Mott MacDonald

# Corporation Ditch Improvements

October 9, 2023

City of Port Lavaca

- **Reduce Street Flooding in the Half League Road Area**
- **Improve the Capacity of Corporation Ditch**

**Data Collection**

**Develop a Stormwater Model**

**Identify Stormwater Solutions**

# Data Collection

- **City Drainage Maps**
- **NOAA LIDAR**
- **Survey (inlets, Pipes, Culverts)**
- **Historical Photos**

# May 18/19 2021 Storm Event

- **Flooding along Half League Road at Tilley, George, and Schooley Streets**
- **Corporation Ditch Flowing nearly Full**
- **Majority of the Rainfall fell in 6 hours (6.1 inches with a total of 7 inches in 17 hours)**
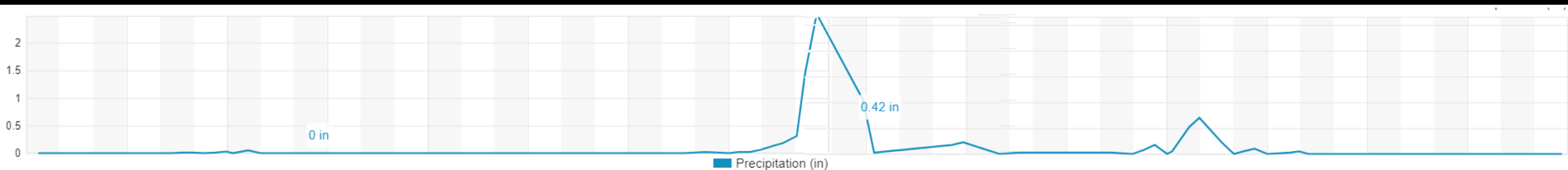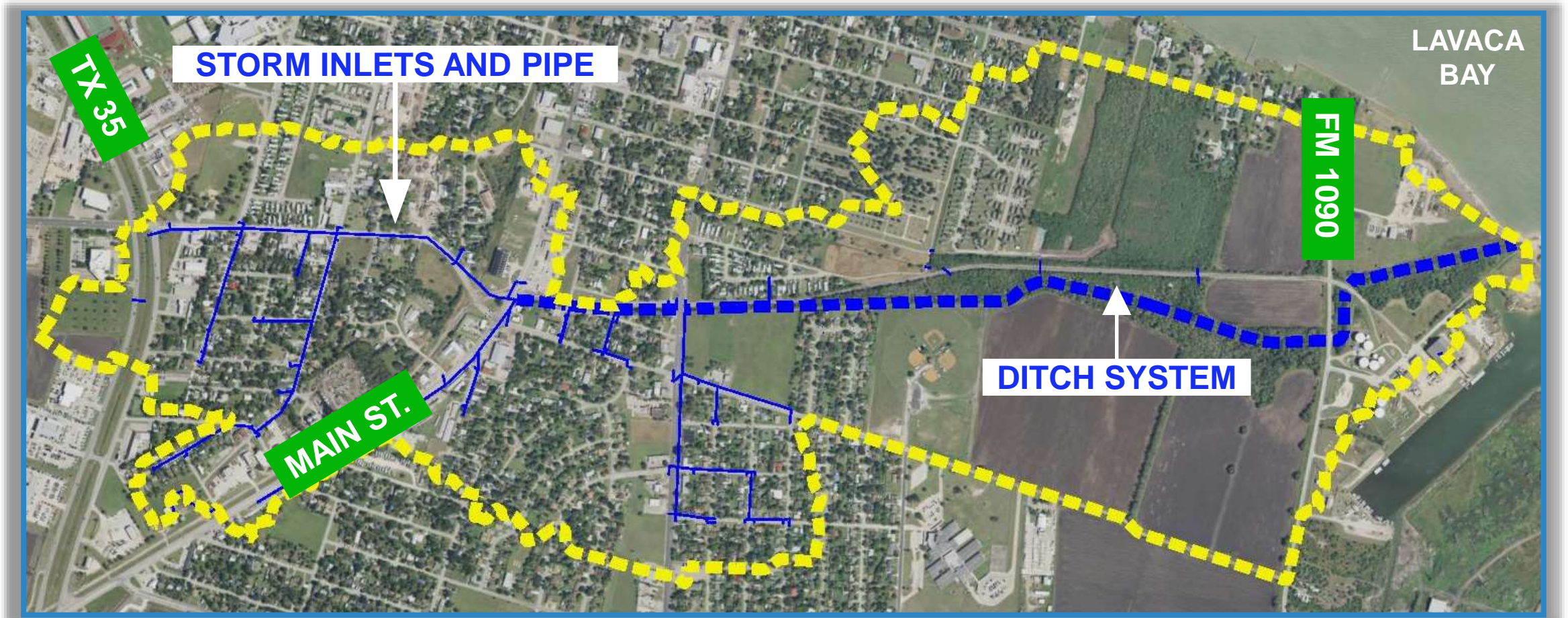


