Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

GUADALUPE CHANNEL
&
SOSSAMAN BOX

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT _____ PAGE ____ OF ____

DETAIL _____ COMPUTED _____ DATE ____

_____ CHECKED BY _____ DATE ____

INDEX:

DESIGN COMPS, GUADALUPE CHANNEL

DESIGN COMPS, SOSSAMAN BOX

GEOMETRY, GUADALUPE CHANNEL

COMPUTER OUTPUT

FILL & EXCN QUANTITY

STEEL & CONCRETE QTY.

CONSTRUCTION PERMIT & MISCE.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT GUADALUPE / SOSSAMAN PAGE ____ OF ____

DETAIL CHANNEL / BOX COMPUTED KVH DATE 9/92

CHECKED BY ____ DATE ____

DESIGN CRITERIA:

As per AASHTO Standard Specifications for Highway Bridges 14th Edition, 1989

Concrete Comp. Strength 4000 psi (Class-AA)

Concrete Channel Lining 2500 psi (Class-B)

Reinforcing Steel shall Conform to ASTM-A615 Grade 60. fs = 24000 psi
All Reinf. bars shall have 2" cl. cover unless noted otherwise.

All Construction shall Conform to latest M.A.G. Standard details and Specifn., MCDOT Supplements and City of Mesa.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 1 OF 31
DETAIL Wall Design COMPUTED KVH DATE 9/92
CHECKED BY CGW DATE 12/92

I) Using Submerged Condition:

Wt of Soil (wet) = 130 pcf
Wt. of water = 62.4
Wt. of Submerged Soil = 67.6 pcf

Use K = 0.33

$p_r = wKh = (67.6 \times 0.33\,h) = 22.3\,h$ pcf
62.4
84.7

Use 85 pcf for Submerged Condition

II) Using Dry Condition with 2' Surcharge.

$p_r = (0.12 \times 0.33\,h) = .4\,h$ pcf

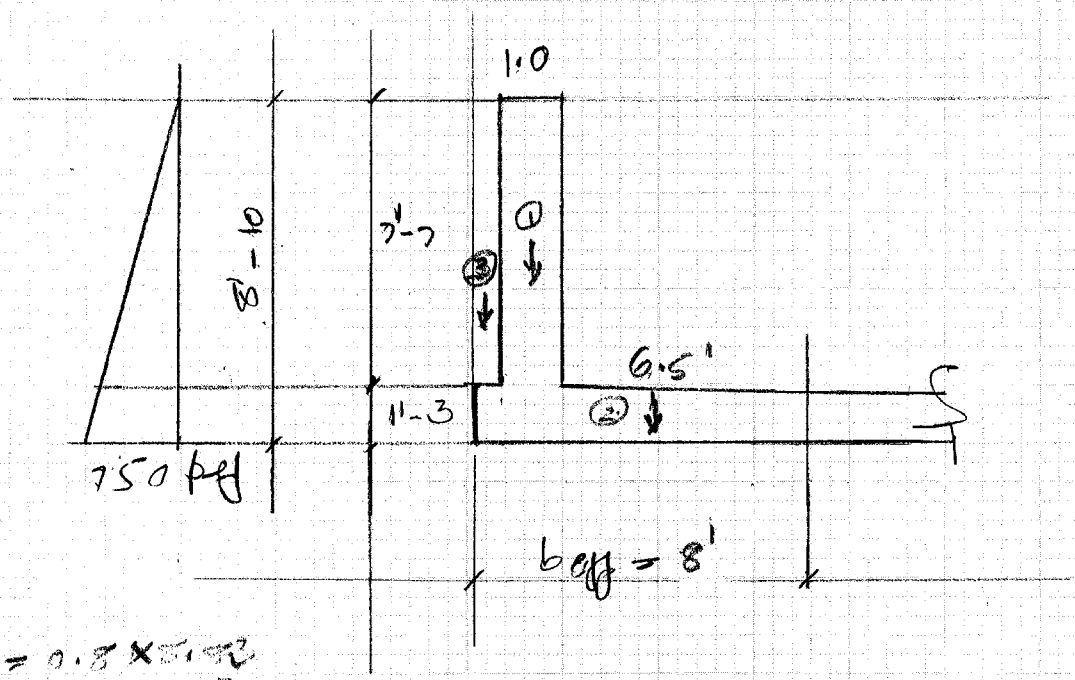
p_r(Surch 2') = (0.12 × 0.33 × 2) = 0.08 ksf

Say 0.10 ksf (uniform)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 2 OF 31
DETAIL Wall Design COMPUTED KVH DATE 9/92
CHECKED BY CGW DATE 12/92

I) Check with Submerged Condition



beff = 0.8 × 8.92
= 7.1 + 0.5
say 8'

Using 85 psf under Submerged Condition

$P_v = (85 \times 8.83) = 750$ psf

$P = \left(\frac{0.750}{2} \times 8.83\right) = 3.31^{k}$

$M_{OT} = \left(3.31 \times \frac{8.53}{3}\right) = 9.74^{k/ft}$

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 3 OF 31

DETAIL Wall Design COMPUTED KVH DATE 9/92

CHECKED BY CGW DATE 12/92

Try 6" Heel

Stabilizing Mom:

$W_1 = (7.58 \times 1.0)\,0.15 = 1.14^K$

$W_2 = (8.0 \times 1.25)\,0.15 = 1.50$

$W_3 = (7.58 \times 0.5)\,0.13 = 0.49$

3.13

$Mom\,(STB) = 1.14(7.0) + (1.5 \times 4.0) + (0.49 \times 7.75)$
$= 19.8^{K'}$

$F.S = \frac{19.8}{9.74} = 1.8$

$x_R = (19.8 - 9.74)/3.13 = 2.58'$

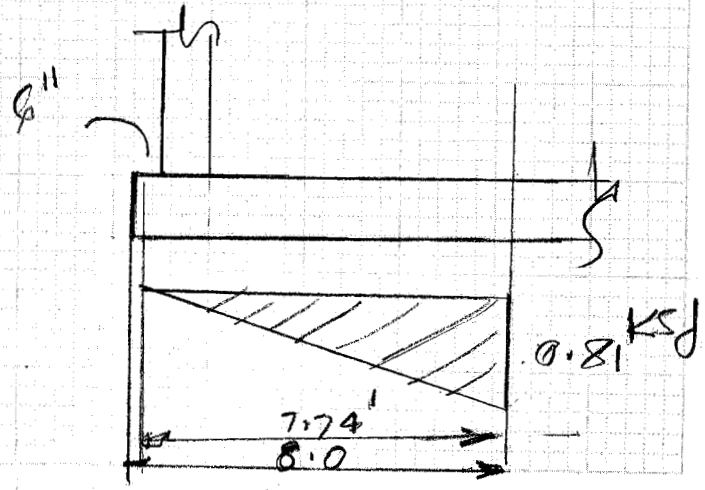
$e = \left(\frac{8}{2} - 2.58\right) = 1.42'$

$b/6 = \frac{8}{6} = 1.33'$ $\quad e > \frac{b}{6}$ $\therefore$ Triangular Pr

$\frac{L'}{3} = \left(\frac{L}{2} - e\right)$

$L' = 3\left(\frac{L}{2} - e\right) = 3(4.0 - 1.42) = 7.74'$

$q_{max} = \frac{2P}{BL'} = \left(\frac{2 \times 3.13}{1 \times 7.74}\right) = 0.81^{KSF}$



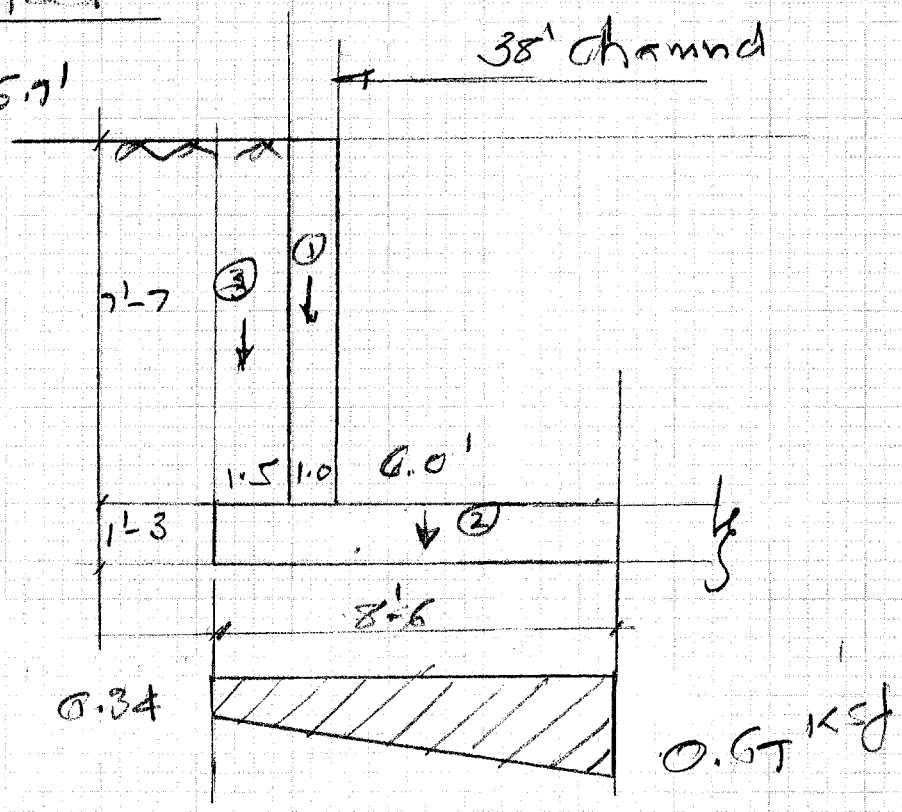
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 4 OF 31
DETAIL Wall Design COMPUTED KVH DATE 9/92
CHECKED BY CGW DATE 12/92

Try 1'-6" Heel

$b_{eff} = 0.65 \times 8.83 = 5.7'$
use 6'

$0.8h = 0.8 \times 8.83$
$= 7.1'$
$(7.1 + 1.5) = 8.6'$
say $8\frac{1}{2}'$



MISTIB

$W_1 = (1.0 \times 7.55)\,0.15 = 1.14^K$
$W_2 = (8.5 \times 1.25)\,0.15 = 1.60$
$W_3 = (1.5 \times 7.58)\,0.13 = 1.48$
$\Sigma = 4.22^K$

M_{rm} S+13 $= (1.14 \times 6.5) + (1.60 \times 4.25) + (1.48 \times 7.75)$
$= 25.68$

$M_{OT} = 9.74$, $FS = \frac{25.68}{9.74} = 2.64$

$x_R = (25.68 - 9.74)/4.22 = 3.78$

$e = \left(\frac{8.5}{2} - 3.78\right) = 0.47$ $b/6 = \frac{8.5}{6} = 1.42$

$e < \frac{b}{6}$ ∴ Resultant within mid third.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

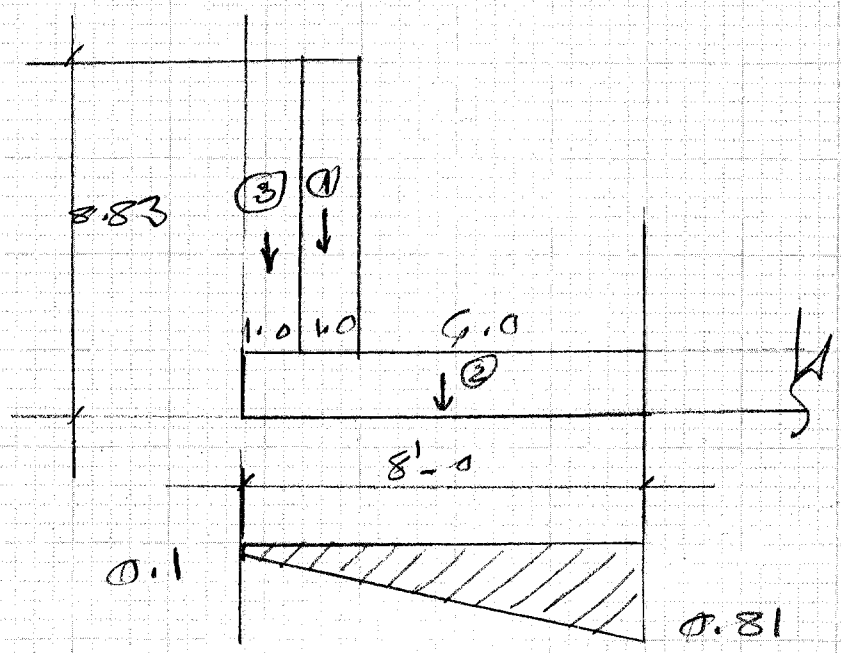
PROJECT Guadalupe Channel PAGE 5 OF 31
DETAIL Wall Design COMPUTED K VH DATE 9/92
CHECKED BY CGW DATE 12/92

$$p_r(max) = \frac{4.22}{8.5 \times 1}\left(1 \pm \frac{6 \times 0.47}{8.5}\right)$$

$$= 0.5\,(1 \pm 0.33) = 0.67 \text{ ksf}$$

$$p_r(min) = 0.34 \text{ ksf}$$

Try 1'-0 Heel



$w_1 = \qquad = 1.14^k$

$w_2 = 8.0 \times 1.25 \times 0.15 = 1.50$

$w_3 = 1.0 \times 7.58 \times 0.13 = 0.99$

3.63^k

$M_{STB} = (1.14 \times 6.5) + (1.5 \times 4) + (0.99 \times 7.5) = 20.8$ k/ft

$X_R = (20.8 - 9.74)/3.63 = 3.05'$

$e = (4 - 3.05) = 1.05, \quad b/6 = 8/6 = 1.33$

$p_r(max) = \frac{3.63}{8 \times 1}\left(1 \pm \frac{6 \times 1.05}{8}\right) = 0.81$ ksf, $p_r(Min) = 0.1$

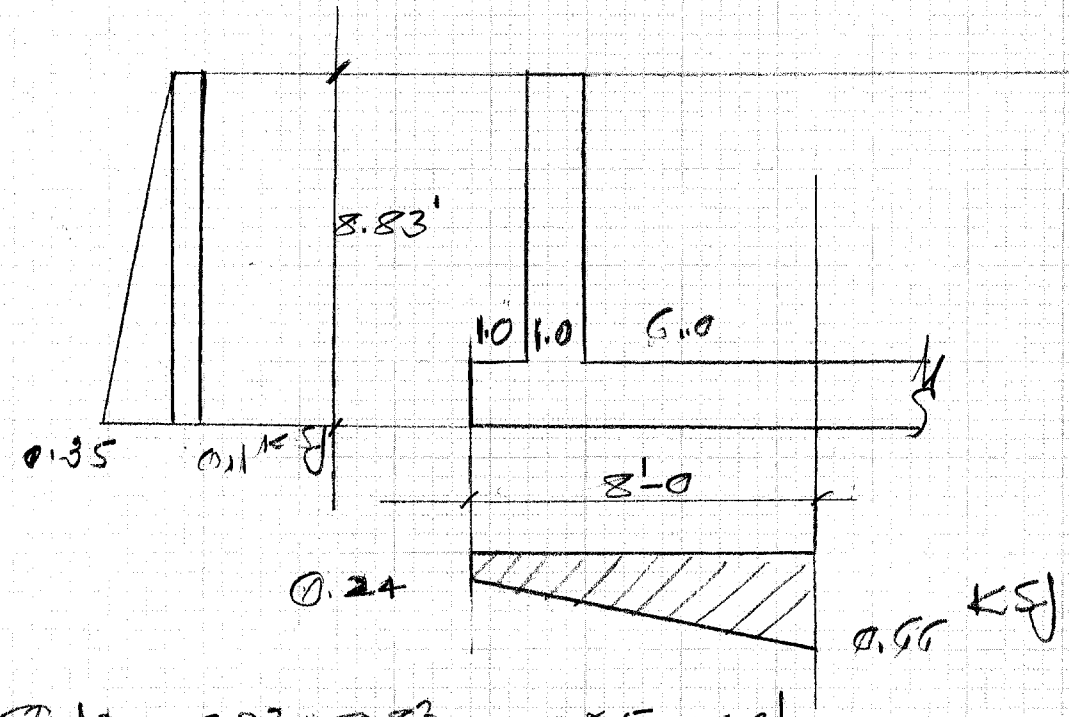
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 6 OF 31

DETAIL Wall Design COMPUTED KVH DATE 9/92

CHECKED BY Clay DATE 12/92

II Check using Dry Condition & Surch.



$P_r = 0.12 \times 0.33 \times 8.83 = 0.35$ KSF

1' Surch $= 0.12 \times 0.33 \times 2 = 0.10$

$P_1 = \left(\frac{0.35}{2} \times 8.83\right) = 1.55^K$

$P_2 = (0.1 \times 8.83) = 0.89^K$

$M_{OT} = \left(1.55 \times \frac{8.83}{3}\right) + \left(0.89 \times \frac{8.83}{2}\right) = 8.5^{K'}$

$M_{STB} = 20.8^{K'}$, $X_R = (20.8 - 8.5)/3.63 = 3.39'$

$e = (4.1 - 3.39) = 0.71' < b/6 = 1.33$

$p_r(max) = \frac{3.63}{8 \times 1}\left(1 \pm \frac{6 \times 0.71}{8}\right) = 0.45(1 \pm 0.46)$

$p_r(max) = 0.66$ KSF

$p_r(Min) = 0.24$

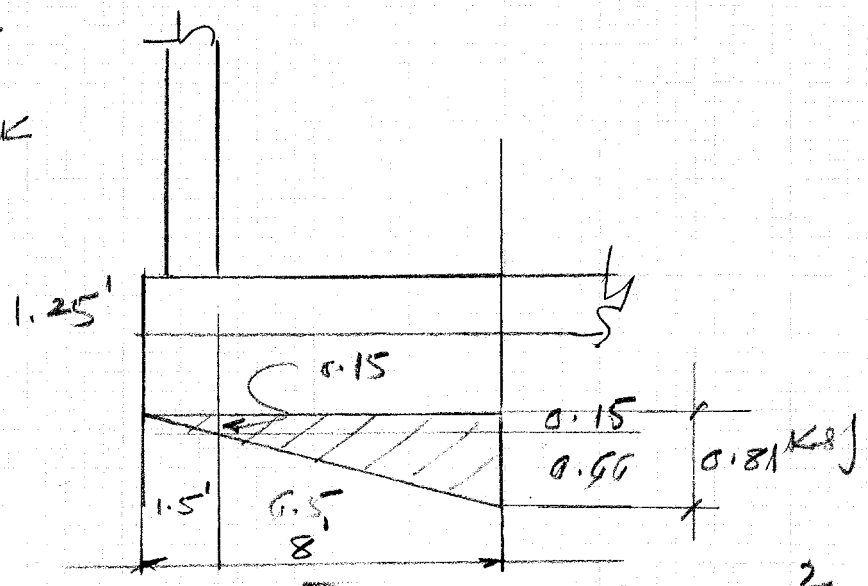
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 7 OF 31
DETAIL Ftg. Design COMPUTED KVH DATE 9/92
CHECKED BY CGW DATE 12/92

Footing Steel

$p_{w_1} = \frac{1.5}{8.0} \times 0.81 = 0.15$

$P = \left(\frac{0.66}{2} \times 6.5\right) = 2.15^{K}$



$M = \left(0.15 \times \frac{6.5^2}{2}\right) + \left(2.15 \times \frac{2}{3} \times 6.5\right) - \left(1.25 \times 0.15\right)\frac{6.5^2}{2}$

$(12.5 - 3.9) = 8.6$ K/ft

$d_{eff} = (15 - 3 - 0.5) = 11.5$

$A_s = \frac{8.6 \times 12}{24 \times 0.88 \times 11.5}$

$= 0.43 \text{ in}^2$

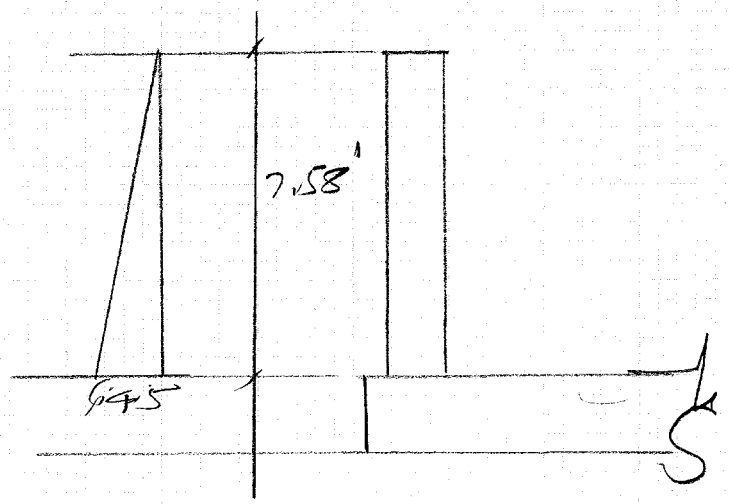
#4 @ 12", $A_{s_1} = 0.20$
#5 @ 12", $A_{s_2} = 0.31$
0.51

Base at 6" Contours ALT. #4 & #5 Bars
Actually Continue Storm Steel

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 8 OF 31
DETAIL Wall Design COMPUTED KVH DATE 9/92
CHECKED BY CGW DATE 12/92

Stem Steel



1) $p_r = (85 \times 7.58) = 645$ psf

$T_1 = \left(\frac{0.645}{2} \times 7.58\right) = 2.45^K$

$Mom = \left(2.45 \times \frac{7.58}{3}\right) = 6.2$ Kfts

$d_{eff} = (12 - 2 - 0.5) = 9.5''$

$A_s = \left(\frac{6.2 \times 12}{24 \times 0.88 \times 9.5}\right)$

$= 0.39$

Alternate { #4 @ 12, $A_s = 0.20$
#5 @ 12 $A_s = 0.31$
0.51

Shear Check

$V_{max} = 2.45^K$

$v = \left(\frac{2.45}{12 \times 9.5}\right) = 21.5$ psi

v_c Allow $= 0.95\sqrt{4000} = 60$ psi ∴ OK

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 9 OF 31

DETAIL Wall Steel COMPUTED KRH DATE 7/92

CHECKED BY Clay DATE 12/92

Check Bar Cutoff at 3' from Bottom:

Bar Extention:

12 Bar ϕ = 12 × 5/8 = 7.5"

d_{eff} = 12 − 2.5 = 9.5

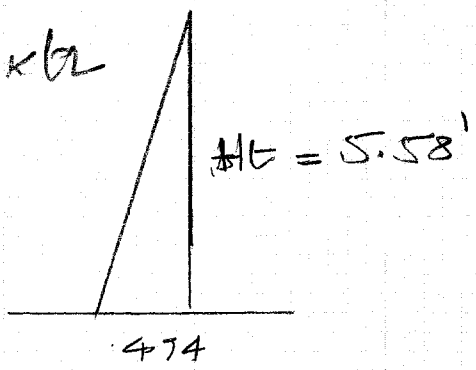
Min 12" = 1.0'

∴ Check Mom at (7−7) − 2.0' = 5.58'

P_h = 85 (5.58) = 474 psf

$P = \left(\frac{0.474}{2} \times 5.58\right) = 1.32^{k}$

$M = \left(1.32 \frac{\times 5.58}{3}\right) = 2.46^{k'}$



$A_s = \left(\frac{2.46 \times 12}{24 \times 0.88 \times 9.5}\right)$

= 0.15 in^2

∴ #5 @ 12" used is ok.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 10 OF 31

DETAIL Wall Design COMPUTED KVH DATE 9/92

CHECKED BY CGW DATE 12/92

Check Wall Steel:

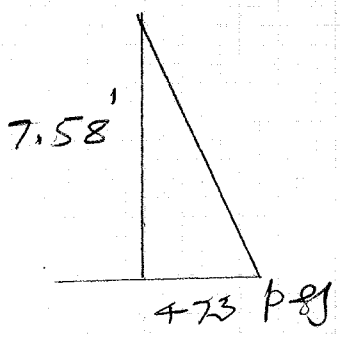
Temporary Condition - No Backfill - Water pr

$p_r = (62.4 \times 7.58) = 473$ psf

$P = \left(\frac{0.473}{2} \times 7.58\right) = 1.8^{K}$

$M = \left(1.8 \times \frac{7.58}{3}\right) = 4.55^{K/ft}$

$d_{eff} = (12 - 2.5) = 9.5''$



$$A_s = \frac{4.55 \times 12}{24 \times 0.88 \times 9.5} = 0.29 \text{ in}^2$$

Since this is temp. Condition use 133%

$A_s = \frac{1}{1.33}(0.29) = 0.20$

#4 @ 12" is OK $A_s = 0.20$

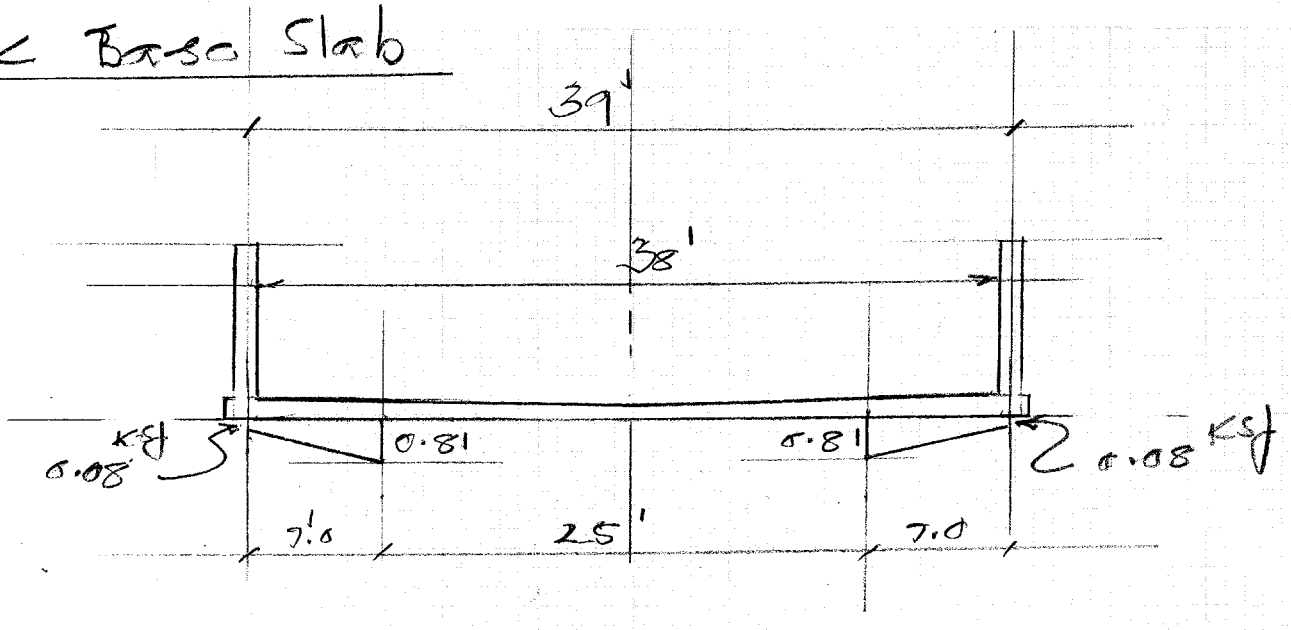
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

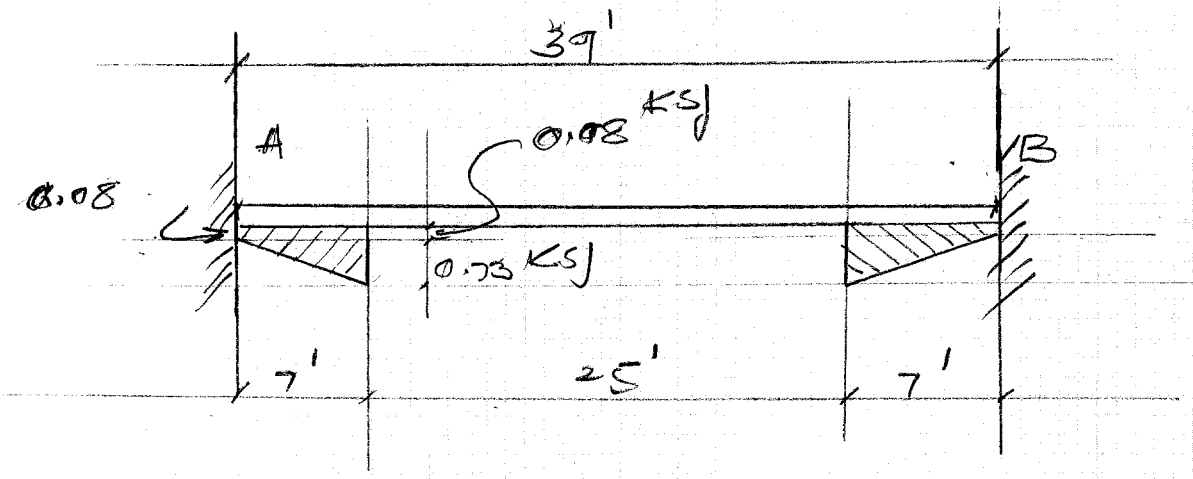
PROJECT Guadalupe Channel PAGE 11 OF 31

DETAIL Check Base Slab COMPUTED KVH DATE 9/92

CHECKED BY CCW DATE 12/92

Check Base Slab





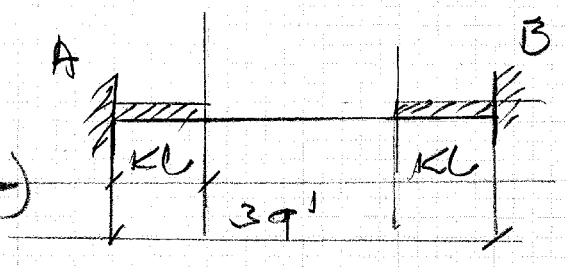
$$R_A = R_B = (0.08 \times 7.0) + \left(\frac{0.73}{2} \times 7.0\right) = 3.12^K$$

$KL = 7,\ K = 0.18$

a) $M_{A1} = M_{B1} = \frac{wL^2}{6} K^2 (3 - 2K)$

$= \frac{0.08 \times 39^2}{6} \times 0.18^2 (3 - 2 \times 0.18)$

$= 1.74^{K'L}$



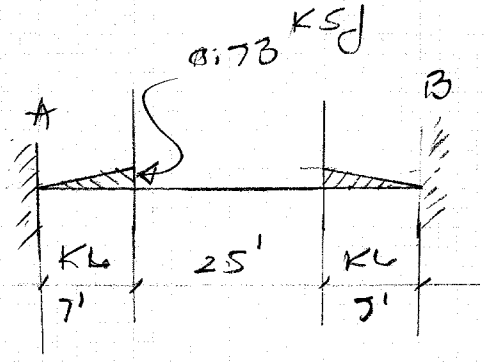
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 12 OF 31
DETAIL Base Slab COMPUTED KVH DATE 9/92
CHECKED BY CCW DATE 12/92

Base Slab (Contd)

b) Triangular Load

$K = 0.18$



$$M_{A_2} = \frac{wL^2}{30} K^2 (10 - 15K + 6K^2)$$

$$= \frac{0.73 \times 39^2 \times 0.18^2}{30} (10 - 15 \times 0.18 + 6 \times 0.18^2)$$

$$= 1.2 (7.49) = 8.9 \text{ KFL}$$

$$M_{B_2} = \frac{wL^2}{20} K^3 (5 - 4K)$$

$$= \frac{0.73 \times 39^2 \times 0.18^3}{20} (5 - 4 \times 0.18)$$

$$= 0.32 (4.28) = 1.37$$

$$\therefore M_{A_2} = M_{B_2} = (8.9 + 1.37) = 10.27$$

$\therefore$ Combining Cases a) & b)

$$M_A = M_B = (10.27 + 1.74) = 12.01 \text{ KFL}$$

$$M_S = 3.12 (19.5) - 0.08 \times 7 \times (\overset{16}{12.5} + 3.5) - \frac{0.73}{2} \times 7 \times (\overset{14.83}{12.5 + \tfrac{1}{3} \times 7})$$

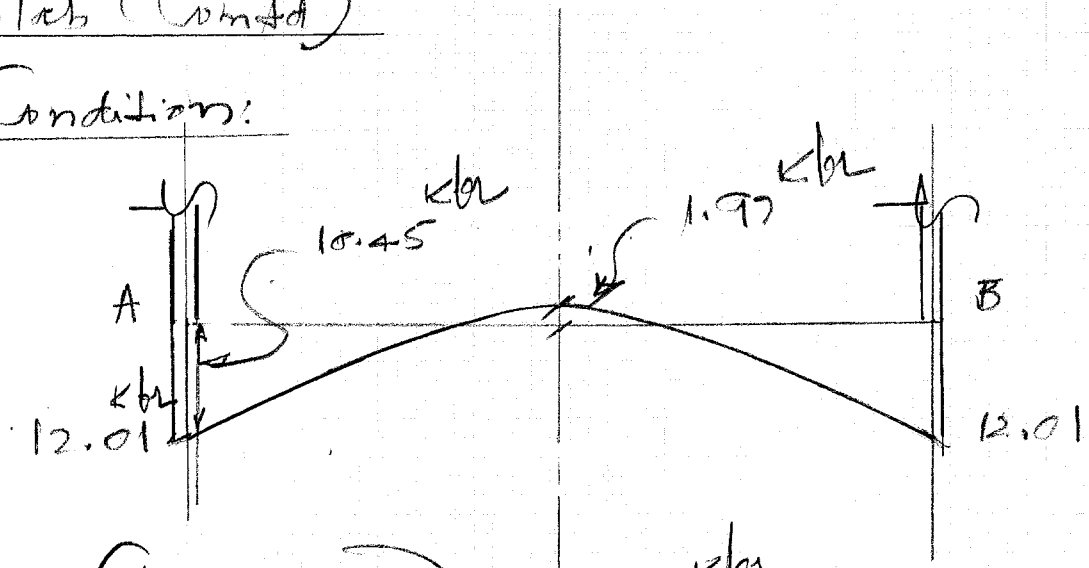
$$= (60.84 - 8.96 - 37.9) = 13.98 \text{ KFL}$$

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 13 OF 31
DETAIL Base Slab COMPUTED KVH DATE 9/92
CHECKED BY Cwd DATE 10/92

Base Slab (Contd)

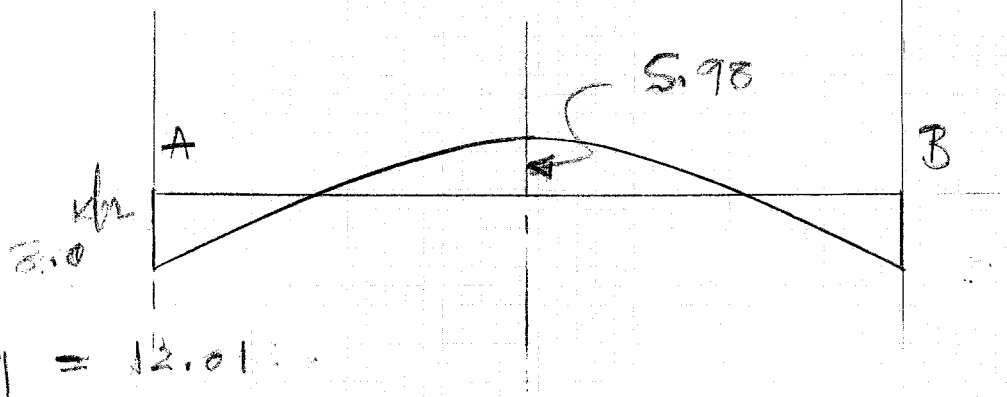
1) Fixed Condition:



Mom. Pos = (13.98 − 12.01) = 1.97 kip

2) Partially Fixed: (2/3 × 12.01) = 8.0 kip

Mom. Pos = (13.98 − 8.0) = 5.98



Mom Neg = 12.01

Area of Shear Diagram = Change in Moment

Max. Shear at A = 3.12 K

Area = (0.5 × 3.12) = 1.56 = Change in Mom. kip

Mom at the Face of Wall = (12.01 − 1.56) = 10.45 kip

Mom Face = 10.45 kip

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 14 OF 31
DETAIL Base Slab COMPUTED KVH DATE 9/92
CHECKED BY CWW DATE 12/92

Mom Neg = 8.0 kft

$d_{eff} = (15 - 3 - 0.5) = 11.5''$

$$A_s = \frac{8.0 \times 12}{24 \times 0.88 \times 11.5}$$

$$= 0.39$$

ALT #4 Bars & #5 Bars, Same Wall Steel is OK

Mom Pos = 5.98 kft

$d_{eff} = (10 - 2.5 - 0.5) = 7.0''$

2½" clear

$$A_s = \frac{5.9 \times 12}{24 \times 0.88 \times 7.0} = 0.48$$

Use #6 @ 12"

Check Base Slab Shear:

$V_{max} = 3.12^k$ $b = 12$, $d = (15 - 3 - 0.5) = 11.5''$

$$v = \left(\frac{3.12}{12 \times 11.5}\right) = 22.6 \text{ psi}$$

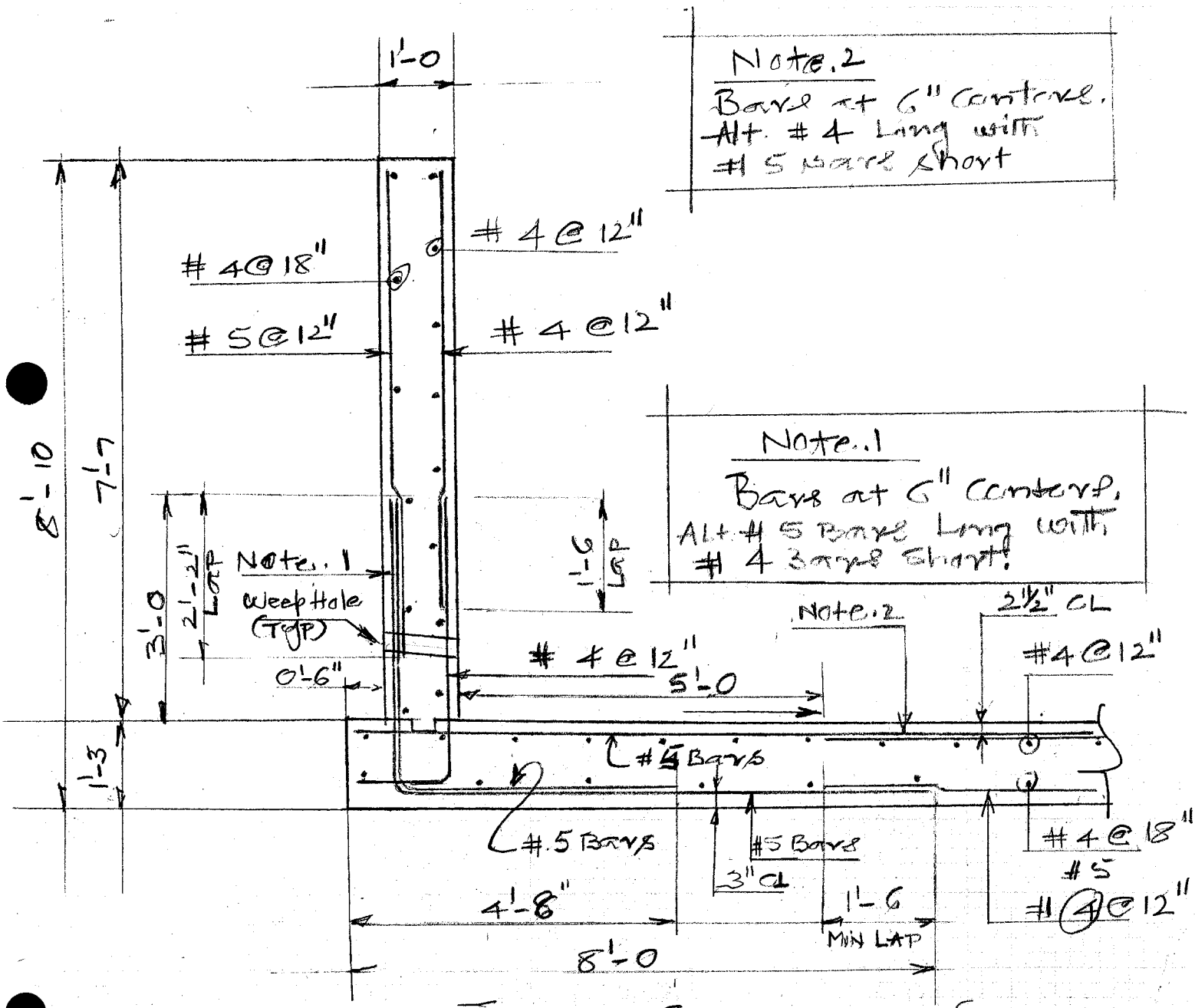
v (Allow) $= 0.95\sqrt{4000} = 60$ psi > 22.6 psi ∴ OK

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 15 OF 31

DETAIL Wall Detail COMPUTED KAH DATE 9/92

CHECKED BY CCW DATE 11/92



Typical ~~Section~~ Wall Section

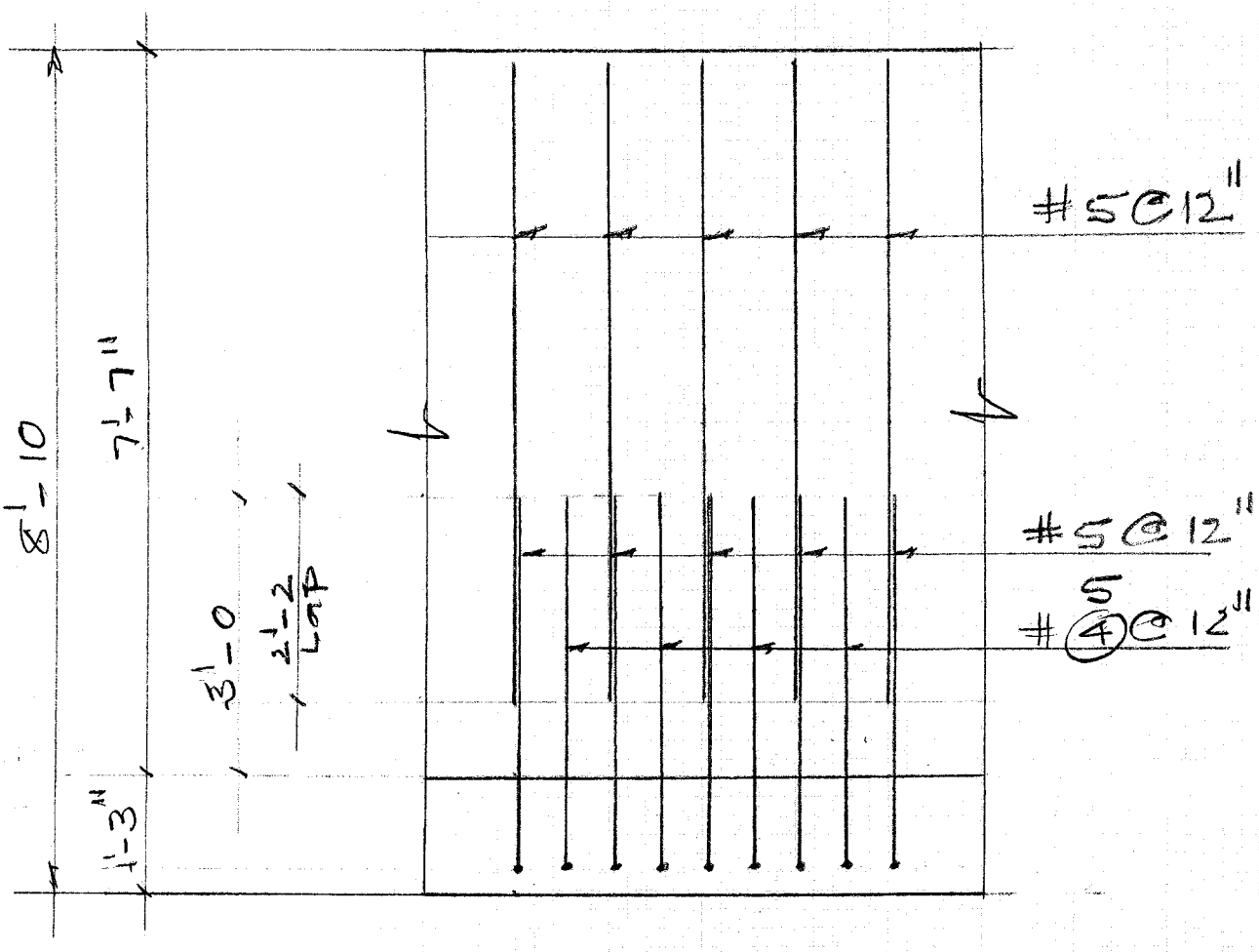
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 16 OF 31

DETAIL Wall Elevation COMPUTED KVH DATE 9/92

CHECKED BY CCW DATE 12/92



Typical Wall Elevation

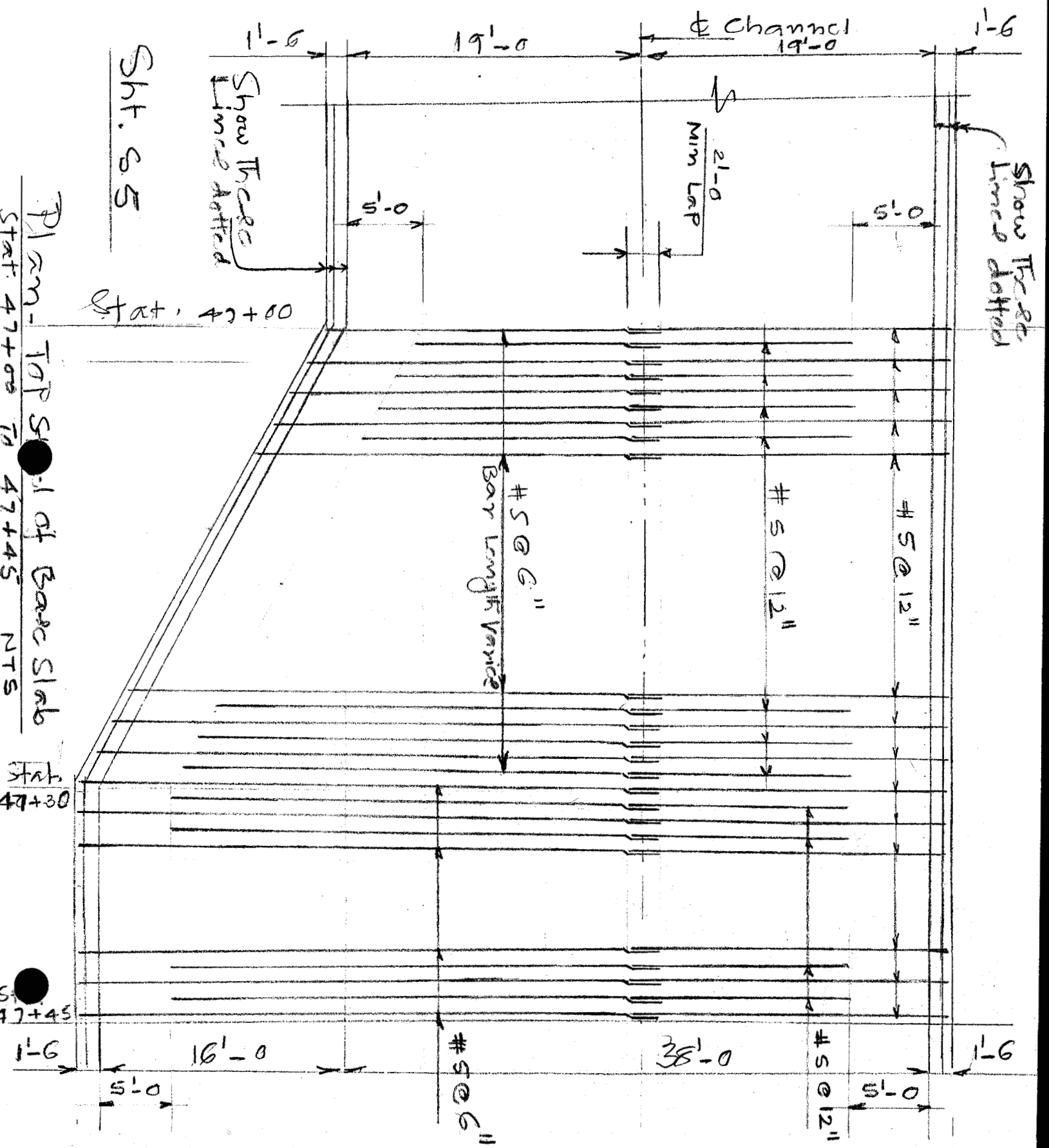
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 17 OF 31

DETAIL Base Slab COMPUTED KVH DATE 9/92

CHECKED BY CWW DATE 12/4

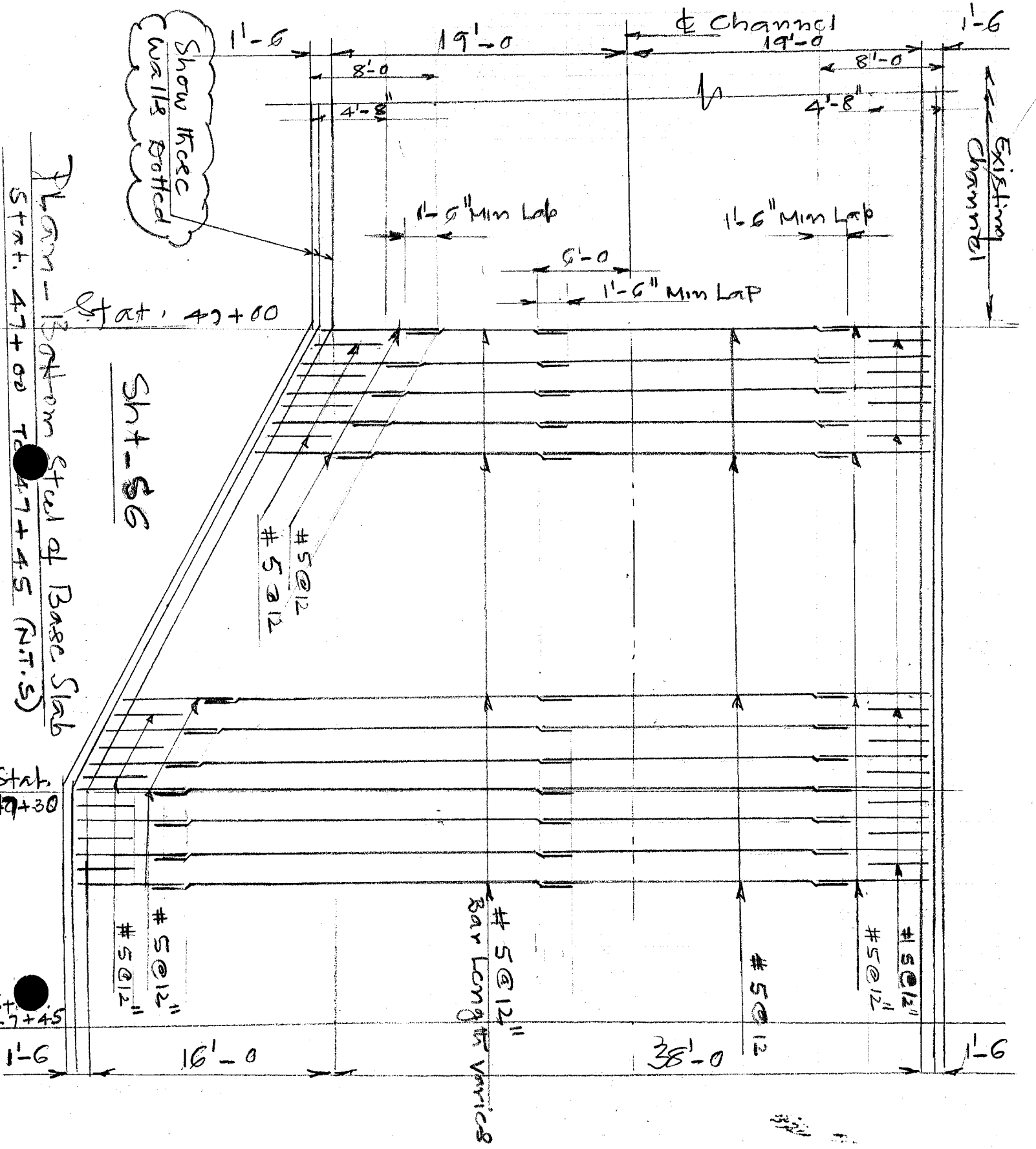


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 18 OF 31

DETAIL Base Slab COMPUTED KVH DATE 9/92

CHECKED BY CCW DATE 12/92

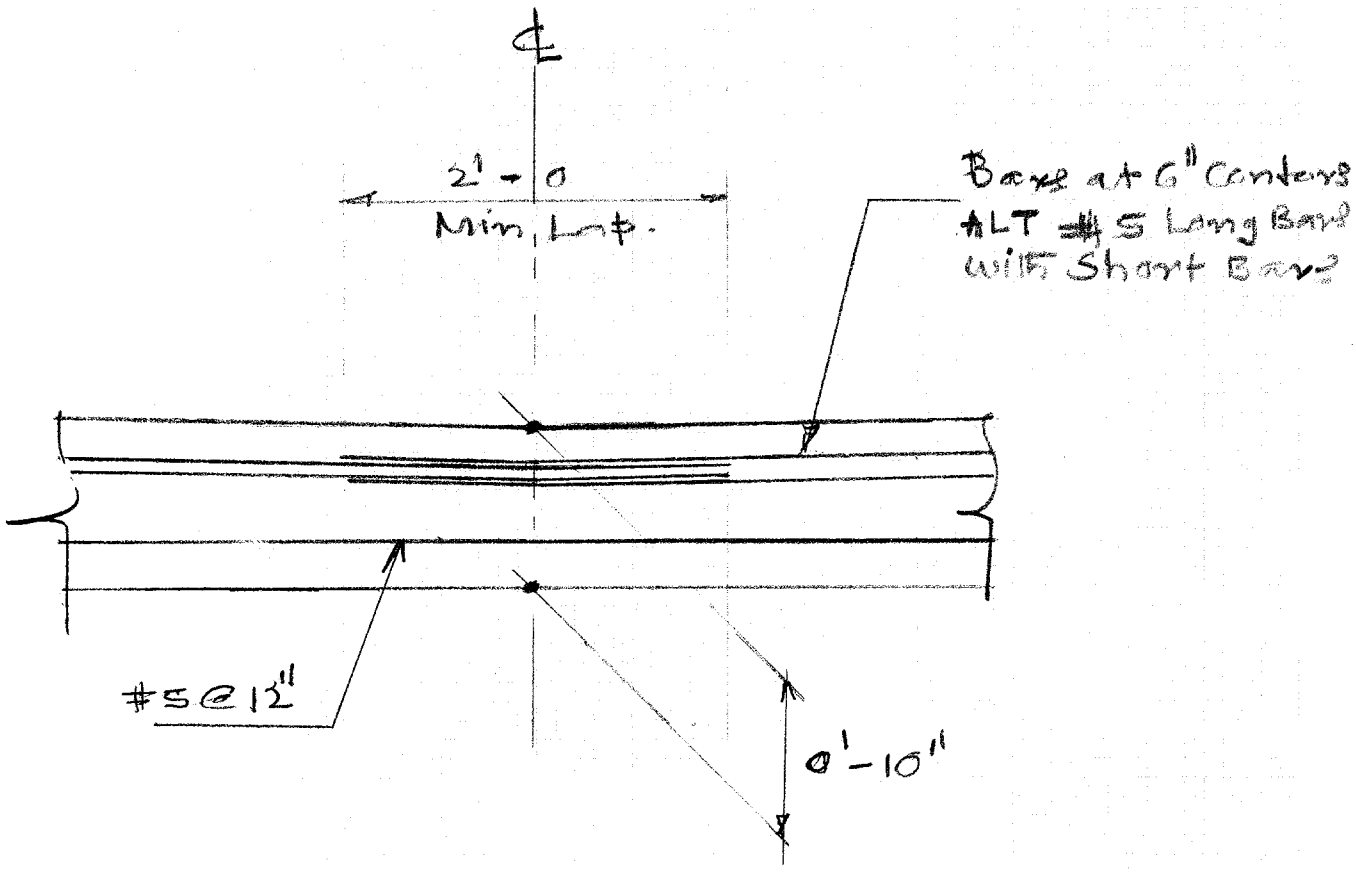


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 19 OF 31

DETAIL Splice Detail COMPUTED KVH DATE 11/92

CHECKED BY CCW DATE 12/92



Splice Detail (1)

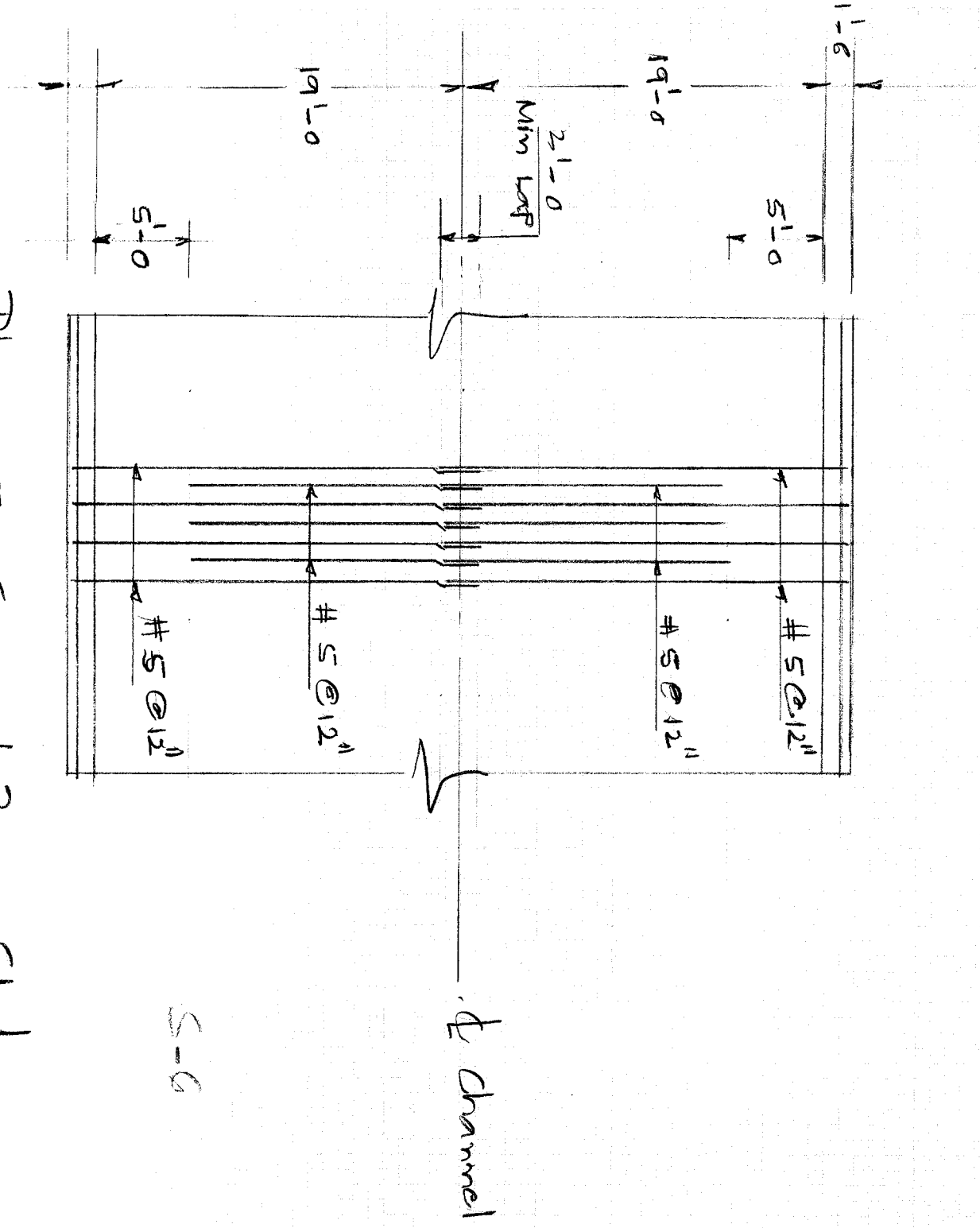
Scale 1" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 20 OF 31

DETAIL Plan (Reinf. St) COMPUTED KVH DATE 11/92

Stat. (47+45) TO (50+25.95) CHECKED BY Carl DATE 12/92



Plan - Top Steel of Rabc Slab.
Stat. (47+45) To 50+25.95

N.T.S

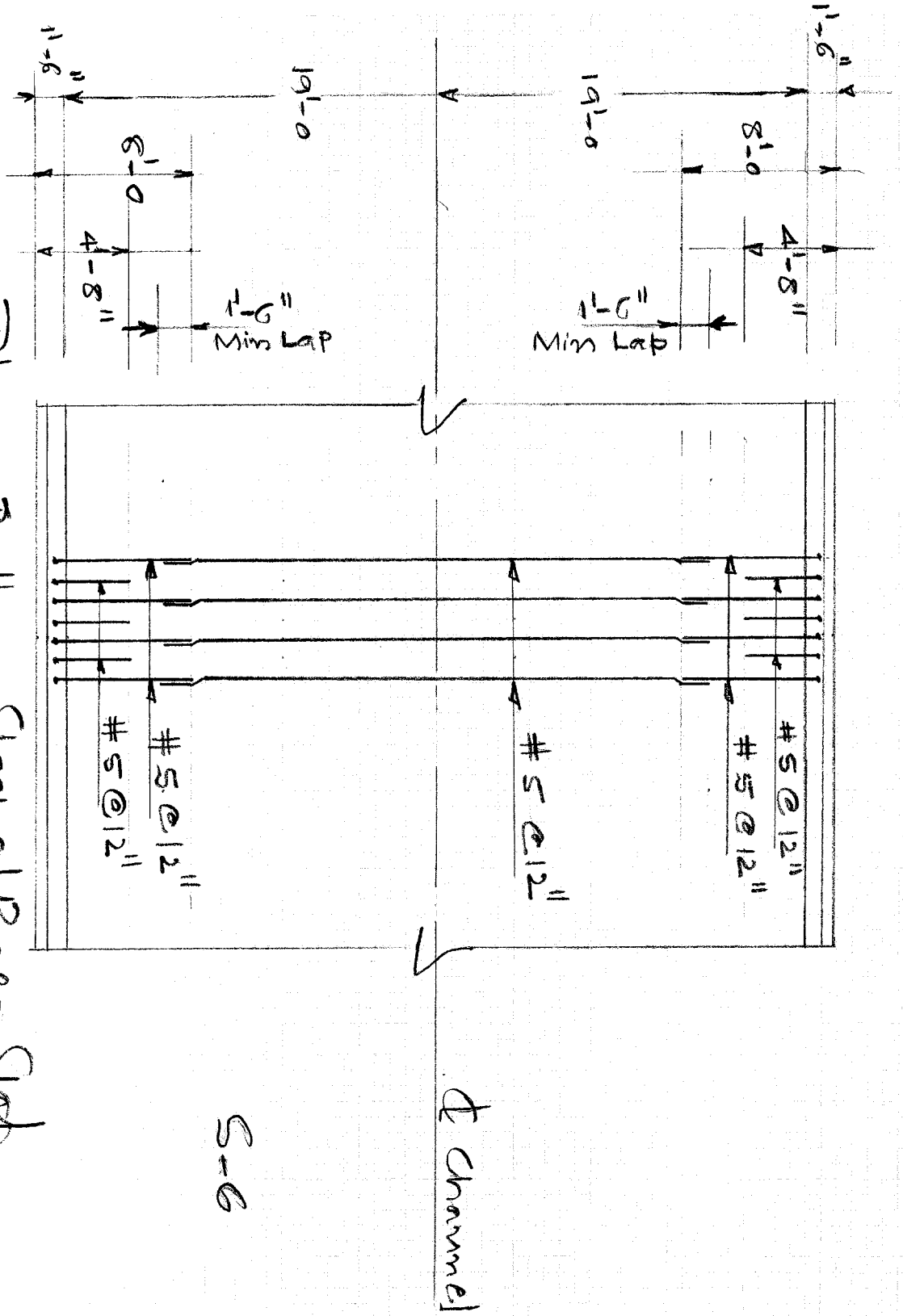
5-6

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 21 OF 31

DETAIL plan (Reinf St) COMPUTED KVH DATE 11/92

CHECKED BY Chad DATE 12/92



Plan - Bottom Steel Reinf Slab

Sta. 47+45 to 50+25.95

NTS

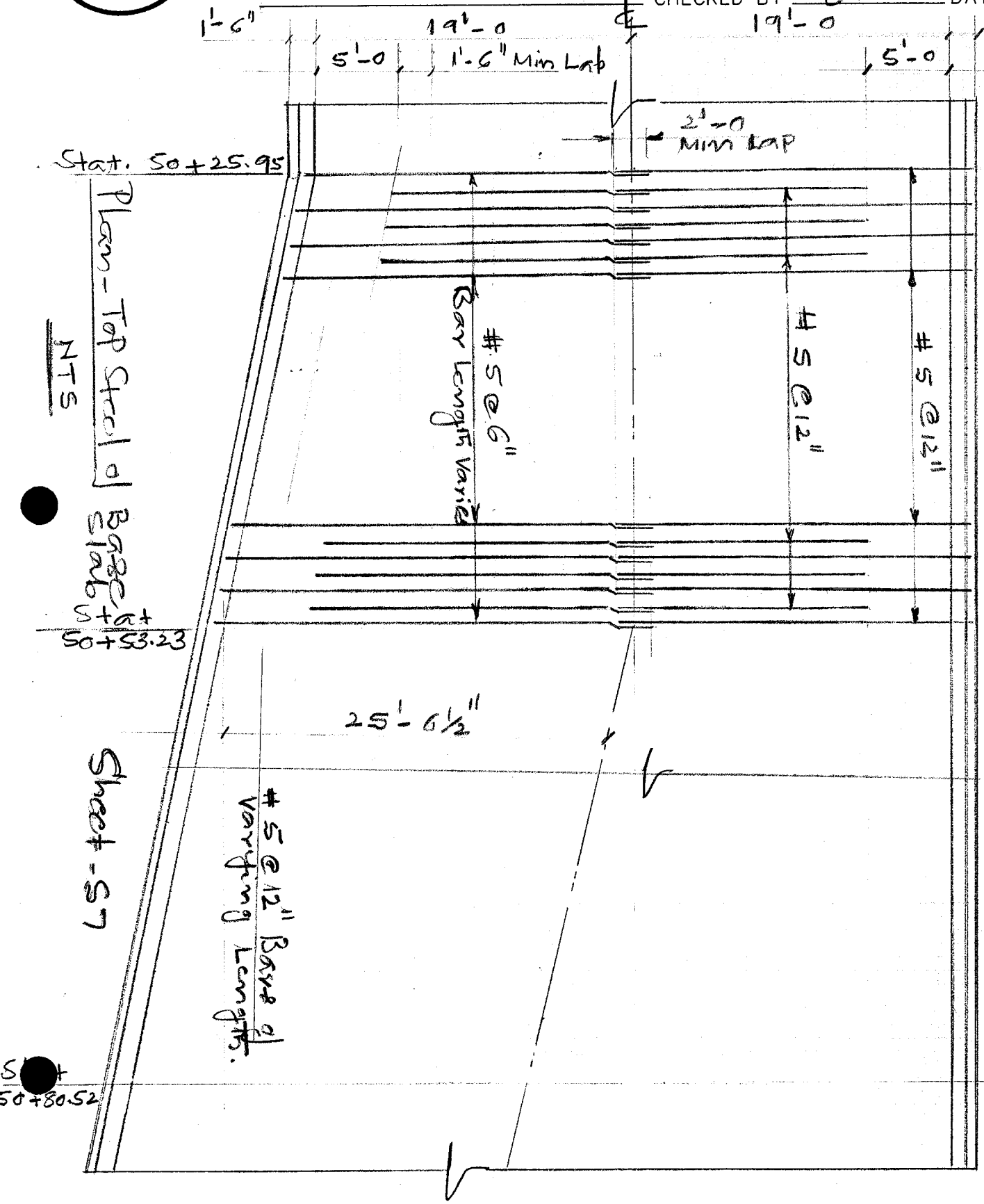
S-8

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 52 OF 31

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 11/92

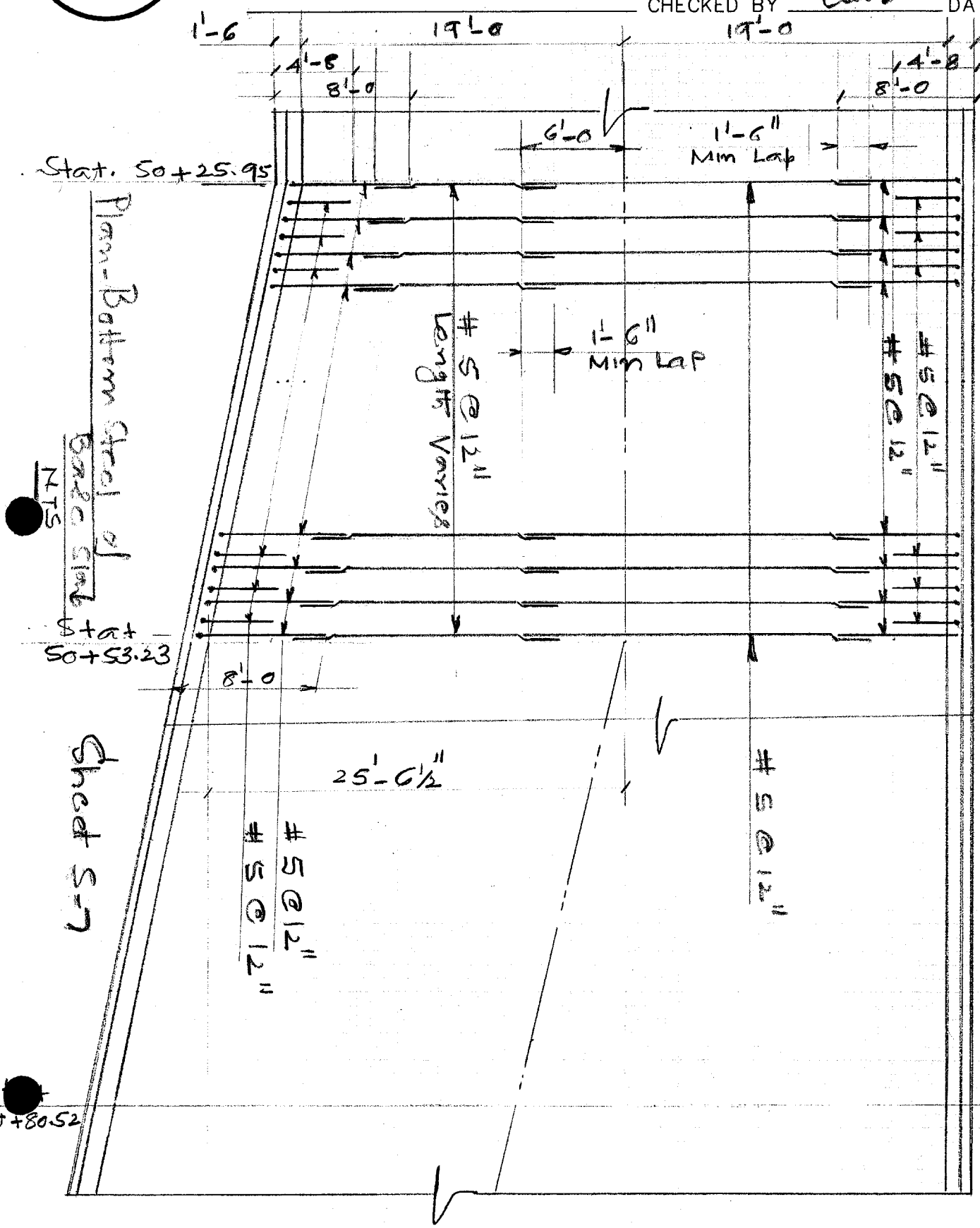


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 23 OF 31

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWC DATE 12/92

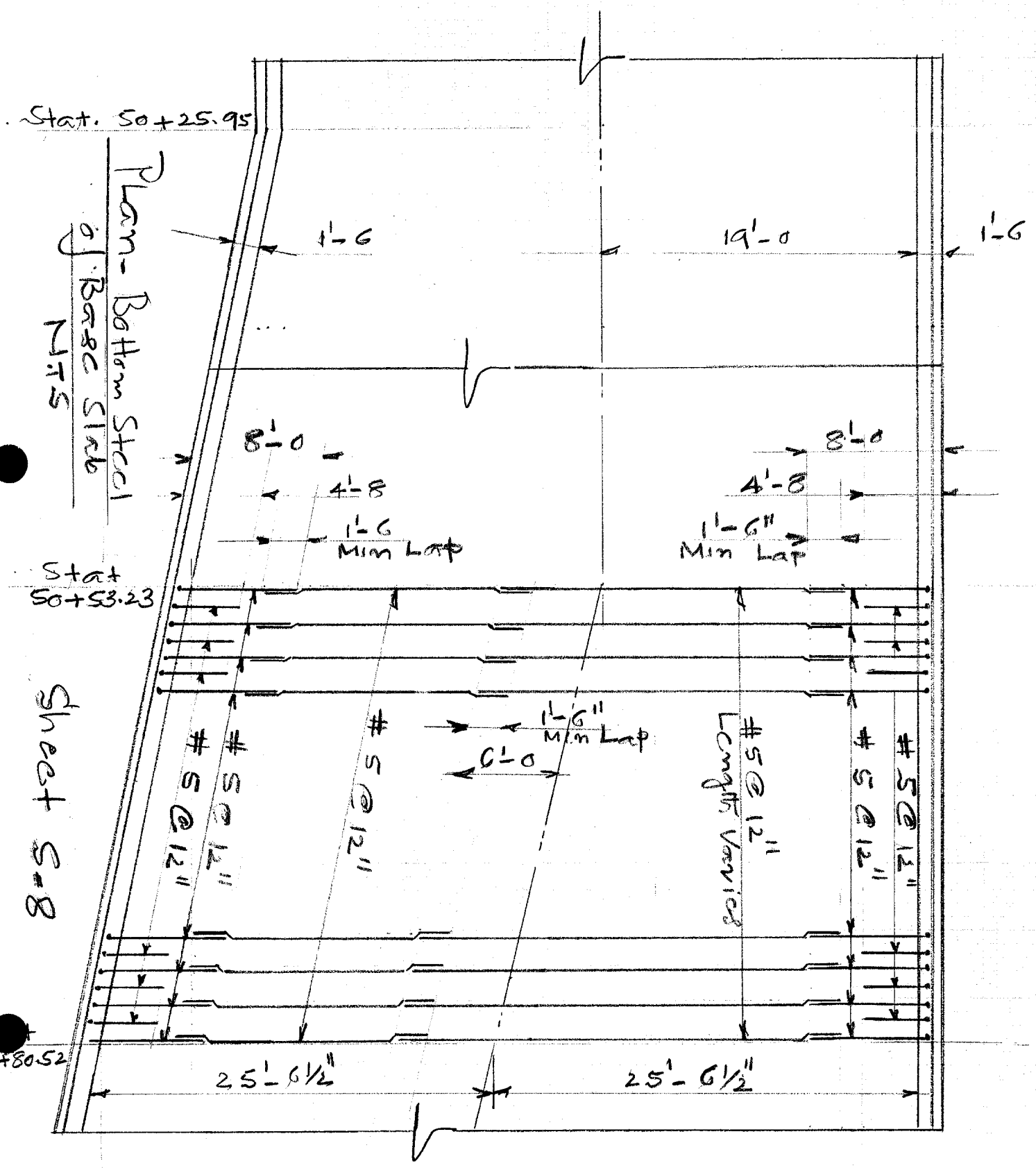


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 24 OF 31

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY Chen DATE 12/92

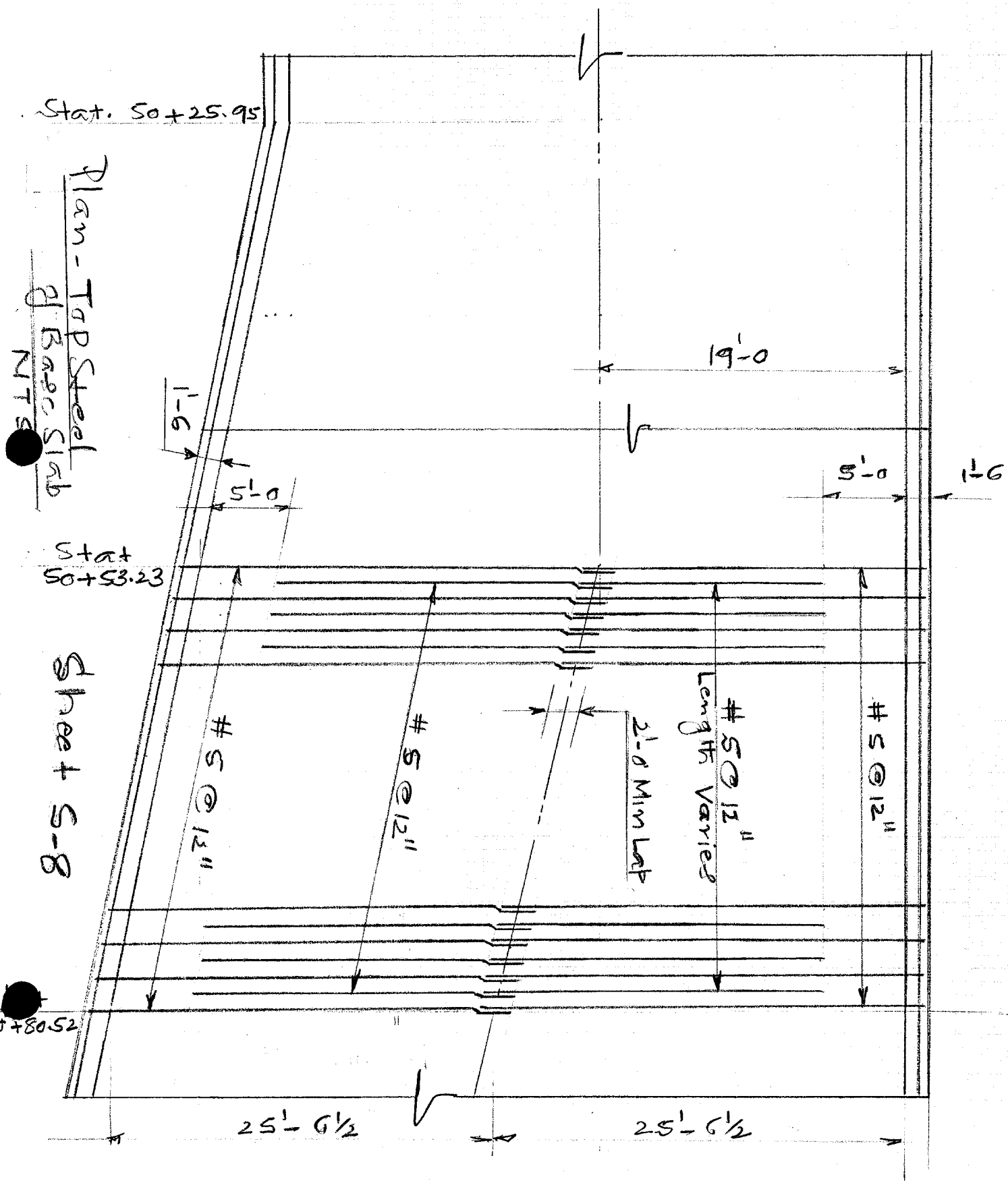


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

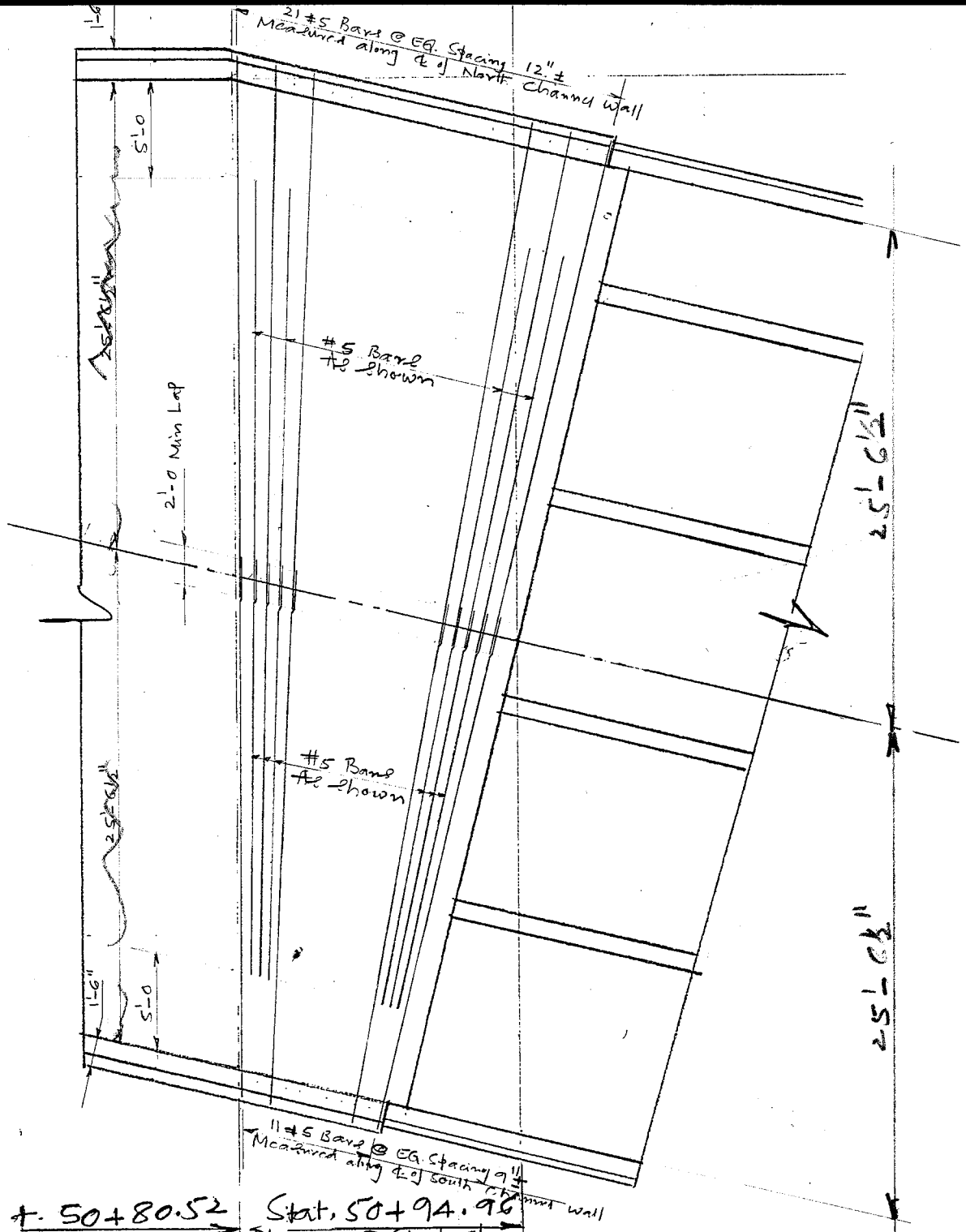
PROJECT Guadalupe Channel PAGE 25 OF 31

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 12/92



Sht. 26 of 31



Sta. 50+80.52 → Stat. 50+94.96

Plan - Top Steel of Base Slab

NTS.

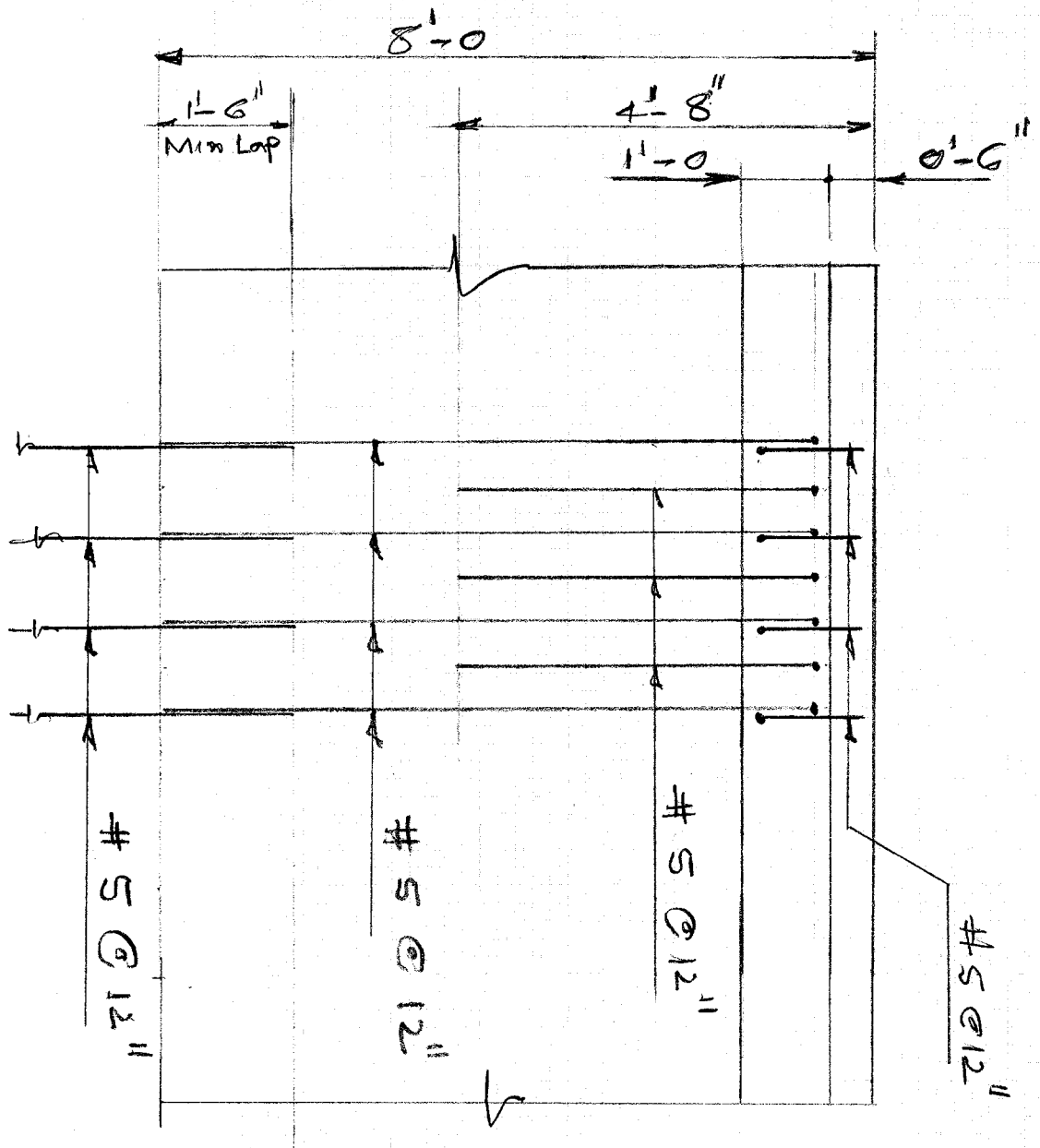
1'-6"
25'-6½"
25'-6½"
1'-6"
8'-0
6'-0
8'-0
1'-6" Min Lap
1'-6" Min Lap
1'-6" Min Lap
4'-8
#5 Bars Shown
#5 Bars Shown
Measured 12" #5 @ 6" along Sta. 14+50 Tunnel wall
Measured 41 #5 Bars @ 6" along Sta. 14+50 North Channel wall
25'-6½
25'-6½
Sta. 14+50.92
Sta. 14+80.52
Plan - Base Slab. NTS

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 28 OF 31

DETAIL Reinf. Detail COMPUTED KVH DATE 12/92

CHECKED BY CW DATE 12/92

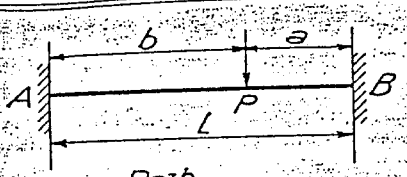
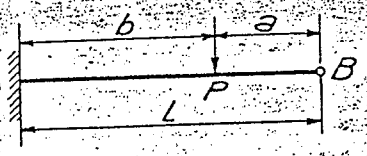
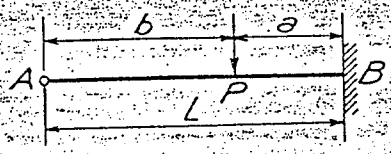
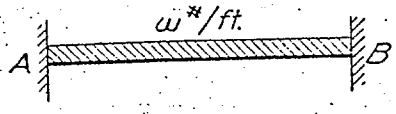
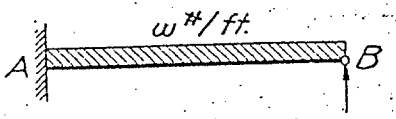
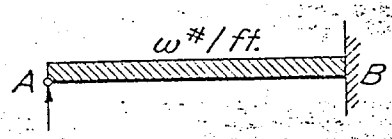
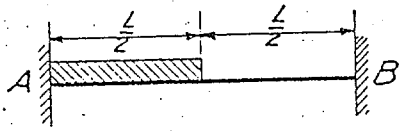
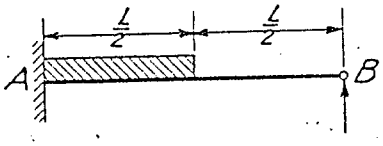
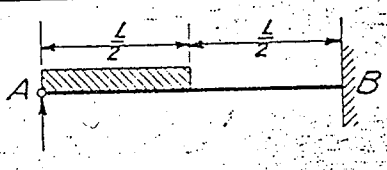
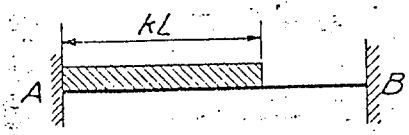
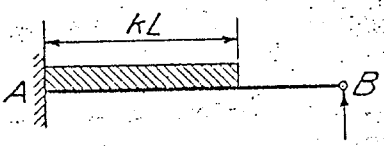
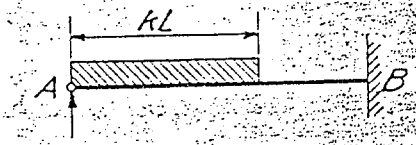
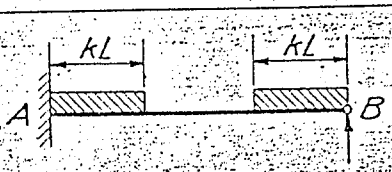
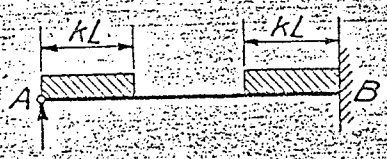


Detail - A

Drawn-Hardy Cross
Traced- A.E.
Checked- H.M.M.
DATE 9-1-34

FIXED END MOMENT
ARIZONA HIGHWAY DEPARTMENT
FOR BEAMS OF CONSTANT MOMENT OF INERTIA

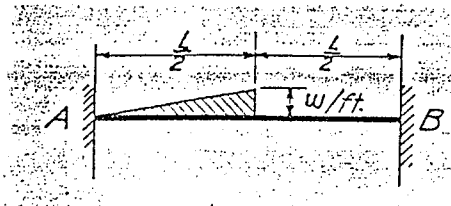
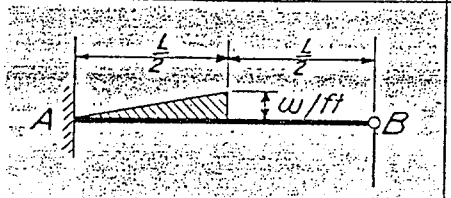
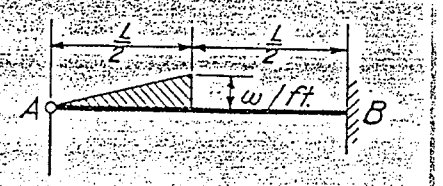
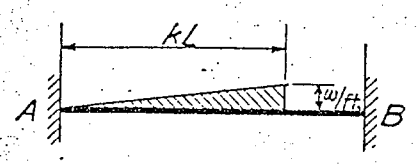
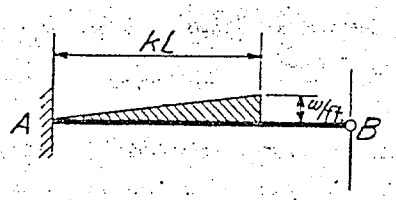
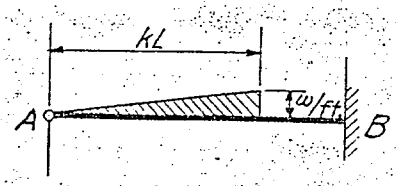
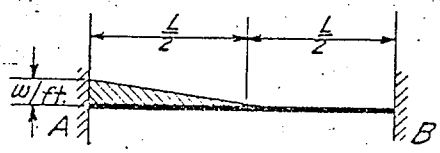
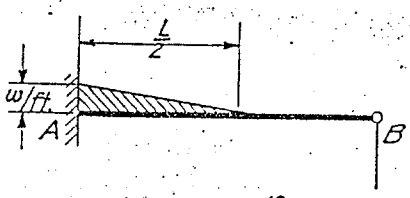
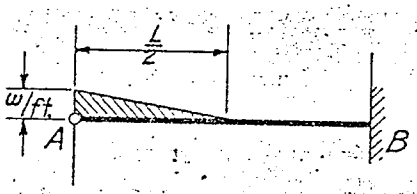
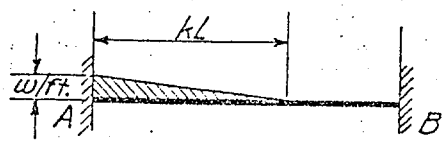
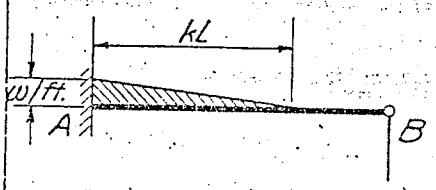
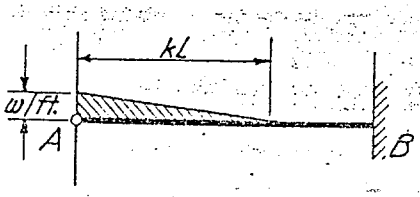
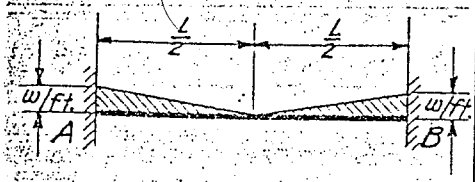
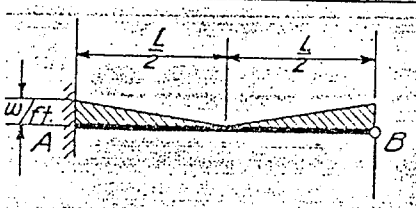
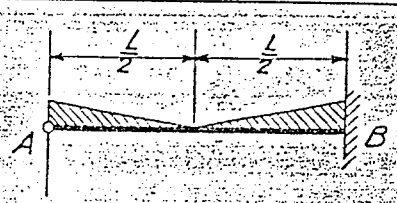
SHEET No. 1
PROJ. No.
FILE No.

Beam Fixed at Both Ends	Left End Fixed Right End Hinged	Left End Hinged Right End Fixed
 $M_A = \frac{Pa^2b}{L^2}$ $M_B = \frac{Pb^2a}{L^2}$	 $M_A = \frac{P}{L^2}(a^2b + \frac{b^2a}{2})$	 $M_B = \frac{P}{L^2}(b^2a + \frac{a^2b}{2})$
 $M_A = \frac{wL^2}{12}$ $M_B = M_A$	 $M_A = \frac{wL^2}{8}$	 $M_B = \frac{wL^2}{8}$
 $M_A = \frac{11}{192}wL^2$ $M_B = \frac{5}{192}wL^2$	 $M_A = \frac{9}{128}wL^2$	 $M_B = \frac{7}{128}wL^2$
 $M_A = \frac{wL^2}{12}k^2(6-8k+3k^2)$ $M_B = \frac{wL^2}{12}k^3(4-3k)$	 $M_A = \frac{wL^2k^2}{8}(4-4k+k^2)$	 $M_B = \frac{wL^2k^2}{8}(2-k^2)$
$M_A = \frac{wL^2}{6}k^2(3-2k)$ $M_B = M_A$	 $M_A = \frac{wL^2}{4}k^2(3-2k)$	 $M_B = \frac{wL^2}{4}k^2(3-2k)$

Drawn - Hardy Cross
Traced - A.J.
Checked - [illegible]
DATE 9-1-34

FIXED END MOMENTS
ARIZONA HIGHWAY DEPARTMENT
FOR BEAMS OF CONSTANT MOMENT OF INERTIA

SHEET No. 3
PROJ. No.
FILE No.

Beams fixed at both ends.	Left end fixed Right end hinged.	Left end hinged Right end fixed.
 $M_A = \frac{wL^2}{30}$ $M_B = \frac{3wL^2}{160}$	 $M_A = \frac{41wL^2}{960}$	 $M_B = \frac{17wL^2}{480}$
 $M_A = \frac{wL^2}{30}k^2(10-15k+6k^2)$ $M_B = \frac{wL^2}{20}k^3(5-4k)$	 $M_A = \frac{wL^2k^2}{120}(40-45k+12k^2)$	 $M_B = \frac{wL^2k^2}{30}(5-3k^2)$
 $M_A = \frac{23wL^2}{960}$ $M_B = \frac{7wL^2}{960}$	 $M_A = \frac{53wL^2}{1920}$	 $M_B = \frac{37wL^2}{1920}$
 $M_A = \frac{wL^2}{60}k^2(10-10k+3k^2)$ $M_B = \frac{wL^2}{60}k^3(5-3k)$	 $M_A = \frac{wL^2}{120}k^2(20-15k+3k^2)$	 $M_B = \frac{wL^2}{120}k^2(10-3k^2)$
 $M_A = M_B = \frac{wL^2}{32}$	 $M_A = \frac{3wL^2}{64}$	 $M_B = \frac{3wL^2}{64}$

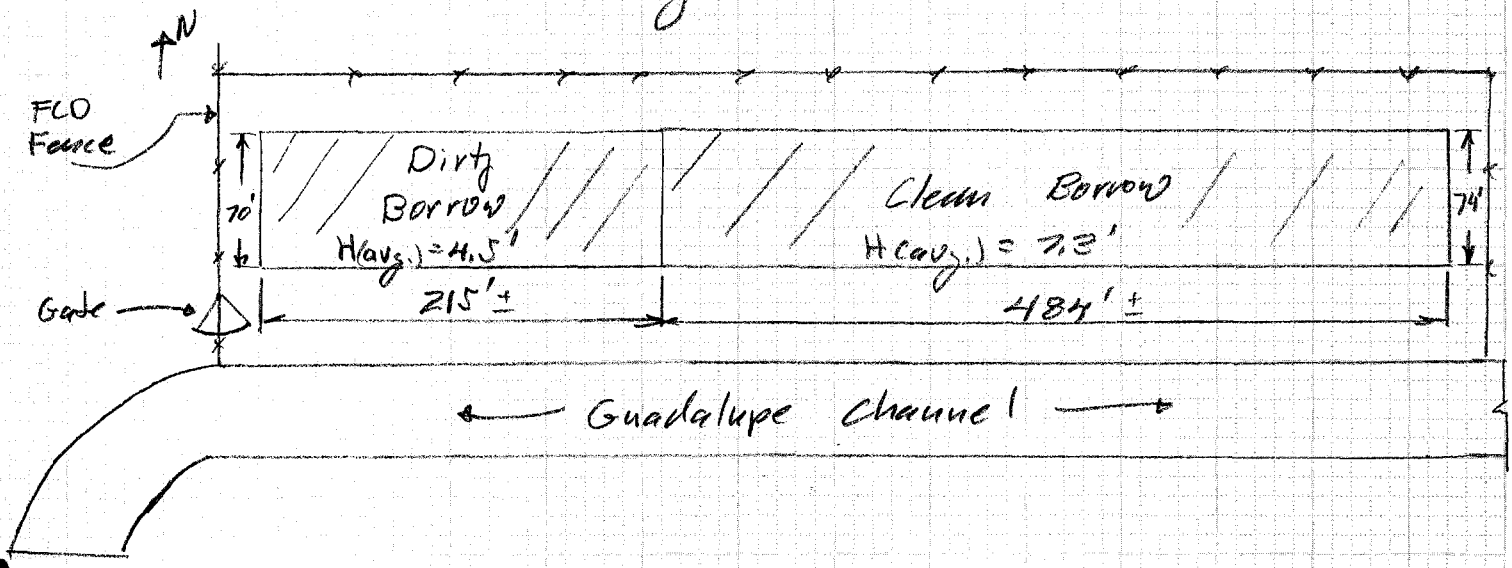
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel / Sossaman Rd PAGE 31 OF 31

DETAIL Fill Borrow Volume COMPUTED Clay DATE 1/5/93

on site CHECKED BY KVH DATE 1/93

from survey by G. Waimwright on 1/5/93
L. Wong



Volume of Clean fill available on site near intersection of Power Road and Guadalupe Road on North side of Guadalupe Channel.

Vol = (Length)(Width)(Height)

Vol = (484')(74')(7.3')

Vol = 261,457 ft³ / 27 ft³/cy

Vol Clean Fill = 9,600 cy

6900-018

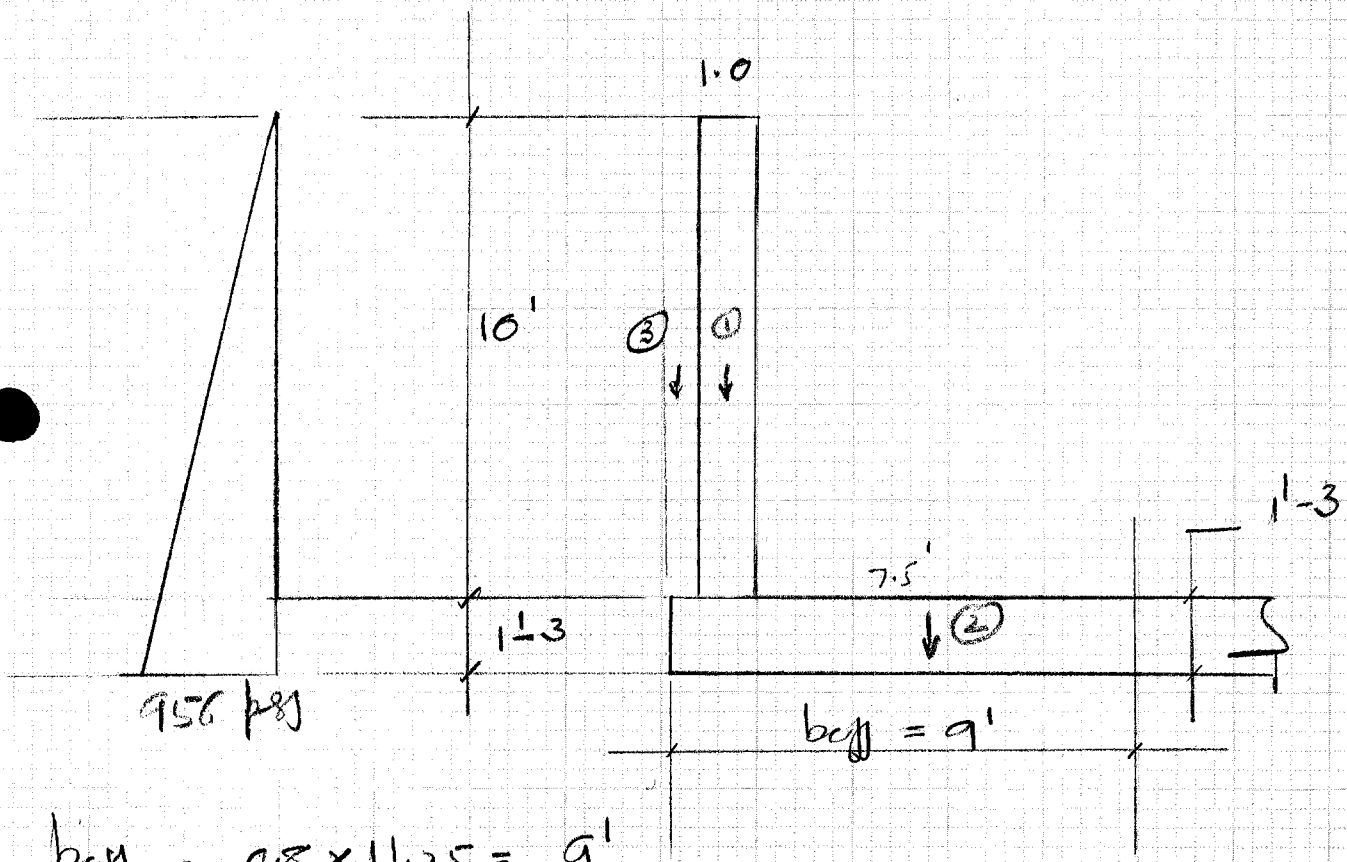
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 1 OF 28

DETAIL Wall Design COMPUTED KVH DATE 10/92

CHECKED BY CGW DATE 12/92

Wall Height = 10'



$b_{eff} = 0.8 \times 11.25 = 9'$

a) Using Submerged Soil pr. @ 85 pcf

$p_x = (85 \times 11.25) = 956$ psf

$P = \left(\frac{0.956}{2} \times 11.25\right) = 5.38^{k}$

$M_{OT} = \left(5.38 \times \frac{11.25}{3}\right) = 20.2^{k'}$

Stabilizing Moment:

$W_1 = (1.0 \times 10.0 \times 0.15) = 1.5^K$

$W_2 = (9.0 \times 1.25 \times 0.15) = 1.7^K$

$W_3 = (0.5 \times 10 \times 0.15) = 0.75$

3.3^K

$M_{STB} = 1.5(0.5+0.5) + (1.7 \times 4.5) + 0.75 \times (8.75)$

$= 26.2$ kft

$FS = \frac{26.2}{20.2} = 1.3$ ok since footing is continuous

b) Using Dry Condition

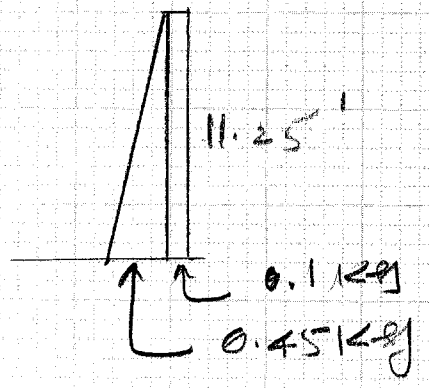
$p_{v_1} = w\gamma h = (0.12 \times 0.33 \times 11.25) = 0.45$ ksf

Surcharge = 2'

$p_{v_2} = (0.12 \times 0.33 \times 2) = 0.08$, Say 0.1 ksf

$P_1 = \left(\frac{0.45}{2} \times 11.25\right) = 2.53^K$

$P_2 = (0.1 \times 11.25) = 1.13^K$



$M_{OT} = \left(2.53 \times \frac{11.25}{3}\right) + \left(1.13 \times \frac{11.25}{2}\right)$

$= 15.84$ kft

$F.S = \frac{26.2}{15.84} = 1.65$ ok

a) Footing Check : (Submerged Condition)

$x_R = (26.2 - 20.2)/3.3 = 1.82'$

$e = (\frac{9.0}{2} - 1.82) = 2.68$, $e > \frac{b}{6}$

$\frac{L'}{3} = (\frac{L}{2} - e)$, $L' = 3(4.5 - 2.68) = 5.46'$

This is not likely to happen because there will be wt. of water in the channel which will increase the stabilizing moment & decreasing the eccentricity.

