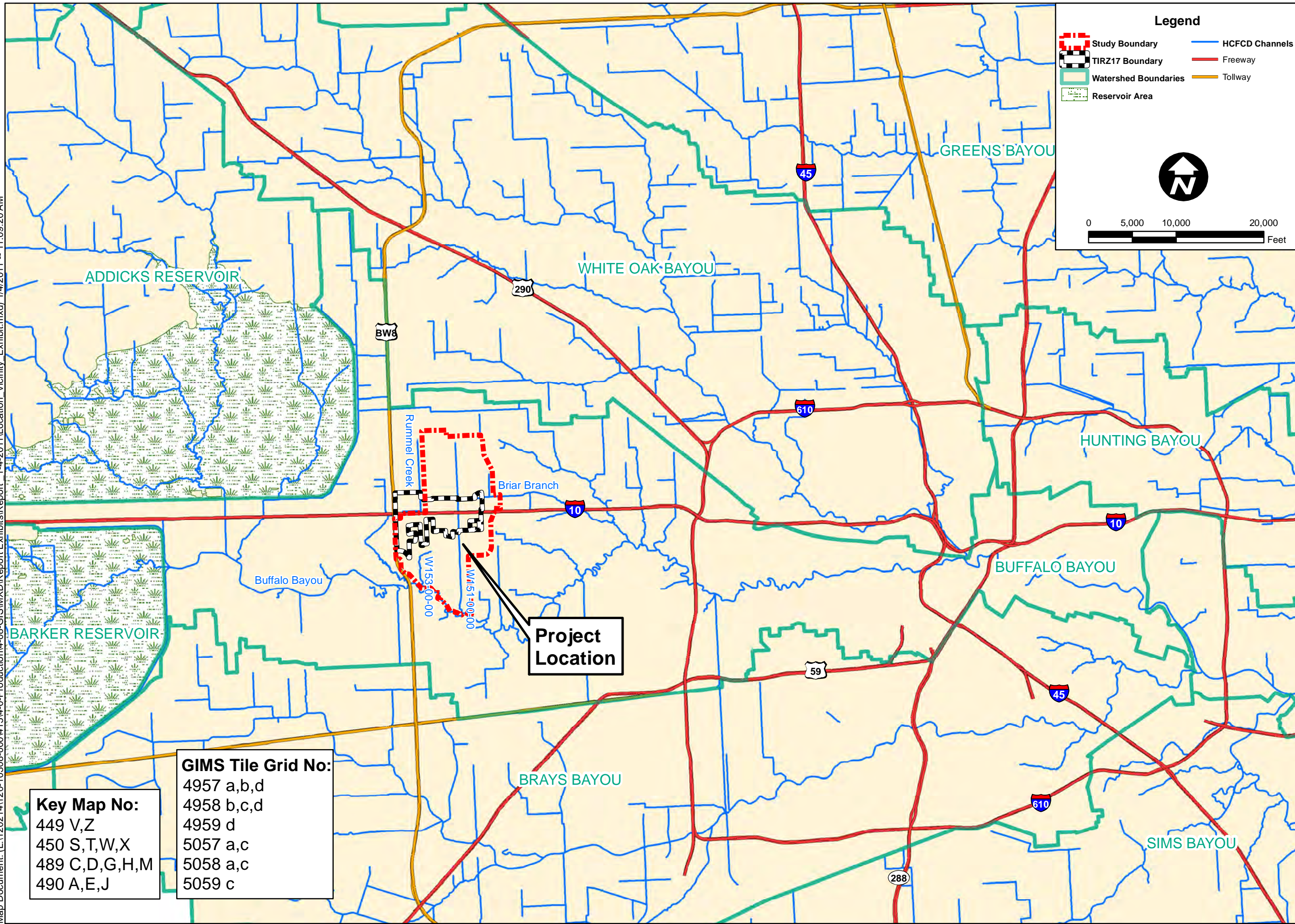


## EXHIBITS



Map Document: (L:\120214\120-10308-000\41514-0-Production\4-08-GIS\MXD\Report Exhibits\Report\_1-4-2011\Location\_Vicinity\_Exhibit.mxd) 1/4/2011 -- 11:09:20 AM



**Legend**

- Study Boundary
- TIRZ17 Boundary
- Watershed Boundaries
- Reservoir Area
- HCFC Channels
- Freeway
- Tollway

Scale: 0, 5,000, 10,000, 20,000 Feet

North Arrow

**Key Map No:**  
 449 V,Z  
 450 S,T,W,X  
 489 C,D,G,H,M  
 490 A,E,J

**GIMS Tile Grid No:**  
 4957 a,b,d  
 4958 b,c,d  
 4959 d  
 5057 a,c  
 5058 a,c  
 5059 c

**Project Location**

REV	DESCRIPTION	DATE	APPR

TIRZ 17 REGIONAL DRAINAGE STUDY

LOCATION MAP SHEET 1 OF 1

PREPARED: MJM  
 CHECKED: DST  
 APPROVED: DST

Lockwood, Andrews & Newnam, Inc.  
 A LEG A DAILY COMPANY

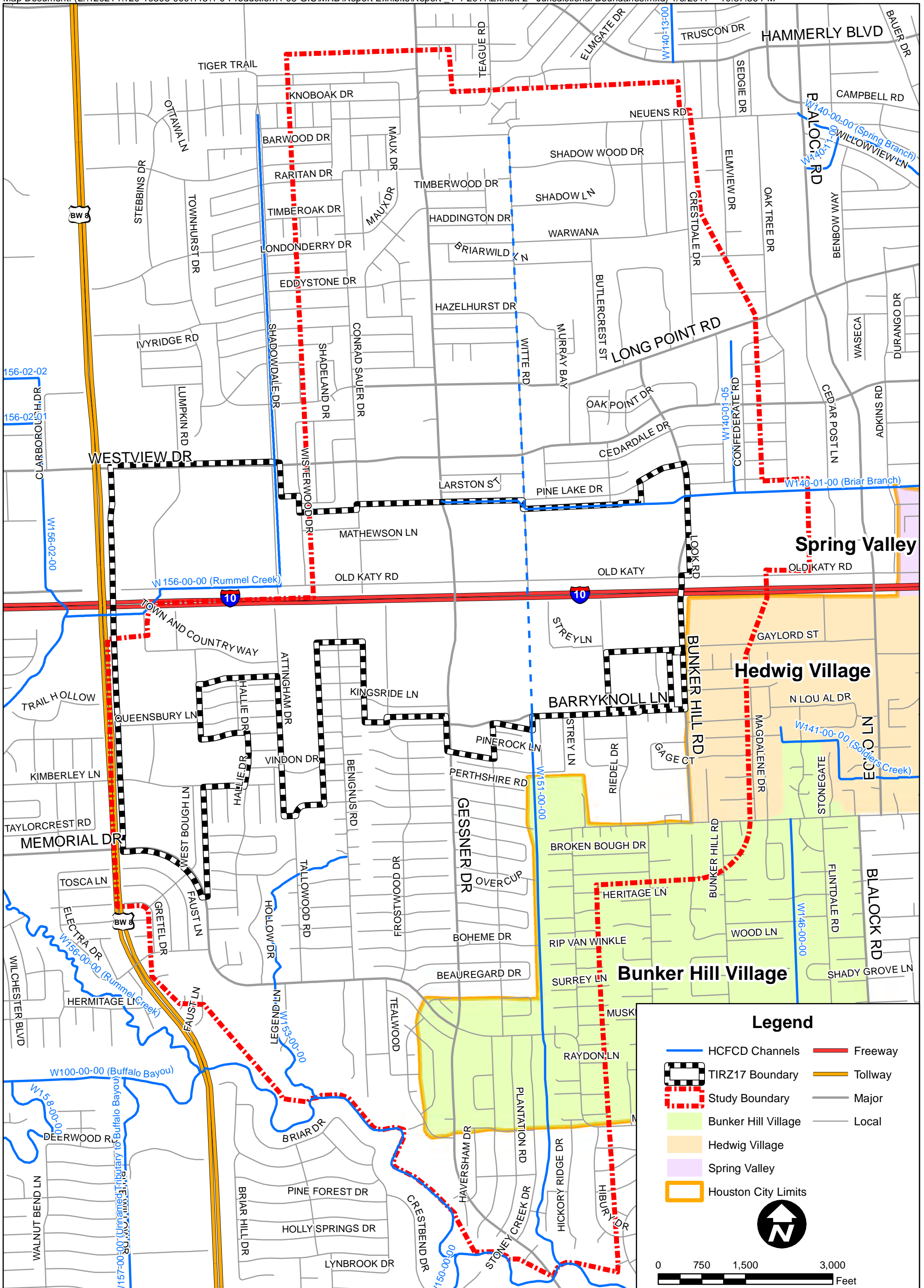
**IGN**

TIRZ 17 REDEVELOPMENT AUTHORITY

DATE: JUNE 2011  
 SCALE: AS NOTED

EXHIBIT NUMBER  
 1 OF 38





**Legend**

- HCFCD Channels
- - - Freeway
- TIRZ17 Boundary
- Study Boundary
- Bunker Hill Village
- Hedwig Village
- Spring Valley
- Houston City Limits
- Major
- Local

0 750 1,500 3,000 Feet

EXHIBIT NUMBER  
**2 OF 38**

DATE: JUNE 2011  
SCALE: AS NOTED

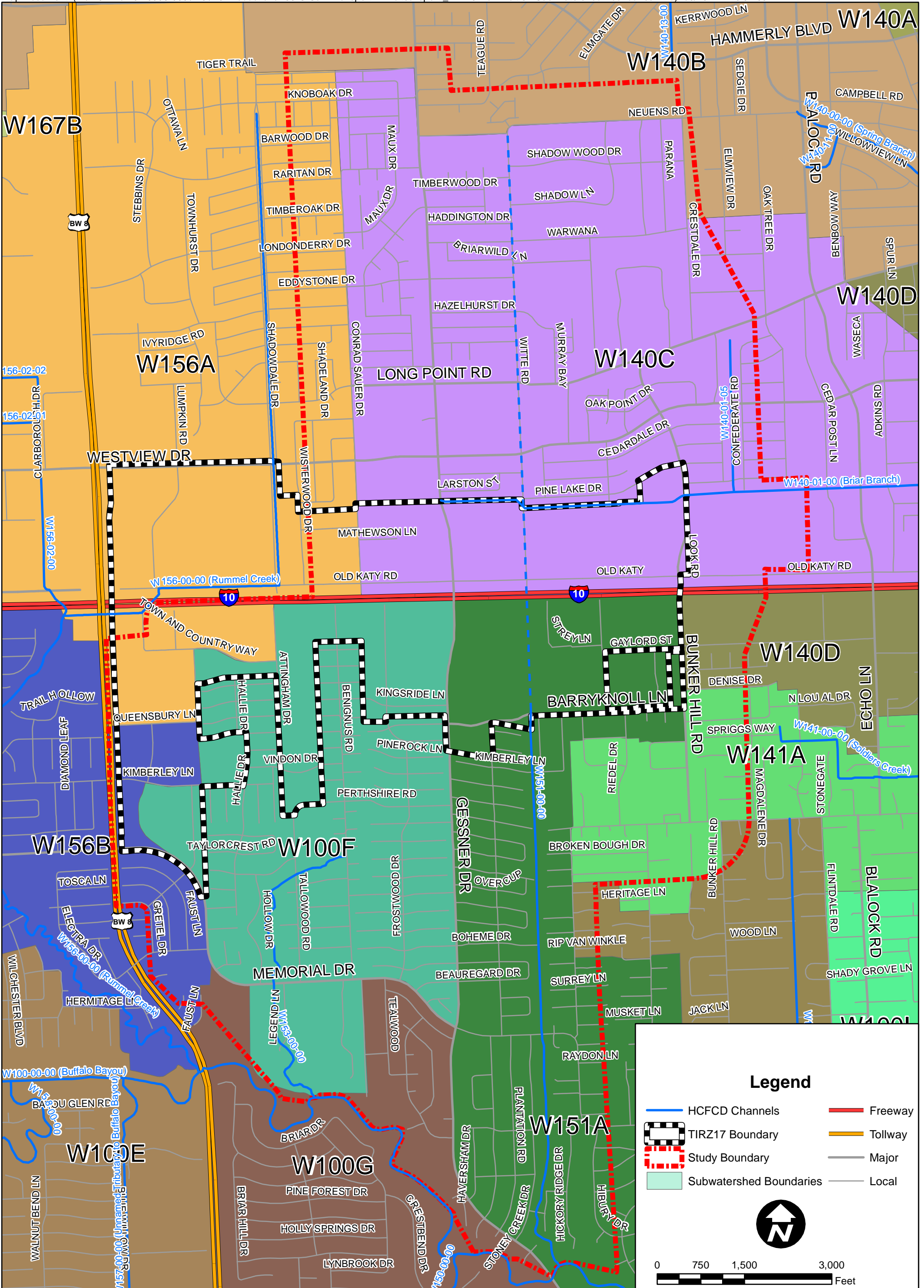
Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

PREPARED: **MJM**  
CHECKED: **DST**  
APPROVED: **DST**

**TIRZ 17 REGIONAL DRAINAGE STUDY**  
**JURISDICTIONAL BOUNDARIES**

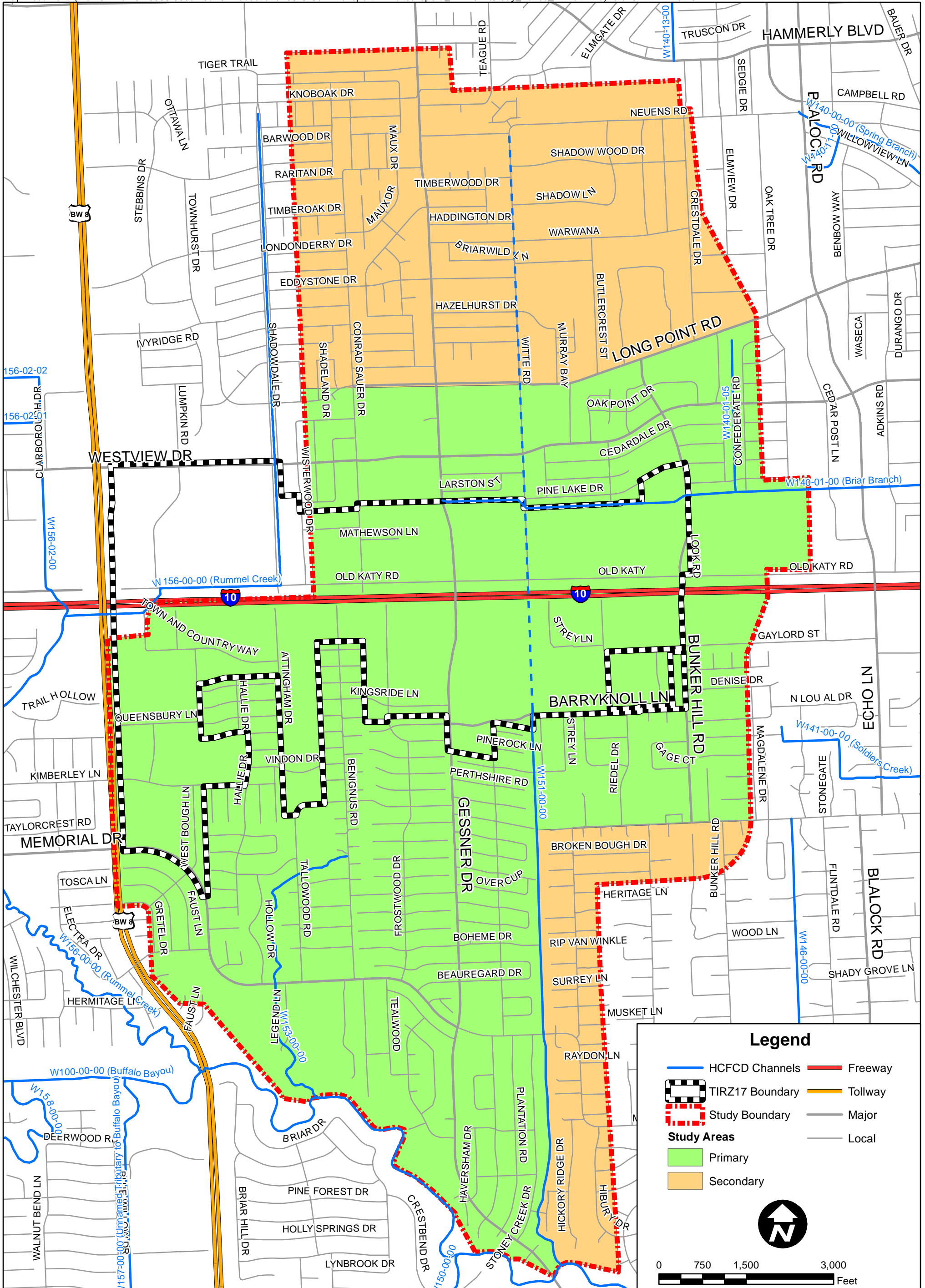
REV	DESCRIPTION	DATE	APPR



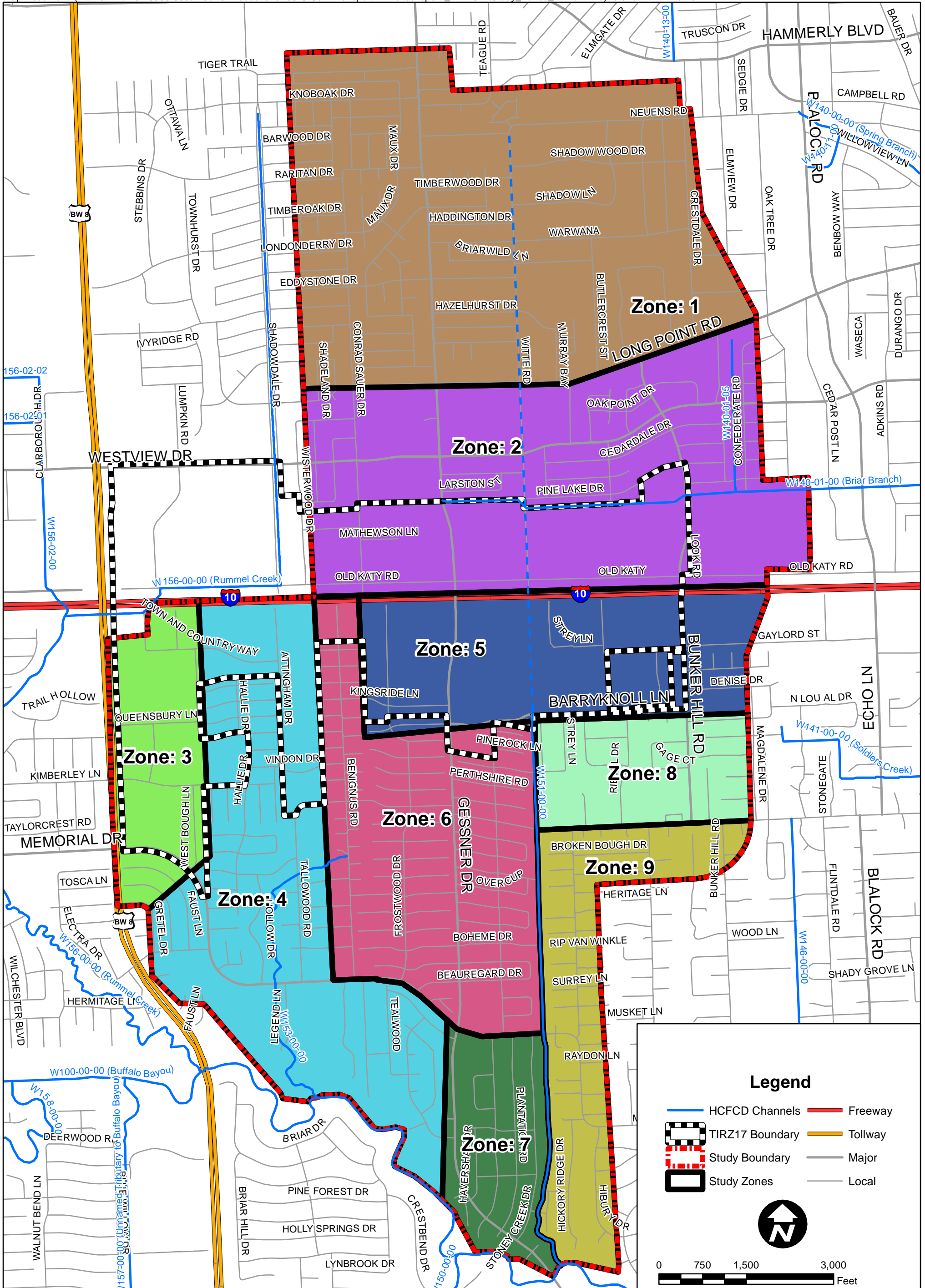


REV	DESCRIPTION	DATE	APPR



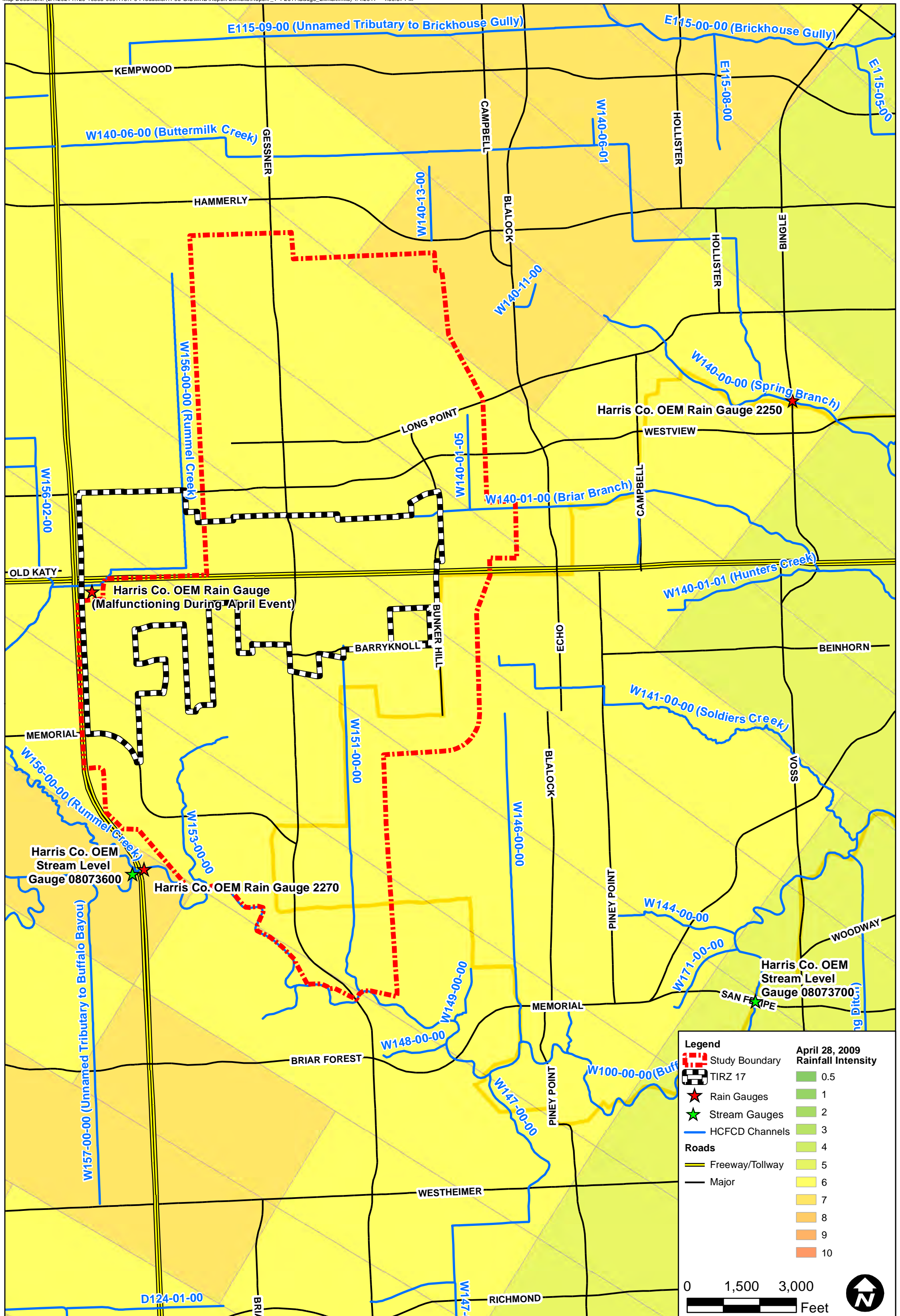






REV	DESCRIPTION	DATE	APPR





**Legend**

- Study Boundary
- TIRZ 17
- Rain Gauges
- Stream Gauges
- HCFCD Channels
- Roads**
  - Freeway/Tollway
  - Major

