# City of Hutchins
## General Development Manual

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ARTICLE I. DEFINITIONS

Sec. 100. DEFINITIONS

Alleys. Minor ways which are used primarily for vehicular service access to back or the side of properties otherwise abutting on a street.

Alleys, Interior. Internal alleys within a subdivision not parallel to a City street.

Alleys, Perimeter. Alleys adjacent to and parallel to a City street requiring a screening wall between the rights-of-ways.

Amended Plat. A plat of a subdivision correcting the scrivener errors of a previously approved plat. Amended Plats must be prepared in accordance with the requirements of this development manual, shall require City approval, and upon approval shall be filed for record with the County Clerk of Dallas County, Texas.

Arterial Streets. Major streets in the City’s street system that serve as avenues for the circulation of traffic onto, out, or around the City and carry high volume of traffic.

Building. A structure (anything constructed or erected), designed to be used as a place of occupancy, storage, or shelter.

Building Plans. Plans for the construction of a building. Building Plans may include: architectural plans, architectural elevations, foundation plans, mechanical (HVAC) plans, electrical and lighting plans, plumbing plans, etc. Building Plans will often be accompanied by Construction Plans for site development projects. Building Plans may not, in some cases, include Construction Plans for remodel projects.

Building Area. A portion of a lot on which single-family buildings are allowed to be placed.

Building Lot. A single tract of land located within a single block which, (at time of filing for a building permit) is designed by its owner or developer as a tract to be used, developed, or built upon as a unit, under single ownership or control. It shall front upon a street unless otherwise approved by the City. Therefore, in some cases, a “building lot” may not be the same as a lot of record. A building lot may be subsequently subdivided into two or more building lots, and a number of building lots may be cumulated into one building lot, subject to the provisions of the City’s development requirements.

Building Pad. A portion of a lot covered by a building footprint.

City. The City of Hutchins, Texas, and all its governing and operating bodies.
City Engineer. The Texas licensed professional engineer or Texas registered engineering firm, employed by the City or engaged by the City as a consultant, and designated by the City as the "City Engineer".

City Staff. City employees and City consultants, including the City Engineer, designated by the City and by properly constituted authority to recommend and enforce the regulations contained in the City's development requirements.

Clear Vision Area. A part of a lot (generally corner lot) which may not be utilized for plantings, walls, fences, parking, vending machines, or other obstructions which would cause danger, as determined by the City, to traffic by obstructing the view.

Collector Streets. Streets whose principal function is to carry traffic between residential streets and the arterial streets, but that may also provide direct access to abutting properties, including the principal entrance streets of residential developments.

Commercial Building. Any building, other than a single-family residential building, will be referred to as a Commercial Building in this development manual.

Commercial Development. Any development subdivision which is not strictly Residential in nature as defined by this development manual. Multi-family uses, retail uses, restaurants, office buildings, mixed-use developments, industrial uses, and all other non-residential uses will be considered Commercial Development as used throughout this development manual.

Construction Plans. Plans for construction activities other than building construction. Construction plans may include: paving plans, grading plans, drainage plans, water line plans, sanitary sewer plans, erosion control plans, construction details, etc. Construction Plans will often accompany Building Plans for site development projects.

Control of Access Line. Lines along sections of the street and alley rights-of-way that delineate areas where no driveway access will be permitted. These lines shall be shown within the limits that the city determines to be potentially unsafe for driveway access.

Controlled Access Streets. Streets which are parallel to and adjacent to arterial streets and highways and which provide access to abutting properties and protection from through traffic.

Conveyance Plat. A complete and exact plan, map, or drawing, indicating the boundary information of a parcel of previously unplatted land, solely for the purpose of conveying property in a real estate transaction. Conveyance Plats must be prepared in accordance with the requirements of this development manual, shall require City approval, and upon approval shall be filed for record with the County Clerk of Dallas County, Texas.

Corner Clip. A triangular area of additional right-of-way at street and alley intersections.
Council. The City Council of the City of Hutchins, Texas.

Cul-De-Sacs. Short minor streets having only one vehicular access to another street and terminated by a vehicular turn-around.

Dead End Streets. Streets other than a cul-de-sac with only one outlet.

Development Plan. The site plan document for one or more lots upon which is shown all information required by the City’s development requirements. Also called "Development Plan" or "Site Plan" throughout this development manual.

Earth Disturbance. Any grading, filling, excavating or trenching activities within the City of Hutchins.

Earth Disturbance Permit. A permit which must be obtained from the City of Hutchins prior to commencing any grading, filling, excavating or trenching activities within the City of Hutchins.

Easement. The right granted for the purpose of limited public use across, over, or under private land.

Engineer of Record. A Texas licensed professional engineer in responsible charge of the engineering associated with a development or project.

Development Plan. The site plan document for one or more lots upon which is shown all information required by the City’s development requirements. Also called "Development Plan" or "Site Plan" throughout this development manual.

Extra Territorial Jurisdiction (ETJ). The unincorporated area contiguous to the municipality’s corporate boundaries and extends to a certain distance based on the municipality’s population. A municipality may extend to the ETJ the application of municipal ordinances and other ordinances relating to platting, access to public roads, or the pumping, extraction, and use of groundwater by persons other than retail public utilities. A municipality may not enforce its Zoning Rules and Regulations within the ETJ; however, subdivision rules and regulations apply to the ETJ areas.

Final Plat. A complete and exact plan, map, or drawing, on which a plan of a subdivision is represented in conformance with an approved Preliminary Plat. Final Plats must be prepared in accordance with the requirements of this development manual, shall require City approval, and upon approval shall be filed for record with the County Clerk of Dallas County, Texas.

Fire Lane. A fire apparatus access road (or drive) meeting the minimum width specified by City standards and the International Fire Code and constructed of a City approved all-weather surface, typically asphalt or reinforced concrete, sufficiently designed to support the imposed loads of fire apparatus, and providing a surface capable of being striped in accordance with current City requirements. Fire Lanes will be required and maintained in accordance with this development manual and the International Fire Code.
Lot of Record. A lot that is created by an approved plat of which has been duly recorded in the office of the County Clerk of Dallas County, Texas.

Master Plan. The various plans for the City and its adjoining areas, as adopted by the Council, and as it may subsequently be amended, and which indicates the existing and recommended general locations of various land uses, streets, parks, and other public and private developments and improvements.

Mining. The use of a facility or area for the extraction, removal, or stockpiling of sub-earth materials, including sand, gravel, oil, gas or other materials found under the earth. The following are not considered mining:

1. The excavation, extraction, removal, or stockpiling of earth materials for ponds or lakes, or incidental to an approved plat, or incidental to construction with a building permit, or for governmental or utility construction projects such as streets, alleys, gas, electrical, water, telephone facilities and similar projects.

2. The extraction, removal, or stockpiling of earth materials incidental to construction of landscaping, retaining walls, screening devices and similar activities consistent with the land use allowed at the site of removal.

3. Grading, filling, or excavating when done in conjunction with an approved Earth Disturbance Permit properly issued by the City of Hutchins.

Minor Plat. A complete and exact plan, map, or drawing, on which a plan of a subdivision is represented, only for a subdivision that involves four or fewer lots which front on an existing street and do not require the creation of any new street or the extension of municipal facilities. Minor Plats must be prepared in accordance with the requirements of this development manual, shall require City approval, and upon approval shall be filed for record with the County Clerk of Dallas County, Texas.

Multi-Family Residential. Development or subdivision, consisting of one or more lots, developed, or intended for development, for the purpose of providing any building or, portion thereof, which is designed, built, rented, leased, or let to be occupied as three or more dwelling units or apartments or which is occupied as a home or residence of three or more households.

Multi-Lot Single-Family Residential. Development or subdivision, consisting of two or more lots, which is Single-Family Residential in nature, as defined by this development manual.

Non-Residential. All uses in all zoning districts that are not Single-Family Residential in nature as defined by this development manual. Multi-family residential and mobile home parks shall be considered under this design manual as Non-Residential in terms of process and design requirements. As used throughout this development manual, the term "Commercial" shall mean Non-Residential as defined herein.
Off-Site Public Improvements. All improvements outside the limits of the development.

On-Site Public Improvements. All improvements constructed within the development.

Opaque. As specified in the Screening Requirements shall mean a fence or hedge that cannot be seen through. A chain link fence with slats or a fabric fence are not considered opaque under the requirements of this development manual.

Ordinances, Standards, Codes, Criteria, Requirements, Construction Details, and Specifications. These terms may be used interchangeably throughout this development manual. As used in this development manual, these terms may be used interchangeably, and any of these terms shall mean the various or combined ordinances, standards, codes, criteria, requirements, construction details, and/or specifications of the City of Hutchins.

Planning & Zoning Commission. The Planning and Zoning Commission of the City of Hutchins, Texas.

Plat. See “Amended Plat”, “Conveyance Plat”, “Final Plat”, “Preliminary Plat”, “Replat”.

Preliminary Plat. A preliminary plan, map, or drawing that represents a proposed subdivision, showing all boundaries and location of individual properties and streets, as well as other information in accordance with the requirements of this development manual. Preliminary plats must be approved by the City in accordance with the requirements of this development manual.

Protected Tree. Trees that are defined as protected by City standards, often determined by species and caliper size.

Public Improvements. All publically maintained infrastructure including public surface improvements (curbs, gutters, driveway approaches, sidewalks, paved streets, alleys, bridges, culverts, street lights, and etc.) and public utilities (water lines, sanitary sewer lines, storm drains, fire hydrants, and etc).

Replat. A plat of any portion or all of a subdivision which has been previously platted (other than by Conveyance Plat). Replats must be prepared in accordance with the requirements of this development manual, shall require City approval, and upon approval shall be filed for record with the County Clerk of Dallas County, Texas.

Residential. Development which is Single-Family Residential in nature as defined by this development manual. Multi-family residential and mobile home parks shall be considered under this design manual as Non-Residential in terms of process and design requirements.

Residential Streets. Streets which are intended primarily to serve traffic within a neighborhood or limited residential district, and which is used for access to abutting properties.
Screening Hedge. An allowable Screening Device of shrubs as required in development manual.

Screening Fence. A solid opaque screening fence used to screen outside storage in accordance with the screening section of this development manual.

Screening Wall. A solid, opaque wall made of wood, brick, stone, decorative concrete block, or concrete panels to be erected at designated areas in accordance with the screening section of this development manual.

Semi-Public Improvements. Privately maintained improvements installed on private property, other than easements, which are required for the public benefit, public use or public welfare. Semi-Public Improvements might include: fire lanes, fire lines, onsite fire hydrants, screening devices, onsite drainage, etc.

Setback Line. A line that a building must be set back from the property line, the street right-of-way line or easement line.

Single-Lot Single-Family Residential. Development or subdivision, consisting of a single lot only, which is Single-Family Residential in nature, as defined by this development manual.

Single-Family Residential. Development or subdivision with the intended purpose of providing for single-family detached housing. Duplexes will also be considered as Single-Family Residential for the purposes of this development manual. Development involving commercial, industrial, or multi-family uses is not considered as Single-Family Residential as defined by this development manual.

Site Improvements. All necessary site related improvements required by this development manual.

Site Plan. The site plan document for one or more lots upon which is shown all information required by this development manual. Also called “Development Plan” or “Site Plan” throughout this development manual.

Street. A public right-of-way for vehicular traffic, whether designated as street, highway, thoroughfare, parkway, road, boulevard, or however otherwise designated.

Subdivision. The division of a parcel of land into two or more lots, or building sites for purpose of sale or building development (whether immediate or future) including one lot subdivision and all divisions of land involving dedication of streets, alleys, and easements, or change in existing streets. The term also includes re-subdivision, and the term subdivider or developer are synonymous and interchangeable, and include any person, partnership, corporation, association, firm, trustee, or agent who participate in subdivision of land within the intent, scope, and purview of this development manual. Divisions of land for agricultural purposes in parcels of five (5) acres or more shall not be included within this definition, unless any such division of five (5) acres or more includes the planning or development of a new street or access easement.
Thoroughfare Plan. A master plan, as adopted by the City Council, and as it may subsequently be amended, which indicates the existing and recommended streets of the City of Hutchins and its extra territorial jurisdiction.

Tract. An unplatted parcel of land whose boundaries have been established by a recorded deed and which is recognized as a separate parcel for purpose of transfer of title.

Tree Survey. A drawing showing all trees on a property greater than the minimum diameter described in this development manual.

Truck-Lay. The route Fire Department apparatus travels from a fire hydrant to all points of a structure or combustible storage area. Actual distance is measured along a paved street and/or fire lane as the apparatus would travel.

Utility Company. Companies, corporations and other entities that undertake transmission and distribution of natural gas, electricity, telecommunications, radio or television communications.

Utility Lines / Utilities. Pipes, poles, structures, wire, aerial cables and related facilities used in transmission and distribution of natural gas, electricity, telecommunications, radio or television communications.

Variance. A grant of permission by the City Council that authorizes a specific suspension or waiver of one or more of the development rules and regulations of the City.
ARTICLE II. GENERAL PROVISIONS

Sec. 201. PURPOSE AND AUTHORITY

The purpose of this development manual is to provide for the orderly, safe and healthful development within the City of Hutchins, Texas, and to promote the health, safety and general welfare of the community. This development manual is adopted under the authority of the Constitution and laws of the State of Texas, and the City Charter of the City of Hutchins, Texas.

Sec. 202. JURISDICTION

Provisions of this development manual shall apply within the incorporated limits of the City of Hutchins, Texas.

Sec. 203. SPECIAL DISTRICTS

Special districts, such as utility districts, must be approved by the City of Hutchins.

Sec. 204. DEVELOPMENT POLICY

Development and/or construction activities shall not be allowed within the City of Hutchins until the appropriate City approvals and permits have been obtained by the developer or contractor/builder. The submittal and approval of plats, Development Plans, and permit applications shall be in accordance with the requirements and procedures outlined within this development manual.

Sec. 205. FEES REQUIRED

Various fees shall be required for the review and processing of applications and permits for development, construction, and building related activities within the City of Hutchins. Appendix A of the City of Hutchins Code of Ordinances (not to be confused with Appendix A of this development manual) lists the fees adopted by the City.

Sec. 206. DESIGN STANDARDS

Standards for design of public improvements and private improvements which interface with public improvements shall be as required by the City of Hutchins, including those requirements identified in this development manual, the City of Hutchins Standard Construction Details, and the Standard Specifications For Public Works Construction of the North Central Texas Council of Governments as adopted by the City of Hutchins, except as otherwise noted.
ARTICLE III. DEVELOPMENT REQUIREMENTS AND PROCEDURES

Sec. 301. PLATTING REQUIREMENTS

(a) Final Plat – A Final Plat shall be required by the City of Hutchins, in accordance with the Local Government Code, Section 212.004, whereby the owner of a tract of land, located within the limits or in the extra-territorial jurisdiction of a municipality, who divides the tract in two or more parts for the purpose of sale, or to lay out a subdivision or building lots or any lots, or streets, alleys, parks or other portions intended for public use or the use of purchasers or owners of lots, shall cause a final plat to be made in accordance with this development manual and with the Local Government Code. A Final Plat shall substantially conform to an approved Preliminary Plat, or a revised Preliminary Plat must be submitted for formal approval. Final Plat approval will be granted only on the condition that all lots can stand alone in terms of public and semi-public improvements. Every structure hereafter erected or enlarged shall be located on a lot of record as identified on a Final Plat for the property.

(b) Preliminary Plat – Preliminary Plat approval will be granted only on the condition that all lots can stand alone in terms of public and semi-public improvements. Development Plan approval is typically required prior to approval of a Preliminary Plat. However, Preliminary Plat and Development Plan applications may be submitted and considered concurrently. A Preliminary Plat approval is typically required prior to approval of a Final Plat, Minor Plat, or Replat. However, at the discretion of the Director of Public Works, the City shall have the option to accept applications for Final Plats, Minor Plats, or REPLATs concurrently with applications for the associated Preliminary Plats and Development Plans. The approval of the Preliminary Plat by the City shall be effective for a period of eighteen (18) months after the date of formal approval. Following an eighteen (18) month period after the approval of a Preliminary Plat, the Preliminary Plat or any portion of the Preliminary Plat which has not had final plat approval by the Planning and Zoning Commission, will be considered invalid. At the discretion of the Director of Public Works, the expiration date of an approved Preliminary Plat may be extended an additional twelve (12) months without the need to resubmit through the typical approval process for new Preliminary Plats. Request for extension shall be made by the property owner in writing at least fourteen (14) calendar days prior to the end of the first eighteen (18) month period. Preliminary Plats are not filed with the County.

(c) Replat – A Replat will be required to further subdivide a lot which has already been final platted. When replatting, a lot of record must be replatted in its entirety. In addition, all replats of commercially zoned land and all replats of single-family and two-family residential zoned land of more than six lots must be considered in a public hearing in accordance with the Local Government Code. Upon approval and County filing, a Replat will be treated as a Final Plat with regard to the development process of the City of Hutchins. Replat approval will be granted only on the condition that all lots can stand alone in terms of public and semi-public improvements. Development Plan and Preliminary Plat approval is typically required prior to approval of a Replat. However, at the discretion of the Director of Public Works, the City shall have the option...
to accept applications for Replats concurrently with applications for the associated Preliminary Plats and Development Plans.

(d) **Minor Plat** – A Minor Plat may be obtained for a subdivision that involves four or fewer lots that fronts on an existing street, does not require the creation of any new street or the extension of municipal facilities, and is not a Replat. A Minor Plat can be “administratively approved” by the Mayor or other person as designated by the City Council. The Mayor or designee shall not unreasonably disapprove a Minor Plat which meets the City’s standards and requirements. Upon request by the land owner, the Mayor or designee shall be required to refer any disapproved Minor Plat to the Planning and Zoning Commission for consideration and public hearing. Upon approval and County filing, a Minor Plat will be treated as a Final Plat with regard to the development process of the City of Hutchins. Development Plan and Preliminary Plat approval is typically required prior to approval of a Minor Plat. However, at the discretion of the Director of Public Works, the City shall have the option to accept applications for Minor Plats concurrently with applications for the associated Preliminary Plats and Development Plans.

(e) **Conveyance Plat** – A Conveyance Plat may be obtained solely for the purpose of conveying property in a real estate transaction in order to plat an unplatted tract of land. A Conveyance Plat may only be obtained if the tract is plated as a single lot that fronts on an existing street, does not require the creation of any new street or the extension of municipal facilities, and is not a Replat. A Conveyance Plat, similar to a Minor Plat, can be “administratively approved” by the Mayor or other person as designated by the City Council. The Mayor or designee shall not unreasonably disapprove a Conveyance Plat which meets the City’s standards and requirements. Upon request by the land owner, the Mayor or designee shall be required to refer any disapproved Conveyance Plat to the Planning and Zoning Commission for consideration and public hearing. Upon approval and County filing, a Conveyance Plat will be treated as a Final Plat with regard to the development process of the City of Hutchins.

**Sec. 302. DEVELOPMENT PLAN REQUIREMENTS**

(a) Development Plan approval is required for all construction other than projects which involve only interior building remodel. Projects performed and funded by the City of Hutchins are exempt from this requirement to the extent that such projects are for the construction or maintenance of public streets, drainage, water and/or sanitary sewer facilities. Development Plans may proceed through staff review and approval so long as no variances are required. Development plan approval will be required when any of the following apply:

1. Any proposed new development, including building construction or site improvements (grading, paving, drainage, water, sanitary sewer, etc.).

2. Any change in the location, configuration, or square footage of any existing building, driveway, fire lane, parking area, on-site public drainage system, open drainage channel, or storm water detention facility.
(3) Any platting or subdivision of real property.

(b) Existing legal non-conforming structures may maintain a legal non-conforming status until the requirement for a Development Plan is triggered per the section above or until the use or operation of the structure or property ceases or becomes vacant for a period of twelve (12) months or more, in which case, the startup of any use of the structure or property will require compliance with all applicable provisions of this development manual, including platting and Development Plan application.

(c) The approval of a Development Plan shall be effective for a period of eighteen (18) months after the date of formal approval. Following an eighteen (18) month period after the approval of a Development Plan, the Development Plan will be considered invalid. At the discretion of the Director of Public Works, the expiration date of an approved Development Plan may be extended an additional twelve (12) months without the need to resubmit through the typical approval process for new Development Plans. Request for extension shall be made by the property owner in writing at least fourteen (14) calendar days prior to the end of the first eighteen (18) month period.

Sec. 303. PLATTING AND DEVELOPMENT PLAN PROCEDURES

(a) All plats, Development Plans, construction plans and building plans shall be submitted to the Building Inspection Division of the Public Works Department. Persons wishing to discuss specific questions in the development process should contact the appropriate department/division, but all formal submittals should be made to the Building Official in order to provide a coordinated review. In the event that the Building Official is not available, submittals can be made to the Director of Public Works.

(b) Prior to submitting a plat or Development Plan, the developer/owner should consult with the appropriate City staff concerning the proposal. Staff will assist in determining whether the proposed development is generally consistent with City of Hutchins standards, plans and policies. City review staff will be available on a regular basis for a meeting with any person wishing to discuss projects in review or proposed for submittal. The project engineer or architect is encouraged to attend the review meeting in order to directly receive pertinent information regarding the proposed project. This meeting will not provide a full review of any particular project, but will provide the opportunity for a developer, architect or engineer to ask questions regarding City policies, process, plans, and requirements. Persons wishing to schedule a review meeting should contact the Building Official or the Director of Public Works.

(d) Upon submittal, plats, Development Plans, permit applications, building plans, construction plans, and other related items will be reviewed by applicable Public Works staff. The Building Inspection Division will coordinate all submittals and returns of marked-up copies. The Building Inspection Division will also coordinate payment of City fees, acceptance of tax certificates, and acceptance of final file copies. The developer shall be responsible to provide copies of plats and Development Plans to the electric, telephone, gas, cable, and solid waste disposal utility companies for review and comment. The developer shall coordinate with each utility company prior to plat or
development plan approval to ensure that adequate utility easements are provided to serve the proposed development. In order to prevent delays in obtaining building or construction permits, the developer shall obtain letters from each utility (electric and gas at a minimum) indicating that the utility has reviewed the plat or Development Plan and that the developer has satisfied the utility’s easement requirements. The developer shall provide copies of the utility acceptance letters to the City at the time of permit application. The City shall have the right to refuse issuance of building permits and construction permits if proof of utility company acceptance is not provided to the City.

(e) All plats and Development Plans submitted for review will be on the City’s active list for a period of three months from the date of each submittal. After the three month period, a project may be considered abandoned and may be removed from the City’s files. Substantial developer-initiated changes in the project from one submittal to the next that need additional review will require an additional payment equal to one-half of the original review fee.

(f) Following completion of the review process, plats must be submitted to the Planning and Zoning Commission. If a variance is requested, Preliminary Plats will be forwarded City Council after going before the Planning and Zoning Commission. Although City Council will consider the recommendations of the Planning and Zoning Commission, City Council is not required to adhere to those recommendations.

(g) Following completion of the review process, Development Plans can be granted approval by City staff if the Development Plans conform with all applicable requirements of the City. If a variance is requested, upon completion of staff review, Development Plans will be forwarded to the Planning and Zoning Commission and then to City Council for public hearing. Although City Council will consider the recommendations of the Planning and Zoning Commission, City Council is not required to adhere to those recommendations.

Sec. 304. BUILDING PERMITS

(a) All building activities within the City of Hutchins shall comply with Chapter 3 “Building Regulations” of the City of Hutchins Code of Ordinances.

(b) Prior to commencement of any building activities, the owner, developer or contractor shall secure a Building Permit, a site Construction Permit (if applicable) and an Earth Disturbance Permit (if applicable), all properly issued by the City of Hutchins. Simultaneous construction of public and private improvements may be approved by the Director of Public Works in some instances where a written request of sufficient merit, as determined by the Director of Public Works, has been made by the applicant. However, without written approval of the Director of Public Works, no building or construction permit for private improvements, including but not limited to permits for electrical, mechanical, plumbing, signs, paving, etc. (with the exception of temporary power permits associated with construction), will be issued for any residential or commercial building until all public improvements associated with the development are completed and accepted by the City and until gas and electrical service has been made available to each lot. These public improvements and franchise utilities constitute the basic
infrastructure required to serve the development and include construction of streets, sidewalks, drainage, water and sanitary sewer facilities as outlined in Article V.

(c) Commercial Building Permit applications will not be granted until a Development Plan has been approved and the construction and acceptance of all required public and semi-public improvements (fire lanes, fire lines, fire hydrants and other appurtenances, sidewalks, driveway approaches, drainage facilities, water and sanitary sewer service connections, etc.) as shown on the approved Development Plan. Simultaneous construction of public and private improvements will require written approval of the Director of Public Works.

(d) A foundation permit may be issued, on a case-by-case basis, based on the approved Development Plan that adequately addresses the location and elevations of water and sanitary sewer services in relation to the proposed finish floor elevation of the building.

(e) No building construction above the slab may be commenced prior to the construction and approval of all fire lanes, fire lines, fire hydrants and other waterline appurtenances.

(f) Some items of public and semi-public improvements (i.e. sidewalks, driveway approaches, grading and drainage improvements, water and sanitary sewer service connections) may be constructed simultaneously with the building provided a cash escrow is deposited with the City to cover 100 percent of the cost of the improvements. A non-refundable fee will be charged by the City for escrow handling. On cash escrow's where the developer satisfactorily completes all public and semi-public improvements, the City will return the entire amount escrowed (without interest). If the developer fails to complete the project, then the escrowed funds will be retained by the City. The City will either use the funds to complete the public improvements associated with the project, or the City will hold the funds and apply them for public improvements on a future project at the same location. The City shall be entitled to retain all interest earned on the escrowed funds.

(g) Three-party contracts may be considered on case-by-case basis and are subject to approval by the City Council.

(h) The developer shall coordinate with each utility company prior to plat or development plan approval to ensure that adequate utility easements are provided to serve the proposed development. In order to prevent delays in obtaining building or construction permits, the developer shall obtain letters from each utility (electric and gas at a minimum) indicating that the utility has reviewed the plat or Development Plan and that the developer has satisfied the utility's easement requirements. The developer shall provide copies of the utility acceptance letters to the City at the time of permit application. The City shall have the right to refuse issuance of building permits and construction permits if proof of utility company acceptance is not provided to the City.

(i) Building Permits shall be valid for a period of six (6) months from the date of permit issuance. That portion of the building activities which is not substantially complete within six (6) months will require a new permit and the remaining building
activities must comply with the most current City standards and regulations, unless a variance is granted by the City Council. In cases of large scale building projects which require longer than six (6) months to complete, the Building Official, upon approval by the Director of Public Works, shall be authorized to provide permit extensions which do not require compliance with new building codes.

Sec. 305. CONSTRUCTION PERMITS

(a) Prior to commencement of any construction activities (paving, drainage, utilities, etc.) the owner, developer or contractor shall secure a Construction Permit properly issued by the City of Hutchins. A Construction Permit will be issued only after City requirements have been met.

(b) Three-party contracts may be considered on case-by-case basis and are subject to approval by the City Council.

(c) Construction must be underway within six (6) months from the date of permit issuance and the improvements must be substantially completed within eighteen (18) months from the date of permit issuance. That portion of the construction which is not substantially complete within eighteen (18) months will require a new permit and the remaining construction must comply with the most current City standards and regulations, unless a variance is granted by the City Council.

(d) Any construction activities involving grading, filling, excavation, or trenching activities, shall also require an Earth Disturbance Permit.

Sec. 306. EARTH DISTURBANCE PERMITS

(a) No grading, filling, excavation, or trenching activities, shall be performed within the limits of the City of Hutchins except by an unexpired Earth Disturbance Permit properly issued by the City. An Earth Disturbance Permit will be issued only after the requirements outlined in this development manual and other City requirements have been met. The City of Hutchins shall be exempt from this requirement.

(b) In order to apply for an Earth Disturbance Permit, the applicant must submit various plans and items as outlined in Article IV. An Earth Disturbance Permit will not be issued until all of the required submittal items have been approved.

(c) The applicant must pay an Earth Disturbance Permit fee.

(c) An Earth Disturbance Permit will not be issued if the work is deemed to adversely affect drainage on adjacent or other properties, create a traffic safety problem, or be considered a mining operation. Specific use district zoning is required for mining, including such mining as sand and gravel removal.
(d) Earth disturbance within in the floodway or floodplain will trigger additional requirements.

(e) Earth disturbance impacting trees is prohibited prior to the approval of a Development Plan for commercial developments. The Development Plan requirement may be waived by the Director of Public Works for earth disturbance activities necessary to improve drainage or for utility work if such activities are not associated with demolition, construction, expansion, or reconfiguration of a commercial building, fire lane, commercial parking lot, outdoor storage area, or outdoor area used for business operations. Tree mitigation fees must be paid before grading permits will be issued.

(f) An Earth Disturbance Permit is not required for the addition of topsoil or similar material used to spread over grassed areas in average depths of less than two inches.

(g) The contractor shall establish erosion control devices in accordance with the current Texas Pollution Discharge Elimination System (TPDES) requirements. Texas Commission on Environmental Quality (TCEQ) requirements must be followed by the developer and contractor.

(h) Grading, filling, excavating, and/or trenching activities must be underway within six (6) months from the date of permit issuance and must be substantially completed within eighteen (18) months from the date of permit issuance. That portion of the work which is not substantially complete within eighteen (18) months will require a new permit and the remaining work must comply with the most current City standards and regulations, unless a variance is granted by the City Council.

Sec. 307. DRIVEWAY PERMITS

No driveway shall be constructed within the limits of the City of Hutchins except by an unexpired Driveway Permit properly issued by the City. A Driveway Permit will be issued only after the requirements outlined in this development manual and other City requirements have been met. The City of Hutchins shall be exempt from this requirement.

In order to apply for a Driveway Permit, the applicant must submit various plans and items as outlined in Article IV. A Driveway Permit will not be issued until all of the required submittal items have been approved. The applicant must pay a Driveway Permit fee. A Driveway Permit will not be issued if the driveway is deemed to create a traffic problem or a potential safety problem. If granted, a Driveway Permit shall be effective for a period of thirty (30) days from the date the permit is issued. The driveway must be constructed within the thirty (30) day period or a new permit will be required. The contractor shall construct all City permitted driveways within five (5) days of the sawcut and removal of the existing pavement. In addition to the requirements described above, access to state controlled highways shall require State permits through the Texas Department of Transportation (TxDOT).
Sec. 308. SIGN PERMITS

a) No sign or advertising structure shall be erected, relocated, posted, painted or maintained within the City by any person, firm or corporation without first obtaining a permit therefor, properly issued by the City Building official, except as may otherwise be provided in the City's sign ordinance (see Article 3.11 “Signs” of the City of Hutchins Code of Ordinances). The information below is a summary of the City's sign ordinance (see Article 3.11 “Signs” of the City of Hutchins Code of Ordinances) at the time that this development manual was prepared. In case of a discrepancy, the most currently adopted version of Article 3.11 “Signs” of the City of Hutchins Code of Ordinances will govern.

b) Any person applying for a sign permit must show proof of property damage and public liability insurance in an amount not less than ten (10) times the construction cost of the sign and containing standard provisions that the sign contractor or property owner are insured against claims by third persons for negligence of the contractor or owner or their agents, officers, or employees in the construction, erection, or maintenance of the proposed sign. Electrical signs shall also require electrical permits. Permits for advertising signs (billboards) shall also require approval of the city council.

c) No sign permit shall be issued except after receipt of an application prescribed by the building official and showing the sign location, size, type, height, materials of constructions, surface area and such other information as the building official shall require. When required by the building official, plans shall be prepared by a registered professional engineer or architect.

d) The fee for all permitted signs shall be as provided for in the fee schedule found in appendix A of this code. When a sign is erected, placed or maintained or work started thereon before obtaining a sign permit, there shall be a late fee equal to twice the amount of the sign permit fee. The late fee does not excuse full compliance with the sign code provisions.

e) A permit for a sign shall expire if the work is not started within sixty (60) days, or is not completed within one hundred and twenty (120) days after work has commenced. A new permit shall be required to replace any permit which has expired. Any permit issued in conflict with the provisions of this section is void.

Sec. 309. DEVELOPMENT OF LAND SERVED BY SUBSTANDARD PUBLIC IMPROVEMENTS (OR NOT SERVED BY PUBLIC IMPROVEMENTS)

a) General Provisions. This section deals with lots or tracts that are not served by public improvements or that are served by one or more existing substandard public improvements including water, sanitary sewer, streets, sidewalks or storm drainage. Such developments must meet these required minimum standards in order to obtain a building permit for a new building or if an addition is being made to an existing building. In reviewing the required Development Plan, the City staff will note areas that fail to meet minimum standards. If in the opinion of the City staff, on a case-by-case basis, these minimums are not adequate, more extensive improvements may be required as
necessary. Additionally, each of the lots or tracts must follow all City master plans for streets, utilities, parks and other public improvements.

b) Paving. Development must be served by minimum street right-of-way as determined by the adopted Thoroughfare Plan shall be required.

c) Water Lines. If development is to occur on land which is not currently served or which is currently served by sub-standard water utilities, the owner, developer or applicant may be required to extend the existing system or improve the existing system to current requirements.

d) Fire protection. Inadequate or substandard water line size may require line upgrades and additional fire hydrants or other measures may be needed in order to provide adequate fire protection.

e) Sanitary Sewers. If improvement is to occur on land that is not currently served or that is served by substandard sanitary sewer utilities, the owner, developer, or applicant may be required to extend the existing system or improve the existing system to current requirements.

f) Septic Systems. Application for construction and operation of a septic system must be submitted to Dallas County. Application, fees, tests, design and on-site inspections must be submitted and coordinated with Dallas County. The tract of land must consist of one (1) acre or more to qualify for a septic system. If the project includes a septic system, prior to issuance of a Certificate of Occupancy by the City of Hutchins, the City must be in receipt of the following:

1. Approved septic system permit by Dallas County
2. Approved design by Dallas County
3. Approved final inspection by Dallas County

Septic systems will not be permitted within the City limits of Hutchins for Single-Lot Single-Family Residential where any part of the platted lot or tract is within 100 feet of an existing City sanitary sewer line, unless otherwise approved by the Director of Public Works. Septic systems will not be permitted within the City limits of Hutchins for Multi-Lot Residential or Non-Residential uses (including Multi-Family) where any part of the platted lot or tract is within 1,000 feet of an existing City sanitary sewer line, unless otherwise approved by the Director of Public Works. The requirements to connect to the City's sewer system may be enforced even if the improvements must include a lift station, force main or both. The requirement will not be enforced in instances where the Director of Public Works determines that the connection is impractical.

g) Drainage. Storm water detention may be required for any development at the discretion of the City Engineer or Director of Public Works. All site drainage resulting in concentrated flow must discharge to an adequate outfall condition capable of conveying the proposed runoff for a 100-year rainfall event. Concentrated flow shall discharge from the site to public right-of-way or a drainage easement. In the event that a drainage
easement cannot be obtained from adjacent property owners, the developer shall take measures to, as closely as practical, simulate pre-existing drainage flow rates and patterns.

Sec. 310. ABANDONMENT OF REAL PROPERTY

(a) General Provisions. An Abandonment Ordinance is required for abandonment of any public right-of-way. Any easement may be abandoned with a Certificate of Abandonment (see Appendix 2) in accordance with paragraph (c) below. Requests for abandonment shall be made in writing to the Public Works Department. The City will file with the County all documents that are required to record the transaction. An application fee must accompany all requests and the Dallas County filing fees shall be submitted with a separate check. If applicable, fair market value will be established by the City based on information, acceptable to the City. Should appraisals be required, the cost shall be paid in advance by the applicant. Any relocation, adjustment or other construction shall be the financial responsibility of the applicant.

The following information must be provided with any request for abandonment of real property by the City of Hutchins:

1. Metes and bounds description of the property to be abandoned
2. Exhibit showing the property to be abandoned
3. Letters of Release from utility companies, if applicable
4. Application fee made payable to City of Hutchins
5. Filing fee made payable to Dallas County Clerk

(b) Additional Requirements for Certain Abandonments.

1. Abandonment of an improved street or alley:
   a. Fair market value of the real property and the improvements that are to be removed or converted to private use
   b. Dedication of easements for any facilities that are to remain

2. Abandonment of street or alley right-of-way (unimproved):
   a. Fair market value of the real property
   b. Dedication of easements for any facilities that are to remain
(3) Abandonment of a part of an occupied easement where the reduction in easement will adversely affect the operation and maintenance of the facility:

a. Fair market value of the released area

b. Compensation for detriment to the remainder

(4) Abandonment of an occupied easement in exchange for another easement at the request of the property owner:

a. Fair market value of the difference in value if the abandoned easement is greater than the replacing easement

b. Escrowed funds for the cost to relocate and/or reconstruct any streets, drainage improvements, utilities, or other facilities (unless otherwise waived by the City)

To abandon an easement in exchange for an equivalent easement, or when it is determined that an easement is no longer necessary, a Certificate of Abandonment (see Appendix 2), or such other documents as may be legally required, shall be filed of record with Dallas County. This certificate shall be filed only after all information for abandonment of an easement on real property has been submitted and a final approval for abandonment has been made by the Director of Public Works.

Sec. 311. PARKLAND DEDICATION

(a) Purpose. The provisions described in Sec. 213 "Park and Other Public Dedication Requirement" have been adopted by the City Council to provide recreational areas in the form of neighborhood parks as a function of subdivision development in the City of Hutchins. The City Council has declared that recreational areas in the form of neighborhood parks are necessary and in the public welfare, and that the only adequate procedure to provide for same is by integrating such a requirement into the procedure for planning and developing property or subdivisions in the City, whether such development consists of new construction on vacant land or rebuilding and remodeling of structures on existing residential property. Neighborhood parks are those parks providing for a variety of outdoor recreational opportunities and within convenient distances from a majority of the residences to be served thereby. The primary cost of neighborhood parks should be borne by the ultimate residential property owners who, by reason of the proximity of their property to such parks, shall be the primary beneficiaries of such facilities. The existing location of Interstate Highway 45, from Interstate Highway 635 to Fulghum Road, divides the City of Hutchins into an east and west zone for park planning purposes. The park and recreational facilities are required to be accessible to the residential areas in each zone. Therefore, the following requirements are adopted to affect the purposes stated.
(b) General Requirements. Whenever a final plat is filed of record with the County Clerk of Dallas County for development of a residential area in accordance with the planning and zoning ordinances of the city, such plat shall contain a clear fee simple dedication of an area of land to the city for park purposes, which area shall equal one (1) acre for each one hundred thirty-three (133) proposed dwelling units. Any proposed plat submitted to the city for approval shall show the area proposed to be dedicated under this division. The required dedication of this section may be met by a payment of money in lieu of land when permitted or required by the other provisions of this section. The City Council declares that development of an area smaller than one-half (1/2) of one (1) acre for public park purpose, is impractical. Therefore, if fewer than sixty-six (66) units are proposed by a plat filed for approval, the developer shall be required to pay the applicable cash in lieu of land amount provided by Sec. 213(d) “Money in Lieu of Land”, rather than to dedicate any land area. No plat showing a dedication of less than one-half (1/2) of one (1) acre shall be approved. In instances where an area of less than five (5) acres is required to be dedicated, the City shall have the right to accept the dedication for approval on the final plat, or to refuse same, after consideration of the recommendation of the planning and zoning committee and to require payment of cash in lieu of land in the amount provided by Sec. 213(d) “Money in Lieu of Land”, if the City determines that sufficient park area is already in the public domain in the area of the proposed development, or if the recreation potential for that zone would be better served by expanding or improving existing parks. The dedication required by this division shall be made by filing of the final plat or contemporaneously by separate instrument unless additional dedication is required subsequent to the filing of the final plat. If the actual number of completed dwelling units exceed the figure upon which the original dedication was based, such additional dedication shall be required, and shall be made by payment of the cash in lieu of land amount provided by Sec. 213(d) “Money in Lieu of Land”, or by the conveyance of an entire numbered lot to the city.

(c) Prior Dedication. At the discretion of the city, any former gift of land to the city may be credited on a per-acre basis toward eventual land dedication requirements imposed on the donor of such lands. The city council shall consider the recommendation of the planning and zoning commission in exercising its discretion under this division.

(d) Money in Lieu of Land. Subject to the veto of the City Council, a land owner responsible for dedication under this division may elect to meet the requirements of Sec. 213(b) “General Requirements” in whole or in part by a cash payment in lieu of land, in the amount set forth in Sec. 213(d) “Money in Lieu of Land”. Such payment in lieu of land shall be made at or prior to the time of final plat approval. The City may from time to time decide to purchase land for parks in or near the area of actual or potential development. If the City does purchase parkland in a park zone, subsequent parkland dedications for that zone shall be in cash only, and calculated to reimburse the City’s actual cost of acquisition and development of such land for parks. The cash amount shall be equal to the sum of (1) the average price per acre of such land, and (2) the actual cost of adjacent streets and on-site utilities, or an estimate of such actual cost provided by the City Engineer. Once the City has been reimbursed entirely for all such parklands within a park zone, this subsection shall cease to apply, and the other sections of this subsection shall again be applicable. To the extent that Sec. 213(d) “Money in Lieu of Land” is not applicable, the dedication requirement shall be met by a payment in lieu of land at a per-acre price set from time to time by resolution of the city.
council, sufficient to acquire land and provide for adjacent streets and utilities for a neighborhood park to serve the park zone in which such development is located. Unless changed by the City Council, such per-acre price shall be computed as provided in the fee schedule found in Appendix A or the City of Hutchins Code of Ordinances (not to be confused with Appendix A of this drainage manual. Cash payments may be used only for acquisition or improvement of a neighborhood park located within the same zone as the development.

(e) Comprehensive Plan Considerations. Land shown on a comprehensive plan as being suitable for development of the City for a major recreational center, school site, park, or other public use, shall be reserved, for a period of one (1) year after the preliminary plat is approved by the City if within two (2) months after such approval the City Council advises the subdivider of its desire to acquire the land or of the interest of another governmental unit to acquire the land, for purchase by the interested governmental authority at land appraisal value at the time of purchase. A failure by the City Council to so notify the subdivider shall constitute a waiver of the right to reserve the land. Any waiver of the right to reserve the land shall no longer be effective if the preliminary plat shall expire without adoption of a final plat.

(f) Special Fund, Right to Refund. There is hereby established a special fund for the deposit of all sums paid in lieu of land dedication under this section or any preceding section, which fund shall be known as the parkland dedication fund. The City shall account for all sums paid in lieu of land dedication under this section with reference to the individual plats involved. Any funds paid for such purposes must be expended by the city within three (3) years from the date received by the City for acquisition of development of a neighborhood park as defined herein. Such funds shall be considered to be spent on a first in, first out basis. If not so expended, the owners of the property on the last day of such period shall be entitled to a pro rata refund of such sum, computed on a square footage of area basis. The owners of such property must request such refund within one (1) year of entitlement, in writing, or such right shall be barred.

(g) Additional Requirements, Definitions. Any land dedicated to the City under this division must be suitable for park and recreation uses. The following characteristics of a proposed area are generally unsuitable:

1. Any area primarily located in the one hundred (100) year floodplain.

2. Any areas of unusual topography or slope which renders same unusable for organized recreational activities.

Drainage areas may be accepted as part of a park if the channel is constructed in accordance with city engineering standards, and if no significant area of the park is cut off from access by such channel.
Sec. 312.    VARIANCES AND EXCEPTIONS

(a) Variances requested on a plat or Development Plan will be scheduled for Planning and Zoning Commission after staff's review. After the Planning and Zoning Commission hearing, variance requests will be scheduled for a City Council hearing.

(b) An administrative fee will be charged by the City for processing variance requests.

(c) Where the City Council, in its judgment, finds that hardship or practical difficulties may result from strict compliance with the regulations outlined in this development manual ("the regulations"), and/or that the purpose of the regulations may be served to a greater extent by an alternative proposal, the City Council may approve exceptions to these subdivision regulations so that substantial justice may be done and the public interest secured, provided that such exception shall not have the effect of nullifying the intent and purpose of the regulations. In approving exceptions, the City Council may require such conditions and stipulations that will, in its judgment, secure substantially the objectives of the standards of the regulations.

(d) A petition for any such exception shall be submitted in writing by the owner/agent, four weeks prior to any council meeting, to the Department of Public Works. The request shall state fully the grounds for the application and all facts relied upon by the applicant. All supporting exhibits, fees and documents must be included with the application. Incomplete applications will not be processed until all documents are received by staff.

Sec. 313.    TAX CERTIFICATE REQUIREMENT

A current Tax Certificate must be included with all plat submittals, Development Plan submittals, Construction Permit applications, and Building Permit applications. All taxes due to the City of Hutchins must be current at the time of approval of plats and Development Plans and at the time of issuance of construction and building permits. A current, original (official) Tax Certificate must be provided to the City prior to filing of any Final Plat, Replat, Minor Plat, or Conveyance Plat.

Sec. 314.    TITLE OPINION REQUIREMENT

To provide evidence that the owner has adequate title and authority to convey dedication, a Title Opinion must be submitted for all plats or actions that include dedication of land or easements to the City. Said Title Opinion must be deemed to be satisfactory by the City Attorney and will be at the sole expense of the owner. In the event there is one or more lien holder(s), written approval by the lien holder(s) must be provided to show agreement with the plat or dedication. Dedication along state routes shall be by warranty deed.
Sec. 315. PHASING A DEVELOPMENT

Development may be performed in phases by establishing phase lines and/or lot lines on a Development Plan. Each phase shall be capable of standing alone, as development occurs, and shall not be dependent on future construction associated with separate phases to meet City standards or requirements. All required public, semi-public and private improvements, as defined by this development manual, (roads, turn lanes, deceleration lanes, traffic control devices, sidewalks, screening walls, etc.), shall be designed and constructed with each phase in conformance with all applicable City standards.

Sec. 316. TRAFFIC IMPACT ANALYSIS REQUIREMENT

When a proposed development is estimated to generate more than 1,000 vehicle trips per day, a traffic impact analysis shall be required with the submittal of a preliminary plat application or a Development Plan. The traffic impact analysis shall be prepared in accordance with accepted engineering practices. The purpose of the traffic impact analysis is to determine the need for traffic mitigation measures which may include, but are not limited to, dedication of additional right-of-way, construction of turning lanes, or construction of traffic control facilities. Any mitigating measures required shall be the responsibility of the developer, unless a cost-sharing agreement is approved by the City.
PRELIMINARY PLAT, FINAL PLAT, OR REPLAT PROCESS FLOWCHART

(1) Submit required items and pay all fees at this time.

(2) Staff will attempt to review and provide comments within 15 working days after the 1st submittal (larger projects may require longer time).

(3) Staff will attempt to review and provide comments within 10 working days after revisions are submitted.

* City Council may approve a variance, but all other criteria must be met before approving the plat.

** A park dedication agreement shall be finalized at the time of approval of any Final Plat including all dedication and/or fees to be paid at this time. The agreement, including approval date, must be noted on the face of the plat.

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MINOR PLAT OR CONVEYANCE PLAT PROCESS FLOWCHART

1. Submit required items and pay all fees at this time.

2. Staff will attempt to review and provide comments within 15 working days after the 1st submittal (larger projects may require longer time).

3. Staff will attempt to review and provide comments within 10 working days after revisions are submitted.

* A park dedication agreement shall be finalized at the time of approval of any Minor Plat including all dedication and/or fees to be paid at this time. The agreement, including approval date, must be noted on the face of the plat.
DEVELOPMENT PLAN
PROCESS FLOWCHART

(1) Submit required items and pay all fees at this time.

(2) Staff will attempt to review and provide comments within 15 working days after the 1st submittal (larger projects may require longer time).

(3) Staff will attempt to review and provide comments within 10 working days after revisions are submitted.

* City Council may approve a variance, but all other criteria must be met before approving the Development Plan.
ARTICLE IV. SUBMITTAL REQUIREMENTS AND CHECKLISTS

Sec. 401. SUBMITTAL ITEMS

(a) Submittals shall comply with all requirements as set forth in this development manual. Submittal documents which do not include all of the necessary items or comply with the submittal standards as described throughout this development manual may be subject to rejection.

