

# County of Willacy Flood Protection Planning Study

MAY 25, 2023



**Texas Water**  
Development Board





## PROJECT TEAM



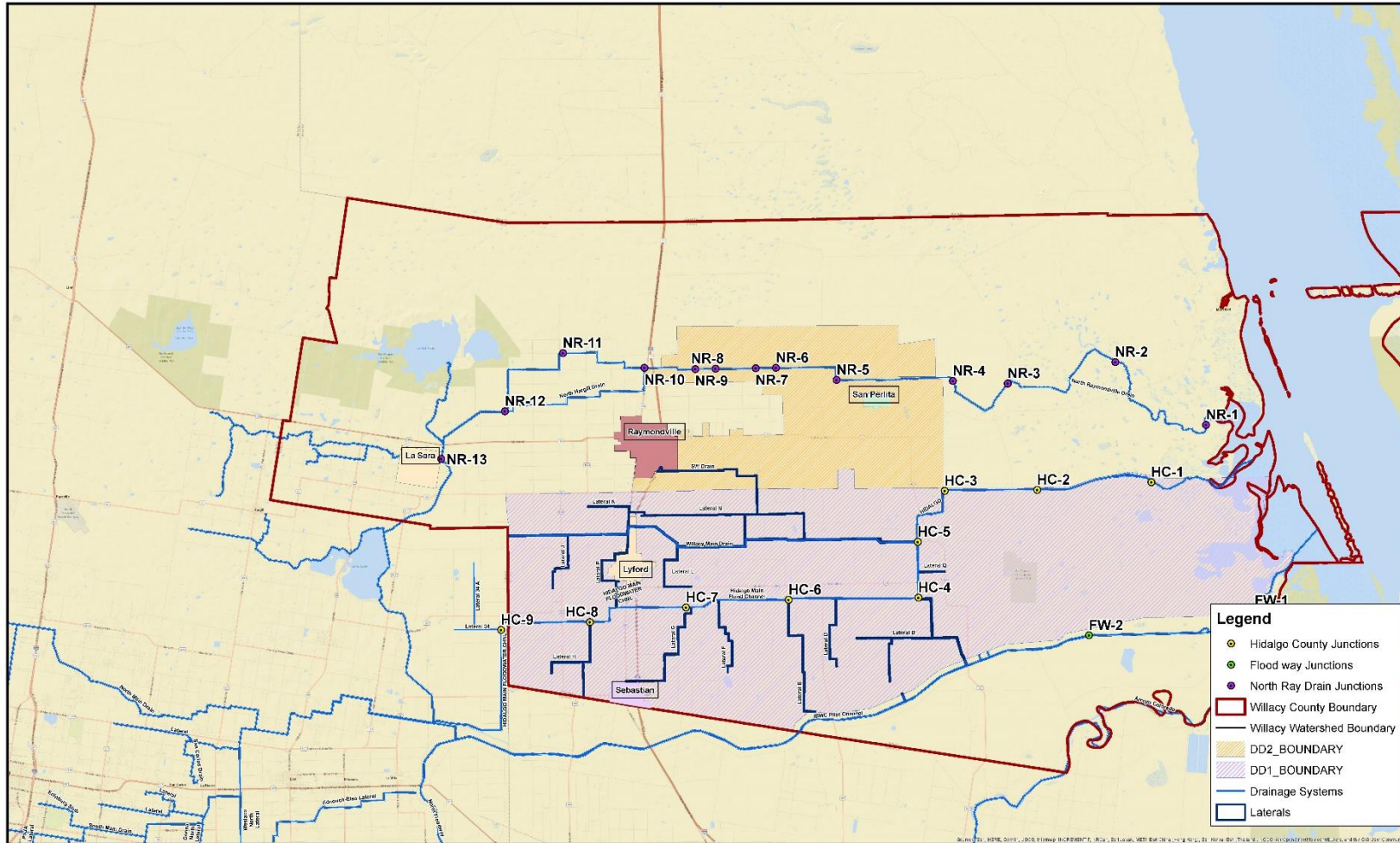
**GM**  **GUZMAN & MUÑOZ**  
ENGINEERING AND SURVEYING, INC.  
Texas Registered Engineering Firm F-8017  
TBPLS Firm Registration No. 10087700

2020 E. EXPRESSWAY 83 MERCEDES, TEXAS 78570      PHONE: (956) 565-4637      FAX: (956) 565-4636

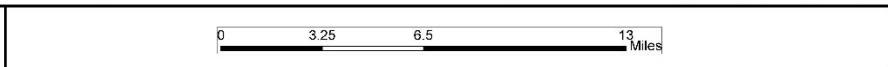
 **RESEARCH, APPLIED**  
**TECHNOLOGY**  
EDUCATION AND SERVICE  
*Rio Grande Valley*



