CITY OF Tulsa
A New Kind of Energy

Repetitive Loss Area # 64

RLA # 277884

June 8, 2020

Flanagan & Associates, LLC
Planning Consultants

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Engineering Services

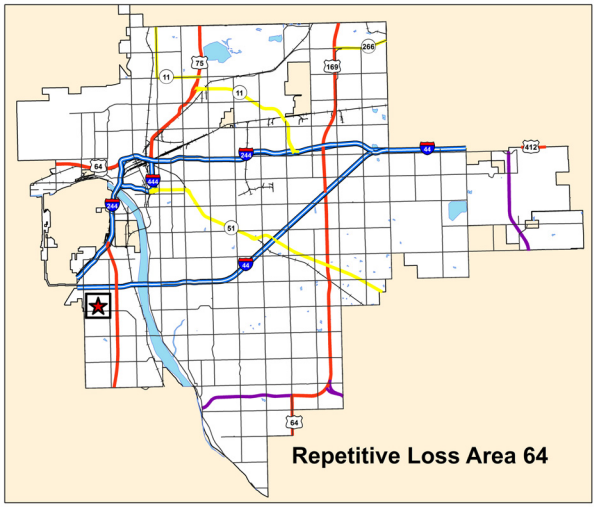
City of Tulsa
Repetitive Loss Area Analysis

Repetitive Loss Area 64

RL# 277884

1. Background

The Area: Repetitive Loss Area 64, is in a rural developing area of Southwest Tulsa. There are 8 Repetitive Loss Area (RLA) buildings located in the RLA. A creek tributary channel and NFIP Floodway, FEMA A-Zone and City Regulatory floodplains border the east edge of the property, and one building is touched by the floodplains. One of the buildings not in or touched by the floodplain, and is a Repetitive Loss Property, due overland flow of stormwater. The RLA location is shown on the aerial topography and photo maps on the following pages.



2. Problem Statement

Sources of information used for this study/analysis include: National Flood Insurance Program (NFIP), Flood Insurance Rate Map, Repetitive Loss Data, Flood Insurance Data, 2014 Tulsa Hazard Mitigation Plan Update, Engineering Services, City of Tulsa Customer Care/Mayor's Action Center Comments/Complaints, property owners, and on-site field visits and interviews with building employees.

