INFRASTRUCTURE DESIGN STANDARDS, SPECIFICATIONS AND DETAILS

Proposed Adoption Date: March 2023

Contents

CHAPTER 1. INTRODUCTION

100. GENERAL PROVISIONS.

100.1 The City of Caldwell Infrastructure Design Standards, Standard Specifications, and Standard Details outline specific minimum planning, engineering, construction and policy provisions that shall be used for the improvement, development and subdivision of land within the City of Caldwell corporate limits and extraterritorial jurisdiction. This document is intended to be used jointly with the City of Caldwell Subdivision Ordinance, and other applicable Federal, State and local regulations. The Subdivider or his Engineer may propose more stringent criteria than those specified in these regulations and may use details and specifications other than the City's Standard Details and Standard Specifications, but shall be responsible for ensuring that all provisions included in the City's standards are met unless a specific variance has been granted.

CHAPTER 2. PUBLIC EASEMENT STANDARDS

200. UTILITY EASEMENTS.

200.1 Easement Criteria. Easements shall be provided as required by the Subdivision Ordinance. The location and placement of easements shall be coordinated with the City of Caldwell.

200.2 Utilities. All new utilities shall be placed and constructed within designated public easements or street rights-of-way. In general, all underground utilities shall be buried outside of the finished pavement grade of the street.

200.3 Easement Widths. Utility easements must adhere to the following width requirements:

a. Utility easements shall be dedicated adjacent to all streets and must be at least fifteen (15) feet in width along both sides of the street.

b. Utility easements that are not adjacent to streets must be at least twenty (20) feet in width for utility construction, service, and maintenance.

c. Utility easements located along the rear or side of lots which abut each other shall be twenty (20) feet in width, taken ten (10) feet from each lot.

d. Where a proposed subdivision adjoins an unplatted area, the full twenty (20) foot width of easement may be required along the side of the lots adjoining the unplatted area.

e. Where aerial electrical utilities will be installed, these utility easements shall be a minimum of twenty (20) feet in width and an additional five (5) foot wide anchor and guy easement is required where necessary to anchor overhead utility lines.

f. Where any public or private utility line is required by the developer to be adjusted in location or elevation, the developer shall cause such changes to be made with the approval of the appropriate city representatives and shall bear all costs of such changes.

g. Easements with multiple utilities may require additional width.

h. Additional easements may be required for the placement of guy wires where utility easements are not straight within each block, or if such easements do not connect directly with adjoining blocks.

200.4 Placement. The placement, arrangement and depth of utilities within easements shall be subject to approval by the City Engineer.

200.5 Requirements. No structure, foundation, slab or other improvement shall be placed within any dedicated public easement without written permission from the City. Utility easements may be fenced if unlocked gates or easily removable panels are provided to allow free movement of excavating machines, maintenance equipment, and personnel through the full length of the easement.

201. ACCESS EASEMENTS.

201.1 Emergency access (fire lane) easements. Emergency Access Easements shall be provided as required by the City. These easements shall meet the City's Fire Code. Any emergency access easement shall either connect at each end to a dedicated public street or be provided with a turnaround having a minimum diameter of eighty feet (80') with an additional distance of ten feet (10') on all sides clear of permanent structures. The driving surface within emergency access easements shall be designed and constructed according to standards

established for local public streets. All structures shall be located within one hundred fifty feet (150') of a dedicated and improved emergency access easement or public street.

201.2 Vehicular access easements. Vehicular access easements may be required to facilitate the sharing of curb cuts between adjacent owners of property fronting on collector and/or arterial streets. Vehicular access easements may also be used to provide access for properties which do not have direct frontage on public rights-of-way. Driveways in such easements shall be constructed using the same standards as alleys.

201.3 Pedestrian access easements. Pedestrian easements may be required where deemed necessary by the planning and zoning commission or staff to provide pedestrian circulation within the subdivision or access to schools, shopping centers, recreation, transportation, or other community facilities. Such easements shall be at least ten feet in width and include a minimum four-foot sidewalk.

201.4 Maintenance Easements. *Maintenance easements.*

a) Dedication of a maintenance easement shall be required on subdivision plats for properties intended for zero lot line/patio home development. The maintenance easement shall be a minimum of seven and one-half feet in width and extend along the entire length of the side (zero) lot line to which it is adjacent.

b) A note on the subdivision plat shall read: "Maintenance easements shown hereon shall be perpetual private access easements in favor of the lots on which a zero-lot line/patio homes are planned at the boundaries to which these easements are adjacent."

202. DRAINAGE/FLOODWAY EASEMENTS

Drainage easements shall be provided as required by the Flood Damage and Prevention Ordinance and Subdivision Ordinance along all watercourses, city designated floodways, drainageways, natural channels or streams.

CHAPTER 3. CONSTRUCTION PLANNING STANDARDS

300. GENERAL.

Prior to the construction of any facilities related to the improvement, development or subdivision of land, construction plans and specifications showing sufficient detail shall be submitted to the City and appropriate reviewing agencies for approval. No construction activities shall begin prior to approval.

301. DESIGN CRITERIA.

The minimum design criteria to be utilized in the preparation of detailed plans and specifications are those outlined by this document, the City of Caldwell Subdivision Ordinance, Infrastructure Design Standards, Standard Specifications, Standard Details, Building Codes and other applicable Federal, State and local regulations. Other considerations shall include the application of generally accepted engineering standards of practice where specific criteria are not mandated.

302. PROFESSIONAL PREPARATION.

All plans and specifications for public infrastructure shall be prepared under the direction of a Registered Professional Engineer licensed to practice in the State of Texas. All plans, specifications and studies shall bear the seal, signature and date of preparation by the engineer. Subdivision and survey plats shall be prepared by a Registered Professional Land Surveyor licensed to practice in the State of Texas and bear that individual's seal, signature and date.

303. APPROVALS.

All plans and specifications prepared for review shall receive approval from the City and applicable State and Federal agencies. Water and wastewater plans and specifications shall receive approval from the Texas Commission on Environmental Quality, or its successor. Other agency approvals shall be obtained as individual projects may dictate.

304. STORMWATER POLLUTION PREVENTION.

All projects subject to the National Pollutant Discharge Elimination System (NPDES) shall be properly engineered and permitted in accordance with applicable regulations. Provisions to mitigate erosion and control silt problems shall be included in the detailed plans and/or specifications whether or not a NPDES permit is required.

305. OTHER PERMITS.

Prior to construction, all required permits shall be obtained from the Texas Department of Transportation, Texas Commission on Environmental Quality, Environmental Protection Agency, Corps of Engineers, Burleson County, railroad companies, pipeline companies and other affected authorities.

306. ENVIRONMENTAL CLEARANCE.

On all projects requiring environmental clearance, the necessary documentation, including

assessment or impact statement, shall be completed and approved prior to start of construction.

CHAPTER 4. WATER SYSTEM STANDARDS

400. GENERAL PROVISIONS

400.1 The developer shall provide public water access to every lot the developer creates.

400.2 The developer shall design and construct all water supply, distribution, pumping, and storage improvements according to this chapter, the City's Construction Specifications, and the Texas Commission on Environmental Quality (TCEQ) regulations.

400.3 Approval of Water System. The City shall not approve the final plat until the water system plans are approved by the Texas Commission on Environmental Quality.

401. DESIGN CRITERIA.

401.1 Minimum Size, Looped. All water mains shall be a minimum of six inches (6") in size and shall be constructed of PVC pipe rated for fire protection service. All water mains shall be looped, except in the case of temporary dead ends where provisions shall be made for future extension.

401.2 Provision for Future Extensions. All water lines shall be extended, where necessary, to the borders of the development for future extensions of the distribution system. The City may participate in the cost of oversizing lines required to serve land areas or improvements beyond the development.

401.3 Fire Hydrants. Fire hydrants shall be installed as part of the water distribution system. In residential areas, fire hydrants shall be served by a main line of six inches (6") or larger and shall be located at a distance of no greater than five hundred feet (500') on a clear path to each residence. In commercial and industrial areas, main lines shall be eight inches (8") or larger, and fire hydrants shall be located at a distance of no greater than three hundred feet (300') on a clear path to each structure.

401.4 Fire Suppression. Fire suppression service 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. Only one connection allowed to City main per building. No looping of fire suppression service lines shall be allowed.

401.5 Valves. Valves shall be installed at the intersections of all water mains. The minimum number of valves shall be one less than the number of lines at the intersection. In-line valves shall be installed at approximately one-thousand-foot (1000') intervals.

401.6 Depth of Cover. The depth of cover of water mains shall be a minimum of forty- two inches (42") below finished grade or if finished grade cannot be determined, 48' below existing grade.

401.7 Backfill. Trenches for all lines, including all service laterals, installed across proposed or future paved areas shall be backfilled with soil having a P.I. between 5 and 20 and compacted to 95% Standard Proctor.

401.8 Air Relief Valves. Air release valves and/or air vacuum relief valves shall be installed at critical water line high points.

401.9 Flush Valves. Blow-offs or flushing valves shall be installed at critical water line low points and dead ends.

402. INDIVIDUAL SERVICES

402.1 Water services shall be in accordance herein:

(1) Service connections shall be installed and marked by stake (water "taps") for each unit (dwelling or commercial/industrial) in the development intended for individual ownership at the time of construction of new water improvements.

(2) If individual utility connections for apartments or accessory dwellings are desired, service connections shall be installed for each unit at the time of construction of new water improvements.

(3) Such service connections shall be the appropriate size to serve the intended use of the property, as approved by the City, and shall extend from the public water main to the lot property line or utility easement line, as the case may be.

(4) All corporation stops, service piping, curb stops, meter boxes and vaults and any other material required for the connection shall be included in the service connection installation.

402.2 Individual meter services and fire lines will not be taken from transmission lines. Transmission lines are generally considered to be 24 inches in diameter or larger.

402.3 Water meters shall be placed within the public ROW or in an easement immediately adjacent to the ROW. Meters may not be located inside fences and must be accessible by vehicle. Water meter boxes and its appurtenances are not allowed in sidewalks, paved areas, driveways or load bearing pavement.

402.4 Service taps to the main shall have a minimum separation distance of 3 feet.

402.5 Service taps, regardless of type, shall not be made in vaults.

402.6 Domestic water services shall not be supplied from fire hydrant leads.

403. WATER METERS

403.1 Properties with two, three, or four individual dwelling units (attached or detached) shall have an individual COCU water meter serving each dwelling unit. Dwelling units are defined as a residential unit providing independent living facilities. Accessory uses defined in the City's Code, are not viewed as dwelling units and will not be required to provide multiple meters.

403.2 Commercial and Multi-family separate meter requirements:

(1) Except as provided by subsection b. of this section, commercial and multi-family properties shall purchase and install a separate COCU meter or meters to measure water used for all common areas and outdoor purposes, including swimming pools, fountains, permanently installed irrigation systems, and irrigation with quick-coupler hose bibbs.

(2) Upon receipt of a completed application on a form approved by COCU, COCU may grant a waiver from this requirement if:

a. The development does not include any landscaping; or

b. A permanent automatic irrigation system does not exist nor is planned to be installed and multiple hose bibs are available for any necessary hand watering; or

c. Commercial landscaping requirements do not apply to the property; or

d. There is impervious cover of 90% or more; or

e. The water is being used for a new fire in-line installation; or

f. Air conditioning condensate or other alternative on-site water is being required to meet common areas and outdoor water demands; or

g. There has been a change of use for interior remodeling; or

h. Well water is being used to meet all common areas and outdoor water demands.