# STUDY AREA

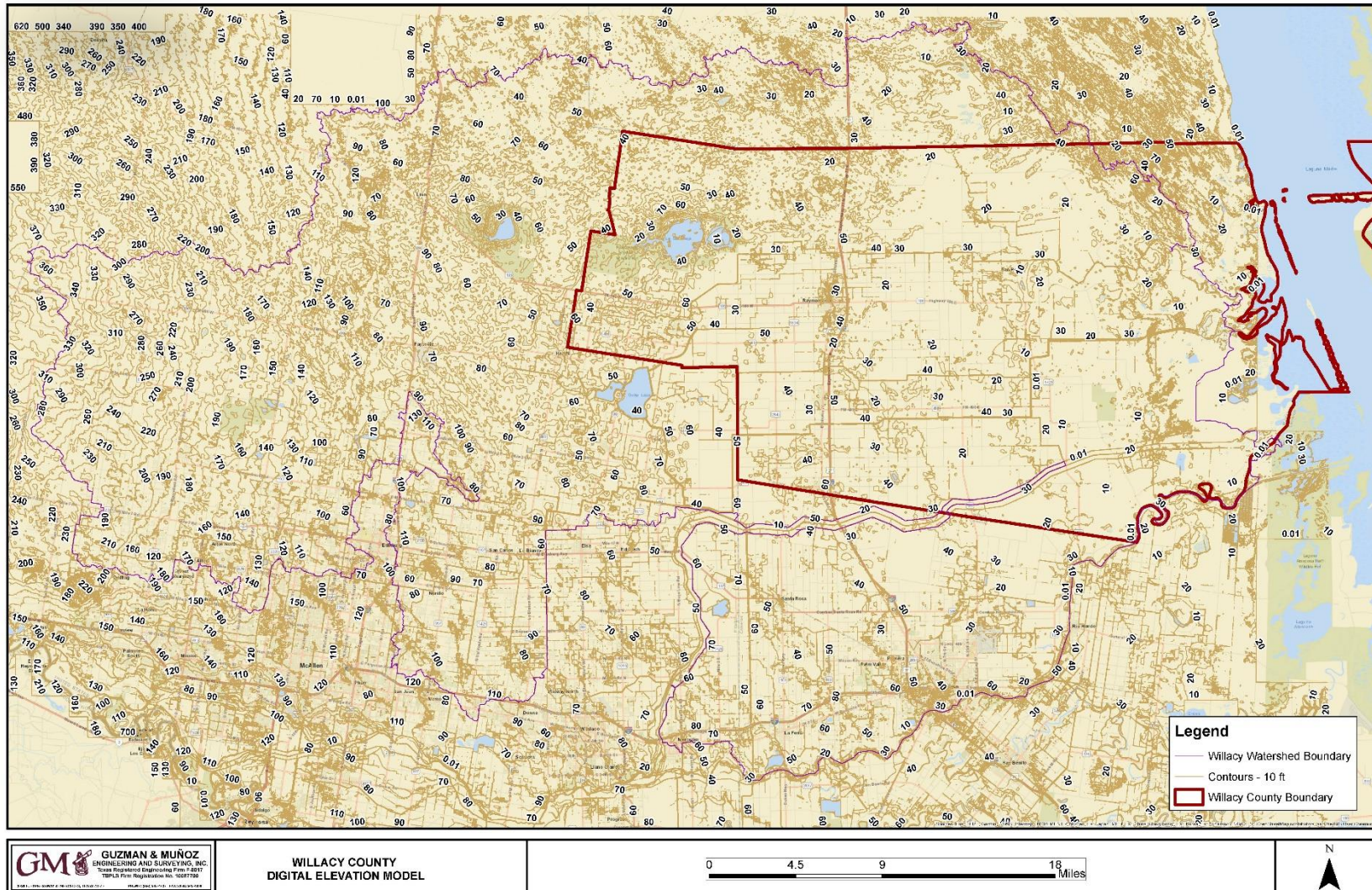


**WILLACY COUNTY  
WATERSHED STUDY**



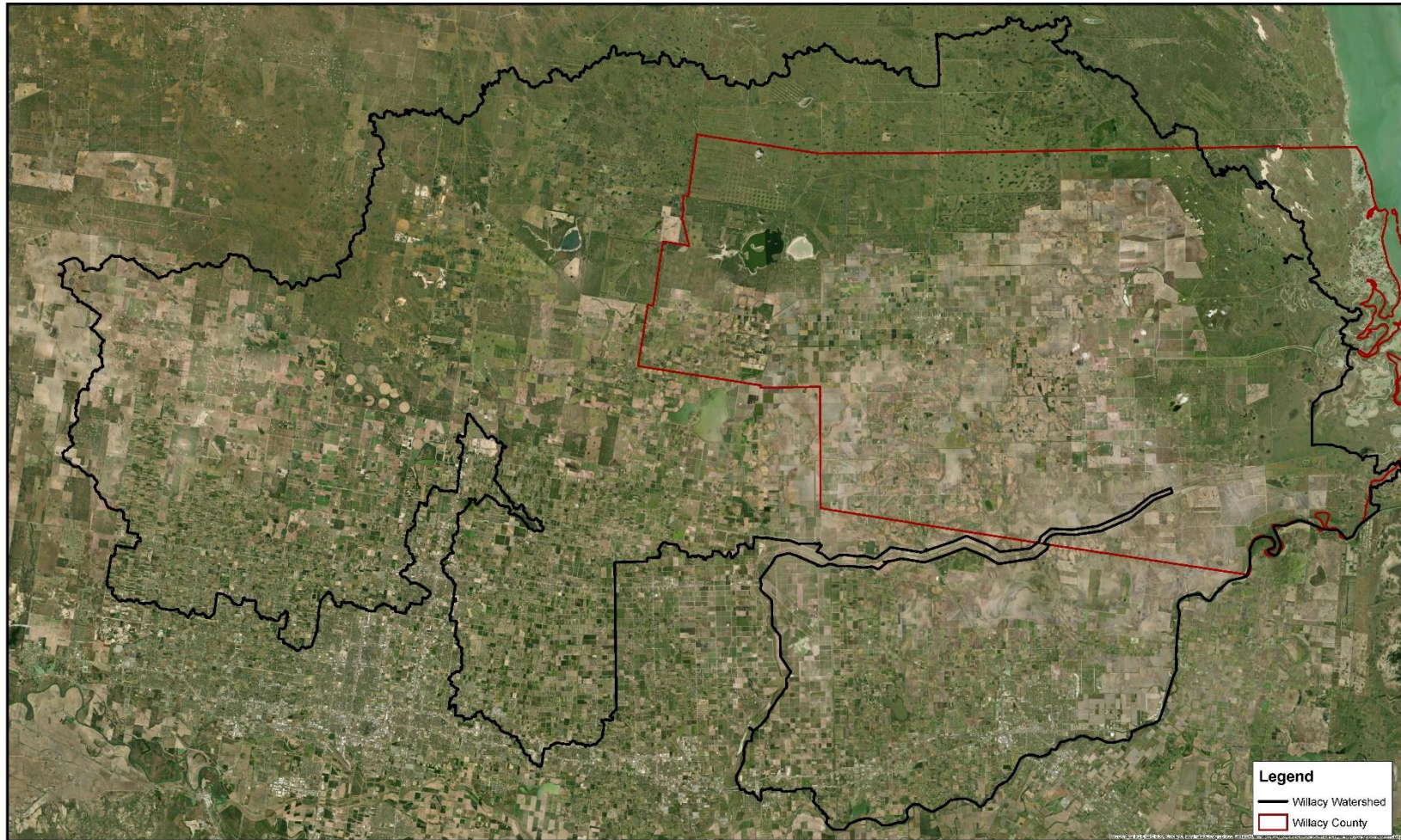


# Willacy County Watershed & Elevation Characteristics





# Willacy County Watershed & Hydrologic Network



WILLACY COUNTY  
WATERSHED DELINEATION



# Historical Events in Willacy County

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1. 39 major flooding events since 1996
  - a. (Average NFIP payment of \$54.2K)
2. FEMA Disaster Declarations for the LRGV region (2015 – present) with approved Claim amounts

