

Repetitive Loss Area # 2

**Bell Creek
E. 41st St. & S. 87th E. Ave. Area**



August 17, 2017



ENGINEERING SERVICES

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

Contents

Acknowledgements	iii
Overview	1
I. Background	2
II. Location	5
III. History	5
Development.....	5
Flooding.....	5
Improvements	6
IV. Research and Analysis	6
Agencies and Organizations	6
Plans, Studies and Documents	7
Capital Improvements Plans	7
Flood Insurance Data	7
Claims Data.....	8
Field Surveys and Site Visits	8
Review Drainage Patterns.....	8
Structures	8
Structure Type.....	8
Foundation Type.....	8
Condition of Structures.....	8
Notification	9
Annual Floodplain Notification	9
Annual Repetitive Loss Area Notification.....	9
Property Owners/Residents Notification	9
Public Participation and Involvement.....	9
Property Owner Response to Notifications.....	9
Conclusions.....	9
V. Mitigation Measures	10
Overview.....	10
Individual Flood Protection Measures: What You Can Do	10
Know and Understand Your Flood Risk.....	10
Make a Disaster Preparedness Plan	11
Create Berms, Swales or Redirected Drainage.....	11
Install Local, Property-Specific Paving, Plantings and Catchment Basins	11
Acquisition.....	11
Elevate Your Structure.....	11
Dry Floodproofing Your Structure	12
Wet Floodproof Your Building.....	12

Wet Floodproof Your Garage	12
Elevate Damage-Prone Components	12
Correct Sewer Backup Problems	12
Maintain Nearby Streams, Ditches, and Storm Drains	12
Purchase and Maintain Flood Insurance	12
Repetitive Loss Area Mitigation Measures: What the City Can Do.....	12
VI. Funding	13
VII. Conclusions and Recommendations	13

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:

City of Tulsa Elected Officials

G.T. Bynum	Mayor
Vanessa Hall Harper	City Council District 1
Jeannie Cue	City Council District 2
David Patrick	City Council District 3
Blake Ewing	City Council District 4
Karen Gilbert	City Council District 5
Connie Dodson	City Council District 6
Anna America	City Council District 7
Phil Lakin, Jr.	City Council District 8
Ben Kimbro	City Council District 9

Stormwater Drainage and Hazard Mitigation Advisory Board

Dr. Judith Finn, Esq., Chair	Attorney at Law
Lynn Scofield, P.E., Vice Chair	CH2M Hill Engineering
Kyle Brierly, Member	RotoRooter Plumbing
David Williams, Ph.D, P.E., Member	US Army Corps of Engineers
Steve Walman, Member	Walman Commercial Realtors
Mark Swiney, Esq.	Board Counsel

Tulsa Technical Advisory Committee

Paul D. Zachary, P.E, CFM	Director, Engineering Services
Matt Leichti, P.E.	Manager, Project Coordination
Bill Robison, P.E., CFM	Project Manager
Brad Jackson, P.E., CFM	Lead Engineer, Stormwater Design
Laura Hendrix, CFM	Floodplain Administrator
Tim Lovell	Disaster Resilience Network
Angela King	Records Custodian

Consultants

Flanagan & Associates, LLC

Planning Consultants
3015 E. Skelly Drive, Suite 430
Tulsa, Oklahoma 74105
(918) 749-2696 www.rdflanagan.com

Ronald D. Flanagan, CFM, Principal
John D. Flanagan, Research, Writing
Tyler Brooks, GIS Specialist
Nancy K. Edwards, Administration

Swift Water Resources Engineering, LLC

Hydrologic Engineering Consultants
9 East 4th Street, Suite 301
Tulsa, Oklahoma 74103
(918) 582-1380 swre@sbcglobal.net

