ENCAUZAMIENTO RIO GUADALMEDINA

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Julio-95

ENCAUZAMIENTO DEL RIO GUADALMEDINA

PANTALLA DE PROTECCION EN SECCION

TIPO 2

ENCAUZAMIENTO RIO GUADALMEDINA

SECCION TIPO DE PANTALLA

Hipótesis 1. Etapa Final:

Pantalla de hormigón de espesor e = 0,45 m y altura total definida por cálculo H = 4.0 m. entre cota ±0.00 y -4.0.

Definición del terreno:

Trasdós — Uniforme entre cotas ±0,00 y -4,0

Densidad aparente: γ_{ap} = 1.7 tn/m³

Densidad saturada: γ_{sat} = 2.10 tn/m³

Angulo de rozamiento interno: φ = 32.5°

Angulo de rozamiento Tierras-Pantallas δ = 11°

Cohesión: c = 0 tn/m²

Nivel freático cota -1,80

SOBRECARGAS VERTICALES EN FAJA (representadas en croquis)				
COTA	TIPO	VALOR	DISTANCIA	ANCHO
0.00	1	1.0 tn/m²	0.00	4.25 m
0.00	1	6.6 tn/m	4.25	12.25 m

Intradós

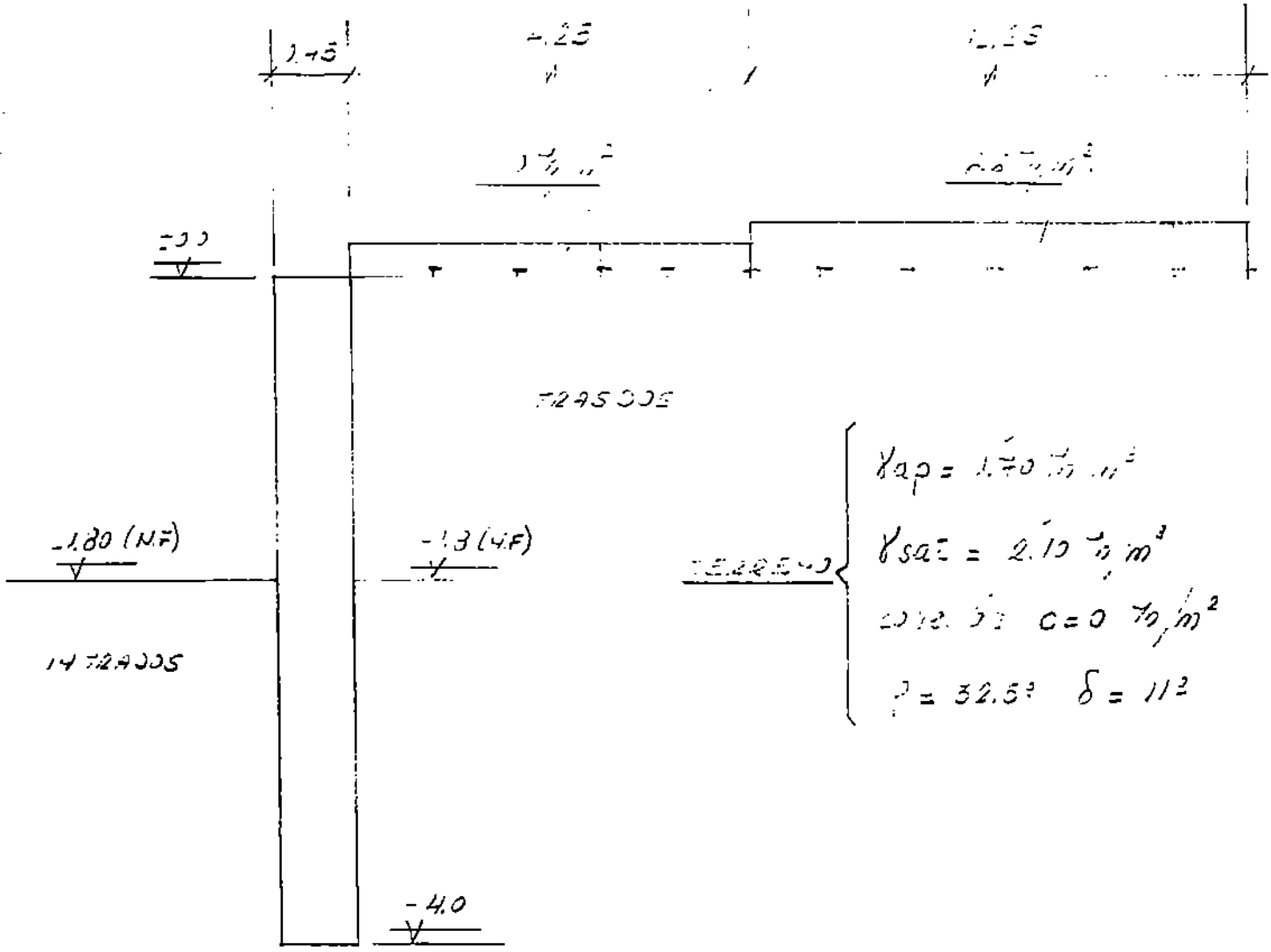
Características del terreno análogo a trasdós

Nivel freático cota -1.80. Cota de excavación -1.80

Sobrecarga uniforme cota -1.80 q = 0 tn/m²

[illegible]

[illegible]



PANTALLA:

CARACTERISTICAS DE LOS MATERIALES

- HORMIGON: RESISTENCIA CARACTERISTICA = 175 Kg/cm²
  COEF. MINORACION RESIST. DEL HORMIGON = 1,50
- ACERO: LIMITE ELASTICO = 4100 Kg/cm²
  COEF. MINORACION LIMITE ELASTICO = 1.15.

COEFICIENTE DE PONDERACION DE ENVOLVENTE γ = 1.50

TIPO	VALOR	DISTANCIA	ANCHO
[illegible]	1	[illegible]	4,250
[illegible]	1	4,25	[illegible]1,250

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] RIGIDEZ Y DEFORMACIÓN

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.90	[illegible]	0.45	0.13
[illegible]	[illegible]	[illegible]	0.38	0.13
[illegible]	[illegible]	[illegible]	0.27	0.16
1.50	0.57	[illegible]	0.18	0.17
[illegible]	0.99	[illegible]	0.13	0.15
[illegible]	1.58	1.18	0.06	0.12
[illegible]	1.87	[illegible]	0.02	0.06
[illegible]	1.22	[illegible]	0.00	0.01
[illegible]	[illegible]	[illegible]	0.00	0.00
[illegible]	[illegible]	[illegible]	0.00	0.00

APPENDICES & DEFINITIONS

Título : [illegible]
SECCION TAUME [illegible]

ENVOLVENTE DE MOMENTOS

ETAPA	COE. PONDERACION
1	1.000

ENVOLVENTE DE MOMENTOS FLECTORES (m) PONDERADOS

COTA	MOM. POSITIVOS	MOM. NEGATIVOS
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

CARACTERISTICAS DE LOS MATERIALES

HORMIGON :

RESISTENCIA CARACTERISTICA (Kg/cm2) = 175

COEF. MINORACION RESIS. DEL HORMIGON = 1.50

COEF. MINORACION POR HORMIG. VERT. = 0.70

ACERO :

LIMITE ELASTICO (Kg/cm2) = 4100

COEF. MINORACION LIM. ELASTICO = 1.15

ARMADURA DE LA PANTALLA

I- ARMADURA VERTICAL

TRASDOS :

ARMADURA BASE [illegible] POR [illegible]

[illegible] POR [illegible]

INTRADOS :

ARMADURA BASE [illegible] POR [illegible]

[illegible] POR [illegible]

II- ESTRIBADURAS

VERTICALES [illegible]

[illegible]

III- [illegible]

[illegible]

MEDICIONES Y CUANTIAS POR m.l.

HORMIGON :

LONGITUD DE PANTALLA (L) = 5.000 (SIN VIGA DE ATADO)

[illegible] DE HORMIGON (m) = 1.35 (SIN VIGA DE ATADO)

[illegible] VIGA DE ATADO (m) = 1.100

[illegible] DEL BATACHE (m) = 2.500

ACERO :

EN ARMADURAS VERTICALES	(kg) =	25.5
[illegible]	(kg) =	15.2
[illegible]	(kg) =	14.9
[illegible]	(kg) =	[illegible]

[illegible] (kg/[illegible]) = [illegible]

[illegible] = [illegible]

ENCAUZAMIENTO RIO GUADALMEDINA

CALCULO HIDRAULICO DEL ENCAUZAMIENTO (HEC)

-TRAMO ORIGEN A P.K. 1+800-

5-JULIO-1995

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*****************************************
*  HEC-2 WATER SURFACE PROFILES         *
*                                       *
*  Version   4.6.2;  May 1991           *
*                                       *
*  RUN DATE     5JUL95    TIME   10:46:39 *
*****************************************
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*******************************
*  U.S. ARMY CORPS OF ENGINEERS
*  HYDROLOGIC ENGINEERING CENTER
*  609 SECOND STREET, SUITE D
*  DAVIS, CALIFORNIA 95616-4687
*          (916) 756-1104
*******************************
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X     X  XXXXXXX   XXXXX             XXXXX
X     X  X       X     X           X     X
X     X  X       X                       X
XXXXXXX  XXXX    X         XXXXX   XXXXX
X     X  X       X                 X
X     X  X       X     X           X
X     X  XXXXXXX   XXXXX           XXXXXXX
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::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION  :::
:::                                      :::
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============================
H A E S T A D   M E T H O D S
============================
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS RUN EXECUTED 5JUL95 10:46:40

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

T1ORIO GUADALMEDINA
T2 ESTUDIO DE NIVELES DE LAMINA EN LA CANALIZACION PROYECTADA
T3 CAUDAL 600 M3/S

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	2	0	0	-1	1	0	0	0	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1	0	0	0	0	0	-1			

QT	1	600								
NH	1	0.015	80.201							
X1	0.033	8	20.17	80.201	33	33	33			
GR	13.29	20.17	9.00	20.171	9.00	37.68	8.77	37.69	8.77	62.69
GR	9.00	62.70	9.00	80.20	13.26	80.201				
X1	0.074				41.0	41.0	41.0			
X3	10							13.26	13.26	
SB	1.05	1.60	1.50		60.00	2.4	192.75	0.001		
X1	0.084				10.0	10.0	10.0			
X2			1	12.26	13.26					
X3	10							13.26	13.26	
BT	-2	7.49	13.26	12.26	67.53	13.26	12.26			
X1	0.085				0.50	0.50	0.50			
NH	1	0.015	80.21							
X1	0.091	4.00	17.20	80.21	6.5	6.5	6.5			
GR	13.74	17.20	8.82	17.201	8.82	80.20	13.74	80.21		
NH	1	0.015	80.71							
X1	0.126	8.00	17.20	80.71	35.0	35.0	35.0			
GR	13.12	17.20	12.87	17.201	12.87	28.00	8.87	28.01	8.87	72.00
GR	12.87	72.001	12.87	80.70	13.12	80.71				
NH	7	0.015	17.20	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.70	0.015	80.71					
X1	0.127	8.00	17.20	80.71	1.00	1.00	1.00			
GR	13.12	17.20	12.87	17.201	12.87	28.00	8.87	28.01	8.87	72.00
GR	12.87	72.01	12.87	80.70	13.12	80.71				

NH	7.00	0.015	19.21	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.20	0.015	80.21					
X1	0.141	8.00	28.00	72.01	14.0	14.0	14.0			
GR	13.367	19.20	12.94	19.21	12.94	28.00	8.94	28.01	8.94	72.00
GR	12.94	72.01	12.94	80.20	13.36	80.21				
NH	7	0.015	19.21	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.20	0.015	80.21					
X1	0.178	8.00	28.00	72.01	37.0	37.0	37.0			
GR	13.53	19.20	13.13	19.21	13.13	28.00	9.13	28.01	9.13	72.00
GR	13.13	72.01	13.13	80.20	13.53	80.21				
NH	7	0.015	20.61	0.035	28	0.015	28.01	0.035	72	0.015
NH	72.01	0.035	79.60	0.015	79.61					
X1	0.232	8.00	28.00	72.01	54.5	54.5	54.5			
GR	13.90	20.60	13.40	20.61	13.40	28	9.40	28.01	9.40	72
GR	13.40	72.01	13.40	79.60	13.90	79.61				
NH	7	0.015	21.01	0.035	28	0.015	28.01	0.035	72	0.015
NH	72.01	0.035	80	0.015	80.01					
X1	0.284	8.00	28.00	72.01	51.5	51.5	51.5			
GR	14.28	21.00	13.65	21.01	13.65	28	9.65	28.01	9.65	72.00
GR	13.65	72.01	13.65	80.00	14.28	80.01				
NH	7.00	0.015	20.71	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.70	0.015	79.71					
X1	0.334	8.00	28.00	72.01	50.5	50.50	50.50			
GR	14.65	20.70	13.90	20.71	13.90	28.00	9.90	28.01	9.90	72.00
GR	13.90	72.01	13.90	79.70	14.65	79.71				
NH	7.00	0.015	20.51	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.50	0.015	79.51					
X1	[illegible]	8.00	28.00	72.01	50.00	50.00	50.00			
GR	15.01	20.50	14.15	20.51	14.15	28.00	10.15	28.01	10.15	72.00
GR	14.15	72.01	14.15	79.50	15.05	79.51				
NH	7.00	0.015	20.71	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.70	0.015	79.71					
X1	0.437	8.00	28.00	72.01	53.00	53.00	53.00			
GR	15.40	20.70	14.41	20.71	14.41	28.00	10.41	28.01	10.41	72.00
GR	14.41	72.01	14.41	79.70	15.40	79.71				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.40	0.015	79.41					
X1	0.489	8.00	28.00	72.01	51.50	51.50	51.50			
GR	15.78	20.40	14.66	20.41	14.66	28.00	10.66	28.01	10.66	72.00
GR	14.66	72.01	14.66	79.40	15.78	79.41				

NH	7.00	0.015	20.72	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.71	0.015	80.72					
X1	0.539	8.00	28.00	72.01	50.00	50.00	50.00			
GR	16.15	20.71	14.91	20.72	14.91	28.00	10.91	28.01	10.91	72.00
GR	14.91	72.01	14.91	80.71	16.15	80.72				
NH	7.00	0.015	20.01	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.00	0.015	79.01					
X1	0.589	8.00	28.00	72.01	50.5	50.5	50.5			
GR	16.52	20.00	15.16	20.01	15.16	28.00	11.16	28.01	11.16	72.00
GR	15.16	72.01	15.16	79.00	16.52	79.01				
NH	7.00	0.015	20.01	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.90	0.015	79.91					
X1	0.637	8.00	28.00	72.01	48.0	48.0	48.0			
GR	16.87	20.00	15.39	20.01	15.39	28.0	11.39	28.01	11.39	72.00
GR	15.39	72.01	15.39	79.90	16.87	79.91				
NH	7.00	0.015	20.51	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.50	0.015	79.51					
X1	0.684	8.00	28.00	72.01	47.00	47.00	47.00			
GR	17.21	20.50	15.63	20.51	15.63	28.00	11.63	28.01	11.63	72.00
GR	15.63	72.01	15.63	79.50	17.21	79.51				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.706	8.00	28.00	72.01	22.00	22.00	22.00			
GR	17.21	20.40	15.74	20.41	15.74	28.00	11.74	28.01	11.74	72.00
GR	15.74	72.01	15.74	80.40	17.21	80.41				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.714	8.00	28.00	72.01	8.00	8.00	8.00			
GR	17.36	20.40	14.97	20.41	14.97	28.00	11.77	28.01	11.77	72.00
GR	14.97	72.01	14.97	80.40	17.36	80.41				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.722	8.00	28.00	72.01	8.00	8.00	8.00			
GR	17.52	20.40	14.21	20.41	14.21	28.00	11.81	28.01	11.81	72.00
GR	14.21	72.01	14.21	80.40	17.52	80.41				
NH	5.00	0.015	20.50	0.040	28.01	0.035	72.00	0.040	79.51	0.015
NH	79.52									
X1	0.731	6.00	20.49	79.52	9.00	9.00	9.00			
GR	18.49	20.49	16.16	20.50	11.86	28.01	11.86	72.00	16.16	79.51
GR	18.49	79.52								

X1	0.735				4.00	4.00	4.00			
X3	10							17.42	17.42	
SB	1.05	1.60	1.65		44	2	205.92	1.80	11.96	11.88
X1	0.752				17.00	17.00	17.00			
X2			1.00	16.16	18.46					
X3	10							18.49	18.49	
BT	-3	20.49	18.49		28.01	18.49		79.52	18.49	
X1	0.759				6.5	6.5	6.5			
X1	0.765				6.5	6.5	6.5			
X3	10							17.42	17.42	
SB	1.05	1.60	1.65		44	2	205.92	1.80	12.09	12.01
X1	0.782				17.00	17.00	17.00			
X2			1.00	16.16	18.46					
X3	10							18.49	18.49	
BT	-3	20.49	18.49		28.01	18.49		79.52	18.49	
X1	0.783				1.00	1.00	1.00			
NH	5.00	0.015	20.50	0.040	28.01	0.035	72.00	0.040	79.51	0.015
NH	79.52									
X1	0.786	6.00	20.49	79.52	3.00	3.00	3.00			
GR	18.49	20.49	16.16	20.50	12.13	28.01	12.13	72.00	16.16	79.51
GR	18.49	79.52								
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.795	8.00	28.00	72.01	9.00	9.00	9.00			
GR	17.50	20.40	14.56	20.41	14.56	28.00	12.16	28.01	12.16	72.00
GR	14.56	72.01	14.56	80.40	17.50	80.41				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.803	8.00	28.00	72.01	8.00	8.00	8.00			
GR	17.50	20.40	15.40	20.41	15.40	28.00	12.20	28.01	12.20	72.00
GR	15.40	72.01	15.40	80.40	17.50	80.41				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	80.40	0.015	80.41					
X1	0.811	8.00	28.00	72.01	8.00	8.00	8.00			
GR	17.50	20.40	16.24	20.41	16.24	28.00	12.24	28.01	12.24	72.00
GR	16.24	72.01	16.24	80.40	17.50	80.41				
NH	7.00	0.015	19.21	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	78.20	0.015	78.21					
X1	0.853	8.00	28.00	72.01	42.00	42.00	42.00			
GR	18.42	19.20	16.46	19.21	16.46	28.00	12.46	28.01	12.46	72.00
GR	16.46	72.01	16.46	78.20	18.42	78.21				

