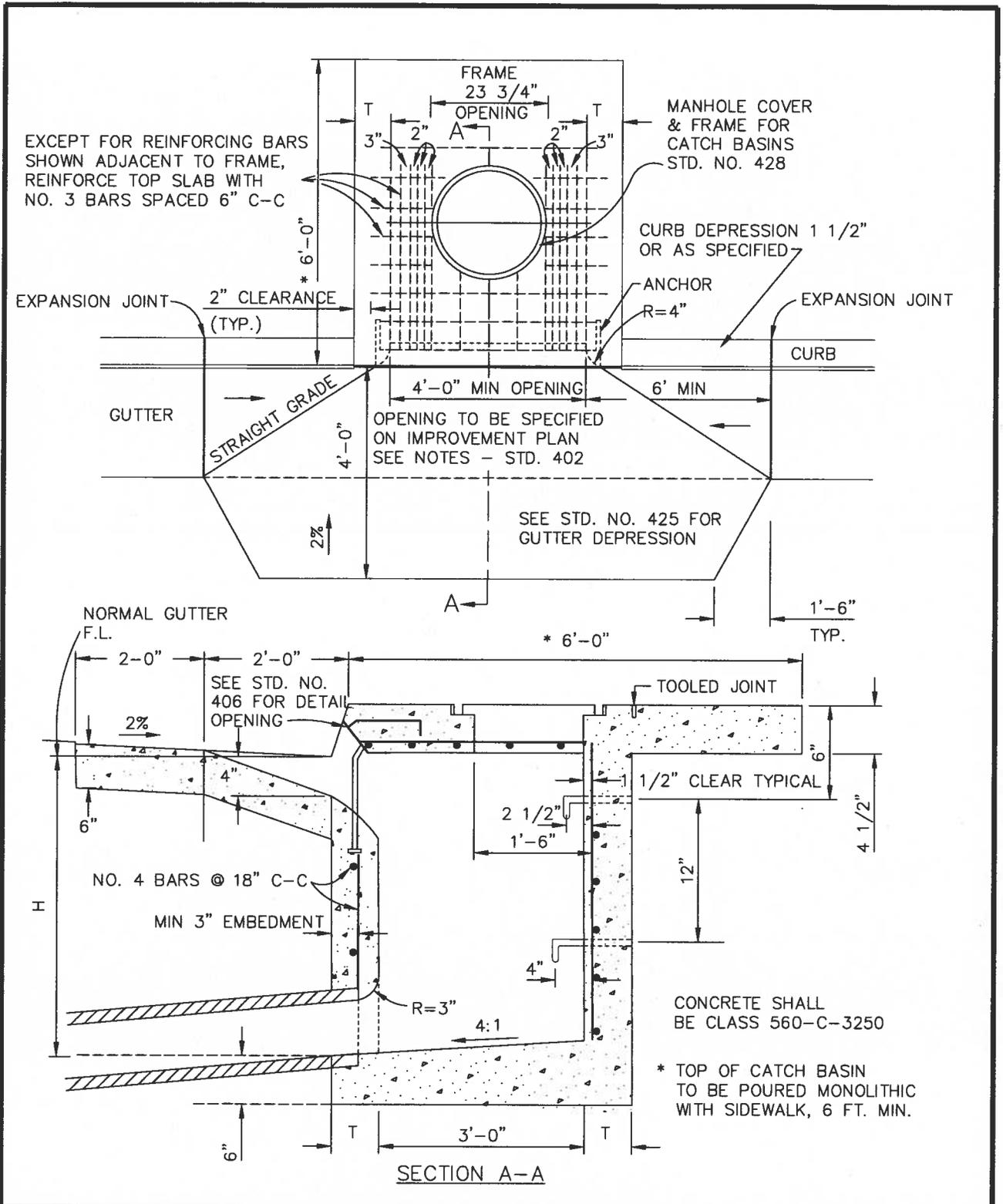


# SECTION 400

## DRAINAGE





**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

REVISIONS	
5/92	
APPROVED 1/14/10	

**CURB INLET  
 CATCH BASIN**

STD. NO.

**401**

CONNECTION PIPES MAY BE PLACED ANY POSITION AROUND THE WALLS, PROVIDED THEY POINT IN THE PROPER DIRECTION AND THE POSITION IS OTHERWISE CONSISTENT WITH THE IMPROVEMENT PLAN

CURVATURE OF THE LIP AND SIDEWALLS AT GUTTER OPENING SHALL BE FORMED BY CURVED FORMS AND SHALL NOT BE MADE BY PLASTERING

DIMENSIONS.

T=6 INCHES IF H IS 8 FEET OR LESS.  
T=8 INCHES IF H IS GREATER THAT 8 FEET AND LESS THAN 20 FEET  
H=3 FEET 6 INCHES, UNLESS OTHERWISE SPECIFIED.

FLOOR OF BASIN SHALL BE GIVEN A STEEL-TROWELLED FINISH.

MANHOLE SHALL BE PLACED AS SHOWN ON STANDARD NO. 401, UNLESS NOTED DIFFERENTLY ON IMPROVEMENT PLANS.

OUTLET PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

OPENING SHALL BE 4'-0" UNLESS OTHERWISE SPECIFIED.

REINFORCING STEEL SHALL BE NO. 3 ROUND DEFORMED BARS IN TOP SLAB AND NO. 4 BARS AT 18 INCH CENTERS IN SIDES OF BOX.

STEPS: 3/4" PLAIN ROUND GALVANIZED STEEL STEPS ARE REQUIRED AS FOLLOWS:  
(ALHAMBRA FDY. A-3320 OR EQUAL.)  
IF H IS 3.5 FEET OR LESS, NO STEPS ARE REQUIRED  
IF H IS MORE THAN 3.5 FEET, AND NO MORE THAN 5 FEET, INSTALL 1 STEP 16 INCHES ABOVE FLOOR OF BASIN.  
IF H IS MORE THAN 5 FEET, INSTALL STEPS 12 INCHES APART, WITH THE TOP STEP 6 INCHES BELOW THE SURFACE OF THE BASIN  
ALL STEPS SHALL BE 4 INCHES FROM THE WALL, EXCEPT THE TOP STEP, WHICH SHALL BE 2 1/2 INCHES (CLEAR) FROM THE WALL, AND ANCHORED NOT LESS THAN 5 INCHES IN THE WALL OF BASIN.

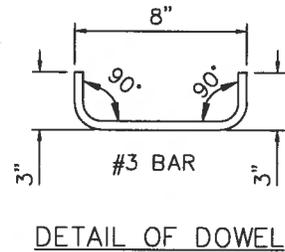
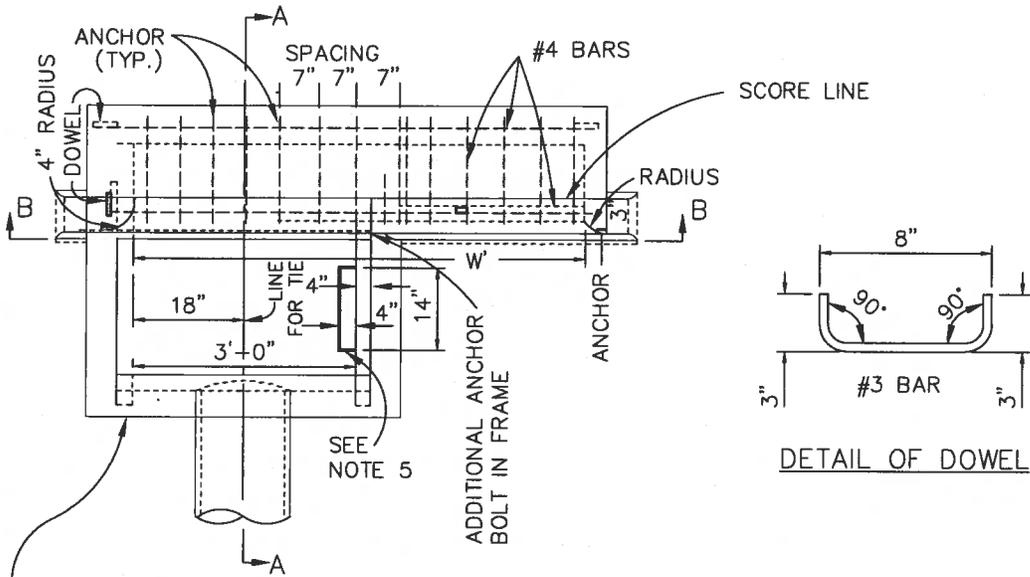
SURFACE OF ALL EXPOSED CONCRETE IN BASIN SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH AND SCORING TO EXISTING OR PROPOSED CURB AND WALL ADJACENT TO THE BASIN.

CONCRETE SHALL BE CLASS 560-C-3250 WHEN THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF A PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH A SIDEWALK, THE TOP OF THE BASIN SHALL BE POURED MONOLITHIC WITH THE SIDEWALK, USING CLASS 560-C-3250 CONCRETE IN THE SIDEWALK AND THE TOP OF THE CATCH BASIN FINISHED PER SIDEWALK STANDARDS.

WATER QUALITY INSERT OR EQUIVALENT PER PROJECT SPECIFIC WQMP OR AS REQUIRED BY THE CITY ENGINEER. MAINTENANCE SHALL BE FUNDED BY THE PROJECT ANNEXING INTO OR FORMING A LANDSCAPE LIGHTING MAINTENANCE DISTRICT.

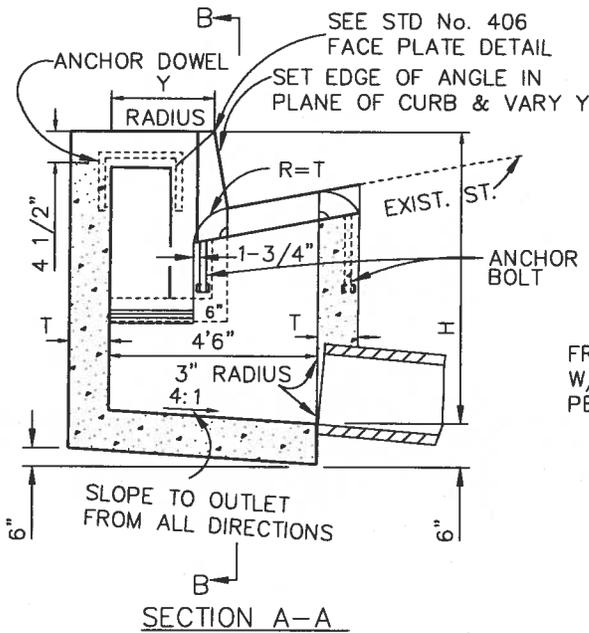
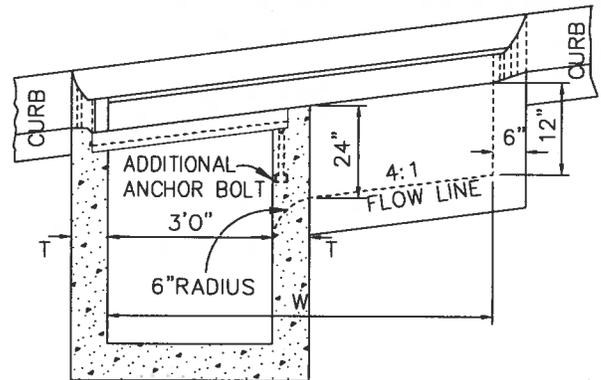
**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

<b>REVISIONS</b>		<b>CURB INLET CATCH BASIN SPECIFICATIONS</b>	<b>STD. NO.</b>
5/92			<b>402</b>
<b>APPROVED 1/14/10</b>			



THE OUTER EDGES OF THE WALLS SHALL CONFORM TO THE STREET OR LOCAL DEPRESSION SURFACE. THE GRATING SHALL BE LAID IN THE PLANE OF THIS SURFACE. SEE STD. NO. 424 CASE B FOR GUTTER DEPRESSION.

PLAN



FRAME & GRATING W/ ANCHOR BOLTS PER STD. NO. 407

CITY OF MURRIETA  
 DEPARTMENT OF PUBLIC WORKS

REVISIONS	
5/92	
APPROVED 1/14/10	

COMBINATION INLET  
 CATCH BASIN NO. 1

STD. NO.

403a

SHEET 1 OF 2

NOTES:

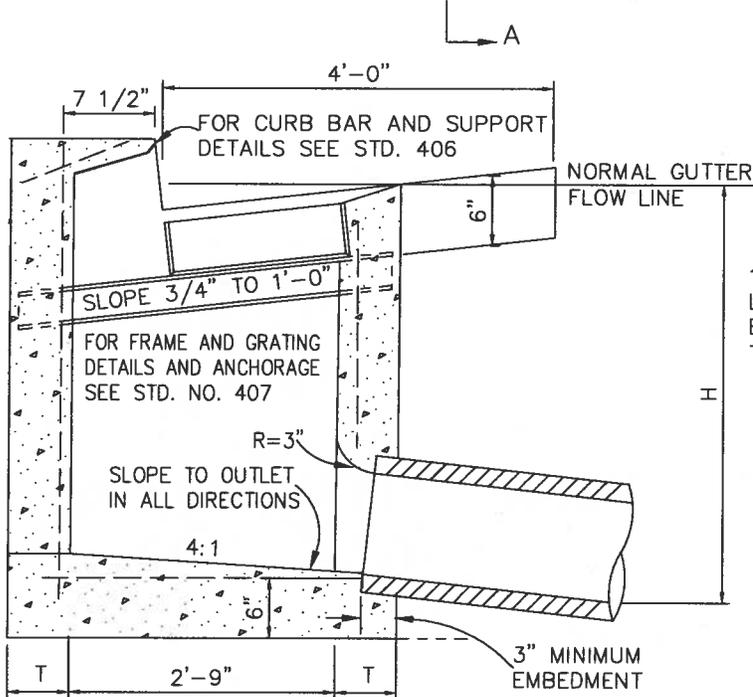
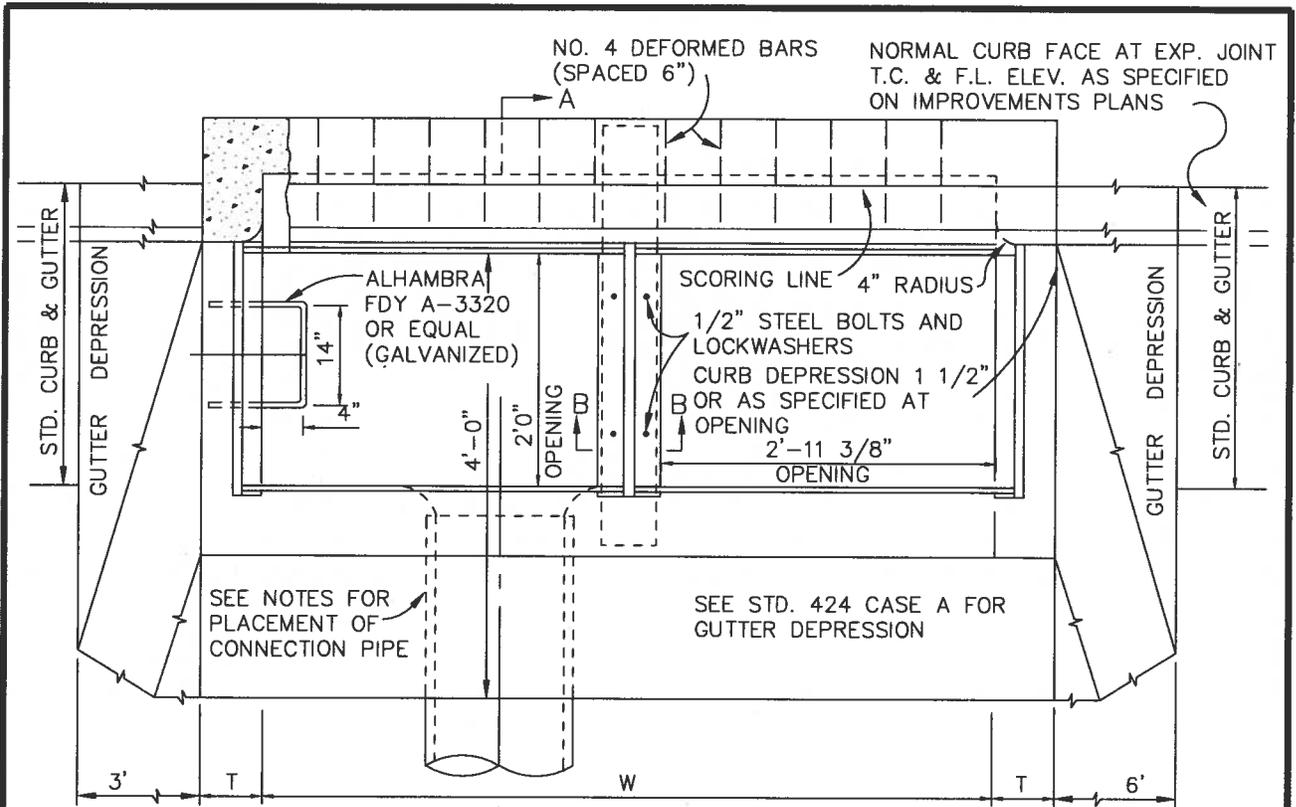
1. DIMENSIONS UNLESS OTHERWISE SPECIFIED \*

Y	W	T	H
2'3"	7'*		4'6" *
		6"	5' OR LESS
		8"	5' TO 8'
		10"	8' OR GREATER

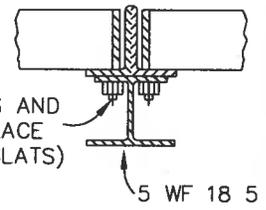
2. CONCRETE SHALL BE CLASS 560-C-3250 PORTLAND CEMENT CONCRETE.
3. THE REINFORCING STEEL SHALL BE NUMBER 4 DEFORMED BARS. CLEARANCE SHALL BE 1 1/2" FROM THE BOTTOM OF THE SLAB.
4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE COLOR, FINISH, AND SCORING IN THE EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE BASIN. THE BASIN FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP AND SIDEWALLS AT THE GUTTER OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE THE CONCRETE IS POURED.
5. STEPS: 3/4" PLAIN ROUND NON-GALVANIZED STEEL STEPS, OR MATERIAL AS APPROVED BY CITY ENGINEER SHALL BE INSTALLED 16 INCHES APART WHEN H EXCEEDS 4 FEET 6 INCHES. THE TOP STEP SHALL BE 6 INCHES BELOW THE TOP SURFACE AND SHALL BE 2 1/2 INCHES CLEAR FROM THE WALL. ALL OTHER OTHER SHALL BE 4 INCHES CLEAR OF THE WALL. ONLY ONE STEP 12 INCHES FROM THE BOTTOM SHALL BE INSTALLED IF H IS 4 FEET 6 INCHES OR LESS ALL STEPS SHALL BE ANCHORED NOT LESS THAN 4 INCHES INTO THE WALL OF THE BASIN.
6. WATER QUALITY INSERT OR EQUIVALENT PER PROJECT SPECIFIC WQMP OR AS REQUIRED BY THE CITY ENGINEER. MAINTENANCE SHALL BE FUNDED BY THE PROJECT ANNEXING INTO OR FORMING A LANDSCAPE LIGHTING MAINTENANCE DISTRICT.

**CITY OF MURRIETA**  
DEPARTMENT OF PUBLIC WORKS

<b>REVISIONS</b>		<b>COMBINATION INLET CATCH BASIN NO. 1</b>	STD. NO.
5/92			<b>403b</b>
			SHEET 2 OF 2
APPROVED 1/14/10			



1/2" STEEL BOLTS AND LOCKWASHERS (PLACE BETWEEN GRATE SLATS) TOTAL-4



SECTION B-B

SECTION A-A

CONCRETE SHALL BE CLASS 560-C-3250 CONCRETE

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DEPARTMENT OF PUBLIC WORKS

REVISIONS	
5/92	
APPROVED 1/14/10	

COMBINATION INLET  
CATCH BASIN NO. 2

STD. NO.

404

NOTES:

BASIN SHALL HAVE ONE GRATING UNLESS OTHERWISE SPECIFIED ON IMPROVEMENT PLANS.

CONCRETE SHALL BE CLASS 560-C-3250 WHEN THE BASIN IS TO BE CONSTRUCTED WITHIN THE LIMITS OF A PROPOSED SIDEWALK OR IS CONTIGUOUS TO SUCH A SIDEWALK, THE TOP OF THE BASIN SHALL BE POURED MONOLITHIC WITH THE SIDEWALK, USING CLASS 560-C-3250 CONCRETE IN THE SIDEWALK. THE TOP OF THE CATCH BASIN SHALL BE FINISHED PER SIDEWALK STANDARDS.

CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS, PROVIDED THEY POINT IN THE PROPER DIRECTION AND THE POSITION IS OTHERWISE CONSISTENT WITH THE IMPROVEMENT PLAN.

CURVATURE OF THE END-WALLS AT CURB OPENING SHALL BE FORMED BY CURVED FORMS AND SHALL NOT BE MADE BY PLASTERING.

DIMENSIONS:

GRATE SHALL BE PARALLEL TO PLANE OF GUTTER SLOPE.

t=6 INCHES IF H IS 8 FEET OR LESS.

t=8 INCHES IF H IS GREATER THAN 8 FEET AND LESS THAN 20 FEET.

H=3 FEET 6 INCHES, UNLESS OTHERWISE SPECIFIED ON IMPROVEMENT PLANS.

W=2 FEET 11 3/8 INCHES FOR ONE GRATING. ADD 3 FEET 5 3/8 INCHES FOR EACH ADDITIONAL GRATING.

EXPOSED SURFACES OF THE CATCH BASIN SHALL CONFORM IN SLOPE, GRADE, COLOR, FINISH, AND SCORING TO EXISTING IMPROVEMENTS ADJACENT TO THE BASIN. WHERE NO SIDEWALK EXISTS, THE TOP SHALL BE FINISHED TO CONFORM TO STANDARD SIDEWALK SLOPE AND FINISH. WHERE NO CURB EXISTS, THE BATTER OF EXPOSED END WALLS ABOVE THE STREET SURFACE SHALL CONFORM TO BATTER FOR STANDARD CURB.

FLOOR OF BASIN SHALL BE GIVEN A STEEL-TROWELLED FINISH.

OUTLET PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

REINFORCING STEEL SHALL BE NO. 4 DEFORMED BARS. CLEARANCE SHALL BE 1 1/2 INCHES FROM INSIDE OF BOX. SPACING IS AS SHOWN IN TOP SLAB AND AT 18 INCH CENTERS IN SIDES OF BOX.

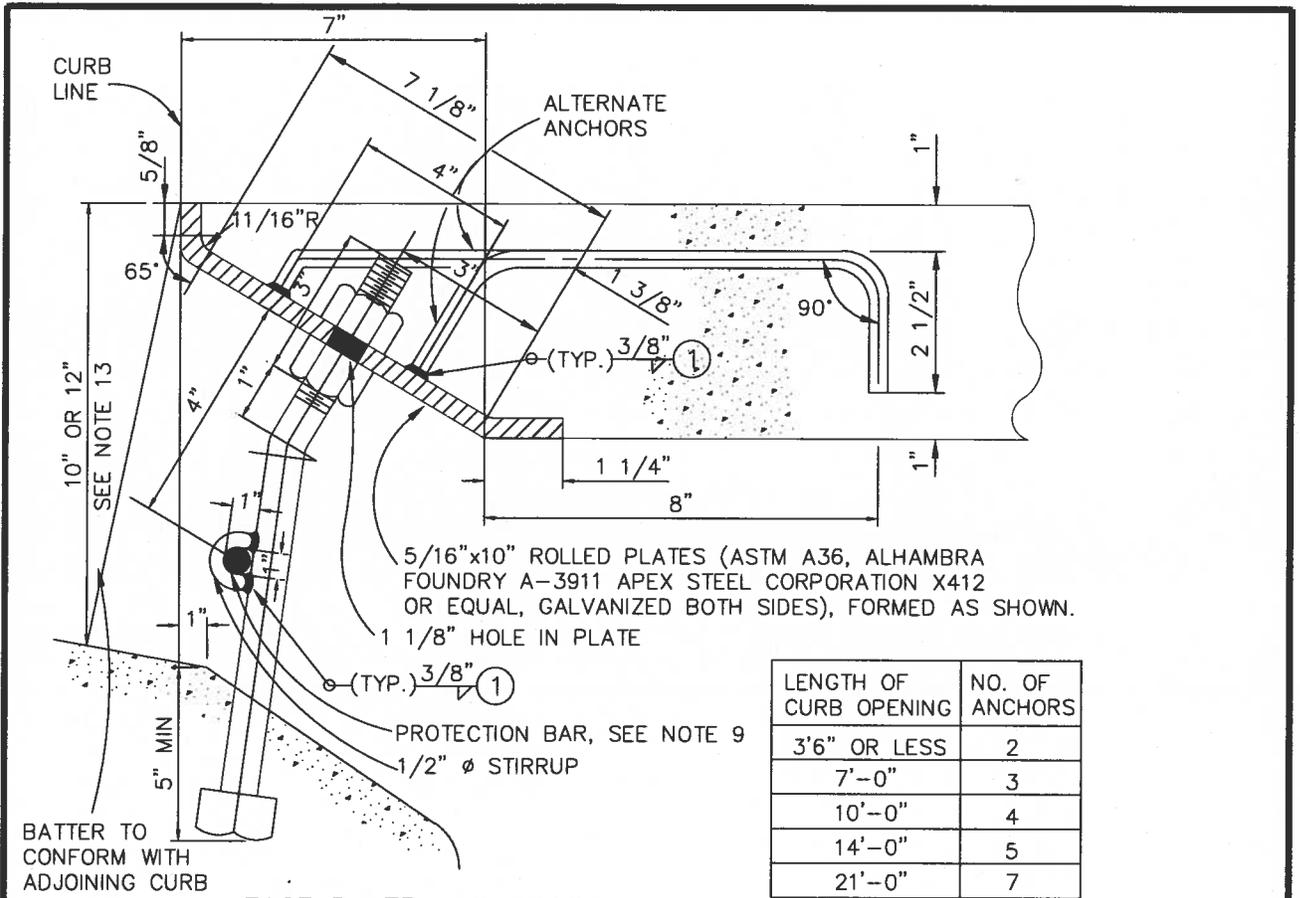
SLOPE OF FLOOR PARALLEL WITH CURB SHALL BE 1 IN 12 UNLESS OTHERWISE SPECIFIED SLOPE FLOOR FROM ALL DIRECTIONS TO THE OUTLET.

STEPS: 3/4 INCH PLAIN ROUND GALVANIZED STEEL STEPS ARE REQUIRED AS FOLLOWS.  
 (ALHAMBRA FDY. A-3320 OR EQUAL)  
 IF H IS 3.5 FEET OR LESS, NO STEPS ARE REQUIRED.  
 IF H IS MORE THAN 3.5 FEET, AND NOT MORE THAN 5.0 FEET, INSTALL ONE STEP 16 INCHES ABOVE FLOOR OF BASIN.  
 IF H IS MORE THAN 5.0 FEET, INSTALL STEPS 12 INCHES APART, WITH THE TOP STEP 6 INCHES BELOW THE TOP OF INLET.  
 ALL STEPS SHALL BE 4 INCHES CLEAR FROM THE WALL EXCEPT THE TOP STEP, WHICH SHALL BE 2 1/2 INCHES (CLEAR) FROM THE WALL AND ANCHORED NOT LESS THAN 5 INCHES IN WALL OF BASIN.

WATER QUALITY INSERT OR EQUIVALENT PER PROJECT SPECIFIC WQMP OR AS REQUIRED BY THE CITY ENGINEER. MAINTENANCE SHALL BE FUNDED BY THE PROJECT ANNEXING INTO OR FORMING A LANDSCAPE LIGHTING MAINTENANCE DISTRICT.

