AGENDA

Planning and Zoning Commission Meeting

October 14, 2021 | 7:00 PM

Council Chambers | Video Conference

City Hall | 665 Country Club Road, Lucas, Texas

Notice is hereby given that a meeting of the City of Lucas Planning and Zoning Commission will be held on Thursday, October 14, 2021 at 7:00 pm at Lucas City Hall, 665 Country Club Road, Lucas, Texas 75002-7651 and by video conference, at which time the following agenda will be discussed. As authorized by Section 551.071 of the Texas Government Code, the Planning and Zoning Commission may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney on any item on the agenda at any time during the meeting.

Pursuant to Texas Government Code Section 551.127, on a regular, non-emergency basis, members may attend and participate in a meeting remotely by video conference, when a quorum of the members and the presiding officer will be physically present at the location noted above on this agenda.

Effective September 1, 2021, residents are allowed to use the Zoom link below to participate in a Planning and Zoning Commission meeting; however, audio-only is no longer allowed, and full-video will be required when speaking to the Planning and Zoning Commission Meeting. To join the meeting, please click this URL:

https://us06web.zoom.us/s/92691972860?pwd=cWJxTnZGWW1hZDhDVlFNSXJwZFpTQT09
and enter your name and email address.
Join by phone: 1-346-248-7799
Webinar ID: 926 9197 2860
Passcode: 813188

If you would like to watch the meeting live, and not participate via Zoom, you may go to the City's live streaming link at https://www.lucastexas.us/live-streaming-videos/.

How to Provide Input at a Meeting:

Speak In Person: Request to Speak forms will be available at the meeting. Please fill out the form and give to the City Secretary prior to the start of the meeting. This form will also allow a place for comments.

Speak Remotely Via Zoom: If you would like to attend a meeting remotely and speak via Zoom, email the City Secretary at shenderson@lucastexas.us by 4:00 pm noting the item you wish to speak on and noting your attendance will be remote. Please note, any requests received after 4:00 pm will not be included at the meeting.

Submit Written Comments: If you are unable to attend a meeting and would like to submit written comments regarding a specific agenda item, email the City Secretary at shenderson@lucastexas.us by no later than 4:00 pm the day of the meeting. The email must contain the person's name, address, phone number, and the agenda item(s) for which comments will be made. Any requests received after 4:00 pm will not be included at the meeting.

Call to Order

- Roll Call
- Determination of Quorum
- Reminder to turn off or silence cell phones
- Pledge of Allegiance

Regular Agenda

1. Consider approval of a request by Matt Dorsett with Spiars Engineering and Surveying and Brock Babb with Centurion American CTMGT Lucas 238 LLC, on behalf of property owners Steve Lenart with CTMGT Lucas 238, LLC and Mehrdad Moayedi for an extension of a preliminary plat for Enchanted Creek Estates Phase 2, expiring December 1, 2021, for the property located in the James Anderson Survey, Abstract No. 17 and John McKinney Survey, Abstract No. 596, being 135.743 acres, 700 feet north of the intersection of Enchanted Way and Lillyfield Drive. **(Development Services Director Joe Hilbourn)**

2. Consider approving the amendments to the City's Code of Ordinances for Chapter 10, Subdivisions, Article 10.03 Subdivision and Development. **(Development Services Director Joe Hilbourn)**

3. Discuss the creation of a Paving Design Manual for the City's Code of Ordinances, Chapter 10, Subdivisions, Article 10.03 Subdivision and Development and provide direction to staff on any proposed amendments. **(Development Services Director Joe Hilbourn)**

4. Review stormwater design criteria, determine if any amendments are needed to the City's current regulations and provide direction to City staff. **(Development Services Director Joe Hilbourn)**

5. Consider approval of the minutes of the September 9, 2021, Planning and Zoning Commission meeting. **(City Secretary Stacy Henderson)**

Executive Agenda

As authorized by Section 551.071 of the Texas Government Code, the Planning and Zoning Commission may convene into closed Executive Session for the purpose of seeking confidential legal advice from the City Attorney regarding any item on the agenda at any time during the meeting. This meeting is closed to the public as provided in the Texas Government Code.

6. Executive Session: An Executive Session is not scheduled for this meeting.

7. Adjournment.

Certification

I do hereby certify that the above notice was posted in accordance with the Texas Open Meetings Act on the bulletin board at Lucas City Hall, 665 Country Club Road, Lucas, Texas 75002 and on the City's website at www.lucastexas.us on or before 6:00 p.m. on October 8, 2021.

_____

Stacy Henderson, City Secretary

In compliance with the American with Disabilities Act, the City of Lucas will provide for reasonable accommodations for persons attending public meetings at City Hall. Requests for accommodations or interpretive services should be directed to Stacy Henderson at 972-912-1211 or by email at shenderson@lucastexas.us at least 48 hours prior to the meeting.

Item No. 01

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Consider approval of a request by Matt Dorsett with Spiars Engineering and Surveying and Brock Babb with Centurion American CTMGT Lucas 238 LLC, on behalf of property owners Steve Lenart with CTMGT Lucas 238, LLC and Mehrdad Moayedi for an extension of a preliminary plat for Enchanted Creek Estates Phase 2, expiring December 1, 2021, for the property located in the James Anderson Survey, Abstract No. 17 and John McKinney Survey, Abstract No. 596, being 135.743 acres, 700 feet north of the intersection of Enchanted Way and Lillyfield Drive.

Background Information

This property is currently zoned R-1 (Residential 1-acre) and has an approved development agreement and concept plan. This plat proposes 66 lots on 135.743 acres, with an average lot size of 2.05 acres. The smallest lot is greater in size than the required one acre. There are no dead-end water lines proposed with this development, all water lines are looped.

The Preliminary Plat was originally approved on December 1, 2016 and will expire December 1, 2021. The approval of a preliminary plat expires five years after the date of City Council approval unless a final plat is submitted and approved by the Planning and Zoning Commission for the property within such period, or the period is extended by the Planning and Zoning Commission upon written request of the owner. If the time period is not extended or a final plat is not submitted and approved by the Planning and Zoning Commission within the 60-month period, the preliminary plat approval shall be null and void, and the owner shall be required to submit a new plat for the property subject to the then-existing zoning, subdivision and other regulations.

The reasons for the delays on the project as described by the applicant are: The homebuilding groups initially experienced a slower than anticipated home sales velocity in Phase 1, which lead to the replacement phase being delayed. As the Owner's representative, we have full ability to comply with the conditions / terms of the plat.

Attachments/Supporting Documentation

1. Platting Application
2. Preliminary and Final Plat Checklist
3. Location Map
4. Preliminary Plat
5. Updated Tree Survey

Item No. 01

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Budget/Financial Impact

NA

Recommendation

Staff recommends extending the preliminary plat as requested.

Motion

I make a motion to approve/deny the request by property owners Steve Lenart with CTMGT Lucas 238, LLC and Mehrdad Moayedi for an extension of a preliminary plat for Enchanted Creek Estates Phase 2, expiring December 1, 2021, for the property located in the James Anderson Survey, Abstract No. 17 and John McKinney Survey, Abstract No. 596, being 135.743 acres, 700 feet north of the intersection of Enchanted Way and Lillyfield Drive.

PLATTING APPLICATION

Name of Subdivision and/or Project: Enchanted Creek Phase 2

Items Submitted	Previously approved preliminary plat requesting extension	Filing Fee
☒ **Preliminary Plat**		$0 - Extension Only
▪ Single Family Residential Subdivision Development		
o $750 + $5 per acre with 20 acres or less (i.e. $850 for 20 acres) excluding minor plats of five (5) acres or less.		
o $750 + $5 per acre with 21 - 30 acres (i.e. $900 for 30 acres)		
o $800 + $5 acre with 31 - 45 acres (i.e. $1,025 for 45 acres)		
o $900 + $5 per acre with 46+ acres (i.e. $1,130 for 46 acres)		
▪ Estate Residential Subdivision Development		
o $1,000 + $7 per acre for all size parcels (i.e. $1,140 for 20 acres)		
▪ Minor Plats		
o $500 + $5 per acre with 5 acres or less (i.e. $525 for 5 acres)		
▪ Non-residential District Plats		
o $800 + $10 per acre with 30 acres or less		
o $850 + $10 per acre with 31 – 45 acres		
o $950 + $10 per acre with 46+ acres		
☐ **Final Plat**		
▪ Single Family Residential Subdivision Development		
o $800 + $5 per acre with 30 acres or less		
o $850 + $5 per acre with 31 – 45 acres		
o $950 + $5 per acre with 46+ acres		
Any additional development fees will be charged at final plat rates.		
▪ Estate residential Subdivision Development		
o $950 + $7 per lot for all size parcels		
▪ Minor Plat		
o $350 + $5 per acre with 5 acres or less		
▪ Non-residential District Plats		
o $850 + $10 per acre for up to 30 acres		
o $900 + $10 per acre with 31 – 45 acres		
o $1,000 + $10 per acre with 46+ acres		
▪ Replat		
o Minor Plat (5 acres or less) $450 + $5 per acre ($475 for 5 acres)		
o All others - $600 + $10 per acre		
▪ Amended Plat		
o Minor Plats (5 acres or less) - $300 + $7 per acre (i.e. $300 for an amended plat for 5 acres)		
o All others - $500 + $10 per acre (i.e. $700 for an amended plat for 20 acres)		
☐ **Storm Water Run-Off Permit**		
o Developments 0 – 3 acres $75		
o Developments 4 – 10 acres $150		
o Developments 10+ acres $500		
☐ **Vacation of Plat**		
o $500 + $10 per acre		
☐ **Concept Plan (Optional Land Study)**		
o $150 per session with Planning & Zoning and/or City Council		
☒ **Tree Survey/Conservation Plan**		No Fee
☐ **Tree Removal & Site Clearing Permit**		
o $ 250		
☐ **Park Site Dedication**		
o $ 1,000 per lot or land dedication		
TOTAL		$0

PLATTING APPLICATION

Physical Location of Property: 700' north of intersection of Enchanted Way and Lillyfield Drive
(Address and general location – approximate distance to nearest existing street intersection)

Legal Description of Property: Tract of land in James Anderson Survey, Abst. No. 17 and John McKinney Survey, Abst. No. 596
(Survey/ Abstract Number and Tracts/Platted Subdivision Name with Lots/Block – Must attach metes and bounds description)

Comprehensive Zoning Designation(s): R-1

Existing Zoning Designation(s): R-1

Description of Project Use: Single Family Residential

Acreage: 135.743 | Existing # of Lots/Tracts: 2

OWNERS NAME: CTMGT Lucas 238, LLC | Contact Number:

Applicant/Contact Person Steve Lenart | Title:

Company Name CTMGT Lucas 238, LLC

Street Address 520 Central Parkway East, Suite 104, Carrollton, Texas 75006

Mailing Address 520 Central Parkway East, Suite 104, Carrollton, Texas 75006

Phone: 469-440-2701 | Fax: | Email: s_lenart@lenartdevelopment.com

OWNERS NAME: Mehrdad Moayedi | Contact Number: 469-892-7200

Applicant/Contact Person Brock Bubb | Title: Asset Manager

Company Name Centurion American (CTMGT Lucas 238, LLC)

Street Address 1800 Valley View Ln Ste 300 Farmers Branch, Tx 75234

Mailing Address same

Phone: 469-892-7200 | Fax: 469-892-7201 | Email: brock@centurionamerican.com

ENGINEER REPRESENTATIVE: | Contact Number:

Applicant/Contact Person Matt Dorsett, P.E. | Title: Principal

Company Name Spiars Engineering and Surveying, Inc.

Street Address 765 Custer Road, Plano, Texas 75075

Mailing Address 765 Custer Road, Plano, Texas 75075

Phone: 9724220077 | Fax: | Email: matt.dorsett@spiarsengineering.com

Read before signing below: If there is more than one property owner complete a separate sheet with the same wording as below. The City requires all original signatures. If applicant is other than the property owner a "Power of Attorney" with original, notarized signatures are required. (notaries are available)

ITEMS REQUIRED PRIOR TO FINAL PLAT APPROVAL:

ALL APPLICATIONS MUST BE COMPLETE, ACCOMPANIED BY THE APPLICABLE CHECKLIST AND TAX CERTIFICATE SHOWING TAXES PAID BEFORE BEING SCHEDULED ON THE P&Z AGENDA. It is the applicant's responsibility to be familiar with, and to comply with, all City submittal requirements (in the Zoning & Subdivision Ordinances, and any separate submittal policies, requirements and/or checklists that may be required from City staff), including the number of plans to be submitted, application fees, etc. Please contact City staff in advance for submittal requirements. Drawings will not be returned to applicant.

ALL PARCELS/PROPERTIES MUST MATCH IN ACREAGE ALL OTHER DOCUMENTS SUBMITTED WITH NO AMBIGUITY.

SUBMISSIONS: Failure to submit all materials to the City with this application will result in delays scheduling the agenda date.

NOTICE OF PUBLIC RECORDS: The submission of plans/drawings with this application makes such items public record, and the applicant understands that these items may be viewed by the public unless they are copyrighted.

PLATTING APPLICATION

- Applicant agrees to pay any and all monies due to the City including but not limited to Park Site fee, Tree Removal Permit fee, 3% of Construction cost (developer to provide contracts for verification) and including but not limited to other fees that may be required prior to final plat approval.
- Maintenance Bond for City Improvements, 2 year – 10% Bond to be verified by submitting contract.
- Construction as-built record drawings (mylar)
- Engineering construction test reports.
- Walk-through with Public Works personnel completed with satisfactory outcome.
- HOA (covenants, conditions & restrictions) documentation approved by City Attorney before submittal to Planning & Zoning.

By signing this application, staff is granted access to your property to perform work related to your case. I waive the statutory time limits in accordance with Texas Local Government Code, Section 212.

STATE OF TEXAS }

COUNTY OF COLLIN }

BEFORE ME, a Notary Public, on this day personally appeared Mehrdad Moayedi the undersigned applicant, who, under oath, stated the following: "I hereby certify that I am the owner, or duly authorized agent of the owner, (**proof must be attached, e.g. "Power of Attorney**) for the purposes of this application; that all information submitted herein is true and correct. I understand that submitting this application does not constitute approval, and incomplete applications will result in delays and possible denial."

ROME BRADLEY BARNES
Notary ID #129140981
My Commission Expires
September 26, 2024

Owner / Agent (*circle one*)

SUBSCRIBED AND SWORN TO before me, this the 29 day of September, 2021.

Notary Public in and for the State of Texas: _____

Official Use Only:

Planning & Zoning: _____ Date: _____

City Council: _____ Date: _____

Applicant Withdrew: Yes or No Date: _____

Applicant Made a Written Withdrawal: Yes or No Date: _____

PRELIMINARY AND FINAL PLAT
Minimum Requirements Checklist

Project Name Enchanted Creek Phase 2 Preparer Colton Smith

This checklist is provided to assist you in addressing the minimum requirements for Preliminary Plat submission. Confirm that all information is included on the submitted plans by checking the box next to the required information. Checking the box certifies to the City that you have completely and accurately addressed the issue. This completed form must be returned at the time of application submittal.

If an exception or modification to the regulations is requested, the reason and/or request for each shall be provided both directly on the plan and on a separate sheet on letterhead with sufficient details as to allow a determination by the appropriate approving body. Additional information may be required. Reference the specific requirement. Plans are to be submitted complete in all detail as shown by the checklist. Should plans be determined to be incomplete, they may either be returned to the applicant without further review or marked up with needed changes. If a preliminary plat is required, a Tree Survey/Preservation Plan is also required as part of the submittal requirements with and at the time of preliminary plat submittal. Refer to the Development Plan Application packet for the needed application and checklist.

- ☑ I have made the decision NOT to waive the statutory time limits (30 days) in accordance with section 212 of the Texas Local Government Code. I understand and acknowledge that the City may DENY my plat application if not complete as determined by staff within the 30-day time period.
- ☐ The required number of copies of the preliminary plat and the approved engineering and construction plans for all public infrastructure improvements in accordance with the design standards of the City, to include all streets, water mains and services, sewer system and services, and drainage systems required to develop the proposed subdivision. – Prelim Plat Extension. Construction Plans not yet approved.
- ☑ The name, address and telephone number of the owner, the surveyor, and engineer responsible for the preparation of the final plat.
- ☑ The name of the subdivision and location map showing adjacent subdivisions, street names (which shall conform, whenever possible, to existing street names and be approved by the Post Office) and lot and blocks numbers in accordance with a systematic arrangement.
- ☑ An accurate boundary survey description of the property, with bearings and distances, referenced to survey lines, existing property descriptions and established subdivisions, and showing the lines of adjacent tracts, the layout, dimensions and names of adjacent streets and alleys and lot lines shown in dashed lines.
- ☑ Existing boundary of adjacent street, and alley rights-of-way and boundaries of right-of-way (ROW) dedication are indicated, street names are labeled, and ROW widths are dimensioned.
- ☑ Scale, north point, date, lot and block numbers.
- ☑ The name and location of adjacent subdivisions or unplatted tracts drawn to scale shown in dotted lines and in sufficient detail to accurately show the existing streets, alleys and other features that may influence the layout and development of the propose subdivision. The abstract name and number, and name of the owner of the adjacent unplatted tracts should be shown.
- ☑ Exact location of lots, streets, public highways, alleys, parks and other features, with accurate dimensions in feet and decimal fractions of feet, with the length of radii and of arcs of all curves, internal angles, points of curvatures, length and bearings of the tangents, and with all other surveyor information necessary to reproduce the plat on the ground. Dimensions shall be shown from all angle points.
- ☑ All lots on building sites shall conform to the minimum standards for area, width and depth prescribed by the zoning district or districts in which the subdivision is located and state the area size of each lot. Internal lot lines are clearly indicated, shown to scale, and labeled with bearings and distances.
- ☑ Building setback lines and the location of utility easements.
- ☑ Topographic information showing contour lines with intervals up to one (1') foot indicating the terrain, drainage pattern of the area, and the drainage basin areas within the proposed subdivision. Topographic information showing contour lines with intervals up to two (2) feet indicating the terrain, the drainage pattern of the area, and the drainage basin areas outside the boundaries of the proposed subdivision.
- ☑ The layout and dimensions of proposed storm drainage areas, easements and rights-of-way necessary for drainage within and outside the boundaries of the proposed subdivision.
- ☑ The location and purpose of all proposed parks or other areas offered for dedication to public use.

PRELIMINARY AND FINAL PLAT
Minimum Requirements Checklist

- [x] The location of all existing property lines, buildings, sewer or water mains, storm drainage areas, water and wastewater facilities, fire hydrants, gas mains or other underground structures, easements of record or other existing features.
- [x] The location, size and identification of any physical features of the property, including water courses, ravines, bridges, culverts, existing structures, drainage or other significant topographic features located on the property or within one hundred fifty feet (150') of the proposed subdivision.
- [x] Copy of any deed restrictions, restrictive covenants, special use permit or planned development district ordinance regulating the property.
- [x] The angle of intersection of the centerlines of all intersecting streets which are intended to be less than ninety (90°) degrees.
- [x] In accordance with the city floodplain management regulations, of the Code of Ordinances, as amended, the floodplain and floodway lines and base flood elevations as shown on the current effective flood insurance rate maps for the city shall be shown, where applicable. A notation shall be shown on the face of the preliminary plat stating: "Lots or portions of lots within the floodplain or areas of special flood hazard require a development permit prior to issuance of a building permit or commencement of construction including site grading, on all or part of those lots".
- [x] Floodplain and floodway lines and base flood elevations as shown on the current effective flood insurance rate maps for the City should be shown, where applicable.
- [x] For a preliminary plat of land located outside the city limits where sanitary sewer does not exist or where street improvement standards vary from those specified by the city, such differences shall be noted.
- [x] A certificate of ownership and dedication of all streets, alleys, easements, parks and other land intended for public use, signed and acknowledged before a Notary Public by the owner and lien holders of the property, along with complete and accurate metes and bounds description of the land subdivided and the property dedicated to public use.
- [x] Receipt showing all taxes on the subject property are paid.
- [x] Certification by a surveyor, to the effect that the preliminary plat represents a survey made by the Surveyor, and that all the necessary survey monuments are correctly shown thereon.
- [x] A preliminary plat provided in multiple sheets shall include a key map showing the entire subdivision at smaller scale with lot and block numbers and street names on one (1) of the sheets or on a separate sheet of the same size.
- [x] Copy of any proposed property owner or homeowners' association agreements, covenants and restrictions.
- [x] Front and exterior side or corner setback lines are shown and labeled.
- [x] Abstract lines, survey lines, county lines, school ISD boundary and corporate boundaries are shown and clearly labeled.
- [x] A title block is provided in the lower right corner that includes large, boldly printed:

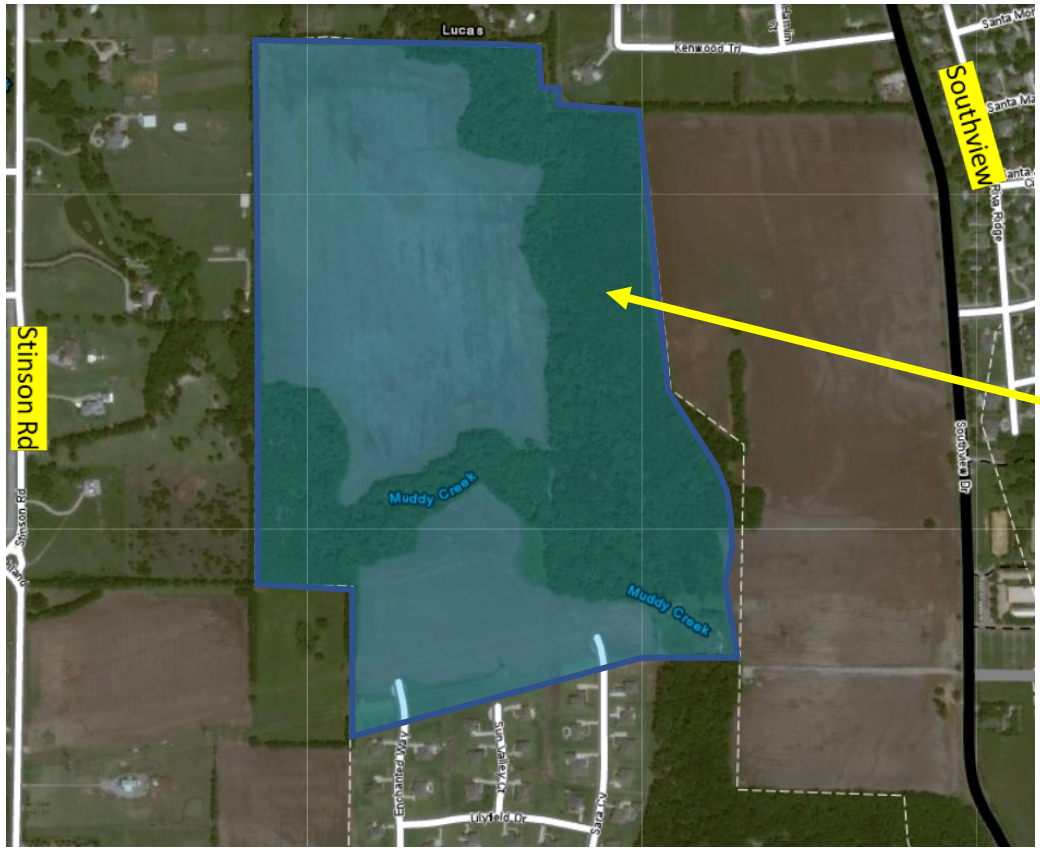
(Subdivision Name)
Preliminary Plat
Lot(s) _____, Block(s) _____ (survey, abstract and tract number)

If a replat, include:
Replat of Lot(s) _____, Block(s) _____

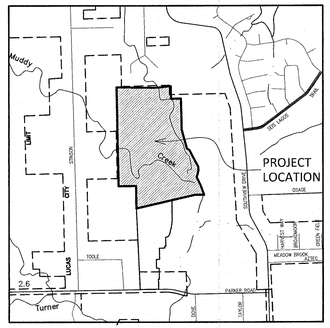
- [x] A log of submittal/revision dates since submitted to the City.
- [x] The purpose of a replat or amending plat is stated on the face of the plat document.
- [ ] If the proposal is a replat or amending plat, the existing lot numbers and block numbers or letters are shown as light dotted lines, with lot number designation followed by R for replats or an A for amending plats. N/A
- [x] Location of property lines, owner or subdivision name(s) and recording information of abutting properties is indicated. Unplatted property or any streets or alleys within a 500-foot radius of subject property are shown and identified/labeled as appropriate.

PRELIMINARY AND FINAL PLAT
Minimum Requirements Checklist

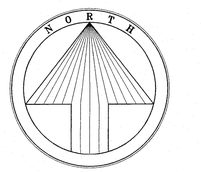
- ☐ Medians, median openings; turn lanes, deceleration/acceleration lanes and stacking distance is indicated within 200 feet of the property. The entire median, left-turn lane and/or deceleration lane and median opening serving a site is shown. N/A
- ☑ Each lot is dimensioned, and the square footage of each lot is indicated.
- ☑ Each lot is numbered, and block groups are assigned a letter. Homeowner's association and other open space areas are identified with tract number.
- ☑ The location of existing underground and above ground utilities, flood plain boundaries and state or federally protected areas, such as wetlands, are indicated.
- ☑ The location of existing structures or other features proposed to remain and those proposed for removal.
- ☑ Existing easements are indicated by a light, dashed line and labeled indicating dimension, purpose and County recording information.
- ☑ Location, dimension, and purpose of proposed easements are indicated by a medium-weight, dashed line. Required and proposed ingress/egress or access easements are shown, clearly labeled and tied down, as appropriate.
- ☑ Existing zoning is shown.
- ☑ Location and area of parks, drainage ways, creeks and open space is indicated and labeled.
- ☑ Legal description/metes and bounds description is included.
- ☑ Include any notes required by the various affected agencies/utilities.
- ☑ Residential minor streets shall be designed and platted so that no street segment shall have a straight line for more than 1,000 feet before altering its course by at least 20 degrees.
- ☑ Sites to be reserved or dedicated for parks, playgrounds and/or other public uses are indicated and labeled.
- ☑ Preliminary water plans are included with this submittal.
- ☑ Contours are indicated with intervals of two (2) feet for property five acres or less and five (5) feet for property more than five acres.
- ☑ A note is included that states whether or not the property is in the 100-year flood plain, with the FIRM Community Panel reference number and map date.
- ☑ A note shall be added to the plat stating: **"Preliminary Plat - For Inspection Purposes Only."**



Enchanted Creek Phase 2



LOCATION MAP
1" = 2000'

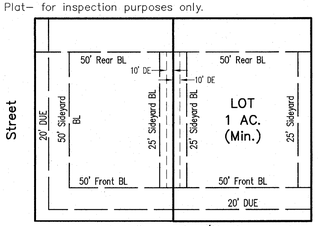


100 0 50 100 200
1 inch = 100 ft.

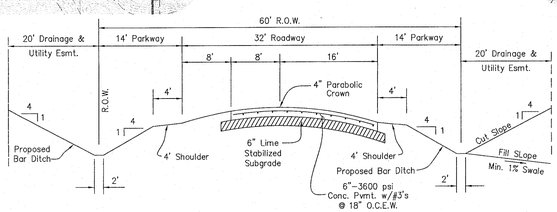
LEGEND (Not all items may be applicable)	
○	1/2" IRON ROD WITH PLASTIC CAP STAMPED "SPIARSENG" SET, UNLESS OTHERWISE NOTED
IRF	IRON ROD FOUND
CIRF	CAPPED IRON ROD FOUND
IPF	IRON PIPE FOUND
AMF	ALUMINUM MONUMENT FOUND
CM	CONTROL MONUMENT
Esmt.	EASEMENT
Util.	UTILITY
DE	DRAINAGE EASEMENT
DUE	DRAINAGE AND UTILITY EASEMENT
UE	UTILITY EASEMENT
WE	WATER EASEMENT
SSE	SANITARY SEWER EASEMENT
SE	SIDEWALK EASEMENT
STE	STREET EASEMENT
FAUE	FIRELANE, ACCESS, & UTILITY EASEMENT
WW	WASTE WATER EASEMENT
WME	WALL MAINTENANCE EASEMENT
HBE	HIKE & BIKE TRAIL EASEMENT
VAM	VISIBILITY, ACCESS & MAINTENANCE EASEMENT
(BTP)	BY THIS PLAT
R.O.W.	RIGHT-OF-WAY
Min. FF	MINIMUM FINISH FLOOR ELEVATION
BL	BUILDING LINE
◀▬▶	STREET NAME CHANGE
℄	CENTERLINE
Ⓐ	BLOCK DESIGNATION
▶	STREET FRONTAGE
Cab.	CABINET
Vol.	VOLUME
Pg.	PAGE
No.	NUMBER
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FIRM	FLOOD INSURANCE RATE MAP
NTS	NOT TO SCALE
Ord. No.	ORDINANCE NUMBER
Inst./Doc.	INSTRUMENT OR DOCUMENT
(DRCCT)	DEED RECORDS, COLLIN COUNTY, TEXAS
(PRCCT)	PLAT RECORDS, COLLIN COUNTY, TEXAS
(OPRCCT)	OFFICIAL PUBLIC RECORDS, COLLIN COUNTY, TEXAS
(DRDCT)	DEED RECORDS, DENTON COUNTY, TEXAS
(PRDCT)	PLAT RECORDS, DENTON COUNTY, TEXAS
(OPRDCT)	OFFICIAL PUBLIC RECORDS, DENTON COUNTY, TEXAS
(DRCCT)	DEED RECORDS, DALLAS COUNTY, TEXAS
(MRDCT)	MAP RECORDS, DALLAS COUNTY, TEXAS
(OPRDCT)	OFFICIAL PUBLIC RECORDS, DALLAS COUNTY, TEXAS

NOTES:

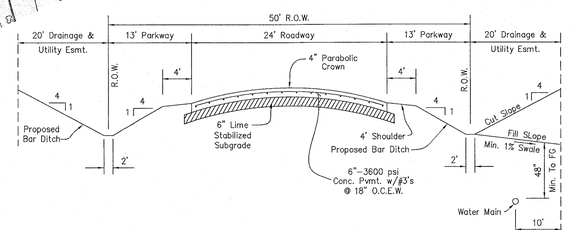
1. This replat was prepared without the benefit of a commitment for title insurance. No research was performed for any easements other than that shown on the record plat of this property. Therefore, easements, agreements, and other documents may exist that affect the subject property that are not shown on this replat.
2. Basis of bearing, horizontal and vertical position derived from the Texas WDS RTK Network–Texas State Plane Coordinate System, NAD83, North Central Zone (4202).
3. Selling a portion of this addition by metes and bounds is a violation of City ordinance and state law and is subject to fines and withholding of utilities and building permits
4. Preliminary Plat– for inspection purposes only.



TYPICAL LOT DETAIL



TYPICAL PAVEMENT SECTION 60' R.O.W. (w/BAR DITCHES)



TYPICAL PAVEMENT SECTION 50' R.O.W. (w/BAR DITCHES)

PRELIMINARY PLAT

ENCHANTED CREEK PHASE 2

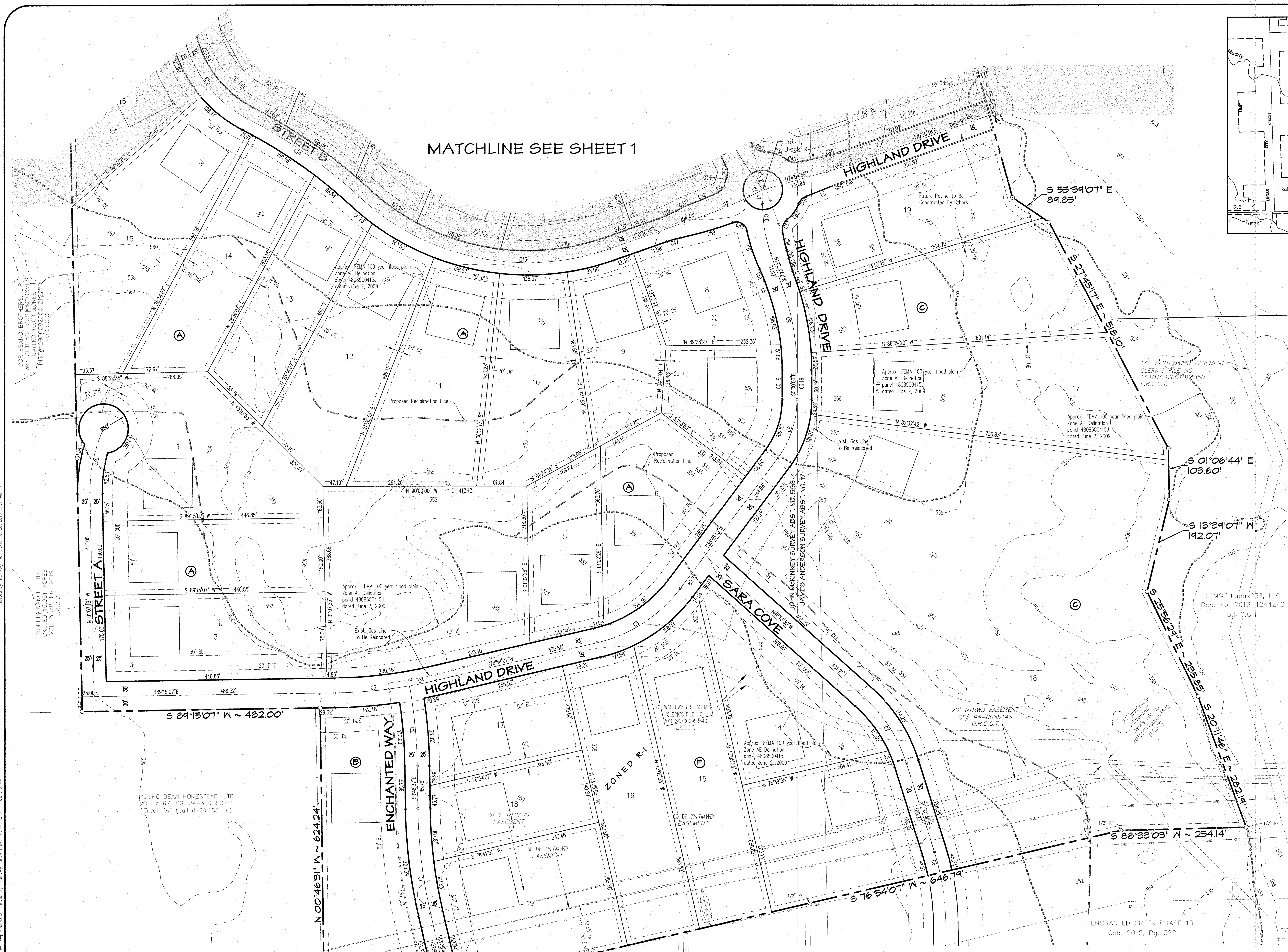
LOTS 1-34, BLOCK A
LOT 10, BLOCK B
LOTS 16-19, BLOCK C
LOTS1-9, BLOCK D
LOTS 1-11, BLOCK E
LOTS 13-19, BLOCK F

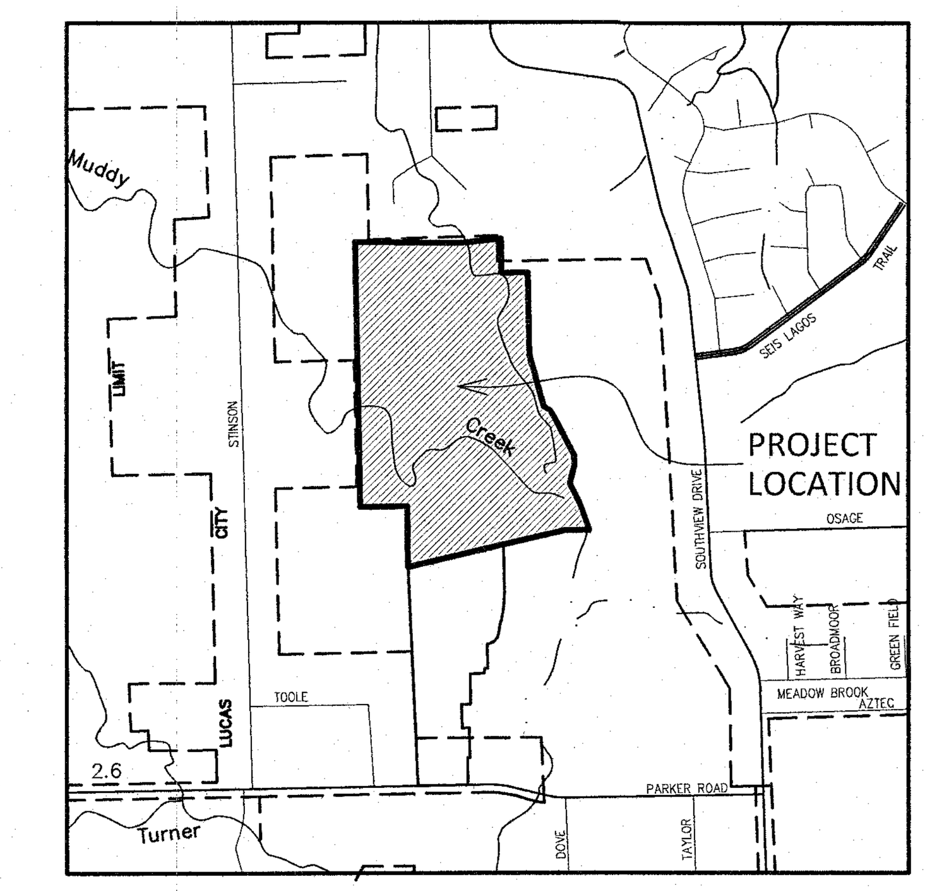
135.743 ACRES OUT OF THE
JAMES ANDERSON SURVEY ~ ABSTRACT NO. 17
JOHN MCKINNEY SURVEY ~ ABSTRACT NO. 596
CITY OF LUCAS, COLLIN COUNTY, TEXAS
ZONING DISTRICT R-1

ENGINEER / SURVEYOR
Spiars Engineering, Inc.
765 Custer Road, Suite 100
Plano, TX 75075
Telephone: (972) 422-0077
TBPE No. F-2121
Contact: Matt Dorsett

OWNER / APPLICANT
CTMGT Lucas 238, LLC
520 Central Parkway East, Suite 104
Carrollton, Texas 75006
Telephone (972) 422-9880
Contact: Steve Lenart

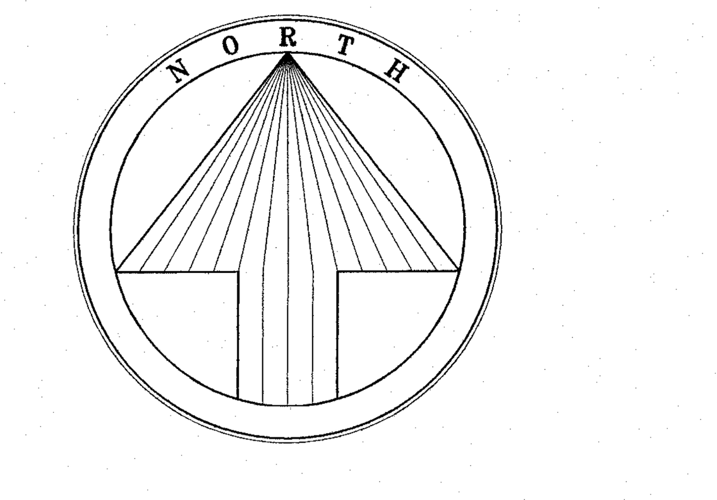
October, 2016 SEI Job No. 16-119

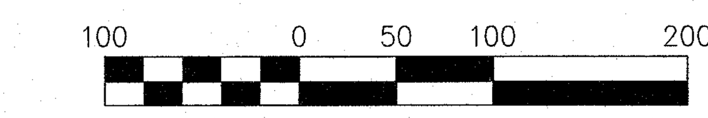




LOCATION MAP

1" = 2000'



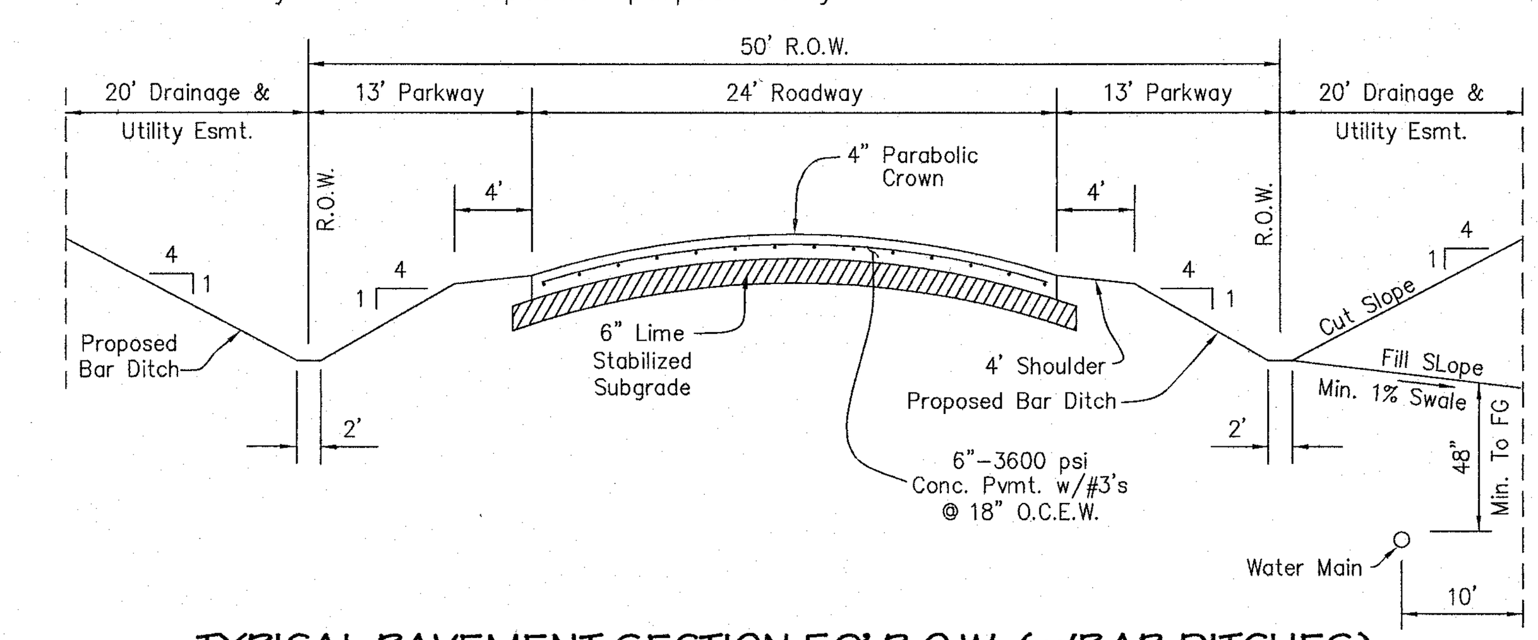


1 inch = 100ft.

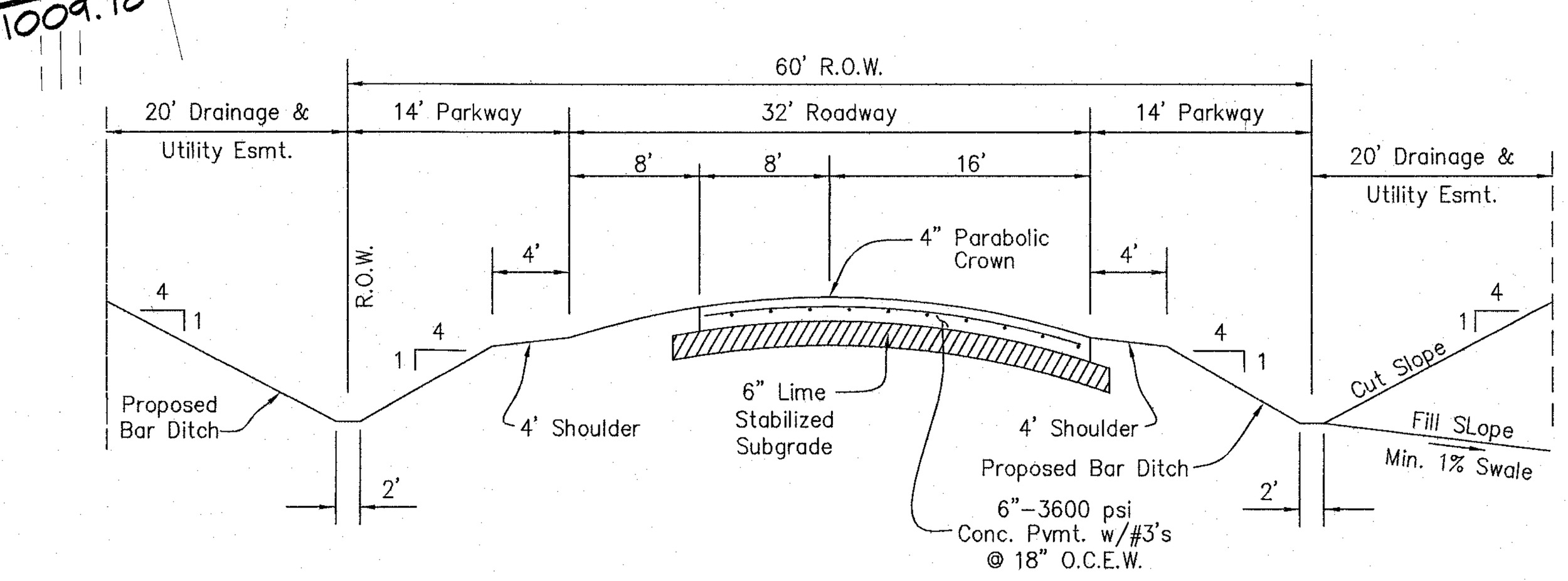
LEGEND (Not all items may be applicable)	
○	1/2" IRON ROD WITH PLASTIC CAP STAMPED "SPIARSENG" SET, UNLESS OTHERWISE NOTED
IRF	IRON ROD FOUND
CIRF	CAPPED IRON ROD FOUND
IPF	IRON PIPE FOUND
AMF	ALUMINUM MONUMENT FOUND
CM	CONTROL MONUMENT
Esmt.	EASEMENT
Util.	UTILITY
DE	DRAINAGE EASEMENT
DUE	DRAINAGE AND UTILITY EASEMENT
UE	UTILITY EASEMENT
WE	WATER EASEMENT
SSE	SANITARY SEWER EASEMENT
SE	SIDEWALK EASEMENT
STE	STREET EASEMENT
FAUE	FIRELANE, ACCESS, & UTILITY EASEMENT
WW	WASTE WATER EASEMENT
WME	WALL MAINTENANCE EASEMENT
HBE	HIKE & BIKE TRAIL EASEMENT
VAM	VISIBILITY, ACCESS & MAINTENANCE EASEMENT
(BTP)	BY THIS PLAT
R.O.W.	RIGHT-OF-WAY
Min. FF	MINIMUM FINISH FLOOR ELEVATION
BL	BUILDING LINE
◆	STREET NAME CHANGE
℄	CENTERLINE
Ⓐ	BLOCK DESIGNATION
▶	STREET FRONTAGE
Cab.	CABINET
Vol.	VOLUME
Pg.	PAGE
No.	NUMBER
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FIRM	FLOOD INSURANCE RATE MAP
NTS	NOT TO SCALE
Ord. No.	ORDINANCE NUMBER
Inst./Doc.	INSTRUMENT OR DOCUMENT
(DRCCT)	DEED RECORDS, COLLIN COUNTY, TEXAS
(PRCCT)	PLAT RECORDS, COLLIN COUNTY, TEXAS
(OPRCCT)	OFFICIAL PUBLIC RECORDS, COLLIN COUNTY, TEXAS
(DRDCT)	DEED RECORDS, DENTON COUNTY, TEXAS
(PRDCT)	PLAT RECORDS, DENTON COUNTY, TEXAS
(OPRDCT)	OFFICIAL PUBLIC RECORDS, DENTON COUNTY, TEXAS
(DRDCT)	DEED RECORDS, DALLAS COUNTY, TEXAS
(MRDCT)	MAP RECORDS, DALLAS COUNTY, TEXAS
(OPRDCT)	OFFICIAL PUBLIC RECORDS, DALLAS COUNTY, TEXAS

NOTES:

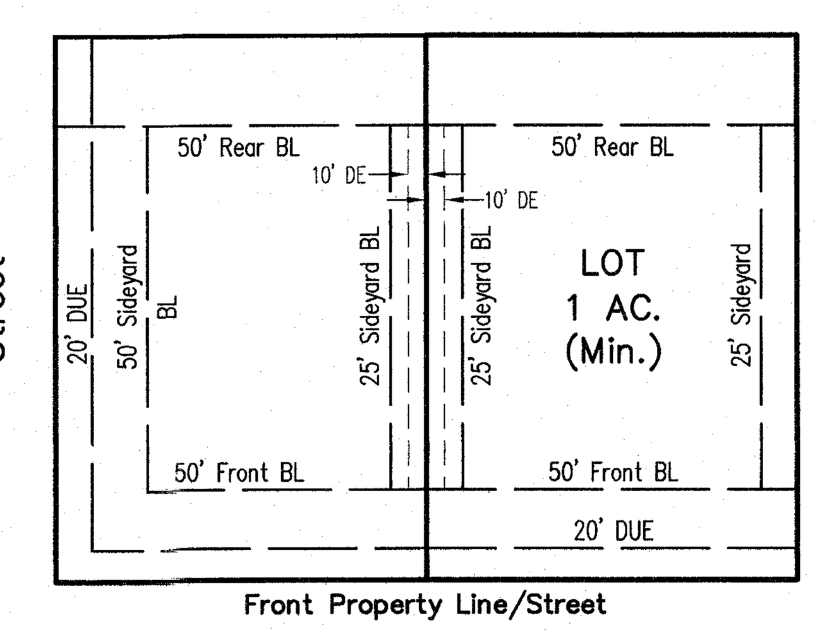
1. This replat was prepared without the benefit of a commitment for title insurance. No research was performed for any easements other than that shown on the record plat of this property. Therefore, easements, agreements, and other documents may exist that affect the subject property that are not shown on this replat.
2. Basis of bearing, horizontal and vertical position derived from the Texas WDS RTK Network—Texas State Plane Coordinate System, NAD83, North Central Zone (4202).
3. Selling a portion of this addition by metes and bounds is a violation of City ordinance and state law and is subject to fines and withholding of utilities and building permits
4. Preliminary Plat— for inspection purposes only.



TYPICAL PAVEMENT SECTION 50' R.O.W. (w/BAR DITCHES)



TYPICAL PAVEMENT SECTION 60' R.O.W. (w/BAR DITCHES)



TYPICAL LOT DETAIL

PRELIMINARY PLAT

ENCHANTED CREEK PHASE 2

LOTS 1-34, BLOCK A
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Sheet 2 of 3

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Telephone (972) 422-9880
Contact: Steve Lenart

October, 2016 SEI Job No. 16-119

STATE OF TEXAS §
COUNTY OF COLON §

OWNER'S CERTIFICATE

Legal Description

BEING part of a 232.162 acre tract of land, situated in the John Anderson Survey, Abstract No. 17, and the John McKinney Survey, Abstract No. 596, City of Lucas, Collin County, Texas, the subject tract being a portion of a tract of land conveyed to CTMGT Lucas 238, LLC according to the deed recorded in 2013-1244240 of the deed records of Collin County, Texas (D.R.C.C.T.), the subject tract being more particularly described as follows:

BEGINNING at a 1/2" iron rod found for corner at the northwest corner of Lot 9 Block B, Enchanted Estates Phase 1, an addition to the City of Lucas, Collin County Texas, according to the plat thereof recorded in Cabinet 2015, Pg 155 & 156, Plat Records, Collin County, Texas (P.R.C.C.T)

Thence, N 0°46'31" W, a distance of 624.24', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 89°15'07" W, a distance of 482.00' to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, N 1°07'19" W, a distance of 2730.35' to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 89°17'29" E, a distance of 1065.97' to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, N 84°12'29" E, a distance of 435.32', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 0°38'47" E, a distance of 352.45', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, N 88°48'37" E, a distance of 273.45', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 1°11'22" E, a distance of 850.00', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 15°26'29" E, a distance of 543.34', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 55°39'07" E, a distance of 89.85', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 27°45'17" E, a distance of 518.10', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 1°06'44" E, a distance of 103.60', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 13°39'07" W, a distance of 192.07', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 25°56'29" E, a distance of 235.85', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" set;

Thence, S 20°11'46" E, a distance of 282.19', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" found;

Thence, S 88°33'03" W, a distance of 254.14', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" found;

Thence, S 76°54'07" W, a distance of 646.79', to a 1/2" iron rod with a plastic cap stamped "SPIARSENG" found;

Thence, S 76°54'07" W, a distance of 1009.78', to the POINT OF BEGINNING with the subject tract containing 5,912,976.21 square feet or 135.743 acres of land.

DEDICATION

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS:

THAT, CTMGT Lucas 238, LLC is the Owner of the above described project and does hereby adopt this plat designating the herein described property as **Enchanted Creek Phase 2** Lots 1-34 Block A, Lot 10 Block B, Lots 16-19 Block C, Lots 1-9 Block D and Lots 1-11 Block E and Lots 13-19 Block F an addition to City of Lucas, Texas and does hereby dedicate to The City of Lucas the right-of-way, streets, and easements platted hereon.

This plat approved subject to all platting ordinances, rules, regulations, and resolutions of the City of Lucas, Texas.

Executed this the _____ day of _____ , 2016.

CTMGT Lucas 238, LLC

By: _____
Mehrdad Moayedi

STATE OF TEXAS §
COUNTY OF COLLIN §

Before me, the undersigned authority, a Notary Public in and for said County and State, on this day personally appeared Mehrdad Moayedi, known to me to be the person(s) whose names are subscribed to the foregoing instrument and acknowledged to me that they each executed the same for the purpose and considerations therein expressed.

Given under my hand and seal of office, this _____ day of _____, 2016.

_____
Notary Public in and for
the State of Texas

SURVEYOR'S CERTIFICATE

KNOW ALL MEN BY THESE PRESENTS:

That I, Darren K. Brown, of Spiars Engineering, Inc., do hereby certify, that I prepared this plat from an actual on the ground survey of the land as described and that the corner monuments shown thereon were properly placed under my personal supervision in accordance with the Platting Rules and Regulations of the City of Lucas Planning and Zoning Commission.

_____
DARREN K. BROWN, R.P.L.S. NO. 5252

STATE OF TEXAS §
COUNTY OF COLLIN §

Before me, the undersigned, a Notary Public in and for said County and State, on this day personally appeared Darren K. Brown, known to me to be the person whose name is subscribed to the foregoing instrument, and acknowledged to me that he executed the same for the purpose and considerations therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE this the _____ day of _____, 2016.

_____
Notary Public in and for
the State of Texas

CITY APPROVAL CERTIFICATE

This plat is hereby approved by the Planning and Zoning Commission of the City of Lucas, Texas

_____
Chairman, Planning and Zoning Commission Date

ATTEST:

_____
Signature Date

_____
Name and Title Date

The Director of Public Works of the City of Lucas, Texas hereby certifies that to the best of his/her knowledge of belief, this subdivision plat conforms to all the requirements of the Code of Ordinances and with engineering construction standards and processes adopted by the City of Lucas, Texas as to which is /her approval is required

_____
Director of Public Works Date

The Director of Planning and Community Development of the City of Lucas, Texas hereby certifies that to the best of his/her knowledge or belief, this subdivision plat conforms to all requirements of the Code of Ordinances, or as may have been amended or modified, as allowed, by the Planning and Zoning Commission as to which his/her approval is required

_____
Director of Planning and Community Development Date

Health Department Certification

I hereby certify that the on-site sewage facilities described on this plat conform to the applicable OSSF laws of the State of Texas, that site evaluations have been submitted representing the site conditions in the area in which on-site sewage facilities are planned to be used.

_____ _____
Registered Sanitarian or Designated Representative Date
Collin County Development Services

Lot Line Table		
Line #	Length	Direction
L1	29.32'	S 00°28'43" W
L2	67.57'	N 34°26'41" W
L3	30.98'	S 63°37'26" W
L4	53.77'	N 78°19'38" E
L5	56.95'	N 68°22'01" E
L6	36.52'	S 13°37'41" E
L7	26.77'	N 19°23'42" W
L8	26.41'	N 19°23'42" W

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
13	F	83,524	78192
14	F	76,433	65805
15	F	92,916	89521
16	F	87,286	84275
17	F	52,486	43560
18	F	49,895	46824
19	F	88,821	83724

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
1	A	106,424	98138
2	A	67,027	64027
3	A	78,199	66162
4	A	149,308	140939
5	A	51,346	48265
6	A	74,775	66457
7	A	49,333	43723
8	A	53,676	44240
9	A	54,393	51548
10	A	77,440	74656
11	A	89,990	87206
12	A	86,001	83104
13	A	69,033	65971
14	A	75,511	72499
15	A	106,290	103609
16	A	49,690	47081
17	A	47,857	43572
18	A	48,260	43585
19	A	47,731	43595
20	A	47,403	43583

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
16	C	586,291	563402
17	C	126,956	124410
18	C	105,013	102422
19	C	88,997	76934

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
1	E	54,217	45338
2	E	48,399	43605
3	E	47,500	43700
4	E	47,500	43700
5	E	50,146	43803
6	E	53,417	44862
7	E	52,692	47341
8	E	53,112	49568
9	E	48,239	45130
10	E	47,111	43594
11	E	50,342	43605

Centerline Curve Table					
Curve #	Length	Radius	Chord	Chord Bearing	Delta
C1	215.01'	1000.00'	214.60'	S 06°56'12" E	12°19'09"
C2	163.74'	1000.00'	163.55'	N 05°28'04" W	9°22'53"
C3	206.93'	960.00'	206.53'	N 83°04'37" E	12°21'01"
C4	206.93'	960.00'	206.53'	N 83°04'37" E	12°21'01"
C5	206.63'	295.00'	202.43'	N 56°50'08" E	40°07'57"
C6	43.43'	500.00'	43.41'	N 14°59'19" W	4°58'35"
C7	161.03'	300.00'	159.10'	N 32°51'13" W	30°45'14"
C8	128.35'	200.00'	126.16'	N 18°23'05" E	36°46'10"
C9	169.25'	500.00'	168.45'	N 09°41'51" W	19°23'42"
C10	104.06'	300.00'	103.54'	S 09°27'30" E	19°52'26"
C11	48.49'	800.00'	48.48'	N 72°20'28" E	3°28'21"
C12	97.47'	800.00'	97.41'	N 67°06'52" E	6°58'52"
C13	543.74'	500.00'	517.34'	S 78°14'28" E	62°18'30"
C14	276.22'	1000.00'	275.35'	N 55°00'00" W	15°49'35"
C15	253.94'	250.00'	243.16'	S 33°48'52" E	58°11'52"
C16	310.91'	2000.00'	310.60'	S 00°15'44" E	8°54'25"
C17	130.05'	2000.00'	130.03'	S 06°03'14" W	3°43'32"
C18	118.35'	300.00'	117.59'	N 78°41'39" W	22°36'14"
C19	160.32'	400.00'	159.24'	S 78°52'27" E	22°57'49"
C20	383.95'	2025.00'	383.38'	N 02°29'06" E	10°51'49"

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
21	A	47,452	43565
22	A	50,424	47473
23	A	49,984	48350
24	A	59,610	58046
25	A	55,148	46154
26	A	57,060	47830
27	A	55,280	51578
28	A	190,957	186234
29	A	77,659	69617
30	A	166,184	159821
31	A	215,671	211540
32	A	154,044	146624
33	A	75,968	72966
34	A	85,257	73307

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
10	B	111,124	96450

Lot Area Table			
Lot #	Block #	Gross Square Feet	Net Square Feet
1	D	58,478	49200
2	D	54,941	49668
3	D	46,960	43589
4	D	47,325	43599
5	D	52,543	44659
6	D	52,720	43560
7	D	48,400	43560
8	D	52,418	47958
9	D	59,980	50424

Open Space Area Table		
Lot #	Block #	Square Feet
1	X	5027

Centerline Curve Table					
Curve #	Length	Radius	Chord	Chord Bearing	Delta
C21	254.09'	2025.00'	253.93'	N 06°32'29" W	7°11'22"
C22	91.71'	225.00'	91.08'	N 78°19'23" E	23°21'14"
C23	78.80'	300.00'	78.57'	S 26°55'12" E	15°02'58"
C24	121.02'	400.00'	120.56'	S 10°43'40" E	17°20'05"
C25	98.39'	300.00'	97.95'	S 11°11'06" W	18°47'31"
C26	26.87'	400.00'	26.87'	S 00°08'08" E	3°50'58"
C27	404.12'	300.00'	374.25'	N 18°00'35" W	77°10'53"
C28	110.26'	200.00'	108.87'	S 40°48'23" E	31°35'17"
C29	87.31'	200.00'	86.62'	S 12°30'22" E	25°00'44"
C30	135.34'	300.00'	134.19'	S 11°48'06" W	25°50'51"

Lot Curve Table					
Curve #	Length	Radius	Chord	Chord Bearing	Delta
C31	34.93'	263.00'	34.91'	S 65°11'08" W	7°36'36"
C32	58.17'	770.56'	58.15'	N 66°49'41" E	4°19'30"
C33	25.52'	27.00'	24.58'	N 37°35'18" E	54°09'17"
C34	12.95'	78.00'	12.94'	S 15°16'03" W	9°30'48"
C35	19.38'	237.00'	19.38'	S 21°44'17" E	4°41'09"
C36	17.29'	237.00'	17.29'	S 26°10'16" E	4°10'49"
C37	34.01'	263.00'	33.99'	N 24°33'22" W	7°24'36"
C38	60.57'	267.42'	60.44'	S 27°17'16" E	12°58'37"
C39	23.20'	27.00'	22.50'	N 04°35'48" W	49°14'31"
C40	33.73'	286.00'	33.71'	N 74°56'55" E	6°45'28"
C41	28.15'	830.00'	28.15'	N 71°34'35" E	1°56'35"
C42	90.52'	332.69'	90.24'	S 21°25'22" E	15°35'23"
C43	25.79'	27.00'	24.82'	S 61°05'35" E	54°44'14"
C44	49.71'	78.00'	48.87'	N 70°12'13" W	36°30'58"
C45	22.57'	26.00'	21.86'	S 76°48'33" E	49°43'38"
C46	21.47'	26.00'	20.86'	S 44°42'47" W	47°18'43"
C47	29.07'	237.00'	29.05'	S 74°07'09" W	7°01'43"
C48	23.86'	237.00'	23.85'	N 16°30'42" W	5°46'02"
C49	38.16'	237.00'	38.11'	N 65°59'34" E	9°13'27"
C50	20.87'	285.92'	20.87'	S 70°27'27" W	4°10'56"

Lot Curve Table					
Curve #	Length	Radius	Chord	Chord Bearing	Delta
C51	25.02'	236.00'	25.01'	N 22°25'57" W	6°04'29"
C52	40.56'	78.00'	40.11'	N 35°57'16" E	29°47'42"
C53	26.84'	26.00'	25.66'	S 21°16'54" W	59°08'26"
C54	39.23'	267.91'	39.19'	S 12°29'00" E	8°23'20"
C55	16.65'	264.00'	16.65'	N 14°52'14" W	3°36'51"
C56	26.08'	236.00'	26.07'	S 16°13'46" E	6°19'53"
C57	83.32'	334.34'	83.11'	S 18°19'49" E	14°16'46"
C58	36.22'	21.00'	31.90'	N 60°36'21" W	98°49'52"
C59	111.62'	835.44'	111.54'	N 73°48'21" E	7°39'18"

PRELIMINARY PLAT

ENCHANTED CREEK PHASE 2

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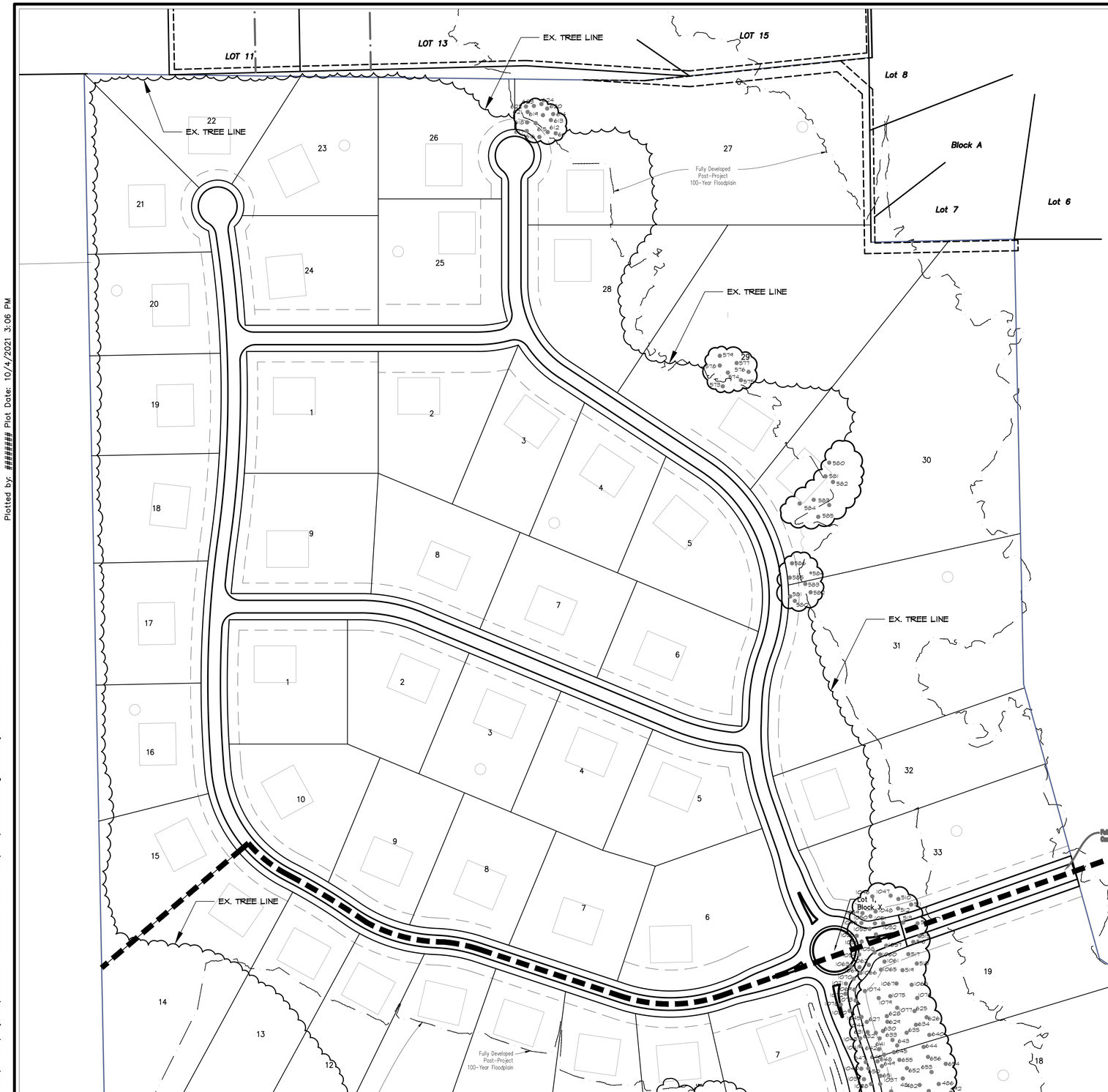
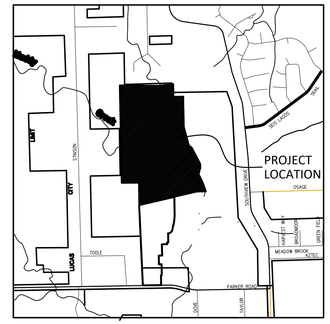




LOCATION MAP
1" = 2000'

STUDIO 13
DESIGN GROUP

Studio 13 Design Group, PLLC.
386 W. Main Street
Lewisville, Texas 75057
469-635-1900

TBAE Firm #BR643

NORTH

100 50 0 100
1" = 10' - 0"

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale as necessary.

One Inch

TREE SURVEY

TREE SURVEY

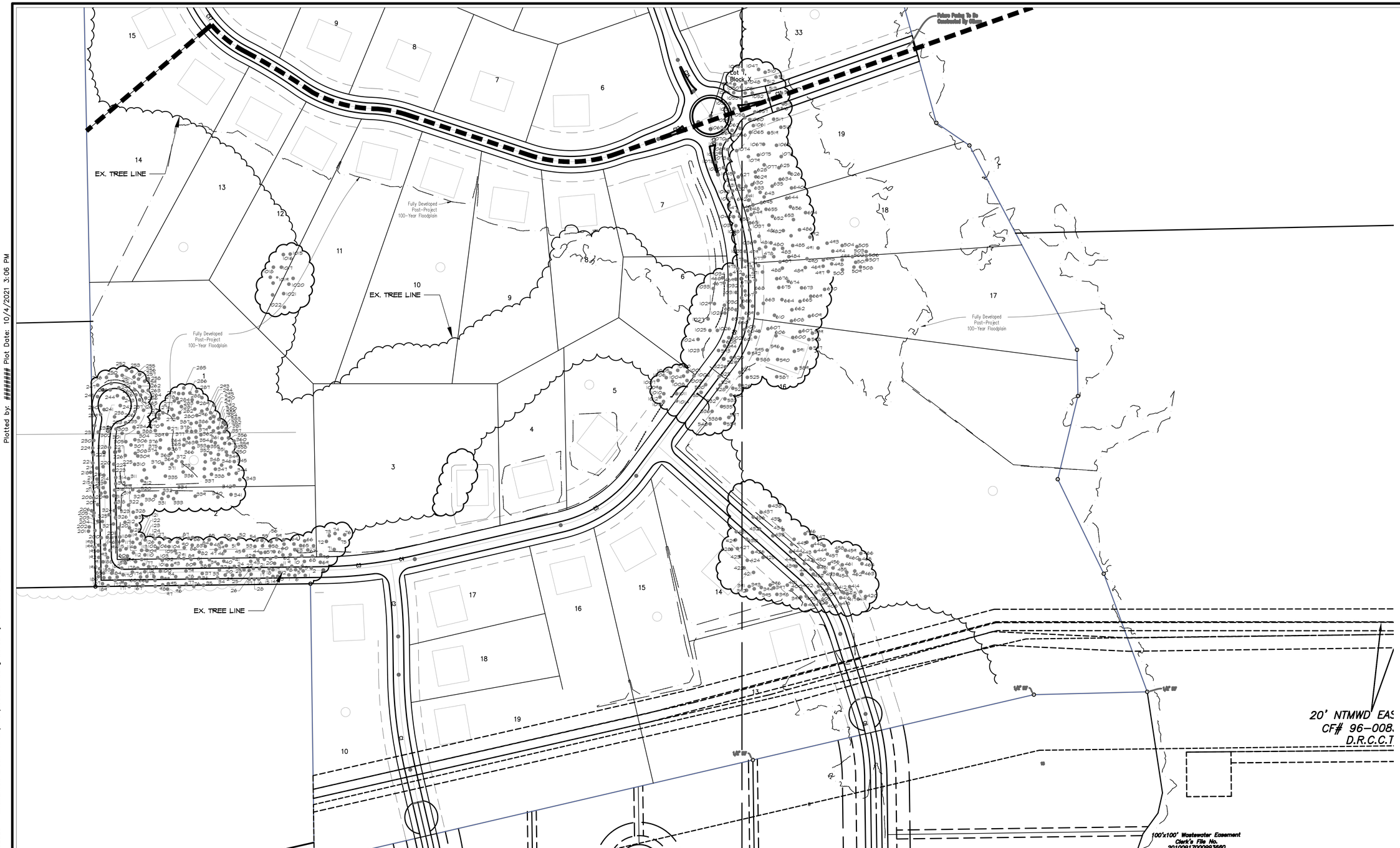
Enchanted Creek, Phase 2

City of Lucas, Collin County, Texas

#	PLAN REVIEW REVISIONS	BY	DATE
0			

PROJECT
LDC086

SHEET
TR1 of 2



STUDIO 13 DESIGN GROUP

Studio 13 Design Group, PLLC.
386 W. Main Street
Lewisville, Texas 75057
469-635-1900

TBAE Firm #BR643

NORTH

100 50 0 100

1" = 100' - 0"

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale as necessary.

