

Chapter 16 - DRAINAGE AND FLOOD CONTROL^[1]

Footnotes:

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Cross Reference – Public Works Departments, § 2-541 et seq.; buildings and buildings regulations, Ch 12

§ 16-1. - Purpose and scope

It is the intent of this chapter to establish community floodplain management ordinances to protect the general health, safety, and welfare of the public from the hazards and damages of flooding; to provide clean and sanitary channels for stormwater runoff; to prevent pollution of watersheds, streams, and channels; to prevent the encroachment of structures and improvements on channels to protect natural scenic areas; and to provide for the conservation of the natural resources of the area. All subdivisions of land and all developments or improvements of any character which affect runoff, stormwater flow or drainage in any portion of the City of Oklahoma City (City) shall be subject to the provisions of this chapter and the technical details within the Oklahoma City Drainage Criteria Manual (DCM). This chapter is not intended to repeal, abrogate, or impair any existing requirements, obligations, easements, covenants, or deed restrictions. However, where another ordinance conflicts or overlaps this chapter or the DCM, whichever imposes the more stringent restrictions shall prevail.

§ 16-2. – Administration

1. Local Floodplain Administrator.

The City Engineer is designated as the Local Floodplain Administrator (Administrator) to administer and implement the provisions of this chapter, the DCM, and appropriate sections of 44 CFR, National Flood Insurance Program (NFIP) pertaining to floodplain management. Prior to authorization of any building permit by the City, the City Engineer shall review all such stream flow and runoff calculations as required under the terms of this chapter and the DCM. The City Engineer has final authority over engineering interpretations.

2. Applicability of provisions.

- a. The Consultant Engineer (Engineer) registered in the State of Oklahoma must sign and seal all final plans submitted to the City for review and approval. Review and approval of the plans by the City shall not relieve the Engineer of responsibility for all aspects of the design included as part of the plans.
- b. The flood prone area provisions of this chapter shall apply to all lands, tracts, parcels, or lots which are in part or in whole traversed by or encompassed by or lying within 200 feet of the external boundaries of the delineated Federal Emergency Management Agency (FEMA) floodplain for that watercourse as shown on the effective floodplain maps, or an area deemed flood prone by the City Engineer.
- c. The location and boundaries of the floodplain are shown on the FEMA Flood Insurance Rate Maps (FIRM) Flood Hazard Boundary Map of the City, which are hereby incorporated into this chapter and placed on file in the office of the City Clerk. The maps, together with everything shown thereon and all amendments thereto, shall be as much a part of this chapter as if fully set forth and described herein. Application of this chapter to floodplain boundaries may be modified on portions of major river channels, primary channels, and secondary channels only by specific application of Flood

Insurance Studies and Flood Insurance Rate Maps as completed and received from the Administrator.

- d. The boundaries of the floodplain are as they appear on the effective Flood Hazard Boundary Maps. The boundary lines on the map shall be determined using the scale appearing on the map. Where there is conflict between the boundary lines on the map and actual field conditions, the dispute shall be settled by the City Engineer. In all cases the person contesting the location of the boundary shall be given a reasonable opportunity to present a case to the City Engineer and to submit technical evidence if so desired. The City Engineer shall not allow deviations from the boundary line as mapped unless the evidence clearly and conclusively establishes that the mapped location of the line is incorrect.
- e. The areas of special flood hazard are identified by the FEMA in a scientific and engineering report entitled, "The Flood Insurance Study for Canadian County, Oklahoma and Incorporated Areas" dated June 7, 2019, with accompanying Flood Insurance Rate Map, are hereby adopted by reference and declared to be a part of this chapter.
- f. The areas of special flood hazard identified by the FEMA in a scientific and engineering report entitled, "The Flood Insurance Study for Cleveland County, Oklahoma and Incorporated Areas" dated ~~January 15, 2021~~, with accompanying Flood Insurance Rate Map, are hereby adopted by reference and declared to be a part of this chapter.
- g. The areas of special flood hazard identified by the FEMA in a scientific and engineering report entitled, "The Flood Insurance Study for Oklahoma County, Oklahoma and Incorporated Areas" dated ~~December 18, 2018~~, with accompanying Flood Insurance Rate Map, are hereby adopted by reference and declared to be a part of this chapter.
- h. The areas of special flood hazard identified by the FEMA in a scientific and engineering report entitled, "The Flood Insurance Study for Pottawatomie County, Oklahoma and Incorporated Areas" dated May 16, 2019, with accompanying Flood Insurance Rate Map, are hereby adopted by reference and declared to be a part of this chapter.

3. Disclaimer of liability.

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On occasion, greater floods can and will occur, and flood heights may be increased by manmade or natural causes. This chapter does not imply that land outside the floodplain areas or uses permitted within floodplain areas will be free from flooding or flood damages. This chapter shall not create liability on the part of the City or any officer or employee thereof for any flood damages that result from reliance on this chapter or any decision made hereunder.

Plans prepared by Engineers are the representations and responsibilities of those professionals. Approval of plans and other documents by the City, the City Engineer, or the Administrator are for administrative purposes only and are not and shall not be deemed a representation, guaranty, or warranty. Neither the City nor City Engineer nor the Administrator has the responsibility to verify or validate the information, assumptions,

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conclusions, or recommendations provided in a plan, document, and any approval thereof shall relieve not any landowner, developer, professional engineer or architect or other person or entity so providing.

4. Penalty.

Any person who shall violate any of the provisions of this chapter shall be deemed guilty of a Class "A" offense. For any second or subsequent offense and upon proof of prior conviction, said person shall be guilty of a Class "B" offense.

5. Enforcement.

The City Engineer, or their designated representatives, has full authority to enforce the provisions of this chapter and the DCM and permits issued under Federal and State authorities.

§ 16-3. - Inclusion by reference the Oklahoma City Drainage Criteria Manual

The means and methods of calculations, design parameters, requirements and limitations referenced within and supporting the intent and purpose of this chapter shall be outlined and defined by the most recent version of the Oklahoma City Drainage Criteria Manual (DCM). The DCM provides the means and methods of calculations necessary for the application of and compliance with the minimum standards of this chapter and other governing ordinances, rules, and regulations. Calculations made utilizing DCM, as a technical standards and requirements, must be confirmed by the signature and seal of an Engineer registered and licensed in the State of Oklahoma.

§ 16-4. - Definitions

The following words, terms, and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

44 CFR means applicable subsections of Chapter 44 of the Code of Federal Regulations also referred as the national Flood Insurance Program (NFIP).

Administrator/Floodplain Administrator means the person responsible for implementing the community's local floodplain ordinance and ensuring that the community is complying with minimum NFIP standards and enforcing any locally imposed higher standards. The Administrator shall review, and evaluate floodplain development permit applications, review elevation certificates for completeness and accuracy, review development plans and specifications for compliance with this chapter, inspect floodplain construction to verify location relative to the floodplain/floodway and ensure compliance with this chapter, educate community members and local officials about floodplain management, maintain documentation and records of floodplain activities, and investigate violations of this chapter and initiate corrective action.

Base Flood means the flood having a one percent chance of being equaled or exceeded in any given year commonly referred to as the 100-year frequency flood.

