



**La Paz County
Public Works Standards
Volume III
Storm Drainage Facilities**

Adopted: March 4, 2002

LA PAZ COUNTY
PUBLIC WORKS STANDARDS

VOLUME III

CONSTRUCTION STANDARDS

- Preface -

Standards for La Paz County, Volume III, are intended to provide a consistent policy for the orderly development of improvements for storm drainage facilities within the County. This volume contains the following:

1. General Provisions
2. Storm Drainage Development Requirements
3. Storm Drainage Facility Standards
4. Standards for Preparing Drainage Report and Improvement Plans

Companion documents, Volume I, contains Public Works Construction Standards and Volume 11, contains Public Works Construction Specifications.

These Standards are prepared to fulfill the need for uniform rules governing construction performed in La Paz County and other Public agencies in La Paz County who use these standards.

Copies of the Standards are available from the La Paz County Public Works Department, 1112 Joshua Avenue, Suite #207 Parker, Arizona 85344 - Telephone 520-669-6407.

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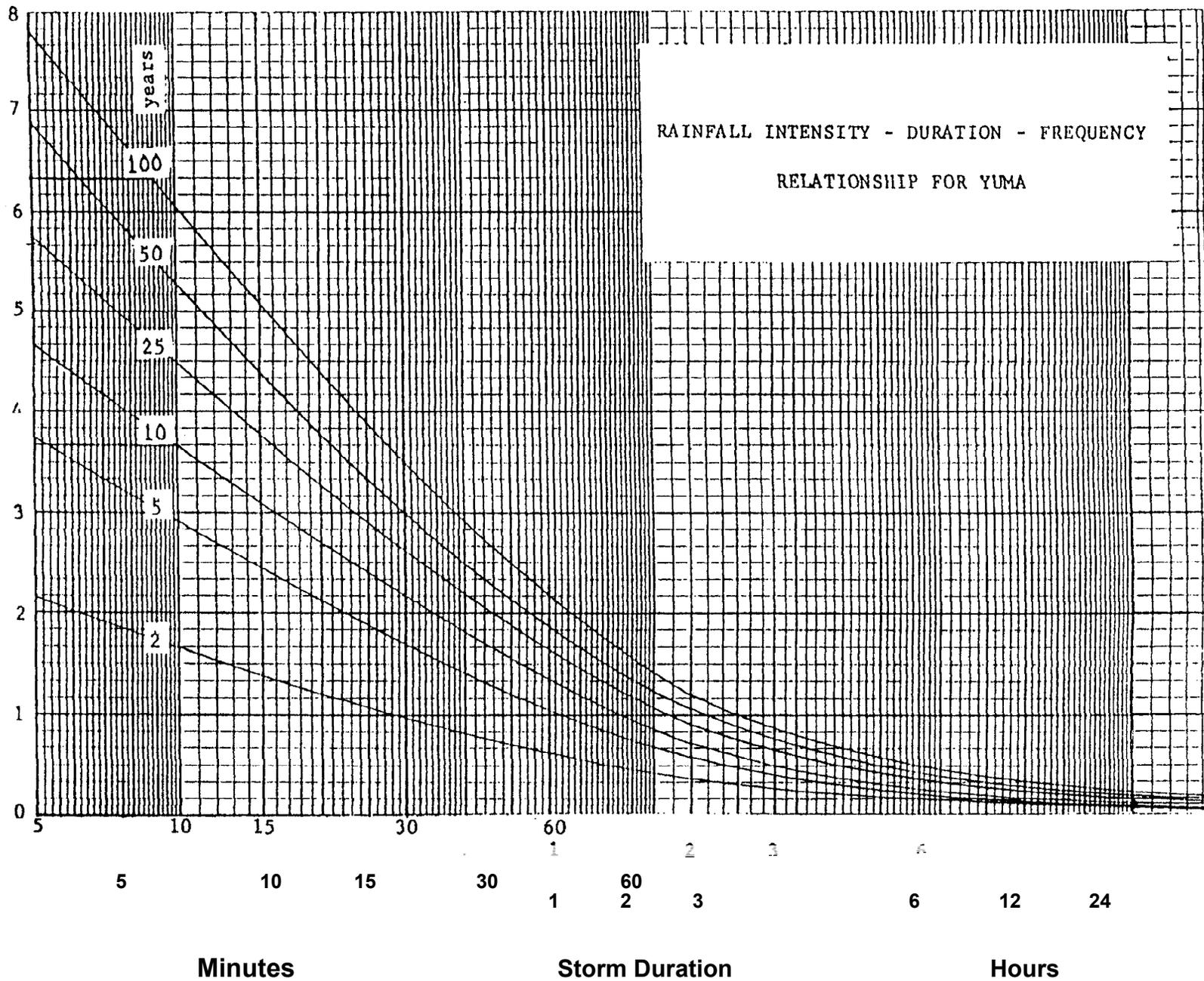
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RAINFALL INTENSITY

RAINFALL INTENSITY

APPENDIX A

STANDARDS
FOR
LA PAZ COUNTY
VOLUME III
STANDARDS

FOR

STORM

DRAINAGE FACILITIES

(XXXXXXX, ,2001)

LA PAZ COUNTY PUBLIC WORKS DEPARTMENT
1112 JOSHUA AVENUE, SUITE #207
PARKER, ARIZONA 85344

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1.0 GENERAL PROVISIONS

1.1 INTRODUCTION

Grading, excavating, and filling alter the natural contours of the ground, often causing erosion, siltation, landslides, unstable soil conditions, flooding, soil and vegetation loss, diversion, obstruction and altering of drainage patterns. Development of land often results in an increase of impervious surface area of a water shed, causing an increase in the volume of storm water runoff. Proper measures for grading and excavating land are necessary to address these problems and to avoid unnecessary future problems.

1.2 PURPOSE

It is the purpose of this standard to promote the public health, safety and general welfare, and to minimize public and private losses due to unnecessary loss from erosion, flooding and inundation by provisions designed:

1.21 To provide the minimum design and technical standards for the analysis and design of storm drainage facilities.

1.22 To match or blend with the natural contours all grading, excavations, cut, fill and other undulations of the land with particular concern for existing developed real property immediately adjacent to the earth work operation.

1.23 To stabilize cuts and fills, reduce erosion, siltation, and inundation and stabilize soil condition problems.

1.24 To provide storage of sufficient volume to retain the total runoff from the design storm falling on that parcel, lot or plot of land.

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1.25 To minimize damage to public facilities and utilities such as water and gas mains, electric, and telephone lines, streets and bridges located in areas adjacent to proposed earth work.

1.26 To provide uniform storm water drainage minimum requirements for development.

1.27 To establish responsibility and provide mechanisms to enforce and implement management of grading and drainage with respect to construction and development.

1.28 To preserve the stormwater carrying capacity of natural drainage ways or constructed flood control and drainage facilities and protect natural drainage ways from grading and filling.

1.29 To provide standards for the preparation of grading plans and drainage reports so that manpower requirements are reduced in developing and reviewing grading plan submittals.

1.0 GENERAL PROVISIONS

1.3 GLOSSARY

Approval shall mean a written notice approving the design, progress and completion of the work, by the Public Works Director.

Approved Plans shall mean the most current grading and improvements plans and specifications. All approved plans are subject to a one year approval limit.

Borrow is earth material acquired from an off-site location for use in grading a site.

Civil Engineer shall mean a Professional Engineer registered in the State of Arizona to practice Civil Engineering.

Clearing, Brushing, and Grubbing shall mean soil disturbance and/or the removal of vegetation (grass, brush, trees, and similar plant types) by mechanical means.

County Engineer shall mean the Professional Engineer as designated by the Public Works Director.

County Flood Control (CFD) shall mean the person designated by the County.

Critical Point the location of a water flow which is at the narrowest sections, highest volume, greatest slope, etc.

Detention Basin an area designated for temporary storage of storm water where bleeding or pumping drains the basin.

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Director shall mean the Public Works Director.

Earth Material shall mean any rock, natural soil or fill, and/or any combination thereof.

Erosion shall mean the wearing away of the ground surface as a result of the movement of wind and water.

Erosion Control System shall mean any combination of sediment traps, and erosion protection, including lining, riprap and effective planting.

Excavation shall mean the artificial removal of earth material.

Filling shall mean a deposit of earth material by artificial means.

Finished Grade (FG) shall mean the final grade of the site which conforms to the approved plan.

Flood Control Engineer (FCE) shall mean the County appointed County Flood Control Staff.

Grade shall mean the vertical location of the ground surface.

Grading shall mean any excavating or filling, or combination thereof including the initial clearing, brushing and grubbing.

Grading Permit shall mean an official document or certificate issued by the Flood Control Engineer, authorizing grading activity as specified by approved plans and specifications.

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Grading Plans shall mean an engineered plan outlining the extent and quantity of cut and fill, the existing and finish grades, contour lines, detention and/or retention facilities. This may also include, but not be limited to soils or geotechnical reports, phasing or scheduling plans, and plans for stabilization or other structural improvements.

Impervious Surface Area shall mean the area of a site that has been surfaced with material causing reduction of natural percolation into the soil.

Inspector shall mean an inspector to perform inspection on grading and excavation work, as directed by the Public Works Director.

Lot and Plot shall mean real property recorded by a deed.

Natural Grade shall mean the ground surface unaltered by artificial means.

Owner or Person shall mean an individual, agent, firm, partnership, association corporation or this State or any agency or political subdivision having a legal or equitable interest in given real property. Further, the owner or his designated representative shall be the responsible party with regard to compliance with this standard.

Off-Site Drainage shall mean that area of the drainage basin and improvements outside of the particular project or site.

On-Site Drainage shall mean drainage pertaining to the developing area and not including the area outside of the development boundary.

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Retention shall mean the prevention of runoff from entering a stream, storm disposal or sewer system by storing it in some type of storage basin.

Retention Basin shall mean as designated and constructed for total storage of storm water from the drainage area without bleeding or pumping of stormwater to another facility.

Revetment shall mean a retaining wall or facing of rock, concrete blocks, mattresses, etc, with structural integrity, that is placed along an embankment to minimize erosion and to prevent sliding or slippage of earth.

Site shall mean any lot or parcel of land or contiguous combination thereof, under the same ownership or unified control, where the proposed grading is to be performed or permitted.

Slope shall mean an inclined ground surface, the inclination of which is expressed as the ratio of vertical distance to horizontal distance.

Structure shall mean anything constructed or erected for use which requires a location on the ground or attachment to something having a location on the ground; but not including walls and fences less than 4 1/2 feet in height when located in front yards, or less than 6 feet in height when located in side or rear yards. Structure shall also include streets, alleys, roadways, water lines and sewer lines; however, setback line requirements shall not apply to streets, alleys, roadways, water or sewer lines and their appurtenant features.

2.0 STORM DRAINAGE DEVELOPMENT REQUIREMENTS

2.1 APPLICABLE AREA

These standards apply to all land within the unincorporated area of the County of La Paz and to those incorporated areas of La Paz County whose governing bodies adopt these standards and requirements.

2.2 REQUIREMENTS AND CONFORMANCE

Before any grading, excavation or filling takes place on any land within the area of jurisdiction, a grading plan with a drainage report and required fees shall be submitted to County Flood Control for approval and a grading permit obtained.

This requirement applies when the impervious surface area of any parcel is increased by more than 400 square feet for any addition or improvement including building construction or aggregate or other surfacing on the natural ground.

Exceptions to the requirements are as follows:

- A) Cemetery grave excavation.
- B) Refuse disposal sites operated by a public agency or controlled by other regulations.
- C) Excavations for well and utility line trenching.
- D) When not specified otherwise, individual residential lots and parcels.
- E) Grading done exclusively for agricultural or farming purposes.

2.0 STORM DRAINAGE DEVELOPMENT REQUIREMENTS

F) Exploratory excavations under the directions of provided all excavations are properly backfilled.

G) Grading and maintenance of existing streets and roads.

H) Excavations below finished grade for a cesspool, septic tank, swimming pool, storage tanks for oil, gas or water or foundations and footing for buildings, manufactured homes, retaining walls or other structure authorized by a valid building pen-nit. This does not exempt any fill made with the material from the excavation nor exempt any excavation having an unsupported height greater than 5 feet after completion of such structure.

2.3 STATUTORY EXEMPTIONS

In accordance with ARS§ I 1-830 (A) nothing contained in this ordinance shall:

2.3.1 Affect existing uses of property or the right to its' continued use or the reasonable repair or alteration thereof for the purpose for which used at the time this standard affecting the property takes effect.

2.3.2 Prevent, restrict or otherwise regulate the use or occupation of land or improvement for railroad, mining, metallurgical, grazing or general agricultural purposes, if the tract concerned is five or more contiguous commercial acres.

2.4 SUBMITTALS

A drainage report, with a grading plan, appropriate details and required fee shall be submitted to County Flood Control for approval. The drainage report and grading plans are

2.0 STORM DRAINAGE DEVELOPMENT REQUIREMENTS

to be in accordance with the standards in Section 4. In addition, when required, engineering plans for off-site improvements in existing and proposed public right of-way

shall be prepared and submitted with the grading plan submittal. Procedure in preparing a drainage report is shown in Figure 1.

2.5 SUBMITTAL PROCEDURE

Applicants for a grading plan approval from the County should submit an application, two copies of a grading plan with a drainage report, necessary improvement plans, and required fees to:

La Paz County Community Development Department
1112 Joshua Avenue, Suite #202
Parker, Arizona 85344

The owner's name and address are to be furnished.

All drainage reports and site grading plans submitted for approval must be prepared by an Arizona Registered Engineer or Architect. All drainage reports and improvement plans that include engineering work within or proposed public right of-way shall be prepared by an Arizona Registered Civil Engineer who shall **affix** his signature and seal to the documents.

Approval of the drainage report, grading and improvement plans shall only be granted and a grading permit issued after all concerns and comments noted from review of the submittal have been satisfactorily addressed in re-submittals to CFC. Three copies of the final drainage report, grading plan and improvement plans are to be provided for approval. An approved copy of the grading plans and any other submitted plans along with a grading

2.0 STORM DRAINAGE DEVELOPMENT REQUIREMENTS

permit shall be forwarded to the owner and the County.

On subdivision projects, the preliminary drainage report and grading plans shall be submitted with the tentative plat. The final drainage report and grading plans shall be

submitted before submittal of subdivision improvement plans.

Drainage Reports and plan review fees shall be in accordance with the current fee schedule. Fees shall be paid in advance of reviewing the submittal.

A grading permit and plan approval shall be void after one year from the date of approval if construction has not begun, and is void after two years from date of approval. To reinstate a permit, a new application with the required fees will be required.

2.6 CONSTRUCTION IN ACCORDANCE WITH APPROVED PLANS

All construction and work shall be in accordance with and conform to the approved plans and specifications. Minor revisions to on-site work not affecting total retention capacities and drainage routing to detention areas shall be permitted during construction without re-approval of plans, provided the revisions are submitted, in documented form, to CFC before final approval. All revisions to approved plans for work on the off-site areas shall be first approved by the Flood Control Engineer.

2.7 COMPLETION AND APPROVAL OF WORK

Every holder of a grading permit shall have a final inspection. The Public Works Department shall be notified when the permittee is ready for a final inspection.

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The final inspection shall determine if the work has been completed and constructed to approved plans. Any deviation from approved plans that has not been documented and approved by CFC, shall be cause for a delayed approval. Approval of stormwater facility construction shall be given after all deviations from the plan have been documented and approved, and on equipment after any necessary operation and maintenance manuals have been submitted and approved.

2.8 COMPLIANCE

No grading, excavation or filling on any land shall hereafter take place without full compliance with the terms of this standard. A mechanical, electrical, plumbing, building permit or mobile home placement pen-nit is not issued without full compliance with the terms of this standard. After final approval of construction a certificate of occupancy can be issued when requested.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.1 GENERAL STANDARDS

Drainage reports, grading and improvement plans showing facilities to control storm water shall be designed and prepared in accordance with the standards and criteria contained in this volume. All improvements located in a public or County right-of-way or proposed to be in a public right-of-way, are to conform to the "Public Works Standards Volume I and II.

Submitted drainage reports, grading and improvement plans shall be in accordance with the latest adopted Master Drainage Plans. Additions or reconstructions shall show efforts to bring the entire site into compliance with these rules.

3.2 BASIS OF CALCULATIONS

The minimum design for facilities to control stormwater generated within a project shall be based on a storm having a frequency of one (1) in 100 years unless stated otherwise in this report.

The acceptable methods for performing hydrologic calculations used in determination of peak storm water flow rates and run-off volumes shall be:

A) The Soil Conservation Service (SCS) Unit Hydrography Method; or other methods as approved in advance by the Public Works Director.

B) The Rational Method.

Limits and criteria for defining the use of these methods are set forth in the following paragraphs.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.2.1 The SCS Unit Hydrography Method may be applied by use of the SCS TR-20 computer program or the U.S. Army Corps of Engineers HEC- I computer program. The following shall be the limits and sources allowed for input parameters:

A) Time of Concentration - Use the procedures set forth in the SCS Publication Technical Release 55 (TR-55).

B) Precipitation - Use the precipitation from a 2 hour duration storm as shown on Table 2 in the Appendix.

C) Rainfall Distribution - Use the 2 hour duration storm rainfall distribution shown on Table 3 in the Appendix.

D) Soil Classification - Use the SCS Publication Soil Survey of Yuma Wellton Area, Parts of La Paz County, Arizona and Imperial County, California to classify the soils present on the watershed by SCS Soil Type A through D.

E) Runoff Curve Numbers - Assign curve numbers according to SCS soil type and land use per Table 4 in the Appendix. For areas which do not correlate with the land use categories in Table 4, use the methods set forth in TR-55, or methods as approved by the Public Works Director. Curve numbers selected from TR-55 shall be for soil antecedent moisture condition II.

3.2.2 The peak runoff from an urbanized area, may be computed using the rational method, $Q=CIA$. The hydrologic design **data** sheet on Page B and IDF curve on Page A in the Appendix may be used for water shed areas up to 10 acres in size. Other methods employing the rational method for watersheds greater than 10 acres must be approved in advance by the Public Works Director.

3.0 STORM DRAINAGE FACILITIES STANDARDS

Where:

Q = Peak runoff (cfs).

C = Runoff coefficient representing the characteristics of the drainage area. (See the Rational Method Data Sheet on Page B in the Appendix).

i = Average intensity of rainfall in inches per hour for a duration equal to the time of concentration, t_c , for a selected rainfall frequency. Utilize the intensity-frequency graph on Page A in the Appendix.

t_c = Time of concentration, in minutes, after the beginning of rainfall for a floodwave to travel from the hydraulically most distant point in the water shed to concentration point. Time of concentration from impervious areas should be computed using average gutter velocities from the modified Manning's formula for triangular flow, if applicable, and/or average pipe velocities utilizing Manning's formula: See the graphs on Pages C and D in the Appendix.

A = Size of drainage area in acres.

3.2.3 The Flood Control Engineer may require the specific use of one of the methods set forth herein or of another method as applicable.

3.2.4 Runoff volume calculations to size a detention basin are to be computed by estimating the area under the hydrograph of a 100 year storm of 2 hour duration. The design hydrograph on Page E and Table 1 in the Appendix may be used for sites with a contributing drainage area of less than ten (10) acres. Sites with contributing drainage area greater than 10 acres shall use the SCS Unit Hydrograph Method. Calculations shall be provided to substantiate that the basin will be drained in 5 days.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.2.5 On-site retention basins shall be sized to contain the entire volume of storm precipitation falling on the individual parcel, lot, space or block. Calculations shall be provided to substantiate the design and follow the examples on Page F in the Appendix. No consideration may be given to rainfall absorbed by the ground.

The following design storms shall be used for sizing retention basins:

A) Commercial/Industrial - 100 year storm with 1 hour duration or 2.25 inches of total rainfall.

B) Residential with drained streets - 100 year storm with 1 hour duration or 2.25 inches of total rainfall.

C) Residential with streets drained onto lot - 100 year storm with 6 hour duration or 3.05 inches of total rainfall.

D) R.V. Parks - 100 year storm with 1 hour duration or 2.25 inches of total rainfall.

E) Mobile Home Park with drained streets - 100 year with 1 hour duration or 2.25 inches of total rainfall. With streets drained onto space - 100 year storm with 6 hour duration or 3.05 inches of total rainfall.

Other - 100 year storm with 1 hour duration or 2.25 inches of total rainfall.

3.2.6 The charts, graphs and work sheets as provided in the Appendix shall be utilized in the preparation of a drainage report.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.3 OFF-SITE DRAINAGE

This criteria applies to Section 4.2.3 of these guidelines. For storm runoff water from off-site which drains through the project, the following applies to the project area:

Dispose of water in the same manner as before the planned development, keeping erosion to a minimum.

All existing drainage patterns affecting the land shall be shown.

Provide for drainage ways for all channels and washes.

Streets shall not be used to carry off-site drainage.

Provide a erosion control system including channelization, flume, lining, and rip-rapping as required. Projects shall be reviewed individually and approved by County Flood Control.

3.4 ON-SITE DRAINAGE

Provide for the disposal of water in as nearly as possible, the same manner as before planned development, keeping erosion to a minimum.

Where a project is traversed by or abuts a stream, water course, wash or proposed drainage way, a legal drainage way shall be provided.

Provide adequate facilities for disposal of stormwater including underground pipe, inlets, catch basins, open drainage, ditches and washes, channels, pumps, lining, channelization, rip-rapping, basins and erosion control system as necessary.

