# Repetitive Loss Area # 34

## East Branch of Joe Creek
## E. 26th St. & S. Yale Ave. Area

August 17, 2017

Flanagan & Associates, LLC
Planning Consultants

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Engineering Services

CITY OF Tulsa
A New Kind of Energy

**Planning and Coordination**
**ENGINEERING SERVICES DEPARTMENT**

August 17, 2017

Dear Resident/Property Owner:

Once considered the most flood-prone city in America, Tulsa has worked hard to reduce or eliminate flooding of its homes and neighborhoods. The City joined the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) in 1974 and through decades of effort is now recognized as a national leader in flood hazard mitigation. As a result, property owners in Tulsa receive as much as 40% discount on their flood insurance.

A key component of the NFIP has been its focus on Repetitive Loss Properties, which make up only 1 percent of insured properties, but account for over 30 percent of flood insurance claims payments. A Repetitive Loss Property is defined by FEMA as any property that has been paid two or more flood insurance claims of $1,000 or more in a 10-year time period.

The NFIP recently expanded its flood hazard mitigation program to include the identification of "Repetitive Loss Areas" (RLA)—those properties near an existing Repetitive Loss Property that may be subject to the same general flooding conditions. In most instances, 95% of the properties in an RLA will never have experienced flooding—especially if the cause of damage is shallow, overland flow due to local drainage conditions. Once the City has identified an RLA, we are required to contact the owners and residents of the area and, work together to develop a plan to reduce or eliminate flooding in the neighborhood.

Your property has been identified as being in an Repetitive Loss Area. We want to re-emphasize that this does not mean your property has flooded or is even likely to flood—only that it is in the same area, and in a similar geographical situation, as an existing Repetitive Loss Property.

You can protect your property from flooding. We would like to invite you to participate in our flood prevention and mitigation efforts for your neighborhood. We need your input. What can we do, working together, to eliminate potential flood losses in your area? We look forward to hearing from you.

To learn more about your risk of flooding visit www.floodsmart.gov or contact the City of Tulsa Customer Care Center at (918) 596-7777.

Sincerely,
**CITY OF TULSA, ENGINEERING SERVICES**

Bill Robison

Bill Robison, P.E., CFM
Senior Special Projects Engineer
Stormwater Project Coordination

# Contents

# Acknowledgements

The City of Tulsa Repetitive Loss Area Analysis Plans were developed by Engineering Services with local funding from the City of Tulsa in compliance with the Federal Emergency Management Agency's Community Rating System's requirements. Numerous agencies, departments, organizations and individuals participated in these studies, including:

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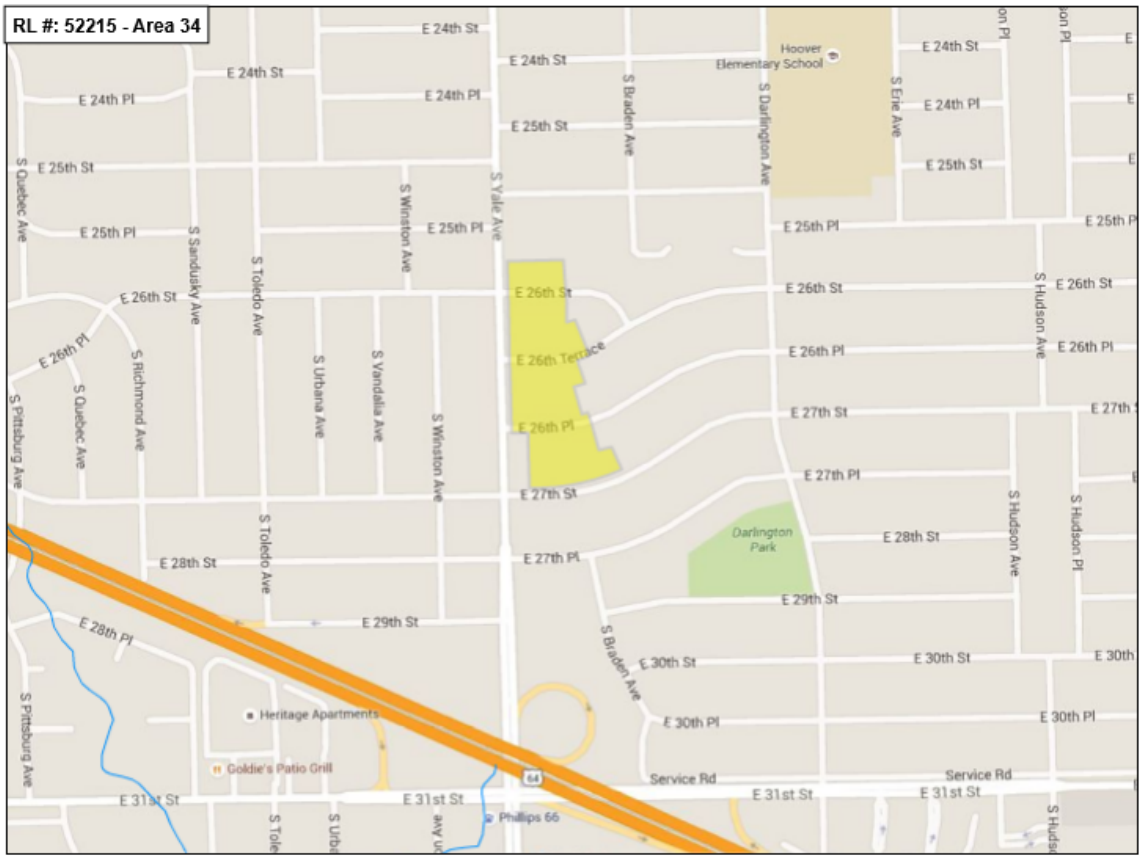
# Repetitive Loss Area # 34

