



Drainage Systems



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Drainage Systems

Important Design Considerations

- Drainage systems are required on any project in which a footprint is added to or modified.
- Systems should be designed to accommodate a 5 year frequency rain event.
 - For design purposes, a 5 year event is about 3.5” of rain over 60 minutes.
 - Water falling on permeable surfaces has a runoff coefficient of 65%.
- Example:
 - 20,000 square foot lot with 45% impermeable surfaces. This results in:
9,000 square feet of impermeable hard surfaces with 100% runoff.
11,000 square feet of permeable absorbant surfaces with 65% runoff.

3.5” X 1 ft. ÷12” = 0.291667 ft of water per hour.

9,0000 s.f. X 0.291667 ft. = 2,625 cubic feet of water x 7.48 gallons/cubic feet = 19,635 gallons

11,000 s.f. X 0.291667 Ft. = 3,208 cubic feet of water x 7.48 gallons/cubic feet = 23,998 gallons
(35% of this water will be absorbed by the ground, so 65% will runoff – 23,998 x 0.65=15,598 gallons

So the total water to be designed for is 19,635 + 15,598 = 35,233 gallons per hour or 587 Gallons per Minute

If you are designing a sump system, the total capacity of the pumps would need to be 587 gpm.

If you are designing a gravity system, the total outfall capacity would need to be 587 gpm

- **Please submit one complete set of 11” X 17” drawings for review.** You should receive a response for your project in 10 business days or less. Projects which do not include all of the required items on the enclosed Required Documentation List will be charged a \$100 resubmission fee.



Drainage System Design Standards

1. New construction requires an underground drainage system to drain the entire lot area. **NO SHEET FLOW TO THE CITY DRAINAGE FACILITIES.**
2. Lots should be generally graded so that flow is from back to front. Exceptions should be requested in writing with details as to why this plan cannot be followed. Lots should also be graded so that water does not flow between properties. (Even if it is currently configured with cross lot drainage)
3. Minimum pipe size is 6". Four inch lateral lines are allowed IF they are directly connected to only one four inch gutter down spout.
4. Gutter connections are allowed but not required.
5. System should be designed to accommodate a 5 year frequency storm.
6. Systems should be designed to connect to a city underground storm water system if one is available to the site.

