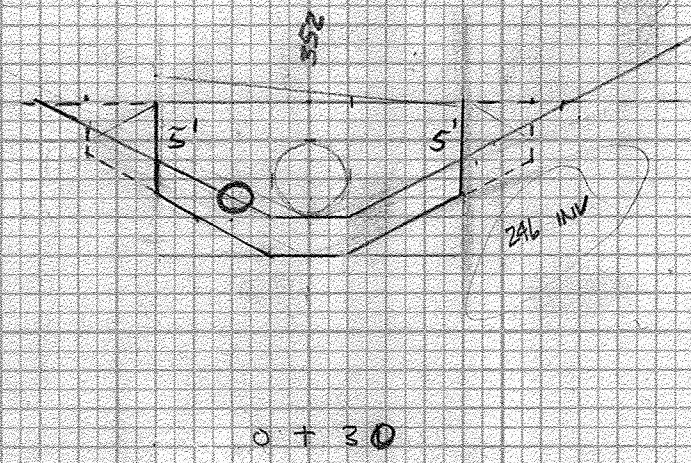
1' IN FRONT OF HEADWALL = $(110 \text{ SF} \times 1) \times \frac{1}{27} = 4.07 \text{ cy}$
 IN FRONT OF WINGWALLS = $\left[\frac{(2' + 5') \times 7.5 \times 1}{2} \right] \times \frac{1}{27} = 1.94 \text{ cy}$

STA	COMMON EXC A VOL	STONE FILL A VOL	STONE FILL B VOL
0+009	110	32	195
0+004	142	46	196
0+000	148	52	1470
0+030	131.25	46	714
0+048	96	40	1036
0+085	63	16	1036

0+009 COMMON EXC = $(8' \times 4') + \left(\frac{5' \times 8'}{2} \times 6' \times 2 \right) = 110 \text{ SF}$
 SF = $16 \times 2 = 32 \text{ SF}$

0+004 COMMON EXC = $(6' \times 4') + \left(\frac{6' \times 12'}{2} \times 2 \right) + (23 \times 2) = 142 \text{ SF}$
 SF = $23 \times 2 = 46 \text{ SF}$

0+000 COMMON = $(6' \times 4') + \left(\frac{6' \times 12'}{2} \times 2 \right) + (26 \times 2) = 148 \text{ SF}$
 SF = $26 \times 2 = 52 \text{ SF}$



0+030 COMMON EXC = $(8' \times 7.5') + \left(\frac{7.5' \times 2'}{2} \times 7.5 \times 2 \right) = 131.25 \text{ SF}$
 SF = $23 + 2 = 46 \text{ SF}$

0+048 COMMON EXC = $(8' \times 6') + \left[\frac{(6' \times 2')}{2} \times 6 \times 2 \right] = 96 \text{ SF}$
 SF = $20 \times 2 = 40 \text{ SF}$

0+085 COMMON EXC = $16 \times 2 = 32 \text{ SF}$

DS #4

REMOVAL OF EXISTING DI

FM 6'x6'x10' + 6'x6'x2' BASE
 203.16 SOLID ROCK = $3.64 \times 6 \times 6 / 27 = 4.85 \text{ cy}$

229.21 TRENCH ROCK = $\left[\frac{(12 - 3.64 - 5) \times 1.5 \times 6 \times 6}{2} \right] \times \frac{1}{27} = 13.39 \text{ cy}$

