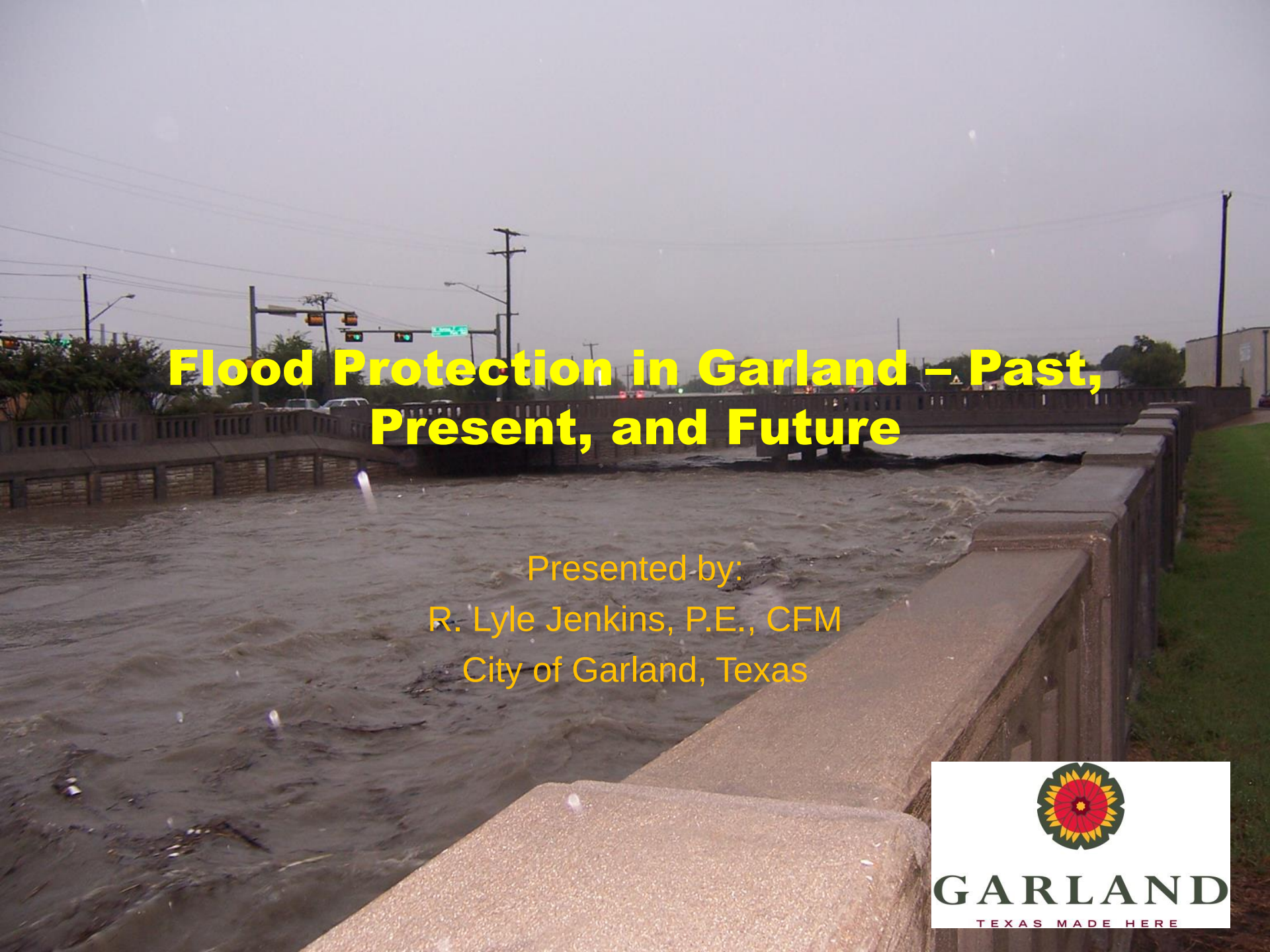


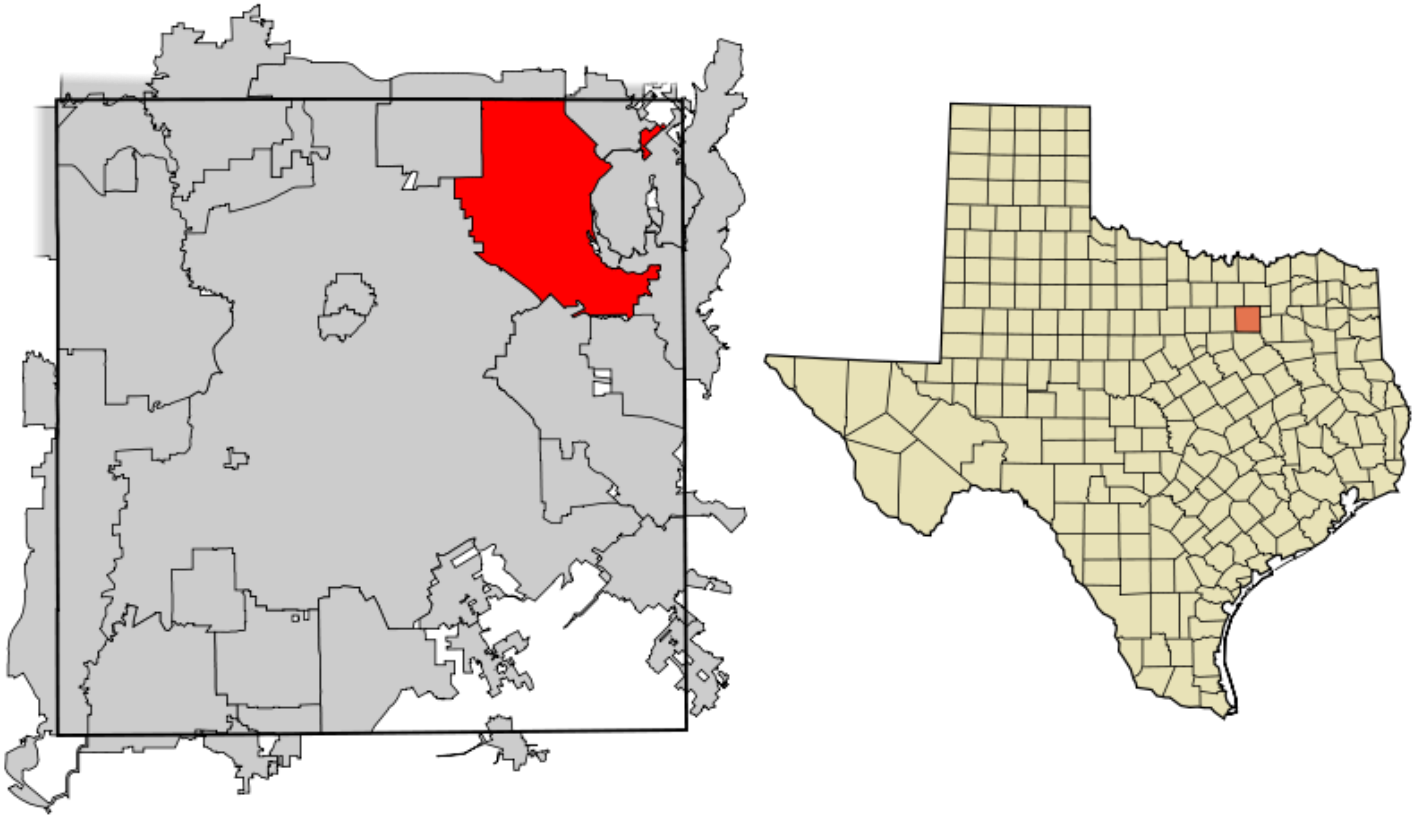
Flood Protection in Garland – Past, Present, and Future

Presented by:
R. Lyle Jenkins, P.E., CFM
City of Garland, Texas

GARLAND
TEXAS MADE HERE

A few facts about Garland:

- Originally incorporated in 1891
- Population 226,876 (2010 census)
- 12th most populous city in Texas
- Over 200 Flood Insurance Policies currently in force
- 57 Repetitive Loss Properties citywide as of 2014



Location of Garland within Dallas County and Texas
(from Wikipedia)

Brief History of Garland Flooding

Severe flooding has a long history in Garland:

- June 1949
- May 1957
- July 1962
- April 1966
- October 1981
- April 1990
- April 1991
- June 2000
- March 2006
- September 2007
- September 2010
- January 2012

TODAY'S EDITORIAL: Tragedy In Our Town

The Garland News

For Sixty-Two Years Devoted to the Best Moral and Financial Interests of Garland and Communities

TODAY'S EDITORIAL: Tragedy In Our Town

Vol. 62 | PUBLISHED TWICE A WEEK | GARLAND, DALLAS COUNTY, TEXAS, FRIDAY, JUNE 17, 1949 | FIVE CENTS A COPY | No.

