CITY OF LOMPOC
CALIFORNIA

STANDARD REQUIREMENTS FOR THE DESIGN AND CONSTRUCTION OF SUBDIVISIONS AND SPECIAL DEVELOPMENTS

SECTION 5

CONSTRUCTION OF STORM DRAINS

REVISED: JULY 3, 1990

SECTION 5

STORM DRAIN CONSTRUCTION

GENERAL

A Project shaft be constructed as shown on the Plans and shall conform to these project specifications. Standard Specifications are an essential part of the Plans, Project Specifications, or any contract documents. All references herein to Standard Specifications are to the Standard Specifications of the State of California, Department of Transportation, current edition.

SUSPENSION OF WORK

The Engineer shall have the authority to suspend the work wholly or in part, for such period of time as may be necessary because of the failure of the Contractor to carry out orders from the Engineer to comply with any of the provisions of these Specifications. Upon receipt of a written notice from the Engineer, the Contractor shall immediately suspend operations. Only upon written instructions from the Engineer shall the Contractor resume construction. Upon receipt of such written instructions to resume work, he shall immediately proceed with the work. No claim for damages or additional compensation will be allowed as a result of any such suspension of the work.

UTILITIES

Utilities for the purpose of these Specifications shall be considered as including, but not limited to: pipelines, conduits, transmission lines, and appurtenances of "Public Utilies" (as defined in the Public Utilities Act of the State of California) and those of private industry, businesses, or individuals solely for their own use or for use of their tenants; and storm drains, sanitary sewers, street lighting, and traffic signal systems. The Development Engineer has, by a search of known records, endeavored to locate and indicate on the Plans all utilities which exist within the limits of the work. However, the accuracy or completeness of the utilities indicated on the Plans is not guaranteed. Service connections to adjacent property may or not be shown on the Plans. It shall he the responsibility of the Contractor to determine the exact location of all utilities and their service connections. The Contractor shall make his own investigation as to the location, type, kind of material, age, and condition of existing utilities and their appurtenances and service connections which may be affected by the contract work, and in addition, he shall notify the City as to any utilities, appurtenances, and service connections located by him which have been incorrectly shown on or omitted from the Plans.

All such abandoned utilities removed by the Contractor shall become the property of the City and shall he disposed of by him away from the site of work. Utilities which are approved for relocation and relocated by the Contractor in order to avoid interference with storm drain structures and which cross the project work shall he maintained in their relocated positions by the Contractor. All utilities (except abandoned utilities) shall be maintained in their present or relocated position by the Contractor. All costs for such work shall be paid for by the Contractor.

The Contractor shall notify the owners of all utilities at least 48 hours in advance of excavating around any of their structures. At completion of the contract work, the Contractor shall leave all utilities and appurtenances in a condition satisfactory to the owners and the City of Lompoc.

The temporary or permanent relocation or alteration of utilities, including service connections, desired by the Contractor for his own convenience shall be approved by the City at the Contractor's own responsibility and he shall make all arrangements regarding such work.

USE OF PAVEMENT SAWS

A concrete pavement saw shall be used in the removal of all existing concrete curbs, sidewalks, and gutters. The saw cut shall go completely through the full depth of existing concrete where applicable.

Pavement saws shall be used for the removal of bituminous pavement in Lompoc City streets. No cutting wheel shall be permitted.

LINES, GRADES

In case of pipelines (storm drains or sewers) and their appurtenances, points will be established on offsets at convenient distances from the centerline of construction located outside of the lateral limits of excavation. Grade sheets referring to these points will he furnished by the Contractor to the City of Lompoc. From this data, the Contractor shall make all horizontal and vertical measurements and set all stakes necessary for the complete construction, except those stakes which may be required to establish the final grade for street resurfacing.

Pipe shall he laid true to line and grade, with uniform bearing under the full length of the barrel of the pipe. Any sections of the pipeline found to have an adverse grade shall he removed and reconstructed by the Contractor. For the purpose of these Specifications, an adverse grade exists when an upstream flow line elevation is lower than a downstream flow line elevation.

The Contractor shall employ skilled personnel for making measurements, and skilled mechanics for setting equipment or metal parts that are to be permanently imbedded in or attached to the proposed structures. Any inaccuracies in the placing of equipment or metal parts shall be remedied by the Contractor at his own cost.

REINFORCED CONCRETE PIPE

Reinforced concrete pipe shall conform to the provisions in Section 65 of the Standard Specifications and be installed in accordance with the Plans.

The pipe shall conform in all other respects to the applicable requirements specified herein. The pipe shall be tasted by one of the two standard methods of testing, namely: the 3-edge bearing or the sand bearing, as described in ASTN C 76.

The specified class strengths for design of reinforced concrete pipe are based upon the loads to which the pipe will be subjected upon completion of the project. Should the Contractor, as a result of his construction methods, or for any other reason, subject the pipe to loading which is greater than that for which the pipe was designed, it shall be the Contractor's responsibility to consult with the City Engineer and take whatever steps are required to strengthen or otherwise protect the pipe from damage. Pipe stronger than that specified may be furnished at the Contractor's option and expense.

All reinforced pipe joints shall he mortared on the inside of the pipe. The annular space in the inside joints of the pipe shalt he filled with jointing material and finished smooth with a steel trowel. Said space shall be finished as each section of pipe is installed for pipes 24 inches in diameter and smaller, and after the entire installation is completed for larger pipe. All reinforced concrete pipe shall he mortared on the upper 270 degrees of the out-side of the pipe. The grout should be made harder before setting takes place in order to avoid filtering of sand into the pipe.

OVERSIZE DRAINS

Work under this Section shall conform to the requirements of Section 69 of the Standard Specifications and to the sizes and dimensions as shown on the Plans.

REINFORCING STEEL

All reinforcing steel shall conform to the details shown on the Plans and the Provisions in Section 52 of the Standard Specifications.

STORM DRAIN PIPE AND APPURTENANCES

Work under this Section shall consist of furnishing and installing corrugated metal pipe, drains, and appurtenances, complete with all necessary fittings as shown on the Plans and further specified in these Project Specifications.

Storm drain pipe shall conform to the requirements as specified in Section 66 of the Standard Specifications. Pipe shall be of the gauge specified on the Plans.

Tack welding, coupling hands, and joint sealant shall also conform to Section 66 of the Standard Specifications.

GALVANIZING

When the galvanized surface of any corrugated metal pipe has been damaged (burned) by welding operations, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked galvanizing removed.

Repair of such pipe shall conform to Section 75-1.05 "Galvanizing". Such operations shall take place in the field.

SACKED CONCRETE

Sacked concrete for headwalls or dissipation basin shall conform to the requirements set forth in Section 72-3 of th Standard Specifications and to the dimensions as shown on the Plans.

TRENCH EXCAVATION

The Contractor shall perform all excavation necessary for the construction of all work shown on the Plans. Excavation shall include the removal of all water and materials of any nature which interfere with the construction work.

Excavation for pipe conduits shall be by open trenches.

If, in the opinion of the Engineer, the maximum trench width shown on Standard Trench Detail is exceeded to the extent that the load on the pipe is increased so as to require additional or another type of bedding, or a high D-load strength pipe, such additional bedding or increased strength of pipe shall be furnished and installed by the Contractor.

Voids left by the removal of sheeting, piles, and similar sheeting supports shall be immediately backfilled with clean sand which shall be jetted into place to assure dense and complete filling of the voids.

Where it becomes necessary to excavate beyond the limits of normal excavation lines to remove boulders or other interfering objects, the voids remaining after the removal of the boulders shall be backfilled as herein specified:

a. When the void is below the subgrade for the pipe bedding, it shall he filled with thoroughly tamped or consolidated bedding material and approved by the Engineer.

b. When the void is in the side of the pipe trench, it shall be filled with suitable earth or sand and compacted or consolidated, as approved by the Engineer.

DISPOSAL OF EXCESS MATERIAL

Where material is excavated in excess of that required for the site, such excess materials shall be removed and disposed of by the Contractor ns directed by the Engineer. All excess material shall be removed from the right-of-way and disposed of by the Cointractor. The location of the disposal site shall be the responsibility of the Contracoor and shall he subject to approval of the City Engineer, with written approval of the disposal site owner and a grading permit issued by the affected public agency must he provided. Removal of excess material. shall he done immediately following backfilling operations. Any spoils piles, bedding gravel, base material and the like shall be properly lighted and barricated for traffic safety. In all cases, such piles shalt be placed as far out of the travelled way as is possible.

PIPE BEDDING

The subgrade upon which the storm drain is to be constructed shall he firm, thoroughly compacted, and true to grade and the pipe bedded as indicated on the Plans.

TRENCH BACKFILL

Shall be river-run sand or as called for on the Plans to accommodate the "D" load of the pipe.

ASPHALT CONCRETE

Asphalt concrete shall be reconstructed to match the existing A.C. pavement according to the existing Structural Section, but not less than 2" AC. over B" Class II base material.

DUST CONTROL

The Contractor shall maintain a water supply vehicle on the job site at all times. The Contractor shall apply water in amounts and at intervals as directed by the Engineer. The water supply vehicle and an operator shall be available on Saturdays, Sundays, and holidays to perform dust control work.

PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall he responsible for the protection and the restoration or realacement of any improvements existing on public or private property at the start of work or placed there during the progress of work and not specified or shown on the Plans to be permanently removed. Existing improvements shall include, but are not limited to, curbs, gutters, cross-gutters, sidewalks, driveways, lawns, shrubs, trees, fences, and walls. All existing improvements shall be reconstructed to equal or better than the existing improvements removed.

All curbs, gutters, sidewalks, and driveways shall be removed and replaced to the next joint or scoring line beyond the actually damaged or broken sections; or in the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shalt be removed and reconstruction to neat, plane faces. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements.

MINIMUM LENGTH OF OPEN TRENCH

Except by special permission of the Engineer, the maximum length of open trench shall not be greater than 250 feet or that length of trench required for one day's work. The distance is the collective length, including excavation, backfilling, and pipe laying at any one location. All backfilled trenches shalt have compacted cold mix immediately after backfilling and prior to opening to traffic.

STORAGE OF MATERIALS IN PUBLIC STREETS

Pipe may be stored on City of Lompoc street rights-of-way. Excavated materials may not be stored on City streets overnight. In this event, protective devices such as barricades complete with operable flashers must he employed as per these Standard Specifications.

CONCRETE STRUCTURES

This work shalt consist of constructing concrete manholes, junction structures, catch basins, headwalls, endwalls, transition structures, pipe collars, and other concrete structures as required. All concrete shalL be Class A and shall conform to the provisions in Section 51 and Section 90 of the Standard Specifications. Concrete shall have a stump range (extreme limits) between 2" and 4".

All reinforcing steel shalt conform to the details shown on the Plans and the provisions in Section 52 of the Standard Specifications. Struct.!re excavation and backfill shall conform to the provisions in Section 19 of the Standard Specifications except that river-run sand with maximum aggregate at 3/4" may be used in lieu of the backfill material specified in Section 19-3.06 of the Standard Secifications. Structure backfill shalt be compacted to the relative compactions shown on Standard Trench Detail. All excess excavated or removed materials, including asphaltic concrete shalt become the property of the Contractor and disposed of by him away from the job site.

PUBLIC CONVENIENCE AND ACCESS

The Contractor shall conduct his operations so as to cause the minimum obstruction and inconvenience to traffic and to places of business, multiple dwelling units, and residences adjacent to the work. No greater quantity of work shall he under construction at any one time than can be properly conducted with due regard for the rights of the public.

Safe, adequate pedestrian access to all residences, places of business, and other establishments affected by the work shall be provided and maintained by the contractor at all times. The Contractor shall provide safe, adequate crossings for pedestrians at each street intersection, cross street and pedestrian crossing.

In streets or roadways where street intersections, cross streets or pedestrian crosswalks are infrequent or do not exist, the Contractor shall provide safe, adequate pedestrian crossings at intervals of not more than 300 feet, unless otherwise approved by the Engineer.

At locations where traffic is being routed through grading operations, roadway excavation and the construction of embankments shall he conducted in a manner to provide a surface reasonably satisfactory for traffic at all times. If road must be closed for unknown reasons, the Contractor shall notify Local Fire Department, Police Department, school districts, and ambulances.

Substructure installation or construction shall he conducted on but half the width of the traveled way at a time, and that portion of the traveled way being surface of the roadbed shall be brought to a smooth, even condition free from humps and depressions, and made satisfactory for traffic with the application of asphaltic cold mix.

The Contractor shall promptly restore normal facilities for the convenience of access by the public. This includes particularly, but is not limited to, restoration of sidewalks, driveways, and similar types of access, and the prompt removal of excess materials from streets and parkways when in the opinion of the Engineer a reasonable portion of the work in any location has been completed. The orders of the Engineer, in this regard, shall be promptly complied with, and failure to do so may result in a written directive from the Engineer to cease progress on any or all other work under the contract until the unsatisfactory condition is corrected. Any added costs resulting from such suspension shall be borne by the Contractor.

REMOVAL OF STORM DEPOSITS

Should storms occur prior to the date upon which the work is completed, and should debris or other material he deposited as a result of said storms in or upon any works or improvements of whatever nature constructed or being constructed under the contract, the Contractor shall immediately remove and dispose of such deposited material.

