



## Stormwater Master Plan Summary

---

**DATE:** November 16, 2023

### **City of Corpus Christi Stormwater Master Plan Executive Summary:**

In March 2021, the City of Corpus Christi contracted with Pape Dawson Engineers to develop a Master Plan for the City's Stormwater Infrastructure. Previously, the City had conducted riverine and storm drainage hydraulic models, but some of those studies used outdated methods for determining discharges and flooding extents, and most were prepared prior to the adoption of Atlas 14 precipitation data.

Pape-Dawson provided comprehensive master planning and engineering services for the development of a Stormwater Master Plan, including an updated assessment of the City's drainage infrastructure; updated modeling to identify areas of flooding; and development of a Capital Improvement Plan intended to mitigate flood risk. The Master Plan included a review of proposed land use assumptions and determined the projected increase in impervious cover for a ten (10) year planning period, as well as looking at ultimate development of the City and its Extra-Territorial Jurisdiction (ETJ).

To accurately implement the Stormwater Master Plan and Capital Improvement Plan, the following updates were performed.

- Data was collected to inventory existing storm drain infrastructure. The City's GIS data was compiled and compared to as-built project data and formatted to be input into hydrologic and hydraulic (H&H) models.
- H&H model types were selected based on watershed, flooding type (riverine, urban, coastal), and prevalence and type of stormwater infrastructure. Selected models included HEC-RAS 1D/2D unsteady flow; HEC-RAS 2D rain-on-grid; XPSWMM 1D/2D unsteady flow; and ICM 1D/2D unsteady flow models.
- Existing conditions H&H models were developed, and Potential Mitigation Areas were identified based on existing flood risks and property flooding.
- H&H models were updated to include proposed Capital Improvement Projects consisting of added or up-sized storm drainage pipes, culverts, channels, and detention ponds.
- Costs estimates were performed for each Capital Improvement Project and are included as part of the master plan.

The Capital Improvement Plan within the Stormwater Master Plan includes recommended projects within eight (8) service areas across the City and its ETJ.



# **CITY OF CORPUS CHRISTI**

## **Stormwater Master Plan Supporting Document**

**October 2023**





# **CITY OF CORPUS CHRISTI**

## **Stormwater Master Plan Supporting Document**

**October 2023**

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**TABLE OF CONTENTS**

**INTRODUCTION .....5**

General Overview ..... 5

Outline of Scope..... 5

    Land Use Assumptions Update ..... 6

    Collect and Review of Existing Data ..... 6

    Storm Water Mapping System Update..... 6

    Hydrologic & Hydraulic (H&H) Model Development ..... 7

    System Capacity & Risk Assessment ..... 7

    Capital Improvement and Master Plan Development..... 8

Capital Improvement Advisory Council ..... 8

**SERVICE AREAS AND FLOODPLAINS .....9**

Service Areas..... 9

FEMA Floodplain ..... 10

**LAND USE ASSUMPTIONS .....10**

Area Development Plans..... 10

Projected Growth Rate ..... 11

Land Use ..... 17

    Existing Conditions..... 18

    Proposed (10-Year) Conditions ..... 18

    Ultimate Conditions ..... 18

**HYDROLOGY & HYDRAULICS .....18**

ICM 1D/2D Area ..... 18

    Hydrology and Subcatchments ..... 19

    Additional Hydrologic Parameters..... 19

    Pipes and Nodes..... 20

    2D Zones ..... 21

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

Run Manager..... 22

Existing Conditions Results ..... 22

Proposed Conditions Results ..... 22

Downtown – XPSWMM 1D/2D ..... 22

Oso Creek – 1D/2D Unsteady Model ..... 23

    Hydrologic Study – Level 1 ..... 23

    Hydrologic Study – Level 2 ..... 24

    Hydrologic Study – Level 3 ..... 25

    Applying Existing Hydrology to 1D/2D Unsteady Model ..... 26

    Ultimate Conditions Hydrology..... 26

    Proposed/Ultimate Conditions 1D/2D Hydraulics ..... 27

Flour Bluff – RAS 2D Rain-on-Grid RAS 2D ..... 27

    Study Area ..... 27

    Collecting Data ..... 27

    COCC 2D ROG RAS Modeling ..... 28

    PMA Identification ..... 29

    Proposed Conditions..... 29

North Beach & The Island ..... 29

**POTENTIAL MITIGATION AREA (PMA) DETERMINATION..... 34**

Potential Mitigation Area (PMA) Determination ..... 34

Proposed Projects ..... 34

**COST & BENEFIT FACTORS ..... 37**

Benefits ..... 38

Capital Improvements..... 38

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### LIST OF TABLES

Table 1. Projected Annual Growth by Households	12
Table 2. Projected Annual Growth by Employees	12
Table 3. MPO Annual Growth Rate vs. Annual Growth Rate by Lot Additions	13
Table 4. Historic Growth Rate by ADP	14
Table 5. Growth Rates Reviewed and Selected	15
Table 6. Projected 10-Year Commercial and Residential Growth by ADP	16
Table 7. Flood Frequency Analysis	25
Table 8. Project Descriptions	35
Table 9. Project Costs	38
Table 10. Project Benefits - Risk Reduction (Excluding Oso Creek)	39
Table 11. Project Benefits and Cost (Excluding Oso Creek)	40
Table 12. Project Cost Benefit Ratio (Excluding Oso Creek)	41
Table 13. Oso Creek Basin Project Costs	42

### LIST OF FIGURES

Figure 1. North Beach Floodplain	30
Figure 2. North Padre Island Floodplain	31
Figure 3. Mustand Island Floodplain	32
Figure 4. Mustand Island Floodplain	33

### LIST OF EXHIBITS

- Exhibit 1 - Overall H&H Method
- Exhibit 2 - Overall Master Plan
- Exhibit 3 - Drainage Service Areas
- Exhibit 4 - FEMA Floodplains
- Exhibit 5 - Existing Conditions Land Use
- Exhibit 6 - Proposed Conditions (10-Year) Land Use
- Exhibit 7 - Ultimate Conditions Land Use

# **CITY OF CORPUS CHRISTI**

## **Stormwater Master Plan Supporting Document**

Exhibit 8 - ICM Zones

Exhibit 9 - Level 1 & 2 Watersheds (Oso Creek)

Exhibit 10 - Level 3 Watersheds (Oso Creek)

Exhibit 11 - Existing Conditions Results (Oso Creek)

Exhibit 12 - Proposed/Ultimate Conditions Results (Oso Creek)

Exhibit 13 - Flour Bluff ROG Results

### **LIST OF APPENDICES**

Appendix A - Oso Creek Hydrology Calculations

Appendix B - Indexed Citywide Master Plan

Appendix C - Project Quad Sheets

Appendix D - Project Quad Sheets with Inundation Mapping

# **CITY OF CORPUS CHRISTI**

## **Stormwater Master Plan Supporting Document**

### **INTRODUCTION**

Corpus Christi Public Works (PWD) is responsible for the maintenance, operation, management, and expansion of stormwater drainage systems throughout the City of Corpus Christi, Texas (City). This Stormwater Master Plan is an overarching planning document intended to guide policy on maintenance, improvement, and expansion of stormwater infrastructure through a ten-year planning horizon, while looking at ultimate development conditions for the City's watersheds. This plan is intended to identify Potential Mitigation Areas (PMAs) based on storm drain system capacity constraints, buildings potentially at flood risk, and develop recommendations for drainage system improvement projects to be implemented in the City's Capital Improvement Program (CIP). Proposed new and upgraded storm drain projects are recommended and general cost data is provided.

### **General Overview**

This Stormwater Master Plan has been developed in accordance with Texas Local Government Code Title 12, Planning and Development, Subtitle C, Planning and Development Provisions Applying to More Than One Type of Local Government, Chapter 395 – Financing Capital Improvements Required by New Development in Municipalities, Counties, and Certain other Local Governments (Chapter 395). In addition, existing local codes and regulations including the City's Infrastructure Design Manual (IDM), Unified Development Code (UDC); the City's draft Drainage Criteria Manual and draft Drainage Design Manual; and other relevant state and federal codes and regulations were considered in providing recommendations for improvements. Existing system conditions, Area Development Plans, current and past Master Plans, existing studies, USGS gage data, and land use information have been collected, reviewed, and assessed to develop planning and development guidance through a ten-year planning period and an ultimate buildout condition. This Master Plan meets the requirements of Chapter 395 for use in evaluating impacts related to development and identified projects and related costs are apportioned for maintenance and improvement of existing service separately from projects and costs related to new development.

### **Outline of Scope**

Development of this comprehensive master plan for the City of Corpus Christi Stormwater System was accomplished through a series of tasks as outlined below.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### ***Land Use Assumptions Update***

Updated Land Use Assumptions (LUAs) are necessary to accurately assess current and future stormwater system capacity and infrastructure needs. Comprehensive master plans, Area Development Plans, platting and building permit history, along with adopted current and future Land Uses from the City were reviewed to provide updated LUAs. Land use assumptions are based on past and present development patterns, current and projected land use, current and projected zoning, projected population growth and patterns, and input from city Staff, the Capital Improvements Advisory Committee (CIAC), and the community.

### ***Collect and Review of Existing Data***

Data and documents reviewed in conjunction with the development of this Master Plan include, but are not limited to:

- City of Corpus Christi stormwater network GIS files.
- Federal Emergency Management Agency (FEMA) Base Level Engineering (BLE) hydraulic models.
- Existing City of Corpus Christi hydraulic and hydrologic models, as available.
- City of Corpus Christi project as-builts, as available.
- National Oceanic and Atmospheric Association (NOAA) Atlas 14 Precipitation Data
- United States Geologic Survey (USGS) Gage Data
- Texas Natural Resources Information System (TNRIS) 2018 LiDAR topographic mapping for the City and Extra Territorial Jurisdiction (ETJ).
- Existing Stormwater Master Plan exhibits.
- Existing adopted and draft design standards.
- Nueces County Appraisal District (NCAD) parcel data and building footprints.
- USGS Soils and Data
- National Land Cover Dataset (2016)

### ***Storm Water Mapping System Update***

Additional information was used to update stormwater system models and GIS data to at least 2019 conditions. This process included:

- Performing desktop review of infrastructure using Eagleview Connect Explorer. Data was incorporated into HEC-RAS 1D/2D and 2D models, and InfoWorks ICM 1D/2D model.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

- Incorporating topographic survey from the Tri-County Drainage Master Plan study (performed by Halff & Associates). Data was incorporated into the HEC-RAS 1D/2D model.
- Update of underground storm drain system components such as manhole (MH), node, and outfall locations, elevations and inverts as needed to obtain hydrologic and hydraulic (H&H) model stability. Data was incorporated into ICM 1D/2D model.

### ***Hydrologic & Hydraulic (H&H) Model Development***

Hydrologic and hydraulic (H&H) models were developed for watersheds throughout the city limits of Corpus Christi. They were also developed for the Oso Creek watershed outside of the city limits, including the ETJ, Robstown, Nueces County unincorporated areas, etc. H&H methods and selected software varied based on watershed topographic characteristics, level of development, and density of existing stormwater infrastructure. **Exhibit 1** illustrates the limits of the different H&H modeling methods. Calculations were performed for existing and ultimate development conditions for 10% annual chance (10-year) and 1% annual chance (100-year) storm events to assess infrastructure capacity and identify areas with potential flood risk, designated as Potential Mitigation Areas (PMAs).

### ***System Capacity & Risk Assessment***

Project recommendations for the master plan are based on insufficient capacity for existing storm drain, culvert, and channel systems; areas with potential population growth; and number of buildings potentially at risk under existing development and infrastructure conditions. In the Oso Creek watersheds, channels, ditches, and tributaries tend to be at or over capacity during an existing 10-year storm event. Proposed projects were prioritized based on the likelihood of development growth in the next ten years and to relieve known drainage issues based on discussions with the City. In the developed areas of the City, Potential Mitigation Areas (PMAs) were identified and refined based on the number of buildings at risk of flooding. Potential structure inundation was analyzed for 10-year and 100-year storm events, with varying minimum inundation depths. Based on discussions with City staff, PMAs were identified where a 10-year storm event resulted in flood depths of 12" or greater at existing structures. Recommendations for improvements were identified and included in the proposed master plan.



# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### *Capital Improvement and Stormwater Master Plan Development*

As PMAs were identified and proposed projects were developed, the information was discussed with, and reviewed by, City of Corpus Christi Public Works engineering staff. Coordination meetings were also held with Nueces County and TxDOT engineers and consultants. Where PMAs coincided with recent or existing City, County, or State projects, proposed project limits were revised. Projects that were taken into consideration include but are not limited to:

- La Volla Creek channel and detention improvements and remapping
- Williams Ditch Improvements
- Glen Oak Drive culvert improvements
- Oso Creek Bottom Rectification project planned by the City.
- Potential Nueces County Projects identified in the Tri-County Drainage Master Plan study.
- TxDOT Harbor Bridge related improvements
- TxDOT Crosstown Expressway improvements near London

PMA selection was refined as H&H model iterations were completed and based on discussion with City staff and with the Capital Improvements Advisory Council (CIAC). Proposed projects to mitigate issues in the PMAs were then developed for the Stormwater Master Plan. Opinions of Probable Construction Costs (OPCC) for identified projects were developed using historic costs data from recent projects in the City, TxDOT unit price information, and adjusted for consistency for the range of applicable bid items.

The Stormwater Master Plan was then developed by compiling the information, data, analysis, and results from the various tasks as described. Potential funding sources were identified for each project in the Stormwater Master Plan. See **Exhibit 2** for an overall exhibit of the Stormwater Master Plan projects.

This document was prepared under the direction of Steven Dean, P.E. #83905.

### **Capital Improvement Advisory Council**

In accordance with Chapter 395, the City established a Capital Improvement Advisory Council (CIAC) that was tasked with overseeing and guiding the development of the Master Plan and the associated Capital Improvement Program. Composition of the CIAC is fifteen members appointed by the City council of which

## CITY OF CORPUS CHRISTI

### Stormwater Master Plan Supporting Document

at least six members represent the real estate, development, or building industry. As noted by the City's description of the CIAC:

"The committee shall serve in an advisory capacity; advise and assist the City Council in adopting land use assumptions; review the capital improvements plan, land use assumptions and impact fees, and file written comments in accordance with Chapter 395 of the Texas Local Government Code; monitor and evaluate the implementation of the capital improvements plan; file semiannual reports with respect to the progress of the capital improvements plan and report to City Council any perceived inequities in implementing the plan or imposing the impact fee; and advise the City Council of the need to update or revise the land use assumptions, capital improvements plan, and impact fee."

Members of CIAC were regularly briefed on the development of the Master Plan, provided information as it was developed, and provided input and recommendations.

## SERVICE AREAS AND FLOODPLAINS

### Service Areas

Corpus Christi watersheds drain in several directions. Areas generally north of I-37 drain towards the Nueces River and Viola Channel/Tule Channel/Industrial Canal. Areas south of I-37 and west/southwest of South Padre Island Drive (SPID) generally drain towards Oso Creek and eventually into Oso Bay. Areas east/northeast of SPID generally drain directly to Corpus Christi Bay or Oso Bay. Flour Bluff generally drains in two directions, with the western half draining to Oso Bay and the eastern half draining to the Laguna Madre. Mustang Island/North Padre Island (The Island) drain to Corpus Christi Bay, the Laguna Madre, or the Gulf of Mexico.

The watersheds within Corpus Christi, and within the Oso Creek watershed outside the city limits were broken up into service areas initially for the purposes grouping areas by watershed, development type, and possible funding sources. After reviewing service areas with City staff and CIAC, the total number of service areas was determined to be eight (8). See **Exhibit 3**.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### FEMA Floodplain

City of Corpus Christi and Nueces County FEMA Floodplains were updated, effective October 13, 2022. Depending on the area of the city or county, and the proximity to the bay or gulf, FEMA Zones include riverine Zones A, AE, AO, and velocity zone VE. FEMA Base Flood Elevations (BFE) derived from Zone AE and VE information was used as downstream boundary constraints for H&H models See **Exhibit 4** for the FEMA Floodplains.

### LAND USE ASSUMPTIONS

For the stormwater master plan, demand on public infrastructure is a function of impervious cover within the watershed, which is a function of population growth and development type. In other words, the denser the development, the more runoff is produced from that development. Evaluation of existing capacity of the stormwater system (pipes, culverts, and channels) is based on existing land use and associated impervious cover. Likewise, evaluation of the future demands on the stormwater system related to development requires a reasonable assessment of impervious cover associated with development and where and how new development occurs. Taken together these parameters are referred to as Land Use Assumptions (LUAs). LUAs were determined for Existing Conditions, 10-year future development conditions, and ultimate development conditions (assuming the entire watershed is developed).

### Area Development Plans

To improve City-wide planning, zoning, and land use assumptions the City Planning Department divides the city into nine planning areas (Bayside, Corpus Christi Airport, Downtown, Flour Bluff, London, Northwest, Padre/Mustang Island, Southside, and Westside) and has developed planning documents for each area. These Area Development Plans (ADPs) are based on current and projected land usage and on projected needs based on the character, land use, population, and anticipated development of the individual areas. Projections for each area can be combined to provide overall City-wide Land Use Assumptions.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

In addition to the ADPs currently in place, a tenth planning area bounded by the Northwest ADP, the City of Robstown, Texas, and west of Interstate 69 has been identified and used in the master plan development. This tenth planning area is referred to as the Calallen Planning Development Area. Refer to the Wastewater Master Plan to see the ADPs used in developing the land use assumptions.

Both the London and Calallen planning areas extend into the City's ETJ outside of the City Limits. Development in these areas is occurring and is expected to continue to occur with related annexation of the land and extension of City services over the next ten years. Additional development of land in the ETJ is expected to follow the growth patterns of the adjacent ADP and is assumed to follow the established land use patterns.

Significant portions of the ETJ are located north of Corpus Christi Bay and Nueces Bay. There are no City owned services in these areas and development is not expected to be significant within the planning horizons of this Master Plan. Planning efforts have not been included for areas of the ETJ where costs to extend wastewater services are high and significant development is not expected to occur for an extended period.

### Projected Growth Rate

Growth projections are developed and updated by the Metropolitan Planning Organization. Data from the MPO projections was initially used to calculate a predicted annual growth rate based on increase in households and the projected increase in employees from 2021 to 2031. Project growth rates were calculated using the following equation.

$$\text{Percent Annual Growth} = \left[ \left( \frac{2031 \text{ households/employees}}{2021 \text{ households/employees}} \right)^{\frac{1}{\text{number of years}}} - 1 \right] 100$$

As an example, in the Downtown ADP, the number of current households is 3,794. In 2031, it is projected that the number of households in this ADP may be 4,919. This is a difference of 1,124 and correlates to a 2.6 percent growth per year in households. A similar methodology was used for projected increases in employees.

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

Projected annual growth based on households and employees are shown in **Tables 1 and 2.**

**Table 1. Projected Annual Growth by Households Projected Annual Growth by Households**

<b>ADP</b>	<b>2021 Households</b>	<b>2031 Households</b>	<b>2031 Less 2021</b>	<b>Annual Growth in households</b>
Bayside	31,508	32,478	970	0.3%
Calallen	1,310	2,201	891	5.3%
CC Airport	1,582	2,228	646	3.5%
Downtown	3,794	4,919	1,125	2.6%
Flour Bluff	8,006	8,573	567	0.7%
London	1,100	1,720	620	4.6%
Northwest	12,152	15,194	3,042	2.3%
Padre/Mustang Island	5,987	7,295	1,308	2.0%
Southside	41,601	47,130	5,529	1.3%
Westside	18,533	19,978	1,445	0.8%
<b>Total</b>	<b>125,573</b>	<b>141,716</b>	<b>16,143</b>	<b>1.2%</b>

**Table 2. Projected Annual Growth by Employees**

<b>ADP</b>	<b>2021 Employees</b>	<b>2031 Employees</b>	<b>2031 Less 2021</b>	<b>Annual Growth in Employees</b>
Bayside	25,887	26,342	455	0.2%
Calallen	3,502	4,093	591	1.6%
CC Airport	8,927	10,755	1,828	1.9%
Downtown	17,328	17,450	122	0.1%
Flour Bluff	11,725	12,077	352	0.3%
London	423	732	309	5.6%
Northwest	11,536	13,307	1,771	1.4%
Padre/Mustang Island	2,666	3,431	765	2.6%
Southside	26,898	30,226	3,328	1.2%
Westside	31,253	33,767	2,514	0.8%

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

<b>Total</b>	<b>140,145</b>	<b>152,180</b>	<b>12,035</b>	<b>0.8%</b>
--------------	----------------	----------------	---------------	-------------

According to the US Census Bureau, the City of Corpus Christi had an annual growth rate of 0.4 percent from 2010 to 2020. The data from the MPO projections shows a more robust growth rate is anticipated over the next ten-year period.

City records of lots added in each ADP from January 1, 2020, to January 25, 2022, were then used to generate an annual growth rate for the last two years. The MPO baseline number for 2021 households was used in conjunction with the lots added data from the city using the same formula to generate an annual growth rate based on the lot added information. The growth rate from lots added is compared to the MPO Households growth rate in **Table 3**.

**Table 3. MPO Annual Growth Rate vs. Annual Growth Rate by Lot Additions**

<b>ADP</b>	<b>MPO Annual Residential Units Added</b>	<b>MPO Annual Growth Rate</b>	<b>Average Annual Lot Addition</b>	<b>Annual Lot Addition Growth Rate</b>
Bayside	97	0.3%	60	0.2%
Calallen	80	5.3%	24	1.8%
CC Airport	65	4.1%	0	0.0%
Downtown	112	3.0%	5	0.5%
Flour Bluff	57	0.7%	112	1.4%
London	288	4.6%	225	4.5%
Northwest	304	2.5%	71	0.6%
Padre/Mustang Island	131	2.2%	36	0.6%
Southside	553	1.3%	421	1.0%
Westside	145	0.8%	70	0.4%
<b>Total</b>	<b>1,832</b>	<b>1.3%</b>	<b>1024</b>	<b>0.8%</b>

In addition, the City provided growth rate information from previous time periods for six of the ADPs, which was included in the overall evaluation of growth rates. Historic growth rate and the associated period are provided in **Table 4**.

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 4. Historic Growth Rate by ADP**

<b>ADP</b>	<b>Time Period</b>	<b>Growth Trend</b>
Bayside	2010-2021	0.15%
Calallen	No Data	
CC Airport	No Data	
Downtown	No Data	
Flour Bluff	2010-2019	0.67%
London	2000-2018	7.2%
Northwest	No Data	
Padre/Mustang Island	2000-2019	2.48%
Southside	2000-2018	2.04%
Westside	2000-2019	0.36%

This information was considered along with the other data discussed to develop a baseline and a reasonable prediction of projected growth. Growth trends were discussed with City Staff and the CIAC, who provided input from the builder, developer, engineering, business, and general citizen communities. Growth rates were adjusted based on the input from the CIC and based on the reviews and the discussions noted, a growth rate for each ADP was selected with the following rationale:

- Bayside is judged to have minimal growth and there is no current indication this growth rate may increase in the ten-year planning period. A growth rate of 0.2 percent is used.
- Conditions and growth in Calallen are like those in the Northwest ADP and the same growth rate of 1.5 percent is used.
- Based on discussions with the CIAC, residential development in the CC Airport ADP may not occur at an appreciable rate during the planning horizon of this Master Plan and no growth (0.0 percent) is used.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

- The Downtown rates have a broad range; however, there is an ongoing effort to encourage “redevelopment” in the downtown areas, necessitating consideration of a higher growth rate. A rate of 2.0 percent is used.
- In the Flour Bluff area, the MPO and City growth rate are similar, but there is an increase in growth occurring recently based on the lot added information. This observation is consistent with recent development activity in the area. A rate of 1.0 percent is used for this area.
- For the London area there is currently strong interest in development, the past observed growth rate as identified by the City is 7.2 percent. After discussions and review with the CIAC, an annual growth rate of 10.6 percent has been applied in this area.
- The Northwest area has a significant range of the available data. An average growth rate between the MPO household data and the lot addition data of 1.5 percent is used.
- In the Padre/Mustang Island ADP, the MPO growth rate and the City’s growth trend are consistent. The growth rate in lot count may be minimal due to the type of growth (i.e., planned use developments). A growth rate of 2.4 percent is used.
- The Southside area has experienced a higher rate identified by City data than either the MPO or the added lot count data. Interest in development in this area is strong and a conservative 2.0 percent growth rate has been selected.
- The Westside lot count rate and growth trend identified by the City are consistent. A growth rate of 0.4 percent was selected for the Westside.

The growth rates developed and considered and the selected growth rates for use as the basis of this Master Plan are shown in **Table 5**.

**Table 5. Growth Rates Reviewed and Selected**

ADP	Annual Growth in Employees	Annual Growth in households	Annual Lot Addition Growth Rate	Historic Growth Rate	Selected Growth Rate
Bayside	0.2%	0.3%	0.2%	0.15%	0.2%
Calallen	1.6%	5.3%	1.8%		1.5%
CC Airport	1.9%	3.5%	0.0%		0.0%
Downtown	0.1%	2.6%	0.5%		2.0%
Flour Bluff	0.3%	0.7%	1.4%	0.67%	1.0%



**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

London	5.6%	4.6%	4.6%	7.2%	10.6%
Northwest	1.4%	2.3%	0.6%		1.5%
Padre/Mustang Island	2.6%	2.0%	0.6%	2.48%	2.4%
Southside	1.2%	1.3%	1.0%	2.04%	2.0%
Westside	0.8%	0.8%	0.4%	0.36%	0.4%
<b>Total</b>	0.9%	1.3%	1.8%		1.5%

For commercial development, the growth rates taken from the MPO data are used. **Table 6** provides the 2021 and 2031 data for residential and commercial growth used for evaluating future wastewater demands and proposed Projects to meet current and future needs.

**Table 6. Projected 10-Year Commercial and Residential Growth by ADP**

<b>ADP</b>	<b>2021 Households</b>	<b>2031 Households</b>	<b>2021 Employees</b>	<b>2031 Employees</b>
Bayside	31,508	32,144	25,887	26,342
Calallen	13,310	1,520	3,502	4,093
CC Airport	1,585	1,582	8,927	10,755
Downtown	3,794	4,625	17,328	17,450
Flour Bluff	8,006	8,844	11,725	12,077
London	1,100	3,000	423	732
Northwest	12,152	14,103	11,536	13,307
Padre / Mustang Island	5,987	7,589	2,666	3,431
Southside	41,601	50,711	26,898	30,226
Westside	18,533	19,288	31,253	33,767
<b>Total</b>	<b>129,485</b>	<b>147,886</b>	<b>142,214</b>	<b>155,164</b>

For the purposes of the Stormwater Master plan, understanding population growth is useful for prioritizing projects in currently undeveloped or partially developed areas. The population growth information is not, however, used directly to estimate increases in runoff.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### Land Use

One primary factor for determining the current capacity and future demand of the stormwater system is to understand land use patterns within the watersheds. Unlike wastewater, water, and roadway master plans, stormwater planning is dependent upon density of impervious cover, and not only on population growth. For example, a ¼ acre single family lot with 6,000 sq. ft. impervious cover has more hydrologic impact than a ¼ acre multi-story duplex lot with 5,000 sq. ft. Existing land use is used to understand existing stormwater system (pipes, culverts, and channels) conditions. Proposed 10-year land use is useful for understanding how to prioritize projects over the next 10 years. Ultimate land use conditions are used for sizing large stormwater infrastructure, so that the infrastructure built in the next ten years has capacity to be useful beyond the immediate planning cycle.

For impervious cover calculations and associated hydrologic analyses, land uses were broken down into basic land use categories, and an assumed impervious cover percentage was assigned based on the 2016 National Land Cover Dataset (NLCD), as shown in the table below.

**Table 7. Land Use and Impervious Cover Percentages**

Land Use	Percent Impervious
Water Features	100%
Transportation	90%
Commercial	90%
Industrial	72%
High Density Residential	65%
Mixed Use	40%
Medium Density Residential	38%
Low Density Residential	25%
Dispersed Residential	10%
Undeveloped (Open Space)	0%

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### *Existing Conditions*

Existing land use conditions were based on City zoning data, City subdivision plat information, and visual assessment of land use based on desktop review of aerial photography. Vacant parcels/properties were considered undeveloped for existing H&H calculations. See **Exhibit 5**.

### *Proposed (10-Year) Conditions*

For stormwater master plan purposes, the 10-year proposed conditions land uses were determined by using existing conditions as a baseline and replacing undeveloped areas within the city with development types shown in the City's zoning information and the ADPs. See **Exhibit 6**.

### *Ultimate Conditions*

For stormwater master plan purposes, ultimate land development assumptions were made to estimate potential runoff assuming full build-out of the watershed. Ultimate conditions land use is generally the same as proposed (10-year) conditions land use in the areas that are mostly developed. In less developed areas like the Oso Creek watershed, the areas currently undeveloped were assumed to have a mixed use and 40% impervious cover under ultimate conditions. See **Exhibit 7**.

## HYDROLOGY & HYDRAULICS

### ICM 1D/2D Area

The software program InfoWorks ICM was used to study much of the developed area of Corpus Christi. The ICM study area is generally bound on the north by I-37, on the west by Oso Creek, and on the east by Corpus Christi Bay. The southern end of the ICM area is generally the northwestern half of Flour Bluff. ICM 1D/2D modeling was utilized for this area due to the presence of existing storm drain system components (pipes and culverts), the area being developed, and the need to analyze urban overland flooding.

The ICM zones were loosely based on the 1D hydrology sub basins for the Oso Creek study within this master plan and are between 2,000 and 10,000 acres (3.1 – 15.6 sq. mi.) in size. The zones were combined and delineated such that each zone is self-contained or drains to a common outfall location like Oso Creek or Corpus Christi Bay. See **Exhibit 8** for ICM Zones.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### *Hydrology and Subcatchments*

Rainfall data for the entire study was based on NOAA Atlas 14 rainfall taken from a central point within the City of Corpus. The subcatchments for the ICM model were delineated per zone using local contours and pipe networks. The subcatchments vary in size from 10-150 acres. All 951 subcatchments utilize rational method based on the City of Corpus Christi (CoCC) 2009 Draft Drainage Criteria Manual (DCM) where time of concentration (TC) was assumed based on the minimum initial TC for commercial areas to be 15 minutes and single family residential as 30 minutes. Some TC values were also assumed based on land cover and size of watershed while respecting the accepted minimum values from the CoCC DCM.

Composite C values for the rational method were determined based on the draft 2009 CoCC DCM values and applied to a composite database created by merging USGS soil data and revised land cover and comparing to current aerial imagery and existing land cover shapefiles.

Subcatchment hydrology was applied to the pipe networks by assigning a subcatchment to flow to a specific manhole (node) within the given subcatchment. In some areas the assigned flow was placed at the most upstream node within a network, and some were applied intermittently along the network. This type of scenario varied and was dependent on the size of the given network within a zone. Wherever there is no subcatchment within a zone, the model uses 2D rain on mesh analysis.

### *Additional Hydrologic Parameters*

Rainfall event generators were created within the model to simulate flow for the 2D mesh. These generators received parameters like wetness index, intensity pattern, antecedent depth, duration of storm, 24hr depth of design storm, timestep, and multiplying factor. For the entire modeling area, a wetness index of 2 was used to model average subcatchments. The intensity pattern for the entire modeling area was set to a Type III to represent storm systems from the Gulf of Mexico. The antecedent depth utilized the default setting to help the start the simulation to ensure that any initial loss volume is already filled. All the previously stated parameters within the rainfall generator were based on ICM modeling guidelines and applied to conditions of the existing stormwater system. A duration of 24 hours was assumed for the storm generator, with a timestep of 5 minutes and a multiplying factor of 1. The 24-hour depth of design storm was based on the previously stated NOAA Atlas 14 storm data.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### *Pipes and Nodes*

The pipes and nodes (Manholes) were obtained from the City as individual shapefiles. The focus of the study was at a high, master planning level, and not at an inlet level. Therefore, the ICM modeling accounted only for pipes 36" in diameter and larger. This allows for the analysis of only the main trunk lines of the pipe networks. Individual inlets were generally not analyzed.

The raw pipe shapefiles contained around 38,000 individual pieces of pipes and were manually consolidated to be around 8,000 pipes. This means wherever pipes were the same size but were broken up between nodes were merged to make one continuous run. In some cases, shapefile data indicated pipes with negative slope. In those cases, pipes were altered so that they flowed in the correct direction via ICM tools, stabilizing the models.

The nodes consisted of approximately 8,700 individual points and were consolidated using ArcGIS to around 5,200 to simplify the model, since individual inlets were not generally modeled. Some areas contained nodes with no data for invert elevations. These nodes received values based on interpolated elevations from surrounding inlets and nodes. The same applies for the pipes that are connected to those nodes. There were also areas where pipes changed in size but had no intermediate node at the size change, so a node was added at that location using the interpolation method previously described. Manhole dimensions were all determined by ICM based on the node invert elevation and ground level. The flood type for the nodes was set to 2D with a 1D-2D linkage based on depth for added stability of computation within the model. The flood type set as 2D allows for the node to surcharge onto the 2D mesh creating a realistic interaction between the 1D pipes and 2D mesh. In other words, when a pipe has insufficient capacity, water is shown to surcharge out of the nodes (manholes), then spreading across the mesh (ground).

The downstream ends of the pipe networks received nodes set to 'outfall 2D' so that they would interact with the 2D mesh. Connections points where pipe or culverts discharge onto the 2D mesh require 'connect 2D nodes'. Connect 2D nodes were added at upstream and downstream ends of culvert or bridge crossings. If the crossing data was not present or didn't seem valid, Eagleview Connect Explorer was used

## **CITY OF CORPUS CHRISTI**

### **Stormwater Master Plan Supporting Document**

to estimate the size of the crossing. The crossing links (pipes) were set as conduit 2D to act as a connection between physical breaks in the channel where the crossing exists. One line was drawn for the crossing and barrels were added to the respective field if required.

When adding the links and nodes to ICM, connectivity was checked using ICM connectivity tools to ensure all pipes in a network were properly connected. This also aided in seeing where there were breaks, if any in a network.