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NH    7.00    0.015   19.21   0.035   28.00   0.015   28.01   0.035   72.00   0.015
NH   72.01    0.035   79.20   0.015   79.21
X1    0.909    8.00   28.00   72.01   56.00   56.00   56.00
GR   18.82   19.20   16.74   19.21   16.74   28.00   12.74   28.01   12.74   72.00
GR   16.74   72.01   16.74   79.20   18.82   79.21

NH    7.00    0.015   19.41   0.035   28.00   0.015   28.01   0.035   72.00   0.015
NH   72.01    0.035   79.40   0.015   79.41
X1    0.959    8.00   28.00   72.01   49.50   49.50   49.50
GR   19.30   19.40   16.98   19.41   16.98   28.00   12.98   28.01   12.98   72.00
GR   12.98   72.01   16.98   79.40   19.30   79.41

NH    5.00    0.015   19.41   0.035   28.00   0.015   72.01   0.035   79.40   0.015
NH   79.41
X1    0.960    8.00   28.00   72.01    1.00    1.00    1.00
GR   19.30   19.40   16.98   19.41   16.98   28.00   12.98   28.01   12.98   72.00
GR   12.98   72.01   16.98   79.40   19.30   79.41

NH    5.00    0.015   19.41   0.035   28.00   0.015   72.01   0.035   79.40   0.015
NH   79.41
X1    0.962    8.00   28.00   72.01    2.28    2.28    2.28
GR   19.30   19.40   17.33   19.41   17.33   28.00   10.70   28.01   10.70   72.00
GR   17.33   72.01   17.33   79.40   19.30   79.41

NH    5.00    0.015   19.41   0.035   28.00   0.015   72.01   0.035   79.40   0.015
NH   79.41
X1    0.973    8.00   28.00   72.01   10.81   10.81   10.81
GR   19.30   19.40   19.03   19.41   19.03   28.00   10.70   28.01   10.70   72.00
GR   19.03   72.01   19.03   79.40   19.30   79.41

NH    5.00    0.015   19.41   0.035   28.00   0.015   72.01   0.035   79.40   0.015
NH   79.41
X1    0.978    8.00   28.00   72.01    5.87    5.87    5.87
GR   19.30   19.40   19.20   19.41   19.20   28.00   15.20   28.01   15.20   72.00
GR   19.20   72.01   19.20   79.40   19.30   79.41

NH    7.00    0.015   19.41   0.035   28.00   0.015   28.01   0.035   72.00   0.015
NH   72.01    0.035   79.40   0.015   79.41
X1    0.979    8.00   28.00   72.01    0.01    0.01    0.01
GR   19.30   19.40   19.20   19.41   19.20   28.00   15.20   28.01   15.20   72.00
GR   19.20   72.01   19.20   79.40   19.30   79.41

NH    7.00    0.015   19.41   0.035   28.00   0.015   28.01   0.035   72.00   0.015
NH   72.01    0.035   79.40   0.015   79.41
X1    1.014    8.00   28.00   72.01   36.00   36.00   36.00
GR   20.60   19.40   19.38   19.41   19.38   28.00   15.38   28.01   15.38   72.00
GR   19.38   72.01   19.38   79.40   20.60   79.41
```

NH	7.00	0.015	19.21	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.40	0.015	79.41					
X1	1.072	8.00	28.00	72.01	58.00	58.00	58.00			
GR	20.25	19.20	19.67	19.21	19.67	28.00	15.67	28.01	15.67	72.00
GR	19.67	72.01	19.67	79.40	20.25	79.41				
NH	7.00	0.015	20.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.40	0.015	79.41					
X1	1.127	8.00	28.00	72.01	55.00	55.00	55.00			
GR	20.80	20.40	19.94	20.41	19.94	28.00	15.94	28.01	15.94	72.00
GR	19.94	72.01	19.94	79.40	20.80	79.41				
NH	7.00	0.015	15.21	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	79.70	0.015	79.71					
X1	1.184	8.00	28.00	72.01	57.00	57.00	57.00			
GR	21.30	15.20	20.20	15.21	20.20	28.00	16.20	28.01	16.20	72.00
GR	20.20	72.01	20.20	79.70	21.30	79.71				
NH	7.00	0.015	5.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	77.40	0.015	77.41					
X1	1.233	8.00	28.00	72.01	49.00	49.00	49.00			
GR	21.75	5.40	20.39	5.41	20.39	28.00	16.39	28.01	16.39	72.00
GR	20.39	72.01	20.39	77.40	21.75	77.41				
NH	7.00	0.015	5.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	77.40	0.015	77.41					
X1	1.241	8.00	28.00	72.01	8.00	8.00	8.00			
GR	21.75	5.40	19.62	5.41	19.62	28.00	16.42	28.01	16.42	72.00
GR	19.62	72.01	19.62	77.40	21.75	77.41				
NH	7.00	0.015	5.41	0.035	28.00	0.015	28.01	0.035	72.00	0.015
NH	72.01	0.035	77.40	0.015	77.41					
X1	1.249	8.00	[illegible]	72.01	8.00	8.00	8.00			
GR	21.75	5.40	18.85	5.41	18.85	28.00	16.45	28.01	16.45	72.00
GR	18.85	72.01	18.85	77.40	21.75	77.41				
NH	6.00	0.035	20.49	0.015	20.50	0.040	28.01	0.035	72.00	0.040
NH	79.00	0.015	79.01							
X1	1.258	7.00	5.40	79.01	9.00	9.00	9.00			
GR	23.10	5.40	23.10	20.49	21.15	20.50	16.48	28.01	16.48	72.00
GR	21.15	79.00	23.10	79.01						
X1	1.262				4.00	4.00	4.00			
X3	10							22.10	22.10	
SB	1.05	1.60	1.65		44	1.95	226.869	1.63	16.62	16.51
X1	1.290				28.00	28.00	28.00			
X2			1.00	21.15	23.10					
X3	10.00							23.10	23.10	
BT	-3.00	5.40	23.10		28.01	23.10		79.01	23.10	

```
X1   1.292                                  2.00      2.00      2.00

NH   5.00     0.015    20.50    0.040    28.01     0.035    72.00    0.040    79.00    0.015
NH   79.01
X1   1.294    7.00     2.60     79.01    2.00      2.00     2.00
GR   23.10    2.60     23.10    20.49    20.78     20.50    16.63    28.01    16.63    72.00
GR   20.78    79.00    23.10    79.01

NH   7.00     0.015    2.61     0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    78.60    0.015    78.61
X1   1.303    8.00     28.00    72.01    9.00      9.00     9.00
GR   22.55    2.6      19.06    2.61     19.06     28.00    16.66    28.01    16.66    72.00
GR   19.06    72.01    19.06    78.60    22.55     78.61

NH   7.00     0.015    2.61     0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    77.00    0.015    77.01
X1   1.311    8.00     28.00    72.01    8.00      8.00     8.00
GR   22.55    2.6      19.89    2.61     19.89     28.00    16.69    28.01    16.69    72.00
GR   19.89    72.01    19.89    77.00    22.55     77.01

NH   7.00     0.015    2.61     0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    77.00    0.015    77.01
X1   1.319    8.00     28.00    72.01    8.00      8.00     8.00
GR   22.55    2.6      20.72    2.61     20.72     28.00    16.72    28.01    16.72    72.00
GR   20.72    72.01    20.72    77.00    22.55     77.01

NH   7.00     0.015    6.01     0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    77.00    0.015    77.01
X1   1.347    8.00     28.00    72.01    28.00     28.00    28.00
GR   22.55    6.00     20.85    6.01     20.85     28.00    16.85    28.01    16.85    72.00
GR   20.85    72.01    20.85    77.00    22.55     77.01

NH   7.00     0.015    12.61    0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    77.60    0.015    77.61
X1   1.407    8.00     28.00    72.01    60.50     60.50    60.50
GR   23.20    12.60    21.09    12.61    21.09     28.00    17.09    28.01    17.09    72.00
GR   21.09    72.01    21.09    77.60    23.20     77.61

NH   7.00     0.015    17.21    0.035    28.00     0.015    28.01    0.035    72.00    0.015
NH   72.01    0.035    77.20    0.015    77.21
X1   1.437    8.00     28.00    72.01    30.04     30.04    30.04
GR   23.40    17.20    21.21    17.21    21.21     28.00    17.21    28.01    17.21    72.00
GR   21.21    72.01    21.21    77.20    23.40     77.21

NH   7.00     0.015    17.21    0.035    26.55     0.015    26.56    0.035    72.00    0.015
NH   72.01    0.035    77.20    0.015    77.21
X1   1.454    8.00     26.55    72.01    17.00     17.00    17.00
GR   23.45    17.20    21.28    17.21    21.28     26.55    17.28    26.56    17.28    72.00
GR   21.28    72.01    21.28    77.20    23.45     77.21
```

NH	7.00	0.015	17.21	0.035	25.10	0.015	25.11	0.035	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.470	8.00	25.10	72.01	16.00	16.00	16.00			
GR	23.70	17.20	21.35	17.21	21.35	25.10	17.35	25.11	17.35	72.00
GR	21.35	72.01	21.35	77.20	23.70	77.21				
NH	5.00	0.015	17.21	0.035	25.10	0.015	72.01	0.015	77.20	0.015
NH	77.21									
X1	1.471	8.00	25.10	72.01	1.00	1.00	1.00			
GR	23.70	17.20	21.35	17.21	21.35	25.10	17.35	25.11	17.35	72.00
GR	21.35	72.01	21.35	77.20	23.70	77.21				
NH	7.00	0.015	17.21	0.035	25.10	0.015	25.11	0.015	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.472	8.00	25.10	72.01	1.15	1.15	1.15			
GR	23.70	17.20	21.35	17.21	21.35	25.10	16.20	25.11	16.20	72.00
GR	21.35	72.01	21.35	77.20	23.70	77.21				
NH	7.00	0.015	17.21	0.035	25.10	0.015	25.11	0.015	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.483	8.00	25.10	72.01	11.05	11.05	11.05			
GR	23.71	17.20	21.47	17.21	21.47	25.10	16.20	25.11	16.20	72.00
GR	21.47	72.01	21.47	77.20	23.71	77.21				
NH	7.00	0.015	17.21	0.035	25.10	0.015	25.11	0.015	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.489	8.00	25.10	72.01	5.26	5.26	5.26			
GR	23.75	17.20	23.20	17.21	23.20	25.10	19.20	25.11	19.20	72.00
GR	23.20	72.01	23.20	77.20	23.75	77.21				
NH	7.00	0.015	17.21	0.035	25.10	0.015	25.11	0.035	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.490	8.00	25.10	72.01	1.00	1.00	1.00			
GR	23.75	17.20	23.20	17.21	23.20	25.10	19.20	25.11	19.20	72.00
GR	23.20	72.01	23.20	77.20	23.75	77.21				
NH	7.00	0.015	19.01	0.035	25.10	0.015	25.11	0.035	72.00	0.015
NH	72.01	0.035	77.20	0.015	77.21					
X1	1.504	8.00	25.10	72.01	14.00	14.00	14.00			
GR	23.84	19.00	23.27	19.01	23.27	25.10	19.275	25.11	19.275	72.00
GR	23.27	72.01	23.27	77.20	23.84	77.21				
NH	11.00	0.015	19.01	0.035	26.55	0.015	26.56	0.035	35.78	0.015
NH	37.50	0.035	62.50	0.015	64.225	0.035	73.455	0.015	73.46	0.035
NH	78.00	0.015	78.01	.						
X1	1.514	12.00	26.55	73.46	10.00	10.00	10.00			
GR	23.96	19.00	23.725	19.01	23.725	26.55	20.475	26.56	20.475	35.78
GR	19.325	37.50	19.325	62.50	20.475	64.225	20.475	73.455	23.725	73.46
GR	23.725	78.00	23.96	78.01						

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NH   11.00   0.015   19.01   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   78.00   0.015   78.01
X1   1.524   12.00   26.54   73.46   10.00   10.00   10.00
GR   23.96   19.00   23.77   19.01   23.77   26.54   21.67   26.55   21.67   34.05
GR   19.37   37.50   19.37   62.50   21.67   65.95   21.67   73.45   23.77   73.46
GR   23.77   78.00   23.96   78.01

NH   11.00   0.015   20.01   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   78.00   0.015   78.01
X1   1.539   12.00   26.54   73.46   15.50   15.50   15.50
GR   24.10   20.00   23.85   20.01   23.85   26.54   21.75   26.55   21.75   34.05
GR   19.45   37.50   19.45   62.50   21.75   65.95   21.75   73.45   23.85   73.46
GR   23.85   78.00   24.10   78.01

NH   11.00   0.015   14.21   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   78.20   0.015   78.21
X1   1.593   12.00   26.54   73.46   54.00   54.00   54.00
GR   25.00   14.20   24.12   14.21   24.12   26.54   22.02   26.55   22.02   34.05
GR   19.72   37.50   19.72   62.50   22.02   65.95   22.02   73.45   24.12   73.46
GR   24.12   78.20   25.00   78.21

NH   11.00   0.015   14.21   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   78.70   0.015   78.71
X1   1.650   12.00   26.54   73.46   57.00   57.00   57.00
GR   25.60   14.20   24.39   14.21   24.39   26.54   22.29   26.55   22.29   34.05
GR   19.99   37.50   19.99   62.50   22.29   65.95   22.29   73.45   24.39   73.46
GR   24.39   78.70   25.60   78.71

NH   11.00   0.015   13.41   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   77.40   0.015   77.41
X1   1.698   12.00   26.54   73.46   48.00   48.00   48.00
GR   26.00   13.40   24.66   13.41   24.66   26.54   22.56   26.55   22.56   34.05
GR   20.26   37.50   20.26   62.50   22.56   65.95   22.56   73.45   24.66   73.46
GR   24.66   77.40   26.00   77.41

NH   11.00   0.015   12.61   0.035   26.54   0.015   26.55   0.035   34.05   0.015
NH   37.50   0.035   62.50   0.015   65.95   0.035   73.45   0.015   73.46   0.035
NH   78.60   0.015   78.61
X1   1.755   12.00   26.54   73.46   57.00   57.00   57.00
GR   26.70   12.60   24.95   12.61   24.95   26.54   22.85   26.55   22.85   34.05
GR   20.55   37.50   20.55   62.50   22.85   65.95   22.85   73.45   24.95   73.46
GR   24.95   78.60   26.70   78.61
```

NH	11.00	0.015	11.21	0.035	26.54	0.015	26.55	0.035	34.05	0.015
NH	37.50	0.035	62.50	0.015	65.95	0.035	73.45	0.015	73.46	0.035
NH	78.20	0.015	78.21							
XI	1.807	12.00	26.54	73.46	52.00	52.00	52.00			
GR	27.30	11.20	25.21	11.21	25.21	26.54	23.11	26.55	23.11	34.05
GR	20.81	37.50	20.81	62.50	23.11	65.95	23.11	73.45	23.21	73.46
GR	25.21	78.20	27.30	78.21						

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

1490 NH CARD USED
*SECNO 0.033
1553 STARTING NC CARD OMITTED
2096 WSEL NOT GIVEN, AVG OF MAX, MIN USED
3720 CRITICAL DEPTH ASSUMED

0.033	2.30	11.07	11.07	0.00	12.15	1.08	0.00	0.00	13.29
600.0	0.0	600.0	0.0	0.0	130.1	0.0	0.0	0.0	13.26
0.00	0.00	4.61	0.00	0.000	0.015	0.000	0.000	8.77	20.17
0.001880	33.	33.	33.	0	4	0	0.00	60.03	80.20

*SECNO 0.074
1553 STARTING NC CARD OMITTED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 13.26 ELREA= 13.26

0.074	2.62	11.39	11.06	0.00	12.22	0.82	0.06	0.00	13.29
600.0	0.0	600.0	0.0	0.0	149.3	0.0	5.7	2.5	13.26
0.00	0.00	4.02	0.00	0.000	0.015	0.000	0.000	8.77	20.17
0.001205	41.	41.	41.	4	5	0	0.00	60.03	80.20

SPECIAL BRIDGE

5070, VARIABLE ELCHU OR ELCHD ON SB CARD NOT SPECIFIED

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.05	1.60	1.50	0.00	60.00	2.40	192.75	0.00	8.77	8.77

*SECNO 0.084
1553 STARTING NC CARD OMITTED
CLASS A LOW FLOW

3420 BRIDGE W.S.= 11.18 BRIDGE VELOCITY= 4.33 CALCULATED CHANNEL AREA= 139.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
12.18	12.32	0.25	0.	600.	193.	201.	12.26	13.26	0.

