

SECCIÓN TÍPICA

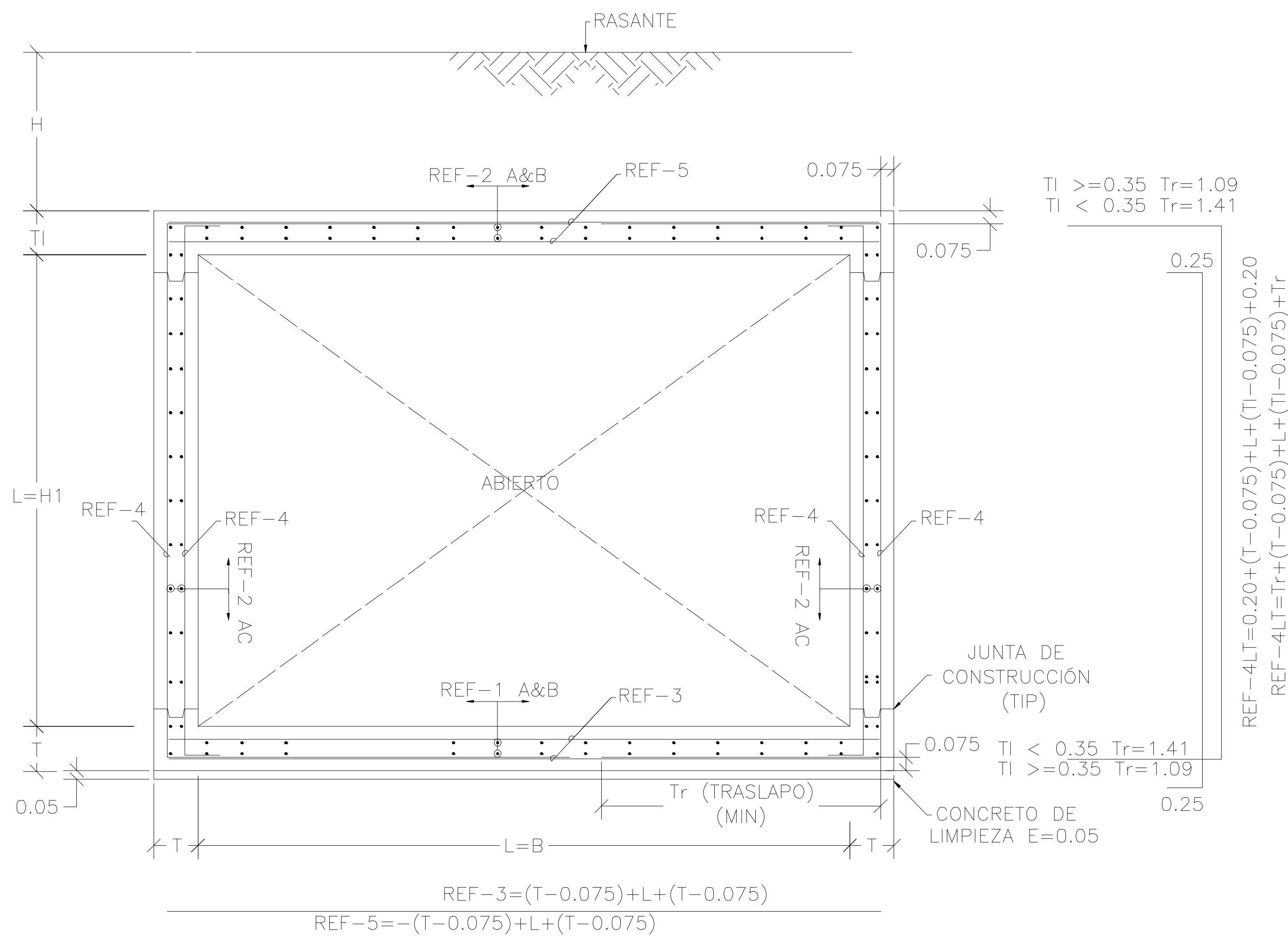
ESCALA: 1:25

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ESPECIFICACIONES DE DISEÑO
- CONCRETO $f'c = 28 \text{ MPa}$ (4000 PSI, Clase C)
- ACERO CORRUGADO $f_y = 420 \text{ MPa}$ (60000 PSI)
- TODAS LAS MEDIDAS ESTAN DADAS EN METROS.