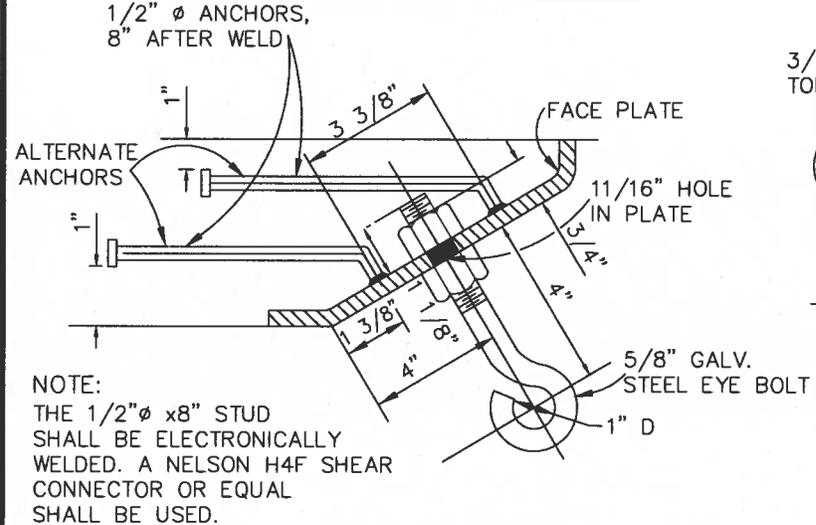
**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

<b>REVISIONS</b>		<b>COMBINATION INLET CATCH BASIN SPECIFICATIONS</b>	<b>STD. NO.</b>
3/97			<b>405</b>
<b>APPROVED 1/14/10</b>			

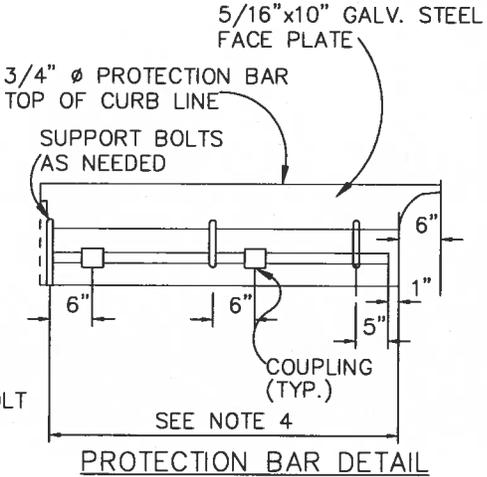


LENGTH OF CURB OPENING	NO. OF ANCHORS
3'-6" OR LESS	2
7'-0"	3
10'-0"	4
14'-0"	5
21'-0"	7

**FACE PLATE ANCHORAGE AND CURB SUPPORT DETAIL**



**EYE BOLT AND ALTERNATE ANCHOR DETAIL FOR FACE PLATE**



**CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS**

REVISIONS	
5/92	
APPROVED 1/14/10	

**MISCELLANEOUS CURB INLET  
DETAILS AND NOTES**

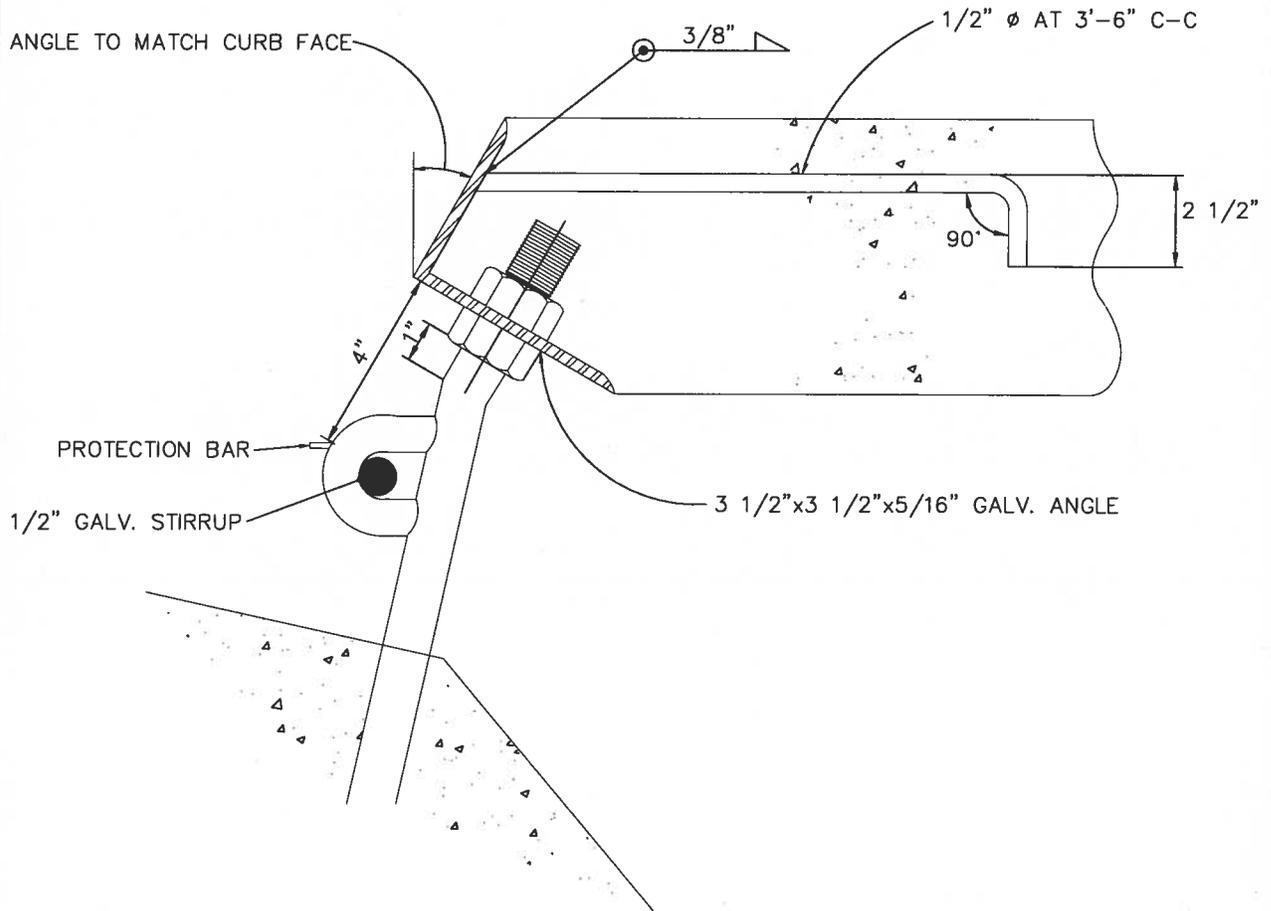
STD. NO.  
**406a**  
SHEET 1 OF 3

NOTES:

1. ONE EYE BOLT SHALL BE PLACED 12" FROM EACH END OF FACE PLATE.
2. EYE BOLTS SHALL BE SYMMETRICALLY SPACED IN THE CURB OPENING SO THAT THE UNSUPPORTED SPAN IS NOT MORE THAN 4', SUPPORT BOLTS, WHEN USED, SHOULD BE CONSIDERED AS EYE BOLTS IN THE SPACING.
3. ONE COUPLING SHALL BE PLACED 6" TO THE RIGHT OR LEFT OF EACH EYE BOLT WITH THE EXCEPTION OF THE LAST EYE BOLT. COUPLING SHALL BE THREADED TO FACILITATE REMOVAL OF PROTECTION BAR.
4. GALVANIZED STEEL SUPPORT BOLTS SHALL BE INSTALLED WHEN LENGTH OF CURB OPENING EXCEEDS 7'-0" AND SHALL BE SPACED AT NOT MORE THAN 7'-0" O.C. AND NOT LESS THAN 5'-0" O.C.
5. FACE PLATE ANCHORS SHALL BE UNIFORMLY SPACED NOT TO EXCEED 4' BETWEEN CENTERS AND SHALL BE PLACED 4 1/2" FROM EACH END OF THE FACE PLATE. AN ANCHOR SHALL BE PLACED OVER EACH W-BEAM IN A GRATING BASIN.
6. A COUPLING MAY BE OMITTED PROVIDED THE PROTECTION BAR IS REMOVABLE AFTER INSTALLATION.
7. ALL METAL SHALL BE GALVANIZED AFTER FABRICATION.
8. SUPPORT BOLTS, EYE BOLTS, AND ANCHOR BOLTS MAY BE ATTACHED BY A FULL PENETRATION BUTTWELD AS AN ALTERNATE.
9. PLACE A 3/4"  $\phi$  PROTECTION BAR HORIZONTALLY ACROSS THE ENTIRE LENGTH OF THE CURB OPENING.
10. SEE STD. NO. 406c FOR ADDITIONAL MISCELLANEOUS INLET DETAILS AND NOTES
11. CURB SECTION SHALL MATCH ADJACENT CURB TYPE.
12. CURB OPENING SHALL CONFORM TO CURB ALIGNMENT.
13. HEIGHT OF CURB OPENING WILL VARY WITH THE TYPE OF CURB AND THE DEPTH OF THE LOCAL DEPRESSION
14. THE ANGLE AS SHOWN ON STD. NO. 406c DETAIL A SHALL BE ALLOWED ONLY WHEN SHOWN ON APPROVED PLANS.

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<b>REVISIONS</b>		STD. NO.
5/92		<b>406b</b>
	<b>MISCELLANEOUS CURB INLET DETAILS AND NOTES</b>	SHEET 2 OF 3
APPROVED 1/14/10		



DETAIL A

**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

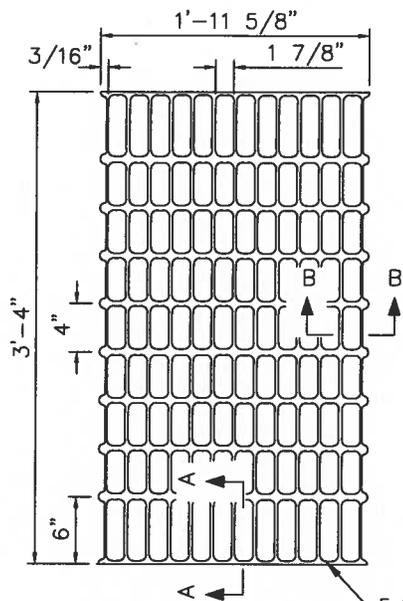
REVISIONS	
5/92	
APPROVED 1/14/10	

**MISCELLANEOUS CURB INLET  
 DETAILS AND NOTES**

STD. NO.

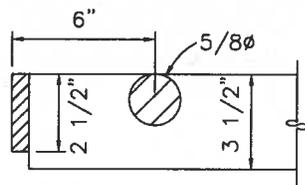
**406c**

SHEET 3 OF 3

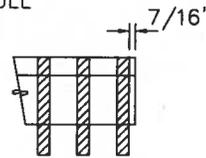


NOTE:

1. BEARING BARS TO BE  
3 1/2" x 1/4" BARS  
ON 1 7/8" CENTERS  
3/8"Ø CROSS BARS RESISTANCE  
WELDED OR ELECTROFORGED  
TO BEARING BARS
2. WEIGHT OF GRATE 141 lbs
3. USE TYPICAL FRAME AS SHOWN

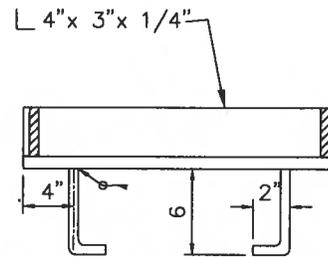
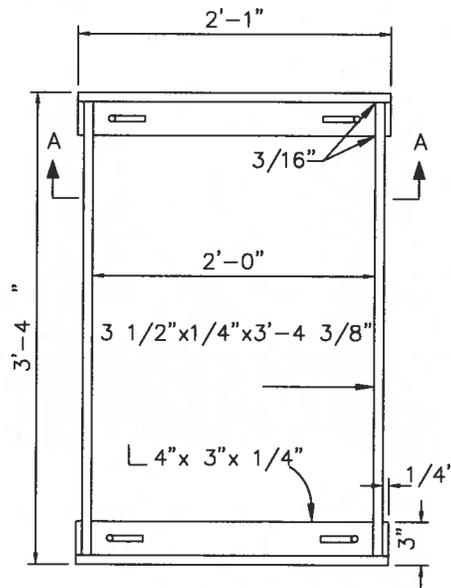


SECTION A-A



SECTION B-B

WELDED STEEL GRATE



SECTION A-A  
TYPICAL FRAME

GRATE & FRAME DETAILS  
( SEE SHEET 2 FOR LOCKING DEVICE )

CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS

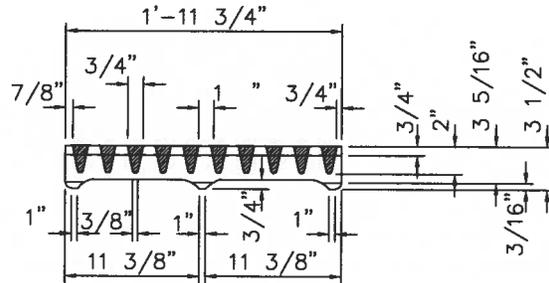
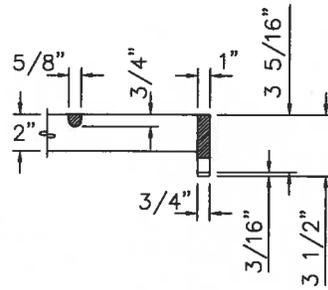
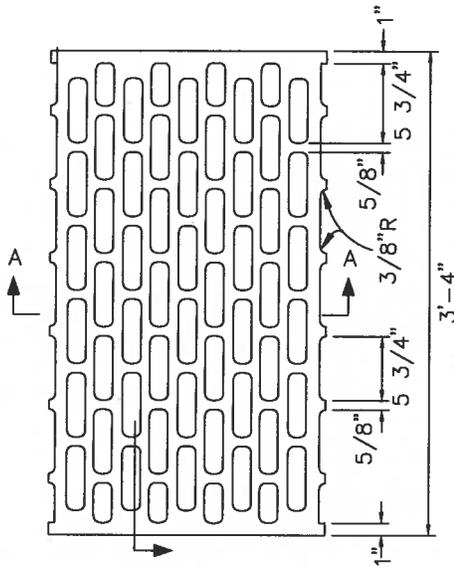
REVISIONS	
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MISCELLANEOUS CURB INLET  
DETAILS AND NOTES

STD. NO.

407a

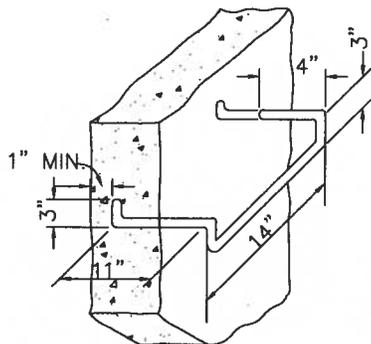
SHEET 1 OF 4



NOTES:  
 WEIGHT OF GRATE 155 lbs.  
 USE TYPICAL FRAME AS SHOWN

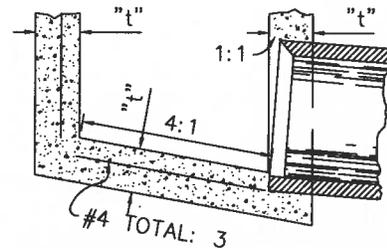
SECTION A-A  
 CAST NODULAR IRON GRATE

GRATE & FRAME DETAILS  
 ( SEE SHEET 4 FOR LOCKING DEVICE )



STEP DETAIL

GALV. STEEL STEP  
 ( SEE NOTE 7 )



ALTERNATE  
 REINFORCED FLOOR  
 ( SEE NOTE 7 )

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MISCELLANEOUS CURB INLET  
 DETAILS AND NOTES

STD. NO.

407b

SHEET 2 OF 4

NOTES:

1. GRATE AND FRAME SHALL BE GALVANIZED. SEE STANDARD OR SPECIFICATIONS OR SPECIAL PROVISIONS.
2. FOR "t" WALL THICKNESS SEE TABLE ON INLET PLAN.
3. REINFORCING STEEL SHALL BE #4 BARS AT 18 ± CENTERS PLACED 1 1/2" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE SHOWN.
4. STEP—NONE REQUIRED WHERE "H" IS 3'-6" OR LESS. INSTALL ONE STEP 16" ABOVE FLOOR WHEN "H" IS MORE THAN 3'-6" AND LESS THAN 5'-0". WHERE "H" IS MORE THAN 5'-0", STEPS SHALL BE EVENLY SPACED AT 12" INTERVALS FROM 16" ABOVE FLOOR TO WITHIN 6" OF THE TOP OF THE BOX. PLACE STEPS IN WALL WITHOUT PIPE OPENINGS.
5. PIPE(S) CAN BE PLACED IN ANY WALL.
6. EXCEPT FOR INLETS USED AS JUNCTION BOXES, BASIN FLOOR SHALL HAVE A MINIMUM SLOPE OF 4:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE AND SHALL HAVE A WOODEN TROWEL FINISH.
7. ALTERNATE REINFORCED FLOOR AT THE OPTION OF THE CONTRACTOR.

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5/92	
APPROVED 1/14/10	

**MISCELLANEOUS CURB INLET  
 DETAILS AND NOTES**

STD. NO.

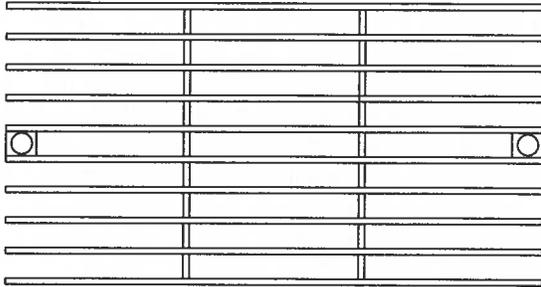
**407c**

SHEET 3 OF 4

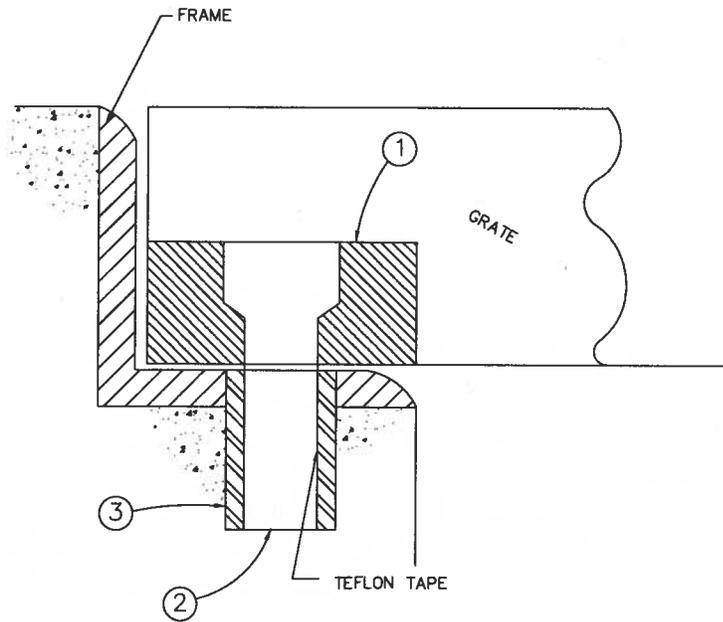
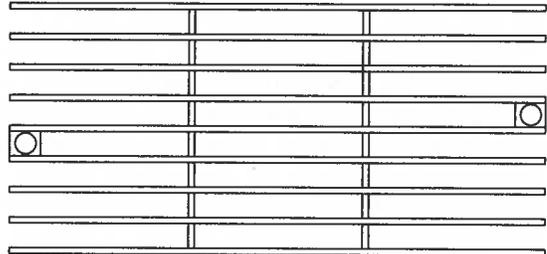
NOTES:

- ① USE 3/4" THICK STEEL BAR. DRILL 1/2" HOLE & COUNTERSINK WITH 3/4" DRILL 3/8" DEEP. WELD TO GRATE. PAINT TO PREVENT RUST.
- ② 1/2" DIA. ALLEN BOLT.
- ③ USE 1/2 " CONCRETE ANCHOR OR 1/2" THREADED RECEIVER WELDED TO FRAME.

IF THERE ARE AN EVEN NUMBER OF BARS IN THE GRATE,  
INSTALL THE HOLD-DOWNS IN THE CENTER SPACE.



IF THERE ARE AN ODD NUMBER OF BARS IN THE GRATE,  
INSTALL THE HOLD-DOWNS ON OPPOSITE SIDES OF THE CENTER BAR.



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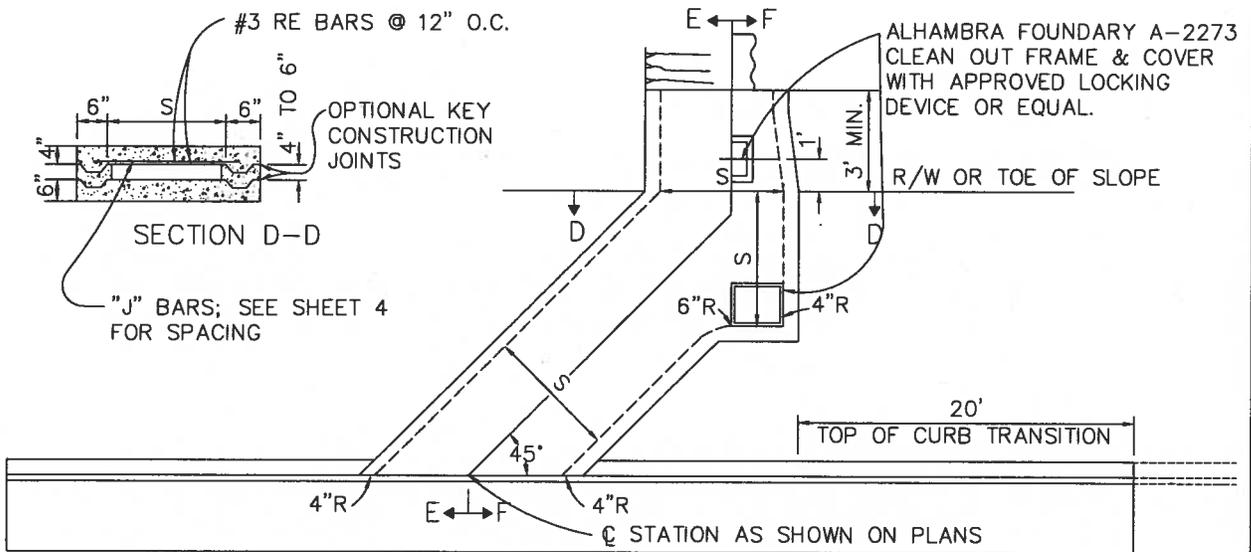
REVISIONS	
5/92	
APPROVED 1/14/10	

MISCELLANEOUS INLET  
DETAILS AND NOTES

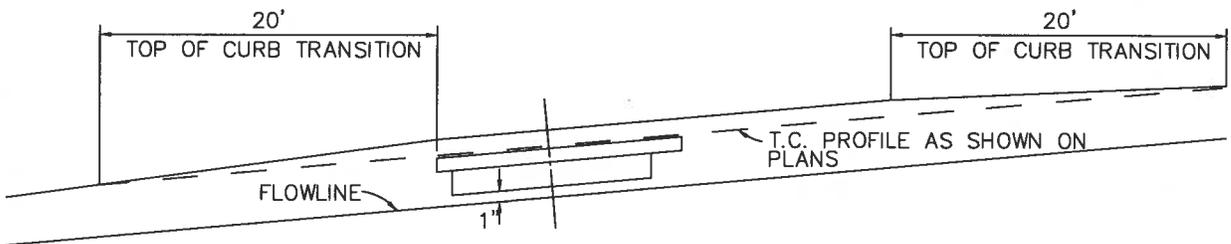
STD. NO.

407d

SHEET 4 OF 4



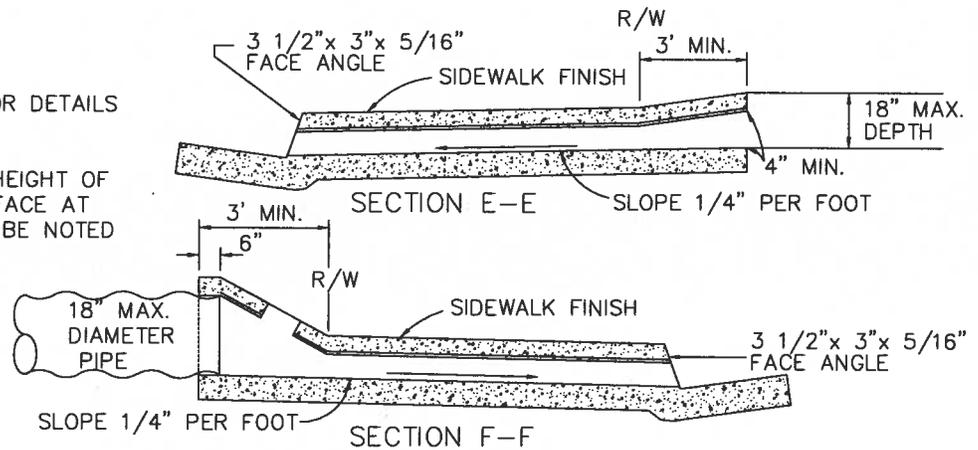
PLAN



PROFILE

NOTES:

1. SEE SHEET 4 FOR DETAILS AND NOTES.
2. SPAN "S" AND HEIGHT OF OPENING CURB FACE AT CULVERT SHALL BE NOTED ON PLANS.



**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

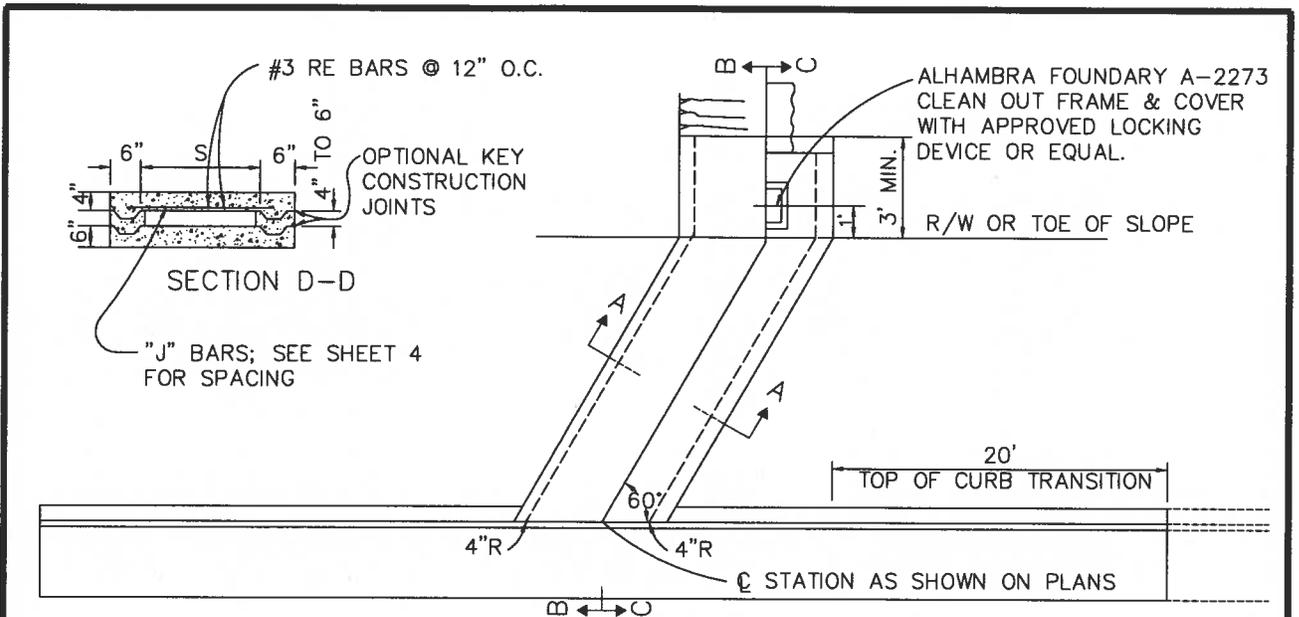
REVISIONS	
5/92	
APPROVED 1/14/10	

**PARKWAY CULVERT - TYPE "A"**

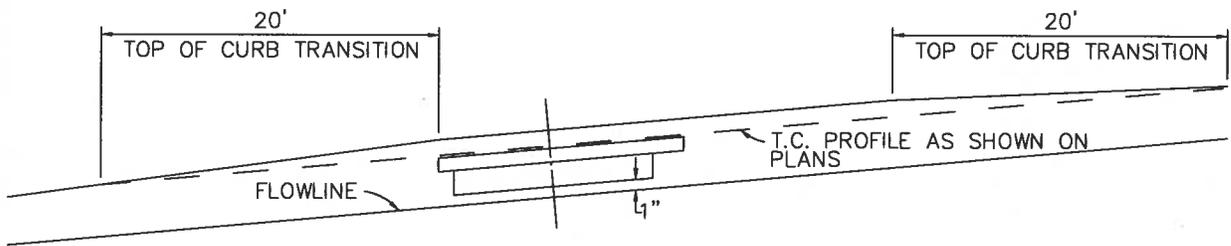
STD. NO.

