CITY OF MISSION

City of Mission
Comprehensive Storm Drainage Assessment

PROJECT UPDATE
February 10, 2020

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CSE Civil Systems Engineering, Inc.

JEH

M2 Engineering, PLLC

HINOJOSA ENGINEERING, INC
STRUCTURAL - CIVIL - SURVEYING

PURPOSE & OBJECTIVES

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The purpose - develop a Master Drainage Plan to assist the City of Mission to plan, design, and manage its drainage systems to protect life, property, and infrastructure, and to provide guidance for future developments.

- Identify inadequacies and constraints of the existing drainage systems (drainage ditches and storm sewers)
- Develop improvement plans to reduce or eliminate the existing flooding risks and provide drainage needs for future development
- Develop a capital improvement plan (CIP) to prioritize the proposed drainage improvements

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PROJECT APPROACH

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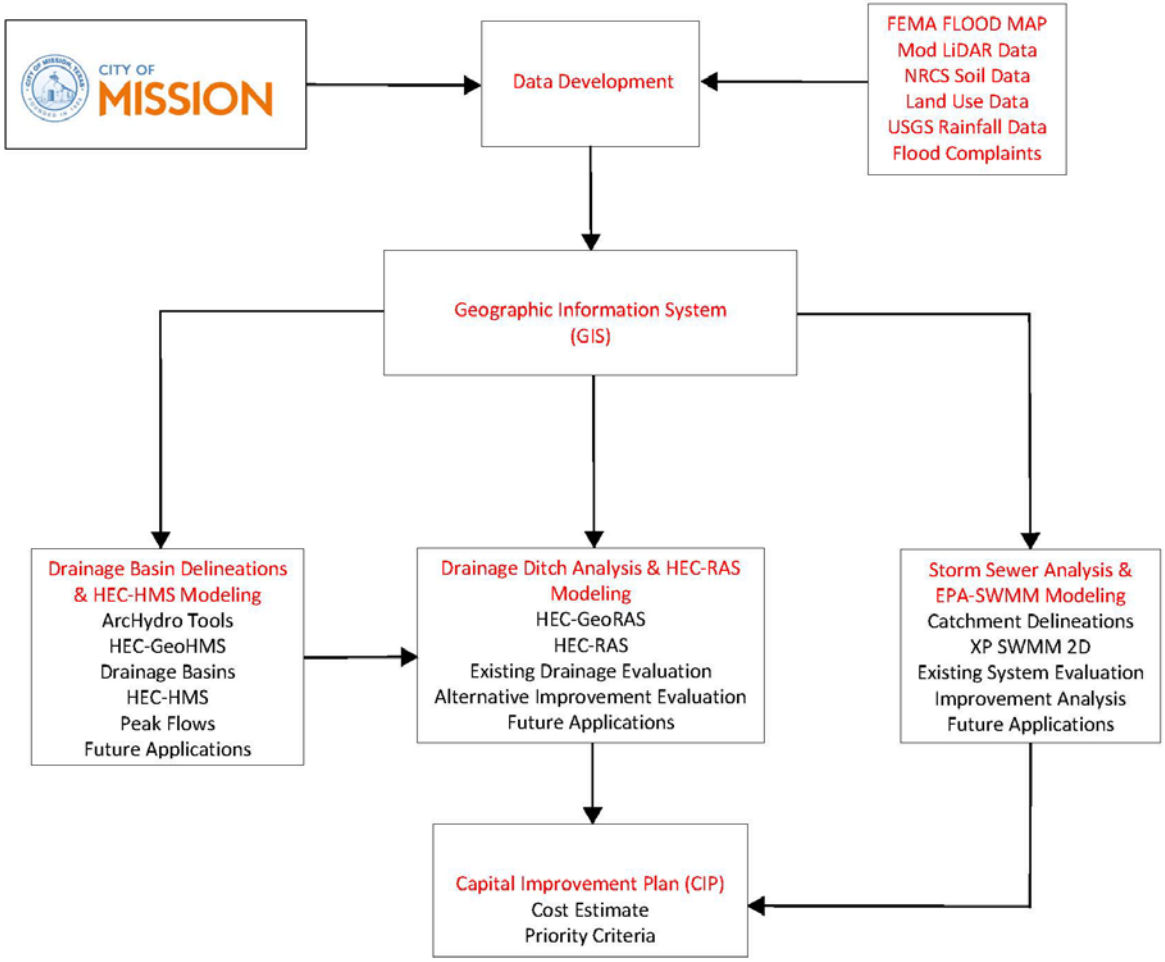

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STORM EVENT, STORM DURATION & RAINFALL DEPTH

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RAINFALL DEPTH (INCH)-DURATION-FREQUENCY

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.428 (0.324-0.565)	0.517 (0.396-0.676)	0.664 (0.506-0.872)	0.785 (0.589-1.05)	0.952 (0.691-1.31)	1.08 (0.763-1.52)	1.21 (0.833-1.75)	1.35 (0.904-2.00)	1.53 (0.996-2.36)	1.68 (1.06-2.66)
10-min	0.681 (0.516-0.900)	0.825 (0.631-1.08)	1.06 (0.808-1.39)	1.25 (0.941-1.67)	1.52 (1.11-2.09)	1.73 (1.22-2.44)	1.94 (1.34-2.81)	2.15 (1.45-3.20)	2.43 (1.58-3.75)	2.65 (1.68-4.18)
15-min	0.862 (0.652-1.14)	1.04 (0.791-1.35)	1.32 (1.00-1.73)	1.56 (1.17-2.08)	1.89 (1.38-2.60)	2.15 (1.52-3.04)	2.41 (1.66-3.50)	2.68 (1.80-3.99)	3.05 (1.98-4.69)	3.32 (2.10-5.25)
30-min	1.21 (0.919-1.60)	1.46 (1.12-1.91)	1.86 (1.42-2.44)	2.19 (1.64-2.91)	2.64 (1.92-3.62)	2.98 (2.11-4.21)	3.33 (2.30-4.83)	3.71 (2.50-5.52)	4.23 (2.75-6.52)	4.64 (2.94-7.33)
60-min	1.56 (1.18-2.06)	1.89 (1.44-2.46)	2.42 (1.84-3.18)	2.86 (2.15-3.81)	3.47 (2.51-4.75)	3.93 (2.77-5.53)	4.40 (3.04-6.38)	4.93 (3.32-7.34)	5.68 (3.69-8.76)	6.28 (3.98-9.93)
2-hr	1.84 (1.40-2.40)	2.27 (1.73-2.89)	2.92 (2.24-3.79)	3.50 (2.65-4.62)	4.34 (3.18-5.91)	5.02 (3.58-7.02)	5.76 (3.99-8.26)	6.57 (4.44-9.66)	7.74 (5.04-11.8)	8.69 (5.52-13.6)
3-hr	1.99 (1.52-2.58)	2.48 (1.88-3.11)	3.21 (2.46-4.13)	3.88 (2.95-5.09)	4.88 (3.60-6.61)	5.72 (4.10-7.97)	6.65 (4.63-9.47)	7.68 (5.19-11.2)	9.15 (5.98-13.8)	10.4 (6.60-16.0)
6-hr	2.25 (1.74-2.89)	2.85 (2.16-3.51)	3.72 (2.87-4.73)	4.54 (3.48-5.90)	5.80 (4.32-7.79)	6.89 (4.98-9.51)	8.12 (5.68-11.4)	9.49 (6.44-13.7)	11.5 (7.51-17.1)	13.1 (8.37-20.0)
12-hr	2.52 (1.96-3.21)	3.23 (2.47-3.94)	4.26 (3.32-5.36)	5.24 (4.04-6.73)	6.72 (5.02-8.91)	7.99 (5.80-10.9)	9.42 (6.63-13.1)	11.0 (7.54-15.7)	13.4 (8.85-19.8)	15.4 (9.90-23.3)
24-hr	2.82 (2.21-3.55)	3.64 (2.82-4.40)	4.85 (3.81-6.03)	5.97 (4.64-7.58)	7.65 (5.75-10.0)	9.07 (6.62-12.2)	10.7 (7.55-14.7)	12.5 (8.59-17.6)	15.2 (10.1-22.2)	17.6 (11.3-26.1)
2-day	3.18 (2.52-3.97)	4.10 (3.20-4.92)	5.46 (4.32-6.73)	6.71 (5.26-8.44)	8.59 (6.51-11.1)	10.2 (7.48-13.5)	12.0 (8.51-16.2)	14.0 (9.63-19.4)	16.9 (11.2-24.3)	19.3 (12.5-28.4)

