



City Council Workshop Drainage CIP Update

March 16, 2023

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Agenda



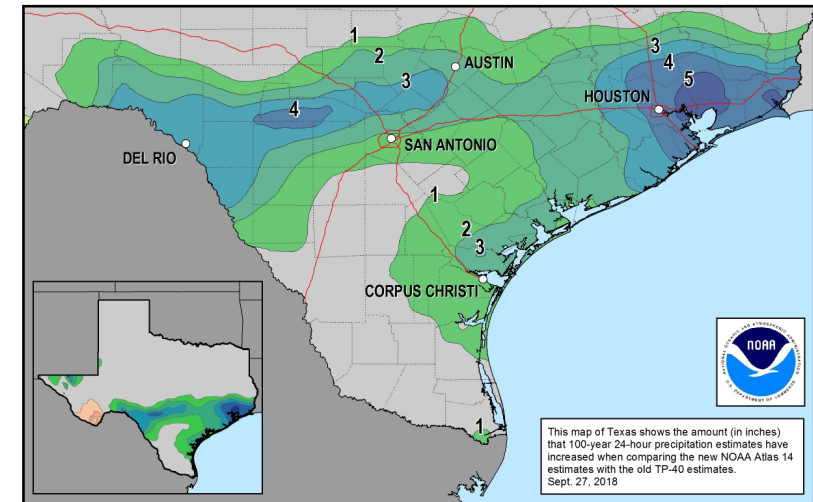
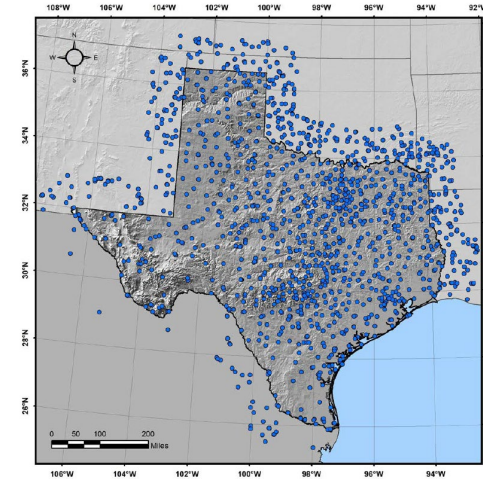
- Purpose
- Background
- Drainage Project Updates
 - CIP#37 Turf Paradise Lane
 - CIP#17 Silver Spur Low Water Crossing
 - CIP#5 Rolling Acres Trail Low Water Crossing
 - CIP#34 Tivoli Way
- Summary of Budget vs Estimated Cost
- Next Steps
- Questions

Background

- Since Master Drainage Plan adopted, NOAA's Atlas 14, Volume 11 (Texas) was released and adopted by COSA
 - Now serves as the official government source of precipitation frequency values
 - Replaced Technical Paper 40 (1961), TP-49 (1964), NWS Hydro-35 (1977)
 - Rainfall data from over 2000 stations across TX used to generate frequency estimates
 - Comparison of 24-hr design storm depths (in.) for COSA

	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Pre Atlas 14	4.44"	5.36"	6.00"	7.50"	9.00"	10.00"
Atlas 14	4.10"	5.49"	6.85"	8.93"	10.76"	12.88"

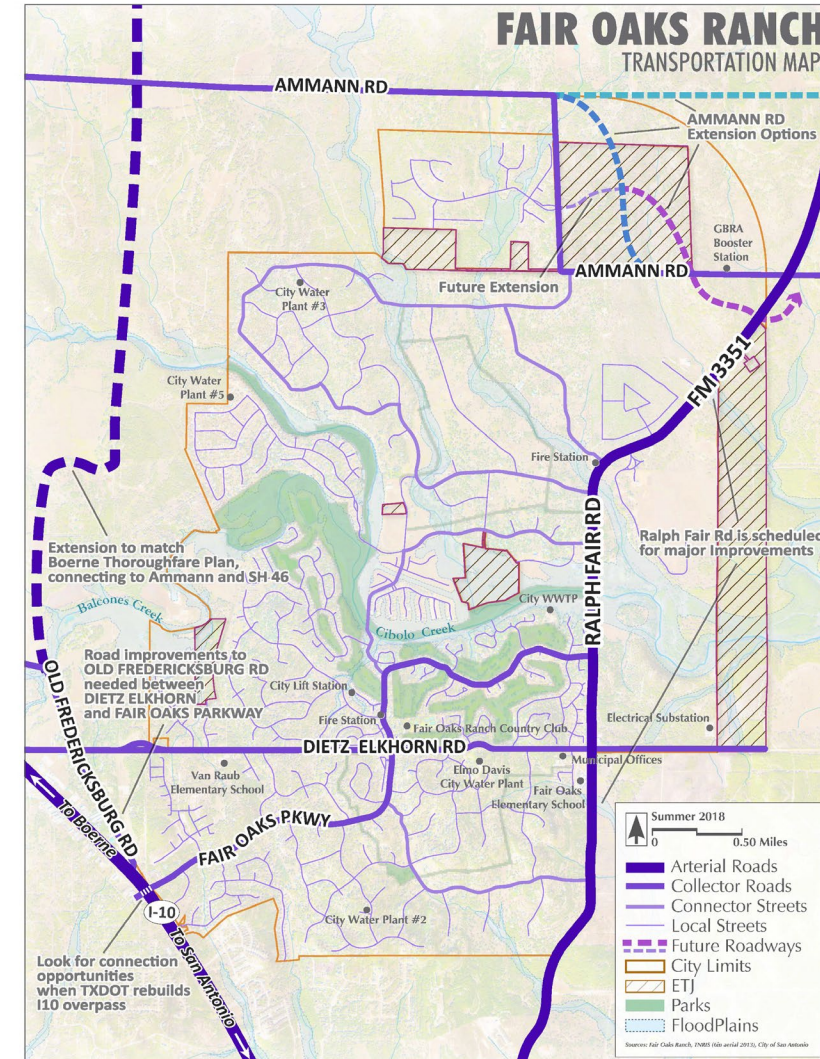
- Impacts size and cost of drainage infrastructure going forward since our UDC adopts the COSA Stormwater Design Criteria Manual until such time we create our own