TRAFFIC REQUIREMENTS (CITY STREETS)

The Contractor shalt arrange his work in such a manner that the following traffic requirements are satisfied:

a. Provide and maintain one 14 foot traffic lane during contractor's normal working hours and two 12 foot traffic lanes after normal working hours.

FINAL CLEANUP

The construction site shall he left in a neat and presentable condition in conformance with Section 4-1.02 of the Standard Specifications.

ASBESTOS-CEMENT PIPE

Asbestos-cement pipe shall conform to the provisions of Section 64 of the Standard Specifications. The Contractor may substitute asbestos--cement pipe for reinforced concrete pipe on the following basis:

a. The inside diameter of the asbestos-cement pipe substitute shall be equal to the inside diameter of the reinforced concrete pipe shown on the Plans.

b. Pipe strength substitution shall be per the following table:

Class of asbestos-cement pipe required for substitution	Class of reinforced concrete pipe per plans
Class III	Class III

Joining of asbestos-cement pipe shall conform to the provisions of Section 64 of the Standard Specifications.

CLEANUP WORK

During construction, the Contractor shall keep the work site, areas adjacent to the work site, and streets and alleys in an orderly condition, free and clear from debris and discarded materials. Care shall he taken daily to prevent spillage when hauling is being done.

TEMPORARY PAVEMENT REPLACEMENT

The Contractor shall replace all asphaltic concrete pavement removed to construct the pipelines and appurtenances thereto with asphaltic cold mix immediately upon completion of backfilling.

PROTECTING AND SUPPORTING UTILITIES

The Contractor shall support and protect all utilities and service connections found not to interfere with the nernanent project work. It shall he the Contractor's responsibility to provide continuous and safe operation of all utilities protected and supported by him. The Contractor shall be responsible for all damages and costs that may be caused by his failure to protect and support utilities in a satisfactory manner. Most City of Lompoc water lines are asbestos cement pipe.

GUARANTEE

The Contractor shall guarantee all work and materials for a period of one year after acceptance by the City.

Drainage computations shall provide for the following conditions:

A. *When streets can carry the overflow away from the site, design shall be based on 10 year frequency of rainfall.*

B. *When the site is in a sump, the design shall be based on 100 year frequency.*

C. *Catch basins shall be designed for essentially 100% interception of* 10 year gutter flow.

D. *Street flow to catch basin shall not exceed top of curb in depth.*

E. *Computations shall be based on rainfall intensity curve approved by City and approved runoff coefficients for the particular drainage area.*

F. *Catch basin capacities used for design of side-opening basins* shall not *exceed the following:*

Street Grade	*Q/Foot of Opening (W)*
S=.002 (.2%)	*0.67 cfs*
S=.005 (.5%)	*0.56 cfs*
S=.020 (2%)	*0.45 cfs*
S=.050 (5%)	*0.40 cfs*
Sumps	2.00 cfs

Interpolation may be used for intermediate grades.

G. *Hydraulic gradient for storm drain shall not be above a freeboard limit of 3" below the bottom of the catch basin opening. Drainage into catch basin shall be with free fall.*

H. *Details of construction shall conform to Standard Drawings adopted by the City. Pipe conduit in streets shall have the required "D" load capacity for the bedding design used.*

I. *Pipe conduit shall be of Portland cement concrete unless otherwise approved by the Engineer. Reinforcement, if used, shall be adequate to provide the required "D" load with a cover of not less than 1 1/4". For pipe on steep grades the minimum cover shall be as specified by the Engineer.*

J. *Subdivision drainage shall be so designed that each lot drains to the fronting street and so that individual owners will be responsible for all drainage until it reaches the city street.*

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

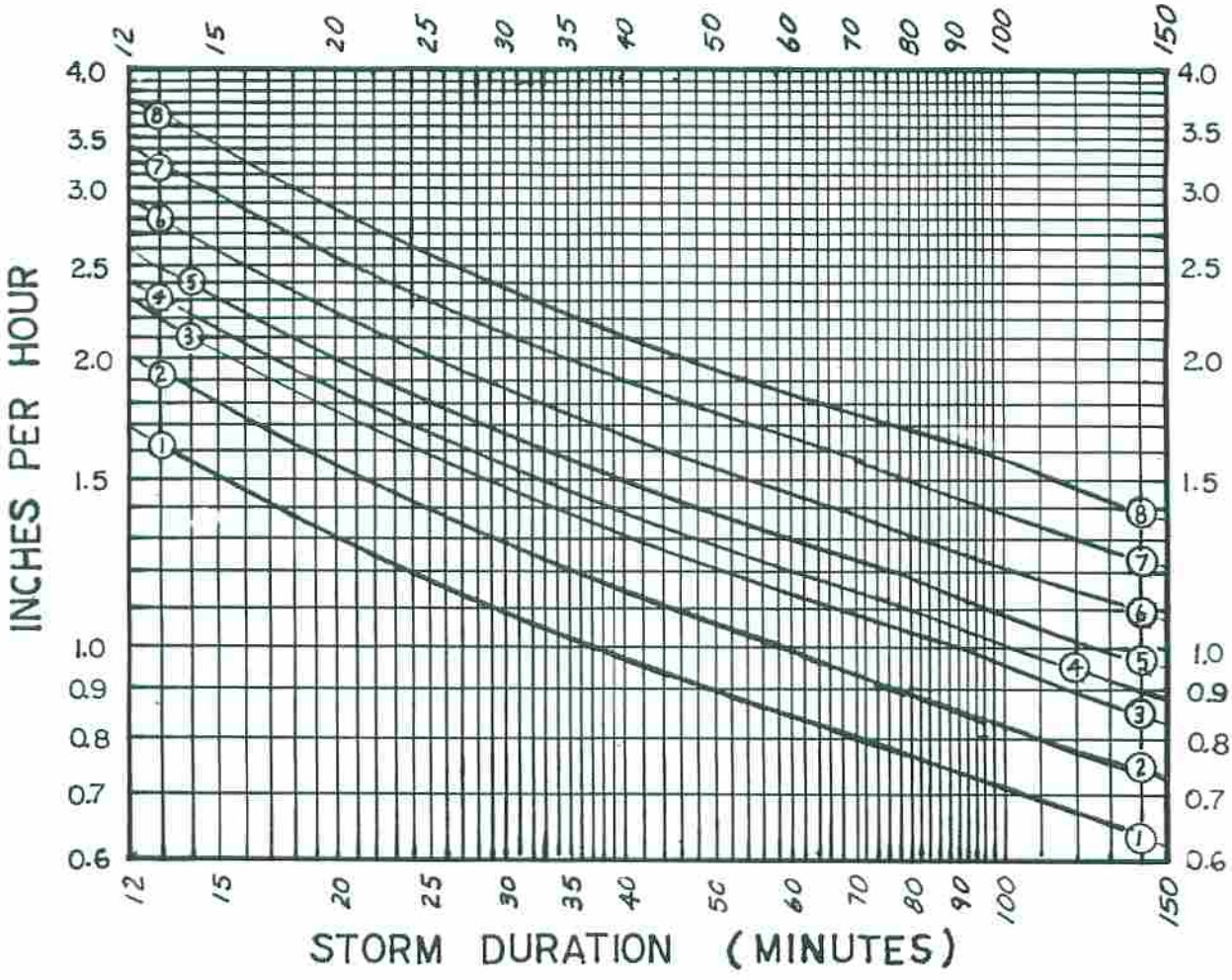
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

STORM DRAIN DESIGN STANDARDS

STANDARD DRAWING NO. 500

RESOLUTION NO. 3366 (84) SHT. 1 OF 1



INDEX TO CURVES				
AREA	FREQUENCY			
	10% (Q10)	4% (Q25)	2% (Q50)	1% (Q100)
SANTA MARIA ORCUTT	①	②	③	⑤
LOMPOC SANTA YNEZ	②	③	⑤	⑥
GOLETA SANTA BARBARA CARPINTERIA coastal plain	④	⑥	⑦	⑧

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

RAINFALL INTENSITY - DURATION CURVE

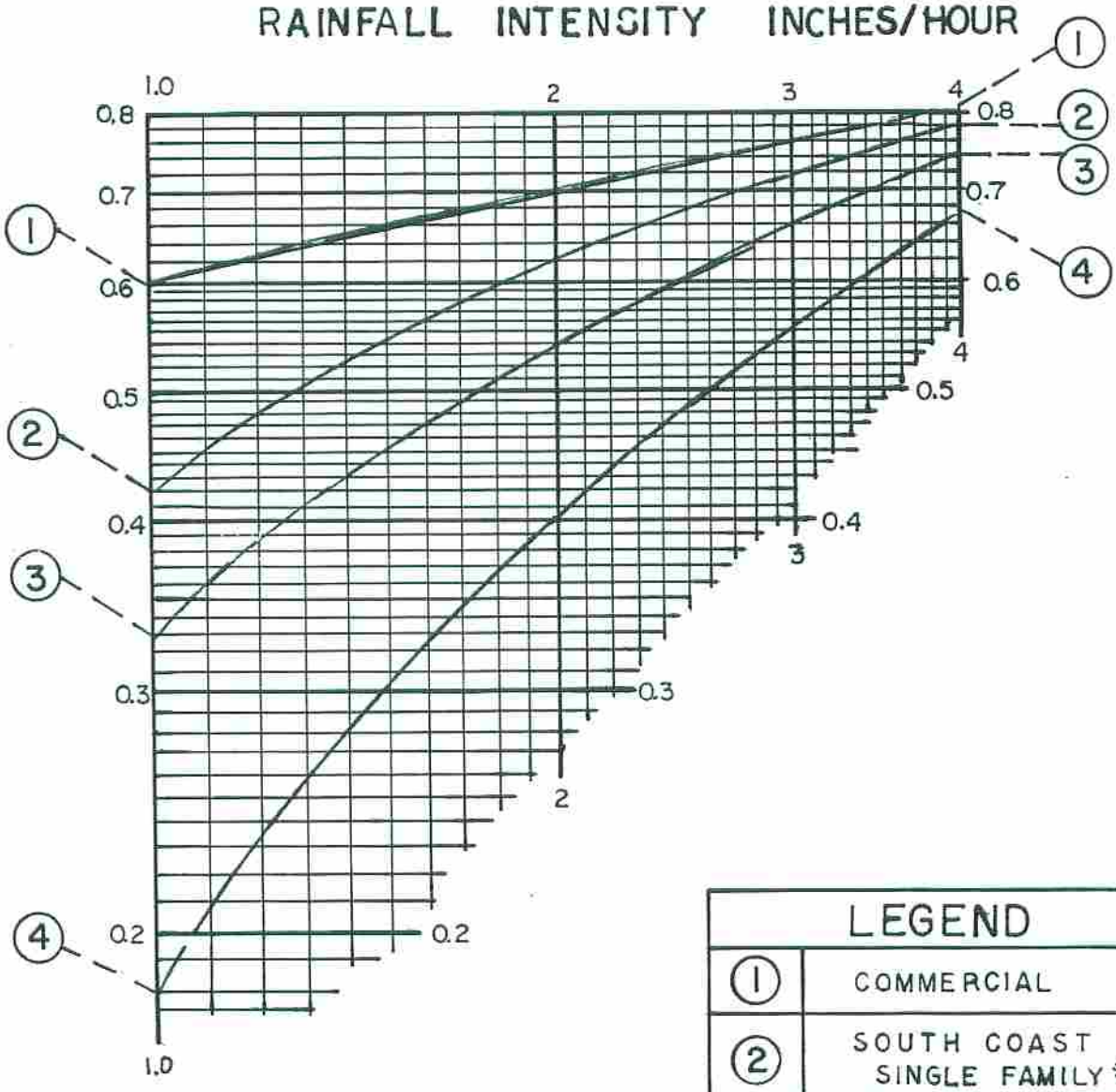
STANDARD DRAWING NO. 501

RESOLUTION NO. 3366(84)

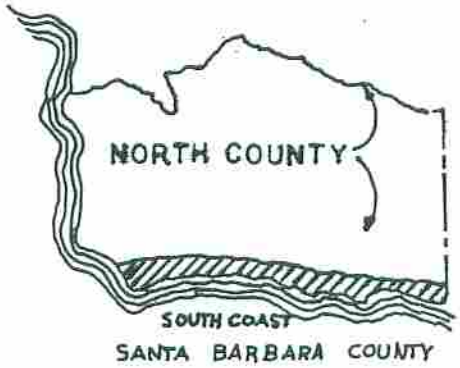
SHT. 1 OF 1

RAINFALL INTENSITY INCHES/HOUR

RUNOFF COEFFICIENTS



LEGEND	
1	COMMERCIAL
2	SOUTH COAST SINGLE FAMILY *
3	NORTH COUNTY SINGLE FAMILY, * SOUTH COAST AGRICULTURE
4	NORTH COUNTY AGRICULTURE



SANTA BARBARA COUNTY

* Single Family Lots with an Average of 10,000 sq. ft. or less, Interpolate between Single Family and Agriculture for Large Lots.