(b) The following items shall be submitted to the Building Inspection Division of the Public Works Department and to the City Engineer (Bannister Engineering, LLC):

Staff Review Submittals for Plats and Development Plans:

Submit directly to the Building Inspection Division
- Two (2) full size, 22"x34", bond paper copies
- Four (4) half size, 11"x14", bond paper copies
- City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
- One (1) full size, 22"x34", bond paper copy
- PDF copy of all drawings

P&Z Submittals for Plats and Development Plans:

Submit directly to the Building Inspection Division
- Two (2) full size, 22"x34", bond paper copies
- Ten (10) half size, 11"x14", bond paper copies
- City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
- One (1) full size, 22"x34", bond paper copy
- PDF copy of all drawings

City Council Submittals for Plats and Development Plans:

Submit directly to the Building Inspection Division
- Two (2) full size, 22"x34", bond paper copies
- Ten (10) half size, 11"x14", bond paper copies
- City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
- One (1) full size, 22"x34", bond paper copy
- PDF copy of all drawings

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Final Submittals for Plats and Development Plans:

Submit directly to the Building Inspection Division
  • One (1) full size, 22"x34", mylar signed, sealed and dated copy
  • Four (4) half size, 11"x14", bond paper copies
  • City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
  • One (1) full size, 22"x34", bond paper copy
  • PDF copy of all drawings, signed, sealed and dated
  • AutoCAD dwg files, version 2010 or later, showing all line work and text

Staff Review Submittals for Construction Plans, Building Plans, Tree Surveys, Etc.:

Submit directly to the Building Inspection Division
  • Two (2) full size, 22"x34", bond paper copies
  • Four (4) half size, 11"x14", bond paper copies
  • City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
  • One (1) full size, 22"x34", bond paper copy
  • PDF copy of all drawings

Final Submittals for Construction Plans, Building Plans, Tree Surveys, Etc.:

Submit directly to the Building Inspection Division
  • Two (2) full size, 22"x34", bond paper signed, sealed and dated copies
  • Four (4) half size, 11"x14", bond paper copies
  • City Fees and Current Tax Certificates

Submit directly to Bannister Engineering, LLC *
  • One (1) full size, 22"x34", bond paper copy
  • PDF copy of all drawings, signed, sealed and dated
  • AutoCAD dwg files, version 2010 or later, showing all line work and text

* Note: Hard copies and electronic media can be delivered by hand delivery, courier, FedEx, UPS, US Postal Service, etc. Electronic files can also be sent by email or FTP. Please call or check the City Engineer's web site for current mailing address and email.

Bannister Engineering, LLC
www.bannister-engineering.com
817-842-2094 (office)
NOTE: ALL DEVELOPMENT PLANS, PLATS, CONSTRUCTION PLANS, CITY FEES, AND TAX CERTIFICATES ARE DUE AT THE TIME OF INITIAL SUBMITTAL. ALL FEES AND TAX CERTIFICATES SHALL BE SUBMITTED DIRECTLY TO THE CITY (NOT THROUGH THE CITY ENGINEER).

Sec. 402. SINGLE-LOT SINGLE-FAMILY RESIDENTIAL DEVELOPMENT PLANS

This section applies to individual single-family construction projects involving infill development. Single-family construction projects which involve multiple lots shall comply with the Multi-Lot Single-Family Residential Development Plan criteria. The following is a checklist for items, which shall be included, as applicable, on each Single-Lot Single-Family Residential Development Plan submitted for review:

1. A title block located at the bottom right hand side of the page to include project's name, addition's name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

2. A summary table to include total land area (square feet / acres) and the building area (square feet)

3. Staff signature block (see Appendix 1)

4. North arrow

5. Date (all revision dates should also be indicated)

6. Location map (at legible scale)

7. Sheet size of 22" X 34"

8. Scale (must be legible)

9. Name, address and phone number of contact persons of developer/owner and Engineer of Record (or Architect of Record)

10. Distances and bearings of the lot including total land area and subdivision lot & block designation. The entire platted lot or tract shall be shown on the Development Plan

11. Iron rods set or found and shown on the plan

12. Contours with intervals of two feet (2') or less or spot elevations indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum

13. Building setback lines
(14) Zoning of subject lot and adjoining property

(15) Easements, deed restrictions or encumbrances which impact development of the lot

(16) Control of access lines, corner clips and clear vision areas

(17) Streets, alleys and easements adjacent to the site showing right-of-way and limits of paving

(18) Existing and proposed streets, driveways and sidewalks

(19) Existing and proposed water and sanitary sewer utilities and services

(20) Fire protection including fire hydrants, fire lanes, fire lines and related devices, if applicable

(21) Franchise utilities serving the property

(22) Finished floor elevation. The builder is responsible to furnish the City with a form survey (surveyor certification of elevation and location) prior to construction of a foundation.

(23) Requested variances from City requirements shall be clearly listed on the face of the Development Plan

(24) All Development Plans must include a note with the following wording:

"Notice: Approval of this Development Plan does not entitle the developer to deviate from City zoning, development policy, construction standards, or building standards, except for those variances which are listed on the Variance Table provided on this Development Plan. All other deviations shown on the Development Plan, whether deviations from City zoning, City development requirements, or City design standards, are not approved and the developer shall be required to seek official variance approval or provide a conforming, substantially similar, alternative for staff review prior to approval of any construction or building permits."

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Single-Lot Residential Development Plan submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Development Plan.

(b) Tree Survey
(c) Tree Preservation and Mitigation Plan (if applicable)

Sec. 403. MULTI-LOT SINGLE-FAMILY RESIDENTIAL DEVELOPMENT PLANS

The following is a checklist for items, which shall be included, as applicable, on each Multi-Lot Single-Family Residential Development Plan submitted for review:

(1) A title block located at the bottom right hand side of the page to include project's name, addition's name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

(2) A summary table to include total land area (square feet / acres), total area per phase (square feet / acres), total number of lots and number of lots per phase, minimum lot size (square feet / acres), minimum dwelling size (square feet), and density per acre

(3) Staff signature block (see Appendix 1)

(4) North arrow

(5) Date (all revision dates should also be indicated)

(6) Location map (at legible scale)

(7) Sheet size of 22" X 34"

(8) Scale (must be legible)

(9) Name, address and phone number of contact persons of developer/owner and engineer.

(10) Distances and bearings of the lot including total land area, subdivision lot & block designation and phase lines (if any). The entire platted lot or tract shall be shown on the Development Plan.

(11) Iron rods set or found and shown on the plan

(12) Existing contours with intervals of two feet (2') or less or spot elevations indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum

(13) Building setback lines

(14) Zoning of subject lot and adjoining property
(15) Easements, deed restrictions or encumbrances which impact development of the lot

(16) Control of access lines, corner clips and clear vision areas

(17) Streets, alleys and easements adjacent to the site showing right-of-way and limits of paving

(18) Existing and proposed streets, driveways and sidewalks

(19) Existing and proposed water and sanitary sewer utilities and services

(20) Fire protection including fire hydrants, fire lanes, fire lines and related devices, if applicable

(21) Common areas and common area access and parking

(22) Screening devices, if applicable

(23) Dumpster location, if applicable

(24) Franchise utilities serving the property

(25) Finished floor elevation. The builder is responsible to furnish the City with a form survey (surveyor certification of elevation and location) prior to construction of a foundation.

(26) Requested variances from City requirements shall be clearly listed on the face of the Development Plan

(27) Location of all proposed freestanding signage. The City's adopted policy regarding signs is located in Article 3.11 "Signs" of the City of Hutchins Code of Ordinances.

(28) All Development Plans must include a note with the following wording:

"Notice: Approval of this Development Plan does not entitle the developer to deviate from City zoning, development policy, construction standards, or building standards, except for those variances which are listed on the Variance Table provided on this Development Plan. All other deviations shown on the Development Plan, whether deviations from City zoning, City development requirements, or City design standards, are not approved and the developer shall be required to seek official variance approval or provide a conforming, substantially similar, alternative for staff review prior to approval of any construction or building permits."
The following is a list of accompanying documents or items, which shall be included, as applicable, with each Multi-Lot Residential Development Plan submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Development Plan.

(b) Preliminary site improvement plans/exhibits prepared by a Texas Licensed Professional Engineer (including grading, drainage, water, and sanitary sewer)

(c) Preliminary Landscape Plan

(d) Tree Survey

(e) Preliminary Tree Preservation and Mitigation Plan (if applicable)

Sec. 404. **NON-RESIDENTIAL (OR COMMERCIAL) DEVELOPMENT PLANS AND MULTI-FAMILY RESIDENTIAL DEVELOPMENT PLANS**

The following is a checklist for items, which shall be included, as applicable, on each Non-Residential (Commercial) Development Plan submitted for review:

(1) A title block located at the bottom right hand side of the page to include project's name, addition's name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

(2) A summary table to include total land area (square feet / acres) and the building area (square feet)

(3) Staff signature block (see Appendix 1)

(4) North arrow

(5) Date (all revision dates should also be indicated)

(6) Location map (at legible scale)

(7) Sheet size of 22" X 34"

(8) Scale (must be legible)

(9) Name, address and phone number of contact persons of developer/owner and engineer.
(10) Distances and bearings of the lot including total land area, subdivision lot & block designation and phase lines (if any). The entire platted lot or tract shall be shown on the Development Plan.

(11) Iron rods set or found and shown on the plan

(12) Existing contours with intervals of two feet (2") or less or spot elevations indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum

(13) Building setback lines

(14) Zoning of subject lot and adjoining property

(15) Easements, deed restrictions or encumbrances which impact development of the lot

(16) Control of access lines, corner clips and clear vision areas

(17) Streets, alleys and easements adjacent to the site showing right-of-way and limits of paving

(18) Existing and proposed streets, driveways, fire lanes, sidewalks, and parking areas

(19) Existing and proposed water and sanitary sewer utilities and services

(20) Fire protection including fire hydrants, fire lanes, fire lines and related devices, if applicable

(21) Landscape and open space areas

(22) Screening devices, if applicable

(23) Dumpster locations, if applicable

(24) Franchise utilities serving the property

(25) Finished floor elevations. The builder is responsible to furnish the City with a form survey (surveyor certification of elevation and location) prior to construction of a foundation.

(26) Requested variances from City requirements shall be clearly listed on the face of the Development Plan

(29) Location of all proposed freestanding signage. The City's adopted policy regarding signs is located in Article 3.11 "Signs" of the City of Hutchins Code of Ordinances.
(30) All Development Plans must include a note with the following wording:

"Notice: Approval of this Development Plan does not entitle the developer to deviate from City zoning, development policy, construction standards, or building standards, except for those variances which are listed on the Variance Table provided on this Development Plan. All other deviations shown on the Development Plan, whether deviations from City zoning, City development requirements, or City design standards, are not approved and the developer shall be required to seek official variance approval or provide a conforming, substantially similar, alternative for staff review prior to approval of any construction or building permits."

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Non-Residential (Commercial) Development Plan submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Development Plan.

(b) Preliminary site improvement plans/exhibits prepared by a Texas Licensed Professional Engineer (including grading, drainage, water, and sanitary sewer)

(c) Preliminary Landscape Plan

(d) Tree Survey

(e) Preliminary Tree Preservation and Mitigation Plan (if applicable)

Sec. 405. PRELIMINARY PLATS

The following is a checklist for items, which shall be included, as applicable, on each Preliminary Plat submitted for review:

(1) A title block located at the bottom right hand side of the page to include project's name, addition's name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

(2) A summary table to include (as applicable):

a. Non-Residential: total land area (square feet / acres) and the building area (square feet) for Non-Residential developments

b. Residential: total land area (square feet / acres), land area per phase (square feet / acres), total number of lots and number of lots per phase,
minimum lot size (square feet / acres), minimum dwelling size (square feet), and density per acre

(3) City of Hutchins signature block (see Appendix 1)

(4) North arrow

(5) Date (all revision dates should also be indicated)

(6) Location map (at legible scale)

(7) Sheet size of 22" X 34"

(8) Scale (must be legible)

(9) Name, address and phone number of contact persons of developer/owner and engineer and/or surveyor

(10) Iron rods set or found and shown on the plan

(11) Contours with intervals of two feet (2') or less or spot elevations indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum

(12) Abstract(s) and Survey(s) of subject tract

(13) Abstract and Survey lines

(14) Boundary line, accurate in scale, of the subject tract

(15) Building setback lines

(16) The layout and approximate dimensions of proposed lots, blocks, etc.

(17) Lot number, block letter designations, and square footage / acreage of each lot

(18) Zoning of subject property and adjoining property

(19) The names of adjacent subdivisions and/or the names of record owners of adjoining parcels of unplatted land

(20) Designation of boundaries of municipalities, counties, and special districts

(21) Existing and proposed streets and alleys including widths of right-of-way and pavement, street names, and any proposed dedication of right-of-way in accordance with the requirements of the Thoroughfare Plan
(22) Easements, deed restrictions or encumbrances

(23) Control of access lines, corner clips and clear vision areas

(24) Median openings, turning lanes, acceleration and deceleration lanes

(25) For residential developments, park dedication provisions are to be addressed by the Park Board prior to approval of the preliminary plat. The park dedication agreement shall be noted on the face of the plat with the approval date.

(26) All land proposed for public use dedication or to be reserved for the common use of all property owners, together with conditions or limitations of such use. Such reservations and dedications must be identified with a lot and block designation except street and alley rights-of-way. Right-of-way dedication square footage and acreage must be listed on the plan.

(27) Other features which impact the subject property including, but not limited to, buildings, cemeteries, parks, landfills and monuments

(28) Phase lines must be clearly delineated, with improvements capable of standing alone as development occurs and not depending on future construction to meet City standards or requirements.

(29) Variances from this development manual that may be requested shall be listed on the face of the plat.

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Preliminary Plat submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Preliminary Plat.

(b) A copy of an approved Development Plan or a copy of a Development Plan to be considered by the City

(c) Preliminary site improvement plans/exhibits prepared by a Texas Licensed Professional Engineer (including grading, drainage, water, and sanitary sewer).

(d) Preliminary Landscape Plan

(e) Tree Survey

(f) Preliminary Tree Preservation and Mitigation Plan (if applicable)
Sec. 406.  FINAL PLATS, REPLATS, AND MINOR PLATS

The following is a checklist for items, which shall be included, as applicable, on each Final Plat, Replat, or Minor Plat submitted for review:

(1) A title block located at the bottom right hand side of the page to include project’s name, addition’s name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

(2) A summary table to include (as applicable):

   a. Non-Residential: total land area (square feet / acres), total number of lots, minimum lot size (square feet / acres)

   b. Residential: total land area (square feet / acres), total number of lots, minimum lot size (square feet / acres), minimum dwelling size (square feet), and density per acre

(3) City of Hutchins signature block (see Appendix 1)

(4) North arrow

(5) Date (all revision dates should also be indicated)

(6) Location map (at legible scale)

(7) Sheet size of 22” X 34”

(8) Scale (must be legible)

(9) Name, address and phone number of contact persons of land owner and surveyor

(10) Location of corner pins and monuments, including description and indication of whether found or set

(11) Abstract(s) and Survey(s) of subject tract

(12) Abstract and Survey lines

(13) Zoning of subject property and adjoining property

(14) The names of adjacent subdivisions and/or the names of record owners of adjoining parcels of unplatted land

(15) Designation of boundaries of municipalities, counties, and special districts
(16) Boundary line, accurate in scale and with exact distances and bearings, of the subject tract and each lot within the subdivision including exact acreage and square footage per lot

(17) Designations of lots and blocks within the subdivision

(18) Metes and bounds description of the subdivision, with exact acreage, in reference to the deed records of the County, including the volume and page of the deed for the land being platted

(19) Building setback lines

(20) Existing and proposed street and alley right-of-way and access easements, indicating street names, right-of-way or easement widths, and curve data. Any proposed dedication of right-of-way, including right-of-way dedication square footage and acreage, in accordance with the requirements of the Thoroughfare Plan.

(21) Easements, deed restrictions or encumbrances. A note regarding responsibility for maintenance shall be included for all drainage easements

(22) Control of access lines, corner clips and clear vision areas

(23) All land proposed for public use dedication or to be reserved for the common use of all property owners, together with conditions or limitations of such use. Such reservations and dedications must be identified with a lot and block designation except street and alley rights-of-way.

(24) Right-of-way and public property to be abandoned should be identified on the plat, but information being provided separately as required for the creation of an abandonment ordinance.

(25) The 100-year flood plain per current FEMA Flood Insurance Rate Map (FIRM), if applicable, shall be delineated. If the floodplain is not mapped, the developer is responsible for making this determination using a FEMA-approved method.

(26) Other features which impact the subject property including, but not limited to, buildings, cemeteries, parks, landfills and monuments

(27) For all residential development, the park dedication shall be finalized at the time of approval of the final plat including all dedications and/or fees to be paid at this time. The park dedication agreement, including the approval date, must be noted on the face of the plat.

(28) Variances from this development manual shall be listed on the face of the plat.

(29) Certification by a Registered Professional Land Surveyor (R.P.L.S.), registered in the State of Texas, to the effect that the plan represents a survey made by
him or under his direct supervision and that all the monuments and corner pins shown exist and are correctly described

(30) An Owner's Certificate of Dedication of all streets, alleys, parks, easements and other public ways, signed and acknowledged before a notary public by the owner, trustee(s) or person(s) duly authorized to sign the plat. This will include any lien holder(s) on the property (see Appendix 1).

(31) All plats must include the following wording:

"Notice: Selling a portion of this addition by metes and bounds is a violation of the city Subdivision Ordinance and State platting statutes and is subject to fines and withholding of utilities and building permits."

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Final Plat, Replat, or Minor Plat submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Plat.

(b) A copy of an approved Development Plan or a copy of a Development Plan to be considered by the City.

(c) Site construction plans prepared by a Texas Licensed Professional Engineer (including grading, paving, drainage, water, sanitary sewer, erosion control, and construction details)

(d) Landscape Plan

(e) Tree Survey

(f) Tree Preservation and Mitigation Plan (if applicable)

Sec. 407. CONVEYANCE PLATS

The following is a checklist for items, which shall be included, as applicable, on each Conveyance Plat submitted for review:

(1) A title block located at the bottom right hand side of the page to include project's name, addition's name, lot, block and phase designations, total acreage, zoning classification and address if available (see Appendix 1 for title block)

(2) City of Hutchins signature block (see Appendix 1)

(3) North arrow
(4) Date (all revision dates should also be indicated)
(5) Location map (at legible scale)
(6) Sheet size of 22" X 34"
(7) Scale (must be legible)
(8) Name, address and phone number of contact persons of land owner and surveyor
(9) Location of corner pins and monuments, including description and indication of whether found or set
(10) Abstract(s) and Survey(s) of subject tract
(11) Abstract and Survey lines.
(12) Zoning of subject property and adjoining property
(13) The names of adjacent subdivisions and/or the names of record owners of adjoining parcels of unplatted land
(14) Designation of boundaries of municipalities, counties, and special districts
(15) Boundary line, accurate in scale and with exact distances and bearings, of the subject tract/lot including exact acreage and square footage
(16) Lot and block designation
(17) Metes and bounds description of the tract/lot, with exact acreage, in reference to the deed records of the County, including the volume and page of the deed for the land being platted
(18) Building setback lines
(19) Existing street and alley right-of-way and access easements, indicating street names, right-of-way or easement widths, and curve data
(20) Easements, deed restrictions or encumbrances
(21) Control of access lines, corner clips and clear vision areas
(22) The 100-year flood plain per current FEMA Flood Insurance Rate Map (FIRM), if applicable, shall be delineated. If the floodplain is not mapped, the developer is responsible for making this determination using a FEMA-approved method.
(23) Other features which impact the subject property including, but not limited to, buildings, cemeteries, parks, landfills and monuments

(24) Certification by a Registered Professional Land Surveyor (R.P.L.S.), registered in the State of Texas, to the effect that the plan represents a survey made by him or under his direct supervision and that all the monuments and corner pins shown exist and are correctly described

(25) An Owner’s Certificate, signed and acknowledged before a notary public by the owner, trustee(s) or person(s) duly authorized to sign the plat. This will include any lien holder(s) on the property (see Appendix 1).

(26) All Conveyance Plats must be titled "Conveyance Plat" and include a note with the following wording:

“Notice: A Conveyance Plat is a record of property approved by the City for the purpose of sale or conveyance in its entirety or interests thereon defined. No building permit shall be issued nor permanent public utility service provided until a Final Plat is approved, filed of record, and public improvements accepted in accordance with the provisions of the City of Hutchins requirements. Selling a portion of this property by metes and bounds, except as shown on an approved, filed, and accepted Conveyance Plat, Final Plat, or Replat is a violation of the City ordinance and State law.”

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Conveyance Plat submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Plat.

Sec. 408. BUILDING PERMIT APPLICATIONS

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Building Permit application submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current.

(b) A copy of an approved Development Plan.

(c) A copy of the filed Final Plat, Replat or Minor Plat (a Conveyance Plat is not acceptable).

(d) Architectural plans (floor plan, building elevations, etc.)

(e) Mechanical, electrical, and plumbing plans (MEP)

(f) Structural plans
(g) Site construction plans prepared by a Texas Licensed Professional Engineer (including grading, paving, drainage, water, sanitary sewer, erosion control, and construction details). See Section 409 below.

(h) Landscape Plan

(i) Tree Survey

(j) Tree Preservation and Mitigation Plan (if applicable)

(k) Any other plans or information needed for proper review of the Building Permit application

Sec. 409. CONSTRUCTION PERMIT APPLICATIONS

Construction plans shall contain engineering data for the construction of all improvements consistent with current city development standards and master plans. The following is a checklist for items, which shall be included, as applicable, as part of each set of construction plans submitted for review:

(1) The plans shall be signed, sealed, and dated by a Professional Engineer licensed in the State of Texas (the Engineer of Record). In addition to the license number of the Engineer of Record, the plans shall indicated the firm registration number of the engineering firm responsible for preparation of the plans, which shall be registered as an engineering firm with the Texas Board of Professional Engineers. If standardized construction detail sheets, schedules, or specifications are included in the plans they shall be noted on the sheet index. If such standardized construction detail sheets, schedules, or specifications are not sealed by the Engineer of Record, then the Engineer of Record shall include a statement under the sheet index stating that the construction detail sheets, schedules, and/or specifications have been selected by the Engineer of Record and have been deemed appropriate by the Engineer of Record for their specified use on the project.

(2) The plans shall be drawn to a standard sheet size of 22" X 34".

(3) The plans shall have a cover sheet including, at a minimum, the project name/description, engineer and firm licensure/registration information as described above, a location map, a sheet index, and the contact information for the developer/owner and engineer. When possible, contact information for the surveyor should also be included.

(4) The maximum scale for all construction plans shall be 1" = 40' (1" = 20' is preferred). Construction plans for street construction shall be drawn to a scale of 1" = 20'.

(5) Typical plan and/or profile sheets shall include the following basic items:
a. Title block including project name/description and information about the Engineer of Record and the engineering firm

b. North arrow on all plan sheets

c. Date (all revision dates should also be indicated)

d. Scale (must be legible)

e. Engineer's seal for completed plans or a preliminary stamp (specifying that plans are preliminary, for review only, and not for construction purposes)

f. Benchmark description indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum

(6) Construction plan sets should typically include the following plan sheets as well as other sheets deemed appropriate by the Engineer of Record:

a. A grading plan including existing and proposed one-foot interval elevation contours and spot elevations. Grades shall be indexed to the NAD 1983 State Plane Coordinate System using the appropriate horizontal projection for the applicable zone, and indexed to the NAVD 1988 vertical datum. The grading plan shall include a proposed finished floor elevation for all buildings and a proposed finished pad elevation for all pad sites. Note that the builder is responsible for furnishing a certification of the foundation elevation and location prior to construction of a foundation.

b. Typical Cross-Sections of proposed public streets and alleys drawn to a maximum scale of 1" = 10' horizontal and 1" = 2' vertical, and drawn from beyond right-of-way to beyond right-of-way. Proposed street and alley pavement sections shall conform to City of Hutchins standards unless otherwise approved by the Director of Public Works.

c. Paving Plans for driveways, fire lanes, parking areas, and sidewalks indicating pavement types, thicknesses, and dimensions

d. Paving Plans and Profiles for each public street and alley with top of curb grades for streets and centerlines for alleys. The plan view shall show all existing features and the profile view shall include the existing ground. The profile grade lines and cross-sections of intersecting streets should be adjusted to provide a smooth junction and proper drainage.

e. Roadway Cross-Sections for each arterial or collector street indicating cut and fill and the limits of earth work
f. A Drainage Area Map which shall include size and delineation of drainage areas, storm frequency, storm water runoff calculations, designation of points of concentration, and any additional data necessary for the proper design of drainage facilities.

g. Drainage Plans for storm sewers showing drainage calculations, hydraulic data, pipe grades and sizes, manholes and junction boxes, other pipe connections, inlets, and outfall structures. Storm sewers for public systems (and all other storm sewers as required by the City Engineer or Director of Public Works) must be profiled and shall include hydraulic grade line.

h. Drainage Plans for open channels showing drainage calculations, hydraulic data and depth of flow, channel grades, channel material, channel geometry, inlet structures, culverts, bridges, and outfall structures (such as concrete rip-rap, etc.). Open channels for public systems (and all other open channels as required by the City Engineer or Director of Public Works) must be profiled and shall include depth of flow. Cross-sections may be required on a case-by-case basis.

i. Drainage Plans for storm water detention ponds showing drainage calculations, hydraulic data, pond depth and geometry, pond material, and other information necessary for proper design review and construction of the proposed improvements. If an underground storm water detention facility is proposed, then appropriate plans and details should be provided.

j. Water Line Plans showing pipe sizes, location of valves, fire hydrants, fittings and other appurtenances, including installation and backfill details. All public water lines (of any size) and all private water lines 12" in diameter and larger must be profiled. Water line profiles shall include the station, elevation and description of utility crossings.

k. Sanitary Sewer Plans and Profiles indicating pipe grades and sizes, manholes, cleanouts and other appurtenances, including installation and backfill details. Profiles are not required for private sanitary sewer services under 250 feet long and 6-inches or less in diameter, if they do not cross other private properties. Sanitary sewer lines or services crossing other private properties must be in easements and must be profiled. Sanitary sewer connections which extend more than 10 feet into the paved section of public streets must be profiled for the section which is located in the right-of-way. Private sanitary sanitary sewer profiles shall include the station, elevation, existing and proposed ground lines, and the location and description of utility crossings.

l. An Erosion Control Plan prepared in accordance with the current Texas Pollution Discharge Elimination System (TPDES) requirements and all other applicable requirements of the Texas Commission on
Environmental Quality (TCEQ). For all projects requiring a SWPPP based on TPDES/TCEQ requirements, the contractor or the developer/owner shall provide the Department of Public Works with a copy of the SWPPP and the Construction Site Notice (and NOI if applicable) prior to any earth disturbance activities.

m. A Traffic Control Plan shall be submitted for all proposed construction within a street right-of-way. The traffic control plan shall incorporate all applicable requirements of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

n. Street Lighting Plan for all projects involving public street construction

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Construction Permit application submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Plat.

(b) A copy of an approved Development Plan

(c) A copy of the filed Final Plat, Replat or Minor Plat (a Conveyance Plat is not acceptable)

(d) Landscape Plan

(e) Tree Survey

(f) Tree Preservation and Mitigation Plan (if applicable)

Sec. 410. EARTH DISTURBANCE PERMIT APPLICATIONS

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Earth Disturbance Permit application submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Plat.

(b) A copy of an approved Development Plan

(c) A copy of the filed Final Plat, Replat or Minor Plat (a Conveyance Plat is not acceptable)

(d) A Grading Plan prepared and submitted in accordance with the plan preparation/submittal requirements described under the section on Construction Permit Application Submittals above.
(e) Drainage Plans prepared and submitted in accordance with the plan preparation/submittal requirements described under the section on Construction Permit Application Submittals above.

(f) An Erosion Control Plan prepared in accordance with the current Texas Pollution Discharge Elimination System (TPDES) requirements and all other applicable requirements of the Texas Commission on Environmental Quality (TCEQ). For all projects requiring a SWPPP based on TPDES/TCEQ requirements, the contractor or the developer/owner shall provide the Department of Public Works with a copy of the SWPPP and the Construction Site Notice (and NOI if applicable) prior to any earth disturbance activities. Note: Erosion control plans shall be prepared in accordance with the plan preparation/submittal requirements described under the section on Construction Permit Application Submittals above.

(g) Tree Survey

(h) Tree Preservation and Mitigation Plan (if applicable)

Sec. 411. DRIVEWAY PERMIT APPLICATIONS

Application for a driveway permit can be made as part of the Development Plan request or as a separate request. Driveway permit applications shall contain sufficient information to allow the city to fully assess the adequacy of the proposed driveway design. A Driveway Permit application shall include a driveway plan. The following is a checklist for items, which shall be included, as applicable, on the driveway plan:

(1) Title block including property address, property legal description, and information contact information for the property owner and contractor

(2) North arrow

(3) Date

(4) Scale (must be legible)

(5) The dimensions, locations and design of the driveway(s) being requested

(6) The location of any building or structure on the site, either existing or proposed

(7) List uses on commercial lots (such as office, retail store, gas station, etc.)

(8) The layout of all drive lanes, fire lanes, and parking areas including the proposed internal circulation patterns
(9) All existing or proposed driveways, gutters, storm sewers, manholes, fire hydrants, utility poles, underground utilities, service fixtures, etc., which may be impacted by the driveway construction or may affect driveway operations.

(10) Any existing driveways or curb cuts located on the property, adjacent properties, or properties across the street.

(11) The geometric design features of the connecting roadway, including the roadway width, roadway material (concrete or asphalt), the presence of a median, the number and width of travel lanes, the presence of a shoulder or a parking lane, etc.

(12) The distances to the nearest intersecting streets and driveways.

The following is a list of accompanying documents or items, which shall be included, as applicable, with each Driveway Permit application submitted for review:

(a) Tax certificate showing all tax payments to the City of Hutchins are current. Note: Taxes must be current as of the date of formal City approval of the Plat.

(b) A copy of the filed Final Plat, Replat or Minor Plat (a Conveyance Plat is not acceptable).

(c) A Traffic Control Plan shall be submitted for all proposed construction within a street right-of-way. The traffic control plan shall incorporate all applicable requirements of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

Sec. 412. SIGN PERMIT APPLICATIONS

No sign permit shall be issued except after receipt of an application prescribed by the building official and showing the sign location, size, type, height, materials of constructions, surface area and such other information as the building official shall require. When required by the building official, plans shall be prepared by a registered professional engineer or architect. The applicant shall comply with all requirements as described in the City’s sign ordinance (see Article 3.11 “Signs” of the City of Hutchins Code of Ordinances).
ARTICLE V. PUBLIC IMPROVEMENTS

Sec. 501. GENERAL CONSTRUCTION STANDARDS

(a) General Provisions. All improvements shall be in conformance with the City's construction standards and specifications (City standards) except as may be otherwise provided. The requirements of this development manual are considered minimum requirements and are not intended to replace accepted engineering judgment or practices. Improvements may be constructed based on alternative standards and specifications only if approved by the City Engineer and the Director of Public Works. The developer shall provide the City Engineer and Director of Public Works with a written detailed listing of all variations from City Standards at the time of permit application. The City shall not be required to accept any deviation from City standards which were not authorized in writing by the City prior to construction. Authorization to deviate from City standards does not remove liability from the developer, engineer, and/or contractor. Design and construction appropriateness shall be the responsibility of the developer, engineer, and contractor (as applicable) and no review, approval, or acceptance by the City or anyone working on behalf of the City shall imply any liability accepted by the City, the City Engineer, the Director of Public Works, or any other agents or employees of the City.

The developer of a subdivision shall install all water, sewer, street, sidewalk and drainage improvements, and any other facilities required by this development manual, which are necessary for the proper development of the subdivision. The design, construction and inspection of any public facilities shall be a cost to the developer, unless the City has entered into an agreement for cost sharing. All such facilities shall be designed and constructed in accordance with the criteria contained in this development manual, unless otherwise agreed by the City, and shall be in conformance with the general layout of the City of Hutchins Comprehensive Plan and Capital Improvements Plan. The public facility requirement of this section shall be applicable to the upgrading of any existing facilities which do not meet current standards.

If a proposed subdivision is situated adjacent to an existing street or municipal utility which does not meet the standards contained in this development manual, the developer shall bear the cost for constructing the infrastructure improvements required by this development manual in order to serve the proposed development.

For the purpose of this regulation, the calculation used for estimating the reconstruction costs for an unimproved street shall include all street paving, curb and gutter, traffic control and traffic signals, sidewalks, hike and bike trails, water and sewer utilities, and drainage improvements. The improvements shall be sized in accordance with the most recently approved Thoroughfare Plan or Capital Improvements Plan, whichever is applicable.

(b) Apportionment of Infrastructure Costs. As a condition of the approval of a development, the developer's portion of the costs may not exceed the amount required for infrastructure improvements that are roughly proportionate to the projected impact of
the proposed development, as determined by a professional engineer, licensed in the State of Texas, and who is retained by the City of Hutchins.

1. In making the rough proportionality determination, consideration shall be given to the availability of adequate and minimum levels of public facilities and accessibility to the site for delivery of emergency services.

2. The professional engineer making the proportionality determination may rely on categorical findings from comparable public improvement projects for establishing a cost basis.

3. A developer who disputes the determination by said professional engineer may appeal to the City Council and present testimony and evidence in support of the appeal. The appeal shall be written and filed with the City Secretary within ten (10) days after the date action taken by the Planning and Zoning Commission on the development proposal. The developer shall not be required to waive the right to appeal as a condition of approval of the development project.

(c) Optional Escrow Provision. Where, in the opinion of the City, construction of a required public improvement should be deferred to a future date, the developer shall place in escrow with the City, an amount equal to the estimated cost of the improvements, as determined by the Director of Public Works. The Planning and Zoning Commission or City Council may consider an alternate arrangement when appropriate.

(d) City Participation in Over-Sizing. Where over-sizing of a public improvement is required by the Comprehensive Plan, Thoroughfare Plan, Water or Sewer Capital Improvements Plan or other planning document adopted by the City, City participation shall be in accordance with the provisions of any applicable Impact Fee Ordinance or City-Developer Agreement, which has been approved by the City Council.

(e) Standard Specifications. The "Standard Specifications for Public Works Construction" as published under the authority of the North Central Texas Council of Governments, along with the amendments and Special Provisions to the document, approved or issued by the City, shall comprise the Standard Specifications for the City of Hutchins as indicated in Article 3.09 "Public Works Construction Standard Specifications" of the City of Hutchins Code of Ordinances. Reference Article 3.09 for further details.

(f) Special Specifications. Special Specifications are those construction specifications that are not covered by the Standard Specifications. Special Specifications shall be required for all projects having items of construction not adequately covered by the Standard Specification. All Special Specifications shall be subject to review and approval by the City.

(g) Construction Standards. Construction of public improvements within the City of Hutchins shall be performed in accordance with this development manual, the City of Hutchins Standard Construction Details, and the Standard Specifications as described in Section 501(e) above.
(n) **Material Testing.** The project owner is responsible for providing all material testing services for the proposed development. The required testing shall be performed by a City approved geotechnical testing laboratory company under the supervision of a licensed professional engineer. The procedures and criteria for testing are generally outlined in North Central Texas Council of Governments (NCTCOG) Standard Specifications. A copy of the test results shall be furnished to the City.

(o) **Final Acceptance.** Final acceptance is the formal approval by the City. It will be made in writing based on the finding that the improvements have been satisfactorily installed and that all administrative requirements have been satisfied.

(p) **Partial Acceptance.** Generally, the City will not accept any part of any development prior to the completion and acceptance of the entire development. However, at the discretion of the Director of Public Works, partial acceptance may be granted in unusual circumstances.

(q) **Conditional Acceptance.** The City may issue a letter of conditional acceptance upon the determination by the City that unusual conditions warrant such acceptance and that the City will not be adversely affected.

(r) **Record Drawings.** Prior to final acceptance, the Engineer of Record shall furnish the City the revised drawings depicting as-built conditions (one set of mylar reproducibles, electronic PDF, and AutoCAD .dwg formats). The plans shall be marked “Record Drawings” on each plan sheet and shall be signed and dated by the Engineer. The Engineer shall certify that the plans accurately depict the work as actually constructed based on the information available to the Engineer of Record. The Engineer of Record will not be responsible for materials used in the construction or workmanship; only the geometrics and elevations of paving, drainage, and sanitary sewer improvements, and the horizontal locations of water line improvements as evidenced by locations of water valves, vaults, fire hydrants, etc. While the Engineer of Record will not be responsible to personally verify all conditions in the field, the Engineer of Record shall, at a minimum, obtain a signed written statement from the contractor or developer indicating the extent of any deviations from the original plans. The Engineer of Record shall not prepare Record Drawings acceptable verification of as-built conditions. Other acceptable verifications shall be personal verification on site by the Engineer of Record or someone working under the direction of the Engineer of Record, or an as-built survey of the completed project.

(s) **Surveyors Certification of Monumentation and Pinning.** Prior to final acceptance, a Texas Registered Professional Land Surveyor (R.P.L.S.) employed by the developer, shall provide the City with a written certification that all lot and right-of-way lines have been marked as evidenced by the setting of iron rods or other appropriate monumentation.

(t) **Maintenance Bonds.** Prior to final acceptance, the developer shall furnish the City with an acceptable fifty percent (50%), two (2) year maintenance bond. The maintenance bond shall cover all items of construction dedicated to the City.
Sec. 502. BLOCKS

(a) The length, widths and shapes of blocks shall be determined based upon adequate building sites suitable to the special needs of the type of use proposed as well as the needs for convenient access, circulation, control, and safety of traffic.

(b) Where no existing subdivision controls block lengths, arterial blocks shall be a minimum of 660-feet and a maximum of 2,600-feet in length. Blocks in multi-family, commercial and industrial zoned developments shall be a minimum distance of 500-feet and a maximum distance of 1,800-feet.

(c) Blocks in single-family and two-family residential zoned developments shall not contain more than 18 platted lots on either side between intersections and shall not exceed a maximum distance of 1,800-feet. When conditions prevent the installation of streets to address block lengths, a fire control easement of 40-feet may be allowed to define the appropriate block length. One fire control easement may be used per block. No structures may be allowed within such easement.

(d) In the event a property owner is platting only major street rights-of-way for dedication and construction, the requirements stated herein shall be met with final platting of the property into lots and blocks.

(e) All distances specified shall be measured along the centerline of the street right-of-way between the center points of street intersections.

Sec. 503. LOTS

(a) All lots shall conform to the requirements of this development manual and the City’s Zoning Ordinance. Lots shall be arranged to provide access and to avoid foreseeable difficulties due to topography and natural physical features inherent to the property. All lots shall adjoin a public street or may be served by an access easement or private street. Such access easement or private street shall meet the same minimum standards as required for a fire lane, although the easement or private street itself may not be a required fire lane.

No residential lot shall front on or derive access directly from an existing or proposed collector street, or larger, except where the proposed subdivision meets all the following criteria:

1. Where the only street frontage which may be provided to the residential lot is from a collector street due to the shape, topography, or other physical condition of the property;

2. The City Engineer has provided favorable recommendation; and

3. Where the residential lot is designed and dimensioned to permit loop driveways or on-site turnaround facilities so that vehicles can exit the lot facing head into the collector street.
Double frontage and reversed frontage lots shall be avoided except where approved by the City to provide separation of residential development from a collector street or to overcome specific disadvantages of topography and orientation. In single-family residential double frontage situations, a notation should be placed on the plat to limit the facing of residential structures toward collector streets and to prevent driveway access from a collector street.

The width between side lot lines at their foremost points (where they intersect with the street line) shall not be less than eighty (80) percent of the required lot width. In the case of lots on the turning circle of a cul-de-sac, the width may be less than eighty (80) percent of the required lot width. Side lines of lots shall be approximately at right angles to straight street lines and radial to curved street lines, except for single-family attached townhouse developments (three (3) units or more attached).

Every lot shall contain a buildable area that is adequate in size for the proposed development. The buildable area shall be situated out of the 100-year floodplain. If a tract being subdivided contains a water body, or portion thereof, lot lines shall be drawn so as to distribute the entire ownership of the water body among the adjacent lots. The City may approve an alternate plan provided the ownership of and responsibility for maintenance of the water body is so placed that it will not become a City responsibility. Where a watercourse separates the buildable area of a lot from the street by which it has access, provision shall be made for installation of a culvert or other structure, of design approved by the City.

(b) In subdivisions where buildings are to be served by septic tanks, the size of lots shall be sufficiently large to accommodate adequate drainage fields and to meet the standards set forth by the Texas State Department of Health, the Texas Commission on Environmental Quality, and the City of Hutchins.

(c) A lot which had construction thereon or had been platted prior to the adoption of this development manual, which is reduced in size to less than herein required by reason of the widening of an abutting street by the City or other governmental agency, may be used for dwelling purposes. In such instance, the minimum lot area or depth requirements shall be computed on the basis of the original lot size prior to the street widening.

Sec. 504. EASEMENTS AND RIGHT-OF-WAY

(a) General Provisions. Easements and/or right-of-ways (R.O.W.s) shall be provided for all City owned public facilities (streets, water, sanitary sewer and storm drainage) and shown on subdivision plats. Easements and/or R.O.W.s for utilities shall be a minimum of fifteen (15) feet in width, except as otherwise provided. Where a subdivision is bounded by a watercourse, drainage way, channel or stream, there shall be provided a storm sewer easement or drainage right-of-way conforming substantially to the lines of such watercourse or of such width to provide for any future construction.
In situations where a City owned utility lies within its own prescribed minimum easement and a privately owned utility (electric, gas, telephone, cable) is located, underground or overhead, adjacent to and outside the City easement, it would be agreeable to the City that such easements may be mutually shared for ingress-egress and for temporary storage of equipment or materials.

In situations where two City utility systems are to be installed separately in parallel and contiguous easements, the minimum width of the combined easement may be reduced to a width approved by the Director of Public Works on a case-by-case basis.

Easements for the use of utilities of not less than seven and one-half (7.5') feet in width shall be provided on each lot and extend along the entire length of the rear property line and side property lines. Side lot line easements may be reduced in size or waived for narrow lots or other constraints if approved on the Final Plat with the recommendation of the Director of Public Works. Easements shall connect with easements already established on adjoining properties or extend to connect with a public right-of-way. No lot shall be shown with an easement which prevents proper development and full utilization of the lot as a suitable building site for the intended zoning district. When a proposed water, sewer or drainage line will be placed adjacent to a public road maintained by the Texas Department of Transportation, a separate specific use easement shall be provided for each utility or drainage facility.

In single-family residential subdivisions, City owned utilities shall be located within a prescribed right-of-way and shall not be located within easements, unless otherwise approved by the Director of Public Works. If an existing City owned utility is located within a dedicated easement prior to the development of a single-family subdivision, the developer shall convert the easement into a right-of-way or relocate the utility into a street right-of-way.

The following statement of restrictions shall be placed in the dedication instrument of the subdivision plat:

"Any public utility, including the City of Hutchins, shall have the right to move and keep moved all or part of any building, fences, shrubs, other growths or improvements which in any way endanger or interfere with the construction, maintenance, or efficiency of its respective systems on any of the easements shown on the plat; and any public utility, including the City of Hutchins, shall have the right at all times of ingress and egress to and from and upon said easements for the purpose of construction, reconstruction, inspection, patrolling, maintaining and adding to or removing all or part of its respective systems without the necessity at any time of procuring the permission of anyone."

(b) Water and Sanitary Sewer Line Easements. Refer to water and sewer design guidelines in this design manual for proper easement widths for different pipe sizes at different depths of cover.

(c) Storm Drainage Easements. Refer to applicable drainage guidelines for proper easement widths for drainage channels and for different pipe sizes at different depths of cover. Additional widths may be required depending upon the engineering
design, size, depth, soil conditions and other criteria as determined by the Director of Public Works or his representative.

The following statement of restriction shall be placed in the dedication instrument of the subdivision plat:

"Drainage Easement Restriction: No construction or filling, without the written approval of the City of Hutchins shall be allowed within a drainage easement, and then only after detailed engineering plans and studies show that no flooding will result and that no obstruction to the natural flow of water will result. Where construction is permitted, all finished floor elevations shall be a minimum of two (2) feet above the 100-year flood elevation."

(d) **Access Easements.** In lieu of street frontage, lots may be accessed by means of an access and utility easement. Such easement must be dedicated by a plat and filed with the County Clerk. Such easement must be maintained by the owners, shall remain in good repair and shall in no way be the responsibility of the City. The width of such easements shall be sufficient to accommodate a minimum 24 feet of paving. The need for such easements shall be determined by following the usual platting process established in this development manual.

(e) **Slope Easements.** Slope easements or extension of parkway cross slope shall be required in areas of new development, where significant earth (cut or fill) slopes extend into private property beyond street right-of-way lines. These slopes are required for the stability of the roadway sections, effective erosion control, drainage, and maintenance. At developer's option, either of the following alternates shall be followed:

1. The slope easement width shall be sufficient to provide a maximum slope of 4′ (horizontal) to 1 foot (vertical) as measured from the right-of-way line to the limit of the slope.

2. Other maintenance-free slope protection methods (e.g., concrete riprap, retaining walls, etc.) may be utilized for slopes steeper than 4:1 if approved by the Director of Public Works.

(f) **Parkway Cross Slope Extension.** The parkway cross slope (2%) shall be extended an additional ten (10) feet beyond the right-of-way line to the hinge point of the slope for cut or fill slopes in excess of three (3) feet in height. No easements or additional right-of-way will be required except that the resulting slope easement may become wider. The additional parkway and cut or fill slope shall be landscaped as required to equal the adjacent public parkway in accordance with the landscaping requirement of this development manual.

(g) **Alleys.** Alleys shall comply with the following requirements:

1. Twenty (20) feet where residential building sites are provided on both sides. Alleys used for fire lanes must be a minimum of twenty-four (24) feet wide.
(2) Twenty-two (22) feet where residential development abuts commercial or industrial areas. Alleys used for fire lanes must be a minimum of twenty-four (24) feet wide.

(3) Twenty-four (24) feet where commercial or industrial development abuts on both sides.

Dead-end alleys shall be prohibited except where prior development of land adjoining the subdivision permits no other reasonable design. Under such circumstances alleys shall be provided with turnaround or back-around facilities at the dead-end adequate to permit clear maneuvering of sanitation trucks, utility service vehicles and emergency vehicles.

(h) **Fire Hydrant and Water Meter Easements.** All fire hydrants, fire hydrant leads, water meters, and water services (up to the meter) which are not within City right-of-way shall be placed in a 10 (ten) feet wide water line easement.

(i) **Construction Easements.** The developer, at his own cost, shall be responsible for obtaining appropriate temporary construction easements or letters of agreement/permission from adjacent property owners for the proper construction of streets, drainage, and water and sewer facilities and provide such documentation to the City.

**Sec. 505. PAVING**

(a) **General Provisions.** The paving of streets, alleys, turning lanes, driveways and sidewalks shall be in accordance with this development manual and the construction standards of the City of Hutchins. Temporary asphalt streets, connections and driveways will be considered on an individual basis and shall be constructed in accordance with approved plans.

(b) **Streets.** The arrangement, character, extent, width, grade and location of all proposed streets shall conform to the Thoroughfare Plan of the City of Hutchins. Design of such streets shall take into consideration existing and planned streets, topographic conditions, public convenience, safety and the relationship of uses that will be served by the streets. The developer is responsible for the dedication of all required right-of-way and construction of all street(s) within the development and one-half of the street(s) that abut the development. Where it is determined by City staff to be impractical to construct one-half (½) of the street, the developer shall escrow with the City the full monetary value of these improvements prior to the approval of the final plat/replat. Any off-site street required to provide adequate access to the development shall be the entire responsibility of the developer. These provisions shall apply in all cases including where there is an existing sub-standard street.

When not shown in the City's Thoroughfare Plan, all proposed streets shall:

(1) Provide for the continuation or appropriate projection of existing streets.
(2) Conform to a plan for the neighborhood approved or adopted by the City to meet a particular situation where topographical or other conditions make continuation of, or conformance to existing streets impractical.

(3) Be laid out so that street right-of-way lines intersect at 90 degrees and so that no street curvature is closer to the point of intersection of right-of-way lines than 50 feet.

(4) Provide necessary minimum left-turn lane storage lanes for entry into subdivisions along both traveled ways, as necessary.

