

DIVISION IV
PRIVATE STORM DRAINAGE FACILITIES REQUIREMENTS

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SECTION 1 – DESIGN CRITERIA

This section presents special drainage design requirements for private storm drains within the City of Anaheim.

A. RECURRENCE INTERVAL

For private storm drains within a watershed tributary to the Santa Ana River beginning and ending on Private property, and not connected directly or indirectly to a publicly owned facility, the design recurrence interval may be a minimum of the 10-year storm.

B. MINIMUM PIPE DIAMETER

For privately maintained storm drains within the City right of way, the following criteria for minimum pipe diameter shall apply:

- Mainlines shall be 18 inches.
- Connections to existing catch basins in the City Right of Way shall be 15 inches.

For private main line storm drains within private property, the minimum pipe diameter shall be 12 inches.

C. MANHOLE SPACING

For mainline storm drains, the maximum distance between manholes shall be 200 feet for 18 inch diameter pipe.

D. GRATE INLETS AT SUMP LOCATIONS

1. General

- a. Grate inlets are allowed on private property.
- b. Onsite inlets in sump condition shall be designed to capture Q_{25} .
- c. The capacity of the grate depends upon the areas of the openings and the depth of the water at the grate. Experiments have determined that a grater will act as a weir and follow the weir formula for depths (heads) on the grate up to 0.4 ft. It will act as an orifice and follow the orifice formula for heads of 1.4 ft and greater. For heads between 0.4 ft and 1.4 ft, the operation is not defined because of vortices and eddies over the grate.
- d. When proposing a sump condition the designer must verify 100-year protection of habitable areas assuming the grate clogs 100%. This will required a secondary emergency outlet for the sump waters which should provide a minimum of 1.0 foot freeboard between

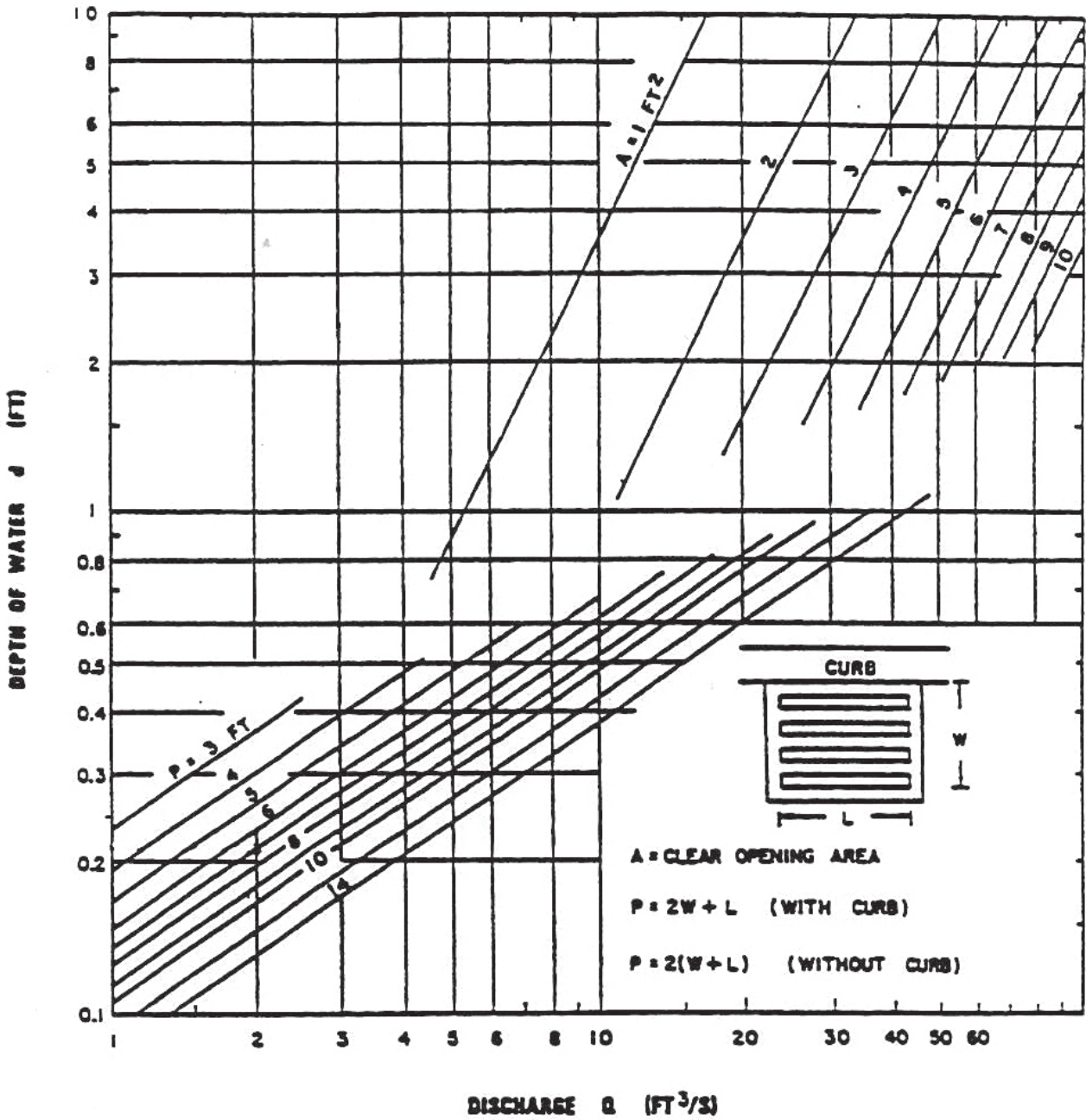
maximum WS elevation and minimum finish floor elevation. This emergency outlet system must direct overflows to either a downstream street with adequate capacity of natural conveyance system. Point of discharge must be analyzed with regard to prevention of downstream problems. Such a system need not consist of additional structures, but may require modification of surrounding grading, allowing water to flow between dwelling units.