Base Flood Elevation (BFE) means the computed elevation to which the flood is anticipated to rise during the base flood.

Board means the Oklahoma Water Resources Board.

Bridge means a hydraulic structure that is constructed with abutments and a superstructure

which are typically made of concrete, steel, or other materials. Since superstructures are not an integral part of the abutments and could therefore potentially move, the hydraulic criteria for bridges are different than for culverts.

Building (see Structure).

Channel means defined landforms, either natural or manmade or man improved, whereby stormwater is carried between points of origin and destination.

City means the City of Oklahoma City.

City Engineer means the professional engineer designated in Section 2-111 of this Code.

Clearing means the process of manually or mechanically removing the vegetative and/or nonvegetative cover of any land.

Corps of Engineers (COE) 404 Permit means a permit issued by the United States Army Corps of Engineers pursuant to Section 404 of the Clean Water Act.

Construction includes, but is not limited to, land preparation such as clearing, grading, and filling; the installation of streets and/or walkways; excavation for a basement, footings, piers, or foundations or for the erection of temporary forms; and the installation on the property of building, accessory buildings, structures, or improvements, such as garages or sheds not occupied as dwelling units or not part of the main structure.

Culvert means a closed conduit for the passage of stormwater under an embankment, such as a road, railroad, or trail. Flow generally enters a closed conduit (culvert) by an open channel, generally at a similar elevation. The geometry of the culvert inlet is utilized in the determination of the required size and capacity of the culvert. (See DCM for calculating culvert capacity)

Detention means storage that reduces the rate of stormwater runoff, for a short period of time, to lower peak flows whereby controlling the discharge rate of release to the receiving stream, river, pipe, channel, or culvert.

Detention facility or detention pond means a constructed facility, improvement, or pond functioning to retain or attenuate stormwater flow or runoff.

Developer means a person or entity that owns the land upon which a development is made or is to be made, occupies, or uses has the right to occupy or use the land where a development is made or is to be made or contracts for a development to be made.

Development or development in floodprone areas means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavations, or drilling operations, and/or storage of equipment or materials.

Drainage Criteria Manual (DCM) means the manual providing design guidance for use by landowners, developers, architects and/or engineers, and/or their agents, in preparation of drainage plans for development within the City. It establishes rules and design standards and requirements and methods that must be consistently followed and will be enforced throughout the City's jurisdiction. The design methods presented in this manual are intended to provide minimum standards for determination of runoff rates, methods of storm water collection, conveyance, and detention. The DCM sets forth the technical details, provisions, standards, and requirements established by the City Engineer, as may be amended from time to time.

Driveway pipe means a culvert located under a driveway.

EPA means the United States Environmental Protection Agency.

Elevated building means, for insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns:

1. built, in the case of a building in zones A1—30, AE, A, A99, AO, AH, B, C, X, and D, to have the top of the elevated floor, or in the case of a building in zones V1—30, VE, or V, to have the bottom of the lowest horizontal structure member of the elevated floor elevated above the ground level by means of pilings, columns (posts and piers), or shear walls parallel to the floor of the water; and

2. adequately anchored so as not to impair the structural integrity of the building during a flood of up to the magnitude of the base flood.

In the case of zones A1—30, AE, A, A99, AO, AH, B, C, X, and D, "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of floodwaters.

In the case of zones VI—30, VE, or V, "elevated building" also includes a building otherwise meeting the definition of "elevated building" even though the lower area is enclosed by means of breakaway walls if the breakaway walls meet the standards of Section 60.3(e)(5) of the National Flood Insurance Program regulations.

Engineer means a registered professional engineer licensed in the State of Oklahoma. The City Engineer and other City employees who are registered professional engineers licensed in the State of Oklahoma are not included in this definition.

Erosion means the process of gradual wearing away of land areas or masses or portions thereof.

Erosion and sediment control measures are methods used to reduce the amount of soil particles that are carried by stormwater, from a land area or mass and deposited in a receiving water, or stormwater conveyance facility or improvement.

Excavation means the process of removing earth, stone, land, soil, topsoil, or other materials.

FEMA Elevation Certificate (EC) means a document for the purpose of estimating the risk premium rates necessary to provide flood insurance for new or substantially improved structures in designated Special Flood Hazard Areas. It is to be used to provide elevation information necessary to ensure compliance with community floodplain management ordinances and this chapter, to determine the proper insurance premium rate and to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F). It is a technical document which must be prepared by a registered Land Surveyor, or Engineer, licensed in the State of Oklahoma.

Flood or flooding means a general and temporary condition of partial or complete inundation of normally dry land areas from:

1. the overflow of inland waters; or
2. the unusual and rapid accumulation, flow, or runoff of surface waters from any source.

Flood Elevation Study means an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation, and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood insurance study (FIS) Flood Elevation Study

Floodplain or Floodprone Area means any land area susceptible to being inundated by water from any source (see definition of flood or flooding). **Floodprone areas are determined from FEMA Flood Insurance Rate Maps, USGS Oklahoma City Urbanized Study, and/or any individual study of an unnamed tributary by an Oklahoma Professional Engineer.**

Floodplain activity permit means the permit required for development from which runoff or drainage flows through or into the boundaries of the delineated floodplain for a watercourse as shown on the official floodplain maps or an area deemed floodprone, through independent flood study, reviewed and approved by the City Engineer.

Floodplain management means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, drainage improvements, stormwater detention, and land use and control measures.

Floodproofing means protective measures added to or incorporated in a building or structure that is not elevated above the base flood elevation to prevent or minimize flood damage. "Dry floodproofing" measures are designed to keep water from entering a building. "Wet floodproofing" measures minimize damage to a building or structure and its contents from water that is allowed into a building or structure.

Flood protection system means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the areas within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, detention ponds, levees, or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Floodway means the channel of a river or other watercourse and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without cumulatively increasing the water surface elevation more than one foot.

Flows or discharges means City calculated urbanized stormwater discharges or FEMA calculated stormwater discharges, whichever is higher.

Freeboard means a factor of safety expressed in feet above a flood level for purposes of flood plain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Frequency flood means all frequency flood(s) mentioned in this chapter shall refer to either FEMA calculated stormwater discharges or City calculated urbanized discharges, whichever is higher.

Grading means the cutting and/or filling of the land surface to a desired slope or elevation.

Grubbing means the process of removing vegetation, roots, stumps, brush, or any excess

deleterious materials that cannot be used for sub-grade or structural soil.

Hydraulic Grade line is a measure of flow energy, is a line coinciding with the level of flowing water at any point along an open channel. In closed conduits flowing under pressure, the hydraulic grade line is the level to which water would rise in a vertical tube (open to atmospheric pressure) at any point along the pipe.

Highest adjacent grade means the highest natural elevation of the ground surface prior to grading or construction next to the proposed walls of a building or structure.

Historical runoff means, when utilized in the calculations of detention requirements, the runoff conditions existing prior to any new development, construction, or grading.

Impervious surface means any hard-surfaced areas which prevent or retard the entry of water into the soil in the manner or to the extent that such water entered the soil under natural conditions, or where water is caused to run off the surface in greater quantities or at an increased rate of flow than was present under natural conditions. Impervious surfaces shall include, but are not limited to, rooftops; sidewalks; paving; driveways; parking lots; walkways; patio areas; storage areas; and asphalt, concrete, gravel, oiled macadam, or other surfaces which similarly affect the natural infiltration or runoff patterns of real property in its natural state.