(3) For properties with five or more attached or detached living units on a single lot, including mobile home communities, commercial facilities with multiple occupants, and/or multi-use facilities, that do not have public water meters for each unit, owners must comply with private submetering requirements established by plumbing code and/or TCEQ.

403.3 Requirements for meters 3 inches and larger:

(1) Bypasses shall be provided on all meters 3 inches and larger except those used for irrigation only.

(2) Pipe and meter size shall be determined by Owner based upon plumbing code and COCUWA Water Meter Standards. Plans must be prepared by a Licensed Engineer Registered in the State of Texas.

403.4 Fire Demand Meters (4"×2", 6"×2", 8"×2", 10"×2", 12"×2") shall be allowed only if domestic demand necessitates a domestic meter of 3 inches or larger. If domestic demand does not require a 3 inches or larger meter, required fire flow shall be provided via an appropriately sized dedicated fire line with a double check detector backflow prevention assembly per COCU Standard Detail. For small fire demand applications where both fire demand and domestic demand can be provided with 2 inches or smaller meter, a single meter may be used for both fire and domestic.

404. WATER MAINS

404.1 A 4 inch line may be allowed for permanent dead-end mains not exceeding 500 feet.

404.2 A 6 inch main may be allowed up to a maximum of 1500 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.

404.3 TCEQ rules shall dictate the number of services allowed on the smaller sized line.

405. FIRE HYDRANTS

405.1 Hydrants shall be installed at the intersection of two streets and between intersections where necessary, at distances not in excess of 300 feet between hydrants in commercial or other high-density areas and not more than 500 feet in residential areas.

405.2 Hydrants shall be installed on both sides of all divided road/highways to provide adequate firefighting coverage. Roads/highways where opposing lanes of traffic are separated by a vehicle obstruction shall be considered a divided road/highway.

405.3 The entire fire hydrant assembly shall have restrained joints.

405.4 Fire hydrants shall not be designed to be within 9 feet in any direction of any wastewater

main, lateral, or service regardless of material of construction.

405.5 Fire hydrants shall be designed so as not to interfere with sidewalk ramps, trash receptacles, and street light and signal pole foundations.

405.6 To avoid sidewalks, ramps, and other features, fire hydrants placed near a street corner should in general be located outside the curve radius and a minimum of 4 feet from ramps. Exceptions may apply in existing neighborhoods or long (>5 feet) radius curb return.

405.7 Placement of fire hydrants should take into consideration above ground improvements, landscaping, critical root zones, grades and other utilities.

405.8 In existing neighborhoods, new fire hydrants should be placed as close as possible to the existing fire hydrant locations with the exception of new hydrants needed to meet minimum spacing requirements.

405.9 Fire hydrants should be placed on the short side of the street where possible unless there are site constraints.

405.10 When fire hydrants are subjected to pressures above 150 psi, they shall have an attached PRV installed and set to reduce the operating pressure of the fire hydrants below 150 psi.

405.11 When new water lines are installed along with new fire hydrant leads, the drawings shall indicate existing fire hydrants are to be replaced with a new one, if the existing fire hydrant is older than 10 years old.

405.12 Fire Hydrants shall not be designed in such a manner as to provide fire flow for developments served by other water utility service providers.

CHAPTER 5. WASTEWATER SYSTEM STANDARDS

500. GENERAL PROVISIONS.

500.1 Sanitary sewer improvements shall be designed and constructed in accordance with this chapter, the City's Standard Details, Standard Specifications and the Texas Commission on Environmental Quality (TCEQ) regulations.

500.2 Approval of Sanitary Sewer System. The City shall not approve the final plat until the sanitary sewer system plans are approved by the Texas Commission on Environmental Quality.

501. DESIGN CRITERIA.

501.1 Minimum Size. No public sewer line shall be less than six inches (6") inside diameter.

501.2 Future Extensions. All sewers shall be designed to serve both the subject property and the full sewershed area tributary to the sewer system. Where necessary, sewer lines shall be extended to the borders of the development to allow for future extensions of the collection system. The City may participate in the cost of any oversizing of lines required to serve land areas or improvements beyond the development.

501.3 Manholes. Manholes shall be installed at all intersections of sewers six inches (6") in diameter or larger and at intermediate spacings along the line. The maximum spacing shall be in accordance with the TCEQ "Design Criteria for Sewerage Systems." Manholes shall be installed at all changes in grade or direction and at the ends of all extendable sewers.

501.4 Alignment. Sewers shall be designed with straight alignment. If horizontal curvatures must be used, they shall meet TCEQ design guidelines.

501.5 Grades. Minimum and maximum grades shall be those outlined by the TCEQ "Design Criteria for Sewerage Systems."

501.6 Surface Water and Nondomestic Waste Prohibited. No connection shall be made to any sanitary sewerage system within the city that permits the entrance of surface water or waste of other than domestic sewage characteristics without the specific authorization by the City.

501.7 Backfill. Trenches for all lines, including all service laterals, installed across proposed or future paved areas shall be backfilled with soil having a P.I. between 5 and 20 and compacted to 95% Standard Proctor.

501.8 Lift Stations. Lift Stations or Separate Treatment facilities shall not be designed or constructed unless such lift stations or separate facilities are more beneficial to the City than constructing an adequate outfall or approach sewer from the existing system. All lift stations shall have dedicated emergency power constructed on-site. In determining benefit, the City shall consider power cost for operation, land costs and all other costs of lift stations based on a twenty-year (20-yr.) life.

501.9 Public Easements. All public sanitary sewer facilities shall be placed in public easements.

502. INDIVIDUAL SEWER SERVICE CONNECTIONS.

502.1 Service connections (sewer “taps”) shall be appropriately sized, installed and marked by stake for each lot or building in a development at the time of construction of sewer improvements. Services shall extend from the public sewer main to the lot property line or utility easement line.

502.2 Duplex and Multifamily Dwelling Units. Individual sanitary sewer service connections shall be installed for each dwelling unit in duplex or two-family buildings. Buildings containing more than two (2) dwelling units may provide a common sewerage collection system from the building.

502.3 Standards. Each service connection shall serve only one (1) building (no “sharing” of service connections). The individual service connections shall be a minimum of four inches (4") inside diameter and may extend to a common building sewer system or individually to the public sewer. A manhole connection to the public sewer is required for all service connections greater than four inches (4") inside diameter.

503. ALTERNATIVE SEWAGE TREATMENT FACILITIES.

503.1 Alternative sanitary sewage treatment systems shall consist of individual on-site sewage treatment systems or a common treatment and collection system to provide service to each lot. The TCEQ shall approve the plans for a separate sanitary sewage system prior to the final plat approval by the City. Nothing in this chapter shall be construed as permission to install on on-site sewage treatment system (including septic tanks) on an individual lot.

503.2 Variance Required. A variance from the requirement to provide a public sewage system may be granted by the City at the time of preliminary plat approval if it is determined that the municipal sewage system cannot be feasibly made available to the area of development. The City shall be provided with sufficient technical data (topography, soils, existing sewer system and construction costs) to demonstrate the proposed development’s need for an alternative to the public sanitary sewage treatment facilities. Alternative sewage treatment systems shall not be designed or constructed unless such facilities are more beneficial to the City than construction of an adequate system extended from and connected to the existing municipal system.

503.3 Approval by Texas Commission on Environmental Quality. The City shall not approve a final plat until an engineered sewage disposal plan has been approved by the TCEQ.

503.4 Dedication of Utility Easements. If the City allows on-site sewage treatment installations, utility easements shall be dedicated for the future installation of a municipal sewage system.

CHAPTER 6. STREET SYSTEM STANDARDS

600. GENERAL PRINCIPLES OF STREET SYSTEM LAYOUT.

600.1 Streets shall be located and aligned to conform to the standards and principles contained in the City's Master Thoroughfare Plan and Chapter 5 of the City's Comprehensive Plan. Streets shall be designated and designed according to their expected traffic capacity and function. Streets shall also be designed and constructed to achieve conformance with requirements of the City of Caldwell Subdivision Ordinance.

600.2 Dedication of Street Rights-of-Way.

a. The dedication and/or reservation for acquisition of pedestrian and/or vehicular rights-of-way shall be required of owners or developers of properties. This is necessary and desirable to lessen or control the impact upon the transportation system created by development.

b. Street right-of-way widths shall meet the requirements established in the subdivision ordinance. Minimum required right-of-way shall be determined by the functional classification of the road.

c. Street right-of-way shall be either dedicated by plat or deed to the city or the anticipated right-of-way area shall be reserved for future acquisition. If reserved for future acquisition, no physical improvements such as buildings, parking lots, landscaping or stormwater facilities shall be allowed within the area so reserved. All setbacks shall be calculated from the anticipated right-of- way line.

601. STREET ACCESS.

601.1 Direct Public Access. All public streets shall have direct access to another public street.

601.2 Primary Access. Primary access to large subdivisions, commercial tracts and industrial tracts shall be provided from public streets designed to carry fairly high traffic loads such as arterials and collectors. Residential tracts shall be protected from the adverse effects of through traffic by locating lots facing local streets.

601.3 Points of Access and Safety Lanes. All residential subdivisions shall have access to existing public streets. The number of points of access required shall be in accordance with the Subdivision Ordinance and the City's adopted Fire Code.

a. Manufactured home parks, recreational vehicle parks, apartments, multi-family, commercial and industrial areas shall have driving surfaces within the site designated and clearly identified as safety lanes or fire lanes for fire protection, EMS, etc. These areas must be paved with concrete or asphalt and be maintained by the owners. Exits from these sites must be onto a dedicated street. The pavement width for safety lanes shall be a minimum as required by the adopted building and fire codes but shall not be less than twenty feet (20').

b. Exits from single family residential areas shall be a minimum pavement width of twenty-four (24') feet.

c. All roadways that serve emergency vehicles are required to have a minimum clearance of fourteen feet (14') to any overhead obstructions including, but not limited to, bridges, trees, canopies, awnings and signs.

601.4 Limited Access. Access to arterial streets is limited as follows:

a. No lot in any subdivision shall create any lot abutting a designated arterial street that has a lot width parallel to the arterial street right-of-way line of less than two hundred (200) linear feet unless one of the following conditions is met:

(1) Access to the lot is limited to streets other than arterial streets, except that commercial and industrial developments should not be given access on residential streets;

(2) Access to the lot is provided jointly with other lots created as part of the same subdivision such that minimum driveway spacing, corner clearance and (pre-subdivision) property clearance requirements as provided in the Design Standards are met;

(3) Access to the lot is provided jointly with adjacent lot(s) not part of the same subdivision such that no additional driveways are created, and provided that, to the extent possible, minimum driveway spacing, corner clearance and (combined) property clearance requirements as provided in the Design Standards are satisfied by the combination of lots served by the existing or relocated joint access driveway; or

(4) Access to the lot is ultimately to be provided from a frontage road (paralleling the arterial) which has been planned and officially approved by the participating agencies, and right-of-way dedication along the arterial street adjacent to the lot totals at least one hundred (100) feet from the arterial street centerline or any other distance designated on the approved plans.

b. Whenever a residential subdivision abuts or contains an existing or proposed arterial street, direct access to such arterial street shall be prohibited. One or more of the following means shall be utilized to limit access to the residential lots:

601.5 Subdivision lots back onto the arterial and front onto a parallel local street. In such cases the words “Access Prohibited” shall be placed in the applicable areas on the face of the final plat and a six (6) foot opaque screening fence shall be erected along the property line of all residential lots abutting the arterial street.

(1) Subdivision lots are on a series of cul-de-sacs, U-shaped streets, or short loops entered from and designed generally at right angles to a parallel local street, with the rear line of their terminal lots backing onto the arterial street. In such cases the words “Access Prohibited” shall be placed in the applicable areas on the face of the final plat and a six (6) foot opaque screening fence shall be erected along the property line of all residential lots abutting the arterial street.