## East Branch of Joe Creek
## E. 26th St. & S. Yale Ave. Area

**Overview**

Repetitive Loss Area (RLA) #34 is located on Tributary ELB.3 of the East Branch of Joe Creek, along the east side of S. Yale Ave., from about E. 26th St. south to E. 27th St. The RLA is 6.5 miles above where the creek joins the Arkansas River. There are 35 properties in the RLA, including one Repetitive Loss Property. The 35 structures are single-family residences in the Lortondale Addition built largely between 1954 and 1956, with one final home constructed in 1960. The residences are one-story, mid-century modern ranch-style structures with slab-on-grade foundations. Eighteen of the properties are within or touched by a zone of shallow flooding, according to the City's Regulatory Floodplain (which is only delineated north to E. 26th Terrace). Between 1979 and 1984 overland flow resulted in 13 flood damage claims (12 of which were paid) from ten properties totaling $166,438. The paid claims averaged about $14,000 and ranged from a low of $659 to a high of $29,523. There has been no flooding in this stretch of Joe Creek since




**RLA #34 is located in the East Branch of the Upper Joe Creek drainage on the east side of S. Yale Ave. from E. 26th St. in the north to E. 27th St. in the south.**

channel modifications and storm sewer enlargements were completed on Joe Creek by the City of Tulsa and the US Army Corps of Engineers in the 1980s and 1990s.

The general location of RLA #34 is shown on the map above and on the more detailed photo/topography map on page 5. The detailed map identifies properties, County Assessor parcels, floodplains, and the existing storm sewer system.

## I. Background

During the post-World War building boom of the 1950s and 1960s, Tulsa expanded rapidly east and south into the basins of Mingo and Joe creeks. Because of the city's climate and the broad floodplains along these creeks this growth brought with it an increased risk of flooding. And indeed, by the mid-1980s floods were occurring almost yearly and flooding had become Tulsa's most destructive natural hazard. One researcher at the time declared Tulsa "the most flood-prone community in the nation."

Tulsa was not unique in its rapid post-war development and attendant risks. Cities across America were experiencing similar problems as they spread out into prosperous subdivisions. In response, the U.S. Congress created the National Flood Insurance Program (NFIP) in 1968 to help property owners protect themselves from flood losses. The NFIP offered flood insurance to homeowners, renters, and business owners if their community participated in the NFIP and agreed to adopt and enforce ordinances that met or exceeded FEMA requirements to reduce the risk of flooding.

Tulsa joined the NFIP in 1974, and through great effort and considerable expense has significantly reduced its exposure to flooding. As a result, Tulsa has been awarded a Class II rating in the NFIP's Community Rating System (CRS), which grants its residents a 40 percent discount on the cost of flood insurance for structures in the Special Flood Hazard Area (SFHA), also known as the 1% or 100-year floodplain. Since the Biggert-Waters Flood Insurance Reform Act of 2012, many properties have seen a substantial increase in their premiums, making this discount even more important.

For its part, the NFIP is continually faced with the job of paying claims while trying to keep the price of flood insurance at an affordable level. Properties that flood repeatedly—known as "Repetitive Loss Properties," have been a particular problem for the program: Although they make up only 1 percent of insured properties, they account for one-third of all claims payments (about $200 million a year, or $4.5 billion to date). A Repetitive Loss Property is defined by FEMA as any property that has been paid two or more flood insurance claims of $1,000 or more in a 10-year time period.

Consequently, one of the requirements of the CRS is that communities identify all Repetitive Loss Properties in their jurisdiction and work with the owners to find ways to reduce or eliminate future flood damage. This initiative has been very successful in reducing flood losses and claims.