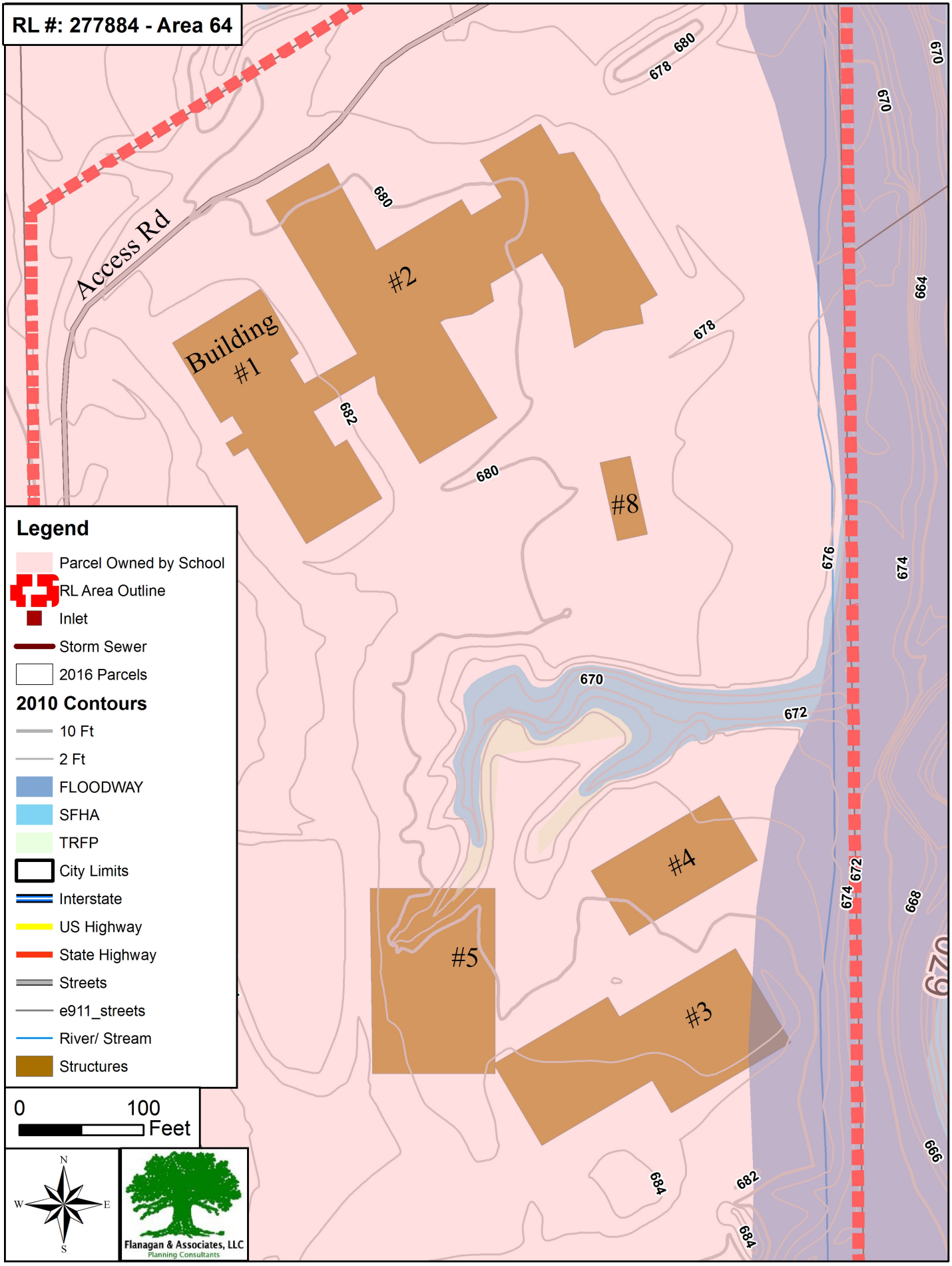
Recent flood events affecting the RLA include flooding events in 5/9/2015, and 8/17/2018, and are primarily shallow, overland flow drainage events.

Flooding and flood damage is due to the site's flat topography, the slab-on-grade construction of the buildings, inadequate drainage/flood interception and conveyance, and lack of flood proofing of the building entrance and structure.

2.1. Existing Studies and Documents

The following reports and studies were in this study analysis:

- Flood Insurance Rate Map, City of Tulsa, October 16, 2012
- Regulatory Floodplain Map Atlas, Tulsa Engineering Services, April 2013
- 2014 City of Tulsa Hazard Mitigation Plan Update, Flanagan & Assoc., 2014
- Stormwater Design: Critical Neighborhood Flood Control Projects