**Tilley Street**

**George Street**

**W. Austin Street**
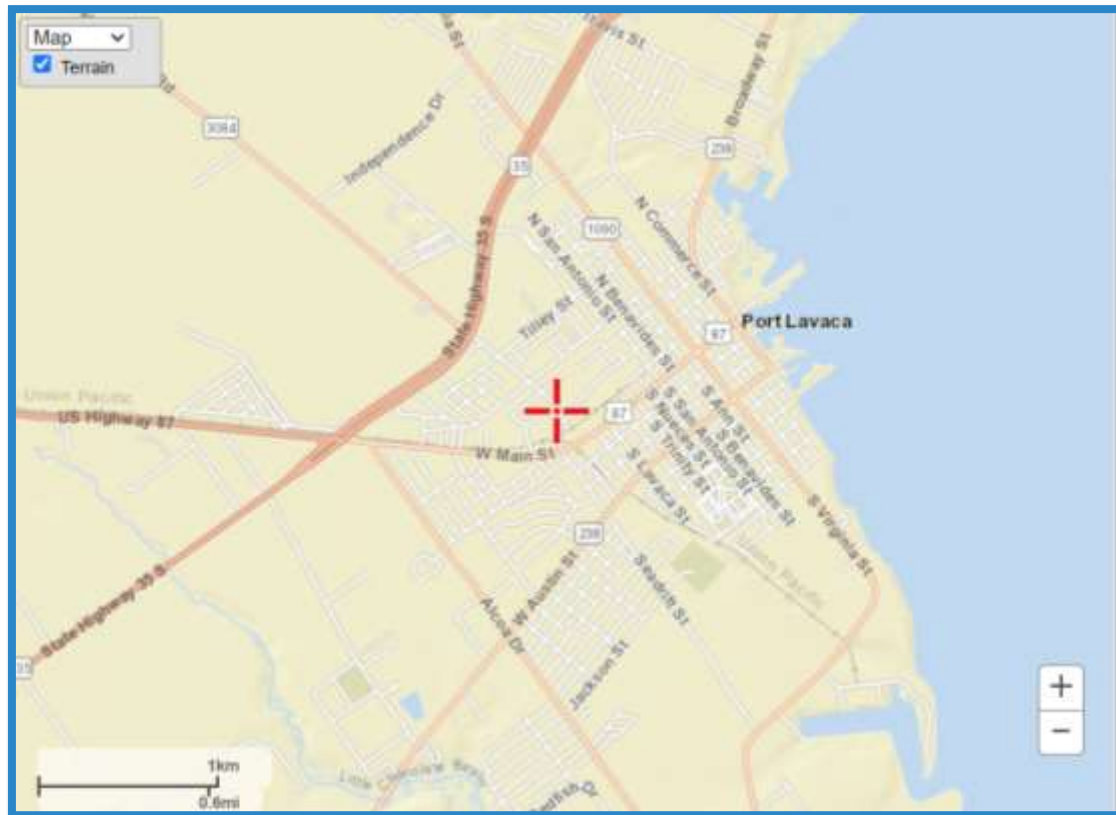


0 in

0.42 in

Precipitation (in)

# Existing Conditions

- **646 Acre Drainage Basin.**
- **Storm Inlets and Pipe from Texas 35 to Main Street**
- **Ditch System from Main Street to the Bay.**
- **Box Culverts at Live Oak St., W. Austin St., FM 1090, and Railroad**