∴ Check using normal Dry Conditions

b) Footing Check (Dry Soil Conditions)

$x_R = (26.2 - 15.84)/3.3 = 3.14'$

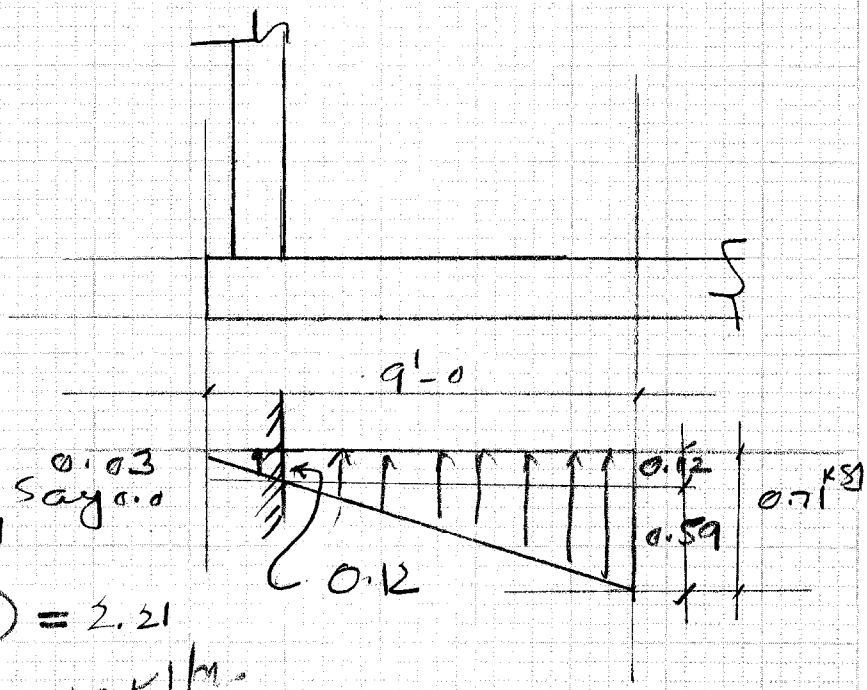
$e = (\frac{9}{2} - 3.14) = 1.36 < \frac{b}{6} = 1.5$

$p_{tr} = \frac{3.33}{9 \times 1}(1 \pm \frac{6 \times 1.36}{9}) = 0.37(1 \pm 0.91)$

$p_{tr}(max) = 0.71$ ksf

$p_{tr}(min) = 0.03$ ksf

Footing Check



$\frac{x}{1.5} = \frac{0.71}{9.0}$

$x = 0.12, \quad (0.71 - 0.12) = 0.59$

$P_{\text{triangle}} = \left(\frac{0.59}{2} \times 7.5\right) = 2.21$

$UDL = (1.25 \times 0.15) = 0.19$ klf

$M = (2.21)\frac{2}{3} \times 7.5 + 0.12 \frac{\times 7.5^2}{2} - (0.19 \times \frac{7.5^2}{2})$

$= (11.1 + 3.4 - 5.3) = 9.2$ kft

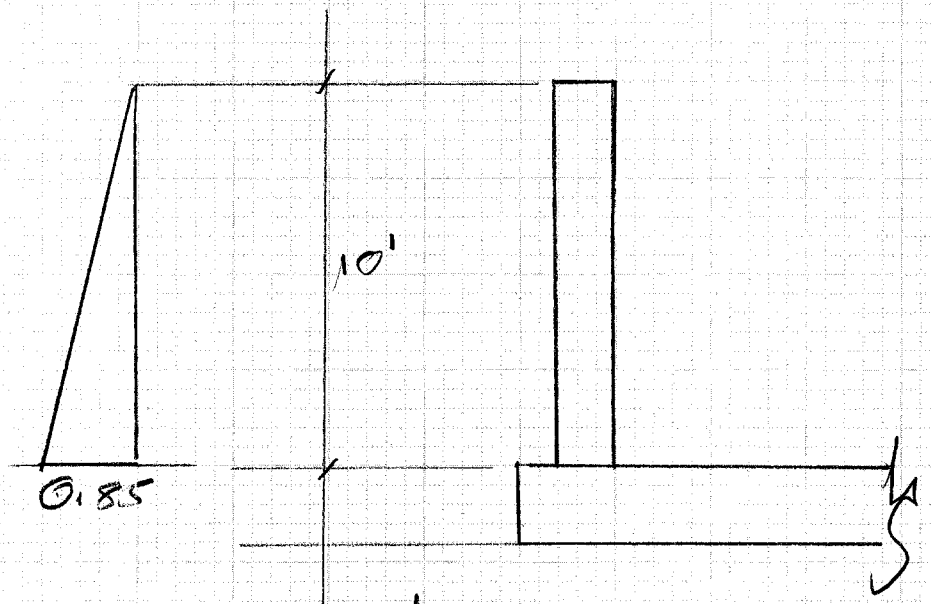
$d_{eff} = (15 - 3 - 0.5) = 11.5''$

$A_s = \frac{9.2 \times 12}{24 \times 0.88 \times 11.5}$

$= 0.45 \text{ in}^2$

#5 @ 6", $A_s = 0.62 \text{ in}^2$

Stem Steel



$P_r = (85 \times 10) = 850$ plf

$P_1 = \left(\frac{0.85}{2} \times 10\right) = 4.25^K$

$M_{om} = \left(4.25 \times \frac{10}{3}\right) = 14.2^{k'}$

$d_{eff} = (12 - 2 - 0.5) = 9.5''$

$A_s = \frac{14.2 \times 12}{2.4 \times 0.88 \times 9.5}$

$= 0.85 \text{ in}^2$

Use #6 @ 6"

Shear Check!

$V_{max} = 4.25^K$

$v = \frac{4.25}{12 \times 9.5} = 37.3$ psi

v (Allow) $= 0.95\sqrt{4000} = 60$ psi $\therefore$ OK

Box Cut-off @ 4'-0

Box Extension

12 Bar d = 12 × 3/4 = 9"

d eff = (12 − 2.5) = 9.5

Min 12"

Check Cut off @ (10.0 − 3) = 7'

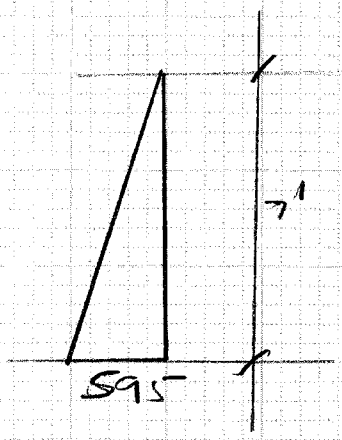
Pr = 85 (7.0) = 595 psf

P = $\left(\frac{0.595}{2} \times 7.0\right)$ = 2.08 K

M = $\left(2.08 \times \frac{7.0}{3}\right)$ = 4.85

$A_s = \left(\frac{4.85 \times 12}{24 \times 0.88 \times 9.5}\right) = 0.29$

Use # 6 @ 12, A_s = 0.44

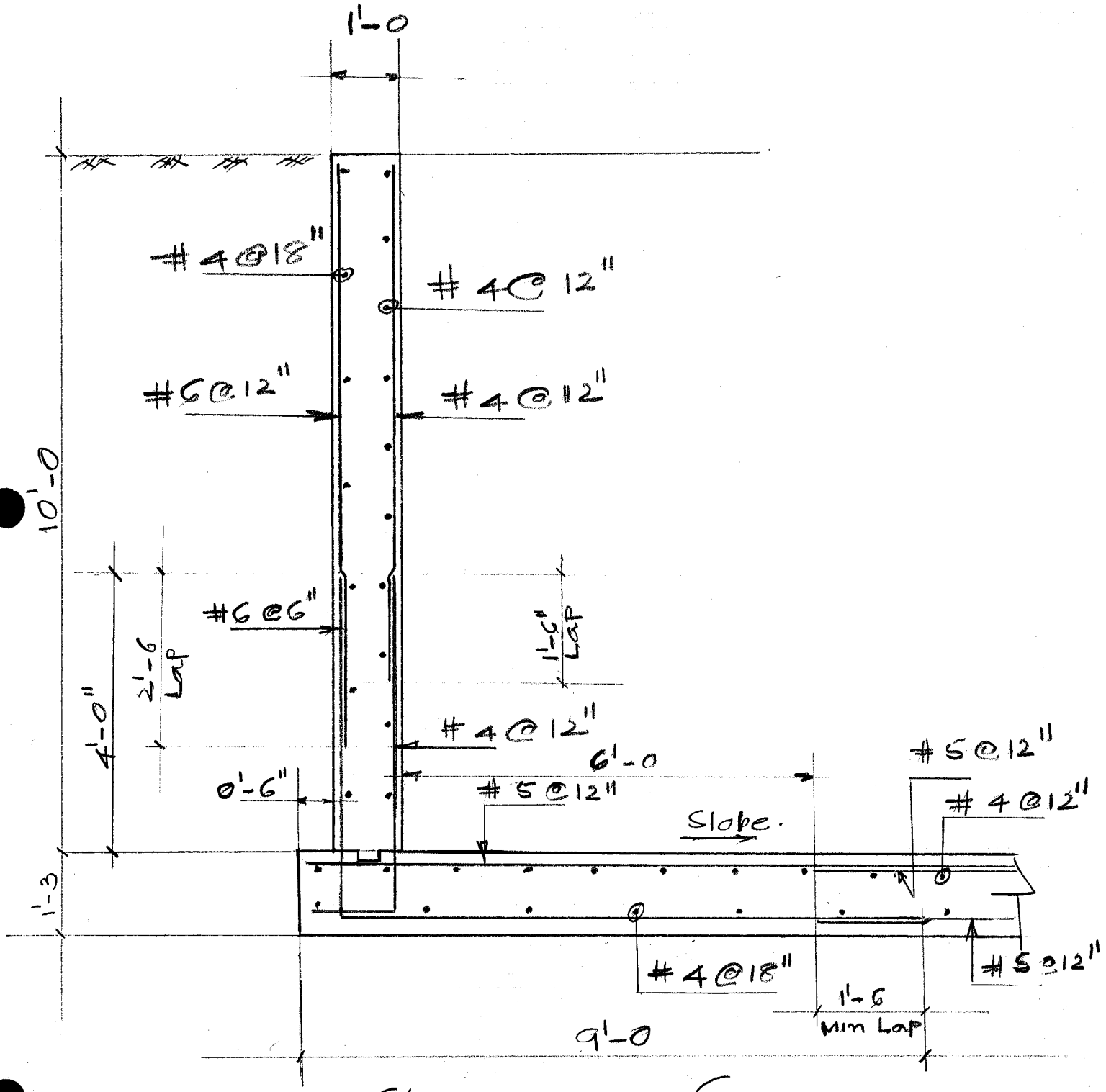


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 7 OF 28

DETAIL Wall Detail COMPUTED KVH DATE 10/92

CHECKED BY CCW DATE 11/92



Channel wall Section

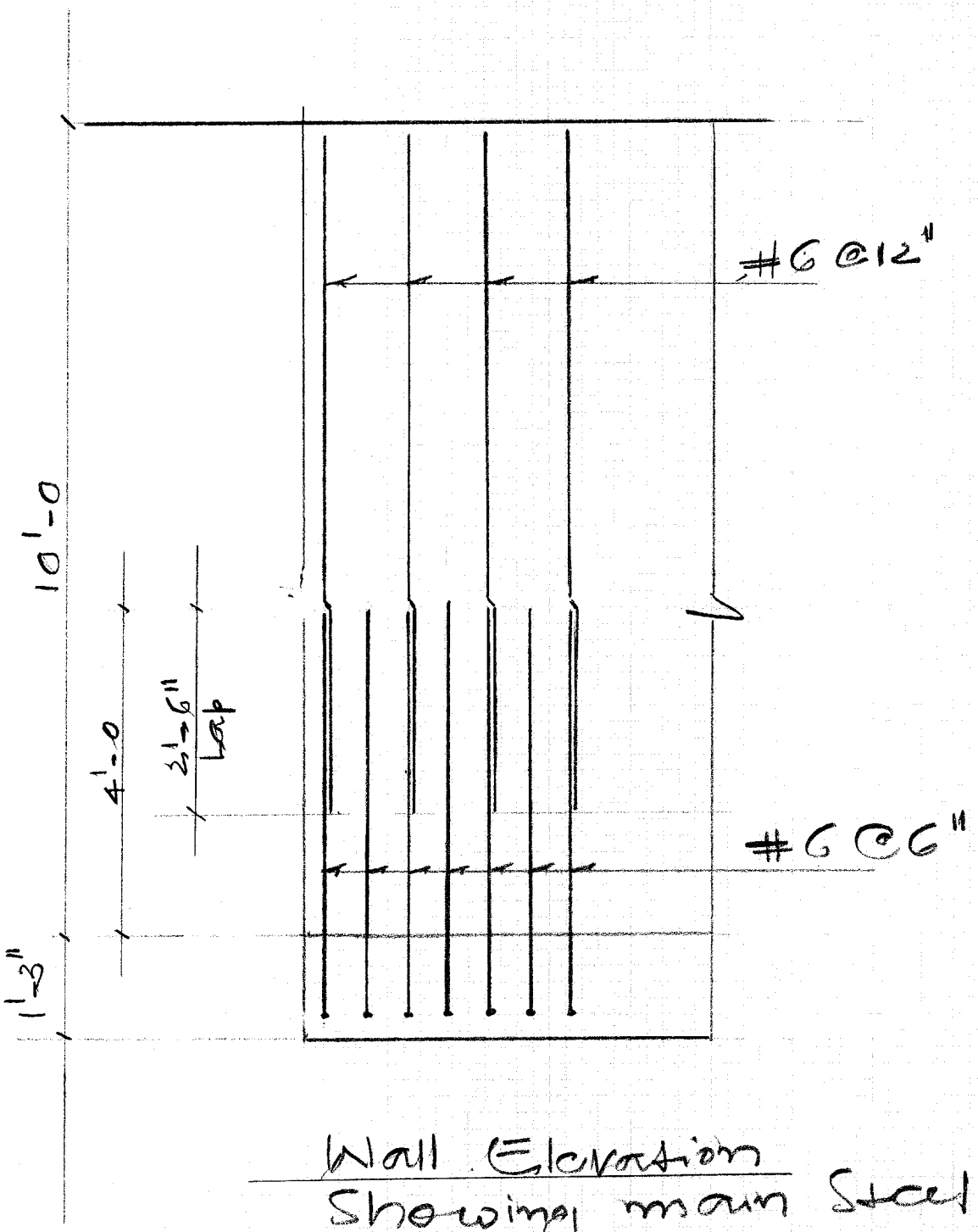
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 8 OF 38

DETAIL Wall Steel COMPUTED KVH DATE

CHECKED BY CGR DATE 12/



Wall Elevation
Showing main Steel

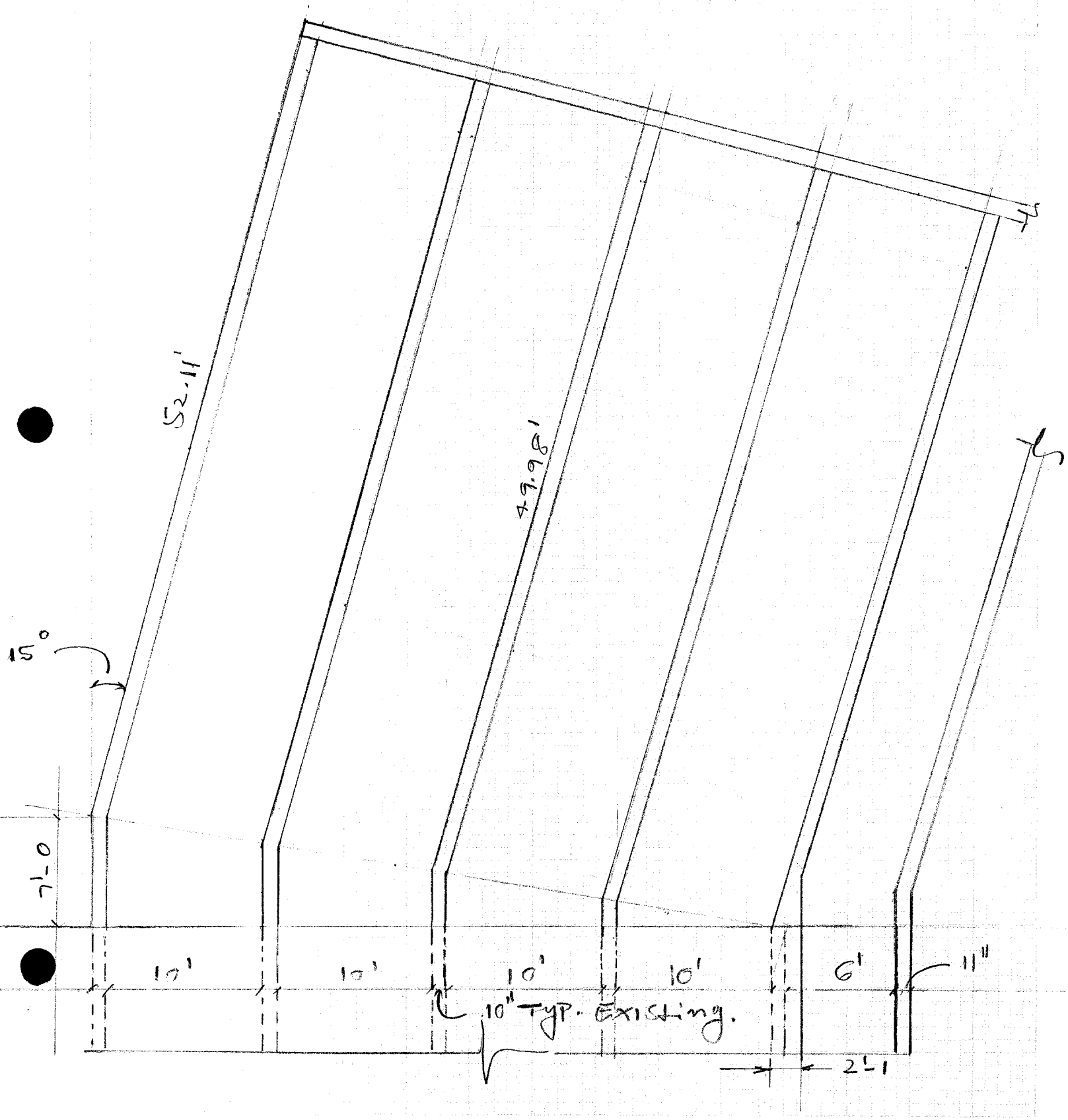
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 9 OF 28

DETAIL Geometry COMPUTED KVH DATE 9/92

CHECKED BY CWO DATE 12/92



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

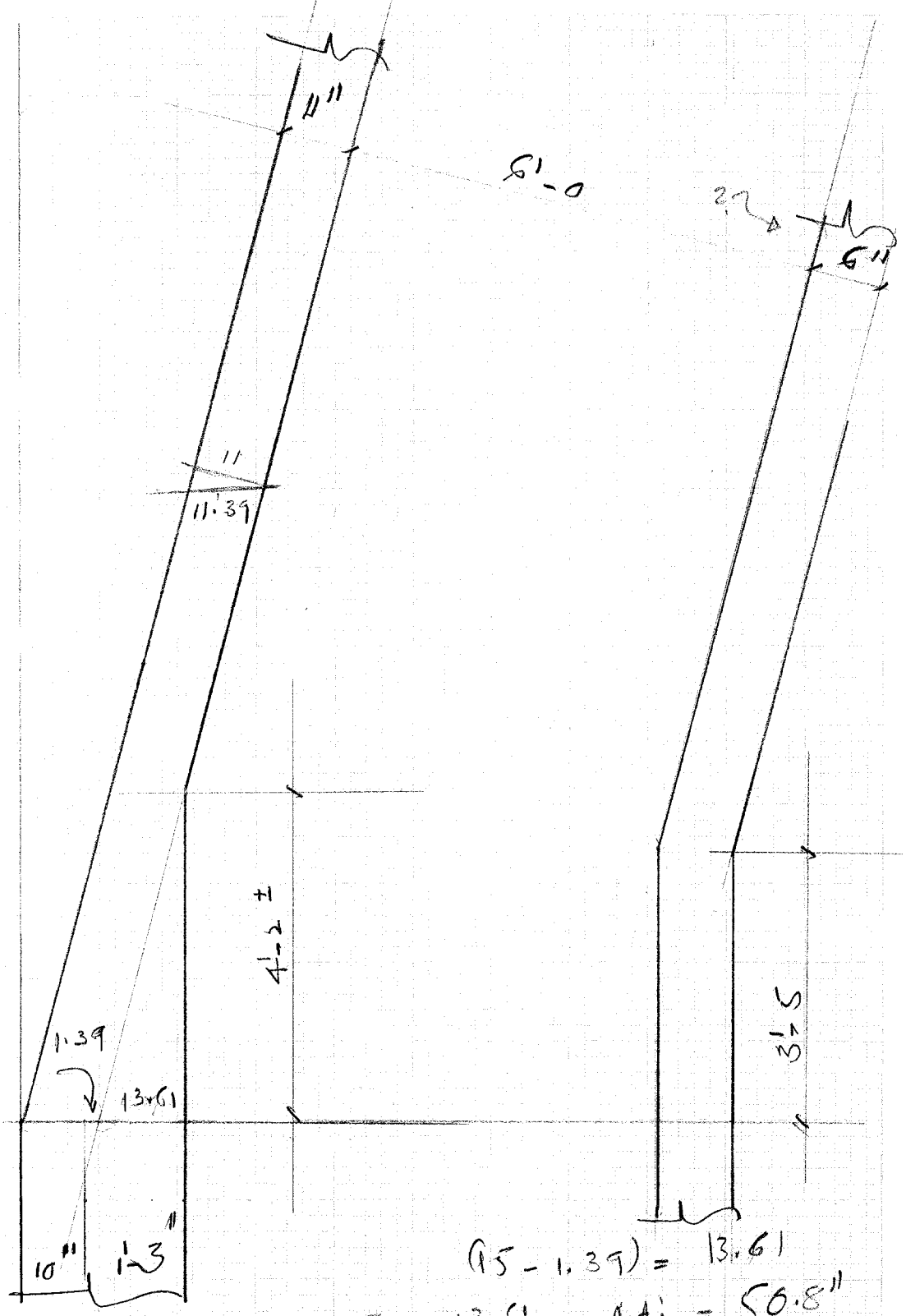
PROJECT Sossman Box PAGE 10 OF 28

DETAIL Geometry COMPUTED KVH DATE 5/92

CHECKED BY CCW DATE 12/92

$\text{Col } 15 = \frac{11}{x}$

$x = 11.39$



$(15 - 1.39) = 13.61$

$\tan 15 = \frac{13.61}{AA_i}$, $AA_i = 50.8"$

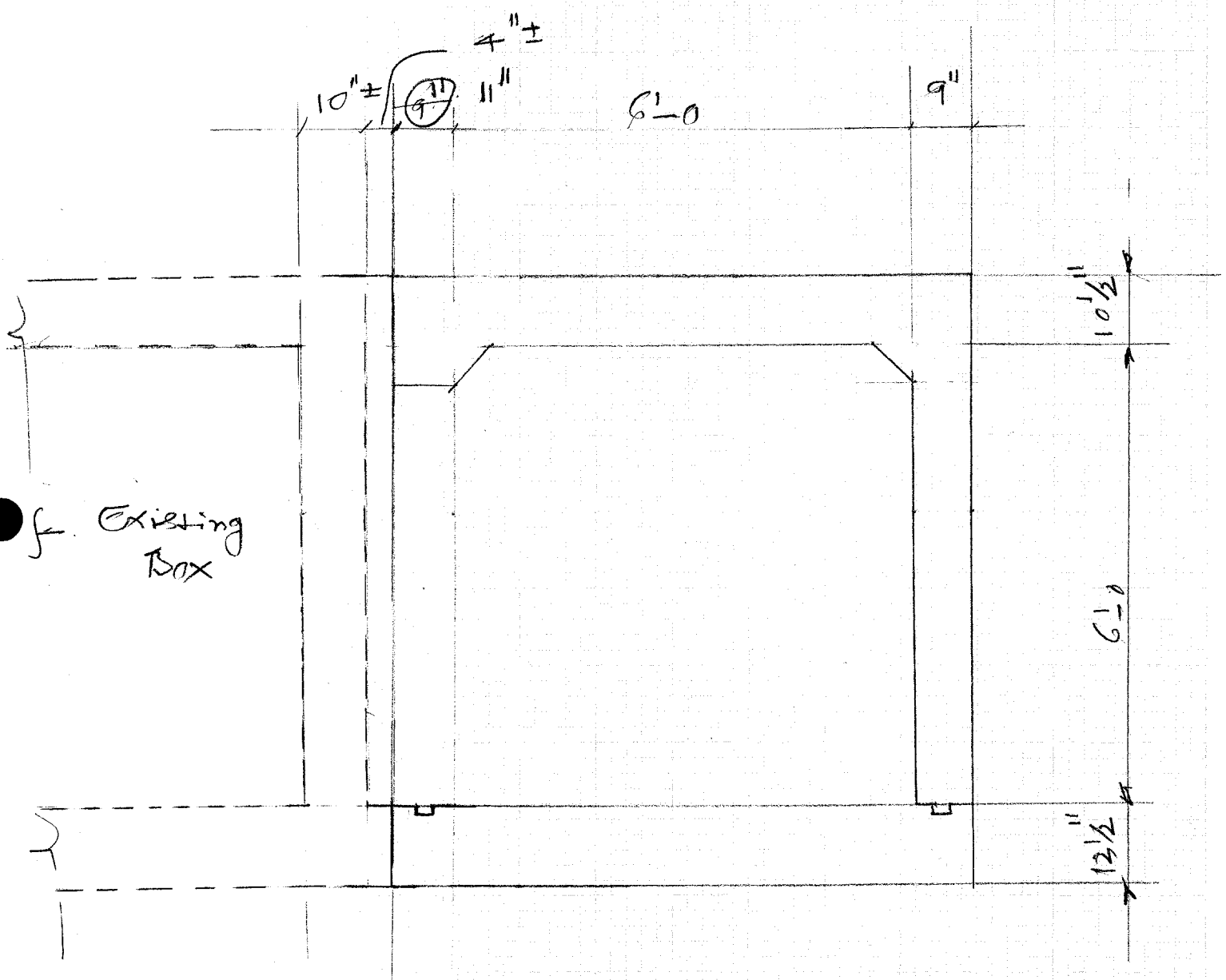
4.23'

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 11 OF 28

DETAIL Cross Section COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 10/92

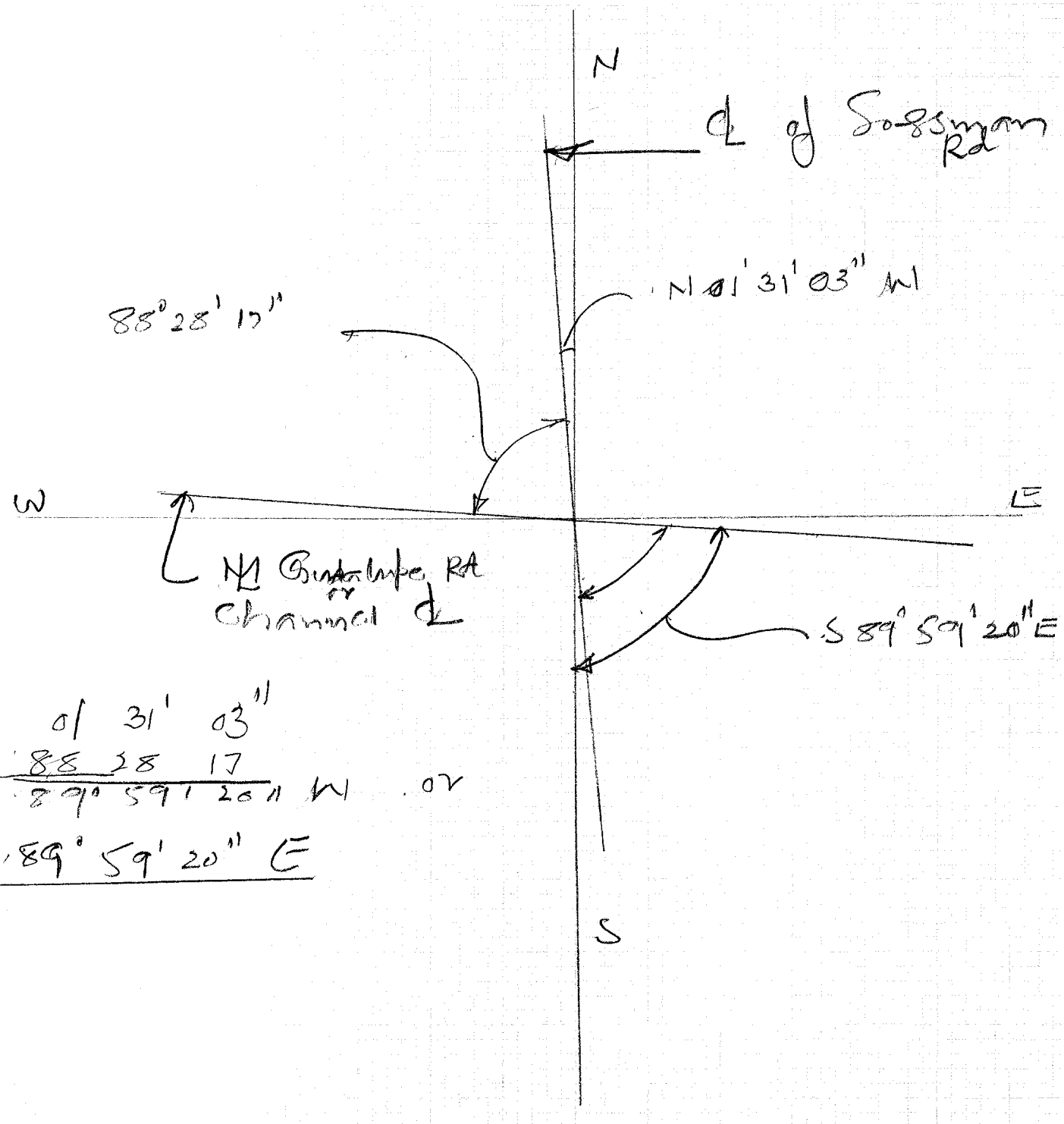


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 12 OF 28

DETAIL Check Bearings COMPUTED KRH DATE 9/92

CHECKED BY CWW DATE 12/92



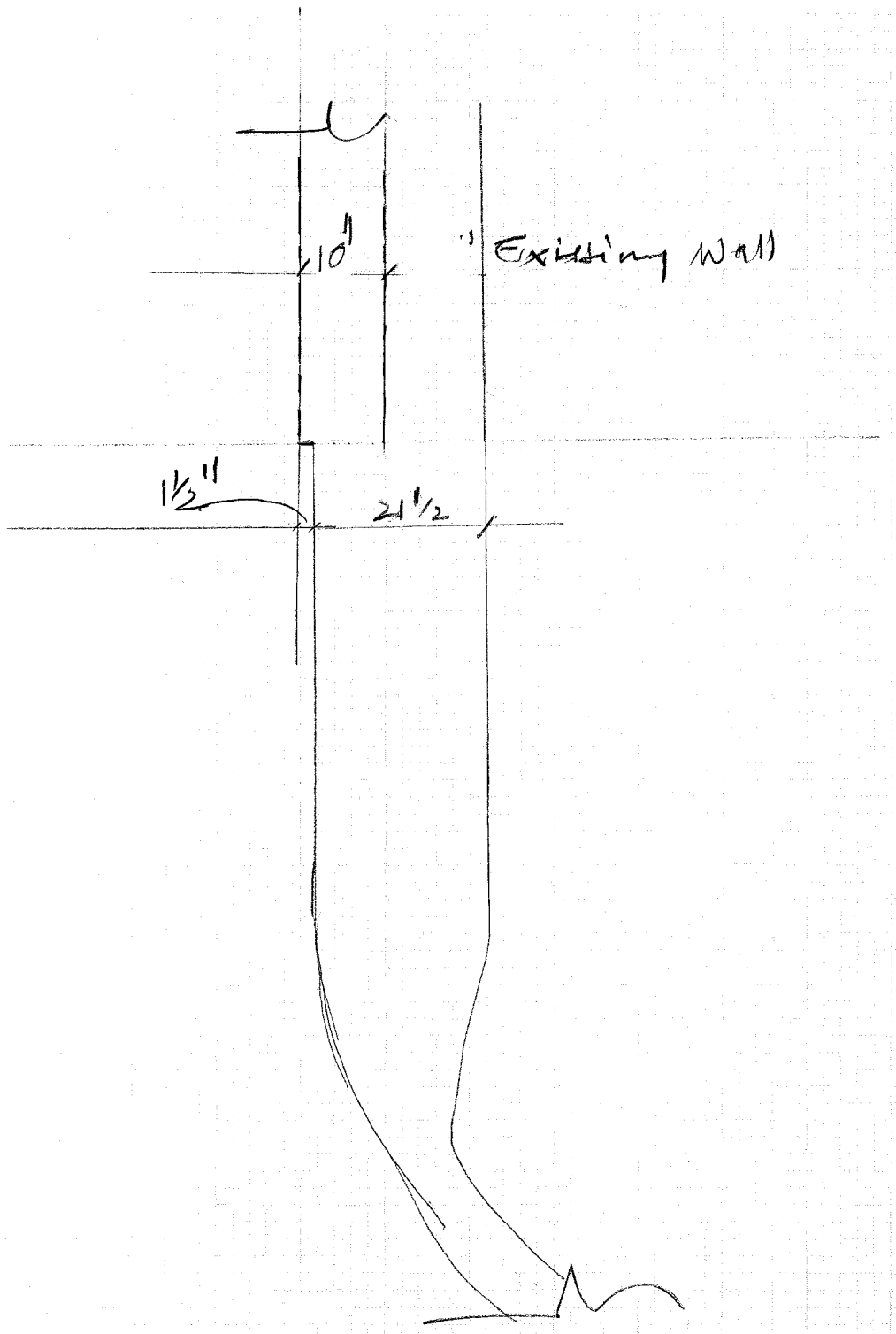
01 31' 03"
88 28 17
N 89° 59' 20" W or
S 89° 59' 20" E

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sellsman Box PAGE 13 OF 28

DETAIL Detail COMPUTED KVH DATE 10/92

CHECKED BY Cowo DATE 12/92



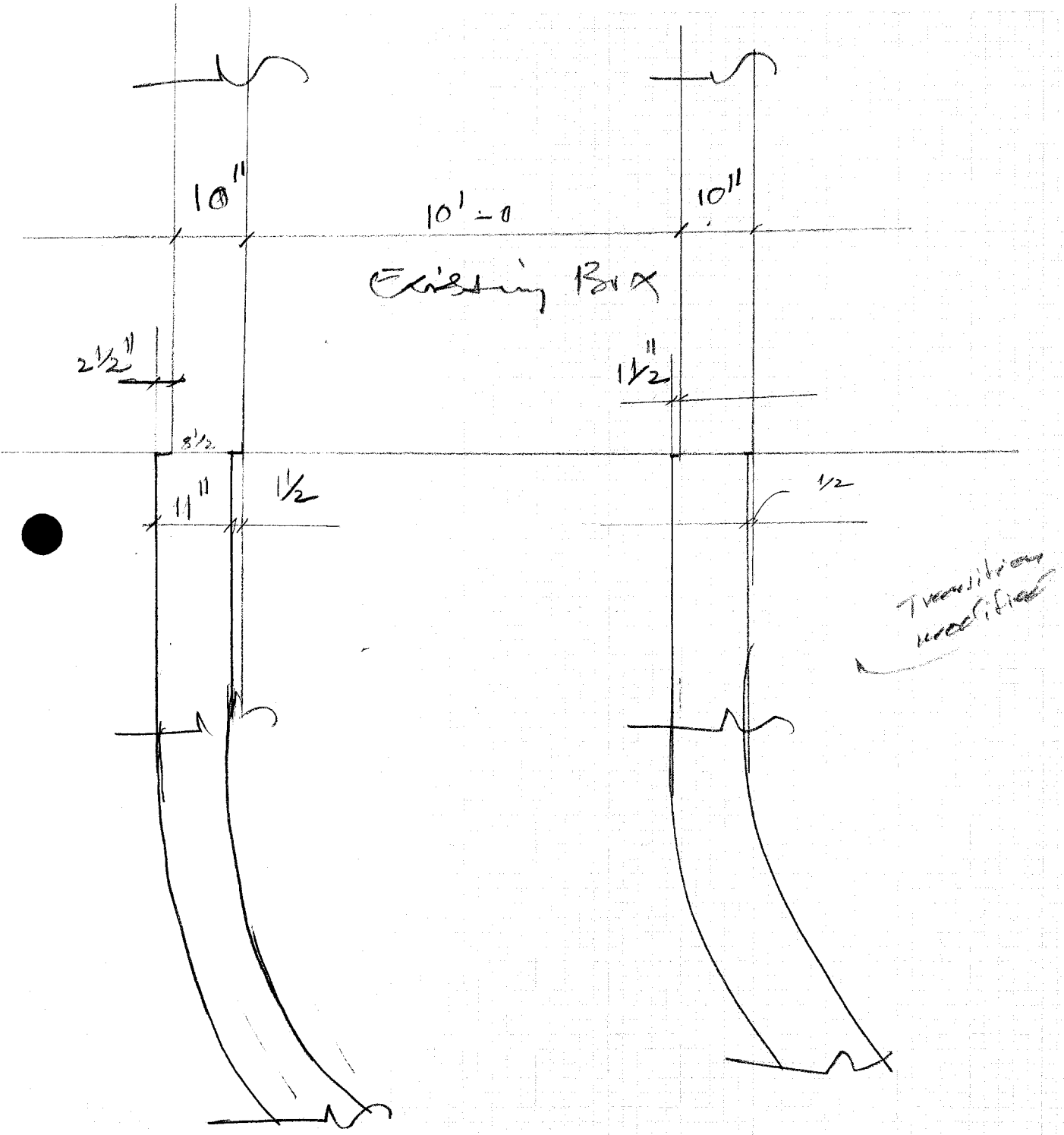
23
10

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 14 OF 28

DETAIL off scale COMPUTED KMH DATE 10/92

CHECKED BY Cleo DATE 12/92



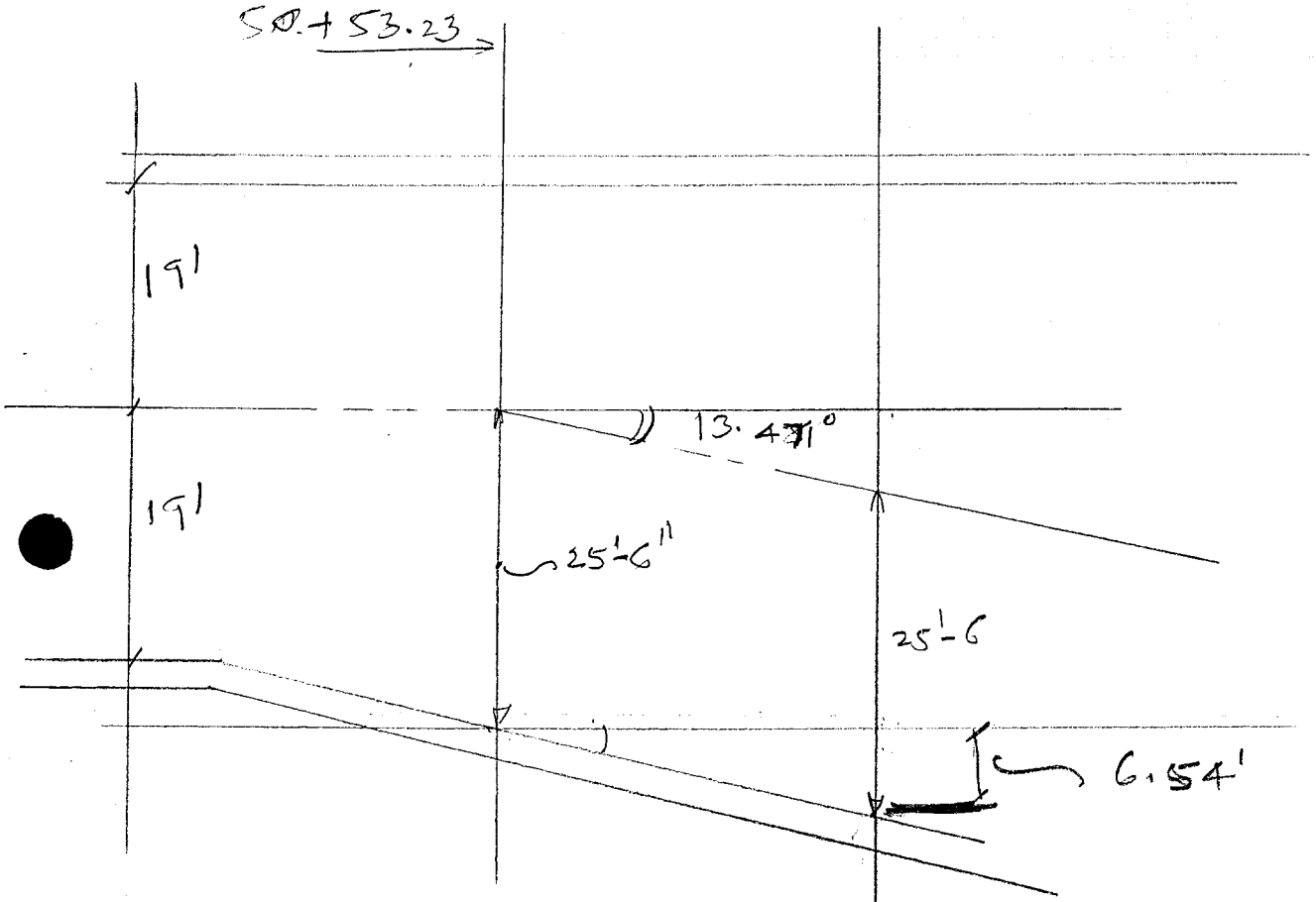
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe PAGE 14(A) OF 28

DETAIL off Sets COMPUTED KNH DATE 10/92

CHECKED BY CGW DATE 12/92

Stat 50 + 53.23 To 50 + 80.52



$$\begin{array}{r} 80.52 \\ 53.23 \\ \hline 27.29 \end{array}$$

$$\tan 13.47 = \frac{x}{27.29} \qquad x = 6.54'$$

6'-6½"

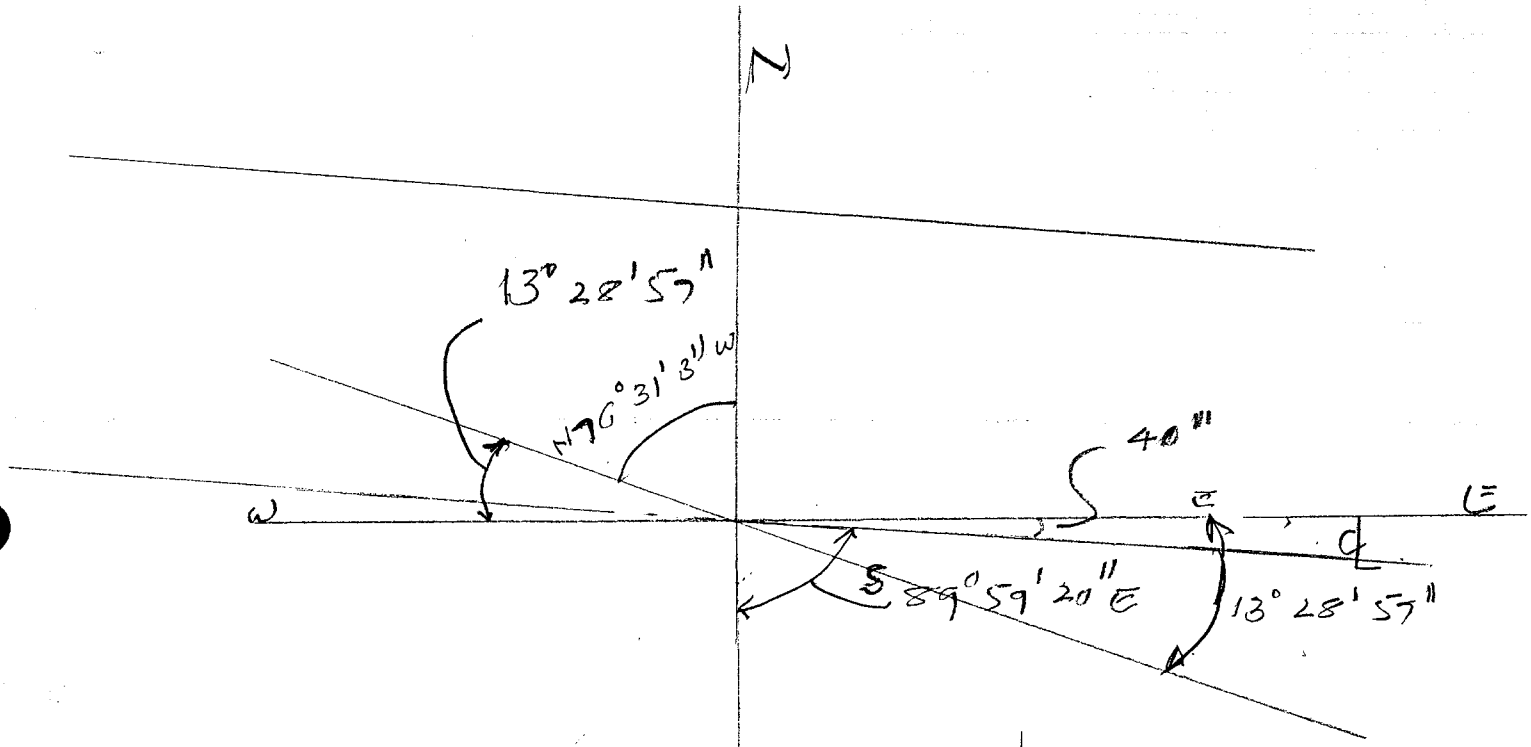
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

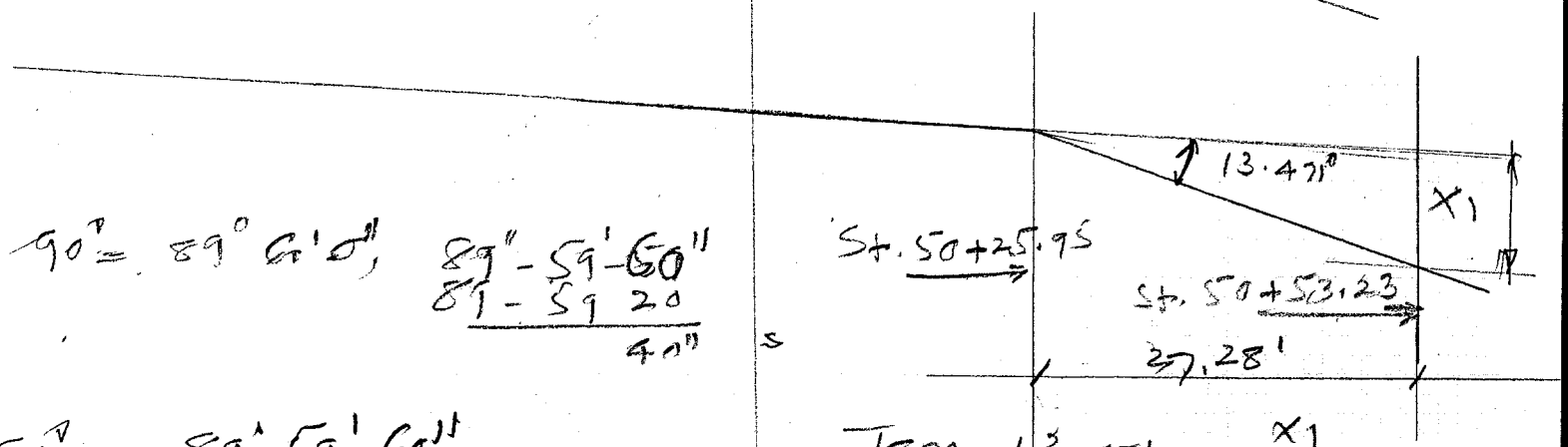
PROJECT Grand Lake Channel PAGE 14(B) OF 28

DETAIL Offset COMPUTED KNH DATE 9/92

CHECKED BY CGW DATE 12/92

Sta. 50 + 25.95 To Sta. 50 + 53.23





90° = 89° 60' 0"

89° - 59' - 60"
89 - 59 20
40"

90° — 89° 59' 60"
76 31' 3
13° 28' 57"
— 40"
13° 28' 17" = 13.471°

Tan 13.471 = $\frac{X_1}{27.28}$

X_1 = 6.5347'
= 6' - 6½"

19' - 0
6' - 6½
25' - 6½"

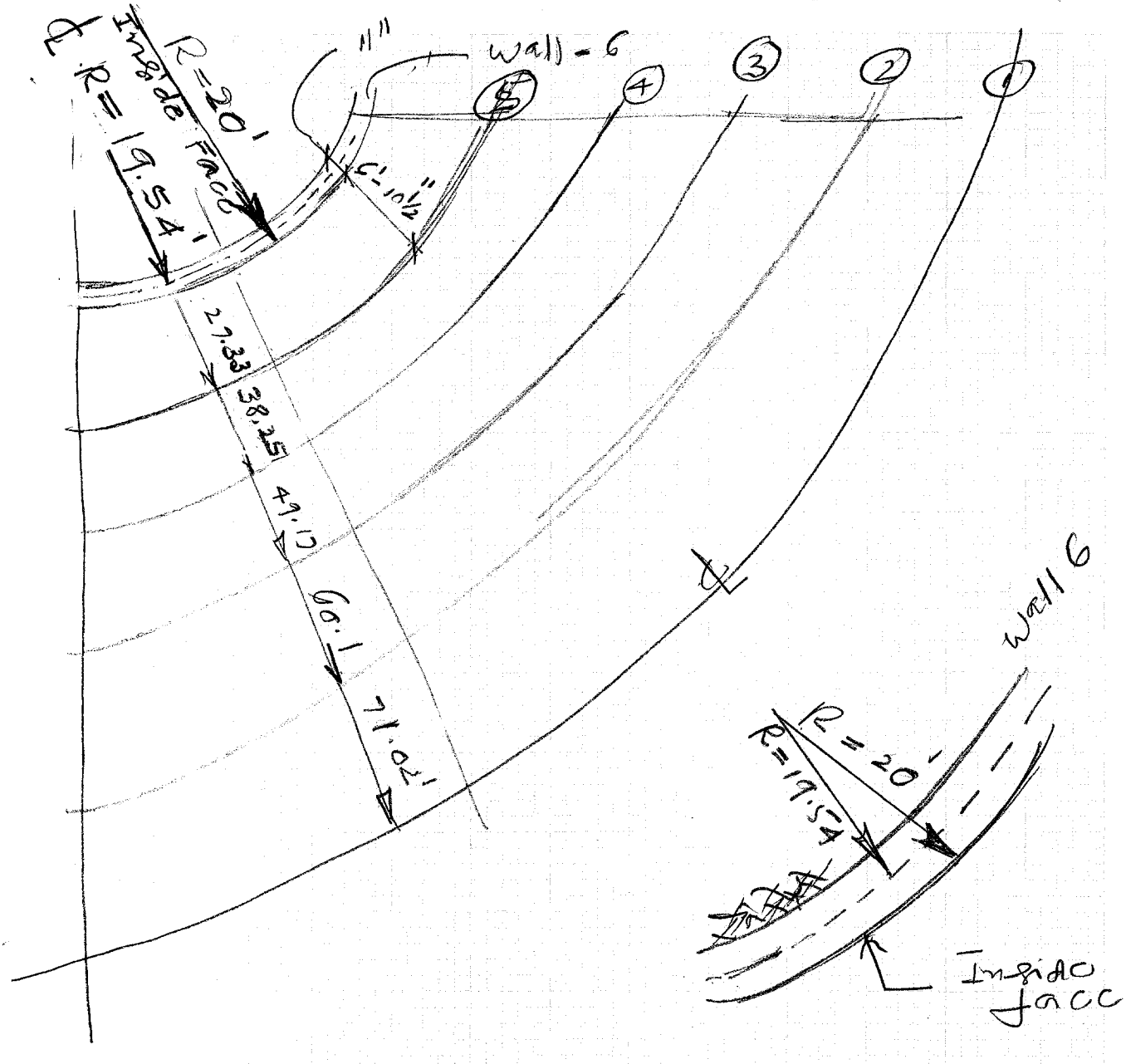
Varies from 19' to 25' - 6½"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Salsaman Box PAGE 15 OF 28

DETAIL Geometry COMPUTED KVH DATE 10/92

CHECKED BY [illegible] DATE [illegible]



$5.5''/12 = 0.46$

$11'' = \begin{array}{r} 6.00 \\ 5.92 \\ \hline 6.92' \end{array}$

$\begin{array}{r} 49.17 \\ 10.92 \\ \hline 60.1 \\ 10.92 \\ \hline 71.02 \end{array}$

$6'-10\tfrac{1}{2}''$

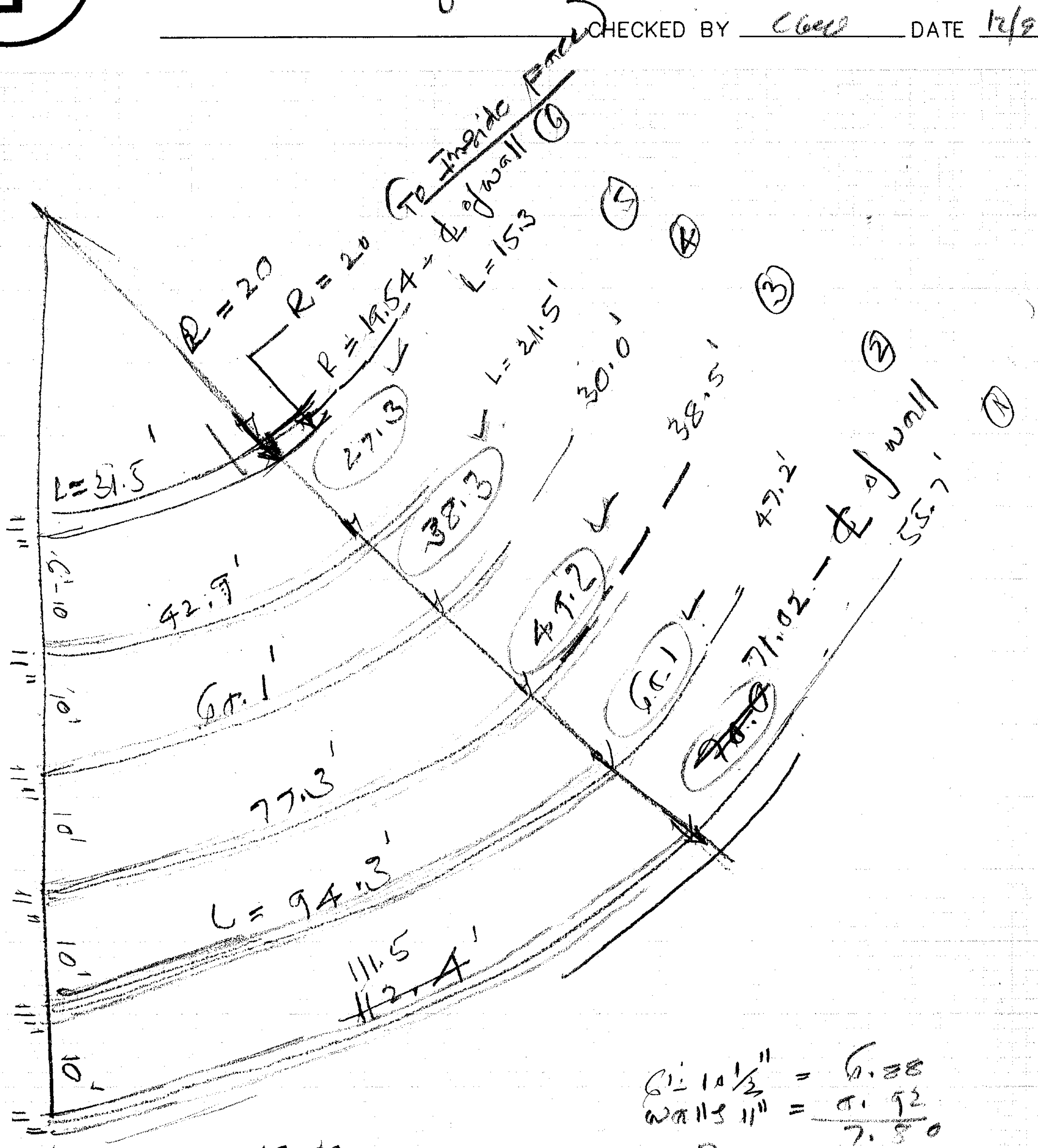
$\begin{array}{r} 49.17 \\ -10.92 \\ \hline 38.25 \\ -10.92 \\ \hline 27.33 \\ -6.88 \\ \hline 20.45 \\ -0.45 \\ \hline = 20.00 \\ -0.46 \\ \hline 19.54 \end{array}$ — ③ — ④ — ⑤ — ⑥ → Inside face = R (℄)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Seelman Road Box PAGE 16 OF 28

DETAIL Geometry COMPUTED KNH DATE 10/92

CHECKED BY CGee DATE 12/92



$6' 10\frac{1}{2}'' = 6.88$

walls 11" = 0.92

7.80

R = 20.00

27.80

10.92

38.72

10.92

49.64

10.92

60.56

10.92

71.48

49.2
10.0
0.92
60.12
10.00
0.46
70.58

0.92 / 2

49.20
− 10.92
38.28
− 10.92
27.34
− 6.88
− 0.46
20.00

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 17 OF 28

DETAIL Bar Spacings COMPUTED KVH DATE 11/92

CHECKED BY CW DATE 11/92

(1) $\frac{15 \times 12}{4} = \cancel{45}\ 44$ sp

45 ~~46~~ #6 @ 4"

(6) $\frac{55 \times 12}{88.90 \text{ sp}} = 7.3''$, ~~91~~ 89 #6 @ ~~7¼"~~ 7½"

$(46 \times 2) - 1 = 91$

(5) $\frac{47 \times 12}{\cancel{90}\ 88} = \cancel{6¼}''\ 6½$

(4) $\frac{38 \times 12}{\cancel{90}\ 88} = 5.0$ ✓

(3) $\frac{30 \times 12}{\cancel{90}\ 88} = 4''$ ✓

(2) $\frac{21 \times 12}{\cancel{90}\ 88} = 2.8$ ✓

Wall 1	—	Spacings	4" x 3 times = 12" ±
Wall 6	—	"	7½ x 3 = 21" = 1.75'

R = 49.17

$\pi R = 3.14 \times 49.17 \times 2 = 308.78/4 = 77.19$

$(2 \times 2) + 1 = 5$

$(45 \times 2) + 1 = 91$ #6 Bottom Bars wall-6

$(45 \times 4) + 1 = 181$ #6 Top Bars wall-6

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sobbaman Box PAGE 18 OF 28

DETAIL Bar Spacing COMPUTED KNH DATE 11/92

CHECKED BY CCW DATE 12/92

(a) 15.0 x 12 / 4" Sp = 45

45 Sp @ 4"

46 #6 @ 4"

1) $\frac{55.5 \times 12}{45 \text{ Sp}} = 14.8$

2) $\frac{47 \times 12}{45 \text{ Sp}} = 12.5$

3) $\frac{38 \times 12}{45} = 10.1$

4) $\frac{30 \times 12}{45} = 8.0$

(5) $\frac{21.0 \times 12}{45} = 5.6$

$\frac{15 \times 12}{4\frac{1}{2}} = 40 \text{ Sp}$

41 #6 @ $4\frac{1}{2}$"

$\frac{55.5 \times 12}{40} = 16.6$ ~~8.3~~ 5.4

~~80~~ 120

$\frac{47 \times 12}{40} = 14.1$ ~~9.0~~ 4.5

~~80~~ 120

$\frac{38 \times 12}{40} = 11.4$ ~~5.7~~ 3.7

120

$\frac{30 \times 12}{40} = 9.0$ ~~4½~~ 3

120

$\frac{21 \times 12}{40} = 6.3$ 2.1

120

(1) 20 Sp. @ 33.3" = ~~21.1~~ ±

$\frac{16.6}{2} = 8.3$

33.
24
7

~~41 #6 @ 4½" ±~~

~~84 #6 @ 8¼" ±~~

41 #6 @ $4\frac{1}{2}$"

124 #6 @ $5\frac{1}{2}$"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Scottsdale Box PAGE 19 OF 28

DETAIL Bar Layout COMPUTED KNH DATE 10/92

CHECKED BY CWW DATE 12/92

$\frac{25.75 \times 12}{4.5}$ = 69 #6 @ 4½" wall (5)

(69 − 1)/2 = 34

$\frac{12.5 \times 12}{34 \text{ sp}}$ = 4½"±, 35 #6 @ 4½ wall (1)

$\frac{16 \times 12}{34 \text{ sp}}$ = 5½"± wall (2)

$\frac{19 \times 12}{68 \text{ sp}}$ = 3½"± wall (3)

$\frac{22.5 \times 12}{68 \text{ sp}}$ = 4" wall (4)

$\frac{27 \times 12}{68 \text{ sp}}$ = 4¾" sp — wall (5)

$\frac{12.5 \times 12}{34 \text{ sp}}$ = 4½" sp — wall (1)

$\frac{14.5 \times 12}{34}$ = 5.0"± — wall (2)

$\frac{17.5 \times 12}{34}$ = 6.1"± — wall (3)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

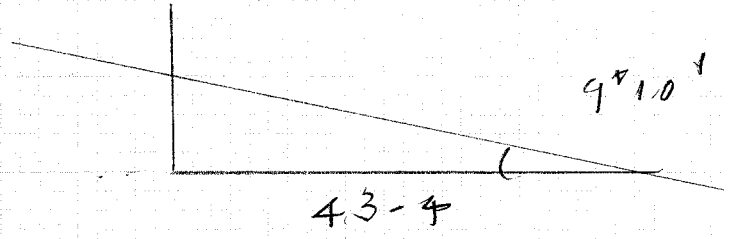
PROJECT Sossaman Box PAGE 20 OF 28

DETAIL Dimension Check COMPUTED Kurt DATE 10/92

CHECKED BY Lee DATE 12/92

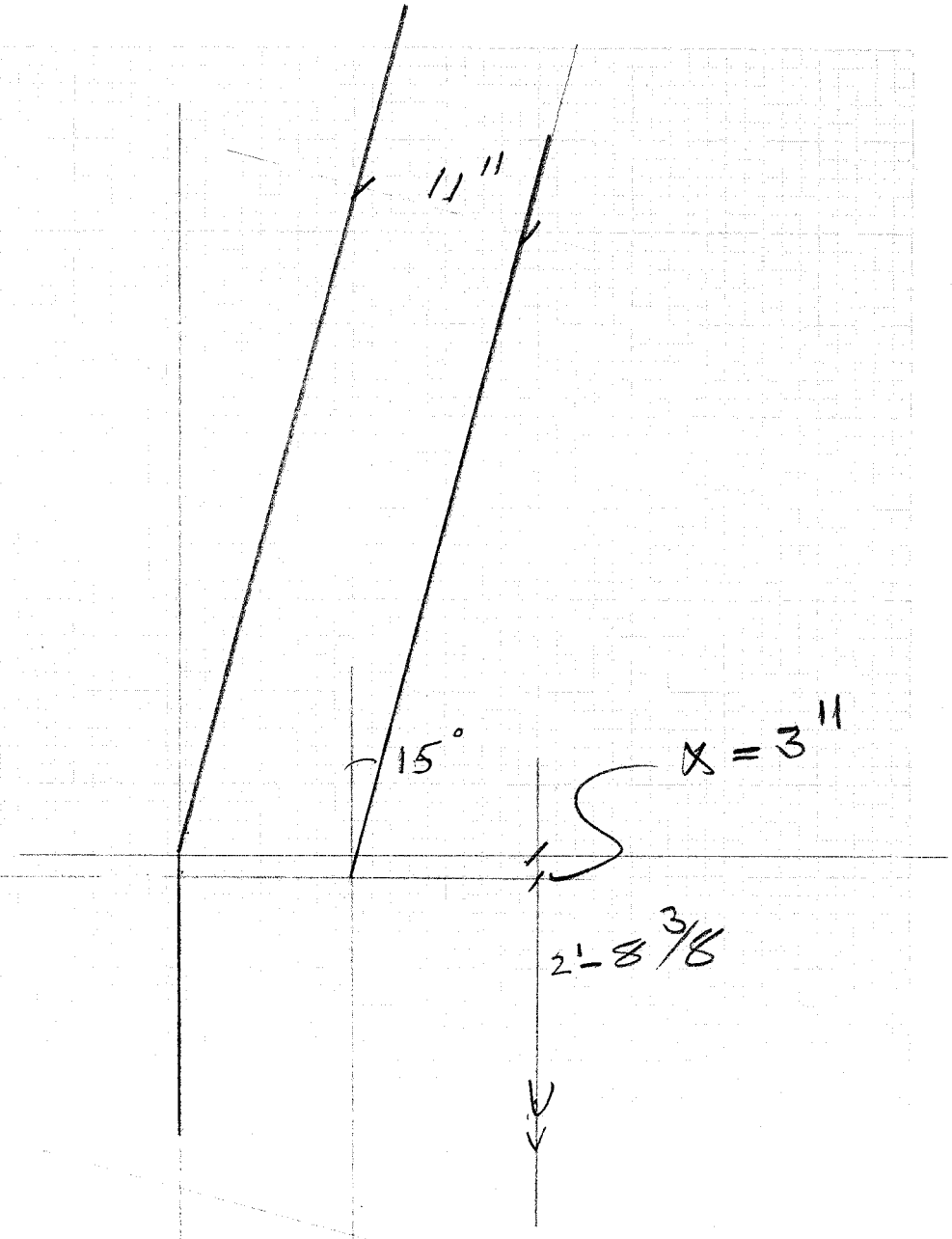
$10 \times 4 = 40'$

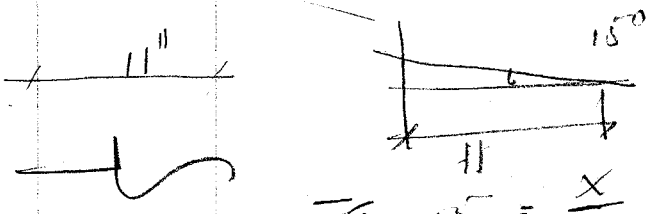
$40'' = \frac{3-4}{43-4}$



$\tan 9.167 = \frac{X}{43.33}$

$X = 6.99$, Say 9'-8





$\tan 15 = \frac{X}{11}$

$X = 2.947'' \approx 3''$

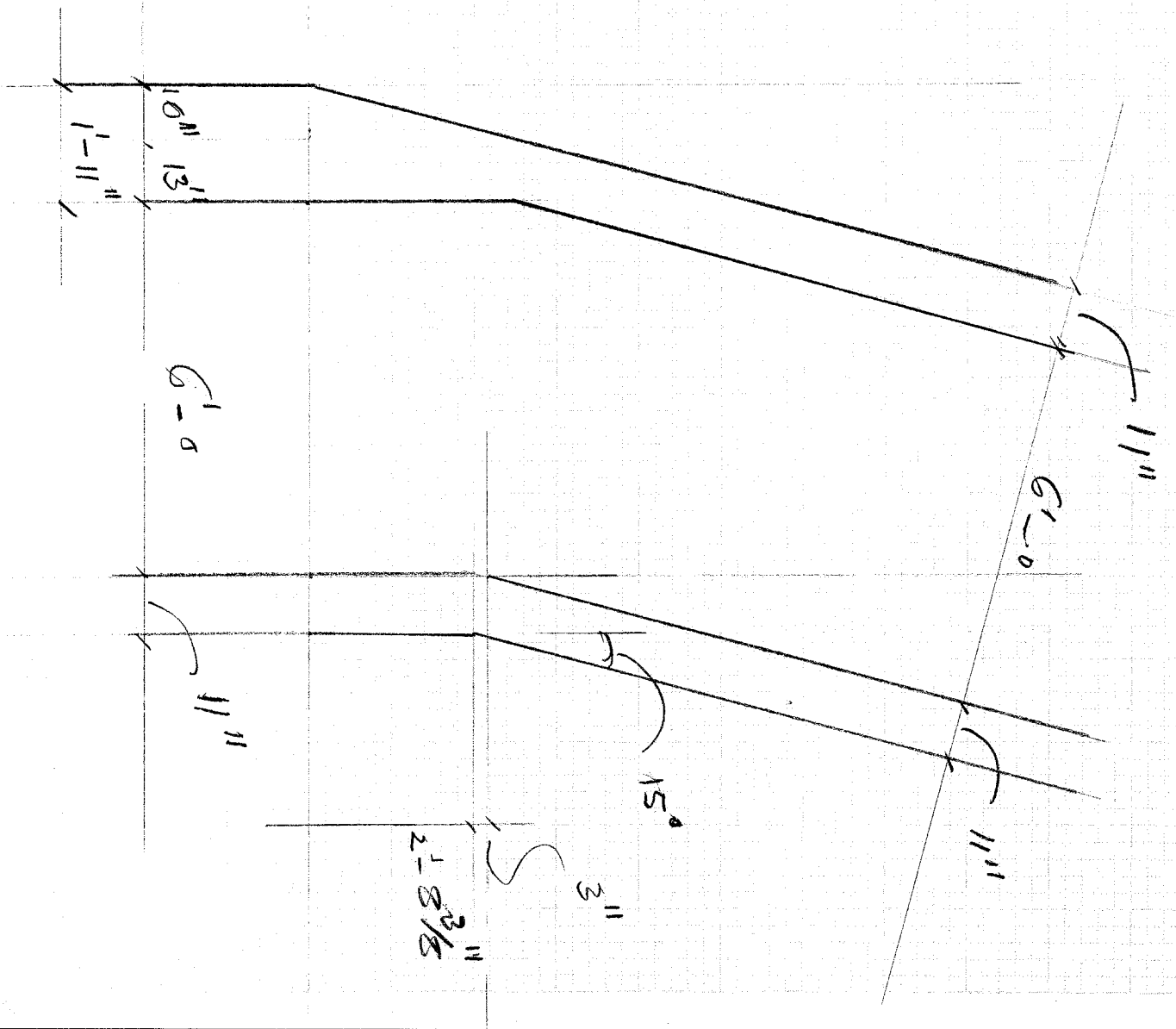
$\frac{150}{163}$

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 21 OF 28

DETAIL Dimension Ch 12 COMPUTED KVH DATE 10/92

CHECKED BY CWD DATE 12/92

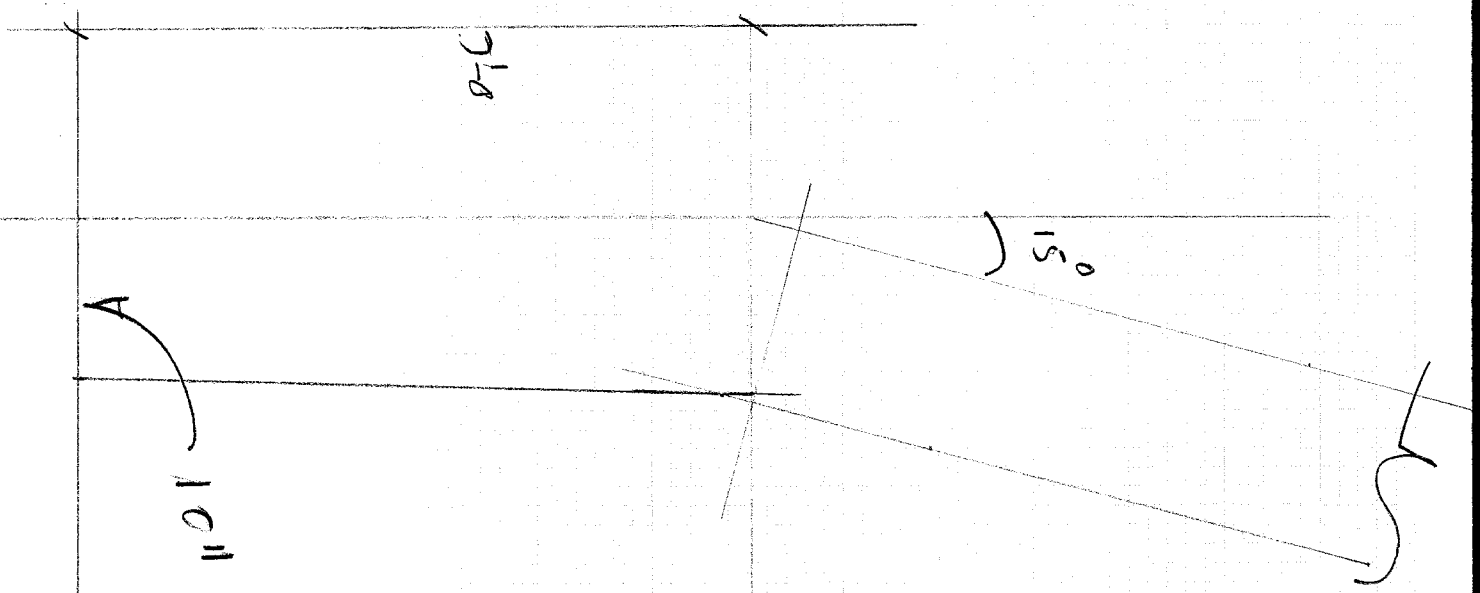


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 22 OF 28

DETAIL Dimensions COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE Mar



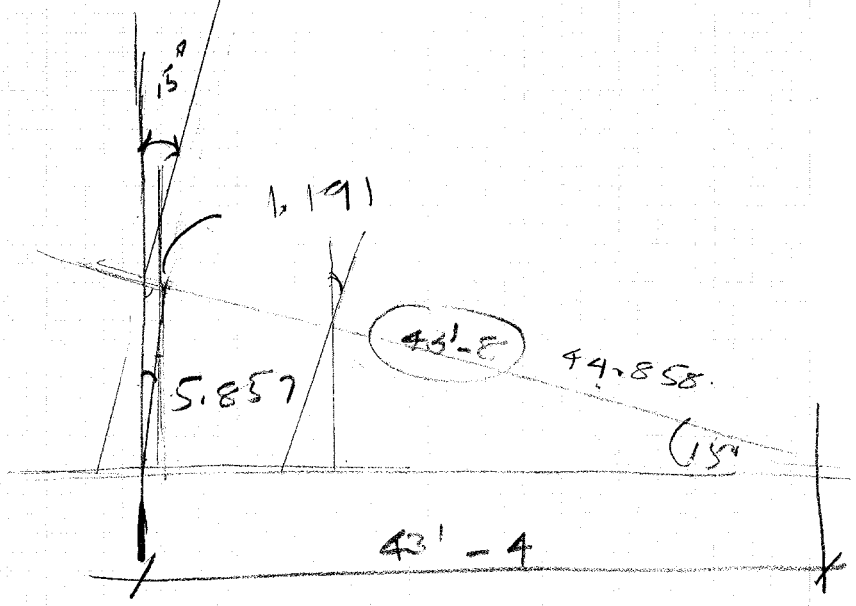
1" = 1'-0"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sallaman Box PAGE 23 OF 28

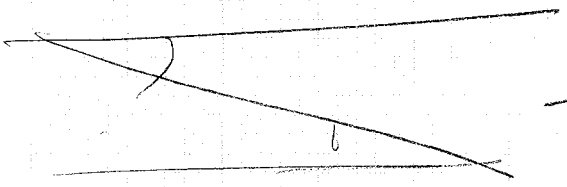
DETAIL Geometry COMPUTED KWH DATE 11/19/92

CHECKED BY CWD DATE 12/9



10' - 0 × 4 = 40' - 0
4 4
3 6
3 - 8
43 - 8

10 × 4 = 40' - 0
10 × 4 = 3 - 4



88° 37' 31"

$\tan 15 = \frac{x}{43.33}$

$x = 11.61$

44.858
43.667
1.191'

$\tan \theta = \frac{1.191}{11.61}$

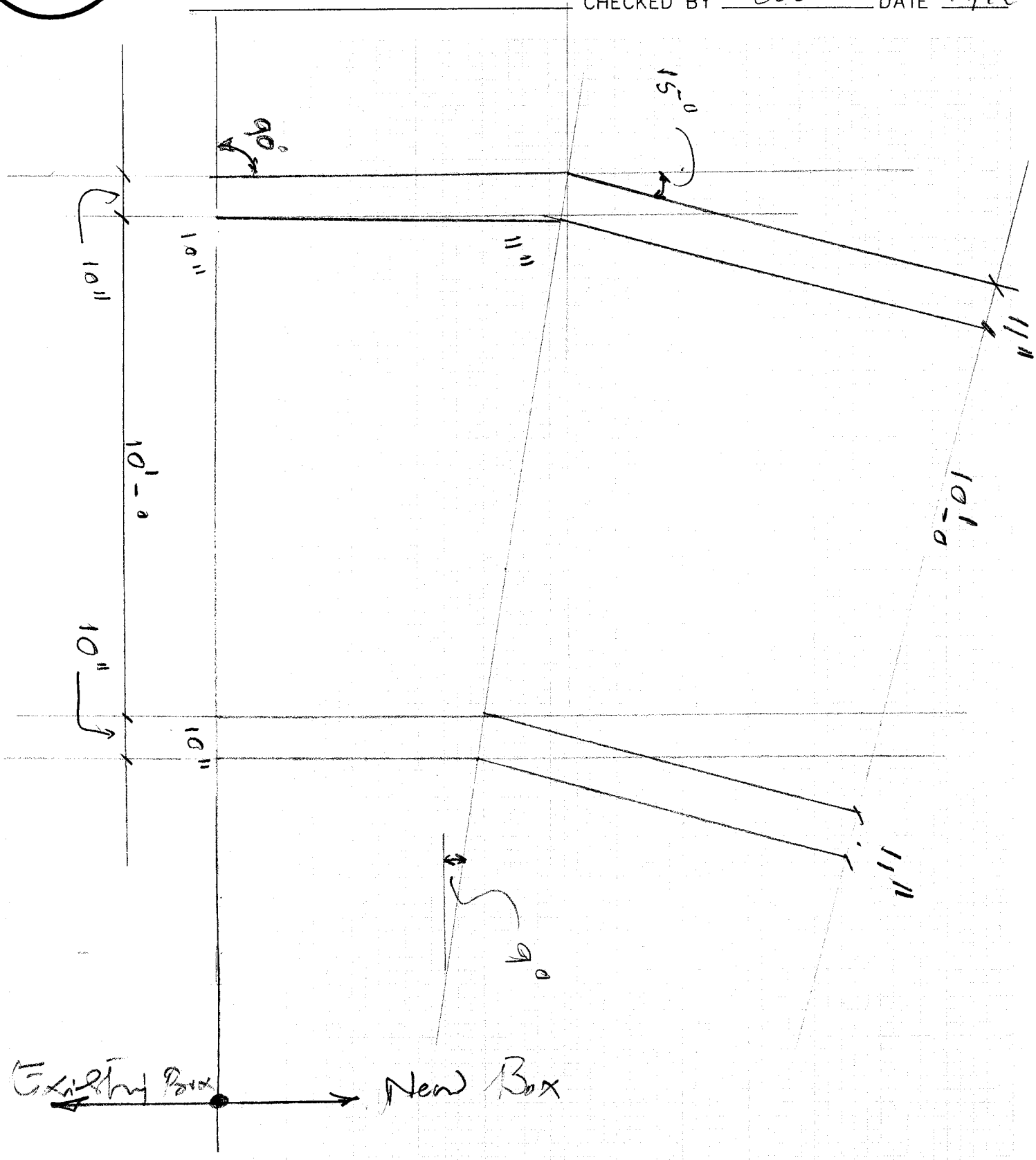
$\theta = 5.857°$

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 24 OF 28

DETAIL Geometry COMPUTED KVH DATE 11/19/92

CHECKED BY CWO DATE 12/92



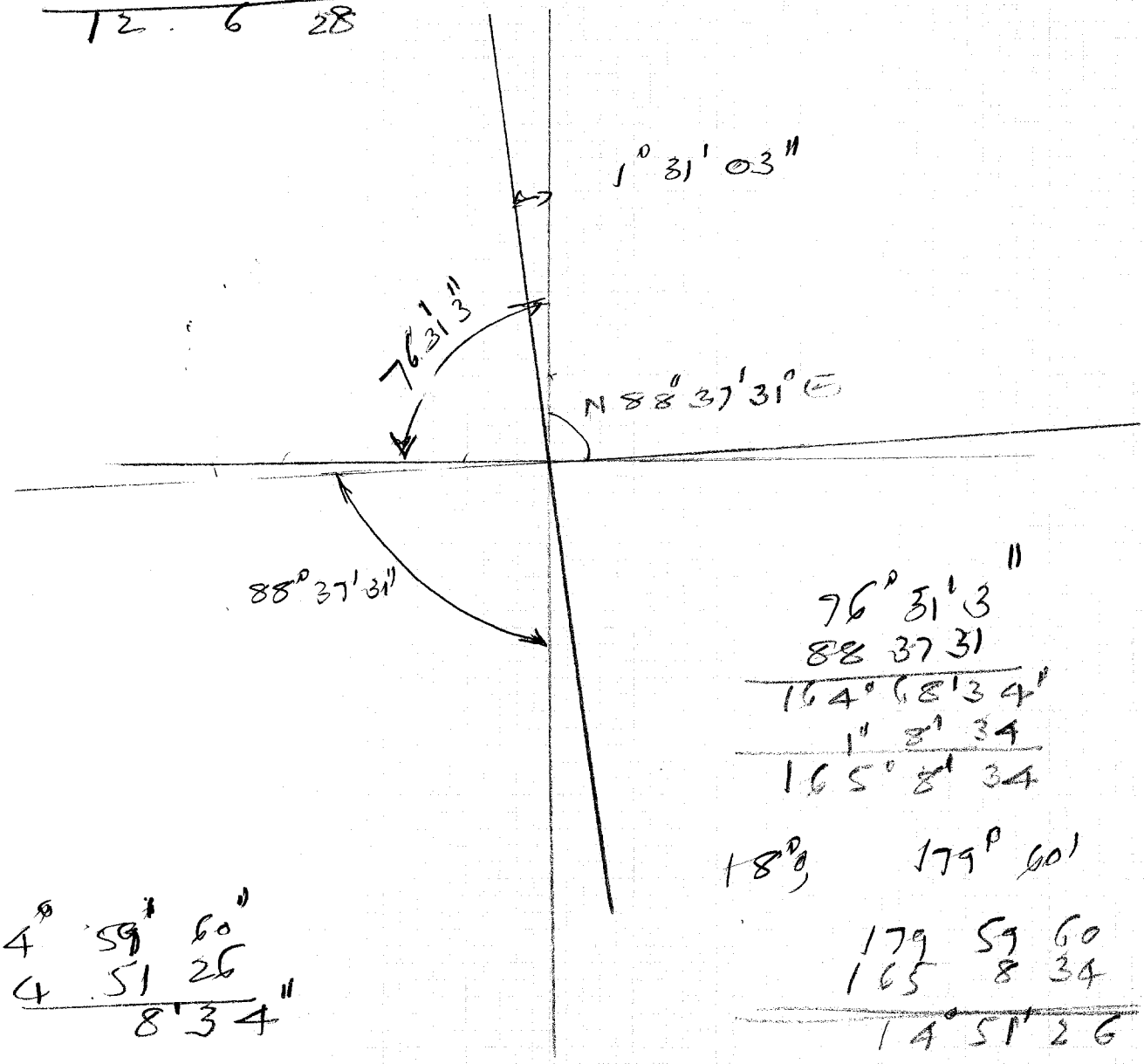
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 25 OF 28

DETAIL Geometry COMPUTED RVH DATE 11/19/92

CHECKED BY CCW DATE 12/92

88° 37' 31
76 31 3
12 6 28



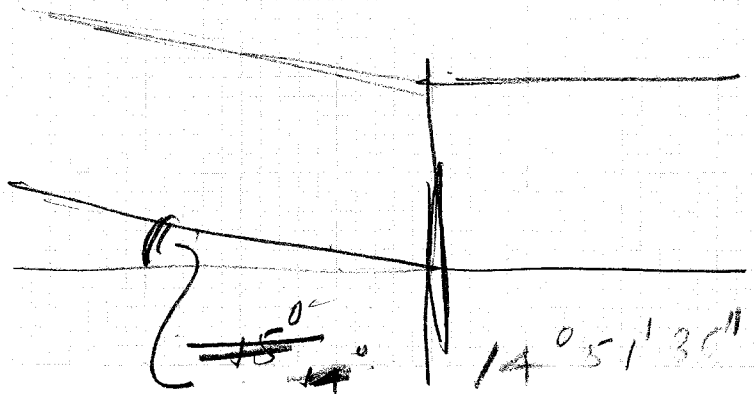
76° 31' 3"
88 37 31
164° 68' 34"
1° 8' 34
165° 8' 34

~~18°~~ 179° 60'

179 59 60
165 8 34
14° 51' 26

14° 59' 60"
14 51 26
8' 34"

9° - 10' = 8' 70'
8° 34
36"

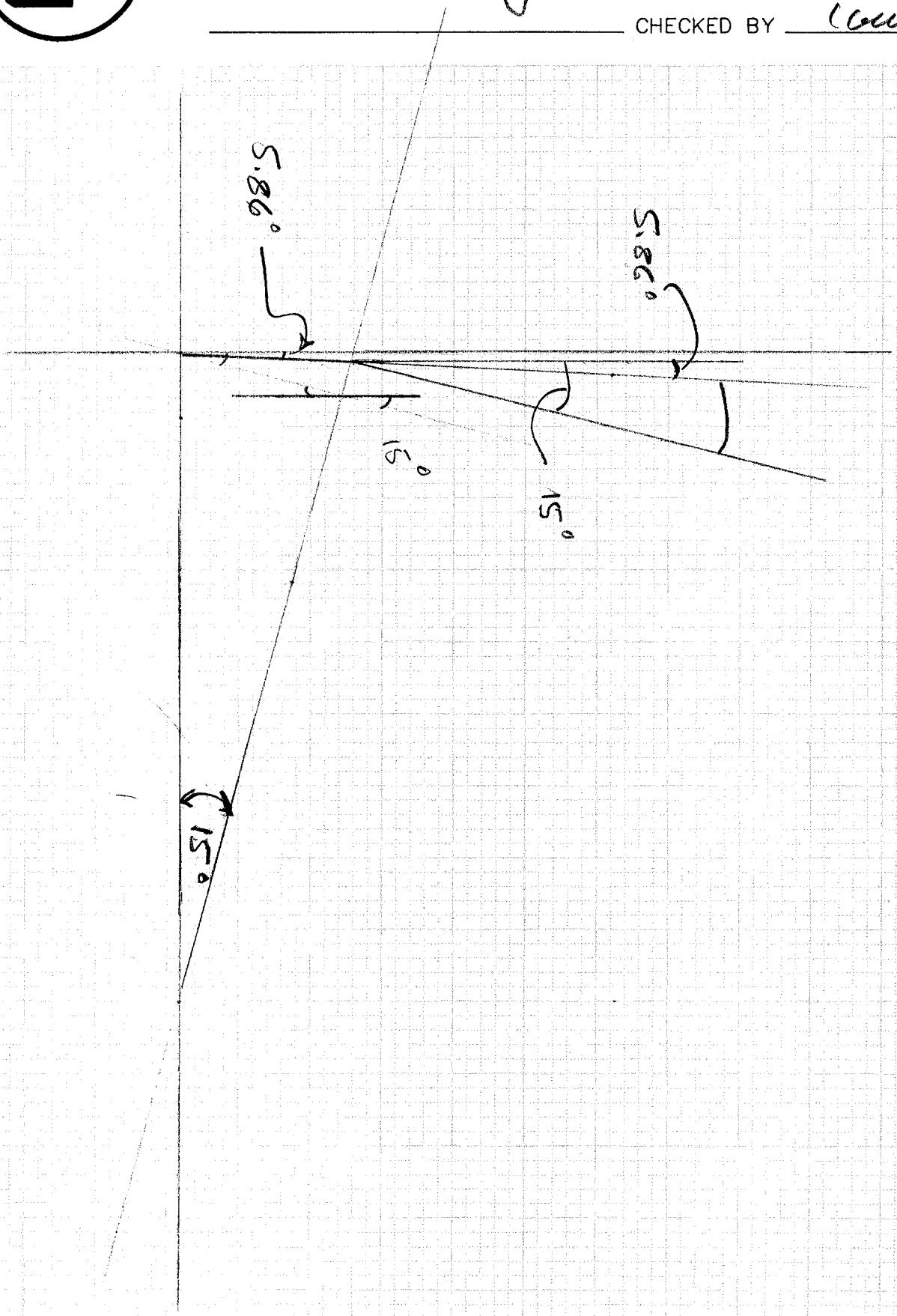


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 26 OF 28

DETAIL Geometry COMPUTED KVH DATE 11/92

CHECKED BY CCW DATE 1/93



$\frac{15.5}{29.5}$ 1:1.4

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Rd PAGE 27 OF 28

DETAIL Bar spacing COMPUTED KVH DATE 12/92

CHECKED BY CWO DATE 12/92

6' − 10½

40' − 0

15'' 4 − 0

50 − 15½

1 − 6½

51 − 6½

− 5½

51 − 1''

20

71 − 1''

$R = 20 - 5\frac{1}{2} = 14.5'$

$\frac{3.14 \times 14.5 \times 2}{4 \times 2} = 15.3'$

$\frac{15 \times 12}{4.5 \text{ sp}} = 4''$

$R = 71'$, $\frac{3.14 \times 71 \times 2}{4 \times 2} = 55.7$

$\frac{55.5 \times 12}{176 \text{ sp}} = 3\frac{3}{4}''$

$4'' \frac{\times 71}{14.5} = 14.5''/4 = 3.64 \approx 3\frac{3}{4}$

Try $4\frac{1}{2} \times \frac{71}{14.5} = 16.2/4 = 4.1$ say $4''$

$\frac{(41+1)}{2} = 22 \# 5'$

Try $5'' \times \frac{71}{14.5} = 18.21/4 = 4.55$, $4\frac{1}{2}$

$\frac{15 \times 12}{4.5} = 40$ sp @ $4\frac{1}{2}''$, 41 Bars

$(40 \times 4) + 1 = 161$ Bars

~~$\frac{71 \times 12}{160 \text{ sp}}$~~ $= \frac{55.5 \times 12}{160} = 4''.6$ say $4''\pm$

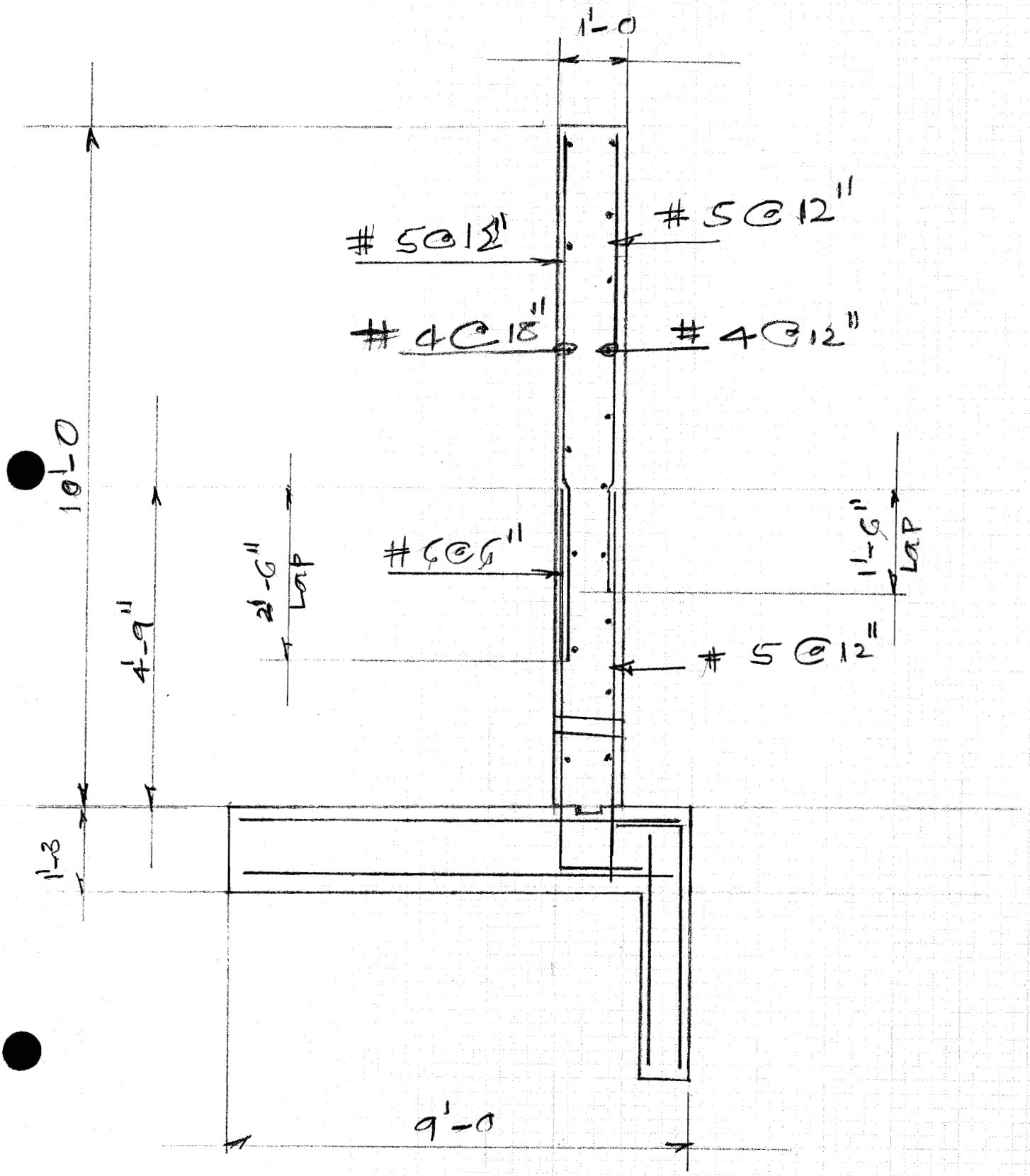
This spacing is used for drawings

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 28 OF 28

DETAIL Wing Wall COMPUTED KVH DATE NOV/92

CHECKED BY CWO DATE 12/92



FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

Wells Engineering, Inc.
3737 North Seventh Street, Suite 201
Phoenix, Arizona 85014-5005

Attention: Tony Bokich

Dear Sirs:

As per our meeting on October 7, 1992, it was decided that the Flood Control District would send its suggested design of the channel wall on the east side of the box culvert to Wells Engineering. The channel design follows:

Sossamon Box Culvert

Included:

1. Cross-section of channel wall (Page 7).

2. Wall elevation showing suggested back wall steel layout (Page 8).

   The #6 at 6", As=0.88 in ^{2}/ft., main back wall steel if the suggested spacing only. This is the suggested minimum required steel for this wall design for both the inside and outside wall designs. Because of the large degree of curvature in the channel, the main wall steel bar size and/or the spacing may be modified, as long as the As=0.88 in^2/ft. minimum back wall steel is met.

If you have any questions, please call me at 506.1501.

Sincerely,

Charles G. Wainwright, P.E.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

Wells Engineering, Inc.
3737 North Seventh Street, Suite 201
Phoenix, Arizona 85014-5005

Attention: Tony Bokich

Dear Sirs:

As per our meeting on October 7, 1992, it was decided that the Flood Control District would send its suggested design of the channel wall on the east side of the box culvert to Wells Engineering. The channel design follows:

Sossamon Box Culvert

Included:

1. Cross-section of channel wall (Page 7).

2. Wall elevation showing suggested back wall steel layout (Page 8).

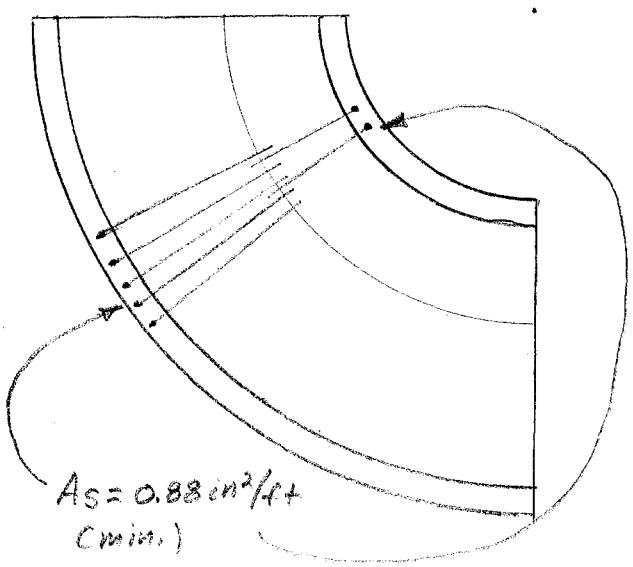
   The #6 at 6", As=0.88 in ^{2}/ft., main back wall steel if the suggested spacing only. This is the suggested minimum required steel for this wall design for both the inside and outside wall designs. Because of the large degree of curvature in the channel, the main wall steel bar size and/or the spacing may be modified, as long as the As=0.88 in^2/ft. minimum back wall steel is met.

If you have any questions, please call me at 506.1501.

Sincerely,

C. G. Wainwright

Charles G. Wainwright, P.E.