BOX COULVERT DE H1=1.00 m x B=2.00 m										
ALTURA DEL RELLENO (H)	ESPESORES		REFUERZO					CANTIDADES DE OBRA		
	T	TI	REF - 1	REF - 2	REF - 3	REF - 4	REF - 5	CONCRETO m3/m	SOLADO m3/m	ACERO Kg/m
0.00 - 0.30	0.30	0.35	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	2.29	0.13	213.08
0.30 - 0.60	0.30	0.30	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	2.16	0.13	210.27
0.60 - 1.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
1.00 - 1.50	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
1.50 - 2.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
2.00 - 2.50	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
2.50 - 3.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
3.00 - 4.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
4.00 - 5.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
5.00 - 6.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	1.75	0.13	200.58
6.00 - 7.00	0.30	0.35	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	2.29	0.13	213.08
7.00 - 8.00	0.35	0.35	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	2.59	0.14	221.51

BOX COULVERT DE H1=2.00 m x B=3.00 m										
ALTURA DEL RELLENO (H)	ESPESORES		REFUERZO					CANTIDADES DE OBRA		
	T	TI	REF - 1	REF - 2	REF - 3	REF - 4	REF - 5	CONCRETO m ³ /m	SOLADO m ³ /m	ACERO Kg/m
0.00 - 0.30	0.35	0.40	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.15	4.18	0.19	367.11
0.30 - 0.60	0.30	0.30	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.25	3.36	0.18	371.17
0.60 - 1.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	2.75	0.18	370.07
1.00 - 1.50	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	2.75	0.18	335.32
1.50 - 2.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	2.75	0.18	335.32
2.00 - 2.50	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	2.75	0.18	335.32
2.50 - 3.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	2.75	0.18	335.32
3.00 - 4.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	2.75	0.18	335.32
4.00 - 5.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	2.75	0.18	370.07
5.00 - 6.00	0.30	0.30	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	3.36	0.18	381.95
6.00 - 7.00	0.30	0.35	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	3.54	0.18	385.38
7.00 - 8.00	0.40	0.40	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	4.64	0.19	407.25