(2) An access or service road separated from the arterial by a planting or grass strip and having access thereto at suitable points.

602. LOCATION OF PUBLIC STREETS.

602.1 A design for the system of streets shall be submitted with the preliminary plat. Certain streets should be planned to carry large volumes of through traffic (arterials, collectors) while other streets (locals) should be laid out to provide access within a development. Arterial and collector streets, if located within a residential subdivision, should follow the continuity of

City streets leading to or from the tract and should provide for extensions into adjacent tracts. The City shall approve the final location of all public streets.

602.2 Local streets shall be designed to service only the development in which they are contained. Local streets shall:

a. Create building lots of desirable elevation, size shape and orientation;

b. Discourage through traffic;

c. Ensure access by firemen, police and other emergency services to all areas of the tract; and

d. Ensure vision clearance.

603. INTERSECTION OF PUBLIC STREETS.

603.1 Local to Collector/Arterial Intersections. Local streets intersecting a collector or arterial street shall have a tangent section of centerline at least fifty (50) feet in length, measured from the right-of-way line of the higher traffic volume street; however, no such tangent is required if the minor street curve has a centerline radius greater than four hundred (400) feet with the center located in the high traffic volume street right-of-way.

603.2 Visibility Triangle.

a) A visibility triangle shall be provided at all intersecting streets in accordance with the Subdivision Ordinance.

b) On a corner lot, nothing shall be erected, placed, planted, or allowed to grow in such a manner as materially to interfere with traffic visibility across the corner.

c) This visibility area shall be a forty-five (45°) degree angle in each direction formed by the intersection of the right-of-way lines from the point of intersection for a distance of twenty feet (20') and extending vertically in which nothing is erected, placed, planted, or allowed to grow between a height of three feet (3') and eight feet (8') above any portion of the crown of the adjacent roadways in such a manner as to limit or obstruct the sight distance of motorists entering or leaving the intersection. Vegetation should not drop to less than ten (10') feet from the crown of the adjacent roadways.

604. PEDESTRIAN AND BICYCLE INFRASTRUCTURE

Developers shall consider the goals, objectives and recommendations contained in Chapter 5 of the City's Comprehensive Plan regarding the expansion of sidewalks and bicycle infrastructure as applicable to the development.

605. SIDEWALKS

Sidewalks shall be installed in accordance with the requirements of the Subdivision Ordinance.

606. ALLEYS

The developer shall construct private and/or public alleys that meet or exceed street standards

contained in this chapter and the City's Subdivision Ordinance.

607. CUL-DE-SAC AND DEAD-END PUBLIC STREETS

607.1 The developer shall design cul-de-sac streets to prohibit future extensions by arranging lots around the turnaround. The developer shall construct a circular turnaround conforming to City standards for all cul-de-sac and dead-end public streets contained in the Subdivision Ordinance.

607.2 The developer shall not design or construct a dead-end street unless it is intended to connect with a future street on adjacent land. The developer shall construct temporary turnarounds within the standard right-of-way at the end of any dead-end street. In a commercial/industrial development, however, the City Council may waive construction of a temporary turnaround if adequate alternatives are available for vehicles to turn around.

608. GATED STREETS

When a residential street is gated to limit access to the street and/or its subdivision to residents and their guests, the developer must ensure, through homeowner's association bylaws or another means acceptable to the City, that provisions are in place to provide the City with permanent access to the street and/or subdivision gate(s) for solid waste collection, emergency and police response, utility readings and repair, and any other reason for which the City or its agents may need to enter the street and/or subdivision in a timely manner. The developer must also ensure that provisions regarding all maintenance and repairs to the gate and street is maintained by the homeowner's association.

609. STREET NAMES.

609.1 Public Street Names.

a. Public street names shall be subject to the approval of the City and named in conformance with the Burleson County Addressing Standards and Procedures and the following additional criteria:

(1) Signs shall be provided for all public streets; the signs shall conform in size, height and material to City standards.

(2) The background color for any public street sign in the City shall be green. This standard may be varied from in the Downtown Area if the City adopts differing standards in a Downtown Design Plan or Downtown Master Plan.

(3) No public street name shall be changed without approval of the City.

609.2 Private Street Names.

. Private street names shall conform to the same standards applicable to public street names and the following additional criteria:

(1) Signs shall be provided for all private streets; the signs shall conform in size, height and material to City standards.

(2) The suffix "PRIVATE" shall be an integral part of any street sign example: ROSE LANE (PRIVATE).

(3) The background color for any private street sign shall be white.

(4) No private street name shall be changed without approval of the City.

(5) No private street sign shall be installed without the approval of the City.

a. Private street signs not established in conformance with the provisions of this section and installed within the right-of-way of any public street may be removed from the public street right-of-way without notice.

610. GEOMETRIC CRITERIA.

610.1 Public streets shall be designed according to the minimum cross-sections shown in Figures 6-2 through 6-5 on file in the office of the city secretary.

610.2 Reserve strips controlling access to streets are prohibited.

610.3 Street jogs with centerline offsets of less than one hundred and twenty-five (125) feet shall be avoided.

610.4 A tangent at least one hundred (100) feet long shall be introduced between reverse curves on arterial and collector streets.

610.5 Streets shall be laid out so as to intersect as nearly as possible at right angles. Variations of more than ten (10) degrees on local streets and more than five (5) degrees on arterial or collector streets are not allowed.

610.6 Property lines at street and alley intersections will be constructed on a curvature of a minimum of twenty (20) feet tangent from the point of intersection of the intersecting lines.

611. CONSTRUCTION STANDARDS AND SPECIFICATIONS.

611.1 All public streets shall be constructed in accordance with the City's Standard Details and Standard Specifications.

611.2 Noncurb and Gutter Alternative for Local Residential Streets. Noncurbed and guttered paved streets may be provided in residential subdivisions as defined in the Subdivision Ordinance.

611.3 Pavement With Alternatives for Local Commercial Streets. With City approval, local commercial streets may be constructed with reduced pavement width if "No Parking" signs are furnished and installed in accordance with City standards. Pavement width may be reduced to a minimum of twenty-eight feet (28'), back of curb to back of curb; provided, however, that increased driveway and intersection radii may be required for truck turning movements.

611.4 Pavement Alternative for Low Density, Rural Subdivisions. Residential subdivisions located in the extraterritorial jurisdiction (ETJ) of the City may provide streets constructed according to the rural street standards contained in Figure 6-5 on file in the office of the city secretary.

611.5

TABLE 6-3 GEOMETRIC DESIGN CRITERIA FOR PUBLIC STREETS

STANDARD CATEGORY	STREET CLASSIFICATION

	ARTERIAL	COLLECTOR	LOCAL
Maximum Grade (in %)	6[1]	8[1]	10
Minimum Grade (in %)	0.35	0.35	0.35
Minimum Center Line Curve Radius (in feet)	1,000	800	300
Minimum Length of Vertical Curves (in feet)[2]	300	100	100
Minimum Sight Distance (in feet)	400	250	250
Minimum Tangent Length Between Curves (in Feet)	300	200	100
Curb Return Radii (in feet)[3]	30	25	20

611.6 Where existing topography makes conformance to these grades impractical consideration may be given to allowing an additional two percent (2%) increase in grade for a distance of five hundred feet (500') or less.

611.7 Arterial - or fifty (50) times the algebraic difference in grades; whichever is greater. Collector or local - or twenty (20) times the algebraic difference in grades; whichever is greater.

611.8 Acute angle intersection shall have twenty-five-foot (25') radii.

611.9 Alternative designs using superelevation and other generally accepted transportation methods to reduce radii will be considered by the City on a case-by-case basis.

612. STREET STRUCTURAL THICKNESS DESIGN.

612.1 Engineered Design of Street Structural Section.

. Except as provided by this document, a registered engineer shall design the street structural sections (structural thickness) in accordance with:

(1) American Association of State Highway & Transportation Officials (AASHTO), Flexible-Pavement Design Method;

(2) Asphalt Institute Design Method;

(3) Portland Cement Association, Rigid Pavement Design Method; or

(4) Any other design methods not specifically mentioned in this manual may be used, with prior approval of the City.

a. The street structural section design shall be based on the total number and weight (plus configuration) of the axles expected to go over the street section during a design life of twenty (20) years. The concept of “Equivalent Axle Loadings” shall be used to express the total number and mixture of loadings that will occur during the street section’s expected life. If a roadway is proposed, it will be designated as an arterial, collector or local and the street structural section design shall be based on the loadings shown in Table 6-4, Street Design by Equivalent Axle Loads.

612.2

TABLE 6-4 STREET DESIGN BY EQUIVALENT AXLE LOADS (20-YEAR DESIGN LIFE)	
STREET CLASSIFICATION	**AXLE LOADS EQUIVALENT TO 18,000 LBS.**
Arterial	5,000,000
Collector	400,000
Local (Commercial/Industrial)	400,000
Local (Residential)	9,000

612.3 Standard Structural Section Design for Paved Local Streets.

. In lieu of a designed street structural section, local street pavement sections may be designed as follows:

(1) One- and one-half-inch (1.5") hot mix asphaltic concrete (H.M.A.C.), six-inch (6") flexible base, six-inch (6") stabilized subgrade, where necessary.

(2) Six-inch (6") H.M.A.C., six-inch (6") stabilized subgrade, where necessary.

(3) Six-inch (6") reinforced Portland cement concrete, six-inch (6") stabilized subgrade, where necessary.

612.4 Soils Testing and Subgrade Stabilization.

a. A soil test report for each 1,000 square yards of paved surface proposed or for each type of soil encountered in the subgrade shall be submitted to the City.

b. The following data as part of the soil test report shall be submitted to the City:

i. Soil classification;

ii. Optimum moisture/density (Modified Proctor, ASTM D-1557);

iii. Atterberg Liquid Limits and Plasticity Index (P.I.);

iv. Stabilization requirements for subgrade soil (percent lime for clay or percent cement for sandy soils), if street structural section is to be designed by an engineer;

c. All tests shall be performed by a certified testing laboratory.

d. All subgrade soils with a P.I. of seventeen (17) or more shall be stabilized.

e. If the standard structural section design for paved local streets is used, five percent (5%) lime by weight may be used; otherwise,

f. A certified testing laboratory shall conduct lime (or other approved material) series test to determine the percent of stabilizing agent necessary to lower the P.I. below seventeen (17).

g. All subgrade soils with a P.I. under seventeen (17) shall be stabilized with five percent (5%) by weight Portland cement.

h. Subgrade soils evaluation shall generally apply to the top six inches (6") of soil measured down from the proposed subgrade surface.

612.5 Other Basic Criteria.

a. All subgrade materials shall be compacted to ninety-five percent (95%) relative density, Standard Proctor Test (ASTM D-698).

b. All individual layers of base and paving materials shall be compacted to ninety-five percent (95%) relative density, Modified Proctor Test (ASTM D-1557).

c. The total design thickness of the street structural section shall be rounded up to the nearest whole inch.

d. The total thickness of an asphaltic concrete pavement may be divided into different grades of material. Unless otherwise approved by the City, Type "D" Hot Mix Asphaltic Concrete (H.M.A.C.) per Item 340 Texas Department of Transportation Standard Specifications, shall be used for a surface course.

e. Asphaltic concrete pavement shall be laid in lifts of no more than three (3) or less than one and one-half (1-1/2) inches each, unless otherwise approved by the City.

f. The area shall be completely cleared and grubbed within the street right-of- way prior to construction of any street improvements.

g. The design requirements set forth in this chapter are minimum design standards. The City reserves the right to require additional precautions or treatments consistent with sound engineering practice to provide for conditions not specifically covered herein.

h. Any other design methods not specifically mentioned in this document may be used with prior approval by the City.