**409a**

SHEET 1 OF 5



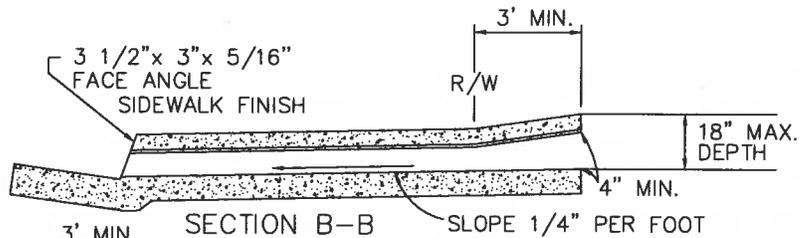
PLAN



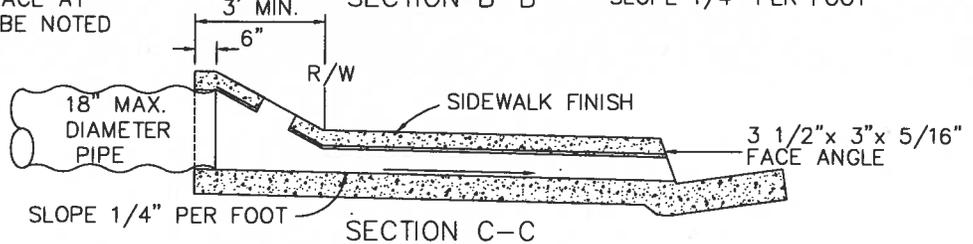
PROFILE

NOTES:

1. SEE SHEET 4 FOR DETAILS AND NOTES.
2. SPAN "S" AND HEIGHT OF OPENING CURB FACE AT CULVERT SHALL BE NOTED ON PLANS.



SECTION B-B



SECTION C-C

**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

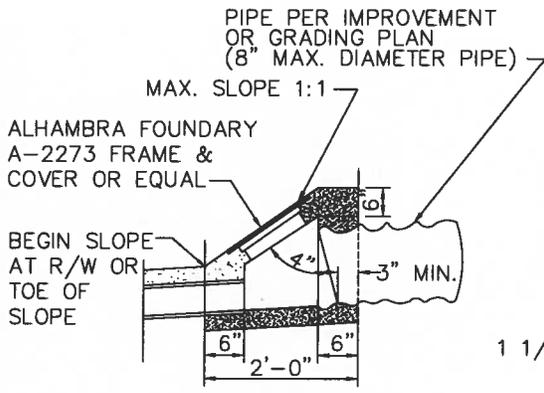
REVISIONS	
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APPROVED 1/14/10	

**PARKWAY CULVERT - TYPE "B"**

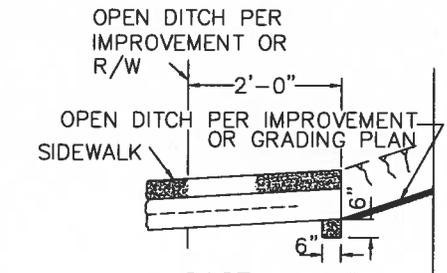
STD. NO.

**409b**

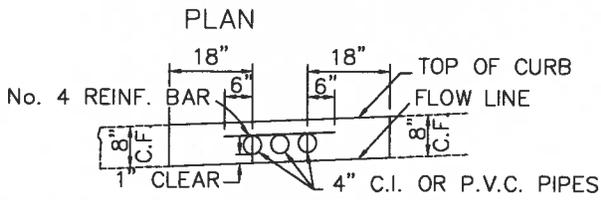
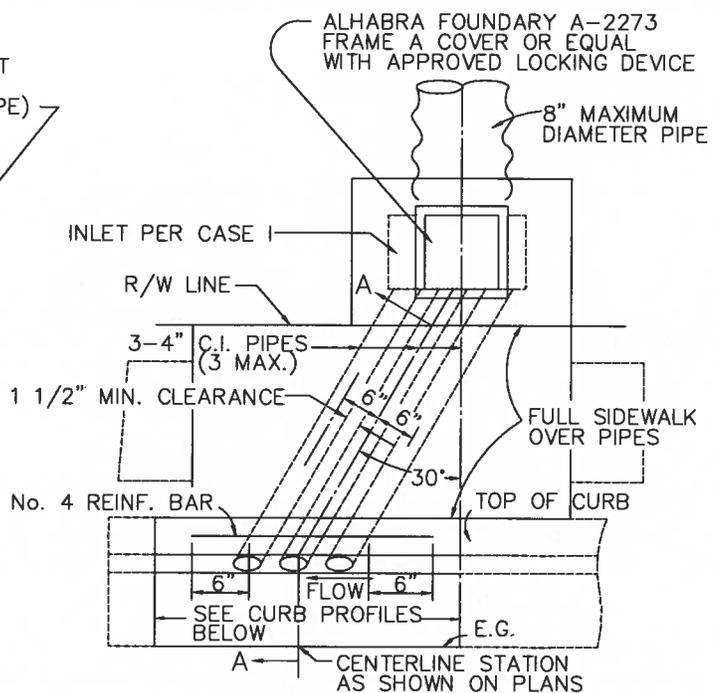
SHEET 2 OF 5



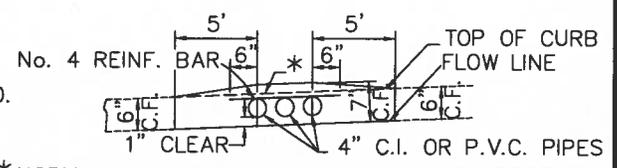
CASE I INLET  
TRANSITION STRUCTURE SECTION



CASE II INLET

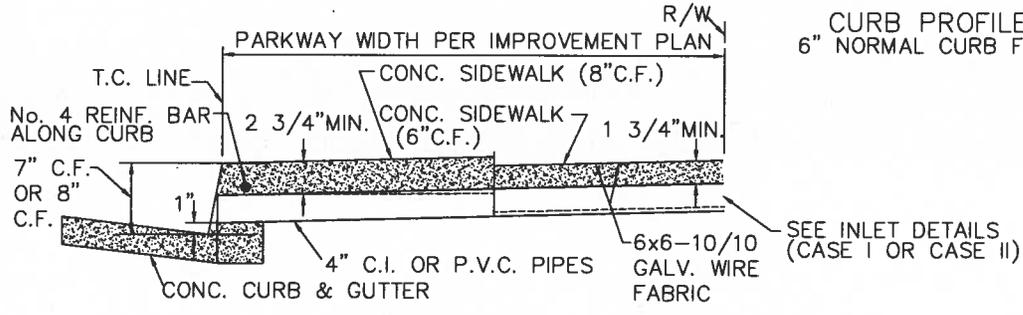


CURB PROFILE  
8" NORMAL CURB FACE



CURB PROFILE  
6" NORMAL CURB FACE

- NOTES:
1. SEE SHEET 4 FOR DETAILS AND NOTES
  2. ASBESTOS-CEMENT PIPE MAY BE SUBSTITUTED AT THE CONTRACTOR'S OPTION OR AS SPECIFIED ON THE PLANS.
  3. ALHAMBRA FOUNDRY A-470 RECTANGULAR CAST IRON PIPE MAY BE SUBSTITUTED AT THE CONTRACTOR'S OPTION OR AS SPECIFIED ON THE PLANS.
  4. CAST IRON FACILITIES SHALL HAVE A BITUMINOUS COATING CONFORMING TO AASHO DESIGNATION=M190.
  5. P.V.C. PIPES SHALL BE SCHEDULE 80.



SECTION A-A

CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS

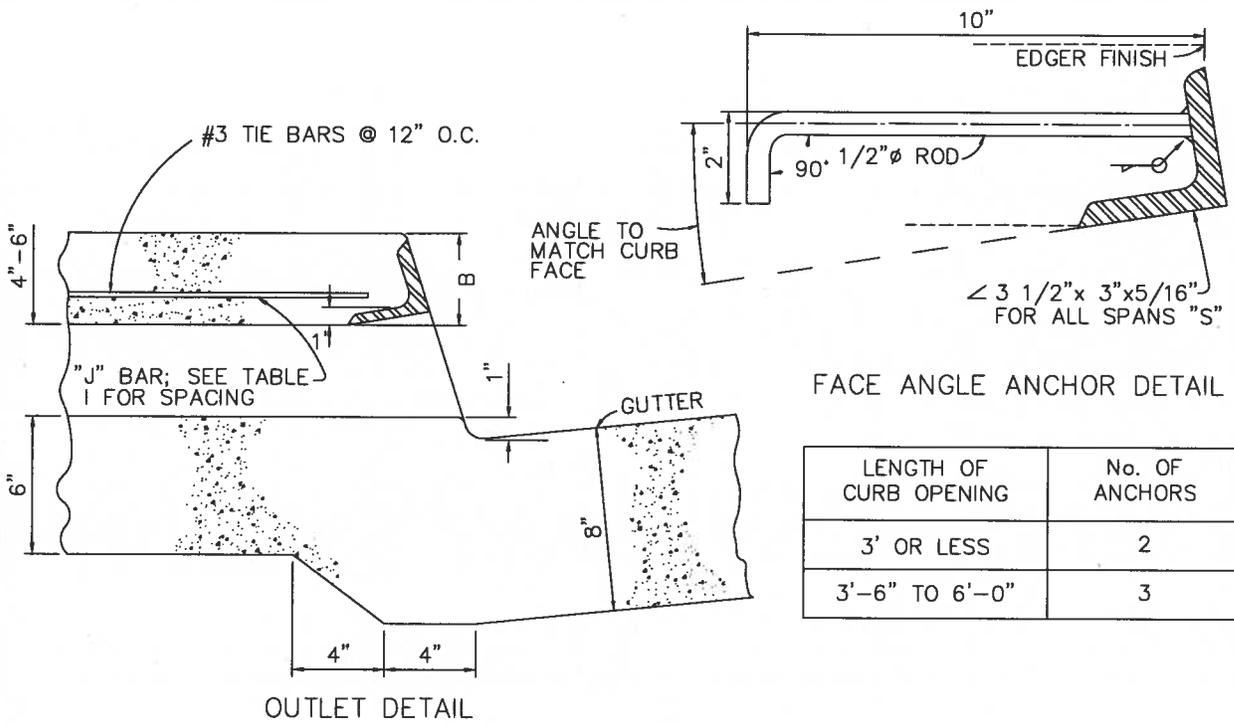
REVISIONS	
5/92	
APPROVED 1/14/10	

PARKWAY CULVERT - TYPE "C"

STD. NO.

409c

SHEET 3 OF 5



FACE ANCHOR ANCHOR DETAIL

LENGTH OF CURB OPENING	No. OF ANCHORS
3' OR LESS	2
3'-6" TO 6'-0"	3

NOTES:

1. USE PARKWAY CULVERT-TYPE "A" WHEN INLET VELOCITIES WILL BE 10 FEET PER SECOND OR GREATER.
2. USE PARKWAY CULVERT-TYPE "B" WHEN INLET VELOCITIES WILL BE LESS THAN 10 FEET PER SECOND.
3. USE PARKWAY CULVERT-TYPE "C" WHEN INLET VELOCITIES ARE LESS THAN 5 FEET PER SECOND.
4. FLOOR OF PARKWAY CULVERT SHALL HAVE A STEEL TROWEL FINISH.
5. ALL EXPOSED METAL SHALL BE GALVANIZED AFTER FABRICATION.
6. HEIGHT OF CURB OPENING FOR TYPES "A" & "B" PARKWAY CULVERTS WILL VARY WITH TYPE OF CURB.
7. SPAN "S" AND HEIGHT OF CURB OPENING WILL BE DETERMINED FROM THE REQUIRED HYDRAULIC CAPACITY AND LIMITED TO THE DIMENSION IN TABLE I.
8. REINFORCING STEEL SHALL BE 1" CLEAR TO INSIDE OF CULVERT UNLESS OTHERWISE SHOWN.

SPAN S	B	STEEL SCHEDULE J-BARS		
		SIZE	SPACING C-C	LENGTH
2'-0"	3"	#3	7"	2'-9"
2'-6"	"	"	"	3'-3"
3'-0"	"	"	"	3'-9"
3'-6"	"	"	6"	4'-3"
4'-0"	"	"	5"	4'-9"
4'-6"	4"	"	6 1/2"	5'-3"
5'-0"	"	"	5"	5'-9"
5'-6"	"	"	4"	6'-3"
6'-0"	"	"	3 1/2"	6'-9"

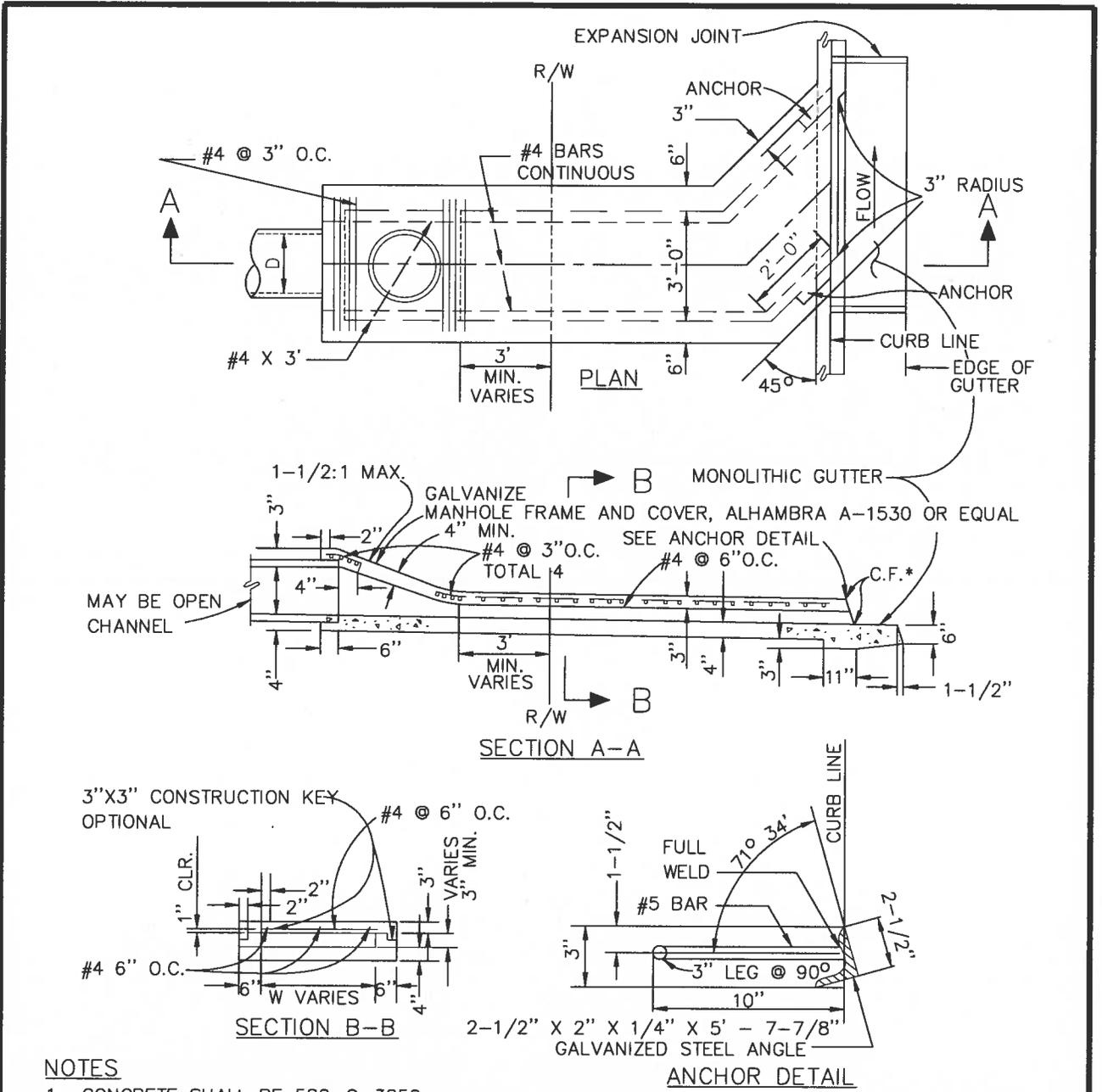
TABLE I

CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS

REVISIONS	
5/92	
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PARKWAY CULVERT  
DETAILS AND NOTES

STD. NO.  
**409d**  
SHEET 4 OF 5



**NOTES**

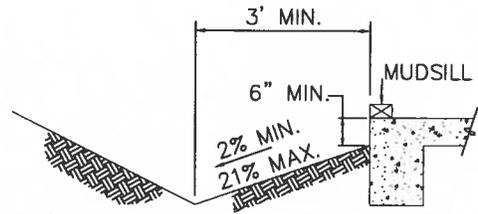
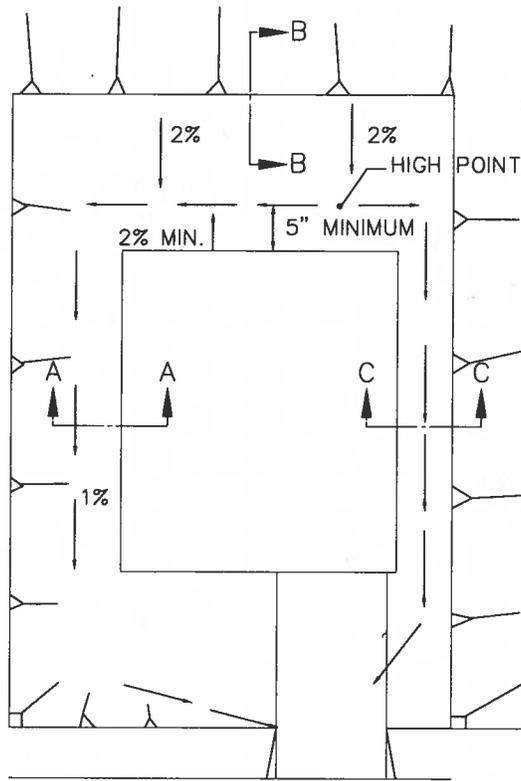
1. CONCRETE SHALL BE 580-C-3250.  
D=INSIDE DIAMETER OF PIPE OR DEPTH OF CHANNEL.
2. SECTION TO BE SLOPED LATERALLY WITH TOP CONFORMING TO THE GRADES OF THE EXISTING SIDEWALK AND CURB.
3. EXISTING SIDEWALK AND CURB.
4. MANHOLE FRAME AND COVER MAY BE DELETED WITH OPEN CHANNEL.
5. TROWEL FINISH TOP SURFACE AND REPRODUCE MARKINGS OF EXISTING SIDEWALK AND CURB.
6. TROWEL FINISH FLOOR OF OUTLET.
7. ELEVATION OF TOP OF CURB PER CURB GRADE LINE. LOWER FLOW LINE IF OPENING IS GREATER THAN 4\".
8. SEE STD. 415b FOR TRANSITION TO DOWN DRAIN OR OPEN CHANNEL.

**CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS**

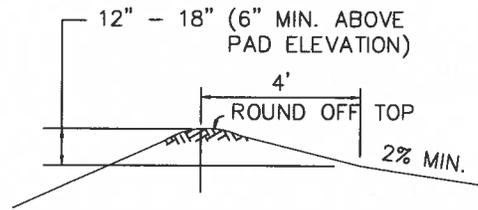
REVISIONS	
5/92	
APPROVED 1/14/10	

**PARKWAY CULVERT - TYPE "D"**

STD. NO.  
**409e**  
SHEET 5 OF 5

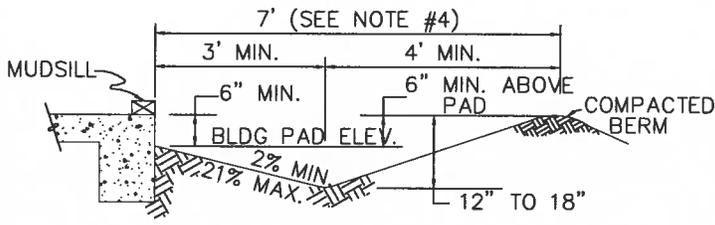


SECTION A-A



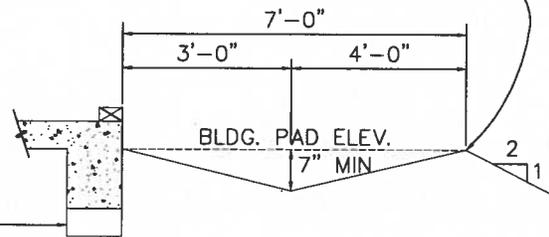
SECTION B-B  
TYPICAL BERM DETAIL

PLAN



SECTION C-C

ELEV. MUST BE EQUAL TO BLDG. PAD ELEV. OR HIGHER.



DEEPEMED FOOTING REQUIRED (SEE SHEET 3 OF 3)

SECTION C-C  
ALTERNATE

CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS

REVISIONS	
5/92	
10/98	
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HILLSIDE LOT DRAINAGE

STD. NO.

413a

SHEET 1 OF 3

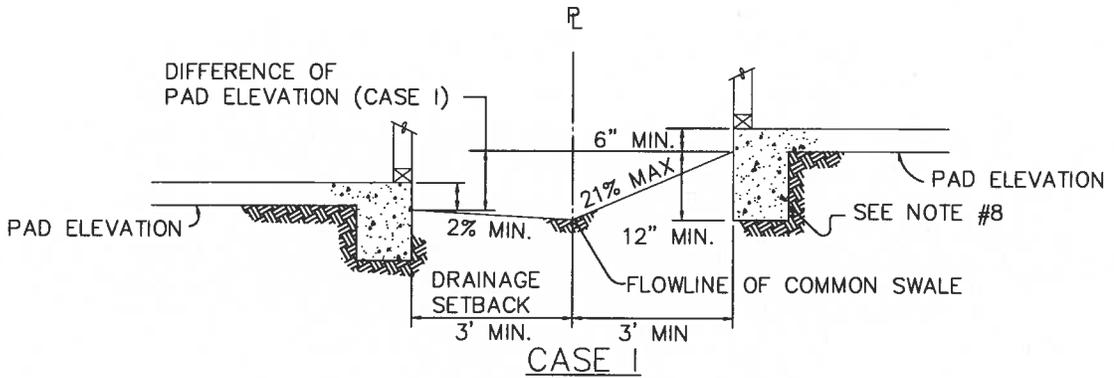
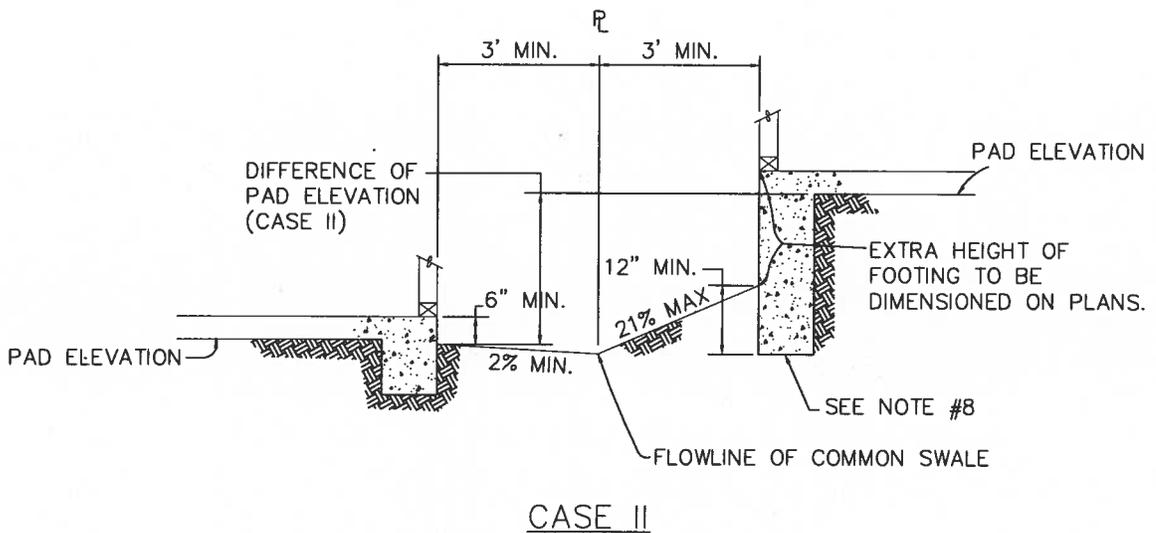


TABLE A  
LIMITING  
CASE I  
CONDITIONS

DRAINAGE SETBACK	MAXIMUM DIFFERENCE OF PAD ELEVATIONS
3'	.6'
4'	.8'
5'	1.0'



**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

REVISIONS	
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**COMMON SIDEYARD DRAINAGE**

STD. NO.

**413b**

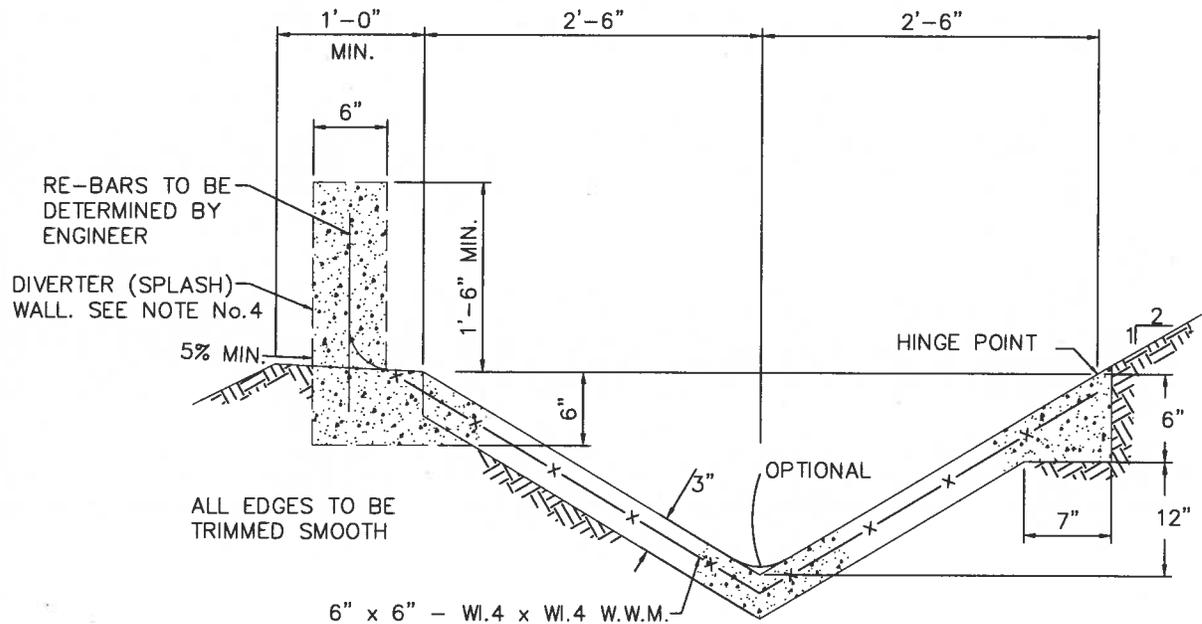
SHEET 2 OF 3

NOTES:

1. SWALES TO BE CUT IN AT 1% AT ROUGH GRADING AND PRIOR TO BUILDING CONSTRUCTION.
2. A PAVED DRAINAGE SWALE, CATCH BASIN AND PIPE, OR OTHER SIMILIAR DRAINAGE DEVICE IS REQUIRED WHEN A STOOP, FIREPLACE, OR PORTION OF THE BUILDING EXTENDS WITHIN THE MINIMUM ESTABLISHED DRAINAGE SETBACKS.
3. A COMMON DRAINAGE SWALE MAY BE USED ALONG SIDEYARD PROPERTY LINES AS SHOWN ON SHEET 2 OF 3. A DRAINAGE EASEMENT SHALL BE PROVIDED.
4. THIS DIMENSION MAY BE REDUCED TO THE REQUIRED MINIMUM SETBACK IN THE GRADING & EXCAVATION CODE IF AN IMPROVED (i.e. CONCRETE) DRAINAGE DEVICE IS USED.
5. ALL BUILDING SETBACKS FROM SLOPES SHALL BE IN ACCORDANCE WITH THE GRADING & EXCAVATION CODE.
6. CASE 1 APPLIES WHEN THE DIFFERENCE IN PAD ELEVATION AND DRAINAGE SETBACK ALLOWS A COMMON DRAINAGE SWALE TO BE CONSTRUCTED IN ACCORDANCE WITH TABLE A.
7. CASE II MAY BE USED WITH A COMMON DRAINAGE SWALE WHEN THE DIFFERENCE OF PAD ELEVATIONS EXCEEDS THE LIMITING CONDITIONS OF TABLE "A" AND THE EXTRA HEIGHT FOOTING IS SHOWN ON THE GRADING AND STRUCTURAL PLANS.
8. IN NO CASE SHALL THE SWALE FLOWLINE BE LOWER THAN THE BOTTOM OF THE FOOTING WITHIN 5' OF THE FOOTING.
9. A COMMON SIDEYARD DRAINAGE SWALE SHALL NOT BE USED WHEN THE DIFFERENCE BETWEEN THE PAD ELEVATIONS EXCEED ONE FOOT.