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

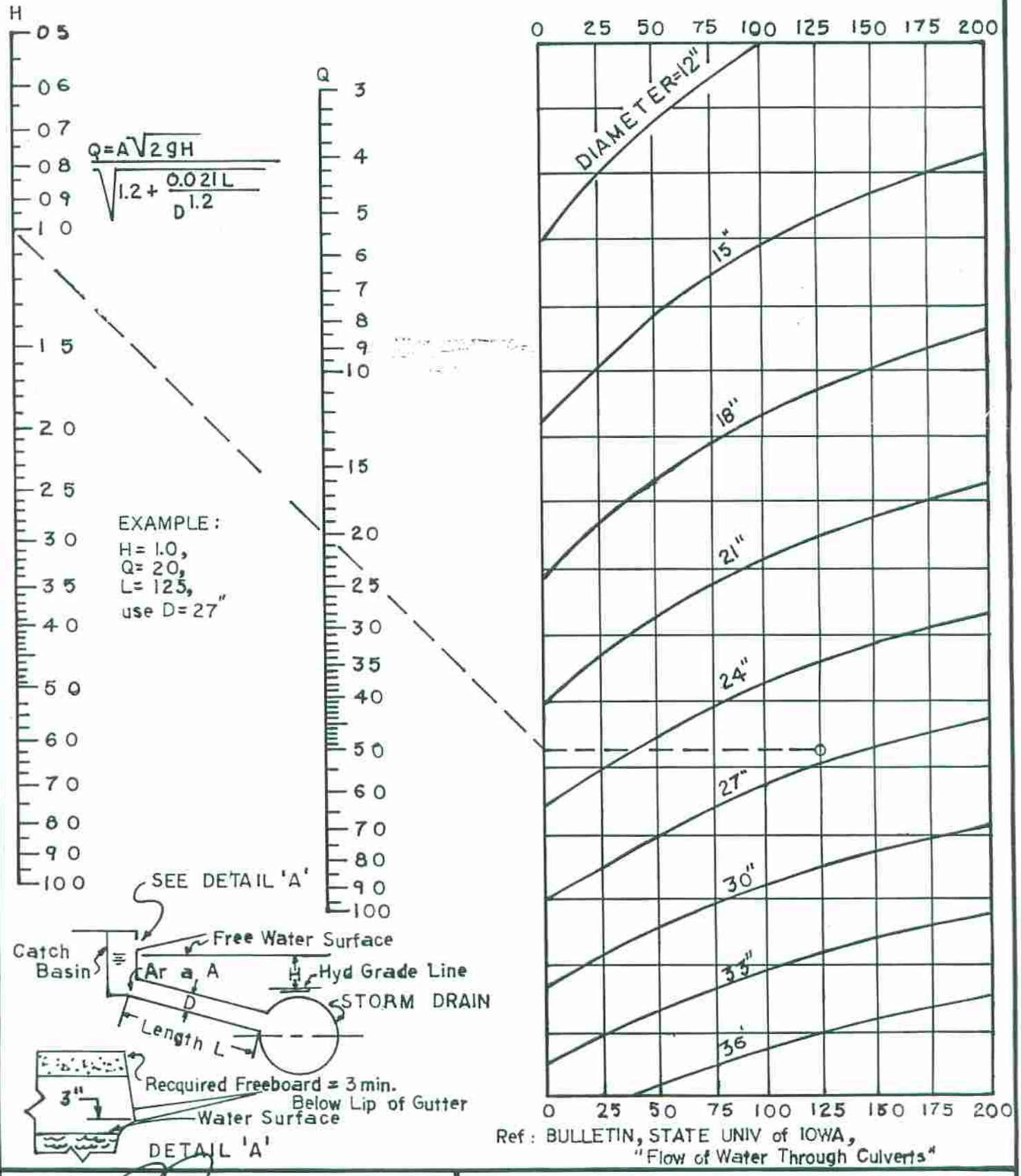
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

RUNOFF COEFFICIENTS . RAINFALL INTENSITY
For Subdivision and Small Watershed Design in Santa Barbara County

STANDARD DRAWING NO. 502

RESOLUTION NO. 3366(84) SHT. 1 OF 1



Ref: BULLETIN, STATE UNIV of IOWA, "Flow of Water Through Culverts"

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

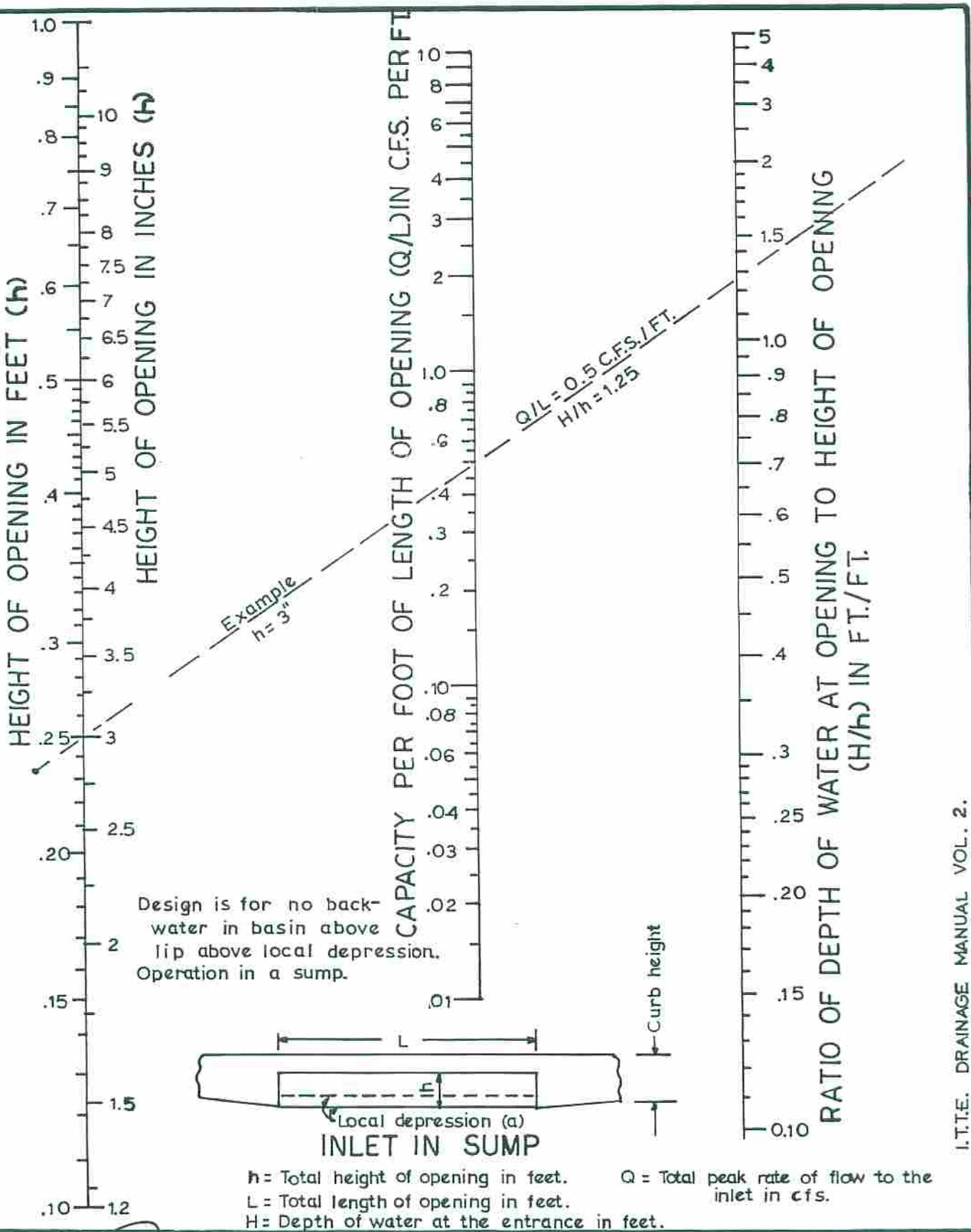
CITY OF LOMPOC
ENGINEERING DIV.

DESIGN OF CONNECTOR PIPES FLOWING FULL

STANDARD DRAWING NO. 503

RESOLUTION NO. 3366(84)

SHT. 1 OF 1



APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

CITY OF LOMPOC

CURB OPENING INLET CAPACITY NOMOGRAPH

STANDARD DRAWING NO. 504

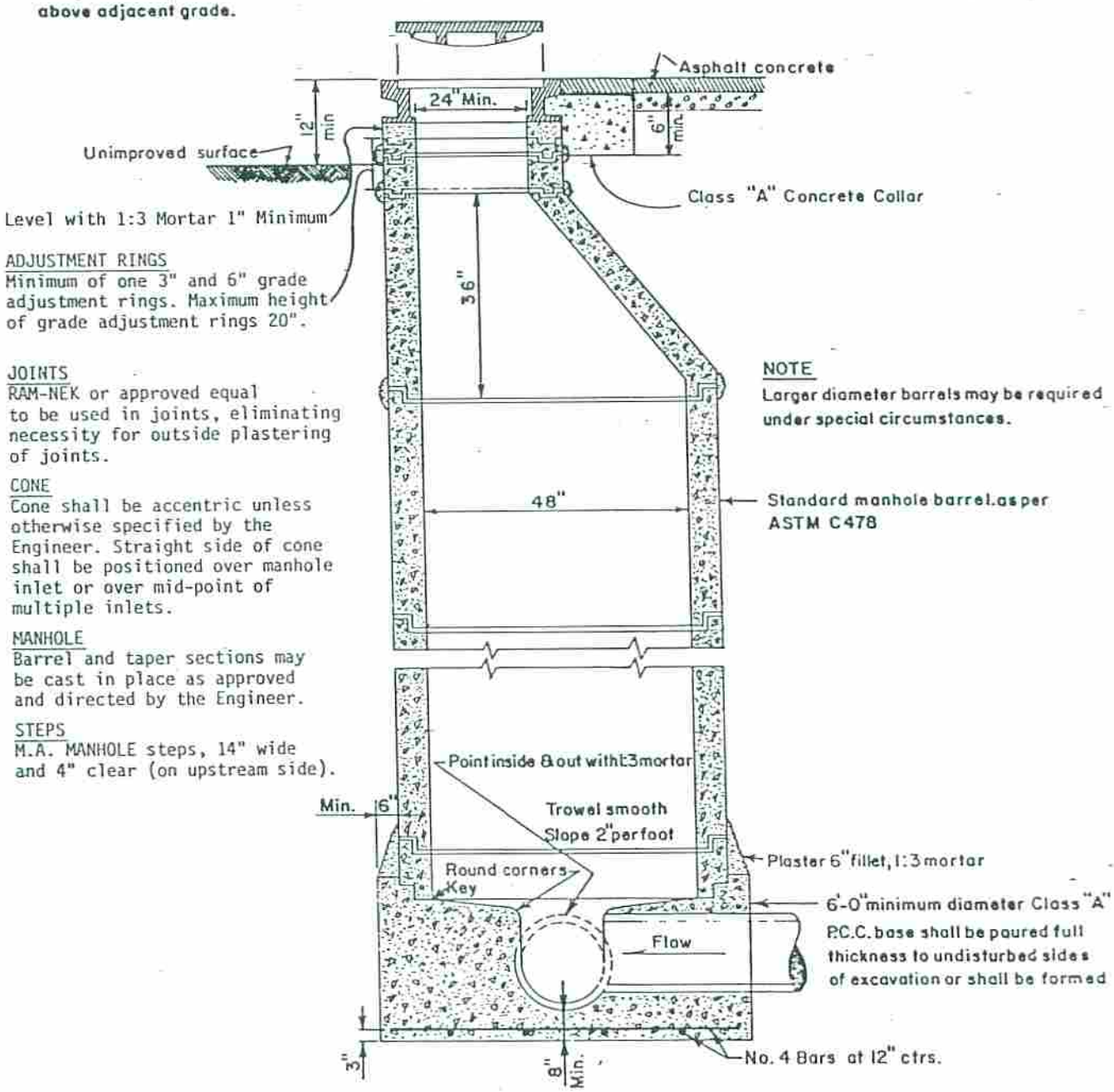
RESOLUTION NO. 3366(84) SHT. 1 OF 1

MARK	REVISIONS	APPR.	DATE

NOTE

When manholes are installed in unimproved areas, the top of the cover shall be a minimum of 1 foot above adjacent grade.

FOR MANHOLE COVER AND FRAME SEE STD. 300



ADJUSTMENT RINGS

Minimum of one 3" and 6" grade adjustment rings. Maximum height of grade adjustment rings 20".

JOINTS

RAM-NEK or approved equal to be used in joints, eliminating necessity for outside plastering of joints.

CONE

Cone shall be accentric unless otherwise specified by the Engineer. Straight side of cone shall be positioned over manhole inlet or over mid-point of multiple inlets.

MANHOLE

Barrel and taper sections may be cast in place as approved and directed by the Engineer.

STEPS

M.A. MANHOLE steps, 14" wide and 4" clear (on upstream side).

NOTE

Larger diameter barrels may be required under special circumstances.

Standard manhole barrel as per ASTM C478

NOTE

Construct all flow channels of pipe wherever possible. After base is poured break out top half of pipe flush with inside face of M.H. wall and construct U-shaped channel. Make elevation changes gradually and directional changes with smooth curves. Set ring base in mortar.