FEMA has recently extended its repetitive loss program to include "Repetitive Loss Areas" (RLA). To maintain a Class II rating in the CRS, Tulsa is now required to analyze the area surrounding each of its Repetitive Loss Properties and identify any neighboring properties (including uninsured ones) that may be subject to the same general flooding conditions. This group of nearby properties is then designated as an RLA. The City is required to contact the owners of the properties in all its RLAs, inform them that they are

located in an area subject to flooding, and develop a plan for mitigating or eliminating flooding in the area, much as is being done for the individual Repetitive Loss Properties.

It is important to note that most of the homes in a Repetitive Loss Area—perhaps as many as 80% or 90%—may not have experienced flooding of any kind. What they have in common is being subject to the same general geographical and flood conditions as the nearby repetitive loss property. It should also be stressed that the flooding events in question may have had little or nothing to do with overflow from a creek, but may have been the result of storm sewer backup or overland flow from a neighbor's property into a low-lying, slab-on-grade home or garage.

## II. Location

Joe Creek is about 6.5 miles in length and drains an area of 13.7 sq. miles in southeast Tulsa. The creek has several tributary branches (East and West Joe Creek, Little Joe and South Joe) that converge near E. 53rd and S. Evanston Ave., at Manion Park, just north of Eisenhower International School, to form lower Joe Creek mainstem. The mainstem and its tributaries have been channelized through much of their lengths.

Upper Joe Creek has two branches: West Branch and East Branch. The West Branch rises near E. 23rd St. and S. Oswego Ave. and flows south for about 3 miles to join the East Branch at Skelly Dr. and I-44, and then the mainstem at Manion Park. Almost all of the West Branch is underground. The creek surfaces at E. 28th St. and S. Florence Ave. as the source of Lakewood Lake, and again briefly between E. 33rd and E. 36th St. before returning underground until it surfaces between E. 49th St. and Skelly Dr. to finally merge with the East Branch under I-44, just west of Harvard Ave.

The East Branch of Joe Creek has its origins in several tributary streams that flow for about 3 miles south southwest from high ground along the Broken Arrow Expressway—beginning near E. 25th and S. Quebec Ave., at E. 26th and S. Yale Ave., at E. 32nd and S. Darlington, and at 38th and S. Hudson Ave. These tributaries flow underground in storm sewers for most of their lengths, to occasionally emerge as small neighborhood amenity streams or lakes, such as Mockingbird Lake near E. 36th and S. Yale Ave., and the creek and small lake on the grounds of Methodist Manor between E. 31st and 33rd and S. Sandusky Ave. The East Branch emerges fully from underground near 46th Pl. and S. Louisville Ave., where it is channelized until its junction with the West Branch under Skelly Dr. and I-44.

RLA #34 is situated at the beginnings of Tributary ELB.3 of the East Branch, on the east side of Yale Ave., between E. 26th St. and E. 27th St. There are 35 properties in the RLA, all of them in the Lortondale Addition. The houses sit astride what was once a shallow ravine that drained to the south southwest, towards the intersection of S. Yale Ave. and E. 31st St. The properties vary in elevation from 760 ft. to 740 ft., from north to south. The development of Lortondale generally filled in this shallow swale and routed runoff through a storm sewer system which proved to be inadequate during times of extremely heavy rainfall, as on May 27, 1984.

## III. History

### *Development*

As stated above, the properties of RLA #34 are in the Lortondale Addition, developed between 1954 and 1956, with one final residence added in 1960. The structures are all one-story, mid-century modern, ranch-style homes. The objective of the developers was to provide upscale, reasonably priced, modernistic homes for veterans returning from World War II. The neighborhood has a distinctive, coherent appearance and has been nominated for inclusion as a Historic District in the National Register of Historic Places.

**Lortondale Addition is unique in being comprised entirely of mid-century modern, ranch-style homes.**

### *Flooding*

There was significant flooding on Joe Creek in October 1959, May 10-11, 1970 (Mothers Day flood), June 7-9, 1974, May 31, 1976 (Memorial Day flood), June 21, 1979, June 17, 1980, May 27, 1984 (another Memorial Day flood), August 11, 1992, May 7, 1993, July 1994, May 6, 2000, May 8, 2007, and May 20, 2010. According to newspaper reports, flooding was particularly bad on Joe Creek in 1974, 1976 and 1984, although not necessarily along this reach. The storms that resulted in the 12 paid damage claims in RLA #34 totaling $166,438 occurred in 1979, 1983 and 1984.

The greatest contribution to flooding in RLA #34 are undersized storm sewers and overland flow. During exceptionally heavy downpours, such as the 300-year rainfall event in May 1984 when 9-12 inches of rain fell in three hours, storm sewers become overwhelmed and overland flow inundates streets and any low-lying properties along the swales that generally follow the alignment of the original creek bed.