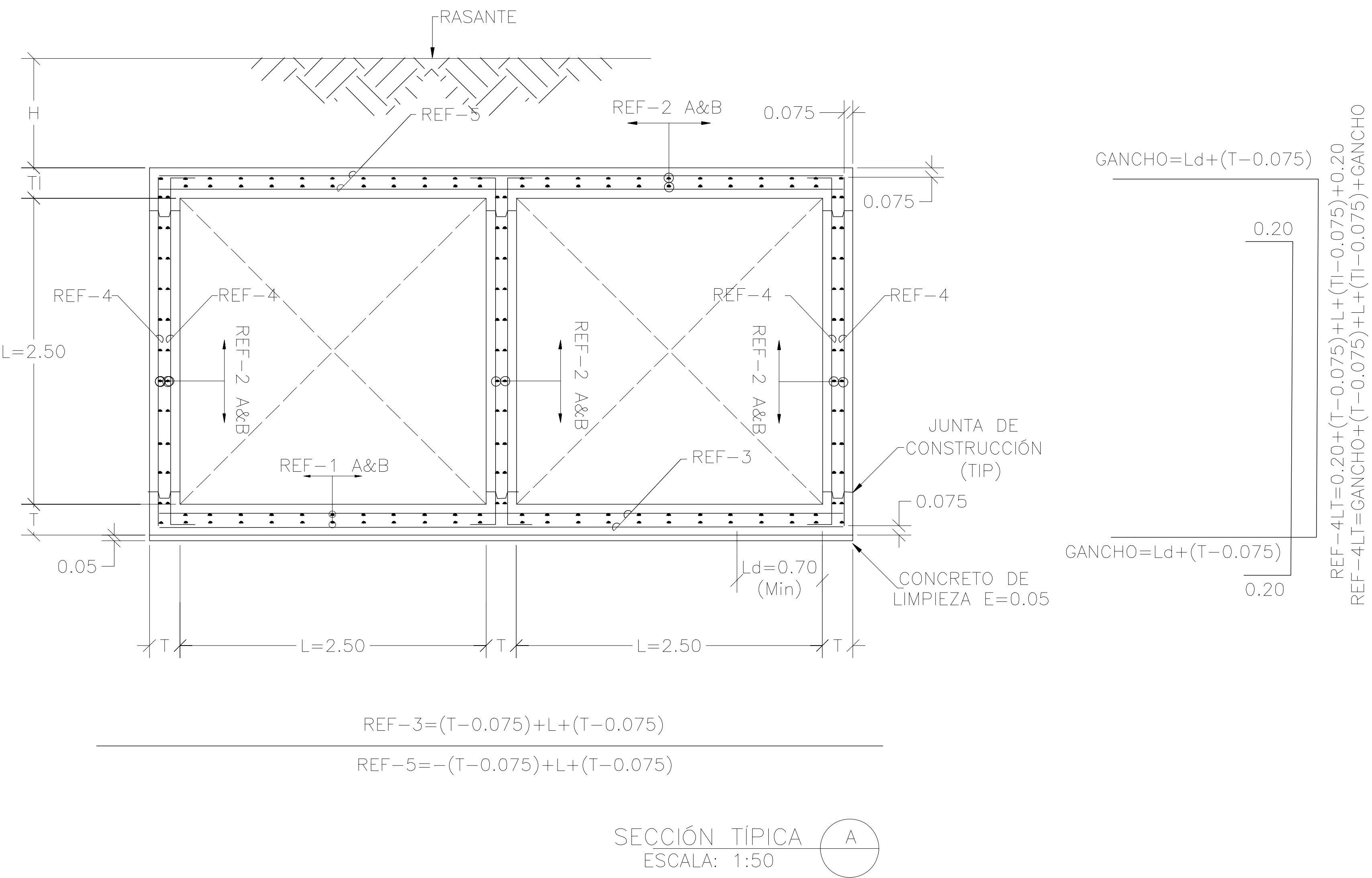


SECCIÓN TÍPICA
ESCALA: 1:50

ESPECIFICACIONES DE DISEÑO
CONCRETO f'c=28 MPa (4000 PSI, Clase C)
ACERO CORRUGADO fy=420 MPa (60000 PSI)
TODAS LAS MEDIDAS ESTAN DADAS EN METROS