No residential and collector (2-lane) street intersection with arterial streets shall be allowed within 250-feet of a major arterial street intersection (4 lane undivided and above) and/or within proposed right-turn lane limits.

Residential streets shall be laid out in a manner to discourage use by through traffic. Street right-of-way widths shall conform to the City’s Thoroughfare Plan. In no case shall a street right-of-way be less than 50-feet.

Every subdivision shall be designed to provide sufficient access into the development to accommodate anticipated traffic demands and to provide for emergency public services using the criteria contained in this Section.

Where a proposed subdivision, or cul-de-sac street, contains more than twelve (12) lots, the development shall provide for two entryways as follows:

(1) The development shall provide one street entryway and one emergency access easement. The emergency access easement shall be located on an adjacent or opposite side of the subdivision from the main entryway. The widths of the right-of-way and driving surfaces of the street entryway and the emergency access easement shall be in accordance with the standards contained elsewhere in this development manual,

or

(2) The development shall provide a divided entryway and one emergency access easement. The driving surfaces of the divided entryway shall be separated by a median not less than ten (10) feet in width and provide for one-way traffic. The widths of the right-of-way and driving surfaces of the divided entryway shall be in accordance with the standards contained elsewhere in this development manual. The emergency access easement shall be located on an adjacent or opposite side of the subdivision from the main entryway and be constructed in accordance with the standards contained elsewhere in this development manual.

If it is physically impractical or otherwise impossible to provide two entryways or to incorporate an emergency access easement into the development in accordance with the above stated requirements, the following alternative may be considered by the City Engineer and Director of Public Works:
A single pavement width of forty-one (41) feet which extends from the intersecting street right-of-way into the property a minimum distance of one-hundred (100) feet. All residences within the subdivision shall contain automatic fire-sprinkler systems.

If it is physically impractical or otherwise impossible to comply with the above-stated requirements, an alternative design may be submitted to the City Council for consideration. The City Engineer and Director of Public Works may approve the alternate design if they find that the above-stated requirements cannot be satisfied and that all efforts have been made by the developer to comply with requirements.

Half streets shall be prohibited, except where necessary to the reasonable development of the subdivision in conformance with the other requirements of these regulations and where the City finds it will be practicable to require the dedication of the other half when the adjoining property is subdivided or platted. When a half street has already been provided, the remaining portion of the street shall be platted within such subdivision. Where part of a residential or collector street is being dedicated along a common property line, the first dedication shall be one-half of the proposed street right-of-way plus five (10) feet, with a minimum of 24 feet of pavement width to be constructed.

The reservation in private strips of land at the end of, or adjacent to, proposed or existing streets and intended for the purpose of controlling access to property shall be prohibited.

(c) Concrete Strength Requirements. Public streets and alleys shall meet the minimum concrete strength requirements as described by the City of Hutchins Pavement Design Guidelines (see Appendix) and the City of Hutchins Standard Construction Details.

(d) Pavement Thickness Requirements. Public streets and alleys shall meet the minimum pavement thicknesses as described by the City of Hutchins Pavement Design Guidelines (see Appendix) and the City of Hutchins Standard Construction Details.

Where right-turn, left-turn or deceleration lanes are added to existing streets, the pavement thickness shall be in accordance with the current pavement thickness standards for the street type.

(e) Pavement Width Requirements. The minimum pavement width for residential streets shall be 29-feet measured back to back of curbs. When rollover curbs are approved, the minimum standard width shall be increased to account for any increased curb width from a typical curb section. The use of rollover curbs within public right-of-way will not be allowed without approval of the Director of Public Works.

Non-Residential streets shall be a minimum of 38-feet measured back to back of curbs. Wider street paving shall be constructed to provide the number of through lanes, left turn lanes, right turn lanes, acceleration, and deceleration lanes as required and shown as part of the City's Master Thoroughfare Plan.

(f) Curbs. Curb construction shall be as follows:
(1) Monolithic Curbs. All streets shall be constructed with a monolithic curb continuous on each side of the street pavement. Monolithic curbs shall be six (6) inches in height and six (6) inches wide, in accordance with the appropriate construction standard.

(2) Rollover/Mountable Curbs. The use of rollover curbs are only allowed for front entry residential uses and only with approval of the Director of Public Works.

(g) Sidewalks. Public sidewalks along public streets should typically be located in the right-of-way. A minimum of four (4) feet of clear pedestrian width shall be provided for public sidewalks in single-family residential areas. A minimum of five (5) feet of clear pedestrian width shall be provided for public sidewalks in multi-family residential and non-residential areas. Sidewalks which are not separated from the street back of curb by at least three (3) feet shall be widened to a minimum of six (6) feet in single-family residential areas and seven (7) feet in multi-family residential and non-residential areas. The minimum requirements shall be exceeded as necessary to comply with any Texas Accessibility Standards (TAS) standards, Americans with Disabilities Act (ADA) standards, or any other applicable laws, codes or requirements. All projects shall provide accessible routes per TAS and all other applicable laws, codes and requirements. Sidewalks shall be included on construction plans and on development plans.

Developers of tracts of land served by sidewalks not meeting the requirements of this development manual, or not structurally sound, shall be responsible for removing the existing sidewalks and constructing new sidewalks to meet current requirements. The dedication of additional right-of-way or easement may be required to provide adequate space for the construction of sidewalks. Along state routes, a sidewalk easement may be dedicated to the City of Hutchins and the sidewalk shall be constructed within this easement. Sidewalks across bridges shall be continuous and approved safety features shall be incorporated into the design to adequately protect pedestrians.

Sidewalks shall be constructed as part of the infrastructure improvements associated with the developments. When a subdivision is proposed with a masonry or other permanent perimeter screening wall adjacent to a street, the sidewalk shall be constructed by the developer at the same time as the screening wall. Sections of sidewalk construction, at locations approved by the City, may be delayed until development of adjacent lots. Instances in which sidewalk construction may be delayed include the front and side yards of residential and commercial properties where subsequent building construction would likely damage the sidewalk. Sidewalks shall be constructed at street intersections, areas of existing high pedestrian traffic and drainage locations that would not be subject to destruction during later development of the adjacent lot. In areas where sidewalk construction is delayed, grading shall be in full conformance with the typical section.

(h) Driveways. All driveways in the City of Hutchins shall be constructed by city permit only. A permit will be granted only after due consideration of safety, traffic flow, and conflicts with existing and proposed facilities. In addition to the above, access to state controlled highways shall require State permits. The contractor shall construct the
proposed driveway within five (5) days of the saw cut and removal of the existing pavement.

(1) Residential driveway approaches shall follow these guidelines:

a. Width shall be 11-feet minimum and 20-feet maximum, plus a 5-foot curb radius on each side.

b. The radius or flare point at the street or alley of any driveway shall not extend beyond the property line(s).

c. All driveway approaches shall be constructed in accordance with the City standard driveway construction details.

d. The average slope of a residential driveway shall not exceed 8 percent up to the right-of-way line and 14 percent beyond the right-of-way line. Sidewalk crossings shall meet all applicable accessibility codes, standards, and laws.

(2) Commercial driveway approaches shall follow these guidelines:

a. Width shall be 24-feet minimum and 40-feet maximum, plus a 10-foot curb radius (20-foot curb radius for fire lanes) on each side.

A 30-foot curb radius on each side will be allowed for commercial and industrial sites where significant truck traffic is projected.

b. The average slope of a commercial driveway shall not exceed 8 percent up to the right-of-way line and 12 percent beyond the right-of-way line. If the driveway is a fire lane, then the average slope of a commercial driveway shall not exceed 8 percent up to the right-of-way line and 8 percent beyond the right-of-way line. Sidewalk crossings shall meet all applicable accessibility codes, standards, and laws.

c. The minimum spacing between driveways shall be 50 feet. However, the minimum spacing between driveways for single-family residential properties, where adjacent driveways on separate lots are divided by a property line, shall be 10 feet. The measurement for driveway spacing shall be made to the point where the flare or curb return intersects with the street pavement or curb. The minimum spacing for multi-family, commercial, and industrial lots may be reduced upon approval of the Director of Public Works.

d. All two-way driveways shall intersect streets at 90 degrees.

e. Adequate site distances and on-site maneuvering shall be available from every driveway.
f. All driveway approaches shall be constructed in accordance with the City standard driveway construction details.

g. Driveways on State maintained highways shall meet the Texas Department of Transportation (TxDOT) requirements and must be approved by TxDOT.

(i) Lane Closures. In instances where the proposed construction necessitates the closure of an existing travel lane, the construction plans shall include specifications for traffic control and a work sequence to minimize the effect on existing traffic. As a minimum, early strength concrete shall be specified along with a work sequence whereby lane closures are of minimal duration. Specific details will be reviewed by City staff and approval will be based on the finding that every step has been taken to accomplish the purpose of this section. Depending on conditions associated with the particular site, City staff may alter those requirements where it is determined that existing traffic will not be significantly affected. On major thoroughfares, a cash bond may be required as a guarantee by the contractor to ensure compliance with the specifications.

(j) Fire Lanes. See Section 508 for paving requirements concerning fire lanes and fire apparatus access roads.

Sec. 506. DRAINAGE

(a) General Provisions. The design, size, type and location of all storm drainage facilities in the City of Hutchins shall be in accordance with the City drainage guidelines. The developer and his engineer (the Engineer of Record) shall bear total responsibility for the adequacy of design. The approval of a given drainage facility in no way relieves the developer or the Engineer of Record from their responsibility or liability. Prior to any channel improvement or storm water detention design, the Director of Public Works and the City Engineer shall be consulted regarding preferred flood control strategies for the watershed of interest.

All drainage outfalls into the City-maintained drainage rights-of-ways shall include proper erosion control measures and velocity controls. No concentrated discharges will be permitted near the tops of creek banks. Creek banks disturbed during the construction of storm sewer outfalls shall be properly restored, stabilized, seeded and/or sodded to the satisfaction of the City. It is recommended that the owners/developers conduct a field meeting with City staff during preliminary plat/preliminary engineering stage to identify the locations for proposed drainage outfalls. It shall be the owner's/developer's responsibility to remove trash, debris, fallen trees, etc., and to restore and repair creek banks prior to the dedication of drainage rights-of-way and acceptance of the subdivision.

All drainage structures or improvements in the City of Hutchins shall be designed to properly accommodate the runoff from a storm event of 100-year frequency.

If a site discharges more than 5-cfs of storm water into the right-of-way at each drive approach, an onsite storm drainage system shall be required for connection to an
existing public storm sewer system, unless a public storm sewer is not available near the site which has the capacity to handle the 100-year future discharge.

If the public storm sewer system has inadequate capacity for 100-year storm discharges, the developer has the following design options:

(1) Option A: To upgrade the public storm sewer system to accommodate the 100 year storm discharges from their site as well as any offsite future 100 year discharges upstream of their property, at their own expense.

(2) Option B: To design their onsite storm sewer system for a total runoff to include: a) 100 year onsite developed runoff, b) 100 year offsite drainage coming into the property under existing (undeveloped) conditions. The resulting excess discharges (above the capacity of public system) shall be retained or detained onsite, to reduce peak runoff so the existing public drainage system will not be overloaded.

Drainage improvements in residential developments shall be located within public right-of-ways. Street and alley layouts shall be arranged such that the drainage can be provided within the rights-of-way. In the event drainage improvements must be located outside street and alley rights-of-way, a drainage right-of-way shall be dedicated.

Drainage may be designed in a manner which will allow one lot to drain across an adjacent lot and into a permanent structure, such as a concrete flume, lined channel, or proper inlet to an adequate drainage facility, or to a street right-of-way. Sheet flow techniques shall be used for lot-to-lot drainage where possible. If an approved drainage structure is not present, it will be required of the developer to construct the necessary facilities.

(b) Design of Storm Sewer Systems. Storm sewers shall be design per City standards. To the extent practicable, concentrated flows from storm water runoff should be placed in underground storm sewer systems. Open channels may be used for large flows and for situations where underground storm systems are not practical. If the City Engineer and/or Director of Public Works determine that an underground storm system is desirable and practical, then the developer shall provide an underground storm system. Cost of the storm sewer system will not be a determining factor unless deemed to be an undue burden by the City Engineer and/or Director of Public Works. All streets shall be protected from flooding in accordance with City drainage guidelines. Inlets shall be provided along all streets based on inlet and gutter capacity calculations prepared by a Texas Licensed Professional Engineer.

(c) Criteria for Filling in a Floodplain. An area of special flood hazard is defined as the land in the floodplain within a community subject to a one (1) percent or greater chance of flooding in any given year. This area has been identified by the Federal Emergency Management Agency (FEMA) on its Flood Insurance Rate Map. On watercourses not covered by the FEMA Flood Insurance Rate Map (FIRM), the special flood hazard area shall be determined by an appropriate floodplain analysis. The results of such an analysis must be reviewed and accepted by the Director of Public Works prior to design.
All construction or construction-related activity which is proposed to take place in a special flood hazard area shall be subject to the conditions of this development manual and any amendments thereto, of the City of Hutchins. A Construction Permit and an Earth Disturbance Permit are required to ensure conformance with these requirements. In addition, the following specifications shall also be observed:

1. There shall be no increase in the 100-year water surface elevation on any property upstream, downstream, or on the opposite bank (unless developer owns both banks) from the proposed site caused by construction activity in the floodplain. The floodplain may be altered only to the extent permitted by equal conveyance reduction on both sides of channel. The property owner/developer shall be required to provide technically acceptable proof (such as a backwater analysis) that this restriction has not been violated.

2. Any increase in mean stream flow velocity shall be limited so as not to exceed the open channel velocity limitations delineated in Section 4.4 of the Drainage Guidelines. In addition, there shall be no increase in erosion on any property upstream, downstream, or on the opposite bank from the proposed site caused by construction activity in the floodplain. The owner or developer shall be required to provide technically acceptable proof (such as backwater analysis) that this restriction has not been violated.

3. The toe of any fill slope shall parallel the direction of flow.

4. Maximum unreinforced fill slope shall be 4:1 unless approval for a steeper grade is received from the Director of Public Works. Vertical walls, terracing, and other slope treatments will be acceptable subject to approval of construction plans.

(d) Required Technical Information For City Review. The engineer shall be required to submit for City review appropriate hydraulic and hydrologic design calculations and technical information. This includes at a minimum:

<table>
<thead>
<tr>
<th>Drainage Structure Type</th>
<th>Required Submittal</th>
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<tbody>
<tr>
<td>Open Channels</td>
<td>All information delineated in Section 4.4 of the Drainage Design Guidelines.</td>
</tr>
<tr>
<td>Culverts</td>
<td>All information delineated in Section 4.2 of the Drainage Design Guidelines.</td>
</tr>
<tr>
<td>Storm Sewers (including inlets)</td>
<td>All information delineated in Section 3.2 of the Drainage Design Guidelines.</td>
</tr>
<tr>
<td>Storm Water Storage Facilities</td>
<td>All information delineated in Section 4.5 of the Drainage Design Guidelines.</td>
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</tbody>
</table>
Construction in a Flood Hazard Zone

Hydraulic calculations and/or computer runs providing no increase of flood elevation or erosional activity on neighboring property. Plans for erosion control on cut and fill slopes and restoration of excavated areas.

The City Engineer and Director of Public Works may require additional technical backup information.

Sec. 507. WATER LINES

(a) General Provisions. This section deals with general requirements for water line construction in the City of Hutchins. All water lines shall be sized and designed in accordance with the City’s water system master plan. All construction shall be in accordance with City standard specifications and construction standards. The Texas Department of Health, Texas Commission on Environmental Quality (TCEQ), and the Environmental Protection Agency must be consulted for their regulations and specifications, where required. The Water Guidelines of the City of Hutchins shall also be adhered to in regards to the design and construction of water lines.

(b) Water Main Categories. Water lines in the City of Hutchins are categorized as follows:

(1) Distribution Lines – sizes up to 12-inches (nominal diameter).

(2) Transmission Lines – sizes greater than 12-inches (nominal diameter).

Distribution lines shall be of sufficient size to provide adequate water for potable and fire protection needs. Transmission line sizes are typically indicated on the City’s water system master plan. The City’s water system master plan may be periodically revised to meet the current demands as well as future needs as development occurs.

(c) Water Line Requirements. The owner/developer shall be required to install at their own expense, all water lines needed to serve their development, including all engineering costs. It shall be the developer's responsibility to determine the demand of the subject development. All off-site water mains required to connect service to the subdivision shall be installed at the expense of the developer. The developer shall provide all reasonable water line stub outs for connection to future adjacent development. The owner shall also be responsible for obtaining easements, when required, from other property owners for off-site water main connections.

All water lines shall be designed to complete a looped system to avoid dead-end lines. Valves shall be placed at or near the ends of mains in such a manner that a shut down can be made for a future main extension without causing a loss of service on the existing main. When it is not possible to prevent a dead end main, the main shall be terminated with a fire hydrant or blow-off valve.
The following shall apply to the installation of all water lines:

(1) All water lines shall be installed within a City street right-of-way or when necessary, within an easement that is contiguous to the right-of-way.

(2) Water lines shall not be installed within a TxDOT right-of-way. A water line easement that is contiguous to the TxDOT right-of-way shall be provided.

(3) The City reserves the right to consider alternate alignments on a case-by-case basis when field conditions warrant.

Water lines within single-family residential developments shall be installed within right-of-way. Water line easements in single-family residential developments may only be utilized in place of right-of-way with approval from the Public Works.

All service lines shall be installed for each lot, with a suitable marker placed at the point of stub-out for reference in advance of street paving, sidewalk construction, or any other item of street construction. A suitable reference marked "W" (minimum letter height of two inches) shall be imprinted by City approved method on the face of the curb, or on pavement where there is no curb. Service connections will not be permitted on transmission mains or fire hydrant leads unless authorized by the Director of Public Works.

(d) Water Line Materials. All water line materials (pipes and fittings) shall conform with AWWA standards and City of Hutchins Standard Specifications. See Section 501(e) for further details.

(1) Water lines of 12-inches (nominal) or less in diameter shall be P.V.C. AWWA standard C900 pressure class 200 (D.R. 14), unless otherwise approved. (Poly pipe is acceptable for services.)

(2) Water lines larger than 12-inches (nominal) diameter shall be PVC AWWA standard C905 pressure class 235 (D.R. 18), unless otherwise approved.

Note: For all pipe sizes, concrete pressure pipe, ductile iron pipe, or other material alternatives will require approval by the Director of Public Works.

(e) Backflow Devices. Approved backflow prevention devices must be installed on all privately maintained fire lines, at locations approved by the City.

(f) Booster Pump Stations. The City of Hutchins will operate and maintain only those booster pump stations and force mains that serve the public. Booster pump stations and force mains serving private developments shall be privately maintained.

(g) Oversizing and Extensions. The City of Hutchins may elect to participate in the oversizing of water mains above the size needed to supply the development. If the City of Hutchins agrees to participation in water line construction, the developer shall be
responsible for the design of the project and shall submit the plans for approval and bidding by the City of Hutchins.

Water extensions outside the City of Hutchins will not be granted to private entities. Water extensions outside the City of Hutchins may be granted to neighboring municipalities or governmental entities as approved by the City of Hutchins City Council.

(h) Meter Requirements. Each connection to service individual or multiple spaces or structures shall be metered by a radio read meter (MasterMeter for less than 2" and Octive for 2" and greater). All meters, regardless of size, shall be purchased by the developer, builder, owner, or applicant through the City of Hutchins.

Individuals installing water meters shall pay administration fees, meter costs, meter deposits and capital recovery fees. Meters installed for City owned buildings or street medians are exempt from capital recovery fees. Capital recovery fees shall not be required for fire protection water lines.

All meters shall be dedicated to the City of Hutchins except devices classified as private and utilized for sub-metering.

All required meters, backflow device boxes, and valves shall be approved by the City of Hutchins. Temporary water service shall be metered.

Sec. 508. FIRE PROTECTION

(a) General Provisions. The information provided in this section is for reference purposes only. All development must comply with International Fire Code and any amendments or other fire codes adopted by the City of Hutchins, together the “City of Hutchins Fire Codes”. In case of a discrepancy between the City of Hutchins Fire Codes and the information provided in this development manual, the most stringent and restrictive requirement shall govern, unless otherwise approved by the City of Hutchins Fire Department.

(b) Fire Hydrants and Water Lines. The location and number of fire hydrants and water lines shall be situated as to afford adequate fire protection to all buildings located or proposed to be located on the property. Such installation to be completed in a reasonable period of time as the Fire Marshal may direct.

(c) Fire Lanes. Fire lanes shall be provided when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet from fire apparatus access as measured by an approved route around the exterior of the building or facility. When required, all fire lanes shall conform to the current edition of the International Fire Code and amendments adopted by the City.

Fire lanes shall be provided to serve all buildings through parking areas to service entrances, loading areas, trash collection areas, and other areas deemed necessary to be available to fire and emergency vehicles. Fire lanes shall include driveways leading onto a public street. Heavily traveled public roadways are not considered for fire
apparatus access due to the dangers involved with operating fire apparatus in close proximity to moving traffic.

Fire lanes shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with an asphalt or concrete surface so as to provide all-weather driving capabilities. Fire apparatus access roads (fire lanes) shall have an unobstructed width of not less than twenty-four feet (24'), an unobstructed vertical clearance of not less than fourteen feet (14'), a minimum inside radius of twenty feet (20'), and a minimum outside radius of forty-four feet (44').

Striping – All fire apparatus access roads (fire lanes) shall be continuously marked by painted lines of red traffic paint six inches (6") in width to show the boundaries of the lane. The words “NO PARKING FIRE LANE” or "FIRE LANE NO PARKING" shall appear in four inch (4") white letters at 25 feet intervals on the red border markings along both sides of the fire lanes. Where a curb is available, the striping shall be on the vertical face of the curb.

Signs – Where required by the Fire Marshal or Building Official, approved signs or other approved notices shall be provided and maintained to identify fire lanes and prohibit obstructions. Signs shall read “NO PARKING FIRE LANE” or "FIRE LANE NO PARKING" and shall be 12" wide and 18" high. Signs shall be painted on a white background with letters and borders in red, using not less than 2” lettering. Signs shall be permanently affixed to a stationary post and the bottom of the sign shall be approximately six feet, six inches (6' 6") above finished grade. Signs, when required by the Fire Department or the Building Official, shall be spaced not more than fifty feet (50') apart. Signs may be installed on permanent buildings or walls or as approved by the Fire Chief.

(d) Third Party Review of Fire Sprinkler and Fire Alarm Plans. Fire sprinkler and fire alarm plans must be sent by the applicant (generally a developer or builder) for third party review. The City has a preferred third party reviewer and substitute reviewers will only be allowed under rare circumstances with approval of the City of Hutchins Fire Department. The fees charged by the third party reviewer are the responsibility of the applicant and the applicant shall pay those fees directly to the third party reviewer. The applicant should contact the Fire Department for contact information for the City’s currently approved third party reviewer.

Sec. 509. SANITARY SEWER LINES

(a) General Provisions. The design, size, type, and location of all sanitary sewer lines shall be in accordance with City’s wastewater master plan, City of Hutchins construction drawings, standards specifications, this development manual and accepted engineering practice. In addition, the design and construction methods shall meet or exceed Texas Commission on Environmental Quality (TCEQ) and Environmental Protection Agency regulations.
All sanitary sewer lines shall be installed within rights-of-way or sanitary sewer easements. Sanitary sewer lines may not be located in easements on any residential lot unless otherwise approved by the Director of Public Works.

(b) **Materials.** All sanitary sewer materials (pipes and fittings) shall comply with the City of Hutchins Standard Specifications. See Section 501(e) for further details. Sanitary sewer lines 12-inches in diameter and less shall be PVC SDR-35 for depths up to 10 feet. When PVC pipe is used for depths exceeding 10-feet, the pipe material shall be PVC SDR-26. Other pipe materials shall be approved at the discretion of the Director of Public Works. Lines larger than 12-inches diameter shall be as specified by the Director of Public Works. Manholes shall be reinforced concrete. Poured-in-place and pre-cast concrete manholes are allowed.

(c) **Manhole Spacing.** Manholes shall be provided at all points of directional change. Manholes shall be provided at vertical points of intersection (vertical curves are not allowed). All sanitary sewer lines shall terminate at a manhole. The maximum allowable spacing between manholes on a line shall be 500 linear feet.

(d) **Manhole Size Criteria.** Sanitary sewer manhole size criteria are established based on manhole depth and maximum pipe size entering manhole. Manhole sizes are subject to approval by the Director of Public Works. All manholes shall have hinged rain caps.

(e) **Minimum Pipe Size.** The minimum size of sanitary sewer lines shall be 8-inches in diameter for lines that are to be maintained by the City, unless otherwise approved by the Director of Public Works.

(f) **Parallel Sanitary Sewer Collection Systems.** Residential or commercial sanitary sewer collection lines shall be designed to not exceed maximum depths of 12'-0" measured from finished grade to the bottom of the pipe. Depths greater than 12'-0" will only be permitted when parallel sanitary sewer collection lines to serve properties on both sides of the street are provided. The Director of Public Works shall be consulted to determine the location and design criteria of the parallel lines prior to final design.

(g) **Oversizing and Extensions.** The City of Hutchins may elect to participate in the oversizing of sanitary sewer mains above the size needed to serve the development. If the City of Hutchins agrees to participation in sanitary sewer construction, the developer shall be responsible for the design of the project and shall submit the plans for approval and bidding by the City of Hutchins.

During the process of development, the owner(s) of the subject property shall extend sewer mains by constructing the necessary sewer line within proper easements/right-of-way, at their sole expense, to serve the adjacent property, when the adjacent property or any portion thereof, are considered to be in the same sewer basin. The construction of the lines shall extend along the frontage or through the property to the furthest point possible, where the adjacent property can readily tie into the system.

Sanitary sewer extensions outside the City of Hutchins will not be granted to private entities. Sanitary sewer extensions outside the City of Hutchins may be granted to
neighboring municipalities or governmental entities as approved by the City of Hutchins City Council.

(h) **Clean-Outs.** A clean out, directed toward the main, shall be provided on all services at the property line or easement line.

(i) **Additional Easements.** Additional easements for sanitary sewer lines shall be dedicated along State controlled routes and along other routes when the right-of-way is not sufficient to adequately provide for the orderly construction and maintenance of the sanitary sewer improvements.

(j) **Emergency Maintenance.** When conditions warrant, the City may perform maintenance operations during the warranty period. The cost of such maintenance shall be paid for by the developer/contractor.

(k) **Television Inspection.**

1. The developer or contractor shall, at its own expense, perform a television inspection of all sanitary sewer gravity lines prior to acceptance by the City. Repairs shall be made if required and the television inspection repeated as many times as needed until the line is deemed acceptable. Prior to final acceptance, the developer or its contractor shall escrow funds to cover the cost of a second television inspection. If the developer or its contractor performs the second television inspection in accordance with the terms stated hereinafter, the escrow shall be refunded less administrative costs.

2. All television inspections shall be provided in color.

3. The City of Hutchins Inspector must be present during the television inspection, unless specifically otherwise authorized in writing.

4. The television inspection of the sanitary sewer mains shall commence after the compaction of backfill, the air test, and the mandrill test are completed.

5. The jet ball technique may be used to remove all foreign debris and silt, prior to television inspection.

6. The second television inspection shall be made no sooner than the 20th month and no later than the 22nd month after the date of the Letter of Acceptance of the subdivision by the City. In the event the developer or contractor shall refuse or fail to complete the second inspection within time permitted, the City shall use the escrowed funds previously described to cause completion of the inspection.

7. All information gathered must be legible, clearly understandable, and of good picture quality.
(8) A run sheet shall be made, and it shall be compatible with the recording medium for noting deficiencies.

(9) By audio on the recording, the operator must note the date and time the recording is made, note the developer or contractor's name, project name, and contract number, note the name of company performing the inspection, if other than the developer or contractor, and the operator's name, note the location, line designation, main size, direction of run, identify every 50-foot station, identify the station of each manhole and identify deficiencies and include station number.

(11) The sewer mains must be televised from manhole to manhole in a downstream manner.

(12) All sanitary sewer mains must be laced with water. The television inspection must be done immediately following the lacing of the main with no water flow.

(13) One recording per television inspection shall be furnished to the City of Hutchins.

(14) Recordings shall be on DVD or as otherwise approved by the City.

(15) All tapes and run sheets shall be submitted to the City Inspector for storage and inspection by the City. All tapes and run sheets shall become the property of the City of Hutchins.

(I) Criteria for Repair. The developer shall make repairs if the City Inspector notes problems, including but not limited to the following:

(1) Pulled or slipped joints.

(2) Water infiltration.

(3) Cracked or damaged pipe.

(4) If standing water is found in pipes of gradients equal to or greater than 0.7 percent.

(5) In pipes of gradients less than 0.7 percent, a maximum one-half (1/2) inch of standing water will be allowed in 8-inch through 12-inch diameter pipes; and a maximum ten (10) percent of pipe size or three (3) inches, whichever is less in pipes greater than 12-inches diameter.

(6) Structural damage to pipe.

The City will review the television inspection recording and notify the developer or contractor of required repairs.
If repairs are required, another television inspection of the repaired area shall be made after the repairs are complete, at the developer or contractor’s expense. Repairs shall be made to the satisfaction of the City of Hutchins.

(m) **Lift Stations and Force Mains.** The City of Hutchins will operate and maintain only those lift stations and force mains which serve the public. Lift stations and force mains serving private developments shall be privately maintained.

(n) **Sanitary Sewer Services.** No sanitary sewer service of less than four inches in diameter shall be connected to a City-maintained sanitary sewer main. Services of six inches in diameter or larger shall connect to sanitary sewer lines only at manholes. An “S” shall be imprinted by City approved method on the face of the curb or on pavement where there is no curb, to identify the exact location of the sanitary sewer service. A sanitary sewer service shall be stubbed out to all residential lots to a point, eight (8) feet minimum, within the lot. The elevation of all services shall be shown on the plans and shall be established such that the lot will be adequately served. For connection fee information, refer to the schedule listed in Appendix A of the City of Hutchins Code of Ordinances (not to be confused with Appendix A of this development manual).

### Sec. 510. EROSION CONTROL

(a) **General Provisions.** Private property owners, developers, or builders shall be accountable for any erosion of their property or construction site that results in measurable accumulation of sedimentation in dedicated streets and alleys. Any accumulation deeper than one (1) inch in dedicated streets, alleys, or offsite private property constitutes a violation of this policy.

1. Maximum use shall be made of vegetation to minimize soil loss.

2. Natural vegetation shall be retained wherever possible.

3. Where inadequate natural vegetation exists, or where it becomes necessary to remove existing natural vegetation, temporary controls shall be installed promptly to minimize soil loss and insure that erosion and sedimentation does not occur.

4. Erosion control plans shall be submitted to the Director of Public Works for approval prior to any earth disturbance activities.

5. Wastes or disposal areas and construction entrances shall be located and constructed in a manner that will minimize the amount of sediment entering streams and City storm sewers.

6. When work areas or material sources are located in or adjacent to live streams, such areas shall be separated from the stream by a dike or other barrier to keep sediment from entering a flowing stream. Care shall be taken during the construction and removal of such barriers to minimize the sediment transport into a stream.
(7) Should preventative measures fail to function effectively, the developer and contractor shall act immediately to bring the erosion and/or siltation under control by whatever additional means are necessary.

(8) Runoff shall be diverted away from construction areas as much as possible.

(9) Developers, builders, or owners of property shall permanently stabilize all disturbed areas prior to final acceptance of the subdivision, development, structure, or other improvements. Stabilization shall be accomplished through the use of perennial vegetative cover or other permanent means, such as channel lining, retaining walls, etc.

(b) **Permanent Erosion Control.** Permanent erosion controls are installed at or near end of the construction project when no further disturbance of the area will occur. The purpose of these controls is to permanently minimize erosion.

(c) **Temporary Erosion Control.** Temporary erosion control methods are used to abate sediment runoff from construction sites. The application of control devices can yield significant water quality and drainage benefits at a minimal cost to the developer. The erosion control measures can be grouped as barriers, filter devices, or routing devices.

(d) **Erosion Control Standards.** Erosion control shall comply with City of Hutchins standards, the North Central Texas Council of Governments Public Works Construction Standards, and the ISWM. In addition, the developer or contractor shall be responsible to provide an Erosion Control Plan prepared in accordance with the current Texas Pollution Discharge Elimination System (TPDES) requirements and all other applicable requirements of the Texas Commission on Environmental Quality (TCEQ). For all projects requiring a SWPPP based on TPDES/TCEQ requirements, the contractor or the developer/owner shall provide the Department of Public Works with a copy of the SWPPP and the Construction Site Notice (and NOI if applicable) prior to any earth disturbance activities.

(e) **Enforcement.** Should proper erosion controls fail or become inoperative, the developer/owner and builder/contractor shall correct the issues immediately. The City shall have the right to revoke the construction permit, building permit, or earth disturbance if erosion control violations are not promptly addressed by the developer/owner and builder/contractor. The City shall also have the right to withhold issuance of a certificate of occupancy or final acceptance.

**Sec. 511. PRIVATE UTILITIES**

(a) **General Provisions.** In the course of development the services of various private utility agencies may be required, including:

(1) Telephone
(2) Gas
(3) Electric
(4) Cable
(5) Solid Waste

In addition, gas (if applicable) and electrical service shall be available to each lot prior to the issuance of a building permit.

(b) Utility Locations. In areas where no overhead utility lines currently exist, all new utility lines of 60KV and below shall be placed underground.

In areas where overhead utility lines exist, the utility companies may augment, upgrade, repair, replace and maintain as necessary.

Relocations may take place based on no change in the character of service. Overhead lines may be relocated overhead and underground lines shall be relocated underground.

The utility companies shall be responsible for developing administrative policies and cost reimbursement procedures for the installation and extension of underground facilities. These policies should permit the utility companies to recover the cost differential between the cost of extending and installing overhead and underground service, in the event the City or a developer requests such facilities from the utility companies.

All utilities shall be constructed and installed in accordance with current standards of the City of Hutchins and the utility companies. No utility shall be constructed closer than two (2) feet to any curb.

Adequate easements shall be provided at the time of platting for all underground utilities.

Sec. 512. MISCELLANEOUS CONSTRUCTION

(a) General Provisions. The developer shall be responsible for the construction, or payment in lieu of construction, of all traffic control devices, railroad crossings and bridges within or adjacent to the development.

(b) Traffic Control Devices. Traffic control devices include traffic signage, street name signs, pavement markings, school beacons, traffic signals, and all related items. All traffic control devices as shown on plans and approved by the City shall be installed by the developer or contractor at their sole cost, unless otherwise directed. Any developer or property owner requesting the installation of a traffic signal shall pay 100% cost for the design and construction. The City, upon evaluation of the needs and justified warrants of
the proposed signal shall help coordinate the approval process on its own thoroughfares, as well as TXDOT routes. Any developer whose development necessitates the modification of an existing traffic signal shall pay for 100 percent of the total cost of the design and construction of the modifications to the traffic signal, roadway approaches, signage and all related items.

(c) **Street Lighting.** The developer shall submit a proposed street lighting plan as part of the construction plans for public improvements. The street lighting plan shall be approved by the Public Works Department prior to the commencement of construction. Streetlights are required to be installed at intervals along all streets defined within the Paving Guidelines (see Appendix). Additionally, streetlights are required to be installed at street intersections, cul-de-sacs, bridges, railroad crossings and other selected points when the City determines that a streetlight is needed for traffic safety.

Streetlights will typically be located in rights-of-way on residential and undivided streets. On divided streets, streetlights with dual mast arms and fixtures will be located within the median.

Once the proposed street lighting plan is approved by the Public Works Department, the developer shall arrange for the installation of all street lighting with the appropriate electrical utility company. The developer shall be responsible for all costs associated with the installation of the proposed street lighting system. The City will pay the monthly charges for all required streetlights.

Any streetlights that exceed the standards listed above must be located on private property and on a separately metered service. Installation cost, maintenance, and the monthly electrical charges will be the responsibility of the property owner.

The above requirements do not apply to signalized intersections where the streetlights are an integral part of the traffic signal, or for streetlights located within Texas Department of Transportation rights-of-way.

(d) **Railroad Crossings.** The developer shall bear 100% of the total cost of all proposed railroad crossing design and construction triggered by new development. The developer who first develops any quadrant of a street/railroad crossing shall pay 100% of the total cost of the construction and may be eligible for reimbursements from future development if an agreement is made with the City.

(e) **Bridges.** The developer shall bear 100% of the total cost of all proposed bridge design and construction triggered by new development(s). The City shall help coordinate approval processes through other federal and state agencies, as needed.

(f) **Payment.** Payments made to the City as a condition of this section shall be made prior to the approval of the final plat or Development Plan (if a final plat is not required).
ARTICLE VI. TREE PRESERVATION AND LANDSCAPING REQUIREMENTS

Sec. 601. GENERAL PROVISIONS

The purpose of this article is to establish incentives for the preservation of existing and protected trees, replanting of trees lost due to development and to provide guidelines for minimum landscaping on new and redeveloped sites. Clear cutting of trees is prohibited within the City of Hutchins. Cutting of trees, grading and land clearing may be done, only for development purposes, in accordance with an approved final plat with construction plans and/or Development Plan. Cutting of trees and land clearing for other than development purposes shall be considered by the City Council. The existing natural landscape character of the city shall be preserved to the extent reasonable and feasible.

Sec. 602. TREE PRESERVATION AND MITIGATION

(a) Only trees from the list provided in this section will be considered to meet the requirement of this development manual. For every recommended tree in healthy, thriving condition that is preserved, the developer/owner shall be given credits as outlined below. Tree caliper shall be measured four and a half (4.5) feet from the base of the tree. Multi-trunk trees shall count as one (1) tree and the total caliper inches for the tree shall be the sum of the largest trunk plus one-half the sum of the remaining trunks. Credits for trees saved in the required 10-foot landscape strip (Sec. 605) will only be applicable for trees required in the landscape strip area. Credits for trees saved in parking areas will be applicable only for trees required in the parking area. A "credit" shall equal one required three (3) inch caliper tree from the Approved Tree List.

<table>
<thead>
<tr>
<th>SIZE OF EXISTING TREES FROM RECOMMENDED LIST</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&quot; – 11&quot; Caliper</td>
<td>1</td>
</tr>
<tr>
<td>12&quot; – 24&quot; Caliper</td>
<td>2</td>
</tr>
<tr>
<td>25+&quot; Caliper</td>
<td>3</td>
</tr>
</tbody>
</table>

Points granted for trees greater than 25 caliper inches will be considered on a case-by-case basis by City staff.

(b) Where conflict exists regarding existing protected trees versus site layout and parking lot design, developers are encouraged to protect trees.

(c) The requirements of this section shall apply to all properties subject to approval of a Development Plan.

(d) A landscape plan including a tree schedule shall be submitted as part of the Development Plan.

(e) Where the location of existing overhead utility lines conflict with the required landscaping strip, planting of ornamental trees at a rate of two (2) ornamental trees per one (1) required canopy tree will be required.
(f) Where easements containing underground utilities conflict with the required landscaping strip, required tree planting shall be outside the easement on the property owner’s side.

(g) Required landscaping must be permanently maintained in a healthy growing condition at all times. The property owner is responsible for regular weeding, mowing of grass, irrigating, fertilizing, pruning and other permanent maintenance of all plantings, as needed.

(h) Only trees from the list provided in this section will be considered as acceptable canopy trees for planting with a new development. Other tree species may be considered by City staff upon request.

Approved Canopy Tree List

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer saccharum “Caddo”</td>
<td>Caddo Maple</td>
</tr>
<tr>
<td>Cercis canadensis</td>
<td>Eastern Red Bud</td>
</tr>
<tr>
<td>Chilopsis linearis</td>
<td>Desert Willow</td>
</tr>
<tr>
<td>Diospyrus texana</td>
<td>Texas Persimmon</td>
</tr>
<tr>
<td>Fraxenis texensis</td>
<td>Texas Ash</td>
</tr>
<tr>
<td>Liquidambar styraciflua</td>
<td>Sweetgum</td>
</tr>
<tr>
<td>Magnolia grandiflora</td>
<td>Southern Magnolia</td>
</tr>
<tr>
<td>Pinus nigra</td>
<td>Austrian Pine</td>
</tr>
<tr>
<td>Pinus eldarica</td>
<td>Afghan Pine</td>
</tr>
<tr>
<td>Pyrus calleryana ‘Aristocrat’</td>
<td>Aristocrat Pear</td>
</tr>
<tr>
<td>Pyrus calleryana ‘Bradford’</td>
<td>Bradford Pear</td>
</tr>
<tr>
<td>Quercus acutissima</td>
<td>Sawtooth Oak</td>
</tr>
<tr>
<td>Quercus macrocarpa</td>
<td>Bur Oak</td>
</tr>
<tr>
<td>Quercus virginiana</td>
<td>Live Oak</td>
</tr>
<tr>
<td>Quercus shumardii (a.k.a. texana)</td>
<td>Shumard Red Oak (a.k.a Texas Red Oak)</td>
</tr>
<tr>
<td>Quercus muhlenbergii</td>
<td>Chinquapin Oak</td>
</tr>
<tr>
<td>Ulmus crassifolia</td>
<td>Cedar Elm</td>
</tr>
<tr>
<td>Ulmus parvifolia</td>
<td>Lacebark Elm</td>
</tr>
<tr>
<td>Pistacia chinensis</td>
<td>Chinese Pistachio</td>
</tr>
<tr>
<td>Pinus thunbergii</td>
<td>Japanese Black Pine</td>
</tr>
<tr>
<td>Taxodium ascendens</td>
<td>Pond Cypress</td>
</tr>
<tr>
<td>Taxodium distichum</td>
<td>Bald Cypress</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Quercus Accutissima</th>
<th>5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quercus Stellata</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Quercus Marilandica</td>
<td>5&quot;</td>
</tr>
<tr>
<td>Ulmus Crassifolia</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

(j) Protected trees, if removed, shall be replanted on a 1:1 ratio per caliper inch and shall be from the protected tree list. If protected trees are removed and not replaced, penalties for removal shall be paid according to the following chart:

<table>
<thead>
<tr>
<th>Size of Tree Removed (Cal. Inches)</th>
<th>Cost of Removing Protected Trees (Per Tree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-9&quot;</td>
<td>$500</td>
</tr>
<tr>
<td>10-14&quot;</td>
<td>$1,000</td>
</tr>
<tr>
<td>15-24&quot;</td>
<td>$1,500</td>
</tr>
<tr>
<td>25&quot;+</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

Payment for tree removal shall be due prior to the approval of the applicable tree survey. Funds received for tree removal shall be designated to a general beautification fund as determined by the City.

Required tree planting for interior landscaping and any landscape strip will not count towards replanting or the cost assessed for removing protected trees.

Sec. 603. TREE SURVEY AND MITIGATION REQUIREMENTS

This section shall apply to all new construction in single-family and non-residential developments.

A tree survey and mitigation plan shall be prepared by a civil engineer, arborist, landscape architect or surveyor. A tree survey and mitigation plan shall be required with single-family preliminary plats, single-family final plats with construction plans, development plan submittals and with individual building permit applications for single-family residential development (new lots). Trees within rights- of-way and City easements do not have to be shown.

Tree surveys, protection and inspection shall include the following:

(a) Single Family: Protected Trees (both caliper size and species) outside the building and driveway areas.

(b) Commercial: Protected Trees (both caliper size and species) outside the building pad, driveways and mutual accesses.

(c) Any Protected Tree (both caliper size and species) with an established drip line that falls within the envelope of a building area for single-family parcels of land or building pads for non-single-family parcels of land shall be considered as within the envelope of said building area or pad.
(d) All protected trees shall be protected during construction by marking protected
trees, fencing drip lines and inspections by the developer. All tree protection measures
shall be in place and approved prior to the commencement of any on-site demolition,
grading, or construction. Protection measures such as fencing shall be maintained at all
times during construction.

(e) If determined by a registered arborist or licensed landscape architect and the
City that a protected tree is diseased, it shall be exempt from the requirements of this
section.

(f) Prior to issuance of a certificate of occupancy, the project landscape architect
shall perform a site visit and provide signed and sealed documentation stating that all
landscaping and irrigation system items are installed and operational as specified in the
approved project plans and specification.

Sec. 604. SINGLE-FAMILY RESIDENTIAL LANDSCAPING REQUIREMENTS

(a) These standards shall apply to all residential lots, excluding multi-family.
These standards may be met by saving existing trees on the site or planting new trees
from the approved list.

(b) All required trees must be planted prior to request for final building inspection
of dwelling units.

(c) One (1) shade tree (3" caliper minimum) shall be provided for all single-family
residential lots less than 6,000 square feet

(d) Two (2) shade trees (3" inch caliper minimum) shall be provided for all single-
family residential lots of 6,000 square feet to less than 9,000 square feet.

(e) Three (3) shade trees (3" caliper minimum) shall be provided for all single-
family residential lots of 9,000 square feet or more.

Sec. 605. MULTI-FAMILY AND NON-RESIDENTIAL LANDSCAPING
REQUIREMENTS.

(a) These standards shall apply to all multi-family residential uses as well as all
non-residential uses. These standards may be met by saving existing trees on the site or
planting new trees from the approved lists.

(b) Landscaping shall be provided by the planting of a landscaped strip adjacent
to all public and private streets. The landscaped strip shall be located within any such
street setback and shall begin at the right-of-way line and extend to the front of the
building or a maximum depth of ten (10) feet, whichever is greater. Within the
landscaped strip, one (1) approved shade tree (3" caliper minimum) and five (5)
evergreen shrubs (5 gallon, minimum) shall be provided per every fifty (50) linear feet of
frontage.
(c) Interior parking areas shall be landscaped in addition to any landscaped strip. Trees must be provided in each parking lot spaced at a ratio of one (1) shade tree (3 inch caliper minimum) for each fifteen (15) parking spaces provided, or any fraction thereof. These trees must be spaced a maximum of fifteen (15) parking spaces apart.

(d) Parking lot islands at the end of a row of parking shall be a minimum of nine (9) feet wide, measured face of curb to face of curb. Landscape strips between head to head parking spaces, if provided, shall be a minimum of four (4) feet, measured face of curb to face of curb.

(e) The required landscaping for parking lots shall be more or less evenly distributed throughout the parking lot, although adjustments may be approved by the Public Works Department where the shape or size of the parking lot, the location of existing trees or other natural constraints reasonably prevent such distribution.

(f) Where parking lots are adjacent to the landscape strip along a public street frontage, evergreen shrubs must be provided for screening. The shrubs must be five (5) gallon in size and at least twenty-four (24) inches at planting, with a mature height of thirty-six (36"). The maximum spacing between shrubs shall be thirty (30) inches.

(e) Dumpster enclosures that are visible from a public street frontage shall be screened with evergreen shrubs. The shrubs must be five (5) gallon in size and at least thirty (30) inches at planting, with a minimum height of forty-eight (48) inches. The maximum spacing between shrubs shall be thirty (36) inches.

(f) All landscaped areas, including the permeable areas and drip lines around existing trees and planting beds used for visual screening which abut any parking lot or vehicular travel area, shall be protected with curbs, parking blocks or similar barriers sufficient to protect them from vehicular intrusion.

(f) A water conserving automatic irrigation system is required for all landscaping.

Sec. 606. LANDSCAPE PLAN REQUIREMENTS

(a) Submittal of Plans. Landscape construction plans shall be submitted as part of the overall construction plans associated with a related plat or development plan, whichever is applicable. The plans shall include the following:

(1) Appropriately scaled drawings, clearly indicating the location, type, size and description of all proposed landscape materials and existing utilities. Planting design of materials must be submitted to ensure adequate coverage.

(2) Standard sheet size of be 22" X 34".
(3) Title block including project name/description, contact information for the developer/owner, and contact information for the Landscape Architect who prepared the plan.

(4) North arrow on all plan sheets

(5) Date (all revision dates should also be indicated)

(6) Scale (must be legible)

(7) A table summarizing the landscape and tree preservation items, both required and proposed to be provided by the developer.

(8) Plant and irrigation specifications, general notes and applicable details.

(9) A clear indication of the configuration, location, type and size of all irrigation, piping, heads and controllers, including the name, address and license seal of the designer.

(10) Such other information reasonably deemed necessary by the Public Works Department.