APPROVED _____ CITY ENGINEER

DATE 7-13-90

R.C.E. 21157

MARK	REVISIONS	APPR	DATE

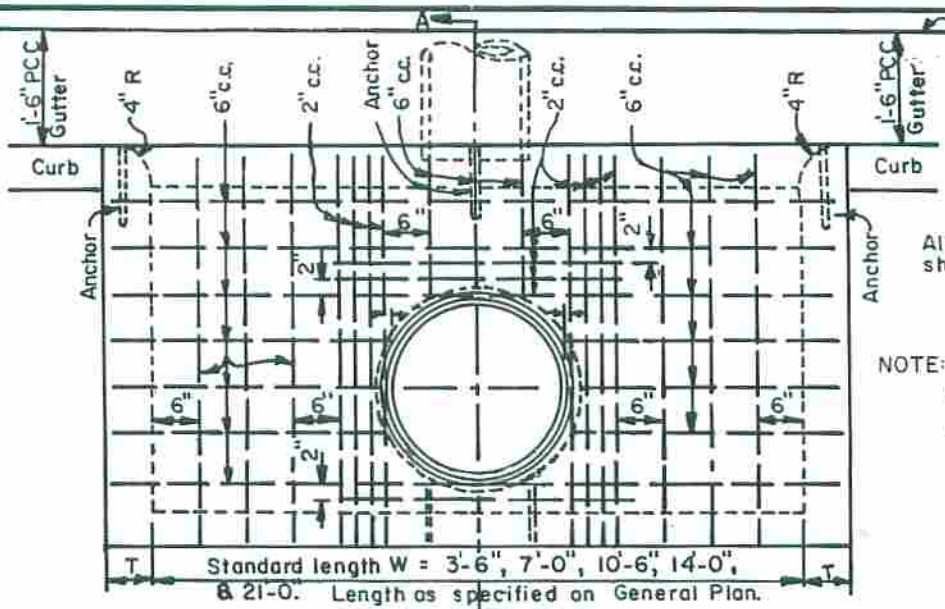
CITY OF LOMPOC
ENGINEERING DIVISION

STANDARD STORM DRAIN MANHOLE

STANDARD DRAWING NO. 505

RESOLUTION NO. 3967(90)

SHT. 1 OF 1

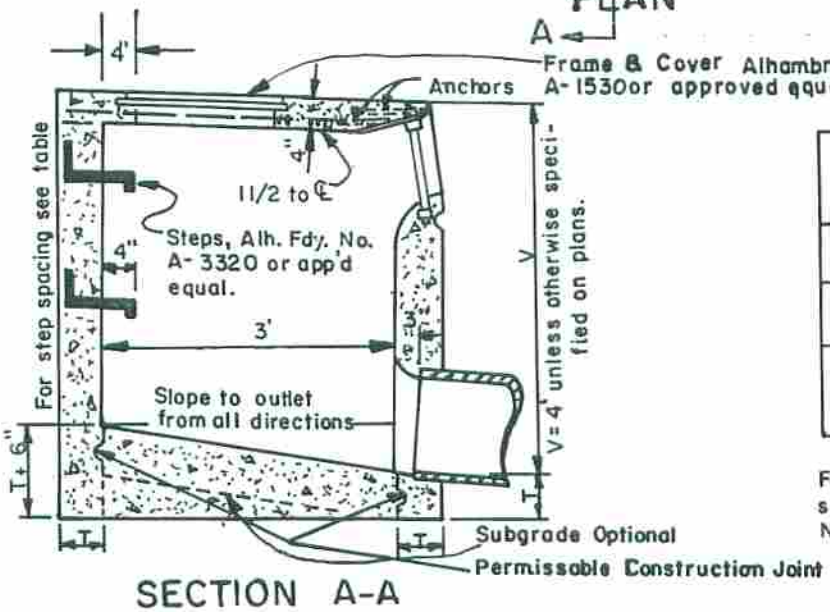


For details of local depression see Standard Drawing No. 509.

All steel shown = #3

NOTE: Pre-cast structures may be used as an option as approved by City Engineer.

PLAN



SECTION A-A

V	STEP SPACING
<3'6"	None
3'6" to 4'6"	One step 16" above floor
>4'6"	Steps at 12" intervals from 12" to 16" above floor to within 4" to 12" below top

For wall and bottom reinforcing not shown hereon see Standard Drawing No. 507.

NOTES:

1. For opening detail see Standard Drawing No. 508.
2. If soil will hold firmly, outside of walls may be cast to soil except increase T of walls 1/2", when V is 5' or less. When outside walls are formed, floor shall be in place before walls are backfilled.
3. Connection pipes and outlet pipe may be placed in any position around the walls.
4. Curvature of the lip and side walls at gutter opening shall be formed by curved forms.
5. Floor of basin shall be troweled to a hard, smooth surface and shall slope from all directions to the outlet.
6. Concrete shall be class A (6 sack).
7. Outlet pipe shall be trimmed to the final shape and length before concrete is poured.
8. Surface of all exposed concrete shall conform in slope, grade, color, finish, and scoring to existing or proposed curb and walk adjacent to the basin.
9. Concrete shall be cured with a pigmented curing compound as specified by Dept. of Transportion State of California.

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

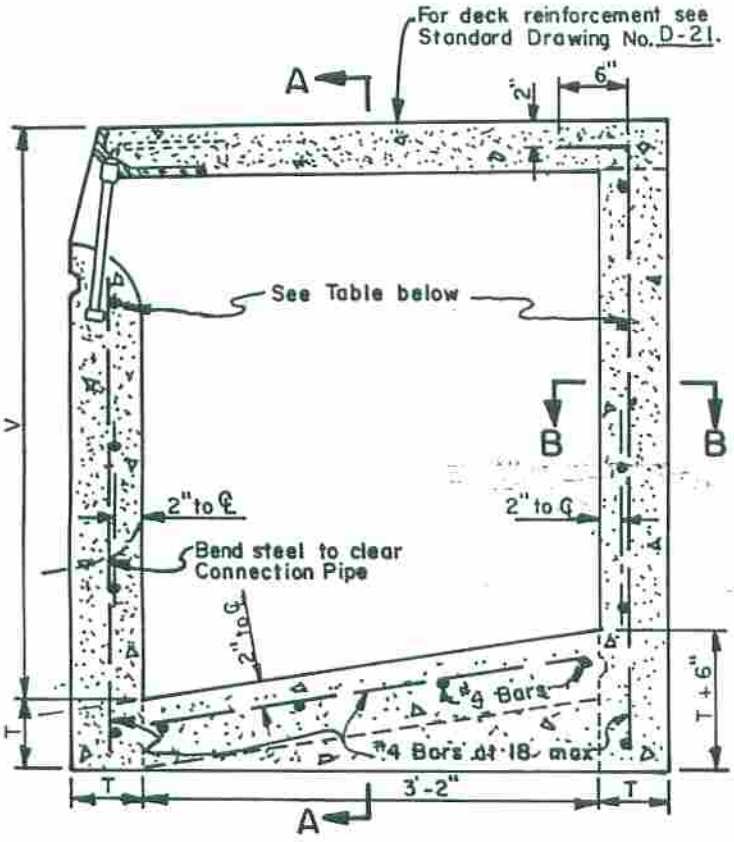
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

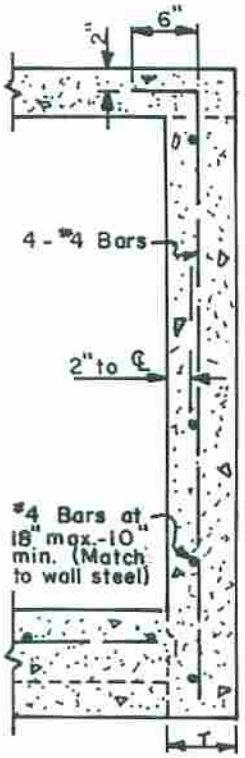
STANDARD CURB INLET CATCH BASIN

STANDARD DRAWING NO. 506

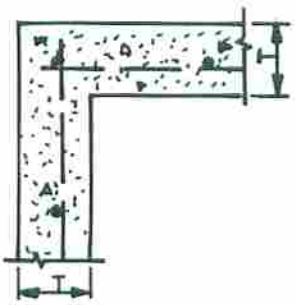
RESOLUTION NO. 3366 (84) SHT. 1 OF 1



TYPICAL SECTION



PART SECTION A-A



PART SECTION B-B

LENGTH OF CB = W	V OF CB	T	FRONT WALL HOR. STEEL	REAR WALL HOR. STEEL
3'-6"	to 8'	6"	#4 at 18"	#4 at 18"
7'-0"	to 8'	7"	#4 at 12"	#4 at 12"
10'-6"	to 4'	8"	#5 at 12"	#4 at 12"
10'-6"	4' to 6'	8"	#5 at 10½"	#5 at 10½"
10'-6"	6' to 8'	8"	#5 at 10"	#5 at 10"
14'-0"	to 4'	8"	#5 at 8"	#4 at 8"
14'-0"	4' to 6'	8"	#5 at 6½"	#5 at 6½"
14'-0"	6' to 8'	8"	#5 at 6½"	#5 at 6½"
21'-0"	to 4'	9"	#6 at 8"	#6 at 8"
21'-0"	4' to 6'	10"	#6 at 6½"	#6 at 6½"
21'-0"	6' to 8'	10"	#6 at 6"	#6 at 6"

WALL DIMENSIONS & REINFORCEMENT

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

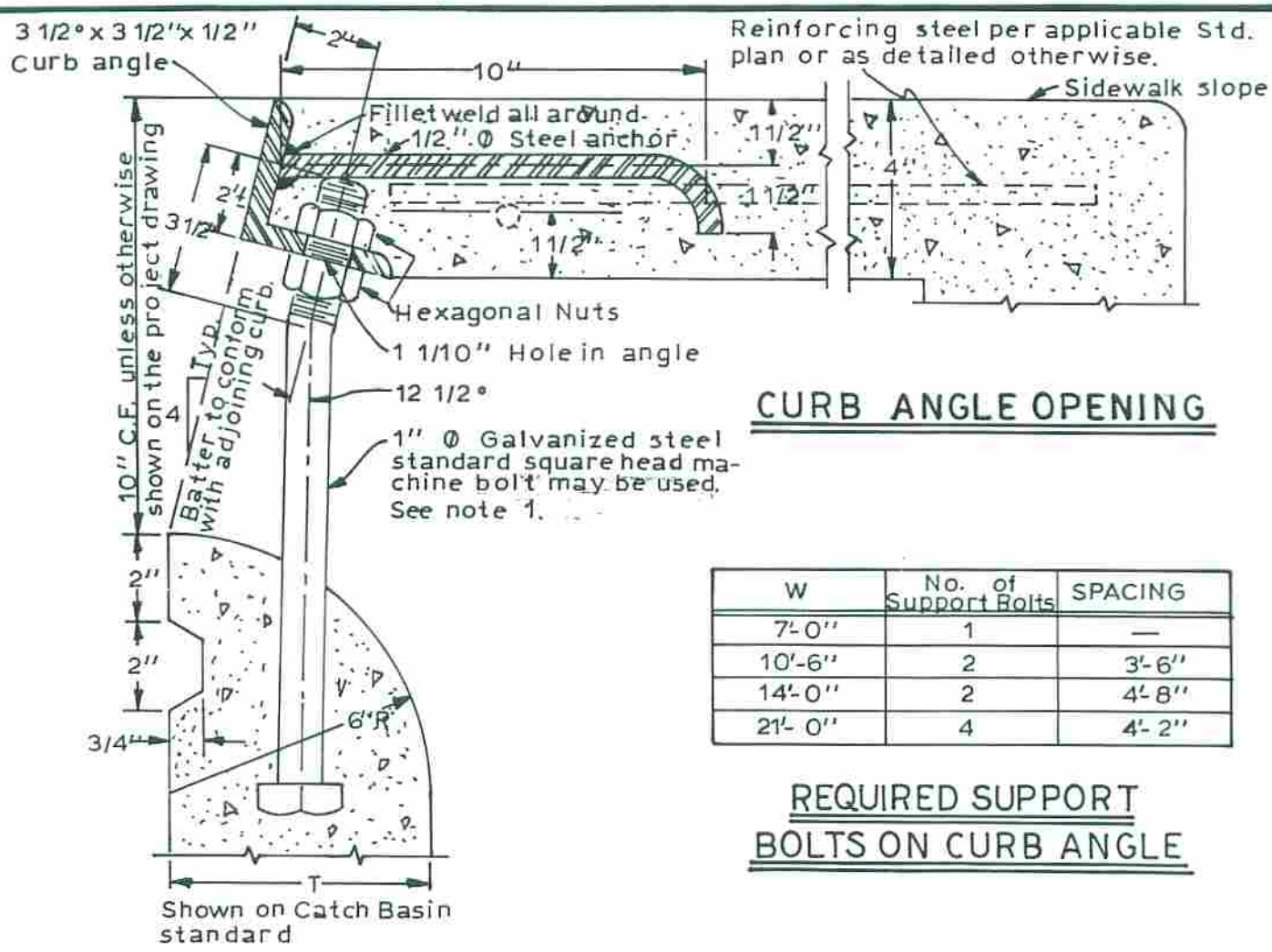
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

CATCH BASIN REINFORCEMENT AND DIMENSIONS

STANDARD DRAWING NO. 507

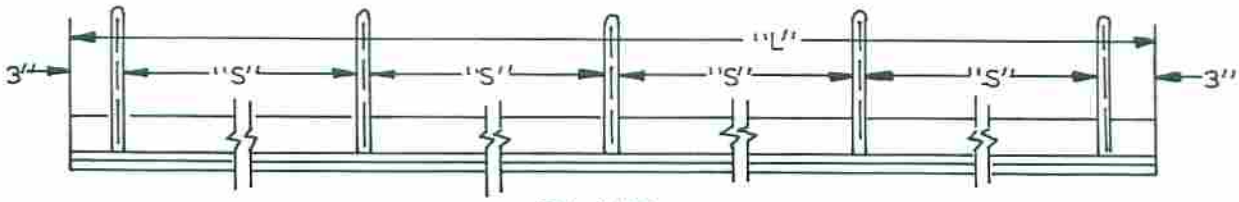
RESOLUTION NO. 3366(84) SHT. 1 OF 1



CURB ANGLE OPENING

W	No. of Support Bolts	SPACING
7'-0"	1	—
10'-6"	2	3'-6"
14'-0"	2	4'-8"
21'-0"	4	4'-2"

REQUIRED SUPPORT BOLTS ON CURB ANGLE



PLAN

NOTES:

1. Support bars shall be equal in length to curb face + 4" ± for all curb patterns.
2. All exposed metal parts shall be galvanized.
3. Length of curb angle shall be equal to outside dimension of catch basin, W + 2T.