612.6 Construction Quality Control and Material Testing.

a. Construction quality control and material testing shall be performed and the results shall be provided to the City to verify acceptability of specific work.

b. All tests and retests shall be by an approved commercial testing laboratory. All related costs shall be the developer's responsibility.

c. Copies of all materials test reports shall be submitted to the City.

d. Subgrade shall be tested a minimum of every three hundred feet (300') for density and depth. The job mix formula shall be designed in accordance with

Texas Department of Transportation standards.

e. Hot mix shall be tested a minimum of every three hundred feet (300') for density and depth. The job mix formula shall be designed in accordance with Texas Department of Transportation standards.

f. Surface course thickness shall be tested by the coring method.

g. Concrete shall be tested for compressive strength at seven (7) and twenty-eight (28) days. One (1) set of cylinders three (3) shall be tested for each 1,000 square yards of pavement. Structures shall be tested on the basis of one (1) set per one hundred (100) cubic yards.

h. Concrete pavement shall be tested by coring a minimum of every 1,000 feet for thickness. A minimum of three (3) tests is required.

613. STREET LIGHTING AND LANDSCAPING STANDARDS.

613.1 Location. Streetlights shall be installed at all street intersections, at the end of all cul-de-sac or dead-end streets, and at all significant changes in direction of the roadway. All streetlights shall be installed in accordance to Table 6-5, Street Lighting Intensity.

TABLE 6-5 STREET LIGHTING INTENSITY

STREET CLASSIFICATION	MINIMUM LIGHTING INTENSITY IN FOOTCANDLES (FC) @ PAVEMENT LEVEL
Arterial	1.0
Collector	1.0
Local Commercial	1.0
Local Residential	0.2
Private Street	0.2

613.2 Installation. Streetlights shall be mast arm mounted to the light pole. If the electrical system for the development is installed underground, the electrical service to the streetlights shall also be underground. If the electrical system for the development is overhead wires with power poles located along the rear lot lines, the electrical service to the streetlights shall be underground. If the power poles are located adjacent to the street, the electrical service to the streetlights may be overhead and the streetlight mast arms may be mounted on the power poles provided that the required lighting intensity is maintained.

613.3 Median Landscaping.

a. Landscaping required. When medians, parkways and other unpaved portions of rights-of-ways are dedicated to the city, the developer shall have the initial responsibility of landscaping at the time of development of the subdivision.

b. Limitations on landscaping. Unpaved portions of rights-of-ways shall be landscaped with live vegetative cover. In the event that the developer desires additional landscaping in any median, parkway or walled parkway, the trees, shrubs and other landscape materials to be installed shall not obstruct the visibility of motor vehicles at intersections or points of ingress and egress. No landscaping which exceeds an elevation of the top-of-curb plus two (2) feet shall be allowed in such areas, except for single trunk trees pruned to a height of seven (7) feet. These trees are to be of such size and so spaced that no visual obstruction that represents a traffic hazard is created.

c. Adequate provisions shall be made by the developer for the maintenance of landscaped medians, parkways or other public rights-of-way therein to rest with the subdivisions in perpetuity. Generally, a homeowner's association (HOA) will be responsible for maintenance of landscaped medians.

CHAPTER 7. PARKING LOT AND DRIVEWAY STANDARDS

700. PARKING LOTS.

700.1 Parking Lots.

. All parking lots, parking spaces, maneuvering aisles, loading areas and driveways shall be paved with an all-weather surface. Such all-weather surface shall consist, at a minimum of six inches (6") of approved crushed rock base material on compacted or undisturbed subgrade. If such parking lots, spaces, aisles and loading areas are to be paved with asphalt or concrete, the base of such paving shall be the same as, or the approved equivalent to, the all-weather surfacing required above.

a. Location, size and number of handicapped parking spaces shall conform to the latest building codes, State and Federal laws, including the Americans with Disabilities Act (ADA).

b. If a development contains ten (10) or more parking spaces, up to ten percent (10%) of those spaces may be designed for "compact cars." Effective stall dimensions shall be a minimum of 7.5 feet by 15 feet and each space shall be signed "COMPACT CARS ONLY."

c. All parking spaces whether in a lot consisting of an all-weather surface or a paved surface shall be clearly delineated and designated by means of painted stripes, wheel stops, signs or other approved methods.

d. Parking lots and loading areas shall be designed to allow all vehicle maneuvers such as backing, parking and turning the vehicle, to take place on the lot.

700.2 Off-Street Loading Requirements.

. Any use that receives or distributes materials or merchandise by vehicle shall provide at least one off-street loading space.

a. The required off-street loading spaces shall be located on the same lot as the building or use served.

b. A loading space shall contain a minimum of 420 square feet and shall be approximately twelve feet (12') in width and thirty-five feet (35') in depth. All loading spaces, maneuvering aisles and driveways shall be paved with an all-weather surface.

701. DRIVEWAY DESIGN STANDARDS.

701.1 Driveway or other facilities for access to lots shall be designed, constructed, upgraded, reconstructed or repaired according to the standards of this section. Driveways shall be permitted only upon streets where full street improvements exist and are maintained as a public street by the City.

701.2 Location and Construction of Driveways. The location of driveways is based on a number of factors, including the location of individual property lines and available street frontage, requirements or internal site design, number of vehicles to be accommodated and traffic safety. As a general rule, the farther from an intersection a driveway can be located, the less it will affect the through traffic and the less delay it will cause to vehicles using the driveway.

. High volume driveway approaches shall be located entirely within the

frontage of the lot and not less than ten feet (10') from any side property line; provided, however, joint driveway approaches may be permitted where a permanent joint access is provided by the respective property owners either through platting or a mutual access easement (see 702.1.e). Low volume (residential) driveway approaches shall be located entirely within the lot dimensions and not less than five feet (5') from any side or rear property line.

a. Location of other driveways shall be considered on the opposite side of the street when locating a proposed driveway. Where possible, driveways on both sides of the street shall be aligned in order to minimize adverse effects on through traffic and to optimize efficiencies of the driveway. Driveways directly opposite each other shall be given preference over staggered driveways. Where it is not possible to place driveways directly opposite each other, a driveway shall be placed so that adequate left turn storage capacity is provided in advance of each driveway in order to avoid the overlap of left turn movements.

b. Driveway approaches shall be constructed so as not to interfere with pedestrian crosswalks.

c. Driveways shall be constructed a minimum of three feet (3') from any obstruction such as a streetlight or utility pole, fire hydrant, traffic signal controller, telephone junction box, etc.

701.3 When the owner or owners of two (2) adjacent lots agree to permanently combine access points, the City shall grant an incentive bonus. The total lot width normally required will be reduced by fifteen percent (15%) for each lot.

701.4 The maximum number of driveways per lot, based on the street classification and lot width shall be as shown in Table 7-1, Maximum Driveways per Lot.

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TABLE 7-1 MAXIMUM DRIVEWAYS PER LOT

STREET TYPE	LOT WIDTH	PERMITTED DRIVEWAYS
Local	< 100'	1
	101–200'	2
	Over 200'	1 per additional 100'
Collector	< 100'	1
	100–250'	2
	Over 250'	1 per additional 200'
Arterial	< 100'	1
	101–300'	2
	Over 300'	1 per additional 300'

701.5 Driveway Design. Driveway design will depend on the land use, the volume, the character of both through traffic and driveway traffic and the speed of traffic on the through street.

Dependent upon these factors, the critical design elements include radii of curb returns, driveway throat width and the angle between the driveway centerline and the edge of the roadway.

. Driveway entrances shall be designed to be able to accommodate all vehicle types having occasion to enter the lot, including delivery vehicles.

a. Driveways shall be designed with curb return radii according to the type of driveway and the classification of the street as provided in Table 7-2, Minimum Curb Return Radii.

b.

TABLE 7-2 MINIMUM CURB RETURN RADII

(IN FEET)

STREET CLASSIFICATION	LOW VOLUME DRIVEWAY	HIGH VOLUME DRIVEWAY
Local	5	10
Collector	5	10
Arterial	10	20

c. Tapered or channelized deceleration lanes for vehicles turning right into high volume or intersection type driveways may be required on arterial streets, in accordance with the Texas Department of Transportation standards and requirements. Where such lanes are necessary, additional right-of-way may also be required.

d. The use of one-way driveways, supported by an appropriate internal circulation system, is encouraged so that entrances and exits can be separate driveways. This will promote smoother traffic flow into and out of the driveways and reduce traffic congestion in through lanes on the street.

e. In some cases, where necessary for the safe and efficient movement of traffic, the City may require that special design techniques be employed to restrict or limit turning movements into or out of a driveway before the driveway can be approved. Such restrictions do not affect the number and location of access points as specified elsewhere. Deceleration lanes may also be required to be incorporated into the design.

701.6 Driveway design standards for sites that include fuel pumps parallel to the adjacent street are necessary due to the special access needs that characterize such developments. Sites shall be designed for fuel pumps according to the following standards:

. The minimum corner clearance shall be a distance of thirty-five feet (35') measured from the point of intersection right-of-way lines to the point of tangency of the curb return radii leading to the driveway approach. The point of tangency of the curbline corner radius and that of the curb return radius of the driveway approach shall not be compounded.

a. The minimum spacing between driveway approaches within the same property lines shall be twenty-five feet (25') of tangent curb length.

b. A minimum distance between the fuel pump island and the right-of-way or property line shall be twenty-five feet (25').

701.7 Restrictive Provisions.

. Access to public streets will not be provided where the conditions described below restrict or compromise the safety and efficiency of the access.

701.8 Backing Maneuvers.

. Access points shall not be approved for parking or loading areas that require backing maneuvers in a public street right-or-way except for single-family or duplex residential uses on local streets.

701.9 Signalized Intersections.

. Access drives within the area of intersection of public streets where traffic signals are installed, or are anticipated to be installed in the future, will not be permitted.

701.10 Provision of Access.

. If a lot has frontage on more than one (1) street, access will be permitted only on those street frontages where standards can be met. If a lot cannot be served by any access point meeting these standards, access point(s) shall be designated by the City based on traffic safety, operational needs and conformance to as much of the requirements or these guidelines as possible.

701.11 Driveway approaches shall not be constructed or used for the standing or parking of vehicles.

Driveway restrictions along expressway ramps;

(1) If a driveway provides access to and from expressway frontage roads, it shall not intersect the frontage road at any point along the curbline of the frontage road, or along the edge of the pavement within 250 feet downstream from an exit ramp measured in the direction of traffic flow on the frontage road, Figure 7-7 on file in the office of the city secretary. This distance is measured from a line perpendicular to the right curbline of the frontage road, drawn through the point of intersection of the right curbline of an exit ramp and left curbline of the frontage road, and located to minimize danger by the crossing, weaving and merging of traffic.

(2) If a driveway provides access to and from expressway frontage roads, it shall not intersect the frontage road at any point along the curbline of the frontage road, or along the edge of pavement if there is no curbline, within fifty feet (50') upstream of an entrance ramp, Figure 7-7 on file in the office of the city secretary. This distance is measured on the frontage road upstream from a line perpendicular to the right curbline of the frontage road upstream from a line perpendicular to the right curbline of the frontage road sic, drawn through the point of intersection of the right curbline of an entry ramp and the left curbline of the frontage road, and located to minimize danger created by the crossing, weaving and merging of traffic.