DR Number	Disaster Declared Date	Individual Assistance \$	Public Assistance \$	Counties
4454	7/17/2019	\$25,812,074.32	\$0	Hidalgo, Cameron, Willacy
4377	7/6/2018	\$60,593,763.34	\$0	Hidalgo, Cameron
4272	6/11/2016	\$140,400.36	\$130,861.33	Hidalgo
4245	11/25/2015	\$7,746,214.64	\$4,558,538.89	Hidalgo, Cameron, Willacy
4223	5/29/2015	\$5,521,773.68	\$6,377,522.34	Hidalgo



# STAKEHOLDER COLLABORATION



## EXISTING, ON-GOING AND FUTURE STUDIES

- ✓ Lower Rio Grande Valley Development Council (LRGVDC) Flood Planning Study
- ✓ Region 15 Lower Rio Grande Regional Flood Plan
- ✓ Willacy County Watershed Study
  - Ensure Consistency across Studies
  - Ensure Product Optimization
  - Avoid Duplication

## ENTITIES & AGENCIES

### Local Planning Agencies & Drainage Districts

- ✓ Lower Rio Grande Valley Development Council (LRGVDC)

### State & Federal Funding Agencies

- ✓ Texas Water Development Board (TWDB)
- ✓ Texas General Land Office (GLO)



# COUNTIES & CITIES STAKEHOLDERS



## **Regions/Counties**

- ✓ Willacy County
- ✓ Hidalgo County

## **Cities**

- ✓ The City of Raymondville
- ✓ The City of San Perlita
- ✓ The City of Lyford

## **Communities**

- ✓ Sebastian
- ✓ La Sara





# Drainage Districts & IBWC Stakeholders



## **Drainage Districts**

- ✓ Willacy County  
Drainage District No.1
- ✓ Willacy County  
Drainage District No.2

## **Irrigation Districts**

- ✓ Delta Lake Irrigation District



## Purpose & Objectives



- ✓ Provide Higher Level Flood Protection to Reduce the Loss of Life, Property and Critical Infrastructure Damages
- ✓ Increase the Region's Resilience To Floodwaters
- ✓ Develop Watershed-Based Hydrologic & Hydraulic Models (1D/2D & Atlas 14)
- ✓ Identify Existing and Future Flood Risks
- ✓ Develop and Evaluate Alternative Mitigation Measures  
Develop Flood Risk Inundation Mapping
- ✓ Recommend Regional Drainage Criteria
- ✓ Identify Gage Stations for Early Flood Warning Systems



# Existing Flood/ Drainage Issues



- ✓ Limited Outfall Channel System and Capacity
- ✓ Limited Storm Sewer System and Capacity
- ✓ Operation of IBWC North Floodway Gated Outlets
- ✓ Runoffs from Hidalgo County



# Local Drainage Challenges



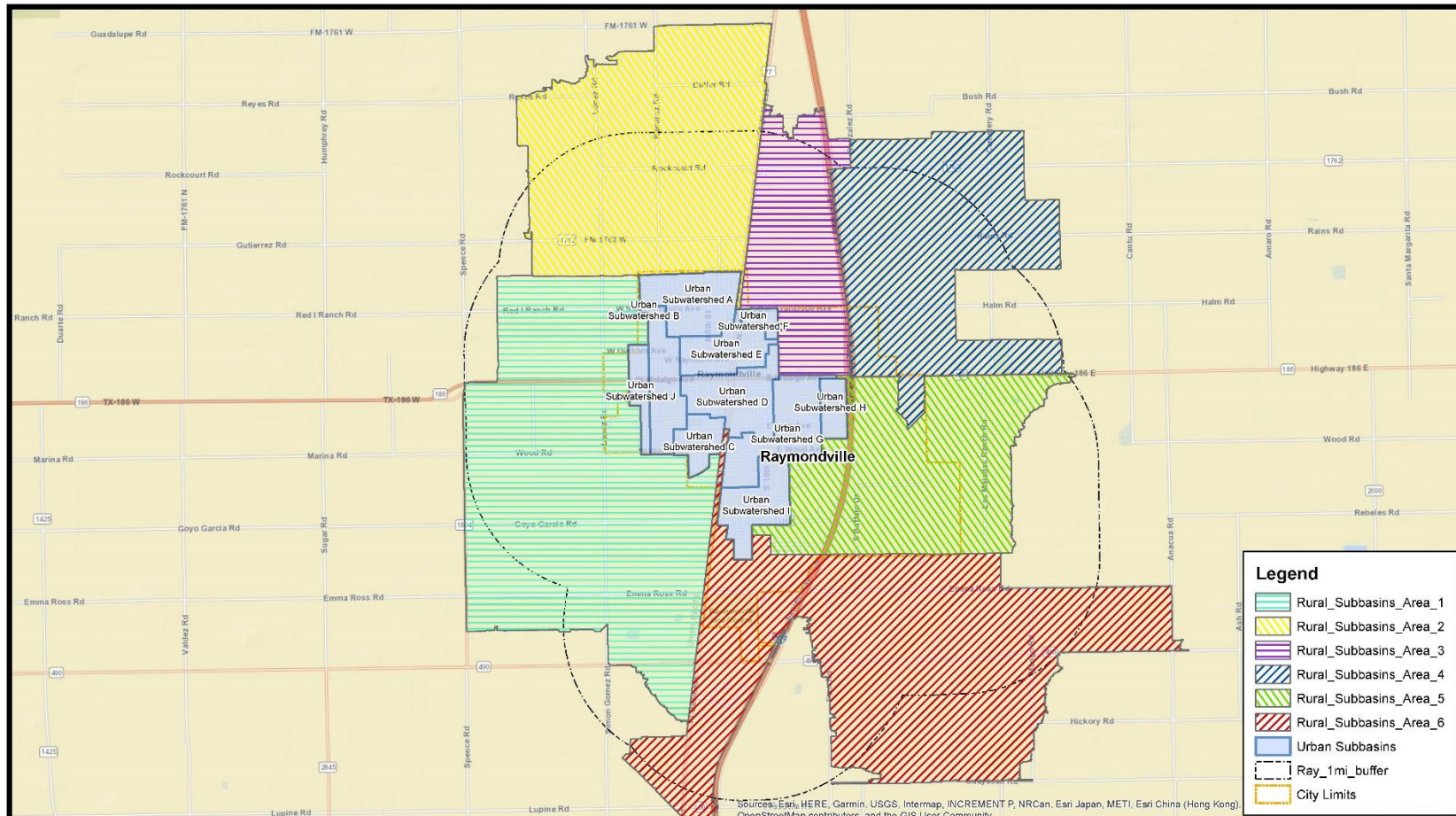
- ✓ Frequent & Repetitive Flooding
- ✓ High Rainfall Intensity
- ✓ Tropical Storms & Hurricanes
- ✓ Flat Terrain
- ✓ Clay Soils
- ✓ Shallow Groundwater Level