2. Design Procedures for Sump Grates

- a. Given data.

Generally the following are given:

- i. Design discharge (Q)
 - ii. Grate configuration (adjacent to curb or in an open area).
- b. Assume grate dimensions and include grate detail with calculations.
- c. Compute the perimeter of the grate opening (P) ignoring the bars and omitting any side over which the water does not enter, such as when one side is against the face of a curb. Divide the result by 2. This allows for partial clogging of the grate by assuming that only half of the perimeter will be effective.
- d. Compute the total area of clear opening (A), excluding area taken up by bars, and divide by 2. This allows for partial clogging of the grate by assuming that only half of the area will be effective.
- e. Enter Figure 6 at the bottom scale using the design discharge.
- f. If design discharge intersects appropriate "P" curve, read the required head at the left margin. In this case, the grate perimeter controls, which is the usual case.
- g. If design discharge does not intersect appropriate "P" curve, find the intersection of design discharge and appropriate "A" curve and read the required head at the left margin. In this case, the grate area controls.



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GRATE INLET CAPACITY IN SUMP CONDITIONS

FIGURE

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3. Inlet Design

For grating inlet catch basins (Standard Details #304 or 305), the minimum depth from the top of grate to the lowest pipe invert, V, shall be 4 ft. Design values for V shall be rounded up to the nearest 0.25 ft.

E. SUMP PUMP DESIGN

Sump pumps shall be designed for Q_{25} . Calculations and specifications shall be provided for selecting the sump pump. Calculations shall include the determination of the total dynamic head (T.D.H. equals the static head plus the friction head) and the well float set points to satisfy pump operation. (See Appendix B).

F. ENCROACHMENT EASEMENT/ENCROACHMENT LICENSE

Private storm drains shall be used in private streets, in private easements when draining private property.

Private storm drains connecting to a City storm drain will require the recordation of a Save Harmless in-lieu of Encroachment Agreement. A private storm drain within a public right-of-way (excluding direct connections) will require an Encroachment License.

SECTION 2 – SUBMITTAL

A. GRADING PLANS.

Private storm drains may be shown on grading plan, however they must show rates of grade, direction of flow, size of pipe, invert elevations at begin of pipe and end of pipe and grade breaks, locations and elevations of all adjacent or crossing underground facilities, sufficient horizontal control to permit the system to be located in the field, and any other information which may be required to adequately check, construct, and inspect the system.

B. STANDARD DETAILS

Use of City standard details is required.

C. CONSTRUCTION NOTES

Add a note to each sheet indicating limits of construction within private property for private storm drains. This note shall read: "APPROVED ONLY FOR INSPECTION OF WORKMANSHIP AND MATERIALS ON PRIVATE PROPERTY."