One Inch

TREE SURVEY

TREE SURVEY

Enchanted Creek, Phase 2

City of Lucas, Collin County, Texas

#	PLAN REVIEW REVISIONS	BY	DATE
0			

PROJECT
LDC086

SHEET
TR2 of 3

Plotted by: ######## Plot Date: 10/4/2021 3:06 PM

Drawing: W:\Shared With Me\shared\Projects\LDC086 - Enchanted Creek Ph. 2\DWG\LDC086TR.dwg Saved By: Station13 Save Time: 10/3/2021 9:38 PM

Tree #	Size	Common Name	Scientific Name	Condition
1	19	Hackberry	Celtis occidentalis	Fair
2	8.5	Hackberry	Celtis occidentalis	Fair
3	19.75	Hackberry	Celtis occidentalis	Fair
4	19.25	Ash	Fraxinus texensis	Good
5	11	Hackberry	Celtis occidentalis	Poor
6	11	Hackberry	Celtis occidentalis	Fair
7	15.75	Cedar Elm	Ulmus crassifolia	Good
8	9.5	Cedar Elm	Ulmus crassifolia	Good
9	11	Cedar Elm	Ulmus crassifolia	Good
10	11.75	Walnut	Juglans microcarpa	Good
11	16.75	Hackberry	Celtis occidentalis	Fair
12	22.25	Hackberry	Celtis occidentalis	Poor
13	8.5	Hackberry	Celtis occidentalis	Fair
14	6.25	Ash	Fraxinus texensis	Good
15	8.25	Ash	Fraxinus texensis	Good
16	7	Ash	Fraxinus texensis	Good
17	21.25	Cedar Elm	Ulmus crassifolia	Good
18	10.75	Dead	Dead	Dead
19	8.75	Ash	Fraxinus texensis	Good
20	6	Ash	Fraxinus texensis	Good
21	7.25	Ash	Fraxinus texensis	Good
22	6.75	Ash	Fraxinus texensis	Good
23	9	Hackberry	Celtis occidentalis	Fair
24	6.25	Hackberry	Celtis occidentalis	Fair
25	16	Hackberry	Celtis occidentalis	Poor
26	10.75	Ash	Fraxinus texensis	Good
27	8	Cedar Elm	Ulmus crassifolia	Good
28	10	Cedar Elm	Ulmus crassifolia	Good
29	6.5	Cedar Elm	Ulmus crassifolia	Good
30	12.5	Eastern Red Cedar	Juniperus virginiana	Fair
31	6	Eastern Red Cedar	Juniperus virginiana	Fair
32	11.75	Eastern Red Cedar	Juniperus virginiana	Fair
33	9.25	Eastern Red Cedar	Juniperus virginiana	Fair
34	6.25	Cedar Elm	Ulmus crassifolia	Good
35	7.5	Cedar Elm	Ulmus crassifolia	Good
36	9.25	Eastern Red Cedar	Juniperus virginiana	Good
37	9.325	Eastern Red Cedar	Juniperus virginiana	Good
38	7.25	Eastern Red Cedar	Juniperus virginiana	Good
39	21.25	Eastern Red Cedar	Juniperus virginiana	Fair
40	10.5	Cedar Elm	Ulmus crassifolia	Good
41	13.75	Eastern Red Cedar	Juniperus virginiana	Fair
42	7.5	Cedar Elm	Ulmus crassifolia	Good
43	6.25	Ash	Fraxinus texensis	Good
44	7	Hackberry	Celtis occidentalis	Fair
45	13.75	Hackberry	Celtis occidentalis	Fair
46	8.75	Hackberry	Celtis occidentalis	Fair
47	8.75	Hackberry	Celtis occidentalis	Fair
48	6	Hackberry	Celtis occidentalis	Fair
49	11.25	Hackberry	Celtis occidentalis	Fair
50	6.5	Ash	Fraxinus texensis	Good
51	9	Ash	Fraxinus texensis	Fair
52	13.75	Eastern Red Cedar	Juniperus virginiana	Fair
53	10.5	Eastern Red Cedar	Juniperus virginiana	Fair
54	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
55	8	Eastern Red Cedar	Juniperus virginiana	Good
56	13	Cedar Elm	Ulmus crassifolia	Good
57	12.75	Ash	Fraxinus texensis	Good
58	12.75	Dead	Dead	Dead
59	9	Hackberry	Celtis occidentalis	Fair
60	7.5	Hackberry	Celtis occidentalis	Fair
61	12.25	Ash	Fraxinus texensis	Good
62	6.5	Cedar Elm	Ulmus crassifolia	Good
63	11.75	Eastern Red Cedar	Juniperus virginiana	Fair
64	11.5	Eastern Red Cedar	Juniperus virginiana	Good
65	6.5	Eastern Red Cedar	Juniperus virginiana	Good
66	6	Ash	Fraxinus texensis	Good
67	6.5	Cedar Elm	Ulmus crassifolia	Good
68	10.5	Cedar Elm	Ulmus crassifolia	Good
69	12.5	Eastern Red Cedar	Juniperus virginiana	Fair
70	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
71	12	Ash	Fraxinus texensis	Good
72	8.25	Cedar Elm	Ulmus crassifolia	Good
73	7	Ash	Fraxinus texensis	Good
74	6	Ash	Fraxinus texensis	Good
75	8.75	Eastern Red Cedar	Juniperus virginiana	Poor
76	6.25	Eastern Red Cedar	Juniperus virginiana	Good
77	18	Cedar Elm	Ulmus crassifolia	Good
78	7	Eastern Red Cedar	Juniperus virginiana	Good
79	6.25	Ash	Fraxinus texensis	Good
80	6	Ash	Fraxinus texensis	Good
81	14.75	Eastern Red Cedar	Juniperus virginiana	Fair
82	12.25	Eastern Red Cedar	Juniperus virginiana	Fair
83	7	Eastern Red Cedar	Juniperus virginiana	Fair
84	7	Eastern Red Cedar	Juniperus virginiana	Fair
85	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
86	8.75	Eastern Red Cedar	Juniperus virginiana	Fair
87	11.25	Cedar Elm	Ulmus crassifolia	Good
88	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
89	11.75	Eastern Red Cedar	Juniperus virginiana	Good
90	14.5	Eastern Red Cedar	Juniperus virginiana	Fair
91	8	Eastern Red Cedar	Juniperus virginiana	Fair
92	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
93	7	Eastern Red Cedar	Juniperus virginiana	Fair
94	6	Eastern Red Cedar	Juniperus virginiana	Fair
95	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
96	11.5	Eastern Red Cedar	Juniperus virginiana	Fair
97	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
98	10	Eastern Red Cedar	Juniperus virginiana	Fair
99	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
100	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
101	6	Cedar Elm	Ulmus crassifolia	Good
102	6.25	Eastern Red Cedar	Juniperus virginiana	Good
103	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
104	7.75	Eastern Red Cedar	Juniperus virginiana	Good
105	6.25	Eastern Red Cedar	Juniperus virginiana	Good
106	10.25	Eastern Red Cedar	Juniperus virginiana	Good
107	9.25	Eastern Red Cedar	Juniperus virginiana	Fair
108	7.25	Eastern Red Cedar	Juniperus virginiana	ff
109	6	Cedar Elm	Ulmus crassifolia	Good
110	7.25	Cedar Elm	Ulmus crassifolia	Good
111	6	Cedar Elm	Ulmus crassifolia	Good
112	8.75	Cedar Elm	Ulmus crassifolia	Good
113	8.25	Hackberry	Celtis occidentalis	Fair
114	6	Hackberry	Celtis occidentalis	Fair
115	11.5	Hackberry	Celtis occidentalis	Fair
116	7	Eastern Red Cedar	Juniperus virginiana	Good
117	8	Eastern Red Cedar	Juniperus virginiana	Poor
118	6.5	Eastern Red Cedar	Juniperus virginiana	Good
119	10.5	Hackberry	Celtis occidentalis	Fair
120	8.5	Eastern Red Cedar	Juniperus virginiana	Good
121	7	Eastern Red Cedar	Juniperus virginiana	Fair
122	12	Hackberry	Celtis occidentalis	Fair
123	11.5	Hackberry	Celtis occidentalis	Fair
124	10.5	Hackberry	Celtis occidentalis	Fair
125	6.75	Hackberry	Celtis occidentalis	Fair
126	11.5	Hackberry	Celtis occidentalis	Fair
127	10.25	Hackberry	Celtis occidentalis	Fair
128	12.75	Hackberry	Celtis occidentalis	Fair
129	7.75	Hackberry	Celtis occidentalis	Fair
130	7.25	Hackberry	Celtis occidentalis	Fair
131	11	Eastern Red Cedar	Juniperus virginiana	Fair
132	7.25	Hackberry	Celtis occidentalis	Fair
133	8	Eastern Red Cedar	Juniperus virginiana	Fair
134	20	Hackberry	Celtis occidentalis	Fair
135	8.25	Cedar Elm	Ulmus crassifolia	Fair
136	6.25	Cedar Elm	Ulmus crassifolia	Good
137	11	Cedar Elm	Ulmus crassifolia	Fair
138	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
139	9.25	Cedar Elm	Ulmus crassifolia	Fair
140	7.25	Eastern Red Cedar	Juniperus virginiana	Poor
141	6.75	Cedar Elm	Ulmus crassifolia	Good
142	11.25	Hackberry	Celtis occidentalis	Poor
143	20.5	Hackberry	Celtis occidentalis	Poor
144	9.25	Hackberry	Celtis occidentalis	Good
145	8.25	Hackberry	Celtis occidentalis	Poor
146	9.25	Hackberry	Celtis occidentalis	Poor
147	7	Cedar Elm	Ulmus crassifolia	Good
148	6.75	Eastern Red Cedar	Juniperus virginiana	Good
149	9.5	Ash	Fraxinus texensis	Good
150	7	Eastern Red Cedar	Juniperus virginiana	Fair
151	7	Eastern Red Cedar	Juniperus virginiana	Fair
152	6.75	Cedar Elm	Ulmus crassifolia	Good
153	11	Cedar Elm	Ulmus crassifolia	Fair
154	7.5	Hackberry	Celtis occidentalis	Fair
155	6.25	Hackberry	Celtis occidentalis	Fair
156	13	Hackberry	Celtis occidentalis	Fair
157	16	Hackberry	Celtis occidentalis	Fair
158	6	Hackberry	Celtis occidentalis	Fair
159	6.75	Hackberry	Celtis occidentalis	Fair
160	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
161	7.25	Cedar Elm	Ulmus crassifolia	Good
162	6.25	Cedar Elm	Ulmus crassifolia	Good
163	7.25	Ash	Fraxinus texensis	Fair
164	8.25	Ash	Fraxinus texensis	Fair
165	9.5	Eastern Red Cedar	Juniperus virginiana	Fair
166	10.5	Ash	Fraxinus texensis	Good
167	12.5	Hackberry	Celtis occidentalis	Fair
168	6.5	Hackberry	Celtis occidentalis	Fair
169	11.25	Hackberry	Celtis occidentalis	Fair
170	7.25	Hackberry	Celtis occidentalis	Fair
171	9	Hackberry	Celtis occidentalis	Fair
172	8.5	Hackberry	Celtis occidentalis	Fair
173	14.25	Hackberry	Celtis occidentalis	Fair
174	12	Hackberry	Celtis occidentalis	Fair
175	10	Hackberry	Celtis occidentalis	Fair
176	10.5	Hackberry	Celtis occidentalis	Fair
177	7.5	Cedar Elm	Ulmus crassifolia	Fair
178	6.5	Eastern Red Cedar	Juniperus virginiana	Poor
179	6.25	Cedar Elm	Ulmus crassifolia	Good
180	6	Eastern Red Cedar	Juniperus virginiana	Poor
181	14	Cedar Elm	Ulmus crassifolia	Good
182	10.25	Cedar Elm	Ulmus crassifolia	Good
183	20.75	Cedar Elm	Ulmus crassifolia	Fair
184	13.25	Ash	Fraxinus texensis	Good
185	18	Hackberry	Celtis occidentalis	Poor
186	19	Eastern Red Cedar	Juniperus virginiana	Dead
187	9.5	Hackberry	Celtis occidentalis	Fair
188	10.75	Ash	Fraxinus texensis	Dead
189	8.75	Hackberry	Celtis occidentalis	Fair
190	11.5	Cedar Elm	Ulmus crassifolia	Good
191	13	Hackberry	Celtis occidentalis	Fair
192	10.25	Ash	Fraxinus texensis	Bad - Dead
193	14.5	Hackberry	Celtis occidentalis	Fair
194	10.5	Cedar Elm	Ulmus crassifolia	Good
195	10	Cedar Elm	Ulmus crassifolia	Good
196	19.5	Cedar Elm	Ulmus crassifolia	Good
197	8.75	Eastern Red Cedar	Juniperus virginiana	Fair
198	18.5	Cedar Elm	Ulmus crassifolia	Good
199	9.5	Eastern Red Cedar	Juniperus virginiana	Fair
200	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
201	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
202	6.75	Cedar Elm	Ulmus crassifolia	Good
203	8.25	Eastern Red Cedar	Juniperus virginiana	Good
204	18	Cedar Elm	Ulmus crassifolia	Good
205	12	Eastern Red Cedar	Juniperus virginiana	Good
206	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
207	7.25	Hackberry	Celtis occidentalis	Fair
208	14	Eastern Red Cedar	Juniperus virginiana	Good
209	10.75	Eastern Red Cedar	Juniperus virginiana	Good
210	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
211	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
212	21	Eastern Red Cedar	Juniperus virginiana	Fair
213	7	Eastern Red Cedar	Juniperus virginiana	Fair
214	6.75	Cedar Elm	Ulmus crassifolia	Fair
215	8	Eastern Red Cedar	Juniperus virginiana	Good
216	9	Eastern Red Cedar	Juniperus virginiana	Fair
217	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
218	9.5	Cedar Elm	Ulmus crassifolia	Good
219	11.25	Eastern Red Cedar	Juniperus virginiana	Fair
220	11.5	Eastern Red Cedar	Juniperus virginiana	Fair
221	6.5	Ash	Fraxinus texensis	Good
222	6.5	Cedar Elm	Ulmus crassifolia	Good
223	6.75	Cedar Elm	Ulmus crassifolia	Good
224	18	Cedar Elm	Ulmus crassifolia	Dead
225	10.75	Cedar Elm	Ulmus crassifolia	Good
226	8	Eastern Red Cedar	Juniperus virginiana	Good
227	10	Eastern Red Cedar	Juniperus virginiana	Fair
228	10	Eastern Red Cedar	Juniperus virginiana	Poor
229	8.25	Eastern Red Cedar	Juniperus virginiana	Poor
230	7.75	Eastern Red Cedar	Juniperus virginiana	Poor
231	11.5	Eastern Red Cedar	Juniperus virginiana	Poor
232	9.25	Eastern Red Cedar	Juniperus virginiana	Fair
233	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
234	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
235	14	Eastern Red Cedar	Juniperus virginiana	Fair
236	9	Eastern Red Cedar	Juniperus virginiana	Fair
237	9	Eastern Red Cedar	Juniperus virginiana	Fair
238	9	Eastern Red Cedar	Juniperus virginiana	Fair
239	18	Eastern Red Cedar	Juniperus virginiana	Fair
240	7	Eastern Red Cedar	Juniperus virginiana	Fair
241	10	Eastern Red Cedar	Juniperus virginiana	Fair
242	8	Eastern Red Cedar	Juniperus virginiana	Fair
243	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
244	10	Cedar Elm	Ulmus crassifolia	Good
245	8	Cedar Elm	Ulmus crassifolia	Good
246	11.5	Cedar Elm	Ulmus crassifolia	Good
247	9.75	Eastern Red Cedar	Juniperus virginiana	Fair
248	7	Eastern Red Cedar	Juniperus virginiana	Fair
249	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
250	8.5	Ash	Fraxinus texensis	Good
251	6.75	Cedar Elm	Ulmus crassifolia	Good
252	10	Eastern Red Cedar	Juniperus virginiana	Fair
253	9	Eastern Red Cedar	Juniperus virginiana	Fair
254	12.75	Cedar Elm	Ulmus crassifolia	Good
255	6.5	Eastern Red Cedar	Juniperus virginiana	Good
256	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
257	8	Eastern Red Cedar	Juniperus virginiana	Fair
258	7	Cedar Elm	Ulmus crassifolia	Good
259	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
260	7.75	Cedar Elm	Ulmus crassifolia	Good
261	12	Eastern Red Cedar	Juniperus virginiana	Fair
262	9	Eastern Red Cedar	Juniperus virginiana	Fair
263	11	Eastern Red Cedar	Juniperus virginiana	Fair
264	10	Eastern Red Cedar	Juniperus virginiana	Fair
265	8.75	Eastern Red Cedar	Juniperus virginiana	Fair
266	7	Eastern Red Cedar	Juniperus virginiana	Fair
267	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
268	8.75	Eastern Red Cedar	Juniperus virginiana	Fair
269	8	Eastern Red Cedar	Juniperus virginiana	Fair
270	10.25	Eastern Red Cedar	Juniperus virginiana	Fair
271	13	Eastern Red Cedar	Juniperus virginiana	Fair
272	8	Eastern Red Cedar	Juniperus virginiana	Fair
273	14	Eastern Red Cedar	Juniperus virginiana	Fair
274	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
275	14.5	Eastern Red Cedar	Juniperus virginiana	Fair
276	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
277	8	Eastern Red Cedar	Juniperus virginiana	Fair
278	6.25	Eastern Red Cedar	Juniperus virginiana	Fair
279	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
280	13.75	Eastern Red Cedar	Juniperus virginiana	Fair
281	11	Cedar Elm	Ulmus crassifolia	Good
282	7	Cedar Elm	Ulmus crassifolia	Good
283	14.75	Eastern Red Cedar	Juniperus virginiana	Good
284	9.75	Eastern Red Cedar	Juniperus virginiana	Fair
285	8.25	Eastern Red Cedar	Juniperus virginiana	Poor
286	9.25	Eastern Red Cedar	Juniperus virginiana	Poor
287	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
288	7	Eastern Red Cedar	Juniperus virginiana	Fair
289	9	Eastern Red Cedar	Juniperus virginiana	Fair
290	8	Eastern Red Cedar	Juniperus virginiana	Fair
291	18	Eastern Red Cedar	Juniperus virginiana	Fair
292	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
293	19.5	Eastern Red Cedar	Juniperus virginiana	Fair
294	8.75	Eastern Red Cedar	Juniperus virginiana	Fair
295	6.25	Eastern Red Cedar	Juniperus virginiana	Fair
296	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
297	10	Eastern Red Cedar	Juniperus virginiana	Fair
298	7	Eastern Red Cedar	Juniperus virginiana	Fair
299	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
300	8	Eastern Red Cedar	Juniperus virginiana	Fair
301	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
302	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
303	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
304	8.25	Eastern Red Cedar	Juniperus virginiana	Fair
305	9.75	Eastern Red Cedar	Juniperus virginiana	Fair
306	10.25	Eastern Red Cedar	Juniperus virginiana	Fair
307	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
308	14	Eastern Red Cedar	Juniperus virginiana	Fair
309	8	Eastern Red Cedar	Juniperus virginiana	Fair
310	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
311	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
312	7	Eastern Red Cedar	Juniperus virginiana	Fair
313	7	Cedar Elm	Ulmus crassifolia	Good
314	7.75	Eastern Red Cedar	Juniperus virginiana	Poor
315	6.5	Cedar Elm	Ulmus crassifolia	Good
316	8	Cedar Elm	Ulmus crassifolia	Good
317	10.5	Eastern Red Cedar	Juniperus virginiana	Fair
318	6	Eastern Red Cedar	Juniperus virginiana	Fair
319	11	Eastern Red Cedar	Juniperus virginiana	Fair
320	6.5	Cedar Elm	Ulmus crassifolia	Good
321	21	Ash	Fraxinus texensis	Good
322	18	Hackberry	Celtis occidentalis	Poor
323	7.75	Eastern Red Cedar	Juniperus virginiana	Poor
324	8	Eastern Red Cedar	Juniperus virginiana	Poor
325	8	Cedar Elm	Ulmus crassifolia	Poor
326	9	Eastern Red Cedar	Juniperus virginiana	Fair
327	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
328	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
329	10.75	Cedar Elm	Ulmus crassifolia	Good
330	9.5	Eastern Red Cedar	Juniperus virginiana	Fair
331	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
332	10	Eastern Red Cedar	Juniperus virginiana	Fair
333	10.25	Eastern Red Cedar	Juniperus virginiana	Fair
334	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
335	7	Eastern Red Cedar	Juniperus virginiana	Fair
336	11.5	Eastern Red Cedar	Juniperus virginiana	Fair
337	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
338	7	Eastern Red Cedar	Juniperus virginiana	Fair
339	10.5	Eastern Red Cedar	Juniperus virginiana	Fair
340	8	Eastern Red Cedar	Juniperus virginiana	Fair
341	9	Eastern Red Cedar	Juniperus virginiana	Fair
342	8.5	Eastern Red Cedar	Juniperus virginiana	Fair
343	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
344	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
345	7	Eastern Red Cedar	Juniperus virginiana	Fair
346	11.75	Eastern Red Cedar	Juniperus virginiana	Fair
347	8	Eastern Red Cedar	Juniperus virginiana	Fair
348	8	Eastern Red Cedar	Juniperus virginiana	Fair
349	7	Eastern Red Cedar	Juniperus virginiana	Fair
350	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
351	6.75	Eastern Red Cedar	Juniperus virginiana	Fair
352	9	Eastern Red Cedar	Juniperus virginiana	Fair
353	6	Eastern Red Cedar	Juniperus virginiana	Fair
354	7.25	Eastern Red Cedar	Juniperus virginiana	Fair
355	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
356	6	Eastern Red Cedar	Juniperus virginiana	Fair
357	9.75	Eastern Red Cedar	Juniperus virginiana	Fair
358	6	Eastern Red Cedar	Juniperus virginiana	Fair
359	7	Eastern Red Cedar	Juniperus virginiana	Fair
360	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
361	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
362	8	Eastern Red Cedar	Juniperus virginiana	Fair
363	7	Eastern Red Cedar	Juniperus virginiana	Fair
364	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
365	10	Cedar Elm	Ulmus crassifolia	Good
366	11	Cedar Elm	Ulmus crassifolia	Good
367	9	Cedar Elm	Ulmus crassifolia	Good
368	8	Eastern Red Cedar	Juniperus virginiana	Poor
369	7.75	Eastern Red Cedar	Juniperus virginiana	Poor
370	12.25	Eastern Red Cedar	Juniperus virginiana	Poor
371	7.25	Eastern Red Cedar	Juniperus virginiana	Poor
372	6	Eastern Red Cedar	Juniperus virginiana	Fair
373	8	Cedar Elm	Ulmus crassifolia	Good
374	7.5	Eastern Red Cedar	Juniperus virginiana	Fair
375	6.5	Cedar Elm	Ulmus crassifolia	Good
376	6	Cedar Elm	Ulmus crassifolia	Good
377	8.5	Cedar Elm	Ulmus crassifolia	Good
378	7.25	Cedar Elm	Ulmus crassifolia	Good
379	6	Eastern Red Cedar	Juniperus virginiana	Fair
380	7	Cedar Elm	Ulmus crassifolia	Good
381	7.75	Cedar Elm	Ulmus crassifolia	Good
382	8.25	Cedar Elm	Ulmus crassifolia	Good
383	6.5	Eastern Red Cedar	Juniperus virginiana	Fair
384	7.75	Eastern Red Cedar	Juniperus virginiana	Fair
385	7	Eastern Red Cedar	Juniperus virginiana	Fair
386	19.5	Hackberry	Celtis occidentalis	Fair
387	23.5	Ash	Fraxinus texensis	Good
388	11	Ash	Fraxinus texensis	Good
389	15.5	Ash	Fraxinus texensis	Good
390	20	Hackberry	Celtis occidentalis	Fair
391	19.25	Hackberry	Celtis occidentalis	Fair
392	7.25	Ash	Fraxinus texensis	Fair
393	10	Hackberry	Celtis occidentalis	Fair
394	12.5	Hackberry	Celtis occidentalis	Fair
395	8.5	Ash	Fraxinus texensis	Good
396	23	Ash	Fraxinus texensis	Good
397	25.75	Ash	Fraxinus texensis	1/2 Dead
398	22.25	Ash	Fraxinus texensis	Good
399	8.75	Cedar Elm	Ulmus crassifolia	Good
400	8.5	Cedar Elm	Ulmus crassifolia	Good
401	31.5	Bois d'arc	Maclura pomifera	Poor
402	45	Ash	Fraxinus texensis	Fair
403	7	Ash	Fraxinus texensis	Good
404	14	Ash	Fraxinus texensis	Good
405	22	Ash	Fraxinus texensis	Good
406	16	Ash	Fraxinus texensis	Good
407	7.5	Ash	Fraxinus texensis	Good
408	7	Ash	Fraxinus texensis	Good
409	6.75	Ash	Fraxinus texensis	Good
410	8	Ash	Fraxinus texensis	Good
411	20.75	Ash	Fraxinus texensis	Good
412	9	Cedar Elm	Ulmus crassifolia	Good
413	8	Hackberry	Celtis occidentalis	Fair
414	20	Ash	Fraxinus texensis	Good
415	6.5	Cedar Elm	Ulmus crassifolia	Good
416	7	Ash	Fraxinus texensis	Good
417	9	Ash	Fraxinus texensis	Good
418	6.5	Ash	Fraxinus texensis	Good
419	7.5	Cedar Elm	Ulmus crassifolia	Good
420	10	Hackberry	Celtis occidentalis	Good
421	11	Ash	Fraxinus texensis	Good
422	6.5	Cedar Elm	Ulmus crassifolia	Good
423	9	Cedar Elm	Ulmus crassifolia	Good
424	10.5	Ash	Fraxinus texensis	Good
425	6	Ash	Fraxinus texensis	Good
426	6.5	Ash	Fraxinus texensis	Good
427	7	Cedar Elm	Ulmus crassifolia	Good
428	11	Ash	Fraxinus texensis	Good
429	8	Ash	Fraxinus texensis	Good
430	6	Ash	Fraxinus texensis	Good
431	8.5	Hackberry	Celtis occidentalis	Good
432	6.5	Hackberry	Celtis occidentalis	Good
433	8	Cedar Elm	Ulmus crassifolia	Good
434	6.75	Cedar Elm	Ulmus crassifolia	Good
435	9	Cedar Elm	Ulmus crassifolia	Good
436	7	Hackberry	Celtis occidentalis	Good
437	8.5	Ash	Fraxinus texensis	Good
438	7	Ash	Fraxinus texensis	Good
439	7.5	Cedar Elm	Ulmus crassifolia	Good
440	9.5	Hackberry	Celtis occidentalis	Good
441	23	Cedar Elm	Ulmus crassifolia	Good
442	10.5	Ash	Fraxinus texensis	Dead
443	11.75	Ash	Fraxinus texensis	Good
444	29	Ash	Fraxinus texensis	Good
445	8.5	Ash	Fraxinus texensis	Dead
446	22	Ash	Fraxinus texensis	Dead
447	8	Ash	Fraxinus texensis	Fair
448	6.25	Ash	Fraxinus texensis	Fair
449	7	Ash	Fraxinus texensis	Good
450	7	Cedar Elm	Ulmus crassifolia	Good
451	25	Cedar Elm	Ulmus crassifolia	Good
452	15.25	Ash	Fraxinus texensis	Dead
453	32	Bois d'arc	Maclura pomifera	Poor
454	16.75	Ash	Fraxinus texensis	Good
455	17	Cedar Elm	Ulmus crassifolia	Good
456	21	Ash	Fraxinus texensis	Good
457	12	Ash	Fraxinus texensis	Dead
458	11.5	Ash	Fraxinus texensis	Dead
459	1125	Ash	Fraxinus texensis	Dead
460	17.25	Ash	Fraxinus texensis	Dead
461	19	Ash	Fraxinus texensis	Good
462	7	Cedar Elm	Ulmus crassifolia	Good
463	8	Ash	Fraxinus texensis	Dead
464	8.25	Cedar Elm	Ulmus crassifolia	Good
465	8	Ash	Fraxinus texensis	Good
466	19	Ash	Fraxinus texensis	Good
467	30	Ash	Fraxinus texensis	Good
468	47	Ash	Fraxinus texensis	Good
469	20	Ash	Fraxinus texensis	Good
470	6.5	Cedar Elm	Ulmus crassifolia	Good
471	13.25	Ash	Fraxinus texensis	Dead
472	7.75	Ash	Fraxinus texensis	Good
473	6.5	Hackberry	Celtis occidentalis	Good
474	6.25	Hackberry	Celtis occidentalis	Good
475	6.75	Hackberry	Celtis occidentalis	Good
476	10	Ash	Fraxinus texensis	Good
477	20	Ash	Fraxinus texensis	Dead
478	8.25	Ash	Fraxinus texensis	Good
479	15	Hackberry	Celtis occidentalis	Poor
480	23	Hackberry	Celtis occidentalis	Poor
481	20	Ash	Fraxinus texensis	Dead
482	9	Ash	Fraxinus texensis	Good
483	20	Ash	Fraxinus texensis	Good
484	17	Ash	Fraxinus texensis	Good
485	7.5	Ash	Fraxinus texensis	Good
486	6.75	Ash	Fraxinus texensis	Good
487	7	Ash	Fraxinus texensis	Good
488	46	Ash	Fraxinus texensis	Dead
489	28	Ash	Fraxinus texensis	1/2 Dead
500	11.5	Cedar Elm	Ulmus crassifolia	Good
501	13	Cedar Elm	Ulmus crassifolia	Good
502	10	Cedar Elm	Ulmus crassifolia	Good
503	10.25	Ash	Fraxinus texensis	Good
504	8.25	Cedar Elm	Ulmus crassifolia	Good
505	14.75	Cedar Elm	Ulmus crassifolia	Good
506	7.5	Cedar Elm	Ulmus crassifolia	Good
507	8.25	Cedar Elm	Ulmus crassifolia	Dead
508	11.5	Cedar Elm	Ulmus crassifolia	Good
509	16.5	Cedar Elm	Ulmus crassifolia	Good
510	6.75	Cedar Elm	Ulmus crassifolia	Good
511	7	Cedar Elm	Ulmus crassifolia	Good
512	6.25	Cedar Elm	Ulmus crassifolia	Good
513	6	Eastern Red Cedar	Juniperus virginiana	Good
514	25	Ash	Fraxinus texensis	Good
515	10	Cedar Elm	Ulmus crassifolia	Good
516	20	Cedar Elm	Ulmus crassifolia	Good
517	12.25	Cedar Elm	Ulmus crassifolia	Good
518	14.5	Cedar Elm	Ulmus crassifolia	Good
519	17.75	Cedar Elm	Ulmus crassifolia	Good
520	8.25	Cedar Elm	Ulmus crassifolia	Dead
521	17.75	Cedar Elm	Ulmus crassifolia	Good
522	16	Cedar Elm	Ulmus crassifolia	Good
523	6.5	Cedar Elm	Ulmus crassifolia	Dead
540	15	Bois d'arc	Maclura pomifera	Dead
541	13.5	Cedar Elm	Ulmus crassifolia	Good
542	8.25	Cedar Elm	Ulmus crassifolia	Good
543	6.75	Hackberry	Celtis occidentalis	Poor
544	9.5	Cedar Elm	Ulmus crassifolia	Good
545	7.75	Cedar Elm	Ulmus crassifolia	Good
546	11	Hackberry	Celtis occidentalis	Fair
547	11.25	Cedar Elm	Ulmus crassifolia	Good
548	19	Cedar Elm	Ulmus crassifolia	Good
549	12.25	Cedar Elm	Ulmus crassifolia	Good
550	14	Cedar Elm	Ulmus crassifolia	Good
551	23	Cedar Elm	Ulmus crassifolia	Good
552	7.5	Hackberry	Celtis occidentalis	Fair
553	7.25	Hackberry	Celtis occidentalis	Fair
554	8.75	Hackberry	Celtis occidentalis	Fair
555	6	Cedar Elm	Ulmus crassifolia	Good
556	6	Bradfor Pear	Pyrus communis	Poor
557	25	Bois d'arc	Maclura pomifera	Poor
558	6	Cedar Elm	Ulmus crassifolia	Good
559	7.75	Cedar Elm	Ulmus crassifolia	Good
560	10.25	Cedar Elm	Ulmus crassifolia	Good
561	3.75	Cedar Elm	Ulmus crassifolia	Good
562	12.25	Cedar Elm	Ulmus crassifolia	Good
563	6	Cedar Elm	Ulmus crassifolia	Good
564	10.25	Ash	Fraxinus texensis	Good
565	11.5	Cedar Elm	Ulmus crassifolia	Good
566	6.25	Cedar Elm	Ulmus crassifolia	Good
567	12.25	Cedar Elm	Ulmus crassifolia	Good
568	30	Cedar Elm	Ulmus crassifolia	Good
569	12.5	Cedar Elm	Ulmus crassifolia	Good
570	23	Hackberry	Celtis occidentalis	Poor
571	34	Hackberry	Celtis occidentalis	Poor
572	14.25	Cedar Elm	Ulmus crassifolia	Good
573	22.5	Hackberry	Celtis occidentalis	Poor
574	7.75	Hackberry	Celtis occidentalis	Good
575	13.5	Hackberry	Celtis occidentalis	Dead
576	27	Bois d'arc	Maclura pomifera	Dead
577	25	Cedar Elm	Ulmus crassifolia	Good
578	6.75	Cedar Elm	Ulmus crassifolia	Good
579	7	Cedar Elm	Ulmus crassifolia	Good
580	45	Bois d'arc	Maclura pomifera	Poor
581	21	Hackberry	Celtis occidentalis	Poor
582	6	Cedar Elm	Ulmus crassifolia	Good
583	9.5	Cedar Elm	Ulmus crassifolia	Good
584	7.75	Cedar Elm	Ulmus crassifolia	Good
585	11.75	Hackberry	Celtis occidentalis	Good
586	10.75	Cedar Elm	Ulmus crassifolia	Good
587	31.5	Cedar Elm	Ulmus crassifolia	Good
588	26.25	Bois d'arc	Maclura pomifera	Good
589	19	Bois d'arc	Maclura pomifera	Good
590	10.25	Cedar Elm	Ulmus crassifolia	Good
591	24.5	Walnut	Juglans microcarpa	Good
592	9.5	Cedar Elm	Ulmus crassifolia	Good
593	13.75	Bois d'arc	Maclura pomifera	Good
594	16	Bois d'arc	Maclura pomifera	Dead
595	36	Bois d'arc	Maclura pomifera	Good
596	10.75	Bois d'arc	Maclura pomifera	Dead
597	8.25	Bois d'arc	Maclura pomifera	Good
598	7.75	Cedar Elm	Ulmus crassifolia	Good
599	7	Bois d'arc	Maclura pomifera	Good
600	13.5	Walnut	Juglans microcarpa	Good
601	18	Eastern Red Cedar	Juniperus virginiana	Bad
602	34.75	Bois d'arc	Maclura pomifera	Bad
603	11	Cedar Elm	Ulmus crassifolia	Good
604	16.25	Bois d'arc	Maclura pomifera	Good
605	7	Cedar Elm	Ulmus crassifolia	Good
606	10	Bois d'arc	Maclura pomifera	Dead
607	27.5	Cedar Elm	Ulmus crassifolia	Good
608	7.75	Eastern Red Cedar	Juniperus virginiana	Bad
609	9	Eastern Red Cedar	Juniperus virginiana	Good
610	20.5	Walnut	Juglans microcarpa	Good
611	6.75	Bois d'arc	Maclura pomifera	Good
612	6.25	Cedar Elm	Ulmus crassifolia	Good
613	11.5	Cedar Elm	Ulmus crassifolia	Good
614	18.5	Cedar Elm	Ulmus crassifolia	Good
615	7.75	Cedar Elm	Ulmus crassifolia	Good
616	6.25	Cedar Elm	Ulmus crassifolia	Good
617	8.25	Cedar Elm	Ulmus crassifolia	Good
618	12.5	Cedar Elm	Ulmus crassifolia	Bad
619	6.5	Cedar Elm	Ulmus crassifolia	Good
620	7	Cedar Elm	Ulmus crassifolia	Good
621	7.5	Cedar Elm	Ulmus crassifolia	Good
622	6.75	Cedar Elm	Ulmus crassifolia	Good
623	7	Cedar Elm	Ulmus crassifolia	Good
624	42	Bois d'arc	Maclura pomifera	Bad
625	6	Cedar Elm	Ulmus crassifolia	Good
626	7.5	Cedar Elm	Ulmus crassifolia	Good
627	17	Cedar Elm	Ulmus crassifolia	Good
628	18.25	Cedar Elm	Ulmus crassifolia	Bad
629	7.75	Cedar Elm	Ulmus crassifolia	Good
630	27.5	Cedar Elm	Ulmus crassifolia	Good
631	8.5	Cedar Elm	Ulmus crassifolia	Good
632	12.25	Cedar Elm	Ulmus crassifolia	Good
633	17	Cedar Elm	Ulmus crassifolia	Good
634	9.25	Bois d'arc	Maclura pomifera	Bad
635	7	Cedar Elm	Ulmus crassifolia	Good
636	13.75	Cedar Elm	Ulmus crassifolia	Good
637	7.25	Cedar Elm	Ulmus crassifolia	Good
638	14.75	Cedar Elm	Ulmus crassifolia	Good
639	13.5	Cedar Elm	Ulmus crassifolia	Good
640	13	Cedar Elm	Ulmus crassifolia	Good
641	8.5	Cedar Elm	Ulmus crassifolia	Good
642	11.5	Cedar Elm	Ulmus crassifolia	Good
643	12.25	Cedar Elm	Ulmus crassifolia	Good
644	6.5	Cedar Elm	Ulmus crassifolia	Good
645	7.25	Cedar Elm	Ulmus crassifolia	Good
646	11.75	Cedar Elm	Ulmus crassifolia	Good
647	6.75	Cedar Elm	Ulmus crassifolia	Good
648	13	Cedar Elm	Ulmus crassifolia	Good
649	19	Cedar Elm	Ulmus crassifolia	Good
650	7	Cedar Elm	Ulmus crassifolia	Good
651	6.25	Cedar Elm	Ulmus crassifolia	Good
652	16.5	Cedar Elm	Ulmus crassifolia	Good
653	7.5	Cedar Elm	Ulmus crassifolia	Good
654	16.5	Cedar Elm	Ulmus crassifolia	Good
655	17.75	Cedar Elm	Ulmus crassifolia	Good
656	23.25	Bois d'arc	Maclura pomifera	Good
657	17.25	Bois d'arc	Maclura pomifera	Good
658	8.25	Cedar Elm	Ulmus crassifolia	Good
659	18	Cedar Elm	Ulmus crassifolia	Good
660	6.75	Bois d'arc	Maclura pomifera	Good
661	32	Bois d'arc	Maclura pomifera	Good
662	11.5	Cedar Elm	Ulmus crassifolia	Good
663	33	Walnut	Juglans microcarpa	Good
664	11.75	Cedar Elm	Ulmus crassifolia	Good
665	16.75	Bois d'arc	Maclura pomifera	Good
666	13.5	Cedar Elm	Ulmus crassifolia	Good
667	20.25	Cedar Elm	Ulmus crassifolia	Good
668	21.75	Bois d'arc	Maclura pomifera	Bad
669	16.5	Cedar Elm	Ulmus crassifolia	Good
670	6.25	Cedar Elm	Ulmus crassifolia	Good
671	12.5	Cedar Elm	Ulmus crassifolia	Good
672	18	Cedar Elm	Ulmus crassifolia	Good
673	19	Cedar Elm	Ulmus crassifolia	Good
674	7.75	Cedar Elm	Ulmus crassifolia	Good
675	20.75	Bois d'arc	Maclura pomifera	Good
1000	35	Hackberry	Celtis occidentalis	Good
1001	11	Hackberry	Celtis occidentalis	Good
1002	9.5	Hackberry	Celtis occidentalis	Good
1003	7.5	Hackberry	Celtis occidentalis	Good
1004	6.25	Cedar Elm	Ulmus crassifolia	Good
1005	18.5	Hackberry	Celtis occidentalis	Good
1006	7	Hackberry	Celtis occidentalis	Good
1007	11.5	Hackberry	Celtis occidentalis	Good
1008	14.5	Hackberry	Celtis occidentalis	Dead
1009	15.75	Hackberry	Celtis occidentalis	Good
1010	17	Hackberry	Celtis occidentalis	Good
1011	18.25	Cedar Elm	Ulmus crassifolia	Good
1012	22.5	Ash	Fraxinus texensis	Good
1013	19	Hackberry	Celtis occidentalis	Good
1014	25	Hackberry	Celtis occidentalis	Good
1015	7.5	Cedar Elm	Ulmus crassifolia	Good
1016	8	Hackberry	Celtis occidentalis	Good
1017	10.5	Ash	Fraxinus texensis	Good
1018	12.5	Hackberry	Celtis occidentalis	Good
1019	7.75	Cedar Elm	Ulmus crassifolia	Good
1020	8.5	Cedar Elm	Ulmus crassifolia	Good
1021	21.5	Ash	Fraxinus texensis	Good
1022	28.25	Bois d'arc	Maclura pomifera	Good
1023	20.5	Hackberry	Celtis occidentalis	Good
1024	6.5	Cedar Elm	Ulmus crassifolia	Good
1025	16	Walnut	Juglans microcarpa	Good
1026	12.5	Walnut	Juglans microcarpa	Good
1027	7	Hackberry	Celtis occidentalis	Good
1028	10.5	Hackberry	Celtis occidentalis	Good
1029	15.5	Hackberry	Celtis occidentalis	Good
1030	18	Bois d'arc	Maclura pomifera	Bad
1031	14	Bois d'arc	Maclura pomifera	Good
1032	11	Hackberry	Celtis occidentalis	Good
1033	10.5	Hackberry	Celtis occidentalis	Good
1034	7	Hackberry	Celtis occidentalis	Good
1035	7.25	Walnut	Juglans microcarpa	Good
1036	8.75	Walnut	Juglans microcarpa	Good
1037	9.5	Hackberry	Celtis occidentalis	Good
1038	10	Hackberry	Celtis occidentalis	Good
1039	10.5	Hackberry	Celtis occidentalis	Good
1040	26	Hackberry	Celtis occidentalis	Good
1041	6.5	Bois d'arc	Maclura pomifera	Bad
1042	11	Hackberry	Celtis occidentalis	Good
1043	7.5	Hackberry	Celtis occidentalis	Good
1044	16	Hackberry	Celtis occidentalis	Good
1045	27	Bois d'arc	Maclura pomifera	Good
1046	7	Hackberry	Celtis occidentalis	Good
1047	7.5	Hackberry	Celtis occidentalis	Good
1048	9.5	Hackberry	Celtis occidentalis	Good
1049	14.5	Hackberry	Celtis occidentalis	Good
1050	10.5	Hackberry	Celtis occidentalis	Good
1051	10.5	Bois d'arc	Maclura pomifera	Bad
1052	9	Bois d'arc	Maclura pomifera	Good
1053	10.5	Cedar Elm	Ulmus crassifolia	Good
1054	10	Ash	Fraxinus texensis	Good
1055	10.5	Ash	Fraxinus texensis	Good
1056	17.5	Bois d'arc	Maclura pomifera	Bad
1057	9.5	Bois d'arc	Maclura pomifera	Bad
1058	10	Bois d'arc	Maclura pomifera	Bad
1058	10.5	Bois d'arc	Maclura pomifera	Bad
1059	19	Hackberry	Maclura pomifera	Good
1060	7	Ash	Fraxinus texensis	Good
1061	10.5	Hackberry	Celtis occidentalis	Good
1062	9.5	Bois d'arc	Maclura pomifera	Good
1063	9	Hackberry	Celtis occidentalis	Good
1064	19	Walnut	Juglans microcarpa	Good
1065	14	Hackberry	Celtis occidentalis	Good
1066	19.5	Hackberry	Celtis occidentalis	Good
1067	10	Bois d'arc	Maclura pomifera	Bad
1068	7	Ash	Fraxinus texensis	Good
1069	6.5	Ash	Fraxinus texensis	Good
1070	9.5	Bois d'arc	Maclura pomifera	Bad
1071	23	Hackberry	Celtis occidentalis	1/2 Dead
1072	12	Bois d'arc	Maclura pomifera	Good
1073	15.5	Hackberry	Celtis occidentalis	Good
1074	14	Hackberry	Celtis occidentalis	Good
1075	7.5	Ash	Fraxinus texensis	Good
1076	8	Ash	Fraxinus texensis	Good
1077	19	Hackberry	Celtis occidentalis	Good
1078	14	Hackberry	Celtis occidentalis	Good
1079	6.75	Ash	Fraxinus texensis	Good
1080	9.50	Ash	Fraxinus texensis	Good
	9,345.08			
	Total Tree Population			

NOTES:

1. FENCE TO BE MAINTAINED AND REPAIRED AS NEEDED DURING CONSTRUCTION.

2. NO CONSTRUCTION TRAFFIC, GRADING, STORAGE OR WASTE DISPOSAL ALLOWED WITHIN THE FENCED AREA AROUND TREES.

1/TR3 TREE PROTECTION DETAIL

NOT TO SCALE

TREE PROTECTION NOTES

1. EXISTING TREES SHOWN TO REMAIN ARE TO BE PROTECTED DURING CONSTRUCTION. ORANGE COATED CHAINLINK FENCING (MIN. 4'-0" HEIGHT) SHALL BE INSTALLED AT THE DRIP LINE OF ALL TREES OR TREE GROUPS TO REMAIN. PARKING OF VEHICLES OR PERFORMING WORK WITHIN THESE AREAS OTHER THAN SHOWN ON THE PLAN, WILL NOT BE ALLOWED. THE TREE PROTECTION SHALL REMAIN DURING CONSTRUCTION. OTHER TREE PROTECTION MEASURES SHALL BE IN ACCORDANCE WITH THE CITY'S STANDARDS AND ORDINANCES.
2. DISPOSAL OF ANY WASTE MATERIAL SUCH AS, BUT NOT LIMITED TO, PAINT, ASPHALT, OIL SOLVENTS, CONCRETE, MORTAR, ETC. WITHIN THE CANOPY AREA OF THE EXISTING TREES SHALL NOT BE ALLOWED.
3. NO ATTACHMENTS OR WIRES OF ANY KIND, OTHER THAN THOSE OF A PROTECTIVE NATURE, SHALL BE ATTACHED TO ANY TREE.
4. NO FILL OR EXCAVATION OF ANY NATURE SHALL OCCUR WITHIN THE DRIP LINE OF A TREE TO BE PRESERVED, UNLESS THERE IS A SPECIFIED WELL OR RETAINING WALL SHOWN ON THE GRADING PLAN.
5. NO MATERIALS SHALL BE STORED WITHIN THE DRIPLINE AREA OF A TREE TO BE PRESERVED

STUDIO 13 DESIGN GROUP

Studio 13 Design Group, PLLC.
386 W. Main Street
Lewisville, Texas 75057
469-635-1900

TBAE Firm #BR643

1" = 20' - 0"

Bar is one inch on original drawing. If not one inch on this sheet, adjust scale as necessary.

One Inch

TREE SURVEY

TREE SURVEY

Enchanted Creek, Phase 2

City of Lucas, Collin County, Texas

PLAN REVIEW REVISIONS

#	BY	DATE
0		

PROJECT
LDC086

SHEET
TR3 of 3

Plotted by: ######## Plot Date: 10/4/2021 3:06 PM

Drawing: W:\Shared With Me\shared\Projects\LDC086 – Enchanted Creek Ph. 2\DWG\LDC086TR.dwg Saved By: Station13 Save Time: 10/3/2021 9:38 PM

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 02

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Consider approving the amendments to the City's Code of Ordinances for Chapter 10, Subdivisions, Article 10.03 Subdivision and Development.

Background Information

At the direction of the City Council, on June 10, 2021, the Planning and Zoning Commission began a review of the Code of Ordinances, Chapter 10 Subdivisions, Article 10.03 Subdivision and Development regulations, as well as platting submission requirements to determine if any updates and/or revisions were needed.

At the July 8, 2021, August 12, 2021, and September 9, 2021, Planning and Zoning Commission meetings, the Commission gave City staff direction on code sections that warranted updating. City staff has made the recommended changes and are attached in supporting documents.

Section 10.03.127 Design standards states the following design standards and specifications are incorporated by reference into the Code of Ordinances. These reference manuals are attached for Commission review and direction to staff on any proposed amendments.

Reference documents include the following (larger copies of maps will be available at meeting:

1. Drainage and Stormwater Pollution Prevention Design Manual (currently being revised)
2. Paving Design Manual (needs to be created)
3. Water and Wastewater Design Manual (adequate provisions are provided in Chapter 10, this reference can be deleted)
4. Water Master Plan
5. Wastewater Master Plan
6. Storm Drainage Master Plan

Attachments/Supporting Documentation

1. Updated redlined version of platting requirements.
2. Section 10 Manual References

Budget/Financial Impact

NA

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 02

Recommendation

This item is for review by the Planning and Zoning Commission to approve the recommended changes to the Code of Ordinances.

Motion

I make a motion to approve/deny the amendments to the City's Code of Ordinances for Chapter 10, Subdivisions, Article 10.03 Subdivision and Development.

CHAPTER 10

SUBDIVISIONS

Document Legend:
Addition
~~Deletion~~

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ARTICLE 10.03 SUBDIVISION AND DEVELOPMENT ORDINANCE*

Division 1. General

Sec. 10.03.001 Title

This article shall be known and may be cited as "The City of Lucas Subdivision and Development Ordinance."

Sec. 10.03.002 Authority

This article is adopted under the authority of the city charter, and the constitution and laws of the state, including chapters 43, 212 and 242 of the Texas Local Government Code, as amended.

Sec. 10.03.003 Purpose; plat required

(a) The purpose of this article is to: (i) provide for the orderly, safe and healthy development of the land within the city; (ii) protect and promote the health, safety, morals and general welfare of the city; (iii) guide the future growth and development of the city; (iv) provide for the proper location and width of streets and building lines; (v) provide adequate and efficient transportation, streets, storm drainage, water, wastewater, parks, and open space facilities; (vi) establish reasonable standards of design and procedures for platting to promote the orderly layout and use of land, and to insure proper legal descriptions and monumenting of platted land; (vii) insure that public infrastructure facilities required by city ordinances are available with sufficient capacity to serve the proposed development; (viii) require the cost of public infrastructure improvements that primarily benefit the tract of land being platted be borne by the owners of the tract.

(b) Every owner of any tract of land situated within the corporate limits of the city or within the extraterritorial jurisdiction of the city who divides the tract in two or more parts to lay out a subdivision of the tract, including an addition to the city, to lay out a building lot, or other lots, or to lay out streets, alleys, squares, parks or other parts of the tract intended to be dedicated to public use or for the use of purchasers or owners of lots fronting on or adjacent to the streets, alleys, squares, parks, or other parts must have a plat of the subdivision prepared and approved according to this article. A division of a tract under this article includes a division regardless of whether it is made by using a metes and bounds description in a deed of conveyance or in a contract for a deed, by using a contract of sale or other executing contract, or by using any other method. A division of land does not include a division of land into parts greater than 5 acres, where each part has access and no public improvement is dedicated.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(c) The procedure for approving a plat may require~~s~~ a preliminary plat as ~~applicable~~required, a minor plat as applicable, and a final plat. Except as otherwise permitted, the approval of a preliminary plat by the planning and zoning commission and city council is required for the construction of public improvements on the property. The preliminary plat and the associated engineering plans for the property may be amended during construction, with only major changes requiring reapproval by the planning and zoning commission. Upon completion of the required public improvements, or the provision of an improvement agreement, the owner may submit a corrected final plat for the subdivision. Lots may be sold and building permits obtained after approval of the final plat by the planning and zoning commission, and the recording thereof. (Ordinance 2010-11-00668, sec. 1, adopted 11/4/10)

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Sec. 10.03.004 Applicability

This article shall apply to all subdivisions of land within the corporate limits of the city, and all land outside the corporate limits that the city council may annex, and all land within the extraterritorial jurisdiction of the city to the full extent allowed by state law. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Sec. 10.03.005 Definitions

The following words and phrases when used in this article shall have the meaning respectively ascribed to them in this section:

Alley. A minor right-of-way, dedicated to public use, which affords only secondary means of vehicular access to the back or side of properties otherwise abutting a street, and which may be used for public utility purposes.

Channel. Any drainage system including a bar ditch.

City council. The governing body of the City of Lucas, Texas.

(Ordinance 2016-01-00827 adopted 1/7/16)

City engineer. The person or company employed or appointed as the city engineer or director of public works by the city manager.

City staff. A person currently employed by the City of Lucas.

Comprehensive plan. A plan of the city adopted by the city council, as amended from time to time. The comprehensive plan indicates the general locations recommended for various land uses, transportation routes, streets, parks and other public and private developments and improvements.

Comprehensive zoning ordinance. The city's comprehensive zoning ordinance, as amended.

Design standards. Collectively means the drainage and stormwater pollution prevention design manual, the current North Central Texas Council of Governments ("NCTCOG") paving design standards, or paving design manual, stormwater design manual, and water and wastewater design manual.

Developer. The owner of property or the person authorized by the owner to develop the property.

Development. The subdivision of land and/or the construction or reconstruction of one (1) or more buildings or the structural alteration, relocation or enlargement of any buildings or structures on a tract or tracts of land.

Development review committee (DRC). The DRC is comprised of staff members representing the various departments and divisions involved in the review and approval process (administration, planning, engineering, building inspection, public works, fire, parks and health). DRC is responsible for review of development and building plans, subdivision plats and zoning applications. It offers reports and recommendations to both P&Z and city council pertaining to applications and proposals requiring actions by these bodies. DRC has final approval authority for certain plats such as minor plats in compliance with Texas Local Government Code, section 212.016.

(Ordinance 2012-05-00715, sec. 1, adopted 5/17/12)

Development services director. The city manager or the person appointed by the city manager as the development services director of the city who oversees the daily operations involving the development of the city. (Ordinance 2016-01-00827 adopted 1/7/16)

Drainage and stormwater pollution prevention design manual. The city drainage standards adopted by ordinance from time to time as amended.

Easement. One or more of the property rights granted by the owner to and/or for the use by the public, or another person or entity.

Engineer. A person licensed as a professional engineer duly authorized under the provisions of the Texas Engineering Practice Act, as amended, to practice the profession of engineering.

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Engineering plans. The drawings and specifications prepared by a ~~registered~~ licensed professional engineer submitted to the city and required for plat approval.

Extraterritorial jurisdiction. The unincorporated area that is contiguous to the corporate boundaries of the city, as determined by Texas Local Government Code, section 42.001 et seq.

Improvement agreement. A contract entered into by the developer and the city by which the developer promises to complete the required public improvements within the subdivision within a specific time period following final plat approval in accordance with this article (i.e., letter of credit, cash bond, facilities agreement).

Lot. An undivided tract or parcel of land under one ownership having frontage on a public street, and either occupied or intended to be occupied by one main building and the required parking, or a group of main buildings, and accessory buildings, which parcel of land is designated as a separate and distinct tract and building site.

May. The word "may" is permissive.

Owner. The person or legal entity that holds fee simple title to the property, and the person or persons that have acquired any interest in the property by contract or purchase or otherwise; or, the owner's authorized representative.

Paving design standards. The current North Central Texas Council of Governments ("NCTCOG") design standards.

Plan for development. Any formal plan, such as a plat, replat, any site plan, or concept plan which has been deemed administratively complete and contains all of the items or information required under this code and has affixed thereto a stamp or notation that the development documents are filed.

Planned development. A zoning district which accommodates planned associations of uses developed as integral land use units such as industrial districts, office, commercial or service centers, shopping centers, residential developments of multiple or mixed housing including attached single-family dwellings or an appropriate combination of uses which may be planned, developed or operated as integral land use units either by a single owner or a combination of owners.

Planning and zoning commission, or commission. Appointed by the city council to develop design standards, and make recommendations concerning the platting, zoning, and use of land within the city.

Planning and zoning manager. The development services director or the person appointed by the city manager.

Plat. The graphic representation of a subdivision, resubdivision, combination of lots or tracts, or recombination of lots or tracts. Plat includes a replat, minor plat, and amending plat.

Plat, amending. A plat as described by Texas Local Government Code, section 212.016, as amended.

Plat, final. The final plat of a proposed development submitted for approval by the planning and zoning commission prepared in accordance with the provisions of this article and requested to be filed with the county clerk.

Plat, minor. A plat which contains four (4) or fewer lots fronting on an existing street and not requiring the creation of any new street or extension of municipal facilities as described by Texas Local Government Code, section 212.0065, as amended.

Plat, preliminary. The initial plat or working draft map or plan of a proposed development submitted to the planning and zoning commission and the city council for approval.

Public Improvements. Any land and improvements thereon dedicated to the public and accepted by a governmental entity, including but not limited to streets, alleys, squares, parks, ~~schools~~, and open space; construction, reconstruction, or upgrading of a water, wastewater, sanitary sewer, or storm sewer line, public street, or undergrounding of public utilities.

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Shall. The word "shall" is always mandatory and nondiscretionary.

Stormwater management plan. The master plan for the city for storm drainage facilities adopted and amended by ordinance from time to time.

Street. A public way for vehicular traffic, whether designated as a street, highway, thoroughfare, parkway, throughway, road, avenue, boulevard, private place, or however otherwise designated, other than an alley or driveway.

Structure. Anything constructed or erected, the use of which requires location on the ground, or which is attached to something having a location on the ground.

Subdivision. The division of any tract of land situated within the corporate limits, or within the city's extraterritorial jurisdiction, in two or more parts, or the identification of a single tract, for the purpose of laying out any subdivision of any tract of land or any addition to the city, or for laying out suburban lots or building lots, or any lots, streets, alleys, squares, parks or other parts intended to be dedicated to public use or for the use of purchasers or owners of lots fronting on or adjacent to the streets, alleys, squares, parks, or other parts for the purpose, whether immediate or future, of creating building sites. A division of a tract includes a division regardless of whether it is made by using metes and bounds description in a deed of conveyance or in a contract for a deed, by using a contract of sale or other executory contract to convey, or by using any other method. Subdivision includes resubdivision, but it does not include the division of land into parts greater than five (5) acres, where each part has access and no public improvement is dedicated.

Surveyor. A registered professional land surveyor, as authorized by state law to practice the profession of surveying as authorized by the Professional Land Surveying Practices Act, as amended.

Temporary improvement. Improvements built and maintained by an owner during construction of the development of the subdivision or addition and prior to the acceptance of the performance bond or improvements required for the short-term use of the property.

Thoroughfare master plan. The thoroughfare plan adopted by ordinance and as amended from time to time.

Vicinity location map. A small vicinity location map which shows sufficient streets, collector and arterial street names, and major features of the surrounding area to locate the area being subdivided.

Wastewater master plan. The master plan for the city for wastewater facilities adopted and amended by ordinance from time to time.

Water and wastewater design manual. The city water and wastewater standards adopted and amended by ordinance from time to time.

(Ordinance 2012-05-00715, sec. 1, adopted 5/17/12)

Water master plan. The master plan for the city for water facilities adopted and amended by ordinance from time to time. (Ordinance 2016-01-00827 adopted 1/7/16)

Sec. 10.03.006 Appeal to city council

Except as otherwise provided herein, any developer aggrieved by any finding or action of the ~~planning and zoning~~ development services department, or the planning and zoning commission may appeal to the city council within thirty (30) days after the date of such finding or action and not thereafter. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

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Sec. 10.03.007 Filing fees

(a) Filings fees for plats established by ordinance by the city council from time to time shall be paid by the developer at time of application. (Ordinance 2016-01-00827 adopted 1/7/16)

(b) Plat recordation fees which are charged by the county shall be paid by the developer to the ~~planning and zoning~~ development services department at the time of application.

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Sec. 10.03.008 Waivers

(a) The standards and requirements of this article may be modified by the planning and zoning commission for a subdivision zoned planned development containing several types of land uses which, in the judgment of the planning and zoning commission, provides adequate public spaces and improvements for vehicular circulation, recreation, light, air and service needs of the tract when fully developed and which also provides such covenants or other legal provisions as will assure conformity to and achievement of the plan.

(b) Where existing conditions require a modification of these standards and regulations because of a unique and unusual condition not applicable generally to other property, the planning and zoning commission may, subject to city council approval, grant a waiver to these standards to permit equitable treatment of the land or tract in light of the condition.

(c) In granting waivers and modifications, the planning and zoning commission and city council may require such conditions as will, in their judgment, secure substantially the purposes of these standards and requirements and maintain the spirit and intent of this article.

(d) The grant of a waiver shall not in any manner vary the provisions of the city comprehensive zoning ordinance.

(e) A request for a waiver shall be submitted in writing by the developer at the time the preliminary plat is filed.

(f) A request for a waiver must be approved by the city council at the time of preliminary plat approval.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Sec. 10.03.009 Penalty; enforcement

(a) Any person, firm or corporation who shall violate any of the provisions of this article or who shall fail to comply with any provision hereof within the corporate limits of the city shall be guilty of a misdemeanor and upon conviction shall be subject to a fine as provided in section 1.01.009 of this code, and each day that such violation continues shall constitute a separate offense. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06; Ordinance adopting Code)

(b) Any person, firm, or corporation who shall violate any of the provisions of this article or who shall fail to comply with any provisions hereof within the corporate boundaries of the city or the extraterritorial jurisdiction of the city shall be subject to any appropriate action or proceeding by the city to enjoin, correct, abate or restrain the violation of this article including the recovery of damages and civil penalties. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Secs. 10.03.010–10.03.030 Reserved

Division 2. Platting Procedure

Sec. 10.03.031 General

(a) Before any land is platted, the owner shall apply for and secure approval of the proposed subdivision plat in accordance with the following procedures, unless otherwise provided by these regulations. The procedure for approving a plat typically requires two steps: preliminary plat, and final plat. (Ordinance 2010-11-00668, sec. 1, adopted 11/4/10). ~~A~~ The purpose of a ~~preliminary plat s purpose~~ is for the design and installation of public improvements.; ~~should there be no~~if public improvements are not ~~as~~ part of the project, a preliminary plat is not required.

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(b) Except as otherwise permitted, the approval of the commission and city council of a preliminary plat is required prior to the construction of public improvements on the property. The preliminary plat and the associated engineering plans for the property may be amended during construction, with only major changes requiring reapproval by the planning and zoning commission. Subject to review and approval by city council.

(c) Upon completion of the required public improvements, or the provision of an improvement agreement, the owner may submit a corrected final plat for the subdivision. Lots may be sold and building permits obtained after approval of the final plat by the planning and zoning commission and filing of the signed plat. Improvement ~~A~~agreements shall be s~~S~~ubject to review and approval by city council.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Sec. 10.03.032 Submission dates

The ~~planning and zoning manager~~ Development Services Director or City Manager designee may establish official submission deadlines for the placement of plats on the agenda of the planning and zoning commission and the city council for consideration. No plat shall be considered by the planning and zoning commission until it has been determined by the ~~planning and zoning~~ development services department that the submittal is complete and in conformance with this article. No plat shall be considered by the planning and zoning commission until it has been determined by the development services department that the submittal is complete and in conformance with this article.

Sec. 10.03.033 Official filing date

For purposes of this article, the date the ~~planning and zoning~~ development services department has determined that: (1) the submittal is complete and in conformance with this article; (2) all required documents are submitted in a complete format; and (3) all required fees have been paid, shall constitute the official filing date of the plat, from which the statutory period requiring approval or disapproval of the plat shall commence. The planning and zoning commission and city council may not table or postpone the consideration of the approval or disapproval of a plat, but may request the applicant to withdraw. The applicant may withdraw a plat from consideration by submitting a written request, and may resubmit the plat with no additional fees if it is rescheduled within sixty (60) days of the date of withdrawal.

Sec. 10.03.034 General approval criteria

No plat shall be approved unless the following standards have been met:

(1) The plat conforms to applicable zoning, the comprehensive plan, the capital improvements plan of the city, the design standards, the major thoroughfare plan, the master park plan of the city, and other regulations in this article. If a zoning change is contemplated for the property, the zoning change must be completed before the approval of preliminary plat of the property. Any plat reflecting a condition not in accordance with the zoning requirements shall not be approved until any available relief from the board of adjustment has been obtained; (Ordinance 2010-11-00668, sec. 1, adopted 11/4/10)

(2) Adequate provision has been made for the dedication and installation of public improvements; and

(3) All required fees have been paid.

Sec. 10.03.035 Dedications

The owner of the property to be platted must provide an easement or fee simple dedication of all property needed for the construction of streets, thoroughfares, alleys, sidewalks, storm drainage facilities, floodways, water mains, wastewater mains and other utilities, public parks, and any other property necessary to serve the plat and to implement the requirements of this article. Dedications shown on plats are irrevocable offers to dedicate the property shown. Once the offer to dedicate is made, it may be accepted by an action by the city by acceptance of the improvements in the dedicated areas for the purpose intended, or by actual use by the city. No improvements may be accepted until they are constructed in accordance with this article, and the final plat is filed for recording. No dedication otherwise required by this article may be imposed upon an owner unless the property is being subdivided and the dedication related to the impact of the proposed development is roughly proportional to the needs created by the proposed development, and provides a benefit to the development.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

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Sec. 10.03.036 Reserved

Editor's note–Former section 10.03.036 pertaining to optional land study and deriving from section 6.206 of Ordinance 2006-07-00567 adopted by the city on July 7, 2006 has been deleted by section 1 of Ordinance 2010-11-00668 adopted by the city on November 4, 2010.

Sec. 10.03.037 Procedure for preliminary plat

(a) Prior to the filing of a preliminary plat, the developer shall meet with the ~~city staff~~ development services department. The purpose of the meeting is to familiarize the developer with the city's development regulations and the relationship of the proposed subdivision to the comprehensive plan. At such meeting, the general character of the development, the zoning, utility service, street requirements and other pertinent factors related to the proposed subdivision will be discussed.

(b) Prior to submission of a preliminary plat, the developer shall submit to the city construction and engineering plans for the public infrastructure improvements required for the proposed subdivision unless the approval of an improvement agreement has been requested. If the city does not approve of the use of an improvement agreement, engineering and construction plans for the required public infrastructure must be submitted by the developer and approved by the city engineer prior to approval of the preliminary plat.

c~~(c)~~. After the preapplication conference and completion of engineering and construction plans for all public infrastructure improvements, the developer shall file the required number of copies of the preliminary plat of the proposed subdivision with the development review committee, for submission to the planning and zoning commission, and include the required filing fees and tax certificates showing all taxes have been paid on the property being platted.

(d) The following notice shall be stamped on the face of each preliminary plat: "Preliminary Pl~~a~~t - for inspection purposes only, and in no way official or approved for record purposes."

(e) Preliminary plats shall be distributed by city staff to city departments. The owner shall be responsible for the distribution of copies of the preliminary plats to the agencies listed below. The city staff shall give the owner and such agencies a specific date by which to return written responses. The owner and the agencies listed below shall be provided an opportunity to attend a developer/city staff conference for the purpose of notifying the developer of necessary corrections.

(1) Independent school districts affected by the plat (one copy).
(2) City utility departments (two copies).
(3) Public utility companies and franchise utility companies that serve or will provide service to the proposed subdivision (two copies).
(4) County commissioner and county public works director if the subdivision is outside the city limits (one copy each).

(f) The development review committee shall accumulate the comments of the city departments and agencies, and conduct a developer/city staff conference to report the comments and requested corrections to the developer. The developer shall be allowed to make comment or make required corrections and submit the corrected preliminary plat to the development review committee for submission to the planning and zoning commission. The corrected preliminary plat shall be submitted within thirty (30) days of the date the original preliminary plat was officially filed and prior to the meeting of the planning and zoning commission at which such preliminary plat is scheduled for consideration. Upon timely receipt, the ~~planning and zoning manager~~ Development Services Director or City Manager designee shall submit the corrected preliminary plat to the planning and zoning commission.

(g) A written report shall be prepared by city staff and submitted to the planning and zoning commission stating the review comments of the preliminary plat noting any unresolved issues.

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(h) Following review of the preliminary plat and other materials submitted in conformity with this article, the planning and zoning commission shall act on a preliminary plat, within thirty (30) days after the date the preliminary plat is officially filed. The planning and zoning commission may either: (i) approve the preliminary plat as presented; (ii) approve the preliminary plat with conditions; or (iii) disapprove the preliminary plat. If disapproved, the planning and zoning commission, upon written request, shall state the reasons for disapproval. A conditional approval shall be considered a disapproval until the conditions have been satisfied.

(i) The actions of the planning and zoning commission shall be noted on two (2) copies of the preliminary plat. One (1) copy shall be returned to the developer and the other retained in the files of the development review committee.

(j) The planning and zoning commission shall, in its action on the preliminary plat, consider the physical arrangement of the subdivision and determine the adequacy of the street and thoroughfare rights-of-way and alignment and the compliance of the streets and thoroughfares with the major thoroughfare plan, the existing street pattern in the area and with any other applicable provisions of the comprehensive zoning ordinance and comprehensive plan. The planning and zoning commission, based on city staff recommendations, shall also ascertain that adequate easement for proposed or future utility service and surface drainage are provided, and that the lot sizes and area comply with the comprehensive zoning ordinance and are adequate to comply with the minimum requirements for the type of sanitary sewage disposal proposed. ~~All on-site sewage disposal systems shall meet the minimum standards required by the city plumbing code and the regulations of the county and of the state commission on environmental quality, or their successors.~~ (move to Chapter 3)

(k) After approval of a preliminary plat by the planning and zoning commission, the development review committee shall forward the preliminary plat to the city council for consideration at the next available city council meeting.

(l) The city council shall act on the preliminary plat within thirty (30) calendar days after the date the preliminary plat is approved by the planning and zoning commission or is considered approved by the inaction of the planning and zoning commission. A preliminary plat shall be considered approved by the city council unless it is disapproved within that period.

(m) Approval of a preliminary plat by the planning and zoning commission and/or the city council is not approval of the final plat but is an expression of approval of the layout shown subject to satisfaction of specified conditions. The preliminary plat serves as a guide in the preparation of a final plat.

(n) Expiration of preliminary plat approval. The approval of a preliminary plat expires two (2) ~~5~~ years after the date of city council approval unless a final plat is submitted and has received approval by the planning and zoning commission for the property within such period, or the period is extended by the planning and zoning commission upon written request of the owner. If the time period is not extended, or a final plat is not submitted and approved by the planning and zoning commission within the sixty-month period, the preliminary plat approval shall be null and void, and the owner shall be required to submit a new plat for the property subject to the then-existing zoning, subdivision and other regulations.

(o) Phased development. The preliminary plat shall indicate any phasing of the proposed development with a heavy dashed line. Each phase shall be numbered sequentially and in the proposed order of development. The proposed utility, street and drainage layout for each phase shall be designed in such a manner that the phases can be developed in numerical sequence. Thereafter, plats of subsequent units of such subdivision shall conform to the approved overall layout and phasing, unless a new preliminary plat is submitted. The planning and zoning commission and city council may impose such conditions upon the filing of the phases as deemed necessary to assure the orderly development of the city. Such conditions may include but are not limited to temporary street and alley extensions, temporary cul-de-sacs, turnarounds, and off-site utility extensions. Failure to indicate phasing of the proposed development in accordance with this section prohibits the approval of a final plat for such subdivision in phases.

(p) Effective period of preliminary plat approved for phased development. If a final plat has not been submitted and approved on at least one phase of the area covered by the preliminary plat two (2) ~~5~~ years after the date of

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preliminary plat approval, the preliminary plat shall expire and be declared null and void. If in the event that only a phase of the preliminary plat has been submitted for final plat approval, then the preliminary plat for those areas not final platted within two years of the date of preliminary plat approval shall expire and be declared null and void, unless an extension of time is granted by the planning and zoning commission. Any phase of a preliminary plat not

receiving final plat approval within the period of time set forth herein shall expire and be declared null and void, and the owner shall be required to submit a new preliminary plat for approval which shall be subject to the then-existing zoning, subdivision and other regulations, and the payment of any applicable fees.

Sec. 10.03.038 Extension and restatement of expired preliminary plats

(a) Sixty (60) days prior to or following the lapse of approval for a preliminary plat, as provided in these regulations, the owner may request the commission to extend or reinstate the approval.

(b) In determining whether to grant such request, the commission shall take into account the reasons for lapse, the ability of the owner to comply with any conditions attached to the original approval and the extent to which newly adopted zoning and subdivision regulations shall apply to the preliminary plat. The commission may extend or reinstate the preliminary plat, or deny the request, in which instance the owner must submit a new preliminary plat application for approval.

(c) The commission may extend or reinstate the approval subject to additional conditions based upon newly enacted regulations such as are necessary to issue [insure] compliance with the original conditions of approval. The commission may also specify a shorter time for lapse of the extended or reinstated preliminary plat than is applicable to original preliminary plat approval.

Sec. 10.03.039 Standards for approval of preliminary plats

No preliminary plat shall be approved unless the following standards have been met:

(1) The engineering and construction plans for the required public infrastructure improvements have been submitted and approved by the city engineer, unless the approval of an improvement agreement has been requested and approved;

(2) Adequate p~~P~~rovision has been made for the ~~installation and~~ dedication and installation of public improvements ~~has been made~~; and

(3) The preliminary plat conforms to the applicable zoning and all other requirements of this article.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

THIS SECTION WILL BE ADDED TO ARTICLE 3.18 TREE CONSERVATION AND LANDSCAPING, SECTION 3.18.006 TREE SURVEY

~~(4) (A) A tree survey, which identifies large trees with a DBH ("diameter at breast height" measured at 4.5 feet above grade) of four and one-half inches (4.5") or greater and small trees with a DBH of two inches (2") or greater, shall be submitted prior to submission of the engineering and construction plans. The tree survey shall include the species and caliper at DBH of each tree in a tabular form, with each tree identified by a number corresponding to a numbered tree on the tree survey site plan. The tree survey must denote which trees will be saved and which will be removed. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06; Ordinance adopting Code)~~

~~(B) The tree survey must be reviewed and approved by the planning and zoning commission prior to the preliminary plat being submitted and prior to staff approving the engineering and construction plans. The commission shall act on the tree survey within thirty (30) days after it is officially filed. If the commission does not approve the tree survey, that decision may be appealed to city council for consideration at the next available city council meeting, and the city council shall act on the appealed tree survey within thirty (30) days after the date the tree survey was denied by the commission. Inaction by the city council within this period shall be considered as approval.~~

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~~(C) The commission, or the council upon appeal, shall approve the tree survey if it finds and determines that the developer has made a good faith effort to save as many trees, 6" caliper or greater at DBH, as possible, given the subdivision layout, lot size, and topography of the proposed development.~~

~~(D) As part of the final plat application, the developer must submit to the planning~~ development services ~~department a spreadsheet that summarizes, for each lot, the number of trees that were to be saved per tree survey, as well as the number of trees to be saved that were lost during construction. The spreadsheet must denote the caliper inch and species of each tree saved, as well as for the trees to be saved, but lost during development. This will allow staff to verify how many replacement trees are needed for each lot at the building permit stage. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)~~

~~(E) Except as provided in section 3.18.005, no person, directly or indirectly, shall cut down, destroy, remove or move, or effectively destroy through damaging any protected tree situated on property regulated by article 3.18 without first obtaining a tree removal permit, unless otherwise specified in article 3.18. (Ordinance adopting Code)~~

~~(F) Then, prior to the final inspection in connection with a building permit, any tree(s) shown on the tree survey as being retained on the lot, and which is removed or lost during development of the lot or home, shall be replaced by the developer or builder by planting a tree or trees of equivalent caliper inches. The trees used as replacement trees must each have a caliper of at least one and one half inches (1 1/2") and be container grown. Trees used as replacement trees must be from the large tree list found on the approved list in section 3.18.019 or approved by the planning and zoning manager. The replacement tree(s) must be planted on the same lot where the tree(s) it is replacing was, provided that the planning and zoning manager~~ Development Services Director or City Manager designee ~~may approve placement of the tree(s) on another lot(s) in the subdivision, if he finds it to be in the public interest. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06; Ordinance adopting Code)~~

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Sec. 10.03.040 Data requirement for preliminary plat

(a) The owner shall submit the required number of copies of the preliminary plat an [and] 8-1/2" x 11" and a 11" x 17" reduction of copies of the preliminary plat, as determined by the development review committee, to allow for the distribution of the proposed preliminary plat for review. Each copy of the preliminary plat shall be folded so that the title block for the subdivision may be read in the lower righthand corner. The preliminary plat shall be drawn to a scale of one inch equals one hundred feet (1" = 100') or larger on 24" x 36" sheet size. In cases of large developments which would exceed the dimensions of the required sheet at the 100-foot scale, preliminary plats may be submitted at a scale of one inch equals two hundred feet (1" = 200') on multiple sheets, properly registered. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(b) The preliminary plat shall contain or be accompanied by the following:

(1) The required number of copies of the preliminary plat and the approved engineering and construction plans for all public infrastructure improvements in accordance with the design standards of the city, to include all streets, water mains and services, sewer system and services, and drainage systems required to develop the proposed subdivision.

