

# LIBERTY HILL DRAINAGE MASTER PLAN

## PHASE II REPORT

### PREPARED FOR:

CITY OF LIBERTY HILL  
926 LOOP 332  
LIBERTY HILL, TEXAS 78642



PREPARED BY



**K·FRIESE**  
**+ ASSOCIATES**

PUBLIC PROJECT ENGINEERING  
FIRM No. 6535

**AUGUST 2018**

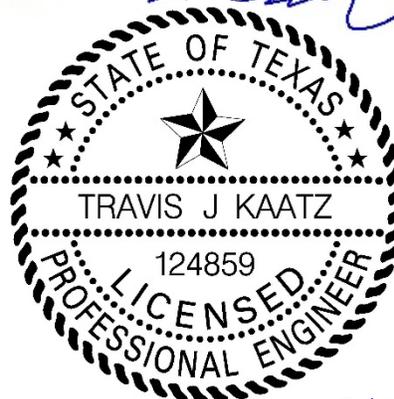
# LIBERTY HILL DRAINAGE MASTER PLAN PHASE II REPORT

Prepared For:

City of Liberty Hill  
926 Loop 332  
Liberty Hill, TX 78642

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*8/9/2018*

August 2018

## TABLE OF CONTENTS

1	GLOSSARY AND ACRONYMS .....	1
2	INTRODUCTION .....	2
3	DRAINAGE CIP DEVELOPMENT .....	2
3.1	PHASE I PROBLEM AREAS.....	2
3.2	UPDATED EXISTING CONDITIONS MODELING .....	3
3.3	PROJECT DEVELOPMENT.....	3
3.4	OPINION OF PROBABLE PROJECT COSTS .....	4
3.5	FINAL CIP PRIORITIZATION.....	4
4	POTENTIAL REGIONAL DETENTION .....	5
5	DRAINAGE POLICY & FUNDING RECOMMENDATIONS .....	6
5.1	RECOMMENDATION #1: IMPLEMENTATION OF A STORMWATER UTILITY FEE .....	6
5.2	RECOMMENDATION #2: MINOR REVISIONS TO DRAINAGE POLICY.....	7
5.3	RECOMMENDATION #3: DEVELOPMENT OF OPERATIONS & MAINTENANCE PROGRAM.....	7

## APPENDICES

- Appendix A: Phase I Problem Areas
- Appendix B: Updated Inundation Maps
- Appendix C: Phase II Project Areas
- Appendix D: Opinion of Probable Project Costs
- Appendix E: Drainage CIP Ranking Criteria
- Appendix F: City-wide Rankings of Drainage CIP
- Appendix G: One Page Summary Reports
- Appendix H: Potential Regional Detention Locations
- Appendix I: City Drainage Basins

## 1 GLOSSARY AND ACRONYMS

Problem Area – defined as identified public issues that pose a risk to property flooding and street flooding.

CIP – Capital Improvement Program

City – City of Liberty Hill

Cross Drainage Structure – A structure conveying flow across a roadway or railroad; this does not include driveway culverts.

ERU – Equivalent Residential Units

FEMA – Federal Emergency Management Program

GIS – Geographic Information System

KFA – K Friese + Associates, Inc.

TCEQ – Texas Commission on Environmental Quality

TNRIS – Texas Natural Resource Information System

## 2 INTRODUCTION

The City of Liberty Hill (City) contracted K Friese + Associates, Inc. (KFA) to perform a comprehensive city-wide drainage study to identify current drainage problems and provide short and long-term solutions for addressing drainage concerns throughout the City limits. The Drainage Master Plan was split into two phases. Phase I, which was completed in August 2017, included data gathering, public involvement and outreach efforts, existing conditions modeling, and inventory and mapping of drainage concerns. The objective of Phase I was to develop a broad and all-inclusive understanding of the city-wide drainage concerns in terms of locations, causes, and risks.

The objective of Phase II is to develop prioritized Capital Improvements Projects (CIP), review the current City code of ordinances and design manuals, recommend revisions to the current City code, and explore various options for implementation of a Drainage Utility Fee.

## 3 DRAINAGE CIP DEVELOPMENT

All communities face the challenge of prioritizing demands to make the best use of their finite resources. The prioritization process identifies the projects which maximize benefit to the community according to the value criteria established by the community. The purpose of Phase II was to develop a drainage Capital Improvement Program (CIP) identifying the top priority projects within the City. The proposed improvements included in each drainage CIP project are based on preliminary level engineering, field visits, and high level topographic information; these are not detailed engineering analysis or design. The following sections discuss the drainage CIP development process and prioritization.

### 3.1 PHASE I PROBLEM AREAS

During Phase I, seventeen (17) problem areas were identified, as shown in **Appendix A**. Problem areas were identified through existing conditions modeling, meetings with City staff, independent KFA field visits, and public outreach efforts. These problems areas were ranked to identify the top priority areas. During the Phase II scoping, it was determined that all 17 problem areas would be analyzed as potential CIP projects. The top 5 problem areas would be analyzed in detail, while the remaining 12 problem areas would be analyzed at a more conceptual level. The complete results of the Phase I problem area prioritization are presented in **Appendix A**. During the initial stages of Phase II, KFA was asked to assist the City with discussions and coordination with Williamson County regarding the CR 200 project currently under design and the adjacent City Park improvements. Additional analysis was performed to identify the future drainage needs for the CR 200 park; therefore, the City Park & CR 200 problem area (B01) was added to the projects for analysis with further detail. The top 5 problem areas with the addition of B01 are presented in **Table 1**.

*Table 1: Phase I Top 6 Problem Areas*

Rank	Problem Area ID	Problem Area Name
1	E04	Jenks Branch Flooding
2	E01	Downtown Flooding
3	F02	East Carson Ave. Flooding
4	D02	West RM 1869 Flooding
5	F04	Liberty Trails Apartments Flooding
6	B01	City Park & CR 200 Flooding

### 3.2 UPDATED EXISTING CONDITIONS MODELING

During Phase I, KFA performed an existing conditions hydrologic and hydraulic analysis utilizing Infoworks ICM v7.0 to simulate a preliminary assessment of existing conditions throughout the City. The model was developed to act as a screening tool to aid in identifying problem areas. The best available data during Phase I was 2008 LiDAR. In early 2018, the Texas Natural Resource Information System (TNRIS) published 2017 LiDAR information covering the City. The Phase I model was updated with the newly available 2017 LiDAR information to form a better understanding of the problem areas. A screen shot of the modeling inundation results is show in **Figure 1**. Inundation areas from the 100-yr storm event are provided in **Appendix B**.



*Figure 1: 100-yr ICM Inundation Example*

### 3.3 PROJECT DEVELOPMENT

The Phase I problem areas were reviewed and analyzed to determine if problem areas could be combined or grouped into a single project. After this review, it was determined that all 17 problem areas would be transitioned into standalone CIP projects. The Jenks Branch problem area (E04) was split into two separate CIP project. The first CIP project (E04), addresses improvement of Jenks Branch along with culvert improvements at RM 1869 and Loop 332. The second CIP project (E06), proposes a regional detention pond on Jenks Branch upstream of SH 29. The regional pond will help mitigate future upstream development and can potentially reduce existing downstream flooding. The construction of a regional pond was split from the original problem area because it can be constructed independently. Additionally, the regional detention project could be funded through a regional detention program or developer agreements. The spatial location of each identified drainage CIP project is provided in **Appendix C**.

*Table 2: Drainage CIP List*

<b>Project ID</b>	<b>Project Name</b>
B01	City Park & CR 200 Drainage Improvements
B02	J&Z Auto Works
B03	Deep Lake Cr. Drainage Improvements
D01	Liberty Hill Elementary School Drainage Improv.
D02	West RM 1869 Drainage Improvements
D03	Nita Cove Drainage Improvements
D04	Taylor Smith & 1869 Drainage Improvements
D05	Barton Ln Drainage Improvements
E01	Downtown Drainage Improvements
E02	South CR 279 Drainage Improvements
E03	Bryson Bend Drainage Improvements
E04	Jenks Branch Drainage Improvements
E05	Stubblefield Lane Drainage Improvements
E06	Jenks Branch Regional Pond
F01	Loop 332 Drainage Improvements
F02	East Carson Ave. Drainage Improvements
F03	Liberty Hill Intermediate School Drainage Improv.
F04	Liberty Trails Apartments Drainage Improv.

### *3.4 OPINION OF PROBABLE PROJECT COSTS*

An opinion of probable cost, provided in **Appendix D**, was developed for each CIP project to assist with the final CIP prioritization and aid the City in their budgeting and planning efforts. The opinion of probable cost includes estimates for the CIP construction costs, professional services to complete final design, construction phase services, and legal fees. All unit costs provided are in 2018 dollars and are based on recent construction bid data and KFA’s experience with similar projects. A 30% contingency was included in construction cost estimates due to the preliminary nature of the conceptual designs.

The construction duration for each CIP was estimated based on production rates from KFA’s experience with projects of similar scope and design. For example, experience working with construction contractors, KFA estimates that approximately 200 feet of ditch grading can be completed within a single working day. Construction phase services were estimated to span the entire project construction duration.

### *3.5 FINAL CIP PRIORITIZATION*

A City specific ranking method was developed to systematically compare the projects and objectively prioritize the CIP. During Phase I, meetings were held with the City to identify criteria and methods for the ranking assessment. Six criteria were identified based on discussion of community values, risk, and typical project processes. KFA developed a weight for each criterion and scoring categories, and each problem area was scored for each criterion to give a score out of a maximum 100 points.

For Phase II, two additional categories were added. The first category assesses the project cost described in **Section 3.4**. A higher score is given for projects with lower project cost, while a lower score is given to more expensive projects. Incorporating project cost into the prioritization assesses the benefit vs cost of

the project. The second category is an assessment of the long-term maintenance requirements for the completed project. Project solutions with low maintenance needs were score higher than projects requiring frequent or cost intensive maintenance.

The detailed weights and categories for each criterion are provided in **Appendix E**. After the scoring criteria and weighting were established, KFA objectively scored each individual problem area. The individual category scores, total score, and rank of each problem area is provided in **Appendix F**.

*Table 3: Drainage CIP Ranking Summary*

Rank	Project ID	Project Name	Total Score	Estimated Cost
1	F02	East Carson Ave. Drainage Improvements	94	\$ 265,104
2	E04	Jenks Branch Drainage Improvements	93	\$ 1,424,832
3	E01	Downtown Drainage Improvements	91	\$ 1,294,757
4	D02	West RM 1869 Drainage Improvements	90	\$ 686,910
5	F04	Liberty Trails Apartments Drainage Improv.	83	\$ 207,329
6	E06	Jenks Branch Regional Pond	82	\$ 1,424,832
7	B01	City Park & CR 200 Drainage Improvements	77	\$ 385,530
8	E02	South CR 279 Drainage Improvements	77	\$ 211,510
9	E03	Bryson Bend Drainage Improvements	77	\$ 313,840
10	D01	Liberty Hill Elementary School Drainage Improv.	73	\$ 622,462
11	D05	Barton Ln Drainage Improvements	70	\$ 617,817
12	B03	Deep Lake Cr. Drainage Improvements	69	\$ 490,768
13	F01	Loop 332 Drainage Improvements	68	\$ 171,315
14	D04	Taylor Smith & 1869 Drainage Improvements	64	\$ 394,953
15	D03	Nita Cove Drainage Improvements	56	\$ 406,045
16	E05	Stubblefield Lane Drainage Improvements	55	\$ 212,841
17	F03	Liberty Hill Intermediate School Drainage Improv.	47	\$ 393,749
18	B02	J&Z Auto Works	32	\$ 575,411

A summary sheet for each CIP project describing the problem area, the proposed solution, assumptions made, estimated cost, project ranking, and a schematic drawing of the solution is provided in **Appendix G**.

#### 4 POTENTIAL REGIONAL DETENTION

During Phase I and Phase II, KFA explored potential regional detention sites throughout the City based on public and staff input, available open space, and most efficient hydrologic locations within the watersheds. Regional detention can reduce flooding at downstream problem areas and/or reduce the cost of improvements needed to solve the problem areas. Additionally, regional detention can mitigate for future development within the watershed. Drainage storage volume added to the ponds to mitigate future development can be sold to developers to supplement their detention needs. Regional ponds reduce the number of detention ponds within a watershed, increasing the amount of developable land, while providing detention at a single location that can be easily maintained and also be utilized as parks or recreational areas. The potential regional detention locations identified are presented in **Appendix H**. The identification of potential regional detention sites will help the City with future planning and discussions with developers as surrounding properties continue to develop.

## 5 DRAINAGE POLICY & FUNDING RECOMMENDATIONS

KFA conducted a review of the current City drainage policies to identify opportunities to improve drainage regulations to ensure responsible development occurs as the City continues to develop and expand. The City is geographically positioned between the North and South Forks of the San Gabriel River. This creates a unique situation in that the City does not share watershed areas with other adjacent Cities. No other major Cities drain to the City of Liberty Hill, and the City runoff generally does not drain to other Cities. This gives the City the unique opportunity to have full control of how stormwater is regulated and drained; a major advantage as the region grows. The City currently utilizes the City of Round Rock Drainage Policy to regulate development. Out of this review, three recommendations were identified to the overall City drainage policy and funding opportunities as outlined below.

### 5.1 Recommendation #1: Implementation of a Stormwater Utility Fee

It is recommended that the City of Liberty Hill implement a Stormwater Utility Fee. KFA has presented the concept of a Stormwater Utility Fee to Staff and Council multiple times with positive feedback. Various municipalities throughout Central Texas have such fees; such as the cities of Georgetown, Taylor, Round Rock, Austin, and Kyle. The fee is a monthly user fee that can fund maintenance and improvements to the City drainage system. It is similar to other utility fees for water, sewer, and waste.

This drainage master plan effort has identified over \$9.8 million in drainage improvement needs. The Stormwater Utility Fee will develop a dedicated fund independent from the General Fund that can be utilized to fix the existing drainage problems throughout the City. Furthermore, the fee can be used to maintain the existing and future drainage systems to ensure the sustainability of the stormwater infrastructure. The fee can also help fund compliance with the state Municipal Separate Storm Sewer Systems (MS4) and development and implementation of an operations and maintenance program.

Stormwater Utility Fees are governed by the Texas Local Government Code Chapter 552.C. The implementation of the fee will require an ordinance notification and public hearing. The charge for a storm water utility fee must be directly related to property runoff characteristics, reasonable, equitable, and non-discriminatory. The easiest way to measure property runoff characteristics is through impervious cover. It is recommended that the fee be based on an Equivalent Residential Unit (ERU).

An ERU is a value that represents the impervious cover of the average residential lot. A study will need to be performed utilizing aerial imagery and LiDAR to establish the ERU for the City of Liberty Hill. The City will develop a stormwater utility fee that will be charged per ERU. All single-family residential lots represent a single ERU and will be charge the same fee. However, commercial developments will be charge based on the number of ERU's for their site.

For example, if the established ERU for the City is 3000 square feet and the stormwater utility fee is \$3/month per ERU

- All single family residential lots will be charged \$3/month.
- A commercial or multifamily development with 30,000 square feet of impervious cover will be charged 10 ERU's (30,000/300) or a fee of \$30/month (\$3/month x 10 ERU's).

It is recommended that the City initially charge \$3 per ERU per month. This will develop a small revenue stream that can potentially be increased as the City grows and stormwater infrastructure needs increase.