3.0 STORM DRAINAGE FACILITIES STANDARDS

Provide and show routing through the project for the 100 year event. Assess damage potential to real property and provide assessment of hazard potential to human life.

Project designs shall be closely compatible with the long range goals of the County's Storm Drainage Management and Master Plans.

3.5 RETENTION AND DETENTION FACILITIES - GENERAL

3.5.1 Peak discharges at the lower boundary of the proposed development shall not be increased as a result of development.

3.5.2 Adequate storage or detention facilities should be provided for the quantity generated for excess peak discharges of direct on-site runoff increased from a pre-development to a post-development status. The design shall show how the runoff reaches the storage areas.

3.5.3 Detention facilities consist of the following and may include other approved methods:

A) Horizontal roof tops of buildings.

B) Vehicle parking areas.

C) Depressed areas or ponds.

D) Landscaped areas.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.5.4 Retention facilities may consist of the following depressed areas or areas where overland flow is restricted:

- A) Individual lots or parcels.
- B) School yards and playgrounds.
- C) Parks, golf courses and other open areas.
- D) Vehicle parking areas.
- E) Landscaped areas.

3.5.5 Disposal of stormwater runoff may be accomplished by the following or other approved methods providing water is not ponded longer than 5 days:

- A) Percolation or infiltration directly into the ground. This option shall not be accepted in high groundwater areas.
- B) Pumping or controlled bleeding of the collected runoff into water courses, storm conduits or drainage ways in a judicious manner, after peak flows in those water courses have passed.

Pumping or controlled bleeding of the collected runoff into dry wells for infiltration into sub-surface zones. This option shall not be allowed in high ground water areas of the urbanized areas.

3.5.6 When the post-development flow rates leaving the project exceed predevelopment flow rates, a recordable easement or written agreement for drainage

3.0 STORM DRAINAGE FACILITIES STANDARDS

purposes shall be obtained from all affected property owners downstream before project approval shall be granted.

3.6 RETENTION AND DETENTION FACILITIES - DESIGN

3.6.1 Detention or Retention basins shall have 25% additional basin capacity over and above the design capacity. Any underground storm sewer shall have a 1 foot minimum free board between top of grade and the high water elevation.

3.6.2 Basins deeper than four feet shall be fenced with a six foot high fence or masonry wall with locked 16 foot wide gate. Depth of basin as per this paragraph and 3.6.1 is determined from the lowest finished grade adjustment to the basin.

3.6.3 Maximum basin side slope shall be 3:1 with a basin bottom slope of 0.5% for grassed areas draining to the sump or dry well. Use 0.3% in nongrassed basin bottoms. All basins shall have a ramp for vehicle access to the bottom.

3.6.4 Concrete flumes to transport water from the street into the basin shall be provided allowing the integrity of the banks and floors of the basin to be preserved.

3.6.5 In residential areas, when the basin is not fenced, an irrigation sprinkler system and landscaping shall be provided.

3.6.6 If evaporation and percolation cannot totally remove the water within 5 days controlled bleeding or pumping of the basin into an approved disposal facility shall be required. Calculations shall be provided to show evaporation and percolation. The final decision as to whether bleeding or pumping is required shall be made by the FCE.

3.0 STORM DRAINAGE FACILITIES STANDARDS

When controlled bleeding or pumping is required, adequate permanent facilities shall be provided as part of each project to drain the basin.

3.6.7 Retention and detention basins shall be dedicated for drainage and public use if the basin receives storm water runoff from public right-of-way.

3.6.8 Location of a basin within a project is to be approved by the FCE. One basin is required per project with a minimum of one per 40 acres.

3.6.9 A positive method shall be provided to drain the basin in the event the storage capacity of the basin is exceeded or the drainage system plugged.

3.6.10 A drywell and sump shall be constructed in all retention basins with bleeding or pumping facilities.

3.6.11 Maintenance provisions for the basin shall be **clearly established** and acceptable to the FCE.

3.7 INDIVIDUAL PARCEL RETENTION

3.7.1 On new subdivision developments in areas with soil Group A, as defined by the Soil Conservation Service, provide a minimum lot size of 6,500 square feet for on-site retention which includes retention for area adjacent to lots. When streets are drained to another location, minimum lot size may be reduced as approved by the FCE.

3.7.2 If on-site retention methods are used on new subdivision developments in other than soil Group A areas, provide a minimum lot size of 9,500 square feet. The on-site retention shall be sized to include contributing area adjacent to each lot. When streets

3.0 STORM DRAINAGE FACILITIES STANDARDS

are drained to another location, minimum lot size may be reduced, as approved by the FCE.

3.7.3 On residential lots the maximum design depth of stormwater storage shall not exceed nine (9) inches below top of curb except as approved by the FCE.

3.7.4 Building site elevations shall be at least 5 inches above the centerline of the adjacent street at its lowest adjacent point.

3.7.5 The usable lot coverage for retention shall not be greater than the percentage of lot cover remaining from the maximum lot or space coverage.

3.7.6 For subdivisions, a deed covenant prohibiting alteration of the final site ground elevations shall be required with depth and area requirements specified.

3.7.7 If the furnished grade is below the high water storage level for mobile home and recreational vehicle parks, the vehicle parking area, and the RN, or mobile home placement area, shall have a minimum of 3 inches aggregate base material surfacing.

3.7.8 An allowance for evaporation and/or percolation shall not be incorporated into the computations for minimum lot ponding depth.

3.7.9 Individual parcel retention shall be utilized on parcels with a ground slope less than two percent.

3.7.10 Freeboard or additional basin capacity shall not be required for individual parcel retention.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.7.11 Calculations shall be submitted to show how the site will be drained in five (5) days. The 100 year high water elevation of a parcel shall be below the lowest elevation of existing ground adjacent to the site. If it is not, a concrete or asphalt barrier shall be required around the area to be used as retention to prevent overland flow.

3.7.12 The 100 year high water elevation of a parcel shall be below the lowest elevation of existing ground adjacent to the site. If it is not, a concrete or asphalt barrier shall be required around the area to be used as retention to prevent overland flow.

3.7.13 Individual parcels shall be sloped inward with adequate protection to retain stormwater on the site.

3.7.14 The use of earth berms shall be only acceptable as a secondary method to reduce overland flow. All applications shall be first approved by the FCE. The parcel shall first be graded as per Section 3.7.13.

3.7.15 Parking areas should be graded toward a landscaped area. A light rain will drain away with little or no ponding and a storm of greater intensity will back up on the pavement and later recede. To drain parking and asphalt areas and to provide additional storage, a dry well should be used.

3.7.16 If more than one area is used for retention, compute the runoff contributing to each basin separately. Each retention area shall retain the runoff contributing directly to it.

3.8 OPEN CHANNELS

Open channels shall be designed to convey the 100 year storm peak as based on time of concentration with erosion control systems.

3.0 STORM DRAINAGE FACILITIES STANDARDS

Channel lining may be required depending on velocity, soil type, side slopes, changes in channel geometry and Froude number. Generally, erosion control including lining or riprap shall be required if the velocity exceeds 5 f.p.s., in sandy soil, the side slopes are greater than 3: 1, or there are rapid changes in channel geometry or the Froude number is greater than 0.80. Final requirements shall be determined at each project review.

Channels shall be designed to provide protection from excessive silt deposition, due to low velocities.

Utilize channel drops to control the longitudinal slope of a drainage channel. Riprap or concrete shall be used.

Utilize energy dissipating devices when the average velocity exceeds 10 f. p. s.

Open channels shall require dedicated drainage ways.

3.9 STORM SEWERS

Storm sewers shall be designed to convey not less than a 10 year, 2 hour rain storm with maximum flow velocity of 15 f.p.s. Storm sewer lines acting as bleedoff line to detention basins shall be a minimum of 12" diameter.

The minimum storm water pipe size shall be 18 inches in diameter for public use.

Utilize catch basin type as required in conformance with the Public Works Standards, Volume 1. All catch basins shall be designed using a 10 years, 2 hour duration storm. Catch basin design procedures shall conform with Drainage of Highway Pavements,

3.0 STORM DRAINAGE FACILITIES STANDARDS

Circular No. 12, U.S. Department of Transportation, Federal Highway Administration, latest revision.

If not in a public right-of-way underground pipelines shall require an easement.

Pipelines shall be designed to prevent excessive silt deposition due to low velocities.

All storm sewer outlets shall have head and wing walls or a flare end section and all outlets shall have riprapping.

3.10 CULVERTS

The minimum culvert size shall be 18 inches diameter round or a 22" X 13" arch or 23" X 14" elliptical.

All outlets not submerged under the design condition shall have designed riprapping with energy dissipaters, headwalls and other improvements as required to provide an erosion control system.

When streets on sustained gradients cross natural drainage courses, adequate culverts shall be provided to accommodate a 50 year storm of 2 hour duration with maximum ponding to an elevation of two (2) feet below the road centerline elevation. Diversion of ponded water into another drainage area shall not be allowed.

Pond, or dip crossings, shall only be permitted after approval of the concept by the Public Works Director. If such a crossing is permitted roadway embankment slopes shall be adequately protected.

3.0 STORM DRAINAGE FACILITIES STANDARDS

3.11 STREETS

3.11.1 The use of streets and roads for collection and movement of storm runoff water is a secondary function of the street and therefore has certain limitations. Generally, the larger the average daily traffic (ADT), the higher the classification of the street.

3.11.2 When the use of a street is permitted for transport of drainage water collected on other streets, the 10 year frequency design discharge with a time of concentration of 10 minutes minimum, shall be contained between the top of curbs. If this condition is exceeded, additional flood control facilities shall be provided. Where peak flows from the design storm exceed the street capacity, underground pipes or drainage channels of sufficient size to carry excess shall be installed. The following conditions apply:

- A) Adjacent lots shall be a minimum of 6 inches above top of curb and of right-of-way.
- B) Flow shall be equally divided across the road cross section, not more than 0.5 feet deep with maximum allowable velocity of 5 f.p.s.
- C) 100 year storm shall be contained between property lines without erosion.
- D) Vertical curbs shall be used.

3.11.3 Arterial and collector streets shall not have more than $\frac{1}{2}$ of through traffic lane flooded during a ten year storm.

3.11.4 On residential streets that are in relatively flat areas, a 5 year design frequency storm should be utilized. The time of concentration shall not be less than 20 minutes

3.0 STORM DRAINAGE FACILITIES STANDARDS

and the gutter velocity a maximum of 3 f.p.s. The 5 year storm shall be contained between top of curbs. Items A, B, and C of Section 3.11.2 shall apply.

3.11.5 Minimum street grades for water transport with concrete gutters shall be a minimum of 0.20% and with asphalt surfacing a minimum of 0.30%.

3.11.6 The use of inverted streets shall be permitted if approved by the Public Works Director. A four (4) foot wide concrete valley gutter shall be required.

3.11.7 Concrete cross and valley gutters shall have a minimum of 0.20% grade.

3.11.8 The maximum velocity of flow of the deepest water in a street parking lot should not exceed (10') ten feet per second.

3.11.9 Valley gutters shall not be allowed on arterial intersections.

3.11.10 Roadside ditches shall have adequate capacity for the 10 year 2 hour storm runoff peaks. Where the runoff exceeds the capacity of the ditch, a storm sewer system shall be required.

3.11.7 Concrete cross and valley gutters shall have a minimum of 0.20% grade.

3.11.8 The maximum velocity of flow of the deepest water in a street or parking lot should not exceed (10') ten feet per second.

3.11.9 Valley gutters shall not be allowed on arterial intersections.

3.11.10 Roadside ditches shall have adequate capacity for the 10 year 2 hour storm runoff peaks. Where the runoff exceeds the capacity of the ditch, a storm sewer system shall be required.

4.0 STANDARDS FOR PREPARING DRAINAGE REPORT & IMPROVEMENT PLANS

4.1 GENERAL STANDARDS

The drainage report shall include hydrologic and hydraulic calculations showing how storm and floodwater shall be controlled.

The report shall follow the outline of Section 4.2 or 4.3 with Section 4.4 being used when retention and/or detention basins are planned.

4.1.1 Whenever overland flow of stormwater occurs or when stormwater is transported in a public roadway, gutter, pipe, ditch, channel, swale or drainage way, Section 4.2 shall be used with appropriate design criteria.

When retention facilities are proposed, on-site storage of sufficient volume to hold the precipitation from the design storm shall be required. The provisions of Section 4.4 shall be required.

In the case where run-off can be directed into a storm sewer or drainage channel that has adequate capacity to an acceptable disposal facility, the peak stormwater discharge from the site at post-development shall be calculated and compared to the stormwater discharge from the site prior to development. A detention facility shall be provided so that the peak discharge from pre-development is not exceeded. Excess quantities of runoff shall be held in the detention basin and discharged at a later date.

If a retention or detention basin is proposed, then the guidelines in Section 4.4 shall be followed in the report.

When all storm drainage water is to be retained on-site and no off-site drainage water enters the site, the report shall state:

- A) There is no off-site drainage entering the site and;
- B) All stormwater generated from the site shall be retained on the site.

In this case, calculations for off-site drainage and on-site drainage at predevelopment status may be omitted.

4.1.2 whenever stormwater is deposited and retained in the same lot, plot or parcel and not transported either on a public roadway, gutter, pipe, channel or drainage way, Section 4.3 shall be utilized to prepare the drainage report. The report shall show the total run-off calculation.

Retention facilities shall be designed to provide storage of sufficient volume to hold the total precipitation from the design storm falling on the lot, plot or parcel of land, in accordance with Section 4.4.

4.1.3 The drainage report shall be accompanied with a grading plan and improvement plans, showing proposed improvements for handling the storm and floodwater as outlined in Section 4.5.

4.1.4 The design criteria shall be used in preparation of the drainage report and improvement plans are included in Section 3.0.

4.2 STANDARDS FOR DRAINAGE REPORTS - TYPE I

Shall be used for overland flow or when storm water is transported.

4.2.1 Describe location by township, range, section and $\frac{1}{2}$ section. Identify local streets within and adjacent to the project and name surrounding developments. Include a vicinity map. Give a general area description, and a project description including total area. Indicate type of terrain and general drainage pattern. Determine and state the floodplain zone of the project.

4.2.2 If there is no off-site drainage water entering the site then a statement shall be made to this effect in the report. The information and calculations in Section 4.2.3 shall not be required.

4.2.3 If there is off-site storm drainage water entering the site, the following information and calculations shall be provided.

A) Identify which outline method herein is used for computations and identify the design frequency.

B) Describe the off-site contributing drainage area of the project at pre development status. Prepare a scale location map on which the off site contributing drainage area is delineated. Indicate dimensions of the drainage area.

C) Provide a topographic map with maximum intervals as follows:

Slope	Interval
0-2%	2'
3-9%	51'
10% and greater	10'

D) Locate and show on the map all natural drainage ways and patterns.

E) Show how the values were determined for all variables and factors used in the various calculations.

F) Indicate how any assumptions were determined.

G) Show cross-sections of washes and drainage ways including hydraulic computations to show velocity, quantity and water surface elevations at the narrowest sections, at the outflow of the project and at other critical points.

H) Indicate the path chosen for computation of time of concentration.

1) Tabulate pertinent data and state conclusions.

4.2.4 If all storm drainage water is to be retained on the site for the post development condition, then a statement to this effect shall be included in the report.

4.2.5 The following information shall be provided concerning on-site drainage for the proposed development:

A) Describe the on-site contributing drainage area of the project at pre and post development;

B) Provide the topographic information as required in Section 4.2.3.

C) Provide hydraulic calculations and cross-sections of gutters, streets, drainage ways and other water transport facilities.

D) Indicate how any assumptions were determined

E) Indicate the path chosen for computation of time of calculations.

F) Show catch basin, inlet and underground pipe calculations.

G) Explain the effects of drainage upon streets including proposed highwater elevations related to top of curb and

H) Explain the effects of drainage upon proposed building finished floor elevations.

I) Tabulate pertinent data and state conclusions.

J) Tabulate the velocity and flow rate in drainage ways from the post development condition, and the difference development condition.

4.3 STANDARDS FOR DRAINAGE REPORT - TYPE 2

To be used for individual parcel, lots, spaces or block retention.

4.3.1 Describe location either by township, range, section and $1/2$ section or, if subdivided, by lot and subdivision name. Identify local streets in the area and adjacent to the project and name surrounding developments. Include a vicinity map. Give a general area description and a project description including the total area of the parcel. Indicate the type of terrain, determine and state the floodplain zone and the soil groups existing on the project.

4.3.2 Describe the proposed run-off area including dimensions and determine total run-off of each drainage area. Describe the direction of drainage for all drainage area and how the site is to be graded.

4.3.3 Determine the 100 year high-water elevation for the drainage area. The high-water elevation shall be determined at the lowest of either the centerline of the adjacent road, the elevation of the adjacent property or the elevation of new permanent retention facilities.

4.3.4 Calculate the retention volumes and required basin depths.

4.3.5 State that there is no off-site stormwater entering the site and all stormwater generated from the site shall be retained on the site.

4.3.6 If water is transported in anyway, provide supporting hydraulic calculations.

4.3.7 Indicate how any assumptions were determined.

4.3.8 Show how values were determined for all variables and factors.

4.3.9 Tabulate pertinent data and state conclusions.

4.4 STANDARDS FOR SUPPLEMENTAL DRAINAGE REPORT

Shall be used when detention and/or retention basins are included in the design.

4.4.1 Describe the proposed retention and/or detention concept including a description of the location with dimensions.

4.4.2 Determine the rate of inflow into the basin and the maximum permitted release rate from the facility.

4.4.3 Determine the storage volume required. Show the proposed capacity of the basin and basin depth along with free board or additional basin capacity with elevations.

4.4.4 Describe the method of controlled bleeding or pumping the basin, including discharge rates.

4.4.5 Show how the values were determined for all variables and factors used in calculations. Indicate how any assumptions were determined.