RL #: 277884 - Area 64
Access Rd
Building #1
#2
#3
#4
#5
#8
680
678
682
670
664
676
674
672
668
666
684
Legend
Parcel Owned by School
RL Area Outline
Inlet
Storm Sewer
2016 Parcels
2010 Contours
10 Ft
2 Ft
FLOODWAY
SFHA
TRFP
City Limits
Interstate
US Highway
State Highway
Streets
e911_streets
River/ Stream
Structures
0
100
Feet
N
W
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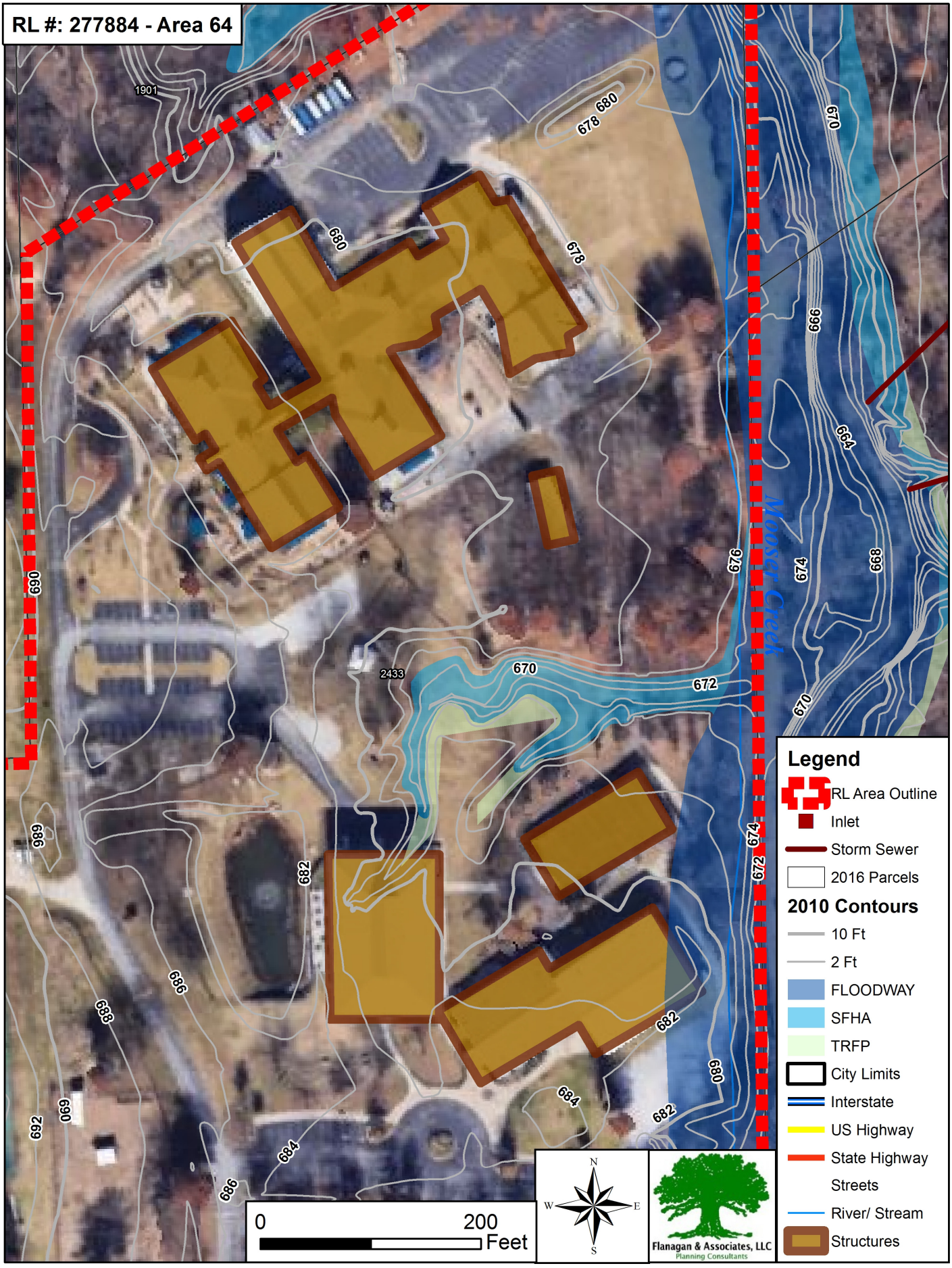
RL #: 277884 - Area 64
1901
680
678
670
680
678
666
664
Moose Creek
676
674
668
690
2433
670
672
670
674
672
682
686
688
682
680
684
682
690
692
684
686
0
200
Feet
N
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E
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Flanagan & Associates, LLC
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Legend
RL Area Outline
Inlet
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2016 Parcels
2010 Contours
10 Ft
2 Ft
FLOODWAY
SFHA
TRFP
City Limits
Interstate
US Highway
State Highway
Streets
River/ Stream
Structures