## 5.2 Recommendation #2: Minor Revisions to Drainage Policy

It is recommended that the City continue to reference the City of Round Rock Drainage Policy. However, a few areas of revisions were identified that would improve the City policy to protect against new drainage problems due to future development. Section 5.10 of the Unified Development Code discusses the current drainage requirements. It is recommended that this section be expanded upon to include some specific policy items specific to the City. This would include the following:

- Stormwater Management Program – The development of a stormwater management program would initiate coordination between the City and developers to allow for increased collaboration in the design and construction of stormwater facilities. This program would include concise text to define the purpose of the program that would encourage development to participate in either Regional Detention or Creek Conveyance Preservation. Participation in the program would not be required, but optional for new development.
  - Regional Detention: Development would have the opportunity to participate with the City to develop regional detention at one of the identified areas outlined in Section 4 of this report.
  - Creek Conveyance Preservation: Development would have the opportunity to dedicate the downstream fully developed 100-year floodplain downstream as easement in lieu of detention.
- Requirement of “No Adverse Impact” for all development. A definition of “No Adverse Impact” would be included in the UDC to better regulate the addition of impervious cover from development. This would require development to fully analyze the 2-, 10-, 25-, and 100-year storm events to ensure that the construction does not increase peak storm runoff rates or water surface elevations downstream. No increase would be defined as 0.0 cubic feet per second increase and 0.00’ increase to water surface elevations.
- Define rainfall depths and intensities to be based on the new NOAA Atlas 14 study. The study is expected to be published by the end of September 2018.
- Include additional reference to TCEQ Edwards Aquifer requirements for water quality treatment to newly developed impervious cover.

## 5.3 Recommendation #3: Development of Operations & Maintenance Program

Over-vegetated creeks and clogged inlets can be a major contributor to flooding during large rainfall events. Frequent maintenance of the City’s stormwater infrastructure is a key component to a successful stormwater program. It is recommended that the City develop a simple, yet comprehensive plan to adequately maintain creeks, roadside ditches, culverts, bridges, storm drain pipes, inlets, detention ponds, and water quality ponds throughout the City. The O&M program can be funded by the Stormwater Utility Fee. Citizens would see an immediate benefit with an Operations and Maintenance Program.

*Table 4: Operations & Maintenance List*

<b>Drainage Feature</b>	<b>Inspection Interval</b>	<b>Maintenance Type</b>	<b>Maintenance Interval</b>
Creeks	Biannual	mowing, debris removal	Annual
Storm Sewer	Biannual	sediment removal	Annual
Culverts/bridges	Biannual	sediment removal	Annual
Ponds	Quarterly	mowing	Quarterly

# Appendices

*Appendix A: Phase I Problem Areas*

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### Legend

-  Identified Problem Areas
-  Public Survey Response
-  City Limits
-  Railroad
-  Streams
- FEMA Floodplain**
-  Zone A
-  Zone AE

## City of Liberty Hill Drainage Master Plan

### Phase I Identified Problem Areas

Sheet 1 of 1



Date: 8/22/2017



**CITY OF LIBERTY HILL  
LIBERTY HILL DRAINAGE MASTER PLAN - PHASE I  
IDENTIFIED PROBLEM AREAS**



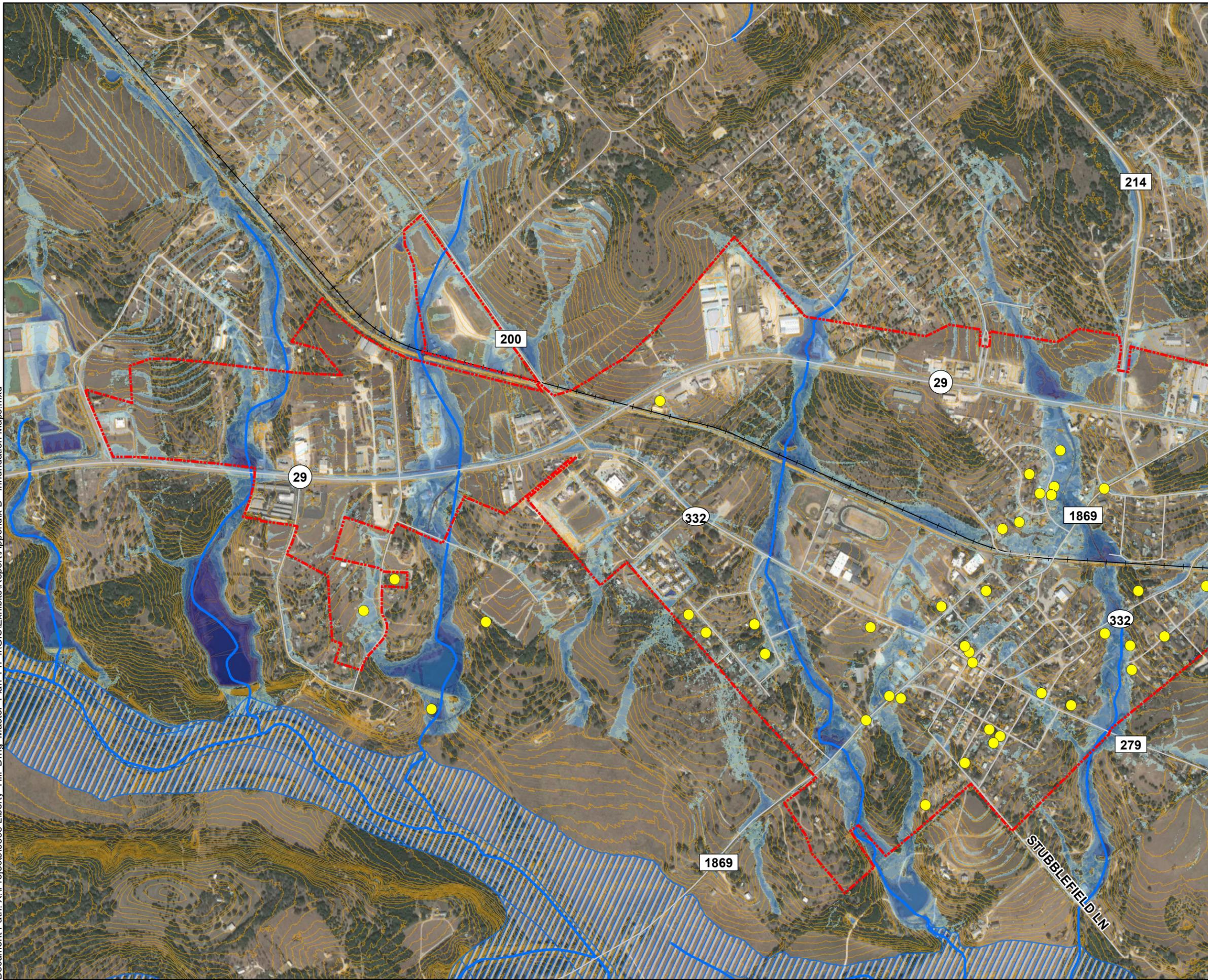
ID	Problem Area Name	Problem Description	Flooding Source	Problem Type	Citizen Complaints
B01	City Park & CR 200 Flooding	Two tributaries flow under CR 200 and into City Park with significant inundation widths throughout the Park.	Creek Flooding	Flooding - Streets Flooding - Park	0
B02	J&Z Auto Works	Modeling simulation shows potential for structural flooding west of creek as water flows through City Park and under the Railroad Crossing	Creek Flooding	Flooding - Buildings	0
B03	Deep Lake Cr. Flooding	Residents have reported the crossing at Deep Lake Circle overtopping and erosion around the downstream headwall. Heavy vegetation upstream and downstream of the crossing is restricting conveyance.	Creek Flooding	Flooding - Streets	3
D01	Liberty Hill Elementary School Flooding	Existing conditions modeling shows a large inundation area to the east of Liberty Hill Elementary School. A residential structure is inundated at the intersection of Forrest Drive and Loop 332.	Creek Flooding	Flooding - Streets Flooding - Yards	2
D02	West RM 1869 Flooding	Creek backs up due to undersized culvert at RM 1869. Residents have reported increased flooding after the construction of the church parking lot. Homes at 3502, 3501, and 3610 have reported flooding. Ditches along RM 1869 need to be improved.	Creek Flooding	Flooding - Buildings Flooding - Streets	3
D03	Nita Cove Flooding	Nita Cove overtops in minor rain events and restricts access to three homes.	Creek Flooding	Flooding - Streets	1
D04	Taylor Smith & 1869 Flooding	Simulation shows the culverts on FM 1869 are undersized at this crossing and there is a potential for frequently roadway overtopping.	Creek Flooding	Flooding- Streets	0
D05	Barton Ln Flooding	Ditches along Myrtle, Grange, Munro, Fallwell and Aynsworth are shallow or nonexistent. Residents have reported extended ponding in this area.	Localized Flooding	Flooding - Streets Flooding - Yards	4
E01	Downtown Flooding	Ditch along RM 1869 and Myrtle Street are inadequate to convey flow to cross culverts. Cross culvert near Hickman and Loop 332 and downstream channel to Myrtle Street are undersized. Residents have reported flooding at the intersections of Forrest Street and Young. Flow is not properly conveyed along CR 279 and floods the yards of adjacent homes.	Localized Flooding	Flooding - Streets Flooding - Yards	6
E02	South CR279 Flooding	Drainage crossing is not adequately sized. Residents have reported the road being closed 4-5 times in the last 10 years.	Creek Flooding	Flooding - Streets	1
E03	Bryson Bend Flooding	Residents have reported flooding in their yards that stands for several days. Driveway culverts are small and may clog during minor rains. Additional capacity is needed.	Localized Flooding	Flooding - Streets Flooding - Yards	7
E04	Jenks Branch Flooding	Residents report that the creek floods and has inundated structures. The structure at RM 1869 is undersized and increased debris cause flow to backup. Residents report flooding of homes during large rains and damages to the Carson Ave cul-de-sac from the adjacent stream. Residents also reported that the structure at Loop 332 is inadequate and debris is accumulating in the creek.	Creek Flooding	Flooding - Buildings Flooding - Streets Flooding - Yards	7
E05	Stubblefield Lane	Residential home is at the confluence of two drainage ways and has reported flooding.	Creek Flooding	Flooding - Buildings	0
F01	Loop 332 Flooding	Railroad culvert is undersized causing water to flow across the water tower property and properties of 209 and 210 Carson Ave. The ditch along Loop 332 adjacent to the duplexes floods and has standing water.	Localized Flooding	Flooding - Streets	4
F02	East Carson Ave. Flooding	Ditch near 210 Carson Ave has filled with sediment and no longer adequately conveys flow. Ditches along Carson Ave are shallow and have standing water.	Localized Flooding	Flooding - Ditch	2
F03	Liberty Hill Intermediate School Flooding	Residents have reported flooding of the school playground during minor rain events.	Creek Flooding	Flooding - Yards	1
F04	Liberty Trails Apartments Flooding	Flooding of the Liberty Trails Apartments has been reported to the City.	Creek Flooding	Flooding - Buildings	0

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE I  
PROBLEM AREA PRIORITIZATION**



Rank	Problem Area ID	Problem Area Name	Property Flooding (30 max)	Street Flooding (20 max)	Citizen Input (15 max)	Overlap with Other CIP (15 max)	Availability of External Funding (10 max)	Outside Entity Coordination (9 max)	Total (100 max)
1	E04	Jenks Branch Flooding	30	21	15	5	10	3	84
2	E01	Downtown Flooding	20	21	15	15	5	3	79
3	F02	East Carson Ave. Flooding	30	7	15	5	10	9	76
4	D02	West RM 1869 Flooding	30	21	15	5	0	3	74
5	F04	Liberty Trails Apartments Flooding	30	14	0	0	10	6	60
6	B01	City Park & CR 200 Flooding	10	21	0	15	10	3	59
7	D01	Liberty Hill Elementary School Flooding	10	21	10	5	5	6	57
8	E03	Bryson Bend Flooding	20	7	15	5	0	9	56
9	E02	South CR279 Flooding	10	21	5	10	5	3	54
10	D05	Barton Ln Flooding	20	7	15	0	0	9	51
11	B03	Deep Lake Cr. Flooding	20	7	15	0	0	9	51
12	D04	Taylor Smith & 1869 Flooding	20	21	0	0	5	3	49
13	F01	Loop 332 Flooding	0	21	15	5	5	0	46
14	D03	Nita Cove Flooding	20	7	5	0	0	9	41
15	E05	Stubblefield Lane	10	14	5	0	0	3	32
16	F03	Liberty Hill Intermediate School Flooding	10	0	5	0	5	6	26
17	B02	J&Z Auto Works	10	0	0	0	0	9	19

*Appendix B: Updated Inundation Maps*



### Legend

-  Public Survey Response
-  City Limits
-  Railroad
-  Streams
-  FEMA Floodplain

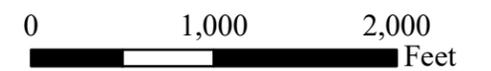
### ICM Inundation Depth

-  3 in - 6 in
-  6 in - 1 ft
-  1 ft - 2ft
-  2 ft - 4 ft
-  4 ft - 6 ft
-  > 6 ft

## City of Liberty Hill Drainage Master Plan

### Phase II Updated Inundation Maps

Sheet 1 of 3



Date: 7/30/2018



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### Legend

- Public Survey Response
- City Limits
- Railroad
- Streams
- FEMA Floodplain

### ICM Inundation Depth

- 3 in - 6 in
- 6 in - 1 ft
- 1 ft - 2ft
- 2 ft - 4 ft
- 4 ft - 6 ft
- > 6 ft

## City of Liberty Hill Drainage Master Plan

### Phase II Updated Inundation Maps

Sheet 2 of 3



Date: 7/30/2018



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### Legend

-  Public Survey Response
-  City Limits
-  Railroad
-  Streams
-  FEMA Floodplain

### ICM Inundation Depth

-  3 in - 6 in
-  6 in - 1 ft
-  1 ft - 2ft
-  2 ft - 4 ft
-  4 ft - 6 ft
-  > 6 ft