4.4.6 Tabulate pertinent data and state conclusions.

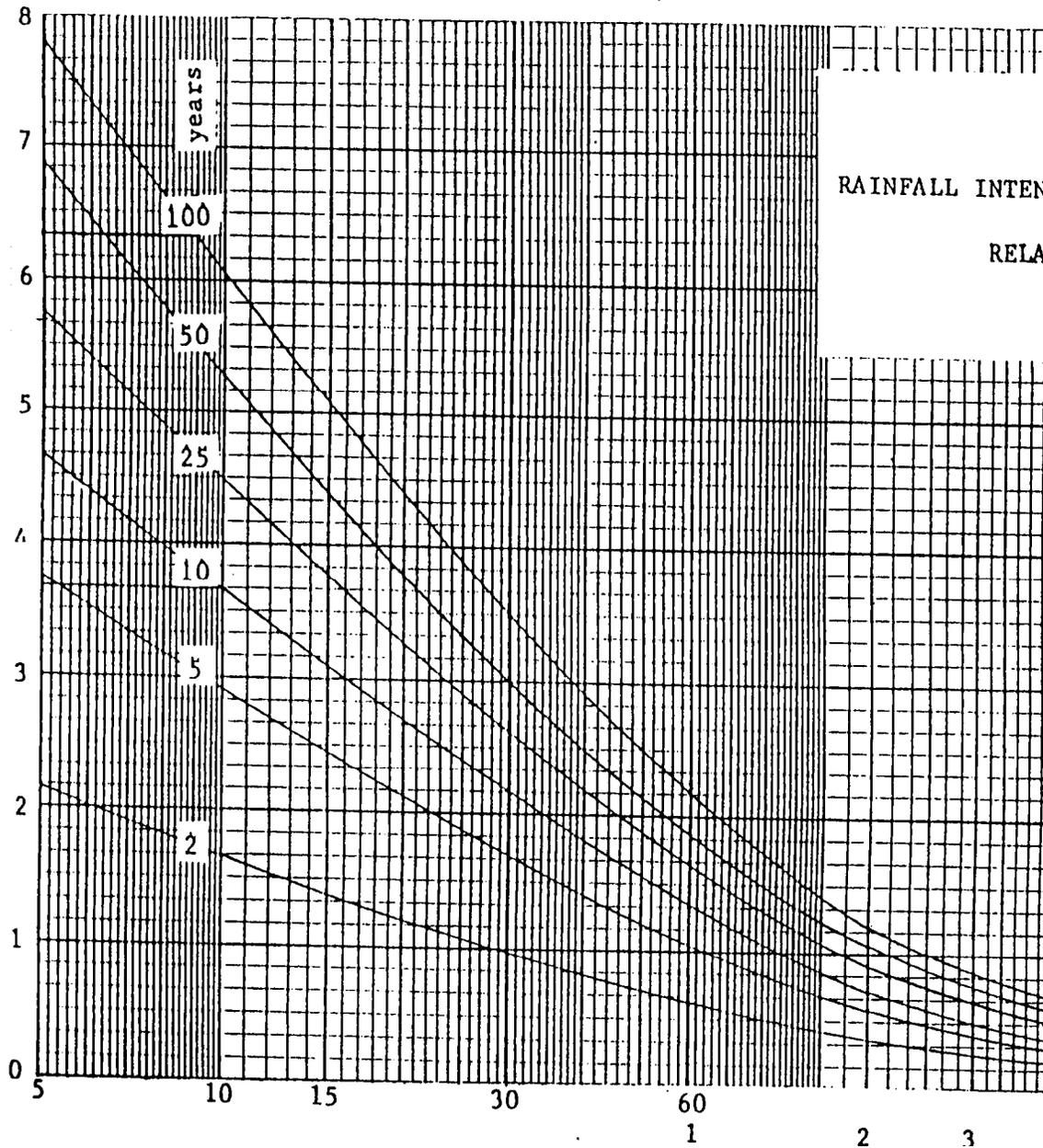
4.5 IMPROVEMENT PLAN STANDARDS

4.5.1 Grading Plan

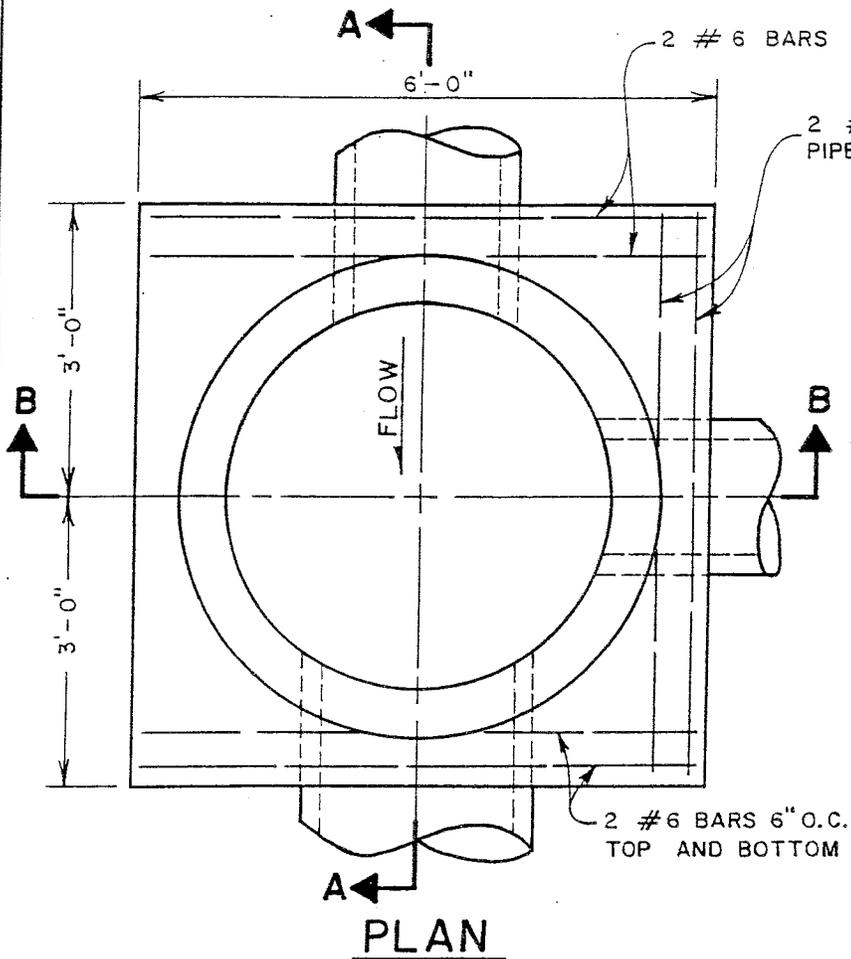
Plans shall conform to Public Works Standard No. 1 -0 10 and No. 1-030. A grading plan and necessary details on how site drainage is to be handled shall be provided with all drainage reports. This plan shall show existing site conditions with grades and elevations of all surfaces on the site and adjacent to the site. Grades and elevations shall be provided for all proposed improvements including building, finished floors, asphalt, grass, desert, surfacing, top of curbs, concrete, etc. Dimensions shall be given. All items of construction that will affect drainage shall be shown with grades. Routing of water to the retention area shall be shown. The new 100 year water surface elevations shall be shown. The grading plan shall be complete and show all details for construction and provide for any necessary erosion control systems.

4.5.2 Improvement Plans

In addition to the site grading plan and details, as described in Section 4.5. 1, plans for all improvements in and in proposed public and County right-of-ways shall be prepared by a registered Civil Engineer with each drainage report. The plans shall show an erosion control system including the improvements necessary to handle the storm and floodwater. The plans shall utilize County Public Works Standards and shall conform to all applicable standards and regulations. All details shall be shown. Identify parcels by lot number or tie to the closest record monument.



CONCRETE MANHOLE BASE No. 1 FOR 15" TO 48" DIA. PIPE



2 # 6 BARS 6" O.C. TOP AND BOTTOM

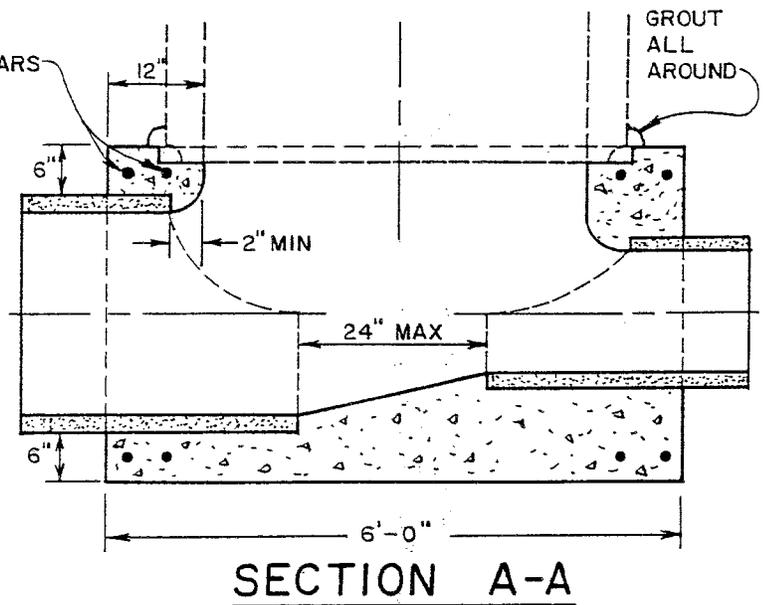
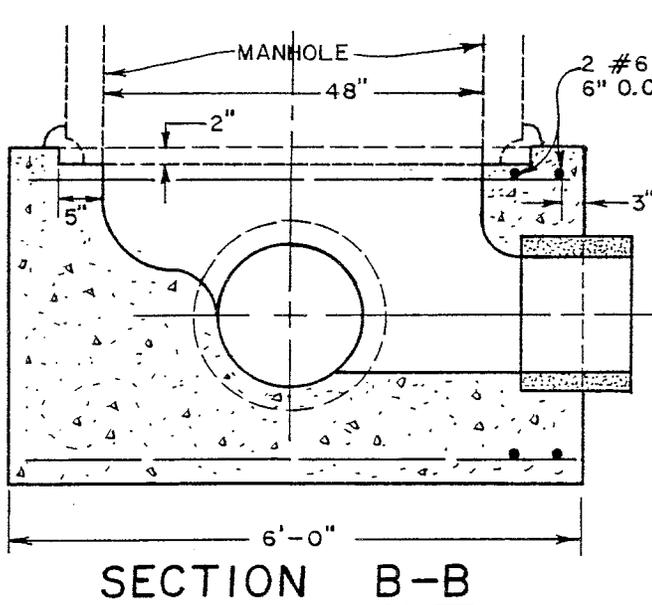
2 #6 BARS TOP AND BOTTOM WHEN PIPE ENTERS SIDE OF M.H.

NOTES:

ALL CONCRETE CLASS 'A'

MATCH SPRING LINE OF PIPES ENTERING M.H. UNLESS OTHERWISE NOTED.

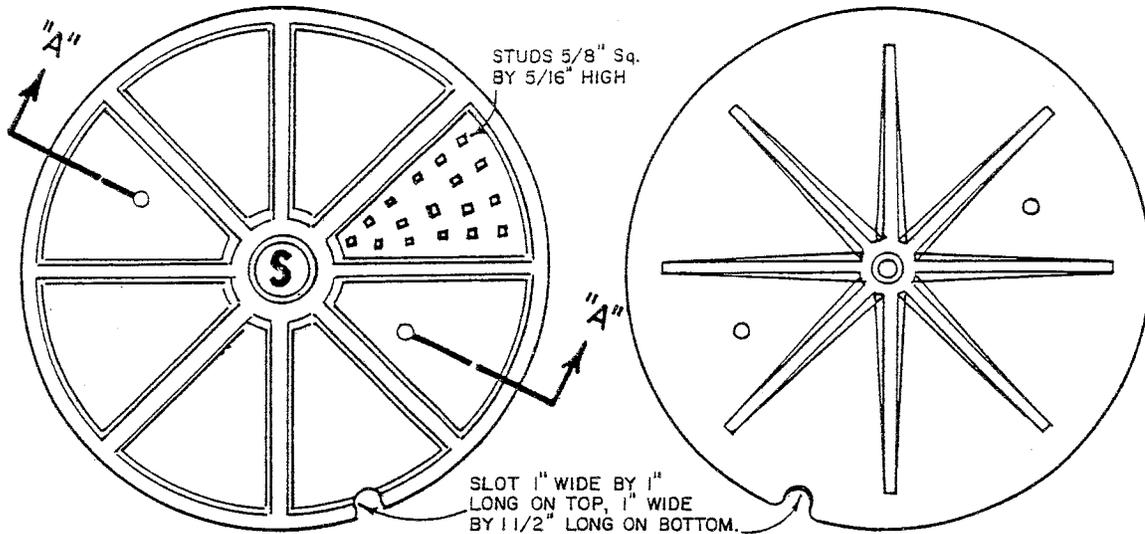
CUT PIPES TO ALLOW SETTING OF 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONCRETE OVER ENDS OF ALL CUT PIPE. INVERT AND BASE OF M.H. TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION FINISH WITH STEEL TROWEL. CENTER M.H. ON PIPE JOINT WHERE PIPE CHANGES SIZE, LEAVE GAP. 12" MIN., 24" MAX.



NOTES: (cont.)

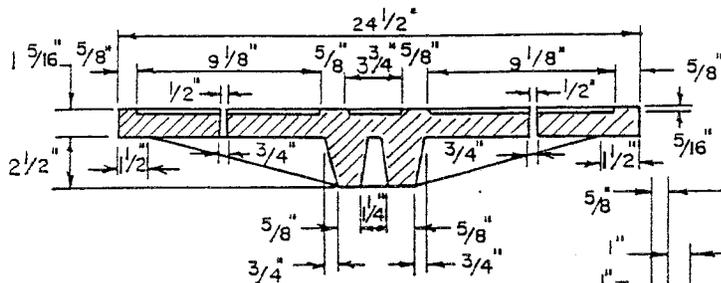
WHEN THE MANHOLE HAS A DROP INLET CONNECTION ON THE MAIN LINE, THE TOP OF THE CONCRETE BASE SHALL BE 6" ABOVE THE TOP OF THE DROP INLET PIPE

**LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No. 5-035
CONC. MANHOLE BASE No. 1**

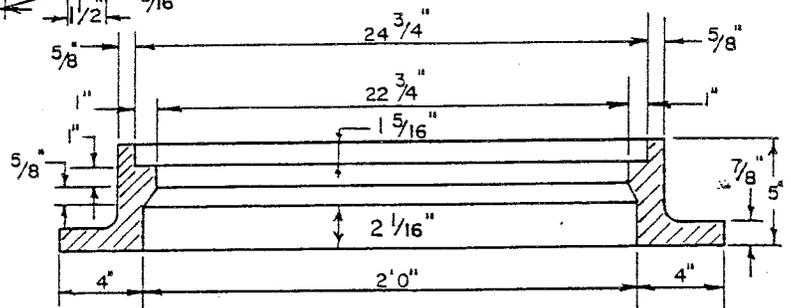


TOP VIEW

BOTTOM VIEW



SECTION "A-A"

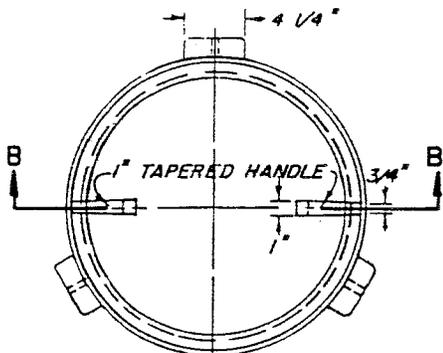


SECTION OF FRAME

NOTE:

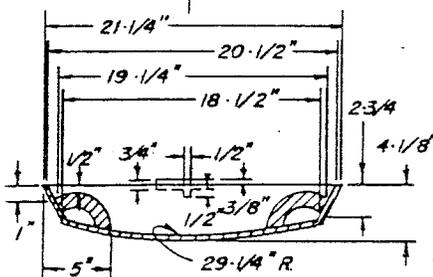
The top of the cover and frame shall be flush, and there shall be 1/8" horizontal clearance all around between frame and cover. All covers to have the letter "S". Letters to be raised 5/16" and not less than 2 1/2" high. All the surface not occupied by ribs or letter to be studded with studs 5/16" high and 5/8" square. Cover shall have min. (2) 3/4" vent holes.

**DUST PAN
MINIMUM WEIGHT 50 POUNDS**



NOTE: DUST PAN SHOWN BUT WILL NOT BE REQUIRED UNLESS CALLED FOR IN PLANS.

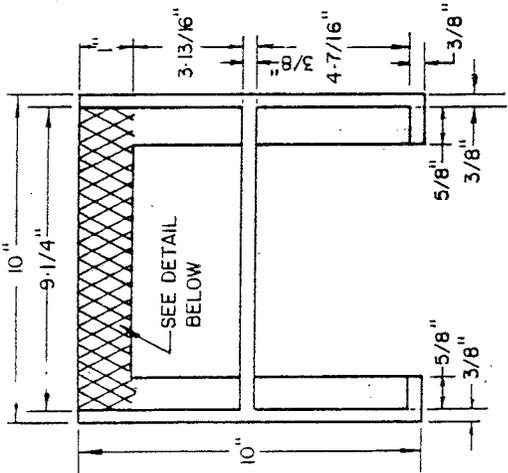
STANDARD MANHOLE COVERS SUCH AS NEENAH R-1642 OR EQUAL, CAN BE USED WITH APPROVAL.



SECTION B-B

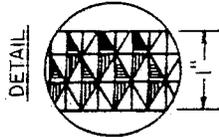
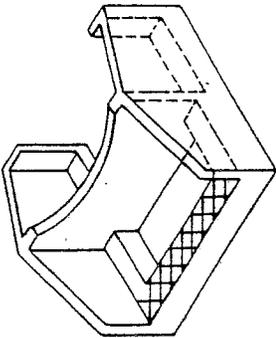
**LAPAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-040
STANDARD MANHOLE COVER**

CAST IRON MANHOLE STEP

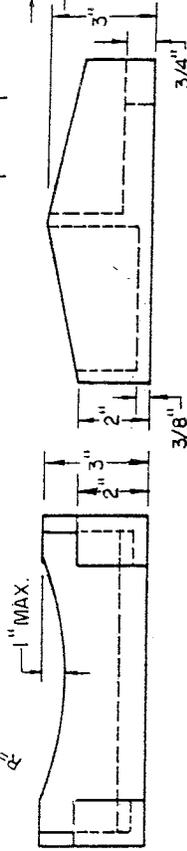


SEE DETAIL BELOW

APPROXIMATE WEIGHT 10 LBS.

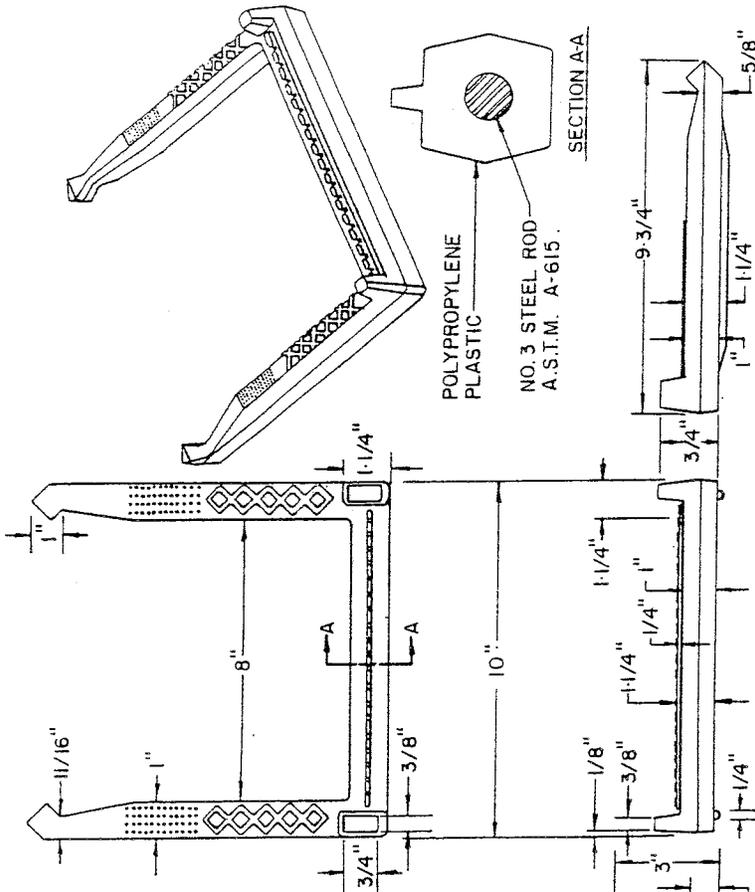


R=10"



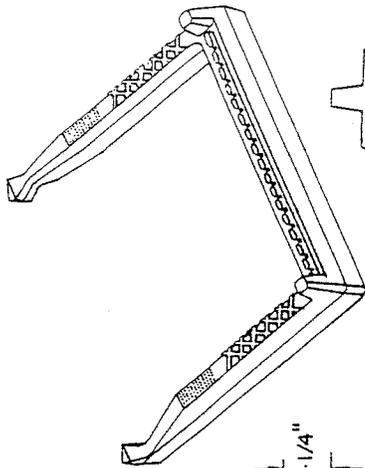
NOTES:
1. ALL DIMENSIONS ARE MINIMUM EXCEPT WHERE NOTED.