#### **2D Zones**

Current available LiDAR was used from TNRIIS to create a 2D mesh within each zone. To create the 2D ground surface, the ICM meshing is completed with triangles and based on the size of the zone, a maximum triangle area ranged from 2-3000 square feet with a minimum element area ranging from 100-200 square feet. For the boundary points of the 2D zone, normal depth condition was used. Generally, Manning's roughness n-value for the 2D mesh was set to 0.045 for areas where the roughness zone layer was not present and developed, open space was assumed. Rainfall for the 2D mesh utilized the same NOAA Atlas 14 data from the applied hydrology within the subcatchments however rainfall was applied outside of the subcatchments to not double calculate runoff.

The revised land use shapefile stated previously was converted to a roughness layer by applying n-values to a given land use type based on the Manning's N suggested value table for 2D taken from Harris County flood control district. This table was used since it is an established method for a coastal area like Corpus Christi.

Mesh level zones were created in the 2D mesh using SQL queries to simulate the buildings being actual raised obstructions to more accurately model surface runoff.

Boundary lines and levels for the 2D zones were only applied in areas where storm surge affected the model. For example, zones 2 and 10-15 received these boundaries. The boundaries were only used during the 100yr storm event to simulate the surge conditions.

# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### ***Run Manager***

The simulation time step required for 1D/2D is recommended to be less than 10 seconds based in InfoWorks ICM guidance. For this analysis a time step of 1 second was used so the model had more stability for slow computations over flat ground. Another parameter to help modeling stability was to link the 1D and 2D calculations at the minor timestep. Result timestep multiplier was set to 1 minute and the duration was set at 16 hours to end right after the peak of the storm.

### ***Existing Conditions Results***

Inundation limits were determined for the existing conditions 10% annual chance (10-year) storm event models. The 10-year delineations were truncated to see whether there are potential flood depths 12" or greater during the 10-year storm. Buildings that coincided with the 10-year, 12" depth delineation were tabulated, and areas of concentrated structures were identified as Potential Mitigation Areas (PMAs). PMAs were also based on common outfall locations within an ICM Zone.

### ***Proposed Conditions Results***

To relieve flooding in PMAs, an initial assumption was made to double pipe/drainage system capacity and widen channels throughout the study area. This served as a sensitivity analysis for determining whether adding system capacity would relieve flood risk. In some areas the doubled pipe capacity remained the basis for proposed conditions, however in most areas proposed pipe/drainage system sizes were refined to reduce risk efficiently. The goal is to determine the correct pipe size needed at a given location within a network. For channel modifications a side slope of used 3:1 was used with varying bottom widths to widen the channels and create consistent bottom slopes for improved channel efficiency. Equipment access was provided leaving 5-10 feet on either side of the channel and within channel easements/right-of-way.

### **Downtown – XPSWMM 1D/2D**

Pape-Dawson obtained the City's 2019 existing conditions XPSWMM 1D/2D model that included the downtown stormwater pump stations. The existing conditions model included only portions of the storm drain system and did not include coverage of the entire downtown area. The existing conditions model

## **CITY OF CORPUS CHRISTI**

### **Stormwater Master Plan Supporting Document**

was updated with Atlas 14 precipitation data and re-run. No PMAs were identified specifically due to updating precipitation data within the downtown XPSWMM model.

However, Based on PMAs identified with the ICM analysis above, several proposed improvements were identified upstream of the downtown XPSWMM model area. The XPSWMM model was updated to mimic the proposed ICM model and was run to confirm that the ICM based proposed improvements did not have an adverse impact downtown. Proposed stormwater master plan projects can be found in **Exhibit 2**.

### **Oso Creek – 1D/2D Unsteady Model**

The Oso Creek watershed is mostly undeveloped, and consists of defined riverine channels, with shallow, flat overbank areas. Watersheds were delineated within the basin, then initial existing conditions hydrology calculations were performed. Flood Frequency Analysis (FFA) was performed based on the USGS gage data at Oso Creek and FM 763 to calibrate the hydrology based on measured flow depths. Existing hydrology was applied to the existing conditions 1D/2D unsteady model, then hydrologic parameters were adjusted for ultimate development conditions. Channel improvements were proposed and incorporated into the ultimate development model to determine future projects to include in the Stormwater Master Plan.

### ***Hydrologic Study – Level 1***

The outer boundaries of the Oso Creek Basin have been delineated using 1M 2018 Texas Water Development Board (TWDB) LiDAR DEM in what PD is referring to as “Level 1” delineation. Level 1 delineation was used in the initial preliminary H&H models. The total area of this watershed was determined to be about 205 square miles. The Level 1 delineation can be seen on **Exhibit 8**.

A stream gage (USGS 08211520) is located at the intersection of Oso Creek and FM 763. A flood frequency analysis (FFA) was performed for this gage with PeakFQ and was backchecked with HEC-SSP. The results of this analysis can be seen in **Appendix A**. The FFA flows were used as a calibration point to compare to flows calculated through the 1D HEC-HMS model created by PD. Using the Level 1 delineation boundary, the total area of the watershed flowing to the gage was determined to be 81.92 square miles.



# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### *Hydrologic Study – Level 2*

The Oso Creek basin was further delineated into 12 watersheds varying in size from 6.08 square miles to 29.44 square miles. These watersheds were delineated at various convergence points along Oso Creek in what PD is referring to as “Level 2” delineation. Level 2 watersheds were used as an intermediate step in the H&H analysis to study input parameters and to further compare flows to the results of the FFA. The USGS gage is located at the downstream end of Watershed 5. The Level 2 delineation can be seen on **Exhibit 9**.

Using the Level 2 watersheds, PD created an HMS model using HMS Version 4.8. For this analysis, the Green and Ampt loss method and the Clark Unit Hydrograph transform method were used. Soil data was acquired from the Web Soil Survey and compiled to determine the Green and Ampt parameters for the Level 2 watersheds. Following guidance from the US Army HEC-HMS tutorials and guides, the soil data was associated with the needed Green and Ampt parameters. Following those guides, a 25% moisture content was used initially. The soil data and calculated parameters can be found in **Appendix A** with the soil map shown on Exhibit 3. Land cover values were also used from the 2016 National Land Cover Dataset (NLCD) to determine the percent impervious to use.

Clark unit parameters, time of concentration ( $T_c$ ) and storage coefficient ( $R$ ), were then determined for the Level 2 watersheds. ArcMap (Version 10.8.1) and ArcHydro were used to determine these parameters with equations from the existing Corpus Christi Drainage Design Manual. This information is summarized in **Appendix A**.

The HMS model was initially set up as an unrouted model up to the gage location to compare to the FFA flows. NOAA Atlas 14 rainfall data was used in the model with an analysis being run for the 10, 50, 100, and 500-year storm events. After comparing flows, a sensitivity analysis was run on the Clark parameters to determine the required adjustments to get HMS flows closer to FFA flows. It was determined that a 5% decrease to the storage coefficient would be required to bring HMS flows within the range of the FFA flows. At this point, flows are about 4% from the FFA analysis flows. Adjustments were also made to the time of concentration, but these adjustments did not result in enough of a change to bring HMS flows

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

within range of the FFA flows. Results of the unrouted HMS model (both to the gage and at the Oso Creek outfall) can be seen below and in **Appendix A**. Flood Frequency Analysis is shown in **Table 7**.

**Table 7. Flood Frequency Analysis**

FM 763 at Oso Creek				HMS Unrouted Flows (cfs)	HMS Unrouted Flows (cfs)
USGS 08211520				25% Moisture Content	25% Moisture Content
Storm Event	Annual Chance Probability of Exceedance	Peak FQ Flow (cfs)	HEC-SSP Flow (cfs)		5% Decrease to Storage Coefficient (R)
10-yr	10%	6342	6342	6306.2	6580.4
50-yr	2%	11320	11317	10674.6	11135.9
100-yr	1%	13810	13810	13055.3	13617.1
500-yr	0.20%	20490	20487	19483.7	20315.6

A routed HMS model was also created using the Muskingum routing method. The Muskingum K and X parameters were determined through an iterative process that also involved the use of the FlowMaster program. The routed model was run under similar meteorological conditions as the unrouted model. The routed model was created and run as an additional source of comparison against the unrouted model. Previously obtained HMS models from the City of Corpus Christi were reviewed against the PD created HMS model to ensure that correct methodology and set-up was being followed.

**Hydrologic Study – Level 3**

Following an internal review, the overall boundary of the Oso Creek watershed was extended to include an additional 12 sq. mi. near the opening of Oso Creek into Oso Bay. This area was designated as a new Level 2 watershed, which brings the total number of Level 2 watersheds to thirteen. Level 1 and Level 2 results were updated to include this additional area.

## CITY OF CORPUS CHRISTI

### Stormwater Master Plan Supporting Document

From the Level 2 watersheds, PD delineated Level 3 watersheds. Level 3 watersheds were used to develop input hydrographs for the unsteady 1D/2D HEC-RAS model. A naming convention was adopted for each watershed. The names consist of three parts: a 6-character maximum string designating the stream/waterway that the area is contributing flow into, a two-digit code designating the Level 2 watershed number, and then a two-digit code designating the Level 3 watershed number. Reference **Exhibit 10** for Level 3 watersheds. The delineation process resulted in 166 watersheds ranging in size from about 0.18 sq. mi. to 3.46 sq. mi. Following the same process used for Level 2 analysis, Clark unit parameters were determined for all Level 3 watersheds. A Level 3 unrouted HMS model was then created using HMS Version 4.8 to determine preliminary flows. A comparison between the previously calculated USGS flows and the 100-year calculated flow from the Level 3 HMS model showed a difference of about 20,000 cfs in the model. As routing was not used in the model, these higher flows were expected. Results from the Level 3 analysis can be found in **Appendix A**.

#### ***Applying Existing Hydrology to 1D/2D Unsteady Model***

A 1D/2D unsteady HEC-RAS model was developed based on the countywide Base Level Engineering (BLE) model received from AECOM, and cross-sections were verified with current LiDAR. Bridges, bridge-class culverts, and culverts were added to the models based on Eagleview Connect Explorer desktop reviews and survey information from the Tri-County Drainage Master Plan study where available. Level 3 existing conditions hydrology was applied as input hydrographs at the appropriate ditch, tributary, or creek within the Oso Creek Watershed.

Oso Creek is generally at capacity under a 10-year existing conditions event, but some of its tributaries are out of their banks. The creek and its tributaries are generally overcapacity under existing conditions. Reference **Exhibit 11** for existing 10- and 100-year results.

#### ***Ultimate Conditions Hydrology***

For ultimate conditions calculations within the Oso Creek basin, it was assumed that the entire watershed was developed as shown in the previous land use exhibits. Peak flows were adjusted based on the assumption that all future development within the watershed would include onsite stormwater

## **CITY OF CORPUS CHRISTI**

### **Stormwater Master Plan Supporting Document**

detention. The T, C, & R coefficient values were adjusted to lower the peak flows near existing conditions. It is estimated that about 0.5 ac-ft of detention storage will be required per acre of development. See **Appendix A** for ultimate conditions Clark Hydrograph parameters.

#### ***Proposed/Ulimate Conditions 1D/2D Hydraulics***

Improvements to Oso Creek and its tributaries were assumed for proposed/ultimate hydraulic conditions. Proposed conditions generally include widening and deepening of tributaries, creeks, and channels throughout the basin with the intent of conveying the 100-year storm assuming ultimate development with onsite detention. The unsteady 1D/2D model was run for 10- and 100-year storm events. Although the hydraulic model includes channel improvements throughout the watershed, only five (5) projects were selected for the purposes of the Stormwater Master Plan.

The five (5) projects selected best serve upcoming development within the next ten years and should relieve immediate capacity needs. The projects were also coordinated with the Tri-County Master Drainage Plan and provide increase capacity downstream of potential Nueces County projects. See **Exhibit 12** for proposed/ultimate conditions 10- and 100-year results.

#### **Flour Bluff – RAS 2D Rain-on-Grid RAS 2D**

##### ***Study Area***

A 2D HEC-RAS Rain-On-Grid (ROG) model was used for the eastern half of Flour Bluff, for the area that drains to the Laguna Madre. The ROG method was used because infrastructure is limited in that part of Flour Bluff.

##### ***Collecting Data***

Rainfall for the entire study was based on NOAA Atlas-14 rainfall taken from a central point within the City. Existing and ultimate development (UD) land use data was obtained from the land use assumptions stated previously. Building footprint data was also gathered to compare to flood delineations for determining PMAs.

## **CITY OF CORPUS CHRISTI**

### **Stormwater Master Plan Supporting Document**

Other data was collected to support hydraulic calculations, including storm surge elevations from Laguna Madre; street and channel center lines; Manning's n-values for ROG models; and Green and Ampt loss values. The Laguna Madre storm surge elevation was based on FEMA FIRM panels collected from the FEMA flood map service website. A storm surge elevation of 11-ft was determined and was applied as a boundary condition. Street and channel centerlines were obtained directly from the City, and the centerlines were used as breaklines in the ROG model, to depict peaks and lows more accurately in the terrain for roads and channels. Extra breaklines were manually added to better depict roads and channels where there were missing centerlines. In the ROG model, the land use that was collected was converted to land cover in the model and depending on the land use type a specific Manning's n-value was applied. The Manning's n-values chosen for the land use were based on the values suggested by Harris County Flood Control District Hydrology and Hydraulic Guidance Manual. This manual was chosen because it is the closest major municipality with an established manual for ROG models. Green and Ampt loss values was taken from the U.S. Army Corp of Engineers (USACE) data for Green and Ampt loss methodology, where each type of soil has a value applied to it for the suction head, porosity, and hydraulic conductivity. This loss method was chosen as it has been the preferred method for hydraulic studies in coastal areas.

#### ***CoCC 2D ROG RAS Modeling***

ROG is different from the common RAS 2D modeling of applying a hydrograph at a specific location. ROG applies a depth of rainfall directly to the mesh, and the precipitation runs across the model depending on changes in elevation and roughness.

Boundary conditions were created to establish the out perimeter of the limits of study. Boundary conditions were created for surge and non-surge conditions. For surge conditions, the sides of Flour Bluff that did not border Laguna Madre, which are Oso Bay, Corpus Christi Bay, and Barney M. Davis Reservoir were all set to normal depth, which is a general calculated slope for each boundary. Under surge conditions, Laguna Madre was set to 11-ft storm surge that was determined by the FEMA FIRM panels by setting a boundary stage hydrograph at a constant elevation of 11-ft. For non-surge conditions, the boundary that borders Laguna Madre was set to normal depth like the other boundary conditions. Since this is a coastal area the grid size was set 100' x 100'. The breaklines were then applied to depict the

## **CITY OF CORPUS CHRISTI**

### **Stormwater Master Plan Supporting Document**

changes of elevations more accurately with road and channel centerlines, which was applied to the created grid.

The initial results were existing and ultimate 100-year storm events with surge and no surge. From this the exact divide between the ICM and ROG halves was determined. Also, based on the existing conditions non-surge results, a count of properties potentially affected by flooding was done to determine possible PMA's identify potential proposed conditions. Reference **Exhibit 13** for ROG results.

#### ***PMA Identification***

Initially, a total of 26 PMA's was determined for all of Flour Bluff based on 100-year flood inundation (including any depth of flooding). Based on discussions with the city, PMA's were reassessed based on the 10-year, 12" depth inundation discussed previously. Out of the 26 PMA's, three (3) were further analyzed, and ultimately one (1) PMA was selected for a proposed master plan project.

#### ***Proposed Conditions***

Proposed storm drain improvements were simulated by "cutting in" representative trenches along the proposed storm drain alignments. Channel improvements downstream of the pipe improvements involved widening and deepening the channels. Proposed master plan projects are included in **Appendix C**.

#### **North Beach & The Island**

Certain areas of Corpus Christi have stormwater management issues that are primarily based on storm surge and the impacts of FEMA velocity (VE) zones. These areas include North Beach and Mustang/North Padre Islands (The Island). As shown in the figures below, the FEMA floodplain encompasses nearly all of North Beach and The Island. Due to this constraint, the master plan does not include any stormwater projects for these areas.

# CITY OF CORPUS CHRISTI Stormwater Master Plan Supporting Document

Figure 1. North Beach Floodplain





**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

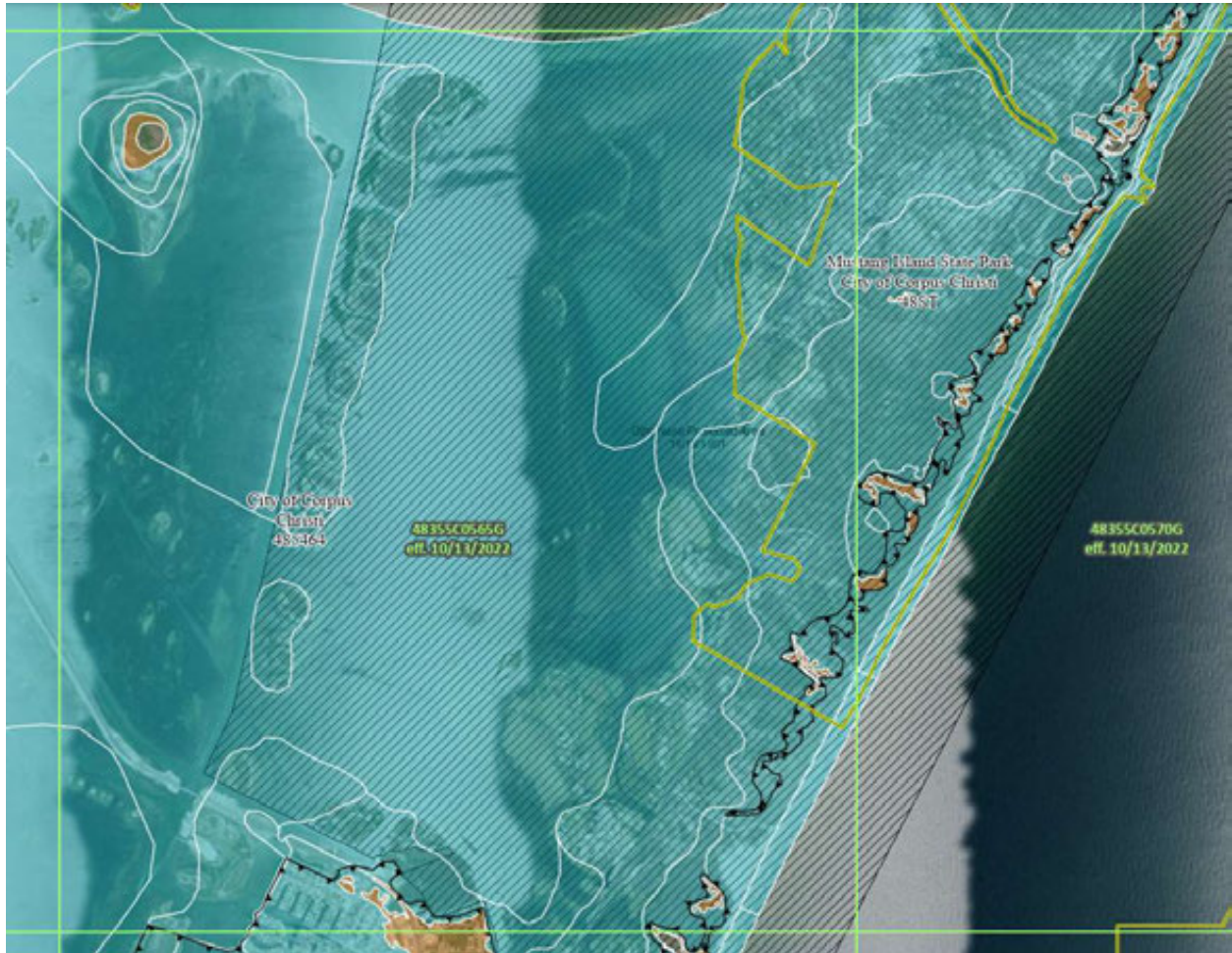
**Figure 2. North Padre Island Floodplain**





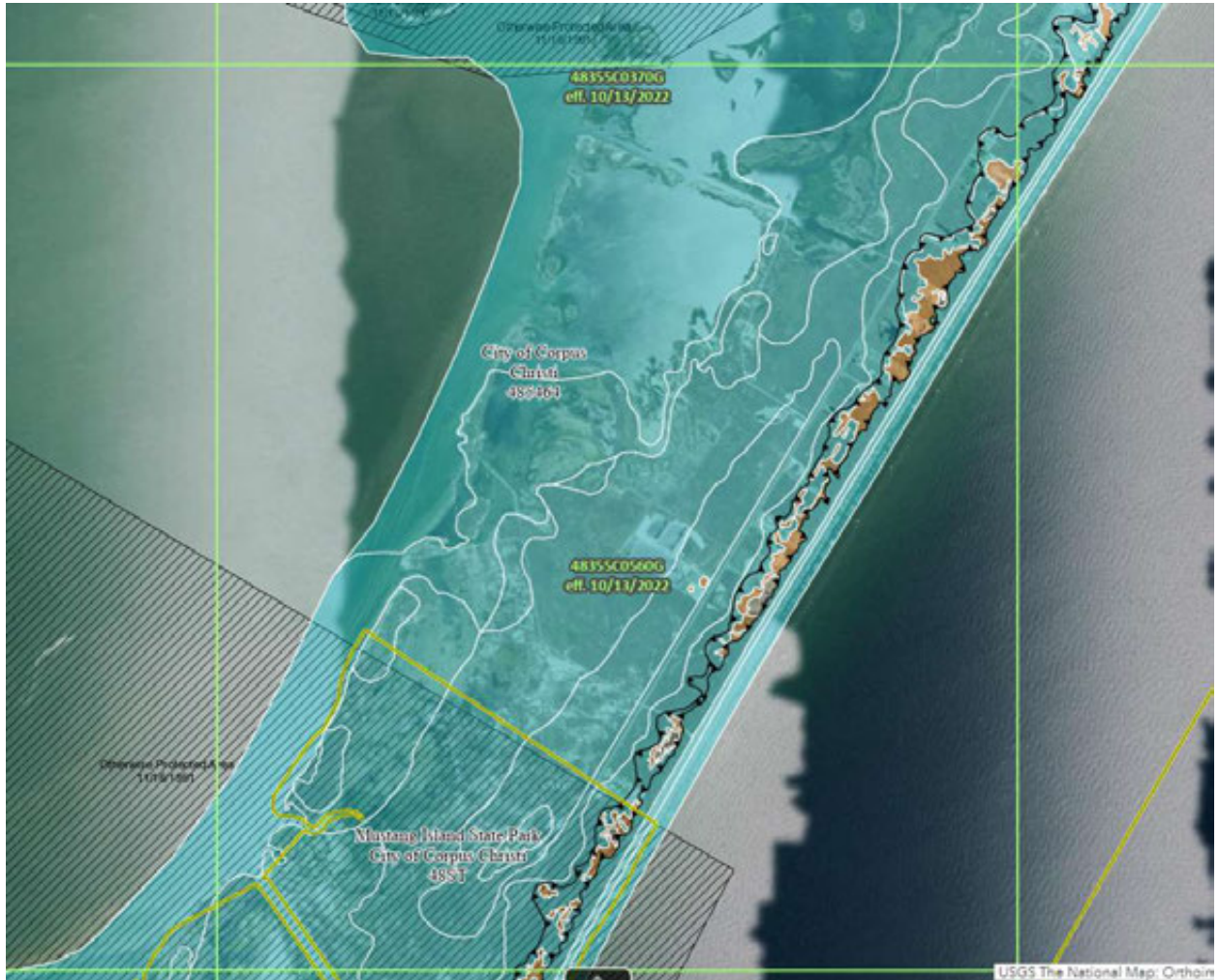
**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Figure 3. Mustang Island Floodplain**



**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Figure 4. Mustand Island Floodplain**



# CITY OF CORPUS CHRISTI

## Stormwater Master Plan Supporting Document

### POTENTIAL MITIGATION AREA (PMA) DETERMINATION

#### Potential Mitigation Area (PMA) Determination

Pape-Dawson worked with city staff to determine the appropriate identifiers for areas of risk, or “Potential Mitigation Areas” in the developed areas. Several options for identifying PMAs were explored including flood risk for 100-year events assuming >6” or >12” flooding depths and 10-year events assuming >6” or 12” flooding depths. Initial discussions also included potentially evaluating lengths of roadways that were shown to be flooded by a certain depth during a certain storm.

Ultimately, it was decided that the deciding indicator for PMAs would be the 10-year storm event, which 12” or more depth of flooding. In other words, if a building was shown to have 12” or more flood depths adjacent to the structure during a 10-year storm, it was counted as a Potentially Inundated Structure (PIS). If a building was shown to have less than 12” of flood depths adjacent to the structure during a 10-year storm, it was not counted. The 10-year, 12” metric is intended to be a relative measurement of risk. The assessment is not intended to claim that structures outside of this delineation are not at risk, nor that all structures in the delineation are certainly at risk.

A summary of PMAs, structure counts, and proposed projects are included in **Tables 8, 9, and 10**.

#### Proposed Projects

Proposed projects were created for PMAs, and iterations of project limits and scope were conducted until a list of proposed master plan projects were finalized. The proposed projects were included because they showed net positive benefit from the proposed improvements. Some projects are shown as one (1) project, but in practice may be broken up into multiple, smaller phased projects. Some projects could also be combined.

In the undeveloped areas of the Oso Creek basin, projects were determined based on long-term benefit for adding capacity to the watershed, and not just mitigating immediate issues. Therefore, the PMA process for the ICM areas was not followed for the Oso Creek areas.



**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

A list of proposed projects with descriptions is included in **Table 8**. Proposed projects are illustrated citywide in **Appendix B**. Individual project sheets with inundation limits are shown in **Appendices C and D**.

**Table 8. Project Descriptions**

<b>Project Name</b>	<b>Drainage Service Area</b>	<b>Project Description</b>
01-B	G	Channel improvements between Glen Oak and Waldron Road, and proposed storm drain system improvements upstream of Glen Oak to relieve neighborhood flooding.
03-A	A	Storm drain/culvert improvements along Edgebrook Dr, Wake Forest Dr, Pepper Mill Dr, Woodgate Dr, Heavens Gate Dr, Timbergate Dr, and Hunt Dr; and channel improvements along Lipes Blvd and across Yorktown Blvd to relieve neighborhood flooding.
04-A	A	Channel improvements along Flynn Parkway; storm drain improvements along Cobblestone Ln, Oxford Dr, and Philippine Dr; and culvert improvements at Holly Rd to reduce neighborhood flooding. Drains to project 4-B.
04-B	A	Channel improvements along Shea Parkway and Flynn Parkway to Saratoga Blvd; and storm drain improvements along Killarmet Dr to reduce neighborhood flooding. Accepts runoff from project 4-A.
04-D	A	Channel improvements from Saratoga through Acushnet Park and along Grand Junction Dr to Oso Creek; and storm drain improvements along Middlecoff Rd and nearby streets to reduce neighborhood flooding. Accepts runoff from projects 4-A, and 4-B.
05-A	A	Storm drain system improvements along Carroll Ln and Waterloo Dr systems; channel and storm drain improvements along Carroll Ln to Saratoga Blvd; and culvert improvements at Holly Rd and Kostoryz Rd to reduce neighborhood flooding. Accepts runoff from project 5-B.
05-B	A	Channel and storm drain improvements along Civitan Dr and Richter St; culvert improvements at Holly Rd; and channel and storm drain system improvements from Holly Rd to Kostoryz Rd to reduce neighborhood flooding. Drains to project 5-A.
06-A	A	Storm drain system improvements along Old Brownsville Rd, Lawton St, Washington St, and Post Ave; and channel improvements along Airport Rd and Post Rd to reduce flooding to neighborhoods and businesses.
10-B2	F	Storm drain system improvements along Lipes Blvd, and Boardwalk Ave; storm drain and culvert improvements along Cimarron Blvd; and channel improvements from Boardwalk Ave to downstream of Cimarron Blvd to reduce neighborhood flooding.

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

<b>Project Name</b>	<b>Drainage Service Area</b>	<b>Project Description</b>
10-C	F	Channel improvements from Vaughan Dr to N Oso Parkway and nearby storm drain improvements to reduce neighborhood flooding.
10-D	F	Storm drain improvements along Brooke Rd and Airline Rd; channel improvements along Brooke Rd; and channel and improvements from near Cimarron Blvd to Oso Bay including culvert improvements at Rodd Field Rd to reduce neighborhood flooding.
11-A	F	Channel and storm drain system improvements along Williams Dr from current Williams Ditch project upstream to Staples St to reduce flooding for neighborhoods and businesses.
12-A	E	Storm drain improvements along Gollihar Rd and S. Staples St; and channel improvements from Airline Rd to Oso Municipal Golf Course to relieve flooding for neighborhoods and businesses.
12-B	E	Storm drain system improvements along Shephard Dr and across Whitaker Dr and Cleopatra Dr to reduce neighborhood flooding.
12-C	E	Storm drain system improvements along Alameda from Ronson Dr to Glenmore Street to reduce neighborhood and street flooding.
13-A	E	Storm drain system improvements along S. Port Ave, across Crosstown Expressway, and along Shely St; and culvert and storm drain improvements along Logan and Louisiana to reduce flooding west of Crosstown and near Staples and Brownlee.
13-C	E	Culvert and channel improvements along Brawner Pkwy from Ramsey St to Corpus Christi Bay; and storm drain system improvements along S Staples St from Buccaneer Dr to Brawner to relieve neighborhood flooding.
13-D	E	Storm drain system improvements along Gollihar Rd, Weber Rd, McArdle Rd, and Carmel Pkwy; and culvert improvements along Carmel Pkwy to relive neighborhood flooding.
13-E	E	Channel improvements along Carmel Pkwy from S. Staples St to Corpus Christi Bay; and storm drain improvements along Santa Fe St to reduce neighborhood flooding. Accepts runoff from project 13-D.
13-F	E	Storm drain improvements along Ashland Dr and Airline Rd from S Alameda St to Corpus Christi Bay to relieve neighborhood flooding.
14-A2	D	Storm drain system improvements along S. 19th St from Hospital St to Comanche St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.
14-B	D	Storm drain system improvements along Old Robstown Rd and Nueces Bay Blvd from Liberty Dr to I-37 to relieve flooding for neighborhoods and businesses.
14-C	D	Storm drain system improvements along S. Brownlee Blvd and Marguerite St from 16th St to King St to relieve neighborhood

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

Project Name	Drainage Service Area	Project Description
		flooding. Drains toward downtown system with storm water pump station.
15-D1	C	Storm drain improvements along McKinzie, Mayfield Dr and Starlite Ln, and Tumbleweed Dr and Rockwood St; and channel improvements from Rockwood St to Leopard to reduce flooding for neighborhoods and businesses.
Oso 1	A	Channel improvements to widen and deepen main channel along centerline of Oso Creek from La Volla Creek confluence to Oso Bay to improve conveyance and provide additional capacity within the high banks of Oso Creek.
Oso 2	A	Channel improvements along London Ditch from Crosstown Expwy to Oso Creek; and channel improvements along ditches/tributaries in London Area to provide conveyance through London area including potential Nueces County and TxDOT improvements.
Oso 3	A	Channel improvements to widen and deepen main channel along centerline of Oso Creek from Hwy 44 downstream to La Volla Creek confluence to improve conveyance and provide additional capacity within the high banks of Oso Creek.
Oso 4	A	Improvements to Clarkwood Ditch/Oso Trib 14 from Hwy 44 to Oso Creek; and potential detention pond north of Hwy 44 to reduce flooding along Clarkwood Rd, near Hwy 44, and in nearby properties.
Oso 5	A	Channel improvements along the centerline of West Oso Creek to improve conveyance to Oso Creek.

**COST & BENEFIT FACTORS**

Proposed projects have been developed to address the identified capacity constraints that currently exist and that are anticipated based on potential development. To provide a reasonable estimate of cost for the proposed projects cost factors have been developed that can be applied proposed work to develop a budgetary level estimate of project costs. Estimates of cost are high level and are based on generally accepted construction practices, overall capacity needs, materials, sizes, and depth of various system components and are not based on a specific design.

Unless otherwise noted, costs were developed based on an estimate of the direct construction costs. Program costs were then added as a percentage of the construction cost as noted in **Table 9**.

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 9. Project Costs**

<b>Expenditure</b>	<b>Cost (As a Percent of Direct Cost)</b>
Direct Construction Cost	0 (base cost)
Mobilization	10%
Bonds and Insurance	5%
Overhead and Profit	10%
Design and Inspection	15%
Contingency	30%

Implementation schedules for individual projects will be a function of funding availability, growth, and other factors that are not predictable. Costs are provided in 2023 dollar values and an appropriate time based escalation factor should be included depending on the actual implementation schedule determined by the City.

**Benefits**

Benefits were calculated for the projects in the developed areas, based simply on the reduction of Potentially Inundated Structures for the proposed 10-year, 12” delineation when compared to the existing 10-year 12” delineation. Cost-benefit ratios were calculated by dividing the reduction in Potentially Inundated Structures into the project cost. The associated ratio has units of \$/structure. Projects were ranked for overall benefit, overall cost, and overall cost-benefit ratio.

**Capital Improvements**

The proposed Stormwater Master Plan capital improvement projects and their benefits and costs are summarized in **Tables 10, 11, and 12** below. A list of proposed projects with descriptions is included in **Table 8** and are illustrated citywide in **Appendix B**. Individual project sheets are shown in **Appendices C and D**.