# Raymondville Flood Protection Planning Study





# City of Raymondville Watershed Study: Cat 1



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## RAYMONDVILLE WATERSHED PLANNING STUDY AREA

0 0.25 0.5 1 Miles



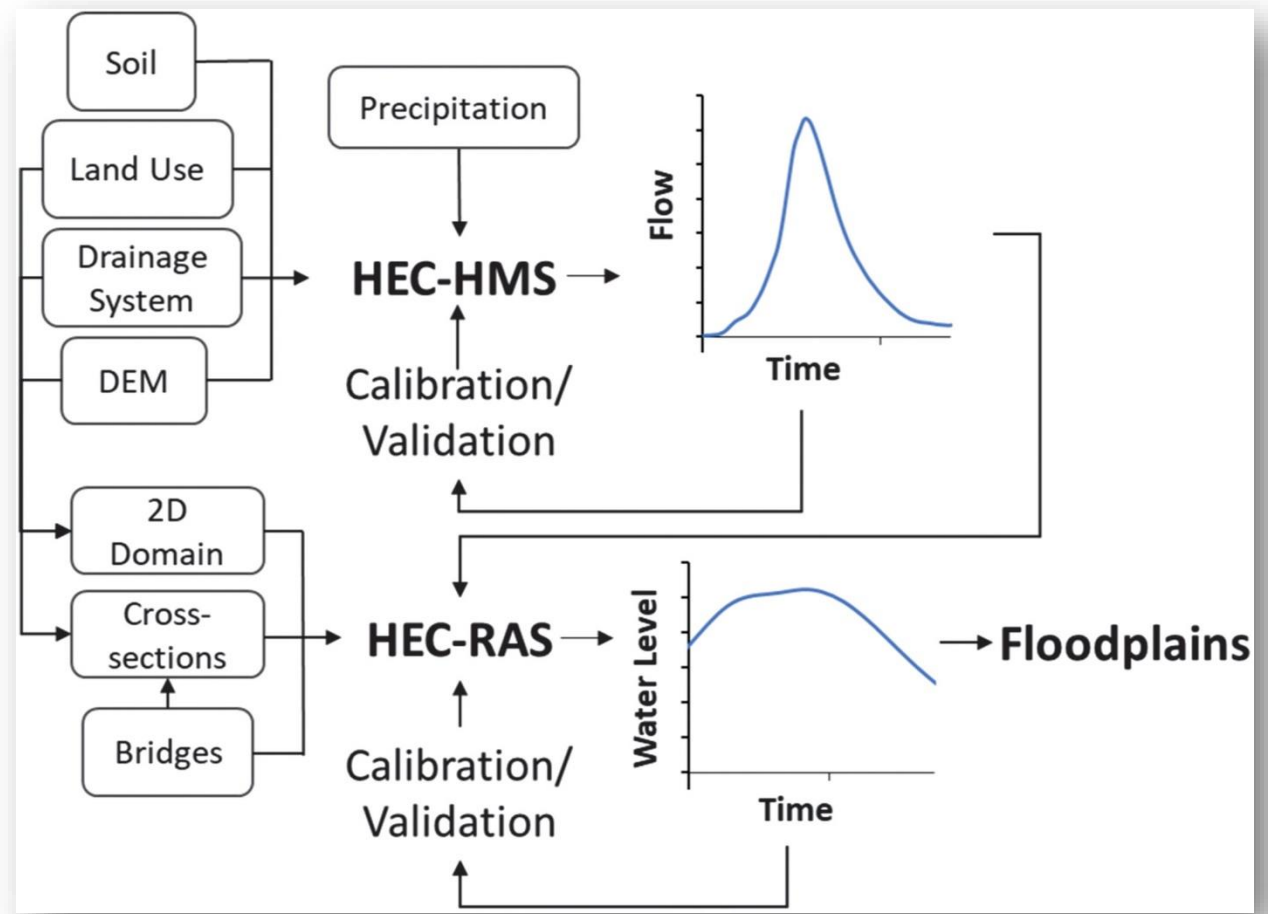


# Modeling



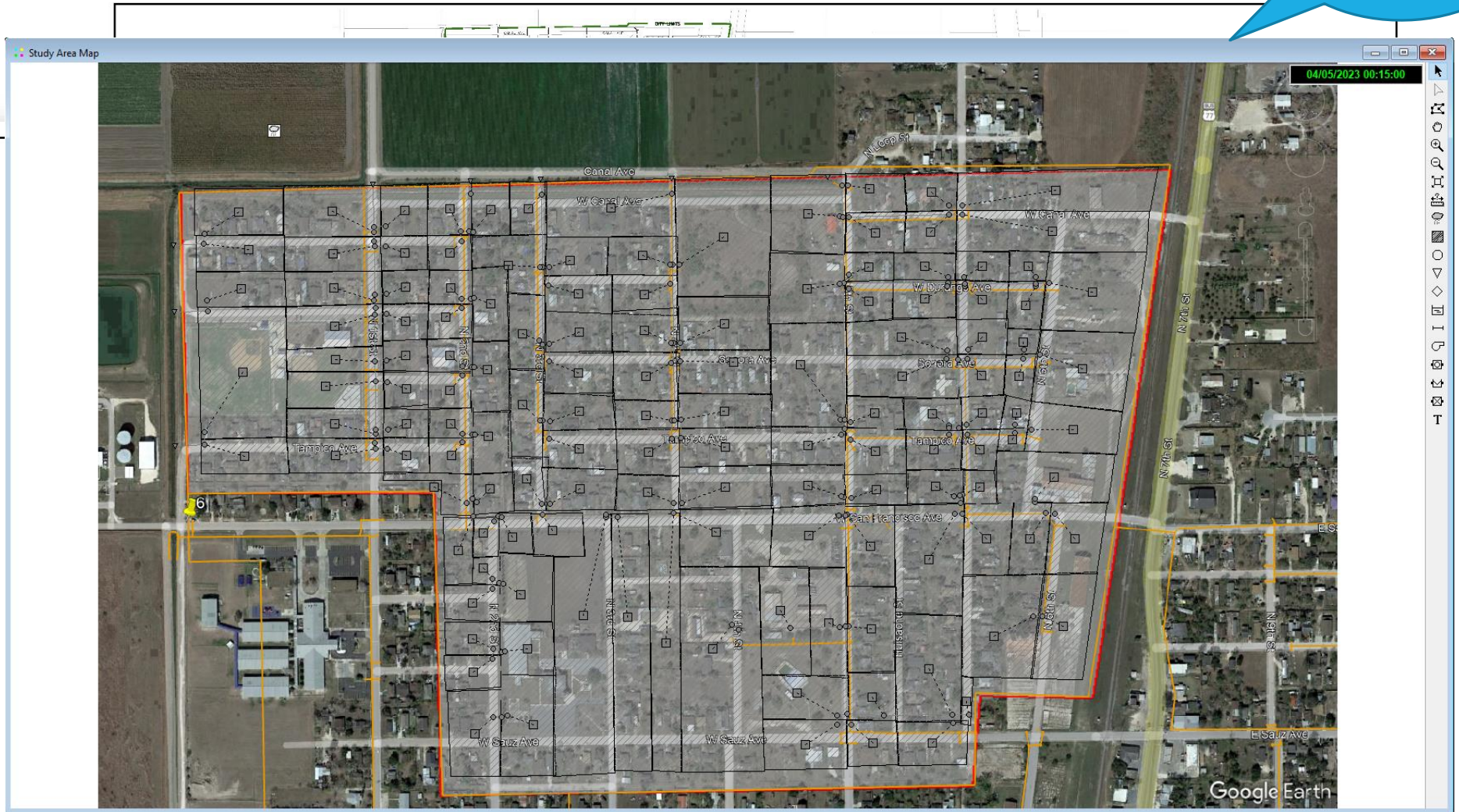
## H&H Models

1. EPA SWMM 5.1
  - Analyze the existing MS4 for the City of Raymondville by watershed
2. HEC-HMS
  - Analyze watershed under storm events (10,25,50,100)