Mark Swift, P.E., CFM
Angela Swift, CPA, CEO

Repetitive Loss Area # 2

Bell Creek E. 41st St. & S. 87th E. Ave. Area

Overview

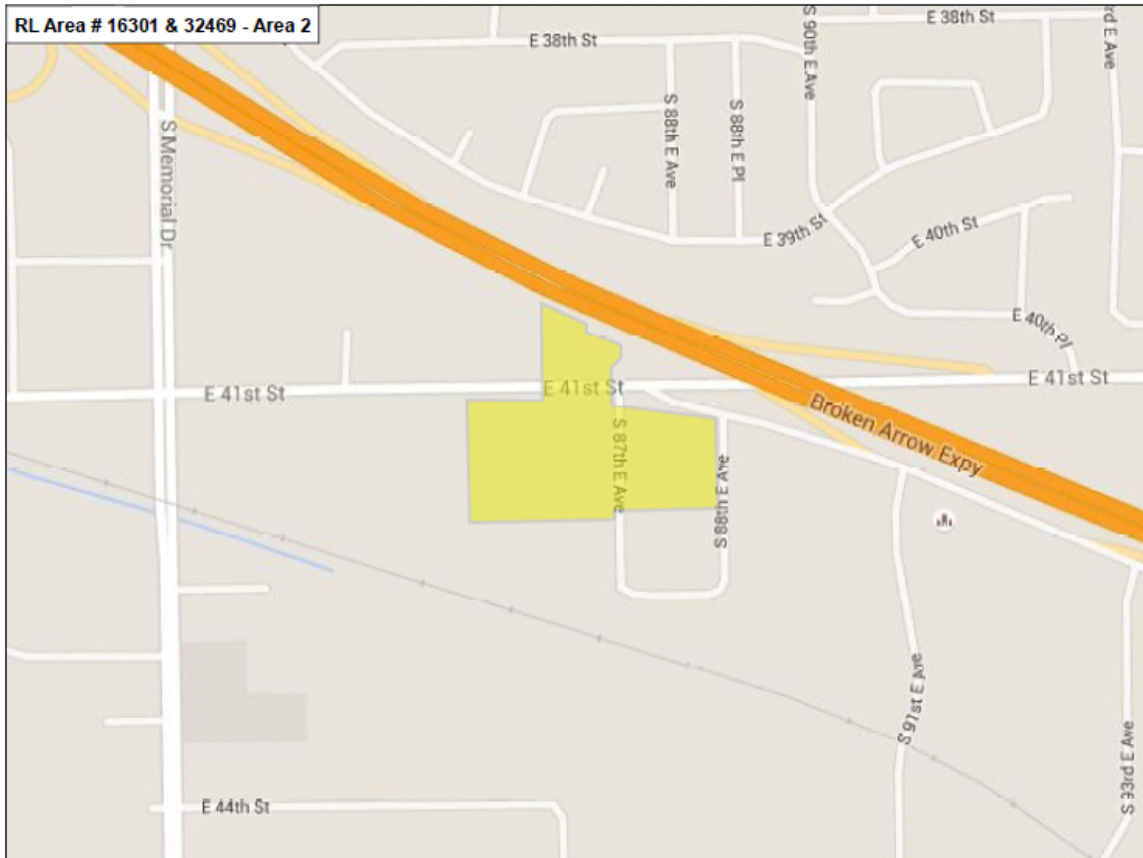
Repetitive Loss Area #2 is comprised of 13 commercial and industrial properties on 15 lots developed between 1957 and 1978 and located along the west branch of Bell Creek (Mingo Creek's Tributary 11A), between the Broken Arrow Expressway and the MKT railroad, generally in the 4100 block of S. 87th E. Ave. The RLA is about 0.67 miles above the junction with Bell Creek's east tributary (Mingo Tributary 11B) and 1.1 mile above the confluence of Bell Creek with Mingo Creek. Seven properties in the RLA have made a total of 21 flood damage claims, for a total of \$852,397. Of these, two repetitive loss properties in the RLA have made a total of 13 flood damage claims (seven for one property and six for the other) for a total of \$524,892. The flooding which caused all 21 claims occurred in 1979 (\$67,370), 1981 (\$172,354), 1982 (\$7,521), 1984 (\$371,893), 1986 (\$14,667), 1994 (\$26,904), and 2000 (\$191,688). There have been no claims or reported flooding in this neighborhood since 2000.