(Ordinance 2016-01-00827 adopted 1/7/16)

(2) The name, address and telephone number of the owner, the surveyor, and engineer responsible for the preparation of the final plat.

(3) The name of the subdivision, vicinity location map showing adjacent subdivisions, street names (which shall conform, whenever possible, to existing street names) and lot and block numbers in accordance with a systematic arrangement.

(4) An accurate boundary survey description of the property, with bearings and distances, referenced to survey lines, existing property descriptions and established subdivisions, and showing the lines of adjacent tracts, the layout, dimensions and names of adjacent streets and alleys and lot lines shown in dashed lines.

(5) Scale, north point, date, lot and block numbers.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(6) The name and location of adjacent subdivisions or unplatted tracts drawn to scale shown in dotted lines and in sufficient detail to accurately show the existing streets, alleys and other features that may influence the layout and development of the proposed subdivision. The abstract name and number, and name of the owner of the adjacent unplatted tracts shall be shown. (Ordinance 2016-01-00827 adopted 1/7/16)

(7) Exact location of lots, streets, public highways, alleys, parks and other features, with accurate dimensions in feet and decimal fractions of feet, with the length of radii and of arcs of all curves, internal angles, points of curvatures, length and bearings of the tangents, and with all other surveyor information necessary to reproduce the plat on the ground. Dimensions shall be shown from all angle points. All lots on building sites shall conform to the minimum standards for area, width and depth prescribed by the zoning district or districts in which the subdivision is located, and state the area size of each lot.

(8) ~~Building setback lines and~~ T~~t~~he location of utility easements. **Formatted:** Strikethrough

~~(9) Topographic information showing contour lines with intervals up to one foot (1') indicating the terrain, the drainage pattern of the area, and the drainage basin areas within the proposed subdivision. Topographic information showing contour lines with intervals up to two (2) feet indicating the terrain, the drainage pattern of the area, and the drainage basin areas outside the boundaries of the proposed subdivision.~~ **Formatted:** Strikethrough

(9~~10~~) The layout and dimensions of proposed storm drainage areas, easements and rights-of-way necessary for drainage within and outside the boundaries of the proposed subdivision. **Formatted:** Strikethrough

(10~~1~~) The location and purpose of all proposed parks or other areas offered for dedication to public use. **Formatted:** Strikethrough

(11~~2~~) The location of all existing property lines, buildings, sewer or water mains, storm drainage areas, water and wastewater facilities, fire hydrants, gas mains or other underground structures, easements of record or other existing features. **Formatted:** Strikethrough

~~(13) The location, size and identification of any physical features of the property, including watercourses, ravines, bridges, culverts, existing structures, drainage or other significant topographic features located on the property or within one hundred fifty feet (150') of the proposed subdivision.~~ **Formatted:** Strikethrough

(12~~4~~) Copy of any deed restrictions, restrictive covenants, special use permit or planned development district ordinance regulating the property. **Formatted:** Strikethrough

(13~~5~~) The angle of intersection of the centerlines of all intersecting streets which are intended to be less than ninety degrees (90°). **Formatted:** Strikethrough

(14~~6~~) In accordance with the city floodplain management regulations, of the Code of Ordinances, as amended, the floodplain and floodway lines and base flood elevations as shown on the current effective flood insurance rate maps for the city shall be shown, where applicable. A notation shall be shown on the face of the preliminary plat stating: "Lots or portions of lots within the floodplain or areas of special flood hazard require a development permit prior to issuance of a building permit or commencement of construction including site grading, on all or part of those lots." **Formatted:** Strikethrough

(15~~7~~) For a preliminary plat of land located outside the city limits where sanitary sewer does not exist or where street improvement standards vary from those specified by the city, such differences shall be noted. **Formatted:** Strikethrough

(16~~8~~) A certificate of ownership and dedication of all streets, alleys, easements, parks and other land intended for public use, signed and acknowledged before a notary public by the owner and lienholders of the property, along with complete and accurate metes and bounds description of the land subdivided and the property dedicated to public use. **Formatted:** Strikethrough

(17~~9~~) Receipt showing all taxes on the subject property are paid. **Formatted:** Strikethrough

(18~~20~~) Certification by a surveyor, to the effect that the preliminary plat represents a survey made by the surveyor, and that all the necessary survey monuments are correctly shown thereon. **Formatted:** Strikethrough

(19~~21~~) A preliminary plat provided in multiple sheets shall include a key map showing the entire subdivision at smaller scale with lot and block numbers and street names on one (1) of the sheets or on a separate sheet of the same size. **Formatted:** Strikethrough

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(202) Copy of any proposed property owner or homeowners' association agreements, covenants and restrictions. (Ordinance 2016-01-00827 adopted 1/7/16)

(21) A site plan showing building setback lines, topographic information showing contour lines with intervals up to one foot (1') indicating the terrain, the drainage pattern of the area, and the drainage basin areas within the proposed subdivision. Topographic information showing contour lines with intervals up to two (2) feet indicating the terrain, the drainage pattern of the area, and the drainage basin areas outside the boundaries of the proposed subdivision; and the location, size and identification of any physical features of the property, including watercourses, ravines, bridges, culverts, existing structures, drainage or other significant topographic features located on the property or within one hundred fifty feet (150') of the proposed subdivision.

Sec. 10.03.041 Effect of preliminary plat approval

Approval of a preliminary plat by the commission and city council constitutes authorization for the city engineer to release construction plans and to permit the owner to commence construction of the public improvements. Approval of a preliminary plat also authorizes the owner, upon fulfillment of all requirements and conditions of approval, to submit a final plat for approval. Upon release of the construction plans, the city engineer may, upon request of the applicant, issue a certificate indicating the construction plans have been released and construction of the improvement is thereafter authorized. The certificate shall read as follows:
"The Preliminary Plat for (insert name of the subdivision or addition) as approved by the City Council for the City of Lucas on (insert date of approval) is authorized for use with engineering plans for the construction of public improvements as approved by the City Engineer. A Final Plat shall be approved by the Planning and Zoning Commission upon the completion of all public improvements or the provision of an Improvement Agreement under the terms of the Subdivision and Development Ordinance and submission of a Final Plat in compliance with the Subdivision and Development Ordinance of the City of Lucas."

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Sec. 10.03.042 Amendments to ~~optional land study or~~ preliminary plat

(a) At any time following the approval of a preliminary plat, and before the lapse of such approval, the owner may request an amendment. No amendment may be approved pursuant to this section which amends or changes any condition, regulation, or development required by a planned development ordinance or specific use permit which governs the development of such subdivision. The rerouting of streets, addition or deletion of alleys, or addition or deletion of more than ten percent (10%) of the approved number of lots shall be considered a major amendment. The adjustment of street and alley alignments, lengths, and paving details; the addition or deletion of lots within ten percent (10%) of the approved number and the adjustment of lot lines shall be considered minor amendments. (Ordinance 2010-11-00668, sec. 1, adopted 11/4/10)

(b) The director of development services may approve or disapprove a minor amendment. Disapproval may be appealed to the commission. Major amendments may be approved by the commission at a public meeting in accordance with the same requirements for the approval of a preliminary plat. (Ordinance 2016-01-00827 adopted 1/7/16)

(c) Approval. The commission shall approve, conditionally approve or disapprove any proposed major amendment and may make any modifications in the terms and conditions of preliminary plat approval reasonably related to the proposed amendment.

(d) Retaining previous approval. If the applicant is unwilling to accept the proposed amendment under the terms and conditions required by the commission, the applicant may withdraw the proposed major amendment or appeal the action of the commission to the city council in accordance with section 10.03.006.

Sec. 10.03.043 Procedure for final plat

(a) After approval of the preliminary plat by the planning and zoning commission and the city council and upon completion of the required public improvements or the provision of an improvement agreement as allowed herein,

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the owner shall submit a final plat for the property for approval.

(b) The final plat shall conform substantially to the approved preliminary plat, if required, and, if desired by the developer, may cover only a phase of the approved preliminary plat; provided, however, such phase conforms to all the requirements of this article and the approved preliminary plat indicated the phasing of such development.

(c) The final plat shall be distributed to the city departments and other agencies for review and comment in the same manner as a preliminary plat.

(d) The development review committee shall accumulate the comments of the city departments and agencies and conduct a developer/city staff conference to report the comments and requested corrections to the developer. The developer shall make comment or make the required corrections and submit the corrected final plat to the development review committee for submission to the planning and zoning commission. The corrected final plat shall be submitted within thirty (30) days of the date the original final plat was officially filed and prior to the meeting of the planning and zoning commission at which the original final plat is scheduled for consideration.

(e) The final plat shall be submitted to the planning and zoning commission at the next available meeting with any appropriate comments and recommendations by the development review committee. The planning and zoning commission shall act on the final plat within thirty (30) days after the official filing date. If no action is taken by the planning and zoning commission within such period, the final plat shall be deemed approved. A certificate showing the filing date and failure to take action thereon within the thirty-day period shall, on request, be issued by the planning and zoning commission, which shall be sufficient in lieu of a written endorsement of approval. The planning and zoning commission shall be the final approval authority for final plats. The denial of approval of a final plat shall not be appealable to the city council.

(f) The planning and zoning commission shall consider the final plat, including all proposals by the owner with respect to the dedication of right-of-way for public use, the construction of utilities, streets, drainage and other improvements.

(g) The approval of the final plat by the planning and zoning commission shall authorize the planning and zoning commission chairperson to execute the certificate of approval on the final plat.

(h) The approved final plat shall then be filed by the city ~~of record~~ in the plat records of the county.

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~~(i) The final plat for any subdivision located outside the city limits shall be submitted to the commissioner's court of the county for approval and the execution of any applicable agreements.~~

~~(j) After action by the commissioner's court, the final plat shall be returned to the city for filing by the development review committee.~~

(k) Final plats disapproved by the planning and zoning commission shall be returned to the developer by the development review committee.

(l) In the event a final plat is approved by the planning and zoning commission for a subdivision in phases, the final plat of each phase shall carry the same name throughout the entire subdivision, but bear a distinguishing letter, number or subtitle. Lot and block numbers shall run consecutively throughout the entire subdivision, even though such subdivision may be finally approved in phases.

Sec. 10.03.044 Standards for approval of final plat

No final plat shall be approved unless the following standards have been met:

(1) The final plat substantially conforms to the preliminary plat, if required;

(2) Required public improvements have been constructed and are ready to be accepted by the planning and zoning commission, and/or an improvement agreement has been approved by the ceity council for the subsequent completion of the public improvements;

(3) The final plat conforms to the applicable zoning and all other requirements of this article;

(4) Adequate provision has been made for the dedication and installation of public improvements; and ~~Provisions have been made for adequate public facilities under the terms of this article; and~~

(5) All required fees have been paid.

Sec. 10.03.045 Data requirement for final plat

The owner shall prepare a final plat in accordance with the conditions of approval for the preliminary plat drawn to a scale of one inch equals one hundred feet (1" = 100') on 24" x 36" sheet size. For large developments, the final plat may be submitted on multiple sheets properly registered to match with the surrounding sheets and a small-scale key map showing all sheets of the final plat ~~have been~~ [shall be] provided. The owner shall submit the required number of "copies" of the final plat and 8-1/2" x 11" and an 11" x 17" reduction copies of the final plat as determined by the development review committee with three (3) copies of the approved construction plans for the public infrastructure improvements for the proposed subdivision. Each copy of the final plat shall be folded so that the title block for the subdivision may be read in the lower righthand corner. The final plat shall contain or be accompanied by the following:

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(1) Record drawings, construction plans including one set of mylars and a digital copy in PDF, DWG or DGN format, and two sets of bluelines, where applicable.

(2) All information required for a preliminary plat.

(3) The improvement agreement and security, if required, in a form satisfactory to the city attorney and in an amount established by the city council upon recommendation of the city engineer and shall include a provision that the owner shall comply with all the terms of the final plat approval as determined by the commission.

(4) Formal irrevocable offers of dedication to the public of all streets, alleys, utilities, easements and parks in a form approved by the city attorney.

(5) The following certificates shall be placed on the final plat in a manner that will allow them to be clearly visible on the final plat.

APPROVED BY THE PLANNING AND ZONING COMMISSION OF THE CITY OF LUCAS, TEXAS, ON THE _____ DAY OF _____, __.

ATTEST:

_____
Chairperson, Planning and Zoning Commission

_____
City ~~Zoning~~ Secretary

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(6) An owner may, at the discretion of the commission, obtain approval of a phase of a subdivision for which a preliminary plat was approved provided such phase meets all the requirements of this article in the same manner as is required for a complete subdivision.

(7) If applicable, copy of agreements, covenants and restrictions establishing and creating the homeowners' association approved by the commission based on recommendation of the city attorney.

Sec. 10.03.046 Execution and recordation of final plat

(a) When an improvement agreement and security are required, the city council shall endorse approval on the final plat after the improvement agreement and security have been approved by the city attorney, and all the conditions pertaining to the final plat have been satisfied. A final plat for which an improvement agreement has been approved shall contain the following notation on the final plat:
"This Subdivision is subject to an Improvement Agreement pursuant to the City of Lucas, Texas Subdivision and Development Ordinance. All or some of the public infrastructure were not constructed and accepted by the City of Lucas, Texas prior to approval of this Final Plat."

(b) When installation of public improvements is required prior to recordation of the final plat, the city council shall endorse approval on the final plat after all conditions of approval have been satisfied and all public improvements are satisfactorily completed. There shall be written evidence that the required public improvements have been installed and have been completed in a manner satisfactory ~~to the city~~ as shown by a certificate signed by the city engineer stating that the necessary dedication of public lands and installation of public improvements ~~and [sic]~~ have been accomplished.

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(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(c) City staff shall be responsible for filing the final plat with the county clerk. Simultaneously with the filing of the final plat, the city staff shall record such other agreements of dedication and legal documents as shall be required to be recorded by the city secretary or the city attorney. The final plat, bearing all required signatures, shall be recorded after final approval and within five working days of its receipt. One (1) copy of the recorded final plat, with street addresses assigned, will be forwarded to the owner by the city staff. (Ordinance 2016-01-00827 adopted 1/7/16)

(d) Approval of a final plat shall certify compliance with the regulations of the city pertaining to the subdivision. An approved and signed final plat may be filed with the county as a record of the subdivision and may be used to reference lots and interests in property thereon defined for the purpose of conveyance and development as allowed by these regulations.

Sec. 10.03.047 Administrative approval of certain amending plats, minor plats and replats

(a) The development review committee is authorized to approve the following:

(1) Amending plats described by section 212.016 Tex. Loc. Gov't Code;
(2) Minor plats involving four or fewer lots fronting an existing street and not requiring the creation of any new street or extension of municipal facilities; and
(3) A replat under section 212.0145 Tex. Loc. Gov't Code that does not require the creation of any new street or the extension of municipal facilities.

(b) The ~~planning and zoning manager~~ Development Services Director or City Manager designee may for any reason elect to present an amending plat, minor plat or replat meeting the requirements of (a) above to the planning and zoning commission for approval.

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(c) Any amending plat, minor plat or replat meeting the requirements of (a) above which the ~~planning and zoning manager~~ Development Services Director or City Manager designee fails or refuses to approve shall be submitted to the planning and zoning commission for approval.
(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

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Sec. 10.03.048 Vacating plats, replats and amendment of plats

(a) Vacating plats.
(1) The owners of the tract covered by a plat may vacate the plat at any time before any lot in the plat is sold. The plat is vacated when a signed, acknowledged instrument declaring the plat vacated is approved and recorded in the manner prescribed for the original plat. Subject to review and approval by both the planning and zoning commission and the city council.
(Ordinance 2016-01-00827 adopted 1/7/16)
(2) If lots have been sold, the plat, or any part of the plat, may be vacated on the application of all the

owners of lots in the plat with approval obtained in the manner prescribed for the original plat. Subject to review and approval by city council.

(3) The planning and zoning commission shall disapprove any vacating instrument which abridges or destroys public rights in any of the public uses, improvements, streets or alleys.

(4) Upon approval and recording with the county clerk, the vacated plat has no effect.

(b) Replatting without vacating preceding plat.

(1) A replat of a subdivision or part of a subdivision may be recorded and is controlled over the preceding plat without vacation of that plat if the replat: (i) is signed and acknowledged by only the owners of the property being platted; (ii) does not attempt to amend or remove any covenants or restrictions; and (iii) and is approved, after a public hearing on the matter, by the planning and zoning commission. Subject to review and approval by city council.

(2) An application for a replat shall follow the same procedure required for preliminary and final plats.

(c) Additional requirements for certain replats.

(1) In addition to compliance with section 10.03.048(b), a replat without vacation of the preceding plat must conform to the requirements of this section if:

(A) During the preceding five (5) years, any of the area to be replatted was limited by an interim or permanent zoning classification to residential use for not more than two (2) residential units per lot; or

(B) Any lot in the preceding plat was limited by deed restrictions to residential use for not more than two (2) residential units per lot.

(2) Notice of the public hearing, as required in section 10.03.048(b), shall be given before the fifteenth (15th) day before the date of the public hearing by: (1) publication in the official newspaper; and (2) by written notice, with a copy of Tex. Loc. Gov't Code section 212.015(c) attached, forwarded to the owners of lots that are in the original subdivision and that are within two hundred feet (200') of the lots to be replatted, as indicated on the most recently approved city tax rolls or[, in] the case of a subdivision within the extraterritorial jurisdiction, the most recently approved county tax roll of the property upon which the replat is requested.

(3) If the proposed replat requires a waiver and is protested in accordance with this subsection, the proposed replat must receive, in order to be approved, the affirmative vote of at least three-fourths (3/4) of the members present at the meeting of the planning and zoning commission. For a legal protest, written instruments signed by owners of at least twenty percent (20%) of the area of the lots or land immediately adjoining the area covered by the proposed replat and extending two hundred feet (200') from that area, but within the original subdivision, must be filed with the planning and zoning commission prior to the close of the public hearing.

(4) In computing the percentage of land area under subsection (3), the area of streets and alleys shall be included.

(5) Compliance with subsections (3) and (4) is not required for approval of a replat of part of a preceding plat if the area to be replatted was designated or reserved for other than single or duplex family residential use by notation on the last legally recorded plat or in the legally recorded restrictions applicable to the plat. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(d) Plat amendments and corrections.

(1) The director of development services is allowed to approve the following:

(A) Amending the plats described in section 212.016 of the Texas Local Government Code;

(B) Minor plats involving four or fewer lots fronting an existing street and not requiring the creation of any new street or extension of facilities; and

(C) A replat under section 212.0145 of the Texas Local Government Code that does not require the creation of any new street or the extension of municipal facilities.

(2) The director of development services may for any reason elect to present an amending plat, minor plat or replat meeting the requirements of subsection (1) above to the planning and zoning commission for approval.

(3) Any amending plat, minor plat or replat meeting the requirements of subsection (1) above which the ~~planning and zoning manager~~ Development Services Director or City Manager designee fails or refuses to approve shall be submitted to the planning and zoning commission for approval.

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~~**Sec. 10.03.049 Expiration of final plat approval**~~

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~~(a) If public improvements for a subdivision have not been constructed and accepted by the city and the corresponding final plat for said subdivision has not been filed in the county plat records within two (2) years after the date of final plat approval by the planning and zoning commission, said final plat shall be null and void and shall conclusively be deemed to be withdrawn without further action by the city. This provision shall not apply to final plats approved by the city prior to the effective date of this section (ordinance adopted July 7, 2006).~~ ~~(Ordinance 2016-01-00827 adopted 1/7/16)~~

~~(b) Final plats approved prior to the effective date of this section [ordinance adopted July 7, 2006] shall become null and void and shall be conclusively deemed to be withdrawn without further action by the city in 5 years if the public improvements for the subdivision have not been constructed and accepted by the city and the corresponding final plat for said subdivision filed in the county plat records.~~

~~(c) An approved, unexpired final plat may be extended by the planning and zoning commission upon written request, once for a period not to exceed twelve (12) months provided:~~

~~(1) Good cause is shown by the developer; and~~
~~(2) There has been no significant change in development conditions affecting the subdivision; and~~
~~(3) The final plat continues to comply with all applicable regulations, standards and this article.~~

~~Sec. 10.03.050 Nonresidential property~~

~~A nonresidential subdivision shall be processed for approval in the same manner as a residential subdivision, except that no individual lots need be drawn on such plat. Only streets, blocks, drainage easements and minimum building lines need be shown.~~

Secs. 10.03.04~~51~~–10.03.080 Reserved

Division 3. Completion and Maintenance of Public Improvements

Sec. 10.03.081 Construction plan procedure

(a) General application requirement. Construction plans shall be prepared by or under the supervision of a professional engineer or architect ~~registered~~ licensed in the state as required by state law governing such professions. Plans submitted for review by the city shall be dated and bear the responsible engineer's or architect's name, serial number and the designation of "engineer," "professional engineer" or "P.E." or "architect" and an appropriate stamp or statement near the engineer's or architect's identification, stating that the documents are for preliminary review and are not intended for construction. Final plans ~~acceptable to the city~~ shall bear the seal and signature of the engineer or architect and the date signed on all sheets of the plans. Public works construction in streets, alleys or easements which will be maintained by the city shall be designed by a professional engineer ~~registered~~ licensed in the state.

(b) Construction plan review procedure. Copies of the construction plans, and the required number of copies of the preliminary plat, shall be submitted to the city engineer for final approval. The plans shall contain all necessary information for construction of the project, including screening walls and other special features. All materials specified shall conform to the standard specifications and standard details of the city. Each sheet of the plans shall contain a title block including space for the notation of revisions. This space is to be completed with each revision to the plan sheet and shall clearly note the nature of the revision and the date the revision was made. The city engineer will release the plans for construction, after approval of the preliminary plat by the commission subject to review and approval by city council and payment of all inspection fees. Upon such release, each contractor shall maintain one set of plans, stamped with city release, at the project site at all times during construction.

~~(c)~~I Failure to commence construction. If commencement of construction has not occurred within one (1) year after approval of the plans, resubmittal of plans may be required by the city engineer for meeting current standards and engineering requirements. For purposes of this section "commencement of construction" shall mean (i) issuance of construction permit(s); and (ii) grading of the land.

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Sec. 10.03.082 Improvement agreements

(a) Completion of improvements. Except as provided below, before the final plat is approved by the commission or ~~planning and zoning manager~~ Development Services Director, all applicants shall be required to complete, in accordance with the city's direction and to the satisfaction of the city engineer, all street, sanitary, and other public improvements, including lot improvements on the individual residential lots of the subdivision as required in these regulations and specified in the final plat, and to dedicate those public improvements to the city. As used in this section, "lot improvements" refers to grading and installation of improvements required for proper drainage and prevention of soil erosion.

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(b) Improvement agreement.

(1) Agreement. The city council, considering the recommendation of the commission, may waive the requirement that the applicant complete and dedicate all public improvements prior to approval of the final plat, and may permit the owner to enter into an improvement agreement by which the owner covenants to complete all required public improvements no later than two (2) years following the date on which the final plat is signed. The city council may also require the owner to complete and dedicate some required public improvements prior to approval of the final plat and to enter into an improvement agreement for completion of the remainder of the required improvements during such two-year period. The improvement agreement shall contain such other terms and conditions as are agreed to by the owner and the city.

(2) Improvement agreement required for oversize reimbursement. The city shall require an improvement agreement pertaining to any public improvement for which the developer shall request reimbursement from the city for oversize costs.

(3) Security. The improvement agreement shall require the owner to provide sufficient security, covering the completion of the public improvements. The security shall be in the form of cash escrow or, where authorized by the city, a letter of credit, or other security acceptable to the city attorney. Security shall be in an amount equal to one hundred percent (100%) of the city's estimated cost of completion of the required public improvements and lot improvements. In addition to all other security, for completion of those public improvements where the city participates in the cost, the owner shall provide a performance bond from the contractor, with the city as a co-obligee. The issuer of any surety bond and letter of credit shall be subject to the approval of the city attorney.

(4) Letter of credit. If the city council authorizes the owner to post a letter of credit as security for its promises contained in the improvement agreement, the letter of credit shall:

(A) Be irrevocable;

(B) Be for a term sufficient to cover the completion, maintenance and warranty periods but in no event less than two (2) years; and

(C) Require only that the city present the issuer with a sight draft and a certificate signed by an authorized representative of the city certifying to the city's right to draw funds under the letter of credit.

(5) Letter of credit reductions. As portions of the public improvements are completed, the developer may make application to the city engineer to reduce the amount of the original letter of credit.

(A) The city engineer, if satisfied that such portion of the improvements has been completed in accordance with city standards, may cause the amount of the letter of credit to be reduced by such amount deemed appropriate, so that the remaining amount of the letter of credit adequately insures the completion of the remaining public improvements.

(B) Upon the dedication of and acceptance by the city of all required public improvements, the city shall authorize a reduction in the security to 10% of the original amount of the security if the owner is not in breach of the improvement agreement. The remaining security shall be security for

the owner's covenant to maintain the required public improvements and the warrant that the improvements are free from defect for two (2) years thereafter.

(C) Temporary improvements. The owner shall build and pay for all costs of temporary improvements required by the commission and shall maintain those temporary improvements for the period specified by the commission. Prior to construction of any temporary improvement, the owner shall file with the city a separate improvement agreement and escrow, or where authorized, a letter of credit, in an appropriate amount for such temporary improvements, which improvement agreement and escrow or letter of credit shall ensure that the temporary improvements will be properly constructed, maintained, and removed.

(D) Units of government. Governmental units may file, in lieu of the contract and security, a certified resolution or ordinance agreeing to comply with the provisions of this section.

(E) Failure to complete improvements. For plats for which no improvement agreement has been executed and no security has been posted, if the public improvements are not completed within the period specified by the city, the preliminary plat approval shall be deemed to have expired. In those cases where an improvement agreement has been executed and security has been posted and required public improvements have not been installed within the terms of the agreement, the city may:

(1) Declare the agreement to be in default and require that all the public improvements be installed regardless of the extent of completion of the development at the time the improvement agreement is declared to be in default;

(2) Suspend final plat approval until the public improvements are completed and record a document to that effect for the purpose of public notice;

(3) Obtain funds under the security and complete or cause the public improvements to be completed;

(4) Assign its right to receive funds under the security to any third party, including a subsequent owner of the subdivision for which public improvements were not constructed, in whole or in part, in exchange for that subsequent owner's promise to complete the public improvements in the subdivision; and

(5) Exercise any other rights available under the law.

(F) Acceptance of dedication offers. Acceptance of formal offers of dedication of streets, public areas, easements, and parks shall be by authorization of the city engineer. The approval by the commission of a plat, whether preliminary or final, shall not in [and] of itself be deemed to constitute or imply the acceptance by the city of any street, easement, or park shown on plat. The commission may require the plat to be endorsed with appropriate notes to this effect.

(G) Maintenance of public improvements. The owner shall maintain all required public improvements for a period of two (2) years following the acceptance by the city and shall provide a warranty that all public improvements shall be free from defect for a period of two (2) years following such acceptance by the city.

Sec. 10.03.083 Construction procedures

(a) Permit required. A permit is required from the city prior to commencement of any ~~subdivision~~ development work in the city which affects erosion control, vegetation or tree removal, or a floodplain.

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(b) Preconstruction conference. The city engineer may require that all contractors participating in the construction meet for a preconstruction conference to discuss the project prior to release of a permit.

(c) Conditions prior to authorization. Prior to authorizing release of a construction permit, the city engineer shall be satisfied that the following conditions have been met:

(1) The preliminary plat shall be approved by the commission subject to the review and approval by council.

(2) All required contract documents shall be completed and filed with the city engineer.

(3) All necessary off-site easements or dedications required for city infrastructure and not shown on the final plat must be conveyed solely to the city, with proper signatures affixed. The original of the documents shall be returned to the engineering department prior to approval and release of the engineering plans and issuance of a permit.

(4) All contractors participating in the construction shall be provided, at the developer's cost, with a set of approved plans bearing the stamp of release of the engineering department. One set of these plans shall remain on the job site at all times.

(5) A complete list of the contractors, their representatives on the site, and telephone numbers where a responsible party may be reached at all times must be submitted to the city engineer at least twenty-four (24) hours prior to the preconstruction meeting which is optional.

(6) All applicable fees must be paid to the city.

(7) Subject to the approval by city council.

Sec. 10.03.084 Inspection of public improvements

(a) General procedure. Construction inspection shall be supervised by the city engineer. Construction shall be in accordance with the approved plans and the design standards. Any change in design required during construction should be made by the engineer whose seal and signature are shown on the plans. Another engineer may make revisions to the original engineering plans if so authorized by the owner of the plans and the engineer who sealed the original plans if those revisions are noted on the plans or documents. All revisions shall be approved by the city engineer. If the city engineer's inspection finds that any of the required public improvements have not been constructed in accordance with the city's construction standards and specifications, the owner shall be responsible for completing and/or correcting the public improvements.

(b) Certificate of satisfactory completion. The city will not accept dedication of required public improvements until the applicant's engineer or surveyor has certified to the city engineer, through submission of record drawings, indicating location, dimensions, materials, and other information required by the commission or city engineer, that all required public improvements have been completed. The record drawings shall also include a complete set of drawings of the paving, drainage, water, sanitary sewer, or other public improvements, showing that the layout of the line and grade of all public improvements is in accordance with construction plans for the plat, and all changes made in the plans during construction and containing on each sheet a record drawing stamp bearing the signature of the engineer and the date. The engineer or surveyor shall also furnish a copy of the final plat and engineering plans, if prepared on a computer assisted design drawings (CADD) -system, in such a format that is compatible

with the city's CADD system or PDF. The developer shall provide a maintenance bond executed by a corporate surety duly authorized to do business in the state, payable to the city and approved by the city as to form, to guarantee the maintenance of the construction for a period of two (2) years after its completion and acceptance by the city. In lieu of a maintenance bond the developer may submit either an irrevocable letter of credit payable to the city and approved by the city as to form, or a cash bond payable to the city and approved as to form. The amount of the maintenance bond, letter of credit or cash bond shall be at least ten percent (10%) of the full cost of the infrastructure in the subdivision, as determined by the estimate of construction costs. When such requirements have been met the city engineer shall thereafter accept the public improvements.

(c) Acceptance of the development shall mean that the developer has transferred all rights to all the public improvements to the city for use and maintenance.

(d) Upon acceptance of the required public improvements, the city engineer shall submit a certificate to the developer stating that all required public improvements have been satisfactorily completed.

Sec. 10.03.085 Deferral of required improvements

(a) The commission, subject to the review and approval of city council, may, upon petition of the owner, defer at the time of final approval, subject to appropriate conditions, the provision of any or all public improvements [that] are not required in the interests of the public health, safety and general welfare.

(b) Whenever a petition to defer the construction of any public improvement required under these regulations is granted by the commission, the owner shall deposit in escrow the developer's share of the costs of the future public improvements with the city prior to approval of the final plat, or the owner may execute a separate improvement agreement secured by a cash escrow or, where authorized, a letter of credit guaranteeing completion of the deferred public improvements upon demand of the city.

Sec. 10.03.086 Issuance of building permits and certificates of occupancy

(a) No building permit shall be issued for a lot or building site unless the lot or site has been officially recorded by an approved final plat ~~approved by the city~~, and all public improvements as required for final plat approval have been completed, except as permitted below.

(1) Building permits may be issued for nonresidential developments provided that a preliminary plat is approved ~~by the city~~ and civil construction plans have been released by the city engineer. Building construction will not be allowed to surpass the construction of fire protection improvements.

(2) The city engineer may authorize residential building permits for a portion of a subdivision, provided that a preliminary plat has been approved and all public improvements have been completed for that portion of the development, including but not limited to those required for fire and emergency protection. Notwithstanding, no lot may be sold or title conveyed until a final plat ~~approved by the city~~ has been recorded.

(b) No certificate of occupancy shall be issued for a building or the use of property unless all subdivision improvements have been completed and a final plat approved ~~by the city~~ has been recorded. Notwithstanding the above, the city building official may authorize the occupancy of a structure provided that an agreement providing cash escrow, a letter of credit, or other sufficient surety is approved ~~by the city~~ for the completion of all remaining public improvements.

Sec. 10.03.087 Utility connections

Utility connections for individual lots are not authorized until a final plat has been approved in accordance with this article.

Sec. 10.03.088 Withholding improvements

The city shall withhold all city improvements of whatsoever nature, including the furnishing of water facilities and service, from any subdivision which has not been constructed and approved in accordance with this article.

Secs. 10.03.089–10.03.120 Reserved

Division 4. Standards and Requirements

Sec. 10.03.121 Lots and blocks

(a) All lots of a plat shall front on a dedicated public street, or an approved private street.

(b) Lot dimensions shall comply with the standards required by the comprehensive zoning ordinance.

(c) The area of the lots shall be computed by taking the total area measured on a horizontal plane, included within the lot lines.

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(d) All side lines of lots shall be at right angles to straight street lines or radial to curved street lines, unless a waiver from this rule would, in the opinion of the planning and zoning commission, subject to review and approval by council, produce a better lot plan and better utilize the proposed development.

(e) Block lengths between intersecting cross streets shall be no more than one thousand six hundred feet (1,600') and no less than two hundred fifty feet (250').

Sec. 10.03.122 Park sites

(a) Whenever a final plat is submitted to the city or is required to be approved by the city for development of a residential area consisting of ten (10) or more single-family residences in accordance with the ordinances of the city, such plat shall contain a clear fee simple dedication of an area of land to the city for park purposes, which area shall equal one acre for each 30 proposed dwelling units. No plat showing a dedication of less than one (1) acre shall be approved, except as hereinafter provided.

(b) The city council declares that development of an area smaller than one acre for public park purposes is impractical. Therefore, if a proposed subdivision consists of fewer than 35 units, the developer shall be required to pay a sum of money in lieu of a dedication of landing [land in] the amount provided in this subsection. In lieu of dedication, the developer may make payment at a per-acre price set from time to time by resolution of the city council, sufficient to acquire land and provide for adjacent streets and utilities for a neighborhood park to serve the park zone in which such development is located. The zones are hereby illustrated in exhibit A. Unless changed hereafter by the city council, such per-acre price shall be computed on the basis of fewer than 35 lots and basis of $1,000.00 per dwelling unit/lot. Such funds may be used for acquisition, improvement, or maintenance of a park within a same zone as a development. The city council may establish a special fund for the deposit of all sums paid in lieu of any land dedication. These sums must be expended within two (2) years of the completion of the subdivision for the acquisition, development, or maintenance of a neighborhood park. If the funds are not expended, the funds shall be refunded to the property owners in the subdivision on a pro-rata basis. For proposed subdivisions of 35 or greater family dwellings, the developer may elect to pay cash, subject to city council approval, in lieu of any land dedication requirement.

Editor's note–Exhibit A, referred to in the above section, is not printed herein but is on file in the city secretary's office.
(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

Sec. 10.03.123 Streets and drainage

(a) Streets.

(1) All street widths shall conform to the master thoroughfare plan and shall be as follows:

Street or Thoroughfare Type	Minimum Right-of-Way Width	Pavement Width (measured from edge to edge)
Arterial (type A)	120 ft.	39 ft. (each direction)
Major collector (type B)	90 ft.	64 ft.
Collector (type C)	60 ft.	34 ft.
Residential	50 ft.	24 ft.
Private ~~drive~~ road~~drive road~~ (type D)	50 ft.*	24 ft.

*Private ~~drives~~ road shall not be in ROW but within an access, drainage, and utility easement.

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(2) All street rights-of-way shall be dedicated to the city as part of the platting process and without cost to the city.

(Ordinance 2016-01-00827 adopted 1/7/16)

(3) Existing streets shall be continued with the same or greater right-of-way and pavement widths as the existing streets being connected where practical, as determined by the planning and zoning commission. Street names shall also be continued for extended streets. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(4) Dead-end streets may be platted where the land adjoining the proposed plat has not been developed and the opportunity exists for future extension of the proposed street and shall not exceed one hundred fifty feet (150'). In the event that such proposed street exceeds one hundred fifty feet (150') in length or one lot width, from the nearest street intersection, the street will be provided with an approved cul-de-sac, turnaround either permanent or temporary (defined as permanent quality and made of asphalt), having a minimum right-of-way radius of sixty feet (60'). (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06; Ordinance adopting Code)

(5) Where streets within the proposed subdivision are dictated by lot design to be cul-de-sacs, such cul-de-sac streets shall be provided with a permanent cul-de-sac having a minimum right-of-way radius of sixty feet (60') and shall not exceed six hundred feet (600') in length except in circumstances dictated by topography and existing development. Future streets that may offer a second point of access shall not be considered when measuring the length of cul-de-sac until the street is actually constructed. In situations where cul-de-sacs exceed the prescribed length by more than five percent (5%), a combination of the following based on the number of lots and dwelling units will be considered as a mitigating measure:

(A) A secondary emergency entrance/exit;
(B) Widening of the street and enlarging the cul-de-sac turnaround;
(C) Addition of fire hydrants; and
(D) Looped water system.

(6) A secondary point of access, meeting the fire code, will be required for any subdivision, or any part of a subdivision, to prevent more than 10 lots from having only one point of access or emergency access. The secondary point of access shall not be routed through existing subdivisions.

(7) Roadways shall be designed with regard for all topographical features lending themselves to treatment and layout of utilities.

(8) In platting the subdivision, the developer shall dedicate all the necessary right-of-way for the existing and proposed streets as shown on the proposed plat in accordance with the major thoroughfare plan or other plans approved by the city, at no cost to the city.

(9) All streets shall be constructed in the dedicated right-of-way as required by the major thoroughfare plan. If a street as shown on the major thoroughfare plan is located in the interior of the subdivision, the developer shall construct the entire width of the roadway. Streets which dead-end at utility rights-of-way, intended for future extension across these rights-of-way, shall be constructed to the center of the right-of-way as required by the major thoroughfare plan for half the distance across the rights-of-way. Where streets are dedicated adjacent to undeveloped land and the property line is normally the centerline of the street, the developer shall dedicate the necessary right-of-way.

(10) All new streets and median openings and left-turn lanes, constructed in existing streets to serve dedicated streets in a development, or to serve private drives, shall be paved to city standards, inspected by city inspectors and paid for by the developers.

(11) Acceleration and deceleration lanes shall be constructed to the same standards as the adjoining streets, and cost of construction shall be the developer’s responsibility.

(12) All handicap ramps shall be constructed by the developer in accordance with the paving design manual prior to acceptance of the subdivision.

(13) At a signalized intersection in which one public street terminates at the intersection of a connecting cross street, a private driveway shall not be placed on the cross street so as to be in alignment with the terminating street. However, an exception to this requirement may be considered when it is demonstrated that the location of the proposed drive, at the intersection, is the only acceptable access point due to spacing requirements and other design standards.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

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(14) A public cross-access easement shall be required between adjacent lots fronting on an arterial street in order to minimize the number of access points and facilitate access between and across individual lots and at any other location where existing lot widths are not sufficient to allow individual driveways per the city's driveway criteria as determined by the city engineer. The location shall be approved by the city[.] Minimum easement width shall be twenty-four (24) feet and the length shall be the full width of the lot fronting the roadway[.] This standard is required and must be shown on all optional studies, preliminary plats and final plats. (Ordinance 2014-05-00780 adopted 5/1/14)

(15) Subdivision streets shall be tied to an existing paved public street by pavement built to city standards. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(16) Residential lots shall not face arterial streets or thoroughfares and driveways shall not be permitted on arterial streets unless approved by the city engineer.

(b) Private ~~drives.~~roads The following are required for private ~~drives~~roads.

(1) A minimum pavement width of twenty-four (24) feet constructed in accordance with the paving design manual;

(2) Within an access, drainage, and utility easement with a minimum width of fifty (50) feet;

(3) Shall be in a separated lot dedicated to and maintained by an HOA; and

(4) Shall be all the same design, engineering, and planning elements as a city street.

(Ordinance 2014-05-00780 adopted 5/1/14)

(c) Sidewalks.

(1) Concrete sidewalks are required for all streets ~~(residential R1 and~~ (any commercial or retail zoning), unless waived by the city council at time of preliminary plat approval.

(2) Sidewalks located on residential streets shall be five feet (5') in width, located within the street right-of-way and constructed in accordance with the paving design manual. In R-1 zoning districts, each residential lot will pay double park fees in lieu of a sidewalk.

(3) Sidewalks located adjacent to commercial property and all designated arterial or collector streets, as shown in the major thoroughfare plan, shall be eight feet (8') in width within the street right-of-way and constructed in accordance with the paving design manual.

(4) Sidewalks adjacent to arterial or collector streets shall be constructed at the time the street is constructed. All other sidewalks shall be constructed at the time the residence or development is permitted.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

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(d) Street name signs.

(1) Street name signs and all traffic-control devices shall be conform to the Texas Manual on Uniform Traffic-Control Devices and the standards adopted by the city ~~street name signs~~ shall be required at each intersection.

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(2) The cost of the street name signs, poles and installation shall be paid by the developer prior to acceptance of the subdivision. The city shall install the signs upon receipt of payment. The city engineer may allow the developer to install the street name signs and traffic-control devices.

(Ordinance 2014-05-00780 adopted 5/1/14)

(e) Storm sewers–Residential developments.

(1) An adequate storm sewer system consisting of inlets, pipes, and/or excavated channels or natural creeks and other drainage structures shall be constructed with [within] the subdivision. The developer shall bear the cost of all channel excavation, inlets, laterals, headwalls, manholes, junction structures, and all other items required to complete the system.

(2) The developer shall be responsible for all the costs of storm drainage systems where a pipe of seventy-two inches (72") in diameter, or less, is installed.

(3) In cases where the storm drain is larger than seventy-two inches (72"), twenty-five percent (25%) of the cost of providing the additional pipe larger than seventy-two inches (72") may be borne by the city and reimbursed to the developer, if a part of the capital improvement plan for the city and if funds become available. In such event, the developer shall be responsible for the remaining seventy-five percent (75%) and the cost of constructing the seventy-two-inch diameter pipe.

(4) In general, underground drainage shall be constructed in streets, alleys and drainage easements. As an alternate, and upon approval by the city engineer, the developer may construct, excavate, or reconstruct, at the developer's expense, an open channel. The proposed channel shall be constructed in accordance with the drainage and stormwater pollution prevention design manual.

(5) All channels shall be provided with dedicated drainage easements covering the floodway areas as defined by the drainage and stormwater pollution prevention design manual. All lots platted adjacent to the channel shall include the required drainage easement. Where possible, the property line division between lots shall be the center of the constructed channel.

(6) If a developer chooses to construct an open channel or maintain a channel in its existing condition, the following conditions shall be met:

(A) Creeks or excavated channels with side slopes of 4:1, or less, shall be maintained by the adjacent owner(s); and

(B) Creeks or channels with greater slopes shall be maintained by the adjacent owners through an organized entity, owner association, public improvement district, condominium agreement, or other means. The city shall, through written agreement with the operating entity, have access for emergency purposes.

(7) In street crossings over drainage systems with a cross-section exceeding the dimension of an opening larger than that of a two (2) seventy-two-inch culvert pipe culvert, the city may participate in such crossings in an amount not to exceed twenty-five percent (25%) of the construction costs if a part of the capital improvement plan and if funds become available.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(8) Drainage ditches located within the public right-of-way or drainage easements shall have a minimum of 2% slope, if a drainage ditch has less than 2% slope the drainage ditch shall be concrete lined. The concrete lining shall be a minimum of 2' wide but not less than the width of the base of the ditch, the

concrete lining shall be 5 inches thick, have a minimum of 2500 psi compressive strength and have grid pattern of 12" with 3/8" rebar with a minimum of two bars in any direction. (Ordinance 2014-05-00780 adopted 5/1/14)

(f) Storm sewers–Nonresidential developments.

(1) An adequate storm drainage system consisting of inlets, pipes, underground structures, and/or channels or creeks shall be constructed by the developer in accordance with the drainage and stormwater pollution prevention design manual.

(2) The developer shall pay the total cost of all underground systems which are constructed where a double seventy-two-inch diameter or smaller pipe will carry the runoff. The city may participate to the extent of ten percent (10%) of the difference between two seventy-two-inch pipes and any larger diameter pipes, and reimburse the developer for such costs if a part of the capital improvement plan and if funds become available.

(3) In general, underground drainage shall be constructed in rights-of-way. As an alternate, if approved by the city engineer, the developer may construct, excavate, or reconstruct, at the developer's expense, an open channel in accordance with the drainage and stormwater pollution prevention design manual.

~~(4) In street crossings over drainage systems with a cross-section exceeding the dimension of an opening larger than that of a two (2) seventy-two-inch culvert pipe culvert, the city may participate in such crossings in an amount not to exceed twenty-five percent (25%) of the construction costs if a part of the capital improvement plan and if funds become available.~~

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(g) Lakes, detention ponds, and retention ponds may be constructed in all areas to be maintained by the owner, subject to approval by the city engineer. Dedication of an easement to the city is required to provide access for emergency purposes.

(h) Other innovative drainage concepts will be considered, subject to review and approval by the city engineer and city council.

(Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

(i) Street lighting.

(1) Street lighting shall be provided at street intersections at the request of the city engineer within new subdivisions and at streets connecting to new subdivisions. Street lighting shall conform to the latest edition of the Illuminating Engineering Society Handbook and the city's regulations as provided in the Code of Ordinances and zoning regulations. When a conflict exists between the two, the city's Code of Ordinances shall take precedent. The use of sodium vapor lights for street and parking lot illumination shall not be allowed in the city.

(2) Cost of installation of street lighting shall be borne by the subdivider. Cost of ongoing service and utilities shall be borne by the subdivider and included in a maintenance agreement as part of the homeowners' association documents approved by the city attorney.

(3) The city may install and maintain lights at existing intersections that the city engineer deems necessary.

(4) The city engineer may, based on field conditions, modify the requirements of this section.

(5) A request for street lighting that is denied by the city engineer may be appealed to the planning and zoning commission. The request for an appeal must be made in writing to the development services director explaining why a streetlight in the proposed location is warranted and further citing factors as to why the city engineer's decision should be overturned. This request for an appeal must be received by the development services department no less than 20 days prior to the scheduled planning and zoning commission meeting in which the appeal will appear on the agenda. A recommendation for approval from the planning and zoning commission shall then be forwarded to the city council for final action. A recommendation of denial by the planning and zoning commission will only be forwarded to the city

council for final action upon written request of the applicant. Such written request must be received within thirty (30) days of the commission denying the request. The decision of the city council is final.

(6) All streetlights shall conform to the city's lighting regulations and be the same or similar in nature to the examples of streetlights as shown on figure 1, figure 2 and figure 3:

FIGURE 1

FIGURE 2

FIGURE 3

(Ordinance 2016-10-00843 adopted 11/3/16)

Sec. 10.03.124 Water and utility extensions

(a) Water and utility, general provisions.

(1) All utilities shall be required to extend across the full width of the last lot platted on each street proposed within the subdivision, in such an alignment that it can be extended to the next property in accordance with the master water and sewer plans for the city. Properties already served by water and sewer shall not be required to install additional facilities unless the current lines are not of adequate capacity to serve the proposed development, in which case the developer shall be required to install adequate facilities.

(2) Every lot of the plat shall have direct access to the water. Utility service shall be from a water main located in an abutting right-of-way or through easements from the lot to a water main.

(b) Water.

(1) No water main shall be extended unless the diameter of any such extended main is a minimum of eight inches (8") in diameter. Larger mains may be required per the water master plan.

Commented [CM8]: I have a note that we were going to add an exception per the City Engineer if ___ acres with no more than ___ lots???

(2) The water system shall be looped. Dead-end mains, if permitted, shall not exceed six hundred feet (600'). Single feeds may be permitted with the approval of the city engineer. Single feeds shall provide for looping in the future.

(3) The spacing and location of all fire hydrants shall comply with the provisions of the fire code and the water and wastewater design manual adopted by the city.

(4) The developer will bear the total cost of on-site mains, with sizes to be determined by the city, except that the city may pay for the increment of cost of water and sewer mains over twelve inches (12") in diameter provided that such mains are required as a part of the water master plan, and if a part of the capital improvement plan for the city, and if funds become available. The increment of the cost borne by the city shall be determined on the basis of percentage difference between the twelve-inch water or sewer mains and the larger size required.

(c) Wastewater. In locations where wastewater service is not available, as determined by the city engineer, an individual sewage disposal system of a type approved by the building official may be installed, in conformance with the plumbing code adopted by the city, as applicable, and the requirements of the county and the state commission on environmental quality.

Sec. 10.03.125 Provision of amenities

(a) When amenities are proposed as a part of a subdivision and are owned and maintained by owners in common or through an association of owners, or where the amenities are to be dedicated to the city and are to be maintained publicly or privately through agreement with the city, the city may require the following:

(1) Plans and illustration of the proposed amenities;
(2) Cost estimates of construction, maintenance and operating expenses;
(3) Association documents, deed restrictions, contracts and agreements pertaining to the amenities; and
(4) Provision of surety as required for maintenance and other expenses related to the amenities.

(b) The design of amenities shall conform to the city's guidelines for residential amenities as adopted by the city council.

(c) All amenities to be placed on land dedicated to the city, or involving the potential use of public funds for maintenance and/or operation, shall require city council approval prior to approval of the preliminary plat. The city council may deny any such amenities at its sole discretion.

(d) All such amenities must be completed and in place prior to acceptance of the public improvements and prior to final release of certificate of occupancy and occupying of residential structures.

(e) Any subdivision creating an area or amenity to be owned in common by the owners of lots within the subdivision shall require the establishment of a mandatory owners' and/or homeowners' association prior to the approval of the final plat.

Sec. 10.03.126 Mandatory homeowners' association

(a) Applicability. When a subdivision contains streets, sewers, sewage treatment facilities, water supply systems, drainage systems or structures, parks, landscaping systems or features, irrigation systems, screening walls, living screens, buffering systems, subdivision entryway features (including monuments or other signage), or other physical facilities or grounds held in common that are not to be maintained by the city, the city may require the establishment and creation of a mandatory homeowners' association to assume and be responsible for the continuous and perpetual operation, maintenance and supervision of such facilities or grounds.

(b) Responsibilities. Such mandatory homeowners' associations shall be responsible for the continuous and perpetual operation, maintenance and/or supervision of landscape systems, features or elements located in parkways, lighting, [and] common areas between screening walls or living screens and adjacent curbs or street pavement edges, adjacent to drainageways or drainage structures, or at subdivision entryways. Subdivision entryway treatments or features shall not be allowed unless a mandatory homeowners' association as required herein is established and created. The city shall be responsible for the repair of landscape systems, features or elements damaged by city-initiated utility work in dedicated easements. Other damage occurring during utility repairs will be the responsibility of the appropriate utility company.

(c) Purpose. A homeowners' association shall be established and created to assume and be responsible for the continuous and perpetual operation, maintenance and supervision of landscape systems, features or elements located in parkways, common areas between screening walls or living screens and adjacent curbs or street pavement edges, adjacent to drainageways or drainage structures or at subdivision entryways, open space common areas or properties including but not limited to: landscape features and irrigation systems, subdivision entryway features and monuments, private amenity center, playgrounds, pavilions, ponds, detention ponds, drainage easements, off-street parking for the private amenity center, swimming pool, exercise trail, private neighborhood park and related amenities.

(d) Dedications to homeowners' association. All open space and common properties or areas, facilities, structures, improvements systems, or other property that are to be operated, maintained and/or supervised by the homeowners' association shall be dedicated by easement or deeded in fee simple ownership interest to the homeowners' association after construction and installation as applicable by the owner and shall be clearly identified on the record final plat of the property.

(e) Approval. A copy of the agreements, covenants and restrictions establishing and creating the homeowners' association must be approved by the planning and zoning commission based on recommendation of city attorney prior to the approval of the final plat of the subdivision and must be filed of record with said final plat in the plat records of the county. The final plat shall clearly identify all facilities, structures, improvements, systems, areas or grounds that are to be operated, maintained and/or supervised by the homeowners' association.

(f) Contents of homeowners' association agreements. At a minimum, the agreements, covenants and restrictions establishing and creating the homeowners' association required herein shall contain and/or provide for the following:

(1) Definitions of terms contained therein;

(2) Provisions acceptable to the city for the establishment and organization of the mandatory homeowners' association and the adoption of bylaws for said homeowners' association, including provisions requiring that the owner(s) of any lot or lots within the applicable subdivision and any successive purchaser(s) shall automatically and mandatorily become a member of the homeowners' association;

(3) The initial term of the agreement; covenants and restrictions establishing and creating the homeowners' association shall be for a twenty-five-year period and shall automatically renew for successive ten-year periods, and the homeowners' association may not be dissolved without the prior written consent of the city council;

(4) Provisions acceptable to the city to ensure the continuous and perpetual use, operation, maintenance and/or supervision of all facilities, structures, improvements, systems, open space or common areas that are the responsibility of the homeowners' association and to establish a reserve fund for such purposes;

(5) Provisions prohibiting the amendment of any portion of the homeowners' association's agreements, covenants or restrictions pertaining to the use, operation, maintenance and/or supervision of any facilities, structures, improvements, systems, area or grounds that are the responsibility of the homeowners' association without the prior written consent of the city council;

(6) The right and ability of the city or its lawful agents, after due notice to the homeowners' association, to remove any landscape systems, features or elements that cease to be maintained by the homeowners' association; to perform the responsibilities of the homeowners' association and its board of directors if the homeowners' association fails to do so in compliance with any provisions of the agreements, covenants or restrictions of the homeowners' association or of any applicable city codes or regulations; to assess the homeowners' association for all costs incurred by the city in performing said responsibilities if the homeowners' association fails to do so; and/or to avail itself of any other enforcement actions available to the city pursuant to state law, city codes or regulations; and

(7) Provisions indemnifying and holding the city harmless from any and all costs, expenses, suits, demands, liabilities or damages including attorney's fees and costs of suit, incurred or resulting from the city's removal of any landscape systems, features or elements that cease to be maintained by the homeowners' association or from the city's performance of the aforementioned operation, maintenance or supervision responsibilities of the homeowners' association due to the homeowners' association's failure to perform said responsibilities.

(g) Notice to purchasers. Builders are required to post notice in a prominent place in all model homes, sales offices and on all open space areas larger than 20,000 square feet stating that a property association has been established and membership is mandatory for all property owners. The notice shall state at a minimum that the builder shall provide any person, upon their request, the association documents and a five-year projection of dues, income and association expenses.

(h) Maintenance reserve fund. Prior to the transfer of the control of the homeowners' association to the lot owners, the developer must provide a reserve fund equivalent to two months' dues based on full homeowners' association membership.

(i) Property association activation. Concurrent with the transfer of the homeowners' association, the developer must transfer to the homeowners' association control over all utilities related to property and amenities to be owned by the homeowners' association. The developer must also disclose to the homeowners' association the total cost to date related to the operation and maintenance of common property and amenities.

Sec. 10.03.127 Design standards

The following design standards and specifications are incorporated by reference into this article:

(1) The city drainage and stormwater pollution prevention design manual, paving design manual, and water and wastewater design manual adopted by ordinance from time to time.

(2) The city water master plan, wastewater master plan and storm drainage master plan.

Sec. 10.03.128 Payment of fees, charges and assessments

As a condition of plat approval, the developer shall pay all fees, charges, and assessments established by resolution or ordinance of the city council, as may be imposed under this article or other regulations of the city. (Ordinance 2006-07-00567, sec. 1, adopted 7/7/06)

ARTICLE 10.04 STORMWATER RUNOFF REGULATIONS AND CONTROL

Sec. 10.04.001 Purpose

The purpose of this article is to diminish threats to the public health and safety caused by the runoff of excess stormwater, to minimize movement of soils resulting from development, to reduce the possibilities of hydraulic overloading of the storm sewer drainage system, to reduce economic losses to individuals and the community at large as a result of erosion and the runoff of excess stormwater, and to protect and conserve land and water resources, while at the same time ensuring orderly development. The provisions of this article are specifically intended to supplement existing ordinances regulating the following:

(1) The subdivision, layout, and improvement of lands located within the city;
(2) The excavating, filling, and grading of lots and other parcels or areas;
(3) The construction of buildings, including related parking and other paved areas, and the drainage of the sites on which those structures and their related parking and other paved areas are located; and
(4) The design, construction, and maintenance of erosion control and stormwater drainage facilities and systems.

Sec. 10.04.002 Definitions

For the purposes of this article, the following definitions are adopted:

Base flood elevation. The elevation delineating the flood level having a one-percent probability of being equaled or exceeded in any given year (also known as the 100-year flood elevation), as determined from flood insurance rate maps (FIRMS) or the best available information.

Channel. A natural or manmade open watercourse with definite bed and banks which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water.

City. The City of Lucas.

City engineer. The city engineer or ~~his~~ designee.

City manager. The city manager or ~~his~~ designee.

Conduit. Any channel, pipe, sewer, or culvert used for the conveyance of movement of water, whether open or closed.

Control elevation. Contour lines and points of predetermined elevation used to denote a detention storage area on a plat or site drawing.

Design standards for public improvements. Standards on file in the city's offices to which all designs and the resulting public improvements, must conform.

Detention facility. A facility constructed or modified to restrict the flow of stormwater to a prescribed maximum rate, and to concurrently detain the excess waters that accumulated behind the outlet.

Detention storage. The temporary detaining or storage of stormwater in storage basins, on rooftops, in streets, parking lots, school yards, parks, open space, or other areas under predetermined and controlled conditions, with the rate of drainage therefrom regulated by appropriately installed devices.

Discharge. The rate of outflow of water from any source.

Drainage area. The area from which water is carried off by a drainage system, i.e., a watershed or catchment area.

Excess stormwater runoff. The rate of flow of stormwater discharged from an urbanized drainage area which is or will be in excess of that volume and rate which represented or represents the runoff from the property prior to the date of this article.

Floodplain. The special flood hazard lands adjoining a watercourse, the surface elevation of which is lower than the base flood elevation and is subject to periodic inundation.

Hydrograph. A graph showing, for a given point on a stream or conduit, the runoff flow rate with respect to time.

Land disturbance. Any manmade change to improve or unimprove real estate including but not limited to building structures, filling, grading, excavation, clearing, or removal of vegetation.

(Ordinance 2009-04-00645 adopted 4/2/09)

Municipal separate storm sewer system {MS4). A conveyance or system of conveyances including roads with drainage systems, municipal city streets, catchbasins, curbs, gutters, ditches, manmade channels or storm drains and similar means of collecting or conveying water runoff. (Ordinance 2020-06-00914 adopted 6/4/20)

One-hundred-year storm. A precipitation event of 24-hours' duration, having a one-percent chance of occurring in any one year.

Peak flow. The maximum rate of flow of stormwater at a given point or in a channel or conduit resulting from a predetermined storm or flood.

Sediment. Any particulate matter that can be transported by fluid flow, and which eventually is deposited.

Stormwater drainage facility. Any element in a stormwater drainage system which is made or improved by man.

Stormwater drainage system. All means, natural or manmade, used for conducting stormwater to, through, or from a drainage area to the point of final outlet including, but not limited to, any of the following: open and closed conduits and appurtenant features, canals, channels, ditches, streams, swales, culverts, streets, and pumping stations.

Stormwater runoff. The waters derived from precipitation within a tributary drainage area flowing over the surface of the ground or collected in channels or conduits.

Time of concentration. The elapsed time for stormwater to flow from the most distant point in a drainage area to the outlet or other predetermined point.

Two-year storm. A precipitation event having a fifty percent chance of occurring in any one year.

Two-year storm runoff. The stormwater runoff having a fifty percent probability of occurring in any one year.

Unprotected channel. A channel which receives stormwater discharge and which is not paved, riprapped, or otherwise improved by addition of manmade materials so as to reduce the potential for erosion.

Upland area. Any land whose surface drainage flows toward the area being considered for development.

Urbanization. The development, change, or improvement of any parcel of land consisting of one or more lots for residential, commercial, industrial, institutional, recreational, or public utility purposes.

Waterbody. Any natural or artificial pond, lake, reservoir, or other area which ordinarily or intermittently contains water and which has a discernable shoreline.

Watercourse. Any natural or artificial stream, river, creek, channel, ditch, canal, conduit, culvert, drain, waterway, gully, ravine, street, roadway, swale, or wash in which water flows in a definite direction, either continuously or intermittently, and which has a definite channel, bed, or banks.

Wet bottom detention basin. A basin designed to retain a permanent pool of stormwater after having provided its planned detention of runoff during a storm event.

Sec. 10.04.003 Permit

Before initiating any activity regulated by this article, an applicant shall be required to obtain a permit from the city which indicated that the requirements of this article have been met. Permit fees shall be located in the city fee schedule for permits.

Sec. 10.04.004 Other requirements

In addition to meeting the requirements of section 10.04.003 and the more specific requirements of sections 10.04.005–10.04.031 of this article and before starting any activity regulated by this article, an applicant shall comply with the requirements set forth in all other related ordinances and state statutes and regulations. (Ordinance 2009-04-00645 adopted 4/2/09)

Sec. 10.04.005 Specific requirements; general

Sediment shall be maintained on site and excess stormwater runoff shall be detained in connection with any new construction, development, redevelopment, or land use change occurring within the city in accordance with the requirements set forth in this article. (Ordinance 2020-05-00911 adopted 5/7/20)

Sec. 10.04.006 Discharge rate

The peak discharge rate after full development resulting from the proposed development shall not exceed the corresponding peak discharge rate prior to development during storms of 2-year, 5-year, 10-year, ~~and~~ 25-year and 100-year ~~-~~return frequencies.

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Sec. 10.04.007 Flood elevation

There shall be no detrimental effect on the floodway or the flood elevation during a 100-year storm upstream or downstream of the proposed development area as a result of the proposed development.

Sec. 10.04.008 Allowable detention facilities

The increased stormwater runoff resulting from proposed development shall be detained by providing for appropriate detention storage as required by this article. Where streets or parking areas are used for temporary storage of stormwater runoff all manholes for sanitary sewers shall be of a type which prevent the infiltration of the ponded water. Where streets are used for the temporary storage of stormwater runoff, in no case shall the maximum design depth exceed six (6) inches.

Sec. 10.04.009 Detention storage

Designs for detention storage and related appurtenances shall be submitted to the city for approval. Upon submittal of designs of detention storage the city shall make a determination as to whether any or all of the facilities proposed are to become part of the public drainage system. The city shall, at the same time, in the case of a proposed subdivision make a determination as to those control elevations that shall be entered on the final plat or make a determination as to the necessity for deed restrictions on any particular lot in said subdivision requiring the preservation of mandatory drainage facilities. Where a non-subdivided parcel of land is proposed for development, the city shall make a determination as to the need for covenants to maintain responsibility for mandatory drainage facilities. All of said facilities shall be designed and constructed in accordance with the city specifications, and shall be subject to continuing inspection during the construction period in the same manner as any other improvement regulated under this article. Detention facilities associated with residential subdivisions shall be in a separate lot that shall be deeded to the HOA after 75% of the lots in the subdivision are occupied and the lot soil

stabilized. Prior to acceptance of the detention facility the city and the developer will inspect the facility to assure it meets all of the requirements of this article. If any deficiencies are found, the developer will be responsible to make the necessary changes at his expense. Wet bottom detention basin shall be aerated or designed to drain within 60 hours.

Sec. 10.04.010 Sizing of detention storage and outlet

Detention storage shall meet the requirements of this article and the city drainage manual.

Sec. 10.04.011 Discharge velocity

The discharge velocity from detention facilities shall not exceed three feet per second unless it is determined by the city that greater velocities will not be harmful to the receiving channel. Where the city's determination is requested, the developer shall make available such hydraulic or hydrologic computations as will adequately support the course of action being requested.

Sec. 10.04.012 Emergency spillway

Emergency spillways shall be provided to permit the safe passage of runoff generated from rainfall events in excess of the 100-year rainfall event.

Sec. 10.04.013 Freeboard

Detention storage areas shall have adequate capacity to contain the storage volume of tributary stormwater runoff with at least one foot of freeboard above the water surface during the 100-year rainfall event.

Sec. 10.04.014 Joint development of control system

Stormwater control systems may be planned in coordination by two or more property owners as long as the potential for damage from stormwater is not increased at intervening locations.

Sec. 10.04.015 Early installation of control systems

Stormwater control measures shall be installed prior to undertaking other grading of site and a schedule of construction for this purpose shall be submitted by the owner(s)/developer(s) prior to construction in the city.

Sec. 10.04.016 Flows from upland areas

The total drainage area must be used in calculating the allowable release rate. The required storage volume will be based on the project area only, with extraneous flows from upland areas being bypassed or discharged via overflow spillways or other devices. Where storm sewers are required they shall be of such size as will provide sufficient capacity to receive the flow generated by five-year storm from upland areas. As to the latter and regardless of whether it has occurred in fact, such upland area shall be deemed to have been fully developed for all purposes of this requirement.

Sec. 10.04.017 Land disturbance of five acres or more

The developer shall comply with the Texas Commission on Environmental Quality or TPDES and federal NPDES permit for stormwater discharges associated with construction activity and provide a copy to the city prior to starting construction.

Sec. 10.04.018 Land disturbance of more than two acres and less than five acres

The developer shall submit to the city a sediment and erosion control plan that meets the requirements of the Texas Commission on Environmental Quality or TPDES and federal NPDES permit for stormwater discharges associated with construction activity prior to starting construction.

Sec. 10.04.019 All land disturbances

Land disturbances associated with any new construction, development, redevelopment, or land use change on any site of 2,500 square foot or larger or requiring a building permit shall incorporate into the development plan the following elements as minimum:

(1) Stone construction entrance.
(2) Silt fence or other sediment retaining device on the low side of the site.
(3) Temporary seeding of disturbed areas remaining open more than three weeks.
(4) Immediate removal of soil tracked into the public right-of-way.
(5) Permanent turf established. A copy of the development plan shall be submitted to the city prior to starting construction.

Sec. 10.04.020 Preliminary plats

Information indicating the manner in which the provisions of this article are to be met shall be submitted with the preliminary plats.

Sec. 10.04.021 Requirements for construction plans

Information indicating the manner in which the provisions of this article are to be met shall be submitted with all construction plan submissions or any other plan for improvements which falls under the requirements of section 10.04.005 of this article. All computations, plans, and specifications shall be prepared and sealed by a professional engineer registered in the state.

Sec. 10.04.022 Requirements for final plats

The easements or separate lots required for detention facilities shall be shown on the final plat. The control elevation for each detention facility shall be shown on the plat near the detention facility.

Sec. 10.04.023 Drainage and detention design requirements

All subdivisions and other proposed improvements which are subject to the provisions of section 10.04.005 of this article shall incorporate such design features as are required in this article. Variation from these requirements shall require the approval of the city planning commission whose action shall be conditioned upon the following:

(1) That a petition be submitted describing in detail the rationale for the proposed designs change.
(2) That there are special circumstances or conditions affecting the property under consideration such that strict compliance with the provisions of this article would deprive the applicant of the reasonable use of his land.
(3) That the variance is necessary for the preservation and enjoyment of a substantial property right of the proprietor.
(4) That the granting of the variance will not be detrimental to the public health, safety, or welfare or injurious to other property in the territory in which said property is located.

Sec. 10.04.024 Maintenance

Designs of detention facilities will incorporate features which facilitate their inspection and maintenance. The designer shall submit an operation and maintenance (O&M) plan for any detention facility prior to its approval by the city. All privately owned detention facilities may be inspected by representatives of the city at such times as they deem necessary. If deficiencies, or conditions creating nuisances, are found, the owner or homeowners' association shall be required to initiate the necessary corrections within fourteen (14) days, and all deficiencies shall be corrected within forty-five (45) days.

Sec. 10.04.025 Safety features

Designs of detention facilities shall incorporate safety features, particularly at inlets, outlets, on steep slopes, and at any attractive nuisances. These features shall include, but not be limited to, fencing, handrails, lighting, steps, grills, signs, and other protective or warning devices so as to restrict access.
(Ordinance 2009-04-00645 adopted 4/2/09)

Sec. 10.04.026 Specific prohibition and illicit discharges

(a) No person shall introduce or cause to be introduced into the MS4 any discharge that causes or contributes to causing the city to violate a water quality standard, the city's TPDES permit, or any state-issued discharge permit for discharges from its MS4.

(b) No person shall dump, drain, spill, leak, pump, pour, emit, empty, discharge, leach, dispose, throw, place or otherwise introduce or cause, allow, or permit to be introduced any of the following substances in or on any public street, alley, storm sewer, drainage structure, drainage channel, stream, river, pond or any other public property. The following are illicit discharges:

(1) Any used motor oil, antifreeze, grease, solvents, toxic chemicals, paint, stain or any other petroleum product or waste;

(2) Any industrial waste;

(3) Any hazardous waste or infectious waste, including household hazardous waste;

(4) Any garbage, trash, filth, junk, domestic sewage or septic tank waste, cooking oil, grease trap waste, or grit trap waste;

(5) Any trash, rubbish, refuse, or wastepaper;

(6) Any wastewater from a commercial car wash facility; from any vehicle washing, cleaning, or maintenance at any new or used automobile or other vehicle dealership, rental agency, body shop, repair shop, or maintenance facility; or from any washing, cleaning, or maintenance of any business or commercial or public service vehicle, including a truck, bus, or heavy equipment, by a business that operates more than two (2) such vehicles;

(7) Any wastewater from a commercial mobile power washer or from the washing or other cleaning of a building or mechanical equipment exterior that contains any soap, detergent, degreaser, solvent, other harmful cleaning substance;

(8) Any wastewater from commercial floor, rug, or carpet cleaning;

(9) Any wastewater from the saw cutting, wash down or cleaning of pavement that contains soap, detergent, solvent, degreaser, emulsifier, dispersant, or any other harmful cleaning substance; or any wastewater from the washing or cleaning of pavement where any spill, leak, or other release of petroleum based products, hazardous material, hazardous substance, hazardous waste or other pollutant has occurred, unless all such released material has been previously removed;

(10) Any effluent, overflow or blow down, from a cooling tower, condenser, compressor, emissions scrubber, emissions filter, or boiler;

(11) Any ready-mixed concrete, mortar, ceramic, asphalt base material, hydro mulch material, or any wastewater or substance from the cleaning of any vehicle or equipment containing, or used in transporting or applying, such material;

(12) Any runoff or wash down water from an animal pen, kennel, or foul or livestock containment area;

(13) Any filter backwash from a swimming pool or fountain;

(14) Any swimming pool, hot tub water, or public interactive water fountain containing disinfectants;

(15) Any discharge from water line disinfection by hyperchlorination or other means unless the disinfecting chemical has been removed or attenuated to the point where it is not a pollutant;

(16) Any fire protection water, not including firefighting water used by the fire department, containing "hazardous materials" as defined in the fire protection and prevention ordinance of the city;

(17) Any wastewater from a water curtain in a spray room used for painting vehicles or equipment;

(18) Any contaminated or unpermitted stormwater discharge associated with an industrial activity;

(19) Any substance or material that will damage, block, or clog the MS4;

(20) Any release from a petroleum storage tank (PST), or any leachate or runoff from soil contaminated by a leaking PST, or any discharge of pumped, confined, or treated wastewater from the remediation of any such PST release;

(21) Any petroleum oil, non-biodegradable cutting oil, transmission fluid, hydraulic fluid, brake fluid, power steering fluid, antifreeze or other household hazardous wastes;

(22) Any rubble, debris, rubbish, tile, concrete, brick, asphalt, or other building material resulting from demolition activities;

(23) Any ashes or burn refuse;

(24) Any weeds, grass cuttings, brush, or other yard debris;

(25) Solid or liquid substances which may cause obstruction to the flow in storm sewers or other interference with the proper operation of the stormwater system;

(26) Any wastewater from washout of concrete and wastewater from water well drilling operations, unless managed by an appropriate control;

(27) Any wastewater from washout and cleanout of stucco, paint, from release oils, and other construction materials;

(28) Fuels, oils, or other, pollutants used in vehicle and equipment operation and maintenance;

(29) Any discharges from dewatering activities, including discharges from dewatering of trenches and excavations, unless managed by appropriate BMPs; and

(30) Any kind of other matter that will cause damage to the MS4 or any receiving bodies of water.

(c) Sediment and erosion control:

(1) No person shall introduce or cause to be introduced into the MS4 any harmful quantity of sediment, silt, earth, soil, or other material associated with clearing, grading, excavation, landfilling, or other construction activities (including any placement, movement, removal, or disposal of soil, rock, or other earth materials) in excess of what could be retained on site or captured by employing sediment and erosion control measures to the maximum extent practicable.

(2) No person shall implement erosion or sediment control measures not currently approved by the city.

(3) A construction project (commercial, residential, or capital improvement) shall not be considered complete and acceptable by the city until permanent erosion control measures have been installed to the city's satisfaction.

(4) No person shall conduct any land disturbing or construction activities:

(A) On property over one (1) acre in area without a director-approved erosion control design plan and a TCEQ submitted stormwater pollution prevention plan (SWPPP) for that area on properties 5 acres or greater; or

(B) On property less than one (1) acre in area that constitutes more than 50% of the site without a director approved erosion control design plan.

(5) No person shall knowingly fail to install or to maintain erosion control devices as shown or represented in the approved erosion control design plan and/or stormwater pollution prevention plan (SWPPP), including maintenance of grass or sod and sediment cleaning of erosion control devices.

(6) No person shall allow the build-up of off-site sediment from above or below ground construction related activities in any open space areas.

(d) No person shall connect or maintain a line conveying sewage, domestic or industrial, to the MS4.

(e) Any wash water from the service area, garage, or enclosure of a minor auto repair or fuel service station shall not discharge into the MS4.

(f) Regulation of pesticides, herbicides, and fertilizers:

(1) No person shall use or cause to be used any pesticide, herbicide, or fertilizer contrary to any directions for use on any labeling required by state or federal law.

(2) No person shall use or cause to be used any pesticide, herbicide, or fertilizer in any manner that the person knows, or reasonably should know, is likely to cause, or does cause, a harmful quantity of the pesticide, herbicide, or fertilizer to enter the MS4 or waters of the United States.

(3) No person shall dispose of, discard, store, or transport a pesticide, herbicide, or fertilizer, or a pesticide, herbicide, or fertilizer container, in a manner that the person knows, or reasonably should know, is likely to cause, or does cause, a harmful quantity of the pesticide, herbicide, or fertilizer to enter the MS4 or waters of the United States.

(4) If provided with a display notice containing the provisions of this subsection, pertaining to the regulation of pesticides, herbicides, and fertilizers (or a reasonable description thereof), and the information that any user of the product may obtain further information from the director or designated individual, any person selling pesticides, herbicides, or fertilizers at retail or wholesale shall post the notice prominently where it may be read by purchasers of the product.