### *Improvements*

Improvements to the Joe Creek channel by the City and the US Army Corps of Engineers in the 1970s and 1980s channelized a good deal of Joe Creek and its tributaries and installed parallel storm sewers along much of Joe Creek's East and West Branches. In the 1990s the City enlarged the storm sewer system in the Joe Creek drainage to solve chronic backup problems at numerous locations, and through much of the East Branch, including Lortondale and the box culverts under the Skelly Bypass. The expansion of I-44 in 2010-2012 further increased drainage beneath the I-44. These improvements have virtually eliminated flooding in RLA #34, as evidenced by there having been no flood damage claims in the immediate area since 1984. It must be mentioned, however, as stated in the *Master Drainage Plan* for the East and West Branches of Joe Creek (W.R.

Holway and Associates, 1989), 300-year storms, such as on May 27, 1984, will continue to cause overland flow flooding in this reach of the creek, despite recent improvements.

## IV. Research and Analysis

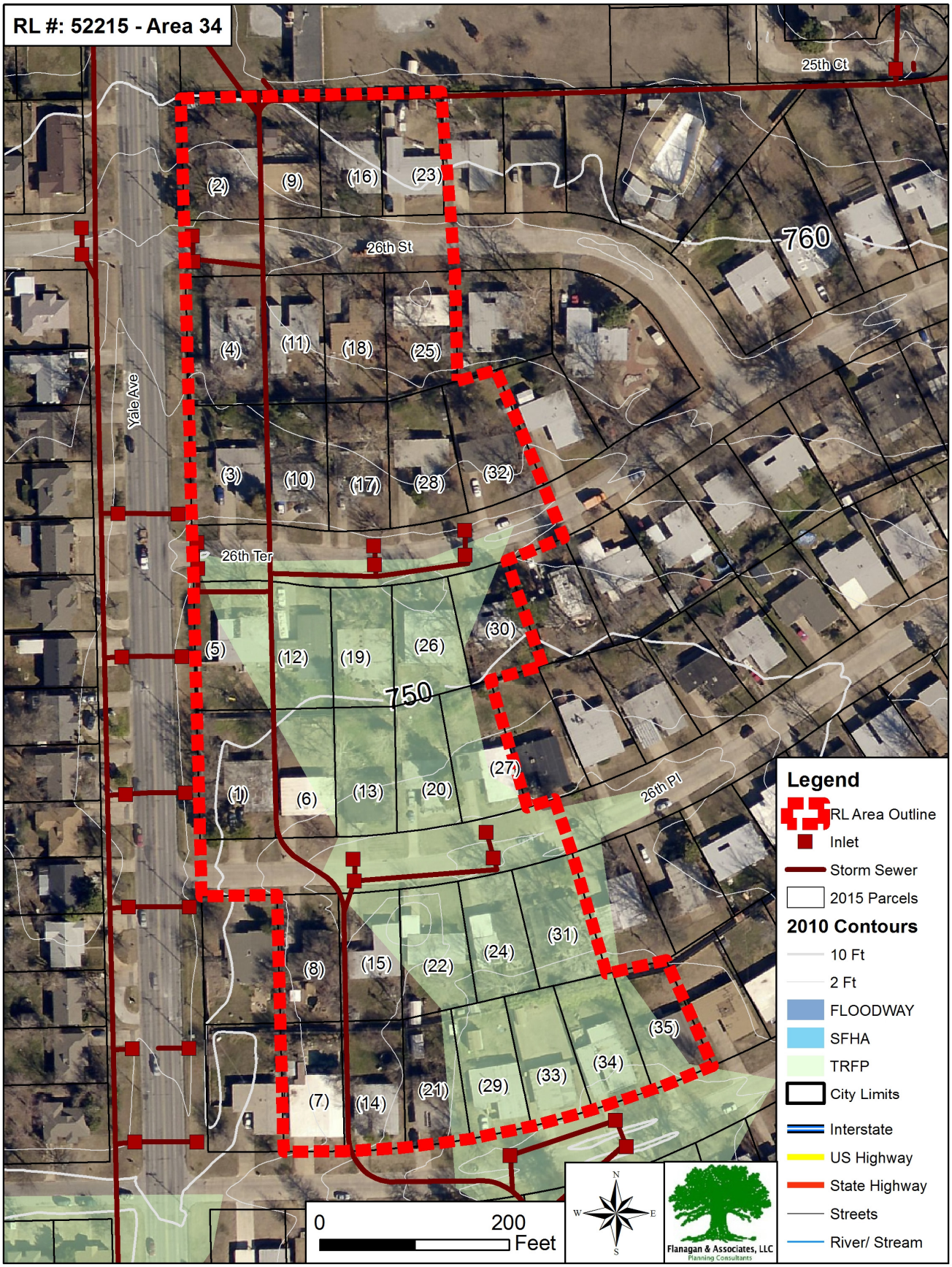
The analysis of Repetitive Loss Area #34 was conducted by the Project Team through interviews with City officials, research into Engineering Services and Stormwater Drainage files, including the *Joe Creek Master Drainage Plan*, review of the City's extensive flood history documentation, assessment of insurance claims, field trips to the RLA, interviews with home owners, and questionnaires mailed to owners and residents soliciting information about prior and existing flooding issues, if any.