Levee means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide protection from temporary flooding.

Levee system means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the building or structure in violation of the applicable non-elevation design requirements.

Basements or underground storm shelters, shall be permitted to be constructed if an engineered plan illustrating that the lowest opening to any part of the basement or shelter is not less than 1 foot above the 100-year frequency, as determined by the FEMA maps or a flood study, which plan was prepared by an Engineer and submitted to and accepted approved by the City Engineer prior to construction.

Specifically, for all new construction and substantial improvements to buildings or structures, in fully enclosed areas below the lowest floor that are subject to flooding must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

Major river channels mean the cross-sectional area of the North Canadian and Canadian Rivers at and below the elevation of the 100-year frequency flood limits as established by the City, the Federal Emergency Management Agency, and the U.S. Army Corps of Engineers.

Manufactured home means a building or structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured home park or subdivision means a parcel (or continuous parcels) of land divided into two or more manufactured home, or lots for sale or rent.

Mean sea level means, for purposes of the National Flood Insurance Program, the North American Vertical Datum (NAVD 88) or, other City accepted datum, as the datum can be updated from time to time, to which base flood elevations shown on a community's flood insurance rate map are referenced.

Mechanical equipment or utility equipment means any electrical, heating, ventilation, plumbing, and air conditioning equipment or other service facilities associated with a building or structure.

New construction for floodplain management purposes means buildings or structure for which the "start of construction" commenced on or after the effective date of an initial Flood Insurance Rate Map (FIRM) or after December 31, 1974, whichever is later, including any subsequent improvements. For Floodplain Management Purposes: Building or structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such buildings or structures.

NPDES means National Pollutant Discharge Elimination System, EPA's program to control the discharge of pollutants to waters of the United States.

NPDES permit means an authorization, license, or equivalent control document issued by the EPA.

100-year floodplain area means river or stream flood hazard areas, and areas with a 1% or greater chance of flooding each year.

Primary drainage channels are all drainage channels, streams or creeks which drain an area of 500 acres or more, excluding those areas defined as major river channels.

Private stormwater facility means a stormwater facility other than a public stormwater facility.

Public stormwater facility means a stormwater facility in a **public** drainage or utility easement, dedicated to, and formally accepted by the City for public use and benefit if constructed as approved by the City Engineer and in accordance with this chapter and if accepted by specific formal action of the City by the City Council.

Public Works Director or Director means the person designated in Section 2-542 of this Code.

Repetitive Loss (RL) property is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.

Receiving water means a runoff process connected to a network of waterways that increase in size as the watershed area increases.

Riverine means of or produced by a river.

Riverine floodplains are a floodplain of or produced by a river having readily identifiable channels.

Rural subdivision shall include any subdivision of land: (1) Within an AA Agricultural District; or (2) Under the RA Single-Family Rural Residential District provisions set forth in the Planning and Zoning Code; or (3) Under the Planned Unit Development provisions set

forth in the Planning and Zoning Code; or (4) Within the Garber-Wellington Aquifer Recharge Area, regardless of the uses allowed by zoning.

Secondary drainage channels are all drainage channels, streams, and creeks which drain an area of less than 500 acres, excluding those areas defined as major river channels or Primary Drainage Channels.

Sediment means soil, sand, and minerals transported by wind offsite or washed from land into water, usually after rain.

Soil means the unconsolidated mineral and organic material on the surface of the earth that serves as a natural medium for growth of plants.

Soil disturbance/soil disturbing activities mean any moving or removing by manual or mechanical means of the vegetative and/or nonvegetative cover or soil mantle, including but not limited to grading, excavations, and mining.

Special flood hazard map means an official map provided through FEMA administration, having special flood, mudslide, or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map (FHBM) or FIRM as Zone A, AO, A1-30, AE, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1-30, VE, V, M, or E.

Stockpiling means storing of soil or other fill or excavated material.

Stormwater system means any improved open channel, closed conduit, natural stream, creek, or swale, that acts to collect, deliver, discharge, and release any stormwater, improved or unimproved, across a specific development site or tract of land.

Structure means a walled and roofed building, other than a gas or liquid storage tank, principally above ground and permanently affixed to a site as well as a manufactured home on a permanent foundation.

Substantial improvement means any repair, reconstruction, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure either (1) before the improvement or repair is started, or (2) if the building or structure has been damaged and is being restored, before the damage occurred. For the purpose of this definition "substantial improvement" is considered to commence when the first alteration of any wall, ceiling, floor, or other structural part of the structure commences, whether or not that alteration affects the external dimensions of the building or structure. The term does not, however, include either (1) any project for improvement of a building or structure to comply with such existing State or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions, or (2) any alteration of a building or structure listed on the National Register of Historic Places or an official State of Oklahoma inventory of historic places.

Sump areas means low elevations which collect water.

Surface means the upper most boundary of either standing or flowing water and that elevation of said surface boundary equals the Water Surface Elevation.

Surveyor's Certificate means a document prepared by a qualified engineer/surveyor, licensed in the State of Oklahoma, which provides information on elevation of a building or structure relative to flood elevations, building or structure type, and as-built finished floor elevation established by independent flood study approved by the City.

Urbanized discharge means FEMA/USGS (USGS Open File Report 83-26) historical

“urbanized” information for the City studies for streams and rivers, or new hydrology for unstudied FEMA drainage basins for portions of the City; prepared, signed, sealed, and submitted to the City Engineer by an Engineer.

Vegetative cover means vegetative growth shielding the soil surface from erosion.

Violation means act or omission in violation of this chapter, the DCM or any other referenced applicable requirement or the failure of a structure, building, improvement, or other development to be fully compliant with this chapter, the DCM, or any other referenced applicable requirement. A structure, building, improvement or other development without the elevation certificate, other required certifications, or other evidence of compliance required in CFR 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4) or (e)(5) is presumed to be in violation until such time as that documentation is provided.

Water surface elevation means the heights in relation to mean sea level expected to be reached by floods of various magnitudes and frequencies at pertinent points in the floodplains or riverine areas.

§ 16-5. - Responsibility for improvements

1. It is intended by this chapter that the improvements of primary drainage and major river channels shall be the responsibility of the developer since the developer is directly and materially benefitted and for the long-term benefit of the community as a whole. The developer of land or improvements within an area containing a primary drainage channel must design, plan, and carry out their developments in a manner that will not interfere with, increase, change, or restrict the natural flow of water or materially change the condition of runoff or discharge within the calculated area below the 100-year maximum flood elevation. Increased runoff or discharge and changes in primary drainage channels which are created by such developments within primary drainage areas are the planning responsibility of the developer and will be constructed and maintained in accordance with the provisions of this chapter. The improvement of secondary drainage channels is the responsibility of the developer, since the primary benefit is to the area served by the secondary channel and not to the community. Community as used in this chapter shall not mean the City but rather members of the general public individually and collectively. Provided, this chapter does not create any responsibility or liability upon the City to make improvements or to prevent flooding.