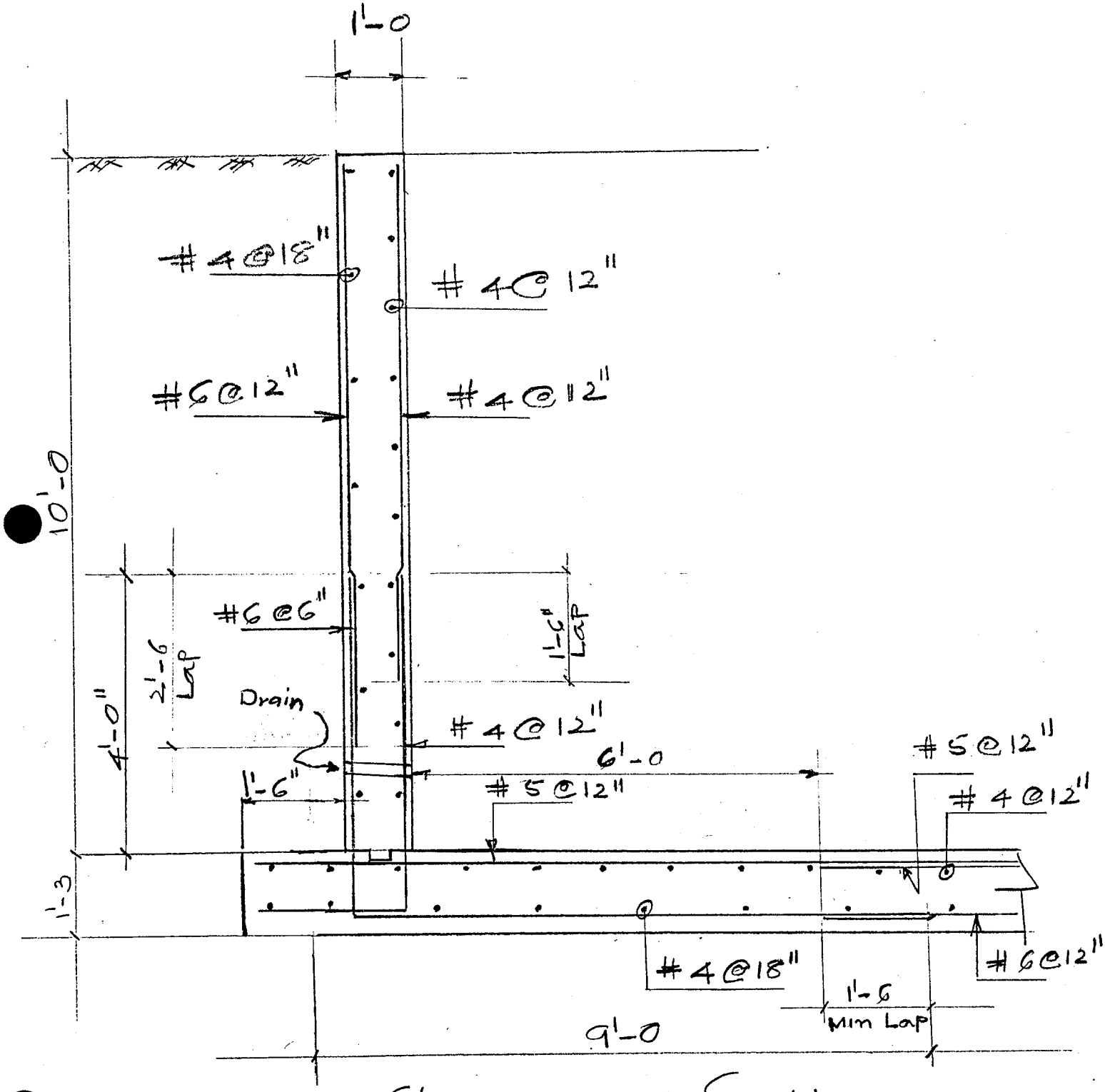


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 7 OF

DETAIL Wall Detail COMPUTED KVH DATE 10/92

CHECKED BY CBW DATE 10/92



Channel wall Section

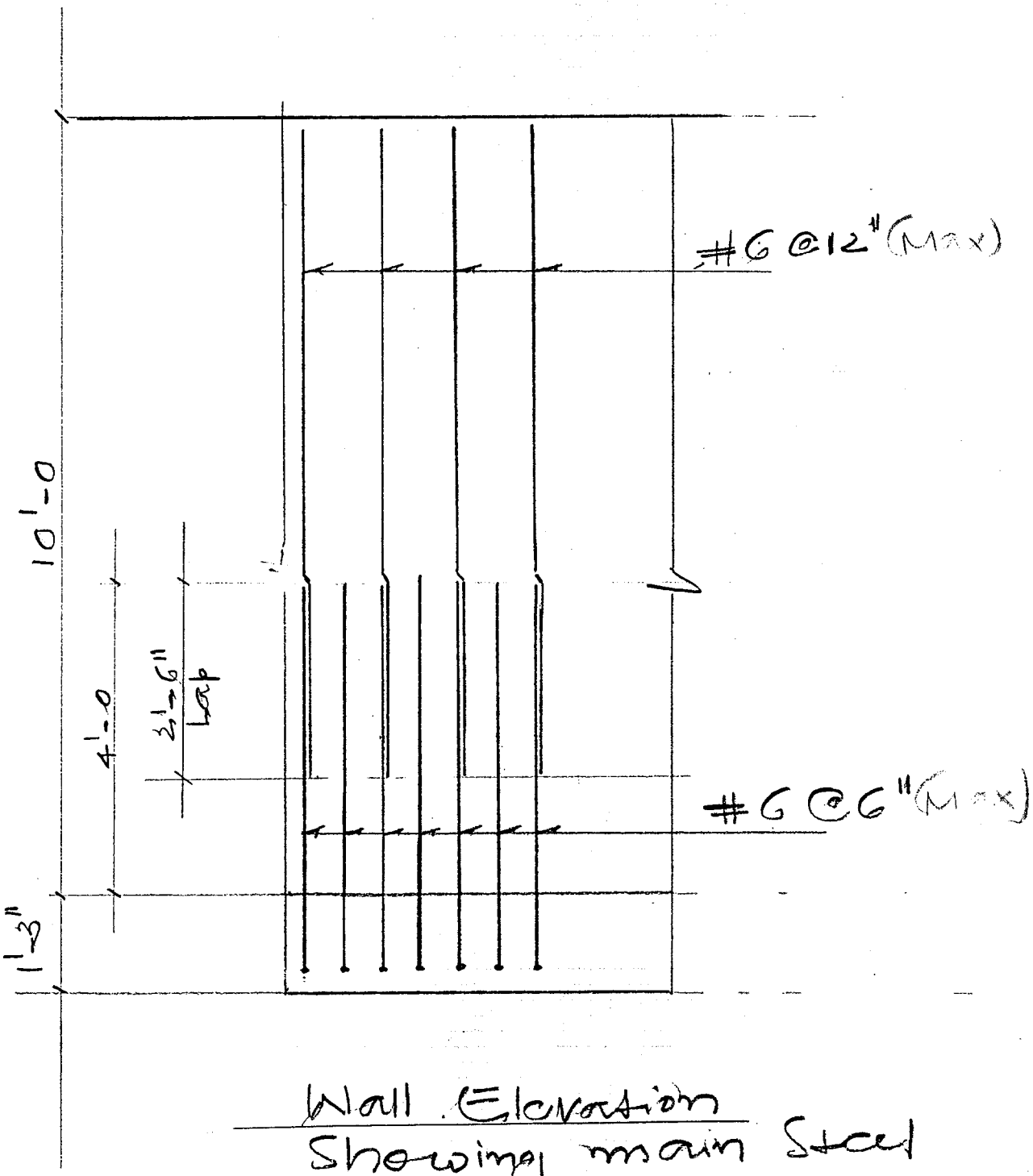
½" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 8 OF

DETAIL Wall Steel COMPUTED KVH DATE

CHECKED BY CCW DATE 12/92



Wall Elevation
Showing main Steel

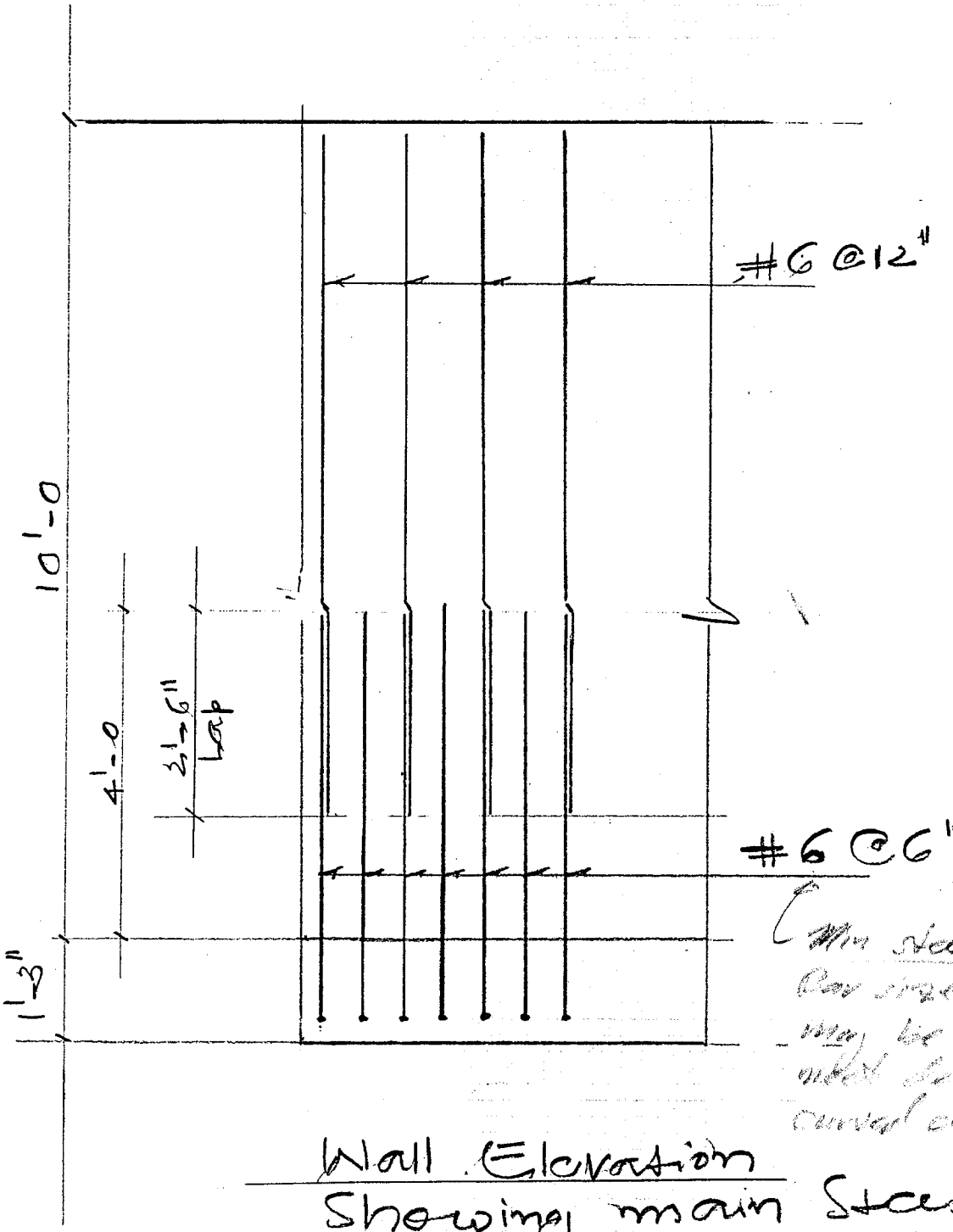
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 8 OF

DETAIL Wall Steel COMPUTED KVH DATE

CHECKED BY CLW DATE 12/92



Min steel required. Bar size and spacing may be modified to match drawings of the curved channel.

Wall Elevation
Showing main Steel

1/2" = 1'-0

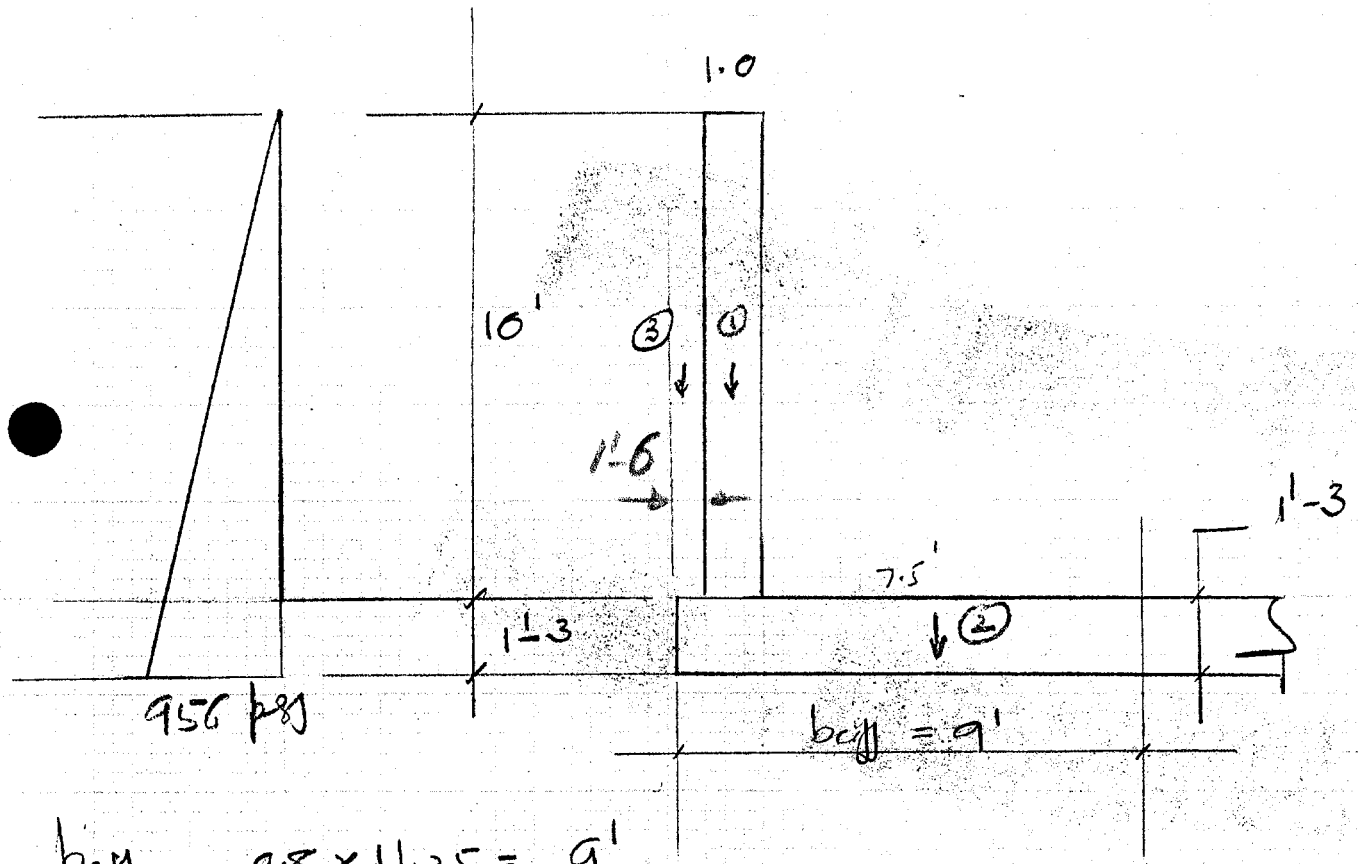
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 1 OF

DETAIL Wall Design COMPUTED KVH DATE 10/92

CHECKED BY CGW DATE

Wall Height = 10'



$b_{eff} = 0.8 \times 11.25 = 9'$

a) Using Submerged Soil pr. @ 85 psf

$p_r = (85 \times 11.25) = 956$ psf

$P = \left(\frac{0.956}{2} \times 11.25\right) = 5.38^{k}$

$M_{OT} = \left(5.38 \times \frac{11.25}{3}\right) = 20.2^{k'}$

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sellman Box PAGE 2 OF

DETAIL Wall Design COMPUTED KVH DATE 10/92

CHECKED BY CGW DATE

Stabilizing Moment:

$W_1 = (1.0 \times 10.0 \times 0.15) = 1.5^K$ 1.50

$W_2 = (9.0 \times 1.25 \times 0.15) = 1.7^K$ 1.88

$W_3 = (0.5 \times 10 \times 0.15) = 0.75$ 2.25

3.8^K 5.63

$M_{STB} = 1.5(0.5+0.5) + (1.7 \times 4.5) + 0.75 \times (8.75)$

$= 26.2$ kft $= 12.0 + 9.4 + 20.8 = 42.2$

$FS = \frac{26.2}{20.2} = 1.3$ 42.2 2.09 OK

OK since footing is continuous

b) Using Dry Condition

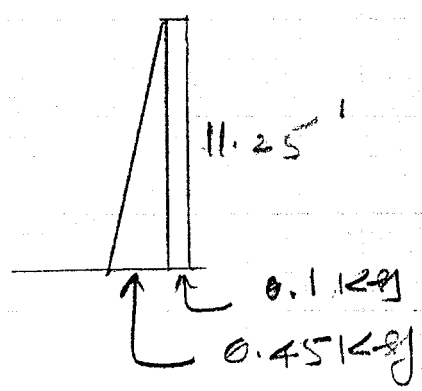
$p_{h_1} = wKh = (0.12 \times 0.33 \times 11.25) = 0.45$ KPf

Surcharge = 2'

$p_{h_2} = (0.12 \times 0.33 \times 2) = 0.08$, Say 0.1 KPf

$P_1 = \frac{0.45}{2} \times 11.25 = 2.53^K$

$P_2 = (0.1 \times 11.25) = 1.13^K$



$M_{OT} = \left(2.53 \times \frac{11.25}{3}\right) + \left(1.13 \times \frac{11.25}{2}\right)$

$= 15.84$ kft

$F.S = \frac{26.2}{15.84} = 1.65$ 42.2 2.7 OK

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sallman Box PAGE 3 OF

DETAIL Footing Check COMPUTED KVH DATE 10/92

CHECKED BY CAW DATE

Large Uplift area?

a) Footing Check : (Submerged Condition)

$$X_R = (26.2 - 20.2)/3.3 = 1.82$$

$$e = \left(\frac{9.0}{2} - 1.82\right) = 2.68$$

In Middle third

$$\frac{L}{3} = \left(\frac{L}{2} - e\right), \quad L' = 3(4.5 - 2.68) = 5.46'$$

1'-6 heel

Soil Pressures

$$P_r = \frac{R}{LB}\left(1 \pm \frac{6e}{L}\right)$$

$$P_r = \frac{5.63}{(10)(1)}\left[1 \pm \frac{(6)(1.67)}{10}\right]$$

$$= 0.563[1 \pm 1.00]$$

$P_{r\,max} = 1.13$ ksf

$P_{r\,min} = 0.0$ ksf

This is not likely to happen because there will be wt. of water in the channel which will increase the stabilizing moment & decreasing the eccentricity.

∴ Check using normal Dry Conditions (rapid drawdown?)

b) Footing Check (Dry Soil Conditions)

$$X_R = (26.2 - 15.84)/3.3 = 3.14'$$

$$e = \left(\frac{9}{2} - 3.14\right) = 1.36 < \frac{b}{6} = 1.5$$

$$P_r = \frac{3.3}{10 \times 1}\left(1 \pm \frac{6 \times 1.36}{10}\right) = 0.37(1 \pm 0.91)$$

$$0.56(1 \pm 0.19)$$

$P_{r\,(max)} = 0.71$ ksf 0.75

$P_{r\,(min)} = 0.03$ ksf 0.37

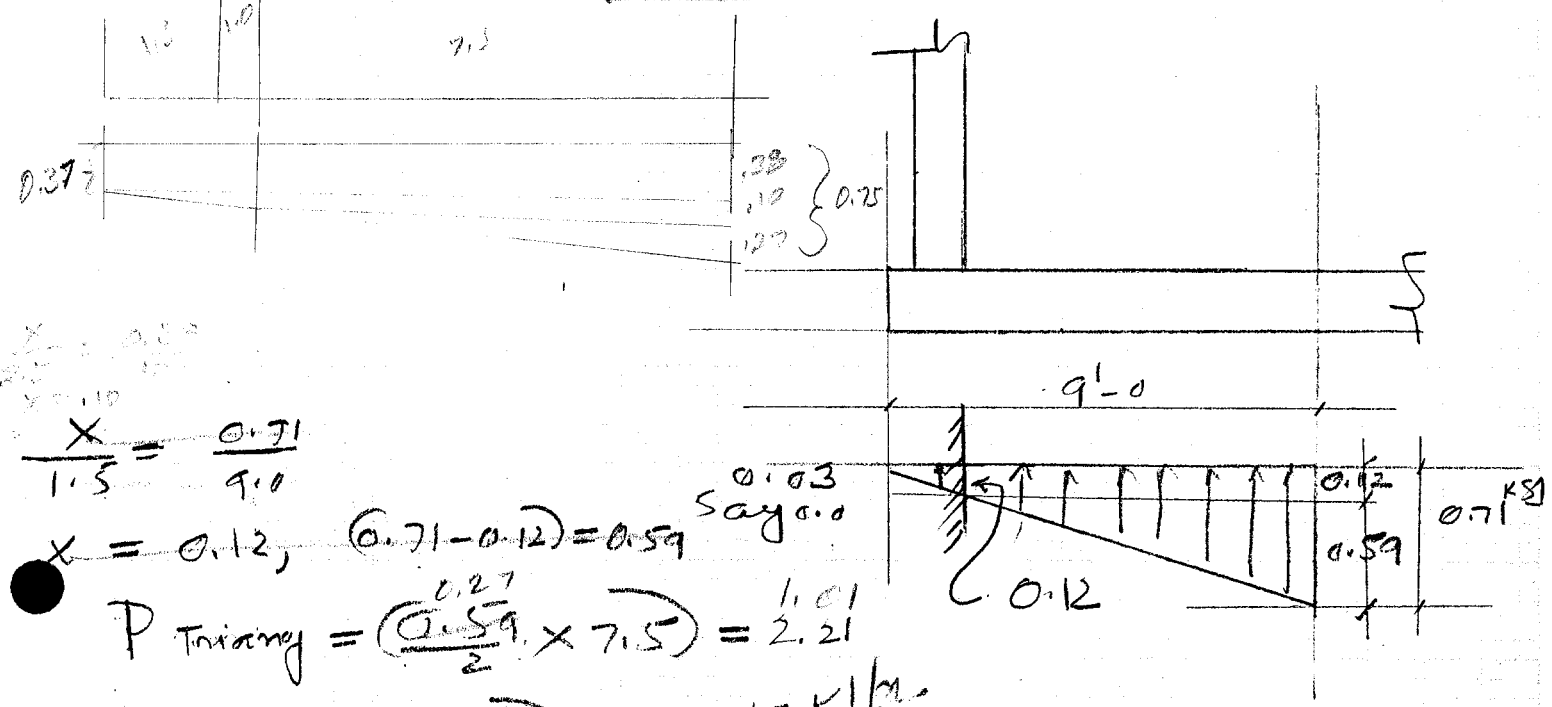
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Salsman Box PAGE 4 OF

DETAIL Footing Check COMPUTED KVH DATE 10/9.

CHECKED BY CCW DATE 12/92

Footing Check Dry Soil



$$\frac{X}{1.5} = \frac{0.71}{9.0}$$

$X = 0.12$, $(0.71 - 0.12) = 0.59$

$$P_{\text{triangle}} = \left(\frac{0.59}{2} \times 7.5\right) = 2.21$$

$$\text{UDL} = (1.25 \times 0.15) = 0.19 \text{ klf}$$

$$M = \left(2.21\right)\frac{2}{3} \times 7.5 + 0.12 \frac{\times 7.5^2}{2} - \left(0.19 \times \frac{7.5^2}{2}\right)$$

$$= \left(11.1 + 3.4 - 5.3\right) = 9.2 \text{ k'}$$

$$d_{eff} = (15 - 3 - 0.5) = 11.5''$$

$$A_s = \frac{9.2 \times 12}{24 \times 0.88 \times 11.5}$$

$$= 0.45 \text{ in}^2$$

$$\#8 \text{ @ } 6'', \quad A_s = 0.62 \text{ in}^2$$

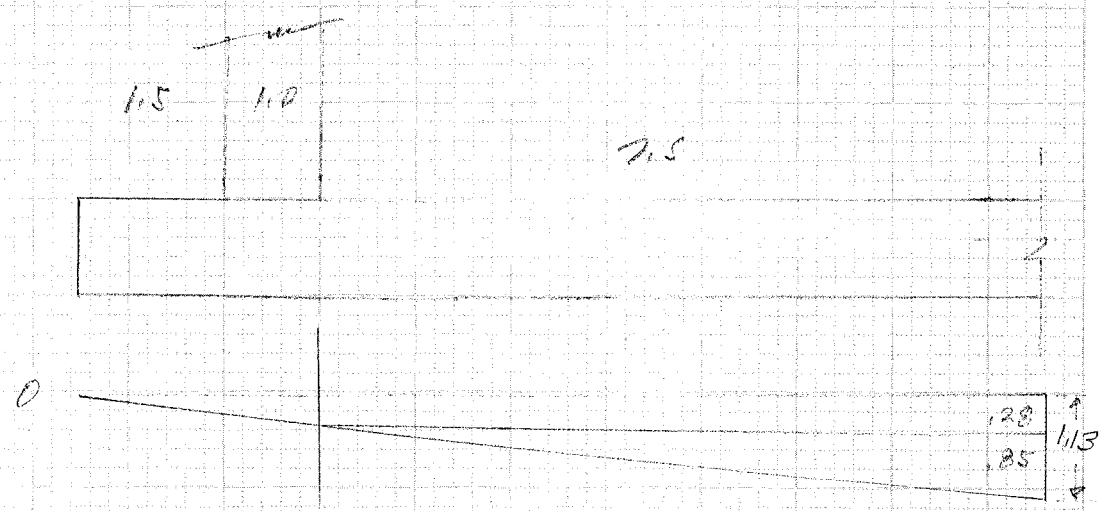
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 4A OF

DETAIL Footing Check COMPUTED CGW DATE

Saturated Soil CHECKED BY KNH DATE 11/92

Footing Check (Saturated Soil)



$\frac{X}{2.5} = \frac{1.13}{10}$

$x = .28$ $(1.13 - .28) = 0.85$ ksf

DDL = (1.2 x 0.15) = 0.19 ksf

$P_{triangle} = \left(\frac{0.85}{2}\right)(2.5) = 2.19$ kip

$M = (2.19)\left(\frac{2}{3}\right)(2.5) + (.28)\frac{(2.5)^2}{(2)} - (.19)\frac{(2.5)^2}{2}$

M = 1.60 + 2.3 = 1.83

d = 11.5"

$A_s = \frac{(1.8)(12)}{(.9)(60)(11.5)}$

$A_s = 0.91 \text{ in}^2 \geq 0.88 \text{ in}^2$ ok

Use #6 @ 6

$A_s = .88 \text{ in}^2$

Rare + temporary condition ok

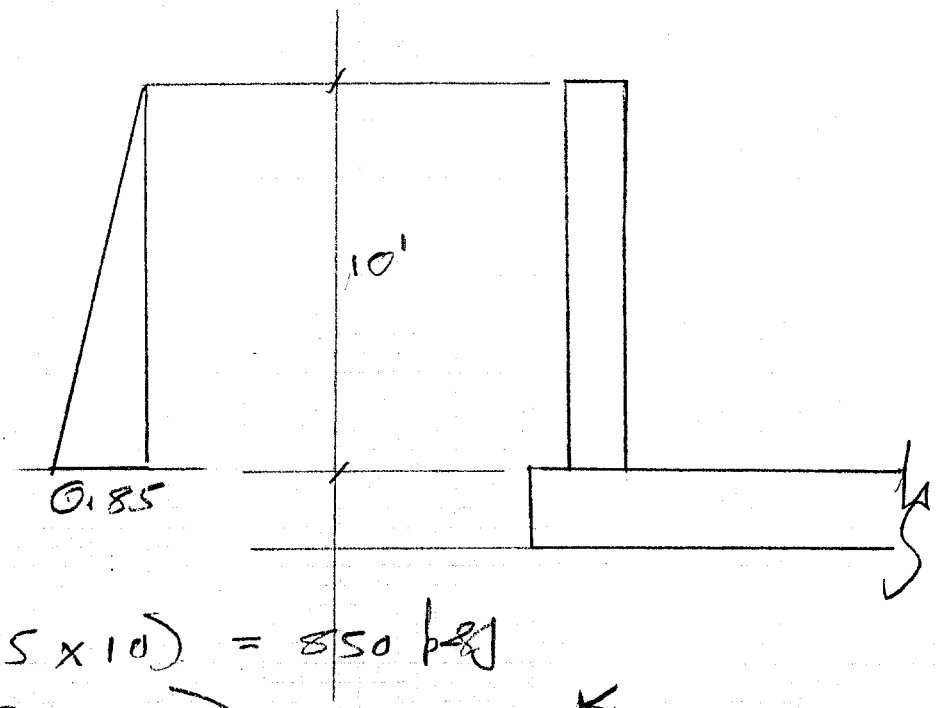
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 5 OF

DETAIL Wall Steel COMPUTED KVH DATE 10/92

CHECKED BY CGW DATE 12/92

Stem Steel



$P_r = (85 \times 10) = 850$ lbs

$P_1 = \left(\frac{0.85}{2} \times 10\right) = 4.25^K$

$M_{lm} = \left(4.25 \times \frac{10}{3}\right) = 14.2^{K'}$

$d_{eff} = (12 - 2 - 0.5) = 9.5''$

$A_s = \frac{14.2 \times 12}{2.4 \times 0.88 \times 9.5}$

$= 0.85 \text{ in}^2$

Use #6 @ 6"

Shear Check:

$V_{max} = 4.25^K$

$v = \frac{4.25}{12 \times 9.5} = 37.3$ psi

v (Allow) $= 0.95\sqrt{4000} = 60$ psi ∴ OK

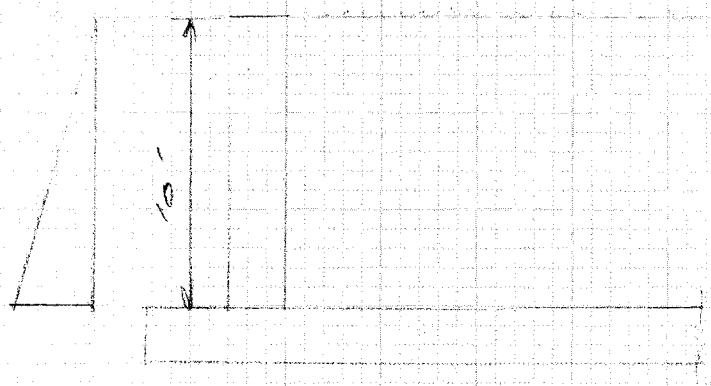
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 5½ OF ____

DETAIL Wall Shed COMPUTED CLC DATE ____

Reverse Force CHECKED BY KVH DATE 11/92

Reverse Force due to channel full of water & no backfill



$P = (62.4)(10) = 640$ plf

$P_1 = \frac{(64)}{2}(10) = 320$ #

$M = (320)\left(\frac{10}{3}\right) = 1066$ '-#

$A_s = \frac{(1066)(12)}{(20)(.88)(9.5)}$

$A_s = .57$ in²

Use #5 @ 4

Cut off

$P_r = (62.4)(7.0) = 437$

$P = \frac{(437)}{2}(7.0) = 1.5$

$M = (1.5)\left(\frac{7.0}{3}\right) = 3.7$

$A_s = \frac{(3.7)(12)}{(20)(.88)(9.5)}$

$A_s = .021$

#5 @ 12

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 6 OF

DETAIL Wall Steel COMPUTED KVH DATE 10/92

CHECKED BY CGW DATE 12/92

Box Cut-off @ 4'-0

Box Extension

12 Bar d = 12 × 3/4 = 9"

d eff = (12 − 2.5) = 9.5

Min 12"

Check Cut off @ (10.0 − 3) = 7'

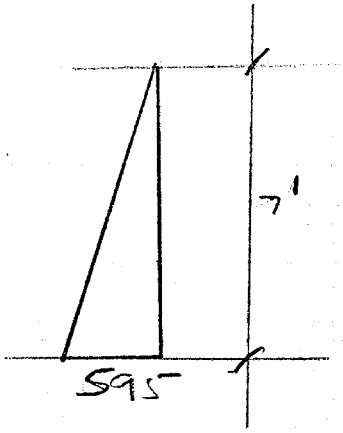
Pw = 85 (7.0) = 595 psf

P = (0.595/2 × 7.0) = 2.08 K

M = (2.08 × 7.0/3) = 4.85

As = (4.85 × 12 / 24 × 0.88 × 9.5) = 0.29

Use # 6 @ 12, As = 0.44



Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501

FAX # 506-4601

COVER SHEET

TO: Tony Bokich

COMPANY OR DEPT: Wells Engineering FAX # 230-0817

FROM: G.G. Wainwright

NUMBER OF PAGES BEING SENT INCLUDING COVER SHEET: 4

IF THERE ARE ANY PROBLEMS, PLEASE CALL (602) 506-1501.

COMMENTS:

Included - Sossaman Channel Wall Design

1) Channel Wall cross-section
2) Wall Elevation (main rebar)

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TDD (602) 506-5897

BOARD OF DIRECTORS

P. Ben Arredondo
Betsey Bayless
James D. Bruner
Carole Carpenter
Tom Freestone

Wells Engineering, Inc.
3737 North Seventh Street, Suite 201
Phoenix, Arizona 85014-5005

Attention: Tony Bokich

Dear Sirs:

As per our meeting on October 7, 1992, it was decided that the Flood Control District would send its suggested design of the channel wall on the east side of the box culvert to Wells Engineering. The channel design follows:

Sossamon Box Culvert

Included:

1. Cross-section of channel wall (Page 7).

2. Wall elevation showing suggested back wall steel layout (Page 8).

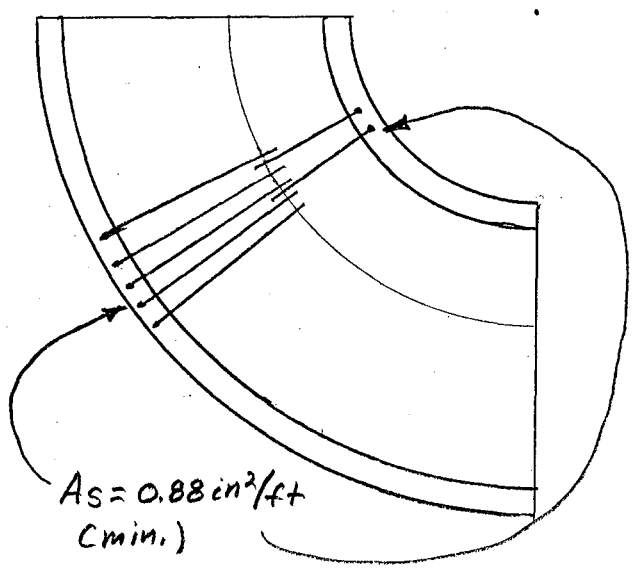
   The #6 at 6", As=0.88 in ^{2}/ft., main back wall steel if the suggested spacing only. This is the suggested minimum required steel for this wall design for both the inside and outside wall designs. Because of the large degree of curvature in the channel, the main wall steel bar size and/or the spacing may be modified, as long as the As=0.88 in^2/ft. minimum back wall steel is met.

If you have any questions, please call me at 506.1501.

Sincerely,

C. G. Wainwright

Charles G. Wainwright, P.E.

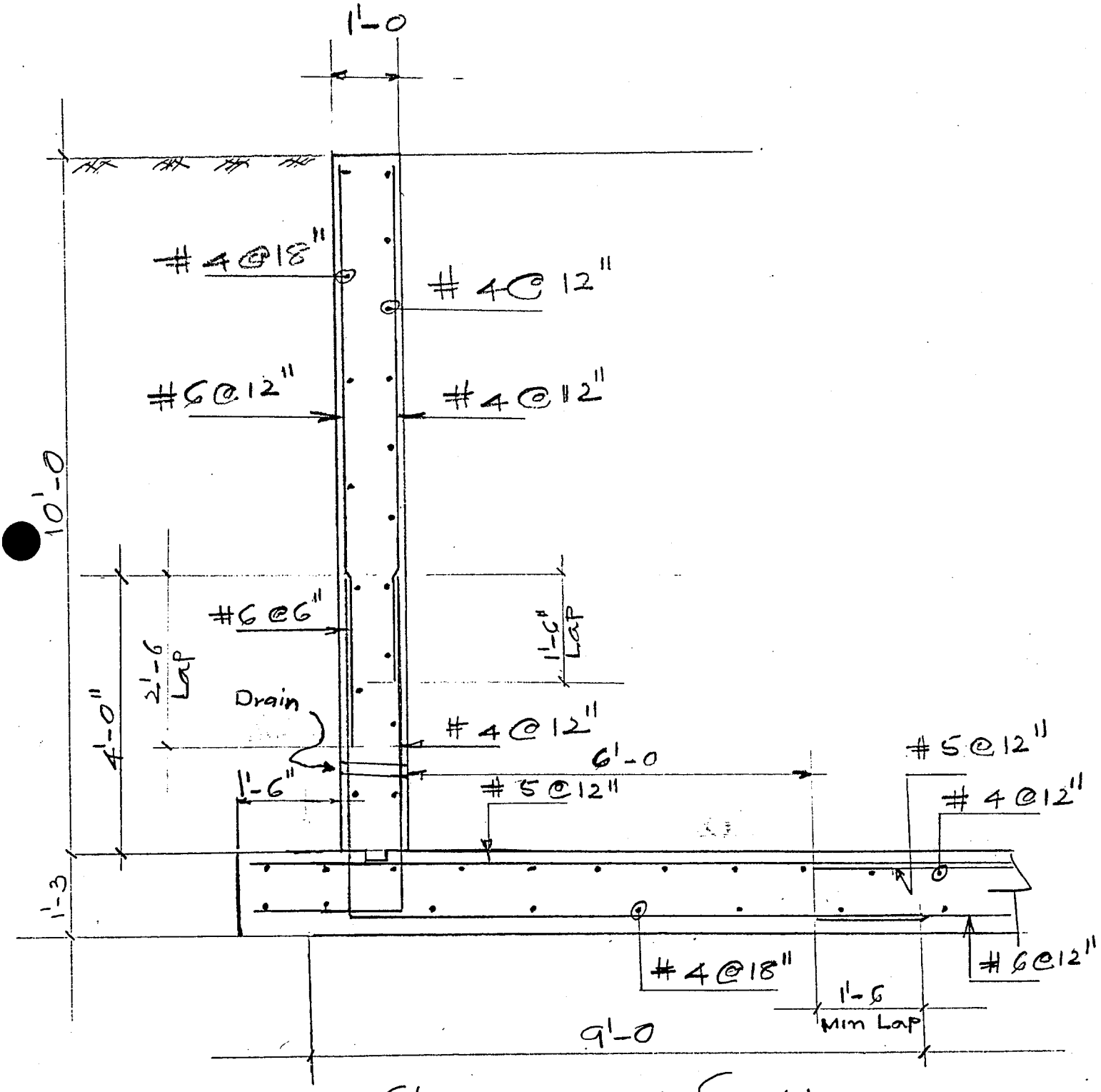


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 7 OF

DETAIL Wall Detail COMPUTED KVH DATE 10/92

CHECKED BY CBW DATE 10/92



Channel wall Section

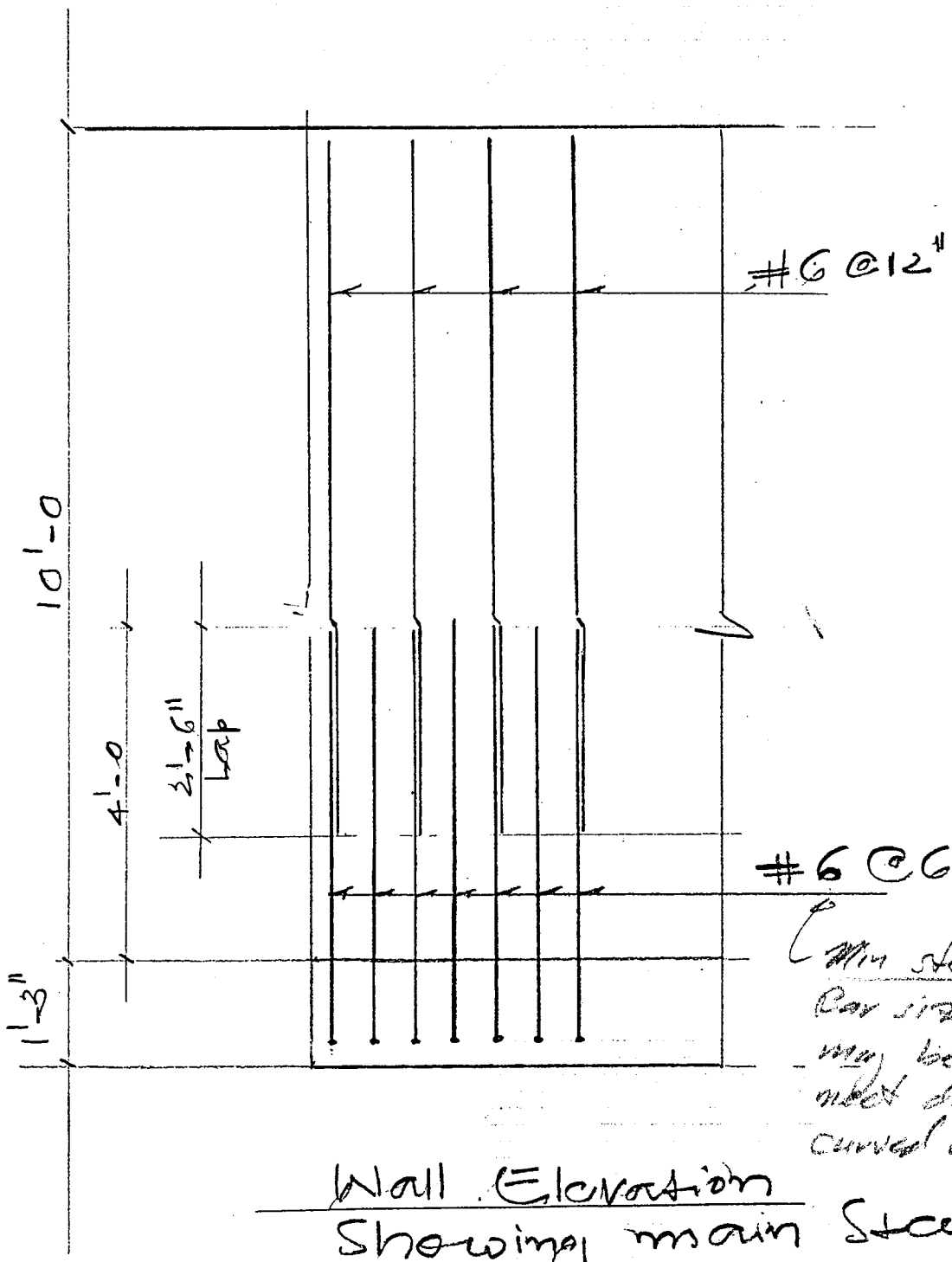
1/2" = 1'-0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossman Box PAGE 8 OF

DETAIL Wall Steel COMPUTED KVH DATE

CHECKED BY DATE



Min steel required.
Bar size and spacing may be modified to meet demands of the curved channel.

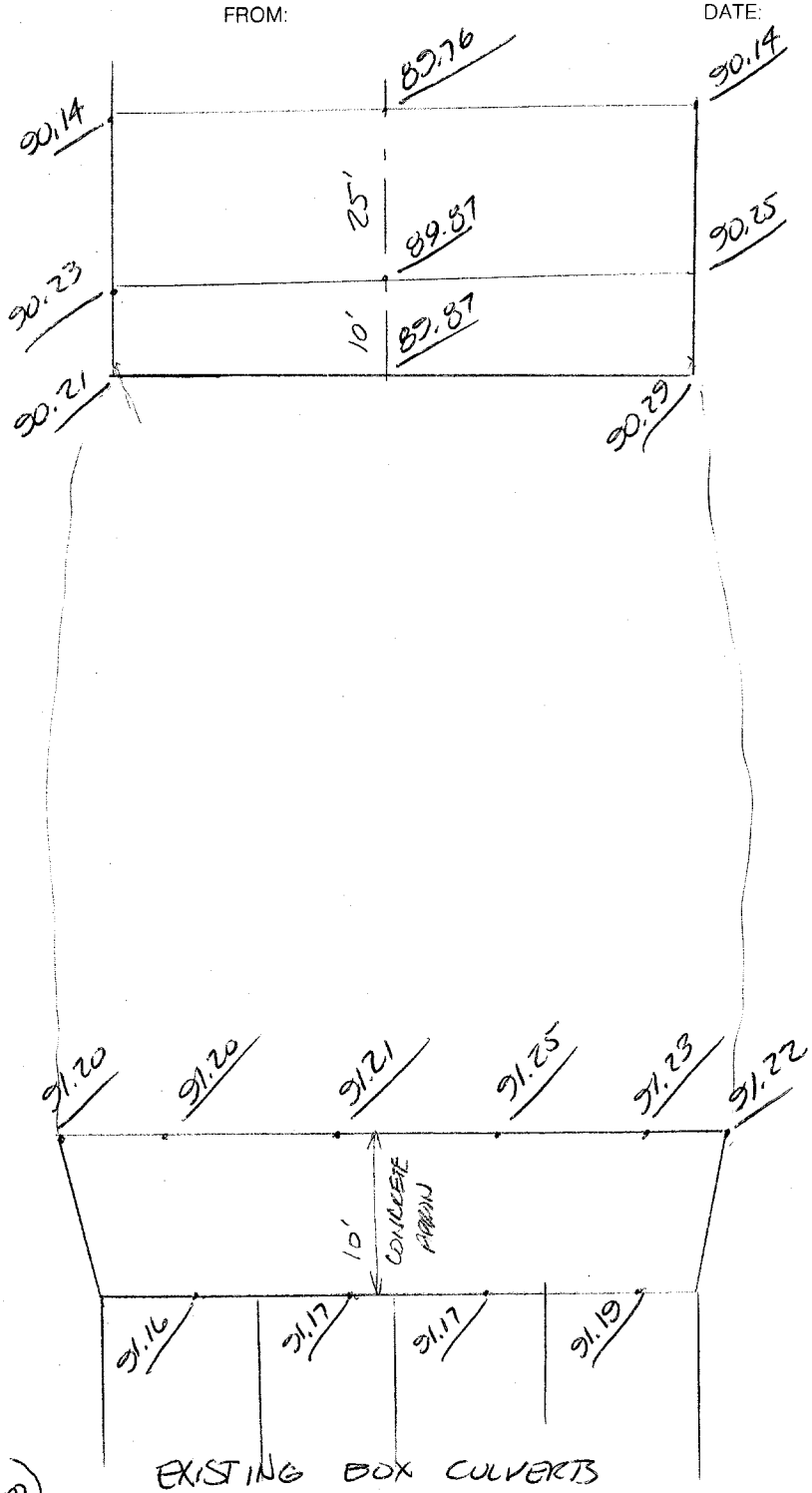
Wall Elevation
Showing main Steel

1/2" = 1'-0

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: GUADALUPE	☐ FILE ☐ DESTROY
	TO: FROM: DATE:	



FLD.
B.C. IN CONCRETE
O 100.17
ON NORTH
SIDE OF ~~BASE~~
CHANNEL

℄ SOSSAMAN and GUADALUPE
BC. IN H.H.
O 100.00 (ASSUMED)

6910-007 3-90

MESSAGE DISPLAY FOR ED RALEIGH

To: CGW
Cc: EAR

From: Ed Raleigh:TALOS
Postmark: 12-18-92 5:10PM
Status: Previously read

Host: TALOS
Delivered: 12-18-92 5:10PM

Subject: Guadalupe Channel

Message:
Phil Epstein's comments are on your chair along with the set of plans he marked. He said he wants to see calculations to check the condition of water in the channel and no passive soil resistance, as it may not develop for small deflections by the wall. Please call him (extension 8625) to clarify whether to assume active soil pressure, as that would seem reasonable.
He also said splices should not be shown for bar lengths less than 60 feet, but Shewa said he wants to leave them shown as the contractor could always propose to eliminate them during shop drawing review. I concur with Shewa, and would like you to talk to him and the Mr. Epstein.
I left four complete sets of the newest drawings for your use.
Merry Christmas.

1-4-93

I talked with Phil Epstein by phone and told him Kumar had done calculations to check the condition of water in the channel with no passive soil resistance. I told him Chuck Wainwright checked the calculation. Mr. Epstein said he did not want me to bring the calculation over for his review.

Ed Raleigh

MESSAGE DISPLAY FOR ED RALEIGH

To: EAR

From: Chuck Wainwright:TALOS
Postmark: 12-22-92 4:05PM
Status: Previously read

Host: TALOS
Delivered: 12-22-92 4:05PM

Subject: Forwarded: Guadalupe Channel

Comments:
KUMAR COVERED THE WATER IN CHANNEL NO BACKFILL ANALYSIS ON SHEET 10 OF HIS CALCULATIONS. HIS CALCS SHOW #4 @ 12 TO BE OK. HE USED #5 @ 12 IN THE PLANS.
THE SPLICES OCCUR AT THE HIGHEST MOMENT POINT IN THE SLAB ACCORDING TO KUMAR'S CALCS, SO IT WOULD PROBABLY BE BEST TO ELIMINATE THE SPLICES.

Previous Comments:
From: Ed Raleigh:TALOS
Date: 12-18-92 5:10PM
Phil Epstein's comments are on your chair along with the set of plans he marked. He said he wants to see calculations to check the condition of water in the channel and no passive soil resistance, as it may not develop for small deflections by the wall. Please call him (extension 8625) to clarify whether to assume active soil pressure, as that would seem reasonable.
He also said splices should not be shown for bar lengths less than 60 feet, but Shewa said he wants to leave them shown as the contractor could always propose to eliminate them during shop drawing review. I concur with Shewa, and would like you to talk to him and the Mr. Epstein.
I left four complete sets of the newest drawings for your use.
Merry Christmas.

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

FLOOD CONTROL DISTRICT RECEIVED DEC 18 1992

CMT. NO.	SUBJECT: Guadalupe Road Channel	☐ FILE ☐ DESTROY

TO: Mr. Phil Epstein

FROM: Ed Raleigh

DATE: 12/17/92

Please review the attached plans and calculations for the Guadalupe Channel wall section. The wall and reinforcing details were all done in-house. If you have any questions, please call me or Kumar Hannumaiah. 506-1501.

Thanks

ED,

Design appears O.K., except should specify AASHTO Bridge Specs. and base slab be checked for condition of water in channel. (Page 10 of calc #5 @ 12 ok cay)

Other comments in red on plans.

Philip Epstein

6900-003
11/78

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Interoffice Memorandum

Subject: Sossaman Road Box Culvert Project - Summary of decisions which led to the choice of alignment File:

To: File From: Scott Clement Date: 11/23/92

Via: John Rodriguez

In October of 1991, the District received a Phase I report for this project from Wells Engineering. The purpose of this report was to investigate the conveyance capacity, hydraulics, constructability and economics of either modifying the existing box culvert or constructing a new structure. The report submitted by Wells recommended construction of a new box culvert on an alignment located to the north of the existing box culvert.

The Wells report identified advantages as:

1. Construction of a new culvert away from the intersection will eliminate conflicts for any future intersection widening improvements.

2. The proposed new alignment should reduce maintenance by decreasing sedimentation that occurs in the existing culvert.

This recommendation was founded on the assumption that the City of Mesa, a cost sharing partner in this project would be agreeable to increase their participation to remove the existing box culvert from the intersection.

Upon further review by the District, it was determined that the existing box culvert could be further modified to reduce sedimentation by the addition of inlet vanes and other modifications to allow for a future intersection improvement at a minor increase in cost. It was then concluded that the difference in cost for a new box culvert exceeds the existing box culvert modifications cost by an estimated $159,000.

In addition, the new alignment would need to provide an inlet for drainage entering the Sossaman Channel from the east along the Guadalupe Road alignment and require the acquisition of more rights-of-way. This additional cost would further increase the cost differential.

Since the District had an IGA (89005) with the City of Mesa for modifications to the existing box culvert which capped Mesa's participation at $125,000, a meeting was held to ascertain Mesa's interest in a new box culvert along with additional cost participation above $125,000 for this project. Mesa submitted a letter dated November 20, 1991, concurring with proceeding with the construction of the modification to the existing box culvert and maximizing their participation at $125,000.

Considering Mesa's position, and with the reduction in the District's budget funding this fiscal year, the obvious management decision was to proceed with the modification to the existing box culvert.

/jnk

10/92

SUMMARY - SOSSAMAN BOX PHASE ONE REPORT ANALYSIS
AND RECOMMENDATION AND
FCD STAFF RECOMMENDATION

BACKGROUND

In 1989 IGA 89005, was signed by FCD and Mesa. The IGA states that Mesa proposes the culvert at Sossaman Road be modified to accommodate a future road width of 107 feet plus two eight foot sidewalks. The IGA estimates this cost to be $125,000.

In a letter dated 10/11/90, to Mesa, the District queried as to Mesa's interest in participating in the construction of a new culvert to replace the existing Sossaman Box.

Mesa's response dated 12/10/90, Mesa indicated that they will not consider picking up costs for a new culvert above $125,000.

Wells Engineering was contracted to prepare a report (Phase One) analyzing the cost and hydraulics of two alternatives for the Sossaman Road Box. The first alternative was to consist of the modification of the existing box culvert at Sossaman and Guadalupe Roads. The second alternative was to consist of demolishing the existing box and constructing a new box culvert north of the existing culvert. Both alternatives were required to convey 2400 cfs. Also, both alternatives were to accommodate a road section of 107 feet plus two eight foot sidewalks.
The report was to investigate the economics, hydraulic conveyance capacity, and constructability of each alternative.

The second phase of the design is to prepare final plans and special provisions for the construction of the selected alternative.

REPORT ANALYSIS AND CONCLUSIONS

Phase one of the project is now complete. Wells has delivered the report to the District and District staff has reviewed the report. Wells found the existing Sossaman Box will convey 2100 cfs.

In the report Wells submitted not two alternatives, but three alternatives. Staff has determined that all three alternatives meet the required criteria. The alternatives submitted were as follows:

Alternative 1 - modification of the existing box culvert, estimated cost of $287,044
Alternative 2 - construction of a new box culvert, estimated cost of $425,742
Alternative 3 - modification of existing box with curved entrance, estimated cost $266,787

Wells engineering recommended that Alternative 2 be constructed for two reasons. First, the culvert would not be in the intersection and therefore would not cause conflicts with future modifications. Second, the new box culvert, having the most efficient alignment will reduce sediment deposition thereby reducing maintenance costs.

STAFF ANALYSIS AND CONCLUSIONS

The Engineering Division reviewed the report and came to the following conclusions:

Engineering noted that the cost estimates were reasonable with the exception of the removal of the existing box culvert in Alternative 2. Wells Engineering listed the removal of the existing improvements at a cost of $91,000. After discussion with MCHD, Engineering believes that a cost of $64,000 is more reasonable. This reduces the cost of Alternative 2 from $425,742. to $395,048.

Engineering recommends that Alternative 3 be constructed. The hydraulic benefits, possible alleviation of future conflicts and reduced maintenance costs do not overcome the high cost of Alternative 2.

The PPM Division has reviewed the report and noted the following:

If Alternative 3 is constructed the City of Mesa is obligated to pay for the modification of the culvert. The IGA, 89005, states the estimated cost to be $125,000. The IGA does not address costs associated with lack of conveyance capacity, these costs will most likely be borne by the District.

Analysis of the costs associated with the additional culvert turns up a figure of $58,500. Subtracting this from the total estimate leaves Mesa with a cost responsibility of $208,287.

Recommend that we notify Mesa of the revised estimates. If Mesa concurs to pay for the modification of the culvert FCD would then direct Wells to go forward with Phase II of the design contract. If Mesa does not concur to pay for the additional cost of modification of the existing culvert we have two options:

1. Construct the additional barrel at an estimated cost of $58,000.
2. Increase the storage capacity of the proposed Sossaman Basin north of the Superstition Freeway from 28 acre-feet to approximately 64 acre-feet. (Preliminary analysis indicates that this will reduce the peak flow at the existing Sossaman Box to 2100 cfs) This would involve the removal of an additional 58,000 cubic yards of material.

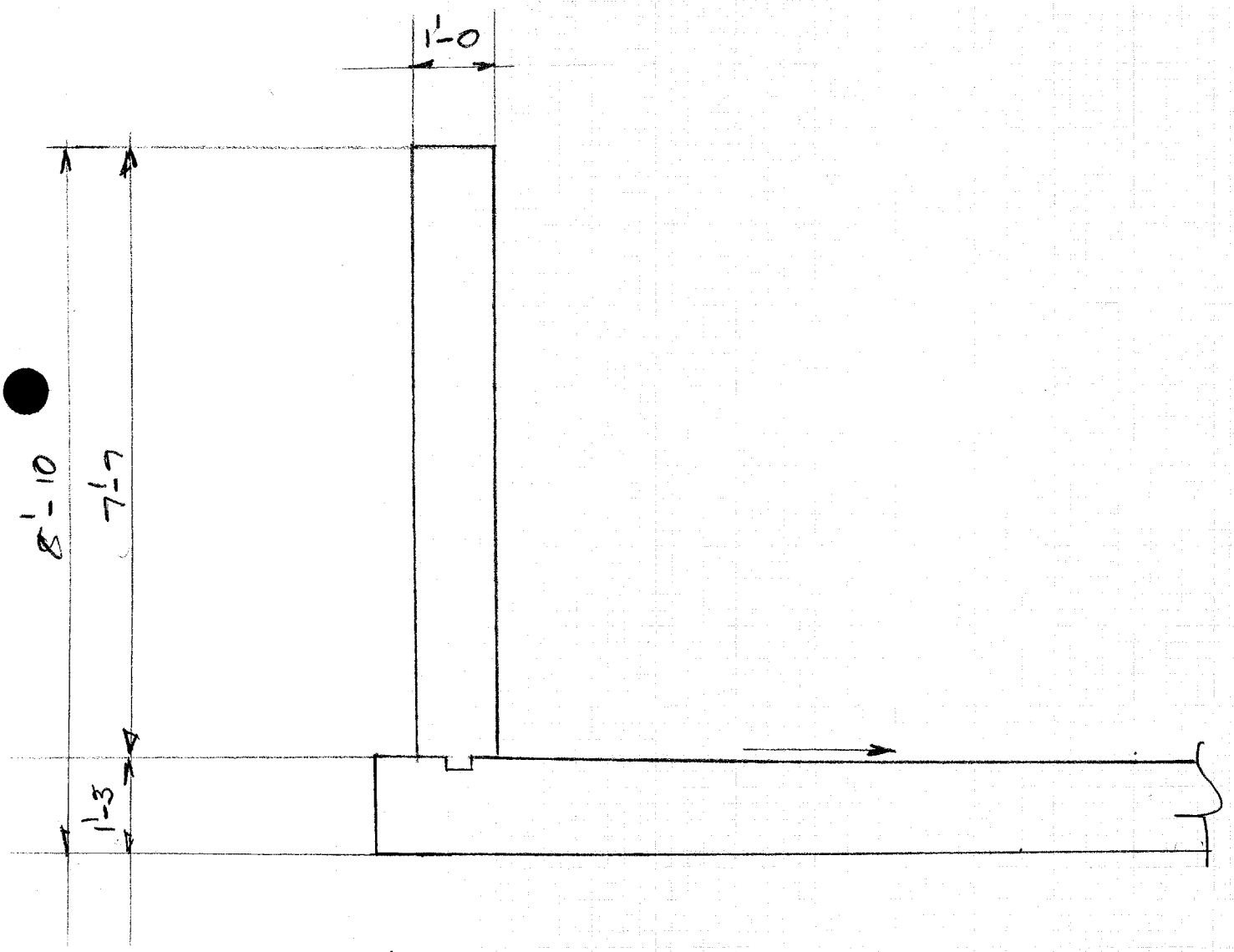
Recommend, if Mesa does not concur to pay for modification of the existing culvert, the District construct the additional barrel.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Wall Detail COMPUTED KMH DATE 9/92

CHECKED BY CCW DATE 12/92



Typical Section

1/2" = 1'-0

(B)

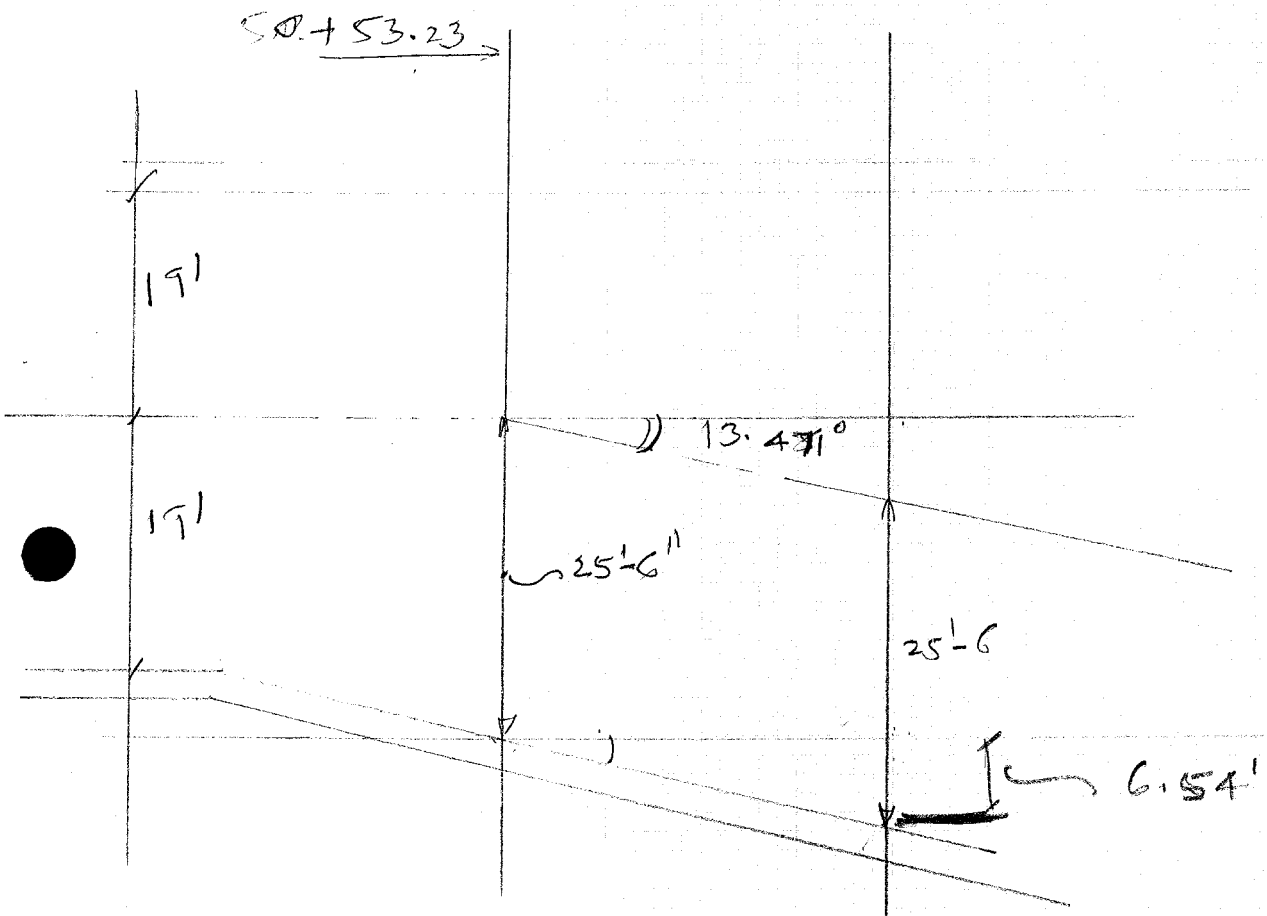
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe PAGE ____ OF ____

DETAIL off Sets COMPUTED KVH DATE 9/92

CHECKED BY CWW DATE 12/92

Stat 50+53.23 To 50+80.52



80.52
53.23
27.29

$\tan 13.47 = \frac{x}{27.29}$ $x = 6.54'$

6'-6½"

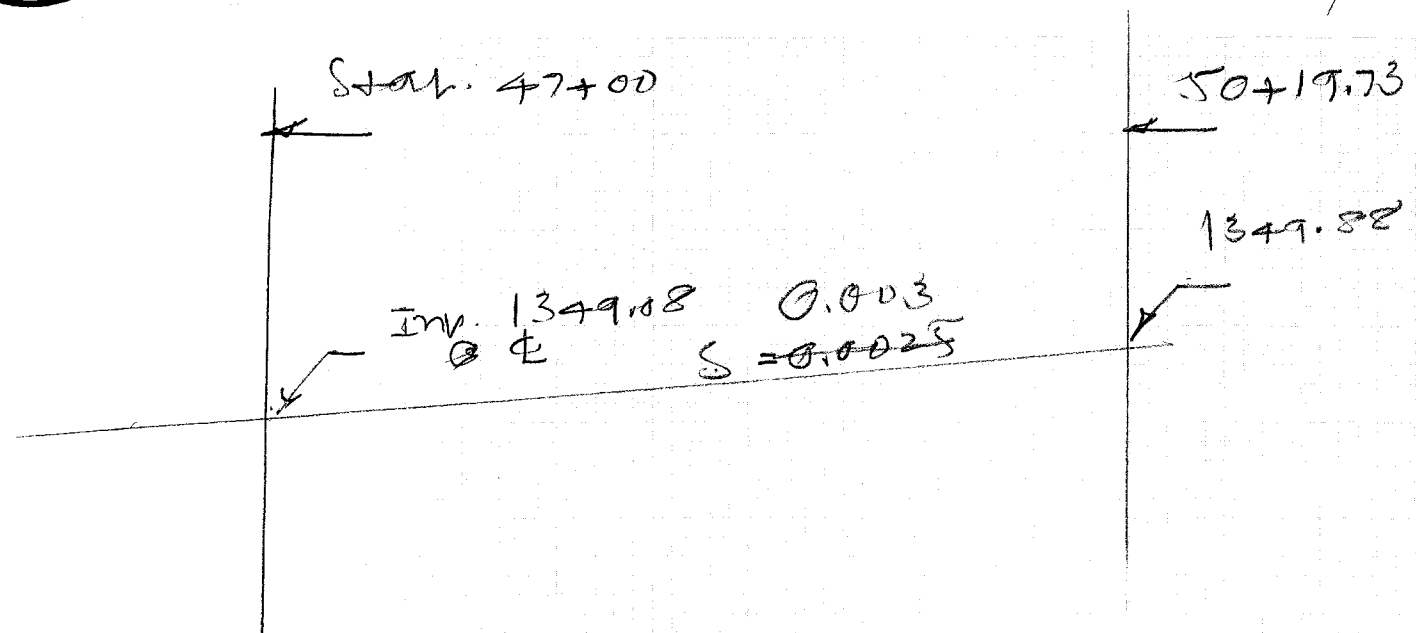
(D)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Check Elevations COMPUTED KVH DATE 9/92

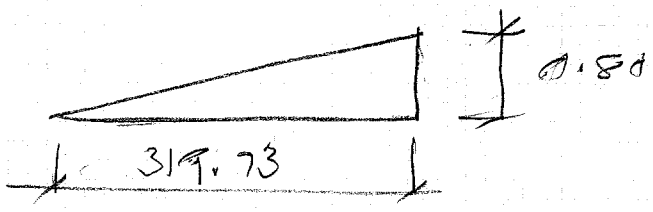
CHECKED BY CGW DATE 12/92



@ Stat 48+25

$L_1 = 125$

$\left(\frac{125}{319.73} \times 0.80\right) = 0.31$



1349.08
0.31
1349.39

319.73 – 0.80'

Per ft = $\frac{0.80}{319.73}$

= 0.0025

Say 0.003

Still OK

@ Stat. 48+55.83

$L = 155.83$

$\frac{155.83}{319.73} \times 0.80 = 0.39$

1349.08
1349.47

@ Stat. 49+00

$\frac{200}{319.73} \times 0.80 = 0.50$

1349.08
1349.58

(A)

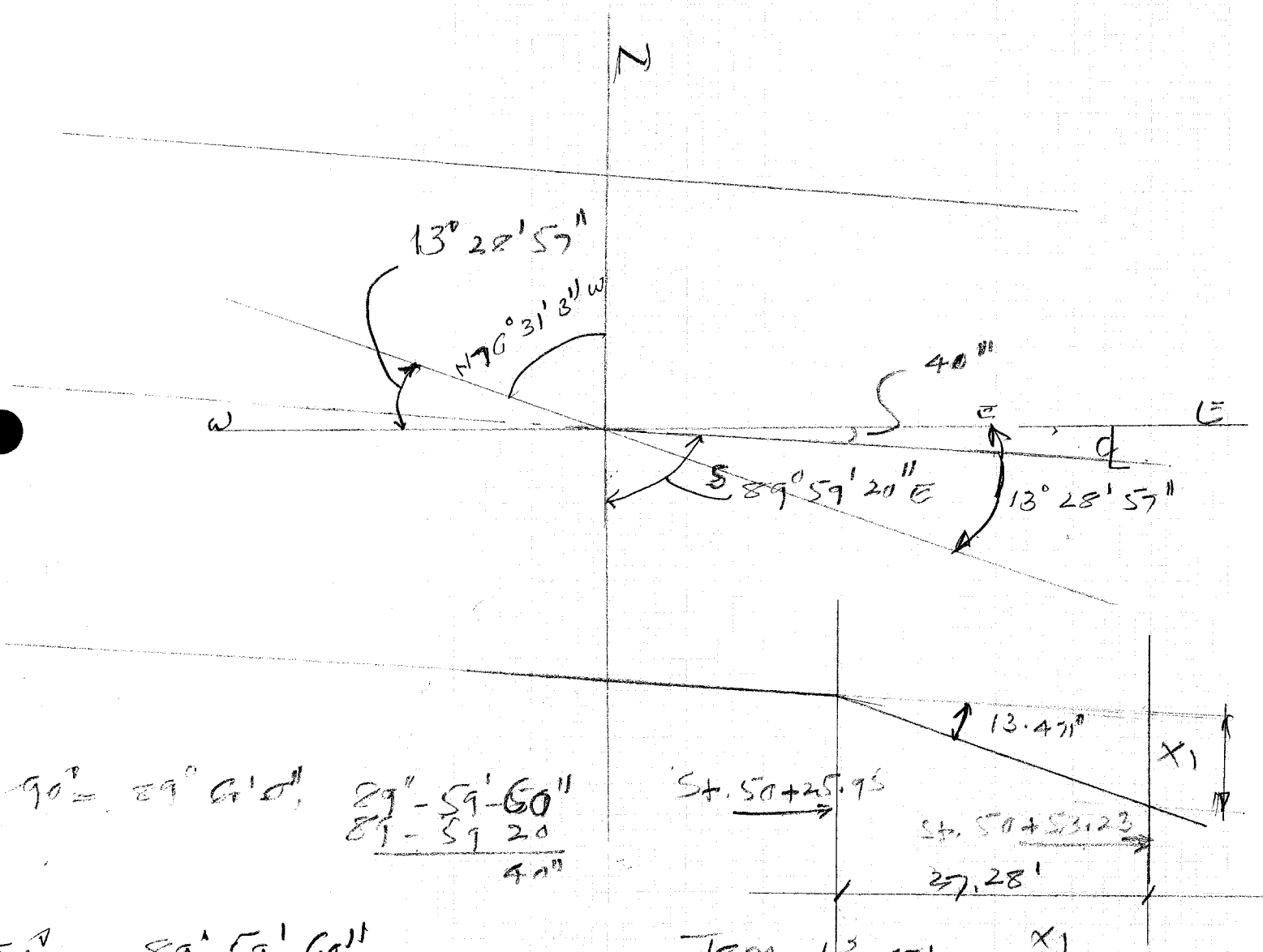
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Gerard Lupo Channel PAGE ____ OF ____

DETAIL Off Sewer COMPUTED KVH DATE 9/92

CHECKED BY LLW DATE 12/92

Stat 50 + 25.95 To Stat. 50 + 53.23



90° = 89° 60' 0"

89° - 59' - 60"
89 - 59 20
40"

To° — 89° 59' 60"
76 31' 3
13° 28' 57"
— 40"
13° 28' 17" = 13.471°

Tan 13.471 = $\frac{X_1}{27.28}$

X_1 = 6.5347'
= 6' - 6½"

19' - 0
6' - 6½
25' - 6½"

Varies from 19' to 25' - 6½"

(A)

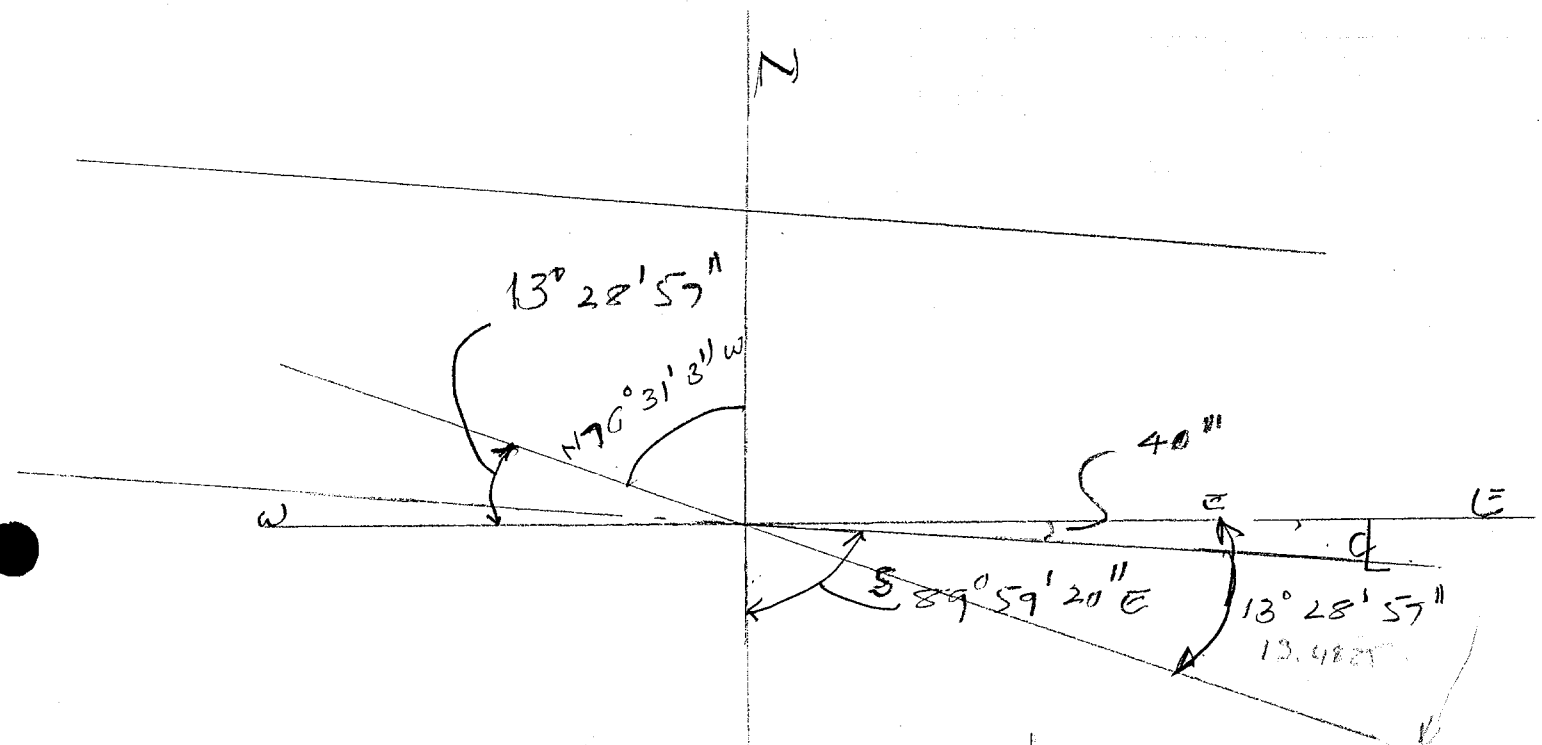
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

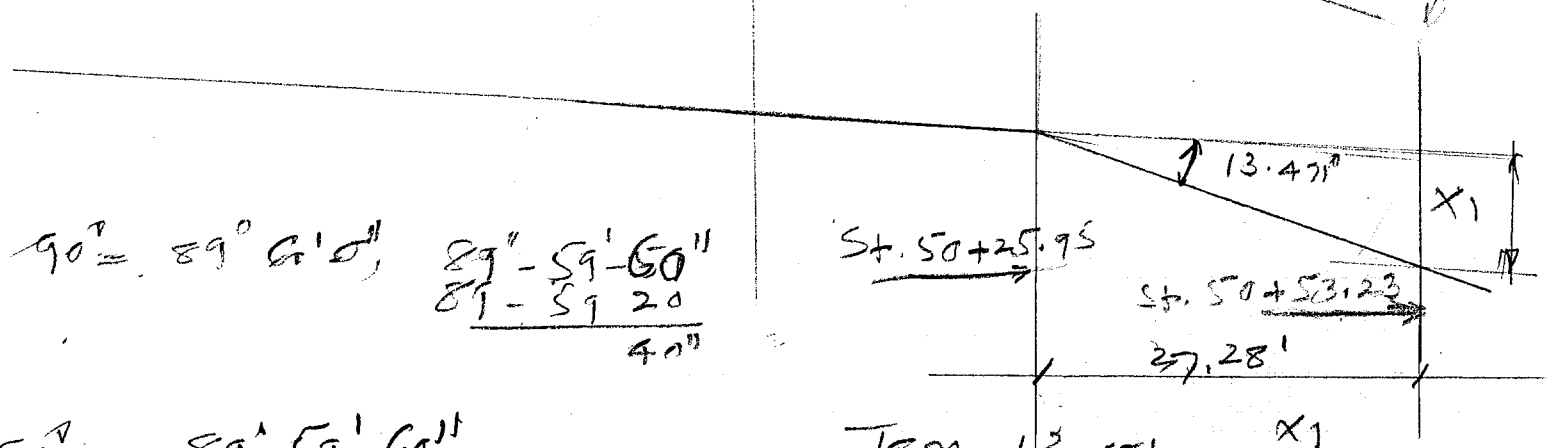
PROJECT Gila Floodway Channel PAGE ____ OF ____

DETAIL Offsets COMPUTED KNH DATE 9/92

CHECKED BY CWW DATE 12/92

Sta. 50 + 25.95 To Sta. 50 + 53.23





90° = 89° 60' 0"

89° - 59' - 60"
89 - 59 20
40"

90° — 89° 59' 60"
76 31' 3
13° 28' 57"
— 40"
13° 28' 17" = 13.471°

Tan 13.471 = $\frac{X_1}{27.28}$

X_1 = 6.5347'
= 6' - 6½"

19' - 0
6' - 6½
25' - 6½

Varies from 19' to 25' - 6½"

24' - 10"

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Rd. Channel PAGE ____ OF ____

DETAIL Amenities Chk COMPUTED KVH DATE 10/92

CHECKED BY CWG DATE 12/92

24 - 10
24 - 10
1 - 8
49'-8"
= 49.67

Cos 13.5 = 49.67 / Hyp

Hyp = 51.08 = 51'-1"

Box

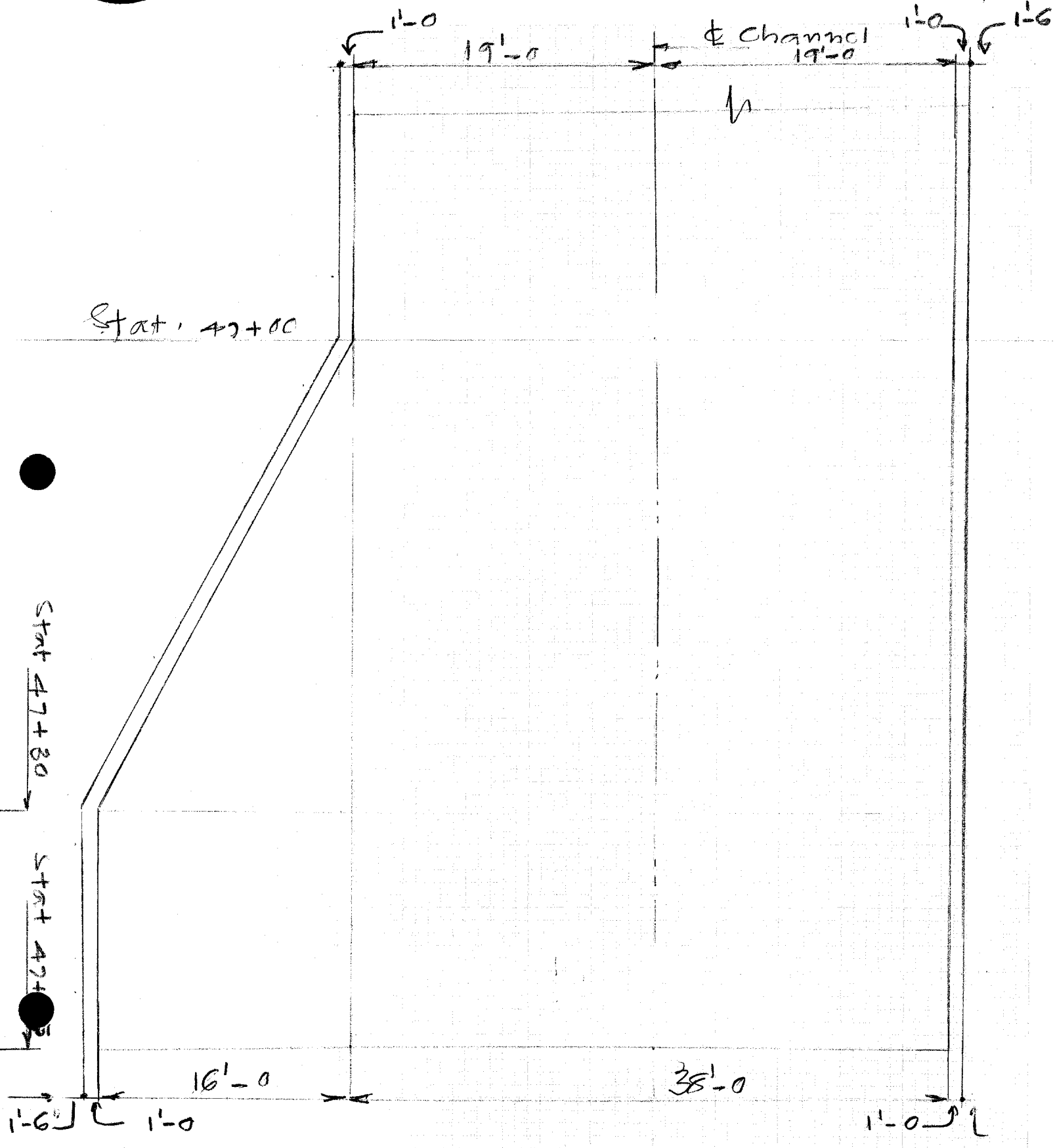
10' × 4 = 40'
4 × 11" = 44" = 3'-8"
49'-8" Checks ok

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Barge Slab COMPUTED KVH DATE 9/92

CHECKED BY Cwd DATE 1/93

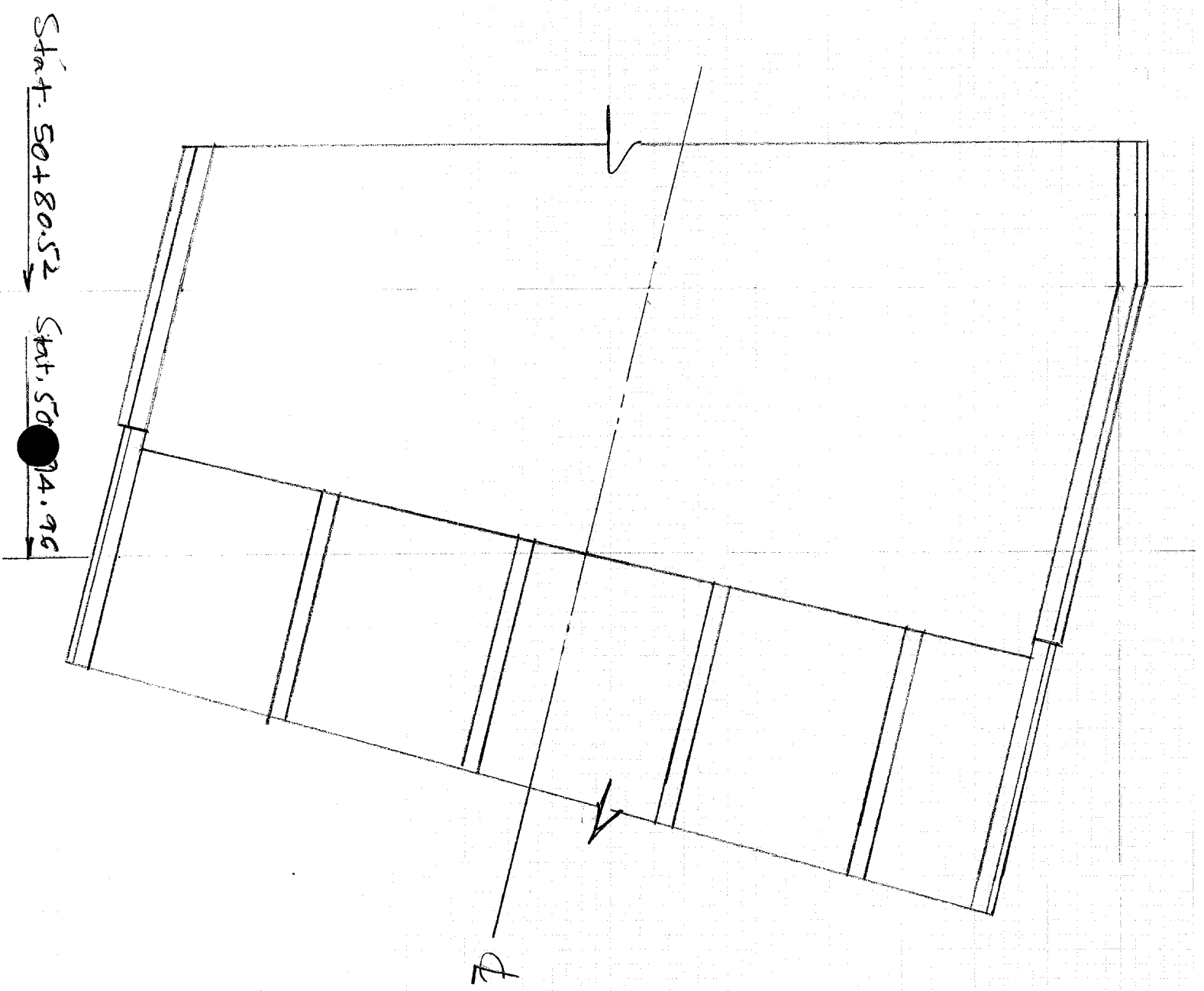


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 12/92

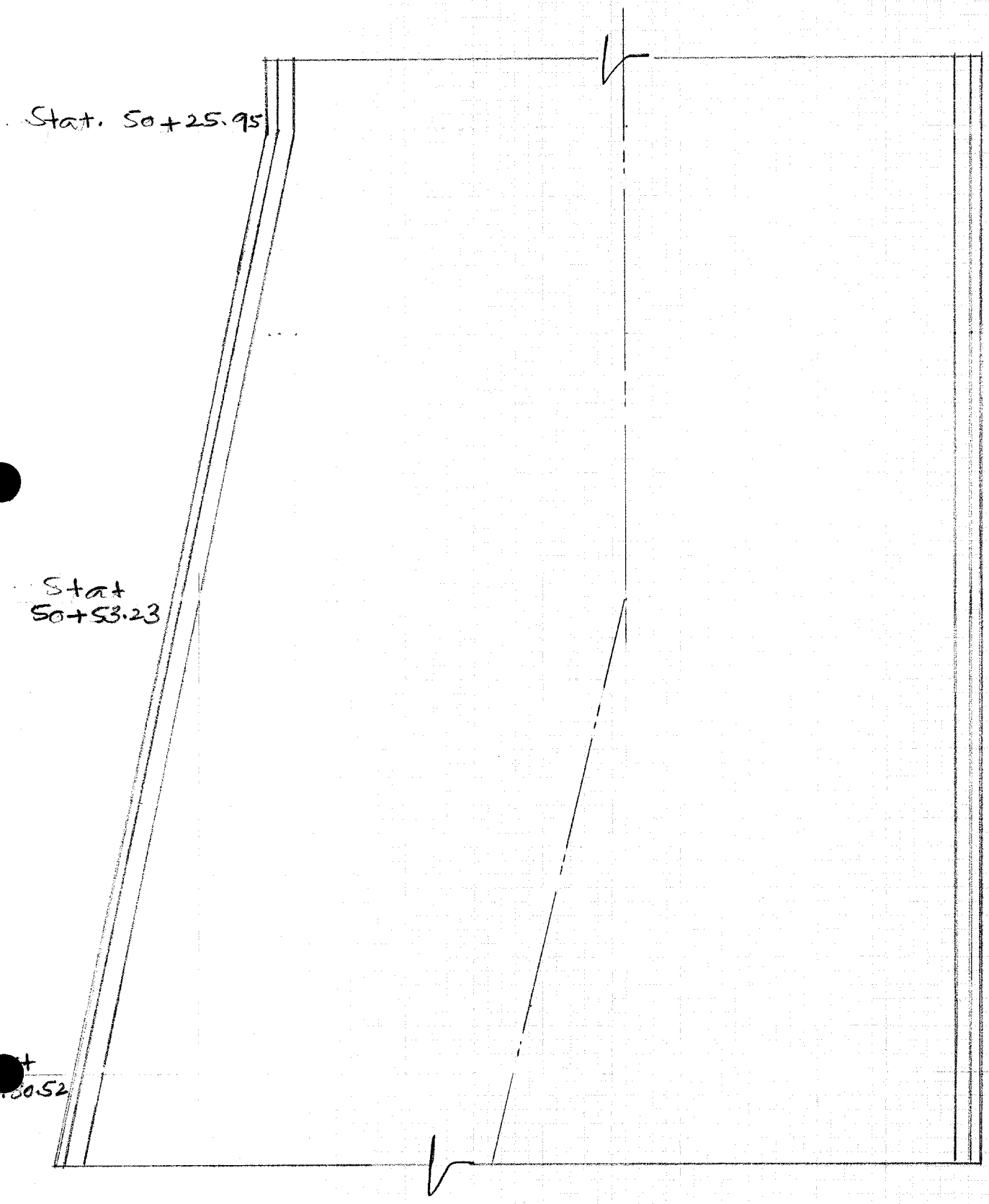


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 4 Jan

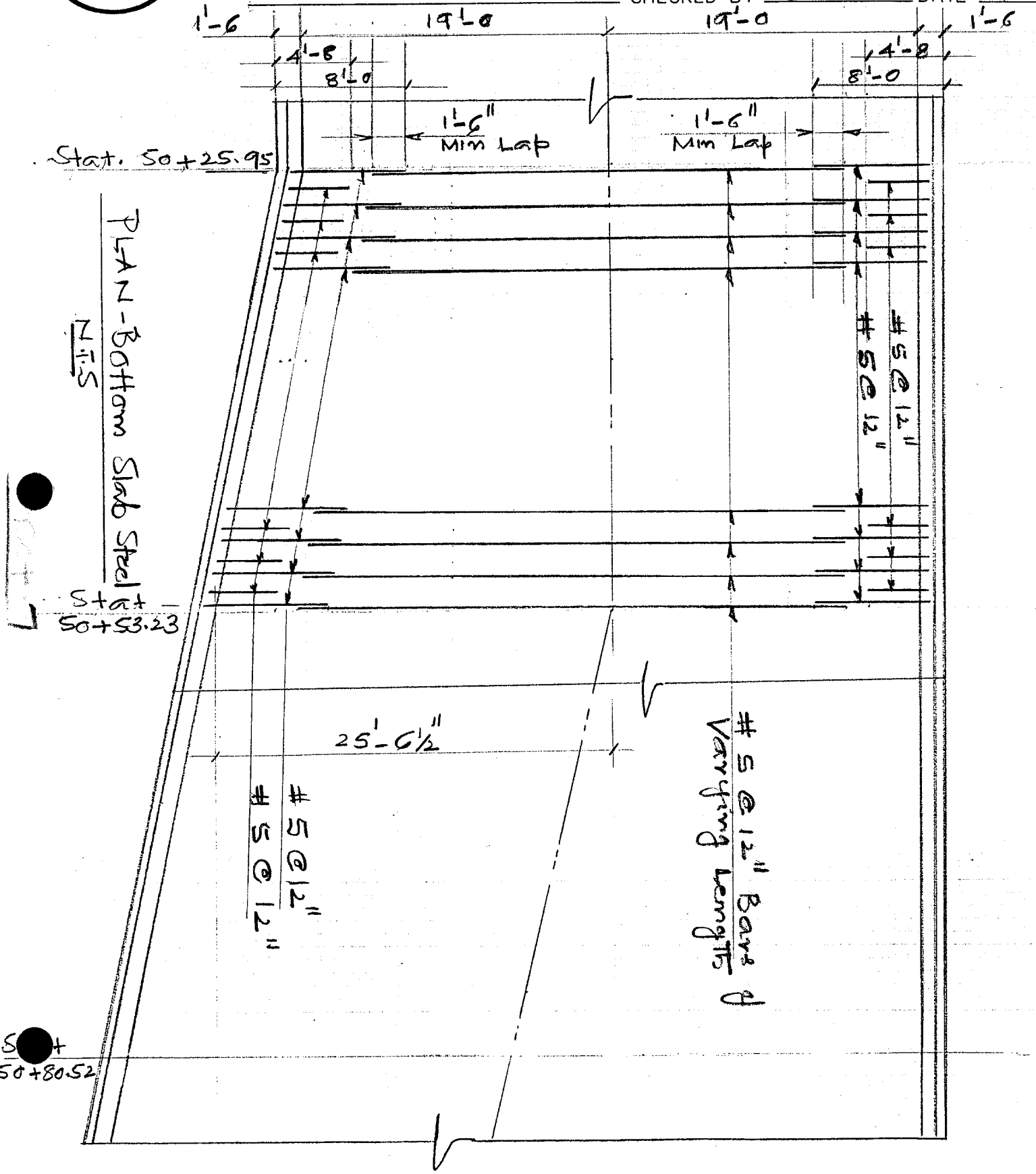


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY ____ DATE ____

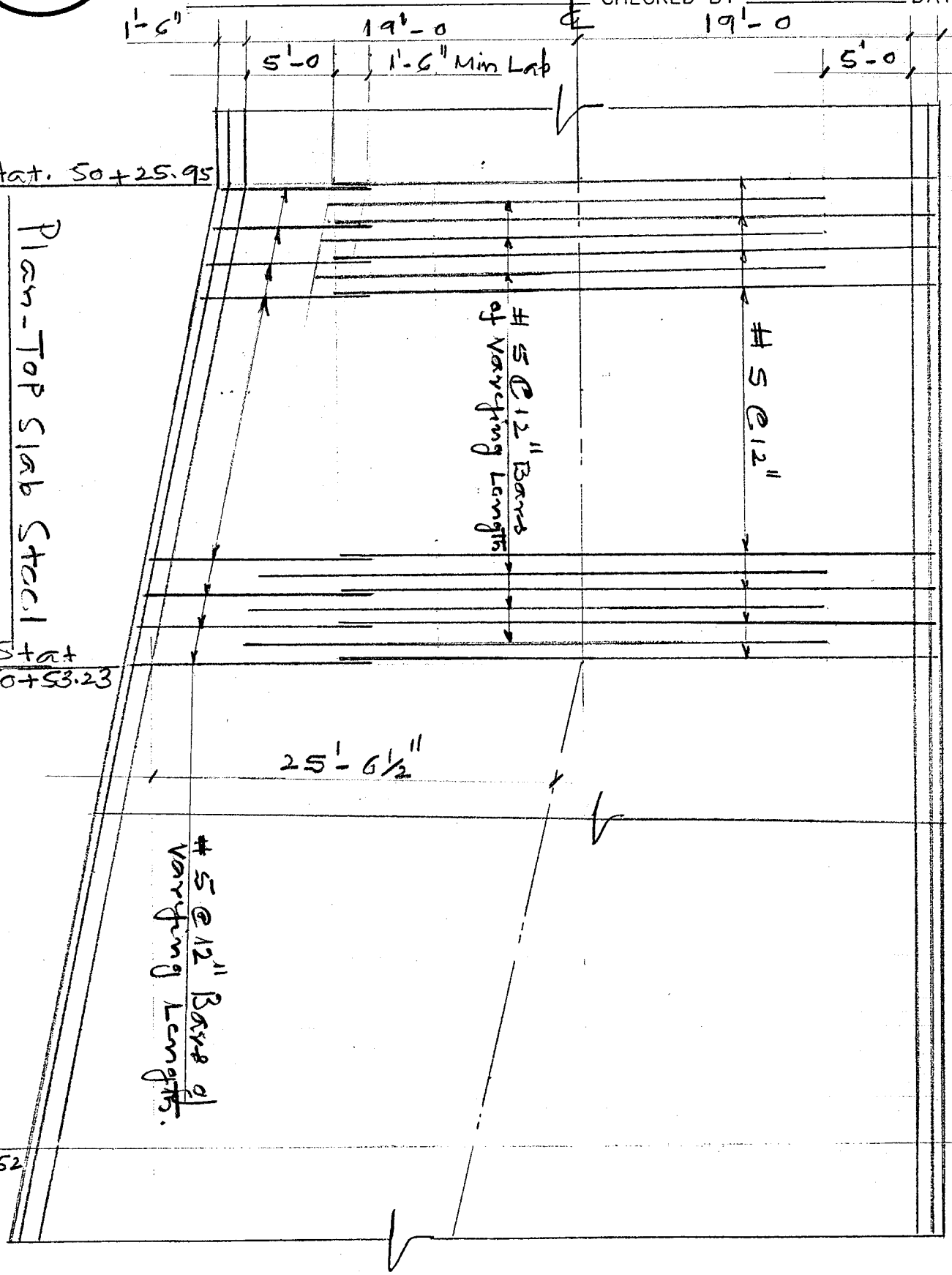


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY LCM DATE 11/9/92

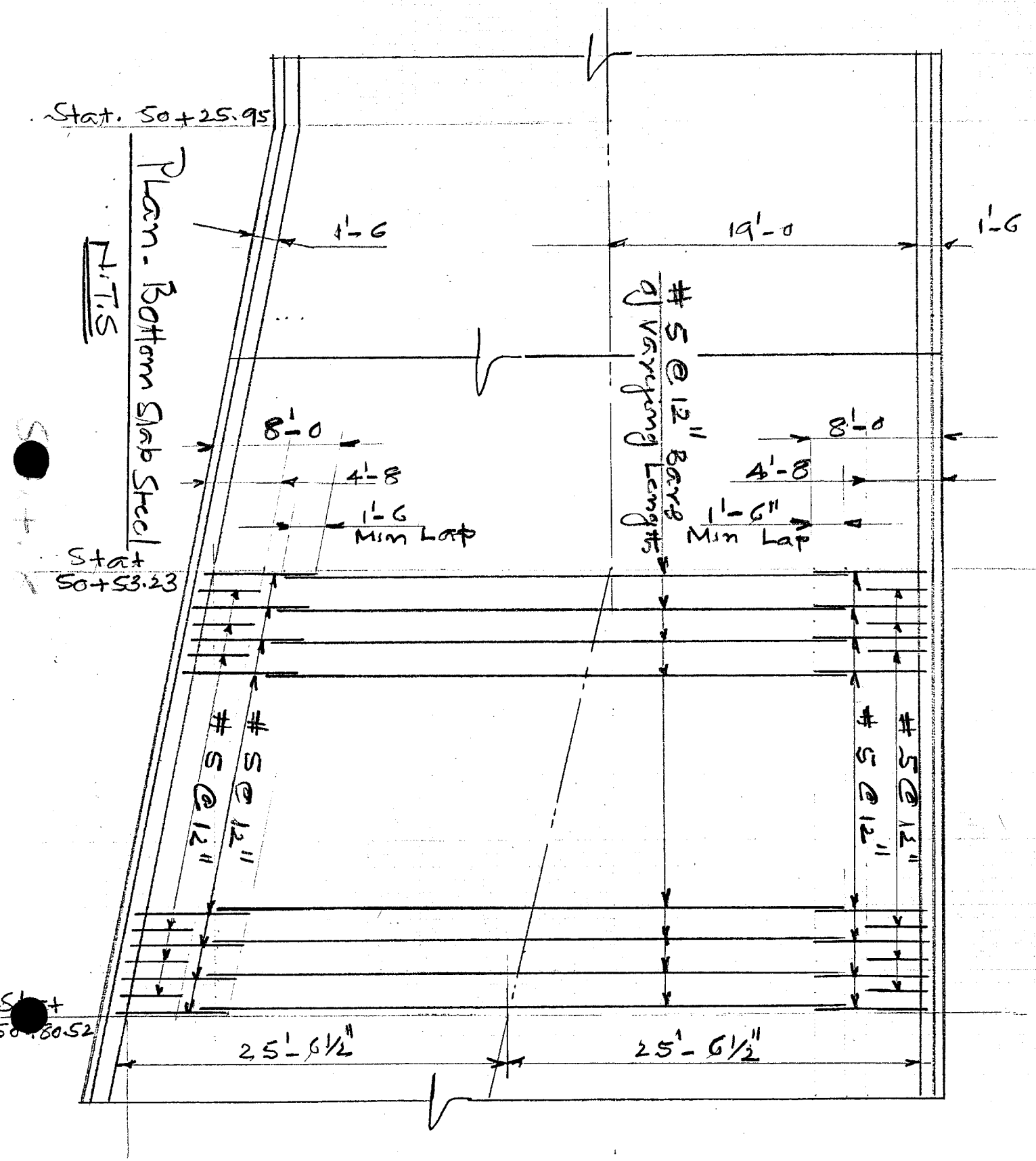


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 21 OF

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY CWW DATE 11/92

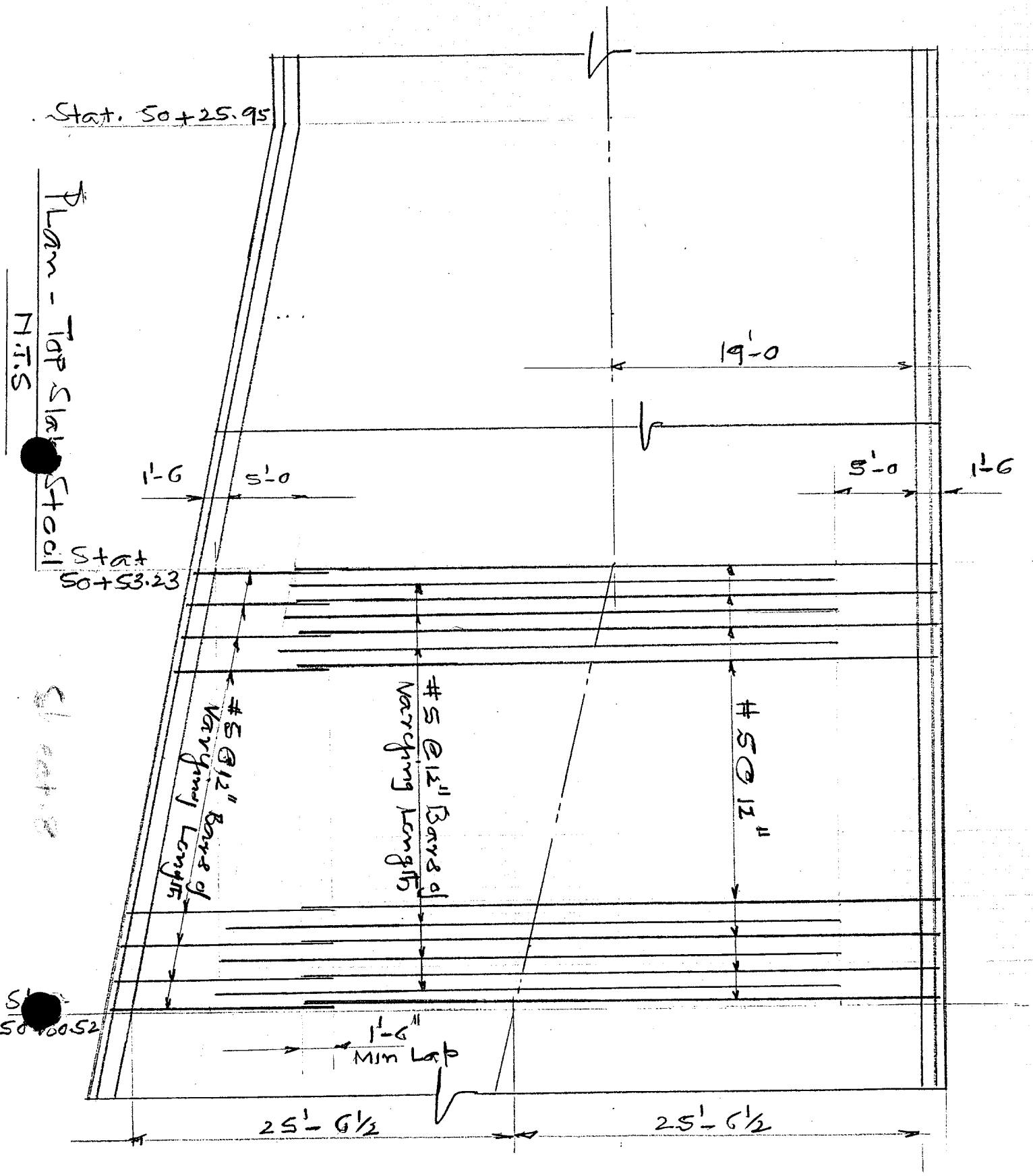


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 22 OF

DETAIL Base Slab COMPUTED KVH DATE 10/92

CHECKED BY [illegible] DATE [illegible]



MESSAGE SCAN FOR EDGAR MORENO

Hanumaiah, Kumar V
To Wainwright, Chuck
To Moreno, Edgar O.

From: Edgar Moreno
Postmark: Nov 23,92 9:55 AM Delivered: Nov 23,92 9:55 AM
Status: Certified Previously read
Subject: SOSSAMAN BOX CULVERT

Comments:
FYI Work Update : shear check is ok!

----------X----------

SOSSAMAN BOX CULVERT DESIGN (shear check)
BARREL SIZE 10X6
EDGAR O. MORENO (Work Update)

F I E L D D A T A

HEIGHT OF FILL OVER CULVERT,FT	2.000
SOIL UNIT WEIGHT, PCF	120.000
LATERAL SOIL PRESSURE COEFFICIENT	.325

D E S I G N C R I T E R I A AASHTO

DEAD LOAD FACTOR - MOMENT AND SHEAR	1.300
DEAD LOAD FACTOR - THRUST	.650
LIVE LOAD FACTOR - MOMENT AND SHEAR	2.170
LIVE LOAD FACTOR - THRUST	1.090
STRENGTH REDUCTION FACTOR-FLEXURE	.900
STRENGTH REDUCTION FACTOR-DIAGONAL TENSION	.850
LIVE LOAD TYPE	HS-20
DIRECTION OF TRAFFIC	TRANSVERSE
VERTICAL SURCHARGE PRESSURE, PSF	.0
LATERAL SURCHARGE PRESSURE, PSF	78.0

M A T E R I A L P R O P E R T I E S

MINIMUM SPECIFIED REINFORCING YIELD STRENGTH, KSI	60.000
CONCRETE - SPECIFIED COMPRESSIVE STRENGTH, KSI	4.000

B A R R E L G E O M E T R Y

TOP SLAB THICKNESS, INCHES				10.500
SIDE WALL THICKNESS, INCHES				11.000
BOTTOM SLAB THICKNESS, INCHES				12.500
HORIZONTAL HAUNCH DIMENSION, INCHES	TOP	6.000	BOTTOM	.000
VERTICAL HAUNCH DIMENSION, INCHES	TOP	6.000	BOTTOM	.000

CONCRETE CLEAR COVER OVER STEEL, INCHES

TOP SLAB - OUTSIDE FACE	2.000
SIDE WALL - OUTSIDE FACE	2.000
BOTTOM SLAB - OUTSIDE FACE	3.000
TOP SLAB - INSIDE FACE	1.000
SIDE WALL - INSIDE FACE	1.500
BOTTOM SLAB - INSIDE FACE	2.000

G O V E R N I N G C O N D I T I O N

AN NON OVERLOADED AASHTO HS-20 TRUCK CENTERED IN 4- 12FT WIDE LANES

ULTIMATE LOAD FORCES AASHTO

SECTION	MAX M+ (IN.-K/FT)	MAX V+ (K/FT)	MAX P+ (K/FT)	MAX M- (IN.-K/FT)	MAX V- (K/FT)	MAX P- (K/FT)
1	138.23	1.72	-.49	.00	-1.72	-.72
2	.00	7.13	-.20	-72.84	.00	-.71
3	.00	7.37	-1.29	-106.54	.00	-.72
4	.00	.00	-1.71	-125.40	-2.93	-3.64
5	.00	.00	-1.71	-119.29	-2.51	-3.64
6	5.00	.15	-1.71	-100.89	-.74	-3.83
7	.00	2.79	-1.71	-92.62	-.54	-4.19
8	.00	2.79	-1.71	-92.62	-.54	-4.19
9	.00	.00	-.28	-59.16	-7.90	-.59
10	.00	.00	-.28	-59.16	-7.90	-.59
11	160.14	.55	.01	.00	-.55	-1.16
12	15.90	6.51	-.65	-39.36	.00	-.72
13	15.90	6.51	-.65	-39.36	.00	-.72
14	.00	.00	-1.71	-113.89	-2.00	-3.45
15	.00	.00	-1.71	-113.89	-2.00	-3.45
16	.00	2.27	-1.71	-88.90	-.54	-3.45
17	.00	2.27	-1.71	-88.90	-.54	-3.45
18	15.50	.00	-.66	-20.63	-6.61	-.59
19	15.50	.00	-.66	-20.63	-6.61	-.59
20	.00	7.59	-.61	-141.08	.00	-.72
21	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.00
23	.00	8.85	-.59	-105.20	.00	-.98

FLEXURE DESIGN TABLE PER AASHTO 17.4.6.1

DES. SEC.	WALL, SIGN OF MOMENT	DEPTH TO STEEL (IN)	ULT. MOMENT (IN-K/FT)	ULT. THRUST (K/FT)	FLEX. REINF. ULT.(1) (SQ.IN/FT)	FLEX. REINF. MIN.(2) (SQ.IN/FT)	CRACK INDEX	GOV. STEEL (3) (SQ.IN/FT)	GOV. MODE (4)
1	TOP-NEG	8.06	.0	.7	.000	.252	.0	.252	MIN STL
2	TOP-NEG	8.06	72.8	.7	.162	.252	.0	.252	MIN STL
3	TOP-NEG	14.06	106.5	.7	.134	.252	.0	.252	MIN STL
4	SIDE-NEG	14.69	125.4	3.6	.121	.264	.0	.264	MIN STL
5	SIDE-NEG	8.69	119.3	3.6	.219	.264	.0	.264	MIN STL
6	SIDE-NEG	8.69	100.9	3.8	.176	.264	.0	.264	MIN STL
7	SIDE-NEG	8.69	92.6	4.2	.153	.264	.0	.264	MIN STL
8	SIDE-NEG	8.69	92.6	4.2	.153	.264	.0	.264	MIN STL
9	BOTTOM-NEG	9.19	59.2	.6	.113	.300	.0	.300	MIN STL
10	BOTTOM-NEG	9.19	59.2	.6	.113	.300	.0	.300	MIN STL
11	BOTTOM-NEG	9.19	.0	1.2	.000	.300	.0	.300	MIN STL

1	TOP-POS	9.13	138.2	.5	.283	.252	.0	.283	FLEXURE
6	SIDE-POS	9.25	5.0	1.7	.000	.264	.0	.264	MIN STL
	BOTTOM-POS	10.13	160.1	-.0	.300	.300	.0	.300	FLEXURE

NOTES:
1. REQUIRED REINFORCING TO DEVELOP ULTIMATE FLEXURAL STRENGTH.
2. MINIMUM FLEXURAL REINFORCING ALLOWED.
3. REINFORCING REQUIRED TO MEET ALL DESIGN CRITERIA. THE GOVERNING CRITERIA IS INDICATED UNDER THE COLUMN "GOVERNING MODE".
4. IF GOVERNING MODE IS LISTED AS CRACK, THE REINFORCING MAY BE REDUCED BY DECREASING THE MAXIMUM REINFORCING SPACING.