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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=       13.26 ELREA=       13.26

    0.084     2.87     11.64      0.00      0.00     12.32      0.68      0.10      0.00     13.29
    600.0      0.0     600.0       0.0       0.0     164.3       0.0       7.3       3.1     13.26
     0.00     0.00      3.65      0.00     0.000     0.015     0.000     0.000      8.77     20.17
 0.000885      10.       10.       10.         0         0         0      0.00     60.03     80.20


*SECNO 0.085
1553 STARTING NC CARD OMITTED
    0.085     2.87     11.64     11.06      0.00     12.32      0.68      0.00      0.00     13.29
    600.0      0.0     600.0       0.0       0.0     164.3       0.0       7.4       3.1     13.26
     0.00     0.00      3.65      0.00     0.000     0.015     0.000     0.000      8.77     20.17
 0.000885       1.        1.        1.         0        15         0      0.00     60.03     80.20


1490 NH CARD USED
*SECNO 0.091
1553 STARTING NC CARD OMITTED
    0.091     2.99     11.81     10.91      0.00     12.33      0.52      0.00      0.00     13.74
    600.0      0.0     600.0       0.0       0.0     188.6       0.0       8.5       3.5     13.74
     0.00     0.00      3.18      0.00     0.000     0.015     0.000     0.000      8.82     17.20
 0.000596       7.        7.        7.         2        15         0      0.00     63.01     80.21


1490 NH CARD USED
*SECNO 0.126
1553 STARTING NC CARD OMITTED

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    0.126     2.66     11.53     11.53      0.00     12.87      1.34      0.03      0.00     13.12
    600.0      0.0     600.0       0.0       0.0     116.9       0.0      13.9       5.4     13.12
     0.01     0.00      5.13      0.00     0.000     0.015     0.000     0.000      8.87     28.00
 0.001876      35.       35.       35.         0        11         0      0.00     44.00     72.00


1490 NH CARD USED
*SECNO 0.127
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


1553 STARTING NC CARD OMITTED

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  0.46

    0.127     2.69     11.56     11.53     0.00      12.87     1.31      0.00      0.00      13.12
    600.0     0.0      600.0     0.0       0.0       118.1     0.0       14.0      5.4       13.12
     0.01     0.00     5.08      0.00      0.000     0.033     0.000     0.000     8.87      28.00
 0.008853     1.       1.        1.        0         5         0         0.00      44.00     72.01


1490 NH CARD USED
*SECNO 0.141
1553 STARTING NC CARD OMITTED
    0.141     2.94     11.88     11.59     0.00      12.98     1.10      0.11      0.00      12.94
    600.0     0.0      600.0     0.0       0.0       129.3     0.0       15.7      6.0       12.94
     0.01     0.00     4.64      0.00      0.000     0.033     0.000     0.000     8.94      28.00
 0.006586     14.      14.       14.       4         5         0         0.00      44.00     72.01


1490 NH CARD USED
*SECNO 0.178
1553 STARTING NC CARD OMITTED
    0.178     3.07     12.20     11.79     0.00      13.20     1.00      0.23      0.00      13.13
    600.0     0.0      600.0     0.0       0.0       135.1     0.0       20.6      7.7       13.13
     0.01     0.00     4.44      0.00      0.000     0.033     0.000     0.000     9.13      28.00
 0.005695     37.      37.       37.       2         11        0         0.00      44.01     72.01


1490 NH CARD USED
*SECNO 0.232
1553 STARTING NC CARD OMITTED
    0.232     3.14     12.54     12.06     0.00      13.50     0.96      0.30      0.00      13.40
    600.0     0.0      600.0     0.0       0.0       137.9     0.0       28.1      10.1      13.40
     0.01     0.00     4.35      0.00      0.000     0.033     0.000     0.000     9.40      28.00
 0.005321     55.      55.       55.       0         11        0         0.00      44.01     72.01


1490 NH CARD USED
*SECNO 0.284
1553 STARTING NC CARD OMITTED
    0.284     3.18     12.83     12.31     0.00      13.77     0.94      0.27      0.00      13.65
    600.0     0.0      600.0     0.0       0.0       139.7     0.0       35.2      12.3      13.65
     0.02     0.00     4.30      0.00      0.000     0.033     0.000     0.000     9.65      28.00
 0.005105     52.      52.       52.       0         11        0         0.00      44.01     72.01
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  SECNO     DEPTH     CWSEL     CRIWS     WSELX     EG        HV        HL        OLOSS     L-BANK ELEV
  Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
  TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
  SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


1490 NH CARD USED
*SECNO 0.334
1553 STARTING NC CARD OMITTED
    0.334      3.20     13.10     12.57      0.00     14.03      0.93      0.25      0.00     13.90
    600.0       0.0     600.0       0.0       0.0     140.7       0.0      42.3      14.5     13.90
     0.02      0.00      4.27      0.00     0.000     0.033     0.000     0.000      9.90     28.00
 0.004991       51.       51.       51.         0        11         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.384
1553 STARTING NC CARD OMITTED
    0.384      3.20     13.35     12.82      0.00     14.28      0.92      0.25      0.00     14.15
    600.0       0.0     600.0       0.0       0.0     141.0       0.0      49.3      16.7     14.15
     0.02      0.00      4.26      0.00     0.000     0.033     0.000     0.000     10.15     28.00
 0.004956       50.       50.       50.         0        11         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.437
1553 STARTING NC CARD OMITTED
    0.437      3.21     13.62     13.07      0.00     14.54      0.92      0.26      0.00     14.41
    600.0       0.0     600.0       0.0       0.0     141.1       0.0      56.8      19.1     14.41
     0.03      0.00      4.25      0.00     0.000     0.033     0.000     0.000     10.41     28.00
 0.004936       53.       53.       53.         0        15         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.489
1553 STARTING NC CARD OMITTED
    0.489      3.21     13.87     13.32      0.00     14.79      0.92      0.25      0.00     14.66
    600.0       0.0     600.0       0.0       0.0     141.4       0.0      64.1      21.3     14.66
     0.03      0.00      4.24      0.00     0.000     0.033     0.000     0.000     10.66     28.00
 0.004909       52.       52.       52.         0        15         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.539
1553 STARTING NC CARD OMITTED
    0.539      3.21     14.12     13.57      0.00     15.04      0.92      0.25      0.00     14.91
    600.0       0.0     600.0       0.0       0.0     141.3       0.0      71.1      23.5     14.91
     0.03      0.00      4.25      0.00     0.000     0.033     0.000     0.000     10.91     28.00
 0.004919       50.       50.       50.         0        15         0      0.00     44.01     72.01
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 0.589
1553 STARTING NC CARD OMITTED

0.589	3.21	14.37	13.82	0.00	15.29	0.92	0.25	0.00	15.16
600.0	0.0	600.0	0.0	0.0	141.1	0.0	78.3	25.8	15.16
0.04	0.00	4.25	0.00	0.000	0.033	0.000	0.000	11.16	28.00
0.004936	51.	51.	51.	0	15	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 0.637
1553 STARTING NC CARD OMITTED

0.637	3.22	14.61	14.05	0.00	15.52	0.92	0.24	0.00	15.39
600.0	0.0	600.0	0.0	0.0	141.4	0.0	85.0	27.9	15.39
0.04	0.00	4.24	0.00	0.000	0.033	0.000	0.000	11.39	28.00
0.004909	48.	48.	48.	0	15	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 0.684
1553 STARTING NC CARD OMITTED

0.684	3.20	14.83	14.29	0.00	15.75	0.92	0.23	0.00	15.63
600.0	0.0	600.0	0.0	0.0	141.1	0.0	91.7	29.9	15.63
0.04	0.00	4.25	0.00	0.000	0.033	0.000	0.000	11.63	28.00
0.004939	47.	47.	47.	0	15	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 0.706
1553 STARTING NC CARD OMITTED

0.706	3.20	14.94	14.40	0.00	15.86	0.92	0.11	0.00	15.74
600.0	0.0	600.0	0.0	0.0	140.9	0.0	94.8	30.9	15.74
0.04	0.00	4.26	0.00	0.000	0.033	0.000	0.000	11.74	28.00
0.004964	22.	22.	22.	0	15	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 0.714
1553 STARTING NC CARD OMITTED

0.714	3.21	14.98	14.44	0.00	15.90	0.92	0.04	0.00	14.97
600.0	0.0	600.0	0.0	0.1	141.2	0.1	95.9	31.3	14.97
0.04	0.02	4.25	0.02	0.035	0.033	0.035	0.000	11.77	20.41
0.004925	8.	8.	8.	0	12	0	0.00	59.99	80.40

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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


1490 NH CARD USED
*SECNO 0.722
1553 STARTING NC CARD OMITTED
    0.722     3.40     15.21     14.59      0.00     15.94      0.72      0.03      0.00     14.21
    600.0     12.1     574.3      13.5       7.6     149.8      .8.4      97.1      31.8     14.21
     0.04     1.59      3.83      1.61     0.035     0.033     0.035     0.000     11.81     20.41
 0.003662       8.        8.        8.         3        11         0      0.00     60.00     80.40


1490 NH CARD USED
*SECNO 0.731
1553 STARTING NC CARD OMITTED
    0.731     3.52     15.38     14.42      0.00     15.97      0.59      0.03      0.00     18.49
    600.0      0.0     600.0       0.0       0.0     176.7       0.0      98.7      32.3     18.49
     0.05     0.00      3.40      0.00     0.000     0.036     0.000     0.000     11.86     21.86
 0.003445       9.        9.        9.         2        15         0      0.00     56.30     78.15


*SECNO 0.735
1553 STARTING NC CARD OMITTED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA=       17.42 ELREA=       17.42

    0.735     3.54     15.40     14.43      0.00     15.98      0.58      0.01      0.00     18.49
    600.0      0.0     600.0       0.0       0.0     177.4       0.0      99.4      32.6     18.49
     0.05     0.00      3.38      0.00     0.000     0.036     0.000     0.000     11.86     21.83
 0.003405       4.        4.        4.         0        15         0      0.00     56.34     78.18


SPECIAL BRIDGE

SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
    1.05      1.60      1.65      0.00      44.00     2.00      205.92    1.80      11.96     11.88

*SECNO 0.752
1553 STARTING NC CARD OMITTED
CLASS A LOW FLOW

3420 BRIDGE W.S.=      15.35 BRIDGE VELOCITY=      3.63     CALCULATED CHANNEL AREA=      163.
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
0.00	16.05	0.10	0.	600.	206.	208.	16.16	18.46	0.

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 18.49 ELREA= 18.49

0.752	3.64	15.50	0.00	0.00	16.05	0.55	0.06	0.00	18.49
600.0	0.0	600.0	0.0	0.0	183.4	0.0	102.5	33.5	18.49
0.05	0.00	3.27	0.00	0.000	0.036	0.000	0.000	11.86	21.65
0.003082	17.	17.	17.	0	0	0	0.00	56.71	78.36

*SECNO 0.759
1553 STARTING NC CARD OMITTED

0.759	3.67	15.53	14.42	0.00	16.07	0.54	0.02	0.00	18.49
600.0	0.0	600.0	0.0	0 9	184.6	0.0	103.7	33.9	18.49
0.05	0.00	3.25	0.00	0.000	0.036	0.000	0.000	11.86	21.61
0.003022	7.	7.	7.	0	19	0	0.00	56.79	78.40

*SECNO 0.765
1553 STARTING NC CARD OMITTED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 17.42 ELREA= 17.42

0.765	3.70	15.56	14.42	0.00	16.09	0.53	0.02	0.00	18.49
600.0	0.0	600.0	0.0	0.0	186.0	0.0	104.9	34.3	18.49
0.05	0.00	3.23	0.00	0.000	0.036	0.000	0.000	11.86	21.57
0.002952	7.	7.	7.	0	19	0	0.00	56.88	78.44

SPECIAL BRIDGE

SB XX	XXOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
1.05	1.60	1.65	0.00	44.00	2.00	205.92	1.80	12.09	12.01

*SECNO 0.782
1553 STARTING NC CARD OMITTED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CLASS A LOW FLOW

3420 BRIDGE W.S.= 15.51 BRIDGE VELOCITY= 3.59 CALCULATED CHANNEL AREA= 165.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
0.00	16.14	0.09	0.	600.	206.	201.	16.16	18.46	0.

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 18.49 ELREA= 18.49

0.782	3.78	15.64	0.00	0.00	16.14	0.50	0.06	0.00	18.43
600.0	0.0	600.0	0.0	0.0	191.4	0.0	108.1	35.2	18.49
0.05	0.00	3.13	0.00	0.000	0.036	0.000	0.000	11.86	21.40
0.002712	17.	17.	17.	0	0	0	0.00	57.20	78.61

*SECNO 0.783
1553 STARTING NC CARD OMITTED

0.783	3.79	15.65	14.43	0.00	16.15	0.50	0.00	0.00	18.49
600.0	0.0	600.0	0.0	0.0	191.6	0.0	108.3	35.3	18.49
0.05	0.00	3.13	0.00	0.000	0.036	0.000	0.000	11.86	21.40
0.002706	1.	1.	1.	0	14	0	0.00	57.21	78.61

1490 NH CARD USED
*SECNO 0.786
1553 STARTING NC CARD OMITTED

0.786	3.40	15.53	14.69	0.00	16.16	0.63	0.01	0.00	18.49
600.0	0.0	600.0	0.0	0.0	171.2	0.0	108.8	35.5	18.49
0.05	0.00	3.50	0.00	0.000	0.036	0.000	0.000	12.13	21.67
0.003846	3.	3.	3.	2	14	0	0.00	56.67	78.34

1490 NH CARD USED
*SECNO 0.795
1553 STARTING NC CARD OMITTED

0.795	3.20	15.36	14.95	0.00	16.19	0.84	0.04	0.00	14.56
600.0	9.5	579.8	10.6	6.1	141.1	6.8	110.3	36.0	14.56
0.05	1.56	4.11	1.57	0.035	0.033	0.035	0.000	12.16	20.41
0.004557	9.	9.	9.	2	11	0	0.00	60.00	80.40

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   SECNO     DEPTH     CWSEL     CRIWS     WSELX     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


1490 NH CARD USED
*SECNO 0.803
1553 STARTING NC CARD OMITTED
    0.803     2.95     15.15     14.87      0.00     16.24      1.09      0.04      0.00     15.40
    600.0      0.0     600.0       0.0       0.0     129.8       0.0     111.4      36.4     15.40
     0.05     0.00      4.62      0.00     0.000     0.033     0.000     0.000     12.20     28.00
 0.006494       8.        8.        8.         3        12         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.811
1553 STARTING NC CARD OMITTED
    0.811     2.96     15.20     14.90      0.00     16.29      1.09      0.05      0.00     16.24
    600.0      0.0     600.0       0.0       0.0     129.9       0.0     112.4      36.7     16.24
     0.05     0.00      4.62      0.00     0.000     0.033     0.000     0.000     12.24     28.00
 0.006478       8.        8.        8.         0        11         0      0.00     44.00     72.01


1490 NH CARD USED
*SECNO 0.853
1553 STARTING NC CARD OMITTED
    0.853     3.09     15.55     15.12      0.00     16.54      0.99      0.25      0.00     16.46
    600.0      0.0     600.0       0.0       0.0     135.9       0.0     118.0      38.6     16.46
     0.05     0.00      4.41      0.00     0.000     0.033     0.000     0.000     12.46     28.00
 0.005583      42.       42.       42.         2        11         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.909
1553 STARTING NC CARD OMITTED
    0.909     3.15     15.89     15.40      0.00     16.84      0.96      0.30      0.00     16.74
    600.0      0.0     600.0       0.0       0.0     138.4       0.0     125.7      41.1     16.74
     0.06     0.00      4.33      0.00     0.000     0.033     0.000     0.000     12.74     28.00
 0.005261      56.       56.       56.         0        11         0      0.00     44.01     72.01


1490 NH CARD USED
*SECNO 0.959
1553 STARTING NC CARD OMITTED
    0.959     3.31     16.29     15.61      0.00     17.07      0.78      0.22      0.00     16.98
    600.0      0.0     576.8      23.2       0.0     145.7      10.1     133.0      43.4     12.98
     0.06     0.00      3.96      2.29     0.000     0.033     0.035     0.000     12.98     28.00
 0.003885      50.       50.       50.         2        11         0      0.00     50.13     78.13
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 0.960
1553 STARTING NC CARD OMITTED

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, XRATIO = 2.08

0.960	3.22	16.20	15.62	0.00	17.07	0.87	0.00	0.00	16.58
600.0	0.0	589.6	10.4	0.0	141.9	9.6	133.1	43.4	12.98
0.06	0.00	4.16	1.08	0.000	0.015	0.035	0.000	12.98	28.00
0.000897	1.	1.	1.	2	15	0	0.00	49.96	77.97

1490 NH CARD USED
*SECNO 0.962
1553 STARTING NC CARD OMITTED

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.55

0.962	6.12	16.82	13.36	0.00	17.07	0.25	0.00	0.00	17.33
600.0	0.0	600.0	0.0	0.0	269.3	0.0	133.6	43.5	17.33
0.06	0.00	2.23	0.00	0.000	0.015	0.000	0.000	10.70	28.00
0.000138	2.	2.	2.	2	15	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 0.973
1553 STARTING NC CARD OMITTED

0.973	6.12	16.82	13.36	0.00	17.07	0.25	0.00	0.00	19.03
600.0	0.0	600.0	0.0	0.0	269.3	0.0	136.5	44.0	19.03
0.06	0.00	2.23	0.00	0.000	0.015	0.000	0.000	10.70	28.00
0.000138	11.	11.	11.	0	14	0	0.00	44.00	72.01

1490 NH CARD USED
*SECNO 0.978
1553 STARTING NC CARD OMITTED

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY

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  SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
  Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
  TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
  SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


3720 CRITICAL DEPTH ASSUMED
    0.978      2.66      17.86      17.86      0.00       19.20      1.34       0.00       0.00       19.20
    600.0      0.0       600.0      0.0        0.0        117.0      0.0        137.7      44.3       19.20
     0.06      0.00      5.13       0.00       0.000      0.015      0.000      0.000      15.20      28.00
 0.001872       6.        6.         6.         0          14         0        0.00       44.00      72.01


