PART IV. - DRAINAGE STANDARDS

Section 6.01. - Purpose.

A. The purpose of this article shall be to establish policies governing storm drainage facilities within the city limits of the City of Hewitt, Texas, and its extraterritorial jurisdiction.

B. The purpose of these policies is to protect the general health, safety and welfare of the public by reducing flooding potentialities, controlling excessive runoff, minimizing erosion and siltation problems, and eliminating damage to public facilities resulting from uncontrolled stormwater runoff.

C. The general design of all storm drainage facilities shall be designed to the most current City of Waco Storm Drainage Design Manual.

(Ord. No. 2006-10-16-2, § 23, 10-16-06)

Section 6.02. - General requirements.

A. *Preliminary plan and study.*

1. For any property involved in the platting process, the subdivider shall provide, at his/her expense, a preliminary drainage study of the area proposed for development. The city or its authorized designee may specifically exempt in writing plats that have had previously approved drainage studies or amended plats.

2. The preliminary drainage study shall be submitted concurrently with the submittal of a preliminary plat, plat revision or plat showing plat for review and approval.

3. The studies shall be prepared by an engineer licensed to practice in the State of Texas and experienced in city drainage work. The studies shall include the date and seal and signature of the engineer responsible for the plan.

4. The study shall include the following:

a. Existing topography shall be shown by contour lines on a basis of two-foot vertical intervals unless the shape of the terrain, in the opinion of the city engineer or his/her authorized designee, warrants two-foot vertical intervals; datum shall be the North American Vertical Datum of 1988 (NAVD88).

b. Existing and proposed drainage facilities both on site and on adjacent affected

properties.

c. Proposed contours plus flow arrows for each lot.

d. The scale shall not be smaller than one inch = 200 feet with contour intervals not greater than five feet unless a variation is specifically approved by the city or its authorized designee.

e. Sufficient design calculations showing preliminary sizes of drainage facilities and easement sizes and locations.

B. *Final plans.*

(1) The subdivider shall, at his/her sole expense, provide complete final plans and specifications for the drainage facilities.

a. The plans and specifications shall be prepared by a Texas licensed engineer, meeting with the qualifications outlined in section 6.02(A) (3) above.

b. The plans and specifications shall be submitted to the city for review and concurrence prior to any construction.

c. Responsibility for plan and specifications. The subdivider and his/her engineer shall be responsible for the accuracy of the information furnished in the design of the storm drainage facilities as it pertains to both the development in question and as the drainage facilities affect properties adjacent to the development. Concurrence in the design by the City of Hewitt shall not be construed to relieve any responsibility referred to herein.

Section 6.03. - Drainage features and policies.

A. The three different types of basic drainage features are as follows:

1. Closed systems;

2. Reinforced concrete lined open channels;

3. Natural channels.

B. Stormwater runoff shall be carried in storm sewer pipe when either of the following applies:

1. The runoff can be carried in a pipe of the equivalent capacity of 60 inches in diameter or smaller; or

2. Where it is necessary for the protection of adjacent facilities that the stormwater be carried in an enclosed facility.

Head walls shall be constructed at the outfall of all storm sewer systems. In rare cases, on a case by case basis, when approved by the City, a concrete lined channel may be used in lieu of a closed pipe.

C. Reinforced concrete lined open channels should be used when the criteria outlined in section 6.03(B) (1) above is exceeded:

1. Reinforced concrete lined channels shall conform to the following:

a. Channels draining an area with a "CA" factor of 250 or less shall be lined with reinforced concrete in a manner which will contain the design frequency storm plus one foot of freeboard within the concrete lining.

b. Channels draining an area with a "CA" factor of more than 250 but less than 500 shall be concrete lined to contain the runoff from a five-year return frequency storm with the balance of the required design frequency storm contained within grassed slopes no steeper than four horizontal to one vertical and with a minimum of one foot freeboard.

c. Channels draining an area with a "CA" factor of more than 500 but less than 2,000 shall be constructed with a reinforced concrete pilot channel not less than 12 feet in width and having at least six-inch curbs, a four-inch depressed invert, and an appropriate edge protection as accepted by the city engineer or his/her authorized designee. The remainder of the channel shall consist of earthen side slopes with proper vegetative cover on slopes not steeper than four to one.

d. Channels draining an area having a "CA" factor of more 2,000 shall be governed by the criteria outlined in section 6.03(D) below.

2. The maximum permissible average velocities in channels shall conform to the velocities as shown in the City of Waco Drainage Manual adopted by the City of Hewitt unless otherwise approved in writing by the city or its authorized designee.

D. Natural channels may be preserved when the criteria in section 6.03(C) (1) (d) are met or when the developer desires to preserve natural channels within his/her addition for purposes of aesthetics and/or open space. The following criteria shall apply when natural channels are to be preserved:

1. An application for preservation of a natural channel shall be submitted to and approved by the city prior to approval of the preliminary plat. This application shall contain the following information furnished by the developer:

a. Topographic, hydrologic and hydraulic information sufficient to properly evaluate the proposal and showing that:

(i) before any site work has begun, all land having an elevation below the 25-year return frequency flood elevation is contained within an easement dedicated to the public for the purpose of providing drainage;

(ii) The channel easement has a minimum hydraulic capacity to accommodate a 25-year return frequency storm based on a fully developed watershed;

(iii) that all minor channel improvements, such as reshaping, realignment, etc., are protected with sodding, back sloping, cribbing, or other bank protection that is designed and constructed to control erosion from the 25-year return frequency flood. An analysis shall also be made to determine the effects of the 100-year flood as required by section 6.04(D) (1).

b. When the natural channel to be preserved is one which has had a floodplain information report prepared on it by FEMA the 100-year return frequency storm shall be as shown in that particular report unless otherwise directed by the city or its authorized designee. All requirements contained in the flood hazard chapter [chapter 38] of the City of Hewitt Code of Ordinances shall be applicable in addition to the requirements outlined above.