(11) Landscape Architect’s seal for completed plans or a preliminary stamp (specifying that plans are preliminary, for review only, and not for construction/installation purposes)
ARTICLE VII. SCREENING DEVICES AND FENCE REGULATIONS

Sec. 701. GENERAL PROVISIONS

(a) The intent of this section is to provide for visual screening of non-single family parking lots, trash container and storage areas.

(b) A screening device shall be a solid wood, brick, stone or decorative block masonry wall not less than six (6) feet nor greater than eight (8) feet in height measured at the highest finished grade. Brick, stone or decorative block masonry walls shall be designed by a Texas licensed engineer. Construction and location details of the required screening devices shall be shown as part of the Development Plan for all multi-family and non-residential uses. The required screening device shall be constructed prior to any building permits being issued for multi-family and non-single-family developments.

In areas where multi-family development or non-residential development is proposed adjacent to established single-family residential dwellings, the screening device shall be constructed prior to issuance of a building permit. The developer/owner will not be allowed to escrow the screening device portion of the project costs under the performance escrow policy.

(c) A four (4) foot screening wall maintenance easement shall be provided on private property for all City-maintained screening walls adjacent to a City right-of-way.

Sec. 702. SCREENING WALL BETWEEN SINGLE-FAMILY RESIDENTIAL AND MULTI-FAMILY RESIDENTIAL USES

There shall be constructed a minimum six (6) foot screening device along any portion of a multi-family parking lot or trash container area which adjoins any portion of a single-family detached and attached residential use. The construction of the screening wall is the responsibility of the multi-family property owner.

Sec. 703. SCREENING WALL BETWEEN NON-RESIDENTIAL AND RESIDENTIAL USES

There shall be constructed a minimum six (6) foot screening device along any portion of a non-residential development parking lot or trash container area which adjoins any portion of a single-family detached or attached residential, townhouse, or multi-family residential use. The construction of the screening wall is the responsibility of the commercial property owner.
Sec. 704. SCREENING OF PARKING LOTS AND TRASH CONTAINER AREAS

Refer to Section 604, (f) and (e).

Sec. 705. SCREENING REQUIREMENTS FOR OUTSIDE STORAGE

Where outside storage of equipment, material, goods and supplies for non-retail purposes is permitted by ordinance, all outside storage shall be screened from the view of any adjacent public street by a screening wall not less than six (6) feet in height. Materials and supplies may not be stacked higher than the height of the wall. The wall shall be placed beyond the required ten (10) foot landscaped strip. Other portions of the storage yard not adjacent to or fronting a street, may be fenced with a solid, opaque fence.

A detail of the proposed opaque fence in section and elevation and/or a manufacturer’s detail and specifications must be provided on the Development Plan for a project and/or as part of the fence permit process. The fence must completely conceal outside storage.

This provision does not apply to display of goods for sale incidental to a retail use, plant nursery, sales and rental of motor vehicles, mobile homes, boats or trailers.

Sec. 706. SCREENING REQUIREMENTS FOR ROOF PROJECTIONS

Screening shall also be required for approved projections above the building roofline. These shall include but are not limited to such projections as satellite dishes, communication towers, and heating and air conditioning units. The screening shall consist of materials similar to that used in the front façade of the building and shall be constructed to a height appropriate for screening the allowed projection from view at ground level within sixty (60) feet of the subject building.

Sec. 707. MAINTENANCE REQUIREMENTS

(a) Required screening walls shall be maintained in good condition by the property owner.

(b) Required screening walls which are to be maintained by the City when within the right-of-way or within a wall maintenance easement, at the time of initial development, the developer shall pay 20 percent of the total cost of initial construction, to be placed in the City’s screening wall maintenance account for future repair and upkeep of the screening walls within the City.
ARTICLE VIII. OFF-STREET PARKING REQUIREMENTS

Sec. 801. GENERAL PROVISIONS

Off-street parking spaces shall be provided at the time any building or structure is erected or structurally altered. Parking which is provided shall be shown on a Development Plan when such a plan is required. All parking and loading or unloading facilities, approaches, access driveways and stacking or storage parking spaces for vehicles shall be paved with concrete or asphalt. This provision shall also apply to any use located on the property with no building or structure, i.e. public or private parking lots. Trailers are defined as vehicles.

Sec. 802. PARKING REQUIREMENTS BASED ON USE

(a) Businesses are encouraged to provide as many spaces as possible utilizing parking formulas in this Section. Parking which is provided shall be shown on a Development Plan, when such a plan is required.

(b) All required off-street parking shall be in accordance with the following requirements.

(1) Business or Professional Office: One (1) parking space for each three hundred (300) square feet of floor area.

(2) Assembly or Exhibition Hall: One (1) parking spaces for each one hundred (100) square feet of floor area used thereof. With fixed seating, one (1) parking space for each four (4) seats or bench seating spaces.

(3) Day Care: One (1) parking space per faculty plus one (1) parking space per then (10) children plus one (1) stacking spaces per three (3) children.

(4) Dwellings, Single-Family Attached or Detached: A minimum of one (1) car garage plus one (1) additional parking space shall be provided.

(5) Dwellings, Multi-Family: Two (2) parking spaces for each dwelling unit.

(6) Hospital: One (1) space per bed, plus additional parking as required for other listed categories.

(7) Hotel, Motel or Inn: One (1) parking space for each one (1) guest room or suite for the first one-hundred (100) guests and three-quarters (0.75) of a parking space for each one (1) guest room or suite for additional guests plus one (1) space for each three hundred (300) square feet of commercial floor area contained therein.
(8) Manufacturing or Industrial Establishment: One (1) parking space for each three hundred (300) square feet of floor area.

(9) Retail Store or Personal Service Establishment: One (1) parking space for each 250 square feet of Gross Leasable Area.

(10) Restaurant, Night Club, Cafe or Similar Recreation or Amusement Establishment: One (1) parking spaces for each one hundred (100) square feet of floor area.

(11) Warehouse or Storage: One (1) parking space for each 2,000 square feet of floor area.

Sec. 803. RULES FOR COMPUTING NUMBER OF PARKING SPACES

(a) "Floor area" shall mean the gross floor area of the specific use. Where fractional spaces result, the parking spaces required shall be constructed to the nearest whole number.

(b) The parking space requirement for a use not specifically mentioned herein shall be the same as required for a use of similar nature.

(c) Whenever a building or use constructed or established after the effective date of this development manual is changed or enlarged in floor area, number of employees, number of dwellings units, seating capacity or otherwise, to create a need for an increase of ten (10) percent or more in the number of existing parking spaces, such spaces shall be provided on the basis of the enlargement or change. Whenever a building or use existing prior to the effective date of this development manual is enlarged to the extent of fifty (50) percent or more in floor area or in the area used, said building or use shall then and thereafter comply with the parking requirements set forth herein.

(d) In the case of mixed uses, the parking spaces required shall equal the sum of the requirements of the various uses computed separately. In the event that the developer of a mixed-use development wishes to reduce the overall parking provided, a parking study based on recognized industry standards and indicating how the uses work together in a way that their peak use periods are phased, may be submitted for review by City staff. An approval of reduced parking would be in the form of a parking variance, to be approved by the City Council.

Sec. 804. LOCATION OF PARKING SPACES

(a) Where an increase in the number of spaces is required by a change or enlargement of use or where such spaces are provided collectively or used jointly by two (2) or more buildings or establishments, the required spaces may not be located in excess of five hundred (500) feet from any other non-residential building served.
(b) In any case where the required parking spaces are not located on the same lot with the building or use served, or where such spaces are collectively or jointly provided and used, a written agreement thereby assuring their retention for such purposes, shall be properly drawn and executed by the parties concerned and shall be filed with the development plan application.

(c) For detached single family or duplex residential uses, it shall be unlawful for any owner of property to allow a driveway or parking surface in the required front yard setback to exceed 27 feet in width on lots 60 feet wide or greater or 45 percent of the lot width for lots less than 60 feet in width. For purposes of this requirement, the lot width shall mean the width of the lot measured at the front yard setback. Driveways shall be paved with concrete except that expansion of an existing driveway may be with concrete or a continuation of an existing non-conforming material adjacent to the side of the driveway being expanded, provided that the total parking area complies with the width requirements herein and not more than 45 percent of the required front yard shall be used for parking. A permit is required for all driveway and parking surface improvements.

Sec. 805. MINIMUM DIMENSIONS FOR OFF-STREET PARKING

(a) The minimum dimensions for off-street parking shall be as follows:

(1) Ninety (90) Degree Angle Parking: Each parking space shall be not less than nine (9) feet wide or less than eighteen (18) feet in length. Maneuvering space shall be in addition to parking space and shall be not less than twenty-four (24) feet perpendicular to the building or parking line.

(2) Sixty (60) Degree Angle Parking: Each parking space shall be not less than (9) feet wide perpendicular to the parking angle nor less than twenty (20) feet in length when measured at right angles to the building or parking line. Maneuvering space shall be in addition to parking space and shall be not less than twenty (20) feet perpendicular to the building or parking line.

(3) Forty-Five (45) Degree Angle Parking: Each parking space shall be not less than nine (9) feet wide perpendicular to the parking angle nor less than nineteen (19) feet in length when measured at right angles to the building or parking line. Maneuvering space shall be in addition to parking space and shall be not less than eighteen (18) feet perpendicular to the building or parking line.

(4) Parallel Parking: Each parking space shall be not less than ten (10) feet wide nor less than twenty four (24) feet in length. Parallel parking will not be considered except when it can be situated in such a manner that persons entering and exiting vehicles will be out of the flow of traffic.
(b) When off-street parking facilities are located adjacent to a public alley, the width of said alley may be assumed to be a portion of the maneuvering space requirement. Where off-street parking facilities are provided in excess of the minimum amounts herein specified, or when off-street parking facilities are provided but not required by this development manual, said off-street parking facilities shall comply with the minimum requirements for parking and maneuvering space herein specified.

Sec. 806. MINIMUM DIMENSIONS FOR OFF-STREET LOADING AREAS

All buildings (except single-family, duplex and multi-family dwellings) hereafter erected, reconstructed or enlarged so as to require additional parking spaces shall have adequate permanent off-street facilities providing for the loading and unloading of merchandise and goods within or adjacent to the building in such a manner as not to obstruct the freedom of traffic movement on the public rights-of-way.

(a) All loading areas are to be indicated on the development plan.

(b) Required off-street loading facilities may be adjacent to a public alley or private service drive, or may consist of a berth within a structure.

(c) No portion of a loading facility or space may extend into a public right-of-way, a fire lane, or into an off-street parking space.
   a. Loading spaces may, with the approval of the City, be located within off-street parking spaces that are anticipated to be unused when deliveries are to be made. Typically, this will apply to fast-food restaurants, and pad retail sites.

(d) The off-street loading spaces or truck berths shall provide maneuvering areas on site to prevent any blockage of public right-of-way.

Sec. 807. HANDICAPPED PARKING REQUIREMENTS

Handicapped parking spaces and/or loading zones shall be provided by the building or facility owner, agent, or occupants in accordance with the Americans With Disabilities Act (ADA), Texas Department of Licensing and Regulation (TDLR) and other applicable agency requirements, if any. All other requirements shall be established by the state or federal authority having jurisdiction.
APPENDIX 1

- TITLE BLOCK FOR PLATS & DEVELOPMENT PLANS
- STAFF AND UTILITY COMPANY SIGNATURE BLOCKS FOR DEVELOPMENT PLANS
- OWNER'S CERTIFICATE OF DEDICATION
- SIGNATURE BLOCKS FOR PRELIMINARY PLATS
- SIGNATURE BLOCKS FOR FINAL PLATS
TITLE BLOCKS FOR PLATS & DEVELOPMENT PLANS

- ITALICIZED WORDS INDICATE THAT THE APPROPRIATE INFORMATION SHALL BE INSERTED

- FOR ALL FINAL PLATS/REPLATS THE TITLE BLOCK AND A 4" WIDE X 3" LONG WHITE SPACE (FOR COUNTY FILING PURPOSES) ARE TO BE LOCATED ON THE LOWER RIGHT-HAND CORNER OF THE SHEET.

TITLE BLOCK (PRELIMINARY, FINAL, MINOR, OR CONVEYANCE)

<table>
<thead>
<tr>
<th>TYPE OF PLAT (i.e. FINAL PLAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME OF THE ADDITION</td>
</tr>
<tr>
<td>LIST OF ALL LOTS &amp; BLOCKS &amp; PHASES TOTAL</td>
</tr>
<tr>
<td>ACREAGE</td>
</tr>
<tr>
<td>ZONING</td>
</tr>
<tr>
<td>SURVEY ABSTRACT NUMBER(S)</td>
</tr>
</tbody>
</table>

REPLAT TITLE BLOCK

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<th>FINAL PLAT</th>
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</thead>
<tbody>
<tr>
<td>NAME OF THE ADDITION</td>
</tr>
<tr>
<td>LIST OF ALL LOTS &amp; BLOCKS &amp; PHASES</td>
</tr>
<tr>
<td>TOTAL ACREAGE</td>
</tr>
<tr>
<td>ZONING</td>
</tr>
<tr>
<td>BEING A REPLAT OF</td>
</tr>
<tr>
<td>NAME OF THE ADDITION LOT(S) &amp; BLOCK(S) &amp; PHASE(S) FILING</td>
</tr>
<tr>
<td>INFORMATION</td>
</tr>
<tr>
<td>SURVEY ABSTRACT NUMBER(S)</td>
</tr>
</tbody>
</table>

AMENDED FINAL PLAT TITLE BLOCK

<table>
<thead>
<tr>
<th>AMENDED FINAL PLAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>This plat is amending (name of addition) Final Plat, which was filed on (date) and can be found in Cabinet Page ______ of the Dallas County Deed Records with the following changes:</td>
</tr>
<tr>
<td>1. (list all amendments)</td>
</tr>
<tr>
<td>2. (list all amendments)</td>
</tr>
<tr>
<td>NAME OF THE ADDITION</td>
</tr>
<tr>
<td>LIST OF ALL LOTS &amp; BLOCKS &amp; PHASES</td>
</tr>
<tr>
<td>TOTAL ACREAGE</td>
</tr>
<tr>
<td>ZONING</td>
</tr>
<tr>
<td>SURVEY ABSTRACT NUMBER(S)</td>
</tr>
</tbody>
</table>
NOTE:

* THE TITLE BLOCK AND A 4" WIDE X 2" LONG WHITE SPACE (FOR COUNTY FILING PURPOSES) ARE TO BE LOCATED ON THE LOWER RIGHT-HAND CORNER OF THE SHEET.
STAFF SIGNATURE BLOCKS FOR DEVELOPMENT PLANS

APPROVED BY THE CITY OF HUTCHINS

SIGNATURE:__________________________________________

PRINTED NAME:_____________________________________

TITLE OF CITY OFFICIAL:______________________________

DATE:_____________________________________________
OWNER'S CERTIFICATE OF DEDICATION

NOW THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

THAT (OWNER NAME) THE UNDERSIGNED AUTHORITY DOES HEREBY ADOPT THIS PLAT DESIGNATING THE HEREIN ABOVE DESCRIBED PROPERTY AS (NAME OF THE ADDITION, PHASE, LOT & BLOCK) AN ADDITION TO THE CITY OF Hutchins, DALLAS COUNTY, TEXAS, AND DOES HEREBY DEDICATE TO THE PUBLIC USE FOREVER THE STREETS AND ALLEYS SHOWN HEREON; AND DOES HEREBY DEDICATE THE EASEMENT STRIPS SHOWN ON THE PLAT FOR MUTUAL USE AND ACCOMMODATION OF THE CITY OF Hutchins AND ALL PUBLIC UTILITIES DESIRING TO USE, OR USING SAME. NO BUILDINGS, FENCES, TREES, SHRUBS, SIGNS, OR OTHER IMPROVEMENTS SHALL BE CONSTRUCTED OR PLACED UPON OVER, OR ACROSS THE EASEMENT STRIPS ON SAID PLAT. THE CITY OF Hutchins AND ANY PUBLIC UTILITY SHALL HAVE THE RIGHT TO REMOVE AND KEEP REMOVED ALL OR PART OF ANY BUILDINGS, FENCES, TREES, SHRUBS, SIGNS, OR OTHER IMPROVEMENTS OR GROWTHS WHICH IN ANY WAY ENDANGER OR INTERFERE WITH THE CONSTRUCTION, MAINTENANCE, OR EFFICIENCY OF ITS RESPECTIVE SYSTEM ON ANY OF THESE EASEMENT STRIPS, AND THE CITY OF Hutchins AND ANY PUBLIC UTILITY SHALL AT ALL TIMES HAVE THE RIGHT OF INGRESS AND EGRESS TO AND FROM AND UPON ANY OF SAID EASEMENT STRIPS FOR THE PURPOSE OF CONSTRUCTING, RECONSTRUCTING, INSPECTING, PATROLLING, MAINTAINING, AND ADDING TO OR REMOVING ALL OR PART OF ITS RESPECTIVE SYSTEM WITHOUT THE NECESSITY AT ANY TIME OF PROCURING THE PERMISSION OF ANYONE. A BLANKET EASEMENT OF A FIVE (5) FOOT RADIUS FROM THE CENTER POINT OF ALL FIRE HYDRANTS AND A FIVE (5) FOOT RADIUS FROM THE CENTER POINT OF ALL OTHER APPURTENANCES (FIRE HYDRANT VALVES, WATER METERS, METER BOXES, STREET LIGHTS) IS HEREBY GRANTED TO THE CITY OF Hutchins FOR THE PURPOSE OF CONSTRUCTING, RECONSTRUCTING, INSPECTING AND MAINTAINING THE ABOVE NAMED APPURTENANCES.

WE DO FURTHER DEDICATE, SUBJECT TO THE EXCEPTIONS AND RESERVATIONS SET FORTH HEREINAFTER, TO THE PUBLIC USE FOREVER, ALL PUBLIC USE SPACES SHOWN ON THE FACE OF THE PLAN:

INSERT NAME, TITLE
COMPANY

INSERT NAME, TITLE
COMPANY

NOTE:
IF MORE THAN ONE OWNER, ALL WILL HAVE TO SIGN THE PLAT.

LIEN HOLDER SIGNATURE, IF ANY.

ALL SIGNATURES HAVE TO BE NOTARIZED.
SIGNATURE BLOCKS FOR PRELIMINARY PLATS

ONE OF THE FOLLOWING CERTIFICATES SHALL BE PLACED ON THE PRELIMINARY PLAT BY THE SUBDIVIDER:

(A) IF VARIANCES ARE REQUESTED:

LIST:  ALL VARIANCES REQUESTED

"Preliminary Plat for Review Purpose Only
Recommended for Approval"

Insert Name, Chairman, Planning & Zoning Commission
City of Hutchins, Texas

"Approved for Preparation of Final Plat"

Insert Name, Mayor, City of Hutchins, Texas

(B) IF NO VARIANCES ARE REQUESTED:

"No Variances from the General Development Ordinance Requested:
Approved for Preparation of Final Plat"

Insert Name, Chairman, Planning & Zoning Commission
City of Hutchins, Texas

Date"
SIGNATURE BLOCKS FOR FINAL PLATS

One of the following certificates shall be placed on the plat:

(A) IF VARIANCES OTHER THAN THOSE APPROVED BY CITY COUNCIL AT PRELIMINARY PLAT STAGE ARE REQUESTED:
LIST: VARIANCE(S) APPROVED WITH DATE(S)
NEW VARIANCE(S) REQUESTED
"Recommended for Approval"

Insert Name, Chairman, Planning & Zoning Commission
City of Hutchins, Texas

Approved and Accepted

Insert Name, Mayor, City of Hutchins, Texas

(B) IF NO VARIANCES OTHER THAN THOSE APPROVED BY THE CITY COUNCIL AT PRELIMINARY PLAT STAGE ARE REQUESTED:
LIST: VARIANCE(S) APPROVED WITH DATE(S)
"All Variances (if any) from the General Development Ordinance Approved by City Council,

Insert Name, Chairman, Planning & Zoning Commission
City of Hutchins, Texas

(C) IF PLAT MEETS THE REQUIREMENTS OF A MINOR PLAT:
CERTIFICATE OF APPROVAL BY THE CITY OF HUTCHINS
This is to certify that the City Manager or designee of the City of Hutchins, Texas, have approved the (Name of the Addition, Phase, Lot & Block) as shown hereon.

IN TESTIMONY WHEREOF, witness the official signatures of the City Manager or designee of the City of Hutchins, Texas this ___________ day of __________________, YEAR.

<table>
<thead>
<tr>
<th>SIGNATURE</th>
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<tbody>
<tr>
<td>PLANNING &amp; ZONING</td>
</tr>
<tr>
<td>ENGINEERING</td>
</tr>
<tr>
<td>BUILDING INSPECTION</td>
</tr>
<tr>
<td>FIRE PREVENTION</td>
</tr>
</tbody>
</table>
(D) SIGNATURE BLOCK FOR CITY SECRETARY - FOR FINAL PLATS:
The undersigned, the City Secretary of the City of Hutchins, Texas, hereby certifies that the foregoing final plat of the ______________________ Addition to the City of Hutchins was submitted to the appropriate Planning & Zoning Commission or City Council as required by the ordinances of the City of Hutchins on the _________ day of _____________, YEAR, and such body by formal action, then and there accepted the dedication of streets, alleys, parks, easements, public places and water and sewer lines, as shown and set forth in and upon said plat, and said body further authorized the acceptance thereof by signing as hereinabove subscribed in the capacity stated.

Witness my hand this __________ day of _____________, YEAR.

[Signature]
City of Hutchins, Texas

(E) SIGNATURE BLOCK FOR CITY SECRETARY - FOR MINOR PLATS:
The undersigned, the City Secretary of the City of Hutchins, Texas, hereby certifies that the foregoing final plat of the ______________________ Addition to the City of Hutchins was submitted for review and approved as a Minor Plat meeting all the requirements of the General Development Ordinance as set forth by the ordinances of the City of Hutchins on the _________ day of _____________, YEAR, and including acceptance of the dedication of streets, alleys, parks, easements, public places and water and sewer lines, as shown and set forth in and upon said plat, and further authorized the acceptance thereof by City staff, signing as hereinabove subscribed in the capacity stated in accordance with City ordinances.

Witness my hand this __________ day of _____________, YEAR.

[Signature]
City of Hutchins, Texas

(F) INSERT FILING INFORMATION BLOCK ON ALL SHEETS OF PLATS TO BE FILED AT THE COUNTY:

FILED ______________________

CAB. _______ PG. _______ P.R.D.C.T."
APPENDIX 2

- CERTIFICATE OF ABANDONMENT FORM
- CERTIFICATE OF CORRECTION FORM
CERTIFICATE OF ABANDONMENT

STATE OF TEXAS
COUNTY OF DALLAS

Whereas certain easement(s) was granted on the Final Plat of (NAME OF ADDITION) an addition to the City of Hutchins, Texas, according to the plat in Cabinet ___, Page ___ in the plat records of Dallas County, Texas, or granted by separate instrument filed of record Volume ___, Page _____, and whereas such easement(s) is no longer necessary and the property is served with adequate easement(s), then;

This certificate is filed for the purpose of abandoning


Owner, Insert Name

Registered Surveyor, Insert Name

Registration Number, Signed, Sealed & Dated

STATE OF TEXAS
COUNTY OF DALLAS

BEFORE ME, the undersigned authority, on this day personally appeared, ___ (enter OWNER name) known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated and as the act and deed of said corporation.

Given under my hand and seal of office on this the ___ day of ___ YEAR.

Notary Public, Insert Name

Expiration Date

BEFORE ME, the undersigned authority, on this day personally appeared (enter SURVEYOR name), known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated and as the act and deed of said corporation.

Given under my hand and seal of office on this the ___ day of ___ YEAR.

Notary Public, Insert Name

Expiration Date

Approved:

Insert Name, Mayor
City of Hutchins

Date

Attested:

Insert Name, City Secretary,
City of Hutchins

Date
CERTIFICATE OF CORRECTION

STATE OF TEXAS

COUNTY OF DALLAS

On the Final Plat of (name of Addition), an addition to the City of Hutchins, Texas, according to the plat in Cabinet ____________, Page ____________, in the plat records of Dallas County, Texas, hereby amends and corrects the plat as follows:

This certificate is filed for the purpose of correcting

______________________________
Owner, Name

______________________________
Registered Surveyor, Name

Registration Number Signed, Sealed & Dated

STATE OF TEXAS

COUNTY OF DALLAS

BEFORE ME, the undersigned authority, on this day personally appeared (enter OWNER name), known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated and as the act and deed of said corporation.

Given under my hand and seal of office on this the __________ day of ___________, YEAR.

______________________________
Notary Public, Name

Expiration Date

BEFORE ME, the undersigned authority, on this day personally appeared (enter SURVEYOR name), known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purposes and consideration therein expressed, in the capacity therein stated and as the act and deed of said corporation.

Given under my hand and seal of office on this the __________ day of ___________, YEAR.

______________________________
Notary Public, Insert Name

Expiration Date

Approved:

Insert NAME, Mayor
City of Hutchins

Date

Attested:

Insert NAME, City Secretary,
City of Hutchins

Date
APPENDIX 3

• AGREEMENT FOR PAYMENT IN LIEU OF CONSTRUCTION COST
• AGREEMENT FOR PERFORMANCE ESCROW FOR PUBLIC IMPROVEMENT CONSTRUCTION
STATE OF TEXAS
COUNTY OF DALLAS

AGREEMENT FOR PAYMENT IN LIEU OF CONSTRUCTION

WHEREAS, _______________________________(hereinafter called "Developer") is developing property in the City of Hutchins referred to as _______________________________ (hereinafter called Project); and

WHEREAS, the Hutchins Code of Ordinances requires the Developer to construct certain public improvements associated with the development of the Project; and

WHEREAS, the Developer desires to pay to the City the cost of said public improvements in lieu of actual construction;

NOW, THEREFORE, the Developer and City agree as follows:

1. The Developer will pay and the City will accept $_________ in lieu of construction of said public improvements as may be itemized in Attachment A.

2. Upon execution of this Agreement in duplicate and payment of the amount stipulated in (1) above, the Developer will have no further responsibility toward his obligation for said public improvements.

3. The "City" will complete said public improvements according to its own specifications and time schedule.

4. Regardless of the actual cost to complete the said public improvements, the City will not make any refund to the Developer or any other party.

5. Any amendment to this Agreement shall be in writing, signed by all parties hereto.

6. This Agreement is solely for the benefit of the parties hereto and shall not be construed to be for the benefit of any third party.
STATE OF TEXAS

COUNTY OF DALLAS

AGREEMENT FOR PERFORMANCE ESCROW FOR
PUBLIC IMPROVEMENT CONSTRUCTION

WHEREAS, (hereinafter called "Owner") is the owner of certain real property within the City of Hutchins, Texas, which property consists of Lot , Block (NAME OF ADDITION), an addition to the City of Hutchins, Dallas County, Texas (the "Owner Property"), and

WHEREAS, Owner plans to and is in the process of developing the Owner Property in accordance with Owner’s plans and specifications and in compliance with the City of Hutchins, Texas code procedures and standards; and

WHEREAS, the subdivision regulations of the City of Hutchins, Texas (the "City") require Owner to pay for sewer, water, and other Public Improvements (herein so called) the estimated costs of which are listed on Exhibit A to this Agreement, which attachment is made a part hereof for all purposes.

WHEREAS, the subdivision regulations of the City require Owner to complete and obtain final City acceptance of said Public Improvements prior to issuance by the City of a building permit, however, if funds are escrowed to fully cover all costs of the Public Improvements, a building permit may be issued for the Owner Property prior to completion and final acceptance of the Public Improvements.

NOW, THEREFORE, the parties hereto agree as follows:

1. Owner shall perform the construction of, or enter into a contract for the construction of, said Public Improvements in accordance with the plans approved by the City and in accordance with the requirements of the City. Owner shall be responsible for preparation of all plans and specifications, inspections, payment and all other normal construction matters in compliance with the Code Standards of the City in connection with construction of the Public Improvements.

2. Based upon current estimates from project builder of the cost of construction of the Public Improvements, and as reflected on Exhibit A, Owner shall deposit with City, prior to the date of issuance of any building permit for the construction of improvements on the Owner Property, as cash escrow in the amount of one-hundred-fifths dollars ($ ) to assure performance and completion by Owner of the Public Improvements. The City shall have the right, but not the obligation, to deposit said funds in any investment account utilized by the City. Any interest earned on said escrowed funds shall be credited to the cash escrow account.

3. In the event that Owner fails to complete construction of the Public Improvements, no Certificate of Occupancy shall be issued for the premises on the Owner Property until after such Public Improvements are finally completed. The City shall have the right, but not the obligation, to perform and complete the Public Improvements if Owner defaults in such performance, upon giving written notice thereof to Owner.

4. In the event City elects to perform and complete such Public Improvements after Owner defaults, and is thereby required to administer all normal construction performance matters defaulted by Owner, City shall have the authority to access private property and to draw upon and pay from said escrow account, based upon the Director of Public Utilities’s estimate of percentage of completion, such sums as may be necessary to pay for the completion of the construction and/or design of the Public Improvements. In such event, Owner shall have no claim or right to refund of any sums, including interest earned thereon, without regard to amounts determined by the Director of Public Utilities to be allocable for Owner’s portion of the completion of construction and/or design of said Public Improvements.

City of Hutchins General Development Manual November 2013

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AGREEMENT FOR PERFORMANCE ESCROW FOR
PUBLIC IMPROVEMENT CONSTRUCTION

Page Two

5. If the Public Improvements, as prescribed in this Agreement, are completed, and City finally accepts same, the City shall refund to Owner all sums remaining on deposit in the escrow account, including interest earned thereon. Such refund shall be made within 30 days of completion and final City acceptance of the Public Improvements. Owner shall provide the City with Owner’s tax identification number for reporting purposes of interest paid to the Internal Revenue Service.

6. The term of this Agreement shall commence on the date hereof and shall continue in full force and effect until all funds in the escrow account have been fully disbursed in accordance with the provisions hereof.

7. Any amendment to the terms of this Agreement shall be in writing and signed by all parties hereto.

8. This Agreement shall be governed by and construed in accordance with the laws of the State of Texas.

9. This Agreement is solely for the benefit of Owner and the City and is not intended to be nor shall it be construed to be for the benefit of any third party.

SIGNED this _____ day of _____, YEAR.

OWNER:

Tax Identification No.

SIGNED this _____ day of _____, YEAR.

CITY:
THE CITY OF HUTCHINS, TEXAS

By:
Title:

Finance Project Number:
APPENDIX 4

FEE SCHEDULE

Please find fees on City of Hutchins website.
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GENERAL

The purpose of this manual is to establish basic guidelines and certain minimum criteria for the design of streets, thoroughfares and other publically used paving sections in the City. It is intended to be used by the city staff and private consulting engineers for all new street construction and improvements to existing streets. Unusual circumstances or special designs requiring exception from the standards in this guideline must be approved by the Director of Public Utilities or the City Council.

The criteria outlined in this guideline are also intended to be used in conjunction with the adopted specifications and details of the City of Hutchins.

The geometric design policies contained in this guideline are intended to provide a reasonable degree of safety to users of the public rights-of-way in normal weather and traffic conditions. The minimum design criteria for pavement structures are intended to produce streets having a useful life expectancy of at least 20 years with reasonable expenditures for maintenance and repair.

Special Designs

The Director of Public Utilities may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this guideline on a case by case basis if the Director of Public Utilities determines that: (1) the alternative design or construction methodology is equivalent to, or superior to, the methodology required in this guideline, and (2) the alternative design or construction methodology is sufficient to ensure public health and safety. For unusual circumstances or special designs not covered in this guideline refer to the latest edition of American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets".

STREET CLASSIFICATIONS

The City has adopted a functional street classification system, which categorizes all streets as rural, residential, collector and arterial streets. Table 5.7 defines the design criteria for all proposed streets by classification which are shown on Figures 5.3, 5.4 and 5.5. For classification of existing and proposed streets refer to Table 5.8.

GEOMETRIC CRITERIA

The elements utilized in this guideline to establish engineering design criteria are based on design vehicles traveling at design speeds over specified pavement widths. These elements then relate to design guidelines for horizontal curves, vertical curves, and the use of super-elevation. Intersection controls, driveway locations and other factors may affect the design as well.

Design Vehicle

Two (2) design vehicle configurations are used to establish curve and intersection
design controls as listed in the tables within these Guidelines. The characteristics of these vehicles are shown in Figures 5.6 and 5.7. For additional information, Figure 5.8 represents passenger car configurations for off-street parking. Figure 5.9 represents the City’s Fire Services ladder fire truck.

**Design Speed**

Design speed is the designated speed used to determine curvature, super-elevation and sight distance criteria. The minimum design speeds for the various street classifications and widths are shown in the tables within these guidelines.

**Pavement and Lane Width**

Refer to Table 5.7 for appropriate lane and pavement widths.

**Horizontal Alignment**

The criteria for horizontal alignment are intended to provide safe and comfortable vehicle operations at normal travel speeds, accommodate access to adjacent properties, and provide adequate operating sight distances.

- **Horizontal Curves** - Minimum radii of curvature for the different street classifications and design speeds are shown in Table 5.10. These are based on free flowing traffic consisting of typical automobiles operating under poor weather conditions. Curve design on residential streets and thoroughfares should also consider intersections, bridges, and locations involving a high number of turning movements and topographic conditions.

- **Transitions** - Transitions from a larger street section to a smaller section or vice versa shall be in accordance with TMUTCD.

**Vertical Alignment**

The criteria for vertical alignment are intended to provide safe and comfortable vehicle operations at normal travel speeds, accommodate access to adjacent properties, and provide adequate storm drainage surface flows.

The minimum grade for streets with curbs and gutters is 0.5%. Valley gutters are not permitted at the intersection of streets with a classification of major collector or arterial. Where valley gutters are permitted for intersection drainage, the minimum grade is 0.5% for concrete gutters. Additionally, when used at intersections, valley gutters shall parallel the major street or the through street of the intersection. Valley gutters which cross streets at any location other than at the intersection are not allowed except where special design is approved by the Director of Public Utilities (i.e. low flows or outfall problems). The minimum street grade will not apply to non-curbed streets.

The maximum street grade for alleys and residential streets is 10%. The maximum grade for all other streets is 6%. Steeper grades may be approved by the Director of
Public Utilities for short distances where required by topographical features or restricted alignment.

At intersections, the grades of the intersecting streets should be not more than plus or minus 2% within the first twenty-five feet of the intersecting curb line to provide a safe approach sight distance and accessible routes per the Texas Accessibility Standards (TAS) and the Americans with Disabilities Act (ADA).

- **Vertical Curves** - When the algebraic difference in intersecting longitudinal street grades exceeds one of the following:
  » 1.0% <= 30mph (Residential)
  » 0.8% <= 40mph (Collector)
  » 0.5% <= 55mph (Arterial)

  A parabolic vertical curve is required. The length of vertical curves will be determined by the minimum safe stopping distance for the specified design speed and is calculated by the formula:

\[
L = KA
\]

where:
- \( L \) is the length of vertical curve in feet
- \( A \) is the algebraic change in longitudinal grade expressed in percent (%)
- \( K \) is a constant which can be found in Table 5.9.

- **Super-Elevation** - Super-elevation shall be designed for arterial streets using the following formulas:

\[
e = \frac{V^2}{15R} \quad \text{or} \quad R = \frac{V^2}{15(e+f)}
\]

where:
- \( e \) = rate of super-elevation (feet per foot) (max value = 6%)
- \( V \) = vehicle design speed (mph) (Use 55 mph for major arterials, 45 mph for minor arterials)
- \( f \) = side friction factor (Use \( f = 0.130 \) for \( V=55 \) mph) (Use \( f = 0.145 \) for \( V=45 \) mph)
- \( R \) = radius of curve (feet)

**Cul-de-sacs, Turnarounds and Dead End**

Residential Cul-de-sac Turnarounds shall have a minimum ROW width (diameter) of 100-feet and a minimum pavement width of 80-feet for single-family uses.
Commercial Cul-de-sac Turnarounds shall have a minimum ROW of 120-feet and a minimum pavement width of 100-feet for all other uses.

Fire lane turnarounds shall meet the minimum dimensions shown in Figure 5.1.

Temporary Turnarounds shall be provided at ends of streets more than 150-feet long that will be extended in the future. The temporary turn-around shall be within a temporary easement and constructed of asphalt or concrete.

Maximum Length of Dead End Street - The maximum length of a cul-de-sac or dead end street with a permanent turn-a-round shall be 600-feet measured from the centerline of the intersection to the center point of the cul-de-sac or T-shaped (hammer head) turnaround.

![Figure 5.1 - Fire Lane Turnarounds](image)

**INTERSECTION DESIGN**

Street intersections should normally be at right angles and on centerline tangents. The minimum curb return radii for all right angled intersections shall be 25-feet measured from the face of curb for residential streets and 30-feet for all others. Sight distances for right-angled intersections shall match the safe stopping sight distances listed in Table 5.9.

In the event that an intersection angle varies from 90°, it shall vary by no more than 15°, and each curb return radius shall be set using the WB-50 design vehicle shown in Figure 5.7 with wheels clearing the curb face by 2-feet.

Offset intersections with spacing less than as shown in Table 5.1 are not permitted.
TABLE 5.1
MINIMUM CENTERLINE DISTANCE BETWEEN INTERSECTIONS

<table>
<thead>
<tr>
<th>STREET COMBINATION</th>
<th>DISTANCE (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential – Residential</td>
<td>125</td>
</tr>
<tr>
<td>Residential – Collector</td>
<td>125</td>
</tr>
<tr>
<td>Minor Collector – Minor Collector</td>
<td>175</td>
</tr>
<tr>
<td>Major Collector – Minor Collector</td>
<td>Adjacent – 235</td>
</tr>
<tr>
<td></td>
<td>Opposite – 300</td>
</tr>
<tr>
<td>Collectors – Arterials</td>
<td>1000</td>
</tr>
</tbody>
</table>

The gutter and centerline grades of intersecting streets should be set so as to produce no more than a 2% change in grade in any direction of vehicular travel across an intersection. Storm drainage inlets shall be located outside of the intersection curb returns and should be designed to minimize the volume of storm water entering an intersection.

Intersections shall also have adjacent visibility triangles kept free of obstacles as outlined by the latest edition of AASHTO’s “A Policy on Geometric Design of Highways and Streets”. Obstacles prohibited include vegetation, entry signage, structures, buildings, etc. Public use facilities required to be at intersections such as fire hydrants, traffic signage, utility structures, etc. are exempted.

Additional design information and details shall be as published by AASHTO.

Additional right of way will be required at intersections of arterials with collectors and other arterials to allow for right turn lanes and/or dual left turn lanes. Additional right of way may be required at any intersection to provide sight distance.

MEDIANs
The use of medians will be determined either by the City or by the developer. They shall not be less than 15-feet in width as measured from back-of-curb to back-of-curb. Sheltered left turn lanes must be at least 10-feet in width with minimum storage length and approach taper determined by the included chart. Medians shall be aesthetically pleasing with bricks, stamped concrete, or landscape. Landscaped medians are considered a “special design” and plans addressing plant materials, irrigation, drainage and impact on adjacent pavement must be submitted. Maintenance of the medians will be on a case-by-case basis and approved by the Director of Public Utilities.
TABLE 5.2
MINIMUM LENGTH OF LEFT-TURN LANES

<table>
<thead>
<tr>
<th>STREET CLASSIFICATION</th>
<th>MINIMUM STORAGE LENGTH</th>
<th>APPROACH TAPER LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local (all)</td>
<td>50 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Collector (rural or minor)</td>
<td>80 ft.</td>
<td>100 ft.</td>
</tr>
<tr>
<td>Collector</td>
<td>100 ft.</td>
<td>180 ft.</td>
</tr>
<tr>
<td>Arterial (all)</td>
<td>200 ft.</td>
<td>200 ft.</td>
</tr>
</tbody>
</table>

Optimally, median openings will be spaced, at a minimum, every 1000-feet. The City can approve additional median openings, but in no case should an opening be closer than 300-feet to another opening or to a street intersection. Minimum median opening width is 60 feet.

All divided arterials shall be profiled such that the ultimate median curb lines have a maximum elevation differential of 3" per 20-feet of median width. This is necessary to accommodate the installation of future median openings and turn lanes along arterials. Spot elevations and pavement cross-slope transitions for future lanes shall be included in the plans in order to verify median cross-slopes. In areas where there is no future need for a median opening, the design engineer may justify the use of a greater differential between median curb elevations. Any differential exceeding 3" per 20-feet of median width requires approval from the Director of Public Utilities.

Medians installed on undivided streets at entrances to subdivisions for aesthetic or any other purpose shall be a minimum of 8-feet wide and 100-feet long. Roadway pavement in each direction shall be a minimum of 24 feet (face to face). No driveways for adjacent houses shall be permitted on these street segments within 150-feet of the curb line of the cross street. The median shall terminate at the ROW line of the intersecting thoroughfare.

Additional design information and details shall be as published by AASHTO.
DRIVEWAYS

Driveway Types

- A residential driveway provides access to a single-family residence, a duplex, or a multi-family building containing three or fewer dwelling units. These drives shall primarily intersect residential streets. No direct residential driveway access to collector streets unless approved by the Director of Public Utilities. All access to residential property abutting all other thoroughfares shall be off an alley.

- A commercial driveway provides access to office, retail, institutional, or multiple family buildings having more than three dwelling units. Industrial plant driveways which serve administrative or employee parking lots shall be considered commercial driveways. Commercial drives shall access arterial or collector streets only.

- An industrial driveway serves truck movements to and from loading areas of industrial, warehouse, or truck terminals. A community or regional shopping center may have one or more driveways specially designed, signed, and located to provide access for trucks. Industrial drives shall access arterial or collector streets only.

Driveway Width

As the term is used here, the width of a driveway refers to the width of pavement at the ends of the interior curb returns.

- Residential drives onto streets shall have a minimum width of 11-feet and a maximum width of 20-feet. Joint access residential drives shall have no less than 9-feet on each property.

- Commercial drives shall have a minimum width of 24-feet and a maximum width of 40-feet.

- Industrial drives shall have a minimum width of 30-feet and a maximum width of 40-feet.

- Commercial/industrial drives, including fire lanes, with one-way operation (divided driveways) shall have a width of 20-feet (face to face) for both ingress and egress. The separation median width shall be a minimum of 4-feet and a maximum of 10-feet.

- All driveways intersecting dedicated streets shall be built with a circular curb radius connecting the 6-inch raised curb of the roadway to the design width pavement of the driveway. Driveway radii shall fall entirely within the subject property so as to begin at the street curb, at the extension of the property line.
(h) **Pre-Construction Meeting.** The contractor for each project, or for any phase, shall notify the City of Hutchins of the intent to commence work. Sufficient notice shall be given so that a pre-construction conference may be held. No work shall commence except as specifically authorized at the pre-construction meeting.

(i) **Construction Permit.** The City will issue a permit based on approved engineering plans. No work shall be started until a permit is duly issued.

(j) **Construction Inspection Fee.** Prior to the issuance of any public works construction permit, the City will collect all applicable fees in accordance with the fee schedule listed in Appendix A of the City of Hutchins Code of Ordinances (not to be confused with Appendix A of this development manual).

(k) **Exception for Utility Companies.** Utility companies are not required to secure a permit for repairs and day-to-day maintenance operations but shall notify the City. Utility companies are required to get a permit without fee for new developments and for all relocations.

(l) **Traffic Control Plans.** Each set of construction plans submitted to the City for review and approval shall include traffic control plans. The plan shall provide for the safe handling of traffic through and adjacent to the area of construction. Construction signing, barricades, etc., shall be in conformance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

(m) **Construction Methods.** All utility lines installed under existing concrete paving shall be installed by a method other than open cut, except as specifically approved by the City. The Director of Public Works may approve, on case-by-case basis, open cut of existing pavement for utility installation/construction. Examples of reasons why the Director of Public works might approve open cuts are as follows:

1. The main to be connected onto is under paving. In this case, the open cut shall be limited to the area of the main, the remaining installation to be by other than open cut

2. A boring machine cannot be used because of space limitations

3. The size of the utility line is too large to be economically feasible (in the judgment of the Director of Public Works) to be installed by methods other than open cut

4. Conditions are such that it would be impossible or impractical to install the utility line by means other than open cut

In the event the open cut method is approved, the pavement shall be removed in complete panels and replaced with early yield high strength concrete in accordance with the approved plans. The traffic control plan shall adequately address the safe handling of traffic through the area of the open cut.
1) The curb radii for a residential drive shall be 5-feet.

2) The curb radii for a commercial drive shall be 20-feet.

3) The curb radii of an industrial drive shall be 30-feet.

In order to maintain the location of the edge of pavement for the thoroughfare, driveway radii shall always be designed to become tangent to the street curb line. Drainage inlets shall maintain a minimum 10-foot clearance on upstream side and 5-foot clearance on downstream side from all drive radii.

Encroachment of commercial or industrial drives shall not occur on an adjacent property without a joint access agreement being executed between both property owners. Driveway vertical grade requirements shall be as shown in Table 5.5.

**Driveway Spacing and Location in Relation to Other Streets & Drives**

Unsignalized driveways introduce conflicts into the traffic stream. As an area develops and traffic volumes on the adjacent roadways grow, the gaps between vehicles are shorter. Vehicles turning from a through lane cause through vehicles to slow, causing “shock waves” to the vehicles on the roadway network. In order to maintain the capacity of the roadway network, driveway access should be limited.

- **Residential - Driveway approaches on a tract of land devoted to one use shall not occupy more than 70 percent of the frontage abutting the roadway. No more than two driveway approaches shall be permitted on any parcel of property on each street. These standards may be waived for cul-de-sac lots.**

- **Commercial and Industrial - Spacing and location of driveways shall be related to existing driveways and those shown on approved development plans. The spacing between driveways shall depend upon the Thoroughfare Plan designation of the roadway per Table 5-3. Driveways shall not be permitted in the transition area of any deceleration lane or right turn lane.**

**TABLE 5.3 – COMMERCIAL AND INDUSTRIAL DRIVEWAY SPACING**

<table>
<thead>
<tr>
<th>Thoroughfare Type</th>
<th>Min. Drive Spacing (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector (rural or minor)</td>
<td>50</td>
</tr>
<tr>
<td>Collector</td>
<td>75</td>
</tr>
<tr>
<td>Arterials</td>
<td>75</td>
</tr>
</tbody>
</table>
Spacing between driveways shall be measured along the property line from the closest edge of pavement from one driveway to the closest edge of pavement of the next driveway.

**Driveway Offset Spacing in Relation to a Cross Street**

Offset spacing between a driveway and the adjacent cross street intersection shall be measured along the right-of-way line from the cross street projected curb line to the projected curb line or edge of pavement of the driveway. The minimum offset distance (in feet) shall be equal to the minimum spacing requirement as shown in Table 5.3. Residential driveway spacing from cross streets shall not be closer than 30-feet.

**Driveway Spacing on State Maintained Facilities**

Driveway spacing on all State maintained roadways shall be governed by TxDOT and shall meet minimum standards in accordance with TxDOT Roadway Design Manual. Driveways must be approved by the City based on the finding that the driveway will not create a traffic safety hazard or jeopardize quality of traffic handling. Such factors as vehicular speed, existing traffic patterns, existing and proposed driveway and ramp locations, and existing and future street intersections, shall be considered.

**Driveway Grades**

The change in grade between the roadway cross slope and the slope of the driveway apron is important to ensure a smooth, low speed-turning maneuver. The maximum algebraic change in grade is shown in Table 5.4. An abrupt change in grade will cause the front bumper to drag on the surface of the street and driveway. Maximum slope of a residential driveway shall not exceed 8 percent within the right-of-way line and 14 percent beyond the right-of-way line. Maximum slope of a commercial driveway shall not exceed 8% within the right-of-way and 12% beyond the right-of-way, unless the driveway is a fire lane which requires a maximum slope of 8% within the right-of-way and 8% beyond the right-of-way.

<table>
<thead>
<tr>
<th>Thoroughfare Type</th>
<th>Algebraic Change ( % )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>12</td>
</tr>
<tr>
<td>Collector (rural or minor)</td>
<td>10</td>
</tr>
<tr>
<td>Collector</td>
<td>8</td>
</tr>
<tr>
<td>Arterials</td>
<td>8</td>
</tr>
</tbody>
</table>

TABLE 5.4 – DRIVEWAY GRADE CHANGE
The recommended lengths of vertical curve for the corresponding change in grade for driveway profiles are shown in Table 5.5.