According to the *Mingo Creek Master Drainage Plan for Tributaries between I-44 and the Broken Arrow Expressway*, the major problem in the Bell Creek watershed in this reach of Bell Creek is inadequate conveyance beneath the major roadways and the resulting basin transfers between LB-10 and LB-11. Specifically, when Fulton Creek reaches 400 cfs at the Memorial Blvd. bridge, and 870 cfs at the BA Expressway, flows will be diverted from Fulton Creek to Bell 11A. When flows on Bell Creek (Tributary 11A) reach 770 cfs at 41st St., backup is diverted to Bell Tributary 11B. These blocked and diverted flows can, under 100-year event conditions, combine to create a mile-wide floodplain on the south sides of the BA Expressway and E. 41st St. According to the *Mingo Creek Master Drainage Plan*, during such an event 250 residential structures and 50 industrial properties would be impacted in the basin. In addition, Bell Creek often experienced back-up flooding at its junction with Mingo Creek. In order to increase the capacity of structures at Memorial Blvd., 41st St. and the BA Expressway, the City and US Army Corps of engineers had first to channelize Fulton and Bell creeks downstream of the Expressway and put detention in place upstream in the watershed.

Much of this work of channelization and structure enlargement was accomplished during the massive Mingo Creek Project undertaken by the City of Tulsa and the Corps between 1984 and 1999, followed by several local drainage improvements in subsequent years, including the detention facilities upstream of E. 41st St. These flood control projects have virtually eliminated flooding on lower Bell and Fulton creeks, as there have been no flood claims since the storm of May 6, 2000. Nevertheless, the area remains within both FEMA's SFHA and the City's Regulatory Floodplain, and some property owners have reported erosion from overland flow on and around their structures as recently as 2007 and 2012.

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, Joe and Fred 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."



RLA #2 is located along Bell Creek's Tributary 11A, generally at E. 41st St. and S. 87th E. Ave., south of the Broken Arrow Expressway and north of the MKT railroad.

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 for reducing 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 per 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.