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Drainage Basin Delineations

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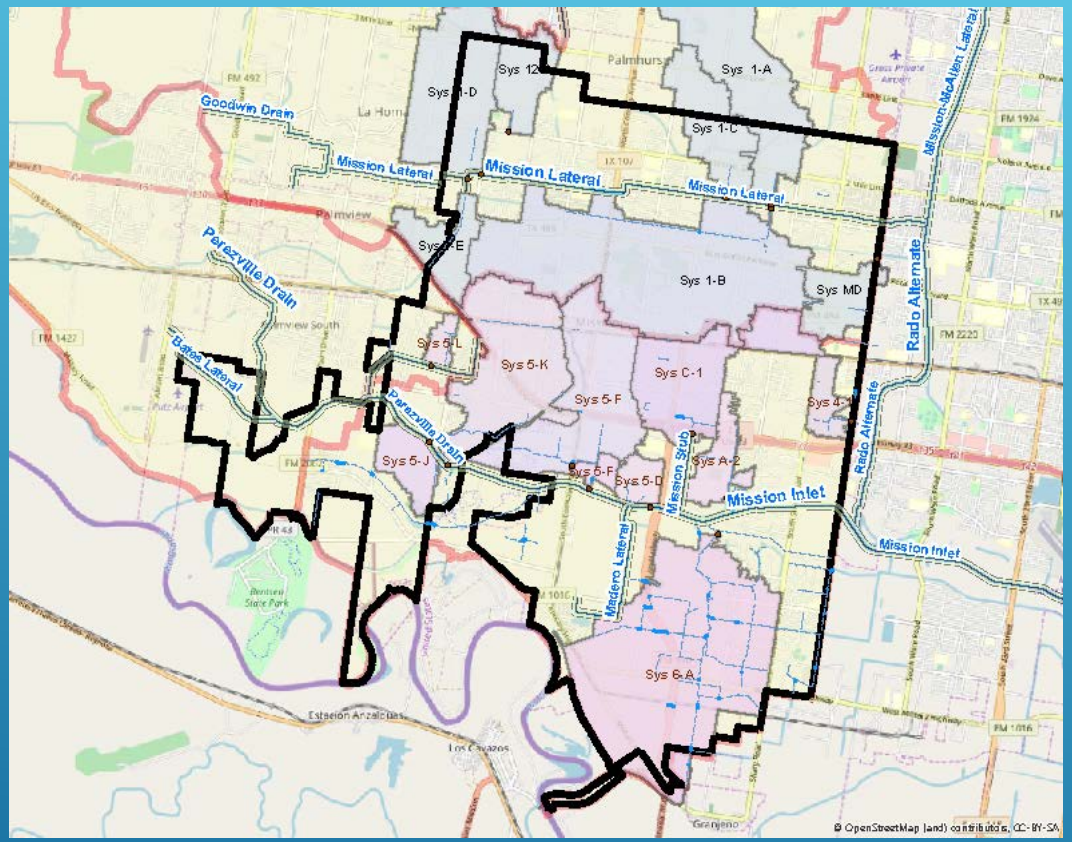
Tools used to delineate Drainage Basins include:

- LiDAR Datasets
- ArcHydro Tools
- HEC-GeoHMS
- HEC-HMS
- GIS Layers

Overall study Area:

- Drainage Basins Covering 34 Sq. Mi.



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Storm Sewer Network

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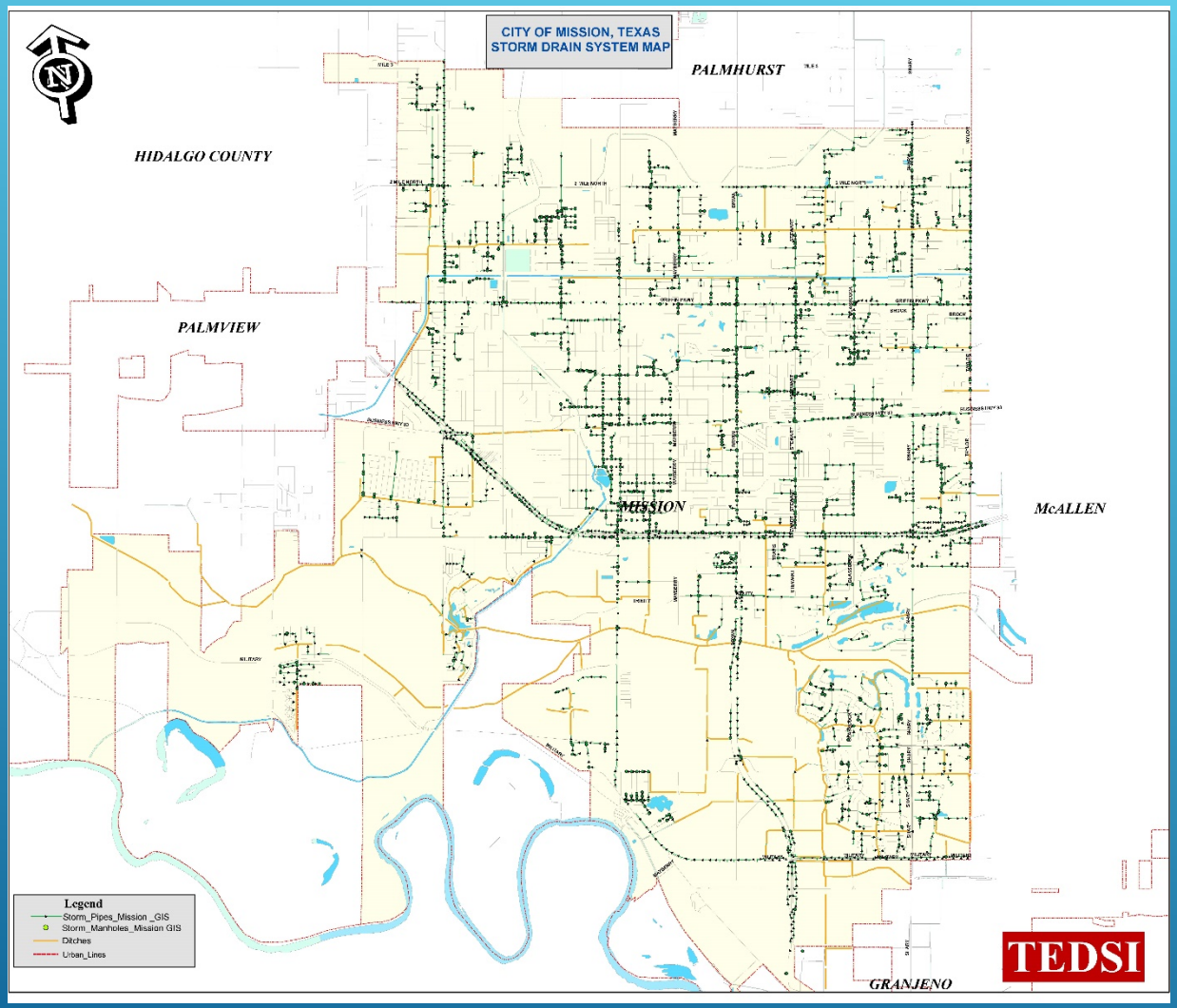

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Flood Concerned Areas

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High prioritization was given to areas that have experienced previous flooding & areas highly susceptible to flooding.