"L"	No. of Anchors	"S"
4'-6"	2	4'-0" ±
3'-2"	3	3'-10" ±
11'-10"	4	3'-9 1/3" ±
15'-4"	5	3'-6 1/2" ±
22'-6"	7	3'-6" ±

LOCATION OF ANCHORS ON CURB ANGLE

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

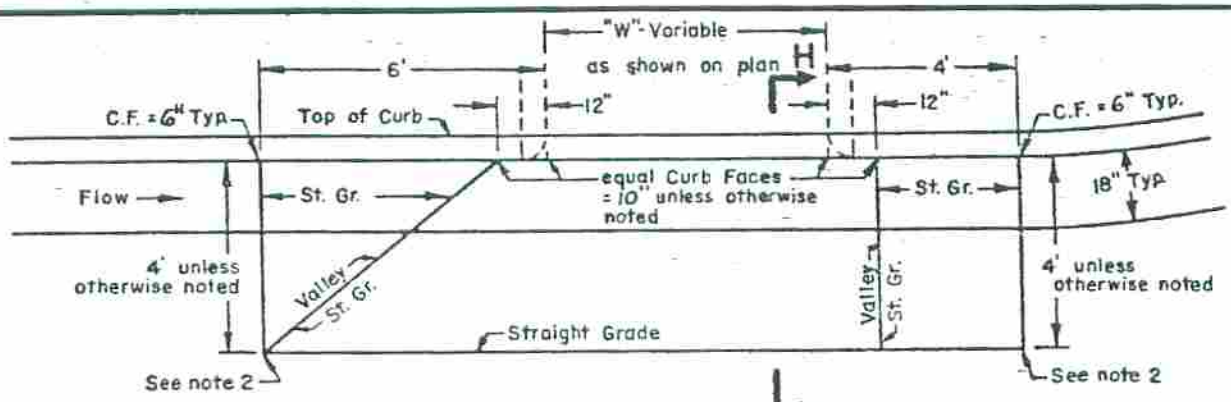
CITY OF LOMPOC
ENGINEERING DIV.

DETAIL OF CATCH BASIN OPENING – DESIGN A

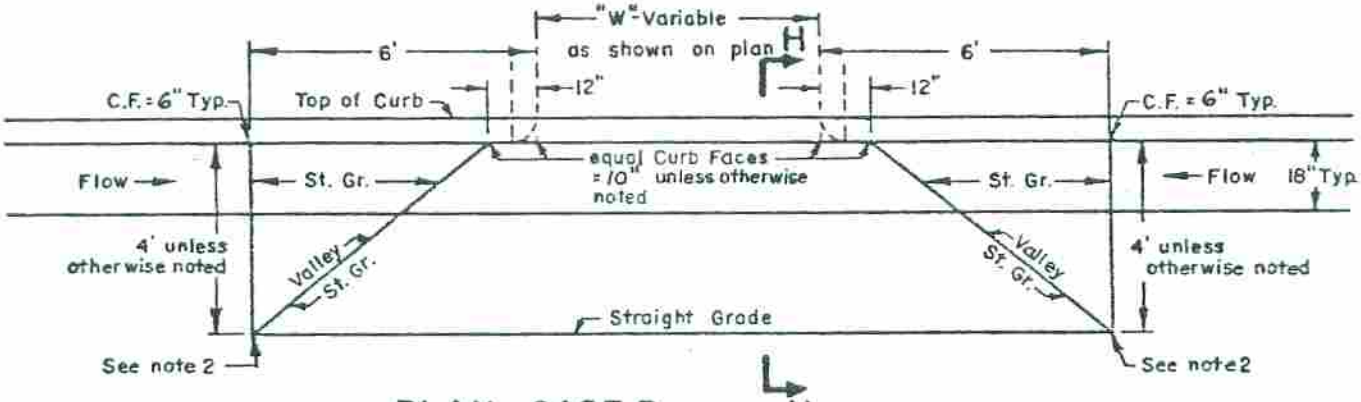
STANDARD DRAWING NO. 508

RESOLUTION NO. 3366(84)

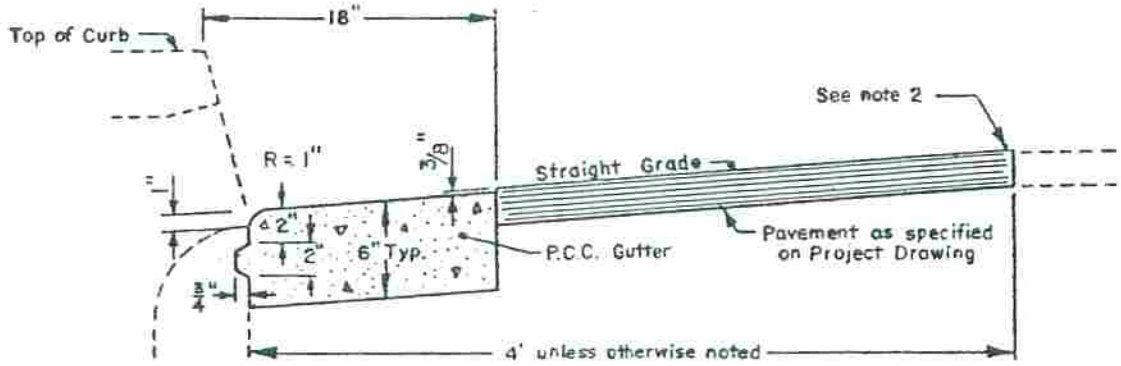
SHT. 1 OF 1



PLAN - CASE A



PLAN - CASE B



SECTION H-H

NOTES:

1. Local Depression shall be Case A unless otherwise specified on general plan.
2. Elevations at outer corners shown on general plan. If no elevations are specified, the outer edge of Local Depression shall conform to finished street surface.
3. Stakes shall be set to grade along the valley. These stakes shall not be removed until just before the final finishing.
4. Concrete shall be cured with a pigmented curing compound as specified by Div. of Highways, State of California.
5. Concrete shall be class B (5 sack).

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

CATCH BASIN LOCAL DEPRESSIONS

STANDARD DRAWING NO. 509

RESOLUTION NO. 3366(84)

SHT. 1 OF 1

NOTE: Pre-cast structures may be used as an option as approved by City Engineer.

NOTES

1. MANHOLE FRAME AND COVER PER STANDARD DETAIL. MAY BE ALHAMBRA FOUNDRY CO. A-1530, OR AN APPROVED EQUAL.

2. WHEN "H" IS GREATER THAN 3.5 FEET, STEPS WILL BE PROVIDED PER STANDARD DETAIL.

3. WINDOW WILL BE REQUIRED ON UPSTREAM SIDE. WINDOWS MAY BE PLACED IN OTHER WALLS AS NECESSARY. WHEN "W" IS GREATER THAN 8", HORIZONTAL PROTECTOR BARS SHALL BE PLACED AT INTERVALS NOT TO EXCEED 6".

4. ALL PORTLAND CEMENT CONCRETE IS TO BE CLASS "A".

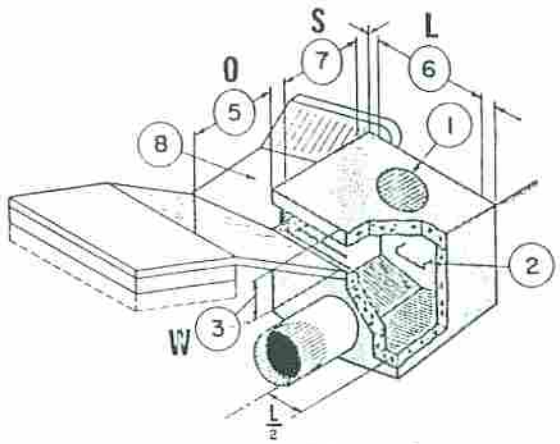
5. THE MINIMUM OFFSET "O" SHALL BE 3'-0".

6. THE LENGTH "L" SHALL BE A MINIMUM OF 4'-0". SPECIAL DESIGNS WILL BE REQUIRED FOR LENGTHS GREATER THAN 4'-0".

7. THE SPAN "S" SHALL BE 3'-0".

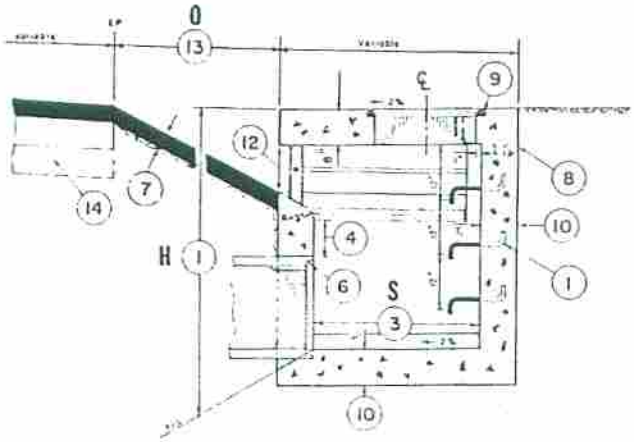
8. CONSTRUCT APRON PER STANDARD DETAIL.

9. Inlet shall be open on three sides.

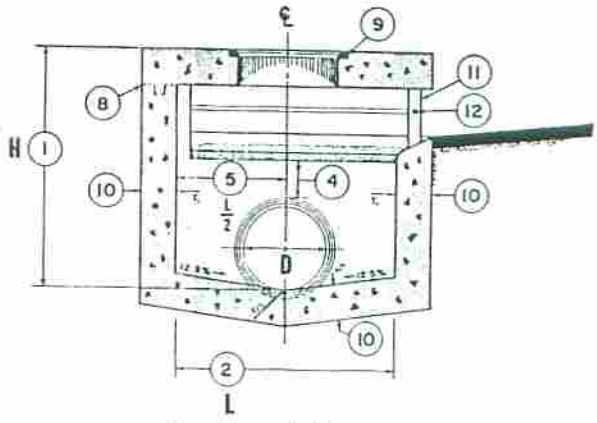


Section & Elevation

APPROVED _____ CITY ENGINEER	DATE 7-3-84 R.C.E. 24658	CITY OF LOMPOC ENGINEERING DIV.
		TYPE "C" DROP INLET
		STANDARD DRAWING NO. 510
MARK REVISIONS	APPR. DATE	RESOLUTION NO 3366(84) SHT. 1 OF 3



Section A-A



Section B-B

NOTES

1. WHEN THE HEIGHT "H" IS GREATER THAN 3'-6", STEPS WILL BE PROVIDED PER STANDARD DETAIL.
2. THE MINIMUM LENGTH "L" SHALL BE 4'-6". SPECIAL DESIGNS WILL BE REQUIRED FOR LENGTHS GREATER THAN 4'-0".
3. THE SPAN "S" SHALL BE A MINIMUM OF 3'-0". SPECIAL DESIGNS WILL BE REQUIRED FOR SPANS GREATER THAN 3'-0".
4. PROVIDE A MINIMUM OF 9" FROM THE BOTTOM OF THE WINDOW ROUNDING TO THE TOP OF THE PIPE.
5. THE OUTLET PIPE SHALL BE PLACED AT THE MIDPOINT (L/2) OF THE WALL.
6. PROVIDE A 3" ROUNDING IF THE CELL END OF ACP OR RCP IS NOT USED.
7. CONSTRUCT THE APRON WITH A MINIMUM OF .20 FEET OF ASPHALT CONCRETE PER STANDARD DETAIL.
8. OPTIONAL CONSTRUCTION JOINT MAY BE USED.
9. MANHOLE FRAME AND COVER PER STANDARD DETAIL. MAY BE ALHAMBRA FOUNDRY CO. A-1530 OR AN APPROVED EQUAL.
10. ALL WALL AND SLAB THICKNESS ARE PER STANDARD DETAIL.
11. PROVIDE A 3" OD GALVANIZED STEEL PIPE 30" IN LENGTH. SUPPORT POST IS TO BE NOTCHED AND REINFORCING STEEL IS TO BE PLACED IN THE NOTCH AND WELDED AS SHOWN.
12. WHEN THE WINDOW HEIGHT "W" IS GREATER THAN 8", HORIZONTAL PROTECTOR BARS SHALL BE PLACED AT INTERVALS NOT TO EXCEED 6".
13. THE MINIMUM OFFSET "O" SHALL BE 3'-0". THE SLOPE OF THE APRON SHALL NOT BE GREATER THAN 1:1.
14. COMPACT .50' OR .75' OF NATIVE MATERIAL TO 95% MAXIMUM DENSITY UNDER ROADWAY.