SHEAR DESIGN Vc=2*PHI*SQR(F'c)bd PER AASHTO 8.16.6.2.1

LOCATION	ULTIMATE SHEAR (K/FT)	ALLOWABLE SHEAR (K/FT)	DIAGONAL TENSION INDEX	DEPTH TO STEEL (IN.)	STIRRUPS REQD?
12	6.5	10.4	.63	8.06	NO
13	6.5	10.4	.63	8.06	NO
14	2.0	11.2	.18	8.69	NO
15	2.0	11.2	.18	8.69	NO
16	2.3	11.2	.20	8.69	NO
17	2.3	11.2	.20	8.69	NO
18	6.6	11.9	.56	9.19	NO
19	6.6	11.9	.56	9.19	NO

SHEAR DESIGN PER AASHTO 17.4.6.4.5.

DESIGN SECTION	12	13	14	15
M/(V*PHI*D)	1.492	1.210	3.430	6.442
ULTIMATE SHEAR (KIPS/FT)	6.508	6.508	2.000	2.000

ULTIMATE THRUST (KIPS/FT)	.710	.717	3.638	3.638
STEEL RATIO	.002605	.001690	.001702	.002878
DEPTH TO STEEL (IN.)	8.063	14.063	14.688	8.688
DISTANCE FROM A-END, (IN.)	18.353	18.353	64.866	64.866
THRUST FACTOR (FN)	.984	.984	.834	.814
DIAGONAL TENSION STRENGTH, (KIPS/FT)	11.090	18.800	12.728	8.973
ULTIMATE SHEAR/ ALLOWABLE SHEAR	.587	.346	.157	.223
NEW STEEL AREA DUE TO DIAGONAL TENSION (SQ.IN./FT)	.000	.000	.000	.000
DESIGN SECTION	16	17	18	19
M/(V*PHI*D)	4.499	4.499	.959	.959
ULTIMATE SHEAR (KIPS/FT)	2.265	2.265	6.606	6.606
ULTIMATE THRUST (KIPS/FT)	4.194	4.194	.592	.592
STEEL RATIO	.002878	.002878	.002999	.002721
DEPTH TO STEEL (IN.)	8.688	8.688	9.188	9.188
DISTANCE FROM A-END, (IN.)	13.634	13.634	117.691	117.691
THRUST FACTOR (FN)	.809	.809	.988	.988
DIAGONAL TENSION STRENGTH, (KIPS/FT)	9.028	9.028	15.872	15.656
ULTIMATE SHEAR/ ALLOWABLE SHEAR	.251	.251	.416	.422
NEW STEEL AREA DUE TO DIAGONAL TENSION NN(SQ.IN./FT)	.000	.000	.000	.000

SOSSAMAN BOX CULVERT DESIGN SUMMARY

R E I N F O R C I N G S T E E L

LOCATION	AREA SQ. IN. PER FT	STIRRUPS REQUIRED?	BAR SIZE	SPACING IN.
TRANSVERSE				
SIDE WALL - OUTSIDE FACE (hh)	.264	NO	#5	6.
TOP SLAB - INSIDE FACE (ee,dd)	.283	NO	#5,#6	12.
BOTTOM SLAB - INSIDE FACE (ee,dd)	.300	NO	#5,#6	12.
SIDE WALL - INSIDE FACE (aa)	.264	NO	#5	12.
TOP SLAB - OUTSIDE FACE (ff)	.252	NO	#6	12.
BOTTOM SLAB - OUTSIDE FACE (ff)	.300	NO	#6	12.
DISTRIBUTION				
TOP SLAB - INSIDE FACE (gg)	.252		#4	8.
TOP SLAB - OUTSIDE FACE	.252		#4	14.

NOTES:

1 TOP SLAB OUTSIDE FACE STEEL (ff) MUST EXTEND COMPLETELY ACROSS THE TOP SLAB. THE SIDEWALL OUTSIDE FACE STEEL (hh) MUST BE BENT AT THE CORNER AND EXTENDED ACROSS THE OUTSIDE FACE OF THE TOP SLAB SUFFICIENTLY TO MEET AASHTO REQUIREMENTS FOR TENSION LAPS.

2 BOTTOM SLAB OUTSIDE FACE STEEL (ff) MUST EXTEND COMPLETELY ACROSS THE BOTTOM SLAB. THE SIDEWALL OUTSIDE FACE STEEL (hh) MUST BE BENT AT THE CORNER AND EXTENDED ACROSS THE OUTSIDE FACE OF THE BOTTOM SLAB SUFFICIENTLY TO MEET AASHTO REQUIREMENTS FOR TENSION LAPS.

3 ASMIN = 0.002 x GROSS SECTION AREA

4 THERE MAY BE NEGATIVE MOMENT FROM THE OUTSIDE CORNER OF THE BOX TO 38. INCHES ACROSS THE TOP SLAB (F=3'-2").

5 THERE MAY BE NEGATIVE MOMENT FROM THE OUTSIDE CORNER OF THE BOX TO 35. INCHES ACROSS THE BOTTOM SLAB (f=3'-2").

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT SOSSAMAN ROAD CHANNEL PAGE 1 OF 48

DETAIL Edgar Q. Moreno COMPUTED Edgar Moreno DATE 11/30/92

& FRACIS CROSBY CHECKED BY _____ DATE _____

TO: Chuck Wainwright
Kumar Hanumaiah (Work Update)

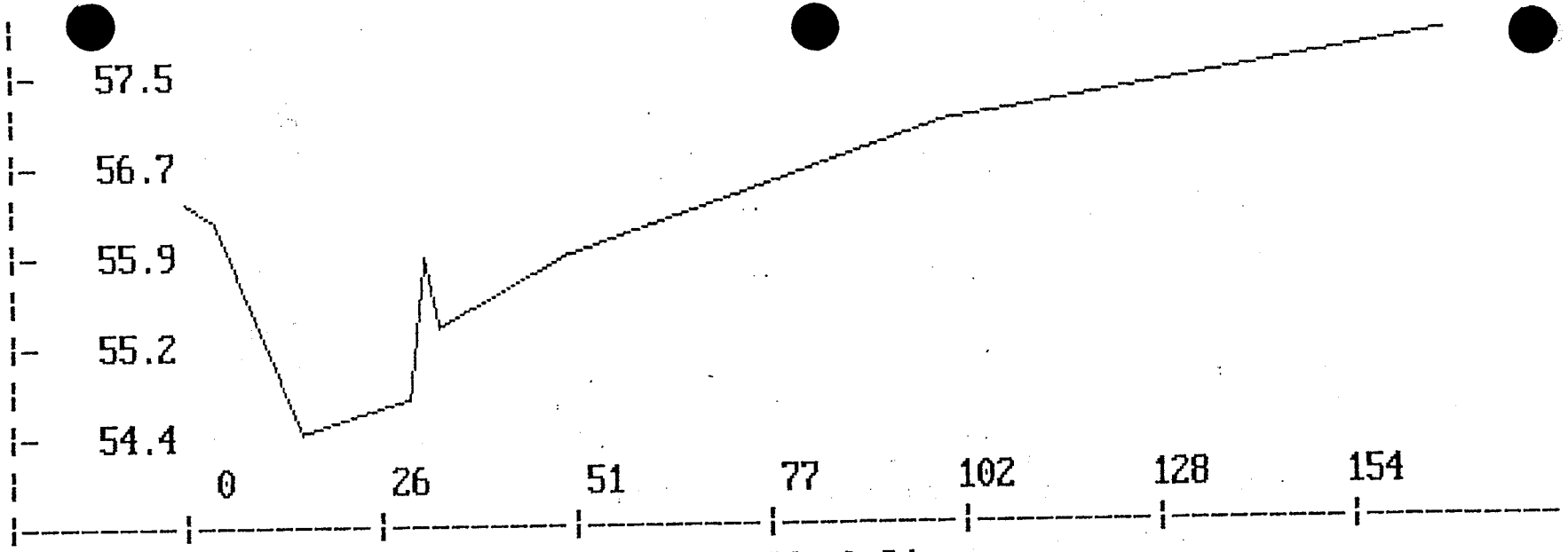
here are the calculations of cut & Fill on sossomon as well as all the cross sections used for the calculations (48 pages)

Edgar Q. Moreno
11/30/92

sossaman

Top Width	Left SS	Right SS	Off-CL (ft)	CL Sta	Dist (ft)	** EXCAVATION ** Area (SqFt)	Volume (Cu.Yds)	** FILL ** Area (SqFt)	Volume (Cu.Yds)
0	74.7:1	1:1	166.0	1+00		8.0		11.5	
					20		17.1		5.3
0	123.2:1	1:1	166.0	1+20		38.1		2.9	
					20		59.4		7.7
0	98.9:1	1:1	166.0	1+40		76.2		3.4	
					20		96.8		11.4
0	104.6:1	1:1	166.0	1+60		24.8		6.7	
					20		121.3		15.8
0	74.4:1	1:1	166.0	1+80		41.3		5.1	
					20		153.1		23.3
0	95.5:1	1:1	166.0	2+00		44.5		15.3	
					20		183.1		39.5
0	102.3:1	1:1	166.0	2+20		36.5		28.4	
					20		203.2		65.8
0	82.9:1	1:1	166.0	2+40		17.6		42.7	
					20		213.9		106.3
0	120.6:1	1:1	166.0	2+60		11.4		66.6	
					20		220.1		168.2
0	133:1	1:1	166.0	2+80		5.1		100.4	
					20		226.2		246.7
0	190:1	1:1	166.0	3+00		11.4		111.5	
					20		230.7		344.3
0	335.7:1	1:1	166.0	3+20		1.0		152.1	
					20		231.1		467.1
0	446.3:1	1:1	166.0	3+40		0.0		179.5	
					20		231.1		604.9
0	563.5:1	1:1	166.0	3+60		0.0		192.5	
					20		231.4		748.4
0	1320:1	1:1	166.0	3+80		0.8		194.8	
					20		234.2		894.7
0	657.5:1	1:1	166.0	4+00		6.6		200.2	
					20		246.0		1040.7

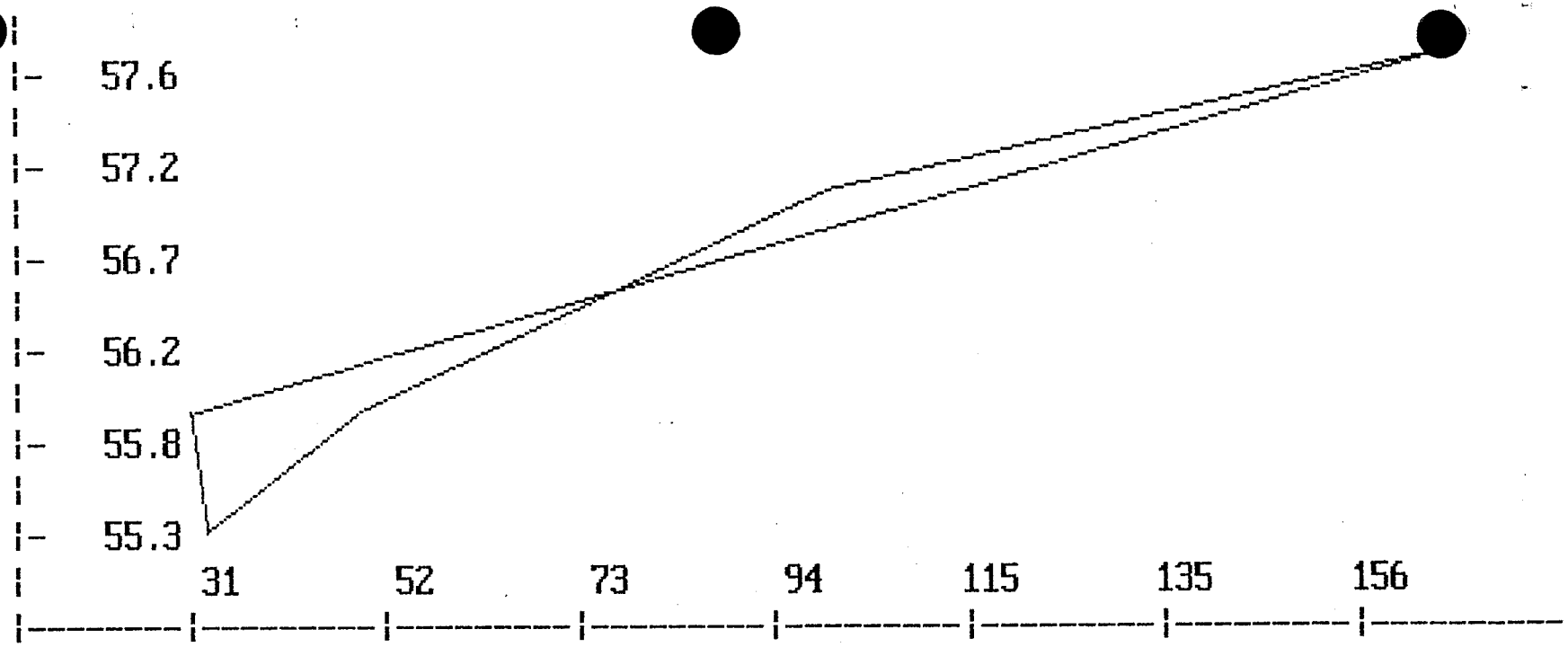
Top Width	Left SS	Right SS	Off-CL (ft)	CL Sta	Dist (ft)	** EXCAVATION ** Area (SqFt)	Volume (Cu.Yds)	** FILL ** Area (SqFt)	Volume (Cu.Yds)
0	131:1	1:1	166.0	4+20		25.4		194.2	
					20		259.0		1196.3
0	650:1	1:1	166.0	4+40		9.7		225.9	
					20		266.5		1371.8
0	1310:1	1:1	166.0	4+60		10.3		248.0	
					20		271.9		1573.5
0	435:1	1:1	166.0	4+80		4.4		296.4	
					20		273.5		1880.9
0	45.1:1	1:1	166.0	5+00		0.0		533.6	
					20		274.1		2189.8
0	58.9:1	1:1	166.0	5+20		1.4		300.5	
					20		274.6		2502.8
0	496.6:1	1:1	186.0	5+40		0.0		544.7	



Sec # 24 of 24

Centerline Station = 11+00
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1	3.4	56.2	15.2	54.4	29.4	54.7	31.4	55.9
2	33.3	55.3	50.0	55.9	100.0	57.0	166.0	57.7
3		56.4						
4								
5								
6								



Section Number 1 of 24
Centerline Station 1+00

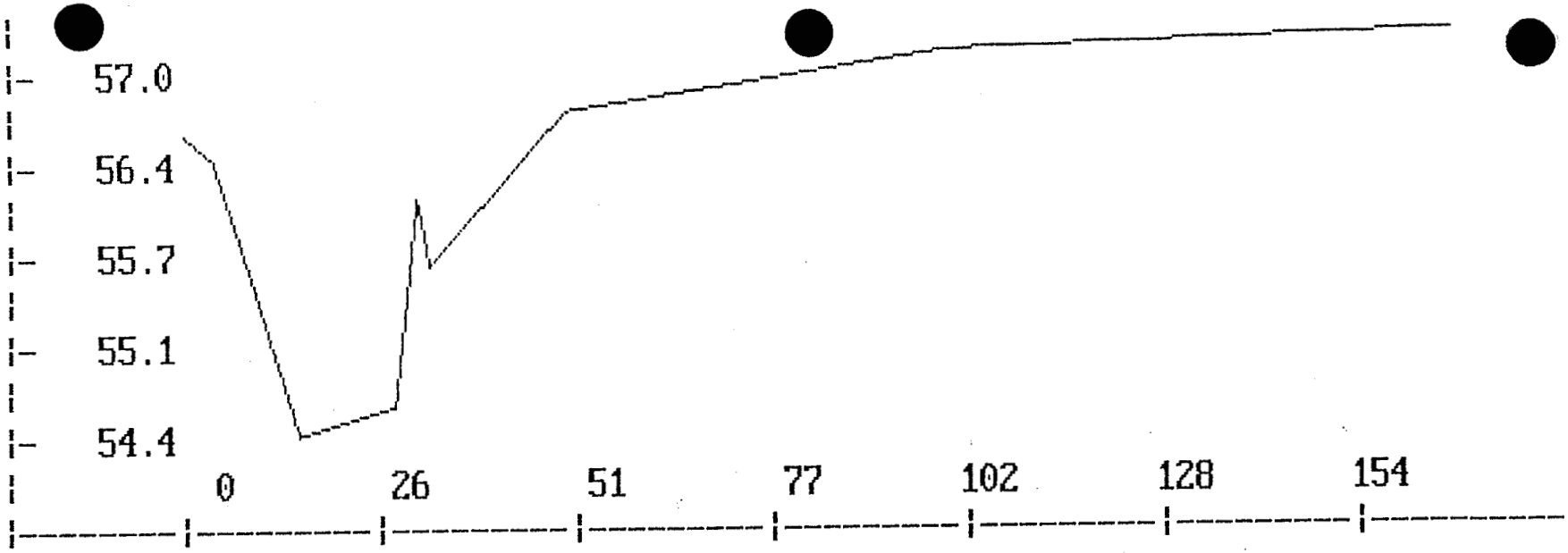
Grade Elevation = 57.70
Excavated Area = 7.98 Sq Ft
Filled Area = 11.47 Sq Ft

Rules - Off ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 74.8:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

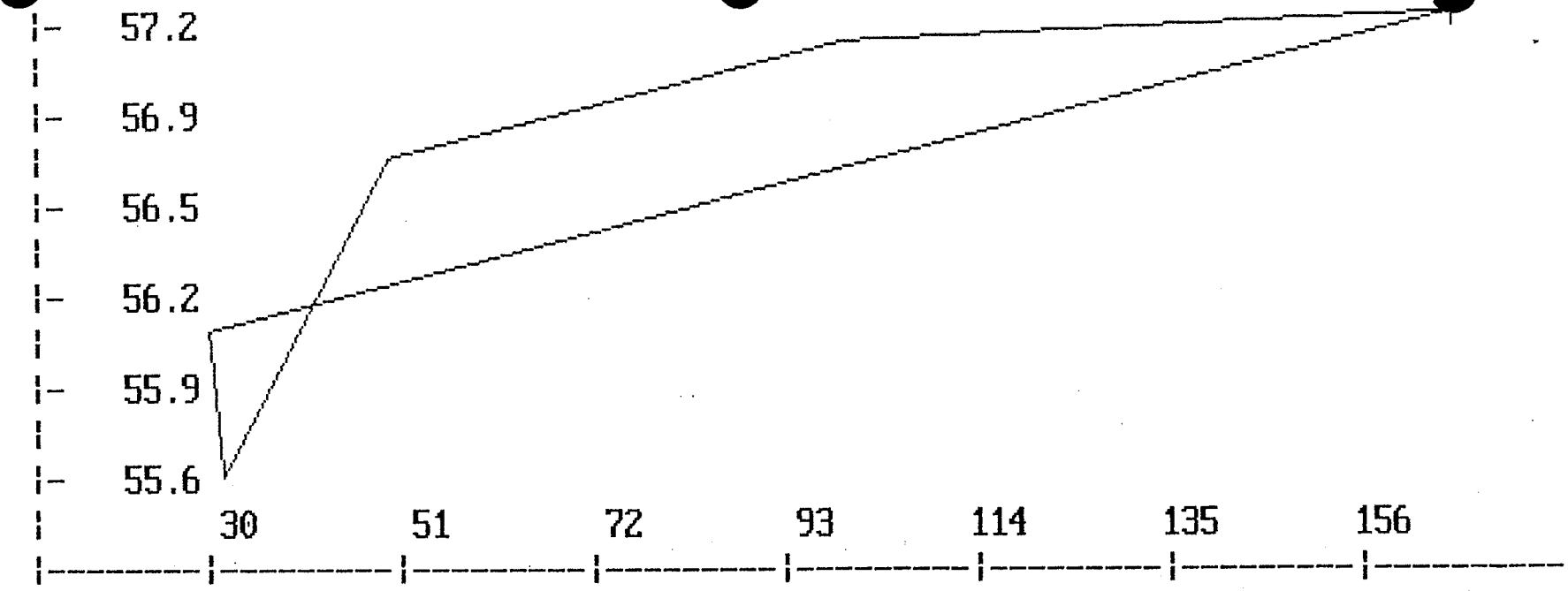
Left	31.4	55.9
Right	166.0	57.7



Sec # 23 of 24

Centerline Station = 11+20
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		56.6	3.4	56.4	15.0	54.4	27.4	54.6
2	30.4	56.1	32.0	55.6	50.0	56.7	100.0	57.1
3	166.0	57.2						
4								
5								
6								



Section Number 2 of 24
Centerline Station 1+20

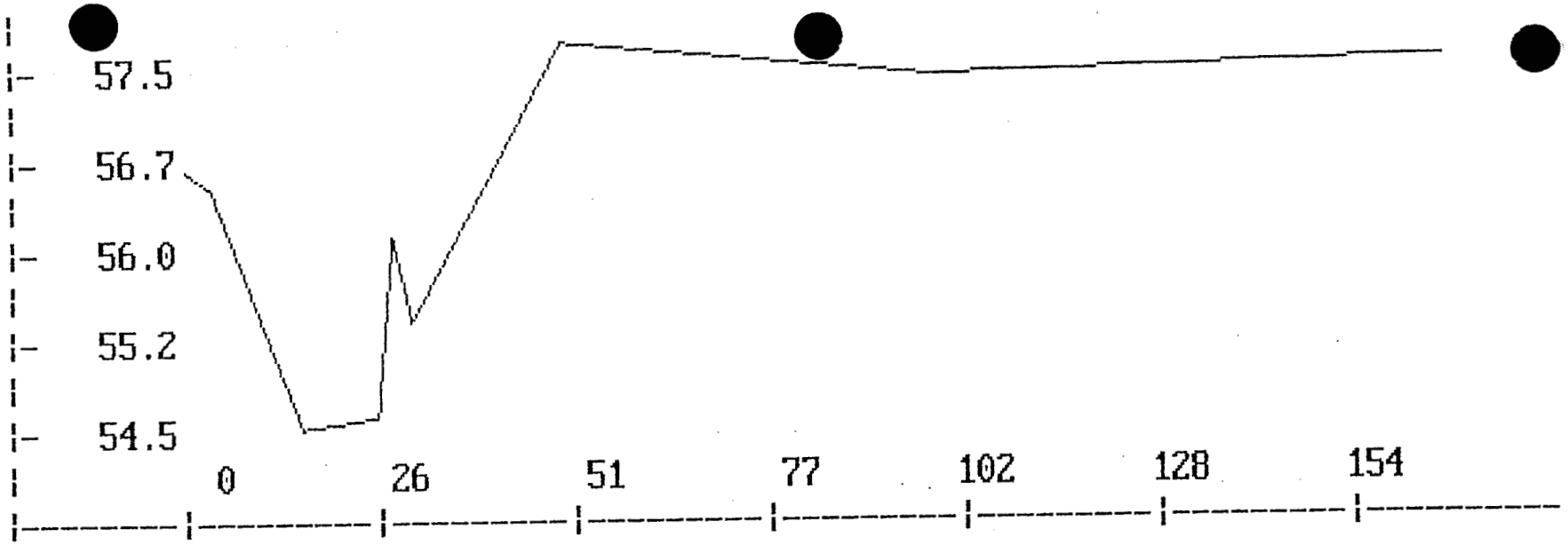
Grade Elevation = 57.20
Excavated Area = 38.11 Sq Ft
Filled Area = 2.89 Sq Ft

Rules - Off ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %123.3:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

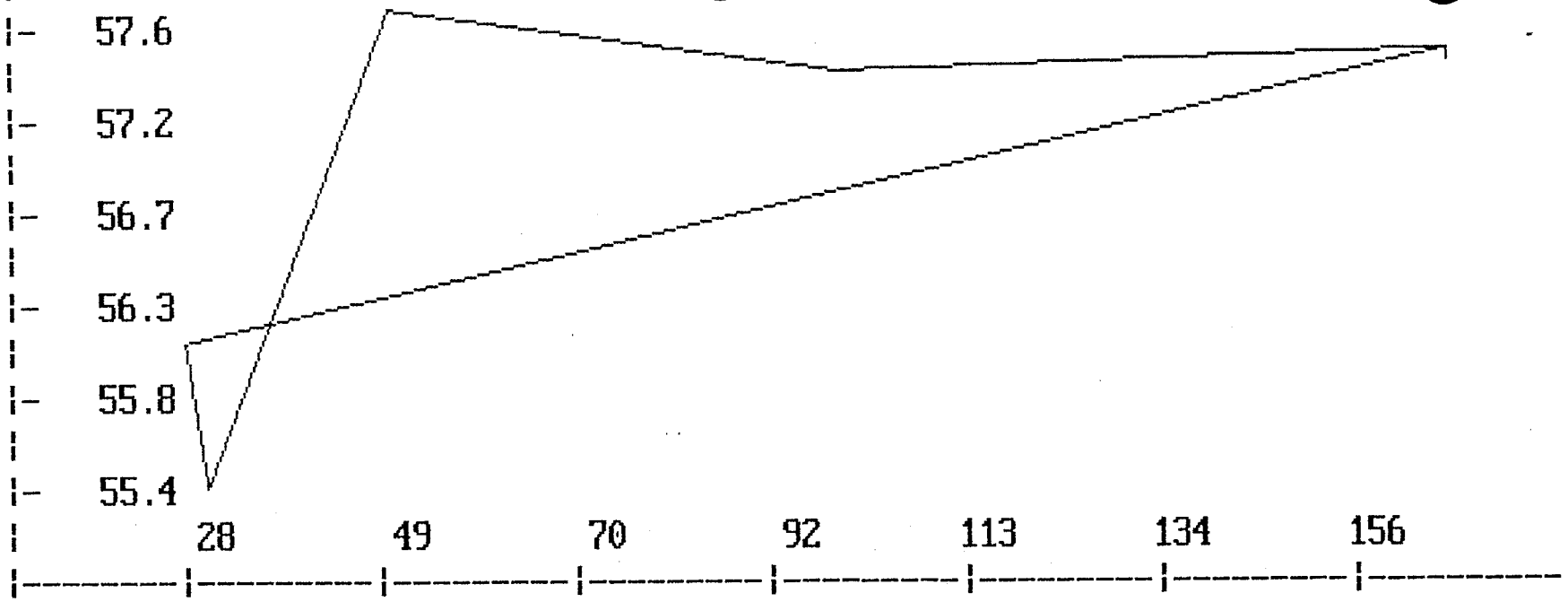
Left	30.4	56.1
Right	166.0	57.2



Sec # 22 of 24

Centerline Station = 11+40
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		56.7	3.3	56.5	15.6	54.5	25.6	54.6
2	27.5	56.1	30.0	55.4	50.0	57.7	100.0	57.4
3	166.0	57.5						
4								
5								
6								



Section Number 3 of 24
Centerline Station 1+40

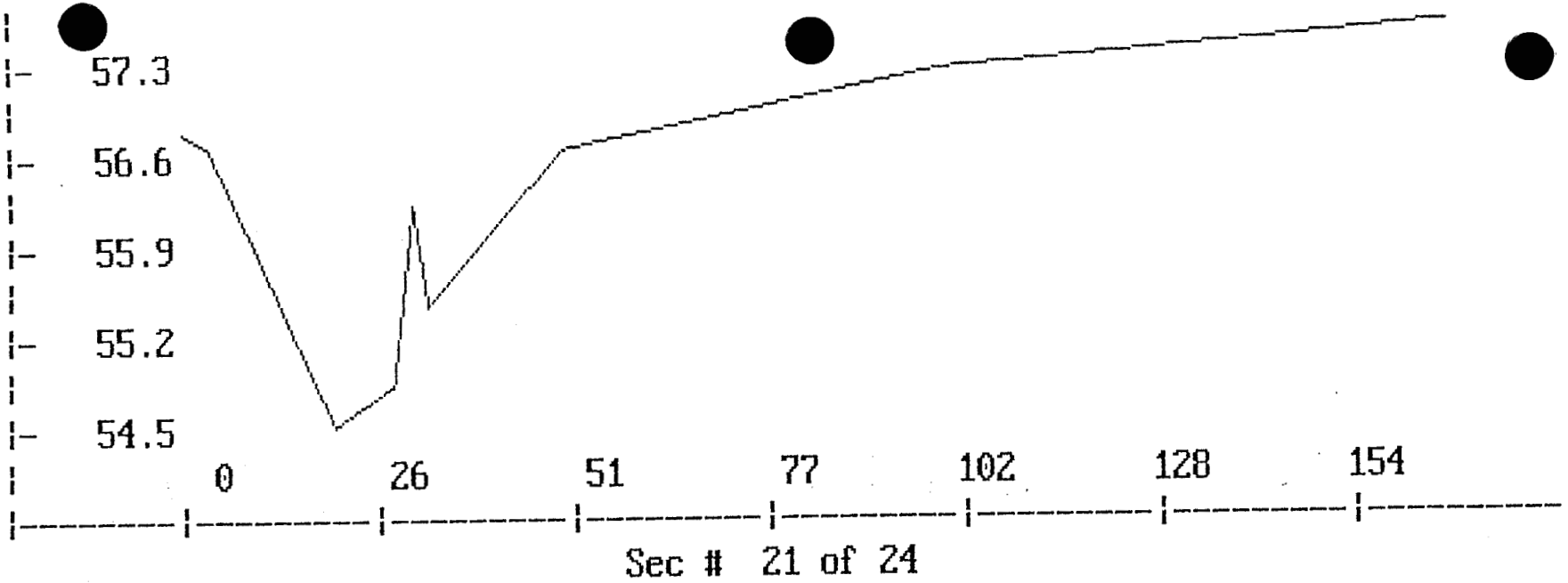
Grade Elevation = 57.50
Excavated Area = 76.19 Sq Ft
Filled Area = 3.41 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 98.9:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

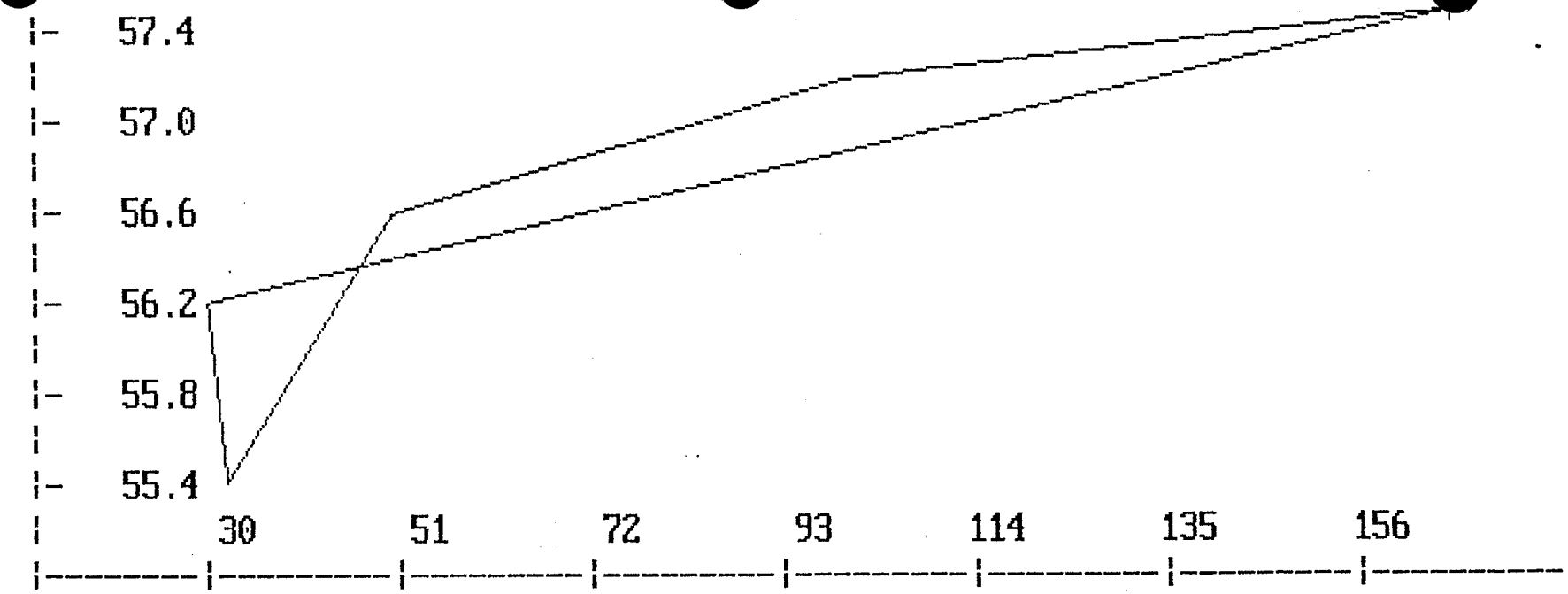
Slope Intercepts

Left	27.5	56.1
Right	166.0	57.5



Centerline Station = 11+60
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		56.8	3.1	56.7	19.8	54.5	27.4	54.8
2	30.0	56.2	32.0	55.4	50.0	56.6	100.0	57.2
3	166.0	57.5						
4								
5								
6								



Section Number 4 of 24
Centerline Station 1+60

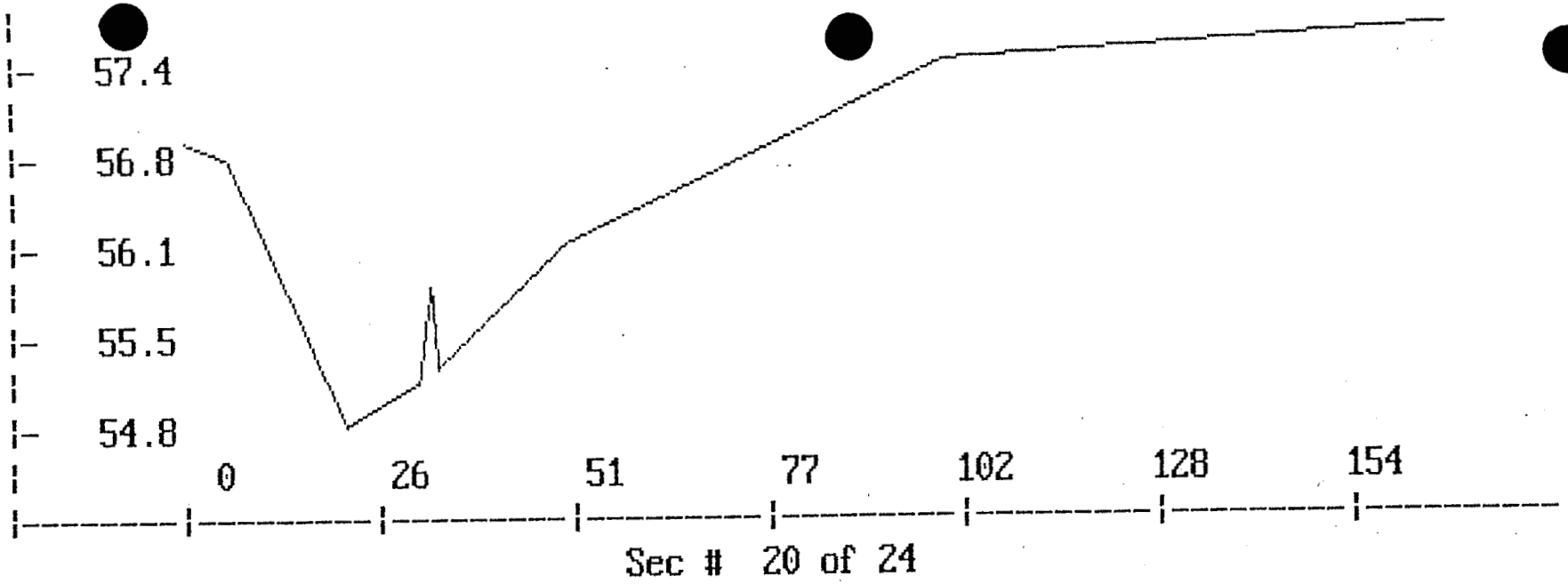
Grade Elevation = 57.50
Excavated Area = 24.79 Sq Ft
Filled Area = 6.69 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %104.6:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

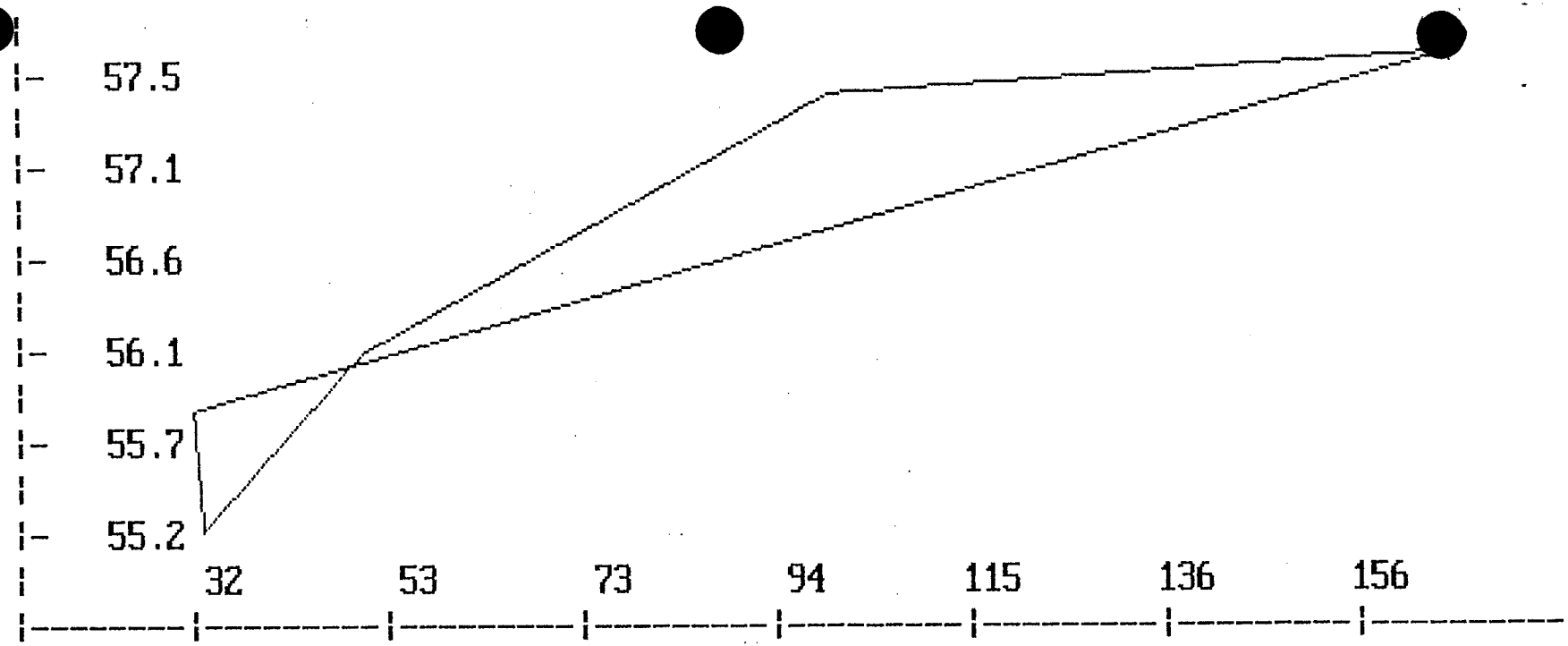
Slope Intercepts

Left	30.0	56.2
Right	166.0	57.5



Centerline Station = 11+80
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		56.9	5.3	56.8	21.0	54.8	30.5	55.1
2	32.0	55.8	33.0	55.2	50.0	56.1	100.0	57.4
3	166.0	57.6						
4								
5								
6								



Section Number 5 of 24
Centerline Station 1+80

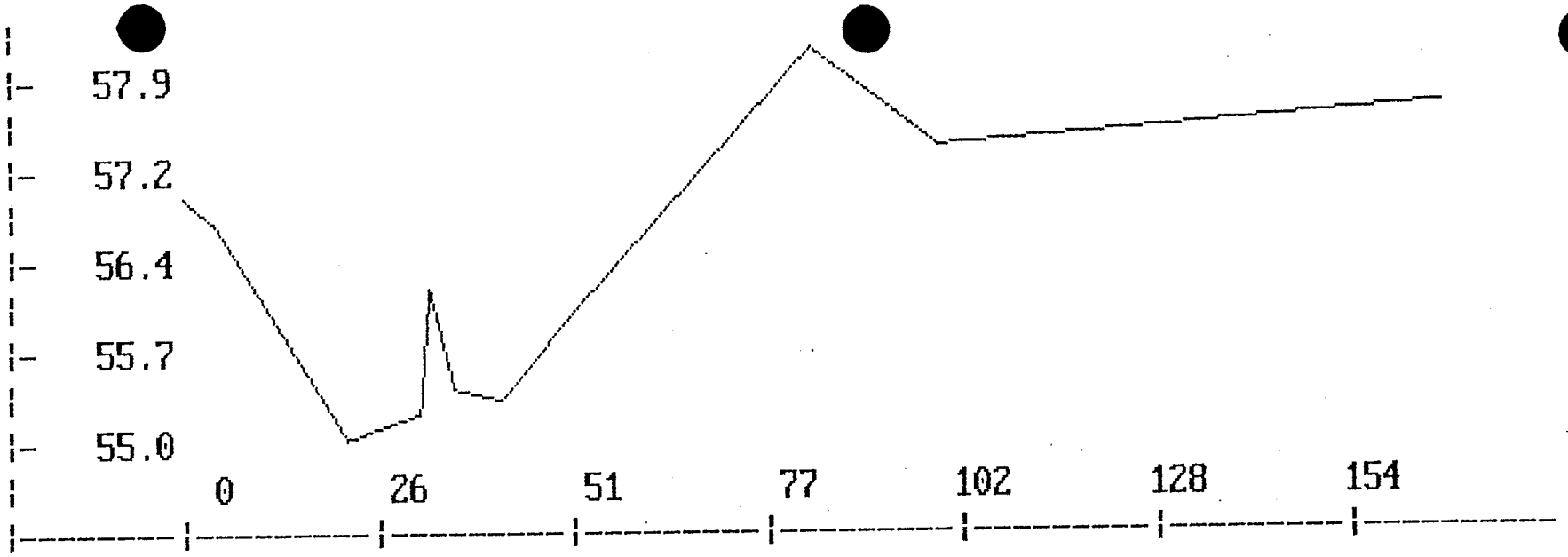
Grade Elevation = 57.60
Excavated Area = 41.32 Sq Ft
Filled Area = 5.07 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 74.4:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

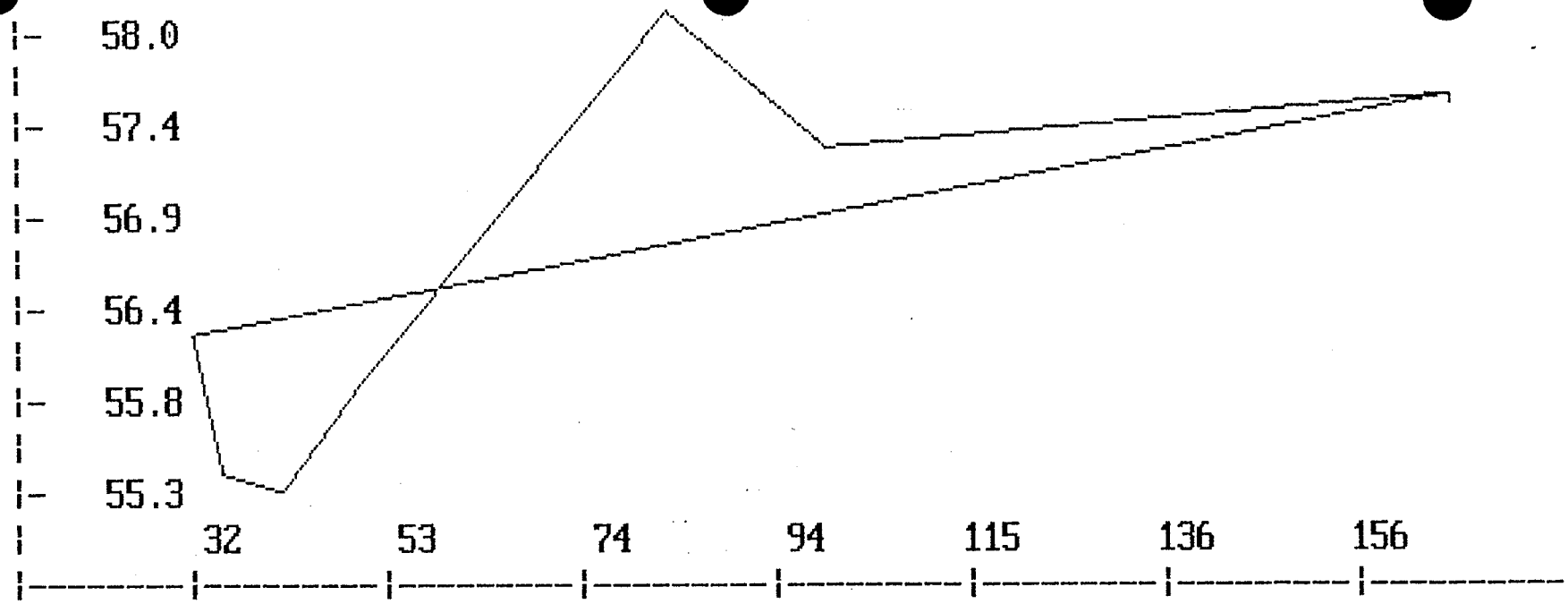
Left	32.0	55.8
Right	166.0	57.6



Sec # 19 of 24

Centerline Station = 20+00
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.0	3.9	56.8	21.5	55.0	31.0	55.2
2	32.3	56.2	35.5	55.4	42.0	55.3	50.0	55.9
3	83.0	58.1	100.0	57.3	166.0	57.6		
4								
5								
6								



Section Number 6 of 24
Centerline Station 2+00

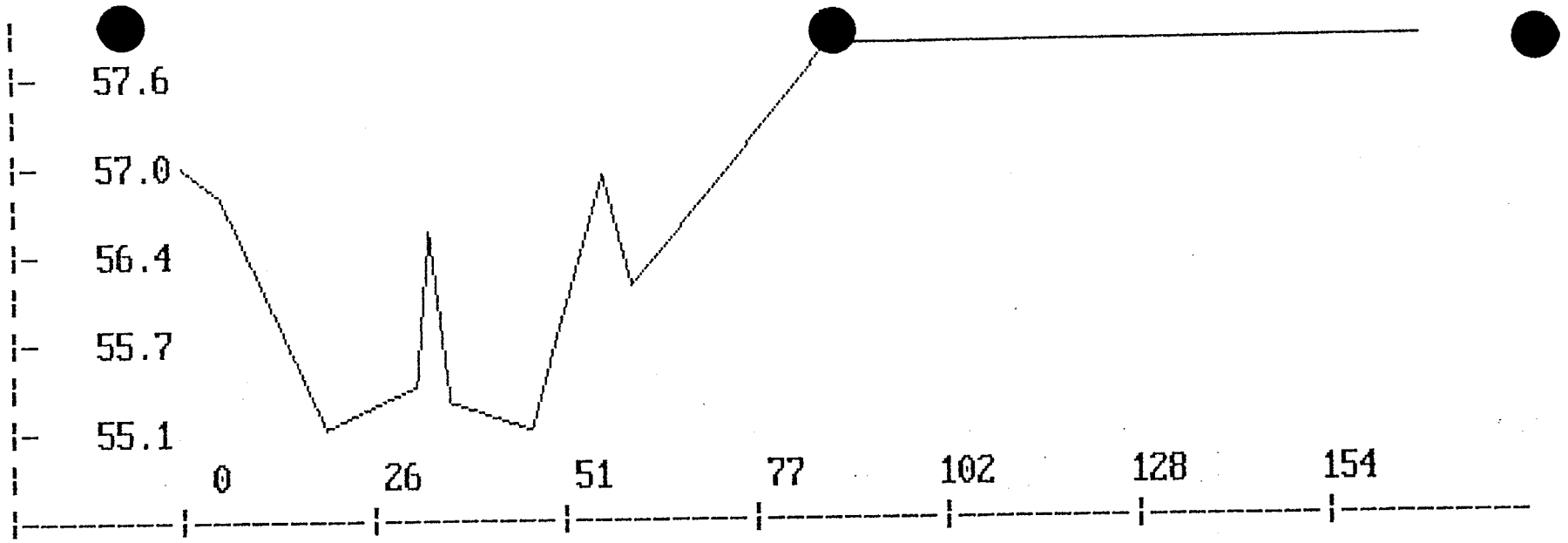
Grade Elevation = 57.60
Excavated Area = 44.54 Sq Ft
Filled Area = 15.34 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 95.5:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

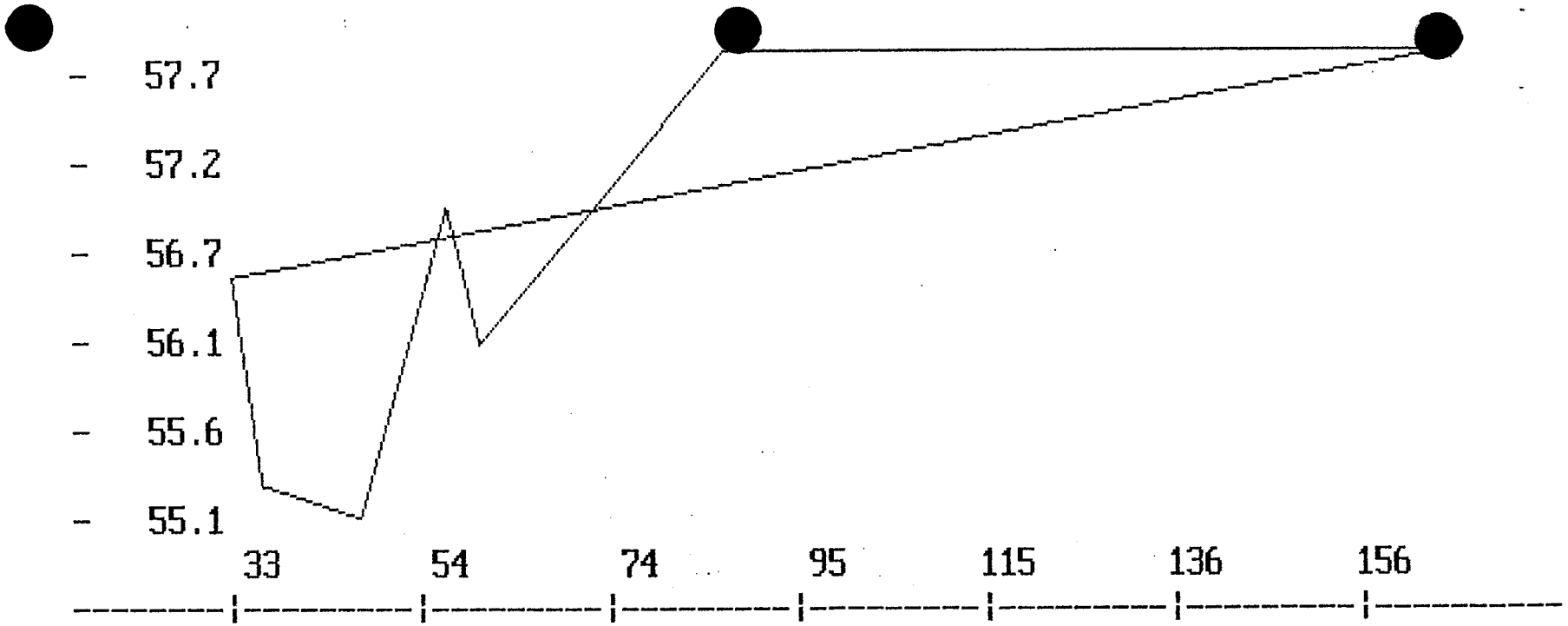
Left	32.3	56.2
Right	166.0	57.6



Sec # 18 of 24

Centerline Station = 20+20
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.0	4.8	56.8	19.3	55.1	31.5	55.4
2	33.0	56.5	36.0	55.3	46.8	55.1	56.3	56.9
3	60.0	56.1	86.6	57.8	100.0	57.8	166.0	57.8
4								
5								
6								



ection Number 7 of 24
enterline Station 2+20

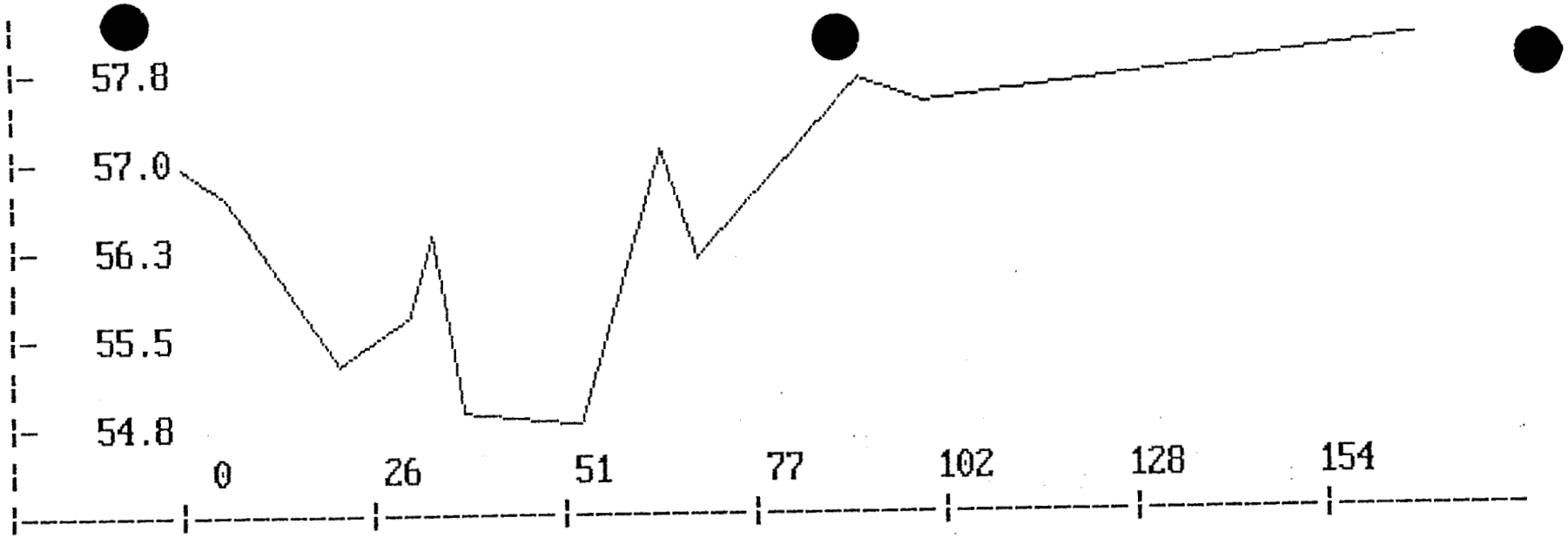
Grade Elevation = 57.80
Excavated Area = 36.52 Sq Ft
Filled Area = 28.37 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %102.3:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

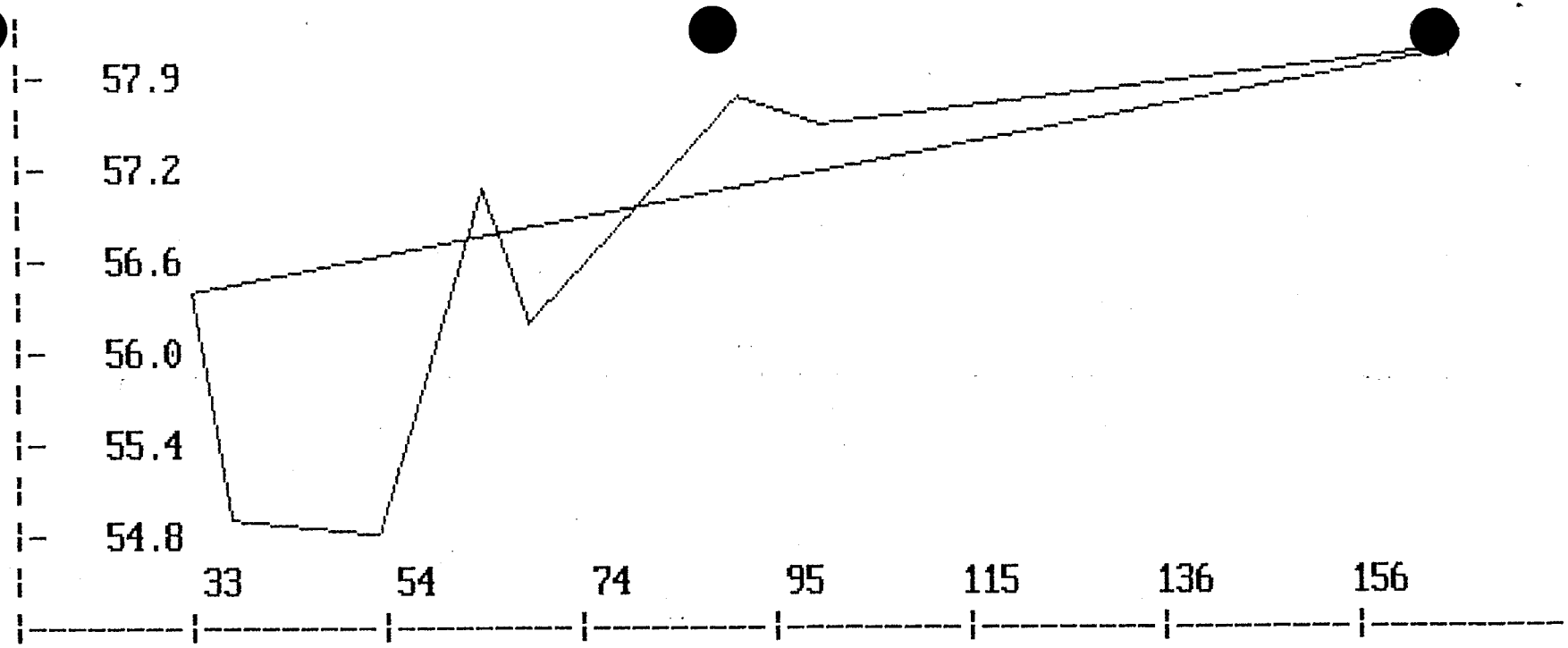
Left	33.0	56.5
Right	166.0	57.8



Sec # 17 of 24

Centerline Station = 20+40
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.0	5.4	56.7	21.0	55.3	30.2	55.7
2	33.3	56.4	37.4	54.9	53.0	54.8	64.0	57.1
3	68.8	56.2	91.0	57.7	100.0	57.5	166.0	58.0
4								
5								
6								



Section Number 8 of 24
Centerline Station 2+40

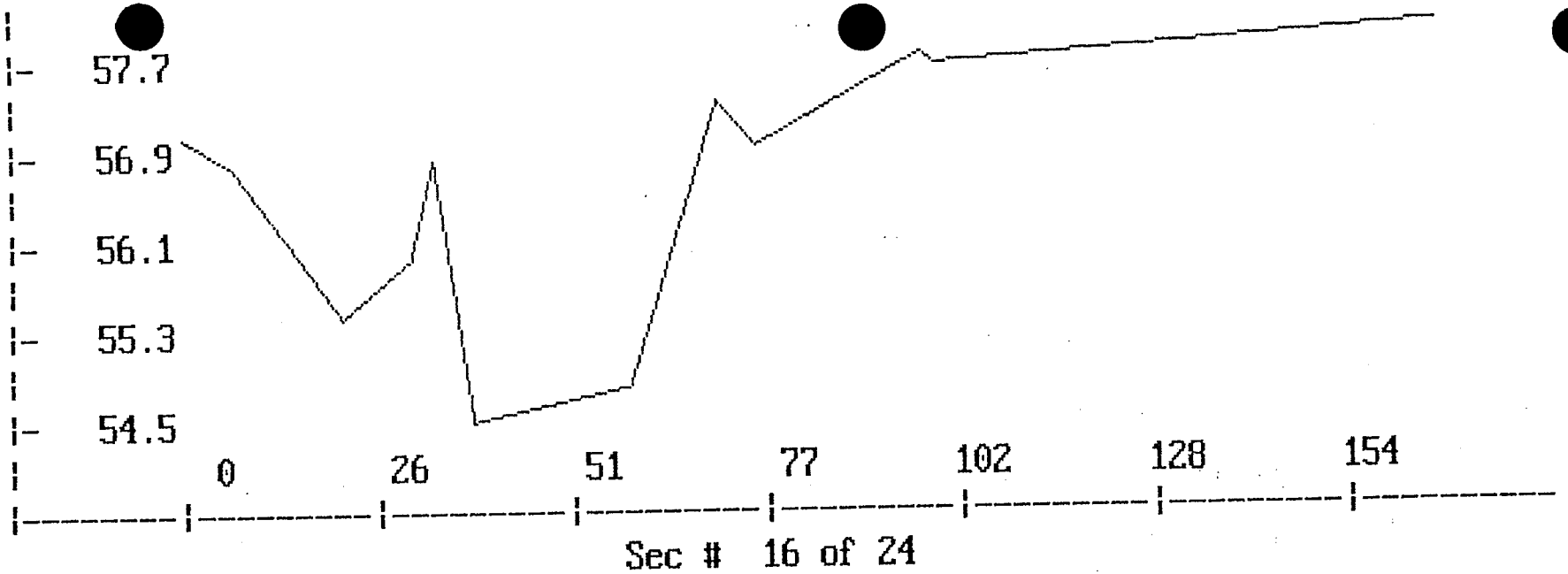
Grade Elevation = 58.00
Excavated Area = 17.65 Sq Ft
Filled Area = 42.70 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 82.9:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

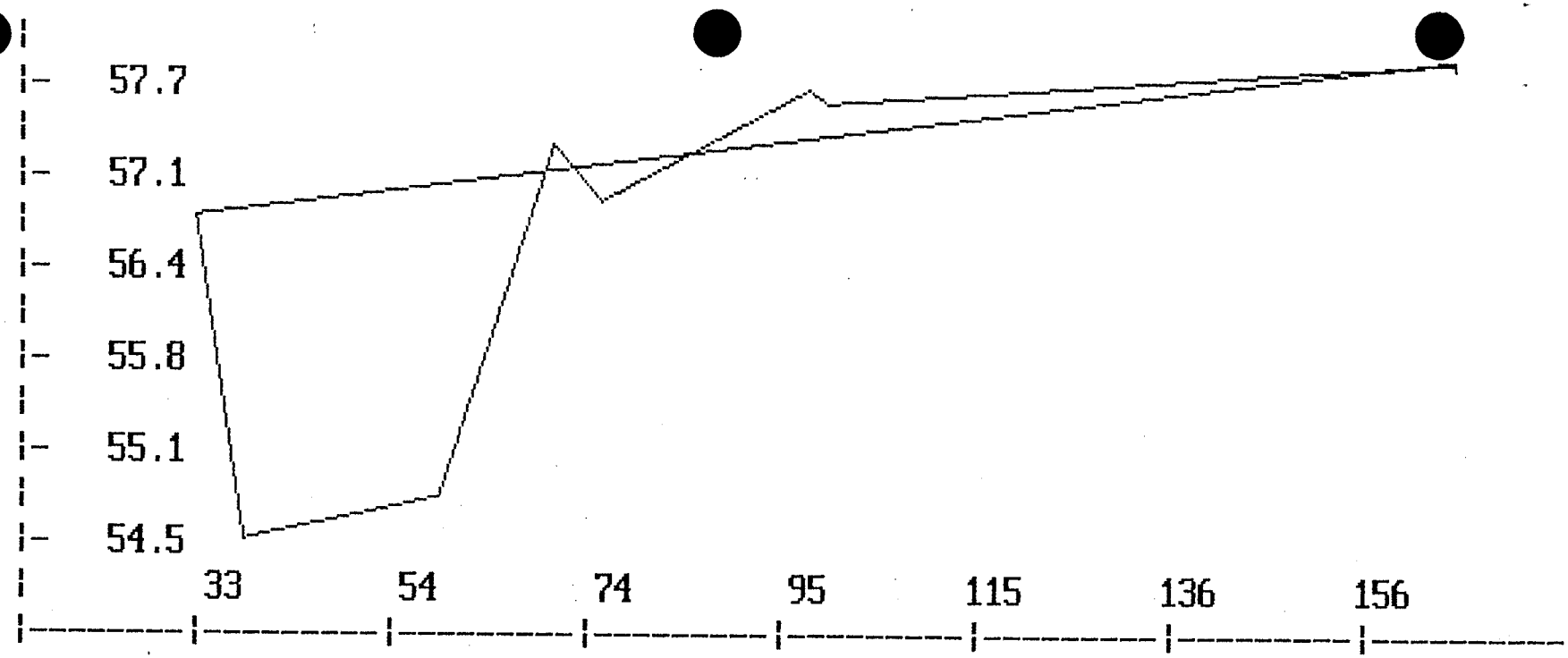
Slope Intercepts

Left	33.3	56.4
Right	166.0	58.0



Centerline Station = 20+60
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.0	6.2	56.8	21.0	55.4	30.0	55.9
2	33.3	56.8	38.4	54.5	59.0	54.8	71.0	57.3
3	76.0	56.9	98.0	57.7	100.0	57.6	166.0	57.9
4								
5								
6								



Section Number 9 of 24
Centerline Station 2+60

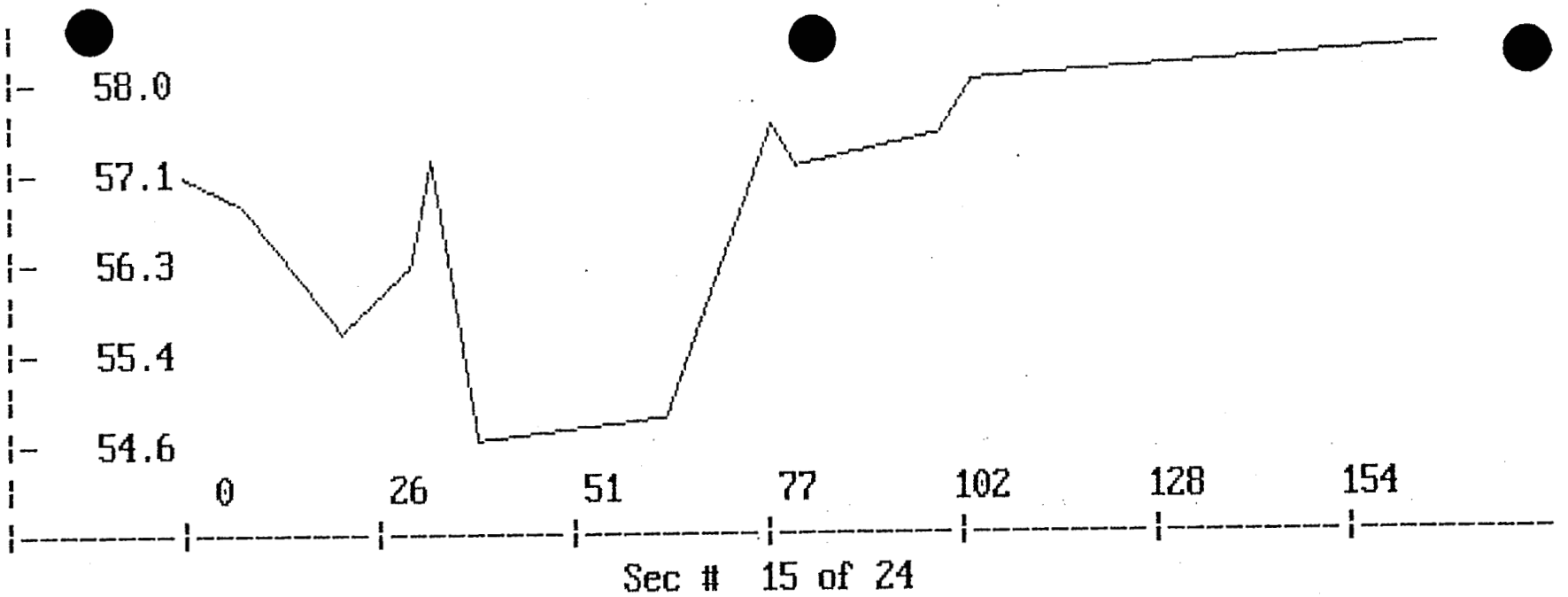
Grade Elevation = 57.90
Excavated Area = 11.41 Sq Ft
Filled Area = 66.65 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %120.6:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

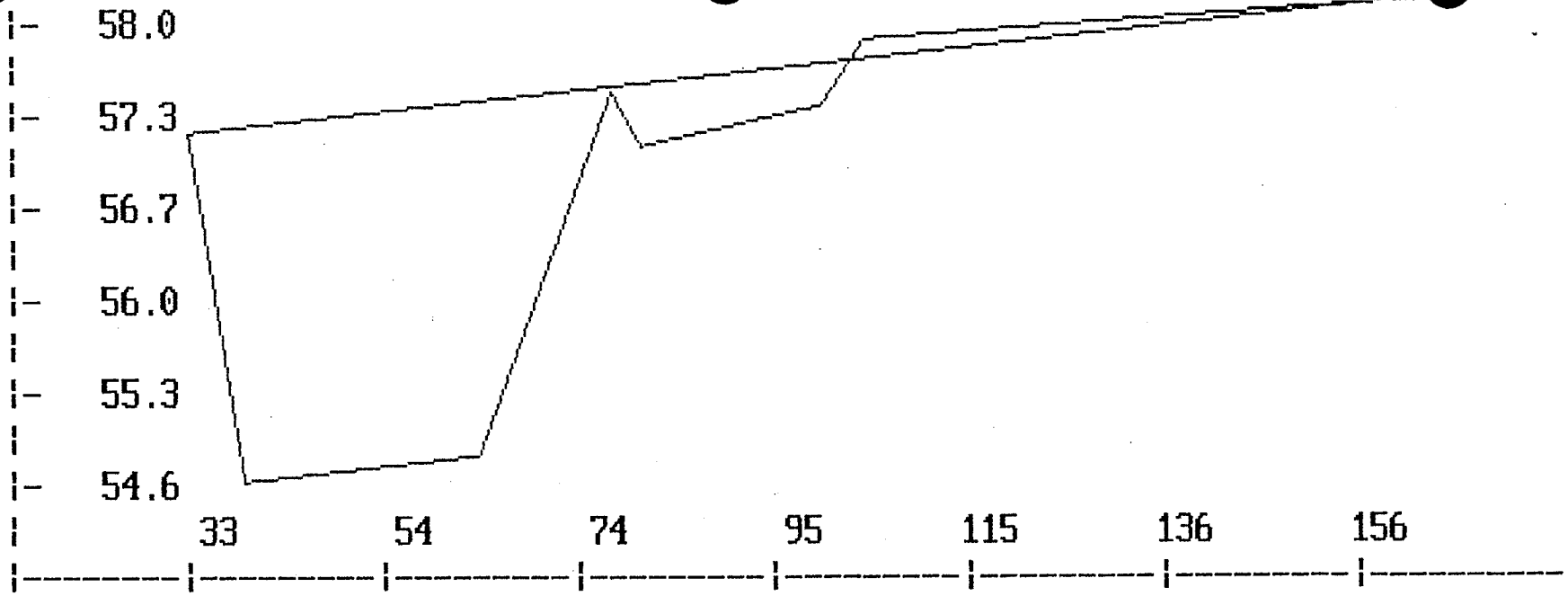
Slope Intercepts

Left	33.3	56.8
Right	166.0	57.9



Centerline Station = 20+80
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.1	7.5	56.8	21.0	55.6	30.0	56.2
2	33.0	57.2	39.0	54.6	63.7	54.8	77.8	57.5
3	81.0	57.1	100.0	57.4	104.5	57.9	166.0	58.2
4								
5								
6								



Section Number 10 of 24
Centerline Station 2+80

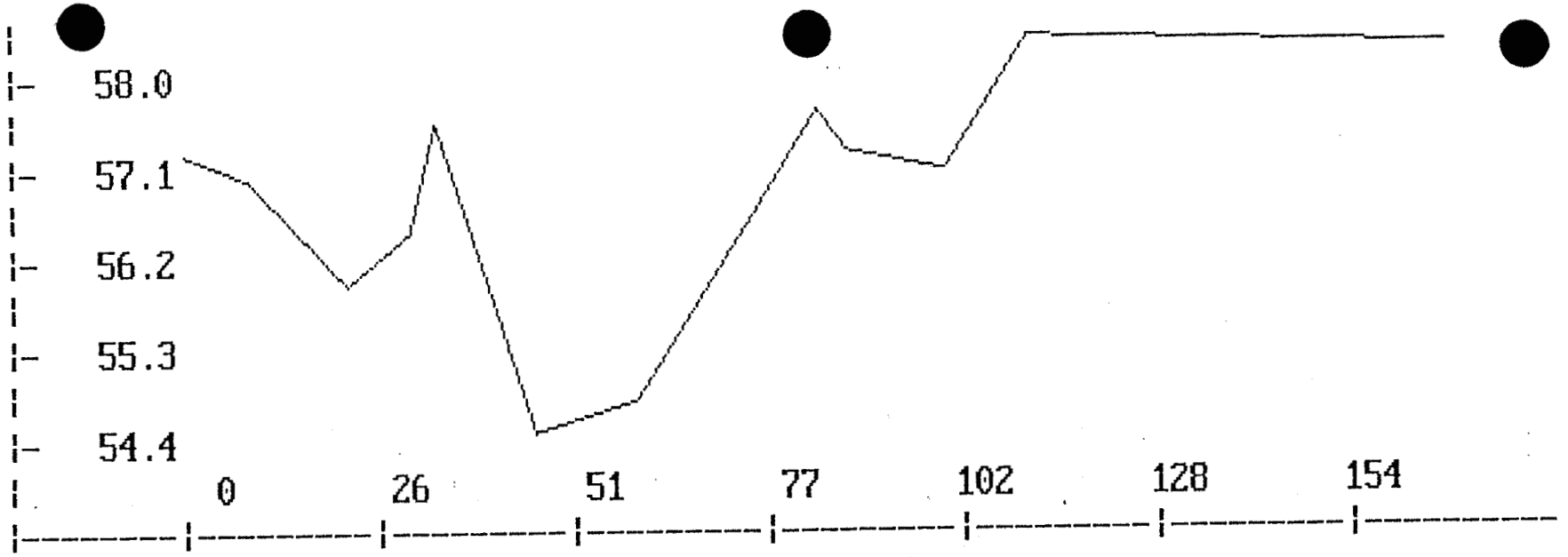
Grade Elevation = 58.20
Excavated Area = 5.12 Sq Ft
Filled Area = 100.41 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %133.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

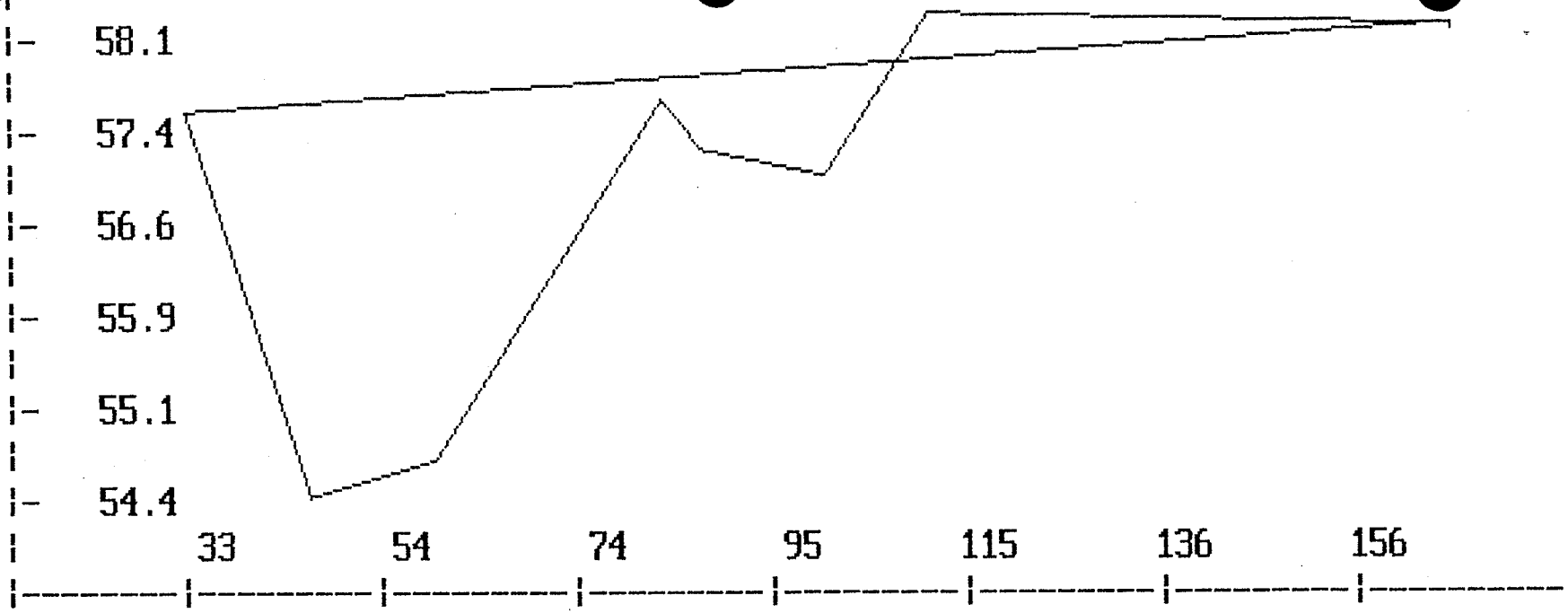
Left	33.0	57.2
Right	166.0	58.2



Sec # 14 of 24

Centerline Station = 30+00
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.3	8.4	57.0	21.4	55.9	29.5	56.4
2	33.0	57.5	46.0	54.4	59.0	54.7	83.0	57.6
3	87.0	57.2	100.0	57.0	111.0	58.3	166.0	58.2
4								
5								
6								



Section Number 11 of 24
Centerline Station 3+00

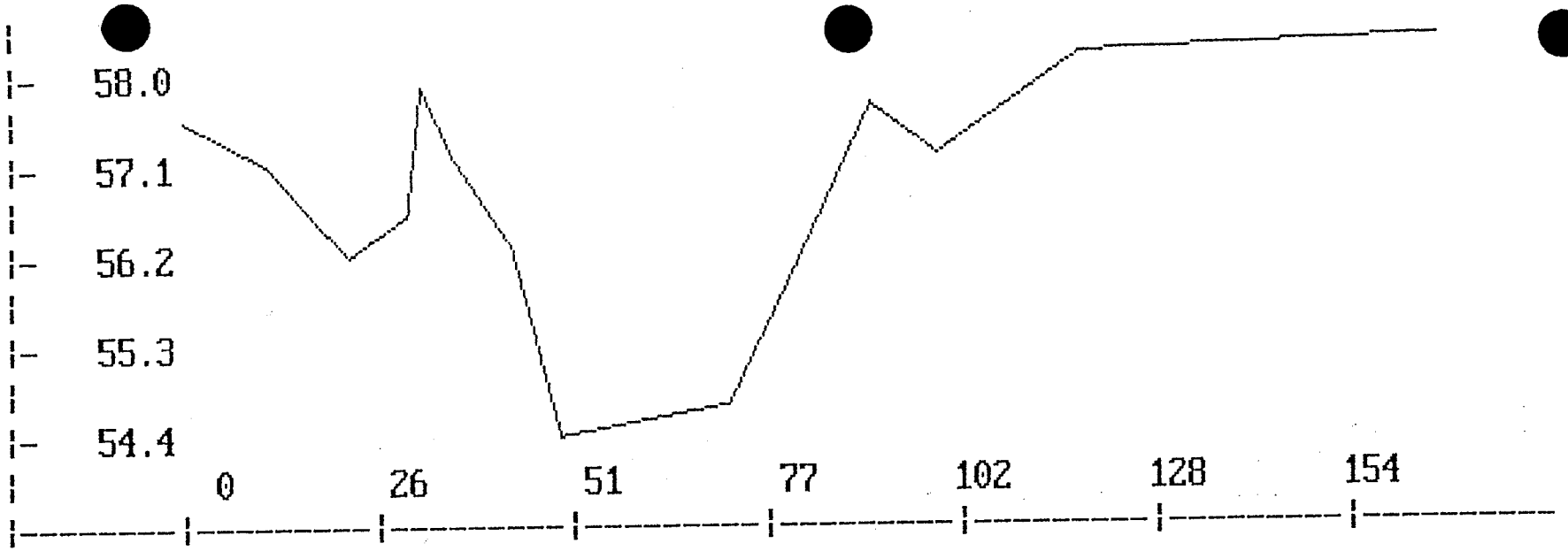
Grade Elevation = 58.20
Excavated Area = 11.38 Sq Ft
Filled Area = 111.53 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %190.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

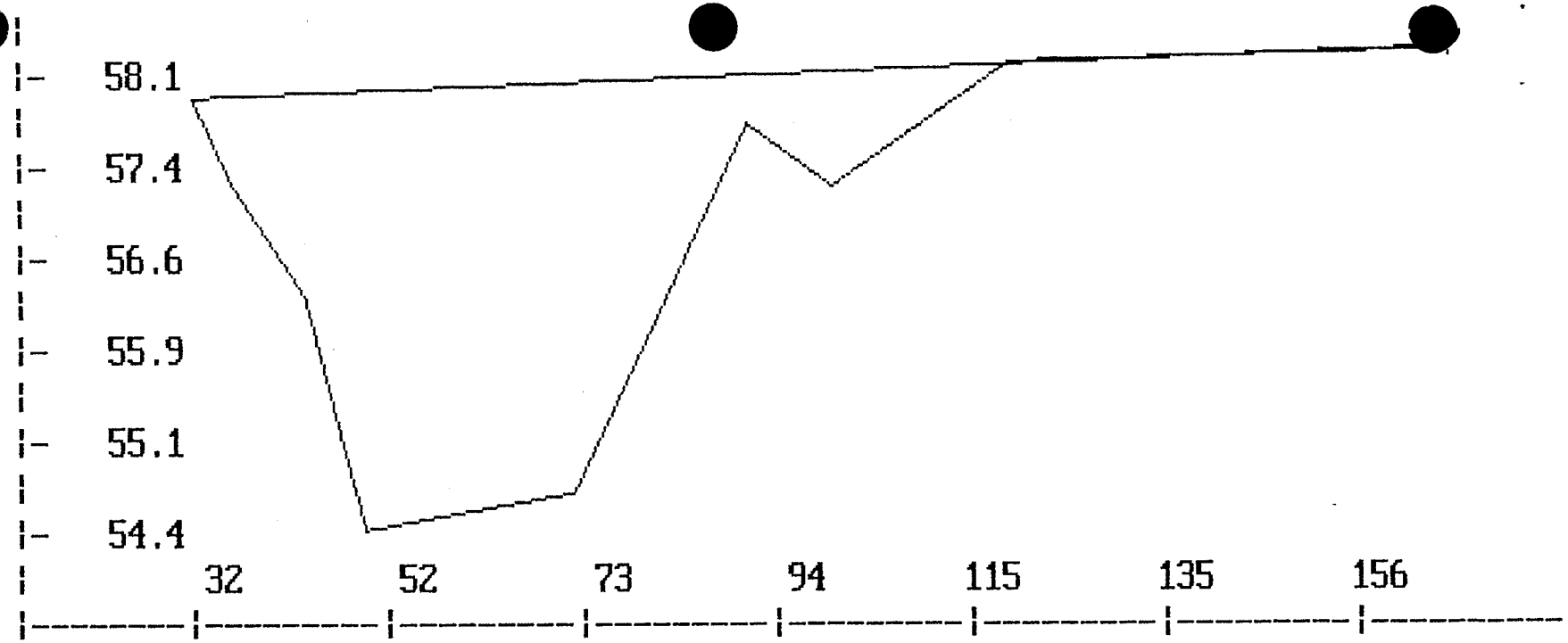
Left	33.0	57.5
Right	166.0	58.2



Sec # 13 of 24

Centerline Station = 30+20
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.6	11.0	57.1	22.0	56.2	29.7	56.6
2	31.7	57.9	35.8	57.2	43.5	56.3	50.0	54.4
3	72.0	54.7	91.0	57.7	100.0	57.2	119.0	58.2
4	166.0	58.3						
5								
6								



Section Number 12 of 24
Centerline Station 3+20

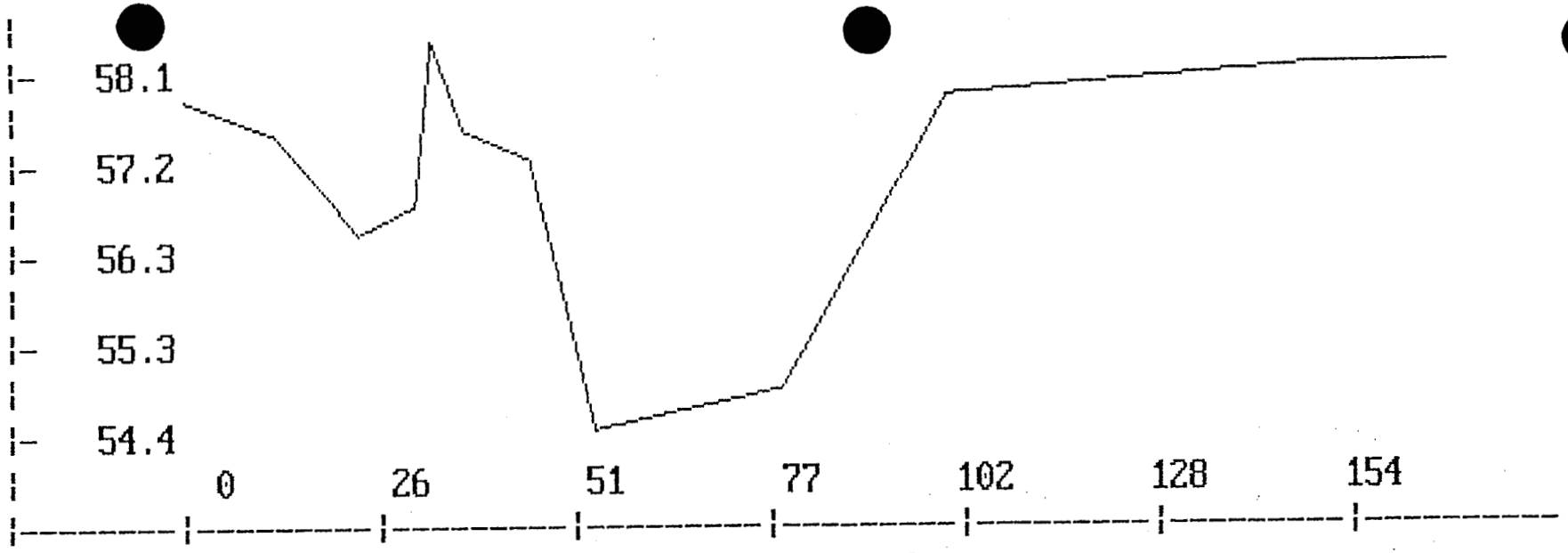
Grade Elevation = 58.30
Excavated Area = 0.96 Sq Ft
Filled Area = 152.08 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %335.8:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

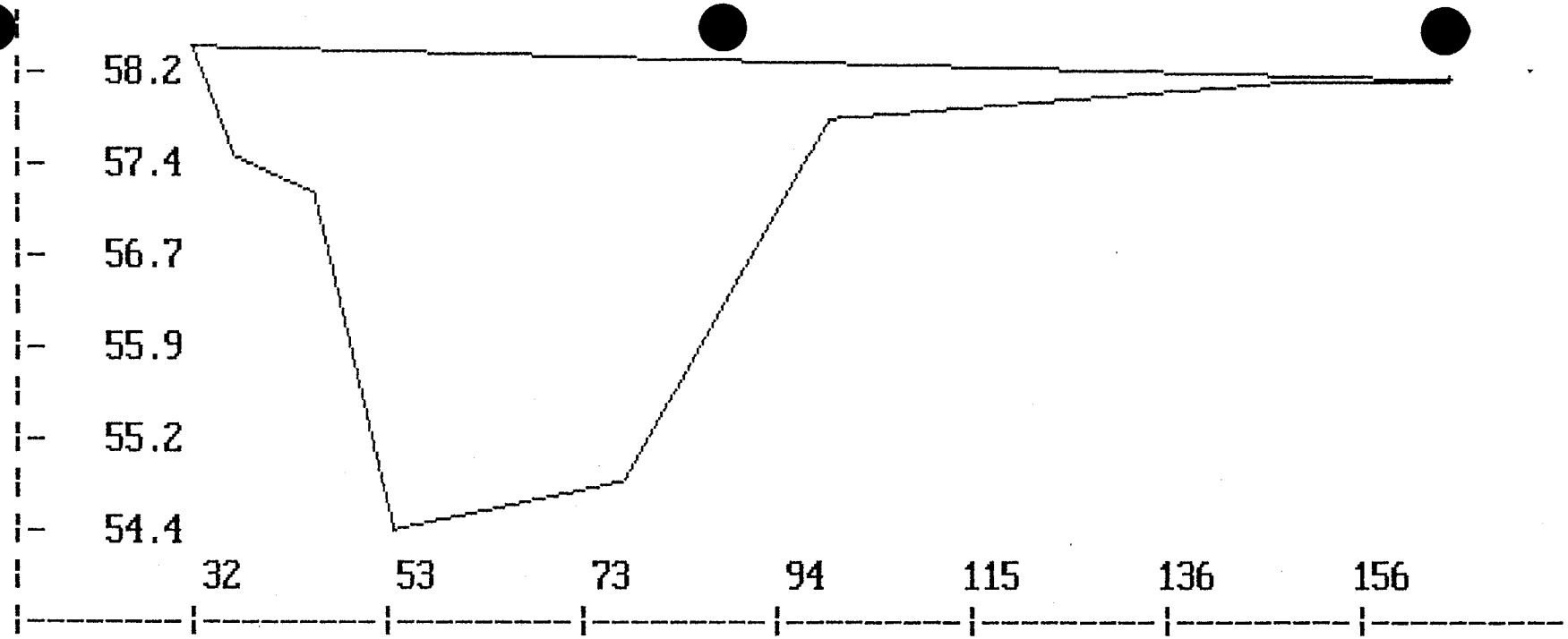
Left	31.7	57.9
Right	166.0	58.3



Sec # 12 of 24

Centerline Station = 30+40
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		57.8	11.4	57.5	22.5	56.4	30.0	56.7
2	32.1	58.4	36.4	57.5	45.0	57.2	53.6	54.4
3	78.0	54.8	100.0	57.8	150.0	58.1	166.0	58.1
4								
5								
6								



Section Number 13 of 24
Centerline Station 3+40

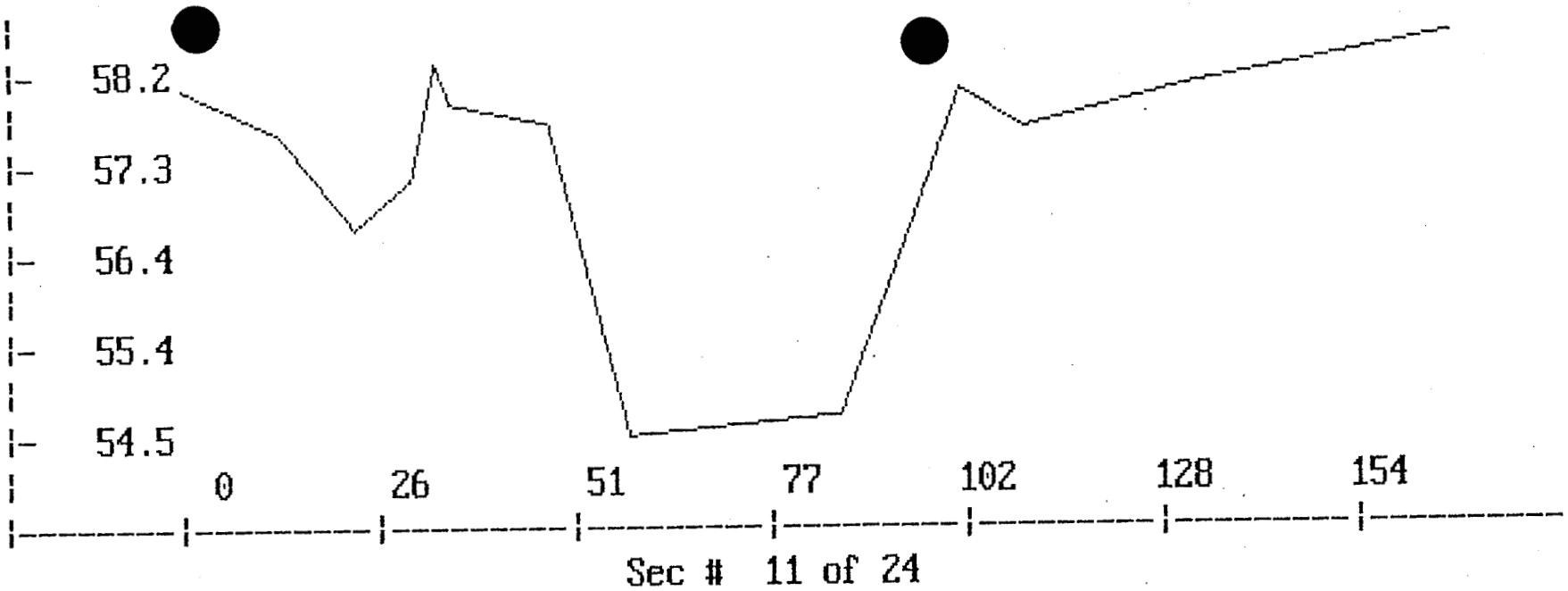
Grade Elevation = 58.10
Excavated Area = 0.00 Sq Ft
Filled Area = 179.46 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = %446.3:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

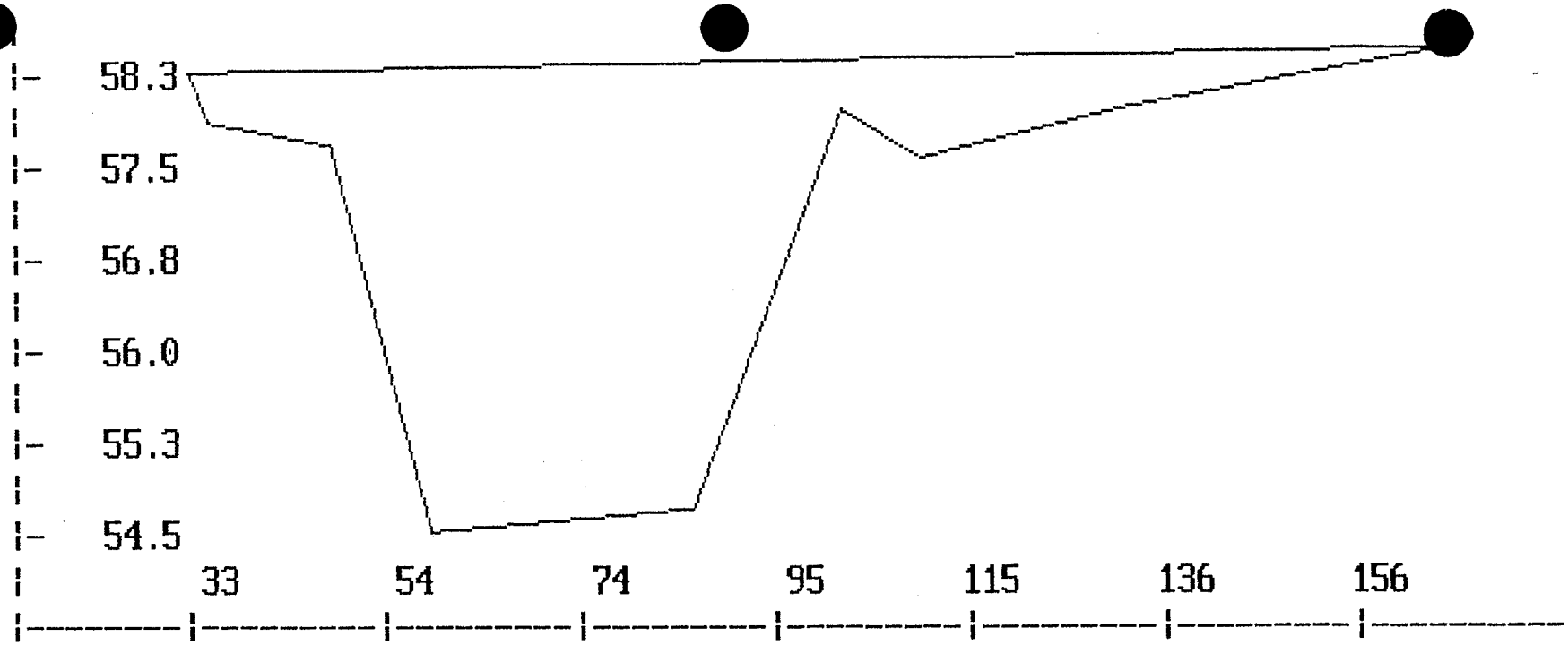
Slope Intercepts

Left	32.1	58.4
Right	166.0	58.1



Centerline Station = 30+60
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		58.0	12.6	57.6	22.5	56.6	30.0	57.1
2	33.3	58.3	35.3	57.9	48.0	57.7	58.5	54.5
3	86.0	54.7	102.0	58.0	110.5	57.6	131.5	58.0
4	166.0	58.5						
5								
6								



Section Number 14 of 24
Centerline Station 3+60

Grade Elevation = 58.50

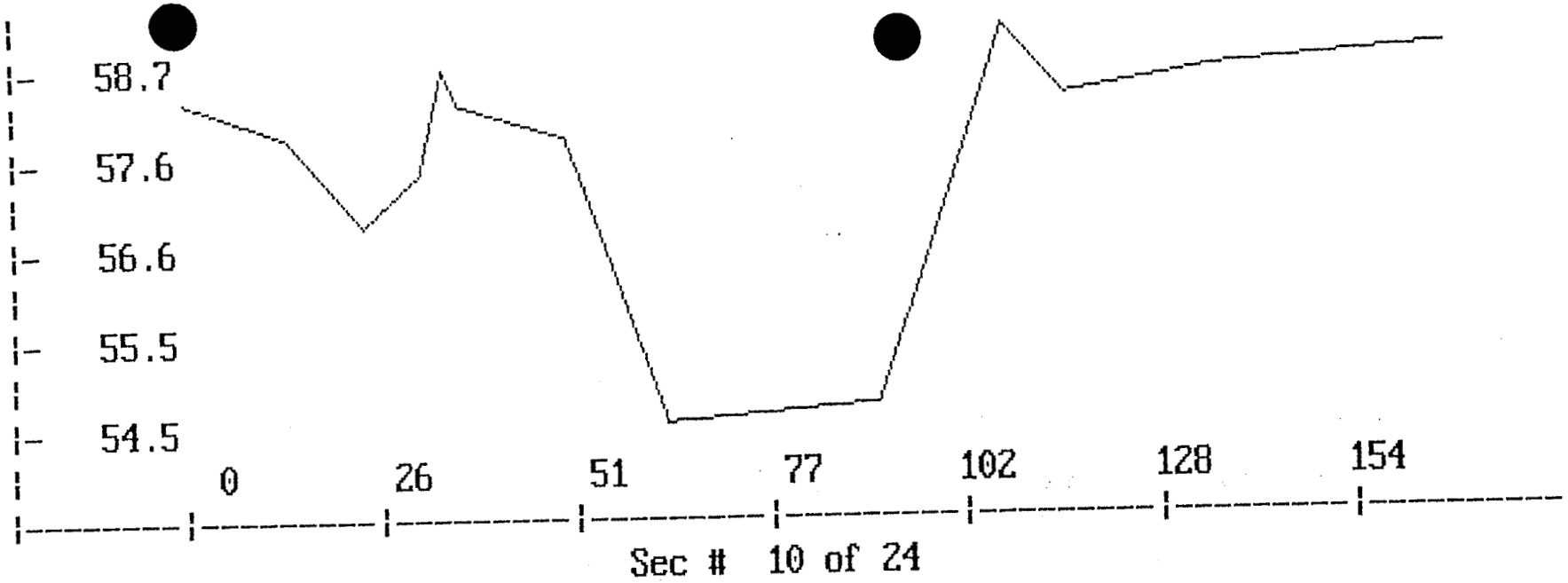
Filled Area = 192.55 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %663.5:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

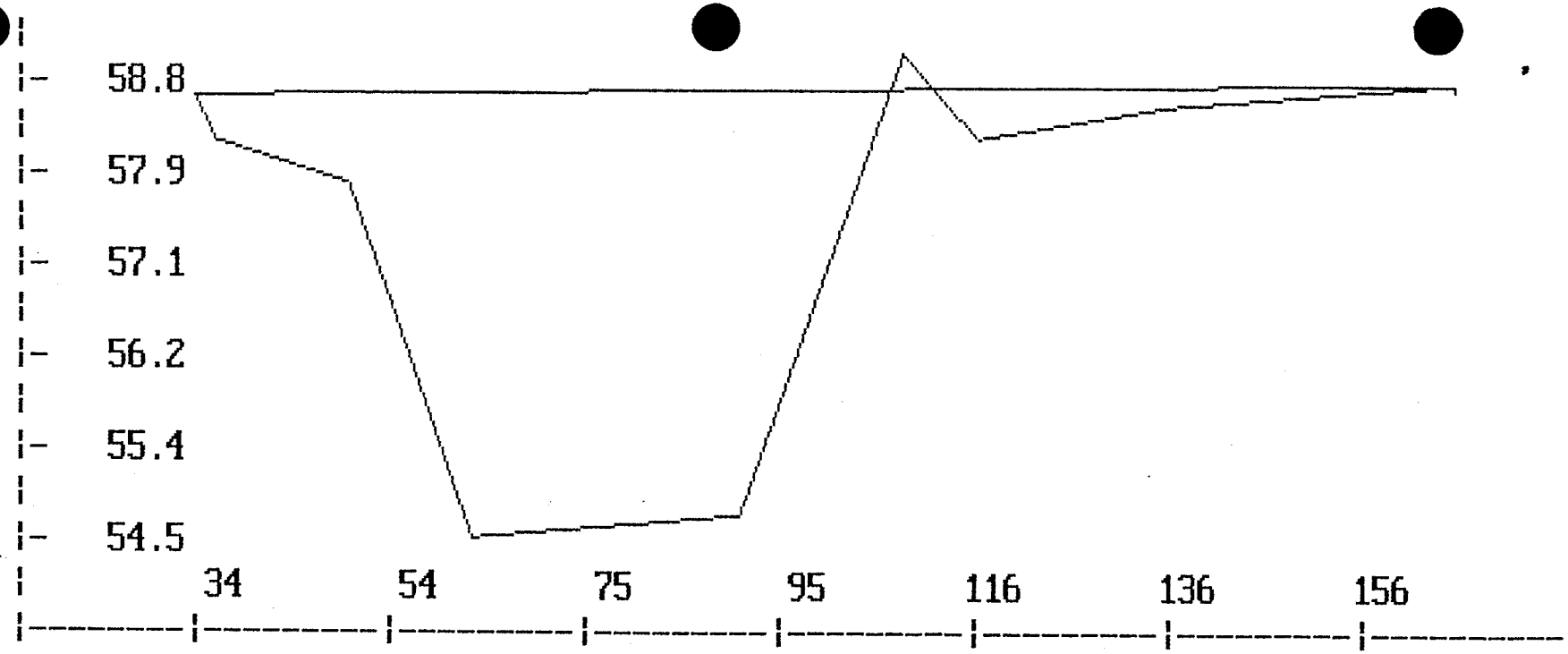
Slope Intercepts

Left	33.3	58.3
Right	166.0	58.5



Centerline Station = 30+80
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		58.3	13.0	57.8	23.3	56.8	30.7	57.4
2	34.0	58.6	36.0	58.2	50.0	57.8	63.0	54.5
3	91.0	54.7	108.0	59.0	116.0	58.2	136.0	58.5
4	166.0	58.7						
5								
6								