1490 NH CARD USED
*SECNO 0.979
1553 STARTING NC CARD OMITTED

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  0.45

    0.979      2.66      17.86      17.86      0.00       19.20      1.34       0.00       0.00       19.20
    600.0      0.0       600.0      0.0        0.0        117.0      0.0        137.7      44.3       19.20
     0.06      0.00      5.13       0.00       0.000      0.033      0.000      0.000      15.20      28.00
 0.009149       0.        0.         0.         0          5          0        0.00       44.00      72.01


1490 NH CARD USED
*SECNO 1.014
1553 STARTING NC CARD OMITTED
    1.014      3.07      18.45      18.04      0.00       19.46      1.01       0.26       0.00       19.38
    600.0      0.0       600.0      0.0        0.0        134.9      0.0        142.2      45.9       19.38
     0.07      0.00      4.45       0.00       0.000      0.033      0.000      0.000      15.38      28.00
 0.005721       36.       36.        36.        4          5          0        0.00       44.01      72.01


1490 NH CARD USED
*SECNO 1.072
1553 STARTING NC CARD OMITTED
    1.072      3.15      18.82      18.33      0.00       19.77      0.96       0.32       0.00       19.67
    600.0      0.0       600.0      0.0        0.0        138.5      0.0        150.1      48.4       19.67
     0.07      0.00      4.33       0.00       0.000      0.033      0.000      0.000      15.67      28.00
 0.005249       58.       58.        58.        2          11         0        0.00       44.01      72.01


1490 NH CARD USED
*SECNO 1.127
1553 STARTING NC CARD OMITTED
    1.127      3.18      19.12      18.60      0.00       20.06      0.94       0.28       0.00       19.94
    600.0      0.0       600.0      0.0        0.0        139.9      0.0        157.8      50.8       19.94
     0.07      0.00      4.29       0.00       0.000      0.033      0.000      0.000      15.94      28.00
 0.005082       55.       55.        55.        0          11         0        0.00       44.01      72.01
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   SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
   Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
   TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
   SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


1490 NH CARD USED
*SECNO 1.184
1553 STARTING NC CARD OMITTED
    1.184      3.23      19.43      18.87       0.00      20.34       0.91       0.28       0.00      20.20
    600.0       0.0      600.0        0.0        0.0      141.7        0.0      165.8       53.3      20.20
     0.08      0.00       4.24       0.00      0.000      0.033      0.000      0.000      16.20      28.00
 0.004875       57.        57.        57.          1         11          0       0.00      44.01      72.01


1490 NH CARD USED
*SECNO 1.233
1553 STARTING NC CARD OMITTED
    1.233      3.32      19.71      19.05       0.00      20.57       0.86       0.23       0.00      20.39
    600.0       0.0      600.0        0.0        0.0      146.0        0.0      172.9       55.5      20.39
     0.08      0.00       4.11       0.00      0.000      0.033      0.000      0.000      16.39      28.00
 0.004417       49.        49.        49.          2         15          0       0.00      44.01      72.01


1490 NH CARD USED
*SECNO 1.241
1553 STARTING NC CARD OMITTED
    1.241      3.33      19.75      19.08       0.00      20.60       0.85       0.04       0.00      19.62
    600.0       1.3      598.4        0.3        2.8      146.3        0.7      174.0       56.0      19.62
     0.08      0.47       4.09       0.46      0.035      0.033      0.035      0.000      16.42       5.41
 0.004353        8.         8.         8.          0         14          0       0.00      71.99      77.40


1490 NH CARD USED
*SECNO 1.249
1553 STARTING NC CARD OMITTED
    1.249      3.63      20.08      19.31       0.00      20.63       0.55       0.03       0.00      18.85
    600.0      45.2      545.0        9.7       27.7      159.6        6.6      175.4       56.5      18.85
     0.08      1.63       3.42       1.47      0.035      0.033      0.035      0.000      16.45       5.41
 0.002669        8.         8.         8.          3         11          0       0.00      72.00      77.40


1490 NH CARD USED
*SECNO 1.258
1553 STARTING NC CARD OMITTED
    1.258      3.60      20.08      19.06       0.00      20.66       0.57       0.03       0.00      23.10
    600.0       0.0      600.0        0.0        0.0      178.6        0.0      177.1       57.1      23.10
     0.08      0.00       3.36       0.00      0.000      0.037      0.000      0.000      16.48      22.22
 0.003382        9.         9.         9.          2         15          0       0.00      55.18      77.40
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 1.262
1553 STARTING NC CARD OMITTED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 22.10 ELREA= 22.10

1.262	3.62	20.10	19.06	0.00	20.67	0.57	0.01	0.00	23.10
600.0	0.0	600.0	0.0	0.0	179.3	0.0	177.8	57.3	23.10
0.08	0.00	3.35	0.00	0.000	0.037	0.000	0.000	16.48	22.20
0.003342	4.	4.	4.	0	15	0	0.00	55.22	77.42

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	1.05	1.60	1.65	0.00	44.00	1.95	226.87	1.63	16.62	16.51

*SECNO 1.290
1553 STARTING NC CARD OMITTED
CLASS A LOW FLOW

3420 BRIDGE W.S.= 20.07 BRIDGE VELOCITY= 3.58 CALCULATED CHANNEL AREA= 165.

EGPRS	EGLWC	H3	QWEIR	QLOW	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
0.00	20.73	0.10	0.	600.	227.	224.	21.15	23.10	0.

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 23.10 ELREA= 23.10

1.290	3.72	20.20	0.00	0.00	20.73	0.54	0.06	0.00	23.10
600.0	0.0	600.0	0.0	0.0	184.9	0.0	182.9	58.9	23.10
0.08	0.00	3.25	0.00	0.000	0.037	0.000	0.000	16.48	22.03
0.003032	28.	28.	28.	0	0	0	0.00	55.53	77.57

*SECNO 1.292
1553 STARTING NC CARD OMITTED

1.292	3.72	20.20	19.05	0.00	20.74	0.53	0.01	0.00	23.10
600.0	0.0	600.0	0.0	0.0	185.3	0.0	183.3	59.0	23.10
0.09	0.00	3.24	0.00	0.000	0.037	0.000	0.000	16.48	22.02
0.003013	2.	2.	2.	0	19	0	0.00	55.55	77.58

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 1.294
1553 STARTING NC CARD OMITTED

1.294	3.53	20.16	19.20	0.00	20.74	0.58	0.01	0.00	23.10
600.0	0.0	600.0	0.0	0.0	177.1	0.0	183.6	59.1	23.10
0.09	0.00	3.39	0.00	0.000	0.036	0.000	0.000	16.63	21.62
0.003424	2.	2.	2.	2	14	0	0.00	56.33	77.95

1490 NH CARD USED
*SECNO 1.303
1553 STARTING NC CARD OMITTED

1.303	3.54	20.20	19.54	0.00	20.77	0.57	0.03	0.00	19.06
600.0	46.4	542.5	11.2	28.7	155.3	7.4	185.3	59.7	19.06
0.09	1.62	3.49	1.50	0.035	0.033	0.035	0.000	16.66	2.61
0.002896	9.	9.	9.	0	15	0	0.00	76.00	78.60

1490 NH CARD USED
*SECNO 1.311
1553 STARTING NC CARD OMITTED

1.311	3.17	19.86	19.35	0.00	20.80	0.94	0.03	0.00	19.89
600.0	0.0	600.0	0.0	0.0	139.5	0.0	186.6	60.2	19.89
0.09	0.00	4.30	0.00	0.000	0.033	0.000	0.000	16.69	28.00
0.005126	8.	8.	8.	3	11	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 1.319
1553 STARTING NC CARD OMITTED

1.319	3.19	19.91	19.38	0.00	20.84	0.94	0.04	0.00	20.72
600.0	0.0	600.0	0.0	0.0	139.8	0.0	187.7	60.5	20.72
0.09	0.00	4.29	0.00	0.000	0.033	0.000	0.000	16.72	28.00
0.005088	8.	8.	8.	1	11	0	0.00	44.01	72.01

1490 NH CARD USED
*SECNO 1.347
1553 STARTING NC CARD OMITTED

1.347	3.21	20.06	19.52	0.00	20.98	0.92	0.14	0.00	20.85
600.0	0.0	600.0	0.0	0.0	141.0	0.0	191.7	61.8	20.85
0.09	0.00	4.26	0.00	0.000	0.033	0.000	0.000	16.85	28.00
0.004953	28.	28.	28.	1	11	0	0.00	44.01	72.01

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   SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
   Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
   TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
   SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

1490 NH CARD USED
*SECNO 1.407
1553 STARTING NC CARD OMITTED
    1.407      3.32      20.41      19.75       0.00      21.27       0.86       0.28       0.00      21.09
    600.0       0.0      600.0        0.0        0.0      145.9        0.0      200.3       64.4      21.09
     0.09      0.00       4.11       0.00      0.000      0.033      0.000      0.000      17.09      28.00
 0.004424       61.        61.        61.          2         15          0       0.00      44.01      72.01

1490 NH CARD USED
*SECNO 1.437
1553 STARTING NC CARD OMITTED
    1.437      3.34      20.55      19.87       0.00      21.40       0.85       0.13       0.00      21.21
    600.0       0.0      600.0        0.0        0.0      146.8        0.0      204.7       65.7      21.21
     0.10      0.00       4.09       0.00      0.000      0.033      0.000      0.000      17.21      28.00
 0.004335       30.        30.        30.          0         15          0       0.00      44.01      72.01

1490 NH CARD USED
*SECNO 1.454
1553 STARTING NC CARD OMITTED
    1.454      3.43      20.71      19.88       0.00      21.47       0.75       0.07       0.00      21.28
    600.0       0.0      600.0        0.0        0.0      156.2        0.0      207.3       66.5      21.28
     0.10      0.00       3.84       0.00      0.000      0.033      0.000      0.000      17.28      26.55
 0.003685       17.        17.        17.          2         15          0       0.00      45.46      72.01

1490 NH CARD USED
*SECNO 1.470
1553 STARTING NC CARD OMITTED
    1.470      3.49      20.84      19.90       0.00      21.52       0.69       0.06       0.00      21.35
    600.0       0.0      600.0        0.0        0.0      163.6        0.0      209.9       67.2      21.35
     0.10      0.00       3.67       0.00      0.000      0.033      0.000      0.000      17.35      25.10
 0.003291       16.        16.        16.          2         15          0       0.00      46.91      72.01

1490 NH CARD USED
*SECNO 1.471
1553 STARTING NC CARD OMITTED

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.19

    1.471      3.49      20.84      19.90       0.00      21.52       0.68       0.00       0.00      21.35
    600.0       0.0      600.0        0.0        0.0      163.7        0.0      210.0       67.3      21.35
     0.10      0.00       3.67       0.00      0.000      0.015      0.000      0.000      17.35      25.10
 0.000687        1.         1.         1.          0         15          0       0.00      46.91      72.01
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   SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
   Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
   TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
   SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


1553 STARTING NC CARD OMITTED
    1.593     3.81     23.53     23.16      0.00     24.52      0.99      0.30      0.00     24.12
    600.0      0.0     600.0       0.0       0.0     136.3       0.0     227.2      73.0     24.12
     0.11     0.00      4.40      0.00     0.000     0.031     0.000     0.000     19.72     26.54
 0.005129      54.       54.       54.         2        11         0      0.00     46.91     73.46


1490 NH CARD USED
*SECNO 1.650
1553 STARTING NC CARD OMITTED
    1.650     3.86     23.85     23.43      0.00     24.80      0.95      0.28      0.00     24.39
    600.0      0.0     600.0       0.0       0.0     138.7       0.0     235.0      75.7     24.39
     0.11     0.00      4.33      0.00     0.000     0.031     0.000     0.000     19.99     26.54
 0.004842      57.       57.       57.         0        11         0      0.00     46.91     73.46


1490 NH CARD USED
*SECNO 1.698
1553 STARTING NC CARD OMITTED
    1.698     3.77     24.03     23.71      0.00     25.04      1.01      0.24      0.00     24.66
    600.0      0.0     600.0       0.0       0.0     134.5       0.0     241.6      77.9     24.66
     0.11     0.00      4.46      0.00     0.000     0.031     0.000     0.000     20.26     26.54
 0.005352      48.       48.       48.         2        11         0      0.00     46.91     73.46


1490 NH CARD USED
*SECNO 1.755
1553 STARTING NC CARD OMITTED
    1.755     3.80     24.35     23.99      0.00     25.34      0.99      0.30      0.00     24.95
    600.0      0.0     600.0       0.0       0.0     135.9       0.0     249.3      80.6     24.95
     0.12     0.00      4.41      0.00     0.000     0.031     0.000     0.000     20.55     26.54
 0.005169      57.       57.       57.         2        11         0      0.00     46.91     73.46


1490 NH CARD USED
*SECNO 1.807
1553 STARTING NC CARD OMITTED
    1.807     3.82     24.63     24.25      0.00     25.61      0.98      0.27      0.00     25.21
    600.0      0.0     600.0       0.0       0.0     136.6       0.0     256.4      83.1     25.21
     0.12     0.00      4.39      0.00     0.000     0.031     0.000     0.000     20.81     26.54
 0.005092      52.       52.       52.         0        11         0      0.00     46.91     73.46
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THIS RUN EXECUTED 5JUL95 10:47:26

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

CAUDAL 600 M3/S

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
*	0.033	0.00	0.00	0.00	8.77	600.00	11.07	11.07	12.15	18.80	4.61	130.14
	0.074	41.00	0.00	0.00	8.77	600.00	11.39	11.06	12.22	12.05	4.02	149.31
	0.084	1[illegible].00	13.26	12.26	8.77	600.00	11.64	0.00	12.32	8.85	3.65	164.29
	0.085	0.50	0.00	0.00	8.77	600.00	11.64	11.06	12.32	8.85	3.65	164.32
	0.091	6.50	0.00	0.00	8.82	600.00	11.81	10.91	12.33	5.96	3.18	188.61
*	0.126	35.00	0.00	0.00	8.87	600.00	11.53	11.53	12.87	18.76	5.13	116.87
*	0.127	1.00	0.00	0.00	8.87	600.00	11.56	11.53	12.87	88.53	5.08	118.14
	0.141	14.00	0.00	0.00	8.94	600.00	11.88	11.59	12.98	65.86	4.64	129.26
	0.178	37.00	0.00	0.00	9.13	600.00	12.20	11.79	13.20	56.95	4.44	135.11
	0.232	54.50	0.00	0.00	9.40	600.00	12.54	12.06	13.50	53.21	4.35	137.94
	0.284	51.50	0.00	0.00	9.65	600.00	12.83	12.31	13.77	51.05	4.30	139.69
	0.334	50.50	0.00	0.00	9.90	600.00	13.10	12.57	14.03	49.91	4.27	140.65
	0.384	50.00	0.00	0.00	10.15	600.00	13.35	12.82	14.28	49.56	4.26	140.96
	0.437	53.00	0.00	0.00	10.41	600.00	13.62	13.07	14.54	49.36	4.25	141.13
	0.489	51.50	0.00	0.00	10.66	600.00	13.87	13.32	14.79	49.09	4.24	141.37
	0.539	50.00	0.00	0.00	10.91	600.00	14.12	13.57	15.04	49.19	4.25	141.28
	0.589	50.50	0.00	0.00	11.16	6[illegible].00	14.37	13.82	15.29	49.36	4.25	141.13

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
	0.637	48.00	0.00	0.00	11.39	600.00	14.61	14.05	15.52	49.09	4.24	141.36
	0.684	47.00	0.00	0.00	11.63	600.00	14.83	14.29	15.75	49.39	4.25	141.10
	0.706	22.00	0.00	0.00	11.74	600.00	14.94	14.40	15.86	49.64	4.26	140.88
	0.714	8.00	0.00	0.00	11.77	600.00	14.98	14.44	15.90	49.25	4.25	141.37
	0.722	8.00	0.00	0.00	11.81	600.00	15.21	14.59	15.94	36.62	3.83	165.80
	0.731	9.00	0.00	0.00	11.86	600.00	15.38	14.42	15.97	34.45	3.40	176.69
	0.735	4.00	0.00	0.00	11.86	600.00	15.40	14.43	15.98	34.05	3.38	177.37
	0.752	17.00	18.46	16.16	11.86	600.00	15.50	0.00	16.05	30.82	3.27	183.39
	0.759	6.50	0.00	0.00	11.86	600.00	15.53	14.42	16.07	30.22	3.25	184.58
	0.765	6.50	0.00	0.00	11.86	600.00	15.56	14.42	16.09	29.52	3.23	186.04
	0.782	17.00	18.46	16.16	11.86	600.00	15.64	0.00	16.14	27.12	3.13	191.39
	0.783	1.00	0.00	0.00	11.86	600.00	15.65	14.43	16.15	27.06	3.13	191.55
	0.786	3.00	0.00	0.00	12.13	600.00	15.53	14.69	16.16	38.46	3.50	171.22
	0.795	9.00	0.00	0.00	12.16	600.00	15.36	14.95	16.19	45.57	4.11	153.93
	0.803	8.00	0.00	0.00	12.20	600.00	15.15	14.87	16.24	64.94	4.62	129.82
	0.811	8.00	0.00	0.00	12.24	600.00	15.20	14.90	16.29	64.78	4.62	129.91
	0.853	42.00	0.00	0.00	12.46	600.00	15.55	15.12	16.54	55.83	4.41	135.93
	0.909	56.00	0.00	0.00	12.74	600.00	15.89	15.40	16.84	52.61	4.33	138.41
	0.959	49.50	0.00	0.00	12.98	600.00	16.29	15.61	17.07	38.85	3.96	155.87
*	0.960	1.00	0.00	0.00	12.98	600.00	16.20	15.62	17.07	8.97	4.16	151.47
*	0.962	2.28	0.00	0.00	10.70	600.00	16.82	13.36	17.07	1.38	2.23	269.32
	0.973	10.81	0.00	0.00	10.70	600.00	16.82	13.36	17.07	1.38	2.23	269.32
*	0.978	5.87	0.00	0.00	15.20	600.00	17.86	17.86	19.20	18.72	5.13	116.96
*	0.979	0.01	0.00	0.00	15.20	600.00	17.86	17.86	19.20	91.49	5.13	116.96
	1.014	36.00	0.00	0.00	15.38	600.00	18.45	18.04	19.46	57.21	4.45	134.92
	1.072	58.00	0.00	0.00	15.67	600.00	18.82	18.33	19.77	52.49	4.33	138.51