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 10. Project Benefits - Risk Reduction (Excluding Oso Creek)**

Project Name	Drainage Service Area	Potentially Inundated Structures (10-year storm, 12" depth)		
		Existing Conditions	Proposed Conditions	Reduced Risk (Ex - Prop)
01-B	G	52	20	32
03-A	A	102	56	46
04-A	A	124	43	81
04-B	A	127	44	83
04-D	A	115	109	6
05-A	A	143	69	74
05-B	A	157	70	87
06-A	A	164	125	39
10-B2	F	150	123	27
10-C	F	101	51	50
10-D	F	51	39	12
11-A	F	542	512	30
12-A	E	98	62	36
12-B	E	48	39	9
12-C	E	30	14	16
13-A	E	77	67	10
13-C	E	192	132	60
13-D	E	354	279	75
13-E	E	42	32	10
13-F	E	60	22	38
14-A2	D	25	4	21
14-B	D	195	148	47
14-C	D	17	8	9
15-D1	C	99	76	23
<b>Totals:</b>	<b>N/A</b>	<b>3747</b>	<b>2852</b>	<b>895</b>



**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 11. Project Benefits and Cost (Excluding Oso Creek)**

<b>Project Name</b>	<b>Drainage Service Area</b>	<b>Reduced Risk (Ex - Prop)</b>	<b>Cost (2023 \$)</b>
01-B	G	32	\$ 10,343,481
03-A	A	46	\$ 29,999,937
04-A	A	81	\$ 13,349,233
04-B	A	83	\$ 8,008,974
04-D	A	6	\$ 17,442,995
05-A	A	74	\$ 37,708,444
05-B	A	87	\$ 25,402,283
06-A	A	39	\$ 39,305,365
10-B2	F	27	\$ 27,708,972
10-C	F	50	\$ 9,868,445
10-D	F	12	\$ 22,232,222
11-A	F	30	\$ 30,202,930
12-A	E	36	\$ 17,046,402
12-B	E	9	\$ 4,808,524
12-C	E	16	\$ 12,224,624
13-A	E	10	\$ 33,233,238
13-C	E	60	\$ 61,485,822
13-D	E	75	\$ 47,243,760
13-E	E	10	\$ 6,090,820
13-F	E	38	\$ 20,702,150
14-A2	D	21	\$ 17,721,936
14-B	D	47	\$ 27,357,346
14-C	D	9	\$ 12,230,158
15-D1	C	23	\$ 21,703,877
<b>Totals:</b>	<b>N/A</b>	<b>895</b>	<b>\$ 553,421,937</b>

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 12. Project Cost Benefit Ratio (Excluding Oso Creek)**

Project Name	Drainage Service Area	Cost (2023 \$)	Cost Rank	Cost-Benefit Ratio (\$/structure)	CBR Rank
01-B	G	\$ 10,343,481	5	\$ 323,234	5
03-A	A	\$ 29,999,937	18	\$ 652,173	13
04-A	A	\$ 13,349,233	8	\$ 164,805	2
04-B	A	\$ 8,008,974	3	\$ 96,494	1
04-D	A	\$ 17,442,995	10	\$ 2,907,166	23
05-A	A	\$ 37,708,444	21	\$ 509,574	7
05-B	A	\$ 25,402,283	15	\$ 291,980	4
06-A	A	\$ 39,305,365	22	\$ 1,007,830	19
10-B2	F	\$ 27,708,972	17	\$ 1,026,258	20
10-C	F	\$ 9,868,445	4	\$ 197,369	3
10-D	F	\$ 22,232,222	14	\$ 1,852,685	22
11-A	F	\$ 30,202,930	19	\$ 1,006,764	17
12-A	E	\$ 17,046,401	9	\$ 473,511	6
12-B	E	\$ 4,808,524	1	\$ 534,280	8
12-C	E	\$ 12,224,624	6	\$ 764,039	14
13-A	E	\$ 33,233,238	20	\$ 3,323,324	24
13-C	E	\$ 61,485,822	24	\$ 1,024,764	19
13-D	E	\$ 47,243,760	23	\$ 629,917	12
13-E	E	\$ 6,090,820	2	\$ 609,082	11
13-F	E	\$ 20,702,150	12	\$ 544,793	9
14-A2	D	\$ 17,721,936	11	\$ 843,902	15
14-B	D	\$ 27,357,346	16	\$ 582,071	10
14-C	D	\$ 12,230,158	7	\$ 1,358,906	21
15-D1	C	\$ 21,703,877	13	\$ 943,647	17
<b>Totals:</b>	<b>N/A</b>	<b>\$ 553,421,937</b>			

**CITY OF CORPUS CHRISTI**  
**Stormwater Master Plan Supporting Document**

**Table 13. Oso Creek Basin Project Costs**

<b>Project Name</b>	<b>Drainage Service Area</b>	<b>Cost (2023 \$)</b>
Oso 1	A	\$ 52,962,272
Oso 2	A	\$ 10,981,578
Oso 3	A	\$ 27,782,173
Oso 4	A	\$ 39,937,821
Oso 5	A	\$ 11,909,572
<b>Totals</b>	<b>A</b>	<b>\$ 143,573,415</b>

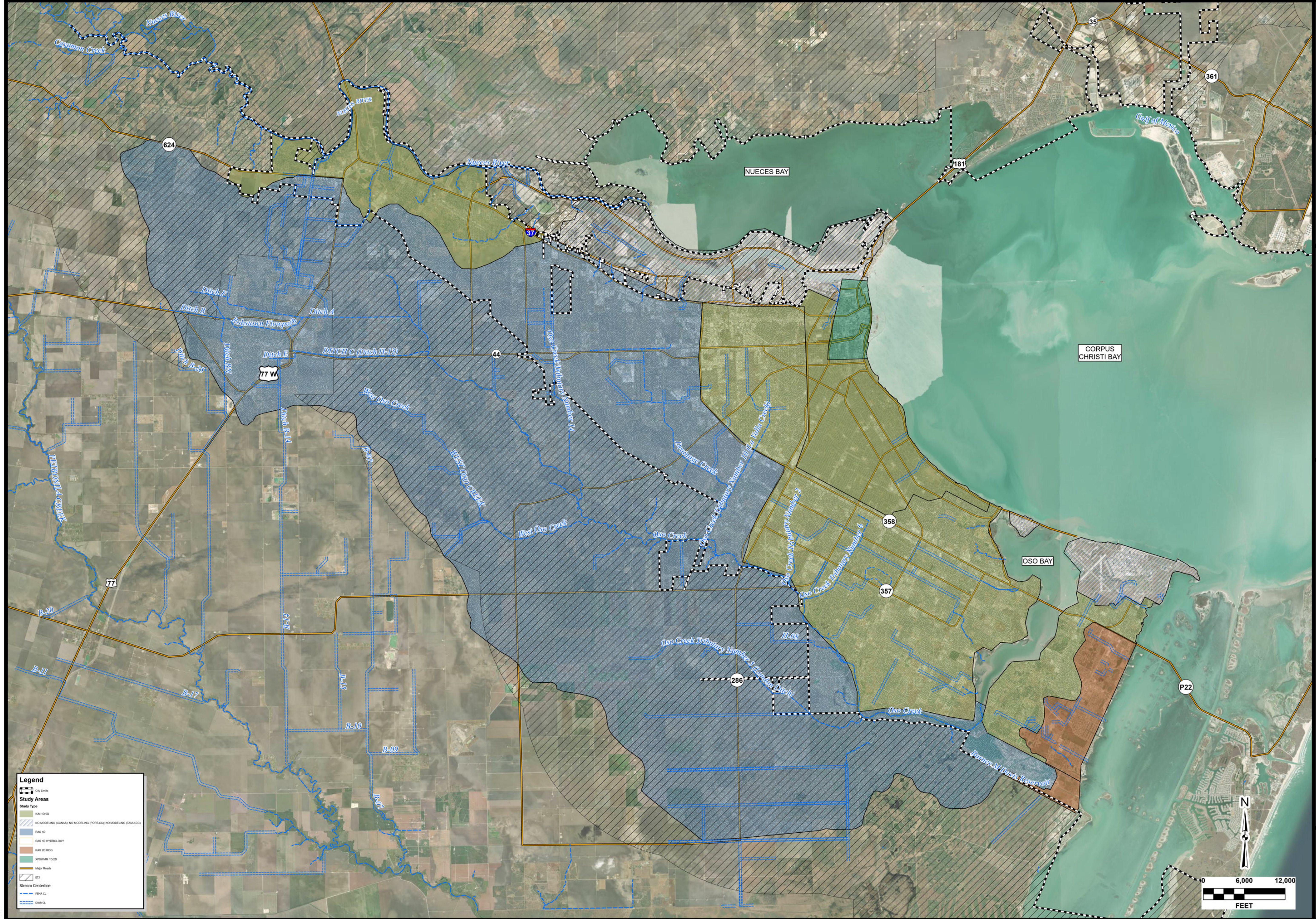
# **EXHIBITS**

**EXHIBIT 1**  
**Overall H&H Method**



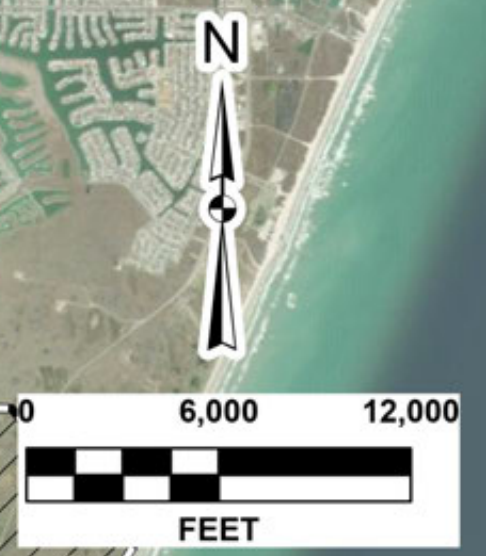
Date: Aug 23, 2023 11:54 AM User: RGenz

File:



**Legend**

- City Limits
- Study Areas**
- Study Type
  - ICM 1D/2D
  - NO MODELING (CNMA), NO MODELING (PORT-CL), NO MODELING (DMA/CC)
  - RAS 1D
  - RAS 1D HYDROLOGY
  - RAS 2D R005
  - APSWMM 1D/2D
- Major Roads
- ETI
- Stream Centerline
- FEMA CL
- Ditch CL



NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 1D & 2D HYDROLOGIC STUDY  
 OVERALL  
 H&H METHOD EXHIBIT

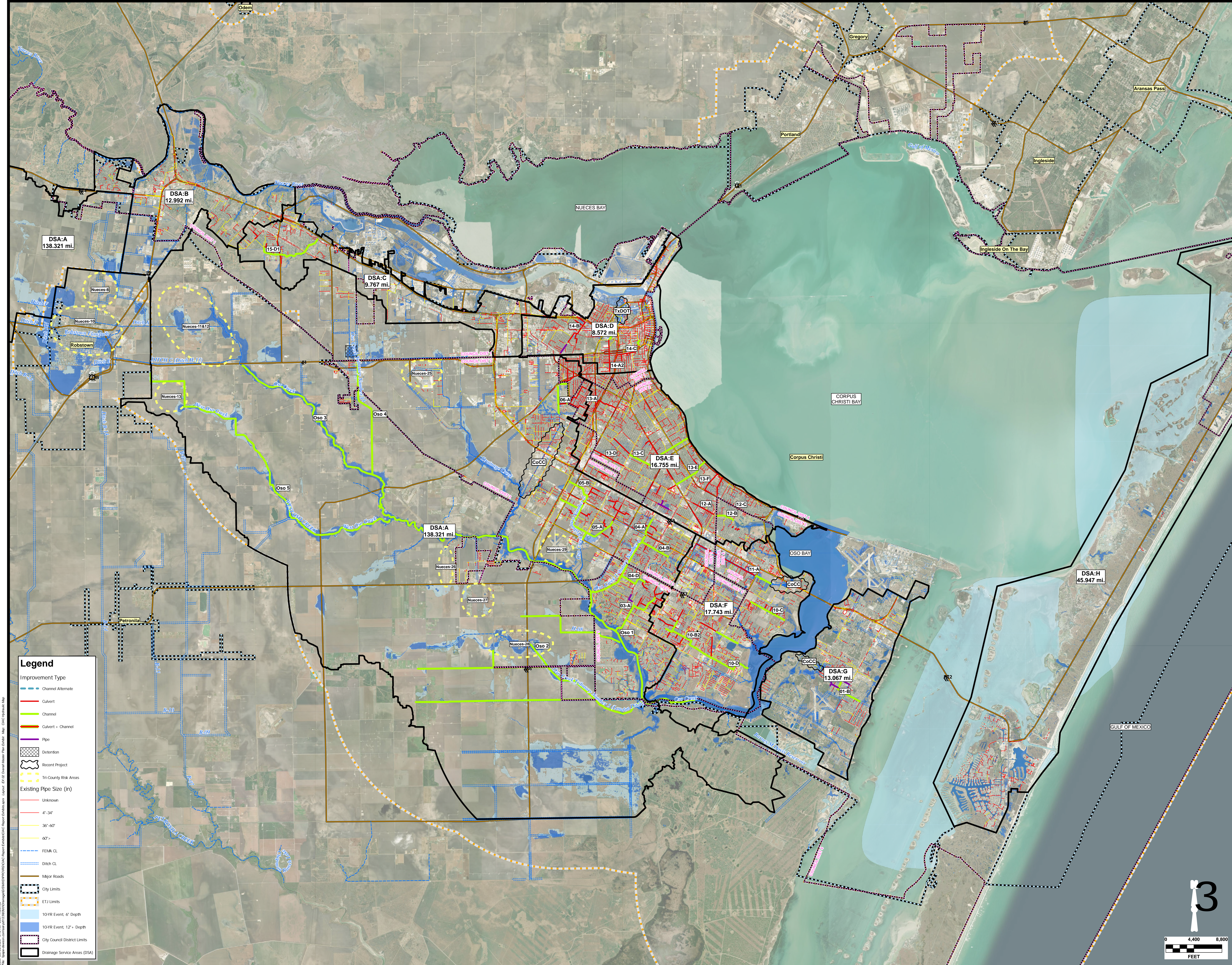
PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	EX 1

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.



**EXHIBIT 2**  
**Overall Master Plan**





**Legend**

**Improvement Type**

- Channel Alternate
- Culvert
- Channel
- Culvert + Channel
- Pipe
- Detention
- Recent Project
- Tri-County Risk Areas

**Existing Pipe Size (in)**

- Unknown
- 4'-34"
- 36'-60"
- 60"

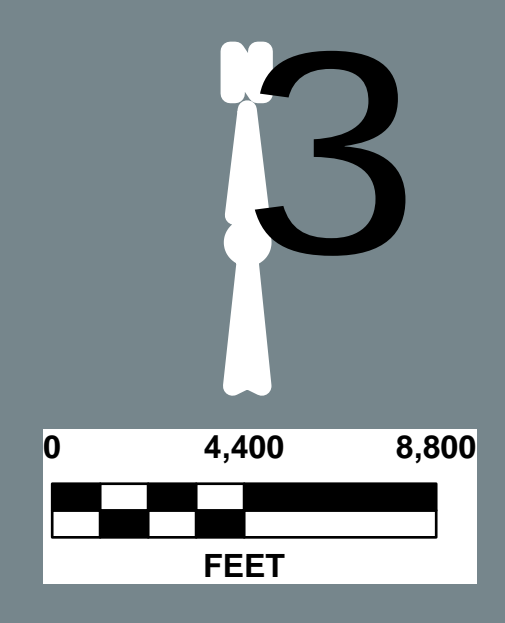
**Other Features**

- FEMA CL
- Ditch CL
- Major Roads
- City Limits
- ETJ Limits
- 10YR Event, 6" Depth
- 10YR Event, 12" Depth
- City Council District Limits
- Drainage Service Areas (DSA)

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 2000 W LOOP 101, SUITE 101, SAN ANTONIO, TX 78201 | 210.375.0000  
 TEXAS ENGINEERING FIRM #01178453 | TEXAS SURVEYING FIRM #10038800

**CITY OF CORPUS CHRISTI**  
 COMPREHENSIVE MASTER PLAN  
 OVERALL STORMWATER MASTER PLAN EXHIBIT



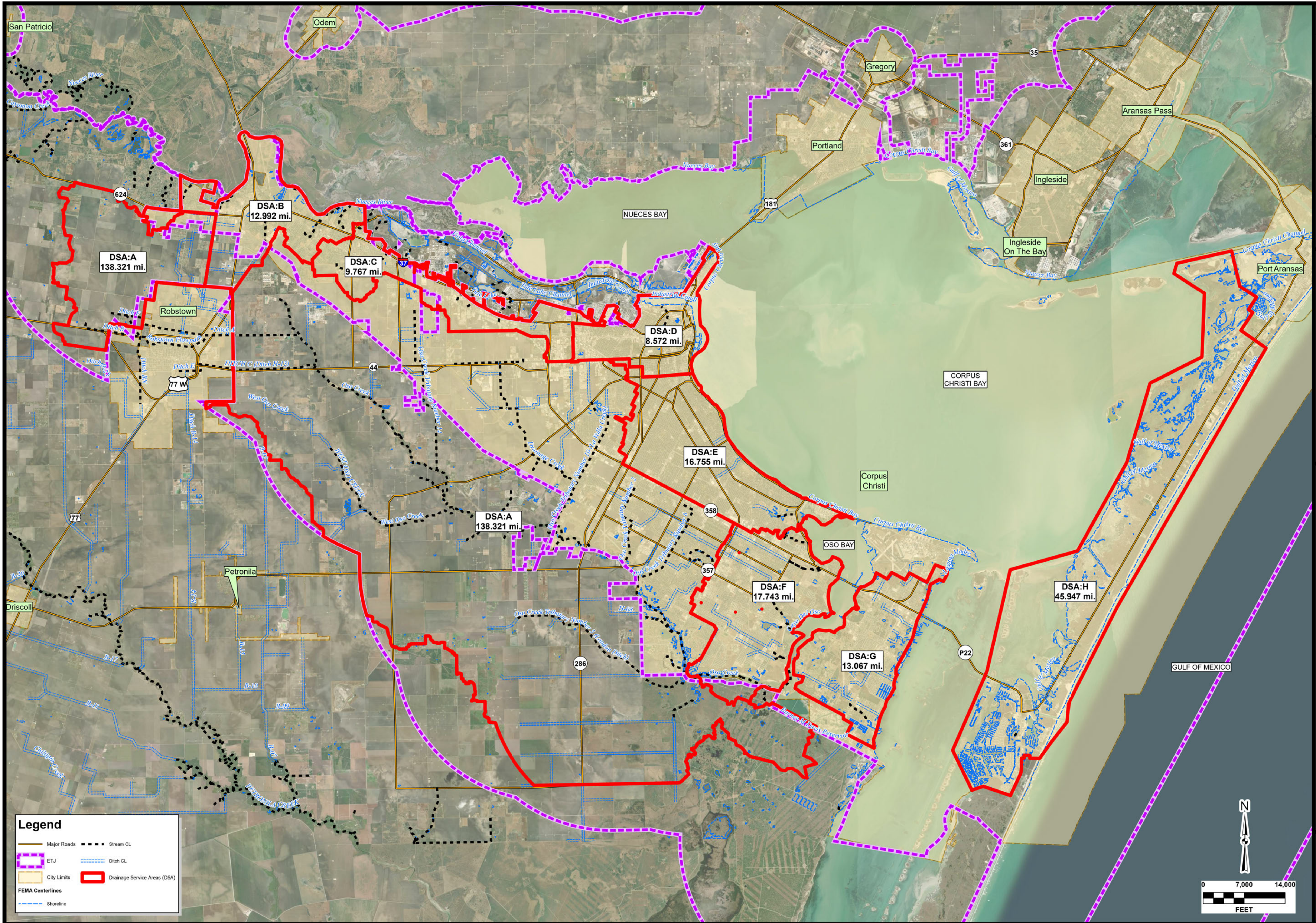
PLAT NO.	
JOB NO.	12383-00
DATE	Oct 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	EX 2

DATE: 09/20/2023 8:46:44 AM User: R0000000  
 THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN MODIFIED OR ALTERED. REFERENCE TO ANY ORIGINAL MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL, APPLICABLE WHERE REQUIRED, IS HEREBY DEEMED TO HAVE BEEN MADE.



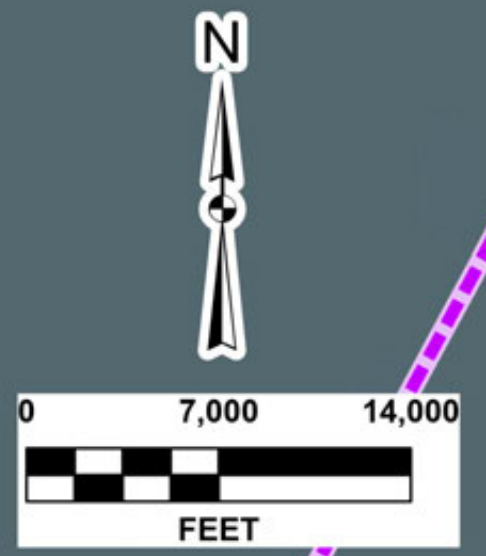
**EXHIBIT 3**  
**Drainage Service Areas**





**Legend**

- Major Roads
- Stream CL
- ETJ
- Ditch CL
- City Limits
- Drainage Service Areas (DSA)
- FEMA Centerlines
- Shoreline



NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 STORMWATER MASTER PLAN  
 DRAINAGE SERVICE AREA MAP

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	<b>EX 3</b>

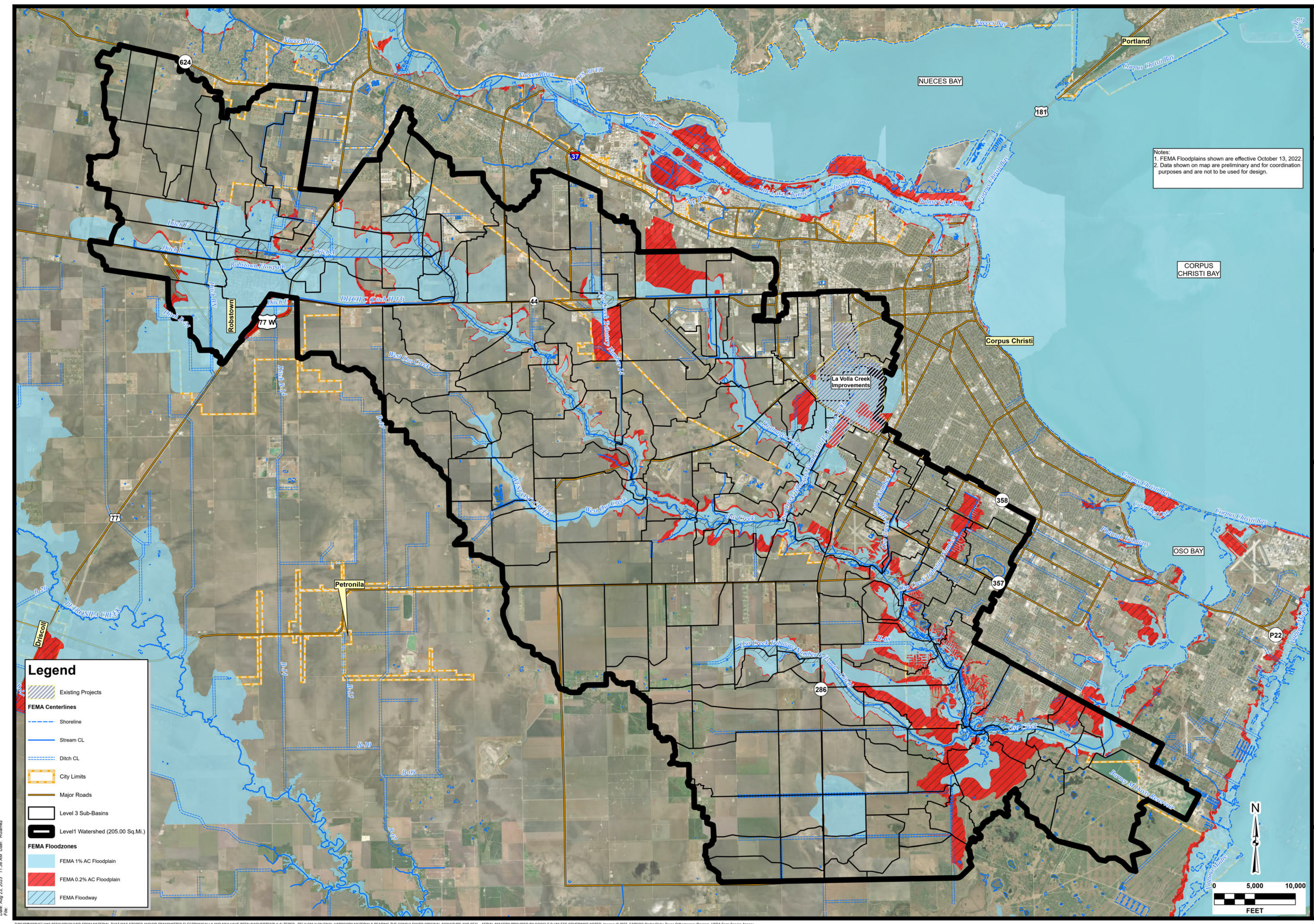
Date: Aug 23, 2023 11:56 AM User: RGenz

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.



**EXHIBIT 4**  
**FEMA Floodplains**





Notes:  
 1. FEMA Floodplains shown are effective October 13, 2022.  
 2. Data shown on map are preliminary and for coordination purposes and are not to be used for design.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 COMPREHENSIVE MASTER PLAN  
 FEMA FLOODPLAINS

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	EX 4

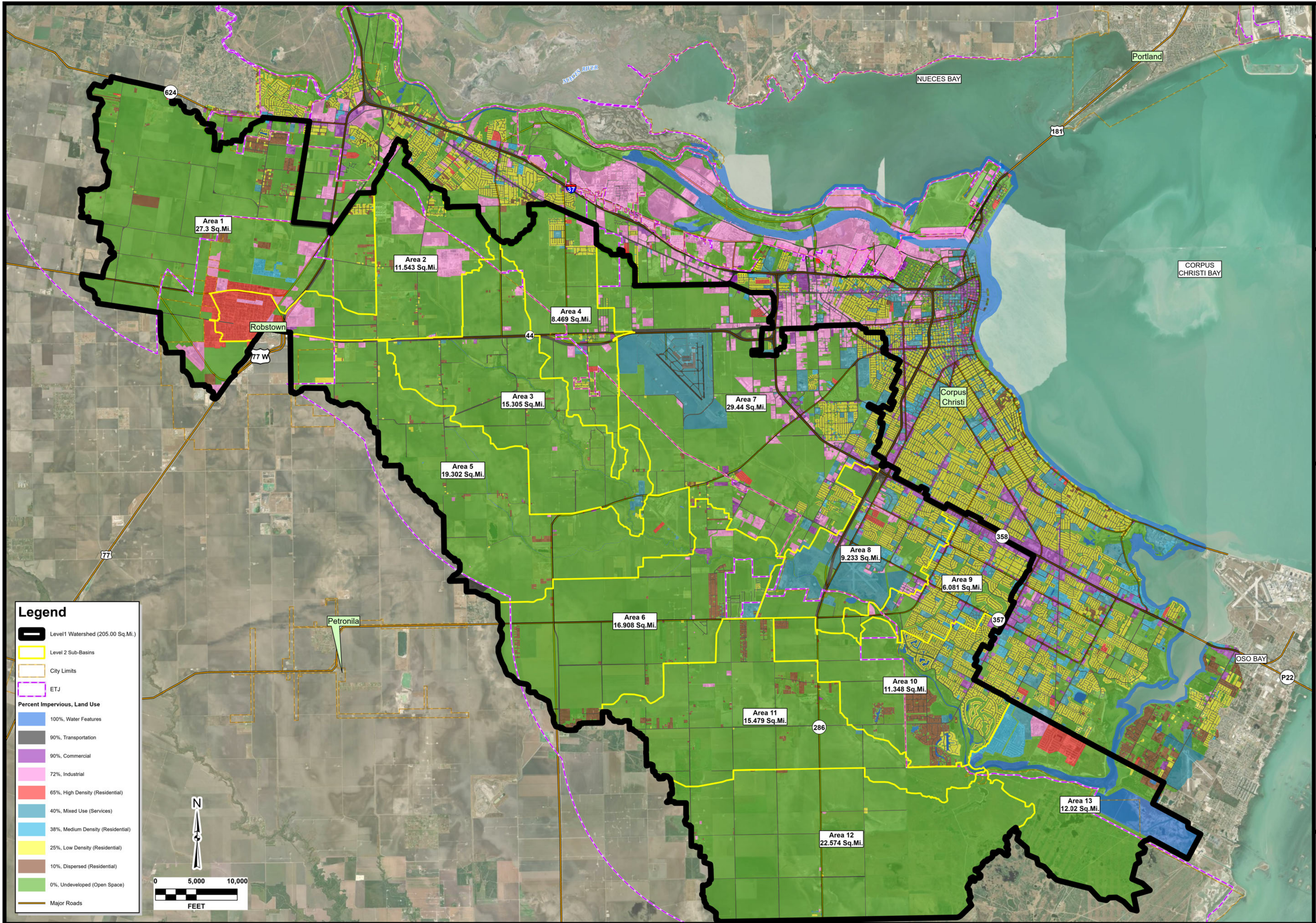
Date: Aug 23, 2023 11:39 AM User: RGomez  
 File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.



**EXHIBIT 5**  
**Existing Conditions Land Use**





**Legend**

- Level 1 Watershed (205.00 Sq. Mi.)
- Level 2 Sub-Basins
- City Limits
- ETJ

**Percent Impervious, Land Use**

- 100%, Water Features
- 90%, Transportation
- 90%, Commercial
- 72%, Industrial
- 65%, High Density (Residential)
- 40%, Mixed Use (Services)
- 38%, Medium Density (Residential)
- 25%, Low Density (Residential)
- 10%, Dispersed (Residential)
- 0%, Undeveloped (Open Space)

Major Roads



Date: Aug 23, 2023 12:02 PM User: RGamez File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

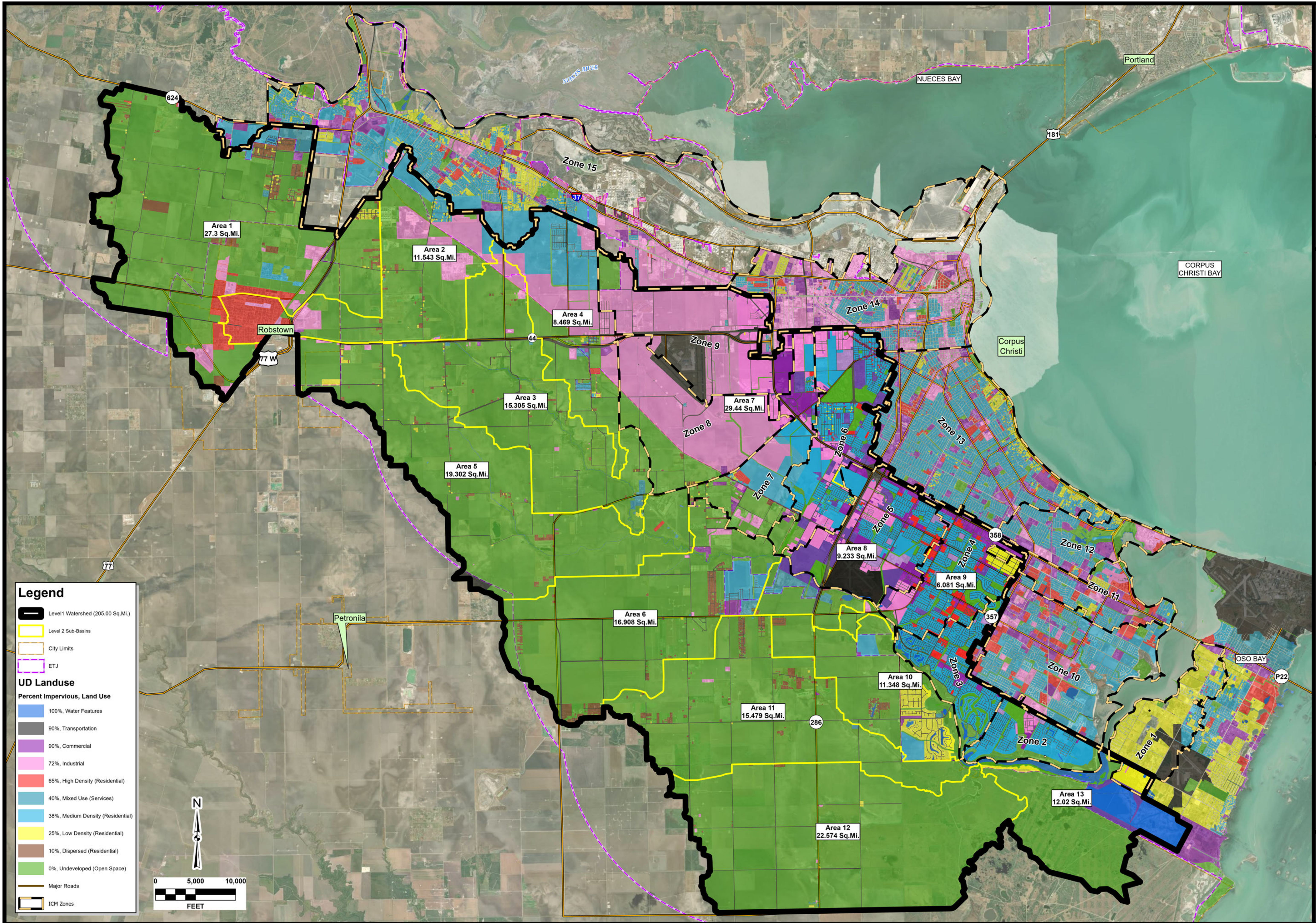
**CITY OF CORPUS CHRISTI**  
 1D HYDROLOGIC STUDY  
 EXISTING CONDITIONS LAND USE

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	<b>EX 5</b>



**EXHIBIT 6**  
**Proposed Conditions (10-Year)**  
**Land Use**





**Legend**

- Level1 Watershed (205.00 Sq.Mi.)
- Level 2 Sub-Basins
- City Limits
- ETJ

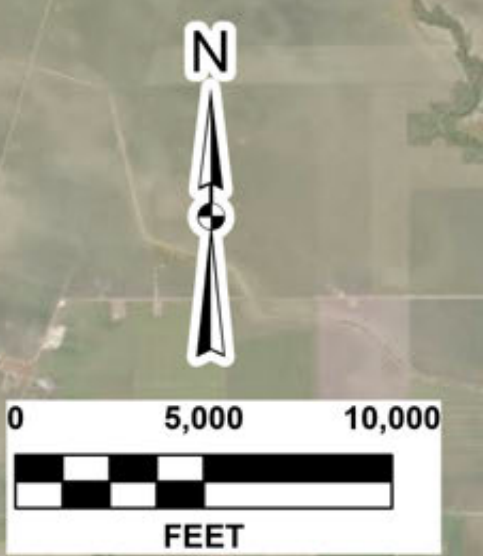
**UD Landuse**

**Percent Impervious, Land Use**

- 100%, Water Features
- 90%, Transportation
- 90%, Commercial
- 72%, Industrial
- 65%, High Density (Residential)
- 40%, Mixed Use (Services)
- 38%, Medium Density (Residential)
- 25%, Low Density (Residential)
- 10%, Dispersed (Residential)
- 0%, Undeveloped (Open Space)

Major Roads

ICM Zones



NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 1D HYDROLOGIC STUDY  
**PROPOSED CONDITIONS (10-YEAR) LAND USE**

PLAT NO. --  
 JOB NO. 12383-00  
 DATE Aug 2023  
 DESIGNER BES  
 CHECKED JP DRAWN RG  
 SHEET **EX 6**

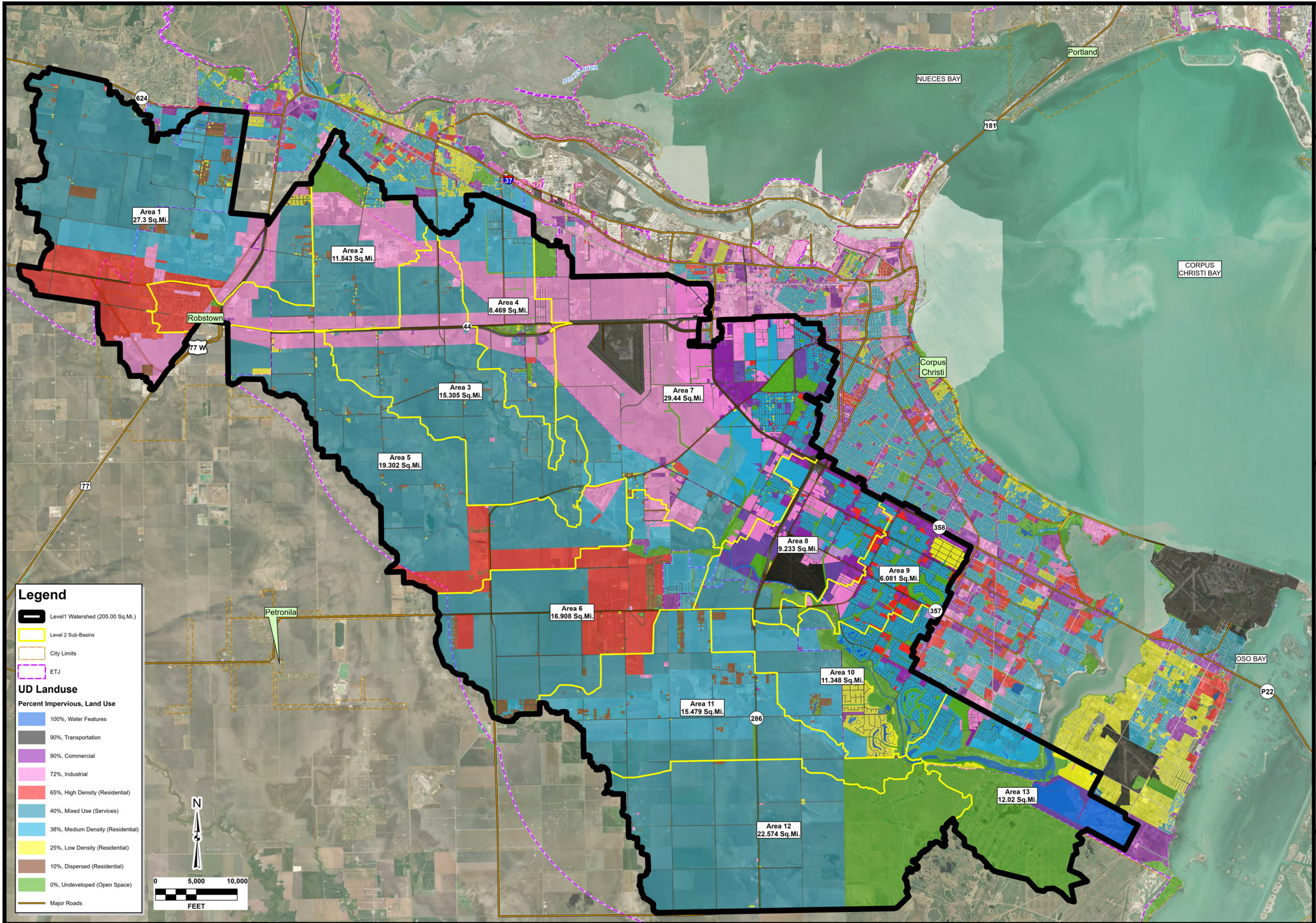
Date: Aug 23, 2023 12:39 PM User: RGomez File: ...