Section Number 15 of 24
Centerline Station 3+80

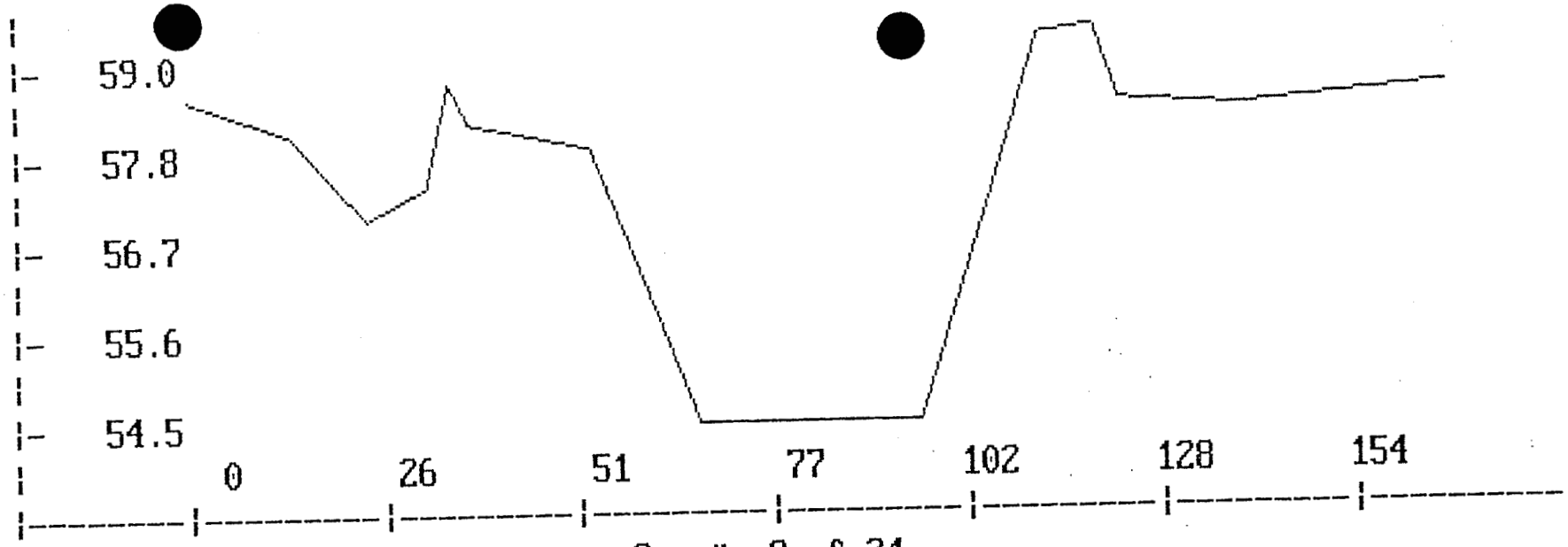
Grade Elevation = 58.70
Excavated Area = 0.82 Sq Ft
Filled Area = 194.82 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %1320.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

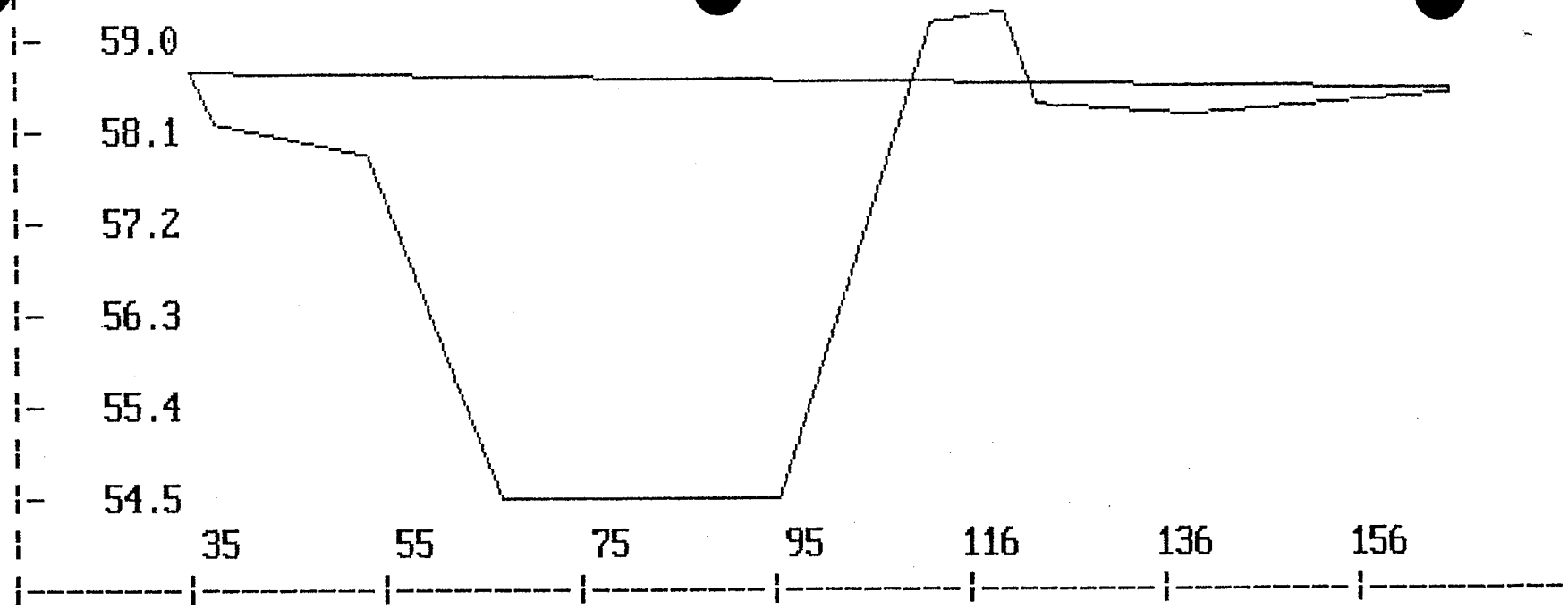
Left	34.0	58.6
Right	166.0	58.7



Sec # 9 of 24

Centerline Station = 40+00
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		58.5	13.2	58.1	23.6	57.0	31.4	57.4
2	34.5	58.7	37.0	58.2	53.0	57.9	67.0	54.5
3	96.0	54.5	112.0	59.2	119.5	59.3	122.7	58.4
4	140.0	58.3	166.0	58.5				
5								
6								



Section Number 16 of 24
Centerline Station 4+00

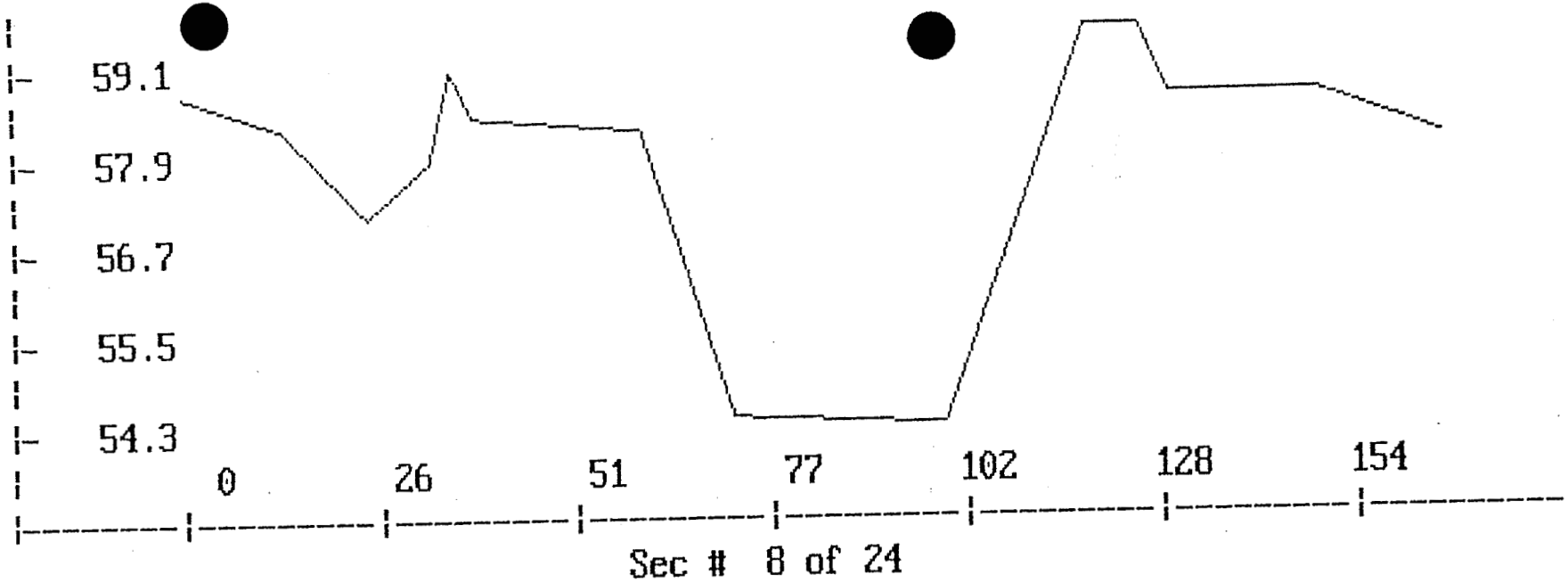
Grade Elevation = 58.50
Excavated Area = 6.65 Sq Ft
Filled Area = 200.17 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = %657.5:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

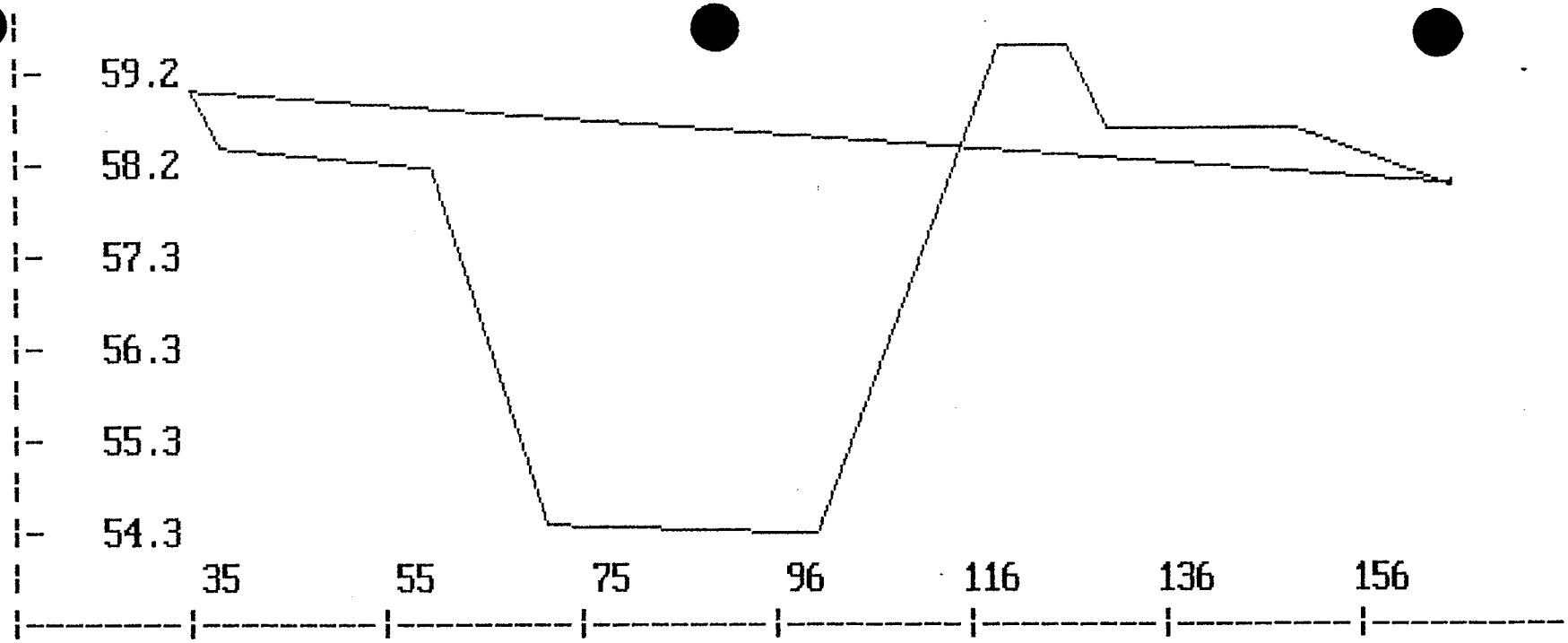
Slope Intercepts

Left	34.5	58.7
Right	166.0	58.5



Centerline Station = 40+20
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		58.7	12.9	58.3	24.0	57.1	32.0	57.8
2	35.0	59.0	38.0	58.4	60.0	58.2	72.0	54.4
3	100.0	54.3	119.0	59.5	126.0	59.5	130.0	58.6
4	150.0	58.6	166.0	58.0				
5								
6								



Section Number 17 of 24
Centerline Station 4+20

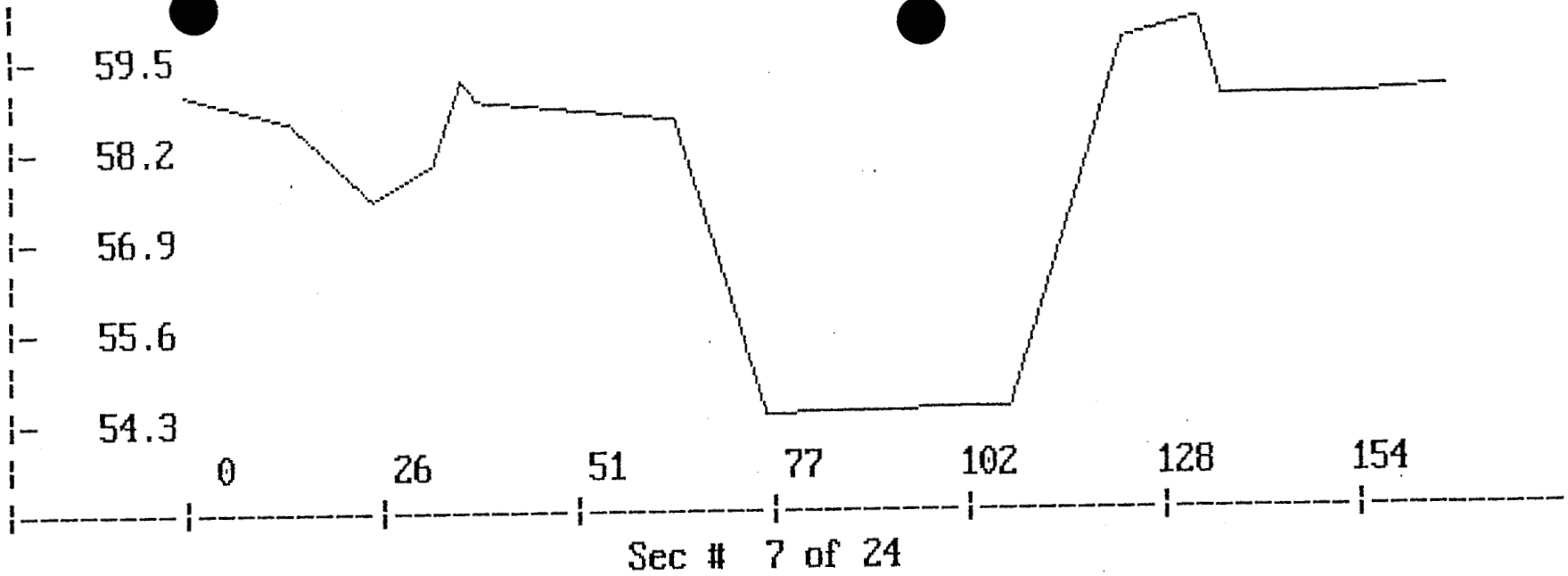
Grade Elevation = 58.00
Excavated Area = 25.38 Sq Ft
Filled Area = 194.18 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = %131.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

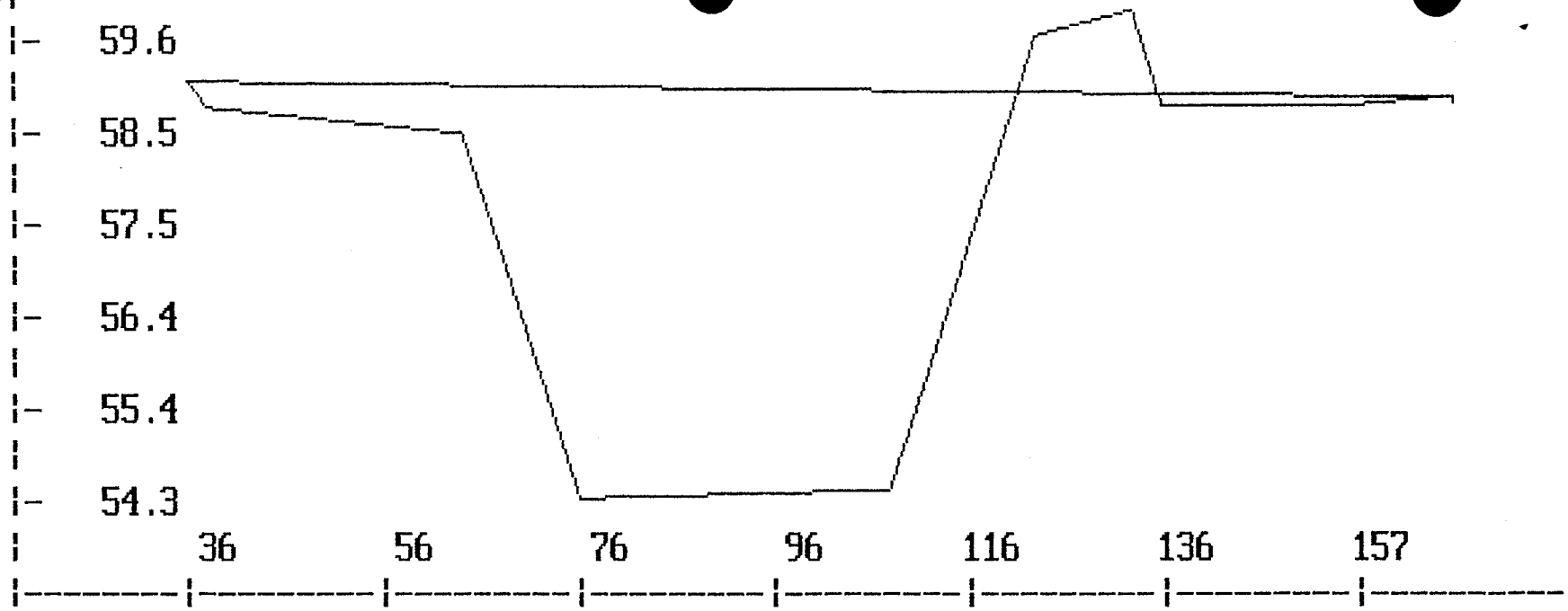
Slope Intercepts

Left	35.0	59.0
Right	166.0	58.0



Centerline Station = 40+40
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		59.0	13.7	58.5	24.6	57.4	32.2	57.9
2	36.0	59.1	38.0	58.8	64.0	58.5	76.0	54.3
3	108.0	54.4	123.0	59.6	133.0	59.9	136.0	58.8
4	156.0	58.8	166.0	58.9				
5								
6								



Section Number 18 of 24
Centerline Station 4+40

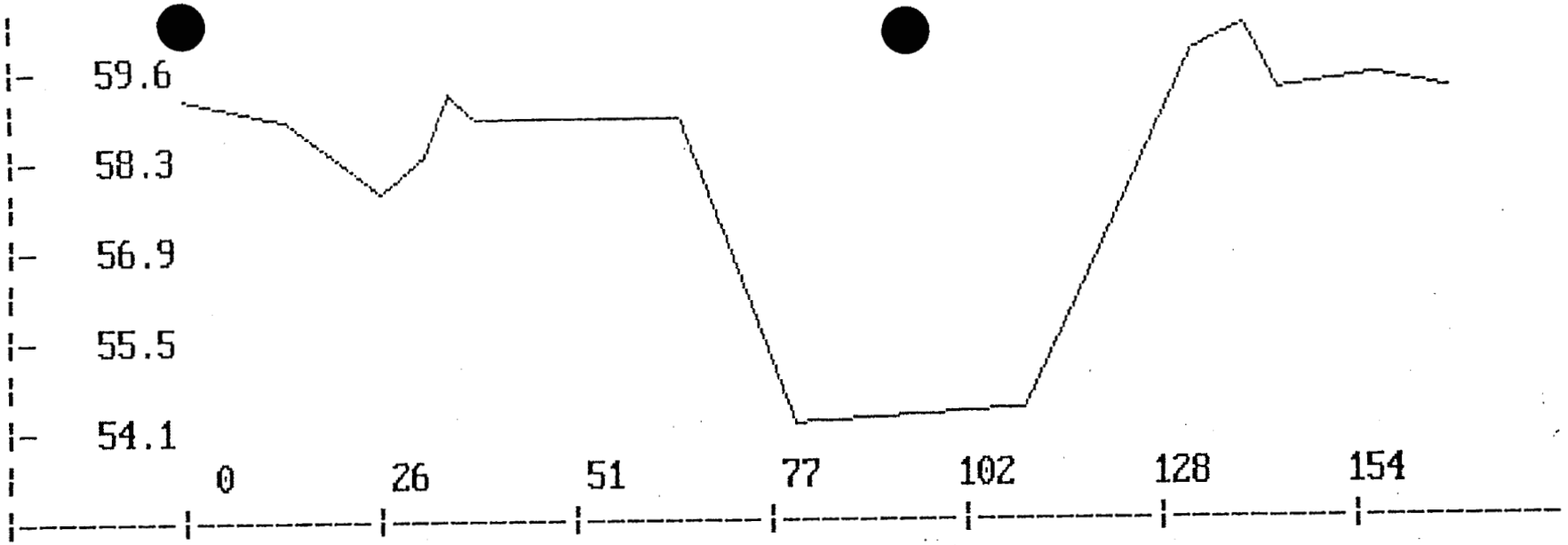
Grade Elevation = 58.90
Excavated Area = 9.73 Sq Ft
Filled Area = 225.88 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = %650.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

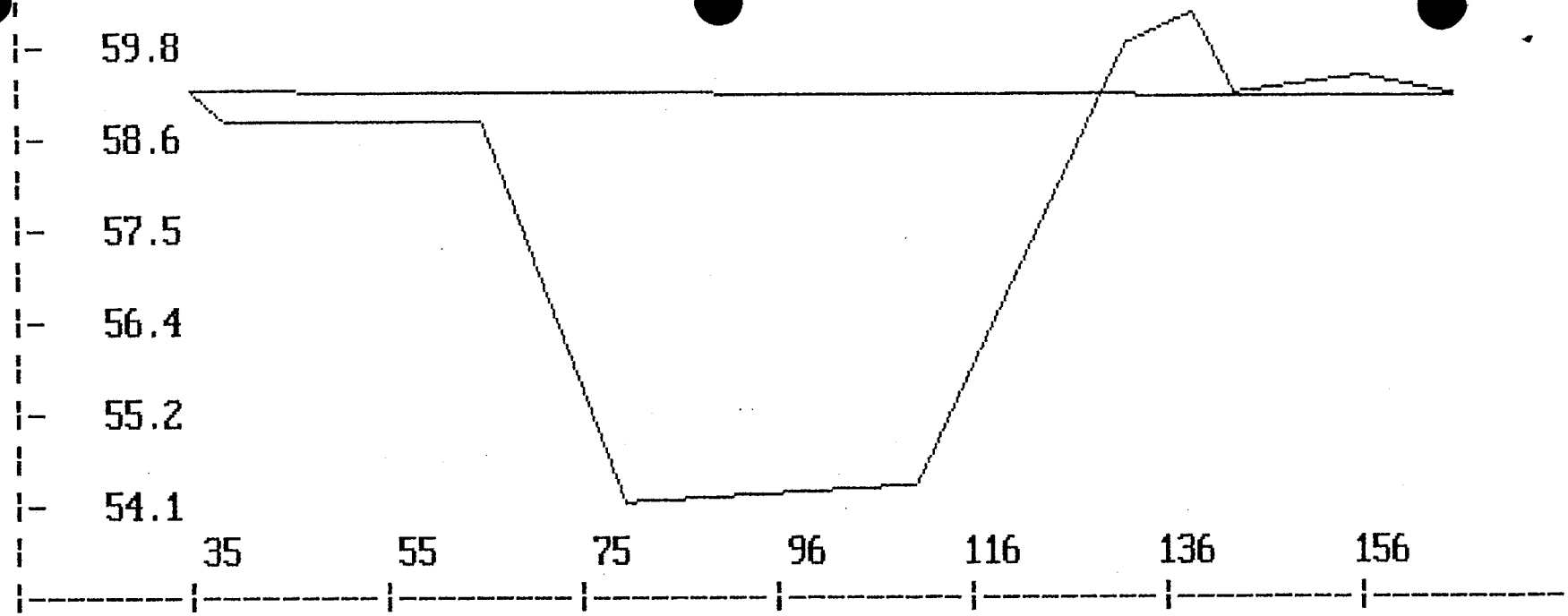
Left	36.0	59.1
Right	166.0	58.9



Sec # 6 of 24

Centerline Station = 40+60
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		59.2	13.5	58.8	26.0	57.7	31.5	58.2
2	35.0	59.2	38.5	58.8	65.0	58.8	80.0	54.1
3	110.0	54.3	132.0	59.7	139.0	60.1	143.4	59.1
4	157.0	59.3	166.0	59.1				
5								
6								



Section Number 19 of 24
Centerline Station 4+60

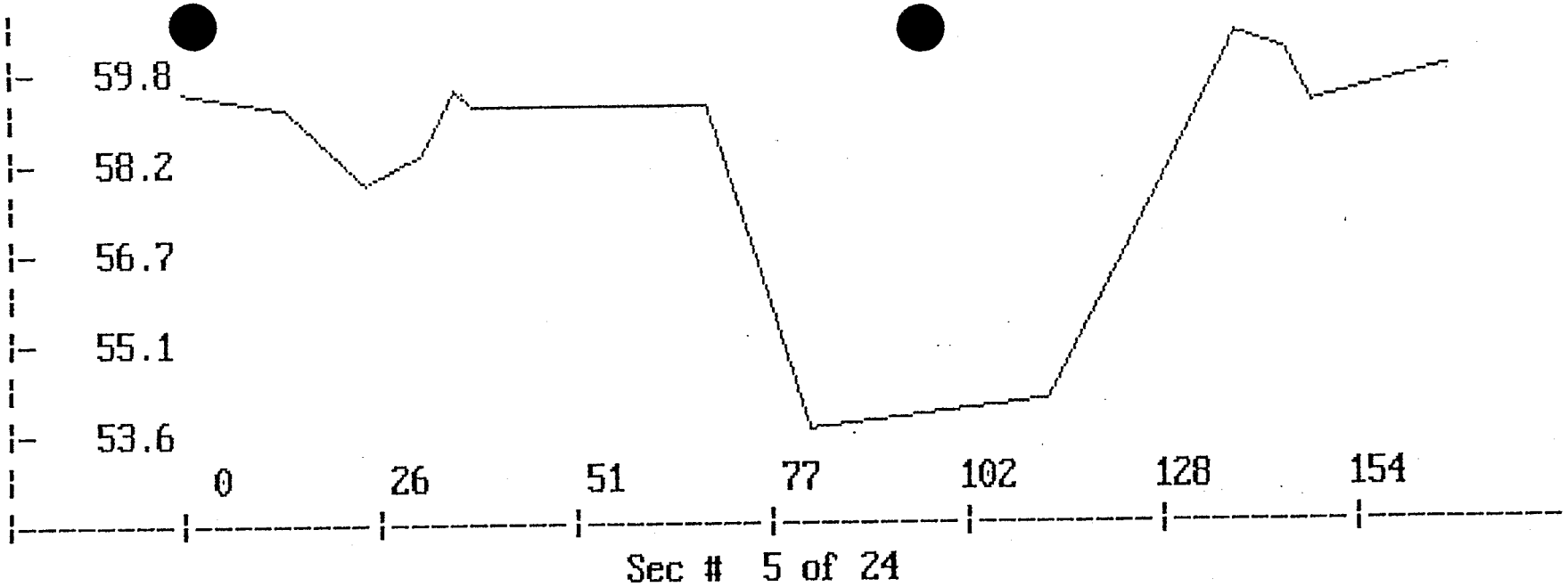
Grade Elevation = 59.10
Excavated Area = 10.30 Sq Ft
Filled Area = 248.04 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = %1310.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

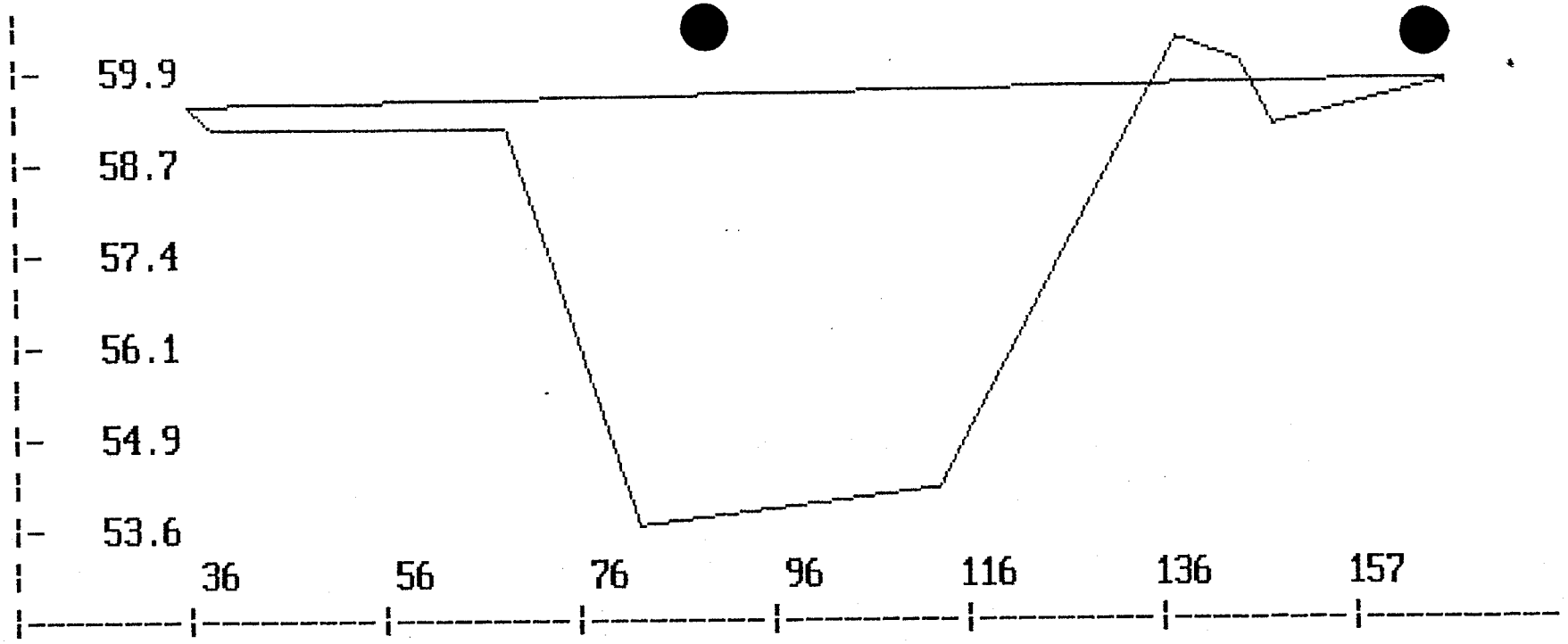
Slope Intercepts

Left	35.0	59.2
Right	166.0	59.1



Centerline Station = 40+80
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		59.4	13.3	59.1	24.0	57.8	31.0	58.3
2	35.5	59.4	38.0	59.1	68.5	59.1	82.0	53.6
3	113.0	54.1	138.0	60.3	144.5	60.0	148.0	59.1
4	166.0	59.7						
5								
6								



Section Number 20 of 24
Centerline Station 4+80

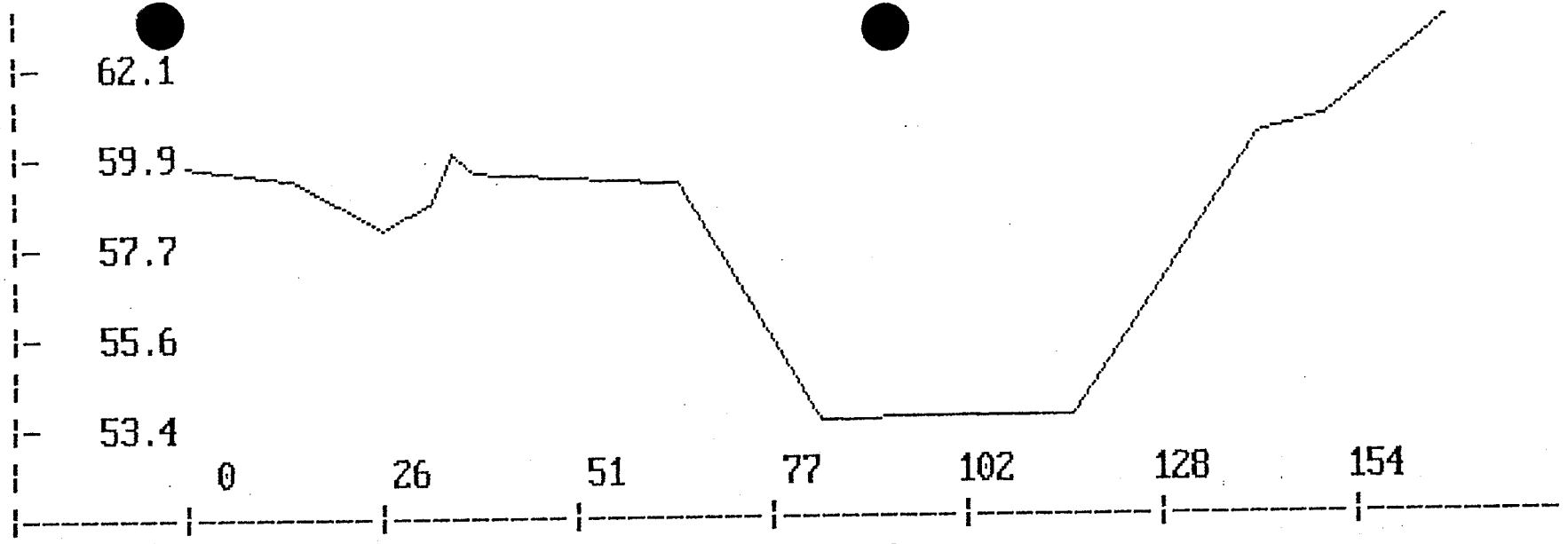
Grade Elevation = 59.70
Excavated Area = 4.43 Sq Ft
Filled Area = 296.35 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %435.0:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

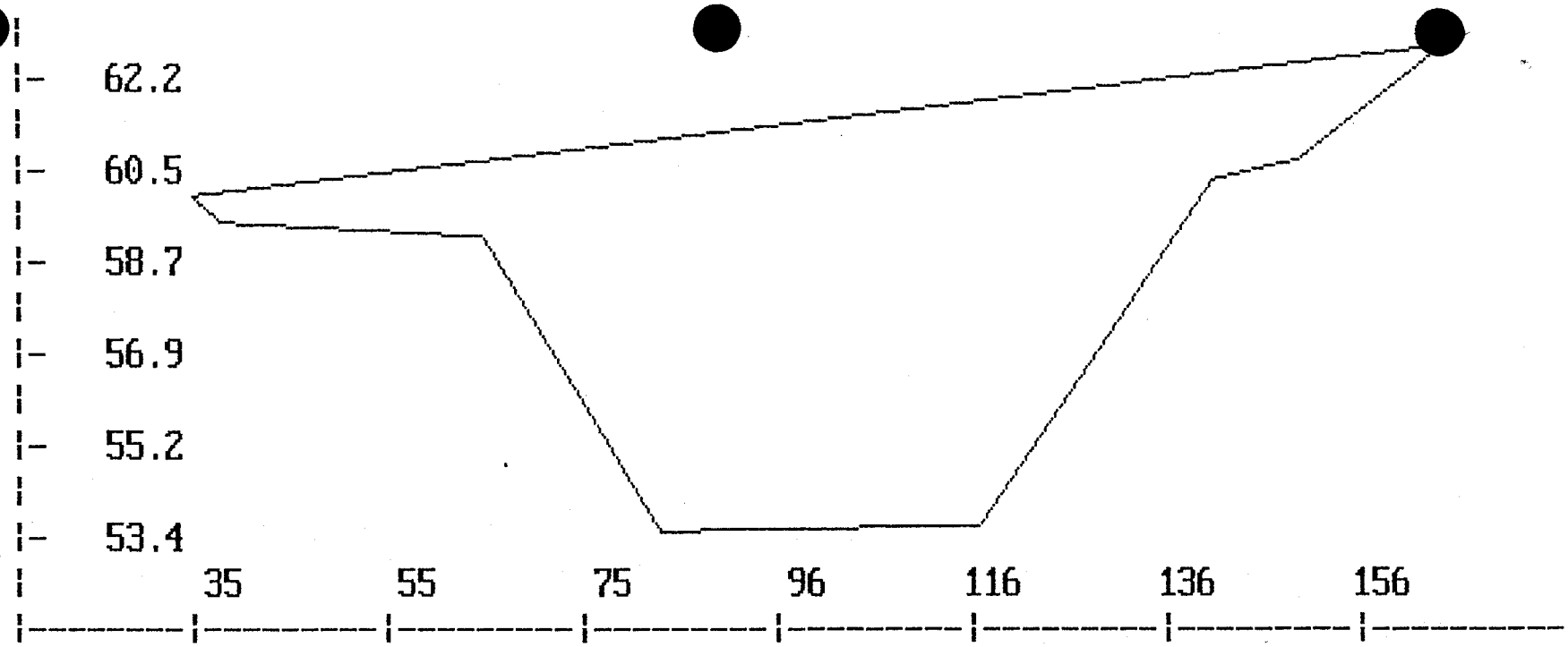
Left	35.5	59.4
Right	166.0	59.7



Sec # 4 of 24

Centerline Station = 50+00
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		59.7	14.0	59.3	26.0	58.1	32.0	58.7
2	35.0	59.9	38.0	59.4	65.0	59.1	83.5	53.4
3	116.7	53.5	141.0	60.1	150.0	60.5	166.0	62.8
4								
5								
6								



Section Number 21 of 24
Centerline Station 5+00

Grade Elevation = 62.80

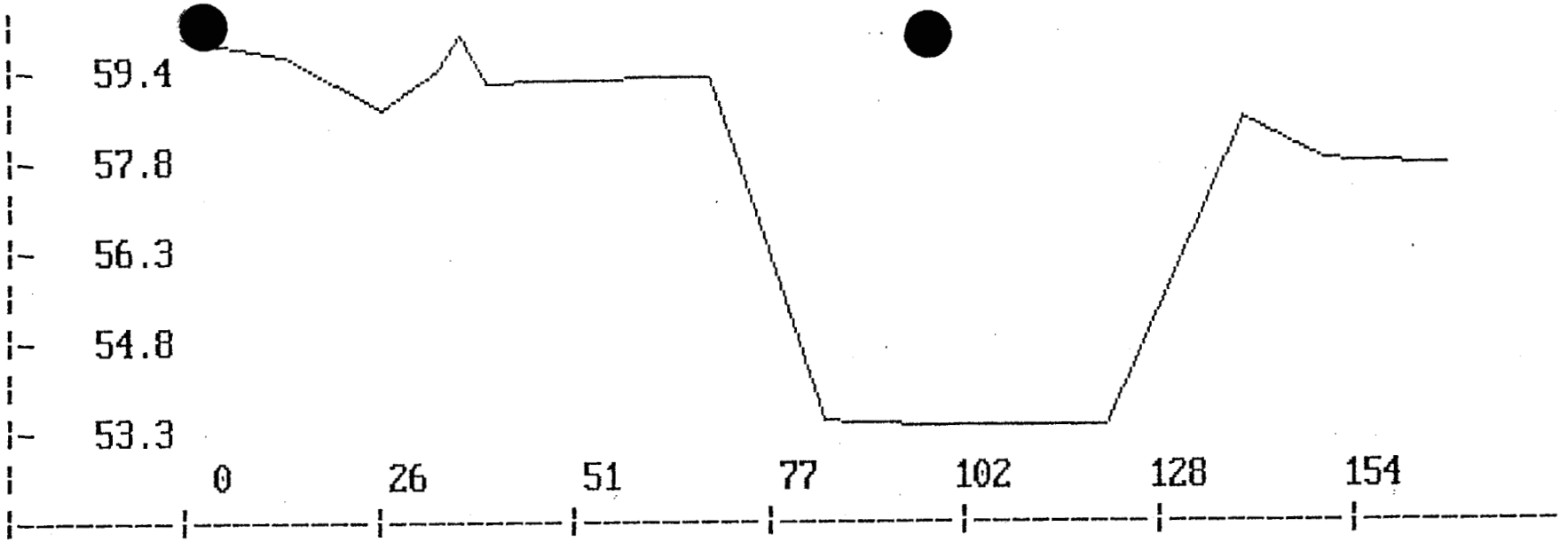
Filled Area = 533.64 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = 45.2:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

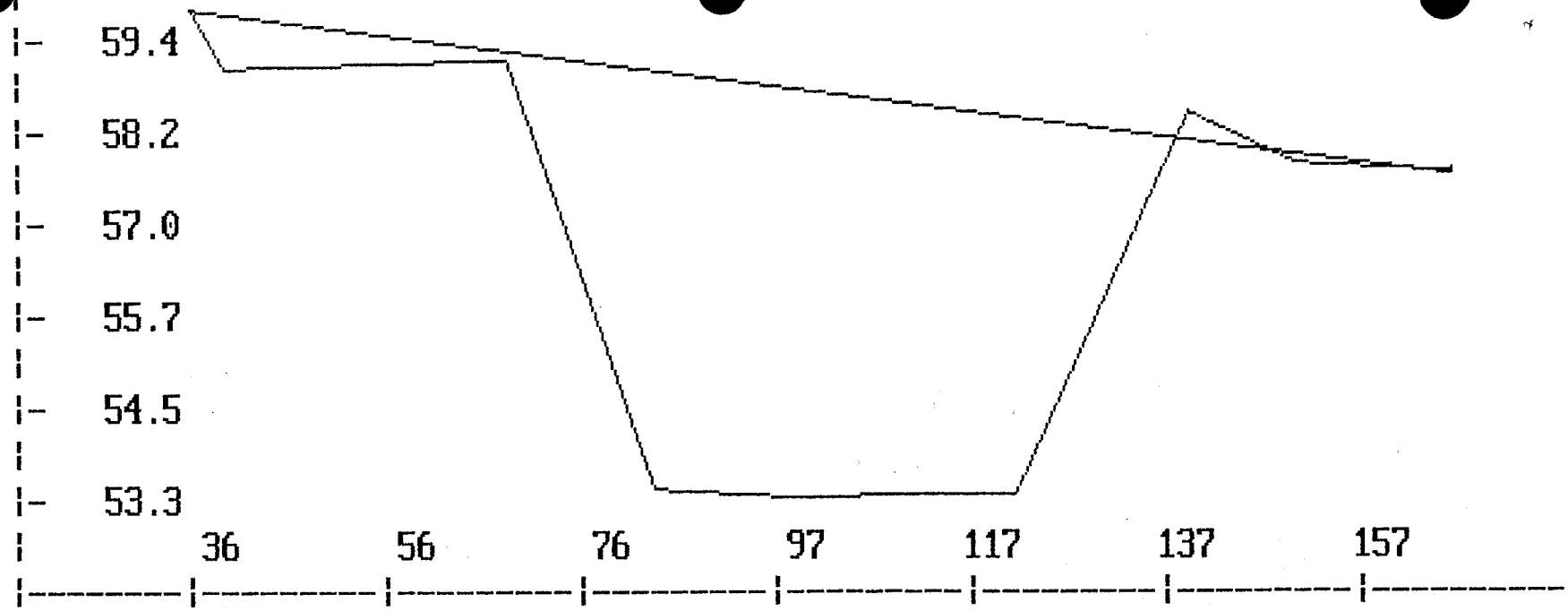
Left	35.0	59.9
Right	166.0	62.8



Sec # 3 of 24

Centerline Station = 50+20
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		59.8	13.9	59.5	26.3	58.6	33.3	59.2
2	36.4	59.8	40.0	59.0	69.0	59.1	84.0	53.4
3	100.0	53.3	121.0	53.3	139.0	58.4	150.0	57.7
4	166.0	57.6						
5								
6								



Section Number 22 of 24
Centerline Station 5+20

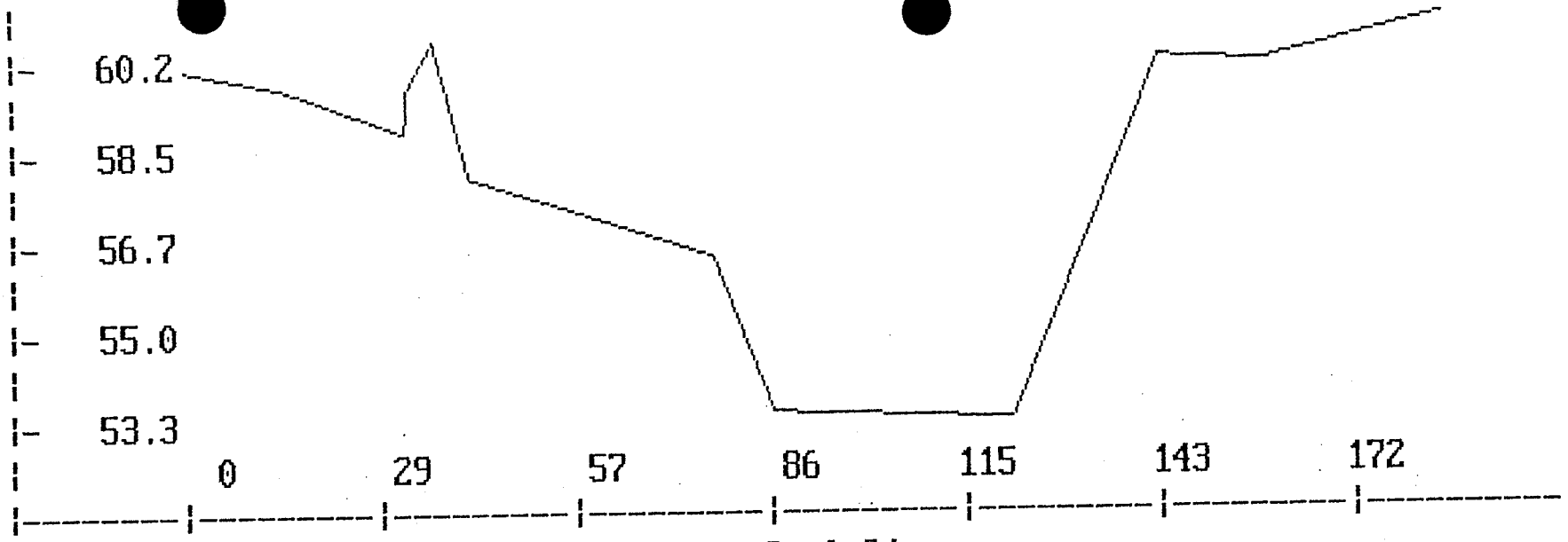
Grade Elevation = 57.60
Excavated Area = 1.44 Sq Ft
Filled Area = 300.47 Sq Ft

Rules - On ; Extrapolation - Y

Bottom Width = 0.0 ft.
Left Sideslope = 58.9:1
Right Sideslope = 1.0:1
CL Offset = 166.0 ft

Slope Intercepts

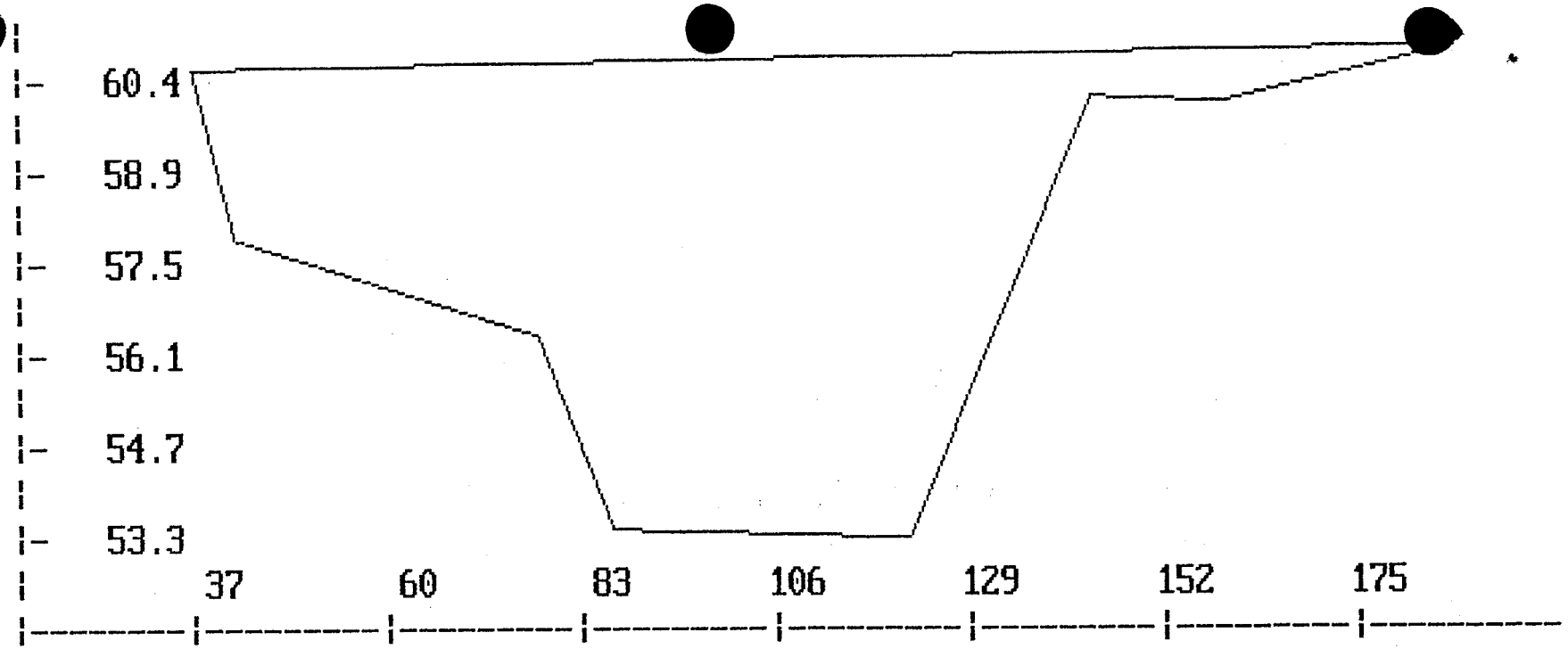
Left	36.4	59.8
Right	166.0	57.6



Sec # 2 of 24

Centerline Station = 50+40
Elevation or Rod Reading (E/R) E

	Dist	Elev	Dist	Elev	Dist	Elev	Dist	Elev
1		60.0	14.5	59.7	32.5	58.8	33.0	59.6
2	37.0	60.5	42.0	57.9	78.0	56.4	86.8	53.4
3	100.0	53.4	122.0	53.3	144.0	60.1	160.0	60.0
4	186.0	60.8						
5								
6								



Section Number 23 of 24
Centerline Station 5+40

Grade Elevation = 60.80

Filled Area = 544.73 Sq Ft

Rules - On ; Extrapolation - Y

Top Width = 0.0 ft.
Left Sideslope = %496.7:1
Right Sideslope = 1.0:1
CL Offset = 186.0 ft

Slope Intercepts

Left	37.0	60.5
Right	186.0	60.8

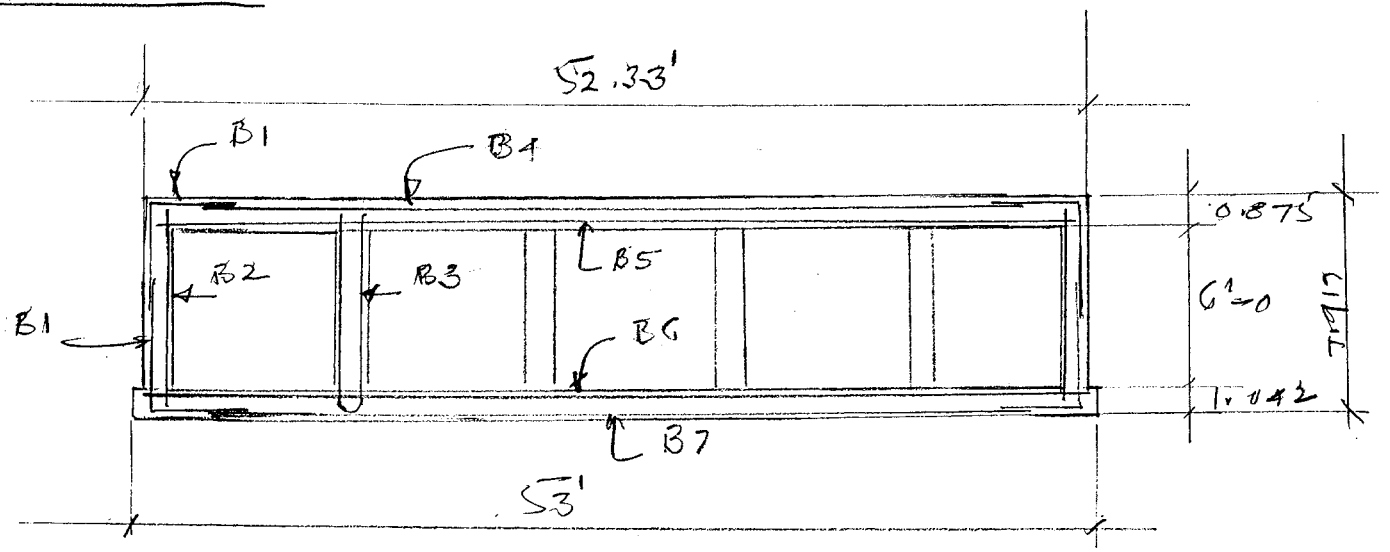
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 9 OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Box Sect^n:



B1: 6'-10 / 4'-8 L = (4.83 + 4.67) = 9.5'

#6, (1.502 × 9.5) = 14.27 lbs/Bar

B2: (6' + 8½ + 9½) = 7.5'

(1.502 × 7.5) = 11.27 lbs/Bar

B3: 7'-6 + 8" (7'-6) 2 + 8" = 15.67'

(15.67 × 1.502) = 23.54

B4: L = 46.33' 46.33 × 1.502 = 69.59 lbs/Bar

B5: L = 52.0 52 × 1.502 = 78.10

B6: L = 52.67 52.67 × 1.502 = 79.11

B7: L = 46.33 46.33 × 1.502 = 69.59

Wt. Per ft width of Slab: lbs/ft

B1: (14.27 × 4) 2 ← 2 Bars per ft = 114.16

B2: (11.27 × 2) 1 = 22.54

B3: ~~(45.67 × 4)~~ 1 = ~~62.68~~ 94.16

B4: (69.59 × 1) 2 = 139.18

~~332.56~~ 370.04

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 10 OF 40

DETAIL Qty. COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

B5: (78.10 × 1) 2 (2 Bars/ft) = 156.20

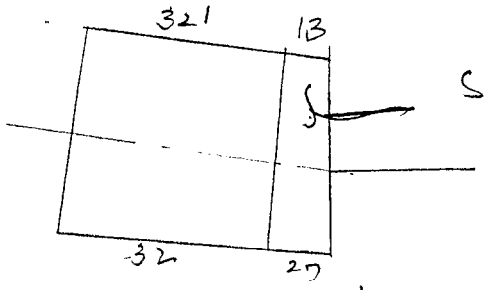
B6: (79.11 × 1) 2 = 158.22

B7: (69.59 × 1) 2 = 139.18

Laps: [(1.502 × 2.0) 4] 2 (Long; No. of Laps) = 24.03

Typ. Box Sect. Reinf. St = 816.19 lbs/ft

St. Box Sect = 32 + 6.25 = 38.25' (Incl; Each side)



Skewed Part

Skew Box Qty = (816.19 × 38.25) = 31219 lbs

B5 (N. Side) (34 #6),	(34 × 20) 1.502 (Long)	= 1021	Top Slab 4648
B5 (S. Side) 69 #6	(69 × 35) 1.502	= 3627	
B6 (N. Side) 34 #6,	(34 × 20.33) 1.502	= 1038	Bot Slab 4700
B6 (S. Side)	(69 × 35.33) 1.502	= 3662	
B4 (N. Side)	(34 × 17.0) 1.502	= 868	Top Slab 4184
B4 (S. Side)	(69 × 32.0) 1.502	= 3316	
		4184	4184

B7: Bott. Slab Same as Top Slab

48935

(A)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 23 OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

EXCAVATION CHECKED BY _____ DATE _____

Structural Exc^n

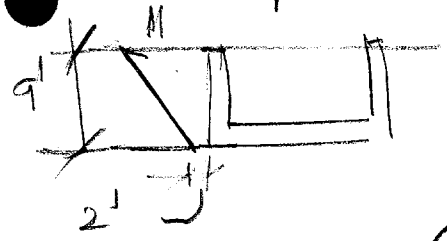
Sta. (47+00) TO (48+00)

1) (8.0 × 10) = 80 sq/ft
2) (½ × 8 × 10) = 40
   120 } — Sta. 48+00

Sta. 47+00 = 0
47.5+00 = 120

AV = (0 + 120)/2 = 60 sq/ft

Qty = (60 × 100)/27 = 222 (N. Side) — 222 CY

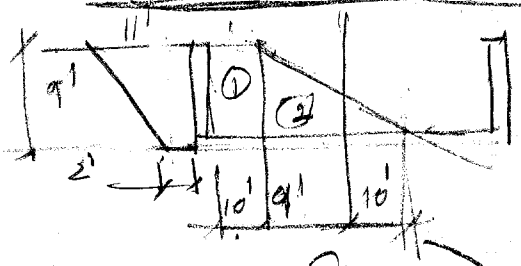


½ (2 + 11) 9 = 58.5

Qty = (58.5 × 100)/27 = (N. Side) — 217

South Side: (58.5 × 50') = 2925/27 — 108
[Approx. Length

Betn Sta. 48 & 49



→ Sta. 49+00

A1 = (11 × 9) = 99 sq/ft
A2 = ½ (19 × 9) = 86
   185 sq/ft

AV. Betn Sta. 48 & 49
= (120 + 185)/2 = 153 sq/ft — 547 CY

(B)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl PAGE 24 OF 40

DETAIL Qty's (Excavn) COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Stat'n (48+00) To (49+00) Cont'd

Qty (N. Side) (153 x 100)/27 = 567
(58.5 x 100)/27 = 217
784 — 784 CY

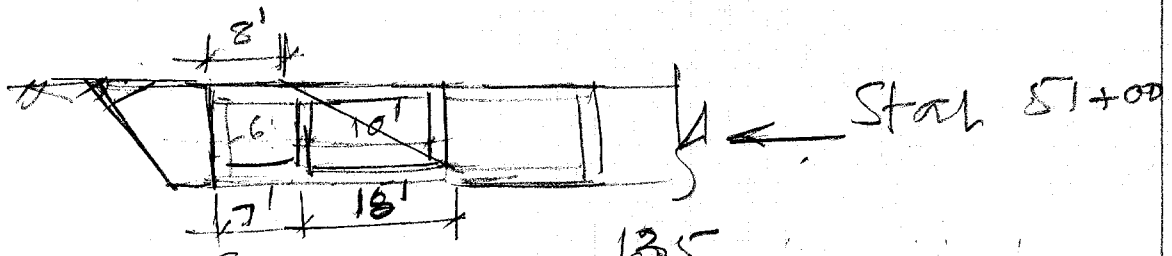
Qty (S. Side) — Negligable

Stat 49+00 To Stat 50+00

Stat 50 is almost same as Stat 50+00

Qty (N. Side) = (185 x 100)/27 = 685
58.5 x 100/27 = 217
902 — 902

Stat 50+00 To Stat 51+00



(N. Side) $A_1 = \frac{1}{2}(22+8)9 = 135$
$A_2 = 58.5$
193.5

Qty = 193.5 x 100/27 = 717

2403

(A)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

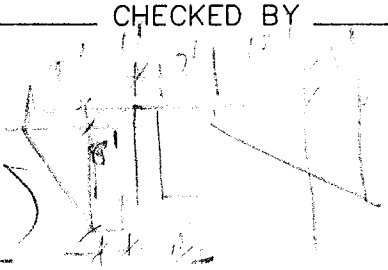
PROJECT Guadalupe Channel PAGE 23 (A) OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

Excavation CHECKED BY _____ DATE _____

Structural Exc^n

Sta. (47+00) to (48+00)

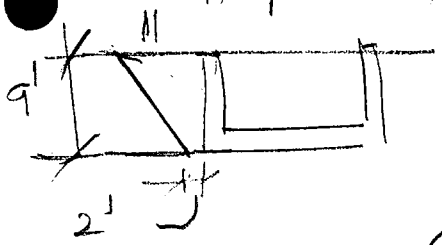


1) (8.0 × 10) = 80 sq/ft
2) (½ × 8 × 10) = 40
120

Sta. 47+00 = 0
48+00 = 120

AV = (0 + 120)/2 = 60 sq/ft

Qty = (60 × 100)/27 = 222 (N. Side) — 222 CY

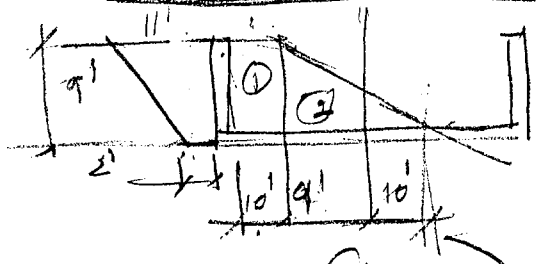


½ (2 + 11) 9 = 58.5

Qty = (58.5 × 100)/27 = (N. Side) — 217

South Side: (58.5 × 50') = 2925/27 — 108
(Approx. Length)

Bet^n Sta. 48 & 49



→ Sta. 47+00

A1 = (11 × 9) = 99 sq/ft

A2 = ½ (19 × 9) = 86
185 sq/ft

AV. Bet^n Sta. 48 & 49
= (120 + 185)/2 = 153 sq/ft — 547 CY

(B)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl PAGE 24(A) OF

DETAIL Qty & Excavn COMPUTED KVH DATE 1/93

CHECKED BY DATE

Stat^n (48+00) To (49+00) Cont'd

Qty (N. Side) (153 x 100)/27 = 567
(58.5 x 100)/27 = 217
784 — 784 CY

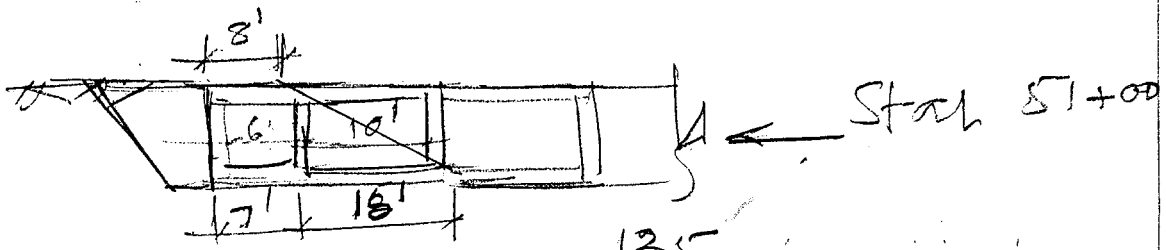
Qty (S. Side) — Negligable

Stat (49+00 To Stat. 50+00

Stat 50 is almost same as Stat 50+00

Qty (N. Side) = (185 x 100)/27 = 685
58.5 x 100/27 = 217
902 — 902

Stat 50+00 To Stat 51+00



(N. Side) $A_1 = \frac{1}{2}(22+8)9 = 135$

$A_2 = 58.5$

193.5

Qty = 193.5 x 100/27 = 717

2403

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Ch. PAGE 2.54 OF
DETAIL Estimate COMPUTED KVH DATE 1/9
Excavation CHECKED BY DATE

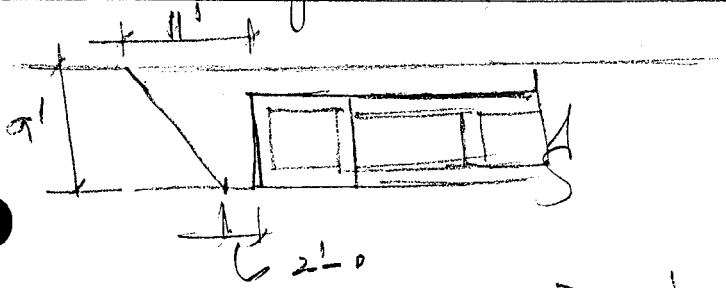
Box Excav of Guad. Ch.

Approx. Long (Ch. Side) = 45'

Use the same Cross Section as at Stat. 51+00

Qty = (193.5 × 45)/27 = 322 CY

New Single Cell on N. Side.



$A_1 = \frac{1}{2}(2+11)\cdot 9' = 58.5$ sq/ft

Approx L. = (42 + 41) = 83'

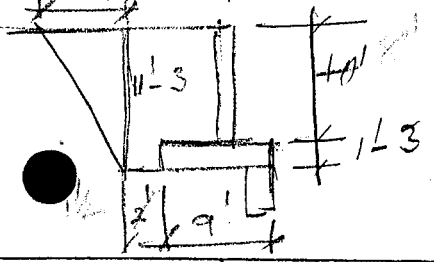
Qty = (58.5 × 83)/27 = 180 CY

Curved Box Excav of Salerman

N. Side: Curved Long = $\frac{3.14 \times 20}{4} + 6.25$
= 22' ±

Qty (N. Side) = 58.5 × 22/27 = 48

11½ ceiling walls



A = ½ (11 × 22.25) + 1.25
= 187 sq/ft

Q = [187 × 30] 2 / 27
Long 2 Sides = 201

~~415~~

~~965~~

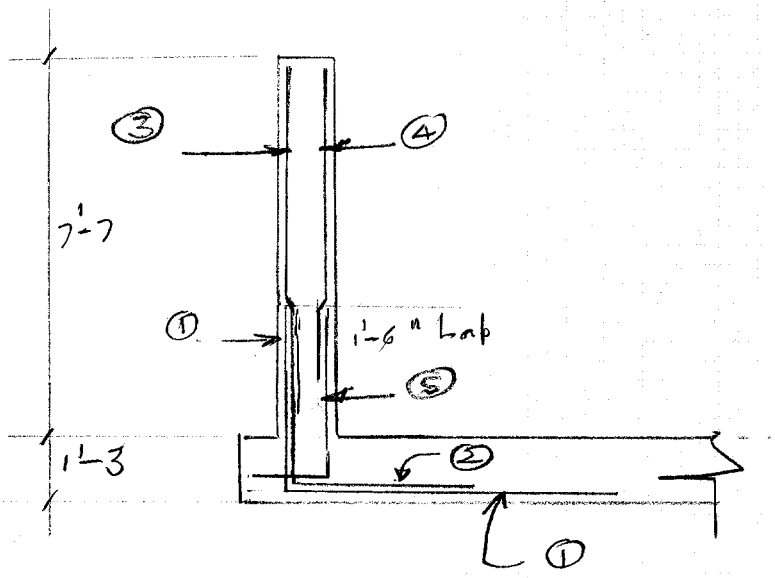
Total Excav = 547 + 2403 + ~~965~~ = ~~3915~~ 3368

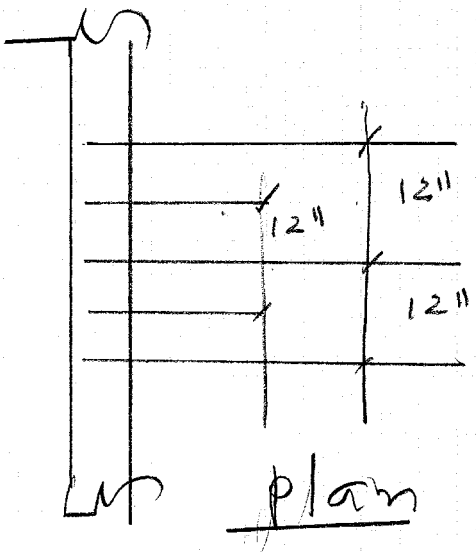
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 1 OF 40

DETAIL Quantities COMPUTED KNH DATE 12/92

Reinf. Sheet CHECKED BY _____ DATE _____





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 2 OF 40

DETAIL Quantities COMPUTED KVH DATE 12/92

Reinf. Steel CHECKED BY _____ DATE _____

Reinf Steel

Stah (47+00) To (47+45) (Wall Steel)

① 4'-0 | 7'-4 L = 11.33' @ 1.043 lbs/ft #5 bar = 11.82 lbs/bar

② 4'-0 | 4'-0 L = 8.0' @ 1.043 = 8.34 lbs/bar

③ Top Bar Outside #5 @ 12, L = 6-7" = 6.58' (6.58 × 1.043) = 6.86 lbs/bar

④ Top bar #4 @ 12, L = 5-11 = 5.92' 5.92 × 0.668 = 3.95 lbs/bar

⑤ Bott. Bar Inside #5 @ 12" | 4' 1'-2 L = 5.17' (5.17 × 1.043) = 5.39 lbs/bar

Quantities per ft of wall:

①	1 Bars	(1 × 11.82)	= 11.82
②	1 Bar	@	= 8.34
③	1 Bar	@	= 6.86
④	1 Bar	@	= 3.95
⑤	1 Bar	@	= 5.39
	Typ. Section wall Steel per ft		36.36 lbs/ft

Stah (47+00) To (47+45):

North wall L = 45

Qty = (45 × 36.36) = 1636.2

South wall = 1636.2

3272.4

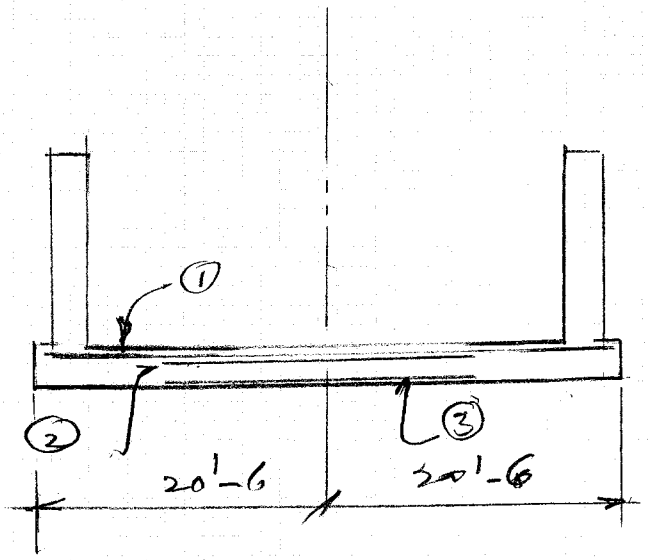
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 3 OF 40

DETAIL Reinf. Steel COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Reinf Steel (Base Slab)



Bar 1 : L = 40-8, #5

(1.043 x 40.67) = 42.4 lbs/Bar

Bar 2 : L = 28 ; 1.043 x 28 = 29.2

Bar 3 : L = 28, 1.043 x 28 = 29.2

Typ Per ft :

1 Long Bar = 42.4 lbs

1 Sht. Bar = 29.2

1 Sht. Bar = 29.2

100.8 lbs per ft

Typ. Section Base Slab per ft = 100.8 lbs/ft

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chf PAGE 4 OF 40

DETAIL Gate 8 COMPUTED KVH DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

Stat. (49+45) To 50+25.95

L = 281'

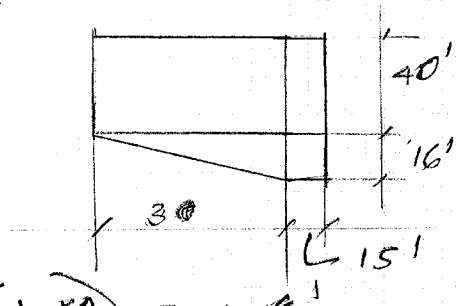
Wall St: (36.36 lbs/L/L × 281) 2 (2 walls) = 20,434 lbs

Base Slab: (100.8 × 281) = 28,325

Stat (49+00) To (47+45)

Walls: (36.36 × 45) 2 = 3,272

Base Slab:



Avg L = (56 + 40)/2 = 48'

Proportions = 48/40 = 1.2

prop = 56/40 = 1.4

Base Slab 1 = (100.8 × 30) 1.2 = 3,629

Base Slab 2 = (100.8 × 15) 1.4 = 2,117

57,777 lbs

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 5 OF 40

DETAIL Style COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

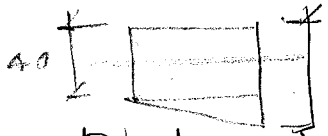
Start (50 + 25.95) To 50 + 53.23

L = 27.28'

walls: (36.36 × 27.28) 2 = 1984

2 walls

Base Slab:



26.5
20.00
46.5

AN = $\frac{(40 + 46.5)}{2}$ = 43.25

Proportion: $\frac{43.25}{40.00}$ = 1.08

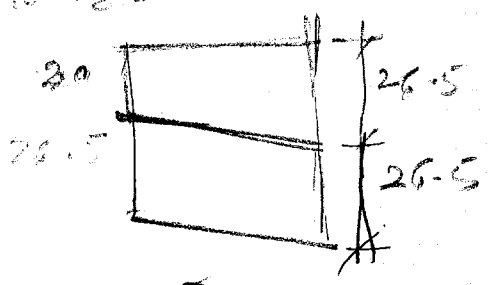
Base Slab: (100.8 × 27.28) 1.08 = 2970

Start. 50 + 53.23 To 50 + 80.52

L = 27.3'

walls: (36.36 × 27.3) 2 = 1984

Base Slab



$\frac{(46.5 + 53)}{2}$ = 49.75

Prop = $\frac{49.75}{40}$ = 1.244

Base Sl = (100.8 × 27.3) 1.244 = 3423

10361

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 6 OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Stat. 50+80.52 TO 50+94.96

L_1 (North) = 20'

L_2 South = 8'

Wall N: (36.36 × 20) = 727] 1115 Nos

Wall S: 36.36 × 8 (6.0/4.5) = 388]

Spacing

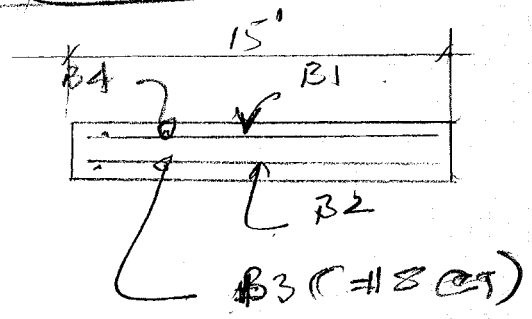
Base Slab:

Perim = 51.0 / 4.0 = 1.275

Average = (20+8)/2 = 14'

Qty = (100.8 × 14) 1.275 × 6/4.5 = 2399

Access Ramp



B1: #4 @ 12": Length = 80', 81 Bars

Bar Length = 14.67', (0.668 × 14.67) 81 = 794

B2: #5, (1.043 × 14.67) 81 = 1240

B3: #8 @ 9", 20 Nos = 4272

(80 × 2.67) 20

Length

B4: #4 @ 12", 16 Bars, (80 × 0.668) 16 = 855

#4 Laps (1.5 × 0.668) 16 × 2 = 32] 192

#8 Laps (1.5 × 2.67) 20 × 2 = 160]

10867

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 8 OF 40
DETAIL Styl COMPUTED KVH DATE 1/93
Rein Steel CHECKED BY _____ DATE _____

Access Ramp Ret. wall:

B1 : 5'-3" 1'-0" 1'-8" L = 7.25', No# = 161

B2 : L = 6.58' Sta Bar . No# 81

B4: L = 5.92' No# = 81

B3 : L = 4.25' No# = 81

B5 : L = 5.5 No# = 81

B6 : L = 5.5, No# = 81

B1 : #5, (1.043 x 7.25) 161 = 1217
B2 : (1.043 x 6.6) 81 = 558
B3 : (1.043 x 4.25) 81 = 359
B4 : #4 (0.668 x 5.92) 81 = 320
B5 : #6 (1.502 x 5.5) 81 = 669
B6 : (1.502 x 5.5) 81 = 669

Dig'n Steel (Ramp)

#4 @ 12 No# = 110
#4 @ 18 No# 6 } 28 #4
Base Slab : No# = 12

Length = 80',

(0.668 x 80) 28 = 1496

Dig'n Steel (Channel)

Wall : #4 @ 12 = No# = 8 } 13 x 2 = 26
#4 @ 18 = 5

Base Sl: Top, 42 #4 42 } 69
Bott #4 @ 18 27 } 95

L = (50.94 − 47) = 394 + (1.5 x 10) = 409
Lap Lap
(0.668 x 409) 95 = 25995

25995
31283

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

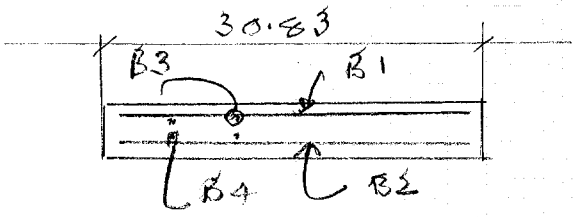
PROJECT Guadalupe Bridge PAGE 9 OF 40

DETAIL Bridge COMPUTED KNH DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

App. Slab: (Access Ramp)

$L = (55.83 - 25) = 30.83'$



B1: #4 @ 12, L = 30.5' Nos = 19

0.668 × 30.5 × 19 = 346

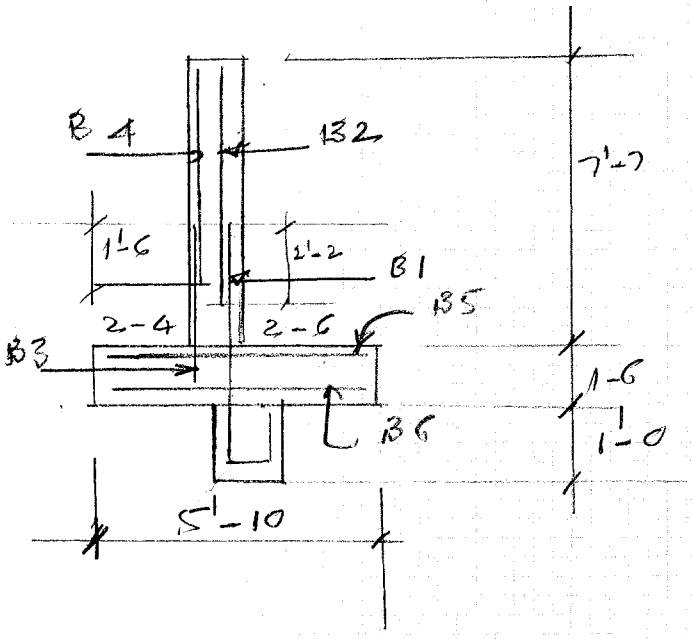
B2: #8 @ 9, 2.67 × 30.5 × 19 = 1384 — 1730

B3: #4 @ 12, 32 #4, L = 15.67

0.668 × 15.67 × 32 = 335

B4: #5 @ 12, 1.043 × 15.67 × 32 = 523 — 858

Retaining wall:



2588

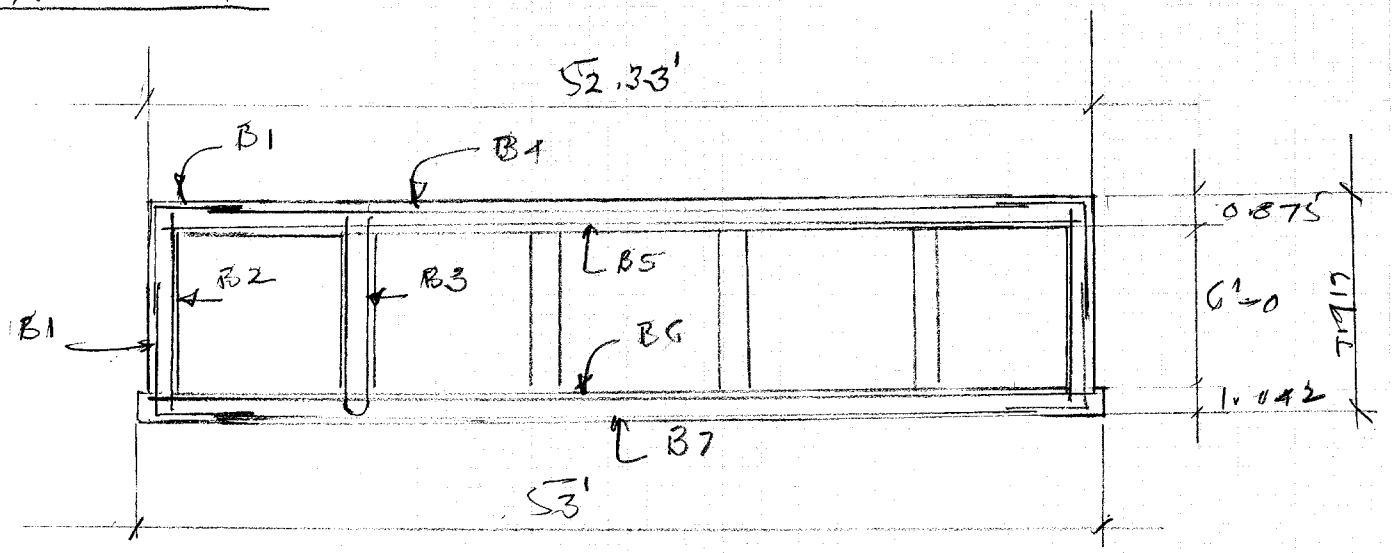
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 9 OF 40

DETAIL Abut COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Box Sect.



B1: 4'-10, 4'-8 $L = (4.83 + 4.67) = 9.5'$

#6, $(1.502 \times 9.5) = 14.27$ lbs/Bar

B2: $(6' + 8\tfrac{1}{2} + 9\tfrac{1}{2}) = 7.5'$

$(1.502 \times 7.5) = 11.27$ lbs/Bar

B3: 7'-6, 8" $(7'-6)2 + 8" = 15.67'$

$(15.67 \times 1.502) = 23.54$

B4: $L = 46.33'$ $46.33 \times 1.502 = 69.59$ lbs/Bar

B5: $L = 52.0$ $52 \times 1.502 = 78.10$

B6: $L = 52.67$ $52.67 \times 1.502 = 79.11$

B7: $L = 46.33$ $46.33 \times 1.502 = 69.59$

Wt. Per ft width of Slab: lbs/ft

B1: $(14.27 \times 4) \times 2$ ← 2 Bars per ft $= 114.16$

B2: $(11.27 \times 2)\ 1$ $= 22.54$

B3: $(23.54 \times 4)\ 1$ $= 94.16$

B4: $(69.59 \times 1)\ 2$ $= 139.18$

370.04

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

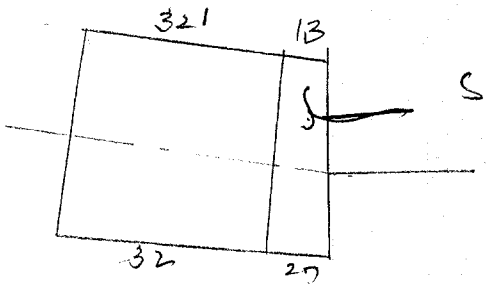
PROJECT Guadalupe Channel PAGE 10 OF 40

DETAIL Box Culvert COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

		370.04
B5: (98.10 × 1) 2 ← 2 Bars/ft	=	156.20
B6: (79.11 × 1) 2	=	158.22
B7: (69.59 × 1) 2	=	139.18
		823.64
Laps: [(1.502 × 2.0) 4] 2 (Long; No. of Laps)		24.03
Typ. Box Sect. Reinf. St	=	847.67 lbs/ft

St. Box Sect = 32 + 6.25 = 38.25' (inside; Outside)



Skewed Part

Skew Box Qty = (847.67 × 38.25) = 32423 lbs

B5 (N. Side) (34 #6),	(34 × 20) 1.502 (Long)	= 1021	Top Slab	4648
B5 (S. Side) 69 #6	(69 × 35) 1.502	= 3627		
B6 (N. Side) 34 #6,	(34 × 20.33) 1.502	= 1038	Bot Slab	4700
B6 (S. Side)	(69 × 35.33) 1.502	= 3662		
B4 (N. Side)	(34 × 17.0) 1.502	= 868	Top Slab	4184
B4 (S. Side)	(69 × 32.0) 1.502	= 3316		
		4184		
B7: Bott. Slab	Same as Top Slab			4184
				50139

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 11 OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

B1: Length = 9.5' 34 #6 (N. Side)

(34 x 9.5) 1.502 x 2 (Top & Bott) = 970

B1: 69 #6 (S. Side)

(69 x 9.5) 1.502 x 2 = 1969

lbs

2939

B2: 18 #6 (N. Side), 35 #6 (S. Side)

N. Side: (18 x 7.5) 1.502 = 203

S. Side: (35 x 7.5) 1.502 = 394

597

B3: Length = 15.67'

wall 2: 18 x 15.67 x 1.502 = 424

wall 3: 35 x 15.67 x 1.502 = 824

wall 4: = 824

wall 5: = 824

2896

Diagn Steel

52 x 12/18" sp = 35 sp, 36 Bars Top Slab

38 Bars Bott. Slab

Av. Length = (45 + 59)/2 = 52

wall: 5 x 12/18" sp = 4 sp, 5 Bars

Top Slab: (36 x 52 x 0.668) 2 (Top & Bott) = 2501

Bott. Slab: (38 x 52 x 0.668) 2 = 2640

walls: (5 x 2) 6 x 52.0 x 0.668 = 2084

No. of walls

13747

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 12 OF 40

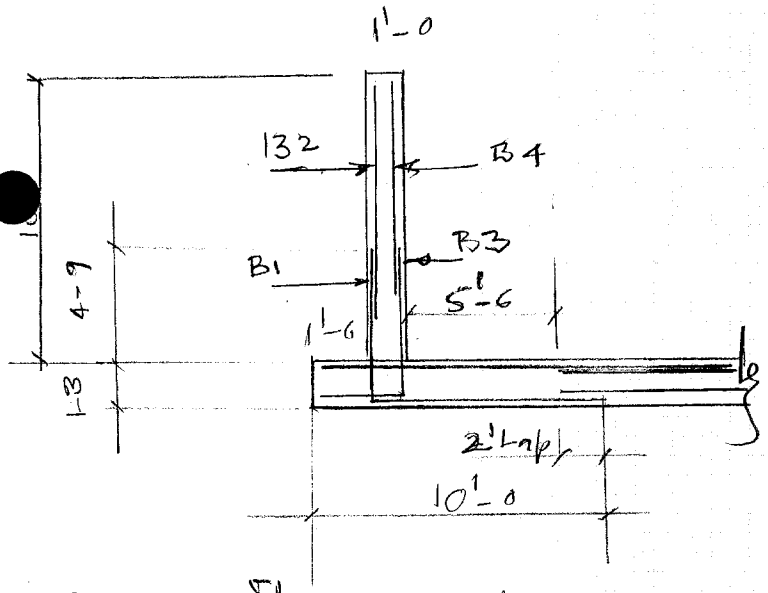
DETAIL Qty's COMPUTED KNH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Top Slab : 36 x 2 = 72
Bott. Sl : 38 x 2 = 76
Walls : 10 x 6 = 60
208 splices

Length = 1.5' Qty = 1.5 x 208 x 0.668 = 208 lbs

open Channel Sect^n (Curved Sect^n)



B1 : 1'-6 / 8'-4 L = 14.08'

B2 : L = 7'-3 St. Bar

B3 : 1'-6 / 2'-4 L = 8.08'

B4 : L = 6.58' St. Bar.

B1 : N. Wall : 41 #6, 14.08 x 41 x 1.502 = 867
B2 : N. Wall 22 #5, 7.25 x 22 x 1.043 = 166
B3 : N. Wall 22 #5 8.08 x 22 x 1.043 = 185
B4 : N. Wall 22 #4 6.58 x 22 x 0.668 = 97
1315

1315
1523

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl. PAGE 13 OF 40

DETAIL Bridge COMPUTED KWH DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

B1. S. wall: 161 #6, (14.08 x 161 x 1.502) = 3405

B2: S. wall: 81 #5, (7.25 x 81 x 1.043) = 612

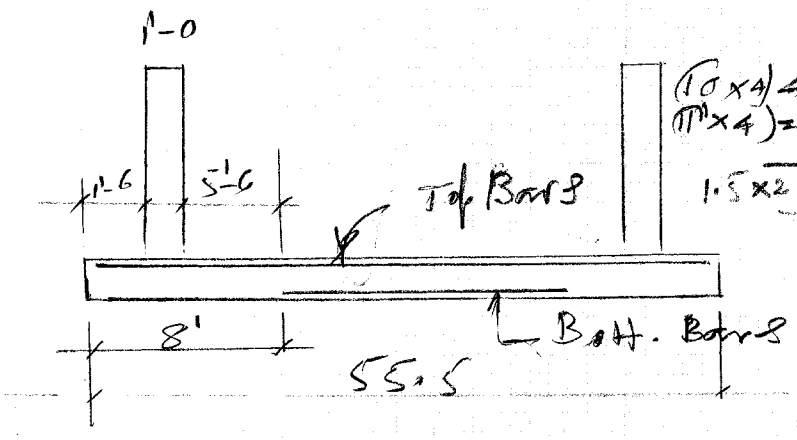
B3: S. wall 81 #5 (8.08 x 81 x 1.043) = 683

B4: S. wall 81 #4 (6.58 x 81 x 0.668) = 356

5056 lbs

5056

6'



1'-0
6'-10½"
(10 x 4) 40'-0
(π" x 4) = 3-8
1-0
1.5 x 2 = 3-0
55.5

~~W.S. N. Side: 22 #5, 21'-9" long~~

1-6"
1-6
6-10½
11"
10-0
11"
6½
18-4
3-9
21-9"

8'-0
6-6
14-6

55.5
-14.3
41.0

L = (4-7)-2 = 14-4
L = 6'-6

Top Bars
85 #5, 85 x 41 x 1.043 = 3635
22 #5, 22 x 14.33 x 1.043 = 329
22 #5 22 x 6.5 x 1.043 = 149
2' Lap 43 x 2 x 1.043 = 90
4203

4203

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl. PAGE 14 OF 40

DETAIL Bdy 8 COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY DATE

Bott. Bars

(8'-0") + 8.0 = 16'

(55-6") - 16 - 4" = 39.17', 41 #5 — lbs

(41 × 39.17 × 1.043) = 1675

1'-6
1-0
5-6
8-0

2-6
10-0
0-11"
10'-0"
5½"
22-22½
1.9
23.9'

(23.9 - 8) = 15.9' Long, 41 #5

(41 × 15.9 × 1.043) = 680

Diagn Steel:

walls 10 × 12/12 = 11 #4 Inside, L = 15' ±

11 × 12/18 = 7 #4 outside

18 #4 total

N. wall = 18 × 15 × 0.668 = 180

S. wall = 18 × 56 × 0.668 = 673 — 853

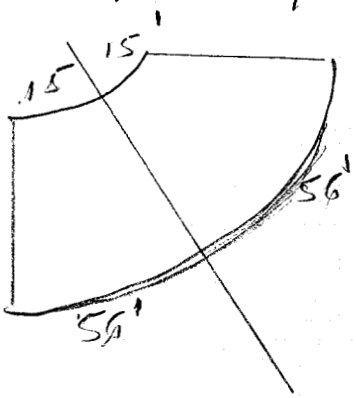
Lengths

Base slab: 55 × 12/12 = 56 #4 Top

55 × 12/18 = 38 #4 Bottom

94 #4

Av. Length = (15 + 56)/2 = 35.5



(94 × 35.5) 0.668 = 2229

5437 lbs

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 10 OF 40

DETAIL Qty's COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

370.04

B5: (38.10 × 1) 2 (2 Bars/ft) = 156.20

B6: (79.11 × 1) 2 = 158.22

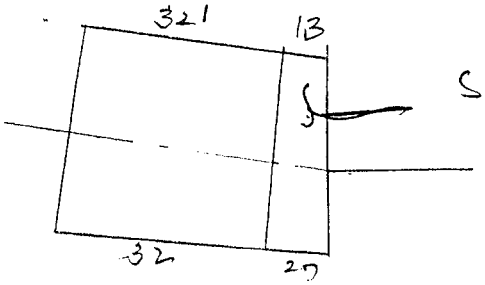
B7: (69.59 × 1) 2 = 139.18

823.64

Laps: [(1.502 × 20.0) 4] 2 (Long; No. of Laps) 24.03

Typ Box Sect. Reinf. St = 847.69 lbs/ft

Sta. Box Sect = 32 + 6.25 = 38.25' (Wing; Energy side)



Skewed Part

lbs

Skew Box Qty = (847.69 × 38.25) = 32423

B5 (N. Side) (34 #6), (34 × 20) 1.502 = 1021 } Top Slab
B5 (S. Side) 69 #6 (69 × 35) 1.502 = 3627 } 4648

B6 (N. Side) 34 #6, (34 × 20.33) 1.502 = 1038 } Bot Slab
B6 (S. Side) (69 × 35.33) 1.502 = 3662 } 4700

B4 (N. Side) (34 × 17.0) 1.502 = 868 } Top Slab
B4 (S. Side) (69 × 32.0) 1.502 = 3316 } 4184
4184

B7: Bott. Slab Same as Top Slab 4184

50139

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 11 OF 40
DETAIL Qty's COMPUTED KVH DATE 1/93
Reinf Steel CHECKED BY DATE

B1: Lengths = 9.5' 34 #6 (N. Side)

(34 x 9.5) 1.502 x 2 (Top & Bott) = 970 } lbs
B1: 69 #6 (S. Side)
(69 x 9.5) 1.502 x 2 = 1969 } 2939

B2: 18 #6 (N. Side), 35 #6 (S. Side)

N. Side: (18 x 7.5) 1.502 = 203 } 597
S. Side: (35 x 7.5) 1.502 = 394

B3: Lengths = 15.67'
wall 2: 18 x 15.67 x 1.502 = 424
wall 3: 35 x 15.67 x 1.502 = 824 } 2896
wall 4: = 824
wall 5: = 824

Dist Steel
52 x 12/18" sp = 35 sp, 36 Bars Top Slab
38 Bars Bott. Slab
Avg Lengths = (45 + 59)/2 = 52
wall: 6 x 12/18" sp = 4 sp, 5 Bars
Top Slab: (36 x 52 x 0.668) 2 (Top & Bott) = 2501
Bott. Slab: (38 x 52 x 0.668) 2 = 2640
walls: (5 x 2) 6 x 52.0 x 0.668 = 2084
No. of walls
13747

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 12 OF 40

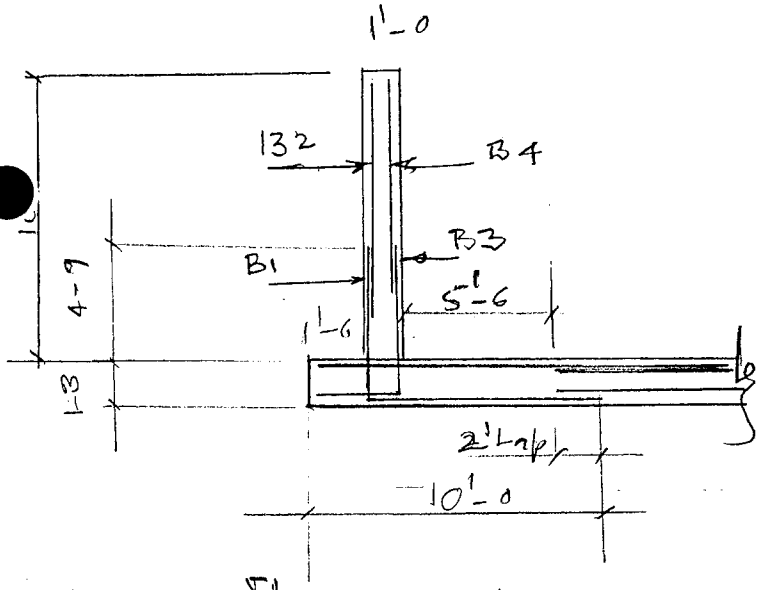
DETAIL Qty's COMPUTED KNH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Top Slab : 36 x 2 = 72
Bott. Sl : 38 x 2 = 76
Walls : 10 x 6 = 60
208 splices

Length = 1.5' Qty = 1.5 x 208 x 0.668 = 208 lbs

Open Channel Sect^n (Curved Sect^n)



B1 : 1'-5 / 8'-4 L = 14.08'

B2 : L = 7'-3 St. Bar

B3 : 1'-5 / 2'-4 L = 8.08'

B4 : L = 6.58' St. Bar.