## City of Liberty Hill Drainage Master Plan

### Phase II Updated Inundation Maps

Sheet 3 of 3

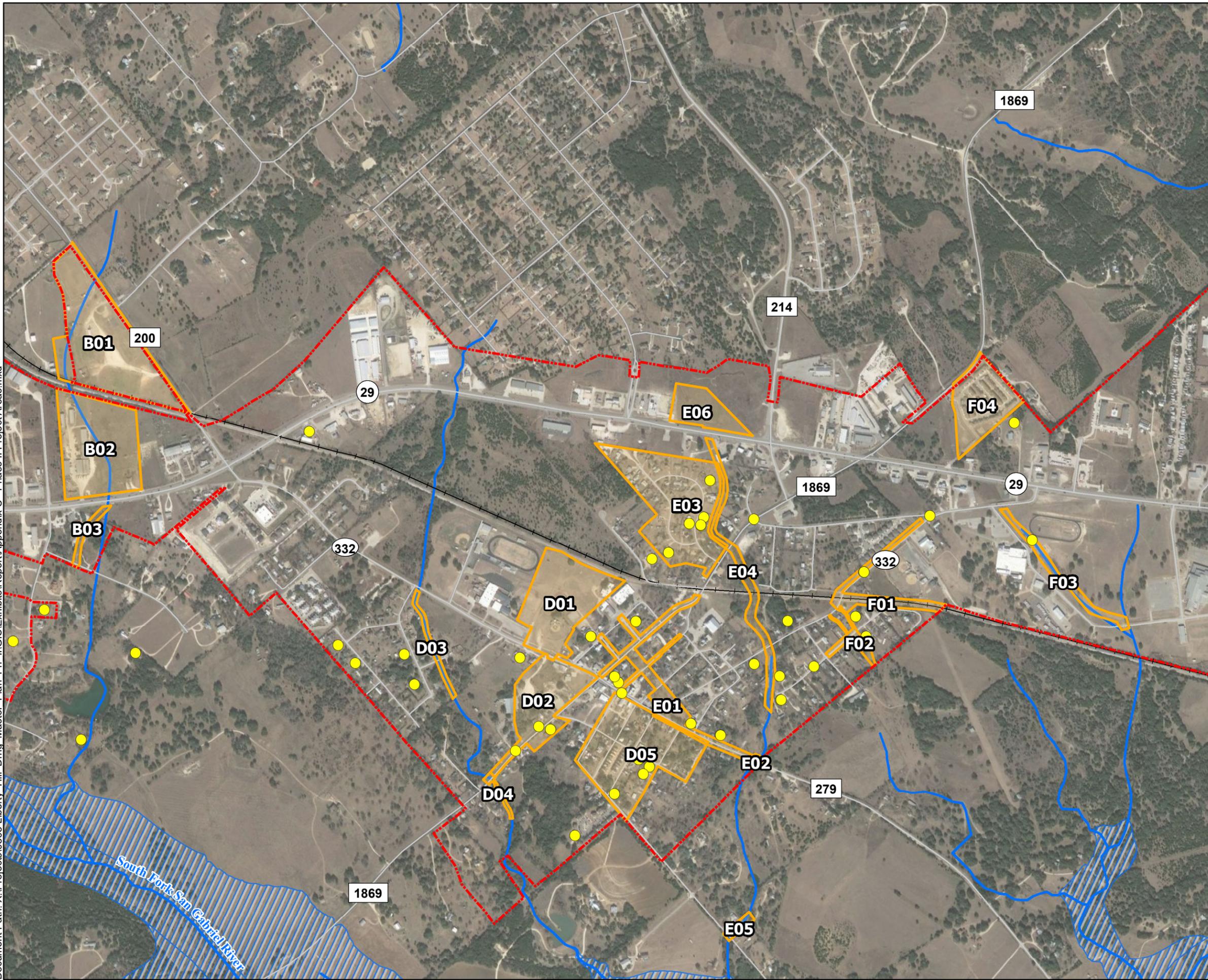


Date: 7/30/2018



*Appendix C: Phase II Project Areas*

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### Legend

-  Project Area
-  Public Survey Response
-  City Limits
-  Roads
-  Railroad
-  Streams
-  FEMA Floodplain

## City of Liberty Hill Drainage Master Plan

### Phase II Project Areas

Sheet 1 of 1



Date: 7/30/2018



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FIRM NO. 6535

*Appendix D: Opinion of Probable Project Costs*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
EAST CARSON AVE. DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 20,500	\$ 20,500
SURVEY (5%)	1	LS	\$ 10,300	\$ 10,300
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 30,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	56	LF	\$ 40	\$ 2,240
REMOVE SET	4	EA	\$ 250	\$ 1,000
PIPE, 18" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	72	LF	\$ 110	\$ 7,920
PIPE, 24" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	56	LF	\$ 130	\$ 7,280
SAFETY END TREATMENT, TYPE II, 18" DIA	6	EA	\$ 1,500	\$ 9,000
SAFETY END TREATMENT, TYPE II, 24" DIA	4	EA	\$ 2,000	\$ 8,000
DITCH IMPROVEMENTS	557	LF	\$ 35	\$ 19,495
CHANNEL IMPROVEMENTS	998	LF	\$ 50	\$ 49,900
RECONSTRUCTION OF DRIVEWAYS	3	EA	\$ 3,500	\$ 10,500
CUT AND RESTORE PAVEMENT	32	SY	\$ 120	\$ 3,840
REVEGETATION	3,208	SY	\$ 4	\$ 12,832
BARRICADES, SIGNS, AND TRAFFIC HANDLING	3	MO	\$ 4,000	\$ 12,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,450	\$ 1,450
MOBILIZATION (8%)	1	LS	\$ 11,700	\$ 11,700
<b>SUBTOTAL</b>				<b>\$ 157,157</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 47,147</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 204,304</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	3	MO	\$ 5,000	\$ 15,000
LEGAL	3	PARCEL	\$ 5,000	\$ 15,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 30,000</b>

**OPINION OF PROBABLE TOTAL PROJECT COST: \$ 265,104**

\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
JENKS BRANCH DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (8%)	1	LS	\$ 91,200	\$ 91,200
SURVEY (5%)	1	LS	\$ 57,000	\$ 57,000
ENVIRONMENTAL (5%)	1	LS	\$ 57,000	\$ 57,000
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 205,200</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CLEARING AND GRUBBING	4.5	AC	\$ 4,000	\$ 18,000
REMOVE PIPE	80	LF	\$ 40	\$ 3,200
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (8 FT. X 6 FT.)	80	LF	\$ 675	\$ 54,000
PRECAST CONCRETE BOX CULVERTS (8 FT. X 4 FT.)	40	LF	\$ 500	\$ 20,000
HEADWALL	2	EA	\$ 20,000	\$ 40,000
MODIFY EXISTING HEADWALL	2	EA	\$ 10,000	\$ 20,000
BRIDGE RAIL	180	LF	\$ 75	\$ 13,500
RIPRAP (STONE PROTECTION)(24 IN)	178	CY	\$ 150	\$ 26,700
CHANNEL EXCAVATION	15,000	CY	\$ 25	\$ 375,000
TOP SOIL	3,000	CY	\$ 40	\$ 120,000
REVEGETATION	17,800	SY	\$ 4	\$ 71,200
BARRICADES, SIGNS, AND TRAFFIC HANDLING	10	MO	\$ 4,000	\$ 40,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 8,040	\$ 8,040
MOBILIZATION (8%)	1	LS	\$ 65,000	\$ 65,000
<b>SUBTOTAL</b>				<b>\$ 876,640</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 262,992</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 1,139,632</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	10	MO	\$ 5,000	\$ 50,000
LEGAL	1	LS	\$ 30,000	\$ 30,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 80,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>	<b>\$ 1,424,832</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
DOWNTOWN DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 107,400	\$ 107,400
SURVEY (5%)	1	LS	\$ 53,700	\$ 53,700
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 161,100</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	60	LF	\$ 40	\$ 2,400
REMOVE BOX CULVERT	30	LF	\$ 80	\$ 2,400
REMOVE SET	4	EA	\$ 250	\$ 1,000
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PIPE, 24" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	1,325	LF	\$ 130	\$ 172,250
PIPE, 30" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	280	LF	\$ 150	\$ 42,000
PRECAST CONCRETE BOX CULVERTS (4 FT. X 3 FT.)	30	LF	\$ 200	\$ 6,000
PRECAST CONCRETE BOX CULVERTS (5 FT. X 3 FT.)	910	LF	\$ 250	\$ 227,500
INLET	6	EA	\$ 4,000	\$ 24,000
SAFETY END TREATMENT	3	EA	\$ 2,000	\$ 6,000
HEADWALL	3	EA	\$ 10,000	\$ 30,000
CUT AND RESTORE PAVEMENT	1,272	SY	\$ 120	\$ 152,640
DITCH IMPROVEMENTS	700	LF	\$ 35	\$ 24,500
CHANNEL IMPROVEMENTS	220	LF	\$ 60	\$ 13,200
REVEGETATION	1,430	SY	\$ 4	\$ 5,720
RECONSTRUCTION OF DRIVEWAYS	5	EA	\$ 3,500	\$ 17,500
BARRICADES, SIGNS, AND TRAFFIC HANDLING	7	MO	\$ 4,000	\$ 28,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 7,580	\$ 7,580
MOBILIZATION (8%)	1	LS	\$ 61,200	\$ 61,200
<b>SUBTOTAL</b>				<b>\$ 825,890</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 247,767</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 1,073,657</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	7	MO	\$ 5,000	\$ 35,000
LEGAL	5	PARCEL	\$ 5,000	\$ 25,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 60,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>	<b>\$ 1,294,757</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
WEST RM 1869 DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 57,200	\$ 57,200
SURVEY (5%)	1	LS	\$ 28,600	\$ 28,600
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 85,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	248	LF	\$ 40	\$ 9,920
REMOVE SET	2	EA	\$ 250	\$ 500
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PIPE, 24" DIA, RCP CLASS III	1,040	LF	\$ 130	\$ 135,200
PRECAST CONCRETE BOX CULVERTS (6 FT. X 3 FT.)	100	LF	\$ 275	\$ 27,500
SAFETY END TREATMENT, TYPE II, 24" DIA	8	EA	\$ 2,000	\$ 16,000
HEADWALL	2	EA	\$ 15,000	\$ 30,000
DROP INLET	4	EA	\$ 6,000	\$ 24,000
ROADSIDE DITCH IMPROVEMENTS	565	LF	\$ 35	\$ 19,775
CHANNEL IMPROVEMENTS	1,000	LF	\$ 50	\$ 50,000
RECONSTRUCTION OF DRIVEWAYS	9	EA	\$ 3,500	\$ 31,500
RIPRAP (STONE PROTECTION)(24 IN)	67	CY	\$ 150	\$ 10,050
REVEGETATION	6,560	SY	\$ 4	\$ 26,240
BARRICADES, SIGNS, AND TRAFFIC HANDLING	5	MO	\$ 4,000	\$ 20,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 4,030	\$ 4,030
MOBILIZATION (8%)	1	LS	\$ 32,600	\$ 32,600
<b>SUBTOTAL</b>				<b>\$ 439,315</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 131,795</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 571,110</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	5	MO	\$ 5,000	\$ 25,000
LEGAL	1	PARCEL	\$ 5,000	\$ 5,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 30,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>	<b>\$ 686,910</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY TRAILS APARTMENTS DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 17,200	\$ 17,200
SURVEY (5%)	1	LS	\$ 8,600	\$ 8,600
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 25,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE BOX CULVERT	80	LF	\$ 80	\$ 6,400
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
REMOVE AND REPLACE FENCE	120	LF	\$ 30	\$ 3,600
PRECAST CONCRETE BOX CULVERTS (6 FT. X 4 FT.)	80	LF	\$ 275	\$ 22,000
HEADWALL	2	EA	\$ 15,000	\$ 30,000
CUT AND RESTORE PAVEMENT	52	SY	\$ 120	\$ 6,240
ROADSIDE DITCH IMPROVEMENTS	265	LF	\$ 35	\$ 9,275
CHANNEL IMPROVEMENTS	360	LF	\$ 50	\$ 18,000
EMBANKMENT	260	CY	\$ 15	\$ 3,900
REVEGETATION	2,880	SY	\$ 4	\$ 11,520
BARRICADES, SIGNS, AND TRAFFIC HANDLING	2	MO	\$ 4,000	\$ 8,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,210	\$ 1,210
MOBILIZATION (8%)	1	LS	\$ 9,800	\$ 9,800
<b>SUBTOTAL</b>				<b>\$ 131,945</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 39,584</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 171,529</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	2	MO	\$ 5,000	\$ 10,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 10,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 207,329</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
JENKS BRANCH REGIONAL POND  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (8%)	1	LS	\$ 55,700	\$ 55,700
SURVEY (5%)	1	LS	\$ 34,900	\$ 34,900
ENVIRONMENTAL (5%)	1	LS	\$ 34,900	\$ 34,900
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 125,500</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
EXCAVATION	16,000	CY	\$ 15	\$ 240,000
POND OUTLET STRUCTURE	1	LS	\$ 40,000	\$ 40,000
TOP SOIL	2,670	CY	\$ 40	\$ 106,800
REVEGETATION	16,000	SY	\$ 4	\$ 64,000
BARRICADES, SIGNS, AND TRAFFIC HANDLING	10	MO	\$ 4,000	\$ 40,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 4,910	\$ 4,910
MOBILIZATION (8%)	1	LS	\$ 39,700	\$ 39,700
<b>SUBTOTAL</b>				<b>\$ 535,410</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 160,623</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 696,033</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	10	MO	\$ 5,000	\$ 50,000
EASEMENT ACQUISITION	245291	SF	\$ 1.60	\$ 392,466
LEGAL	1	LS	\$ 30,000	\$ 30,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 472,466</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 1,293,999</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
CITY PARK CR 200 DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 31,000	\$ 31,000
SURVEY (5%)	1	LS	\$ 15,500	\$ 15,500
TOTAL ENGINEERING AND SURVEYING COSTS:				\$ 46,500

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CHANNEL IMPROVEMENTS	850	LF	\$ 50	\$ 42,500
DITCH IMPROVEMENTS	845	LF	\$ 25	\$ 21,125
EXCAVATION (POND)	2,890	CY	\$ 15	\$ 43,350
EMBANKMENT	500	CY	\$ 15	\$ 7,500
POND OUTLET STRUCTURE	1	LS	\$ 20,000	\$ 20,000
TOP SOIL (POND)	490	CY	\$ 40	\$ 19,600
REVEGETATION	10,940	SY	\$ 4	\$ 43,760
BARRICADES, SIGNS, AND TRAFFIC HANDLING	5	MO	\$ 4,000	\$ 20,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 2,180	\$ 2,180
MOBILIZATION (8%)	1	LS	\$ 17,700	\$ 17,700
SUBTOTAL				\$ 237,715
CONTINGENCY (30%)				\$ 71,315
TOTAL CONSTRUCTION COSTS:				\$ 309,030

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	5	MO	\$ 5,000	\$ 25,000
LEGAL	1	PARCEL	\$ 5,000	\$ 5,000
TOTAL OTHER COSTS:				\$ 30,000

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 385,530</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
SOUTH CR 279 DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 17,600	\$ 17,600
SURVEY (5%)	1	LS	\$ 8,800	\$ 8,800
TOTAL ENGINEERING AND SURVEYING COSTS:				\$ 26,400

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	80	LF	\$ 40	\$ 3,200
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (9 FT. X 5 FT.)	80	LF	\$ 650	\$ 52,000
HEADWALL	2	EA	\$ 20,000	\$ 40,000
CUT AND RESTORE PAVEMENT	80	SY	\$ 120	\$ 9,600
RIPRAP (STONE PROTECTION)(24 IN)	54	CY	\$ 150	\$ 8,100
REVEGETATION	140	SY	\$ 4	\$ 560
BARRICADES, SIGNS, AND TRAFFIC HANDLING	2	MO	\$ 4,000	\$ 8,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,240	\$ 1,240
MOBILIZATION (8%)	1	LS	\$ 10,000	\$ 10,000
SUBTOTAL				\$ 134,700
CONTINGENCY (30%)				\$ 40,410
TOTAL CONSTRUCTION COSTS:				\$ 175,110

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	2	MO	\$ 5,000	\$ 10,000
TOTAL OTHER COSTS:				\$ 10,000

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 211,510</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
BRYSON BEND DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 24,700	\$ 24,700
SURVEY (5%)	1	LS	\$ 12,400	\$ 12,400
TOTAL ENGINEERING AND SURVEYING COSTS:				\$ 37,100

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
PIPE, 30" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	40	LF	\$ 150	\$ 6,000
SAFETY END TREATMENT, TYPE II, 30" DIA	2	EA	\$ 2,500	\$ 5,000
DITCH IMPROVEMENTS	3,100	LF	\$ 20	\$ 62,000
CUT AND RESTORE PAVEMENT	20	SY	\$ 120	\$ 2,400
RECONSTRUCTION OF DRIVEWAYS (INCLUDING CULVERT)	16	EA	\$ 4,000	\$ 64,000
REVEGETATION	4,140	SY	\$ 4	\$ 16,560
BARRICADES, SIGNS, AND TRAFFIC HANDLING	6	MO	\$ 3,000	\$ 18,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,740	\$ 1,740
MOBILIZATION (8%)	1	LS	\$ 14,100	\$ 14,100
SUBTOTAL				\$ 189,800
CONTINGENCY (30%)				\$ 56,940
TOTAL CONSTRUCTION COSTS:				\$ 246,740