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

TYPE "C" DROP INLET

STANDARD DRAWING NO. 510

RESOLUTION NO 3366(84) SHT. 2 OF 3

NOTES

1. MANHOLE FRAME AND COVER PER STANDARD DETAIL. MAY BE ALHAMBRA FOUNDY CO. A-1530 OR AN APPROVED EQUAL.

2. THE LENGTH "L" SHALL BE A MAXIMUM OF 4'-0". SPECIAL DESIGNS WILL BE REQUIRED FOR LENGTHS GREATER THAN 4'-0".

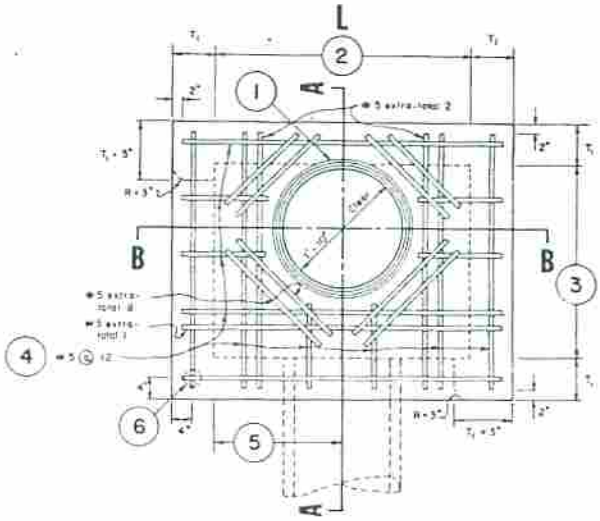
3. THE SPAN "S" SHALL BE 3'-0".

4. TOP SLAB REINFORCING SHALL BE #5 BARS AT 12" MAXIMUM SPACING AS SHOWN.

5. OUTLET PIPE SHALL BE PLACED AT THE MIDPOINT L/2 OF THE WALL.

6. PROVIDE A 3" OD GALVANIZED STEEL PIPE 30" IN LENGTH. SUPPORT POST IS TO BE NOTCHED AND REINFORCING STEEL IS TO BE PLACED IN THE NOTCH AND WELDED AS SHOWN. THIS 3" PIPE IS NOT NEEDED IN D.I.'S WITH ONE WINDOW OR IN D.I.'S WITH WINDOWS IN OPPOSITE WALLS.

7. TOP SLAB SHALL BE A MINIMUMOF 6" THICK.



Plan View

Table A

HEIGHT OF DI	CONCRETE T_1	CONCRETE T_2	REINFORCING BOTTOM	REINFORCING SIDES
Less than 4'-0"	6"	8"		
4'-0" to 8'-0"	6"	8"	#4 at 18"	#4 at 18"
Greater than 8'-0"	8"	8"	#4 at 12"	#4 at 12"

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

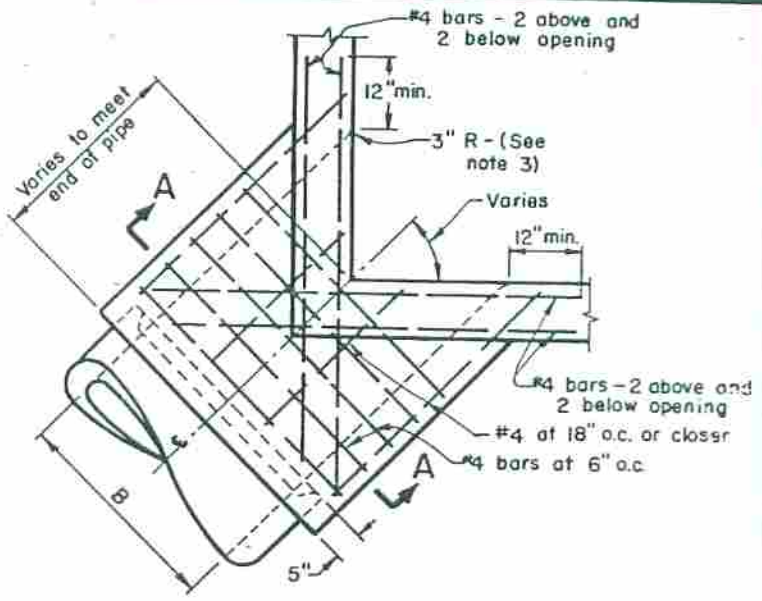
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

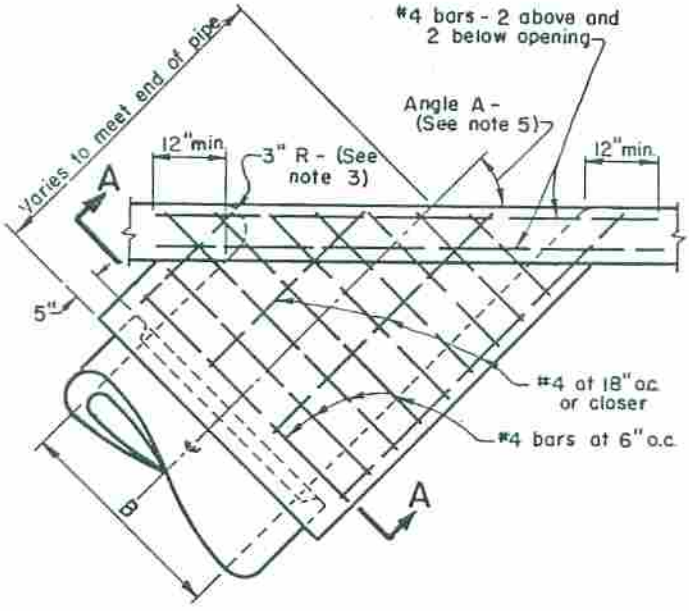
TYPE "C" DROP INLET

STANDARD DRAWING NO. 510

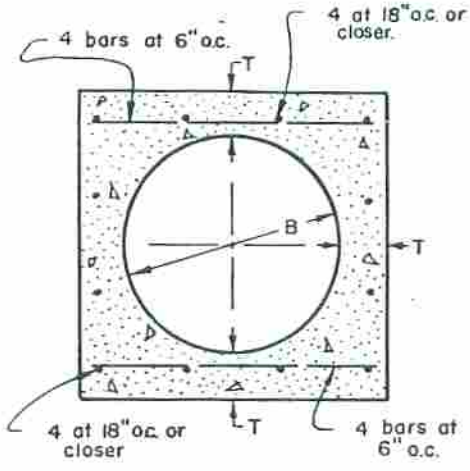
RESOLUTION NO 3366 (84) SHT. 3 OF 3



PLAN - CORNER CONNECTION



PLAN - SIDE CONNECTION



SECTION A-A

NOTES

1. Reinforcing steel shall be $1\frac{1}{2}$" clear from face of concrete unless otherwise shown.
2. Reinforcing steel for inside face of catch basin wall shall be cut at center of opening and walls of monolithic construction.
3. Connection shall be poured monolithic with catch basin. The rounded edge of outlet shall be constructed by pouring concrete against a curved surface with a radius of 3".
4. Floor of structure shall be steel-troweled to a spring line.
5. Connections shall be constructed when:
   (a). Pipes, 12" through 72" in diameter, inlet or outlet through corner of catch basin.
   (b). Angle A, for pipes 24" through 30" in diameter, is 70° or less.
   (c). Pipes, 33" through 72" in diameter, inlet or outlet through the side wall of the catch basin.

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

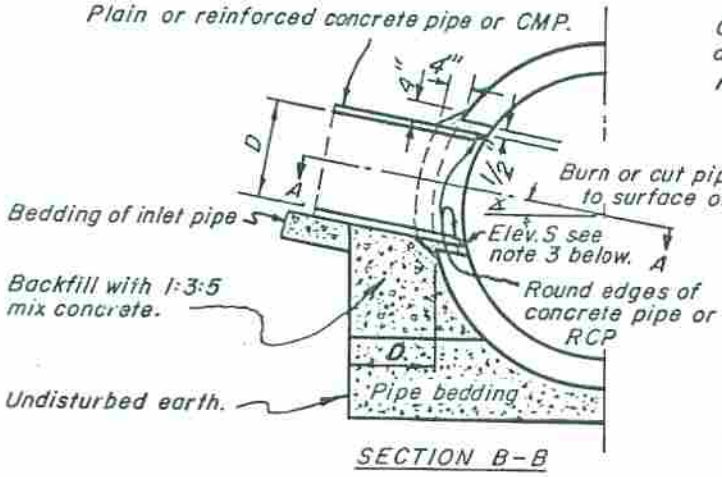
CITY OF LOMPOC
ENGINEERING DIV.

CATCH BASIN SPECIAL CONNECTIONS

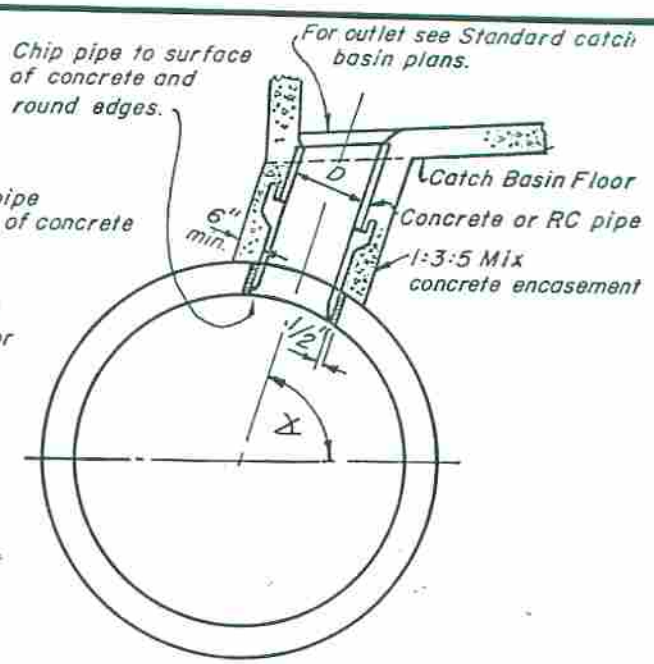
STANDARD DRAWING NO. 511

RESOLUTION NO. 3366 (84)

SHT. 1 OF 1

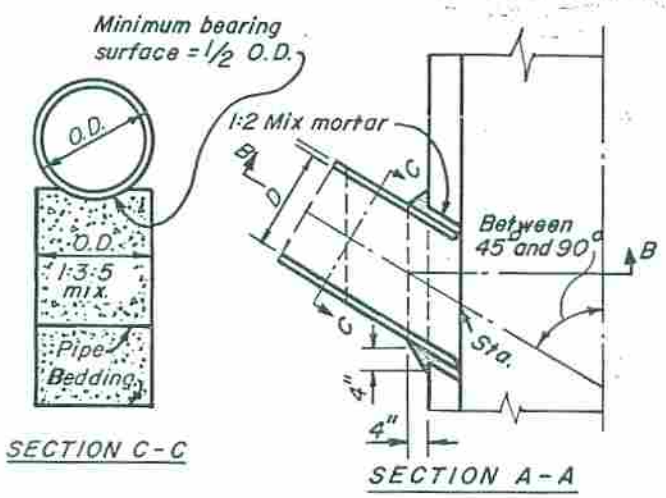


SECTION B-B



CASE 2
CATCH BASIN ABOVE STORM DRAIN

NOTE:
All connector pipes (within the angles specified for case 2) shall be encased when laid within the main line excavated trench, or when laid on fill which has not been compacted.



SECTION C-C

SECTION A-A

CASE 1
SIDE INLET

NOTES: CASES 1 and 2

1. D shall be 24" or less
2. In no case shall the outside diameter of the inlet pipe exceed one-half the inside diameter of main storm drain.
3. Centerline of inlet shall be on radius of main storm drain except where elevation "S" is shown on project drawing.
4. The minimum opening into the main storm drain shall be the outside diameter of the connecting pipe plus 1-inch.
5. All corrugated metal pipe and fittings shall be galvanized.
6. If "X" is 45° or less, use Case 1. If "X" is greater than 45°, use Class 2.