B1 : N. Wall : 41 #6, 14.08 x 41 x 1.502 = 867
B2 : N. Wall 22 #5, 7.25 x 22 x 1.043 = 166
B3 : N. Wall 22 #5 8.08 x 22 x 1.043 = 185
B4 : N. Wall 22 #4 6.58 x 22 x 0.668 = 97
1315

1315
1523

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl. PAGE 13 OF 40

DETAIL Gates COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

B1. S. wall: 161 #6, (14.08 x 161 x 1.502) = 3405

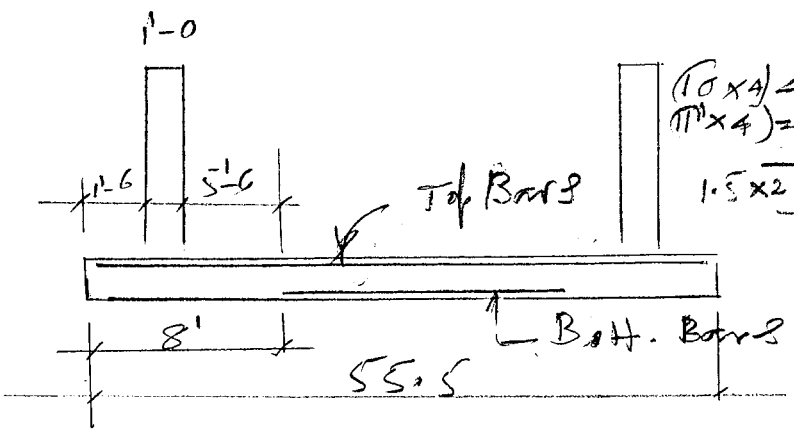
B2: S. wall: 81 #5, (7.25 x 81 x 1.043) = 612

B3: S. wall 81 #5 (8.08 x 81 x 1.043) = 683

B4: S. wall 81 #4 (6.58 x 81 x 0.668) = 356

5056 — 5056 lbs

6'



1'-0
6'-10½"
(16 x 4) 4'-0
(π' x 4) = 3-8
1-0
1.5 x 2 = 3-0
55.5

~~W5: N. side: 22 #5, 21'-9" long~~

1'-6"
1-0
6-10½
11"
10'-0"
11"
6½
18'-4½"
3'-9
21'-9"

8'-0
6-6
14-6

55.5
-14.5
41.0

L = (14-6) - 2 = 14-4
L = 6'-6

Top Bars

85 #5,	85 x 41 x 1.043 =	3635
22 #5,	22 x 14.33 x 1.043 =	329
22 #5	22 x 6.5 x 1.043 =	149
2' Lap	43 x 2 x 1.043 =	90
		4203

4203

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl. PAGE 14 OF 40

DETAIL Bdy 8 COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Bott. Bars

(8'-0") + 8'-0" = 16'

(55'-6") - 16 - 4" = 39.17', 41 #5 lbs

(41 × 39.17 × 1.043) = 1675

1'-6
1-0
5-6
8-0

2-6
10-0
0-11"
10'-0
5-½"
22-22½
1.9
23.9'

(23.9 - 8) = 15.9' Long, 41 #5

(41 × 15.9 × 1.043) = 680

Diagn Steel:

walls 10 × 12/12 = 11 #4 inside, L = 15' ±

11 × 12/18 = 7 #4 outside

18 #4 total

N. Wall = 18 × 15 × 0.668 = 180

S. Wall = 18 × 56 × 0.668 = 673

Length

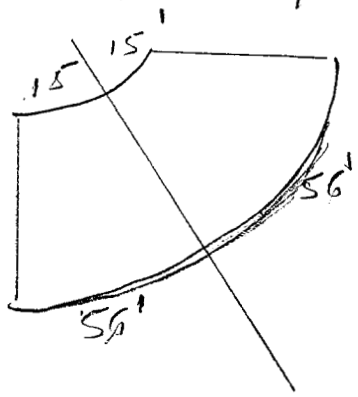
853

Base Slab: 55 × 12/12 = 56 #4 Top

55 × 12/18 = 38 #4 Bottom

94 #4

Av. Length = (15 + 56)/2 = 35.5



(94 × 35.5) 0.668 = 2229

5437 lb

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl PAGE 15 OF 40
DETAIL Styl COMPUTED KVH DATE 1/93
Reinf Steel CHECKED BY DATE

Curved Box Section (East of Sossman)

B1: L = 9.5' Page 9, #4.27 lb/1 Bar
(4.27 x 2) Top & Bottom

B1 { N. Wall: 41 #5, 41 x 14.27 x 2 = 1170 (168) — 1170
S. Wall: 161 #6, (161 x 14.27 x 2) = 4595 — 4595

L = (12'-3) + 2 = 14'-3

(B4) S. Side: 161 x 14.25 x 1.502 (Top Slab / Top St.) — 3446
(B7) 161 x 14.25 x 1.502 (Bot. Slab / Bott. St) — 3446

Mid. Sect.: L = 20'
(B4) 82 x 20 x 1.502 (Top Slb / Top St) — 2463
82 #6 (B7) 82 x 20 x 1.502 (Bott. Slb / Bot. St) — 2463

B4 — 41 x 9.80 x 1.502 = 604
B7 — 41 x 9.80 x 1.502 = 604

Bars B5 & B6

B5: L = (11.84 - 0.16) = 11.68, 161 #6
B5: 161 x 11.68 x 1.502 (S. End) = 2824
B6: 161 x 12.01 x 1.502 (S. End) = 2904

B5: 82 x 29.3 x 1.502 } Mid Sect =
B6: 82 x 29.3 x 1.502 }

31737

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Ch1 PAGE 16 OF 40

DETAIL Atyp. COMPUTED KVH DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

Bars B5 & B6 (Contd)

0.92
6.88
0.92
2.50
11.22

B5: L = 11.22', 41 #6

B5: 41 × 11.22 × 1.502 } N. End 691

B6: 41 × 11.55 × 1.502 } 711

B2: L = 7.5' Pages, 9 162/2 = 81 #5

(81 × 7.5 × 1.043) S. Wall = 634 } 798

L = 7.5, 42/2 = 21 #5

(21 × 7.5 × 1.043) N. Wall = 164

B3. walls 4 & 5: Length = 15.67, 162/2 = 81 #5

(81 × 15.67 × 1.043) 2 = 2648

2 walls

walls 2 & 3: Length = 15.67, 82/2, 41 #5

(41 × 15.67 × 1.043) 2 = 1340

Diaph Steel

52 × 12/18" Sp = 36 Bars Top Sl
38 Bars Bot. Sl

Av. Length = (15 + 56)/2 = 35.5'

Top Slab: (36 × 35.5 × 0.668) 2 = 1707
#4 @ Top & Bott

Bott. Sl: (38 × 35.5 × 0.668) 2 = 1802

walls: (5 × 2) 6 × 35.5 × 0.668 = 1422

2' Lap on wall. 3, No. of Laps = 161/4 ≈ 40

(40 × 2.0 × 0.668) 2 = 107

11226

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl PAGE 15 OF 40
DETAIL Styl COMPUTED KVH DATE 1/93
Reinf Steel CHECKED BY DATE

Curved Box Section (East of Softon)

B1: L = 9.5' Page 9, 14.27 lb/1 Bar
(14.27 × 2) Top & Bottom

B1 { N. Wall: 41 #6, 41 × 14.27 × 2 = 1170 lbs — 1170
S. Wall: 161 #6, (161 × 14.27 × 2) = 4595 — 4595

L = (12'-3) + 2 = 14'-3

(B4) S. Side: 161 × 14.25 × 1.502 (Top Slab / Top St.) — 3446
(B7) 161 × 14.25 × 1.502 (Bot Slab / Bott. St) — 3446

Mid. Sect.: L = 20'
(B4) 82 × 20 × 1.502 (Top Slb / Top St) — 2463
82 #6 (B-7) 82 × 20 × 1.502 (Bott. Slb / Bot St) — 2463

B4 — 41 × 9.80 × 1.502 = 604
B7 — 41 × 9.80 × 1.502 = 604

Band B5 & B6
B5: 0.92
L = (11.84 − 0.16) = 11.68, 161 #6
B5: 161 × 11.68 × 1.502 (S. End) = 2821
B6: 161 × 12.01 × 1.502 (S. End) = 2904
B5: 82 × 29.3 × 1.502 } Mid Sect =
B6: 82 × 29.3 × 1.502 }
= 11" × 2

31737

Bars B5 & B6 (Contd)

0.92
6.88
0.92
2.50
11.22

B5: L = 11.22', 41 #6

B5: 41 × 11.22 × 1.502 } N. End 691

B6: 41 × 11.55 × 1.502 } 711

B2: L = 7.5' Page, 9 162/2 = 81 #5

(81 × 7.5 × 1.043) S. Wall = 634 } 798

L = 7.5, 42/2 = 21 #5

(21 × 7.5 × 1.043) N. Wall = 164

B3. walls 4 & 5: Length = 15.67, 162/2 = 81 #5

(81 × 15.67 × 1.043) 2 = 2648

2 walls

walls 2 & 3: Length = 15.67, 82/2, 41 #5

(41 × 15.67 × 1.043) 2 = 1340

Diagn Steel

52 × 12/18" Lap = 36 Bars Top Sl
38 Bars Bot. Sl

Av. Length = (15 + 56)/2 = 35.5'

Top Slab: (36 × 35.5 × 0.668) 2 = 1707
#4 @ Top & Bott

Bott. Sl: (38 × 35.5 × 0.668) 2 = 1802

walls: (5 × 2) 6 × 35.5 × 0.668 = 1422

2' Lap on wall. 3, No. of Laps = 161/4 ≈ 40

(40 × 2.0 × 0.668) 2 = 107

11226

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chnl PAGE 17 OF 40

DETAIL Adyl COMPUTED KVH DATE 1/93

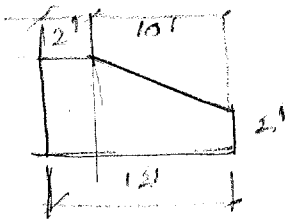
Reinf Steel CHECKED BY _____ DATE _____

Baffle walls:

Wall Stud: 2'-10 / 1-6 L = 4.33'

Wall Lengths: 12' + 16 + 20' + 2 × 8' = 72

73 #5, (4.33 × 1.043) 73 × 2 (Both Sides) = 659 lbs



Av. Long = (1'-10) + (5-10)/2 = 3.83'

#5 @ 12, 11 #5

(11 × 3.83 × 1.043) 2 × 4 = 352

2 Sides, 4 walls

Lengths of 6' walls: (3' + 6 + 10 + 14) = 32'

33 #5 @ 12", (33 × 5.83 × 2) 1.043 = 401

2 Sides

Diagn Stud

Av. Lengths = (12 + 24)/2 = 18'

7 #5 each face, (7 × 18 × 4 × 2) 1.043 = 1051

Walls, Both faces

Nosing Bars:

1'-3, 5½

L = (1 1/3) 2 + 6 = 3'

3 × 0.668 × 3 × 4 = 24

Nos, Walls

24.87

Barriers

4'-7 / 1-6 L = 6.08' #6 @ 9"

L = 52.33 (52 × 12/9 = 70 #6

(70 × 6.08 × 1.502) = 639

#5 @ 18": 4'-7 / 3-6 L = 8.08, 35 #5

(35 × 8.08 × 1.043) = 295

#6 @ 18" 1'-4 / 1-1, (35 × 5.42 × 1.502) = 285

Diagn Bars: 10 #4, (10 × 52 × 0.668) = 347

For 2 Barriers = 1566

3132

5619

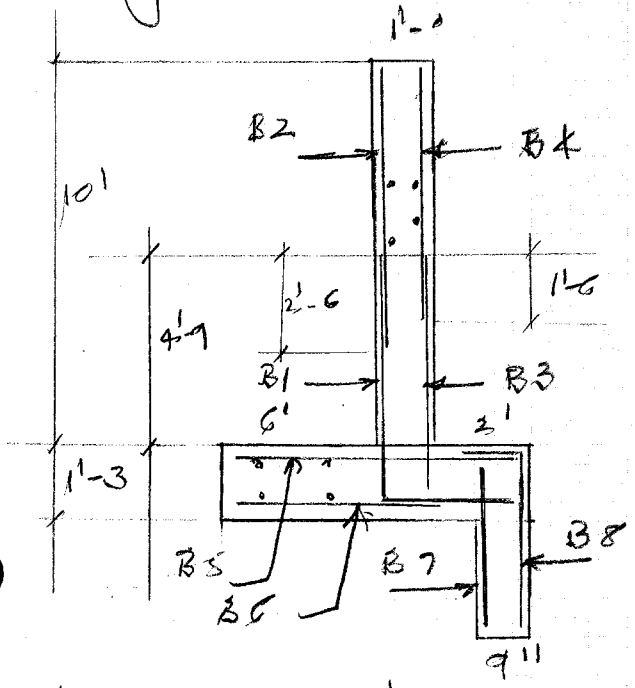
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 18 OF 40

DETAIL Gates COMPUTED _____ DATE 1/93

Reinf Steel CHECKED BY _____ DATE _____

Using Walls



Lengths = 28', B1: 5-9, 2-8 L = 8.42'

28 x 12/6 = 56, 57 #6

57 x 8.42 x 1.502 = 721

B2: L = 7.58, #5 @ 12

29 x 7.58 x 1.043 = 229

B3: 29 x 5.75 x 1.043 = 174

B4 29 x 6.58 x 0.668 = 128

B5: 57 x 8.67 x 1.043 = 515

B6 28 x 12/18" = 18 sp, 19 Bars

19 x 6.83 x 0.668 = 87

B7: 19 x 3.5 x 0.668 = 45

B8: 19 x 4.5 x -"- = 57

Total (11 + 8 + 12 + 3) = 34 = 658 | 5228

34 x 29 x 0.668 = 2614 | 5228

For 2 W. Walls

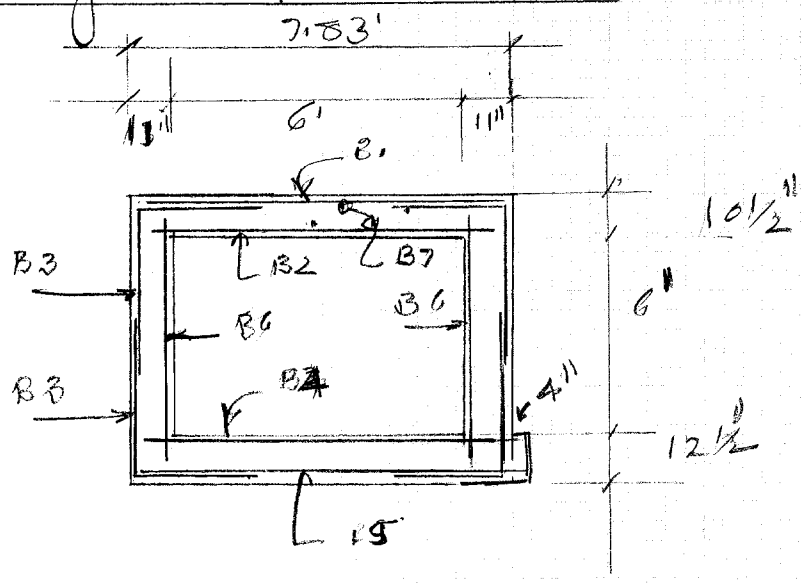
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Ch1 PAGE 19 OF 40

DETAIL Q Ang 8 COMPUTED _____ DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Single Cell (N. Side)



Length = (41.5 + 40.8) = 82.3'

B1: #5 @ 12", L = 7.5', 83 #5

(83 × 7.5 × 1.043) = 649

B2: #6 @ 6", 82 × 12/6, 165 #6

165 × 7.5 × 1.502 = 1859

2508 lb

B3: 3.0 / 4.67 L = 7.67', 165 #6

(165 × 7.67 × 1.502) 4 = 7603

4 Corn.

7603

B4: L = 7.83, (165 × 7.83 × 1.502) = 1940

B5: L = 7.83 (83 × 7.83 × 1.043) = 698

B6: L = 7.5, (83 × 7.5 × 1.043) 2 = 1299

2 walls

3917

Diagonal

8 × 12/18 = 6 #4, (6 #4) × 4 = 24 #4

6 × 12/9 = 9 #4, (9 #4) 2 + (6 #4) 2 = 30 #4

54

(82 + 1.5) 54 × 0.668 =

1.04

3012

Dowels: 35 × 2.5 × 0.668 = 1.043

91

17131

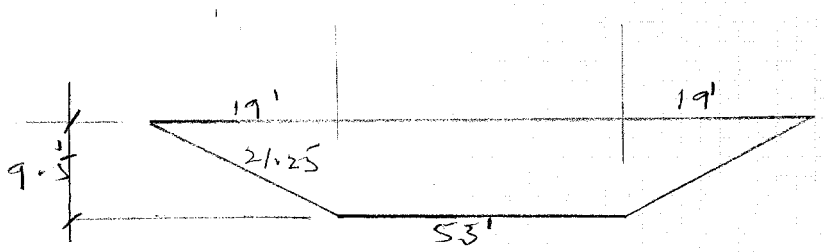
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Ch I PAGE 20 OF 40

DETAIL Steel COMPUTED KNH DATE 1/93

Reinforcing Steel CHECKED BY DATE

Concrete Chl Lining:



Longl Bars

width = (50.5 + 55)/2 = 52.75 say 53

W = [53 + (21.25 × 2)] = 95.5 × 12/12 = 96 #4

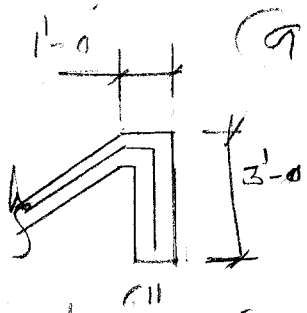
L = 90' + 1.5 Lap = 91.5 × 96 × 0.668 = 5868

Trans. Bars

L = (21.25 × 2) + 53 = 95.5 + (1.5 × 2) Laps

90 × 12/12 = 91 #4

(91 × 98.5 × 0.668) = 5988



L = (2-8) + 1 = 3.67

(91 × 3.67) 2 × 0.668 = 446

2 sides

Lining Cut off wall: 3-6 / 3-6 96 #4

L = 95.5', 90 × 96 × 0.668 = 449

Channel Cut off wall: 54 #4

90 × 54 × 0.668 = 252

13003

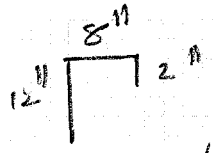
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Chl PAGE 21 OF 40

DETAIL Cut 8 COMPUTED KNH DATE 1/93

CHECKED BY _____ DATE _____

Barricade :



L = 1.83'

4 @ 18": 52 x 12/18 = 35 #4

(35 x 1.83 x 0.668) 2 = 86

No of Barricades

Slab old & New

: 52 x 12/18 = 36 #6 ; L = 1.75

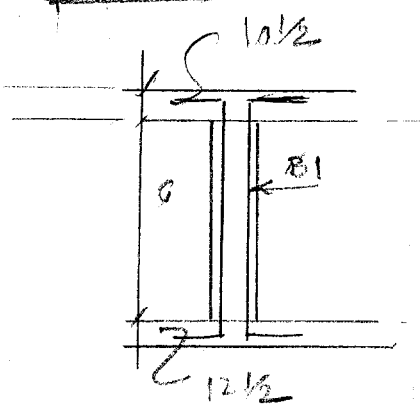
(36 x 1.75 x 1.502) 2 = 190

Both sides

3 #7 J&B, L = 52,

(52 x 3 x 2 x 2.044) 2 = 1275

pole a



L = 6' + 8½" + 9½" = 7.5, 10 #9

B1 = (7.5 x 10 x 3.4) = 255

Tie 8: (23 - 8) = 15"

(15 x 4) + 6 = 5.5'

7 x 12/12 = 8 #4

8 x 5.5 x 0.668 = 30

pole A

10 #6

(10 x 7.5 x 1.502) 2 = 225

2 poles

Tie 8: (8 x 5.5 x 0.668) 2 = 60

2121

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 22 OF 40

DETAIL Gabs COMPUTED KVH DATE 1/93

Reinf. Steel CHECKED BY _____ DATE _____

Total:

	57777	lbs
	10361	
	10867	
	2588	
	31283	
	112876	lbs
	50139	p. 10
	13747	p. 11
	176762	
	1523	p. 12
	4203	p. 13
	5437	p. 14
	189925	
	31737	p. 15
	11226	p. 16
	230888	
	5619	— 17
	5228	— 18
	17131	— 19
	258866	
	13003	— 20
	271869	
	2121	— 21
	273990	

©

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Ch. PAGE 25 OF 40

DETAIL Estimate COMPUTED KVH DATE 1/92

Excavn CHECKED BY _____ DATE _____

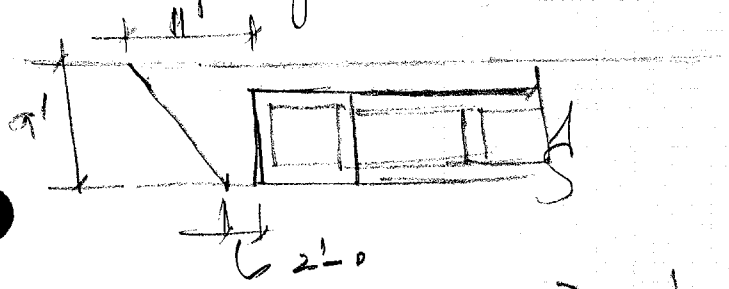
Box East of Guad. Ch.

Approx. Long (N. Side) = 45'

Use the same Cross Section as at Stat. 51+00

Qty = (193.5 × 45)/27 = 322 CY

New Single Cell on N. Side.



$A_1 = \frac{1}{2}(2+11)\,9' = 58.5$ sq ft

Approx L. = (4 + 2 + 4) = 83'

Qty = (58.5 × 83)/27 = 180 CY

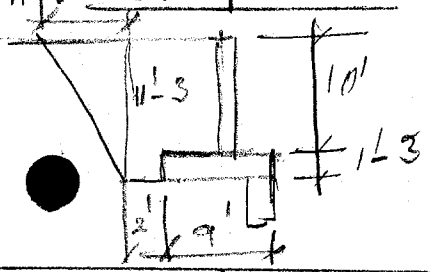
Curved Box East of Soleman

N. Side: Curved Long = $\frac{3.14 \times 20}{4} + 6'.25$

= 22' ±

Qty (N. Side) = 58.5 × 22/27 = 48

11'-3 ceiling wall



$A = \frac{1}{2}(11 + 22.25)\,11.25$

= 187 sq ft

Q = [187 × 30]2/27 = 415

Long 2 Sides

965

Total Exc'n = 547 + 2403 + 965 = 3915

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 26 OF 40

DETAIL Adv 2 COMPUTED KVH DATE 1/93

Excavation CHECKED BY _____ DATE _____

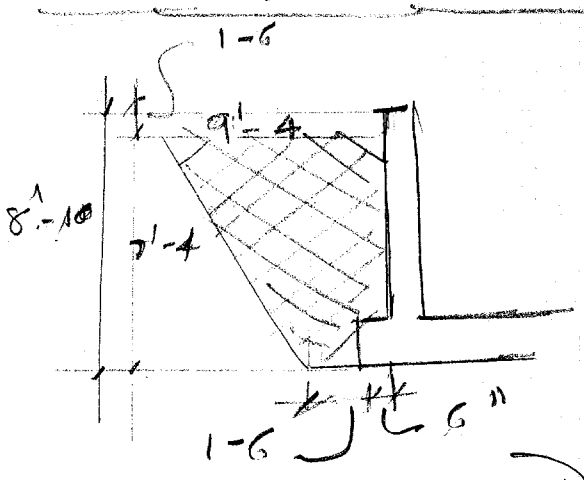
Structural Excav (As per EOM)

Stat. 47 & 48:	$\frac{(0+192)}{2} \times 100/27$ =	355
Stat 48 & 49:	$\frac{(192+280)}{2} 100/27$ =	874
Stat 49 & 50:	$\frac{(280+245)}{2} 100/27$ =	972
Stat 50 & 51:	$\frac{(245+274)}{2} \times 100/27$ =	961
Stat 51 & (51+51):	$\frac{(274+266)}{2} \times 51/27$ =	510
Stat (51+51) & 52:	$\frac{(266+75)}{2} 49/27$ =	309
		3981

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 27 OF 40
DETAIL Hyd (~~Str. B~~ COMPUTED KNH DATE 1/93
Str. Backfill
CHECKED BY DATE

Stat 47+00 To 48+00 To 51+00



N. Side, Typical

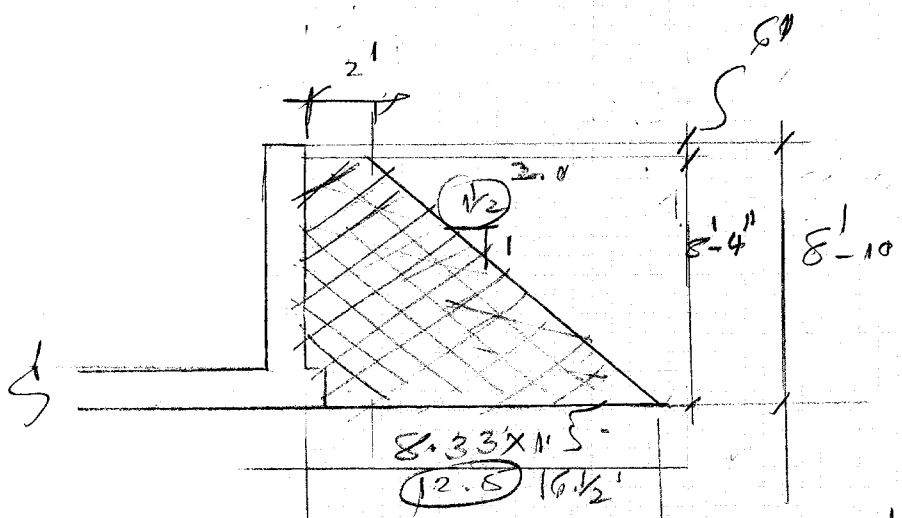
$A = \frac{1}{2}(2 + 9.33)\,7.33 = 41.5$

$- 1.25 \times 0.5 = 0.5$

41.00

Stat 47 to 51.0 (N. Side), L = 400

(N. Side) Qty = 41 × 400 / 27 = 607



$Q_1 = \frac{1}{2}(2.0 + 12.5)\,8.33 = 60.4$ sq ft

$Q_2 = \frac{1}{2}(2.0 + 16.5)\,8.33 = 77.0$

S. Side: Qty = (60.4 × 400)/27 = 895 | 1140

(77.0 × 400)/27 = 1140

1747 CY

(E)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 28 OF 40

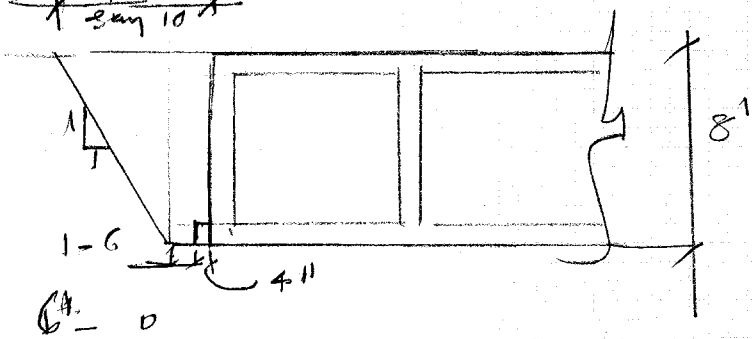
DETAIL Hyd COMPUTED KVH DATE 1/93

Sta. 13 + 00 to 14 + 11 CHECKED BY _____ DATE _____

Box Section (N. Side) (E. of Stah. 51+00)

Appx Length = (43 + 42 + 41) = 126'

~~9.83~~ say 10



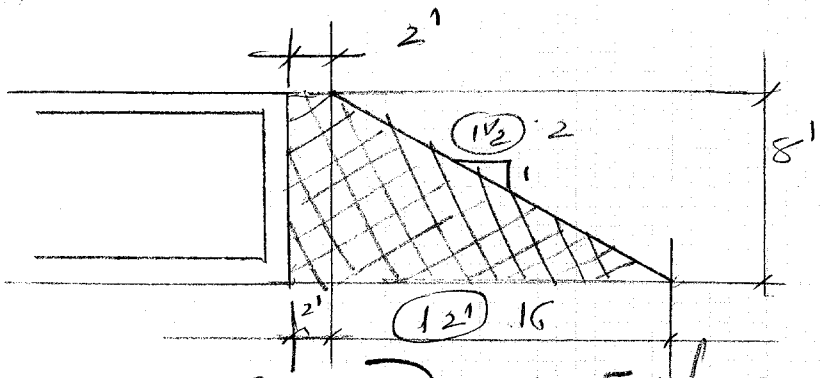
Ht. – 0
10½
12½
7-11 say 8'

$A = \left(\frac{1.83 + 9.83}{2}\right) 8' = 46.6$ Sq ft say 47

Qty N. Side = 47 × 126/27 = 219 cy

Box S. Side (E. of Stah. 51+00)

Appx Long = (52 + 7) − 9 = 50'



$Q_1 = \frac{1}{2}(2 + 14)\, 8 \times 50/27 = 119$

$Q_2 = \frac{1}{2}(2 + 18)\, 8 \times 50/27 = 148$

148

367 cy

(F)

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 29 OF 40

DETAIL Retyped COMPUTED KNH DATE 1/93

Struct. Backfill CHECKED BY _____ DATE _____

Curved Box

$3.14\,(19\times2)/8 + 6.25' = 21$ (N. Side)

$3.14\,(71.9\times2)/8 + 6.25 = 62.9'$ (S. Side)

$A_1 = 46.6$ Typ. Cut Sect.

$A_2 = \frac{1}{2}(2+18)\,8 = 80$

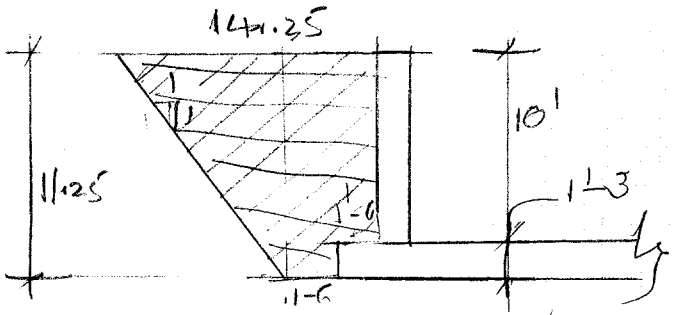
Q_1 (N. Side) $= (46.6\times21)/27 =$ 36 cy

Q_2 (S. Side) $= (80\times62.9)/27 =$ 186

Curved Open Channel

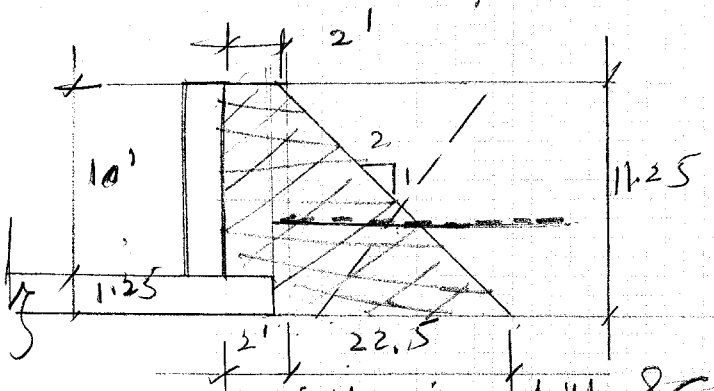
$L = 3.14\times\frac{(19\times2)}{8}' = 15' \pm$ N. Side

$L = 3.14\times\frac{(71.9\times2)}{8} = 56' \pm$ S. Side



$A = \frac{1}{2}(3+14.25)\,11.25 - 1.5\times1.25 = 95$

$Q = 95\times15/27 =$ 53



275 cy

Assume S. Side in fill section

Actually partly fill & cut

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 30 OF 40
DETAIL Ramp COMPUTED KVA DATE 1/93
Structure Backfill CHECKED BY _____ DATE _____

$A = \frac{1}{2}(2 + 24.5)11.25 - (1.5 \times 1.25) = 149.2$

Qty $= (149.2 \times 56)/27 = 305$ cy

According to partial fill Cond^n

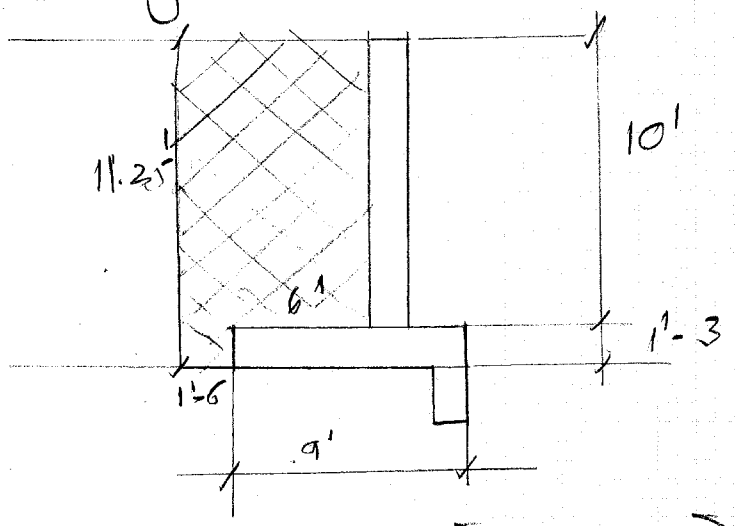
Av. Ht $= (9+3)/2 = 5'$

$A = \frac{1}{2}(20 \times 5) = 50$ sq ft

Add^n $\frac{50 \times 56}{27} = 104$ cy

Net Str. Backfill $= (305 - 104)$ 201 cy

Wing walls



$A = (11.25 \times 9.0) - (6 \times 1.25) = 96.9$

Length $= 28'$ $Q = 96.9 \times 28 \times 2/27$ 160
2 wings

361 cy

Total $= 1947 + 367 + 275 + 361$
$= 2950$ cy

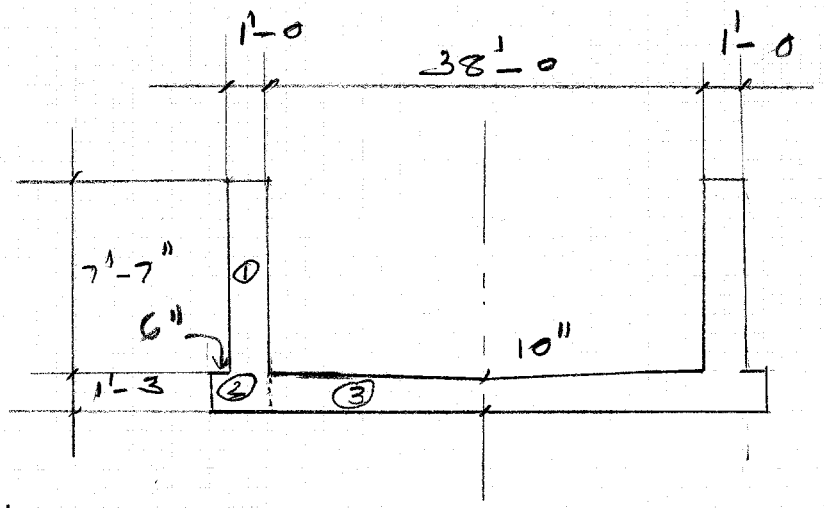
plus Structural Backfill behind Ramp to be added to 2950

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 31 OF 40

DETAIL Concrete Qtys COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____



Quantities per ft

① Wall : (7.583 × 1.0) 1.0 = 7.583 cu

② Base Slab. (1.5 × 1.25) 1.0 = 1.875

③ — " — $\frac{(1.25 + 0.833)}{2}$ 19.0 × 1.0 = 19.789

29.247 cu

Both Sides = $\frac{(29.247 \times 2)}{27}$ = 2.17 cy

2 Sides

2.17 cy per ft

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 32 OF 40

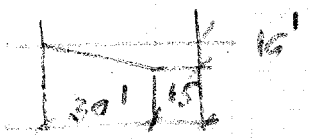
DETAIL Conc. Rtyl COMPUTED KRH DATE 1/93

CHECKED BY _____ DATE _____

Start. (47+00) To (47+45)

North wall: (7.583 x 1.0) 45 = 341.2 cbl

South wall



$\sqrt{30^2 + 16^2} = 34'$

(7.583 x 1.0 x 34) = 257.8 cbl

(7.583 x 1.0 x 15) = 113.8

712.8/27 26.4 CY

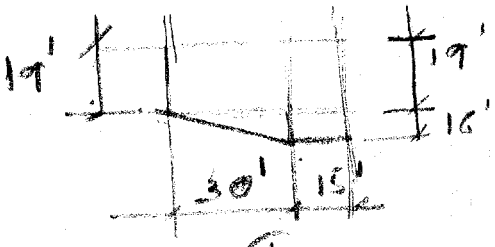
Base Slab:

North side: (1.5 x 1.25) 45 = 84.4

$(1.25 + \frac{0.833}{2})$ 19 x 45 = 890.5

South Side

(1.5 x 1.25) (34+15) = 91.9



$(\frac{1.25 + 0.833}{2})$ 19 x 45 = 890.5

$(\frac{16}{2} \times 30 \times 1.25)$ = 300.0

(16.0 x 15.0 x 1.25) = 300.0

2557.3 cbl

2557.3/27 = 94.7 CY

121.1 CY

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 33 OF 40

DETAIL Concrete Lining COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Sta. (47+45) TO (50+25.95)

L = 280'

(280 × 2.17) = 607.6 CY — 607.6 CY

Sta. (50+25.95) TO (50+53.23)

L = 27.28'

N. Wall

(7.583 × 1.0) 27.28 = 206.9

S. Wall

25 − 6½
− 19 + 1
6' − 6½

$L = \sqrt{27.28^2 + 6.54^2}$
= 28.05'

(7.583 × 1.0 × 28.05) = 212.7

419.6/27 = 15.5

Base Slab

N. Side:

(1.5 × 1.25) 27.28 = 51.2

$\left(\frac{1.25 + 0.833}{2}\right)$ 19 × 27.28 = 539.8

S. Side

(1.5 × 1.25) 28.05 = 52.6

$\left(\frac{1.25 + 0.833}{2}\right)\left(\frac{19 + 25.54}{2}\right)$ 27.28 = 632.7

1276.3/27 = 47.3

670.4

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

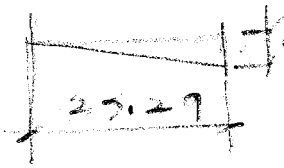
PROJECT Guadalupe Channel PAGE 34 OF 40
DETAIL Concrete Qty COMPUTED KVH DATE 1/93
CHECKED BY _____ DATE _____

Start 50+53.23 To 50+80.52

L = 27.29'

N. wall: (0.583 × 1.00 × 27.29) = 306.9 cft

S. wall:



$\sqrt{27.29^2 + 6.54^2} = 27.53'$

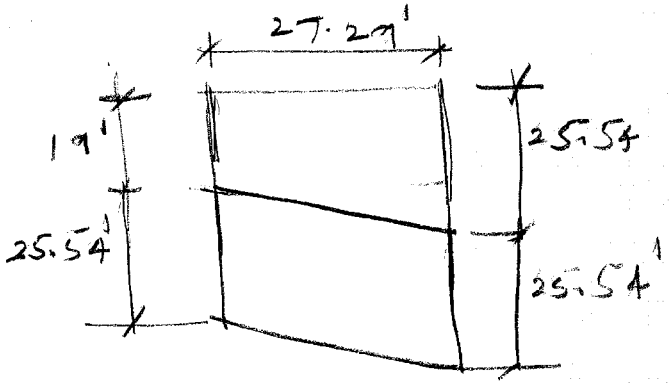
(0.583 × 1.0 × 27.53) = 208.8

415.7/27 = 15.4 cy

Base Slab

N. Side: (1.5 × 1.25 × 27.29) = 51.2

$\left(\frac{1.25 + 0.833}{2}\right)\left(\frac{19 + 25.54}{2}\right) 27.29 = 633.0$



S. Side

(1.5 × 1.25 × 27.53) = 51.6

$\left(\frac{1.25 + 0.833}{2}\right) 25.54 \times 27.29$ = 725.9

1451.7/27 = 54.1 cy

69.5

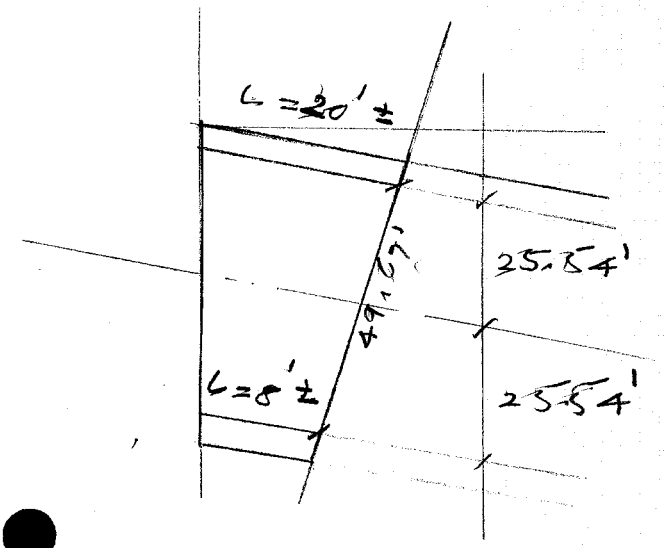
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 35 OF 40

DETAIL Concrete Bdy COMPUTED KNH DATE 1/93

CHECKED BY _____ DATE _____

Stat. 50+80.52 To 50+94.98



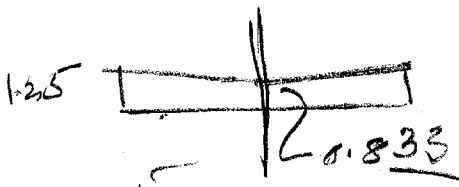
10' × 4 = 40'-0"
11" × 4 = 44" = 3'-8"
49'-8"

Wall length = (20 + 8) = 28'

(7.583 × 1.0 × 28) = 212.3 cft/27 = 7.9 CY

Base Slab:

(1.5 × 1.25) 28 = 52.5



$\left[\left(\frac{1.25 + 0.833}{2}\right) \frac{49.67}{2}\right] 2 = 51.73$

Qty = 51.73 × $\left(\frac{20+8}{2}\right)$ = 724.2 cft/27 = 26.8

34.7

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 39 OF 40
DETAIL Conc. Grates COMPUTED KNH DATE 1/93
CHECKED BY _____ DATE _____

Access Ramp:

Stah (47+45) to (48+25)

L = 80 lf

Slab:	(1.0 x 15.0 x 80)	= 1200 cft	
wall:	(1.0 x 7.583 x 80)	= 607	
fdg:	(1.5 x 5.83 x 80)	= 700	
Key:	(1.5 x 1.0 x 80)	= 120	
Bedrock:	(1.33 x 3.0 x 15)	= 60	
	(0.83 x 3.0 x 15)	= 37	
	(1.0 x 1.0 x 30.83)	= 31	
Slab	(30.83 x 1.0 x 16.0)	= 493	
		3248/27	120.3 CY

Total for Channel Section

121.1
670.4
69.5
34.7
120.3
1016.0

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 37 OF 40

DETAIL Conc. Alys COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Box Culvert of Sossaman

$L_1 = (41.5 + 40.8) = 82.3'$

Av. Length $= (49.98 + 4.8) = 54.78'$ clr

Top Slab: $(0.875 \times 51.5 \times 54.8) = 2469$

Bottom Sl.: $(1.042 \times 52.17 \times 54.8) = 2979$

Walls: $(6.0 \times 0.917) 54.8 \times 6$ Nat. $= 1809$

$7257/27$ 268.8 CY

New cell on N. Side:

Top Slab: $(8.0 \times 0.875 \times 82.3) = 576$

Bott. Slab: $(8.33 \times 1.042 \times 82.3) = 714$

Walls: $(1.083 \times 6.0 \times 82.3) = 535$

$(0.917 \times 6.0 \times 82.3) = 453$ 84.4

$2278/27$

Curved Box East of Sossaman Rd

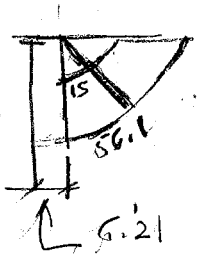
$[3.14 \times (19.08 \times 2)]/8 = 15.0$

$[3.14 \times (91.46 \times 2)]/8 = 56.1$

Av. Length $= (15 + 56.1)/2 = 35.6'$

$R_1 = 19.08$, $R_2 = 91.46'$

$(91.46 - 19.08) = 52.38'$



353.2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Soldaman Box PAGE 38 OF 40
DETAIL Conc. Rtyl COMPUTED KNH DATE 1/93
CHECKED BY _____ DATE _____

Curved Box (Cont'd)

Top Slab: 35.6 × 52.38 × 0.875 = 1632 cft

Base Slab: 35.6 × 53.05 × 1.042 = 1968

Walls: (0.917 × 6.0 × 35.6) 6 Nos = 1175 / 4775/27 = 176.9 CY

Tangent Sect. of Box

Top Slab: (52.38 × 0.875) 6.21 = 285
Bott. Sl.: (53.05 × 1.042) 6.21 = 343
Walls: (6.0 × 0.917 × 6.21) 6 = 205 / 833/27 = 30.9

Open Channel Sect^n

Walls: (1.0 × 10.0 × 35.6) 2 Nos = 712
Av. Length

Base Slb: 55.55 × 35.6 × 1.25 = 2472

Toe Down: 3.75 × 0.75 × 52.38 = 147 / 3331/27 123.4

Wing Walls

Stem: (1.0 × 10.0 × 28) = 280
Base Sl: (9.0 × 1.25 × 28) = 315
Key: (2.75 × 0.75 × 28) = 58
653

Both Sides = 653 × 2/27 48.4

Baffles

Av. Length = 35.6/2 = 17.8'
Av. Ht = (2 + 6)/2 = 4.0
(17.8 × 4.0 × 0.912) 4 Nos = 260/27 9.6

389.2

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 39 OF 40

DETAIL Conc. Qty COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Barrel

(4.0 x 0.875) 52.38 = 183 cfr
(0.5 x 0.17) 52.38 = 5
188

Both Sides Excl & Wcl.
188 x 2/27 13.9 CY

Total for Sossaman Box

353.2
389.2
13.9
756.3 CY

Over all Total :

Channel (Page 6) = 1016 CY
Box (This Page) = 756
1772
Class B Conc. Slope protn 185
1957 CY

Edgar Qty = 1927 CY

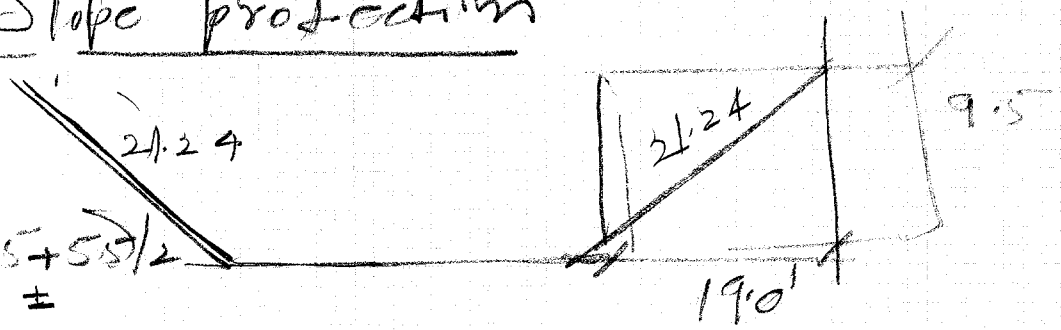
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Salsaman Box PAGE 40 OF 40

DETAIL Conc. Slope COMPUTED KNH DATE 1/93

CHECKED BY _____ DATE _____

Concrete Slope protection



Av. width = (57.5 + 55)/2
= 53 ±

AV

$\frac{8}{12} \times 53 \times .80 = 2829/27 = 105$ CY

$(21.24 \times \frac{6}{12} \times 80)\ 2 = 1,699/27 = 63$

Both Sides

Toe Down: $(3.33 \times 0.75 \times 97.5) = 244/27 = 9$

Toe Down (Sides): $(3.0 \times 0.5 \times 70)\ 2 = 210/27 = 8$

2 Sides

185 CY

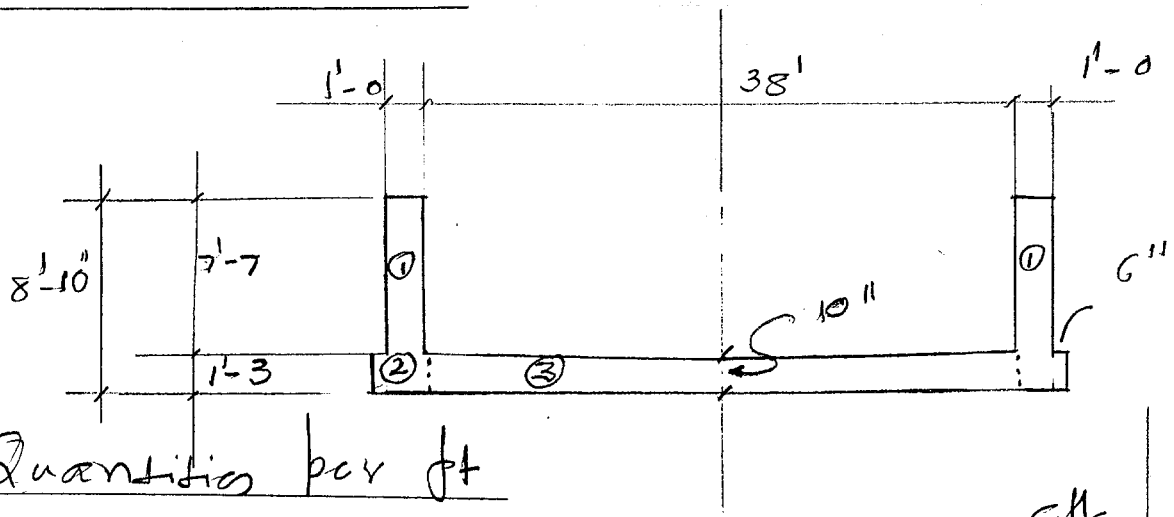
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 1 OF 7

DETAIL Conc. Qtys COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

New Section



Quantities per ft

1) Walls : (7.583 x 1.0) 1.0 = 7.58 cft

2) Base Slab : (1.25 x 1.5) 1.0 = 1.88

3) — " — : $\left(\frac{1.25 + 0.833}{2}\right)$ 19 x 1.0 = 19.79

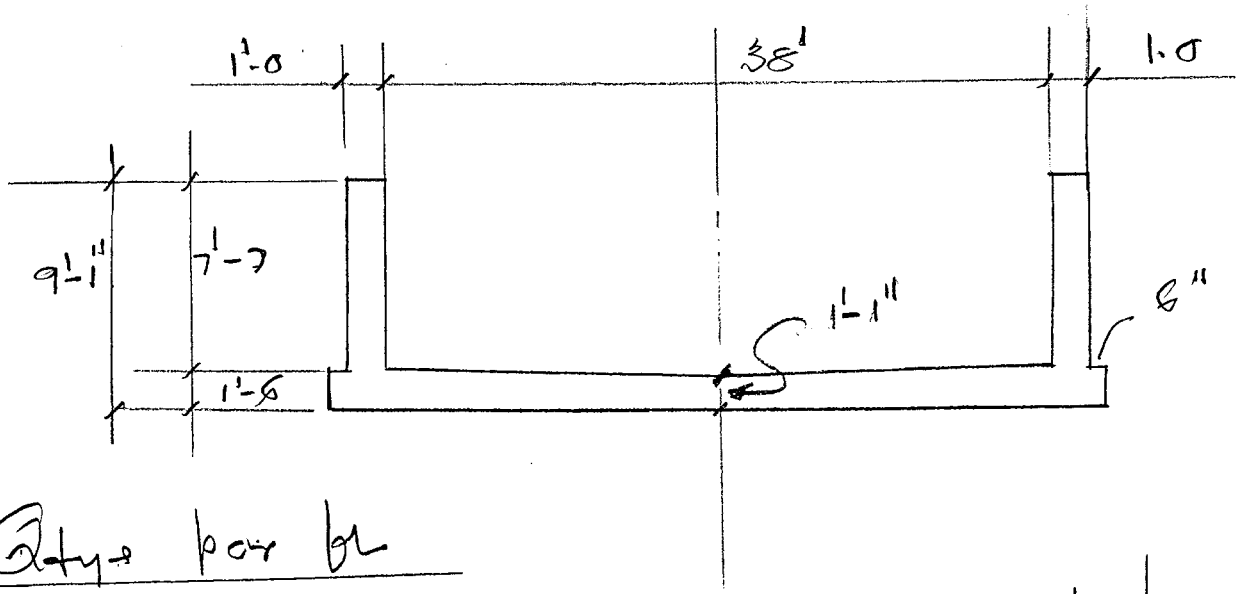
29.25

Both Sides = 29.25 x 2/27 = 2.17 cy | 2.17 cy/ft

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 2 OF 7
DETAIL Conc. Qtys COMPUTED KVH DATE 1/93
CHECKED BY DATE

Old Section



Qtys per ft

1) Walls : (7.583 x 1.0) 1.0 = 7.58 cy
2) Base Slab: (7.5 x 1.5) 1.0 = 2.25
3) —"— $\left(\frac{1.5 + 1.083}{2}\right)$ (7. x 1.0 = 24.54

34.37

Both sides : 34.37 x 2/27 = 2.55 cy | 2.55 cy/ft

Savings (Concrete Qty)

(2.55 - 2.17)/2.55 = 15 % Savings

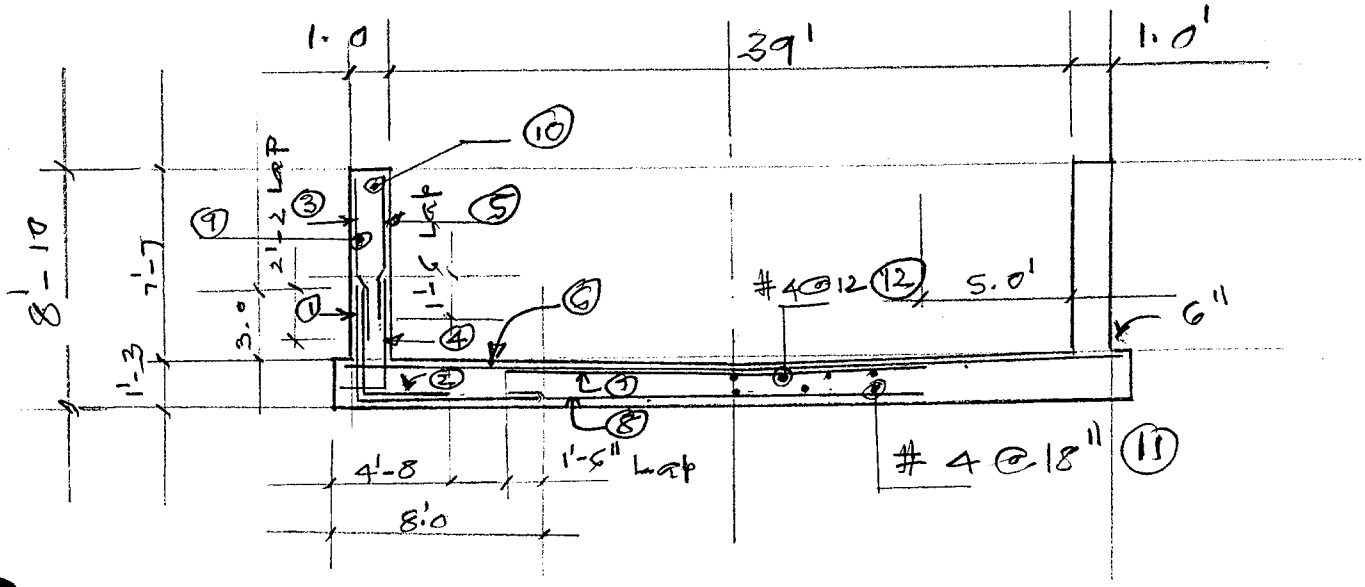
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

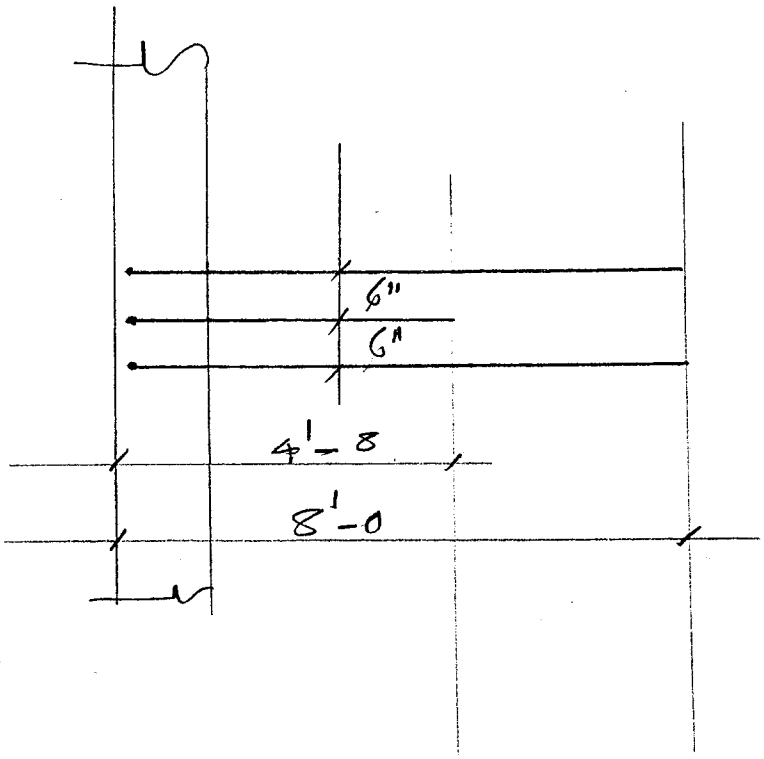
PROJECT Guadalupe Channel PAGE 3 OF 7

DETAIL Steel Ramp COMPUTED NVH DATE 1/93

CHECKED BY _____ DATE _____

New Section





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 4 OF 7
DETAIL Steel Bdgs COMPUTED KVH DATE 1/93
CHECKED BY _____ DATE _____

Reinf. Steel bar bl (New Section)

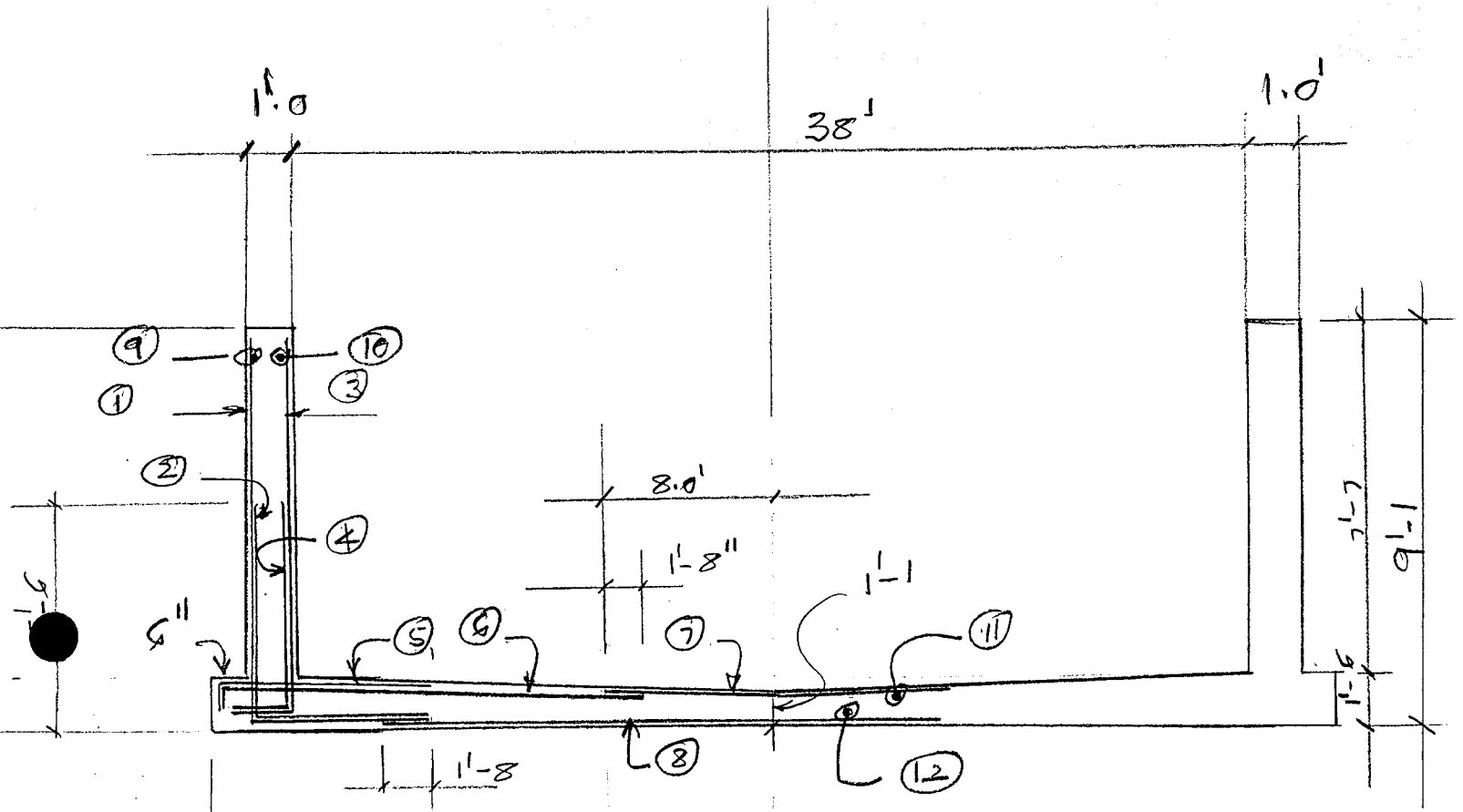
	lbs	lbs
Bar ① : #5 @ 12" 4.0 / 7'-4 (11.33 × 1.043) 2 = 2 Sides	23.63	23.63
Bar ②: #5 @ 12" 4.0 / 4.0 (8 × 1.043) 2 =	16.69	16.69
Bar ③ #5 @ 12" L = 6'.58 (6.58 × 1.043) 2 =	13.73	13.73
Bar ④ 4.0' #5 @ 12 1'-2 (5.17 × 1.043) 2 =	10.78	10.78
Bar ⑤ #4 @ 12", L = 5.92 (5.92 × 0.668) 2 =	7.91	7.91
Bar ⑥ L = 41.67' #5 @ 12" (41.67 × 1.043) =	43.46	43.46
Bar ⑦ L = 29' #5 @ 12" (29 × 1.043) =	30.25	30.25
Bar ⑧ L = 29 #5 @ 12 (29 × 1.043) =	30.25	30.25
Bar ⑨ 7 × 12/12 = 7 ft, (8 Bars) 2 = 16 ⑩ 7 × 12/18 = 5 ft, (6 Bars) 2 = 12 ⑪ 41 × 12/18 = 27 ft, 28 Bars = 28 ⑫ 41 × 12/12 = 41 ft, 42 Bars = 42 (98 × 1.0) 0.668 = per bl	98 #4	65.46
		242.16 lbs

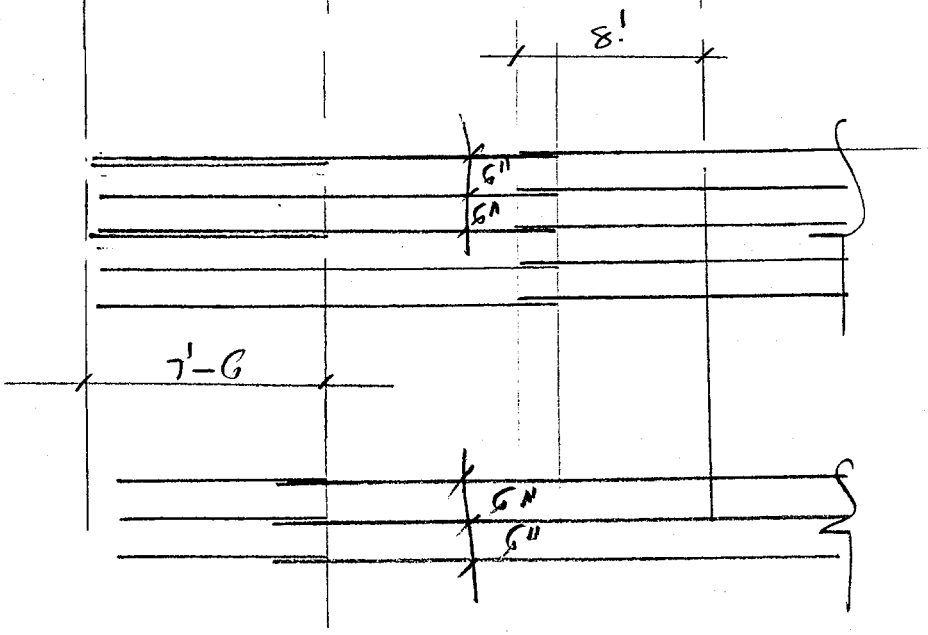
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 5 OF 7

DETAIL Steel Qtys COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____





Top Steel Layout

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 6 OF 7

DETAIL Steel Gate COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

			lbs
B1: #4 @12", L = 15.5'			
1'-8 / 5'-10	(15.5 × 0.668) 2 (2 walls)	=	20.71
B2: #5 @12, L = 12.08'			
5'-3 / 5'-10	(12.08 × 1.043) 2	=	25.20
B3: #4 @12 L = 9.83'			
1'-8 / 1'-2	(9.83 × 0.668) 2	=	13.13
B4: 1'-3 / 1'-2 #5 @12" L = 6.42'			
	(6.42 × 1.043) 2	=	13.40
B5: 7'-4 / 1'-1" #5 @12, L = 8.42			
	(8.42 × 1.043) 2	=	17.56
B6: 14' / 1'-1 #5 @6" L = 15.08'			
	(15.08 × 1.043 × 2)	=	31.46
B7: #5 @6", L = 16			
	(16 × 1.043 × 2) 6" step - 2 Bars per ft	=	33.38
B8: #5 @6", L = 29.33			
	(29.33 × 1.043 × 2)	=	61.18
B9: #4 @16", 7 × 12/16 =	(5 Bars) 2 (2 walls)	= 10	
B10: #4 @8"	(10) 2	= 20	
B11: #4 @8"	(40 × 12/8)	= 60	
B12: #4 @16"	(40 × 12/16)	= 30	
		120 #4	
L = 1.0,	(120 × 1.0 × 0.668)	=	80.16
			296.20

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 7 OF 7

DETAIL Quantities COMPUTED KVH DATE 1/93

CHECKED BY _____ DATE _____

Summary of Savings

Concrete:

old Section = 2.55 cy/Lft

New Section = 2.17

$$\text{Savings } \% = \frac{(2.55 - 2.17)}{2.55} 100 = 15\%$$

Steel:

old Section = 296 lbs/Lft

New Sect = 242

$$\text{Savings } \% = \frac{(296 - 242)}{296} 100 = 18\%$$

FLOOD CONTROL DISTRICT OF
MARICOPA COUNTY

Project : Review the DEA proposed alternatives for a new bridge across the Guadalupe Channel.

Computations : Edgar O. Moreno.
Date Submitted : March 15, 1994.

HYDRAULIC COMPUTATIONS:

The following calculations outline the design criteria applied to the Guadalupe Channel.

1)

Discharge	= 2400.0 cfs
Slope	= 0.0036 f/f
Manning's n	= 0.0130
U Channel bottom	= 38.00 ft.

Yn = 4.08 ft
Vn =15.46 ft/sec
Yc = 4.99 ft

FLOW IS SUPERCRITICAL

critical velocity = 12.67
critical slope = 0.00196

@ Vn froude number = 1.35
@ Yn hydraulic radius = 3.36

WATER PROFILE

Distance from CS	0.02	v=12.695	d=4.975	sd=5.00	F=1.00
Distance from CS	0.03	v=12.698	d=4.974	sd=5.00	F=1.00
Distance from CS	0.09	v=12.724	d=4.964	sd=5.01	F=1.01
Distance from CS	0.19	v=12.750	d=4.954	sd=5.02	F=1.01
Distance from CS	0.33	v=12.775	d=4.944	sd=5.03	F=1.01
Distance from CS	0.50	v=12.801	d=4.934	sd=5.04	F=1.02
Distance from CS	0.72	v=12.827	d=4.924	sd=5.05	F=1.02
Distance from CS	0.85	v=12.840	d=4.919	sd=5.05	F=1.02
Distance from CS	1.13	v=12.866	d=4.909	sd=5.06	F=1.02
Distance from CS	1.45	v=12.893	d=4.899	sd=5.07	F=1.03
Distance from CS	1.82	v=12.919	d=4.889	sd=5.08	F=1.03

Distance from	CS	2.23	v=12.946	d=4.879	sd=5.09	F=1.03
Distance from	CS	2.46	v=12.959	d=4.874	sd=5.10	F=1.03
Distance from	CS	2.69	v=12.972	d=4.869	sd=5.10	F=1.04
Distance from	CS	3.20	v=12.999	d=4.859	sd=5.11	F=1.04
Distance from	CS	3.75	v=13.026	d=4.849	sd=5.12	F=1.04
Distance from	CS	4.36	v=13.053	d=4.839	sd=5.13	F=1.05
Distance from	CS	5.01	v=13.080	d=4.829	sd=5.14	F=1.05
Distance from	CS	5.72	v=13.107	d=4.819	sd=5.16	F=1.05
Distance from	CS	6.10	v=13.120	d=4.814	sd=5.16	F=1.05
Distance from	CS	6.89	v=13.148	d=4.804	sd=5.17	F=1.06
Distance from	CS	7.74	v=13.175	d=4.794	sd=5.18	F=1.06
Distance from	CS	8.64	v=13.203	d=4.784	sd=5.19	F=1.06
Distance from	CS	9.12	v=13.216	d=4.779	sd=5.20	F=1.07
Distance from	CS	10.11	v=13.244	d=4.769	sd=5.21	F=1.07
Distance from	CS	11.17	v=13.272	d=4.759	sd=5.22	F=1.07
Distance from	CS	12.29	v=13.300	d=4.749	sd=5.23	F=1.08
Distance from	CS	13.48	v=13.328	d=4.739	sd=5.24	F=1.08
Distance from	CS	14.73	v=13.356	d=4.729	sd=5.25	F=1.08
Distance from	CS	16.06	v=13.384	d=4.719	sd=5.26	F=1.09
Distance from	CS	16.75	v=13.399	d=4.714	sd=5.27	F=1.09
Distance from	CS	18.18	v=13.427	d=4.704	sd=5.28	F=1.09
Distance from	CS	19.69	v=13.456	d=4.694	sd=5.29	F=1.09
Distance from	CS	21.28	v=13.484	d=4.684	sd=5.30	F=1.10
Distance from	CS	22.11	v=13.499	d=4.679	sd=5.30	F=1.10
Distance from	CS	23.82	v=13.528	d=4.669	sd=5.32	F=1.10
Distance from	CS	25.62	v=13.557	d=4.659	sd=5.33	F=1.11
Distance from	CS	27.50	v=13.586	d=4.649	sd=5.34	F=1.11
Distance from	CS	29.48	v=13.615	d=4.639	sd=5.35	F=1.11
Distance from	CS	31.55	v=13.645	d=4.629	sd=5.36	F=1.12
Distance from	CS	32.08	v=13.652	d=4.626	sd=5.36	F=1.12
Distance from	CS	33.17	v=13.667	d=4.621	sd=5.37	F=1.12
Distance from	CS	35.41	v=13.696	d=4.611	sd=5.38	F=1.12
Distance from	CS	37.76	v=13.726	d=4.601	sd=5.39	F=1.13
Distance from	CS	38.98	v=13.741	d=4.596	sd=5.40	F=1.13
Distance from	CS	41.49	v=13.771	d=4.586	sd=5.41	F=1.13
Distance from	CS	44.12	v=13.801	d=4.576	sd=5.42	F=1.14
Distance from	CS	46.87	v=13.831	d=4.566	sd=5.43	F=1.14
Distance from	CS	49.75	v=13.862	d=4.556	sd=5.44	F=1.14
Distance from	CS	52.76	v=13.892	d=4.546	sd=5.45	F=1.15
Distance from	CS	54.31	v=13.908	d=4.541	sd=5.46	F=1.15
Distance from	CS	57.52	v=13.938	d=4.531	sd=5.47	F=1.15
Distance from	CS	60.88	v=13.969	d=4.521	sd=5.48	F=1.16
Distance from	CS	64.38	v=14.000	d=4.511	sd=5.49	F=1.16
Distance from	CS	68.05	v=14.031	d=4.501	sd=5.50	F=1.17
Distance from	CS	71.88	v=14.062	d=4.491	sd=5.51	F=1.17
Distance from	CS	75.89	v=14.094	d=4.481	sd=5.53	F=1.17
Distance from	CS	80.08	v=14.125	d=4.471	sd=5.54	F=1.18
Distance from	CS	84.47	v=14.157	d=4.461	sd=5.55	F=1.18
Distance from	CS	89.05	v=14.189	d=4.451	sd=5.56	F=1.19

Distance from	CS	93.85	v=14.221	d=4.441	sd=5.57	F=1.19
Distance from	CS	98.88	v=14.253	d=4.431	sd=5.58	F=1.19
Distance from	CS	104.14	v=14.285	d=4.421	sd=5.59	F=1.20
Distance from	CS	109.66	v=14.317	d=4.411	sd=5.61	F=1.20
Distance from	CS	115.44	v=14.350	d=4.401	sd=5.62	F=1.21
Distance from	CS	121.52	v=14.383	d=4.391	sd=5.63	F=1.21
Distance from	CS	127.89	v=14.415	d=4.381	sd=5.64	F=1.21
Distance from	CS	131.20	v=14.432	d=4.376	sd=5.65	F=1.22
Distance from	CS	132.88	v=14.440	d=4.374	sd=5.65	F=1.22
Distance from	CS	139.84	v=14.473	d=4.364	sd=5.66	F=1.22
Distance from	CS	147.16	v=14.507	d=4.354	sd=5.67	F=1.23
Distance from	CS	154.87	v=14.540	d=4.344	sd=5.69	F=1.23
Distance from	CS	163.00	v=14.573	d=4.334	sd=5.70	F=1.23
Distance from	CS	171.59	v=14.607	d=4.324	sd=5.71	F=1.24
Distance from	CS	180.67	v=14.641	d=4.314	sd=5.72	F=1.24
Distance from	CS	190.28	v=14.675	d=4.304	sd=5.73	F=1.25
Distance from	CS	195.31	v=14.692	d=4.299	sd=5.74	F=1.25
Distance from	CS	205.82	v=14.726	d=4.289	sd=5.75	F=1.25
Distance from	CS	217.00	v=14.761	d=4.279	sd=5.77	F=1.26
Distance from	CS	228.91	v=14.795	d=4.269	sd=5.78	F=1.26
Distance from	CS	241.65	v=14.830	d=4.259	sd=5.79	F=1.27
Distance from	CS	255.29	v=14.865	d=4.249	sd=5.80	F=1.27
Distance from	CS	269.95	v=14.900	d=4.239	sd=5.81	F=1.28
Distance from	CS	285.75	v=14.935	d=4.229	sd=5.83	F=1.28
Distance from	CS	302.86	v=14.971	d=4.219	sd=5.84	F=1.28
Distance from	CS	321.47	v=15.006	d=4.209	sd=5.85	F=1.29
Distance from	CS	341.80	v=15.042	d=4.199	sd=5.86	F=1.29
Distance from	CS	364.16	v=15.078	d=4.189	sd=5.88	F=1.30
Distance from	CS	388.93	v=15.114	d=4.179	sd=5.89	F=1.30
Distance from	CS	416.60	v=15.150	d=4.169	sd=5.90	F=1.31
Distance from	CS	447.84	v=15.187	d=4.159	sd=5.91	F=1.31
Distance from	CS	483.58	v=15.223	d=4.149	sd=5.93	F=1.32
Distance from	CS	525.18	v=15.260	d=4.139	sd=5.94	F=1.32
Distance from	CS	574.69	v=15.297	d=4.129	sd=5.95	F=1.33
Distance from	CS	635.49	v=15.334	d=4.119	sd=5.97	F=1.33
Distance from	CS	713.73	v=15.372	d=4.109	sd=5.98	F=1.34
Distance from	CS	822.43	v=15.409	d=4.099	sd=5.99	F=1.34
Distance from	CS	997.85	v=15.447	d=4.089	sd=6.00	F=1.35

RECOMMENDATION

Since there is no control over drastic water-surface fluctuations and since pronounced wave fluctuations are expected due to the high velocities, the criteria of freeboard is applied to the alternate depth, furthermore in this case the velocity head is even higher therefore it is my recommendation not to allow any changes on the geometry of the Channel and to request that any structure placed above the channel shall clear at least 8" from the top of the walls.

Edgar O. Moreno.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INTEROFFICE MEMORANDUM

Subject: Guadalupe Channel (from EMF to Sossaman) **File:** JHK

To: Ed Raleigh **From:** Jay H. Kim JHK **Date:** Dec. 18, 1992
To: Scott Clement

I have studied the hydraulic performance of the Guadalupe Channel from EMF to the Sossaman Box Culverts. The Sossaman culverts are currently redesigned to enhance their hydraulic performance by adding one more barrel. The existing downstream concrete channel is extended upstream to the Sossaman culverts. The datum discrepancy between several plans have been corrected to conform to the plan datum for the Guadalupe Road Channel. The following has been found in the study for the three reaches described in the sketch attached:

(1) From EMF to Guadalupe Road Channel

The 100-yr water surface elevation at the confluence of EMF and Guadalupe channel was given by SCS as 1332.19 feet. A backwater calculation which was performed by HEC-2 showed a minimum of 3 feet of freeboard. The 10'x10' box culvert was modeled as a 10'x7' to take the sewer pipe crossing into consideration. This approximate modeling shows that the 100-yr discharge of 2400 cfs can be conveyed through the culverts without overtopping the Guadalupe Road. Because of the flat slope of the downstream grouted riprap channel, sediment deposition problem will occur.

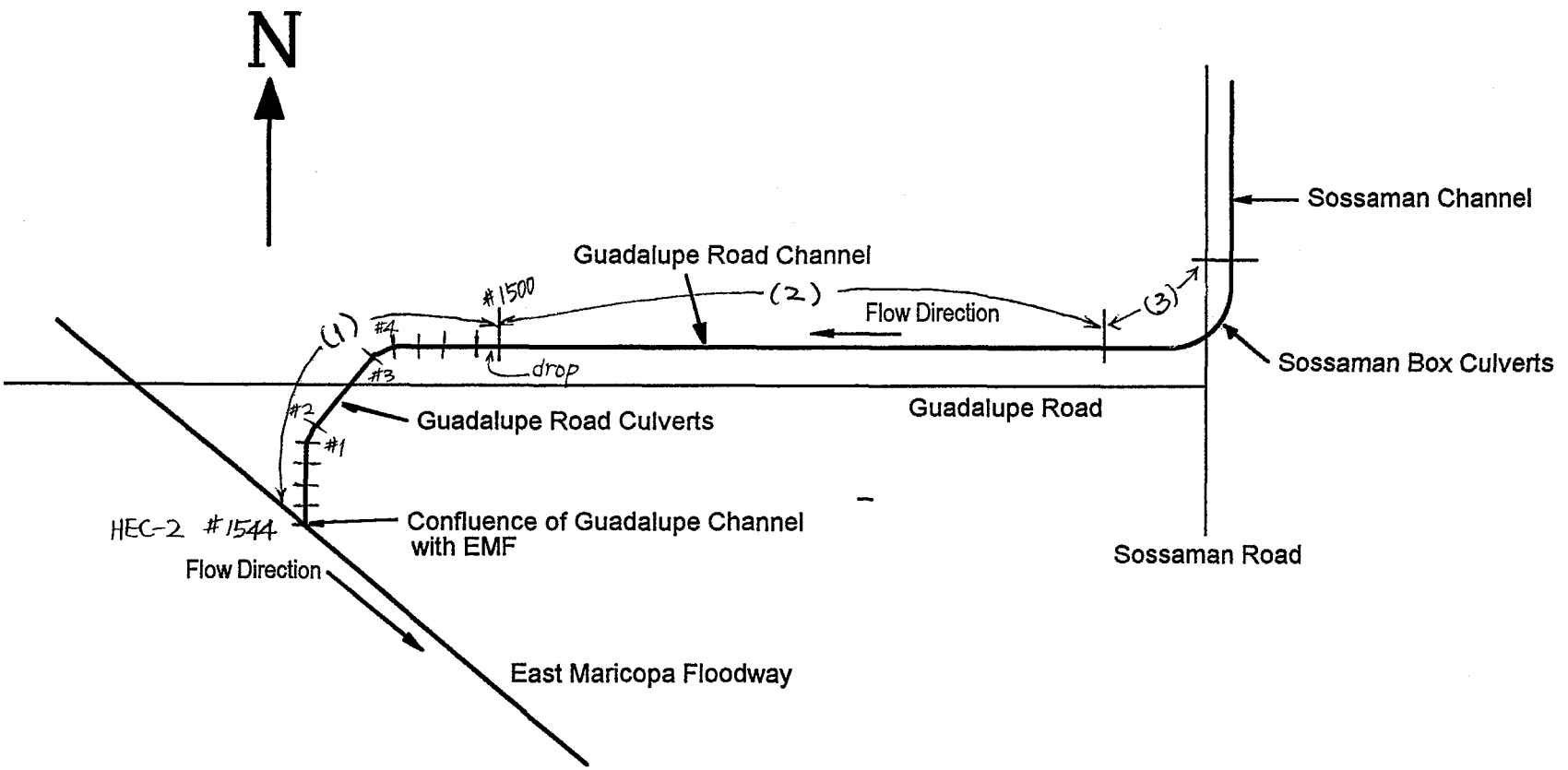
(2) Guadalupe Road Channel

This concrete channel will have a supercritical flow in most part of the channel reach. The flow depth for the 100-yr flow will be 4.5 feet providing 3.5 feet of freeboard. There is a steep slope section near the downstream end of the channel. There will be a hydraulic jump downstream of this drop. However, the freeboard in this reach considering the jump will still be about 3 feet.

(3) New Sossaman Box Culverts

The analysis of the culverts (1x6'x6' and 4x10'x6') shows that The culverts can convey the 2400 cfs without overtopping. The inlet headwater elevation is 8 feet which is 2 feet higher than the culvert height. However, the wingwall height of 11 feet provides an enough freeboard (3 feet). Because of the 90 degree curve along the culverts, sediment deposition is expected in the inner curve barrels. This will require a maintenance after a major storm. This phenomenon also applies to the Guadalupe Road Box Culverts.

Although there are some minor problems as mentioned above, the channel and culverts are expected to hydraulically function well for the design flow of 2400 cfs.


N
Sossaman Channel
Guadalupe Road Channel
#1500
(2)
Flow Direction
(3)
(1)
#4
#3
drop
Sossaman Box Culverts
Guadalupe Road
#2
#1
Guadalupe Road Culverts
HEC-2 #1544
Confluence of Guadalupe Channel
with EMF
Sossaman Road
Flow Direction
East Maricopa Floodway

(Input file)

```
T1      FCDMC    Jay H. Kim                                    Nov. 25, 1992
T2      From EMF To the drop in the Guadalupe Road Channel
T3      GUADALUPE CHANNEL
J1                                                            2400   32.19
NC  .025    .025    .025      .1      .3
* confluence of EMF and Guadalupe channel
X1  1544       4     100   210.5
GR 35.46     100   23.71  135.25   23.71  175.25   35.46   210.5
X1  1430                             114     114     114            .057
X1  1250                             180     180     180             .09
NC                              .3      .5
X1  1175       4     100  174.26      79      79      79
GR 35.65     100   23.90  117.63   23.90  156.63   35.65  174.26
* beginning of concrete channel
X1  1091       4     100     138      80      80      80
GR 35.94     100   23.94  100.01   23.94  137.99   35.94     138
NC                  .015
* Guadalupe road culverts outlet
X1     2       4     100     132      65      65      65
GR    36     100   24.06  100.01   24.06  131.99      36     132
SC 3.015      .2     3.0                7      10     160    11.1   24.35   24.06
* Guadalupe road culverts inlet
X1     3                             160     160     160             .29
BT     2      80    36.8   31.35     150    36.8   31.35
* beginning of Guadalupe road channel
X1     4       4     100     138      80      80      80
GR  36.5     100    24.5  100.01    24.5  137.99    36.5     138
X1   450                          131.75  131.75  131.75             .26
X1   650                             200     200     200              .4
* downstream of the drop
X1   872                             222     222     222             .44
* upstream of the drop
X1  1500                             628     628     628           11.81
EJ
ER
```

```
*-----------------------------------*
|              S U M P O            |
|                                   |
|   Interactive Summary Printout    |
|   for MS/PC-DOS micro computers   |
|              May 1991             |
*-----------------------------------*
```

NOTE - Asterisk (*) at left of profile number indicates message in summary of errors list

GUADALUPE CHANNEL

Summary Printout

	SECNO	Q	DEPTH	CWSEL	XLBEL	VCH	FRCH (Fr #)
	1544.00	2400.00	8.48	32.19	35.46	4.32	.31
	1430.00	2400.00	8.48	32.25	35.52	4.33	.31
	1250.00	2400.00	8.48	32.34	35.61	4.33	.31
	1175.00	2400.00	8.39	32.29	35.65	5.55	.38
*	1091.00	2400.00	8.21	32.15	35.94	7.69	.47
	2.00	2400.00	7.94	32.00	36.00	9.45	.59
*	3.00	2400.00	7.70	32.05	36.29	10.72	.71
*	4.00	2400.00	8.94	33.44	36.50	7.07	.42
	450.00	2400.00	8.72	33.48	36.76	7.24	.43
	650.00	2400.00	8.39	33.55	37.16	7.53	.46
	872.00	2400.00	8.04	33.64	37.60	7.85	.49
*	1500.00	2400.00	4.97	42.38	49.41	12.72	1.01

```
*******************************************
*  HYDRAULICS OF TRAPEZOID CHANNEL PROGRAM  *
*******************************************
```

ARIZONA DEPT. OF TRANSPORTATION ..... STRUCTURES SECTION

PROJECT NO. : DATE : 12-18-1992 TIME : 08:35:03
PROJECT NAME : Guadalupe Road Channel
COMPUTED BY : JHK CHK BY :

****

Channel Bottom Width (ft)	Side Slope Lt. (Horz. to 1)	Side Slope RT. (Horz. to 1)	Normal Water Depth (ft)	Area @ Normal Depth (ft^2)
38.00	0.00	0.00	4.48 (C)	170.28

wall height = 8 ft → 3.5' of freeboard.

Discharge (cfs)	Channel Slope (ft/ft)	Manning Coefficient	Velocity (f/s) @ Normal Depth	Froude Number
2400.00	0.0036	0.015	14.09	1.1734

↳ supercritical

Critical Depth (ft)	Velocity (f/s) @ Critical Depth	Critical Slope (ft/ft)	Sequent Depth (ft)
4.98	12.67	0.0026	5.53

Figure 4.42
Culvert Design Form

New

Project: Sossaman Box Culverts

Station: _____

Sheet _____ **of** _____

CULVERT DESIGN FORM
Designer/Date: JHK / 12-10-92
Reviewer/Date: _____ / _____

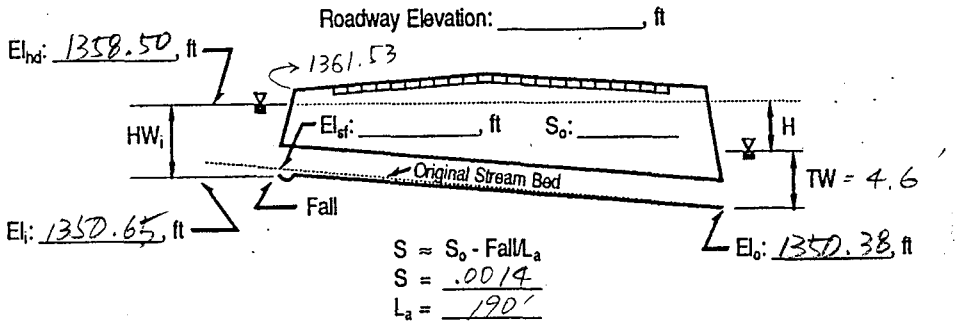
See Add'l shts

Hydrological Data

- ☐ Method: _____
- ☐ Drainage Area: _____ ☐ Stream Slope: _____
- ☐ Channel Shape: _____
- ☐ Routing: _____ ☐ Other: _____

Design Flows/Tailwater

R.I., years	Flow, cfs	TW, ft
100-yr	2400	4.6



Culvert Description: Material - Shape - Size - Entrance	Total Flow Q, cfs	Flow Per Barrel Q/N (1)	Headwater Calculations: Inlet Control: HW_i/D (2)	HW_i	Fall (3)	EL_{hi} (4)	Outlet Control: TW (5)	d_c	$\frac{d_c + D}{2}$	h_o (6)	k_e	H (7)	EL_{ho} (8)	Control Headwater Elevation	Outlet Velocity	Comments
1 X 6'x6' Box culverts	300	50	1.27	7.62	0	1358.27	4.6	4.25		4.6	0.2	1.8	1356.78	1358.27		assuming 1358.50
4 x 10'x6' Box culverts	2100	52.5	1.30	7.8	0	1358.45	4.6	4.35		4.6	0.2	1.8	1356.78	1358.45		provides 3 feet of freeboard

Technical Footnotes:

(1) Use Q/NB for box culverts.
(2) HW_i/D = HW /D or HW_f/D from design charts
(3) FALL = $HW_i - (EL_{hd} - EL_{sf})$; Fall is zero for culverts on grade.
(4) $EL_{hi} = HW_i + EL_i$ (invert of inlet control section)
(5) TW based on downstream control or flow depth in channel.
(6) h_o = TW or $(d_c + D)/2$ (whichever is greater).
(7) $H = \left[1 + k_e + (29n^2L)/R^{1.33}\right] V^2/2g$
(8) $EL_{ho} = EL_o + H + h_o$

Subscript Definitions:

a. approximate
f. culvert fact
hd. Design Headwater
hj. Headwater in inlet control
he. Headwater in outlet control
i. inlet control section
o. Outlet
sf. Streambed at culvert face
TW. Tailwater

Comments / Discussion:

Culvert Barrel Selected:
Size: _____
Shape: _____
Material: _____ n: _____
Entrance: _____

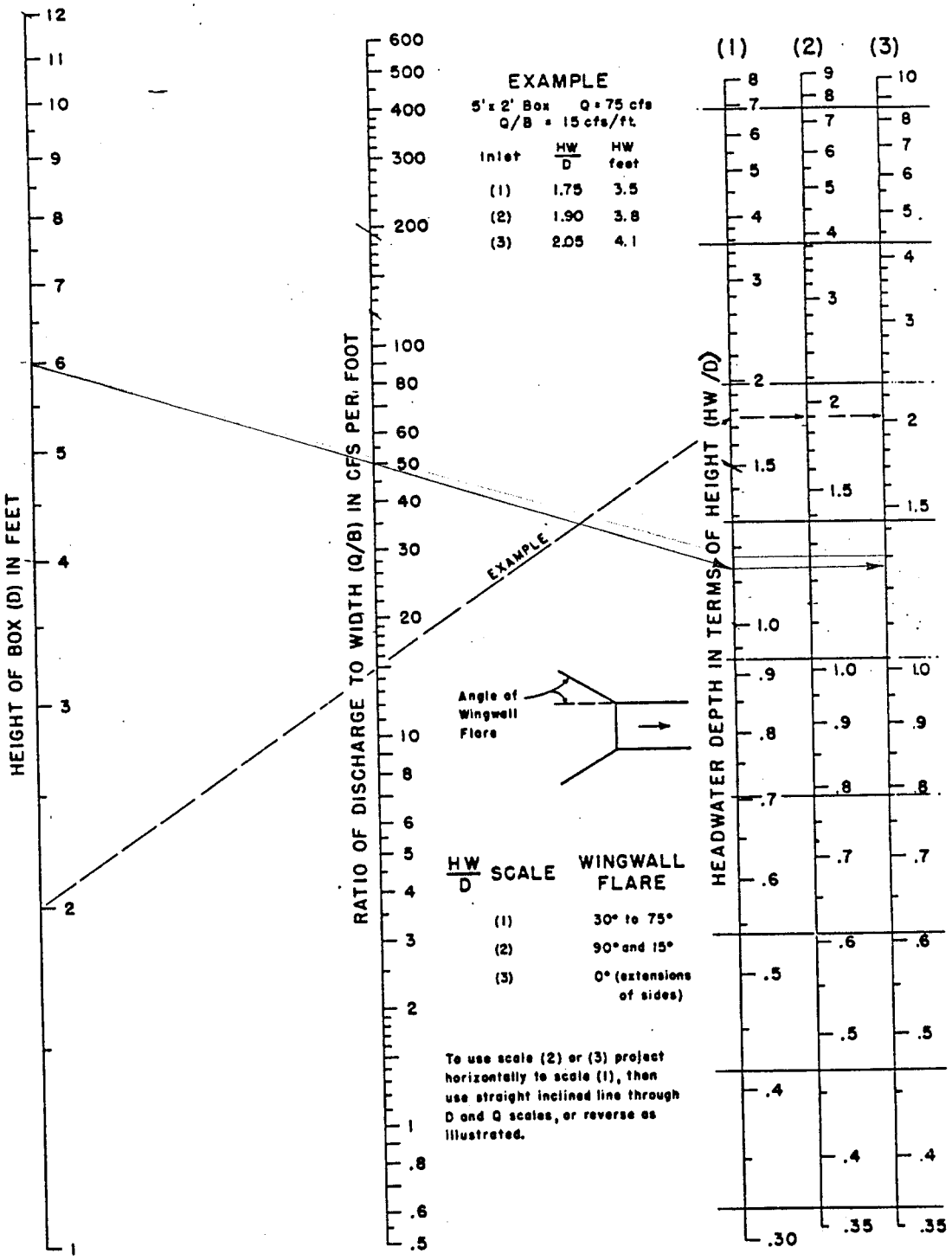
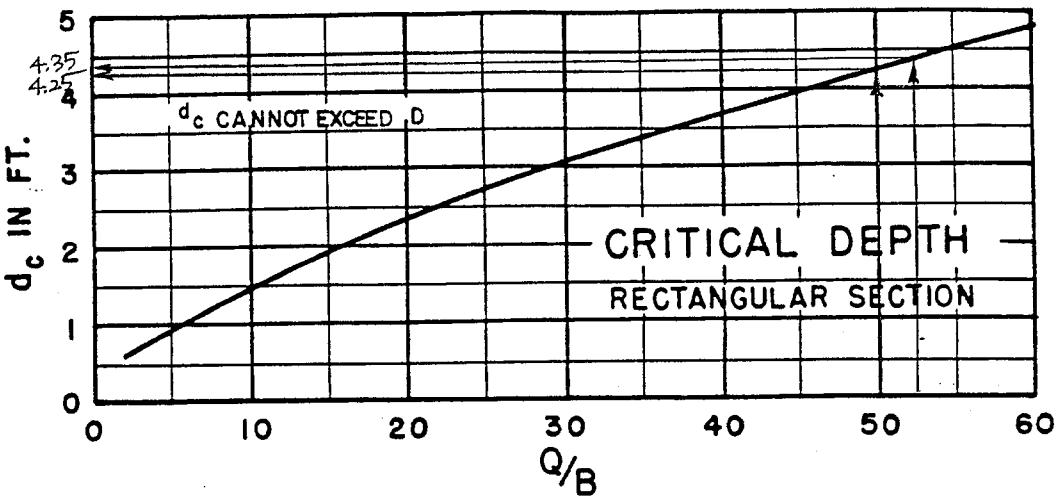


Figure 4.59
Headwater Depth for Box Culverts with Inlet Control
(FHWA, HDS-5, 1985)



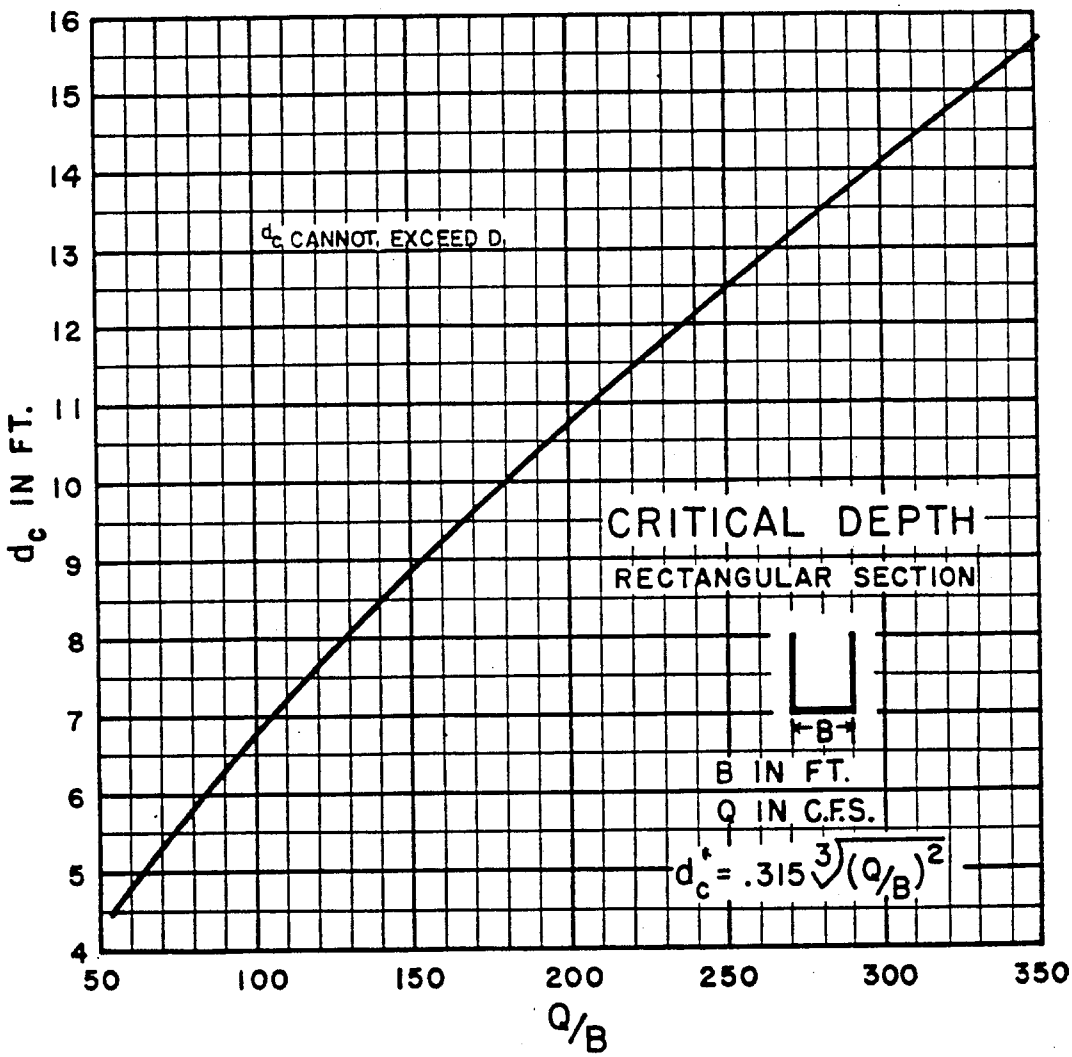


Figure 4.62
Critical Depth Rectangular Section
(FHWA, HDS-5, 1985)

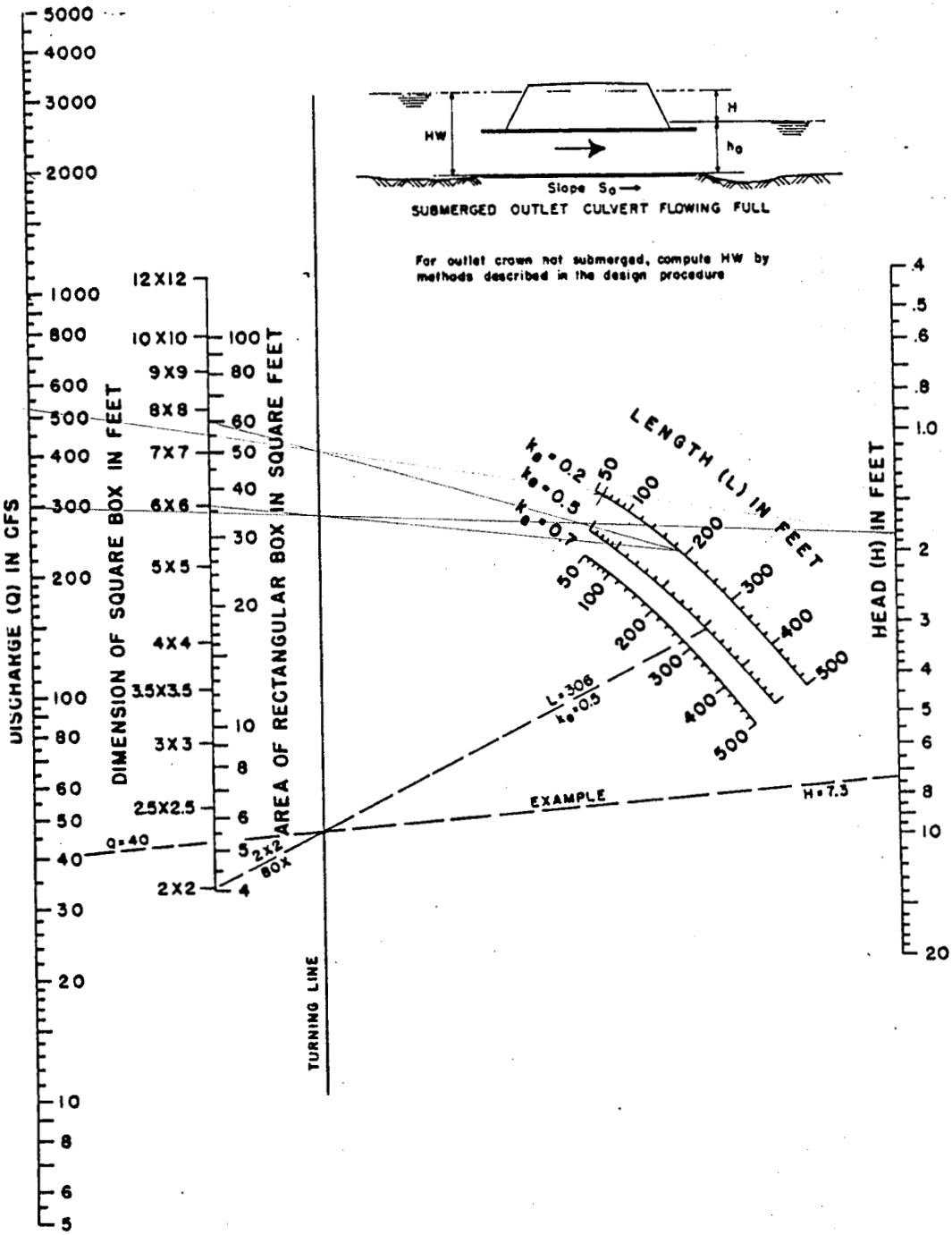


Figure 4.63
Head for Concrete Box Culverts Flowing Full
n = 0.012
(FHWA, HDS-5, 1985)

MESSAGE DISPLAY FOR ED RALEIGH

EAR

From: John Svechovsky
Postmark: Jan 28,91 4:32 PM Delivered: Jan 28,91 4:32 PM
Status: Previously read
Subject: Headlosses

Message:
Let me try to put this to bed for you. There are 4 issues to resolve; 1 the capacity of the drain, not an issue; 2 the capacity of the Guadalupe channel, presumably also not an issue although I haven't looked at the plans or the design cross-sections; 3 the culvert; and 4 the 90-degree bend. The approach velocity at the inlet of the culvert adds to the available headwater. I estimate that the approach velocity is 4 fps, for an increase in headwater of about 0.25 feet. I neglected it. The water ponds at the inlet and the culvert's conveyance ability has nothing to do with the upstream geometrics. As far as the bend is concerned, it doesn't matter either. Water will overtop the weir and flow uphill to the South and eventually pond. There is no field evidence that ponding in the concrete area of the bend or South in the unlined adversely sloped tapering channel has caused erosion. In my estimation the channel was designed to flow into the concrete area, overtop into the tapering channel and pond to the elevation of the top of the boxes before flowing into the road. The main channel, the concrete bend and the tapering channel are all working well. I really don't care about losses in the bend when water is being delivered to the inlet. Let's talk about this if you don't agree.

----------X=========-------

INSPECTOR
241

SR-7

MARICOPA COUNTY HIGHWAY DEPARTMENT
APPLICATION AND PERMIT
FOR CONSTRUCTION IN COUNTY RIGHT-OF-WAY

NO. L 14416

Receipt No. 0 No. 00000 Fee $ 0.00 Cash ( ) Check ( ) Rec'd by SLB

RECEIVED
JAN 26 1993
PERMITS

Bond $ N/A Rec'd by N/A

Insurance Expires 0 /0 /0 Rec'd by N/A

Issue Date 01/26/93 Expiration Date 09/30/93

Bond Return 0 /0 /0 Completion Date / /

The undersigned herewith makes application for a permit to enter upon and use a portion of the right-of-way of the Public Highway, Street or Alley,

in MESA (S) Subdivision.

Located at GUADALUPE ROAD AND SOSSAMAN ROAD in the

NW4 of Section 08 Township 01S Range 07E for the purpose of

FILLING IN DRAINAGE CHANNEL

FOR AND IN CONSIDERATION of the granting of a permit of license for the purpose set forth therein Licensee hereby agrees, covenants, and bids said Licensee to conditions on back hereof.

IN WITNESS WHEREOF, this application has been duly signed this 26TH day of JANUARY, 19 93.

Applicant's Signature (X)

Applicant FLOOD CONTROL

Address 2801 W DURANGO PHX AZ 85009 Phone 506-1501

Contractor FLOOD CONTROL Lic. No. N/A Phone 506-1501

PERMIT FEES

QUANTITY	UNIT	ITEM	UNIT COST	AMOUNT
		PROCESSING FEE	.00	$25.00
		TOTAL FEE	$	0.00

Construction shall be in accordance with the latest MAG Uniform Standard Specifications, Amendments and Maricopa County Supplements thereto; approved plans and the latest Maricopa County Special Provisions.

Comments

PHONE 233-8791 FOR INSPECTION
24 HOURS IN ADVANCE

ARRANGEMENTS FOR ROAD OBSTRUCTION OR CLOSURES MUST BE MADE 24 HOURS IN ADVANCE WITH TRAFFIC ENGINEERING AT 233-8676

APPROVED
COUNTY ENGINEER

By

Revised: 04/26/89

When recorded, return to:

Flood Control District
of Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009

RECORDED IN OFFICIAL RECORDS
OF MARICOPA COUNTY, ARIZONA
JUN 21 1989 -12 00
HELEN PURCELL, County Recorder
FEE N/C PGS 6 TB

89 283265

EASEMENT AND AGREEMENT FOR FLOOD CONTROL PURPOSES

Project: Sossaman Road Drain

Item: SR-4

Assessor Parcel No.: 304-05-014C

MARICOPA COUNTY, a political subdivision of the STATE OF ARIZONA, GRANTOR, FOR AND IN CONSIDERATION of the sum of Ten and No/100---- Dollars ($10.00), and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, does hereby grant and convey to the FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, a municipal corporation and political subdivision of the State of Arizona, GRANTEE, its agents, contractors, successors and assigns, a permanent easement and right-of-way for the following purposes, namely: The right to enter upon the hereinafter described land and survey, clear, grade, level, fill, inundate, drain; and build and operate a flood control project, including incidental purposes consistent therewith, together with such roads, pipes, underground box culverts, ramps, and service utilities as may be necessary, on, over, under, and across the ground embraced within the right-of-way situated in the County of Maricopa, State of Arizona, and described as follows:

See Exhibit "A"

To have and to hold the said easement and right-of-way unto the GRANTEE, its agents, contractors, successors and assigns forever, together with the right of ingress and egress to permit the economical operation and maintenance of said flood control project and all incidents thereto, and together with the right to authorize, permit, and license the use

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Road Channel PAGE 1 OF

DETAIL Reinf. Steel COMPUTED KVH DATE 8/92

CHECKED BY DATE

Stat (47+00) to Stat (50+94) — Steel (lbs)

L = 394'

1) Wall Steel Inside face.

5'-0 L 1'-0

L = 6.25, No. = 394 × 12/12 = 394

(1.043 × 394) 6.25 × 2 = 5137

#5 @ 12 — 2 walls

2) Base Slab: Top Steel

#5 @ 12 1'-0 7L3 L = 8.25

1.043

(1.043 × 394) 8.25 × 2 = 6780

#5 — 2 Sides

3) Outside wall Steel Bent to Bottom of Base Slab.

Cut off at 4'

Saving Length = 2'-10

5'-0 6L10 4-0

#4

(0.668 × 394) 2.83 × 2 = 1490

#4 — 2 sides

4) #5 × 14'-0 @ 6" (Top Steel Bott. Slab)

(1.043 × 394) 14.0 × 2 = 11506

2 sides

5) #5 × 27'-8 @ 6" Top Steel - Bott Slab)

(1.043 × 394 × 27.67) = 11370

36283 lbs

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 2 OF

DETAIL Savings COMPUTED KNH DATE 8/92

Reinf. Steel CHECKED BY DATE

6) # 5 x 41'-0 @ 6" (Bott. Steel - Bott. Slab) 36283 lbs

$\frac{394 \times 12}{6''\text{ Spacing}} = 788$

$\frac{394 \times 12}{18\text{ Spacing}} = 263$

No. of Bars (Savings) = (788 - 263) = 525

(1.043 x 525 x 41.0) = 22450

7) # 4 Longitudinal Bars Base Slab Top Bars

Width = (52'-8) Say 52'

No. = 52 x 12/8 = 78

52 x 12/12 = 52

26 Savings

Length = 394

0.668 x 26 x 394 = 6842

No. of Bars

Savings - Total Steel 65575 lbs

Concrete:

Cutting Base Slab from 1'-6 to 1'-3

Qty = (0.25 x 52.67 x 394)/27 = 192 CY

Steel prices varies from \$0.30 to \$0.40

use Ave. \$0.35

Concrete prices varies from \$90 to \$120

use \$100/CY

Reinf Steel \$0.35 x 65575 = \$22951

Concrete \$100 x 192 \$19200

Total Savings \$42151

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Road Channel PAGE 1 OF

DETAIL Reinf. Steel COMPUTED KVH DATE 8/92

CHECKED BY DATE

Sta 47+00 to Sta 50+94 — Steel (lbs)

L = 394'

1) Wall Steel Inside face.

5'-3 / 1'-0 — L = 6.25, No# = 394 × 12/12 = 394

(1.043 × 394) 6.25 × 2 = 5137

#5 @ 12 — 2 walls

2) Base Slab: Top Steel

#5 @ 12 — 1'-0 / 7'-3 — L = 8.25

1.043

(1.043 × 394) 8.25 × 2 = 6780

#5 — 2 Sides

3) Outside wall Steel Bent to Bottom of Base slab.

Cut off at 4'

3'-8 / 4'-0 — Saving Length = 2'-10

#4

(0.668 × 394) 2.83 × 2 = 1490

#4 — 2 sides

4) #5 × 14'-0 @ 6" (Top Steel Bott. Slab)

(1.043 × 394) 14.0 × 2 = 11506

2 sides

5) #5 × 27'-8 @ 6" Top Steel - Bott Slab)

(1.043 × 394 × 27.67) = 11370

36283 lbs

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE 2 OF

DETAIL Savings COMPUTED KNH DATE 8/92

Reinf. Steel CHECKED BY DATE

6) # 5 x 41'-0 @ 6" (Bott. Steel - Bott. Slab) 36283 lbs

$\frac{394 \times 12}{6'' \text{ Spacing}} = 788$

$\frac{394 \times 12}{18 \text{ spacing}} = 263$

No of Bars (Savings) = (788 - 263) = 525

(1.043 x 525 x 41.0) = 22450

7) # 4 Longitudinal Bars Base Slab Top Bars

Width = (52'-8) say 52'

Nos = 52 x 12/8 = 78

52 x 12/12 = 52

26 Savings

Length = 394

0.668 x 26 x 394 = 6842

No. of Bars

Savings - Total Steel 65575 lbs

Concrete:

Cutting Base Slab from 1'-6 to 1'-3

Qty = (0.25 x 52.67 x 394)/27 = 192 CY

Steel prices varies from $0.30 to $0.40

use Ave. $0.35

Concrete prices varies from $90 to $120

use $100/CY

Reinf Steel $0.35 x 65575 = $22951

Concrete $100 x 192 $19200

Total Savings $42151

CONSTRUCTION GENERAL PROVISIONS

MARICOPA COUNTY PROJECT
FOR THE

GUADALUPE ROAD CHANNEL

FCD No.

DRAFT

SEP 22 1992

LOCATION OF THE WORK: This project is located at Guadalupe and Sossaman Roads, East of Power Road in the City of Mesa, Maricopa County, Arizona.

PROPOSED WORK: The work consists of constructing a concrete U-Channel, extending a box culvert, new inlet, and other miscellaneous items of work required for the completion of the project.