Flood Lashes Duck Creek Area, Kills 4

Total Damage Hits $1 Million

Terror and destruction descended upon the Duck Creek area of Garland Monday night in a savage storm-driven flood which claimed four lives and destroyed a million dollars' worth of property.

The churning waters lashed residential and business districts along the creek's course like an angry whip rolling automobiles as though they were toy blocks, beating through store fronts, demolishing one building entirely, scattering debris for miles.

Persons in the lowland area were trapped before they realized the waters were rising. Some found refuge by moving to higher levels in their homes and others fled to safety on higher ground; some were swept to danger—and death—as they tried to fight their way through the rampaging overflow.

Known dead in the flood are:

Mrs. Donald Cooper, 21, 1808 Briarwood Circle.

Mr. and Mrs. Aubon R. King and their 15-year-old son, Buddy, all of 1449 Walnut Street.

Complete reports of persons injured could not be secured, so widespread was the havoc. Hospitalized at Baylor Hospital, Dallas, was Donald Cooper, treated for exposure and shock.

Mr. and Mrs. Cooper and four guests were caught by the flood as they left the Cooper home for higher ground. Swept away, they found precarious safety by holding on to trees or poles until they were carried Cooper

to six feet deep in water at the flood's height.

Duck Creek shopping village was shattered. Water crept up beyond the Avenue D intersection on Highway 67 and damage varied with the water depth—being most serious in business buildings closer to the creek, where the flood took its pressure from the

WASHATERIA ROOF was dumped squarely across Avenue F by the rampaging waters that tore the building to pieces, leaving the roof as the largest single piece of wreckage. Note the pieces of hollow tile wall, washing machines and tubs, and the ash drink cooler scattered across the waters' path. Other debris from the laundry was carried across the Municipal Park (in background) and deposited hundreds of yards from the building site.

ANDERSON VARIETY STORE was left like this by the flood which broke through plate glass windows and reached just over the counters along the left wall. While items on high shelves were still undisturbed, the force of the swirling waters tore display cases and dumped stock items into the jumbled heap that ran the length of the shop.

Garland Morning News, June 17, 1949

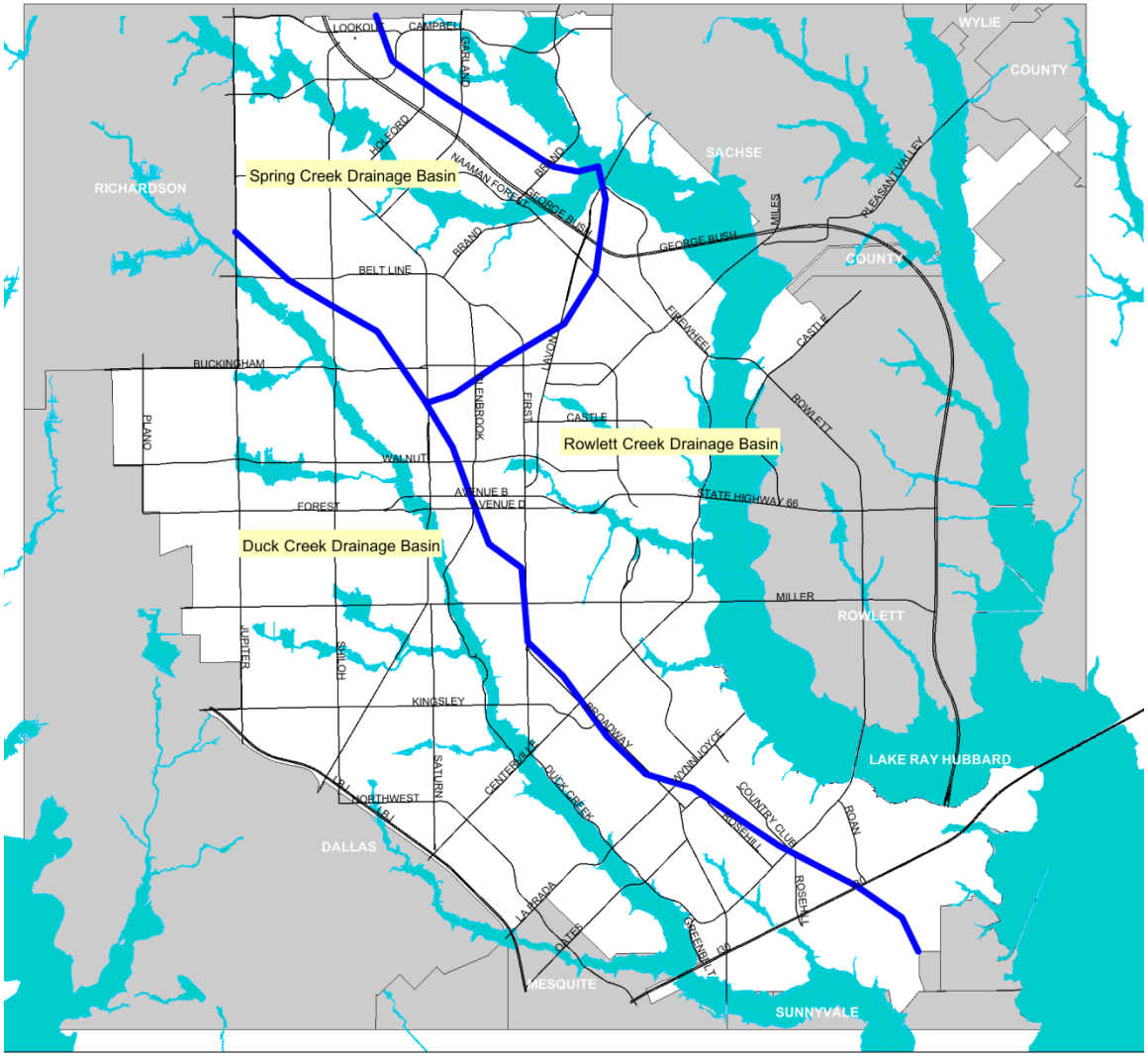
Major Drainage Basins

Duck Creek Drainage Basin

- Development along creeks 1950s-1960s
- Majority of flooding issues are here
- Any redevelopment must conform to current stds.
- Majority of impact from 2014 FIRM revisions

Rowlett/Spring Creek Drainage Basins

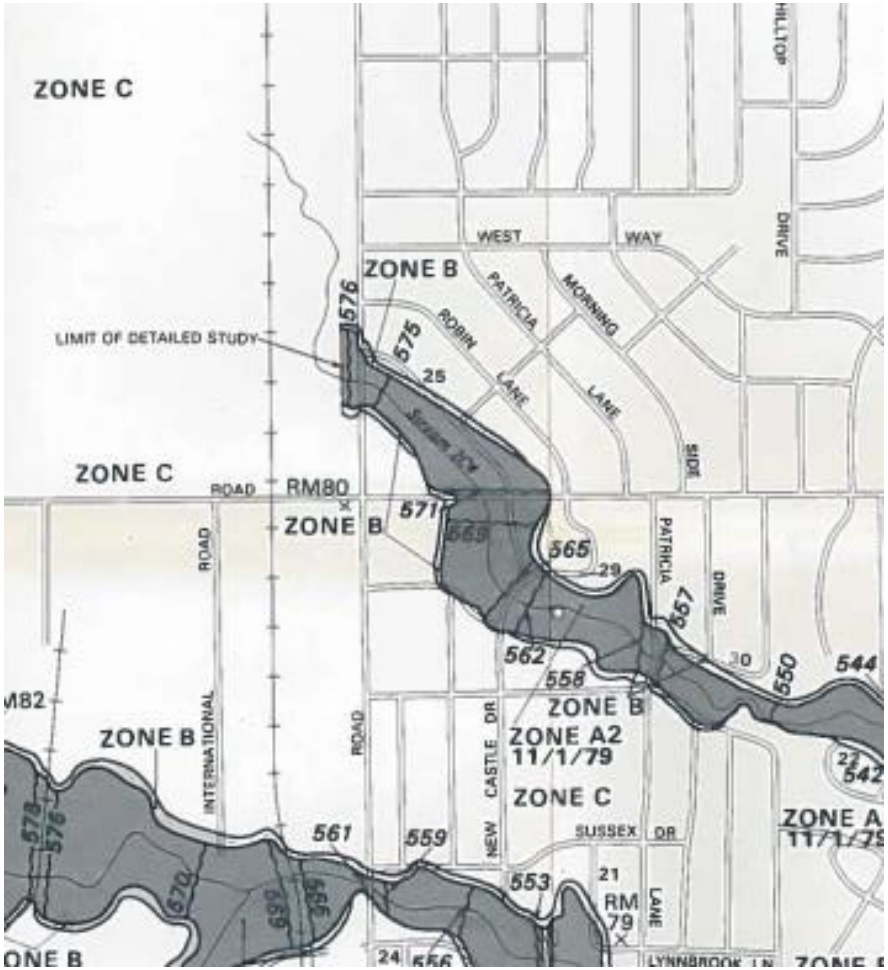
- Development along creeks 1970s and later
- More stringent flood protection ordinances
- Fewer flooding problems