- Stormwater Capital Improvements List, City of Tulsa, Engineering Services
- Flood Insurance Rate Map, City of Tulsa, October 16, 2012
- Regulatory Floodplain Map Atlas, Tulsa Engineering Services, April 2013
- 2014 City of Tulsa Hazard Mitigation Plan Update, Flanagan & Assoc., 2014

Contact Agencies and Organizations: The City of Tulsa Engineering Services, Stormwater Design, Development Services, Communications Department, and Working in Neighborhoods were contacted, included and input solicited in the RL Area analysis and Plan development.

The Drainage System: RL Area #64, is located in an alluvial floodplain area of a creek tributary, in southwest Tulsa. The area site is flat, and subject to frequent shallow street and overland flow drainage flooding. No record of flooding or damage has been reported or recorded from the creek tributary to the east of the development buildings.

2.2. Flood Insurance Data

The Repetitive Loss Property has carried Flood Insurance, and has made two (2) flood damage claims for flood events in 2015 and 2018. The Privacy Act of 1974 (5 USC 522a) restricts the release of flood insurance policy and claims data to the public.

Claims Data: Flood Insurance claims data shows that the building has been paid two claims for a total of $79,086.05, primarily damage to contents.

Site Visits/Field Investigations

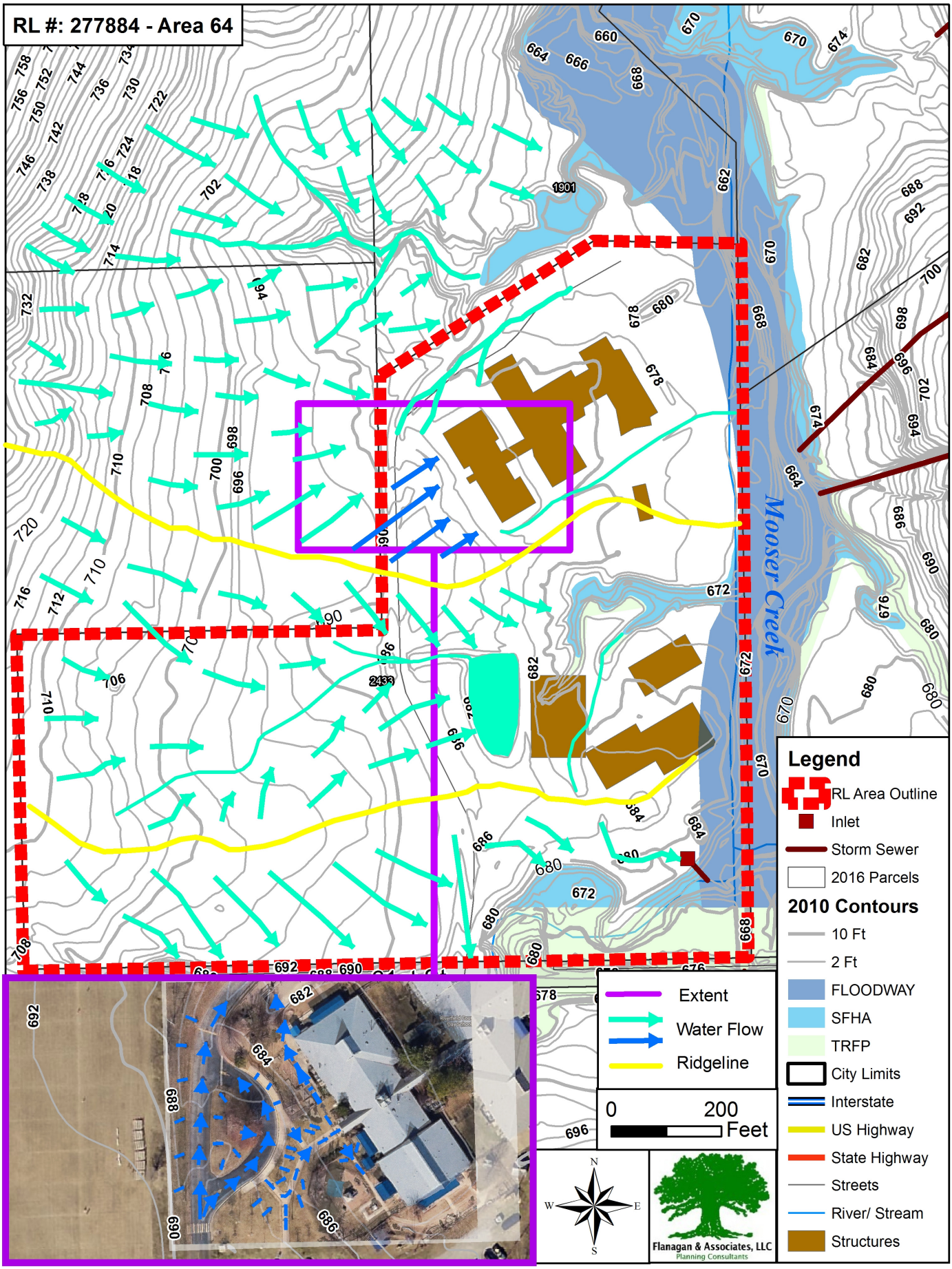
Review Drainage Patterns: Aerial topography maps, Master Drainage Plans, stormsewer plans, City Customer Care Center complaints and comments were examined, and field checks and interviews were conducted to determine area drainage patterns and identify flooding problem areas.