701.12 Driveway Construction.

. The portion of the driveway approach within the street right-of-way shall be paved with concrete or asphalt as follows:

701.13 Commercial, Multifamily or Industrial: All pavement shall be concrete.

701.14 Residential: All driveway pavement abutting curb and gutter streets shall be concrete.

. All driveway pavement abutting on noncurb and guttered streets may be concrete or asphalt.

a. Property owners developing multifamily, commercial or industrial driveways located on noncurbed and guttered streets are responsible for all culvert installations.

701.15 Abandoned Driveway Approaches. Whenever the use of any driveway approach is abandoned and not used for ingress and/or egress to the property abutting, it shall be the duty of the property owner of such abutting property to restore the curb according to the City's specifications.

CHAPTER 8. STORM DRAINAGE STANDARDS

800. GENERAL PROVISIONS.

800.1 Drainage facilities shall be designed and constructed in accordance with this chapter and the City's Standard Details and Standard Specifications. The following design criteria are the City's minimum methods and standards. Other hydrologic and hydraulic design methods may be used to satisfy drainage requirements with prior approval of the City. Development within FEMA designated floodplains shall be in accordance with applicable City ordinance.

800.2 Upstream Conditions. The developer shall design all drainage facilities based on potential and fully developed upstream conditions. A developer shall use a minimum runoff coefficient of 0.75 for all undeveloped upstream property

800.3 Protection of Downstream Properties. Downstream drainage improvement or a detention system shall be designed and constructed to protect downstream properties from any increase in stormwater runoff level. When detention storage is not proposed, downstream water surface elevations shall be determined for a one- hundred-year (100-yr.) design frequency storm in order to define the downstream flood hazards created by the proposed development.

800.4 Discharge Points. All drainage improvements shall be terminated at a discharge point approved by the City. Such discharge point, or outlet, shall be designed and constructed to prevent damage to or overflowing into adjacent property. The City may require creek improvement, channel lining, energy dissipaters or other improvements for such outlet to prevent erosion or increase the flow capacity.

800.5 Public Streets as Drainage Facilities.

. Maximum spread of water to be allowed in local streets at five-year design flow shall allow for one (1) clear lane of traffic twelve feet (12') wide.

a. Maximum spread of water in collector streets at ten-year (10 yr.) design flow shall allow for one (1) clear lane of traffic each way twelve feet (12') wide each.

b. Maximum spread of water in arterial streets at ten-year (10 yr.) design flow shall allow for two (2) clear lanes of traffic twenty-four feet (24') wide.

800.6 Drainage Channels and Structures.

a. An underground storm drain on curb and gutter streets shall be installed beginning at the point where the calculated stormwater runoff is of such a quantity that it exceeds the height specified above (see also Table 8-2). The storm drain system from this point shall be constructed to an approved outlet.

b. For noncurb and gutter streets open channel (channel or ditch) methods may be used to dispose of stormwater runoff of such a quantity that it exceeds the height specified above. Such channels may be in dedicated drainage easements outside the standard street right-of-way upon City approval of the location and alignment of such easements. Alternatively, the street right-of-way may be widened to accommodate an open channel of greater capacity than the standard street/ditch section.

c. If the channel is located in a widened street right-of-way, the City shall approve the right-of-way width and channel configuration.

d. All channels shall be designed and constructed to terminate at an approved outlet.

800.7 Habitable Structures. Adequate means for stormwater runoff in excess of the streets' "design storm" capacity i.e., five, ten-year (5, 10-yr.) storm shall be provided to flow around habitable structures.

. If adjacent topography rises away from the street, a grading/drainage plan shall be provided which shows that all building sites can provide a finished floor elevation:

(1) at least one foot (1') above the top of the curb using the highest point along the portion of such curb fronting the building site, or

(2) at least one foot (1') above the top of ditch elevation, using the highest point along the portion of such ditch fronting the building site.

(3) If adjacent topography falls away from the street, a grading/drainage plan shall be provided which shows that all building sites can provide a finished floor elevation at least one foot (1') above the ground elevation along all sides of the building site.

a. Provisions shall be made in the subdivision grading plan which will contain stormwater on each lot and discharge it to either the street or a drainageway at the rear of the lot. If necessary, drainage swales shall be constructed on the low side of each lot which will prevent stormwater migration to adjacent lots.

b. All streets shall be designed and constructed to minimize any fill required to bring building pads into compliance with this document.

c. Alternate methods of building protection of those above may be accepted by the City upon submittal of detailed, engineered plans.

800.8 Drainage System Criteria. If an underground drainage system is required, and a sixty-inch (60") or smaller pipe will handle the design flow, pipe shall be used. If a sixty-inch (60") pipe is not adequate, concrete pipe or natural and/or a lined open drainage channel may be utilized. If pipe is selected, the maximum allowable velocity shall be twelve (12) feet per second in the pipe. Lining materials, if used, shall be approved by the City.

800.9 Line of Flow. Watercourses shall be allowed to follow their natural lines of flow; provided, however, that rechanneling or rerouting of watercourses may be allowed where approved by the City and where the point at which the watercourse enters the lot and the point at which it leaves the lot are not changed.

800.10 Bridges and Box Culverts. Bridges or box culverts shall be designed and constructed at all street crossings over all drainageways and floodways in accordance with Table 8-2, Design Storm Frequency.

800.11 Valley Gutters. Concrete valley gutters shall be provided if the gutter flow must be carried across intersections of curbed asphalt streets.

800.12 Public Easements Required. All public drainage facilities shall be placed in public easements.

801. DESIGN CRITERIA.

801.1 Basis for Discharge. Drainage improvements shall be designed for watersheds less than one thousand (1,000) acres based on flood discharges determined from the Rational Formula. The Rational Formula for calculating storm flows is shown in Figure 8-1.

801.2

Description of Watercourse	Velocity of Runoff in fps for Slope in %			
	0% to 3%	4% to 7%	8% to 11%	Over 12%
Overland Surface Drainage	5	10	15	18
Channels	Determine V by Manning's Formula			
Storm Sewers	Determine V by Manning's Formula			

For street or gutter flow, the velocity shall be based on the grade of the street. In the absence of detailed calculation by Manning's Formula for the specific street section, the average velocities shown in Table 8-1 may be used.

801.3

TABLE 8-1 AVERAGE VELOCITIES OF RUNOFF

% SLOPE OF GUTTER	ASSUMED VELOCITY (FT. / SEC.)
0.5%	1.5
1.0%	2.2
2.0%	3.1
3.0%	3.8
4.0%	4.3
5.0%	4.9
6.0%	5.3
8.0%	6.1
10.0%	6.9

FIGURE 8-1 THE RATIONAL FORMULA

Q = CIA where:

Q	=	The maximum storm flow rate at a given point (in cubic feet per second).
C	=	A runoff coefficient which varies with the topography, land use and moisture content of the soil at the time. The runoff coefficient shall be based on the ultimate use of the land. The runoff coefficient can be selected from the major use classification shown below.

801.4 Runoff Coefficients (c) By Land Use Type

Surface Description	Slope	Range of Values	
		From	To
Undeveloped			
Cultivated Land	Flat (0 to 2%)	0.31	0.47
	Average (2 to 7%)	0.35	0.51
	Steep (>7%)	0.39	0.54
Pasture / Unimproved	Flat (0 to 2%)	0.25	0.41
	Average (2 to 7%)	0.33	0.49
	Steep (>7%)	0.37	0.53
Wooded	Flat (0 to 2%)	0.22	0.39
	Average (2 to 7%)	0.31	0.47
	Steep (>7%)	0.35	0.52
Floodplains	Flat (0 to 2%)	0.40	0.60
Developed Areas			
Roof Areas	All	0.92	0.97
Asphaltic Areas	All	0.90	0.95
Concrete	All	0.92	0.97
Compacted Crushed Limestone Base	All	0.80	0.90
Grass Areas (lawns, parks, etc.)			
Poor Condition	Flat (0 to 2%)	0.32	0.44
(< 50% vegetative cover)	Average (2 to 7%)	0.37	0.49
	Steep (>7%)	0.40	0.52
Fair Condition	Flat (0 to 2%)	0.25	0.37
(50 to 75% vegetative cover)	Average (2 to 7%)	0.33	0.45
	Steep (>7%)	0.37	0.49
Good Condition	Flat (0 to 2%)	0.21	0.32
(>75% vegetative cover)	Average (2 to 7%)	0.29	0.42
	Steep (>7%)	0.34	0.47

Runoff Coefficients (c) By Surface Type

Surface Description	Slope	Range of Values	
		From	To
Undeveloped			
Cultivated Land	Flat (0 to 2%)	0.31	0.47
	Average (2 to 7%)	0.35	0.51
	Steep (>7%)	0.39	0.54
Pasture / Unimproved	Flat (0 to 2%)	0.25	0.41
	Average (2 to 7%)	0.33	0.49
	Steep (>7%)	0.37	0.53

Wooded	Flat (0 to 2%)	0.22	0.39
	Average (2 to 7%)	0.31	0.47
	Steep (>7%)	0.35	0.52
Floodplains	Flat (0 to 2%)	0.40	0.60
Developed Areas			
Roof Areas	All	0.92	0.97
Asphaltic Areas	All	0.90	0.95
Concrete	All	0.92	0.97
Compacted Crushed Limestone Base	All	0.80	0.90
Grass Areas (lawns, parks, etc.)			
Poor Condition	Flat (0 to 2%)	0.32	0.44
(< 50% vegetative cover)	Average (2 to 7%)	0.37	0.49
	Steep (>7%)	0.40	0.52
Fair Condition	Flat (0 to 2%)	0.25	0.37
(50 to 75% vegetative cover)	Average (2 to 7%)	0.33	0.45
	Steep (>7%)	0.37	0.49
Good Condition	Flat (0 to 2%)	0.21	0.32
(>75% vegetative cover)	Average (2 to 7%)	0.29	0.42
	Steep (>7%)	0.34	0.47

I = The average intensity of rainfall in inches per hour for a period equal to the time of concentration of flow from the farthest point of the drainage area to the point under consideration.

Where:

$$I = \frac{b}{(t + d)^e}$$

		5-Year	10-Year	25-Year	50-Year	100-Year
e	=	0.784	0.763	0.760	0.743	0.739
b	=	74	79	90	97	98
d	=	8.4	8.4	8.4	8.4	8.0
t	=	Time of concentration in minutes.				
A	=	The drainage area, in acres, tributary to the point under design calculated from the drainage map of the area. This drainage map shall be submitted with any drainage map of the area. This drainage map shall be submitted with any drainage plans submitted for consideration by the City.				

801.5 Using the average velocities in Table 8-1, the time of concentration shall be calculated by the formula shown in Figure 8-2 or by other recognized methods such as the Texas Department of Transportation formulas unless more data is shown on the plans for calculating time of concentration.

801.6 Reserved.

801.7 Storm Frequency. Design storm frequencies for storm drainage improvements are shown in Table 8-2.

801.8

TABLE 8-2 DESIGN STORM FREQUENCY

TYPE OF FACILITY	DESCRIPTION OF AREA TO BE DRAINED	MINIMUM DESIGN FREQUENCY (YEARS)
Streets and Storm Sewers or Side Ditches, Combined*	Residential, Commercial and Industrial	Local - 5 Collector - 10 Arterial - 10
Culverts, Bridges, Channels and Creeks	Any Type of Area Greater Than 1,000 Acres	25
Culverts, Bridges, Channels and Creeks	Any Type of Area Greater Than 1,000 Acres	100

* If in a storm drain, an inlet is located at a low point so that flow in excess of the storm drain capacity would be directed onto private property, and such overflow could cause damage or serious inconvenience in the opinion of the City, the design frequency shall be twenty-five (25) years.