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.



**EXHIBIT 7**  
**Ultimate Conditions Land Use**





Date: Aug 23, 2023 12:17 PM User: RGenetz  
File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

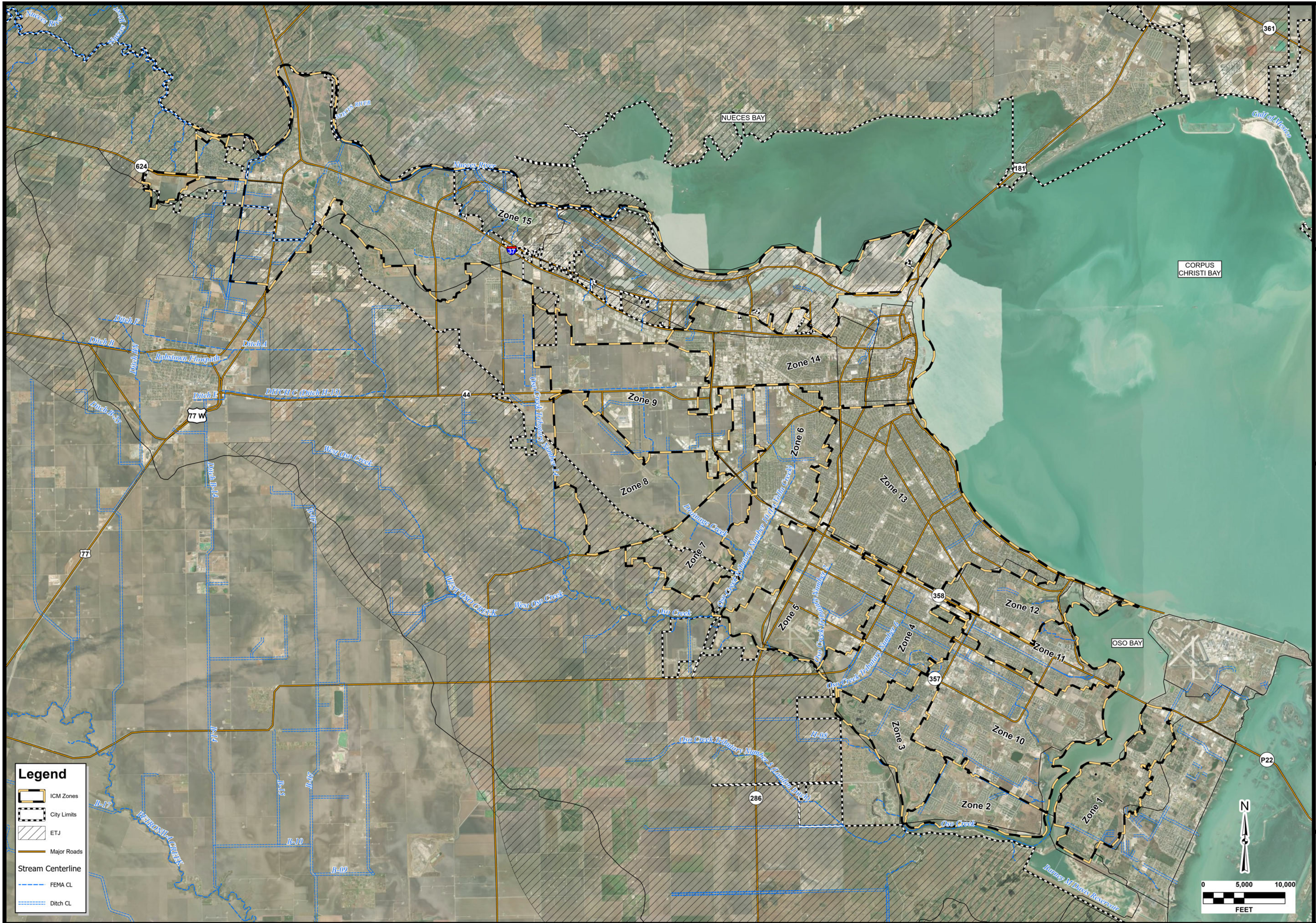
**CITY OF CORPUS CHRISTI**  
 1D HYDROLOGIC STUDY  
 ULTIMATE CONDITIONS LAND USE

PLAT NO.	--
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	EX 7



**EXHIBIT 8**  
**ICM Zones**

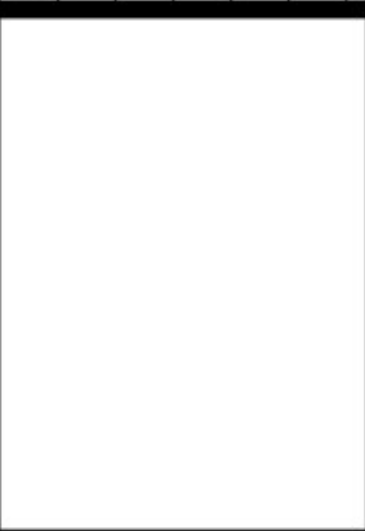




Date: Aug 23, 2023 12:28 PM User: RGenarez  
File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE



**PAPE-DAWSON  
ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

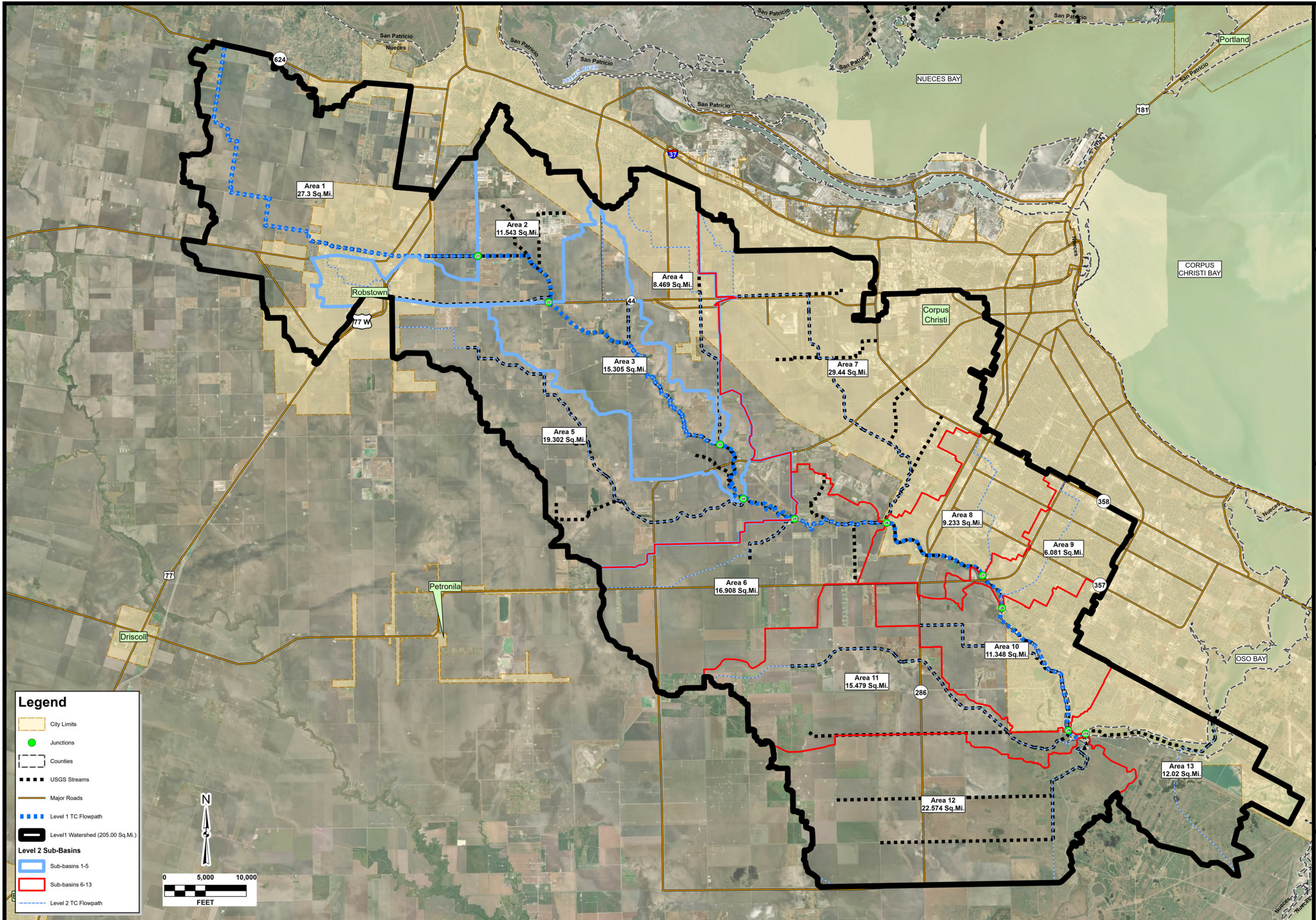
**CITY OF CORPUS CHRISTI**  
 1D & 2D HYDROLOGIC STUDY  
 ICM ZONES

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	<b>EX 8</b>



**EXHIBIT 9**  
**Level 1 and 2 Watersheds**  
**(Oso Creek)**





Date: Aug 23, 2023 12:22 PM User: RGenarez  
 File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

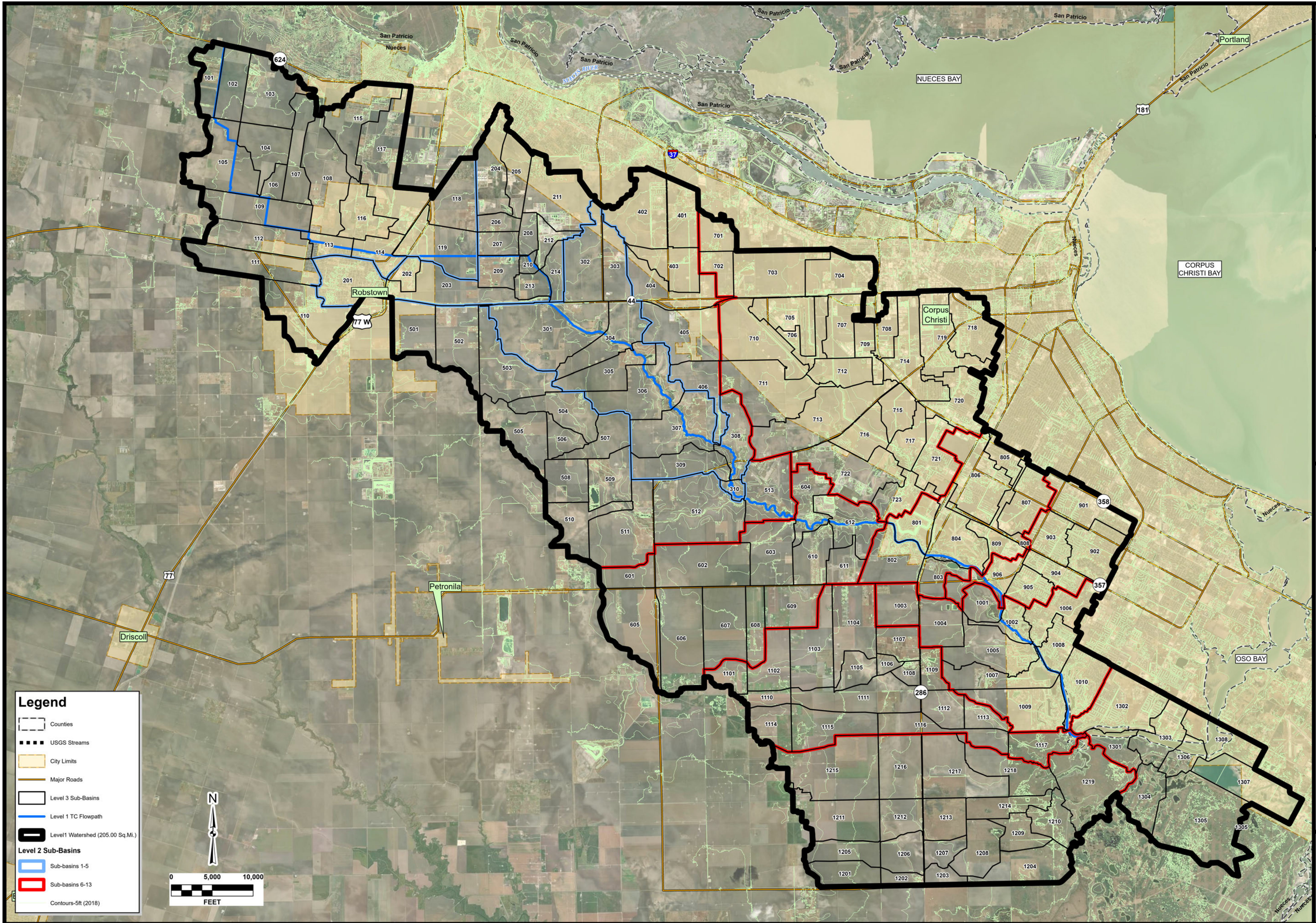
**CITY OF CORPUS CHRISTI**  
 1D HYDROLOGIC STUDY  
**LEVEL 1 & 2 WATERSHEDS (OSO CREEK)**

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	<b>EX 9</b>



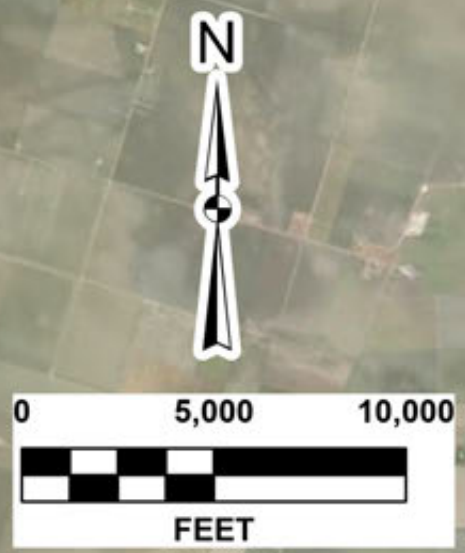
**EXHIBIT 10**  
**Level 3 Watersheds**  
**(Oso Creek)**





**Legend**

- Counties
- USGS Streams
- City Limits
- Major Roads
- Level 3 Sub-Basins
- Level 1 TC Flowpath
- Level 1 Watershed (205.00 Sq.Mi.)
- Level 2 Sub-Basins**
  - Sub-basins 1-5
  - Sub-basins 6-13
- Contours-5ft (2018)



Date: Aug 23, 2023 12:28 PM User: RGenanz File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

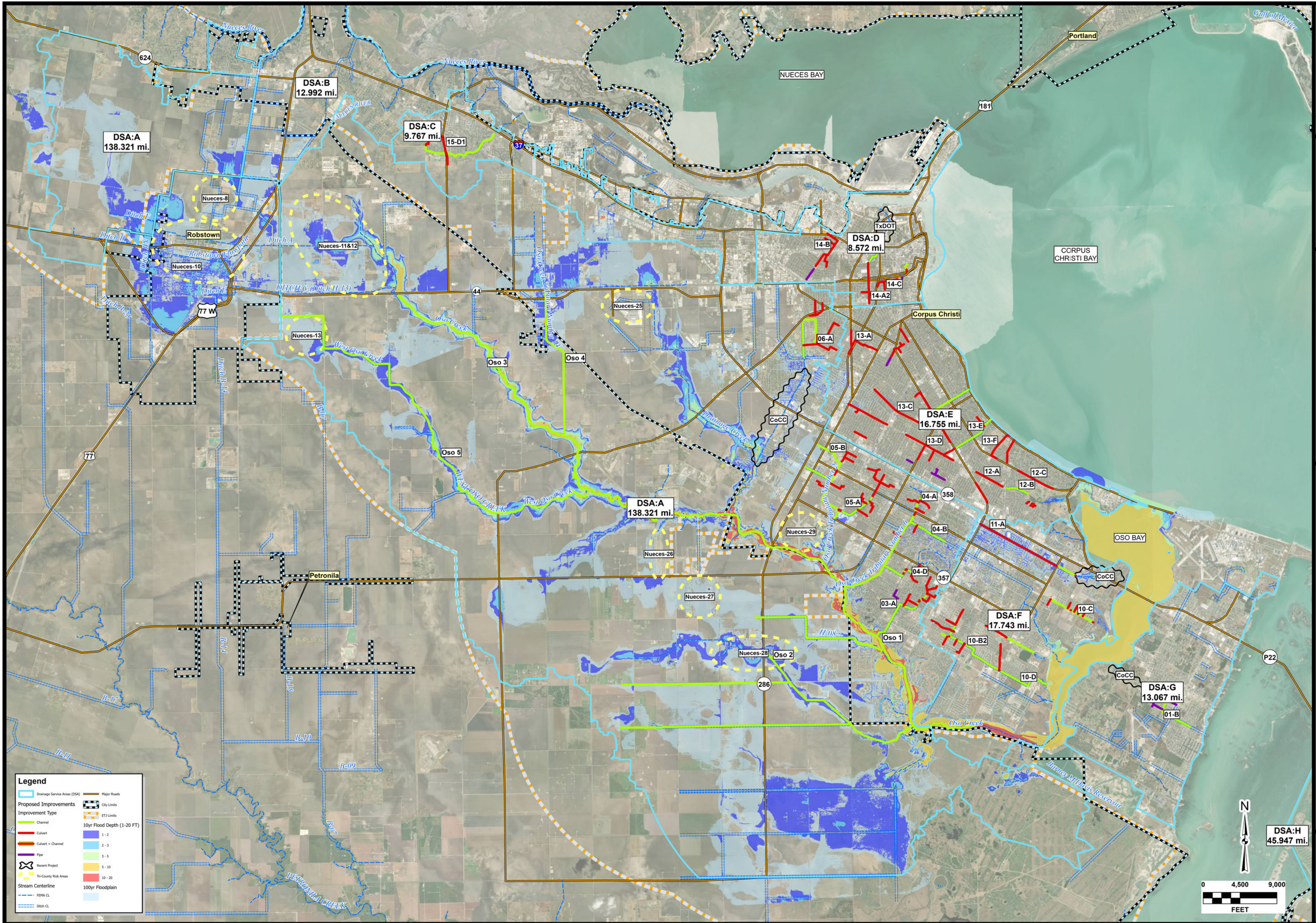
**CITY OF CORPUS CHRISTI**  
 1D HYDROLOGIC STUDY  
**LEVEL 3 WATERSHEDS (OSO CREEK)**

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	EX 10



**EXHIBIT 11**  
**Existing Conditions Results**  
**(Oso Creek)**





Date: Aug 23, 2023 11:38 AM User: RGenz

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON  
ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 1D & 2D HYDROLOGIC STUDY  
 EXISTING CONDITIONS RESULTS (OSO CREEK)  
 10YR DEPTHS AND 100YR FLOODPLAIN

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	EX 11

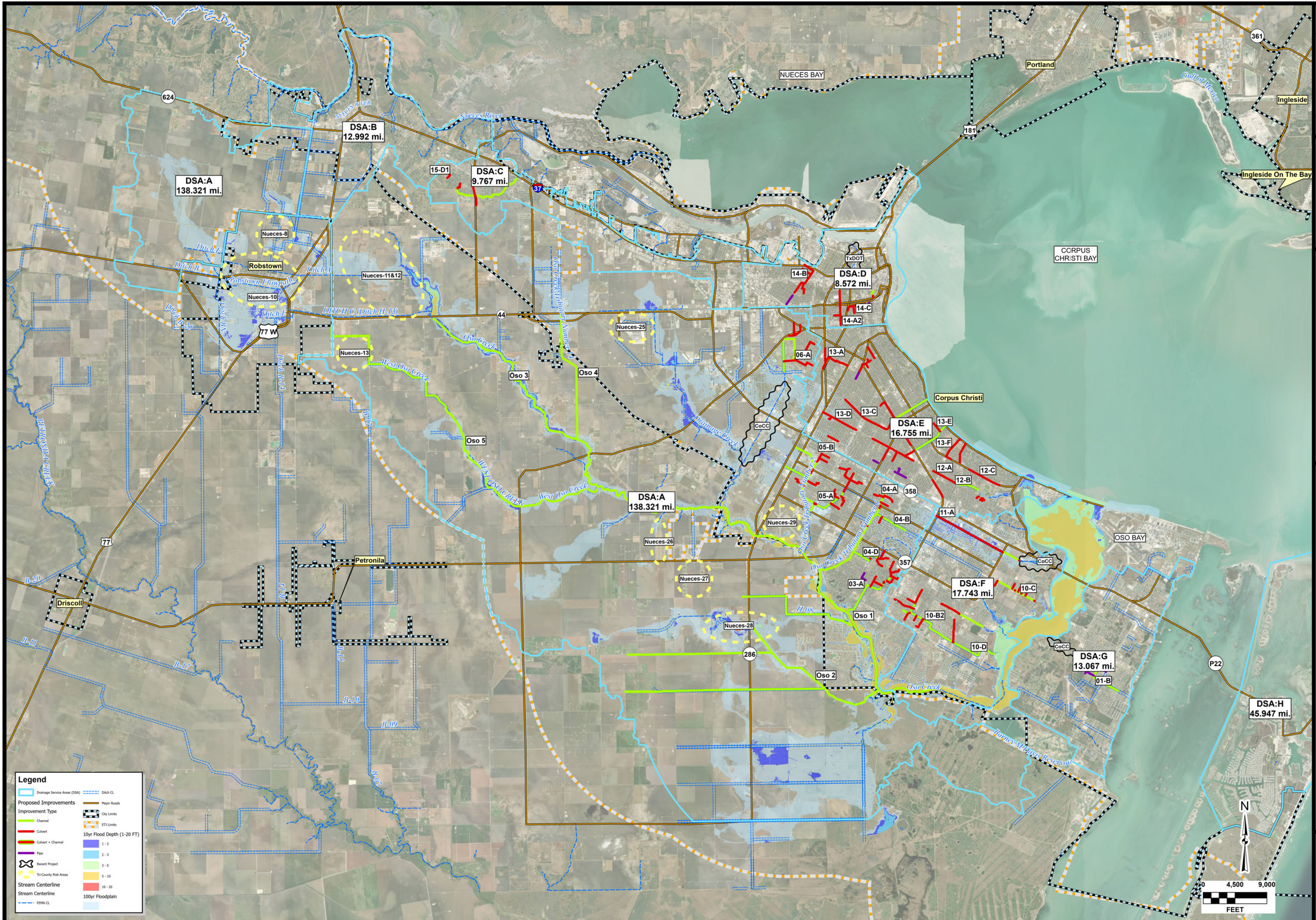


DSA:H  
45.947 mi.



**EXHIBIT 12**  
**Proposed/Ultimate Conditions**  
**Results (Oso Creek)**





NO.	REVISION	DATE

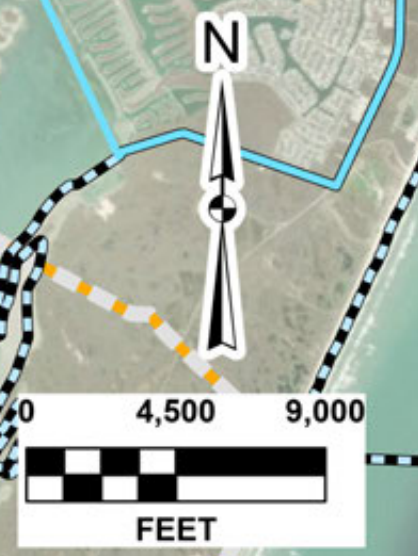
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 1D & 2D HYDROLOGIC STUDY  
 PROPOSED CONDITIONS RESULTS (OSO CREEK)  
 10YR DEPTHS AND 100YR FLOODPLAIN

PLAT NO. --  
 JOB NO. 12383-00  
 DATE Aug 2023  
 DESIGNER BES  
 CHECKED JP DRAWN RG  
 SHEET EX 13

**Legend**

Drainage Service Areas (DSA)	Ditch CL
Channel	Major Roads
Culvert	City Limits
Pipe	ETJ Limits
Second Project	10yr Flood Depth (1-20 FT)
Tri-County Risk Areas	1-2
Stream Centerline	2-3
FEMA CL	3-5
	5-10
	10-20
	100yr Floodplain



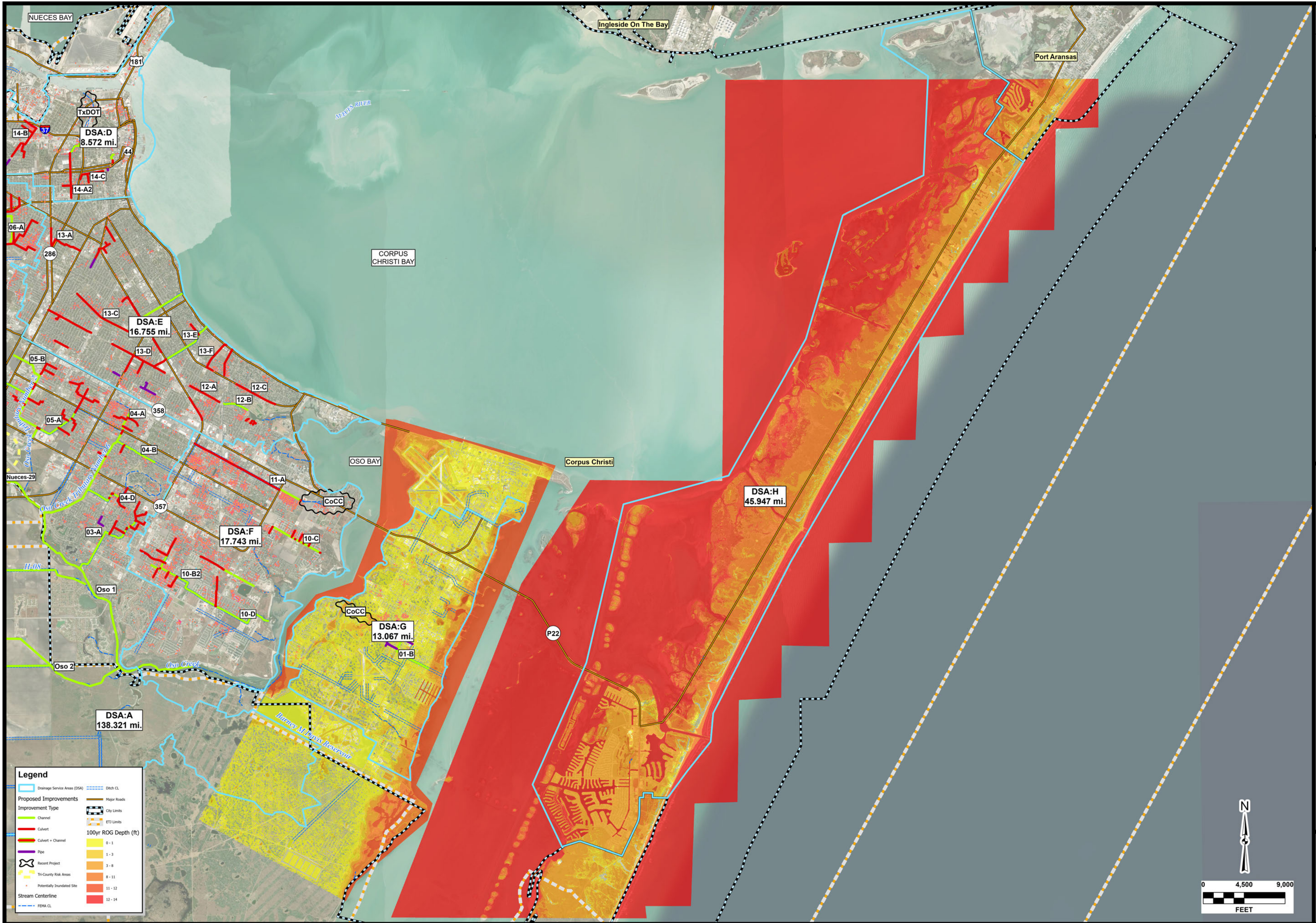
Date: Aug 23, 2023 11:38 AM User: RGenere  
File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.



**EXHIBIT 13**  
**Flour Bluff ROG Results**





Date: Aug 23, 2023 11:41 AM User: RGomez  
File:

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADVERTENTLY ALTERED. RELY ONLY ON FINAL HARDCOPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPCOG Digital Globe Texas Orthomosaic Program. USDA Farm Service Agency.

NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI**  
 1D & 2D HYDROLOGIC STUDY  
 FLOUR BLUFF ROG RESULTS

PLAT NO.	--
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP DRAWN RG
SHEET	EX 13



# **APPENDICES**

**APPENDIX A**  
**Oso Creek Hydrology**  
**Calculations**



## Soil Parameters

Effective Porosity (Saturated Content)									
	Sand	Sandy Loam	Loam	Sandy Clay Loam	Clay	Total Area	Total Area	Average*	Initial Content (25% Saturation)
<b>Effective Porosity</b>	<b>0.42</b>	<b>0.41</b>	<b>0.43</b>	<b>0.33</b>	<b>0.39</b>	<b>acres</b>	<b>miles</b>		
Area 1		1421	109		16180	17,710	27.672	0.39	0.098
Area 2		2277			4866	7,143	11.161	0.40	0.099
Area 3		1151	61	237	8346	9,795	15.305	0.39	0.098
Area 4		122			5296	5,419	8.467	0.39	0.098
Area 5		1106	15		11229	12,350	19.297	0.39	0.098
Area 6		219			10601	10,820	16.906	0.39	0.098
Area 7		1602	55		17180	18,837	29.433	0.39	0.098
Area 8		9			5900	5,909	9.233	0.39	0.098
Area 9		1114			2778	3,891	6.080	0.40	0.099
Area 10		26			7236	7,262	11.347	0.39	0.098
Area 11		1099			8740	9,839	15.374	0.39	0.098
Area 12	425	1319	121		12644	14,508	22.669	0.39	0.098

\*Note: Values will be assumed as consistent for Level 3 calculations within each area

Wetting Front Suction Head								
	Sand	Sandy Loam	Loam	Sandy Clay Loam	Clay	Total Area	Total Area	Average*
<b>Wetting Front Suction Head</b>	<b>1.90</b>	<b>4.30</b>	<b>3.50</b>	<b>8.60</b>	<b>12.50</b>	<b>acres</b>	<b>miles</b>	
Area 1		1421	109		16180	17,710	27.672	11.79
Area 2		2277			4866	7,143	11.161	9.89
Area 3		1151	61	237	8346	9,795	15.305	11.39
Area 4		122			5296	5,419	8.467	12.31
Area 5		1106	15		11229	12,350	19.297	11.75
Area 6		219			10601	10,820	16.906	12.33
Area 7		1602	55		17180	18,837	29.433	11.78
Area 8		9			5900	5,909	9.233	12.49
Area 9		1114			2778	3,891	6.080	10.15
Area 10		26			7236	7,262	11.347	12.47
Area 11		1099			8740	9,839	15.374	11.58
Area 12	425	1319	121		12644	14,508	22.669	11.37

\*Note: Values will be further calculated for each Level 3 Sub-Basin

## Soil Parameters

Saturated Hydraluic Conductivity								
	Sand	Sandy Loam	Loam	Sandy Clay Loam	Clay	Total Area	Total Area	Average*
Saturated Hydraluic Conductivity	4.60	0.40	0.10	0.06	0.01	acres	miles	
Area 1		1421	109		16180	17,710	27.672	0.04
Area 2		2277			4866	7,143	11.161	0.13
Area 3		1151	61	237	8346	9,795	15.305	0.06
Area 4		122			5296	5,419	8.467	0.02
Area 5		1106	15		11229	12,350	19.297	0.05
Area 6		219			10601	10,820	16.906	0.02
Area 7		1602	55		17180	18,837	29.433	0.04
Area 8		9			5900	5,909	9.233	0.01
Area 9		1114			2778	3,891	6.080	0.12
Area 10		26			7236	7,262	11.347	0.01
Area 11		1099			8740	9,839	15.374	0.05
Area 12	425	1319	121		12644	14,508	22.669	0.18

\*Note: Values will be further calculated for each Level 3 Sub-Basin



### Impervious Cover Calculations

Existing Conditions Impervious Cover													
	Undeveloped/ Open Space	Dispersed Residential (1 ac Lots)	Low Density Residential (1/2 ac Lots)	Medium Density Residential (1/4 acre Lots)	Mixed use	High Density Residential (1/8 acre Lots)	Industrial	Commercial	Transportation	Water Features	Total Area (ac)	Total Area (mi)	Composite Impervious Cover
DFIRM Grid Code	AG,CP,DC,PAR K,VAC	ER	LDR	MDR		HDR,MH	HI,LI	COM,PO	ROWRR	WATER			
Percent Impervious	0%	20%	25%	38%	40%	65%	72%	90%	98%	100%			
Area 1	14,883	684	140	132	37	526	676	70	565	5	17,715	27.680	9.5%
Area 2	5,091	68	83	1	2	860	868	16	154	1	7,145	11.163	19.4%
Area 3	9,124	69	19		96		54	5	399	29	9,795	15.305	5.3%
Area 4	4,510	25	220	1	60	27	220	27	331		5,421	8.470	11.2%
Area 5	11,619	124	91	1	9	15	57	10	396	31	12,354	19.303	4.3%
Area 6	9,778	401	18		99		65	43	400	18	10,823	16.910	5.7%
Area 7	11,378	54	990	91	2,702	76	1,505	427	1,619		18,842	29.440	23.8%
Area 8	2,012	17	639	131	1,815	43	187	294	727	43	5,910	9.234	35.9%
Area 9	800	12	1,431	302	191		44	410	689	13	3,892	6.081	42.1%
Area 10	4,518	556	1,119	64	102		0	83	628	193	7,263	11.348	18.4%
Area 11	9,246	276	7		12		22	3	260	13	9,841	15.376	3.5%
Area 12	14,245	23	13		4		12		217		14,513	22.677	1.6%

Note: Impervious cover areas were derived from the Corpus Christi Land Use database published in 2021.

Existing Impervious Cover Parameters			
Total Impervious Area (ac)	Total Impervious Area (mi)	Avg % Impervious of Impervious Cover "C"*	Impervious Cover Ratio "D"*
2,832	4.425	59.5%	0.16
2,053	3.208	67.5%	0.29
671	1.049	77.5%	0.07
911	1.424	66.9%	0.17
734	1.148	72.2%	0.06
1,044	1.632	59.4%	0.10
7,463	11.661	60.0%	0.40
3,898	6.091	54.5%	0.66
3,092	4.831	53.0%	0.79
2,745	4.289	48.8%	0.38
595	0.929	58.7%	0.06
268	0.419	85.8%	0.02

\*Note: Values will be further calculated for each Level 3 Sub-Basin

### Clark Hydrograph Parameters

Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)	10% Decrease R
	sq mi	mi	ft/mi	ft/mi		%	%					
Area 1	27.68	10.86	3.87	1.87	0.13	59.51	15.99	0.10	49.69	5.13	44.56	40.10
Area 2	11.16	6.53	4.73	2.37	0.13	67.50	28.74	0.19	27.25	3.88	23.37	21.03
Area 3	15.31	8.07	5.66	1.87	0.13	77.52	6.85	0.05	41.47	4.28	37.18	33.46
Area 4	8.47	7.38	6.04	2.21	0.13	66.86	16.81	0.11	33.14	4.34	28.80	25.92
Area 5	19.3	11.94	4.71	1.72	0.13	72.23	5.95	0.04	56.44	5.05	51.39	46.25
Area 6	16.91	7.69	7.19	1.77	0.13	59.36	9.65	0.06	37.55	3.54	34.01	30.61
Area 7	29.44	11.59	4.34	2.75	0.13	59.99	39.61	0.24	34.46	5.75	28.70	25.83
Area 8	9.23	3.99	8.37	3.7	0.13	54.46	65.96	0.36	11.38	2.46	8.92	8.03
Area 9	6.08	4.59	6.16	3.65	0.13	53.04	79.44	0.42	11.68	2.50	9.18	8.26
Area 10	11.35	7.09	4.44	2.81	0.13	48.79	37.80	0.18	29.17	4.97	24.20	21.78
Area 11	15.48	10.26	4.71	1.71	0.13	58.72	6.04	0.04	52.70	4.67	48.03	43.23
Area 12	22.57	9.94	3.82	2.11	0.13	85.77	1.85	0.02	56.16	6.92	49.24	44.32

Note: Values will be further calculated for each Level 3 Sub-Basin



## Level 1 Unrouted Flows

Storm Event	Flow at Gage (cfs)	Flow at Outfall (cfs)
	81.92 sq mi	192.98 sq mi
10-yr	5856.1	17424.4
50-yr	9822.4	28419.6
100-yr	11975.5	34296.6
500-yr	17816.9	50117.1

Note: Flows shown are prior to calibration

## Gage Comparison

Flood Frequency Analysis for Oso Creek @ FM 763				HMS Unrouted Flows (cfs)
USGS 08211520				25% Moisture Content 81.92 sq mi
Storm Event	Probability of Exceedance	PeakFQ	HEC-SSP	
2-yr	50.0%	2306	2306.2	
5-yr	20.0%	4514	4513.6	
10-yr	10.0%	6342.0	6342.0	5856.1
25-yr	4.0%	9041.0	9040.5	
50-yr	2.0%	11320.0	11317.0	9822.4
100-yr	1.0%	13810.0	13809.5	11975.5
200-yr	0.5%	16530.0	16528.6	
500-yr	0.2%	20490.0	20487.0	17816.9

Notes:

Using Weighted Skew

Regional Skew = 0

Regional Skew MSE = .123 (Texas)

Station Skew = -0.549

Weighted Skew = -0.144

Low outlier threshold = 1080

EMA & Multiple Grubbs-Beck methods used

Events = 48

Low Outliers = 9

Mean = 3.3544

Standard Deviation = 0.354

Use PeakFQ results for design. HEC-SSP was a check.



## HMS Sensitivity Analysis

FM 763 at Oso Creek				HMS Unrouted Flows (cfs)	HMS Unrouted Flows (cfs)
USGS 08211520				25% Moisture Content	25% Moisture Content
Storm Event	Probability of Exceedance	PeakFQ	HEC-SSP		10% Decrease to Storage Coefficient (R)
10-yr	10.0%	6342.0	6342.0	5856.1	6434.5
50-yr	2.0%	11320.0	11317.0	9822.4	10766.2
100-yr	1.0%	13810.0	13809.5	11975.5	13112.0
500-yr	0.2%	20490.0	20487.0	17816.9	19471.2

## Level 2 Unrouted Flow Summary

Area ID	Area (ac)	Area (sq mi)	HMS Unrouted Flows (cfs)			
			Storm Event			
			10-Year	50-Year	100-Year	500-Year
Area 1	17715.20	27.68	1788.5	2996.1	3650.1	5404.7
Area 2	7142.40	11.16	1161.4	1933.2	2350.5	3496.7
Area 3	9798.40	15.31	1059.6	1804.5	2210.5	3321.8
Area 4	5420.80	8.47	877.0	1426.0	1718.9	2493.6
Area 5	12352.00	19.30	1012.8	1736.3	2131.2	3202.5
Area 6	10822.40	16.91	1488.8	2444.1	2956.3	4313.0
Area 7	18841.60	29.44	3053.6	4938.7	5942.6	8619.9
Area 8	5907.20	9.23	2836.0	4293.2	5037.9	6998.0
Area 9	3891.20	6.08	1757.1	2679.7	3154.4	4416.0
Area 10	7264.00	11.35	1486.2	2348.4	2800.4	3989.1
Area 11	9907.20	15.48	867.6	1482.9	1818.5	2733.1
Area 12	14444.80	22.57	856.9	1554.0	1959.8	3123.9

Note: Flows shown are prior to calibration



## Clark Hydrograph Parameters

Oso Creek Watershed - Ultimate Conditions Adjust Clark Parameters

Area Name	Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)
		sq mi	mi	ft/mi	ft/mi		%	%				
DRNCK-07-01	701	0.67	1.60	4.66	6.79	0.13	26.95	67.38	0.18	11.24	3.55	7.68
DRNCK-07-02	702	0.63	1.41	3.70	2.50	0.13	73.04	100.00	0.73	3.53	0.53	3.00
DRNCK-07-03	703	1.94	2.71	3.87	2.50	0.13	73.46	100.00	0.73	5.00	0.76	4.24
DRNCK-07-04	704	1.40	1.11	10.84	4.12	0.13	73.96	100.00	0.74	2.10	0.49	1.61
DRNCK-07-05	705	1.20	2.52	8.24	2.50	0.13	85.18	100.00	0.85	2.95	0.45	2.51
DRNCK-07-06	706	0.65	2.14	12.38	7.04	0.13	78.04	100.00	0.78	2.52	0.81	1.71
DRNCK-07-07	707	1.07	1.37	13.34	7.37	0.13	72.67	100.00	0.73	2.16	0.71	1.44
DRNCK-07-08	708	0.63	1.57	3.70	4.38	0.13	86.04	100.00	0.86	2.61	0.64	1.98
DRNCK-07-09	709	0.55	1.23	12.62	2.50	0.13	70.26	100.00	0.70	2.45	0.37	2.08
DRNCK-07-10	710	1.99	2.45	5.04	6.76	0.13	74.54	100.00	0.75	3.83	1.21	2.62
DRNCK-07-11	711	2.34	3.20	7.81	9.36	0.13	59.35	100.00	0.59	5.39	1.99	3.40
DRNCK-07-12	712	0.84	1.31	9.61	9.17	0.13	70.05	100.00	0.70	2.39	0.87	1.52
DRNCK-07-13	713	2.73	1.61	16.23	8.82	0.13	58.98	100.00	0.59	3.00	1.08	1.92
DRNCK-07-14	714	1.72	2.50	3.70	3.97	0.13	64.91	100.00	0.65	5.60	1.27	4.33
DRNCK-07-15	715	0.75	1.56	9.64	10.43	0.13	42.73	100.00	0.43	4.88	1.89	2.99
DRNCK-07-16	716	0.93	1.29	19.91	18.13	0.13	52.28	100.00	0.52	2.70	1.29	1.41
DRNCK-07-17	717	0.75	1.78	19.50	9.99	0.13	38.10	95.25	0.36	5.01	1.90	3.11
DTCHA-01-08	108	2.08	3.31	5.59	4.02	0.13	40.06	100.00	0.40	10.34	2.37	7.97
DTCHA-01-13	113	0.50	1.22	3.70	2.50	0.13	57.68	100.00	0.58	4.62	0.70	3.92
DTCHA-01-14	114	0.76	1.47	15.02	11.62	0.13	54.09	100.00	0.54	3.16	1.28	1.88
DTCHA-01-15	115	1.66	2.04	5.27	6.50	0.13	40.81	100.00	0.41	7.44	2.30	5.14
DTCHA-01-16	116	1.09	2.35	5.18	8.42	0.13	37.24	93.10	0.35	9.08	3.19	5.89
DTCHA-01-17	117	2.79	4.87	3.70	8.39	0.13	42.34	100.00	0.42	12.69	4.45	8.23
DTCHA-01-18	118	1.40	1.84	3.89	2.52	0.13	46.00	100.00	0.46	7.53	1.15	6.38
DTCHA-01-19	119	1.76	2.42	8.28	6.08	0.13	55.82	100.00	0.56	5.15	1.53	3.61
DTCHB-01-12	112	1.44	3.02	4.60	5.30	0.13	66.74	100.00	0.67	5.45	1.50	3.95
DTCHBN-01-10	110	2.23	1.65	4.38	3.73	0.13	65.83	100.00	0.66	4.16	0.90	3.25
DTCHBN-01-11	111	1.80	3.19	5.19	4.91	0.13	67.77	100.00	0.68	5.34	1.40	3.94
DTCHF-01-01	101	0.82	1.97	3.70	4.35	0.13	38.93	97.33	0.38	9.02	2.19	6.83
DTCHF-01-02	102	1.05	1.91	4.37	2.50	0.13	40.34	100.00	0.40	8.50	1.28	7.21
DTCHF-01-03	103	1.77	1.96	3.70	2.50	0.13	40.21	100.00	0.40	9.05	1.37	7.68
DTCHF-01-04	104	1.13	1.91	3.70	2.70	0.13	39.68	99.20	0.39	9.03	1.48	7.55
DTCHF-01-05	105	2.04	2.96	3.70	5.62	0.13	39.03	97.58	0.38	11.00	3.13	7.87
DTCHF-01-06	106	0.33	0.85	7.13	9.18	0.13	41.00	100.00	0.41	3.96	1.45	2.51
DTCHF-01-07	107	1.12	2.71	4.23	2.50	0.13	40.17	100.00	0.40	10.50	1.59	8.91
DTCHF-01-09	109	1.54	3.30	4.51	4.07	0.13	39.49	98.73	0.39	11.23	2.60	8.63
OCT02-08-05	805	0.51	1.30	3.70	14.02	0.13	65.49	100.00	0.65	3.32	1.45	1.87
OCT02-08-06	806	2.07	2.97	9.80	2.50	0.13	61.16	100.00	0.61	5.36	0.81	4.55
OCT02-08-07	807	1.21	2.09	11.64	11.61	0.13	51.77	100.00	0.52	4.39	1.78	2.61

### Clark Hydrograph Parameters

Area Name	Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)
		sq mi	mi	ft/mi	ft/mi		%	%				
OCT02-08-08	808	0.44	1.82	15.72	4.19	0.13	72.61	100.00	0.73	2.57	0.61	1.97
OCT02-08-09	809	0.57	1.68	19.23	19.95	0.13	56.43	100.00	0.56	2.84	1.40	1.44
OCT05-11-01	1101	0.56	0.82	13.50	16.60	0.13	37.89	94.73	0.36	3.42	1.59	1.83
OCT05-11-02	1102	1.07	1.27	4.46	7.83	0.13	38.46	96.15	0.37	6.37	2.16	4.21
OCT05-11-03	1103	1.72	1.42	6.21	7.16	0.13	43.12	100.00	0.43	5.41	1.76	3.65
OCT05-11-04	1104	1.76	1.71	4.50	3.44	0.13	38.17	95.43	0.36	8.34	1.70	6.64
OCT05-11-05	1105	0.60	1.41	5.51	4.22	0.13	38.13	95.33	0.36	6.91	1.64	5.27
OCT05-11-06	1106	0.21	0.82	9.25	2.50	0.13	36.02	90.05	0.32	5.08	0.77	4.31
OCT05-11-07	1107	0.74	1.63	3.70	2.50	0.13	36.03	90.08	0.32	9.75	1.47	8.27
OCT05-11-08	1108	0.28	0.66	9.41	10.43	0.13	39.02	97.55	0.38	3.36	1.30	2.06
OCT05-11-09	1109	0.53	1.16	5.69	7.21	0.13	38.46	96.15	0.37	5.71	1.86	3.85
OCT05-11-10	1110	0.40	1.22	4.06	12.59	0.13	39.46	98.65	0.39	5.81	2.43	3.38
OCT05-11-11	1111	1.84	3.06	4.41	2.50	0.13	39.28	98.20	0.39	11.55	1.75	9.80
OCT05-11-12	1112	0.77	1.25	7.30	5.19	0.13	40.74	100.00	0.41	5.28	1.43	3.84
OCT05-11-13	1113	0.53	1.15	17.51	12.13	0.13	40.46	100.00	0.40	3.59	1.48	2.11
OCT05-11-14	1114	0.87	0.91	3.70	2.50	0.13	40.76	100.00	0.41	5.78	0.87	4.91
OCT05-11-15	1115	1.47	2.03	7.00	4.01	0.13	40.68	100.00	0.41	7.23	1.66	5.57
OCT05-11-16	1116	1.15	3.04	4.40	6.17	0.13	39.71	99.28	0.39	10.21	3.07	7.14
OCT05-11-17	1117	0.99	2.01	8.42	34.45	0.13	4.29	10.73	0.00	13.62	7.95	5.66
OCT06-09-01	901	1.39	1.25	12.48	3.46	0.13	63.55	100.00	0.64	2.79	0.57	2.22
OCT06-09-02	902	1.39	1.58	8.21	3.94	0.13	41.49	100.00	0.41	5.89	1.33	4.56
OCT06-09-03	903	0.94	1.59	12.20	7.17	0.13	52.28	100.00	0.52	3.86	1.26	2.61
OCT06-09-04	904	0.68	1.23	3.70	7.71	0.13	55.92	100.00	0.56	4.28	1.44	2.84
OCT06-09-05	905	0.69	1.24	26.81	20.02	0.13	48.63	100.00	0.49	2.60	1.28	1.31
OCT10-07-18	718	1.41	1.64	11.84	2.50	0.13	49.57	100.00	0.50	4.74	0.72	4.02
OCT10-07-19	719	1.69	2.57	7.53	8.92	0.13	42.47	100.00	0.42	7.12	2.57	4.55
OCT10-07-20	720	1.39	1.98	9.55	2.54	0.13	53.98	100.00	0.54	5.06	0.78	4.28
OCT10-07-21	721	1.17	1.60	18.09	2.50	0.13	52.66	100.00	0.53	3.86	0.58	3.27
OCT10-07-22	722	2.13	2.83	7.63	6.29	0.13	55.57	100.00	0.56	5.77	1.75	4.02
OCT10-07-23	723	0.87	1.50	21.12	30.20	0.13	44.11	100.00	0.44	3.29	1.85	1.44
OCT14-04-01	401	1.07	1.61	19.76	16.57	0.13	47.44	100.00	0.47	3.46	1.60	1.85
OCT14-04-02	402	1.90	1.99	12.49	12.65	0.13	44.49	100.00	0.44	4.89	2.05	2.84
OCT14-04-03	403	1.12	2.58	12.24	16.64	0.13	68.22	100.00	0.68	3.21	1.49	1.72
OCT14-04-04	404	1.45	2.44	9.04	7.69	0.13	59.87	100.00	0.60	4.47	1.50	2.97
OCT14-04-05	405	1.96	2.61	10.20	13.38	0.13	55.14	100.00	0.55	4.71	2.02	2.70
OCT14-04-06	406	0.97	2.84	11.77	5.67	0.13	42.09	100.00	0.42	7.04	2.02	5.03
UNTB01-02-01	201	1.52	2.41	8.37	6.69	0.13	64.65	100.00	0.65	4.13	1.30	2.84
UNTB01-02-02	202	0.38	1.26	5.68	19.91	0.13	72.86	100.00	0.73	2.34	1.15	1.18
UNTB01-02-03	203	1.76	4.12	6.25	2.50	0.13	60.66	100.00	0.61	7.44	1.13	6.32
UNTB01-03-01	301	3.24	2.69	8.09	7.73	0.13	52.64	100.00	0.53	5.76	1.94	3.82



### Clark Hydrograph Parameters

Area Name	Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)
		sq mi	mi	ft/mi	ft/mi		%	%				
UNTB01-05-13	513	1.62	1.87	23.70	26.49	0.13	46.47	100.00	0.46	3.47	1.88	1.59
UNTB01-06-01	601	0.69	1.62	6.88	6.50	0.13	42.96	100.00	0.43	5.76	1.78	3.98
UNTB01-06-02	602	2.20	2.80	4.99	8.45	0.13	41.17	100.00	0.41	8.73	3.07	5.65
UNTB01-06-03	603	1.58	2.42	14.29	10.78	0.13	64.59	100.00	0.65	3.37	1.32	2.05
UNTB01-08-01	801	0.85	2.10	15.90	14.60	0.13	42.95	100.00	0.43	4.81	2.13	2.68
UNTB01-09-06	906	0.98	1.88	16.96	31.69	0.13	47.04	100.00	0.47	3.70	2.11	1.59
UNTB01-10-01	1001	0.66	1.41	18.29	14.86	0.13	28.19	70.48	0.20	6.26	2.79	3.47
UNTB01-12-01	1201	0.89	1.60	4.54	8.89	0.13	41.04	100.00	0.41	6.50	2.34	4.16
UNTB01-12-02	1202	0.31	1.23	4.66	4.73	0.13	42.10	100.00	0.42	5.82	1.49	4.32
UNTB01-12-03	1203	0.36	1.05	3.70	3.85	0.13	40.51	100.00	0.41	6.03	1.34	4.69
UNTB01-12-04	1204	1.52	2.76	3.70	6.13	0.13	9.43	23.58	0.02	23.95	7.17	16.78
UNTB01-13-01	1301	0.70	1.17	20.43	21.89	0.13	14.76	36.90	0.05	7.26	3.70	3.56
UNTB02-02-04	204	1.48	2.96	4.63	4.04	0.13	43.38	100.00	0.43	9.47	2.18	7.29
UNTB02-03-02	302	1.63	2.09	6.97	2.50	0.13	51.12	100.00	0.51	6.10	0.92	5.17
UNTB02-03-03	303	0.97	2.28	6.09	4.77	0.13	56.34	100.00	0.56	5.51	1.42	4.09
UNTB02-03-04	304	1.49	2.21	10.61	7.38	0.13	48.21	100.00	0.48	5.31	1.75	3.56
UNTB02-06-04	604	1.05	2.00	19.06	24.14	0.13	47.90	100.00	0.48	3.75	1.97	1.78
UNTB02-08-02	802	1.40	1.85	11.33	10.24	0.13	41.39	100.00	0.41	5.31	2.04	3.27
UNTB02-10-02	1002	0.61	1.16	20.57	19.30	0.13	40.17	100.00	0.40	3.29	1.61	1.68
UNTB02-12-05	1205	0.84	1.78	5.42	6.05	0.13	41.54	100.00	0.42	6.78	2.01	4.77
UNTB02-12-06	1206	0.84	1.24	6.85	5.51	0.13	41.66	100.00	0.42	5.18	1.46	3.72
UNTB02-12-07	1207	0.51	1.14	8.04	14.58	0.13	42.49	100.00	0.42	4.17	1.84	2.32
UNTB02-12-08	1208	1.13	1.55	5.45	7.82	0.13	40.49	100.00	0.40	6.23	2.11	4.11
UNTB02-12-09	1209	0.71	1.42	3.70	2.50	0.13	8.57	21.43	0.02	18.23	2.76	15.48
UNTB02-12-10	1210	0.89	1.45	5.40	9.58	0.13	0.00	0.00	0.00	14.94	5.57	9.37
UNTB02-13-02	1302	2.06	2.18	5.80	2.50	0.13	37.17	92.93	0.35	9.64	1.46	8.18
UNTB03-02-05	205	0.90	2.10	5.25	3.96	0.13	35.30	88.25	0.31	9.98	2.27	7.71
UNTB03-03-05	305	1.29	2.57	9.37	19.45	0.13	41.76	100.00	0.42	6.24	3.06	3.18
UNTB03-06-05	605	2.09	1.90	3.90	10.84	0.13	43.33	100.00	0.43	6.93	2.73	4.21
UNTB03-06-06	606	2.43	3.10	4.51	4.00	0.13	39.10	97.75	0.38	11.05	2.53	8.52
UNTB03-06-07	607	1.79	3.29	3.70	2.74	0.13	42.04	100.00	0.42	11.54	1.92	9.62
UNTB03-06-08	608	0.79	2.17	3.70	2.50	0.13	53.48	100.00	0.53	7.08	1.07	6.01
UNTB03-06-09	609	1.26	1.23	3.70	4.06	0.13	64.95	100.00	0.65	3.73	0.86	2.87
UNTB03-06-10	610	1.01	2.00	18.45	10.94	0.13	49.91	100.00	0.50	3.94	1.55	2.38
UNTB03-08-03	803	0.71	1.05	14.79	36.95	0.13	32.52	81.30	0.26	4.37	2.60	1.77
UNTB03-10-03	1003	0.99	1.19	3.70	3.49	0.13	39.40	98.50	0.39	6.78	1.40	5.38
UNTB03-10-04	1004	1.11	1.81	6.56	7.57	0.13	40.43	100.00	0.40	6.48	2.16	4.31
UNTB03-10-05	1005	1.64	2.73	8.28	11.13	0.13	34.95	87.38	0.31	9.21	3.66	5.55
UNTB03-12-11	1211	1.78	2.13	5.68	11.06	0.13	40.77	100.00	0.41	7.05	2.79	4.25
UNTB03-12-12	1212	0.86	1.05	10.42	5.39	0.13	41.51	100.00	0.42	4.22	1.17	3.05



### Clark Hydrograph Parameters

Area Name	Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)
		sq mi	mi	ft/mi	ft/mi		%	%				
UNTB03-12-13	1213	0.96	1.41	3.70	2.50	0.13	40.78	100.00	0.41	7.42	1.12	6.30
UNTB03-12-14	1214	0.83	2.39	4.96	4.88	0.13	23.82	59.55	0.14	15.79	4.13	11.65
UNTB03-13-03	1303	1.15	1.46	12.59	31.36	0.13	32.19	80.48	0.26	5.69	3.24	2.46
UNTB04-02-06	206	0.39	0.91	8.83	2.50	0.13	39.13	97.83	0.38	4.77	0.72	4.05
UNTB04-03-06	306	1.95	2.95	11.86	12.25	0.13	41.35	100.00	0.41	6.71	2.78	3.94
UNTB04-06-11	611	0.66	1.79	6.84	7.95	0.13	50.86	100.00	0.51	4.98	1.70	3.28
UNTB04-08-04	804	1.47	3.19	11.60	4.00	0.13	81.51	100.00	0.82	3.17	0.72	2.44
UNTB04-10-06	1006	1.24	2.29	3.93	7.10	0.13	50.16	100.00	0.50	6.91	2.23	4.67
UNTB04-12-15	1215	2.83	2.52	7.55	4.69	0.13	40.82	100.00	0.41	7.86	2.00	5.85
UNTB04-12-16	1216	1.50	1.92	5.23	6.92	0.13	40.59	100.00	0.41	7.20	2.30	4.90
UNTB04-12-17	1217	2.02	2.99	4.12	9.00	0.13	40.99	100.00	0.41	9.53	3.46	6.08
UNTB04-12-18	1218	1.41	2.96	6.06	7.10	0.13	18.13	45.33	0.08	18.55	6.00	12.55
UNTB04-13-04	1304	1.12	1.52	6.09	9.97	0.13	0.00	0.00	0.00	14.77	5.60	9.16
UNTB04-13-05	1305	3.46	2.86	5.30	3.00	0.13	2.01	5.03	0.00	25.03	4.53	20.50
UNTB04-13-06	1306	0.60	1.52	19.57	52.36	0.13	22.00	55.00	0.12	6.67	4.35	2.31
UNTB05-02-07	207	0.52	1.05	5.32	20.82	0.13	39.68	99.20	0.39	4.61	2.31	2.30
UNTB05-03-07	307	2.11	2.42	14.13	14.76	0.13	41.62	100.00	0.42	5.55	2.46	3.08
UNTB05-06-12	612	1.37	1.40	29.90	26.89	0.13	37.28	93.20	0.35	3.61	1.96	1.65
UNTB05-10-07	1007	1.29	3.36	7.29	10.54	0.13	32.49	81.23	0.26	11.92	4.63	7.29
UNTB05-12-19	1219	2.40	2.24	5.31	11.17	0.13	0.02	0.05	0.00	18.87	7.52	11.36
UNTB05-13-07	1307	1.75	1.48	3.70	2.50	0.13	94.57	100.00	0.95	2.21	0.33	1.87
UNTB06-02-08	208	0.39	1.18	11.27	10.91	0.13	42.53	100.00	0.43	3.98	1.57	2.41
UNTB06-03-08	308	1.13	2.61	13.95	22.25	0.13	40.86	100.00	0.41	5.66	2.90	2.76
UNTB06-10-08	1008	0.73	1.60	14.81	17.59	0.13	48.23	100.00	0.48	3.65	1.73	1.92
UNTB06-13-08	1308	1.19	1.68	20.67	33.11	0.13	34.36	85.90	0.30	4.89	2.83	2.07
UNTB07-02-09	209	0.69	1.89	10.95	3.61	0.13	40.39	100.00	0.40	6.23	1.32	4.91
UNTB07-02-10	210	0.18	0.63	19.71	18.61	0.13	39.40	98.50	0.39	2.44	1.18	1.26
UNTB07-03-09	309	1.29	2.72	12.08	20.89	0.13	41.77	100.00	0.42	5.95	2.99	2.97
UNTB07-10-09	1009	1.78	3.41	6.26	7.49	0.13	35.25	88.13	0.31	11.70	3.89	7.81
UNTB08-02-11	211	1.90	1.67	7.85	2.50	0.13	62.96	100.00	0.63	3.95	0.60	3.36
UNTB08-02-12	212	0.46	1.91	7.04	4.02	0.13	59.43	100.00	0.59	4.53	1.04	3.49
UNTB08-03-10	310	0.20	0.45	67.51	89.20	0.13	40.59	100.00	0.41	1.15	0.85	0.30
UNTB08-10-10	1010	1.30	2.30	8.89	23.31	0.13	38.29	95.73	0.37	6.56	3.41	3.15
UNTB09-02-13	213	0.47	1.27	16.97	6.78	0.13	49.53	100.00	0.50	3.32	1.05	2.27
UNTB10-02-14	214	0.50	1.42	11.31	20.52	0.13	45.79	100.00	0.46	3.83	1.91	1.92
WTOSO-05-01	501	1.26	1.27	3.70	3.00	0.13	48.51	100.00	0.49	5.72	1.04	4.69
WTOSO-05-02	502	1.63	1.03	7.57	9.15	0.13	48.67	100.00	0.49	3.65	1.33	2.32
WTOSO-05-03	503	1.96	3.14	4.84	11.29	0.13	43.27	100.00	0.43	8.66	3.46	5.20
WTOSO-05-04	504	1.26	2.48	7.00	12.36	0.13	41.15	100.00	0.41	7.09	2.94	4.15
WTOSO-05-05	505	1.57	1.16	8.56	7.32	0.13	40.63	100.00	0.41	4.66	1.53	3.13