(g) Used oil regulation:

(1) No person shall:

(A) Pour, spill, leak, pump, empty, leach, dispose, or otherwise discharge used oil into the MS4 or a sewer, drainage system, septic tank, surface water, groundwater, or watercourse;
(B) Knowingly mix or commingle used oil with solid waste that is to be disposed of in a landfill or knowingly directly dispose of used oil on land or in a landfill; or
(C) Apply used oil to a road or land for dust suppression, weed abatement, or other similar use that introduces used oil into the environment.

(2) All businesses that change motor oil for the public and municipal waste transfer stations are encouraged to serve as public used oil collection centers as provided by V.T.C.A., Health and Safety Code § 371.024, as amended.

(3) A retail dealer who annually sells directly to the public more than five hundred (500) gallons of oil in containers for use off-premises shall post in a prominent place a sign provided by the city or by the state informing the public that improper disposal of used oil is prohibited by law. The sign shall prominently display the toll-free telephone number of the state used oil information center.

(h) No person shall have inadequate or unsanitary sewage or plumbing facilities, contrary to the public health, safety or welfare or in violation of the codes and ordinances of the city and state that could pollute the MS4 sewer system.

(i) No person shall introduce or cause to be introduced into the sanitary sewer system any discharge of stormwater, polluted or unpolluted, or any discharge that causes or contributes to causing the city to violate a water quality standard, its agreements associated with the regional sewage treatment plants, or any state issued permit.

(j) Any person that causes a spill, release, or other discharge of a prohibited substance or other pollutant to the MS4 is responsible for the cleanup and removal of the substance from the MS4 or any area adjacent to the MS4 that is exposed to stormwater runoff. The owner of the property on which the spill, release, or discharge occurred is responsible for the cleanup or removal of the substance from the MS4 or any area adjacent to the MS4 if the person that caused the spilt release, or discharge to the MS4 is unknown.

(k) Sanitary sewer overflows shall be prevented in any way possible. All sanitary sewer overflows shall be reported to the city as soon as the owner, occupant, or person otherwise having control of the sanitary sewer becomes aware of the overflow and to the appropriate federal and state agencies within twenty-four (24) hours.

(l) No person shall store items segregated for separate collection, disposal, recycling or reuse in a manner that allows pollutants to enter the MS4. Drums, dumpsters and polycarts shall be closed, not leaking, and in good condition.

(m) Parking lot storm drain inlets shall be maintained free of trash, litter, garbage, rubbish, grass clippings, leaves, and other debris material.

(n) Trash and litter on any parcel of land shall be collected for appropriate disposal prior to mowing.

(o) The owner, owner's representative, operator, contractor or developer of property shall comply with the TXR150000 general construction permit, Industrial TXR050000 permit or city approved erosion control design plan relating to said property.

Sec. 10.04.027 Prohibition of illicit connections

(a) The construction, use, maintenance or continued existence of illicit connections to the storm drain system is prohibited, including, but not limited to, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

(b) A person violates this article if such person connects or maintains a line conveying sewage to the MS4.

(c) Connections in violation of this article must be disconnected and redirected, if necessary, to an approved onsite wastewater management system or the sanitary sewer system upon approval of the director.

(d) Any drain or conveyance that has not been documented in plans, maps or equivalent, and which may be connected to the storm sewer system, shall be located by the owner or occupant of that property upon receipt of written notice of violation from the director requiring that such location be completed. Results of these locations are to be documented and provided to the director.

Sec. 10.04.028 Responsibility

The administration of this article shall be the responsibility of the city.

Sec. 10.04.029 Interpretation

In the interpretation and application of this article, the provisions expressed herein shall be held to be the minimum requirements and shall be liberally construed in favor of the city.

Sec. 10.04.030 Appeals

The city council is hereby designated as the appeals board for disputes arising from the application of this article. The council's responsibility shall be to hear appeals where it is alleged by an appellant that there is error in any order, requirement, decision, grant or refusal made by the city in the enforcement of the provisions of this article.

Sec. 10.04.031 Penalties

(a) General. Any person, firm, organization, association, or corporation violating any of the provisions of this article, including violation of any variances granted under the authority of this article, shall be deemed guilty of a violation of a municipal ordinance and each such person or other entity shall be deemed guilty of a separate offense for each and every day or portion thereof that any violation of any of the provisions of this code is committed, continued or permitted, and upon conviction of such violation, such person or other entity may be punished by a fine of not less than two hundred and fifty dollars ($250.00) and not more than two thousand dollars ($2,000.00).

(b) Additional corrective actions. Any building or structure constructed in violation of the provisions of this article or any use carried on in violation of this article is hereby declared to be a nuisance per se, with any court of competent jurisdiction having the authority to determine that the owner or developer is guilty of maintaining a nuisance per se and to order such nuisance abated. In this connection, the city is hereby authorized to institute any appropriate action or proceeding in any appropriate court to prevent, restrain, correct, or abate any violations of this article.

(Ordinance 2020-06-00914 adopted 6/4/20)

Item 1

Drainage and Stormwater Pollution Prevention Design Manual
(Currently being revised)

☐ Annexation
☐ Disannexation
☒ Code of Ordinances
☐ Other

ORDINANCE # 2009-04-00644
[PLANNING & DESIGN CRITERIA FOR STORMWATER RUN-OFF]

THE CITY COUNCIL OF LUCAS, TEXAS APPROVES THE ADOPTION OF A PLANNING AND DESIGN DRAINAGE CRITERIA FOR STORM WATER RUN-OFF TO BE MAINTAINED ON FILE IN THE OFFICE OF THE CITY SECRETARY; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A REPEALING CLAUSE; PROVIDING FOR A PENALTY OR FINE NOT TO EXCEED THE SUM OF TWO THOUSAND DOLLARS ($2,000) FOR OFFENSES; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City Council has determined an urgent need for the adoption of guidelines for storm water run-off;

WHEREAS, the City Council desires to adopt the Planning and Design Drainage Criteria for storm water run-off attached hereto as Exhibit "A."

NOW, THEREFORE, BE IT ORDAINED THAT THE CITY COUNCIL OF THE CITY OF LUCAS THAT:

SECTION 1. The City Council hereby approves and adopts the Planning and Design Drainage Criteria ("Criteria") attached as Exhibit "A." The City commits to the implementation of the requirements and guidelines set forth in the adopted Criteria. A copy of the Criteria will be maintained on file in the office of the City Secretary.

SECTION 2. If any section, paragraph, subdivision, clause, phrase or provision of this ordinance shall be judged invalid or unconstitutional, the same shall not affect the validity of this ordinance as a whole or any portion thereof other than that portion so decided to be invalid or unconstitutional.

SECTION 3. That all provisions of the Ordinances of the City of Lucas in conflict with the provisions of this Ordinance be, and the same are hereby repealed and all other provisions of the Ordinances of the City of Lucas not in conflict with the provisions of this Ordinance shall remain in full force and effect.

SECTION 4. That an offense committed before the effective date of this ordinance is governed by the prior law and the provisions of the Code of Ordinances, as amended, in effect when the offense was committed and the former law is continued in effect for this purpose.

SECTION 5. Any person, firm or corporation violating any of the provisions or terms of this Ordinance shall be subject to the same penalty as provided for in the Code of Ordinances, as

amended, and upon conviction in the municipal court shall be punished by a fine not to exceed the sum of Two Thousand Dollars ($2,000) for each offense, and each and every day such violation shall continue shall be deemed to constitute a separate offense.

SECTION 6. This ordinance shall take effect immediately from and after its passage as the law in such case provides.

DULY PASSED BY THE CITY COUNCIL OF THE CITY OF LUCAS, COLLIN COUNTY, TEXAS ON THIS THE 2nd DAY OF APRIL, 2009.

DULY PASSED BY THE CITY COUNCIL OF THE CITY OF LUCAS, COLLIN

APPROVED:

Bill Carmickle, Mayor

ATTEST:

Kathy Wingo, TRMC, City Secretary

CITY OF LUCAS, TEXAS SEAL

APPROVED AS TO FORM:

Joe Gorfida, Jr., City Attorney
(JJG/cgo/35057)

WATER RUN-OFF MANUAL

PLANNING AND DESIGN DRAINAGE CRITERIA

A. General

The Drainage Criteria included in this section are for the purpose of providing a set of guidelines for planning and designing storm drainage facilities in the City of Lucas, Texas and within its extraterritorial jurisdiction. These criteria will be used by the Department of Public Works, other City Departments, consulting engineers employed by the City, and engineers for private developments in the City.

B. Rational Method for Peak Storm Flows

The formula to be used for calculating peak storm flows for drainage areas less than 200 acres shall be the Rational Method, in which:
Q = CIA, where
Q - is the peak storm flow at a given point in cubic feet per second (cfs)
C - is the runoff coefficient that is equal to the ratio that the peak rate of runoff bears to the average rate (intensity)of rainfall;
I - is the average intensity of rainfall in inches per hour for a storm duration equal to the time of travel for run off to flow from the farthest point of the drainage area to the design point in question;
A - is the drainage area tributary to the design point, in acres.
Note: For drainage areas greater than 200 acres, peak storm flows shall be determined based on a flow routing analysis using detailed hydrographs such as the Soil Conservation Service hydrologic methods that are available in such computer programs as TR-20, HEC-1, etc.

C. Runoff Coefficient

The runoff coefficient (C) shall consider the slope of the terrain, the character of the land use, the length of overland flow and the imperviousness of the drainage area and shall be determined based on ultimate land development. The run-off coefficient for the appropriate land used shall be as follows:
Commercial 0.90
Industrial 0.70
Single Family Residential 0.55
Multi-Family 0.75
Parks and Open Space 0.35
Schools, Churches, etc. 0.75

D. Rainfall Intensity-Frequency

The rainfall intensity-frequency curves should be platted from data from TXDOT or other government sources in our area. The intensity (I) in the formula Q = CIA, is determined from the curves by arriving at a time of concentration for the subject drainage area and adapting a storm frequency upon which to base the design of drainage improvements.

1. Time of Concentration The time of concentration, which is the longest time of travel for runoff to flow from any point of the subject drainage area to the design point, consists of the time required for runoff to flow overland plus the time required to flow in a street gutter, storm drain, open channel or other conveyance facility. A minimum time of concentration of fifteen (15) minutes shall be used for Single Family Residential, Parks and Open Space areas and a minimum time of concentration of ten (10) minutes shall be used for Commercial, Industrial, Multi-Family Residential, School and Church areas. A nomograph, is attached for estimating the time of concentration.

2. Storm Frequency

Required design storm frequencies for storm drainage improvements in the City of Lucas are shown in the following table.

Type of Design Facility	Frequency (years)
*Storm Sewer Systems	25
*Culverts, Bridges,	100

* The drainage system shall be designed to carry those flows greater than the 25-year frequency up to and including a 100-year frequency within defined rights-of-way or drainage easements.

E. Area

The drainage area used in determining peak storm flows shall be calculated by subdividing a map into the watersheds within the basin contributing storm water runoff to the system. Areas shall be determined by planimetering or digitizing.

F. Spread of Water

During the design storm, the quantity of storm water that is allowed to collect in the streets before being intercepted by a storm drainage system is referred to as the "spread of water". In determining the limitations for carrying storm water in the street, the ultimate development of the street shall be considered. The use of the street for carrying storm water shall be limited to the following:

SPREAD OF WATER

Major thoroughfares (divided) - One traffic lane on each side to remain clear.
Thoroughfares (not divided) - Two traffic lanes to remain clear.

Collector streets - One traffic lane to remain clear.
Residential streets - Six-inch depth of flow at curb and One traffic lane to remain clear.

G. Storm Sewer Design

Storm water in excess of that allowed to collect in the streets shall be intercepted in inlets and conveyed in a storm sewer system. Storm sewer capacity shall be calculated by the Mannings-formula --

Q = AV, and
Q = 1.486 AR2/3S1/2n
where
Q is the discharge in cubic feet per second;
A is the cross-sectional area of the conduit in square feet;
V is the velocity of flow in the conduit in feet per second;
R is the hydraulic radius in feet, which is the area of flow divided by the wetted Perimeter.
S is the slope of the hydraulic gradient in feet per foot;
n is the coefficient of roughness.
The recommended roughness coefficients to use in the design of a storm
sewer system are as follows:
Type of Storm Drain Manning's Coefficient
Concrete Box Culvert 0.015
New Concrete Pipe 0.013
Standard, unpaved, with or without
bituminous coating corrugated
metal pipe 0.024
Paved invert, 25% of periphery paved
corrugated metal pipe 0.021
Paved invert, 50% of periphery paved
corrugated metal pipe 0.018
100% paved and bituminous coated
corrugated metal pipe 0.013

In the design of the storm sewer system, the elevation of the hydraulic gradient of the storm sewer shall be a minimum of 0.5 feet below the elevation of the adjacent street gutter. Storm sewer pipe sizes shall be so selected that the average velocity in the pipe will not exceed 15 feet per second nor less than 3 feet per second. The minimum grade recommended for storm sewer pipe is 0.30%. Closed storm sewer systems shall be installed in all areas where the quantity of storm runoff is 300 cubic feet per second, or less at the discretion of the city. A closed storm sewer system may be constructed when the quantity exceeds 300 cfs, at the discretion of the City. Hydraulic gradients shall be calculated and lines drawn for each storm sewer.

H. Intentionally left blank for future use

I. Open Channel Design

Storm water runoff in excess of that allowed to collect and be conveyed in the streets in developed areas and runoff in undeveloped areas may be carried in grass lined, concrete lined or weathered rock open channels. Earthen, non-vegetated or unlined open channels are not acceptable. Open channel capacity shall be calculated by the Manning's Formula, and roughness coefficients shall be as follows:

Type of Lining	Roughness Coefficient "n"	Maximum Permissible Mean Velocity
Earth (Bermuda grass)	0.035	6 ft. per sec.
Concrete Lined	0.015	15 ft. per sec.
Weathered Rock	0.030	10 ft. per sec.

Open channels shall be constructed with a trapezoidal cross-section and shall have side slopes no steeper than 3:1 when grass lined and 1.5:1 when lined with concrete. A right-of -way for all channels of sufficient width shall be dedicated to provide for excavation of the open channel of proper width, plus ten feet on each side to permit ingress and egress for maintenance. Additional width may be considered if sanitary sewer mains are proposed to follow the channel alignment.

J. Culvert Design

At locations of stream or open channel crossings with proposed roadway improvements, it is sometimes necessary to receive and transport storm water under the roadway in culverts. The quantity of flow shall be determined by the appropriate method, and the friction loss through of the culvert shall be calculated by Manning's Formula.
Design of culverts shall include the determination of upstream backwater conditions as well as downstream velocities and flooding conditions. Consideration shall be given to the discharge velocity from culverts, and the limitations specified culverts shall not be less than 18". A headwall is required at exposed ends. Under private drives concrete or steel culverts, under public road concrete culverts are required.

K. Stormwater Detention Pond Design

The basic concept underlying the use of stormwater detention ponds (SDP) involves providing temporary storage of stormwater runoff so that peak rates of runoff can be reduced. Runoff is released from storage at a controlled rate which cannot exceed the capacities of the existing downstream drainage systems or the pre developed peak runoff rate of the site, whichever is less. Stormwater detention ponds may be of two (2) basic types: On-site and Regional. In general, on-site ponds are those which are located off-channel and provide stormwater detention for a particular project of development. Regional ponds are designed to provide stormwater detention in conjunction with other improvements on a watershed-wide basis. The performance and safety criteria in this section apply to all ponds which provide management of peak rates of stormwater runoff, regardless of type.

PERFORMANCE CRITERIA FOR ON-SITE SDP's

1. On-site SDP's are further classified as either small or large, as follows:

ON-SITE SDP
POND CLASS DRAINAGE AREA
Small <25 acres
Large 25-64 acres
For design purposes, any pond with a drainage area larger that 64 acres shall be classified as a regional pond.

2. On-site SDP ponds shall be designed to reduce post-development peak rate of discharge to existing pre-development peak rates of discharge for the 2-, 10-, 25- and 100-year storm events at each point of discharge from the project or development site. In addition, the capacity of the existing downstream systems must be considered in determining the need for managing the 100-year storm event. For the post-development hydrologic analysis, any offsite areas which drain to the pond shall be assumed to remain in the existing developed condition.

3. The Rational Method (RM) may be used for the design of small on-site ponds only. The maximum contributing drainage area to a pond designed with the RM is 50 acres when using this equation.

4. A design method approved by the City Engineer.

PERFORMANCE CRITERIA FOR REGIONAL SDP's

1. Regional SDP's are classified as small or large, based on the following criteria:

REGIONAL IMPOUNDED
POND CLASS VOLUME, AC-FT
Small 0-150
Large >150
Any regional pond with a height of dam over 15 feet shall be classified as a large regional pond.
2. Performance criteria for regional detention ponds shall be determined by the City on a project-by-project basis. The determination shall be based on a preliminary engineering study prepared by the project engineer.

SAFETY CRITERIA FOR SDP's

All ponds shall meet or exceed all specified safety criteria. Use of these criteria shall in no way relieve the engineer of the responsibility for the adequacy and safety of all aspects of the design of the SDP.

1. The spillway, embankment, and appurtenant structures shall be designed to safely pass the design storm hydrograph with the freeboard shown in the table below. All contributing drainage areas, including on-site and off-site area, shall be assumed to be fully developed. Any

orifice with a dimension smaller than or equal to twelve (12) inches shall be assumed to be fully blocked.

DETENTION DESIGN STORM FREEBOARD TO TOP
POND CLASS EVENT OF EMBANKMENT, FT.
On-site: Small 100 year 0
Large 100 year 1.0
Regional: Small 100 Year 2.0
Large 100 year *
*Design storm event and required freeboard for large regional ponds shall be determined in accordance with Chapter 299 of the Texas Administrative Code (Dam Safety Rules of the Texas Natural Resource Conservation Commission).

2. All SDP's (except small on-site ponds) shall be designed using a hydrograph routing methodology. The Rational Method (RM) may be used only for contributing drainage areas less than fifty (50) acres.

3. The minimum embankment top width of earthen embankments shall be as follows:

TOTAL HEIGHT OF MINIMUM TOP EMBANKMENT, FT. WIDTH, FT.
0-6, 4'
6-10, 6'
10-15, 8'
15-20, 10'
20-25, 12'
25-35, 15'

4. The constructed height of an earthen embankment shall be equal to the design height plus the amount necessary to ensure that the design height will be maintained once all settlement has taken place. This amount shall in no case be less than five (5%) percent of the total fill height. All earthen embankments shall be compacted to 95% of maximum density.

5. Earthen embankment side slopes shall be no steeper than three (3) horizontal to one (1) vertical. Slopes must be designed to resist erosion, to be stable in all conditions and to be easily maintained. Earthen side slopes for regional facilities shall be designed on the basis of appropriate geotechnical analyses.

6. Detailed hydraulic design calculation shall be provided for all SDP's. Stage-discharge rating data shall be presented in tabular form with all discharge components, such as orifice, weir, and outlet conduit flows, clearly indicated. A stage-storage table shall also be provided.

7. When designing SPD's in a series (i.e., when the discharge of one pond becomes the inflow to another), the engineer must submit a hydrologic analysis which demonstrates the system's adequacy. This analysis must incorporate the development of hydrographs for all inflow and outflow components.

8. No outlet structures from SDP's, parking detention, or other concentrating structures shall be designed to discharge concentrated flow directly onto arterial or collector streets. Such discharges shall be conveyed by a closed conduit to the nearest existing storm sewer. If there is no existing storm sewer within 300 feet, the outlet design shall provide for a change in the discharge pattern from concentrated flow back to sheet flow, following as near as possible the direction of the gutter.

9. Stormwater runoff may be detained within parking lots. However, the engineer should be aware of the inconvenience to both pedestrians and traffic. The location of ponding areas in a parking lot should be planned so that this condition is minimized. Stormwater ponding depths (for the 100-year storm) in parking lots are limited to an average of eight (8") inches with a maximum of twelve (12") inches.

10. All pipes discharging into a public storm sewer system shall have a minimum diameter of twelve (12"). In all cases, ease of maintenance and/or repair must be assured.

11. All concentrated flows into a SDP shall be collected and conveyed into the pond in such a way as to prevent erosion of the side slopes. All outfalls into the pond shall be designed to be stable and non-erosive.

OUTLET STRUCTURE DESIGN

There are two (2) basic types of outlet control structures: those incorporating orifice flow and those incorporating weir flow. Weir flow is additionally broken down into two (2) categories: rectangular and V-notch. In each type, the bottom edge of the weir over which the water flows is called the crest. Sharp-crested and broad-crested weirs are the most common types. Generally, if the crest thickness is more than 60% of the nappe thickness, the weir should be considered broad-crested. The coefficients for sharp-crested and broad-crested weirs vary. The respective weir and orifice flow equations are as follows:

1. Rectangular Weir Flow Equation
   $Q = CLH\ 3/2$
   where
   Q = Weir discharge, cubic feet per second
   C = Weir coefficient
   L = Horizontal length, feet
   H = Head on weir, feet
   2. V-notch Weir Flow Equation \\
   $Q = Cv \tan (O/2)H\ 2.5$
   where
   Q = Weir Flow, cubic feet per second
   Cv = Weir Coefficient
   O = Angle of the Weir notch at the apex (degrees)
   H = Head on Weir, feet

3. Orifice Flow Equation
   $Q = Co\ A\ (2gH)\ 0.5$
   Where
   Q = Orifice Flow, cubic feet per second
   Co = Orifice Coefficient (use 0.6)
   A = Orifice Area, square feet
   g = Gravitation constant, 32.2 feet/sec^2
   H = Head on orifice measured from centerline, feet

Analytical methods and equations for other types of structures shall be approved by the City prior to use.

DETENTION POND STORAGE DETERMINATION

The method to be used for determining detention pond volume requirements is governed initially by the size of the total contributing drainage area to the pond.
For contributing areas up to fifty (50) acres, the Rational Method (RM) may be used.
For contributing areas greater than fifty (50) acres, a flow routing analysis using detailed hydrographs must be applied. The Soil Conservation Service hydrologic methods (available inTR-20, HEC-1) can be used. The engineer may use other methods but must have their acceptability approved by the City engineer. These methods may also be used for the smaller areas.

DETENTION POND MAINTENANCE AND EQUIPMENT ACCESS REQUIREMENTS

1. Silt shall be removed and the pond returned to original lines and grades when standing water conditions occur or the pond storage volume is reduced by more than 10%.

2. To limit erosion, no unvegetated area shall exceed 10 sq. ft in extent.

3. Accumulated paper, trash and debris shall be removed every 4 weeks or as necessary to maintain proper operation.

4. Ponds shall be mowed monthly between the months of May and September.

5. Corrective maintenance is required any time a pond does not drain completely within 60 hours of cessation of inflow (i.e., no standing water is allowed).

6. Structural integrity of pond embankments shall be maintained at all times.

7. Upon completion of development the owners/Homeowners association shall be required to maintain the detention basin in its original designed and approved condition.

STORMWATER RUN-OFF
PLANNING AND DESIGN CRITERIA MANUAL

PLANNING AND DESIGN DRAINAGE CRITERIA

A. General

The Drainage Criteria included in this section are for the purpose of providing a set of guidelines for planning and designing storm drainage facilities in the City of Lucas, Texas and within its extraterritorial jurisdiction. These criteria will be used by the Department of Public Works, other City Departments, consulting engineers employed by the City, and engineers for private developments in the City.

B. Rational Method for Peak Storm Flows

The formula to be used for calculating peak storm flows for drainage areas less than 200 acres shall be the Rational Method, in which:

Q = CIA, where

Q = is the peak storm flow at a given point in cubic feet per second (cfs)
C = is the runoff coefficient that is equal to the ratio that the peak rate of runoff bears to the average rate (intensity) of rainfall;
I = is the average intensity of rainfall in inches per hour for a storm duration equal to the time of travel for run off to flow from the farthest point of the drainage area to the design point in question;
A = is the drainage area tributary to the design point, in acres.

Note: For drainage areas greater than 200 acres, peak storm flows shall be determined based on a flow routing analysis using detailed hydrographs such as the Soil Conservation Service hydrologic methods that are available in such computer programs as TR-20, HEC-1, etc.

C. Runoff Coefficient

The runoff coefficient (C) shall consider the slope of the terrain, the character of the land use, the length of overland flow and the imperviousness of the drainage area and shall be determined based on ultimate land development. The run-off coefficient for the appropriate land used shall be as follows:

Commercial	0.90	Parks and Open Space	0.35
Industrial	0.70	Schools, Churches, etc.	0.75
Single Family Residential	0.55		
Multi-Family	0.75		

D. Rainfall Intensity-Frequency

The rainfall intensity-frequency curves should be platted from data from TXDOT or other government sources in our area. The intensity (I) in the formula Q = CIA, is determined from the curves by arriving at a time of concentration for the subject drainage area and adapting a storm frequency upon which to base the design of drainage improvements.

1. Time of Concentration

The time of concentration, which is the longest time of travel for runoff to flow from any point of the subject drainage area to the design point, consists of the time required for runoff to flow overland plus the time required to flow in a street gutter, storm drain, open channel or other conveyance facility. A minimum time of concentration of fifteen (15) minutes shall be used for Single Family Residential, Parks and Open Space areas and a minimum time of concentration of ten (10) minutes shall be used for Commercial, Industrial, Multi-Family Residential, School and Church areas. A nomograph, is attached for estimating the time of concentration.

2. Storm Frequency

Required design storm frequencies for storm drainage improvements in the City of Lucas are shown in the following table.

Type of Facility	Design Frequency (years)
* Storm Sewer Systems	25
* Culverts, Bridges	100

*The drainage system shall be designed to carry those flows greater than the 25-year frequency up to and including a 100-year frequency within defined rights-of-way or drainage easements.

E. Area

The drainage area used in determining peak storm flows shall be calculated by· subdividing a map into the watersheds within the basin contributing storm water runoff to the system. Areas shall be determined by planimetering or digitizing.

F. Spread of Water

During the design storm, the quantity of storm water that is allowed to collect in the streets before being intercepted by a storm drainage system is referred to as the "spread of water". In determining the limitations for carrying storm water in the street, the ultimate development of the street shall be considered. The use of the street for carrying storm water shall be limited to the following:

Spread of Water:

Major thoroughfares (divided)	One traffic lane on each side to remain clear.
Thoroughfares (not divided)	Two traffic lanes to remain clear.
Collector streets	One traffic lane to remain clear.
Residential streets	Six-inch depth of flow at curb and one traffic lane to remain clear

G. Storm Sewer Design

Storm water in excess of that allowed to collect in the streets shall be intercepted in inlets and conveyed in a storm sewer system. Storm sewer capacity shall be calculated by the Mannings-formula –

$Q = AV$, and

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

where

Q is the discharge in cubic feet per second;
A is the cross-sectional area of the conduit in square feet;
V is the velocity of flow in the conduit in feet per second;
R is the hydraulic radius in feet, which is the area of flow divided by the wetted Perimeter.
S is the slope of the hydraulic gradient in feet per foot;
n is the coefficient of roughness.

The recommended roughness coefficients to use in the design of a storm sewer system are as follows:

Type of Storm Drain	Manning's Coefficient
Concrete Box Culvert	0.015
New Concrete Pipe	0.013
Standard, unpaved, with or without bituminous coating corrugated metal pipe	0.024
Paved invert, 25% of periphery paved corrugated metal pipe	0.021
Paved invert, 50% of periphery paved corrugated metal pipe	0.018
100% paved and bituminous coated corrugated metal pipe	0.013

In the design of the storm sewer system, the elevation of the hydraulic gradient of the storm sewer shall be a minimum of 0.5 feet below the elevation of the adjacent street gutter. Storm sewer pipe sizes shall be so selected that the average velocity in the pipe will not exceed 15 feet per second nor less than 3 feet per second. The minimum grade recommended for storm sewer pipe is 0.30%. Closed storm sewer systems shall be installed in all areas where the quantity of storm runoff is 300 cubic feet per second, or less at the discretion of the city. A closed storm sewer system may be constructed when the quantity exceeds 300 cfs, at the discretion of the City. Hydraulic gradients shall be calculated and lines drawn for each storm sewer.

H. Intentionally left blank for future use

I. Open Channel Design

Storm water runoff in excess of that allowed to collect and be conveyed in the streets in developed areas and runoff in undeveloped areas may be carried in grass lined, concrete lined or weathered rock open channels. Earthen, non-vegetated or unlined open channels are not acceptable. Open channel capacity shall be calculated by the Manning's Formula, and roughness coefficients shall be as follows:

Type of Lining	Roughness Coefficient "n"	Maximum Permissible Mean Velocity
Earth (Bermuda grass)	0.035	6 ft. per sec.
Concrete Lined	0.015	15 ft. per sec.
Weathered Rock	0.030	10 ft. per sec.

Open channels shall be constructed with a trapezoidal cross-section and shall have side slopes no steeper than 3: I when grass lined and 1.5: 1 when lined with concrete. A right-of -way for all channels of sufficient width shall be dedicated to provide for excavation of the open channel of proper width, plus ten feet on each side to permit ingress and egress for maintenance. Additional width may be considered if sanitary sewer mains are proposed to follow the channel alignment.

J. Culvert Design

At locations of stream or open channel crossings with proposed roadway improvements, it is sometimes necessary to receive and transport storm water under the roadway in culverts. The quantity of flow shall be determined by the appropriate method, and the friction loss through of the culvert shall be calculated by Manning's Formula.

Design of culverts shall include the determination of upstream backwater conditions as well as downstream velocities and flooding conditions. Consideration shall be given to the discharge velocity from culverts, and the limitations specified culverts with the limitation that culvert pipe diameter shall be a minimum 18". A headwall is required at exposed ends. Under private driveways, permanent culverts (those with reinforced concrete, asphalt, or AASHTO #3 gravel paving over the culvert) and temporary culverts (those without paving over the culvert) shall be constructed with reinforced concrete or minimum 16 gauge galvanized corrugated steel pipe. Temporary culverts and driveways must be removed within 18 months of permit issuance and the open channel reconstructed to its original design. Under public roads reinforced concrete culverts are required. Permanent culvert design shall include minimum embedment of Class B+ per the North Central Texas Council of Governments (NCTCOG) design manual drawing 3020 dated October 2004.

K. Stormwater Detention Pond Design

The basic concept underlying the use of stormwater detention ponds (SOP) involves providing temporary storage of stormwater runoff so that peak rates of runoff can be reduced. Runoff is released from storage at a controlled rate which cannot exceed the capacities of the existing downstream drainage systems or the pre developed peak runoff rate of the site, whichever is less. Stormwater detention ponds may be of two (2) basic types: On-site and Regional. In general, on-site ponds are those which are located off-channel and provide stormwater detention for a particular project of development. Regional ponds are designed to provide stormwater detention

in conjunction with other improvements on a watershed-wide basis. The performance and safety criteria in this section apply to all ponds which provide management of peak rates of stormwater runoff, regardless of type.

Performance Criteria for On-Site SDP's

1. On-site SDP's are further classified as either small or large, as follows:

On-Site SDP Pond Class	Drainage Area
Small	<25 acres
Large	25-64 acres

For design purposes, any pond with a drainage area larger than [*sic*] 64 acres shall be classified as a regional pond.

2. On-site SDP ponds shall be designed to reduce post-development peak rate of discharge to existing pre-development peak rates of discharge for the 2-, 10-, 25- and 100-year storm events at each point of discharge from the project or development site. In addition, the capacity of the existing downstream systems must be considered in determining the need for managing the 100-year storm event. For the post-development hydrologic analysis, any offsite areas which drain to the pond shall be assumed to remain in the existing developed condition.

3. The Rational Method (RM) may be used for the design of small on-site ponds only. The maximum contributing drainage area to a pond designed with the RM is 50 acres when using this equation.

4. A design method approved by the City Engineer.

Performance Criteria for Regional SDP's

1. Regional SDP's are classified as small or large, based on the following criteria:

Regional Pond Class	Impounded Volume, Ac-Ft
Small	0-150
Large	>150

Any regional pond with a height of dam over 15 feet shall be classified as a large regional pond.

2. Performance criteria for regional detention ponds shall be determined by the City on a project-by-project basis. The determination shall be based on a preliminary engineering study prepared by the project engineer.

Safety Criteria for SDP's

All ponds shall meet or exceed all specified safety criteria. Use of these criteria shall in no way relieve the engineer of the responsibility for the adequacy and safety of all aspects of the design of the SDP.

1. The spillway, embankment, and appurtenant structures shall be designed to safely pass the design storm hydrograph with the freeboard shown in the table below. All contributing drainage areas, including on-site and off-site area, shall be assumed to be fully developed. Any orifice with a dimension smaller than or equal to twelve (12) inches shall be assumed to be fully blocked.

Detention Pond Class		Design Storm Event	Freeboard to Top of Embankment, Ft.
On-site:	Small	100 year	0
	Large	100 year	1.0
Regional:	Small	100 year	2.0
	Large	100 year	*

*Design storm event and required freeboard for large regional ponds shall be determined in accordance with Chapter 299 of the Texas Administrative Code (Dam Safety Rules of the Texas Natural Resource Conservation Commission).

2. All SDP's (except small on-site ponds) shall be designed using a hydrograph routing methodology. The Rational Method (RM) may be used only for contributing drainage areas less than fifty (50) acres.

3. The minimum embankment top width of earthen embankments shall be as follows:

Total Height of Embankment, Ft.	Minimum Top Width, Ft.
0-6	4
6-10	6
10-15	8
15-20	10
20-25	12
25-35	15

4. The constructed height of an earthen embankment shall be equal to the design height plus the amount necessary to ensure that the design height will be maintained once all settlement has taken place. This amount shall in no case be less than five (5%) percent of the total fill height. All earthen embankments shall be compacted to 95% of maximum density.

5. Earthen embankment side slopes shall be no steeper than three (3) horizontal to one (I) vertical. Slopes must be designed to resist erosion, to be stable in all conditions and to be easily maintained. Earthen side slopes for regional facilities shall be designed on the basis of appropriate geotechnical analyses.

6. Detailed hydraulic design calculation shall be provided for all SDP's. Stage-discharge rating data shall be presented in tabular form with all discharge components, such as orifice, weir, and outlet conduit flows, clearly indicated. A stage-storage table shall also be provided.

7. When designing SPD's in a series (i.e., when the discharge of one pond becomes the inflow to another), the engineer must submit a hydrologic analysis which demonstrates the system's adequacy. This analysis must incorporate the development of hydrographs for all inflow and outflow components.

8. No outlet structures from SDP's, parking detention, or other concentrating structures shall be designed to discharge concentrated flow directly onto arterial or collector streets. Such discharges shall be conveyed by a closed conduit to the nearest existing storm sewer. If there is no existing storm sewer within 300 feet, the o tlet design shall provide for a change in the discharge pattern from concentrated flow back to sheet flow, following as near as possible the direction of the gutter.

9. Stormwater runoff may be detained within parking lots. However, the engineer should be aware of the inconvenience to both pedestrians and traffic. The location of ponding areas in a parking lot should be planned so that this condition is minimized. Stormwater ponding depths (for the 100-year storm) in parking lots are limited to an average of eight (8) inches with a maximum of twelve (12) inches.

10. All pipes discharging into a public storm sewer system shall have a minimum diameter of twelve (12"). In all cases, ease of maintenance and/or repair must be assured.

11. All concentrated flows into a SOP shall be collected and conveyed into the pond in such a way as to prevent erosion of the side slopes. All outfalls into the pond shall be designed to be stable and non-erosive.

Outlet Structure Design

There are two (2) basic types of outlet control structures: those incorporating orifice flow and those incorporating weir flow. Weir flow is additionally broken down into two (2) categories: rectangular and V-notch. In each type, the bottom edge of the weir over which the water flows is called the crest. Sharp-crested and broad-crested weirs are the most common types. Generally, if the crest thickness is more than 60% of the nappe thickness, the weir should be considered broad-crested. The coefficients for sharp-crested and broad-crested weirs vary. The respective weir and orifice flow equations are as follows:

1. Rectangular Weir Flow Equation
   $Q = CLH^{3/2}$
   where

   Q = Weir discharge, cubic feet per second
   C = Weir coefficient
   L = Horizontal length, feet
   H = Head on weir, feet

2. V-notch Weir Flow Equation\\
   $Q = C_v \tan (0/2)H^{2.5}$
   where

   Q = Weir Flow, cubic feet per second
   C_v = Weir Coefficient

O = Angle of the Weir notch at the apex (degrees)
H = Head on Weir, feet

3. Orifice Flow Equation
$Q = Co\ A\ (2gH)^{0.5}$
where

Q = Orifice Flow, cubic feet per second
Co = Orifice Coefficient (use 0.6)
A = Orifice Area, square feet
g = Gravitation constant, 32.2 feet/sec^2
H = Head on orifice measured from centerline, feet

Analytical methods and equations for other types of structures shall be approved by the City prior to use.

Detention Pond Storage Determination

The method to be used for determining detention pond volume requirements is governed initially by the size of the total contributing drainage area to the pond.
For contributing areas up to fifty (50) acres, the Rational Method (RM) may be used.
For contributing areas greater than fifty (50) acres, a flow routing analysis using detailed hydrographs must be applied. The Soil Conservation Service hydrologic methods (available in TR-20, HEC-1) can be used. The engineer may use other methods but must have their acceptability approved by the City engineer. These methods may also be used for the smaller areas.

Detention Pond Maintenance and Equipment Access Requirements

1. Silt shall be removed and the pond returned to original lines and grades when standing water conditions occur or the pond storage volume is reduced by more than 10%.

2. To limit erosion, no unvegetated area shall exceed 10 sq. ft in extent.

3. Accumulated paper, trash and debris shall be removed every 4 weeks or as necessary to maintain proper operation.

4. Ponds shall be mowed monthly between the months of May and September.

5. Corrective maintenance is required any time a pond does not drain completely within 60 hours of cessation of inflow (i.e., no standing water is allowed).

6. Structural integrity of pond embankments shall be maintained at all times.

7. Upon completion of development the owners/Homeowners association shall be required to maintain the detention basin in its original designed and approved condition.

Item 2

Paving Design Manual

(Needs to be Created)

Item 3

Water and Wastewater Design Manual

(Adequate provisions are provided in

Chapter 10, this reference can be deleted)

Item 4

Water Master Plan

WATER SYSTEM

INTRODUCTION

The City of Lucas owns and operates Lucas Waterworks that serves the residents inside and outside its current Certificate of Convenience and Necessity (CCN) site map. The Lucas Waterworks serves residents outside the city limits and outside the Lucas extraterritorial jurisdiction (ETJ), but the City does not supply water to all residents within the Lucas ETJ. The Seis Lagos Utility District, the Wylie Northeast Special Utility District and the City of Allen supply water to a portion of residents inside the Lucas city limits and within the Lucas ETJ.

The City's water system is a vital part of the City owned infrastructure. The purpose of this section on the water system is to update the Comprehensive Plan by providing a description of the current water system, identifying the criteria for determining future additions to the water system, and providing a description of the capital improvements needed for the future water system.

EXISTING WATER SYSTEM

Water Supply

The City purchases water from the North Texas Municipal Water District (NTMWD). Water is delivered to the City at two delivery points. One of the delivery points is at the North Pump Station site located on Country Club Road between West Lucas Road and Estates Parkway. The other delivery site is at the McGarity Pump Station site located on McGarity Lane just east of Angel Parkway. The delivery point at the McGarity Pump Station site is the newer of the two delivery sites. It was established when the first facilities were constructed at that site in 2004/2005.

Existing System Facilities

The principal facilities in the existing water system include ground storage tanks, elevated storage tanks, and pump stations. The storage tanks and pump stations are all located at the McGarity Pump Station, the North Pump Station and the Winningkoff elevated tank site. Following is a summary of the principal facilities in the existing water system:

Ground Storage:

McGarity Pump Station	200,000 gallon tank
	350,000 gallon tank
North Pump Station	500,000 gallon tank
	750,000 gallon tank
Total	1,800,000 gallons

Elevated Storage:

McGarity Pump Station	300,000 gallon tank
Winningkoff Site	300,000 gallon tank
Total	**600,000 gallons**

Pumping Facilities:
McGarity Pump Station:
Pump No. 3 – 750 gpm
Pump No. 4 – 750 gpm
Pump No. 5 – 750 gpm

North Pump Station:
Pump No. 1 – 1,100 gpm
Pump No. 2 – 1,000 gpm
Pump No. 3 – 1,000 gpm
Total 5,250 gpm

New Facilities

A number of facilities have been added to the existing water system since the last comprehensive plan was prepared in 2004. These facilities include the initial McGarity Pump Station facilities which were under construction at the time of the preparation of the last comprehensive plan. Those facilities include the 300,000 gallon elevated storage tank, the 200,000 gallon ground storage tank, and the pump station with the first two 750 gpm pumps. Other facilities that have been added to the water system include the following:

Ground Storage:
750,000 gallon ground storage tank at the North Pump Station
350,000 gallon ground storage tank at the McGarity Pump Station

Pumping Facilities:

- Replacement of 900 gpm pump with 1,100 gpm pump at the North Pump Station
- New pump station at the McGarity Pump Station with two 750 gpm pumps
- Additional 750 gpm pump at the McGarity Pump Station

Water Lines:

- Country Club Road Water Line, including 9,200 feet of sixteen inch- and twelve-inch water lines
- Forest Grove Road Water Line, including 1,000 feet of eight-inch water line
- Shady Lane Water Line including 2,200 feet of eight-inch water line
- Southview Drive Water Line, including 12,000 feet of twelve inch water line
- Brockdale Park Road Water Line, including 7,000 feet of eight-inch water line
- Brookhaven Drive Water Line, including 6,300 feet of eight-inch water line
- Stinson Road Water Line, including 11,700 feet of twelve inch water line

- Water line to the fire station, including 320 feet of 12-inch water line
- Rock Ridge Road Water Line Phase I, including 3,500 feet of twelve inch water line
- Osage Lane Water Line, including 2,700 feet of six-inch water line

PARAMETERS FOR FUTURE FACILITIES

Typically, the two principal factors that determine the size and capacity of future water system facilities are the anticipated water demand in the water system and certain facilities design criteria. In the case of the Lucas water system, four other factors will also have an impact on the future water system facilities. These factors are the pending conversion of the water system from two pressure planes to one pressure plane, staging the additions to the water system to account for development, the need to reduce the number of dead end water lines in the system, and the ability of the NTMWD to supply water.

Water Demand

Water demand is a function of the number of people living in the service area and their water usage habits. The population to be served by the water system will include the build out population of 13,274, plus an estimated population of 168 people in the Allen ETJ currently being served by the water system. Accordingly, a total population of 13,442 located within the proposed Certificate of Convenience and Necessity (CCN) will be utilized for determining the water demand that will eventually need to be met by the water system. The size and capacity of future system facilities will be based on this population of 13,442.

Since water demand in the water system service area is based on the population and their water usage habits, historical water usage habits need to be determined in order to establish the projected demands. Based on established water usage habits, the water usage is approximately 250 gallons per capita per day, the maximum day to average day ratio is 2.5, and the peak hour to maximum day ratio is 1.8. With a build out population of 13,442 in the service area, this water usage will result in an average daily demand of 3.36 mgd, a maximum day demand of 8.4 mgd, and a peak hour demand of 15.12 mgd for the water system at build out.

Design Criteria

Different design criteria can be used to determine the size and capacity needed for future system facilities. Minimum requirements for determining the size of storage facilities and pumping facilities are provided by the Texas Commission on Environmental Quality (TCEQ). Per the Texas Commission on Environmental Quality (TCEQ), the water system needs to have at least 200 gallons of ground storage and 100 gallons of elevated storage per connection. More stringent design criteria has been utilized, per previous analysis, for the present water system. This design criteria is based on providing elevated storage to meet peak hour demands in the system. Based on this criteria, the elevated storage needs to have enough capacity to provide for peak hour demand with a reserve of one-third of the total

elevated storage capacity for fire flow. The ground storage requires sufficient capacity to meet a specified portion of the maximum day demand. The pumping capacity in the system needs to be sufficient to meet a specified portion of the maximum day demand. It is recommended that the more stringent design criteria, which has been used in the past for the existing water system, continue to be utilized for system facilities.

Pressure Planes

The existing water system presently operates on two pressure planes. The upper pressure plane is located primarily in the northwest part of the service area. The lower pressure plane serves the rest of the service area. The facilities that provide water to the upper pressure plane are located at the McGarity Pump Station site. The facilities that provide water to the lower pressure plane are located at the North Pump Station site and the Winningkoff Elevated Tank site.

Prior to the establishment of the two pressure planes, the water system was operating on a single pressure plane. One of the goals is to reestablish one pressure plane in order to simplify operation of the water system and improve efficiency. Due to the difference in elevations of the elevated storage tanks serving the existing water system, one strategy is an altitude valve installed at the Winningkoff elevated storage tank. This will allow the two elevated storage tanks to work together in the water system when it is converted to one pressure plane. Additionally limiting connections between the planes and the installation of residential pressure regulating valves (RPRVs) are other strategies for balancing the planes.

ETJ Annexation

The areas within the Lucas ETJ with the highest potential for annexation are already being served by the Lucas waterworks. However, the large ETJ area in the southeast part of the City is not. If this ETJ area is added to the City by annexation, the area would not be added to the water system service area. These areas are currently located within the CCN held by the Wylie Northeast Special Utility District (WNSUD) and the Seis Lagos Utility District (SLUD). In general terms, the WNSUD supplies water to the southeast corner of the city as well as the Inspiration neighborhood with in the Lucas ETJ and the SLUD supplies the Seis Lagos and Brockdale Park neighborhoods.

Projected population in this area at build out is 3,892 people. This added population would not increase the projected population in the water system service area at build out. The only potential impact to the Lucas waterworks would be the operation of the SLUD water infrastructure. The WNSUD would most likely not relinquish its system to the City of Lucas.

Dead End Water Lines

There are a large number of dead end water lines in the existing water system. Dead end water lines have to be periodically flushed per TCEQ requirements in order to keep sufficient disinfection levels in the water lines. The City has to devote resources and funds to accomplish this purpose. It is the City's goal to address this situation by reducing the number of dead end water lines in the City thru the addition of water lines that will provide loops to eliminate the longer dead end water lines. Looping lines will eliminate the need to flush the lines, will improve the dependability of the system in the area, and enhancing fire protection. Included in the Appendix is a water system map showing the existing dead end water lines.

PROPOSED WATER SYSTEM

Proposed System Facilities

A number of system improvements will need to be made for the future water system based on water demand, the design criteria for improvements, and the other criteria mentioned in the previous section. The principal facilities needed for build out conditions when the water system service area (without the large ETJ area in the southeast part of the City included in the service area) include the following:

McGarity P.S. Site:

- 1,000,000 gallon ground storage tank
- Pump station with two 1,250 gpm pumps (replaces old pump station)
- 300,000 gallon elevated storage tank

North P.S. Site:

- Replace existing 8" delivery line (from NTMWD) with 12" delivery line
- Pump station with two 800 gpm pumps

Winningkoff Elevated Tank Site:

- Altitude valve with valve vault and piping

The additional facilities needed for build out conditions when the water system service area with the large ETJ area in the southeast part of the City included in the service area.

McGarity P.S. Site:

- Add a third 1,250 gpm pump in the new pump station
- 200,000 gallon elevated storage tank

North P.S. Site:

- 800,000 gallon ground storage tank
- Add a third 800 gpm pump in the new pump station

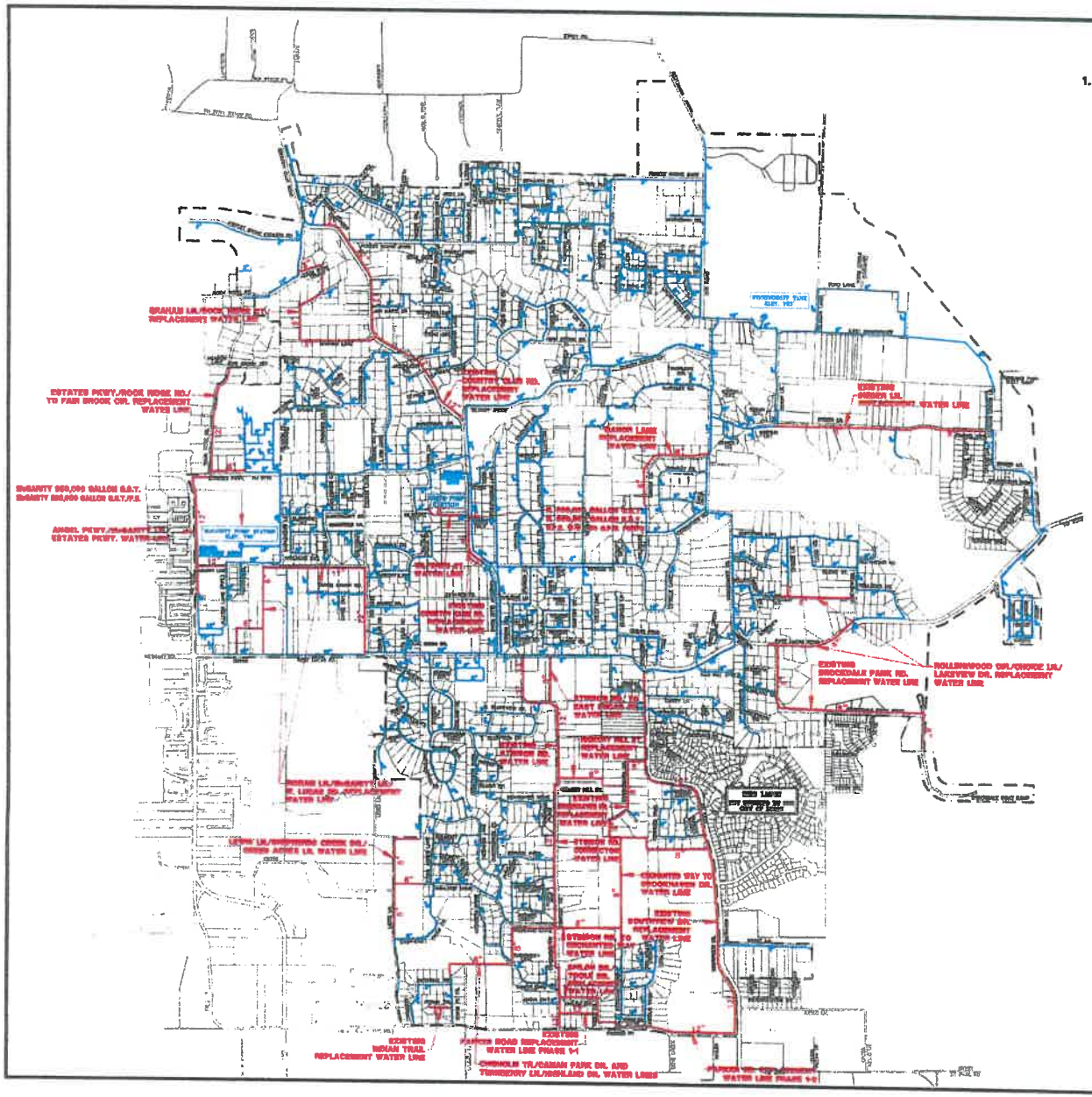
McGarity P.S. Site:

- Add a third 1,250 gpm pump in the new pump station
- 200,000 gallon elevated storage tank

Water Lines:

- 12" water line along Country Club Road and East Lucas Road
- 12" water line between Brockdale Park Road and Southview Drive

The additions to the water system listed above for both sets of conditions (i.e., with and without the large ETJ area in the southeast part of the City included in the service area) provide the facilities that will be needed in the water system under build out conditions and provide a balanced water system with similar capacity facilities at the two pump station sites.



NOTES:

1. THIS MAP WAS PREPARED FOR AND INTENDED TO BE A GENERAL GUIDE ONLY. DUE TO GRAPHIC REQUIREMENTS SOME AREAS ARE NOT TO SCALE.

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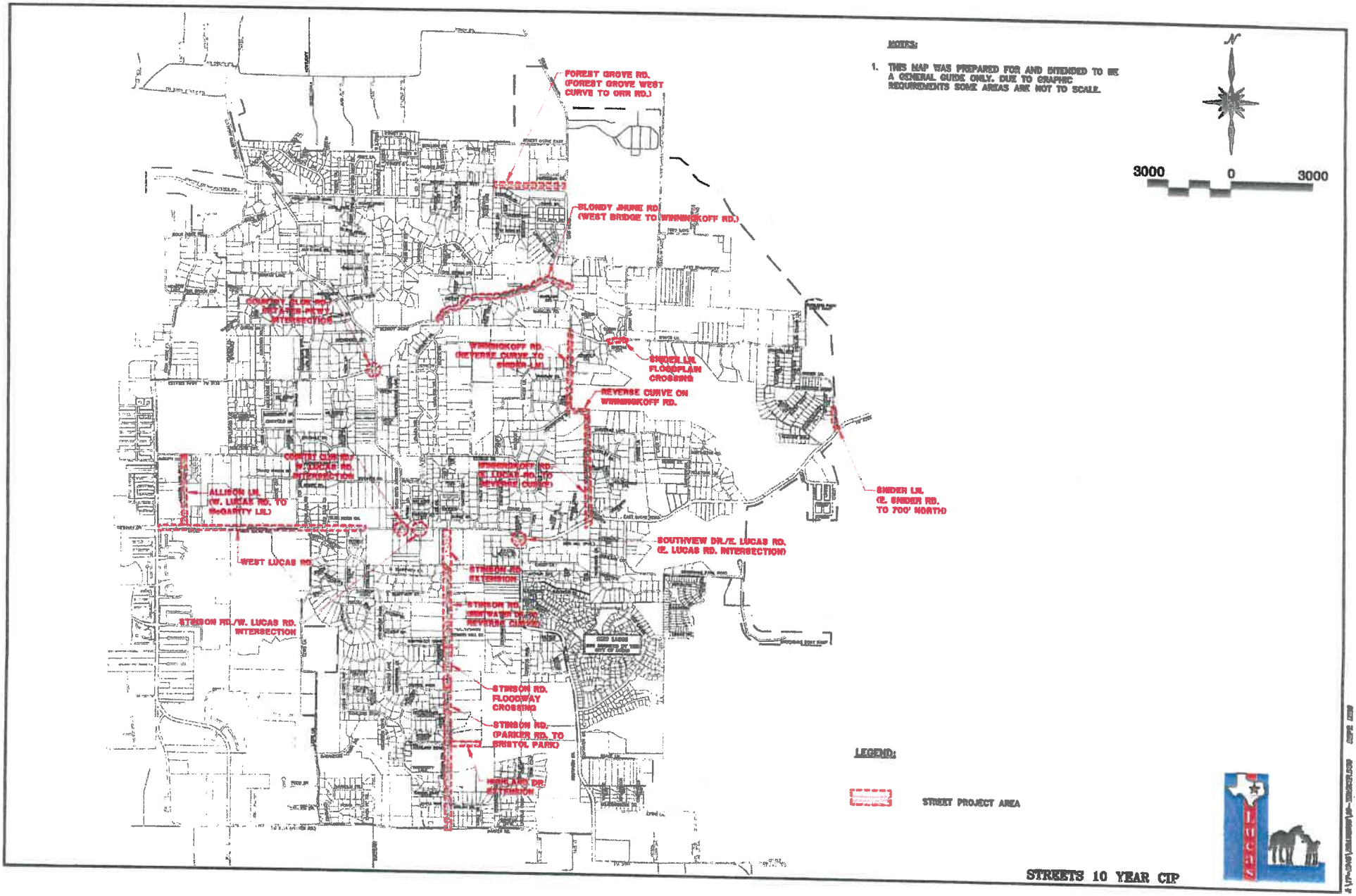
THE 10 YEAR CIP INCLUDES CAPACITY IN THE FOLLOWING:

1. EXISTING NORTH 750,000 GALLON GROUND STORAGE TANK.
2. EXISTING McGARITY 350,000 GALLON GROUND STORAGE TANK/PUMP STATION.
3. EXISTING 12" COUNTRY CLUB ROAD REPLACEMENT WATER LINE.
4. EXISTING 12" SOUTHVIEW DRIVE REPLACEMENT WATER LINE.
5. EXISTING 8" BROOKHAVEN DRIVE REPLACEMENT WATER LINE.
6. EXISTING 8" BROOKDALE PARK ROAD REPLACEMENT WATER LINE.
7. EXISTING 12" STENSON ROAD REPLACEMENT WATER LINE.
8. EXISTING 16" COUNTRY CLUB ROAD REPLACEMENT WATER LINE.
9. EXISTING 12" PARKER ROAD REPLACEMENT WATER LINE PH. 1-1.
10. EXISTING 8" INDIAN TRAIL REPLACEMENT WATER LINE.
11. EXISTING 8" SNIDER LANE REPLACEMENT WATER LINE.

LEGEND:

- SERVICE AREA LIMITS
- EXISTING WATER LINES
- IMPACT FEE ELIGIBLE WATER LINES AND FACILITIES

WATER SYSTEM 10 YEAR CIP


NOTES:
1. THIS MAP WAS PREPARED FOR AND INTENDED TO BE A GENERAL GUIDE ONLY. DUE TO GRAPHIC REQUIREMENTS SOME AREAS ARE NOT TO SCALE.
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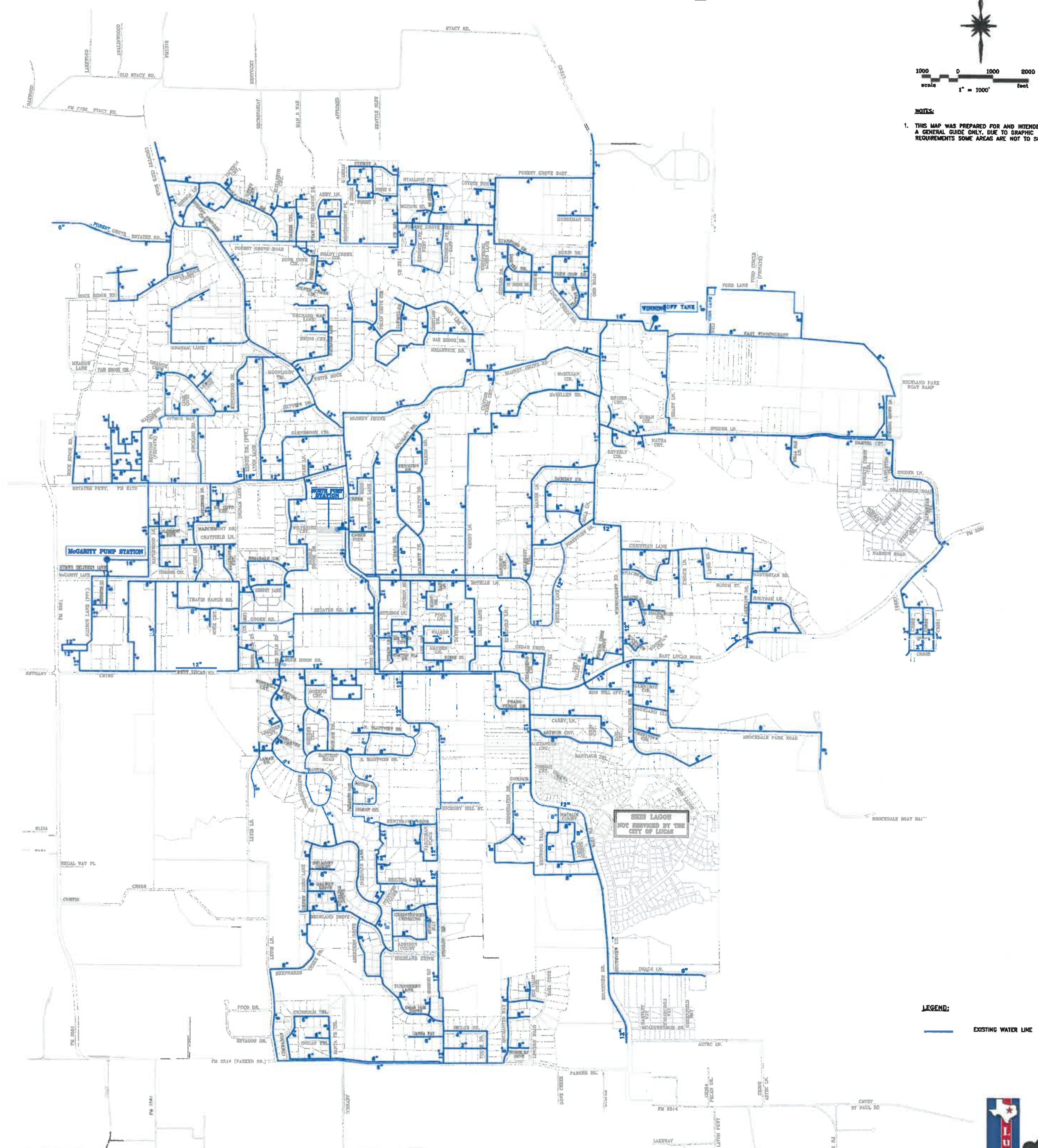
FOREST GROVE RD. (FOREST GROVE WEST CURVE TO OWR RD.)
BLONDY JHUNE RD. (WEST BRIDGE TO WINNINGKOFF RD.)
SNIDER LN. FLOODPLAIN CROSSING
REVERSE CURVE ON WINNINGKOFF RD.
SNIDER LN. (E. SNIDER RD. TO 700' NORTH)
SOUTHVIEW DR./E. LUCAS RD. (E. LUCAS RD. INTERSECTION)
ALLISON LN. (W. LUCAS RD. TO McGARITY LN.)
WEST LUCAS RD.
STINSON RD. EXTENSION
STINSON RD./W. LUCAS RD. INTERSECTION
STINSON RD. FLOODWAY CROSSING
STINSON RD. (PARKER RD. TO BRISTOL PARK)
LEGEND:
STREET PROJECT AREA
STREETS 10 YEAR CIP

Water System Map



NOTES:

1. THIS MAP WAS PREPARED FOR AND INTENDED TO BE A GENERAL GUIDE ONLY. DUE TO GRAPHIC REQUIREMENTS SOME AREAS ARE NOT TO SCALE.

LEGEND:

EXISTING WATER LINE

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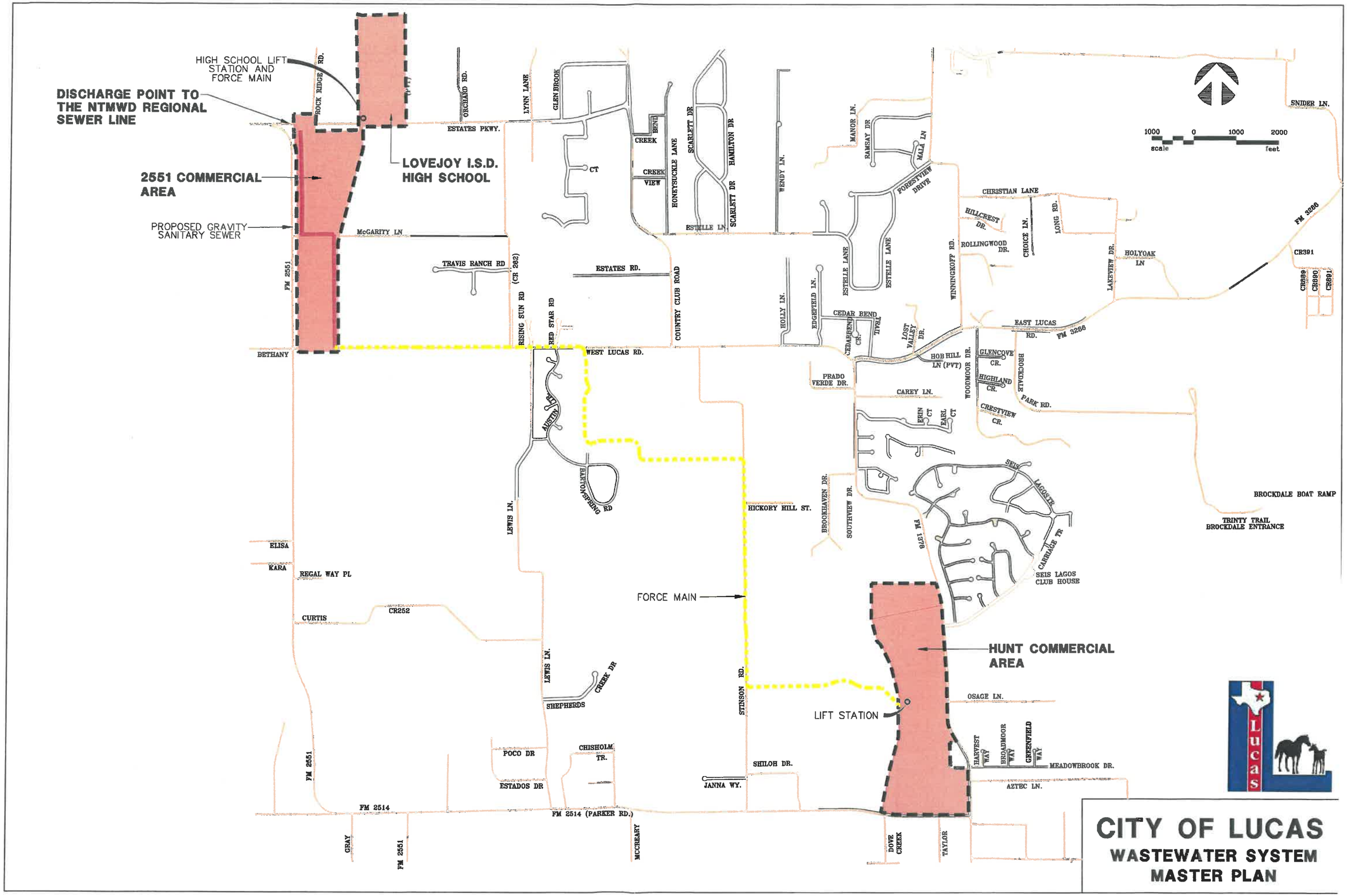
Item 5

Wastewater Master Plan



CITY OF LUCAS
WASTEWATER SYSTEM MASTER PLAN

Item 6

Storm Drainage Master Plan

INTRODUCTION

The intent of this Storm Drainage System Study is to review all available information on storm drainage in Lucas, make an analysis of the existing system, establish a database to be used to prepare a plan, and make recommendations with the cost estimates of the improvements to the existing storm drainage systems within the City.

The topography of Lucas consists of both level and gently rolling terrain. The majority of the population within the Lucas city limits is located in relatively flat areas with few deep drainage channels. As a result, localized flooding can be a problem, especially where culvert and drainage ditches are obstructed with vegetation or debris.

To help minimize property damage from flooding during periods of intense rainfall, the drainage system for a community must be addressed, sized and properly maintained. The public has come to expect that no damage will result to property from storm drainage or high water and gives no thought to the location of neighborhoods in relation to ground elevation and drainage flows. All of these factors directly affect the surface storm drainage immediately adjacent to homes and/or business structures. Storm drainage facilities required for a city may include inlets, storm sewers, culverts, bridges, French drains, concrete lined channels, natural drainage channels, overflow swales, creeks, rivers, retention ponds and lakes.

STORM DRAINAGE INVENTORY

INVENTORY

An inventory survey was completed in April of 2004 to determine the present condition of the drainage system and to identify the drainage system in and around the City of Lucas. The existing storm water facilities in the City of Lucas were catalogued and are illustrated in Figure 8.1. The approximate length, size and type of all public drainage structures within the city limits have been identified and are detailed in Appendix 8.1.

The storm drainage system of Lucas currently consists of a system of bar ditches, channels, bridges and numerous culverts. These facilities carry storm water run-off within Lucas to the eventual terminus outside the city limits. No underground system exists.

Annual precipitation is approximately 34 inches per year. The rains are heaviest in spring and fall.

The streets in the City crowned to promote open ditch drainage on each side. No curb and gutter exists.

The Federal Emergency Management Agency (FEMA) provides flood insurance rate maps that depict the 100-year and 500-year flood plains. These flood plains cover those areas that would most likely be inundated with storm water during the heaviest rains typically occurring in the area over the specified 100 or 500 years. The regulatory 100-year floodway defines the area where buildings are not eligible for flood insurance, while those located in the 100-year floodway fringe are eligible once flood proofing is implemented. The goal of this program is to curtail development in flood plains, thereby reducing damage to structures and minimizing the danger to people during flooding.

The City of Lucas is a participating city in the National Flood Insurance Program (NFIP) and figure 8.1 illustrates the approximate locations of the flood plains.

The City of Lucas is responsible for the maintenance of most of the above drainage features. However both the County and the Texas Department of Transportation (TXDOT) control those facilities in the extraterritorial jurisdiction and along some of the major roadways in and around the City.

STORM DRAINAGE ANALYSIS

The entire City relies on storm water drainage to be carried on the surface within bar ditches and well-defined unimproved drainage channels. No curb and gutter exists. As mentioned earlier, the drainage pattern varies within Lucas as some areas of the City are flatter than others.

GENERAL PROBLEMS

Creeks:

While flooding creeks can pose significant flooding problems, none exist in the City.

Bar Ditches and Water Channels:

A significant portion of the flooding that occurs in the City is associated with man-made bar ditches and culverts being inundated with rainwater flowing off adjacent properties while following the natural topographical lay of the City. Despite the proper construction and operation of the majority of these ditches, some are not able to deal with the intense storm water flows brought on by heavy rains. As a result, water is often left standing in intersections and yards of homes after rain has subsided. This water is a breeding ground for mosquitoes, contributes to premature street damage and is a visual blight on the City.

Street System:

Manmade structures such as the street system do not lend themselves to adequate drainage since the facilities exist perpendicular to the natural flow lines. This occurrence is evident in throughout the City. This can allow storm water to prematurely damage roadways.

Drainage Facilities:

In an attempt to identify problems and make needed recommendations, a complete inventory of drainage facilities within the City of Lucas was made. As a result, a total of 219 facilities have been identified, 68 of which are 50 per cent or more blocked with siltation, crushed or can be characterized as overgrown with vegetation. These facilities are in need of attention.

In analyzing the drainage system, adequate facilities exist under intersection rights-of-ways throughout the majority of the City.

In regard to the drainage facilities of Lucas, problems with culverts were identified citywide. **14 percent** are at least 50 percent plugged and/or crushed and need immediate maintenance. For this reason, it is recommended that improvements be made to increase the capacity of these existing facilities in order to expedite run-off past these areas towards the natural drainage ways. This lack of maintenance contributes to localized flooding along many streets and could cause some homes to become inundated with water.

LOCAL PRIORITIZED ACTIONS

1. Establish a Maintenance Program: To enable existing and proposed drainage facilities to carry the maximum possible flow without entering into a major capital improvement program, the City needs to initiate a ditch maintenance program. This program should include the reworking and deepening of existing bar ditches and cleaning out or replacing deteriorated and silted culverts. Great attention should be placed upon this program before each rainy system. As a general rule, bar ditches should be constructed at a 4:1 slope so they can be mowed by individual property owners. The program should also include the routine removal of debris and mowing of bar ditches. Finally, culverts should be cleaned and replaced as necessary. The estimated cost of such a program is $3.00/lf, excluding driveway and drainage pipe.

2. Modify Existing System: In addition to maintaining the existing drainage system, modifications may be necessary to eliminate severe localized flooding. Examples include re-sloping bar ditches.

SPECIFIC PROBLEM AREAS

An analysis of the areas within the community where local flooding has occurred was conducted. As a result, a total of five (5) areas were identified and have been illustrated in Figure 8.1. During a hard rain, the bar ditches along the roadways in these areas become virtual rivers as extreme water flows rush in. The severe siltation and improper slope of some of these ditches prevents water from being expelled quickly enough. In some cases, this causes pools to form in yards and intersections. Other times, water simply overflows out of the bar ditches, cascading over roadways.

STORM DRAINAGE PLAN AND RECOMMENDATIONS

Any plan that is developed to improve the drainage in the City must be coordinated with plans to improve the road system. Poor drainage not only causes localized flooding that could threaten some property, but flooding on and near the roadways in the City is responsible for much of the damage that exists in the roadways. Poor drainage or lack of drainage causes the pavement and road base to deteriorate. The weight of normal traffic on the road travels over the weakened areas, breaks down the surface and causes potholes to form. Most cities attempt to patch the potholes for a temporary fix. However, complete reconstruction of roadways that includes new drainage, preferably curb and gutter, is usually required to assure a long life for the roadway.

The primary efforts that can be completed by the City to address local flooding are: constant maintenance to address potholes and pavement surface failures; and drainage ditch maintenance. Through this study and other more extensive studies of the roads and drainage systems, the City can get a good understanding of the costs and construction involved to repair the roadways and drainage systems.

The affect of development on the drainage in the City must be addressed for the future. Since development increases impermeable cover (from structures, roads, driveways, etc.), an acceptable amount of permeable ground cover in the City must be maintained to allow water to be absorbed and minimize run-off. Special bricks or other special construction material may be used and the City can also develop regulations such as a landscape ordinance that requires developments to keep a minimum percentage of the

native trees and vegetation or to plant new vegetation. If left unregulated, development could ultimately seal the ground from water absorption, and increase the speed and amount of run-off and the chances for additional flooding.

Several different methods are used in various areas in the state to control streams and areas that are prone to flooding. These methods can either directly control the flooding stream or control drainage ways and creeks that "feed" the major drainage channel, lessening the amount and speed of water.

Some measures that can be used to control flooding include, but are not limited to:

- ✓ Retention Ponds - Permanent walls or earthen berms intended to hold storm water for absorption and evaporation.
- ✓ Detention Ponds - Similar to retention ponds; intended to slow down the runoff of storm water. Designed to hold water from a higher intensity (100-year) flood and release it at the rate of a lower intensity (10-year) flood.
- ✓ Porous Paving - An alternative type of paving that allows for absorption of storm water into the ground instead of forcing it into the City's storm water system.
- ✓ Levees - Similar to retention ponds; a form of terracing that hold storm water for absorption and evaporation.
- ✓ Channelization - Consists of the shaping of a stream, including the potential paving of the banks or entire drainage way to direct the removal of storm water.

One of the most successful measures implemented in the State is the detention pond system. Many municipalities, as a part of flood management, have implemented a detention requirement for sites as small as an acre. However, numerous small detention facilities can be difficult to construct and maintain or have a significant effect during peak flooding periods. Large, regional detention facilities designed for larger acreage can often prove more efficient. Though technically possible and adequate to reduce the amount of major channel enlargement required to handle a flood, detention ponds are usually not economical and will not solve existing flooding alone. Detention ponds can

be detrimental to existing development due to implementation costs, loss of land, maintenance, and health hazards.