Foundation Type: The type of foundation- slab-on-grade was determined by field investigation and the County Assessor's records, confirmed by Elevation Certificates on two of the buildings, and is reported in the Table below for each structure.

Bldg ID #	Property Type	Year Built	Sq. Footage
1	Commercial	1970	11,930
2	Commercial	1970-2014	36,031
3	Commercial	1970	17,650
4	Commercial	1970	7,788
5	Commercial	2014	21,348
6	Commercial Equip.	1970	391
7	Commercial Equip.	1970	140
8	Commercial	1970	1,560

2.3. Drainage Patterns & Facilities:

Existing stormwater drainage facilities for Building # 1 are illustrated in Pictures 1-4.


RL #: 277884 - Area 64
Mooser Creek
Legend
RL Area Outline
Inlet
Storm Sewer
2016 Parcels
2010 Contours
10 Ft
2 Ft
FLOODWAY
SFHA
TRFP
City Limits
Interstate
US Highway
State Highway
Streets
River/ Stream
Structures
Extent
Water Flow
Ridgeline
0
200
Feet
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E
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Flanagan & Associates, LLC
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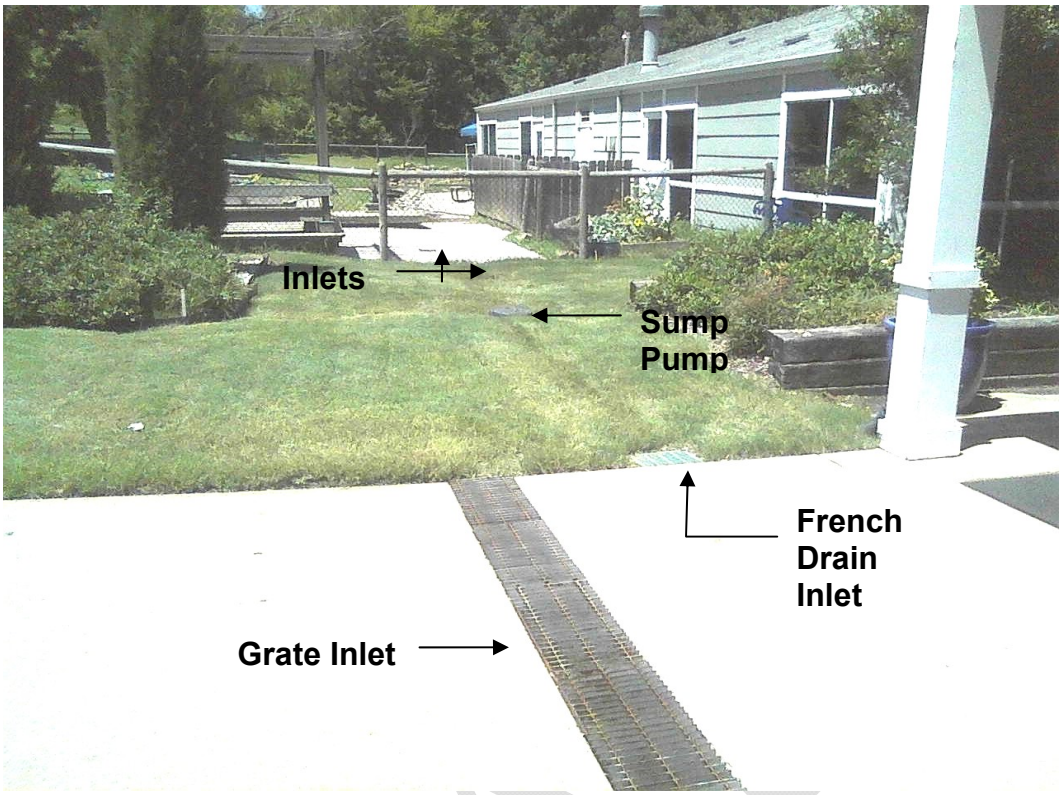
RL #: 277884 - Area 64
Legend
Contours
10 Ft
2 Ft
Water Flow
Picture Number & Direction
P 1
P 2
P 3
P 4
682
684
686
688
690
692
0
25
50
Feet
Flanagan & Associates, LLC

Picture 2. Entrance to Building # 1, Looking Northeast

Picture 1. Entrance to Building 1; Existing Interception Grate. Looking NE



Picture 3. Front of Building #1 Looking North; French Drains & Sump Pump