SPECIFICATIONS: The work embraced herein and as shown on the plans for the construction of this project shall be done in accordance with the Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction dated 1979, the MAG Uniform Standard Details for Public Works Construction dated 1979, the Maricopa County Highway Department (MCHD) Supplements to the Uniform Standard Specifications dated August 3, 1981, and the Construction Special Provisions contained herein. The latest published editions, including published revisions thereto of the above described documents shall be included.

PRECEDENCE OF CONTRACT DOCUMENTS: In case of any discrepancy or conflict the Project Plans will govern over both the MAG Uniform Standard Specifications and the MCHD Supplements. These Construction Special Provisions will govern over the MAG Uniform Standard Specifications, the MCHD Supplements and the Project Plans.

WORK STANDARDS: The Contractor shall comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor Regulations (29 CFR Part 5).

CONTRACT TIME: The Contractor shall start work within seven (7) calendar days and complete all work on the project within two-hundred seventy (270) calendar days from the date of Notice to Proceed.

WATER, LIGHT, POWER, HEAT, TELEPHONE: All water for construction purposes, drinking water, lighting, temporary electric power, heat and telephone service shall be arranged and provided for by the Contractor at his own expense.

GENERAL COMMENTS:

A. REMOVAL OF WATER:

1. DIVERTING SURFACE WATER: The Contractor shall build, maintain, and operate all channels, flumes, sumps, and other temporary diversions and/or protective works needed to divert streamflow and other surface water through or around the construction site and away from the construction work while construction is in progress. Unless otherwise specified, a diversionmust discharge into the same natural drainageway in which its headworks are located.

2. DIVERSION PLAN: The Contractor shall furnish to the Engineer in writing, his plan for diverting surface water before beginning the construction work for which the diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

3. DEWATERING THE CONSTRUCTION SITE: Foundations, cutoff trenches, and other parts of the construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction work. The Contractor shall furnish, install, operate, and maintain all drains, sumps, pumps, casings, wellpoints, and other equipment needed to perform the dewatering as specified. Dewatering methods that cause a loss of fines from foundation areas will not be permitted.

4. DEWATERING PLAN: The Contractor shall furnish to the Engineer in writing, his plan for dewatering before beginning the construction work for which the dewatering is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

B. MISCELLANEOUS

The cost of all work required under this contract as shown on the plans for which there are no specific items shown on the Bidding Schedule, shall be included in the prices bid for related items.

All desired equals must be approved in writing by the Engineer.

An attempt has been made to determine the location of all underground utilities and to design the location and elevation of all irrigation and drainage pipes, culverts and structures so as not to interfere with the existing utilities, however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation may be adjusted.

Any facility or work which may be performed for the accommodation of any utility shall be paid for by the utility owner. The Contractor shall make all arrangements that may be necessary for the construction and any financial agreement shall be solely between the Contractor and the utility owner.

The Flood Control District reserves the right to adjust design grades or the location of drainage structures prior to construction, if it should become necessary in the opinion of the Engineer, without additional cost to the District.

It shall be the Contractor's responsibility to protect the structure and construction site from any excessive or detrimental flooding, within the channel right-of-way which may occur during the construction period and until final acceptance of the completed project by the Engineer.

Upon completion of the construction, the Contractor shall clear the channel invert and work area of all debris to the satisfaction of the Engineer.

The Contractor shall take special precautions to keep the area around the structures properly barricaded and marked to prevent automotive traffic from running into the channel or crossing the new structures prior to the acceptance of the completed project by the Engineer.

SUBSECTION 101.2 - DEFINITIONS AND TERMS: Change the definition of Budget Project to read as follows: A project financed by funds set aside in the annual budget or otherwise approved by the Board of Directors of the Flood Control District of Maricopa County.

Change the definition of Engineer to read as follows: The Chief Engineer and General Manager of the Flood Control District of Maricopa County acting directly or through his duly authorized representative.

Change the definition of Owner to read as follows: The Flood Control District of Maricopa County, acting through its legally constituted officials, officers or employees.

SUBSECTION 102.5 - ADDENDA & SUBMISSION OF BIDDING SCHEDULE: It shall be the responsibility of prospective bidders to determine, prior to submission of a bid, if any addenda have been issued by the Flood Control District of Maricopa County. This may be accomplished by calling 602-506-1501. Any addendum issued, if not already bound into the Special Provisions, must be included as part of the Special Provisions and any quantities on the Bidding Schedule requiring change shall be adjusted by pen and ink, to the new figure.

Bids which do not include appropriate addenda and show appropriate changes to the Bidding Schedule shall be invalid.

The Contractor shall be appropriately licensed as a contractor in the State of Arizona for performing the work on the project.

SUBSECTION 102.6 - SUBCONTRACTORS' LIST: A list of subcontractors proposed to be employed on the project shall be submitted with the bid.

SUBSECTION 103.6 - CONTRACTOR'S INSURANCE: Concurrently with the execution of the contract, the Contractor shall furnish a Certificate of Insurance using the included Certificate or one of equal wording that designates both the Flood Control District of Maricopa County (FCDMC) and the City of Mesa (COM) as additional insured. Such certificates shall name both the FCDMC and the COM as certificate holders. The types of insurance and the limits of liability shall be as indicated on the included form.

SUBSECTION 105.2 - PLANS AND SHOP DRAWINGS: The number of copies of plans/shop drawings required for review and/or approval shall be as follows:

Initial submittal:	Three (3) copies	One (1) copy will be returned to the Contractor
Final submittal:	Five (5) copies	Two (2) copies will be returned to the Contractor.

The MAG phrases "Furnish as Submitted", "Furnish as Noted", and "Revise and Resubmit" shall be changed to read "Approved", "Approved as Noted", and "Not Approved", respectively.

SUBSECTION 105.6 - COOPERATION WITH UTILITIES: An attempt has been made to determine the location of all underground utilities and drainage pipes, culverts and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation may be adjusted. Should the Contractor's operations result in damage to any utility the location of which has been brought to his attention, he shall assume full responsibility for such damage.

The following phone numbers should put the Contractor in contact with the proper personnel:

Flood Control District.....506-1501
US West Communications.....831-4647
Salt River Project.....236-2765
Location Staking (A.P.S.,Mtn. Bell,S.R.P.).....263-1100
Maricopa County Department of Transportation.....506-8600
City of Mesa Engineering Permits Dept.....644-2240

SUBSECTION 105.8 - CONSTRUCTION STAKES, LINES, AND GRADES: The project control line and bench mark elevation are shown on the drawings and will be established by the Engineer. The Contractor shall establish offset stakes and temporary bench marks for referencing the designated construction lines and grades. The Contractor shall provide all rough grade, fine grade, and structural reference lines and shall be responsible for their conformance with the plans and specifications.

Survey work shall be performed by a qualified and experienced surveyor licensed in the State of Arizona or under the direct supervision of such a surveyor.

The MAG phrase "lines and grades" shall be changed to "the project control line".

SUBSECTION 107.2 - PERMITS: The Contractor shall be responsible for being aware of and obtaining all permits and licenses, pay all charges, fees, taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work. Permits for earth moving may be obtained from the Bureau of Air Pollution Control, Maricopa County Department of Health Services, 2406 South 24th Street, telephone number 506-6700.

A right of way permit shall be obtained from the City of Mesa (644-2240). The right-of-way permit from the City of Mesa will be at no charge to the Contractor.

A highway encroachment permit shall be obtained by the contractor from Maricopa County Highway Department.

SUBSECTION 108.4 - CONTRACTOR'S CONSTRUCTION SCHEDULE: The Contractor shall submit his proposed work progress schedule to the Chief Engineer and General Manager for approval at the pre-construction conference.

SUBSECTION 108.5 - LIMITATIONS OF OPERATIONS: Should the Contractor wish to perform any work after regular working hours or on legal holidays the Contractor is required to make such a request to the Engineer well in advance and obtain his approval.

Further, any charges incurred by the District for inspection of the work, surveys or material test will be deducted from monies due or that will become due to the Contractor.

SUBSECTION 108.9 - FAILURE TO COMPLETE ON TIME: The actual cost per calendar day incurred by the District for Administrative and Inspection Services on this project will be added to the daily charges as indicated by TABLE 108, LIQUIDATED DAMAGES, and will be deducted from monies due or to become due to the Contractor for each and every calendar day that work shall remain uncompleted after the time specified for the completion of the work in the proposal, or as adjusted by the Engineer. Nothing contained in this provision shall prohibit the District from deducting from monies due or to become due to the Contractor any other costs incurred by the District directly attributable to the delay in completing this contract.

SUBSECTION 109.2 - SCOPE OF PAYMENT: In addition to the contained provisions, the work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work operations that must be performed and costs incurred prior to beginning work on the various items on the project site.

Mobilization will be measured for payment as a lump sum, a single complete unit of work.

Payment for mobilization, measured as provided above, will be made at the contract lump sum price, which shall be full compensation for supplying and furnishing all materials, facilities and services and performing all the work required.

SECTION 201 - CLEARING AND GRUBBING: The work under this item consists of removal and disposal of all trees, stumps, and other objectionable material within the limits of the proposed channel construction as necessary for the construction of this project.

The term "waste" used on the plans means to remove, dispose of off-site, and backfill any resulting trench or similar excavation as an incidental and related item of work.

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL: The work under this section consists of the removal, placing and compacting material around the channel to the lines designated on the plans or specified or directed by the Engineer.

SUBSECTION 206.4 - STRUCTURE BACKFILL: The structure backfill material shall conform to Subsection 206.4 of the Uniform Standard Specifications. Holes, pits and depressions under the channel invert shall be filled and compacted in horizontal lifts to level. The depth of the uncompacted lifts shall not exceed eight (8) inches. Structure backfill behind the U-Channel, box culvert, and wing walls shall be compacted in accordance with Table 601-2, Type III of the Uniform Standard Specifications. Hand operated compaction equipment will be used adjacent to structures.

All backfill behind the U-Channel, box culvert, and wing walls shall consist of free-draining granular material and shall not contain stones larger than three inches in diameter, with not more than 5 percent passing a #200 sieve and a PI less than 7. Backfill shall be placed in horizontal lifts consistent with the maximum material size and type of compaction equipment in use and compacted to a minimum of 95 percent of the maximum density at the optimum moisture content plus or minus 3 percent as determined in accordance with ASTM D-2922 and D-3017. Compaction equipment or methods which may cause excessive displacement or may damage structures, shall not be used.

The cost of the coarse aggregate drain material at each weephole shall be included in the unit bid price for fill construction. Structure excavation shall be incidental to fill construction. Structure backfill shall be incidental to fill construction.

SUBSECTION 210.2 - IMPORTED BORROW: Borrow material shall be obtained from approved sources. The Contractor shall pay all royalties or any other charges or expenses.

No separate payment will be made for imported borrow. Payment for all work under this section, including watering and compacting, shall be included in SECTION 211 - FILL CONSTRUCTION.

SECTION 211 - FILL CONSTRUCTION: The work under this section consists of placing and compacting all material wherever necessary according to construction drawings. Unless otherwise specified, material obtained from the project excavations may be presumed to be suitable for use in fill construction, provided that all organic material, rubbish, debris and other objectionable material is first removed.

SUBSECTION 211.3 - COMPACTING: Prior to the placement of fill material all loose soil, vegetation, any roadside debris existing pavement, and existing structures within the proposed fill areas shall be completely removed. Depressions and ditches shall be cleaned of all loose or wet soils and widened to accommodate compaction equipment. Sloping surfaces shall be benched to provide a level surface for fill placement.

SECTION 225 - WATERING: The work under this item shall be in accordance with Section 225 of Uniform Standard Specifications and Maricopa County Highway Department Supplement. No separate payment will be made for watering and its cost shall be included in the bid price of related items.

SECTION 310 - UNTREATED BASE: The work under this item shall consist of placing the Aggregate Base course and shall be accordance with Section 310 of Uniform Standard Specifications and Maricopa County Highway Department Supplement.

SECTION 321 - ASPHALT CONCRETE PAVEMENT: The work under this item shall be in accordance with Section 321 of Uniform Standard Specifications and Maricopa County Highway Department Supplement. No separate payment will be made for application of tack coat or preservative seal.

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS: The work under this item shall consist of the removal and disposal of existing concrete structures, and any other obstacle to construction, whether shown on the plans or not, unless specifically called out on the plans to be removed or relocated by other agencies. Holes, cavities, trenches resulting from the removal of structures, except in areas to be excavated, shall be backfilled in accordance with MAG section 206. Arrangements for disposal of all waste material shall be the responsibility of the Contractor.

If a Maricopa County landfill is selected for disposition of road construction waste and/or debris, a Maricopa County Landfill Use Permit will be required. Application for permit can be made at the Maricopa County Solid Waste Management Office, located at 2901 West Durango Street, Phoenix, Arizona 85009 (telephone 506-7060). Charges will be levied on a volume basis for each load delivered to the landfill in accordance with the current fee schedule. The nearest County landfill to this project is Queen Creek located on Haws Road, one-half mile south of Chandler Heights Road.

Payment for this item will be made on a lump sum bid price which shall be full compensation for the item complete, as described in Section 350 of the Standard Specifications and on the plans.

SECTION 401 - TRAFFIC CONTROL: Traffic control shall conform to the applicable paragraphs of Section 401 of the MAG Uniform Standard Specifications with revisions, the County Supplement thereto and these Special Provisions.

The Maricopa County Traffic Engineer or his representative shall approve the Contractor's barricade and traffic routing plan. For bid purposes, a preliminary traffic control plan has been prepared and included in the plan set. The contractor may either use this plan as a base on which to develop his working plan or provide a new plan for consideration. In either case, the working plan must be submitted to the Highway Department and receive their approval of the traffic control plan prior to beginning field operations. The Contractor shall provide a copy of the detailed traffic control plan (working plan submitted to the Highway Department) to the DISTRICT at the pre-construction conference. The plan shall show all types of signs, sand berms, and their placement.

The number and kind of barricades, signs, delineators, barriers, and all other traffic control devices and the approval of the contractor's method of application of all traffic control measures, shall not relieve the contractor of the responsibility of protecting the work, the workmen, and the traveling public.

All advance warning construction signs shall be mounted on channels driven into the ground.

The Contractor shall provide all signing to keep traffic out of the construction area. No paint striping shall be used on existing pavement and striping tape properly installed shall be used. See Figure 6-2 in the Manual on Uniform Traffic Control Devices.

The Contractor shall install and maintain protective sand berms (approximately five feet high) in the path of through traffic and on either side of the construction work area prior to U-Channel or box culvert construction or excavation.

All necessary signs, barricades, and center line vertical panels shall remain three working days beyond acceptance of the project by the Engineer.

<u>SUBSECTION 401.7 - PAYMENT</u>: Shall be revised to read "Payment for traffic control devices will be at the contract lump sum price, including all mobilization, placing, storing, removal and maintenance incidental to the approved traffic control plan.

<u>SECTION 505 - CONCRETE STRUCTURES</u>: The work under this section consists of constructing in place the concrete U-Channel, box culvert extensions, and new box culvert in accordance with the plans and Section 505 of the Uniform Standard Specifications.

The concrete shall conform to Section 725 (Class AA) and the reinforcing steel shall conform to Section 727 (Grade 60) of the Uniform Standard Specifications.

The use of fly ash will be permitted in all concrete mixes.

SECTION 508 - EPOXY GROUTED DOWELS: The work under this section shall consist of furnishing all materials, labor and equipment necessary to install steel reinforcing dowels into existing structures. This includes drilling and cleaning the holes, furnishing and placing materials in accordance with the details shown on the plans and the requirements of these provisions.

SUBSECTION 508.1 - MATERIALS AND COMPOSITION: Epoxy shall be a two component liquid designed for anchoring dowels into concrete. Minimum performance criteria shall be:

Pot life @ 77 degrees F. (ASTM D695) 60 min.
Tensile strength (ASTM D638) 4000 psi.

Steel reinforcing dowels shall conform to the requirements of MAG Section 727. Steel grade shall be as shown on the plans.

SUBSECTION 508.2 - CONSTRUCTION METHODS: Drilled holes shall be to the diameter and depth shown on the plans. Epoxy shall be mixed and applied according to the manufacturers recommendations. After placement, dowels shall not be disturbed by other work for the lesser of the manufacturers recommended set time or 24 hours.

SUBSECTION 508.3 - MEASUREMENT: Measurement for this work shall be by the unit "each".

SUBSECTION 508.4 - PAYMENT: Payment will be made for Epoxy Grouted Dowels at the unit price bid in the proposal.

SECTION 703 - RIPRAP: The work under this Section consists of placing riprap wherever necessary according to the construction drawings. Prior to placing riprap, the slopes shall be shaped to 3:1 slope and transitioned to the existing channel section. Riprap shall extend 20 feet downstream from the upstream end of the corrugated pipe and shall be 18 inches deep. Material shall be in accordance with MAG Section 703.

No separate payment will be made for the material and placement of the riprap and the cost thereof shall be included in the price bid for related items of work.

SECTION 731 - ANCHOR BOLTS

SUBSECTION 731.1 - DESCRIPTION: The work under this section shall consist of furnishing all materials in accordance with the details shown on the plans and the requirements of these specifications.

SUBSECTION 731.2 - MATERIALS: All anchor bolts shall be threaded at both ends in accordance with the dimensions shown on the plans.

High strength anchor bolts, washers and nuts shall be fabricated from steel which meets or exceeds the minimum requirements of ASTM A 36. The anchor bolts, washers, and nuts shall be fully galvanized in accordance with the requirements of ASTM A 153.

SUBSECTION 731.3 - MEASUREMENT: Measurement for this work shall be for the unit each including the nuts and washers attached to each bolt as shown in the construction documents.

SUBSECTION 731.4 - PAYMENT: Payment will be made at the basis unit price bid in the proposal.

SECTION 732 - STEEL PIPE CASING

SUBSECTION 732.1 - DESCRIPTION: The construction shall conform to applicable standard specification and details, except as otherwise required on the plans as modified herein.

SUBSECTION 732.2 - MATERIALS: The casing pipe shall be within 1-1/2 per cent of being a true circle, and shall be welded steel pipe in accordance with ASTM A-283, Grade C. Fabrication and welding shall be in accordance with AWWA C-102, but no weld testing or hydrostatic testing of the casing pipe will be required. Shop and field joints in the casing pipe shall be butt welded.

SUBSECTION 732.3 - CONSTRUCTION METHODS: Except as otherwise required in the standard specifications, by the Engineer, or herein, trench excavation, backfilling and compaction shall be in accordance with the requirements of Section 601 of the Standard Specifications. Backfilling may be accomplished as soon as the casing has been installed to the satisfaction of the Engineer.

The Contractor shall submit detailed shop drawings of the casing pipe. The drawings shall show the material, method of fabrication, type of reinforcement, and detail of field joints.

The ends of the casing pipe shall be securely closed to the satisfaction of the Engineer, so that no water, earth or other substance will enter the casing pipe, and the approach trenches shall be backfilled.

SUBSECTION 732.4 - MEASUREMENT: Measurement of all casings shall be of the linear feet of casings installed, measured along the centerline of the casing.

SUBSECTION 732.5 - PAYMENT: Payment will be made at the unit bid price per linear foot of each size of casing called for in the proposal. Such payment shall be compensation in full for furnishing and installing the casing, securing the ends, complete in place as called for on the plans, and shall include all costs of excavation, removal of obstruction, shoring and bracing, bedding, backfilling, compaction and all other work not specifically covered that is incidental to the installation of the casing.

SECTION 733 - CONCRETE CHANNEL LINING

SUBSECTION 733-1 - DESCRIPTION: The work under this section shall consist of furnishing all materials, labor and equipment necessary to construct the concrete channel lining in accordance with the details shown on the plans and the requirements of these specifications.

SUBSECTION 733.2 - MATERIALS: The Portland cement concrete used shall conform to the requirements of MAG Section 725. Minimum criteria shall be Class B, 2500 psi concrete.

The steel reinforcement used in the concrete shall conform to the requirements of MAG Section 727.

SUBSECTION 733.3 - MEASUREMENT: Concrete shall be paid for by the cubic yard. Measurement will be made in accordance with the dimensions shown on the plans or such other dimensions as may be ordered in writing by the Engineer. No deduction shall be made for the volume occupied by reinforcing steel.

SUBSECTION 733.4 - BASIS OF PAYMENT: Concrete channel lining, measured as provided above, will be paid for at the contract unit price, complete in place, including excavation, compaction, backfill, reinforcing steel and labor.

SUBSECTION 735.1 - REINFORCED CONCRETE PIPE: All installed pipe shall conform to ASTM C-76, Class III (Rubber Gasket) conforming to the requirements of Section 735 and 765 of the Uniform Standard Specifications. The basis of pipe acceptance shall be in accordance with test methods described in ASTM Standard C-76, Section 5.1.1.

No separate payment will be made for the 18" pipe and the 24" pipe and the installation of said pipe and the cost thereof shall be included in the price bid for related items of work.

SECTION 772 - CHAIN LINK FENCE

Work under this item shall conform to Section 772 of the Uniform Standard Specifications.

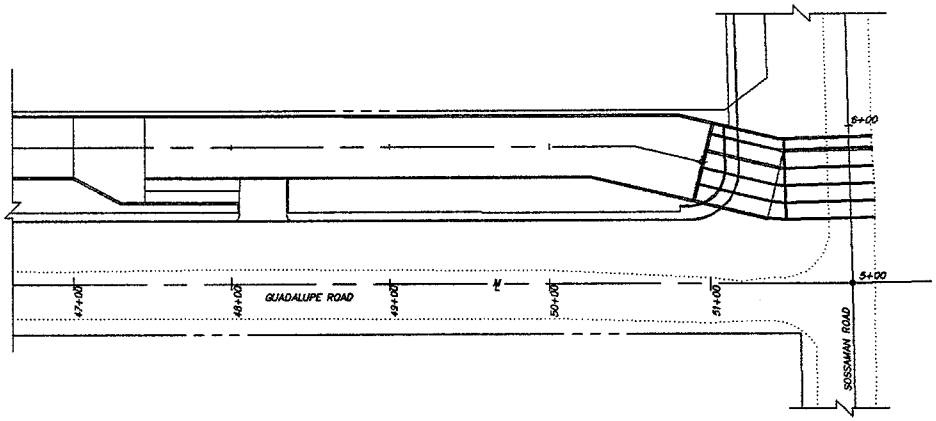
SUBSECTION 772.2 - POSTS, RAILS AND BRACES: Posts, rails and braces shall conform to Table 772, Type A.

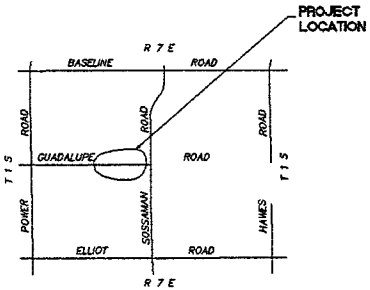
SUBSECTION 772.8 - MEASUREMENT: Measurement shall be per linear foot installed.

SUBSECTION 772.9 - PAYMENT: Payment shall be made at the unit price bid per linear foot to the nearest foot.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

CONSTRUCTION PLANS
FOR
GUADALUPE ROAD CHANNEL





VICINITY MAP
N.T.S.

WORK DRAWINGS NOT TO BE RELEASE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	GUADALUPE ROAD CHANNEL COVER SHEET
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S1 S1 of 317
SUBMITTED BY: DATE			RECOMMENDED BY: DATE; APPROVED BY: DATE; CHIEF ENGINEER AND GENERAL MANAGER

GUADALUPE ROAD
MARICOPA COUNTY

GENERAL NOTES

1. All Construction shall conform to the latest M.A.G. Standard Details and Specifications and the City of Mesa and ADOT amendments where applicable.
2. The Contractor shall call Blue Stake (263-1100) for the location of all underground utilities two (2) working days before digging.
3. The Contractor is responsible for obtaining ALL necessary permits prior to the start of construction. He is also responsible for the cost of said permits. Permits may be required from one or more of the following agencies:

   Maricopa County Highway Department
   City of Mesa
   Maricopa County Health Department (Dust Control)

4. An approved set of construction plans shall be on the job site at all times.
5. Disposal of all waste material, broken concrete, etc., is the responsibility of the Contractor subject to the approval of the Engineer.
6. The estimated quantities shown hereon are not to be accepted as accurate, but must be recalculated by the Contractor for himself. The Contractor shall resolve any significant discrepancy before submitting a bid.
7. Work performed without the approval of the Engineer and/or all materials not in conformance with the plans and specifications is subject to removal and replacement at the Contractors expense.
8. The Contractor is advised that an excavation and dirt moving permit is required by the Maricopa County Health Department. It shall be the responsibility of the Contractor to obtain this permit and comply with its requirements.
9. A thorough attempt has been made to show the locations of all underground obstructions and utility lines in the work area, however, the Contractor shall be responsible for any damage to obstructions and utility lines encountered during construction and shall determine the exact location of said utilities in advance of trenching. The engineer will not guarantee any elevations or locations of existing underground utilities shown on these plans.
10. Salt River Project maintains energized aerial electrical power lines in the immediate vicinity of the project. The Contractor shall contact S.R.P. at 273-8888 several days in advance of construction to arrange for protective measures.
11. The plans prepared for this project present a description of the work to be accomplished. The Contractor shall visit the site and determine, from his own inspection, the conditions under which it is to be performed. The Contractor, by making his bid, represents that he has visited the site and familiarized himself with local conditions, the type of work to be performed, evaluated the difficulty of performing the required tasks, and the labor, equipment and material that are required to provide a complete project.
12. Reinforcing steel shall conform to ASTM Specification A615. Grade 60.
13. Stresses – fs = 24,000 psi – Grade 60 reinforcing steel.
14. All reinforcing steel dimensions shall be to center of bars unless noted otherwise.
15. All reinforcing steel shall have 2" clear cover unless noted otherwise.
16. All welding shall conform to the requirements of the American Welding Society, Structural Welding Code, D1.1, 1980, revised to date, and as modified by the AASHTO Standard Specifications for Welding of Structural Steel Highway Bridges, 1989, revised to date.
17. Dimensions shall not be scaled from drawings.
18. Chamfer all exposed corners 3/4" unless otherwise noted.
19. Concrete compressive strength shall be 4,000 psi for all structures (Class AA).
20. Structural Design:

    The U-Channel has been designed as continuously reinforced, without transverse and longitudinal joints, except construction joints placed at the end of a day's run or anytime the concreting operation has ceased for 45 minutes.

    For construction joints on the slab they shall be spaced at intervals of 40 to 50 feet and perpendicular to the line of flow.

    For construction joints in the walls they shall be spaced at intervals of 40 to 50 feet. Vertical expansion joints are provided only where the channel abuts another structure.

APPROXIMATE QUANTITIES

ITEM	Struct. Excav. C.Y.	Fill Constr. C.Y.	Struct. Backfill C.Y.	Concrete Class "AA" C.Y.	Reinforce Steel LBS.	Fence LF
Channel						

INDEX OF DRAWINGS

S1. COVER SHEET
S2. INDEX, GENERAL NOTES & APPROXIMATE QUANITIES
S3. PLAN AND PROFILE
S4. PLAN, PROFILE, GEOMETRY DETAILS
S5. STRUCTURAL DETAILS STA. 47+00 TO STA. 47+45
S6. STRUCTURAL DETAILS STA. 47+45 TO STA. 50+25.95
S7. STRUCTURAL DETAILS STA. 50+25.95 TO STA. 50+53.23
S8. STRUCTURAL DETAILS STA. 50+53.23 TO STA. 50+80.52
S9. STRUCTURAL DETAILS STA. 50+80.52 TO STA. 50+94.96
S10. RAMP STRUCTURAL DETAILS STA. 47+45 TO STA. 45+55.83
S11. WALL REBARS
S12. CHANNEL ACCESS RAMP
S13. END WALL DETAILS
S14. ACCESS GATES DETAILS
S15. INVERT ACCESS LADDER
S16. FENCE DETAILS
S17. TRAFFIC CONTROL PLAN

PROJECT BENCH MARK:

"B.C." ON THE INTERSECTION OF GUADALUPE & SOSSAMAN ROAD
STATION 5189.20 ELEVATION 1359.18

WORK DRAWING
NOT TO BE RELEASE

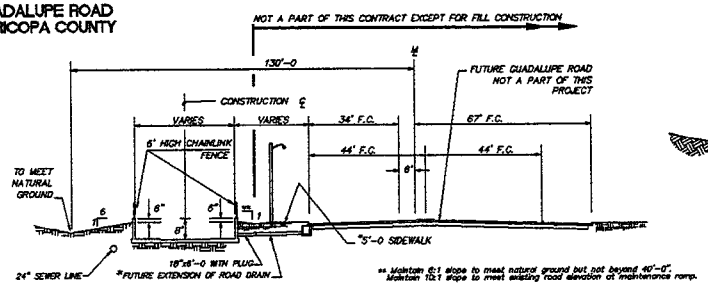
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

	BY	DATE	
DESIGN	EOM	8-92	QUADALUPE ROAD CHANNEL INDEX, GENERAL NOTES + APPROXIMATE QUANTITIES
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	

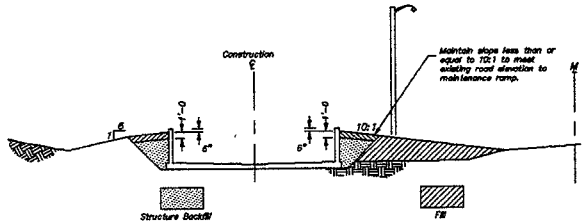
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER
SUBMITTED BY: DATE

SHEET S2
S2 OF 017

GUADALUPE ROAD
MARICOPA COUNTY



TYPICAL SECTION A-A GUADALUPE ROAD AND DRAINAGE CHANNEL
(LOOKING EAST)
N T S

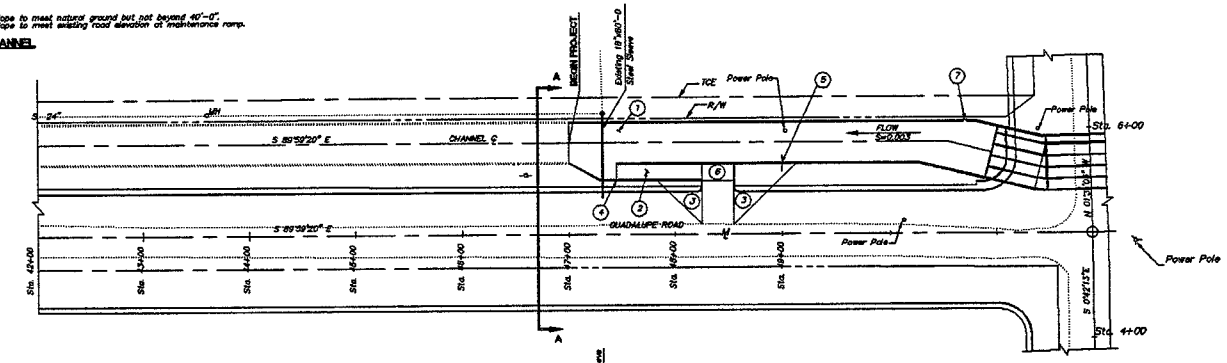


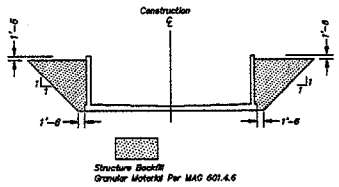
PAYMENT LIMITS FOR FILL PLACEMENT
NTS

1. New Concrete U-Channel Sta. 47+00 to Sta. 50+94.96.
2. New Concrete Ramp Sta. 47+45 to Sta. 48+25.
3. Fill Construction for Approach Driveway to Maintenance Ramp.
4. New Retaining Wall Sta. 47+45 to Sta. 48+25.
5. New Road Drain at Sta. 49+00.
6. New Entrance Slab.
7. New 8'-0 Channel Access Ladder Sta. 50+70.

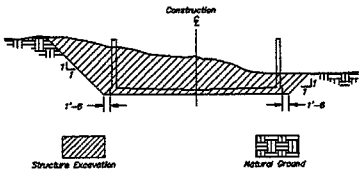
SCALE
HOR. 1"=50'
VER. 1"=5'

B.M.
"B.C." ON THE INTERSECTION OF GUADALUPE & SOSSAMAN ROAD
STA. 5189.20 ELEV. 1359.18

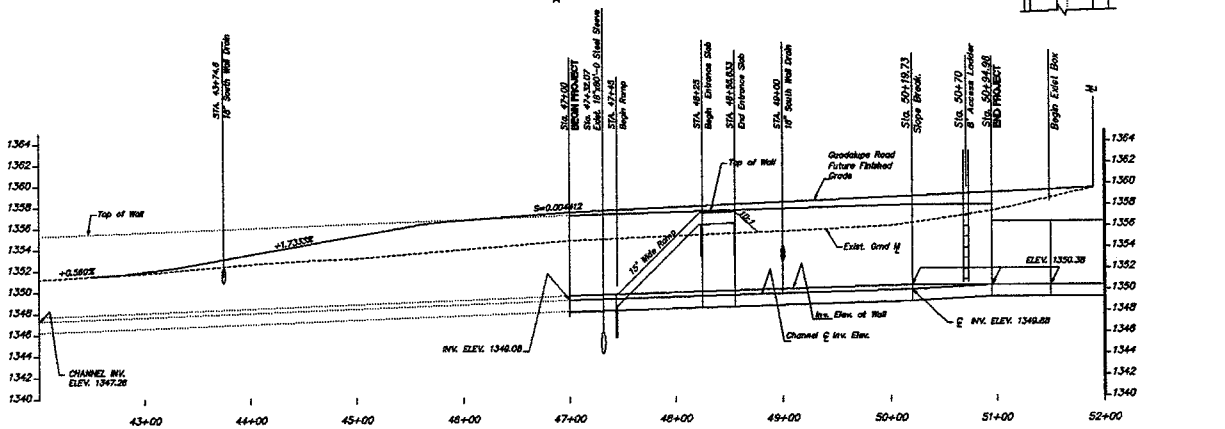


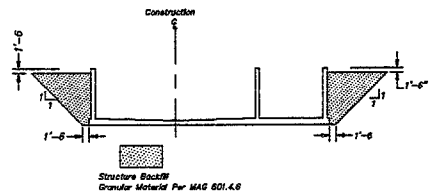


PAYMENT LIMITS FOR STRUCTURE BACKFILL
NTS



PAYMENT LIMITS FOR CHANNEL EXCAVATION
NTS





PAYMENT LIMITS FOR STRUCTURE BACKFILL
NTS

WORK DRAWING
NOT TO BE RELEASE

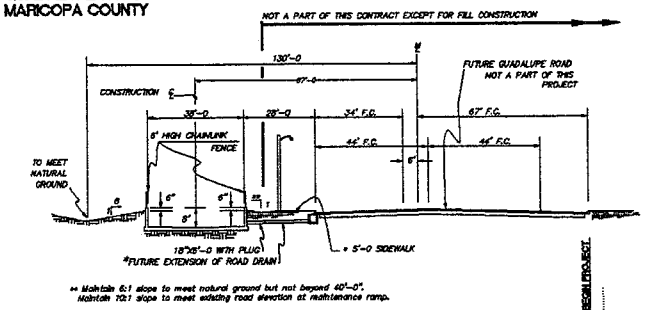
Detail Number
Sheet Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

	BY	DATE	
DESIGN	ECM	8-92	STA. 42+00 TO STA. 50+94.96 GUADALUPE ROAD CHANNEL PLAN AND PROFILE
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	ECM	8-92	RECOMMENDED BY: DATE
SUBMITTED BY: DATE			APPROVED BY: DATE; CHIEF ENGINEER AND GENERAL MANAGER

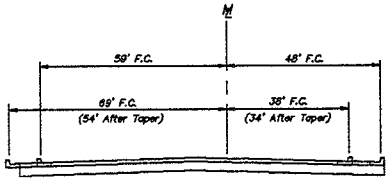
SHEET S3
83 of 87

GUADALUPE ROAD
MARICOPA COUNTY

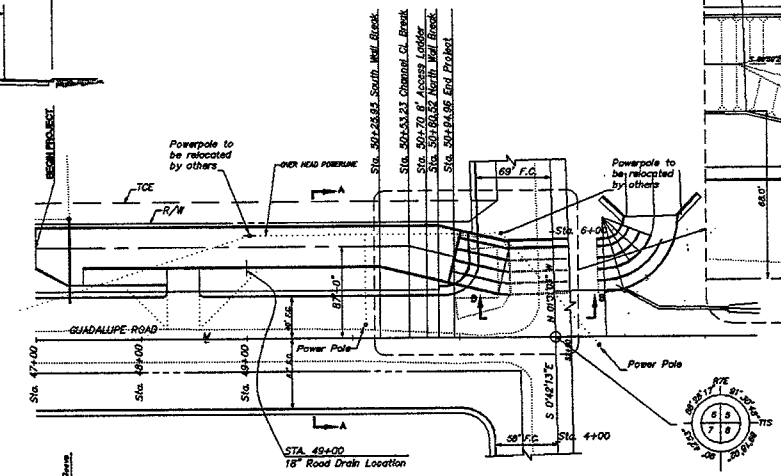


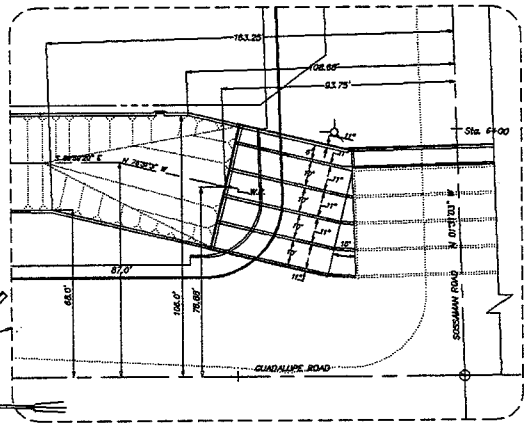
** Maintain 6:1 slope to meet natural ground but not beyond 40'-0".
Maintain 10:1 slope to meet existing road elevation at maintenance ramp.

TYPICAL SECTION A-A GUADALUPE ROAD AND DRAINAGE CHANNEL
(LOOKING EAST)
No Scale

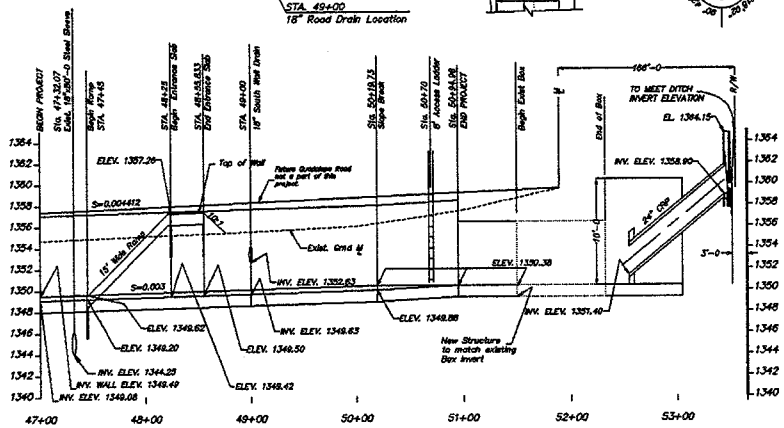


TYPICAL SECTION B-B SOSSAMAN ROAD
LOOKING NORTH – N.T.S.





GEOMETRIC DETAILS
N T S



SCALE
HOR. 1"=50'
VER. 1"=5'

B.M.
"B.C." ON THE INTERSECTION OF GUADALUPE & SOSSAMAN ROAD
STATION 5189.20 ELEVATION 1359.18
INTERSECTION OF GUADALUPE & SOSSAMAN ROAD STA. 5+00 N

Detail Number
Sheet Number

WORK DRAWING
NOT TO BE RELEASE

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

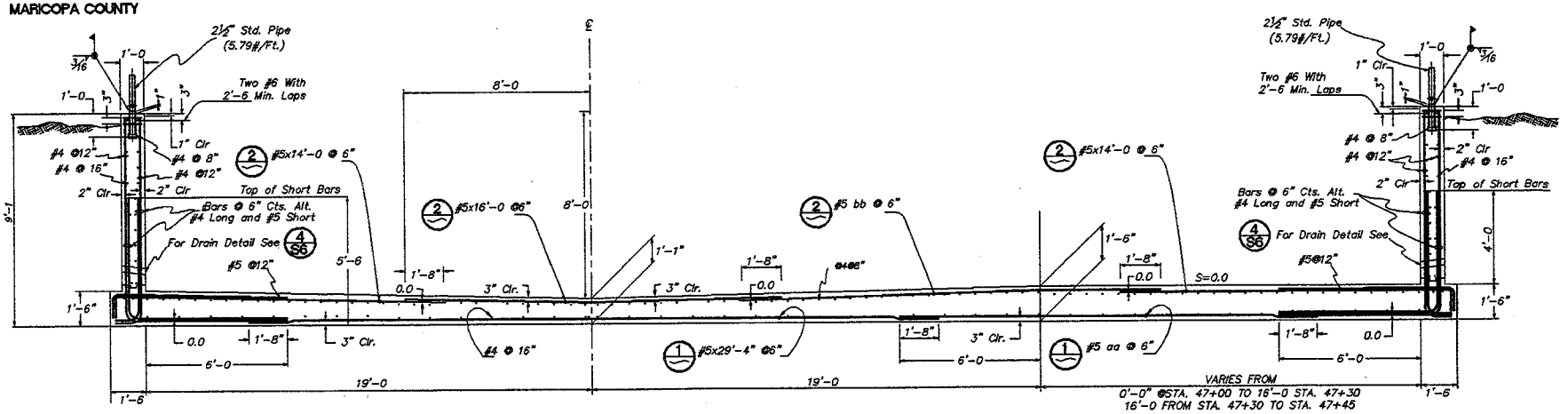
	BY	DATE
DESIGN	CDM	8-92
DESIGN CHK.	CGW	8-92
PLANS	FC	8-92
PLANS CHK.	CDM	8-92
SUBMITTED BY:		DATE

STA. 47+00 TO STA. 50+94.96
QUADALUPE ROAD CHANNEL
PLAN, PROFILE, GEOMETRY DETAILS

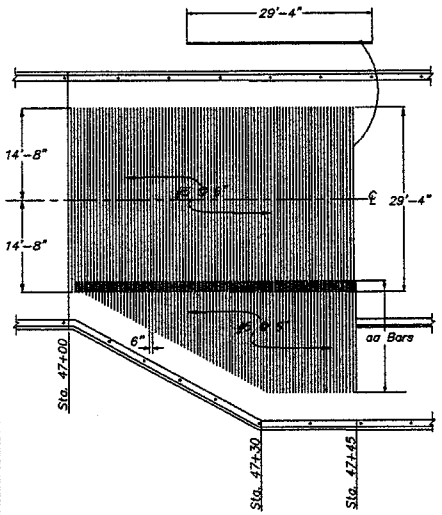
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET S4
84 of 87

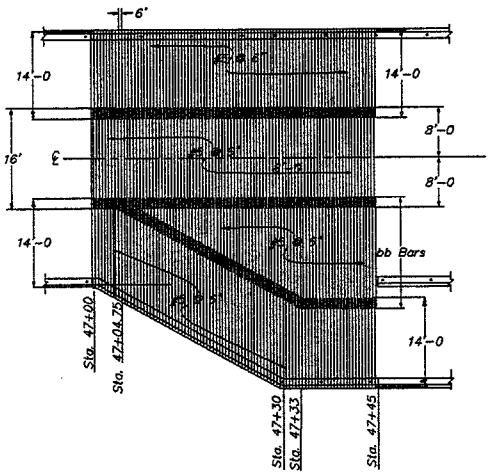
GUADALUPE ROAD
MARICOPA COUNTY



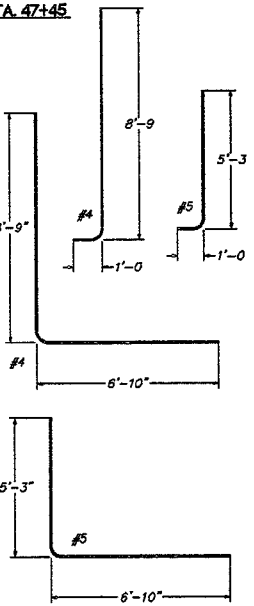
3 CROSS SECTION STA. 47+00 TO STA. 47+45
N T S

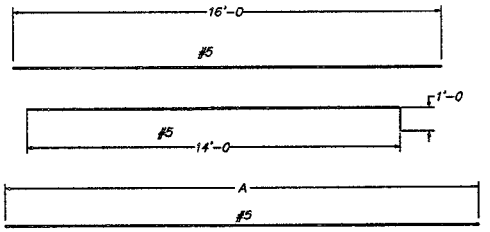


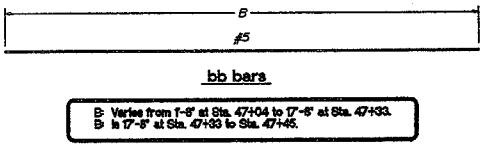
1 BOTTOM OF SLAB STEEL
N T S



2 TOP OF SLAB STEEL
N T S





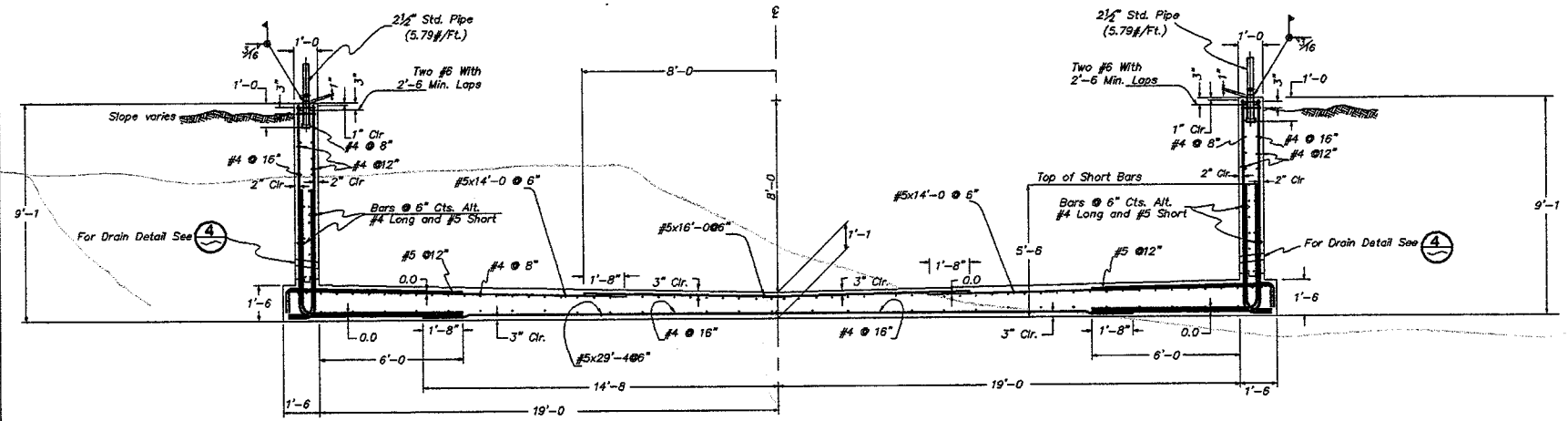


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

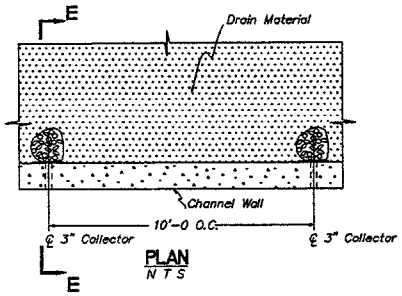
	BY	DATE	
DESIGN	EOM	8-92	STA. 47+00 TO STA. 47+45 QUADALUPE ROAD CHANNEL STRUCTURAL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	
SUBMITTED BY:		DATE	RECOMMENDED BY: DATE / APPROVED BY: DATE / CHIEF ENGINEER AND GENERAL MANAGER

SHEET S5
S5 of S07

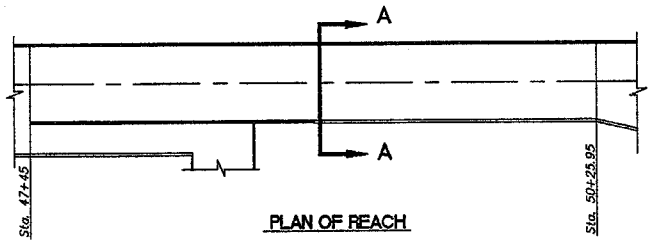
GUADALUPE ROAD
MARICOPA COUNTY



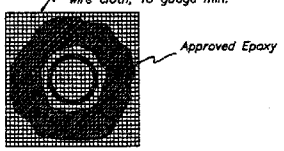
3 TYPICAL CROSS SECTION A-A STA. 47+45 TO STA. 50+25.95
SCALE: ½" = 1'-0



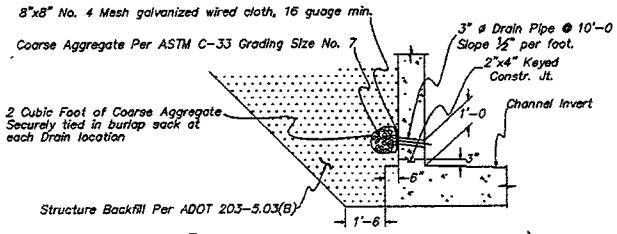
PLAN
N T S



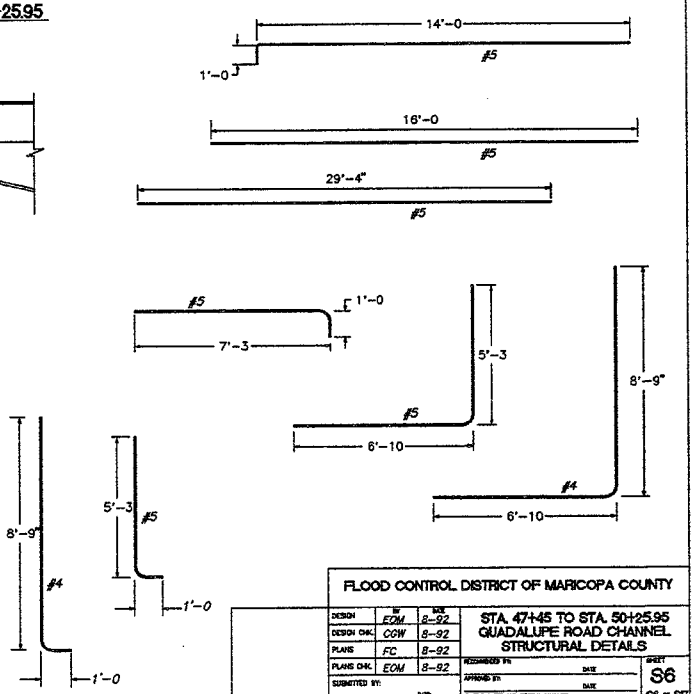
PLAN OF REACH



MESH INSTALLATION DETAIL
N T S

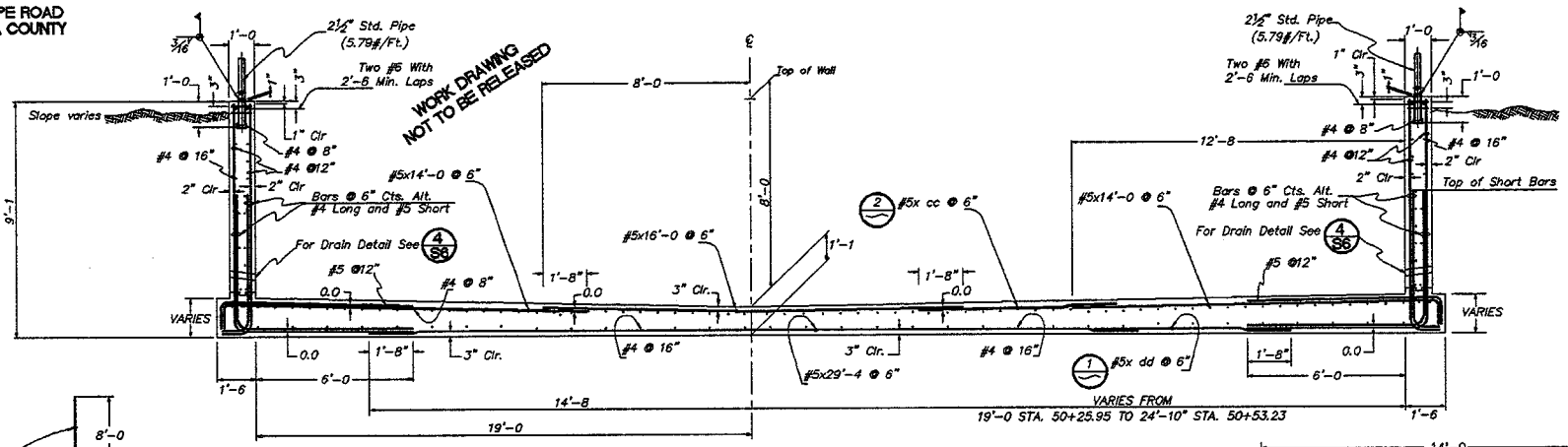


4 TYPICAL SECTION E-E DRAINAGE SYSTEM DETAILS
N T S

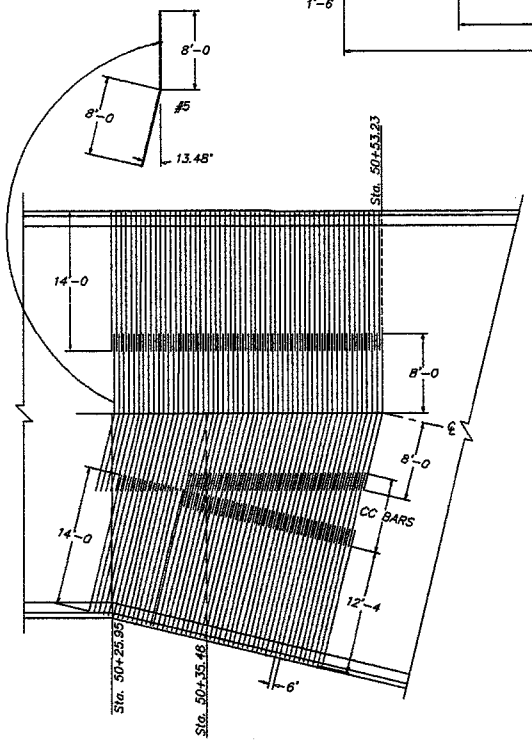


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	STA. 47+45 TO STA. 50+25.95 GUADALUPE ROAD CHANNEL STRUCTURAL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S6
SUBMITTED BY:	DATE		S6 of 57

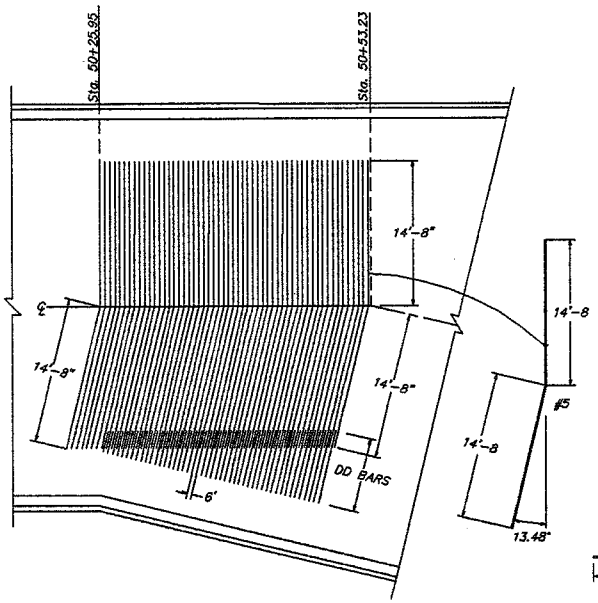
GUADALUPE ROAD
MARICOPA COUNTY



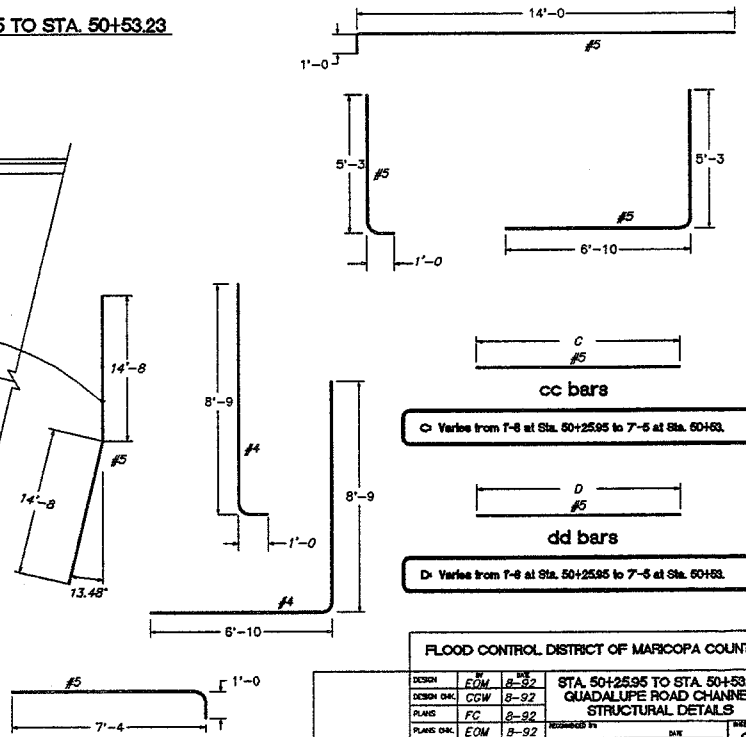
3 TYPICAL CROSS SECTION STA. 50+25.95 TO STA. 50+53.23
SCALE: ½" = 1'-0



2 TOP OF SLAB STEEL
N T S



1 BOTTOM OF SLAB STEEL
N T S

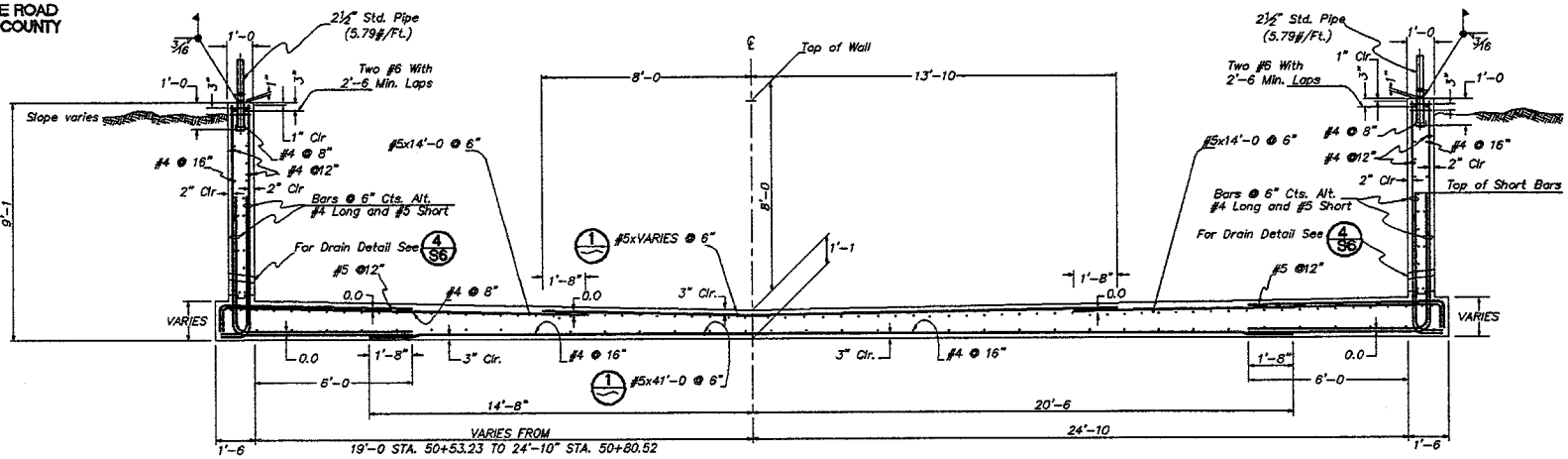


FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

	BY	DATE	
DESIGN	EOM	8-92	STA. 50+25.95 TO STA. 50+53.23
DESIGN CHK.	CGW	8-92	QUADALUPE ROAD CHANNEL
PLANS	FC	8-92	STRUCTURAL DETAILS
PLANS CHK.	EOM	8-92	
SUBMITTED BY:		DATE	RECOMMENDED BY: DATE
			APPROVED BY: DATE
			CHIEF ENGINEER AND GENERAL MANAGER

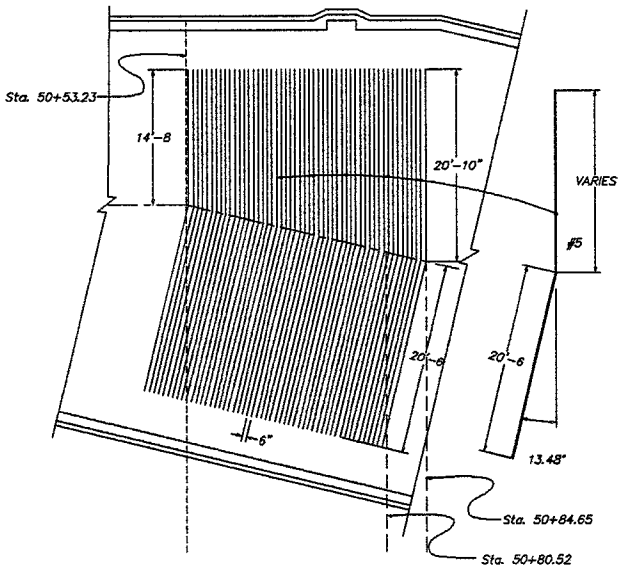
SHEET S7
S7 of S17

GUADALUPE ROAD
MARICOPA COUNTY



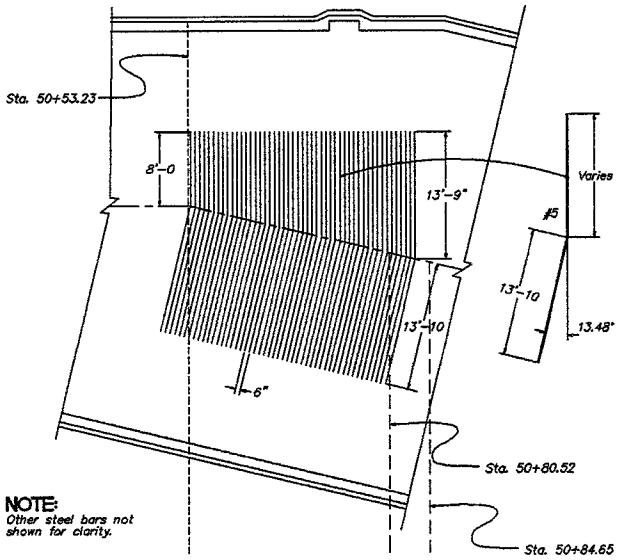
3 TYPICAL CROSS SECTION STA. 50+53.23 TO STA. 50+80.52

SCALE: ½" = 1'-0



1 BOTTOM OF SLAB STEEL

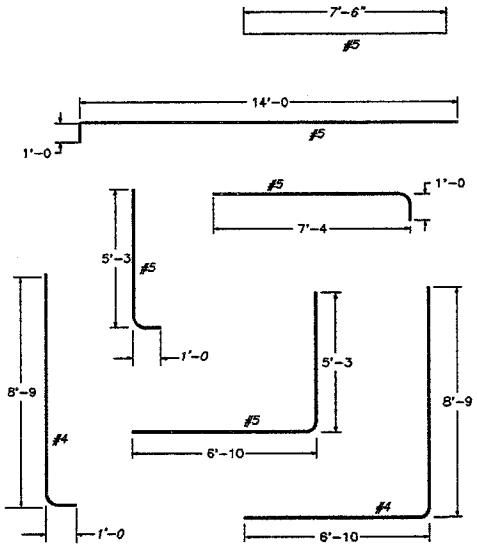
N T S



NOTE:
Other steel bars not shown for clarity.

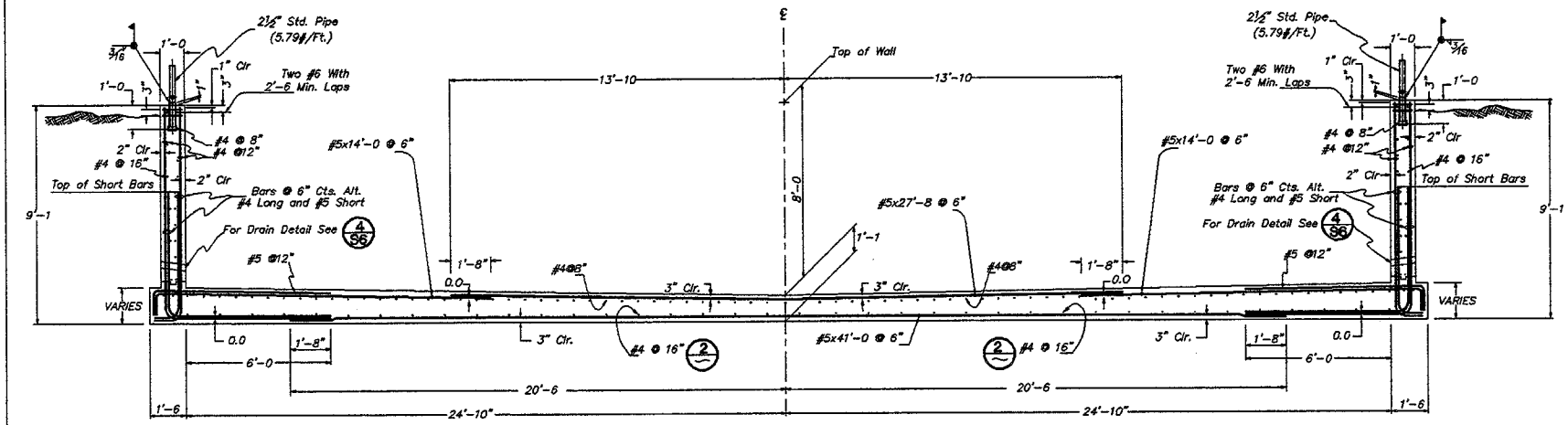
2 TOP OF SLAB STEEL

N T S



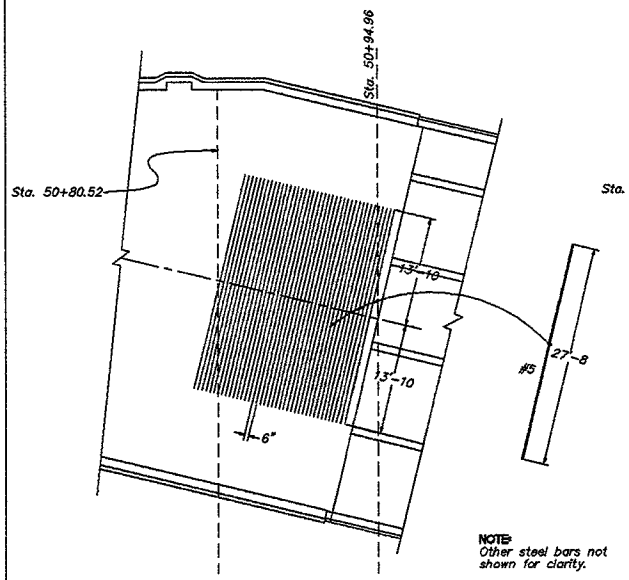
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	STA. 50+53.23 TO STA. 50+80.52 QUADALUPE ROAD CHANNEL STRUCTURAL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S8
SUBMITTED BY:		DATE	68 OF 107

GUADALUPE ROAD
MARICOPA COUNTY



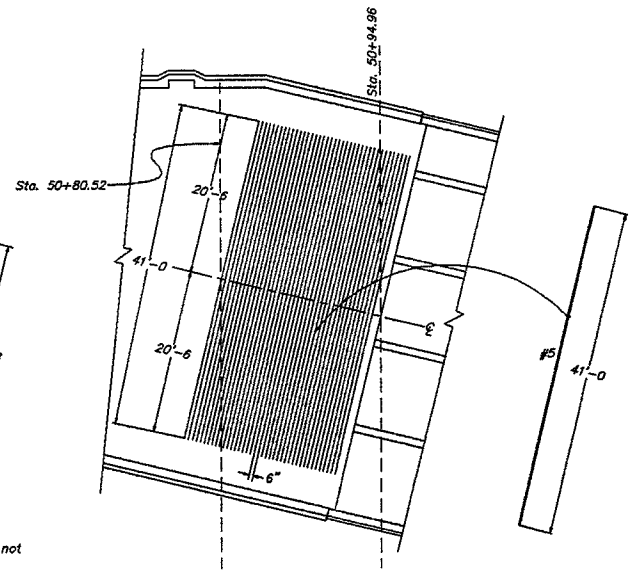
3 TYPICAL CROSS SECTION STA. 50+80.52 TO STA. 50+94.96

SCALE: ½" = 1'-0

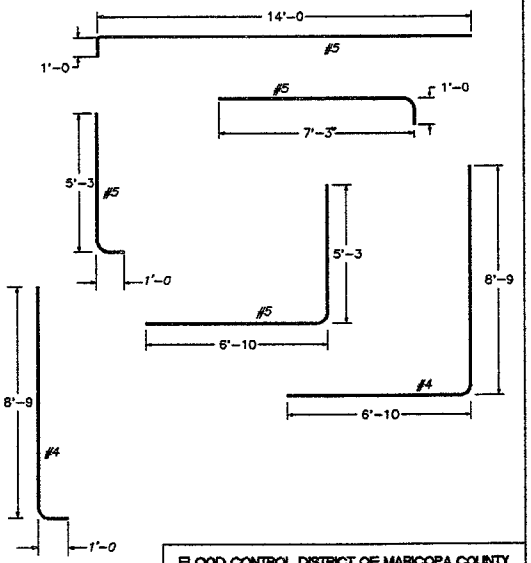


1 TOP OF SLAB STEEL

NOTE:
Other steel bars not shown for clarity.

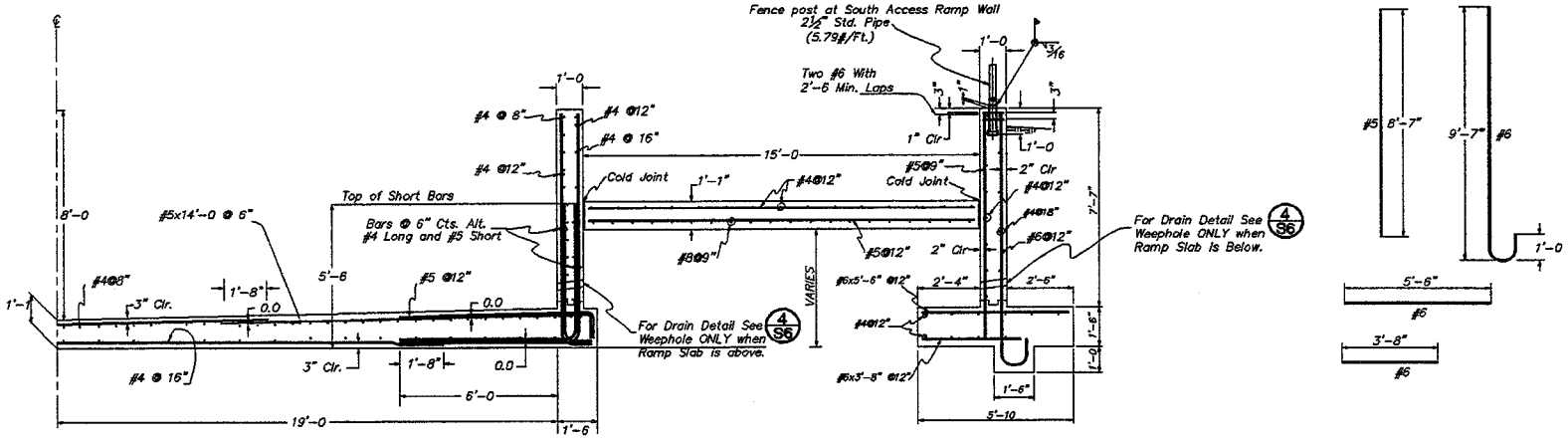


2 BOTTOM OF SLAB STEEL



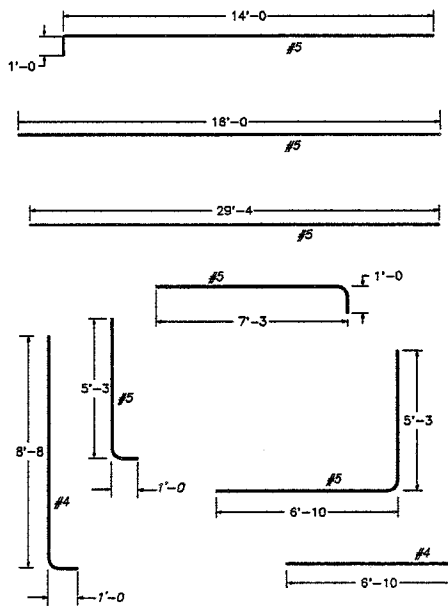
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	STA. 50+80.52 TO STA. 50+94.96 GUADALUPE ROAD CHANNEL STRUCTURAL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S9
SUBMITTED BY: DATE			99 of 97

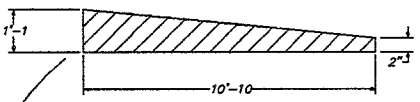
GUADALUPE ROAD
MARICOPA COUNTY



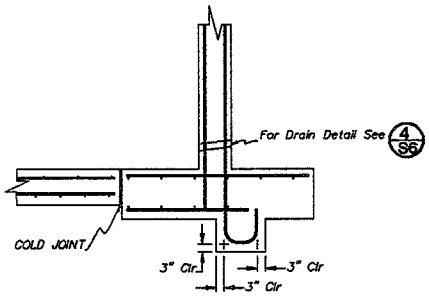
2 CHANNEL ACCESS RAMP CROSS SECTION AT STA. 47+45 TO STA. 48+55.83

N T S

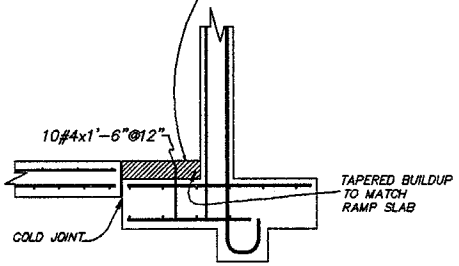




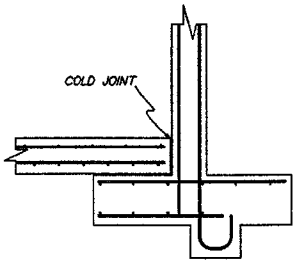
PLAN SIDE VIEW



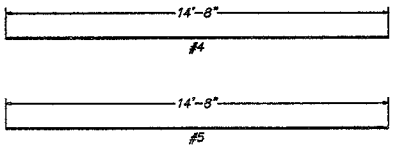
WALL FOOTING BUILDUP
AT STA. 47+45
N T S



WALL FOOTING BUILDUP
AT STA. 47+50
N T S



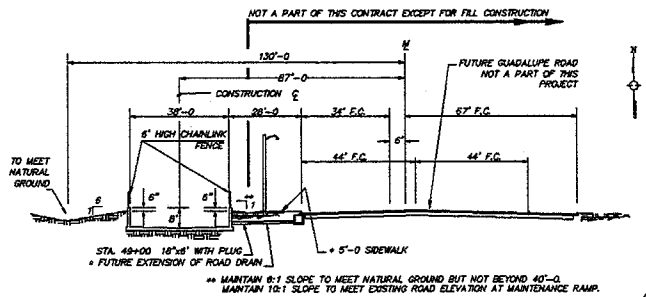
WALL FOOTING BUILDUP
AT STA. 47+55
N T S



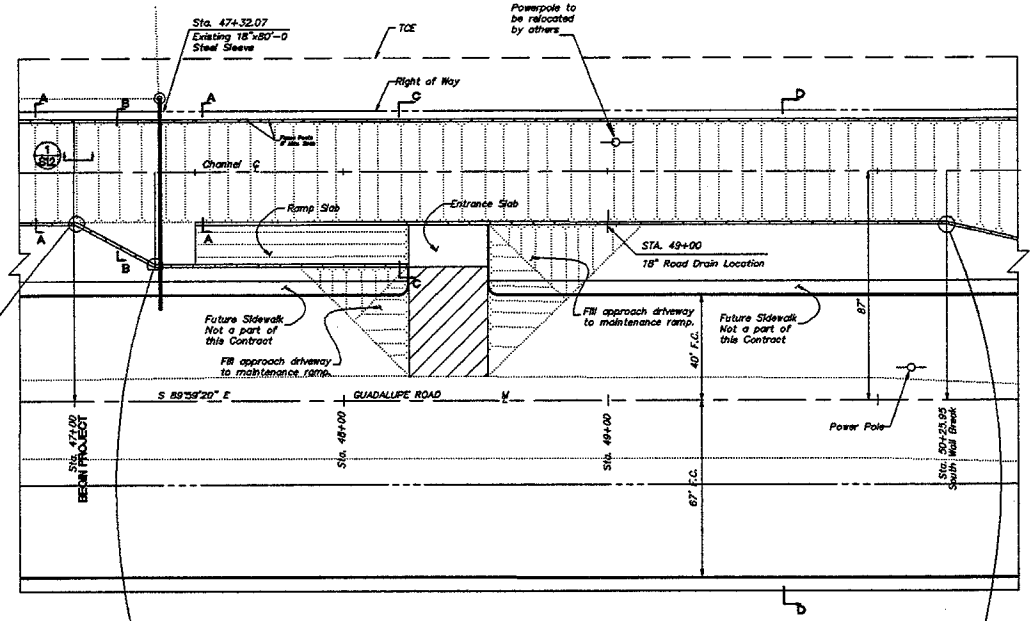
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	STA. 47+45 TO STA. 48+55.83 GUADALUPE ROAD CHANNEL RAMP STRUCTURAL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	
SUBMITTED BY: DATE			RECOMMENDED BY: DATE / APPROVED BY: DATE / CHIEF ENGINEER AND GENERAL MANAGER

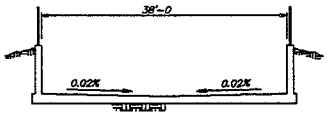
SHEET S10
S10 OF S17

GUADALUPE ROAD
MARICOPA COUNTY

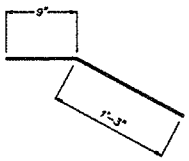


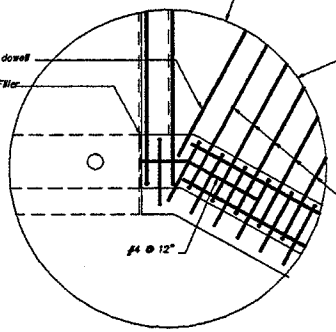
TYPICAL CROSS SECTION D-D STA. 47+00 TO STA. 50+25.95
(LOOKING EAST)
N T S





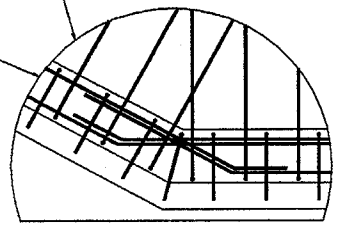
SECTION A-A
N T S





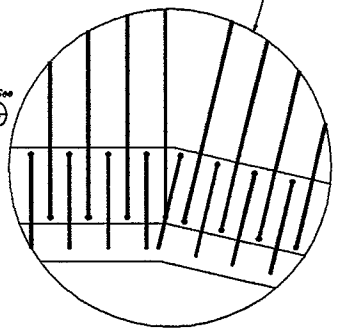
WALL STEEL
N T S

For Slab Steel See 1/S5 and 2/S6

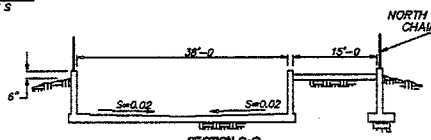


WALL STEEL
N T S

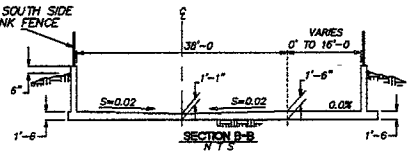
For Slab Steel See 3/S6 and 3/S7



WALL STEEL
N T S



SECTION C-C
N T S



SECTION B-B
N T S

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

	BY	DATE
DESIGN	ECM	8-92
DESIGN CHK.	CGW	8-92
PLANS	FC	8-92
PLANS CHK.	ECM	8-92

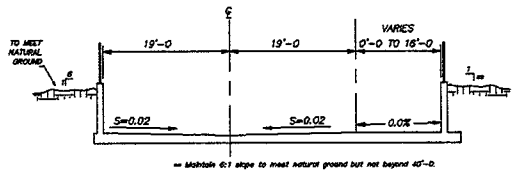
SUBMITTED BY: DATE

STA. 47+00 TO STA. 50+25.95
GUADALUPE ROAD CHANNEL
WALL REBARS

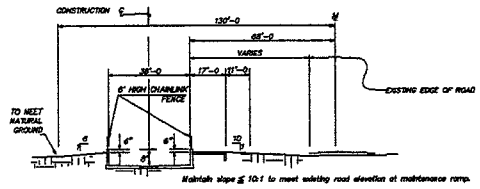
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET S11
S11 of S17

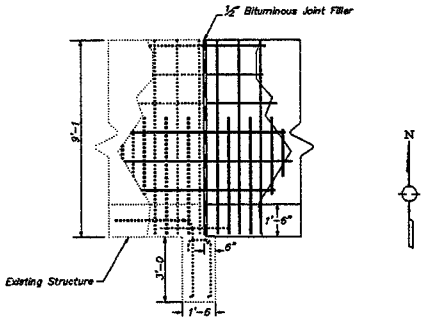
GUADALUPE ROAD
MARICOPA COUNTY



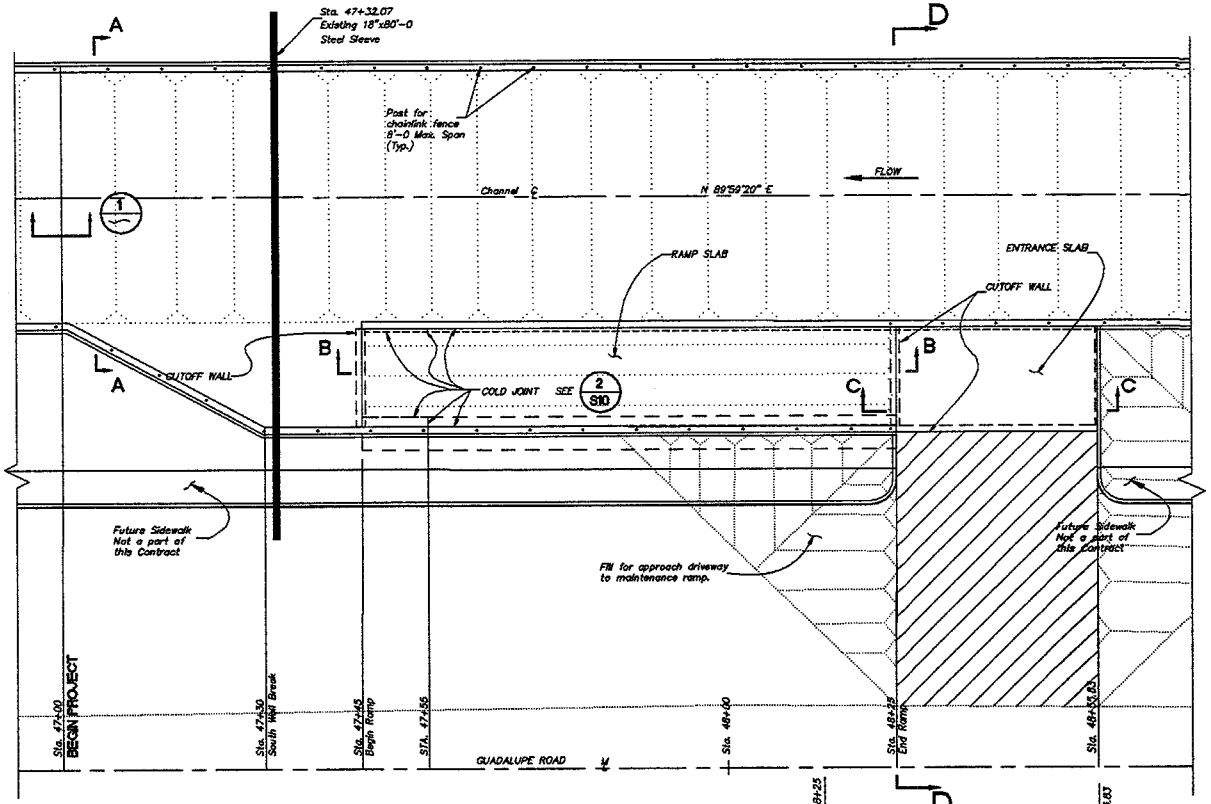
TYPICAL CROSS SECTION A-A STA. 47+00 TO STA. 47+30
N T S

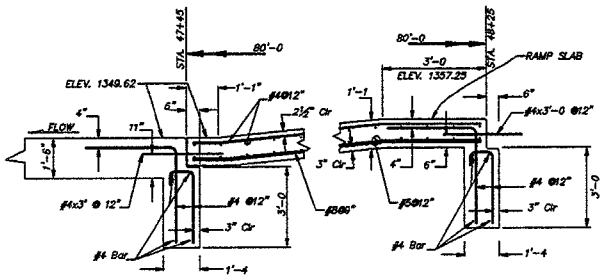


TYPICAL CROSS SECTION D-D STA. 48+26 TO STA. 48+55.83
(LOOKING EAST)
N T S



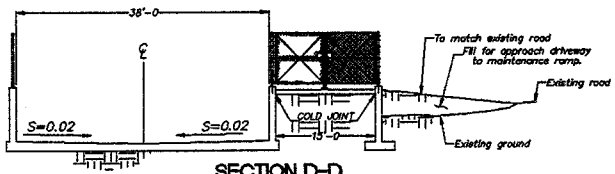
1 WALL SECTION AT STA. 47+00
N T S



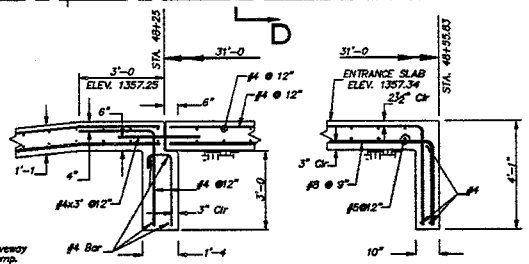


SECTION B-B
N T S

WORK DRAWINGS NOT TO BE RELEASE



SECTION D-D
N.T.S.



SECTION C-C
N T S

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

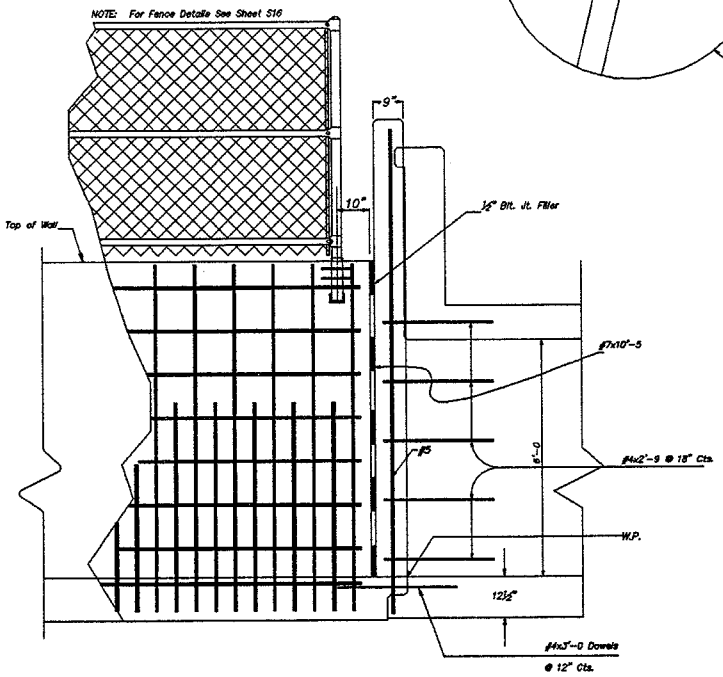
	BY	DATE
DESIGN	EOM	8-92
DESIGN CHK.	CGN	8-92
PLANS	FC	8-92
PLANS CHK.	EOM	8-92
SUBMITTED BY:		DATE

GUADALUPE ROAD CHANNEL
CHANNEL ACCESS RAMP

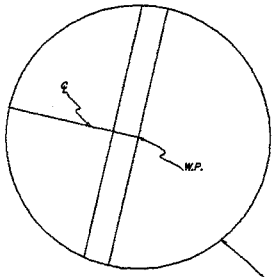
RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

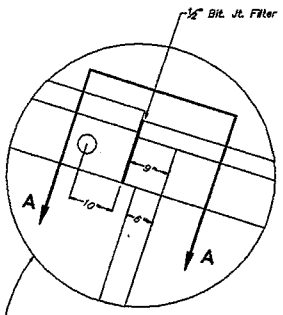
SHEET S12
S12 of S17

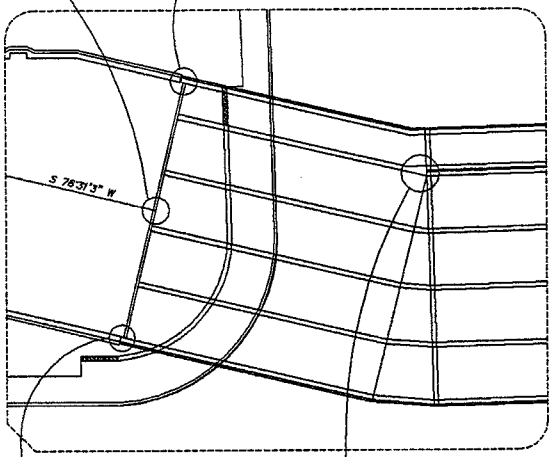
GUADALUPE ROAD
MARICOPA COUNTY

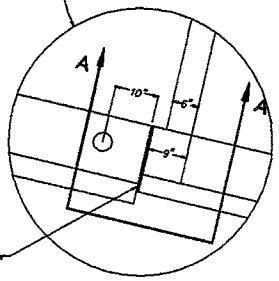


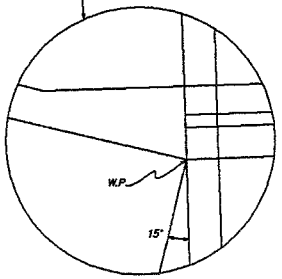
1 PART ELEVATION SECTION A-A
N T S

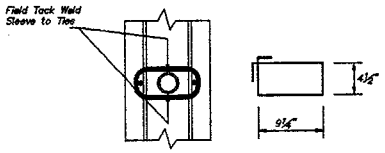




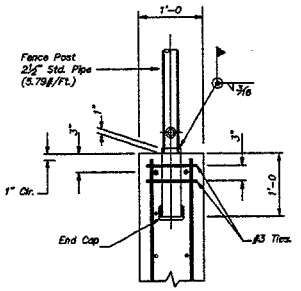




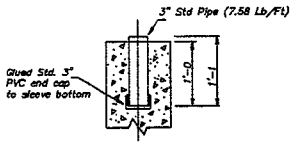




PLAN VIEW AT END POST
N T S



TYPICAL WALL DETAIL AT END POST
N T S



NOTE: Apply Cold Galvanizing Protection To All Weld Areas.

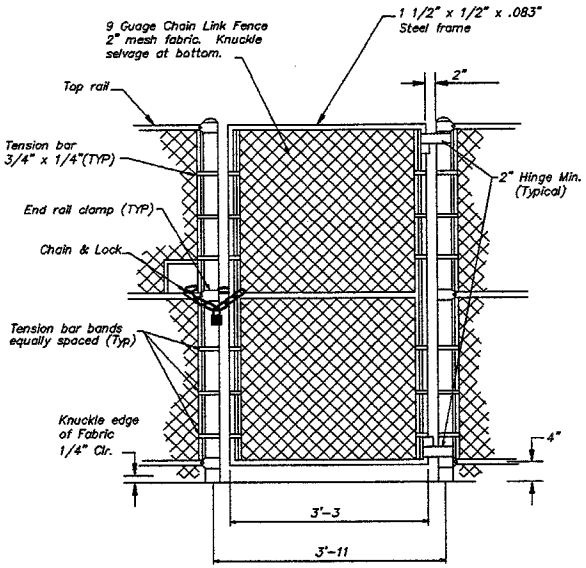
SLEEVE DETAIL AT END POST
N T S

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

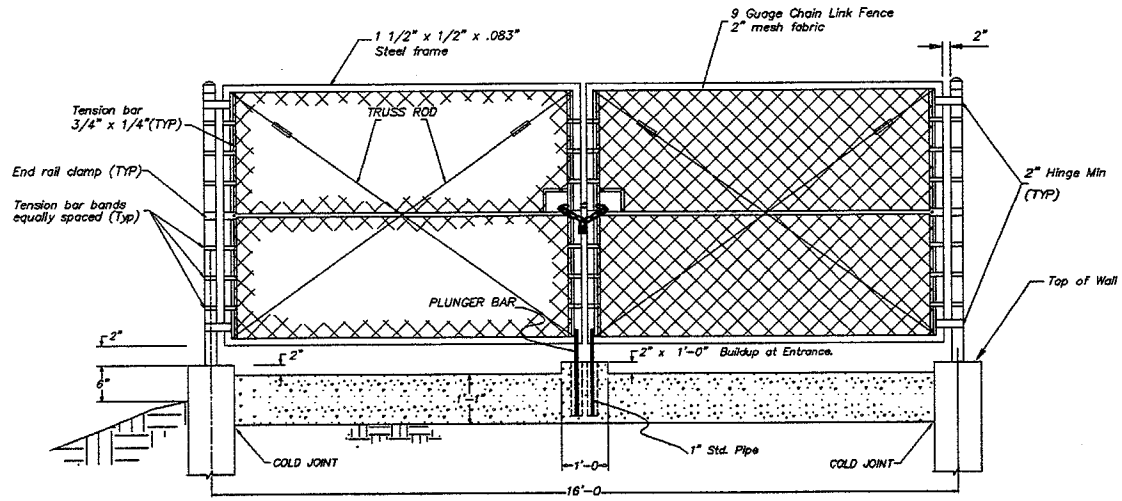
	BY	DATE	
DESIGN	EOM	8-92	STA. 47+00 TO STA. 50+94.96 QUADALUPE ROAD CHANNEL END WALL DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	
SUBMITTED BY:		DATE	RECOMMENDED BY: DATE
			APPROVED BY: DATE
			CHIEF ENGINEER AND GENERAL MANAGER

SHEET S13
S13 OF 267

GUADALUPE ROAD
MARICOPA COUNTY



ACCESS LADDER GATE DETAIL
N T S

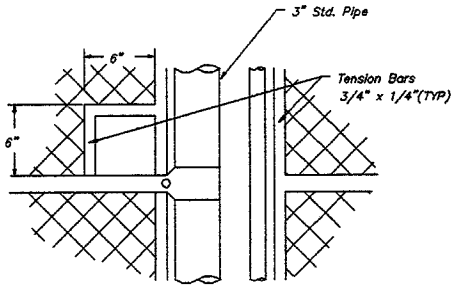


16' GATE, DOUBLE SWING
N T S

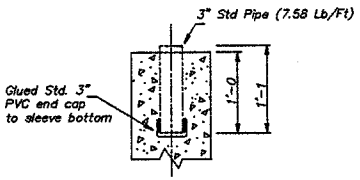
CHAIN LINK GATES NOTES

1. Chain link fence fabric, fittings and hardware shall conform to ADOT Standard Specifications SECTION 902
2. All galvanizing that has been damaged in handling, transporting or welding shall be repaired by the application of a paste compound of an approved zinc powder and flux.
3. All exposed edges shall be smooth.
4. All bolt heads shall be to the inside.

NOTE:
ALL PARTS THIS SHEET TO BE GALVANIZED

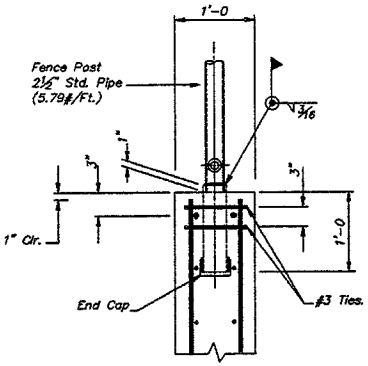


DETAIL OF CUTOUT FOR CHAIN AND LOCK
N T S



NOTE: Apply Cold Galvanizing Protection To All Weld Areas.

SLEEVE DETAIL
N T S



GATE POST DETAIL
N T S

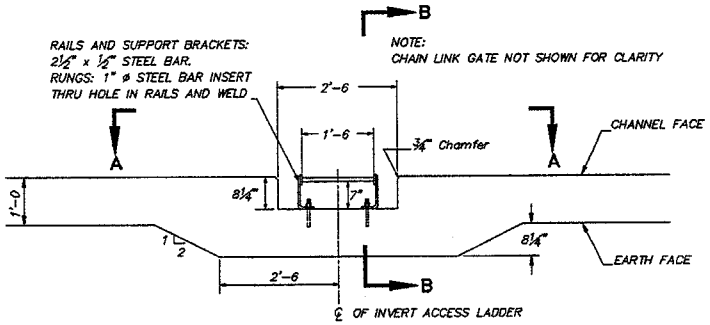
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

	BY	DATE	
DESIGN	EOM	8-92	GUADALUPE ROAD CHANNEL ACCESS GATES DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	
SUBMITTED BY:		DATE:	

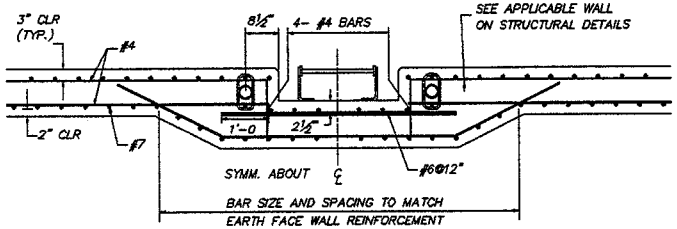
RECOMMENDED BY: DATE:
APPROVED BY: DATE:
CHIEF ENGINEER AND GENERAL MANAGER

SHEET S14
S14 of S27

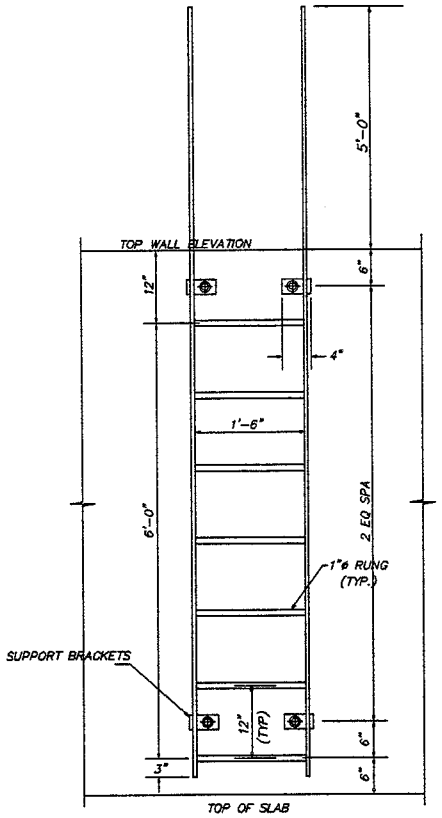
GUADALUPE ROAD
MARICOPA COUNTY



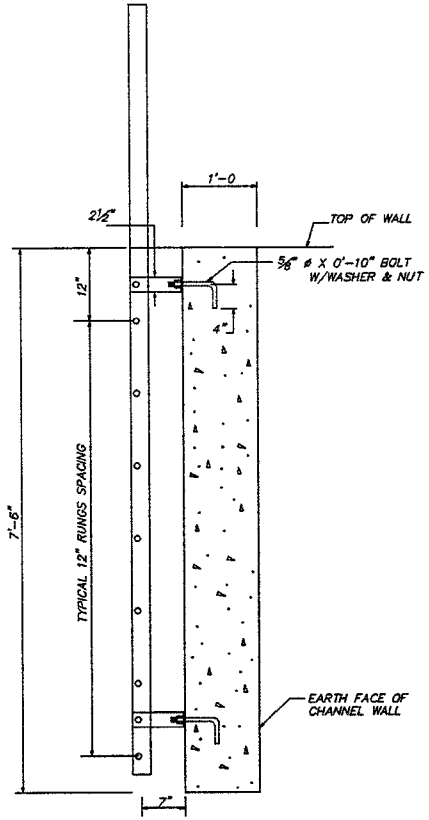
PLAN
NTS



REINFORCEMENT DETAILS
NTS

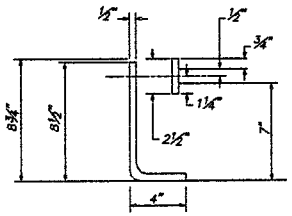


ELEVATION A-A



SECTION B-B

8'-0 ACCESS LADDER AT STA. 50+70
N. T. S.

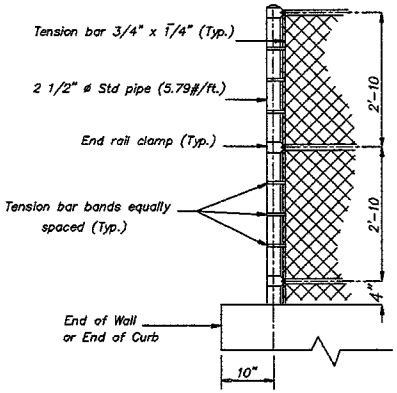


BRACKET AND RAIL DETAILS
N T S

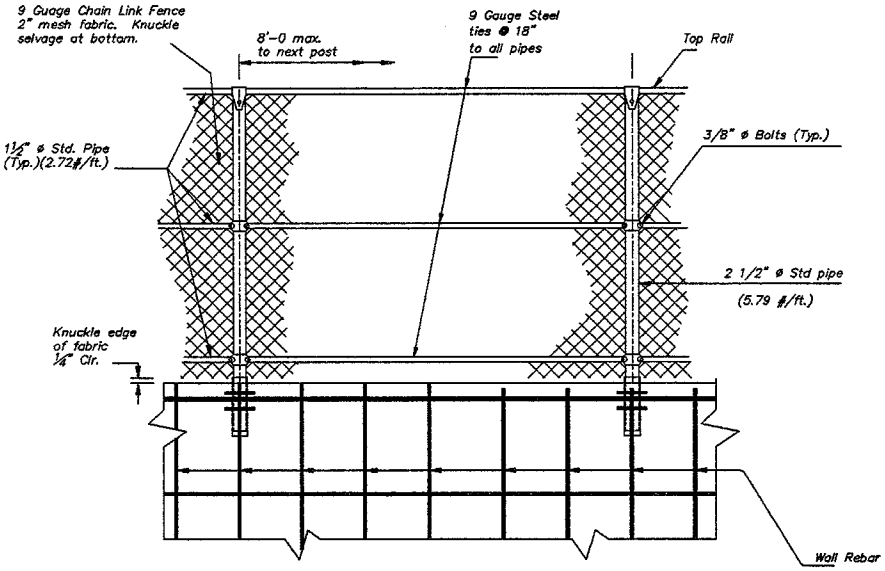
NOTE:
ALL PARTS THIS SHEET TO BE GALVANIZED

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	EOM	8-92	STA. 50+70 GUADALUPE ROAD CHANNEL INVERT ACCESS LADDER
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S15
SUBMITTED BY:		DATE:	S15 OF 57

GUADALUPE ROAD
MARICOPA COUNTY



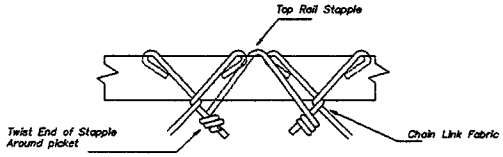
TYPICAL END POST ELEVATION
N.T.S.



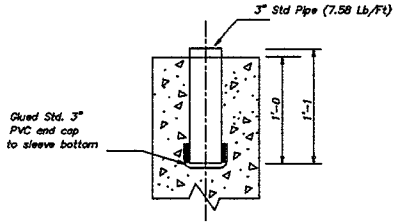
POST DETAIL AT WALL
TYPICAL PANEL ELEVATION
N.T.S.

CHAIN LINK FENCE NOTES

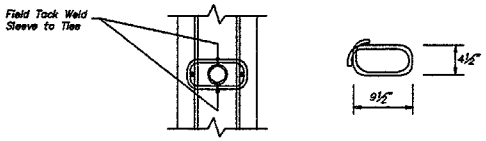
1. Chain link fence fabric, fittings and hardware shall conform to ADOT standard Specifications SECTION 902.
2. All galvanizing that has been damaged in handling, transporting or welding shall be repaired by the application of a paste compound of an approved zinc powder and flux.
3. All exposed edges shall be smooth.
4. All bolts heads shall be to the inside.



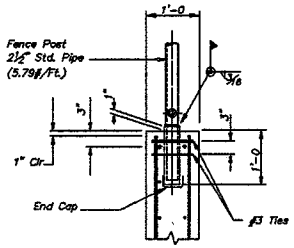
ATTACHMENT OF FABRIC TO TOP RAIL
N.T.S.



SLEEVE DETAIL
N.T.S.



PLAN VIEW
N.T.S.



TYPICAL WALL DETAIL AT POST
N.T.S.