Glasscock Drainage Area

Spikes Drainage Area

Stewart Drainage Area

Astroland Park Drainage Area

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Capital Improvement Plan

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IMPROVEMENT COMPONENTS:

- Drainage Ditches
  - Channel Improvements
  - Culvert Replacements
  - Detention Basins
- Storm Sewers
  - System Enlargements

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21st & Stewart/Glasscock Drainage Area Existing Conditions

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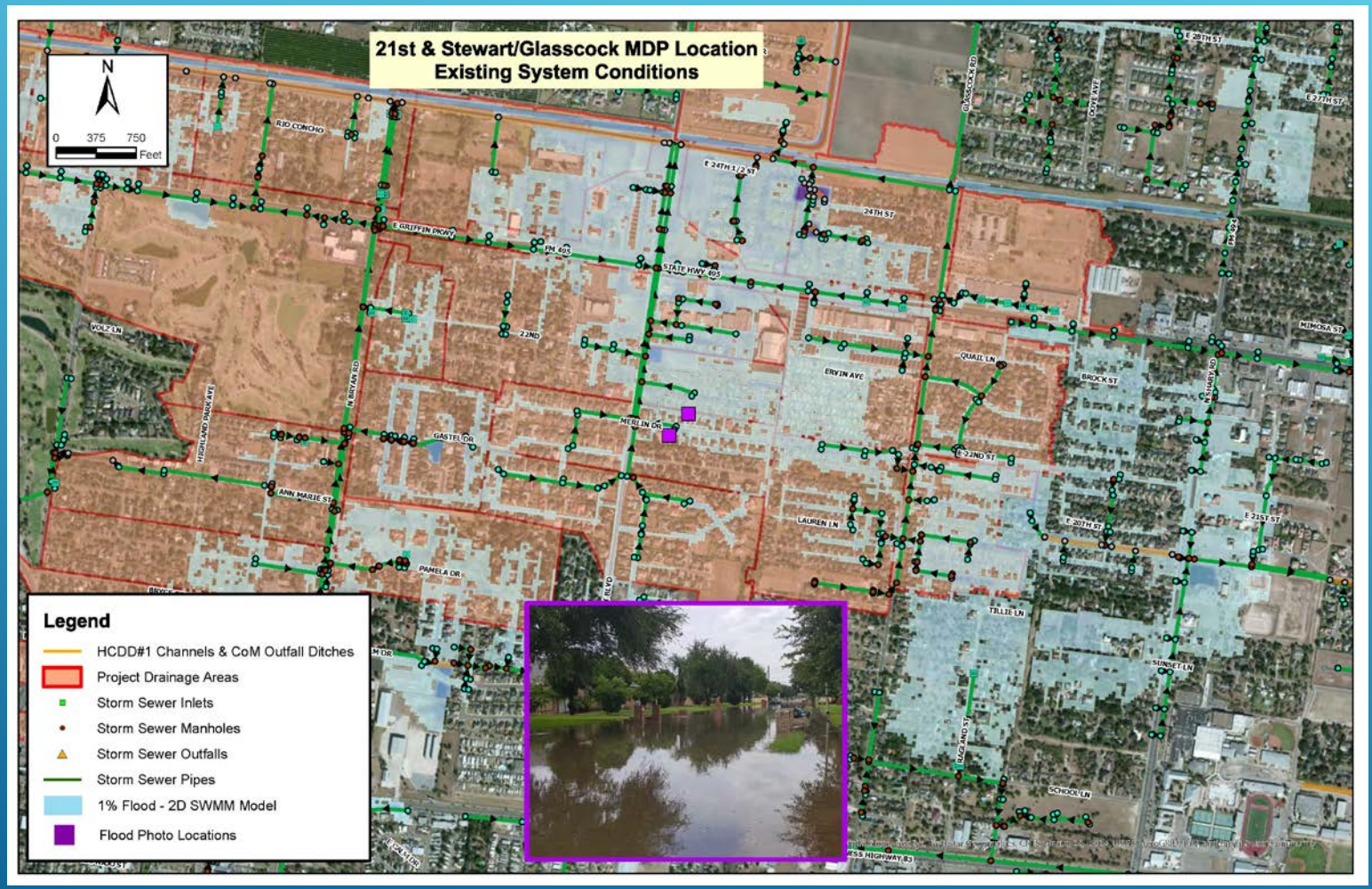

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21st & Stewart/Glasscock Drainage Area Proposed Conditions

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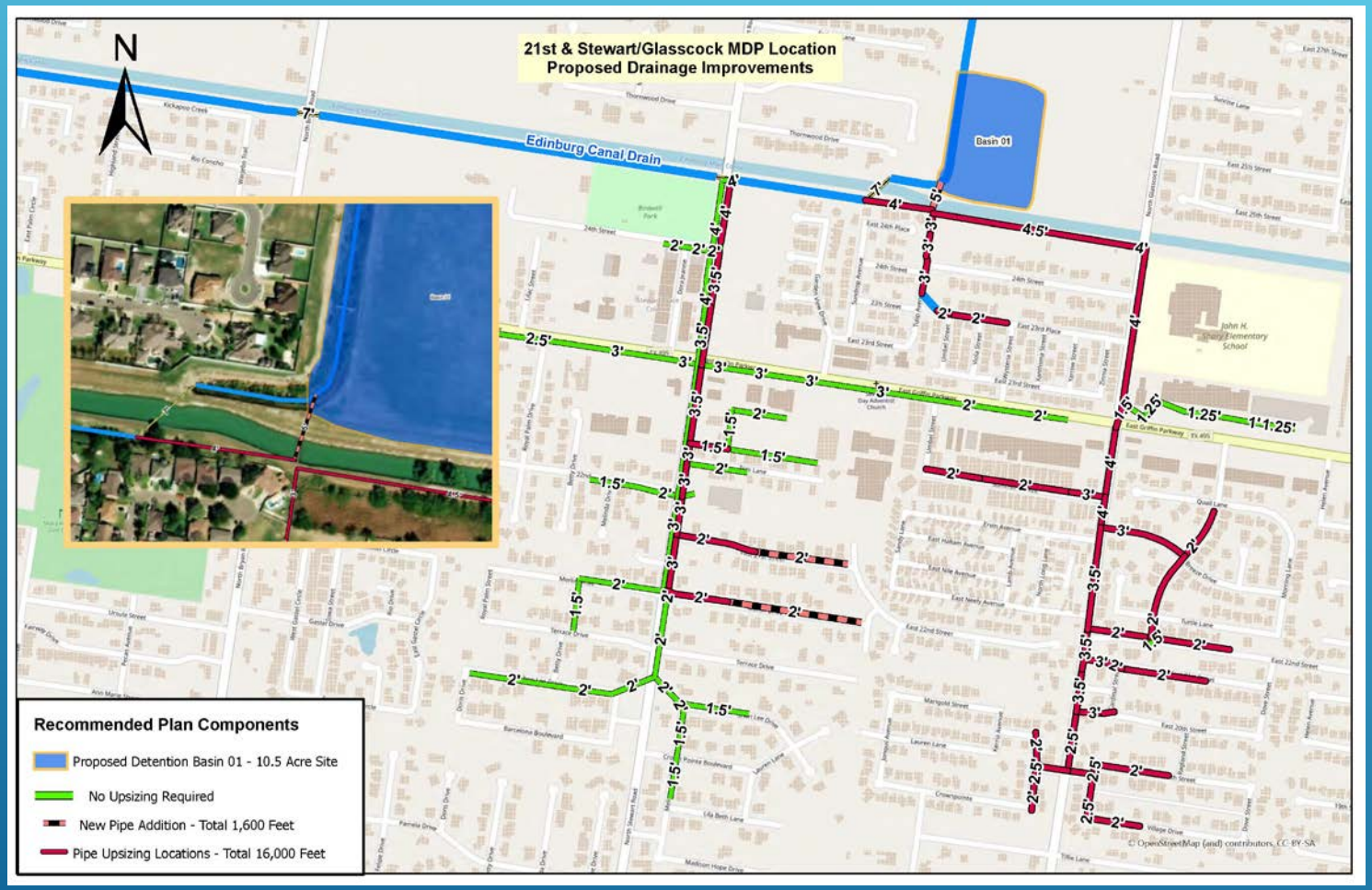