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	6	MO	\$ 5,000	\$ 30,000
TOTAL OTHER COSTS:				\$ 30,000

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 313,840</b>
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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY HILL ELEMENTARY DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 49,400	\$ 49,400
SURVEY (5%)	1	LS	\$ 24,700	\$ 24,700
ENVIRONMENTAL (5%)	1	LS	\$ 24,700	\$ 24,700
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 98,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE BOX CULVERT	30	LF	\$ 80	\$ 2,400
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (8 FT. X 5 FT.)	30	LF	\$ 650	\$ 19,500
PRECAST CONCRETE BOX CULVERTS (5 FT. X 4 FT.)	50	LF	\$ 250	\$ 12,500
HEADWALL	2	EA	\$ 15,000	\$ 30,000
HEADWALL	2	EA	\$ 10,000	\$ 20,000
CUT AND RESTORE PAVEMENT	41	SY	\$ 120	\$ 4,920
RECONSTRUCTION OF DRIVEWAYS	1	EA	\$ 3,500	\$ 3,500
CHANNEL IMPROVEMENTS	865	LF	\$ 60	\$ 51,900
POND EXCAVATION	2,770	CY	\$ 15	\$ 41,550
POND EMBANKMENT	1,860	CY	\$ 15	\$ 27,900
POND OUTLET STRUCTURE	1	LS	\$ 30,000	\$ 30,000
REVEGETATION	19,470	SY	\$ 4	\$ 77,880
BARRICADES, SIGNS, AND TRAFFIC HANDLING	6	MO	\$ 4,000	\$ 24,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 3,490	\$ 3,490
MOBILIZATION (8%)	1	LS	\$ 28,200	\$ 28,200
<b>SUBTOTAL</b>				<b>\$ 379,740</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 113,922</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 493,662</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	6	MO	\$ 5,000	\$ 30,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 30,000</b>

**OPINION OF PROBABLE TOTAL PROJECT COST: \$ 622,462**

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**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
BARTON LANE DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 51,200	\$ 51,200
SURVEY (5%)	1	LS	\$ 25,600	\$ 25,600
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 76,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	22	LF	\$ 40	\$ 880
PIPE, 18" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	370	LF	\$ 110	\$ 40,700
PIPE, 30" DIA, RCP CLASS III, W/ EXCAVATION AND BACKFILL	30	LF	\$ 150	\$ 4,500
SAFETY END TREATMENT, TYPE II, 18" DIA	16	EA	\$ 1,500	\$ 24,000
SAFETY END TREATMENT, TYPE II, 30" DIA	2	EA	\$ 2,500	\$ 5,000
DITCH IMPROVEMENTS	5,300	LF	\$ 30	\$ 159,000
CUT AND RESTORE PAVEMENT	16	SY	\$ 120	\$ 1,920
RECONSTRUCTION OF DRIVEWAYS (INCLUDING CULVERT)	24	EA	\$ 3,000	\$ 72,000
REVEGETATION	7,070	SY	\$ 4	\$ 28,280
BARRICADES, SIGNS, AND TRAFFIC HANDLING	6	MO	\$ 4,000	\$ 24,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 3,610	\$ 3,610
MOBILIZATION (8%)	1	LS	\$ 29,200	\$ 29,200
<b>SUBTOTAL</b>				<b>\$ 393,090</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 117,927</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 511,017</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	6	MO	\$ 5,000	\$ 30,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 30,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 617,817</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
DEEP LAKE CR. DRIANAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 38,400	\$ 38,400
SURVEY (5%)	1	LS	\$ 19,200	\$ 19,200
ENVIRONMENTAL (5%)	1	LS	\$ 19,200	\$ 19,200
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 76,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE BOX CULVERT	60	LF	\$ 80	\$ 4,800
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (10 FT. X 4 FT.)	80	LF	\$ 650	\$ 52,000
WINGWALL	2	EA	\$ 20,000	\$ 40,000
BRIDGE RAIL	100	LF	\$ 75	\$ 7,500
CUT AND RESTORE CONCRETE PAVEMENT	117	SY	\$ 250	\$ 29,250
CHANNEL IMPROVEMENTS	810	LF	\$ 120	\$ 97,200
REVEGETATION	4,500	SY	\$ 4	\$ 18,000
BARRICADES, SIGNS, AND TRAFFIC HANDLING	5	MO	\$ 4,000	\$ 20,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 2,710	\$ 2,710
MOBILIZATION (8%)	1	LS	\$ 21,900	\$ 21,900
<b>SUBTOTAL</b>				<b>\$ 295,360</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 88,608</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 383,968</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	5	MO	\$ 5,000	\$ 25,000
LEGAL	1	LS	\$ 5,000.00	\$ 5,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 30,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 490,768</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LOOP 332 DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 13,200	\$ 13,200
SURVEY (5%)	1	LS	\$ 6,600	\$ 6,600
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 19,800</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE BOX CULVERT	40	LF	\$ 80	\$ 3,200
REMOVE SET	1	EA	\$ 300	\$ 300
REMOVE HEADWALL	1	EA	\$ 500	\$ 500
PRECAST CONCRETE BOX CULVERTS (4 FT. X 3 FT.)	40	LF	\$ 200	\$ 8,000
HEADWALL	2	EA	\$ 8,000	\$ 16,000
CUT AND RESTORE PAVEMENT	29	SY	\$ 120	\$ 3,480
RECONSTRUCTION OF DRIVEWAYS (INCLUDING CULVERT)	2	EA	\$ 3,500	\$ 7,000
DITCH IMPROVEMENTS	1,723	LF	\$ 25	\$ 43,075
CLEARING & GRUBBING	550	LF	\$ 10	\$ 5,500
REVEGETATION	3,830	SY	\$ 4	\$ 15,320
BARRICADES, SIGNS, AND TRAFFIC HANDLING	4	MO	\$ 4,000	\$ 16,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,190	\$ 1,190
MOBILIZATION (8%)	1	LS	\$ 9,600	\$ 9,600
<b>SUBTOTAL</b>				<b>\$ 101,165</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 30,350</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 131,515</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	4	MO	\$ 5,000	\$ 20,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 20,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>	<b>\$ 171,315</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
TAYLOR SMITH AND 1869 DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 29,600	\$ 29,600
SURVEY (5%)	1	LS	\$ 14,800	\$ 14,800
ENVIRONMENTAL (10%)	1	LS	\$ 29,600	\$ 29,600
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 74,000</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE BOX CULVERT	80	LF	\$ 80	\$ 6,400
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (10 FT. X 7 FT.)	80	LF	\$ 800	\$ 64,000
WINGWALL	2	EA	\$ 20,000	\$ 40,000
TRENCH EXCAVATION PROTECTION	40	LF	\$ 6	\$ 240
RIPRAP (STONE PROTECTION)(24 IN)	67	CY	\$ 150	\$ 10,050
CUT AND RESTORE PAVEMENT	87	SY	\$ 120	\$ 10,440
CHANNEL IMPROVEMENTS	470	LF	\$ 100	\$ 47,000
REVEGETATION	3,134	SY	\$ 4	\$ 12,536
BARRICADES, SIGNS, AND TRAFFIC HANDLING	4	MO	\$ 4,000	\$ 16,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 2,090	\$ 2,090
MOBILIZATION (8%)	1	LS	\$ 16,900	\$ 16,900
<b>SUBTOTAL</b>				<b>\$ 227,656</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 68,297</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 295,953</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	4	MO	\$ 5,000	\$ 20,000
LEGAL	1	PARCEL	\$ 5,000	\$ 5,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 25,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>	<b>\$ 394,953</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
NITA COVE DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 32,600	\$ 32,600
SURVEY (5%)	1	LS	\$ 16,300	\$ 16,300
ENVIRONMENTAL (5%)	1	LS	\$ 16,300	\$ 16,300
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 65,200</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	280	LF	\$ 30	\$ 8,400
REMOVE HEADWALL	2	EA	\$ 1,000	\$ 2,000
PRECAST CONCRETE BOX CULVERTS (7 FT. X 4 FT.)	120	LF	\$ 350	\$ 42,000
WINGWALL	2	EA	\$ 15,000	\$ 30,000
CUT AND RESTORE PAVEMENT	80	SY	\$ 120	\$ 9,600
CLEARING AND GRUBBING	1	AC	\$ 5,000	\$ 6,500
CHANNEL IMPROVEMENTS	1,120	LF	\$ 75	\$ 84,000
RIPRAP (STONE PROTECTION)(24 IN)	67	CY	\$ 150	\$ 10,050
REVEGETATION	6,300	SY	\$ 4	\$ 25,200
BARRICADES, SIGNS, AND TRAFFIC HANDLING	3	MO	\$ 4,000	\$ 12,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 2,300	\$ 2,300
MOBILIZATION (8%)	1	LS	\$ 18,600	\$ 18,600
<b>SUBTOTAL</b>				<b>\$ 250,650</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 75,195</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 325,845</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	3	MO	\$ 5,000	\$ 15,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 15,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 406,045</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
STUBBLEFIELD LANE DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 17,700	\$ 17,700
SURVEY (5%)	1	LS	\$ 8,900	\$ 8,900
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 26,600</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	24	LF	\$ 40	\$ 960
REMOVE HEADWALL	2	EA	\$ 500	\$ 1,000
PRECAST CONCRETE BOX CULVERTS (10 FT. X 5 FT.)	80	LF	\$ 700	\$ 56,000
HEADWALL	2	EA	\$ 20,000	\$ 40,000
RIPRAP (STONE PROTECTION)(24 IN)	54	CY	\$ 150	\$ 8,100
CUT AND RESTORE PAVEMENT	80	SY	\$ 120	\$ 9,600
REVEGETATION	140	SY	\$ 4	\$ 560
BARRICADES, SIGNS, AND TRAFFIC HANDLING	2	MO	\$ 4,000	\$ 8,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 1,250	\$ 1,250
MOBILIZATION (8%)	1	LS	\$ 10,100	\$ 10,100
<b>SUBTOTAL</b>				<b>\$ 135,570</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 40,671</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 176,241</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	2	MO	\$ 5,000	\$ 10,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 10,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 212,841</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY HILL INTERMEDIATE SCHOOL DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 31,600	\$ 31,600
SURVEY (5%)	1	LS	\$ 15,800	\$ 15,800
ENVIRONMENTAL (5%)	1	LS	\$ 15,800	\$ 15,800
<b>TOTAL ENGINEERING AND SURVEYING COSTS:</b>				<b>\$ 63,200</b>

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
REMOVE PIPE	84	LF	\$ 30	\$ 2,520
REMOVE HEADWALL	2	EA	\$ 500	\$ 1,000
PRECAST CONCRETE BOX CULVERTS (8 FT. X 4 FT.)	56	LF	\$ 600	\$ 33,600
HEADWALL	2	EA	\$ 15,000	\$ 30,000
CHANNEL IMPROVEMENTS	1,870	LF	\$ 50	\$ 93,500
REVEGETATION	12,470	SY	\$ 4	\$ 49,880
BARRICADES, SIGNS, AND TRAFFIC HANDLING	3	MO	\$ 4,000	\$ 12,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 2,230	\$ 2,230
MOBILIZATION (8%)	1	LS	\$ 18,000	\$ 18,000
<b>SUBTOTAL</b>				<b>\$ 242,730</b>
<b>CONTINGENCY (30%)</b>				<b>\$ 72,819</b>
<b>TOTAL CONSTRUCTION COSTS:</b>				<b>\$ 315,549</b>

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	3	MO	\$ 5,000	\$ 15,000
<b>TOTAL OTHER COSTS:</b>				<b>\$ 15,000</b>

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 393,749</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
J AND Z AUTO WORKS DRAINAGE IMPROVEMENTS  
OPINION OF PROBABLE COST**



<b>ENGINEERING AND SURVEYING</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ENGINEERING (10%)	1	LS	\$ 45,500	\$ 45,500
SURVEY (5%)	1	LS	\$ 22,800	\$ 22,800
ENVIRONMENTAL (10%)	1	LS	\$ 22,800	\$ 22,800
TOTAL ENGINEERING AND SURVEYING COSTS:				\$ 91,100

<b>CONSTRUCTION COSTS</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CHANNEL EXCAVATION	8,860	CY	\$ 30	\$ 265,800
REVEGETATION	10,640	SY	\$ 4	\$ 42,560
BARRICADES, SIGNS, AND TRAFFIC HANDLING	3	MO	\$ 4,000	\$ 12,000
TEMPORARY EROSION & SEDIMENT CONTROLS (1%)	1	LS	\$ 3,210	\$ 3,210
MOBILIZATION (8%)	1	LS	\$ 25,900	\$ 25,900
SUBTOTAL				\$ 349,470
CONTINGENCY (30%)				\$ 104,841
TOTAL CONSTRUCTION COSTS:				\$ 454,311

<b>OTHER</b>				
DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
CONSTRUCTION PHASE SERVICES	3	MO	\$ 5,000	\$ 15,000
LEGAL	3	PARCEL	\$ 5,000	\$ 15,000
TOTAL OTHER COSTS:				\$ 30,000

<b>OPINION OF PROBABLE TOTAL PROJECT COST:</b>				<b>\$ 575,411</b>
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\*THIS DOCUMENT IS AN OPINION OF PROBABLE COST AND NOT TO BE USED FOR BID PURPOSES.\*

*Appendix E: Drainage CIP Ranking Criteria*



## City of Liberty Hill Drainage Master Plan – Phase II Project Ranking Criteria

### Property Flooding

Does the problem area have any structures or properties at risk to flooding?

Value	Description
0	No properties or structures are at risk
10	A single property/structure is at risk
20	Multiple properties are at risk
30	Multiple properties and structures are at risk

### Street Flooding

Does the problem area involve overtopping of roadways?

Value	Description
0	Does not involve roadway overtopping
7	Local Roadway
14	Collector Roadway
21	Minor/Major Arterial

### Citizen Input + Complaints

How much input was provided by citizens during the public survey or open houses about the problem area?

Value	Description
0	No input was received
5	One citizen provided input
10	Two citizens provided input
15	Three or more citizens provided input

### Overlap with Other CIP Projects

Does the problem area overlap with other drainage problem areas or project identified in the Parks and/or Transportation Mater Plan?

Value	Description
0	Does not overlap with any drainage problem areas or master plans
5	Overlaps with at least 1 drainage problem area or other CIP
10	Overlaps with at least 2 drainage problems area or other CIP
15	Overlaps with at least 3 drainage problem areas or other CIP



## Availability of External Funding

Does the problem area have the potential to receive external funding?

Value	Description
0	No potential for external funding
5	Potential funding from School District, TxDOT or Williamson County
10	Potential State or Federal grant funding

## Outside Entity Coordination

Does the potential solution require coordination with any outside entities? (Williamson County, TxDOT, Railroad)

Value	Description
0	Coordination with railroad
3	Coordination with TxDOT or Williamson County
6	Coordination with School District
9	No coordination necessary

## Long-term Maintenance

Difficulty and cost of long-term maintenance for the completed project.

Value	Description
0	Regular maintenance required including special maintenance (vacuum truck)
3	Regular Mowing and clearing required with limited access
6	Regular mowing and debris removal with easy access
9	Maintained by others or low-cost maintenance

## Project Cost

Overall cost of the project including construction, engineering, and easement acquisition.