2. Stormwater facilities

a. Public stormwater facilities and systems

~~It is required to be used when there is offsite stormwater flow from a drainage area of greater than six (6) acres that enters the subject development site and must be carried through the development site to the point of discharge. The public stormwater system must be designed in accordance with this chapter and the DCM and constructed in accordance with plans designed by an Engineer and reviewed for compliance by the City Engineer. Public stormwater facilities and systems must be placed in an appropriately sized easement approved by the City Engineer and dedicated to the City for public benefit, and upon formal acceptance by the City Council of the public stormwater facilities and systems and the easement, the City will assume maintenance. Public Storm Sewer Systems shall be provided when an existing storm sewer system, either Public or Private discharges onto the Development site.~~

Need to be sure about this —
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FOR ALL PROPOSED DEVELOPMENTS THAT WILL HAVE STREETS DEDICATED TO THE PUBLIC, THE STORM SEWER SYSTEMS FOR THAT DEVELOPMENT SHALL BE PUBLIC.

~~If the offsite drainage area entering the development is between 0 and 6 acres, the flow may be intercepted and directed to a defined point of discharge such as to a paved concrete channel and/or closed storm sewer.~~

~~When specifically requested by a Developer or Engineer, the City Engineer may approve the construction of public stormwater facilities and systems, when the entire development generates all the stormwater drainage on site, provided public streets are being constructed.~~

b. Private stormwater facilities and systems

~~When specifically requested by a Developer or Engineer, the City Engineer may approve, on a case-by-case basis, the construction of a private stormwater facilities and systems within a private drainage easement. Private stormwater facilities and systems may be utilized when the entire development generates all the stormwater drainage on the site, and there is not any offsite or pass-through stormwater runoff or discharge. For any proposed development with private streets, private stormwater facilities and systems shall be constructed.~~ Private stormwater facilities and systems shall not be dedicated to the City and all construction, operation and maintenance responsibilities shall remain with the developer and property owner(s). Post-construction operation and maintenance responsibilities of private stormwater facilities and systems placed in a private drainage easement or suitable common area as a part of a plat may be assigned to a Property Owners Association or Homeowners Association.

The design, construction, operation and maintenance of private stormwater facilities and systems will not be reviewed or inspected by Public Works Engineering or City Engineer personnel. Private stormwater facilities and systems will be inspected by Development Services Plumbing Inspectors in accordance with the applicable Plumbing Code.

e. ~~Public stormwater facilities and systems are required to be used when there is offsite stormwater flow from a drainage area of greater than six (6) acres that enters the subject development site and must be carried through the development site to the point of discharge. The public stormwater system must be designed in accordance with this chapter and the DCM and constructed in accordance with plans designed by an Engineer and~~

~~reviewed for compliance by the City Engineer. Public stormwater facilities and systems must be placed in an appropriately sized easement approved by the City Engineer and dedicated to the City for public benefit, and upon formal acceptance by the City Council of the public stormwater facilities and systems and the easement, the City will assume maintenance. Public Storm Sewer Systems shall be provided when an existing storm sewer system, either Public or Private discharges onto the Development site.~~

d. ~~If the offsite drainage area entering the development is between 0 and 6 acres, the flow may be intercepted and directed to a defined point of discharge such as a to a paved flume and/or an underground pipe, either of which will be privately constructed, operated, and maintained and be a private stormwater facility and ownership.~~

3. Where construction of a stormwater drainage facility or system is required along a property line common to two or more property owners, the property owner proposing development or use of their property shall be responsible for meeting the stormwater drainage requirements at the time of development.

THE STORM SEWER SYSTEMS FOR THIS DEVELOPMENT SHALL BE PRIVATE.

Private Stormwater facilities & systems will be inspected by Public Works Field Services Inspection Personnel.

→ by Public Works Engineer Personnel.

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4. Drainage easements of adequate width to provide working room for construction and maintenance must be provided for all storm sewers with the minimum width being 15 feet. Drainage easements should include additional width for structures, buildings, and improvements adjacent to drainage easements are not affected by excavation or other work within and to the edges of the drainage easement.

§ 16-6. - Primary drainage channel requirements

All primary drainage channels, which are located within ~~or immediately adjacent to~~ an improvement, construction area, development, or subdivision, must be protected and/or improved in accordance with this chapter, the DCM and as follows:

1. **Any fill placed within a floodprone area will require a flood study to demonstrate the no negative impact to adjacent property owners and allowable rise must comply with FEMA regulations. The developer must obtain and comply with all applicable permits and requirements prior to commencing any grading, excavation, or fill.**

~~All land within a development having an elevation below the 100-year frequency flood elevation of the primary drainage channel must be left unimproved as a common area with a private stormwater dedication or as a private drainage easement. If that land is not within a FEMA designated floodway, the area can be filled and improved. The developer must obtain and comply with all applicable permits and requirements prior to commencing any grading, excavation, or fill.~~

2. The existing channel lying within ~~or immediately adjacent to~~ a subdivision or a parcel of land proposed for development or redevelopment, **if left unimproved, shall be placed in common area and/ or private drainage easement. must be cleaned by the property owner, only if it is not Waters of the United States or, considered non-jurisdictional by the COE, to provide for the free flow of water runoff, and the channel alignment and geometry shall be improved to contain and convey stormwater runoff generated by a 100-year rainfall event, within the limits of the dedicated drainage easement or common area, provided for in Subparagraph 1 above. Maintenance responsibility for all unimproved open channels will remain with the property owner or homeowner's association.**
3. Site drainage improvements must provide for the grading of all building pads to an elevation where all building pads will not be subjected to overflow from a 100-year frequency flood and in a manner that will provide for a rapid runoff of stormwater. Construction of new and substantially improvements to existing buildings and structures are subject to all regulations and requirements of this chapter, the DCM, and the following:
 - a. New construction or substantial modification of residential buildings and structures (including manufactured homes) and accessory buildings must have the lowest floor (including basements) elevated to 1 foot above the level of the 100-year frequency flood.
 - b. New construction or substantial modification of nonresidential buildings and structures and accessory buildings within the 100-year frequency floodplain must have the lowest floor (including basement) elevated to 1 foot above the 100-year frequency flood level or floodproofed, including **above ground** utility and sanitary facilities, up to 1 foot above the level of the 100-year frequency flood.
 - c. Mechanical and utility equipment for residential or nonresidential buildings and

structures must be designed and/or located to prevent water from entering or accumulating within the components during conditions of a 100-year **frequency event** flood.

- d. If a nonresidential building or structure is intended to be floodproofed, an Engineer must develop and/or review its structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice for meeting the elevation requirements of this chapter. A record of such certificates which includes the specific elevation (in relation to mean sea level) to which such buildings or structures are floodproofed must be submitted by the Engineer to City Engineer for review as to compliance with this chapter and the DCM before any construction may commence.
 - e. A fully urbanized condition must be used to calculate flow for the design of stormwater facilities and systems.
4. Whenever drainage channel improvements are constructed or improved, sodding, back sloping, cribbing, and other bank protection must be designed and constructed to control erosion for the anticipated conditions and flows resulting from a 100-year frequency rainfall event.
 5. An open primary drainage channel may not be located in a street easement.