**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

<b>REVISIONS</b>	<b>COMMON SIDEYARD DRAINAGE</b>	STD. NO.
5/92		<b>413c</b>
		SHEET 3 OF 3
<b>APPROVED 1/14/10</b>		



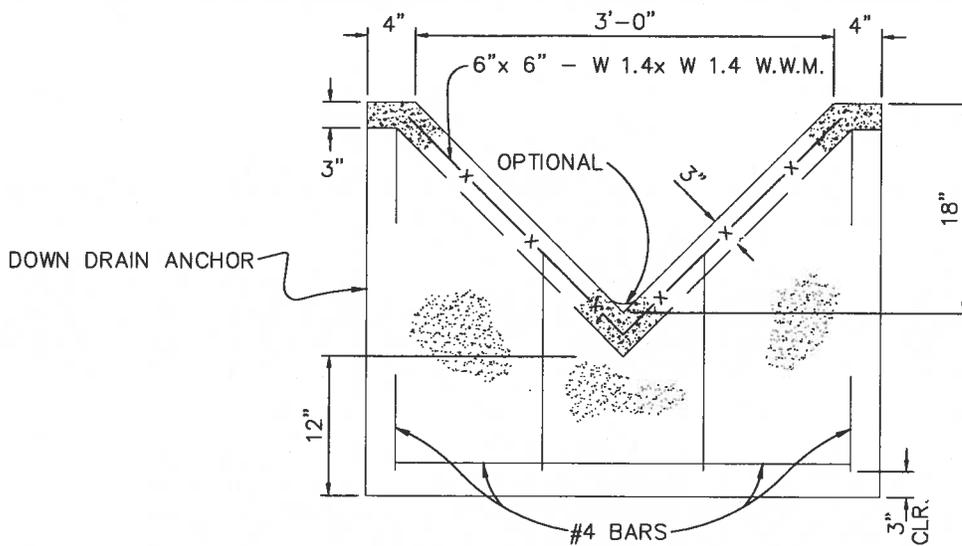
TERRACE DRAIN

NOTES:

1. CONCRETE SHALL BE 560-C-3250. CONCRETE MAY BE PNEUMATICALLY PLACED AND SHALL CONFORM TO SECTION 2621 OF THE UNIFORM BUILDING CODE.
2. REINFORCING SHALL BE 6"x6"-W1.4 x W1.4 WELDED WIRE MESH (W.W.M.) OR APPROVED EQUAL.
3. GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO PLACEMENT OF CONCRETE. MOISTURE LOSS RETARDANT SHALL BE USED WHEN REQUIRED BY THE CITY ENGINEER.
4. CONCRETE OR CONCRETE BLOCK DIVERTER (SPLASH) WALL TO BE CONSTRUCTED WHEN DOWN DRAIN TERMINATES AT TERRACE DRAIN. SEE PLAN FOR LOCATION AND DETAILS.

**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

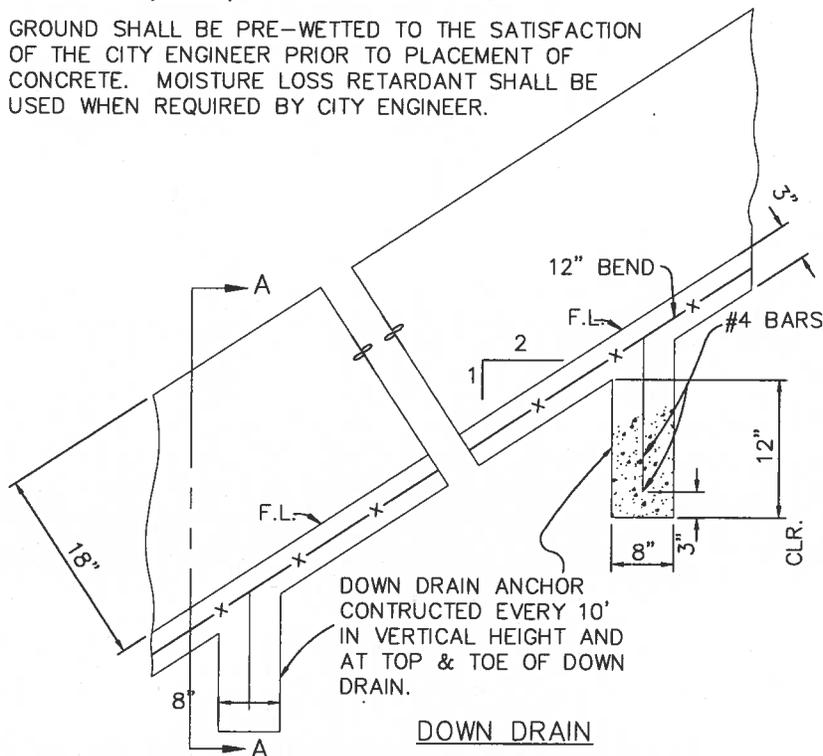
<b>REVISIONS</b>		<b>TERRACE DRAIN</b>	STD. NO.
5/92			<b>415a</b>
APPROVED 1/14/10			SHEET 1 OF 3



SECTION A-A

NOTES:

1. CONCRETE SHALL BE 560-C-3250. CONCRETE MAY BE PNEUMATICALLY PLACED AND SHALL CONFORM TO SECTION 2621 OF THE UNIFORM BUILDING CODE.
2. REINFORCING SHALL BE 6"x6"-W1.4 x W1.4 WELDED WIRE MESH (W.W.M.) OR APPROVED EQUAL.
3. GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO PLACEMENT OF CONCRETE. MOISTURE LOSS RETARDANT SHALL BE USED WHEN REQUIRED BY CITY ENGINEER.



CITY OF MURRIETA  
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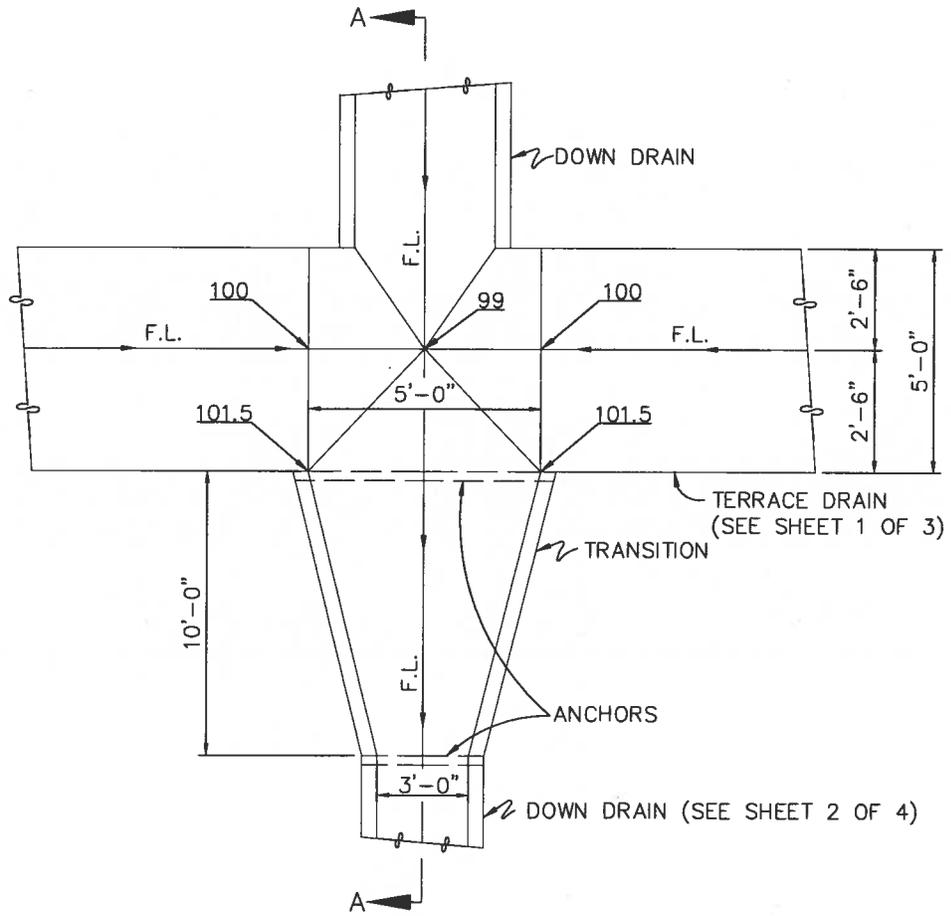
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DOWN DRAIN

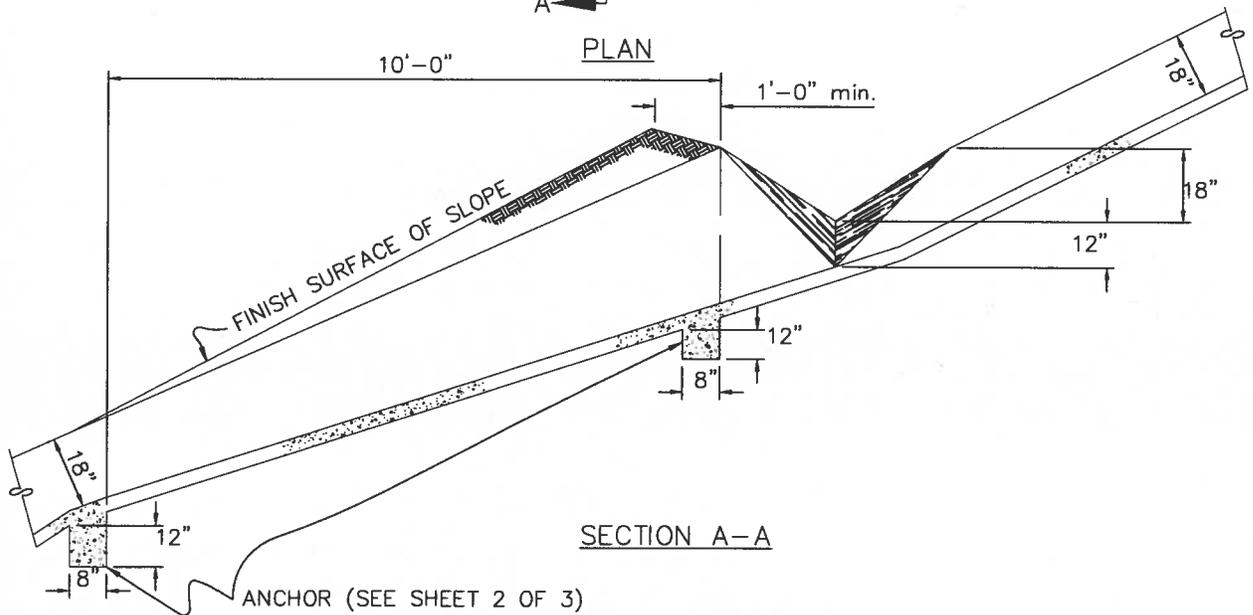
STD. NO.

415b

SHEET 2 OF 3



PLAN



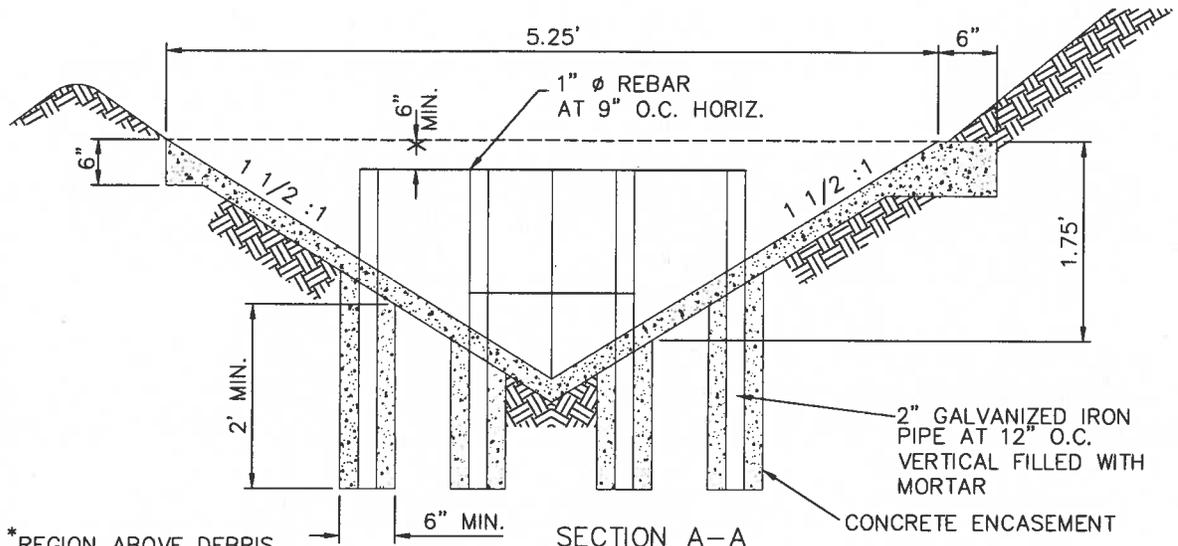
SECTION A-A

**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

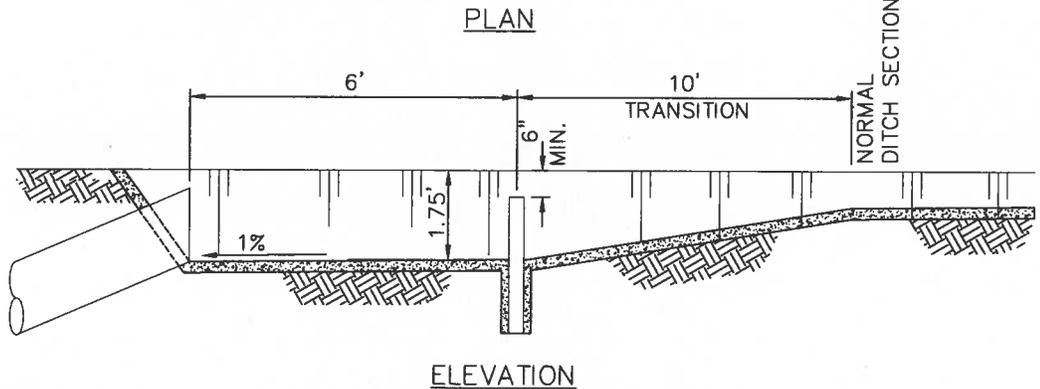
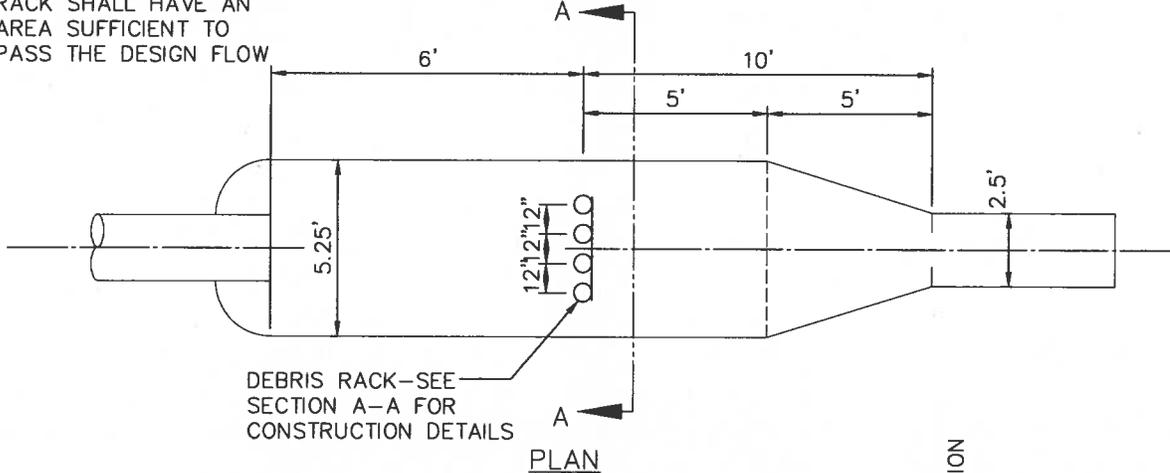
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**TERRACE DRAIN AND**  
**DOWN DRAIN INTERSECTION**

STD. NO.  
**415c**  
 SHEET 3 OF 3



\* REGION ABOVE DEBRIS RACK SHALL HAVE AN AREA SUFFICIENT TO PASS THE DESIGN FLOW

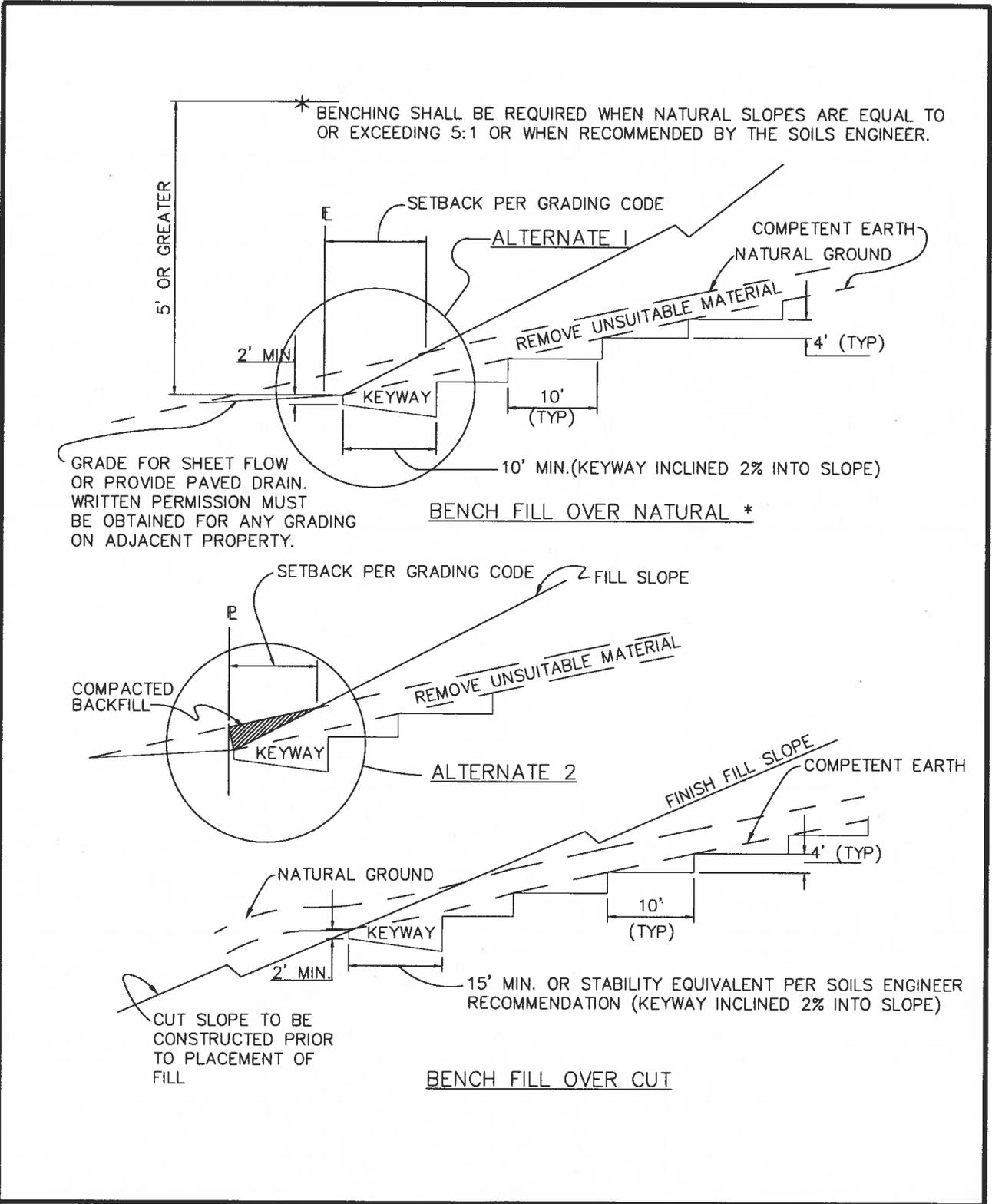


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BROW DITCH DEBRIS RACK

STD. NO.  
**416**

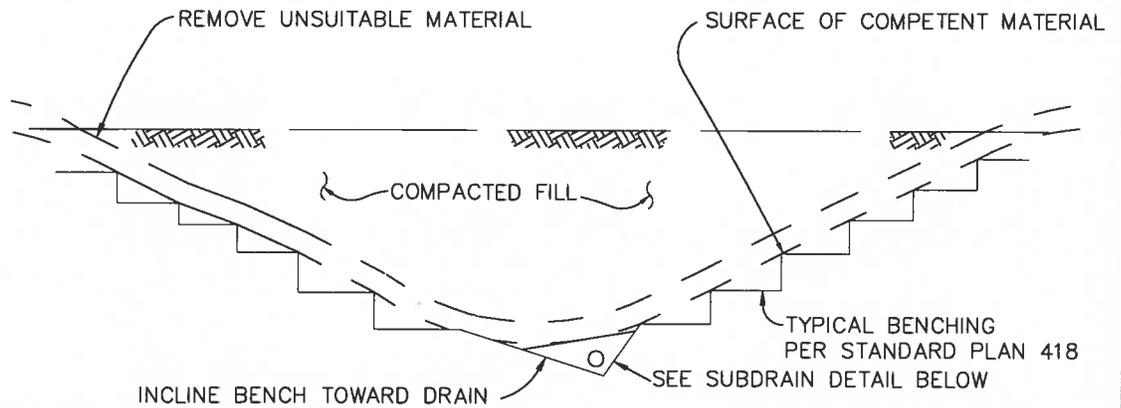


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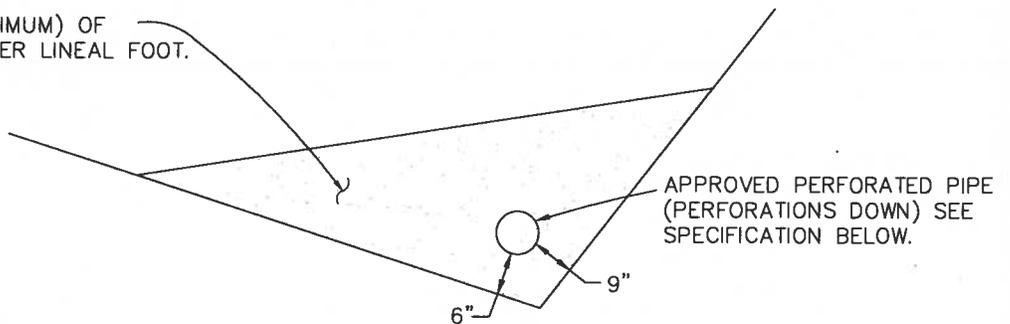
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5/92	
APPROVED 1/14/10	

**BENCHING FOR COMPACTED FILL**

STD. NO.  
**418**



9 CUBIC FEET (MINIMUM) OF FILTER MATERIAL PER LINEAL FOOT.



SUBDRAIN DETAIL

NOTES:

1. PIPE SPECIFICATION: DRAIN PIPE SHALL BE A MINIMUM OF 4" DIAMETER (6" MINIMUM FOR RUNS OF 500' OR GREATER OR AS RECOMMENDED BY SOILS ENGINEER). PIPE SPECIFICATIONS SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OR AS RECOMMENDED BY THE SOILS ENGINEER AND APPROVED BY THE CITY ENGINEER.
2. FILTER MATERIALS SHALL MEET THE FOLLOWING SPECIFICATIONS OR AS RECOMMENDED BY THE SOILS ENGINEER AND APPROVED BY THE CITY ENGINEER.

<u>SIEVE SIZE</u>	<u>PERCENTAGE PASSING</u>
1"	100
3/4"	90-100
3/8"	40-100
NO.4	25-40
NO.8	18-33
NO.30	5-15
NO.50	0-7
NO.200	0-3

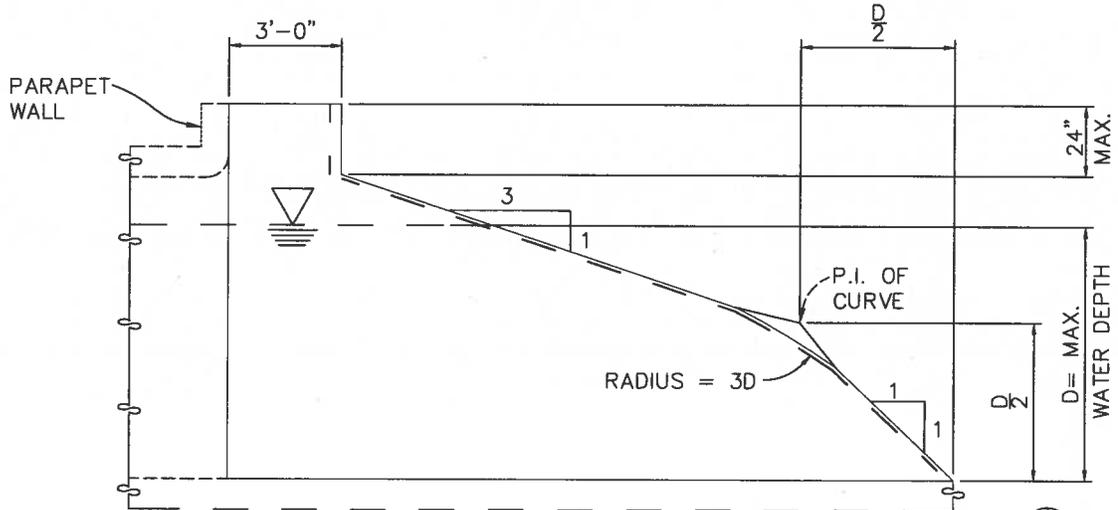
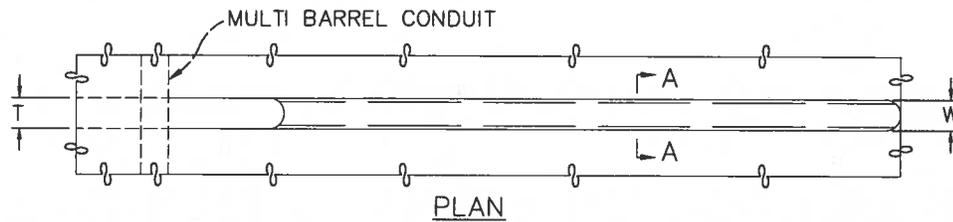
**CITY OF MURRIETA**  
**DEPARTMENT OF PUBLIC WORKS**

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**CANYON SUBDRAIN**

STD. NO.