Picture 4. Open Drainage Channel Conveyance; North End of Building #1.

2.4. Property Owners Notification:
Site Development/Building Administration was contacted advised of the Repetitive Loss Area study and analysis by letter, were sent a questionnaire soliciting information and input, and in person, and were asked to contact the City for more information or a copy of the completed RL Area Plan.

2.5. Property Owners
Repetitive Loss Area # 64 property includes RL#277884.

2.6. On-Site Survey

The following general conclusions can be made based on data, comments and field checks:

Experiences: The reported and claimed flood events are primarily local drainage and overland flow problems, and caused and damage to contents and minor structural damages. The two claims average almost $40,000 each. The two claims are to one Repetitive Loss structure, Building #1.

3. Alternative Mitigation Measures

Solutions: The Master Drainage Plans for the basin identify the most cost-effective structural solution (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.

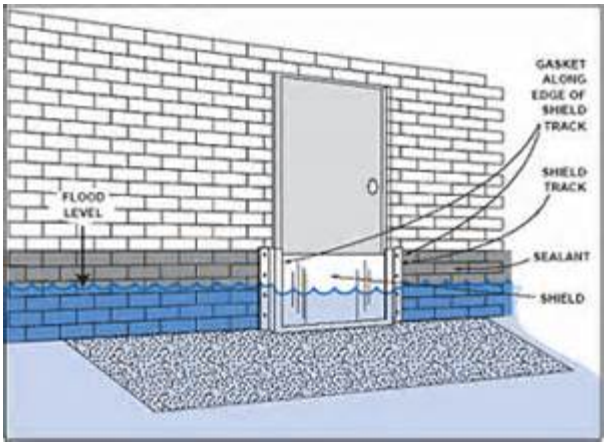
Recommended individual property protection actions are usually undertaken by property owners on a building-by-building basis, and include: private flood proofing, moving mechanical equipment above grade and flood elevation, installation of French drains and minor site grading to move local drainage to street, sewer backup protection, and flood insurance.