Historic FIRMs

Initial FIRM effective date 4-16-1971

- Areas in Duck Creek drainage basin already developed
- Flood Zone delineation based on best available data at that time
- Some tributaries with small drainage basins never received large (50-year+ floods)
- No restudy or change to these areas was ever done
- Flood zones in area shown delineated 11-1-1979

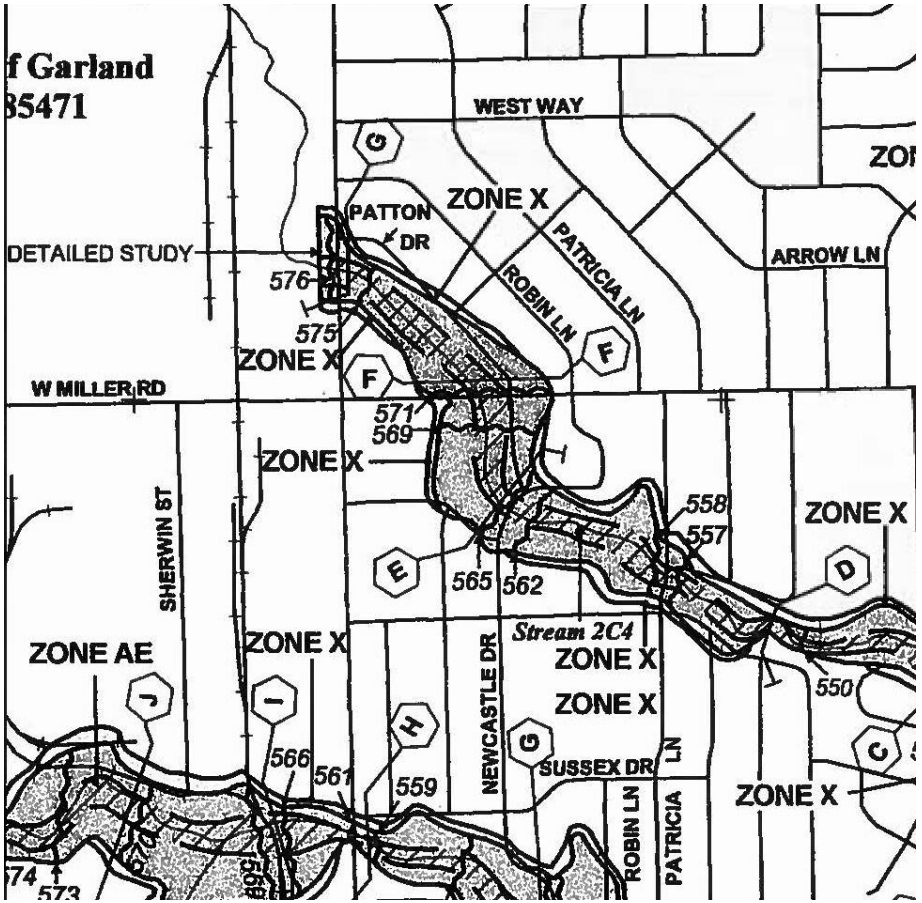


FIRM Panel 485471 0015C, 3-15-1984

Historic FIRMs

FIRM Revision of February, 2003

- Revised 5 panels within Garland to account for Duck Creek Widening project
- Only studied Duck Creek proper, not upstream tributaries
- Flood zone delineations along tribs more detailed but basically unchanged since 1979
- No major floods along tribs, no Repetitive Loss properties
- Older established neighborhoods, many residents own homes outright
- Almost all pre-FIRM homes
- Investigation of possible projects to reduce floodplain areas but not feasible (economics, lack of available open space, etc.)

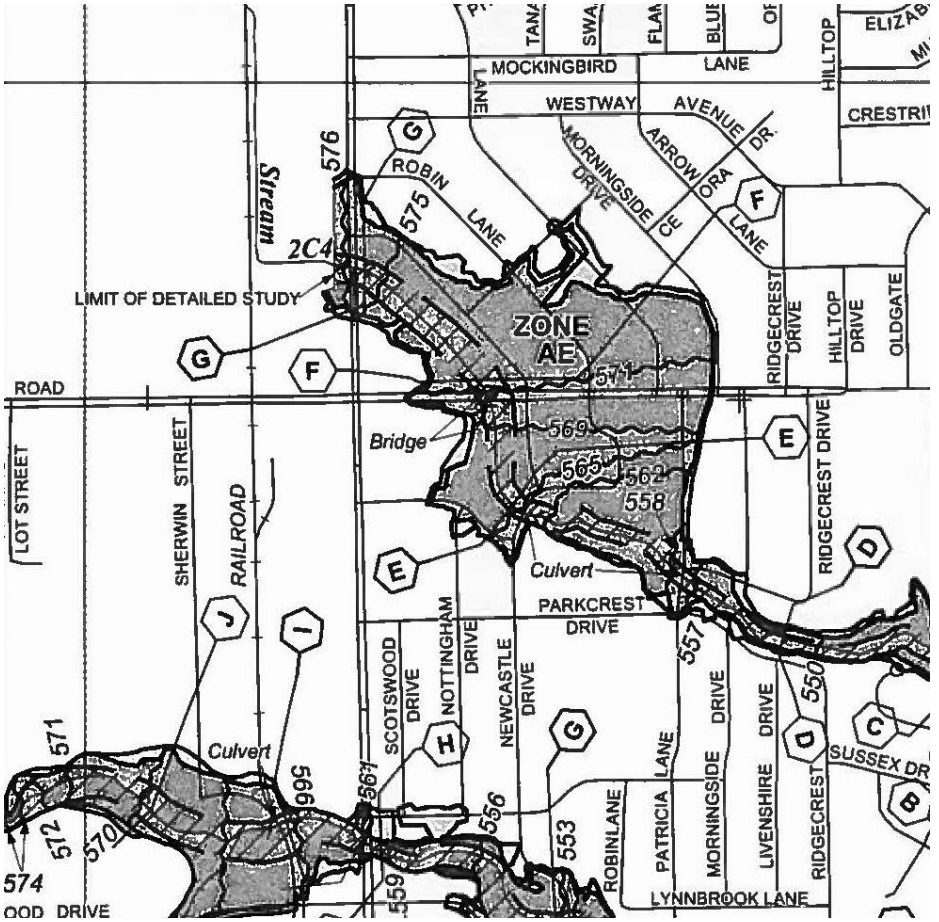


FIRM Panel 48113C0220K, 2-5-2003

FIRM revision 7-7-2014

Detailed restudy of entire City

- Based on more detailed aerial topography
- BFEs unchanged
- Resulted in significant alterations to long-standing flood zone delineations
- Subsequent site surveys (so far) are confirming new flood zones
- Significant “spike” in Elevation Certificate and LOMA requests, almost all for pre-FIRM homes
- Still have not received large floods on most tributaries

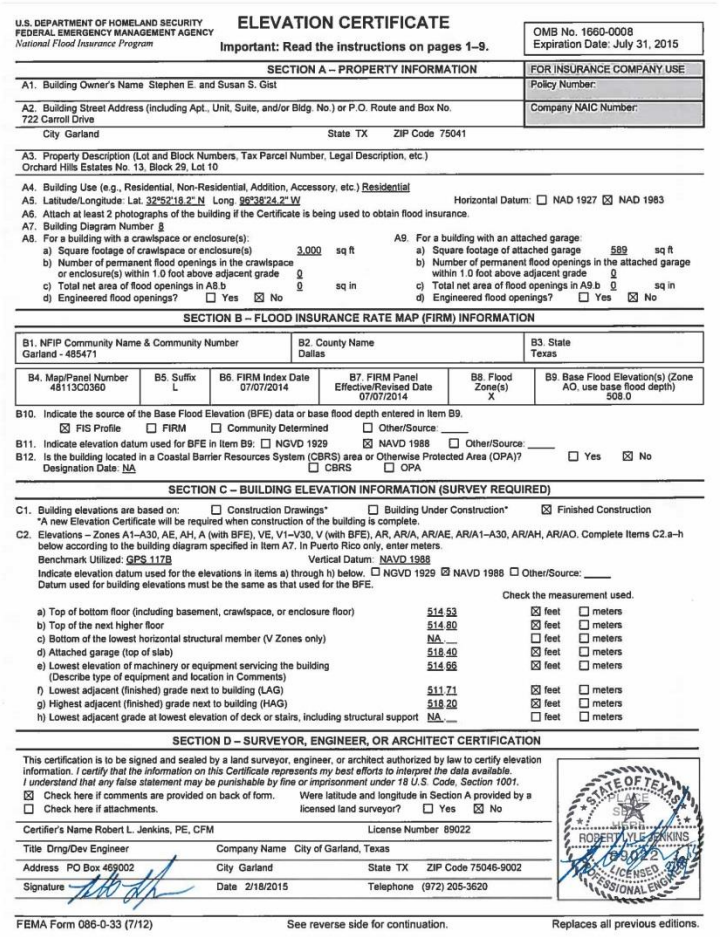


FIRM Panel 48113C0220L, 7-7-2014

Elevation Certificates in Garland

2000 – 23 Elevation Certificates
2001 – 21 Elevation Certificates
2002 – 46 Elevation Certificates
2003 - 52 Elevation Certificates
2004 - 28 Elevation Certificates
2005 – 8 Elevation Certificates
2006 – 12 Elevation Certificates
2007 – 6 Elevation Certificates
2008 – 9 Elevation Certificates
2009 – 5 Elevation Certificates
2010 – 11 Elevation Certificates
2011 - 5 Elevation Certificates
2012 – 12 Elevation Certificates
2013 - 11 Elevation Certificates
2014 - 45 Elevation Certificates
2015 - 4 Elevation Certificates (so far)