**April 28, 2009 Rainfall Intensity**

- 0.5
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

0 1,500 3,000 Feet





**TIRZ - 17 REGIONAL DRAINAGE STUDY**  
**DRAINAGE AREA BOUNDARIES**  
**EXHIBIT 7 - A**



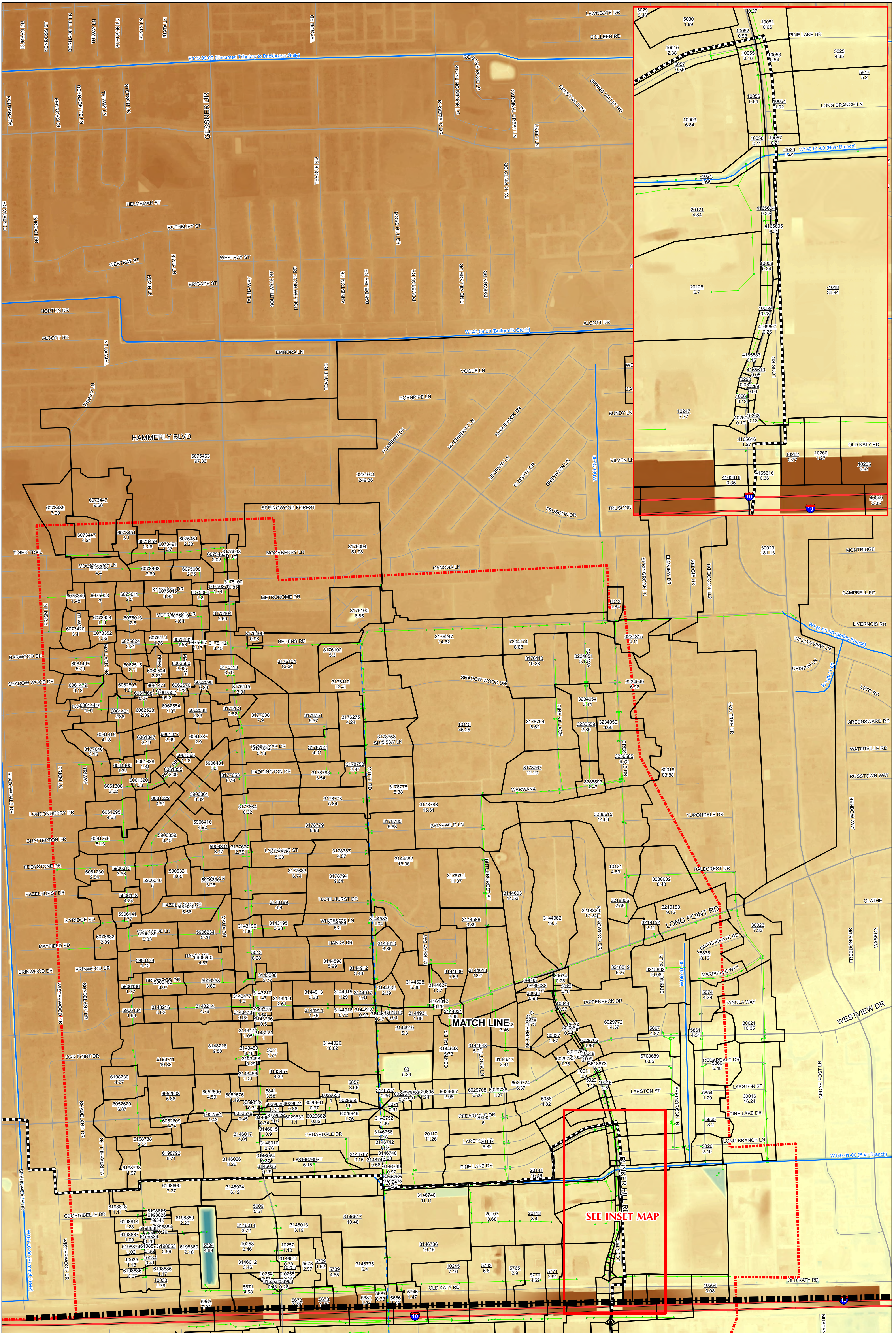
- Legend**
- Existing Nodes
  - Existing Storm Sewer
  - Existing Drainage Areas
  - TIRZ17 Boundary
  - Study Boundary
  - HCFCD Channels
  - W151 Extension to Nuens

**LIDAR - Elevation (Ft.)**  
 High : 100  
 Low : 50

**Drainage Area Labels**  
 DAID  
 AREA (AC)

0 250 500 1,000 Feet

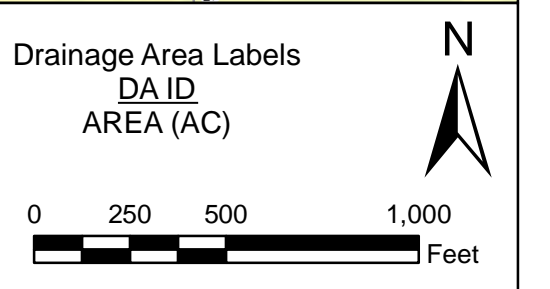
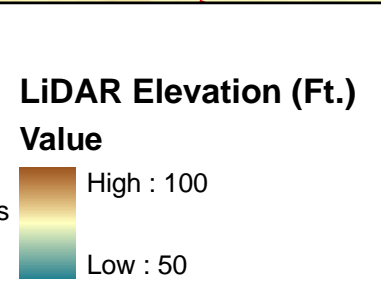




**TIRZ - 17 REGIONAL DRAINAGE STUDY**  
**DRAINAGE AREA BOUNDARIES**  
**EXHIBIT 7 - B**



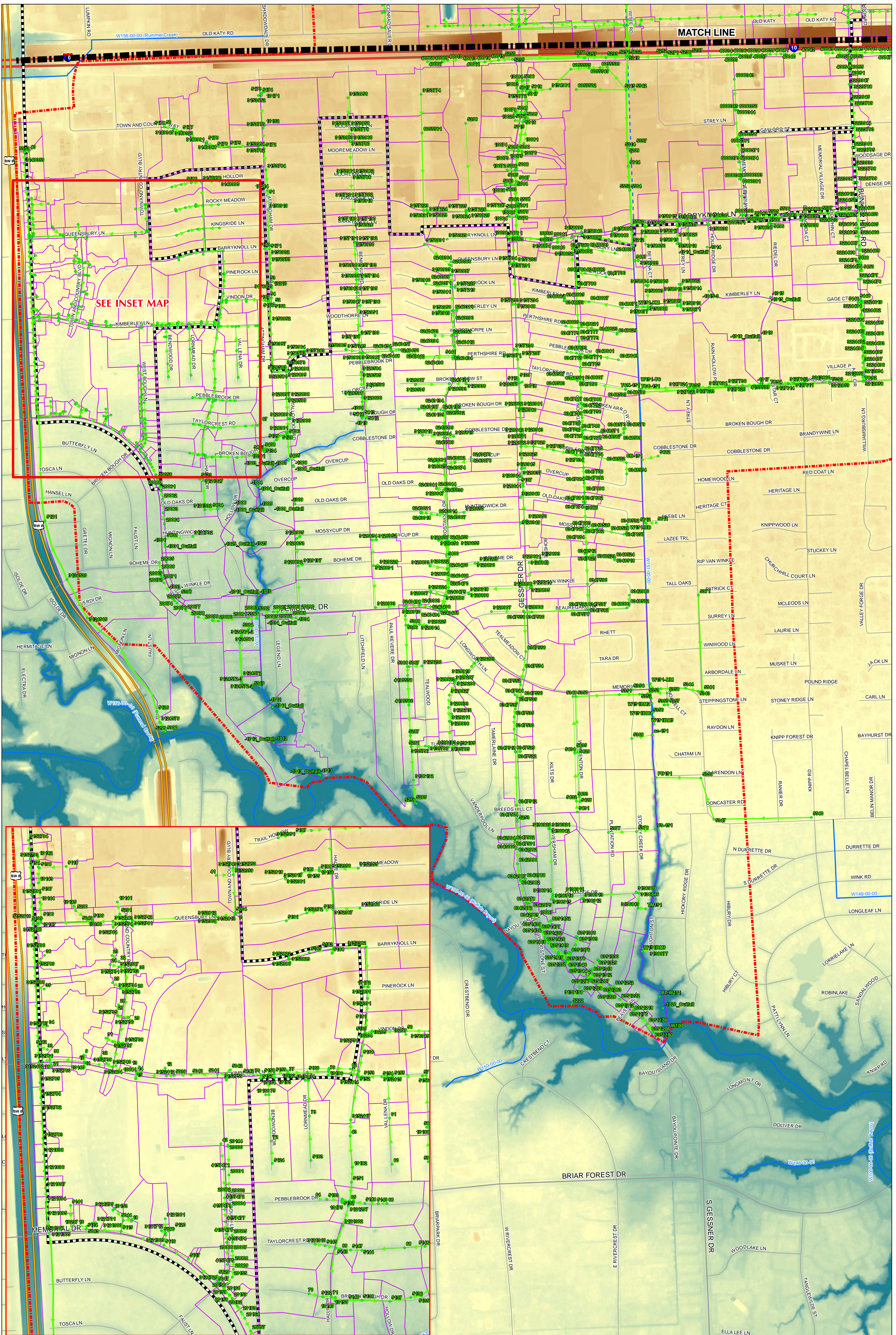
- Legend**
- Existing Nodes
  - Existing Storm Sewer
  - Existing Drainage Areas
  - TIRZ17 Boundary
  - Study Boundary
  - HCFCD Channels
  - W151 Extension to Nuens



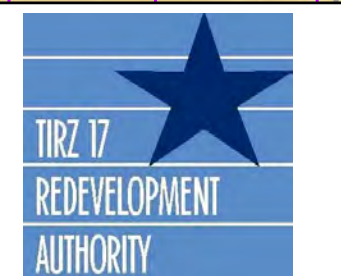
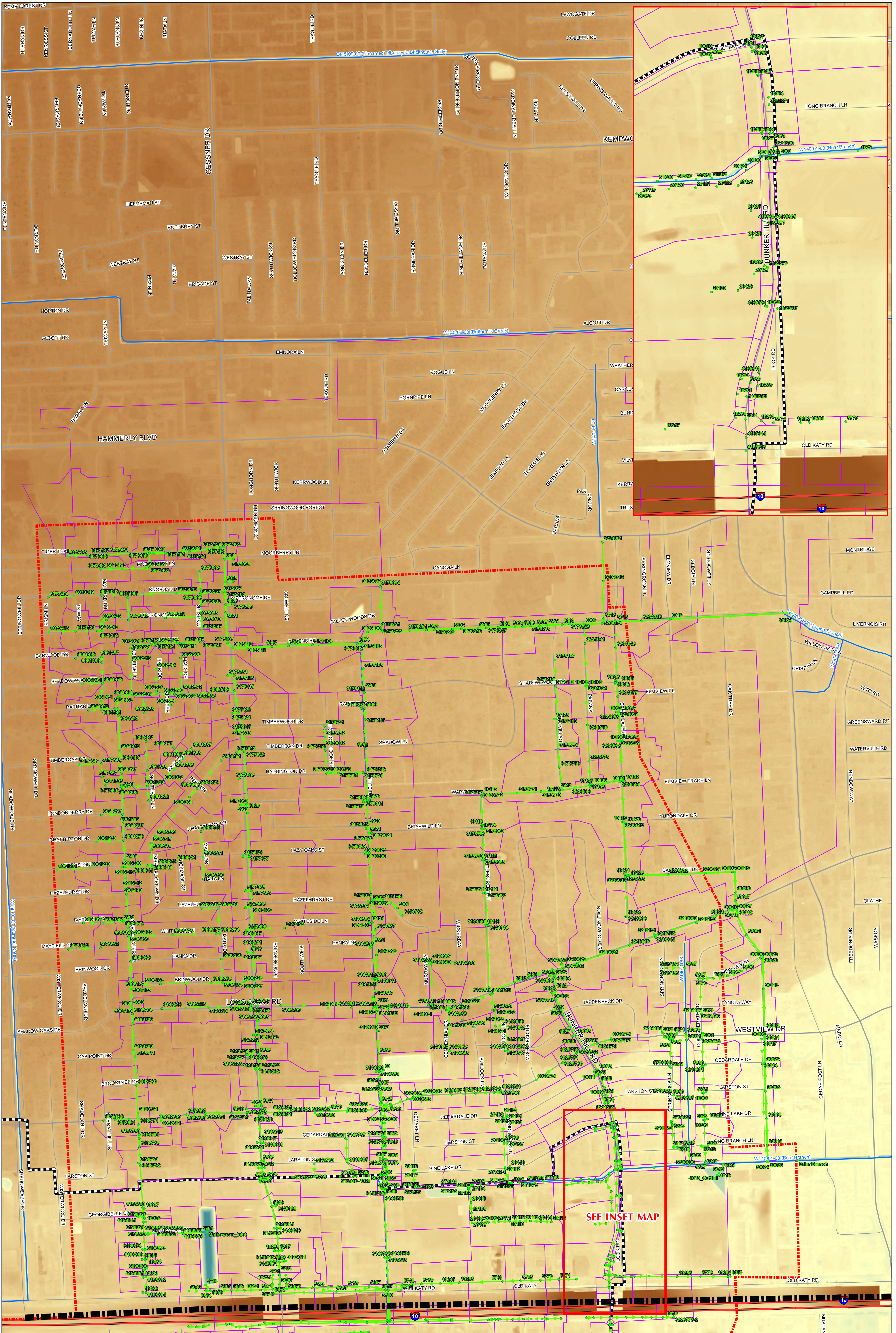
**SEE INSET MAP**

