



Melissa Municipal Center
 3411 Barker Avenue
 Melissa, Texas 75454
 Phone: (972) 838-2036

Storm Water Drainage Design Criteria Checklist

7/16/2010

Project Name: _____ Zoning: _____

Description: _____ Acres: _____ No. of Lots: _____

Design Engineer: _____

Reviewed by BWR: _____ BWR Project: _____

NOTE: All comments must be addressed prior to approval. The approval of the final plat shall be contingent upon acceptance of construction plans and specifications by the city engineer.

Drainage Design Reference	Requirement	Complete		
		Yes	No	N/A
SECTION II RUNOFF METHODS				
Section B.1	Drainage areas less than 200 acres may be calculated using the Rational Method.			
Section B.1	Antecedent precipitation factor: 25 year – 1.1 100 year – 1.25			
Section B.2	Runoff Coefficient “C” minimum of 0.4			
Section B.3	Time of Concentration: $T_c = T_{sheet} + T_{shallow} + T_{open}$ Min $T_c = 10$ min for non-residential or 15 for residential			
Section B.4	Rainfall Intensity Curve is TX Dot Rainfall Intensity Curve for Collin County			
DESIGN CRITERIA				
SECTION III FEMA CRITERIA				
	All FEMA regulations must be met, and when submittal to FEMA is required it must be approved by City Engineer Prior to submitting to FEMA. Submittals are required when there are any modifications to a floodplain or floodway.			
SECTION IV CITY CRITERIA				
Section A.1	Runoff calculations are required for developments of 1 acre or greater, major streams are proposed to be modified.			
Section A.3	Runoff calculations from off-site sources must be considered at the proposed ultimate land use.			
Section A.4	All drainage shall provide for positive overflow at all low pints.			
Section A.5	Detention is not required when runoff can be directly carried to a designated FEMA floodway without adversely impacting property downstream.			
Section 4.09 (5)	Drainage System shall be designed so that water shall not be greater than curb deep and shall not flow farther than 1000 ft before reaching and inlet, no flow across collector or higher			
SECTION IV B. Open Channels				

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Section B.1.a.1	For channel sections contained entirely within project: improved cross-section shall reduce velocity to 6 fps for vegetated channels. Over bank velocities from 6 to 8 fps, structures shall be constructed to prevent erosion. Grade control structures to be 3 ft below proposed grades and adequate number to prevent less than 1 ft of degradation			
Section B.1.a.2	For channel sections contained entirely within project: improved cross-section shall reduce velocity to 6 fps for vegetated channels. Over bank velocities from 6 to 8 fps, structures shall be constructed to prevent erosion. Grade control structures to be 3 ft below proposed grades and adequate number to prevent less than 1 ft of degradation. Coordination with adjacent landowners to construct entire channel at time of construction. Easements shall be provided for maintenance.			
Section B.1.b	Major channels or channels where backwater effects occur must be modeled using a standard backwater model and must meet FEMA criteria. Otherwise Manning's equation can be used.			
Section B.1.c.1	Two feet of freeboard is required on all major channels and one foot on collector channels including superelevation of the water surface at bends.			
Section B.1.c.2	All channels to be designed to have subcritical flow with a Froude Number less than 0.86, Hydraulic jumps to be avoided.			
Section B.1.c.3	Channel shape shall be trapezoidal			
Section B.1.c.4	All channel radii are recommended to be a minimum of three times the top width of flow			
Section B.1.c.5	Channel Side Slopes: 4 feet horizontal to 1 foot for natural ground cover, 1.5 feet horizontal to 1 foot for rock or gabions			
Section B.1.c.6	Channel Slopes and Velocities, minimum of 0.30% with concrete pilot channel for earthen channels. Maximum Velocity is 15 fps			
Section B.1.d	Channel Vegetation shall be low maintenance and comply with existing ground cover			
Section B.2	Erosion prevention must be accounted for in the design			
SECTION IV C. Bridges				
Section C.1 Section C.2	Bridges: One foot of freeboard between 100-year and the low chord of the bridge, skew shall be 0 degrees in the direction of the water travel, erosion protection shall be accounted for			
SECTION IV D. Culverts				
Section D	Freeboard: One foot of freeboard is required 100 yr Thoroughfare 50 yr Collector 25 yr Residential Erosion: supercritical flow is allowed such that the hydraulic jump is at the outlet and erosion control is accounted for. Bends: maximum 15 deg on 50 ft intervals Discharge Velocity: 15 fps maximum			