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

JUNCTION STRUCTURE FOR PIPE

STANDARD DRAWING NO. 512

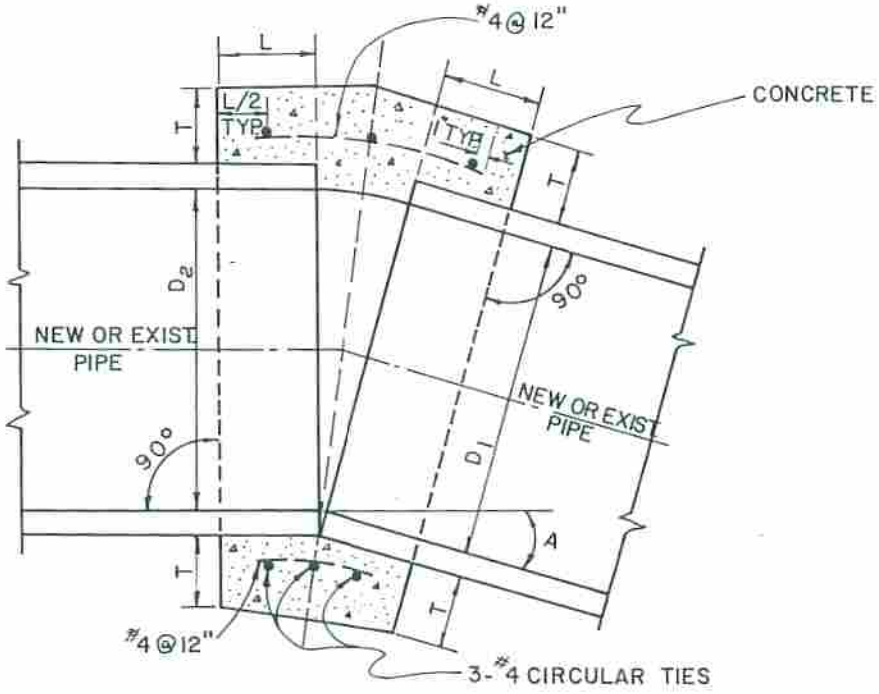
RESOLUTION NO. 3366 (84)

SHT. 1 OF 1

D	L	T
12"	1.0'	4"
18"	1.0'	5"
24"	1.0'	6"
36"	1.5'	8"
48"	1.5'	10"
57"	1.5'	10"
60"	1.75'	11"
66"	1.75'	11"

NOTES

1. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE. $D = D_1$ OR D_2, WHICHEVER IS GREATER.
2. FOR PIPE LARGER THAN 66" A SPECIAL COLLAR DETAIL IS REQUIRED.
3. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
4. OMIT REINFORCING ON PIPES 24" AND LESS IN DIAMETER AND ON ALL PIPES WHERE ANGLE 'A' IS LESS THAN 10°.
5. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE D+(2 x WALL THICKNESS)+8".
6. WHEN D_1 IS EQUAL TO OR LESS THAN D_2, JOIN INVERTS AND WHEN D_1 IS GREATER THAN D_2, JOIN SOFFITS.
7. PIPE MAY BE CORRUGATED METAL PIPE, CONCRETE PIPE, OR REINFORCED CONCRETE PIPE, OR ASBESTOS CEMENT PIPE.



APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

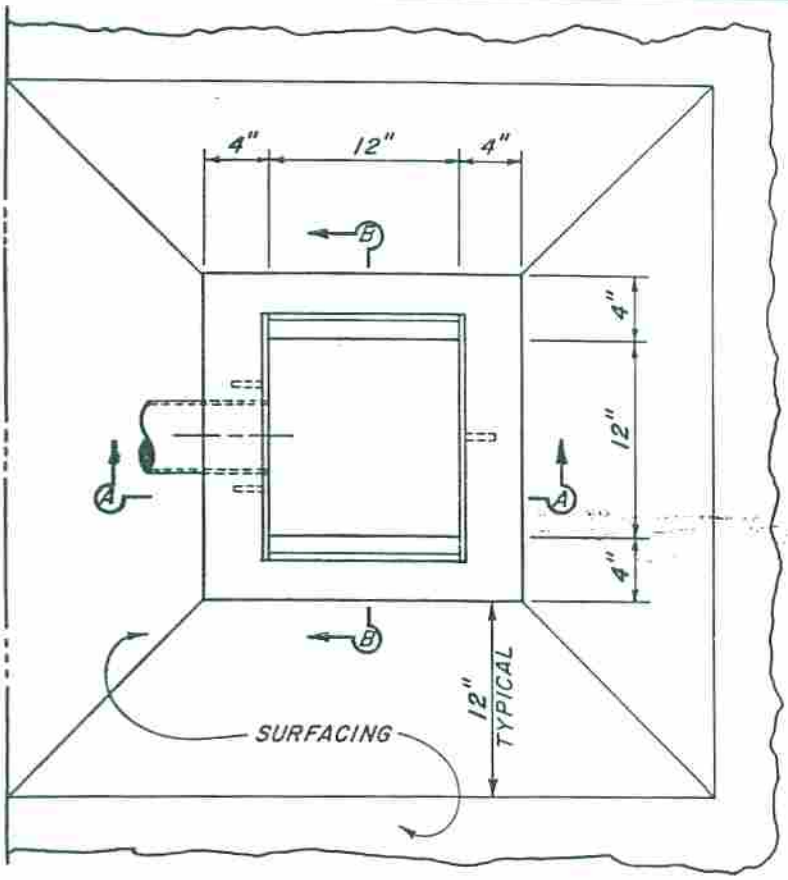
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

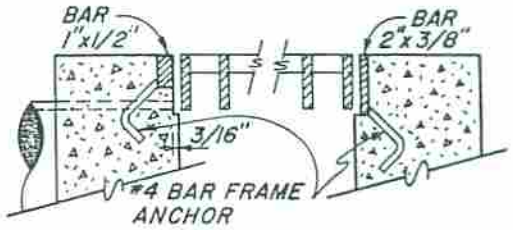
CONCRETE COLLAR
FOR PIPES 12 INCHES THROUGH 66 INCHES

STANDARD DRAWING NO. 513

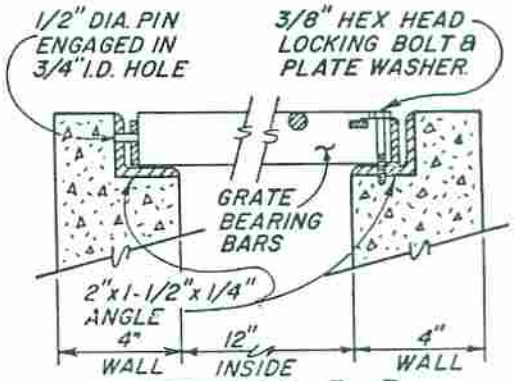
RESOLUTION NO. 3366 (84) SHT. 1 OF 1



PLAN

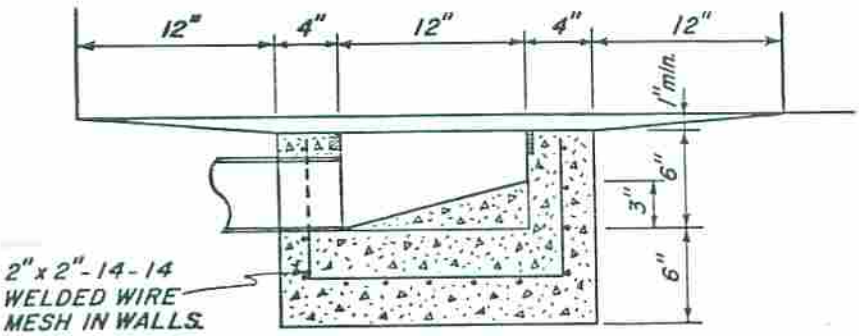


SECTION A-A

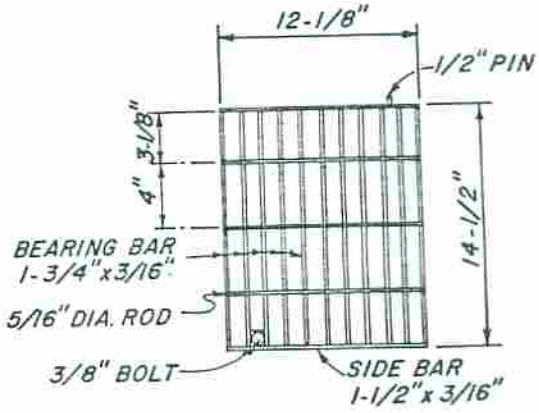


SECTION B-B

NOTE: Pre-cast structures may be used as an option as approved by City Engineer.



ELEVATION



GRATE DETAIL

NOTES:

1. ALL CONCRETE TO BE CLASS "A" PER STATE DIVISION OF HIGHWAYS SPECIFICATIONS.
2. GRATING & FRAMES ARE TO BE ASSEMBLED & MADE TO FIT BEFORE DELIVERY ON THE JOB SITE.
3. ALL STEEL COMPONENTS TO BE GALVANIZED AFTER FABRICATION. AFTER ERECTION ALL ABRADED SURFACES SHALL BE CLEANED FREE OF RUST & OIL AND NEATLY SOLDERED OVER WITH 50-50 SOLDER.
4. SEE STD. NO. 516 FOR SIDEWALK UNDERDRAIN DETAIL.

APPROVED _____ CITY ENGINEER DATE 7-3-84 R.C.E. 24658

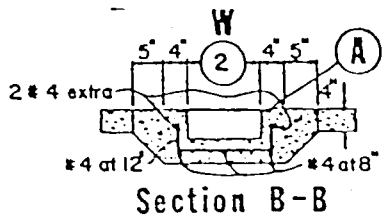
MARK	REVISIONS	APPR.	DATE

CITY OF LOMPOC
ENGINEERING DIV.

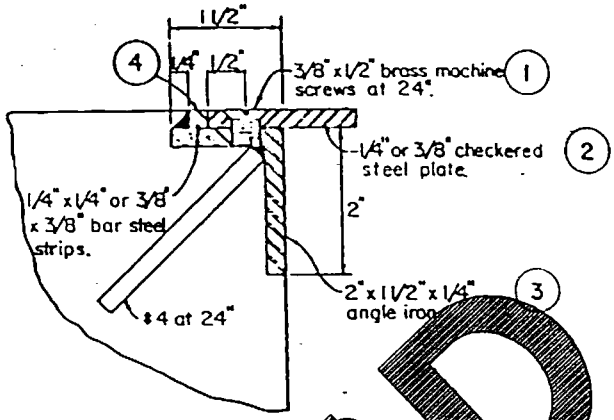
SIDEWALK DRAIN CATCH BASIN 12"x 12"

STANDARD DRAWING NO. 514

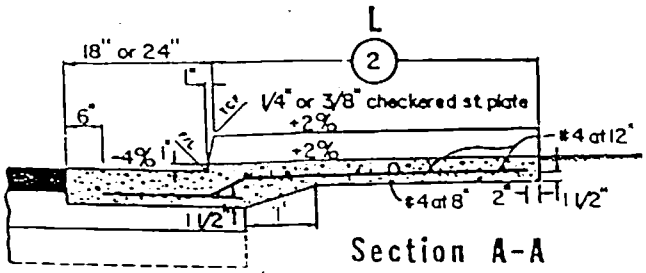
RESOLUTION NO. 3366(84) SHT. 1 OF 1



Section B-B

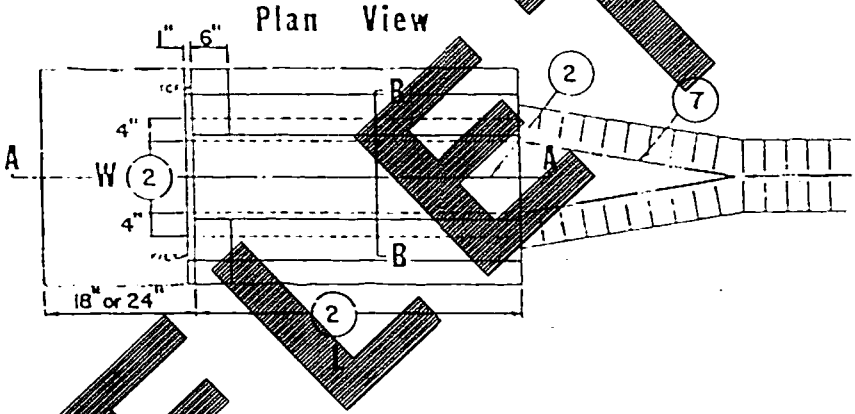


Detail A



Section A-A

Plan View



NOTES:

1. Flathead Brass Machine Screws 3/8" x 1/2". Holes are to be drilled and tapped in the field at intervals not to exceed 2'-0" center to center.
2. Checkered steel cover plates are to be 1/4" when "W" is 2'-0" or less and 3/8" "W" is greater than 2'-0". When "L" is 6.5' or less, plate is to be one piece. When "L" is greater than 6.5', the cover plate is to be supplied in two equal lengths.
3. Angle iron support brackets are to be fabricated from 1 1/2" x 2" x 1/4" material. Weld #4 bars 2" long to the angle iron as anchors on 24" centers.
4. Bar steel strips, 1/4" x 1/4" or 3/8" x 3/8" are to be tack welded to the angle iron at 12" intervals.
5. Provide a 1" lip at the FL as shown.
6. Concrete shall be 5.5 sack mix with a 4" min. slump by Calif. Test Method 519 A.
7. The flow line of graded "V" ditches should have a minimum flare of 5'-0".
8. All fabricated metal materials including the checkered plate shall be "Hot Dipped Galvanized."
9. A minimum of 2" of fine sand shall be used for leveling under all sidewalk.