Background



- UDC Section 9.7 Drainage and Erosion Control Standards
 - Para 1(c) Street Crossings. Concentrated flow will be conveyed under streets by roadway classification as detailed below:
 - Arterial: min design storm capacity = 50-yr
 - Collector: min design storm capacity = 25-yr
 - Local: min design storm capacity = 10-yr
- Silver Spur and Rolling Acres Trail are classified as Connector Streets



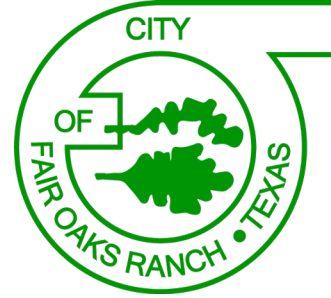
CIP#37 Turf Paradise Lane



- Purpose: Contain 10-yr flows within drainage system to minimize runoff across street and adjacent lots
- Scope: Replacement of undersized culverts, driveway repair, bar ditch restoration, grading and erosion mat installation
- Status: 80% complete. Final grading, vegetation and erosion mat installation to occur after brush pile removal.



CIP#17 Silver Spur LWC



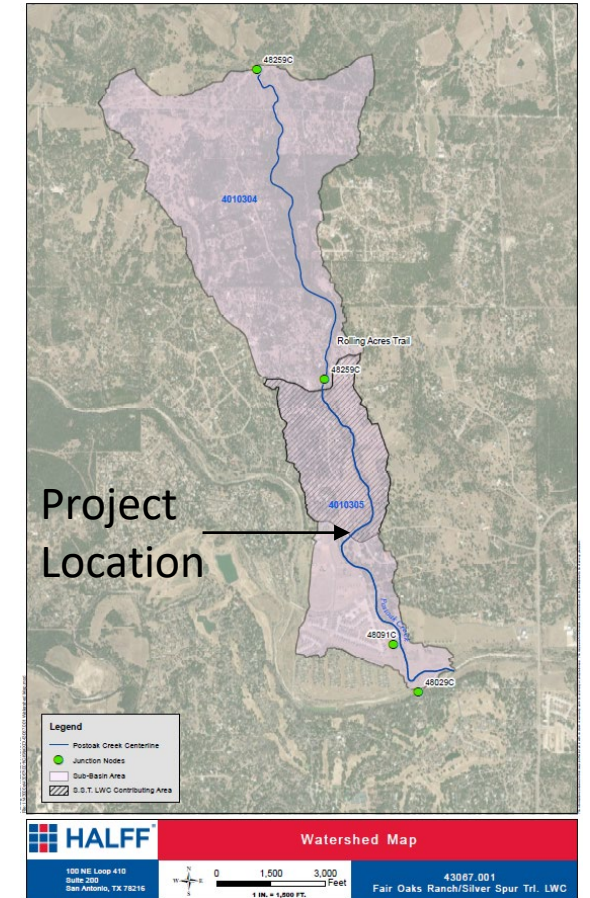
- Scope: Provide surveying and engineering services to upgrade the Silver Spur LWC to convey the 10 or 25-yr storm event without overtopping the roadway
- Comparison between Pre-Atlas 14 and Atlas 14 flows

Table 2.0: Comparison between Pre Atlas 14 and Atlas 14 flows

	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr
Pre-Atlas 14: Q (cfs)	405.20	2,433.00	4,167.20	6,109.00	7,412.70	8,623.30	*DNA
Atlas 14: Q (cfs)	3,358.89	*DNA	6,608.17	8,747.97	10,320.50	12,004.71	16,565.71

*Data not available

- Scenarios evaluated:
 - 1) Existing condition (4 x 94-in CMP culverts)
 - 2) Addition of two culverts (6 x 94-in CMP culverts)
 - 3) Slab-span bridge (40 ft overall length)
 - 4) Long span bridge (160 ft overall length)