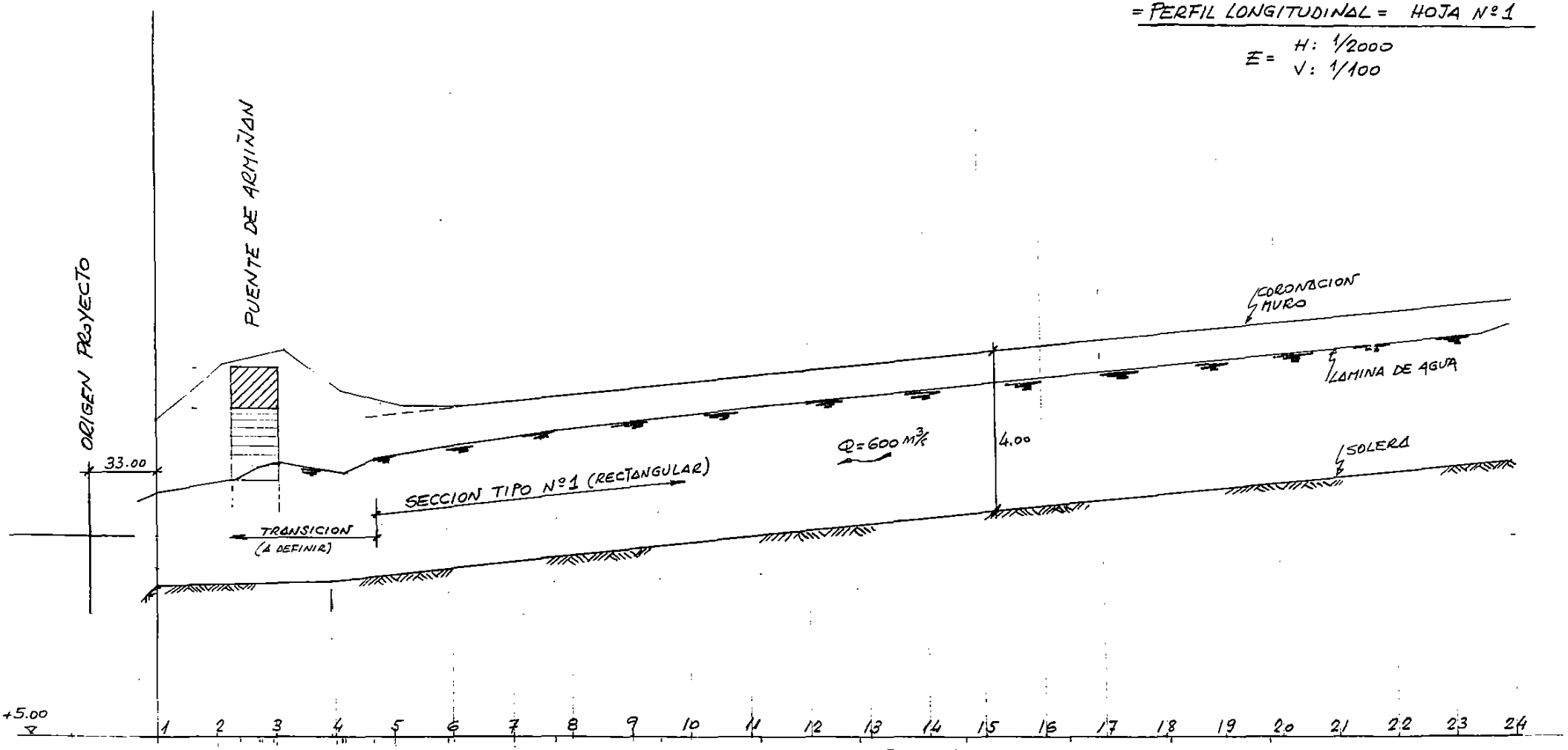
	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
	1.127	55.00	0.00	0.00	15.94	600.00	19.12	18.60	20.06	50.82	4.29	139.88
	1.184	57.00	0.00	0.00	16.20	600.00	19.43	18.87	20.34	48.75	4.24	141.67
	1.233	49.00	0.00	0.00	16.39	600.00	19.71	19.05	20.57	44.17	4.11	145.99
	1.241	8.00	0.00	0.00	16.42	600.00	19.75	19.08	20.60	43.53	4.09	149.80
	1.249	8.00	0.00	0.00	16.45	600.00	20.08	19.31	20.63	26.69	3.42	193.88
	1.258	9.00	0.00	0.00	16.48	600.00	20.08	19.06	20.66	33.82	3.36	178.63
	1.262	4.00	0.00	0.00	16.48	600.00	20.10	19.06	20.67	33.42	3.35	179.30
	1.290	28.00	23.10	21.15	16.48	600.00	20.20	0.00	20.73	30.32	3.25	184.90
	1.292	2.00	0.00	0.00	16.48	600.00	20.20	19.05	20.74	30.13	3.24	185.25
	1.294	2.00	0.00	0.00	16.63	600.00	20.16	19.20	20.74	34.24	3.39	177.06
	1.303	9.00	0.00	0.00	16.66	600.00	20.20	19.54	20.77	28.96	3.49	191.36
	1.311	8.00	0.00	0.00	16.69	600.00	19.86	19.35	20.80	51.26	4.30	139.51
	1.319	8.00	0.00	0.00	16.72	600.00	19.91	19.38	20.84	50.88	4.29	139.83
	1.347	28.00	0.00	0.00	16.85	600.00	20.06	19.52	20.98	49.53	4.26	140.98
	1.407	60.50	0.00	0.00	17.09	600.00	20.41	19.75	21.27	44.24	4.11	145.92
	1.437	30.04	0.00	0.00	17.21	600.00	20.55	19.87	21.40	43.35	4.09	146.83
	1.454	17.00	0.00	0.00	17.28	600.00	20.71	19.88	21.47	36.85	3.84	156.17
	1.470	16.00	0.00	0.00	17.35	600.00	20.84	19.90	21.52	32.91	3.67	163.55
*	1.471	1.00	0.00	0.00	17.35	600.00	20.84	19.90	21.52	6.87	3.67	163.70
*	1.472	1.15	0.00	0.00	16.20	600.00	21.19	18.75	21.52	2.24	2.56	234.17
	1.483	11.05	0.00	0.00	16.20	600.00	21.19	18.76	21.53	2.24	2.56	234.25
*	1.489	5.26	0.00	0.00	19.20	600.00	21.76	21.76	23.03	18.53	5.01	119.83
*	1.490	1.00	0.00	0.00	19.20	600.00	21.76	21.75	23.04	91.27	5.00	119.92
	1.504	14.00	0.00	0.00	19.27	600.00	22.08	21.82	23.14	67.31	4.56	131.54
*	1.514	10.00	0.00	0.00	19.33	600.00	22.36	22.36	23.65	86.23	5.03	119.26
*	1.524	10.00	0.00	0.00	19.37	600.00	22.83	22.83	24.11	78.70	5.02	119.62

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA
1.539	15.50	0.00	0.00	19.45	600.00	23.11	22.89	24.21	61.65	4.66	128.84
1.593	54.00	0.00	0.00	19.72	600.00	23.53	23.16	24.52	51.29	4.40	136.27
1.650	57.00	0.00	0.00	19.99	600.00	23.85	23.43	24.80	48.42	4.33	138.68
1.698	48.00	0.00	0.00	20.26	600.00	24.03	23.71	25.04	53.52	4.46	134.51
1.755	57.00	0.00	0.00	20.55	600.00	24.35	23.99	25.34	51.69	4.41	135.94
1.807	52.00	0.00	0.00	20.81	600.00	24.63	24.25	25.61	50.92	4.39	136.57

ENCAUZAMIENTO RIO GUADALMEDINA

= PERFIL LONGITUDINAL = HOJA Nº 1

E = H: 1/2000
V: 1/100



i=0,000810 en 86,47m.

PTE=0,004931 en 819,57

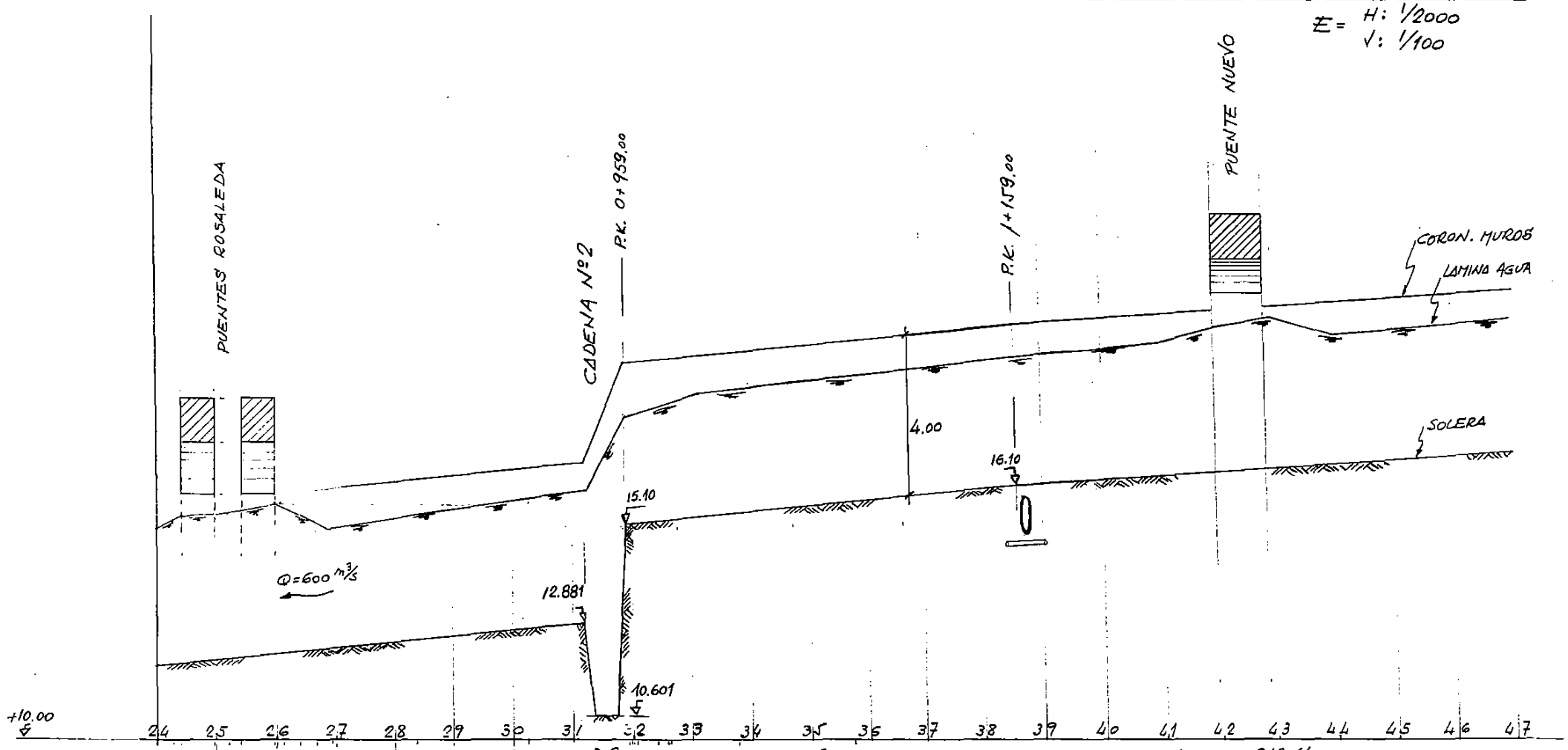
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
DIST. ORIGEN	33.00	63.00	93.00	123.00	153.00	183.00	213.00	243.00	273.00	303.00	333.00	363.00	393.00	423.00	453.00	483.00	513.00	543.00	573.00	603.00	633.00	663.00	693.00	723.00
COTA SOLERA	8,770	8,794	8,819	8,857	9,005	9,153	9,301	9,449	9,597	9,745	9,893	10,040	10,188	10,336	10,484	10,632	10,780	10,928	11,076	11,224	11,372	11,520	11,668	11,816
CALADO (Q=600 m³/s)	2.30	2.	3.00	2.66	3.00	3.08	3.12	3.15	3.17	3.19	3.20	3.20	3.20	3.20	3.21	3.21	3.21	3.21	3.21	3.21	3.22	3.21	3.21	3.40

H= 1/2000
V= 1/100

ENCAUZAMIENTO RIO GUADALMEDINA

= PERFIL LONGITUDINAL = HOJA Nº 2

E = H: 1/2000
V: 1/100



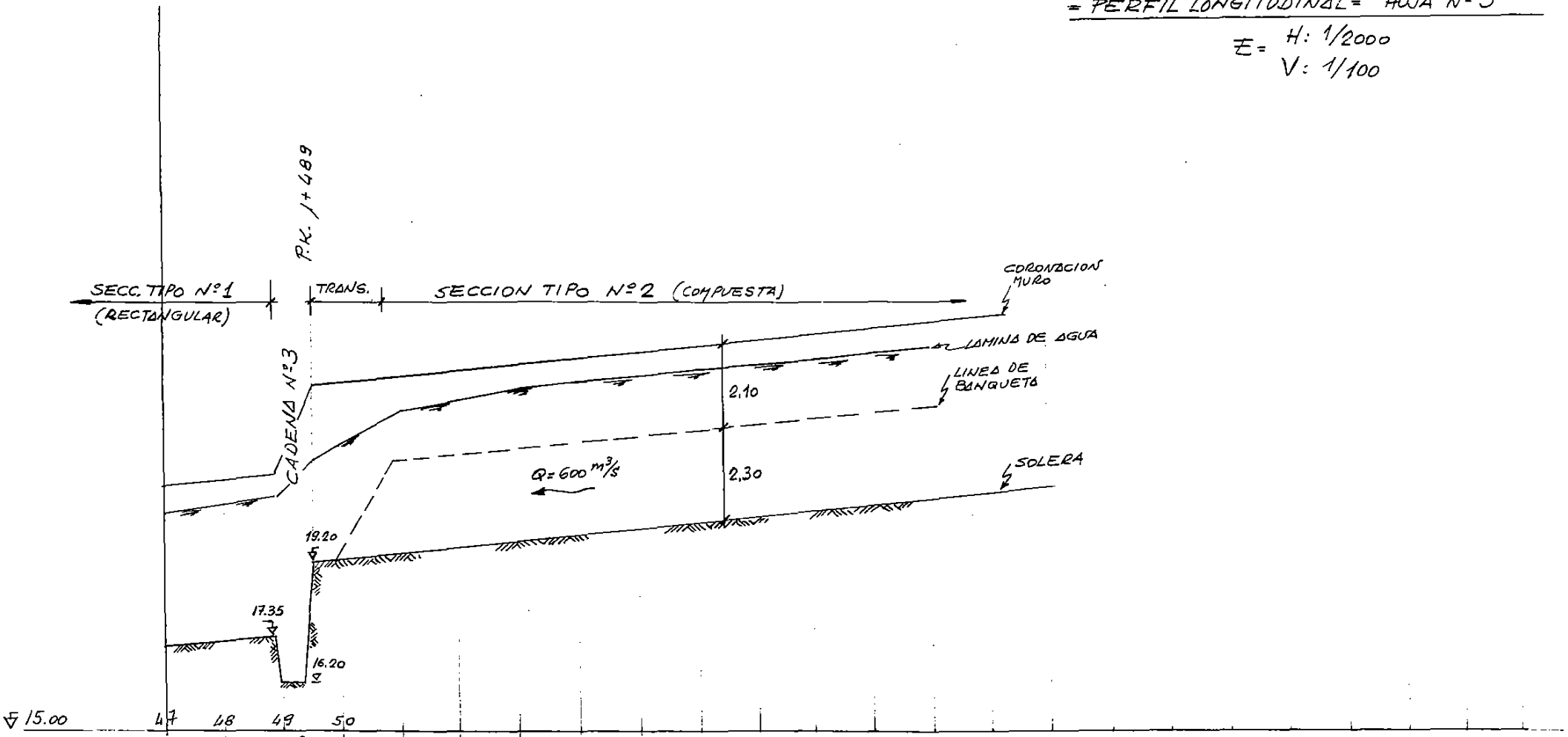
DIST. ORIGEN	725,00	753,00	783,00	813,00	843,00	873,00	903,00	933,00	963,00	993,00	1023,00	1053,00	1083,00	1113,00	1143,00	1173,00	1203,00	1233,-	1263,-	1293,-	1323,-	1353,-	1383,-	1413,-
COTA SOLERA	11,816	11,964	12,112	12,260	12,408	12,556	12,704	12,852	15,120	15,27	15,42	15,57	15,72	15,87	16,02	16,156	16,276	16,396	16,516	16,636	16,756	16,876	16,996	17,116
CALADO (Q=600 m³/s)	3,40	3,64	3,79	2,96	3,08	3,12	3,15	3,20	2,66	3,07	3,11	3,15	3,17	3,19	3,21	3,24	3,28	3,32	3,62	3,72	3,20	3,23	3,28	3,32

H = 1/2000
V = 1/100

ENCAUZAMIENTO RIO GUADALMEDINA

= PERFIL LONGITUDINAL = HOJA Nº 3

E = H: 1/2000
V: 1/100



DIST. ORIGEN	1413,-	1443,-	1473	1503,	1533	1563	1593,	1623,-	1653	1683	1713	1743	1773	1803
COTA SOLERA	17.116	17.236		19,270	19,420	19,570	19,720	19,870	20,020	20,170	20,320	20,470	20,620	20,770
CALADO (Q=600)	3.32	3.40	3.49	2,81	3,60	3,70	3,81	3,83	3,86	3,84	3,82	3,80	3,81	3,82

H = 1/2000
V = 1/

ENCAUZAMIENTO DEL RIO GUADALMEDINA

DISPOSICION Y CALCULO DE LAS PROTECCIONES DE ESCOLLERA

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1.- INTRODUCCION

En este estudio se trata de adoptar las medidas de protección frente a la erosión adecuadas para garantizar la estabilidad del cauce durante el paso de las avenidas de diseño previstas.