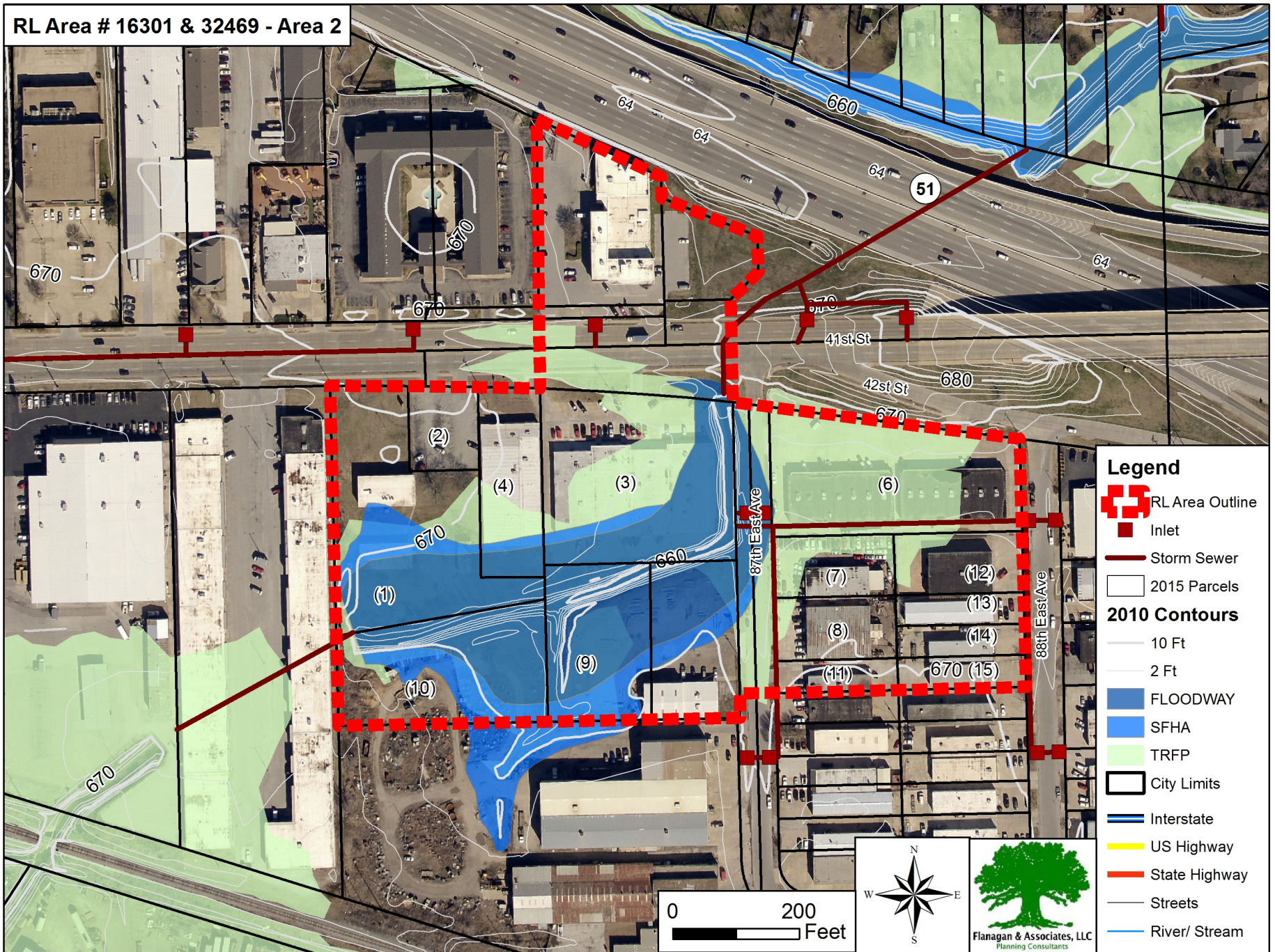


Bell Creek Tributary 11A looking downstream (south) along S. 87th E. Ave. from the 41st St. bridge.

FEMA 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 an RLA. The City is required to contact the owners of the properties in the RLA, 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 has been done for the individual repetitive loss properties.

It is important to note that most of the structures 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. In addition, the flooding events in question may have had little to do with overbank flooding from a creek, but perhaps may have been the result of storm sewer backup or overland flow.

RL Area # 16301 & 32469 - Area 2



The location of RLA #2 is shown on the aerial photo/topography map on page 4, below. The map identifies residential properties, County Assessor parcels, floodplains and the existing storm drainage system

II. Location

Bell Creek is a 2.5-mile-long, left-bank tributary to Mingo Creek that drains 2.5-square-miles of southeast Tulsa. The basin is fully developed with a combination of residential, commercial and industrial properties. The creek has two primary branches (Mingo Tributaries 11A and 11B) that rise in the south Tulsa hills near E. 51st and S. 76th E. Ave. and E. 55th and S. Memorial Blvd., respectively. The two branches flow generally north north-east to join at E. 39th St. and S. 93rd E. Ave. before continuing north to junctions with Fulton Creek near 33rd Pl. and S. 93rd E. Ave. and Mingo Creek at about E. 32nd Pl. and S. 93rd E. Ave.