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Astroland Drainage Area
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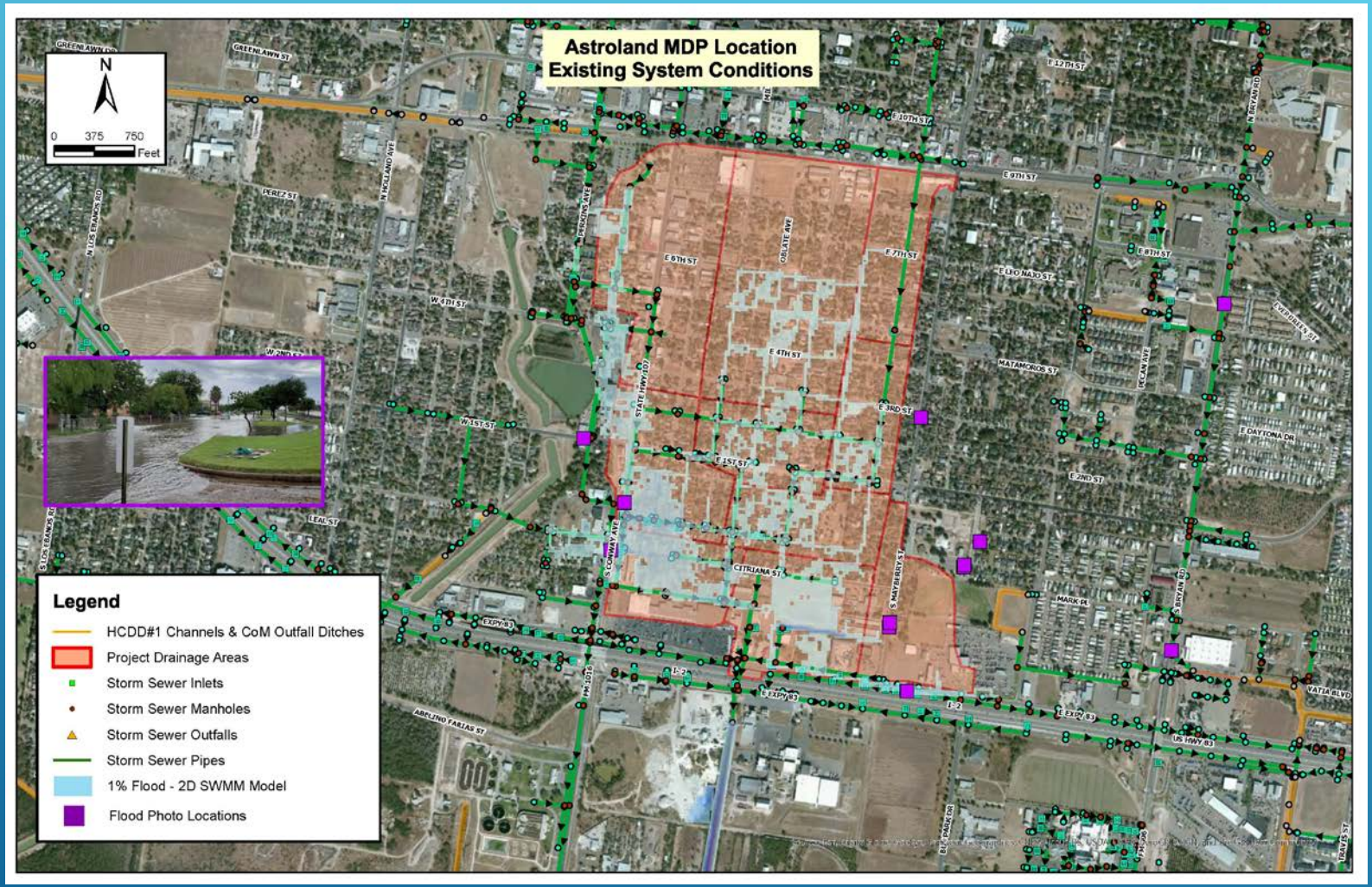

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Astroland Drainage Area
Proposed Conditions

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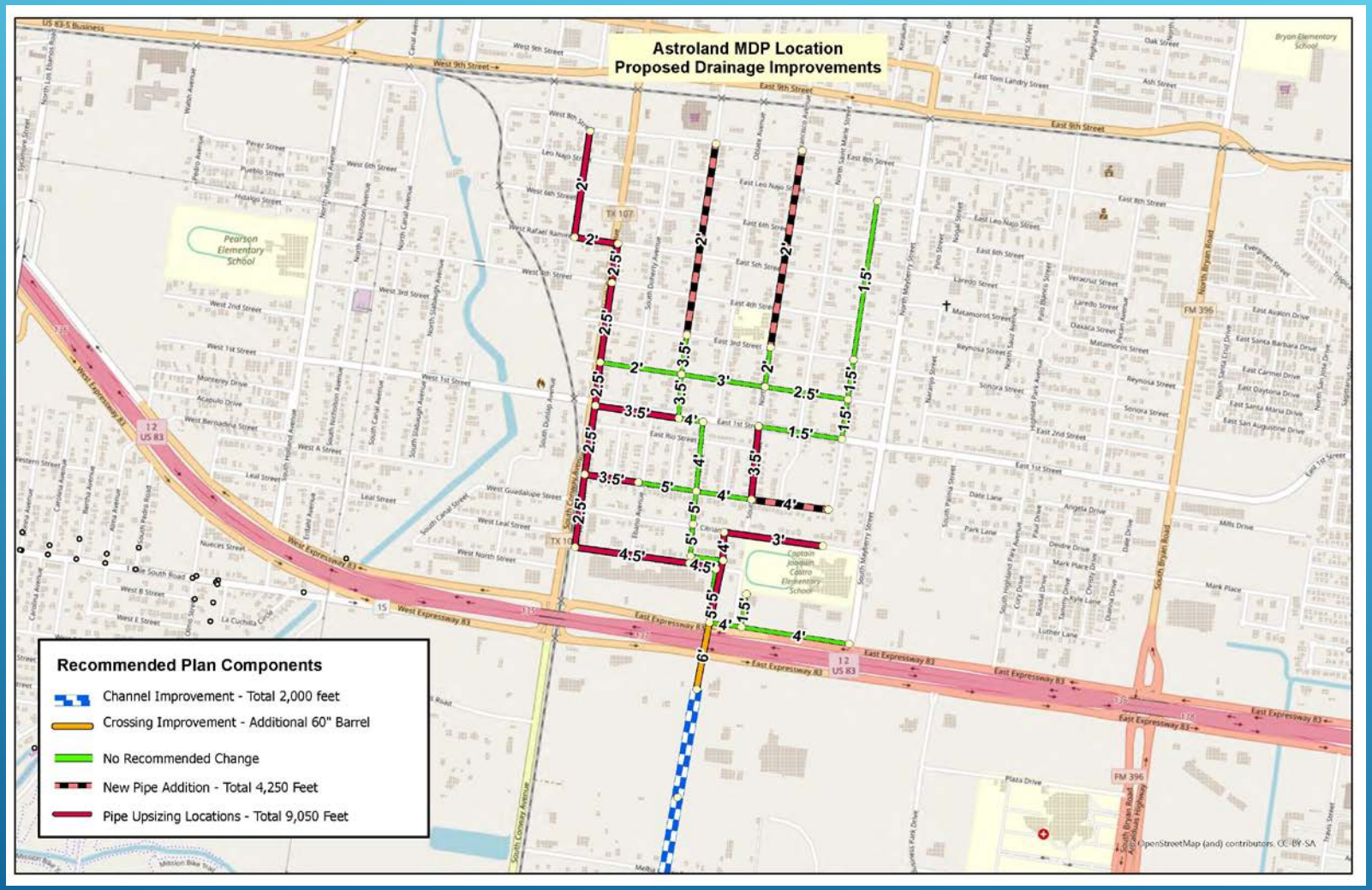

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Basham Drainage Area
Existing Conditions