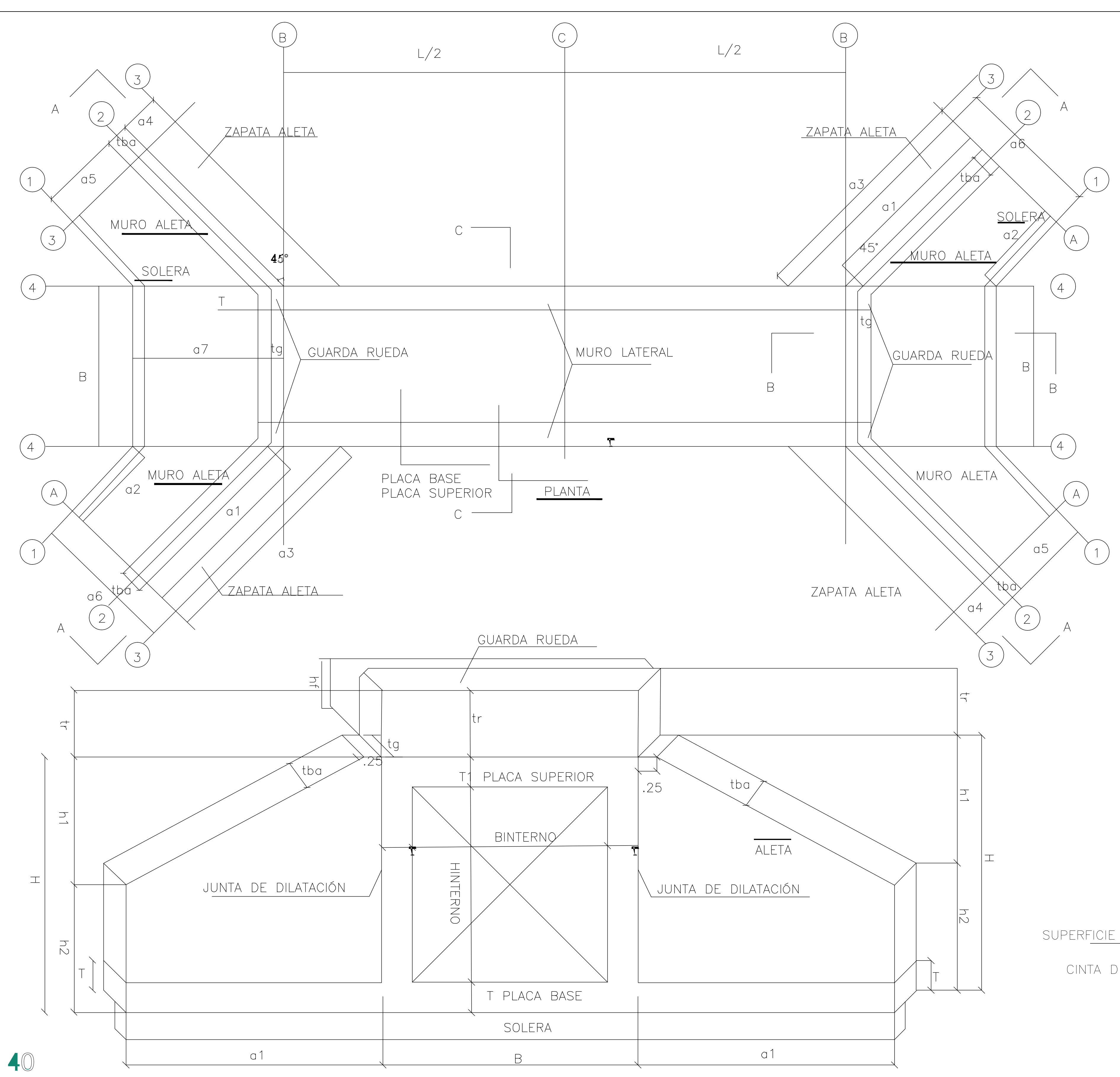
BOX COULVERT DE H1=2.00 m x B=4.00 m										
ALTURA DEL RELLENO (H)	ESPESORES		REFUERZO					CANTIDADES DE OBRA		
	T	TI	REF - 1	REF - 2	REF - 3	REF - 4	REF - 5	CONCRETO m3/m	SOLADO m3/m	ACERO Kg/m
0.00 - 0.30	0.40	0.45	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	5.68	0.24	569.23
0.30 - 0.60	0.30	0.35	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.20	4.19	0.23	590.01
0.60 - 1.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.15	3.96	0.23	595.47
1.00 - 1.50	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.20	3.96	0.23	585.55
1.50 - 2.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.20	3.96	0.23	585.55
2.00 - 2.50	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.20	3.96	0.23	585.55
2.50 - 3.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.15	3.96	0.23	595.47
3.00 - 4.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	3.96	0.23	646.12
4.00 - 5.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	3.96	0.23	646.12
5.00 - 6.00	0.35	0.40	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	4.93	0.24	670.20
6.00 - 7.00	0.35	0.45	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	5.16	0.24	672.88
7.00 - 8.00	0.40	0.50	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	5.92	0.24	692.05

BOX COULVERT DE H1=3.00 m x B=4.00 m										
ALTURA DEL RELLENO (H)	ESPESORES		REFUERZO					CANTIDADES DE OBRA		
	T	TI	REF - 1	REF - 2	REF - 3	REF - 4	REF - 5	CONCRETO m3/m	SOLADO m3/m	ACERO Kg/m
0.00 - 0.30	0.40	0.45	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	6.48	0.24	640.57
0.30 - 0.60	0.30	0.35	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.25	4.79	0.23	660.35
0.60 - 1.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.20	4.56	0.23	725.38
1.00 - 1.50	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.20	4.56	0.23	665.81
1.50 - 2.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.20	4.56	0.23	725.38
2.00 - 2.50	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.20	4.56	0.23	725.38
2.50 - 3.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.20	4.56	0.23	725.38
3.00 - 4.00	0.30	0.30	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	3/4" @0.15	4.56	0.23	675.73
4.00 - 5.00	0.30	0.35	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	4.79	0.23	740.21
5.00 - 6.00	0.30	0.40	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	5.02	0.23	745.11
6.00 - 7.00	0.40	0.45	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	6.48	0.24	776.32
7.00 - 8.00	0.40	0.50	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	3/4" @0.15	6.72	0.24	781.23