CIP#17 Silver Spur LWC



Scenario 1: Existing Condition

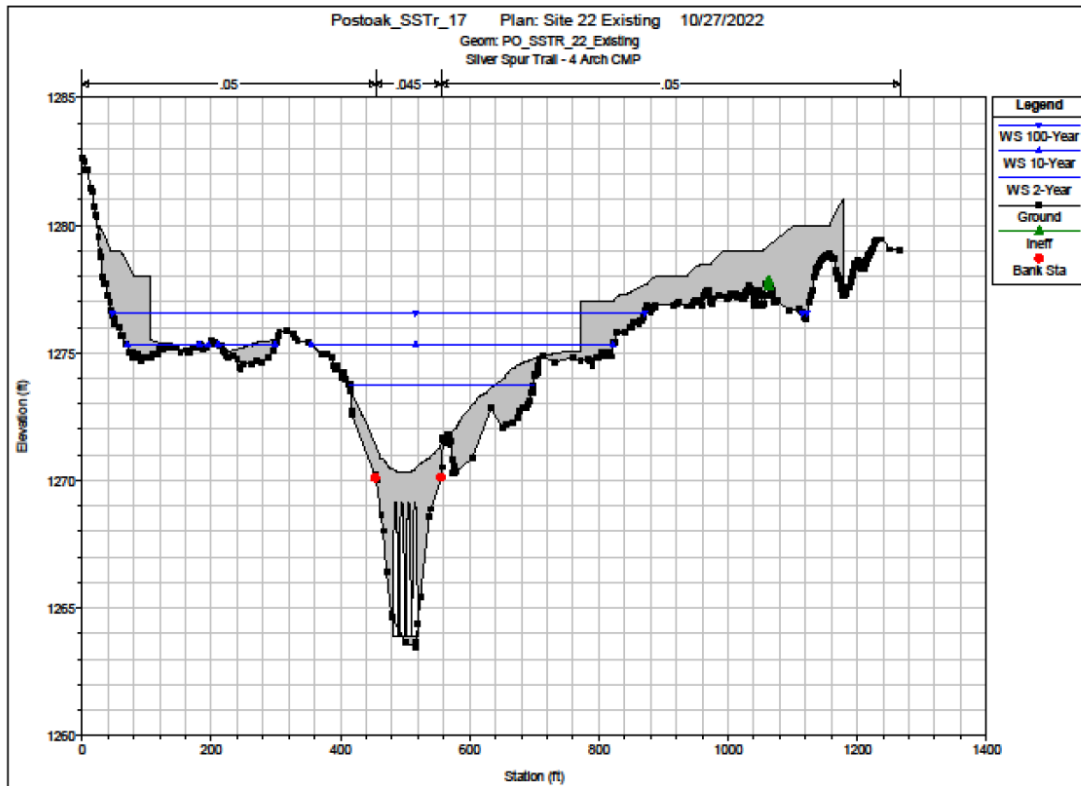


Figure 1: Cross-section of existing conditions structure with water surface elevations.

Scenario 2: Addition of two culverts

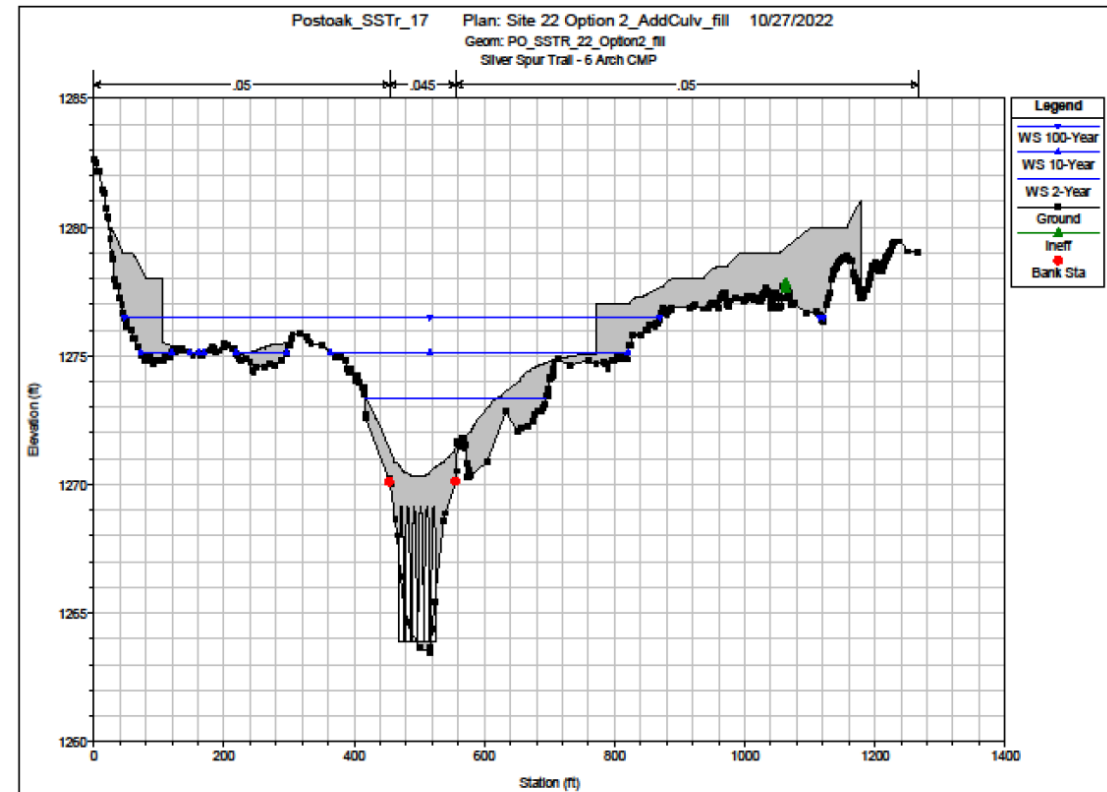


Figure 2: Cross-section of existing conditions with additional 96-inch pipes structure with water surface elevations.