**MATCH LINE**

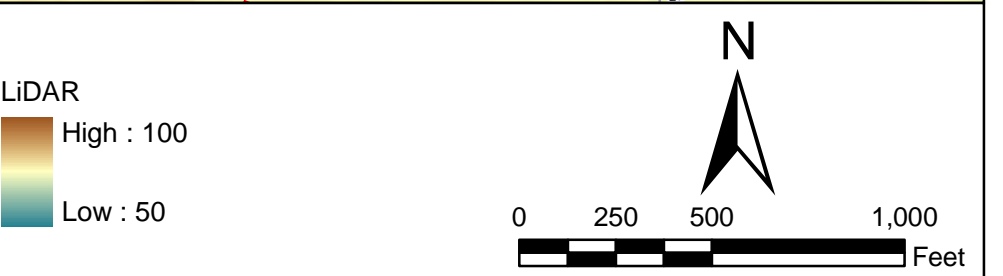




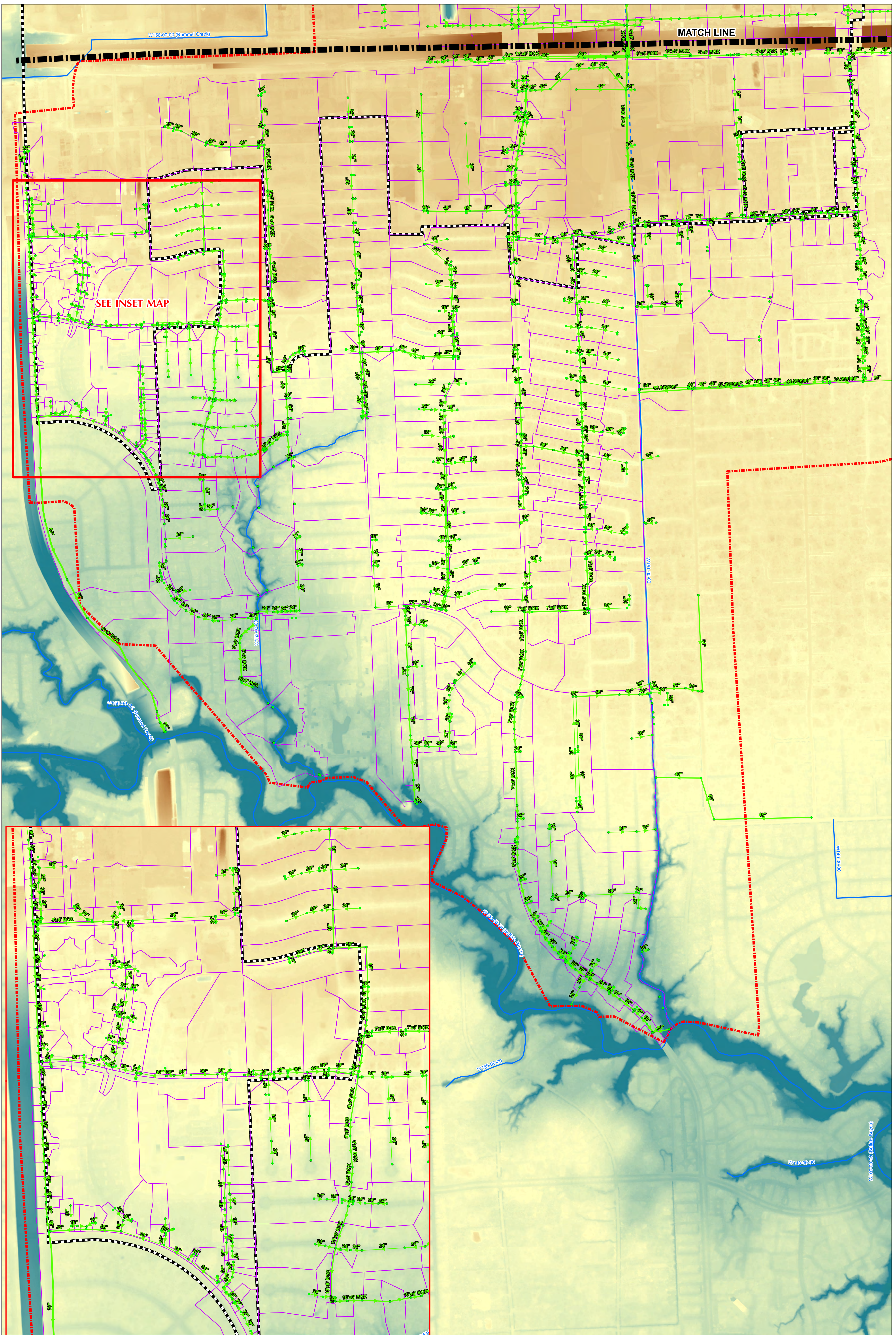




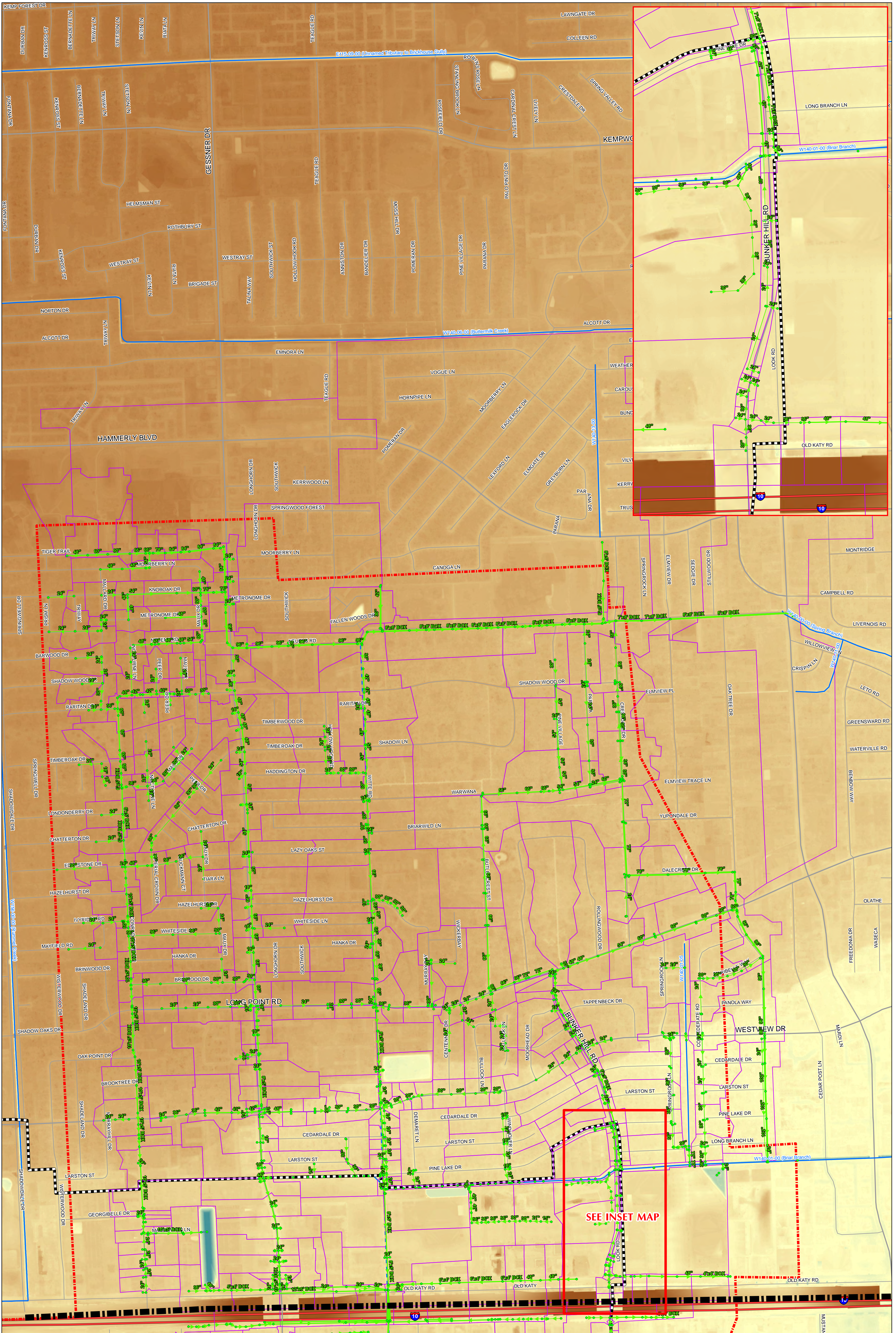
- Legend**
- Existing Nodes
  - Existing Storm Sewer
  - < 36"
  - 36" - 72"
  - > 72"
  - ▭ Existing Drainage Areas
  - ▭ TIRZ17 Boundary
  - ▭ Study Boundary
  - ▭ HCFCD Channels
  - ▭ W151 Extension to Nuens
  - ▭ LIDAR
  - High : 100
  - Low : 50











**TIRZ - 17 REGIONAL DRAINAGE STUDY**  
**EXISTING STORM SEWER SIZES**  
**EXHIBIT 9 - B**

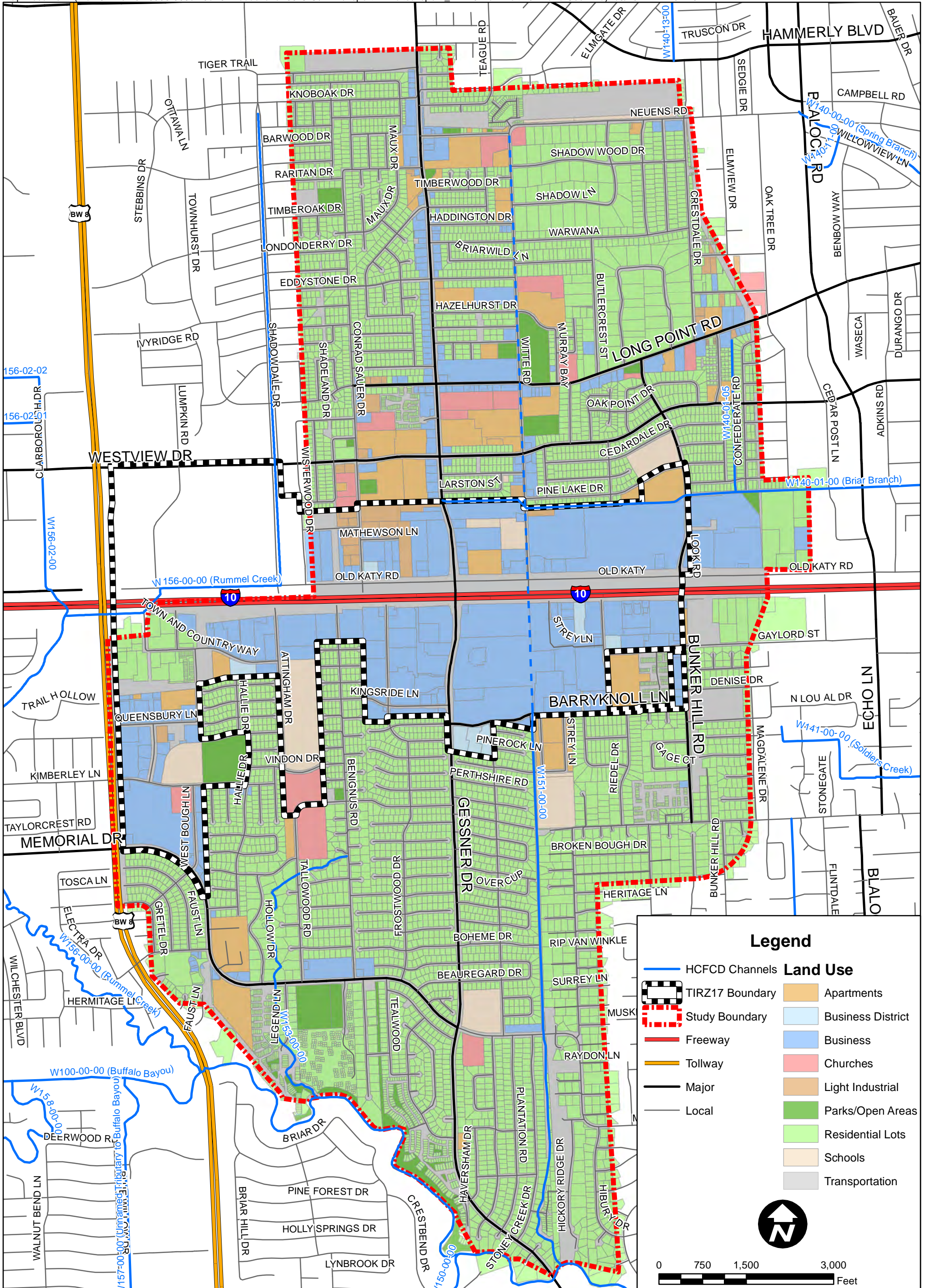


**Legend**

- Existing Nodes
- Existing Storm Sewer
- < 36"
- 36" - 72"
- > 72"
- Existing Drainage Areas
- TIRZ17 Boundary
- Study Boundary
- HCFC Channels
- W151 Extension to Nuens
- LIDAR Elevation (Ft.)
  - High : 100
  - Low : 50

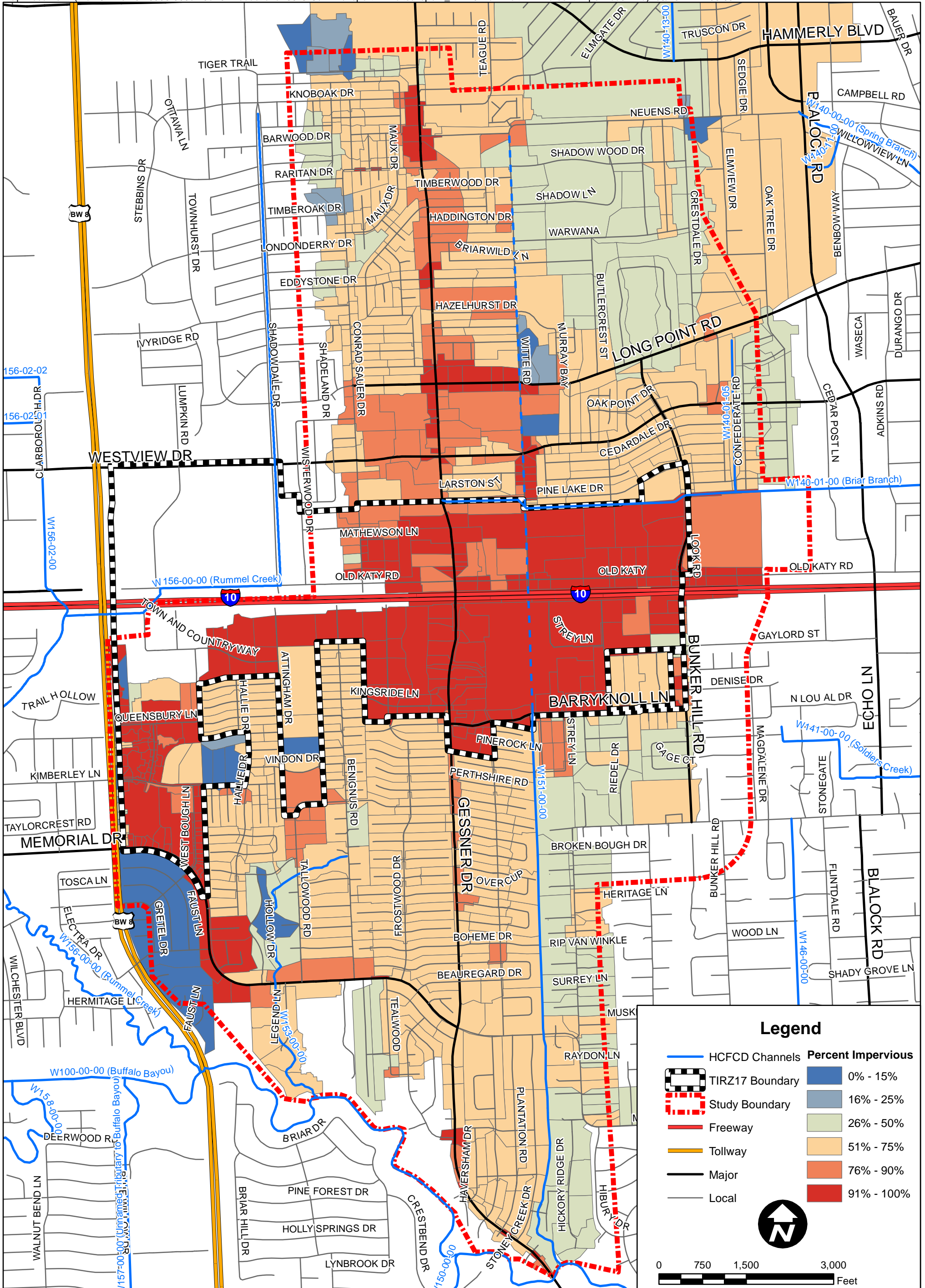
0 250 500 1,000 Feet





REV	DESCRIPTION	DATE	APPR





**Legend**

	HCFC Channels		<b>Percent Impervious</b>
	TIRZ17 Boundary		0% - 15%
	Study Boundary		16% - 25%
	Freeway		26% - 50%
	Tollway		51% - 75%
	Major		76% - 90%
	Local		91% - 100%

0 750 1,500 3,000 Feet

EXHIBIT NUMBER  
**11 OF 38**

DATE: JUNE 2011  
SCALE: AS NOTED

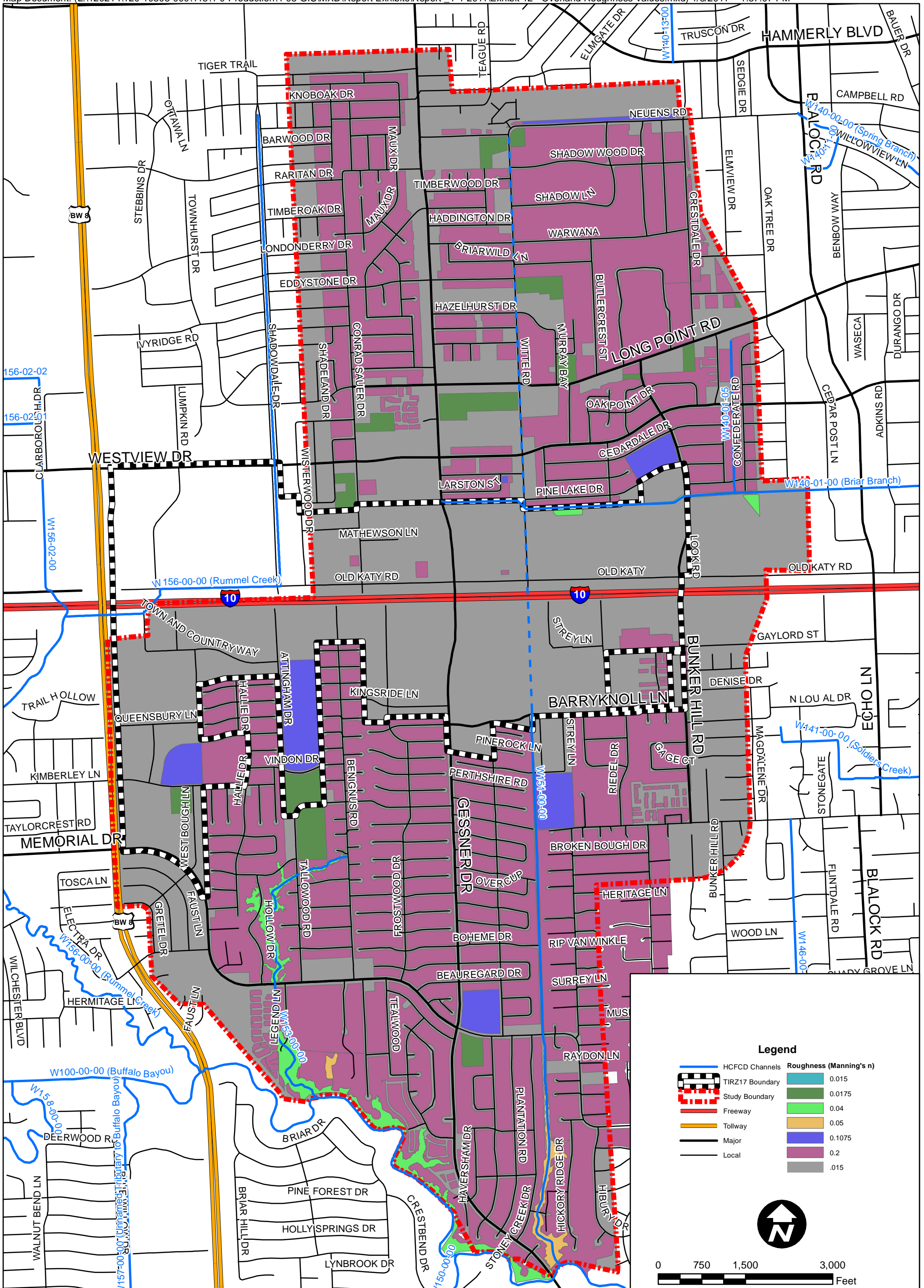
Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

PREPARED: **MJM**  
CHECKED: **DST**  
APPROVED: **DST**

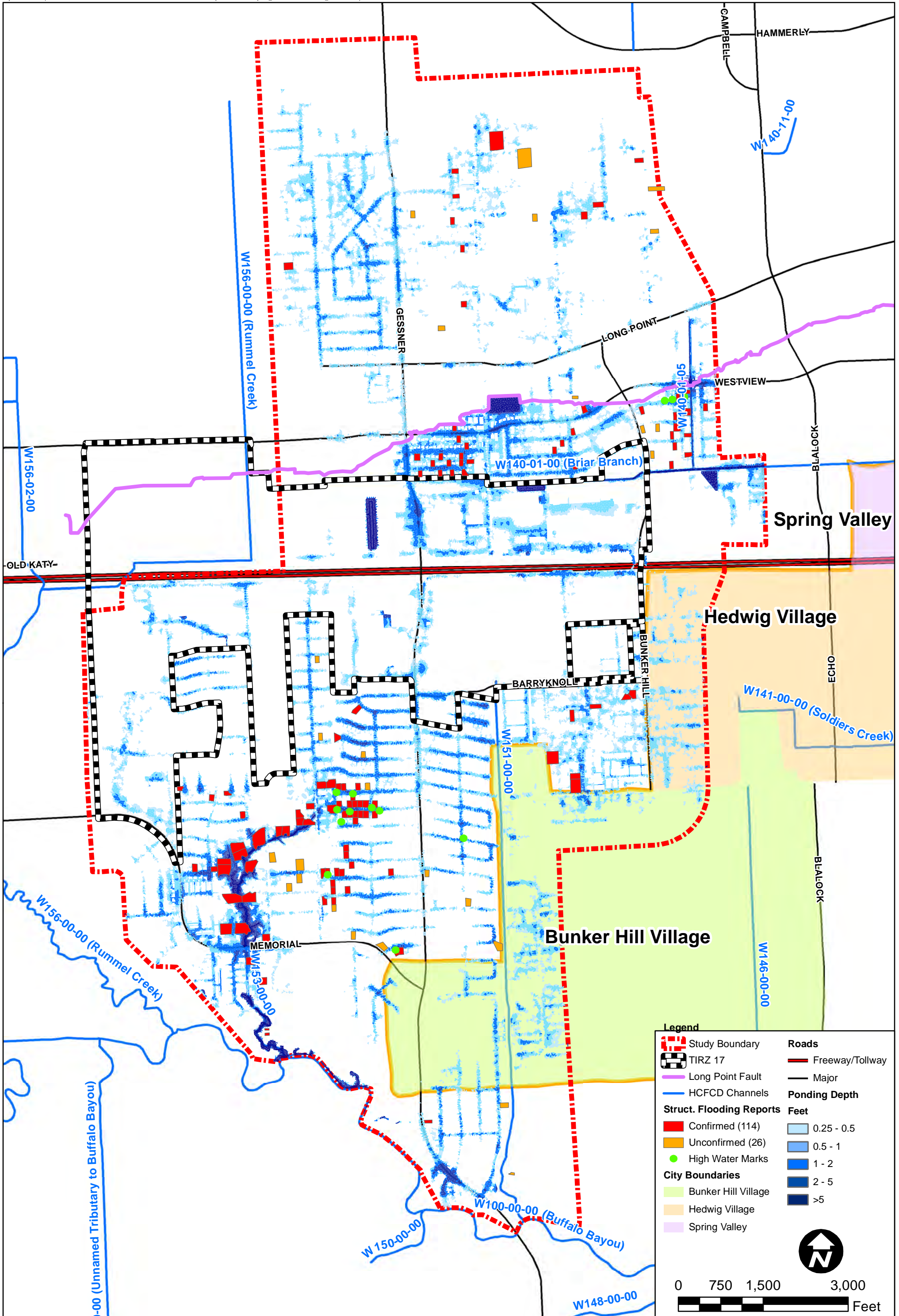
**TIRZ 17 REGIONAL DRAINAGE STUDY**  
**PERCENT IMPERVIOUS**