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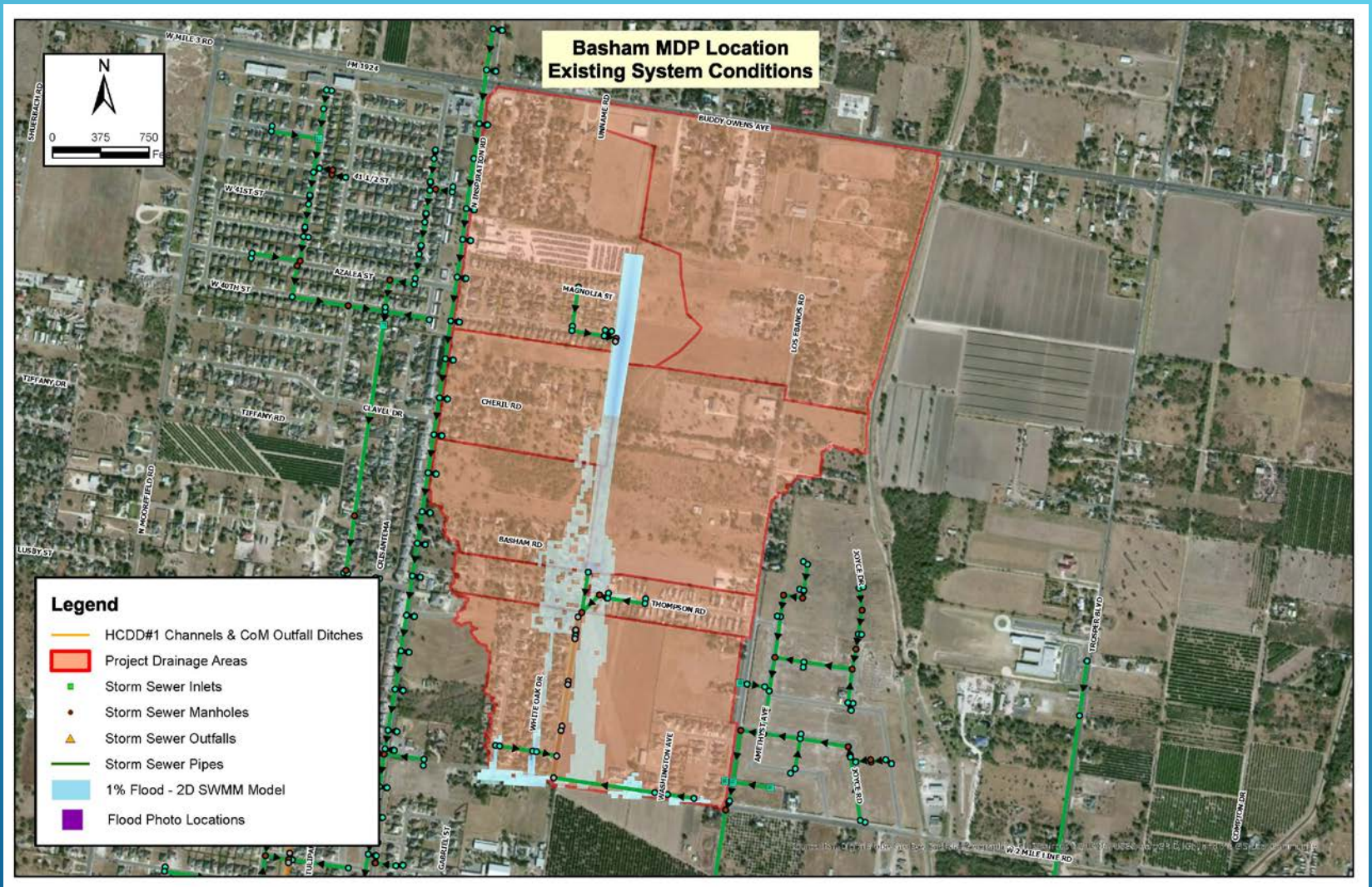

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Basham Drainage Area
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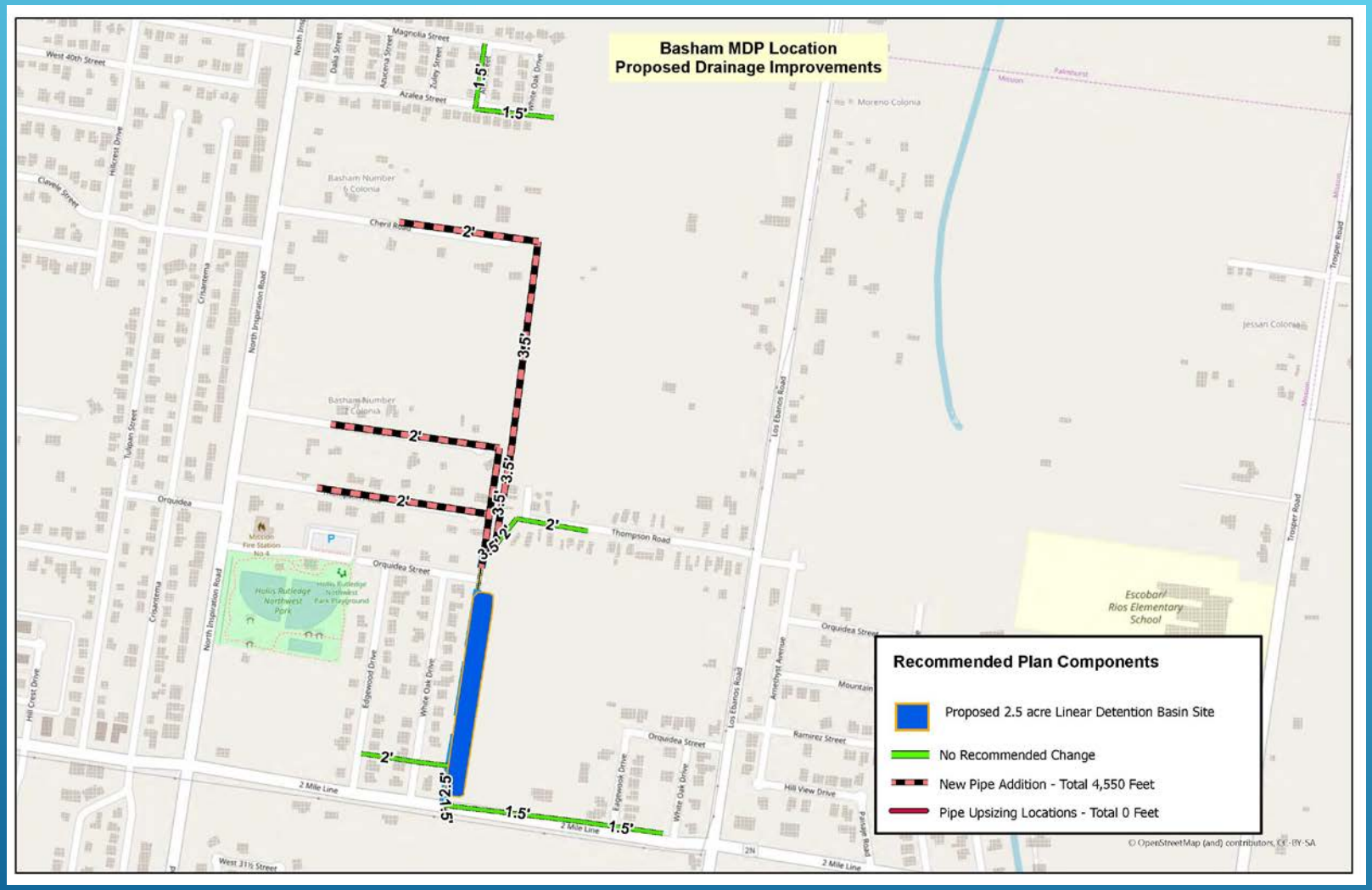