### *Agencies and Organizations*

The City of Tulsa's Storm Drainage & Hazard Mitigation Advisory Board (SDHMAB), which also serves as the City's Hazard Mitigation and CRS Committee, and the CRS Public Participation Involvement & Information Committee (PPI) met monthly during the two-year Repetitive Loss Area Planning process. Each committee was updated on the status of the planning process, discussed issues, and provided guidance. Research and analysis were done in accordance with guidelines from the Federal Emergency Management Agency (FEMA), the National Flood Insurance Program (NFIP) and the Community Rating System (CRS).

Local, State & Federal Agencies and non-profit organizations are represented on the PPI Committee. The RLA plans were discussed at the PPI Committee meetings, and other agencies such as TAEMA were contacted by phone or email. The RLA plans were presented to City Council for adoption; the agenda was made public and furnished to the media. The council meeting is a public meeting and the local media was present at the meeting. In addition the council meetings are aired on our local government network TV channel TGOV.

Participating agencies and organizations involved were: City of Tulsa (CoT) Storm Drainage & Hazard Mitigation Advisory Board, CRS PPI Committee, CoT Communications Department, CoT Development Services, Working in Neighborhoods, CoT Engineering Services, CoT Finance Department, CoT Legal Department, CoT Streets & Stormwater, CoT Water & Sewer Department, Child Care Resource Center, Indian Nations Council of Governments, Tulsa Area Emergency Management Agency (TAEMA), Disaster Resilience Network, Metropolitan Environmental Trust, Oklahoma Insurance Department, Tulsa Association of Realtors, U.S. Army Corps of Engineers.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SFHA
TRFP
City Limits
Interstate
US Highway
State Highway
Streets
River/ Stream

***Plans, Studies and Documents***

The following City of Tulsa and FEMA documents were used in the analysis:

- *Flood Insurance Rate Map*, City of Tulsa, October 16, 2012
- *Regulatory Floodplain Map Atlas*, Tulsa Engineering Services, October 2016
- *2014 City of Tulsa Hazard Mitigation Plan Update*, Flanagan & Assoc., 2014
- City of Tulsa *Stormwater Management Plan*
- Stormwater Design Criteria Manual: Critical Neighborhood Flood Control Projects
- Stormwater Capital Improvements List, City of Tulsa, Engineering Services
- *Joe Creek Flood Survey and Study*, Owen, Mansur & Steele, 1955
- *Joe Creek East and West Branches Master Drainage Plan, Interim Report*, W.R. Holway & Associates., March 1988
- *Joe Creek East and West Branches Master Drainage Plan, Final Report*, W.R. Holway and Associates, 1989.
- *Guidebook to Conducting Repetitive Loss Area Analyses*, UNO and FEMA

***Capital Improvements Plans***

City of Tulsa Capital Improvements are currently planned that could have a positive impact on the flooding problems in Repetitive Loss Area # 34. There are storm sewer improvement and regional detention facilities on the existing Master Drainage Plan and CIPs for the East Branch of Joe Creek. None are presently funded.

***Flood Insurance Data***

Two properties in the RLA currently carry flood insurance.

***Claims Data.***

Between 1979 and 1984 sewer backup and overland flow generated 13 damage claims from 10 properties, 12 of which were paid, for a total of $166,438. Of the paid claims, there were two in 1979, one in 1983 and nine in 1984. Although the causes of flooding in 1979 are somewhat obscure, the flooding of 1984 was due to a 300-year storm that dropped 13 inches of rain in six hours, causing widespread creek and street flooding throughout the city. Because the Privacy Act of 1974 (5 USC 522a) restricts the release of flood insurance policy and claims data to the public, no specific claim data are detailed in this Plan.

***Field Surveys and Site Visits***

Site visits were conducted during the study, primarily to confirm foundation type and view local on-site overland flow drainage patterns.

***Review Drainage Patterns.***

The Project Team examined aerial topography maps, master drainage plans, storm sewer plans, City Customer Care Center complaints and comments, and conducted field checks to determine area drainage patterns and identify flood problem areas. The results of the research and analysis are described in the following paragraphs and summarized in the table below.

### *Structures*

The Project Team has made numerous visits to RLA #34 to determine the situation and condition of the structures. On-site, visual analysis was verified by queries of Tulsa County Assessor data.