- 2002/03 “spike” due to FIRM revisions
- Significant 2014 “spike” due to new FIRMs
- Almost all ECs were for pre-FIRM homes
- Approximately 75% led to LOMAs
- Many others led to reduced insurance premiums
- Most by City, a few by outside firms



U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
National Flood Insurance Program

ELEVATION CERTIFICATE
Important: Read the instructions on pages 1–9.

OMB No. 1660-0008
Expiration Date: July 31, 2015

SECTION A – PROPERTY INFORMATION | FOR INSURANCE COMPANY USE

A1. Building Owner's Name Stephen E. and Susan S. Gist | Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 722 Carroll Drive | Company NAIC Number:

City Garland State TX ZIP Code 75041

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) Orchard Hills Estates No. 13, Block 29, Lot 10

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) Residential

A5. Latitude/Longitude: Lat. 32°52'18.2" N Long. 96°38'24.2" W Horizontal Datum: ☐ NAD 1927 ☒ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number 8

A8. For a building with a crawlspace or enclosure(s):
a) Square footage of crawlspace or enclosure(s) 3,000 sq ft
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade 0
c) Total net area of flood openings in A8.b 0 sq in
d) Engineered flood openings? ☐ Yes ☒ No

A9. For a building with an attached garage:
a) Square footage of attached garage 589 sq ft
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade 0
c) Total net area of flood openings in A9.b 0 sq in
d) Engineered flood openings? ☐ Yes ☒ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State
Garland - 485471	Dallas	Texas

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use base flood depth)
48113C0360	L	07/07/2014	07/07/2014	X	508.0

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.
☒ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: ____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: ____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No
Designation Date: NA ☐ CBRS ☐ OPA

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☒ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.
Benchmark Utilized: GPS 117B Vertical Datum: NAVD 1988
Indicate elevation datum used for the elevations in items a) through h) below. ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: ____
Datum used for building elevations must be the same as that used for the BFE.

		Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	514.53	☒ feet	☐ meters
b) Top of the next higher floor	514.80	☒ feet	☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only)	NA	☐ feet	☐ meters
d) Attached garage (top of slab)	518.40	☒ feet	☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	514.66	☒ feet	☐ meters
f) Lowest adjacent (finished) grade next to building (LAG)	511.71	☒ feet	☐ meters
g) Highest adjacent (finished) grade next to building (HAG)	518.20	☒ feet	☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	NA	☐ feet	☐ meters

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

☒ Check here if comments are provided on back of form. Were latitude and longitude in Section A provided by a licensed land surveyor? ☐ Yes ☒ No
☐ Check here if attachments.

Certifier's Name Robert L. Jenkins, PE, CFM License Number 89022

Title Drng/Dev Engineer Company Name City of Garland, Texas

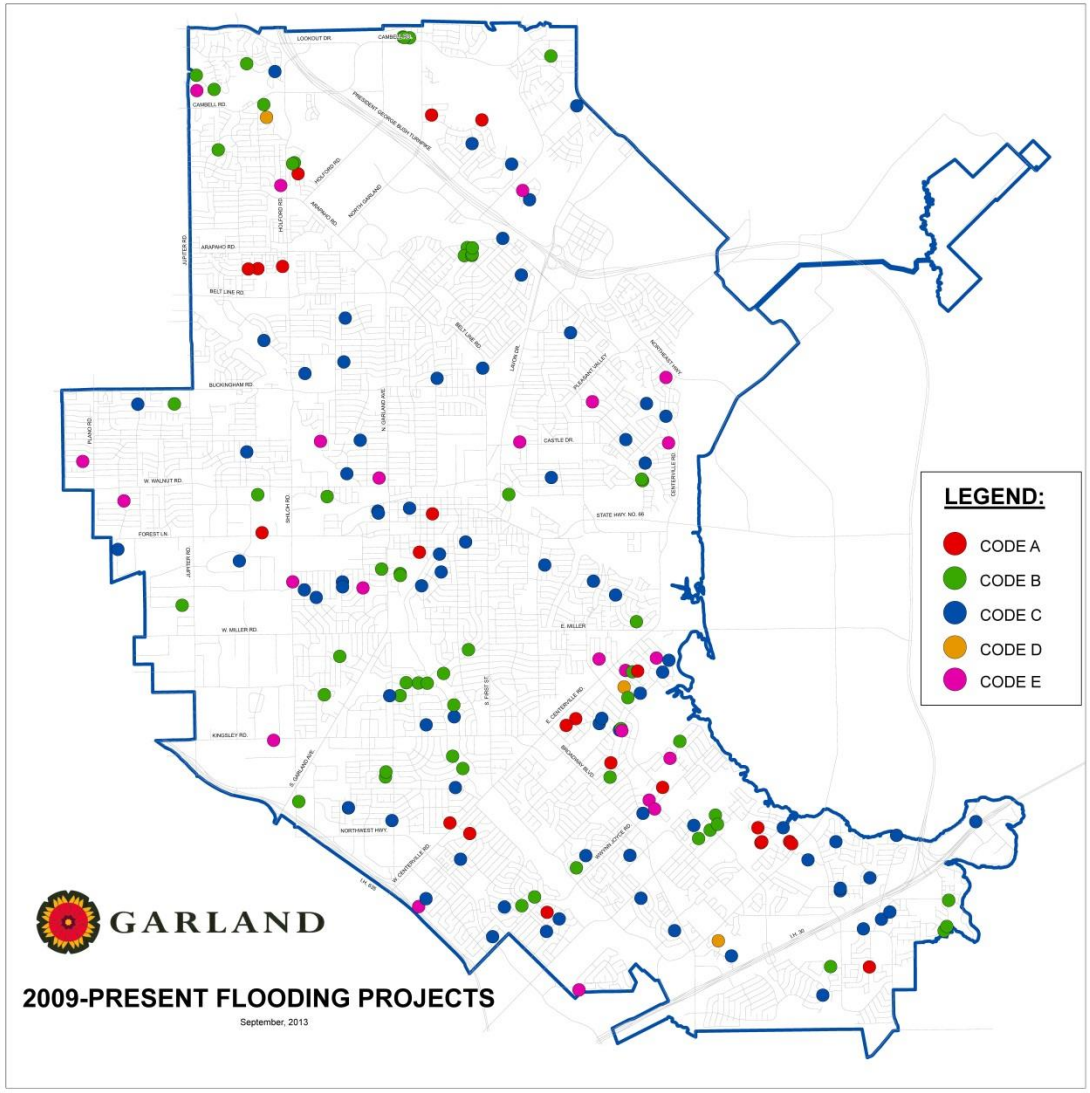
Address PO Box 469002 City Garland State TX ZIP Code 75046-9002