REV	DESCRIPTION	DATE	APPR









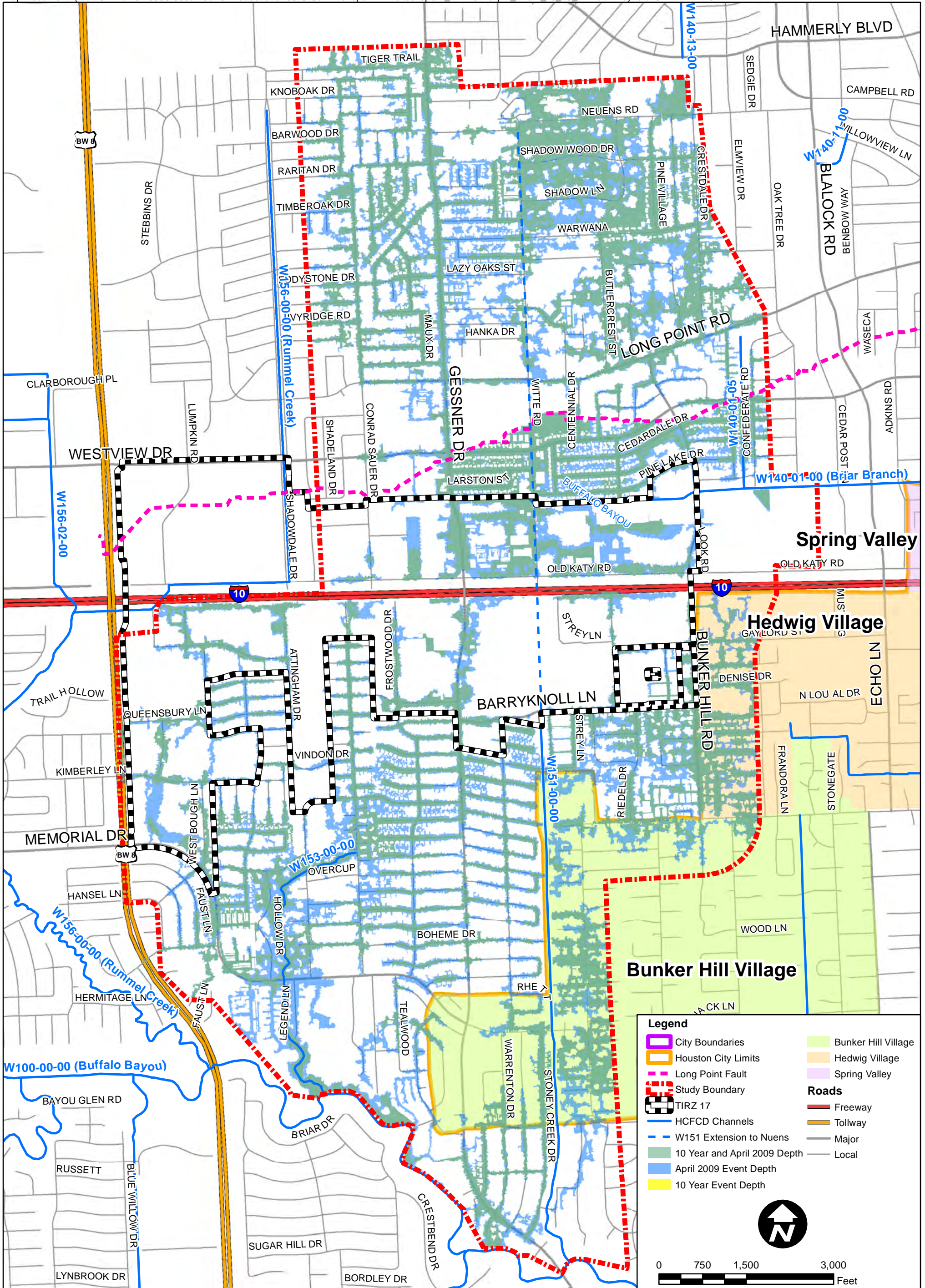
**Legend**

- Study Boundary
- TIRZ 17
- Long Point Fault
- HCFCD Channels
- Struct. Flooding Reports**
- Confirmed (114)
- Unconfirmed (26)
- High Water Marks
- City Boundaries**
- Bunker Hill Village
- Hedwig Village
- Spring Valley
- Roads**
- Freeway/Tollway
- Major
- Ponding Depth**
- Feet**
- 0.25 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 5
- >5

0 750 1,500 3,000 Feet

EXHIBIT NUMBER <b>13 OF 38</b>	DATE: JUNE 2011 SCALE: AS NOTED			PREPARED: BJC	TIRZ 17 REGIONAL DRAINAGE STUDY  Calibration Exhibit	REV	DESCRIPTION	DATE	APPR
				CHECKED: MJM					
				APPROVED: DST					





**Legend**

- City Boundaries
- Houston City Limits
- Long Point Fault
- Study Boundary
- TIRZ 17
- HCFC Channels
- W151 Extension to Nuens
- 10 Year and April 2009 Depth
- April 2009 Event Depth
- 10 Year Event Depth
- Bunker Hill Village
- Hedwig Village
- Spring Valley

**Roads**

- Freeway
- Tollway
- Major
- Local

0 750 1,500 3,000 Feet

EXHIBIT NUMBER  
14 OF 38

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

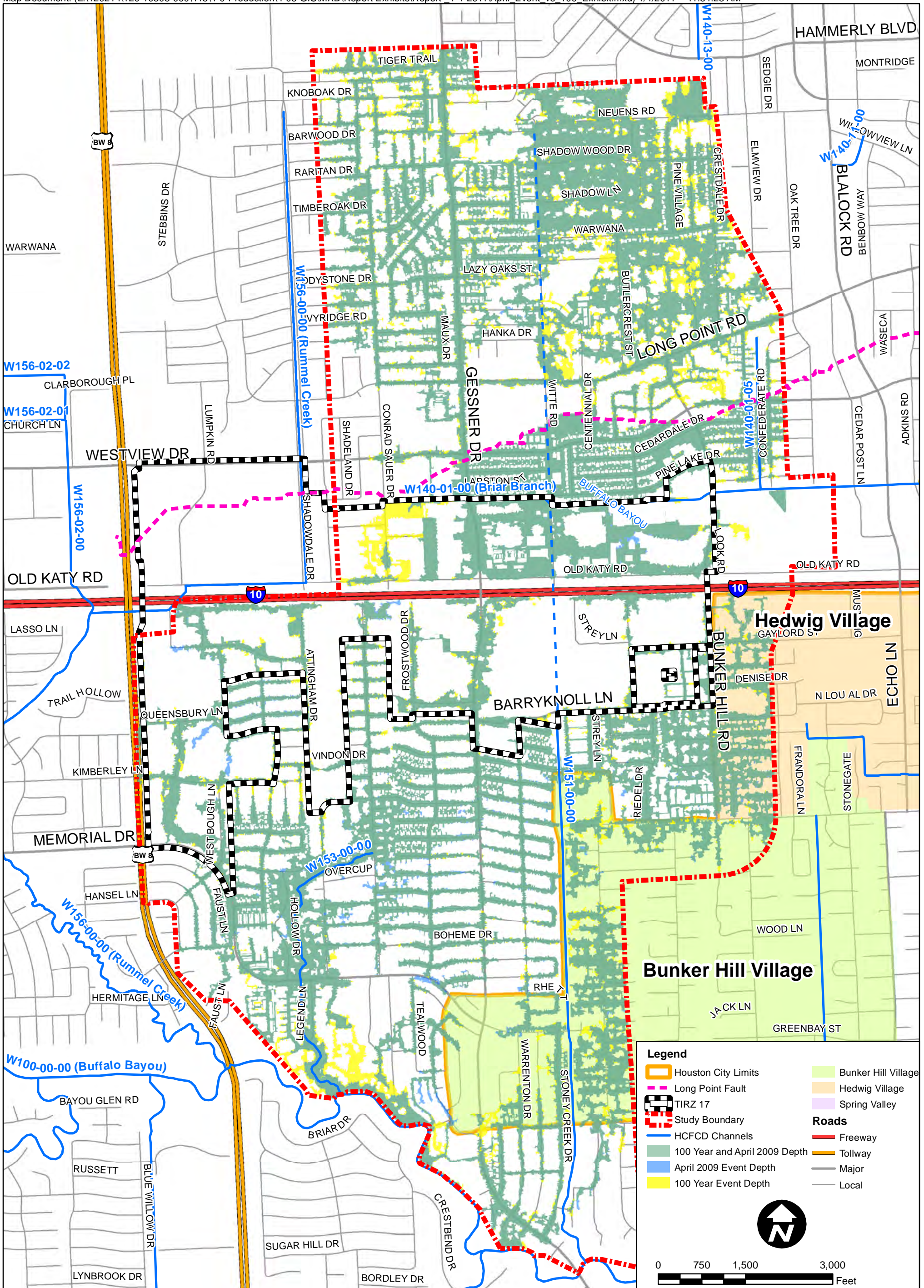
PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY

April 28th Event vs. Existing 10 Yr. Event

REV	DESCRIPTION	DATE	APPR





**Legend**

- Houston City Limits
- Long Point Fault
- TIRZ 17
- Study Boundary
- HCFC Channels
- 100 Year and April 2009 Depth
- April 2009 Event Depth
- 100 Year Event Depth
- Bunker Hill Village
- Hedwig Village
- Spring Valley

**Roads**

- Freeway
- Tollway
- Major
- Local

Scale: 0, 750, 1,500, 3,000 Feet

North Arrow

EXHIBIT NUMBER  
15 OF 38

DATE: JUNE 2011  
SCALE: AS NOTED

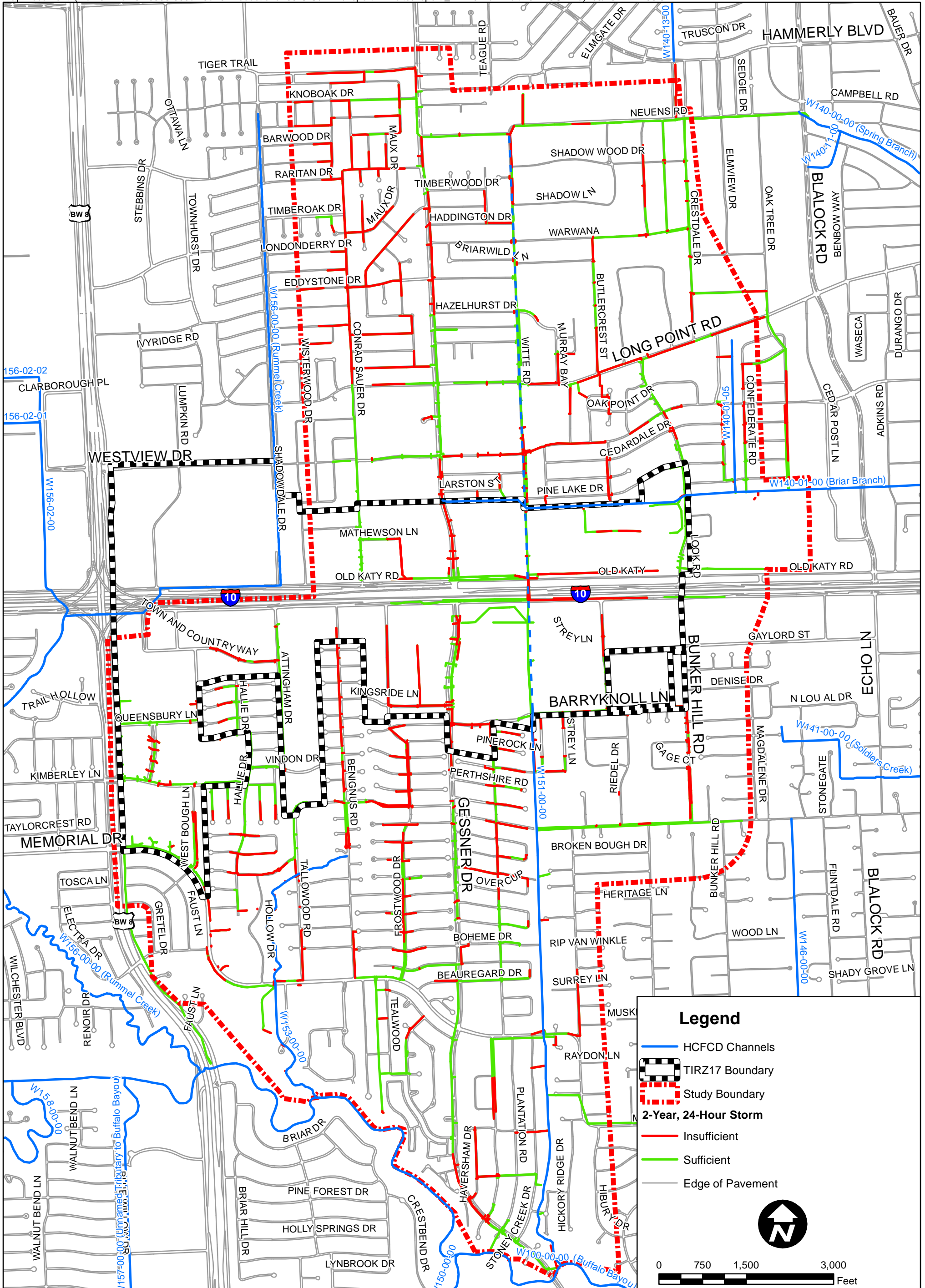
PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY

April 28th Event vs. Existing 100 Yr. Event

REV	DESCRIPTION	DATE	APPR





**Legend**

- HCFCD Channels
- TIRZ17 Boundary
- Study Boundary
- 2-Year, 24-Hour Storm**
- Insufficient
- Sufficient
- Edge of Pavement

0 750 1,500 3,000 Feet

REV	DESCRIPTION	DATE	APPR



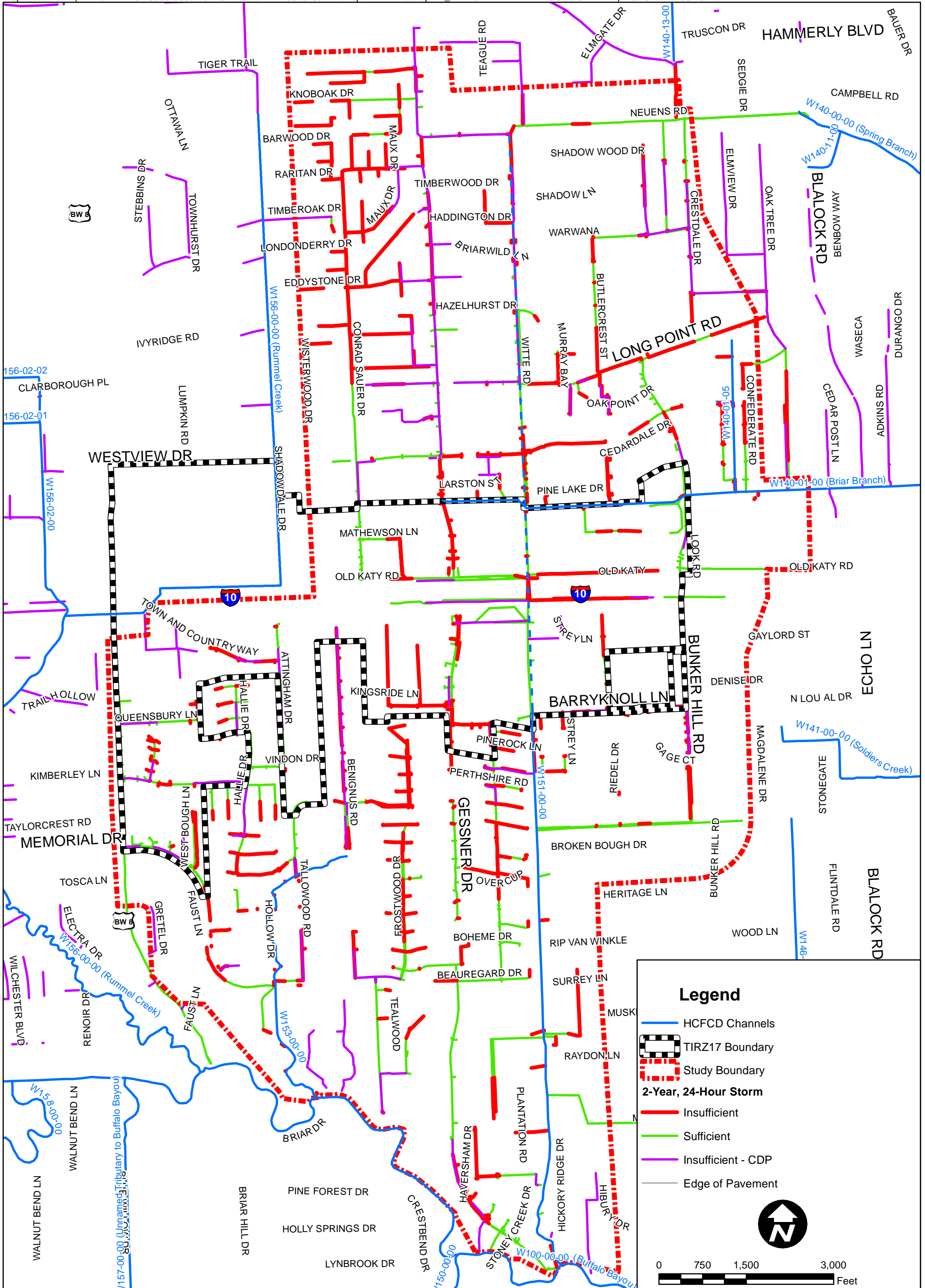


EXHIBIT NUMBER  
**17 OF 38**

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

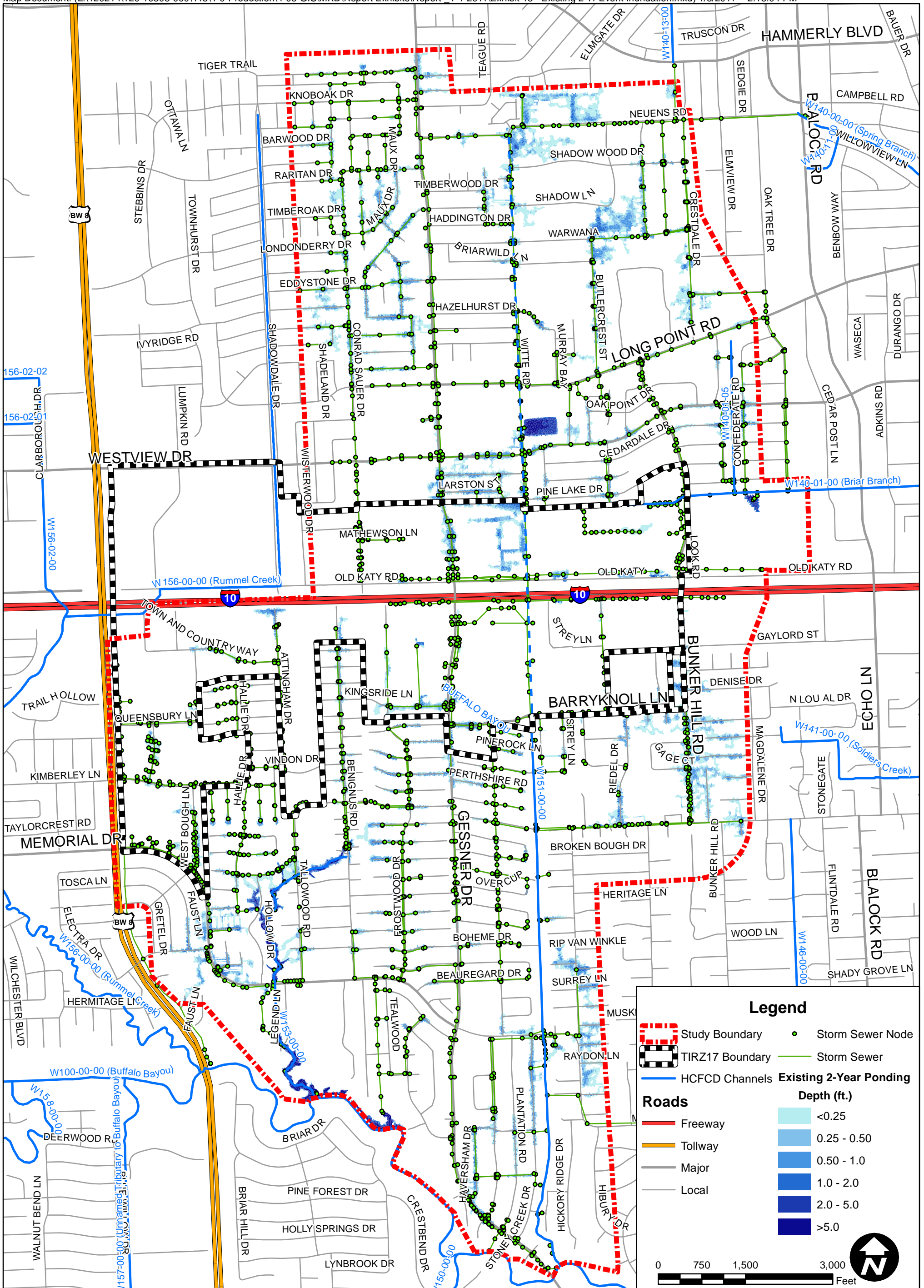
PREPARED: **MJM**  
CHECKED: **DST**  
APPROVED: **DST**