All **public stormwater facilities and systems, pipe or box culverts, bridges, and other drainage improvements** must be designed and constructed in accordance with this chapter and the DCM. **Public stormwater facilities and system, and the drainage easement must be dedicated and accepted by City Council before the City can accept the ownership and maintenance responsibilities.** ~~Whenever the City is to assume future ownership and maintenance responsibility, the property owner must dedicate drainage easements accepted by formal action of the City Council., Provided, however, the acceptance only of an easement is not an acceptance of the drainage improvement, which requires separate formal action of the City Council.~~

§ 16-7. - Secondary drainage channel **requirements**

All secondary drainage channels which are **located** within ~~or immediately adjacent to,~~ an improvement, construction area, development, or subdivision, must be protected and/or improved by the developer in accordance with this chapter, the DCM and as follows:

1. All land within a development having an elevation below the 100-year frequency flood elevation of the secondary drainage channel must be dedicated for the purpose of providing: containment of runoff and drainage flow in a drainage facility within a private drainage easement, or in a common area. Private drainage facilities and systems must be constructed, operated, and maintained by the developer, property owner, or Homeowners Association or Property Owners Association.
- ~~2. Secondary drainage channels which have a function of transporting water through the development or collecting water from cross channels but are not deemed jurisdictional Waters of the United States, by the Army Corps of Engineers regulations. The secondary~~ **Secondary** drainage channels with a drainage area of 40 to 500 acres must be improved with a concrete lined channel or enclosed storm sewer system. Drainage areas ~~less than~~ **between 6 to** 40 acres shall have an improved closed storm sewer system, unless written

approval has been given by the City Engineer for construction of a concrete lined channel. ~~When the development area to be drained is less than 6 acres, a paved open channel, designed by an Engineer for use as a sidewalk, having a minimum width of 4 feet and provided with 6 inch curbs, when also designed to drain stormwater runoff from the street to a natural stream or an improved open channel. If the offsite drainage area entering the development is between 0 and 6 acres, the flow may be intercepted and directed to a paved concrete channel and/or closed storm sewer. If the entire drainage area of 0 to 6 acres is generated on site, enclosed storm sewer system shall be constructed. In all cases above, the developer may develop the land without making channel improvements for areas non-jurisdictional, only if the landowner or developer has dedicated 100% of the land inundated by the 100-year frequency storm as a common area or private drainage easement dedicated to stormwater drainage.~~

3. **For purpose of maintenance, all closed storm sewer system shall be constructed at the front of the lot, or between lots in any subdivision development. It shall not be constructed at the back of the lot, unless approved by the City Engineer.**
4. Site drainage improvements must provide for the grading of all building pads to an elevation where all building pads will not be subjected to overflow from a 100-year frequency flood. Manufactured home placement pads must be elevated to 1 foot above the FEMA 100-year frequency flood elevation. Construction of new and substantial improvements to existing buildings and structures are subject to all regulations and requirements of this chapter, the DCM, and the following:
 - a. New construction or substantial improvements of residential or nonresidential buildings and structures (including manufactured homes) must have the lowest floor (including basements) elevated to 1 foot above the level of the 100-year frequency flood.
 - b. Nonresidential building and structures and accessory buildings may meet this requirement by floodproofing the buildings and structures, including above ground utility and sanitary facilities, up to 1 foot above the level of the 100-year frequency flood.
 - c. Mechanical and utility equipment for residential or nonresidential buildings and structures must be designed and/or located to prevent water from entering or accumulating within the components during conditions of flooding of 100-year frequency flood.
 - d. If a nonresidential building or structure is intended to be floodproofed, an Engineer must develop and/or review its structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice and meeting the elevation requirements of this chapter. A record of such certificates which includes the specific elevation (in relation to mean sea level) to which such buildings or structures are floodproofed must be submitted by an Engineer to the City Engineer for review as to compliance with this chapter and the DCM before any construction may commence.
5. An open drainage channel may not be located in a street easement or utility easement unless it is placed in an enclosed storm sewer culvert or pipe or except under the following conditions:

- a. Where a paved street surface of at least two lanes is provided on both sides of a paved channel to provide access to abutting properties.
 - b. Where lots are platted to back up to the street right-of-way where the open drainage channel is located between the rear lot line and the paved street, and further provided that at no time in the future may access be allowed or constructed over the open drainage channel to the rear of a lot so platted. For the purpose of this chapter, a lot which sides to a public street is not considered to back up to the street right-of-way.
 - c. When a condition outlined in either Subsection 4.a. or 4.b. above is present, adequate space adjacent to the channel must be dedicated as right-of-way to provide for maintenance of the paved drainage channel and its bank, paved or unpaved.
6. Open drainage channels must be improved by providing a paved section that will carry the runoff from a **100-year frequency** rain event, ~~either the FEMA 100-year discharges or the urbanized 100-year discharges, whichever is higher.~~ Whenever an open improved channel is required or authorized for a secondary drainage channel under the provisions of this chapter and that channel crosses residential lots, or where the channel improvement is designed as a drainage area and will be privately maintained by a Property Owners Association or Home Owners Association, the City Engineer may modify the requirements of the first part of this provision to permit an alternate channel design, provided all hydraulic requirements to support the overflow resulting from a 100- year frequency rainfall are met to prevent flooding of all building pads, buildings, structures and accessory buildings.

§ 16-8. - Surface drainage

1. In single-family residential, duplex, or manufactured home developments, site grading must be carried out in such a manner that surface water and runoff from each dwelling lot will flow directly to a stormwater facility or system, improved channel, sodded swale, or paved street without crossing more than four (4) adjacent lots.
2. Surface water and runoff collected in streets must be directed to street drains at satisfactory intervals to prevent overflow of 6-inch curbs during a 25-year frequency flood event, and all street and street drainage design must be in accordance with the DCM and this chapter. The maximum allowable water spread allowed for the 25-year storm event is one lane width for arterial streets. Surface flow on streets at point of interception shall not exceed 20 acres of drainage area.

§ 16-9. - Rural subdivisions

1. The development of rural acreage subdivisions with 1-acre or larger lots, must be carried out in such a manner that surface water and runoff from each lot will flow to a roadway side ditch, swale, channel, or natural creek. Prior to final plat or building permit approval the developer must provide the City Engineer detailed construction plans showing channel and roadway side ditch sizes, grades, elevation, and driveway pipe sizes as well as erosion control measures necessary to prevent erosion of the proposed channel or ditch construction designed by an Engineer. These drainage improvements must include but not be limited to sodding, channel lining or ditch checks as required to prevent erosion of the

proposed or existing channel or ditch. These drainage improvements are the responsibility of the developer to construct and if public, must be installed and inspected by the City prior to the acceptance of the streets and dedications on the final plat. Should the rural subdivision be constructed with private streets, then the developer and property owners will be responsible for construction and maintenance of the roadway side ditch.

