

1. Chamfer all exposed edges  $\frac{3}{4}$  inch and finish all exposed surfaces with a Class 1 ordinary finish.

2. The minimum concrete cover to the face of any bar is 2 inches unless otherwise shown.

3. See Standard 604-2 for Type A Frame and Grate and Standard 604-3 for Type B Frame and Grate.

CONCRETE CATCH BASINS				
PIPE SIZE	DEPTH	FRAME AND GRA		
DIAMETER		TYPE A	TYPE B	
12"	3'-0"	2'-6"	2'-6"	
18"	3'-0"	2'-6"	2'-6"	
24"	4'-0"	3'-3"	3'-4"	
30"	4'-0"	4'-0"	4'-2"	
36"	4'-6"	4'-9"	5'-0"	
42"	5'-0"	5'-6"	5'-5"	
48"	5'-6"	6'-3"	6'-3"	

CONCRETE CATCH BASINS				
		ESTIMATED QU	ANTITIES	
PIPE SIZE AMFTFR	CONCRETE REINFORCING		FRAME AND GRATE LB	
	COID	LB	TYPE A	TYPE B
12"	0.7	54	215	238
18"	0.7	54	215	238
24"	1.1	81	271	314
30"	1.2	92	327	390
36"	1.5	101	383	466
42"	1.8	131	439	504
48"	2.2	151	495	580

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD 604-1
	0011
	SPECIFICATION
CATCH DACINE TYDE 4	FP-24, FP-14
CATCH BASIN, TYPE I	APPROVED FOR USE
	1/2024



PRO1ECT	
TROJECT	

1. Chamfer all exposed edges 20 mm and finish all exposed surfaces with a Class 1 ordinary finish.

2. The minimum concrete cover to the face of any bar is 50 mm unless otherwise shown.

3. See Standard M604-2 for Type A Frame and Grate and Standard M604-3 for Type B Frame and Grate.

CONCRETE CATCH BASINS				
PIPE SIZE	DEPTH u	FRAME AND GRA		
DIAMETER	11	TYPE A	TYPE B	
300	900	780	780	
450	900	780	780	
600	1200	1010	1020	
750	1200	1240	1260	
900	1350	1470	1500	
1050	1500	1700	1680	
1200	1650	1930	1920	

CONCRETE CATCH BASINS				
0105		ESTIMATED QU	ANTITIES	
PIPE SIZE AMFTFR	CONCRETE	REINFORCING STEEL	FRAME AN k	ND GRATE g
		kg	TYPE A	TYPE B
300	0.6	24	98	108
450	0.6	24	98	108
600	0.8	37	123	142
750	0.9	42	148	177
900	1.2	46	174	211
1050	1.4	59	199	263
1200	1.7	68	225	297

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY

CATCH BASIN, TYPE 1

M604-1 SPECIFICATION FP-24, FP-14 APPROVED FOR USE 1/2024

FLH STANDARD



c:\pw-wc

	DDOJECT		SHEET
$x^{2} x^{2} x^{1} x^{4}$			NUMBER
im L to size)	L		L
NOTE:			
1. STRUCTURAL STEEL: ASTM	1 A36.		
2. BOLTS & WASHERS: ASTM	A307, Galvanized		
3. THREADED CONCRETE ANC inserts for <sup>3</sup> / <sub>8</sub> inch bolt or ap	CHORS: Ferrule lo oproved equal.	юр	
4. HEADED CONCRETE ANCHO a full penetration butt weld	DRS: Weld to fram	ne with	
5. WELDING: Weld in conform Specifications. Unless othe all joints with a minimum s material thickness. Grind s FINISH: Galvanized after fa	nance with the Sta rwise indicated se ize fillet weld, bas rmooth all contact abrication.	ndard eal weld eed on surfaces.	
<ol> <li>Estimated weight, frame ar 215 lbs. Increase or decrea each 4<sup>1/</sup><sub>2</sub> inch increment.</li> </ol>	nd grate (2'-6" x 2 ase weight by 28	?'-6") lbs for	
7. Number of plates varies acc See Standard 604-1.	cording to pipe dia	ameter.	
8. See Standard 604-1 for din	nensions of T.		
L4" x 1" x <sup>1</sup> / <sub>4</sub> "	$\frac{1}{2}$ x 4" headed a	anchor	
Plate			
FRAME ANCH	OR DETAIL		
stiffener			
U.S. DEPARTMENT OF TRANSPORTA OFFICE OF FEDERAL LANDS H	ATION, FHWA IGHWAY	FLH STAN	DARD
METAL FRAME ANI TYPE A	D GRATE	SPECIFIC FP-24, F APPROVED F 1/20	TION P-14 OR USE