Value	Description
20	Less than \$100,000
18	\$100,000 - \$149,999
16	\$150,000 – \$199,999
14	\$200,000 - \$249,999
12	\$250,000 - \$499,999
10	\$500,000 - \$749,999
8	\$750,000 - \$999,999
6	\$1,000,000 - \$1,499,999
4	\$1,500,000 - \$1,999,999
2	More than \$2,000,000

*Appendix F: City-wide Rankings of Drainage CIP*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
PROJECT PRIORITIZATION**



Rank	Project ID	Project Area Name	Property Flooding (30 max)	Street Flooding (20 max)	Citizen Input (15 max)	Overlap with Other CIP (15 max)	Availability of External Funding (10 max)	Outside Entity Coordination (9 max)	Long-term Maintenance (6 max)	Project Cost (20 max)	Total (125 max)
1	F02	East Carson Ave. Drainage Improvements	30	7	15	5	10	9	6	12	<b>94</b>
2	E04	Jenks Branch Drainage Improvements	30	21	15	5	10	3	3	6	<b>93</b>
3	E01	Downtown Drainage Improvements	20	21	15	15	5	3	6	6	<b>91</b>
4	D02	West RM 1869 Drainage Improvements	30	21	15	5	0	3	6	10	<b>90</b>
5	F04	Liberty Trails Apartments Drainage Improv.	30	14	0	0	10	6	9	14	<b>83</b>
6	E06	Jenks Branch Regional Pond	20	14	15	5	10	6	6	6	<b>82</b>
7	B01	City Park & CR 200 Drainage Improvements	10	21	0	15	10	3	6	12	<b>77</b>
8	E02	South CR 279 Drainage Improvements	10	21	5	10	5	3	9	14	<b>77</b>
9	E03	Bryson Bend Drainage Improvements	20	7	15	5	0	9	9	12	<b>77</b>
10	D01	Liberty Hill Elementary School Drainage Improv.	10	21	10	5	5	6	6	10	<b>73</b>
11	D05	Barton Ln Drainage Improvements	20	7	15	0	0	9	9	10	<b>70</b>
12	B03	Deep Lake Cr. Drainage Improvements	20	7	15	0	0	9	6	12	<b>69</b>
13	F01	Loop 332 Drainage Improvements	0	21	15	5	5	0	6	16	<b>68</b>
14	D04	Taylor Smith & 1869 Drainage Improvements	20	21	0	0	5	3	3	12	<b>64</b>
15	D03	Nita Cove Drainage Improvements	20	7	5	0	0	9	3	12	<b>56</b>
16	E05	Stubblefield Lane Drainage Improvements	10	14	5	0	0	3	9	14	<b>55</b>
17	F03	Liberty Hill Intermediate School Drainage Improv	10	0	5	0	5	6	9	12	<b>47</b>
18	B02	J&Z Auto Works	10	0	0	0	0	9	3	10	<b>32</b>

*Appendix G: One Page Summary Reports*

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
EAST CARSON AVE. DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**



**Project ID:** F02  
**Project Name:** East Carson Ave. Drainage Improvements  
**Drainage Basin:** F

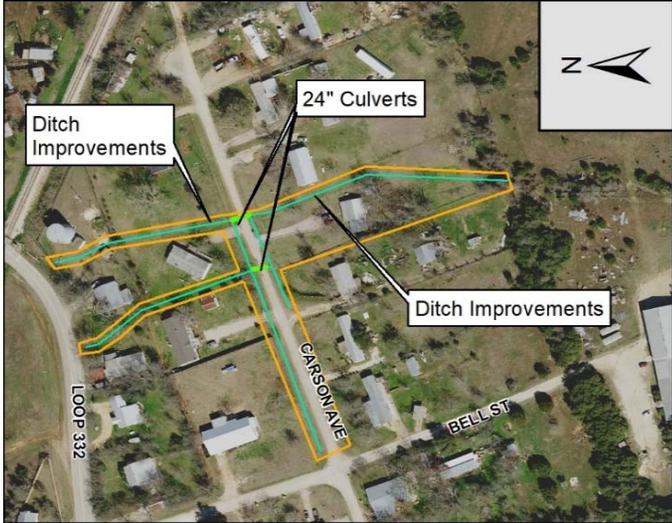
**Problem Description**

The ditches draining Loop 332 towards Carson Ave. are filled in with sediment and undefined. There are two small CMP culvert crossings under Carson Ave. that are undersized. The channel draining between 206 and 210 Carson Ave. is also filled with sediment and undefined. Several residents have reported standing water in their yards after minor rain events. A large rain event poses risk of structural flooding due to the undersized drainage system.

**Proposed Improvements**

- Excavate a new ditch between 209 and 211 Carson Ave.
- Excavate a new ditch between 211 and 215 Carson Ave.
- Excavate new ditches along Carson Ave east of Bell St.
- Install three new driveway culverts at 209, 211, and 206 Carson Ave.
- Excavate a new channel between 206 and 210 Carson Ave. to drain to the south.

**Project Photos**



Proposed ditch and culvert improvements



100-yr Inundation from ICM

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	30
Street Flooding	7
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	10
Outside Coordination	9
Long-term Maintenance	6
Project Cost	12
<b>Total</b>	<b>94</b>

**Project Costs**

Engineering & Survey:	\$ 30,800
Construction:	\$ 204,304
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 265,104</b>
 Conceptual Cost Range:	 \$250k - \$500k
Estimated Construction Duration:	3 Months

**Assumptions**

◦ It is assumed easements will need to be obtained from three property owners for the channel improvements. It is assumed these easements will be dedicated to the City and only legal costs are required.



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
JENKS BRANCH DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** E04  
**Project Name:** Jenks Branch Drainage Improvements  
**Drainage Basin:** E

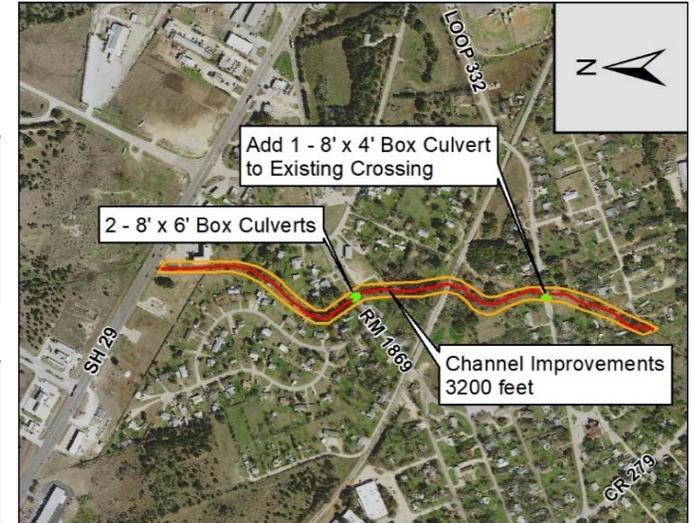
**Problem Description**

Residents report that the creek floods and has inundated structures. The structure at RM 1869 is undersized causes flow to backup. Vegetation and debris have accumulated within the creek restricting conveyance. Residents report flooding of homes during large rains and damages to the Carson Ave cul-de-sac from the adjacent stream. Residents also reported that the structure at Loop 332 is inadequate and debris is accumulating in the creek.

**Proposed Improvements**

- Clear approximately 4.5 acres of existing overgrowth and debris from channel.
- Construct 3200 feet of channel improvements within existing easement.
- Replace existing 2 - 60" corrugated metal pipe culverts at RM 1869 with 2 - 8' x 6' concrete box culverts.
- Add an additional 8' x 4' concrete box culvert to the crossing at Loop 332.

**Project Photos**



Proposed channel and culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	30
Street Flooding	21
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	10
Outside Coordination	3
Long-term Maintenance	3
Project Cost	6
<b>Total</b>	<b>93</b>

**Project Costs**

Engineering & Survey:	\$ 205,200
Construction:	\$ 1,139,632
Other:	\$ 80,000
<b>Total:</b>	<b>\$ 1,424,832</b>
 Conceptual Cost Range:	 \$1M - \$1.5M
Estimated Construction Duration:	10 Months

**Assumptions**

- It is assumed easements will need to be obtained from the adjacent property owners in Bryson Bend for the construction of the project. It is assumed these easements will be dedicated to the City and only legal costs are required.

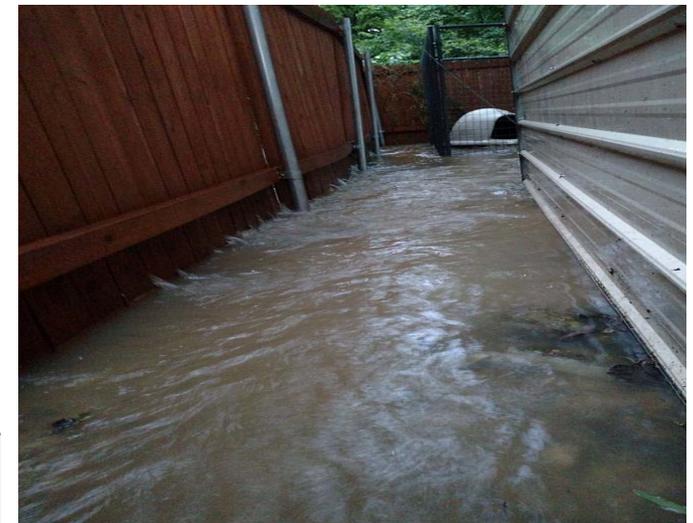


Photo from 201 Snyder Trail during June 2016 storm event



# CITY OF LIBERTY HILL DRAINAGE MASTER PLAN - PHASE II DOWNTOWN DRAINAGE IMPROVEMENTS PROJECT SUMMARY

**Project ID:** E01  
**Project Name:** Downtown Drainage Improvements  
**Drainage Basin:** E

### Problem Description

Ditches along RM 1869 and Myrtle Ln are inadequate to convey flow to cross culverts. The cross culvert near Hickman and Loop 332 and the downstream channel to Myrtle Ln are undersized. Residents have reported flooding at the intersections of Forest St and Young St. The existing ditch conveying flow from RM 1869 to CR 279 is undersized and causes flooding on several properties. Flow is not properly conveyed along CR 279 and floods the yards of adjacent homes.

### Proposed Improvements

- Clean out and re-excavate ditches along Young St. and Grove St.
- Install 1325 linear feet of 24" storm sewer along RM 1869.
- Clean out and re-excavate the ditch between RM 1869 and E Myrtle Ln.
- Install 280 linear feet of 30" storm sewer between E Myrtle Ln. and Loop 332.
- Replace the existing 3' x 2' box culvert under Loop 332 with a 4' x 3' box culvert.
- Install 910 linear feet of 5' x 3' concrete box culvert from Wetzzel Park to the creek crossing at CR 279.

### CIP Ranking Criteria

	Score
Property Flooding	20
Street Flooding	21
Citizen Input	15
Overlap with Other CIP	15
Avail. of Ext. Funding	5
Outside Coordination	3
Long-term Maintenance	6
Project Cost	6
<b>Total</b>	<b>91</b>

### Project Costs

Engineering & Survey:	\$ 161,100
Construction:	\$ 1,073,657
Other:	\$ 60,000
<b>Total:</b>	<b>\$ 1,294,757</b>
Conceptual Cost Range:	\$1M - \$1.5M
Estimated Construction Duration:	7 Months

### Assumptions

- It is assumed easements will need to be obtained from five (5) property owners for the ditch and storm sewer improvements. It is assumed these easements will be dedicated to the City and only legal costs are required.

### Project Photos



Proposed storm sewer, ditch, and culvert improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
WEST RM 1869 DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** D02  
**Project Name:** West RM 1869 Drainage Improvements  
**Drainage Basin:** D

**Problem Description**

The creek to the east of Fellowship Church backs up due to the undersized culvert at RM 1869. Residents have reported increased flooding after the construction of the church parking lot. Homes at 3502, 3501, and 3610 have reported structural flooding. The ditches on the northwest side of RM 1869 are undersized or nonexistent. Several driveways lack storm drain conveyance.

**Proposed Improvements**

- Replace the existing 3 - 30" CMP culverts under RM 1869 with 2 - 6' x 3' box culverts.
- Excavate a new ditch to the west of the culvert crossing and add four driveway culverts.
- Add 900 feet of 24" storm drain to the east of the culvert crossing and connect to system at RM 1869 and Main St.
- Clean out and perform channel improvements by Fellowship Church.
- Excavate an outfall channel to convey flow across 3501 RM 1869.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	30
Street Flooding	21
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	0
Outside Coordination	3
Long-term Maintenance	6
Project Cost	10
<b>Total</b>	<b>90</b>

**Project Costs**

Engineering & Survey:	\$ 85,800
Construction:	\$ 571,110
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 686,910</b>
Conceptual Cost Range:	\$500k - \$750k
Estimated Construction Duration:	5 Months

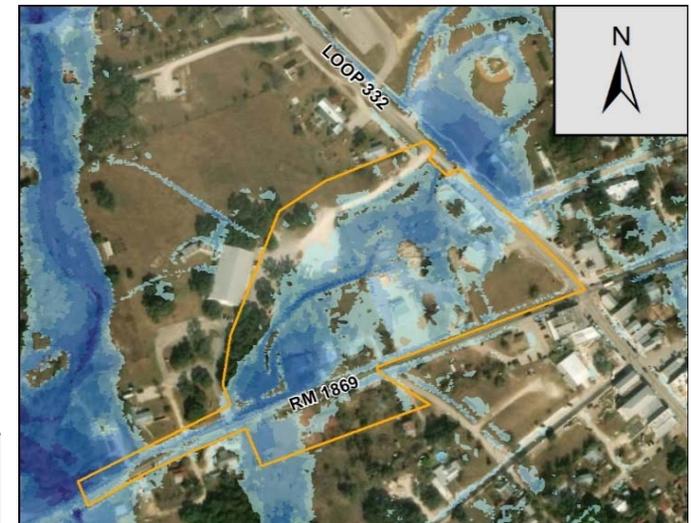
**Assumptions**

- It is assumed an easement will be obtained from 3501 RM 1869 for the outfall channel. It is assumed this easement will be dedicated to the City and only legal costs are required.

**Project Photos**



Proposed channel, storm sewer, and culvert improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY TRAILS APARTMENTS DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** F04  
**Project Name:** Liberty Trails Apartments Drainage Improvements  
**Drainage Basin:** F

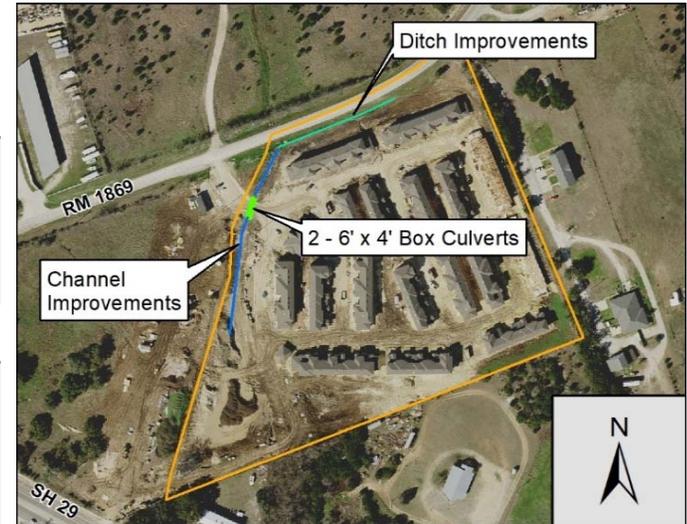
**Problem Description**

A drainageway with a 130 acre watershed flows on the west side of the Liberty Trails Apartments. The creek takes a sharp bend after passing under RM 1869 before the northern apartment driveway. The existing 2 - 4' x 2' box culverts under drive near RM 1869 are slightly undersized and the outside bank of the channel has settled and eroded. Flow exceeds the outside bank of the creek and spills towards the apartment buildings. Structural flooding during large rain events has been reported to the City.