2. The sizing of roadway side ditches and driveway pipes will be designed to provide for the runoff from fully developed land of a 25-year frequency storm. Surface water collected in roadway side ditches must be directed to a secondary drainage channel not located within the street right-of-way as often as the terrain will allow. Driveway pipe culvert schedule, elevation, size, and grade must be provided for all rural subdivisions and submitted for approval on the paving plans.
3. The sizing of channels, creeks, and any drainage improvements that are needed for street crossings will be designed to provide for the runoff from a 50-year frequency.
4. Site drainage improvements must provide for the grading of all building pads to an elevation that will not be subject to overflow from a 100-year frequency flood plus 1 foot of freeboard and in a manner that will provide for the rapid runoff of stormwater. Substantial improvements to existing buildings and structures within the 100-year frequency floodplain are subject to all regulations and the requirements of this chapter. The areas projected for inundation by the 100-year frequency flood must remain free of all buildings and structures and must be preserved in as natural a condition as possible. The maintenance of channels serving drainage areas of less than 500 acres are the responsibility of the property owner, the adjoining or abutting property owner or owners, or a duly constituted Property Owners Association or Homeowners Association unless such improvements are in a dedicated drainage easement and the drainage easement and channels formally accepted for ownership and maintenance by the City Council. Drainage areas containing more than 500 acres must be improved as outlined in Section ~~16-6~~ ~~16-7~~ , **Secondary Primary** Drainage Channels and constructed in accordance with this chapter and the DCM.

§ 16-10. – Detention

1. For all new development, detention facilities shall be installed providing a developed discharge rate not to exceed the historical runoff rate prior to development for the 2-, 5-, 10-, 25-, 50- and 100-year frequency storms. All private on-site detention facilities shall be constructed in a private drainage easement or common area, and **the private drainage easement** should include at a minimum the Q100 floodplain, outlet structures, and riprap.
2. On-site detention facilities require signed and sealed plans and drainage calculations by an Engineer and must be provided to the City Engineer for review and must comply with this chapter and the DCM before the filing of a final plat or applying for a building permit on un-platted property. Approval of plans neither relieves the developer or property owner or the Engineer of responsibility or liability for the plan nor creates responsibility or liability for the City or the City Engineer. **Detention pond facilities are reviewed, approved, and inspected by Public Works Engineering.**
3. The required maximum volume for stormwater detention must be calculated by the Engineer in accordance with the DCM.

4. ~~The~~ developer ^{or engineer} ~~may~~ ^{space} submit to the City Engineer alternative methods of protecting downstream properties that can be accomplished without causing substantial detriment to the public good, safety or welfare of surrounding or downstream properties, the City Engineer may accept a waiver of on-site detention facilities requirements. The developer's petition must include all the plans and calculations, as produced by an Engineer, that the City Engineer may need or request to demonstrate compliance with this chapter and the DCM and to support the developer's request for a waiver of on-site detention.

- a. All applications for a waiver of on-site detention facilities requirements must show no adverse impact to downstream structures or streets, and must be submitted to the City Engineer with the following information for review:
 - i. Site plan drawn to scale showing surveyed location, property dimensions, grade and elevations, and proposed construction or development including all impervious surfaces.
 - ii. A summary showing total impervious surfaces in square feet, historic site runoff calculations, and proposed site runoff calculations.
 - iii. Runoff from the proposed developed site must discharge directly to a public or private street or stormwater system as required in and in accordance with this chapter.
 - iv. Discharge onto an adjacent property will not be allowed, **unless an analysis provided by an engineer to demonstrate such developed discharges caused no negative impact to adjacent property and approved by the City Engineer.**

The City Engineer may approve or conditionally approve a waiver of on-site detention facilities or may deny the application and require on-site detention facilities or other improvements or modifications of the stormwater control system. Any significant change to the proposed construction or development or any failure to meet the requirements or standards in this chapter or the DCM shall void the waiver and will require either compliance with this chapter and the DCM or a new application for a waiver.

- b. Impervious surfaces installed or constructed as a part or portion of a public street or public sidewalk in the public street right-of-way shall not be included as a part of the on-site impervious area.
- c. Whenever a property upon which an impervious surface is installed or constructed lies within two different watersheds, detention shall be provided based upon the amount of increased impervious surface within each watershed.
- d. It is unlawful for any person to erect, construct, install, enlarge, alter, repair, move, improve, make, put together, or convert any building, structure, improvement, facility, or impervious surface within the City, or cause the same to be done, without providing on-site detention facilities, or request for waiver, as required by this section.
- e. If the City Engineer has record of any flooding within one-half (1/2) mile of the proposed development, a waiver of the on-site detention requirement will not be considered.
- f. **Single lot residential shall be excluded from the detention pond requirement in this chapter.**

§ 16-11. - Major river channels

All major river channels which are located within ~~or immediately adjacent to~~ an improvement, development or subdivision must be protected and improved by the developer as follows:

1. All land having an elevation below the 100-year ~~frequency flood City Urbanized WSEL or FEMA WSEL, whichever is higher~~ for the final improved channel, must be dedicated in a private drainage easement or platted common area dedicated for drainage purposes.
2. The existing major river channel may be cleaned to provide free flow of water, straightened, widened, leveed, or diked, or otherwise improved to the extent required to prevent overflow from a 100-year frequency flood. The major river channel is part of Waters of the United States, and under the jurisdiction of the Army Corps of Engineers. All necessary Federal, State, and local permits will be required before working in the major river channel.
3. Site improvement must provide for the grading of all building pads to an elevation where all building pads will not be subjected to overflow from a 100-year frequency flood plus 1 foot of freeboard. Manufactured home placement pads must be elevated to 1 foot above the 100-year frequency flood elevation. All manufactured homes must be anchored in accordance with requirements outlined in the Federal Emergency Management Agency Flood Plain Management Regulations, Subpart A, Section 60.3(b)(8). Substantial improvements to existing buildings and structures within the 100-year frequency floodplain are subject to all regulations and requirements of this chapter and the DCM.
4. New construction or substantial improvements of nonresidential buildings and structures and accessory buildings within the 100-year frequency floodplain must have the lowest floor (including basement) elevated to 1 foot above the 100-year frequency flood level or floodproofed including **above ground** utility and sanitary facilities up to 1 foot above the level of the 100-year frequency flood. Mechanical and utility equipment for residential or nonresidential buildings and structures and accessory buildings must be designed and/or located to prevent water from entering or accumulating within the components during conditions of flooding. If a nonresidential building or structure is intended to be floodproofed, an Engineer or Architect must develop and/or review structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice for meeting the elevation requirements of this chapter. A record of such certificates, which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed, must be submitted by the Engineer or Architect to the office of the City of Engineer for review as to compliance with this chapter and DCM before any construction may commence.
5. Fill, grading measures, and building floodproofing measures must be compliant with this chapter and the DCM and the minimum standards as set forth in the "Floodproofing Regulations" prepared by the Office of the Chief of Engineers, U.S. Army, Washington, D.C., June 1972.

§ 16-12. - Bridges and culverts.

1. All flow of water across continuous streets or alleys must be through culverts or bridges. Bridges shall be designed such that the 100-year frequency flood flow will not overtop the roadway. In addition, ~~the 50-year water surface elevation shall be below the low chord of a bridge. the low chord of the bridge shall be set to provide a minimum of 1 foot of freeboard above the 50-year frequency flood flow.~~
2. Culverts shall be designed to carry the 50-year frequency flood flow with no more than 1 foot of headwater at the upstream end of the culvert and such that the 100-year frequency flood flow will not overtop the roadway.
3. No rise in the 100-year frequency flood flow water surface elevation will be allowed upstream of the bridge or culvert as a result of the construction or installation of any building or structure unless such increase is confined to the limits of the developer's property.