	PROJECT		SHEET
2 x 64 x 6.4 m L to size)			NUMBER
NOTE:			
. STRUCTURAL STEEL: ASTI	M A36.		
. BOLTS & WASHERS: ASTM	1 A307, Galvanize	ed.	
. THREADED CONCRETE ANd inserts for M10 bolt or app	CHORS: Ferrule proved equal.	Іоор	
. HEADED CONCRETE ANCH a full penetration butt weld	ORS: Weld to fra d.	me with	
. WELDING: Weld in conforr Specifications. Unless oth all joints with a minimum s material thickness. Grind FINISH: Galvanized after f	nance with the S erwise indicated size fillet weld, b smooth all conta abrication.	tandard seal weld ased on ct surface.	s.
. Estimated weight, frame a 97.5 kg. Increase or decre each 115 increment.	nd grate (756 x ) ease weight by 1	756) 2.7 kg for	
. Number of plates varies ac See Standard M604-1.	ccording to pipe c	liameter.	
. See Standard M604-1 for o	dimensions of T.		
. Furnish hardware in the m Equivalent U.S. Customary metric sizes are unavailabl	etric sizes shown v sizes may be us le.	sed when	
.02 x 25 x 6.4 —			
ate	M12 x headed	100 I anchor	
FRAME ANCH	OR DETAIL	-	
Plate			
iffener			
This drawing contains <b>M</b> Dimensions without unit	<b>letric</b> units of me ts are millimeters	easure. S.	
U.S. DEPARTMENT OF TRANSPORTA OFFICE OF FEDERAL LANDS HIG	TION, FHWA GHWAY	FLH STAN	
IETAL FRAME AND	GRATE	SPECIFIC FP-24, F	FTION FP-14 FOR USE
ΙΥΡΕ Α		1/20	24



DDOIE	CТ
PROJE	LI

### NOTE:

- 1. STRUCTURAL STEEL: ASTM A36.
- 2. BOLTS & WASHERS: ASTM A307, Galvanized.
- 3. THREADED CONCRETE ANCHORS: Ferrule loop inserts for  $\frac{3}{8}$  inch bolt or approved equal.
- 4. HEADED CONCRETE ANCHORS: Weld to frame with a full penetration butt weld.
- 5. WELDING: Weld in conformance with the Standard Specifications. Unless otherwise indicated seal weld all joints with a minimum size fillet weld, based on material thickness. Grind smooth all contact surfaces. FINISH: Galvanized after fabrication.
- 6. Estimated weight, frame and grate  $(2'-6" \times 2'-6")$ 238 lbs. Increase or decrease weight by 19 lbs for each  $2\frac{3}{8}$ -inch increment.
- 7. Number of plates varies according to pipe diameter. See Standard 604-1.
- 8. See Standard 604-1 for dimensions of T.



# FRAME ANCHOR DETAIL

1¾" x ½" Plate

*- 2¾" x ¼" Plate* 

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD	
	0010	
METAL FRAME AND GRATE	SPECIFICATION FP-24, FP-14	
ΤΥΡΕ Β	APPROVED FOR USE 1/2024	



с.\nwi-work\dms44776\Std604-3 don

2024 3:17 PM

	PROJECT		SHEET NUMBER
NOTE:			
STRUCTURAL STEEL: AST	M A36.		
BOLTS & WASHERS: ASTI	M A307, Galvaniz	ed.	
THREADED CONCRETE AN for M10 bolt or approved e	CHORS: Ferrule equal.	loop inser	ts
HEADED CONCRETE ANCH a full penetration butt weld	IORS: Weld to fra d.	ame with	
WELDING: Weld in confor Specifications. Unless oth all joints with a minimum material thickness. Grind FINISH: Galvanized after	mance with the S erwise indicated size fillet weld, ba smooth all conta fabrication.	Standard seal weld ased on ct surfaces	5.
Estimated weight, frame a 108 kg. Increase or decre each 60 mm increment.	nd grate (756 x ) ease weight by 8.	756 mm) 6 kg for	
Number of plates varies ad See Standard M604-1.	ccording to pipe c	liameter.	
See Standard M604-1 for	dimensions of T.		
Furnish hardware in the metric sizes shown. Equivalent U.S. Customary sizes may be used when metric sizes are unavailable.			
	L102 x 25 x	6.4	
45	M12 Sheadd	< 100 ed anchor	
FRAME ANCHOR DETAIL			
5.4 Plate			
70 x 6.4 Plate			
This drawing contains <b>Metric</b> units of measure.			
U.S. DEPARTMENT OF TRANSPORTA OFFICE OF FEDERAL LANDS HI	TION, FHWA GHWAY	FLH STAN	DARD
		M604 SPECIFICA	ודוסא TION
TVDE P	GRAIE	FP-24, F	·P-14 FOR USE
		1/202	24



## NOTE:

1. Chamfer all exposed edges <sup>3</sup>/<sub>4</sub> inch and finish all exposed surfaces with a Class 1 ordinary finish.

2. The minimum concrete cover to the face of any bar is  $1\frac{1}{2}$  inches unless otherwise shown.

*3.* See Standard 604-2 for Type A Frame and Grate and Standard 604-3 for Type B Frame and Grate.

4. Make all coupling band connections watertight by placing  $\frac{3}{16}$ -inch bead of approved caulking under each half of the bands before tightening.