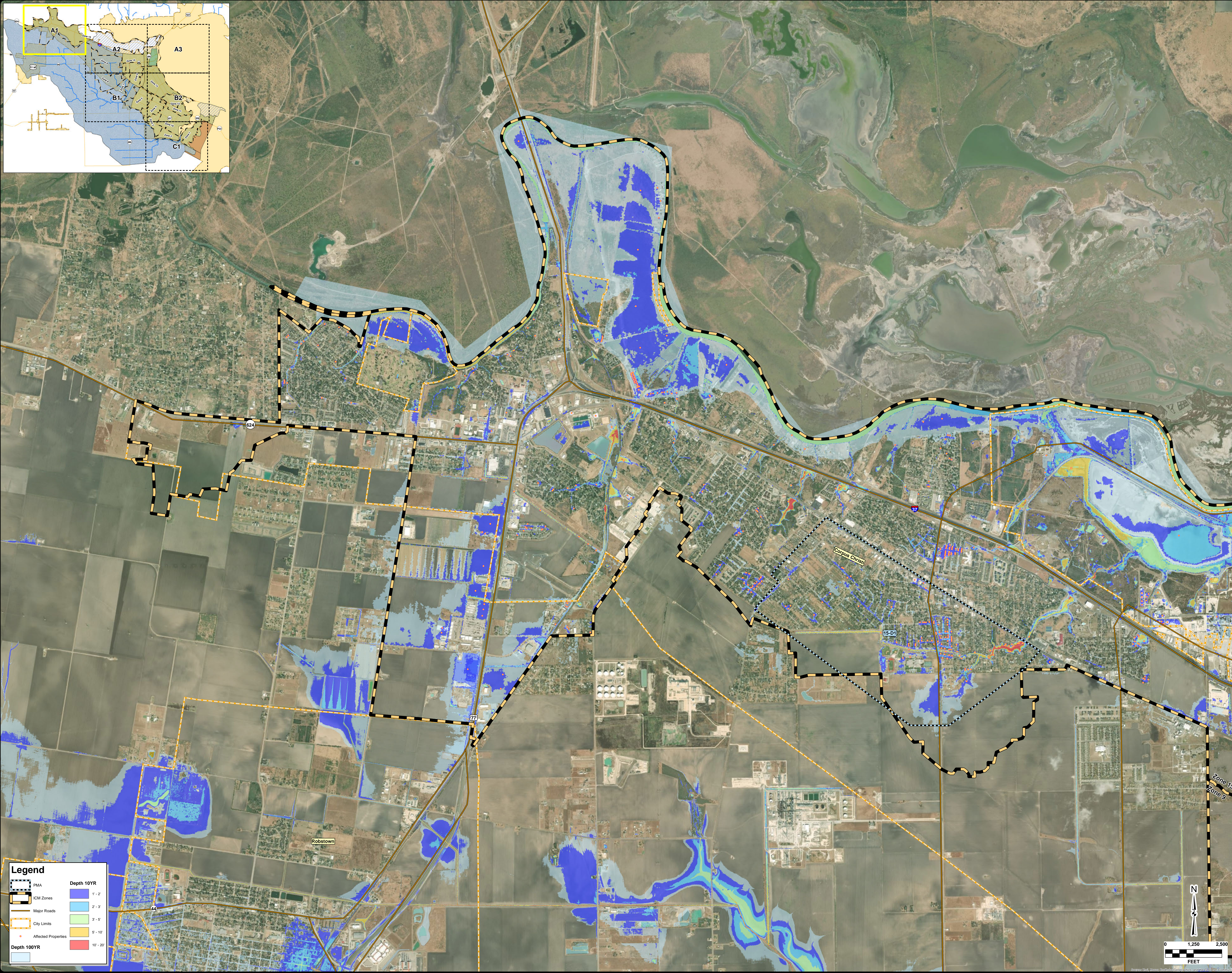
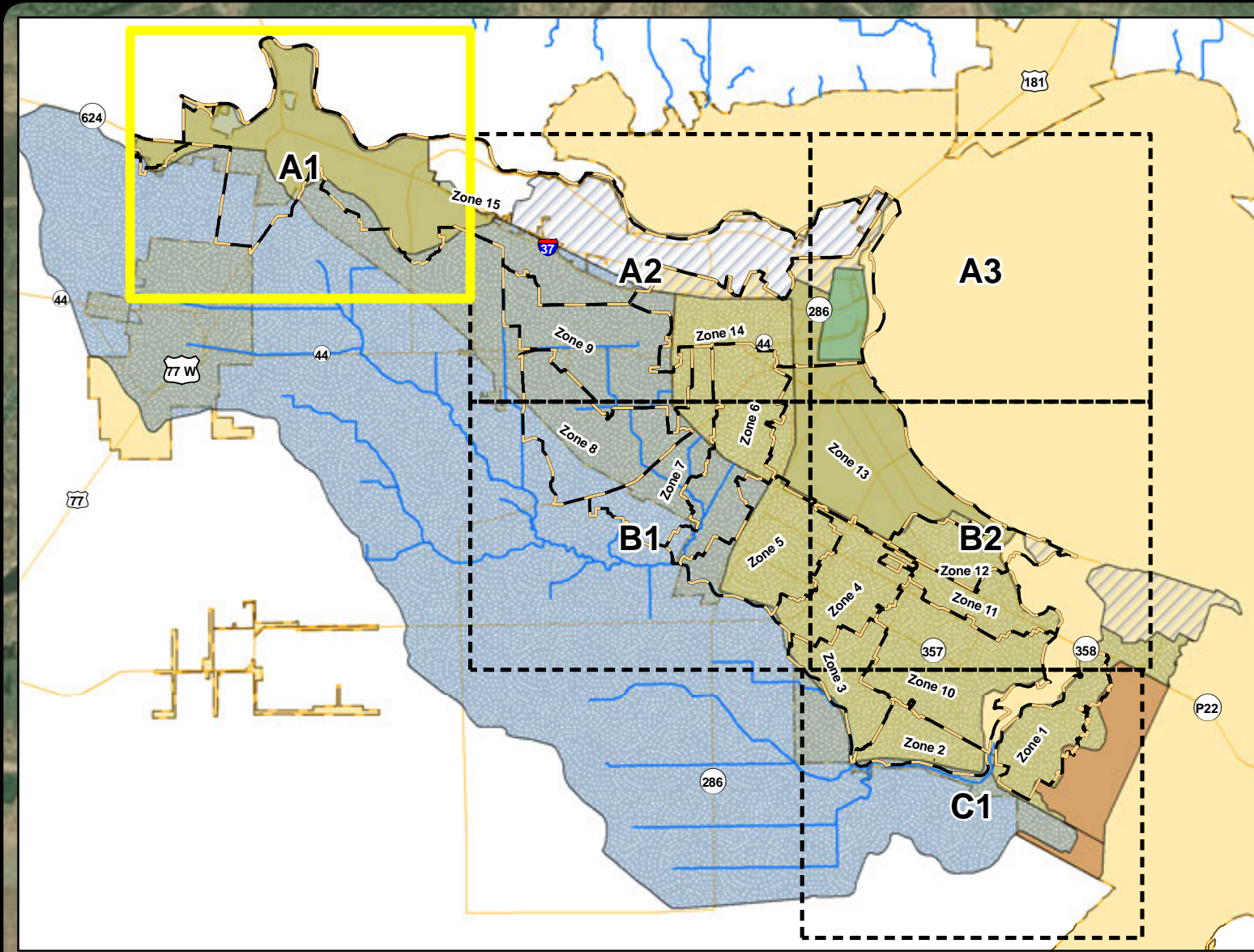
### Clark Hydrograph Parameters

Area Name	Area ID	Drainage Area (A)	Watercourse Length (L)	Channel Slope (S)	Watershed Slope (S0)	Manning's Roughness Coefficient (n)	Average Impervious Cover (C) for Developed Area	Developed Sub-Area (D)	Effective Impervious Ratio (I)	Tc + R	Time of Concentration (Tc)	Storage Coefficient (R)
		sq mi	mi	ft/mi	ft/mi		%	%				
WTOSO-05-06	506	0.54	1.09	11.86	15.68	0.13	40.68	100.00	0.41	3.76	1.71	2.05
WTOSO-05-07	507	0.94	1.42	3.70	3.52	0.13	40.50	100.00	0.41	7.21	1.50	5.72
WTOSO-05-08	508	1.00	1.25	9.73	8.34	0.13	40.87	100.00	0.41	4.60	1.61	2.99
WTOSO-05-09	509	1.16	1.67	7.37	33.10	0.13	40.73	100.00	0.41	5.06	2.92	2.14
WTOSO-05-10	510	1.19	2.39	10.99	4.46	0.13	44.93	100.00	0.45	6.26	1.55	4.72
WTOSO-05-11	511	2.18	1.96	13.46	14.76	0.13	54.45	100.00	0.54	3.71	1.65	2.06
WTOSO-05-12	512	2.99	2.45	13.88	27.32	0.13	49.53	100.00	0.50	4.38	2.39	1.99



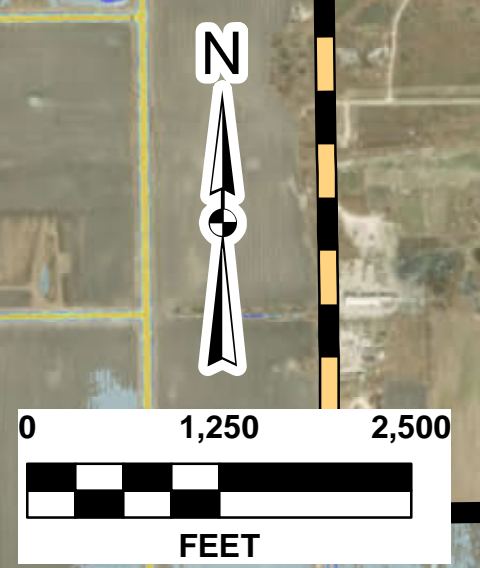
**APPENDIX B**  
**Indexed Citywide Master Plan**





**Legend**

	PMA		<b>Depth 10YR</b>		1' - 2'
	ICM Zones				2' - 3'
	Major Roads				3' - 5'
	City Limits				5' - 10'
	Affected Properties		<b>Depth 100YR</b>		10' - 20'



NO.	REVISION	DATE	BY

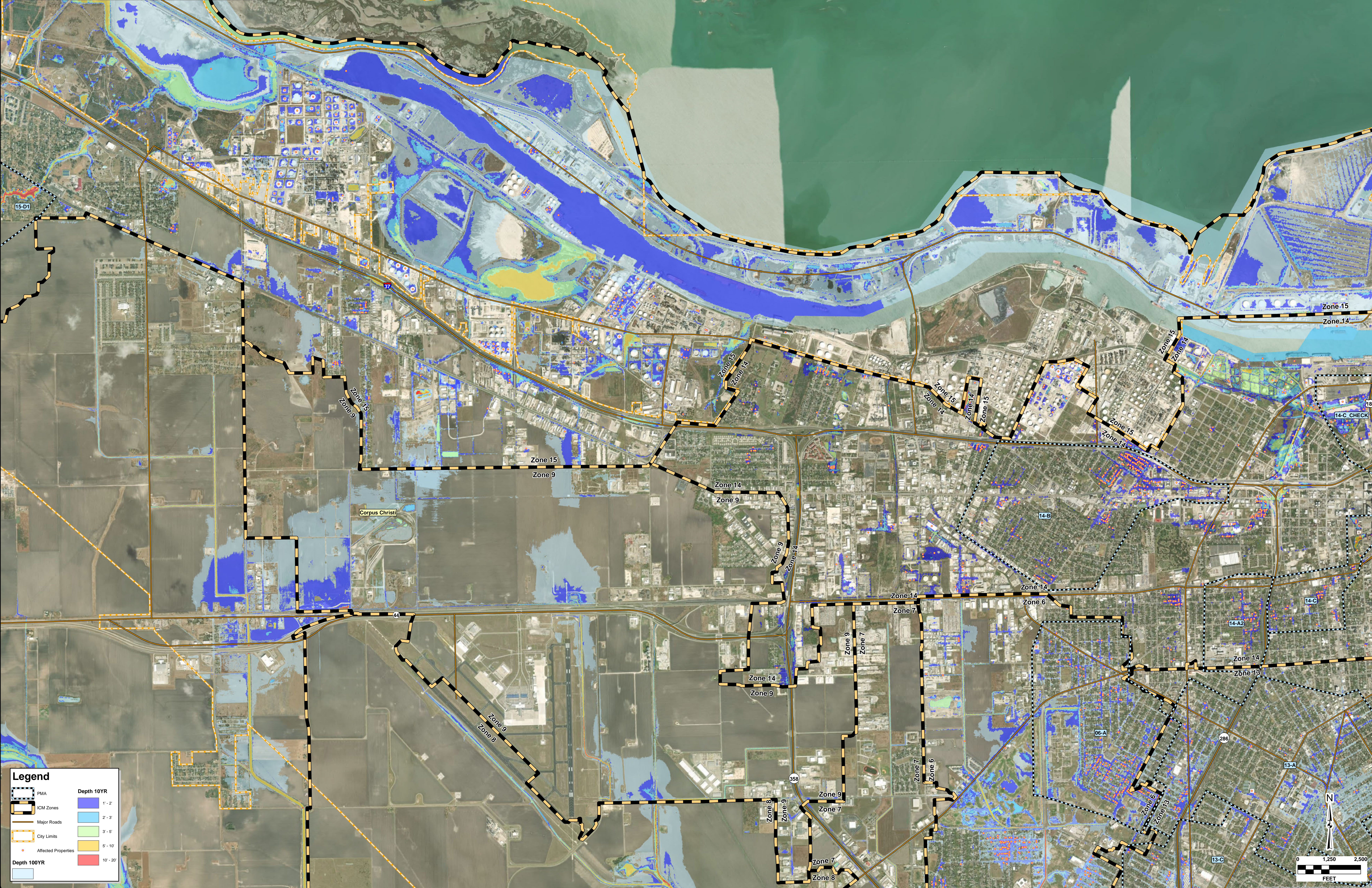
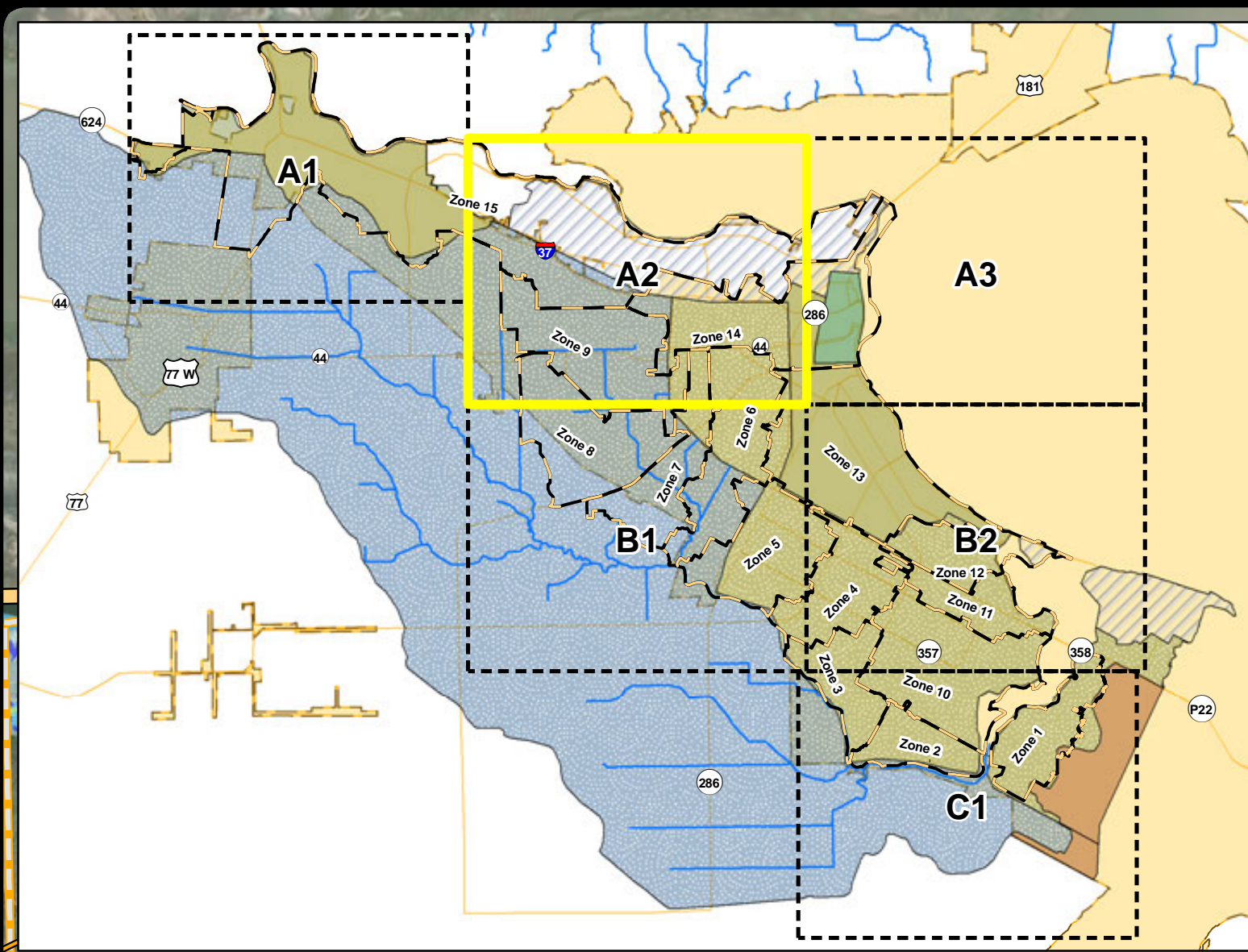
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 EXISTING CONDITIONS GRID SHEET - A1

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	1

Date: Aug 20, 2023, 8:03:16 PM, User: rdawson  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Rely only on final hardcopy materials bearing the consultant's original stamp, signature and seal. Aerial imagery provided by Google © unless otherwise noted. Imagery © 2023. CAPOCO, Digital Globe, Texas Orthometry Program, USDA Farm Service Agency.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

0 1,250 2,500  
FEET

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

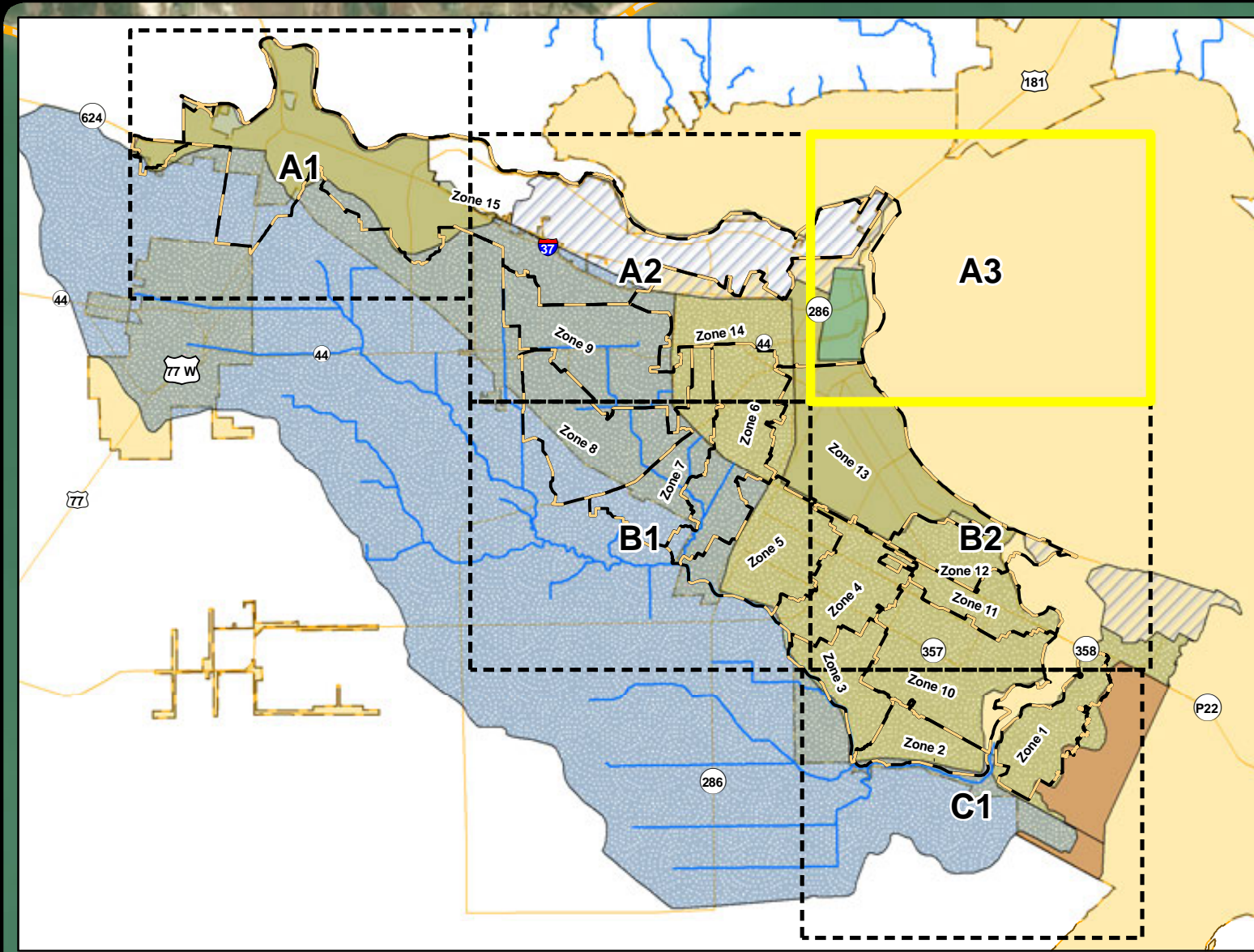
**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
**DRAINAGE STUDY MAP BOOK- 10YR VS 100YR**  
**EXISTING CONDITIONS GRID SHEET - A2**

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	2

NO.	REVISION	DATE

Drawn: Aug 2023 10:33 AM User: rdawson  
 This document has been produced from material that was stored in our cloud-based system and may have been modified electronically. The original data source is the City of Corpus Christi GIS data. All other data is the property of the City of Corpus Christi. All other data is the property of the City of Corpus Christi. All other data is the property of the City of Corpus Christi.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

0 1,250 2,500  
FEET

NO.	REVISION	DATE

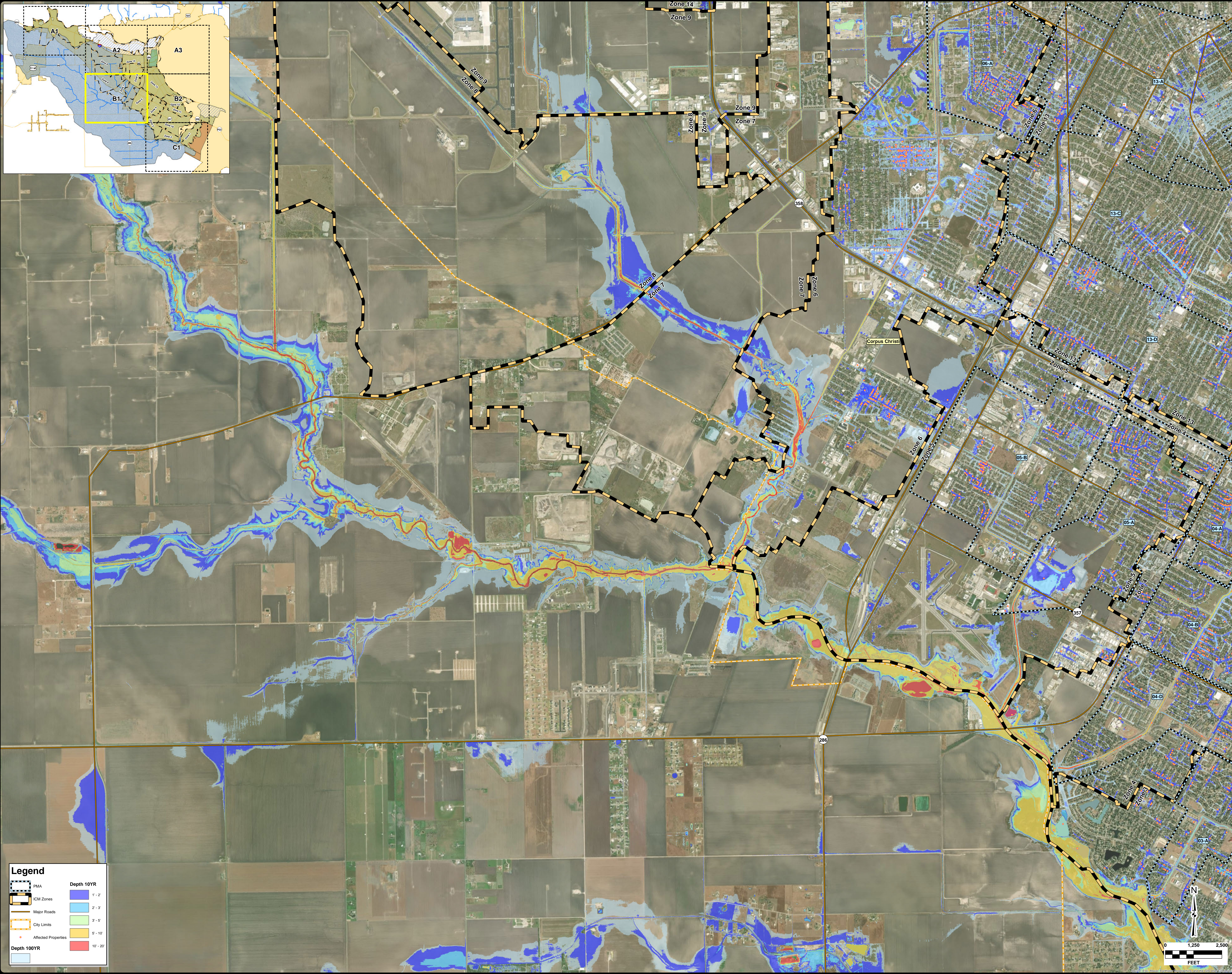
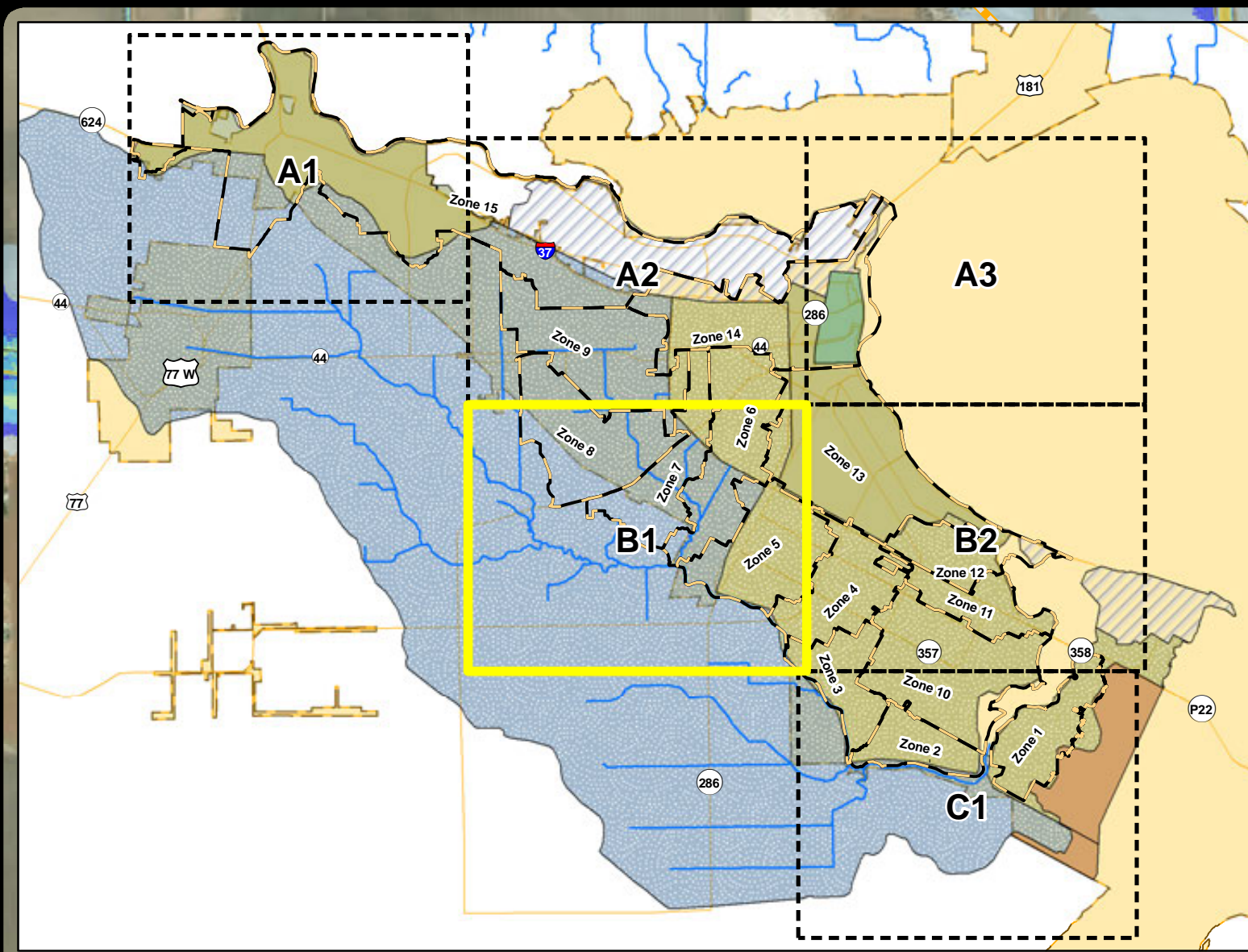
**Pape-Dawson  
ENGINEERS**  
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
CORPUS CHRISTI, TEXAS  
**DRAINAGE STUDY MAP BOOK- 10YR VS 100YR**  
EXISTING CONDITIONS GRID SHEET - A3

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	<b>3</b>

Date: Aug 20, 2023 8:02:09 PM User: rdawson  
THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADEQUATELY ALTERED. RELY ONLY ON ORIGINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPOCO, Digital Globe, Texas Orthographic Projection, USGS Form Service Agency.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

0 1,250 2,500  
FEET

N

NO.	REVISION	DATE

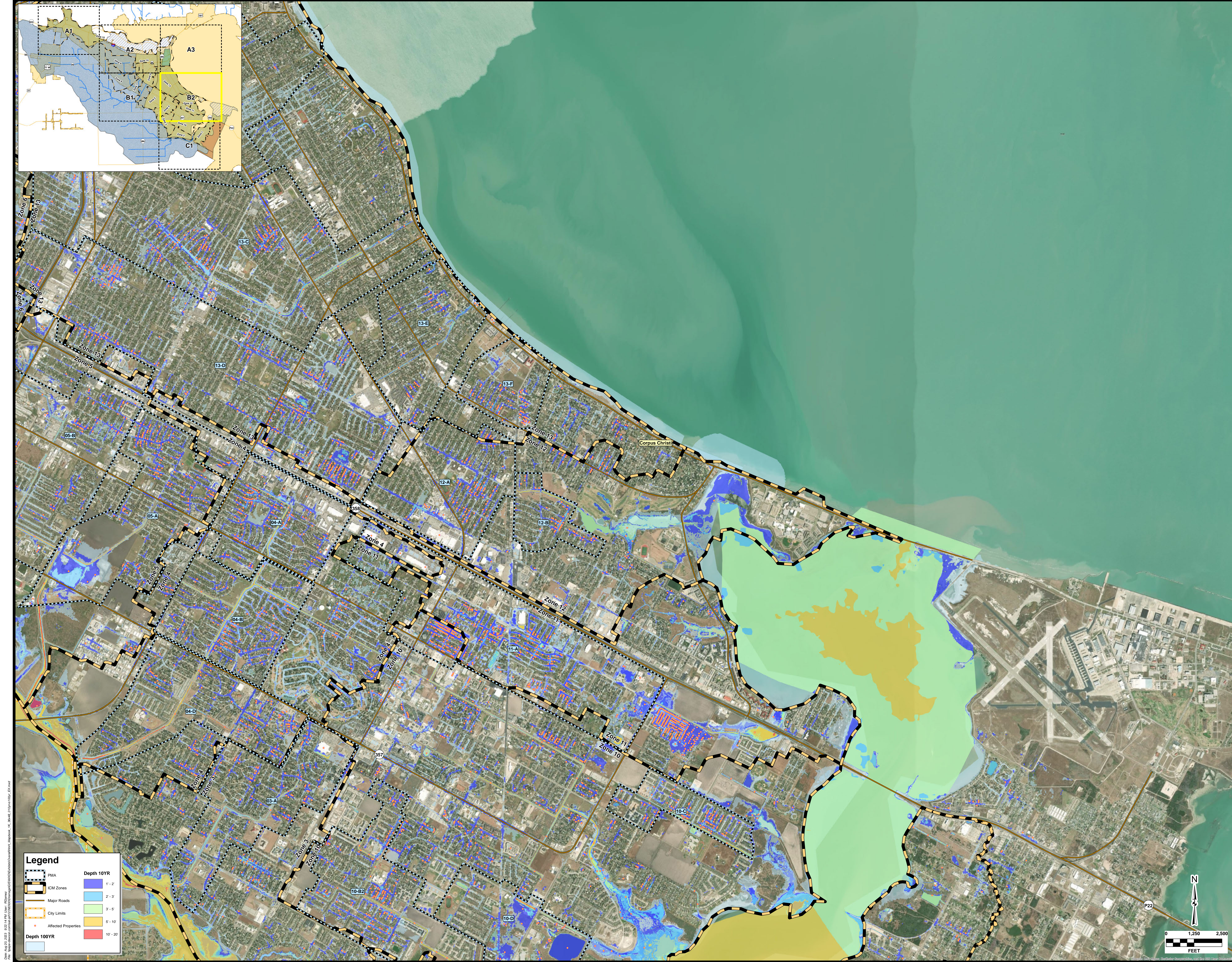
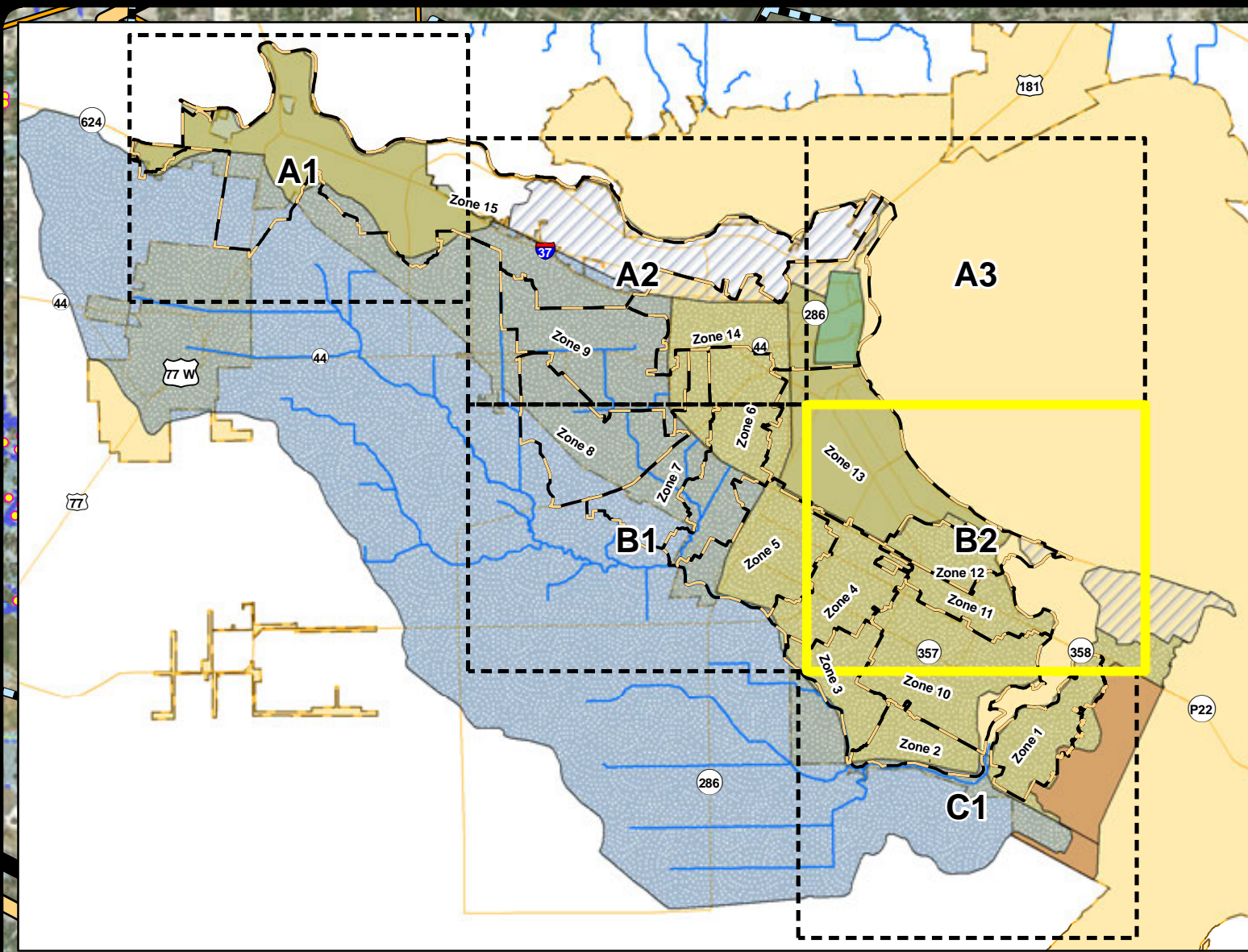
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 EXISTING CONDITIONS GRID SHEET - B1