Since the major drainage problems in Lucas cannot be directly addressed by these methods, the City must determine what steps may be taken both currently and in the future for improvement of drainage within the City. In order to address existing problems, the City must develop a program for the increased maintenance of the existing drainage system. Future plans can include the design and construction of drainage facilities.

Certain administrative controls can be implemented which gives the City control over development in flood areas. A flood prevention ordinance preventing construction in the flood plain is one example of a land use control. This ordinance could regulate development that would not allow people to construct buildings, especially homes, in areas prone to flooding in order to protect them from loss of property or loss of life. This type of ordinance would prohibit a building permit for any structure in a flood hazard area. Land subject to flooding could be controlled administratively through zoning for parks, open space or agricultural use.

Another method of regulating land use in flood hazard areas is through the subdivision ordinance. The primary control that may be imposed through the ordinance is to require the installation of an underground storm sewer system that meets minimum City standards for the subdivision. The developer of a proposed subdivision would be required to construct an underground storm sewer system including curb and gutter to protect the new development from local flooding. If each new development within the City and the ETJ is required to install such improvements, the City would then be closer to developing a functional drainage system.

In addition, any proposed residential subdivision would be required to limit the amount of impervious cover in the development (streets, driveways, etc.) in order to regulate the volume of run-off of new development, as compared to the natural runoff rate before the development. This type of control would allow new facilities to be constructed without major modifications to the existing, natural drainage system. In addition, the City may

also require all future developments (commercial and industrial as well as residential) to provide sufficient drainage easements to accommodate future runoff and potential facilities.

GOALS AND OBJECTIVES

GOAL 1: PROTECT ALL CITIZENS OF LUCAS FROM FLOODING AND HEALTH PROBLEMS CAUSED BY POOR DRAINAGE.

OBJECTIVE 1.1:

Provide all prospective homebuyers and home builders with information from the Federal Emergency Management Agency (FEMA) about flood plains within the City by making FEMA flood rate maps regarding flood plains in the City available at city hall.

OBJECTIVE 1.2:

By the end of 2008, establish a ditch maintenance program.

OBJECTIVE 1.3:

Annually inspect existing drainage system to ensure proper functionality.

OBJECTIVE 1.4:

When possible, identify those specific drainage and street improvements, which should be undertaken concurrently to maximize expenditures.

OBJECTIVE 1.5:

By the end of this planning period, eliminate localized flooding in the areas identified in this study.

GOAL 2: PLAN FOR THE IMPACT OF FUTURE DEVELOPMENT BOTH WITHIN THE CITY AND THE EXTRA-TERRITORIAL JURISDICTION.

OBJECTIVE 2.1:

Document the enforcement of City codes and subdivision ordinances for new development. Through various City restrictions, the City can minimize the impact of new development on future drainage patterns. By requiring plans for runoff control, such as the construction of curb and or retention ponds, the City can ease the pressure on the watershed as the City becomes more developed.

PROPOSED IMPROVEMENTS

As part of the Drainage Plan, a Phased Action Plan listing priorities, estimated costs and possible funding sources has been developed and is presented below. The physical aspects of the plan are graphically presented in Figure 8.2.

Phase I

Ensure proper bar ditch operation along the following section of roadway:

STREET SECTION	FROM	TO
White Rock Trail	all	

Construction activities shall include cleaning/deepening bar ditches as well as providing proper slopes. Culvert # 154 should also be examined to ensure proper functionality. This project should be coordinated with the Street Plan.

Cost: All work will be performed by City crews.

Phase II

Ensure proper bar ditch operation along the following sections of roadway:

STREET SECTION	FROM	TO
Orchard Road	all	
Citrus Way	all	
Orange Cove	all	
Mandarin Cove	all	
Lemon Cove	all	
Lime Cove	all	

Construction activities shall include cleaning/deepening bar ditches.

Cost: All work will be performed by City crews.

Phase III

Ensure proper bar ditch operation along the following sections of roadway:

STREET SECTION	FROM	TO
Woodmore Drive	all	
Highland Circle	all	
Crestview Circle	all	

Construction activities shall include cleaning/deepening bar ditches. Culvert # 76 should also be examined to ensure proper functionality.

Cost: All work will be performed by City crews.

Phase IV

Ensure proper bar ditch operation along the following sections of roadway:

STREET SECTION	FROM	TO
West Lucas Road	Farm to Market 2551	County Road 262
Stinson Road	Parker Road	Culvert #18

Construction activities shall include cleaning/deepening bar ditches. Culvert # 20 should also be examined to ensure proper functionality.

Cost: All work will be performed by City crews.

The physical aspects of the plan are graphically presented in Figure 8.2.

POSSIBLE FINANCIAL SOURCES:

The following is a listing of sources which may be utilized to assist with future drainage projects:

- ✓ The City's General Fund
- ✓ Bonds
- ✓ Grants through the Office of Rural Community Affairs
- ✓ Drainage fees on utility bills. As the area becomes more developed, proper drainage will become an increasing problem and impact fees normally are not used for street and drainage improvements. Because of drainage problems in other cities, drainage fees to pay for improvements such as channelization have been implemented.
- ✓ City participation
- ✓ Individuals who are required to perform community service can often be utilized to do some of the required labor. Often times, this can be accomplished by participating with local governmental units and the county judicial system.
- ✓ Texas Department of Transportation (TXDOT)
- ✓ Texas Department of Agriculture

APPENDIX 9.1
CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

CON = Reinforced Concrete Pipe
CMP = Corrugated Metal Pipe
CIP - Cast Iron Pipe
CH - Channel
BR - Bridge

Number	Size	Length	Type	Headwall	Water	Weeds	Plugged	Crushed	Comment
1	32	100	CON	Yes	No	No	No	No	(2 facilities)
2	32	60	CON	Yes	No	No	No	No	(3 facilities)
3	24	60	CON	Yes	No	No	No	No	(3 facilities)
4	32	60	CON	Yes	No	No	No	No	(2 facilities)
5	32	60	CON	Yes	No	No	No	No	(2 facilities)
6	9' x 3'	40	CON	Yes	No	No	No	No	
7	9' x 3'	40	CON	Yes	No	No	No	No	
8	32	40	CON	Yes	No	No	No	No	(2 facillities)
9	18	40	CON	Yes	No	No	No	No	(2 facillities)
10	32	30	CMP	No	No	No	No	Yes	
11	32	40	CON	Yes	No	No	No	No	
12	24	40	CON	Yes	Yes	No	No	No	(3 facillities)
13	18	30	CMP	No	No	No	Yes	Yes	
14	36	50	CON	No	No	Yes	No	No	
15	36	30	CON	No	Yes	Yes	No	No	
16	24	30	CMP	No	Yes	Yes	No	No	
17	32	30	CMP	No	Yes	No	Yes	No	
18	80	40	CIP	Yes	Yes	No	No	No	(2 facillities)
19	32	30	CMP	No	Yes	Yes	No	No	
20	24	30	CMP	No	No	No	Yes	No	
21	24	40	CMP	Yes	No	No	No	No	
22	18	30	CMP	No	No	Yes	No	No	
23	24	60	CON	No	No	No	No	No	
24	18	60	CON	No	No	No	No	No	
25	9' x 6'	40	CON	Yes	No	No	No	No	
26	32	30	CMP	No	No	No	No	No	
27	32	40	CMP	No	No	No	No	Yes	

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CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

CON = Reinforced Concrete Pipe
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BR - Bridge

28	24	30	CMP	No	No	No	No	Yes	
29	24	30	CMP	No	No	No	No	Yes	
30	24	40	CON	No	No	No	No	No	
31	24	50	CMP	No	No	No	No	Yes	
32	9' x 6'	30	CON	Yes	No	No	No	No	
33	24	24	CON	No	No	No	Yes	Yes	
34	18	24	CON	Yes	No	Yes	No	No	
35	72	24	CON	Yes	No	No	No	No	
36	24	24	CON	Yes	No	No	Yes	No	
37	24	24	CON	No	No	No	No	No	
38	24	24	CON	No	No	No	No	No	
39	24	30	CON	No	No	Yes	No	No	
40	24	30	CON	No	No	Yes	No	No	
41	24	30	CON	No	No	Yes	No	No	
42	42	60	CMP	No	No	Yes	No	No	
43	30	60	CON	No	No	Yes	Yes	No	
44	24	40	CMP	No	No	No	No	No	
45	18	30	CON	No	No	No	No	No	(3 facillities)
46	24	30	CON	Yes	No	No	No	No	
47	18	40	CON	Yes	No	No	No	No	
48	24	24	CON	Yes	No	No	No	No	
49	24	30	CON	Yes	No	No	No	No	
50	24	24	CON	Yes	No	No	No	No	
51	18	20	CON	Yes	No	No	No	No	
52	36	50	CON	No	No	No	No	No	(2 facillities)
53	72	30	CIP	No	No	No	No	No	
54	36	30	CON	No	No	No	No	No	Box on one end
55	42	30	CON	No	No	No	No	No	
56	36	30	CMP	No	No	No	No	No	
57	36	100	CMP	No	No	No	No	No	

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CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

CON = Reinforced Concrete Pipe
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BR - Bridge

58	24	30	CON	No	No	No	No	No	
59	24	30	CMP	No	No	No	No	No	
60	24	30	CMP	No	No	No	No	No	
61	24	30	CMP	No	No	No	No	Yes	
62	36	30	CMP	No	No	No	No	No	
63	24	30	CMP	No	No	No	Yes	Yes	
64	24	30	CMP	No	No	No	No	Yes	
65	24	30	CMP	No	No	No	Yes	Yes	
66	24	30	CMP	No	No	No	No	Yes	
67	24	30	CON	Yes	Yes	No	No	No	
68	12' x 8'	60	CON	Yes	Yes	No	No	No	
69	18	30	CON	Yes	No	No	No	No	
70	36	40	CON	Yes	Yes	No	No	No	
71	18	30	CON	No	No	No	No	No	
72	18	24	CON	No	No	No	No	No	
73	18	24	CON	No	No	No	No	No	
74	18	24	CON	No	No	No	Yes	No	
75	60	30	CON	No	No	No	No	No	
76	12	24	CON	No	No	No	Yes	No	
77	24	50	CON	No	No	No	No	No	
78	18	30	CON	No	No	Yes	No	No	
79	36	30	CON	No	No	No	No	No	(2 facillities)
80	24	30	CMP	Yes	No	No	No	No	
81	24	30	CON	Yes	No	No	No	No	(2 facillities)
82	18	24	CON	No	No	Yes	No	No	
83	18	40	CON	No	No	No	No	No	
84	18	24	CON	No	No	No	No	No	
85	42	30	CON	No	No	No	No	No	
86	24	30	CON	No	No	No	No	No	(2 facillities)
87	24	30	CMP	No	No	No	No	No	

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EXISTING DRAINAGE FACILITIES

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88	24	30	CMP	Yes	No	No	No	No	
89	27	40	CON	Yes	No	No	No	No	(3 facillities)
90	12'		CH	No	No	No	No	No	
91	24	40	CON	Yes	No	No	No	No	
92	12'		CH	No	No	No	No	No	
93	24	30	CON	Yes	No	No	No	No	(3 facillities)
94	24	40	CON	Yes	No	No	No	No	(3 facillities)
95	12'		CH	No	No	No	No	No	
96	8' x 3'	40	CON	Yes	No	No	No	No	(2 facillities)
97	24	30	CMP	No	No	No	No	No	
98	36	30	CMP	No	No	No	No	No	
99	42	30	CMP	No	No	No	No	No	(2 facillities)
100	24	30	CON	Yes	No	No	No	No	
101	24	70	CON	Yes	No	No	No	No	
102	24	30	CON	Yes	No	No	No	No	
103	24	40	CON	Yes	No	No	No	No	(2 facillities)
104	24	40	CON	Yes	No	No	No	No	(2 facillities)
105	24	50	CON	Yes	No	No	No	No	
106	24	50	CMP	Yes	No	No	No	No	
107	20	50	CMP	Yes	No	No	No	No	(2 facillities)
108	30	50	CMP	Yes	No	No	No	No	
109	27	40	CMP	Yes	No	No	No	No	
110	18	40	CMP	Yes	No	No	No	No	
111	48	40	CMP	Yes	No	No	No	No	
112	24	30	CON	No	No	Yes	No	No	
113	24	20	CON	No	No	Yes	No	No	
114	24	30	CON	No	No	No	No	No	
115	24	30	CON	No	No	No	No	No	
116	24	20	CON	No	No	No	No	No	
117	72	30	CMP	No	Yes	No	No	No	

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CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

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BR - Bridge

118	18	30	CON	Yes	No	No	No	No	
119	18	40	CON	Yes	No	No	No	No	
120		85	BR	No	No	No	No	No	
121	36	30	CMP	No	Yes	No	No	Yes	
122	24	40	CMP	No	No	Yes	No	No	
123	24	30	CMP	No	No	No	No	No	
124	12	24	CON	Yes	No	No	No	No	(2 facillities)
125	48	24	CMP	No	No	No	No	No	
126	30	24	CMP	No	No	No	No	No	
127	30	50	CMP	No	No	No	No	No	
128	30	50	CMP	No	No	No	No	No	
129	30	30	CMP	No	No	No	No	Yes	
130	24	24	CMP	No	No	No	No	No	
131	24	24	CMP	No	No	Yes	No	No	
132	0.6666667	24	CMP	No	No	No	No	Yes	(2 facillities)
133	24	30	CMP	No	No	No	No	No	
134		124	BR	No	No	No	No	No	
135	24	30	CMP	No	No	No	No	No	(2 facillities)
136	18	24	CON	No	No	No	No	No	
137		75	BR	No	No	No	No	No	
138	24	24	CMP	No	No	No	No	No	
139	30	24	CMP	No	No	No	No	No	(2 facillities)
140	42	24	CMP	No	No	No	Yes	No	
141	18	40	CON	Yes	No	No	No	No	
142	18	40	CON	Yes	No	No	No	No	
143	24	40	CON	Yes	No	No	No	No	(2 facillities)
144	24	40	CON	Yes	No	No	No	No	
145	24	40	CON	Yes	No	No	No	No	
146	24	40	CON	Yes	No	No	No	No	
147	24	40	CON	Yes	No	No	No	No	(2 facillities)

APPENDIX 9.1
CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

CON = Reinforced Concrete Pipe
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148	24	40	CON	Yes	No	No	No	No	
149	24	40	CON	Yes	No	Yes	No	No	
150	24	40	CON	Yes	No	Yes	No	No	
151	18	24	CON	Yes	No	No	No	No	
152	18	24	CON	Yes	No	No	No	No	
153	36	30	CON	Yes	Yes	No	No	No	
154	24	30	CON	Yes	No	No	Yes	No	
155		40	BR	No	No	No	No	No	
156	24	40	CON	No	No	No	No	No	
157	24	30	CIP	No	No	Yes	No	No	
158	36	40	CMP	No	No	No	No	No	
159		40	BR	No	No	No	No	No	
160	24	30	CON	No	No	No	No	No	
161	24	40	CON	No	No	No	No	No	
162	4' x 2'	50	CON	Yes	No	No	No	No	(2 facillities)
163	24	50	CON	Yes	No	No	No	No	(2 facillities)
164	24	30	CON	Yes	No	No	No	No	
165	24	50	CON	Yes	No	No	No	No	(4 facillities)
166	0.8571429	50	CMP	Yes	No	No	No	No	(2/3 facillities)
167	12' x 6'	30	CON	Yes	No	No	Yes	No	
168	24	40	CON	No	No	No	No	No	
169	18	40	CON	No	No	Yes	No	No	
170	48	30	CON	Yes	No	Yes	No	No	(8 facillities)
171	24	30	CON	No	No	No	No	No	
172	24	30	CMP	No	No	No	No	No	(2 facillities)
173	24	24	CMP	No	No	No	No	No	(2 facillities)
174	18	24	CON	No	No	No	No	No	
175	18	24	CON	No	No	No	No	No	
176	18	24	CON	No	No	No	No	No	
177	42	30	CON	Yes	Yes	No	No	No	(2 facillities)

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CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

CON = Reinforced Concrete Pipe
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BR - Bridge

178	72	30	CIP	Yes	Yes	No	No	No	
179	42	40	CMP	Yes	No	No	No	No	(2 facillities)
180		24	BR	No	No	No	No	No	
181	36	30	CMP	No	No	No	No	Yes	
182	6' x 6'	30	CON	No	No	No	No	No	
183	60	40	CMP	No	No	No	No	No	
184	30	40	CON	No	No	No	Yes	No	(2 facillities)
185		50	BR	No	No	No	No	No	
186	30	40	CMP	No	Yes	No	No	No	
187	24	30	CON	No	Yes	No	No	No	(3 facillities)
188	30	30	CON	No	No	No	No	No	
189	24	30	CON	No	No	No	No	No	
190	24	20	CMP	No	No	No	No	Yes	
191	18	30	CON	No	No	No	No	No	
192	24	24	CON	Yes	No	No	No	No	(2 facillities)
193	24	30	CON	No	No	No	No	No	
194	30	100	CON	No	No	No	No	No	
195	30	30	CON	Yes	No	No	No	No	
196	24	40	CON	Yes	No	Yes	No	No	
197	24	40	CMP	No	No	No	No	No	
198	96	40	CMP	No	No	No	No	No	
199	42	30	CMP	No	No	No	No	No	
200	48	40	CMP	No	Yes	No	No	No	
201	18	24	CMP	No	No	No	Yes	Yes	
202	24	30	CON	Yes	No	No	No	No	
203	24	30	CON	Yes	No	No	No	No	
204	24	30	CON	Yes	No	No	No	No	(2 facillities)
205	24	30	CON	Yes	No	No	No	No	
206	48	24	CON	Yes	No	No	No	No	
207	36	75	CON	Yes	No	No	Yes	No	Box on one end

APPENDIX 9.1
CITY OF LUCAS
EXISTING DRAINAGE FACILITIES

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CIP - Cast Iron Pipe
CH - Channel
BR - Bridge

208	24	40	CON	No	No	Yes	No	No	
209	24	40	CON	No	No	Yes	No	No	
210	18	30	CON	No	No	No	No	No	
211	28	30	CON	No	No	No	No	No	Box on one end
212	72	30	CMP	No	No	No	No	No	
213	24	30	CMP	No	No	No	No	No	
214	24	24	CMP	No	No	Yes	No	Yes	(2 facillities)
215	24	50	CON	Yes	No	No	No	No	
216	36	100	CON	Yes	No	No	No	No	
217	48	40	CON	Yes	No	No	No	No	
218	48	24	CON	No	No	Yes	No	No	
219				No	No	No	No	No	NEED DATA

Source: 2004 Survey by Tim F. Glendening & Associates, Inc.

CITY OF LUCAS
COLLIN COUNTY, TEXAS

FIGURE 8.1

EXISTING DRAINAGE SYSTEM

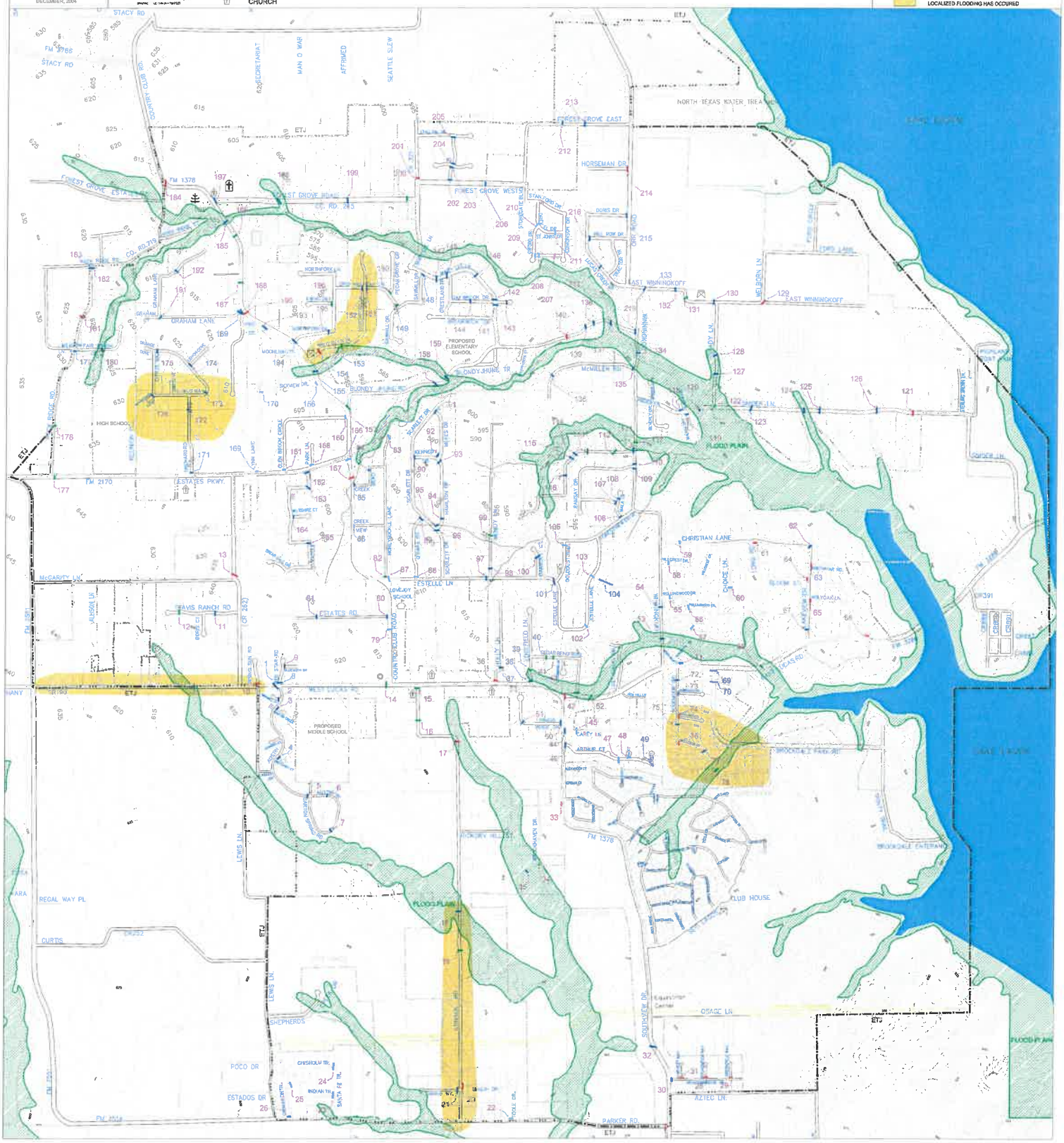
IRCA

DECEMBER, 2004

LEGEND

- CITY PARK
- WATER TOWER
- CITY HALL; POLICE DEPARTMENT
- SCHOOL
- CEMETARY
- CHURCH

- CONTOUR LINES
- CURB AND GUTTER EXISTS
- DRAINAGE FACILITY - GOOD CONDITION
- DRAINAGE FACILITY - OVERGROWN WITH VEGETATION OR PARTIALLY CLOGGED
- DRAINAGE FACILITY - PARTIALLY CRUSHED
- REFERENCE TO DRAINAGE STRUCTURE (SEE DRAINAGE STRUCTURE INVENTORY TABLE)
- LOCALIZED FLOODING HAS OCCURED



CITY OF LUCAS
COLLIN COUNTY, TEXAS

FIGURE 8.2

DRAINAGE SYSTEM PLAN

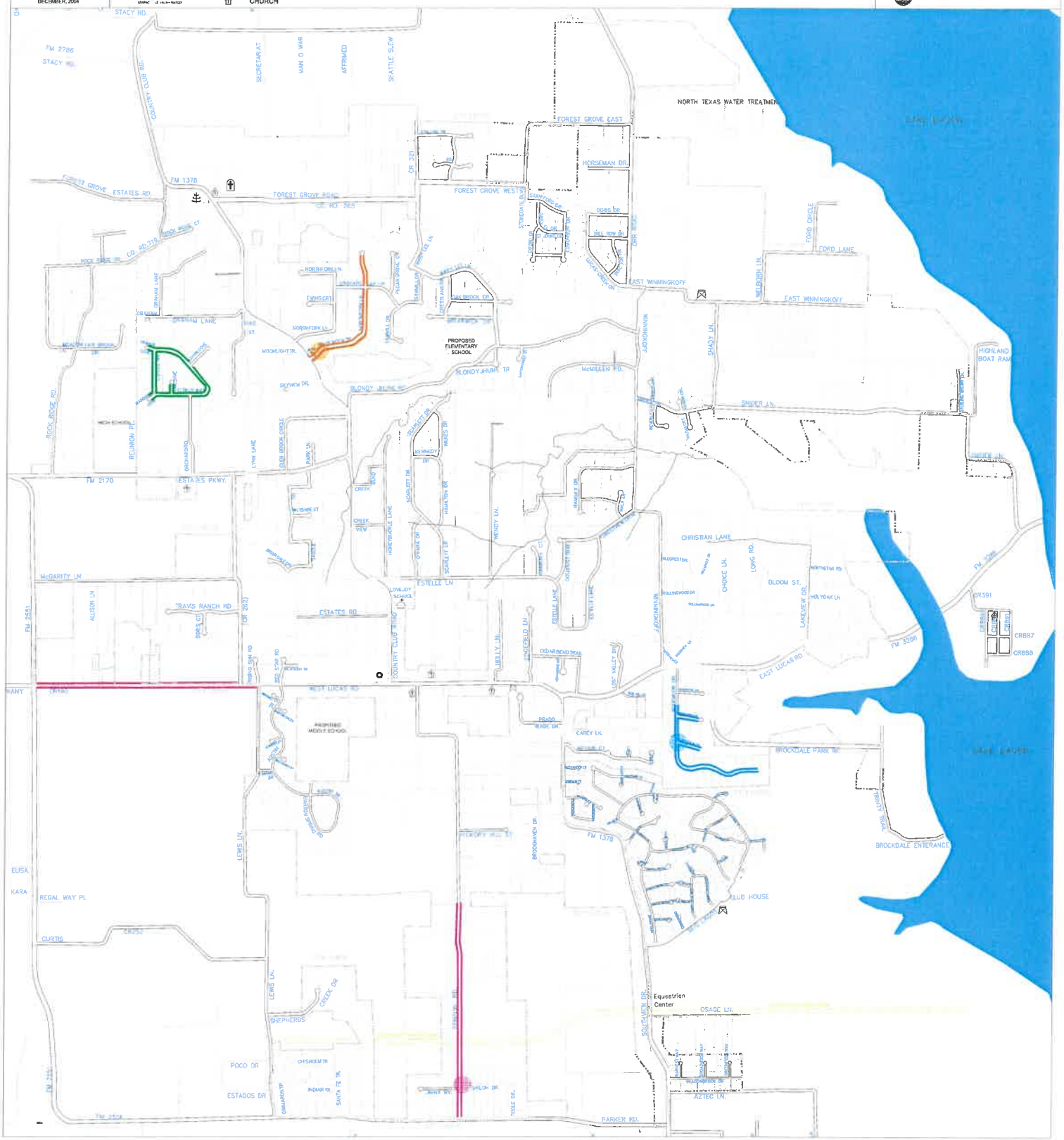
DECEMBER, 2004

LEGEND

- CITY PARK
- WATER TOWER
- CITY HALL; POLICE DEPARTMENT
- SCHOOL
- CEMETARY
- CHURCH

DRAINAGE SYSTEM PLAN

- PHASE 1 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- PHASE 2 — BAR DITCH CLEANING/DEEPENING/SLOPING
- PHASE 3 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- PHASE 4 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- BAR DITCH CLEANING/DEEPENING/SLOPING
- CULVERT CLEANING



CITY OF LUCAS
COLLIN COUNTY, TEXAS

FIGURE 8.1

EXISTING DRAINAGE SYSTEM

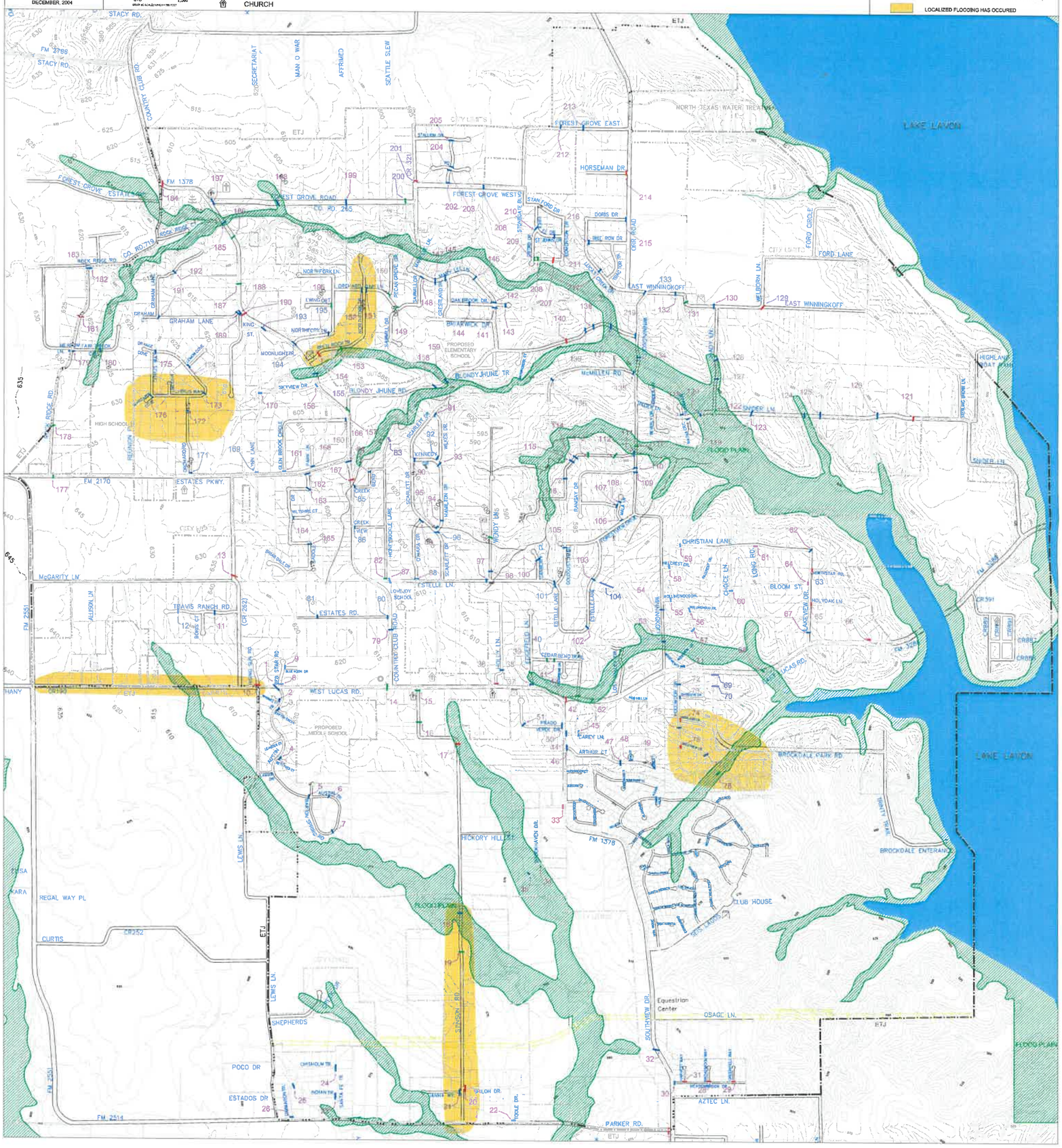
DECEMBER, 2004

0 750 1,500

LEGEND

- CITY PARK
- WATER TOWER
- CITY HALL; POLICE DEPARTMENT
- SCHOOL
- CEMETERY
- CHURCH

- CONTOUR LINES
- CURB AND GUTTER EXISTS
- DRAINAGE FACILITY - GOOD CONDITION
- DRAINAGE FACILITY - OVERGROWN WITH VEGETATION OR PARTIALLY CLOGGED
- DRAINAGE FACILITY - PARTIALLY CRUSHED
- REFERENCE TO DRAINAGE STRUCTURE (SEE DRAINAGE STRUCTURE INVENTORY TABLE)
- LOCALIZED FLOODING HAS OCCURED



CITY OF LUCAS
COLLIN COUNTY, TEXAS

FIGURE 8.2

DRAINAGE SYSTEM PLAN

DECEMBER, 2004

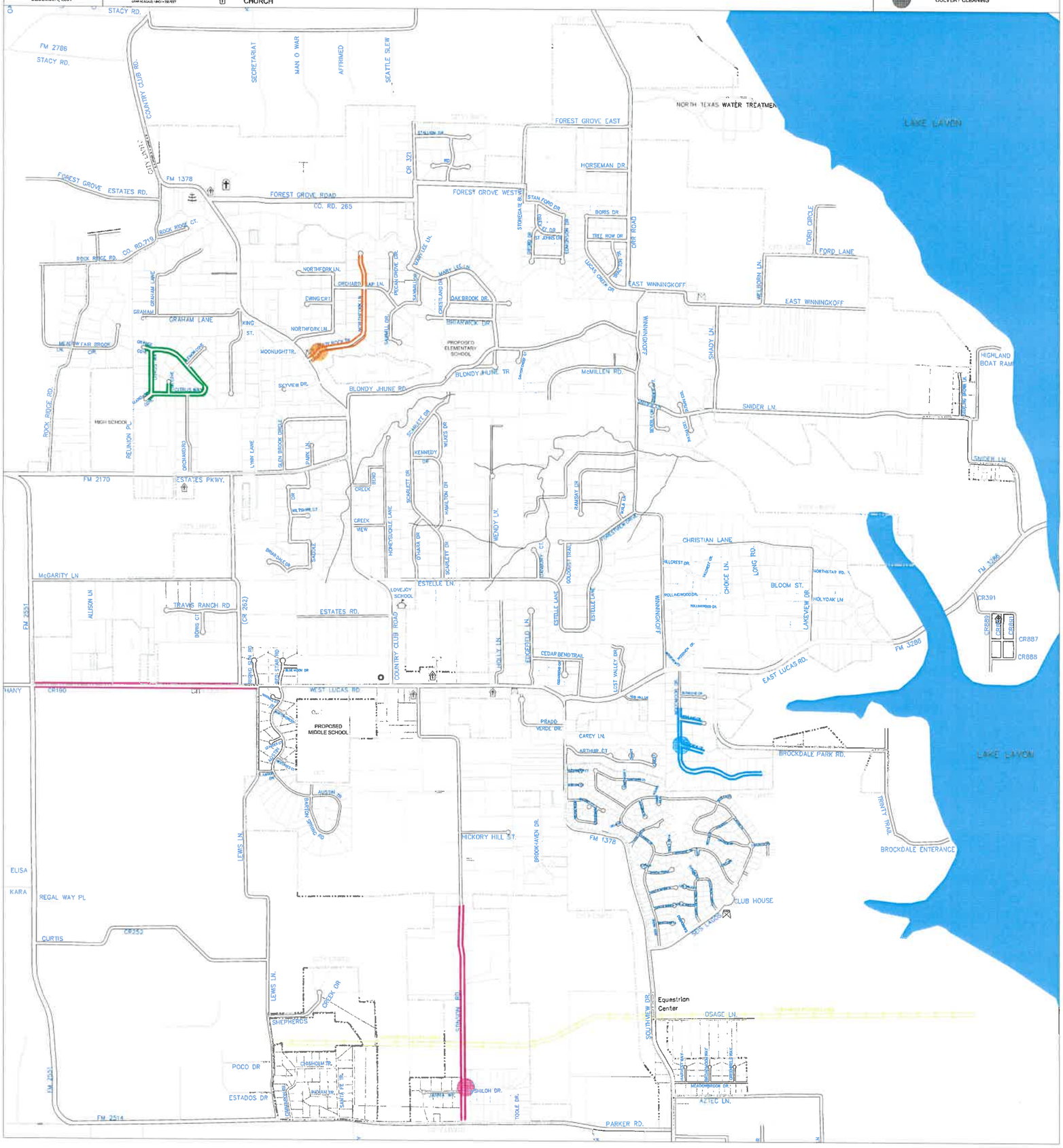
0 750 1,500

LEGEND

- CITY PARK
- WATER TOWER
- CITY HALL; POLICE DEPARTMENT
- SCHOOL
- CEMETARY
- CHURCH

DRAINAGE SYSTEM PLAN

- PHASE 1 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- PHASE 2 — BAR DITCH CLEANING/DEEPENING/SLOPING
- PHASE 3 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- PHASE 4 — BAR DITCH CLEANING/DEEPENING/SLOPING AND CULVERT CLEANING.
- BAR DITCH CLEANING/DEEPENING/SLOPING
- CULVERT CLEANING



City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 03

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Discuss the creation of a Paving Design Manual for the City's Code of Ordinances, Chapter 10, Subdivisions, Article 10.03 Subdivision and Development and provide direction to staff on any proposed amendments.

Background Information

The standard the City has adopted for paving design is NCTCOG paving design standards.

Design standards collectively means the drainage and stormwater pollution prevention design manual, the current North Central Texas Council of Governments ("NCTCOG") paving design standards, and water and wastewater design manual. The City does not own a copy of the NCTCOG Paving Design Standards or the Water and Wastewater Design Manual. We have ordered a copy of the NCTCOG design standards for paving design and anticipate having a copy available prior to the Planning and Zoning Commission meeting.

The City has reviewed the paving design manual for the cities of Heath, Fairview, McKinney and Collin County, that all vary widely in substance and information. We have included the Town of Fairview design standards as an example, as their standards are similar to Lucas. Fairview has incorporated design standards within their Code of Ordinances and has adopted the NCTCOG design standards.

Staff would like direction from the Commission regarding which type of design manual the City would like to adopt. Questions raised from the City's plan review are as follows:

- Turn radius, fire lanes, roads, and interior parking
- Line of sight requirements
- Road connection for drives and road intersections

Attachments/Supporting Documentation

1. Fairview Paving Design Manual

Budget/Financial Impact

NA

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 03

Recommendation

Provide direction to City staff of any proposed amendments. Staff would recommend maintaining the City's current standards and incorporating any perceived deficiencies.

Motion

There is no motion required for this item. This is a discussion item only.

Fairview Paving Design Manual

Part II. Standard Specifications and Details

Sec. 3.16.061 Lime-treated subgrade

(a) The contractor shall rough grade to the proposed top of subgrade as shown on the plans. Areas shall be proof rolled and any soft areas shall be excavated and replaced with satisfactory material.

(b) Lime slurry shall be type B, grade 1, as specified under TXDOT item 264. Lime shall be applied at a rate of 6% of the dry weight of the soil. First mixing shall be allowed to moist cure for 48 hours at the proper moisture content. Final mixing shall begin after the mixture is tested to insure a minimum of 60% passing a no. 4 sieve. Material shall then be compacted to a minimum of 95% standard proctor.

(1998 Code, sec. 97.41)

Sec. 3.16.062 Asphalt paving

(a) Foundation course.

(1) A six-inch crushed stone foundation course shall be placed above the lime-treated subgrade. All borrow material with a plasticity index (PI) greater than 15 will require the addition of 3% by weight of lime as specified under section 3.16.061. Borrow material with a PI equal to or less than 15 will not require any lime treatment. The developer shall submit test reports on the borrow material to the town. The foundation course shall be compacted to a minimum density of 95% standard proctor.

(2) Two-course surface treatment or alternate type D surface course shall not be applied when the air temperature is below 60° and is falling, but it may be applied when the temperature is above 50° and rising. Asphaltic material shall not be placed when general weather conditions, in the opinion of the engineer, are not suitable.

(b) First course.

(1) Asphaltic materials. The asphaltic materials used shall be AC-5 or AC-10, and shall be applied at the rate of 0.35 gallons per square yard.

(2) Aggregate. The aggregate used shall be of the type and grade shown and shall be applied at the rate of 1.0 cubic yard per 70 square yards. Aggregate shall conform to TXDOT item 301, type B, grade 2.

(c) Second course.

(1) Asphaltic materials. The asphaltic materials used shall be AC-5 or AC-10, and shall be applied at the rate of 0.35 gallons per square yard.

(2) Aggregate. The aggregate used shall be of the type and grade shown and shall be applied at the rate of 1.0 cubic yard per 110 square yards. Aggregate shall conform to TXDOT item 301, type B, grade 4.

(A) The area to be treated shall be cleaned of dirt or other deleterious matter by sweeping or other approved methods. The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor so as to distribute the material in the quantity specified, evenly and smoothly, under a pressure necessary for proper distribution. No traffic or hauling will be allowed over the freshly applied asphalt.

(B) The aggregate shall be immediately and uniformly applied and spread by a self-propelled continuous feed aggregate spreader. Rolling shall proceed in a longitudinal direction, beginning at the outer edges and working towards the center.

(d) Alternate surface course. As an alternate to the second course surface treatment, a two-inch deep application of TXDOT item 340, type D, fine graded surface course, may be installed upon the foundation course. The minimum in-place density after compaction shall be 97% of the recorded laboratory density.

(1998 Code, sec. 97.42)

Sec. 3.16.063 Streets generally

(a) The arrangement, character, extent, width, grade, and location of all proposed streets shall conform to the town's thoroughfare plan, and their relationship shall be considered to that of the existing and planned streets, to the preservation of existing trees and tree thickets, to topographical conditions, and to public convenience and safety, and in their appropriate relation to the proposed uses of the land to be served by such streets.

(b) Where such is not shown in the town's thoroughfare plan for the community, the arrangements of streets in a subdivision shall:

(1) Provide for the appropriate continuation or completion of existing collector streets and thoroughfares in surrounding areas;

(2) In the case of residential streets, conform with section 10.02.282 of chapter 10, subdivision regulation;

(3) Conform to a plan for the neighborhood approved or adopted by the town to meet a particular situation where topographical or other conditions make continuation of or conformance to an existing street impracticable;

(4) Be aligned so that they will intersect, as nearly as possible, at right angles; and

(5) Preserve existing trees and tree thickets to the extent possible, without prohibiting street conformance or continuation in a practical manner.

(c) Residential streets shall be laid out so that their use by through traffic shall be discouraged.

(d) Street jogs with centerline offsets of less than 200 feet shall be avoided.

(e) Street right-of-way widths shall conform to the following:

	Type of Street	**Minimum Right-of-Way Width**
	Major thoroughfare	100 ft.
	Collector	80 ft.
	Residential	50 ft.

(Ordinance 2014-2-4B, ex. A, adopted 2/4/14)

(f) Half streets shall be prohibited, except where necessary to the reasonable development of the subdivision in conformance with the other requirements of these regulations. Where the town finds it will be practicable to require the dedication of additional right-of-way to an existing street adjacent to the area to be subdivided, the entire right-of-way shall be shown on the plat of the subdivider. Where part of a street is being dedicated along a common property line, the first dedication shall be one-half of the proposed street right-of-way plus five feet. A minimum of 24-foot width

of pavement shall be constructed within the one-half street right-of-way with proper drainage (two-way traffic for safety and practicality).

(g) Twelve lots for RE-2 and 24 lots for RE-1 shall face on any street that ends in a cul-de-sac. No parking shall be allowed in any cul-de-sac and no obstructions shall be built or allowed in a turnaround. The maximum length of a residential cul-de-sac will be 1,200 feet from the centerline of the intersecting street to the center of the cul-de-sac.

(h) All streets shall be paved, and the paving shall conform to these regulations.

(i) Street grades shall be established regarding topography, proposed land use, and the facilities in the area surrounding the land to be subdivided. An absolute minimum grade of one percent will be allowed on concrete streets.

(j) Street name markers shall be installed in accordance with the prescribed type currently in use by the town, or an approved equal, as approved by the town manager. Street markers and the erection thereof will be at the expense of the subdivider.

(k) Residential lots shall not face arterial streets or thoroughfares and driveways or alley pavement cuts shall not be permitted on arterial streets. Alleys shall be provided along side and rear lot lines on arterial streets for rear entrance.

(l) (1) The developer shall employ a registered professional engineer or a qualified laboratory testing agent for each project. Such engineer or agent shall ensure that construction will be in accordance with the approved plans and specifications. Duties of the engineer or agent will include, but will not be limited to, inspection, testing compaction, moisture content, and lime application rate of the subgrade, inspection and testing plasticity index (PI) and lime application rate of the foundation course, and testing application rates, thickness, density, and inspection of the installation of the roadway surface course. The town and contractor will receive reports of all items, and those not in compliance with the specifications shall have recommendations for corrective action. The town will have full authority to ensure that the corrective action required will be made. The developer will bear the cost of the engineer or agent and any required testing. Samples and testing results shall be furnished to the town. Material testing shall meet the state department of transportation (TXDOT) requirements, Standard Specifications for Road and Bridge Construction.

(2) All items refer to item numbers in TXDOT Standard Specifications. Items 110 and 132, Roadway Excavation and Embankment, provide

requirements for the construction within which the contractor shall work so as to conform to lines and grades as shown on the plans.

(3) Whenever the work provided for in and contemplated under the contract has been completed and the final cleanup performed, the developer will notify the town. The town will conduct the final review, which will be made within 30 days after such notification or as soon thereafter as practicable. After such final review, if the work is found to be satisfactory, the developer will be notified. If not satisfactory, the developer will be notified in writing of the corrective action required for approval.

(4) Where the work consists of concrete pavements of concrete base, the final acceptance will not relieve the developer from responsibility for the thickness of the concrete, which will be determined by means of taking cores from pavement at 200-foot intervals. The coring of the pavement will be done within 30 days from the completion of the pavement. The developer will bear the expense of having the pavement cored.

(1998 Code, sec. 97.43)

(m) Roadway landscape borders.

(1) Applicability. This subsection (m) applies to the new construction of all roadways, streets, and highways (collectively, "roadways") within the town's corporate limits and its extraterritorial jurisdiction and to new improvements made to existing roadways within the town's corporate limits and its extraterritorial jurisdiction. For the purposes of this subsection, "new construction" and "new improvements" does not include routine repair, maintenance or resurfacing of an existing roadway if such repair, maintenance or resurfacing does not widen or result in any other design modifications to such roadway. This subsection (m) does not apply to privately owned and maintained roadways or roadways to which the CPDD streetscape requirements apply.

(2) Intent. The intent of this subsection (m) is to preserve existing tree thickets, and create newly planted tree groves in natural-appearing clusters, which create a rural edge and definition of streets in the town.

(3) The width of the roadway landscape border is measured from the outside edge of the street pavement to the outer line of the rights-of-way, or easements that will allow planting to occur, whichever is furthest from the

edge of the street pavement. These borders are located on both sides of the street.

(4) The landscaping within the width of roadway landscape borders to which this subsection (m) applies shall meet the following landscaping requirements:

(A) Tree density. A minimum of six trees are required per 100 linear feet of landscape border on each side of the street, which may be planted anywhere within the roadway landscape border. Credit will be given for maintaining existing trees of equal or greater size if they are listed in appendix C to article 3.15.

(B) Tree size. There shall be a minimum of sixty (60%) percent large trees ranging from 5"–8" diameter at breast height (DBH), with the remainder being small trees 3"–4" DBH. Approved landscaping shall conform to the quality and understory trees, as listed in appendix C to article 3.15, as well as the list of "acceptable trees" maintained by the town's landscape administrator, that are acceptable for planting along streets, within parks, and other public areas, as stated in section 3.15.076 of this chapter.

(C) Protected trees. Removal of protected trees, as identified in this chapter, from the width of the roadway landscape border shall require replacement in accordance with section 3.15.078 of this chapter and shall otherwise comply with all applicable federal, state and local laws and regulations.

(D) The requirements of this subsection (m) may be waived as to any portion of roadway by the town council to the extent that full compliance would clearly result in a roadway hazard based on visibility requirements at intersections or other such instances that may cause a hazard on the roadway.

(n) Street median landscape requirements.

(1) Applicability. This subsection (n) applies to the new construction of all roadway, street, and highway medians (collectively, "medians") within the town's corporate limits and its extraterritorial jurisdiction and to new improvements made to existing medians within the town's corporate limits and its extraterritorial jurisdiction. For the purposes of this subsection, "new construction" and "new improvements" does not include routine repair,

maintenance or landscaping/planting performed within an existing median if such repair, maintenance or landscaping/planting does not widen or result in any other design modification to such median. This subsection (n) does not apply to privately owned and maintained medians to which the CPDD streetscape requirements apply.

(2) Intent. It is the intent of this subsection to ensure that medians resulting from street construction shall contribute to the rural character of the community through forestation.

(3) The landscaping within medians to which this subsection (n) applies shall meet the following landscaping requirements:

(A) Tree density. Medians may vary in width, and shall contain a minimum of thirteen (13) trees per 10,000 square feet of median area.

(B) Tree size. There shall be a minimum of sixty (60%) percent large trees (5"–8") DBH, with the remainder being small trees (3"–4") DBH, and shall be selected from the "quality and understory" trees only, as listed in appendix C to article 3.15, also from the list of "acceptable trees" maintained by the town's landscape administrator as stated in section 3.15.076 of this chapter.

(C) Tree placement. Tree placement and arrangement shall be in tight clusters and groupings, tying median and street shoulders together to achieve a complete street corridor that is as natural, yet rural in appearance as possible.

(D) The requirements of this subsection (n) may be waived as to any portion of median by the town council to the extent that full compliance would clearly result in a roadway hazard based on visibility requirements at intersections or other such instances that may cause a hazard on the roadway.

(Ordinance 2011-3-1A, sec. 3, adopted 3/1/11)

Sec. 3.16.064 Alleys

(a) Alleys may be required in commercial and industrial districts and shall be paved with reinforced concrete to comply with collector street specifications. The town may waive this requirement where other definite and assured provision is made for service

access, such as off-street loading, unloading, and parking consistent with and adequate for the uses provided.

(b) The minimum right-of-way width of an alley shall be 20 feet in industrial and commercial areas. The alley turnouts shall be paved to the property line and shall be at least two feet wider than the alley paving at that point. The radii of the turnouts for alleys intersecting thoroughfares shall be 16 feet and shall be ten feet at intersections with all other streets.

(c) Alley intersections and sudden changes in alignment shall be avoided, but, where necessary, lot corners shall be cut off at least 15 feet on each tangent to permit safe vehicular movement.

(d) Dead-end alleys shall be avoided where possible, but, if unavoidable, they shall be provided with adequate turnaround facilities, as determined by the town.

(e) All alleys shall be paved, and the paving shall conform to these regulations.

(f) Where driveways connect to alleys in commercial and/or industrial areas, fences may be constructed along the rear lot line of any lot to a point within five feet of a point where the driveway would intersect the alley pavement at 90°. Fences are optional.

(1998 Code, sec. 97.44)

 **Sec. 3.16.065 Other improvements**

(a) All improvements proposed for any subdivision to be developed under the jurisdiction of this division shall be furnished and installed by the subdivider in accordance with the Standard Specifications for Public Works Construction published by the North Central Texas Council of Governments and any amendments thereto.

(b) All improvements, even in previously approved but still unimproved subdivisions, shall conform to the town's current regulations and specifications for street, drainage, and utility construction. A coring of the streets may be required by the town.

(1998 Code, sec. 97.45)

 **Sec. 3.16.066 Concrete paving**

(a) Concrete strength.

(1) Concrete curb and gutter. Concrete curb and gutter shall be constructed of a concrete batch design, providing a 28-day compressive strength of 3,600 pounds per square inch (psi).

(2) Reinforced concrete pavements and monolithic curb. Concrete pavement and monolithic curb properly and continuously reinforced shall be constructed of a concrete batch design providing the appropriate 28-day compressive strength. The minimum reinforcement shall be no. 3 deformed bars spaced at 18 inches center-to-center both ways. Mountable curbs may be used on all residential street and collector streets in residential areas.

(3) Bridges.

(A) Bridges are considered concrete paving and will abide by paving codes except that an additional six feet shall be constructed on one side for sidewalks and guardrails.

(B) All bridges must be classified for HS20 trucks and must follow those guidelines found in the American Association of State Highways and Transportation Officials Standard Specifications for Highway Bridges.

(b) Pavement thickness.

(1) Residential street construction.

(A) The subdivider shall, at his own cost and expense, pay for constructing all residential streets within his subdivision and all perimeter streets to a minimum of 26 feet or one-half, whichever is greater.

(B) A six-inch thickness of 3,600 psi reinforced concrete pavement on six-inch compacted 95% standard proctor density subgrade shall be required. All steel reinforcing shall be deformed no. 3 bars on 18-inch centers both ways.

(C) Where the plasticity index of the soil is 15 or greater, stabilization of the subgrade, six inches thick with a minimum six percent hydrated lime by weight as stated by soils investigation, shall be required. Compaction of the lime-stabilized subgrade shall be to 95% standard proctor density.

(D) Any proposed pavement section of lesser thickness or alternate materials shall be fully documented by the design engineer to substantiate the fact that such alternate will provide an equivalent capacity for the pavement noted above and must be approved by the town.

(E) Coring of the streets at a minimum of 200-foot intervals will be required by the town to insure proper thickness.

(2) Collector street and commercial or industrial alley construction.

(A) The subdivider shall, at his own cost and expense, pay for constructing all collector streets and alleys within his subdivision and one-half of all perimeter streets and alleys.

(B) Collector streets and alleys shall be designed and constructed with eight-inch thickness of 3,600 psi reinforced concrete pavement on six-inch compacted 95% standard proctor density subgrade. All steel reinforcing shall be deformed no. 4 bars on 24-inch centers both ways.

(C) Where the plasticity index of the soil is 15 or greater, stabilization of the subbase with a six-inch thickness of minimum six percent hydrated lime by weight will be required. Compaction of the lime-stabilized subgrade shall be to 95% standard proctor density.

(D) Any proposed pavement section of lesser thickness or alternate materials shall be fully documented by the design engineer to substantiate the fact that such alternate will provide an equivalent capacity for the pavement noted above and must be approved by the town.

(E) Contouring of the streets at a minimum of 200-foot intervals will be required by the town to insure proper thickness.

(3) Major thoroughfare construction.

(A) On roadways, adjacent to the proposed subdivision, that are designated to be major thoroughfares, the subdivider shall be required to construct, at his own cost and expense, one-half of the street section with integral curbs on each side.

(B) Where major thoroughfares traverse a subdivision, the subdivider shall be required, at his own cost and expense, to construct up to a 22-foot-wide section on each side of the centerline of the roadway.

(C) Thoroughfares shall be designed and constructed with an eight-inch thickness of 4,000 psi reinforced concrete pavement on six-inch compacted 95% proctor density subgrade. An additional subbase course to prevent pavement pumping may be required if the amount of heavy truck traffic and associated ESALs is determined to be excessive by the town engineer. All steel reinforcing shall be deformed no. 4 bars at 24-inch centers both ways.

(D) Where the plasticity index of the soil is 15 or greater, stabilization of the subgrade, six inches thick with minimum six percent hydrated lime by weight as stated by soils investigation, shall be required. Compaction of the lime-stabilized subgrade shall be to 95% standard proctor density.

(E) Any proposed pavement section of lesser thickness or alternate materials shall be fully documented by the design engineer to substantiate the fact that such alternate will provide an equivalent capacity for the pavement noted above and must be approved by the town.

(F) Coring of the streets at a minimum of 200-foot intervals will be required by the town to insure proper thickness.

(4) Alleys. Alleys in industrial and commercial areas shall be a width four feet less than the right-of-way, two feet off both sides, and follow collector streets specifications (center in right-of-way).

(c) Pavement width.

(1) Residential streets and collector streets.

(A) Residential street paving shall be a minimum of 26 feet in width, measured between the edge of concrete pavement and/or the faces of curbs.

(B) Collector street paving shall be a minimum of 40 feet in width, measured between the edge of pavement and/or the faces of curbs, except that the width for collector streets in industrial and commercial

areas must be a minimum of 44 feet in width measured between the edge of pavement and/or the faces of the curbs.

(2) Alleys. Alley paving shall be 16 feet wide in commercial and industrial areas. Alley turnouts shall be paved to the property line and shall be at least two feet wider than the alley paving at that point. Paving radius where alleys intersect residential and collector streets shall be ten feet and, where alleys intersect thoroughfare streets, the radius shall be 15 feet.

(3) Thoroughfares. The following minimum pavement widths are set by this division for the construction of thoroughfares as follows:

Thoroughfare Classification	**Minimum Right-of-Way Width**	**Minimum Pavement Width Between Faces of Curbs or Edge of Pavement**
Major thoroughfare	100'	Two 33' traffic lanes divided by a 15' median
Collector A (commercial)	80'	Four 11' traffic lanes
Collector B (residential)	80'	Two 12' traffic lanes and two 8' parking lanes
Residential	65'	26' face of curbs or edge of pavement

(4) Turn lanes.

(A) The minimum width of a median adjacent to a left turn lane shall be five feet.

(B) The minimum stacking for a left turn lane should be 60 feet with a 100-foot transition.

(C) Median openings should be a minimum of 60 feet in width.

(5) Street returns.

(A) The minimum radius for all street returns shall be 20 feet.

(B) Returns for driveways on residential streets shall be ten feet. Commercial and industrial driveway returns shall be a minimum of ten feet and a maximum of 20 feet except in special cases.

(d) Miscellaneous requirements.

(1) Reinforcing steel. Steel for street and alley paving shall meet ASTM designation A15, A16, or A408 and be deformed bars.

(2) Sawed dummy joints.

(A) Sawed dummy transverse joints shall be not greater than 20 feet apart and as required by the town engineer at intersections.

(B) Longitudinal sawed dummy joints shall be required in all pavements where the concrete is poured in a continuous width of 30 feet or more. The longitudinal dummy joint shall be located at the one-third point of the width or as directed by the town.

(3) Expansion joints.

(A) Expansion joints shall be placed at distances no greater than 200 feet and shall be constructed in accordance with the town's standards. Construction joints shall be constructed in accordance with the NCTCOG joint standard.

(B) Expansion joints shall have no. 5 smooth dowels at 24-inch centers that are acceptable to the town. Construction joints shall have the reinforcing bars continuous through the joint.

(4) Longitudinal pavement slopes.

(A) The minimum longitudinal standard alley pavement slopes shall be as set forth in section 3.16.063(i).

(B) The maximum longitudinal slopes are as follows:

Type of Street	**Maximum Slope**
Major thoroughfare	6%
Collector A and B	8%
Residential	10%

(C) Maximum grades for alleys shall be 8:1 within 30 feet of its intersection with a street and 12.5% elsewhere.

(5) Transverse pavement slopes. The transverse pavement slope for all nondivided streets shall consist of a parabolic curve from the pavement centerline to the gutter. The crown of the parabolic curve shall be four inches above the gutter grade on residential streets and six inches on collector streets. For divided streets, the transverse slope shall be as required by the town.

(6) Lime stabilization.

(A) The contractor shall rough grade to the proposed top of subgrade as shown on the plans. Areas shall be proof rolled and any soft areas shall be excavated and replaced with satisfactory material.

(B) Lime slurry shall be type B, grade 1, as specified under TXDOT item 264. Lime shall be applied at a rate of 6% of the dry weight of the soil. First mixing shall be allowed to moist cure for 48 hours at the proper moisture content. Final mixing shall begin after the mixture is tested to insure a minimum of 60% passing of no. 4 sieve. Material shall then be compacted to a minimum of 95% standard proctor.

(1998 Code, sec. 97.46)

  **Sec. 3.16.067 Sidewalks**

(a) Concrete sidewalks, if installed, shall have a width of not less than four feet and thickness of not less than four inches and shall be constructed of 3,000 psi concrete on both sides of all streets and thoroughfares within the subdivision. Sidewalks shall be constructed one foot from the property line within the street or thoroughfare right-of-way or one foot from the dedicated sidewalk easement (when required to accommodate ditch drainage and the like) and shall extend along the street frontage, including the side of corner lots and block ends.

(b) Sidewalks in commercial areas shall be a minimum width of five feet and extend from the back of the curb.

(c) All concrete for sidewalks shall be placed on a two-inch sand cushion and shall be reinforced with 6 x 6 no. 10 gauge welded wire fabric.

(d) The longitudinal slope of sidewalks shall be that of the curb adjacent to the sidewalk. The transverse slope of the sidewalk shall be one-fourth inch per foot starting at the back of the curb. The maximum ground slope from the edge of the sidewalk on the property line side shall not exceed 12.5% (8:1). If it does exceed 12.5% (8:1), a retaining wall that is acceptable to the town shall be provided on the property line.

(1998 Code, sec. 97.47)

Sec. 3.16.068 Driveway approaches

(a) A driveway approach is defined as that access or transitional portion of a driveway intended for vehicular traffic, and running from the street curb line or edge of paving (or rock/gravel) to the property line.

(b) As a condition precedent to the issuance of a building permit for construction on property fronting on any road or street or other approved way, or any road or street or way to be offered or dedicated to the town, an application must be made for a driveway approach permit on a form available at the town offices and the fee specified paid to the town.

(1) Upon receipt of the driveway approach permit, the placement and construction of any driveway approach or other access must be sited and constructed in accordance with specifications required by the town department of public works, who shall be the permit grantor and who shall determine when the specifications have been met; and

(2) File the driveway approach permit is required for each access to be constructed and with respect to the same lot [sic].

(A) A separate driveway approach permit is required for each access to be constructed and with respect to each building permit application, except if prior approval has been granted for a single access to serve two contiguous building lots.

(B) No building permit shall be issued, nor shall any construction or other site improvement, except for access, be started until all requirements of this section are met.

(C) Nothing in this section shall operate to restrict the issuance of building permits with respect to building lots which front on state roads or interstate highways, for which driveway approach permits are issued by those respective agencies; except that the public works department shall not issue a building permit with respect to any such building lot until it is confirmed that an appropriate driveway approach permit has been issued by one of those agencies and remains valid and in force.

(c) Any person changing or altering an already existing driveway approach (i.e., a driveway where a building permit has been issued in the past) must apply for a driveway approach permit and is subject to the regulations outlined herein.

(d) Sample driveway approach permit and inspection form.

DRIVEWAY APPROACH PERMIT

Fairview, Texas

This application must be completed in triplicate and filed with the Town Secretary together with the proper filing fee as provided for in the Town's Master Fee Schedule.

Upon completion this application shall be sent to the Department of Public Works for review of placement and construction specifications and issuance.

Name of Applicant: _____

Address: _____ Phone: _____

Street location of proposed driveway approach: _____

Sketch of Proposed Access:

(Use reverse side of this form or attach additional pages)

Show street, angle of entry, width of driveway approach, distance to accesses on both side (including streets and roads), radius of entry, grade of driveway approach, and location and type of drainage.

Map _____ Lot: _____

_____

Printed Name of Applicant

_____

Signature and Date

DRIVEWAY APPROACH - FIRST INSPECTION

Date Granted/Denied (Circle) Signature

_____

Reasons

DRIVEWAY APPROACH - SECOND INSPECTION

Date Granted/Denied (Circle) Signature

_____

Reason(s)

Approved copy filed with Department of Public Works

Date: _____ Public Works' Initials: _____

(1998 Code, sec. 97.48)

Sec. 3.16.069 Gate and private drive widths

(a) Gates. The minimum width requirement for gates shall be 12 feet and placement shall be at least 20 feet from the roadway.

(b) Private drives. The minimum width requirement for private drives shall be 12 feet with an additional four-foot easement on each side.

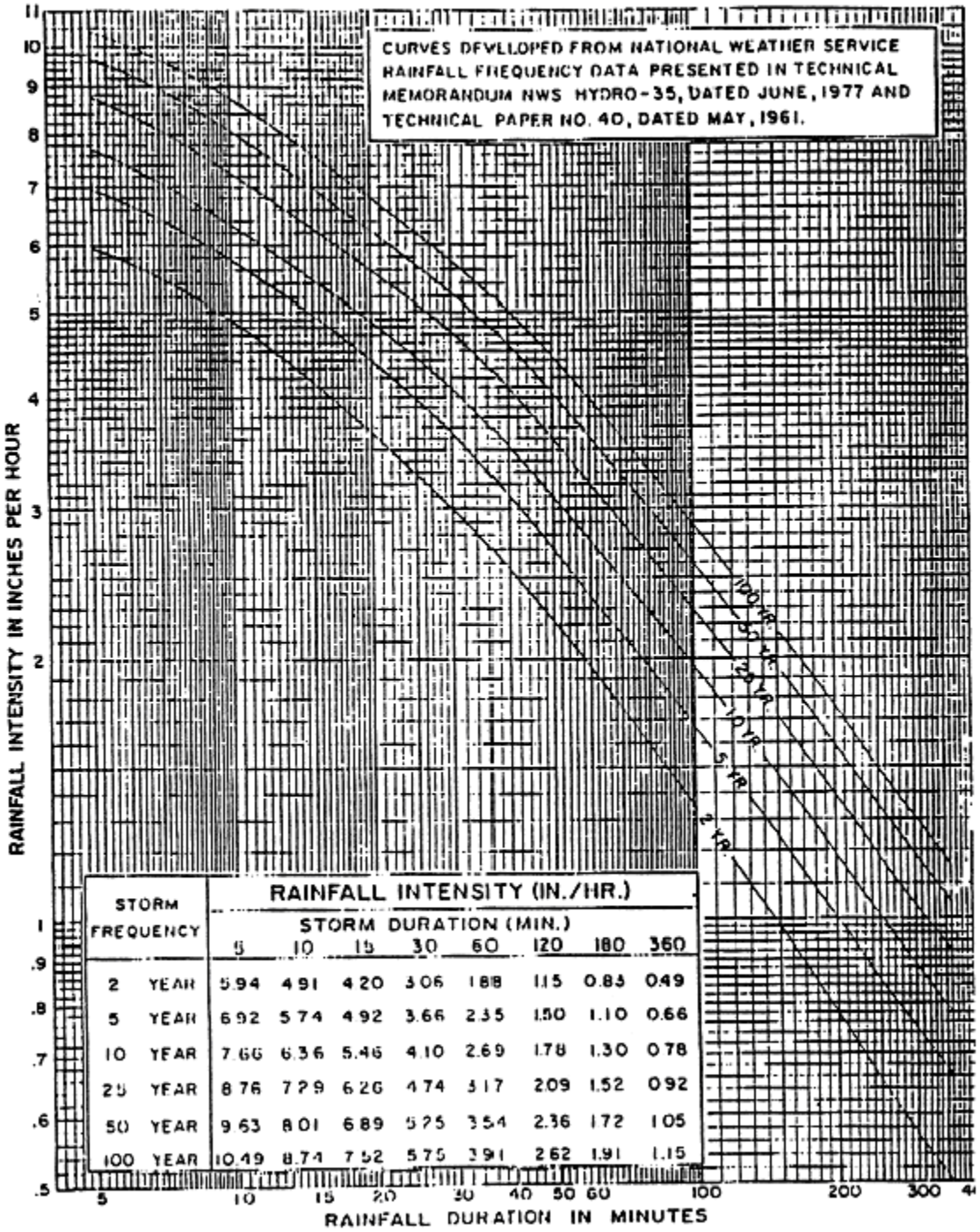
(1998 Code, sec. 97.49)

Sec. 3.16.070 Speed humps

That certain nine-page exhibit titled “Town of Fairview Policy Governing the Installation and Removal of Speed Humps within the Town Limits” and that certain 31-page exhibit, “Guidelines for the Design and Application of Speed Humps,” attached as exhibits to town Ordinance 94-254, are hereby adopted by reference as the town's policy governing installation, removal and guidelines for design and application of speed humps. Said Ordinance No. 94-254, because of its length, shall be maintained as a separate code in the office of the town secretary. (1998 Code, sec. 97.50)

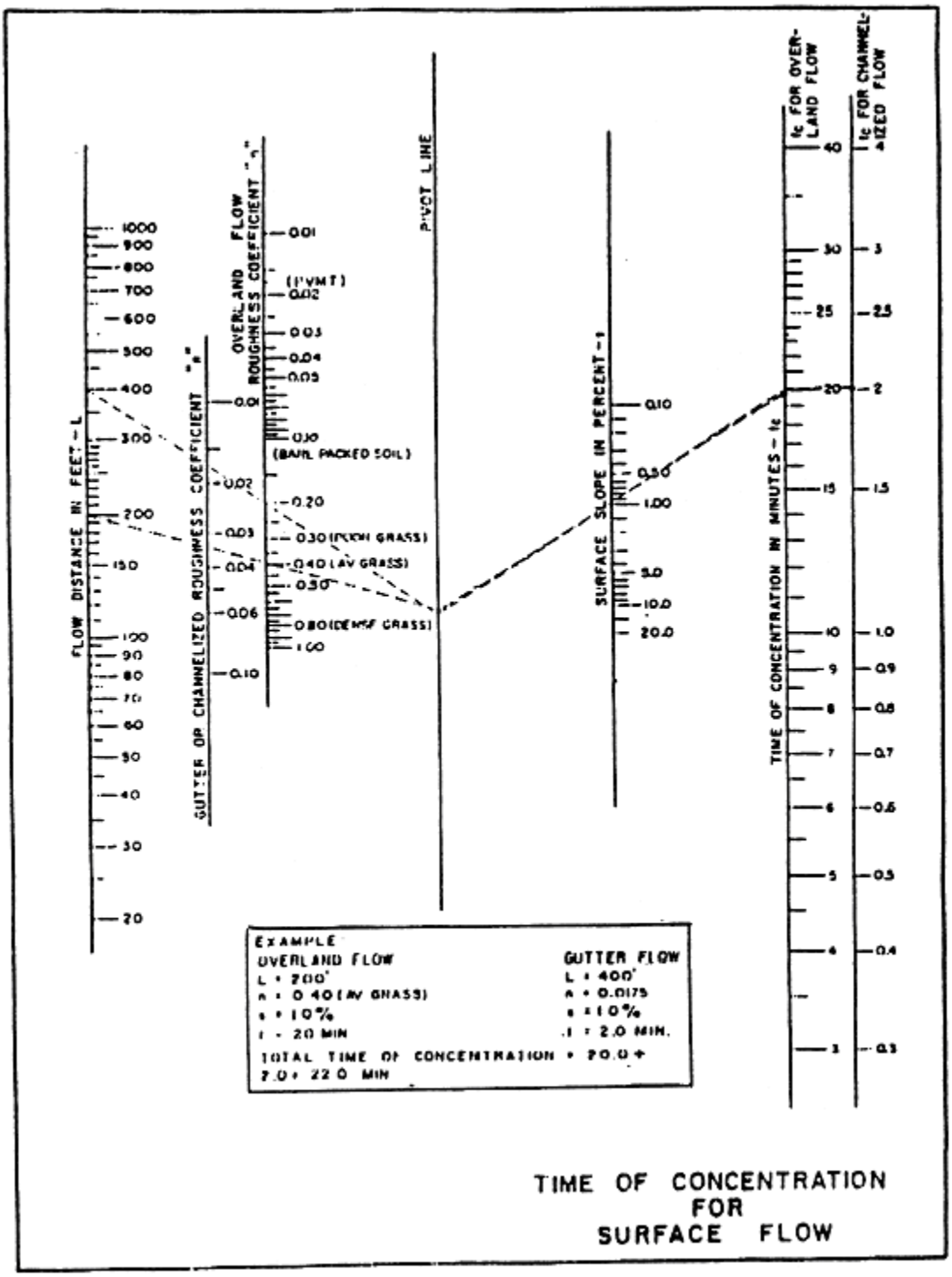
APPENDIX A. PLATES

PLATE 1.



STORM FREQUENCY	RAINFALL INTENSITY (IN./HR.) STORM DURATION (MIN.) 5	10	15	30	60	120	180	360
2 YEAR	5.94	4.91	4.20	3.06	1.88	1.15	0.85	0.49
5 YEAR	6.92	5.74	4.92	3.66	2.35	1.50	1.10	0.66
10 YEAR	7.66	6.36	5.46	4.10	2.69	1.78	1.30	0.78
25 YEAR	8.76	7.29	6.26	4.74	3.17	2.09	1.52	0.92
50 YEAR	9.63	8.01	6.89	5.25	3.54	2.36	1.72	1.05
100 YEAR	10.49	8.74	7.52	5.75	3.91	2.62	1.91	1.15

PLATE 2.



TIME OF CONCENTRATION FOR SURFACE FLOW

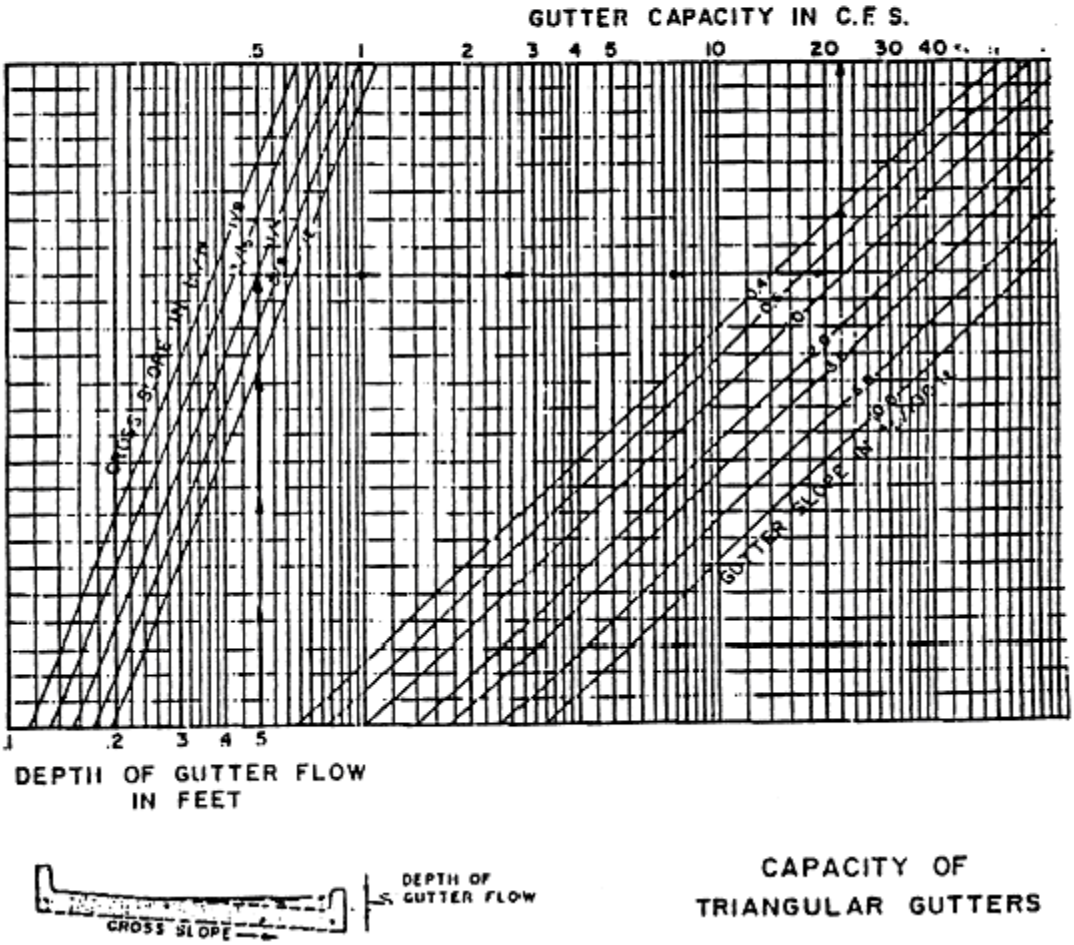
PLATE 3.