Individual Flood Protection Measures

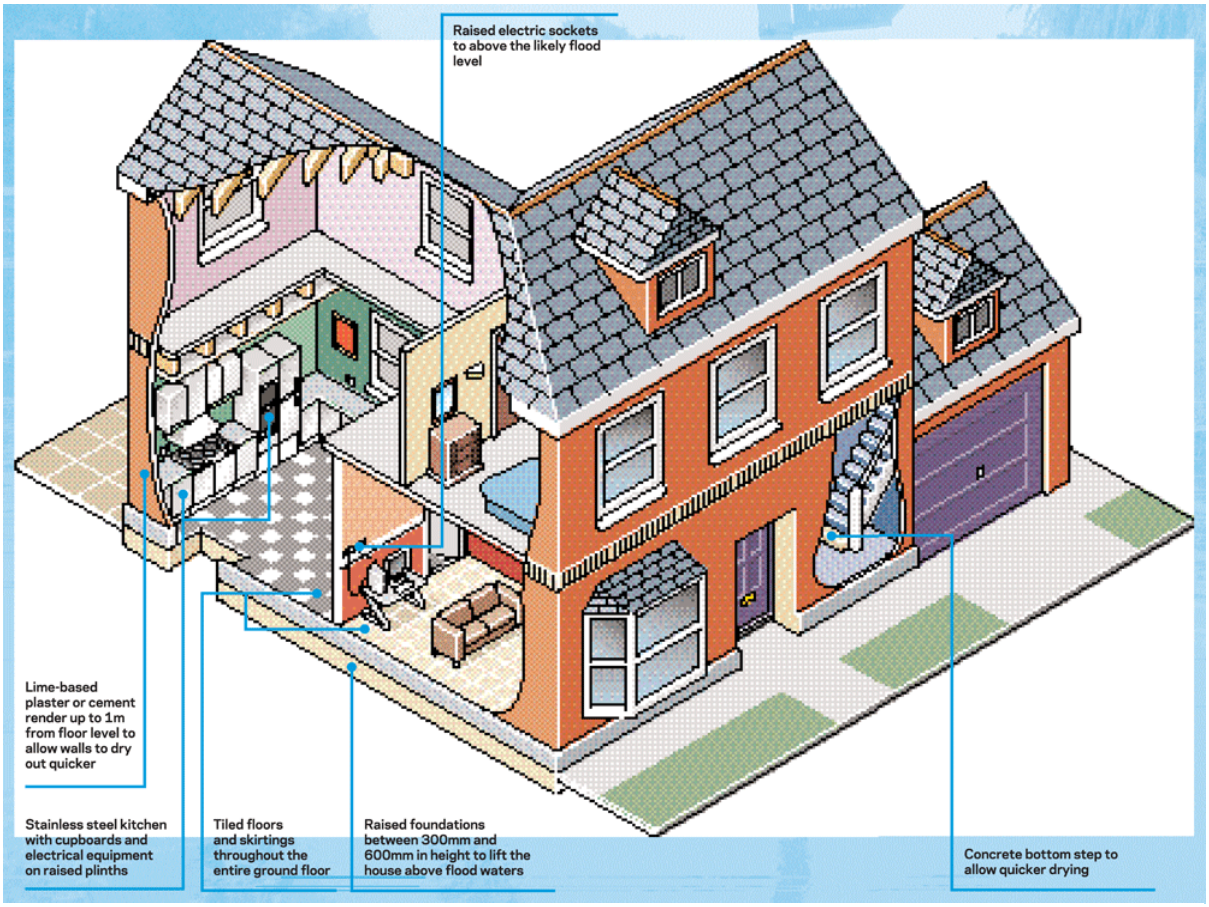
Demolition – Demolition is not feasible nor cost-effective for areas of shallow flooding.