Las secciones tipo estudiadas son dos: La sección nº 1, rectangular de 44.00 m. de ancho, que se extiende en el tramo bajo del cauce desde la Cadena nº 3 a la trampa de áridos, y la sección nº 2, constituida por el cauce de aguas bajas existente y los muros laterales que limitan el cauce superior con un ancho total de 46.90 m., que se extiende desde la Cadena nº 3 hasta el puente de la Variante.

Para ambas secciones se han obtenido los datos hidráulicos necesarios del estudio hidráulico realizado, adoptando como valores característicos de calados y velocidades en cada caso, los que se indican en el apartado de cálculo de la escollera.

2.- CRITERIOS GENERALES DE DISEÑO

Durante el paso de una avenida por un cauce se produce una erosión de tipo general y otra localizada en los puntos singulares (pilas, estribos, etc.). En este caso se trata de proteger el cauce frente a la erosión general, ya que los puntos singulares requieren un tratamiento específico.

La profundidad máxima de erosión depende fundamentalmente de los siguientes factores:

- Fuerza de arrastre o poder erosivo de la corriente, caracterizada por el calado, velocidad y pendiente.

- Tipo de suelo constitutivo del cauce (granulometría, cohesión, etc.).

- Sólidos transportados por la corriente (arrastre y suspensión).

Tratar de evitar totalmente la erosión supone disponer a lo largo y ancho de todo el cauce una protección adecuada, que en cauces de dimensiones y características como el presente resulta de un coste tan elevado que no justifica tal solución.

Las actuaciones que se proponen tratan de limitar a niveles admisibles las erosiones del cauce y garantizar la estabilidad de los cajeros que configuran las secciones transversales.

Con este fin se dispone una protección longitudinal continua al pie de los muros cajeros y paños de hormigón del cauce inferior, combinada con riostras transversales de escollera cuya finalidad es fijar la rasante longitudinal del cauce.

Como medida de seguridad adicional para la sección tipo 2, en previsión de un posible deterioro de la losa de hormigón que existe actualmente en los cajeros del cauce de aguas bajas y para evitar que por erosión progresiva pueda descalzar el muro superior a construir, se dispone entre ambos una pantalla de hormigón de 4,00 m. de profundidad.

El tipo de protección previsto es flexible, formado por escollera del tamaño adecuado a cada caso y extendido el manto sobre un geotextil que evite la fuga de finos a través de los huecos de la escollera.

El cálculo del tamaño de la escollera se ha realizado utilizando fórmulas habituales y contrastadas, adoptando como espesor del manto el correspondiente a dos capas del tamaño de escollera resultante.

Las riostras o traviesas se han profundizado hasta 1,20 m. bajo la rasante del cauce con el fin de asegurar su estabilidad.

3.- DISPOSICION DE PROTECCION ADOPTADAS

3.1.- Sección tipo 1. (Rectangular completa)

Consta de una protección longitudinal del pie de los muros cajeros de 4,00 m. de ancho y 1,10 m. de profundidad con escollera de tamaño D = 0,40 m., alcanzando la protección al nivel de cimentación del muro cajero, lo que supone un espesor de manto de 1,10 m.

El volumen de escollera permite una protección adecuada aún en caso de basculamiento del manto por erosión en su borde exterior.

Las riostras se colocan cada 30 m., distancia que estimamos adecuada para limitar a niveles admisibles la erosión entre dos consecutivas.

3.2.- Sección tipo 2. (Sección compuesta)

3.2.1.- Cauce inferior de aguas bajas

La protección longitudinal del pie de la losa de hormigón existente es continua de 3,50 m. de ancho y espesor de manto variable entre 1,00 y 0,60 m. con mayor espesor al pie del cajero.

Las piedras más próximas a la losa se hormigonarán con el fin de ofrecer una mayor estabilidad a la misma aún en el caso de basculamiento parcial del manto por erosión del fondo.

El tamaño medio de la escollera será de D=0,45 m., dispuesta sobre un geotextil.

En la coronación de la losa, con el fin de evitar la erosión en el trasdós se coloca un manto de escollera de D = 0,20 m. y 0,40 m. de espesor entre ella y la pantalla a construir.

3.2.2.- Cauce superior (muro de 2,10 m. de altura)

Protección del pie del muro con manto de 2,00 m. de ancho y espesor 0,40 m, siendo el tamaño de la piedra D = 0,20 m.

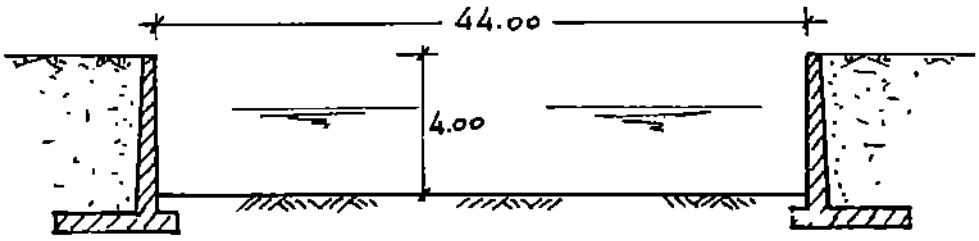
Entre la pantalla y la coronación del cajero de hormigón existente se extiende un manto de las mismas características.

Ambos mantos se extenderán sobre geotextil.

4.- CALCULO DEL TAMAÑO DE ESCOLLERAS

4.1.- Características hidráulicas

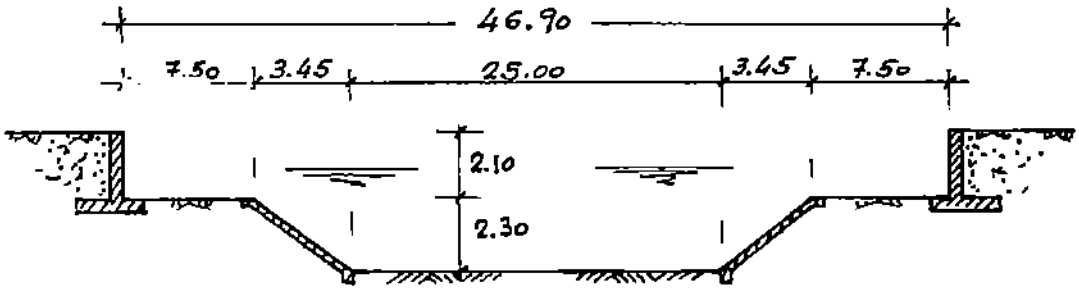
- Sección tipo 1: Rectangular de cauce único.



Calado para cálculo h = 3,00 m.

Velocidad para cálculo V = 4,50 ms

- Sección tipo 2: Cauce menor trapecial+Cauce superior



Cauce inferior: Calado para cálculo h_1 = 3,70 m.

Velocidad para cálculo V_1 = 5,00 m/s

Cauce superior lateral: Calado para cálculo h_2 = 1,40 m.

Velocidad para cálculo V_2 = 2,50 m/s

- Pendiente media de tramos i = 0,005

4.2.- Sección tipo 1 (rectangular)

- Método de Stevens

$$\tau = \gamma_a \cdot h \cdot i = 1000 \times 3{,}00 \times 0{,}005 = 15 \text{ kg/m}^2$$

$$\text{Con } D=0{,}40 \text{ m } \mu = \frac{26 \cdot \tau}{(\gamma_s-\gamma_a)^D} \left(\frac{h}{D}\right)^{0{,}133} = \frac{26 \times 15}{1650 \times 0{,}40} \left(\frac{3}{0{,}4}\right)^{0{,}133} = 0{,}77$$

$$\text{Coef. seg. } S = 1/\mu = \approx 1{,}30$$

- Método de Stephenson ($\phi = 40º$)

$$D = \frac{0{,}25\ V^2}{g(\gamma_s-\gamma_a)\,tg\phi}$$

$$D = \frac{0{,}25 \times 4{,}50^2}{9{,}8 \times 1{,}65 \times tg\ 40^\circ} = 0{,}373 \sim 0{,}40 \text{ m}$$

. Método de Shields ($C_t = 0{,}6$)

$$D > \frac{C_t V^2}{2g\left(\frac{\gamma_s-\gamma_a}{\gamma_a}\right)} = \frac{0{,}6 \times 4{,}5^2}{2 \times 9{,}8 \times 1{,}65} = 0{,}38 \sim 0{,}40 \text{ m}$$

Adoptamos escollera de D = 0,40 m.

Espesor de capa e = 0,80 m, adoptando e = 1,10 por profundidad de cimentación del muro.

4.3.- Sección tipo 2 (sección compuesta)

4.3.1.- Cauce inferior

- Método de Stevens

$$\tau = \gamma_a \cdot h \cdot i = 1000x3{,}70x0{,}005 = 18{,}5 \text{ kg/m}^2$$

Con D = 0,50 m

$$\mu = \frac{26x18{,}5}{1650x0{,}50}\left(\frac{3{,}70}{0{,}5}\right)^{0{,}133} = 0{,}76$$

-

Coef. seg. $S = 1/\mu = 1{,}31$

- stephenson :

$$D = \frac{0{,}25\ V^2}{9{,}8x1{,}65xtg\ 40^\circ} = 0{,}45 \text{ m}$$

- Shields :

$$D > \frac{0{,}6xV^2}{2x9{,}8x1{,}65} = 0{,}45 \text{ m}$$

Adoptamos escollera de D = 0,45 m.

Espesor de capa variable entre 0,60 y 1,00 m.

4.3.2.- Cauce lateral superior

- Método Stevens

$$\tau = 1000x1{,}40x0{,}005 = 7 \text{ kg/m}^2$$

$$D = 0,20 \text{ m } \mu = \frac{26x7}{1650x0,20} \left(\frac{1,40}{0,20}\right)^{0,133} = 0,714$$

Coeficiente seguridad $S = 1/\mu = 1,40$

- Método Stephenson

$$D \geq \frac{0,25x2,5^2}{9,8 \text{ x } 1,65 \text{ x tg } 40^o} = 0,12 \text{ m}$$

- Método Shields

$$D > \frac{0,6x2,5^2}{2 \text{ x } 9,8 \text{ x } 1,65} = 0,12 \text{ m}$$

Adoptamos escollera de D = 0,20 m.

Espesor de capa e = 2 x 0,20 = 0,40 m

ENCAUZAMIENTO RIO GUADALMEDINA

MURO TIPO DE ENCAUZAMIENTO

CALCULOS JUSTIFICATIVOS

ABRIL-1995

I N D I C E

1.- CRITERIOS GENERALES DE CALCULO

2.- MUROS DE 4.00 M.

3.- MUROS DE 2.10 M.

ANEJO: SECCIONES TIPO

ENCAUZAMIENTO RIO GUADALMEDINA

MUROS TIPO DEL ENCAUZAMIENTO

1.- CRITERIOS GENERALES DE CALCULO

Se estudian muro de 4,00 m de altura sobre el fondo del cauce y muro de 2.10 m de altura sobre nivel de banqueta, suponiendo en ambos casos que el agua llega a alcanzar durante la máxima avenida la cota de coronación del muro.

La situación más desfavorable se presenta en el proceso de vaciado, durante el cual el terreno en trasdós del muro esté anegado, mientras del lado del cauce se produce el descenso del nivel de agua con mayor rapidez.

Para el cálculo de estabilidad y armaduras de las secciones, se emplea el programa MURO desarrollado por la Dirección Técnica de AGROMAN.

2.- MURO DE 4,00 M.

Hipótesis 1.- Inicio vaciado

Tras la avenida, se supone altura agua en trasdós igual a la altura de muro, y del lado del cauce 1 m más bajo el nivel del agua.

Para el buen funcionamiento habrá que asegurarse de que las juntas entre módulos son abiertas (a/4-5 m máximo), de que se dispone material drenante en el trasdós y de que se colocan mechinales en posición y número adecuados.

Se obtiene:

$\sigma_{máx}$ = 1,63 kp/cm^2

$\gamma_{deslizamiento}$ = 1,49

Hipótesis 2.- Decalaje 1,50 m

A medida que avanza el vaciado, tras la avenida, se supone altura de que en trasdós a 1,00 m. de la superficie, con 1,50 m. menos de

nivel de agua en el cauce. Valen los mismos comentarios que en el caso anterior.

Se obtiene:

$\sigma_{máx}$ = 1,64 kp/m^2

$\gamma_{deslizamiento}$ = 1,49

Hipótesis 3.- Decalaje 2,00 m

En este caso se supone agua en trasdós a 2,00 m de la superficie, suponiendo que en cauce el nivel de agua alcanza la cota del lecho.

Se obtiene:

$\sigma_{máx}$ = 1,58 kp/m^2

$\gamma_{deslizamiento}$ = 1,72

Hipótesis 4.- En seco

Con agua a nivel del fondo del cauce en trasdós e intradós:

Se obtiene:

$\sigma_{máx}$ = 1,45 kp/m^2

$\gamma_{deslizamiento}$ = 2,35

<u>Hipótesis 5.- Cálculo límite</u>

Se supone que, tras la avenida, queda inundado el terreno hasta coronación del muro, con nivel de agua en fondo del cauce.

Se obtiene:

$\sigma_{máx}$ = 2,29 kp/m^2

$\gamma_{deslizamiento}$ = 1,04 > 1

3.- MURO DE 2,10 M.

Hipótesis 1.- Inicio de vaciado

Se supone en el trasdós que el nivel de inundación llega a coronación del muro, con 1,00 m. menos de cota de agua del lado del cauce.

Se obtiene:

$\sigma_{máx}$ = 0,81 kp/m^2

$\gamma_{deslizamiento}$ = 1,69

Hipótesis 2.- Estado límite

Se supone máximo nivel de inundación en coronación, con cota de agua en fondo de la banqueta.

Se obtiene:

$\sigma_{máx}$ = 0,95 kp/m^2

$\gamma_{deslizamiento}$ = 1,60 > 1

MUROS DE 4.00 M

LISTADOS DE ORDENADOR

DATOS DEL TERRENO

Densidad Aparente	(Ton/m3)	=	1.800
Densidad Saturada	(Ton/m3)	=	2.100
Ang. Roz. Interno	(Grad.)	=	30.00
Ang. Roz. Tierras-Muro	(Grad.)	=	10.00
Ang. Roz. Tierras-Zapata	(Grad.)	=	30.00
Altura de Tierras sobre Puntera	(m)	=	0.000
Inclinacion Terreno Trasdos	(Grad.)	=	0.00

DATOS DEL MURO

TIPO : Muro Estribo de Paredes Inclinadas

Ancho Minimo del Muro	(m)	=	0.300
Proyeccion Horiz. Paramento Interior	(m)	=	0.200
Proyeccion Horiz. Paramento Exterior	(m)	=	0.000
Altura Total del Muro (Peto Incluido)	(m)	=	4.500
Densidad del Hormigon	(Ton/m3)	=	2.500

No Tiene Peto

DATOS DE LA ZAPATA

Puntera	(m)	=	0.550	(Tipo I)
Talon	(m)	=	2.350	(Tipo III)
Canto	(m)	=	0.500	

Ancho de la Base de la Zapata (m) = 3.400

COEFICIENTES DE EMPUJE

	ACTIVOS		PASIVOS	
	Horizontal	Vertical	Horizontal	Vertical
Muro	0.318426	0.070633	4.080353	-0.719476
Zapata	0.303780	0.053565	4.080353	-0.719476

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 4.500
Altura de Agua sobre Base Zapata (Intrados) (m) = 3.500

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.500
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 24.065 Horizontal (T) = 9.330
Momento (m*T) = 17.721 Excentr. (m) = 0.716

TENSIONES EN EL TERRENO (T/m2)

Maxima = 16.297 Minima = 0.000
Ancho Efectivo Base Zapata (m) = 2.753

Coef. de Seguridad al Deslizamiento = 1.489

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 2.712 Cortante (T) = 4.231
TALON : Momento (m*T) = -14.711 Cortante (T) = 8.478

SECCIONES DE CALCULO

Seccion	Altura(m)	Ancho(m)
1	1.125	0.350
2	2.250	0.400
3	3.150	0.440
4	3.825	0.470
5	4.500	0.500

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.600
Empuje de Tierras = 1.600
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	1.125	1.712	1.279	0.543	0.317
2	2.250	3.868	4.170	2.488	0.902
3	3.150	5.909	7.047	8.485	1.436
4	3.825	7.624	9.506	14.046	1.842
5	4.500	9.497	12.217	21.352	2.248

Hip. No. 2 Decalaje 1.5 m.