EXAMPLE

Known:
- Major Thoroughfare, Type C
- Pavement Width = 33'
- Gutter Slope = 1.0%
- Pavement Cross Slope = ¼"/1'

Find:
- Gutter Capacity

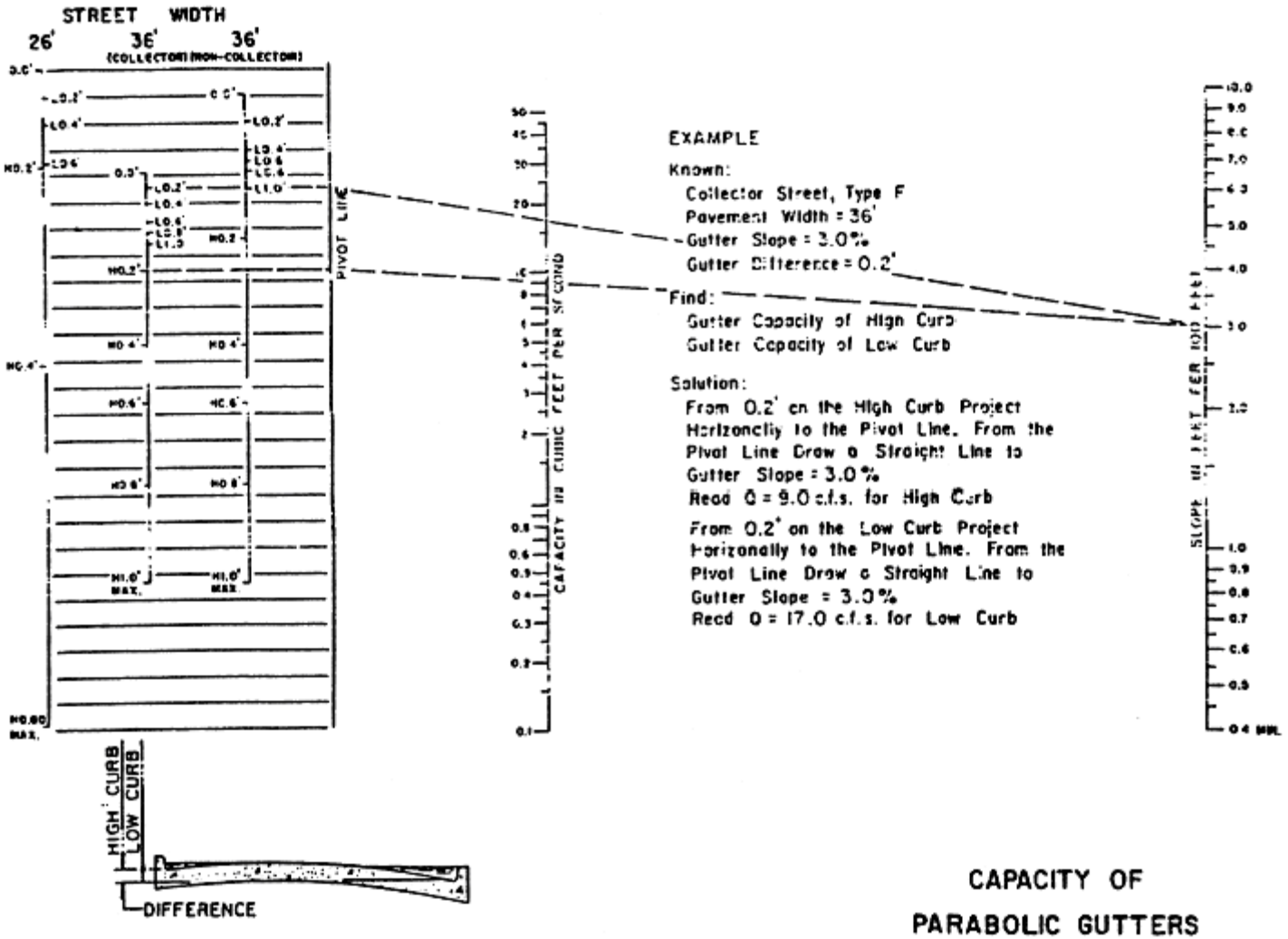
Solution
- Enter Graph at .5'
- Intersect Cross Slope = ¼"/1'
- Intersect Gutter Slope = 1.0%
- Read Gutter Capacity = 22 c.f.s.



CAPACITY OF TRIANGULAR GUTTERS

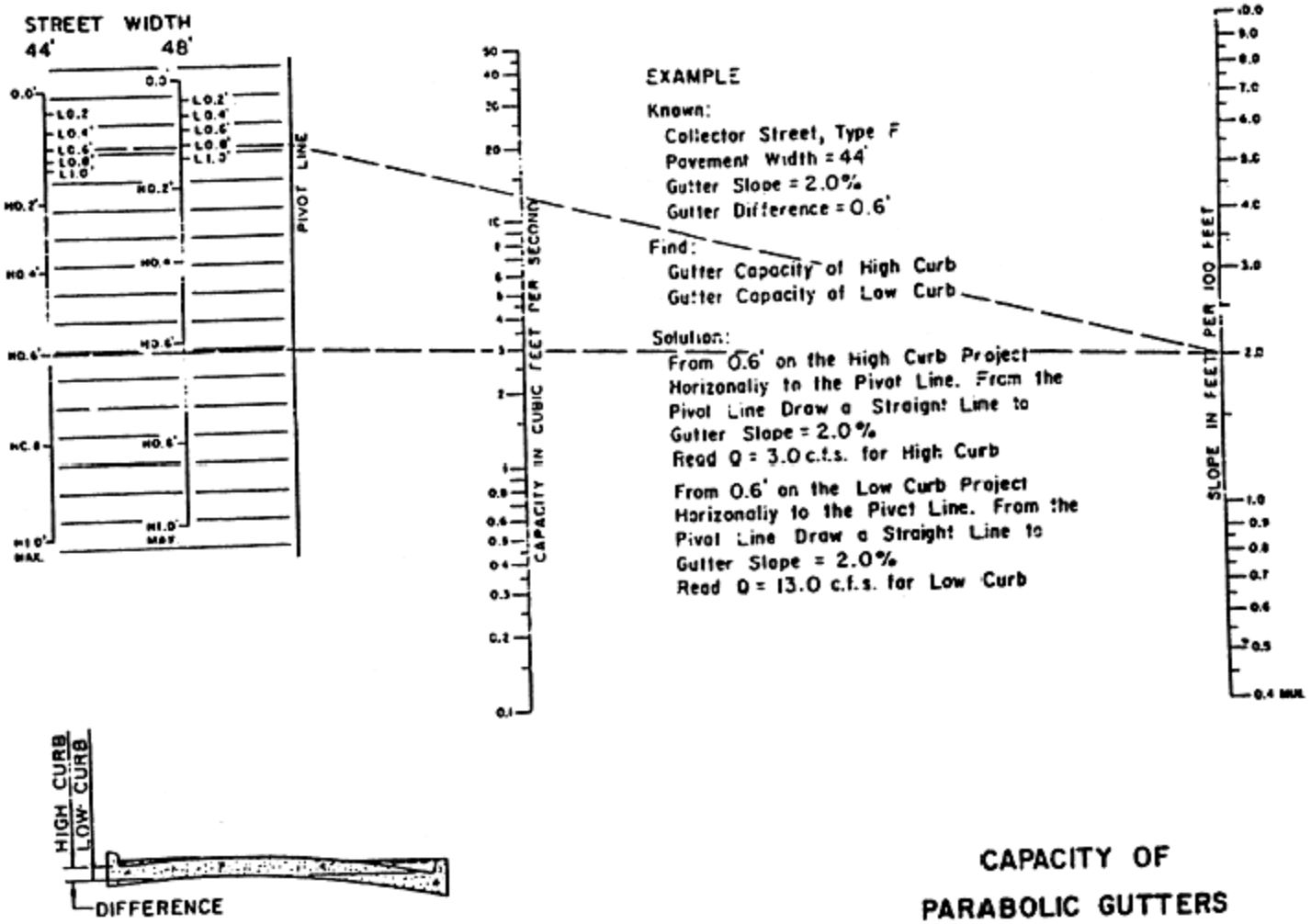
PLATE 4.

PLATE 5.



CAPACITY OF
PARABOLIC GUTTERS
(26' & 36' STREET WIDTHS)

PLATE 6.

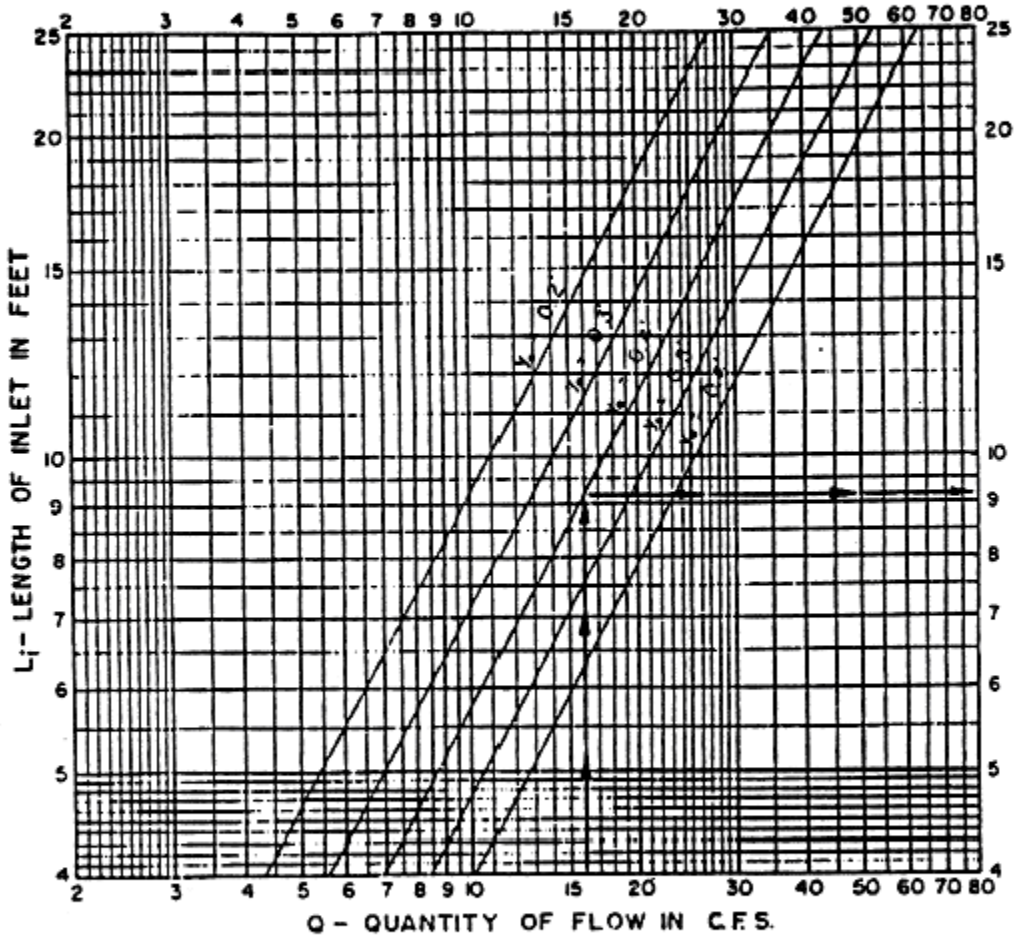


CAPACITY OF
PARABOLIC GUTTERS
(44' & 48' STREET WIDTHS)

EXAMPLE

Known:
Quantity of Flow = 16.0 c.f.s.
Maximum Depth of Flow Desired in Gutter At Low Point (y_o) = 0.4'
Find:
Length of Inlet Required (L_i)

Solution:
Enter Graph at 16.0 c.f.s.
Intersect y_o = 0.4'
Read L_i = 9.2'
Use 10' Inlet



ROUGHNESS COEFFICIENT n = 0175	
STREET WIDTH	CROWN TYPE
ALL	Straight and Parabolic

RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES AT LOW POINT

(1998 Code, ch. 97, app. A)

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 04

Requester: Development Services Director Joe Hilbourn

Agenda Item Request

Review stormwater design criteria, determine if any amendments are needed to the City's current regulations and provide direction to City staff.

Background Information

At the September 9, 2021, Planning and Zoning Commission meeting, the Commission determined that a review of the Town of Fairview's stormwater regulations was needed to discuss proposed amendments to the City's current stormwater design criteria and regulations. The Commission was emailed the Town of Fairview's ordinance on September 11, 2021, for review and discussion at their October 14, 2021, meeting.

City staff is seeking direction from the Commission on any proposed amendments to the City's current stormwater regulations.

Attachments/Supporting Documentation

1. Town of Fairview Ordinance 2021-05 Stormwater Ordinance

Budget/Financial Impact

NA

Recommendation

NA

Motion

This item is for discussion purposes only, no vote is required.

TOWN OF FAIRVIEW, TEXAS

ORDINANCE NO. 2021-05

AN ORDINANCE OF THE TOWN COUNCIL OF THE TOWN OF FAIRVIEW, TEXAS, AMENDING CHAPTER 3 "BUILDING REGULATIONS" OF THE CODE OF ORDINANCES, TOWN OF FAIRVIEW, TEXAS. BY ADDING ARTICLE 3.17 "INDIVIDUAL RESIDENTIAL LOT DEVELOPMENT GUIDELINES" AND BY ADDING DIVISION 4 "STORMWATER ORDINANCE" AND SECTION 3.12.200 "STORMWATER , GENERALLY"; PROVIDING A PENALTY CLAUSE; PROVIDING A SAVING CLAUSE; PROVIDING A SEVERABILITY CLAUSE; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the Town Council has determined that the public health, safety, and welfare are served by the regulation of building construction, stormwater runoff, and associated effects on drainage; and

WHEREAS, the Town Council has determined that certain permitting requirements regarding new home construction, significant remodeling, the addition of accessory structures or significant concrete flatwork in relation to stormwater runoff and other stormwater regulations should be implemented; and

WHEREAS, the Town Council has determined that groundwater conditions within Fairview should be considered in foundation design on new home construction and that the Town's building regulations should be amended accordingly; and

WHEREAS, the Town Council has determined that the Town's Stormwater Ordinance should be amended to provide new regulations including but not limited to amendments to require demonstration of no adverse impacts on downstream property regarding velocity or volume increases and to require the installation of concrete pilot channels addressing flat, open channels or groundwater in order to reduce maintenance by the town or its citizens;

NOW, THEREFORE, BE IT ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF FAIRVIEW, TEXAS:

SECTION 1. Article 3.17 "INDIVIDUAL RESIDENTIAL LOT DEVELOPMENT GUIDELINES", shall be added to Chapter 3 "BUILDING REGULATIONS" of the Code of Ordinances, Town of Fairview, Texas, as follows.

Sec. 3.17.001 New home construction

All new home construction on one acre lots and larger shall submit a grading and drainage plan prior to receiving a building permit. This grading and drainage plan must be approved by the town engineer or his/her designee prior to the issuance of the building permit. The town

engineer may require an engineered drainage plan to be submitted by the builder.

Sec. 3.17.002 Home renovations/additions

If an existing home is being renovated with an addition and/or if an accessory structure or improvement is being added to the lot—either of which (or the combination of each of them) is equal to or greater in lot coverage than 30% of the existing footprint of the main residence—the same grading and drainage plan requirements as the new home construction shall be submitted and approved prior to receiving a building permit.

Sec. 3.17.003 Concrete flatwork

All concrete flatwork that is equal or greater than 30% of the existing footprint of the residential structure shall require a permit. All concrete flatwork that is constructed within an easement to the town, regardless of size, shall require a permit.

Sec. 3.17.004 Adverse drainage effects due to grading

No resident of Fairview shall engage in grading on their land that would create an adverse effect regarding stormwater runoff on downstream neighboring properties. The town engineer may require an engineered drainage plan to be submitted by the owner demonstrating no such adverse effect. For the purposes of this article, grading is defined by the redistribution of existing soil, hauling in of new soil from offsite, or the removal of existing soil from the property.

Sec. 3.17.005 Groundwater analysis in residential foundation design

As a part of the residential building plans for new home construction, all civil engineered foundation designs shall contain confirmation from the design engineer that potential groundwater effects were considered and appropriately incorporated into the foundation design if needed.

Sec. 3.17.006 Effect of approvals.

Approvals by the town, the town's engineer, or other town employee or representative, of any plans, designs, or specifications submitted to the town under this article shall not constitute or be deemed to be a release of the responsibility and liability of an owner or an owner's engineers, employees, contractors, officers, agents or servants for the accuracy and competency of their plans, design or specifications. Further, any such town approvals shall not be deemed to be an assumption of such responsibility or an assumption of liability by the town for any defect in the plans, design and specifications prepared by

an owner or an owner's engineers, employees, contractors, officers, agents, or servants. Any approval by the town signifies the town's approval solely of the general design concept of the improvements to be constructed.

SECTION 2. Division 4: "Stormwater Ordinance", shall be added to Article 3.12 "FLOODS AND STORMWATER" of the Code of Ordinances, Town of Fairview, Texas, as follows.

Division 4 Stormwater Ordinance

Sec. 3.12.200 Stormwater, generally

The Stormwater Ordinance amended under Ordinance No. 2021-05 , and as may be further amended by the town council from time to time, is hereby codified herein by reference and a copy of said amended Stormwater Ordinance shall be kept on file in the office of the town secretary.

SECTION 3. Amendment to Stormwater Ordinance. The town's Stormwater Ordinance, adopted previously is hereby ratified, adopted and amended as shown in the attached Exhibit A and as revised and amended in the attached Exhibit B.

SECTION 4. Any person, firm, or corporation violating any of the provisions of this ordinance shall be deemed guilty of a class C misdemeanor and upon conviction be subject to a fine in accordance with the general provisions of the Fairview Code of Ordinances.

SECTION 5. Chapter 3 of the Code of Ordinances, Town of Fairview, Texas, shall remain in full force and effect save and except as amended by this ordinance.

SECTION 6. The sections, paragraphs, sentences, phrases, clauses and words of this ordinance are severable, and if any section, paragraph, sentence, phrase, clause or word in this ordinance or application thereof to any person, firm or corporation, or to any circumstance is held invalid or unconstitutional by a Court of competent jurisdiction, such holding shall not affect the validity of the remaining portions of this ordinance, and the Town Council hereby declares that it would have adopted such remaining portions of this ordinance despite such invalidity, which remaining portions shall remain in full force and effect.

SECTION 7. This ordinance shall take effect upon passage and publication, and it is accordingly so ordained.

PASSED AND APPROVED BY THE TOWN COUNCIL OF THE TOWN OF FAIRVIEW, TEXAS, this 2nd day of February 2021.

Henry Lessner, Mayor
Town of Fairview

ATTEST:

Tenitrus Bethel, Town Secretary

APPROVED AS TO FORM:

Clark McCoy, Town Attorney

EXHIBIT A

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TABLES

FIGURES

STORMWATER ORDINANCE

ARTICLE 1

SECTION 1

TITLE, FINDINGS OF FACT, STATEMENT OF PURPOSE, AND SCOPE OF AUTHORITY

ORGANIZATION OF THIS ORDINANCE

SECTION A. Title

This Ordinance shall be known as the "Stormwater Ordinance" of the Town of Fairview.

SECTION B. Findings of Fact

1. The drainage ways and flood hazard areas of the Town of Fairview, Texas, are subject to periodic inundation which may result in loss of life and property, health and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely affect the public health, safety, and general welfare.

2. The development of land causes large quantities of soil to be displaced and transported to downstream locations. This soil displacement can create significant soil erosion and sedimentation problems. Erosion is a dangerous activity in that it contaminates water supplies and water resources. A buildup of sediment degrades water quality, destroys valuable environmental resources and clogs watercourses and storm drains which can cause flooding, thereby damaging public and private lands and property. These problems result in a serious threat to the health, safety and general welfare of the Town of Fairview.

SECTION C. Statement of Purpose

This ordinance sets forth the minimum requirements necessary to provide and maintain a safe, efficient, and effective drainage system within the Town of Fairview and to establish the various public and private responsibilities for the provision thereof. Further, it is the purpose of this ordinance to:

(1) Protect human life, health, and property;

(2) Minimize expenditure of public money for drainage related projects;

(3) Minimize damage due to drainage to public and private facilities and utilities such as water and gas mains, electric service, telephone and sewer lines, streets and bridges;

(4) Help maintain a stable tax base and preserve land values;

(5) Insure that potential buyers are notified that property is in an area of special flood hazard;

(6) Insure that those who occupy the areas of special flood hazard assume responsibility for their actions.

(7) Preserve the natural beauty and aesthetics of the community.

(8) Control and manage all stormwater runoff and drainage from points and surfaces within subdivisions.

(9) Establish a reasonable standard of design for development which prevents potential flood and stormwater damage.

SECTION D. Scope of Authority

Any person, firm, corporation, or business proposing to develop land or improve property within the Town of Fairview and its extra territorial jurisdiction (ETJ) is subject to the provisions of this ordinance. This ordinance also applies to individual building structures, subdivisions, excavations and fill operations, and similar activities. The Scope of Authority extends to additional improvements on projects, developments, subdivisions, etc. which were previously permitted and/or constructed under the authority of prior ordinances or guidelines.

SECTION E. Organization of This Ordinance

The following list is a synopsis of the contents of each article.

Article 1 - discusses the purposes, scope, and authority of this ordinance, and provides a penalty for noncompliance with this ordinance.

Article 2 - lists and defines various terms used in this ordinance.

Article 3 - states general provisions related to implementation and enforcement of this ordinance.

Article 4 - overviews the administrative procedures to be followed for obtaining the necessary Town drainage approvals related to building on or improving property.

Article 5 - explains the methodologies to calculate runoff quantities.

Article 6 - gives the design standards for building local drainage systems (i.e., enclosed storm sewers).

Article 7 - states additional design standards for specialty drainage system items.

SECTION F. Related Ordinances

In addition to this ordinance, the Town of Fairview has other ordinances, regulations, and specifications pertaining to drainage and storm sewer facilities. These other documents include the zoning and subdivision ordinances, and shall remain in full force and effect. If there is any conflict between such prior ordinance and this ordinance, this ordinance shall prevail.

ARTICLE 2

DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted to give them the meaning they have in common usage and to give this ordinance its most reasonable application:

1. Angle of Flare

   Angle between direction of a wingwall and centerline of culvert or storm drainage outlet or inlet.

2. Appeal

   A request for review or interpretation of any provisions of this ordinance or a request for a variance.

3. Area of Shallow Flooding

   A designated AO or AH Zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; and the path of flooding is unpredictable and indeterminate.

4. Area of Special Flood Hazard

   The land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year.

5. Base Flood

   The flood having a one percent chance of being equalled or exceeded in any given year, determined based upon FEMA guidelines and as shown in the current effective Flood Insurance Study.

6. Base Flood Elevation

   The water surface elevation resulting from the base flood.

7. Best Management Practices (BMP)

   Consists of schedules of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. This also includes treatment requirements, operating procedures, and practices to control construction site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

8. Town

   The Town of Fairview, Texas, or the Town Council of Fairview.

9. Commencement of Construction

   The disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

10. Conduit

Any closed device for conveying flowing water.

11. Critical Feature

An integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

12. Design Flood

The flood having a one percent chance of being equalled or exceeded in any given year based upon fully developed watershed conditions.

13. Detention Basin

A dry basin or depression constructed for the purpose of temporarily storing storm water runoff and discharging all of that water over time at a reduced rate than would have otherwise occurred.

14. Developer/Builder

A person, partnership, or corporation engaged in the development of land and/or building of structures and not excluded by exemption sections of this ordinance.

15. Development

Any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, drilling operations, grading, or clearing.

16. Discharge

Any addition or introduction of any pollutant, storm water, or any other substance whatsoever into the municipal separate storm sewer system or into waters of the United States.

17. Discharger

Any person who causes, allows, permits, or is otherwise responsible for, a discharge, including, without limitation, any operator of a construction site or industrial facility.

18. Elevated Building

In the case of Zones A1-30, A, A99, AO, B, C, D, V1-V30, and any other designated FEMA Zone, an "elevated building" includes a building elevated by means of fill so that the finished floor of the building is at least two feet above the water surface elevation of the design flood.

19. Entrance Head

The head required to cause flow into a conduit or other structure; it includes both entrance loss and velocity head.

20. Entrance Loss

Head lost in eddies or friction at the inlet to a conduit, headwall, or structure.

21. Environmental Protection Agency (EPA)

The United States Environmental Protection Agency, the regional office thereof, any federal department, agency, or commission that may succeed to the authority of the EPA, any duly authorized official of EPA or such successor agency.

22. Equal Conveyance

Principle of reducing stream conveyance for a proposed alteration with a corresponding reduction in conveyance to the opposite bank of the stream. The right of equal conveyance applies to all owners and uses and may be relinquished only by written agreements.

23. Erosion

The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. In this manual, erosion due to storm water runoff is the primary design issue.

24. Existing Construction

For the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of December 19, 1977. "Existing construction" may also be referred to as "existing structures."

25. Facility

Any building, structure, installation, process, or activity from which there is or may be a discharge of pollutant.

26. Federal Emergency Management Agency (FEMA)

Federal agency which administers National Flood Insurance Program.

27. Final Stabilization

The status when all soil disturbing activities at a site have been completed, and a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

28. Flood or Flooding

A general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) The overflow of inland waters and/or

(2) The unusual and rapid accumulation or runoff of surface waters from any source.

29. Flood Insurance Rate Map (FIRM)

The official map on which the Federal Emergency Management Agency has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

30. Flood Insurance Study

The official report in which the Federal Emergency Management Agency has provided flood profiles, the water surface elevation of the base flood, as well as the Flood Boundary-Floodway Map.

31. Floodplain or Flood-prone Area

Any land area susceptible to being inundated by water from any source (see definition of flooding).

32. Flood Protection System

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

33. Flume

Any open conduit on a prepared grade, trestle, or bridge.

34. Freeboard

The distance between the design flood elevation and the top of an open channel, dam, levee, or detention basin to allow for wave action, floating debris, or any other condition or emergency without overflowing the structure.

35. Functionally Dependent Use

A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities.

36. Harmful Quantity

The amount of any substance that will cause pollution of water in the State.

37. Highest Adjacent Grade

The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

38. Hydraulic Gradient

A line representing the pressure head available at any given point within the drainage system.

39. Levee

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

40. Levee System

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

41. Local Jurisdiction

The local governing body in which the construction takes place (known also as the Town).

42. Lowest Floor

The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of FEMA under 44 CFR, 60.3.

43. Town engineer

The person appointed to the position of Town engineer by the Town Administrator of the Town of Fairview, or his/her duly authorized representative.

44. Manager of Field Services

The person appointed to the position of Manager of Field Services by the Town Administrator of the Town of Fairview, or his/her duly authorized representative.

45. Manning Equation

The uniform flow equation used to relate velocity, hydraulic radius, and energy gradient slope.

46. Manufactured Home

A structure transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. For floodplain management purposes, the term "manufactured home" also includes park trailers, travel trailers, and other similar vehicles placed on a site for greater than 180 consecutive days. The "manufactured home" does not include a "recreational vehicle".

47. Manufactured Home Park or Subdivision

A parcel or contiguous parcels of land divided into two or more manufactured home lots for rent or sale.

48. Maximum Extent Practicable (MEP)

The goal of pollutant reduction through the use of best management practices.

49. Mean Sea Level

For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

50. Municipal Separate Storm Sewer System (MS4)

The system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) owned and operated by the Town and designed or used for collecting or conveying storm water, and which is not used for collecting or conveying sewage.

51. Municipal Solid Waste

Solid waste resulting from or incidental to municipal, community, commercial, institutional, or recreational activities, and includes garbage, rubbish, ashes, street cleanings, dead animals, abandoned automobiles, and other solid waste other than industrial waste.

52. Natural Drainage

The dispersal of surface waters through ground absorption and by drainage channels formed by the existing surface topography which exists at the time of adoption of this ordinance or formed by any man-made change in the surface topography.

53. Natural Floodway

The effective area of a channel, of a river or other water course and the adjacent land areas that must be reserved in order to discharge the "design flood" without cumulatively increasing the water surface elevation. This floodway differs from the FEMA "regulatory floodway."

54. New Construction

Structures for which the "start of construction" commenced on or after the effective date of December 19, 1977.

55. Open Channel

A channel in which water flows with a free surface.

56. Operator

The person or persons who, either individually or taken together, meet the following two criteria:

(1) they have operational control over the facility specifications (including the ability to make modifications in specifications); and

(2) they have the day-to-day operational control over those activities at the facility necessary to ensure compliance with pollution prevention requirements and any permit conditions.

57. Other Municipal Ordinances

Ordinances such as, but not limited to, zoning, subdivision, and erosion.

58. Owner

The person who owns a facility or part of a facility.

59. Person

Any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity; or their legal representatives, agents, or assigns. This definition includes all federal, state, and local governmental entities.

60. Pollutant

Dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials, rock, sand, dirt or cellar dirt generated as part of a construction project.

61. Pollution

The alteration, due to a construction project, of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the State that renders the water harmful, detrimental, or injurious to

humans, animals life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

62. Probable Maximum Flood (PMF)

The flood magnitude that may be expected from the most critical combination of meteorologic and hydrologic conditions that are reasonably possible for a given watershed.

63. Probable Maximum Precipitation (PMP)

Theoretically the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of the year.

64. Qualified Personnel

Persons who possess the appropriate competence, skills, and ability (as demonstrated by sufficient education, training, experience, and/or, when applicable, any required certification or licensing) to perform a specific activity in a timely and complete manner consistent with the applicable regulatory requirements and generally-accepted industry standards for such activity.

65. Rational Formula

The means of relating runoff with the area being drained and the intensity of the storm rainfall.

66. Recreational Vehicle

Means a vehicle which is (i) built on a single chassis; (ii) 400 square feet or less when measured at the largest horizontal projections; (iii) designed to be self-propelled or permanently towable by a light duty truck; and (iv) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

67. Registered Landscape Architect (RLA)

A person who has been duly licensed and registered to practice landscape architecture by the Texas Board of Architectural Examiners.

68. Registered Professional Engineer (RPE)

A person who has been duly licensed and registered by the State Board of Registration for Professional Engineers to engage in the practice of engineering in the State of Texas.

69. Regulatory Floodway

The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the "base flood," as calculated by the Federal Emergency Management Agency, without cumulatively increasing the water surface elevation more than a designated height. This floodway is used by FEMA to determine compliance with its regulations.

70. Retention Basins

A pond or other water body which has been designed to have both a conservation pool for holding some water indefinitely and a flood storage pool for storing storm water runoff on a temporary basis for the purpose of reducing the peak discharge from the basin. Existing ponds shall not be considered retention basins unless they are designed to drain off the design flood down to normal pool elevations within a 24-hour period with sufficient freeboard to contain the design flood.

71. Sanitary Sewer (or Sewer)

The system of pipes, conduits, and other conveyance which carry industrial waste and domestic sewage from residential dwellings, commercial buildings, industrial and manufacturing facilities, and institutions, whether treated or untreated, to the sewage treatment plant serving the Town (and to which storm water, surface water, and groundwater are not intentionally admitted).

72. Sediment

The soil particles deposited through the process of sedimentation as a product of erosion. These soil particles settle out of runoff at variable rates based on the size of the particle and soil type.

73. Site

The land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

74. Standard Project Flood

Flood that has a magnitude of approximately one half of the probable maximum flood, as determined on a case-by-case basis using Corps of Engineers' current criteria.

75. Start of Construction

For a structure, "start of construction" includes substantial improvement and means the date the development or building permit was issued, provided the actual start of construction, repair, reconstruction, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction of a structure does not include land preparation, such as clearing, grading, and filling, nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.

76. Storm Water

Storm water runoff, snow melt runoff, and surface runoff and drainage.

77. Storm Water Pollution Prevention Plan (SWPPP)

A plan required by either the Construction General Permit or the Industrial General Permit and which describes and ensures the implementation of practices that are to be used to reduce the pollutants in storm water discharges associated with construction or other industrial activity at the facility.

78. Structure

A walled and roofed building, a manufactured home, a gas or liquid storage tank, or a substation that is principally above ground.

79. Substantial Improvement

Any combination of repairs, reconstructions, or improvements of a structure, the cumulative cost of which equals or exceeds 50 percent of the initial market value of the structure either:

(1) before the first improvement or repair is started, or

(2) if the structure has been damaged and is being restored, before the damage occurred.

For the purpose of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. Incremental improvements over a period of time, the cumulative cost of which equals or exceeds 50 percent of the market value at the time of the first improvement, shall be considered as a "substantial improvement."

The term does not, however, include either:

(1) any project for improvement of a structure to comply with existing State or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or,

(2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

80. Surety

A corporation surety bond, cash, or certificate of deposit.

81. Time of Concentration

The estimated time in minutes or hours required for a drop of water to flow from the most remote point in the drainage area to the point at which the flow is to be determined.

82. Use

Any purpose for which a building or other structure or a tract of land may be designed, arranged, intended, maintained, or occupied; or any activity, occupation, business, or operation carried on, or intended to be carried on, in a building or other structure or on a tract of land.

83. Use Permit

The permit required before any use may be commenced.

84. Variance

A grant of relief to a person from the requirements of this ordinance when specific enforcement would result in unnecessary hardship. A variance, therefore, permits construction or development in a manner otherwise prohibited by this ordinance.

85. Violation

The failure of a structure or other development to be fully compliant with this ordinance. A structure or other development without the FEMA elevation certificate prior to a certificate of occupancy, other certifications, or other evidence as required by the Town Administrator, is presumed to be in violation until such time as that documentation is provided.

86. Watershed

The area drained by a stream or drainage system.

87. Waters of the United States

All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters, including interstate wetlands; all other waters the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce; all impoundments of waters otherwise defined as waters of the United States under this definition; all tributaries of waters identified in this definition; all wetlands adjacent to waters identified in this definition; and any waters within the federal definition of "waters of the United States" at 40 CFR 122.2; but not including any waste treatment systems, treatment ponds, or lagoons designed to meet the requirements of the federal Clean Water Act.

88. Water Surface Elevation

The height, in relation to the NGVD of 1929 (or other datum, where specified), of floods of various magnitudes and frequencies in the floodplains of riverine areas.

89. Wetlands

Areas identified and designated by the U.S. Army Corps of Engineers as wetlands. (ORD 2726 - Bird Sanctuary)

ARTICLE 3

GENERAL PROVISIONS

SECTION A. Lands to Which This Ordinance Applies

This ordinance shall apply to all areas of land within the jurisdiction of the Town of Fairview, Texas including the Town's ETJ (Extra Territorial Jurisdictions). This ordinance also extends the Scope of Authority to additional improvements on projects, developments, subdivisions, etc. which were previously permitted and/or constructed under the authority of prior ordinances or guidelines.

SECTION B. Basis for Establishing the Areas of Special Flood Hazard

See Chapter 151: Flood Damage Prevention of the Town of Fairview Code of Ordinances

SECTION C. Penalty Clause

Any person, firm or corporation violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor and, upon conviction, shall be punished by a penalty or fine not to exceed the sum of Two Thousand Dollars ($2,000.00) for each offense, and each and every day such offense is continued shall constitute a new and separate offense. In addition, the violator shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the Town of Fairview from taking such other lawful action as is necessary to prevent or remedy any violation. Article 4, Section C.3 states an additional penalty against persons proceeding with construction without obtaining the necessary permits from the Town of Fairview.

SECTION D. Repealing Clause

All provisions of all ordinances conflicting with the provisions hereof are hereby repealed. All other ordinances and provisions of such ordinances not expressly in conflict with the provisions hereof shall remain in full force and effect.

SECTION E. Abrogation and Greater Restrictions

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

SECTION F. Interpretation

In the interpretation and application of this ordinance, all provisions shall be:

(1) Considered as minimum requirements;

(2) Liberally construed in favor of the governing body; and,

(3) Deemed neither to limit nor repeal any other powers granted under State statutes.

SECTION G. Warning and Disclaimer of Liability

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This ordinance shall not create liability on the part of the Town of Fairview, any officer or employee thereof or the Federal Emergency Management Agency for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

SECTION H. Severability

If any section, paragraph, clause, phrase, or provision of this ordinance shall be adjudged invalid or held unconstitutional, the same shall not affect the validity of this ordinance as a whole or any part or provision thereof, other than the part so decided to be invalid or unconstitutional; nor shall such unconstitutionality or invalidity have any effect on any other ordinances or provisions of ordinances of the Town of Fairview.

ARTICLE 4

ADMINISTRATION

SECTION A. Duties of Town Officials

1. Duties of the Town engineer

The Town engineer is hereby appointed to administer and implement this stormwater ordinance.

SECTION B. Responsibilities of Owners

The owner or developer of property to be developed shall be responsible for all storm drainage flowing through or abutting such property. This responsibility also includes drainage directed to that property by ultimate development as well as the drainage naturally flowing through the property by reason of topography. It is the intent of this ordinance that provision be made for storm drainage at such time as any property affected is proposed for development, use, or modification.

Where the improvement or construction of a storm drainage facility is required along a property line common to two or more owners, the owner hereafter proposing development of the property shall be responsible for the required improvements at the time of development, including the dedication of all necessary rights-of-way or easements, to accommodate the improvements.

Where a property owner proposes development or use of only a portion of the property, provision for storm drainage shall only be required in that portion of the property proposed for immediate development, except as construction or improvements of a drainage facility outside that designated portion of the property is deemed essential to the development of that designated portion.

Owners shall provide for stormwater runoff and design drainage related facilities in accordance with and/or in a compatible manner with any future Town of Fairview master drainage study and plan in effect at the time when plans for drainage facilities are submitted to the Town for approval.

Owners and Associations shall provide the dedication of drainage easements and shall perform maintenance activities within the dedicated easements as required by this ordinance.

In addition, owners may be required to provide at their expense a preliminary drainage study for the total area to be ultimately developed. This study shall be submitted to the Town engineer as a part of the submitted data for consideration of preliminary plat or site plan approval for the portion of the property proposed for immediate development.

SECTION C. Permits

The Town of Fairview has several permits related to storm drainage. Some of these permits are listed below and explained in detail in the following paragraphs. Permits required by other ordinances may also be needed.

- Development Permit

1. Development Permit

All developers, owners, or builders shall obtain and submit for approval a Development Permit application for new construction, placement of fill, new manufactured home sites, alteration of a waterway, substantial improvements to existing structures or manufactured homes, or improvements to existing structures, or manufactured homes in the floodplain of the design flood that will result in increasing the overall outside dimensions of the structure or manufactured home. The application form can be obtained from the Town engineer's office. The Town engineer uses this form, along with duplicate copies of the accompanying engineering or architectural plans, to identify those construction or renovation projects that would occur in a flood hazard area. As a minimum, the engineering or architectural plans shall show, to scale:

a. The nature, location, dimensions, and elevations in relation to mean sea level of the area in question.

b. The elevation in relation to mean sea level and the location of existing or proposed structures, fill, storage of materials, and/or drainage facilities.

c. The elevation in relation to mean sea level to which an existing non-residential structure shall be floodproofed, the location of the foregoing.

d. Any off-site facilities or conditions that may either affect on-site conditions or be affected by on-site conditions.

e. Developers, owners, or builders shall also obtain a Development Permit prior to filling in a floodplain; channelizing, impounding, realigning, deepening, or otherwise modifying a natural drainage way; making improvements, substantial or otherwise, to existing structures or manufactured homes in a floodplain if the improvements result in the increase of the overall outside dimensions of the structures or manufactured homes; or otherwise reclaiming floodplain land. Article 4, Section D.2 identifies the information that must be submitted to the Town engineer. No floodplain alterations shall begin until a permit is issued by the Town engineer.

If an existing non-residential structure is proposed for floodproofing, then a certificate sealed by a registered professional engineer in the State of Texas shall be submitted stating that all of the floodproofing criteria listed in Article 8, Section B will be met. Construction or renovation projects cannot begin until the Town issues the Development Permit.

2. Elevation Certificate

Developers, owners, or builders adjacent to the design flood plain, other existing creeks, swales or ditches or other flood prone areas as designated by the Town engineer Services shall complete an elevation certificate prior to issuance of a Certificate of Occupancy by the Town. Elevation Certificate forms can be obtained at the Town engineer's office.

3. Proceeding Without the Applicable Permits

Any developer, owner, or builder who fails to obtain the applicable Development or other necessary permits before beginning the subject project is in violation of this ordinance. Furthermore, any act or omission of any owner or developer of land subject to the provisions herein which has as its effect the circumventing of the intent and purpose of this ordinance shall be considered in violation of same. In addition to the penalties outlined in Article 3, Section C, no Building Permit, plat, site plan, or Certificate of Occupancy shall be issued for any construction, reconstruction, or development upon any land where such construction, reconstruction, or development is not in conformity with the requirements and intent of this ordinance. Any one who violates any of the terms and provisions of this ordinance shall be denied a Building Permit, etc., until the violation is corrected.

4. Deviations from Permit Terms

Permits may be revoked by the Town engineer if, upon periodic inspection, he determines that the work is not progressing in accordance with specifications of the approved plan and permit.

Field changes to storm sewer plans can be made only upon approval by the Town engineer. Record drawings shall be submitted to the Town engineer at the completion of the project.

5. Relationships to Building Permits and Certificates of Occupancy

In residential subdivisions, developer shall provide as-built survey data to the Town engineer verifying the final grading of the lots prior to the issuance of building permits. The developer will also provide the home builder (if different than the developer) a copy of the lot grading plans. The home builder shall provide as-built survey data to the Town engineer verifying the final grading of the lots prior to the issuance of certificates of occupancy.

SECTION D. Plan Requirements

Plan requirements for stormwater drainage systems and floodplain alterations are listed below. All engineering plans shall be sealed by a professional engineer who is registered in the State of Texas and experienced in civil engineering work. The total cost for such engineering plans and specifications shall be borne by the owner or the developer and shall be furnished to the Town engineer for review and approval.

1. Drainage Plans

As part of the platting process, drainage plans shall be prepared. These plans shall include drainage facilities for both off-site and on-site drainage so that the proper transition between the two can be maintained. Criteria for on-site development shall also apply to off-site improvements.

The construction of all improvements shall be in accordance with the current Standard Specifications for Public Works Construction by the North Central Texas Council of Governments as amended by the Town of Fairview, and Design Standards of the Town of Fairview.

The drainage plans shall include:

a. Drainage Area Map

1. Use 1"=100' scale for the development and up to 1"=2000' for creeks and off-site areas, provide that the scale is adequate for review, and show match lines between any two or more maps.
2. Show existing and proposed storm sewers and inlets.
3. Indicate sub-areas for each alley, street, off-site, etc.
4. Indicate contours on map for on- and off-site.
5. Indicate zoning on drainage area.
6. Show points of concentration.
7. Indicate runoff at all inlets, dead-end streets and alleys, or to adjacent additions or acreage.
8. Provide runoff calculations for all areas showing acreage, runoff coefficient, inlet time, and storm frequency.
9. Indicate all crests, sags, and street and alley intersections with flow arrows.

10. Show limits of each plan profile sheet.

b. Plan Profile Sheets

1. Show plan and profile of all storm sewers on separate sheets from paving plans.
2. Indicate concrete cushions or embedment where applicable.
3. Specify reinforced concrete Class III pipe unless otherwise noted. Use heavier pipe where crossing railroads, deep fill or heavy loads.
4. Indicate property lines along storm sewer and show easements with dimensions.
5. Show all existing utilities in plan and profile of storm sewers.
6. Indicate existing and proposed ground line and improvements on all street, alley, and storm sewer profiles.
7. Show hydraulic gradient with computations.
8. Show laterals on trunk profile with stations.
9. Number inlets according to the number designation given for the area or sub-area contributing runoff to the inlet.
10. Indicate size and type of inlet on plan view, lateral size and flow line, paving station and top of curb elevation.
11. Indicate quantity and direction of flows at all inlets, stubouts, pipes and intakes.
12. Show future streets and grades where applicable.
13. Show water surface at outfall of storm sewer velocity, and typical section of receiving water body.
14. Where fill is proposed or trench cut in creeks or outfall ditches, specify compacted fill and compaction criteria.
15. Show size of pipe, length of each pipe size, stationing at one hundred foot intervals in the plan view.
16. Begin and end each sheet with even or fifty foot stationing.
17. Show diameter of pipes, physical grade, discharge, capacity of pipe, slope of hydraulic gradient, and velocity in the pipe in the profile view.
18. Show elevations of flow lines at 100-foot intervals on the profile.
19. Give bench mark information.
20. Show capacities, flows, velocities, etc., of the existing system into which the proposed system is being connected.
21. Show details of all connection boxes, headwalls on storm sewer, flumes or any other item not a standard detail.
22. Provide lateral profiles and where utilities are crossed, show all utilities in profile.
23. Show headwalls and specify type for all storm sewers at outfall.
24. Show if curbing in alleys is needed to add extra capacity.
25. Provide flat grade on alleys and streets at discharge into streets.
26. Show curve data for all storm sewers.

27. Tie storm sewer stationing with paving stations.

28. On all dead-end streets and alleys, show grades for drainage overflow path on the plan and profile sheets, and show erosion controls.

29. Specify concrete strength for all structures.

30. Provide sections for road, railroad and other ditches with profiles and hydraulic computations. Show design water surface on profile.

c. Lot Grading Plans

1. Show the elevation of all property corners, ditch flow lines, ditch top of banks, points of grade change (ie. High and low points), directional arrows showing the flows, all trees that are to be saved with properly scaled radii for tree canopy sizes.

d. Bridge Plans

1. Show the elevation of the lowest member of the bridge and 100-year water surface elevation.

2. Indicate borings on plans.

3. Provide soils report.

4. Show bridge sections upstream and downstream.

5. Provide hydraulic calculations on all sections.

6. Provide structural details and calculations with dead load deflection diagram.

7. Provide vertical and horizontal alignment.

e. Creek Alteration and Channel and Ditch Plans

1. Show stationing in plan and profile.

2. Indicate flow line, banks, design water surface, and freeboard. Show hydraulic computations.

3. Indicate nature of banks such as rock, earth, etc.

4. Provide cross-sections with ties to property lines and easements.

5. Show side slopes of creek, channels, etc.

6. Specify compacted fill where fill is proposed.

7. Indicate any adjacent alley or street elevations on creek profile.

8. Show any temporary or permanent erosion controls.

9. Indicate existing and proposed velocities.

10. Show access and/or maintenance easements.

11. As necessary, show ground elevations parallel to the top of bank to show how runoff is prevented from overland flow into the creek or channel.

f. Detention and Retention Facilities

1. Show plan view of detention/retention area and outlet structure.

2. Delineate limits of conservation pool, sediment storage area, flood storage pool, and/or freeboard.

3. Indicate size, dimension, total capacity, design discharge and velocity of the outlet structure.

4. Show any erosion control features at the discharge point of the outlet structure.

5. Specify side slopes of basin and outlet structure.

6. Show existing or proposed structures or other facilities down stream of the outlet structure and emergency spillway, and provide information sufficient to show that the downstream facilities will not be inundated or otherwise affected by the discharge from the basin.

7. Indicate locations and quantities of all inflows to the basin.

8. State the design time to empty the basin.

g. Levees

1. Show location, extent, nature, dimensions, etc., of levee embankments and associated interior and exterior drainage facilities.

2. Provide engineering analysis addressing potential erosion of the levee embankments during flood events.

3. Provide engineering analysis of levee embankment stability and seepage through the levee during flood events.

4. Demonstrate that future settlement of the levee embankments will not result in freeboard dropping below the minimum requirements. Provide geotechnical reports showing anticipated levee consolidation.

5. Analyze interior drainage concerns. Identify sources of interior flooding, and extent and depth of such flooding, assuming a joint probability of interior and exterior flooding. Consider capacity of pumps and other drainage devices for evacuating interior waters.

6. Write an operations manual which discusses the flood warning system to trigger closures; closure operations, procedures, and personnel; operation plans for interior drainage facilities; at least an annual inspection program; and maintenance plans, procedures, and frequency.

7. Provide all other information required in Article 7, Section C, and any other information requested or required by the Town engineer and/or the Federal Emergency Management Agency.

2. Floodplain Alteration Plans

The materials listed below shall be submitted as part of the application for a Development Permit. It is recommended that applicants coordinate the application materials listed below with those needed for other Town of Fairview permits and with the data requirements of the Federal Emergency Management Agency. Such coordination will facilitate staff review and drawings could be combined so as to save the applicant from multiple drawings.

a. An engineering report consisting of at least:

1. Project description.

2. Description of the hydrologic and/or hydraulic analyses used, including method used to determine historic rainfall and stream data, soils reports used to determine erosive velocity values, and discharges and water surface elevations for both the design and base floods.

3. Vicinity map.

4. Evaluation of the "natural floodway" and floodplain limits for the design flood. The "natural floodway" differs from the FEMA "regulatory floodway." The "natural floodway" is established to allow the Town of Fairview to effectively manage flood plain areas. FEMA requirements for the "regulatory floodway" must also be met by applicants.

5. If hydraulic analyses are being submitted, then a table of values for existing and proposed water surface elevations and velocities must be included.

6. Documentation that the principle of equal conveyance has been achieved.

7. Copies of computer input and output data for existing and proposed conditions for both the base flood and design flood discharges.

8. Evaluation of existing and proposed valley storage (see Article 8 for design requirements).

b. Engineering drawings consisting of at least:

1. Water surface profile, including channel flow line, existing and proposed water surface elevations, recorded high water marks, and location and number designation of cross-sections.

2. Plan view on 24" x 36" paper, including

   a. Scale and north arrow.
   b. Title block.
   c. Boundary lines and nearest street intersections.
   d. Existing and proposed contours.
   e. Existing and proposed floodplain limits, and limits of the "natural floodway" and the "regulatory floodway."
   f. Area to be removed from the floodplain or area to be altered.
   g. Top and toe of fill and/or side slopes and the numerical slope of the fill and/or side slopes labeled.
   h. Location of all other associated improvements or alterations to the creek and/or floodplain, such as check dams, swales, channel modifications, etc.
   i. Location of cross-sections.
   j. Location of all existing and proposed easements and dedications.
   k. Site vicinity map.

3. Plots of cross-sections, including:

   a. Scale.
   b. Title block.
   c. Existing and proposed ground elevations.
   d. Cut and/or fill areas labeled.
   e. Limits of and numerical values for existing and proposed "n" values.
   f. Equal conveyance removed from both sides.

SECTION E. Appeals and Variance Procedure

1. Appeal

Any person aggrieved by a decision of the Town engineer or Town Administrator may appeal from any order, requirement, decision or determination of the Town engineer to the Town Council. An appeal from a determination of the Town Council may be made directly to the Court of Appeal.

2. Variances

The Town Council as established by the Town of Fairview shall hear and decide requests for variances from the requirements of this ordinance.

Variances concerning Development Permits may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this section.

Variances shall not be issued within any designated natural or regulatory floodway if any increase in flood elevations during the design flood discharge would result unless the increase will result in no negative impacts on adjacent properties and written approval is obtained from impacted property owners.

Variances shall be issued only upon a determination that the variance is the minimum necessary to afford relief considering the flood hazard, drainage problems, and soil loss.

Variance shall be issued only upon meeting all three of the following criteria:

1. A showing of good and sufficient cause.

2. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and,

3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.

   Any applicant to whom a variance for building or renovating in a floodplain is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the design flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

   In considering variance requests, the Town Council shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and the:

   - Danger that materials may be swept onto other lands to the injury of others;
   - Danger to life and property due to drainage, flooding, or erosion damage;
   - Susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
   - Importance of the services provided by the proposed facility to the community;

- Necessity to the facility of a waterfront location, where applicable;

- Availability of alternative locations for the proposed use which are not subject to flooding damage.

- Compatibility of the proposed use with existing and anticipated development.

- Relationship of the proposed use to the comprehensive plan and flood plain management program of that area.

- Safety of access to the property in times of flood for ordinary and emergency vehicles;

- Expected heights, velocity, duration, rate of rise, and the effects of wave action, if applicable, expected at the site; and,

- Costs of providing governmental services during and after storm events, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

Upon consideration of the factors listed above and the purposes of this ordinance, the Town Council may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.

The Town Engineer shall maintain the records of all appeal actions, including technical information, and report any variances of the floodplain management portions of this ordinance to the Federal Emergency Management Agency upon request.

ARTICLE 5

RUNOFF CALCULATIONS

The selection of which method to use for calculating runoff depends upon the size of drainage area contributing runoff at a most downstream point of a project. The "Rational Method" is acceptable for situations in which the drainage area is less than 160 acres. A unit hydrograph method is required for situations with larger drainage areas.

Stormwater detention will be required in all development other than low density residential developments with one acre lot sizes or greater. Stormwater detention may be required at the discretion of the Town engineer if downstream development exists that is threatened with any increase in stormwater runoff. If required the owner or developer shall assume full responsibility for maintenance of the detention basin or retention pond. This obligation shall run with the land and be a continuing obligation. The rate of discharge for any detention/retention area shall be set to pre-developed conditions.

Runoff computations shall be based upon fully developed watershed conditions in accordance with the land use projections in the latest comprehensive land use plan for the Town of Fairview. The design engineer shall size drainage facilities by disregarding the detention effects of upstream property and calculating the runoff as if the off-site property was developed without any detention. If an approved regional detention/retention facility is in operation, the design engineer may size downstream drainage facilities based on consideration of the detention effects of the regional facility.

SECTION A. Procedure for Drainage Areas Less Than 160 Acres

1. Rational Method

Computation of Stormwater Runoff for drainage areas less than 160 acres shall be by the "Rational Method," which is based on the principle that the maximum rate of runoff from a given drainage area for an assumed rainfall intensity occurs when all parts of the area are contributing to the flow at the point of discharge. The formula for calculation of runoff by the "Rational Method" is:

(Equation 1)

$$Q = CIA$$

Where: Q = the maximum rate of discharge, expressed in cubic feet per second.

C = a runoff coefficient which varies with the topography, soil, land use and moisture content of the soil at the time the runoff producing rainfall occurs. This runoff coefficient shall be based on the ultimate use of the land as recommended by the Master Plan for the Town of Fairview and shall be selected from Table 1 herein on the basis of the use shown on land use and zoning map of the Comprehensive Zoning Ordinance for the Town of Fairview. If an area has had a change of Zoning to give the area land use for which the "C" in Table 1 is higher than use shown on land use and zoning maps, the higher "C" factor shall be used.

A = The drainage area, expressed in acres, contributing to the runoff at the point in question. Calculation of the drainage area shall be made from an accurate topographic map, a copy of which shall be submitted with the engineering plans for approval.

I = Rainfall intensity in inches per hour for the time period that it takes for flow from the farthest point of the drainage area to reach the point of design. The rainfall intensity is found by referring to the applicable curves of Figure 1. Time of Concentration or Duration of Rainfall for use in Figure 1 shall be calculated by velocity data shown in Table 2.

Time of concentration is the longest time, without interruption of flow by detention devices, that a drop of water takes to flow from the farthest point of the drainage area to the point of concentration (i.e., the point of design). The time of concentration is composed of the "inlet time" and the flow time in a conduit or channel to the point of design. Equation 2 shows how to calculate the time of concentration.

(Equation 2)

$$T_C = \text{Inlet Time} + \frac{L}{V \times 60 \text{ sec/min}}$$

Where: T_C = Time of concentration in minutes.

Inlet time = 10 minutes for property zoned multiple family, churches, restaurant, local business, central business, commercial, or industrial

or

15 minutes for property zoned for parks, cemeteries, agricultural, and single family residential.

or

$$\frac{L}{V \times 60 \text{ sec/min}}$$

L = Length of conduit or channel, in feet.

V = Velocity of flow in conduit or channel, in feet per second.

When designing inlets and laterals, the time of concentration is simply equal to the inlet time. The design engineer will compare the above specified inlet times to the actual calculated inlet time by computing the flow time overland and along the gutter to the first inlet. The Manning equation, along with the velocity information in Table 2 (or other acceptable procedures such as the SCS method), shall be used to determine flow time to the inlet. The design engineer may use the actual calculated or specified inlet time. In no case shall a longer inlet time be used than 10 minutes for multiple family, commercial, churches, schools, industrial and business areas and 15 minutes for parks, cemeteries, agricultural, and single-family areas.

When sizing storm sewers and channels, the time of concentration shall be calculated by adding the actual calculated inlet time (but not greater than the specified inlet times) to the flow time in the conduit and/or channel. The design engineer may use the combined times, as described, or the specified inlet times for storm sewer sizing.

SECTION B. **Procedure for Drainage Areas Greater than 160 Acres.**

For drainage areas in excess of 160 acres where the use of the "Rational Method" does not provide reliable results, the use of a unit hydrograph method shall be made. The use of a unit hydrograph calculation will be based upon standard and accepted Engineering Principles normally used in the Profession subject to the approval of the Town engineer. Use The Corps of Engineers HEC-1 models for drainage areas 160 acres or more.

The unit hydrograph method shall be based upon fully developed watershed conditions assuming no effects from the small on-site detention facilities for maintaining the rate of runoff as if the property was developed as single family residential uses. The detention effects of large regional detention facilities can be taken into account in unit hydrograph methods.

Circumstances that may require the use of a unit hydrograph method include sizing open channels, reclaiming floodplains, creating lakes, or building other types of drainage-related facilities on major drainage courses. Design engineers of these types of facilities should be aware that the requirement of designing for fully developed watershed conditions will mean that they will have to calculate these fully developed flows instead of using the flows calculated in the Federal Emergency Management Agency's (FEMA) flood insurance studies for Fairview. FEMA's flows cannot be used because the flows are based upon existing watershed conditions (For more information, see Article 7 on the sizing of channels and other major drainage facilities and Article 8 for floodplain alteration procedures). Use of the rational method is allowed for design of storm sewers within the project area.

ARTICLE 6

DESIGN OF LOCAL DRAINAGE SYSTEMS

SECTION A. Design Storm Frequencies

The calculations of runoff quantities that must be accommodated in drainage facilities require the selection of the design storm frequency. The design storm frequencies for various drainage structures are given below.

DRAINAGE FACILITY	DESIGN RECURRENCE INTERVAL
Closed Storm Sewer Systems	25-year with 100-year positive overflow for Inlets on Grade in streets such that the depth of flow in the street does not exceed the top of curb.
Closed Storm Sewer Systems and Inlets at Street Low Point or Sag	100-year with positive overflow for 100 yr.
Culverts and Bridges	100-year
Concrete-lined Channels	100-year
Earthen Channels	100-year
Levees	Standard Project Flood
Dams Above Natural Ground/Spillways	Spillway design flood varies with the class of structure (see Article 7, Section B).

The approved drainage system shall provide for positive overflow at all low points. The term "positive overflow" means that when the inlets do not function properly or when the design capacity of the conduit is exceeded, the excess flow can be conveyed overland along a grassed or paved course. Normally, this would mean along a street or alley, or shall require the dedications of special drainage easements on private property.

SECTION B. Street and Alley Capacities

Street capacities shall be designed for the 100-year design flood.

Minor Arterial and lower classifications - Maximum 6 inches or top of curb.

Principal Arterial - One lane open in each direction.

1. Streets

The depth of flow in the streets shall not exceed the top of curb. Figure 2 shows the capacity of streets with a straight cross slope that varies from 1/8 inch per foot to 1/2 inch per foot, which are the minimum and maximum allowable street cross slopes.

2. Alleys

The flows created by the 100-year storm shall be contained within the capacity of all paved alleys. Figure 3 shows the capacity of various alley sections.

Alley capacities shall be checked at all alley turns and "T" intersections to determine if curbing is needed or grades should be flattened. Alley sections shall be super-elevated as required at corners and curves to insure that flow remains in the alley through these changes in alignment.

Curbing shall be required for at least 10 feet on either side of an inlet in an alley and on the other side of the alley so that the top of the inlet is even with the high edge of the alley pavement.

3. Finished Floor Elevations in Relation to Alleys, Streets, and Positive Overflows

The first floor elevations of all residential and other structures shall be set at a minimum elevation of the higher of either 1.5 feet above the alley invert or one foot above the top of the street curb elevation, and with positive drainage provided away from the structure. Positive overflow sections shall provide a minimum of 2 feet of freeboard from the overflow invert adjacent to structures and the corresponding first floor elevation of all residential and other structures. Lot grading plans are required for all new subdivisions.

4. Street ditch design.

(a) Street ditch design in street ROW shall use the Mannings Formula and roughness coefficient as shown in division (J) of this section to follow.

(b) Street ditches shall be "V" shaped with maximum 3:1 slopes and a minimum of three feet deep (18" culvert plus 1' cover plus 6" drive).

(c) The ditch should maintain a minimum of one percent (0.5%) grade. The ditch should have grass to avoid erosion.

(d) The maximum allowable flows in a street ditch shall be 50 c.f.s. Any storm water flows in excess of the maximum allowable shall be carried underground.

(e) All driveway culverts shall be sized for the 25 year frequency storm or greater.

SECTION C. Placement of Inlets

Storm sewer inlets shall be built along paved streets at such intervals that the depth of flow, based upon the 100-year storm, does not exceed the top of curb. Inlets shall be located as necessary to remove the flow based on a 25-year storm. If in the opinion of the Town engineer the flow in the gutters would be excessive using the above design criteria, the storm sewers or inlet locations could be altered to relieve adverse conditions.

Inlets shall be placed upstream from an intersection whenever possible. At any intersection, only one street shall be crossed with surface drainage and this street shall be the lower classified street. When an alley intersects a street, inlets shall be placed in the alley whenever flow down that alley would cause the capacity of the intersecting street to be exceeded.

SECTION D. Inlet Capacities and Sizes

Figure 4 shows the various types of inlets allowed for use along various kinds of streets. Other types of inlets may be used upon the approval of those inlets by the Town engineer. The minimum inlet size shall be eight feet. Figures 5 through 18 show how to determine the capacity of inlets. No more than 20 feet of inlets shall be placed along one gutter at any given location. Grate or combination inlets shall not be used in Town maintained streets unless approved by Town engineer.

Minimum sizes of laterals shall be 18-inches for use with 8-foot inlets, and 21-inch laterals with 10-foot, 14-foot, and drop inlets, and 24-inch laterals for 20-foot inlets. Where laterals tie into trunk lines, place the laterals on a 60° angle with the trunk line and connect them so that the longitudinal centers intersect.

SECTION E. Pipe Design Standards

1. The Manning Equation

Storm sewer conduit shall be sized to flow full. Manning's Equation shall be used to determine the conduit size. Manning's equation is expressed as:

(Equation 3)

$$Q = \frac{1.486}{n}(A)(R)^{2/3}(S)^{1/2} \text{ or } V = \frac{1.486}{n}(R)^{2/3}(S)^{1/2}$$

Where: Q = Flow in cubic feet per second.

V = Velocity of flow in conduit in feet per second.

A = Cross-sectional area of the conduit in square feet.

R = Hydraulic radius of the conduit, which is the area of flow divided by the wetted perimeter (R = A/P).

S = Slope of the hydraulic gradient.

n = Roughness coefficient of the conduit.

P = Wetted perimeter.

Figure 19 is a graphical solution of Manning's Equation, which allows sizing of concrete pipe, assuming an "n" value of 0.013.

2. Minimum and Maximum Velocities in Pipes

The minimum velocities in conduit shall be 2.5 feet per second. The minimum slopes for various pipe sizes that will maintain this minimum velocity are given in Table 3. The recommended maximum velocities of flow in the conduit and channels are given in Table 4.

The maximum discharge velocities in the pipe shall also not exceed the permitted velocity of the receiving channel or conduit at the outfall to prevent erosive conditions, as shown in Table 4. The maximum outfall velocity of a conduit in partial flow shall be computed for partial depth and shall not exceed the maximum permissible velocity of the receiving channel unless controlled by an appropriate energy dissipater (e.g. stilling basins, impact basins, riprap protection).

3. Roughness Coefficients for Conduits

In general, stormwater shall be carried in concrete pipe conduit, but other types of conduit can be used to carry stormwater. However, prior permission to use metal conduit must be obtained from

the Town engineer. Table 5 shows recommended roughness coefficients for various types of conduits. If, in the opinion of the design engineer, other values for the roughness coefficient should be used, the different value can be used with the permission of the Town engineer. Appropriate notes of the approved roughness coefficient shall then be shown on the engineering plans.

4. Hydraulic Gradient of Conduits

Conduits must be sized and slopes must be set such that runoff flows smoothly down the drainage system. To insure this smooth passage, the hydraulic gradient must be at the proper elevations.

The proper starting elevation of the hydraulic gradient shall be set according to the applicable criteria listed below:

1. When a proposed conduit is to connect to an existing storm sewer, the hydraulic gradient of the proposed storm sewer should start at the elevation of the hydraulic gradient of the existing storm sewer based on an evaluation of the existing storm sewer with respect to the requirements found in this ordinance. This criterion will be used for existing systems whether or not they are designed in accordance with this ordinance.

2. When a proposed conduit enters an open channel, creek, or flood control sumps, the hydraulic gradient of the proposed conduit should start at the 25-year water surface elevation of the channel or creek when the ratio of the drainage area of the receiving creek (at the development) to the development area is 15 or greater. For ratios of less than 15, the 100-year water surface will be used on the receiving creek.

Not only is it important to use the proper starting elevation for the hydraulic gradient, but proper hydraulic gradient elevations must be maintained for the length of the conduit. The inside top of the conduit should be at or below the hydraulic gradient. However, effort should be made to keep the top of the pipe as close to the hydraulic gradient as possible so that deep excavations to lay pipe are not required.

When the conduit is flowing partially full, the hydraulic gradient shall be shown at the inside crown of the conduit.

The hydraulic gradient shall be kept two feet below the top of curb. If this cannot be obtained, the hydraulic gradient shall be at least 1.5 $V_1^2/2g$ feet below the gutter line, where V_1 is the velocity in the lateral.

5. Minor Head Losses

When establishing the hydraulic gradient of a storm sewer, minor head losses at points of turbulence shall be calculated and included in the computation of the hydraulic gradient.

Entrance Losses

Entrance losses to a closed storm sewer system from an open channel or lake shall be calculated using Equation 4.

(Equation 4)

$$H_L = K_e \frac{V_1^2}{2g}$$

Where: H_L = Head loss in feet.

V_1 = Velocity in the downstream pipe in feet per second.

K_e = Head loss coefficient (see Table 6).

The resulting hydraulic gradeline shall be compared to inlet control conditions for the storm sewer as described in Section F. The higher of the two values will be used as the controlling upstream hydraulic grade line.

Expansion Losses

For pipe size expansions, head loss shall be calculated using the following equations:

(Equation 5)

$$H_L = \left(1 - \left(\frac{D_1}{D_2}\right)^2\right)^2 \frac{V_1^2}{2g}$$

Where: H_L = Head loss in feet.

V_1 = Upstream velocity in feet per second.

D_1 = Upstream pipe diameter.

D_2 = Downstream pipe diameter.

Manhole and Bend Losses

Head losses associated with manholes for pipe direction changes and bends in pipes of equal diameter shall be calculated using:

(Equation 6)

$$H_L = K_b \frac{V_2^2}{2g}$$

Where: H_L = Head loss in feet.

V_2 = Velocity in the downstream pipe in feet per second.

K_b = Head loss coefficient from Table 7.

Junction Losses

Head losses associated with wye connections or manholes with branch laterals entering the main line can be calculated by using Equation 7.

(Equation 7)

$$H_L = \frac{V_2^2}{2g} - K_j \frac{V_1^2}{2g}$$

Where: H_L = Head loss in feet.

V_1 = Velocity in the upstream pipe in feet per second.

V_2 = Velocity in the downstream pipe in feet per second.

K_j = Head loss coefficient from Table 7.

6. Storm Sewer Laterals

Laterals for storm sewer systems shall be sized to control the flooding depth at the inlets. The depth shall not exceed the limits previously established for storm sewer systems. Calculation of the flooding depth shall be determined based on the addition of the velocity head of the lateral to the computed HGL:

$$ELEV = HGL + \frac{V_L^2}{2g}$$

This calculated elevation shall be compared to the elevation determined based on inlet control nomographs as developed by the Department of Transportation. The highest of the two elevations shall be used to establish the capacity of laterals and the corresponding depth of flooding.

7. Outfalls to Open Channels and Lakes

The flow lines of storm sewer conduits that discharge into open channels shall match the flow line of the channel unless, at the discretion of the Town Engineer, natural vegetation and trees that stabilize the channel banks need to remain. Another exception to this requirement of matching the flow line is when a storm sewer discharges into a concrete-lined channel, or when the outfall is submerged below the normal water surface of a lake. In the case of a pipe discharging to a lined channel, the outlet must be below the top of the channel lining. The second exception pertains to storm sewer discharge that must cross wide floodplain areas. Under this condition, the storm sewer could discharge into a lined ditch which would convey runoff to the flow line of the channel without creating an erosive condition. Permissible velocities within the ditch will be based on the type of lining used and the velocities provided in Table 4. Flumes to bring the discharge down to the flow line of earthen creeks shall not be permitted. Drop structures shall be allowed upon written approval of the Town engineer.

The velocity at the discharge end of the conduit shall be computed based on partial flow depth and shall be sufficiently low so as to not cause downstream erosion problems. Table 4 shows the maximum velocities allowed in various types of channels, which are then the maximum discharge velocities at storm sewer outfalls.

In some circumstances, the configuration of the storm sewer in relation to the flow line of the creek may cause excessive velocities to be reached unless provisions are made to slow the velocity. One recommended method of slowing the velocity is to have the last length of pipe (a length of at least ten times the diameter) be on a slope that will reduce the partial flow outlet velocity to the values shown in Table 4 for the receiving stream. Stilling basins shall also be allowed to reduce discharge velocities.

The discharge pipe shall also intersect minor creeks at an angle not to exceed 60 degrees. Minor creeks are defined as those creeks, channels, or drainage ways where the distance from the pipe outlet to the opposite creek bank at the bottom of the channel is twenty (20) feet or less. Pipes may intersect major creeks (greater than 20 feet to opposite bank) at a 90-degree angle. The Town engineer may require that pipes intersect major creeks at an angle not to exceed 60 degrees, when a 90-degree angle would result in an erosive condition.

Figure 20 shows how a storm sewer should be configured to discharge into a creek.

8. Easements for Enclosed Storm Sewers and Positive Overflow Areas

All storm sewer conduits to be dedicated to the Town of Fairview shall be located in an easement dedicated to the Town of Fairview at the time of final platting of the property. The easement shall be at least 20 feet wide for storm sewers or wider if the Town engineer requires it for maintenance or other purposes. Special drainage easements on private property shall be a minimum of 15 feet wide or wider if the Town engineer requires it for maintenance or other purposes. Maintenance responsibility shall be as required in Article 7.A.5. No fences, buildings or other structures and improvements shall be placed within these dedicated easements.

SECTION F. Culvert Design Standards

Culverts shall be designed in accordance with the Texas Highway Department Hydraulic Manual, Chapter 4 - Culverts. The calculation of hydraulic grade lines will consider both inlet and outlet control for the culvert. Starting water surface elevations for gradeline calculation will be the same as required for storm sewers; see Section E.

ARTICLE 7

SPECIAL DRAINAGE FACILITIES

SECTION A. Channels

1. Channel Design

Open channels may be used instead of enclosed systems when the drainage area of contributing flow to the channel is greater than 160 acres. Open channels shall not be permitted when the drainage area is less than 160 acres. Table 4 shows the maximum velocities allowed for certain types of channels. Roughness coefficients for the design of open channels are provided in Table 8. The following criteria shall be used in determining the nature of the open channel.

- For channels with a contributing drainage area of 160 acres or greater:

a. Channels may be left in their natural state provided that the channel velocities are 6.0 feet per second or less, if approved by Town engineer. Otherwise, all channels shall be in accordance with A.1.d. or fully lined.

b. If the natural channel is to be replaced by an improved channel, the flow from the 100-year design flood must be contained within the improved channel while allowing for one foot of freeboard. An improved channel shall meet the floodplain alteration regulations presented in Article 8.

c. Improved channels shall include a lined section if the design velocity is greater than six feet per second. Lining types such as concrete and rock walls may be used upon approval of the Town engineer. Improved channels with design velocities of less than the permissible velocities shown in Table 11 may be earthen if the channels are revegetated properly.

d. For lined channels, all of the channel bottom and at least the first three feet (vertical height) of the side slopes up from the channel bottom shall be lined, unless approved by the Town engineer.

e. Earthen sides above the lined section or totally earthen channels shall be on at least a four horizontal to one vertical slopes and shall have approved ground cover to prevent erosion.

f. Unless shown to be feasible in a soils report sealed by a registered professional engineer in the State of Texas, and approved by the Town engineer, improved channels shall have minimum side slopes of:

- 4 feet horizontal to 1 foot vertical for earthen grassed side slopes.

- 2 feet horizontal to 1 foot vertical for side slopes in rock.

g. The developer or owner shall use low maintenance vegetation for vegetative cover, as approved by the Town engineer prior to planting. The selection of materials shall comply with either the current ground cover listing for North Central Texas furnished through the Texas Agricultural Extension Service or Table 9 in this ordinance.

h. The developer/owner shall provide a drainage easement and a required maintenance easement (see paragraph 4 below) which shall be dedicated to the Town of Fairview as a permanent drainage right-of-way and open space corridor.

i. Channel improvement shall not include concrete pilot channels which do not meet the requirements of item A.1.d., unless approved by the Town engineer.

2. Erosion Prevention

All channel sections must consider and account for channel stabilization in their design. This requirement pertains to all sections whether they are left in their natural condition or are modified in any manner. Three sets of requirements are provided depending upon the relationship of the existing channel to the limits of the developer/owner's property boundaries. The Town engineer shall have the discretion to require the implementation of the portion of these requirements as deemed necessary, depending on the specifics of the property being developed or improved or to allow the escrow of funds sufficient to provide for the construction of a proportionate amount of channel improvements in lieu of actual construction. This discretion may be exercised when a small section of improvements is not deemed by the Town engineer to be economically practicable.

a. In cases where the entire channel section is contained within the limits of the developer/owner property boundaries. The developer/owner shall:

1. Provide for an improved stabilized channel cross-section which reduces all velocities to 6.0 fps or below for vegetated channels. The channel improvements must meet all requirements of this ordinance.

