X DRAINAGE

DESIGN CRITERIA FOR DRAINAGE FACILITIES

General

This section presents the minimum design criteria for the analysis and design of storm drainage facilities. All subdivision, zoning, and other proposed site development submitted for approval under the provisions of the City Code shall include adequate storm drainage system analysis and appropriate drainage system design. These are minimum standards. All analysis and design shall meet or exceed these Drainage Standards.

Criteria

Design of drainage systems shall be based on the level of protection required for various land uses; major drainage systems shall be based on the runoff expected from the one hundred (100) year storm, unless otherwise determined by the City. Drainage from a development shall not increase erosion or increase flooding problems in the receiving drainage. Drainage shall not degrade the quality of surface and groundwater by increasing sedimentation or by introducing other detrimental constituents.

When a proposal would result in the alteration of natural or existing drainage patterns or the concentration of flow, an analysis prepared by a professional engineer must be provided that demonstrates receiving drainage ways (either natural or manmade) have sufficient capacity to convey the altered flows without causing increased damage, hazard, or liability. The analysis shall address cumulative drainage effects, not only from the development but also from other development within the same drainage basin. The concentration of flow or alteration of drainage patterns must not result in increased erosion to downstream properties.

The drainage system shall be designed to accommodate not only runoff from the subdivision, but also, the historic runoff for those areas adjacent to and upstream from the proposed subdivision, as well as its effects on lands downstream.

Drainage Analysis

When an analysis by a professional engineer is required, the information presented must be accurate and use standard engineering practices to address expected drainage issues. The drainage plan shall describe how the expected maximum water flows from any 25 year flood event, and any 100 year flood event, shall be directed away from all buildings and other developed areas.

Historic Runoff and Drainage Design

The drainage system shall be designed and constructed by the applicant so that only

historic runoff, not including historic irrigation, shall be released from the site. Drainage flows in excess of this amount shall be retained, detained in on-site detention ponds to maintain the historical rate of runoff for the 100-year flood from the undeveloped site, or handled in a storm sewer system which takes into account the low winter temperatures of the area. Drainage shall not be directed to any other property without the written permission, in perpetuity, of the owner(s) of said other property. All capital costs associated with handling runoff generated by a subdivision shall be paid by the applicant and all ongoing maintenance and operations costs of structures on public property or easements shall be paid by the City unless it is agreed that the applicant or successors will maintain the drainage facilities.

Drainage Facilities

The applicant shall provide culverts, drainage pipes, storm sewers, bridges and other flood and runoff control structures which shall be sized as required by the drainage study to protect all roadways and adjacent lots, tracts or parcels, and property that is not a part of the subdivision. Particular attention will be given to items that will prevent over-topping, erosion or silting up of drainage facilities. Culverts and pipes shall be galvanized, corrugated steel or the approved equivalent. The minimum accepted culvert size shall be fifteen (15) inches in diameter. Open channels shall be a trapezoidal in shape with a minimum side slope of two (2) horizontal to one (1) vertical. They shall be sized to retain the anticipated flows at the design velocities.

1. Easements. Where a development is traversed by a watercourse, drainage way, channel, stream, water supply ditch or canal (existing drainage way), a storm water or drainage easement or right-of-way conforming substantially to the lines of such existing drainage way shall be provided. Such easements and existing drainage ways shall be of a width and constructed in a manner adequate to convey expected flows in a 100-year flood. They shall also exclude improvements that would interfere with runoff. Where applicable, drainage easements shall be shown on the final plat and shall provide a minimum access area on each side of the top of bank of twenty (20) feet for maintenance and access during flood events and shall be in accordance with the approved drainage study and drainage plan.

2. Flood Plain Designated as Open Space. Where a subdivision is located adjacent to the Uncompahgre River the applicant shall designate all land located within the 100 year flood plain as open space or open land. In any event, no structures shall be placed within the 100 year flood plain unless in compliance with the City's Floodplain Regulations.

3. Pollution from Drainage. The development shall not result in reasonably avoidable degradation of waterways, other water bodies or wetlands. This

standard shall apply to both the construction activities and the ultimate use of the land. Features such as settling ponds, filtration galleries, and sand traps, and the maintenance of these items, shall be addressed and resolved prior to Site Development Plan approval.

4. Curbs. Concrete curbs shall be required on both sides of streets and shall be designed to direct water so it will flow into the overall storm drainage system for the development and the City. Concrete curbs shall be located between the pavement edge of the street and sidewalk where sidewalks are proposed. Drainage shall be handled by surface drainage between curbs for a lineal distance of no more than 900 feet or until the estimated flows exceed the capacity of the curbs, which ever is shorter. When the curbs can no longer handle the estimated flows, other drainage structures shall be used to direct water.

5. Dips and Swales. Concrete dips, pans or swales are required at street intersections to direct water flowing along curbs through intersections.

6. Phased Development Drainage Plans. A general drainage plan for the entire development shall be presented as part of the first phase of a phased development, and appropriate development stages for the drainage system for each phase shall be indicated and constructed.