Repetitive Loss Area #2 is comprised of 15 commercial and industrial properties located along Bell Creek's mainstem (Mingo Creek's Tributary 11A), between the Broken Arrow Expressway and the MKT railroad, generally in the 4100 block of S. 87th E. Ave. The properties were developed between 1957 and 1978. The terrain is flat with the slab-on-grade structures situated at between 660 and 680 ft. elevation. Bell Creek itself flows through the area at about the same elevation, falling from 680 ft. at E. 42nd Pl. and Memorial Blvd. to 660 ft. on the north side of the Expressway. The major thoroughfares of the area—Memorial Blvd., E. 41st St. and the BA Expressway—have, in the past, acted as major impediments to high volume flows on the creek due to the berms that elevate the roadways and the originally undersized culverts that carried water beneath them. (See Flooding, below.)

III. History

Development

The Broken Arrow Expressway was completed through the area in 1964. The properties in RLA #2 were developed between 1957 and 1978, with the bulk of the structures being built between 1970 and 1978, after the construction of the BA Expressway. The buildings are currently in Fair to Average condition.

Flooding

The properties of RLA #2 suffered flood damage on nine occasions, when rainfall reached or exceeded between 4 and 5 inches: on June 6 and 20, 1979; May 13 and 28, 1981; May 18, 1982; May 27, 1984; September 29, 1986; July 14, 1994; and May 6-7, 2000. As a result, s properties in the RLA made 21 flood damage claims, for a total of \$852,397. Of these, two repetitive loss properties in the RLA made 13 claims (seven for one property and six for the other) for \$524,892. Altogether, the various claims totaled \$67,370 in 1979, \$172,354 in 1981, \$7,521 in 1982, \$371,893 in 1984, \$14,667 in 1986, \$26,904 in 1994, and \$191,688 in 2000. There have been no claims or reported flooding in this neighborhood since 2000.

According to the *Mingo Creek Master Drainage Plan*, flooding was caused by undersized culverts beneath Memorial Blvd., E. 41st St. and the Broken Arrow Expressway. During heavy rains, Fulton and Bell creeks would fill and back up behind these culverts, diverting flows from Fulton to Bell Tributary 11A and then to Bell

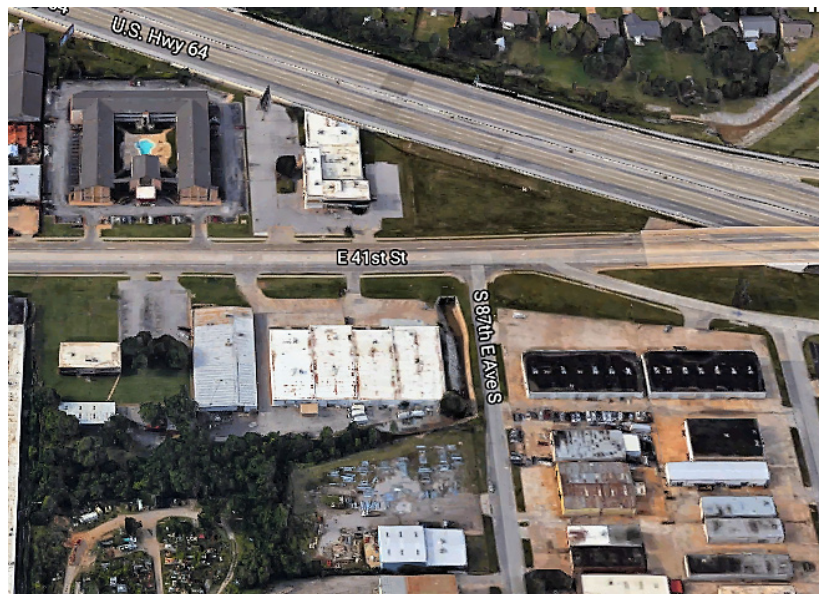
Tributary 11B. Under 100-year event conditions, runoff would combine to create a mile-wide floodplain on the south sides of the BA Expressway and E. 41st St., flooding 250 residential structures and 50 commercial and industrial properties throughout the basin..