2. For vegetated channel sections with channel velocities ranging from 6 to 8 fps, construct grade control structures within the channel and overbank areas to prevent erosion. Grade control structures shall have a minimum effective depth of 3.0 feet below existing or proposed grades with an adequate number of structures to prevent less than 1 foot of degradation.

b. In cases where the property boundary follows the centerline of the channel or incorporates only a portion of the channel cross-section, the developer/owner shall:

1. Determine the design section required to provide for an improved stabilized channel cross-section which reduces all velocities to 6.0 fps or below for vegetated channels. The design channel section must meet all requirements of this ordinance.

2. The design section may include vegetated channel sections with channel velocities ranging from 6 to 8 fps, provided that grade control structures are included within the channel and overbank areas to prevent erosion. Grade control structures shall have a minimum effective depth of 3.0 feet below existing or proposed grades with an adequate number of structures to prevent less than 1 foot of degradation.

3. The developer/owner shall construct or escrow funds for construction of the portion of the design improvements required on their property for the ultimate channel design. The Town engineer shall have the discretion to determine the portion of the design improvements to be constructed/ escrowed by the developer/owner. In most instances, the developer/owner shall construct one-half of the improvements on their property.

4. If grade control structures are incorporated into the design, the developer/owner shall coordinate with adjacent owners in order to construct
these features in their entirety at the time of the initial portion of the channel improvements.

5. The developer/owner shall provide for a drainage easement and access/maintenance easement consistent with the portion of the improvements provided.

c. In cases where the developer/owner owns property adjacent to channel or floodplain areas but does not own a portion of the channel or floodplain area, the developer/owner shall (at the discretion of the Town engineer):

1. Determine the channel improvement configuration necessary to meet the requirements of item (2a) above and

2. Shall provide a dedicated easement to the Town for the portion of this future improvement configuration, including necessary maintenance and access easement, which will include the developer/owner property.

3. Starting Water Surface Condition

When performing hydraulic analyses for channel or drainage way design, the starting water surface shall be based on the following criteria.

a. When the ratio of the drainage area of the receiving creek (at the confluence location) to the drainage area of the channel or drainage way being designed is 15 or greater, the 10-year water surface of the receiving creek shall be used as the starting water surface for hydraulic design calculations. For creeks where the 10-year water surface is not available, the slope-area method will be used for starting design calculations.

b. When the ratio of the drainage area is less than 15, the 100-year elevation on the receiving creek shall be used as the starting water surface for design calculations.

4. Easements Required for Open Channels

Drainage and/or floodway easements for all open channels, creeks and flumes shall be dedicated to the Town of Fairview. Easements shall encompass all areas having a ground elevation below the higher of one foot above the water surface elevation associated with the design flood or the top of the high bank or channel edge. No fences, buildings, or other structures which could impede flow shall be placed within this dedicated drainage easement. In all cases, the easement shall also include at least a 20-foot wide maintenance strip along both sides of the channel or, if the Town engineer so allows, at least a 30- foot wide maintenance strip along one side of the channel. Streets, alleys, bike paths, etc., alongside the channel can serve as all or part of the maintenance easement.

Drainage easements for flumes shall be located with sufficient width to permit future maintenance accessibility, and in no case shall be less than 15 feet wide.

5. Maintenance of Facilities and Easements

All drainage easements shall be dedicated to the Town of Fairview. The maintenance responsibility of the easements will vary based on the situation. The following outlines the maintenance responsibility for various conditions.

a. Drainage improvements constructed by the Town of Fairview shall be the maintenance responsibility of the Town.

b. Drainage improvements constructed in single family residential areas, where no homeowner's association or other similar association has been formed, shall be the maintenance responsibility of the Town of Fairview.

c. Drainage improvements shall not be the maintenance responsibility of the Town of Fairview when constructed in:

   1. residential areas where a homeowner's association or other similar association is formed,
   2. areas of commercial or industrial zoning.

   The maintenance activities in these areas shall be the responsibility of private ownership including associations. If such improvement deteriorates in condition, the Town manager or his designated representative shall notify such property owner or association of required corrections and/or maintenance to bring drainage facility up to the standards as originally approved by the Town and according to the original improvement. If such maintenance is not accomplished within a reasonable time, then the Town may contract for such work and levy an assessment to the property owner or association for such cost.

Perpetual maintenance must be assured by either a homeowner's association (single family only), trust fund, or other private entity as specified by the Town Council.

SECTION B. Lakes and Dams

In the event that a property owner or developer desires to modify an existing pond or lake or desires to impound stormwater by filling or constructing an above-ground dam, thereby creating a lake, pond, lagoon or basin as part of the planned development of that property, the criteria listed below shall be met before Town approval of the impoundment can be given. Ponds or lakes created by excavation of a channel area without erecting a dam above natural ground elevation or instream, low water checkdams are also subject to the criteria listed below, with the exception of spillway capacity requirements. The Town engineer has the final authority to determine the design criteria for a proposed dam, check dam or excavated lake. The requirements of the State of Texas must also be met for the construction of dams, lakes, and other impoundments.

The design criteria for a dam is dependent on the size and hazard classification of the dam. The size and hazard classification will be based on Chapter 12 of the Texas Water Code and will be determined by the Town engineer based on information furnished by the owner. The following criteria will be used to classify a dam:

1. Size

The classification for size is based on the height of the dam and storage capacity, whichever gives the larger size category. Height is defined as the distance between the top of the dam (minus the freeboard) and the existing streambed at the downstream toe. Storage is defined as the maximum water volume impounded at the top of the dam (minus the freeboard).

Size Classification

	Impoundment	
Category	Storage (acre-feet)	Height (feet)
Minor	<100	<10
Small	≥100 and < 1,000	≥10 and < 40
Intermediate	≥1,000 and < 50,000	≥40 and < 100
Large	≥50,000	≥100

2. Hazard Potential

The hazard potential for a dam is based on the potential for loss of human life and property damage downstream from a dam in the event of failure. The following categories will be used:

Hazard Potential Classification

Category	Loss of Life (Extent of Development)	Economic Loss (Extent of Develop.)

Low	None expected (No permanent structures for human habitation)	Minimal (Undeveloped to occasional structures or agriculture)
Significant	Possible, but not expected (No urban developments and no more than a small number of inhabitable structure	Appreciable (notable agricultural, industry,or commercial development)
High	Expected (Urban development or large number of inhabitable structures)	Excessive (Extensive public, industrial,or agricultural development)

3. Spillway Design Flood

The classification of a dam based on the above criteria will be used to determine the Spillway Design Flood (SDF). The total capacity of a dam structure, including principal and emergency spillways, shall be adequate to pass the SDF without exceeding the top dam elevation at a minimum. The SDFs for various dam classifications are as follows:

Spillway Design Flood

Hazard	Size	SDF
Low	Minor	100-year
	Small	1/4 PMF
	Intermediate	1/4 PMF to 1/2 PMF
	Large	PMF
Significant		
	Small	1/4 PMF to 1/2 PMF
	Intermediate	1/2 PMF to PMF
	Large	PMF
High		
	Small	PMF
	Intermediate	PMF
	Large	PMF

In all cases, the minimum principal spillway design capacity is the 100-year design flood. In certain cases, a dam breach analysis may be required to determine the proper classification of the structure. For all structures requiring a spillway design flood equal to the PMF, a dam breach analysis is required to determine the downstream consequences of a failure. All dams designed for a SDF of 1/2 PMF or less shall be constructed with a minimum freeboard of two feet above the SDF elevation.

4. Additional Design Requirements

a. An engineering plan for such construction, accompanied by complete drainage design information and sealed by a registered professional engineer, shall have been approved by the Town of Fairview;

b. The spillway and any emergency overflow areas shall be located so that flood waters will not inundate any buildings, roadways, or other structures.

c. All Federal, State and County laws pertaining to impoundment of surface water shall have been complied with, including the design construction and safety of the impounding structure. Copies of any Federal, State, and County permits issued for the proposed impoundments shall be submitted to the Town engineer.

d. Any existing structure, which is included in the project area shall be improved to comply with the applicable Federal, State, County and Town safety requirements for structures.

e. Before removing, enlarging, or altering any existing lake, the Owner will furnish a study of the effects of the alteration upon flooding conditions both upstream and downstream. The study shall be prepared by a professional Engineer and submitted to the Town for approval prior to making the proposed alteration. Compensatory storage shall be provided in some manner such that equal or comparable flood retention capacity is maintained.

f. Any improvements to existing dams or lakes or construction of new impoundments shall be made at the expense of the developer, prior to acceptance of the adjacent street, utilities and drainage improvements as provided for under the Subdivision Ordinance.

5. Maintenance and Liability Criteria

a. The owner or developer shall have agreed to retain private ownership of the lake, pond, or lagoon or basin constructed and to assume full responsibility for the protection of the general public from any health or safety hazards related to the lake, pond, or lagoon constructed.

b. The owner or developer shall have agreed to assume full responsibility for the maintenance of the lake, pond, or lagoon or basin constructed. The owner or developer shall keep the Manager of Field Services advised of the current responsible agent for this maintenance.

SECTION C. Levees

In the event that developers or owners wish to build levees to protect an area from flooding, applicable FEMA and State of Texas guidelines and the following criteria apply:

1. Levees shall be designed to have four feet of freeboard above the Standard Project Flood for the fully developed watershed flows.

2. Levees shall be designed according to the Corps of Engineers design criteria whether or not they are federally authorized levees.

3. Levee systems shall be designed with interior drainage systems to prevent flooding from local runoff contained within the system for the 100-year design flood.

4. Levee systems shall have written operation procedures that address gate closure conditions and emergency warning plan. A copy of these procedures shall be furnished to the Town engineer and the Manager of Field Services.

5. Automated gate closure systems shall have power from two independent sources and shall be capable of being operated manually.

6. Ring levees protecting individual structures proposed for construction after the enactment date of this ordinance shall not be permitted.

7. All new levee systems shall have permanent positive closures to the required design elevation. Temporary closures involving sandbagging or other procedures requiring manual operations shall not be permitted.

8. Provisions shall be made for ensuring the permanent maintenance of levees either by a flood control district or similar governmental organization or by the existing property owner and all future owners, heirs, or assigns.

9. Additional plan requirements include water surface profiles for the design flood and SPF; top of levee profile, definition of interior drainage facilities, including pump station and ponding areas; location of gravity outlets, gatewells and closure structures; and elevation-duration data on the receiving system.

SECTION D. Detention and Retention Facilities

As previously described in Article 5 of this ordinance, the runoff rates for all land uses other than low density residential shall be to pre-development rates. This requirement may apply to low density residential development in sensitive areas at the discretion of the Town engineer. Detention/retention facilities can be designed to detain all or part of the stormwater runoff in a development as long as the net runoff overall is equal to the pre-developed rate prior to leaving the property. Detention/Retention outlets may have to be converted back to sheet flow or other energy reduction methods used if erosive conditions will occur off-site. Detention/retention facilities shall be designed for the 100-year design flood according to the following criteria.

1. The minimum amount of storage volume of the detention basin shall be that volume required to reduce runoff rate to the pre-developed rate. Dedicated detention/retention basins shall also include an additional one foot of freeboard. The volume of runoff storage for drainage areas greater than 160 acres shall be computed using unit hydrograph procedures. Snyder's Unit Hydrograph will be utilized for all computations. Manual methods or use of the computer program HEC-RAS are allowed for runoff hydrograph computation and flood routings.

   For drainage areas less than 160 acres, the above methods are recommended; however, an approximate routing method based on the rational formula is allowable, as outlined in Figure 21.

2. Detention areas in parking lots shall not be:

   - In required parking spaces but in extra spaces.

   - Behind speed bumps unless the speed bumps are made with reinforced concrete.

   - Deeper than six inches unless warning signs are posted.

3. Public drainage easements shall be provided for all regional detention/retention facilities and private drainage easements for other detention/retention facilities where two or more owners are involved.

4. Detention facilities shall be designed to empty in less than 24 hours, unless it is also serving as an erosion control facility during construction.

5. Detention facilities shall not be counted as an erosion control technique unless (1) the basins are designed to empty a minimum of 24 hours from the storm event and (2) adequate sediment storage areas in the basin have been set aside and are maintained.

6. Detention/retention facilities shall be maintained by the owner unless the facilities are dedicated to and accepted by the Town of Fairview.

7. All detention ponds with earth bottoms shall have concrete pilot flumes connecting the flow lines of the inlet and outlet pipes on a 0.5% minimum grade. If an orifice plate is required to control the outflow rate, the flow line of the orifice opening shall match the flow line of the concrete pilot channel.

8. Detention/retention facilities with vertical walls shall have safety fencing that meets the fencing requirements of the Town of Fairview. Retention facilities that hold water shall have side slopes no steeper than 5:1 unless safety fencing is installed.

SECTION E. Flumes

The use of flumes is not recommended for widespread use. Flumes shall not be permitted when the purpose of a permanent flume is to carry runoff down the sides of earthen channels. A flume may be used to direct overflow runoff along property lines until the runoff can be intercepted by streets or conduit flows. Flumes crossing sidewalks shall be covered or bridged such as to minimize danger to pedestrians.

SECTION F. Connections from Buildings to Storm Sewers

Drainage from residential areas, such as roof tops, should be allowed to flow overland before joining the storm sewer system.

Seepage into basements or sub-surface structures that is pumped to ground level, seepage from springs, and runoff from roof drains on non-residential buildings that would flow onto or across driveways, sidewalks, or other areas commonly crossed by pedestrians can create hazards or nuisances to pedestrians. Thus, if hazards or nuisances would be created, the basement and rooftop drains shall be tied directly to the nearest storm sewer, provided that pumped lines from basements have back flow preventers and the water is uncontaminated.

ARTICLE 8

STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

SECTION A. General Requirements

1. All operators of construction sites shall use best management practices to control and reduce the discharge, to the MS4 and to waters of the United States, of sediment, silt, earth, soil and other material associated with the clearing, grading, excavation, and other construction activities to the maximum extent practicable

under the circumstances. Such best management practices shall include, but not be limited to, the following measures as appropriate:

a. Ensuring that existing vegetation is preserved where feasible and that disturbed portions of the site are stabilized as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased. Stabilization measures may include: temporary seeding, permanent seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Contractor shall submit, as a part of the Best Management Practices, a plan indicating the phasing of site clearing/grading;

b. Use of structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutant from the site to the extent feasible;

c. Minimization of the tracking of sediments off-site by vehicles, the generation of dust, and the escape of other windblown waste from the site;

d. Prevention of the discharge of building materials, including cement, lime, concrete, and mortar, to the MS4 or waters of the United States;

e. Providing general good housekeeping measures to prevent and contain spills of paints, solvents, fuels, septic waste, and other hazardous chemicals and pollutants associated with construction, and to assure proper cleanup and disposal of any such spills in compliance with state, federal, and local requirements;

f. Implementation of proper waste disposal and waste management techniques, including covering waste materials and minimizing ground contact with hazardous chemicals and trash;

g. Timely maintenance of vegetation, erosion and sediment control measures, and other best management practices in good and effective operating conditions; and

h. Installation of structural measures during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. Such installed structural measures may include, but not be limited to, the following: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetative swales and natural depressions; other velocity dissipation devices; infiltration of runoff on site; and sequential systems which combine several practices. Operators of construction sites are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and for a period of two years after final acceptance by the Town unless the area is disturbed by new owners.

i. The owner will escrow 10% of the cost to provide final stabilization to the site. This escrow shall be held for a period of two years from the date of final acceptance. The deposit of an escrow amount shall not relieve the owner/operator of their responsibility to stabilize the site and remain in conformance with this ordinance and other corresponding regulations. The Town shall use the escrow only if the owner/operator fails to stabilize the site in a timely manner.

j. For common drainage locations that serve an area with 10 or more disturbed acres at one time, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable,

smaller sediment basins and/or sediment traps should be used. At a minimum, silt fences, or equivalent sediment controls are required for all sideslopes and downslope boundaries of the construction area.

k. Home builders who have purchased lots will be responsible for the erosion control on the individual lots during construction and until vegetation is established. The minimum bmp's required by the town are shown in Figure 23. Improper maintenance of these minimum bmp's by the home builders/owners may result in the ceasing of inspections by the official town building inspector thus halting home construction at critical milestones of inspection.

2. Stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

a. Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

b. Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of site by the 14th day after construction activity temporarily ceased.

3. Qualified personnel (provided by the operator of the construction site) shall inspect disturbed areas of any construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at least once every seven calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater. All erosion and sediment control measures and other identified best management practices shall be observed in order to ensure that they are operating correctly and are effective in preventing significant impacts to receiving waters and the MS4. Based on the results of the inspection, best management practices shall be revised as appropriate, and as soon as is practicable.

4. The Town Engineer requires any plans and specifications that are prepared for the construction of site improvements to illustrate and describe the best management practices required by paragraph A.1 above that will be implemented at the construction site. The Town may deny approval of any building permit, grading permit, site development plan, or any other Town approval necessary to commence or continue construction, or to assume occupancy, on the grounds that the management practices described in the plans or observed upon a site inspection by the Town Engineer or his representative are determined not to control and reduce the discharge of sediment, silt, earth, soil, and other materials associated with clearing, grading, excavation, and other construction activities to the maximum extent practicable.

5. Any owner of a site of construction activity, whether or not he/she is an operator, is jointly and severally responsible for compliance with the requirements in this Section A.

6. Any contractor or subcontractor on a site of construction activity, who is not an owner or operator, but who is responsible under his/her contract or subcontract for implementing a best management practices control measure, is jointly and severally responsible for any willful or negligent failure on his/her part to adequately implement that control measure if such failure causes or contributes to causing the Town to violate a water quality standard or any State-issued discharge permit or discharges from its MS4.

SECTION B. <u>One-Acre Disturbances or more</u>

All operators of sites of construction activity, including clearing, grading, and excavation activities, that result in the disturbance of one or more acres of total land area shall comply with the following requirements in addition to those in section A.:

1. Any operator who intends to obtain coverage for storm water discharges from a construction site under the NPDES General Permit for Storm Water Discharges From Construction Sites ("the Construction General Permit") shall submit a signed copy of its Notice of Intent (NOI) to the Town Engineer at least two (2) days prior to the commencement of construction activities. If the construction activity is already underway upon the effective date of this Ordinance, the NOI shall be submitted within thirty (30) days. For storm water discharges from construction dates where the operator changes, an NOI shall be submitted at least (2) days prior to when the operator commences work at the site.

2. A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared and implemented in accordance with the requirements of the Construction General Permit or any individual or group NPDES permit issued for storm water discharges from the construction site, and with any additional requirement imposed by or under this Ordinance and any other town ordinance. The SWPPP shall be submitted with the engineering plans for the proposed site improvements.

3. The SWPPP shall be prepared, signed, and sealed by a Registered Professional Engineer or Registered Landscape Architect. The signature and seal of the Registered Professional Engineer or Registered Landscape Architect shall constitute his/her attestation that the SWPPP fully complies with the requirements of the Construction General Permit, or with any applicable individual or group NPDES permit issued for storm water discharges from the construction site, and with any additional requirement imposed by or under this Ordinance. The SWPPP shall contain the name, title, and business address of the Registered Professional Engineer or Registered Landscape Architect signing it, and the date he/she does so.

4. The SWPPP shall be completed prior to the submittal of the NOI to the Town Engineer and, for new construction, during the plan review process with the site development plans. The SWPPP shall be updated and modified as appropriate and as required by the Construction General Permit and this Ordinance. (Any update or modification to the SWPPP shall be prepared, signed, and sealed by a Registered Professional Engineer or Registered Landscape Architect, if the original SWPPP was required by paragraph B.3 to have been prepared by a Registered Professional Engineer or Registered Landscape Architect).

5. A copy of any NOI that is required by paragraph B.1 shall be submitted to the Town in conjunction with any application for a building permit, grading permit, site development plan approval, and other Town approval necessary to commence or continue construction at the site.

6. The Town Engineer may require any operator who is required by paragraph B.2 to prepare a SWPPP to submit the SWPPP, and any modifications thereto, to the Town Engineer for review. Such submittal and review of the SWPPP may be required by the Town Engineer prior to commencement of or during construction activities at the site.

7. Upon the Town Engineer's review of the SWPPP and any site inspection that he/she may conduct, the Town may deny approval of any building permit, grading permit, site development plan, or any other Town approval necessary to commence or continue construction, or to assume occupancy, on the grounds that the SWPPP does not comply with the requirements of the Construction General Permit, any individual or group NPDES permit issued for storm water discharge from the construction site, or any additional requirement imposed by or under this Ordinance. Also, if at any time the Town Engineer determines that the SWPPP is not being fully implemented, the Town may similarly deny approval of any building permit, grading permit, site development plan or any other Town approval necessary to commence or continue construction, or to assume occupancy, at the site.

8. Any significant modification to the SWPPP for a site shall be prepared, signed, and sealed by a Registered Professional Engineer or Registered Landscape Architect as required for the original SWPPP by paragraph B.3.

9. All contractors and subcontractors identified in an SWPPP shall sign a copy of the following certification statement before conducting any professional service identified in the SWPPP.

I certify under penalty of law that I understand the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with the industrial activity from the construction site identified as part of this certification, with the Storm Water and Flood Protection Ordinance of the Town of Fairview, and with those provisions of the Storm Water Pollution Prevention Plan (SWPPP) for the construction site for which I am responsible.

The certification must include the name and title of the person providing the signature; the name, address, and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

10. The SWPPP, with the Registered Professional Engineer's or Registered Landscape Architect's signature and seal affixed, and the certifications of contractors and subcontractors required by paragraph B.9, and with any modifications attached, shall be retained at the construction site from the date of commencement of construction through the date of final stabilization.

11. The operator shall make the SWPPP and any modification thereto available to the Town Engineer upon request (as well as to EPA and State inspectors).

12. The Town Engineer may notify the operator at any time that the SWPPP does not meet the requirements of the Construction General Permit, any applicable individual or group NPDES permit issued for storm water discharges from the construction site, or any additional requirement imposed by or under this Ordinance. Such notification shall identify those provisions of the permit or Ordinance which are not being met by the SWPPP, and identify which provisions of the SWPPP require modifications in order to meet such requirements. Within seven (7) days of such notification from the Town Engineer or as otherwise provided by the Town Engineer, the operator shall make the required changes to the SWPPP and shall submit to the Town Engineer a written certification that the requested changes have been made.

13. The operator shall amend the SWPPP whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to the MS4 or to the waters of the United States, and which has not otherwise been addressed in the SWPPP, or if the SWPPP proves to be ineffective in eliminating or significantly minimizing pollutants, or in otherwise achieving the general objective of controlling pollutants in storm water discharges associated with construction activity. In addition, the SWPPP shall be amended to identify any new contractor and/or subcontractor that will implement a measure in the SWPPP.

14. Qualified personnel (provided by the operator of the construction site) shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at least once every seven calendar days and within 24 hours of the end of the storm that is 0.5 inches or greater. Disturbed areas and areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the SWPPP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters or the MS4. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.

15. In case of emergency, Town forces will perform corrections and deduct their cost from the escrow account.

16. Based on the results of the inspections required by paragraph B.14, the site description and/or the pollution prevention measures identified in the SWPPP shall be revised as appropriate, but in no case later than seven calendar days following the inspection. Such modifications shall provide for timely implementation of any changes to the SWPPP within seven calendar days following the inspection.

17. A report summarizing the scope of any inspection required by paragraph B.14, and the name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWPPP, and actions taken in accordance with paragraph B.15 above shall be made and retained as part of the SWPPP for at least three years from the date that the site is finally stabilized. Such report shall identify any incidence of noncompliance. Where a report dos not identify any incidence of noncompliance, the report shall contain a certification that the facility is in compliance with the SWPPP, the facility's NPDES permit, and this Ordinance. The report shall be certified and signed by the person responsible for making the report.

18. The operator shall retain copies of any SWPPP and all reports required by this Ordinance or by the NPDES permit for the site, and records of all data used to complete the NOI, for a period of at least three years from the date that the site is finally stabilized.

19. Where a site has been finally stabilized and all storm water discharges from construction activities that are authorized by this Ordinance and by the NPDES permit for those construction activities are eliminated, or where the operator of all storm water discharges at a facility changes, the operator of the construction site shall submit to the Town Engineer a Notice of Termination (NOT) that includes the information required for Notices of Termination by Part VIII of the Construction General Permit.

20. Upon final stabilization of the construction site, the owner (or the duly authorized representative thereof) shall submit written certification to the Town Engineer that the site has been finally stabilized. The Town may withhold an occupancy or use permit for any premises constructed on the site until such certification of final stabilization has been filed and the Town Engineer has determined, following any appropriate inspection, that final stabilization has, in fact, occurred and that any required permanent structural controls have been completed.

TABLE 1

MINIMUM RUNOFF COEFFICIENTS

Zone	Zoning District Name	Runoff Coefficient "C"	Max. Inlet Time
AG	Agricultural	0.35	15 min.
RE-1	Single Family, 1 Acre	0.55	15 min.
RE-2	Single Family, 2 Acre	0.50	15 min.
RE-3	Single Family, 3 Acre	0.45	15 min.
CPDD, PC	Duplex, 12,500 sq. ft. lot; 2,200 sq. ft. home	0.60	15 min.
CPDD, PC	Multifamily, 12 units/acre	0.80	10 min.
CPDD, PC	Multifamily, 18 units/acre	0.85	10 min.
CPDD, PC	Multifamily, 25 units/acre	0.90	10 min.
PD	Planned Development	Variable	10 min.
CPDD, PC	Office	0.85	10 min.
CPDD, PC	General Retail	0.85	10 min.
CPDD, PC	Service Station	0.95	10 min.
CPDD, PC	Mixed Use	Variable	10 min.
CPDD, PC	Central Business District	0.90	10 min.
CPDD, PC	Light Commercial	0.90	10 min.
CPDD, PC	Commercial	0.90	10 min.
CPDD, PC	Industrial	0.90	10 min.
FP	Flood Plain	1.00	10 min.
CPDD, PC	Restaurant/Private Club	0.90	10 min.
*	Parking Lots	1.00	10 min.
*	Church	0.90 Varies	10 min.
*	School	0.75 Varies	15 min.
*	Park	0.40 Varies	15 min.
*	Road & Interstate Hwy.	0.90	10 min.
(*)	Indicates non-zoned use		

TABLE 2

AVERAGE VELOCITY FOR USE IN DETERMINING TIME OF CONCENTRATION

Description of Water Course	0% to 3% V. in f.p.s.	4% to 7% V. in f.p.s.	8% to 11% V. in f.p.s.	Over 12% V. in f.p.s.
Surface Drainage	5	9	13	15
Channels	Determine V. by Manning's Equation			
Storm Sewers	Determine V. by Manning's Equation			

TABLE 3

MINIMUM SLOPES FOR CONCRETE PIPES

(to produce a velocity of 2.5 f.p.s. or greater)

(n = .013)

Pipe Diameter (inches)	Slope (Feet/100 Feet)	Pipe Diameter (inches)	Slope (Feet/100 Feet)
18	.180	51	.045
21	.150	54	.041
24	.120	60	.036
27	.110	66	.032
30	.090	72	.028
33	.080	78	.025
36	.070	84	.023
39	.062	90	.021
42	.056	96	.019
45	.052	102	.018
48	.048	108	.016

TABLE 4

MAXIMUM VELOCITIES IN CONDUITS FLOWING FULL AND CHANNELS

Flow Through:	Maximum Velocity (fps)
Culverts	10
Inlet Laterals	10
Storm Sewers	10
Earthen Channels	See Table 11
Concrete Channels	6
Shale	6
Rock	6 - 10*

* Depends upon exact type of vegetative cover, soil, or rock for the location in question.

TABLE 5

ROUGHNESS COEFFICIENTS FOR CLOSED CONDUITS

Materials of Construction	Recommended Roughness Coefficient "n"
Concrete Pipe Storm Sewer	
Good Alignment, Smooth Joints	.013
Fair Alignment, Ordinary Joints	.015
Poor Alignment, Poor Joints	.017
Concrete Pipe Culverts	.012
Monolithic Concrete Culverts & Conduit	.012
Corrugated Metal Pipe	.024
Corrugated Metal Pipe (Smooth Lined)	.013

TABLE 6

ENTRANCE LOSS COEFFICIENTS

$$\text{Entrance head loss } H_L = K_e \frac{V_1^2}{2g}$$

Type of Structure and Design of Entrance	Coefficient K_e
Pipe, Concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, square cut end	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.2
Square-edge	0.5
Rounded (radius = 1/12D)	0.2
Mitered to conform to fill slope	0.7
End-section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side- or slope-tapered inlet	0.2
Pipe, or Pipe-Arch, Corrugated Metal	
Projecting from fill (no headwall)	0.9
Headwall or headwall and wingwalls square-edge	0.5
Mitered to conform to fill slope, paved or unpaved slope	0.7
End-section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side- or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension or beveled edges on 3 sides	0.2
Wingwalls at 30° to 75° to barrel	
Square-edged at crown	0.4
Crown edge rounded to radius of 1/12 barrel dimension dimension, or beveled top edge	0.2
Wingwall at 10° to 25° to barrel	
Square-edged at crown	0.5
Wingwall parallel (extension of sides)	
Square-edged at crown	0.7
Side- or slope-tapered inlet	0.2

TABLE 7

VELOCITY HEAD LOSS COEFFICIENTS FOR CLOSED CONDUITS

MANHOLE AT CHANGE IN PIPE DIRECTION		
DESCRIPTION	ANGLE	HEAD LOSS COEFFICIENT Kj
	90°	0.55
	60°	0.48
	45°	0.42
	30°	0.30
	0°	0.05
BENDS IN PIPES		
DESCRIPTION	ANGLE	HEAD LOSS COEFFICIENT Kj
	90°	0.50
	60°	0.43
	45°	0.37
	30°	0.25
JUNCTION		
DESCRIPTION	ANGLE	HEAD LOSS COEFFICIENT Kj
	0°	1.00
	22 1/2°	0.75
	45°	0.50
	60°	0.35
	90°	0.25

TABLE 8

ROUGHNESS COEFFICIENTS FOR OPEN CHANNELS FLOW AREAS

Channel Description	Roughness Coefficient Minimum	Normal	Maximum
MINOR NATURAL STREAMS (Top Width at Flood Stage Less Than 100 Feet)			
Moderately Well-Defined Channel			
Grass and Weeds, Little Brush	0.025	0.030	0.033
Dense Weeds, Little Brush	0.030	0.035	0.040
Weeds, Light Brush on Banks	0.030	0.035	0.040
Weeds, Heavy Brush on Banks	0.035	0.050	0.060
Weeds, Dense Willows on Banks	0.040	0.060	0.080
Irregular Channel with Pools and Meanders			
Grass and Weeds, Little Brush	0.030	0.036	0.042
Dense Weeds, Little Brush	0.036	0.042	0.048
Weeds, Light Brush on Banks	0.036	0.042	0.048
Weeds, Heavy Brush on Banks	0.042	0.060	0.072
Weeds, Dense Willows on Banks	0.048	0.072	0.096
Floodplain, Pasture			
Short Grass, No Brush	0.020	0.030	0.035
Tall Grass, No Brush	0.025	0.035	0.050
Floodplain, Cultivated			
No Crops	0.025	0.030	0.035
Mature Crops	0.030	0.040	0.050
Floodplain, Uncleared			
Heavy Weeds, Light Brush	0.035	0.050	0.070
Medium to Dense Brush	0.070	0.100	0.160
Trees with Flood Stage Below Branches	0.080	0.100	0.120
MAJOR NATURAL STREAMS (Top Width at Flood Stage Greater Than 100 Feet)			
The roughness coefficient is less than that for minor streams of similar description because banks offer less effective resistance.			
Moderately Well Defined Channel	0.025	---	0.060
Irregular Channel	0.035	---	0.100

TABLE 8, continued

Channel Description	Roughness Coefficient Minimum	Normal	Maximum
MANMADE VEGETATED CHANNELS			
Mowed Grass, Clay Soil	0.025	0.030	0.035
Mowed Grass, Sandy Soil, or Easily Erodible Soils	0.025	0.030	0.035
MANMADE NON-VEGETATED CHANNELS			
Clean Gravel Section	0.022	0.025	0.030
Shale	0.025	0.030	0.035
Smooth Rock	0.025	0.030	0.035
LINED CHANNELS			
Smooth Finished Concrete	0.013	0.015	0.020
Riprap (Larger Pieces)	0.030	0.040	0.050

TABLE 9.A

TEMPORARY VEGETATION

Temporary Vegetation - The following plants are commonly used for temporary cover in Texas. For optimum planting dates and adaptations for a specific soil or site, contact your local field office of the USDA, Soil Conservation Service.

Species	Planting Rate/Materials [1]	Planting Date [2]	Source [3]
Cane, Redtop	30#/Ac /S	8/15-9/30	C
Millet, German	40#/Ac /S	4/1-5/15	C
Oats	3 bu/Ac /S	8/15-9/30	C
Panicum, Texas	25#/Ac /S	3/15-5/15	C
Prosomillet	40#/Ac /S	4/1-5/15	C
Rye, Elbon	1-1/2 bu/Ac /S	8/15-9/30	C
Ryegrass, Annual	30#/Ac /S	8/15-9/30	C
Sprangletop, Green	3.4#PLS/Ac /S	2/1-5/15	C
Sudangrass	40#/Ac /S	4/1-5/15	C

[1] Planting Rate - # Commercial Seed/AC, bu - bushels/AC, #PLS - Pure Live Seed/AC
Materials - S - Seed

[2] Planting Date: This represents a statewide spread in planting dates. Refer to local guides for specific dates.

[3] Source: C - Commercial

TABLE 9.B

PERMANENT VEGETATION - LOW AREAS

Permanent Vegetation - Because of wide variations in growing conditions within a planned area, permanent vegetation has been selected for the following conditions. For optimum planting dates and adaptations for a specific soil or site, contact your local field office of the USDA, Soil Conservation Service.

Note: Low areas are subject to ephemeral and intermittent flows.

Species	Moisture Tolerance[1]	Planting Rate/Materials[2]	Planting Date[3]	Source[4]
Bermudagrass,				
Coastal or				
Selection 3	A/2	50 cu.ft/Ac/Sp	12/1-5/30	C
Common	A/2	4.6#/Ac/S	3/1-5/30	C
Buffalograss	A/3	32#/Ac/S	1/1-4/30	C or PMC
Bushy Beard				
Grass	C/3	---	Spring	-
Cordgrass,				
Prairie	B/2	1/sq.ft/R	1/1-5/30	L
Eastern				
Gammagrass	C/3	---	Spring	-
Knotgrass	A/2	1/sq.ft/R&St	2/1-5/30	L
Marshmillet	B/1	1/sq.ft/R	4/1-5/30	L
Reedgrass,				
Common	A/2	1/sq.ft/R	2/1-5/30	L or PMC
Vine-Fairview	A/2	1/sq.ft/St	2/1-1/30	L

[1] Moisture Tolerance:

Total Submergence	Soil Saturation
A - 20 days or more	1 - Require a saturated soil
B - 10 - 20 days	2 - Will tolerate prolonged saturation and frequent drought.
C - Less than 10 days	3 - Will not tolerate a constantly saturated soil.

[2] Planting: Rate - #PLS/AC, Plant Parts/sq.ft.
Materials - S - Seed, R - Rhizomes, Sp - Sprigs, St - Stolons

[3] Planting Date: This represents a statewide spread in planting dates. Refer to local guides for specific dates.

[4] Source: C - Commercial, L - Locally Collected, PMC - Plant Material Center (as available)

TABLE 9.C

PERMANENT VEGETATION - SIDE SLOPES

Species	Soils[2]	Planting Rate/Materials[3]	Planting Date[4]	Source[5]
Grasses				
Bermudagrass,				
Common	All	4.6#/Ac/S	3/1-5/30	C
Selection 3 or Coastal	All	50 cu.ft/Ac/Sp	12/1-5/30	C
Bluestem,				
K.R.*	M-F	4#/Ac/S	12/1-5/30	C
Old World*	M-F	2.4#/Ac/S	2/1-5/30	PMC
Buffalograss*	M-F	32#/Ac/S	1/1-5/15	C or PMC
Dallisgrass	M-F	7#/Ac/S	2/1-5/30	C
Knotgrass[1]	All	1/sq.ft/R&St	2/1-5/30	L
Vine-Fairview	All	1/sq.ft/St	2/1-4/30	L
Wildrye	All	25#/Ac/S	9/1-10/1	L
Forbs:				
Bushsunflower*	All	10#/Ac/S	4/1-5/20	L or PMC
Englemandaisy*[1]	All	30#/Ac/S	9/1-2/30	L or PMC
Legumes:				
Trailing wildbean*	C-M	25#/Ac/S	2/15-5/15	L or PMC
Vetch*	All	20#/Ac/S	9/1-10/1	C

*Mixtures only: Reduce rates according to percentage of mixture desired.

[1] Lower portion of slope only, frequently inundated.

[2] Soils: C - Coarse, M - Medium, F - Fine

[3] Planting: Rate - #PLS/AC, Plant Parts/sq.ft.
Materials - S - Seed, R - Rhizomes, Sp - Sprigs, St - Stolons

[4] Planting Date: This represents a statewide spread in planting dates. Refer to local guides for specific dates.

[5] Source: C - Commercial, L - Locally Collected, PMC - Plant Material Center (as available)

TABLE 9.D

PERMANENT VEGETATION

BERMS, SPOIL BANKS, AND SIMILAR AREAS

Species	Soils[1]	Planting Rate/Materials[2]	Planting Date[3]	Source[4]
Grasses				
Bermudagrass,				
Common	All	4.6#/Ac/S	3/1-5/30	C
Selection 3 or Coastal	All	50 cu.ft/Sp	12/1-5/30	C
Bluestem,				
Caucasian*	M-F	4#/Ac/S	12/1-5/30	C
K.R.*	M-F	4#/Ac/S	12/1-5/30	C
Little*	All	6.8#/Ac/S	2/1-5/15	C
Buffalograss*	All	6#/Ac/S	2/1-5/15	C
Fescue	M-F	20#/Ac/S	9/1-10/30	C
Hardinggrass				
"Wintergreen"	M-F	6#/Ac/S	9/1-10/30	C
Indiangrass*	All	9#/Ac/S	2/1-5/30	C
Kleingrass,				
"Selection 75"*	M-F	4#/Ac/S	1/1-5/30	C
Wildrye*	All	30#/Ac/S	9/1-10/1	L
Wintergrass,				
Texas*	M-F	30#/Ac/S	9/1-10/30	C
Forbs:				
Bushsunflower*	All	10#/Ac/S	4/1-5/30	L or PMC
Englemandaisy*	All	30#/Ac/S	9/1-2/30	L or PMC
Partridgepea*	C-M	10#/Ac/S	2/15-5/15	C or PMC
Sunflower,				
Maximilian*	All	16#/Ac/S	4/1-5/30	L or PMC

TABLE 9.D, continued

Species	Soils[1]	Planting Rate/Materials[2]	Planting Date[3]	Source[4]
Legumes:				
Clover,				
Crimson*	M	20#/Ac/S	9/1-10/30	C
White*	M-F	3#/Ac/S		C
Trailing wildbean*	C-M	10#/Ac/S	2/15-5/15	PMC
Vetch*	All	20#/Ac/S	9/1-10/1	C

*Mixtures only: Reduce rates according to percentage of mixture desired.

1 Soils: C - Coarse, M - Medium, F - Fine

2 Planting: Rate - #PLS/AC, Plant Parts/sq.ft.
Materials - S - Seed, R - Rhizomes, Sp - Sprigs, St - Stolons

3 Planting Date: This represents a statewide spread in planting dates. Refer to local guides for specific dates.

4 Source: C - Commercial, L - Locally Collected, PMC - Plant Material Center (as available)

TABLE 10

MAXIMUM PERMISSIBLE VELOCITIES FOR CHANNELS LINED WITH GRASS

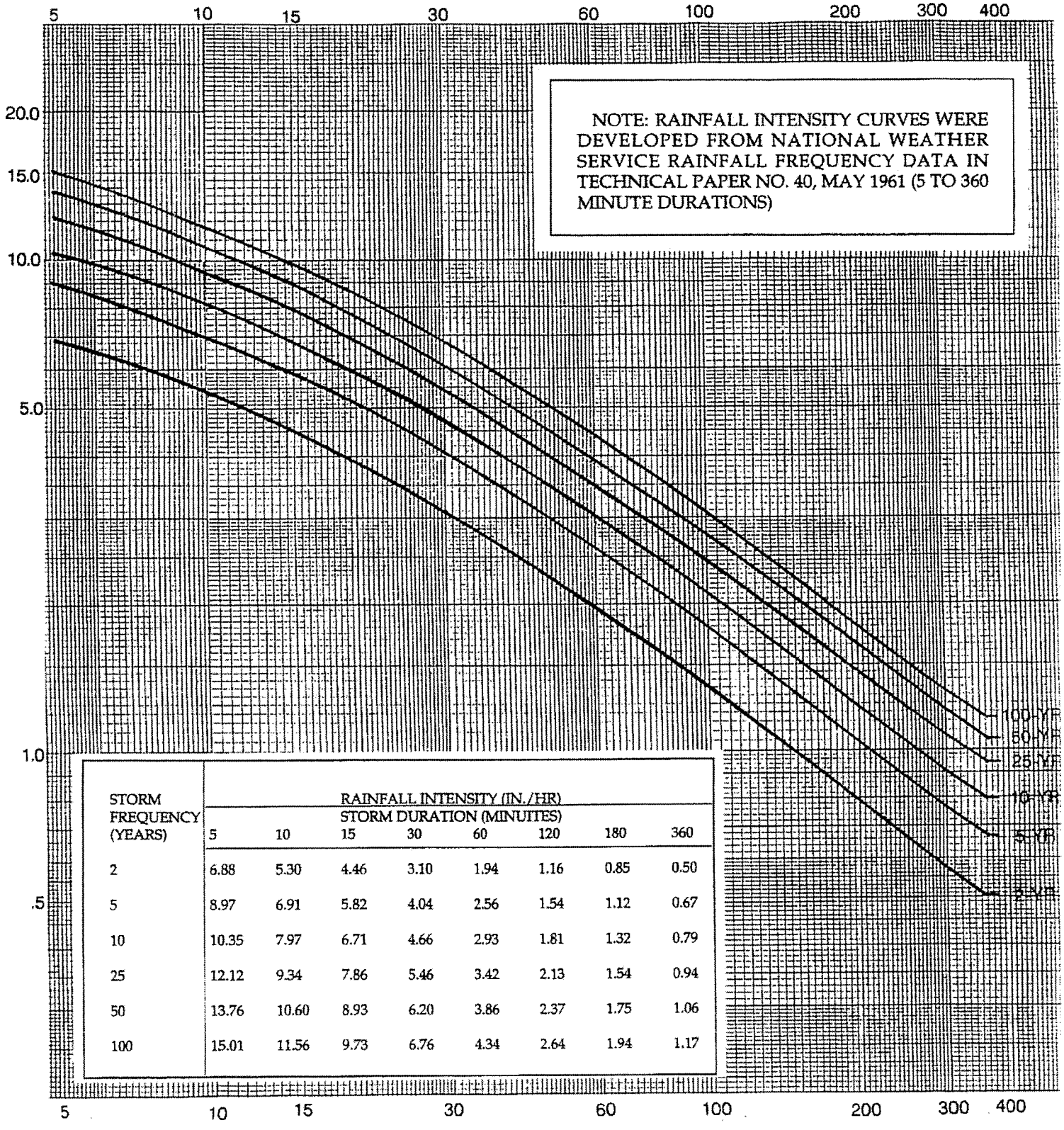
COVER	SLOPE RANGE,*	PERMISSIBLE VELOCITY, FPS
Bermuda Grass	0-5	6
	5-10	5
	>10	4
Buffalo grass, Kentucky bluegrass smooth brome, blue grama	0-5	5
	5-10	4
	>10	3
Grass mixture	0-5	4
	5-10	3
	Do not use on slopes steeper than 10%	
Lespedeza sericea, weeping love grass, ischaemum (yellow blue-stem), kudzu, alfalfa, crabgrass	0-5	2.5
	Do not use on slopes steeper than 5% except for side slopes in a combination channel.	

Annuals - used on mild slopes or as temporary protection until permanent covers are established, common lespedeza, Sudan grass	0-5 Use on slopes steeper than 5% is not recommended.	2.5

Remarks: The values apply to average, uniform stands of each type of cover. Use velocities exceeding 5 fps only where good covers and proper maintenance can be obtained. Based on past experience, all soils within the Town of Fairview have been found to be easily eroded soils.

* Longitudinal bed slope of the channel bottom.

FIGURE 1



STORM FREQUENCY (YEARS)	RAINFALL INTENSITY (IN./HR) STORM DURATION (MINUITES) 5	10	15	30	60	120	180	360
2	6.88	5.30	4.46	3.10	1.94	1.16	0.85	0.50
5	8.97	6.91	5.82	4.04	2.56	1.54	1.12	0.67
10	10.35	7.97	6.71	4.66	2.93	1.81	1.32	0.79
25	12.12	9.34	7.86	5.46	3.42	2.13	1.54	0.94
50	13.76	10.60	8.93	6.20	3.86	2.37	1.75	1.06
100	15.01	11.56	9.73	6.76	4.34	2.64	1.94	1.17

CAPACITY OF TRIANGULAR GUTTERS

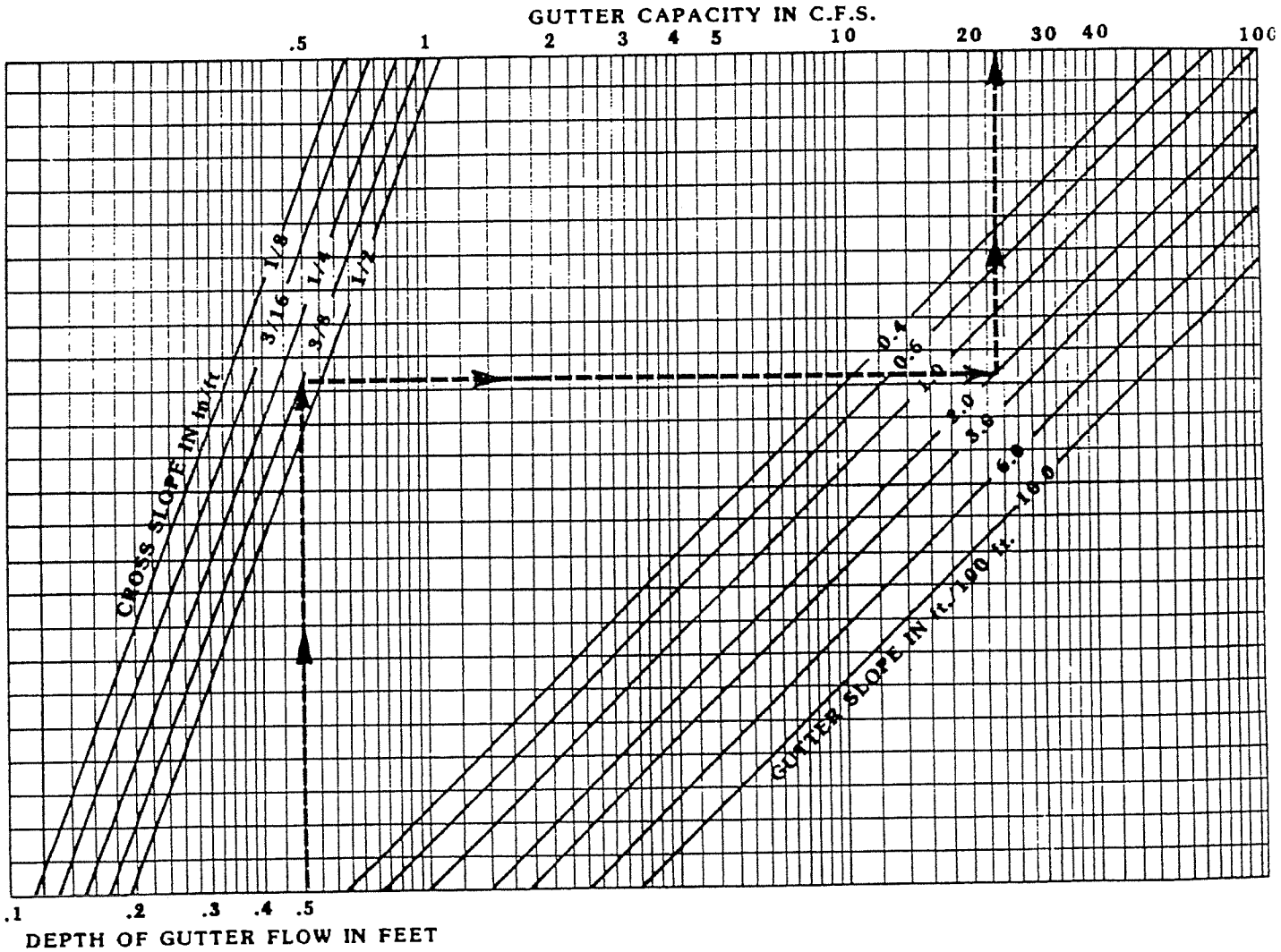
FIGURE 2

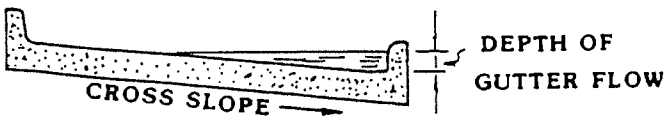
EXAMPLE

KNOWN :
MAJOR THOROUGHFARE, TYPE M6D
PAVEMENT WIDTH : 33'
GUTTER SLOPE : 2.0%
PAVEMENT CROSS SLOPE : 3/8"/1'
DEPTH OF GUTTER FLOW : .5'

FIND:
GUTTER CAPACITY

SOLUTION:
ENTER GRAPH AT .5'
INTERSECT CROSS SLOPE : 3/8"/1'
INTERSECT GUTTER SLOPE : 2.0%
READ GUTTER CAPACITY : 23.5 c.f.s.



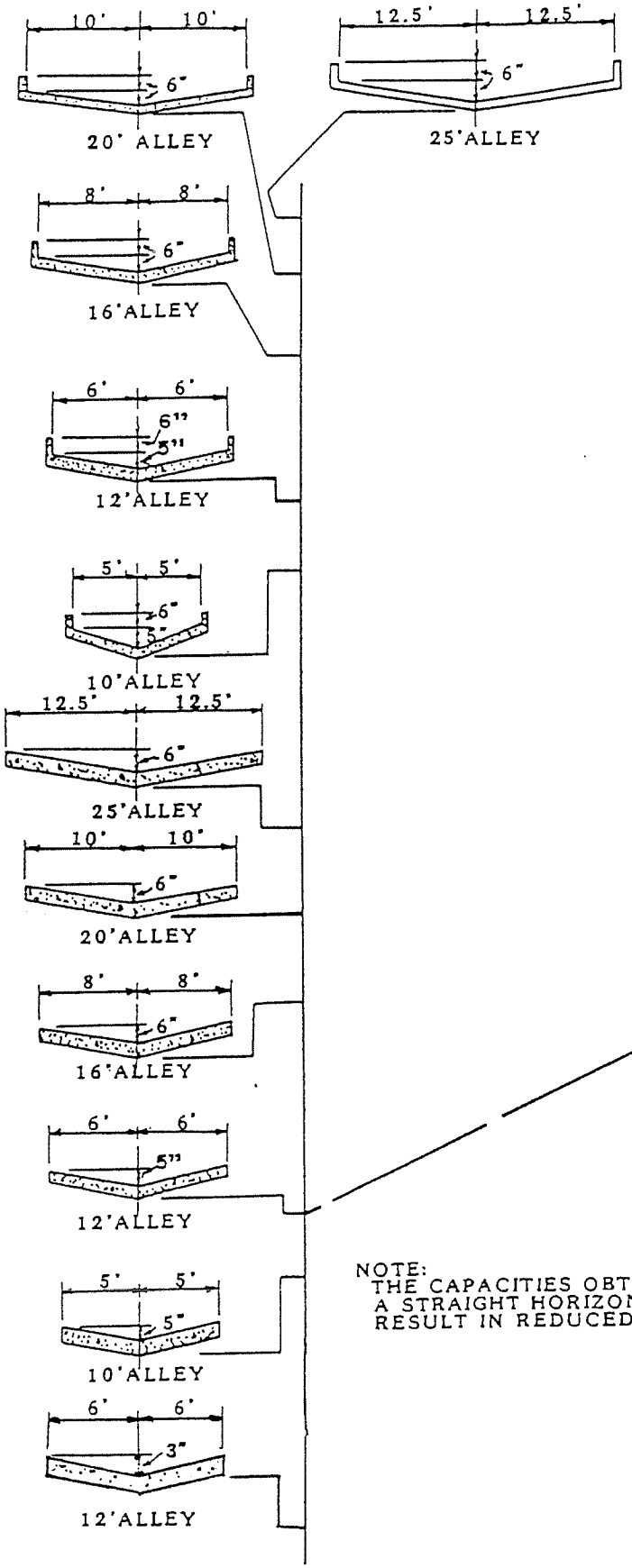


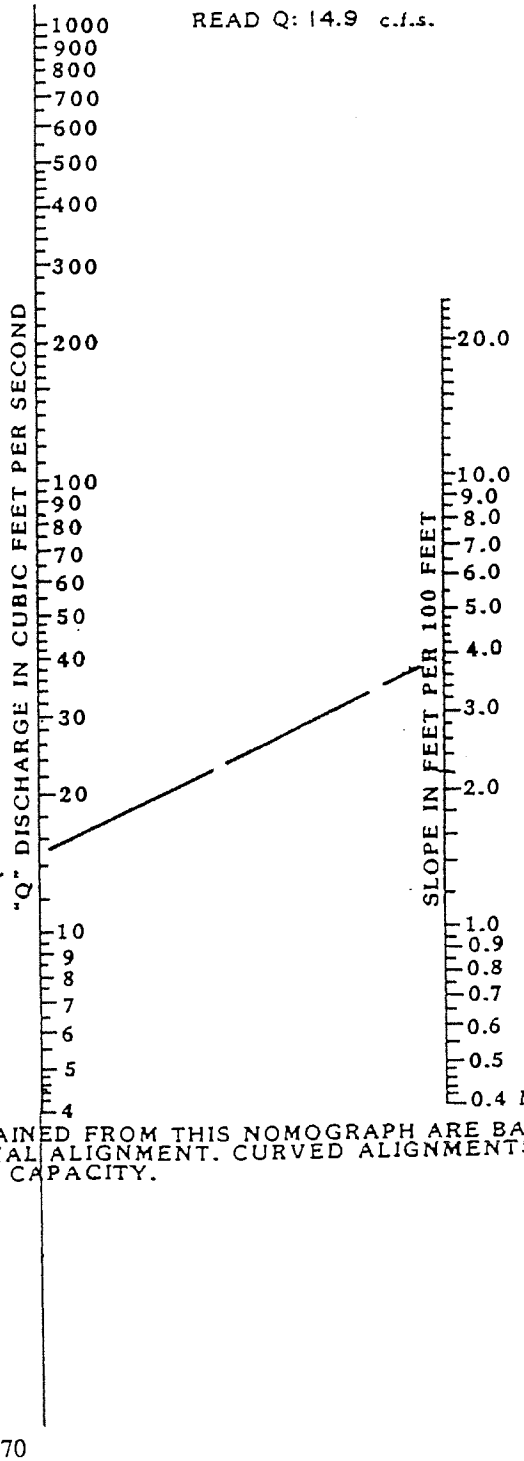
(ROUGHNESS COEFFICIENT n : .0175)

CAPACITY OF ALLEY SECTIONS

n:0.0175

FIGURE 3





EXAMPLE :

KNOWN:
- ALLEY WIDTH: 12'
- ALLEY DEPRESSION: 5"
- GUTTER SLOPE: 4.0%

FIND:
- GUTTER FLOW (Q)

SOLUTION:
- CONNECT THE 12' ALLEY SECTION WITH SLOPE: 4.0%
- READ Q: 14.9 c.f.s.

NOTE:
THE CAPACITIES OBTAINED FROM THIS NOMOGRAPH ARE BASED ON A STRAIGHT HORIZONAL ALIGNMENT. CURVED ALIGNMENTS MAY RESULT IN REDUCED CAPACITY.

FIGURE 4

STORM DRAIN INLETS

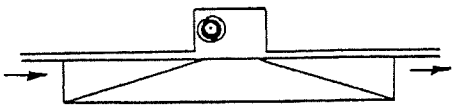
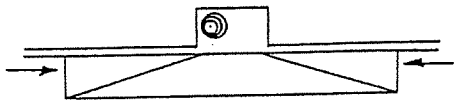
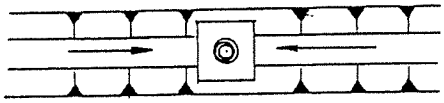
INLET DESCRIPTION	AVAIL. INLET SIZES	WHERE USED	DESIGN CURVES
 STANDARD CURB OPENING INLET ON GRADE	8' 10' 12' 14'	Residential Street, Collector Street - Types C2UA and C2UB; Alley	Figures 5 Through 8
 STANDARD CURB OPENING INLET AT LOW POINT	8' 10' 12' 14'	Residential Street, Collector Street - Types C2UA and C2UB; Alley	Figure 9
 RECESSED CURB OPENING INLET ON GRADE	8' 10' 12' 14'	Collector Street, Type C4U Major Streets - Types M4U, M4D, M6D, Principal Streets (P6D)	Figures 5 Through 8
 RECESSED CURB OPENING INLET AT LOW POINT	8' 10' 12' 14'	Collector Street, Type C4U Major Streets - Types M4U, M4D, M6D, Principal Streets (P6D)	Figure 9

FIGURE 4 CONTINUED

INLET DESCRIPTION	AVAIL. INLET SIZES	WHERE USED	DESIGN CURVES
 COMBINATION INLET ON GRADE	8'	Combination Inlets to be Used Where Space Behind Curb Prohibits Other Inlet Types	Figures 10 Through 12
 COMBINATION INLET AT LOW POINT **Must Be Approved By The City Engineer**	8'	Combination Inlets to be Used Where Space Behind Curb Prohibits Other Inlet Types	Figure 13
 GRATE INLETS **Must Be Approved By The City Engineer**	2 GRATE 3 GRATE 4 GRATE 6 GRATE	Grate Inlets to be Used Where Space Restrictions Prohibit Other Inlet Types or At Locations with No Curb.	Figures 14 THROUGH 17
 DROP INLET	2' x 2' 3' x 3' 4' x 4'	Open Channels	Figure 18

NOTE: Combination inlets can be used on public streets only if approved by Manager of Engineering.

RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES ON GRADE

FIGURE 5

EXAMPLE

KNOWN:

PAVEMENT WIDTH : 36'

GUTTER SLOPE: 3.0%

1/2"/ft CROSS SLOPE

GUTTER FLOW: 5.2 c.f.s.

FIND:

LENGTH OF INLET REQUIRED

SOLUTION:

ENTER GRAPH AT 5.2 c.f.s.

INTERSECT SLOPE: 3.0%

READ L_i: 8.8'

DECISION:

1. USE 10' INLET

NO FLOW REMAINS IN GUTTER

2. USE 8' INLET

INTERCEPT ONLY PART OF FLOW

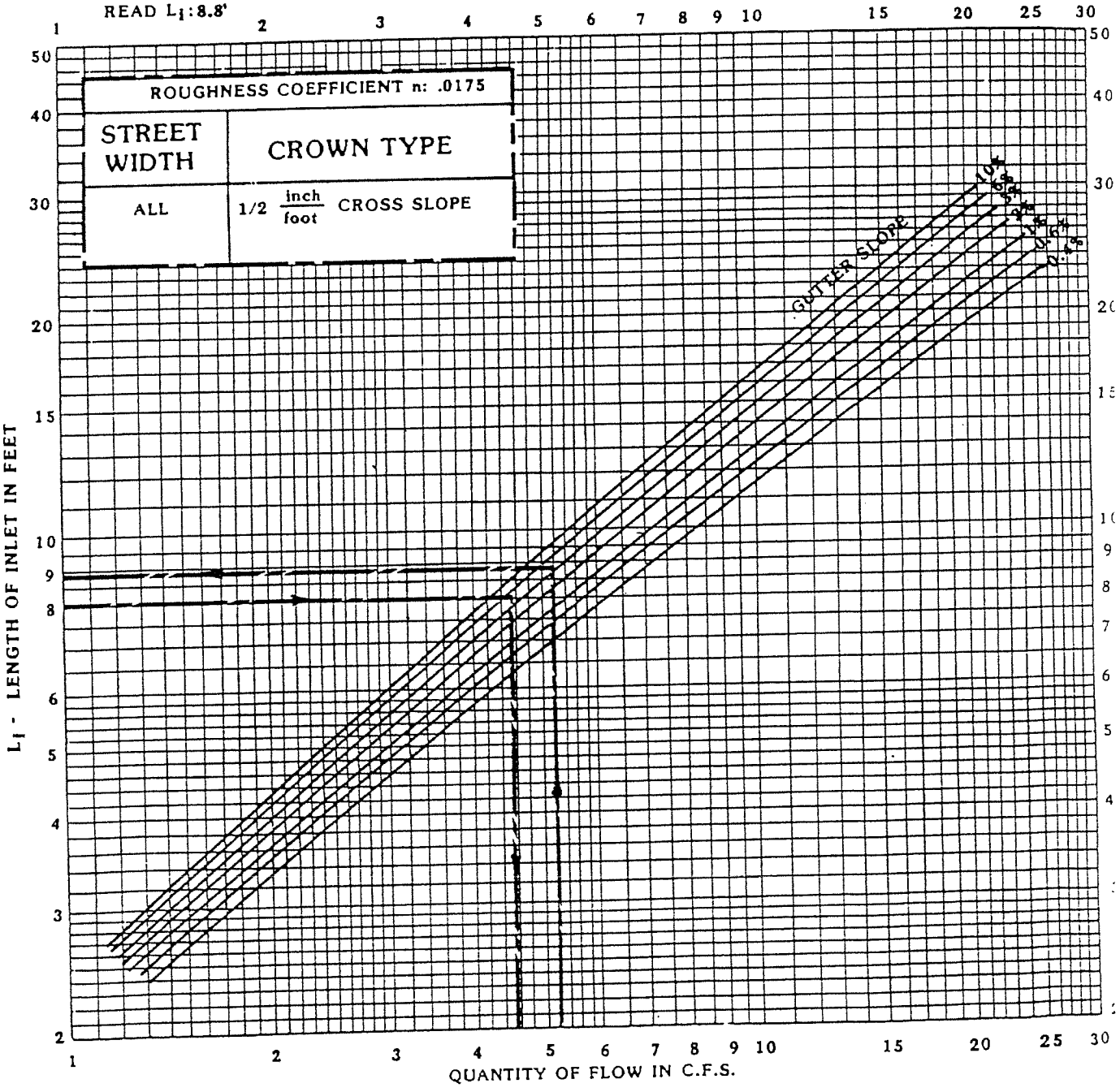
USE 8' INLET

ENTER GRAPH AT L_i: 8'

INTERSECT SLOPE: 3.0%

READ Q: 4.6 c.f.s.

REMAINING GUTTER FLOW: 5.2 c.f.s. - 4.6 c.f.s.: 0.6 c.f.s.



RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES ON GRADE

FIGURE 6

EXAMPLE

KNOWN:

PAVEMENT WIDTH : 30'

GUTTER SLOPE: 3.0%

PAVEMENT CROSS SLOPE: 1/4"/1'

GUTTER FLOW: 4.8 c.f.s.

FIND:

LENGTH OF INLET REQUIRED

SOLUTION:

ENTER GRAPH AT 4.8 c.f.s.

INTERSECT SLOPE: 3.0 %

READ L_i : 9.5'

DECISION:

1. USE 10' INLET

NO FLOW REMAINS IN GUTTER

2. USE 8' INLET

INTERCEPT ONLY PART OF FLOW

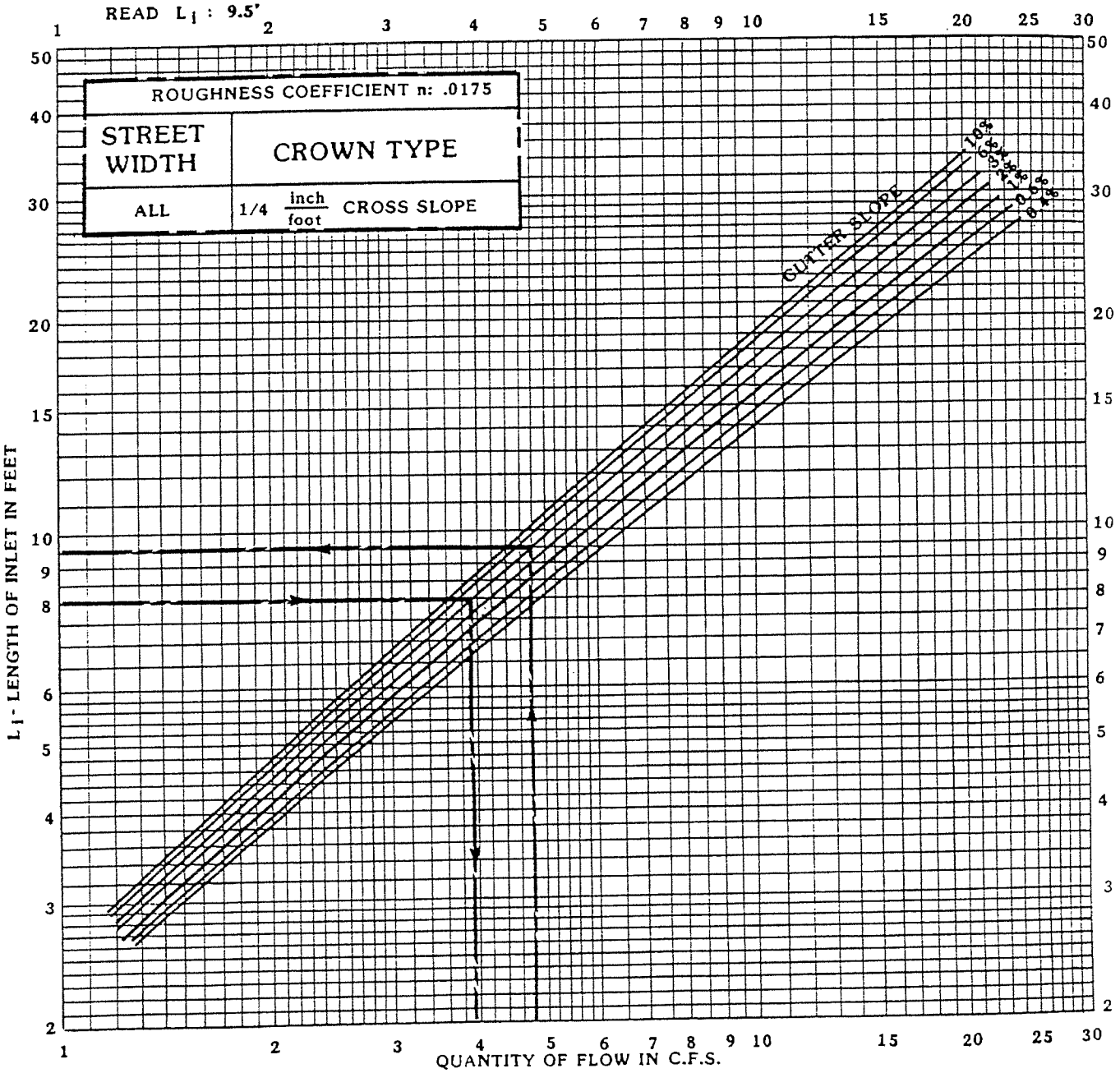
USE 8' INLET

ENTER GRAPH AT L_i : 8'

INTERSECT SLOPE: 3.0%

READ Q: 3.9 c.f.s.

REMAINING GUTTER FLOW: 4.8 c.f.s.-3.9 c.f.s.:0.9 c.f



RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES ON GRADE

FIGURE 7

EXAMPLE

KNOWN:

PAVEMENT WIDTH : 40'

GUTTER SLOPE: 1.0%

6" PARABOLIC CROWN

GUTTER FLOW: 6.5 c.f.s.

FIND:

LENGTH OF INLET REQUIRED

SOLUTION:

ENTER GRAPH AT 6.5 c.f.s.

INTERSECT SLOPE: 1.0 %

READ L_i : 10'

DECISION:

1. USE 10' INLET

NO FLOW REMAINS IN GUTTER

2. USE 8' INLET

INTERCEPT ONLY PART OF FLOW

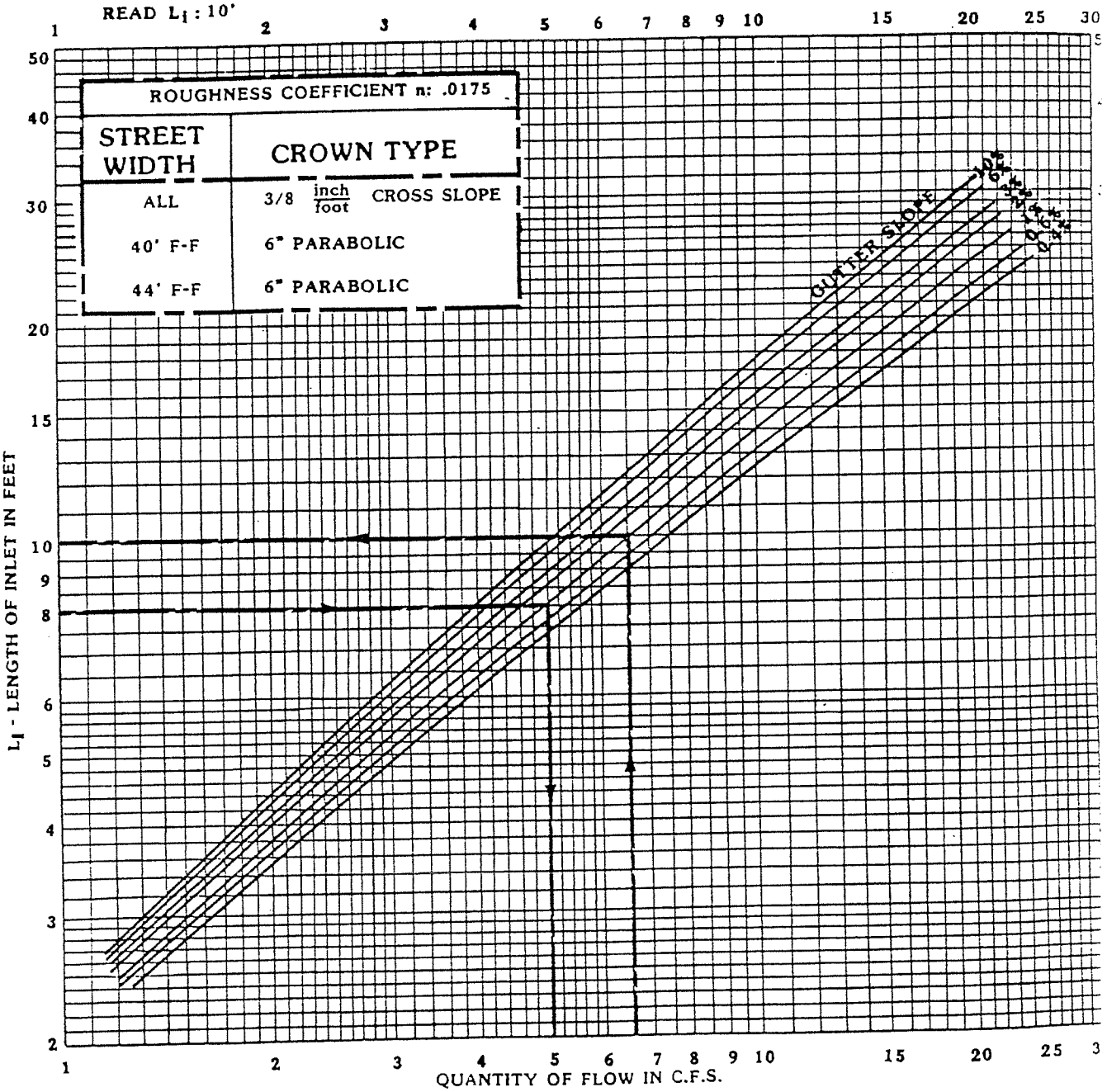
USE 8' INLET

ENTER GRAPH AT L_i : 8'

INTERSECT SLOPE: 1.0%

READ Q: 5.0 c.f.s.

REMAINING GUTTER FLOW: 6.5 c.f.s. - 5.0 cfs :1.5



RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES ON GRADE

FIGURE 8

EXAMPLE

KNOWN:

PAVEMENT WIDTH : 12'

ALLEY SLOPE: 0.4%

QUANTITY OF FLOW: 10.5 c.f.s.

FIND:

LENGTH OF INLET REQUIRED

SOLUTION:

ENTER GRAPH AT 10.5 c.f.s.

INTERSECT SLOPE: 0.4%

READ L_i : 13.0 ft.