# Developing a Stormwater Modeling

- ICPR4 Stormwater Routing Software
- NOAA Atlas 14 Precipitation Estimates



| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 0.514 (0.389-0.678) | 0.591 (0.450-0.772) | 0.716 (0.544-0.940) | 0.821 (0.616-1.09) | 0.968 (0.704-1.33) | 1.08 (0.767-1.53) | 1.20 (0.828-1.74) | 1.32 (0.890-1.97) | 1.49 (0.969-2.30) | 1.62 (1.03-2.56) |
| 10-min | 0.815 (0.617-1.08) | 0.939 (0.715-1.23) | 1.14 (0.866-1.50) | 1.31 (0.981-1.74) | 1.54 (1.12-2.12) | 1.73 (1.22-2.44) | 1.91 (1.32-2.78) | 2.10 (1.41-3.13) | 2.36 (1.53-3.63) | 2.55 (1.62-4.03) |
| 15-min | 1.03 (0.783-1.37) | 1.19 (0.904-1.55) | 1.43 (1.09-1.88) | 1.64 (1.23-2.19) | 1.93 (1.41-2.66) | 2.16 (1.53-3.05) | 2.40 (1.65-3.48) | 2.64 (1.77-3.93) | 2.97 (1.93-4.57) | 3.23 (2.04-5.10) |
| 30-min | 1.48 (1.12-1.95) | 1.69 (1.29-2.21) | 2.03 (1.55-2.67) | 2.32 (1.74-3.10) | 2.73 (1.99-3.75) | 3.05 (2.16-4.31) | 3.38 (2.33-4.90) | 3.73 (2.51-5.55) | 4.21 (2.73-6.48) | 4.58 (2.90-7.24) |
| 60-min | 1.96 (1.48-2.59) | 2.26 (1.72-2.94) | 2.73 (2.08-3.59) | 3.13 (2.35-4.17) | 3.69 (2.68-5.06) | 4.12 (2.92-5.82) | 4.58 (3.16-6.64) | 5.08 (3.42-7.56) | 5.79 (3.76-8.93) | 6.36 (4.03-10.1) |
| 2-hr | 2.47 (1.88-3.23) | 2.89 (2.21-3.75) | 3.57 (2.73-4.67) | 4.15 (3.13-5.49) | 4.94 (3.59-6.69) | 5.53 (3.91-7.70) | 6.16 (4.27-8.85) | 6.91 (4.67-10.2) | 8.04 (5.25-12.3) | 8.99 (5.71-14.0) |
| 3-hr | 2.77 (2.11-3.61) | 3.28 (2.53-4.25) | 4.12 (3.16-5.36) | 4.82 (3.64-6.35) | 5.78 (4.20-7.78) | 6.49 (4.60-8.99) | 7.26 (5.04-10.4) | 8.21 (5.56-12.0) | 9.67 (6.32-14.7) | 10.9 (6.95-16.9) |
| 6-hr | 3.24 | 3.94 | 5.05 | 5.99 | 7.29 | 8.26 | 9.33 | 10.7 | 12.7 | 14.5 |
| 8HR | 3.38 | 4.14 | 5.34 | 6.37 | 7.82 | 8.94 | 10.15 | 11.67 | 13.90 | 15.90 |
| 12-hr | 3.65 | 4.54 | 5.93 | 7.14 | 8.89 | 10.3 | 11.8 | 13.6 | 16.3 | 18.7 |