Signature Date 2/18/2015 Telephone (972) 205-3620

STATE OF TEXAS ROBERT LYLE JENKINS 89022 LICENSED PROFESSIONAL ENGINEER

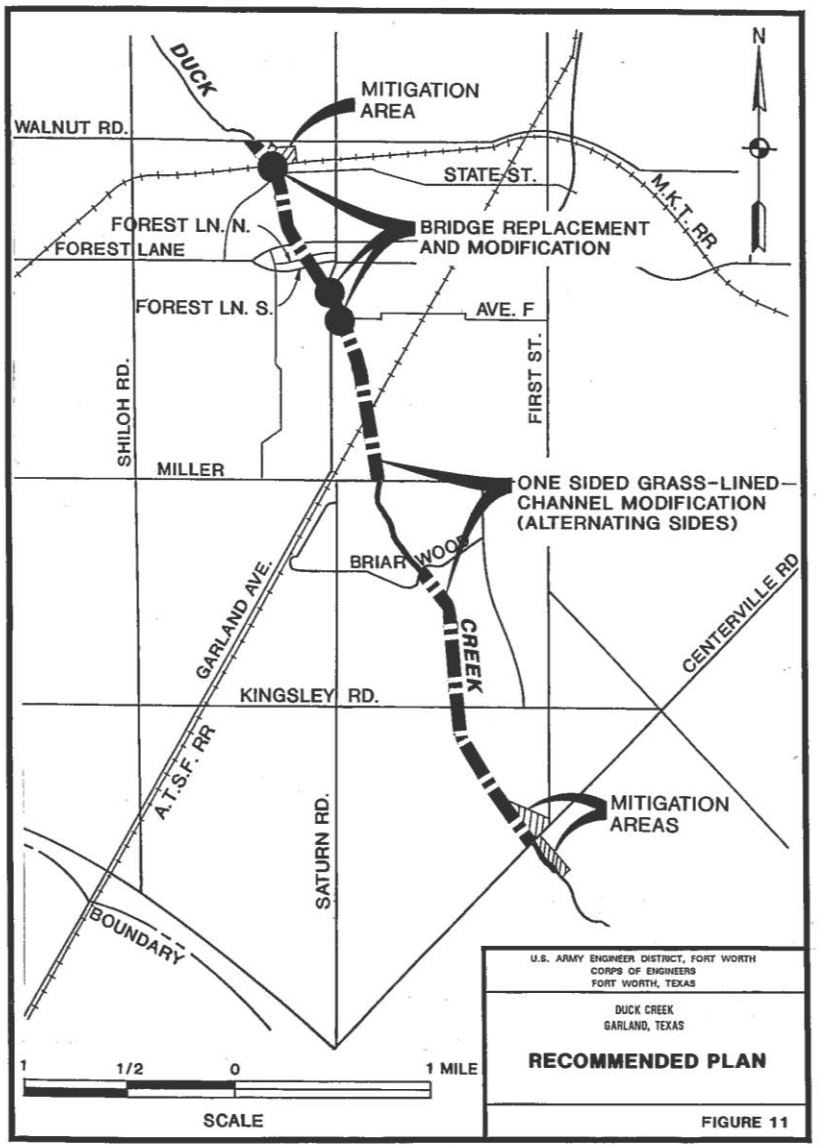
FEMA Form 086-0-33 (7/12) See reverse side for continuation. Replaces all previous editions.

Flooding/Erosion Reduction Projects



Duck Creek Channelization (1994-2001)

- Project length approx. 15,400 lf
- Done in cooperation with USACOE, including all required permits
- In response to multiple damaging floods in 1980s and 1990s, especially 1990-1991
- Project components finalized 1994, construction completed 2001
- Approximate project cost $4,000,000 (1997 dollars)
- Project maintained by Garland Street Department
- Annual inspections by City and Corps staff



Duck Creek Channelization (1994-2001)

Channel widening at multiple locations along project Length

(Pictured: Duck Creek at confluence with Keen Branch, looking upstream towards State Street)

Duck Creek Channelization (1994-2001)

Bridge/structural replacement/modifications (3 locations)

(Pictured: Duck Creek looking upstream towards Avenue “F”)

Duck Creek Channelization (1994-2001)

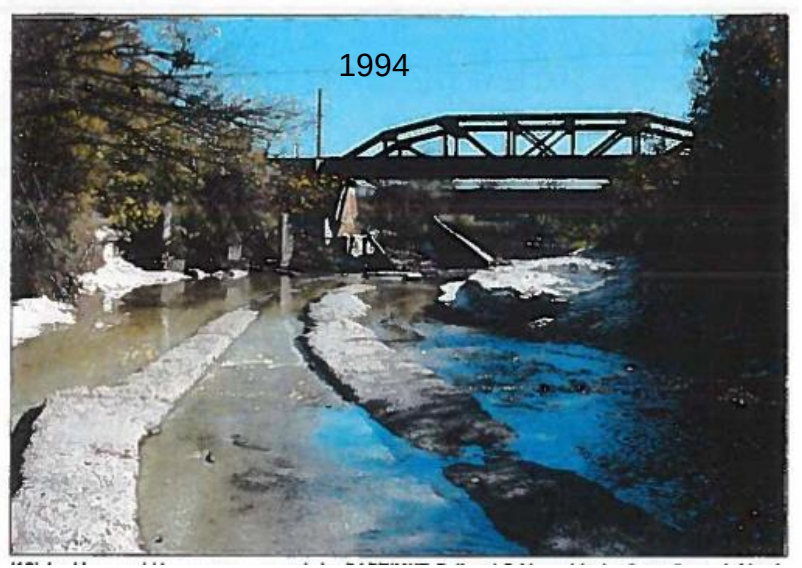
Project included 3 vegetation mitigation areas

(Pictured: Mitigation area along east bank of Duck Creek, just upstream of Centerville Road)

Duck Creek Channelization (1994-2001)

New infrastructure in the project limits must not increase flooding levels

(Pictured: Duck Creek looking south towards State St. and MKT RR bridge, new Dallas Area Rapid Transit bridge installed upstream of MKT bridge since 1994 report – also note creek widening to right/west)



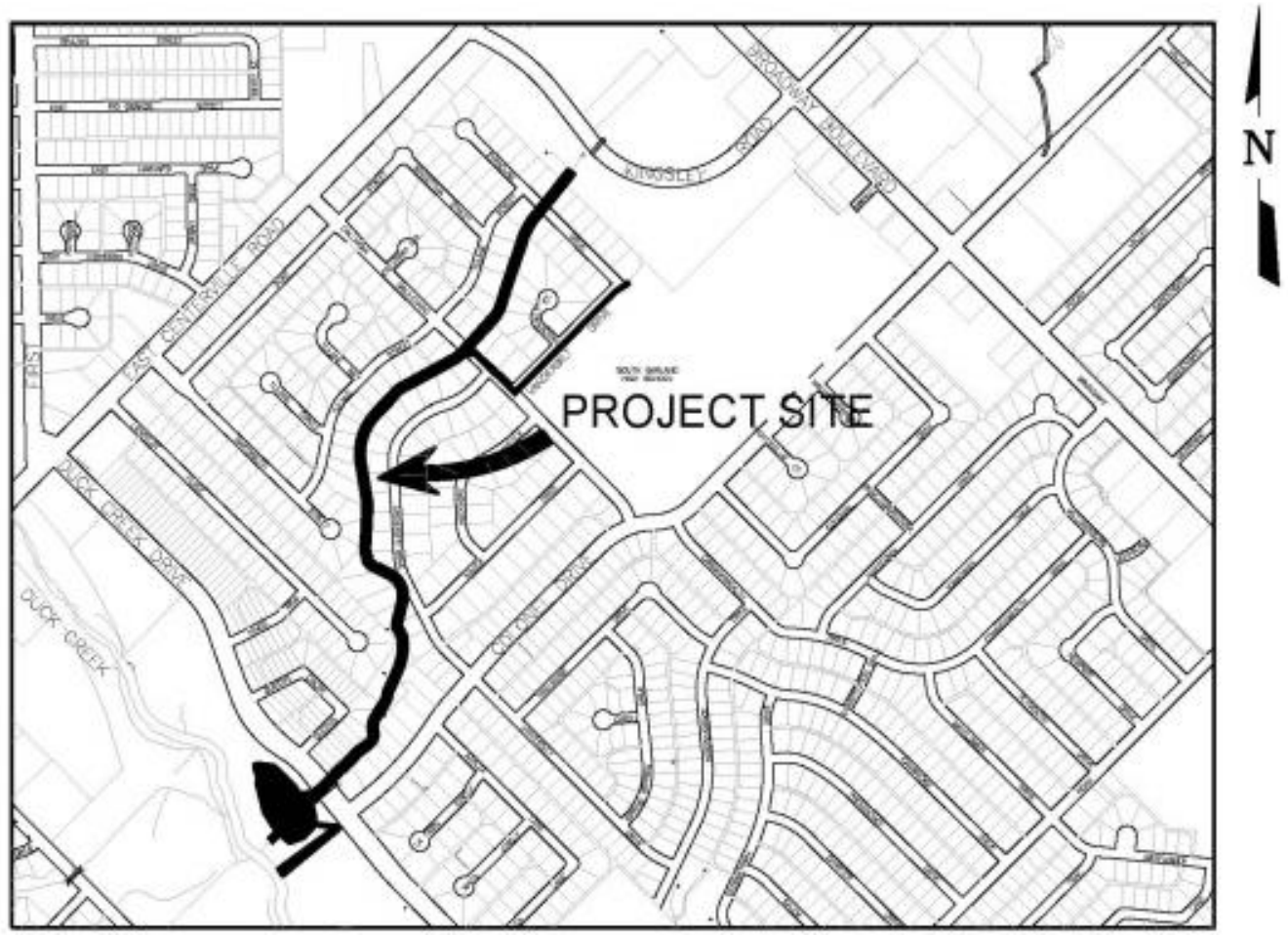
Duck Creek Channelization (1994-2001)