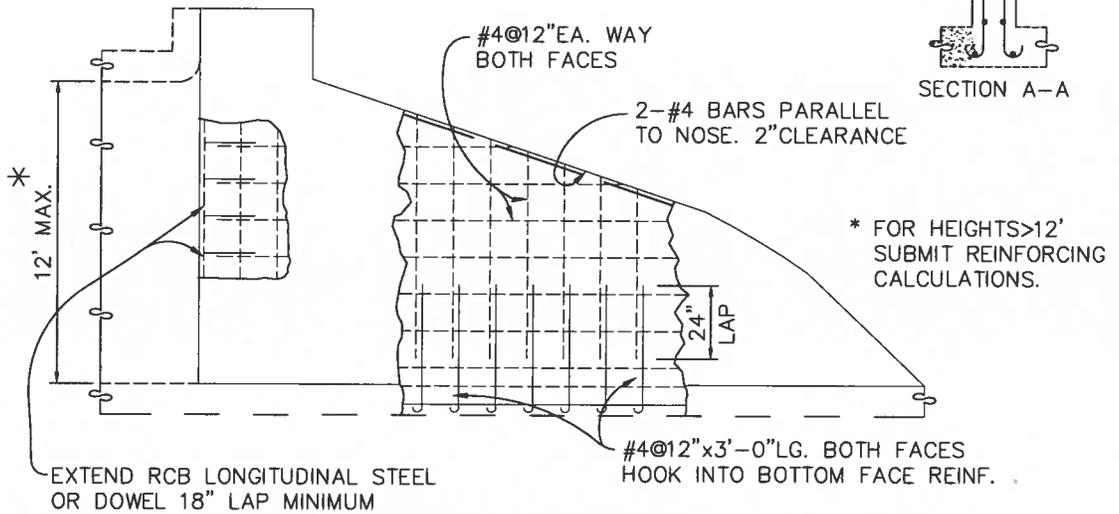
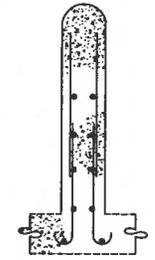
**419**



T = WALL THICKNESS  
 W = DEBRIS WALL THICKNESS

W EQUALS T, IF T ≤ 12"  
 W = 12" IF T > 12"

ELEVATION



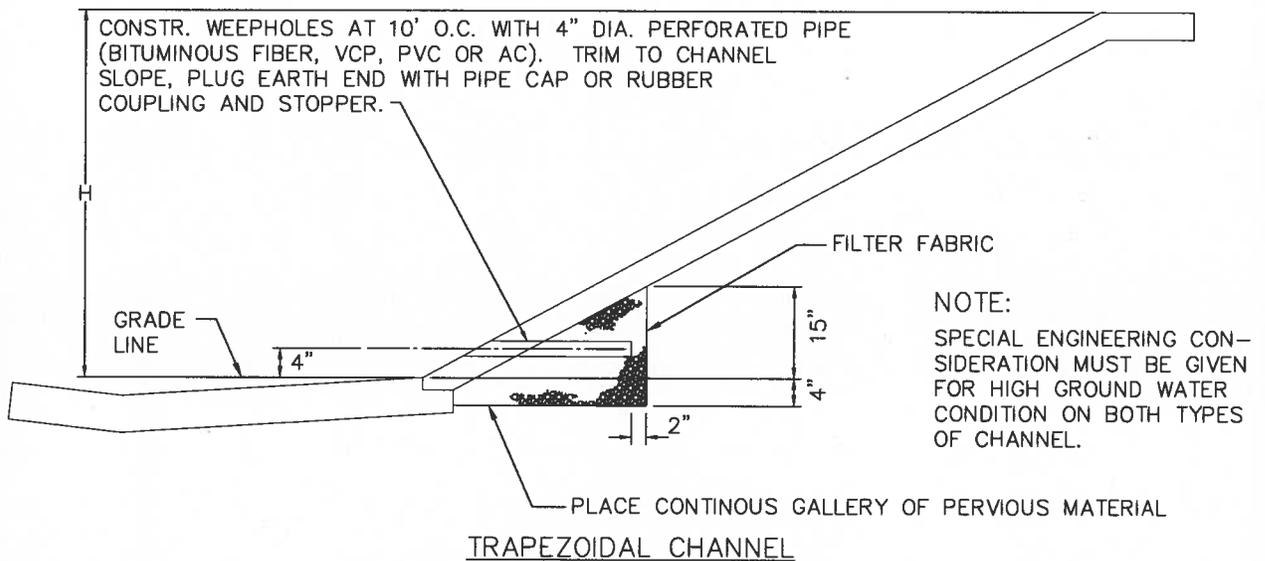
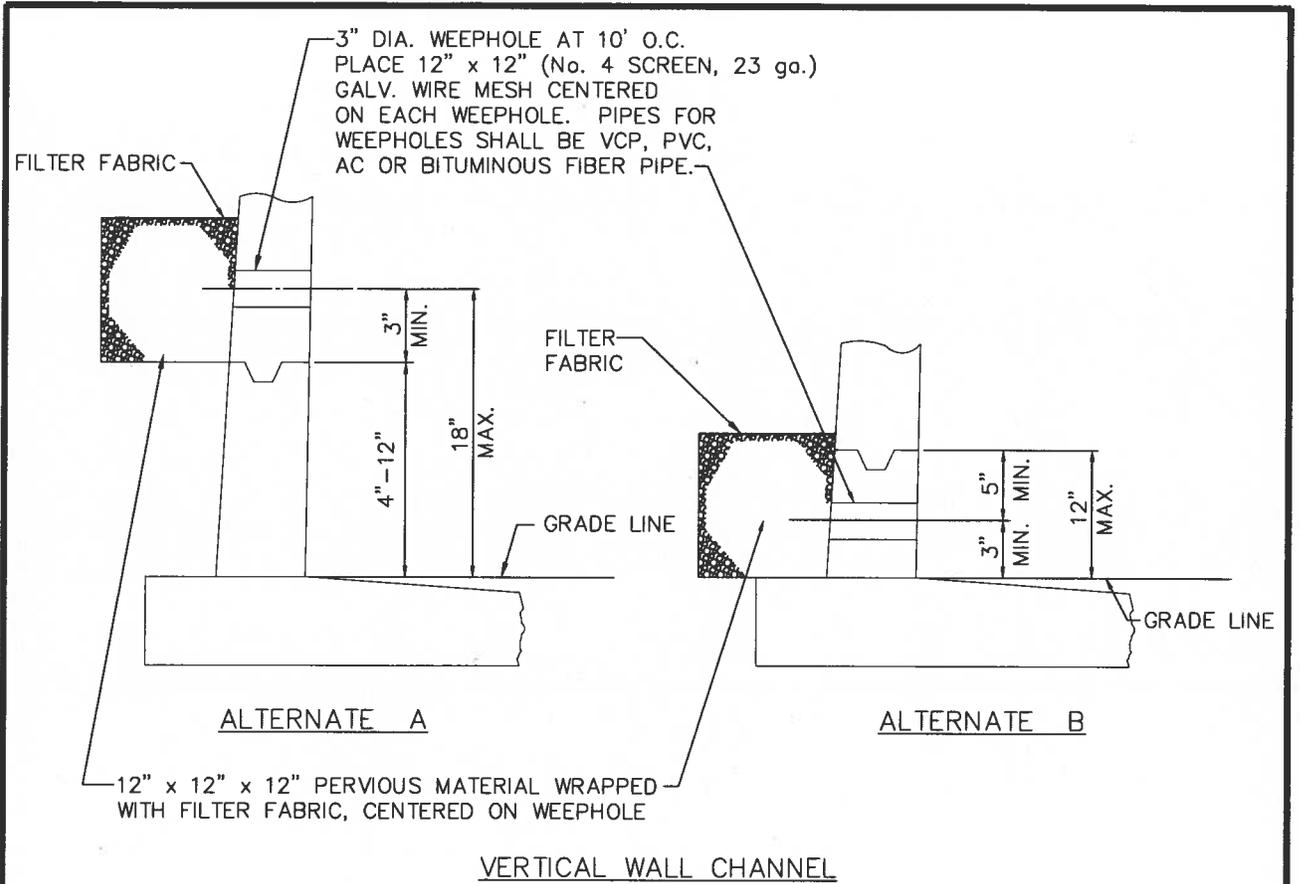
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CULVERT DEBRIS WALL

STD. NO.

420



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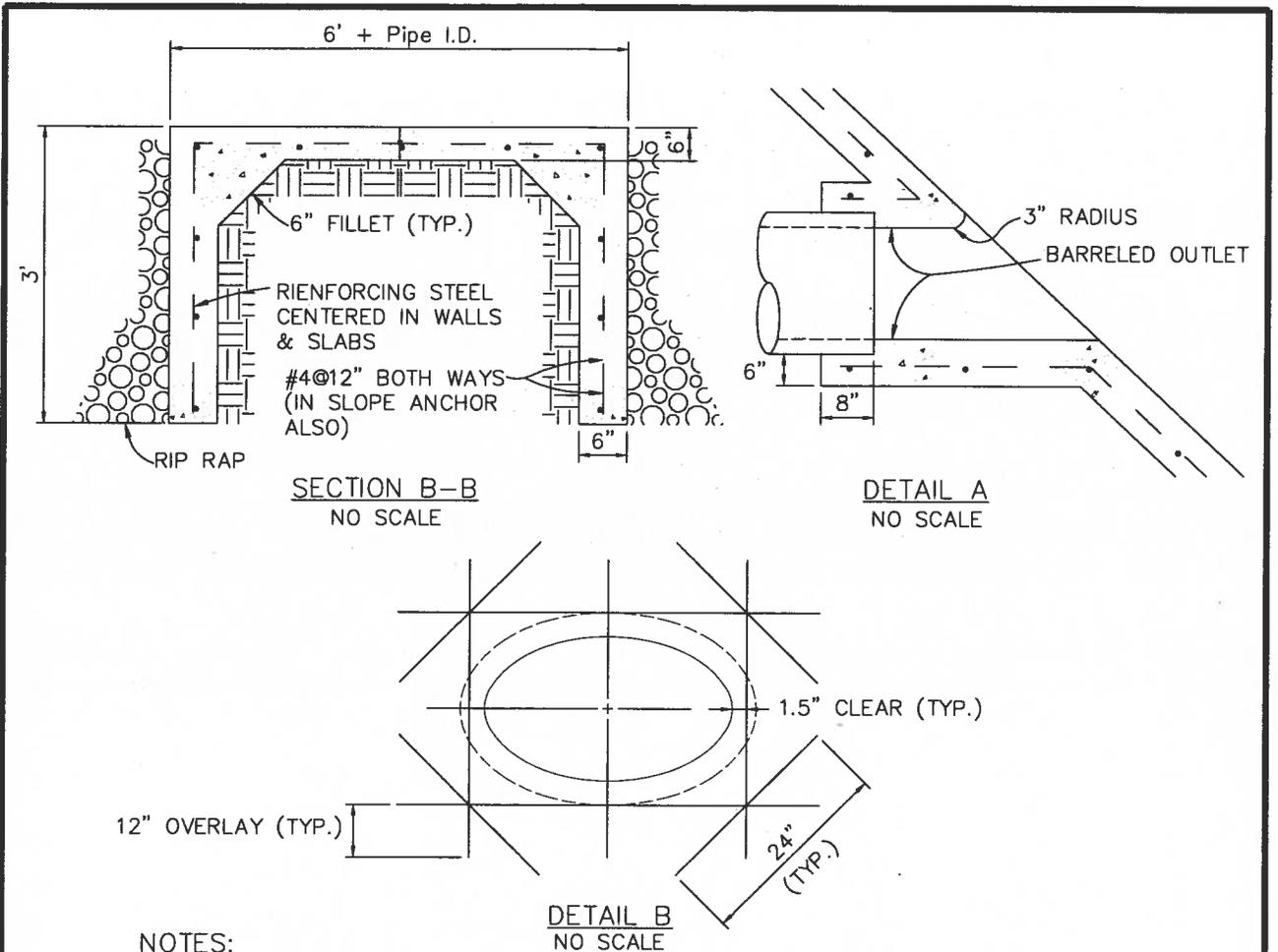
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**CHANNEL WEEPHOLES**

STD. NO.

**421**





**NOTES:**

1. IF LATERAL FLOW EXCEEDS 10% OF THE UPSTREAM FLOW, ANGLE  $\phi$  SHALL BE DETERMINED BY THE HYDRAULICS OF THE CONFLUENCE.
2. MAXIMUM SLIDE SLOPE EQUALS 1.5 TO 1.0.
3. TERMINATE TRANSVERSE DIMENSIONS OF RIPRAP 10 FEET FROM TOE OF SLOPE. IF 10 FEET EXCEEDS 50% OF CHANNEL BASE WIDTH, OR CHANNEL VELOCITY EXCEEDS 10 f.p.s, RIPRAP 'X' FEET WIDE SHALL EXTEND ACROSS INVERT AND 4 FEET UP OPPOSITE SLOPE, PER SECTION A-A.
4. INCREASE DOWNSTREAM LIMIT OF INVERT RIPRAP BLANKET BY 'L' FEET IF LATERAL PIPE'S HORIZONTAL ENTRY ANGLE IS DEFLECTED FROM NORMAL.  $L=2 \sin \phi$  (PIPE DIAMETER). IF 'W' EXCEED 50% OF CHANNEL BASE WIDTH, OR CHANNEL VELOCITY EXCEEDS 10 f.p.s., RIPRAP SHALL EXTEND ACROSS ENTIRE INVERT, (MIN. 'W'=10'.)
5. PROVIDE 1.5" STEEL COVER.
6. LATERALS OF 24" OR LESS MAY BE BEVELED PIPE, 27" OR LONGER SHALL BE BARRELED OR DESIGNED STRUCTURE.
7. FINISH EXPOSED SURFACE OF P.C.C. WITH WOOD FLOAT.

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**PIPE ENTRANCE  
TO EARTH CHANNEL**

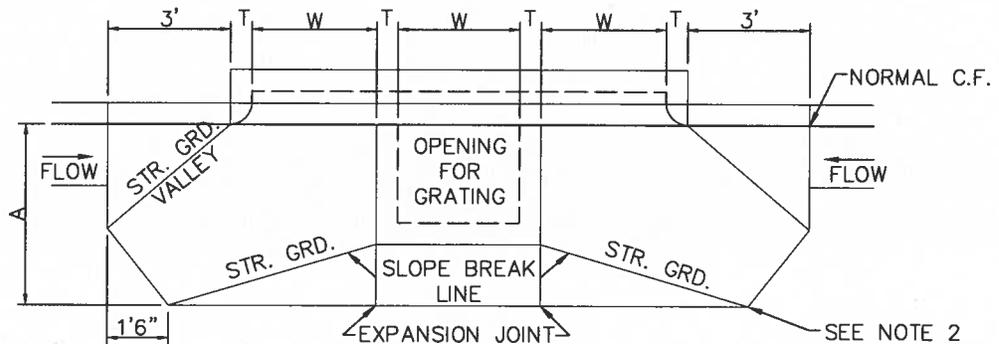
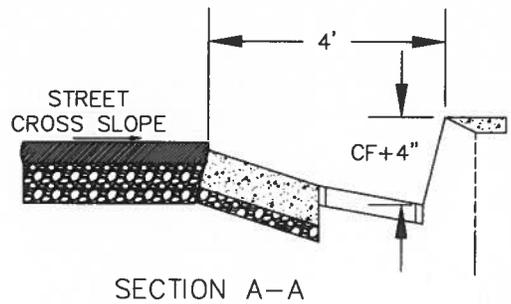
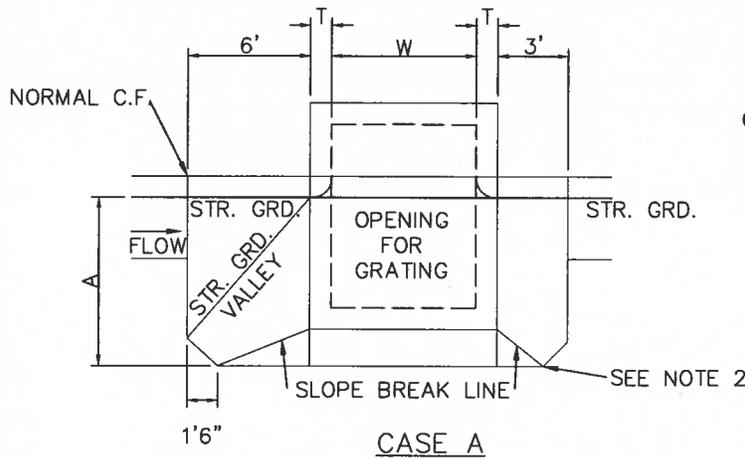
STD. NO.

**422b**

SHEET 2 OF 2

NOTES

1. GUTTER DEPRESSIONS SHALL BE CASE "A" (CASE "B" FOR SAG).
2. ELEVATIONS AT OUTER CORNERS SHOWN ON THE PROJECT DRAWINGS. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE OF THE GUTTER DEPRESSION SHALL CONFORM TO THE FINISHED STREET SURFACE.
3. A = 4 FEET UNLESS OTHERWISE SPECIFIED. FOR T AND W, SEE STD 403.
4. WHERE NO CURB EXISTS, CURB SHALL BE CONSTRUCTED BETWEEN ENDS OF GUTTER DEPRESSION. CURB SECTION SHALL CONFORM TO A STD CURB APPROVED BY THE CITY ENGINEER.
5. DEPRESSION SHALL BE CLASS 560-C-3250.
6. LOCAL DEPRESSION SHALL NOT BE CONSTRUCTED UNTIL CONNECTING CURB AND GUTTER HAS BEEN COMPLETED OR SHALL BE CONSTRUCTED MONOLITHICALLY WITH CONNECTING CURB AND GUTTER, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
7. WIDTH OF OPENING "W" SHALL BE SPECIFIED ON PLANS.



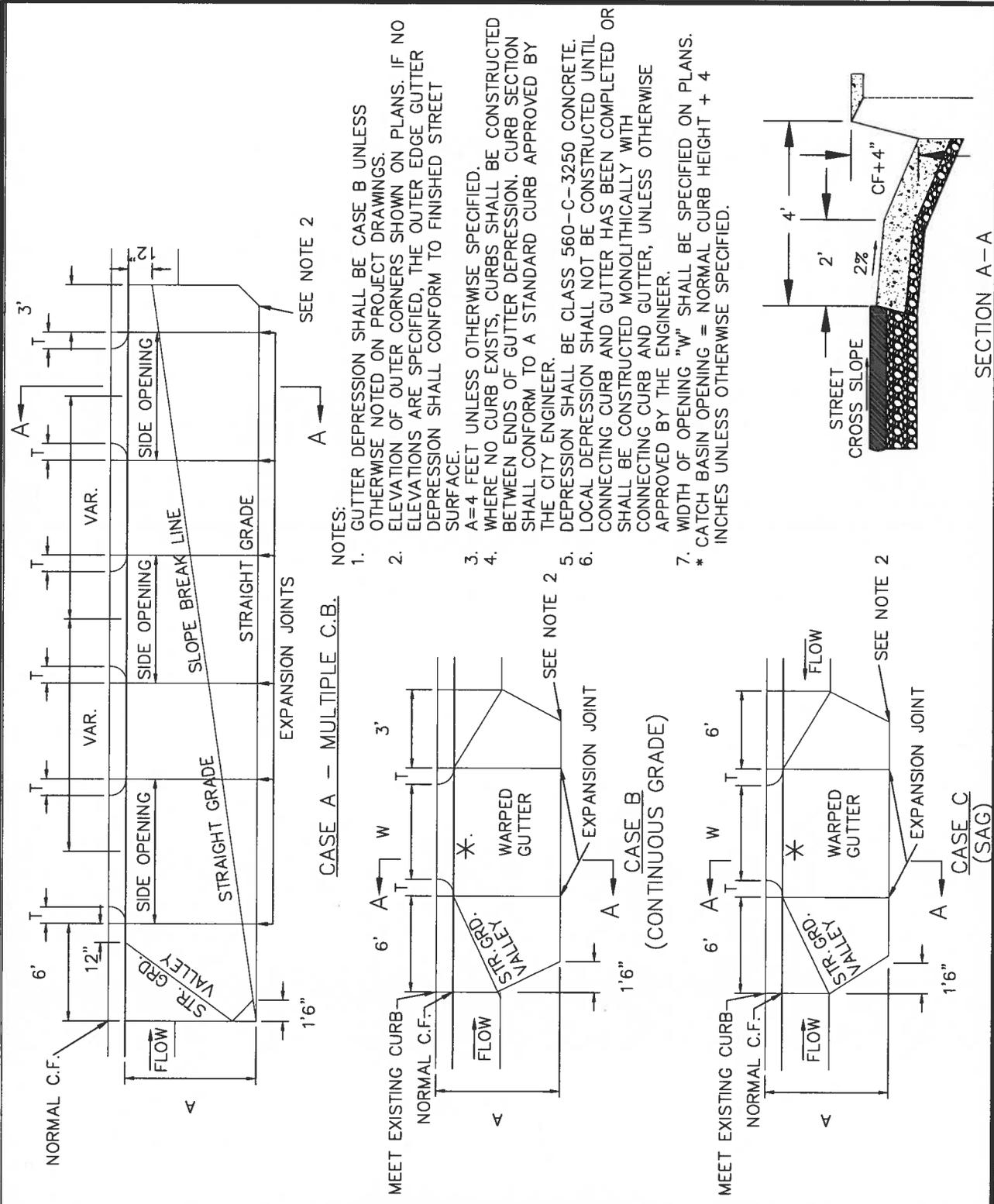
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DEPARTMENT OF PUBLIC WORKS**

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**GUTTER DEPRESSION FOR  
GRATE OPENING CATCH BASIN**

STD. NO.

**424**



NOTES:

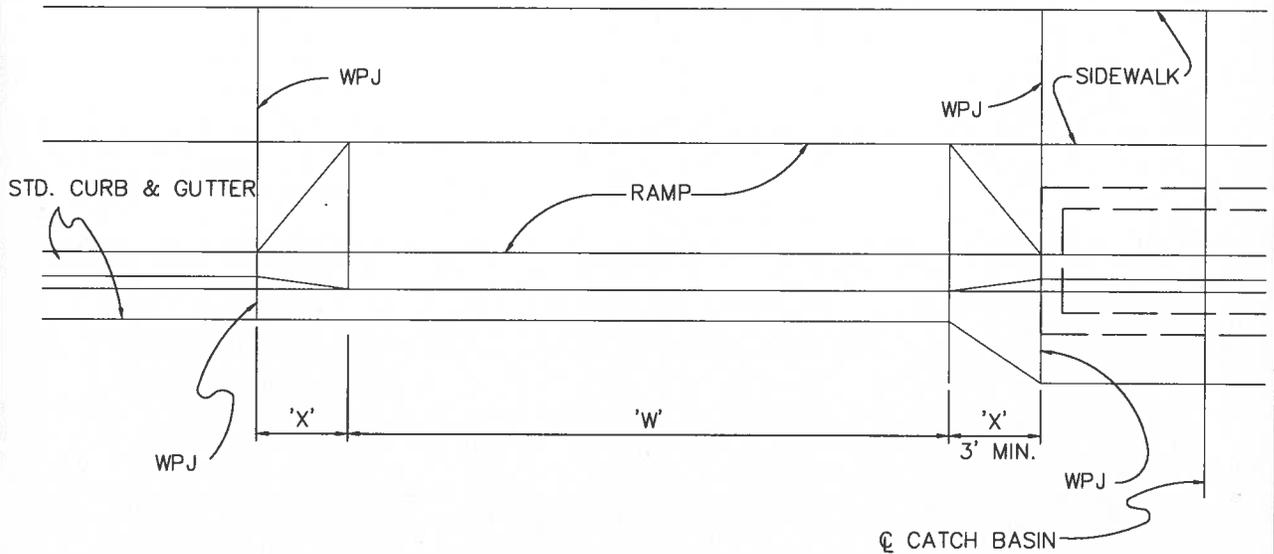
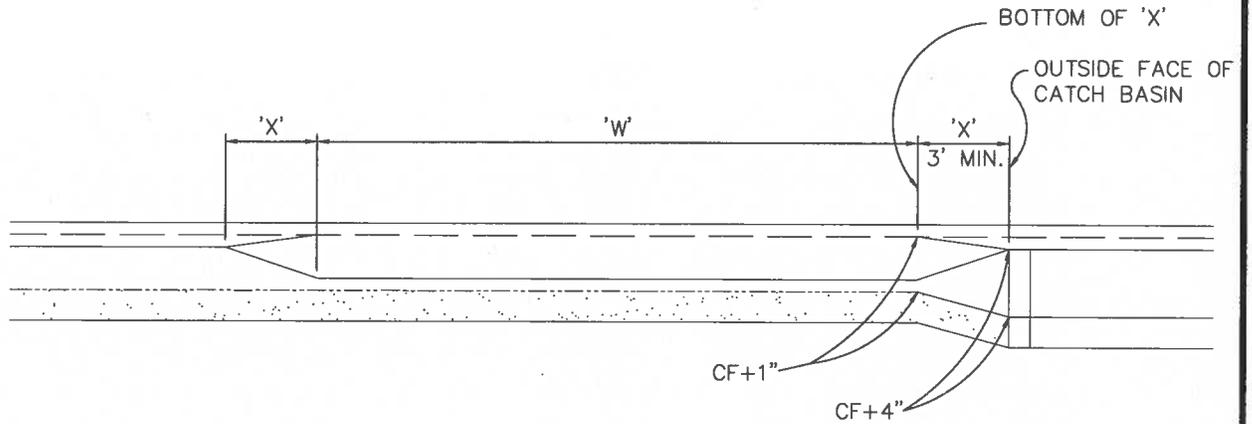
1. GUTTER DEPRESSION SHALL BE CASE B UNLESS OTHERWISE NOTED ON PROJECT DRAWINGS.
2. ELEVATION OF OUTER CORNERS SHOWN ON PLANS. IF NO ELEVATIONS ARE SPECIFIED, THE OUTER EDGE GUTTER DEPRESSION SHALL CONFORM TO FINISHED STREET SURFACE.
3. A=4 FEET UNLESS OTHERWISE SPECIFIED.
4. WHERE NO CURB EXISTS, CURBS SHALL BE CONSTRUCTED BETWEEN ENDS OF GUTTER DEPRESSION. CURB SECTION SHALL CONFORM TO A STANDARD CURB APPROVED BY THE CITY ENGINEER.
5. DEPRESSION SHALL BE CLASS 560-C-3250 CONCRETE. LOCAL DEPRESSION SHALL NOT BE CONSTRUCTED UNTIL CONNECTING CURB AND GUTTER HAS BEEN COMPLETED OR SHALL BE CONSTRUCTED MONOLITHICALLY WITH CONNECTING CURB AND GUTTER, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
6. WIDTH OF OPENING "W" SHALL BE SPECIFIED ON PLANS. \* CATCH BASIN OPENING = NORMAL CURB HEIGHT + 4 INCHES UNLESS OTHERWISE SPECIFIED.

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**GUTTER DEPRESSION FOR**  
**CURB OPENING CATCH BASIN**

STD. NO.
<b>425a</b>
SHEET 1 OF 2



NOTES:

1. TYPE A LOCAL DEPRESSION SHALL BE USED ADJACENT TO DRIVEWAY DEPRESSIONS ONLY.
2. USE OF TYPE A LOCAL DEPRESSION MAY REQUIRE LENGTHENING OF INLET TO PROVIDE ADEQUATE HYDRAULIC CAPACITY.
3. SEE STD 425a FOR ADDITIONAL NOTES AND DETAILS FOR LOCAL DEPRESSION.

**CITY OF MURRIETA**  
**DEPARTMENT OF DEVELOPMENT SERVICES**

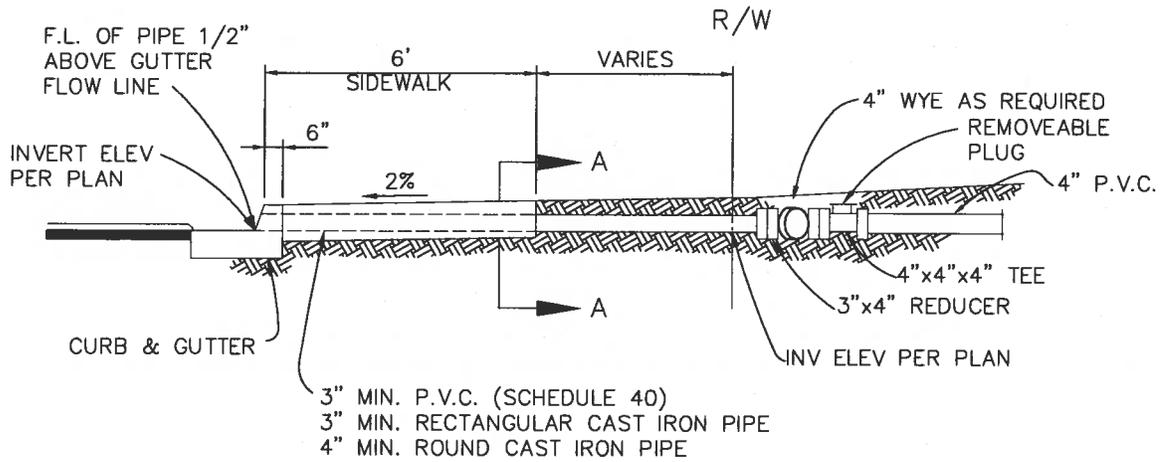
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<b>DRAFT</b>	

**LOCAL DEPRESSION TYPE A**  
**(ADJACENT TO DRIVEWAY)**

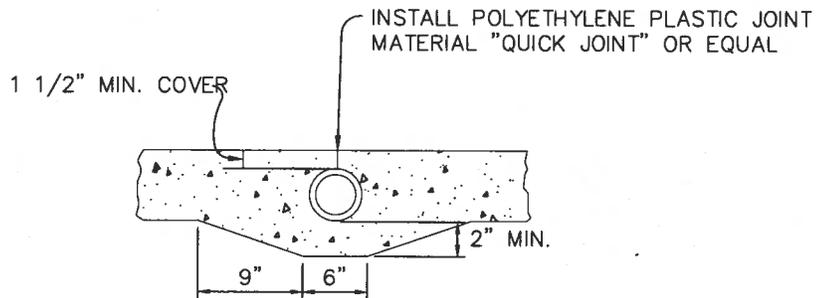
STD. NO.