BOX COULVERT DOBLE DE 2.50 m x 2.50 m										
ALTURA DEL RELLENO (H)	ESPESORES		REFUERZO					CANTIDADES DE OBRA		
	T	TI	REF - 1	REF - 2	REF - 3	REF - 4	REF - 5	CONCRETO m3/m	SOLADO m3/m	ACERO Kg/m
0.00 - 0.30	0.35	0.40	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.15	7.16	0.30	556.13
0.30 - 0.60	0.30	0.35	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	6.09	0.30	525.66
0.60 - 1.00	0.30	0.30	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.20	5.79	0.30	523.32
1.00 - 2.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.15	4.75	0.29	565.81
2.00 - 3.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.25	4.75	0.29	492.23
3.00 - 4.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	5/8" @0.25	4.75	0.29	492.23
4.00 - 5.00	0.25	0.25	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.25	4.75	0.29	527.69
5.00 - 6.00	0.30	0.30	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	5/8" @0.25	5.79	0.30	540.19

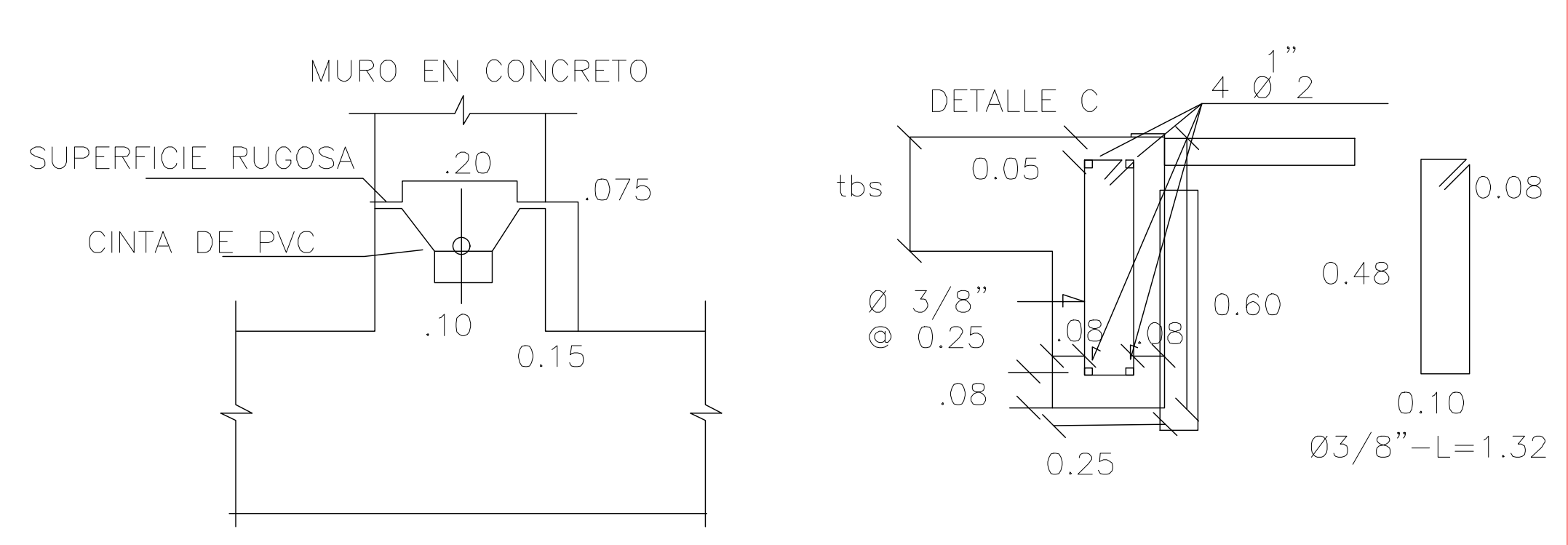
ESPECIFICACIONES DE DISEÑO
CONCRETO f'c=28 MPa (4000 PSI, Clase C)
ACERO CORRUGADO fy=420 MPa (60000 PSI)
TODAS LAS MEDIDAS ESTAN DADAS EN METROS