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 3.500
Altura de Agua sobre Base Zapata (Intrados) (m) = 2.000

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.500
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 26.775 Horizontal (T) = 10.341
Momento (m*T) = 1[illegible].406 Excent. (m) = 0.613

TENSIONES EN EL TERRENO (T/m2)

Maxima = 16.417 Minima = 0.000
Ancho Efectivo Base Zapata (m) = 3.262

Coef. de Seguridad al Deslizamiento = 1.495

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 2.757 Cortante (T) = 4.296
TALON : Momento (m*T) = -14.254 Cortante (T) = 8.194

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.600
Emouje de Tierras = 1.600
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	1.125	1.719	1.153	0.518	0.301
2	2.250	3.912	3.648	3.015	0.771
3	3.150	5.984	7.018	7.689	1.285
4	3.825	7.722	10.053	13.411	1.737
5	4.500	9.619	13.344	21.268	2.211

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 2.500
Altura de Agua sobre Base Zapata (Intrados) (m) = 1.500

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.500
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 29.495 Horizontal (T) = 9.880
Momento (m*T) = 12.918 Excentr. (m) = 0.469

TENSIONES EN EL TERRENO (T/m2)

Maxima = 15.846 Minima = 1.503

Coef. de Seguridad al Deslizamiento = 1.724

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 2.681 Cortante (T) = 4.168
TALON : Momento (m*T) = -12.294 Cortante (T) = 7.252

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.600
Emouje de Tierras = 1.600
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Ext. (m)
1	1.125	1.719	1.153	0.518	0.301
2	2.250	3.922	3.468	2.981	0.760
3	3.150	6.024	6.290	7.233	1.201
4	3.825	7.786	9.221	12.383	1.590
5	4.500	9.706	12.863	19.751	2.035

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 1.000
Altura de Agua sobre Base Zapata (Intrados) (m) = 1.000

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.500
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 30.423 Horizontal (T) = 7.457
Momento (m*T) = 10.738 Excentr. (m) = 0.353

TENSIONES EN EL TERRENO (T/m2)

Maxima = 14.521 Minima = 3.375

Coef. de Seguridad al Deslizamiento = 2.355

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 2.438 Cortante (T) = 3.786
TALON : Momento (m*T) = -10.782 Cortante (T) = 6.395

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.600
Emcuje de Tierras = 1.600
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	1.125	1.719	1.153	0.518	0.301
2	2.250	3.922	3.468	2.981	0.76[illegible]
3	3.150	6.032	6.155	7.229	1.199
4	3.825	7.917	8.657	12.181	1.558
5	4.500	9.772	11.533	18.908	1.935

DATOS DE LOS MATERIALES

Resistencia a Compresion del Hormigon (Kg/cm2)		:	200.0
Limite Elastico del Acero (Kg/cm2)		:	5100.0
Coef. de Minoracion del Hormigon		:	1.500
Coef. de Minoracion del Acero		:	1.150
Recubrimiento Armaduras (cm).	En Muro	:	4.000
	En Zapata	:	5.000

ARMADO DE LA ZAPATA

Hip. N.	Pond. N.	PUNTERA M	PUNTERA Q	TALON M	TALON Q
1	0	2.712	4.231	-14.711	8.478
2	0	2.757	4.296	-14.254	8.184
3	0	2.681	4.168	-12.294	7.352
4	0	2.438	3.786	-10.782	6.395

ESFUERZOS DE CALCULO EN LA ZAPATA

PUNTERA:

Momento Negativo (mT) : 0.000
Momento Positivo (mT) : 2.757
Cortante (T) : 4.296

TALON:

Momento Negativo (mT) : -14.711
Momento Positivo (mT) : 0.000
Cortante (T) : 8.478

ARMADURA DE LA ZAPATA

PUNTERA:

Armadura Superior (cm2) : 0.000
Armadura Inferior (cm2) : 1.861 3Φ16 (6,03)
Capac. a Cortante del Hormigon : 51.962 Ton.

TALON:

Armadura Superior (cm2) : 7.540 6Φ16 (12,06)
Armadura Inferior (cm2) : 0.000
Capac. a Cortante del Hormigon : 25.981 Ton.

Armado geometrico minimo (cm2) : 3.154 por m.. de perim.

ARMADO DEL MURO

Seccion No. : 1

Dist. a Coronacion (m) : 1.125
Canto de la Seccion (m) : 0.350
Capacidad a Cortante (T) : 16.979
Armadura min. Horizontal : 5.600 cm2. (entre las dos caras)
Armadura min. Vertical : 7.150 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	0.543	1.712	1.279	0.242	0.000
2	1	0.518	1.719	1.153	0.215	0.000
3	1	0.518	1.719	1.153	0.215	0.000
4	1	0.518	1.719	1.153	0.215	0.000

Seccion No. : 2

Dist. a Coronacion (m) : 2.250
Canto de la Seccion (m) : 0.400
Capacidad a Cortante (T) : 19.718
Armadura min. Horizontal : 6.400 cm2. (entre las dos caras)
Armadura min. Vertical : 3.600 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	3.488	3.868	4.170	2.167	0.000
2	1	3.015	3.912	3.648	1.828	0.000
3	1	2.981	3.922	3.468	1.802	0.000
4	1	2.981	3.922	3.468	1.802	0.000

Seccion No. : 3

Dist. a Coronacion (m) : 3.150
Canto de la Seccion (m) : 0.440
Capacidad a Cortante (T) : 21.909
Armadura min. Horizontal : 7.040 cm2. (entre las dos caras)
Armadura min. Vertical : 3.960 cm2. (entre las dos caras)

Hip. No.	Pond. No.	E S F U E R Z O S M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	8.485	5.909	7.049	4.235	0.000
2	1	7.689	5.984	7.018	3.945	0.000
3	1	7.233	6.024	6.290	3.755	0.000
4	1	7.229	6.032	6.155	3.753	0.000

Seccion No. : 4

Dist. Coronacion (m) : 3.825
Canto de la Seccion (m) : 0.470
Capacidad a Cortante (T) : 23.552
Armadura min. Horizontal : 7.520 cm2. (entre las dos caras)
Armadura min. Vertical : 4.230 cm2. (entre las dos caras)

Hip. No.	Pond. No.	E S F U E R Z O S M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	14.046	7.624	9.506	6.735	0.000
2	1	13.411	7.722	10.053	6.356	0.000
3	1	12.333	7.786	9.221	5.758	0.000
4	1	12.191	7.817	8.657	5.639	0.000

Seccion No. : 5

Dist. a Coronacion (m) : 4.500
Canto de la Seccion (m) : 0.500
Capacidad a Cortante (T) : 25.195
Armadura min. Horizontal : 8.000 cm2. (entre las dos caras) 10Φ12(11,31
Armadura min. Vertical : 4.500 cm2. (entre las dos caras)

Hip. No.	Pond. No.	E S F U E R Z O S M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	21.252	9.497	12.217	9.980	0.000
2	1	21.268	9.619	13.344	9.920	0.000
3	1	19.751	9.706	12.863	9.061	0.000
4	1	18.908	9.772	11.533	8.586	0.000

6Φ16 (12,06)

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 4.500
Altura de Agua sobre Base Zapata (Intrados) (m) = 1.000

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 2.500
Factor de Mostificación de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 26.940 Horizontal (T) = 14.955
Momento (m*T) = 24.649 Excentr. (m) = 0.915

TENSIONES EN EL TERRENO (T/m2)

Maxima = 22.877 Minima = 0.000
Ancho Efectivo Base Zapata (m) = 2.355

Coef. de Seguridad al Deslizamiento = 1.040

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 3.850 Cortante (T) = 6.050
TALON : Momento (m*T) = -19.323 Cortante (T) = 12.230

SECCIONES DE CALCULO

Seccion	Altura(m)	Ancho(m)
1	1.125	1.350
2	2.250	0.400
3	3.150	0.440
4	3.825	0.470
5	4.500	0.500

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.000
Empuje de Tierras = 1.000
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	1.125	1.073	0.873	0.354	0.330
2	2.250	2.443	3.356	2.554	1.047
3	3.150	3.751	6.572	6.922	1.845
4	3.825	4.857	9.701	12.366	2.546
5	4.500	6.069	13.320	20.107	3.313

DATOS DE LOS MATERIALES

Resistencia a Compresion del Hormigon	(Kg/cm2)	:	200.0
Limite Elastico del Acero	(kg/cm2)	:	5100.0
Coef. de Minoracion del Hormigon		:	1.500
Coef. de Minoracion del Acero		:	1.150
Recubrimiento Armaduras (cm).	En Muro	:	5.000
	En Zapata	:	5.000

ARMADO DE LA ZAPATA

Hip. N.	Pond. N.	PUNTERA M	PUNTERA Q	TALON M	TALON Q
1	0	3.850	6.050	-19.323	12.230

ESFUERZOS DE CALCULO EN LA ZAPATA

PUNTERA:

Momento Negativo (mT) : 0.000
Momento Positivo (mT) : 3.850
Cortante (T) : 6.050

TALON:

Momento Negativo (mT) : -19.323
Momento Positivo (mT) : 0.000
Cortante (T) : 12.230

ARMADURA DE LA ZAPATA

PUNTERA:

Armadura Superior (cm2) : 0.000
Armadura Inferior (cm2) : 2.514 3Φ16 (6.03)
Capac. a Cortante del Hormigon : 51.9[illegible] Ton.

TALON:

Armadura Superior (cm2) : 10.064 6Φ16 (12.06)
Armadura Inferior (cm2) : 0.000
Capac. a Cortante del Hormigon : 25.981 Ton.

Armado geometrico minimo (cm2) : 3.154 por ml. de perim.

ARMADO DEL MURO

Seccion No. : 1

Dist. a Coronacion (m) : 1.125
Canto de la Seccion (m) : 0.350
Capacidad a Cortante (T) : 16.432
Armadura min. Horizontal : 5.600 cm2. (entre las dos caras)
Armadura min. Vertical : 3.150 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
5	1	0.354	1.073	0.873	0.171	0.000

Seccion No. : 2

Dist. a Coronacion (m) : 2.250
Canto de la Seccion (m) : 0.400
Capacidad a Cortante (T) : 19.170
Armadura min. Horizontal : 6.400 cm2. (entre l . dos caras)
Armadura min. Vertical : 3.600 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
5	1	2.554	2.443	3.356	1.739	0.000

Seccion No. : 3

Dist. a Coronacion (m) : 3.150
Canto de la Seccion (m) : 0.440
Capacidad a Cortante (T) : 21.361
Armadura min. Horizontal : 7.040 cm2. (entre las dos caras)
Armadura min. Vertical : 3.960 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
5	1	6.922	3.751	6.572	3.845	0.000

Seccion No. : 4

Dist. a Coronacion (m) : 3.825
Canto de la Seccion (m) : 0.470
Capacidad a Cortante (T) : 23.004
Armadura min. Horizontal : 7.570 cm2. (entre las dos caras)
Armadura min. Vertical : 4.230 cm2. (entre las dos caras)

Hip. No.	Pond. No.	E S F U E R Z O S M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
5	1	12.366	4.857	9.701	6.346	0.000

Seccion No. : 5

Dist. a Coronacion (m) : 4.500
Canto de la Seccion (m) : 0.500
Capacidad a Cortante (T) : 24.648
Armadura min. Horizontal : 8.000 cm2. (entre las dos caras)
Armadura min. Vertical : 4.500 cm2. (entre las dos caras)

Hip. No.	Pond. No.	E S F U E R Z O S M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
5	1	20.107	6.069	13.320	9.904	0.000

6Φ16 (12.06)

MUROS DE 2.10 M

LISTADOS DE ORDENADOR

DATOS DEL TERRENO

Densidad Aparente	(Ton/m3)	=	1.800
Densidad Saturada	(Ton/m3)	=	2.100
Ang. Roz. Interno	(Grad.)	=	30.00
Ang. Roz. Tierras-Muro	(Grad.)	=	10.00
Ang. Roz. Tierras-Zapata	(Grad.)	=	30.00
Altura de Tierras sobre Puntera	(m)	=	0.300
Inclinacion Terreno Trasdos	(Grad.)	=	0.00

DATOS DEL MURO

TIPO : Muro Estribo de Paredes Inclinadas

Ancho Minimo del Muro	(m)	=	0.250
Proyeccion Horiz. Paramento Interior	(m)	=	0.000
Proyeccion Horiz. Paramento Exterior	(m)	=	0.000
Altura Total del Muro (Peto Incluido)	(m)	=	2.100
Densidad del Hormigon	(Ton/m3)	=	2.500

No Tiene Peto

DATOS DE LA ZAPATA

Puntera	(m)	=	0.400 (Tipo I)
Talon	(m)	=	1.250 (Tipo III)
Canto	(m)	=	0.300

Ancho de la Base de la Zapata (m) = 1.900

COEFICIENTES DE EMPUJE

	ACTIVOS		PASIVOS	
	Horizontal	Vertical	Horizontal	Vertical
Muro	0.303780	0.053565	4.080353	-0.719476
Zapata	0.303780	0.053565	4.080353	-0.719476

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 2.400
Altura de Agua sobre Base Zapata (Intrados) (m) = 1.400

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.300
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 6.974 Horizontal (T) = 2.380
Momento (m*T) = 2.642 Excentr. (m) = 0.379

TENSIONES EN EL TERRENO (T/m2)

Maxima = 8.141 Minima = 0.000
Ancho Efectivo Base Zapata (m) = 1.713

Coef. de Seguridad al Deslizamiento = 1.692

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-88)

PUNTERA : Momento (m*T) = 0.554 Cortante (T) = 1.494
TALON : Momento (m*T) = -2.315 Cortante (T) = 2.481

SECCIONES DE CALCULO

Seccion	Altura(m)	Ancho(m)
1	0.525	0.250
2	1.050	0.250
3	1.470	0.250
4	1.785	0.250
5	2.100	0.250

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigon = 1.600
Emouje de Tierras = 1.600
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	0.525	0.583	0.467	0.097	0.166
2	1.050	1.192	1.355	0.546	0.458
3	1.470	1.698	2.262	1.292	0.761
4	1.785	2.088	3.004	2.111	1.011
5	2.100	2.488	3.800	3.170	1.274

DATOS DE LA HIPOTESIS

NIVEL FREATICO

Altura de Agua sobre Base Zapata (Trasdos) (m) = 2.400
Altura de Agua sobre Base Zapata (Intrados) (m) = 0.300

EMPUJE PASIVO

Altura de Tierras sobre Base Zapata (m) = 0.300
Factor de Modificacion de Empuje Pasivo = 2.000

Sobrecarga Uniforme sobre el Terreno en Trasdos (T/m2) = 1.000

CARGAS EXTERIORES EN CABEZA DEL MURO

Vertical (T) = 0.000
Horizontal (T) = 0.000
Momento (m*T) = 0.000

No se considera Efecto Sismico

ACCIONES SIN PONDERAR

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA BASE DE LA ZAPATA

Vertical (T) = 7.754 Horizontal (T) = 2.800
Momento = 3.168 Excentr. (m) = 0.4[illegible]9

TENSIONES EN EL TERRENO (T/m2)

Maxima = 9.548 Minima = 0.000
Ancho Efectivo Base Zapata (m) = 1.624

Coef. de Seguridad al Deslizamiento = 1.599

ESFUERZOS EN ZAPATA PARA CALCULO DE ARMADURAS
(+ Arm. Inf.,- Arm. Sup.) (Segun Norma EH-80)

PUNTERA : Momento (m*T) = 0.620 Cortante (T) = 1.686
TALON : Momento (m*T) = -2.563 Cortante (T) = 2.830

ESFUERZOS EN EL MURO

PONDERACION NO. 1

Peso del Hormigor = 1.000
Empuje de Tierras = 1.000
Cargas Exteriores:
Vertical = 1.000
Horizontal = 1.000
Momento = 1.000

ESFUERZOS REFERIDOS AL PUNTO MEDIO DE LA SECCION

Seccion	Altura (m)	N (T)	Q (T)	M (mT)	Exc. (m)
1	0.525	0.364	0.343	0.070	0.191
2	1.050	0.745	1.054	0.414	0.555
3	1.470	1.061	1.888	1.017	0.958
4	1.785	1.305	2.668	1.725	1.322
5	2.100	1.555	3.580	2.699	1.736

DATOS DE LOS MATERIALES

Resistencia a Compresion del Hormigon	(Kg/cm2)	:	200.0
Limite Elastico del Acero	(Kg/cm2)	:	5100.0
Coef. de Minoracion del Hormigon		:	1.510
Coef. de Minoracion del Acero		:	1.150
Recubrimiento Armaduras (cm.)	En Muro	:	4.000
	En Zapata	:	5.000

ARMADO DE LA ZAPATA

Hip. N.	Pond. N.	PUNTERA M	PUNTERA Q	TALON M	TALON Q
1	0	0.554	1.494	-2.315	2.481
2	0	0.620	1.686	-2.563	2.830

ESFUERZOS DE CALCULO EN LA ZAPATA

PUNTERA:

Momento Negativo (mT) : 0.000
Momento Positivo (mT) : 0.620
Cortante (T) : 1.686

TALON:

Momento Negativo (mT) : -2.563
Momento Positivo (mT) : 0.000
Cortante (T) : 2.83

ARMADURA DE LA ZAPATA

PUNTERA:

Armadura Superior (cm2) : 0.000
Armadura Inferior (cm2) : 0.770 4 Φ10 (3,14)
Capac. a Cortante del Hormigon : 28.868 Ton.

TALON:

Armadura Superior (cm2) : 2.573 4 Φ10 (3,14)
Armadura Inferior (cm2) : 0.000
Capac. a Cortante del Hormigon : 14.434 Ton.

Armado geometrico minimo (cm2) : 1.875 por ml. de perim.