**TIRZ 17 REGIONAL DRAINAGE STUDY**

LEVEL OF SERVICE COMPARED TO COMPREHENSIVE DRAINAGE PLAN

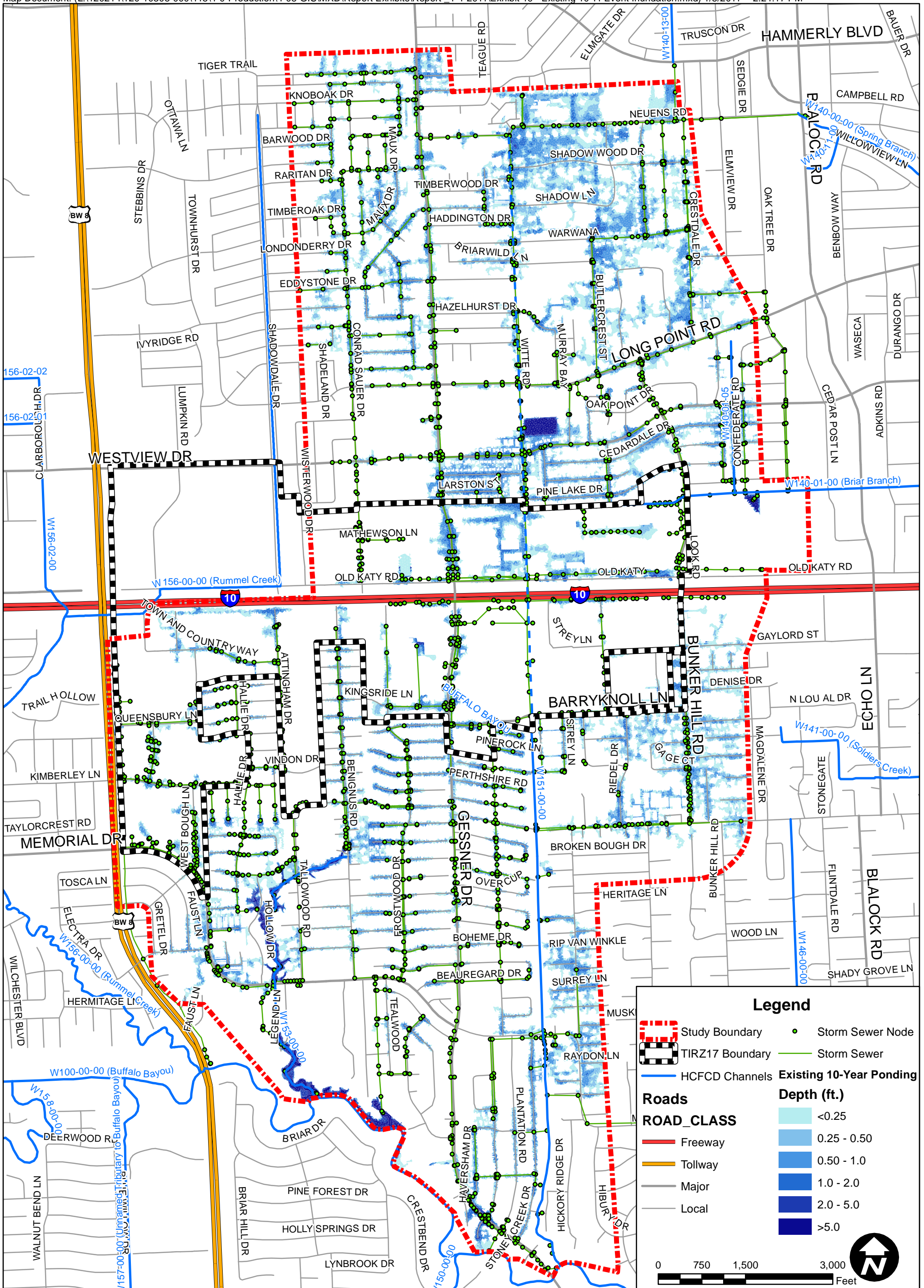
REV	DESCRIPTION	DATE	APPR





REV	DESCRIPTION	DATE	APPR





**Legend**

- Study Boundary
- TIRZ17 Boundary
- HCFC Channels
- Storm Sewer Node
- Storm Sewer

**Existing 10-Year Ponding Depth (ft.)**

- <0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

**Roads**

**ROAD\_CLASS**

- Freeway
- Tollway
- Major
- Local

0 750 1,500 3,000 Feet

EXHIBIT NUMBER  
**19 OF 38**

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

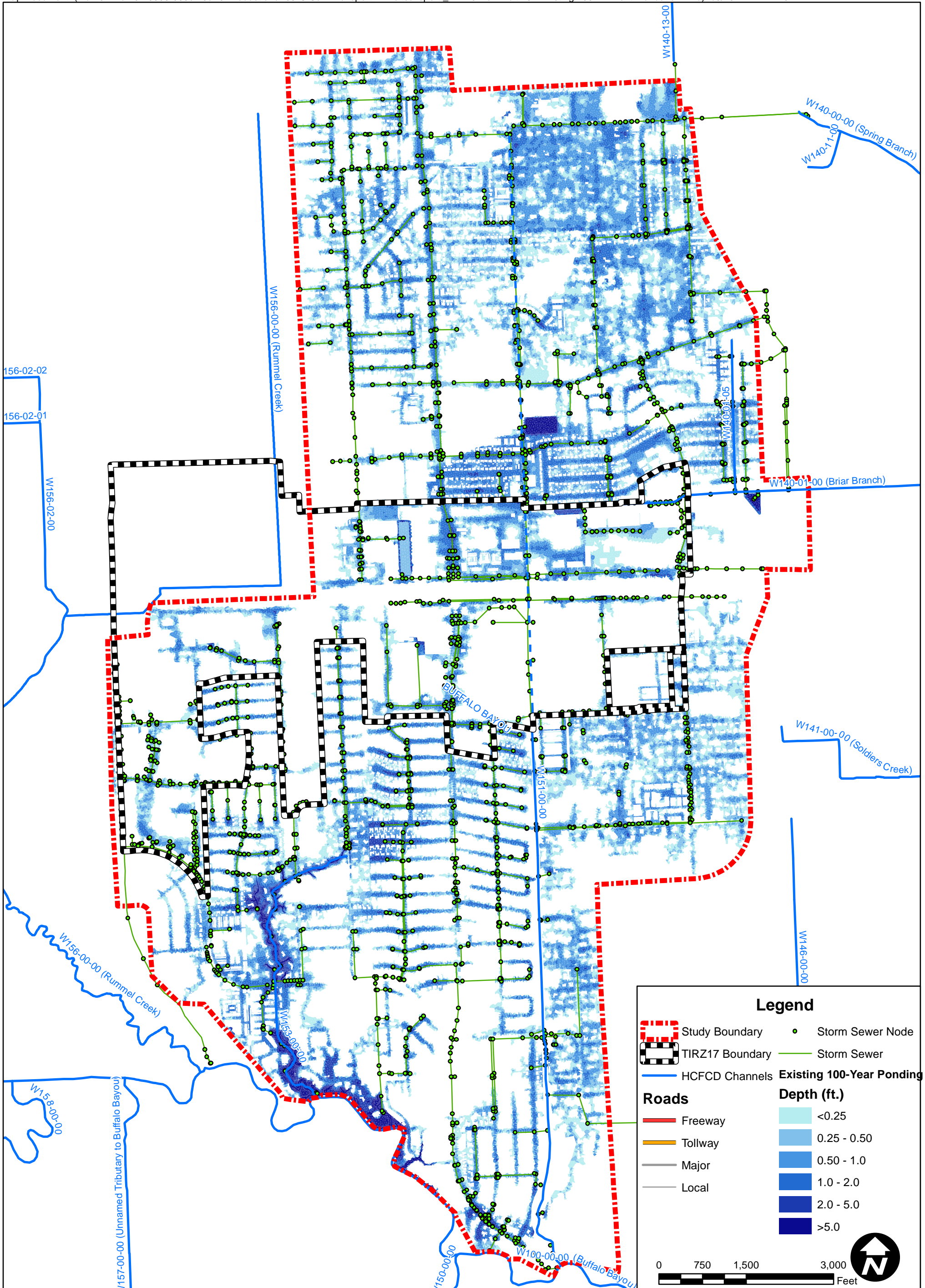
PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

**TIRZ 17 REGIONAL DRAINAGE STUDY**

**EXISTING 10-YEAR INUNDATION**

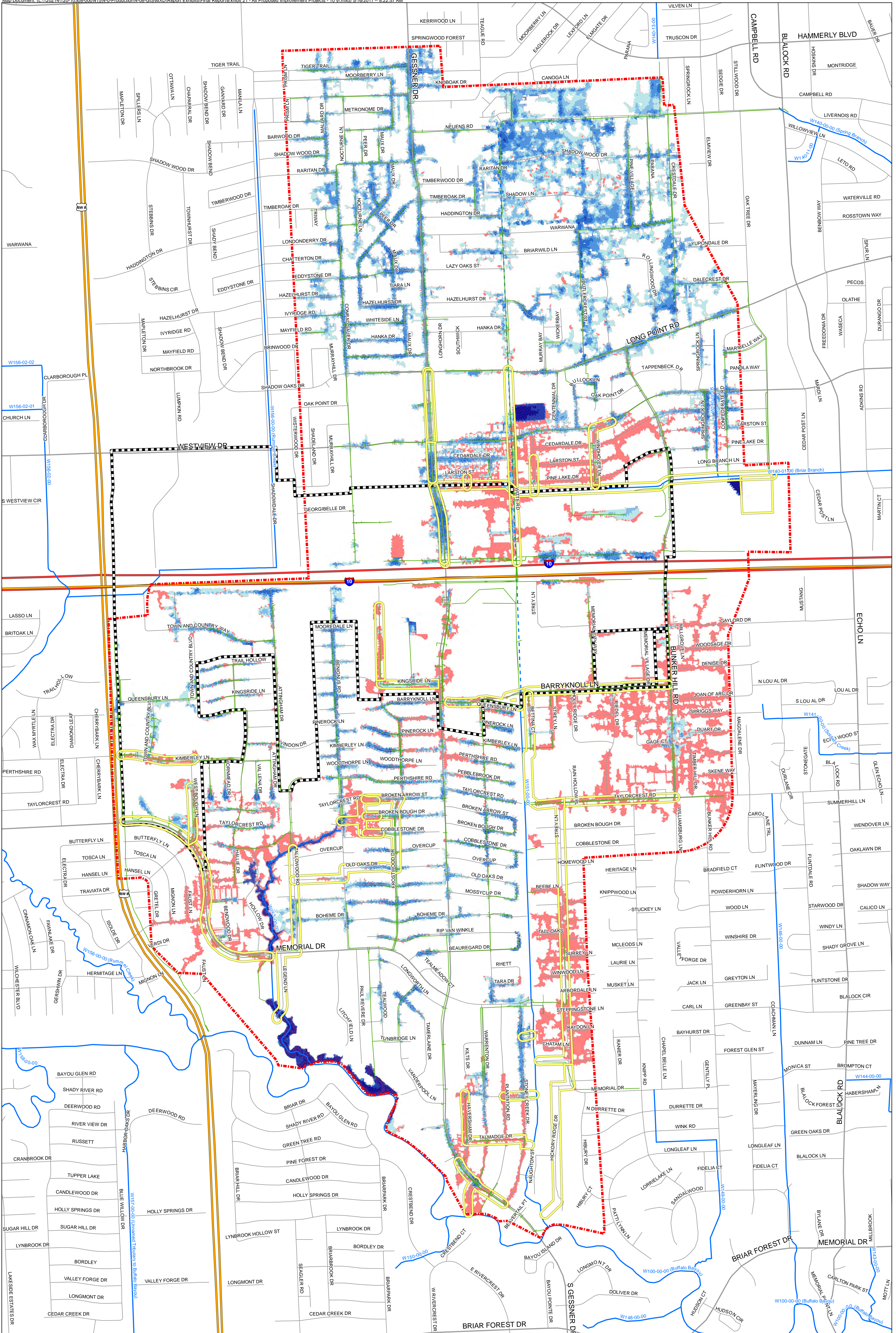
REV	DESCRIPTION	DATE	APPR



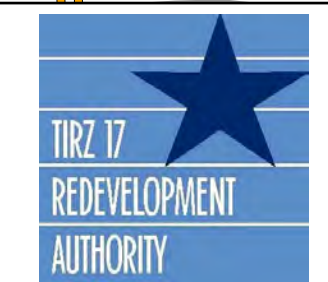


REV	DESCRIPTION	DATE	APPR





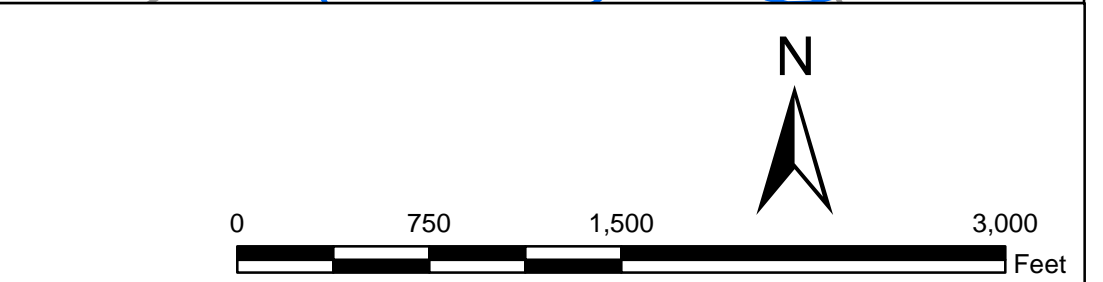
**TIRZ - 17 REGIONAL DRAINAGE STUDY  
ALL IMPROVEMENT PROJECTS  
PROPOSED 10-YEAR EVENT  
PONDING  
EXHIBIT 21**



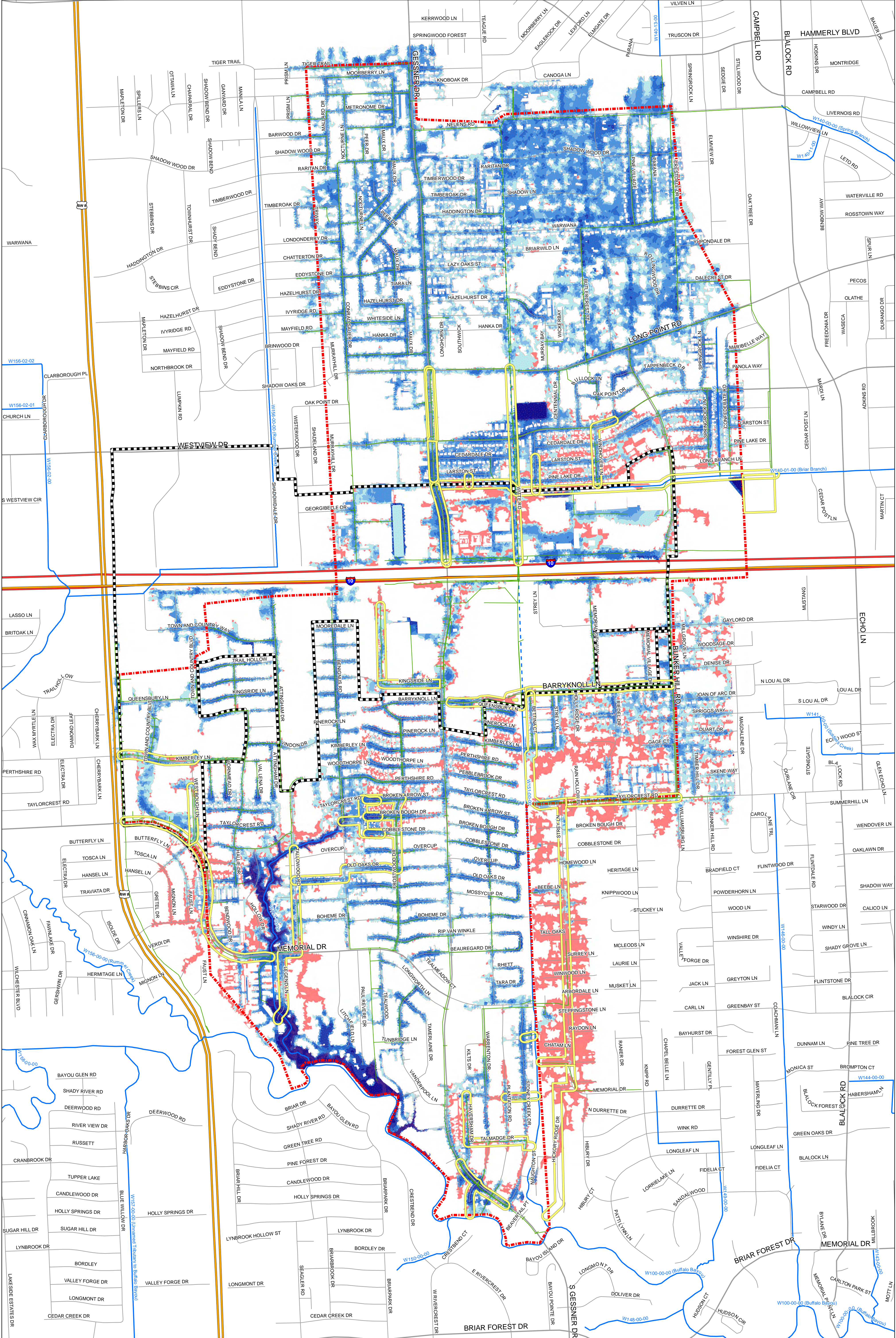
**LAN** Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

**Legend**

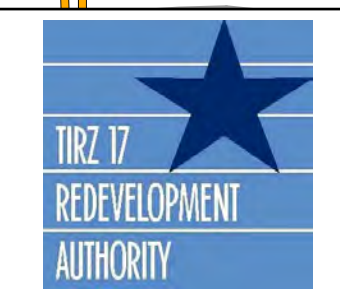
	Improvement Projects		All Improvements PONDING
	Existing Storm Sewer		Freeway Depth (ft.)
	TIRZ17 Boundary		Major
	Study Boundary		Local
	HCFCD Channels		







**TIRZ - 17 REGIONAL DRAINAGE STUDY  
ALL IMPROVEMENT PROJECTS  
PROPOSED 100-YEAR EVENT  
PONDING  
EXHIBIT 22**



Improvement Projects	Existing Storm Sewer	Proposed Storm Sewer	Proposed Stormwater
Existing 100 Year PONDING	Study Boundary	HCFCD Channels	All Improvements PONDING
Road	Freeway	Major	Local
Road	Freeway	Major	Local

**All Improvements PONDING**

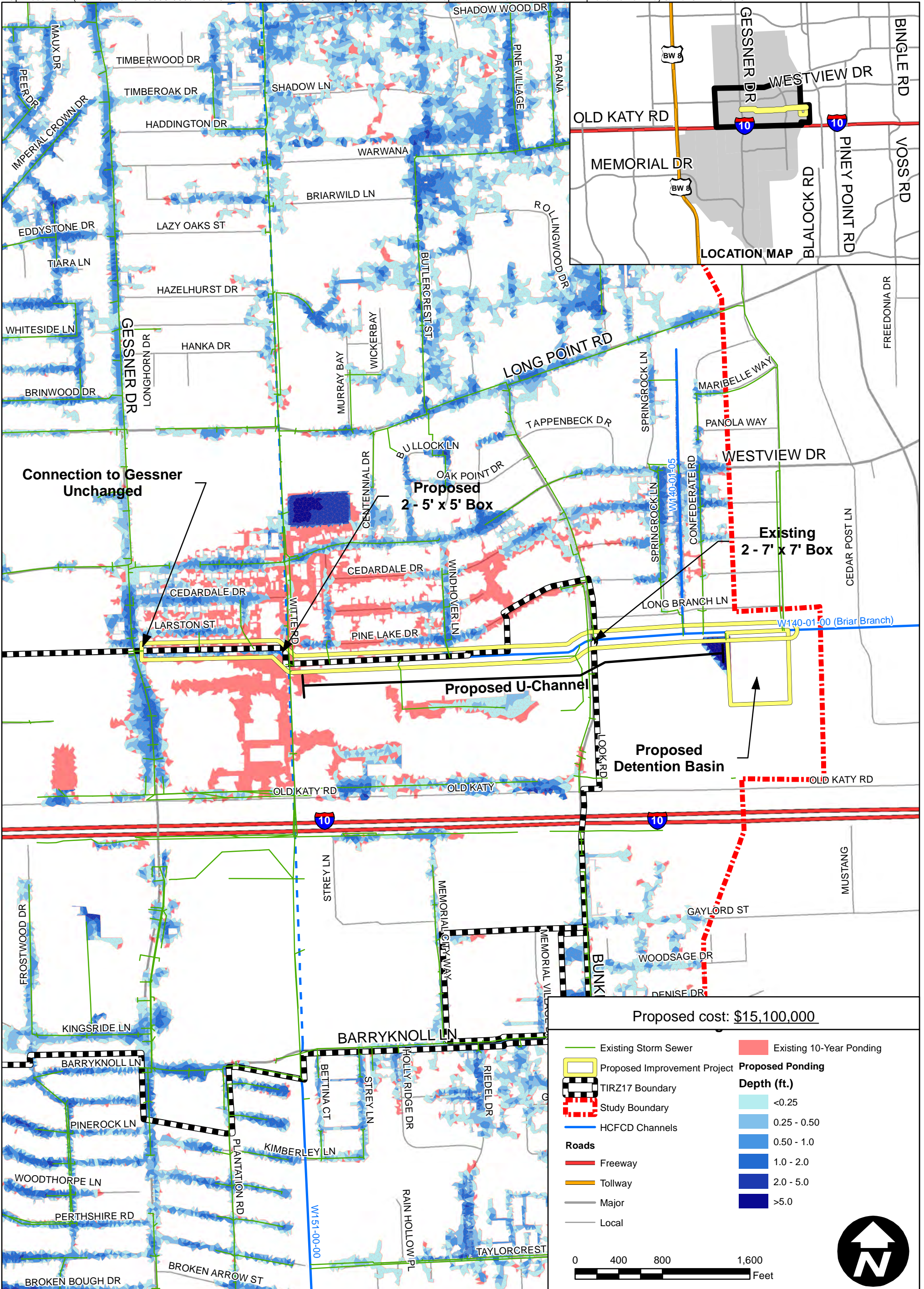
Depth (ft.)	Color
< 0.25	Lightest Blue
0.25 - 0.50	Light Blue
0.50 - 1.0	Medium Blue
1.0 - 2.0	Dark Blue
2.0 - 5.0	Very Dark Blue
> 5.0	Black

Existing 100 yr Event PONDING

0 750 1,500 3,000 Feet

N





Proposed cost: \$15,100,000

- Existing Storm Sewer
- Proposed Improvement Project
- TIRZ17 Boundary
- Study Boundary
- HCFC Channels
- Roads**
- Freeway
- Tollway
- Major
- Local
- Existing 10-Year Ponding
- Proposed Ponding Depth (ft.)**
- <0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