§ 16-13. - Closed storm sewers

1. Closed stormwater facilities and systems must be constructed of precast or prefabricated pipe or cast-in-place or precast, closed box culvert design in conformance with DCM, and construction specifications and requirements. Stormwater facilities and systems carrying runoff from streets must be designed to accept the run-off from a 25-year frequency rain event for the drainage area involved. Provided that in sump areas the stormwater facilities and systems must be designed to serve the 50-year frequency storm event with **an overflow concrete flume**. ~~4 foot minimum width of concrete flume with a 6 inch curb, being constructed over the stormwater facilities and systems to ensure that the difference between the 50 and the 100 year frequency storm overflow can reach a suitable outlet without inundating any building pad.~~
2. **Stormwater facilities and systems shall calculate HGL analysis set forth in DCM.** ~~If closed stormwater facility or system discharges to creek, channel, swale, or detention pond, Q100 WSEL shall be used to establish the tailwater elevation for Q100 HGL analysis. If closed stormwater facility or system discharges to an existing storm sewer system Q50 WSEL of the existing stormwater facility or system shall be used to establish the tailwater elevation for Q50 HGL analysis. If the stormwater facility or system is private, it is up to the engineer to design the site and evaluate the HGL analysis.~~
3. **Curb opening of flume and bollard spacing shall be designed according to DCM.** ~~The maximum curb opening to flume is 15 feet. Whenever curb openings are greater than 6 feet, bollards spaced 3 feet apart will be required to eliminate the potential inadvertent motor vehicles getting on the sidewalks.~~

§ 16-14. - Open paved storm drainage

Open paved storm drainage channels must be constructed in accordance with City specifications, this chapter, and the DCM requirements. Fences **may be installed adjacent to the paved channel but not drilled onto the channel**, ~~may neither be erected closer than one foot (measured horizontally) from the edge of the paved section nor over the open paved storm drainage channel~~ except as approved by the City Engineer.

§ 16-15. - Areas outside subdivisions

The City reserves the right to require drainage improvements to be designed and built to preclude any backup of stormwater inundating any areas outside of the dedicated drainage easements in the development or subdivision or onto adjacent land as a result of a 100-year frequency flood.

§ 16-16. - Floodplain activity permit requirements

A floodplain activity permit is required for all man-made activities occurring within the FEMA floodplain, and all man-made activities within 200 feet of the external boundary of a FEMA floodplain. All activities within the FEMA Floodplain, including Zone A or Zone AE, may require a flood study to show such activities do not cause any rise in ~~Q100 WSEL~~ **100-year frequency flood elevation.**

The following provisions apply to lands designated as floodprone areas. Additional review and measures are required to assure protection from flooding as set forth below:

1. *Special review of building permits or development, ^{including subdivisions,} in floodprone areas.* A floodplain activity permit is required for development within 200 feet of the external boundaries of the delineated floodplain for that watercourse as shown on the official floodplain maps or an area deemed floodprone by the City Engineer. No floodplain activity permit, if any, will be issued for new development or for the start of new construction or for expansion or additional construction to existing buildings or structures or for any residential or nonresidential structure or any bridges or any accessory building including manufactured homes unless the application for floodplain activity permit is submitted and accompanied by the following information for review:
 - a. Plans submitted pursuant to the DCM drawn to scale showing the nature, location, dimensions, grade, and elevation of the lot, existing or proposed buildings and structures, fill, storage of materials, floodproofing measures, and the relationship of the above to the location, grade, elevation, and location of the channel.
 - b. A typical valley cross section showing the channel of the stream, grade and elevation of land areas adjoining each side of the channel, and cross-sectional areas to be occupied by the proposed development and high-water information.
 - c. ~~A profile showing the slope and elevation of the bottom of the channel or flow line of the stream. This profile~~ **When a flood study is required for the Floodplain activity permit application, hydraulic analysis and models performed in the flood study shall cover a minimum of 300 feet upstream and downstream from the property limits unless additional information is requested approved** by the City Engineer.
 - d. Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvements, storage of materials, water supply and sanitary facilities.
 - e. Copies of all other permits required by State or Federal law, including but not limited to Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 USC 1334.
 - f. Plans and/or specifications demonstrating that construction will incorporate methods and practices that minimize flood damage to upstream and downstream property owners and that material resistant to flood damage will be used for all new construction and substantial improvements.

g. Any other plans, surveys, grades, elevations, calculations, or computer studies that may be required by the City Engineer deemed necessary to determine the impact on and of the proposed development or building activity.

REASONABLY SAFE FROM FLOODING
h. Buildings or structures located within the limits of the FEMA Floodplain are required to provide a FEMA Elevation Certificate upon completion of the building or structure.

i. Buildings or structures located within 200 feet of the FEMA Floodplain Boundary are required to provide a surveyor's certificate prior to the issuance of the second part of the building permit.

j. When floodway data has been provided by FEMA, the following control measures and restrictions will apply: The designation of the floodway by FEMA, shall be based on the principle that the area chosen for the floodway be designated to carry the waters of the 100-year frequency flood without increasing the water surface elevation of that flood by more than one foot at any point.

EXCEPT AS NOTED IN SEC K.1.
k. No structure, building, improvement, or development, whether temporary or permanent, may be constructed in the floodway, nor may any obstruction, fill or storage of goods, materials or equipment be permitted within the floodway.

Add Variance Language
l. Existing nonconforming uses in the floodway may not be expanded, but a floodway may be modified, altered, or repaired to incorporate floodproofing measures provided such measures do not raise the level of the 100-year frequency flood with the appropriate FEMA permits and approvals.

m. An exception to Subsections ~~2.a. through 2.e.~~ **1.j through 1.l** above may be made solely for oil and gas drilling operations performed within the floodways of the North Canadian and **South** Canadian Rivers, provided the following special requirements are met:

i. A special permit, not to exceed 120 days in duration, is required from the City Engineer prior to commencement of such operations. A separate permit is required for every drilling operation and for each subsequent periodic drilling or maintenance operation performed on each well.

ii. All permanent well structures or appurtenances must be elevated to a minimum of 1 foot above the 100-year frequency flood elevation and located outside the limits of the floodway. A permanent completed well head may remain within the floodway, provided that the well head is located in a reinforced concrete vault constructed completely below ground with a protective cover so that no portion of the structure extends above the elevation of the natural ground surrounding the well site that existed prior to construction.

iii. Any fill placed for access road construction or site leveling may not exceed six inches in height above the existing natural ground elevation. Prior to issuance of the permit. Complete hydraulic calculations must be provided by the permit applicant to demonstrate that no increase in flood elevations will occur due to the proposed fill.

iv. Well site construction and drilling operations must be accomplished in a manner which will allow all facilities, equipment, and materials to be dismantled, secured and/or evacuated from the floodway within a two-day time period during anticipated high waters.

structures must be ~~designed and/or located to prevent water from entering or accumulating within the components during conditions of a 100-year~~ **frequency event** flood. ^{elevated to 1 foot above the level} ↑

- d. If a nonresidential building or structure is intended to be floodproofed, an Engineer must develop and/or review its structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice for meeting the elevation requirements of this chapter. A record of such certificates which includes the specific elevation (in relation to mean sea level) to which such buildings or structures are floodproofed must be submitted by the Engineer to City Engineer for review as to compliance with this chapter and the DCM before any construction may commence.
- e. A fully urbanized condition must be used to calculate flow for the design of stormwater facilities and systems.
4. Whenever drainage channel improvements are constructed or improved, sodding, back sloping, cribbing, and other bank protection must be designed and constructed to control erosion for the anticipated conditions and flows resulting from a 100-year frequency rainfall event.
5. An open primary drainage channel may not be located in a street easement.