POLYPROPYLENE MANHOLE STEP



POLYPROPYLENE PLASTIC
NO. 3 STEEL ROD
A.S.T.M. A-615

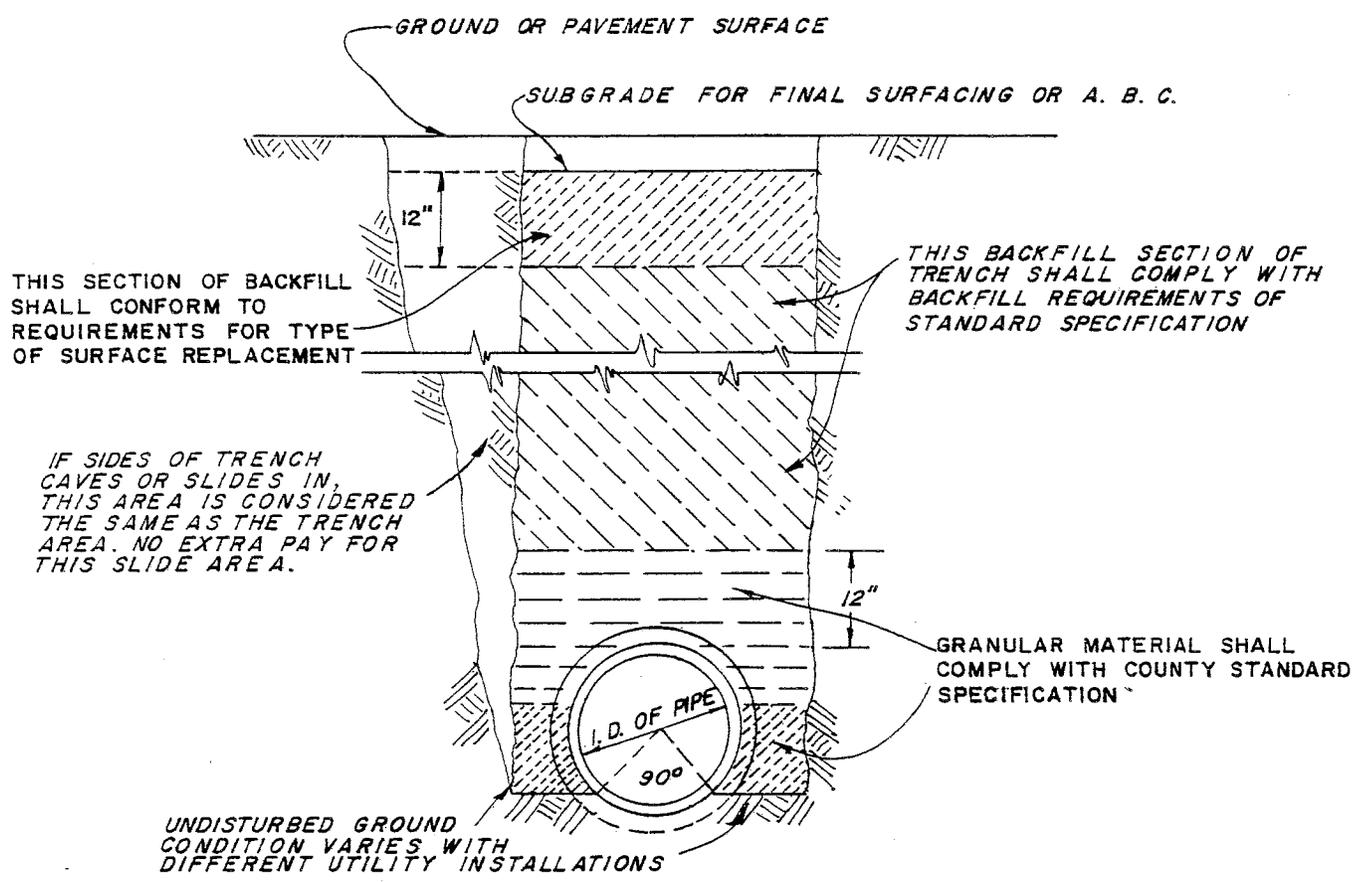
SECTION A-A



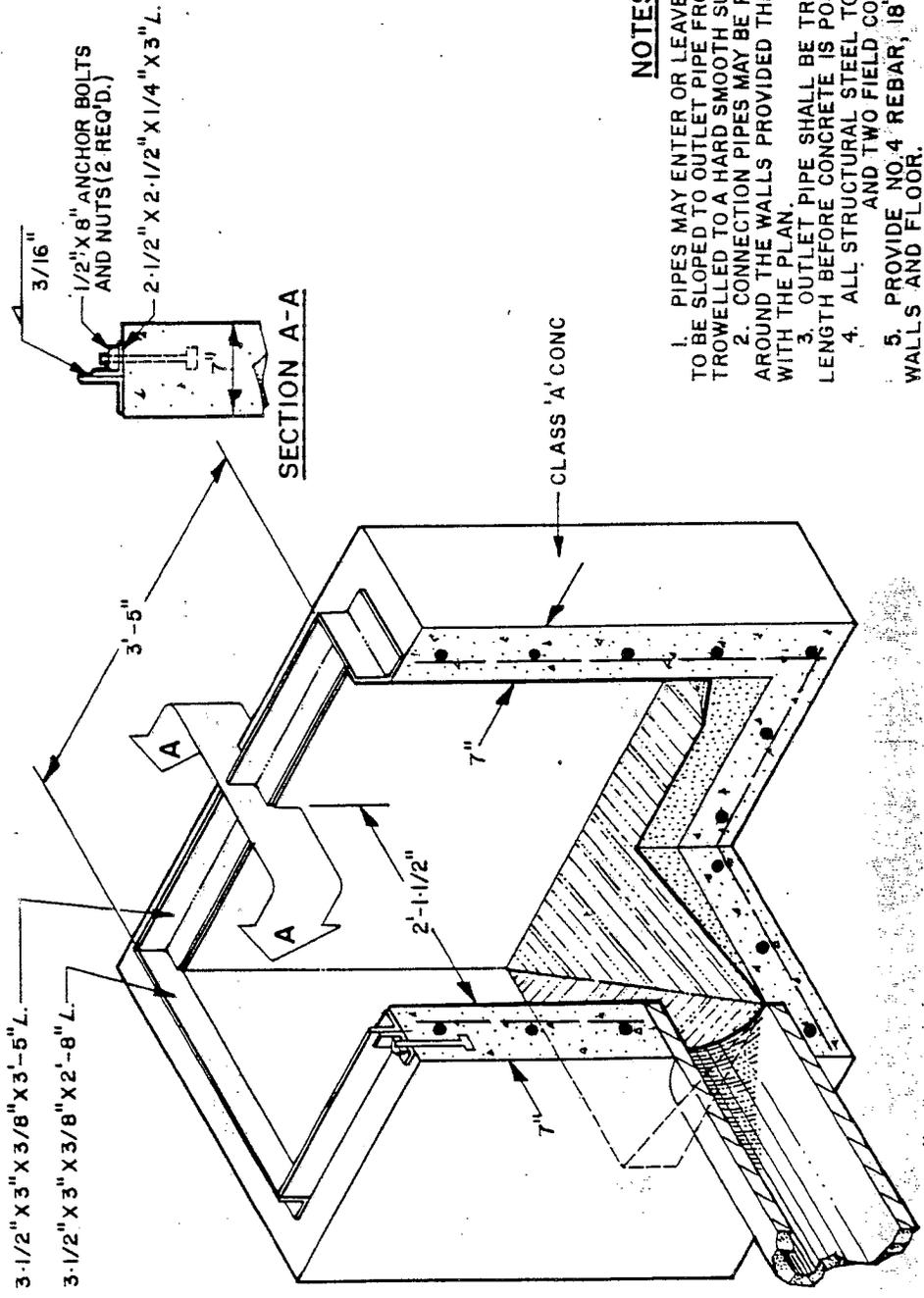
NOTES:

1. STEPS SHALL BE PLACED INTO WET CONCRETE WALL DURING MANUFACTURE OR MORTARED INTO HOLES AFTER CONCRETE HAS SET.
2. POLYPROPYLENE MUST MEET REQUIREMENTS OF A.S.T.M. 2146, TYPE II, GRADE 16906.

LAPAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-045
MANHOLE STEPS



LA PAZ COUNTY
 CONSTRUCTION STANDARDS
 STANDARD Nº ... 5-080
 TYPICAL DITCH BACKFILL



GRATE & FRAME SHALL BE STD. NO. 5-300, PLAN II.

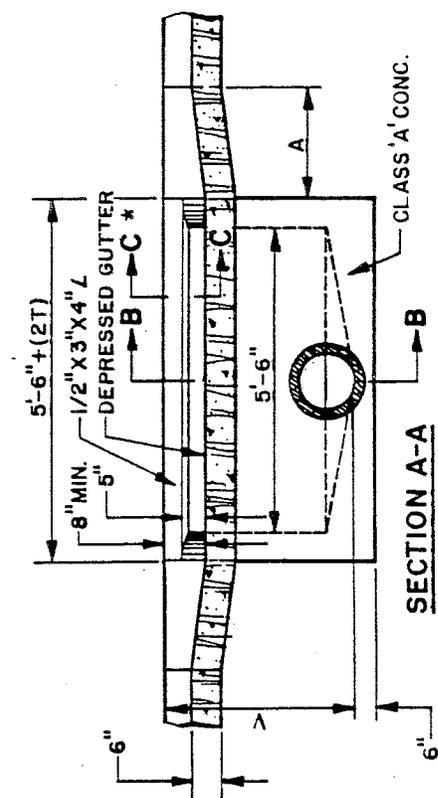
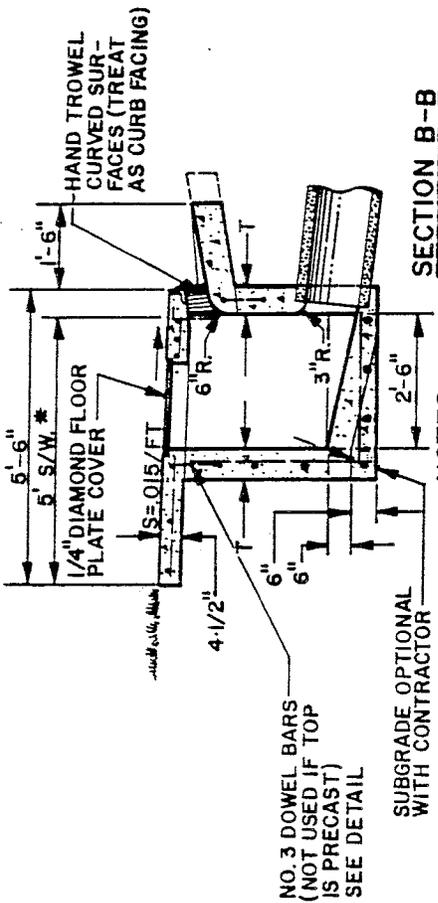
NOTES

1. PIPES MAY ENTER OR LEAVE ANY WALL. BOTTOM OF BOX TO BE SLOPED TO OUTLET PIPE FROM ALL DIRECTIONS AND TROWELLED TO A HARD SMOOTH SURFACE.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED
4. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT AND TWO FIELD COATS
5. PROVIDE NO. 4 REBAR, 18" C TO C - BOTH WAYS IN WALLS AND FLOOR.

LA PAZ COUNTY

CONSTRUCTION STANDARDS

STANDARD No 5-225
 CATCH BASIN - TYPE "A"
 (FOR USE WITHOUT CURB)



SECTION A-A

SECTION B-B

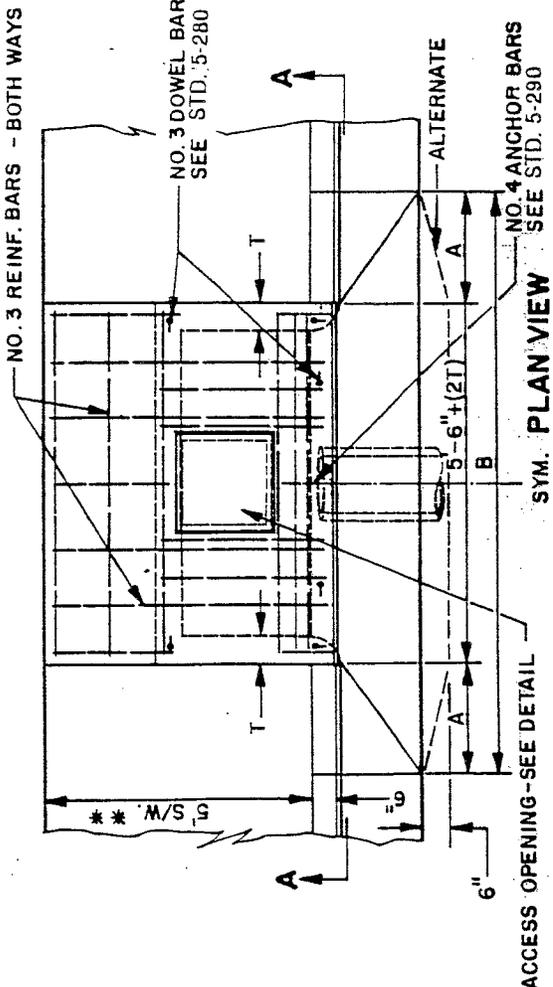
- NOTES**
1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
 2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
 3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
 4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
 5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT AND TWO FIELD COATS.
 6. PROVIDE NO. 4 REBAR, 18" C TO C- BOTH WAYS IN WALLS AND FLOOR.

DIMENSIONS

- T=6" IF V=4' OR LESS.
- T=8" IF V IS BETWEEN 4' AND 8'.
- T=10" IF V IS 8 OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
- V=3'-6" UNLESS OTHERWISE SPECIFIED.

CURB	A	B
4"	3'-3"	13'
6"	1'-9"	10'
7"	1'	8'-9"

*SEE STD. 5-280 FOR DETAILS COMMON TO ALL CURB OPENING BASINS.
 ** 4' IN LOCATIONS WHERE 4' S/W. IS REQUIRED.



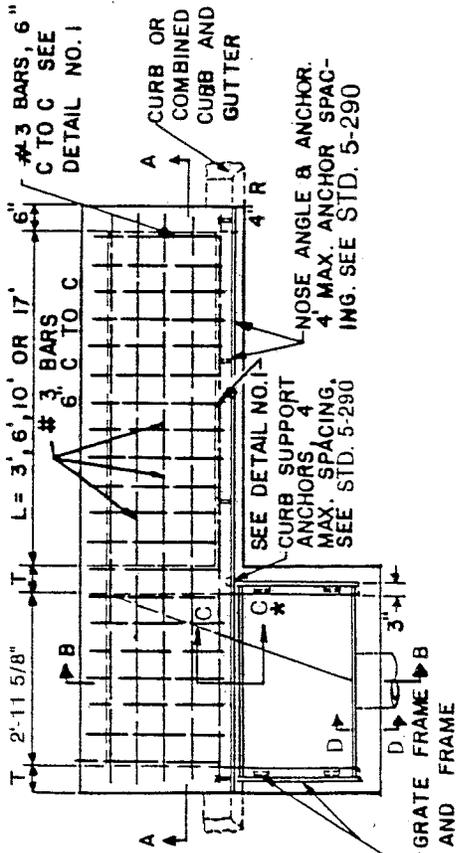
SYM. PLAN VIEW

LA PAZ COUNTY

CONSTRUCTION STANDARDS

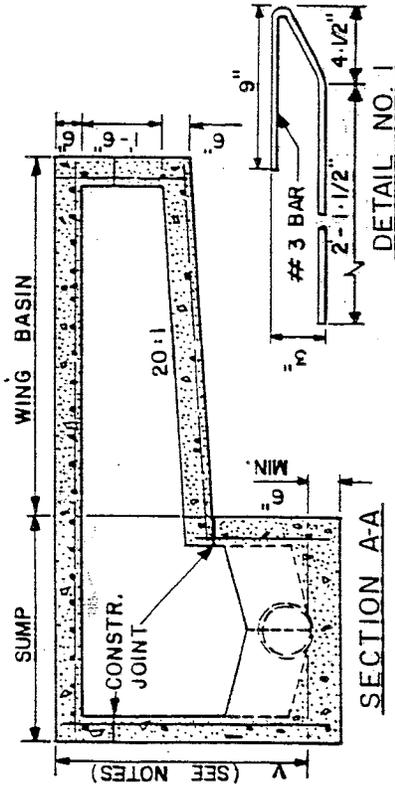
STANDARD No 5-230

CATCH BASIN TYPE "B"
 5'-6' CURB OPENING WITH ACCESS

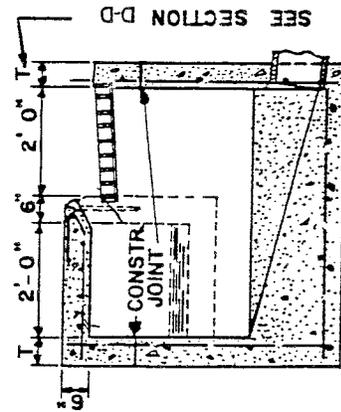


NOTE: REINFORCING BARS SHOWN ARE ANCHORS AS PER STD. NO. 5-300 PLAN II FOR OTHER REINFORCING.

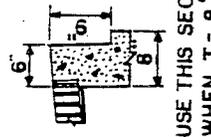
PLAN



SECTION A-A



SECTION B-B



SECTION D-D

NOTES:

1. SINGLE C. B. (ILLUSTRATED), SUMP WITH WING BASIN UPSTREAM.
2. DOUBLE C. B. SUMP WITH SYMMETRICAL WING BASINS EACH SIDE. PIPES CAN BE PLACED IN ANY WALL EXCEPT WALL ADJACENT TO A WING BASIN.
3. SUMP FLOOR SHALL HAVE A WOOD TROWEL FINISH AND A MIN. SLOPE OF 4:1 IN ALL DIRECTIONS TOWARD OUTLET PIPE.
4. ALL REINFORCING BARS SHALL BE #4, 18" C TO C BOTH WAYS AND 1-1/2" CLEAR TO INSIDE OF WALLS AND OUTSIDE OF WING BASIN FLOOR - IN WALLS AND FLOOR EXCEPT AS SHOWN.
5. ALL CONCRETE SHALL BE CLASS A

CONSTR. JOINTS SHALL BE PLACED TO MEET FIELD CONDITIONS.

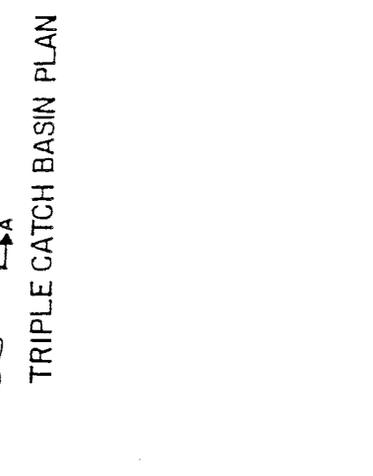
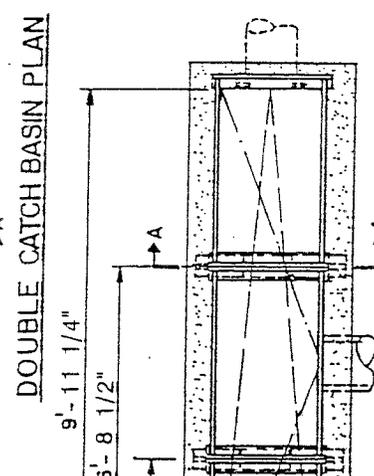
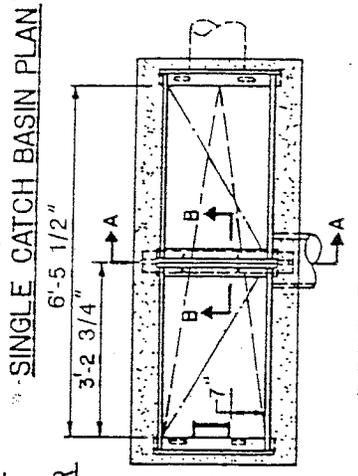
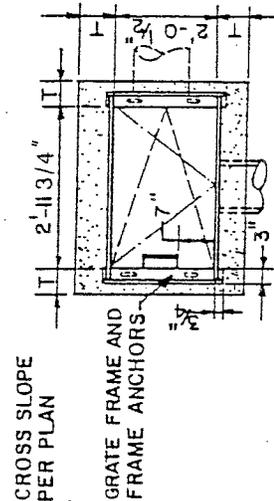
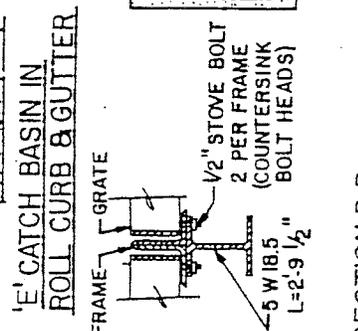
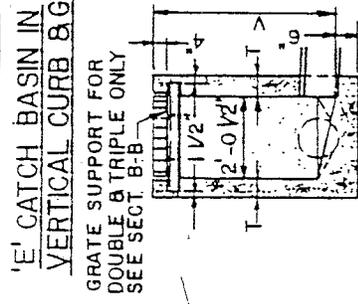
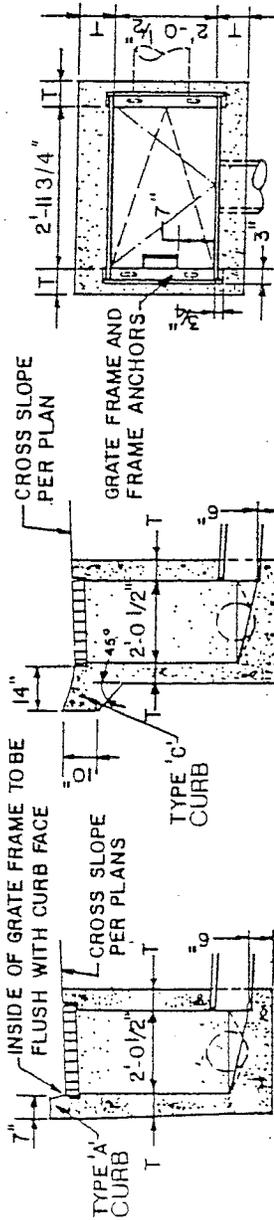
T = 6" WHEN V IS LESS THAN 8'; 6" WHEN GREATER THAN 8" SEE SECTION D-D

- V = 3'-3" MIN. WHEN L = 3'
- V = 3'-5" MIN. WHEN L = 6'
- V = 3'-7" MIN. WHEN L = 10'
- V = 4'-0" MIN. WHEN L = 17'

V DOUBLES FOR SYMMETRICAL WINGS.