| 24-hr | 4.03 (3.12-5.17) | 5.14 (3.94-6.37) | 6.79 (5.26-8.61) | 8.29 (6.36-10.7) | 10.5 (7.81-13.9) | 12.3 (8.92-16.8) | 14.4 (10.1-19.9) | 16.7 (11.4-23.6) | 20.0 (13.2-29.2) | 22.8 (14.7-34.0) |
| 2-day | 4.39 (3.41-5.59) | 5.68 (4.34-6.93) | 7.55 (5.87-9.49) | 9.30 (7.16-11.9) | 11.9 (8.95-15.8) | 14.2 (10.4-19.2) | 16.7 (11.8-23.0) | 19.5 (13.3-27.2) | 23.3 (15.5-33.6) | 26.5 (17.1-38.9) |
| 3-day | 4.68 (3.64-5.93) | 6.08 (4.66-7.40) | 8.12 (6.33-10.2) | 10.0 (7.74-12.8) | 12.9 (9.69-16.9) | 15.3 (11.2-20.6) | 18.0 (12.8-24.6) | 20.9 (14.4-29.0) | 24.9 (16.5-35.6) | 28.1 (18.2-41.0) |
| 4-day | 5.01 (3.91-6.33) | 6.47 (4.99-7.89) | 8.64 (6.76-10.8) | 10.6 (8.22-13.5) | 13.6 (10.2-17.8) | 16.1 (11.8-21.5) | 18.8 (13.3-25.5) | 21.7 (15.0-30.0) | 25.8 (17.1-36.6) | 29.0 (18.8-42.0) |
| 7-day | 5.96 (4.67-7.48) | 7.52 (5.88-9.23) | 9.93 (7.81-12.4) | 12.0 (9.35-15.2) | 15.1 (11.4-19.6) | 17.6 (12.9-23.3) | 20.3 (14.4-27.3) | 23.1 (16.0-31.7) | 27.1 (18.1-38.1) | 30.3 (19.7-43.4) |
| 10-day | 6.70 (5.26-8.38) | 8.33 (6.57-10.3) | 10.9 (8.61-13.6) | 13.1 (10.2-16.5) | 16.3 (12.2-20.9) | 18.8 (13.7-24.6) | 21.4 (15.2-28.6) | 24.2 (16.8-33.0) | 28.1 (18.8-39.3) | 31.2 (20.4-44.5) |
| 20-day | 8.50 (6.71-10.6) | 10.3 (8.24-12.8) | 13.3 (10.6-16.5) | 15.7 (12.3-19.7) | 19.0 (14.3-24.2) | 21.5 (15.8-27.9) | 24.0 (17.2-31.8) | 26.8 (18.7-36.1) | 30.6 (20.6-42.2) | 33.6 (22.0-47.2) |
| 30-day | 9.97 (7.89-12.3) | 11.9 (9.59-14.8) | 15.2 (12.1-18.8) | 17.8 (14.0-22.2) | 21.3 (16.1-26.9) | 23.8 (17.5-30.7) | 26.3 (18.9-34.7) | 29.1 (20.3-38.9) | 32.8 (22.1-44.9) | 35.7 (23.4-49.7) |
| 45-day | 12.2 (9.65-15.0) | 14.4 (11.6-17.7) | 18.1 (14.5-22.2) | 21.0 (16.5-26.1) | 25.0 (18.9-31.5) | 27.9 (20.6-35.8) | 30.7 (22.0-40.1) | 33.5 (23.5-44.5) | 37.2 (25.1-50.6) | 40.0 (26.3-55.2) |
| 60-day | 14.2 (11.3-17.4) | 16.6 (13.4-20.4) | 20.7 (16.6-25.4) | 24.0 (18.9-29.6) | 28.4 (21.6-35.8) | 31.7 (23.5-40.6) | 34.9 (25.1-45.4) | 37.9 (26.5-50.1) | 41.6 (28.2-56.2) | 44.3 (29.1-60.8) |