- NOTAS GENERALES**
1. LAS DIMENSIONES MOSTRADAS ESTÁN DADAS EN METROS, EXCEPTO CUANDO SE INDIQUE OTRA UNIDAD.
 2. RECUBRIMIENTO DEL ACERO DE REFUERZO EXTERNO = 0.075 m INTERNO = 0.05m.
 3. NORMA DE DISEÑO Y ESPECIFICACIONES
 - NORMA COLOMBIANA DE DISEÑO DE PUENTES-LRFD-CCP-14.
 - NORMAS DE ENSAYO DE MATERIALES PARA CARRETERAS. I. VERSIÓN 2013.
 - ESPECIFICACIONES GENERALES DE CONSTRUCCIÓN PARA CARRETERAS-INVIAS VERSIÓN 2013.
 4. MÉTODO DE DISEÑO
 - LAS DISPOSICIONES DE DISEÑO PARA LOS MUROS, SIGUIERON EL MÉTODO CON FACTORES DE CARGA Y RESISTENCIA-LRFD.
 5. CARGAS DE DISEÑO
 - PESO ESPECÍFICO DEL HORMIGÓN: 24 kN/m³.
 6. MATERIALES
 - RESISTENCIA A LA COMPRESIÓN DEL CONCRETO: f'c= 21 MPa (Clase D).
 - RESISTENCIA A LA COMPRESIÓN CONCRETO SIMPLE PARA SOLADOS: f'c= 14 MPa (Clase F).
 - ESFUERZO DE FLUENCIA DEL ACERO DE REFUERZO: fy= 420 MPa.
 - RELLENO MATERIAL FILTRANTE: ESPECIFICACIONES GENERALES DE CONSTRUCCIÓN DE CARRETERAS ARTICULO 610.2.4.
 - GEOTEXTIL: NT.
 - PARÁMETROS GEOTÉCNICOS UTILIZADOS EN EL DIMENSIONAMIENTO DE LOS BOX CULVERT:
- MATERIAL DE RELLENO:**
- PESO ESPECÍFICO DEL RELLENO: $\gamma=19.0 \text{ kN/m}^3$.
 - COEFICIENTE ACTIVO DE PRESIÓN DE TIERRAS $K_a = 0.40$.
 - COEFICIENTE DE PRESIÓN LATERAL DE SUELO EN REPOSO, $k_o= 0.50$.
- SUELO DE FUNDACIÓN:**
- CAPACIDAD DE CARGA ADMISIBLE DEL SUELO DE FUNDACIÓN= 130.0 kN/m².
- PARÁMETROS SÍSMICOS:**
- COEFICIENTE DE ACCELERACIÓN PICO DEL SUELO: $A_a \leq 0.30$.

NOTA:

- EN EL CASO DE PRESENTARSE UNA DIFERENCIA EN LOS PARAMETROS GEOTECNICOS Y SISMICOS. LA ESTRUCTURA REQUIERE DE UN NUEVO DISEÑO.
- SE DEBE HACER UN MANTENIMIENTO RUTINARIO EN LA CUAL SE ELIMINE MATERIAL SEDIMENTARIO DEL FONDO DE LOS BOX CULVERT PARA ASÍ EVITAR POSIBLES OBSTRUCCIONES.
- NO SE PERMITEN SOLDADURAS EN EL ACERO DE REFUERZO.
- SE DEBE GARANTIZAR COMO MÍNIMO LA LONGITUD DE TRASLAPO INDICADA EN CADA DETALLE.