SECTION 3 – STRUCTURES

A. PLASTIC PIPE

Plastic pipe may be used for private storm drain facilities as an alternative pipe material to RCP. This section covers the following types of plastic pipe that may be used:

- PVC Plastic Pipe
- High Density Polyethylene (HDPE) Solid Wall Pipe
- Corrugated HDPE Pipe with smooth interior

1. General

A design life of 50 years shall be used.

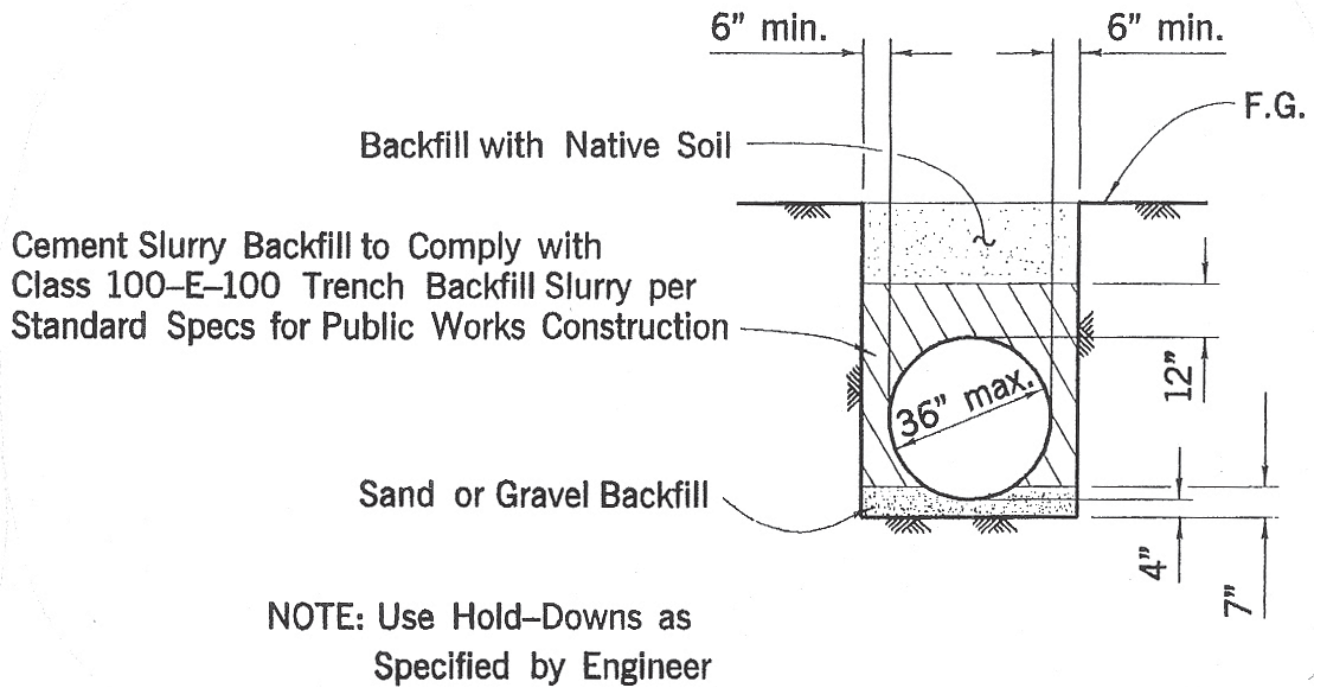
2. Areas of Use/Limitations

Plastic pipe may be used for drainage applications provided the following conditions are met:

- a. Maximum cover shall be 20 feet.
- b. Minimum diameter shall be 4 inches.
- c. Maximum diameter shall be 36 inches.
- d. Plastic pipe shall not be used within the City right of way except for the following applications:
 - i. Landscape median drains
 - ii. Subdrains
- e. Minimum cover within streets shall be 30 inches.
- f. Plastic pipe in streets shall use slurry backfill in accordance with Figure 7.
- g. Plastic pipe outside streets shall use slurry backfill in accordance with Figure 7 when cover is less than 30 inches and pipe is subjected to highway loading.
- h. Maximum velocity in plastic pipe shall be 15 fps, unless otherwise approved by the City Engineer. Plastic pipe may be considered for conditions of higher velocity where the potential abrasion and anticipated bed load are low. The pipe thickness shall be increased to provide for this condition. The special design and manufacturer's specifications shall be submitted to the City engineer for approval.