<table>
<thead>
<tr>
<th>Change in Grade (%)</th>
<th>Length (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crest Curve</td>
</tr>
<tr>
<td>4 - 5</td>
<td>5</td>
</tr>
<tr>
<td>6 - 8</td>
<td>5</td>
</tr>
<tr>
<td>9 - 12</td>
<td>6</td>
</tr>
</tbody>
</table>

All driveway profiles should be designed to accommodate a sidewalk crossing at a maximum allowable cross-slope of 2% in order to meet ADA requirements.

**FIRE LANE**

Fire lanes shall have an unobstructed width of not less than 24 feet and an unobstructed vertical clearance of not less than 14 feet. Fire lanes shall have a minimum inside turning radius of twenty (20) feet and a minimum outside turning radius of forty-four (44) feet.

Dead end fire lanes in excess of 150 feet in length shall provide an approved area for turning around fire apparatus. Dead end fire lanes more than 150 feet in length shall provide a turnaround per Figure 5.1. Dead end fire lanes in excess of 700 feet in length shall be submitted to the Fire Marshal for review and approval. In residential subdivisions where a proposed cul-de-sac will include an obstruction within its center, such as a planter or other impassable object, the pavement width shall measure a minimum of 100 feet.

Fire lanes shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with an asphalt or concrete surface so as to provide all-weather driving capabilities. Fire lanes shall be constructed of a minimum of six (6) inch concrete with #3 rebar on eighteen (18) inch centers on chairs over a modified subgrade as per the Geotechnical Soils Report; or a minimum of six (6) inch asphalt over a modified subgrade as per the Geotechnical Soils Report. The construction shall be capable of supporting a minimum of 75,000 pounds gross vehicle weight.

**Fire Lane Striping**

Fire lanes shall be marked with a six (6) inch wide continuous bright red stripe on both sides. Striping shall be on the curb face where curbing is located at the edge of fire lanes. White 4 inch high lettering with a one (1) inch stroke centered on red stripe shall read: NO PARKING - FIRE LANE. This lettering shall be painted every (15) feet measured from the end of one lettering group to the beginning of the next.
group with a one (1) foot space between “No Parking” and “Fire Lane”. Red paint shall not be used for any parking lot marking other than fire lanes. Fire lane markings are subject to the field inspection of the Fire Marshal.

SIDEWALKS

Sidewalks shall be a minimum of 4-feet in width (located 3-feet from the back of curb) on local streets. Sidewalks located along streets classified as collector and larger shall be a minimum of 5-feet in width (located 3-feet from the back of curb) or 8-feet in width when located adjacent to the back of curb. In existing street areas where this is not possible, the City will work with the developer on a width compatible with existing conditions. When approved by the City, sidewalk alignments may be varied to accommodate landscaping and avoid trees or other obstructions in the standard sidewalk location. In all circumstances, a minimum clear pedestrian width of 4-feet shall be provided.

Designs for the construction of sidewalks shall meet current TAS and ADA standards.

Concrete driveways, regardless of length or slope, will contain a minimum 4-foot wide sidewalk section with a cross slope as shown on the standard detail which aligns with sidewalk approaches.

PAVEMENT STRUCTURE

Pavement structure for urban streets are generally determined by the anticipated loads to be carried, the quality and strength of the paving materials used and the load bearing capacity of the underlying subgrade. This guideline provides minimum criteria for both rigid and flexible pavements using generalized soil conditions applicable to coarse-grained and clay soils for each street classification. These minimum criteria are shown in Table 5.11.

The design engineer shall visit the site and make soil tests to determine the appropriate subgrade preparation and pavement design. The minimum compressive strength shall be 3500 per C.O.D. PSI at 28 days except that in intersections and in areas where hand finishing is required the minimum compressive strength shall be 3750 PSI. The minimum cement ratio shall be 5.5 sacks per cubic yard, except in intersections and in areas where hand finishing is required the minimum cement ratio shall be 6.0 sacks per cubic yard. Early yield high strength concrete shall have a compressive strength of 4,200 PSI at 3 days for panel replacements. The minimum ratio for early yield high strength concrete shall be eight (8) sacks per cubic yard.

All street and alley paving shall be placed on a base course compacted to a minimum of 95% of Standard Proctor. The base course thickness shall be a minimum of six inches and shall consist of lime or cement stabilization as recommended in the geotechnical report. In small areas where stabilization is not practical, the base course shall consist of six inches of compacted flexible base
(95% Standard Proctor) or four inches of asphalt base as directed by the City. Where the geotechnical report identifies area having high sulfates, the base course shall consist of four inches of asphalt. All base courses shall be on compacted subgrades. Added pavement thickness may not be substituted for base course, except where right turn, left turn or deceleration lanes are added to existing streets, the pavement thickness shall be ten inches.

If an alternate pavement design is proposed, the engineer should discuss with the City such alternate ideas and methodology. The engineer shall base the pavement thickness designs on actual soil analyses and use the current AASHTO pavement thickness design methods. Specific pavement thickness designs submitted for approval must be accompanied by soils testing reports to fully support the assumptions of the procedure being used. Parameters based on general soil classifications will not be permitted. The City reserves the right to deny alternate designs.

When underground utility conduits or storm sewers are constructed or reconstructed in open trenches beneath new pavement, the trenches must be backfilled over the required bedding and compacted up to the bottom of the subgrade as shown in the City's Standard Construction Details.

CURBING

Rural streets are not required to have curbs. All other streets shall have 6-inch raised curb. Residential streets may have a standard mountable curb. All mountable curb designs must be accompanied with drainage design calculations. Sidewalks shall not be installed adjacent to lay-down curbs. The use of rollover curbs are only allowed for front entry residential uses. This use requires a variance approved by the Hutchins City Council. When rollover curbs are approved, the minimum standard width shall be 33-feet measured back to back of curbs.

Curbing for rigid pavements shall conform to the cross sections as shown in the City's Standard Construction Details and shall be poured monolithically with the paving.

STREET CROWNS

Street crowns shall be at the centerline of pavement and will be set by a straight 2% cross-slope upward from the edge of the gutter. Offset crowns may be used in special circumstances with approval from the Director of Public Utilities. No streets, with the exception of alleys, will be allowed to have center drains.

ENTRANCE ISLANDS

Entrance islands will be considered as "special designs" and will be reviewed on a case-by-case basis. A homeowners association is required to provide maintenance.
of landscaping and improvements contained in entrance islands.

SIGNAGE

Regulatory Signage
All regulatory signage shall be in compliance with the TMUTCD.

Street Name Signs
Street name signs will be installed by the Developer. The City of Hutchins will continue to install signs with city forces. A fee for sign installation, in the City of Hutchins only, shall be paid at the time the final plat is ready for filing.

Decorative Signage
Special sign poles are allowed but the installation must meet State safety requirements.

Other Signs
All other signs will be regulated by the sign ordinance.

STREETSCAPE

Patterned Colored Concrete
Patterned colored concrete may be used on sidewalks, crosswalks, in intersections, or in medians. Color should be integral to the concrete and shall be used on medians less than 7-feet in width or within 20-feet of median noses.

At locations where median and island pavement is required, a stamped (imprinted concrete paving) and patterned surface with coloring shall be installed in accordance with the following:

(1) In addition to the requirements of the Standard Specifications, median and island pavement installation shall be performed in accordance with either Patterned Concrete Industries, Inc. or Bomanite Corporation standard installation specifications. This includes requirements for expansion joints, joint fiberboard, welded wire fabric and concrete mix. Color hardeners and release agents as recommended by the tooling manufacturer shall be used.

(2) Median and island pavement shall be stamped in a pattern and colored in accordance with one of the following:

a. Per Patterned Concrete Industries, Inc.
   Pattern: Running Bond Cobble
   Color: Dark Red
b. Per Bominite Corporation
   Pattern: Running Bond Cobblestone
   Color: Colonial Red

   Other patterns and colors will be considered on a case-by-case basis.

(3) The contractor performing the work must provide a letter from one of the
above tooling manufacturers to the Director of Public Utilities stating that
the installer is trained and licensed to install the specified work prior to
being issued a construction permit.

(4) Street pavement shall meet all the above specifications for stamped -
patterned concrete.

(5) Median pavement, which is installed in different phases, shall utilize the
same pattern, color and installation technique as other phases within the
project.

*Brick Pavers*

Brick pavers may be used on sidewalks and on streets at crosswalks or in
intersections, with approval of Director of Public Utilities on a case-by-case basis.
Brick pavers in streets and sidewalks are to be placed on top of full depth concrete
pavement. The color and texture of brick pavers will be in accordance with the
standards adopted in the overlay district, where one exists.
STREET LIGHTS AND CONDUIT SYSTEMS

Lighting standards for street lighting shall adhere to following table.

**TABLE 5.6**
STANDARD DESIGN GUIDELINES FOR STREET LIGHTING

<table>
<thead>
<tr>
<th>STREET CLASSIFICATION</th>
<th>LIGHT SOURCE</th>
<th>NOMINAL LAMP SIZE (watts)</th>
<th>SPACING (ft)</th>
<th>POLE STYLE, CONFIGURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL MINOR COLLECTOR</td>
<td>HPS</td>
<td>100 to 150</td>
<td>600</td>
<td>EXISTING UTILITY POLE, STEEL OR FIBERGLASS POLE</td>
</tr>
<tr>
<td>RURAL COLLECTOR MAJOR COLLECTOR</td>
<td>HPS</td>
<td>150 to 200</td>
<td>200 to 300</td>
<td>EXISTING UTILITY POLE, STEEL OR FIBERGLASS POLE</td>
</tr>
<tr>
<td>MINOR ARTERIAL DIVIDED</td>
<td>HPS</td>
<td>150 to 200</td>
<td>200 to 300</td>
<td>LUMINAIRES ON SINGLE STEEL POLE IN MEDIAN</td>
</tr>
<tr>
<td>MAJOR ARTERIAL DIVIDED</td>
<td>HPS</td>
<td>150 to 250</td>
<td>175 to 250</td>
<td>LUMINAIRES ON SINGLE STEEL POLE IN MEDIAN</td>
</tr>
</tbody>
</table>

The developer shall submit a proposed street lighting plan as part of the construction plans for public improvements. The street lighting plan shall be approved by the Public Utilities Department prior to the commencement of construction. Street lights are required to be installed per Table 5.6. Additionally, streetlights are required to be installed at street intersections, cul-de-sac's, bridges, railroad crossings and other selected points when the City determines that a streetlight is needed for traffic safety.

Along arterial roadways, the poles typically are located in the median. Streetlight poles located at the intersection of two arterials shall be installed with a double mast arm or two single mast arm poles at opposite corners of the intersection. Double mast arm poles shall be installed at median openings, and alternating single mast arms at all other locations.
On undivided arterial roadways, the poles shall be installed in the parkway with single mast arms placed on alternating sides and two poles at opposite corners at each intersection.

Conduit systems shall be installed for future franchise utilities, irrigation, traffic signals, traffic signal communication, and roadway lighting.

Traffic signal conduit and ground boxes for future traffic signals shall be installed at all arterial-arterial and arterial-major collector intersections. The traffic signal conduit system will consist of one (1) each - four inch (4") schedule 40 PVC pipe located in accordance with the standard shown in Figure 9-1 prior to pavement construction.

All divided arterial roadways constructed in the City of Hutchins shall be built with a conduit system in the median. The conduit system will be used for traffic signal communications and street lighting. The traffic signal communication conduit system will consist of three (3) each - two inch (2") schedule 40 PVC pipes located 3 feet north or east of the centerline of the median.

The street lighting conduit system will consist of one (1) each - two inch (2") schedule 40 PVC pipes located 3 feet south or west of the centerline of the median. Ground boxes shall be provided every 500 feet. All conduit plans shall be reviewed and approved by the Director of Public Services.

The following general notes shall be added to all arterial intersection designs:
GENERAL NOTES:

1. TRAFFIC CONDUIT SHALL BE FOUR (4) INCH DIAMETER SCHEDULE 40 PVC (DOVE GREY IN COLOR) CONFORMING TO TXDOT SPECIFICATION ITEM 618 AND HAVE A MINIMUM BURIAL DEPTH OF 30 INCHES UNDER NEW PAVEMENT.

2. FOUR EACH TWO (2) INCH DIAMETER SCHEDULE 40 PVC (DOVE GREY IN COLOR) FOR ROADWAY LIGHTING AND FIBER OPTIC COMMUNICATION CABLE WITH TYPE D GROUND BOXES SPACED ON 600 FOOT INTERVALS. CONDUIT SHALL BE CONFORMING TO TXDOT SPECIFICATION ITEM 618 AND HAVE A MINIMUM BURIAL DEPTH OF 30 INCHES UNDER NEW PAVEMENT.

3. WHERE BENDS ARE REQUIRED, THEY SHALL BE OF THE LONG RADIUS TYPE.

4. THE CONDUIT SHALL BE CAPPED AFTER INSTALLATION WITH RED MARKER TAPE INSTALLED ON EACH CAP, WITH A MEANS PROVIDED TO PROVE CONDUIT IS UNOBSERVED BEFORE THE INTERSECTION PAVING WILL BE ACCEPTED BY THE CITY OF HUTCHINS.

5. THE GROUND BOXES AND THEIR INSTALLATION SHALL CONFORM TO THE LATEST EDITION OF TXDOT SPECIFICATION ITEMS 618 AND 624 AND TXDOT STANDARD DRAWINGS (ED1 AND ED2)-03. THE GROUND BOX BODY AND EXTENSION SHALL FORM A TOTAL UNIT DEPTH OF 18 INCHES.

6. THE COVER SHALL BE GALVANIZED STEEL (POLYMER FOR ALL BOXES WITHIN TxDOT RIGHT-OF-WAY) OF THE BOLT-DOWN TYPE AND SHALL BE PERMANENTLY MARKED "CITY OF HUTCHINS-TRAFFIC SIGNAL". GROUND BOXES IN THE MEDIAN SHALL BE PERMANENTLY MARKED "CITY OF HUTCHINS - COMMUNICATIONS".

7. ALL GROUND BOXES SHALL HAVE REINFORCED CONCRETE APRONS AND SHALL BE BEDDED FLUSH WITH THE FINISHED GRADE.

8. THE EXACT LOCATIONS WHERE CONDUIT CROSSES UNDER THE PAVING ARE TO BE MARKED WITH AN "X" AND PAINTED WITH RED PAINT ON THE CURB OR PAVING.

9. A NO. 9 GALVANIZED WIRE SHALL BE IN ALL CONDUIT. THIS WIRE SHALL EXTEND 1 FOOT (MINIMUM) BEYOND THE CONDUIT END WHEN THE CAP IS REMOVED. THE WIRE END SHALL BE COILED AND THEN TAPE TO THE CONDUIT SURFACE AT THE CONDUIT END FOR EASY FUTURE ACCESS.

10. CONDUIT AND GROUND BOXES DESCRIBED AND SHOWN ABOVE SHALL BE INSTALLED AT ALL ARTERIAL-ARTERIAL AND ARTERIAL-MAJOR COLLECTOR INTERSECTIONS PRIOR TO PAVEMENT CONSTRUCTION.

FIGURE 5.2 – INTERSECTION DESIGN GENERAL NOTES
<table>
<thead>
<tr>
<th>Table 5.7 - Minimum Geometric Design Criteria for New Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alley</strong></td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td><strong>ROW</strong></td>
</tr>
<tr>
<td><strong>Pavement Width</strong></td>
</tr>
<tr>
<td><strong>Traffic Lanes</strong></td>
</tr>
<tr>
<td><strong>Lane Width</strong></td>
</tr>
<tr>
<td><strong>Curb</strong></td>
</tr>
<tr>
<td><strong>Shoulder</strong></td>
</tr>
<tr>
<td><strong>Left Turn Lane</strong></td>
</tr>
<tr>
<td><strong>Parking</strong></td>
</tr>
<tr>
<td><strong>Raised Medians</strong></td>
</tr>
<tr>
<td><strong>Sidewalks Req./Width</strong></td>
</tr>
</tbody>
</table>

**NOTES:**
- Cul-de-sacs on residential and rural streets, including streets in the ETJ, shall have a 50' ROW radius with a 40' pavement radius. All other cul-de-sac streets shall have a min. 60' ROW radius with a min. 50' pavement radius. Temp. T-turnarounds, in accordance with the local fire code, will only be allowed under circumstances when no other option is viable and with prior approval.
- All intersecting street rights-of-ways, provide a minimum 25' ROW chamfer.
- Additional easements may be required parallel to the street right-of-way for utilities if necessary.

1 No more than 24 lots between cross streets. Allowed in single-family developments only.
2 Right of Way widths listed herein are a minimum and additional right of way may be required. At intersections of collector to collector streets or greater, additional row will be provided for dual left or right turn lanes as required by traffic impact study or requested by the City.
3 Pavement widths are measured from back of curb to back of curb or from the edge of pavement to edge of pavement where there is no curb.
4 Rural sections shall only be used where allowed by local zoning.
5 Wider lanes required on outside lanes only.
6 Rural Residential Shoulders shall be asphalt primed or shall have ribbon curb installed. Ribbon curb applies only to those rural sections located within the city limits.
7 A 5 foot easement will be required on either side of right-of-way.
8 Sidewalk may be 8 feet in width when located adjacent to the back of curb.
**TABLE 5.8**  
**STREET CLASSIFICATION DEFINITIONS**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALLEY:</td>
<td>A minor public right-of-way which provides a secondary means of vehicular access to abutting property and which is used primarily for vehicular traffic to the rear or side of properties which otherwise abut on a public street. Parking is not allowed on alleys.</td>
</tr>
<tr>
<td>ARTERIAL STREET:</td>
<td>A street which carries high volumes of vehicular traffic (in the general range of 5,000 VP to 60,000 VP) and which is intended to move traffic in, out or around the City.</td>
</tr>
<tr>
<td>COLLECTOR STREET:</td>
<td>A street which primarily serves vehicular traffic (in the general range of 5,000 to 10,000 VP) from residential streets and minor collectors to arterials. A collector may also provide very limited access to abutting properties if approved by the City.</td>
</tr>
<tr>
<td>MINOR COLLECTOR STREET:</td>
<td>A street which primarily serves vehicular traffic (in the general range of 1,000 to 5,000 VP) from residential streets to collectors or arterials. A minor collector may also provide limited access to abutting properties if approved by the City.</td>
</tr>
<tr>
<td>RURAL COLLECTOR STREET:</td>
<td>A street in the ETJ of the City which primarily serves vehicular traffic from residential streets to arterials. A rural collector may provide limited access to abutting residential properties if approved at the time of platting by the City and County. Construction and maintenance of the rural collectors are generally under the jurisdiction of the County.</td>
</tr>
<tr>
<td>RESIDENTIAL STREET:</td>
<td>A street which primarily serves vehicular traffic to abutting residential properties. A residential may also provide limited access to commercial properties if approved by the City.</td>
</tr>
<tr>
<td>RURAL RESIDENTIAL STREET:</td>
<td>A street in the ETJ of the City which primarily serves vehicular traffic to abutting residential properties. A rural residential may also provide limited access to commercial properties if approved at the time of platting by the City and County. Construction and maintenance of the rural residential streets are generally under the jurisdiction of the County. Rural street sections are allowed inside the city limits in areas with appropriate zoning and lot size. Refer to the local zoning ordinance for guidance.</td>
</tr>
</tbody>
</table>
### TABLE 5.9
MINIMUM GEOMETRIC CRITERIA FOR STOPPING SIGHT DISTANCE

<table>
<thead>
<tr>
<th>STREET CLASSIFICATION</th>
<th>DESIGN VEHICLE</th>
<th>DESIGN SPEED (mph)</th>
<th>STOPPING SIGHT DISTANCE (ft)</th>
<th>MIN. &quot;K&quot; &lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CREST</td>
</tr>
<tr>
<td>RESIDENTIAL</td>
<td>SU</td>
<td>25</td>
<td>235</td>
<td>24</td>
</tr>
<tr>
<td>MINOR COLLECTOR</td>
<td>SU</td>
<td>35</td>
<td>250</td>
<td>29</td>
</tr>
<tr>
<td>RURAL COLLECTOR &amp; COLLECTOR</td>
<td>SU</td>
<td>40</td>
<td>305</td>
<td>44</td>
</tr>
<tr>
<td>ARTERIAL</td>
<td>WB-50</td>
<td>45</td>
<td>360</td>
<td>61</td>
</tr>
</tbody>
</table>

<sup>1</sup> If intersecting grades result in a "K" value less than that shown, the minimum vertical curve length shall be equal to 3xDesign Speed.

**NOTES:**
- Sight distance at street intersections shall be provided in accordance with the latest edition of AASHTO's "A Policy on Geometric Design of Highways and Streets" measured 10' from the edge of the intersecting street.
<table>
<thead>
<tr>
<th>Street Classification</th>
<th>Design Vehicle</th>
<th>Design Speed (mph)</th>
<th>Des. Max. Rate of Super-elevation (%)</th>
<th>Min. Center-line Radius (ft)</th>
<th>Max. Relative Edge Slopes for Super Transition (ft/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>SU</td>
<td>25</td>
<td>N/A</td>
<td>150</td>
<td>N/A</td>
</tr>
<tr>
<td>Rural Collector</td>
<td>SU</td>
<td>40</td>
<td>N/A</td>
<td>575</td>
<td>N/A</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>SU</td>
<td>35</td>
<td>N/A</td>
<td>430</td>
<td>N/A</td>
</tr>
<tr>
<td>Collector</td>
<td>SU</td>
<td>40</td>
<td>N/A</td>
<td>575</td>
<td>N/A</td>
</tr>
<tr>
<td>Arterial</td>
<td>WB-50</td>
<td>45</td>
<td>6</td>
<td>675</td>
<td>1:225</td>
</tr>
</tbody>
</table>

1 Super-elevation transition is to be accomplished 2/3 outside of the horizontal curve and 1/3 within the curve. The minimum tangent between successive horizontal curves should be designed such that proper super-elevation transitions can be effected.

Example for calculating super-elevation and minimum tangent between successive curves:

Given: 5-lane minor arterial with 12-foot lanes and a 14-foot TWLTL. Typical section is rooftop crown with 2% cross slopes. 675-foot curve left followed by a 675-foot curve right. Super-elevation rotation is about center of road.

6% maximum super-elevation required for the minimum curves given.

$High\ side\ max.\ relative\ vertical\ transition = (0.06\ -\ (-0.02)) \times (12'\ +\ 12' + (14'/2)) = 2.48$-feet

Horizontal transition required to effect super-elevation = $2.48' \times 225$ (from last column in Table 5.10) = 558 feet

2/3 within tangent = 374 feet; 1/3 within curve = 184 feet

Low side max. relative vertical transition = $(0.06 - 0.02) \times (12' + 12' + (14'/2)) = 1.24$-feet

Horizontal transition required to effect super-elevation = $1.24' \times 225$ (from last column in Table 5.10) = 279 feet

2/3 within tangent = 187 feet; 1/3 within curve = 92-feet

Therefore, the minimum tangent length required between these two curves is 561-feet, or 374-feet + 187-feet.
### TABLE 5.11
MINIMUM PAVEMENT THICKNESS CRITERIA

<table>
<thead>
<tr>
<th>FLEXIBLE PAVEMENTS</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>STREET CLASSIFICATION</td>
<td>SUBGRADE TREATMENT</td>
<td>BASE MATERIAL</td>
<td>SURFACE TREATMENT</td>
</tr>
<tr>
<td>RESIDENTIAL</td>
<td>6-in Lime-Stab.</td>
<td>6-in. Limestone, 6-in. Cement Stabilized Base or 4-in. HMAC</td>
<td>2-in. HMAC</td>
</tr>
<tr>
<td>MINOR COLLECTOR</td>
<td>6-in Lime-Stab.</td>
<td>8-in. Limestone, 8-in. Cement Stabilized Base or 5-in. HMAC</td>
<td>2-in. HMAC</td>
</tr>
<tr>
<td>COLLECTOR &amp; ARTERIAL</td>
<td></td>
<td>Design based upon Geotechnical Report, but not less than pavement structure shown for a minor collector.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RIGID PAVEMENTS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>STREET CLASSIFICATION</td>
<td>SUBGRADE TREATMENT</td>
<td>CONCRETE PAVEMENT</td>
</tr>
<tr>
<td>RESIDENTIAL (includes alleys)</td>
<td>6-in Lime-Stab.</td>
<td>6-in.</td>
</tr>
<tr>
<td>COLLECTOR</td>
<td>8-in Lime-Stab.</td>
<td>8-in.</td>
</tr>
<tr>
<td>ARTERIAL</td>
<td>Design based upon Geotechnical Report, but not less than pavement structure shown for a collector.</td>
<td></td>
</tr>
</tbody>
</table>

NOTE:
- Lime stabilization is the most commonly used for this area, if other types of stabilization are desired, please submit geotechnical report and technical data.
APPENDIX 6

DRAINAGE DESIGN GUIDELINES
Drainage Guidelines

incorporating the

CITY OF HUTCHINS LOCAL CRITERIA SECTION

and the

NCTCOG – integrated Storm Water Management (iSWM) Design Manual for Site Development (2006 Edition)

City of Hutchins

November 2013

This document consists of the regional iSWM Manual prepared by the North Central Texas Council of Governments and the City of Hutchins Local Criteria Section. The City of Hutchins Local Criteria Section adopts by reference the applicable iSWM sections that are required by the City's Storm Water Management Program and includes additional design criteria that is not included in the iSWM Manual. The remaining iSWM sections and criteria are available for technical reference, utilization by developers for enhancement of land development projects, and potential future adoption by the City, as needed.
City of Hutchins
Drainage Design Guidelines

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INTRODUCTION

Why new City of Hutchins Storm Water Management Design Guidelines?

This design guideline updates the policies and criteria for storm water facilities within the City of Hutchins (CH) and its extraterritorial jurisdiction. New policies and criteria are needed to reflect the changes that have occurred in community standards, technology and environmental regulations that impact storm water management. The primary motivation for these guidelines is to manage drainage policy and criteria so that new development does not increase flooding, erosion, and associated risks to public safety.

This guideline is intended for the most commonly encountered storm water or flood control designs. It can also be used for watershed master plans and for design of remedial measures for existing facilities. This manual was developed for users with knowledge and experience in the applications of standard engineering principles and practices of storm water design and management. There will be situations not completely addressed or covered by this manual. Other methods of design or exceptions to the criteria are permissible provided the variance procedure presented in the Supplement to Appendix E (page A6-67) is followed. Any variations from the practices established in this manual must have the expressed written approval of the Director of Public Utilities. Close coordination with staff is recommended and encouraged during the planning, design and construction of all storm water facilities.

Relationship of CH Manual to Regional integrated Storm Water Management (iSWM) Manual

This CH design guideline, as a “Local Criteria” section, incorporates portions of the regional iSWM manual, developed by the North Central Texas Council of Governments (NCTCOG). The iSWM manual was prepared for the 16-county region and includes sections that are not being adopted or are being modified by the CH. Copies of these documents can be downloaded from the websites or ordered from the respective agencies for the cost of reproduction.

Precedence of CH Local Criteria

The requirements contained within this City of Hutchins Local Criteria section shall take precedence over conflicting provisions that may be contained in the integrated Storm Water Management Manual approved by the North Central Council of Governments.

Notes and Abbreviations

Notes and abbreviations used in the Local Criteria Section:

1. CH – City of Hutchins

2. References are made to the Regional iSWM Manual for Site Development, 2006 Edition
GOALS AND OBJECTIVES OF THE CITY OF HUTCHINS
STORM WATER MANAGEMENT PROGRAM

Goals and Objectives of the City of Hutchins Storm Water Management Design Guidelines

1. Establish and implement drainage policy and criteria so that new development does not increase flooding problems, cause erosion or pollute downstream water bodies.

2. Facilitate the development of comprehensive watershed planning that promotes orderly growth and results in an integrated system of public and private storm water infrastructure.

3. Minimize flood risks to citizens and properties, and stabilize or decrease streambank and channel erosion on creeks, channels, and stream

4. Encourage a more standardized, integrated land development process.
CITY OF HUTCHINS STORM WATER POLICY STATEMENTS

1. All development within the City of Hutchins City Limits or Extra-territorial Jurisdiction (ETJ) shall include planning, design, and construction of storm drainage systems in accordance with this Storm Water Management Design Guidelines. Please see definition of development and project size limitations for specific design requirements under "DEFINITIONS".

2. Conceptual, Preliminary and Final Drainage Studies and Plans shall be required for all proposed developments within the Hutchins City Limits or its extra-territorial jurisdiction (ETJ), in conformance with this Storm Water Management Design Guidelines. Specific submittal requirements depend on the complexity of the project and requirements of Subdivision Ordinance and Zoning Ordinance. The checklists for each stage of this three-tier process are included in the Supplement to Appendix E (Forms CH-1, CH-2 and CH-3 on pages A6-68 to A6-82).

3. All drainage related plans and studies shall be prepared and sealed by a Licensed Professional Engineer with a valid license from the State of Texas. The Engineer shall attest that the design was conducted in accordance with this Storm Water Management Design Guideline.

4. For currently developed areas within the City of Hutchins with planned re-development, storm water discharges and velocities from the project should not exceed discharges and velocities from current (existing) developed conditions, unless the downstream storm drainage system is designed (or adequate) to convey the future (increased) discharges and velocities.

5. All drainage studies and design plans shall be formulated and based upon ultimate, fully developed watershed or drainage area runoff conditions. In certain circumstances where regional detention is in place or a master plan has been adopted, a development may plan to receive less than ultimate developed flow from upstream with the approval of Director of Public Utilities. The rainfall frequency criteria for storm water facilities, as enumerated within this Storm Water Management Design Guideline, shall be utilized for all drainage studies and design plans.

6. Storm water must be carried to an "adequate or acceptable outfall". An adequate outfall is one that does not create or increase flooding or erosion conditions downstream and is in all cases subject to the approval of the Director of Public Utilities. See additional clarification under "DEFINITIONS".

7. Proposed storm water discharge rates and velocities from a development shall not exceed the runoff from existing, pre-development conditions, unless a detailed study is prepared that demonstrates that no unacceptable adverse impacts will be created. Adverse impacts include: new or increased flooding of existing insurable (FEMA) structures, significant increases in flood elevations over existing roadways, unacceptable rises in FEMA base flood elevations, and new or increased stream bank erosion.

8. If a proposed development drains into an improved channel or storm water drainage system designed under a previous drainage policy, then the hydraulic capacities of downstream facilities must be checked to verify that increased flows, caused by the new development, will not exceed the capacity of the existing system or cause increased downstream structure flooding. If there is not sufficient capacity to prevent increased downstream flooding, then detention or other acceptable measures must be adopted to accommodate the increase in runoff due to the proposed development.

9. Storm water runoff may be stored in detention and retention basins to mitigate potential downstream problems caused by a proposed development. Proposed detention or retention basins shall be analyzed both individually and as a part of the watershed system, to assure compatibility with one another and with the City’s overall Storm Water Management Master Plan for that watershed (if available). Storage of storm water runoff, near to the points of rainfall occurrence, such as the use of parking lots, ball fields, property line swales, parks, road
embankments, borrow pits and on-site ponds is desirable and encouraged.

10. Alternatives to detention or retention, for mitigation of potential downstream problems caused by proposed development, include: acquisition of expanded drainage easements, ROW, or property owner agreements; downstream channel and/or roadway bridge/culvert improvements or stream bank erosion protection; and financial contributions to the City of Hutchins’ Storm Water Utility Program for future improvements. These alternatives will be considered, as presented by the developer, on a case-by-case basis.

11. Stream bank stabilization and protection features to reduce or prevent erosion and sedimentation for creeks, streams, and channels shall be required, as specified in these guidelines, and to insure the intent of Paragraphs 6 and 7.

12. Required Easements:

- **Drainage easements** shall be required for both on-site and off-site public storm water drainage improvements, including standard engineered channels, storm drain systems, public detention/retention facilities and other storm water controls.

- **Temporary drainage easements** may be allowed off-site for temporary channels when future off-site development are anticipated to enclose the channel in conduit or follow an altered alignment. Temporary drainage easements will not be maintained by the City and will not terminate until permanent drainage improvements meeting City standards are installed and accepted. Temporary drainage easements will require written approval from the Director of Public Utilities and the City Attorney.

- **Private drainage easements**, not dedicated to the city, may be required for private storm water drainage improvements serving multiple lots or for storm water controls on a property. (No Public Water).

- **Access easements** shall be provided for access to public storm water drainage improvements where necessary for maintenance.

- Additional details on easements are included in Section 3.4 (Closed Conduit Systems) and Section 4.8 (Open Channels and Detention Ponds).

13. Required Right of Way:

- **Drainage Right of Way** All drainage improvements in residential developments shall be located within right(s)-of-way.

- **Floodplain Right of Way** shall be provided on sites along natural or improved earthen drainage ways (other than standard engineered channels). Floodplain rights of way shall encompass all areas below a ground elevation one foot above the water surface elevation of the base flood. The right-of-way shall also include at least a 15-foot wide maintenance strip along both sides of the channel or, if the Public Utilities Department so allows, at least a 20-foot wide maintenance strip along one side of the channel, to provide ingress and egress for maintenance of the banks, as determined and required by the Director of Public Utilities. The access shall be part of the floodplain right of way itself and not a separate easement. Floodplain rights of way are not routinely maintained by the City.

14. All proposed developments within the City of Hutchins City Limits or Extra-territorial Jurisdiction (ETJ) shall comply with all local, county, state and federal regulations and all required permits or approvals shall be obtained by the developer.

15. The policy of the City of Hutchins is to avoid substantial or significant transfer of storm water drainage runoff from one basin to another and to maintain historical drainage paths whenever possible.
possible. However, the transfer of storm water drainage from basin to basin may be necessary in certain instances and will be reviewed on a case-by-case basis.

16. City Maintenance - The CH will provide for perpetual maintenance, in accordance with adopted city maintenance standards, of all public drainage facilities located within dedicated easements and constructed to the CH standards. Access shall be provided and dedicated by the developer to all public storm water facilities in developments for maintenance and inspection by the CH.

17. Private Maintenance:
   - Private drainage facilities include those drainage improvements which are located on private property and which handle only private storm water.
   - Private drainage facilities may also include detention or retention ponds, dams, and other storm water controls which collect public water, as well as drainageways not constructed to City standards but which convey public water. Such facilities must be designed in accordance with accepted engineering practices and reviewed and inspected by the City.
   - An agreement for perpetual maintenance of private drainage facilities serving public water shall be executed with the City prior to acceptance of the final plat. This agreement shall run with the land and can be tied to commercial property or to an owner’s association, but not to individual residential lots.
   - Access shall be provided by the developer/owner to all private drainage facilities where there may be a public safety concern for inspection by the CH.
DEFINITIONS

Adequate Outfall - Storm drainage from a development must be carried to an "adequate outfall" or "acceptable outfall." An adequate outfall is one that does not create adverse flooding or erosion conditions downstream and is in all cases subject to the approval of the Director of Public Utilities. See Zone of Influence definition for the required conditions or criteria to determine the adequacy of an outfall from a proposed development.

Development - A contiguous tract of land (or a tract of land separated only by roadway and/or drainage rights-of-way or easements) to be considered as a single development for purposes of this policy, if the tract has one or more of the following characteristics:

- Included in a single Development Plan submitted to the City of Hutchins,
- Included in a single Preliminary Plat submitted to the City of Hutchins,
- Is comprised of contiguous land (or land separated only by roadway and/or drainage rights-of-way or easements) under the same root ownership,
- Is encumbered by a single Master Drainage Study or Plan,
- Is encumbered by a single Developer’s Agreement, TIF, or other public/private partnership agreement,
- Is overlaid by a common Homeowner’s or Property Owner’s Association (HOA, POA), or
- Is owned or managed by a common Master Developer.

Drainage Studies and Downstream Assessment - Studies of the proposed development and drainage areas, including a downstream assessment of properties that could be impacted by the development, will accompany the conceptual, preliminary, and final development plans. The “zone of influence” and “adequate outfall point” for the proposed development will be identified in the study and site plan.

These studies will include adequate hydrologic analysis to determine the existing, proposed, and fully-developed runoff for the drainage area that is affected by the proposed development. They will also include hydraulic studies that help define the “Zone of Influence” and any upstream or downstream offsite effects. The study, as part of the development plan, shall address existing downstream, off-site drainage conveyance system(s) and define the drainage path from the outfall of the on-site storm water facilities, to the off-site drainage system(s) and/or appropriate receiving waters. It will include a capacity analysis of all existing constraint points such as existing floodplain developments, underground storm drainage systems, culverts/bridges, or channels from the point of storm water discharge of the development downstream to the limits of the “Zone of Influence”. Storms to be analyzed will be the 2-, 10-, and 100-year.

Fully developed conditions – For watershed hydrology, fully developed conditions include:

- All existing developed areas shall reflect current land use or current zoning, whichever yields the greatest runoff.
- All existing undeveloped areas shall reflect anticipated future land use designated by zoning classification, by the City’s Comprehensive Plan, or by an approved concept plan.
- If the anticipated future development is unknown, a minimum weighted runoff coefficient of 0.75 shall be used.

Natural Creeks – those drainageways that are generally unimproved, that often exhibit a meandering course, and which are not proposed to be improved to City standards for earthen channels.

Private Water – storm-water runoff which is generated on private property and flowing within the property or from one property to another. Drainage easements and drainage facilities which contain only private water shall not be maintained by the City.
Public Water – the concentration of surface water flowing through or from public land or right-of-way. Public water must be contained within a dedicated right-of-way, floodplain or drainage easement.

Storm Water Credits - A form of incentive to promote conservation of natural and open space areas and encourage incorporation of water quality controls in new developments or redevelopments. Developers or property owners may be allowed reductions in storm water management requirements when they use techniques to reduce storm water runoff or improve water quality at the site. The CH has not developed a storm water credit system at this time.

Zone of Influence and Parameters - A "zone of influence" from a proposed development extends to a point downstream where the discharge from a proposed development no longer has a significant impact upon the receiving stream or storm drainage system. Downstream impacts due to a development must be analyzed and mitigated for the 2-, 10-, and 100-year floods for the entire zone of influence, as determined by the development engineer’s analysis. The Zone of Influence for any proposed development must be defined by the development engineer, based on a drainage study that determines the specific location along the drainage route where "no adverse impacts" from the new development exist.

A drainage study (see definition) will include the necessary hydrologic and hydraulic analyses to clearly demonstrate that the limits of the Zone of Influence have been identified, and that along the drainage route to that location, these parameters are met:

- No new or increased flooding of existing insurable (FEMA) structures (habitable buildings),
- No significant (0.1') increases in flood elevations over existing roadways for the 2-, 10- and 100-year floods,
- No significant rise (0.1' or less) in 100-year flood elevations, unless contained in existing channel, roadway, drainage easement and/or R.O.W,
- No significant increases (maximum of 5%) in channel velocities for the 2-, 10- and 100-year floods. Post-development channel velocities cannot be increased by more than 5% above pre-development velocities, nor exceed the applicable maximum permissible velocity shown in iSWM Table 4.4-2. If existing channel velocities exceed six (6) feet per second, no additional increase in velocities will be allowed,
- No increases in downstream discharges caused by the proposed development that, in combination with existing discharges, exceeds the existing capacity of the downstream storm drainage system,
- For watersheds of 100 acres or less at any proposed outfall, the downstream assessment may use the ten percent rule of thumb (as delineated in Section 2.1.9.2 of the iSWM Manual) or a detailed study in order to determine the Zone of Influence,
- For all other watersheds, the Zone of Influence will be defined by a detailed hydrologic and hydraulic analysis.
CHAPTER 1 – STORM WATER MANAGEMENT SYSTEM PLANNING AND DESIGN

Chapter 1 of the iSWM Manual provides a foundation for integrated Storm Water Management in terms of basic philosophy, principles, definitions, and land development site planning and design practices, and should therefore be utilized for general guidance throughout the development process. Water Quality and Streambank Protection Volume controls are not adopted by CH at this time. Other exceptions are summarized below. All references to iSWM site plans are modified to refer to CH storm water management plans.

Section 1.1 – Storm Water Site Planning
ADAPTED WITH THE FOLLOWING MODIFICATIONS

Conceptual, preliminary, and final storm water management plans and supporting technical data will be submitted for review and approval to the Public Utilities Department for review.

Conceptual Storm Water Management Plan (iSWM 1.1.3.5)

Conceptual storm water management plans shall be prepared and submitted to the CH in the initial planning stages of a land development project with a Conceptual Development Plan. In general, the conceptual storm water management plan guidelines as presented in Section 1.1.3.5 of the iSWM Manual will be followed, as applicable to Hutchins. Water quality and streambank protection detention requirements and credits are not currently part of the CH criteria. A conceptual drainage study and storm water management plan for any proposed development shall include at a minimum the information listed in the Engineer's Checklist for Conceptual Storm Water Management Plan (Form CH-1) shown in the Supplement to Appendix E, pages A6-68 to A6-72.

Preliminary Storm Water Management Plan (iSWM 1.1.3.6)

A preliminary drainage study and storm water management plan for any proposed development must accompany a preliminary plat submitted for development review, and shall include at a minimum the information listed in the Engineer's Checklist for Preliminary Storm Water Management Plan (Form CH-2) shown in the Supplement to Appendix E, pages A6-73 to A6-75. The study will include a downstream assessment of properties that could be impacted by the development. These studies will include adequate hydrologic analysis to determine the existing, proposed, and fully-developed runoff for the drainage area that is affected by the proposed development and will include hydraulic studies that define the "adequate outfall". The study, as part of the development storm water management plan, shall address existing downstream, off-site drainage conveyance system(s) and define the discharge path from the outlet of the on-site storm water facilities, to the off-site drainage system(s) and/or appropriate receiving waters. It will include a capacity analysis of all existing constraint points such as pipes, culverts/bridges, or channels from the point of storm water discharge of the development downstream to an "adequate outfall". For drainage areas of 100 acres or less, the downstream assessment will be limited to an "adequate outfall point", determined by the study, or the 10% rule. For drainage areas larger than 100 acres, the "adequate outfall point" will be defined by the detailed hydrologic and hydraulic analyses. This preliminary drainage study and storm water management plan will include:

1. A topographical map of the entire watershed (not just the area of the proposed development) generally not smaller than 1"=200' (or other such scale approved by Director), delineating the watershed boundary(s) and runoff design point(s), existing and proposed land use and zoning, and the size and description of the outfall drainage facilities and receiving streams.
2. Computation tables showing drainage areas, runoff coefficients, time of concentration, rainfall intensities and peak discharge for the required design storms, for both existing and proposed (ultimate development) conditions, at all design points for each component of the storm water system (streets, pipes, channels, detention ponds, etc.).

3. Any proposed changes to watershed boundaries (i.e. by re-grading, where permissible by Texas Water Code). If significant changes to watershed boundary are made, more extensive analyses of downstream impact and mitigating detention will be required and a variance obtained from the Director of Public Utilities.

4. FEMA Flood Hazard Areas, if applicable.

5. In addition any required Corps of Engineer's Section 404 permits, Conditional Letters of Map Revision (CLOMR), Letters of Map Revision (LOMR) or other permits relating to lakes and streams required by any federal, state or local authorities. These must be documented in the Drainage Study.

6. Detailed off-site outfall information. This shall include the presence of existing or proposed drainage structures, bridges or systems; documentation of existing versus proposed developed site as well as ultimate runoff, identification of downstream properties which might be impacted by increased runoff, and proposed detention or other means of mitigation. Downstream impacts shall generally be delineated identified to a point where the drainage from the proposed development has no impact on the receiving stream or on any downstream drainage systems within the "zone of influence".


**Final Storm Water Management Plan (iSWM 1.1.3.7)**

A Final Drainage Study and Storm Water Management Plan for development of all or a portion (i.e. phase one or phase two, etc.) of the overall development shall be prepared and submitted to the CH. This submittal shall include at a minimum the information listed in the Engineer's Checklist for Final Storm Water Management Plan (Form CH-3) shown in the Supplement to Appendix E, pages A6-76 to A6-78, including:

1. Conformance with the Preliminary Storm Water Management Plan and Study.
2. Submission of detailed drainage calculations and detailed design plans.
3. The submission of a cover sheet signed by the Director of Public Utilities indicating the approval of the detailed construction drawings for the proposed development is sufficient to clear a plat drainage study comment.
4. Final drainage studies shall be approved based on the submission of a signed cover sheet and drainage map with calculations from the approved engineering construction drawings. Where City approval of construction plans is not required, the above information required for preliminary drainage studies, as well as construction plans for any drainage improvements, prepared according to criteria in the current CH plan review checklists, shall be submitted.

**Section 1.1.2 – Integrated Storm Water Management (iSWM) Site Plans**

**ADOPTED WITH THE FOLLOWING MODIFICATIONS**

The CH does not currently require water quality or streambank protection volume mitigation.
Section 1.1.2.2 – Applicability

Storm Water Management plans are required for all new CH subdivisions. At this time the CH does not require Storm Water Management plans for land disturbing activities or increases in impervious areas.

Section 1.1.3 – Developer Steps to Prepare an iSWM Site Plan

See Local Criteria Section 1.1 for a description of CH requirements.

Section 1.1.4 – Local Community Plan Review Responsibilities

FOR GUIDANCE AND REFERENCE

Section 1.1.5 – Local Government Responsibilities during Construction and Operation

MODIFIED AS FOLLOWS The CH Process includes: Construction Phase

1. Pre-construction Meeting - Where possible, a pre-construction meeting shall occur before any clearing or grading is initiated on the site. This step ensures that the owner-developer, contractor, engineer, inspector, and plan reviewer can be sure that each party understands how the plan will be implemented on the site.

2. Periodic Inspections - Periodic inspections during construction by CH representatives. Inspection frequency may vary with regard to site size and location; however, monthly inspections are a minimum target.

3. Final Inspection - A final inspection is needed to ensure that the construction conforms to the intent of the approved design. Prior to accepting the infrastructure components, issuing an occupancy permit, and releasing any applicable bonds, the CH will ensure that: (a) temporary erosion control measures have been removed; (b) storm water controls are unobstructed and in good working order; (c) permanent vegetative cover has been established in exposed areas; (d) any damage to natural feature protection and conservation areas has been mitigated; (e) conservation areas and buffers have been adequately marked or signed; and (f) any other applicable conditions have been met.

4. Record Drawings - Record drawings of the structural storm water controls, drainage facilities, and other infrastructure components will be provided to the CH by the developer.

Maintenance

1. Maintenance Plan - If private maintenance is planned, a maintenance plan, prepared by the developer, will outline the scope of activities, schedule, costs, funding source, and responsible parties. Vegetation, sediment management, access, and safety issues will be addressed.

2. Notification of Property Owners - If necessary, the CH will notify property owners of any maintenance responsibilities, through a legal disclosure, upon sale or transfer of property. Ideally, preparation of maintenance plans should be a requirement of the iSWM Site Plan preparation and review process.

3. Ongoing Maintenance - It will be clearly detailed in the Final Storm Water Management Plan which entity has responsibility for operation and maintenance of all structural storm water controls and drainage facilities (see CH Policy Statements regarding maintenance).

4. Annual Inspections - Annual inspections of private storm water management facilities will be conducted by the owner.
Section 1.1.6 – iSWM Site Plan Design Tools
FOR GUIDANCE AND REFERENCE

Section 1.2 – integrated Planning and Design Approach
ADOPTEO WITH THE FOLLOWING MODIFICATIONS

In general, the CH currently follows the flood control, streambank protection, and water quality protection components of the integrated planning and design approach with the following modifications. Streambank Protection Option (4) which provides for streambank protection volume detention is not required by the CH. Water Quality Protection Option (1) which provides for treatment of the water quality protection volume is not required by the CH.

Section 1.2.1 – Introduction
ADOPTEO

Section 1.2.2 – Downstream Assessment (iSWM 1.2.2)
MODIFIED AND DETAILED. A specific CH approach to ‘Downstream Assessment’ is described in the following paragraphs.