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GEOMETRÍA Y CANTIDADES DE OBRA

SECCIONES	GUARDARUEDAS		ALETAS					BASE ALETAS							REFUERZO				CANTIDADES DE OBRA		
	tg	tr	H externo	h1	h2	a1	tba	tbs	a2	a3	a4	a5	a6	a7	REF 1	REF 2	REF 3	REF 4	CONCRETO	SOLADO	ACERO
	m	m	m	m	m	m	m	m	m	m	m	m	m	m					m3	m3	kg
1.00 X 1.00	0.25	0.30	1.50	0.50	1.00	1.50	0.25	0.25	0.93	1.68	0.18	0.32	0.75	0.55	1/2" @0.25	3/8" @0.25	3/8" @0.25	3/8" @0.25	3.18	0.41	187.06
1.50 X 1.50	0.25	0.30	2.00	0.70	1.30	2.00	0.25	0.25	1.15	2.32	0.32	0.58	1.15	0.95	1/2" @0.25	3/8" @0.25	3/8" @0.25	3/8" @0.25	6.14	0.87	367.32
2.00 X 2.00	0.25	0.30	2.50	0.80	1.70	2.60	0.25	0.25	1.29	3.00	0.40	1.00	1.70	1.55	1/2" @0.25	1/2" @0.25	5/8" @0.25	5/8" @0.25	10.87	1.61	1148.84
2.50 X 2.50	0.25	0.30	3.00	0.80	2.20	2.60	0.25	0.25	1.29	3.00	0.40	1.00	1.70	1.55	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	12.63	1.73	1681.50
3.00 X 3.00	0.25	0.30	3.50	1.30	2.20	3.00	0.25	0.25	1.37	3.40	0.40	1.25	2.00	1.95	5/8" @0.25	5/8" @0.25	3/4" @0.25	3/4" @0.20	16.67	2.33	2781.96
4.00 X 4.00	0.30	0.30	4.60	1.10	3.50	3.00	0.30	0.30	1.37	3.40	0.40	1.25	2.00	1.95	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.15	25.60	2.66	4431.24
1.00 X 2.00	0.25	0.30	1.50	0.50	1.00	1.50	0.25	0.25	0.93	1.68	0.18	0.32	0.75	0.55	1/2" @0.25	1/2" @0.25	1/2" @0.25	1/2" @0.25	3.60	0.52	350.06
2.00 X 3.00	0.25	0.30	2.50	0.80	1.70	2.60	0.25	0.25	1.29	3.00	0.40	1.00	1.70	1.55	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.20	12.78	1.85	1582.46
2.00 X 4.00	0.30	0.30	2.60	0.60	2.00	2.60	0.30	0.30	1.29	3.00	0.40	1.00	1.70	1.55	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	15.81	2.13	2570.14
3.00 X 4.00	0.30	0.30	3.60	1.30	2.30	3.00	0.30	0.30	1.37	3.40	0.40	1.25	2.00	1.95	3/4" @0.25	3/4" @0.25	3/4" @0.25	3/4" @0.20	21.67	2.66	3490.44
2.50 X 2.50 DOBLE	0.30	0.30	3.10	1.40	1.70	2.60	0.30	0.30	1.29	3.00	0.40	1.00	1.70	1.55	5/8" @0.25	5/8" @0.25	5/8" @0.25	5/8" @0.15	17.69	2.45	1771.48
3.00 X 3.00 DOBLE	0.30	0.30	3.60	1.30	2.30	3.00	0.30	0.30	1.37	3.40	0.40	1.25	2.00	1.95	5/8" @0.25	5/8" @0.25	3/4" @0.25	3/4" @0.15	24.77	3.30	3086.94
3.50 X 3.50 DOBLE	0.30	0.30	4.10	1.10	3.00	3.00	0.30	0.30	1.37	3.40	0.40	1.25	2.00	1.95	3/4" @0.25	3/4" @0.25	7/8" @0.25	7/8" @0.25	28.25	3.58	4193.33
4.00 X 4.00 DOBLE	0.30	0.30	4.60	1.10	3.50	3.00	0.30	0.30	1.37	3.40	0.40	1.25	2.00	1.95	3/4" @0.25	3/4" @0.25	7/8" @0.25	7/8" @0.20	31.40	3.87	4878.78

BOX CULVERT GEOMETRÍA GENERAL Y REFUERZO