E. Storm sewer pipe and box culverts shall terminate with 4:1 end slope treatment as detailed in the. TXDOT Standard Construction Details.

(Ord. No. 2006-10-16-2, § 24, 10-16-06)

Section 6.04. - General design requirements.

A. *[Purpose; scope.]* The purpose of this section is to establish standard criteria, principles, procedures and practices for design of storm drainage facilities.

1. The design factors, formulas, graphs and procedures presented or referred to herein are intended for use as engineering guides in the design of drainage facilities and in the solution of drainage problems involving the quantity, method or collection, transportation and disposal of stormwater.

2. Methods of design other than those indicated or referred to herein may be considered in complex and difficult cases where experience clearly indicates they are preferable; however, these deviations shall not be attempted until approval has been obtained from the city or its authorized designee.

3. The methods outlined or referred to herein include accepted principles of surface drainage engineering and should be a working supplement to basic design information obtainable from textbooks and publications on drainage.

B. *Drainage area.*

1. Area of the watershed shall be determined using the information required by section 6.02(A).

2. Outline of drainage areas must follow natural drainage features in nonurbanized areas. Consideration shall be given to manmade features in urbanized areas.

C. *Runoff coefficients.*

1. Storm drainage shall be designed for ultimate development of the watershed and, therefore, runoff coefficients used shall consider these fully developed conditions. Master plans, zoning maps and land use plans shall be used to determine the ultimate development.

D. *Design storm frequency.*

1. In connection with the design of facilities such as low point inlets, culverts, bridges, channels and creeks, the discharge for a 100-year return frequency storm and the resulting possible damages therefrom shall be evaluated to determine if said damages are sufficient to warrant the enlargement of the planned facility. In any areas where stormwater runoff concentrates at low points of grade or where discharge in excess of the design discharge flows across private property, the following information shall be shown:

a. The 100-year design discharge;

b. The depth of inundation of this discharge;

c. An evaluation of the possible damages resulting from the above information;

d. At inlets in sump conditions, relief swales shall be provided to carry runoff in excess of

the design conditions. A reinforced concrete pilot channel shall be provided for swales that will have velocities of five feet per second or greater.

2. The city or its authorized designee, due to particular drainage characteristics of a subdivision, may require minimum finish floor elevations on certain lots contained within said subdivision to be shown upon the plat. These elevations should incorporate the most current floodplain management criteria or other criteria as necessary to avoid damages as specified in section 6.04(D) (1) of these rules. The elevations shall be shown on the plat prior to filing with the plat records of McLennan County, Texas. The following note shall be added to any plat upon which the city or its authorized designee requires the establishment of minimum finish floor elevations:

"The City of Hewitt reserves the right to require minimum finish floor elevations on any lot contained within this addition. The minimum elevations shown are based on the most current information available at the time the plat is filed may be subject to change. Additional lots, other than those shown, may also be subject to minimum finish floor criteria."

(Ord. No. 2006-10-16-2, § 25, 10-16-06)

Section 6.05. - Construction.

All construction shall be in accordance with the specifications included in the various sections of these standards.

Section 6.06. - Off-site draining.

A. The subdivider or developer of property to be developed shall be responsible for all storm drainage flowing on his/her property. This responsibility includes the drainage directed to that property by prior development as well as drainage naturally flowing through the property by reason of topography.

B. Adequate consideration shall be given by the subdivider in the development of property to determine how the discharge leaving the proposed development will affect downstream property.

C. When any proposed development requires the need for off-site grading or includes areas of two acres or more where stormwater runoff has been collected or concentrated, whether it be by permanent drainage systems or streets, it shall not be permitted to drain onto adjacent property except in existing creeks, channels, storm sewers or streets unless the following is provided:

1. Notarized letter of permission from the affected property subdivider; or

2. Proper drainage easements are obtained.

D. The subdivider shall pay for the cost of all drainage improvements required for the development of his/her subdivision, including any necessary off-site channels or storm sewers and acquisition of the required easements, in which only [subsection] 2. above shall apply.

1. In areas where the proposed off-site improvements are to be made within existing city rights-of-way, an estimate of these off-site costs shall be prepared and submitted along with the plans. Subject to approval, cost for such off-site improvements shall be prorated to the extent that the subdivider pays for a percentage of the off-site cost based on the increase of the discharge originating within the limits of his/her addition.

E. Where it is anticipated that additional runoff incident to the development of the subdivision will overload an existing downstream drainage facility, whether natural or manmade, and result in hazardous conditions, the planning commission and/or council may withhold approval of the subdivision until appropriate provision has been made to accommodate the problem, and plans shall be provided which include all necessary off-site improvements including storm sewer systems, channel grading, driveway adjustments, and culvert improvements, stormwater detention ponds with controlled release structures, etc.