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	4

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED IN OUR ARCHIVE. IT MAY BE DIFFERENT FROM THE ORIGINAL. ORIGINAL DATE: 08/2023. ORIGINAL FILENAME: C:\Users\jrdawson\OneDrive\Documents\City of Corpus Christi\GIS\10YR VS 100YR\10YR VS 100YR\_Grid\_Sheet\_B1.mxd





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

NO.	REVISION	DATE

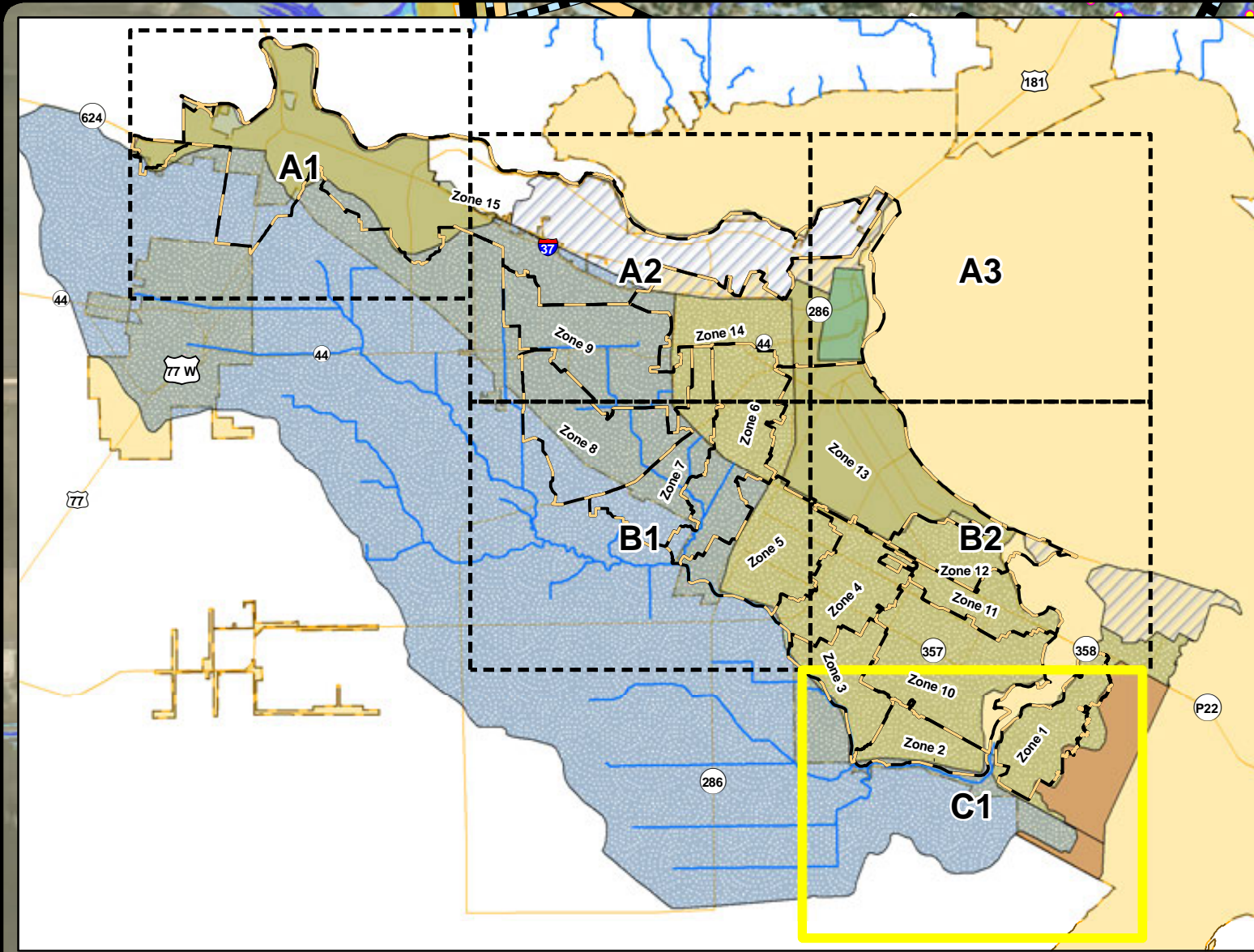
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
**DRAINAGE STUDY MAP BOOK- 10YR VS 100YR**  
**EXISTING CONDITIONS GRID SHEET - B2**

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	5

Drawn August 03, 2023 10:25 AM User: rdawson  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Rely only on final hardcopy materials bearing the consultant's original stamp, signature and seal. Aerial imagery provided by Google © unless otherwise noted. August 3, 2023. City of Corpus Christi, Texas. Orthorectified imagery. USGS Farm Service Agency.





**Legend**

PMA	<b>Depth 10YR</b>
ICM Zones	1' - 2'
Major Roads	2' - 3'
City Limits	3' - 5'
Affected Properties	5' - 10'
Depth 100YR	10' - 20'

NO.	REVISION	DATE	NO.	REVISION	DATE

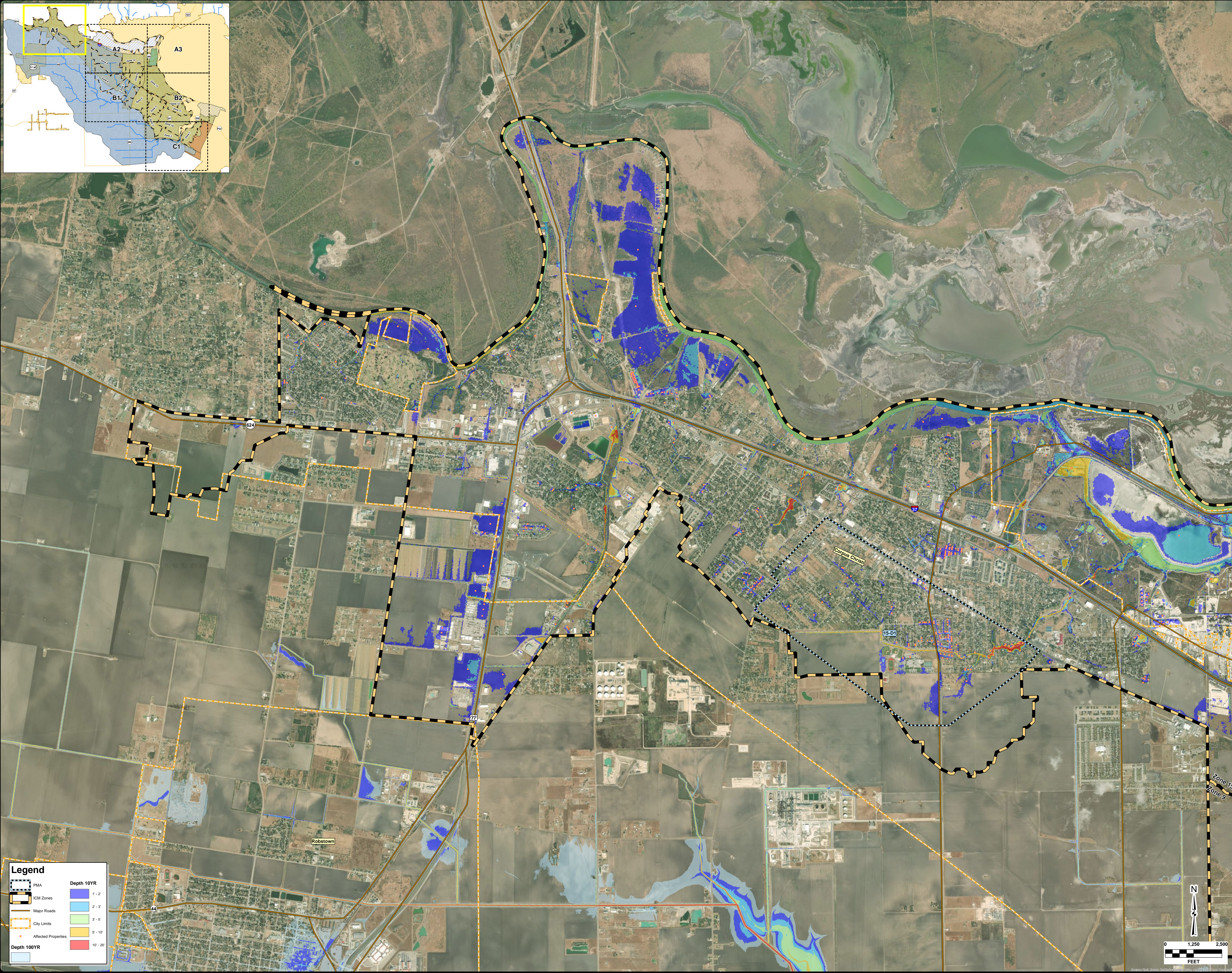
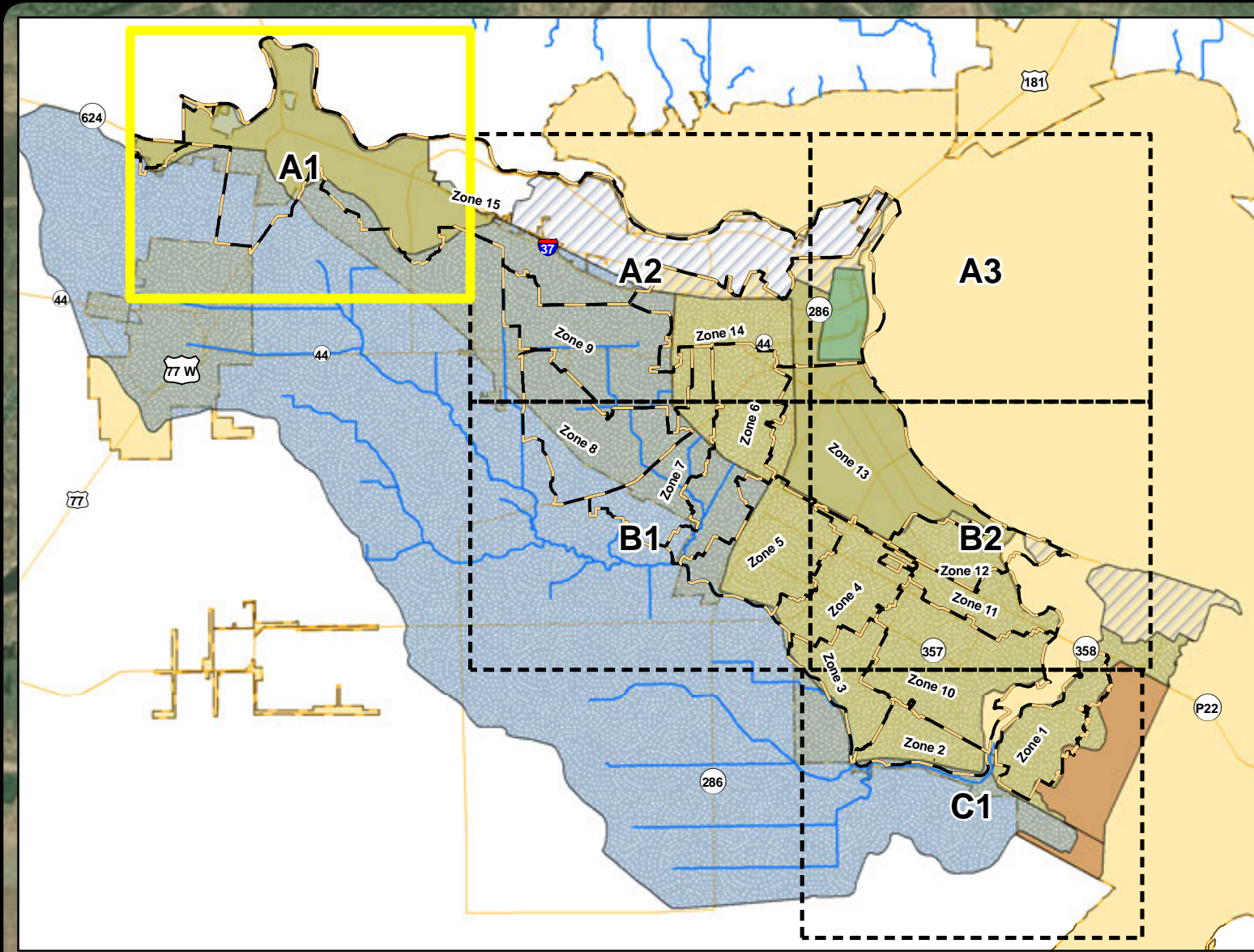
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
**DRAINAGE STUDY MAP BOOK- 10YR VS 100YR**  
 EXISTING CONDITIONS GRID SHEET - C1

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP, DRAWN RG
SHEET	6

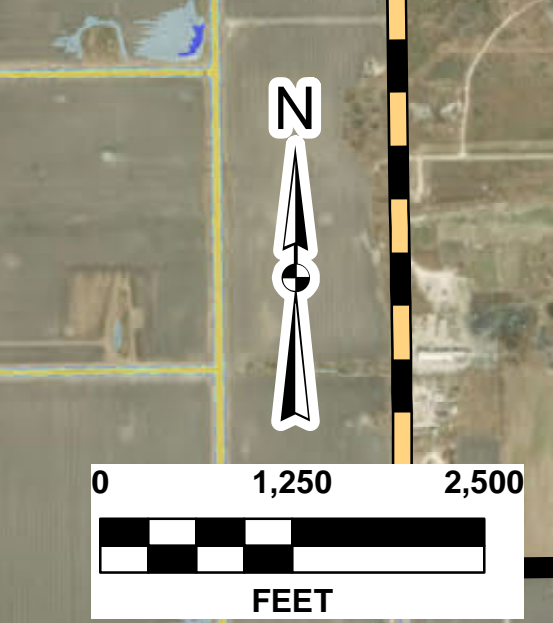
Date: Aug 03 2023 8:57:49 PM User: jrdawson  
 File: \\pape-dawson.com\projects\12383\GIS\12383\_C1\_10YR\_100YR\_Grid\_Sheet\_C1.mxd  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Rely only on final hardcopy materials bearing the consultant's original stamp, signature and seal. Aerial imagery provided by Google © unless otherwise noted. Imagery © 2023. CAPOCO, DigitalGlobe, Terra, Orbimage, Progress, USGS, Farm Service Agency.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'



NO.	REVISION	DATE

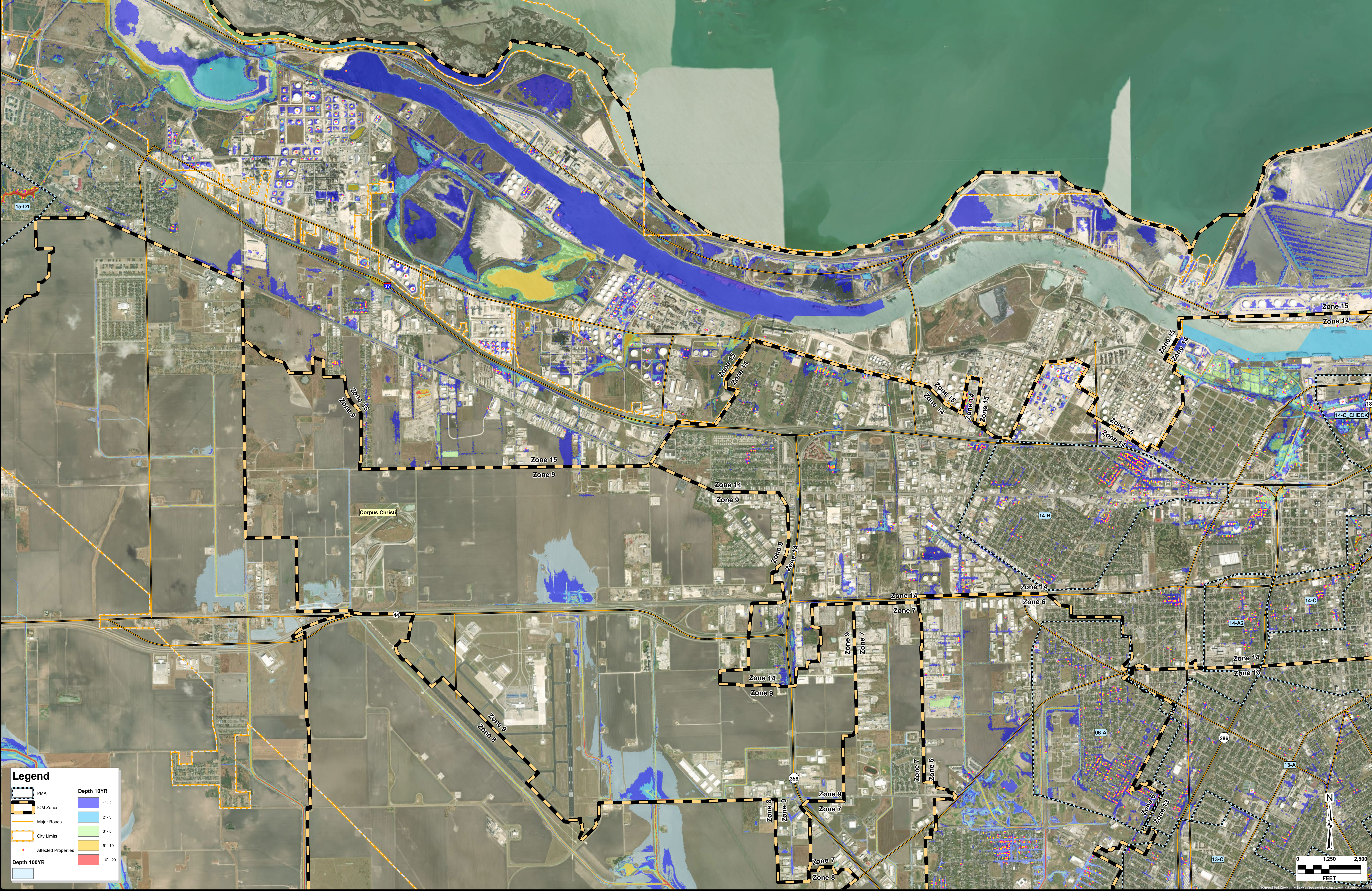
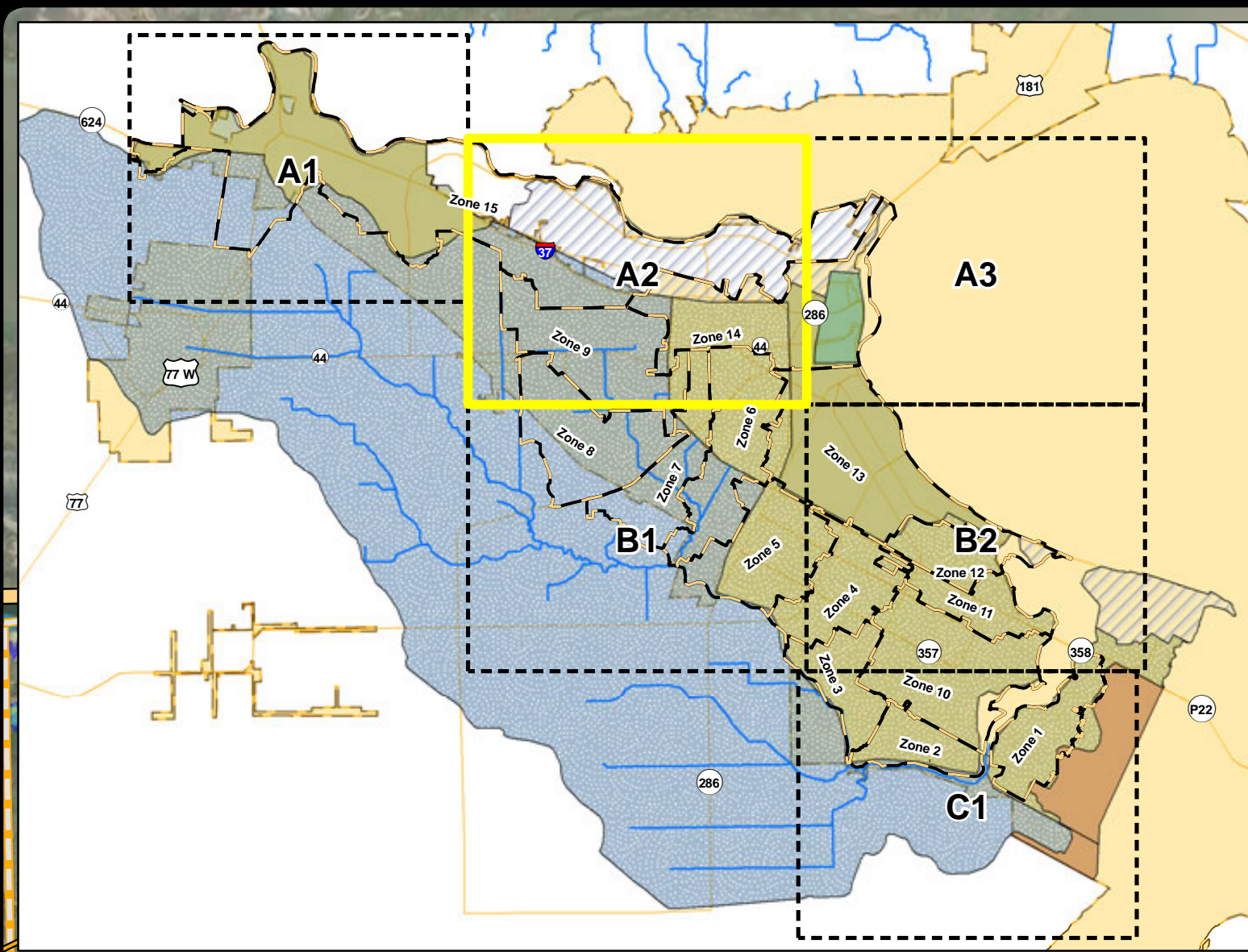
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - A1

PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	1

Date: Aug 20, 2023, 8:46:17 PM, User: rdawson  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Rely only on final hardcopy materials bearing the consultant's original stamp, seal, and signature.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

0 1,250 2,500  
FEET

NO.	REVISION	DATE	BY

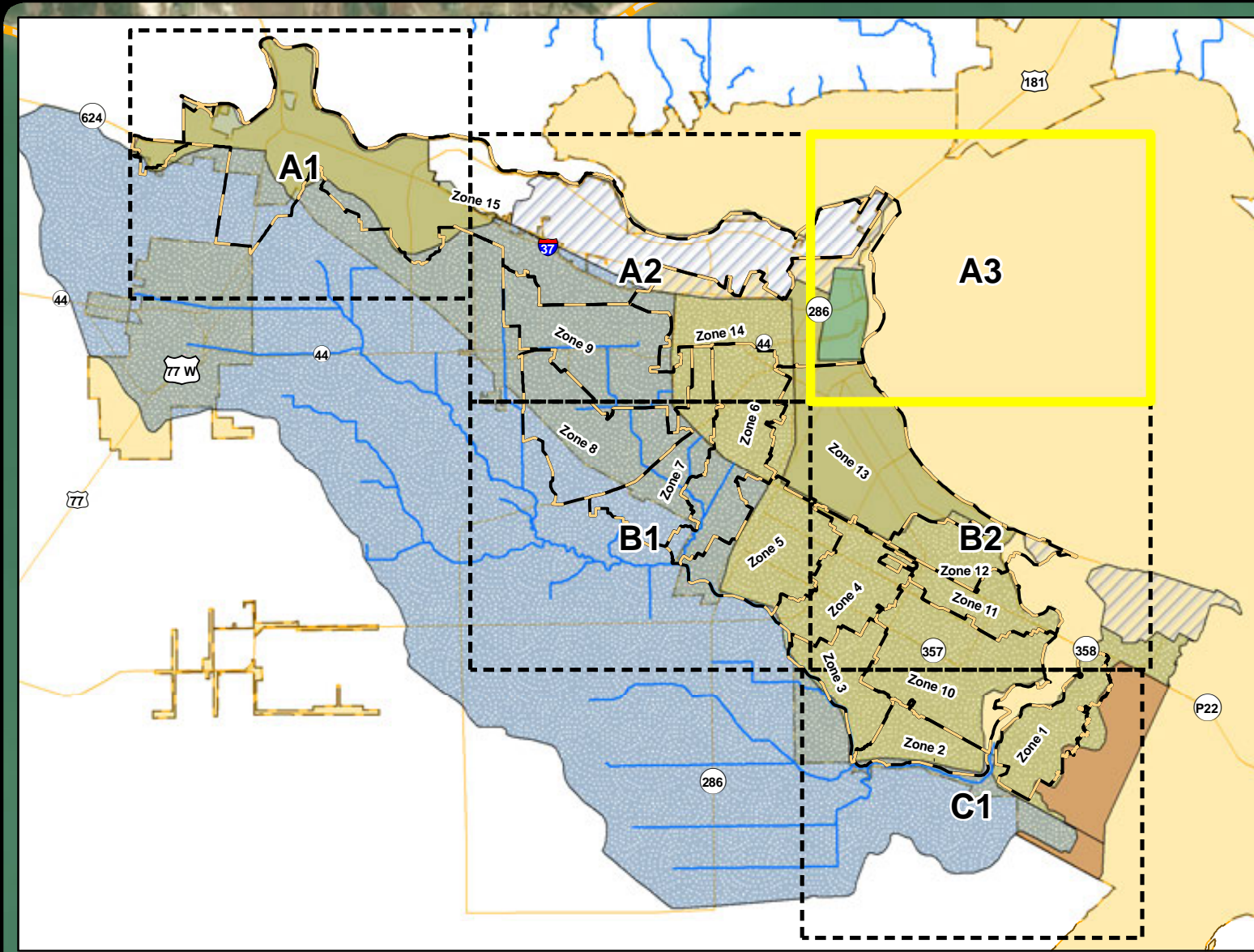
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP #10 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #070 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - A2

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	2

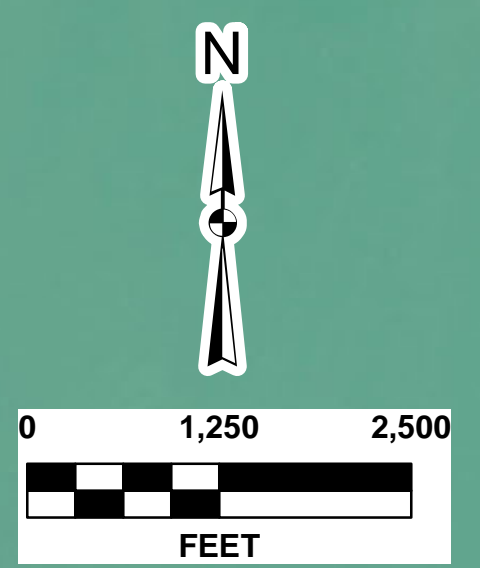
Date: Aug 20, 2023 8:50:37 PM User: rdawson  
 This document has been produced from material that was stored in our cloud-based system and may have been modified electronically.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
			10' - 20'
	Depth 100YR		



NO.	REVISION	DATE

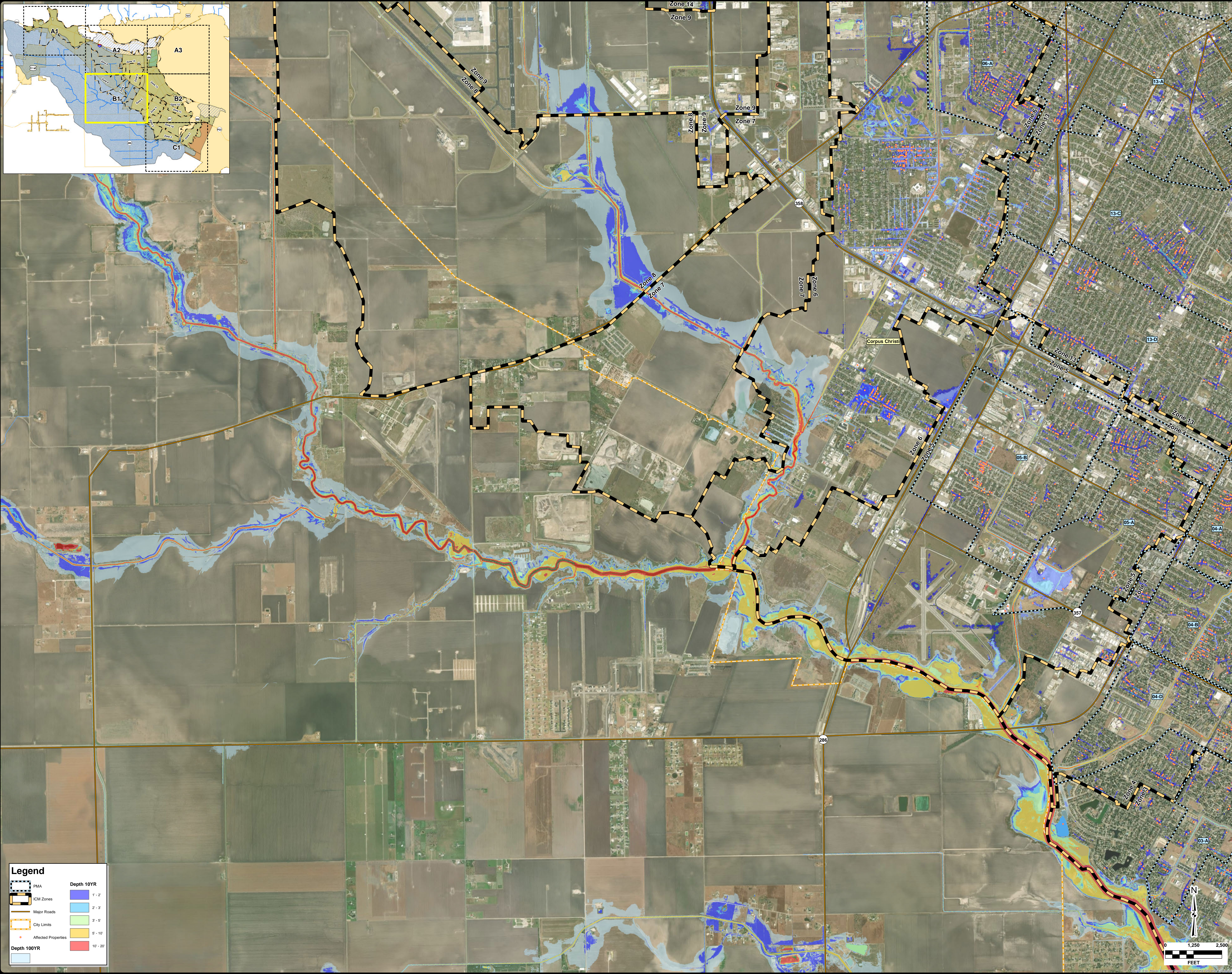
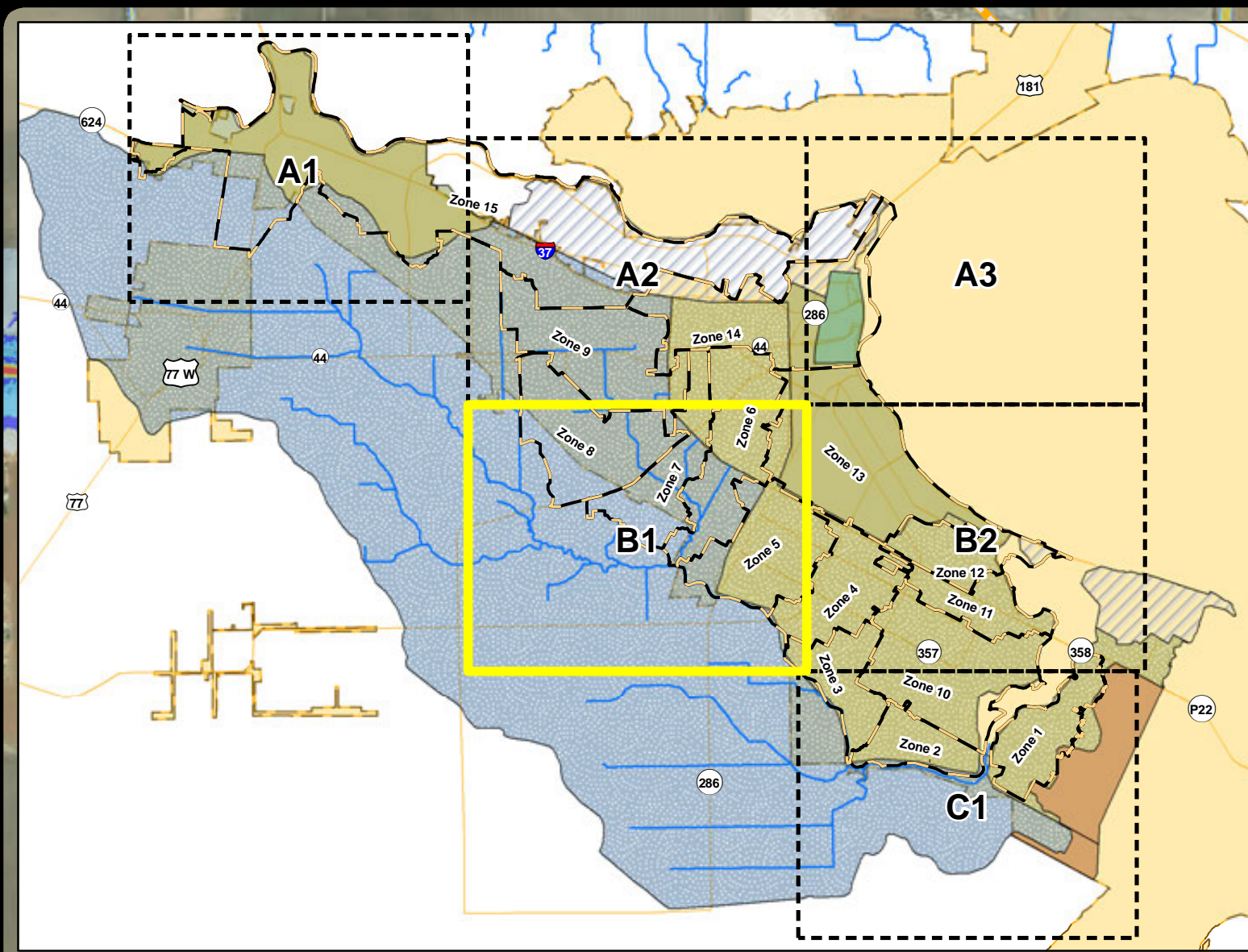
**Pape-Dawson  
ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #271 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - A3

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	3

Drawn: August 2023, 8:06:49 PM, User: rdawson  
 THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED AND/OR TRANSMITTED ELECTRONICALLY AND MAY HAVE BEEN INADEQUATELY ALTERED. RELY ONLY ON ORIGINAL HARD COPY MATERIALS BEARING THE CONSULTANT'S ORIGINAL SIGNATURE AND SEAL. AERIAL IMAGERY PROVIDED BY GOOGLE © UNLESS OTHERWISE NOTED. Imagery © 2023. CAPOCO, Digital Globe, Texas Orthographic Program, USGS Farm Service Agency.