**425b**

SHEET 2 OF 2



ELEVATION



SECTION A-A

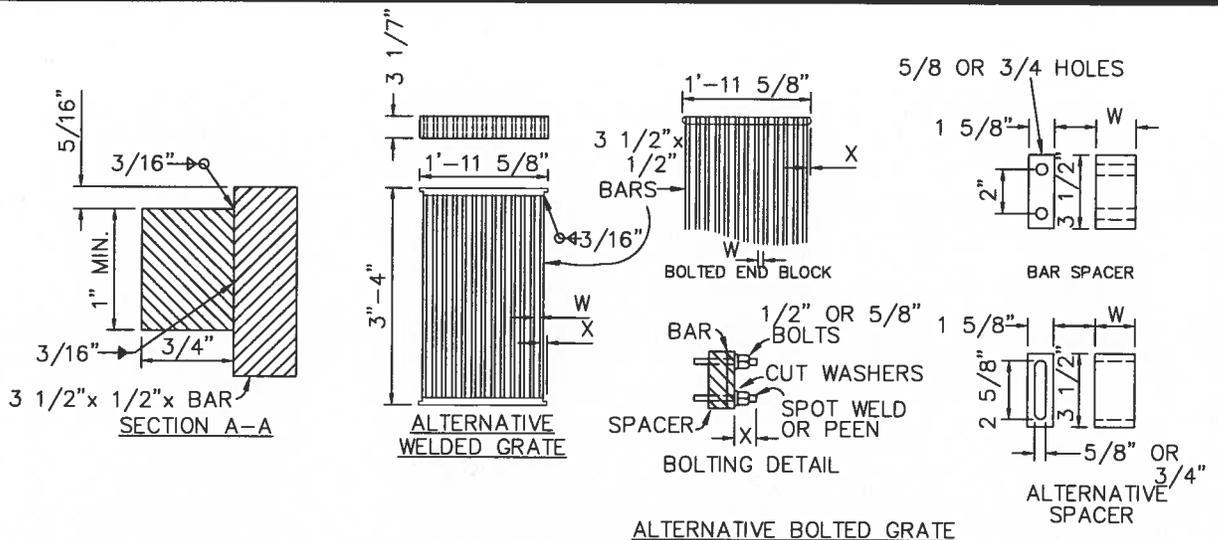
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APPROVED 1/14/10	

PRIVATE DRAIN  
THROUGH CURB

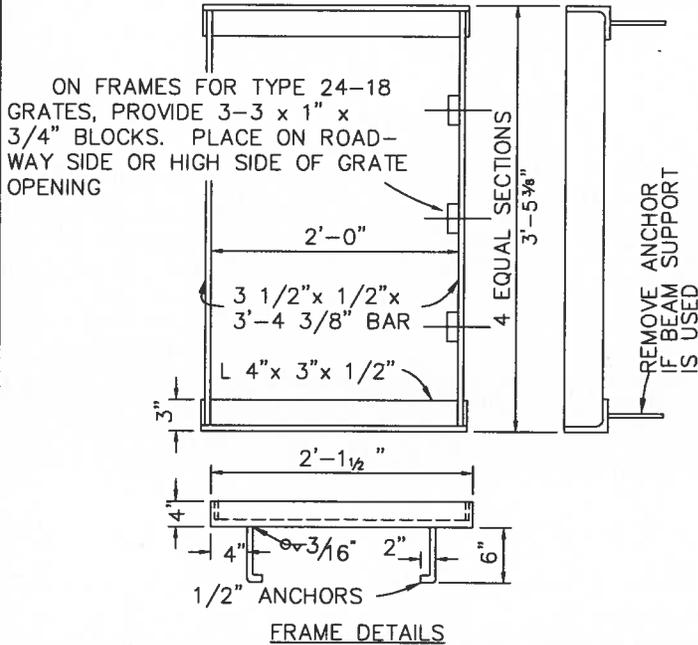
STD. NO.

426



GRATE DETAILS  
(SEE TABLE BELOW)

TYPE	NO	"W"	"X"	USAGE
24-9	9	2"	1 9/16"	USE IN LOCATIONS OFF THE ROADBED ON ALL TYPES OF HIGHWAYS
24-12	12	1 3/8"	1 1/4"	USE WITHIN THE ROADBED ON HIGHWAYS WHERE BICYCLES AND PEDESTRIANS ARE EXCLUDED - OR FOR RURAL CONDITIONS
24-18	18	3/4"	1 1/15"	USE WITHIN THE ROADBED UNDER URBAN CONDITIONS WHERE BICYCLES AND PEDESTRIANS ARE PERMITTED



WEIGHTS		
TYPE	WELDED	BOLTED
24-9	200	230
24-12	258	286
24-18	372	400
24" FRAME	90	

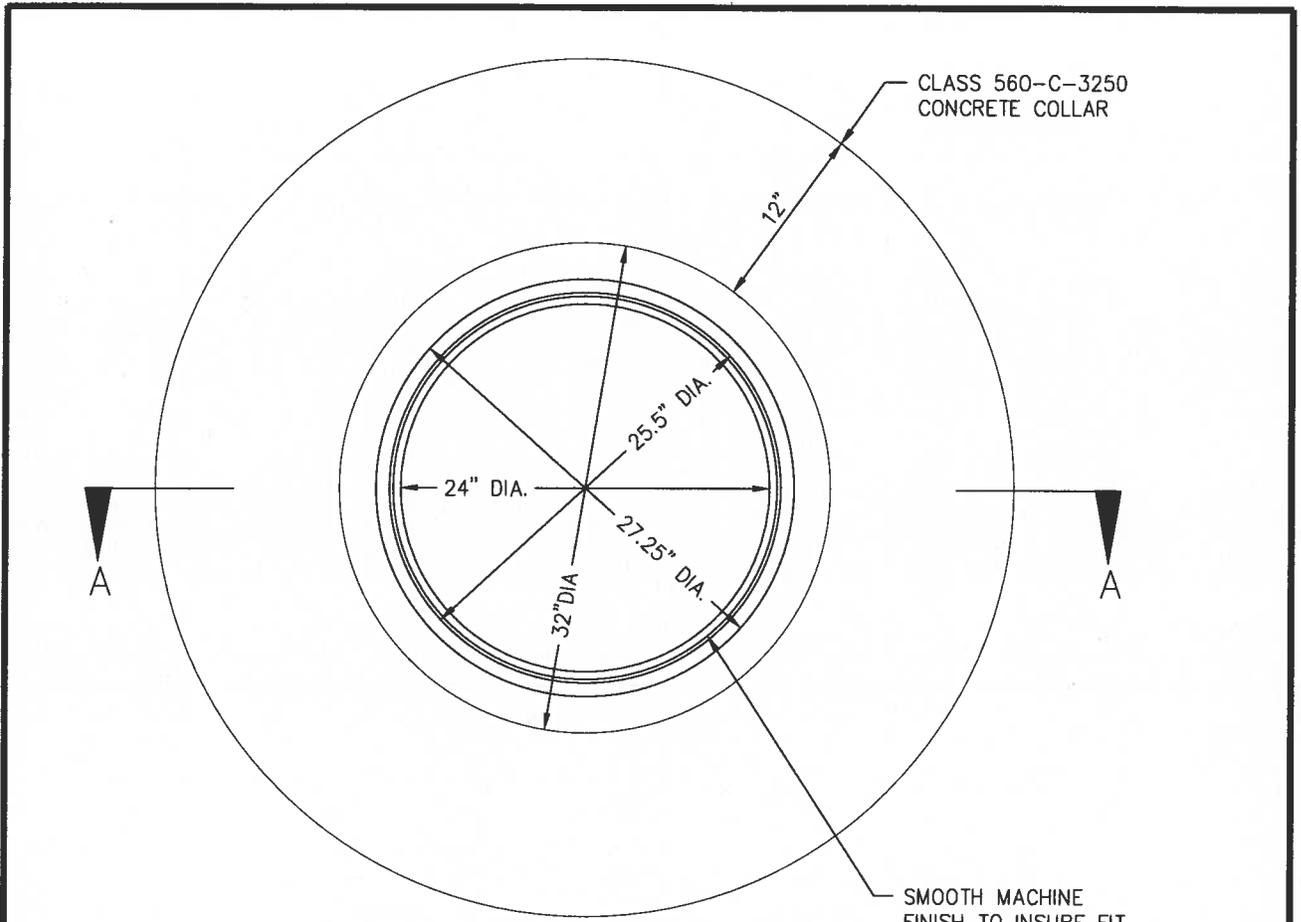
- GENERAL NOTES:
- 1.- GRATE TYPE NUMBERS REFER TO WIDTH OF GRATE IN INCHES AND THE NUMBER OF BARS RESPECTIVELY.
  - 2.- CONTRACTOR HAS THE OPTION OF USING WELDED OR BOLTED GRATES.
  - 3.- GRATES AND FRAMES TO BE PAINTED.
  - 4.- ROUND TOP OF BARS OPTIONAL ON ALL GRATES.
  - 5.- GRATE SHALL BE PLACED SO THAT BARS ARE PARALLEL TO THE DIRECTION OF PRINCIPAL SURFACE FLOW.

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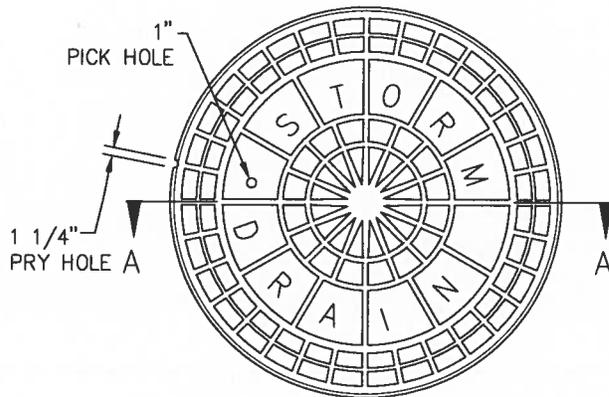
**GRATE AND FRAME DETAIL**

STD. NO.  
**427**



MANHOLE COVER FRAME

CAST IRON - WT. 150 LB.



MANHOLE COVER

CAST IRON - WT. 150 LB.

**CITY OF MURRIETA**  
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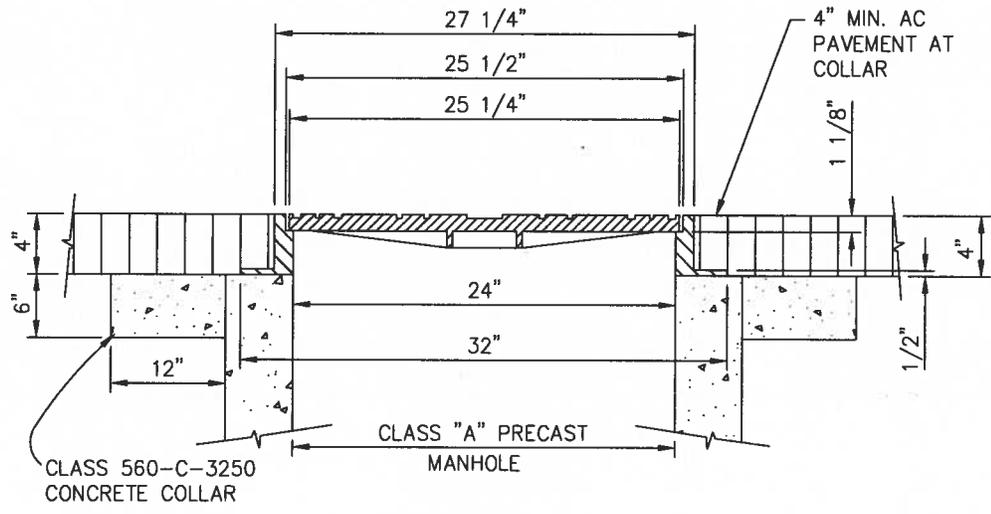
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**MANHOLE COVER AND FRAME**  
**FOR CATCH BASINS**

STD. NO.

**428a**

SHEET 1 OF 2



**SECTION A-A**

**NOTES:**

1. THE MANHOLE FRAME AND COVER SHALL BE MADE OF GRAY CAST IRON CONFORMING TO THE LATEST A.S.T.M. STANDARD A48, CLASS 30 OR BETTER.
2. ALL PARTS OF THE MANHOLE FRAME AND COVER EXCEPT MACHINE SURFACES SHALL BE COATED WITH ASPHALTUM PAINT.
3. THE MANHOLE FRAME AND COVER SHALL BE TESTED FOR ACCURACY OF FIT AND SHALL BE MARKED IN SETS BEFORE DELIVERY. THE COVER SHALL FIT THE FRAME SNUGLY BUT NOT TIGHTLY.
4. THE WEIGHT OF THE FRAME AND COVER SHALL NOT VARY MORE THAN TWO PERCENT FROM THOSE GIVEN HEREON.

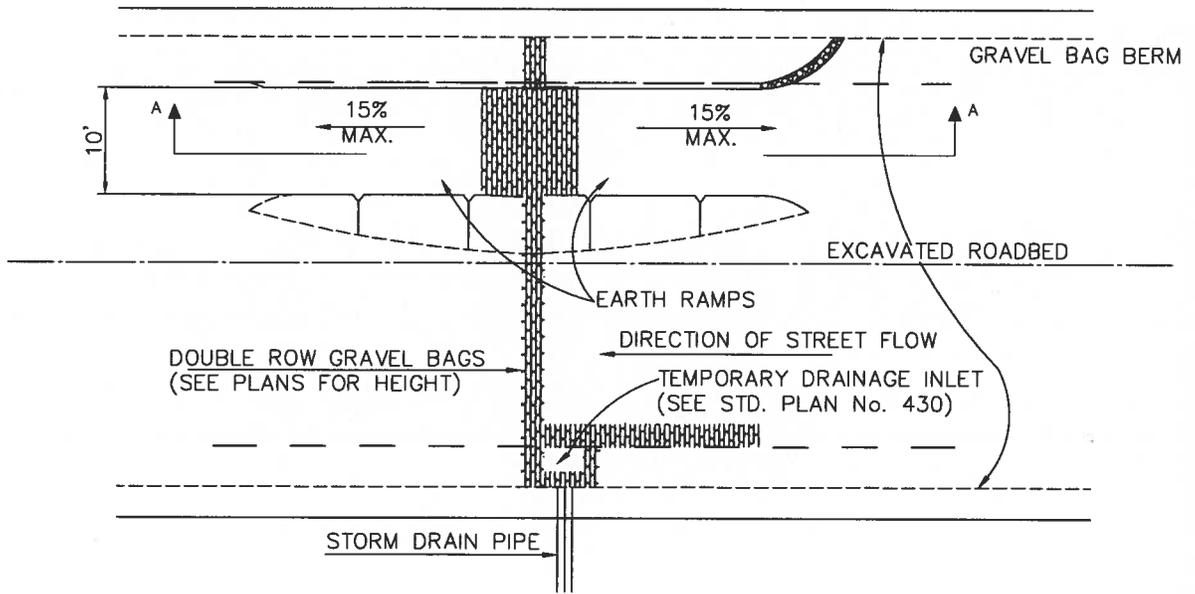
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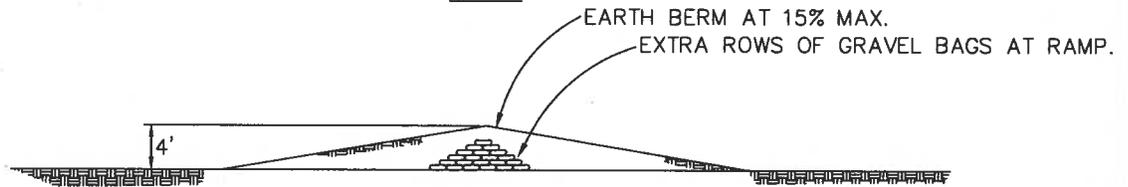
**MANHOLE COVER AND FRAME  
FOR CATCH BASINS**

STD. NO.

**428b**



PLAN



SECTION A-A

NOTES:

1. STORAGE CAPACITY SHALL BE IN ACCORDANCE WITH STD. PLAN No. 423 & THE DIMENSIONS OF THE STORAGE AREA SHALL BE SHOWN ON THE EROSION CONTROL PLAN.
2. GRAVEL BAGS ARE ENCOURAGED OVER SANDBAGS AND MAY BE REQUIRED IN AREAS WHICH ARE PARTICULARLY SENSITIVE TO SEDIMENT DEPOSITION.
3. THIS STANDARD DETAIL SHALL BE USED AS SHOWN ON THE APPROVED EROSION CONTROL PLAN.

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**STREET DESILTING BASIN**  
**VEHICLE ACCESS RAMP**

STD. NO.

**429**

6" X 6"-W 1.4 X W 1.4 W.W.M. OR APPROVED  
ALT. SCREEN AS SAFETY BARRIER

2' MAX. HEIGHT OF  
BAGS AT SPILLWAY

3'  
MIN.

12"  
MIN.

STREET  
SUB-GRADE

DOUBLE ROW  
SANDBAGS

BASE COURSE  
SANDBAGS  
ON EDGE.

2%  
SLOPE

STORM DRAIN PIPE. SEE  
PLAN FOR TYPE AND  
LOCATION.

SECTION C-C

MIN. 4' WIDE  
SPILLWAY

PLAN

NOTES:

1. GRAVEL BAGS ARE ENCOURAGED OVER THE USE OF SANDBAGS AND MAY BE REQUIRED IN AREAS WHICH ARE PARTICULARLY SENSITIVE TO SEDIMENT DEPOSITION.
2. A PORTION OF THE CATCH BASIN MAY BE CONSTRUCTED IN PLACE OF SANDBAGS.
3. THIS STANDARD DETAIL SHALL BE USED AS SHOWN ON THE APPROVED EROSION CONTROL PLAN.

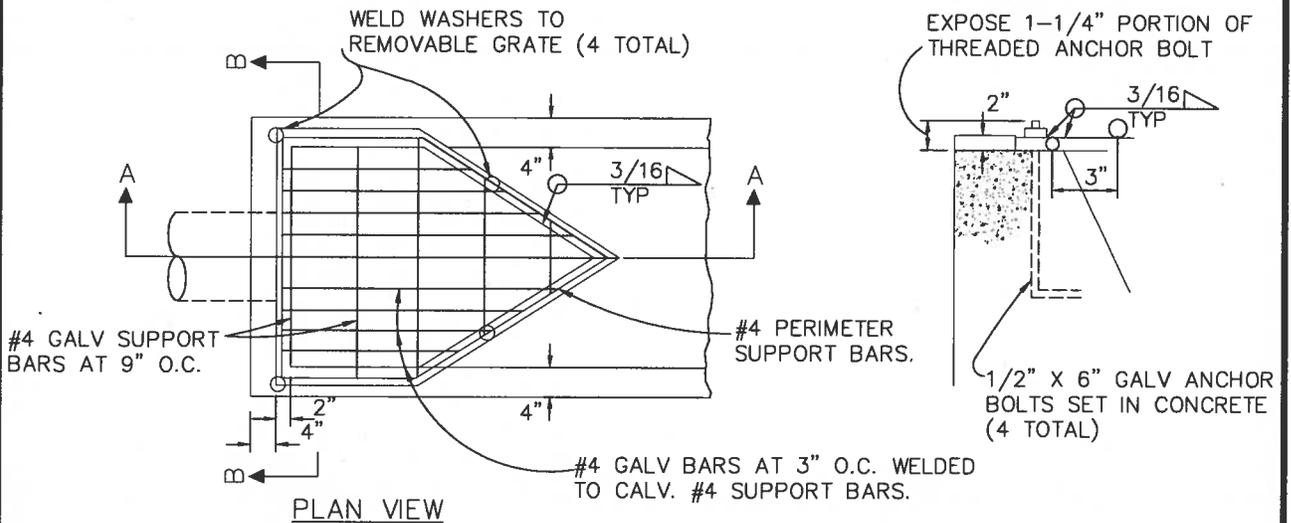
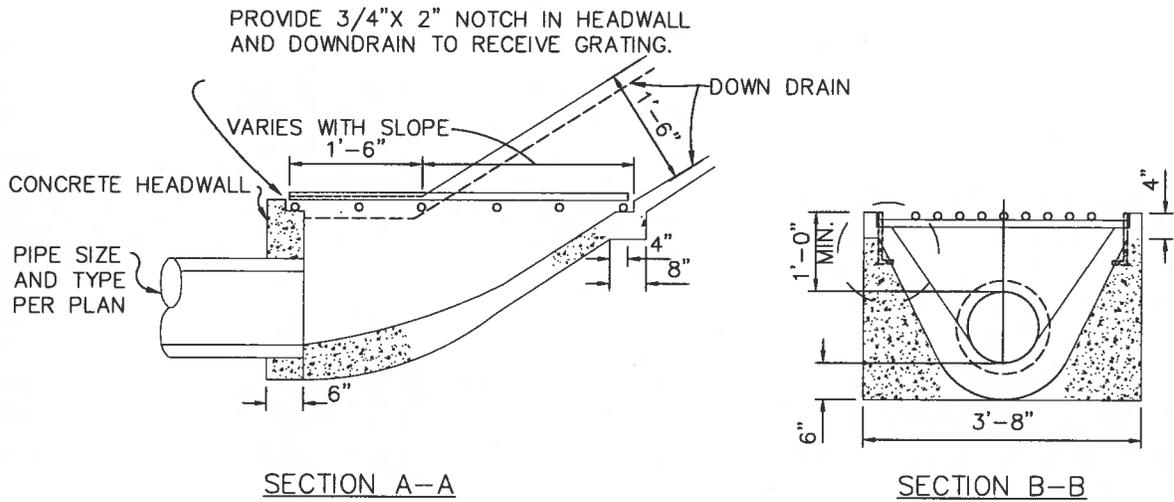
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DEPARTMENT OF PUBLIC WORKS

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APPROVED 1/14/10	

TEMPORARY DRAINAGE INLET

STD. NO.

430

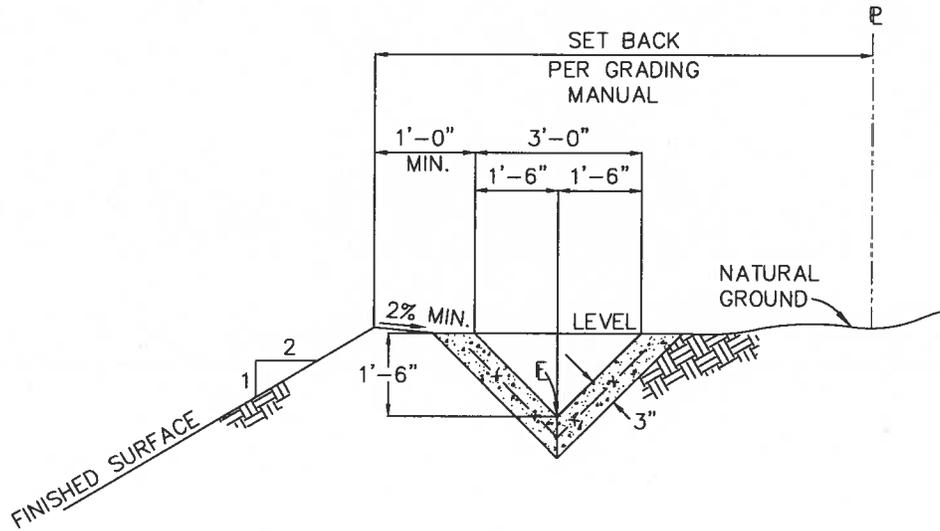


NOTES:

1. GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO PLACEMENT OF CONCRETE.
2. MATERIAL FOR CONSTRUCTION OF DOWNDRAIN SHALL BE CONCRETE REINFORCED WITH 6" x 6" W 1.4 x W 1.4 WELDED WIRE FABRIC.
3. DOWNDRAIN TO PIPE TRANSITION SHALL NOT BE USED WITHIN PUBLIC ROAD RIGHT-OF-WAY.
4. GRATE SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS

REVISIONS		DOWNDRAIN AND PIPE TRANSITION	STD. NO.
5/92			431
APPROVED 1/14/10			



NOTES:

1. CONCRETE SHALL BE 560-C-3250. CONCRETE MAY BE PNEUMATICALLY PLACED.
2. REINFORCING SHALL BE 6" x 6"-W 1.4 x W 1.4 WELDED WIRE MESH (W.W.M.) OR APPROVED EQUAL.
3. GROUND SHALL BE PRE-WETTED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO PLACEMENT OF CONCRETE. CURING COMPOUND SHALL BE USED WHEN REQUIRED BY THE CITY ENGINEER.
4. ANCHORS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD PLANS 415b (SHEET 2) WHEN SLOPE OR EXCEEDS 2:1.

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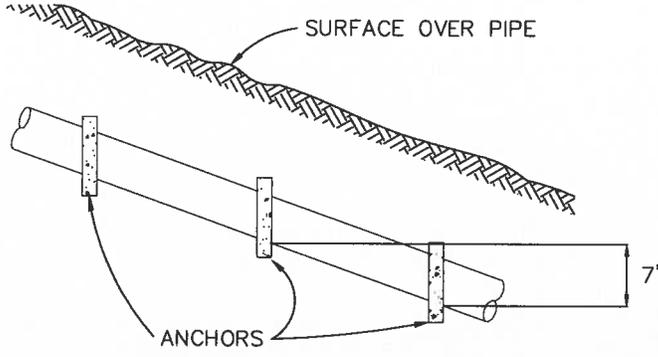
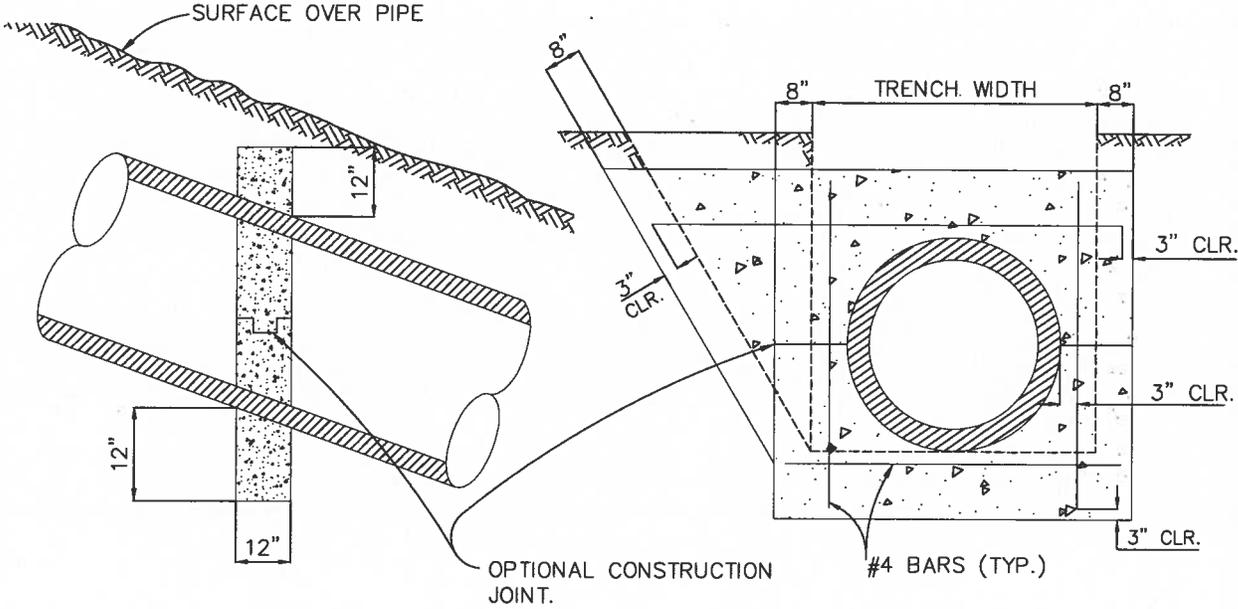
REVISIONS	
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APPROVED 1/14/10	

**INTERCEPTOR DRAIN**

STD. NO.