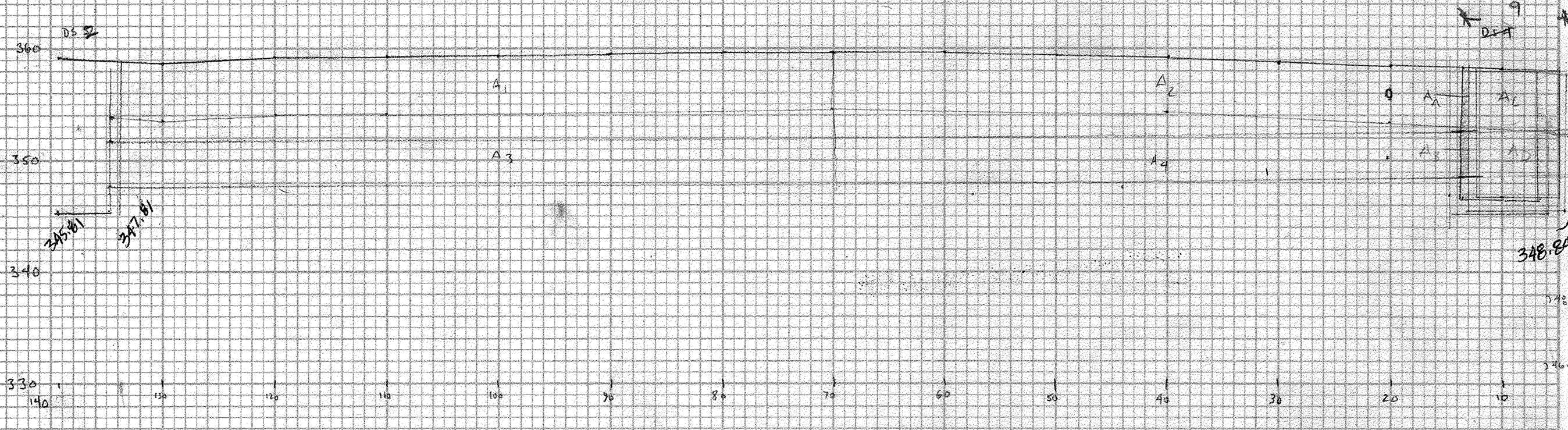
6" DI = 4.5' OUTSIDE RADIUS
 $359.19 - 354.4 - (0.02 \times 31.4) = 354.84$

CB DEPTH = $359.84 - 346.84 = 13.00$
 $Vol = \left(5 \times \pi \times 4.5^2 \right) + \left(1.5 \times 9 \times \pi \times 4.5^2 \right) = 699.79 = 25.92 \text{ cy}$

REMOVAL OF EXISTING PIPE

ADD LENGTH OF PIPE TO BE REMOVED IN TRENCH

L = 25'
 D = 3'
 $Vol = 1.5 \times \frac{3 \times 25 \times 4.1}{27} = 17.08 \text{ cy}$



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 $A_3 = 5' \times 2.5' \times 1' = 12.5 \text{ SF}$
 $A_4 = 5' \times 1.5' \times 1' = 7.5 \text{ SF}$
 TOTAL = 60 SF

GRAVEL BACKFILL FOR PIPE
 $= \pi (3.75')^2 \times 1' \times 1.25 = 5.62 \text{ cy}$

TRENCH EARTH FOR STRUCTURE 15' DIA
 $A = 5' \times 15' \times 1' = 75 \text{ SF}$

GRAVEL BACKFILL FOR STRUCTURE
 $= \pi (3.75')^2 \times 1' \times 1.25 = 5.62 \text{ cy}$

TRENCH EARTH FOR STRUCTURE 15' DIA
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EXTRA CUR AROUND PERMANENT DIA 18" PIPE
 $= \pi (2.25')^2 \times 6 \times 2 = 49.66 \text{ SF} / 27 = 1.84 \text{ cy}$

TRENCH EARTH FOR STRUCTURE 15' DIA
 $A = 5' \times 15' \times 1' = 75 \text{ SF}$

6.8 = 83.32 cy

TRENCH EARTH FOR STRUCTURE 15' DIA
 $A = 5' \times 15' \times 1' = 75 \text{ SF}$

TRENCH EARTH TOTAL
 PIPE = 408.16
 DI = 12.53
 420.69 cy

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+ EXIST PIPE
 17.08 cy

TRENCH EARTH FOR STRUCTURE 15' DIA
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437.77 cy

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 $A = 5' \times 15' \times 1' = 75 \text{ SF}$

437.77 cy

ORIGINAL SURVEY PLOTTING MATERIAL NOTE BOOK NO. 110
 DATE 01/25/08
 DRAWN BY DS4
 CHECKED BY DS4