ALL PIPES THIS SHEET TO BE GALVANIZED

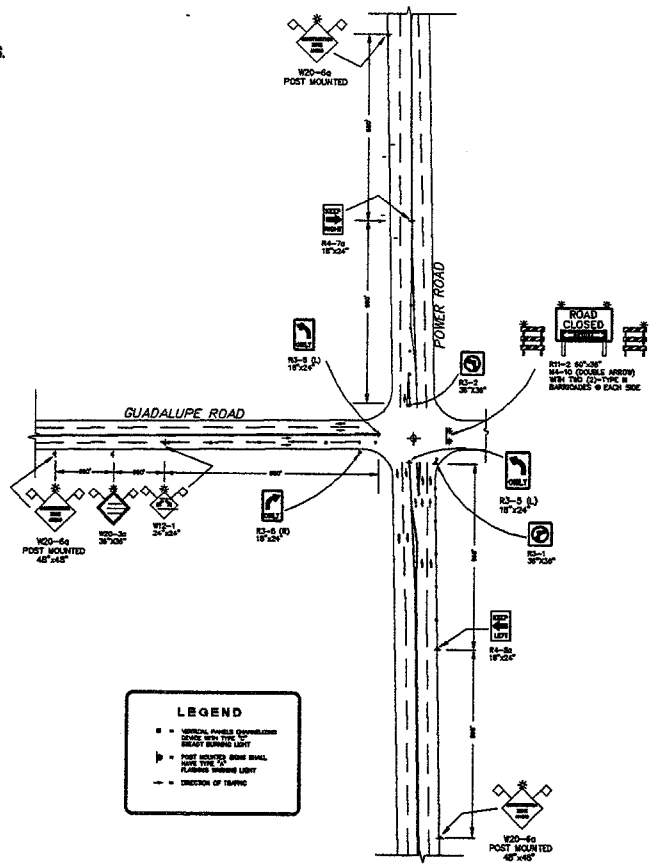
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

DESIGN	EOM	8-92	STA. 47+00 TO STA. 50+54.96 GUADALUPE ROAD CHANNEL FENCE DETAILS
DESIGN CHK.	CGW	8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	SHEET S16
SUBMITTED BY:		DATE:	APPROVED BY: DATE:

GUADALUPE ROAD
MARICOPA COUNTY

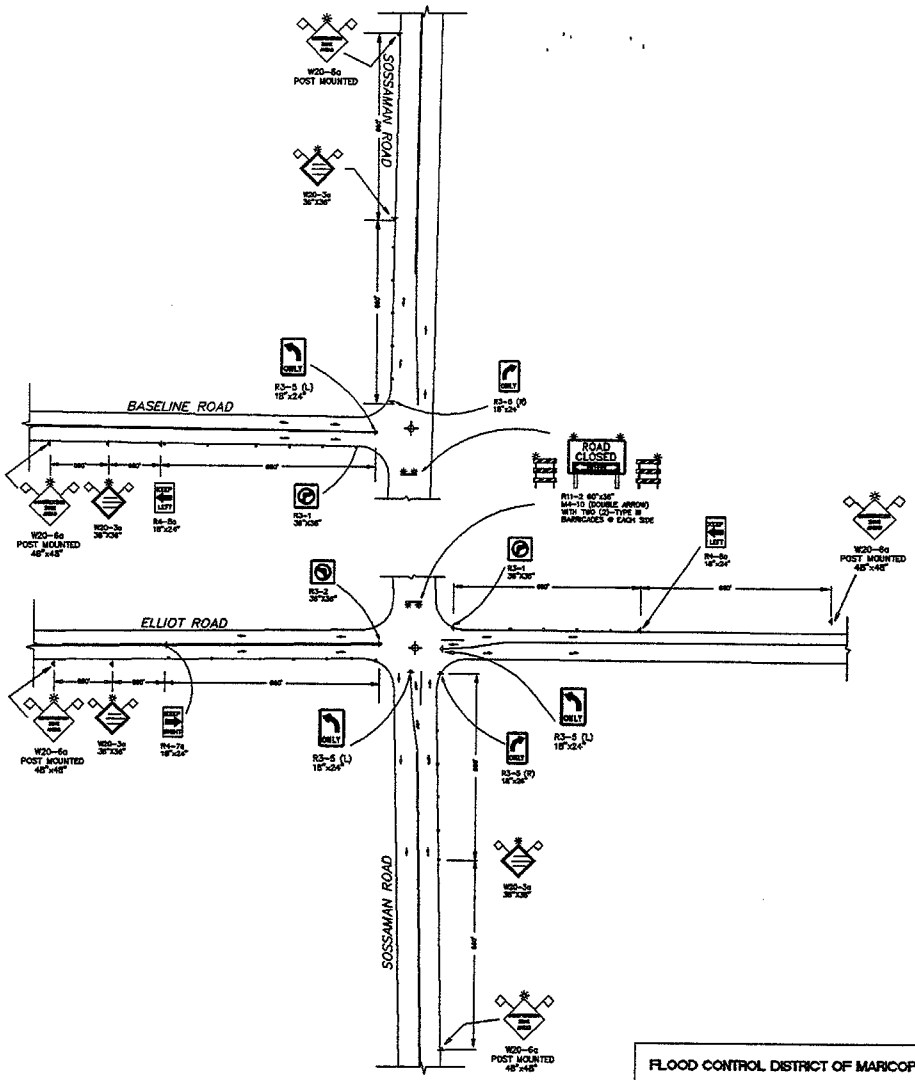
N

N.T.S.



LEGEND

- VERTICAL PANELS (BARRICADES) DENOTE WITH TYPE "C" STEADY BURNING LIGHT
- POST MOUNTED SIGNS SHALL HAVE TYPE "A" FLASHING WARNING LIGHT
- DIRECTION OF TRAFFIC



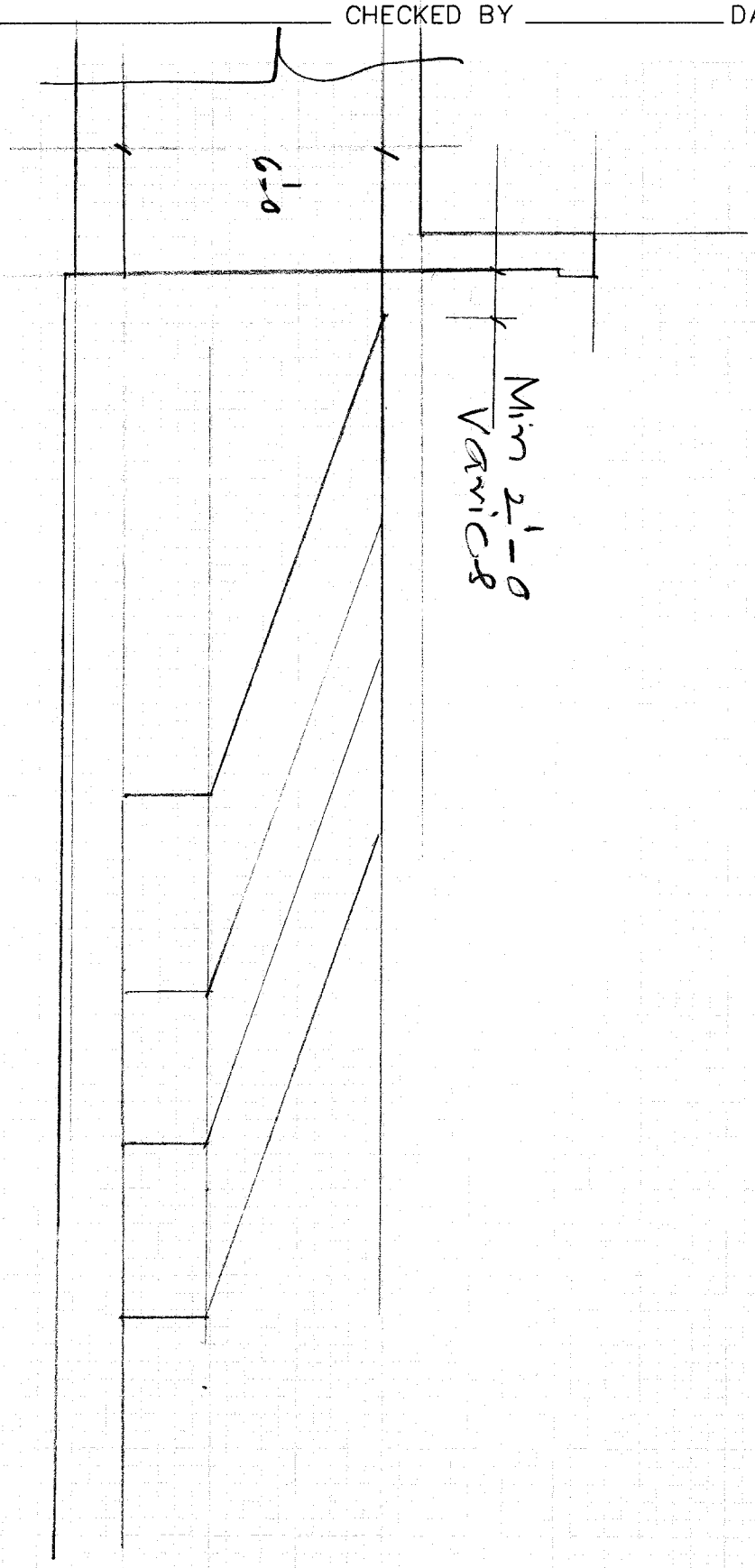
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			
DESIGN	BY EOM	DATE 8-92	QUADALUPE ROAD CHANNEL TRAFFIC CONTROL PLAN
DESIGN CHK.		8-92	
PLANS	FC	8-92	
PLANS CHK.	EOM	8-92	REVIEWED BY DATE / SHEET S17
SUBMITTED BY: DATE			APPROVED BY DATE / CHIEF ENGINEER AND GENERAL MANAGER / 37 OF 37

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE ____ OF ____

DETAIL ____ COMPUTED ____ DATE ____

____ CHECKED BY ____ DATE ____



MESSAGE DISPLAY FOR SCOTT CLEMENT

To: HSC

From: Jan Staedicke:TALOS
Postmark: 08/11/92 09:11AM
Status: Previously read

Host: TALOS
Delivered: 08/11/92 09:11AM

Subject: SRP poles @ Sossaman & Guadalupe

Message:
Dean Metcalf of SRP called with the proposed pole locations:
1st pole, East-west station 48+69, North-south station 5+58
2nd pole, East-west station 50+39, North-south station 5+58
Please have this information plotted on the plans. Thanks.

MESSAGE DISPLAY FOR SCOTT CLEMENT

To: HSC

From: Jan Staedicke:TALOS
Postmark: 08/11/92 09:11AM
Status: Previously read

Host: TALOS
Delivered: 08/11/92 09:11AM

Subject: SRP poles @ Sossaman & Guadalupe

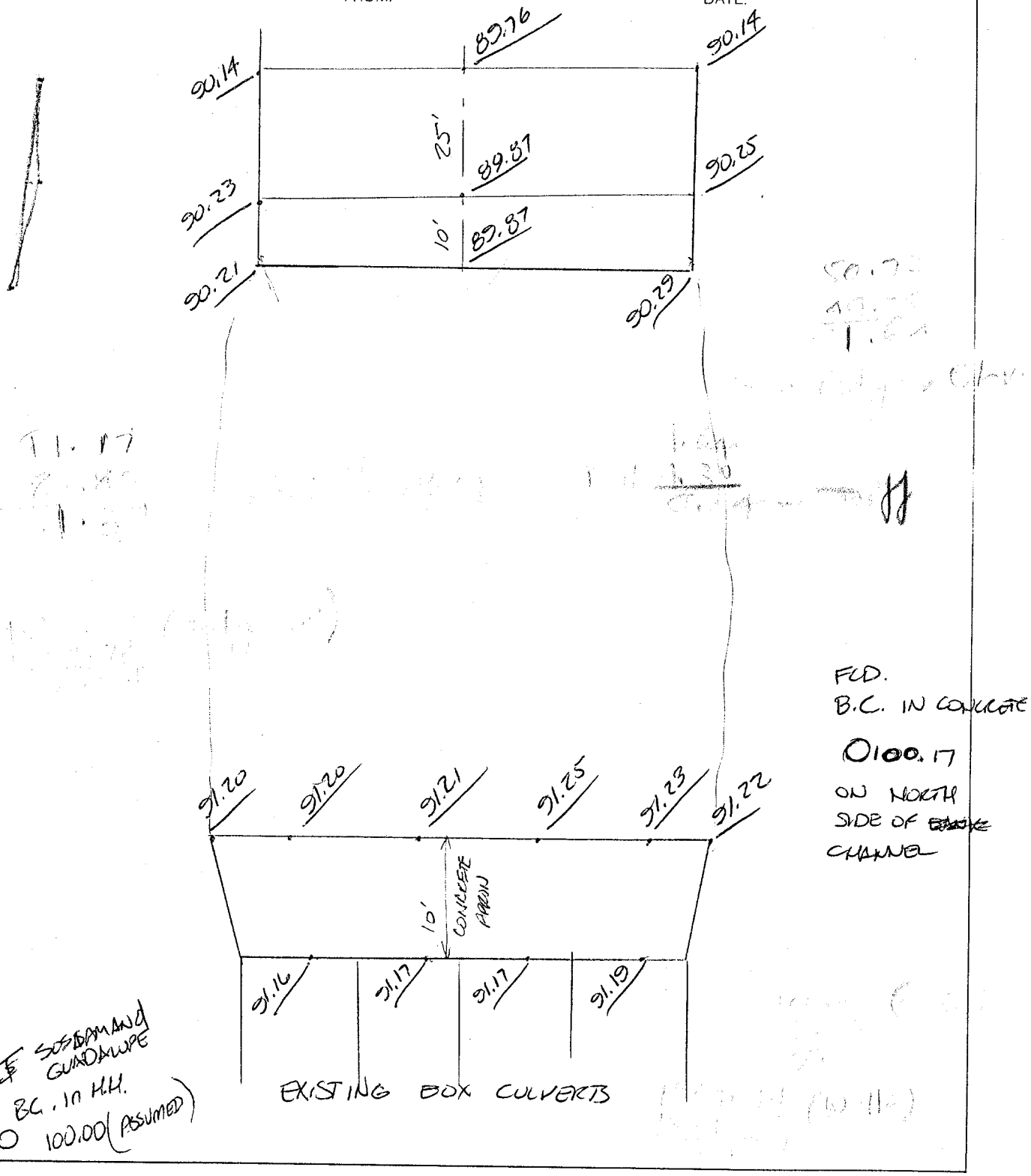
Message:
Dean Metcalf of SRP called with the proposed pole locations:
1st pole, East-west station 48+69, North-south station 5+58
2nd pole, East-west station 50+39, North-south station 5+58
Please have this information plotted on the plans. Thanks.

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: GUADALUPE	☐ FILE ☐ DESTROY

TO: FROM: DATE:



6910-007 3-90

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Elevations COMPUTED KJH DATE 8/92

CHECKED BY ____ DATE ____

Checking Elevations

Inv. Ele at Beg Box = 1351.14 (Wells)

" " = 1350.72 (Edgares)

(Diff) 0.42

BM Elev = 1359.94 Wells

1359.56 Edgares

(Diff) = 0.38

Av. Diff = $\frac{(0.42 + 0.38)}{2}$ = 0.40'

Diff. in Elevations between BM & Inv. Elev.

100.00 (Ring)
91.17
8.83

1359.94 (Wells)
1351.14
8.80

1359.56 (Edgares)
1350.72
8.84

Avg. Diff = 8.82

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Elev. Check COMPUTED KNH DATE 8/92

CHECKED BY ____ DATE ____

Begin Ext. Box

1350.72 → Edgard Inv. Elev.
1347.08 ← Begin Project (Channel)
1.64

91.17
89.87
1.30 } Kris

Dif (1.64 - 1.30) = 0.34

Inv. 1347.08 → Begin Proj.
0.34
1349.42

1350.72 → Begin Ext. Box
0.34
1351.06

Begin Ext. Box 1351.06 (New) → 1351.14 (Wolfe proj.)
BM @ Sorghum 1359.90 (New) → 1359.94 (— " —)

BM = 1359.56
0.34
1359.90

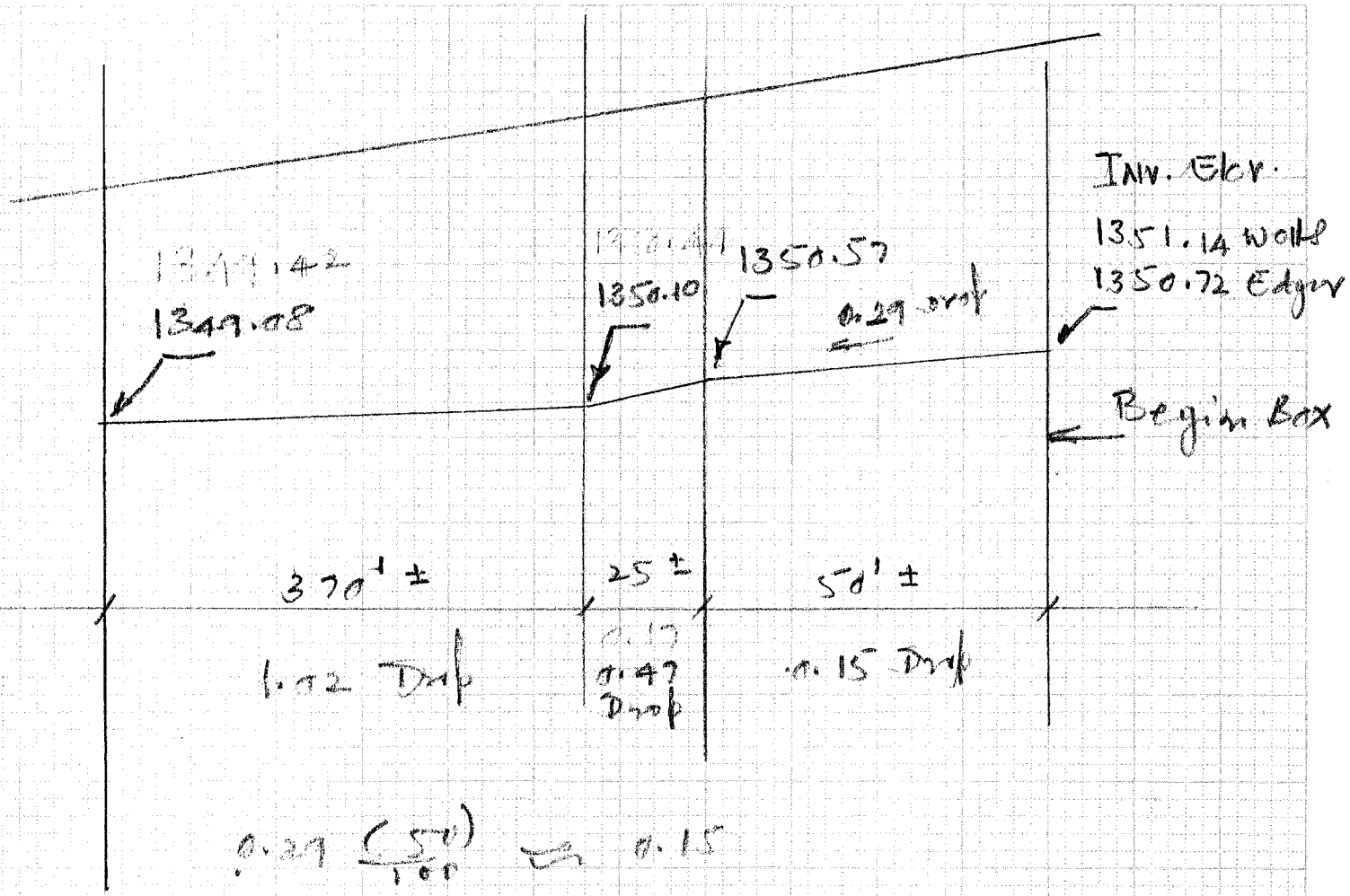
6010-153 4-90

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe Channel PAGE ____ OF ____

DETAIL Elevations COMPUTED KVH DATE 8/92

CHECKED BY ____ DATE ____



$0.29 \frac{(50')}{100} \approx 0.15$

$$\begin{array}{r} 1350.72 \\ -\ 0.15 \\ \hline 1350.57 \end{array}$$

$$\begin{array}{r} 1351.14 \\ -\ 1350.72 \\ \hline 0.42 \end{array}$$ Diff

BM → 1357.56 } Edgar, BM → 1359.94 } walls
INV → 1350.72 } INV 1351.14 }
6.84 8.80

Diff = (8.84 − 5.80) = 0.04'
≈ 1/2"

STA	Horz	Dist	Vert	Rod	Elev
TOE	335°15'	70.76	96	6.00	59.47
Hazard Sign	316°09'	56.56	97	—	
Southwest Cor Retain Wall	314°51'	58.48	98	—	
End Conc. At Wing Wall	314°21'	58.92	99	7.21	58.36
North Face Wing Wall	—	—		14.26	51.21
℄ Top Conc.	304°25'	57.56	100	7.24	58.23
Southwest Cor. Conc.	282°10'	90.28	101	7.53	57.94
Northwest Cor. Conc.	290°07'	97.90	102	14.17	51.30
Southwest Cor. Conc.	306°27'	65.10	103	14.28	51.19
Northwest Cor. Wing Wall	308°03'	63.66	104	11.39	54.08
North Face Wing Wall	—	—		14.22	51.25
Southwest Cor. Wing Wall	330°21'	100.98	105	11.37	54.10
South Face Wing Wall	—	—		14.24	51.23
West Edge Conc. 10.8'	—	—		14.28	51.19
Southwest Cor. Conc.	313°08'	125.34	106	14.10	51.37
P.P.	275°36'	177.06	107	9.13	56.34
TOP	273°43'	262.52	108	9.44	56.03
TOE	279°14'	263.66	109	14.40	51.07
TOE	288°20'	271.32	110	14.00	51.47
TOP	292°26'	278.84	111	6.80	58.67
PP + TBM	290°28'	303.62	112	6.30	59.17
WEI. TBM #9	—	—		6.18	MUSKEGO 1358.59
Guide Spire	292°03'	308.12	113	—	
East End Conc. 38' Wide Chanel	281°34'	496.82	114	15.64	49.83
℄ 38' Wide Chanel	279°55'	594.78	115	16.05	49.42

West ℄ Box Colvert

℄ End Channel	1349.83
℄ Existing Box	1351.14
	1.31
K. Ray Survey	1.30
	OK

MEAS = 59.29 MARICOPA COUNTY DATUM
− 0.71
58.58 CITY OF MESA DATUM

	BID SCHEDULE - GUADALUPE ROAD CHANNEL			
ITEM NO.	WORK OR MATERIAL	MAG SECTION	QUANTITY	UNIT
1	Mobilization		1	Lump Sum
2	Structural Excavation	MAG 206	2900	C.Y.
3	Structural Backfill	MAG 206	844	C.Y.
4	Fill Construction	MAG 211	3800	C.Y.
5	Removal of Existing Improvements	MAG 350		
6	Traffic Control	MAG 401	1	Lump Sum
7	Concrete Class "AA"	MAG 725	1120	C.Y.
8	Steel Reinforcement	MAG 727	146200	Lbs
9	Fencing	MAG 772	792	Ft

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Guadalupe / Sossaman PAGE ____ OF ____

DETAIL ____ COMPUTED ____ DATE ____

____ CHECKED BY ____ DATE ____

Enclosed are Sheets S18 to S28 of Sossaman Road Box Culvert, Continuation of Guadalupe Channel. Please pass on your Review Comments to me by Wed 16, 1992

Thank you
Kumar

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: GUADALUPE CHANNEL CONNECTION TO SOSSAMAN ROAD BOX – PLAN REVIEW	☐ FILE ☐ DESTROY

TO: KVH FROM: HNS VIA FBF DATE: DEC. 8, 92

COMMENTS.

SHEET K2: 1. THE STATIONING OF B.C. AT INTERSECTION OF GUADALUPE/SOSSAMAN SHOULD READ 51+ 89.62.

2. IT MAY BE PRUDENT TO CHECK IF THE ELEVATION 1359.18 OF B.C AT SOSSAMAN/GUADALUPE AGREES WITH THE ELEVATION SHOWN ON B.C - ON NE CORNER OF BRIDGE ON GUADALUPE ROAD, WEST OF POWER ROAD.

SHEET K6: PROVIDE CONNECTION DETAILS OF THE NEW STRUCTURE TO THE EXISTING STRUCTURE AT STA 47+00 NOTE THAT THE SECTION OF THE BOTTOM SLAB IS 3" LESS THAN THE EXISTING SLAB THICKNESS.

SHEET K11: FOR SAFETY REASONS ~~PROVIDE~~ CONTINUE FENCE ON NORTHSIDE OF RAMP SLAB GOING INTO THE CHANNEL

SHEET K12: WHILE EXISTING FROM THE CHANNEL THE GATE IS LOCATED AT THE TOP OF THE SLOPE IT IS DESIRABLE TO EXTEND THE ENTRANCE SLAB FOR ANOTHER 20 FEET WEST OF THE GATE FOR SAFETY REASONS.

6910-007 3-90

The following are the review comments for Sossman road box culvert.

Sheet 2: a) Could the structural excavation quantity of 553 cyd be included in the table of quantities ?
b) List of index of drawings, abbriviations and symbols can be included in this sheet.

Sheet 3: What does these numbers 2649.59' and 2632.07 represents ?

Sheet 4: What does RP represents ?

Sheet 5: Actual bar layout details for curved sections and for sections on skew shall be shown in detail. Showing just the typical box section reinforcing, it is not possible to detail and fabricate the steel.

Sheet 6: a) Typical section A/4 indicates #6 short bars, but not shown on the section.
b) Bar layout detail for the curved portions of wall and slab shall be shown to fabricate the reinforcing steel.
c) Longitudinal bars running along the width of the channel shall be shown on top of transverse bars as shown on cutoff wall detail E/4
d) K bars at 18" as shown on D/3 cutoff wall detail, should match with sheet 3, section B, showing reinforcing steel.
e) 3-6" dimension shown for K bar appears to be too long in comparision with C/4 cutoff wall detail.
f) #4 bars, 2-3" long at 16" as shown on wing wall plan, does not match with wall steel # 4 at 18"

Sheet 7: Reinforcing detail as shown on section C/4 does not match with bar bending detail.

Sheet 8: Add a few additional bars on the inside face of walls of side inlet plan and on top and bottom slabs of section A

Sheet 9: Type A pole location as shown on section C does not match with the location shown on sheet.4

General: All plans, sections and details be shown to scales and be indicated on each sheet.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 1 OF

DETAIL Design Check COMPUTED KVH DATE 11/4/92

CHECKED BY DATE

Edgar:

The following design checks to be documented before we issue the final drawings for Construction.

1) Slab Thickness of 10½" for ~~top~~ slab of Box to be checked for shear as per AASHTO allowable shear.

2) Retaining wall for open channel section could be reduced from 12" to 11" to match with Box culvert wall of 11". Check wall Moments and shear for a 11" wall with saturated fill Equiv. fluid pr of 80 pcf.

3) Wing wall section for Sossaman shows a footing Thickness of 1'-6", which could be reduced to 1'-3" & this needs to be checked and also the footing width of 6'-9" used to be checked.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman PAGE 2 OF

DETAIL Design Check COMPUTED KVH DATE 11/4/92

CHECKED BY DATE

4) Quantities for Sossaman, such as Excavation, Backfill, Concrete & Reinforcing Steel to be worked out.

All of the above to be well documented and checked by by CGW or KVH before we issue the final drawings.

Kumar

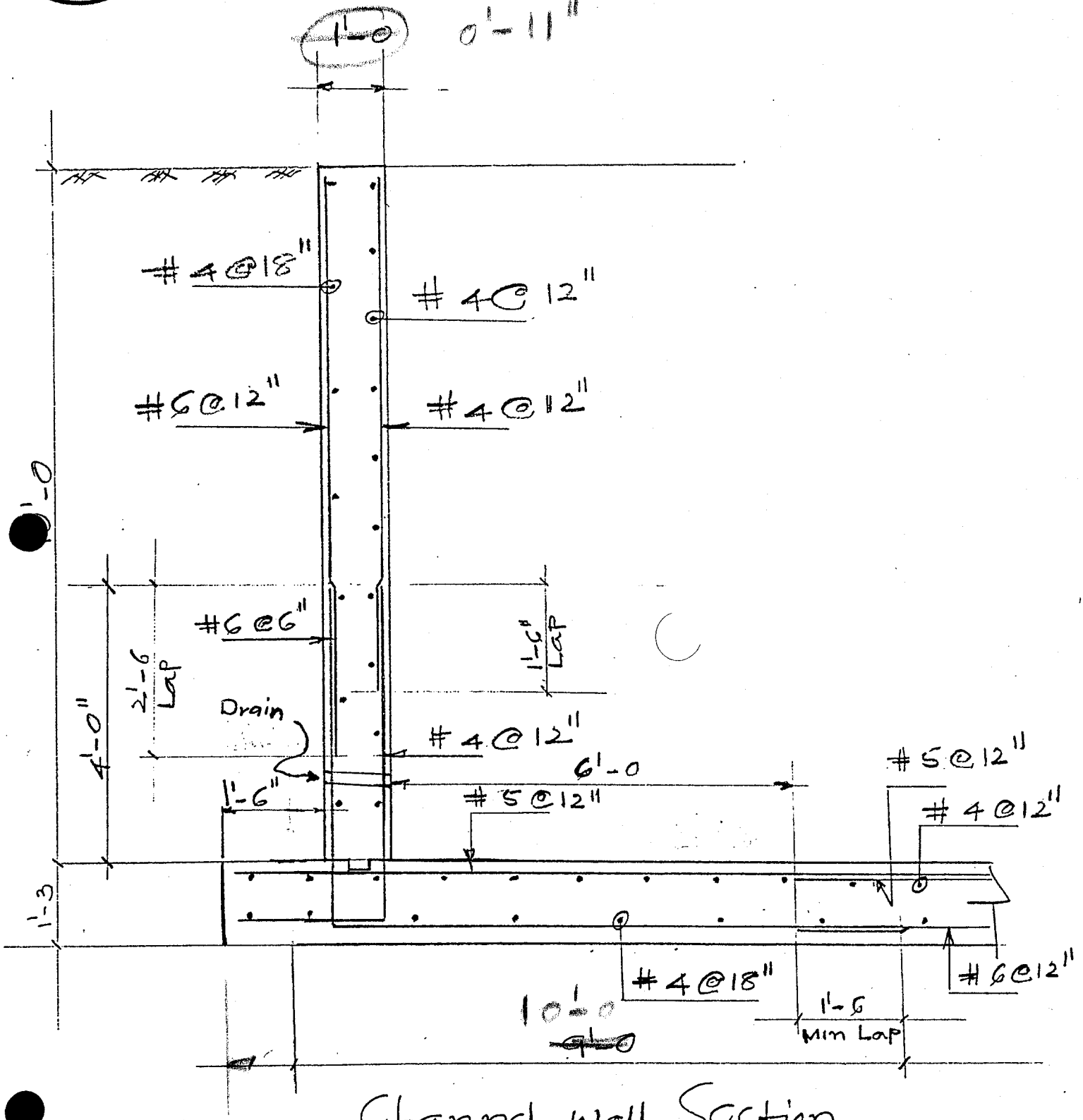
Copy to Ed Raleigh.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Sossaman Box PAGE 7 OF

DETAIL Wall Detail COMPUTED KVH DATE 10/92

CHECKED BY CBW DATE 10/92



Channel Wall Section

½" = 1'-0

MESSAGE DISPLAY FOR KUMAR HANUMAIAH

To Hanumaiah, Kumar V
To Moreno, Edgar O.

From: Edgar Moreno
Postmark: Sep 14,92 9:08 AM Delivered: Sep 14,92 9:08 AM
Status: Previously read
Subject: work update

Message:
During the week of September 7th, more requested changes and revisions were made on almost every drawing, I have hard copies for your use. For the week of September 14th, I will review suggested changes for economies, I will also be working on updating the estimated quantities for the job, so far these quantities are in the order of 1120. CY. of concrete and 146000. Lb of Steel.

----------X----------

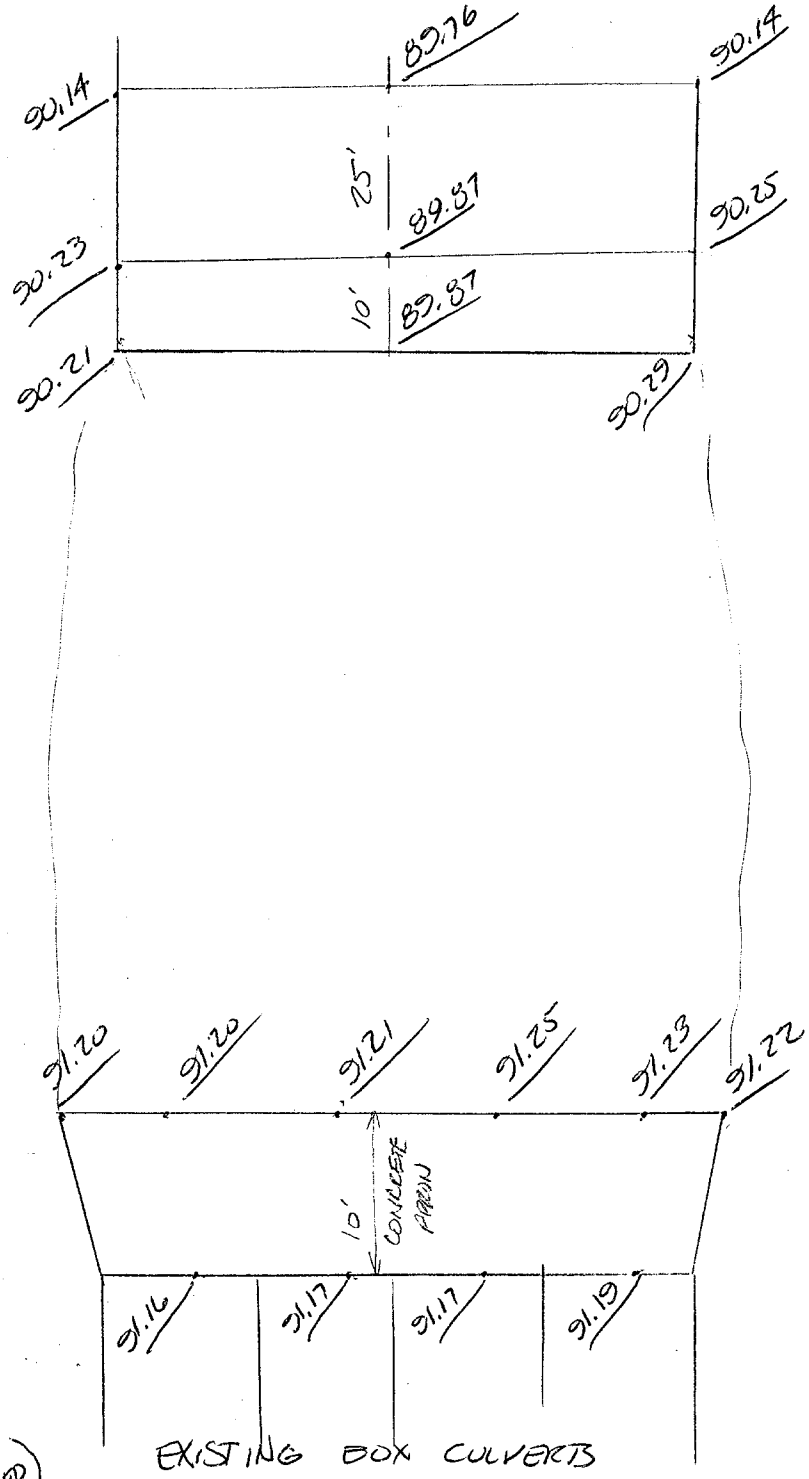
The quantities of cut and fill that are required on sossaman road south of guadalupe road to fill up the existing end of the ditch, are as follows: 274.6 CY. of cut and 2502.8 CY. of fill. A complete set of the calculation summary and a complete set of detail cross-sections have been handed to Chuck Wainwright and another set to k. Hanumaiah.

FLOOD CONTROL DISTRICT of Maricopa County

Interoffice Memorandum

CMT. NO.	SUBJECT: GUADALUPE	☐ FILE ☐ DESTROY

TO: FROM: DATE:



FLD.
B.C. IN CONCRETE
O100.17
ON NORTH
SIDE OF ~~[illegible]~~
CHANNEL

℄ SOSSAMAN and GUADALUPE
B.C. IN H.H.
O 100.00 (ASSUMED)

6910-007 3-90

STATION 47+00 TO STA 47+30 concrete L=30 Guadalupe Lined channel

WALLS $1 \times 7.58 \times 2 = 15.16$ CF $\xrightarrow[L]{30}$ 454.8 CF

Slab $\frac{(1.5 + 1.083) \times 20.5}{2} \times 2 + \frac{(1.5 \times \overset{W}{1.5})}{2} \times 1 = 52.95 + 11.25 = 64.2 \xrightarrow[L]{30} 1926$ CF

TOTAL 2380.8 CF $\approx$ 88 cy or 2.93 cy/FT

STEEL

WALLS #4 $\overbrace{8.75 + 6.83}^{@12} + \overbrace{8.75 + 1.0}^{@12} = 25.33 \times 2 = 50.66 \times .668 = 33.84$ Lb $\xrightarrow[L]{30}$ 1015.22 Lb +

#5 $\underbrace{5.25 + 6.83}_{@12} + \underbrace{5.25 + 1.0}_{@12} = 18.33 \times 2 = 36.66 \times 1.043 = 38.23$ Lb $\xrightarrow[L]{30}$ 1146.90 Lb

72.07 Lb/FT 2162.12 Lb

slab

bottom #5 $29.33 \times 60 + 9.667 \times 60 \approx 2340$ FT $\times 1.043 \rightarrow 2440$ Lb +

top #5 $15.0 \times 60 + 16 \times 60 + 15 \times 60 + 9.66 \times 60 \approx 3340$ FT $\times 1.043 \xrightarrow{\text{Lb}/\text{FT}}$ 3483. Lb

5923. Lb or 193.26 Lb/FT

longitudinal on walls

#6 $(2 \times 1 \times 1.50) \times 2 = 6.0$ Lb/FT +

#4 $(5 \times 1 \times .668) \times 2 + (10 \times 1 \times .668) \times 2 = 6.68 + 13.36 = 20.0$ Lb/FT +

#4 on slab $(32 \times 1 \times .668) + (64 \times 1 \times .668) = 21.37 + 42.75 = 64.1$ Lb/FT

90.2 Lb/FT $\xrightarrow[L]{30}$ 2703. Lbs

Total amount of Steel = 10778. Lbs

Steel/FT = 359 Lb/FT

STATION 47+30 TO STA 47+45 $L = 15$

concrete

WALLS

$1 \times 7.58 \times 2 = 15.16$ SF $\xrightarrow{15}$ = 227.4 CF

Slab

$(1.5 + 1.083) \times 20.5 + 1.5 \times \frac{15}{W} = 52.95 + 22.5 = 75.45 \xrightarrow[L]{15}$ 1131.75 CF

TOTAL = 1359.14 CF ≈ 50.33 CY or 3.35 CY/FT

STEEL

WALLS $72.07 \frac{Lb}{FT} \times 15 FT = 1081.05$ Lb

Wall longitudinal $\frac{26 \frac{Lb}{FT}}{98 \text{ Lb/FT}} \times 15 FT = 390$ Lb

Slab

bottom #5 $29.33 \times 30 + 17.66 \times 30 \approx 1410 FT \times 1.043 \frac{Lb}{FT} = 1470$ Lb

Top #5 $15 \times 30 + 16 \times 30 + 17.66 \times 30 + 15 \times 30 = 450 + 480 + 530 + 451 = 1910 FT \xrightarrow{\times} 1.043 = 1992$ Lb

Slab longitudinal #4 $(86 \times 1 \times .668) + (43 \times 1 \times .668) = 57.44 + 28.72 = 86.16 \frac{Lb}{FT} \xrightarrow[L]{15}$ 1292 Lb

Total steel = 6225 Lb or 415 Lb/FT

STATION 47+45 TO STATION 50+25.95

Concrete

Walls $1 \times 7.58 \times 2 = 15.16$ SF $\xrightarrow{281.04 / L} = 4260.56$ CF

slab $(1.5 + 1.083) \times 20.5 \approx 53$ SF $\xrightarrow{281.04 / L} = 14881.5$ CF

TOTAL = 19142 CF $\approx$ 709 CY or 2.52 CY/FT

Steel

Walls

$98. \frac{Lb}{FT} \times 281.04 = 27561.6$ Lb

slab

bottom #5 $29.33 \times 562 \cong 16483$ FT $\times \xrightarrow{1.043} 17192.$ Lb

top #5 $16.00 \times 562 + 15 \times 562 + 15 \times 562 = 25852$ FT $\times \xrightarrow{1.043} 26964.$ Lb

longitudinal $(32 \times 1 \times .668) + (64 \times 1 \times .668) = 64.1$ Lb/FT $\xrightarrow{281.04 / L} = 17284.$ Lb

total Steel 89000. Lb or 316 Lb/FT

57 S[illegible]011 50+25.95 TO STA 50+53.23 L = 2[illegible]

Concrete

walls $1 \times 7.58 \times 2 = 15.16$ SF $\xrightarrow{27}$ 409 CF

slab $\frac{(1.4 + 1.083) \times 20.5}{2} + \frac{(1.4 + 1.083) \times 22.66}{2} = 25.4 + 28.13 = 53.53 \xrightarrow{27} 1445$ CF

TOTAL 1854 CF ≈ 68.68 CY

or 2.62 CY/FT

Steel

walls $98 \frac{Lb}{FT} \times 27$ FT $= 2646$ Lb

slab bottom #5 $29.33 \times 55 + 4.54 \times 47 = 1613.1 + 213.28 = 1826.43$ FT $\xrightarrow{1.043}$ 1905 Lb

top #5 $15.0 \times 55 + 16 \times 55 + 15 \times 50 + 4.54 \times 43 = 825 + 880 + 750 + 195 = 2650$ FT $\xrightarrow{1.043}$ 2764 Lb

longitudinal $(33 \times 1 \times .668) + (66 \times 1 \times .668) = 22 + 44 = 66$ Lb/FT $\xrightarrow{27}$ 1782 Lb

total Steel = 9097 Lb or 337 Lb/FT

ATION 50+53.23 TO STA 50+74.73 L

Concrete

WALLS $1 \times 7.58 \times 2 = 15.16$ SF $\xrightarrow{26}$ 394.16 CF

SLAB $1.29 \times 22.33 \times 2 = 57.67$ SF $\xrightarrow{26}$ ≈ 1500 CF

total 1893.8 CF = 70.1 CY or 2.69 CY/FT

Steel

WALLS $98 \frac{lb}{FT} \times 26$ FT = 2548 Lb

Slab bottom : $38.25 \times 52 = 1989$ FT $\xrightarrow{1.043}$ 2074.5 Lbs

Top : $24.7 \times 49 + 15 \times 52 + 15 \times 49 = 1210.3 + 780 + 735 = 2725$ Lb

longitudinal : $(34 \times 1 \times .668) + (68 \times 1 \times .668) = 22.7 + 45.4 = 68.1$ Lb/FT $\xrightarrow{26}$ 1771 Lb

total Steel = 9518 Lb or 365 Lb/FT

STATION 50+74.82 TO STATION 50+94.96 L = 20.85

Concrete

Walls $1 \times 7.58 \times 2 = 15.16$ SF $\xrightarrow{20.85}$ 316 CF

slab $1.2 \times 26.3 \times 2 = 63.12$ SF $\xrightarrow{20.85}$ 1316 CF

Total 1632 CF = 60.44 cy or 2.89 cy/FT

Steel

Walls $98 \frac{lb}{FT} \times 20.85 = 2043.3$ lb

Slab bottom: $41.0 \times 40 = 1640$ FT $\xrightarrow{1.043}$ 1710.5 lb

top: $27.66 \times 40 + 15 \times 40 \times 2 = 1106.4 + 1200 = 2306.4$ lb

longitudinal: $(39.5 \times 1 \times .668) + (79 \times 1 \times .668) = 26.38 + 52.77 = 79.15 \frac{lb}{FT} \xrightarrow{20.85} 1650.3$ lb

Total steel 7710.5 lb or 369 lb/FT

RAMP

Concrete

$1.083 \times 15 \times 80.5 = 1307 \text{ CF} = 48.4 \text{ CY}$ or 0.6 CY/FT

Steel

top : $14.66 \times 80 = 1172.8 \text{ FT} \xrightarrow{.668} 783.4 \text{ Lb}$

bottom : $14.66 \times 80 = 1172.8 \text{ FT} \xrightarrow{1.043} 1223.2 \text{ Lb}$

longitudinal : $(20 \times 1 \times 2.67) + (15 \times 1 \times .668) = 53.4 + 10. = 63.42 \text{ Lb/FT} \xrightarrow{80.1} 5105 \text{ Lb}$

total steel = 7120 Lb or 88 Lb/FT

Ret. wall

Concrete

$1 \times 7.58 + 1.5 \times 5.0 + 1.5 \times 1 = 16.58 \text{ CF/FT} \times 80 \text{ FT} = 1326.4 \text{ CF} = 49.1 \text{ CY}$ or $.61 \text{ CY/FT}$

Steel

#4 $8.58 \times 80 = 686.4 \text{ FT} \xrightarrow{.668} 458.5 \text{ Lb}$

#6 $9.58 \times 80 + 4.667 \times 80 + 2.75 \times 80 = 766.4 + 373.36 + 220 = 1323.76 \text{ FT} \xrightarrow{1.5} 1985.6 \text{ Lb}$

longitudinal : $22 \times 1 \times .668 = 14.7 \text{ Lb/FT} \xrightarrow{80} 1175.6 \text{ Lb}$

total steel 3619.78 Lb or 45 Lb/FT

Entrance Slab

Concrete

$31 \times 1.083 \times 16 + .83 \times 3 \times 47 = 537 + 117 = 654 \text{ CF} = 24.2 \text{ CY}$ or $.78 \text{ CY/FT}$

Steel

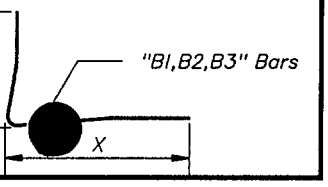
top : $34.0 \times 16 = 544 \text{ FT} \xrightarrow{.668} 363.4 \text{ Lb}$

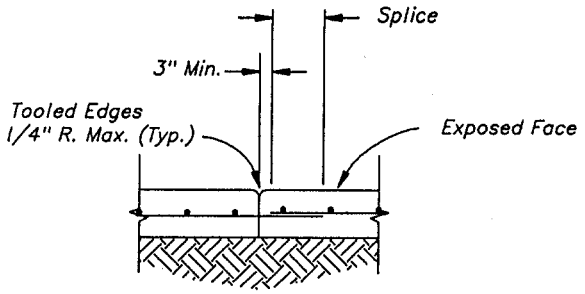
bot : $34.0 \times 21 = 714 \text{ FT} \xrightarrow{2.67} 1906.3 \text{ Lb}$

longitudinal : $(32 \times 1 \times .668) + (32 \times 1 \times 1.043) = 21.37 + 33.37 = 54.74 \text{ Lb/FT} \xrightarrow{16} = 876 \text{ Lb}$

total steel 3145.7 Lb or 116 Lb/FT

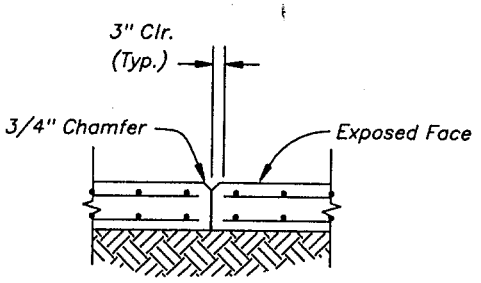
DUL			
E	F–F	G–G	H–H
3"	17'–8"	22'–0"	22'–6"
	10'–0"	10'–0"	10'–0"
0"	16'–1"	20'–6"	24'–9"
0"	11'–0"	14'–0"	18'–0"
2"	1'–7"	2'–0"	2'–3"
3"	1'–8"	2'–2"	2'–5"
12"	#5@12"	#7@9"	#7@9"
6"	13'–6"	7'–9"	5'–6"
0"	10'–0"	12'–6"	14'–9"
12"	#7@12"	#7@9"	#7@9"
0"	9'–6"	11'–3"	13'–0"
6"	13'–9"	5'–6"	11'–3"
2"	#8@12"	#7@9"	#8@9"
9"	6'–3"	4'–9"	9'–0"
0"	6'–6"	8'–6"	7'–3"
2"	#5@12"	#5@9"	#5@9"
"	1'–1"	1'–1"	1'–1"
	–	#6@9"	#7@9"
	–	13'–6"	9'–5"
	–	1'–5"	1'–11"
2"	#5@12"	#5@9"	#5@9"
"	1'–1"	1'–1"	1'–1"
	–	#5@9"	#5@9"
	–	13'–0"	12'–0"
	–	1'–1"	1'–1"
2"	#6@12"	#6@12"	#6@12"





TYPE "A"

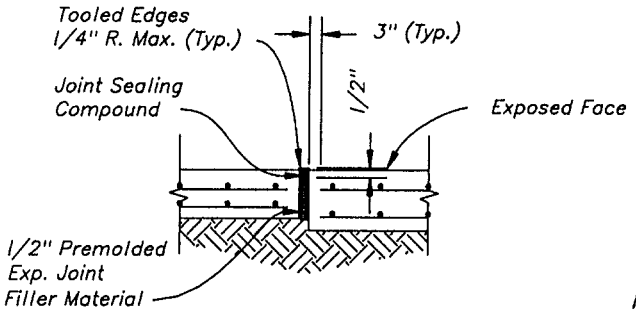
For Invert Slab



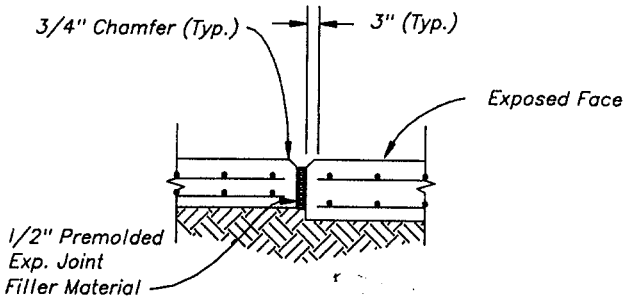
TYPE "B"

For Walls

CONSTRUCTION JOINTS
NOT TO SCALE



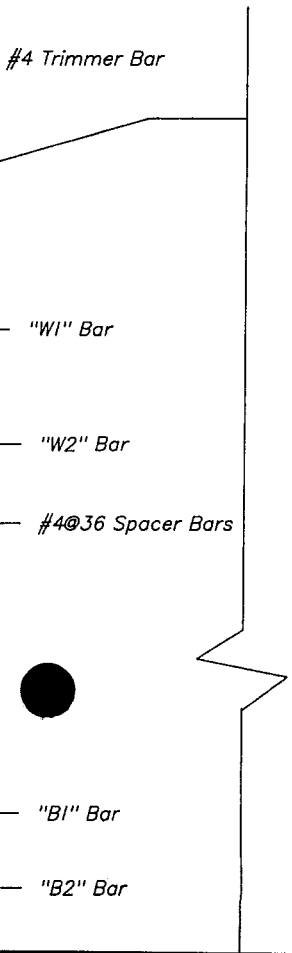
TYPE "C"

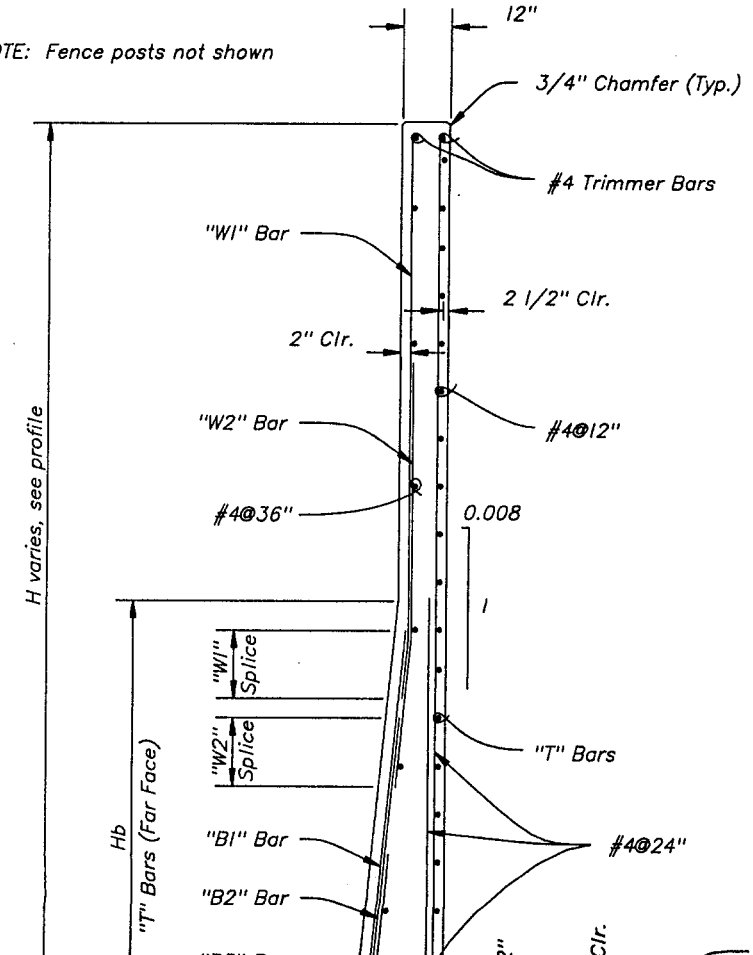


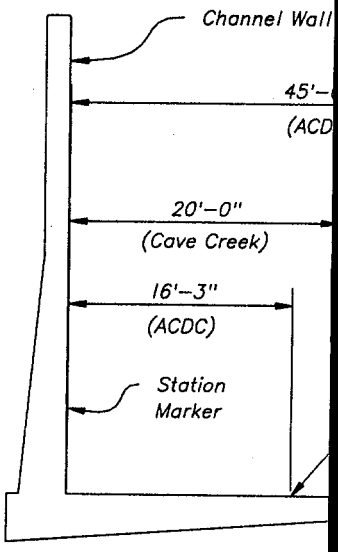
TYPE "D"

For Walls only

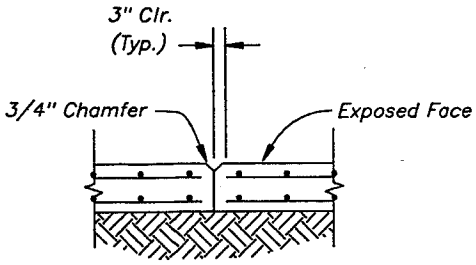
EXPANSION JOINTS
NOT TO SCALE





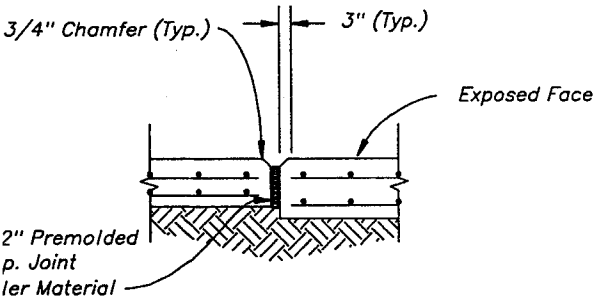


CHANNEL S

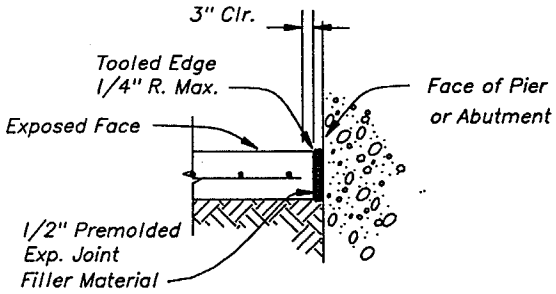


TYPE "B"

JINTS



TYPE "D"

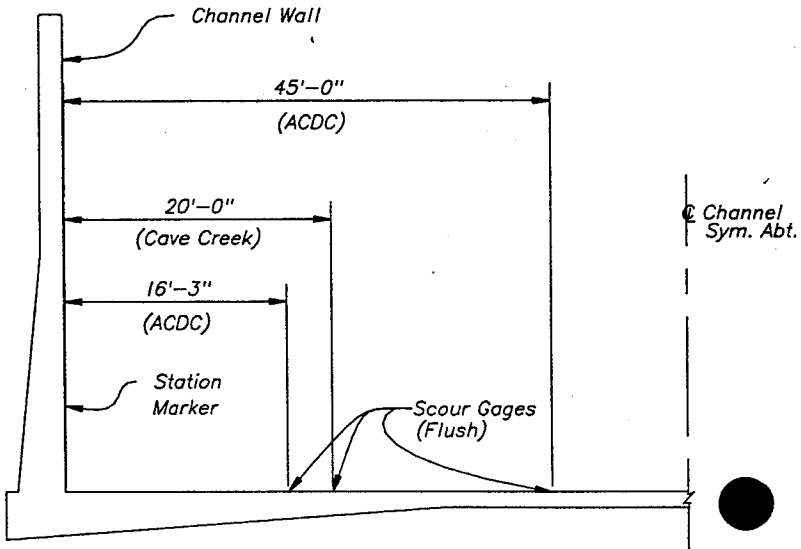


TYPE "E"

JOINTS
ALE

Typ.)

ırs



GENERAL STRUCTURAL NOTES

1. ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

2. ALL STATIONING SHOWN IS ON PROJECT CENTERLINE OR NORMAL TO CENTER LINE OF CONSTRUCTION.

3. TRANSVERSE AND LONGITUDINAL JOINTS IN INVERT SLAB WILL BE REQUIRED AT THE END OF EACH CONTINUOUS POURING OPERATION AND SHALL BE CONSTRUCTION JOINT TYPE A, VERTICAL JOINTS IN CHANNEL WALLS WILL BE CONSTRUCTION JOINT TYPE B AND REQUIRED AT INTERVALS OF 30 FEET MINIMUM AND 60 FEET MAXIMUM, UNLESS SHOWN OTHERWISE AND AS APPROVED BY THE CONTRACTING OFFICER.

4. IN CURVE SECTIONS TRANSVERSE BARS SHALL BE PLACED NORMAL TO THE PROJECT CENTER LINE.

5. ALL SLAB REINFORCING STEEL SPACING AROUND CURVES SHALL BE MEASURED AT THE OUTSIDE FACE OF CHANNEL WALLS.

6. ALL SINGLE LAYER REINFORCEMENT SHALL BE PLACED IN THE CENTER OF CONCRETE UNLESS OTHERWISE NOTED.

7. SPLICES OF REINFORCING BARS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

LAP SPLICE LENGTH IN INCHES
f'c = 3,000 psi & fy = 40,000 psi

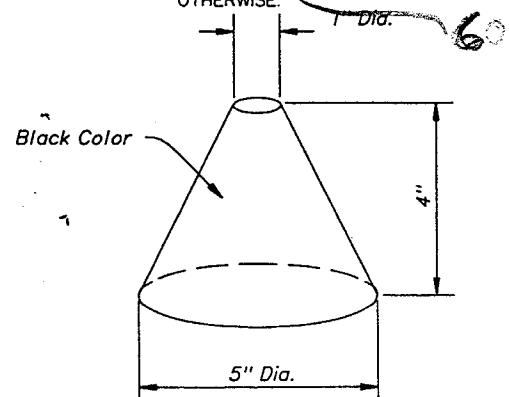
BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
TOP BARS	15"	18"	23"	32"	42"	53"	68"	83"
OTHER BARS	12"	13"	17"	23"	30"	38"	48"	59"

a. ALL SPLICES TO BE SPLICE LENGTH OF THE SMALLER BAR BUT NOT LESS THAN 12 INCHES.

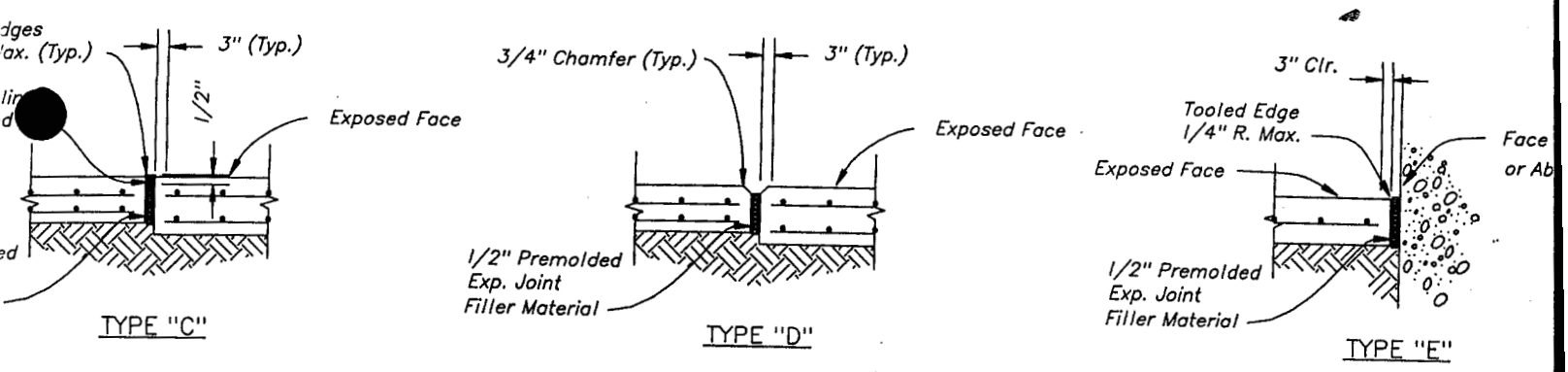
b. SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OF THE AREA OF STEEL IN A LAYER IS SPLICED WITHIN THE REQUIRED LAP LENGTH.

c. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE BELOW THE BAR.

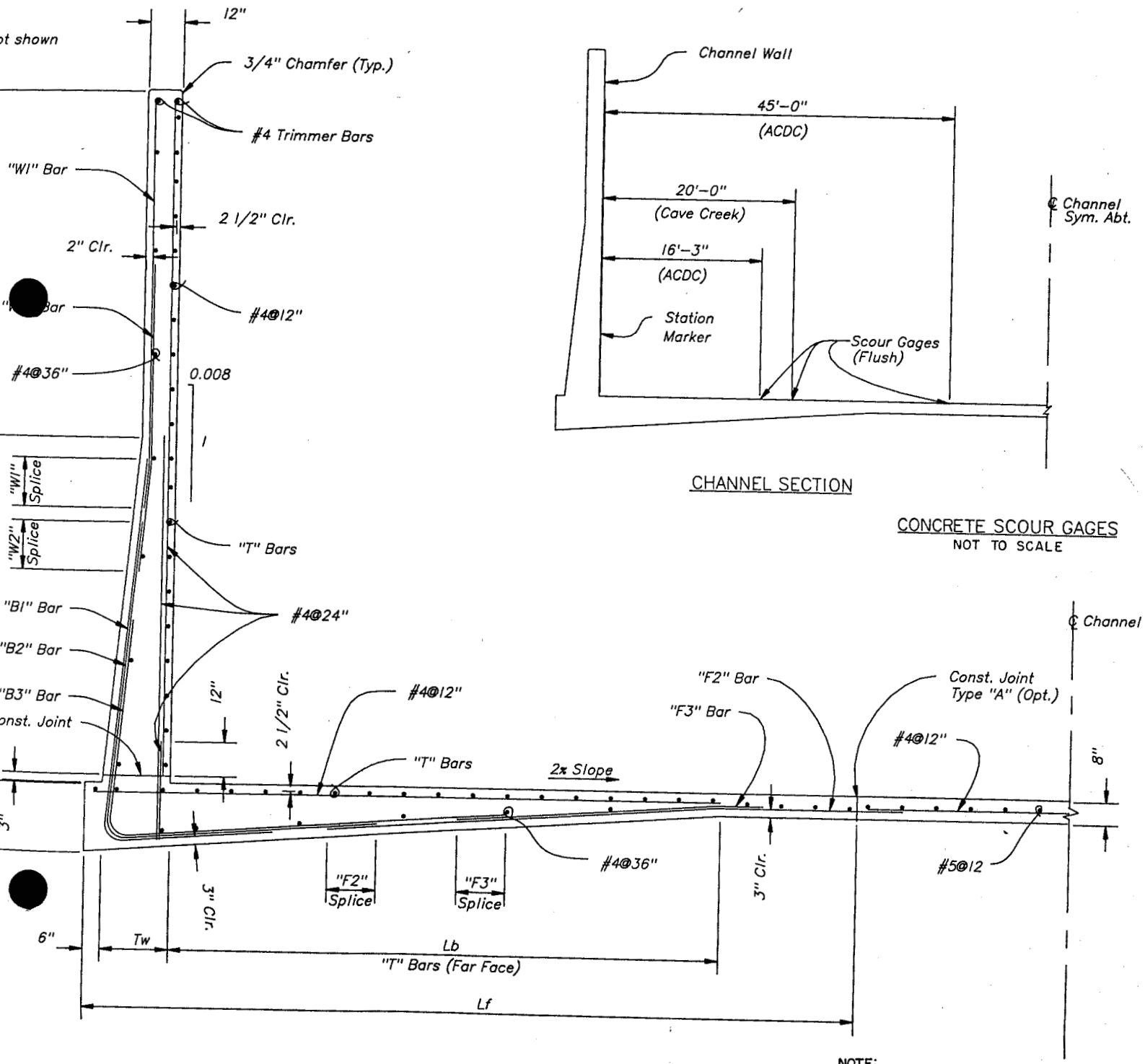
8. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 INCHES, UNLESS NOTED OTHERWISE.
9. ALL REBAR CLEARANCE IS 2 INCHES MINIMUM UNLESS OTHERWISE NOTED.
10. CONCRETE COMPRESSIVE STRENGTH SHALL BE ~~3000 PSI~~ 4000 AND REINFORCEMENT SHALL CONFORM TO ASTM A615 GRADE ~~40~~ 60, FOR ALL STRUCTURES UNLESS SHOWN OTHERWISE.



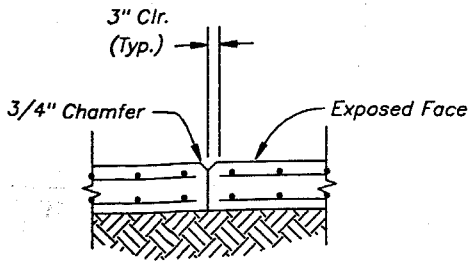
CONSTRUCTION JOINTS
NOT TO SCALE



EXPANSION JOINTS
NOT TO SCALE

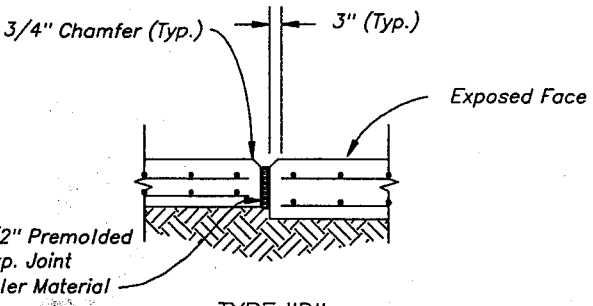


NOTE:

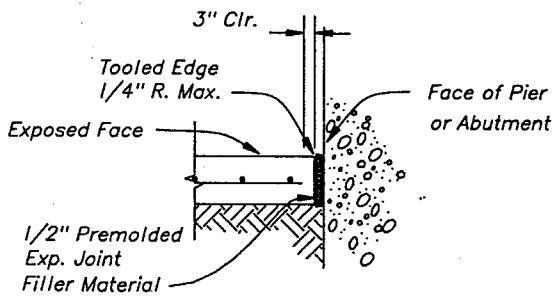


TYPE "B"

OINTS



TYPE "D"

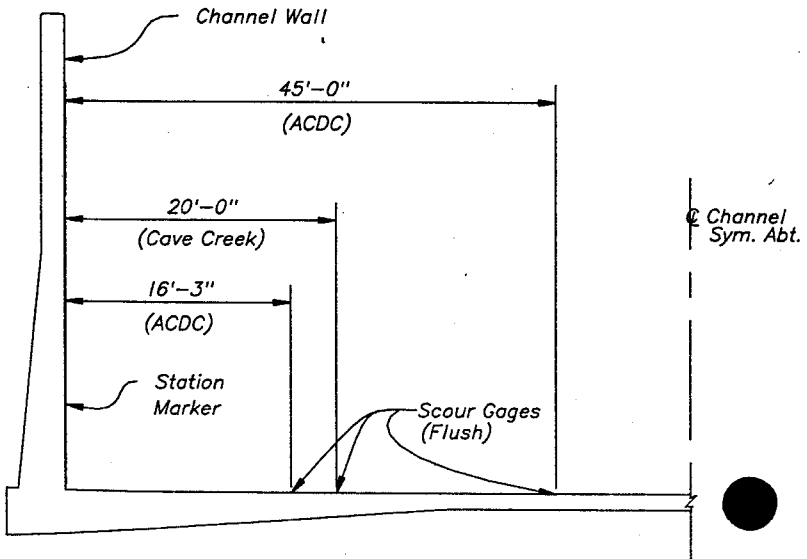


TYPE "E"

JOINTS
ALE

Typ.)

rs



GENERAL STRUCTURAL NOTES

1. ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

2. ALL STATIONING SHOWN IS ON PROJECT CENTERLINE OR NORMAL TO CENTER LINE OF CONSTRUCTION.

3. TRANSVERSE AND LONGITUDINAL JOINTS IN INVERT SLAB WILL BE REQUIRED AT THE END OF EACH CONTINUOUS POURING OPERATION AND SHALL BE CONSTRUCTION JOINT TYPE A, VERTICAL JOINTS IN CHANNEL WALLS WILL BE CONSTRUCTION JOINT TYPE B AND REQUIRED AT INTERVALS OF 30 FEET MINIMUM AND 60 FEET MAXIMUM, UNLESS SHOWN OTHERWISE AND AS APPROVED BY THE CONTRACTING OFFICER.

4. IN CURVE SECTIONS TRANSVERSE BARS SHALL BE PLACED NORMAL TO THE PROJECT CENTER LINE.

5. ALL SLAB REINFORCING STEEL SPACING AROUND CURVES SHALL BE MEASURED AT THE OUTSIDE FACE OF CHANNEL WALLS.

6. ALL SINGLE LAYER REINFORCEMENT SHALL BE PLACED IN THE CENTER OF CONCRETE UNLESS OTHERWISE NOTED.

7. SPLICES OF REINFORCING BARS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

LAP SPLICE LENGTH IN INCHES
f'c = 3,000 psi & fy = 40,000 psi

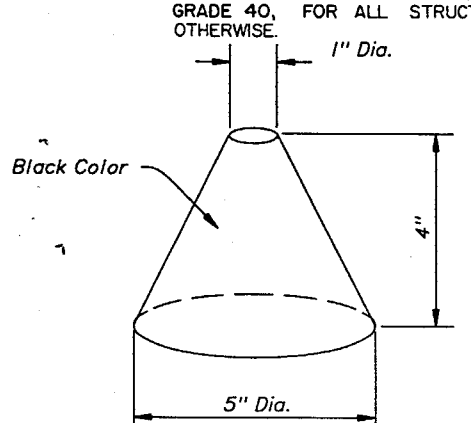
BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
TOP BARS	15"	18"	23"	32"	42"	53"	68"	83"
OTHER BARS	12"	13"	17"	23"	30"	38"	48"	59"

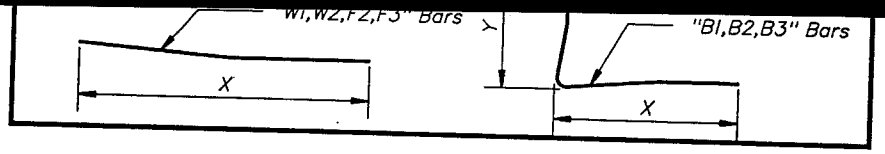
a. ALL SPLICES TO BE SPLICE LENGTH OF THE SMALLER BAR BUT NOT LESS THAN 12 INCHES.

b. SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OF THE AREA OF STEEL IN A LAYER IS SPLICED WITHIN THE REQUIRED LAP LENGTH.

c. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 INCHES OF CONCRETE BELOW THE BAR.

8. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4 INCHES, UNLESS NOTED OTHERWISE.
9. ALL REBAR CLEARANCE IS 2 INCHES MINIMUM UNLESS OTHERWISE NOTED.
10. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3000 PSI AND REINFORCEMENT SHALL CONFORM TO ASTM A615 GRADE 40, FOR ALL STRUCTURES UNLESS SHOWN OTHERWISE.





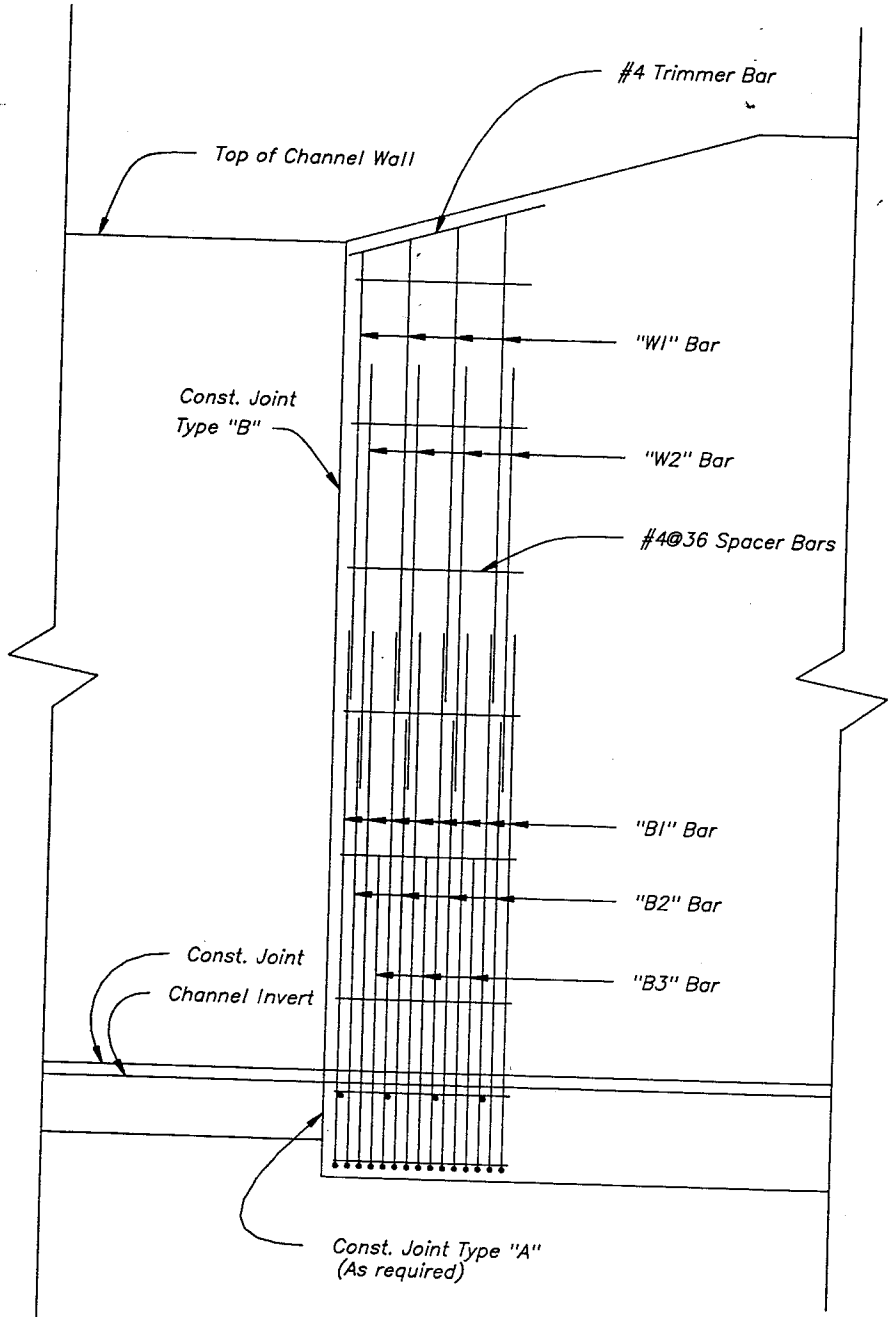
Filler Material

TYPE "C"

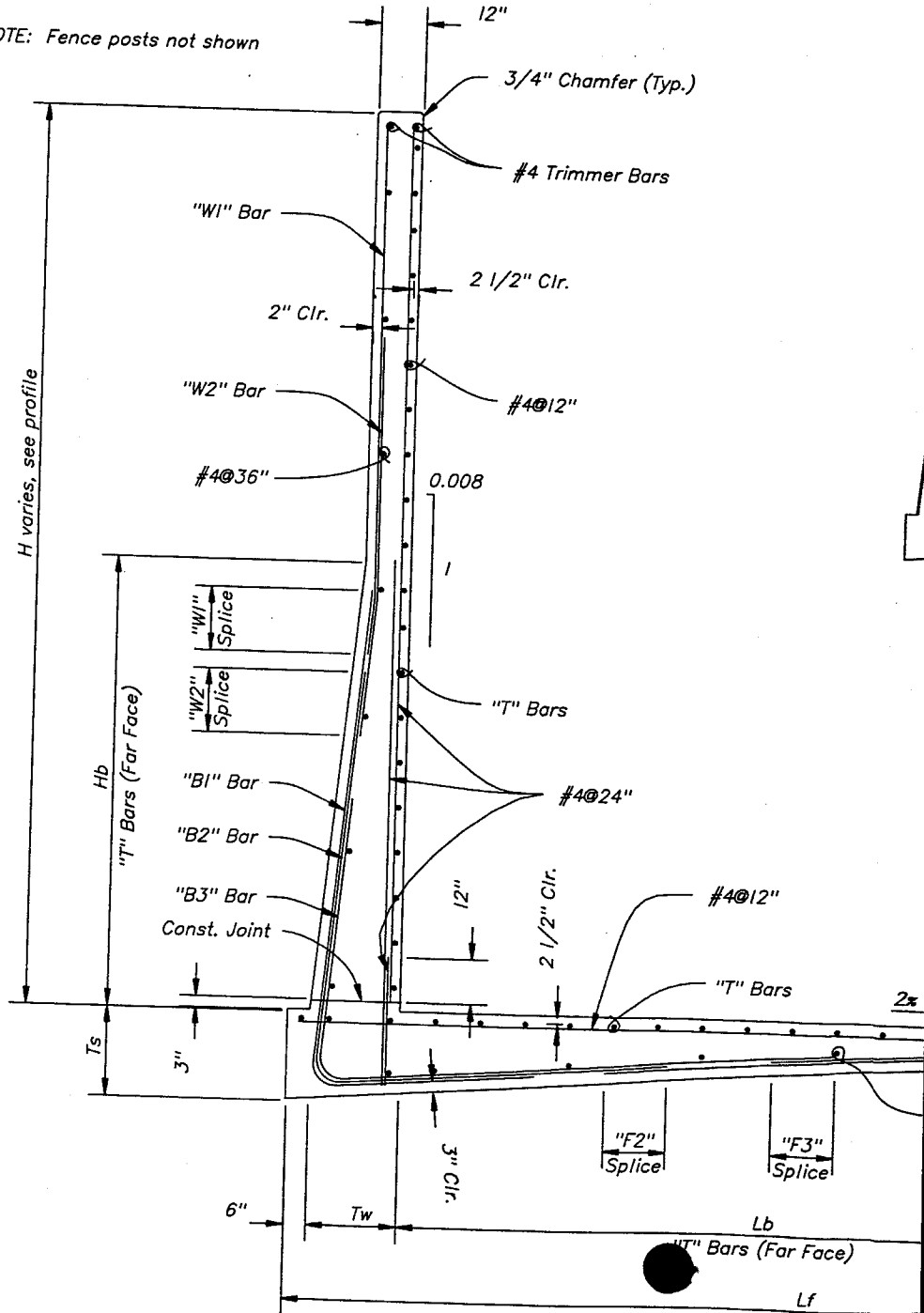
Filler Material

TYPE

EXPANSION JOINTS
NOT TO SCALE

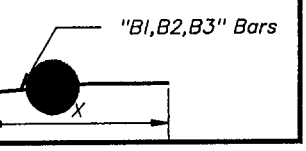


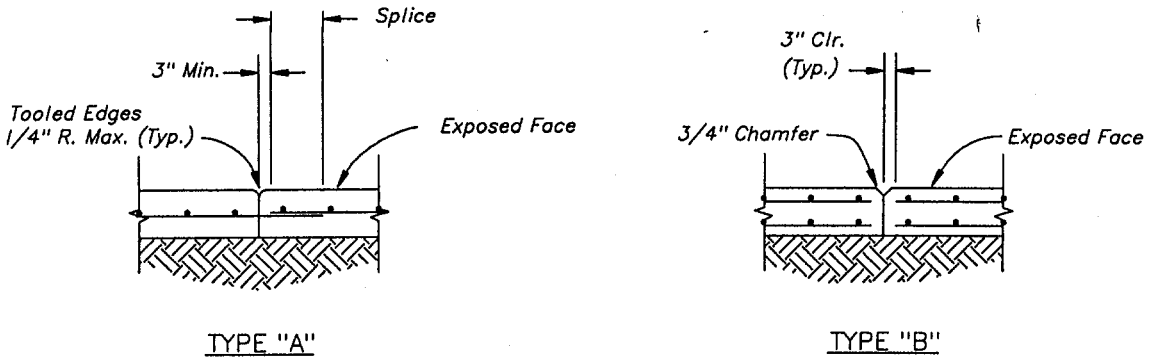
NOTE: Fence posts not shown



ENVIRONMENTAL ENHANCEMENT THRU ENGINEERING

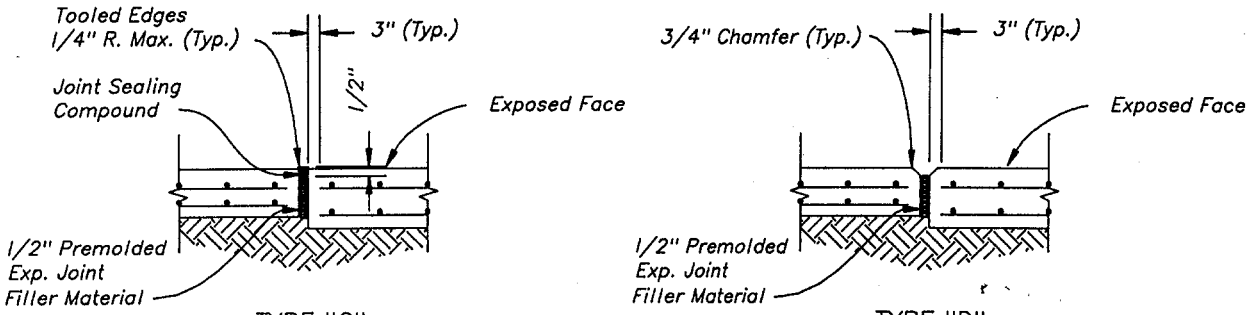
LE		
F–F	G–G	H–H
17'–8"	22'–0"	22'–6"
10'–0"	10'–0"	10'–0"
16'–1"	20'–6"	24'–9"
11'–0"	14'–0"	18'–0"
1'–7"	2'–0"	2'–3"
1'–8"	2'–2"	2'–5"
#5@12"	#7@9"	#7@9"
13'–6"	7'–9"	5'–6"
10'–0"	12'–6"	14'–9"
#7@12"	#7@9"	#7@9"
9'–6"	11'–3"	13'–0"
13'–9"	5'–6"	11'–3"
#8@12"	#7@9"	#8@9"
6'–3"	4'–9"	9'–0"
6'–6"	8'–6"	7'–3"
#5@12"	#5@9"	#5@9"
1'–1"	1'–1"	1'–1"
–	#6@9"	#7@9"
–	13'–6"	9'–5"
–	1'–5"	1'–11"
#5@12"	#5@9"	#5@9"
1'–1"	1'–1"	1'–1"
–	#5@9"	#5@9"
–	13'–0"	12'–0"
–	1'–1"	1'–1"
#6@12"	#6@12"	#6@12"





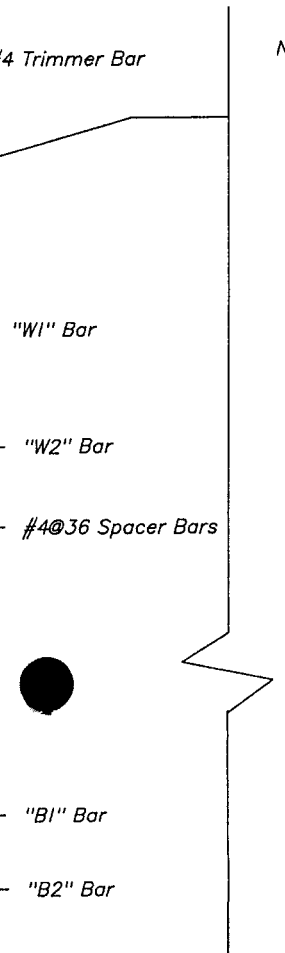
TYPE "A" TYPE "B"

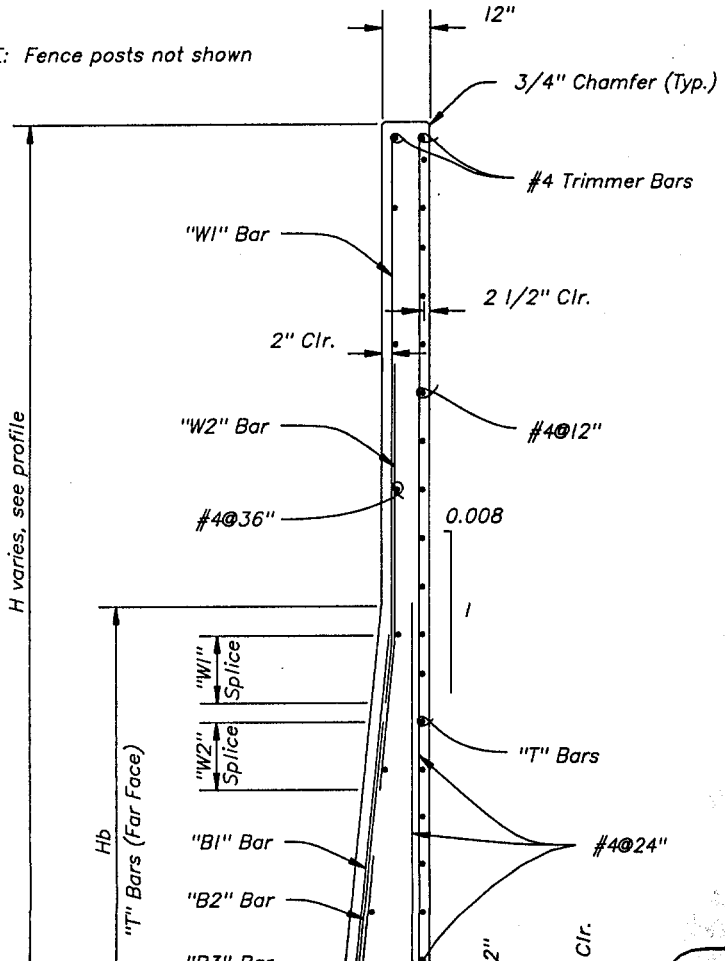
CONSTRUCTION JOINTS
NOT TO SCALE

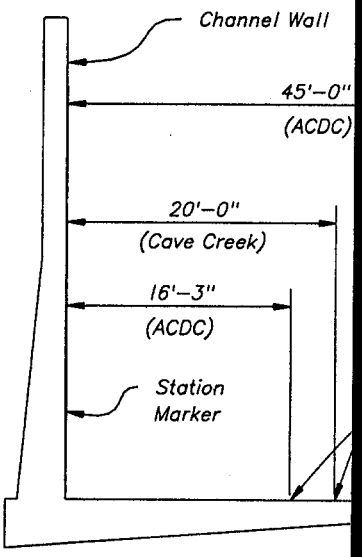


TYPE "C" TYPE "D"

EXPANSION JOINTS
NOT TO SCALE





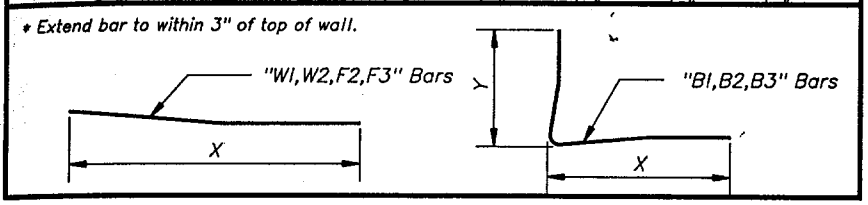


CHANNEL SE

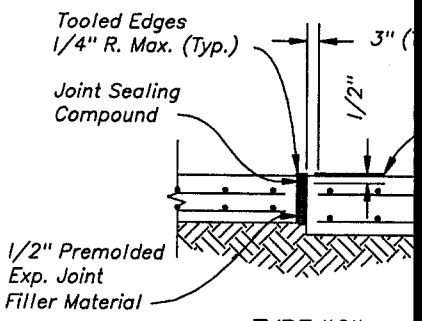
"F2" Bar

Ts	2'-0"	3'-3"	1'-0"	1'-0"	1'-3"	1'-8"	2'-2"	2'-5"
"B1" Bar	#6@6"	#8@6"	#4@12"	#5@12"	#5@12"	#5@12"	#7@9"	#7@9"
X	6'-9"	8'-9"	7'-3"	7'-3"	9'-6"	13'-6"	7'-9"	5'-6"
Y	16'-0"	25'-0"	*	3'-0"	7'-0"	10'-0"	12'-6"	14'-9"
"B2" Bar	#7@12"	#9@12"	–	#5@12"	#6@12"	#7@12"	#7@9"	#7@9"
X	12'-0"	11'-9"	–	4'-9"	3'-0"	9'-6"	11'-3"	13'-0"
Y	13'-0"	15'-0"	–	4'-0"	8'-6"	13'-9"	5'-6"	11'-3"
"B3" Bar	#8@12"	#9@12"	–	–	#6@12"	#8@12"	#7@9"	#8@9"
X	19'-9"	20'-9"	–	–	5'-9"	6'-3"	4'-9"	9'-0"
Y	6'-9"	9'-0"	–	–	4'-0"	6'-6"	8'-6"	7'-3"
"W1" Bar	#5@12"	#6@12"	–	#5@12"	#5@12"	#5@12"	#5@9"	#5@9"
Splice	1'-6"	2'-0"	–	1'-1"	1'-1"	1'-1"	1'-1"	1'-1"
"W2" Bar	–	–	–	–	–	–	#6@9"	#7@9"
X	–	–	–	–	–	–	13'-6"	9'-5"
Splice	–	–	–	–	–	–	1'-5"	1'-11"
"F2" Bar	#5@12"	#5@12"	–	–	#5@12"	#5@12"	#5@9"	#5@9"
Splice	1'-6"	1'-6"	–	–	1'-1"	1'-1"	1'-1"	1'-1"
"F3" Bar	–	#6@12"	–	–	–	–	#5@9"	#5@9"
X	–	11'-0"	–	–	–	–	13'-0"	12'-0"
Splice	–	2'-0"	–	–	–	–	1'-1"	1'-1"
"T" Bar	#6@12"	#6@12"	#4@12"	#4@12"	#4@12"	#6@12"	#6@12"	#6@12"

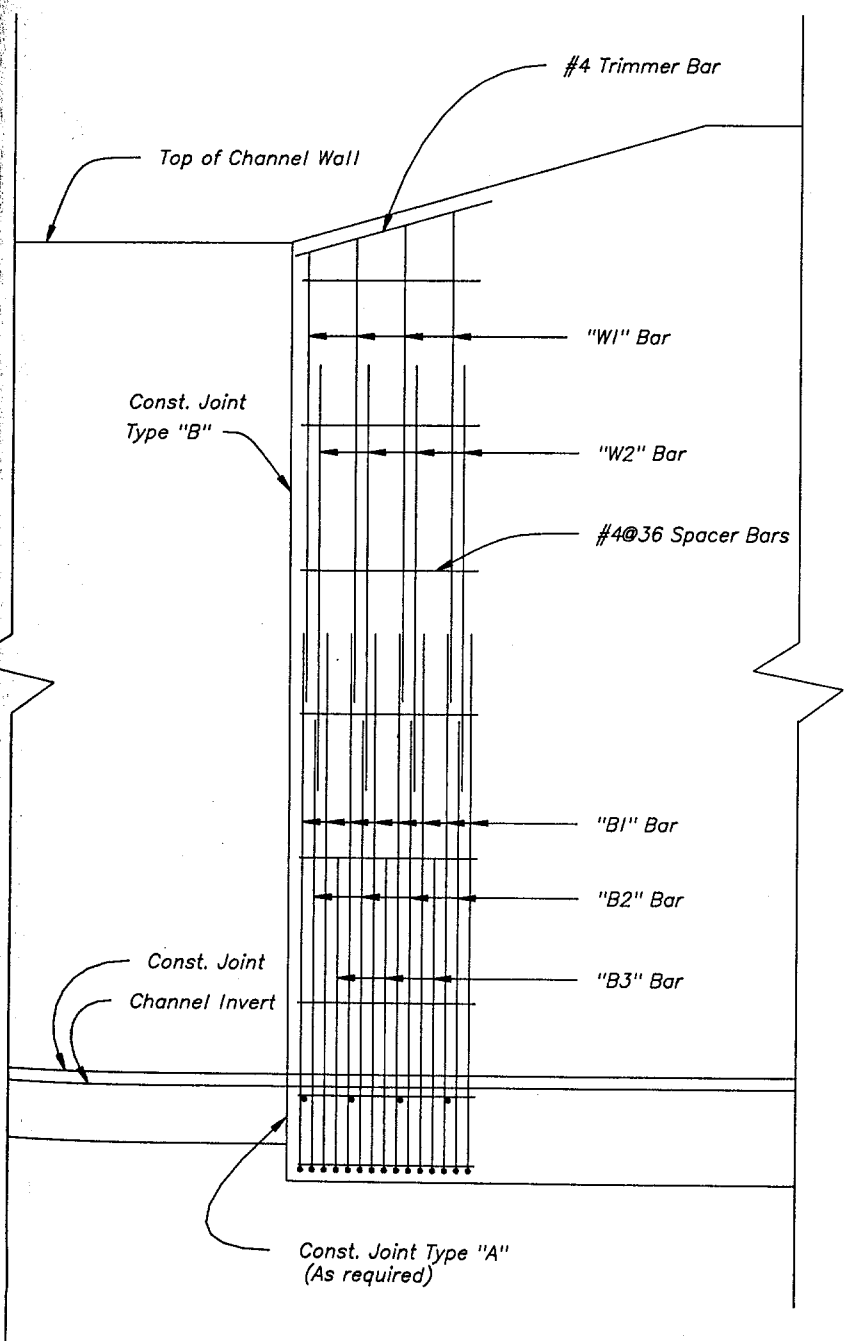
* Extend bar to within 3" of top of wall.

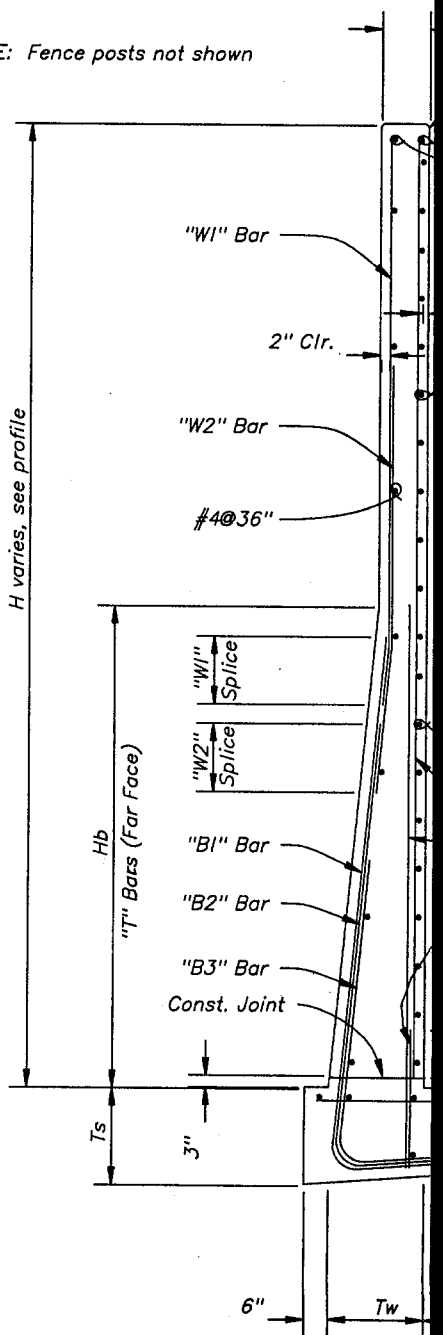


TYPE "A"



TYPE "C"





STRUCTURAL EXCAVATION ESTIMATE
CROSS SECTINAL AREAS
BY EDGAR O. MORENO

STATION 47+00	AREA =	0.0	SQF.
STATION 48+00	AREA =	192.26	SQF.
STATION 49+00	AREA =	280.48	SQF.
STATION 50+00	AREA =	245.42	SQF.
STATION 51+00	AREA =	273.79	SQF.
STATION 51+51	AREA =	266.38	SQF.
STATION 52+00	AREA =	74.78	SQF.

FILL CONSTRUCTION ESTIMATE
CROSS SECTINAL AREAS
BY EDGAR O. MORENO

STATION 47+00	AREA =	0.00	SQF.
STATION 48+00	AREA =	174.25	SQF.
STATION 49+00	AREA =	238.29	SQF.
STATION 50+00	AREA =	275.92	SQF.
STATION 51+00	AREA =	173.20	SQF.
STATION 51+51	AREA =	0.00	SQF.
STATION 52+00	AREA =	0.00	SQF.
STATION 52+78	AREA =	830.52	SQF.

BIDDING SCHEDULE

PROJECT: Guadalupe Channel-Sossaman Box Culvert

CONTRACT: FCD 92-35

ITEM NO	DESCRIPTION	APPROX QTY	UNIT	UNIT COST(IN WRITING) AND/100 DOLLARS	UNIT COST NUMBERS	EXTENDED AMOUNT
206-1	Structure Excavation	1	LS			
206-2	Structure Backfill	1	LS			
211-1	Fill Construction	1	LS			
350-1	Removal of Existing Improvements	1	LS			
401-1	Traffic Control	1	LS			
420-1	Chain Link Fence	1100	LF			
505-1	Class "AA" Concrete	1742	CY			
505-2	Class "B" Concrete	185	CY			
505-3	Reinforcing Steel	292,340	LBS			
505-4	Epoxy Grouted Dowels	35	EA			
505-5						
602-1	12" Steel Utility Sleeve	70	LF			
602-2	30" Steel Utility Sleeve	70	LF			
602-3	54" Steel Utility Sleeve	70	LF			
	RGRCP					
618-1	18" RGRCP	8	LF			
618-2	24" RGRCP	100	LF			

MESSAGE DISPLAY FOR ED RALEIGH

To: CGW
Cc: EAR

From: Ed Raleigh:TALOS
Postmark: 12-18-92 5:10PM
Status: Previously read

Host: TALOS
Delivered: 12-18-92 5:10PM

Subject: Guadalupe Channel

Message:
Phil Epstein's comments are on your chair along with the set of plans he marked. He said he wants to see calculations to check the condition of water in the channel and no passive soil resistance, as it may not develop for small deflections by the wall. Please call him (extension 8625) to clarify whether to assume active soil pressure, as that would seem reasonable.
He also said splices should not be shown for bar lengths less than 60 feet, but Shewa said he wants to leave them shown as the contractor could always propose to eliminate them during shop drawing review. I concur with Shewa, and would like you to talk to him and the Mr. Epstein.
I left four complete sets of the newest drawings for your use.
Merry Christmas.

1-4-93

I talked with Phil Epstein by phone and told him Kumar had done calculations to check the condition of water in the channel with no passive soil resistance. I told him Chuck Wainwright checked the calculations. Mr. Epstein said he did not want me to bring the calculation over for his review.

Ed Raleigh

MEMO

WELLS ENGINEERS

FLOOD CONTROL DISTRICT
RECEIVED
DEC 06 1991

CH ENG		P & PM
D.I.		MAINT.
ADMIN		
FINANCE		FILE
C & O	2	HSC
ENGR		

REMARKS

TO: PBW, DAB, and File
FROM: MAL
REFERENCE: Sossaman Road Box Culvert - FCD 91-06 WE No. 910431
DATE: December 5, 1991

MEETING MINUTES

Subject: Sossaman Road Box Culvert
Date: December 4, 1991

Persons Attending:
Ed Raleigh, MCFCD
Scott Clement, MCFCD
Joong "Jay" Kim, MCFCD
Tony Bokich, WEI
Mike Lopez, WEI

The meeting was held at MCFCD to give notice to proceed with Phase II contract and go over the following items:

1. Address flows entering the box culvert from the east. This item necessitates a contract modification which needs to be broken into two parts; survey, design. We need to get hours back to MCFCD later today or tomorrow for the survey hours. MCFCD is going to set up a meeting with the City of Mesa and get their input on the design phase of the box culvert. Scott will call us when that meeting is set.

2. We discussed the schedule; it will have two reviews: 30% submittal and a 90% submittal which is essentially final plans. The scheduling on these items will be as follows:

   - Four weeks from the start, notice to proceed with Phase II will be the preliminary submittal
   - MCFCD will then have two weeks for review
   - Following that we will have eight weeks to complete 90% plans and specs
   - MCFCD will have two weeks for review
   - Once their review is final we will have an additional two weeks to incorporate their comments
   - An additional two weeks is spread out throughout this to allow coordination between our plans and the plans of MCFCD for construction of Sossaman Wash.

Ed Raleigh asked that we extend the wingwalls on the upstream side of the box culvert. This is outside of the right of way. Scott Clement said that he

120591MI

believes that there is a license agreement and a dedicated easement for that channel, and he will look into that matter. Scott would like our construction stationing to match theirs they are using for the Sossaman Wash. Scott will provide us with the stationing at Guadalupe Road at the intersection of Sossaman Road. I told Ed that we will deliver a floppy of our plans in DGN format and also DXF format in case they would like to use them.

Copy to: Scott Clement, MCFCD

12/4/91

SOSSAMAN BOX - PHASE II

MEETING AGENDA

I. Notice to proceed with Phase II

II. Address flows entering the box culvert from the east
- estimated at 450 cfs

III. Schedule

A. Box design
- 30% submittal 4 weeks after resolving side-flow (450 cfs) → 2 weeks review.
- 90% submittal 8 weeks, 2 week review → give consultant 2 more weeks.

B. Channel extension design

Eng. Div. will prepare the d/s detail.
Match the Station numbering?

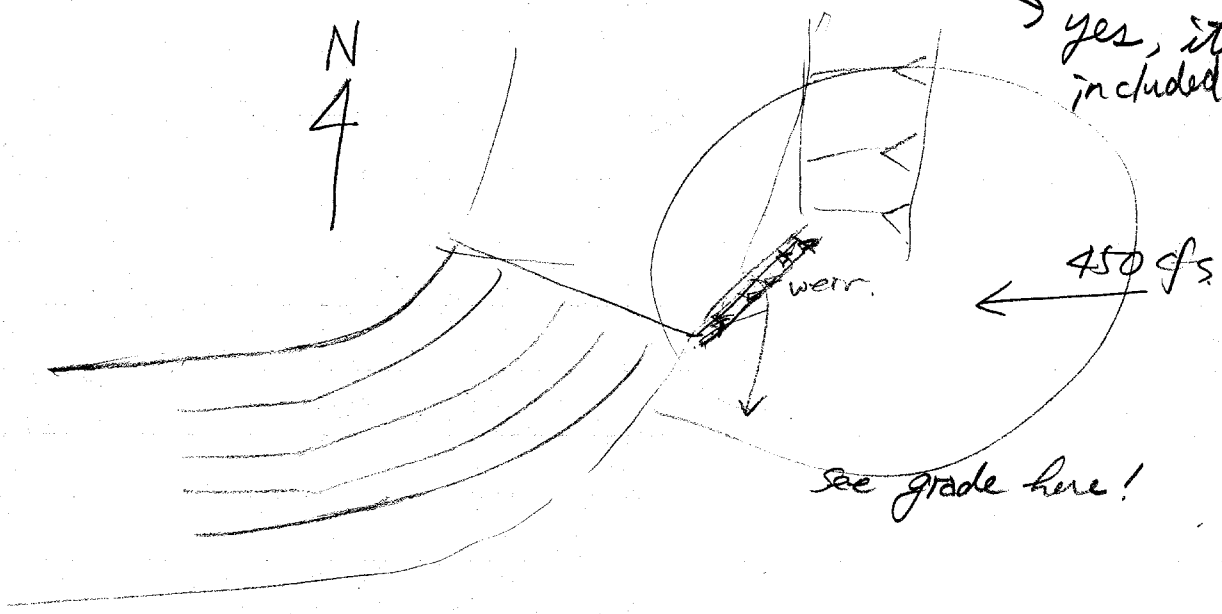
12/4/91

Sossaman Box - Phase II

Phase I - Box Design

2400 cfs includes 450 cfs? → make sure! w/ Bestan.

→ yes, it is included.



end of March '92

put wingwalls u/s of the culverts for transition.

Scott will talk to City of Mesa about their concerns.