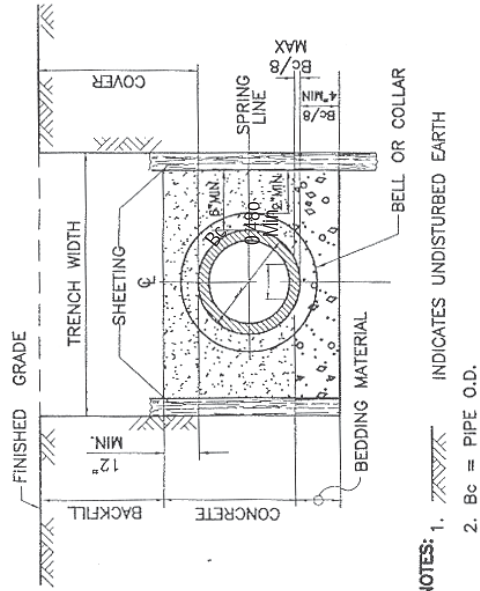
3. Bedding

Figure 8 describes an example of the bedding requirements for PVC pipe with cover between 4 ft and 30 ft. The engineer shall prepare their own structural analysis, based on project-specific load conditions, and submit to the City for approval. Bedding details shall be shown in the plans.



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SLURRY BACKFILL DETAIL

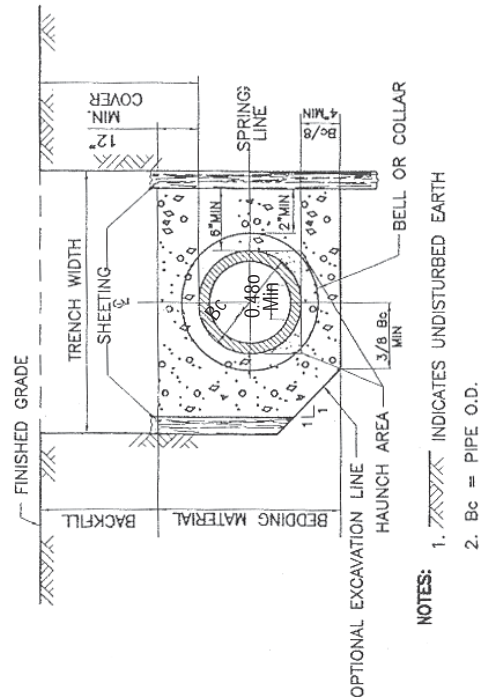
FIGURE
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- NOTES: 1. INDICATES UNDISTURBED EARTH
 2. Bc = PIPE O.D.

PVC PIPE BEDDING DETAIL
 DEPTH OF COVER FROM 17 FT TO 30 FT

N.T.S.



- NOTES: 1. INDICATES UNDISTURBED EARTH
 2. Bc = PIPE O.D.

PVC PIPE BEDDING DETAIL
 DEPTH OF COVER FROM 4 FT TO 17 FT

N.T.S.

- NOTES: 1. BEDDING MATERIAL FOR PVC PIPE SHALL CONSIST OF No. 4 AGGREGATE OR 1/2" CRUSHED ROCK.
 2. IF UNSTABLE SOIL IS ENCOUNTERED, SOILS ENGINEER TO DETERMINE DEPTH OF REMOVAL AND SIZE OF PIPE FOUNDATION ROCK.
 3. BACKFILL TO BE BROUGHT UP IN LIFTS, EACH COMPACTED TO 90% RELATIVE COMPACTION, TO CONFORM TO SECTION 301.1.3 AND 306.1.3 OF THE STANDARD SPECIFICATIONS.
 4. AFTER COMPACTION OF THE BACKFILL, ALL PVC SEWER PIPE SHALL BE MANDREL TESTED IN ACCORDANCE WITH SUBSECTION 306.1.2.12 OF THE STANDARD SPECIFICATIONS.
 5. CONCRETE SHALL BE CLASS 450-C-2000 IN ACCORDANCE WITH SUBSECTION 201.1.1.2 OF THE STANDARD SPECIFICATIONS.

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PVC PIPE BEDDING DETAILS

FIGURE

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