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Spikes Drainage Area
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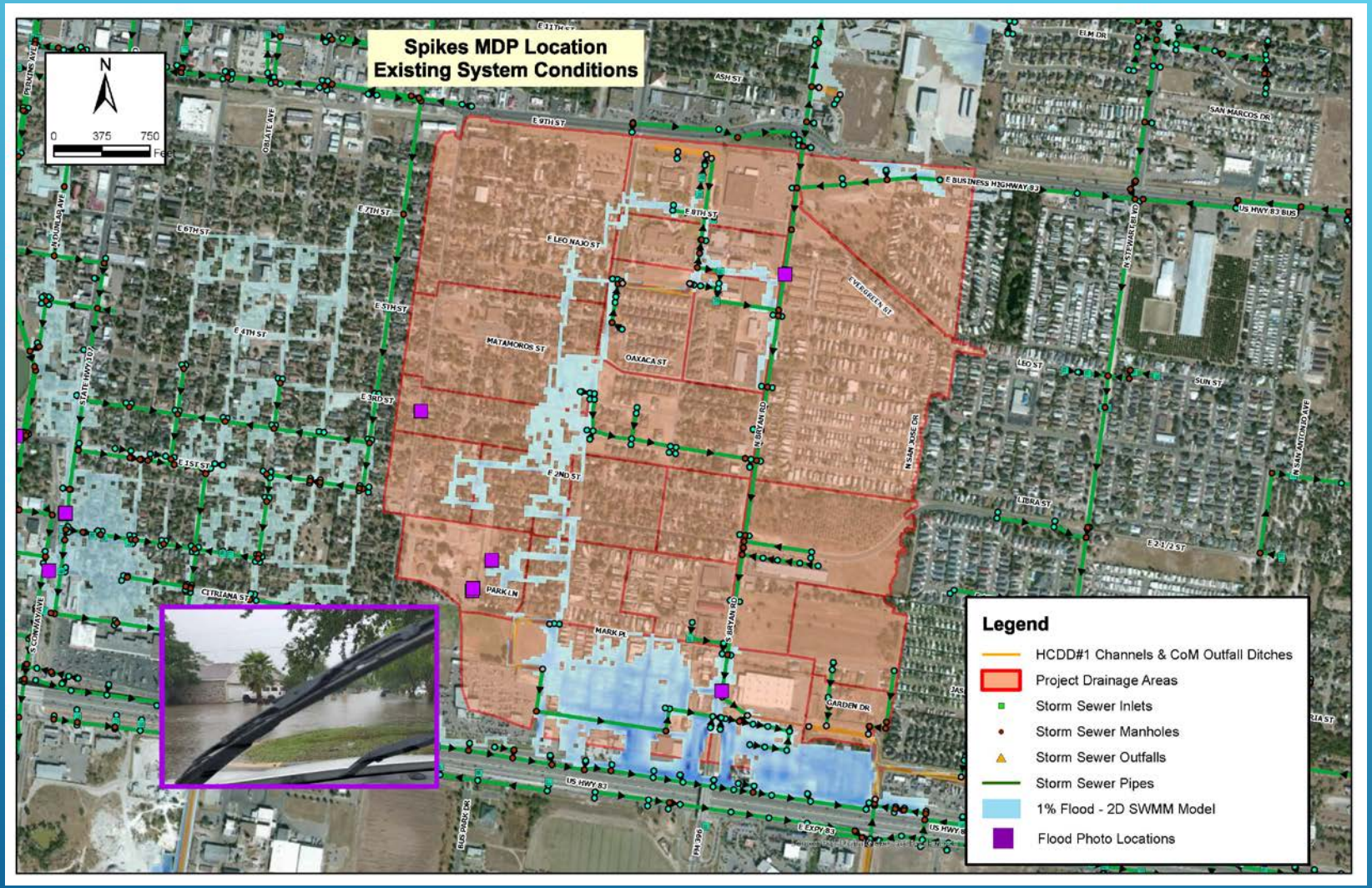

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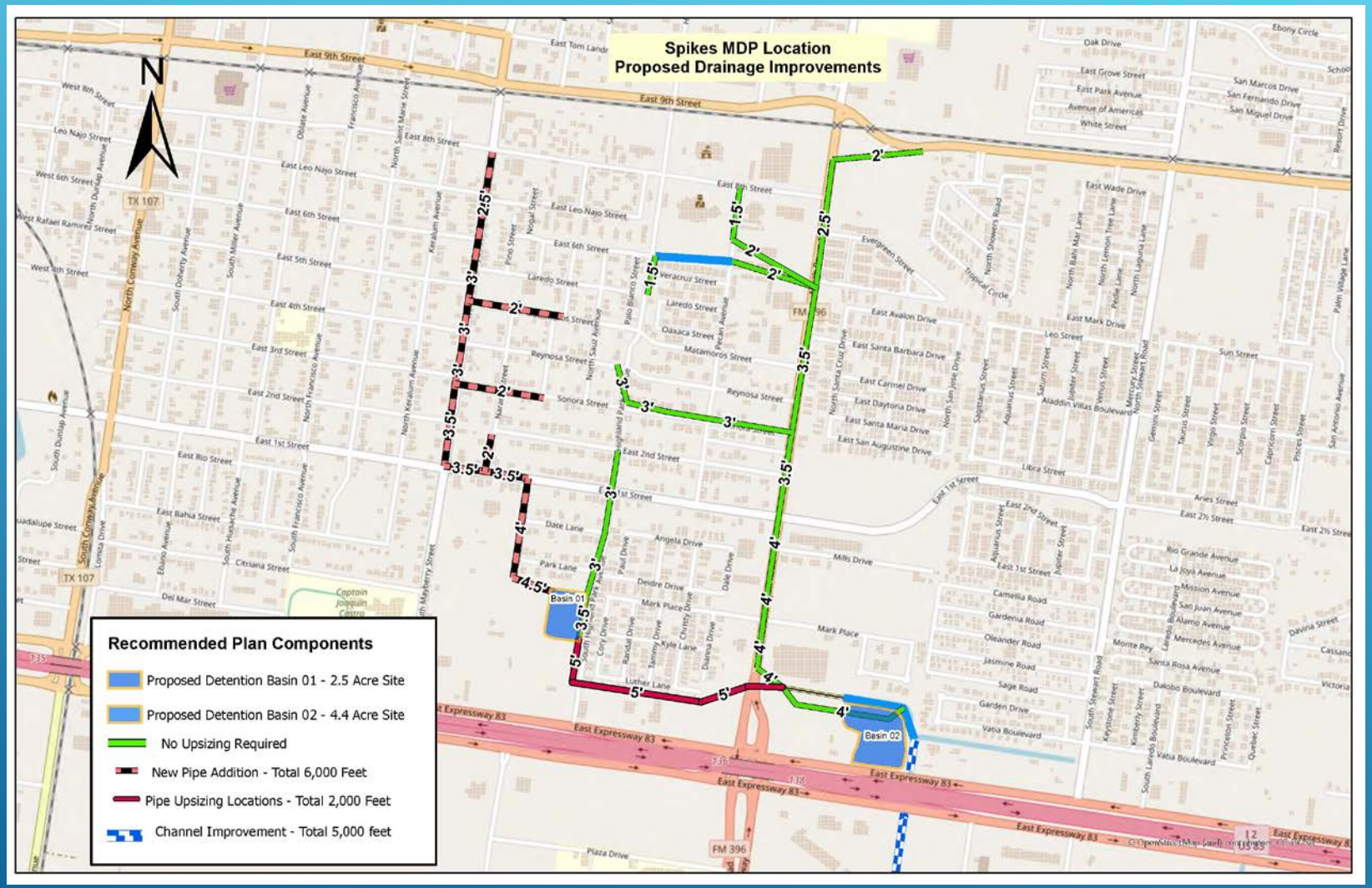