CIP#17 Silver Spur LWC



Scenario 3: Slab Span Bridge

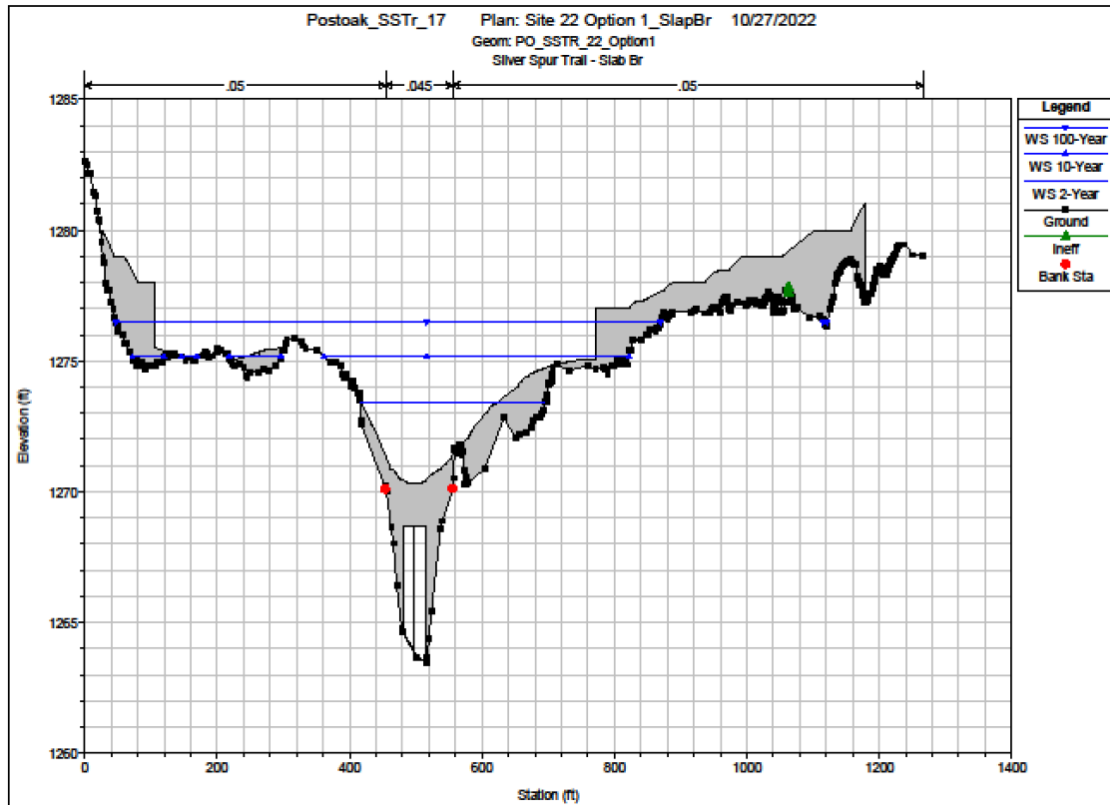


Figure 3: Cross-section of slab span bridge structure with water surface elevations.

Scenario 4: Long Span Bridge

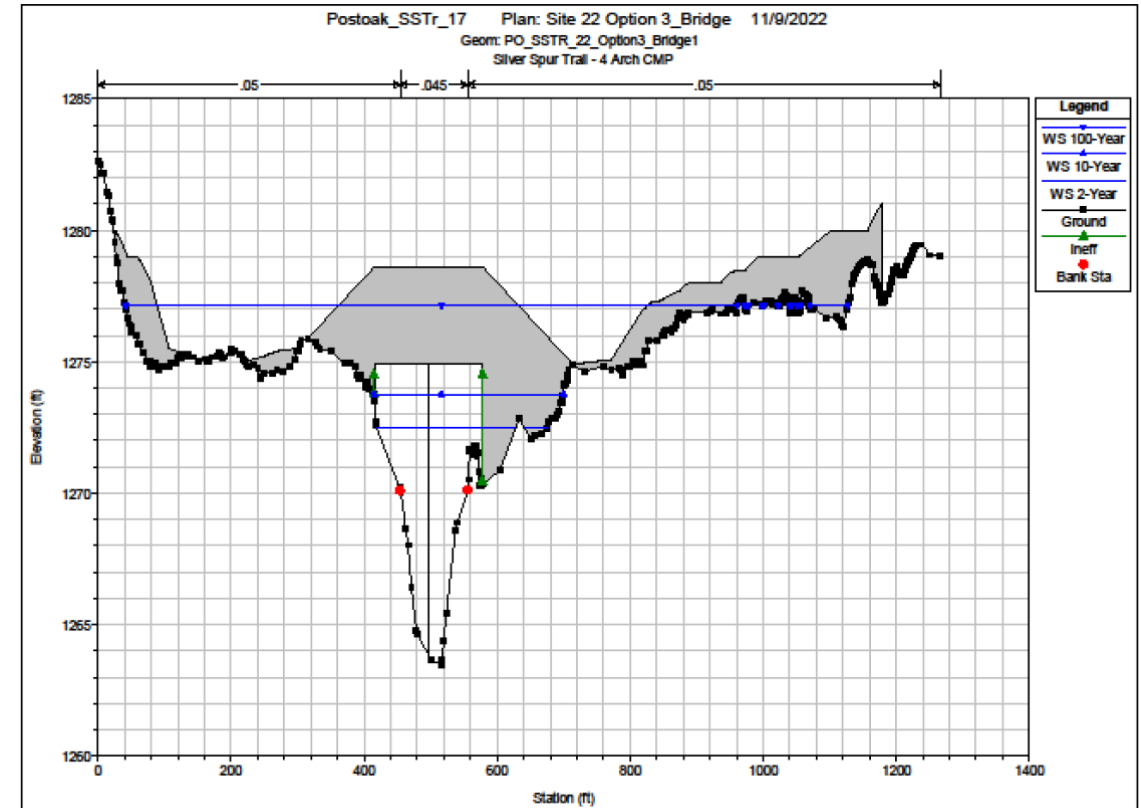


Figure 4: Cross-section of long 160-ft span bridge structure with water surface elevations.



CIP#17 Silver Spur LWC

- Results: Only Scenario 4 is capable of conveying the 10-yr storm event flows. Scenarios 2 and 3 do not mitigate 2-yr flows. Staff suspect several recharge features exist within the LWC contributing area; however, these are difficult to quantify and typically not considered during the design process.

- Cost Estimates:

	Storm Event	Cost Est.
Scenario 1: Existing Condition	<2-yr	NA
Scenario 2: Additional Culverts	<2-yr	\$ 466,500
Scenario 3: Slab Span Bridge	<2-yr	\$ 866,900
Scenario 4: Long Span Bridge	10-yr	\$2,353,020

- Consultant Recommendation: Since this LWC is not frequently closed (2x in past 15 years) and emergency vehicles will still have access to all parts of the city if closed (once FM3351 bridge raised), no action is recommended at this time.