All **public stormwater facilities and systems, pipe or box culverts, bridges, and other drainage improvements** must be designed and constructed in accordance with this chapter and the DCM. **Public stormwater facilities and system, and the drainage easement must be dedicated and accepted by City Council before the City can accept the ownership and maintenance responsibilities.** ~~Whenever the City is to assume future ownership and maintenance responsibility, the property owner must dedicate drainage easements accepted by formal action of the City Council., Provided, however, the acceptance only of an easement is not an acceptance of the drainage improvement, which requires separate formal action of the City Council.~~

§ 16-7. - Secondary drainage channel requirements

All secondary drainage channels which are **located** within ~~or immediately adjacent to,~~ an improvement, construction area, development, or subdivision, must be protected and/or improved by the developer in accordance with this chapter, the DCM and as follows:

1. All land within a development having an elevation below the 100-year frequency flood elevation of the secondary drainage channel must be dedicated for the purpose of providing: containment of runoff and drainage flow in a drainage facility within a private drainage easement, or in a common area. Private drainage facilities and systems must be constructed, operated, and maintained by the developer, property owner, or Homeowners Association or Property Owners Association.
- ~~2. Secondary drainage channels which have a function of transporting water through the development or collecting water from cross channels but are not deemed jurisdictional Waters of the United States, by the Army Corps of Engineers regulations. The secondary~~ **Secondary** drainage channels with a drainage area of 40 to 500 acres must be improved with a concrete lined channel or enclosed storm sewer system. Drainage areas ~~less than~~ **between 6 to** 40 acres shall have an improved closed storm sewer system, unless written

approval has been given by the City Engineer for construction of a concrete lined channel. ~~When the development area to be drained is less than 6 acres, a paved open channel, designed by an Engineer for use as a sidewalk, having a minimum width of 4 feet and provided with 6 inch curbs, when also designed to drain stormwater runoff from the street to a natural stream or an improved open channel. If the offsite drainage area entering the development is between 0 and 6 acres, the flow may be intercepted and directed to a paved concrete channel and/or closed storm sewer. If the entire drainage area of 0 to 6 acres is generated on site, enclosed storm sewer system shall be constructed. In all cases above, the developer may develop the land without making channel improvements for areas non-jurisdictional, only if the landowner or developer has dedicated 100% of the land inundated by the 100-year frequency storm as a common area or private drainage easement dedicated to stormwater drainage.~~

3. **For purpose of maintenance, all closed storm sewer system shall be constructed at the front of the lot, or between lots in any subdivision development. It shall not be constructed at the back of the lot, unless approved by the City Engineer.**
4. Site drainage improvements must provide for the grading of all building pads to an elevation where all building pads will not be subjected to overflow from a 100-year frequency flood. Manufactured home placement pads must be elevated to 1 foot above the FEMA 100-year frequency flood elevation. Construction of new and substantial improvements to existing buildings and structures are subject to all regulations and requirements of this chapter, the DCM, and the following:
 - a. New construction or substantial improvements of residential or nonresidential buildings and structures (including manufactured homes) must have the lowest floor (including basements) elevated to 1 foot above the level of the 100-year frequency flood.
 - b. ~~Nonresidential building and structures and accessory buildings may meet this requirement by floodproofing the buildings and structures, including above ground utility and sanitary facilities, up to 1 foot above the level of the 100-year frequency flood.~~
 - c. Mechanical and utility equipment for residential or nonresidential buildings and structures must be ~~designed and/or located to prevent water from entering or accumulating within the components during conditions of flooding of 100-year frequency flood.~~ *↑ elevated to 1 foot above the level ↑ the*
 - d. If a nonresidential building or structure is intended to be floodproofed, an Engineer must develop and/or review its structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice and meeting the elevation requirements of this chapter. A record of such certificates which includes the specific elevation (in relation to mean sea level) to which such buildings or structures are floodproofed must be submitted by an Engineer to the City Engineer for review as to compliance with this chapter and the DCM before any construction may commence.
5. An open drainage channel may not be located in a street easement or utility easement unless it is placed in an enclosed storm sewer culvert or pipe or except under the following conditions:

§ 16-11. - Major river channels

All major river channels which are located within ~~or immediately adjacent to~~ an improvement, development or subdivision must be protected and improved by the developer as follows:

1. All land having an elevation below the 100-year **frequency flood City Urbanized WSEL or FEMA WSEL, whichever is higher** for the final improved channel, must be dedicated in a private drainage easement or platted common area dedicated for drainage purposes.
2. The existing major river channel may be cleaned to provide free flow of water, straightened, widened, leveed, or diked, or otherwise improved to the extent required to prevent overflow from a 100-year frequency flood. The major river channel is part of Waters of the United States, and under the jurisdiction of the Army Corps of Engineers. All necessary Federal, State, and local permits will be required before working in the major river channel.
3. Site improvement must provide for the grading of all building pads to an elevation where all building pads will not be **subjected** to overflow from a 100-year frequency flood plus 1 foot of freeboard. Manufactured home placement pads must be elevated to 1 foot above the 100-year frequency flood elevation. All manufactured homes must be anchored in accordance with requirements outlined in the Federal Emergency Management Agency Flood Plain Management Regulations, Subpart A, Section 60.3(b)(8). Substantial improvements to existing buildings and structures within the 100-year frequency floodplain are subject to all regulations and requirements of this chapter and the DCM.
4. New construction or substantial improvements of nonresidential buildings and structures and accessory buildings within the 100-year frequency floodplain must have the lowest floor (including basement) elevated to 1 foot above the 100-year frequency flood level or floodproofed including **above ground** utility and sanitary facilities up to 1 foot above the level of the 100-year frequency flood. Mechanical and utility equipment for residential or nonresidential buildings and structures and accessory buildings must be ~~designed and/or located to prevent water from entering or accumulating within the components during conditions of flooding.~~ If a nonresidential building or structure is intended to be floodproofed, an Engineer or Architect must develop and/or review structural design, specifications and plans for the construction, and must certify that the design and methods of construction are in accordance with the accepted standards of practice for meeting the elevation requirements of this chapter. A record of such certificates, which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed, must be submitted by the Engineer or Architect to the office of the City of Engineer for review as to compliance with this chapter and DCM before any construction may commence.
5. Fill, grading measures, and building floodproofing measures must be compliant with this chapter and the DCM and the minimum standards as set forth in the "Floodproofing Regulations" prepared by the Office of the Chief of Engineers, U.S. Army, Washington, D.C., June 1972.

*elevated to 1 foot above
the level of the 100-year
frequency flood.*

§ 16-12. - Bridges and culverts.