Improvements

Since Bell Creek often backed up at its junction with Mingo Creek, the City and the US Army Corps of Engineers could not widen the culverts under Memorial Blvd., 41st St. and the BA Expressway until flooding on Mingo Creek and lower Bell Creek had been mitigated. These reaches of Fulton and Bell creeks were therefore made a part of the much larger Mingo Creek Project, which was constructed between 1984 and 1999. The project channelized Bell Creek north of the BA Expressway, enlarged the culverts, and created four detention sites south of 41st St.

IV. Research and Analysis

The analysis of Repetitive Loss Area #2 was conducted by the Project Team through interviews with City officials, research into Engineering Services and Stormwater Drainage files, including the *Mingo 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 the residences soliciting information about prior and existing flooding issues, if any.



RLA #2 is located along Bell Creek (Mingo Tributary 11A) and S. 87th E. Ave., between the Broken Arrow Expressway and the MKT railroad tracks.

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.

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
- *Mingo Creek Master Drainage Plan for Tributaries between I-44 and the Broken Arrow Expressway*, June 1981
- “The Effects of Urbanization on the Mingo Creek Watershed,” Tim Mars, 1984.
- *Guidebook to Conducting Repetitive Loss Area Analyses*, UNO and FEMA

Capital Improvements Plans

No City of Tulsa Capital Improvements are currently planned that could have a positive impact on the flooding problems in Repetitive Loss Area # 2. There are storm sewer improvement and regional detention facilities on the existing CIPs for Little Joe Creek along with Master Drainage Plan recommendations that are not yet on the CIPs. None are presently funded.

Flood Insurance Data

Three properties in the RLA currently carry flood insurance. Because the Privacy Act of 1974 (5 USC 522a) restricts the release of flood insurance policy and claims information to the public, neither the repetitive loss property nor address-specific claims data are detailed in this Plan.

Claims Data.

Seven properties in the RLA have made a total of 21 flood damage claims—in 1979, 1981, 1982, 1984, 1986, 1994 and 2000, for a total of \$852,397. Individual claims ranged from \$1,244 to \$245,003. There are two repetitive loss properties in the RLA, which have made a total of 13 claims for \$454,948. There have been no claims or reported flooding in this neighborhood since 2000.

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 flooding 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 made a number of visits to RLA #2 to determine the situation and condition of the structures. Visual analysis was verified by queries of Tulsa County Assessor data.

Structure Type.

The structures in RLA #2 are all commercial and light industrial buildings.

Foundation Type.

The type of foundation was determined by field investigation and query of Tulsa County Assessor records. All structures in RLA #2 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. The structures were all considered to be in Fair to Average condition. These findings are summarized in the following table.

Properties in the RLA

Address	Structure Type	Year Built	Foundation Type	Building Condition	Flood plain
Property 1	Commercial	1960	Slab on Grade	Fair	SFHA
Property 2	Commercial	1970	Slab on Grade	Average	CRFP
Property 3	Commercial	1975	Slab on Grade	Fair +	SFHA
Property 4	Commercial	1970	Slab on Grade	Fair +	SFHA
Property 5	Commercial	1973	Slab on Grade	Fair +	No
Property 6	Industrial	1978	Slab on Grade	Average	CRFP
Property 7	Industrial	1975	Slab on Grade	Fair	CRFP
Property 8	Industrial	1974	Slab on Grade	Average	CRFP

Address	Structure Type	Year Built	Foundation Type	Building Condition	Flood plain
Property 9	Industrial	1977	Slab on Grade	Average	SFHA
Property 10	Industrial	1975	Slab on Grade	Fair	SFHA
Property 11	Industrial	1977	Slab on Grade	Average	CRFP
Property 12	Industrial	1978	Slab on Grade	Average	CRFP
Property 13	Industrial	1975	Slab on Grade	Average	CRFP
Property 14	Industrial	1976	Slab on Grade	Average	CRFP
Property 15	Industrial	1976	Slab on Grade	Average	CRFP

Notification

Annual Floodplain Notification. Each year, in March, the City notifies all property owners and occupants within a 100-year floodplain that their properties are subject to flooding and informs them of what steps they can take to protect their buildings and employees, including the purchase of flood insurance.