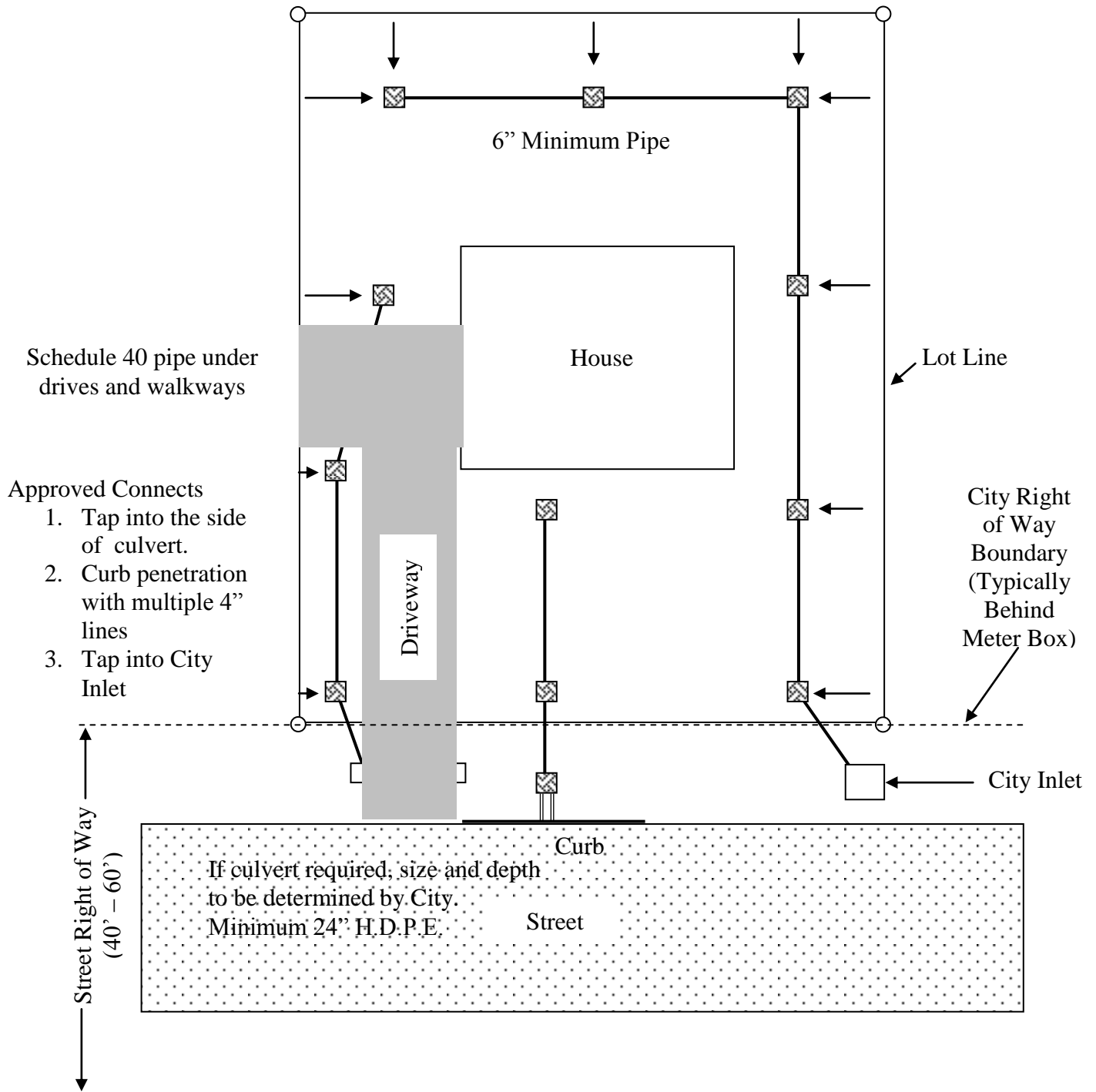
In the absence of a city storm water system, the following should be considered as alternative connection methods:

- a) On streets with curbs, multiple 4" outlet pipes of a sufficient number to accommodate the upstream pipe capacity will be allowed to protrude through the curb. An inlet or serviceable junction box should be used as the transition point between the multiple 4" lines and the upstream pipe to allow removal of debris at the transition point. The transition point should be between 1' and 5' behind the curb.
- b) On streets served by a ditch, all connection points should be into the side of a H.D.P.E. culvert of not less than 24" in diameter. Actual culvert size to be determined by the city.
- c) All culverts to be H.D.P.E. installed in accordance with manufacturer's recommendations. Flowline to be determined by the City of Bunker Hill Village. Minimum size is 24" but larger sizes may be required by the City. Please provide the size of culvert pipes on properties adjacent to the project site.

7. No French drain systems.
8. Bubbler boxes will be considered on a case by case basis. Bubbler boxes should be designed with a minimum of 12" encasement of medium size aggregate. Bubbler boxes will not be approved for clay or soils which do not allow the migration of the storm water.
9. Sump systems should be designed to the design standards listed above. Pump sizing calculations should be included. Sump systems should have backup generator or power source.
10. System should be constructed so that there is no standing water in pipes or inlets.
11. P.V.C. pipe must be a minimum of SDR 35. Schedule 40 required for sections under driveways



Typical Drainage Plan



Minimum pipe size is 6", however all lines must be designed to 5 year rain event standards. Pumps for sump systems must have a total capacity of a 5 year rain event for the drainage area served. All submissions must be signed by a licensed irrigator, engineer, or architect.