801.9 Underground Drainage Facility Design. The underground drainage facility (storm drain) capacity shall be calculated by Manning's Formula as follows:

where:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

Q	=	The discharge in cubic feet per second
A	=	The cross-sectional area of flow in square feet
R	=	The hydraulic radius in feet equals area/wetted perimeter.
S	=	The slope of the hydraulic gradient in feet per foot.
n	=	The coefficient of roughness

801.10 The elevation of the hydraulic gradient of the storm sewer shall be at or below the elevation of the adjacent street gutter. Stormwater pipe shall be sized so that the average velocity in the pipe will not exceed twelve (12) feet per second.

Figure 8-2 Time of Concentration

where: $$T = \frac{D}{V \times 60}$$

where:

T = Time of concentration in minutes for use in Figure 8-1

D = Distance in feet from point of concentration to the most hydraulically distant part of the drainage basing under construction.

V = Velocity in feet per second from Section 802.2 sic or velocity calculated by an engineer for streets and/or storm sewers.

801.11 Open Channel Design. Open channel facilities shall be designed and constructed based on frequencies shown in Table 8-2 and calculated by Manning's Formula with roughness coefficients and velocities as shown in Table 8-3. Side slopes of channels shall be no steeper than 4:1 in earth and 1:1 when lined with concrete

801.12 Culvert Design. Enclosed culverts shall be installed if a creek or ditch crosses proposed roadway improvements. The quantity of flow to be carried by the culvert shall be determined by the Rational Formula. The size of the culvert required shall be the larger size, checking both inlet and outlet flow control.

801.13

TABLE 8-3 COEFFICIENT OF ROUGHNESS

OPEN CHANNELS	MAXIMUM PERMISSIBLE VELOCITY IN FEET/ SECOND	COEFFICIENT* "n"
Paved		
Concrete	8	0.011 to 0.020
Asphalt	8	0.013 to 0.017
Rubble or Riprap	8	0.017 to 0.030
Earth		
Bare, Sandy Silt, Weathered	2.0	0.020
Silt Clay or Soft Shale	3.5	0.020
Clay	6.0	0.020
Soft Sandstone	8.0	0.020
Clean Gravelly Soil	6.0	0.030 to 0.150
Turf		
Shallow Flow	6.0	0.06 to 0.08
Depth of Flow Over 1 Foot	6.0	0.04 to 0.06

801.14

TABLE 8-3 COEFFICIENT OF ROUGHNESS		
OPEN CHANNELS	**MAXIMUM PERMISSIBLE VELOCITY IN FEET/ SECOND**	**COEFFICIENT* "n"**
* Will vary with straightness of alignment, smoothness of bed and side slopes, and whether channel has light vegetation or is choked with weed and brush.		

802. MINIMUM DESIGN STANDARDS.

802.1 The design requirements set forth in this chapter are minimum design standards. The City reserves the right to require additional precautions or treatments consistent with sound engineering practice to provide for condition not specifically covered in this chapter.

802.2

TABLE 8-4 CULVERT DISCHARGE - VELOCITY LIMITATIONS	
CULVERT DISCHARGING ON TO	**MAXIMUM ALLOWABLE VELOCITY (fps)**
Earth	4
Sod Earth	6
Paved or Riprap Apron	8
Shale	8
Rock	8

803. STORMWATER DETENTION.

803.1 General. When physical, topographic, and economic conditions allow it, channel improvements downstream of the development shall be used to prevent increased flooding. When this is not feasible, runoff detention storage shall be used, wherein the storm volume is held back in the watershed and released at an acceptable rate. This section presents information on storage techniques, including guidance for the design of appropriate storm runoff storage facilities.

803.2 Storage Classification.

. Storage systems may be classified as either on-line or off-line facilities.

a. The purpose of detention storage is to hold runoff back but release it continuously at an acceptable rate through a flow-limiting outlet structure, thus controlling downstream peak flows.

803.3 On-Line Storage. An on-line storage facility is one in which the total storm runoff volume passes through the detention facility's outflow structure.

803.4 Off-Line Storage. An off-line storage design is one in which storm runoff does not begin to flow into the storage facility until the discharge in the channel reaches some critical value

above which unacceptable downstream flooding will occur. An off-line facility serves to store only the runoff volume associated with the high flow rate portions of the flood event.

803.5 Design Procedures. The following design procedures are intended to insure ensure that new development, with detention, will not cause any adverse impacts on existing flooding conditions downstream. A reputable computer program which has been designed for such purposes shall be used to design and analyze proposed detention pond facilities including pond size and outfall orifice size. Submission of proposed detention pond plans shall include hard copies of the output data calculations along with a digital file containing the computer input and output files for review by the City Engineer or his designated representative. Alternate detention pond sizing programs may be used with prior approval of the City Engineer or his designated representative. (Note: The design engineer should contact the City of Caldwell for any specific requirements for the watershed in which the proposed facility is to be located).

803.6 Hydrology Methods. The method to be used for determining detention pond volume requirements is governed by the size of the total contributing drainage area. For contributing areas up to 10 acres, the Modified Rational Method may be used. For areas greater than 10 acres, the Soil Conservation Service hydrologic methods shall be used.

803.7 Design Tailwater Depth. In order to route the inflow hydrograph through the detention facility, a relationship must be established between the volume of storage in the pond and the corresponding amount of discharge through the outflow structure. In most cases, this relationship is directly dependent on the elevation of the tailwater at the outlet of the outflow structure.

. For the purpose of establishing an outflow rating curve, the tailwater in the receiving channel shall be assumed to be at all times at the level of the same frequency storm being analyzed. In certain situations where this assumption may be shown not to be reasonable, an alternative tailwater condition can be presented for approval to the City Engineer.

803.8 Final Sizing of Pond Storage and Outflow Structure. Detention facilities shall be sized such that at least one foot of freeboard shall be maintained during the 100-year storm event, as measured from the top of the detention or retention facility berm.

. The minimum recommended outflow pipe for a detention facility is 12 inches. When further flow restriction is necessary, the restriction should be located at a separate manhole outside of the receiving channel.

803.9 Storm sewer Hydraulic Gradients. The hydraulic gradients in storm sewers discharging into a detention pond shall be determined using procedures outlined in previous sections of these guidelines. The starting water surface elevation for these calculations shall be the 25-year maximum pond elevation.

803.10 Allowances for Extreme Storm Events. Design consideration must be given to storm events in excess of the 100-year flood. An emergency spillway, overflow structure, or swale must be provided as necessary to effectively handle the extreme storm event. In places where a dam has been utilized to provide detention directly in a channel, due consideration must be given the consequences of a failure, and if a significant hazard exists, the dam must be adequately designed to prevent such hazards.

. In addition, detention facilities which measure greater than six feet in height are subject to Title 31 Texas Administrative Code (TAC) Chapter 299 (Subchapters A through E), which went into effect May 13, 1986, and all subsequent changes. The height of a detention facility or dam is defined as the distance from the lowest point on the crest of the dam (or embankment), excluding spillways, to the lowest elevation on the centerline or downstream toe of the dam (or embankment)

including the natural stream channel. Subchapters A through E of Chapter 299 classify dam sizes and hazard potential and specify required failure analyses and spillway design flood criteria.

803.11 Erosion Controls. The erosional tendencies associated with a detention pond are similar to those found in an open channel. For this reason the same types of erosion protection are necessary, including the use of backslope swales and drainage systems, proper revegetation, and pond surface lining where necessary. Proper protection must especially be provided at pipe outfalls into the facility, pond outlet structures and overflow spillways where excessive turbulence and velocities will cause erosion.

803.12 Multipurpose Land Use. The amount of land required for a stormwater detention facility is generally quite substantial. For this reason, it is logical that storage facilities could serve a secondary role as parks or recreational areas whenever possible. Such dual use areas will be allowed only after proper review of the design scenario and approval of the specific project by the City.

. When a dual use facility is proposed, a joint use agreement is required between the City of Caldwell and the entity sponsoring the secondary use. This agreement must specify the maintenance responsibilities of each party.

803.13 Approval of Private and Dual-Use Facilities.

. For privately maintained or dual use systems, each stormwater detention facility will be reviewed and approved only if:

a. The facility has been designed to meet or exceed the requirements contained within this document; and

b. Provisions are made for the facility to be adequately maintained.

803.14 Maintenance. In general, the City of Caldwell will only be responsible for maintenance of stormwater detention basins which serve public facilities such as dedicated public streets or parks and recreational areas. Responsibility for the maintenance of any portion of a facility not designed for flood control will not rest with the City, nor will the City be responsible for any damage which may occur resulting from flooding of the facility.

. A 20-foot-wide access and maintenance easement shall be provided around the entire detention pond. This is in addition to the dedication required for the pond itself.

803.15 Pump Detention.

Pumped detention systems will not be maintained by the City of Caldwell under any circumstances and will be approved for use only under the following conditions:

. A gravity system is not feasible from an engineering and economic standpoint;

a. At least two pumps are provided, each of which is sized to pump the design flow rate; if a triplex system is used, any two of the three pumps must be capable of pumping the design flow rate;

b. The selected design outflow rate must not aggravate downstream flooding. (Example: A pump system designed to discharge at the existing 100-year flow rate each time the system comes on-line could aggravate flooding for more frequent storm events).

c. Fencing of the control panel is provided to prevent unauthorized operation and vandalism;

d. Adequate assurance is provided that the system will be operated and maintained on a continuous basis;

e. Emergency source of power is provided.

f. It is recommended that if a pump system is desired, review by the City Engineer of the preliminary conceptual design be obtained before any detailed engineering is performed.

803.16 General Requirements For Detention Pond Construction.

. The structural design of detention facilities is very similar to the design of open channels. For this reason, all requirements pertaining to the design of lined or unlined channels shall also apply to lined or unlined detention facilities.

a. In addition, the following guidelines are applicable:

b. Pond Bottom Design - A pilot channel shall be provided in detention facilities to insure ensure that proper and complete drainage of the storage facility will occur. Concrete pilot channels shall have a minimum depth of two inches and a minimum flowline slope of .0005 ft/ft. Unlined pilot channels shall have a minimum depth of two feet, a minimum flowline slope of .001 ft/ft, and maximum sideslopes of 4:1.

c. The bottom slopes of the detention basin should be graded toward the pilot channel at a minimum slope of 0.005 ft/ft, and a recommended slope of 0.0075 ft/ft.

d. Detention basins which make use of a channel section for detention storage may not be required to have a pilot channel, but should be built in accordance with the requirements for open channels.

e. Outlet Structure - The outlet structure for a detention pond is subject to higher than normal headwater conditions and erosive velocities for prolonged periods of time. For this reason the erosion protective measures are very important.

f. Reinforced concrete pipe used in the outlet structure should conform to ASTM C-76 Class III with compression type rubber gasket joints conforming to ASTM C-443. Pipes, culverts and conduits used in the outlet structures should be carefully constructed with sufficient compaction of the backfill material around the pipe structure. Generally, compaction density should be the same as the rest of the structure. The use of cement stabilized sand backfill around the outlet conduit should be considered where soil types or conditions may prevent satisfactory backfill compaction. Cement stabilized sand backfill should also be used where headwater depths could cause backfill to wash out around the pipe.

CHAPTER 9. BUFFER ZONES

900. BUFFER STANDARDS.

A buffer is a specified land area together with the planting and landscaping required on the land. A buffer may also contain a barrier, such as a berm or a fence, where such additional screening is necessary to achieve the desired level of buffering between various activities.

900.1 Purpose. Requirements are set for this section for the provision of buffers between certain land uses. The requirement of a buffer is designed to reduce nuisances between adjacent land uses or between a land use and a public road by separation of land uses through a required buffer. Such nuisances may include dirt, litter, noise, lights, signs, unsightly buildings or parking areas. Buffers provide spacing to reduce potentially adverse impacts of noise, odor or danger from fires or explosions.