3. HEC-RAS
  - Analyze drainage conveyance systems Major and Minor with flow outputs from the HEC-HMS model



# MISPLASATAMCO LIMITED IN URBAN WATERSHED A

IN THE WORKS



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TXAS REG. SURVEYOR LICENSE NO. 15841  
 TXAS REG. ENGINEER LICENSE NO. 10037/00  
 JOB NO. P-021-01

DATE: 04/05/2023 00:15:00  
 SCALE: 1:5000  
 PROJECT: MISPLASATAMCO LIMITED IN  
 DRAWING: 01-100-01



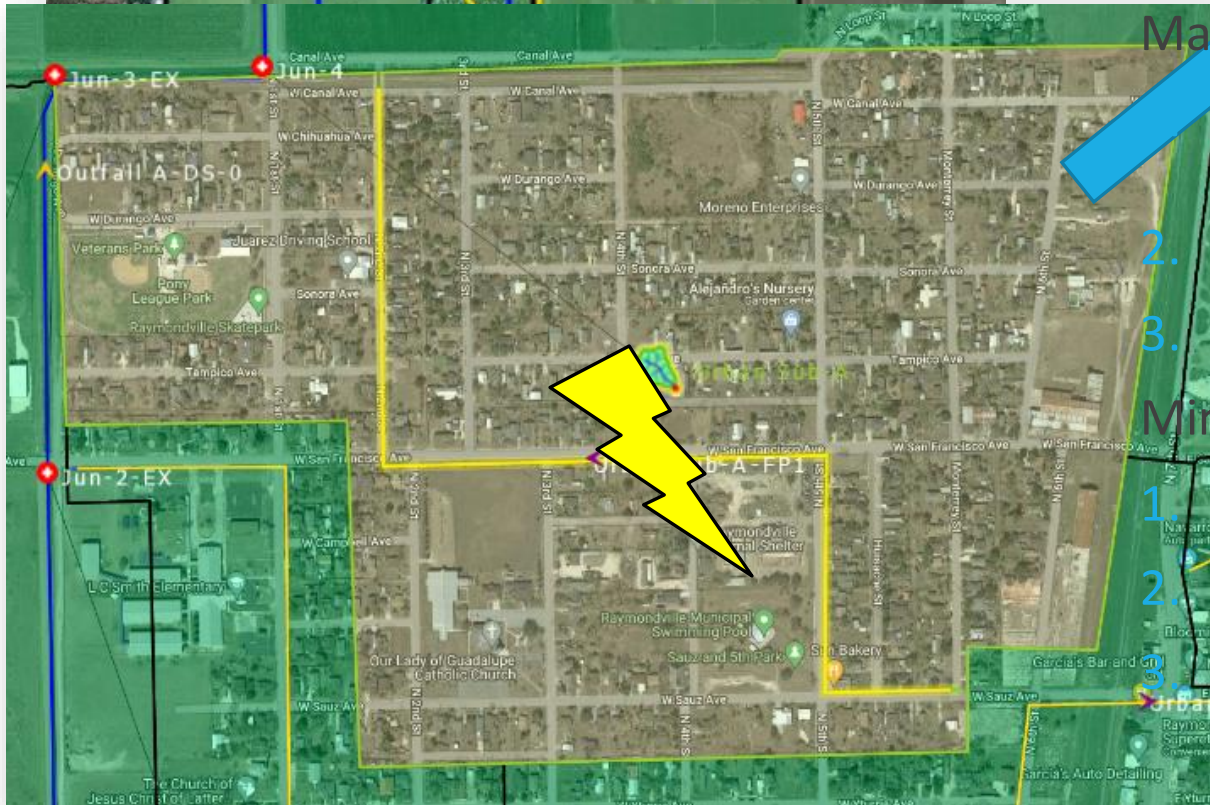
# NEXT STEPS...