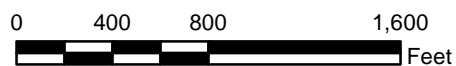


EXHIBIT NUMBER  
**23 OF 37**

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

PREPARED: **MJM**

CHECKED: **DST**

APPROVED: **DST**

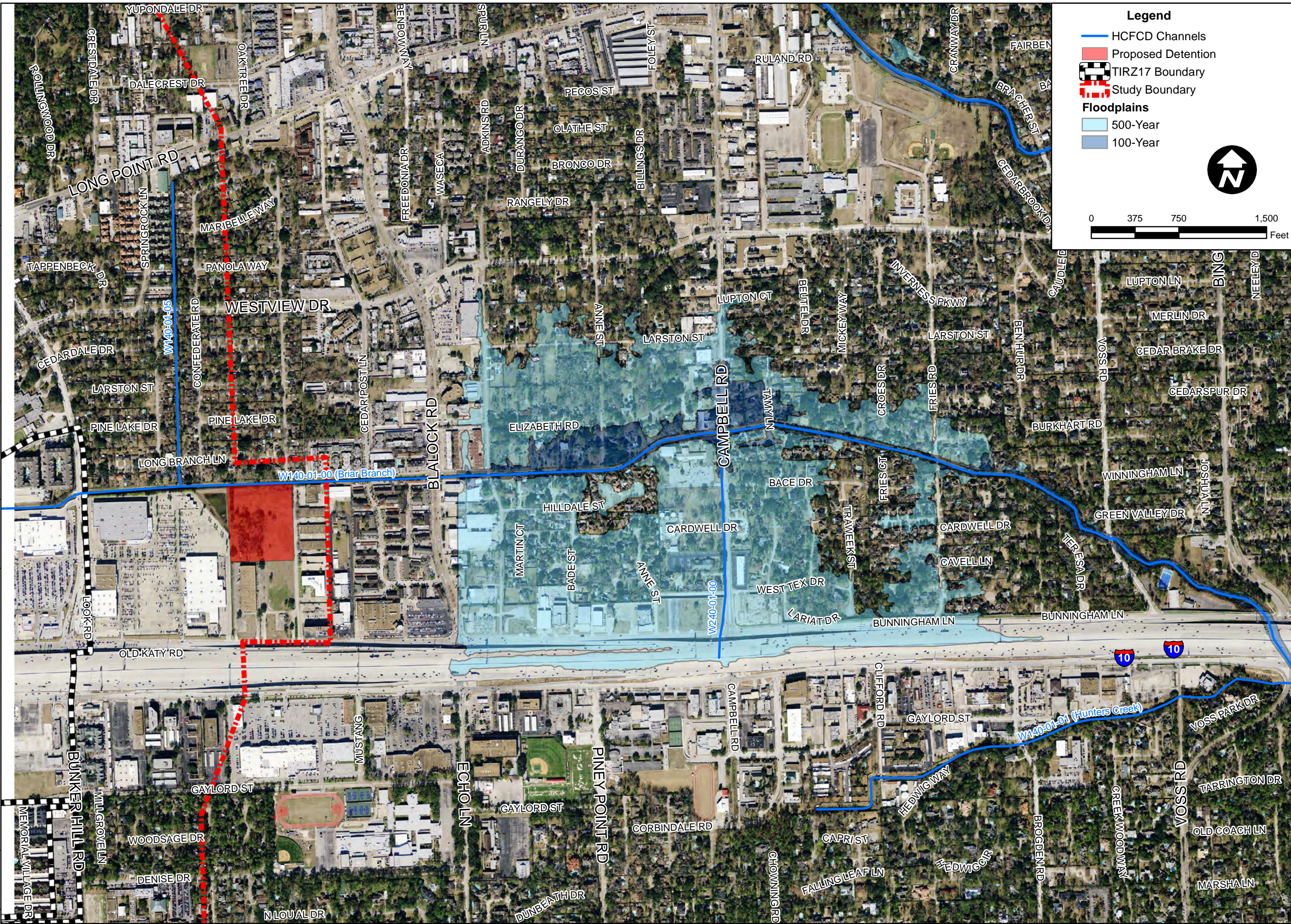
**TIRZ 17 REGIONAL DRAINAGE STUDY**

**BRIAR BRANCH CHANNEL & DETENTION IMPROVEMENTS**

REV	DESCRIPTION	DATE	APPR



Map Document: (L:\120214120-10308-00041514-0-Production\4-08-GIS\MXD\Report Exhibits\Report\_1-4-2011\Exhibit\_35 Briar Branch Detention Location.mxd) 1/14/2011 -- 4:17:27 PM



**Legend**

- HCFC Channels
- Proposed Detention
- TIRZ17 Boundary
- Study Boundary

**Floodplains**

- 500-Year
- 100-Year

0 375 750 1,500 Feet

REV	DESCRIPTION	DATE	APPR

**TIRZ 17 REGIONAL DRAINAGE STUDY**

**BRIAR BRANCH DETENTION LOCATION MAP**

PREPARED:	MJM
CHECKED:	DST
APPROVED:	DST

Lockwood, Andrews & Newnam, Inc.  
A LEG A DAILY COMPANY



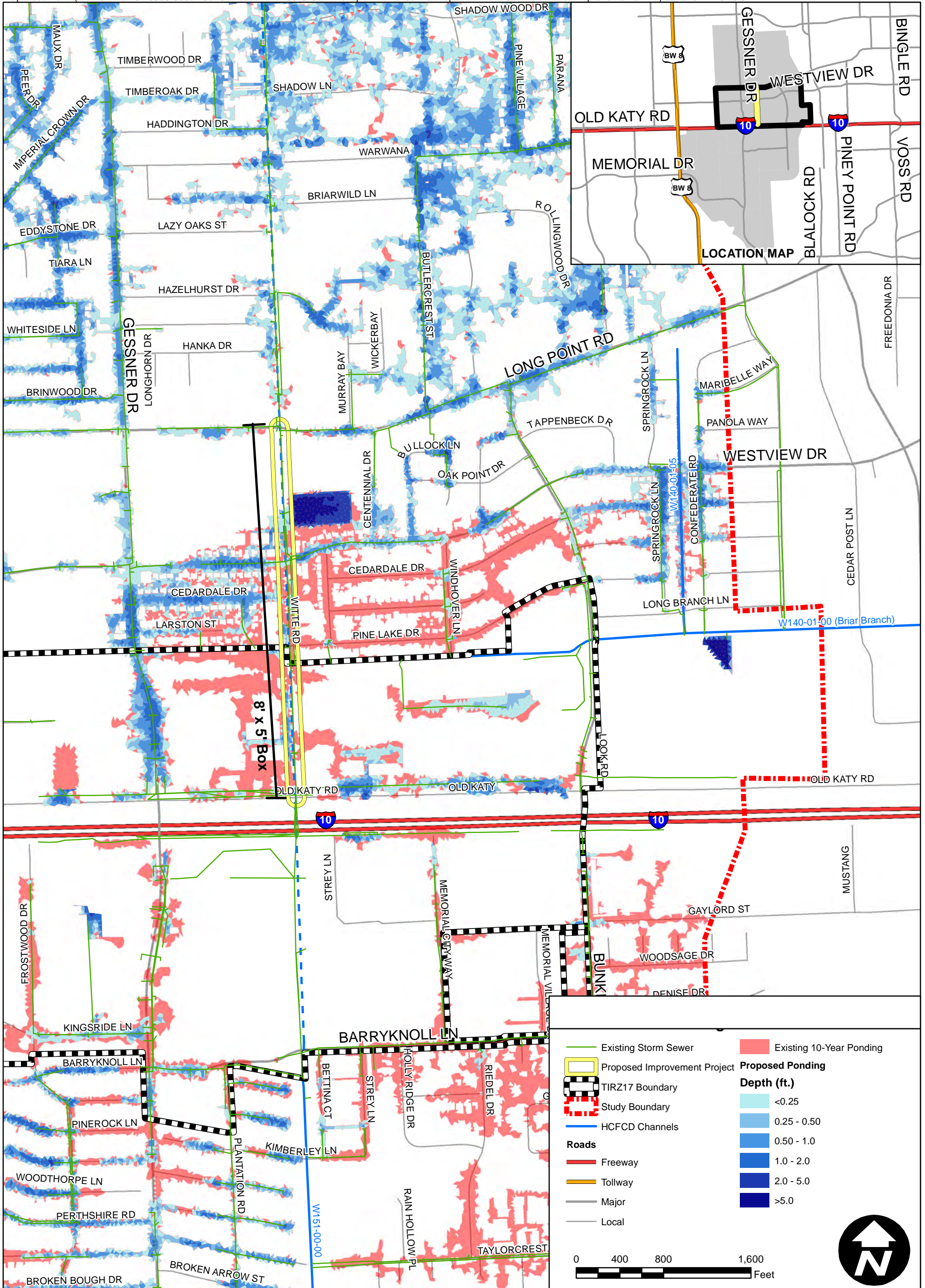
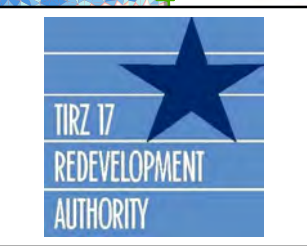


EXHIBIT NUMBER  
25 OF 37



PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY  
WITTE ROAD IMPROVEMENTS

REV	DESCRIPTION	DATE	APPR



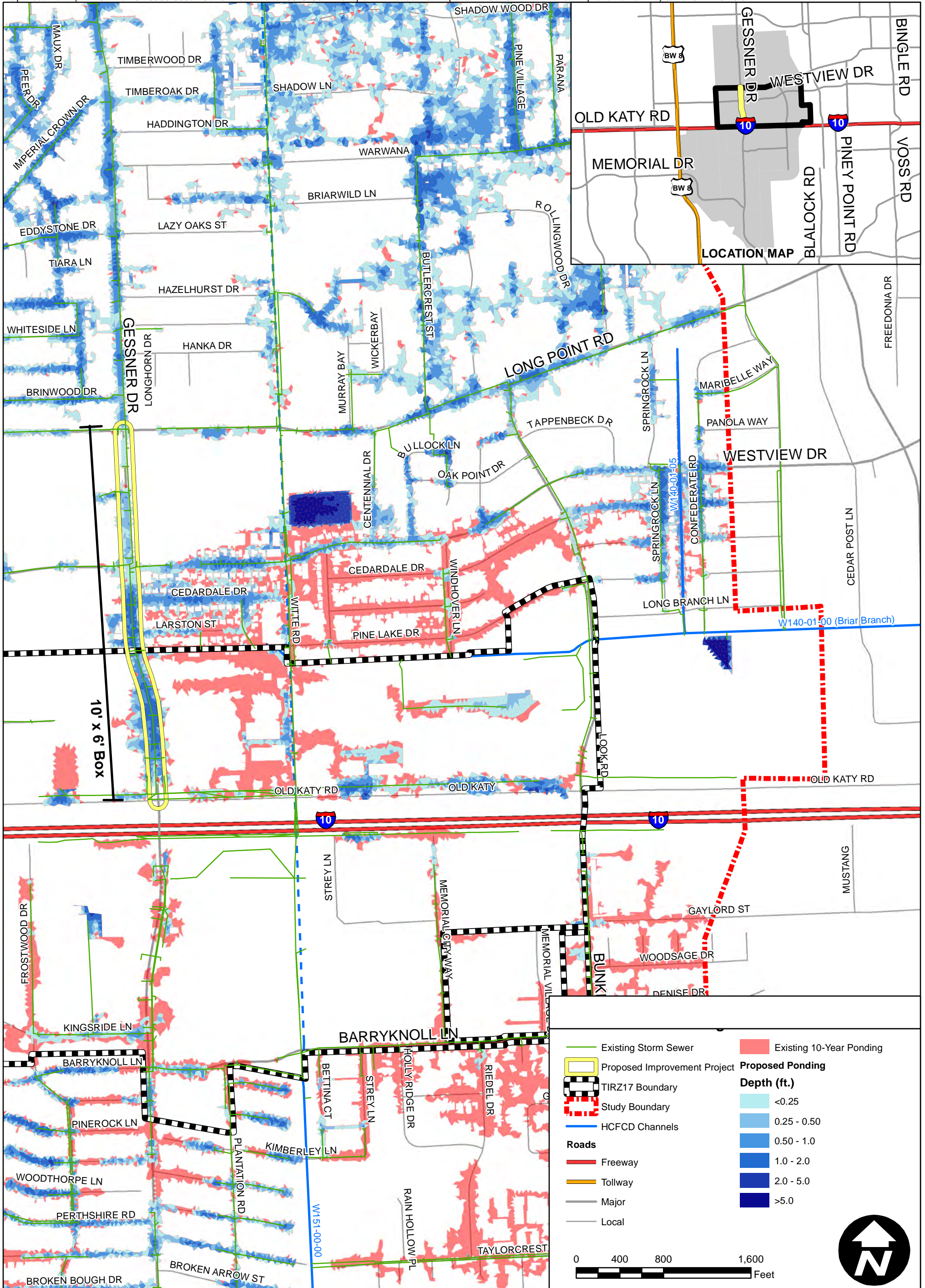


EXHIBIT NUMBER  
26 OF 37

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY  
GESSNER ROAD IMPROVEMENTS

REV	DESCRIPTION	DATE	APPR



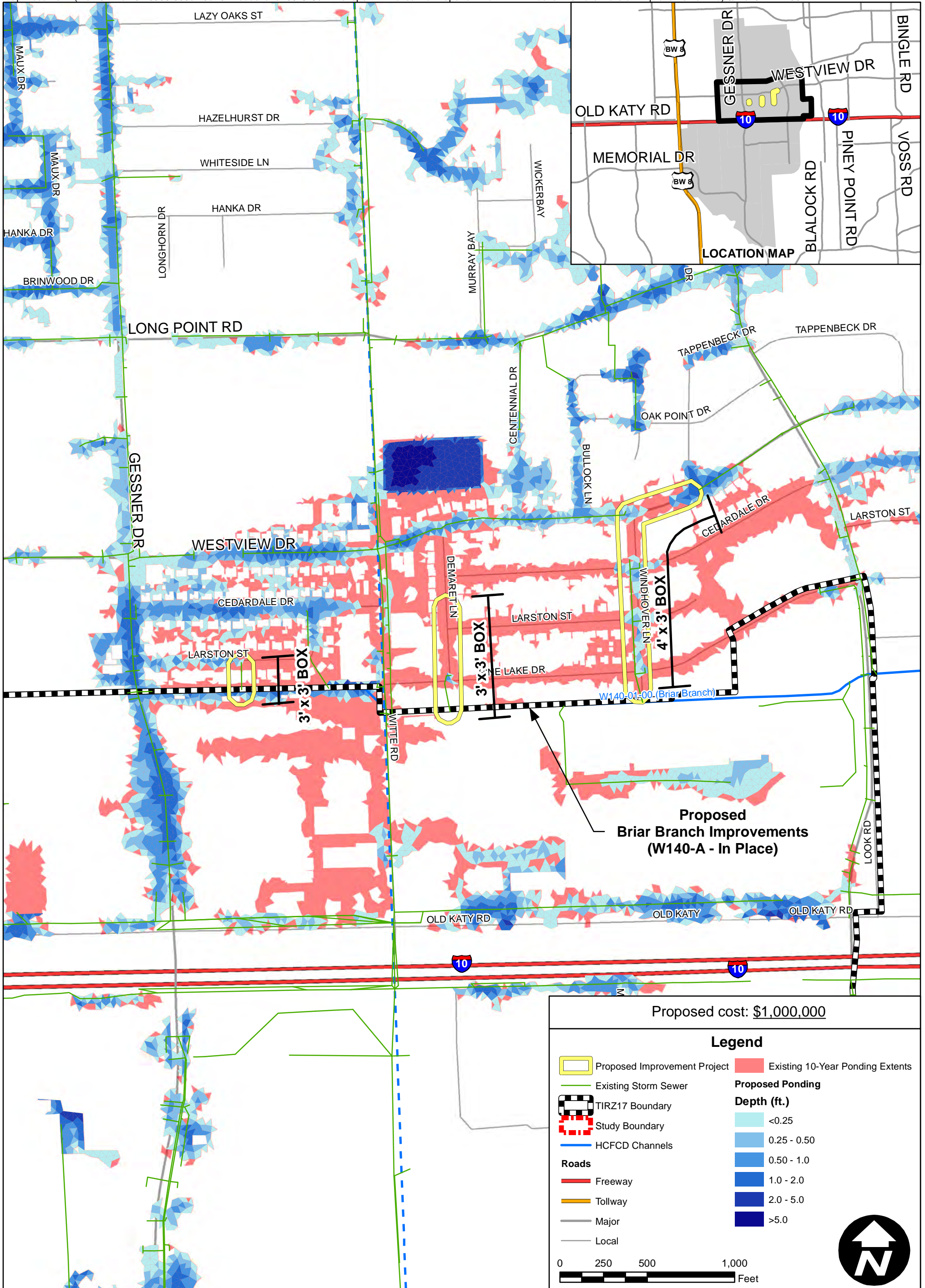
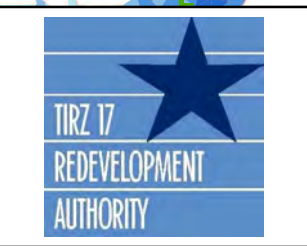


EXHIBIT NUMBER  
27 OF 37



PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY  
WINDOVER, LARSTON & DEMARET IMPROVEMENTS (W140-B)

REV	DESCRIPTION	DATE	APPR



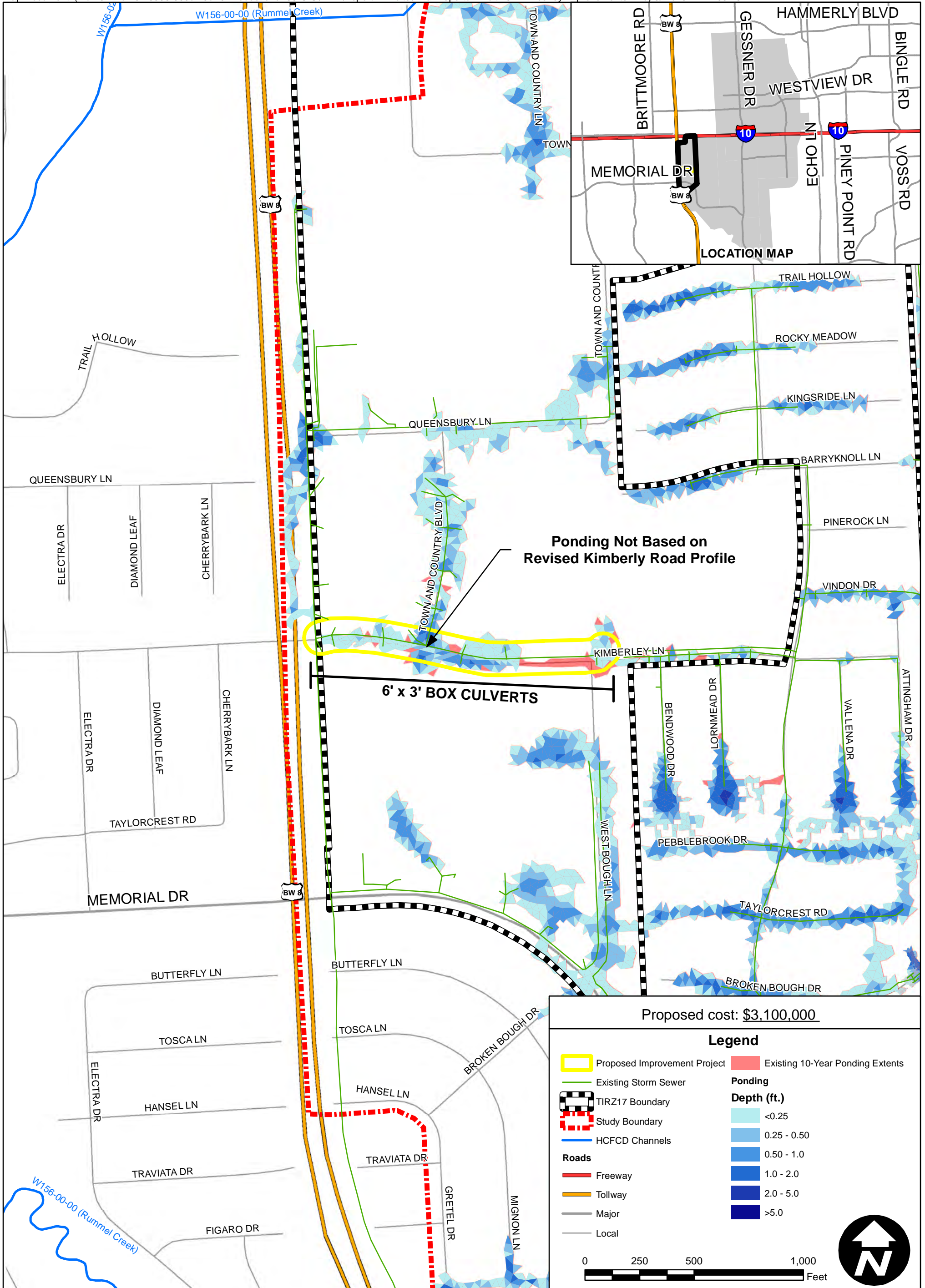
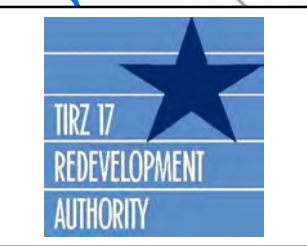