Drainage System Required Documentation

Building Submittal Package

- **Permit Application**

- Drainage Plan stamped by a Texas Licensed Irrigator, Landscape Architect or Civil Engineer.



Required for Approval



Drainage Permit Application

Date: _____

Type of Permit Requested: **Drainage**

Job Address: _____

Contractor: _____ Telephone: _____

Fax: _____ Mobile: _____

Type of Project: (Circle One) **New** **Addition** **Alteration** **Replacement**

Owner of Property: _____



Required for Approval



Contractor Registration

Company Name: _____

Contact Person: _____

Mailing Address: _____

City _____ State: _____ Zip: _____

Office Telephone: _____ Fax: _____

Email: _____

Field Contact Person: _____ Telephone: _____

Texas License Type: _____ Expiration Date: _____

Name on License: _____

License Number: _____

Insurance Underwriter: _____ Expiration Date: _____

Please request your insurance carrier to fax the required insurance certificate to (713) 827-8752. The City of Bunker Hill must be the certificate holder shown on the certificate. A copy of your applicable state license is also required. A permit will not be issued until this information is on file.



WORKING HOURS

**MONDAY – FRIDAY
7:00 A.M. TO 6:00 P.M.**

**SATURDAY
8:00 A.M. TO 5:00 P.M.**

**SUNDAY
HOLIDAY (NO WORK ALLOWED)**



LAS HORAS DE TRABAJO

LUNES – VIERNES

7:00 A.M. HASTA LAS 6:00 P.M.

SABADO

8:00 A.M. HASTA LAS 5:00 P.M.

DOMINGO

**DIA DE DESCANSO (NO SE PERMITE
TRABAJAR)**



Required Drainage System Inspections

Fax Inspection Requests 1 day in advance to the City of Bunker Hill using the form provided in this package. All inspections must be performed by City of Bunker Hill inspectors. Third party inspections do not take the place of city inspections.

- Cover –Pipe
- Final



INSPECTION REQUEST FORM

FAX 713-827-8752

CONTRACTOR: _____

JOB SITE ADDRESS _____ CONTRACTOR FAX: _____

CONTACT PERSON: _____ PHONE NUMBER: _____

PERMIT# _____ DATE FOR INSPECTION: _____ Time Desired: _____

Please fax this form by 4:00 pm to insure next day inspections.

Building

- _____ Site
- _____ Pier
- _____ Foundation*
- _____ Wind Bracing
- _____ Brick Tie
- _____ Frame Cover
- _____ Polly Seal
- _____ Insulation
- _____ Wall Board
- _____ Final

*Form Survey must be presented and approved before a Foundation Inspection will be scheduled.

- _____ Pressurization
- _____ Shower Pan
- _____ Water Lines/Water Heaters
- _____ Gas Turn On
- _____ Area Drains
- _____ Final

Mechanical

- _____ Cover
- _____ Register/Box Seal
- _____ Change Out
- _____ Final

Driveway/Sidewalk

- _____ Approach
- _____ Pre-Pour
- _____ Culvert
- _____ Final

Fence

- _____ Final

Electrical (Electrician must be present @ inspection)

- _____ Cover
- _____ Temporary Pole Set
- _____ TCI
- _____ Underground
- _____ Swimming Pool
- _____ Final

Pool

- _____ Stake Out
- _____ Steel
- _____ Decking
- _____ Final

Plumbing

- _____ Sewer Disconnect
- _____ Underground
- _____ Cover

Irrigation

- _____ Final

Demolition

- _____ Pre-Demo

Roof _____ Final

Comments: _____

Site Inspection is to confirm the presence of 1) On Site Parking 2) Dumpster 3) Screened Sanitary Facilities 4) Filter Fabric and Runoff Protection 5) Temporary Drainage 6) Tree Protection 7) Permit Posting Station 8) Address Clearly visible from the street.