Benefits of the project since completion:

- 5 FIRM panels in Garland revised by FEMA effective 2-5-2003 to reflect this project (later included in 7-7-2014 revision)
- 100-year flood levels reduced by 1 to 3 feet along Duck Creek
- Flood levels reduced for approx. 300 residences along Duck Creek
- Approx. 40 homes removed from SFHA altogether
- 51 Repetitive Loss properties along Duck Creek before construction
- All had flood insurance claims in 1990-91
- Only 8 RL properties have had any flood insurance claims since 2001
- Large storm events occurred in 2006, 2007, 2010, 2012 (2006 storm approached 100-year levels in lower reaches of Duck Creek)
- City working to remove properties from RL list
- Reductions in channel erosion and flood velocity

Duck Creek south of Avenue F, September 10, 2007 (10-year storm)

University Channel (2008-2010)



VICINITY MAP

NOT TO SCALE

University Channel (2008-2010)

- Project length approx. 3,700 ft.
- 61 Residential properties along channel
- Most homes constructed in the 1960’s
- Significant channel erosion over the years
- Erosion damage to many properties
- Standing water problems
- General eyesore
- Near-vertical channel slopes in some areas
- Narrow channel, limited working room
- Some homes impacted by 100-year floodplain

University Channel (2008-2010)

- Permit obtained for self-mitigating project under USACOE Nationwide Permit 27
- Minimized intrusion on existing properties, and restored property back to owners
- Reduced 100-year floodplain levels
- Used native plantings whenever possible
- Avoided necessity of City buyouts
- Construction Cost $6.5 million

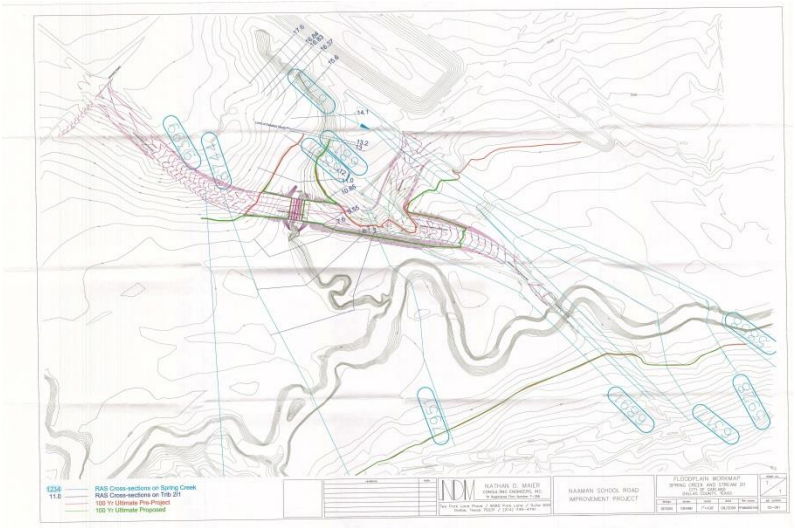
University Channel (2008-2010)

2011 Texas Council of Engineering Companies Engineering Excellence Gold Medal Award Winner (Water Resources)

Naaman Forest Boulevard CIP

- Road reconstruction to alleviate an area of frequent roadway flooding in addition to improving traffic flow in northern Garland
- Consideration given to SFHA mitigation for all CIP projects, where applicable

Naaman Forest Boulevard CIP



- Project designed to have no adverse impact (no rise) in 100-year flooding levels
- LOMR application completed and approved by FEMA
- Significant increase in safety for the public on major travel route in northern Garland

Federal Emergency Management Agency
Washington, D.C. 20472

July 31, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Douglas Athas
Mayor, City of Garland
200 North 5th Street
Garland, TX 75040

IN REPLY REFER TO:
Case No.: 13-06-4550P
Community Name: City of Garland, TX
Community No.: 485471
Effective Date of
This Revision: **December 12, 2014**

Dear Mayor Athas:

The Flood Insurance Study Report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed that provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denton, Texas, at (940) 898-5127, or the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our Web site at http://www.fema.gov/business/nfip.

Sincerely,

Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: Mr. Robert Jenkins, PE, CFM
Drainage/Development Engineer, City of Garland

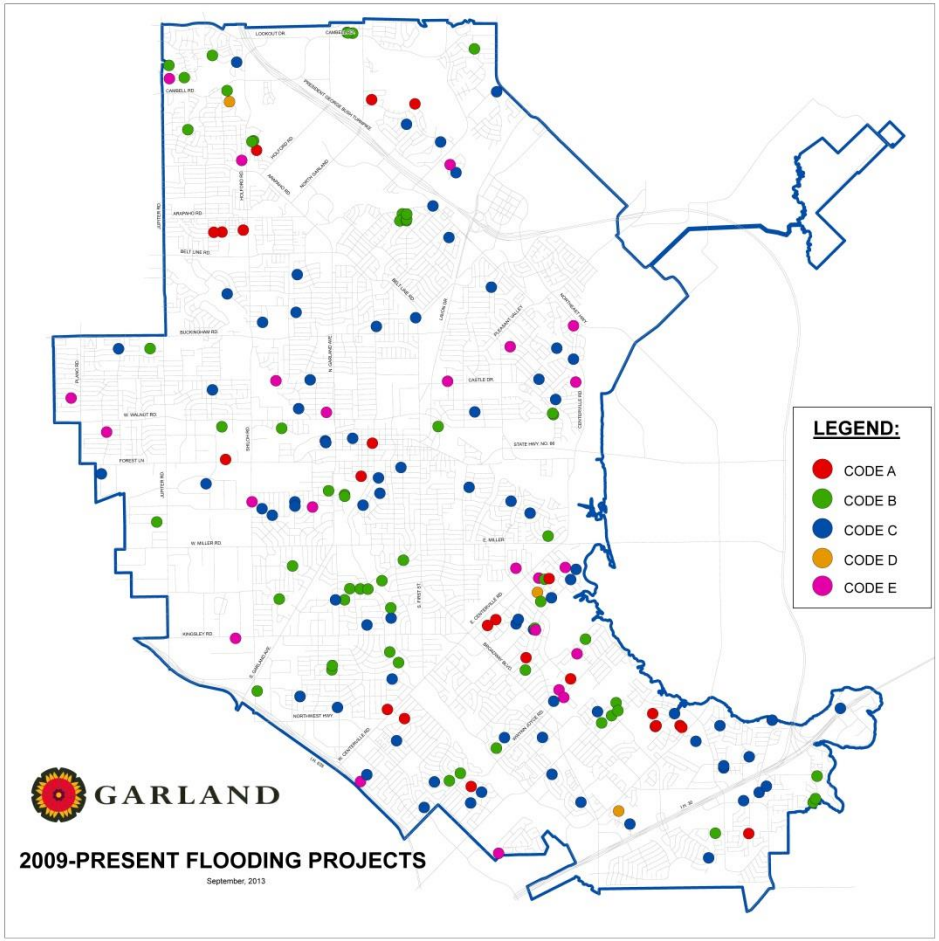
Mr. Mark Roberts, PE, CFM
Project Engineer, Nathan D. Maier Consulting Engineers, Inc.

Other local flooding/erosion projects

Garland maintains database of current and historic local flooding/erosion issues and projects

- Database currently has almost 1500 entries from 1979 to present day, separated into 5 categories:

- Code A: Flooding of building (non-floodplain)
- Code B: Streambank erosion
- Code C: Standing water/other minor flooding issues
- Code D: Flooding of building (floodplain)
- Code E: Groundwater



Code A

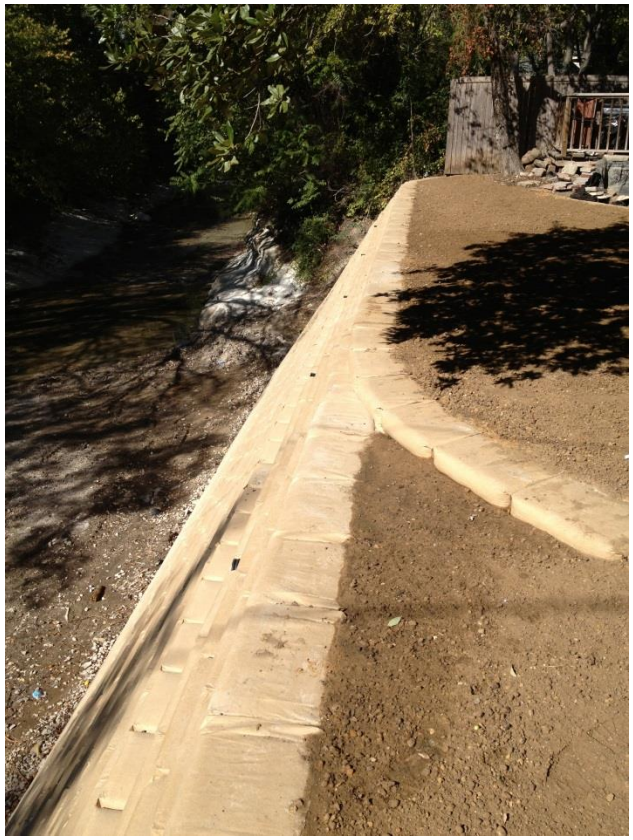
Flooding in a home or business from sources other than streams