EXHIBIT NUMBER  
28 OF 37



DATE: JUNE 2011  
SCALE: AS NOTED

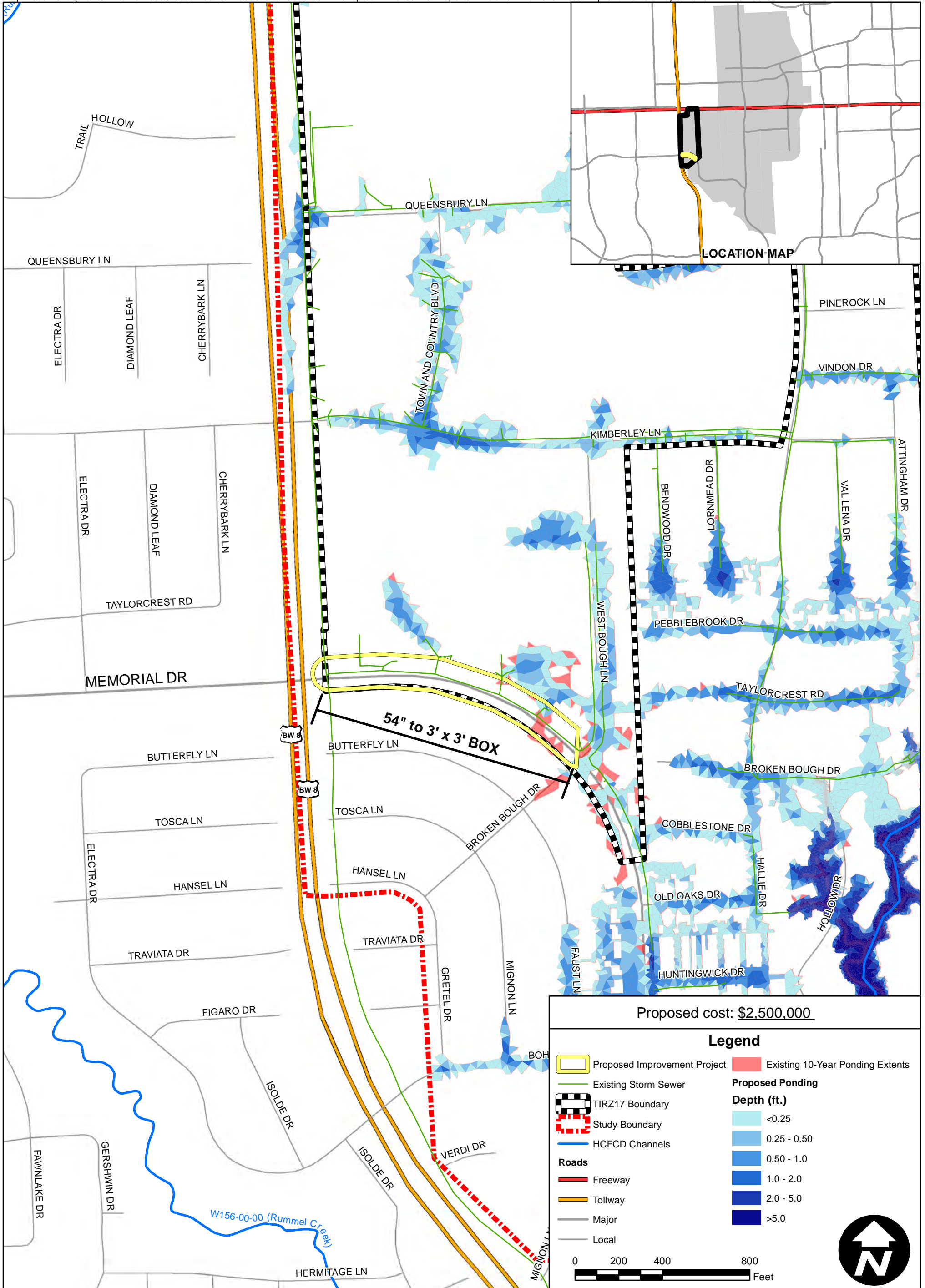
PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY

KIMBERLEY LANE IMPROVEMENTS (W153-E)

REV	DESCRIPTION	DATE	APPR





Proposed cost: \$2,500,000

**Legend**

- Proposed Improvement Project
- Existing Storm Sewer
- TIRZ17 Boundary
- Study Boundary
- HCFCD Channels
- Roads**
- Freeway
- Tollway
- Major
- Local
- Existing 10-Year Ponding Extents
- Proposed Ponding Depth (ft.)**
- <0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

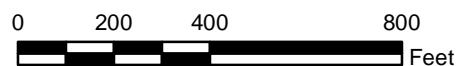


EXHIBIT NUMBER  
**29 OF 37**

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEA & DALY COMPANY

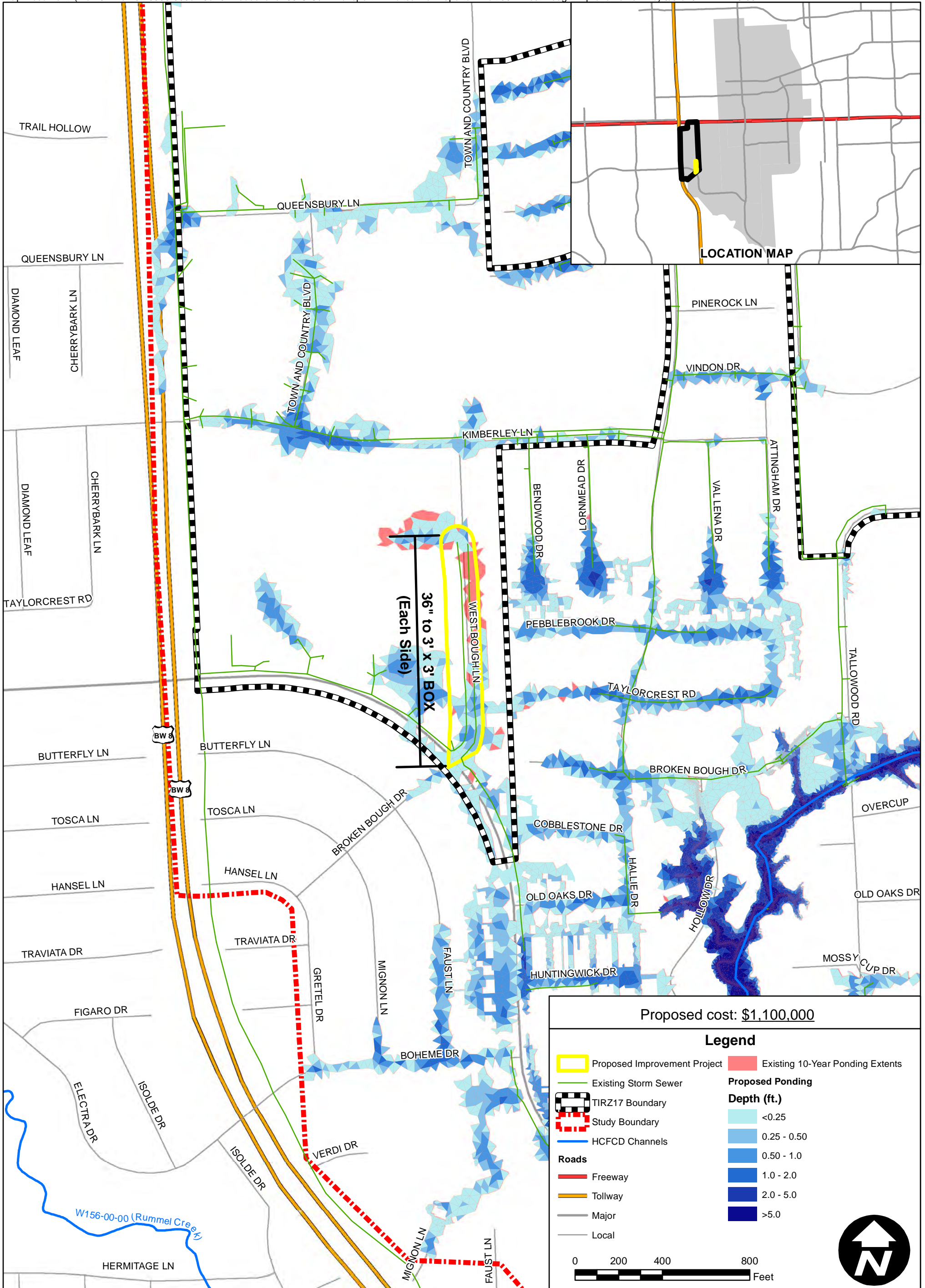
PREPARED: **MJM**  
CHECKED: **DST**  
APPROVED: **DST**

**TIRZ 17 REGIONAL DRAINAGE STUDY**

**MEMORIAL WEST IMPROVEMENTS (W153-F)**

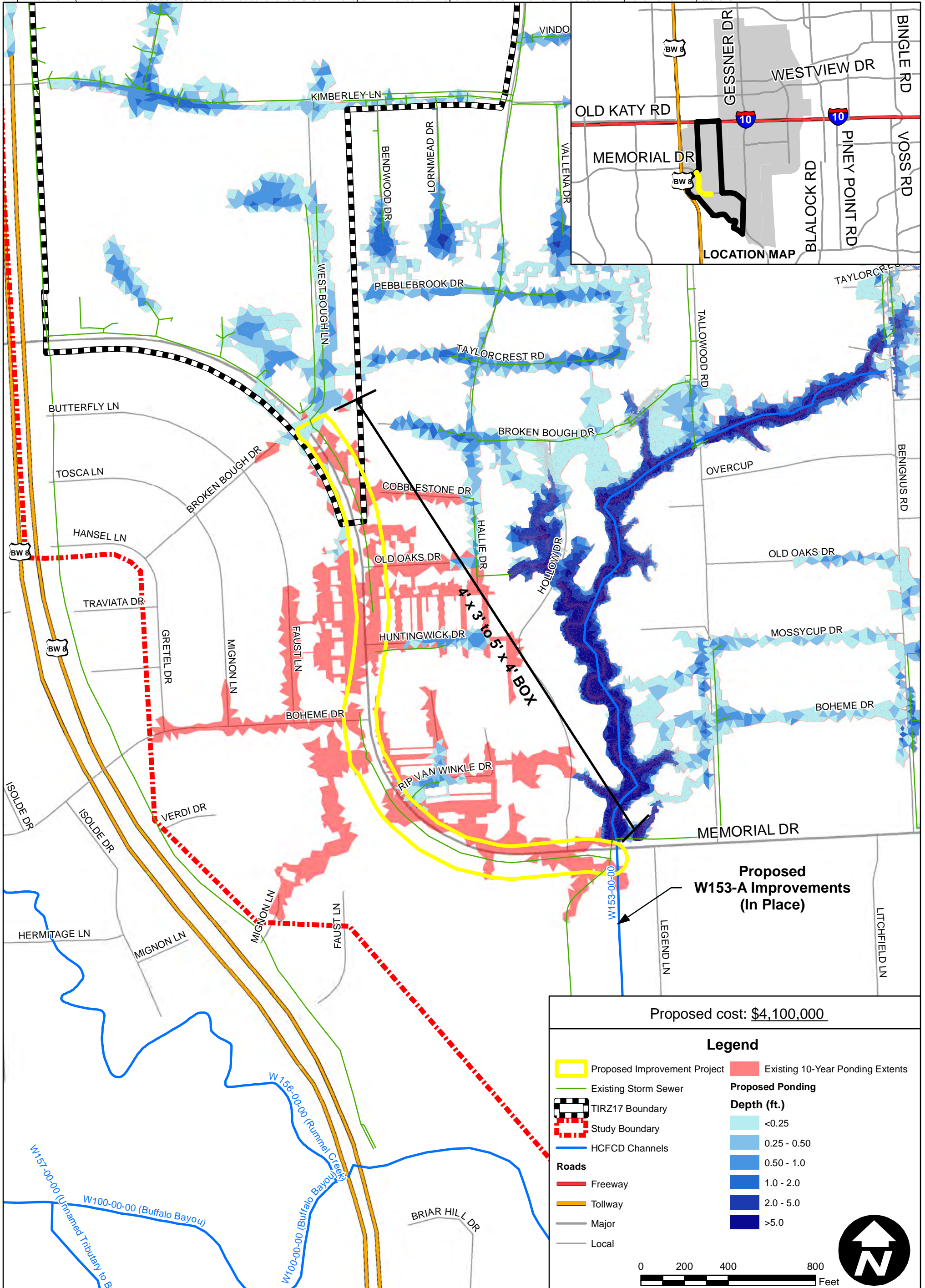
REV	DESCRIPTION	DATE	APPR





REV	DESCRIPTION	DATE	APPR





REV	DESCRIPTION	DATE	APPR



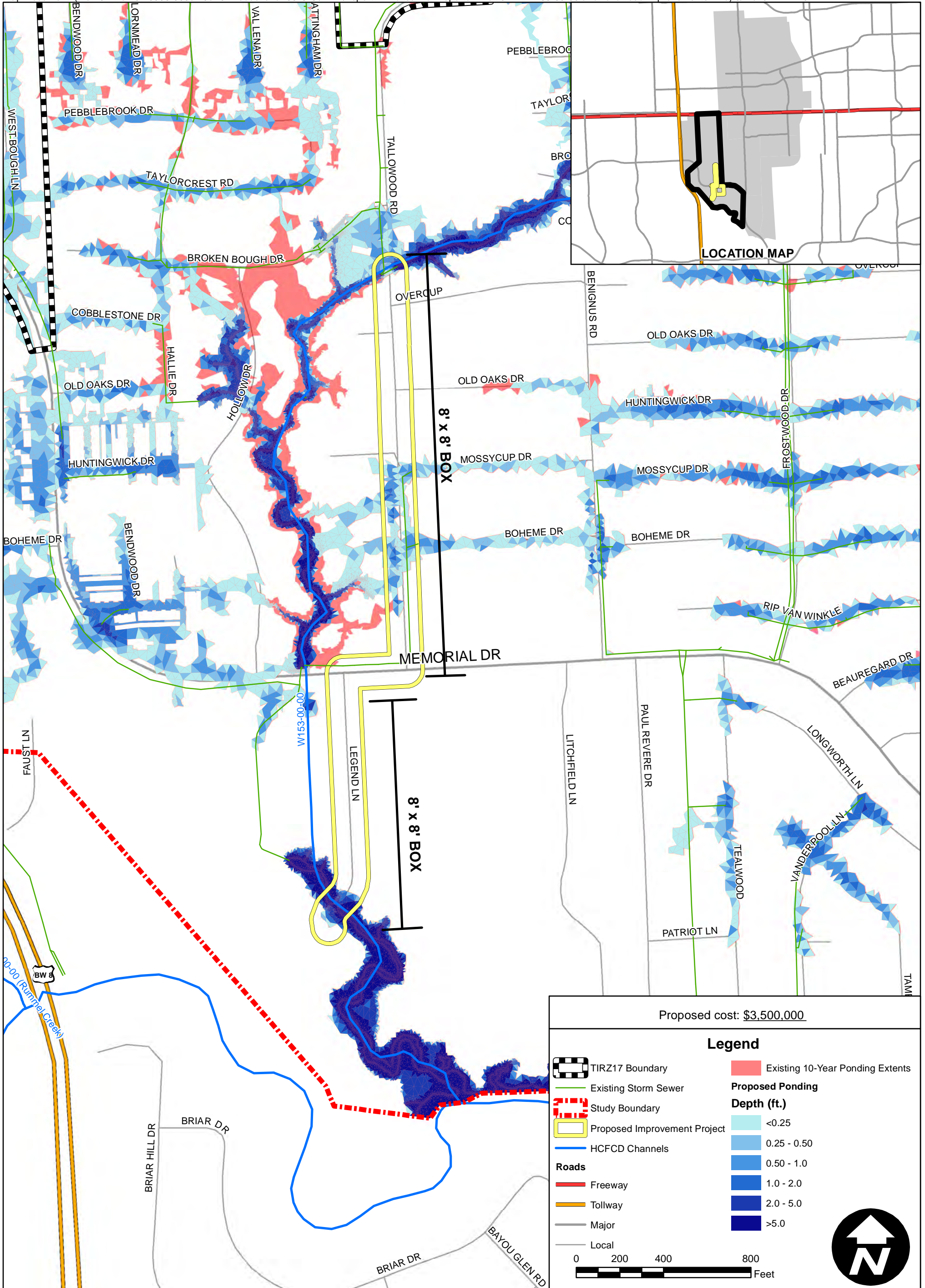
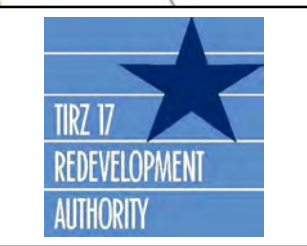


EXHIBIT NUMBER  
32A OF 37

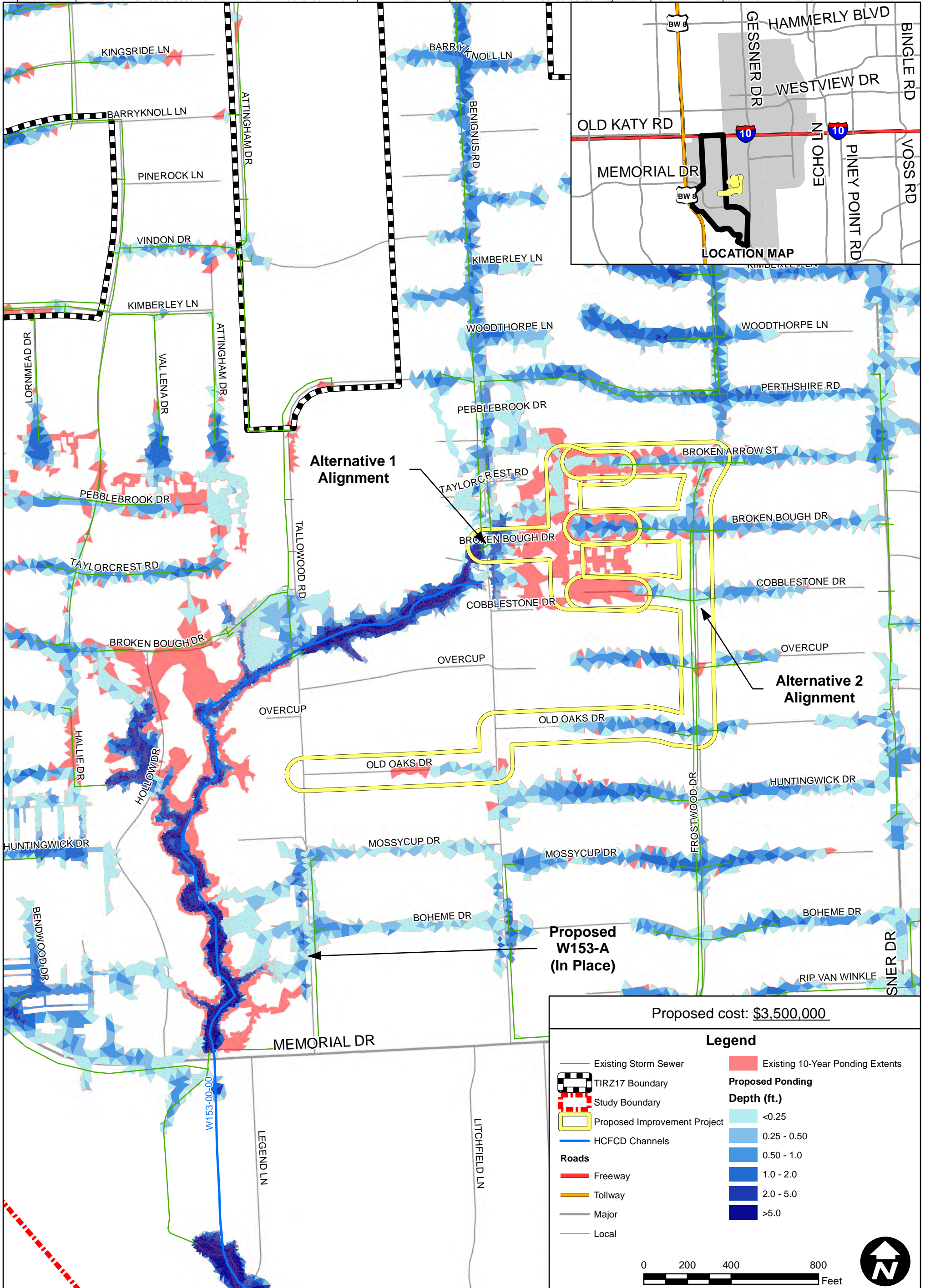


PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY  
W153-00-00 & TALLOWOOD IMPROVEMENTS (W153-A)

REV	DESCRIPTION	DATE	APPR





Proposed cost: \$3,500,000

**Legend**

- Existing Storm Sewer
- TIRZ17 Boundary
- Study Boundary
- Proposed Improvement Project
- HCFC Channels
- Existing 10-Year Ponding Extents
- Proposed Ponding Depth (ft.)**
  - <0.25
  - 0.25 - 0.50
  - 0.50 - 1.0
  - 1.0 - 2.0
  - 2.0 - 5.0
  - >5.0