Annual Repetitive Loss Area Notification. Property owners and occupants in Repetitive Loss Area #2 are notified annually that their properties are located in a Repetitive Loss Area, and are potentially subject to flood damage from overbank flooding, storm drainage backup and overland flow.

Property Owners/Residents Notification. Property owners and 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 four comments concerning flooding from property owners/occupants in response to notification. Two property owners stated that their buildings had water (as much as two or three inches) inside their buildings on May 8 and 9, 2000. One property owner in May 2007 reported that water erosion was undermining the concrete liner on his building, while another said that asphalt was being eroded from a road and falling into a 15-foot deep ditch.

Conclusions

Repetitive Loss Area #2 is located along Bell Creek mainstem (Mingo Tributary 11A) on the south sides of the Broken Arrow Expressway and E. 41st St., in an area of light industrial development. Properties in the RLA have been flooded on nine different occasions, generating 21 claims from seven properties. Two of the claimants are repetitive loss properties with 13 claims between them for a total of \$524,892. The primary cause of flooding was inadequate conveyance structures beneath Memorial Blvd., E. 41st St. and the Broken Arrow Expressway, which during rainfalls of 4 to 5 inches—resulted in backup flooding and basin transfers between Fulton Creek, Bell Creek mainstem (Tributary 11A) and Bell Creek Tributary 11B, creating a mile-wide floodplain in the level terrain on the south sides of 41st St. and the BA Expressway.

V. Mitigation Measures

Overview

The *Master Drainage Plan for Mingo Creek Tributaries Between I-44 and the Broken Arrow Expressway* (1981), which included Bell Creek (Mingo tributaries 11A and 11B), recommended channelization downstream of the BA Expressway, the construction of four detention sites (one at Aaronson Park and three in the industrial area between the MKT tracks and BA), and the replacement of six bridges and culverts, including two beneath the BA Expressway for Bell Creek 11A and 11B. These measures were put in place and appear to have solved most of the backup flooding problems in RLA #2 and in this reach of Bell Creek—but not all, as testified by claims in 2000, and reports from three property owners that their buildings had up to three inches of water inside them. This damage appears to have been the result of overland flow and site drainage issues, not overbank or backup flooding along Bell Creek.

Individual Flood Protection 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.

The City of Tulsa is willing to have a stormwater engineer do a site visit to help property owners and occupants analyze their specific drainage problems and provide recommendations. Contact the City of Tulsa’s 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 property owners in flood hazard areas know and understand their flood risk and take what steps they can to protect their buildings, furnishings and equipment. 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 with the correct legal description and street address, or the Tax Assessor/Parcel Number of the property.



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

Make a Disaster Preparedness Plan. It is always a good idea for people in flood hazard zones to have a disaster preparedness and response plan that thinks through 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.

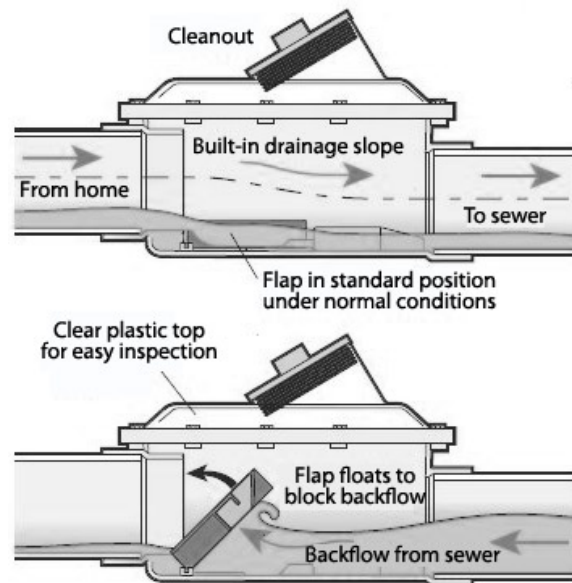
Create Berms, Swales or Redirected Drainage. Flood waters can be diverted away from structures using berms, brick planter boxes and swales, but these may not be done in ways that cause damage to other properties. Owners and occupants can request a meeting with a City Engineer to discuss the best ways to solve existing drainage problems, and whether a Building Permit will be required. This may be the most feasible solution for areas with flooding due to overland flow, as in RLA #2.