### *Structure Type.*

The structures in RLA #34 are all one-story, single-family residences.

### *Foundation Type.*

The types of foundations were determined by field investigation and query of Tulsa County Assessor records. All the residences are built on slab-on-grade foundations.

### *Condition of Structures.*

The condition of the structures in the RLA was determined by field investigation and a search of the County Assessor's records: all properties are in Good to Good+ condition. These findings are summarized in the following table.

**Properties in the RLA**

| Address | Year Built | Structure Type | Foundation Type | Condition |
|---|---|---|---|---|
| Property 1 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 2 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 3 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 4 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 5 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 6 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 7 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 8 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 9 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 10 | 1960 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 11 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 12 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 13 | 1956 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 14 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 15 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 16 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good + |
| Property 17 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 18 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 19 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 20 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 21 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 22 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 23 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 24 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 25 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 26 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 27 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |

| Address | Year Built | Structure Type | Foundation Type | Condition |
|---|---|---|---|---|
| Property 28 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 29 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 30 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good + |
| Property 31 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good + |
| Property 32 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 33 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 34 | 1955 | Residential Ranch 1 Story | Slab-on-Grade | Good |
| Property 35 | 1954 | Residential Ranch 1 Story | Slab-on-Grade | Good |

### *Notification*

**Annual Floodplain Notification.** Each year, in March, the City notifies all homeowners and residents living in a 100-year floodplain that their properties are subject to flooding and informs them of what steps they can take to protect their residences, businesses and families, including the purchase of flood insurance.

**Annual Repetitive Loss Area Notification.** Residents and property owners in Repetitive Loss Area #34 are notified annually that their properties are located in a Repetitive Loss Area, and are potentially subject to flood damage from overland flow and storm sewer back-up.

**Property Owners/Residents Notification.** Property owners and residents/occupants were advised of the Repetitive Loss Area study and analysis by letter, were sent a questionnaire soliciting information and input, and asked to contact the City for more information or a copy of the completed RLA Plan.

**Public Participation and Involvement.** City Staff/Consultants interviewed homeowners to brief them on the Repetitive Loss Area Analysis Study/Plan, receive their input, and discuss possible mitigation measures.

**Property Owner Response to Notifications.** There have been no contacts from property owners in RLA #34 to the City in recent years concerning flooding: As of August 11, 2016, there have been no responses from property owners or residents of RLA #34 to notifications about the Repetitive Loss Area designation.

### *Conclusions*

RLA #34 is in the East Branch of Upper Joe Creek drainage, at the beginning of tributary ELB.3, which originates at around E. 26$^{th}$ St., just east of S. Yale Ave., and drains to the south-southwest to join the East Branch mainstem near Whiteside Park. There are 35 single family, one-story, ranch-style homes with slab-on-grade foundations in the RLA. All properties are in the Lortondale Addition and, with one exception, were built between 1954 and 1956. Lortondale was constructed astride a shallow drainage that originally carried runoff south through the intersection of E. 31$^{st}$ St. and S. Yale Ave. This drainage was filled in when the homes were built and runoff routed through storm sewers which proved to be inadequate to handle very heavy rainfall. There is one Repetitive Loss Property in the RLA, which has made three successful flood damage claims (in 1979, 1983 and 1984) totaling $18,322. Nine other properties have made successful claims—one in 1979 and eight in 1984. The causes of flooding were heavy rainfall, undersized

storm sewers, and overland flow along the swale of the old creek bed. There has been no significant flooding in this stretch of Joe Creek since channel modifications and storm sewer improvements were completed by the City and the US Army Corps of Engineers in the 1980s and 1990s. Nineteen properties in the RLA continue to be within or touched by a zone of shallow flooding. The Joe Creek *Master Drainage Plan Final Report* cautions that even if all the storm sewers are enlarged according to the Plan, there would still be flooding in the RLA should the drainage basin experience a rainfall event similar to that which caused the 1984 flood.

## V. Mitigation Measures

### *Overview*

The Master Drainage Plan for Joe Creek identifies the most cost-effective structural solutions (channel improvements, enlarged inlets and storm sewers, stormwater detention ponds) for the area. The Non-Structural Plan identifies buildings where a structural solution is not cost-effective, and acquisition is the recommended solution. There are presently no funded Capital Improvement Projects for channel improvements or detention ponds in this area. The Joe Creek Master Drainage Plan is in the process of being updated, and additional structural and non-structural solutions may be identified.

### *Individual Mitigation Measures. What You Can Do*

Individual property protection actions are usually undertaken by property owners on a lot-by-lot, building-by-building basis, and include private floodproofing, moving mechanical equipment above flood levels, installing French drains and minor site grading to move local drainage to the street, sanitary sewer backup protection, and flood insurance. Dry floodproofing is sometimes recommended for commercial structures.