*5. Fabricate tapered portion of slip-joint from either flat or corrugated sheets.* 

6. Place Class 2 riprap according to Section 251 for protective apron.



PLAN

**PROTECTIVE APRON** 

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	flh standard 604-4
CATCH BASIN	SPECIFICATION FP-14, FP-24
WITH DOWN DRAIN	APPROVED FOR USE 1/2024



i

	PROJECT		SHEET NUMBER			
TC.			<u> </u>			
<i>I E :</i> amfer all exposed edges 20 i I finish all exposed surfaces inary finish.	mm with a Class 1					
e minimum concrete cover to mm unless otherwise shown	o the face of any i	bar is				
e Standard M604-2 for Type ndard M604-3 for Type B Fr	A Frame and Gra ame and Grate.	te and				
ke all coupling band connections watertight by placing ht bead of approved caulking under each half of the hds before tightening.						
pricate tapered portion of slip rugated sheets.	o-joint from eithe	r flat or				
ce Class 2 riprap according t on.	o Section 251 for	protectiv	е			
1200 min.	AN	······				
PROTECTIVE APRON						
This drawing contains <b>№</b> Dimensions without uni	<b>letric</b> units of me ts are millimeters	easure.				
U.S. DEPARTMENT OF TRANSPORTA OFFICE OF FEDERAL LANDS HI	TION, FHWA GHWAY	FLH STAN	DARD			
CATCH BASI	N	SPECIFIC/				
TYPE 2		APPROVED F	OR USE			
WITH DOWN D	KAIN	1/20	24			







	PROJECT		SHEET NUMBER			
DTE:						
t dip galvanize all metal parts er fabrication.	for frame and gra	ate				
bricate frame and grate from s	tructural steel.					
tach frame to inlet using four <sup>3</sup> th nuts.	4" x 8" anchor bo	lts				
t holes in $3\frac{1}{2}$ " x $\frac{1}{2}$ " bars as realised inch diameter rods.	quired to place					
ot weld $\frac{5}{8}$ -inch diameter rods $3\frac{1}{2}$ " x $\frac{1}{2}$ " bars.	for frame and gra	te				
-						
5⁄8" dia.						
	$\bigcirc$					
SECTION A-A						
3½" x ½" bar		$\backslash$				
		/				
$\overline{\}$						
	ULTAIL U					
U.S. DEPARTMENT OF TRANSPORTA OFFICE OF FEDERAL LANDS HI	TION, FHWA GHWAY	FLH STAN 604-	DARD 6			
FRAME AND GR	ATE.	SPECIFIC/ FP-24.F	TION P-14			
TYPE 5A		APPROVED F	OR USE			
		1/20	- •			















APPROXIMATE QUANTITIES									
	12"	15"	18"	24"	30"	36"			
り	2'-0"	2'-3¼″	2'-6½"	3'-1"	3'-7½"	4'-2"			
UYD	0.947	1.045	1.143	1.339	1.535	1.731			
ncrete	0.362 cuyd for each additional foot of depth (H)								
	Туре 7А: 0.724 сиуd Туре 7В: 1.185 сиуd								
e)	0.413 cuyd								
steel	63 lb.								



					PROJECT	Г	SHEET NUMBER	
DTE:								
pe 7A	has a sin	igle gutte	er whe	n inlet is	s on a g	rade.		
vpe 7B etween	has a do two grac	uble guti les.	ter who	en inlet i	is in a s	ag		
arp dite	ch to tie	smoothly	∕ into i	nlet guti	ter.			
isure o	utside di	mension	s of gr	ate are 1	1000 x (	890 mm		
aximun	n depth (	(H) is 38	00 mm					
l reinfo ear fror enters e enters a	reinforcing bars are #16 placed a minimum 40mm ear from face of concrete. In floors, place bars on 150mm nters each way. In walls, place horizontal bars on 150mm nters and vertical bars on 300mm centers.							
alvanize \SHTO	e grate a M 111.	fter fabri	ication	in accoi	rdance i	with		
ternate ceptab	ternate methods of anchoring angle iron will be ceptable if approved.							
				TIES				
APF		AIEQU	JANTI 450	TIES	75		20	
)	600	690	775	940	$\frac{1}{2}$	00 12	70	
3	0.690	0.769	0.84	4 0.98	9 1.1	30 1.2	280	
crete 0.264 m <sup>3</sup> for each additional 300 mm of depth (H) Type 7A: 0.528 m <sup>3</sup> Type 7B: 0.864 m <sup>3</sup>								
e)			0	301 m³				
teel			2	8.5 kg				
48.3 OD double-extra strong steel pipe at 9.56 kg/m (ASTM A 53). 50.8 dia. solid steel bar at 15.89 kg/m may be substituted. L 51 x 51 x 9.5 (2 at 890 required) Weld								
<i>This drawing contains <b>Metric</b> units of measure.</i> <i>Dimensions without units are millimeters.</i>								
U.S.	DEPARTMEN	NT OF TRAN	SPORTAT	ION, FHWA		FLH ST	STANDARD	
INLET			SPECIFICATION					
TYPE 7A AND 7B     FP-24/FP-14       APPROVED FOR USE					/FP-14 D FOR USE			
FOR 300 TO 900 CULVERT 1/2024						2024		