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1. ADD RAINFALL DATA TO SIMULATE RAIN EVENT
2. ANALYZE THE EXISTING MS4 CONDITIONS UNDER RAIN EVENT
3. LOCATE PROBLEMATIC AREAS (FLOODING)
4. PRELIM DESIGN FOR IMPROVEMENTS
5. RE-RUN MODEL WITH PROPOSED IMPROVEMENTS

# HEC-HMS MODEL

## Urban Watershed A



HEC-HMS Model

Major Components:

1. Watersheds (URBAN A-J & RURAL (1-6))

2. Elevation Data / LiDAR

3. Streams (OUTFALL A-D)

Minor Components:

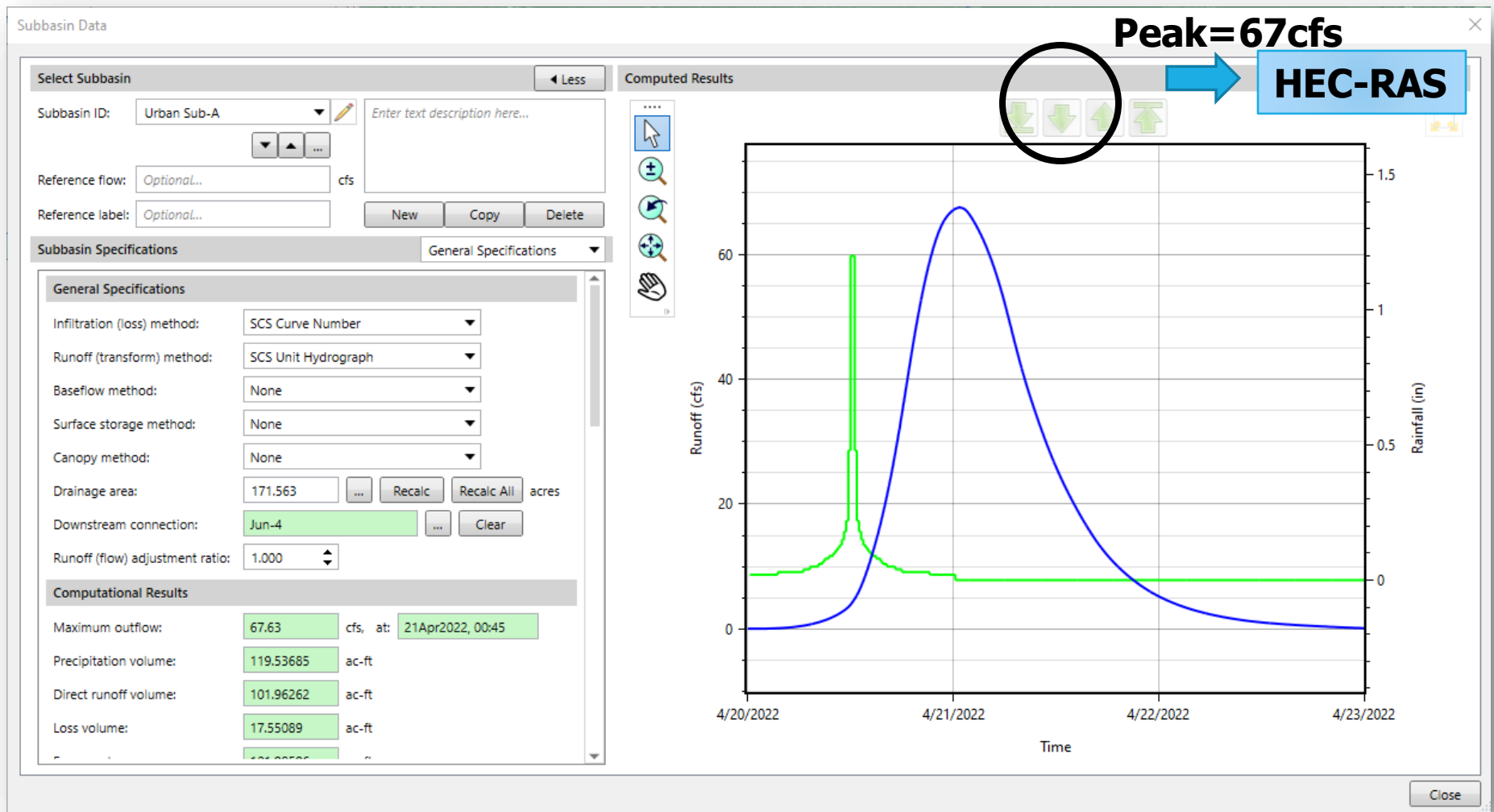
1. Flow Paths

2. Junctions

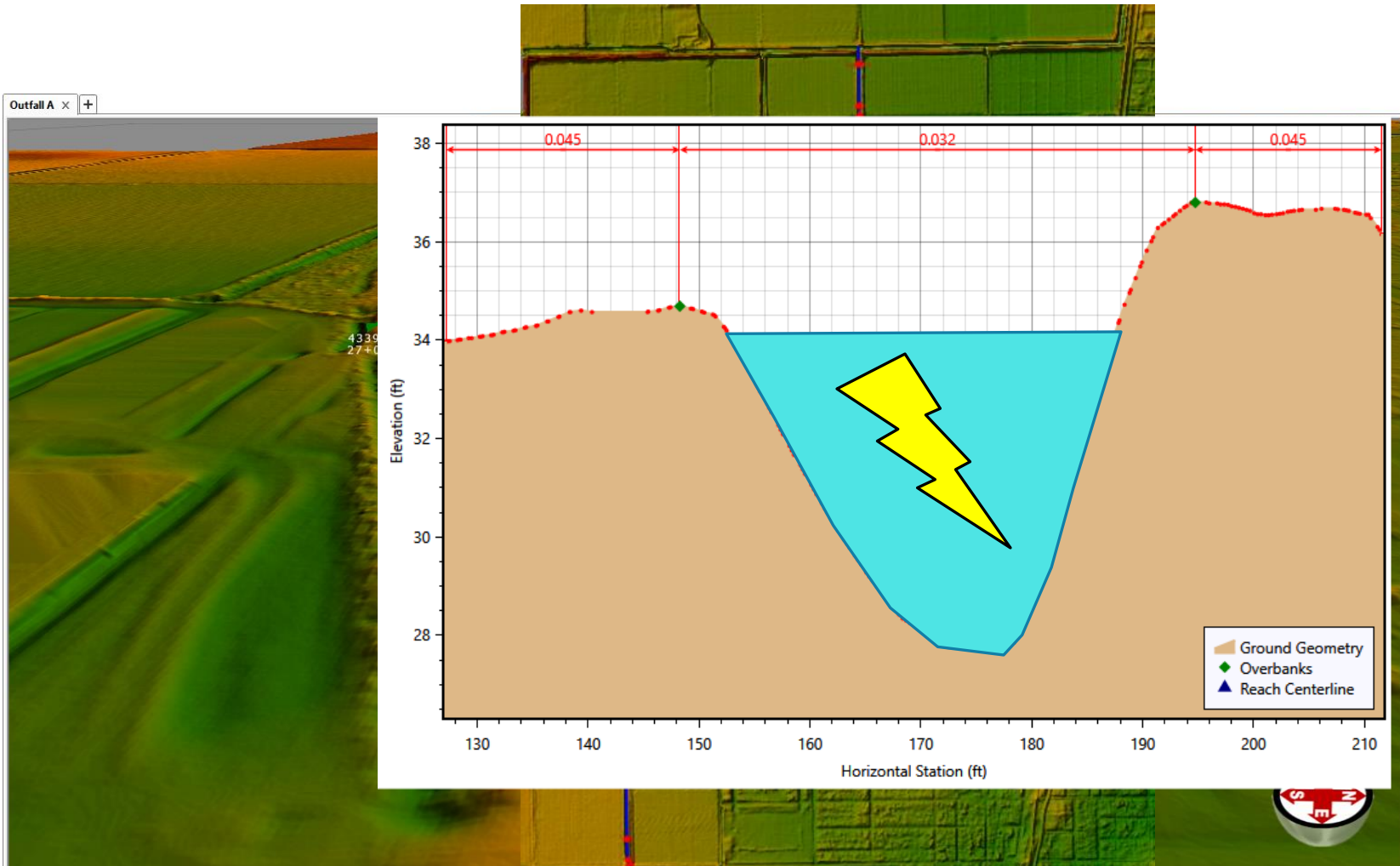
3. Outlets



# Data Output



# HEC-RAS MODEL OUTFALL A



# Data Output

Culvert Output

File Type Options Help

River: 918 Profile: PF# 1 Culv Group: Culvert #1

Reach: CDBG RS: 43267 Plan: Default Scenario

Plan: Default Scenario 918 CDBG RS: 43267 Culv Group: Culvert #1 Profile: PF# 1

Q Culv Group (cfs)	14.04	Culv Full Len (ft)	60.00
# Barrels	1	Culv Vel US (ft/s)	1.12
Q Barrel (cfs)	14.04	Culv Vel DS (ft/s)	1.12
E.G. US. (ft)	39.66	Culv Inv El Up (ft)	27.80
W.S. US. (ft)	39.64	Culv Inv El Dn (ft)	27.46
E.G. DS (ft)	39.64	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	39.62	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.02	Culv Entr Loss (ft)	0.01
Delta WS (ft)	0.02	Q Weir (cfs)	641.03
E.G. IC (ft)	39.70	Weir Sta Lft (ft)	84.00
E.G. OC (ft)	39.66	Weir Sta Rgt (ft)	194.39
Culvert Control	Outlet	Weir Submerg	1.00
Culv WS Inlet (ft)	31.80	Weir Max Depth (ft)	6.22
Culv WS Outlet (ft)	31.46	Weir Avg Depth (ft)	4.28
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	472.34
Culv Crt Depth (ft)	1.10	Min El Weir Flow (ft)	33.45

Errors, Warnings and Notes

**Warning:** During subcritical analysis, while trying to calculate culvert and weir flow, the program could not get a balance of energy within the specified tolerance and number of trials. The program used the solution with the minimum error.