The City of Tulsa is willing to have a stormwater engineer do a site visit to assist you in analyzing your specific drainage problems and discuss potential solutions. Contact the Customer Care Center at (918) 596-7777, or go online to www.cityoftulsa.org/connect/contact-the-city.

**Know and Understand Your Flood Risk.** As stated above, being located in a Repetitive Loss Area does *not* mean a property will flood. Nevertheless, it is important that residents and property owners in flood hazard areas know and understand their flood risk and take what steps they can to protect their homes, families and possessions. City staff is available to explain the local flood risk, interpret floodplain maps, and determine if an area or property has drainage problems or a history of prior flooding. Staff can also discuss the ways a specific property can be protected from flooding. An Elevation Certificate can help define a property's flood risk under various rainfall scenarios (e.g., in a 10-year, 50-year, 100-year, or 300-year storm). You can receive a free flood zone determination by contacting the City Customer Care Center at (918) 596-7777 with the correct legal description and street address, or the Tax Assessor/Parcel Number of the property.

**Make a Disaster Preparedness Plan.** It is always a good idea for residents and property owners in flood hazard zones to prepare a disaster preparedness and response plan that addresses all the steps and details that will demand attention once a flood watch or warning is issued. A Building Permit is required to install a safe room in a flood-prone area.

**Create Berms, Swales or Redirected Drainage.** Flood waters can be diverted away from structures using such things as berms, brick planter boxes and swales, but these may not be done in ways that cause damage to other properties. Owners and residents can request a meeting with a City Engineer to discuss the best ways to solve existing drainage problems, and whether a Building Permit will be required. Berms or redirected drainage may be the most feasible solution for areas with flooding due to overland flow, such as RLA #34.

**Install Local, Property-Specific Paving, Plantings and Catchment Basins.** City Engineering staff can explain the natural functions of floodplains and how they act to slow and purify urban runoff and reduce flooding. Staff can also suggest low-impact development projects which imitate natural floodplain functions by slowing runoff and filtering out impurities. These include such things as rain gardens, catchment basins and pervious paving materials.

**Acquisition.** The City of Tulsa has a repetitive loss acquisition program to purchase repeatedly flooded properties. This voluntary program offers property owners who are in this situation a way out. The City applies to FEMA for funds using the Hazard Mitigation Grant Program. Once the grant is awarded, the property is appraised as if it were not a flooded property and the offer for the property is based on this appraisal. In addition to getting the best possible price, the owner receives moving expenses, a $1,000 stipend for purchasing a home outside the floodplain, and a 30-day rent free period after closing in which to move. All closing costs and other fees are paid by the City. Once the owner has moved out, the home is demolished and restored as open space to protect the natural and beneficial function of the floodplain. Property owners who would like more information about this program are encouraged to contact the City's Customer Care Center at (918) 596-7777.

**This platform and wall protect the home and air conditioning equipment from shallow flooding.**

Acquisition is usually not feasible or cost effective for areas of shallow flooding, as in RLA #34. If a property is located in an existing FEMA Floodway or Special Flood Hazard Area, demolition, acquisition and relocation may be feasible and cost-effective.

**Elevate Your Structure.** Elevating the structure is usually not feasible or cost-effective for areas of shallow flooding, particularly for masonry structures built on concrete slabs.

It can sometimes be cost-effective for wood frame buildings on crawlspaces. None of the structures in RLA #34 is a candidate for elevation.

**Dry Floodproof Your Structure.** This can includes actions that seal a structure and prevent floodwaters from entering. This method is best applied in areas where flood depths are no more than two or three feet. Buildings can be made watertight by sealing the walls with waterproof coatings, impermeable membranes, or additional layers of masonry or concrete. Doors, windows, and other openings below the base flood elevation must also be equipped with permanent or removable shields, and backflow valves must be installed in sewer lines and drains. Dry floodproofing needs to be designed by an engineer to ensure the structure can resist the force of the water.

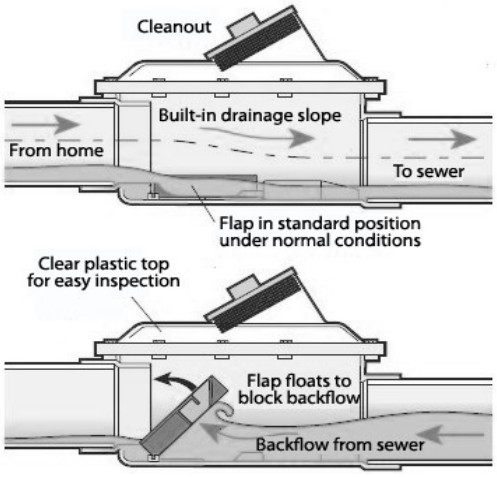
**Wet Floodproof Your Building.** Wet flood-proofing allows water to enter a structure, while removing, protecting or elevating items that can be damaged, such as air conditioning equipment. This is often used on structures with crawl spaces and shallow flood depths. The City does not allow basements in flood-prone areas, or the wet floodproofing of basements.