**Proposed Improvements**

- Improve 265 linear feet of ditch along RM 1869 to the east of creek.
- Replace the existing 2 - 4' x 2' box culverts with 2 - 6' x 4' box culverts.
- Excavate the channel bottom upstream of the driveway by approximately 2 feet and daylight downstream.
- Build up the outside embankment of the channel upstream of the driveway. The existing iron fence will need to be removed and replace.

**Project Photos**



Proposed channel and culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	30
Street Flooding	14
Citizen Input	0
Overlap with Other CIP	0
Avail. of Ext. Funding	10
Outside Coordination	6
Long-term Maintenance	9
Project Cost	14
<b>Total</b>	<b>83</b>

**Project Costs**

Engineering & Survey:	\$ 25,800
Construction:	\$ 171,529
Other:	\$ 10,000
<b>Total:</b>	<b>\$ 207,329</b>
 Conceptual Cost Range:	 \$200k - \$250k
Estimated Construction Duration:	2 Months

**Assumptions**

- It is assumed the Liberty Trails Apartments will allow the work without needing to obtain a drainage easement.



Photo of Liberty Trails Apartment crossing from RM 1869

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
JENKS BRANCH REGIONAL POND  
PROJECT SUMMARY**



**Project ID:** E06  
**Project Name:** Jenks Branch Regional Pond  
**Drainage Basin:** E

**Problem Description**

Residents report that the creek floods and has inundated structures along Jenks Branch. The structures at RM 1869 and Loop 332 are undersized and backup flow. Half of the watershed upstream of SH 29 is still undeveloped, and development of this watershed can lead to further downstream flooding. Construction of a pond upstream of SH 29 can mitigate future upstream development and alleviate existing downstream flooding. Existing conditions models show the existing 5.6 acre parcel upstream of SH 29 is mostly inundated by the 100-yr storm event.

**Proposed Improvements**

- Purchase the 5.6 acre tract upstream of SH 29 along Jenks Branch.
- Construct a large detention pond within the 5.6 acre tract to mitigate upstream development and alleviate existing downstream flooding.
- The bottom of the pond can be utilized as recreational fields.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	20
Street Flooding	14
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	10
Outside Coordination	6
Long-term Maintenance	6
Project Cost	6
<b>Total</b>	<b>82</b>

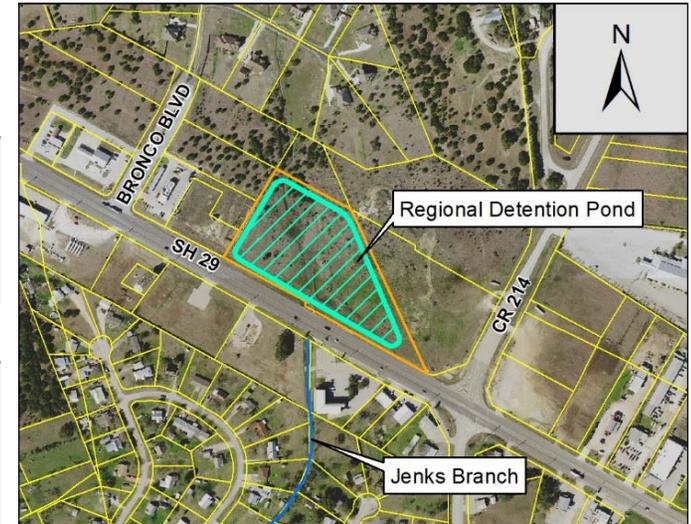
**Project Costs**

Engineering & Survey:	\$ 125,500
Construction:	\$ 696,033
Other:	\$ 472,466
<b>Total:</b>	<b>\$ 1,293,999</b>
 Conceptual Cost Range:	 \$1M - \$1.5M
Estimated Construction Duration:	10 Months

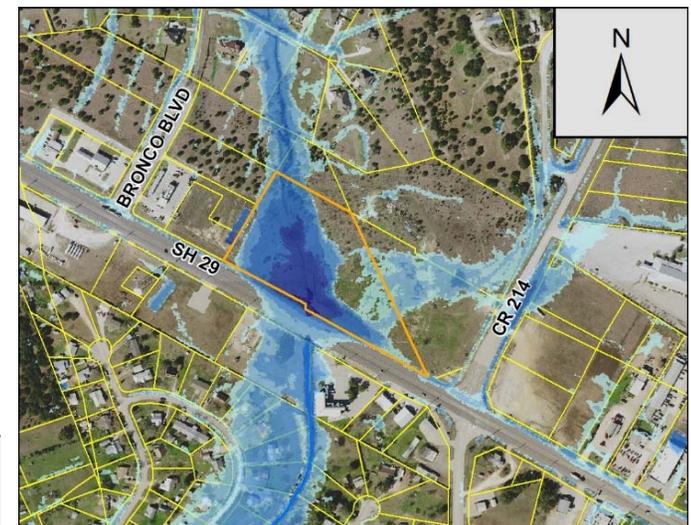
**Assumptions**

- Property acquisition costs are based on 2017 Williamson County Appraisal District data.

**Project Photos**



Proposed regional detention pond



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
CITY PARK CR 200 DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** B01  
**Project Name:** City Park & CR 200 Drainage Improvements  
**Drainage Basin:** B

**Problem Description**

The City park along CR 200 just north of the railroad is at the confluence of two drainageways. The existing channels are small and lack capacity to convey large storm events. The existing conditions model shows a large amount of 100-yr inundation within the park. The City is proposing to build a swim center and other parking improvements in the park. The park improvements will potentially increase flows downstream and cause additional flood inundation due to the constriction at the railroad crossing.

**Proposed Improvements**

- Excavate 845 feet of ditch from the northwest corner of the football field to the existing channel to the south.
- Improve 850 linear feet of the channel crossing the middle of the park in order to convey the 100-yr storm event.
- Construct a detention pond just upstream of the railroad on the parcel to the west of the park.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	21
Citizen Input	0
Overlap with Other CIP	15
Avail. of Ext. Funding	10
Outside Coordination	3
Long-term Maintenance	6
Project Cost	12
<b>Total</b>	<b>77</b>

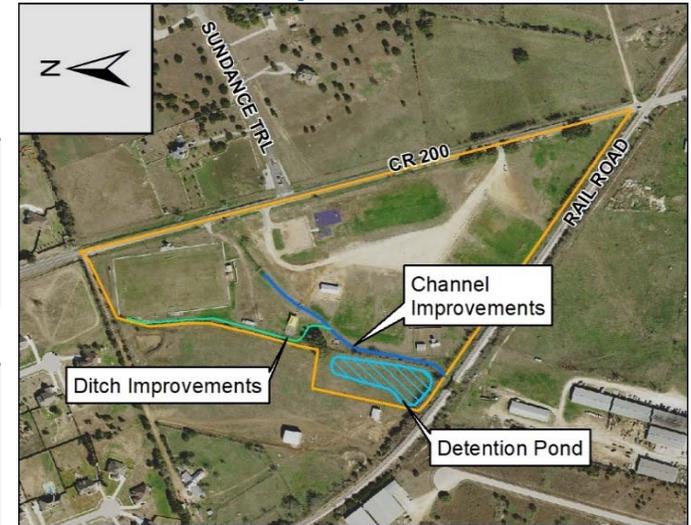
**Project Costs**

Engineering & Survey:	\$ 46,500
Construction:	\$ 309,030
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 385,530</b>
 Conceptual Cost Range:	 \$250k - \$500k
Estimated Construction Duration:	5 Months

**Assumptions**

- It is assumed a drainage easement can be obtain from the adjacent land owner. No land acquisition costs, besides legal fees, are included in the cost estimate

**Project Photos**



Proposed ditch, channel, and pond improvements



100-yr Inundation from ICM

**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
SOUTH CR 279 DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**



**Project ID:** E02  
**Project Name:** South CR 279 Drainage Improvements  
**Drainage Basin:** E

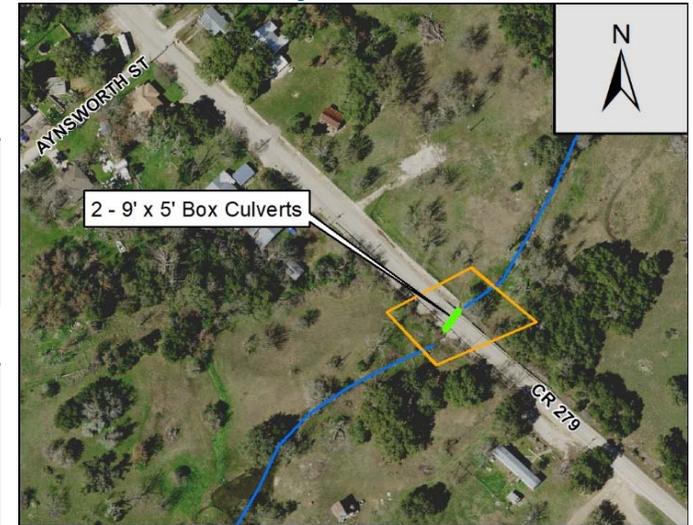
**Problem Description**

The Jenks Branch drainage crossing at CR 279 just east of Aynsworth St. is inadequately sized. The existing 2 - 42" x 30" corrugated metal arch pipes cause flow to back up upstream and cause the roadway to overtop frequently.

**Proposed Improvements**

- Remove the existing 2 - 42" x 30" CMP and replace them with 2 - 9' x 5' box culverts.
- Install rock riprap to protect from downstream erosion.

**Project Photos**



Proposed culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	21
Citizen Input	5
Overlap with Other CIP	10
Avail. of Ext. Funding	5
Outside Coordination	3
Long-term Maintenance	9
Project Cost	14
<b>Total</b>	<b>77</b>

**Project Costs**

Engineering & Survey:	\$ 26,400
Construction:	\$ 175,110
Other:	\$ 10,000
<b>Total:</b>	<b>\$ 211,510</b>
Conceptual Cost Range:	\$200k - \$250k
Estimated Construction Duration:	2 Months

**Assumptions**

- It is assumed no easements will be required for the work.



100-yr Inundation from ICM



# CITY OF LIBERTY HILL DRAINAGE MASTER PLAN - PHASE II BRYSON BEND DRAINAGE IMPROVEMENTS PROJECT SUMMARY

**Project ID:** E03  
**Project Name:** Bryson Bend Drainage Improvements  
**Drainage Basin:** E

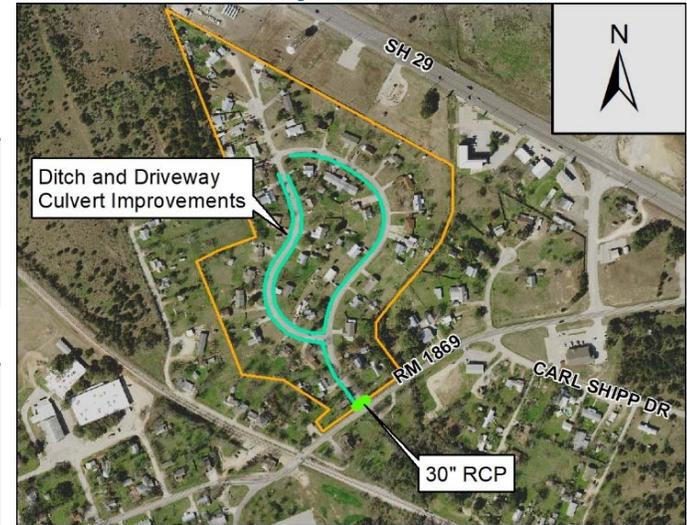
### Problem Description

Residents have reported localized flooding in their yards that stands for several days. The few driveway culverts within the Bryson Bend and Snyder Trail neighborhood are small and may clog during minor rains. Many driveways within the neighborhood do not have driveway culverts and do not properly convey flow. Ditches within the area are shallow or non-existent.

### Proposed Improvements

- Construct ~3100 linear feet of ditch improvements along Bryson Bend and Snyder Trail.
- Reconstruction of 16 driveways to include driveway culverts.
- Replace existing small diameter CMP under Snyder Trail with a 30" RCP.

### Project Photos



Proposed ditch and culvert improvements

### CIP Ranking Criteria

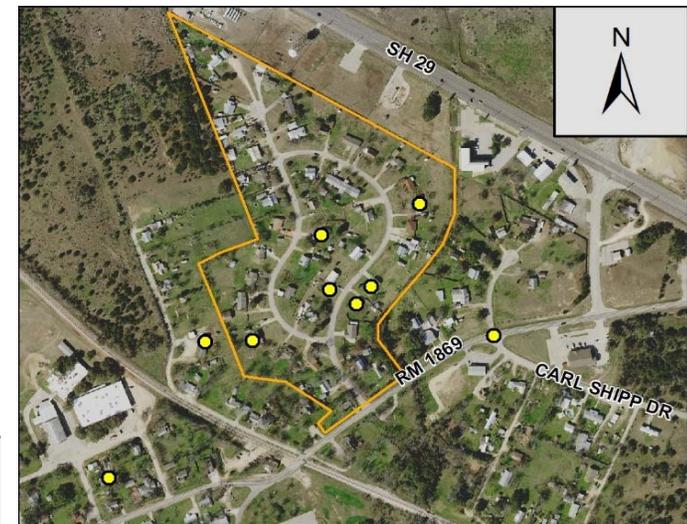
	Score
Property Flooding	20
Street Flooding	7
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	0
Outside Coordination	9
Long-term Maintenance	9
Project Cost	12
<b>Total</b>	<b>77</b>

### Project Costs

Engineering & Survey:	\$ 37,100
Construction:	\$ 246,740
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 313,840</b>
Conceptual Cost Range:	\$250k - \$500k
Estimated Construction Duration:	6 Months

### Assumptions

- It is assumed no easements will be required for the work.



Public surveys received



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY HILL ELEMENTARY DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** D01  
**Project Name:** Liberty Hill Elementary Drainage Improvements  
**Drainage Basin:** F

**Problem Description**

The existing conditions model shows a large inundation area to the east of Liberty Hill Elementary School. A residential structure is inundated at the intersection of Forest Drive and Loop 332. Several structures have reported flooding along the same drainageway downstream of Loop 332.

**Proposed Improvements**

- Construct a 3.4 acre detention pond in the open space to the east of the Elementary School to alleviate flooding through the park and downstream.
- Construct 865 linear feet of channel improvements to convey flow to the Loop 332 crossing.
- Replace the small diameter CMP under the park driveway with a 5' x 4' box culvert.
- Replace the existing 6' x 3.5' concrete box culvert under Loop 332 with a 8' x 5' box culvert.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	21
Citizen Input	10
Overlap with Other CIP	5
Avail. of Ext. Funding	5
Outside Coordination	6
Long-term Maintenance	6
Project Cost	10
<b>Total</b>	<b>73</b>

**Project Costs**

Engineering & Survey:	\$ 98,800
Construction:	\$ 493,662
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 622,462</b>
 Conceptual Cost Range:	 \$500k - \$750k
Estimated Construction Duration:	6 Months

**Assumptions**

- It is assumed no easements will be required for the work.