- Blocked drainage channels
- Inadequate/undersized storm sewer
- Grading work on adjacent private property
- Soil settlement causing poorly drained areas
- Poorly maintained private drainage infrastructure
- Pavement settlement/failure in alleys causing storm runoff to flow into private driveways
- Soil settlement/vehicle traffic in older unpaved alleys can cause runoff to enter private property

When issues are related to City-maintained facilities, an appropriate repair is selected, designed, and constructed

- Street Department has a dedicated Stormwater crew tasked with maintaining storm sewer facilities, removing blockages, regrading unpaved alleys, etc.
- Localized channel improvements and new storm sewer installation designed and constructed as needed
- Paved alley reconstruction where necessary
- Dedicated Capital Improvement Projects where needed for larger problem areas
- Storm sewer upgrades designed and constructed in conjunction with new Capital Improvement Projects wherever possible, even if no complaints received

Code B



Streambank erosion causes damage to private property and can threaten structures

City of Garland has term contract in place for erosion protection improvements on private property

- City shares cost of design and construction (50% residential, 33% non-residential)
- Owner can finance out their portion of cost over 3-years if desired
- All walls 4 feet or more in height are designed by a PE and approved by City
- City takes on permanent maintenance responsibility after completion

Code C

- Minor standing water issues, usually in streets and alleys, no threat to private property
- Usually caused by pavement settlement due to soil consolidation
- Most of these issues can be easily corrected by “mud-jacking” or patching
- Some more severe locations may require sections of street or alley replacement

Code D

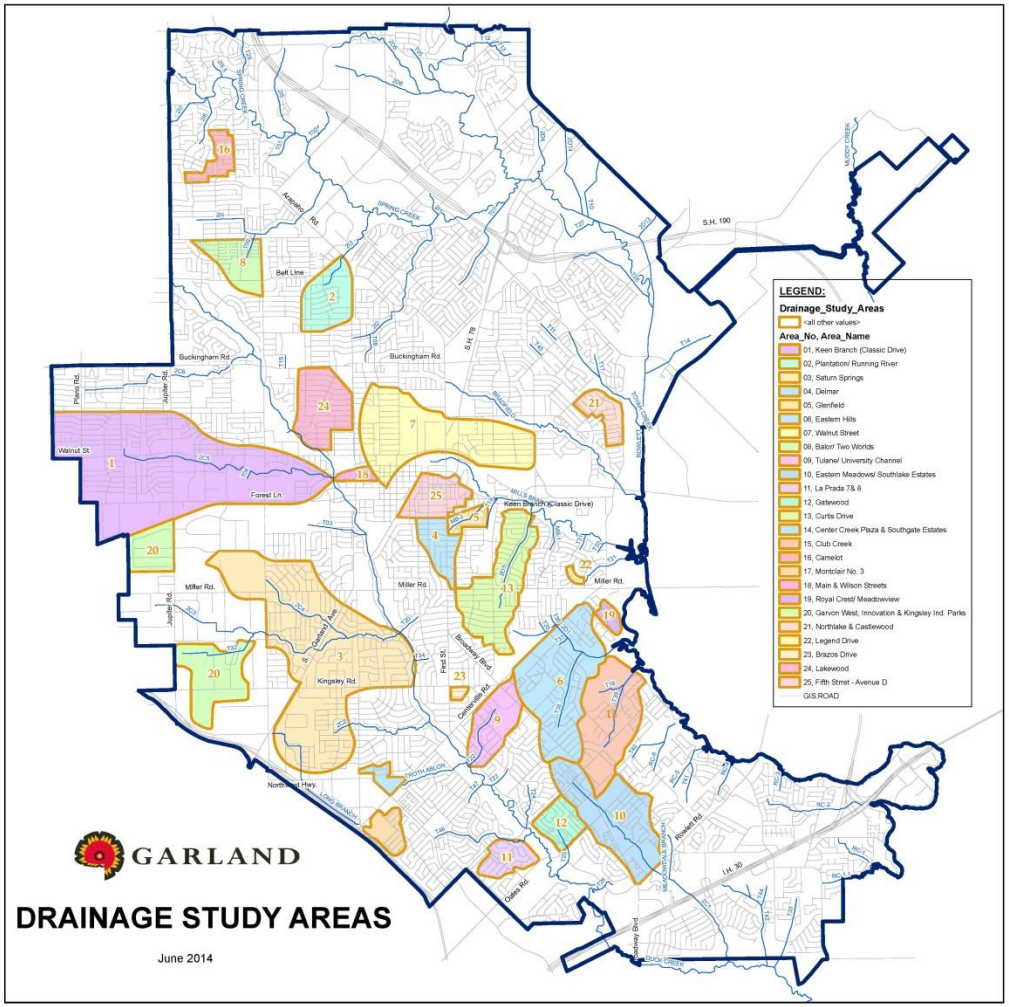
- Flooding along streams (including non-FEMA regulated streams with small drainage basins
- Mostly along Duck Creek and tributaries
- Many Code D issues were resolved by Corps of Engineers project discussed previously
- Known locations of potential street floodplain monitored and closed where necessary during flood events
- Turn Around, Don't Drown!

Code E

- Minor groundwater issues have occurred throughout the City over the years
- No significant amount of water standing in streets or alleys
- Private property issue
- Often can be resolved by private installation of a french drain or other similar method to collect groundwater and convey it to storm drain

Garland Systematic Storm Sewer Study

- City contracted with Freese & Nichols to analyze areas of old/inadequate storm sewer
- Initial study completed in 2001
- New areas added as needed
- Study looked at both pipes and drainage channels
- Full hydraulic analysis of each system in identified study areas
- Deficient areas identified and improvements recommended, including cost estimates
- Study was pro-active, not limited to locations where complaints have been received
- Improvements are being constructed on an ongoing basis, usually in conjunction with street repair or Capital Improvement Projects
- Some larger improvements are being constructed as separate CIP's



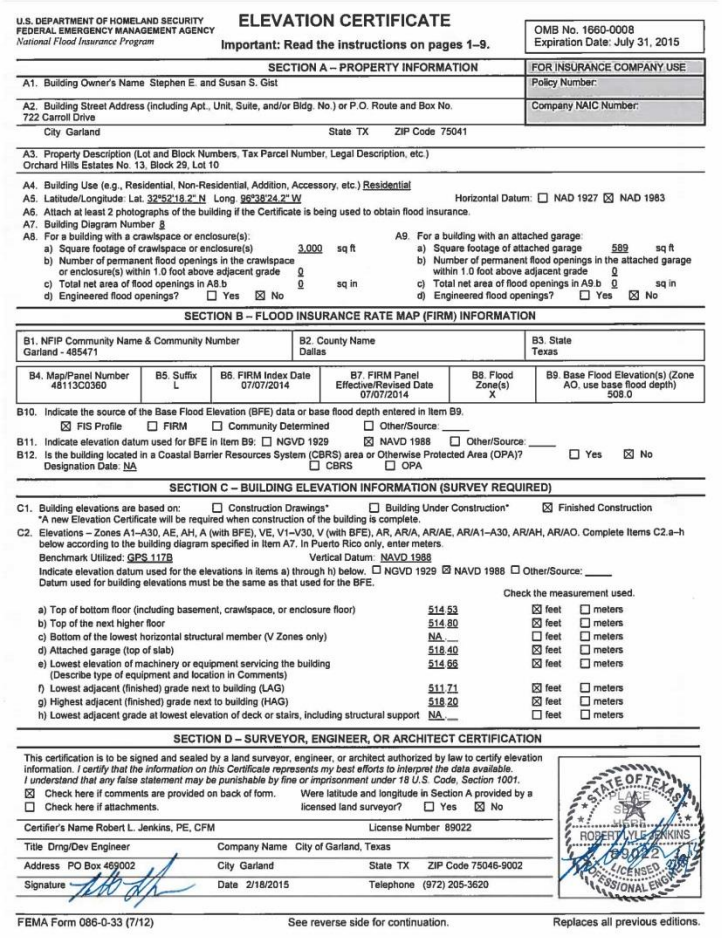
Garland Flood Damage Prevention Ordinance/CRS Program