# Developing a Stormwater Modeling

- **ICPR4 Stormwater Model**
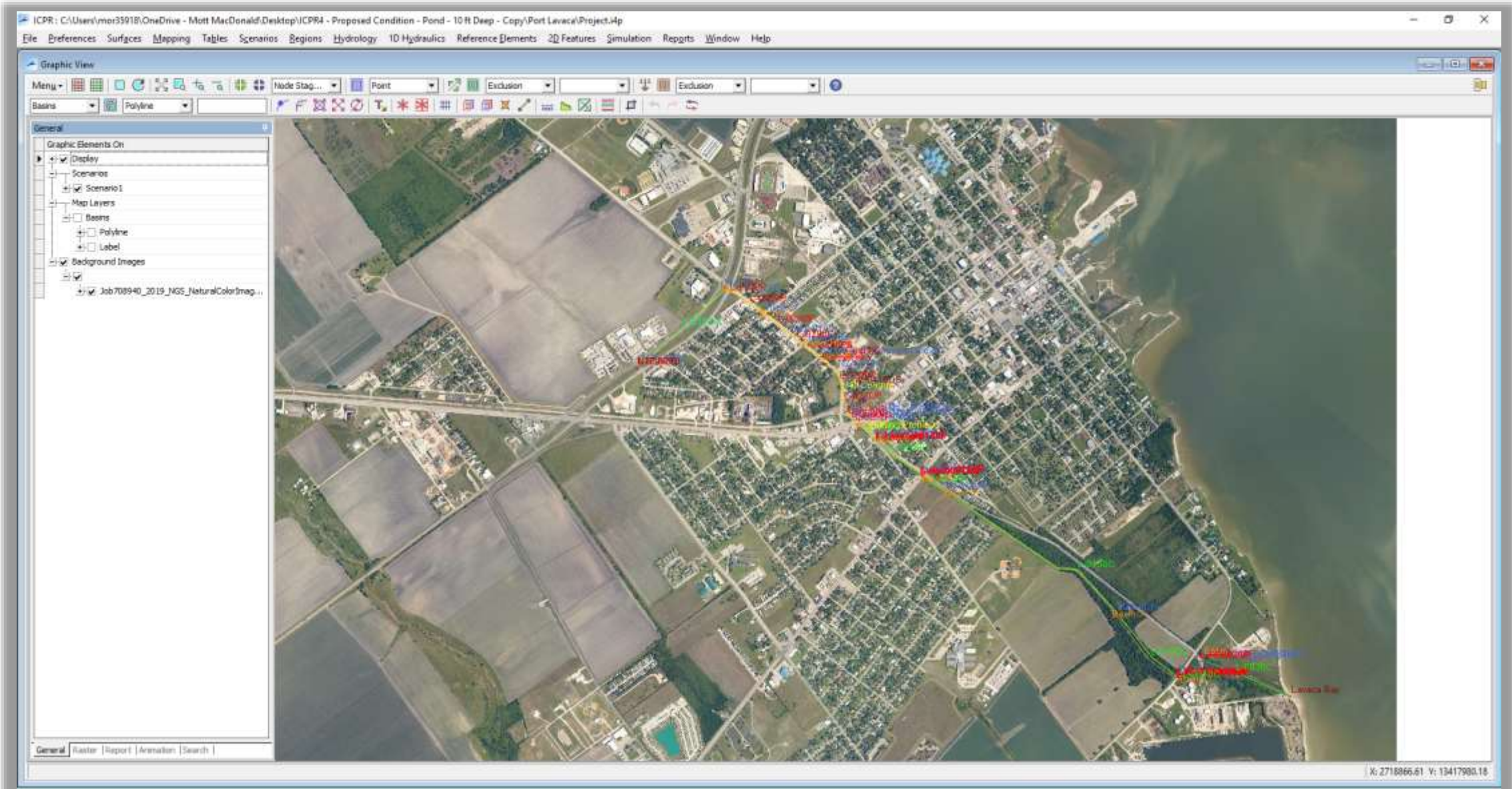
# Stormwater Modeling Existing Results