Section 1.2.2.1 – Zone of Influence and Parameters

A “zone of influence” from a proposed development extends to a point downstream where the discharge from a proposed development no longer has a significant impact upon the receiving stream or storm drainage system. Downstream impacts due to a development must be analyzed and mitigated for the 2-, 10-, and 100-year floods for the entire zone of influence, as determined by the development engineer’s analysis. The Zone of Influence for any proposed development must be defined by the development engineer, based on a drainage study that determines the specific location along the drainage route where “no adverse impacts” from the new development exist.

A drainage study (see Sec 1.2.2.3) will include the necessary hydrologic and hydraulic analyses to clearly demonstrate that the limits of the Zone of Influence have been identified, and that along the drainage route to that location, these parameters are met:

- No new or increased flooding of existing insurable (FEMA) structures (habitable buildings),
- No significant (0.1’) increases in flood elevations over existing roadways for the 2-, 10- and 100-year floods.
- No significant rise (0.1’ or less) in 100-year flood elevations, unless contained in existing channel, roadway, drainage easement and/or R.O.W.
- No significant increases (maximum of 5%) in channel velocities for the 2-, 10- and 100- year floods. Post-development channel velocities cannot be increased by more than 5% above pre-development velocities, nor exceed the applicable maximum permissible velocity shown in iSWM Table 4.4-2. If existing channel velocities exceed six (6) feet per second, no additional increase in velocities will be allowed.
- No increases in downstream discharges caused by the proposed development that, in combination with existing discharges, exceeds the existing capacity of the downstream storm drainage system.
- For watersheds of 100 acres or less at any proposed outfall, the downstream assessment may use the ten percent rule of thumb (as delineated in Section 2.1.9.2 of the iSWM Manual) or a detailed study in order to determine the Zone of Influence.
- For all other watersheds, the Zone of Influence will be defined by a detailed hydrologic and hydraulic analysis.
Section 1.2.2.2 – Adequate Outfall

Storm drainage from a development must be carried to an "adequate outfall" or "acceptable outfall." An adequate outfall is one that does not create adverse flooding or erosion conditions downstream and is in all cases subject to the approval of the Director of Public Utilities. See Zone of Influence definition for the required conditions or criteria to determine the adequacy of an outfall from a proposed development.

Section 1.2.2.3 – Drainage Studies and Downstream Assessment

Studies of the proposed development and drainage areas, including a downstream assessment of properties that could be impacted by the development, will accompany the conceptual, preliminary, and final development plans. The "zone of influence" and "adequate outfall point" for the proposed development will be identified in the study and storm water management plan.

These studies will include adequate hydrologic analysis to determine the existing, proposed, and fully-developed runoff for the drainage area that is affected by the proposed development. They will also include hydraulic studies that help define the "Zone of Influence" and any upstream or downstream offsite effects. The study, as part of the development site plan, shall address existing downstream, off-site drainage conveyance system(s) and define the drainage path from the outfall of the on-site storm water facilities, to the off-site drainage system(s) and/or appropriate receiving waters. It will include a capacity analysis of all existing constraint points such as existing floodplain developments, underground storm drainage systems, culverts/bridges, or channels from the point of storm water discharge of the development downstream to the limits of the "Zone of Influence". Storms to be analyzed will be the 2-, 10-, and 100-year events.

Section 1.2.3 – Water Quality Protection

ADOPTED FOR GUIDANCE AND REFERENCE

As stated in the text of the iSWM Manual, enhanced water quality protection shall only be required as identified by the Local Criteria section. At the time of the initial adoption of the CH Local Criteria Section, the City has opted to implement the streambank protection and flood control goals, but not the enhanced water quality protection component. The CH will continue to monitor and review the storm water program for possible future implementation of the water quality protection goals. The CH encourages land developers to consider the use of storm water controls within new developments that benefit not only flood control and streambank protection, but also water quality protection.

Section 1.2.4 – Stream Bank Protection

ADOPT WITH THE FOLLOWING MODIFICATIONS

Option 4: Provide on-site controlled releases of the streambank protection volume – NOT REQUIRED BY CH.

Section 1.2.5 – Flood Control

ADOPT WITH MODIFICATIONS FOUND IN SECTION 1.2.2 (DOWNSTREAM ASSESSMENT)

Section 1.2.6 – integrated Watershed Planning

FOR GUIDANCE AND REFERENCE
Section 1.3 – Integrated Site Design Practices
ADOPTED WITH THE FOLLOWING MODIFICATIONS

This section provides general guidance for potentially reducing costs of storm water infrastructure construction and the negative impacts of development on flooding, stream stability and water quality. Numerous examples of integrated site design practices are included. City of Hutchins exceptions to this guidance is summarized below:

Section 1.3.4 – Integrated Site Design Credits

This section is not adopted by the CH at this time. The CH will be evaluating and developing an incentive program for preserving open space, incorporating natural drainage features, and providing special water controls in ways that improve and protect water quality. These incentives may take the form of additional flexibility in development standards or reductions in storm water utility fees that may apply after development.

Section 1.4 – Integrated Storm Water Controls
ADOPTED FOR DESIGN GUIDANCE AND TECHNICAL REFERENCE

Section 1.4 and Chapter 5 of the ISWM Manual contain summaries, discussions and examples of storm water controls that can be implemented in land development to meet the goals of protecting water quality, minimizing streambank erosion, and reducing flood volumes. Although primarily oriented toward water quality issues, these storm water controls bring additional and valuable benefits for flood control and streambank protection. Many of the listed storm water control features and techniques enhance the aesthetics and value of land developments, as well as providing a drainage function, and are recommended for use in Hutchins, when applicable.

Special storm water controls are not required for water quality treatment by the CH at this time. Although not mandated, the use of these storm water controls are recognized as inherently valuable for application in overall storm water management.
CHAPTER 2 – HYDROLOGIC ANALYSIS

Section 2.1 – Estimating Runoff

Section 2.1.1 – Introduction to Hydrologic Methods
ADOPTEO WITH THE FOLLOWING MODIFICATIONS

Water quality volume and stream bank protection volume applications do not apply. USGS and TxDOT equations are only allowed with the approval of DIRECTOR OF Public Utilities.

Table 2.1.1-1 – Only hydrograph methods may be used to compute design discharges for bridge design.

Table 2.1.1-2 – See modified version of Table 2.1.1-2 below.

<table>
<thead>
<tr>
<th>Method</th>
<th>Size Limitations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rational</td>
<td>0 – 200 acres</td>
<td>Method can be used for estimating peak flows and the design of small site or subdivision storm sewer systems.</td>
</tr>
<tr>
<td>Modified Rational²</td>
<td>0 –200 acres</td>
<td>Method can be used for estimating runoff volumes for detention planning and conceptual design. However, basin sizes larger than 25 acres must utilize a hydrograph routing method for final design.</td>
</tr>
<tr>
<td>Unit Hydrograph (SCS)³</td>
<td>Any Size</td>
<td>Method can be used for estimating peak flows and hydrographs for all design applications.</td>
</tr>
<tr>
<td>Unit Hydrograph (Snyder’s)⁴</td>
<td>&gt; 100 acres</td>
<td>Method can be used for estimating peak flows and hydrographs for all design applications.</td>
</tr>
<tr>
<td>TXDOT Regression Equations⁵</td>
<td>10 to 100 mi²</td>
<td>Method can be used for estimating peak flows for rural design applications for comparison purposes only.</td>
</tr>
<tr>
<td>USGS Regression Equations⁶</td>
<td>3 – 40 mi²</td>
<td>Method can be used for estimating peak flows for urban design applications for comparison purposes only.</td>
</tr>
</tbody>
</table>

| iSWM Water Quality Protection Volume Calculation¹ | Limits set for each Structural Control | Method used for calculating the Water Quality Protection Volume (WQPv) |

¹Size limitations refer to the drainage basin for the storm water management facility (e.g., culvert, inlet). These do not necessarily apply to master drainage plans.
²Where the Modified Rational Method is used for conceptual sizing the engineer is cautioned that the method could underestimate the storage volume.
³This refers to SCS routing methodology included in many readily available programs (such as HEC-HMS or HEC-1) that utilize this methodology.
⁴This refers to the Snyder’s routing methodology included in many readily available programs (such as HEC-HMS or HEC-1) that utilize this methodology.
⁵Use only with approval of Director of Public Utilities.
⁶Not currently required by CH.

Section 2.1.2 – Symbols and Definitions
ADOPTEO

Section 2.1.3 – Rainfall Estimation
ADOPTEO

Section 2.1.4 – Rational Method
ADOPTEO

Section 2.1.4.1 – Introduction
ADOPTEO

Section 2.1.4.2 – Application
ADOPTEO

Section 2.1.4.3 – Equations
ADOPTEO WITH THE FOLLOWING MODIFICATIONS
The "Frequency Factors" are not required by the CH. The Rational Formula as presented in Equation 2.1.2 is allowed.

Section 2.1.4.4 – Time of Concentration
ADOPTED

Section 2.1.4.5 – Rainfall Intensity (I)
ADOPTED

Section 2.1.4.6 – Runoff Coefficient (C)
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Table 2.1.4-2 presents the Rational Formula Runoff "C" Coefficients for the CH. The basis of these coefficients is the standard zoning classification used by the City. An example of the determination of these coefficients is presented in Figure 2.1.4-1.

<table>
<thead>
<tr>
<th>Description of Land Use</th>
<th>Impervious (3)</th>
<th>Runoff Coefficient “C”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential one-acre lots (1) (2)</td>
<td>35</td>
<td>0.44</td>
</tr>
<tr>
<td>Residential half-acre lots</td>
<td>37</td>
<td>0.46</td>
</tr>
<tr>
<td>Residential 10,000 SF lots</td>
<td>49</td>
<td>0.55</td>
</tr>
<tr>
<td>Residential 7,500 SF lots</td>
<td>55</td>
<td>0.59</td>
</tr>
<tr>
<td>Residential 5,000 SF lots</td>
<td>61</td>
<td>0.65</td>
</tr>
<tr>
<td>Multi-family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4% Open Space (Default if no site plan)</td>
<td>96</td>
<td>0.88</td>
</tr>
<tr>
<td>10% Open Space (Site Plan required)</td>
<td>90</td>
<td>0.83</td>
</tr>
<tr>
<td>20% Open Space (Site Plan required)</td>
<td>80</td>
<td>0.76</td>
</tr>
<tr>
<td>Parks, Cemeteries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playgrounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Railroad Yard Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streets:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt, Concrete and Brick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drives, Walks, and Roofs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unimproved Areas</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.1.4-2 Runoff Coefficients

Assumptions:

(1) For Residential Calculations:
- Current CH development standards for minimum lot size and maximum lot coverage (structure) for each classification
- Assumed 10.5’ Parkway and 18’ driveway
- Assumed 29’ B-B street dimension
- Calculated by applying 90% runoff from impervious areas and 20% runoff from pervious areas
(2) Calculated from designated set-backs
(3) Impervious values are for information only.
APPX. USE OF LOT

AREA=5,000 S.F. + R.O.W. (25'x50')
= 6,250 S.F. MAX.

<table>
<thead>
<tr>
<th>C</th>
<th>USE</th>
<th>A</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>STREET (14.5x50')</td>
<td>725</td>
<td>882.5</td>
</tr>
<tr>
<td>0.00</td>
<td>DRIVEWAY &amp; SIDEWALK</td>
<td>677</td>
<td>809.3</td>
</tr>
<tr>
<td>0.30</td>
<td>ROOF</td>
<td>2,500</td>
<td>2,250</td>
</tr>
<tr>
<td>0.20</td>
<td>LANDSCAPE AREA</td>
<td>2,348</td>
<td>469.6</td>
</tr>
<tr>
<td>TOTAL CAS</td>
<td></td>
<td>3,981.4</td>
<td></td>
</tr>
</tbody>
</table>

CALC. C=CA/A
0.64

APPROXIMATION OF RUNOFF COEFFICIENT
C=0.64

Figure 2.1.4-1 Sample Calculation Sheet for Runoff Coefficient "C"
Section 2.1.4.7 – Example Problem
ADOPTED

Section 2.1.5 – SCS Hydrologic Method
ADOPTED

Section 2.1.5.1 – Introduction
ADOPTED

Section 2.1.5.2 – Application
ADOPTED WITH THE FOLLOWING MODIFICATIONS

CH allows the hydrograph routing method for subdrainage areas of greater than 100 acres but will not allow the Simplified Method, except as approved by Director of Public Utilities. Figure 2.1.6-1 presents a sample computation sheet for presentation of unit hydrograph method results. This form should be completed even if the computations are performed on an acceptable computer programs HEC-1 or HEC-HMS.

Section 2.1.5.3 – Equations and Concepts
ADOPTED

Section 2.1.5.4 – Runoff Factor (CN)
ADOPTED

Section 2.1.5.5 – Urban Modifications of the SCS Method
ADOPTED

Section 2.1.5.6 – Travel Time Estimation
ADOPTED

Section 2.1.5.7 – Simplified SCS Peak Runoff Rate Estimation
ADOPTED WITH THE FOLLOWING MODIFICATIONS

CH will not allow the simplified SCS method except as approved by Director of Public Utilities.

Section 2.1.5.8 – Example Problem 1
FOR REFERENCE ONLY

CH will not allow the simplified SCS method except as approved by Director of Public Utilities.

Section 2.1.5.9 – Hydrograph Generation
ADOPTED

Section 2.1.5.10 – Example Problem 2
ADOPTED

Section 2.1.5.11 – Stream Routing
ADOPTED
<table>
<thead>
<tr>
<th>ANALYSIS POINT</th>
<th>SUBWATER-</th>
<th>WATERSHED</th>
<th>UNIT HYDROGRAPH COEFFICIENTS</th>
<th>PEAK DISCHARGES (CFS)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>8</td>
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<td>9</td>
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</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
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<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMPUTATION SHEET**

**HYDROLOGY BY UNIT HYDROGRAPH METHOD**

**SCS METHOD**

- $C_n$
- $L_{ag}$ (HR)

**Snyder's Method**

- $C_p$
- $T_p$ (HR)

**PEAK DISCHARGES (CFS)**

- $Q_2$
- $Q_5$
- $Q_{10}$
- $Q_{100}$

---

**REMARKS, SKETCHES AND COMPUTATIONS**
Section 2.1.6 – Snyder’s Unit Hydrograph Method
ADOPTED

Section 2.1.6.1 – Introduction
ADOPTED

Section 2.1.6.2 – Application
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Figure 2.1.6-1 presents a sample computation sheet for presentation of unit hydrograph method results. This form should be completed even if the computations are performed on an acceptable computer programs HEC-1 or HEC-HMS.

Section 2.1.6.3 – Urbanization Curves
ADOPTED WITH THE FOLLOWING MODIFICATIONS

An alternative method to determine Snyder’s Lag is to determine the time of concentration (travel time) by the methodology described in Section 2.1.5.6 and multiply this time of concentration by 0.6.

Section 2.1.6.4 – Determination of Percent Urbanization and Percent Sand
ADOPTED

Section 2.1.7 – Modified Rational Method
ADOPTED

Section 2.1.7.1 – Introduction
ADOPTED

Section 2.1.7.2 – Design Equations
ADOPTED WITH THE FOLLOWING MODIFICATIONS

An exception to the iSWM Method is that only “C” coefficients presented in Table 2.1.4-2 are allowed for use in the Modified Rational Method. The remaining methodology is allowed.

Section 2.1.7.3 – Example Problem
ADOPTED

Section 2.1.8 – USGS and TxDOT Regression Methods
FOR REFERENCE ONLY

The regression methods used in this Section will only be used for comparison of the reasonableness of other approved determinations, not for final results or design unless specifically approved by Director of Public Utilities.

Section 2.1.9 – Downstream Hydrologic Assessment
ADOPTED WITH MODIFICATIONS CONTAINED IN SECTION 1.2.2

Section 2.1.10 – Water Quality Protection Volume and Peak Flow
FOR DESIGN GUIDANCE

Section 2.1.11 – Streambank Protection Volume Estimation
FOR DESIGN GUIDANCE
Section 2.1.12 – Water Balance Calculations

FOR DESIGN GUIDANCE

References
ADOPTED
CHAPTER 3 – HYDRAULIC DESIGN OF STREETS AND CLOSED CONDUITS

Section 3.1 – Storm Water Street and Closed Conduit Design Overview

Section 3.1.1 – Storm Water System Design
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Water quality mitigation is not required for storm water management of land development in Hutchins.

Section 3.1.1.1 – Introduction
ADOPTED

Section 3.1.1.2 – System Components
ADOPTED

Section 3.1.1.3 – Checklist for Planning and Design
ADOPTED

Section 3.1.2 – Key Issues in Storm Water System Design
ADOPTED

Section 3.1.2.1 – Introduction
ADOPTED

Section 3.1.2.2 – General Design Considerations
ADOPTED

Section 3.1.2.3 – Street and Roadway Gutter
FOR REFERENCE ONLY

Section 3.1.2.4 – Inlets and Drains
FOR REFERENCE ONLY

Section 3.1.2.5 – Closed Conduit Systems (Storm Drains/Sewers)
FOR REFERENCE ONLY

Section 3.1.3 – Design Storm Recommendations
ADOPTED WITH THE FOLLOWING MODIFICATIONS

The design storms presented in /SWM are replaced by the design storms required by CH as follows:

Storm Sewer System

The design storm is a minimum 5-year for the closed conduit system and the 100-year for the combination of the closed conduit and surface drainage system.

Runoff from the 5-year storm must be contained within the permissible spread of water in the gutter. The 100-year storm flow must be contained within the ROW. Adequate inlet capacity shall be provided to intercept surface flows before the street ROW capacity is exceeded. Note: The capacity of the underground system may be required to exceed the 5-year storm in order to satisfy the 100-year storm criteria.
The closed conduit HGL must be equal to or below the gutter line for pipe systems and one (1) foot or more below curb line at inlets. For situations where no ROW exists, the 100 year HGL must be below finished ground. The 100-year HGL will be tracked carefully throughout the system and described in the hydraulic calculation tables (Fig. 3.2.4-4) in the construction drawings. Some exceptions may be allowed where an adequate overflow route is not possible.

**Sump Inlets**

In sag or sump conditions, the storm drain and sump inlets should be sized to intercept and convey the 25-year storm, provided that a positive overflow is provided for the remainder of the 100-year storm. The positive overflow structure must be concrete or other acceptable non-earthenn structure with a minimum bottom width of 6 feet extending from the sump inlet to the storm sewer outfall. In the event that a structural overflow is not practical, then the underground system must be sized to convey the 100-year storm.

Section 3.2 – On-Site Flood Control System Design

**Section 3.2.1 – Overview**

**LOCAL CRITERIA SECTION ONLY**

The portion of Section 3.2.3 dealing with Flow Spread Limits is an exception to the iSWM requirements. Most of Sections 3.2.4, 3.2.5, 3.2.6, 3.2.7 and 3.2.8 are specific CH requirements rather than the iSWM requirements. The forms presented herein will be used to document all closed conduit calculations even if calculations are actually performed on an acceptable computer program unless otherwise approved by Director of Public Utilities. A “rooftop” section should be used for concrete streets and a parabolic section for asphalt streets.

**Section 3.2.1.2 – General Criteria**

**ADOPTED WITH THE FOLLOWING MODIFICATIONS**

**Permissible Flow Spread of Water Limits**

**General**

Spread of water refers to the amount of water that is allowed to collect in streets during a storm of 5-year design frequency. In order that excess storm water will not collect in streets or thoroughfares during a storm of the design frequency, the following spread of water values shall be used for the various types of streets.

**Arterials (Divided)**

1. **Permissible Spread of Water.** The permissible spread of water in gutters of major divided thoroughfares shall be limited so that one traffic lane on each side remains clear during the 5-year storm. Gutter flow shall be based on maximum storm duration of 15 minutes.

2. **Conditions.** Inlets shall preferably be located at street intersections, at low points of grade or where the gutter flow exceeds the permissible spread of water criteria. Inlets shall be located, when possible, on side streets when grades permit. In no cases shall the gutter depression at inlets exceed the standard. In super-elevated sections, inlets placed against the center medians shall have no gutter depression and shall intercept gutter flow at the point of vertical curvature to prevent flow from crossing the thoroughfares on the surface in valley gutters or otherwise.

**Arterials (Not Divided)**

1. **Permissible Spread of Water.** The permissible spread of water in gutters of major undivided thoroughfares shall be limited so that two traffic lanes will remain clear during the 5-year storm. The 100-year storm shall be contained within the R.O.W.
2. Conditions. Inlets shall preferably be located at street intersections, low points of grades, or where the gutter flow exceeds the permissible spread of water criteria. Inlets shall be located, when possible, on the side streets when grades permit. In no case shall the gutter depression at inlets exceed the standard. Depressed inlets will be permitted in a standard parking lane. Where inlets are required in traffic lanes, inlets with no depression shall be used.

In super-elevated sections, intercept gutter flow at P.V.C. or P.V.T. to prevent flow from crossing thoroughfare. Unless expressly approved by the Director of Public Utilities, storm water will not be allowed to cross major thoroughfares on the surface in valley gutters or otherwise.

**Collector Streets**

1. Permissible Spread of Water. The permissible spread of water in gutters of collector streets shall be limited so that one standard lane of traffic will remain clear during the 5-year storm. The 100-year storm shall be contained within the R.O.W.

2. Conditions. Inlets shall preferably be located at street intersections, low points of grade or where the gutter flow exceeds the permissible spread of water criteria. Inlets shall be located, when at all possible, on the side streets when grade permits. Inlets with the standard gutter depression shall be used. In no case shall the gutter depression at inlets exceed the standard.

**Minor Streets (Residential)**

1. Permissible Spread of Water. The permissible spread of water in gutters for minor streets shall be limited by the height of the curb for 5-year storms. The 100-year storm shall be contained within the R.O.W.

2. Conditions. Inlets shall be located at street intersections, low points of grade or where the gutter flow exceeds the permissible spread of water criteria. Inlets with depressed standard gutter depression shall be used in all cases unless special grading problems are involved. In no case shall the gutter depression at inlets exceed the standard.

Must use roadway sections as approved by CH.

**Section 3.2.2 – Symbols and Definitions**

**ADPTED**

**Section 3.2.3 – Street and Roadway Gutters**

**ADPTED**

**Section 3.2.3.6 – Examples**

**ADPTED**

**Section 3.2.4 – Storm Water Inlets**

**ADPTED WITH THE FOLLOWING MODIFICATIONS**

This section replaces sections 3.2.4, 3.2.5 and 3.2.6 of ISWM. Under the CH classification system, inlets have been classified into two major groups namely: Inlets in Sumps (3.2.4.1) and Inlets on Grade with Gutter Depression (3.2.4.2).

**Section 3.2.4.1 – Inlets in Sumps**

**LOCAL CRITERIA SECTION ONLY**

General
Inlets in sumps are inlets in low points of surface drainage to relieve ponding. The capacity of inlets in sumps must be known in order to determine the depth and width, of ponding for a given discharge.
Curb Opening Inlets and Drop Inlets.

1. General. Curb opening inlets and drop inlets in a sump or low point can be considered to function as a rectangular broad-crested weir with a coefficient of discharge of 3.0. The capacity shall be based on the following equation:

\[ Q = 3.0 \cdot y^{3/2} \cdot L \text{ or } Q/L = 3.0 \cdot y^{3/2} \]

- \( Q \) = Capacity in c.f.s. of curb opening inlet or capacity in c.f.s. of drop inlet. \( y \) = Head at the inlet in feet.
- \( L \) = Length of curb inlet opening or perimeter of drop inlet opening in feet.

The curves shown in Figures 3.2.4-1 and 3.2.4-2 provide for direct solution of the above equation.

Where the depth of water is such that the curb inlet or drop inlet is completely submerged the proper orifice formula should be used in computing the discharge rather than the weir formula. See section 3.2.6.2 of the iSWM Manual for guidance on this application of the orifice formula.

2. Example and Explanation of Computation Sheet.

In order to facilitate the computations required in determining the various hydraulic properties for curb opening inlets and drop inlets in a sump use Computation Sheet Figure 3.2.4-4.

The following example is given to illustrate the use of Figure 3.2.4-4 Computation Sheet for both a curb opening inlet and drop inlet in a sump.

- \( Q_o \) = Gutter flow = 9.0 c.f.s.
- \( S_o \) = Gutter slope = 0.0050 ft. per ft.
- \( Q_p \) = Crown slope of pavement = 0.25 in. per ft.
- \( n \) = Pavement roughness coefficient = (See iSWM Table 3.2-2) Straight crown slope.

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet number and designation.</td>
<td>Slope of gutter in ft. per ft.</td>
<td>Crown slope of pavement in ft. per ft. For parabolic crowns enter type of street section.</td>
<td>Total gutter flow in c.f.s. For inlets other than the first inlet in a system, gutter flow is the sum of runoff from contributing area plus carry-over flow from inlet or inlets upstream.</td>
<td>Depth of gutter flow in feet from the spread of water calculations in Figure 3.2-1 (iSWM Manual), Section 3.2.3 or from direct solution of Manning's equation for triangular gutters. [ Y_o = 1.245 \cdot Q_o^{3/8} \cdot (n^{3/8} / S_o^{3/16}) \cdot (1 / \tan \theta')^{3/8} ]</td>
<td>Depth of gutter depression in ft.</td>
<td>Depth of water at inlet opening in ft. Column 5 plus Column 6.</td>
</tr>
</tbody>
</table>
Column 8  Capacity of curb opening inlet or drop inlet in c.f.s. per ft. of length of opening or perimeter around inlet from Figures 3.2.3-1 or 3.2.3-2 or by direct solution.
\[ Q \text{ or } Q = 3.0 \frac{y^{3/2}}{L \cdot P} \]

Column 9  Assumed length of inlet opening or perimeter in feet.

Column 10  Capacity of inlet in c.f.s. Column 8 times Column 9.

Column 11  Carry-Over flow passing inlet (into overflow swale) in c.f.s. Column 4 minus Column 10.

Column 12  Percent of flow captured by inlet. Column 10 divided by Column 4 times 100.

Section 3.2.4.2 – Inlets on Grade with Gutter Depression
LOCAL CRITERIA SECTION ONLY

General
The hydraulic efficiency of storm-water inlets varies with gutter flow, street grade, street crown, and with the geometry of the inlet depression. The design flow into any inlet can be greatly increased if a small amount (5 to 10 percent) of gutter flow is allowed to flow past the inlet. When designing inlets, freedom from clogging or from interference with traffic often takes precedence over hydraulic considerations.

The depression of the gutter at a curb opening inlet. (See Figure 3.2.4-5) below the normal level of the gutter increases the cross-flow towards the opening, thereby increasing the inlet capacity. Also, the downstream transition out of the depression causes backwater which further increases the amount of water captured. Depressed inlets should be used on all public streets and alleys. Recessed depressed inlets should be used on all arterials.

The capacity of a depressed curb inlet on grade will be based on the following equation:

\[ Q = 0.7[1/ (H_1-H_2)] [(H_1)^{5/2} - (H_2)^{5/2}] \]

Where:
- \( Q \) = Discharge into inlet in c.f.s.
- \( L_0 \) = Length of inlet opening in feet.
- \( H_1 = a + y_0 \)
- \( H_2 = a = \) Gutter depression in feet.
- \( y_0 \) = Depth of flow in approach gutter in feet.

The curve shown in Figure 3.2.4-6 provides for the direct solution of the above equation when the value of \( y_0 \) is known.

The curve shown in Figure 3.2.4-7 provides for the determination of the ratio of the intercepted flow by the inlet to the total flow in the gutter.

Example and Explanation of Computation Sheet for Curb Opening Inlet (Depressed).
Note: Current criteria do not allow depression beyond gutter line. Manhole is on both sides of inlet.

Figure 3.2.4-1 Capacity for Curb Opening Inlet in Sump
Note: Manhole is on any corner of inlet.
### COMPUTATION SHEET NO. IV-1
FOR DETERMINING CAPACITY OF CURB OPENING INLETS AND DROP INLETS IN SUMPS

<table>
<thead>
<tr>
<th>INLET NO.</th>
<th>GUTTER SLOPE S/FT/FT</th>
<th>CROWN SLOPE OF PVMT 5EO FT/FT</th>
<th>GUTTER FLOW Qo C.F.S.</th>
<th>DEPTH OF GUTTER FLOW Y0 FT.</th>
<th>DEPTH OF DEPRESSION a FT.</th>
<th>DEPTH OF FLOW AT OPENING Y FT.</th>
<th>CAPACITY OF INLET PER FOOT OF LENGTH OF INLET OPENING l OR P FT.</th>
<th>CAPACITY OF INLETS C.F.S.</th>
<th>CARRY-OVER INTO OVER FLOW C.F.S.</th>
<th>PERCENT Q100+ CAPTURED BY INLET</th>
<th>NOTES</th>
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**REMARKS: SKETCHES AND COMPUTATIONS**
In order to facilitate the computations required in determining the various hydraulic properties for Curb Opening Inlets on grade (Depressed), Figure 3.2.3-8 Computation Sheet has been prepared.

The following example is given to illustrate the use of Figure 3.2.3-8 and is shown at the end of this sub-paragraph.

Example:

Upstream Drainage Area B-1 (6.4 acres) served by two 15' inlets.  
Downstream Drainage Area B-2 (5.2 acres) served by two 10' inlets.  
Time of Concentration = 15 minutes.  
Tarrant County rainfall table.  
So = Gutter Slope = as given in example.  
Straight Crown Slope ("Rooftop") roadway section.  
Z = Reciprocal of Crown Slope = 50 (2% cross slope).  
n = Pavement roughness coefficient = 0.017 (See ISWM Table 3.2-2 for current criteria)  
L = Actual Length of inlet to be provided in ft. (10', 15', 20')  
Example assumes 5-year pick-up, with bypass of remainder of 100-year storm.

Table Column Description:

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column 1</td>
<td>Design Point for Inlet</td>
</tr>
<tr>
<td>Column 2</td>
<td>Inlet number(s)</td>
</tr>
<tr>
<td>Column 3</td>
<td>Location of inlet by storm drain station number</td>
</tr>
<tr>
<td>Column 4</td>
<td>Drainage area designation for incremental area</td>
</tr>
<tr>
<td>Column 5</td>
<td>Drainage area size (acres)</td>
</tr>
<tr>
<td>Column 6</td>
<td>Runoff coefficient &quot;c&quot;</td>
</tr>
<tr>
<td>Column 7</td>
<td>Time of concentration (minutes)</td>
</tr>
<tr>
<td>Column 8</td>
<td>5-year rainfall intensity (in/hr)</td>
</tr>
<tr>
<td>Column 9</td>
<td>5-year runoff, Q=cAi (cfs)</td>
</tr>
<tr>
<td>Column 10</td>
<td>5-year carryover flow from upstream inlet (cfs)</td>
</tr>
<tr>
<td>Column 11</td>
<td>5-year total gutter flow (Column 9 + Column 10) (cfs)</td>
</tr>
<tr>
<td>Column 12</td>
<td>Slope of approach gutter (S_o) (ft/ft)</td>
</tr>
<tr>
<td>Column 13</td>
<td>Street crown section type (straight crown [&quot;rooftop&quot;] or parabolic)</td>
</tr>
<tr>
<td>Column 14</td>
<td>Reciprocal of the pavement cross slope for pavements with straight crown slopes, 1/6_o</td>
</tr>
<tr>
<td>Column 15</td>
<td>Manning's roughness coefficient (n) for pavement</td>
</tr>
<tr>
<td>Column 16</td>
<td>Total street capacity to top of curb (cfs)</td>
</tr>
<tr>
<td>Column 17</td>
<td>100-year rainfall intensity (in/hr)</td>
</tr>
<tr>
<td>Column 18</td>
<td>100-year runoff, Q=cAi (cfs)</td>
</tr>
<tr>
<td>Column 19</td>
<td>100-year carryover flow from upstream inlet (cfs)</td>
</tr>
<tr>
<td>Column 20</td>
<td>100-year total gutter flow (Column 16 + Column 17) (cfs)</td>
</tr>
<tr>
<td>Column 21</td>
<td>Total right-of-way capacity (normally 2.5&quot; over top of curb) (cfs)</td>
</tr>
<tr>
<td>Column 22</td>
<td>This indicates the controlling storm for inlet spacing, depending on which criteria (5-year in street or 100-year in ROW) may be exceeded. This indicates whether the inlet is sized for the 5-year or 100-year flows.</td>
</tr>
</tbody>
</table>
Column 23
Depth of gutter flow "yo" in approach gutter from spread of water determinations in ISWM Figure 3.2-2 or from direct solution of Manning's equation for triangular gutters: 

\[ yo = 1.245 \frac{Qo}{(n_{0.63})^{0.61}} \frac{(1/z)^{3.33}}{(S_{o}^{0.05})} \]

When the crown is overtopped, a composite analysis will be required.

Column 24
Spread of water (Sp) or width of ponding in the gutter measured from the face of curb. Column 13 times column 23, or the distance from the gutter to the crown, if the crown height is exceeded.

Column 25
Discharge in cubic feet per second (Q) which will be intercepted by an inlet one foot in length for a given depth of flow in the approach gutter (Yo). Determined from Figure 3.2.4-6 or from the following equation:

\[ Qo/Lo = 0.7 \{10/(H1-H2)] [(H1)5/2 - (H2)5/2] \]

Column 26
Length of inlet (Lo) in feet which is necessary to intercept a given discharge Qo. Column 11 or 20 divided by column 25.

Column 27
Actual length (L) in feet of inlet which is to be provided (10', 15' or 20').

Column 28
Ratio of the length of inlet provided (L) to the length of the inlet required for 100% interception (Lo). Column 26 divided by Column 25.

Column 29
Ratio of discharge intercepted by the inlet in question determined from Figure 3.2.4-7 using the values determined in Column 27 and Column 23.

Column 30
Discharge (Q) in cubic feet per second which the inlet in question actually intercepts in the design storm. Column 11 or 20 times Column 29.

Column 31
Carry-over flow (q) is the amount of water which passes the inlet in a 100-year storm. There should be no carryover in a 5-year storm. The carry-over flow should be accounted for in further downstream inlets and should be reflected in the inlet bypass flow (Column 17) in the Storm Drain Hydraulics Table (minor variances may occur due to travel time routing in the Hydraulics Table).

Section 3.2.5 – Grate Inlets on Grade
FOR REFERENCE ONLY

Section 3.2.6 – Curb Inlet Design
FOR REFERENCE ONLY

Section 3.2.7 – Combination Inlets
FOR REFERENCE ONLY

Section 3.2.8 – Closed Conduit Systems
ADOPTED WITH THE FOLLOWING MODIFICATIONS

This section replaces the Closed Conduit System sections 3.2.8 to 3.2.8.9 and 3.2.8.11 to 3.2.8.14 of ISWM. Section 3.2.8.10 Storm Drain Outfalls is ADOPTED.

It is the purpose of this section of the manual to consider the significance of the hydraulic elements of storm drains and their appurtenances to the storm drainage system.
Note: Current criteria do not allow depression beyond gutter line.

Figure 3.2.4-5 Inlets on Grade with Gutter Depression
\[ \frac{Q}{L_0} = 0.7 \left[ \frac{1}{H_1 - H_2} \right] \left[ (H_1)^{5/2} - (H_2)^{5/2} \right] \]

Where:
- \( Q \) = Discharge into inlet in c.f.s.
- \( L_0 \) = Length of inlet opening in feet.
- \( H_1 \) = a + \( y_0 \)
- \( H_2 \) = a = Gutter depression in feet.
- \( y_0 \) = Depth of flow in approach gutter in feet.

(Developed by Texas Highway Department)

**Figure 3.2.4-6 Capacity for Inlets on Grade - Depressed**
\[ L = \text{Length of inlet opening in feet.} \]
\[ L_0 = \text{Length of curb opening for 100\% interception (ft.).} \]
\[ Q = \text{Discharge into inlet in c.f.s.} \]
\[ Q_0 = \text{Total flow in approach gutter (c.f.s.)} \]
\[ a = \text{Gutter depression (ft.)} = 0.417\text{ft.} \]
\[ y_0 = \text{Depth of flow in approach gutter (ft.)} \]

(Developed by Texas Highway Dept.)

**RATIO OF INTERCEPTED FLOW TO TOTAL FLOW**

**F R**

**DEPRESSED INLETS ON GRADE**

**TYPE CO-0**

Figure 3.2.4-7 Ratio of Intercepted Flow to Total Flow
Velocities and Grades

Minimum Grades. Storm drains should operate with velocities of flow sufficient to prevent excessive deposits of solid materials; otherwise objectionable clogging may result. The controlling velocity is near the bottom of the conduit and considerably less than the mean velocity of the sewer. Storm drains shall be designed to have a minimum mean velocity flowing full of 2.5 fps Table 3.2.8-1 indicates the minimum grades for concrete pipe (n = 0.013), flowing at 2.5 fps

Desirable Velocities. Velocities in sewers are important mainly because of the possibilities of excessive erosion on the storm drain inverts. Table 3.2.8-2 shows the desirable velocities for most storm drainage design. Supercritical flow in main lines should be avoided unless approved by Director of Public Utilities.

Materials

Only reinforced concrete pipe is allowed under pavement for public storm drains in the City of Hutchins. Corrugated plastic pipe (profile wall with smooth interior), including High-Density Polyethylene (HDPE) pipe and Corrugated PVC (CPVC), may be used in the following specific situations:

HDPE/CPVC pipe is permitted for use in driveway culverts (i.e. enclosing roadside ditches). Minimum allowable size shall be 15 inches, and driveway permits will be required.

HDPE/CPVC pipe may be allowed for certain off-pavement applications only as approved by Director of Public Utilities. In no case shall HDPE/CPVC pipe be approved for installation under publicly maintained pavement. HDPE/CPVC storm drain shall be installed in accordance with all manufacturer's specifications and shall meet or exceed ASTM D-2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications. Furthermore, NCTCOG Aggregate Grade 4 shall be required for pipe embedment (to a minimum of 6" above the top of pipe).

In selecting roughness coefficients for concrete pipe, consideration will be given to the average conditions at the site during the useful life of the structure. The 'n' value of 0.015 for concrete pipe shall be used primarily in analyzing old sewers where alignment is poor and joints have become rough. If, for example, concrete pipe is being designed at a location where it is considered suitable, and there is reason to believe that the roughness would increase through erosion or corrosion of the interior surface, slight displacement of joints or entrance of foreign materials. A roughness coefficient will be selected which in the judgment of the designer, will represent the average condition. Any selection of 'n' values below the minimum or above the maximum, either for monolithic concrete structures, concrete pipe or HDPE, will have to have written approval of the Director of Public Utilities.

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Concrete Pipe Slope Ft./Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>0.0015</td>
</tr>
<tr>
<td>24</td>
<td>0.0013</td>
</tr>
<tr>
<td>27</td>
<td>0.0011</td>
</tr>
<tr>
<td>30-96</td>
<td>0.0010</td>
</tr>
</tbody>
</table>
Table 3.2.8-2 Desirable Velocity In Storm Drains

<table>
<thead>
<tr>
<th>Description</th>
<th>Maximum Desirable Velocity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culverts (All types)</td>
<td>15 fps</td>
</tr>
<tr>
<td>Storm Drains (Inlet laterals)</td>
<td>No Limit</td>
</tr>
<tr>
<td>Storm Drains (Collectors)</td>
<td>15 fps</td>
</tr>
<tr>
<td>Storm Drains (Mains)</td>
<td>12 fps</td>
</tr>
</tbody>
</table>

*Velocities in excess of these must be approved by Director of Public Utilities.

The following recommended coefficients of roughness are listed in Table 3.2.8-3 and are for use in the nomographs contained herein, or by direct solution of Manning's Equation.

Table 3.2.8-3 Manning's Coefficients for Storm Drain Conduits*

<table>
<thead>
<tr>
<th>Type of Storm Drain</th>
<th>Manning’s n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Pipe (Design n = 0.013)</td>
<td>0.012-0.015</td>
</tr>
<tr>
<td>Concrete Boxes (Design n = 0.015)</td>
<td>0.012-0.015</td>
</tr>
<tr>
<td>Corrugated Metal Pipe, Pipe-Arch and Box</td>
<td></td>
</tr>
<tr>
<td>(Annular or Helical Corrugations - see Table 3.2.6 in iSWM Manual)</td>
<td>0.022-0.037</td>
</tr>
</tbody>
</table>

**NOTE: CH DOES NOT ALLOW CMP FOR NEW CONSTRUCTION**

| Profile Wall High Density Polyethylene (HDPE) or Polyvinyl Chloride (PVC) | 0.010-0.013 |

*NOTE: Actual field values for conduits may vary depending on the effect of abrasion, corrosion, deflection, and joint conditions.

Full or Part Full Flow in Storm Drains

All storm drains shall be designed by the application of the Continuity Equation and Manning Equation either through the appropriate charts or nomographs or by direct solutions of the equations as follows:
\[ Q = AV, \]
and
\[ Q = 1.486 A r^{2.5} S_f \]
\[ n \]

Where:

- \( Q \) = Runoff in cubic feet per second.
- \( A \) = Cross-sectional area of pipe or channel.
- \( V \) = Velocity of flow.
- \( n \) = Coefficient of roughness of pipe or channel.
- \( r \) = Hydraulic radius = \( AP \)
- \( S_f \) = friction slope in feet per foot in pipe or channel.
- \( p \) = Wetted perimeter.

The size of pipe required to transport a known-quantity of storm runoff is obtained by substituting known values in the formula. In practice, the formula is best utilized in the preparation of a pipe flow chart which interrelates values of runoff, velocity, slope and pipe geometry. With two of these variables known or assumed. The other two are quickly obtained from the chart. A pipe flow nomograph for circular conduits flowing full graphs is shown in iSWM Figure 3.2.16. Nomographs for flow in conduits of other cross-sections are available in TxDOT Hydraulic Design Manual, dated March 2004, Chapter 6, Section 2. For circular conduits flowing partially full, graphs are presented in iSWM Figure 3.2-18a.

**Hydraulic Gradient and Profile of Storm Drain**

In storm drain systems flowing full (or partially full as discussed above) all losses of energy through resistance with flow in pipes, by changes of momentum or by interference with flow patterns at junctions, must be accounted for by accumulative head losses along the system from its initial upstream inlet to its outlet. The purpose of accurate determinations of head losses at junctions is to include these values in a progressive calculation of the hydraulic gradient along the storm drain system. In this way, it is possible to determine the water surface elevation which will exist at each structure. The rate of loss of energy through the storm drain system shall be represented by the hydraulic grade line. Since the hydraulic grade line measures the pressure head available at any given point within the system.

The hydraulic grade (HGL) line shall be established for all storm drainage design in which the system operates under a head. In open channels, the water surface itself is the hydraulic grade line. The hydraulic grade line is often controlled by the conditions of the sewer outfall; therefore, the elevation of the tailwater pool must be known. The hydraulic gradient is constructed upstream from the downstream end, taking into account all of the head losses that may occur along the line. iSWM Section 3.2.8.10 provides a table of coincident design frequencies to assist with tailwater determination. The hydraulic gradient shall begin at the higher of the tailwater pool or depth of flow in the pipe at the downstream end.

All head losses shall be calculated if the storm drain system is in a sub critical flow regime whether the system is flowing partially full or surcharged. Hydraulic calculations shall reflect partially full pipe where appropriate. Supercritical flow is allowed in main lines only with the approval of Director of Public Works. If the system is in supercritical regime the section should be marked "SUPERCritical FLOW." The presence of supercritical regime should be confirmed by analyzing from downstream as well as upstream.

The friction head loss shall be determined by direct application of Manning's Equation or by appropriate nomographs or charts as discussed in the first paragraph of this subsection, Minor losses due to turbulence at structures shall be determined by the procedure of last subsection of this section ("Minor Headlosses at Structures") or in the iSWM manual. All HGL calculations will be carried upstream to the inlet.

The hydraulic grade line shall in no case be above the surface of the ground or street gutter for the design storm. Allowance of head must also be provided for future extensions of the storm drainage system. In all
cases the maximum HGL must be 12" below top of curb at any inlet.

**Minor Head Losses At Structures**

The following head losses at structures shall be determined for manholes, wye branches or bends in the design of closed conduits. See Figures 3.2.8-3 and 3.2.8-4 for details of each case. Minimum head loss used at any structure shall be 0.10 foot.

The basic equation for most cases, where there are both upstream and downstream velocity, takes the form as set forth below with the various conditions of the coefficient "Kj" shown in Table 3.2.8-4.

\[ h_j = \frac{v_1^2}{2g} - K_j \left( \frac{v_2^2}{2g} \right) \]

\[ h_j = \text{Junction or structure head loss in feet. } v_1 = \text{Velocity in upstream pipe in fps} \]

\[ v_2 = \text{Velocity in downstream pipe in fps} \]

\[ K_j = \text{Junction or structure coefficient of loss.} \]

In the case where the manhole is at the very beginning of a line or the line is laid with bends or on a curve, the equation becomes the following without any velocity of approach.

\[ h_j = K_j \frac{v_2^2}{2g} \]

**Section 3.2.8.13 – Storm Drain Design Example**

**ADOPTED WITH THE FOLLOWING MODIFICATIONS**

All storm drains shall be designed by the application of the Manning Equation either directly or through appropriate charts or nomographs. In the preparation of hydraulic designs, a thorough investigation shall be made of all existing structures and their performance on the waterway in question.

An example of the use of the method used in the manual for the design of a storm drainage system is outlined below and shown on Figure 3.2.8-5 Computation Sheet. The design theory has been presented in the preceding sections with their corresponding tables and graphs of information.

**Preliminary Design Considerations**

**A.** Prepare a drainage map of the entire area to be drained by proposed improvements. Contour maps serve as excellent drainage area maps, when supplemented by field reconnaissance. The scale of the map shall not be less than 1" = 200' for project area although smaller scale maps for large offsite drainage areas.

**B.** Prepare a layout of the proposed storm drainage system, locating all inlets, manholes, mains, laterals, ditches, culverts, etc.

**C.** Outline the drainage area for each inlet in accordance with present and future street development.

**D.** Indicate on each drainage area the code identification number and the direction of surface runoff by small arrows and collection point. Provide a runoff table showing area, “C” factor for each portion and composite “e”, T, l, Q, L100 and Q100.

