XIII. STORM WATER

The following guidelines address storm drain conveyance system design to protect against flooding, construction practices to prevent contamination of runoff, and design of permanent controls to provide long-term stormwater quality protection.

A. Storm Drain Design Criteria

1. Storm Drain: Show all storm drain lines necessary for the development, from point of interception of upstream drainage to point of adequate discharge. Show sizes, type of materials, catch basins, manhole & lateral locations and all profiles (slope, invert elevations, hydraulic grade lines and surface elevations).

2. All drainage studies shall be in accordance to City's Storm Master Plan. Pipes shall be sized to carry the 10-year discharge without surcharging the pipe. When downstream surcharge effects are included, upstream hydraulic grades shall be no higher than the top of curb elevation at any manholes and inlets. Hydraulic grade shall not exceed the street right-of-way at any location.

3. The Rational method Q= CIA may be used.

   Q is the flow rate in cfs.

   C is the runoff coefficient which represents the amount of rainfall occurring as runoff and is expressed as a value between from 0.0 to 1.0.

   Typical Values of "**C**":

Low density residential	0.40
Medium density residential	0.50
High density residential	0.70
Commercial	0.90
Industrial	0.90
Park	0.20
School	0.30
Other	determined individually

   I is the rainfall intensity in inches per hour.

   Values of "**I**" have been determined for the City of Milpitas

   See A1 - **Rainfall Intensity Charts**

   A is the drainage area in acres.

4. The minimum and maximum velocities are 2 fps and 10 fps, respectively.
where V = 1.486 / n x R raised to 2/3 x S raised to 1/2.
V is the velocity.
n is coefficient of friction, Values of "**n**" for RCP are taken as n = 0.013
R is the hydraulic radius.
S is the slope.

5. Time of flow in gutters can be determined from the City of Milpitas Gutter Flow Table. **See A2 - Milpitas Gutter Flow Table.**

6. Material
Reinforced Concrete Pipe (RCP), Class III

7. Easements
10 feet wide (minimum)
(No trees or deep-rooted plants are permitted within the easement)

8. Normal Location
5 feet toward centerline from face of curb, on the opposite side of the water line.

9. Manhole Spacing
500 feet (maximum)

10. Catch Basin Spacing
400 feet (maximum)
Catch basins shall be spaced to provide for a maximum width of gutter flow not to exceed 8 feet from face of curb, for a 10-year flood or entrance capacity of inlet for a 10-year flood.

11. Cover over Pipe
3 feet (minimum)

12. Mainline Pipe Size
15" diameter (minimum)

13. Pipe Crossing Clearance

The minimum pipe crossing clearance with other utilities is one foot. Where the minimum clearance cannot be met, encasement or cap shall be designed by the developer's engineer and approved by the City Engineer.

14. Storm drains shall be constructed from the upstream properties through the development to a point of adequate discharge downstream.

15. Provide stubs for future extension of on-site development and public street extension.

16. Change of direction or size shall occur only at structures such as manholes.

17. Outfalls and other work within the SCVWD rights-of-way are subject to the approval and issuance of a permit by that agency.

18. Open ditches of a temporary nature may only be used if approved by the City Engineer.

19. See Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM) for special flood hazard zones.

20. Non-rainfall discharge requires approval from the appropriate agencies such as the Regional Water Quality Control Board.