DELETED

APPROVED _____ CITY ENGINEER DATE 7-3-84 RCE. 24658

MARK	REVISIONS	APPR	DATE
	NOTES REVISED		7-13-90
	DETAIL DELETED	KH	10/06

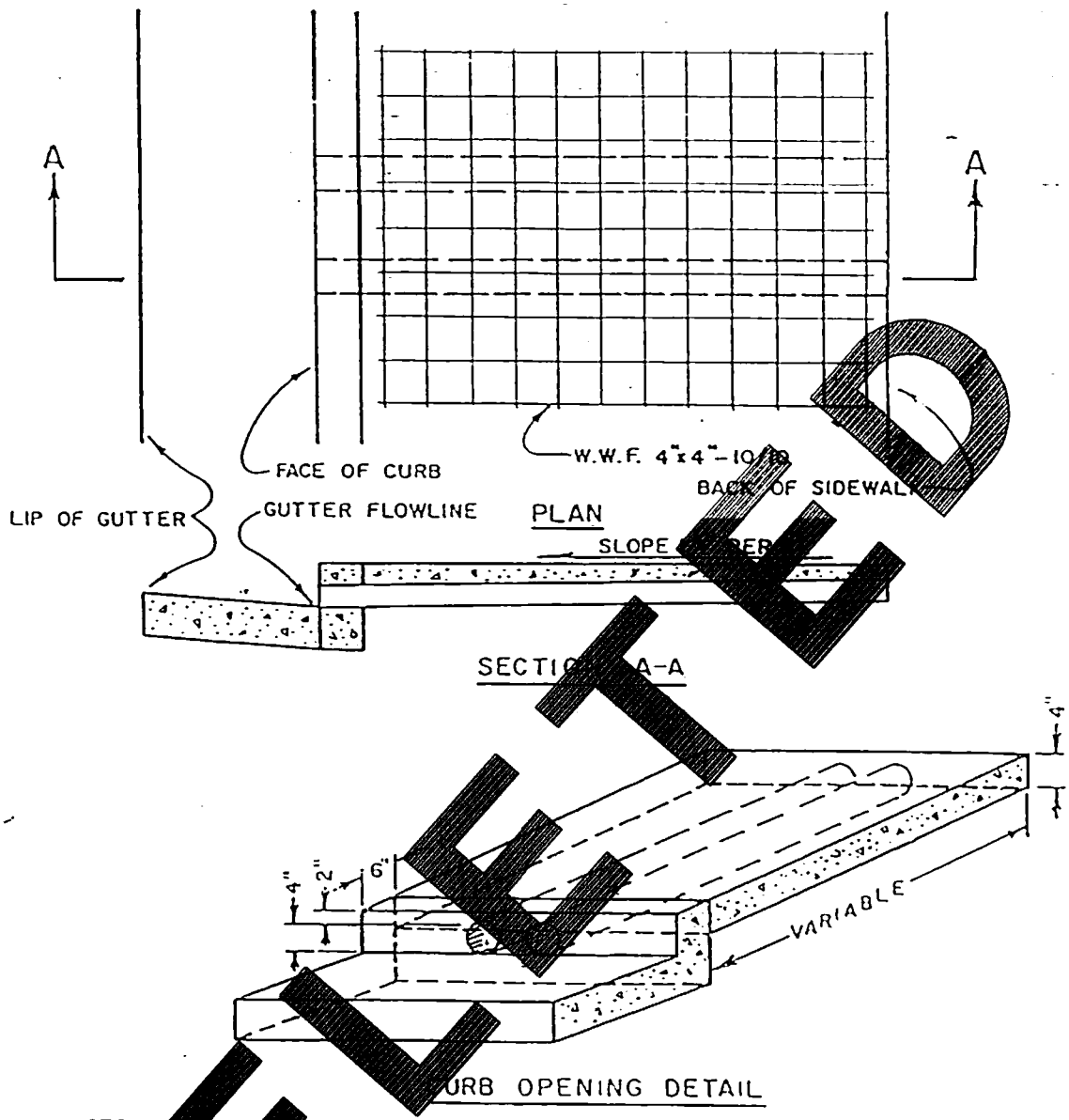
CITY OF LOMPOC
ENGINEERING DIV.

SIDEWALK DRAIN

STANDARD DRAWING NO. 515

RESOLUTION NO. 3366 (84)

SHT 1 OF 1



DELETED

URB OPENING DETAIL

NOTES

1. Wire mesh shall [illegible] wide [illegible]in.). Length shall equal [illegible] wideth minus 4".
2. On site drainage and location of curb outlets shall be by owner to the satisfaction of the City Engineer.
3. Drain pipe shall be installed so that top of pipe is 2" minimum below finish grade at back of sidewalk.
4. Sidewalk drain to be 4" schedule 40 heavy wall rigid polyvinyl chloride D.W.V. pipe or approved equal.

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

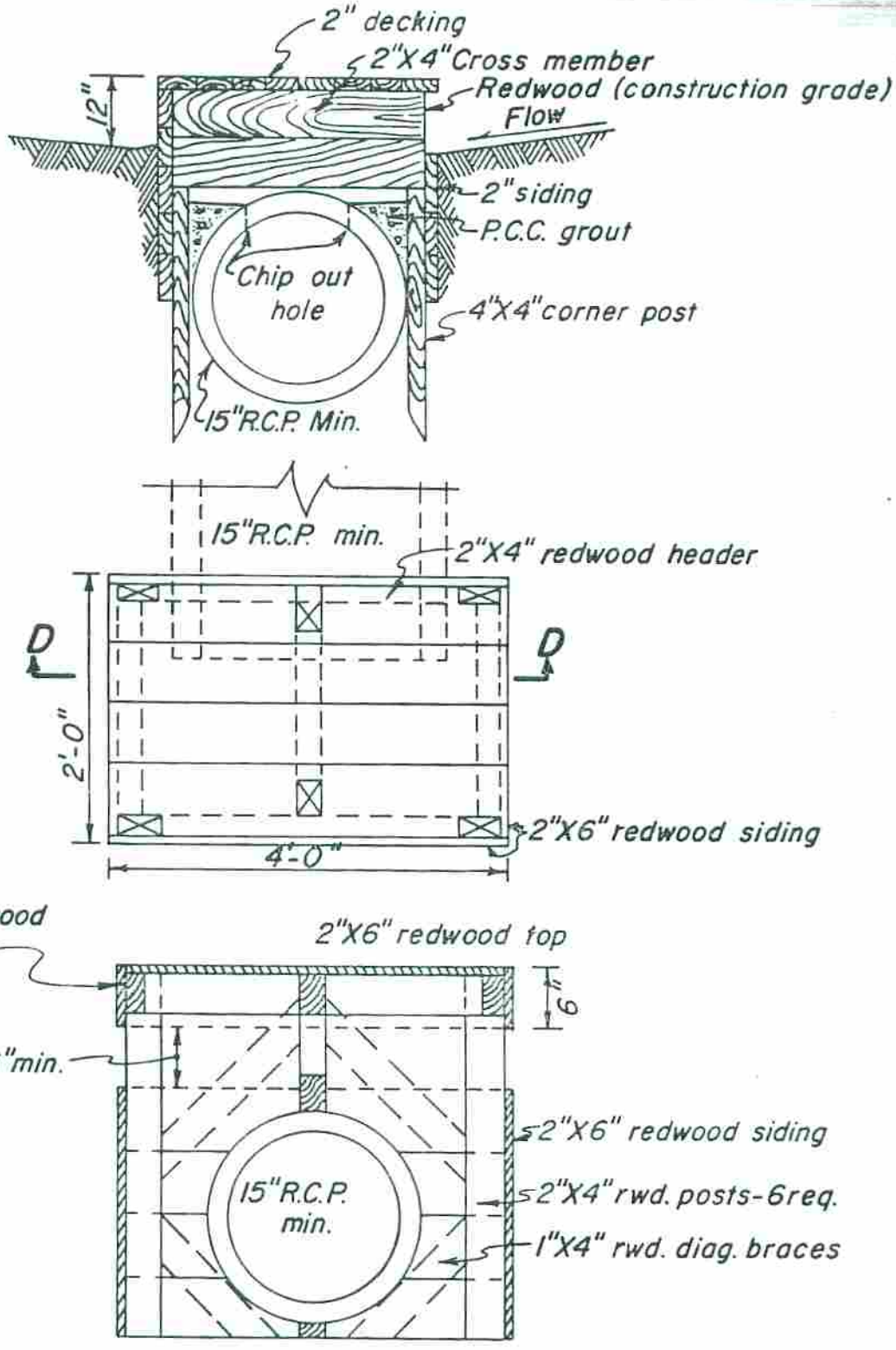
MARK	REVISIONS	APPR.	DATE
	REVISED CURB OPENING DETAIL		7-13-90
	DETAIL DELETED	KM	10/00

CITY OF LOMPOC
ENGINEERING DIV.

MINIMAL FLOW SIDEWALK DRAIN

STANDARD DRAWING NO. 516

RESOLUTION NO. 3366(84) SHT 1 OF 1



SECTION "D-D"

APPROVED _____ DATE 7-3-84
CITY ENGINEER R.C.E. 24658

MARK	REVISIONS	APPR.	DATE

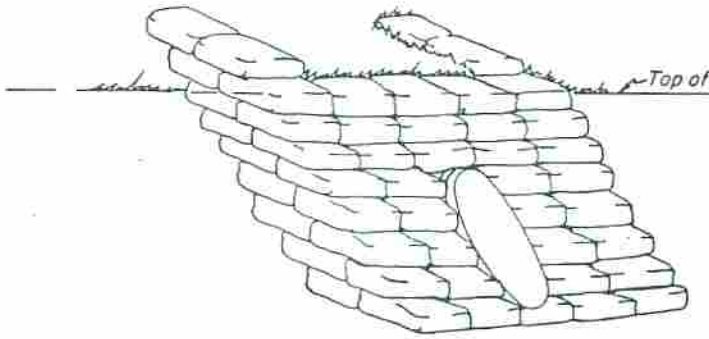
CITY OF LOMPOC
ENGINEERING DIV.

FIELD DRAIN REDWOOD BOX

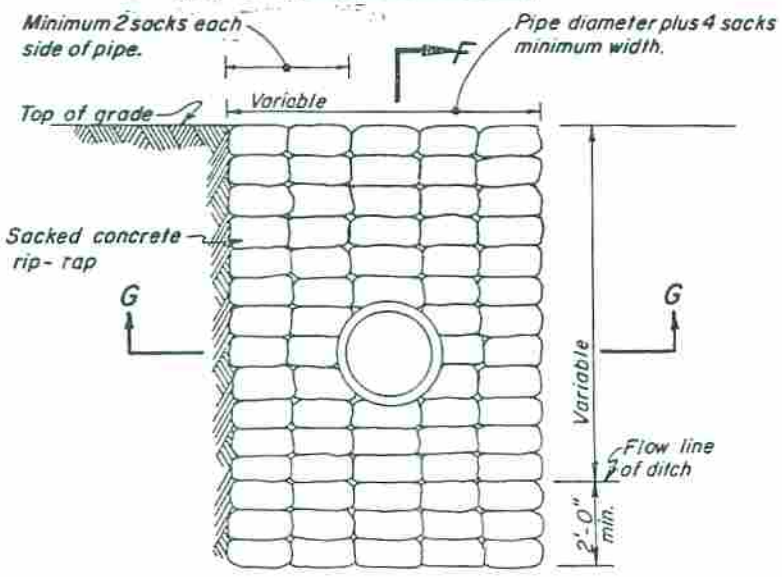
STANDARD DRAWING NO. 517

RESOLUTION NO. 3366 (84)

SHT. 1 OF 1

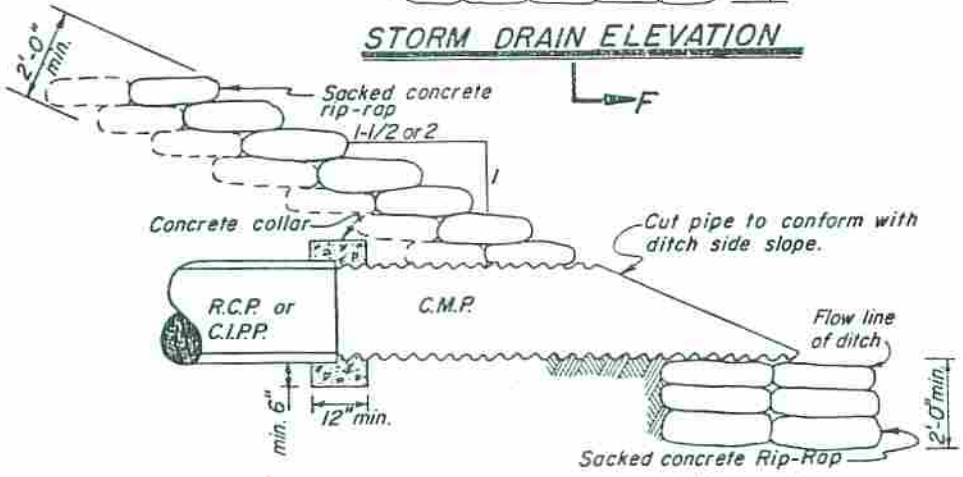


SECTION "G-G"



STORM DRAIN ELEVATION

F



SECTION "F-F"

APPROVED _____ CITY ENGINEER

DATE 7-3-84

R.C.E. 24658

CITY OF LOMPOC

ENGINEERING DIV.

SACKED CONCRETE RIP-RAP STORM DRAIN OUTLET

STANDARD DRAWING NO. 518

RESOLUTION NO. 3366 (84)

SHT. 1 OF 1

MARK	REVISIONS	APPR.	DATE