**432**

CONSTRUCTION OF ANCHOR FOR TRENCH W/ SLOPING SIDE WALLS



NOTES:

1. PIPE ANCHORS SHALL BE CONSTRUCTED AT 7' VERTICAL INTERVAL ON ALL SLOPES OF 5:1 OR STEEPER.
2. ALL REINFORCING STEEL SHALL BE #4 BARS.
3. CONCRETE SHALL BE CLASS 560-C-3250 CONCRETE.

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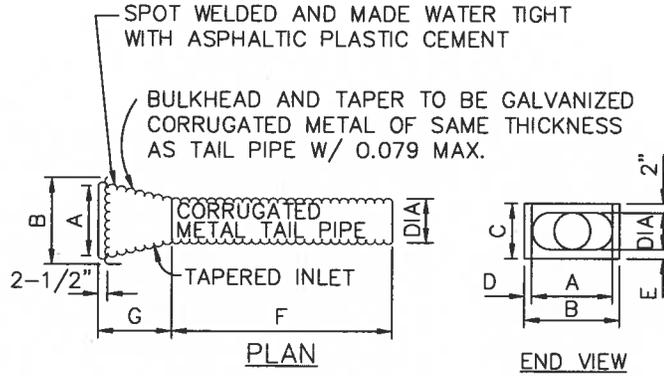
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CONCRETE PIPE SLOPE ANCHOR

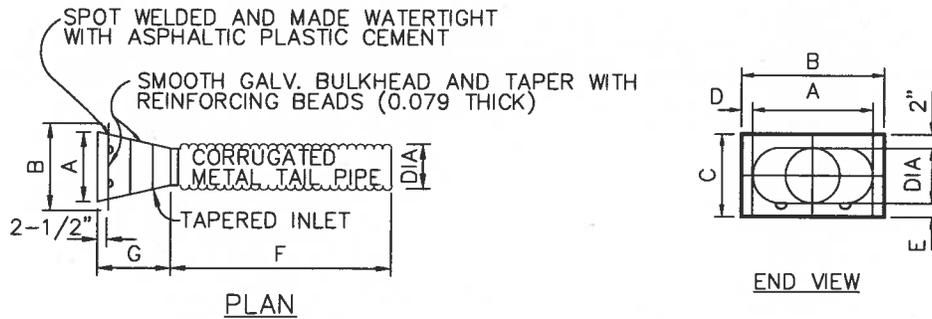
STD. NO.

433

GALVANIZED STEEL OVERSIDE DRAIN



ENTRANCE TAPER-TYPE 1  
ALTERNATIVE A



ENTRANCE TAPER-TYPE 1  
ALTERNATIVE B

DIA	A	B	C	D	E	F	G
8"	16"	25-1/2"	15"	4-3/4"	5"	6'	2'
12"	18"	25-1/2"	19"	3-3/4"	5"	6'	2'
15"	21"	30"	23"	4-1/2"	6"	6'	2'
18"	24"	34"	27"	5"	7"	6'	2'
24"	34"	46"	35"	6"	9"	4'	4'

ENTRANCE TAPER-TYPE 1  
ALTERNATIVE A & B

NOTES:

1. TAIL PIPE SAME THICKNESS AS DOWNDRAIN PIPE
2. TAPER JOINTS MAY BE WELDED OR RIVETED
3. DIMENSIONS TO BE AS TABULATED BELOW FOR TYPE 1 ALTERNATIVES A AND B

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**OVERSIDE DRAIN**

STD. NO.

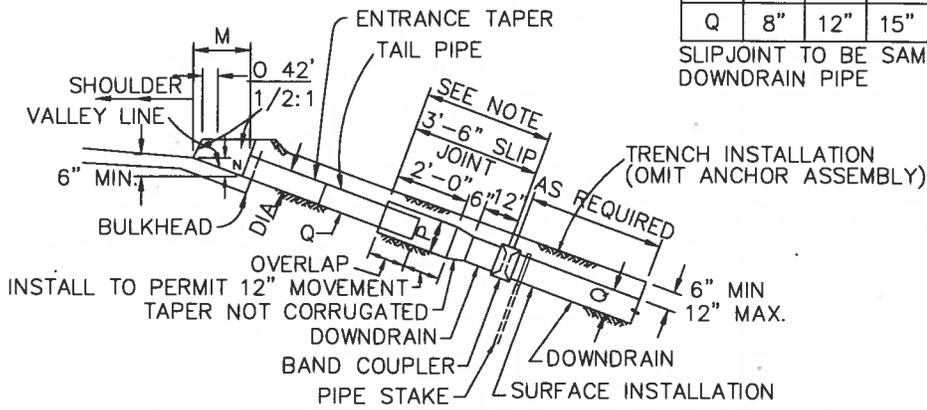
**434a**

SHEET 1 OF 4

C S P DIMENSIONS AS TABULATED BELOW

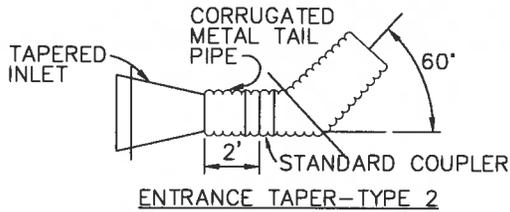
P	10"	15"	18"	21"	27"
Q	8"	12"	15"	18"	24"

SLIPJOINT TO BE SAME THICKNESS AS DOWNDRAIN PIPE



NOTE SECTION A-A (TYPE1)

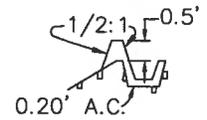
- (1) CABLE, SKIP JOINT OR ANCHOR ASSEMBLY TO BE PLACED WHEN SPECIFIED.
- (2) SLIP JOINT TO BE OMITTED WHEN COMPLETELY BURIED.
- (3) SLIP JOINT FOR TYPE 1 ENTRANCE TAPER SHOWN. TYPE 2 SIMILIAR



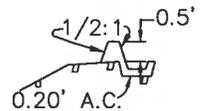
NOTE TAPERED INLET OF SAME CONSTRUCTION AND DIMENSIONS AS TYPE 1-ALTERNATIVE A OR B.

ENTRANCE TAPER AND PIPE DOWNDRAIN

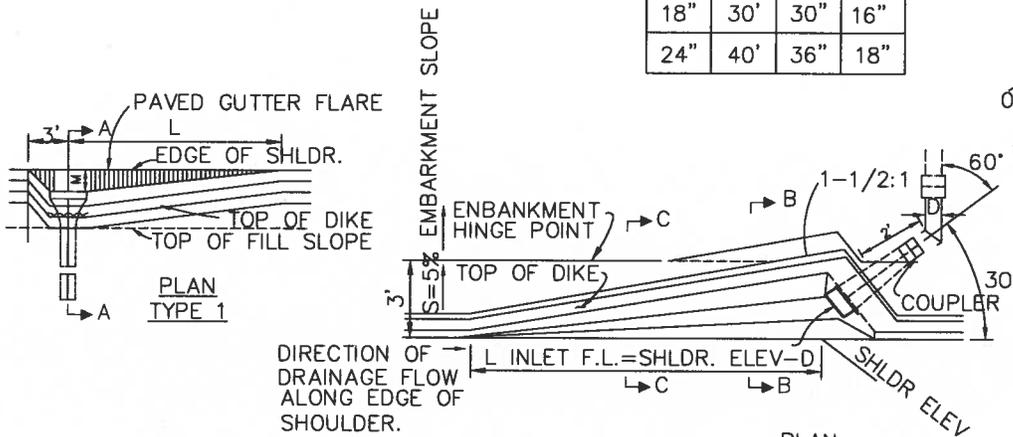
DIA	DIA L	M	N
8"	10'	18"	8"
12"	15'	20"	12"
15"	25'	24"	15"
18"	30'	30"	16"
24"	40'	36"	18"



SECTION B-B



SECTION C-C



NOTE: EXTEND DIKE BASE TO PROVIDE SUITABLE SUPORT WHERE DIKE EXTENDS BEYOND HINGE POINT. (RECOMMENDED FOR GRADES OF 2% OR GREATER)

DIA D	MIN L
8"	15'
12"	20'
15"	30'
18"	35"
24"	45'

SEE SHEET 3 OF 4 FOR ANCHOR ASSEMBLY

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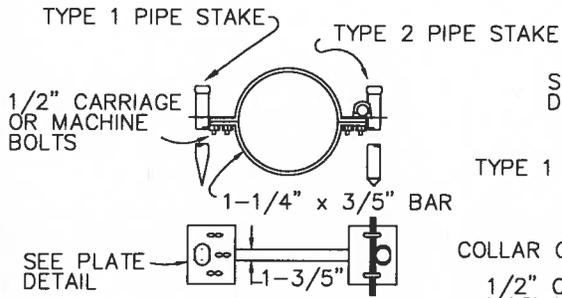
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OVERSIDE DRAIN

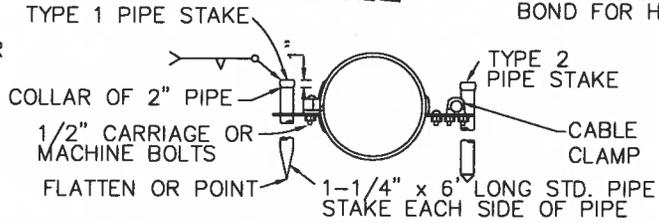
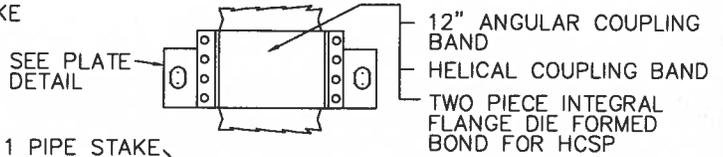
STD. NO.

434b

SHEET 2 OF 4

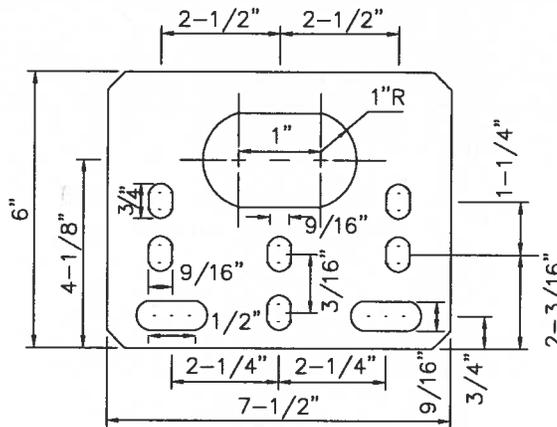


ANCHOR ASSEMBLY  
ALTERNATIVE A

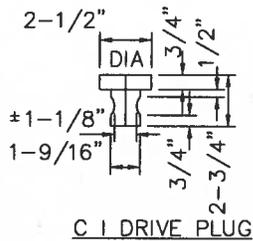


ANCHOR ASSEMBLY  
ALTERNATIVE B

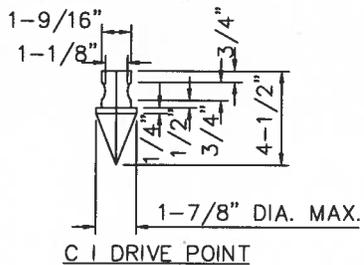
NOTE: CABLE AND CABLE CLAMPS TO BE USED WHEN REQUIRED BY THE SPECIAL PROVISIONS



MATERIAL TO BE 1/4" PLATE GALVANIZED AFTER FABRICATION

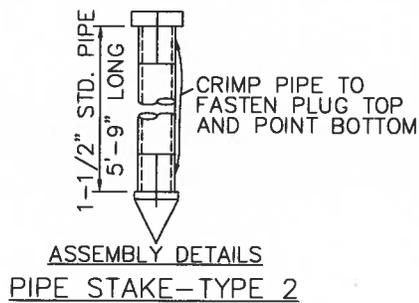


C I DRIVE PLUG



C I DRIVE POINT

PLATE DETAIL



ASSEMBLY DETAILS

PIPE STAKE-TYPE 2

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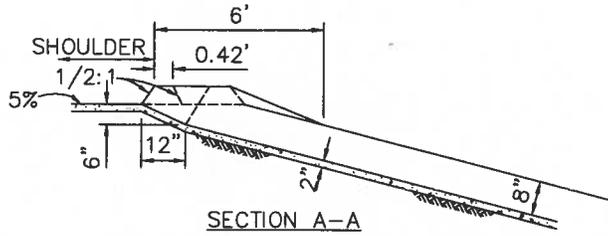
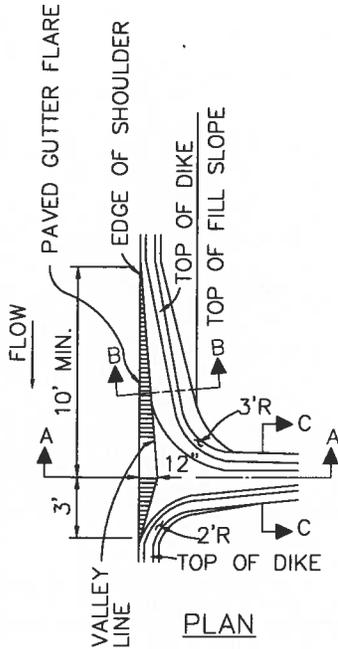
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**OVERSIDE DRAIN**

STD. NO.

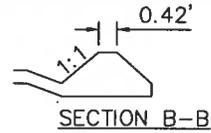
**434c**

SHEET 3 OF 4

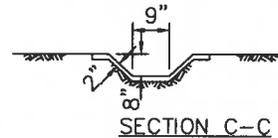


**ASPHALT CONCRETE OVERSIDE DRAINS**

TO BE USED ON FILL SLOPES FLATTER THAN 2:1. USE MIN 10' LENGTH OF GUTTER ON BOTH SIDES IN A SAG LOCATION



NOTE: CROSS-SECTION OF SLOPE DITCH MAY BE SEMICIRCULAR, VEE OR TRAPEZOIDAL MIN. TOP WIDTH=25" MIN. DEPTH=8"



**NOTES:**

- 1-FOR PAYMENT PURPOSES AN ANCHOR ASSEMBLY SHALL INCLUDE TWO PIPE STAKES.
- 2-ALL PIPE STAKES AND HARDWARE TO BE GALVANIZED AFTER FABRICATION.
- 3-EITHER ALTERNATIVE A OR ALTERNATIVE B ANCHOR ASSEMBLIES AND TYPE 1 OR TYPE 2 PIPE STAKES MAY BE USED AT CONTRACTORS OPTION FOR C.M.P. OR C.A.P. ALTERNATIVE A ANCHOR ASSEMBLY ONLY TO BE PLACED IN ANNULAR CORRUGATION. MAY BE PLACED ON ANNULAR OR REFORMED END H C S P. COUPLING BAND IF SECURELY FASTENED ON DOWNSTREAM SIDE OF JOINT. ALTERNATIVE B ANCHOR ASSEMBLY TO BE FASTENED TO PIPE SECTION AND NOT TO BE A BAND COUPLER USED TO JOIN SECTIONS.

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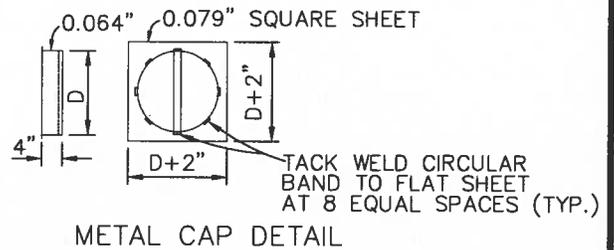
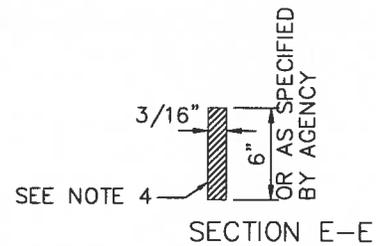
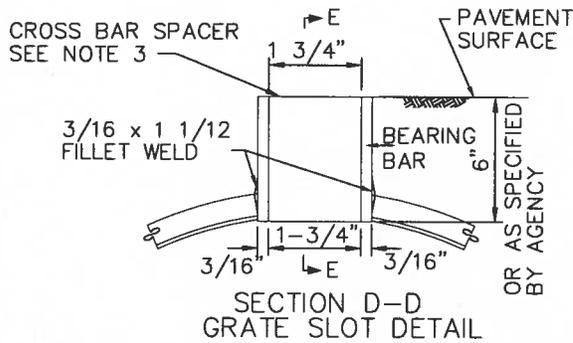
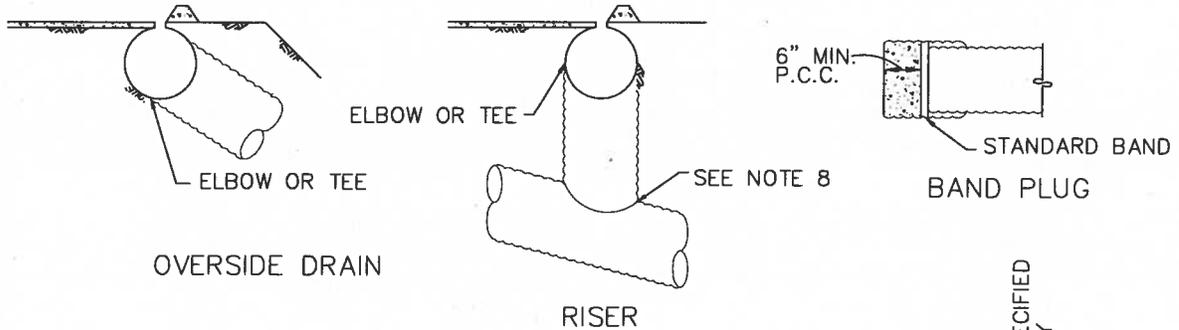
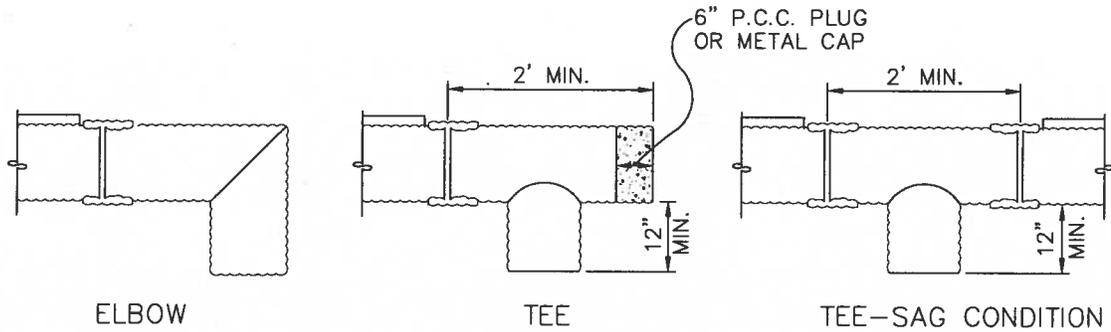
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**OVERSIDE DRAIN**

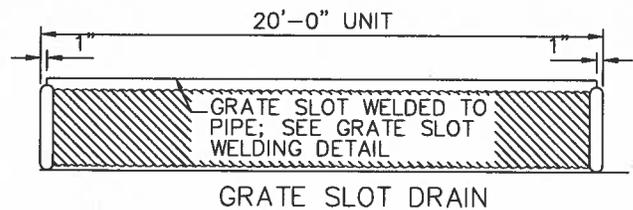
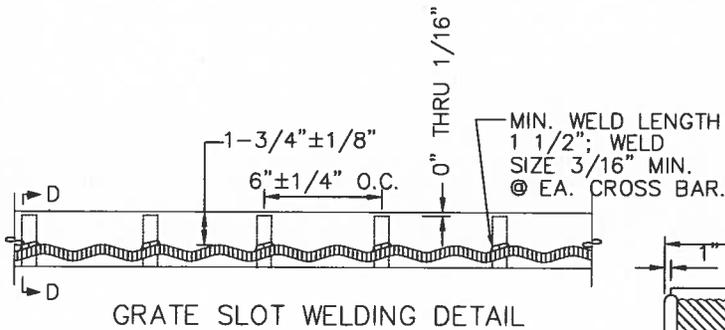
STD. NO.

**434d**

SHEET 4 OF 4



NOTE:  
"D" EQUALS NOMINAL  
PIPE DIAMETER



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**SLOTTED CORRUGATED  
STEEL PIPE DRAIN  
12" THROUGH 24"**

STD. NO.

**435a**

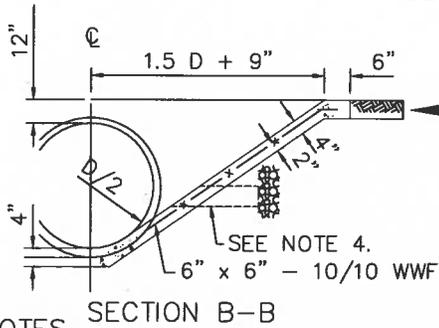
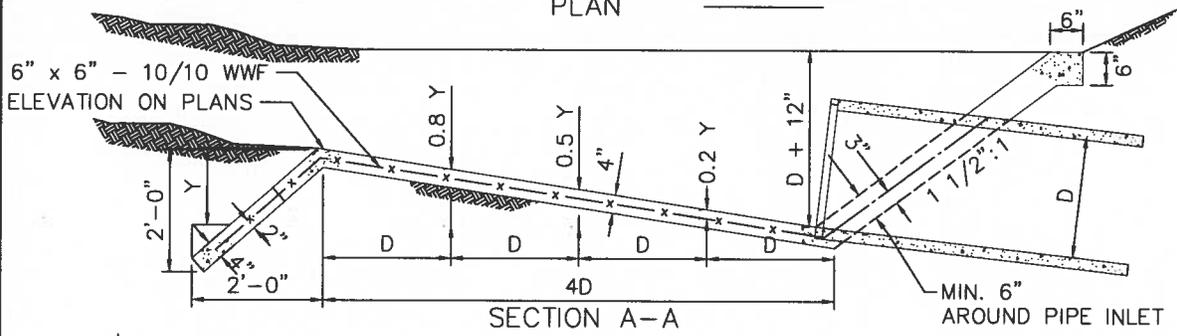
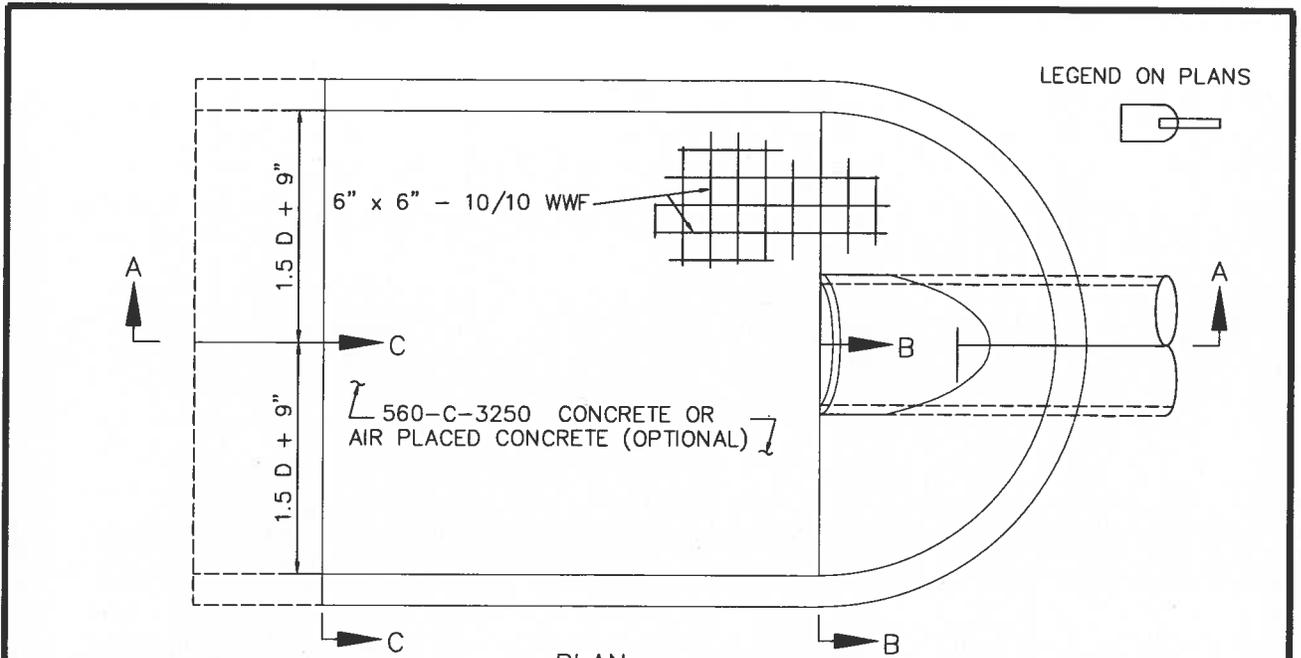
SHEET 1 OF 2

NOTES:

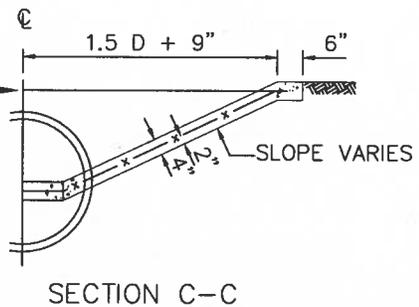
1. DRAIN SEAMS MAY BE RIVETED OR RESISTANCE SPOTWELDED AT EQUAL CENTERS, CONTINUOUS HELICAL LOCK SEAM OR HELICAL WELDED SEAM.
2. EACH DRAIN SECTION SHALL BE ASSEMBLED WITH STANDARD COUPLING BANDS.
3. CROSS BAR SPACER OF GRATE SHALL BE PRESSURE FUSION OR PLUG WELDED TO BEARING BARS IN SUCH A MANNER AS TO DEVELOP THE STRENGTH OF THE CROSS BAR SPACER.
4. CROSS BAR SPACER (SECTION E-E) MAY DIFFER FROM THAT SHOWN PROVIDED SECTION AREA IS EQUAL OR GREATER.
5. GRATE MATERIALS SHALL BE WELDED OF STEEL COMPLYING TO THE REQUIREMENTS OF ASTM A 36.
6. THE MAXIMUM VARIANCE FROM A STRAIGHT LINE FROM THE EXTREME TOP OF THE BEARING BAR SHALL BE 1/2" IN 20 FEET.
7. INSTALLATION LENGTHS SHALL BE 10 FEET OR MULTIPLES THEREOF.
8. EITHER FIELD JOINT SEALED WITH A PLIABLE MIXTURE OF SAND, PORTLAND CEMENT AND EMULSFIED ASPHALT (MIXTURE OF 1 PART PORTLAND CEMENT, 3-5 PARTS SAND AND 1 1/2 PARTS SSI EMULSFIED ASPHALT) OR CONTINUOUS WELD.

**CITY OF MURRIETA  
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<b>REVISIONS</b>	<p><b>SLOTTED CORRUGATED STEEL PIPE DRAIN 12" THROUGH 24"</b></p>	STD. NO.
5/92		<b>435b</b>
		SHEET 2 OF 2
APPROVED 1/14/10		



INLET CONSTR. SYM. ABOUT C EXCEPT FOR MULTIPLE PIPE INSTALLATIONS ( SEE NOTE 1 )



**NOTES**

1. WHEN MORE THAN ONE PIPE IS USED THE PROFILE VIEW SHOWN SHALL HOLD FOR THE DISTANCE ACROSS ALL PIPE OPENINGS. SECTION A-A AND B-B SHALL BE FROM THE OUTERMOST PIPE. THE DISTANCE BETWEEN PIPES SHALL BE D/2 FOR ROUND AND SPAN/3 FOR ARCH PIPE. ( 12" MINIMUM )
2. CULVERT SHALL BE CUT OFF EVEN WITH APRON SURFACE WHEN REQUIRED BY THE AGENCY.
3. USE INLET APRON ONLY WHERE A FLARED END SECTION CAN NOT BE UTILIZED.
4. PLACE WEEP HOLES WHEN REQUIRED BY THE AGENCY.