- Based on FEMA Model Ordinance for the requirements in 44 CFS 60.3 “c”
- Floodplain Development Permit required for all development within the SFHA
- 2-foot freeboard requirement for all new construction unless floodproofed
- No manufactured homes allowed in the SFHA
- Flood Study required for all development impacting 100-year floodplains, including non-SFHA areas
- LOMR/CLOMR/LOMR-F required for all new development in SFHA, depending on size of encroachment
- No rise allowed in 100-year floodplain as a result of development
- Fully-developed flows required to be used in the Rowlett and Spring Creek 100-year floodplains
- Additional requirements for Rowlett/Spring Creeks – no reduction in valley storage, restrictions on post-developed stream velocities (6 ft/sec max)
- Future increases to development standards (i.e., storm sewer design frequency)

- City is long-standing participant in CRS program
- Currently a Class 7 community
- Likely to go to Class 6 next reverification due to changes in CRS manual/additional credits for open space and other items
- Currently reviewing additional credit opportunities (i.e. Floodplain Information Committee per Activities 330/370)

Elevation Certificates

- City maintains database of Elevation Certificates back to the 1970's in PDF format (also LOMCs)
- Database includes all ECs done by the City as well as private surveyors/engineers (if known)
- Existing ECs/LOMCs available to the public at no charge
- Upon request, the City will do field work prior to a full EC to advise a property owner on probable results of an EC
- After field work, EC can be completed for a charge of $325
- ECs can generally be completed and returned to property owner in 2 weeks or less
- City also provides assistance in completing MT-1 forms for LOMAs where applicable
- City provides additional support if FEMA comments need to be addressed for LOMA applications
- City will also review/comment on private ECs, when requested



U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
National Flood Insurance Program

ELEVATION CERTIFICATE

Important: Read the instructions on pages 1–9.

OMB No. 1660-0008
Expiration Date: July 31, 2015

SECTION A – PROPERTY INFORMATION | FOR INSURANCE COMPANY USE

A1. Building Owner's Name Stephen E. and Susan S. Gist | Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 722 Carroll Drive | Company NAIC Number:
City Garland State TX ZIP Code 75041

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)
Orchard Hills Estates No. 13, Block 29, Lot 10

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) Residential
A5. Latitude/Longitude: Lat. 32°52'18.2" N Long. 96°38'24.2" W Horizontal Datum: ☐ NAD 1927 ☒ NAD 1983
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.
A7. Building Diagram Number 8
A8. For a building with a crawlspace or enclosure(s):
a) Square footage of crawlspace or enclosure(s) 3,000 sq ft
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade 0
c) Total net area of flood openings in A8.b 0 sq in
d) Engineered flood openings? ☐ Yes ☒ No
A9. For a building with an attached garage:
a) Square footage of attached garage 589 sq ft
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade 0
c) Total net area of flood openings in A9.b 0 sq in
d) Engineered flood openings? ☐ Yes ☒ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State
Garland - 485471	Dallas	Texas

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use base flood depth)
48113C0360	L	07/07/2014	07/07/2014	X	508.0

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.
☒ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: ____
B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: ____
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No
Designation Date: NA ☐ CBRS ☐ OPA

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☒ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.
C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.
Benchmark Utilized: GPS 117B Vertical Datum: NAVD 1988
Indicate elevation datum used for the elevations in items a) through h) below. ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: ____
Datum used for building elevations must be the same as that used for the BFE.

		Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	514.53	☒ feet	☐ meters
b) Top of the next higher floor	514.80	☒ feet	☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only)	NA	☐ feet	☐ meters
d) Attached garage (top of slab)	518.40	☒ feet	☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	514.66	☒ feet	☐ meters
f) Lowest adjacent (finished) grade next to building (LAG)	511.71	☒ feet	☐ meters
g) Highest adjacent (finished) grade next to building (HAG)	518.20	☒ feet	☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	NA	☐ feet	☐ meters

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*
☒ Check here if comments are provided on back of form. Were latitude and longitude in Section A provided by a licensed land surveyor? ☐ Yes ☒ No
☐ Check here if attachments.

Certifier's Name Robert L. Jenkins, PE, CFM License Number 89022
Title Drng/Dev Engineer Company Name City of Garland, Texas
Address PO Box 469002 City Garland State TX ZIP Code 75046-9002
Signature Date 2/18/2015 Telephone (972) 205-3620

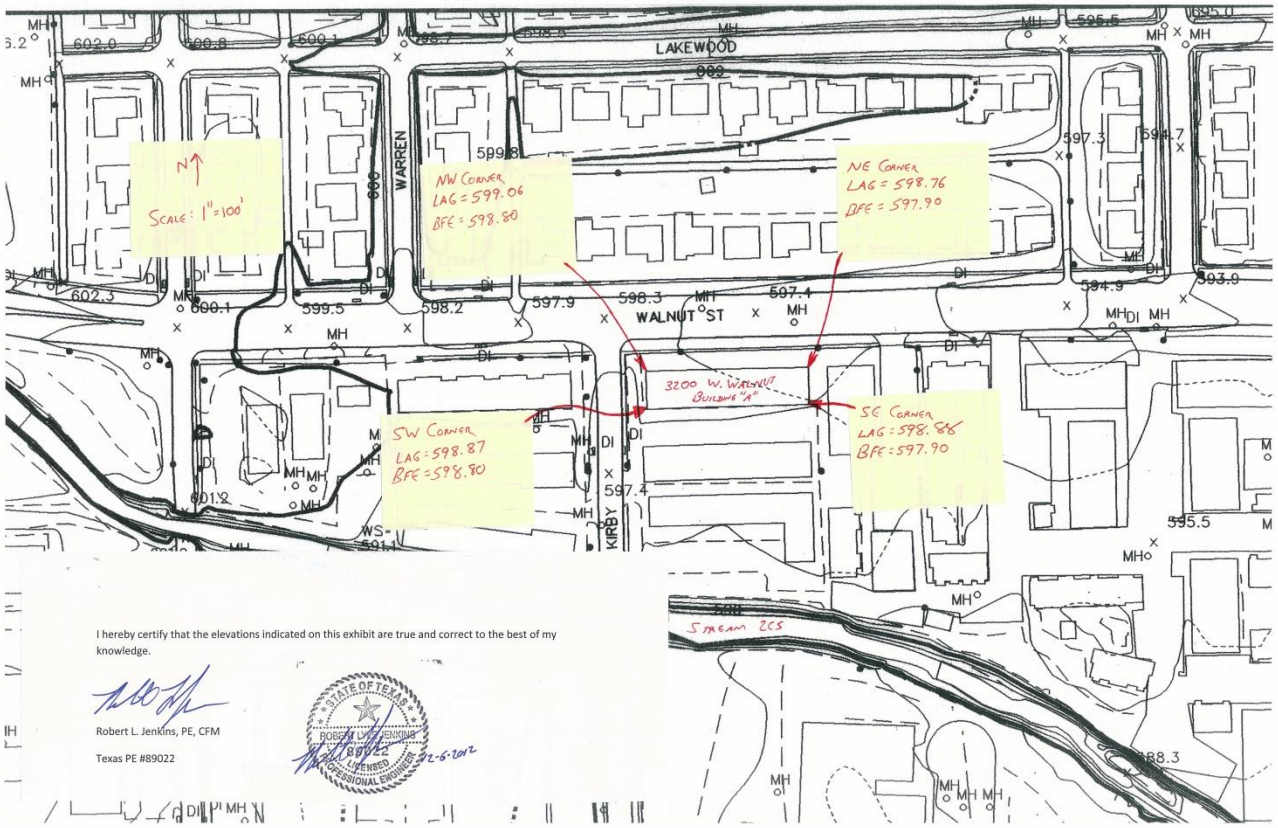
STATE OF TEXAS ROBERT LYLE JENKINS 89022 LICENSED PROFESSIONAL ENGINEER

FEMA Form 086-0-33 (7/12) See reverse side for continuation. Replaces all previous editions.

Letters of Map Amendment

- As mentioned previously, the City of Garland assists property owners in the preparation and submission of LOMA applications to FEMA for review
- Most of them and reviewed and approved with no additional data required
- Occasionally, additional data is needed

- Sometimes LAG appears to be below BFE
- Detailed inspection shows that BFE does not touch building
- Submission of detailed planimetric data to FEMA allows for LOMA to be issued



Unusual Cases

- Incorrect third-party map company reading of flood elevation (computer program)
- Aerial view of commercial building confuses reviewer
- Attached AC machinery a significant distance away from building

- Should a database of unusual situations/resolutions be established?

Thoughts?

Contact Information:
R. Lyle Jenkins, PE, CFM
City of Garland, Texas
(972) 205-3620
ljenkins@garlandtx.gov