CIP#5 Rolling Acres Trail LWC



- Scope: Provide surveying and engineering services to upgrade the Rolling Acres Trail LWC to convey the 10 or 25-yr storm event without overtopping the roadway

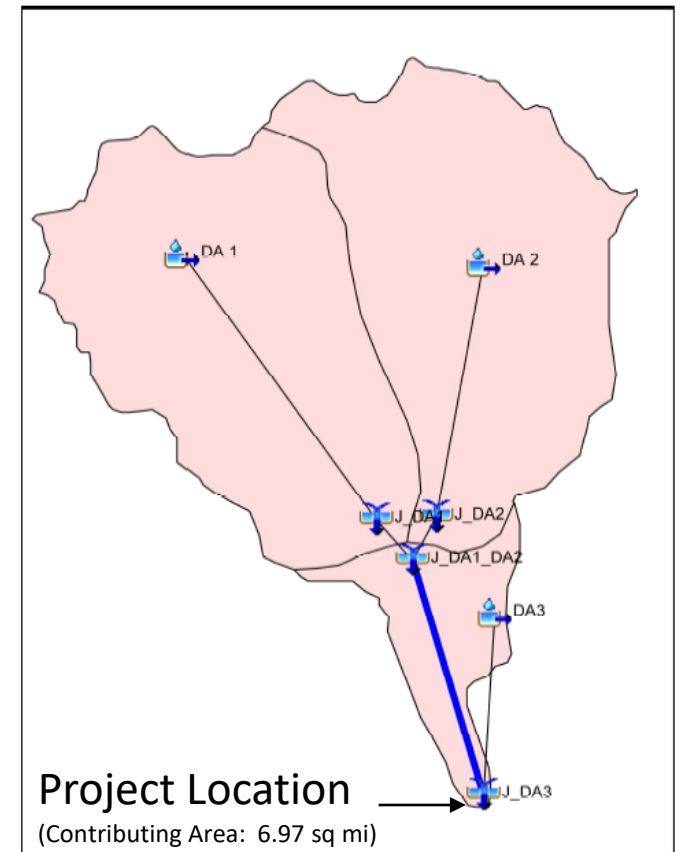
- Atlas 14 flows:

Storm Event	Flow (CFS)
1 Year	3,987
2 Year	5,607
5 Year	8,069
10 Year	10,258
25 Year	13,309
50 Year	15,670
100 Year	18,175

- Options evaluated:

- 1) 5-yr Multiple Box Culvert Bridge (110' overall length, raised 6')
- 2) 25-yr Span Bridge (300 ft overall length, raised 7-8')
- 3) 2-yr Multiple Box Culvert Bridge (106' overall length, raised 4')
- 4) High-Water Alert Lifesaving Technology (HALT) system

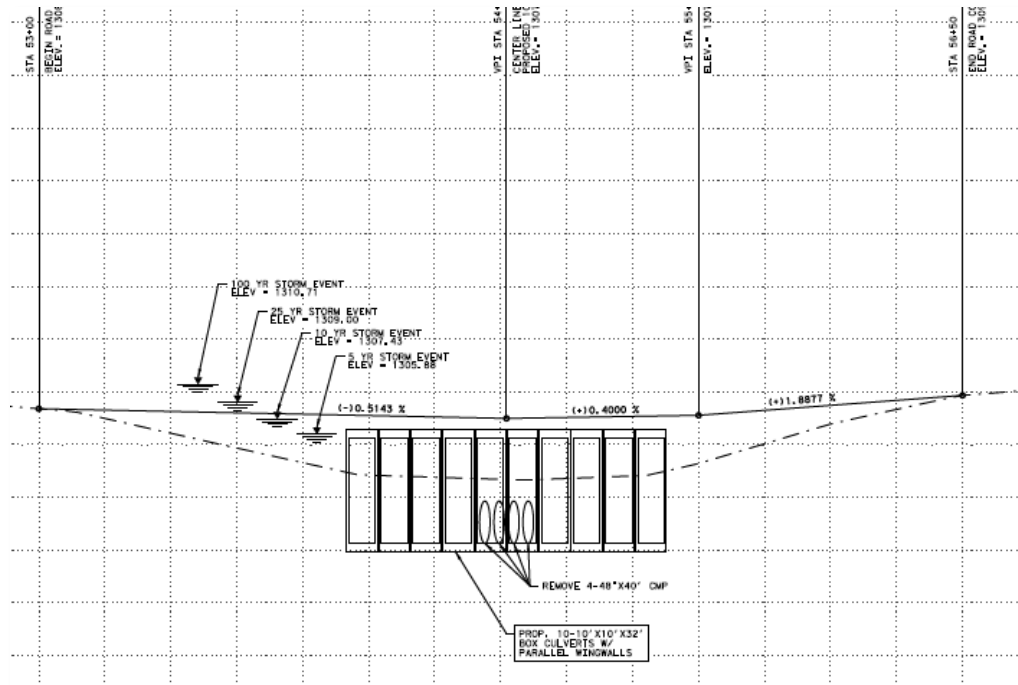
Rolling Acres Trail at Post Oak Creek Drainage Area Map



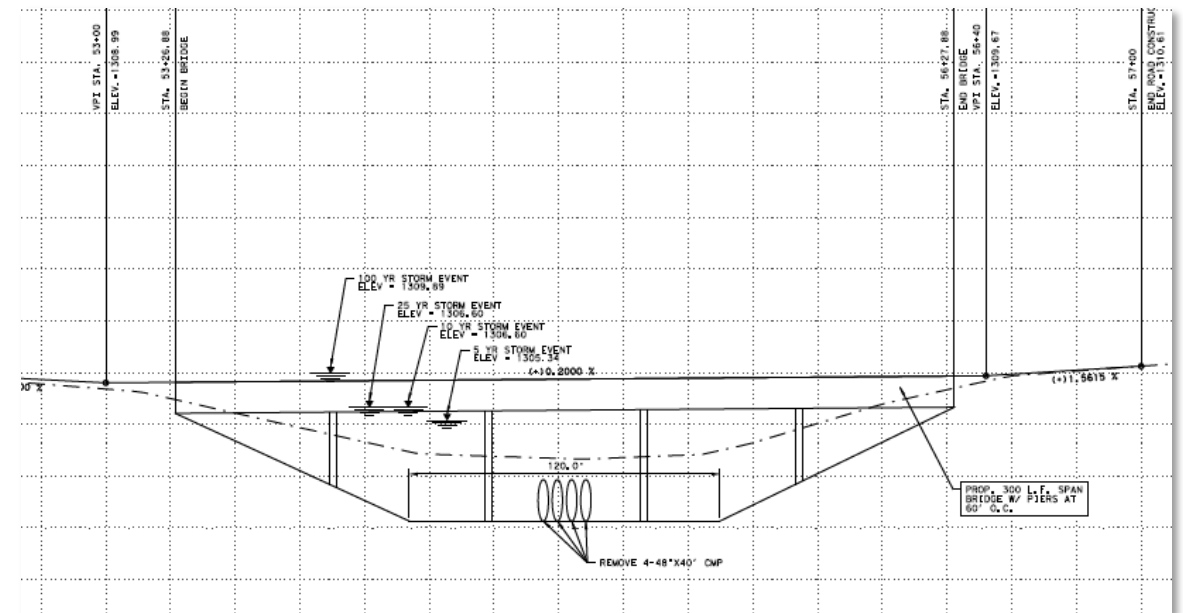
CIP#5 Rolling Acres Trail LWC



Option 1: Multiple Box Culvert Bridge (5-yr)