DECISION:

1. USE 14' INLET

NO FLOW REMAINS IN GUTTER

2. USE 10' INLET

INTERCEPT ONLY PART OF FLOW

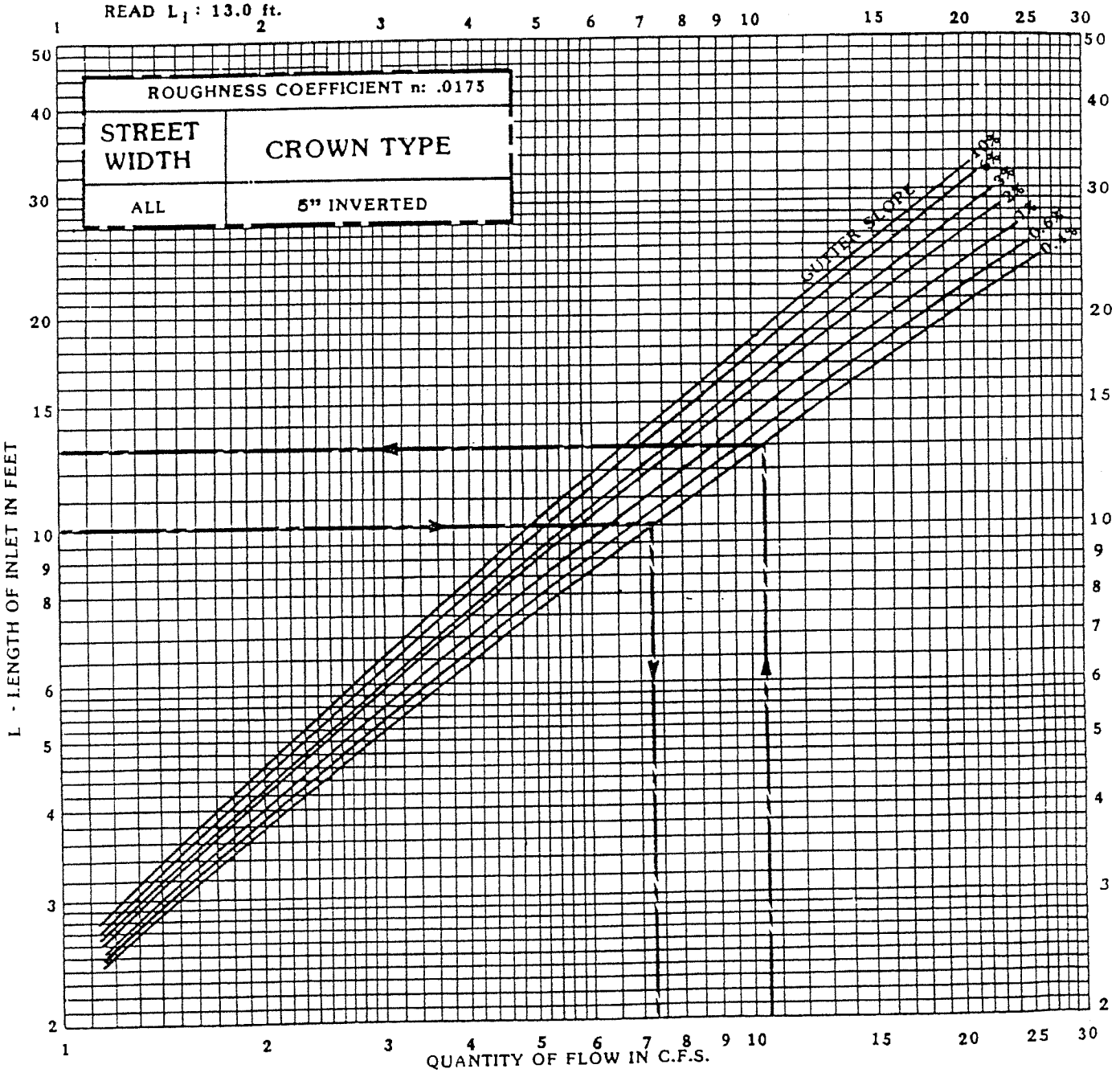
USE 10' INLET

ENTER GRAPH AT L_i : 10'

INTERSECT SLOPE: 0.4%

READ Q: 7.3 c.f.s.

REMAINING FLOW IN ALLEY : 10.5 c.f.s. - 7.3 c.f.s. : 3.2 c.f



RECESSED AND STANDARD CURB OPENING INLET CAPACITY CURVES AT LOW POINT

FIGURE 9

EXAMPLE

KNOWN:

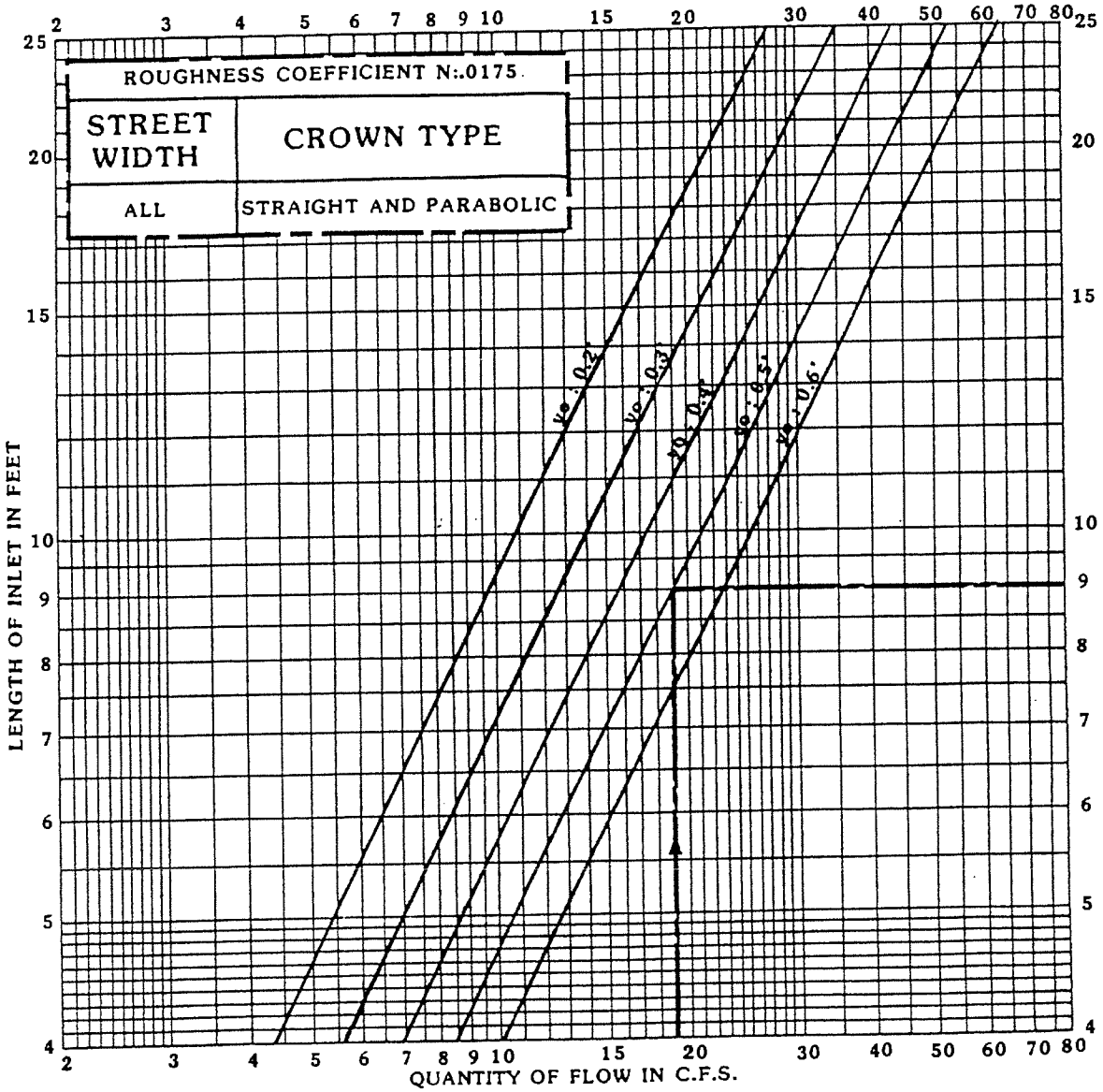
QUANITY OF FLOW: 19.0 c.f.s.
MAXIMUM DEPTH OF FLOW DESIRED IN GUTTER AT LOW POINT (yo): 0.5'

FIND:

LENGTH OF INLET REQUIRED (L_i)

SOLUTION:

ENTER GRAPH AT 19 c.f.s.
INTERSECT yo: 0.5'
READ L_i : 9.0'
USE 10' INLET



TWO GRATE COMBINATION INLET CAPACITY CURVES ON GRADE

FIGURE 10

EXAMPLE

KNOWN:

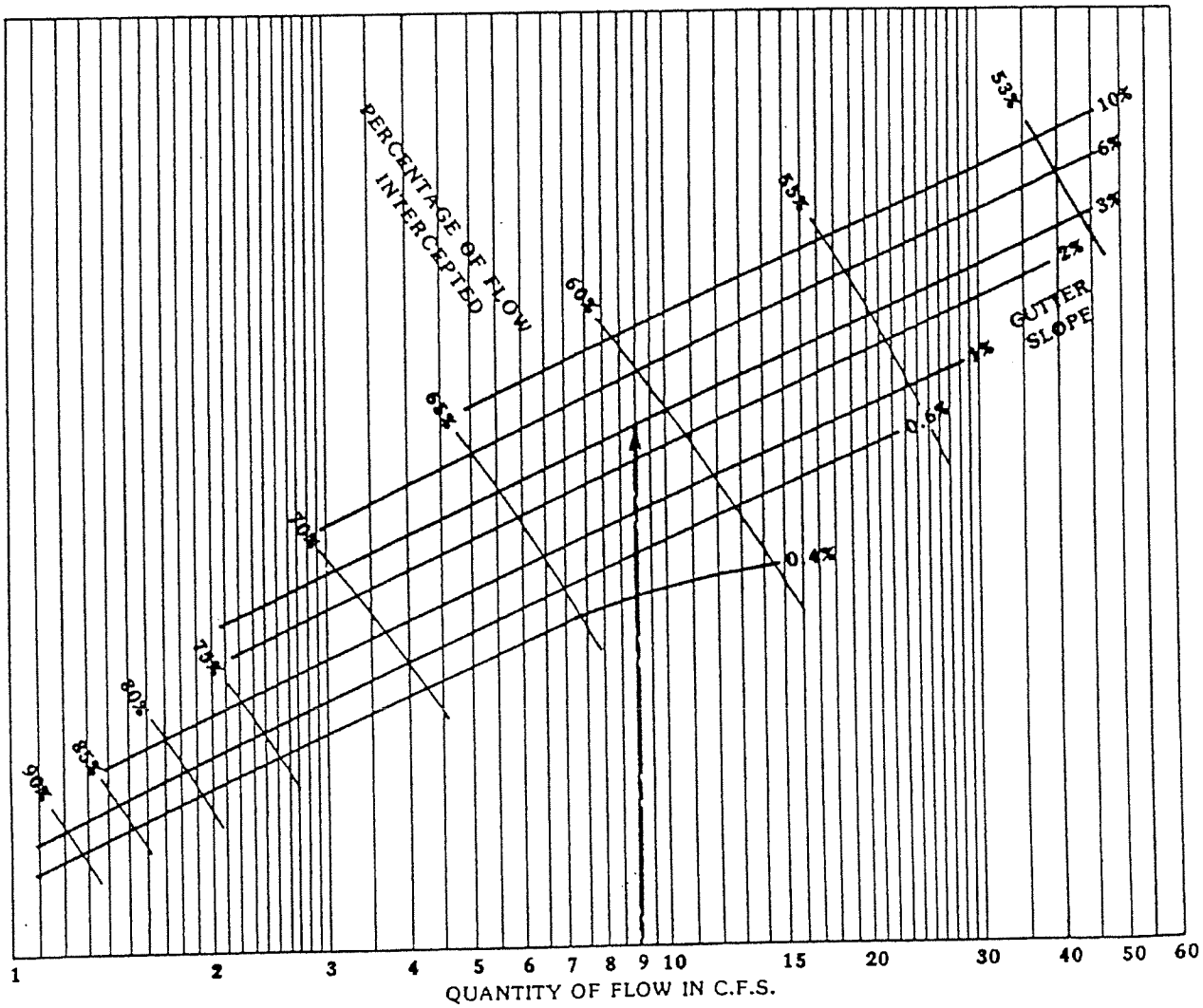
QUANITY OF FLOW: 9 c.f.s.
GUTTER SLOPE: 3.0%

FIND:

CAPACITY OF TWO GRATE COMBINATION INLET

SOLUTION:

ENTER GRAPH AT 9.0 c.f.s.
INTERSECT SLOPE: 3.0 %
READ PERCENT OF FLOW INTERCEPTED: 61%
61% OF 9.0 c.f.s. : 5.5 c.f.s.
AS CAPACITY OF TWO GRATE COMBINATION INLET
REMAINING GUTTER FLOW:
9.0 c.f.s. - 5.2 c.f.s. : 3.8 c.f.s.



THREE GRATE COMBINATION INLET
CAPACITY CURVES ON GRADE

FIGURE 11

EXAMPLE

KNOWN:

QUANTITY OF FLOW: 15 c.f.s.

GUTTER SLOPE: 2.0 %

FIND:

CAPACITY OF THREE GRATE INLET

SOLUTION:

ENTER GRAPH AT 15 c.f.s.

INTERSECT SLOPE: 2.0 %

READ PERCENT OF FLOW

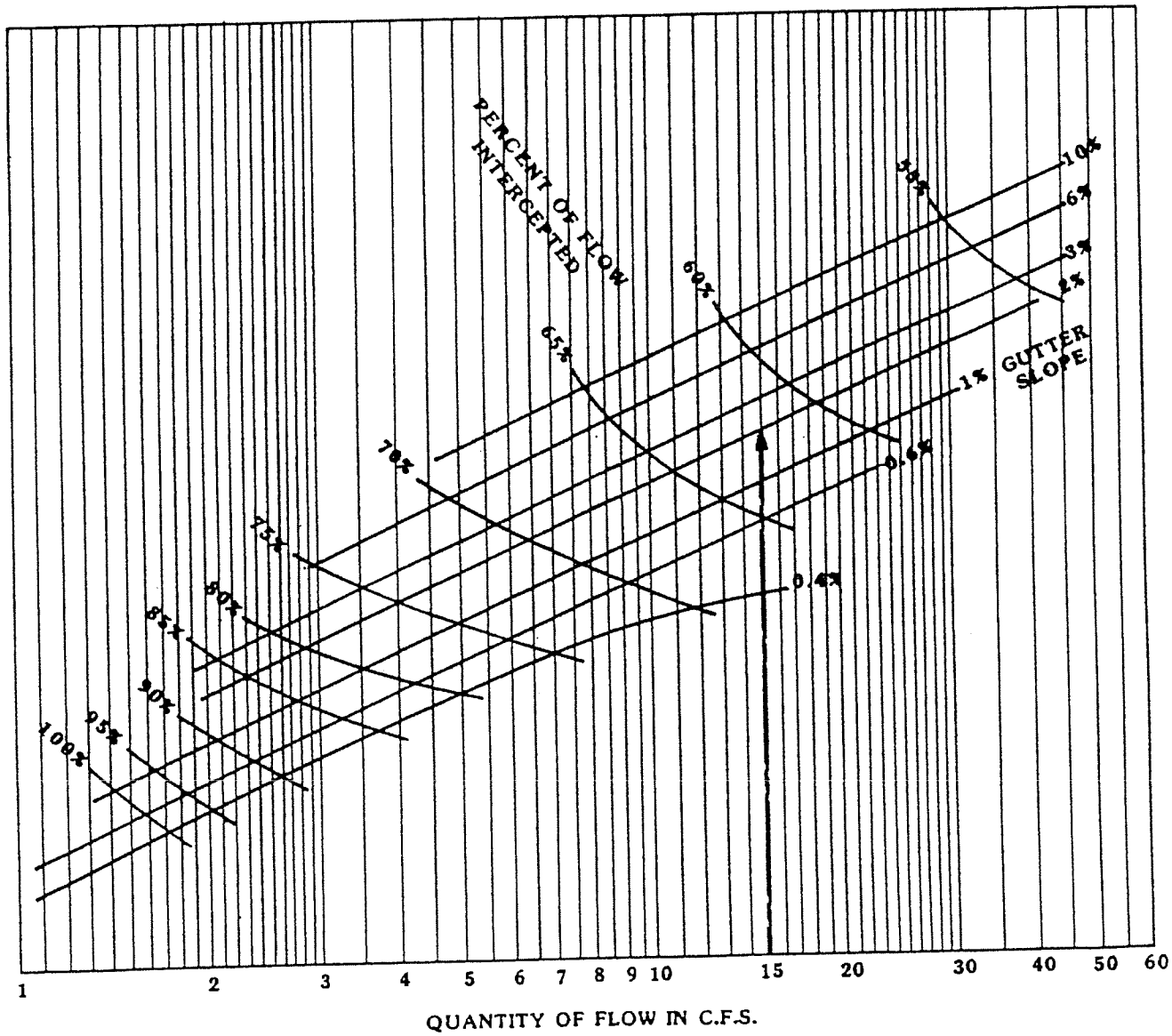
INTERCEPTED: 62%

62 % OF 15 c.f.s.: 9.3 c.f.s.

AS CAPACITY OF THREE GRATE INLET

REMAINING GUTTER FLOW:

15 c.f.s.-9.3 c.f.s. : 5.7 c.f.s.



FOUR GRATE COMBINATION INLET CAPACITY CURVES ON GRADE

FIGURE 12

EXAMPLE

KNOWN:

QUANTITY OF FLOW: 12 c.f.s.

GUTTER SLOPE: 2.0 %

FIND:

CAPACITY OF FOUR GRATE COMBINATION INLET

SOLUTION:

ENTER GRAPH AT 12 c.f.s.

INTERSECT SLOPE: 2.0 %

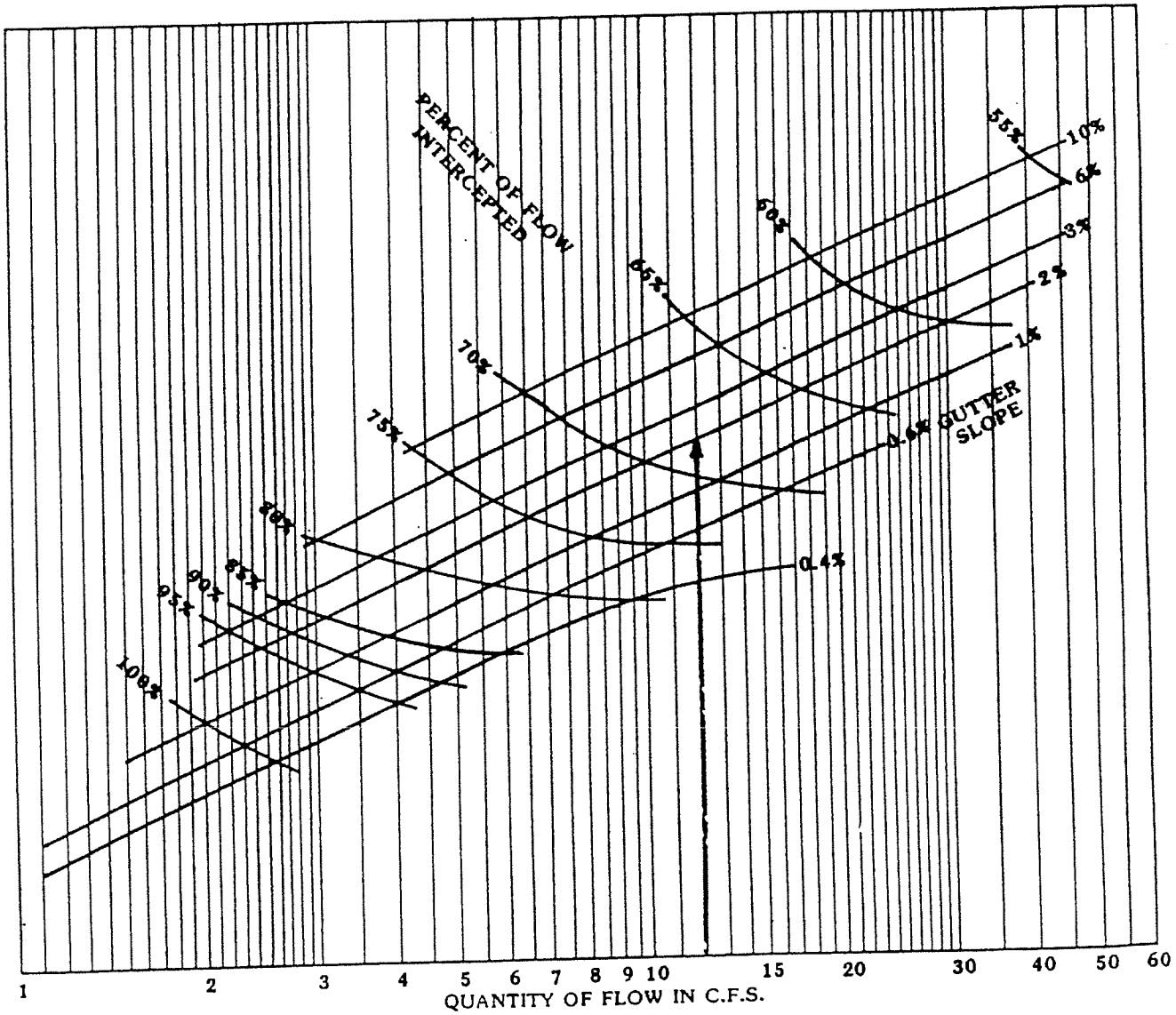
READ PERCENT OF FLOW INTERCEPTED: 68 %

68 % OF 12 c.f.s.: 8.2 c.f.s.

AS CAPACITY OF 4 GRATE COMBINATION INLET

REMAINING GUTTER FLOW:

12 c.f.s.-8.2 c.f.s. : 3.8 c.f.s.



COMBINATION INLET CAPACITY CURVES AT LOW POINT

FIGURE 13

EXAMPLE

KNOWN :

QUANTITY OF FLOW : 20.0 c.f.s.

MAXIMUM DEPTH OF FLOW DESIRED AT LOW POINT (yo) : 0.5'

FIND :

LENGTH OF INLET REQUIRED (Li)

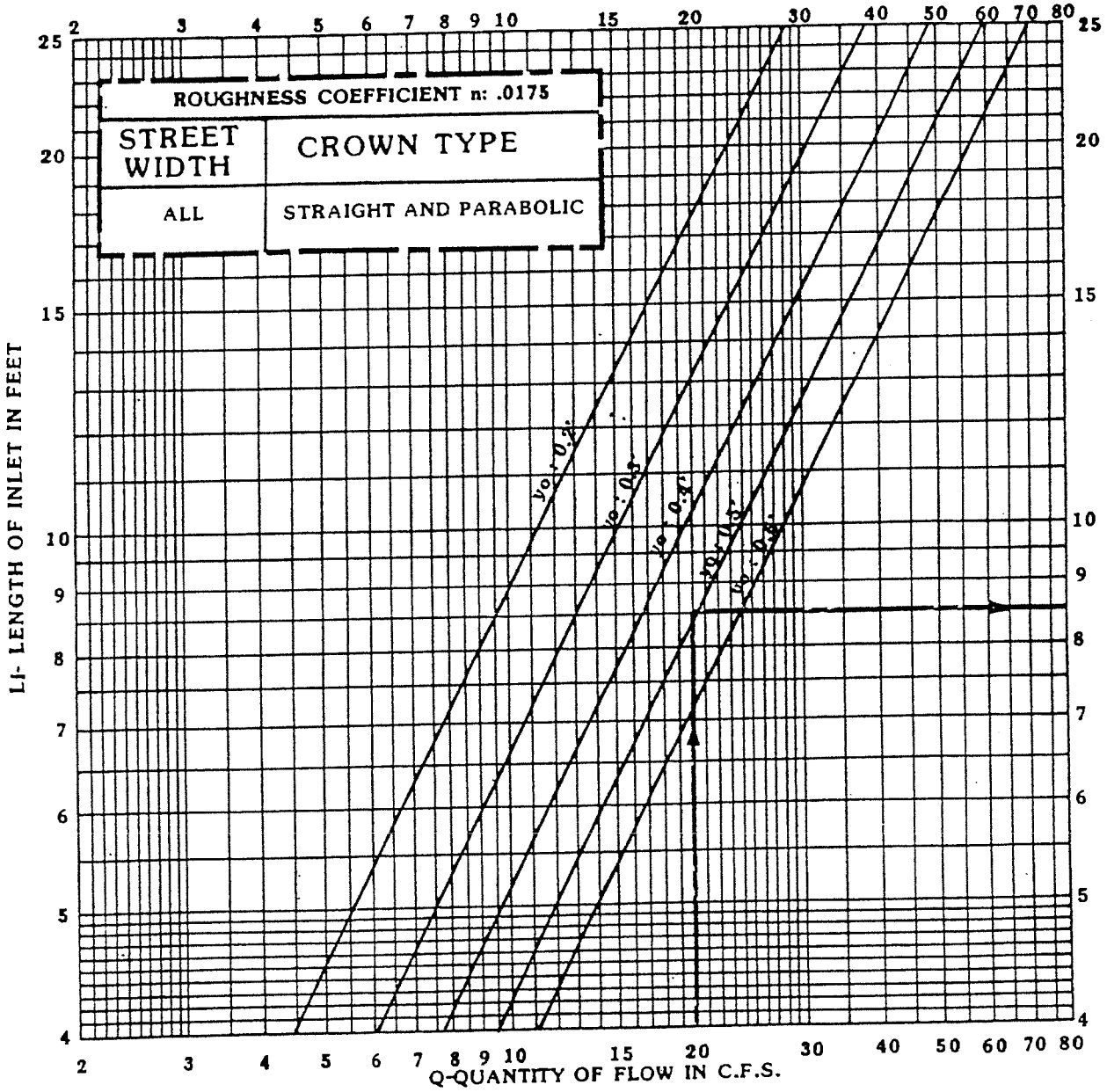
SOLUTION :

ENTER GRAPH AT 20.0 c.f.s.

INTERSECT yo : 0.5'

READ Li : 8.4

USE 10' INLET



TWO GRATE INLET CAPACITY CURVES ON GRADE

FIGURE 14

EXAMPLE

KNOWN:

QUANTITY OF FLOW: 5.0 c.f.s.

GUTTER SLOPE: 0.6 %

FIND:

CAPACITY OF TWO GRATE INLET

SOLUTION:

ENTER GRAPH AT 5.0 c.f.s.

INTERSECT SLOPE: 0.6 %

READ PERCENT OF FLOW

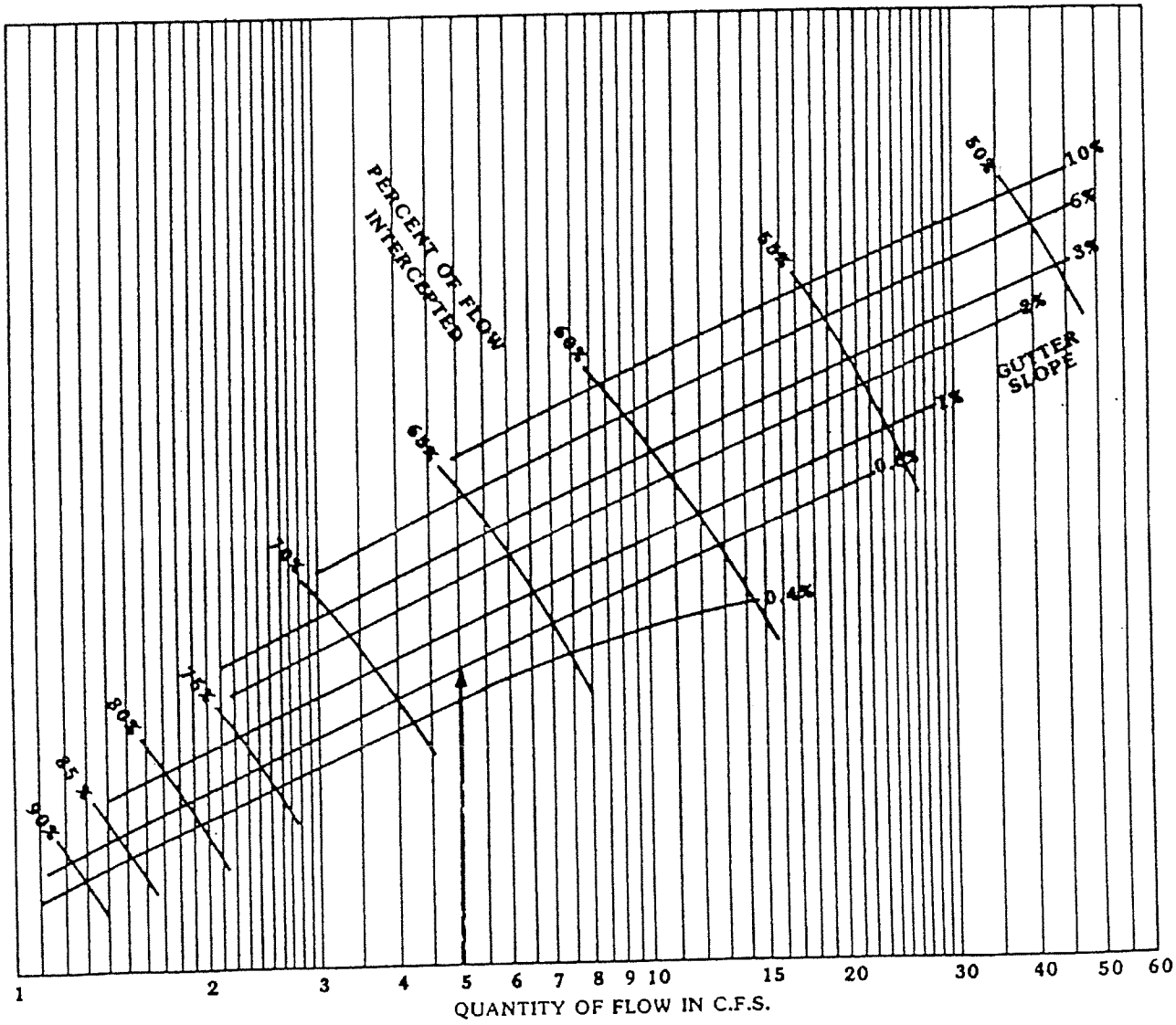
INTERCEPTED: 63%

63 % OF 5.0 c.f.s. : 3.2 c.f.s.

AS CAPACITY OF TWO GRATE INLET

REMAINING GUTTER FLOW:

5.0 c.f.s. -3.2 c.f.s. : 1.8 c.f.s.



FOUR GRATE INLET CAPACITY CURVES ON GRADE

FIGURE 15

EXAMPLE

KNOWN:

QUANTITY OF FLOW: **20** c.f.s.

GUTTER SLOPE: **1.0** %

FIND:

CAPACITY OF FOUR GRATE INLET

SOLUTION:

ENTER GRAPH AT **20** c.f.s.

INTERSECT SLOPE: **1.0** %

READ PERCENT OF FLOW

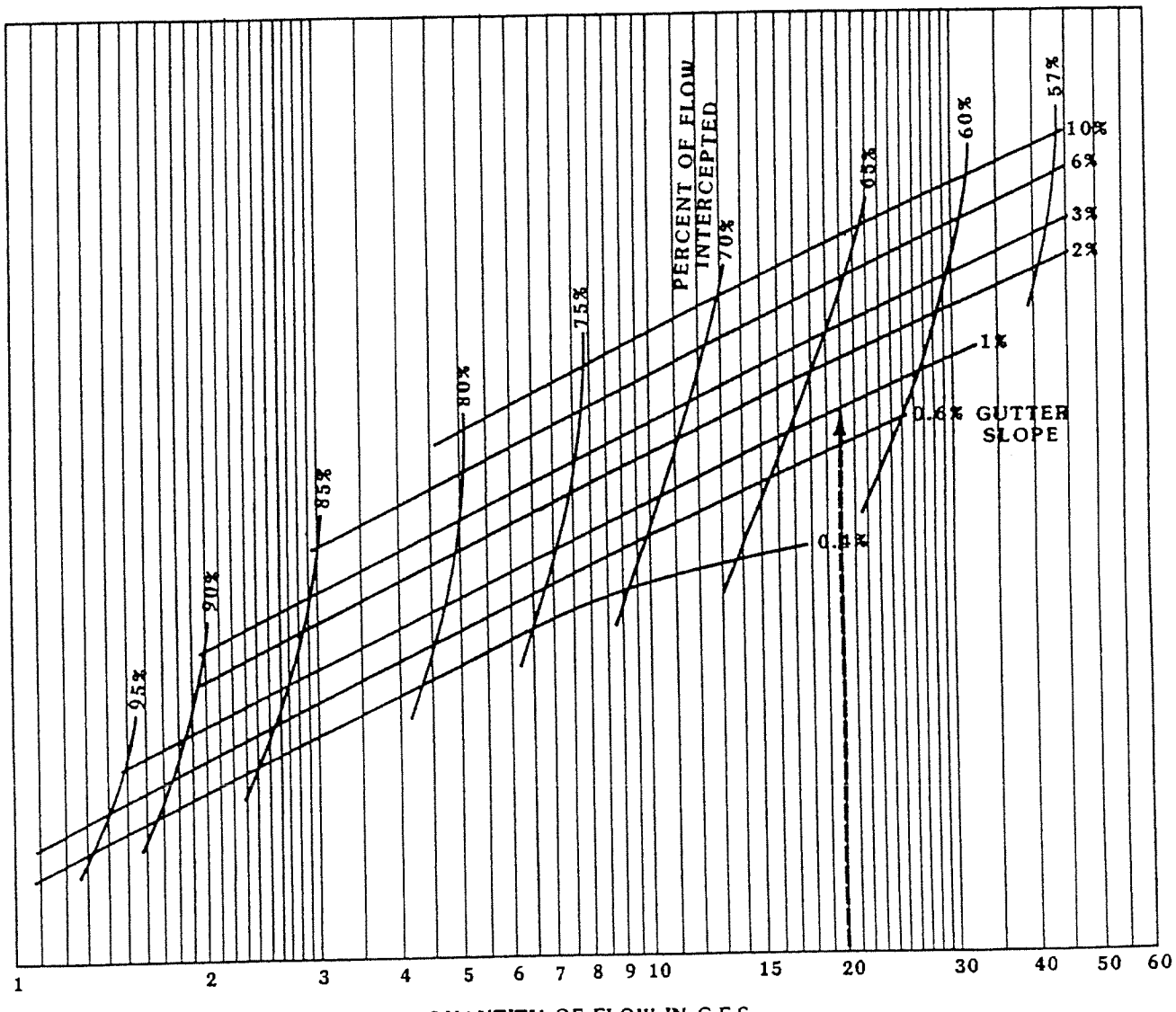
INTERCEPTED: **63** %

63 % OF **20** c.f.s.: **12.6** c.f.s.

AS CAPACITY OF FOUR GRATE INLET

REMAINING GUTTER FLOW:

20.0 c.f.s. − **12.6** c.f.s. = **7.4** c.f.s.



SIX GRATE INLET CAPACITY CURVES ON GRADE

FIGURE 16

EXAMPLE

KNOWN:

QUANTITY OF FLOW: 4.0 c.f.s.

GUTTER SLOPE: 3.0 %

FIND:

CAPACITY OF SIX GRATE INLET

SOLUTION:

ENTER GRAPH AT 4.0 c.f.s.

INTERSECT SLOPE: 3.0 %

READ PERCENT OF FLOW

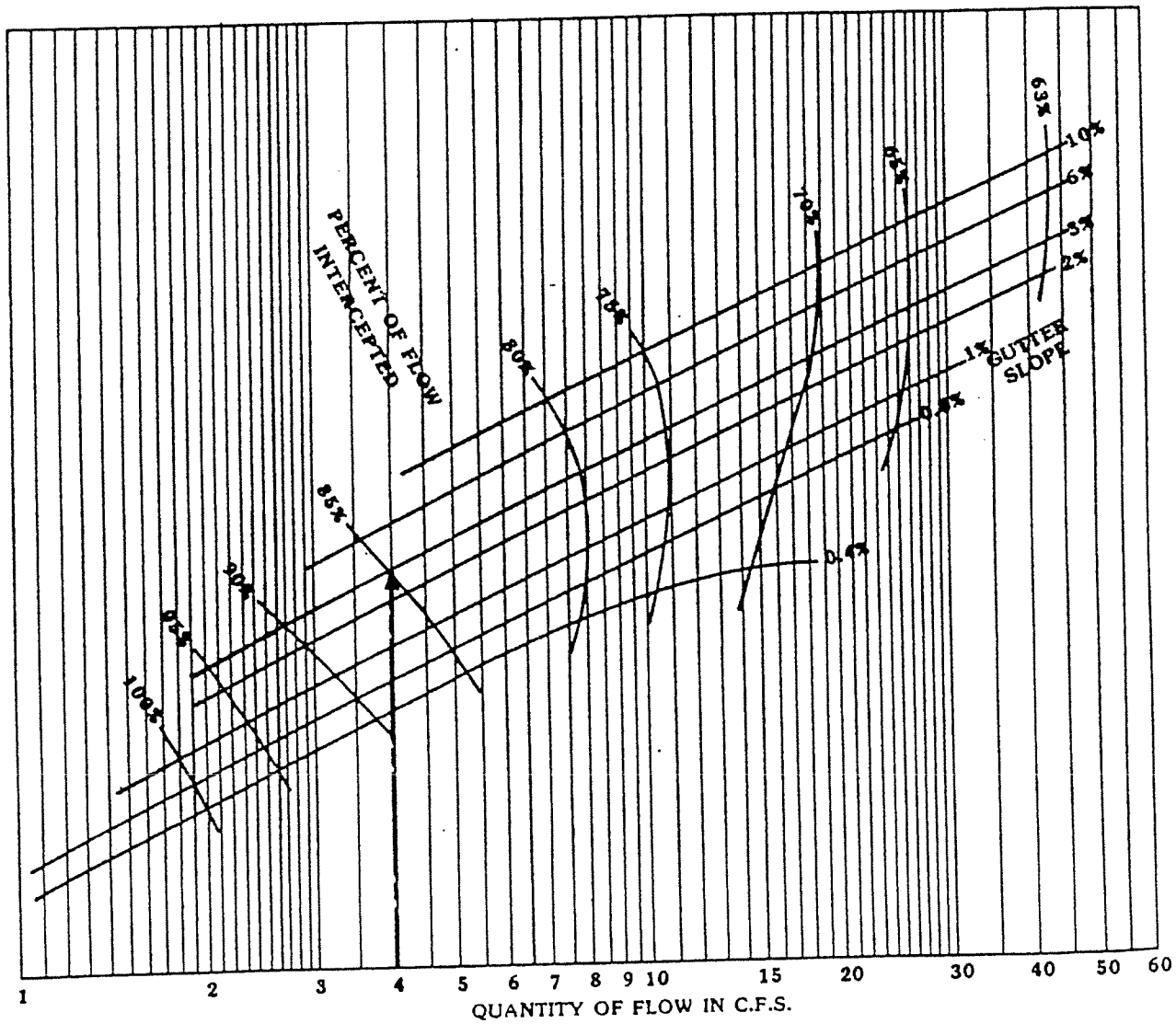
INTERCEPTED: 85%

85% OF 4.0 c.f.s.: 3.4 c.f.s.

AS CAPACITY OF SIX GRATE INLET

REMAINING GUTTER FLOW:

4.0 c.f.s. - 3.4 c.f.s. : 0.6 c.f.s.



GRATE INLET
CAPACITY CURVES AT LOW POINT

FIGURE 17

EXAMPLE

KNOWN:

QUANTITY OF FLOW: **4.8** c.f.s.

MAXIMUM DEPTH OF FLOW DESIRED AT LOW POINT: **0.4'**

FIND:

INLET REQUIRED

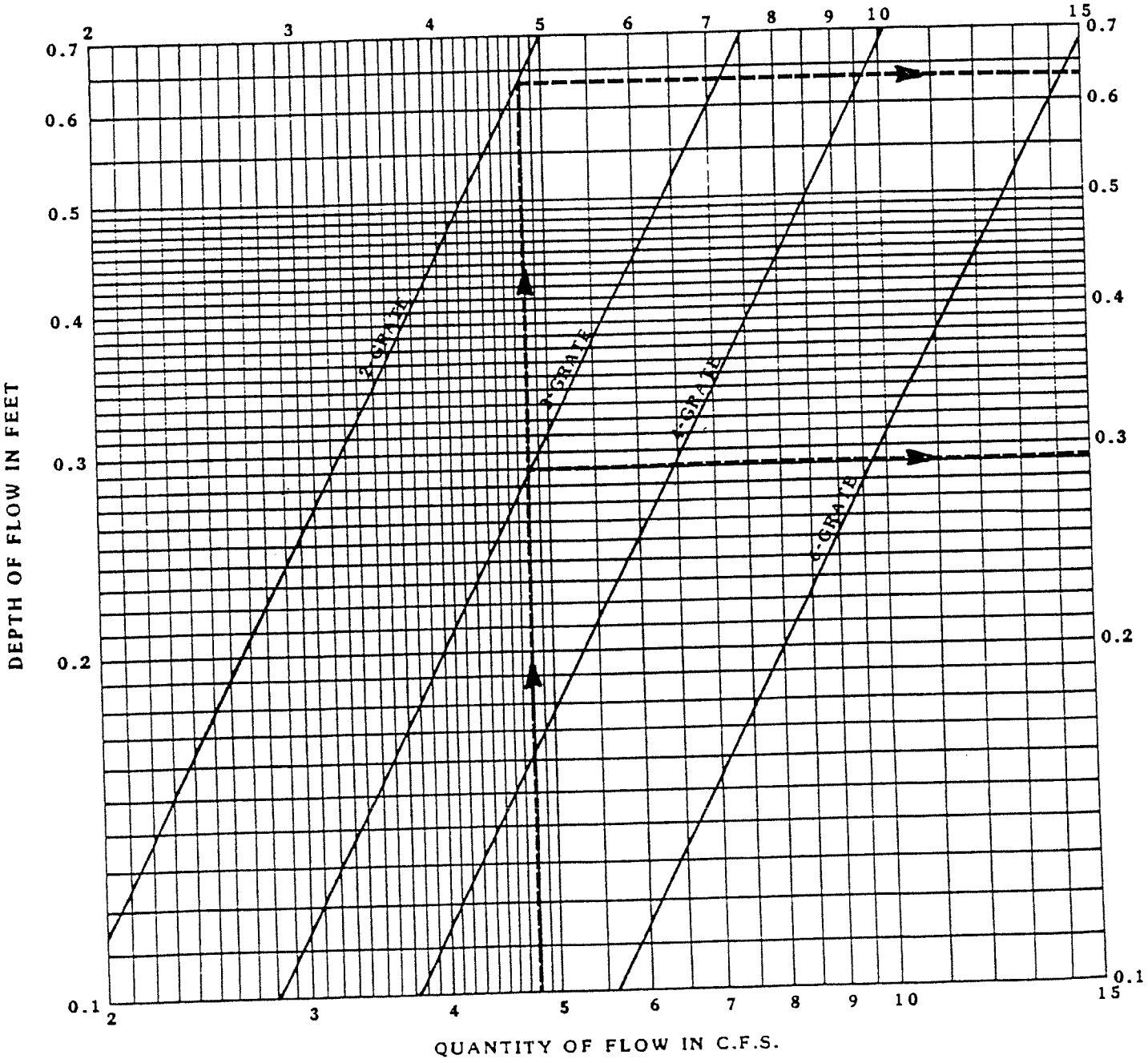
SOLUTION:

ENTER GRAPH AT **4.8** c.f.s.

INTERSECT 3 - GRATE AT **0.28'**

INTERSECT 2 - GRATE AT **0.63'**

USE 3 - GRATE



DROP INLET
CAPACITY CURVES AT LOW POINT

FIGURE 18

EXAMPLE

KNOWN:

QUANTITY OF FLOW: 12 c.f.s.

MAXIMUM DEPTH OF FLOW DESIRED (yo): 0.5'

FIND:

LENGTH OF INLET OPENING REQUIRED (L_I)

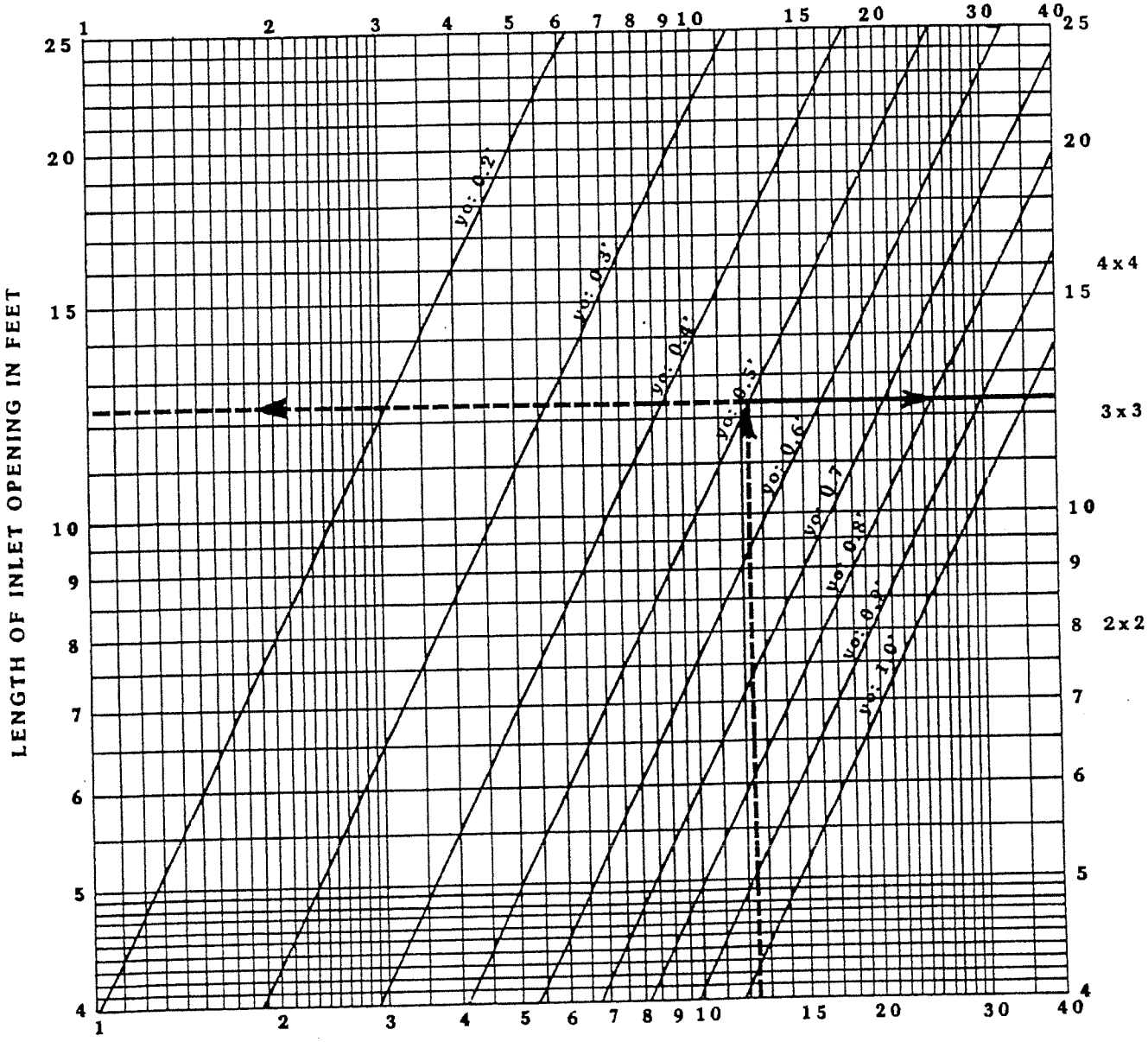
SOLUTION:

ENTER GRAPH AT 12 c.f.s.

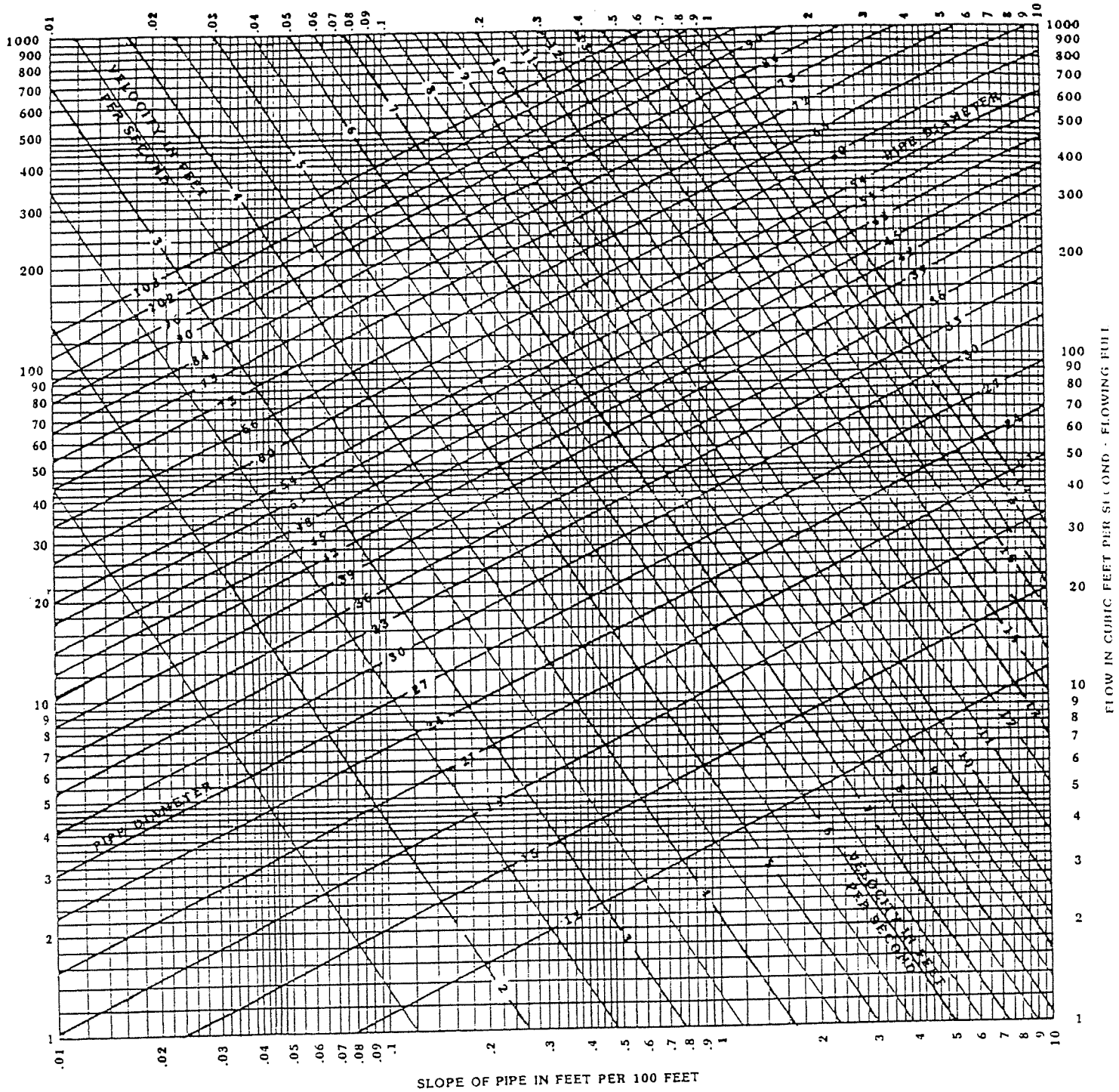
INTERSECT yo: 0.5'

READ L_I: 12.3

USE 12.3 OF INLET 4x4



STANDARD DROP INLET SIZES: 2'x 2', Li:8' 3'x 3', Li:12' 4'x 4', Li:16'



CAPACITY OF CIRCULAR PIPES FLOWING FULL

FIGURE 19

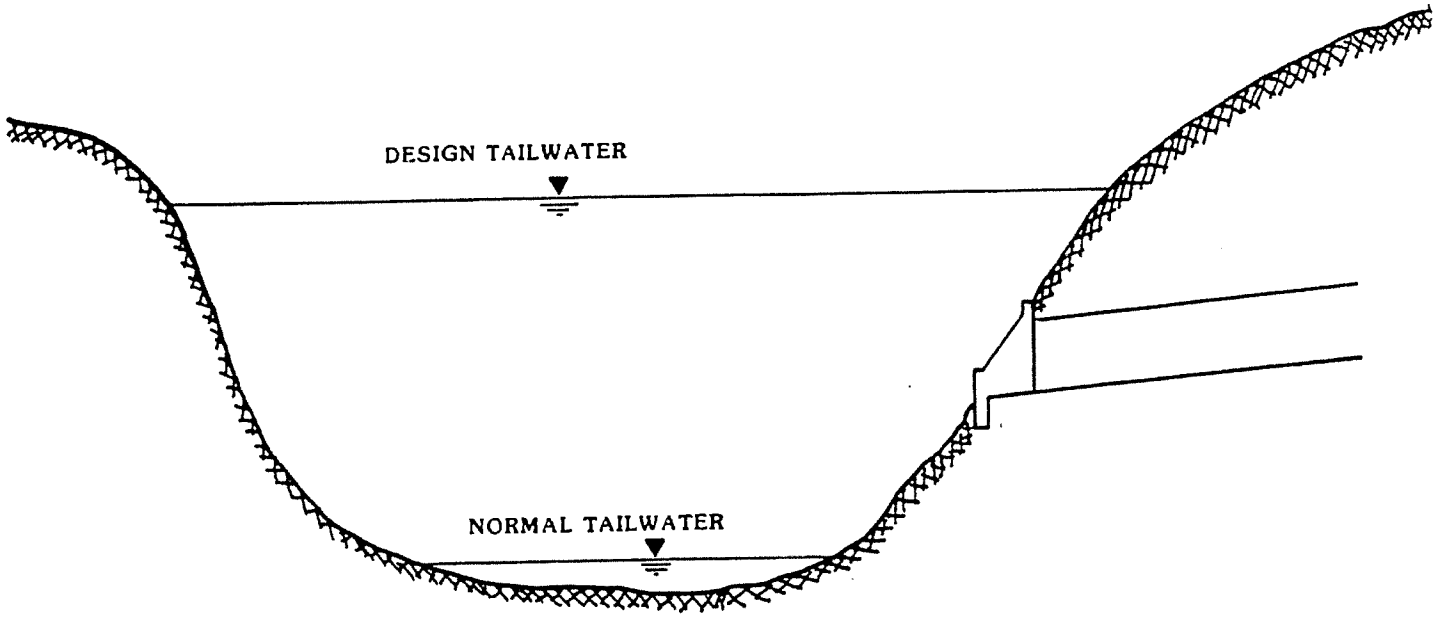
A GRAPHICAL SOLUTION OF MANNING'S EQUATION

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

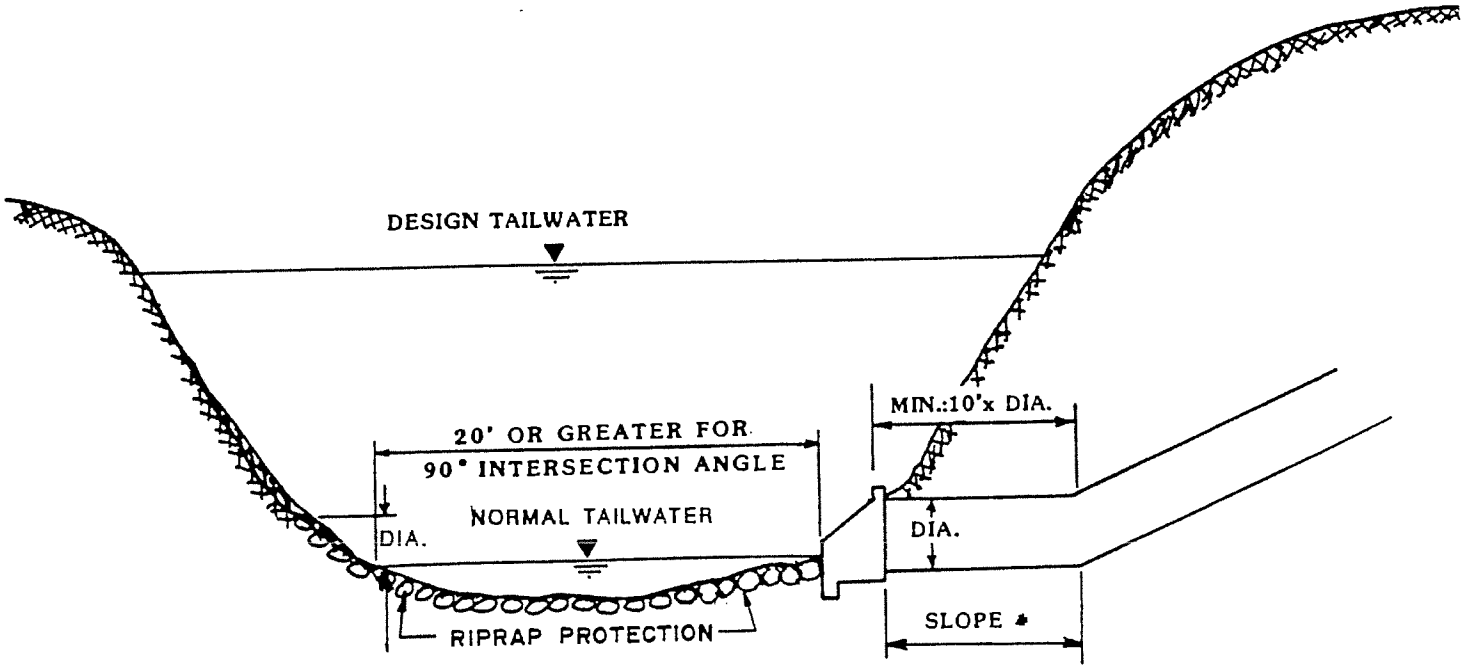
n : 0.013

OUTFALL OF A STORM SEWER INTO A CHANNEL

FIGURE 20



(NOT ALLOWED)

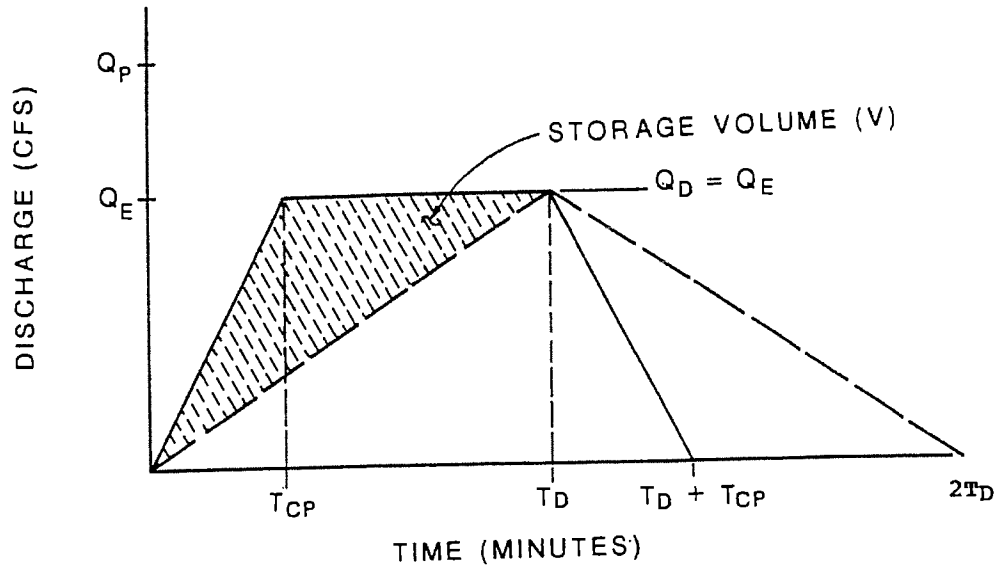


(ALLOWED)

* OUTFALL SLOPE SUCH THAT NONEROSIVE EXIT VELOCITIES WILL OCCUR.

FIGURE 21

Approximate Routing Method for Watersheds < 160 Acres



$$V = (\ 60\ )\ [\ (Q_D[(T_D - T_{CP}) + (T_D + T_{CP})]/2) - (Q_E[T_{CP} + T_D]/2)]$$

in cubic feet.

or

$$V = 60\ (Q_{E/2})\ (T_D - T_{CP})$$

Where: Q_P = Peak discharge in cfs for developed watershed using storm duration equal to T_{CP}.

Q_E = Peak discharge in cfs for existing watershed, assuming full residential development and corresponding T_C.

Q_D = Peak discharge in cfs for developed watershed, based on a storm duration that yields the existing discharge for C_P and A.

T_{CP} = Time of concentration in minutes for proposed development.

T_D = Storm duration in minutes corresponding to I_D.

I_D = Rainfall intensity (inches/hour) for a storm duration that produces Q_D and is calculated using the following formula:

$$I_D = \frac{Q_D}{(C_P A)}$$

Where:

C_P = Rational "C" for developed condition.

A = Drainage area in acres.

FIGURE 21, continued

Detention Basin Example:

Development Data:

Drainage Area = 160 acres
Residential C = 0.60
Residential T_{CR} = 15 minutes
Developed C_P = 0.80
Developed T_{CP} = 10 minutes

For the 100-year storm:

I_{RES} = 9.73 in/hour (from Figure 1)
I_P = 11.56 in/hour.

$Q_E = Q_D = (0.60)\ (9.73)\ (160) = 934$ cfs

$Q_P = (0.80)\ (11.56)\ (160) = 1480$ cfs

$$I_D = \frac{Q_D}{(C_P A)} = \frac{934}{(.8)(160)} = 7.30 \text{ in/hour}$$

From Figure 1, for $I_D = 7.30$ in/hour,

T_D = 26.5 minutes

$$V = 60 \left(\frac{934}{2}\right) (26.5\text{-}10)$$

$$= 28{,}020\ (16.5) = 462{,}330 \text{ cubic feet}$$

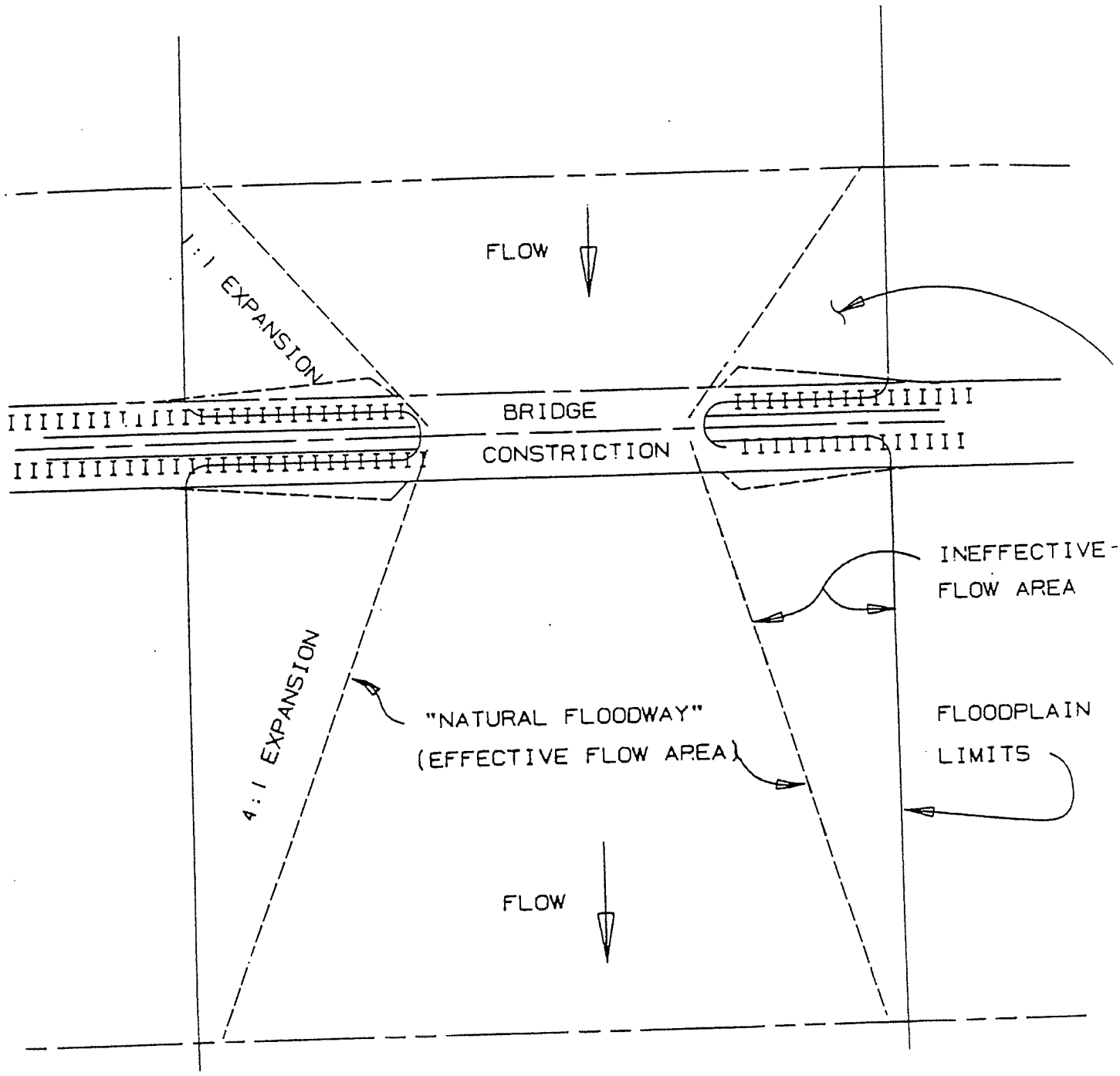


FIGURE 22. "Natural Floodway" Example

FIGURE 23

MINIMUM BMP'S FOR HOME BUILDERS

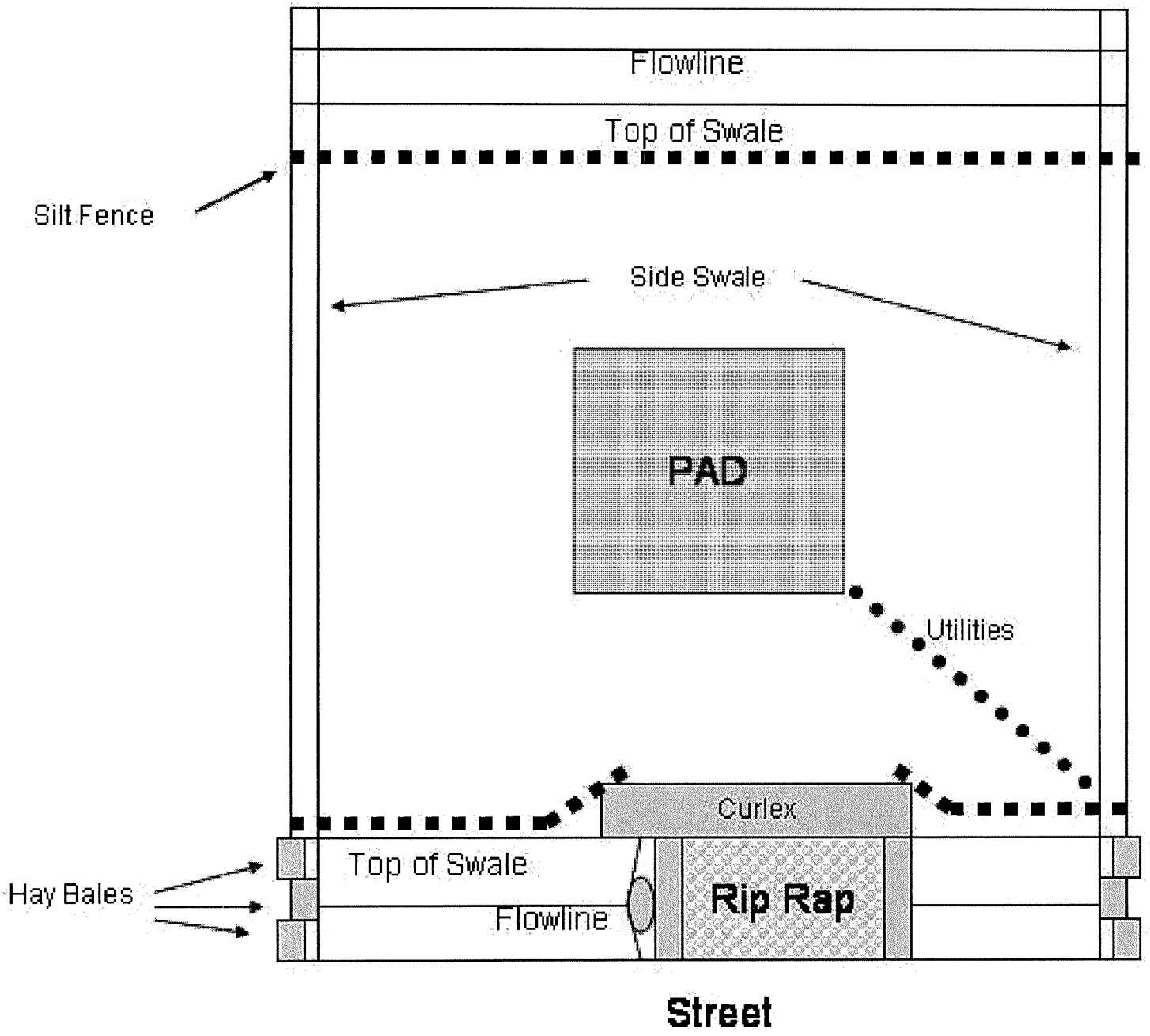


EXHIBIT B: Amendments to Stormwater Ordinance

Article 5: "RUNOFF CALCULATIONS", shall be amended to read as follows:

The selection of which method to use for calculating the peak runoff depends upon the size of the drainage area contributing runoff at a most downstream point of a project. The "Rational Method" is acceptable for situations in which the drainage area is less than 160 acres. A unit hydrograph method is required for situations with larger drainage areas.

Regional Stormwater detention will be required within the Commercial Planned Development District as depicted in the Huitt-Zollars, Inc. Master Plan Drainage and Open Space Study dated 08/23/2016. Any alterations in the detention basins depicted in this study in location, storage volume or outfall designs must be approved by the Town Engineer. A 3rd party review may be required with the cost to be paid by the developer. Any CPDD properties that discharge directly into non-CPDD property will be required to demonstrate "no adverse impacts" locally as defined in the amended section below. In such cases where local adverse impacts are demonstrated in areas not shown for detention in the CPDD Master Drainage Plan, local stormwater detention may be required or other such measures to remove the local adverse impact as approved by the Town Engineer.

Any discharge from a development into areas outside the CPDD shall demonstrate "no adverse impacts in velocity and water surface elevation. Increases in channel velocities by up to 5% of existing velocity values are considered minor, as long as the velocity remains below 6 feet-per-second. Increases in the 100-yr water surface elevations up to one tenth (0.1) of 1 foot are considered to be minor. Water surface elevation increases greater than one tenth of one foot are acceptable as long as the channel conveying the flow has adequate conveyance capacity.

The downstream analysis shall extend to the Zone of Influence (ZOI) point which is defined in this ordinance by traveling downstream until the acres of the proposed stormwater runoff is 10% or less of the total acres of stormwater runoff accumulated. All natural and man-made channels and culverts downstream to the ZOI must be checked for any adverse impacts and mitigated if such impacts are created by the development.

Runoff computations shall be based upon fully developed watershed conditions in accordance with the land use projections in the latest comprehensive land use plan for the Town of Fairview. The design engineer shall size drainage facilities by disregarding the detention effects of upstream property and calculating the runoff as if the offsite property was developed without any detention. If an approved regional detention/retention facility is in operations, the design engineer may size downstream drainage facilities based on consideration of the detention effects of the regional facility.

Article 7: "SPECIAL DRAINAGE FACILITIES", Section A "Channels", paragraph 1 "Channel Design", item d. shall be amended as follows.

d. For lined channels, a 3 ft wide concrete portion of the bottom of the channel in a V shape shall be used, unless approved by the Town engineer.

Article 7: "SPECIAL DRAINAGE FACILITIES", Section A “Channels”, paragraph 1 “Channel Design”, item j. shall be added as follows:

j. All channels with less than 1% slope or those that intercept groundwater shall include a concrete pilot channel that meets the requirements of item A.1.d. All channels that develop groundwater seeps during the duration of the 2 year maintenance period shall also be required to have a concrete pilot channel installed by the developer that meets the requirements of item A.1.d. Alternative hardscaping methods may be approved by the town engineer.

City of Lucas
Planning & Zoning Agenda Request
October 14, 2021

Item No. 05

Requester: City Secretary Stacy Henderson

Agenda Item Request

Consider approval of the minutes of the September 9, 2021, Planning and Zoning Commission meeting.

Background Information

NA

Attachments/Supporting Documentation

1. September 9, 2021 Planning and Zoning Commission minutes.

Budget/Financial Impact

NA

Recommendation

NA

Motion

I make a motion to approve the minutes of the September 9, 2021 Planning and Zoning Commission meeting.

City of Lucas
Planning and Zoning Commission
Regular Meeting
City Hall Council Chambers and by Video Conference
September 9, 2021
6:00 pm – Training | 7:00 pm – Regular Meeting
City Hall – 665 Country Club Road – Lucas. Texas

MINUTES

Training Session with the City Attorney – 6:00 pm

Chairman Rusterholtz called the meeting to order at 6:00 pm.

The City Attorney conducted ethics training, and Open Meetings Act and Public Information Act training with the Planning and Zoning Commission. There was no formal action or business discussed during this item.

Call to Order Regular Meeting - 7:00 pm

Chairman Rusterholtz called the regular meeting to order at 7:02 pm. It was determined that a quorum was present, and the Pledge of Allegiance was recited.

Commissioners Present:
Chairman Peggy Rusterholtz
Vice Chairman Joe Williams
Commissioner Dusty Kuykendall
Commissioner Adam Sussman

Commissioners Absent:
Commissioner Tommy Tolson
Alternate Commissioner Chris Bierman
Alternate Commissioner James Foster

Staff Present:
City Manager Joni Clarke
Development Services Director Joe Hilbourn
City Secretary Stacy Henderson
City Attorney Courtney Morris
Engineer Joe Grajewski

City Council Liaison Present:
Mayor Jim Olk

Regular Agenda

1. **Discuss stormwater design criteria and provide guidance to staff regarding proposed amendments to the Stormwater Run-Off Planning and Design Criteria Manual and Floodplain Ordinance 2009-04-00646.**

Engineer Joe Grajewski discussed his research and findings related to the City's existing drainage criteria and design manual, he discussed the review of surrounding cities drainage ordinances and recommended revisions to the Stormwater Run-Off Planning and Design Criteria Manual that included:

- Adopting an Intensity Duration Frequency IDF used by the Town of Fairview
- Adopt a floodplain development ordinance
- All new home construction shall submit a grading and drainage plan prior to receiving a building permit and approved by the City Engineer. This would also apply to an existing home in which an addition or accessory structure or improvement is being added that is equal to or greater than 30% of the existing footprint of the main residence.

The Commission asked that an ordinance with the suggested drainage design criteria amendments be brought forward for consideration as well as a floodplain ordinance with proposed amendments.

There was no formal action taken on this item.

2. Review the City's submittal procedures and approval requirements relating to the platting process and provide direction to City staff on any recommended amendments.

The Planning and Zoning Commission completed review of Chapter 10 Subdivision regulations. Proposed changes will be brought back to the Commission for review and consideration.

3. Consider approval of the minutes of the August 12, 2021, Planning and Zoning Commission meeting.

MOTION: A motion was made by Commissioner Sussman seconded by Commissioner Kuykendall to approve the minutes of the August 12, 2021, Planning and Zoning Commission meeting. The motion passed unanimously by a 4 to 0 vote.

Executive Session Agenda

4. Executive Session.

An Executive Session was not held at this meeting.

5. Adjournment.

MOTION: A motion was made Commissioner Sussman, seconded by Vice Chairman Williams to adjourn the meeting at 8:00 pm. The motion passed unanimously by a 4 to 0 vote.

_____ _____

Peggy Rusterholtz, Chairman Stacy Henderson, City Secretary