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Erma Drainage Area
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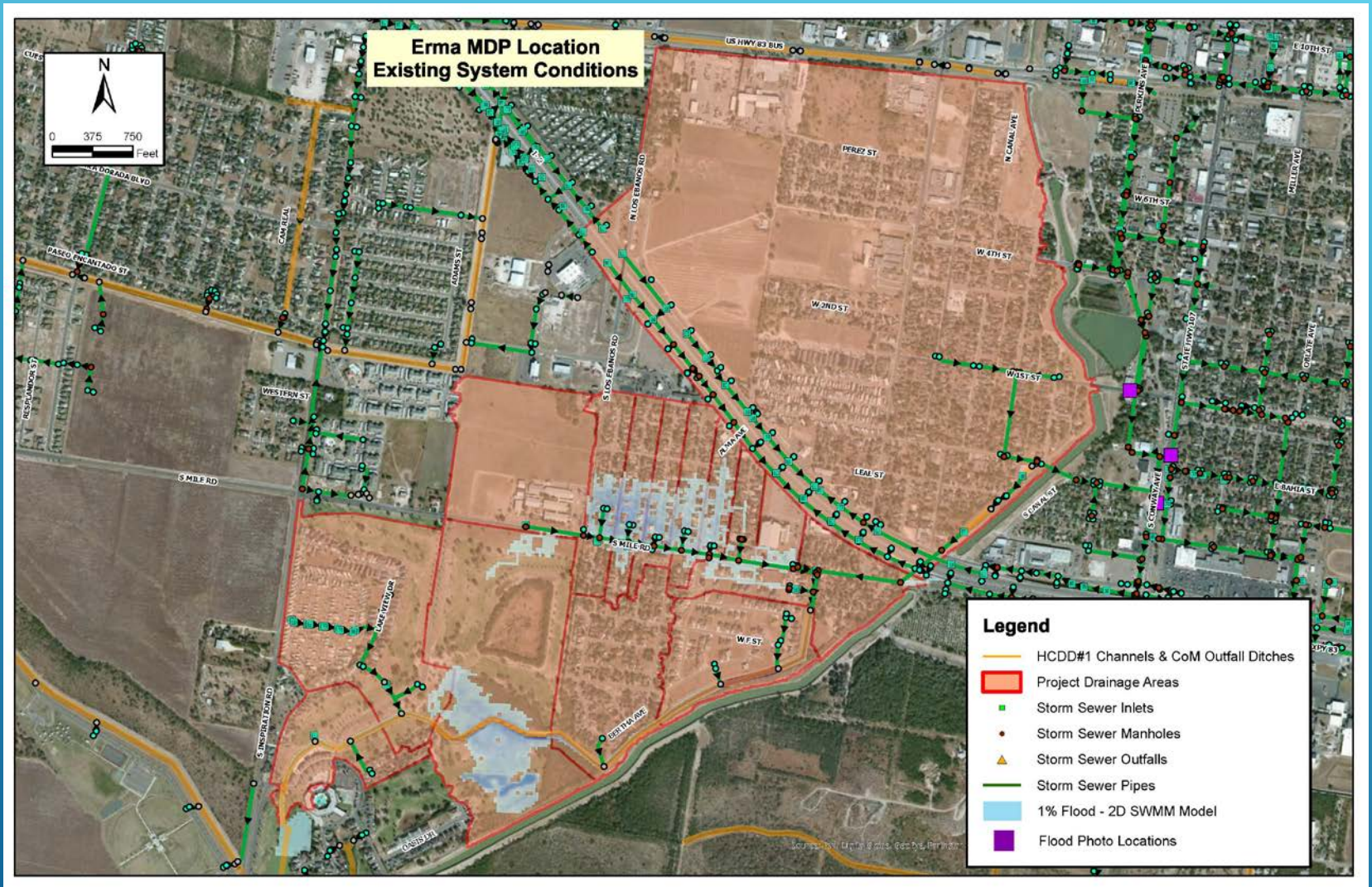

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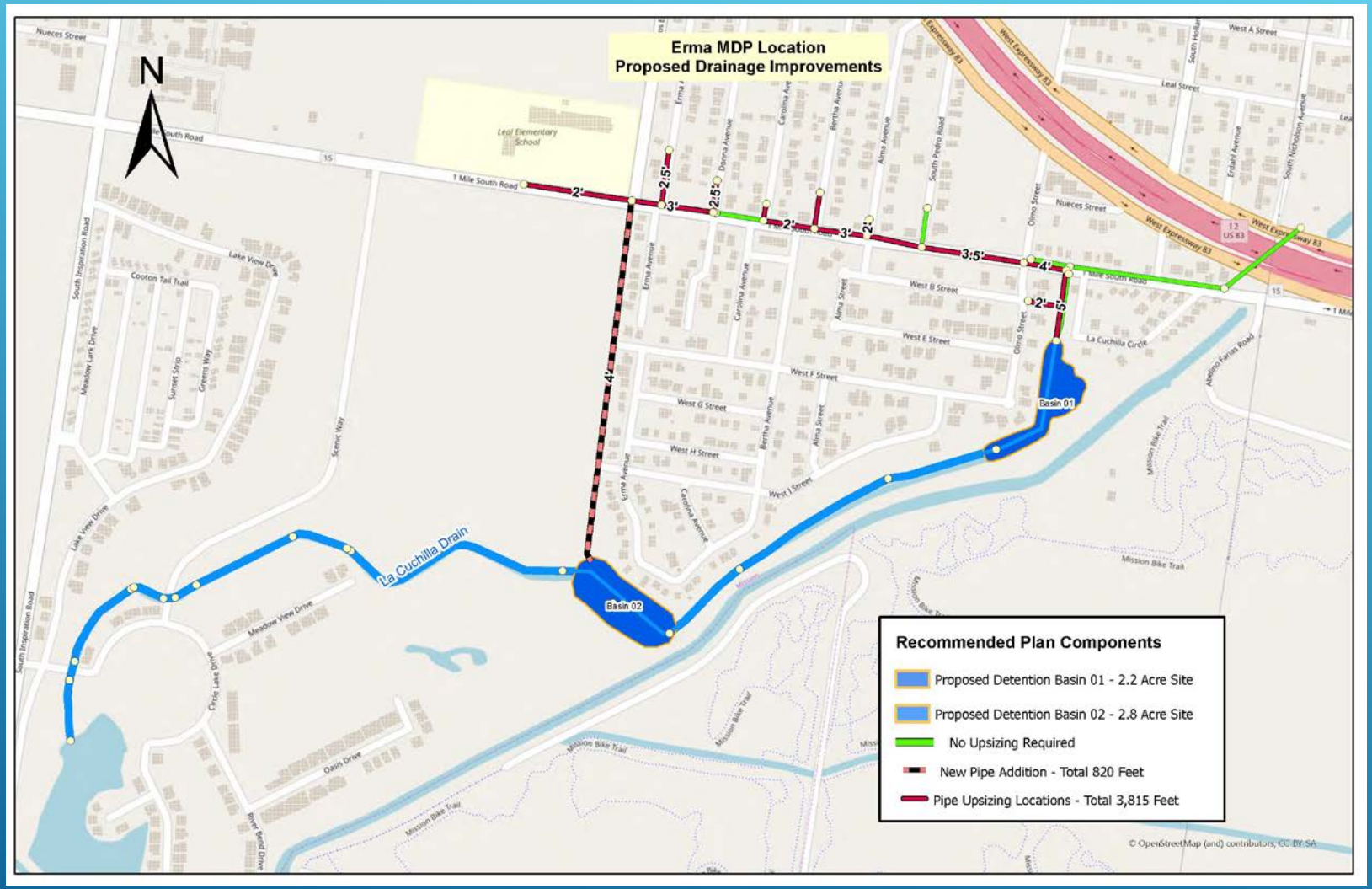

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Sunset Lane Drainage Area
Existing Conditions