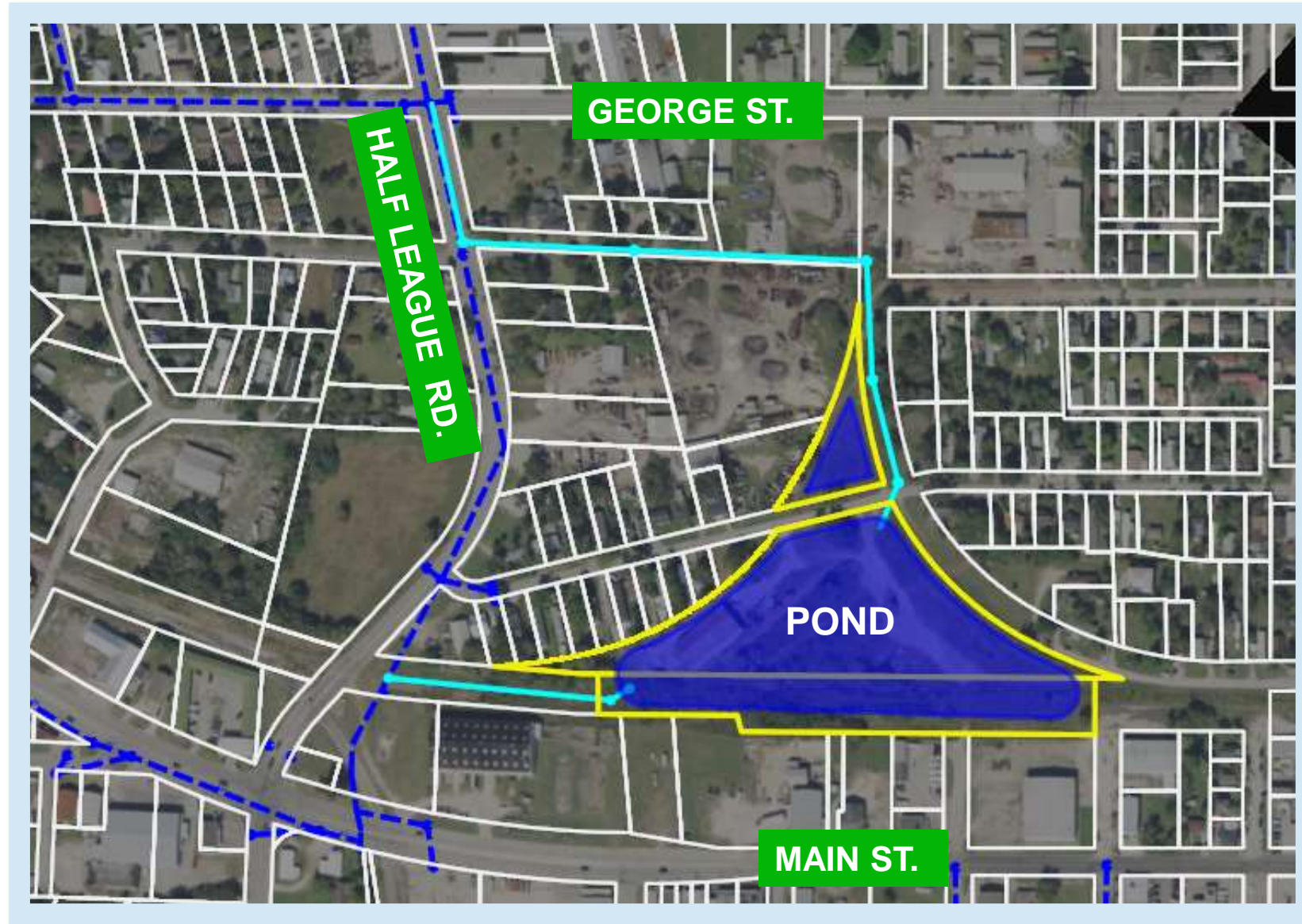| Location | Calculated Water Stage Above Ground (Feet) | | | | |
|---|---|---|---|---|---|
| | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year |
| | Existing | Existing | Existing | Existing | Existing |
| Tilley Street | 1.1 | 2.0 | 3.4 | 4.6 | 6.1 |
| George Street | 1.6 | 2.4 | 3.9 | 5.1 | 6.7 |
| Schooley Street | 0.5 | 1.3 | 2.6 | 3.8 | 5.2 |
| Mahan Street | 1.6 | 2.2 | 3.2 | 4.0 | 5.1 |
| Main Street | -3.3 | -2.8 | -2.1 | -1.5 | -0.8 |
| Live Oak Street | -3.1 | -2.6 | -1.9 | -1.3 | -0.7 |
| W. Austin Street | -3.8 | -3.4 | -2.6 | -2 | -1.2 |
| FM 1090 | -2.8 | -1.9 | -0.5 | 0.8 | 2.4 |
| Railroad | -0.1 | 0.5 | 1.3 | 2.1 | 3.1 |