*SEE STD. 5-280 FOR DETAILS COMMON TO ALL CURB OPENING BASINS

LA PAZ COUNTY
CONSTRUCTION STANDARDS
 STANDARD No 5-250
 CATCH BASIN TYPE D



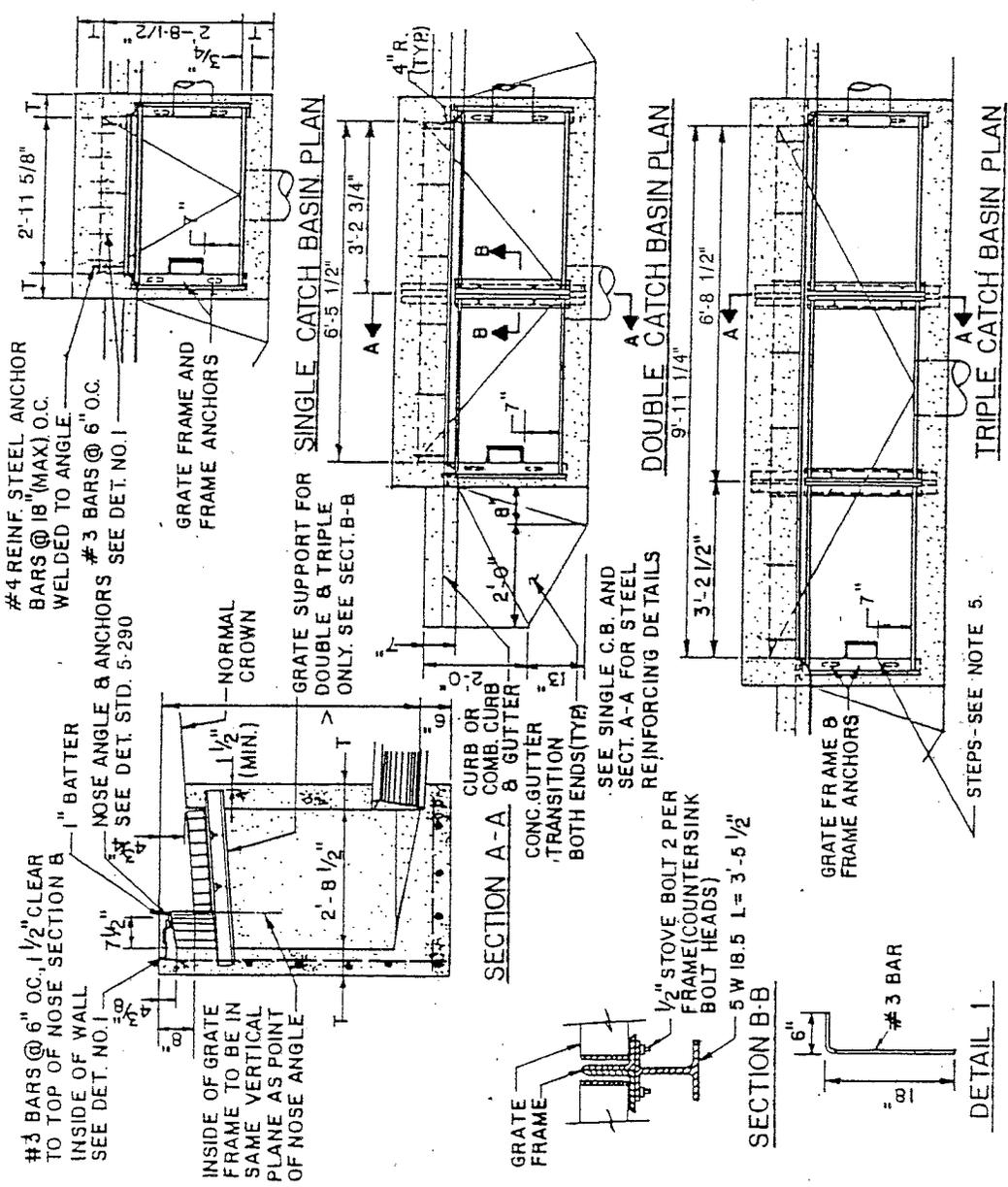
NOTES

1. ALL CONCRETE SHALL BE CLASS 'A'
 2. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLAN.
 3. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
 4. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
 5. PLANS SHOULD SPECIFY GRATE ELEVATION AND INVERT ELEVATION.
 6. THE 'E' TYPE 'E' CATCH BASIN MAY BE PREFABRICATED. PROVIDING A SHOP DRAWING IS APPROVED BY THE ENGINEER PRIOR TO FABRICATION.
 7. THE FRAME SHALL BE DET. 5-300; PLAN II AND THE GRATE SHALL BE DET. 5-300 PLAN II.
 8. STEPS STD. No. 5-040 FOR V=3' OR LESS (INCL), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
 9. PROVIDE NO. 4 REBAR, 18" C TO C BOTH WAYS IN WALLS AND FLOOR.
- CATCH BASIN WALL THICKNESS
 T=6" IF V IS 4' OR LESS
 T=8" IF V IS 4' TO 8'
 (IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED)
 V=3'-0" UNLESS OTHERWISE NOTED

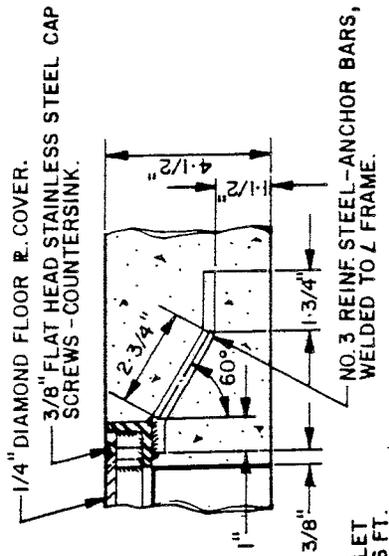
LA PAZ COUNTY
CONSTRUCTION STANDARDS
 STANDARD No 5-260
 SINGLE-TRIPLE GRATE CATCH BASIN
 TYPE 'E'

NOTES

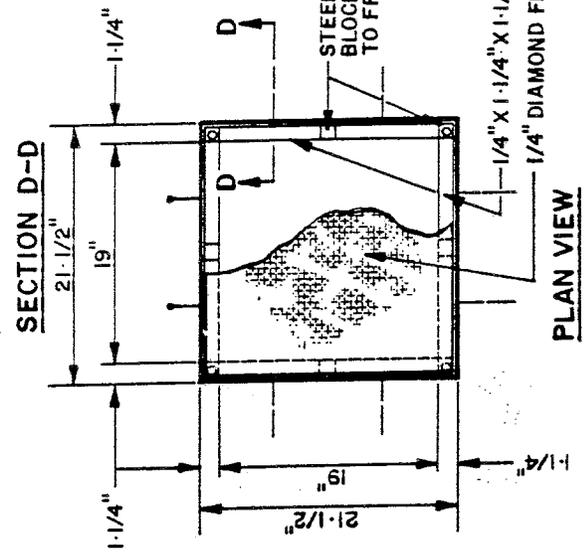
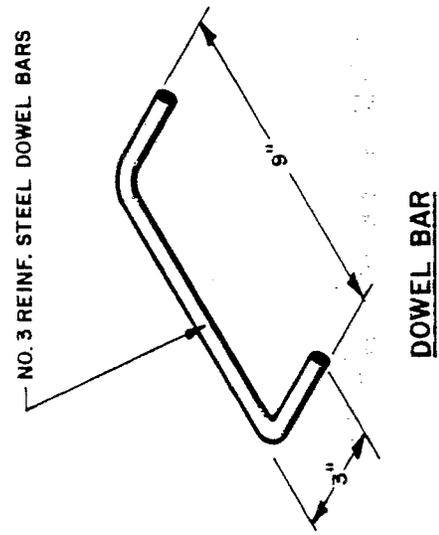
1. ALL CONCRETE SHALL BE CLASS 'A'.
2. CONNECTOR PIPES MAY BE PLACED IN ANY WALL AS PER PLANS.
3. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
4. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
5. STEPS (I SEE STD. 5-045 POLYPROPYLENE) - V=3' (INCL.) PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
6. THE FRAME SHALL BE DET. 5-309 PLAN II AND THE GRATE SHALL BE DET. PLAN II.
7. PROVIDE NO. 4 REBAR, 18" C TO C - BOTH WAYS IN WALLS AND FLOOR.



LA PAZ COUNTY
CONSTRUCTION STANDARDS
 STANDARD No 15-270
 CATCH BASIN TYPE 'F'
 CURB OPENING WITH SINGLE-TRIPLE GRATE



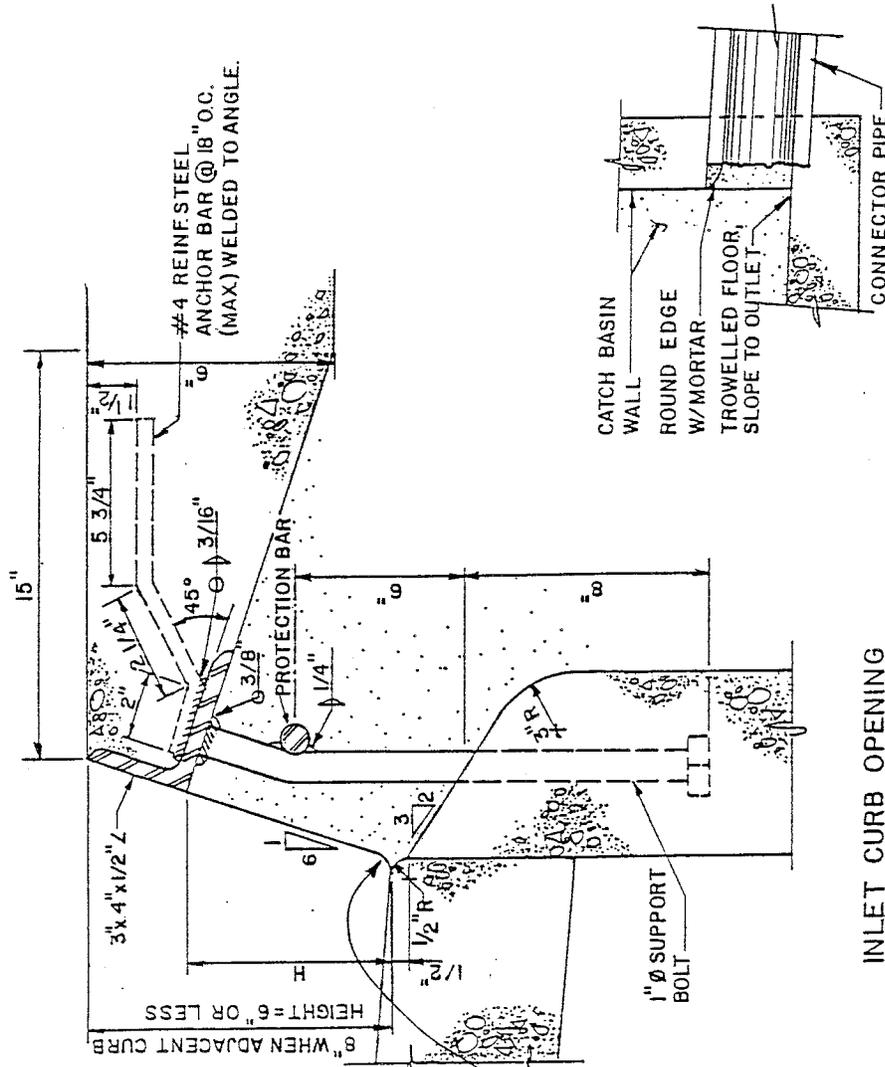
SEE STD. 5-290 FOR ADDITIONAL
CURB OPENING DETAILS



LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-280
COMMON DETAILS & SECTIONS
FOR CURB OPENING CATCH BASINS

NOTES

1. CURB OPENING HEIGHT 'H' SHALL BE 5" (MINIMUM) UNLESS OTHERWISE SPECIFIED.
2. WHEN CURB OPENING HEIGHT 'H' EXCEEDS 6", INSTALL 1" Ø STEEL PROTECTION BARS. THE PROTECTION BARS SHALL EXTEND THE FULL LENGTH OF THE CURB OPENINGS AND SHALL BE EMBEDDED 3" (MIN.) AT EACH END.
3. INSTALL ADDITIONAL BARS AT 3 1/2" CLEAR SPACING ABOVE FIRST BAR WHEN OPENING EXCEEDS 13".
4. WHEN CURB OPENING LENGTH EXCEEDS 6', INSTALL 1" Ø STEEL SUPPORT BOLTS, SPACED AT NO MORE THAN 4' O.C.
5. ALL EXPOSED METAL HARDWARE SHALL BE GIVEN ONE SHOP COAT OF NO. 1 PAINT AND 2 FIELD COATS OF NO. 10 PAINT AS PER SECTION 790, OF MAG SPECS.
6. ALL METAL UNITS SHALL BE FABRICATED FROM STRUCTURAL STEEL EXCEPT AS NOTED. STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH A.S.T.M. A-36.
7. WELDING SHALL BE IN ACCORDANCE WITH M.A.G. WELDING SPECIFICATIONS.
8. CONNECTOR PIPE SHALL BE TRIMMED TO THE FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.

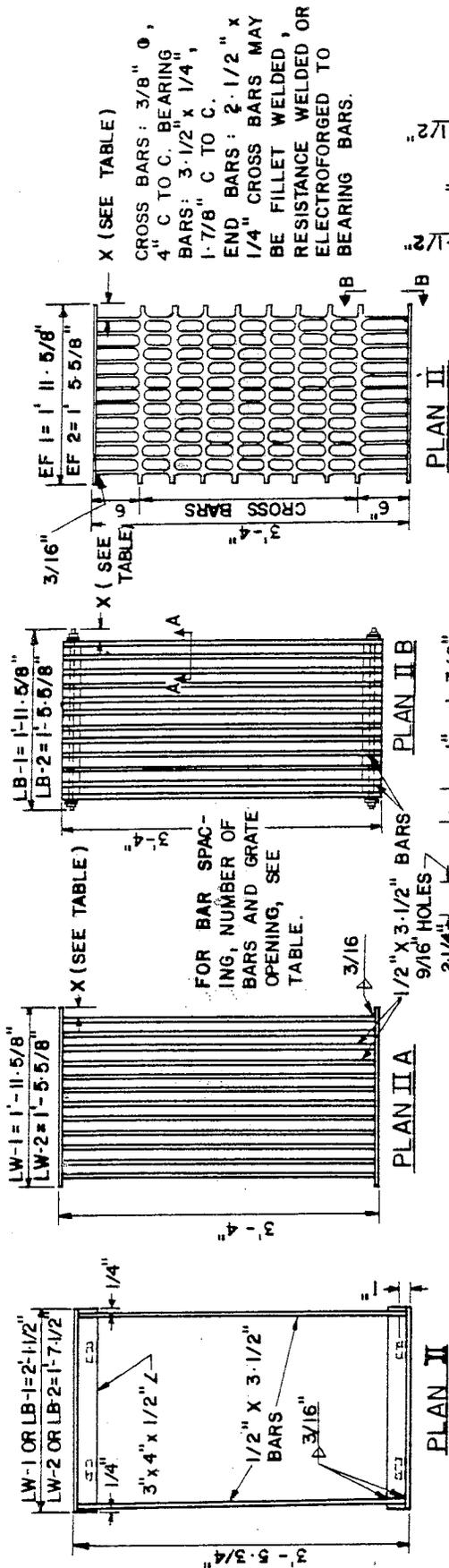


**INLET CURB OPENING
SECTION C-C**

GUTTER DEPRESSION AS SPECIFIED
ON PLANS 3" MAX. 1" MIN.

PIPE ENTRY DETAIL

**LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-290
INLET CURB OPENING
& PIPE ENTRY DETAIL**



PLAN I
 LW-1 OR LB-1 = 2'-1 1/2"
 LW-2 OR LB-2 = 1'-7 1/2"
 3" x 4" x 1/2" L
 1/2" x 3 1/2" BARS
 3/16"

PLAN II
 LW-1 = 1'-11 5/8"
 LW-2 = 1'-5 5/8"
 LB-1 = 1'-11 5/8"
 LB-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

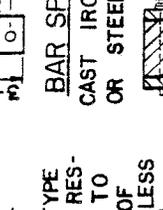
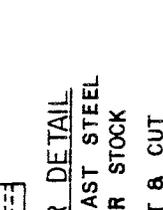
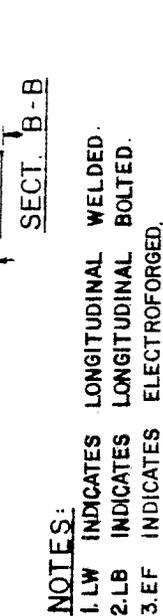
SECTION A-A
 3/8" ANCHORS
 DELETE ON
 END WHEN
 USED WITH
 I BEAM
 SUPPORT

SECTION B-B
 6"
 3/16"
 1/2"

SECTION
 GRATE TYPE
 LW & EF RES-
 TRICTED TO
 SLOPES OF
 3% OR LESS

SECTION A-A
 GRATES TYPES LB
 USE ON LONGITUDINAL
 GRADES IN EXCESS OF 3%
 OR AS AN ALTERNATE TO
 TYPES LW OR EF ON
 GRADES OF 3% OR LESS.

SECTION A-A
 SPACER
 NUT & CUT
 WASHER
 1/2" ROD THREADED ENDS
 SPOT WELD OR PEEN



GRATE TYPE	CLEAR BAR NO. SPACING	NO. BARS	X	GRATE OPENING	SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97	
"	1 3/8"	13	5/16"	4.34	
"	2"	9	9/16"	4.84	
EF-1	1 5/8"	13	7/16"	4.66	
LW OR LB-2.0	1"	12	5/16"	2.98	
"	1 3/8"	9	1/16"	3.35	
"	2"	7	1/16"	3.60	
EF-2	1 5/16"	10	1/4"	3.48	

FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

PLAN IIA
 LW-1 = 1'-11 5/8"
 LW-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

PLAN IIB
 LB-1 = 1'-11 5/8"
 LB-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

SECTION
 GRATE TYPE LW & EF RESTRICTED TO SLOPES OF 3% OR LESS

GRATE TYPE	CLEAR BAR NO. SPACING	NO. BARS	X	GRATE OPENING	SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97	
"	1 3/8"	13	5/16"	4.34	
"	2"	9	9/16"	4.84	
EF-1	1 5/8"	13	7/16"	4.66	
LW OR LB-2.0	1"	12	5/16"	2.98	
"	1 3/8"	9	1/16"	3.35	
"	2"	7	1/16"	3.60	
EF-2	1 5/16"	10	1/4"	3.48	

FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

PLAN II
 LW-1 = 1'-11 5/8"
 LW-2 = 1'-5 5/8"
 LB-1 = 1'-11 5/8"
 LB-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

SECTION
 GRATE TYPE LW & EF RESTRICTED TO SLOPES OF 3% OR LESS

GRATE TYPE	CLEAR BAR NO. SPACING	NO. BARS	X	GRATE OPENING	SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97	
"	1 3/8"	13	5/16"	4.34	
"	2"	9	9/16"	4.84	
EF-1	1 5/8"	13	7/16"	4.66	
LW OR LB-2.0	1"	12	5/16"	2.98	
"	1 3/8"	9	1/16"	3.35	
"	2"	7	1/16"	3.60	
EF-2	1 5/16"	10	1/4"	3.48	

FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

PLAN IIA
 LW-1 = 1'-11 5/8"
 LW-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

PLAN IIB
 LB-1 = 1'-11 5/8"
 LB-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

SECTION
 GRATE TYPE LW & EF RESTRICTED TO SLOPES OF 3% OR LESS

GRATE TYPE	CLEAR BAR NO. SPACING	NO. BARS	X	GRATE OPENING	SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97	
"	1 3/8"	13	5/16"	4.34	
"	2"	9	9/16"	4.84	
EF-1	1 5/8"	13	7/16"	4.66	
LW OR LB-2.0	1"	12	5/16"	2.98	
"	1 3/8"	9	1/16"	3.35	
"	2"	7	1/16"	3.60	
EF-2	1 5/16"	10	1/4"	3.48	

FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

PLAN II
 LW-1 = 1'-11 5/8"
 LW-2 = 1'-5 5/8"
 LB-1 = 1'-11 5/8"
 LB-2 = 1'-5 5/8"
 1/2" x 3 1/2" BARS
 9/16" HOLES
 2 1/4"

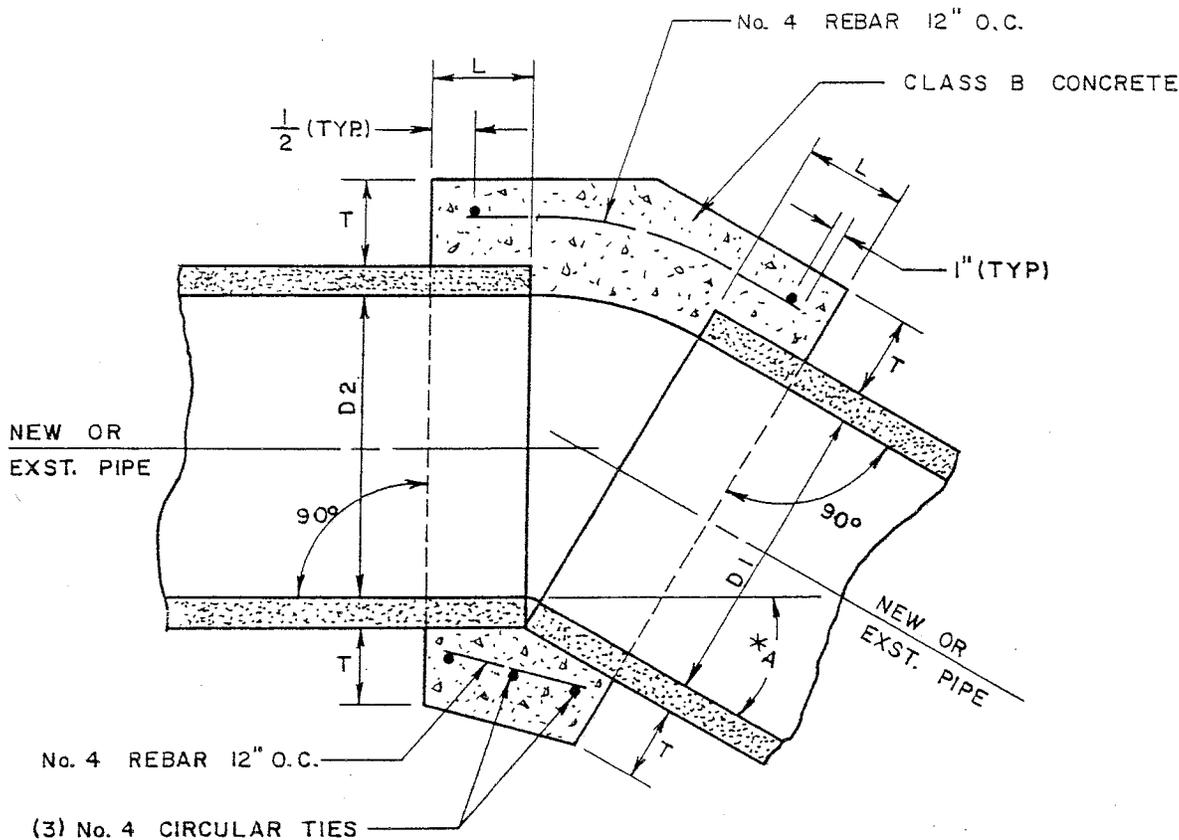
SECTION
 GRATE TYPE LW & EF RESTRICTED TO SLOPES OF 3% OR LESS

GRATE TYPE	CLEAR BAR NO. SPACING	NO. BARS	X	GRATE OPENING	SQ. FT.
LW OR LB-1.0	1"	16	5/16"	3.97	
"	1 3/8"	13	5/16"	4.34	
"	2"	9	9/16"	4.84	
EF-1	1 5/8"	13	7/16"	4.66	
LW OR LB-2.0	1"	12	5/16"	2.98	
"	1 3/8"	9	1/16"	3.35	
"	2"	7	1/16"	3.60	
EF-2	1 5/16"	10	1/4"	3.48	

FOR BAR SPACING, NUMBER OF BARS AND GRATE OPENING, SEE TABLE.