**E.** Show all existing underground utilities. F. Establish design rainfall frequency.

**G.** Establish minimum inlet time of concentration.

**H.** Establish the typical cross section of each street.

**I.** Establish permissible spread of water on all streets within the drainage area.

**J.** Plot profile of existing natural ground along the center line of the proposed storm drain.

**K.** Extend downstream plan and profile beyond the end of the pipe to a point of acceptable outfall.
Figure 3.2.8-3 Minor Head Losses at Structures (1 of 2)
**CASE V**

45° WYE CONNECTION
OR CUT IN

**SECTION**

\[ h_g = \frac{v_1^2}{2g} \frac{0.75v_2^2}{2g} \]

**CASE VI**

INLET OR MANHOLE AT
BEGINNING OF LINE

**SECTION**

\[ h_1 = \frac{125v_2^2}{2g} \]

**CASE VII**

CONDUIT ON 90° CURVES

NOTE: Head loss applied at P.C. for length of curve.
Radius = Dia. of Pipe \( h_1 = \frac{0.50 v_1^2}{2g} \)
Radius = (2-6) Dia. of Pipe \( h_1 = 0.25 \frac{v_1^2}{2g} \)
Radius = (6-20) Dia. of Pipe \( h_1 = 0.10 \frac{v_1^2}{2g} \)
Radius = Greater than 20 Dia. of Pipe \( h_1 = 0.0 \)

**CASE VIII**

BENDS WHERE RADIUS IS EQUAL TO DIAMETER OF PIPE

NOTE: Head loss applied at beginning of bend

90° Bend \( h_2 = 0.50 \frac{v_2^4}{2g} \)
60° Bend \( h_2 = 0.43 \frac{v_2^4}{2g} \)
45° Bend \( h_2 = 0.35 \frac{v_2^4}{2g} \)
22½° Bend \( h_2 = 0.20 \frac{v_2^4}{2g} \)

---

**MINOR HEAD LOSSES DUE TO TURBULENCE AT STRUCTURES**

Figure 3.2.8-4 Minor Head Losses at Structures (2 of 2)
Table 3.2.8-4 Junction or Structure Coefficient of Loss

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Reference Figure</th>
<th>Description of Condition</th>
<th>Coefficient $K_j$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3.2.8-3</td>
<td>Inlet on Main Line</td>
<td>0.50</td>
</tr>
<tr>
<td>II</td>
<td>3.2.8-3</td>
<td>Inlet on Main Line with Branch Lateral</td>
<td>0.25</td>
</tr>
<tr>
<td>III</td>
<td>3.2.8-3</td>
<td>Manhole on Main Line with 45° Branch lateral</td>
<td>0.50</td>
</tr>
<tr>
<td>IV</td>
<td>3.2.8-3</td>
<td>Manhole on Main Line with 90° Branch Lateral</td>
<td>0.25</td>
</tr>
<tr>
<td>V</td>
<td>3.2.8-4</td>
<td>45° Wye Connection or cut-in</td>
<td>0.75</td>
</tr>
<tr>
<td>VI</td>
<td>3.2.8-4</td>
<td>Inlet or Manhole at Beginning of Line</td>
<td>1.25</td>
</tr>
<tr>
<td>VII</td>
<td>3.2.8-4</td>
<td>Conduit on Curves for 90° *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curve radius = diameter</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curve radius = 2 to 8 diam.</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curve radius = 8 to 20 diam.</td>
<td>0.10</td>
</tr>
<tr>
<td>VIII</td>
<td>3.2.8-4</td>
<td>Bends where radius is equal to diameter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>90° Bend</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60° Bend</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45° Bend</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
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<td>22-1/2° Bend</td>
<td>0.20</td>
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<tr>
<td></td>
<td></td>
<td>Manhole on line with 60° Lateral</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manhole on line with 22/1/2° Lateral</td>
<td>0.75</td>
</tr>
</tbody>
</table>

*Where bends other than 90° are used, the 90° bend coefficient can be used with the following percentage factor applied.

| 60° Bend - 85%; 45° Bend - 70%; 22-1/2° Bend - 40% |

The values of the coefficient "$K_j$" for determining the loss of head due to obstructions in pipes are shown in Table 3.2.8-4 and the coefficients are used in the following equation to calculate the head loss at the obstruction:

$$H_j = K_j \frac{v^2}{2g}$$

Table 3.2.8-5 Head Loss Coefficients Due To Obstructions

<table>
<thead>
<tr>
<th>$A/A_o$ *</th>
<th>$K_i$</th>
<th>$A/A_o$ *</th>
<th>$K_i$</th>
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</thead>
<tbody>
<tr>
<td>1.05</td>
<td>0.10</td>
<td>3.0</td>
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<td>1.1</td>
<td>0.21</td>
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<td>1.2</td>
<td>0.50</td>
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<td>1.8</td>
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<tr>
<td>2.5</td>
<td>9.70</td>
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</tr>
</tbody>
</table>

* $A/A_o = \text{Ratio of area of pipe to area of opening at obstruction.}$

The values of the coefficient "$K_j$" for determining the loss of head due to sudden enlargements and sudden contractions in pipes are shown in Table 3.2.8-6, and the coefficients are used in the following equation to calculate the head loss at the change in section:

$$H_j = K_i \frac{V^2}{2g} \text{ where,}$$

$$V = \text{Velocity in smaller pipe}$$

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<table>
<thead>
<tr>
<th>$D_2^*$</th>
<th>Sudden Enlargements</th>
<th>Sudden Contraction</th>
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</thead>
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<tr>
<td>$D_1^*$</td>
<td>$K_1$</td>
<td>$K_1$</td>
</tr>
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</tr>
<tr>
<td>~</td>
<td>0.91</td>
<td>0.47</td>
</tr>
</tbody>
</table>

$D_2/D_1 = \text{Ratio of larger to smaller diameter}$

**Runoff Computations**

Storm drain hydraulics are shown on Figure 3.2.8-5, Storm Drain Hydraulic Calculations Computation Sheet at the end of this section. The first 18 columns of the computation sheet cover the tabulation for runoff calculations:

- **Column 1**: Enter the downstream storm drain station number.
- **Column 2**: Enter the upstream storm drain station number. This is the design point. Design should start at the farthest upstream point.
- **Column 3**: Enter the distance (in feet) between the storm drain stations.
- **Column 4**: Enter the designation of the drainage area(s) at the design point in Column 2 corresponding to the designations shown on the drainage area map.
- **Column 5**: Enter the area in acres for the drainage area identified in Column 4.
- **Column 6**: Enter the total drainage area in acres within the system corresponding to storm drain station shown in Column 2.
- **Column 7**: Enter the runoff coefficient "C" for the drainage area shown in Column 5.
- **Column 8**: Multiply Column 5 by Column 7 for each area.
- **Column 9**: Determine the total "CA" for the drainage system corresponding to the inlet or manhole shown in Column 2.
- **Column 10**: Determine inlet time of concentration (See /SWM Section 2.1.4-4).
- **Column 11**: Determine flow time in the storm drain in minutes. The flow time is equal to the distance in Column 3 divided by 60 times the velocity of flow through the storm drain in ft/sec.
- **Column 12**: Total time of concentration in minutes. Column 10 plus Column 11. Note that time of concentration only changes at a downstream junction with another drainage area(s). It remains the same from an inlet or junction to the next inlet or junction picking up additional drainage areas. The junction of two paired inlets with each other is not a downstream junction.
- **Column 13**: The intensity of rainfall in inches per hour for the 5-year storm frequency from the appropriate county rainfall table in Appendix A.
- **Column 14**: The intensity of rainfall in inches per hour for the 100-year storm frequency from the appropriate county rainfall table in Appendix A.
Column 15 The 5-year storm runoff in cfs. Column 9 times Column 13.

Column 16 The 100-year storm runoff in cfs. Column 9 times Column 14.

Column 17 The proposed inlet bypass during a 100-year storm. This should generally correspond to the carry-over flow “q” in Column 31 of the On-Grade Inlet Capacity Calculations Table (minor variances may occur due to travel time routing in the Hydraulics Table).

Column 18 Design Discharge for the storm drain system ("Qpipe") in cfs. This should be the greater of Q5 (Column 15) or Q100-Qbypass (Column 16 minus Column 17).

Hydraulic Design

After the computation of the quantity of storm runoff entering each inlet, the size and gradient of pipe required to carry off the design storm are determined. Any number of computer programs are available to provide design assistance for pipe sizing to the engineer. However, storm drain hydraulics must be converted and reported in Table VI-1, Storm Drain Hydraulics Calculation Table. The hydraulic grade line (HGL) must be calculated for all storm drain mains and laterals using appropriate head loss equations. In all cases, the storm drain HGL must remain below grade and must be at least one foot below top of curb at any inlet.

In partial flow conditions, the HGL represents the actual water surface within the pipe. Note that for partial flow conditions, the velocity of the flow should be calculated based on actual area of flow, not the full flow area of the pipe or box.

Although the table is presented from upstream to downstream, the calculations are normally performed from the outfall upstream to each inlet. Unless partial flow conditions exist, the beginning hydraulic gradient (Column 22 of the last downstream section) must begin at either the top of pipe or at the hydraulic gradient of the receiving stream at the coincident frequency provided in Table 3.1.3-1, whichever is higher.

Column 19 Enter the selected pipe size.

Column 20 Enter the appropriate Manning’s roughness coefficient “n” from Table 3.2.8-3.

Column 21 Enter the required slope of the frictional gradient (hydraulic gradient) determined by Manning’s equation. The pipe shall be designed on a grade such that the inside crown of the pipe coincides or is below the HGL when flowing full. In a partial flow condition, the friction slope is the slope of the water surface and should follow the slope of the pipe.

Column 22 This is the beginning hydraulic gradient of the line. It is equal to the Design HGL (Column 31) for the next downstream segment, or the beginning HGL of the system as described above.

Column 23 This is the upstream HGL before the structure and is calculated as Column 22 plus the friction loss (Column 3 times Column 21).

Column 24 Velocity of flow in incoming pipe (main line) at the junction, inlet or manhole at the design point identified in Column 2.

Column 25 Velocity of flow in outgoing pipe (i.e. the pipe segment being analyzed) at junction, inlet or manhole at design point identified in Column 2.

Column 26 Velocity head of the velocity in Column 24.

Column 27 Velocity head of the velocity in Column 25.

Column 28 Head loss coefficient “Kj”, at junction, inlet or manhole at design point from Table 3.2.8-4, 3.2.8-5, or 3.2.8-6, or from Figure 3.2.8-3 and 3.2.8-4.

Column 29 Multiply Column 26 by Column 28.
### COMPTATION SHEET

HYDRAULIC COMPUTATIONS FOR STORM DRAINS

<table>
<thead>
<tr>
<th></th>
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<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

**Notes:**

1. **Hydraulic radius must be less than 1000** for conduits. **Rain-gage** with vertical axis at midpoint of flow cross-section.
2. Time of concentration (sec/ft²) is calculated at downstream junctions. **Rain** is input in **inches**.
3. **HGL** (high level grade) is elevation of top of curb or effluent weir. **BGL** (bottom level grade) is elevation of bottom of canal or effluent weir.
4. **M.D.** (main drain) is a foot of the main drain. **P.D.** (peripheral drain) is a foot of the peripheral drain.
5. **Z.D.** (zune drain) is a foot of the zune drain.

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Column 30  Head Loss at Structure. At a junction or change in pipe size, this is Column 27 minus Column 29. At a bend or inlet, this is Column 25 times Column 28. In all cases this is 0.10’ minimum.

EXCEPTION: In a supercritical flow regime with partial flow conditions, head losses are not generated at upstream junctions. These may be designated as “SUPERCRITICAL PARTIAL FLOW” in the head loss calculations, but must be supported by Froude Number in the comments column. Any other proposed deviations from standard head loss calculations due to other unusual flow regimes must be approved by Director of Public Utilities on a case-by-case basis.

Column 31  Design HGL at the design point identified in Column 2. Column 23 plus Column 30. This is the beginning HGL (Column 22) for any upstream pipe discharging into that junction.

Column 32  Invert elevation for the pipe being analyzed at the downstream storm drain station in Column 1.

Column 33  Invert elevation for the pipe being analyzed at the design point (upstream storm drain station) in Column 2.

Column 34  Top of curb elevation at the design point in Column 2.

The above procedure is followed for each section of the storm drain. At the outfall, the hydraulic gradient of the line must be at the same elevation or above the gradient of the conduit or channel receiving the storm runoff discharge. See /SWM Sections 3.2.8.10 for guidance on outfall hydraulic gradients.

With the hydraulic gradient established for a particular line, considerable latitude is available for the physical placement of the pipe flow line elevations. The inside top of the pipe must be on or below the hydraulic gradient, thus allowing the pipe to be lowered where necessary to maintain proper cover and to minimize grade conflicts with existing utilities.

Section 3.3 – General Construction Standards
LOCAL CRITERIA SECTION ONLY

Utilities

General – In the design of a storm drainage system, the engineer is frequently confronted with the problem of crossings between the proposed storm drain and existing or proposed utilities such as water, gas and sanitary sewer lines.

Water Lines – All existing water lines in the immediate vicinity of the proposed storm drains shall be clearly indicated on both the plan and profile sheets. When design indicates that an intersection of the storm drain line and the water main exists and the proposed storm drain cannot be economically relocated, then the existing water line shall be adjusted per specifications and details.

Sanitary Sewers – All existing or proposed sanitary sewers in the immediate vicinity of the proposed storm drains shall be clearly indicated on both plan and profile sheets. When design indicates that an intersection of the storm drain line and the sanitary sewer exist, then either line should be adjusted by relocation. If neither line can be economically relocated, then an alternative design may be considered, provided it is supported by hydraulic calculations and approved by Director of Public Utilities. The alternative design may include a box section in the storm drain to go over or under the sanitary sewer, or a sanitary sewer crossing through the storm drain. If the latter is chosen, the crossing must be installed in a manhole or vault to provide both access and additional capacity. In either alternative, the sanitary sewer must be ductile iron pipe or other approved material.
All Other Utilities – All other utilities in the immediate vicinity of the proposed storm drain shall be clearly indicated on both the plan and profile sheets. Gas lines and other utilities not controlled by elevation shall be adjusted when the design indicates that an intersection of the storm drain line and the utility exists and the proposed storm drain cannot be economically relocated.

Headwalls, Culverts, and Other Structures

For headwalls, culverts and other structures, standard details adopted by the North Central Council of Governments and Texas Department of Transportation (TxDOT) shall be used. The appropriate detail sheets should be included in any construction plans. All headwalls and culverts should be extended to or beyond the street right-of-way.

TxDOT-approved pedestrian rail shall be used for any headwall within 10' of a sidewalk or other normal pedestrian area.

Manholes

Manholes shall be located at intervals not to exceed 550 feet for pipe 54 inches in diameter or smaller. For pipes 60 inches in diameter and larger, the maximum interval is 1000 feet. Manholes must be installed at the upstream end of a system and whenever a storm drain leaves the pavement, unless the outfall is within 50 feet of the roadway and directly accessible. Manholes shall preferably be located at street intersections, sewer junctions, changes of grade and changes of alignment. When the storm drain is a concrete box instead of an RCP, four-foot diameter manhole risers may be installed instead of vaults to provide access. In all cases, steps shall be installed to the flowline of the pipe.

Minimum Pipe Sizes

Minimum pipe sizes are 24" diameter for mains and 21" diameter for inlet leads. Minimum sizes of conduits of other shapes should have equivalent cross-sectional areas.

Pipe Connections

Prefabricated wye and tee connections and other unusual configurations shall be prefabricated by the pipe manufacturer. Radial pipe is can also be fabricated by the pipe manufacturer and shall be used through all curved alignments. When field connections or field radii must be used, all joints and gaps must be fully collared (grouted) to prevent voids and cave-ins caused by material washout into the storm drain.

Inlets

All curb inlets shall be 10, 15 or 20 feet in length and shall have depressed openings. Recessed inlets shall be provided on arterial streets. Proposed inlet lengths greater than 20 feet must be approved by Director of Public Utilities. Care should be taken in laying out inlets to allow for adequate driveway access between the inlet and the far property line. Standard inlet depth is 4.5' at the lead line, with the bottom sloped to drain to the lead line. Manhole steps shall be installed for any inlet over five feet deep. Lead lines shall be plumbed into the inlet at a manhole opening to expedite mechanical cleaning and inspection. A storm drain main may pass through an inlet if the system configuration allows and may substitute for manhole access.

Drop inlets shall be minimum four-foot square and shall have manhole access and steps. Due to excessive clogging, grate inlets are not allowed on any public storm drain except as specifically approved by Director of Public Utilities.

Streets

To minimize standing water, the minimum street grade shall be 0.50%. Along a curve, this grade shall be measured along the outer gutter line. The minimum grade along a cul-de-sac or elbow gutter shall be 0.70%. Alternatively, elbows may be designed with a valley gutter along the normal outer gutter line, with two percent cross slope from curb to the valley gutter. Where a crest or sag on a residential street, a PVI
shall be used instead of a vertical curve where the total gradient change is no more than two percent ($\Delta \leq 2.0\%$).

**Flow in Driveways and Intersections**

At any intersection, only one street shall be crossed with surface drainage and this street shall be the lower classified street. Where an alley or street intersects a street, inlets shall be placed in the intersecting alley or street whenever the combination of flow down the alley or intersecting street would cause the capacity of the downstream street to be exceeded. Inlets shall be placed upstream from an intersection whenever possible. Surface drainage from a 5-year flood may not cross any street classified as a thoroughfare or collector. Not more than 3.0 cfs in a 5-year flood may be discharged per driveway at a business, commercial, industrial, manufacturing, or school site. In all cases, the downstream storm drainage system shall be adequate to collect and convey the flow, and inlets provide as required.

The cumulative flows from existing driveways shall be considered and inlets provided as necessary where the flow exceeds the specified design capacity of the street.

**Section 3.4 – Easements for Closed Conduit Systems**

**LOCAL CRITERIA SECTION ONLY**

Minimum easement requirements for storm sewer pipe shall be as follows:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Minimum Easement Width Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>39&quot; and under</td>
<td>15 Feet</td>
</tr>
<tr>
<td>42&quot; through 54&quot;</td>
<td>20 Feet</td>
</tr>
<tr>
<td>60&quot; through 66&quot;</td>
<td>25 Feet</td>
</tr>
<tr>
<td>72&quot; through 102&quot;</td>
<td>30 Feet</td>
</tr>
</tbody>
</table>

The outside face of the proposed storm drain line shall be placed five (5) feet off either edge of the storm drain easement. The proposed centerline of overflow swales shall normally coincide with the centerline of the easement.

For pipe sizes 39" through 54", a minimum of five (5) additional feet shall be dedicated when shared with utilities.

Box culverts shall have an easement width equal to the width of the box plus twenty (20) additional feet. The edge of the box should be located five (5) feet from either edge of the easement.

Drainage easements will generally extend at least twenty-five (25) feet past an outfall headwall to provide an area for maintenance operations. Drainage easements along a required outfall channel or ditch shall be provided until the flowline reaches an acceptable outfall.

**References**

ADOPTED WITH THE FOLLOWING MODIFICATIONS

CHAPTER 4 – HYDRAULIC DESIGN OF CULVERTS, BRIDGES, OPEN CHANNELS, AND DETENTION STRUCTURES

Section 4.1 – Storm Water Open Channels, Culverts, Bridges, and Detention Structure Design Overview

Section 4.1.1 – Storm Water System Design
ADOPTED

Section 4.1.1.1 – Introduction
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Delete last line of first paragraph and last two lines of second paragraph regarding water quality.

Section 4.1.1.2 – System Components
ADOPTED

Section 4.1.1.3 – Checklist for Planning and Design
ADOPTED

Section 4.1.2 – Key Issues in Storm Water System Design
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Under Section 4.1.2.5 pilot channels are allowed only with the approval of Director of Public Utilities. All other portions of Section 4.1.2 are ADOPTED.

Section 4.1.3 – Design Storm Recommendations
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Roadway Culvert Design
100-year storm for fully developed watershed conditions, or in accordance with TxDOT requirements, whichever is more stringent.

Bridge Design
100-year storm for fully developed watershed conditions or in accordance with TxDOT requirements, whichever is more stringent.

Open Channel Design
100-year design storm for fully developed watershed conditions – Channels may be designed with multiple stages (e.g., a low flow channel section containing the 2-year to 5-year flows, and a high flow section that contains the design discharge) to improve stability and better mimic natural channel dimensions.

Energy Dissipation Design
100-year design storm for fully developed watershed conditions.

Storage (Detention Basin Design)
2-year, 10-year, and 100-year storm for the critical storm duration (i.e. 3 hour, 6 hour or 24 hour duration) that results in the maximum (or near maximum) peak flow. Analysis should consider both existing watershed plus developed site conditions and fully developed watershed conditions.
Section 4.2 – Culvert Design

CH requires a backwater analysis, by hand, or HEC-RAS to evaluate the proposed structure for final design. Complete Culvert Hydraulics Documentation Checklist (see Supplement to Appendix E, Form CH-4, page A6-77).

Section 4.2.1 – Overview
ADOPTED

Section 4.2.2 – Symbols and Definitions
ADOPTED

Section 4.2.3 – Design Criteria
ADOPTED WITH THE FOLLOWING MODIFICATIONS

CH requires a 100-year design storm fully developed watershed with headwater (HW - upstream WSEL) 1' below the adjacent curb. The remainder of this section of iSWM is adopted.

Section 4.2.4 – Design Procedures
ADOPTED

Section 4.2.4.4 – Nomographs
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Nomographs are not allowed by CH for final sizing of culverts. The reference for nomographs is FHWA HDS-5. A backwater analysis using HEC-RAS is required.

Section 4.2.5 – Culvert Design Example
ADOPTED WITH THE FOLLOWING MODIFICATIONS

This procedure is acceptable for preliminary sizing only.

Section 4.2.6 – Design Procedures for Beveled-Edged Inlets
ADOPTED WITH THE FOLLOWING MODIFICATIONS

This procedure is acceptable for preliminary sizing only.

Section 4.2.7 – Flood Routing and Culvert Design
FOR REFERENCE ONLY

Section 4.3 – Bridge Design

Section 4.3.1 – Overview
ADOPTED

Section 4.3.2 – Symbols and Definitions
ADOPTED

Section 4.3.3 – Design Criteria
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Design discharge required by CH is 100-year storm from fully developed watershed. A backwater analysis using HEC-RAS is used for final design of the proposed structure. For bridges up to 100'
width (measured at low chord), 2’ of freeboard required; for bridge >100’ width, 1’ of freeboard required. Exceptions on freeboard must be approved by Director of Public Utilities. Complete Bridge Hydraulics Documentation Checklist (see Local Criteria Supplement to Appendix E, Form CH-5, page A6-78).

Section 4.3.4 – Design Procedures
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Backwater analysis will be required using HEC-RAS, for any proposed bridge, to determine accurate tailwater elevations, velocities, headlosses, headwater elevations, profiles and floodplains affected by the proposed structure. If the current effective FEMA model is a HEC-2 model, the engineer has the option to either use that model, or convert to HEC-RAS for analysis of proposed conditions.

Section 4.4 – Open Channel Design
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Normal Depth (Uniform Flow) vs. Backwater Profile Depths:

For uniform flow calculations, the theoretical channel dimensions, computed by the slope-area methods outlined in the iSWM manual, are to be used only for an initial dimension in the design of an improved channel. Exceptions will be for small outfall channels with the following options:

1. Completely contained on the development site for on-site drainage;
2. Where no off-site drainage easement is required (i.e. not crossing or adjacent to another property that could be flooded if design storm occurs);
3. No nearby downstream restrictions.

CH requires a hand computed or HEC-RAS backwater/frontwater analysis on any proposed open channel to determine the actual tailwater elevations, channel capacity and freeboard, and impacts on adjacent floodplains. If a stream or creek has an effective FEMA model, the engineer will be required to use a computer program for the analysis. If the current effective FEMA model for the stream is a HEC-2 model, the engineer has the option to either use that model, or convert to HEC-RAS for analysis of proposed conditions.

Supercritical Flow Regime

Supercritical flow will not be allowed except under unusual circumstances, with special approval of the City staff. However, for lined channels, the hand computed frontwater or HEC-RAS analysis should include a mixed-flow regime analysis, to make sure no supercritical flow occurs. CH requires that the computed flow depths in designed channels be outside of the range of instability, i.e. depth of flow should be at least 1.1 times critical depth.

Channel Transitions or Energy Dissipation Structures or Small Dams

A HEC-RAS model or complete hand computed backwater analysis is a standard requirement for design of channel transitions (upstream and downstream), energy dissipation structures, and small dams. A backwater analysis will be required by the CH, either hand computed or HEC-RAS, to determine accurate tailwater elevation, headlosses, headwater elevations and floodplains affected by the proposed transition into and out of an improved channel, any on-stream energy dissipating structures, and small dams (less than 6 feet). If the current effective FEMA model for the stream is a HEC-2 model, the engineer has the option to either use that model, or convert to HEC-RAS for analysis of proposed conditions. For larger dams, a hydrologic routing will be required, as well as hydraulic analysis, to determine impacts of the proposed structure on existing floodplains and adjacent properties.
Section 4.4.1 – Overview
ADOPTED

Section 4.4.2 – Symbols and Definitions
ADOPTED

Section 4.4.3 – Design Criteria
ADOPTED

Section 4.4.3.1 – General Criteria
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Earthen Channels

1. An earthen channel shall have a trapezoidal shape with side slopes not steeper than a 4:1 ratio and a channel bottom at least twelve (12) feet in width.

2. One (1) foot of freeboard above the 100-year frequency ultimate development water surface elevation must be available within all designed channels at all locations along the channel.

3. The side slopes and bottom of an earthen channel shall be smooth, free of rocks, and contain a minimum of six (6) inches of topsoil. The side slopes and channel bottom shall be re-vegetated with grass. No channel shall be accepted for maintenance by the City until a uniform (e.g., evenly distributed, without large bare areas) vegetative cover with a density of 70% has been established.

4. Each reach of a channel must have a ramp for maintenance access. Ramps shall be at least ten (10) feet wide and have 15% maximum grade. Twelve-foot (12') width is required if the ramp is bound by vertical walls.

5. Minimum channel slope is 0.0020 ft/ft unless approved by Director of Public Utilities.

6. Erosion protection to be provided at outfall to the receiving stream.

7. Pilot channels will be allowed only with Director of Public Utilities approval.

Lined Channels

1. Channels shall be trapezoidal in shape and lined with reinforced concrete in accordance with City specifications and details with side slopes of two (2) foot horizontal to one (1) foot vertical or otherwise to such standards, shape and type of lining as may be approved by the Director of Public Utilities. The lining shall extend to and include the water surface elevation of the 100-year design storm plus one foot freeboard above the 100-year water surface elevation.

2. The channel bottom must be a minimum of 12-feet in width. (Overflow structures for storm sewer system sumps may have a minimum bottom width of 6-feet.).

3. The maximum water flow velocity in a lined channel shall be twenty (20) feet per second except that the water flow shall not be supercritical in an area from 100-feet upstream from a bridge to 25-feet downstream from a bridge. Hydraulic jumps shall not be allowed from the face of a culvert to 50-feet upstream from that culvert. In general channels having supercritical flow conditions are discouraged (See Section 4.4).

4. Whenever flow changes from supercritical to subcritical, channel protection shall be provided to protect from the hydraulic jump that is anticipated (see comment in Item 3).

5. The design of the channel lining shall take into account the superelevation of the water surface around curves and other changes in direction.

6. A chain link fence six (6) feet in height or other fence as approved by the Director of Public Utilities shall be constructed on each side of the concrete or gabion channel lining.
Roadside Ditches

Design Storms

1. A roadside ditch ("rural") street section is permissible only as specifically approved by Director of Public Utilities. No median ditches are allowed.

2. The design event for the roadside ditches shall be the 100-year storm. The 100-year flow shall not exceed the right-of-way capacity defined as the natural ground at the right-of-way line or top of roadside ditch.

Design Considerations

1. For grass lined sections, the maximum design velocity shall be 6-feet per second during the 100-year design storm (Higher velocities justified by a sealed geotechnical study).

2. A grass lined or unimproved roadside ditch shall have minimum 2-foot bottom width and side slopes no steeper than four horizontal to one vertical. There shall be a four-foot strip at maximum 2% cross slope between the edge of pavement and the beginning of the ditch.

3. Minimum grades for roadside ditches shall be 0.0040 foot/foot (0.40%).

4. Manning's roughness coefficient for analysis and design of roadside ditches are presented in Section 4.4.4.

5. Erosion protection will be provided at the upstream and downstream ends of all culverts.

6. Maximum depth will not exceed 4 feet from center-line of pavement except as specifically approved by Director of Public Utilities.

7. If the ditch extends beyond the right-of-way line, an additional drainage easement shall be dedicated extending at least 2 feet beyond the top of bank. Utility easements must be separate and beyond any drainage easements.

8. Hydraulic analysis of roadside ditches will require a HEC-RAS analysis.

Culverts in Roadside Ditches

1. Culverts will be placed at all driveway and roadway crossings and other locations where appropriate.

2. Roadside culverts are to be sized based on drainage area, assuming inlet control. Calculations are to be provided for each block based on drainage calculations. The size of culvert used shall not create a head loss of more than 0.20 feet greater than the normal water surface profile without the culvert.

3. Roadside ditch culverts will be no smaller than 24-inches inside diameter or equivalent for roadway crossings and 18-inches for driveway culverts.

4. A driveway culvert schedule shall be included on the face of the plat. It shall include for each lot approximate culvert flowline depth below top of pavement, number and size of pipe required, and horizontal distance from edge of pavement to center of culvert (based on horizontal control requirements above).

Section 4.4.3.2 – Velocity Limitation

ADOPTED WITH THE FOLLOWING MODIFICATIONS

Channel Velocities

Maximum allowable:

Lined Channels – Maximum velocities = 15 fps. (Exceptions can be granted by Director of Public Utilities)

Grass Lined Channels – Maximum velocities = 6 fps. Higher values can be justified by a sealed
Section 4.4.4 – Manning’s $n$ Values
ADOPTED

Section 4.4.5 – Uniform Flow Calculations
FOR REFERENCE ONLY

Section 4.4.6 – Critical Flow Calculations
FOR REFERENCE ONLY

Section 4.4.7 – Vegetative Design
FOR REFERENCE ONLY

Section 4.4.8 – Stone Riprap Design
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Section 4.4.8.1 – Introduction
ADOPTED WITH THE FOLLOWING MODIFICATIONS

The "Method # 2" procedure in iSWM for stone riprap design is adopted by CH. An alternative to a granular bedding layer is the use of geotextile material only. Regardless of computed thickness the minimum allowable riprap thickness is 12 inches.

Section 4.4.8.2 – Method # 1: Maynard & Reese
FOR REFERENCE ONLY

Section 4.4.8.3 – Method # 2: Gregory
ADOPTED

Section 4.4.8.4 – Grouted Riprap
LOCAL CRITERIA ONLY

The CH will allow grouted stone riprap as an erosion control feature. However, the design thickness of the stone lining will not be reduced by the use of grout. See the U.S. Army Corps of Engineers design manual ETL 1110-2-334 on design and construction of grouted riprap.

Section 4.4.9 – Gabion Design
ADOPTED

Section 4.4.10 – Uniform Flow - Example Problems
FOR REFERENCE ONLY

Section 4.4.11 – Gradually Varied Flow
ADOPTED

Section 4.4.12 – Rectangular, Triangular and Trapezoidal Open Channel Design
FOR REFERENCE ONLY

Section 4.5 – Storage Design
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Storm water detention shall be provided to mitigate increased peak flows in Hutchins waterways in specific circumstances as defined below. The purpose of the mitigation is to minimize downstream flooding impacts.
from upstream development. In some instances, detention may be shown to exacerbate potential flooding conditions downstream. Therefore, the “Zone of Influence” criteria shall be applied in addition to these criteria.

1. Detention Basins shall be required when downstream facilities within the “Zone of Influence” are not adequately sized to convey a design storm based on current City criteria for hydraulic capacity. Detention basins shall not be required if downstream improvements that will result in sufficient hydraulic capacity are proposed by the City within a relatively short period of time or the proposed development is less than 2-acres.

2. Calculated proposed storm water discharge from a site shall not exceed the calculated discharges from existing conditions, unless sufficient downstream capacity above existing discharge conditions is available.

3. Detention Basins for watersheds of up to 100 acres in size shall be designed using the “Modified Rational Method” as described in Section 2.1.7.

4. Detention Basins draining watersheds over 100 acres in size shall be designed using a detailed Unit Hydrograph method acceptable to the City of Hutchins. These include Snyder's Unit Hydrograph (>200 acres) or the SCS Dimensionless Unit Hydrograph (>100 acres) method.

5. Detention Basins shall be designed for the 2-year, 10-year and 100-year storm for the critical storm duration (i.e. 3-hour, 6-hour, or 24-hour storm duration) that results in the maximum (or near maximum) peak flow.

6. Detention Basins shall be designed with access for tracked earthwork equipment with a 10-foot crown width.

7. No earthen (grassed) embankment slopes shall exceed 4:1. Concrete lined or structural embankment can be steeper with the approval of the Director of Public Utilities.

8. A calculation summary shall be provided on construction plans. For detailed calculations of unit hydrograph studies, a separate report shall be provided to the City for review and referenced on the construction plans. Stage-storage-discharge values shall be tabulated and flow calculations for discharge structures shall be shown on the construction plans.

9. An emergency spillway shall be provided at the 100-year maximum storage elevation with sufficient capacity to convey the 100-year storm assuming blockage of the outlet works with six inches of freeboard. Spillway requirements must also meet all appropriate state and Federal criteria.

10. All detention basins shall be stabilized against significant erosion and include a maintenance plan.

11. State rules and regulations regarding impoundments shall be observed including 30 TAC Chapter 299, Dams and Reservoirs (TCEQ).

12. Design calculations will be provided for all spillways.


14. In accordance with Texas Water Code §11, all surface impoundments not used for domestic or livestock purposes must obtain a water rights permit form the TCEQ. A completed permit for the proposed use, or written documentation stating that a permit is not required, must be obtained. Items 6, 7, 9, 10, 11, and 12 also apply to amenity ponds.

Section 4.5.1 – General Storage Concepts
ADOPTED

Section 4.5.2 – Symbols and Definitions
ADOPTED

Section 4.5.3 – General Storage Design Procedures
ADOPTED

Section 4.5.4 – Preliminary Detention Calculations
ADOPTED
Section 4.6 – Outlet Structures

Section 4.6.1 – Symbols and Definitions
ADOPTED

Section 4.6.2 – Primary Outlets
ADOPTED

Section 4.6.3 – Extended Detention (Water Quality and Streambank Protection) Outlet Design
FOR REFERENCE ONLY

Section 4.6.4 – Multi-Stage Outlet Design
ADOPTED

Section 4.6.5 – Extended Detention Outlet Protection
FOR REFERENCE ONLY

Section 4.6.6 – Trash Racks and Safety Grates
ADOPTED

Section 4.6.7 – Secondary Outlets
ADOPTED

Section 4.7 – Energy Dissipation

Section 4.7.1 – Overview
ADOPTED WITH THE FOLLOWING MODIFICATIONS

Channel Transitions, Energy Dissipation Structures, or Small Dams
A backwater analysis is required by the CH, either hand computed or HEC-RAS, to determine accurate tailwater elevation and velocities, headlosses, headwater elevations, velocities and floodplains affected by the proposed transition into and out of 1) An improved channel, 2) Any on-stream energy dissipating structures, and 3) Small dams (less than 6 feet). If the current effective FEMA model for the stream is a HEC-2 model, the engineer has the option to either use that model, or convert to HEC-RAS for analysis of proposed conditions. For larger dams, a hydrologic routing will be required, as well as hydraulic analysis, to determine impacts of the proposed structure on existing floodplains and adjacent properties.

Examples of Open Channel Transition Structures
See application guidance for Bureau of Reclamation Baffled Chute (Basin IX), Harris County Flood Control District Straight Drop and the computer program associated with FHWA Hydraulic Engineering Circular No. 14 is “HY8Energy” dated May, 2000. This program provides guidance in the selection and sizing of a broad range of energy dissipaters including some of those listed in Chapter 4 of the iSWM manual.

Section 4.7.2 – Symbols and Definitions
ADOPTED

Section 4.7.3 – Design Guidelines
ADOPTED
Section 4.7.4 – Riprap Aprons
ADOPTED

Section 4.7.5 – Riprap Basins
ADOPTED

Section 4.7.6 – Baffled Outlets
ADOPTED

Section 4.7.7 – Grade Control Structures
ADOPTED

Section 4.8 – Easements for Open Channels and Detention Ponds
LOCAL CRITERIA SECTION ONLY

Acceptable types of drainage right(s) of way and easements include:

1. Drainage easements. Drainage easements are required for both on-site and off-site public storm drain and for improved channels designed according to current City standards.

2. Floodplain right of way. Floodplain right of way shall be provided on sites along natural or improved earthen drainage ways (other than standard engineered channels). Floodplain right of way shall encompass all areas below a ground elevation one foot above the water surface elevation of the base flood under fully conditions. The right-of-way shall also include at least a 15-foot wide maintenance strip along both sides of the channel or, if the Public Utilities Department so allows, at least a 20-foot wide maintenance strip along one side of the channel, to provide ingress and egress for maintenance of the banks, as determined and required by the Director of Public Utilities. The access shall be part of the floodplain right of way itself and not a separate easement. Floodplain rights of way are not routinely maintained by the City.

No construction shall be allowed within a floodplain easement without the written approval (floodplain permit) of the City of Hutchins, and then only after detailed engineering plans and studies show that no flooding will result, and that no obstruction to the natural flow of water will result.

In certain circumstances where detention is in place or a master drainage plan has been adopted, a development may plan to receive less than ultimate developed flow conditions from upstream with the approval of the Director of Public Utilities.

3. Temporary drainage easements. Temporary drainage easements may be allowed off-site for temporary channels when future off-site development is anticipated to be enclosed underground or may follow an altered alignment. Temporary drainage easements will not be maintained by the City and will not terminate until permanent drainage improvements meeting City standards are installed and accepted. Temporary drainage easements will require written approval from the Director of Public Utilities and the City Attorney.

4. Any parallel utility easements must be separate and outside of drainage easements for channels. Drainage and utility easements may be combined for underground storm drains, subject to the easement width requirements provided in this section and Section 3.3.

5. Drainage easements shall include a five-foot (5') margin on both sides beyond actual top of bank for improved earthen channels. Retaining walls are not permitted within or adjacent to a drainage easement in a residential area in order to reduce the easement width. Retaining walls adjacent to the channel are allowed in non-residential areas only if the property owner provides an agreement for private maintenance.

6. The minimum finished floor elevation for lots impacted by natural creeks shall be a minimum of two (2) feet above the 100-year water surface elevation.

7. Concrete Lined Channels and Gabion Lined Channels shall have drainage easements dedicated to meet the requirements of the width of the channel, the one-foot freeboard, and the fence.

8. Easements for detention ponds shall be negotiated between the City and the Property Owner.
9. The entire reach or each section of any drainage facility must be readily accessible to maintenance equipment. Additional easement(s) shall be required at the access point(s) and the access points shall be appropriately designed to restrict access by the public (including motorcycles).

References

ADOPTED WITH THE FOLLOWING MODIFICATIONS

Harris County Flood Control District, October 2004, Policy, Criteria and Procedure Manual for Approval and Acceptance of Infrastructure, Houston, Texas.


CHAPTER 5 - STORM WATER CONTROLS

Chapter 5 of the iSWM Manual contains an extensive discussion and detailed examples of storm water controls that can be implemented in land development to meet the goals of protecting water quality, minimizing streambank erosion, and reducing flood volumes. It is an excellent planning and design resource document and has valuable design examples that the CH encourages local developers to consider in their site planning. Although it is primarily oriented toward water quality issues, these storm water controls bring additional and valuable benefits for flood control and streambank protection. Many of the listed storm water control features and techniques enhance the aesthetics and value of land developments, as well as providing a drainage function.

Since the City of Hutchins is currently emphasizing the streambank protection and flood control components of the integrated storm water management approach, Chapter 5 of the iSWM Manual is being adopted for design guidance, technical reference, and applicable features that can be implemented in local developments and redevelopments. The CH does not mandate the use of any of these storm water controls, but recognizes the inherent values of their application in overall storm water management.

Therefore, the CH adopts for design guidance and technical reference all sections of Chapter 5 with the following exceptions:

FOR STORM WATER CONTROLS AS PRESENTED IN THE VARIOUS SECTIONS OF CHAPTER 5, THERE ARE NO CH REQUIREMENTS FOR DRY EXTENDED DETENTION (ED), STREAMBANK PROTECTION VOLUME (SPV) OR WATER QUALITY VOLUME (WQV).
SUPPLEMENTS TO iSWM APPENDICES

Appendix A    Rainfall Tables for North Central Texas
  /SWM Adopted

Appendix B    Hydrologic Soils Data
  /SWM Adopted

Appendix C    Federal, State and Regional Regulations and Programs
  /SWM Adopted

Appendix D    Dams and Reservoirs in Texas
  /SWM Adopted

Appendix E    iSWM Worksheets and Checklists
  See CH Supplement to Appendix E

Appendix F    Landscaping and Aesthetics Guidance
  /SWM Adopted

Appendix G    Storm Water Computer Models
  /SWM Adopted

Appendix H    Storm Water Control Design Examples
  /SWM Adopted
SUPPLEMENTAL APPENDICES TO

¡SWM MANUAL

Supplement to Appendix E – City of Hutchins Worksheets and Checklists and Variance Procedures
ENGINEER’S CHECKLIST FOR CONCEPTUAL
STORM WATER MANAGEMENT PLAN – FORM CH-1

Please attach additional sheets as necessary for comments and descriptions.

1. Project Information
   A. Name of Development: ________________________________  B. Date: ________________________________
   C. Location of Development: ________________________________
   D. Type of Development: ________________________________  E. Total area (acres): ________________________________
   F. Proposed Land Uses (CH zoning designations): ________________________________
   G. Anticipated project schedule: ________________________________
   H. Name of Owner: ________________________________  I. Telephone No.: ________________________________
   J. Owner Contact Name: ________________________________  K. FAX No.: ________________________________
   L. Owner Address: ________________________________  M. Email Address: ________________________________
   N. Engineer’s Name: ________________________________  O. Email Address: ________________________________
   P. Engineering Firm: ________________________________  Q. Telephone No.: ________________________________
   R. Engineer Address: ________________________________

Attachments: ____ Concept Development Plan (if available) or Conceptual Site or Project Layout
   ____ Existing Conditions and Layout Map
   ____ Concept Drainage Area Map
2. Planning Concerns

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments and Descriptions</th>
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<tbody>
<tr>
<td>A.</td>
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<td>Have any previous drainage or watershed plans been completed in the watershed? (If yes, describe)</td>
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<td>B.</td>
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<td>Is there any known history of flooding downstream? (If yes, describe conditions and locations)</td>
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<td>C.</td>
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<td>Is there any known history of excessive erosion downstream? (If yes, describe conditions and locations)</td>
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<td>D.</td>
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<td>Are there any known downstream drainage constrictions such as undersized culverts or channels? Size?</td>
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<td>E.</td>
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<td>Are there any FEMA 100-year floodplains which will need flood studies, CLOMRs, LOMRs, etc., for this project?</td>
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<tr>
<td>F.</td>
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<td>Are there any known or suspected wetlands areas, mitigation areas, 404 permit areas, or other natural habitat features which require special consideration?</td>
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<td>G.</td>
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<td>Are there any existing dams over six feet in height which are or will be subject to TCEQ regulations?</td>
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<td>H.</td>
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<td>Are there any existing impoundments subject to TCEQ water rights permitting? (Livestock ponds are not exempt when converted to other uses.)</td>
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<td>I.</td>
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<td>Are there any existing environmental concerns on the site requiring special treatment or design consideration (i.e. fuel stations, vehicle maintenance, auto recycling, illegal dump sites, outdoor material storage, loading and transfer areas, landfills, industrial facilities, etc.)?</td>
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3. Existing Conditions Map(s) showing the following information on or adjacent to the development site:

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<tr>
<th></th>
<th>Yes</th>
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<th>N/A</th>
<th>Comments and Descriptions</th>
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<tr>
<td>A.</td>
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<td>Digital ortho-photography showing project boundaries</td>
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<td>B.</td>
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<td>Existing topography (normally 2-foot contours)</td>
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<td>C.</td>
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<td>Soil types from USDA soil surveys and/or soil borings</td>
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<td>D.</td>
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<td>Perennial or intermittent streams</td>
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<td>E.</td>
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<td>Boundaries of existing predominant vegetation</td>
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<td>F. Delineation of current FEMA floodplains and floodways</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
<td>Comments and Descriptions</td>
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<td>G. Locations of steep slopes (&gt;15%)</td>
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<td>H. Locations of wetlands and natural habitat areas if known.</td>
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<tr>
<td>I. Locations of all dams and impoundments</td>
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<td>J. Existing paved roads, buildings, and other impervious areas</td>
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<td>K. Environmental concerns identified in (2.H) above</td>
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<td>L. Existing major utilities, pipelines, and easements</td>
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4. **Does this development provide opportunities for Low-Impact Design?**

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<tr>
<th>A. Preserve floodplains and natural valley storage?</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments and Descriptions</th>
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<tr>
<td>B. Preserve natural streams and drainage patterns?</td>
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<td>C. Preserve steep slopes?</td>
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<td>D. Preserve trees and undisturbed natural vegetation?</td>
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<td>E. Preserve wetlands and other natural features?</td>
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<td>F. Drain runoff to pervious areas?</td>
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<td>G. Utilize natural drainage vs. storm drain systems?</td>
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<td>H. Reduce pavement and other impervious covers?</td>
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5. **Conceptual analysis of hydrologic and hydraulic impacts of the proposed development:**

   | A. Hydrologic analysis to determine conceptual rates of | Yes | No | N/A | Comments and Descriptions |
   | runoff, volumes, and velocities to support decisions related |     |    |    | to flood control and erosion protection downstream. |
   |                                                      |     |    |    |                            |
   | B. Conceptual estimates of the three (3) storm design   |     |    |     | Comments and Descriptions |
   | approach requirements.                                  |     |    |     |                            |
   |                                                        |     |    |     |                            |
   | C. Conceptual selection, location, and size of proposed |     |    |     | Comments and Descriptions |
   | storm water structural controls.                       |     |    |     |                            |
   |                                                        |     |    |     |                            |
   | D. Conceptual limits of proposed clearing and grading. |     |    |     |                             |
6. Conceptual Drainage Area Map(s) showing the following information for the development site:

<table>
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<tr>
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<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments and Descriptions</th>
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<tbody>
<tr>
<td>A. Conceptual street layout (scale 1&quot;=200')</td>
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<td>B. All off-site drainage areas with topography (reduced scale)</td>
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<td>C. Delineation of watershed boundaries with flow arrows</td>
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<tr>
<td>D. Reference info (file number, etc.) for previous drainage studies or existing developments &amp; drainage facilities</td>
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<td>E. Approximate zone of influence for all outfalls</td>
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<td>F. Downstream constrictions, flooding, or erosion locations</td>
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<td>G. Location of proposed structural storm water controls, if any</td>
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I certify that this Conceptual Storm Water Management Plan, including this checklist, required attachments, and additional comments, was prepared under my responsible supervision and that the information presented on this checklist and attachments is correct to the best of my knowledge. I also understand that an acceptance of this plan by the City does not waive any City standards or requirements unless a specific waiver request has been submitted and approved.

Signed ___________________________ Date ___________________________

Print Name: ___________________________ PE No. ___________________________
ENGINEER'S CHECKLIST FOR PRELIMINARY STORM WATER MANAGEMENT PLAN – FORM CH-2

Please attach additional sheets as necessary for comments and descriptions.

1. Project Information (for Items 1.C to 1.Q, N/C = No Change from Conceptual SWM Plan)
   A. Name of Development: ___________________________  B. Date: ___________________________
   C. Location of Development: ___________________________
   D. Type of Development: ___________________________
   E. Total area (acres): ___________________________
   F. Proposed Land Uses (CH zoning designations): ___________________________
   G. Anticipated project schedule: ___________________________
   H. Name of Owner: ___________________________  I. Telephone No.: ___________________________
   J. Owner Contact Name: ___________________________  K. FAX No.: ___________________________
   L. Owner Address: ___________________________  M. Email Address: ___________________________
   N. Engineer’s Name: ___________________________  O. Email Address: ___________________________
   P. Engineering Firm: ___________________________  Q. Telephone No.: ___________________________
   R. Engineer Address: ___________________________

Attachments:  ______  Preliminary Plat or Site Plan
              ______  Concept Storm Water Management Plan (Checklist and Exhibits)
              ______  Preliminary Project Layout Map
              ______  Preliminary Drainage Area Map

2. Changes or Modifications to Conceptual Site Plan (May be reprinted with changes tracked or highlighted)

____________________________________________________________________________________
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A6-72
3. Preliminary Project Layout Map(s) shows the following information on or adjacent to the development site:

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<td>Digital ortho-photography showing project boundaries</td>
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<td>Existing topography (normally 2-foot contours)</td>
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<td>Preliminary street and lot layout</td>
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<td>Benchmarks used for site control</td>
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<td>Construction phasing plan, if applicable</td>
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<td>Limits of proposed clearing and grading</td>
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<td>Proposed dams &gt; 6' high</td>
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<td>Proposed FEMA floodplains with flood study reference info</td>
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<td>Proposed ponds subject to TCEQ water rights permits</td>
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<td>J</td>
<td></td>
<td></td>
<td></td>
<td>If yes, has water rights permit been applied for?</td>
</tr>
</tbody>
</table>

4. Preliminary Drainage Area Map(s) shows the following information for the development site:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Comments and Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td>Preliminary street and lot layout (scale 1&quot;=200')</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>All off-site drainage areas with topography (reduced scale)</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>Delineation of watershed boundaries with flow arrows</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td>Proposed modifications to watershed boundaries</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td>File numbers for existing developments &amp; drainage facilities</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td>Zoning or Comp Plan info to document off-site land use</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td>Preliminary hydrology with supporting data &amp; calculations for on-site existing &amp; proposed, &amp; off-site ultimate conditions</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td>Proposed detention ponds or other storm water controls, with summary hydrology for all applicable design storms</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td>Delineate entire zone of influence for all outfalls</td>
</tr>
<tr>
<td>J</td>
<td></td>
<td></td>
<td></td>
<td>Downstream constrictions, flooding, or erosion locations</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td>Proposed facilities with private maintenance (Maintenance Agreement and Maintenance Plan required for final)</td>
</tr>
</tbody>
</table>
5. Determination of Adequate Outfalls and Zones of Influence: Describe these and provide supporting methodology:


6. Description of Any Proposed Waiver Requests: (for informational purposes only; all Waiver Requests must follow published procedures)


7. Other Comments:


I certify that this Preliminary Storm Water Management Plan, including this checklist, required attachments, and additional comments, was prepared under my responsible supervision and that the information presented on this checklist and attachments is correct to the best of my knowledge. I also understand that an acceptance of this plan by the City does not waive any City standards or requirements unless a specific waiver request has been submitted and approved.