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 owners who are in this situation have 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 was 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. If you would like more information about this program contact the Customer Care Center at (918) 596-7777.

Acquisition is usually not feasible or cost effective for areas of shallow flooding, as in RLA #2. If a property is located in a FEMA Floodway or Special Flood Hazard Area, demolition, acquisition and relocation may be feasible and cost-effective.

Elevate Your Structure. Elevating the structure is only suitable for areas of shallow flooding, and is usually not feasible or cost-effective 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 #2 is a candidate for elevation.



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

Dry Floodproofing Your Structure. This can include actions that seal a structure and prevent floodwaters from entering. This method is best 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 floodproofing 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. Critical items such as furnace or air conditioning units, should be elevated to avoid flood damage. 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.

Correct Sewer Backup Problems. Sewer backup can be a problem in low-lying, flood-prone areas like RLA #2. The installation of backflow prevention valves in sewer lines is recommended.

Maintain Nearby Streams, Ditches, and Storm Drains. Local flooding can often be caused by brush and other debris blocking drainage ways and culverts. Channel blocking by limbs, grass cuttings and other debris in Bell Creek through RLA #2 could contribute to future flooding. The channel must be regularly inspected and kept free of blockage. 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.

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 # 2.

- Extend and/or improve the storm sewer system to better collect storm water runoff.
- Create overland flow path to allow better drainage of ponded water to the Creek.
- Create berms or swales to direct runoff away from residential properties.
- Improve conveyance of Creek to mitigate overbank flooding.
- Improve downstream hydraulic structures (bridges, culverts, etc.) to reduce backwater in the RLA.
- Construct upstream detention to reduce storm water runoff into the RLA.

VI. Funding

Due to the nature of the flooding problems and the localized damages involved in RLA #2, the funding of needed improvements will have to be borne by the individual homeowner.

VII. Conclusions and Recommendations

Repetitive Loss Area #2 is located in the Bell Creek drainage between the Broken Arrow Expressway and the MKT railroad grade, generally in the area of E. 41st St. and S. 87th E. Ave. Between 1997 and 2000, nine major rain storms generated 21 flood damage claims from seven properties totaling \$852,937. The cause of flooding was inadequate conveyance beneath the major roadways (Memorial Blvd., E. 41st St. and the BA Expressway) and resulting basin transfers between Fulton Creek and Bell Creek (Mingo Creek tributaries 11A and 11B) in the generally level terrain. Under 100-year storm conditions, the blocked and diverted flows combined to create a mile-wide floodplain on the south sides of the BA Expressway and E. 41st St.

The Mingo Creek Master Drainage Plan for Tributaries Between I-44 and the Broken Arrow Expressway recommended the channelization of Bell Creek downstream of the BA Expressway, the construction of four detention sites, and the replacement of six bridges and culverts, including those for Bell Creek 11A and 11B beneath the BA Expressway. These measures were constructed and appear to have solved overbank and backup flooding along this reach of Bell Creek. There have been no flood damage claims from properties in the RLA since May 2000. Nevertheless, the area retains its designation as an area of shallow flooding in the City's Regulatory Floodplain. There have been two reports of erosion damage in the RLA, which appear to be the result of overland flow and local site drainage issues. Slab-on-grade structures in the RLA will likely remain at some risk of flooding. Property owners are encouraged to keep Bell Creek free of debris and

maintain flood insurance on both their facilities and contents. Because the properties in the RLA are not within FEMA's regulatory floodplain, the cost of flood insurance is low. In addition, since the City is a CRS Class II Community, property owners will receive an additional 10% discount on their insurance premiums.