Elevate the Structure – Elevation of the structures is usually not feasible or cost-effective for areas of shallow overland flooding . Feasibility to be determined on a case-by-case basis, primarily based on structure type, depth of flooding and cost-effectiveness.

Dry Floodproofing – Recommended for commercial and industrial structures where flood depths are less that 3 feet. Dry Floodproofing may be feasible for non-residential structures, but is a temporary method, and is not a long-term solution.



Dry Flood proofing



Residential Wet Flood Proofing

Wet Floodproofing – Wet floodproofing allows the water to enter the structure, while removing, protecting, elevating items that could be damaged. Wet floodproofing is not feasible for RLA #64.

Redirect Drainage

Construct a Berm or Redirect Drainage – Flood waters can be intercepted and diverted away from the building through use of grates, pipes and swales and channels. However, it must be redirected in such a manner as to not cause damage to others.

Maintain nearby streams, ditches, and storm drains – Drainage ditches, inlets and storm drains must be of adequate size for drainage needs, and must be maintained and kept free of debris.

Correct Sewer Backup Problems – Sewer backup is always a problem in flood-prone areas. Installation of a backflow prevention valve is recommended.

Purchase & Maintain Flood Insurance – Flood insurance for structure and contents is recommended for properties within a Repetitive Loss Area. Thirty percent of all flood insurance claims are from outside the FEMA floodplain, and in Tulsa 50% of all Repetitive Losses are due to overland flow flooding, and are not in a designated NFIP or City Rehulatory Floodplain. Tulsa SFHA floodplain properties receive a 40% discount in their flood insurance premiums, and all other properties outside the FEMA floodplain receive a 10% discount. You do not have to be in a floodplain to purchase flood insurance.

4. Funding

Due to the nature of the flooding problems and the localized minor damages incurred, funding the needed improvements to protect the property may reside with the individual property owner. However, cost-effective non-structural improvements may qualify for FEMA grants.

5. Conclusions

Due to the unimproved channel, main stem flooding is not a major problem at this time, although low-lying areas along the channel are always subject to potential flooding. Property owners should be encouraged to maintain flood insurance. Because the area is not in the NFIP Special Flood Hazard Area (SFHA) or the Tulsa Regulatory Floodplain (TRFP), the cost in flood insurance is low. In addition, because the City of Tulsa is a CRS Class 2 Community, property owners not in the SFHA receive an additional 10% discount.

6. Recommendations

1. Annual notification of Repetitive Loss Area properties that they are located in a Repetitive Loss Area, and are potentially subject to flood and drainage damages.
2. Building owners should obtain and keep a flood insurance policy on their buildings. If eligible, they should obtain a Preferred Risk Policy.
3. Property owners should review yard drainage improvements that can protect their buildings from flooding and overland flow damages.
4. The City of Tulsa Engineering Services Department, in conjunction with the property's private planning/engineering consultants should continue to provide technical assistance to the property owners about local drainage mitigation measures, including:

A. Perform a detailed SWMM Drainage Runoff Model to determine the exact routes and amount of overland flow runoff discharges.

B. Size the enlargement of the front door grate to adequately intercept the overland flows entering the front door of Building #1.

C. Size the north and south under ground pipes, french drains and sump pumps to intercept and convey the stormwater runoff discharges.

D. Size and construct, where desired, the necessary open channels to convey the stormwater runoff, and ensure that the increased discharges do no adverse impacts to property or buildings down stream.

E. Investigate Dry Floodproofing of Building #1 Front Door and front wall to withstand excessive or 18" of shallow stormwater runoff.