Signed ___________________________ Date ____________________
Print Name: __________________________ PE No ________________

(seal)
ENGINEER'S CHECKLIST FOR 
FINAL STORM WATER MANAGEMENT PLAN 
FORM CH-3 

Please attach additional sheets as necessary for comments and descriptions.

1. Project Information (for Items 1.C to 1.Q, N/C = No Change from Preliminary SWM Plan)
   A. Name of Development: _______________________________ B. Date: __________________
   C. Location of Development: ____________________________
   D. Type of Development: ________________________________
   E. Total area (acres): ________________________________
   F. Proposed Land Uses (CH zoning designations): _________________
   G. Anticipated project schedule: ____________________________
   H. Name of Owner: ________________________________ I. Telephone No.: __________________
   J. Owner Contact Name: ________________________________ K. FAX No.: __________________
   L. Owner Address: ______________________________________ M. Email Address: ________________
   N. Engineer's Name: ________________________________ O. Email Address: __________________
   P. Engineering Firm: ________________________________ Q. Telephone No.: __________________
   R. Engineer Address: ________________________________

Attachments: ____ Final Plat or Site Plan
                ____ Concept Storm Water Management Plan (Checklist and Exhibits)
                ____ Preliminary Storm Water Management Plan (Checklist and Exhibits)
                ____ Additional Attachments as Specified Below

2. Changes or Modifications to Preliminary Storm Water Management Plan (May be reprinted with changes tracked or highlighted)

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3. Additional Study Attachments (include if applicable)
   A. Dam Safety Checklist
   B. Storm Water Pollution Prevention Plan (SWPPP)
   C. Executed Maintenance Agreement (with Maintenance Plan)
   D. Landscaping Plan (for Storm Water controls)
   E. Copy of approved Waiver Request

4. Applicable Local, State and Federal Permits (Indicate acquired or application pending)
   A. CLOMR, LOMR or LOMA
   B. TCEQ water rights permit
   C. 404 permit
   D. Other: ____________________________
   E. Other: ____________________________

5. Hydrologic Analysis and Storm Water Management Design Plan (separate Attachment, either A or B)
   A. Approved Infrastructure Plans).
      Attach a copy of the signed cover sheet.
      ___________ ___________  Plan File No.: __________________________
   B. Site SWM Plan showing final hydrology, identification of all stormwater controls with summary calculations, delineation of adequate outfalls, zones of influence, required mitigation, and structural details and specifications as required
      ___________ ___________

I certify that this Final Storm Water Management Plan, including this checklist, required attachments, and additional comments, was prepared under my responsible supervision and that the information presented on this checklist and attachments is correct to the best of my knowledge. I also understand that an acceptance of this plan by the City does not waive any City standards or requirements unless a specific waiver request has been submitted and approved.

Signed ___________________________ Date ___________________________
Print Name: ___________________________ PE No: ___________________________
## Culvert Hydraulics Documentation Checklist – Form CH-4

<table>
<thead>
<tr>
<th>Project:</th>
<th>Watershed:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road:</td>
<td>Stream:</td>
<td></td>
</tr>
<tr>
<td>Type of work:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEMA considerations (Detailed or Approx. Study?):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culvert size &amp; shape:</td>
<td>Fill height:</td>
<td>Skew angle:</td>
</tr>
<tr>
<td>Culvert material:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrologic method used:</td>
<td>Hydrograph</td>
<td></td>
</tr>
<tr>
<td>USGS Station</td>
<td>Other (specify):</td>
<td></td>
</tr>
<tr>
<td>Design frequency (yrs):</td>
<td></td>
<td>Drainage area:</td>
</tr>
</tbody>
</table>

### Channel analysis:

<table>
<thead>
<tr>
<th>100 Yr Proposed discharge (cfs):</th>
<th>Channel slope (m/m):</th>
<th>N values (channel):</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Year Ultimate discharge - Q&lt;sub&gt;100&lt;/sub&gt; (cfs):</td>
<td>100 Year Ultimate tailwater (ft):</td>
<td>100 Year Ultimate headwater (ft):</td>
</tr>
<tr>
<td>Allowable highwater (ft):</td>
<td>100 Year Ultimate velocity thru bridge (fps):</td>
<td>100 Year Unconstricted velocity (fps):</td>
</tr>
<tr>
<td>100 Yr Proposed velocity thru bridge (fps):</td>
<td>100 Year Unconstricted velocity (fps):</td>
<td>Height of water over road for Q&lt;sub&gt;100&lt;/sub&gt; (ft):</td>
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<tr>
<td>Design unconstricted velocity (fps):</td>
<td></td>
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<tr>
<td>% Flow overtopping for Q&lt;sub&gt;100&lt;/sub&gt;:</td>
<td></td>
<td></td>
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<tr>
<td>Est. overtopping frequency (years):</td>
<td></td>
<td></td>
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</tbody>
</table>

### Headwater computation method:

| THYSYS-CULVERT | HEC-RAS | HEC 2 | Other |

### Comparison with existing hydraulic conditions:

| Meets FEMA requirements | Yes | No | N/A |

### Outlet velocity excessive:

| Yes | No |

### Outlet protection/control:

|       |

### Safety end treatment:

|       |

### Comments:


## Bridge Hydraulics Documentation Checklist – Form CH-5

<table>
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<tr>
<th>Project:</th>
<th>Date:</th>
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</thead>
<tbody>
<tr>
<td>Road:</td>
<td>Watershed:</td>
</tr>
<tr>
<td></td>
<td>Stream:</td>
</tr>
</tbody>
</table>

**Type of work:**

**FEMA considerations (Detailed or Approx. Study?):**

**Bridge Length:**

**Pier Configuration:**

**Bridge Width:**

**Bridge Low Chord and Roadbed Elev.:**

**Hydrologic Method Used:** Hydrograph Only

- Gaged - USGS Station
- Other

**Design Frequency (yrs):**

**Drainage Area:**

**Channel Dimensions:**

**Channel slope(ft/ft):**

**N value:**

<table>
<thead>
<tr>
<th>STATION</th>
<th>DESIGN PROPOSED</th>
<th>100 YR EXISTING</th>
<th>100 YR PROPOSED</th>
<th>100 YR ULTIMATE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Q (cfs)</td>
<td>V (fps)</td>
<td>WSEL (ft)</td>
<td>Q (cfs)</td>
</tr>
<tr>
<td>EXIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FULL V</td>
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<td>BRIDGE</td>
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<tr>
<td>APPR (UNCONS)</td>
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</tbody>
</table>

**Headwater computation method:** HEC-RAS  

**OTHER**

**Bridge/Roadway overtopping:** Yes  

**No**  

**Overtopping Frequency(years):**

**% Flow overtopping road:**

**Height of water over road(ft):**

**Existing Bridge Length(ft):**

**Meets FEMA requirements:** Yes  

**No**  

N/A

**Type of Bridge Rail:**

**Skew:**

**Abutment protection (rock riprap, etc):**

**Comments:**

*Complete for cases where “design frequency” (such as TxDOT structures) may be different than 100-year.*
Variance Procedure – City of Hutchins Storm Water Management Design Manual

Good engineering practice and practical considerations are necessary when developing storm water management plans and preparing construction drawings for specific projects. The criteria in this guideline cannot cover every possibility.

The closer the criteria are followed, the more likely the plan or drawing will be approved and the construction accepted. For those situations where varying from the criteria is warranted, a variance process is described below.

Submit variance request in writing on the Request for Variance from City of Hutchins – Storm Water Form (CH-7) as early as possible. The variance request must include the following:

- The specific criteria that you want to vary.
- Why the criteria needs to be varied.
- How the basis for the criteria will still be satisfied or why the criteria is not applicable.
- Indicate if there are no criteria for the proposed analysis, design, or feature in this manual.
- Appropriate technical information supporting the variance request, such as calculations, excerpts from the drainage or design plan, and/or construction drawings.

Note: Submittals with insufficient technical information to support the variance request will be returned without review.

The Director of Public Utilities will either approve or reject the variance in writing on the variance request form. If it is rejected, a written explanation will be provided.
REQUEST FOR VARIANCE FROM CITY OF HUTCHINS – STORM WATER – FORM CH-7

Submitted by: __________________________ Phone: _____________ Email: __________________________
Company: ___________________________________________ Date: _____________

Proposed Project Description
Name: ________________________________________________
Type: ________________________________________________
Location: __________________________________________ (include map)

Existing Condition (show information on map or drawing)
CH Maintained Facilities: ________________________________
Existing Right-of-Way for CH facility: _____________________
Topography: __________________________________________
Other Pertinent Data Related to Variance Request:
____________________________________________________

Variance Request
Specific criteria you want to vary: _________________________

Explain why the criteria needs to be varied or is not applicable: ________________________________

Explain how the basis for the criteria will be satisfied: _________________________________________

List attachments supporting variance request (preliminary design report excerpt, construction drawings, calculations, photographs, map, etc.):

CH to fill in this area

<table>
<thead>
<tr>
<th>Date</th>
<th>Reviewer</th>
<th>Dept./Section</th>
<th>Action Taken</th>
</tr>
</thead>
</table>

Justification of Decision: __________________________________________

Approval of Final Decision: ___________________________ Date

City of Hutchins General Development Manual November 2013 A6-80
APPENDIX 7

WATER DESIGN GUIDELINES
Water Design Guidelines

City of Hutchins

November 2013
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GENERAL

The purpose of this guideline is to establish certain minimum criteria for the design of water distribution mains in the City’s jurisdiction. It is intended to be used by the city staff and private consulting engineers for all new utility construction, replacements and modifications to the existing systems. Unusual circumstances or special designs requiring exception from the standards in this guideline must be approved by the Director of Public Utilities.

This guideline is intended to be used in conjunction with all current American Water Works Association (AWWA) and Texas Commission on Environmental Quality (TCEQ) requirements. Additionally, all design should be in accordance with the adopted version of the International Fire Code. In the case of a conflict between this guideline and either or both of these other requirements, the most restrictive will govern.

The criteria outlined in this guideline are also intended to be used in conjunction with the City of Hutchins specifications and details.

Submittal Requirements

The design engineer shall submit the following information with all water system designs:

- Plans shall be clear, legible and neatly drawn on bordered 22-inch x 34-inch sheets. 24-inch x 36-inch should also be allowed if allowed for paving. Each sheet shall clearly display the seal of the Professional Engineer under whose direction the plans were prepared. All engineering documents shall clearly indicate the professional engineering firm name and registration number.

- Plan and profile sheets containing all information necessary to review, construct and inspect the proposed improvements. This shall include a traffic control plan as applicable.

- Copy of information provided to TCEQ in compliance with TCEQ submittal requirements (TAC290) for City records purposes. If the project is exempted from TCEQ submittal, this submittal to the City is also exempted.

Special Designs

The City Engineer may, upon request, approve an alternative design, unusual circumstance, or construction methodology that differs from the requirements in this guideline on a case by case basis if the Director of Public Utilities determines that the:

(1) Alternative design or construction methodology is equivalent to, or superior to, the methodology required in this guideline, and
(2) Alternative design or construction methodology is sufficient to ensure public health and safety.

Connections

All connections and service leads shall be installed to both sides of all roads and alleys at the time of main line installation.

Service connections to 16" or larger water mains shall not be allowed.

PIPE SELECTION

Pipes shall be selected, sized and designed to provide a safe, efficient and maintainable system for the conveyance of domestic water from existing supplies and systems to new or existing users.

Pipe Materials

The following pipe materials may be specified for water distribution mains:

- Ductile iron pipe (DIP) per ANSI/AWWA C151/A21.5 pressure class 350 for sizes 6 through 12-inches, pressure class 250 for 18- inch, and pressure class 200 for 24-inches and greater. Where excessive depths are encountered (greater than 10-feet), the design engineer shall specify an appropriate thickness class to be approved by Director of Public Utilities.

- Polyvinyl chloride pipe (PVC) shall be pressure class 200 D.R.14 (meeting AWWA C-909 standards) for sizes 4 through 12-inches; and pressure class 235 D.R. 18 (meeting AWWA C-905 standards) for pipe sizes greater than 12-inches. PVC pipe will not be permitted for aerial crossings. D.I. fittings shall be used with PVC pipe. Fittings shall be wrapped with eight-mil polywrap and sealed on the edges with an approved tape.

- Potable Water Service (SDR-9)(CTS) tubing shall be used for all service lines 2-inches and smaller.

Changes in pipe material shall only occur at valves or fittings with the exception of short replacements of water lines needed to meet TCEQ separation requirements.
Pipe Sizing

Pipes and pipe systems shall be designed to provide the service criteria listed below.

Standard Pipe Sizes

The standard pipe sizes for water distribution mains are 6, 8, 10, 12, 16 and 18 inches in diameter. As discussed in the "Maximum Lengths for Water Mains" Section, the smaller lines have restrictions for use. Standard size service lines within the right-of-way shall be 1, 1-1/2, or 2-inch. Requests for larger service sizes for special circumstances can be made to the Director of Public Utilities.

Looping Requirements

Permanent dead-end mains will not be allowed if looping alternatives are available. This may require extending the water lines beyond project limits. All water mains constructed within a proposed subdivision shall be extended to the perimeter of the proposed subdivision to allow future extension of the water system into adjacent properties.

Dead-end mains will be allowed at ends of cul-de-sacs where the only alternative is to loop lines down side lot lines in residential subdivisions.

Maximum Lengths for Water Mains

A 6-inch main may be allowed up to a maximum of 1,500-feet in length and must connect at each end to an 8-inch or larger main and shall have no more than 2 fire hydrants or flushing points. Where it is not possible to meet this requirement, a 6-inch main may be extended to a maximum of 800-feet in length and shall terminate with a fire hydrant or blow-off assembly.

TCEQ rules shall dictate the number of services allowed on the smaller sized line.

Water Services

All water services shall be placed at the center of the lot unless otherwise approved by the Director of Public Services.

a. Residential: Services shall consist of a 1-inch service with meter, corporation stop, curb stop and meter box located behind ROW.

b. Commercial:

1. If a 1-inch service is requested, install 1-inch meter, corporation stop, curb stop and meter box located behind ROW.
2. If a 1 ½-inch service or 2-inch service is requested, install a 2-inch tapping sleeve and valve, 1-inch curb stop on bypass, 2 - 2-inch ball valves and
meter box located behind ROW. Reduce to 1 ½-inch service, if required.

All services larger than 2-inches shall include tapping sleeve and valve (same size as service), 2-inch curb stop on bypass, two same size as service gate valves and meter box located behind ROW.

**Pressure/Flow Requirements**

Water distribution mains shall be sized to meet all of the following requirements using a Hardy-Cross based analysis method or methods encompassed in software packages such as KY-Pipe, MikeNet, or Cybernet.

**Design Flow Calculation**

Both normal and fire flows are needed for meeting the design criteria as established under Design Flow Calculation and System Design Criteria.

**Normal Flow**

One of the following three methods shall be used to determine the normal flows by which the water system is to be designed.

Peak Hourly Flow = (Average Daily Flow)(4)

- **Method 1 - Fixture Count Determination**

  The “fixture unit” method of estimating peak water demand may be used in accordance with the currently adopted City Plumbing Code.

- **Method 2 - Land Use Determination**

  Table 7.1 contains the normal flow demands that are expected from a variety of uses.

  The population factor for residential land uses is 2.67 persons per unit, which is then applied to the actual number of units per acre, if known, or the maximum units per acre from the current land use plan if the property development is not yet finalized.

  The population factors for non-residential uses are 30 persons per acre for commercial, office and institutional uses and 15 persons per acre for Industrial uses.

- **Method 3 - Gross Area Determination**
In the absence of projected land uses, the demands contained in Table 7.2 may be used.

**Fire Flows**

For the purposes of this guideline, the following shall be used for fire flow determinations unless greater flows are required for hydrants near structures as per the adopted International Fire Code.

- **Residential**

  1000 gallons per minute for public hydrants in single family or duplex residential areas

- **Commercial**

  At least 2500 gallons per minute for public hydrants shall be in commercial or multi-family areas (this flow may be split between two adjacent fire hydrants within 600 feet of each other). At the time that the site is developed, fire flows shall be as per the adopted Fire Code.

- **Other/Hi-Rise**

  For onsite fire hydrants needed to obtain coverage of commercial or other high density uses, the design engineer shall consult the City Fire Marshal to obtain the specific fire flow demands for each project via the International Fire Code.

**Fire Flow System Design Criteria**

The following criteria shall be met on all new water improvements.

- Under normal conditions, provide residual pressures in the area serviced by the system improvement to meet TCEQ requirements, and at all times a minimum static pressure of 35 pounds per square inch (psi).

- Under fire flow conditions, provide the required fire flow at the most hydraulically remote pairings of 2 adjacent fire hydrants in the system improvement in addition to the peak hourly flow. A residual pressure of no less than 20 psi is required.

- Provide maximum velocities of not more than 12 feet per second (fps) during fire flow in both existing and proposed mains. This maximum velocity may be increased on a case by case basis depending on the condition of the existing mains and if an engineering evaluation has been performed.

- Conform to any area wide master plans, including over sizing for future development.
Fire Flow Report

Prior to release of construction documents, a professional engineer sealed fire flow report must be submitted verifying the system will meet the minimum requirements and model demonstrating flows, velocities, pressures, etc. This initial report should utilize actual flow data if available. However, some assumptions put the developer/engineer at risk of the system not being able to meet the minimum standards upon completion of construction. Systems which do not meet these minimum requirements upon completion will not be accepted. Design engineer shall place the minimum required flow (gpm) on construction plans for each hydrant.

Fire Flow Testing

Upon completion within the City owned water system, a hydrant flow test will be conducted by the City, as part of the letter of completion/acceptance process. All fire flow testing shall be in accordance to the National Fire Prevention Association (NFPA) Standard No. 291, Chapter 4.

For non-City owned water systems, a professional engineer sealed report must be submitted verifying that the NFPA 291 test meeting our minimum design standards was done upon completion of the water system, before the system is acknowledged to meet the requirements.

PIPE ALIGNMENT

The design of water distribution mains should provide for economical access for maintenance and repair, reliability of location and minimum disruption to surrounding facilities during repair operations. In all cases water facilities shall comply with TCEQ separation requirements.

Horizontal Layout

The centerline of water distribution mains constructed in street rights-of-way shall remain parallel to the right-of-way line when possible.

The City may require the location of a proposed water main within a site to be revised based upon proximity to any existing or proposed buildings. Where possible water lines should be located at least 15 to 20 feet away from structures, however size and depth of proposed water line may increase this distance.

Vertical Layout

Water distribution mains should be laid to as straight a grade as possible between cross street connections. Vertical alignment should avoid high or low points between connections (see Flushing Design below).
All water distribution mains 12-inches in diameter and smaller shall have a minimum cover to finished surface of 4-feet. Mains greater than 12-inches in diameter shall have a minimum cover of 5-feet to finished surface.

**Flushing Design**

Water distribution mains should have a means of a minimum cleaning velocity of 5 fps. Additionally, fire hydrants shall be placed close to low point as practical.

Air relief valves and flushing appurtenances shall be placed at critical locations including an air release valve at all peaks for lines 12” and larger and on smaller lines where the peak has an “A” of 10 or more.

\[
A = |(S_1) - (S_2) |
\]

All dead end lines shall be designed to allow adequate flushing capability. A flushing assembly shall be provided for all dead end lines. Provisions for flushing shall be provided at critical low areas along the line.

<table>
<thead>
<tr>
<th>Main Size</th>
<th>Blow-off</th>
</tr>
</thead>
<tbody>
<tr>
<td>3”</td>
<td>2”</td>
</tr>
<tr>
<td>6”</td>
<td>2”</td>
</tr>
<tr>
<td>8”</td>
<td>2”</td>
</tr>
<tr>
<td>10”</td>
<td>4” or Fire Hydrant</td>
</tr>
<tr>
<td>12”</td>
<td>4” or Fire Hydrant</td>
</tr>
<tr>
<td>16”</td>
<td>4” or Fire Hydrant</td>
</tr>
<tr>
<td>18”</td>
<td>4” or Fire Hydrant</td>
</tr>
<tr>
<td>≥24”</td>
<td>6”</td>
</tr>
</tbody>
</table>

**Deflections, Bends and Curves**

The maximum deflection of pipe is to be restricted as shown in Table 7.3. Deflection for PVC pipe shall be made along the pipe barrel and not at the joint, while ductile iron pipe shall be deflected at the joints. Service connections should be limited in curved sections of pipe.

All bends and fittings shall have restrained joints and shall be blocked to undisturbed soil. Use 2 - 45° bends in lieu of a 90° bend whenever possible.
Curvature of pipe shall be accomplished through multiple, spaced deflections as described above. The minimum radius of curvature for water pipes is shown in Table 7.3. 

**Separation from Wastewater Facilities**

Separation of public water and wastewater mains will be consistent with the current Rules and Regulations for Public Water Systems of the TCEQ.

Separation of public water and wastewater mains from other underground utilities (storm, gas, etc.) shall be a minimum of 2-feet. In special circumstances, separation less than 2-feet between water and wastewater or between wastewater and storm may be permitted if the wastewater main is to be concrete encased 10-feet on each side of the crossing.

**VALVES**

All mainline valves on mains 12-inches in diameter or less shall be resilient seat gate valves; whereas valves on mains greater than 12-inches may be butterfly valves or resilient seat gate valves.

**Location and Spacing**

A valve should be located:

- On 3 legs of a "cross" connection.
- At the end of temporary dead-end lines, within 70 feet from the end of the line for lines greater than 8” and within 200 feet for lines equal to and less than 8”.
- On 2 legs of a "tee" connection.
- On fire hydrant lead.
- Every 800 feet.
- Where possible, place valves in areas avoiding ADA ramps.

A valve will be required at the point of connection of a new main extending an existing main, unless the existing main has an in-line valve within 500-feet of the connection.

Valves shall be placed at intervals not to exceed 800-feet regardless of the distance between intersections. The Director of Public Services may require additional valves to prevent unnecessary disruptions of service. Mainline valves shall be located at fire hydrant leads. Fire hydrant lead valves are to be positively anchored to the main line.

Valves are to be located so that no more than 3 valves are required to isolate a section of main.

**FIRE HYDRANTS**

Fire hydrants are to be located at street intersections or as close to an intersection as possible. Hydrants should not be located within the intersection curb return radius.
Intermediate fire hydrants should be located near property line extensions and no closer than 5-feet to any service line. In residential areas fire hydrants should be placed within the right-of-way in the vicinity of the common lot lines.

In accordance with TCEQ, fire hydrants shall not be placed closer than 9-feet horizontally and vertically from any wastewater main or appurtenance. All fire hydrants shall be connected to a 6-inch (minimum) water main.

If it is necessary to place a fire hydrant in a proposed sidewalk location, the sidewalk shall be widened or relocated to maintain the required sidewalk width.

**Fire Hydrant Coverage Requirements**

Public fire hydrants in districts other than single family districts shall be installed as per the City Fire Codes, all buildings shall be within 300-feet of a fire hydrant. Fire hydrants shall be located no more than a 500-foot truck-lay to all points of any structure or combustible storage area on the lot. Upon approval by Director of Public Services, the installation of some or all public fire hydrants in such districts may be deferred and required as a condition of the building permit(s) for structures.

Fire hydrants located on the opposite side of a street, designated as four lane or larger on the current City Thoroughfare Plan, shall not be considered acceptable for meeting hydrant coverage requirements.

Fire hydrants shall be positioned to allow truck-lays to follow normal traffic flow patterns to the site either by street or fire lane.

Fire hydrants shall be placed within 100-feet of a fire department connection on the structure as per the adopted Fire Code.

**Fire Hydrant Markers**

Fire hydrant “blue reflective markers” shall be installed by the developer on all streets, fire lanes and paved access easements to indicate fire hydrant locations. Fire hydrant markers shall be installed in the middle of the nearest traffic lane adjacent to the hydrant. When hydrants are installed at ninety-degree turns along fire lanes or mutual access easements, markers shall be placed on private street(s), fire lane(s) or mutual access easement(s) immediately adjacent to the fire hydrant.

**Fire Hydrant Specifications**

All fire hydrants must meet the following required City of Hutchins Standard Fire Hydrant Specifications:

All fire hydrants shall have one (1) 4.5-inch pumper nozzle and two (2) 2.5-inch hose nozzles with the City's standard threads; shall have a main barrel valve opening of not less than 5.25-inch; and shall be placed on mains of not less than 6-inch in
diameter. Six-inch (6") gate valves shall be placed on all fire hydrant leads. All fire hydrants shall have a valve at the main with flange-to-flange fittings. All fire hydrants shall be of a "break-away" design.
Figure 7.1
Fire Hydrant Marker Placement

TWO LANES

TWO LANE INTERSECTION

DIVIDED HIGHWAY

FOUR LANE INTERSECTION

* This drawing not to scale
Each hydrant shall have a minimum of two primer coats. The final coat of paint on the body of all hydrants shall be a silver color of approved aluminum paint. The top and outlet caps of all fire hydrants shall be painted by the developer with a machine implement paint or approved equal, in accordance with the size of the line constructed.

a. Six inch (6") line – red

b. Eight inch (8") line – blue

c. Ten to fourteen inch (10"-14") line – green

d. Sixteen inch (16") or larger - yellow

**Fire Protection Distribution Systems**

Fire distribution lines shall be private lines. An isolation valve, locked in an open position, shall be installed on the fire suppression service line and shall be maintained by the City. Fire suppression service lines shall not be tapped for service and shall be designed and constructed in accordance to these guidelines.

Water distribution systems shall be of sufficient size to provide adequate water for fire protection to the development and shall conform to the City’s Water Distribution System Master Plan. Maintenance of private water lines and fire hydrants is the responsibility of the property owner.

a. *Sizes and Allowable Dead End Lengths*. The minimum water line size shall be 8”. Dead end lines over 600-feet in length will not be allowed. Dead end lines shall terminate at a fire hydrant that shall be installed for maintenance purposes and may not necessarily be considered for fire hydrant density as required. Flush hydrants may be installed in lieu of fire hydrants at terminating points of dead end lines for maintenance purposes only.

b. *Water Line Requirements For Fire Protection*. The owner/developer shall choose to provide either a public or private water line distribution system for fire protection.

Perpendicular crossings of underground public water lines may be allowed under driveways and sidewalks to provide protection/domestic service to the site. All crossings shall meet construction standards applicable with all provisions of this ordinance.

c. *Valves*. Additional isolation valves may be required to be installed depending upon the configuration of the system as determined by the City.

d. *Construction Standards*. All water line construction shall conform to construction standards located elsewhere in this ordinance.
CROSSINGS

Water distribution mains that are located within state right-of-way must conform to the requirements of the Texas Department of Transportation (TxDOT).

Water distribution mains that cross railroads must conform to the requirements of the railroad company whose right-of-way is being crossed.

Water distribution mains crossing creeks or drainage channels regulated by FEMA shall require encasement. Below grade crossings are preferred; however, aerial crossings may be considered. Thrust restraint shall be provided at points of transition from buried to exposed pipe and at changes in alignment of exposed pipe. Air release valves shall be provided at the high point of all crossings.

Below grade crossings of creeks and drainage channels shall have a minimum cover of 3.5-feet below the creek flowline at the time of construction. All below grade crossings will require steel encasement with all ends capped and sealed. The casing shall be carried into the bank a distance that should consider changes in the creek channel. This distance shall be beyond the high bank, outside of a projected 1H:1V slope from the high bank away from the channel.

ENCASEMENT

Steel cylinder pipe shall be used for all encasement pipe. Other encasement pipe material may be used per TCEQ requirements and City specifications. Carrier pipes sized less than 30 inches shall use an encasement pipe with a wall thickness of no less than 3/8-inch. For carrier pipes 30 inches and larger, a wall thickness of no less than 1/2-inch shall be used. Coating of encasement pipe may be required in special soil conditions.

All carrier pipes will be supported by casing spacers in accordance with the specifications and details, and shall have joints restrained by an approved method that will allow the removal of the carrier pipe from the encasement pipe in a single direction by means of tension on the carrier pipe only.

EASEMENTS

Water mains constructed outside of public rights-of-way shall be in easements of not less than 15 feet in width except for the following: if the water main is deeper than 6 feet, the easement width shall be not less than 20 feet; and if the water main depth is greater than 14 feet, the easement width shall be 30 feet. If both water and wastewater mains are located within the same easement, the width shall not be less than 25 feet (larger widths will be required depending on the depth of the sewer main). Where water lines will be adjacent to building structures, easement width shall be increased.
The easement must be located such that the centerline of the waterline is no closer than 5.5 feet to the closest edge of the easement.

### TABLE 7.1
**AVERAGE WATER DEMANDS**

<table>
<thead>
<tr>
<th>USE</th>
<th>AVERAGE FLOW GPD / CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>100</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>- Office</td>
<td>50</td>
</tr>
<tr>
<td>- Retail</td>
<td>25</td>
</tr>
<tr>
<td>- Hotel/Motel</td>
<td>150</td>
</tr>
<tr>
<td>Institutional</td>
<td></td>
</tr>
<tr>
<td>- Schools</td>
<td>35</td>
</tr>
<tr>
<td>- Hospitals</td>
<td>200</td>
</tr>
<tr>
<td>Industrial</td>
<td>50</td>
</tr>
</tbody>
</table>

### TABLE 7.2
**NORMAL WATER DESIGN DEMANDS**

<table>
<thead>
<tr>
<th>TRIBUTARY AREA (Acres)</th>
<th>DESIGN DEMAND (g.p.d. per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 250</td>
<td>7000</td>
</tr>
<tr>
<td>250-300</td>
<td>6500</td>
</tr>
<tr>
<td>300-500</td>
<td>5500</td>
</tr>
<tr>
<td>500-1500</td>
<td>5000</td>
</tr>
<tr>
<td>1500-3000</td>
<td>4500</td>
</tr>
<tr>
<td>More than 3000</td>
<td>4000</td>
</tr>
</tbody>
</table>

### TABLE 7.3
**MINIMUM RADIUS FOR WATER PIPE**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6-IN</td>
<td>220 ft</td>
<td>400 ft</td>
</tr>
<tr>
<td>8-IN</td>
<td>400 ft</td>
<td>400 ft</td>
</tr>
<tr>
<td>12-IN</td>
<td>600 ft</td>
<td>400 ft</td>
</tr>
</tbody>
</table>
APPENDIX 8

SANITARY SEWER DESIGN GUIDELINES
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GENERAL

The purpose of this guideline is to establish certain minimum criteria for the design of wastewater collection mains in the City of Hutchins jurisdiction. It is intended to be used by the city staff and private consulting engineers for all new utility construction, replacements and modifications to the existing systems. Unusual circumstances or special designs requiring exception from the standards in this guideline must be approved by the Director of Public Utilities.

This guideline is intended to be used in conjunction with all current American Water Works Association (AWWA) and Texas Commission on Environmental Quality (TCEQ) requirements. In the case of a conflict between this guideline and either or both of these other requirements, the most restrictive will govern.

The criteria outlined in this guideline are also intended to be used in conjunction with the City's specifications and details.

For the purpose of this guideline, wastewater collection mains are those mains of 18-inches in diameter or smaller. Larger diameter mains are considered to be interceptor or transmission mains and are subject to additional design criteria and review.

Proposed wastewater collection systems that accept flows from existing upstream sewers shall be designed to accommodate all flows generated by the upstream service area. The existing upstream sewers may experience variable peak flows greater than the peaks utilized in the design of new sewers. The peak flow rates (particularly the infiltration/inflow rates) for each existing subsystem is highly variable. Consult with the Director of Public Utilities to confirm the proper peak flow rates to be used for any existing upstream wastewater collection system. The proposed wastewater collection system design shall include a review of all existing downstream sewers receiving flow from the proposed sewers to verify that flows generated from the proposed wastewater collection system do not adversely affect the performance of the downstream systems.

All subdivisions developed subsequent to this ordinance must be served by community sanitary sewer collection, treatment and disposal system approved by the City. Each lot must be provided with an individual service.

All laterals and sewer mains installed within a subdivision must extend to the boundaries of the subdivision as required for the future extensions of the collection system, regardless of whether or not such extensions are required for service within the subdivision.

Submittal Requirements

The design engineer shall submit the following information with all wastewater system designs:
• Plans shall be clear, legible and neatly drawn on bordered 24-inch x 36-inch or 22-inch x 34-inch sheets. Each sheet shall clearly display the seal of the Professional Engineer under whose direction the plans were prepared. All engineering documents shall clearly indicate the professional engineering firm name and registration number.

• Plan and profile sheets containing all information necessary to review, construct and inspect the improvements. This shall include a traffic control plan as applicable.

• Wastewater Design Report showing that the design of the proposed improvements meet the flow requirements of this guideline.

• Copy of information provided to TCEQ in compliance with TCEQ submittal requirements (TAC317) for City records purposes. If the project is exempted from TCEQ submittal, this submittal to the City is also exempted.

Special Designs

The Director of Public Utilities may, upon request, approve an alternate design or construction methodology that differs from the requirements in this guideline if the Director of Public Utilities determines that: (1) the alternative design or construction methodology is equivalent to, or superior to, the methodology required in this guideline, and (2) the alternative design or construction methodology is sufficient to ensure public health and safety.

Lift station design shall follow acceptable engineering practices and be reviewed by City staff.

Connections

All residential connections and service leads shall be installed to both sides of all roads and alleys at the time of main line installation.

Service connections shall be tied into the main line. Service connections smaller than 6” in diameter do not require a manhole at the point of connection. Should the service tie into a manhole, the service shall be within 2’ of the flow line or a drop should be installed.

PIPE SELECTION

Pipes shall be designed to provide a safe, efficient and maintainable system for the collection of wastewater from its various sources of generation to the existing collection and interceptor systems.
Pipe Materials

The following pipe materials may be specified for wastewater, collection, and force mains within the City’s rights-of-ways.

- Ductile iron pipe (DIP) per ANSI/AWWA C151/A21.5 pressure class 350 for sizes 6 through 12-inches, pressure class 250 for 18-inch, and pressure class 200 for 24-inch and greater. Force mains shall be DIP, pressure class 350 or ASTM D2241 pressure class 160 and shall not be greater in size than 8-inches.

- Polyvinyl chloride pipe (PVC) and all fittings shall be SDR35- ASTM D3034 in sizes 6 through 12-inches for depths less than 10-feet; SDR26- ASTM D3034 in sizes 6 through 12-inches for depths 10-feet and deeper; and ASTM F679 for larger sizes (18-inches and greater). PVC pipe will not be permitted for aerial crossings.

For material information on pipe encasements refer to the “Encasements” section of this document.

Changes in pipe material shall only occur at manholes with the exception of short replacements of sewer lines needed to meet TCEQ separation requirements.

Pipe Sizing

Pipes and pipe systems shall be designed to provide the service criteria listed below.

Standard Pipe Sizes

The standard pipe sizes for wastewater collection mains are 6, 8, 10, 12, and 18-inches in diameter.

Minimum Pipe Sizes

Minimum wastewater pipe sizes shall be as follows:

- Collection Mains – 6 inches
- Residential Service Leads – 4 inches (single & double)
- Commercial Service Leads – 6 inches (single or double when capacity is shown to be adequate)
- Duplex lots shall have a double 4” service per lot or a double service per two lots with a 6-inch service line.
Flow Requirements

Wastewater collection mains shall be sized to meet all of the following requirements using an analysis method based on Manning’s equation.

Flow Calculations

One of the following three methods shall be used to determine the peak hourly flows by which a new wastewater system at the fringes of the existing system is to be designed (For new systems being developed within the existing system, consult the Wastewater Master Plan for design criteria). In each method, the following equations apply:

\[ \text{Peak Hourly Flow} = (\text{Average Daily Flow})(4) \]

- **Method 1 - Fixture Count Determination**

  For multi-family residential, institutional, commercial and industrial uses, the “fixture unit” method of estimating peak wastewater generation may be used in accordance with the current duly adopted City Plumbing Code. Table 8.2 shows a fixture unit value for various plumbing fixtures and groups of fixtures. Table 8.3 shows the probable peak rate of flow generation from systems consisting of various numbers of fixture units.

- **Method 2 – Land Use Determination**

  Table 8.4 contains the average daily flow per capita to be expected from a variety of uses.

  The population factor for residential land uses is 2.67 persons per unit, which is then applied to the actual number of units per acre if known, or the maximum units per acre from the current land use plan if the property development is not yet finalized.

  The population factors for non-residential uses are 30 persons per acre for commercial, office and institutional uses and 15 persons per acre for Industrial uses.

- **Method 3 – Historical Data**

  If there is information regarding average daily flows for a particular type of development that is more accurate than the data from the other methods, the historic information may be used. Please discuss this with the City prior to using so as to ensure the information is acceptable.
**System Design Criteria**

Wastewater mains and collection lines shall be designed to carry the peak daily load estimated from the tributary areas when fully developed to the current land use plan. Determination of peak loadings shall be based on an analysis of the density and character of the land uses in the tributary area and the probable wastewater generation from those uses.

**TABLE 8.1**

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>SLOPE (%)</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot;</td>
<td>0.50</td>
<td>12.40</td>
<td></td>
</tr>
<tr>
<td>8&quot;</td>
<td>0.33</td>
<td>8.40</td>
<td></td>
</tr>
<tr>
<td>10&quot;</td>
<td>0.25</td>
<td>6.23</td>
<td></td>
</tr>
<tr>
<td>12&quot;</td>
<td>0.20</td>
<td>4.88</td>
<td></td>
</tr>
<tr>
<td>15&quot;</td>
<td>0.15</td>
<td>3.62</td>
<td></td>
</tr>
<tr>
<td>18&quot;</td>
<td>0.11</td>
<td>2.83</td>
<td></td>
</tr>
<tr>
<td>24&quot;</td>
<td>0.08</td>
<td>1.93</td>
<td></td>
</tr>
<tr>
<td>30&quot;</td>
<td>0.06</td>
<td>1.43</td>
<td></td>
</tr>
</tbody>
</table>

For lines larger than 36 inches in diameter, the slope may be determined by Manning’s formula to maintain a minimum velocity greater than 2.5 feet per second when flowing full and a maximum velocity less than 8 feet per second when flowing full when using a Manning’s “n” of 0.013.

Pipe velocities should be consistent between manholes and avoid abrupt reductions in velocity.

**Sewer Services**

All sewer services shall be located ten (10) feet from the centerline of the lot nearest the point of the lowest sanitary sewer main grade. No connection shall be made to collection system that will allow entry of surface water or waste which has other than domestic sewage characteristics.

City of Hutchins General Development Manual November 2013
PIPE ALIGNMENT

The design of the wastewater collection mains should provide economical access for maintenance and repair, reliability of location and minimum disruption to surrounding facilities during repair operations. In all cases wastewater facilities shall comply with TCEQ requirements.

Horizontal Layout

Wastewater mains and collection lines should be laid straight (no curves allowed) between manholes and at a uniform distance from the right-of-way line.

The centerline of wastewater mains and collection lines constructed in street rights-of-way shall be located on the opposite side of the street from the water main.

The City may require the location of a proposed sewer main within a site to be revised based upon proximity to any existing or proposed buildings. Where possible sewer lines should be located at least 15 to 20 feet away from structures; however, size and depth of proposed sewer line may increase this distance.

Vertical Layout

The desired depth for sanitary sewer mains shall be six feet (6’) as measured from the outside top of pipe vertically to finished ground or pavement surface elevation. The minimum depth shall be three feet (3’). Where the cover is 3.5’ or less, ductile iron pipe should be used and cement stabilized sand backfill required where erosion may occur.

Wastewater mains and laterals should be laid on a straight grade (no curves allowed) between manholes while avoiding excessive depths. Elevations must be shown on construction plans at 100-foot stations and at all manholes and match marks. Elevations are to be calculated to the nearest 0.01 foot.

Wastewater mains and collection lines must be constructed to a depth which will ensure gravity flow in service connections to adjacent properties. In general, this is accomplished by setting a 2% (1% Min.) grade from the centerline of the collection main to a point one (1) foot below floor elevation at the building line of the structure being served. The service lead must have a minimum cover of 2 feet at its shallowest point including roadside drainage ditches where present.

Separation From Water Facilities

Separation of public water and wastewater mains will be consistent with the current TCEQ Rules and Regulations for Public Water Systems.
**MANHOLES**

Manholes will be required to facilitate maintenance, cleaning, and in horizontal alignment (including at the center of horizontally where the included angle equals or exceeds 45-degrees), change pipe size and at junctions with other wastewater mains or collection be required at the junctions where service leads, 6-inch diameter or less(in diameter or smaller); 900-foot intervals on mains 15-inches thru 24-inches diameter; 1100-foot intervals on mains 27-inches in diameter and larger.

When a change in the size of a wastewater main or collection line occurs without a change in grade, the inside top of pipe (soffit) elevations will be matched in the manhole. Elevation differences between pipes at a manhole will require a drop manhole if >2' above FL.

A 0.1-foot drop through the manhole is desired.

At the end of a main or collection line, the line shall be terminated with a manhole or clean out as per TCEQ requirements. Clean-outs shall only be allowed when there is no physical means for an extension and the line is less than 4 feet in depth. If an extension is anticipated, a plugged stub-out of one full pipe joint with a clean-out is required.

Manholes may be constructed of fiberglass or concrete. Fiberglass manholes may only be used in non-structural areas as a special design. Watertight sealed manholes with bolt-down lids shall be provided in creek beds and in floodplains

Manhole sizes shall be as follows:

<table>
<thead>
<tr>
<th>Manhole Diameter</th>
<th>Main Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ft</td>
<td>&lt;18 in.</td>
</tr>
<tr>
<td>5 ft</td>
<td>≥18 in. &lt; 30 in.</td>
</tr>
<tr>
<td>6 ft</td>
<td>≥36 in.</td>
</tr>
</tbody>
</table>

Additionally, manholes 10 feet to 20 feet deep shall be at least 5 feet in diameter and manholes over 20 feet deep shall be at least 6 feet in diameter.

**RIGHT OF WAY CROSSINGS**

Wastewater collection mains located within state right of way must conform to the requirements of the Texas Department of Transportation (TxDOT).

Wastewater collection mains that cross railroads must conform to the requirements of the railroad company whose right-of-way is being crossed.
For wastewater collection mains crossing creeks or drainage channels, piers must support the elevated sections of such crossings. Dry bore all crossings of existing streets unless otherwise authorized by the Director of Public Utilities.

Below grade crossings of creeks and drainage channels shall have a minimum cover of 3.5-feet below the flowline at the time of construction. All below grade crossings will require encasement with steel encasement pipe and all ends shall be capped and sealed. The casing shall be carried into the bank a distance that should consider changes in the creek channel. This distance shall be beyond the high bank, outside of a projected 1H:1V slope from the high bank away from the channel. If the pipe is less than 3.5-feet in depth, steel encasement and concrete capping shall be required.

**ENCASEMENTS**

Steel cylinder pipe shall be used for all encasement pipe. Other encasement pipe material may be used per TCEQ requirements and City Specifications. Carrier pipes sized less than 30 inches shall use an encasement pipe with a wall thickness no less than 3/8-inch. For carrier pipes 30 inches and larger, a wall thickness of no less than 1/2-inch shall be used. Coating of encasement pipe may be required in special soil conditions.

When required, encasement pipe diameter shall be as specified in the specifications and details. Encasement pipes shall extend 2-feet beyond the back of both curbs on the street. Ends of encasement pipes shall be sealed to prevent the intrusion and collection of groundwater.

All carrier pipes will be supported by casing spacers in accordance with the specifications and details, and shall have joints restrained by an approved method that will allow the removal of the carrier pipe from the encasement pipe in a single direction by means of tension on the carrier pipe only.

**EASEMENTS**

Wastewater lines constructed outside of or not adjacent to public rights-of-way shall be in easements of not less than 15 feet in width except for the following: if the sewer main bury is deeper than 10 feet, the easement width shall be not less than 20 feet; and if the sewer main bury is greater than 14 feet, the easement width shall be 30 feet. If both wastewater and water mains are located within the same easement, the width shall not be less than 25 feet (larger widths will be required depending on the depth of the sewer main).

The easement must be located such that the centerline of the wastewater line is no closer than 5.5-feet to the closest edge of the easement.
<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>FIXTURE UNIT VALUE LOAD FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Bathroom Group – tank operated</td>
<td></td>
</tr>
<tr>
<td>water closet, tub or shower, lavatory</td>
<td>6</td>
</tr>
<tr>
<td>Bathtub (with or without shower)</td>
<td>2</td>
</tr>
<tr>
<td>Dishwater (domestic)</td>
<td>2</td>
</tr>
<tr>
<td>Kitchen Sink</td>
<td>1</td>
</tr>
<tr>
<td>With food grinder</td>
<td>2</td>
</tr>
<tr>
<td>Lavatory</td>
<td>2</td>
</tr>
<tr>
<td>Shower Group, per head</td>
<td>3</td>
</tr>
<tr>
<td>Sinks, commercial</td>
<td></td>
</tr>
<tr>
<td>-Surgeon’s</td>
<td>3</td>
</tr>
<tr>
<td>-Flushing Rim (with valve)</td>
<td>8</td>
</tr>
<tr>
<td>-Service</td>
<td>3</td>
</tr>
<tr>
<td>-Pot (scullery, etc.)</td>
<td>4</td>
</tr>
<tr>
<td>Urinals</td>
<td>4</td>
</tr>
<tr>
<td>Washer, clothes</td>
<td>4</td>
</tr>
<tr>
<td>Water Closets</td>
<td></td>
</tr>
<tr>
<td>-Tank Operated</td>
<td>4</td>
</tr>
<tr>
<td>-Valve Operated</td>
<td>8</td>
</tr>
</tbody>
</table>
### TABLE 8.3
PEAK WASTEWATER FLOWS BASED ON FIXTURE UNITS

<table>
<thead>
<tr>
<th>FIXTURE UNITS</th>
<th>PEAK DEMAND (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>125</td>
</tr>
<tr>
<td>1000</td>
<td>215</td>
</tr>
<tr>
<td>1500</td>
<td>300</td>
</tr>
<tr>
<td>2000</td>
<td>330</td>
</tr>
<tr>
<td>2500</td>
<td>380</td>
</tr>
<tr>
<td>3000</td>
<td>420</td>
</tr>
<tr>
<td>3500</td>
<td>490</td>
</tr>
<tr>
<td>4000</td>
<td>560</td>
</tr>
<tr>
<td>4500</td>
<td>630</td>
</tr>
<tr>
<td>5000</td>
<td>700</td>
</tr>
<tr>
<td>6000</td>
<td>840</td>
</tr>
<tr>
<td>7000</td>
<td>980</td>
</tr>
<tr>
<td>8000</td>
<td>1120</td>
</tr>
<tr>
<td>9000</td>
<td>1260</td>
</tr>
<tr>
<td>10000</td>
<td>1330</td>
</tr>
</tbody>
</table>

### TABLE 8.4
AVERAGE WASTEWATER GENERATIONS

<table>
<thead>
<tr>
<th>USE</th>
<th>AVERAGE FLOW GPD/CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>100</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>- Office</td>
<td>50</td>
</tr>
<tr>
<td>- Retail</td>
<td>25</td>
</tr>
<tr>
<td>- Hotel/Motel</td>
<td>50 *</td>
</tr>
<tr>
<td>- Restaurants</td>
<td>600 GPD/1000 SF</td>
</tr>
<tr>
<td>Institutional</td>
<td></td>
</tr>
<tr>
<td>- Schools</td>
<td>35</td>
</tr>
<tr>
<td>- Hospitals</td>
<td>200</td>
</tr>
<tr>
<td>Industrial</td>
<td>50</td>
</tr>
</tbody>
</table>

* Does not include restaurants or other ancillary