**Warning:** The weir over culvert is submerged.

**Warning:** During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.

**Warning:** During the culvert outlet control computations, the program could not balance the culvert/weir flow. The reported

Select Profile



# TWDB FIF: Cat 2 Raymondville Ditch



- ✓ Construction Plans
  - 90% Complete
  
- ✓ Budget
  - \$885,551

## CONSTRUCTION PLANS FOR PROPOSED DRAINAGE DITCH IMPROVEMENTS FOR CITY OF RAYMONDVILLE WILLACY COUNTY, TEXAS TWDB PROJECT NO. 40089 JANUARY, 2023

PROJECT: PROPOSED DRAINAGE IMPROVEMENTS	SHEET
PROJECT NO: 40089	1
CITY: RAYMONDVILLE, TEXAS	OF
	12

INDEX OF SHEET	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	GENERAL NOTES
3	DESIGN # AN
4	PLAN AND PROF - STATION 199+00 TO 204+00
5	PLAN AND PROF - STATION 205+00 TO 217+00
6	ENLARGED PLANS
7	CROSS SECTION STATION 194+28 TO 217+00
8	EROSION CONTROL PLAN
9	FOUNDATION DETAILS
10	DRAINAGE DETAILS
11	IRRIGATION DETAILS
12	WALL, WALKWAY

VICINITY MAP:  
1" = 2000'

CITY OFFICIALS	
GILBERT GONZALES	MAYOR
JOEL GARCA	COMMISSIONER PLACE #1
CHRIS TAMEZ	COMMISSIONER PLACE #2
CLIFTON SMITH	COMMISSIONER PLACE #3
EDWARD GONZALES	COMMISSIONER PLACE #4
TONY CHAVEZ	CITY MANAGER

LOCATION MAP  
N.T.S.

THE DELTA LAND IRRIGATION DISTRICT HAS REVIEWED AND APPROVED THIS 2900 FT RAYMONDVILLE DITCH PROJECT CONSTRUCTION PLANS AND SPECIFICATIONS

DATE: \_\_\_\_\_

THE CITY OF RAYMONDVILLE HAS REVIEWED AND APPROVED THIS 2900 FT RAYMONDVILLE DITCH PROJECT CONSTRUCTION PLANS AND SPECIFICATIONS

CITY OF RAYMONDVILLE MAYOR

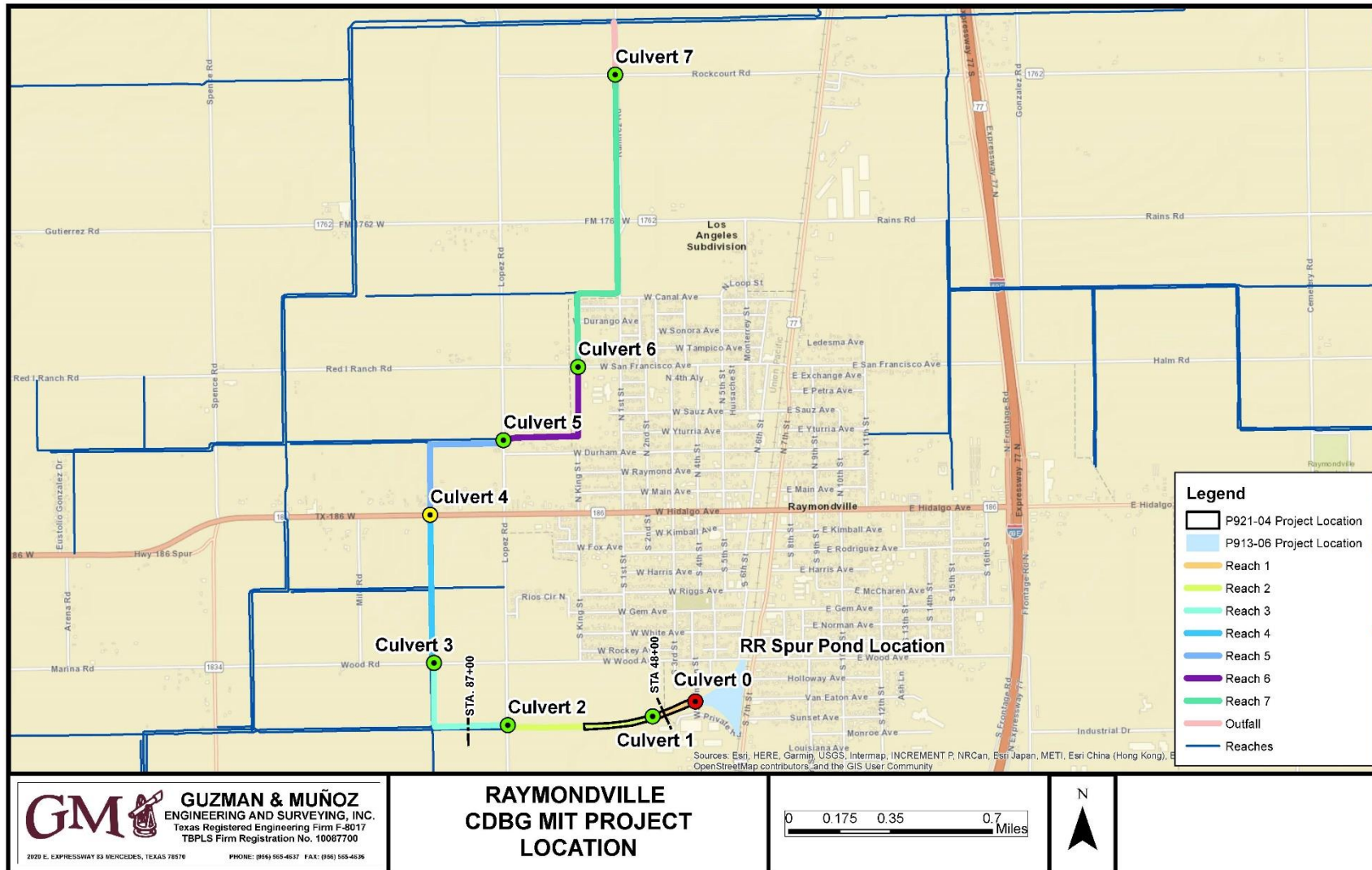
DATE: \_\_\_\_\_

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# TX GLO: CDGB – MIT



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**RAYMONDVILLE  
CDBG MIT PROJECT  
LOCATION**

0 0.175 0.35 0.7 Miles



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**QUESTIONS?**

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