NOTES:
 1. LW INDICATES LONGITUDINAL WELDED.
 2. LB INDICATES LONGITUDINAL BOLTED.
 3. EF INDICATES ELECTROFORGED.
 4. GRATING UNITS AND FRAMES SHALL BE FABRICATED FROM STRUCTURAL STEEL "A-36" EXCEPT AS NOTED.
 5. ALL WELDING SHALL BE IN ACCORDANCE WITH STANDARD WELDING SPECIFICATIONS.
 6. THE COMPLETED ASSEMBLY SHALL BE GIVEN ONE SHOP COAT OF NO.1 PAINT.
 7. FRAMES AND GRATES SHALL FIT TO A MAXIMUM ROCK OF 0.093 AT ANY POINT.

LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-300
CATCH BASIN - GRATES & FRAME



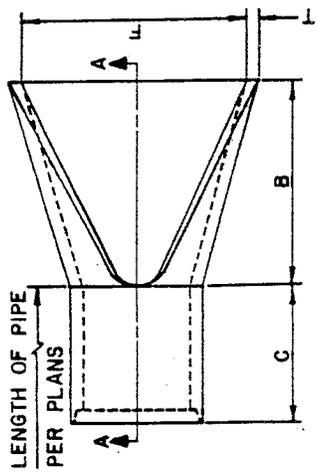
NOTES

1. A CONCRETE COLLAR IS REQUIRED WHERE PIPES OF DIFFERENT DIAMETERS OF MATERIALS ARE JOINED, OR WHERE THE CHANGES IN ALIGNMENT OR GRADE EXCEEDS THAT ALLOWED FOR ON ORDINARY JOINTS.
2. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T. SHOULD BE THOSE OF THE LARGER PIPE. D=D 1, OR D 2, WHICHEVER IS GREATER.
3. FOR PIPE SIZES NOT LISTED USE NEXT SIZE LARGER.
4. OMIT REINFORCING ON PIPE 24" OR LESS IN DIAMETER.
5. WHERE REINFORCING IS REQUIRED, THE DIAMETER OF THE CIRCULAR TIES SHALL BE.....
OUTSIDE DIAMETER OF PIPE + T.
6. FIELD CLOSURES OF PIPE OF THE SAME DIAMETER AND WITHOUT CHANGE IN GRADE OR ALIGNMENT SHALL BE MADE WITH A CONCRETE COLLAR.

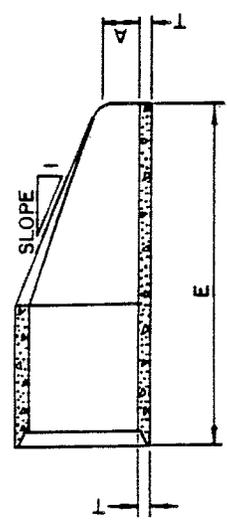
*A = ANGLE OF DEFLECTION

TABLE		
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"

**LA PAZ COUNTY
CONSTRUCTION STANDARD
STANDARD No. 5-350
CONCRETE PIPE COLLAR**

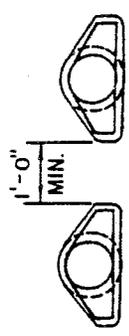


PLAN

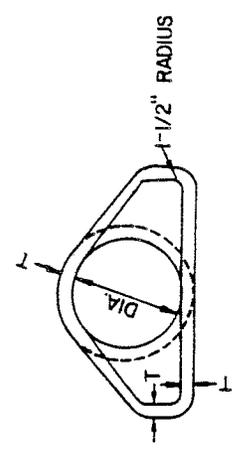


SECTION A-A

PIPE DIA.	APPROX. WEIGHT	DIMENSIONS - INCHES						APPROX. SLOPE
		T	A	B	C	E	F	
24"	1520 lbs.	3	9-1/2	43-1/2	30	73-1/2	48	3
27"	1930 lbs.	3-1/4	10-1/2	49-1/2	24	73-1/2	54	3
30"	2190 lbs.	3-1/2	12	54	19-3/4	73-3/4	60	3
36"	4100 lbs.	4	15	63	34-3/4	97-3/4	72	3
42"	5380 lbs.	4-1/2	21	63	35	98	78	3
48"	6550 lbs.	5	24	72	26	98	84	3
54"	8240 lbs.	5-1/2	27	65	33-1/4	96-1/4	90	2-1/2

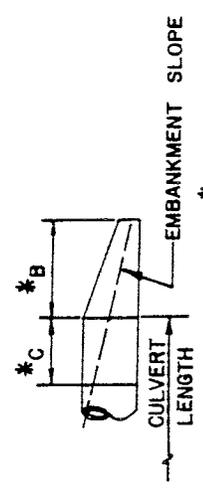


SPACING FOR MULTIPLE INSTALLATION



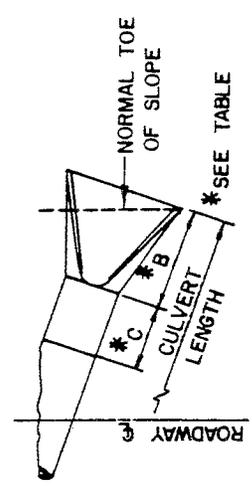
FRONT ELEVATION

- NOTES**
- DESIGN OF END SECTION SHALL CONFORM TO STANDARDS FOR REINFORCED CONC. PIPE.
 - END SECTION JOINT CONFORMATION SHALL MATCH THE PIPE JOINTS.
 - EMBANKMENT SLOPE SHALL BE WARPED TO MATCH SLOPE OF END SECTION.
 - CULVERT LENGTH IS AS SHOWN ON PLANS.



* SEE TABLE

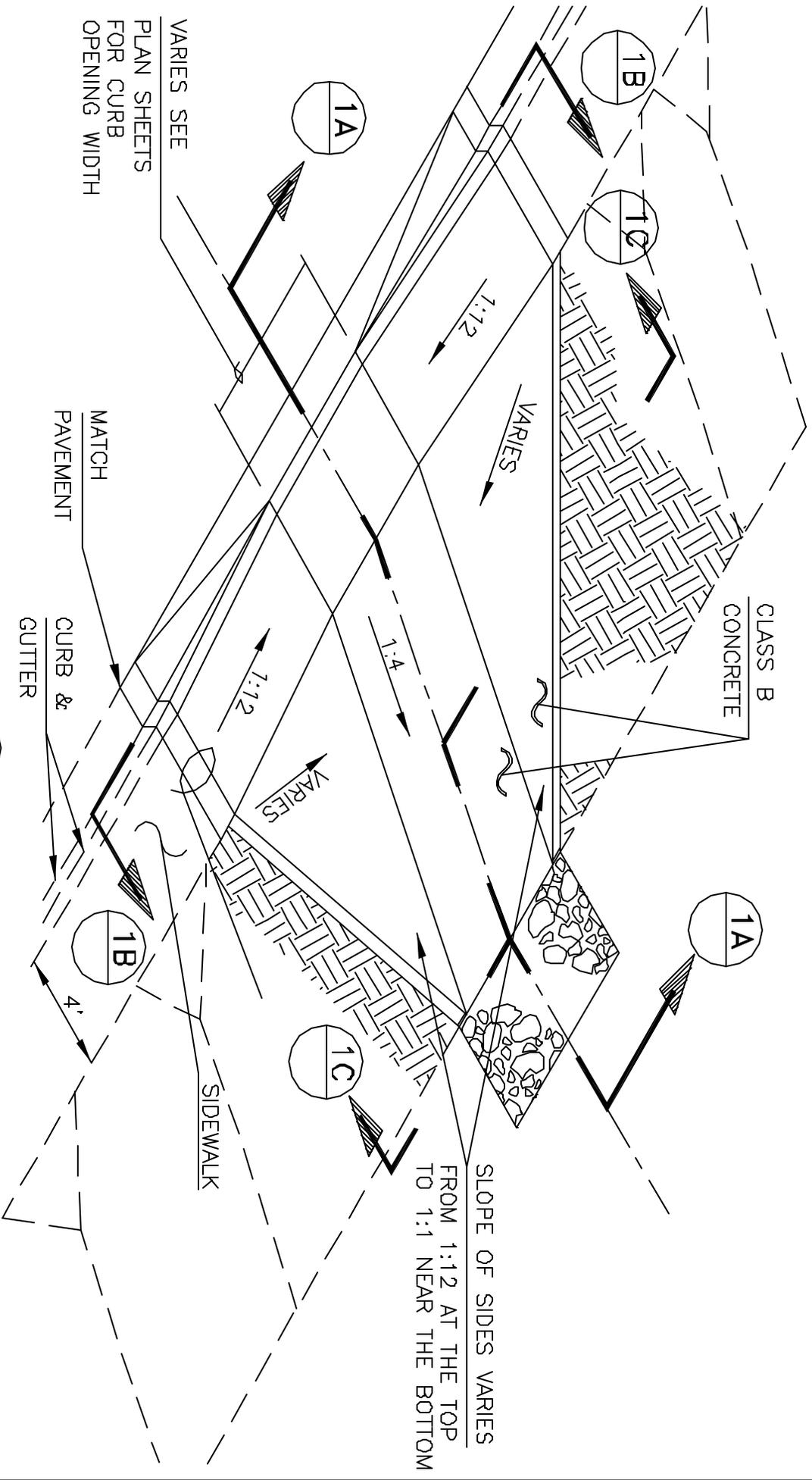
RIGHT ANGLE CULVERT



* SEE TABLE

SKewed CULVERT

LA PAZ COUNTY
 CONSTRUCTION STANDARDS
 STANDARD No 5-360
 END SECTION - REINFORCED CONCRETE PIPE



SPILLWAY ISOMETRIC DETAIL

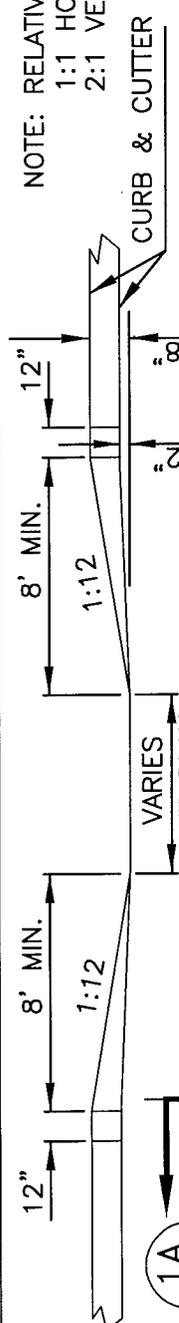
N.T.S.

1

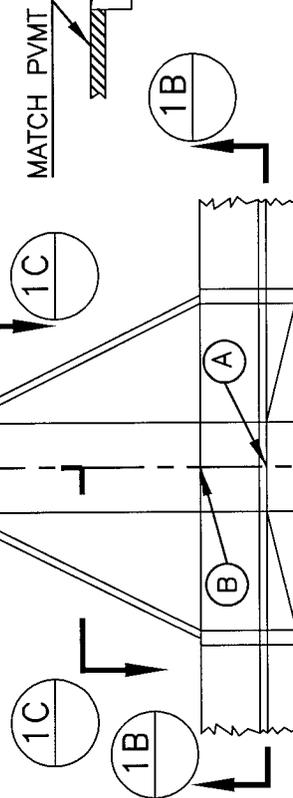
STD_5365.DWG

LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD NO. 5-365
STANDARD SPILLWAY

NOTE: RELATIVE DRAWING SCALE
 1:1 HORIZONTAL
 2:1 VERTICAL

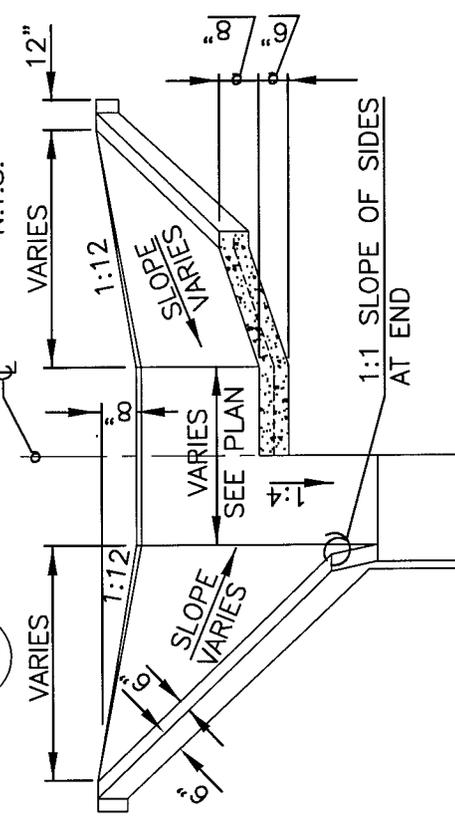


SECTION 1B-1B
 N.T.S.

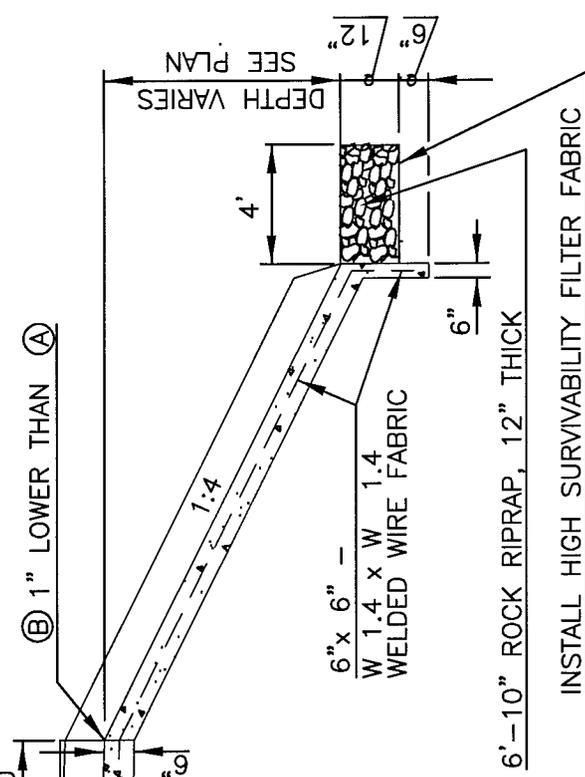


SECTION 1A-1A
 N.T.S.

SPILLWAY - PLAN VIEW
 N.T.S.



SECTION 1C-1C
 N.T.S.



SECTION 1A-1A
 N.T.S.

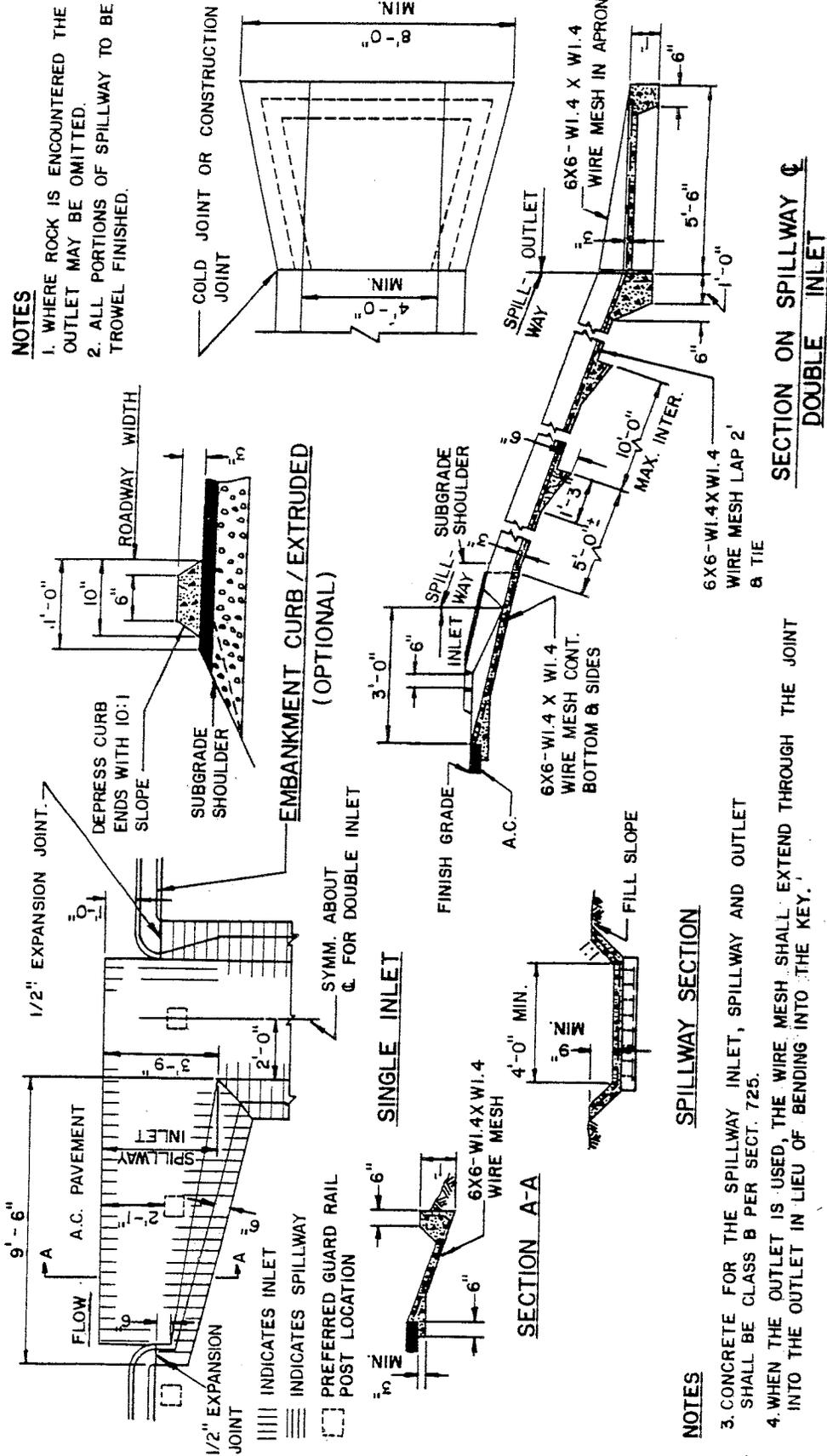
6'-10" ROCK RIPRAP, 12" THICK

INSTALL HIGH SURVIVABILITY FILTER FABRIC

LA PAZ COUNTY
 CONSTRUCTION STANDARDS
 STANDARD NO. 5-366
 SPILLWAY DETAIL

STD_5366.DWG

- NOTES**
1. WHERE ROCK IS ENCOUNTERED THE OUTLET MAY BE OMITTED.
 2. ALL PORTIONS OF SPILLWAY TO BE TROWEL FINISHED.

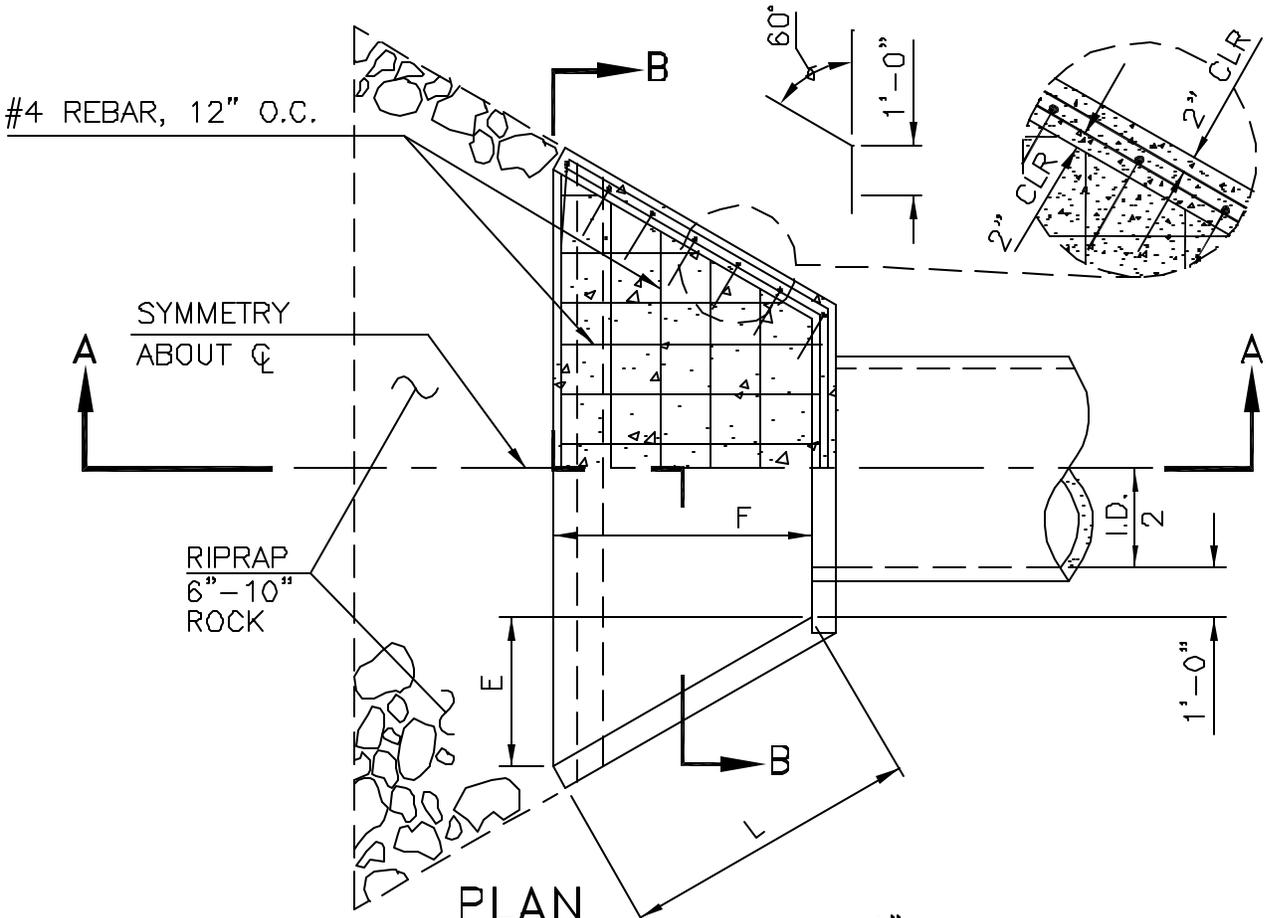


LA PAZ COUNTY
CONSTRUCTION STANDARDS
 STANDARD No 5-370
 SPILLWAY INLET AND OUTLET

NOTES

3. CONCRETE FOR THE SPILLWAY INLET, SPILLWAY AND OUTLET SHALL BE CLASS B PER SECT. 725.
4. WHEN THE OUTLET IS USED, THE WIRE MESH SHALL EXTEND THROUGH THE JOINT INTO THE OUTLET IN LIEU OF BENDING INTO THE KEY.