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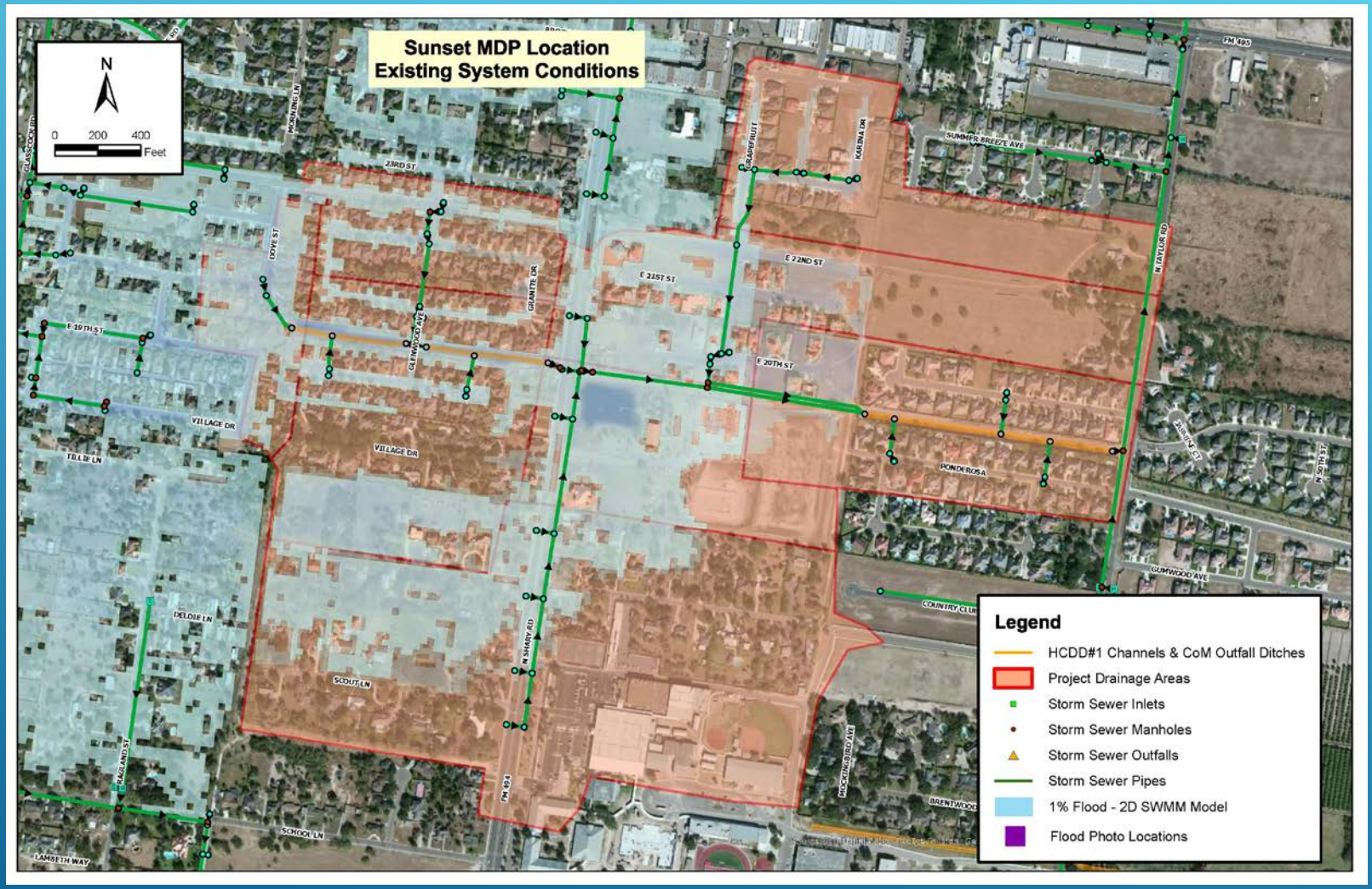

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Sunset Lane Drainage Area
Proposed Conditions

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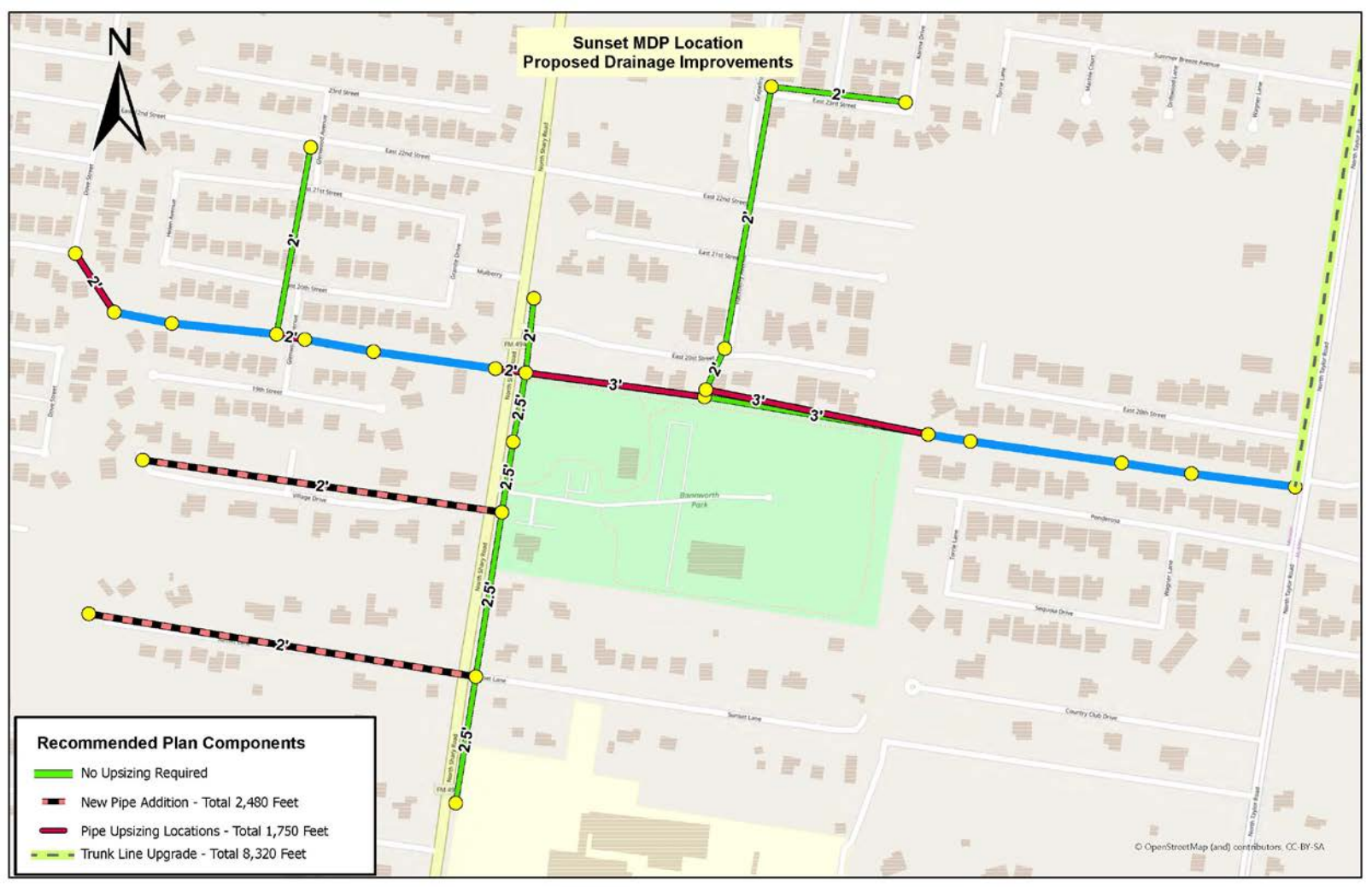

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Project Cost Estimates

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The cost for the proposed improvements for the drainage systems were estimated based on unit cost rates and quantity estimations of proposed improvement elements. Probable construction costs associated with the proposed improvements were estimated based on project bid unit cost information obtained from Texas Department of Transportation Department Average Low Bid Prices. The unit cost obtained include such items as: channel and detention excavation, culvert pipes and boxes, culvert end treatments, concrete paving, etc.

IMPROVEMENT TYPE	IMPROVEMENT ESTIMATED COST
Storm Sewer & Outfall Systems	$18,071,110
20% Contingency	$3,614,222
Professional Services	$2,819,093
Total CIP Proposed Cost	$24,504,425

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