# Stormwater Solutions

➢ **Reducing Street Flooding**

➢ **Improving Capacity in Corporation Ditch**

➢ **Do More – Can We Create Value for the Community**

# Stormwater Solutions

- Construct Stormwater Pond
- Railroad Land (No Being Used)
- Provides Storage Volume
- Improves Water Quality
- Reduces Sediment into the Bay
- Decreases Flows Downstream
- No Improvements North of George Street
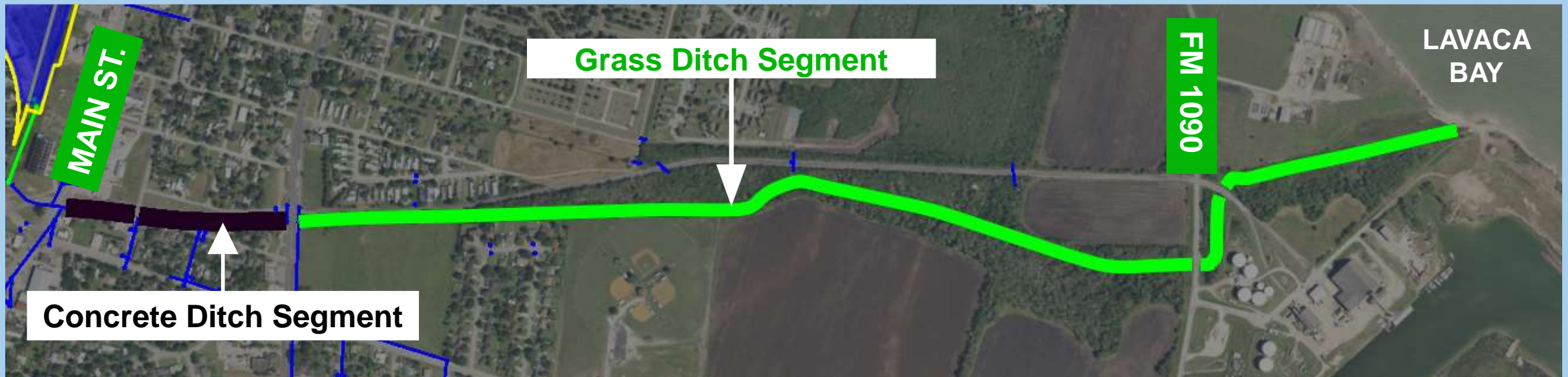- Upsize Pipe from George St. to Schooley St. to the Pond.

# Stormwater Solutions

- **Enhance Corporation Ditch**

  **1. Concrete Ditch**

     - Replace Concrete

     - Improve Capacity

  **2. Grass Ditch**

     - Remove Overgrowth

     - Regrade Ditch







MAIN ST.

**Grass Ditch Segment**

FM 1090

**LAVACA BAY**

**Concrete Ditch Segment**

# Stormwater Modeling Results

| Location | Calculated Water Stage Above Ground (Feet) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 5 Year | | 10 Year | | 25 Year | | 50 Year | | 100 Year | |
| | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| Tilley Street | 1.1 | -1.1 | 2.0 | -0.3 | 3.4 | 0.82 | 4.6 | 1.7 | 6.1 | 2.8 |
| George Street | 1.6 | -1.3 | 2.4 | -0.7 | 3.9 | 0.62 | 5.1 | 1.5 | 6.7 | 2.6 |
| Schooley Street | 0.5 | -2.5 | 1.3 | -1.5 | 2.6 | -0.2 | 3.8 | 0.8 | 5.2 | 1.8 |
| Mahan Street | 1.6 | -3.0 | 2.2 | -2.2 | 3.2 | -1.2 | 4.0 | -0.39 | 5.1 | 0.6 |
| Main Street | -3.3 | -4.2 | -2.8 | -3.6 | -2.1 | -2.7 | -1.5 | -2.1 | -0.8 | -1.3 |
| Live Oak Street | -3.1 | -3.8 | -2.6 | -3.3 | -1.9 | -2.5 | -1.3 | -1.8 | -0.7 | -1.1 |
| W. Austin Street | -3.8 | -4.6 | -3.4 | -4.0 | -2.6 | -3.1 | -2 | -2.5 | -1.2 | -1.6 |
| FM 1090 | -2.8 | -3.6 | -1.9 | -2.5 | -0.5 | -1.0 | 0.8 | 0.3 | 2.4 | 1.9 |
| Railroad | -0.1 | -8.2 | 0.5 | -7.1 | 1.3 | -5.6 | 2.1 | -4.2 | 3.1 | -2.7 |

# QUESTIONS