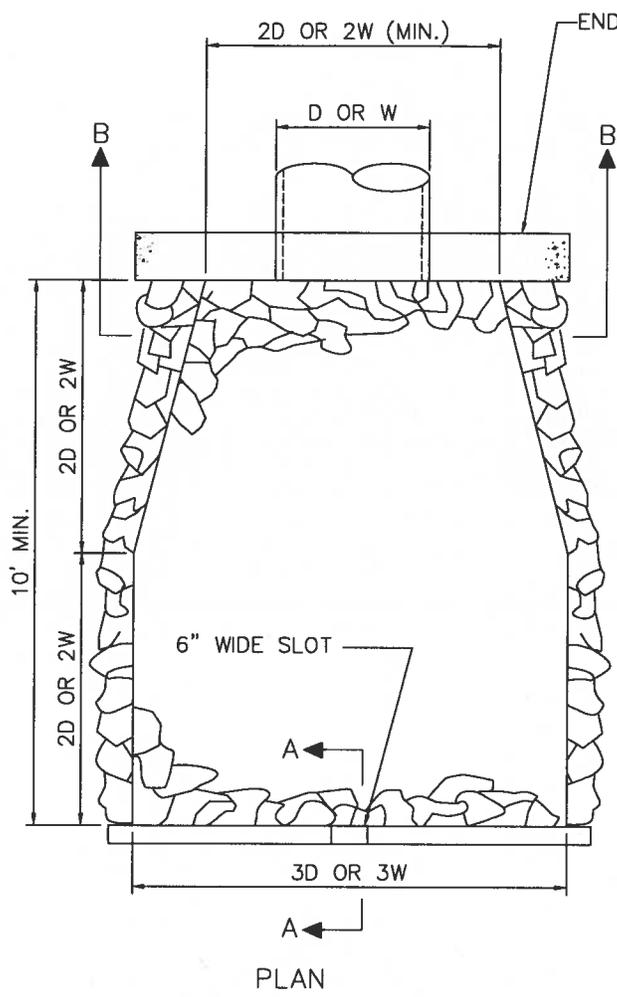
**CITY OF MURRIETA  
DEPARTMENT OF PUBLIC WORKS**

REVISIONS	
5/92	
APPROVED 1/14/10	

**INLET APRON FOR CULVERTS  
UP TO 42" DIAMETER**

STD. NO.

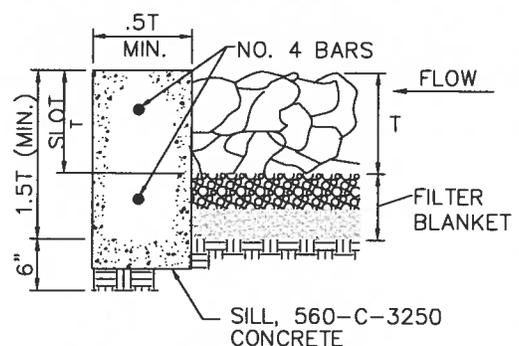
**445**



DESIGN VELOCITY (FT./SEC)	ROCK CLASSIFICATION	T (MIN)
6-10	NO. 2 BACKING	1.1 FT
10-12	1/4 TON	2.7 FT
12-14	1/2 TON	3.5 FT
14-16	1 TON	4.4 FT
16-18	2 TON	5.4 FT

\* OVER 18 FPS REQUIRES SPECIAL DESIGN SECTION OF RIP RAP

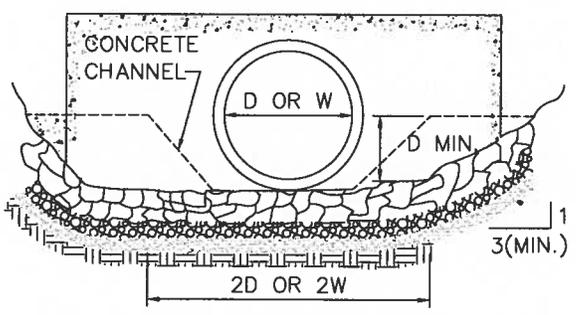
D = PIPE DIAMETER  
W = BOTTOM WIDTH OF CHANNEL



SECTION A-A

NOTES:

- PLANS SHALL SPECIFY:
  - ROCK CLASS AND THICKNESS (T).
  - FILTER MATERIAL, NUMBER OF LAYERS AND THICKNESS.
- RIP RAP SHALL BE EITHER QUARRY STONE OR BROKEN CONCRETE (IF SHOWN ON THE PLANS). COBBLES ARE NOT ACCEPTABLE.
- RIP RAP SHALL BE PLACED OVER FILTER BLANKET WHICH MAY BE EITHER GRANULAR MATERIAL OR FILTER FABRIC (WOVEN FILTER SLIT FILM FABRIC SHALL NOT BE USED).
- RIP RAP ENERGY DISSIPATOR SHALL BE DESIGNATED AS EITHER TYPE 1 OR TYPE 2. TYPE 1 SHALL BE WITH CONCRETE SILL; TYPE 2 SHALL BE WITHOUT SILL.
- SEE 446B FOR FILTER FABRIC SPECIFICATIONS.



SECTION B-B

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**RIP RAP**  
**ENERGY DISSIPATOR**

STD. NO.

**446a**

SHEET 1 OF 2

ROCK CLASSIFICATION	FILTER BLANKET UPPER LAYER(S) (3)			LOWER LAYER (6)
	OPTION 1 (4) SECT. 200	OPTION 2 (4) SECT. 400	OPTION 3 (5)	
NO. 2 BACKING	1/4"	B3	D.G.	-
1/4 TON	3/4"	-	3/4"-1 1/2"	SAND
1/2 TON	1"	-	3/4"-1 1/2"	SAND
1 TON	1 1/2"	-	TYPE B	SAND
2 TON	2"	-	TYPE B	SAND

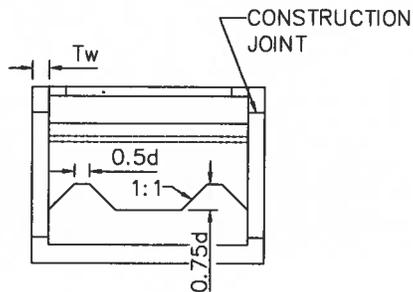
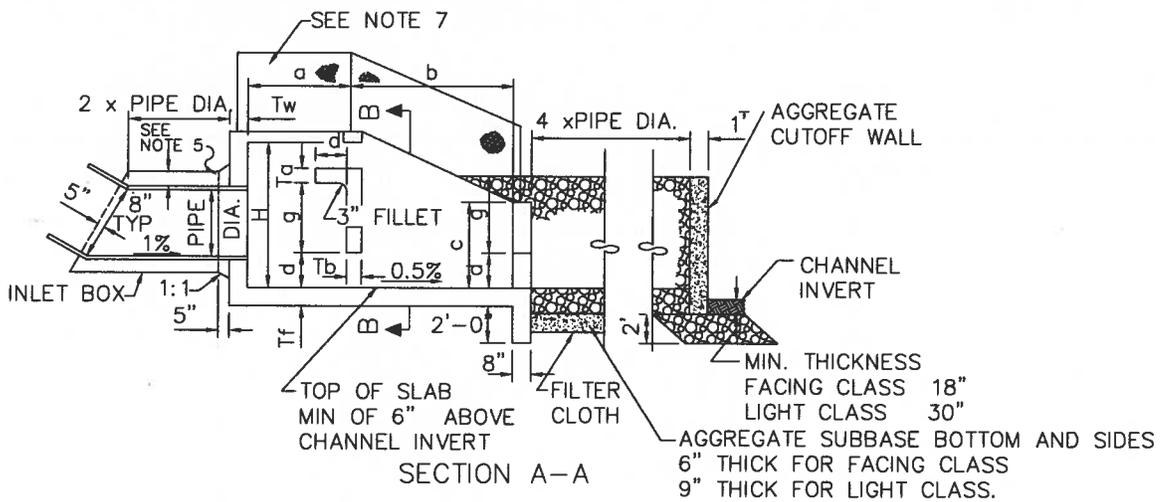
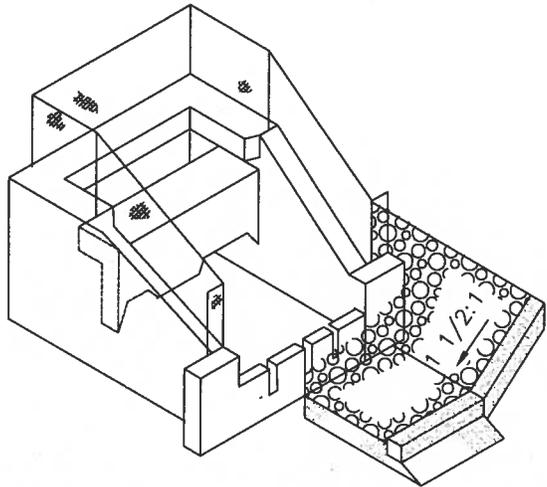
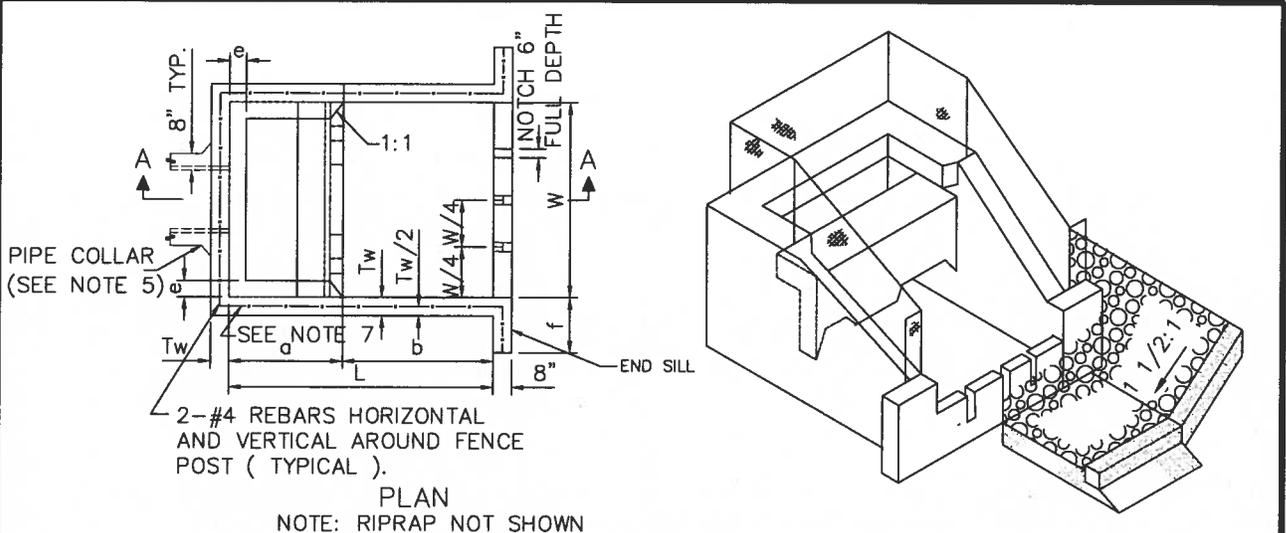
PRACTICAL USE OF THIS TABLE IS LIMITED TO SITUATIONS WHERE "T" IS LESS THAN INSIDE DIAMETER.

FILTER BLANKET NOTES:

1. AVERAGE VELOCITY IN PIPE OR BOTTOM VELOCITY IN ENERGY DISSIPATER, WHICHEVER IS GREATER.
2. IF DESIRED RIP RAP AND FILTER BLANKET CLASS IS NOT AVAILABLE, USE NEXT LARGER CLASS.
3. FILTER BLANKET THICKNESS = 1 FOOT OR "T", WHICHEVER IS LESS.
4. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
5. D.G. = DISINTEGRATED GRANITE, 1mm TO 10 mm.  
P.B. = PROCESS MISCELLANEOUS BASE  
TYPE B = TYPE B BEDDING MATERIAL, (MIN 75% CRUSHED PARTICLES, 100% PASSING 2 1/2" SIEVE, 10% PASSING 1" SIEVE.
6. SAND 75% RETAINED ON #200 SIEVE.

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<b>REVISIONS</b>		<b>RIP RAP ENERGY DISSIPATOR</b>	<b>STD. NO.</b>
5/92			<b>446b</b>
			<b>SHEET 2 OF 2</b>
<b>APPROVED 1/14/10</b>			



SECTION B-B

CITY OF MURRIETA  
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REVISIONS	
5/92	
APPROVED 1/14/10	

CONCRETE ENERGY DISSIPATOR

STD. NO.

447a

SHEET 1 OF 2

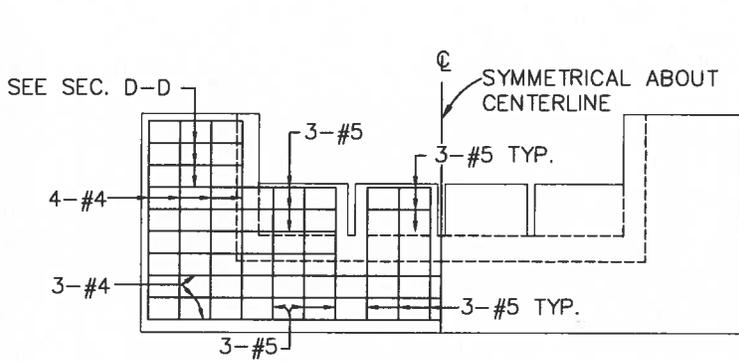
Pipe Dia. (in)	18	24	30	36	42	48	54	60	72
Area (sq.ft.)	1.77	3.14	4.91	7.07	9.62	12.57	15.90	19.63	28.27
Max. Q (cfs)	21	38	59	85	115	151	191	236	339
W	5'-6"	6'-9"	8'-0"	9'-3"	10'-6"	11'-9"	13'-0"	14'-3"	16'-6"
H	4'-3"	5'-3"	6'-3"	7'-3"	8'-0"	9'-0"	9'-9"	10'-9"	12'-3"
L	7'-4"	9'-0"	10'-8"	12'-4"	14'-0"	15'-8"	17'-4"	19'-0"	22'-0"
a	3'-3"	3'-11"	4'-7"	5'-3"	6'-0"	6'-9"	7'-4"	8'-0"	9'-3"
b	4'-1"	5'-1"	6'-1"	7'-1"	8'-0"	8'-11"	10'-0"	11'-0"	12'-9"
c	2'-4"	2'-10"	3'-4"	3'-10"	4'-5"	4'-11"	5'-5"	5'-11"	6'-11"
d	0'-11"	1'-2"	1'-4"	1'-7"	1'-9"	2'-0"	2'-2"	2'-5"	2'-9"
e	0'-6"	0'-6"	0'-8"	0'-8"	0'-10"	0'-10"	1'-0"	1'-0"	1'-3"
f	1'-6"	2'-0"	2'-6"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
g	2'-1"	2'-6"	3'-0"	3'-6"	3'-11"	4'-5"	4'-11"	5'-4"	6'-2"
Tf	8"		10"			12"			
Tb	7"		9 1/2"			10 1/2"			
Tw	7"		9 1/2"			10 1/2"			
Ta	7"		8"						

NOTES:

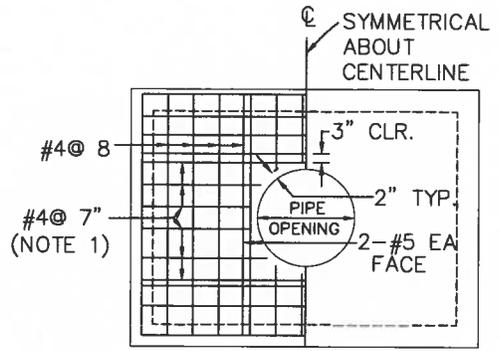
1. DESIGN:  
EQUIVALENT FLUID PRESSURE = 60 p.c.f.  
MAXIMUM OUTLET VELOCITY = 35 f.p.s.
2. CONCRETE SHALL BE 560-C-3250
3. REINFORCING SHALL CONFORM TO ASTM DESIGNATION A615 AND MAY BE GRADE 40 OR 60. REINFORCING SHALL BE PLACED WITH 2" CLEAR CONCRETE COVER UNLESS NOTED OTHERWISE. SPLICES SHALL NOT BE PERMITTED EXCEPT AS INDICATED ON THE PLANS.
4. FOR PIPE GRADE NOT EXCEEDING 20%, INLET BOX MAY BE OMITTED.
5. IF INLET BOX IS OMITTED, CONSTRUCT PIPE COLLAR AS SHOWN.
6. UNLESS NOTED OTHERWISE, ALL REINFORCING BAR BENDS SHALL BE FABRICATED WITH STANDARD HOOKS.
7. FIVE FOOT HIGH CHAIN LINK FENCING, EMBED POST 18" DEEP IN WALLS AND ENCASE WITH CLASS B MORTAR.
8. IN SANDY AND SILTY SOIL:  
A) RIPRAP AND AGGREGATE CUTOFF WALL REQUIRED AT THE END OF ROCK APRON.  
B) FILTER CLOTH (POLYFILTER X OR EQUIVALENT) SHALL BE INSTALLED ON NATIVE SOIL AND BASE, MINIMUM OF 1ft. OVERLAPS AT JOINTS.
9. RIP RAP AND SUBBASE CLASSIFICATION SHALL BE SHOWN ON PLANS.

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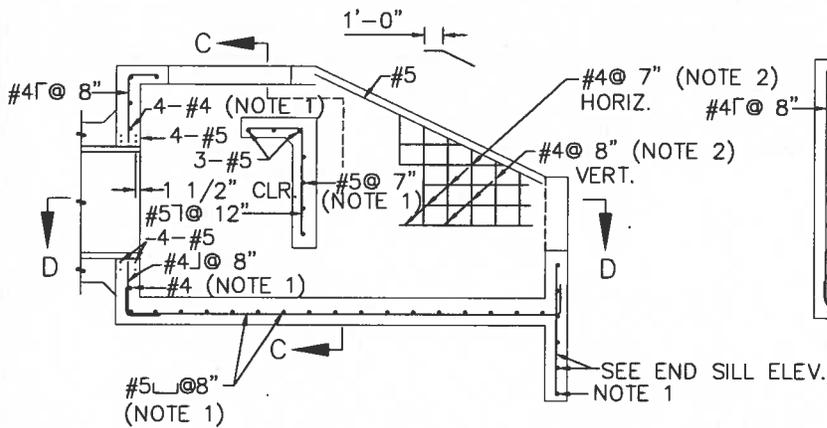
<b>REVISIONS</b>	<b>CONCRETE ENERGY DISSIPATOR</b>	<b>STD. NO.</b>
5/92		<b>447b</b>
		<b>SHEET 2 OF 2</b>
<b>APPROVED 1/14/10</b>		



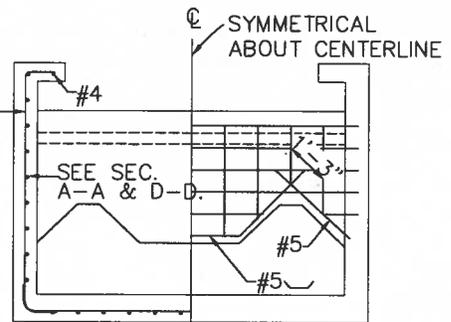
END SILL ELEVATION



HEADWALL ELEVATION



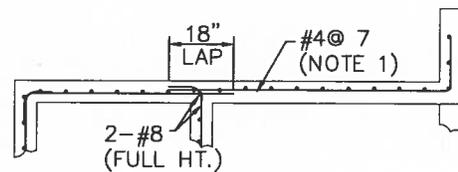
SECTION A-A



SECTION C-C

NOTES:

1. PLACE REINFORCING, AS NOTED, AT CENTER WALL (OR SLAB).
2. MATCH LOCATION OF REINFORCING WITH THAT IN HEADWALL, END SILL AND FOUNDATION SLAB.
3. ALL REINFORCING SHALL BE PLACED WITH 2" CONCRETE COVER, UNLESS NOTED OTHERWISE.



SECTION D-D

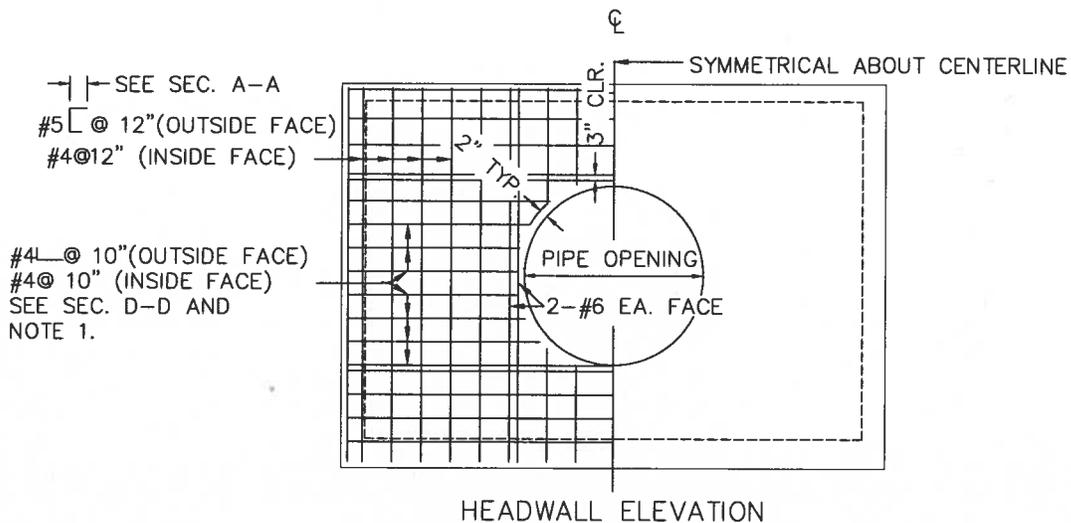
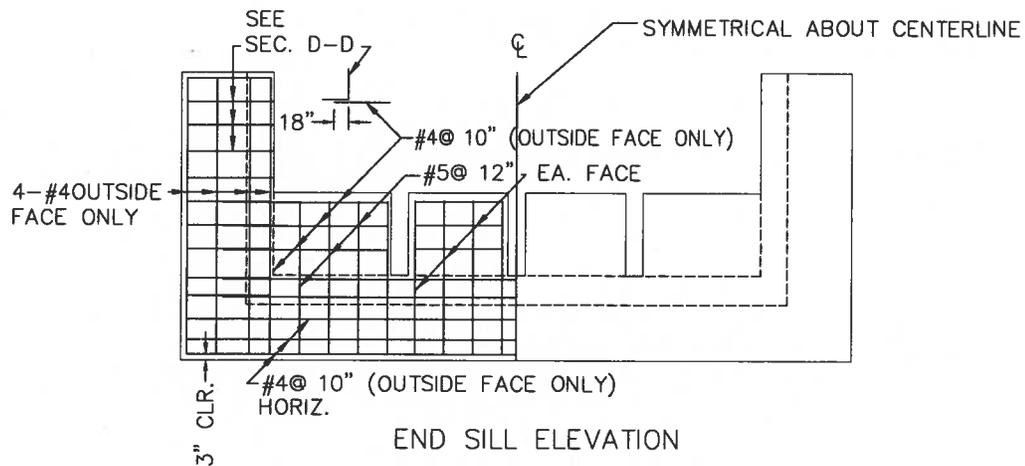
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REVISIONS	
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**CONCRETE ENERGY DISSIPATOR**  
**(REINFORCEMENT)**  
**18" TO 30" DIAMETER PIPE**

STD. NO.

**448**



**CITY OF MURRIETA**  
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**CONCRETE ENERGY DISSIPATOR**  
**(REINFORCEMENT)**  
**36" TO 72" DIAMETER PIPE**

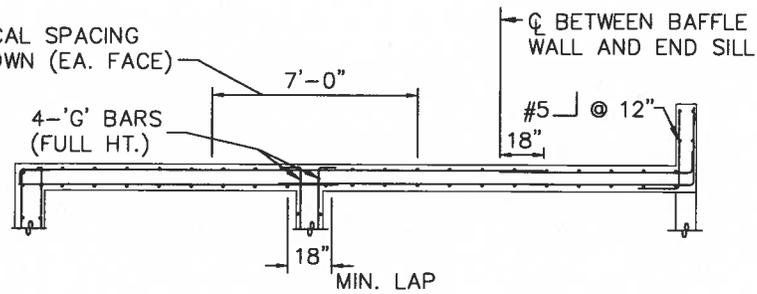
STD. NO.

**449a**

SHEET 1 OF 3



ADD #4 @ 20" VERTICAL SPACING  
TO REINFORCING SHOWN (EA. FACE)



SECTION D-D

PIPE DIA. (IN.)	36	42	48	54	60	72
'A' BAR	#5 @ 12"		#6 @ 12"		#7 @ 12"	
'B' BAR	#5 @ 12"		#6 @ 12"			
'C' BAR	#4 @ 12"		#5 @ 12"			
'D' BAR	#4 @ 12"		#5 @ 12"		#6 @ 12"	
'E' BAR	#4 @ 12"		#5 @ 12"			
'F' BAR	#4 @ 9"		#5 @ 9"		#6 @ 9"	
'G' BAR		#7			#11	

NOTES:

1. MATCH LOCATION OF SIDEWALL REINFORCING.
2. DOWELS HAVING SAME SIZE AND SPACING AS WALL REINFORCING MAY BE USED IN LIEU OF CONTINUOUS BARS AT CONTRACTORS OPTION.
3. MATCH LOCATION OF HEADWALL OR END SILL REINFORCING.

**CITY OF MURRIETA**  
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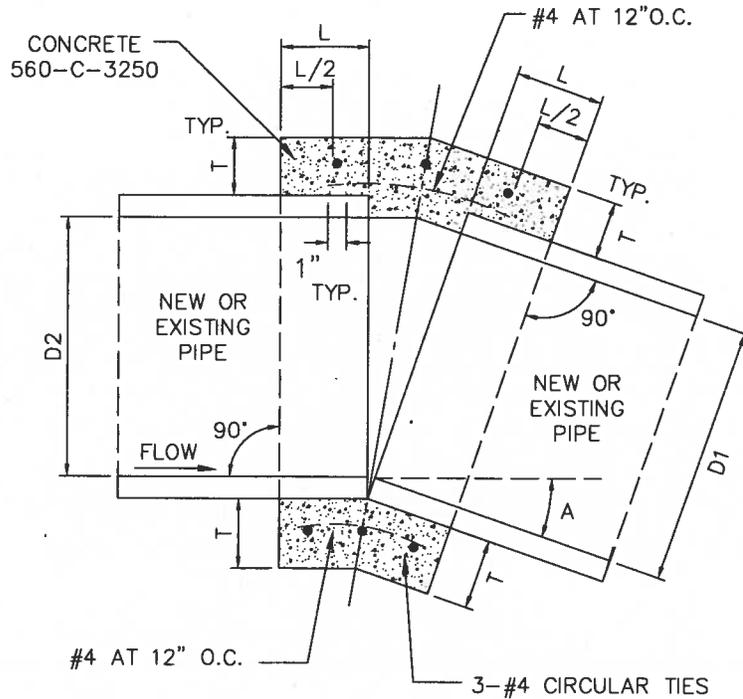
REVISIONS	
5/92	
APPROVED 1/14/10	

**CONCRETE ENERGY DISSIPATOR  
(REINFORCEMENT)  
36" TO 72" DIAMETER PIPE**

STD. NO.

**449c**

SHEET 3 OF 3



NOTES:

1. A CONCRETE COLLAR IS REQUIRED WHERE THE CHANGE IN GRADE EXCEEDS 0.10 FT. PER FT.
2. WHERE PIPES OF DIFFERENT DIAMETER ARE JOINED WITH CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. D=D1 OR D2 WHICHEVER IS GREATER.
3. FOR PIPES LARGER THAN 66" A SPECIAL COLLAR DETAIL IS REQUIRED.
4. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
5. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE A IS LESS THAN 10.
6. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE  $D+(2 \times \text{WALL THICKNESS}) + 8"$
7. WHEN D1 IS EQUAL TO OR LESS THAN D2, JOIN INVERTS AND WHEN D1 IS LARGER THAN D2 JOIN SOFFITS.
8. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE OR REINFORCED CONCRETE PIPE.

D	L	T
12"	1'-0"	4"
18"	1'-0"	5"
24"	1'-0"	6"
36"	1'-6"	8"
48"	1'-6"	10"
57"	1'-6"	10"
60"	1'-9"	11"
66"	1'-9"	11"

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**CONCRETE PIPE COLLAR  
FOR PIPES 12" THROUGH 66"**

STD. NO.

**451**