900.2 General Standards.

. Location and Design. Buffers shall be located on the outer perimeter of a lot or parcel, extending to the lot or parcel boundary line where residential lots are adjacent to commercial or industrial lots. Buffers shall be a minimum of twenty (20) feet for residential/commercial buffers and thirty (30) feet for residential/industrial buffers. Buffers may also be required in residential subdivisions adjacent to a railway line, and some large utility easements. Buffers shall not be located on any existing, dedicated or reserved public or private street or right- of-way or easements.

a. Use of Buffers. A buffer may be used for some forms of passive recreation; it may contain pedestrian, bike or equestrian trails, provided that:

(1) No plant material is eliminated.

(2) The total width of the buffer is maintained.

(3) All other regulations of the document are met.

(4) With written permission of the City and full compliance with standards of this chapter, a required buffer may include a stormwater retention area. In no event, however, shall the following uses be allowed in buffers; play fields, stables, swimming pools, tennis courts or similar active recreation uses.

b. Ownership of Buffers. Buffers shall remain in the ownership of the original owner (and assigns) of a lot or development. Buffers may be subjected to deed restrictions and subsequently be freely conveyed. They may be transferred to any consenting grantees, such as adjoining landowners, or an open space or conservation group, provided that any such conveyance adequately guarantees the protection or the buffer for the purposes of this document.

c. Maintenance. The owner of a bufferyard, provided in compliance with this document, shall provide adequate maintenance of the bufferyard to ensure survival of the plantings. In the event that any of the plantings do not survive, they shall be replaced.

CHAPTER 10. CONSTRUCTION SAFETY STANDARDS

1000. GENERAL PROVISIONS.

1000.1 The construction of facilities to improve, develop or subdivide land shall be conducted in a safe manner to protect human life and property.

1001. TRANSPORTATION SAFETY.

1001.1 All projects undertaken on or near public rights-of-way shall be controlled in accordance with the Texas Manual on Uniform Traffic-Control Devices (TMUTCD). Traffic control plans and measures, including but not limited to, signing, marking, barricading, flagging, detouring and closure shall all be conducted in accordance with TMUTCD criteria.

1002. EXCAVATION AND TRENCH SAFETY.

1002.1 In projects where mass excavation or trenching is required, provision to comply with Occupational Safety Health Administration (OSHA) shall be specifically addressed during construction. Contractors shall comply with specific OSHA regulations set forth in 29 CFR, Part 1926.

1003. PROTECTION OF LIFE AND PROPERTY.

1003.1 Construction activities shall progress in a manner, which places the highest priority on the protection of human life and property. Work shall be conducted in a manner, which complies with OSHA standards and other applicable Federal, State and local regulations.

1004. INSURANCE.

1004.1 Companies that construct facilities to improve, develop or subdivide property shall provide written proof of insurance coverage for no less than the statutory amounts required by COCU.

CHAPTER 11. ELECTRICAL DESIGN STANDARDS

1100. GENERAL PROVISIONS.

1100.1 GENERAL

a. One system of electrical distribution is available, namely 60 Hertz alternating current. As the voltage and the number of phases which will be supplied depend upon the character of the load as well as its size and location, it is necessary for the Customer to consult City of Caldwell Utilities (COCU) regarding the type of service which will be furnished before proceeding with the purchase of equipment or the installation of wiring.

b. All services requested by the Customer shall be metered for energy consumption.

1101. RESIDENTIAL SERVICE

1101.1 Residential Service will be supplied single-phase three-wire, nominally 120/240 volts.

1102. COMMERCIAL AND INDUSTRIAL SERVICE

1102.1 The secondary distribution available to serve commercial and industrial loads may be a three-wire, single-phase system or four-wire, three-phase system. COCU should always be consulted in regard to the exact characteristics of the service that will be required.

1103. APPLICATION FOR ELECTRIC SERVICE

1103.1 Application for electric service to either a new installation, or a revision of service for an existing installation, must be made to and accepted by COCU before service will be supplied. Application can be made by contacting COCU and should be made as far in advance as possible of the date service is required. The Customer must consult COCU for information concerning the point of attachment of COCU's service facilities to the Customer's building, the location of the meter, characteristics of service, and other pertinent matters before proceeding with the installation of the service.

1104. EASEMENTS, RIGHT-OF-WAY, SUITABLE SPACE, AND POINT OF DELIVERY (POD) REQUIREMENTS

1104.1 Customer's electrical installation must be arranged so that the location of the point of delivery allows COCU to provide safe and reliable delivery service, taking into consideration the location of existing COCU facilities and construction needed to connect Customer's electric installation to COCU system. Customer must grant or secure for COCU, at Customer's expense, any rights-of-way or easements on property owned or controlled by Customer necessary for COCU to install delivery system facilities for the sole purpose of delivering electric power and energy to Customer. Customer must provide, without cost to COCU, suitable space on Customer's premises for the installation of delivery system facilities necessary to deliver electric power and energy to Customer and for installation of COCU's metering equipment and the meter.

1104.2 Any change from the COCU designated Point of Delivery (POD) is subject to

payment by customer based on any added costs to reach the new designated point.

1105. EXTENSION OF COCU'S FACILITIES

1105.1 When the Customer requests COCU to deliver energy in a manner or location other than that designated by COCU, the Customer will be required to pay the additional costs. COCU will discuss its terms and conditions for the extension of facilities upon request.

1106. INSTALLATION AND RESPONSIBILITY

1106.1 It is necessary for the protection of the Customer that all work, wiring, and apparatus be installed and maintained in a safe manner by a licensed electrician or qualified party. The Customer, in accepting service from COCU, assumes full responsibility for the safety of the wiring and apparatus which the Customer installs.

1106.2 The Customer shall not operate any apparatus which creates a condition that interferes with COCU's operation and prevents COCU from supplying satisfactory service to the Customer or to other Customers. This condition includes, but is not limited to, operating equipment that interferes with the satisfactory operation of other Customer's radio, television, and communication equipment.

1106.3 COCU reserves the right to place restrictions on the type and manner of use of all the Customer's electrical equipment which is connected to COCU's lines, especially prohibiting any large loads of highly fluctuating or low power factor characteristics and disrupting harmonic levels.

1107. REQUIREMENTS FOR ELECTRICAL INSPECTION

1107.1 The Customer is responsible for obtaining inspections from the City on work performed on their electrical system as required by the local inspection authority.

1108. CUSTOMER ALTERATIONS AND ADDITIONS

1108.1 The Customer must notify COCU prior to making any alterations or upgrades to the service entrance equipment so that facilities of proper capacity may be provided and to prevent damage by overloads. The Customer shall be responsible for all expenses and/or damages to Customer's facilities resulting from failure to give proper notice. The Customer may also be subject to charges by COCU for work required to meet the Customers' alterations or upgrades. The Customer should contact COCU for information concerning charges for such work.

1109. TEMPORARY SERVICE

1109.1 COCU has special requirements for temporary service and should be consulted for each installation.

1109.2 The Customer shall be responsible for re-imbursing COCU 100% of the cost to install and remove the temporary service.

1109.3 Please contact COCU at 979-567-3271 for COCU specifications.

1110. STRUCTURES NEAR OVERHEAD LINES

1110.1 Structures, including signs, flagpoles, light standards, antennas or aerials shall not be installed under, over, or in such close proximity to lines carrying electric current that they could be raised into or fall onto such lines or that they cannot be safely maintained. Antennas or aerials shall not be attached to a COCU owned pole or any pole used in supplying electric service to the Customer. Consult COCU for clearance requirements.

1111. ATTACHMENTS TO COCU-OWNED FACILITIES

1111.1 Under no conditions will the Customer's facilities be installed on COCU owned poles or other facilities unless special arrangements have been made with COCU.

1111.2 COCU does not permit any unlicensed attachments (such as wires, ropes, signs, banners, metering equipment, radio equipment, lightning arresters, alarms, etc.) to COCU facilities by others except when authorized in writing by COCU. Licensed attachments must comply with all requirements set forth by COCU. License agreements do not allow meter equipment to be installed on COCU poles if licensee utilization equipment is not on the same. **COCU may without notice and without liability remove unauthorized attachments to COCU facilities.** For more information, please contact COCU's Joint Use department at 979-567-3271.

1112. ACCESS TO CUSTOMER'S PREMISES

1112.1 COCU's authorized representatives and employees shall have access to the Customer's premises, only to the extent needed by COCU at all reasonable hours, for the purposes necessary to supply and maintain service. Upon termination of service, COCU shall be permitted to remove any or all such property. Authorized COCU employees visiting the premises of the Customer for any purposes are furnished with an identification card. The Customer should refuse admission to persons not having proper identification.

1113. OVERHEAD SERVICE REQUIREMENTS

1113.1 SERVICE FROM OVERHEAD LINES

a. All (permanent) new construction in the City will be designed with underground service and/or primary distribution. Changes to an existing overhead service will be considered on a case-by-case basis and approval to remain overhead must be obtained prior to start of construction.

b. Please contact COCU for specifications at 979-567-3271.

1114. UNDERGROUND REQUIREMENTS

1114.1 UNDERGROUND PRIMARY INSTALLATIONS

a. All new construction in the City will be designed with underground service and/or primary distribution.

b. Please contact COCU for specifications at 979-567-3271.

c. The Developer shall provide the labor and materials to install all of the civil installation of the electric system within the development. This includes, but is

not limited to, the trenching, backfill, conduit, equipment pads, vaults, manholes, handholes, streetlight foundations, etc. The Developer shall review COCU's construction specifications prior to starting construction.

d. Developer or his/her contractor is responsible for acquiring any and all permits and remitting any necessary fees for trench and conduit installation (excavation plans, traffic control plans, digging permits, etc.)

e. COCU shall provide an inspector to inspect all underground installations. Trenches shall remain open until inspected and approved by COCU inspector. COCU retains the right to terminate any conduit installation if inspection reveals non- compliance with COCU inspection policies, procedures, or specifications until said issues are resolved and approved through re-inspection.

f. COCU shall provide the labor and material to install the electric material and equipment to provide electric service to the development. This includes, but is not limited to, the primary cable, terminations, pad-mount transformers, pad-mount equipment, sectionalizing cabinets, switchgear, primary risers, fusing, secondary cable and terminations, metering, etc.

1115. SERVICE ENTRANCE

1115.1 SERVICE ENTRANCE CONDUCTORS (For Maintenance Only)

a. The service entrance cable or raceway, extending from the point of attachment on the structure to COCU-owned metering equipment, shall be run exposed for its entire length except in those cases where it is necessary to pass through over-hanging eaves or projections from the main wall of the building. Where this is necessary, the service entrance cable shall be protected from physical damage in accordance with the NEC. Where conduit is used for protecting the service entrance conductors, there shall be no joints in the length of conduit that is covered by the building construction. In cases acceptable to COCU, and for purposes of obtaining necessary clearance to the ground for the service drop conductors, a rigid metallic conduit will be required and may extend through the roof not more than 36 inches unless guyed. The service entrance conductors and conduit will be furnished and installed by the customer or their contractor. Appropriate clearance of overhead electric supply lines shall be maintained in accordance with the NESC at all times.