**Roads**

- Freeway
- Tollway
- Major
- Local

0 200 400 800 Feet

EXHIBIT NUMBER  
32B OF 37

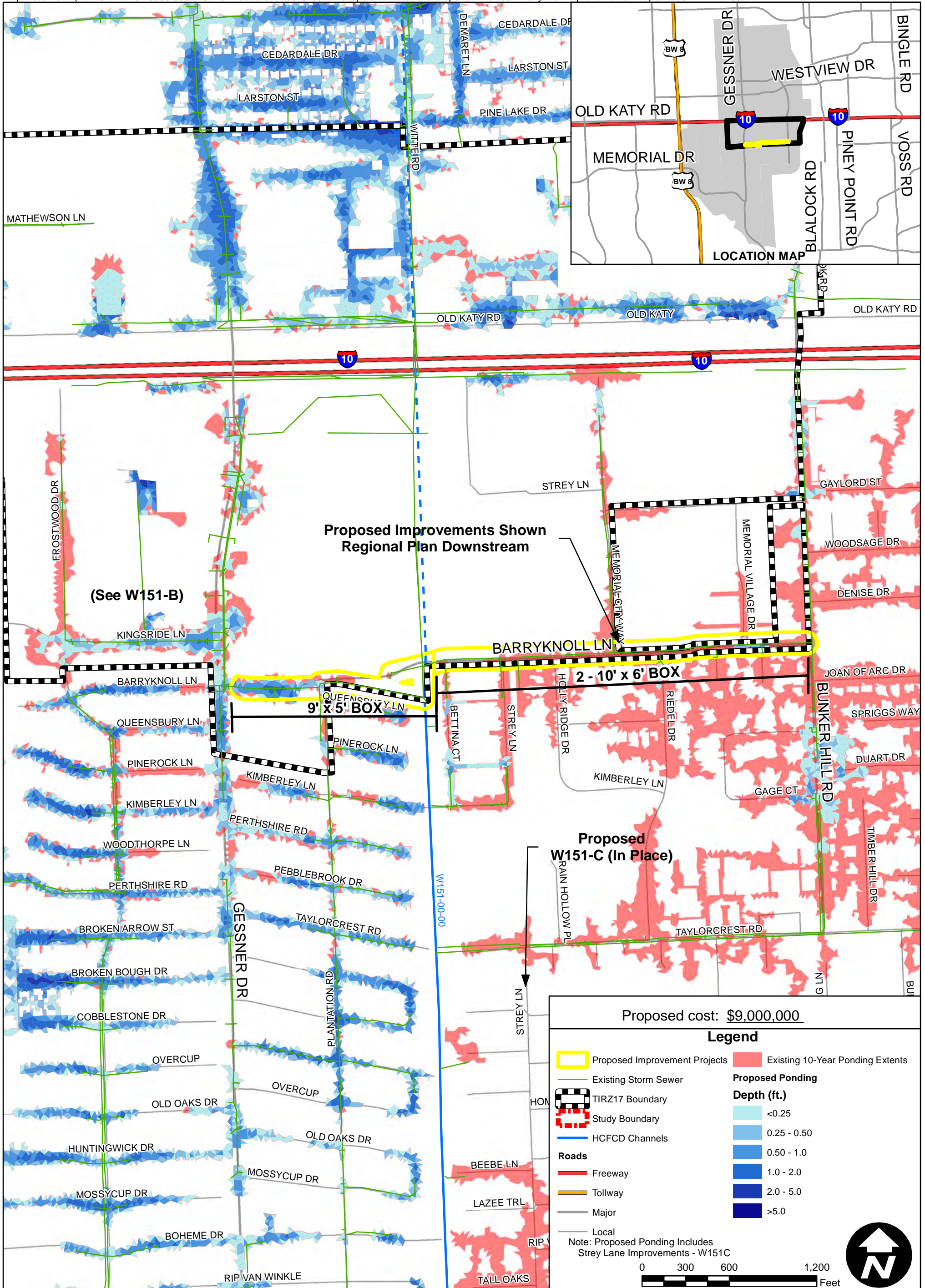


PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

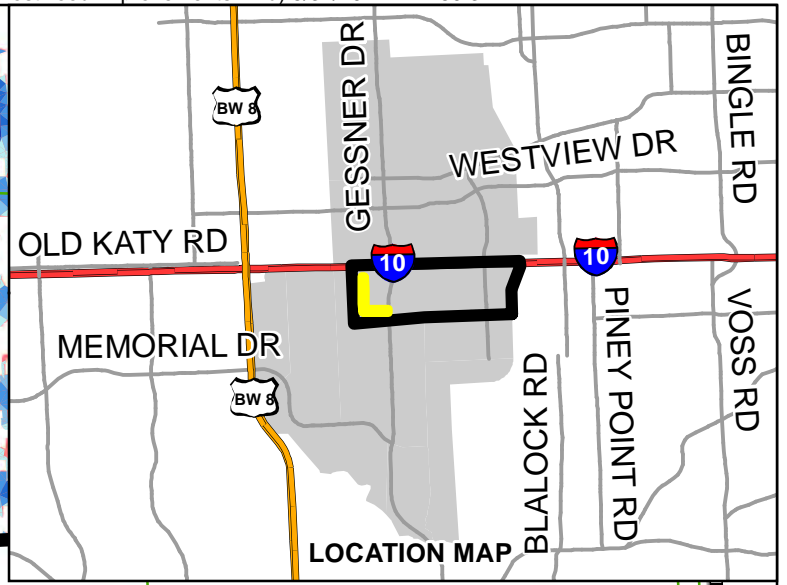
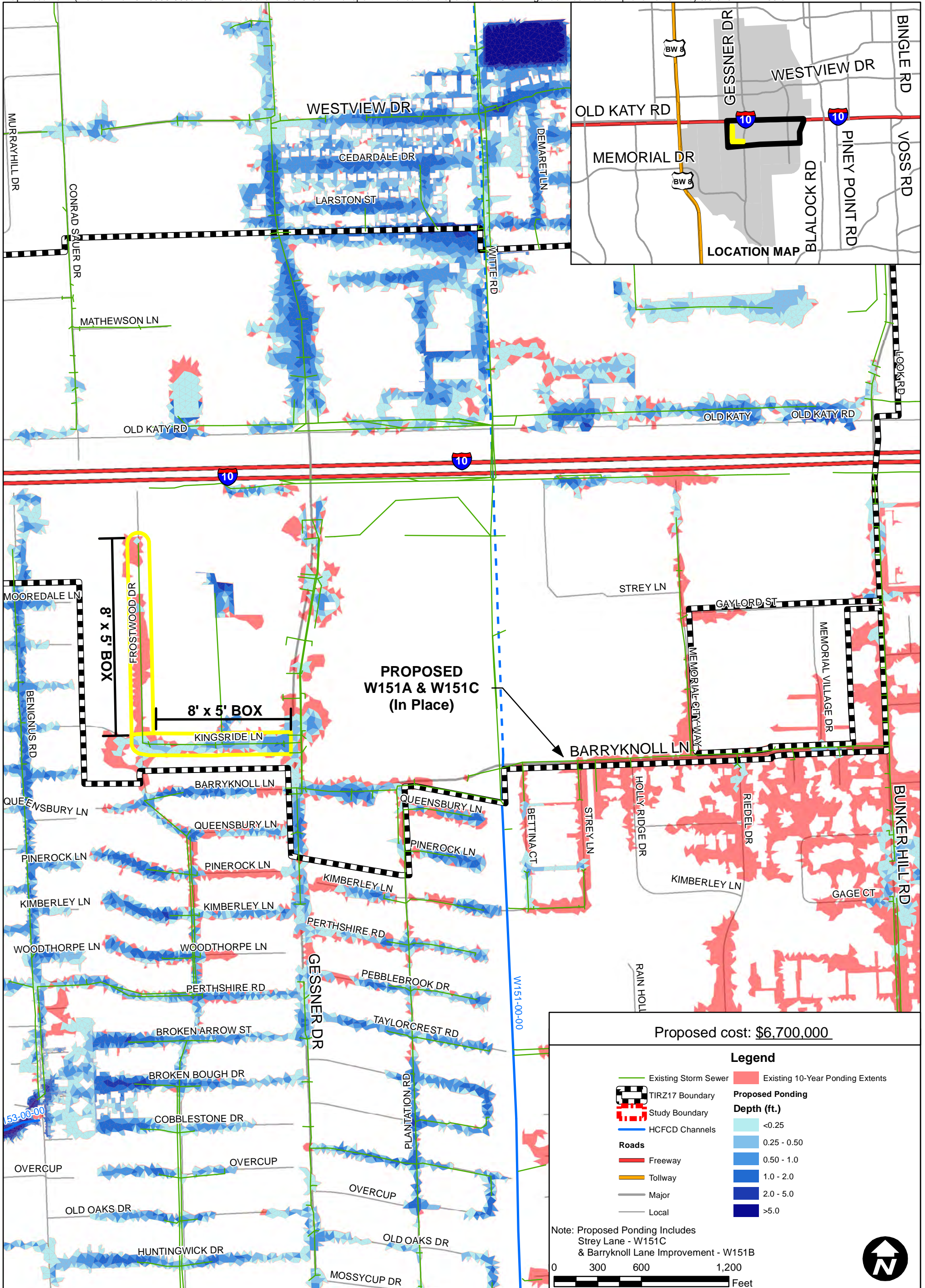
TIRZ 17 REGIONAL DRAINAGE STUDY  
W153-00-00 CONVEYANCE IMPROVEMENTS (W153-B)

REV	DESCRIPTION	DATE	APPR









**PROPOSED  
W151A & W151C  
(In Place)**

Proposed cost: **\$6,700,000**

**Legend**

- Existing Storm Sewer
- TIRZ17 Boundary
- Study Boundary
- HCFCD Channels
- Roads**
- Freeway
- Tollway
- Major
- Local
- Existing 10-Year Ponding Extents
- Proposed Ponding Depth (ft.)**
- <0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

Note: Proposed Ponding Includes  
Strey Lane - W151C  
& Barryknoll Lane Improvement - W151B

0 300 600 1,200 Feet

EXHIBIT NUMBER  
**34 OF 37**

DATE: JUNE 2011  
SCALE: AS NOTED

PREPARED: **MJM**

CHECKED: **DST**

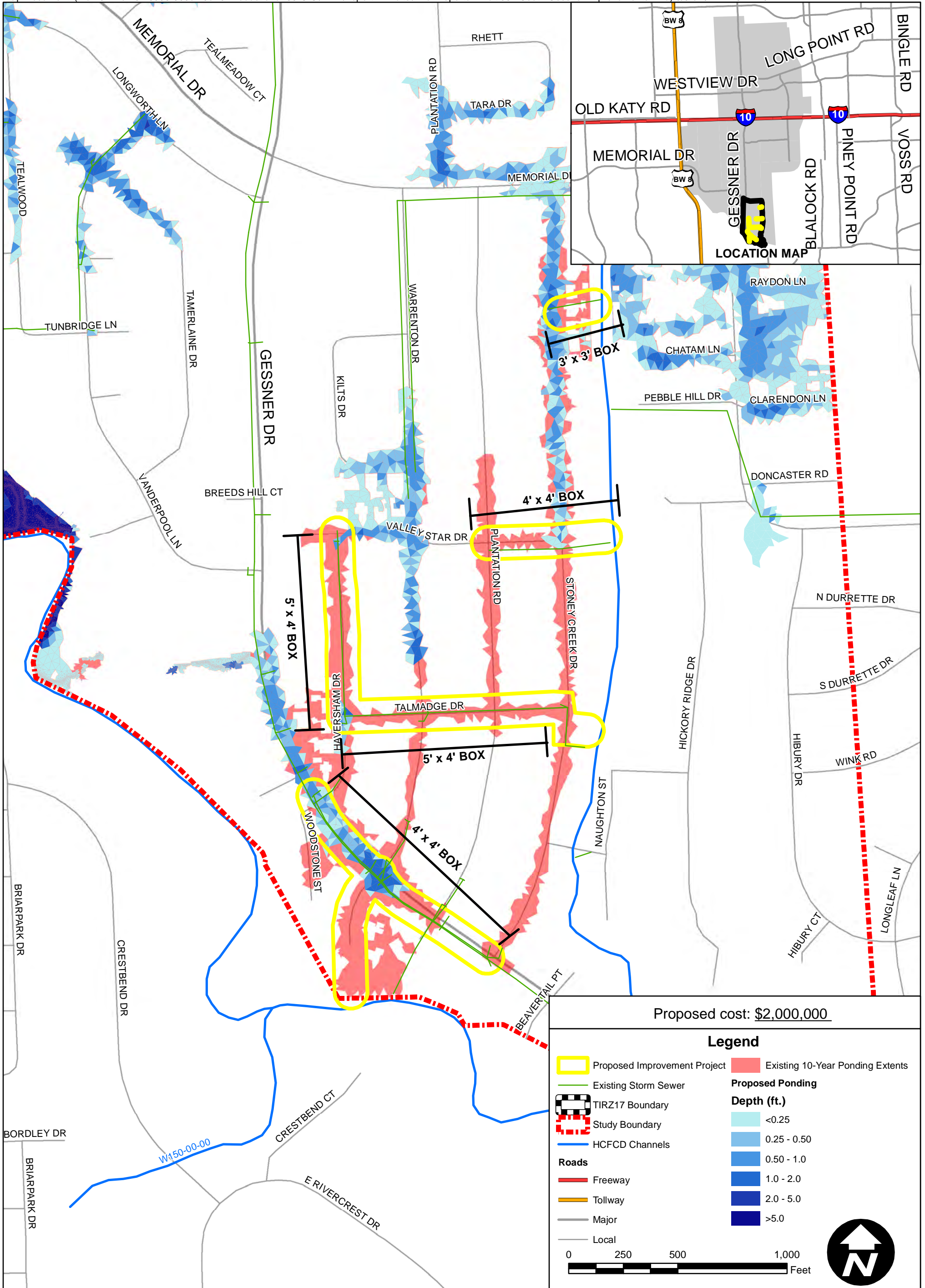
APPROVED: **DST**

**TIRZ 17 REGIONAL  
DRAINAGE STUDY**

**KINGSRIDE & FROSTWOOD  
IMPROVEMENTS (W151B)**

REV	DESCRIPTION	DATE	APPR





REV	DESCRIPTION	DATE	APPR



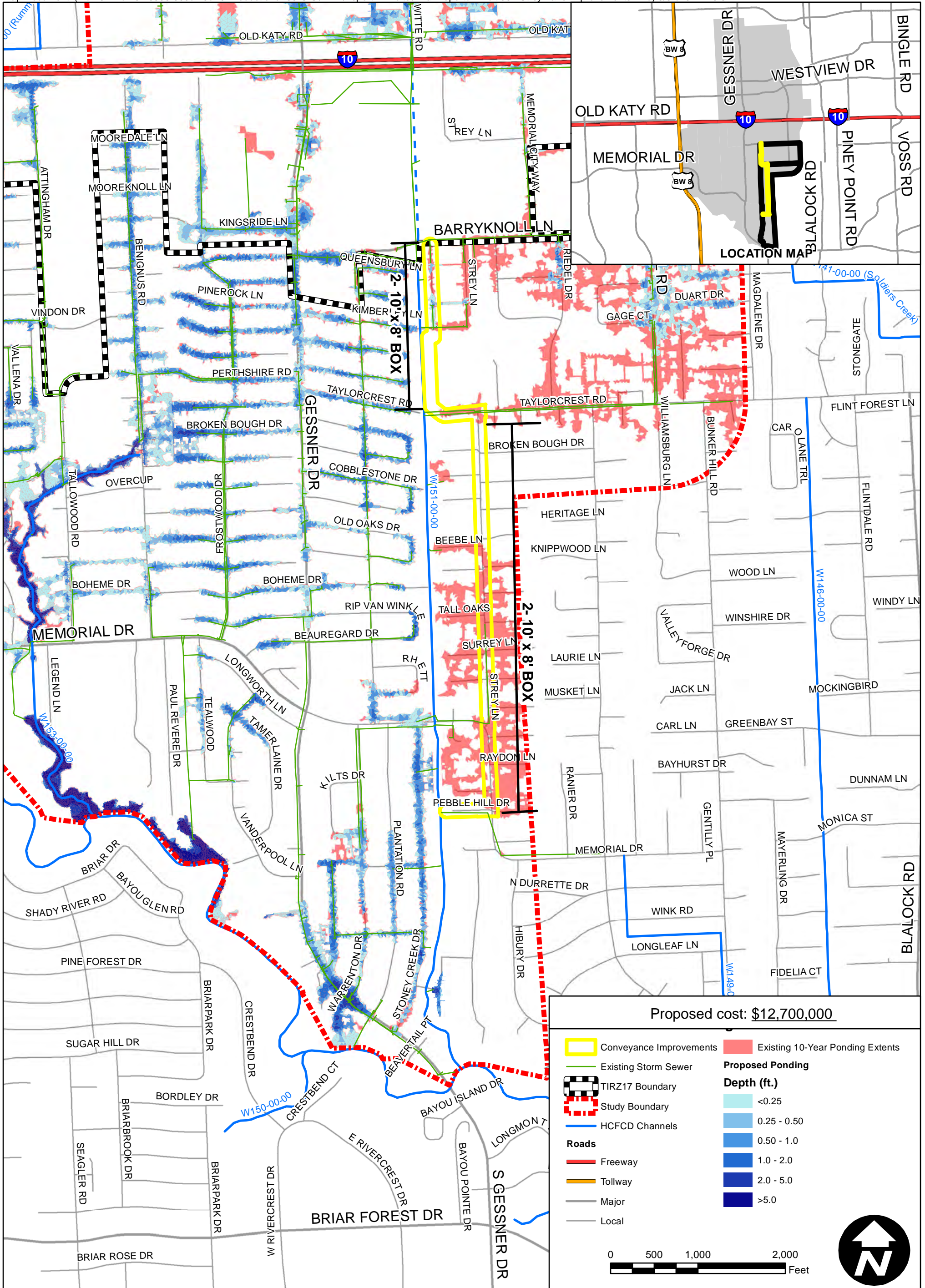
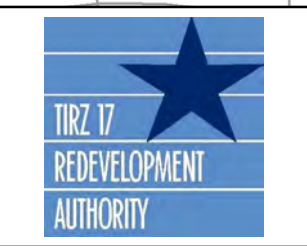


EXHIBIT NUMBER  
36 OF 37

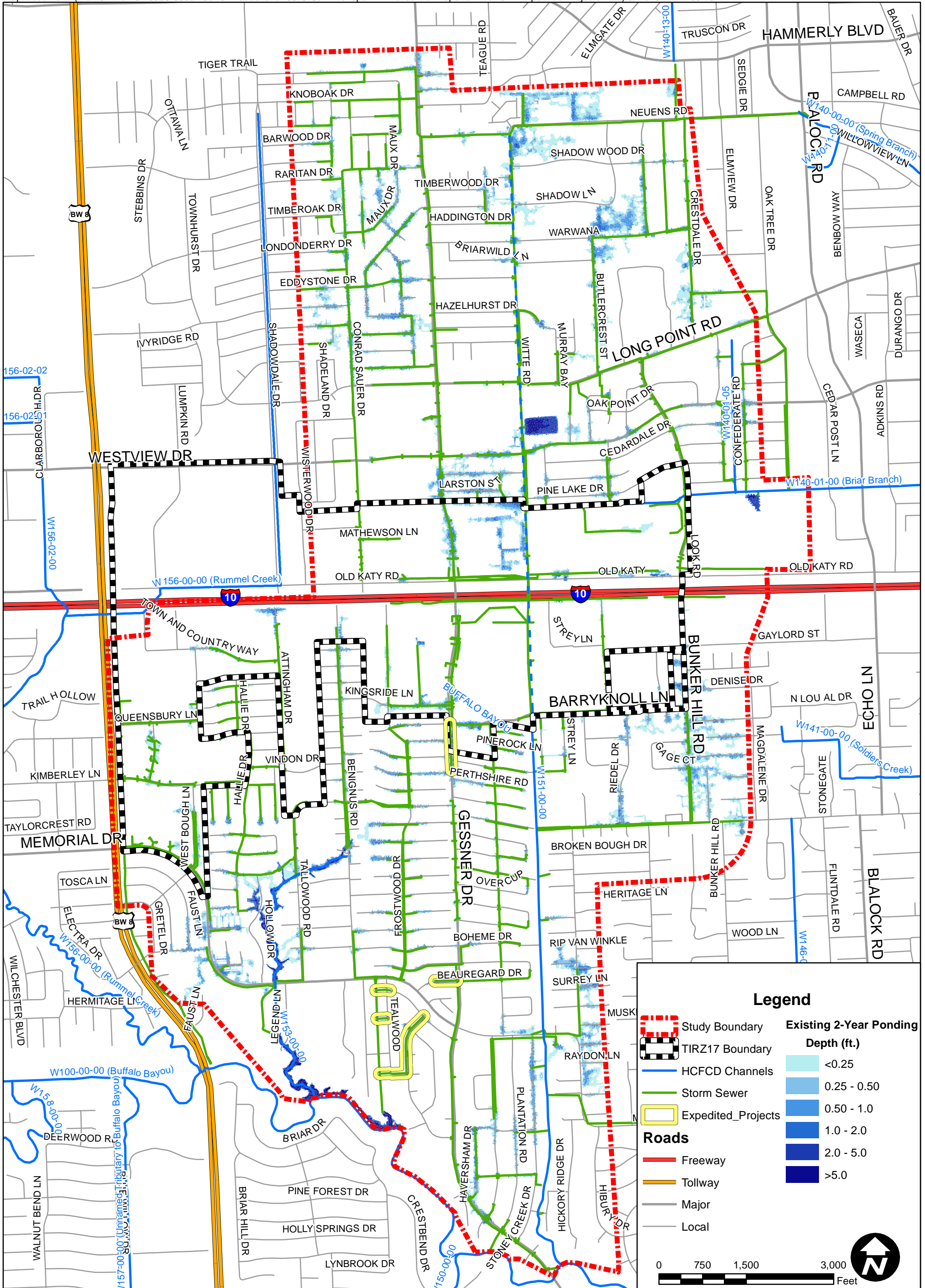


PREPARED: MJM  
CHECKED: DST  
APPROVED: DST

TIRZ 17 REGIONAL DRAINAGE STUDY  
STREY LANE IMPROVEMENTS (W151C)

REV	DESCRIPTION	DATE	APPR





**Legend**

- Study Boundary
- TIRZ17 Boundary
- HCFCD Channels
- Storm Sewer
- Expedited\_Projects

**Roads**

- Freeway
- Tollway
- Major
- Local

**Existing 2-Year Ponding Depth (ft.)**

- <0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

0 750 1,500 3,000 Feet

EXHIBIT NUMBER  
**37 OF 37**

DATE: JUNE 2011  
SCALE: AS NOTED

Lockwood, Andrews & Newnam, Inc.  
A LEO A DALY COMPANY

PREPARED: **MJM**  
CHECKED: **DST**  
APPROVED: **DST**

**TIRZ 17 REGIONAL DRAINAGE STUDY**

**POTENTIAL EXPEDITED PROJECTS**

REV	DESCRIPTION	DATE	APPR