**Wet Floodproof Your Garage.** The garage, with its slab-on-grade construction, is one of the most vulnerable areas of your home to overland flow flooding. Remove, relocate, elevate, or otherwise protect items that can be damaged from flooding.

**Elevate Damage-Prone Components** such as furnace or air conditioning units. This should be done for components that are in the wet-floodproofed area of the building as well as for units that are outside of the structure but subject to shallow flooding.

**Maintain Nearby Streams, Ditches, and Storm Drains:** Local flooding can often be caused by brush and other debris blocking drainage ways and culverts. Although this is not at present a major problem for the East Branch of Joe Creek in this reach, debris can block storm sewer inlets in RLA #34 and increase flood damage from overland flow. Residents and property owners should do their part in keeping inlets and drainage ways clear of brush and debris. Do not attempt to clear debris during a flood event.

**Correct Sanitary Sewer Backup Problems.** Sanitary sewer backup can be a problem in low-lying, flood-prone areas like RLA #34. The installation of backflow prevention valves on sanitary sewer lines is highly recommended.




**Sewer backflow prevention valves are essential components for homes in low-lying, flood-prone areas.**

**Purchase and Maintain Flood Insurance.** Flood Insurance is available and recommended for the structure and contents for all properties in Tulsa. A large percentage of all flood insurance claims are for properties that are outside the FEMA floodplain. Because of the City of Tulsa's sustained efforts to reduce flooding, you are entitled to a discount on your flood insurance. A property does not have to be in a floodplain to qualify for flood insurance.

***Repetitive Loss Area Mitigation Measures: What the City Can Do***

The City of Tulsa is actively committed to the following floodplain management activities:

- Preventative activities to keep flood problems from getting worse.
- Natural resource protection activities to preserve or restore natural areas or the natural functions of floodplain and watershed areas.
- Emergency services measures taken during an emergency to minimize its impact.
- Structural projects to keep flood waters away from properties.
- Public information activities to advise property owners, potential property owners, and visitors about flood hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.

As funding becomes available for this Repetitive Loss Area, the City will undertake a more detailed Mini-Master Drainage Plan to identify alternative solutions to the flooding problems and recommend a public works project. The actual construction of any public works project may require the acquisition of properties and/or drainage easements. The City will continue to fulfill its maintenance responsibility for channels, drainageways, and storm sewer inlets and pipes. At this time, the City has identified the following actions which are appropriate for RLA #34.

- Extend and/or improve the storm sewer system to better collect storm water runoff.
- Acquire flood prone properties on a voluntary basis.

## VI. Funding

Due to the nature of the flooding problems and the localized, minor damages involved in RLA #34, the funding of needed site improvements will have to be borne by the individual property owner. The City of Tulsa would bear the cost for the construction of planned storm sewer drainage improvements. Funding for ongoing City maintenance responsibilities is provided by the Stormwater Utility Fee. Funding for a public works project in this RLA is dependent of several factors, including the prioritized ranking of the project with other Capital Improvement projects, inclusion in future street maintenance projects, being part of a project in a Bond Issue, etc. The City will increase the storm sewer capacity with any future street projects in the area. Another potential funding source is FEMA's Hazard Mitigation Grant Program (HMGP), which can be implemented after a Presidential Major Disaster Declaration in the State.

## VII. Conclusions and Recommendations

RLA #34 is comprised of 35 slab-on-grade, single-family homes in the Lortondale Addition, situated in the uppermost reach of the East Branch of Joe Creek's Tributary ELB.3. Home construction in the mid-1950's covered over the original stream channel in this area and routed runoff through storm sewers which proved to be incapable of handling massive rain storms like that of May 27, 1984. In that event, storm sewer backup and overland flow down the swale of the original drainage flooded streets and inundated some yards, garages and homes to depths of about one foot. Subsequent improvements to the sewer system in the area have largely solved the historic flooding problems in the neighborhood. At present, only one property in the RLA has a first-

finished-floor elevation below the level of the 100-year storm. Nevertheless, rainfall events similar to the 300-year storm of 1984 will continue to cause flooding in the RLA.

Homeowners are encouraged to maintain flood insurance. The City of Tulsa is a Community Rating System (CRS) Class II Community, and all homeowners qualify for up to a 40% discount on their flood insurance premiums. Homeowners are also encouraged to undertake individual mitigation measures to reduce their risk of overland flooding. The City of Tulsa is ready to assist in this effort with professional advice.