1115.2 COMMERCIAL OR INDUSTRIAL SERVICE ENTRANCE

a. The service entrance conductor needs of commercial and/or industrial customers are usually more complex than those for residential customers. To assure that such services meet the electrical load requirements, COCU shall be consulted in every-case before plans are made or equipment purchased. Service entrance conductors are furnished and installed by the Customer in accordance with the requirements of the NEC. In cases where COCU supplies the service, the requirements of the NESC shall govern.

b. For those commercial metering installations (below 600 volts) that require current transformer cabinet/enclosure, the customer shall furnish and install the cabinet. The enclosure shall have provision for a COCU lock and seal, which is solely for COCU access. All enclosures shall be commercial grade, painted, and galvanized steel NEMA 3R or greater. Local inspecting authorities may require enclosure to be UL listed or equivalent.

1115.3 All services from COCU three-phase pad-mount transformers shall be 4 wire - WYE connected.

1115.4 The neutral conductors are required to be grounded at the COCU transformer and at the customer's main disconnect or switchgear. The neutral connection is required to protect against line to ground faults. COCU will not connect a service without the proper neutral connection.

1116. TRANSFORMER VAULTS

1116.1 COCU does not allow below grade transformer vaults.

1117. GROUNDING

1117.1 The grounded neutral conductor of the service entrance conductors shall be grounded in accordance with the NEC. All conduits, metallic tubing, and service entrance equipment shall be grounded in accordance with the latest revision of the NEC. The NEC or other local governing code shall be consulted at the time for dimensions, specification of material, and to determine the appropriate method of installing the grounding system (5/8 inch diameter stainless steel and copper or zinc coated steel rod with a length of 8 feet minimum). The equipment grounding conductors should not be installed along with the service entrance conductors being installed to the secondary compartment of COCU~~'s~~ padmount transformers. Communication companies, such as telephone, satellite dish, and cable television, are forbidden to ground their systems to the meter enclosure or service mast.

1118. METERING EQUIPMENT

1118.1 METER LOCATION

a. The Customer will provide a suitable location on their premises for the installation of COCU meter and other equipment necessary for COCU to provide electric service. The metering location shall be located at the closest point of attachment to the power source. The service entrance will be arranged so that COCU can measure the Customer's entire electric service with one meter, unless otherwise specified in the City's rate tariff schedule. Meters for service to residential and commercial Customer shall be installed outdoors, unless prior approval obtained by COCU. No trees or shrubs shall be planted in front of the meter (NEC 110.26). In general, a location shall be such that it will not interfere with traffic, sidewalks, or driveways nor obstruct the opening of doors and windows. Meters shall be installed on the ground floor and on an exterior wall of the building. Exceptions to this must be preapproved in writing by COCU City Staff.

b. No Customer or third party equipment is allowed to be attached to the meter, associated metering equipment, nor located inside a meter or current transformer enclosure, unless otherwise approved by COCU.

c. On types of service where outdoor installation is not practical, permission and specifications for indoor metering shall be obtained from COCU in writing. The location shall be readily accessible as near as possible to the point where the service conductors enter the building. The center of the meter should not be more than 5 1/2 feet or less than 4 feet from finished grade.

d. Meters will be mounted on customer-owned poles only when no other means of mounting are feasible on approved structures. When mounted on customer-owned poles, all devices and methods of mounting will be specified by COCU.

e. Adequate lighting inside enclosed areas shall be installed and maintained by the Customer for safe working conditions. Means of lighting control shall be within two (2) feet of entrance to the enclosed area. Enclosed metering areas are to be kept free and clear of debris and storage items.

1119. METER SOCKETS

1119.1 All meter sockets installed in COCU service territory are provided by COCU. If the project requires a different/special type of meter socket, the contractor, builder, or Customer must contact COCU for preapproval before installing any foreign meter socket. In addition, meter sockets purchased by the Customer shall be UL listed and labeled in accordance with NEC.

1119.2 Meter sockets used on a commercial Customer shall have a lever operated by-pass device for three-phase services. By-pass meter sockets are not to be used as load breaking devices.

1119.3 Repairs to meter sockets are the responsibility of the Customer. If repairs cannot restore the socket to its standard condition, the Customer will be notified in writing to replace the damaged meter socket within (30) thirty days to avoid a disconnection of service. COCU may, in the interests of safety and efficiency, disconnect the service when conditions warrant. COCU has sole discretion to determine conditions.

1119.4 Contact the COCU Metering Department for questions regarding solar meters.

1119.5 The Customer/Contractor is prohibited from installing any type of devices between the COCU-owned meter socket and the COCU-owned meter. Doing so could result in a disconnection of service.

1120.METER IDENTIFICATION ON MULTI-OCOCUPANCY BUILDINGS

1120.1 Customer must permanently mark EACH meter socket at multimeter locations. All meter socket covers and main service disconnect switches shall be plainly and permanently marked and maintained with numbers and/or letters by the owner so as to indicate the building apartment/condominium address served on all multi-occupancy buildings.

1120.2 The markings must be either engraved phenolic nameplates or adhesive-type labels at least one inch high. Felt tip pens and label maker tape are not considered permanent marking. Service will not be established until marking is complete. COCU will assume no responsibility for inspecting the Customer's equipment, or the accuracy of matching premise location as indicated on the meter socket and main service disconnect switch, but shall have the right to satisfy itself that the service is certified by the local inspection authorities and that it is safe to connect.

1121. RELOCATION OF SERVICE AND METER EQUIPMENT

1121.1 Whenever it becomes necessary to relocate the service entrance and meter equipment of an existing installation, COCU shall be consulted before such work is begun. Where applicable, additional charges may be necessary for relocation of and/or changes to power facilities serving the customer especially if the work is performed at the customer's request and for the Customer convenience.

1122. NO CONNECTIONS AHEAD OF METERING DEVICES

1122.1 The connection of any Customer owned apparatus or device to the service conductors ahead of COCU owned meters or to the meter socket without COCU authorization is expressly forbidden. All 480-volt self-contained meter installations require the installation of non-fused disconnect switch (provided and installed by customer) ahead of the meter socket for the safety of City's employees and also to be sealed and/or locked by COCU.

1122.2 Meter socket/can or current transformer enclosure/cabinet shall not be used as a junction box. Connections will be made in a separate tap enclosure using insulated tap blocks.

1123. SEALS

1123.1 All enclosures containing un-metered conductors shall be capable of being effectively sealed and locked by COCU.

1123.2 The breaking of seals by other than authorized persons or tampering with COCU's meters and measuring devices is prohibited. Where COCU detects that the physical facilities of COCU have been tampered with so as to cause an unauthorized use of electricity, or loss of meter registration, COCU may at any time without notice, discontinue the supply of electricity to the Customer and remove its meter and other apparatus until such time that the customer has corrected the condition to the satisfaction of COCU. Tampering with COCU equipment or using any method which permits the flow of unmetered energy to a premise violates the laws of the State of Texas and may lead to disconnection of service, prosecution, or both. COCU shall not be liable to Customer for any injuries or damages that result from such tampering.

1124. ENERGY MANAGEMENT

1124.1 COCU shall be notified prior to the installation of any demand or energy control equipment.

1124.2 At the Customer's request, COCU will furnish energy and/or demand pulses (KYZ or equivalent approved methods). The Customer will be charged for the installation costs to supply these pulses.

1124.3 The customer's or third party load monitoring equipment must be installed only on the load side of the meter. No customer or third party equipment is allowed to be attached to the meter, associated metering equipment, nor located inside a meter or current transformer enclosure. Such actions could result in criminal and/or civil actions depending upon applicable state COCUs.

1125. UNDERGROUND SERVICE WITH CURRENT TRANSFORMER (CT)

METERING

1125.1 The use of three-phase or single-phase distribution is determined by COCU in the design phase of a project. Placement/location of CTs or CT enclosures will be determined in the design phase of a project. The top of the CT enclosure should not be more than 6 feet or less than 4 feet from finished grade.

1125.2 Please contact COCU for specifications.

1126. CUSTOMER'S SERVICE EQUIPMENT

1126.1 Each Point of Delivery shall have a single disconnecting means which will disconnect all non-grounded customer conductors from the COCU system. This disconnecting means shall be located as close as possible to the Point of Delivery and readily accessible.

1126.2 Service Equipment Rating:

a. The service entrance conductors and the service equipment on residential buildings should have an electrical rating large enough to accommodate the initial electrical load plus anticipated future needs. The equipment interrupting rating shall exceed the maximum fault availability as determined by COCU and rating as required by the current NEC.

b. All fuses and circuit breakers shall be provided by the Customer and shall be of suitable capacity to protect the wiring installation and utilization equipment connected thereto. Circuit protective devices shall not have a rating higher than the current carrying capacity of the conductors that they protect, except where it is necessary to provide for motor starting currents. "Time delay" or "time lag" fuses or circuit breakers are recommended for protection of branch circuits supplying motor driven devices.

c. It is not permissible to fuse or switch the grounded neutral conductor of a grounded system. The customer shall consult the latest applicable edition of the NEC and other local codes for applicable requirements.

1126.3 Customer Owned Current Transformer Enclosures Specifications: The top of the CT enclosure should not be more than 6 feet or less than 4 feet from finished grade. Please contact COCU for approval before installation.

1126.4 Enclosure Construction:

a. In non-corrosive areas, steel enclosures may be used. Steel enclosures shall be a minimum of G-90 galvanized steel. All edges shall be smooth after forming. The enclosure shall be painted after fabrication. Finish coat shall be minimum of 2 mils thickness and provide a tough, non-chalking weather resistant finish. Construction shall be in accordance with ANSI/UL50. Outdoor enclosures shall be rated Type 3R. The current transformer enclosure shall be fitted with vertically hinged door(s) and sealing shall be provided by a minimum grade 304 stainless steel latch and rivets with provision for a 3/8-inch padlock and ribbon seal. The inside back of enclosure shall be entirely covered by 3/4-inch treated plywood or suitable mounting brackets must be provided. A grounding lug shall be provided to ground the enclosure.

1126.5 Protection:

a. Enclosures shall be designed to protect personnel against accidental contact with the electrical devices and guard against unauthorized use of electric service. They cannot be opened without either breaking the seal or visibly damaging the enclosure.

1126.6 Corrosive Environments:

a. Aluminum or fiber reinforced polyester enclosures must be used in corrosive areas. Corrosive areas are any area where high moisture or chemical exposure may exist such as chemical plants or water treatment plants. Enclosure construction shall be in accordance with ANSI/UL50. Outdoor enclosures shall be rated NEMA Type 3R. Current transformer enclosure shall be fitted with hinged door(s) and sealing shall be provided by high strength stainless steel latch with provision for 3/8-inch padlock and ribbon seal. Exposed hinges and hardware shall be minimum grade 316 stainless steel or better. Other methods of sealing may be acceptable but must be approved by COCU prior to being utilized. The inside back of enclosure shall be entirely covered with back plate and/or suitable mounting brackets must be provided. Enclosure ventilator is required. A grounding lug shall be provided to ground the enclosure.

1126.7 Customer Owned Enclosure

a. All metering troughs, switchgear, gutters containing un-metered conductors, and metering equipment must have prefabricated provisions for sealing by COCU Meter personnel. The Customer or Electrician shall contact COCU to obtain access for inspection. Nothing shall be attached to the meter, meter enclosure, current transformer enclosure, or the associated metering equipment that would inhibit COCU personnel and/or their designee from reading the meter, changing or testing the metering equipment, performing routine maintenance, etc. Customer owned equipment shall only be installed on the load side of any meter.

1126.8 Customer's Utilization Equipment

a. All customer utilization equipment must be designed for operation on alternating current at a nominal frequency of 60 Hertz.

b. Customers installing power factor correction apparatus shall consult COCU to ensure that such apparatus will have suitable characteristics to accomplish the desired results.

c. In general, COCU shall be notified before any significant new load is added to ensure that adequate capacity is available. This includes air conditioning and heat pumps.