**Project Photos**



Proposed channel, culvert and pond improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
BARTON LANE DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** D05  
**Project Name:** Barton Lane Drainage Improvements  
**Drainage Basin:** D

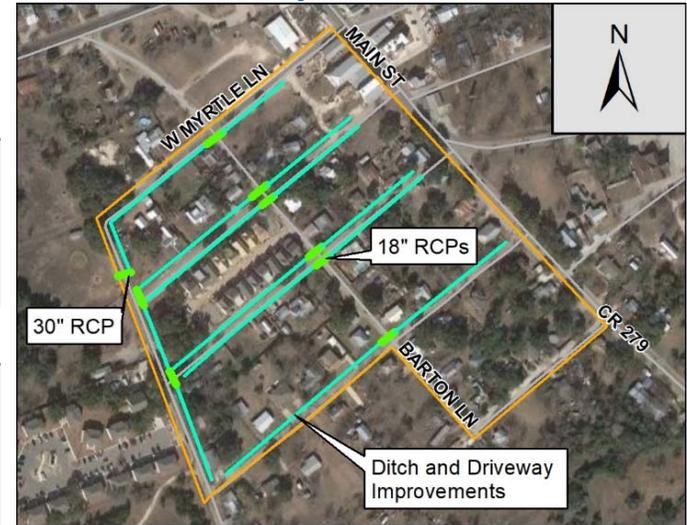
**Problem Description**

Ditches along Myrtle, Grange, Munro, Fallwell and Aynsworth are shallow or nonexistent. Residential driveways are often not paved and have no driveway culverts. Residents have reported extended ponding in this area that lasts for several days. The culvert outfalling the residential neighborhood at Stubblefield Lane is undersized and backs up flow.

**Proposed Improvements**

- Construct approximately 5300 linear feet of roadside ditch improvements
- Reconstruct 24 driveways including driveway culverts
- Add 18" culverts to along Myrtle, Grange, Munro, and Fallwell across Barton Lane.
- Replace the existing 18" CMP under Stubblefield Lane with a 30" RCP

**Project Photos**



Proposed ditch and culvert improvements



Looking west on Myrtle St south of Barton Lane

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	20
Street Flooding	7
Citizen Input	15
Overlap with Other CIP	0
Avail. of Ext. Funding	0
Outside Coordination	9
Long-term Maintenance	9
Project Cost	10
<b>Total</b>	<b>70</b>

**Project Costs**

Engineering & Survey:	\$ 76,800
Construction:	\$ 511,017
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 617,817</b>
Conceptual Cost Range:	\$500k - \$750k
Estimated Construction Duration:	6 Months

**Assumptions**

- It is assumed no easements will be required for the work.



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
DEEP LAKE CR. DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** B03  
**Project Name:** Deep Lake Cr. Drainage Improvements  
**Drainage Basin:** B

**Problem Description**

Residents have reported, and field visits have confirmed, the crossing at Deep Lake Circle overtops frequently and there is erosion around the downstream headwall. Deep Lake Circle serves as the single access point for 12 residential properties. Heavy vegetation upstream and downstream of the crossing is restricting conveyance.

**Proposed Improvements**

- Improve approximately 810 linear feet of channel to properly convey flow and reduce adjacent flooding.
- Replace the existing culvert crossing at Deep Lake Circle with 2 - 10' x 4' box culverts or a 20' bridge.
- Install bridge rail over new culvert/bridge.

**Project Photos**



Proposed channel and culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	20
Street Flooding	7
Citizen Input	15
Overlap with Other CIP	0
Avail. of Ext. Funding	0
Outside Coordination	9
Long-term Maintenance	6
Project Cost	12
<b>Total</b>	<b>69</b>

**Project Costs**

Engineering & Survey:	\$ 76,800
Construction:	\$ 383,968
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 490,768</b>
 Conceptual Cost Range:	 \$250k - \$500k
Estimated Construction Duration:	5 Months

**Assumptions**

- It is assumed a single easement will need to be obtained from the adjacent property owner for the channel improvements. It is assumed this easement will be dedicated to the City and only legal costs are required.



Looking north from Deep Lake Circle



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LOOP 332 DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** F01  
**Project Name:** Loop 332 Drainage Improvements  
**Drainage Basin:** F

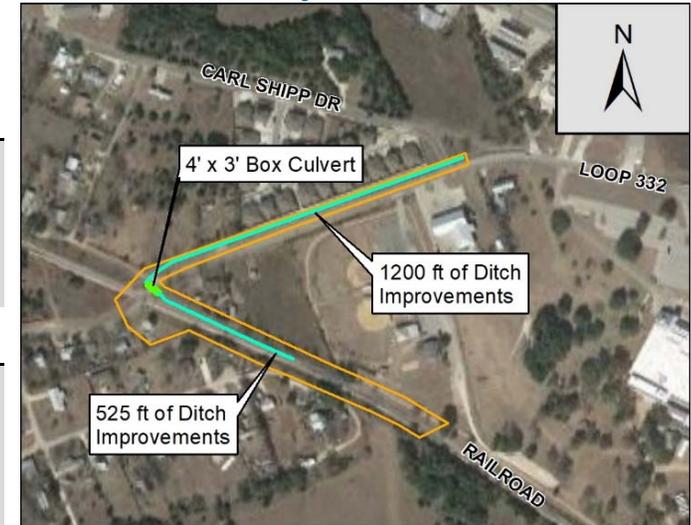
**Problem Description**

The existing culvert crossing Loop 332 near the railroad is undersized. This causes water to flow across the water tower property and properties of 209 and 210 Carson Ave. The ditch along Loop 332 adjacent to the duplexes floods and has standing water.

**Proposed Improvements**

- Improve approximately 1200 linear feet of ditch along Loop 332 between Carl Shipp Dr and the railroad.
- Add driveway culverts to the two residential driveways off Loop 332 near the railroad.
- Replace the existing 3'x2' box culvert under Loop 332 near the railroad with a 4' x 3' box culvert.
- Improve approximately 525 linear feet of ditch along the north side of the railroad downstream of Loop

**Project Photos**



Proposed ditch and culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	0
Street Flooding	21
Citizen Input	15
Overlap with Other CIP	5
Avail. of Ext. Funding	5
Outside Coordination	0
Long-term Maintenance	6
Project Cost	16
<b>Total</b>	<b>68</b>

**Project Costs**

Engineering & Survey:	\$ 19,800
Construction:	\$ 131,515
Other:	\$ 20,000
<b>Total:</b>	<b>\$ 171,315</b>
 Conceptual Cost Range:	 \$150k - \$200k
Estimated Construction Duration:	4 Months

**Assumptions**

- It is assumed no easements will be required for the work.



Looking south on Loop 332 from Carl Shipp Dr



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
TAYLOR SMITH AND 1869 DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** D04  
**Project Name:** Taylor Smith & 1869 Drainage Improvements  
**Drainage Basin:** D

**Problem Description**

The existing 2 - 6' x 4' box culverts under RM 1869 just east of Taylor Smith Dr are undersized and back up flow. The channel downstream of the crossing is over vegetated and full of debris. Several residents have reported flooding in this area.

**Proposed Improvements**

- Replace the existing 2 - 6' x 4' box culverts with 2 - 10' x 7' box culverts.
- Install rock riprap downstream of the crossing to protect from downstream erosion.
- Improve 470 linear feet of the downstream channel to contain the large storm events.

**CIP Ranking Criteria**

	Score
Property Flooding	20
Street Flooding	21
Citizen Input	0
Overlap with Other CIP	0
Avail. of Ext. Funding	5
Outside Coordination	3
Long-term Maintenance	3
Project Cost	12
<b>Total</b>	<b>64</b>

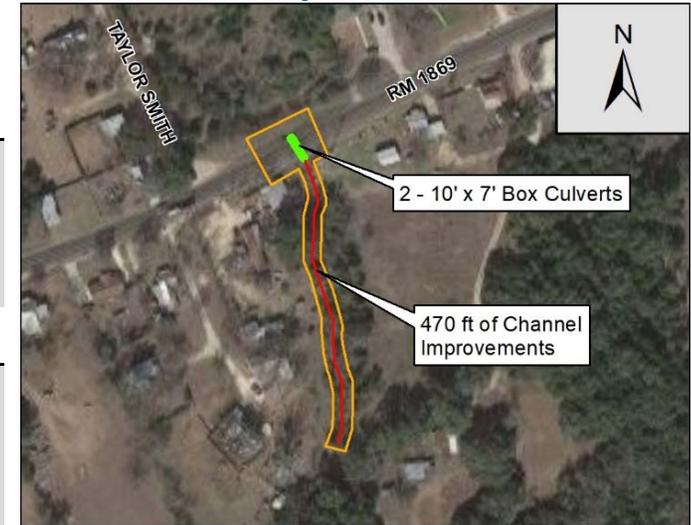
**Project Costs**

Engineering & Survey:	\$ 74,000
Construction:	\$ 295,953
Other:	\$ 25,000
<b>Total:</b>	<b>\$ 394,953</b>
Conceptual Cost Range:	\$250k - \$500k
Estimated Construction Duration:	4 Months

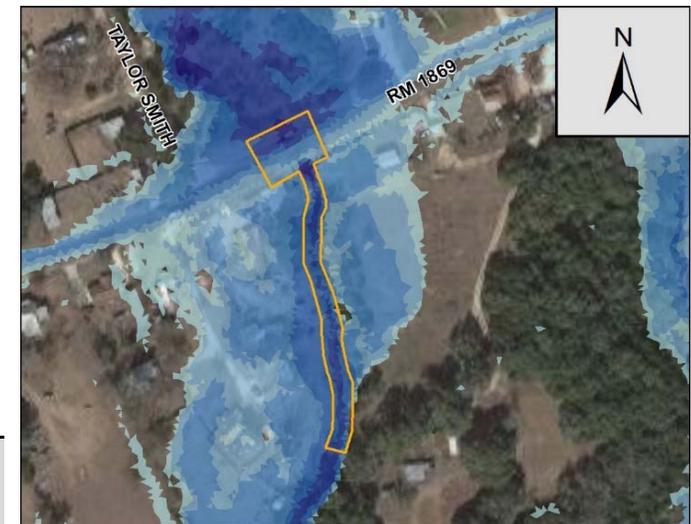
**Assumptions**

- It is assumed a single easement will need to be obtained from the adjacent property owner for the downstream channel improvements. It is assumed this easement will be dedicated to the City and only legal costs are required.

**Project Photos**



Proposed channel and culvert improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
NITA COVE DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** D03  
**Project Name:** Nita Cove Drainage Improvements  
**Drainage Basin:** D

**Problem Description**

The existing 6 - 42" corrugated metal pipe culverts under Nita Cove are undersized and the roadway overtops frequently. Nita Cove serves as the single access point for three residential properties. Additionally, existing conditions modeling shows a significant amount of inundation along the drainageway.

**Proposed Improvements**

- Replace the existing 6 - 42" CMP with 3 - 7' x 4' box culverts.
- Install rock riprap downstream of the crossing to protect from downstream erosion.
- Clear approximately 1.3 acres of debris and vegetation from the channel.
- Improve 1120 linear feet of channel to contain the large storm events.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	20
Street Flooding	7
Citizen Input	5
Overlap with Other CIP	0
Avail. of Ext. Funding	0
Outside Coordination	9
Long-term Maintenance	3
Project Cost	12
<b>Total</b>	<b>56</b>

**Project Costs**

Engineering & Survey:	\$ 65,200
Construction:	\$ 325,845
Other:	\$ 15,000
<b>Total:</b>	<b>\$ 406,045</b>
 Conceptual Cost Range:	 \$250k - \$500k
Estimated Construction Duration:	3 Months

**Assumptions**

- It is assumed no easements will be required for the work.

**Project Photos**



Proposed channel and culvert improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
STUBBLEFIELD LANE DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** E05  
**Project Name:** Stubblefield Lane Drainage Improvements  
**Drainage Basin:** E

**Problem Description**

The small diameter pipe crossing at Jenks Branch and Stubblefield Ln is undersized and causes flow to backup and flood an adjacent residential structure. The upstream channel is eroded and not clearly defined.

**Proposed Improvements**

- Replace the existing culvert crossing with 2 - 10' x 5' box culverts.
- Install rock riprap downstream of the crossing to protect from downstream erosion.
- Clean debris and vegetation from the upstream channel.

**Project Photos**



Proposed channel and culvert improvements

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	14
Citizen Input	5
Overlap with Other CIP	0
Avail. of Ext. Funding	0
Outside Coordination	3
Long-term Maintenance	9
Project Cost	14
<b>Total</b>	<b>55</b>

**Project Costs**

Engineering & Survey:	\$ 26,600
Construction:	\$ 176,241
Other:	\$ 10,000
<b>Total:</b>	<b>\$ 212,841</b>
Conceptual Cost Range:	\$200k - \$250k
Estimated Construction Duration:	2 Months

**Assumptions**

- It is assumed no easements will be required for the work.



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
LIBERTY HILL INTERMEDIATE SCHOOL DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** F03  
**Project Name:** Liberty Hill Intermediate School Drainage Improvements  
**Drainage Basin:** F

**Problem Description**

The existing 3 - 24" reinforced concrete pipe culverts under Championship Dr are undersized and the roadway overtops frequently. The channel passing through the school property does not contain large storm events and inundates much of the school property.

**Proposed Improvements**

- Replace the existing 3 - 24" RCP with 2 - 8' x 4' box culverts.
- Improve 1870 linear feet of channel to contain the large storm events.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	0
Citizen Input	5
Overlap with Other CIP	0
Avail. of Ext. Funding	5
Outside Coordination	6
Long-term Maintenance	9
Project Cost	12
<b>Total</b>	<b>47</b>

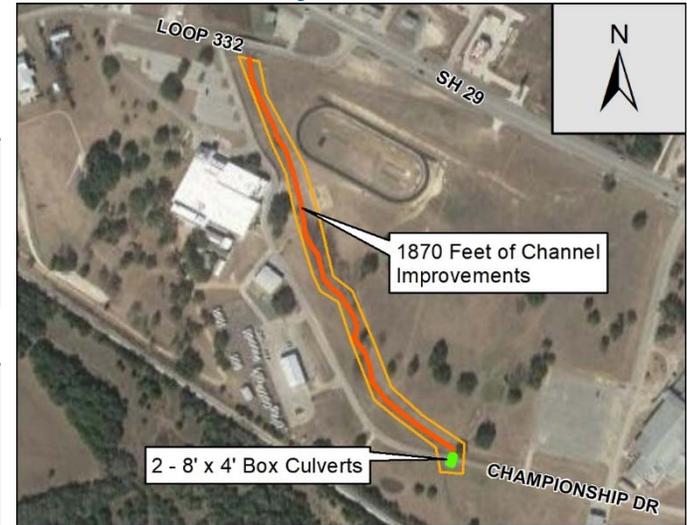
**Project Costs**

Engineering & Survey:	\$ 63,200
Construction:	\$ 315,549
Other:	\$ 15,000
<b>Total:</b>	<b>\$ 393,749</b>
Conceptual Cost Range:	\$250k - \$500k
Estimated Construction Duration:	3 Months

**Assumptions**

- It is assumed no easements will be required for the work.

**Project Photos**



Proposed channel and culvert improvements



100-yr Inundation from ICM



**CITY OF LIBERTY HILL  
DRAINAGE MASTER PLAN - PHASE II  
J AND Z AUTO WORKS DRAINAGE IMPROVEMENTS  
PROJECT SUMMARY**

**Project ID:** B02  
**Project Name:** J&Z Auto Works Drainage Improvements  
**Drainage Basin:** B

**Problem Description**

A large tributary crosses the railroad west of CR 200 and north of J&Z Auto Works. Flow from the railroad crossing makes it way from north to south towards SH 29. There is a small storm sewer pipe under the J&Z Auto Works site; however it is underzied and a large portion of the flow spills towards the east in an undefined channel.