ARMADO DEL MURO

Seccion No. : 1

Dist. a Coronacion (m) : 0.525
Canto de la Seccion (m) : 0.250
Capacidad a Cortante (T) : 11.502
Armadura min. Horizontal : 4.000 cm2. (entre las dos caras
Armadura min. Vertical : 2.250 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	0.097	0.583	0.467	0.032	0.000
2	1	0.070	0.364	0.343	0.034	0.000

Seccion No. : 2

Dist. a Coronacion (m) : 1.050
Canto de la Seccion (m) : 0.250
Capacidad a Cortante (T) : 11.502
Armadura min. Horizontal : 4.000 cm2. (entre las dos caras)
Armadura min. Vertical : 2.250 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	0.946	1.192	1.355	0.583	0.000
2	1	0.414	0.745	1.054	0.476	0.000

Seccion No. : 3

Dist. a Coronacion (m) : 1.470
Canto de la Seccion (m) : 0.250
Capacidad a Cortante (T) : 11.502
Armadura min. Horizontal : 4.000 cm2. (entre las dos caras)
Armadura min. Vertical : 2.250 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	1.792	1.699	2.262	1.438	0.000
2	1	1.017	1.061	1.888	1.213	0.000

Seccion No. : 4

Dist. a Coronacion (m) : 1.785
Canto de la Seccion (m) : 0.250
Capacidad a Cortante (T) : 11.502
Armadura min. Horizontal : 4.000 cm2. (entre las dos caras)
Armadura min. Vertical : 2.250 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	2.111	2.088	3.004	2.129	0.000
2	1	1.725	1.305	2.668	1.902	0.000

Seccion No. : 5

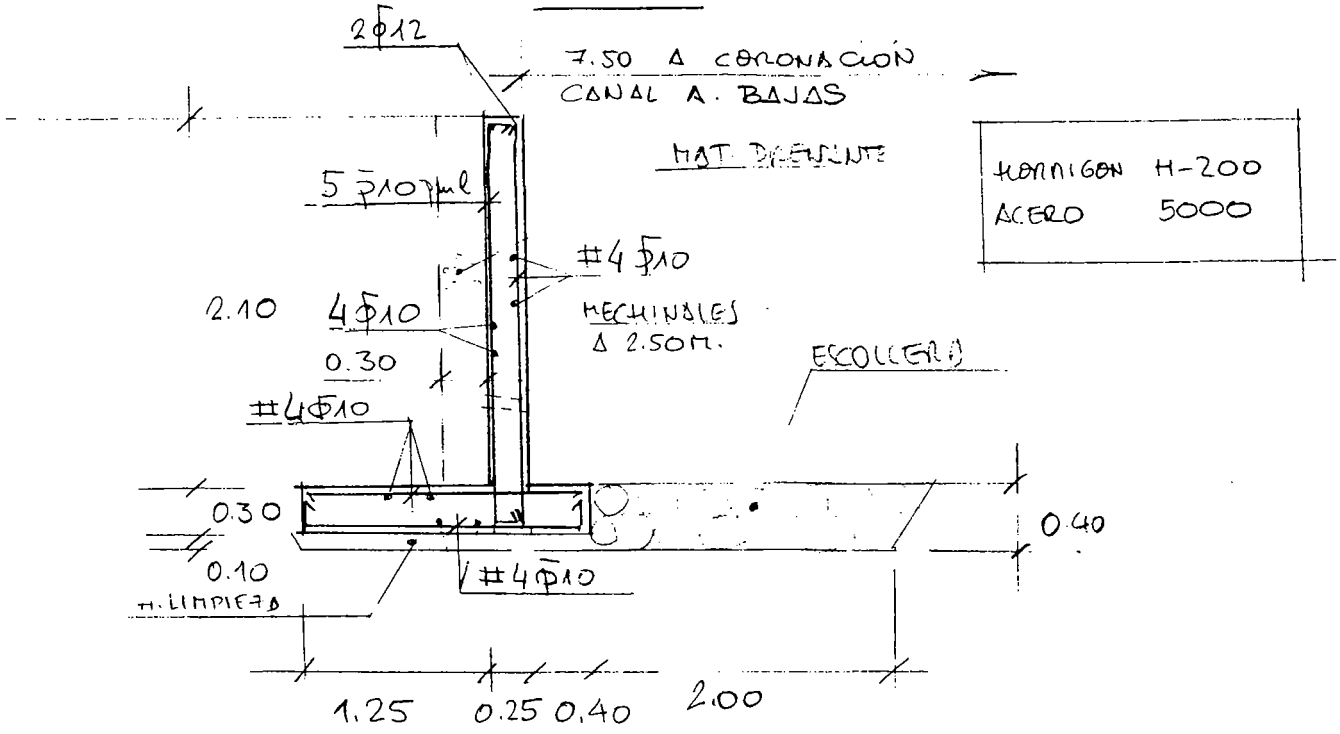
Dist. a Coronacion (m) : 2.100
Canto de la Seccion (m) : 0.250
Capacidad a Cortante (T) : 11.502
Armadura min. Horizontal : 4.000 cm2. (entre las dos caras) 8Φ10 (6.28)
Armadura min. Vertical : 2.250 cm2. (entre las dos caras)

Hip. No.	Pond. No.	ESFUERZOS M	N	Q	ARMADURAS (cm2) Trasdos	Intrados
1	1	3.170	2.488	3.800	3.186	0.000
2	1	2.699	1.555	3.580	2.756	0.000

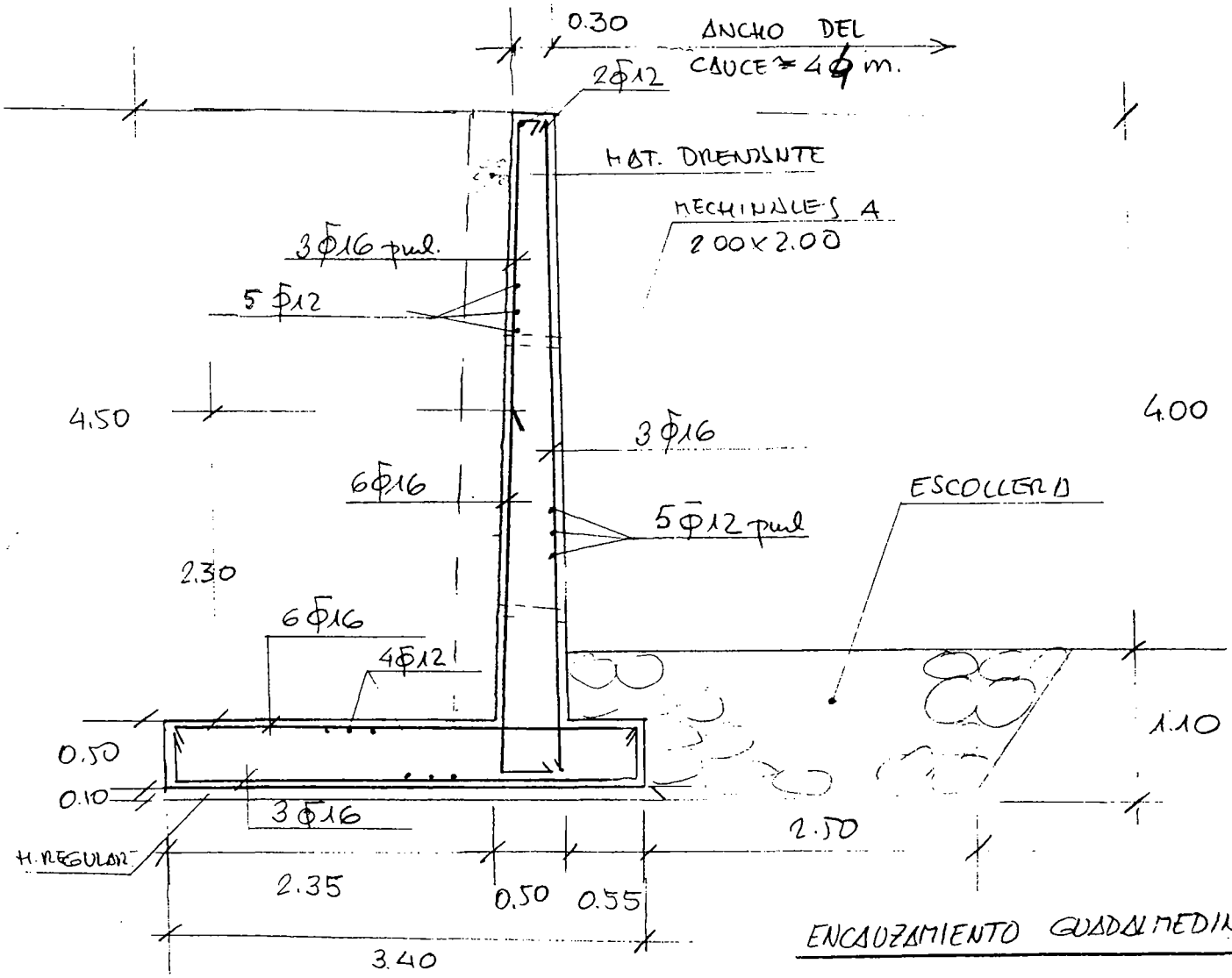
5Φ10 (3,93)

ANEJO: SECCIONES TIPO

- FIG. 1 -

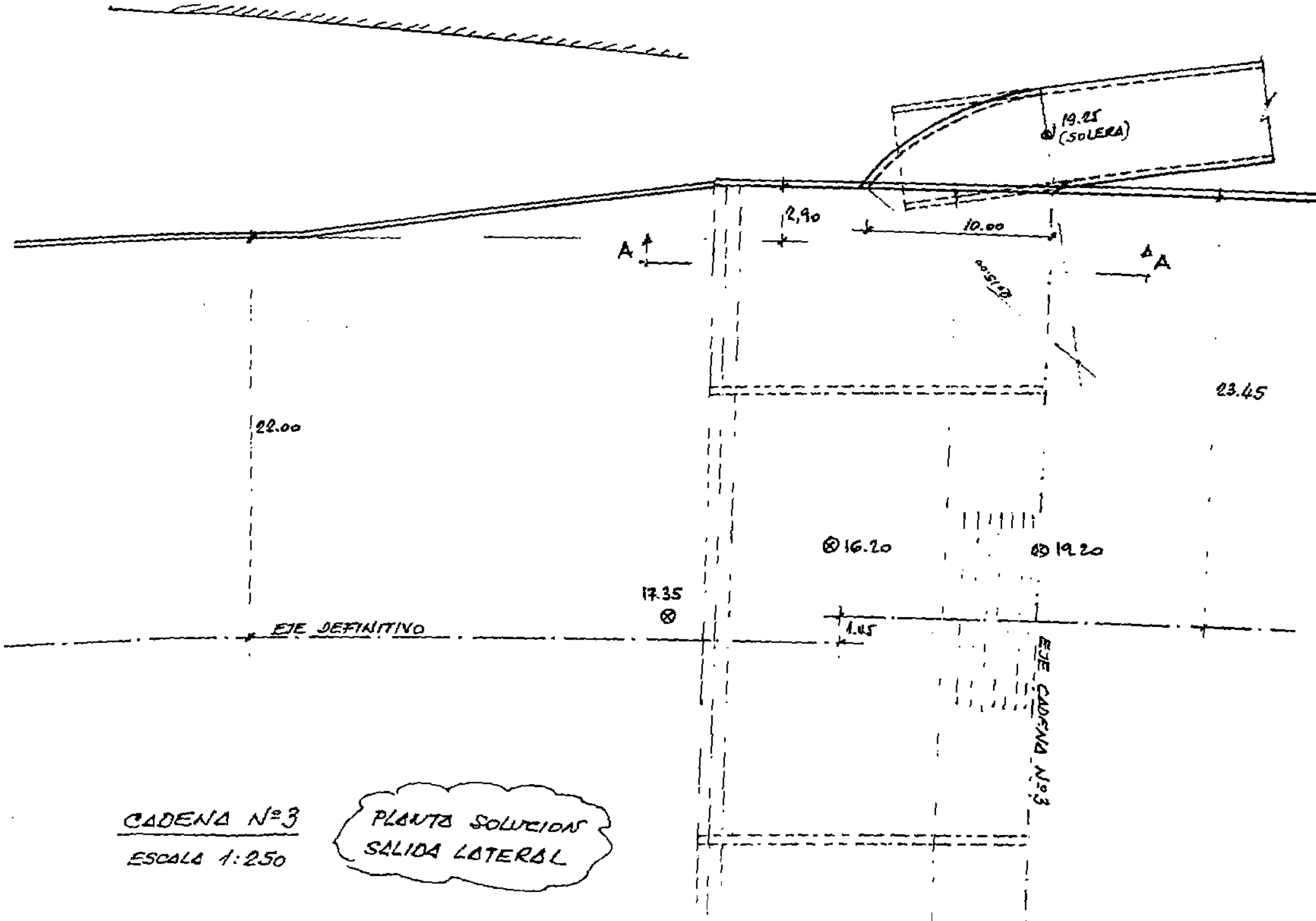


- FIG. 2 -



ENCAUZAMIENTO GUADALMEDINA

ABRIL —95



CADENA Nº3

ESCALA 1:250

PLANTA SOLUCION
SALIDA LATERAL

MURO ACTUAL
MARGEN DERECHA

B

ARBOL

DESAGUE
DE LA TOLMILLA

AMPLIACION CUENCO

LINEA DE MUROS

2.90

A DEMOLER

B

EJE CADENA Nº3

23

22.00

CUENCO ACTUAL 25.00 M.

16.20

17.35

1.45

EJE DEFINITIVO

19,20

A DEMOLER

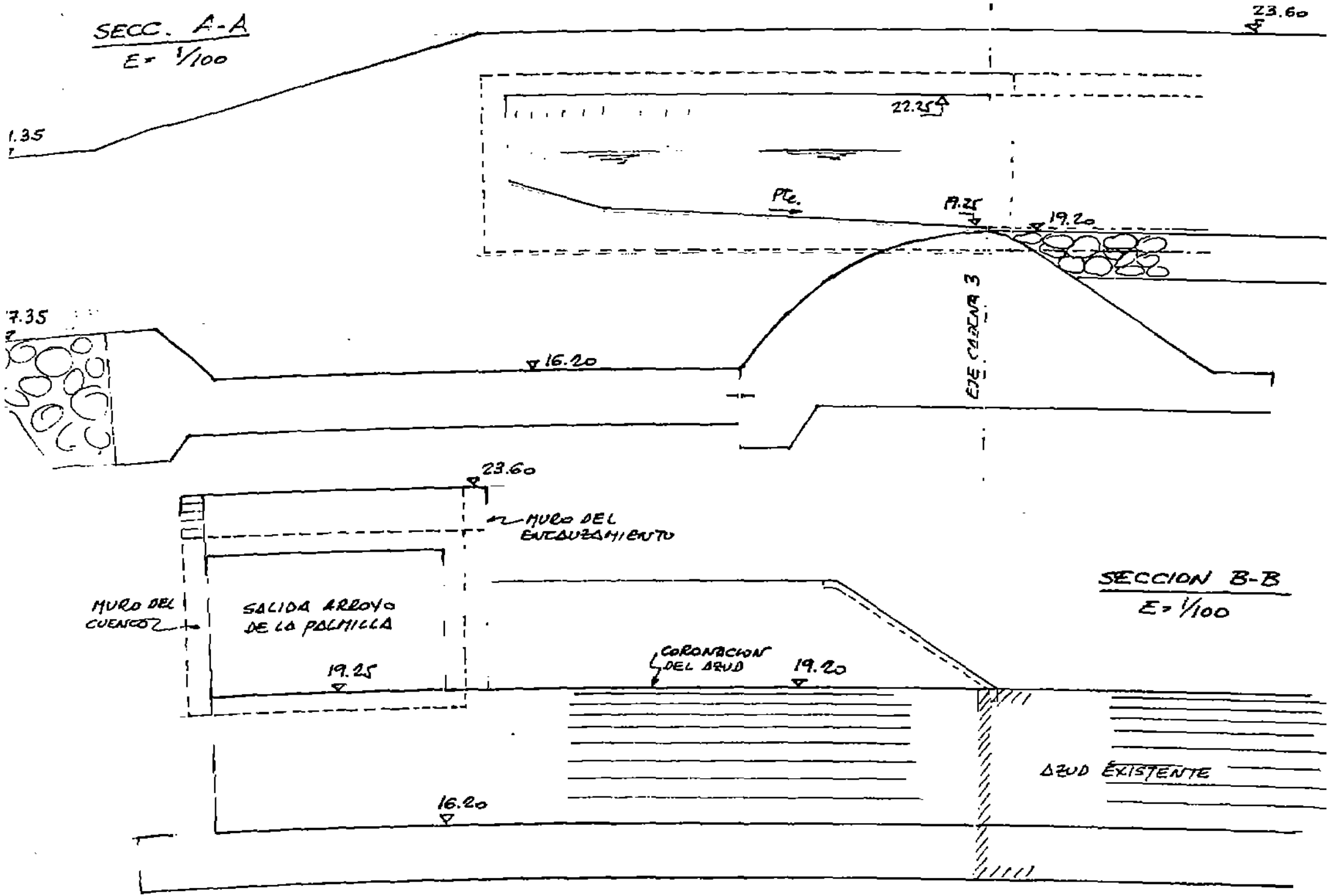
AMP

CUEN

CADENA Nº3

ESCALA 1:250

PLANTA SOLUCION
SALIDA FRONTAL


SECC. A-A
E= 1/100
23.60
22.25
1.35
Pte.
19.25
19.20
7.35
16.20
EJE CADENA 3
23.60
MURO DEL ENCAUZAMIENTO
MURO DEL CUENCO
SALIDA ARROYO DE LA PALMILLA
19.25
CORONACION DEL AZUD
19.20
SECCION B-B
E= 1/100
AZUD EXISTENTE
16.20