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Section E, F, G	<p>Energy Dissipaters: located at exits to culverts, bridges, channels to convey flow safely. (Subcritical flow is preferred)</p> <p>Levees: Discouraged except to meet freeboard requirements</p> <p>Buildings: 2 feet above 100 yr or FEMA flood elevation</p>			
SECTION IV H. Detention Facilities				
Section H.1	<p>Not required when runoff from site can be carried to major channel or natural drainage with adequate capacity, maybe used for aesthetics, control flooding, soil erosion, sedimentation, and pollution control. Maintenance plan is required. Detention facility must drain within 36 hours of storm event. Detention/Retention is allowed with the retention not included in the volume requirements and proper aeration is required.</p>			
Section H.2.a	Storm Frequency: 100 year			
Section H.2.b	Maximum Discharge rate: Limited to the pre-development discharge rate			
Section H.2.c	Minimum Storage Volume: based on 100 year 2 hour event for the site without exceeding the pre-development discharge rate			
Section H.2.d	Minimum Slope: 0.40%			
Section H.2.e	Freeboard: minimum of one foot			
Section H.2.f	Sediment Control Facilities: velocities shall be designed to drop sediment and not pick up additional sediment, sediment removal shall not be more than twice a year, sediment volume shall be incorporated into the detention volume			
Section H.2.g	Flood Peak Consideration: flood peak in the main channel may be affected by delaying the peak from the site in lower portions of a watershed			
Section H.3	Easements: include the outlet structure, associated outfall channel or conduits, detention facility, and a 10 foot maintenance access strip			
Section H.4	Maintenance: by owner, mowing, debris and sediment control scheduled twice a year minimum.			
Section H.5	Discharge to FEMA major corridors is allowed with capacity analysis of downstream corridor			
Section H.6	Downstream Drainage that can not convey ultimate flows: Detention is required. Show on Plans: Calculations showing detention is required, allowable release, calculations showing release without detention, calculations showing release with detention, downstream capacity is adequate when top of curb is not exceeded by the flows			
SECTION IV I. Storm Sewer Systems and Appurtenances				
Section I.1.a	Storm Frequency: 25 year plus 100 year positive overflow at inlets in street low points			
Section I.1.b	Velocities and Grades: minimum 2.5 fps, minimum slopes are shown in Appendix D, maximum velocity for conduit is 12.5 fps, outfall velocity shall not exceed maximum velocity in receiving channel and			

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	may require energy dissipater			
Section I.1.c	Hydraulic Gradient of Storm Sewers: full flow drainage must account for all losses by accumulative head losses along the system, shall be included in the profile, friction head loss is accounted for using Manning's Equation, HGL shall not be closer to street grade than 1 foot			
Section I.1.d	Minor Loses: equations for determination in Appendix C for entrance losses, expansion losses, manhole and bend losses, junction losses			
Section I.1.e	Open Channels and Conduits: open channels may be used instead of enclosed systems when flow exceeds 3 – 72” conduits.			
Section I.2	Laterals: sized to control flooding depth at inlets, HGL shall not be closer to surface than 1 foot with all losses accounted for			
Section I.3.a	Inlets Placement: 25 year storm shall not exceed top of curb, flow may cross residential streets only, inlets are required in alley and/or driveway to prevent capacity of intersecting street to be exceeded, inlet to be placed at lowest corner of backyard areas.			
Section I.3.b	Capacity and Size: minimum 5’ inlet, no more than 20 feet shall be placed, 18” minimum lateral size, 60° intersections between lateral and trunk line.			
Section I.3.c	Design: drain inlets shall be designed in accordance with the latest State of Texas Department of Highways and Public Transportation Bridge Division Hydraulic Manual, recessed inlets in thoroughfare and collector streets curb line else where, slotted and grate inlets will not be allowed, combination inlets are allowed with approval of City Engineer, drains from streets that pass between houses to an outfall shall be designed for the 100 year flow			
Section I.4.a	Outfall flowline elevations: storm sewer flow lines shall match the flow line of the open channel except: discharging into concrete lined channel outlet must be below top of channel, outfall is submerged below the normal water surface level			
Section I.4.b, c	Flumes to bring discharge down to flow the flow line of creeks is not permitted, Drop structures are allowed with approval from City Engineer			
Section I.4.d	Intersections with Creeks: 60° maximum intersect with minor creeks, major creeks may have a 90° intersection provided hat the ratio of discharge in the creek versus the discharge in the pipe during the 100 year storm event is greater than 10, minimize erosion and include safety concerns.			
Section I.5	Manholes: 600 ft maximum for 24” pipe and smaller, 1200 ft maximum for pipes larger than 24” and rectangular in shape			
Section I.6	Materials: RCP with a roughness coefficient specified on plans			
Section J.2	Water encroachment must meet the following: Residential: maximum depth of 6” Collector: One lane must remain open Thoroughfare: One lane in each direction must remain open			
Section J.4	Alleys: 25 year flow shall be contained within pavement and 100 year			

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	flow shall be contained within the ROW, cross section shall provide for containment			
SECTION IV K. Easements				
Section K.1	Open Channels: all easements shall be dedicated to the City of Melissa, no structure that could impede flow shall be placed within the easement, shall encompass one foot above ultimate surface elevation or top of the high bank or channel edge, 10 ft maintenance easement on both sides of channel			
Section K.2	Enclosed Storm Sewers: all easements shall be dedicated to the City of Melissa, 15 ft wide for storm sewers,			