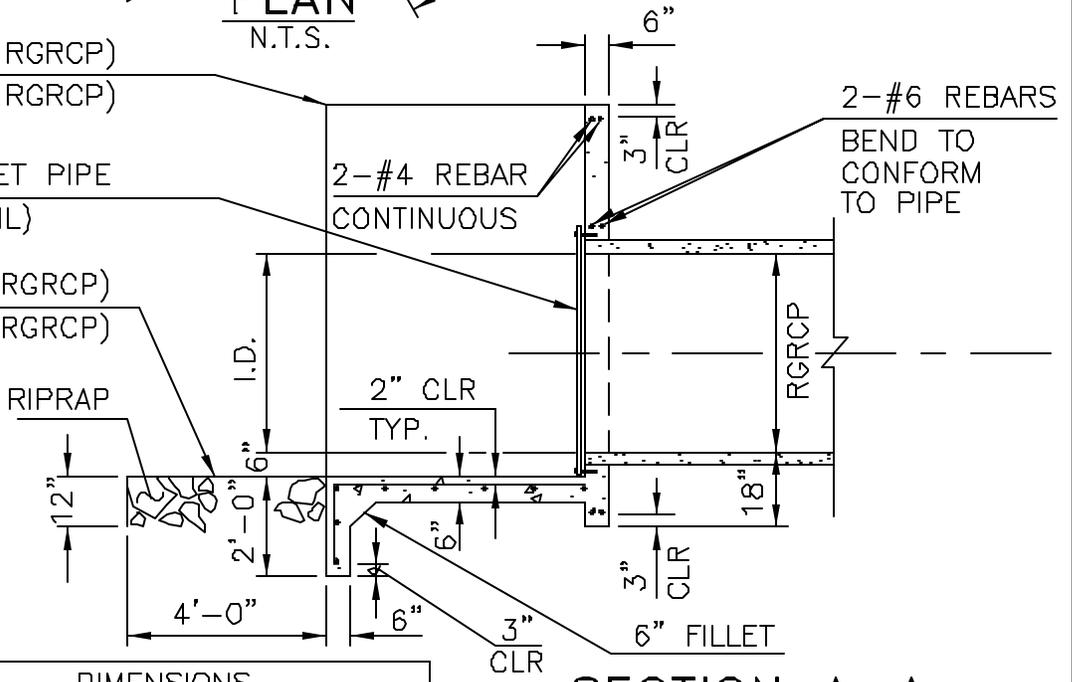
SECTION ON SPILLWAY
 DOUBLE INLET



ELEV. (" RGRCP)
ELEV. (" RGRCP)

CONSTRUCT OUTLET PIPE
GRATE (SEE DETAIL)

ELEV. (" RGRCP)
ELEV. (" RGRCP)



PIPE DIMENSIONS		DIMENSIONS	
I.D.	L	E	F (APPROX.)
6" TO 18"	2'-0"	1'-0"	1'-9"
24"	2'-0"	1'-0"	1'-9"
30"	3'-0"	1'-6"	2'-7"
36"	4'-0"	2'-0"	3'-6"
42"	5'-0"	2'-6"	4'-4"
48"	6'-0"	3'-0"	5'-2"
54"	7'-0"	3'-6"	6'-1"
60"	8'-0"	4'-0"	6'-11"

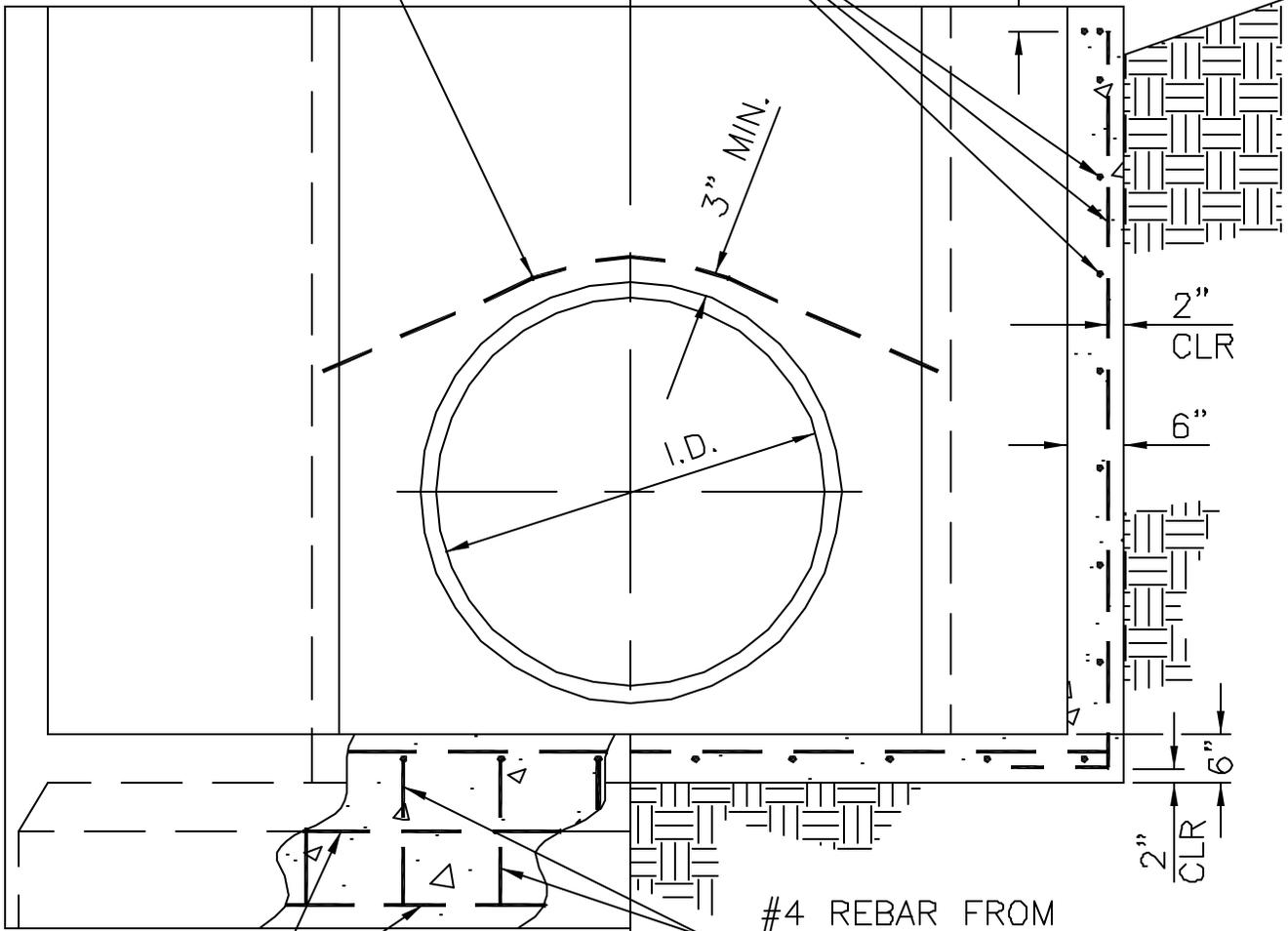
STD_5375.DWG

LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD NO. 5-375
HEADWALL STRUCTURE

2-#6 BARS BEND
TO CONFORM TO
PIPE

#4 REBAR
12" O.C.

3" CLR



2-#4 REBAR

SECTION B-B

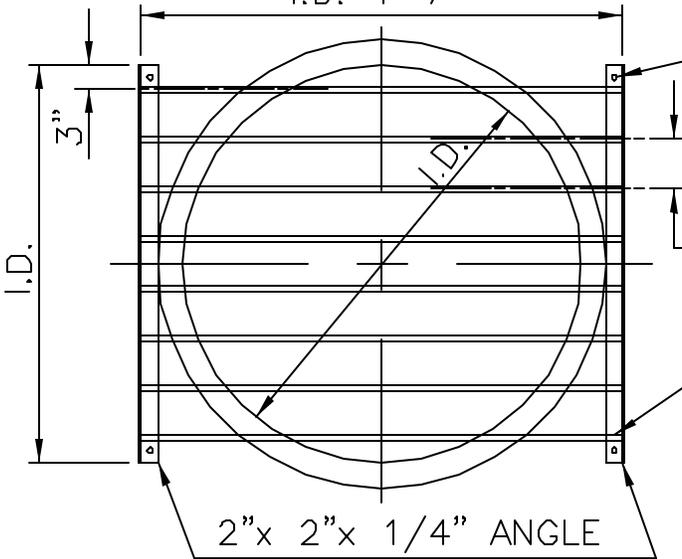
N.T.S.

#4 REBAR FROM
TRANSITION

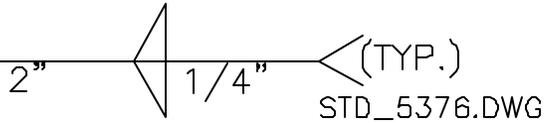
6"
2" CLR

I.D. + 7"

(4) 5/8" HOLES
GROUT 1/2"x3"
1/2" GALV. BOLTS
INTO CONC. HDWL.



#5 REBAR AT 6" O.C. (TYPICAL)



2"x 2"x 1/4" ANGLE
IRON BOTH SIDES

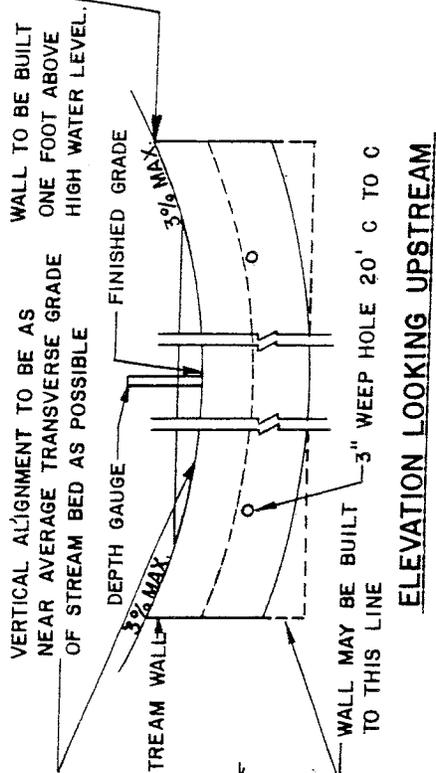
TRASH GRATE DETAIL

N.T.S.

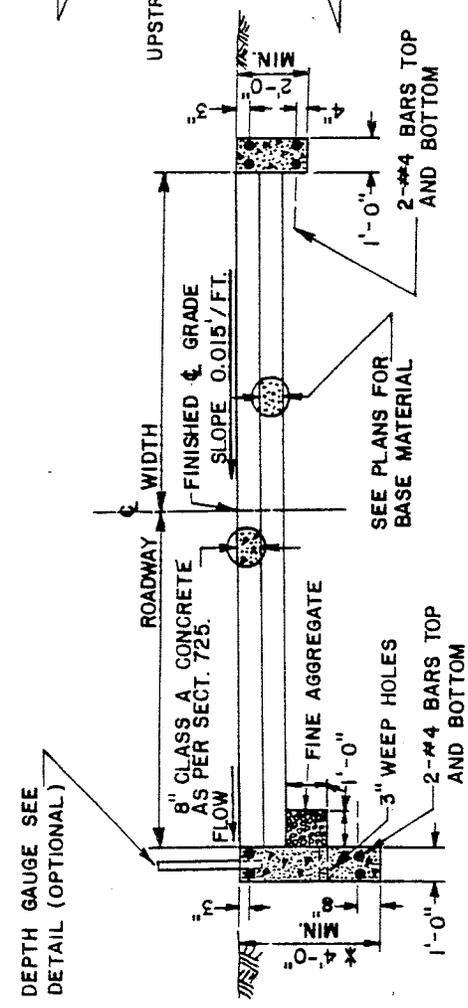
LA PAZ COUNTY
CONSTRUCTION STANDARDS

STANDARD NO. 5-376

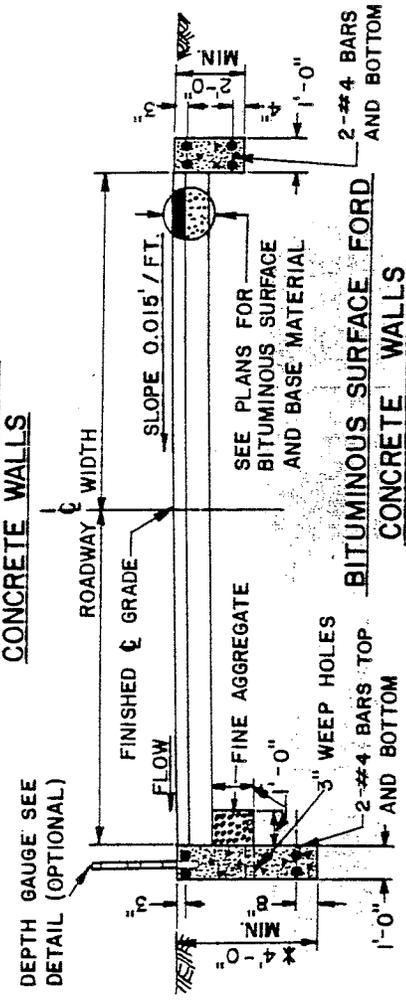
HEADWALL STRUCTURE DETAILS



ELEVATION LOOKING UPSTREAM



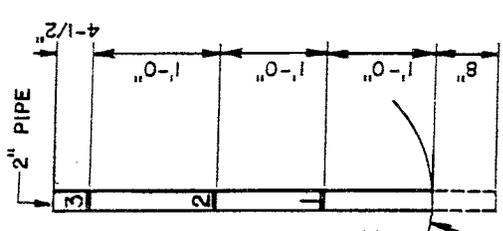
CONCRETE SURFACE FORD CONCRETE WALLS



X MIN. DISTANCE BELOW STREAM BED

NOTES

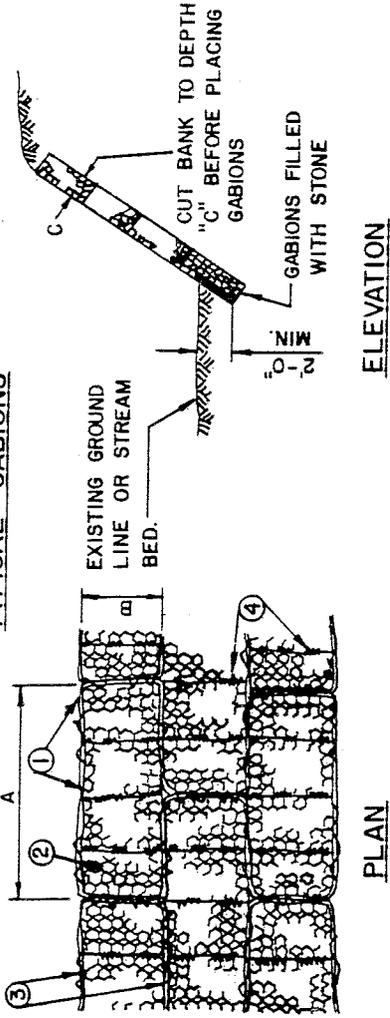
1. FORD WALLS SHALL BE CLASS A CONC. PER SECT. 725.
2. DEPTH GAUGE SHALL BE PAINTED 2-COATS WHITE ENAMEL. NUMERALS AND MARKERS SHALL BE 1-COAT BLACK ENAMEL.
3. NUMBERS ON DEPTH GAUGE TO BE 2" HIGH.
4. HEIGHT OF DEPTH GAUGE OPTIONAL.
5. TWO DEPTH GAUGES MAY BE USED, ONE ON EACH END OF UPSTREAM WALL, START WITH 2' INSTEAD OF 1'.



DEPTH GAUGE DETAIL (OPTION OF THE CONTRACTING AGENCY)

LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-380
CONCRETE CUT-OFF WALLS

TYPICAL GABIONS

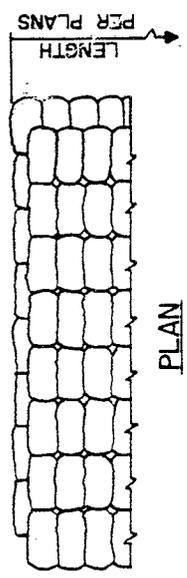


- NOTES**
1. PLAIN ROCK OR GROUTED ROCK MAY BE SUBSTITUTED FOR SACKED CONCRETE.
 2. GROUT FOR RIPRAP MAY BE PNEUMATICALLY PLACED MORTAR.

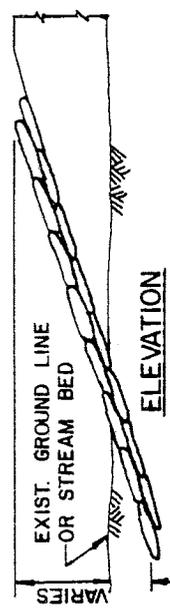
NOMINAL SIZE COMBINATIONS

LENGTH	WIDTH	DEPTH
A	B	C
6'	3'	1', 1.5', 3'
9'	3'	1', 1.5', 3'
12'	3'	1', 1.5', 3'

- OTHER SIZES AVAILABLE FROM MANUFACTURER.
- ① HEAVY GAUGE FRAME WIRE.
 - ② HEAVY GAUGE TRIPLE-TWIST HEXAGONAL MESH (OR EQUAL) FASTENED TO FRAME WIRE.
 - ③ CONTINUOUS HEAVY GAUGE WRAPPED AROUND FRAMES TO FASTEN GABIONS TO EACH OTHER.
 - ④ PARTITIONS TO PREVENT SHIFTING NORMALLY ONE PER 3' LENGTH. INSTALLED AT FACTORY.