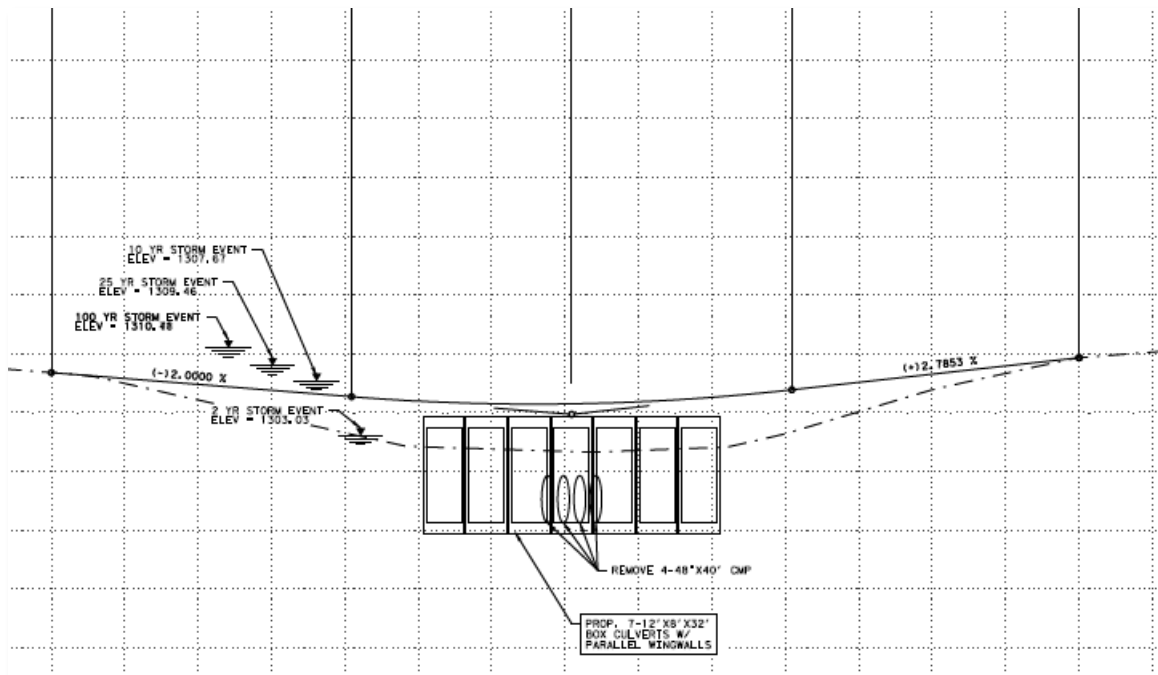
Option 2: 300' Span Bridge (25-yr)



CIP#5 Rolling Acres Trail LWC



Option 3: Multiple Box Culvert Bridge (2-yr)



Option 4: HALT System



CIP#5 Rolling Acres Trail LWC



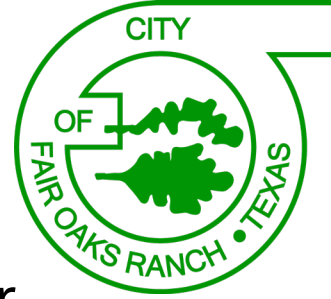
- Results: Any option to mitigate the 2, 5, or 25-yr storm event is extremely costly and requires removal of 25-30 trees. Staff suspect several recharge features exist within the LWC contributing area; however, these are difficult to quantify and typically not considered during the design process.

- Cost Estimates:

	Storm Event	Cost Est.
Option 1: 110' Multiple Box Culvert Bridge	5-yr	\$1,935,570
Option 2: 300' Span Bridge	25-yr	\$3,046,410
Option 3: 106' Multiple Box Culvert Bridge	2-yr	\$1,868,310
Option 4: HALT System	NA	\$ 100,000

- Consultant Recommendation: Since emergency vehicles will still have access all parts of the city if this LWC is closed (once FM3351 bridge is raised), Option 4: HALT System is recommended to automatically send alerts, open/close gates and collect actual flow data. This system is used extensively throughout Bexar County.

CIP#34 Tivoli Way



- Scope: Provide surveying and engineering services to manage stormwater generated in public ROW and redirect stormwater around The Fountains subdivision.

- Atlas 14 flows:

Storm Event	Flow (CFS)
2-yr	74
10-yr	108
25-yr	131
100-yr	167

- Alternatives evaluated:

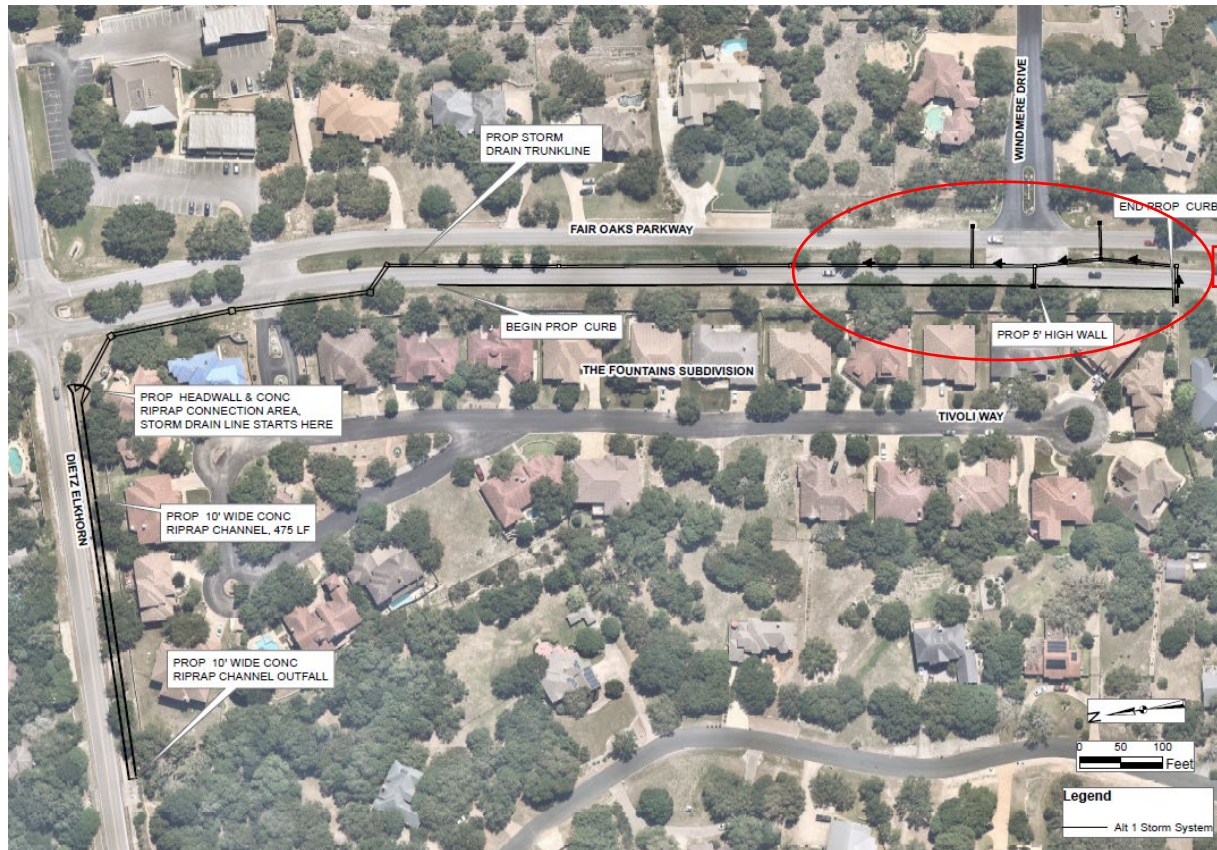
- 1) Underground Stormwater System (25-yr)
- 2) Underground Stormwater System (all from Windermere)
- 3) Underground Stormwater System (10-yr)



CIP#34 Tivoli Way



Alternative 1: Underground Stormwater System (25-yr)



Overview

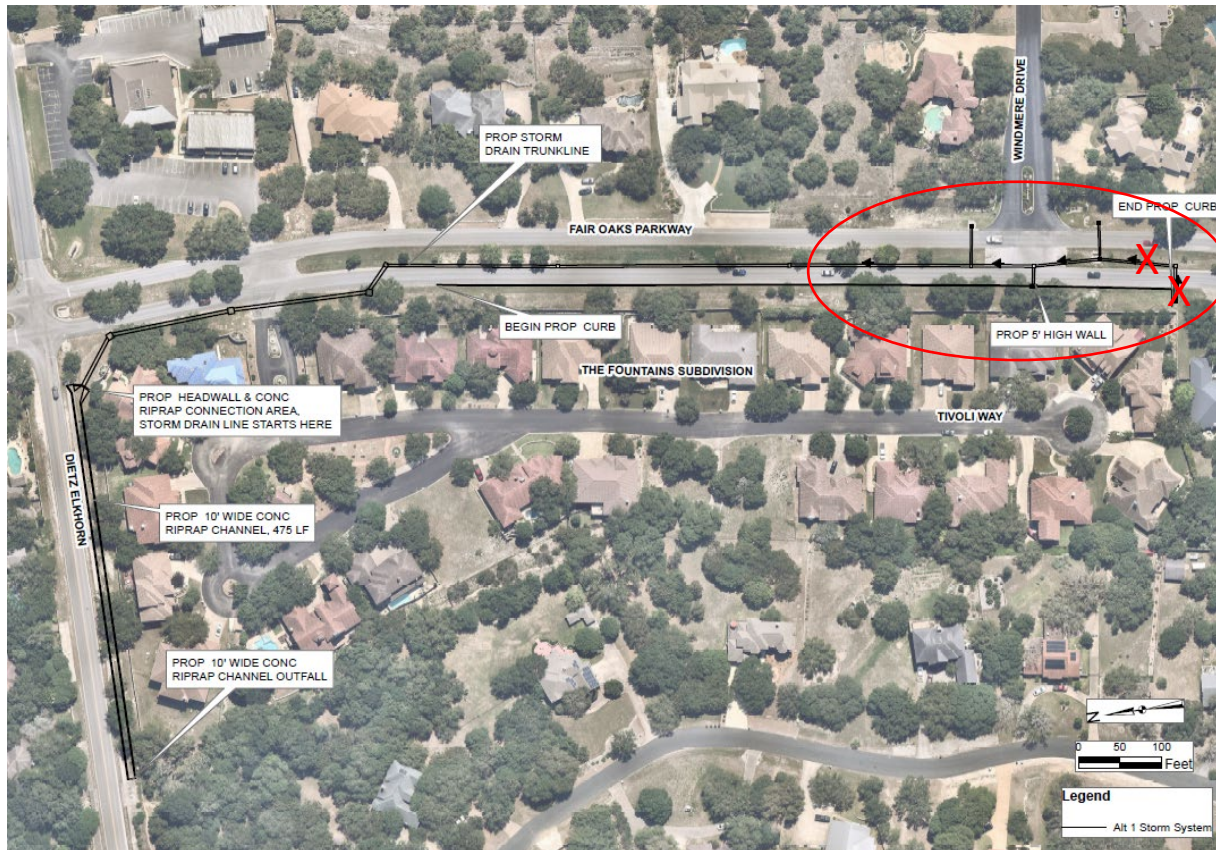


Detail

CIP#34 Tivoli Way



Alternative 2: Underground Stormwater System (all from Windermere)