**Proposed Improvements**

- 1200 linear feet of channel improvements to convey the flow and reduce the amount of inundation.

**CIP Ranking Criteria**

	<u>Score</u>
Property Flooding	10
Street Flooding	0
Citizen Input	0
Overlap with Other CIP	0
Avail. of Ext. Funding	0
Outside Coordination	9
Long-term Maintenance	3
Project Cost	10
<b>Total</b>	<b>32</b>

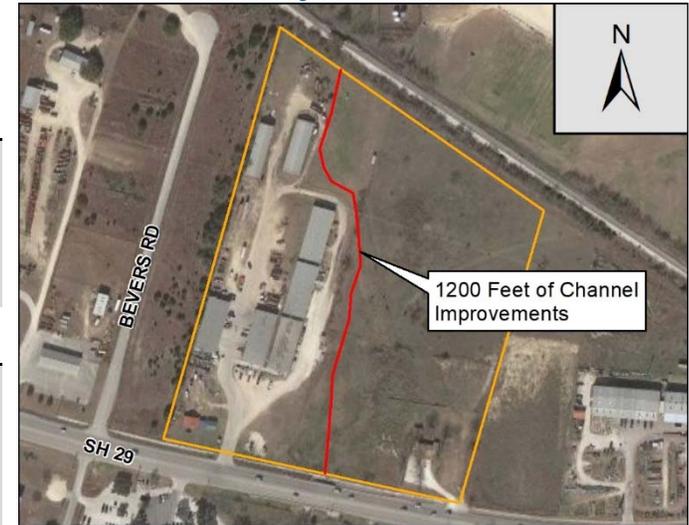
**Project Costs**

Engineering & Survey:	\$ 91,100
Construction:	\$ 454,311
Other:	\$ 30,000
<b>Total:</b>	<b>\$ 575,411</b>
Conceptual Cost Range:	\$500k - \$750k
Estimated Construction Duration:	3 Months

**Assumptions**

- It is assumed easements will need to be obtained from three property owners for the channel improvements. It is assumed these easements will be dedicated to the City and only legal costs are required.

**Project Photos**



Proposed channel improvements



100-yr Inundation from ICM

*Appendix H: Potential Regional Detention Locations*



**Legend**

-  Recommended Pond Location
-  City Limits
-  Roads
-  Railroad
-  Streams
-  FEMA Floodplain

**City of Liberty Hill  
Drainage Master Plan**

**Phase II  
Recommended Pond  
Locations**

Sheet 1 of 3



Date: 7/26/2018





**Legend**

-  Recommended Pond Location
-  City Limits
-  Roads
-  Railroad
-  Streams
-  FEMA Floodplain

**City of Liberty Hill  
Drainage Master Plan**

**Phase II  
Recommended Pond  
Locations**

Sheet 2 of 3



Date: 7/26/2018





**Legend**

-  Recommended Pond Location
-  City Limits
-  Roads
-  Railroad
-  Streams
-  FEMA Floodplain

**City of Liberty Hill  
Drainage Master Plan**

**Phase II  
Recommended Pond  
Locations**

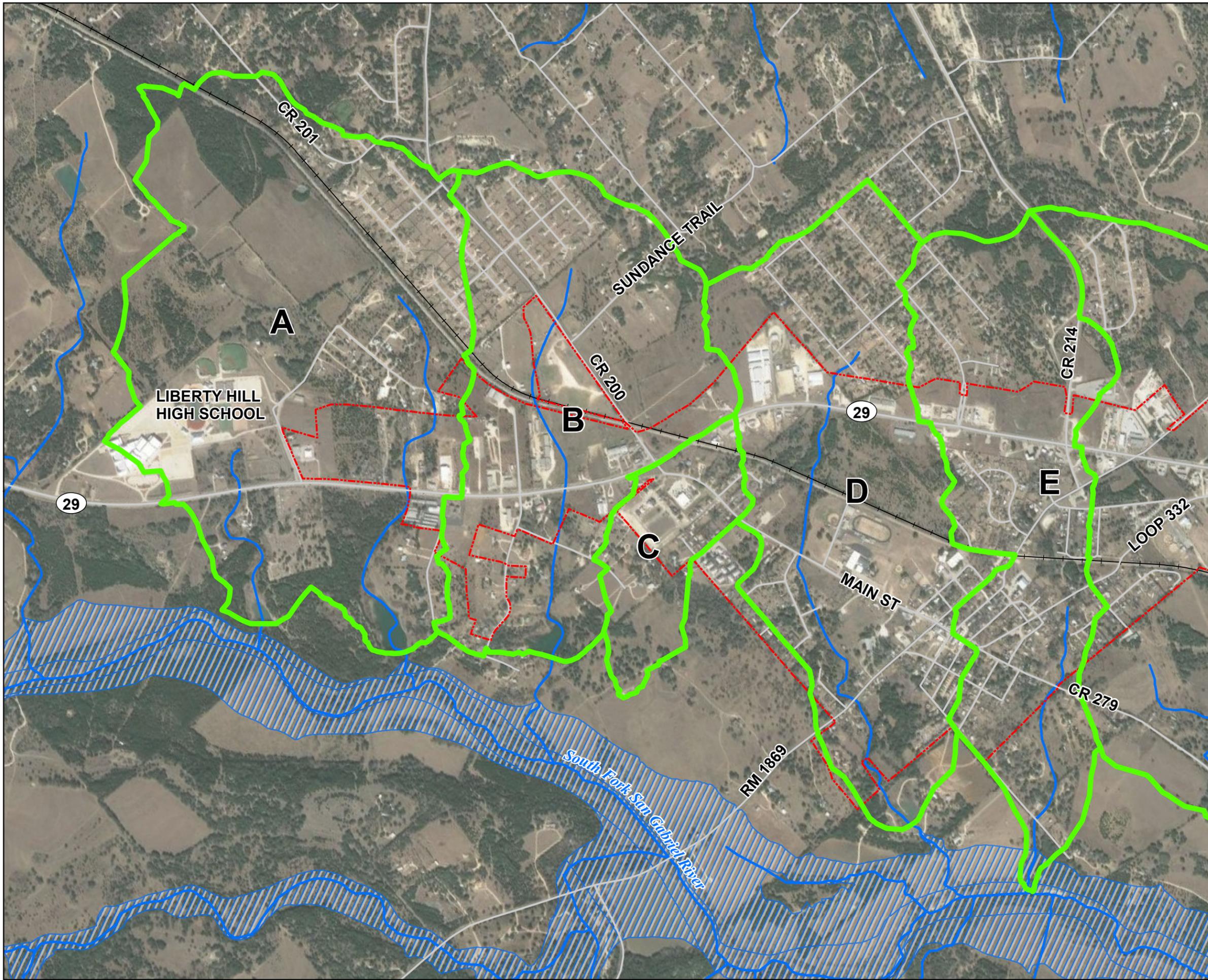
Sheet 3 of 3



Date: 7/26/2018



*Appendix I: City Drainage Basins*



**Legend**

-  Drainage Zones
-  City Limits
-  Roads
-  Railroad
-  Streams
-  FEMA Floodplain

**City of Liberty Hill  
Drainage Master Plan**

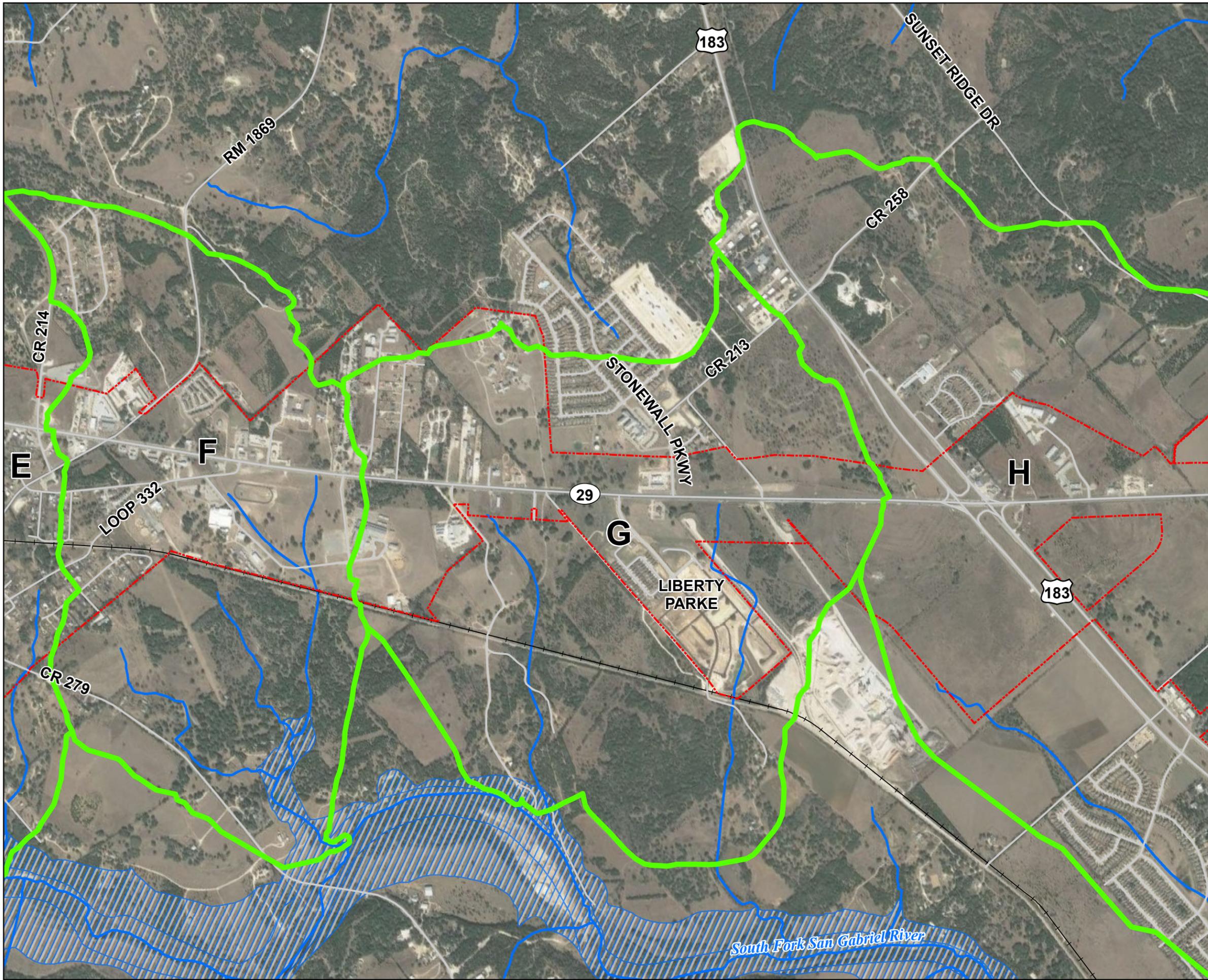
**Phase II  
City Drainage Basins**

Sheet 1 of 3



Date: 7/26/2018

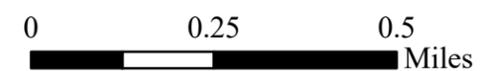




- Legend**
-  Drainage Zones
  -  City Limits
  -  Roads
  -  Railroad
  -  Streams
  -  FEMA Floodplain

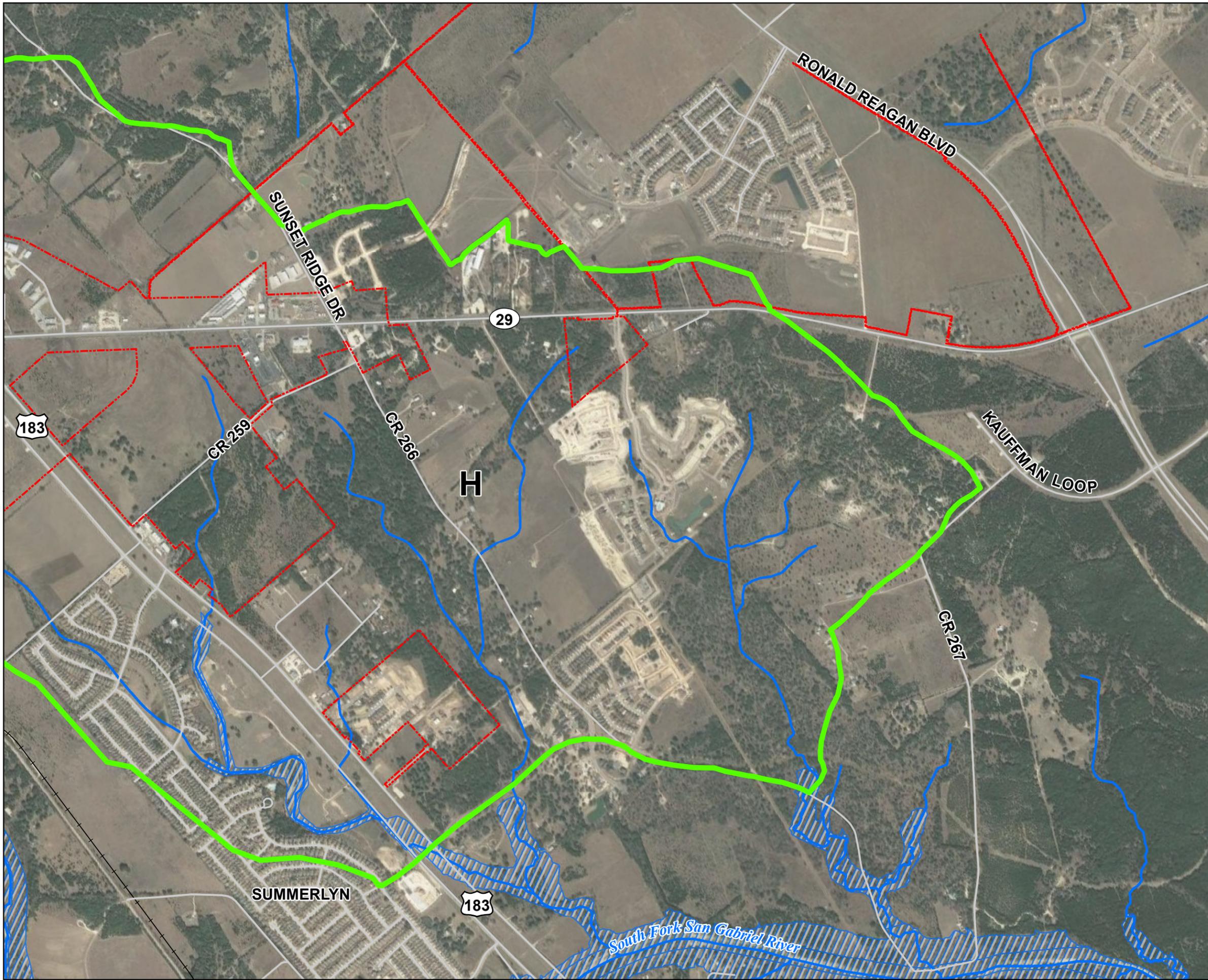
**City of Liberty Hill  
Drainage Master Plan**

**Phase II  
City Drainage Basins**  
Sheet 2 of 3



Date: 7/26/2018





**Legend**

-  Drainage Zones
-  City Limits
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**City of Liberty Hill  
Drainage Master Plan**

**Phase II  
City Drainage Basins**

Sheet 3 of 3



Date: 7/26/2018