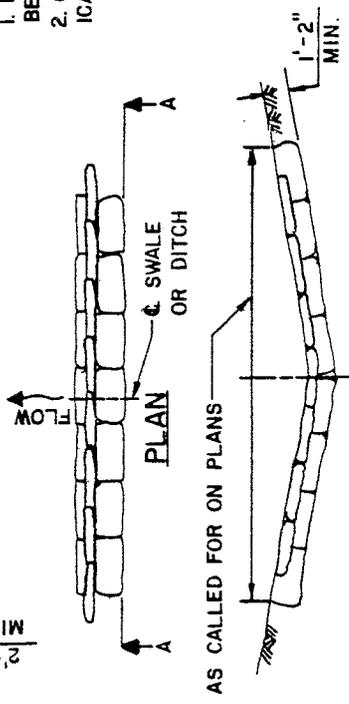


PLAN



ELEVATION

TYPE 1 RIPRAP



AS CALLED FOR ON PLANS

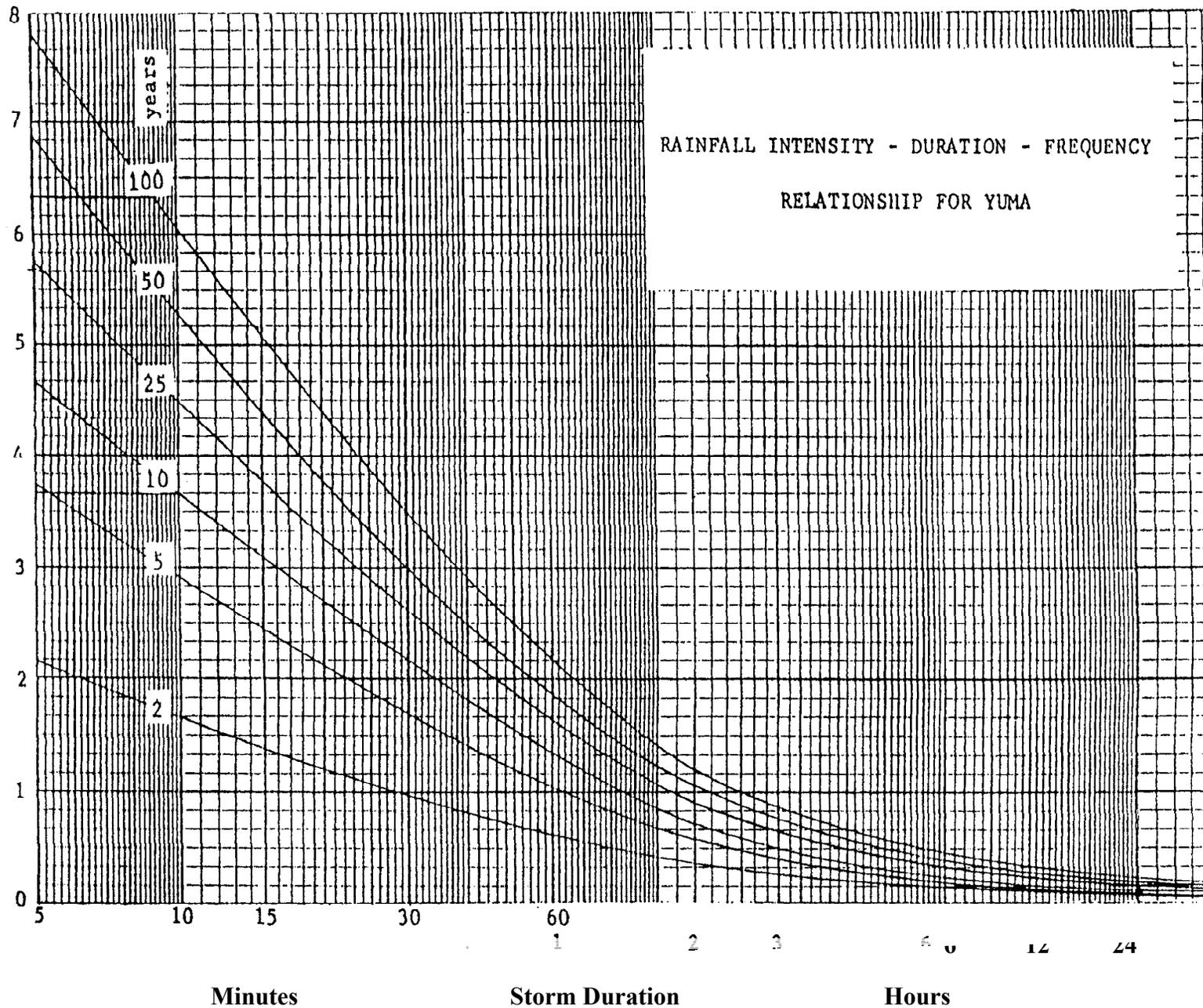
ELEVATION A-A

TYPE 2 RIPRAP

LA PAZ COUNTY
CONSTRUCTION STANDARDS
STANDARD No 5-390
EROSION PROTECTION / RIPRAP

APPENDIX

- A. Rainfall Intensity - Duration Curves for La Paz
- B. Hydrologic Design Data Sheet
- C. Nomograph for Flow in Triangular Channels
- D. Pipe Capacities Flowing Full
- E. 100 Year Storm of 2 Hour Duration Hydrography Table I - Value of Runoff Coefficient "C"
- F. Sample Calculations - Individual Parcel Retention
- G. Sample Grading and Drainage Plan - Individual Parcel Retention
- H. Table 2 - 2 Hour Duration Storm Precipitation by Return Period
- I. Table 3-2 Hour Duration Storm Rainfall Distribution
- J. Table 4 - Runoff Curve Numbers by Soil Type and Zoning Classification



HYDROLOGIC DESIGN DATE SHEET

RATIONAL METHOD

Drainage Area
Area Characteristics *

Land Use	"C" Factor	Area (Acres)	C x A
Low Density Residential	.39		
Medium Density Residential	.43		
High Density Residential	.51		
Mobile Home Parks			
Parks			
Agricultural	.12		
Streets	.90		
Commercial & Industrial			
Total			

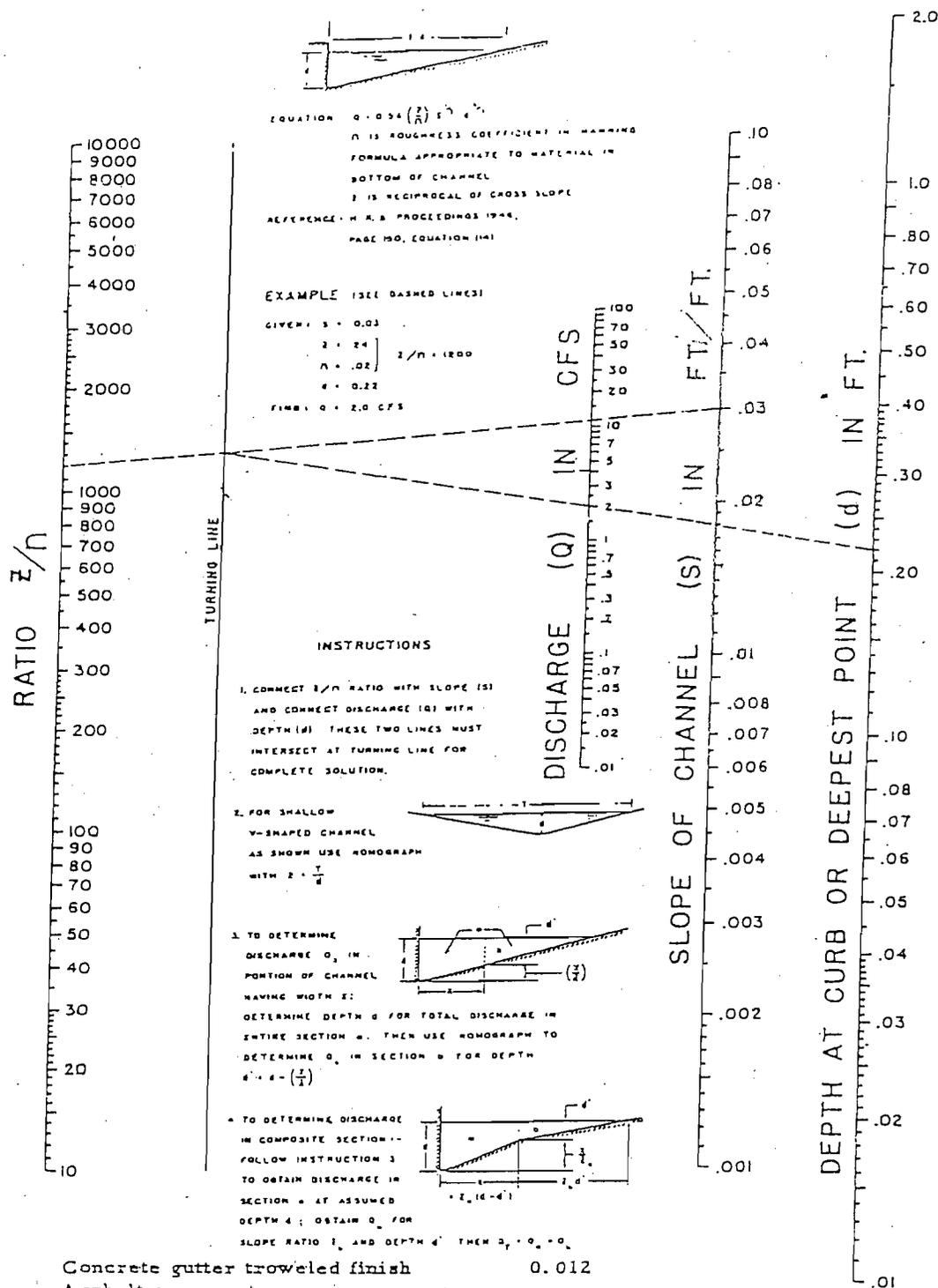
Weighted "C" $CxA = \frac{\quad}{A} = \quad$

Flow Path

Reach	Length feet	Upper Elevation	Lower Elevation	Mean Slope	Channel Type	Velocity (ft./min.)	Time (min.)
Total							

Rainfall and Runoff

Recurrence Interval, yrs.			10			100
1 in./hr.						
Qp CIA (cfs)						
Q (cfs) provided at structure						

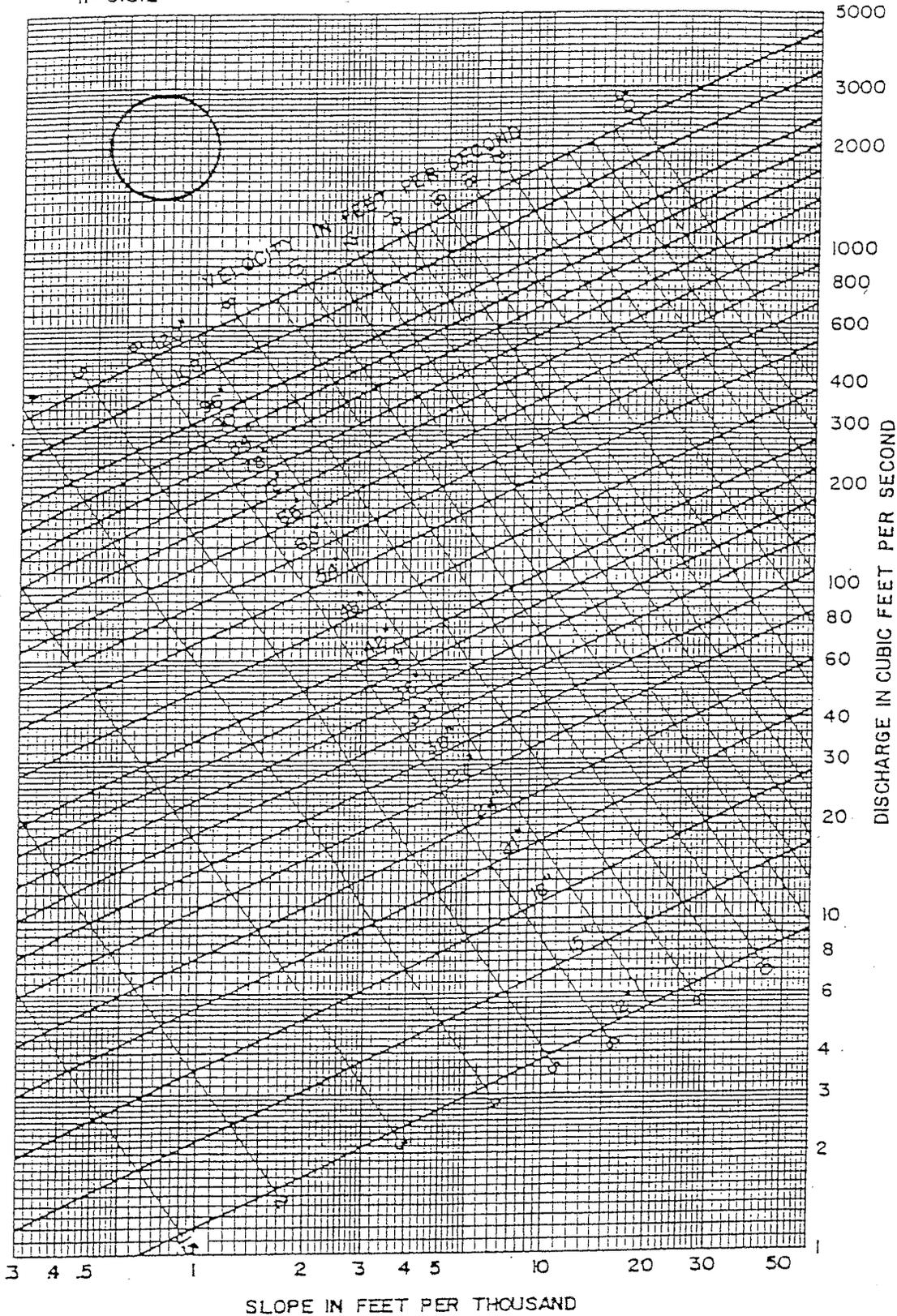


Concrete gutter troweled finish	0.012
Asphalt pavement	
(1) Smooth texture	0.013
(2) Rough texture	0.016
Concrete gutter with asphalt pavement	
(1) Smooth	0.013
(2) Rough	0.015
Concrete pavement	
(1) Float finish	0.014
(2) Broom finish	0.016
	0.016

For gutters with small slope where sediment may accumulate, increase all above values of "n" by 0.002.

NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS

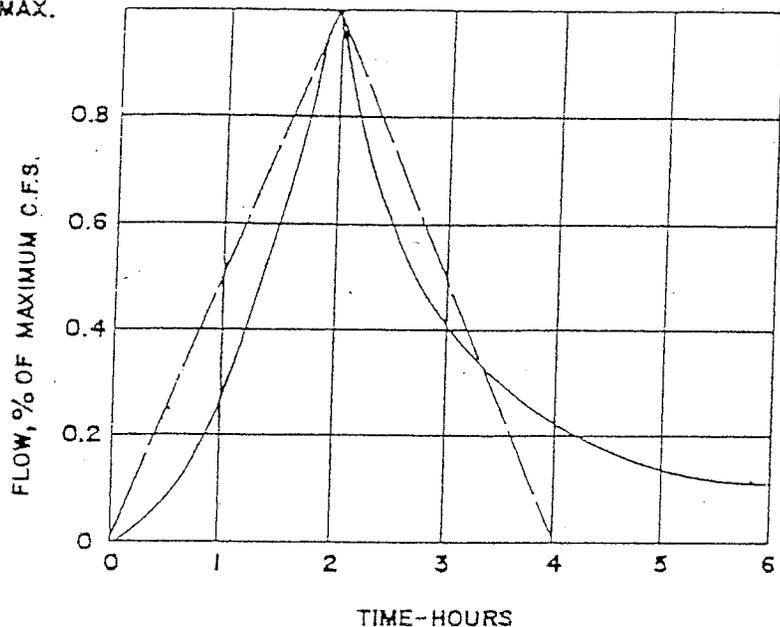
COMPUTED FROM MANNING'S FORMULA
 $n=0.012$



PIPE CAPACITIES
FLOWING FULL

RETENTION BASIN VOLUME

DESIGN MAX.



1. Use $Q=CIA$ where Q equals the peak rate of runoff (cfs), C equals the weighted runoff coefficient, I equals the rainfall intensity of 1.22 inches/hour, and A equals the watershed area (acres).
2. Total runoff volume equals area under triangle = $1/2(4)(Q)(3600) = 7200 Q(FT^3)$

TABLE 1

Values for Runoff Coefficient "C"

<u>Area Type</u>	<u>"C" Factor</u>
Residential (1 to 4 dwelling units/acre)	0.39
Residential (4+ dwelling units/acre)	0.43
Mobile Home Parks	0.51
High Density Dwellings (Apartments)	0.51
Parks	0.20
Agricultural	0.12
Commercial & Industrial	0.80
Streets	0.90

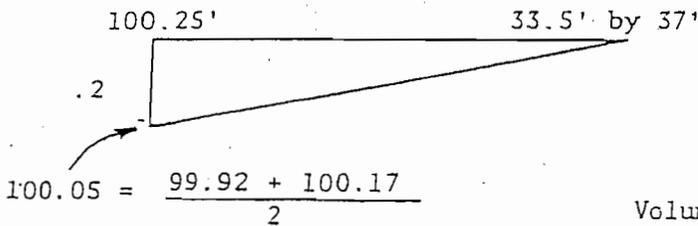
Exhibit - F

Sample Calculations

Individual Parcel Retention - Commercial Using 2.25" = .19'

<u>AREA A:</u>	<u>AREA</u>	<u>RUNOFF</u>
ASPHALT = $\frac{1}{2}(28+33.5)37 = 1138$ ft.	$^2 \times .19$ Ft. =	216 ft. ³
GRASS = $33.5 \times 5 = 167.5$ ft.	$^2 \times .19 =$	<u>32</u> ft. ³
	TOTAL RUNNOFF =	248 ft. ³

The control elevation for this area = 100.25 since the water can rise to this elevation before entering the adjacent areas. Therefore the retention for this area may be calculated as follows:



$$\text{Volume} = \frac{1}{2} \cdot .2 \cdot (33.5) \cdot (37) = 124 \text{ ft.}^3$$

This storage is on the asphalt. Additional storage required is:

$$248 \text{ ft.}^3 - 124 \text{ ft.}^3 = 124 \text{ ft.}^3$$

The depth of the grass area to provide this storage is $\frac{124}{5 \times 33.5} = .74$ ft. Therefore, the grass area will be graded to $100.25 - .74 = 99.51$

to drain the asphalt area and provide additional storage. A drywell could have been used instead, IF DESIRED.

	<u>AREA</u>	<u>RUNOFF</u>
Total Area	$58 \times 102 = 5916$	$\times .19 = 1124$ ft. ³
Less Area A		248 ft. ³
Area B		<u><u>876</u></u> ft. ³

Depth (h) of retention area to retain this full amount is calculated as follows:

$$\begin{aligned} \text{Volume} &= h \left[\frac{1}{2}(10 + 15) \times \frac{1}{2}(25 + 30) \right] \\ &= \frac{h}{4} (25 \times 55) = 343.75 h \\ h &= \frac{876}{343.75} = 2.5 \text{ feet} = \underline{\underline{30 \text{ inches}}} \end{aligned}$$

The control elevation for this area is 100.10, therefore depress to elevation 97.5. The required depth of this area could be decreased if desired by adding the parking lot to retain part of runoff.

TABLE 2

2 HOUR DURATION STORM PRECIPITATION BY RETURN PERIOD

Return Period (Years)	2 Hour Storm Precipitation (inches)
2	0.71
5	1.20
10	1.55
25	2.00
50	2.39
100	2.78

APPENDIX I

TABLE 3

DESIGN 2 HOUR DURATION STORM RAINFALL DISTRIBUTION

TIME (Hours)	Ratio of Precipitation To Total Storm Prec.	TIME (Hours)	Ratio of Precipitation To Total Storm Prec.
0.0000	0.0000	1.0333	0.7351
0.0333	0.0042	1.0667	0.7647
0.0667	0.0086	1.1000	0.7830
0.1000	0.0130	1.1333	0.8031
0.1333	0.0176	1.1667	0.8197
0.1667	0.0223	1.2000	0.8343
0.2000	0.0272	1.2333	0.8475
0.2333	0.0322	1.2667	0.8593
0.2667	0.0374	1.3000	0.8701
0.3000	0.0428	1.3333	0.8801
-3.3333	0.0483	1.3667	0.8891
0.3667	0.0541	1.4000	0.8977
0.4000	0.0601	1.4333	0.9057
0.4333	0.0664	1.4667	0.9133
0.4667	0.0729	1.5000	0.9206
0.5000	0.0797	1.5333	0.9274
0.5333	0.0869	1.5667	0.9339
0.5667	0.0945	1.6000	0.9401
0.6000	0.1026	1.6333	0.9461
0.6333	0.1112	1.6667	0.9519
0.6667	0.1203	1.7000	0.9574
0.7000	0.1303	1.7333	0.9627
0.7333	0.1411	1.7667	0.9679
0.7667	0.1530	1.8000	0.9729
0.8000	0.1662	1.8333	0.9777
0.8333	0.1808	1.8667	0.9824
0.8667	0.1995	1.9000	0.9870
0.9000	0.2227	1.9333	0.9914
0.9333	0.2544	1.9667	0.9958
0.9667	0.3593	2.0000	1.0000
1.0000	0.6632		

TABLE 4

RUNOFF CURVE NUMBERS BY SOIL TYPE AND ZONING CLASSIFICATION

Zoning Classification/Land Use			SCS Soil Classification			
Yuma County	City of Yuma	City of Somerton	A	B	C	C
HI, LI	H-I, L-I	M	91	93	95	96
C-1, C-2	B-2	C	91	93	95	96
R-2, R-3	TR, B-1	R-3	86	88	90	92
RVP	MH	TR	82	89	91	93
RVS	MH	TR	82	88	90	92
MHP	MH	TR	84	88	90	92
MHS	MH	TR	84	87	90	92
R-1-6	R-MH	R-1	81	87	90	92
R-1-8	R-A	R-1	79	85	89	92
R-1-12	RE-12	R-1	77	85	88	92
R-1-20	RE-18	R-1	75	84	87	91
R-1-40	RE-35	R-1	73	81	86	89
SR 1, 2, 3, 4	SR	RA	72	81	85	88
RA 5, 10, 20, 40	AG	A	71	80	85	88
Desert	Desert	Desert	70	81	88	90
Parks	Parks	Parks	60	75	83	87

**TABLE 4
CONTINUED**

Yuma County	Zoning District Title	Minimum Lot Size
HI	Heavy Industrial	8,000 sq. ft.
LI	Light Industrial	8,000 sq. ft.
C-2	Commercial (General)	8,000 sq. ft.
C-1	Commercial (Local)	8,000 sq. ft.
R-3	High Density Residential	2,000 sq. ft.
R-2	Intermediate Density	2,000 sq. ft.
RVP	Recreation Vehicle Park	1,200 sq. ft.
RVS	Recreational Vehicle	2,400 sq. ft.
MHP	Mobile Home Park	3,200 sq. ft.
MHS	Mobile Home Subdivision	2,400 sq. ft.
R-1-6	Low Density Residential	6,000 sq. ft.
R-1-8	Low Density Residential	8,000 sq. ft.
R-1-12	Low Density Residential	12,000 sq. ft.
R-1-20	Low Density Residential	20,000 sq. ft.
R-1-40	Low Density Residential	40,000 sq. ft.
SR-1	Suburban Ranch	1 acre
SR-2	Suburban Ranch	2 acres
SR-3	Suburban Ranch	3 acres
SR-4	Suburban Ranch	4 acres
RA-5	Rural Area	5 acres
RA-10	Rural Area	10 acres
RA-20	Rural Area	20 acres
RA-40	Rural Area	40 acres