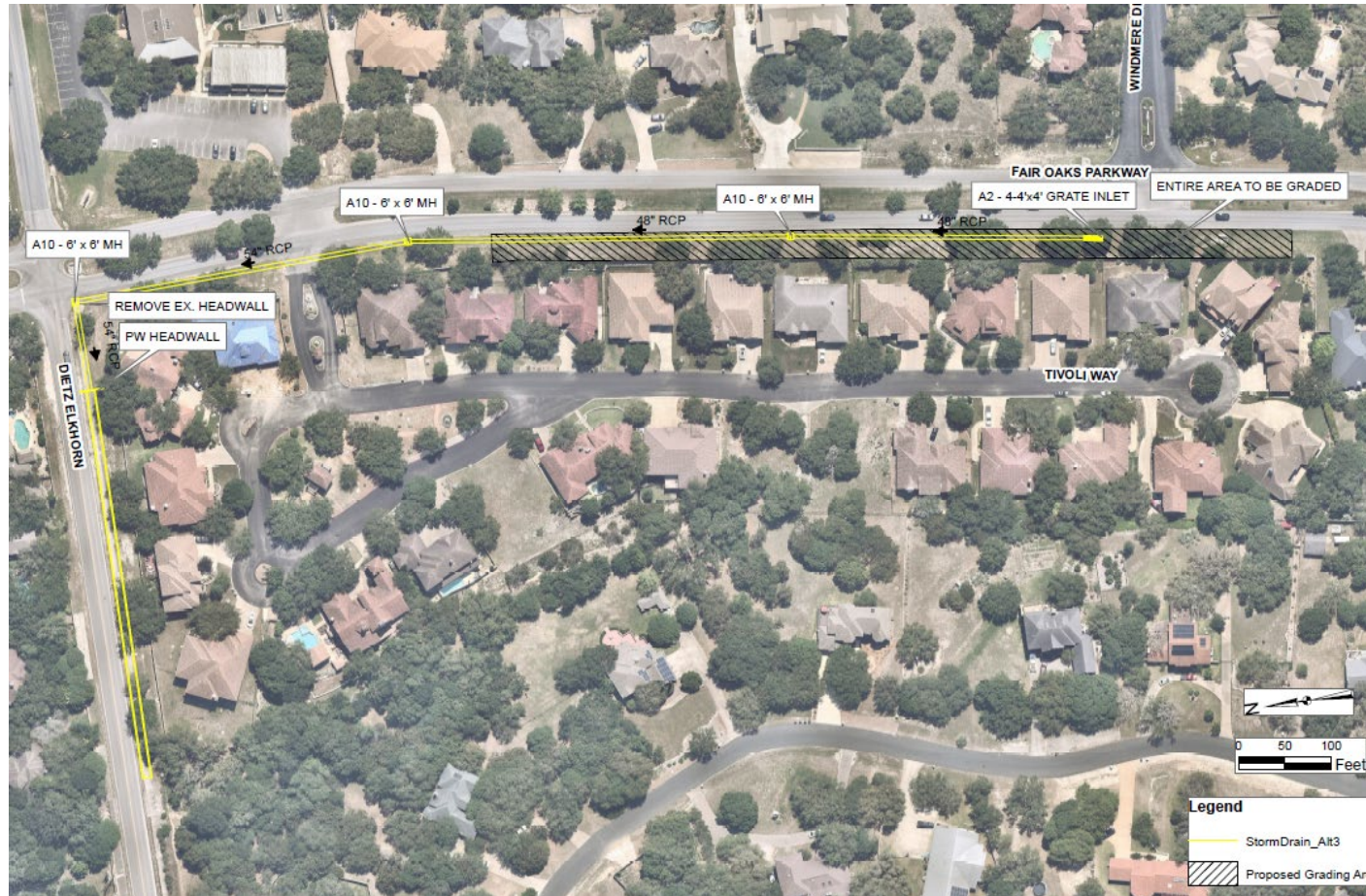
Overview



Detail

CIP#34 Tivoli Way

Alternative 3: Underground Stormwater System (10-yr)



CIP#34 Tivoli Way



- Results: All alternatives will reduce stormwater runoff from public ROW into The Fountains subdivision to a manageable level (minimal risk of flooding homes); however, all are above current budget amounts.

- Cost Estimates:

	Storm Event	Cost Est.
Alt 1: Underground Storm System	25-yr	\$1,610,580
Alt 2: Underground Storm System	All Windermere	\$1,030,980
Alt 3: Underground Storm System	10-yr	\$ 997,050

- Consultant Recommendation: Alternative 2 is recommended due to relatively lower cost, preservation of large trees near the subdivision and minimal impact to HOA common space.

Summary of Budget vs Estimated Cost



Project	Current Budget	Est. Cost to Mitigate 10-yr Storm	Est. Cost to Mitigate 25-yr Storm	Est. Cost of Recommended Option
Silver Spur LWC	\$683,159	\$2.6M	\$3.1M	No Action
Rolling Acres Trail LWC	\$676,738	\$2.7M	\$3.2M	\$100k (HALT system)
Tivoli Way	\$482,572	\$1.2M	\$1.7M	\$1.2M (Option 2)
TOTAL	\$1,842,469*	\$6.5M	\$8.0M	\$1.3M

* Approx. \$144k awarded for surveying and engineering services to date



Proposed Next Steps

- Staff provides additional info or analysis (if requested by Council)
- Council provides guidance on preferred options/alternatives
- City Manager reallocates funds between SAP projects or Council appropriates additional SAP funds
- Staff/consultants prepare PS&E (FY23)
- Bid advertisement and construction award (FY24)



Questions?