**Legend**

	PMA		<b>Depth 10YR</b>
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

NO.	REVISION	DATE

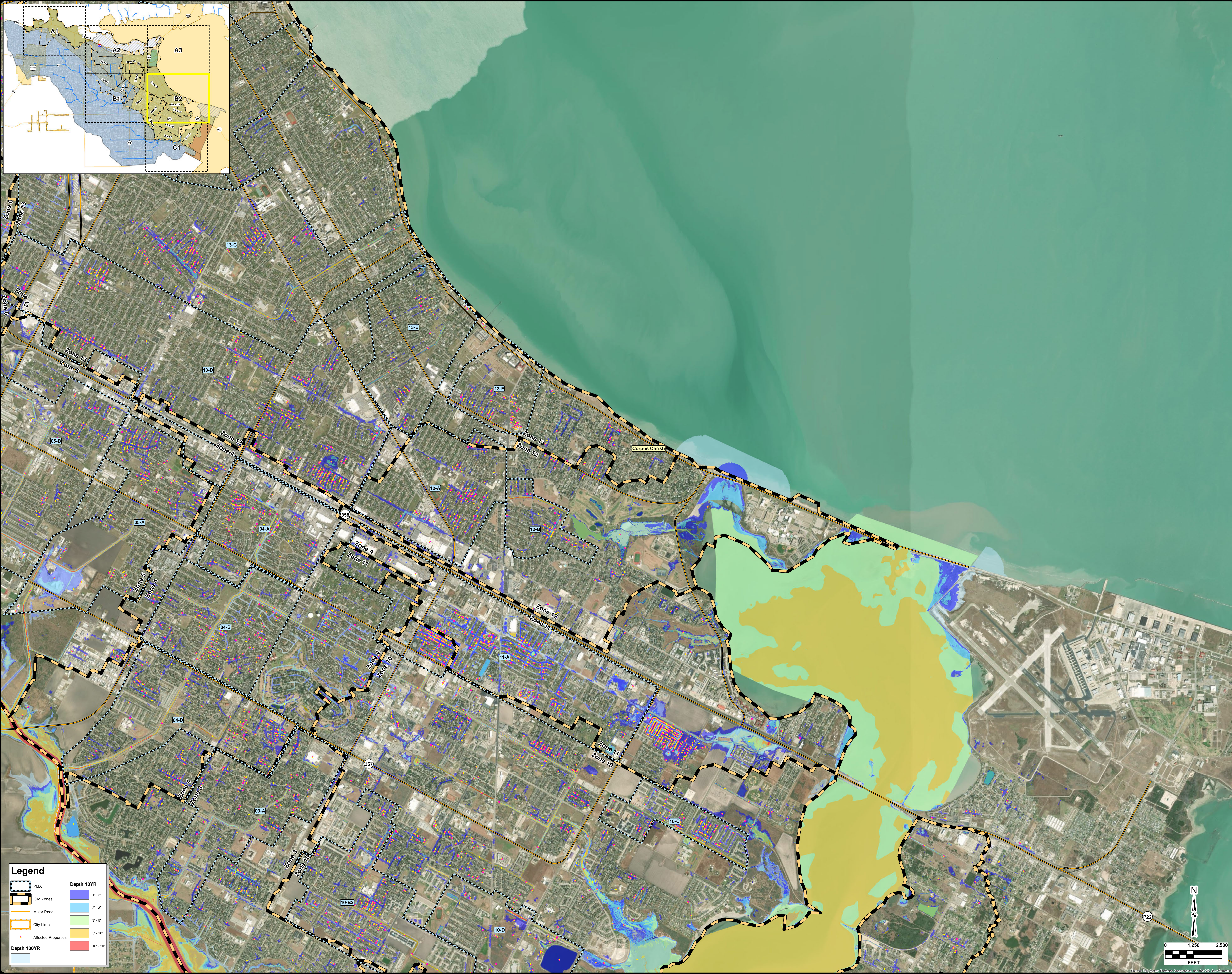
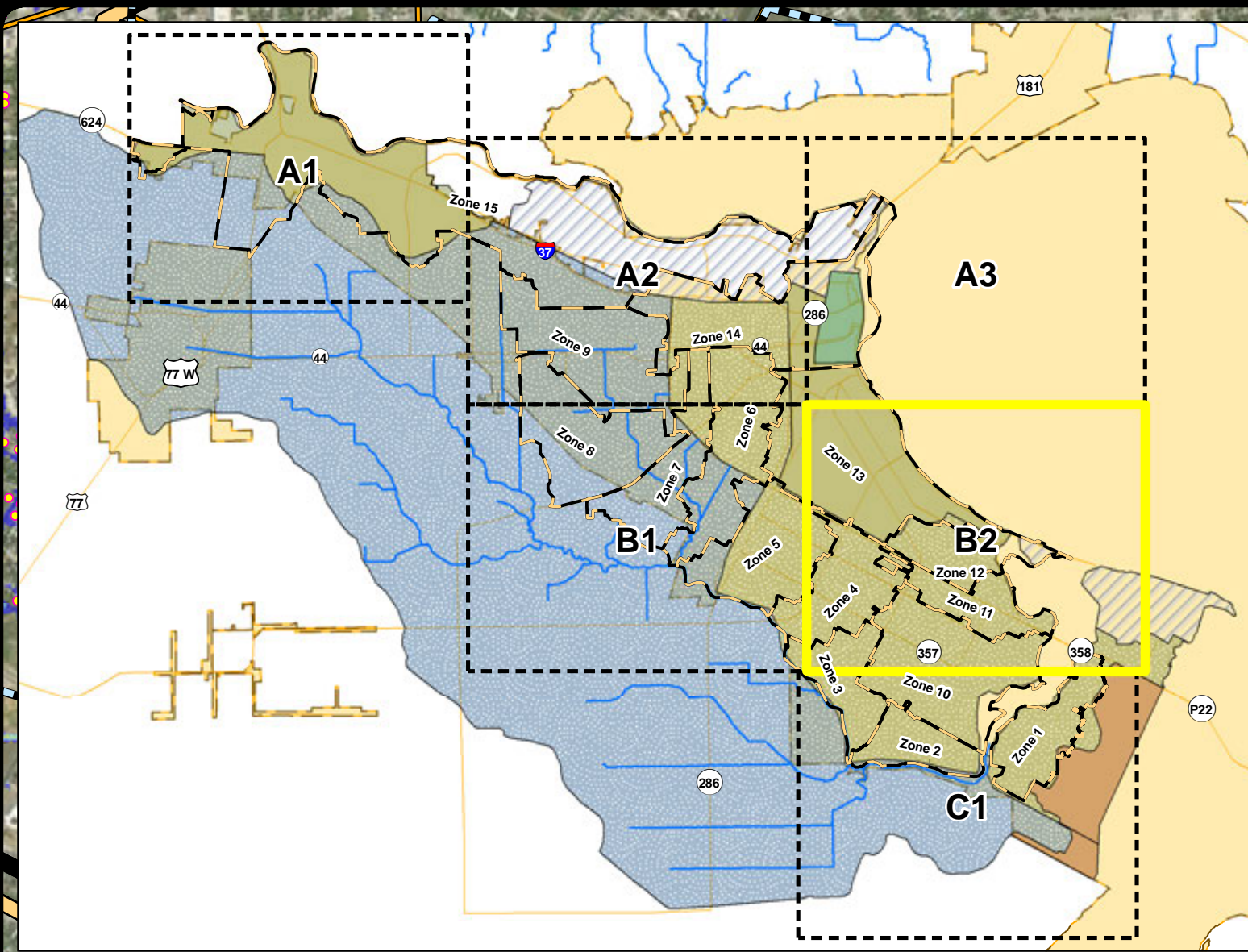
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10038800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - B1

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RO
SHEET	4

THIS DOCUMENT HAS BEEN PRODUCED FROM MATERIAL THAT WAS STORED IN OUR UNCLASSIFIED ELECTRONICALLY AND MAY HAVE BEEN UNCLASSIFIED OR DECLASSIFIED. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE NATIONAL ARCHIVES. THIS DOCUMENT IS THE PROPERTY OF PAPER-DAWSON ENGINEERS AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM PAPER-DAWSON ENGINEERS.





**Legend**

	PMA		Depth 10YR
	ICM Zones		1' - 2'
	Major Roads		2' - 3'
	City Limits		3' - 5'
	Affected Properties		5' - 10'
	Depth 100YR		10' - 20'

0 1,250 2,500  
FEET

NO.	REVISION	DATE

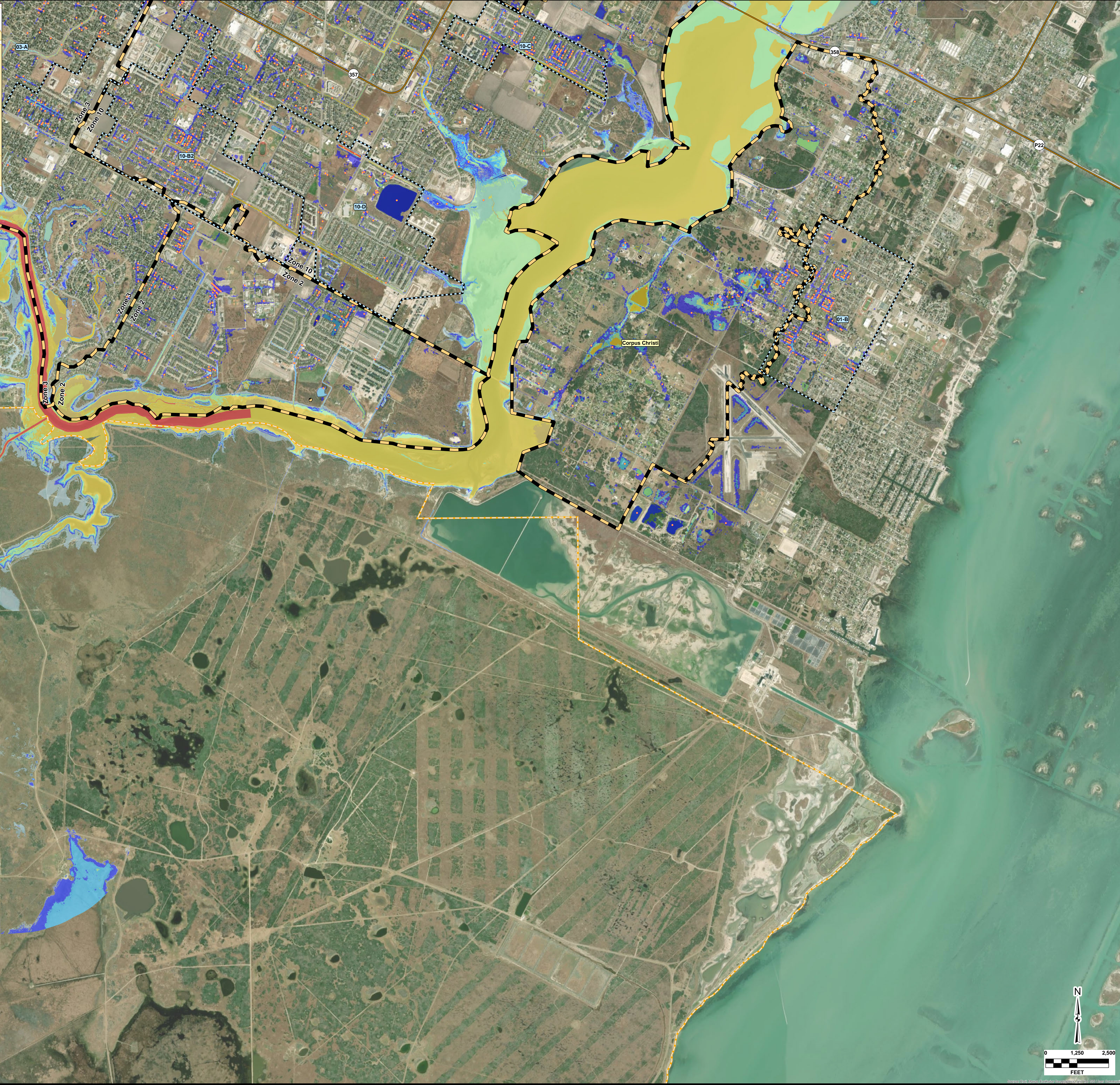
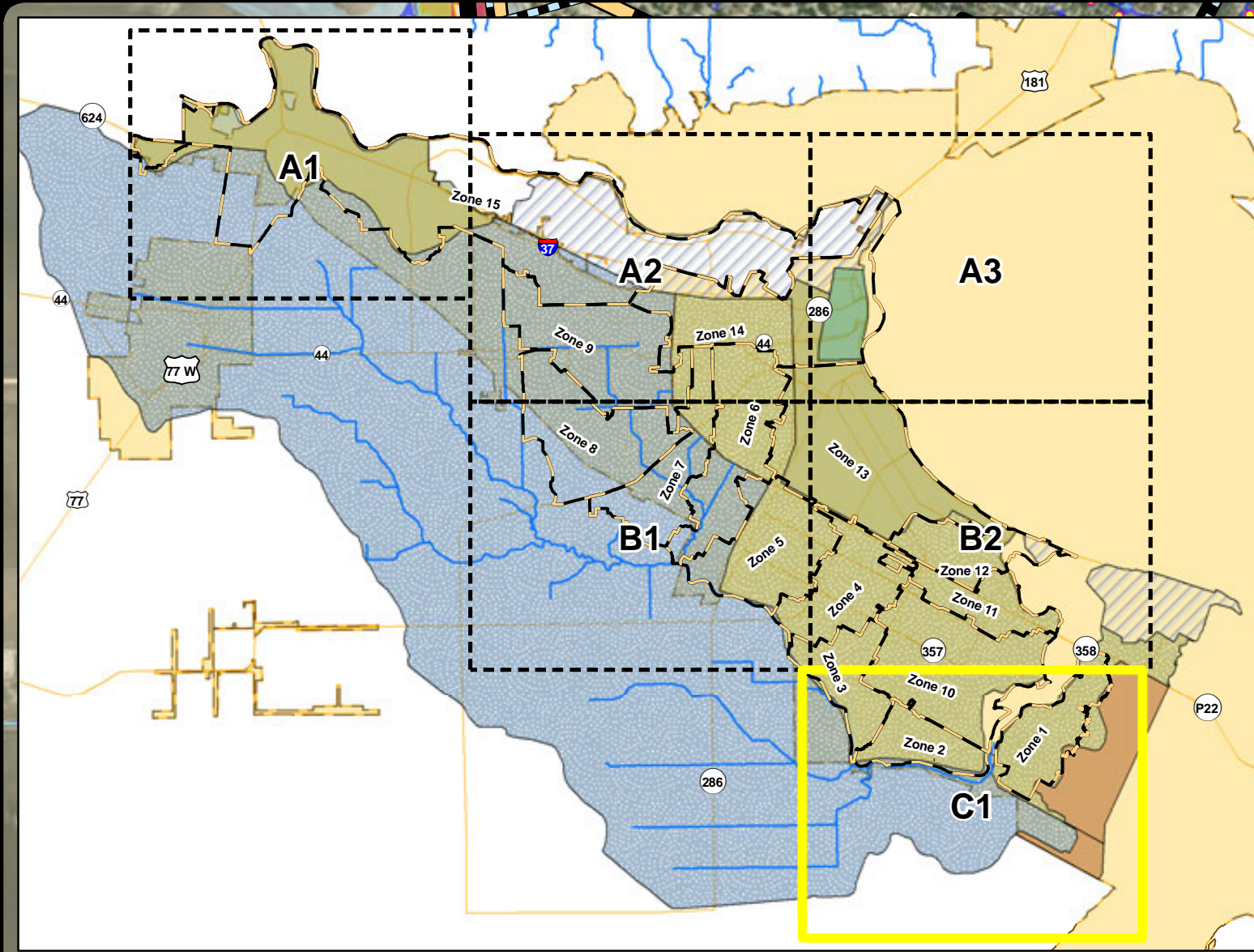
**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - B2

PLAT NO.	
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	5

Date: August 2023, 8:08:19 PM, User: rdawson  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Only the original hardcopy materials bearing the consultant's original stamp, signature and seal, aerial imagery provided by Google, and other otherwise noted imagery © 2023, CAPOCO, DigitalGlobe, Terra, Orbis, and other imagery providers, USGS, and other agencies are the authoritative source.





**Legend**

	PMA		<b>Depth 10YR</b>		1' - 2'
	ICM Zones				2' - 3'
	Major Roads				3' - 5'
	City Limits				5' - 10'
	Affected Properties				10' - 20'
	<b>Depth 100YR</b>				

NO.	REVISION	DATE	NO.	REVISION	DATE

**PAPE-DAWSON ENGINEERS**  
 SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS  
 2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #071 | TEXAS SURVEYING FIRM #10018800

**CITY OF CORPUS CHRISTI DRAINAGE**  
 CORPUS CHRISTI, TEXAS  
 DRAINAGE STUDY MAP BOOK- 10YR VS 100YR  
 PROPOSED CONDITIONS GRID SHEET - C1

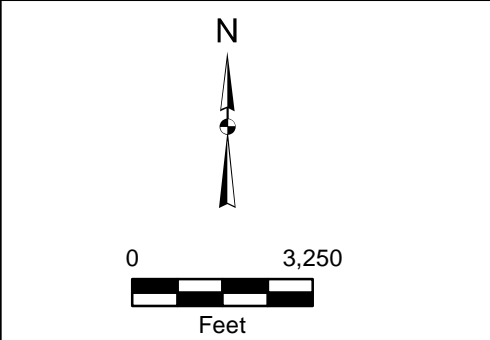
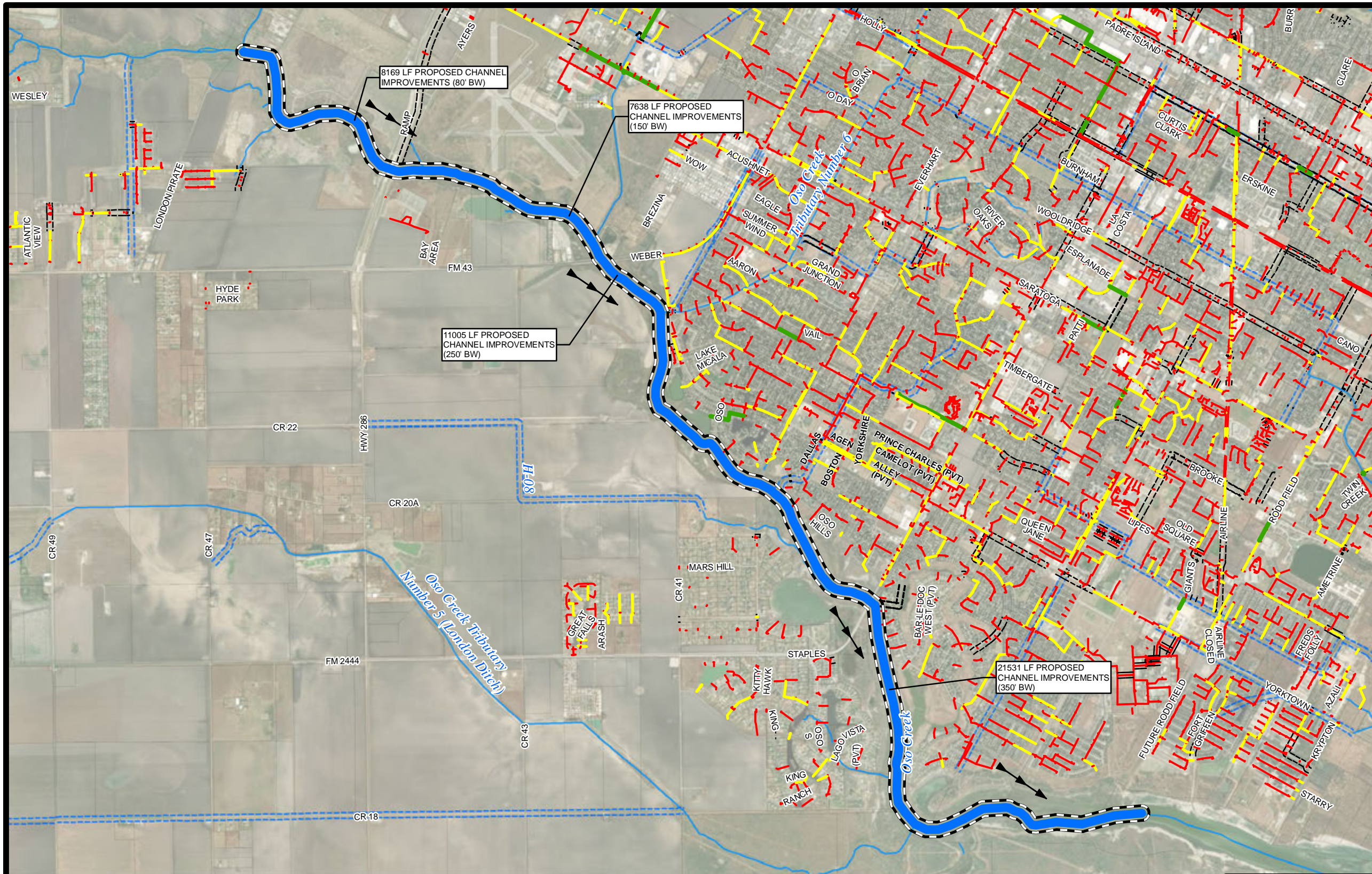
PLAT NO.	---
JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	BES
CHECKED	JP
DRAWN	RG
SHEET	6

Date: Aug 2023 8:08:31 PM User: jrdawson  
 File: \\pape-dawson.com\projects\2023\12383\GIS\20230815\20230815\_C1\_Grid\_Sheet\_C1.mxd  
 This document has been produced from material that was stored and/or transmitted electronically and may have been inadvertently altered. Rely only on final hardcopy materials bearing the consultant's original stamp, signature and seal. Aerial imagery provided by Google © unless otherwise noted. Imagery © 2023. CAPOCO, DigitalGlobe, Terra, Orbimage, Progress, USGS, Farm Service Agency.



**APPENDIX C**  
**Project Quad Sheets**



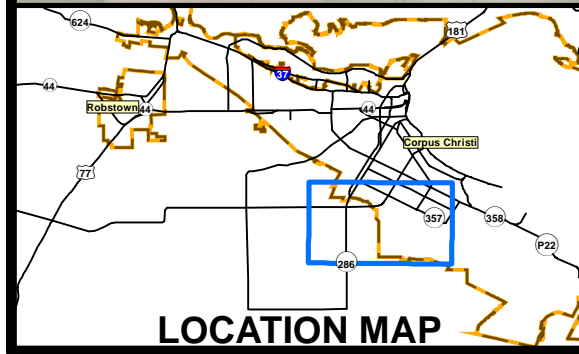


**Legend**

- Flow Direction
- Project Limits
- FEMA CL
- Ditch CL
- Proposed Improvements**
- Channel
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Channel improvements to widen and deepen main channel along centerline of Oso Creek from La Volla Creek confluence to Oso Bay to improve conveyance and provide additional capacity within the high banks of Oso Creek.

**Council District 3, 4, 5**      **Commissioner Precinct 4**


**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$32,163,920
ROW Acquisition:	\$1,500,000
MB&I (15%):	\$4,824,588
Contingency (30%):	\$9,649,176
Design & Inspection (15%):	\$4,824,588
<b>Project Total:</b>	<b>\$52,962,272</b>



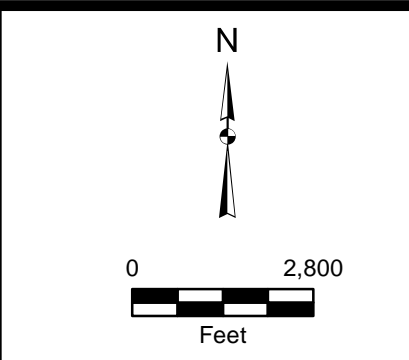
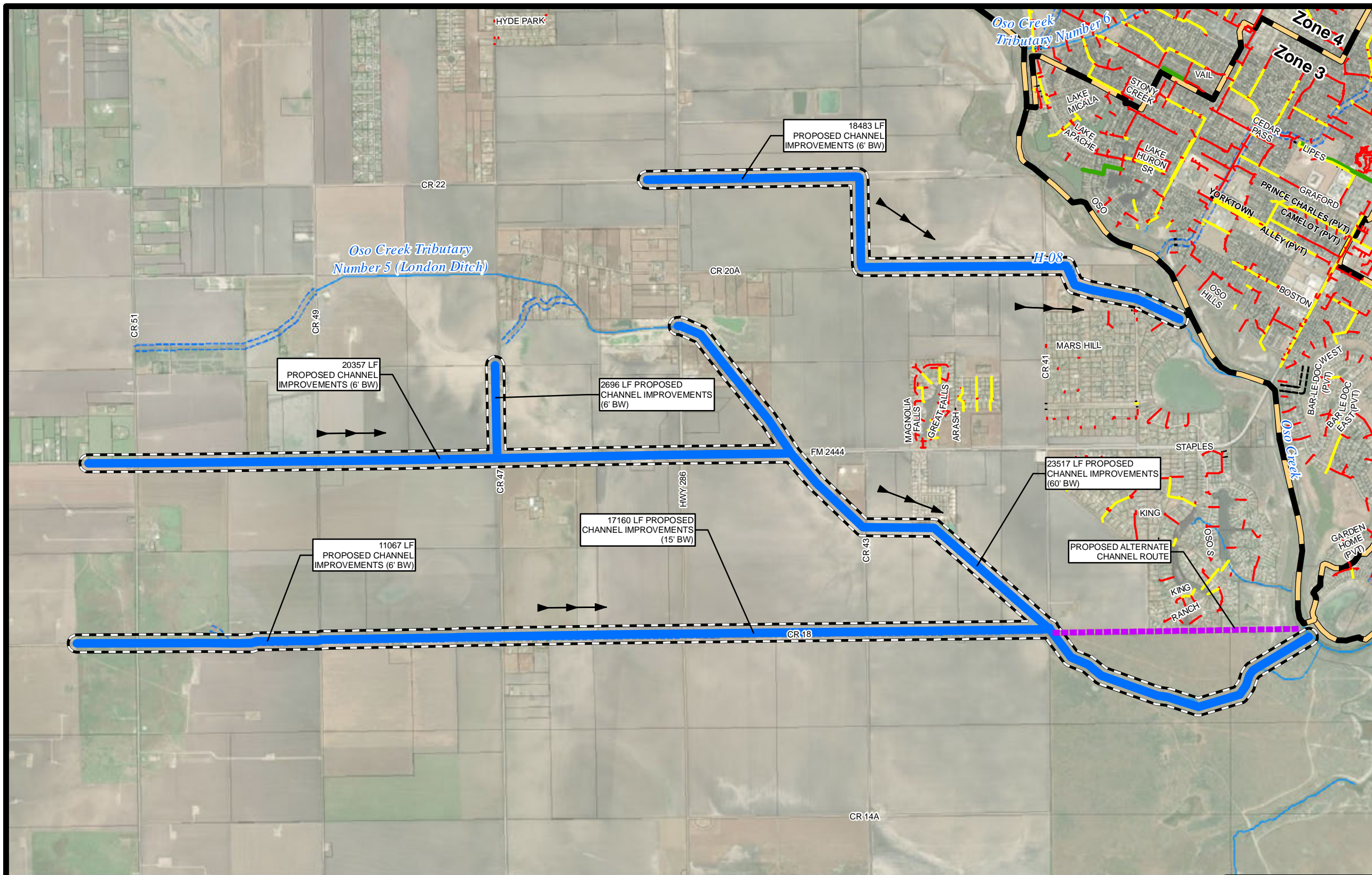
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 1 PROPOSED IMPROVEMENTS**



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 1





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

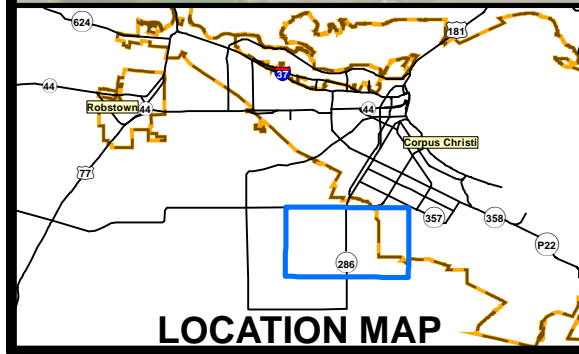
- Channel
- Alternate Channel

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements along London Ditch from Crosstown Expwy to Oso Creek; and channel improvements along ditches/tributaries in London Area to provide conveyance through London area including potential Nueces County and TxDOT improvements.

**Council District 4, 5**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$4,707,236
ROW Acquisition:	\$3,450,000
MB&I (15%):	\$706,085
Contingency (30%):	\$1,412,171
Design & Inspection (15%):	\$706,085
<b>Project Total:</b>	<b>\$10,981,578</b>

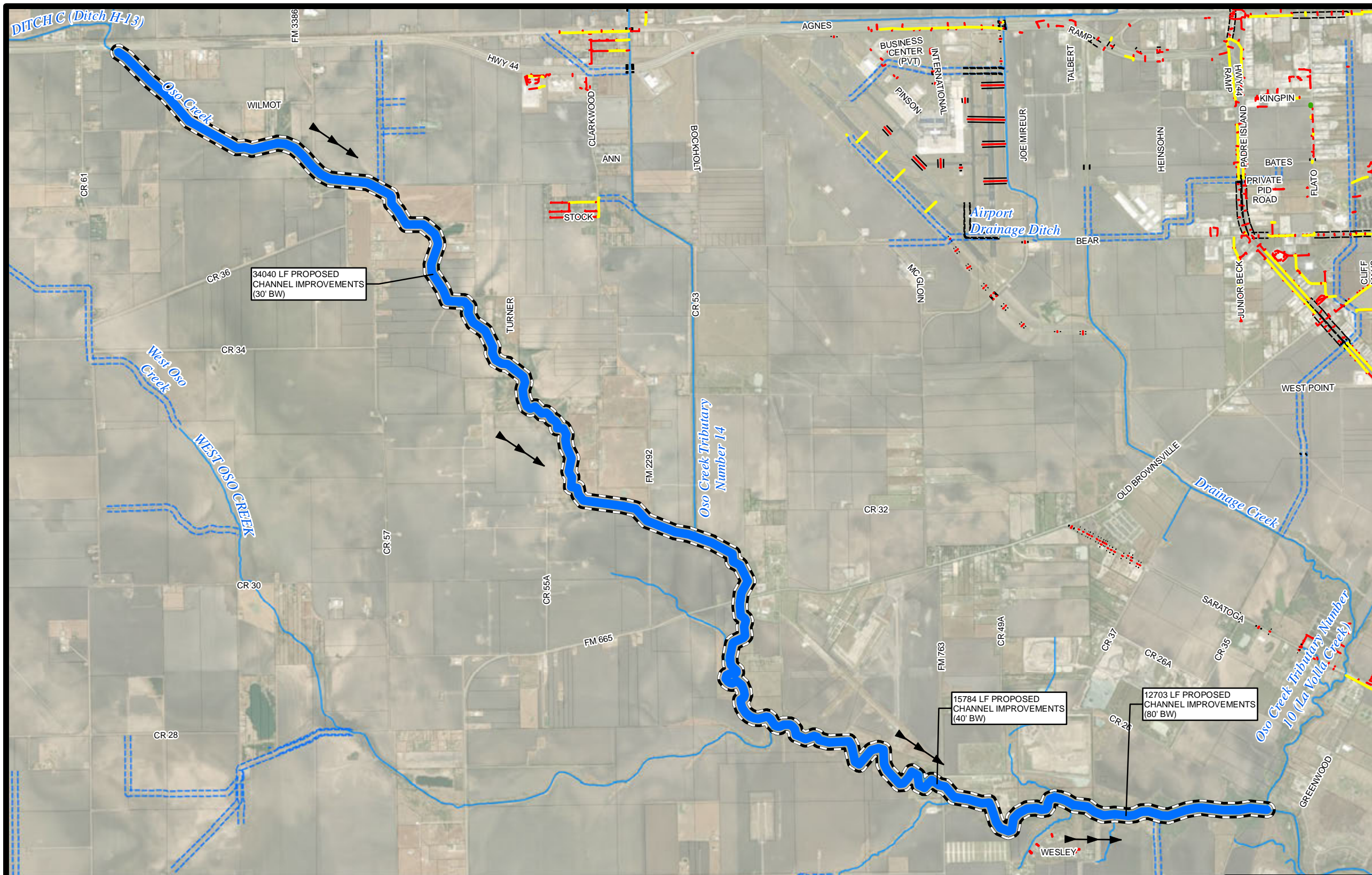
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 2 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 2

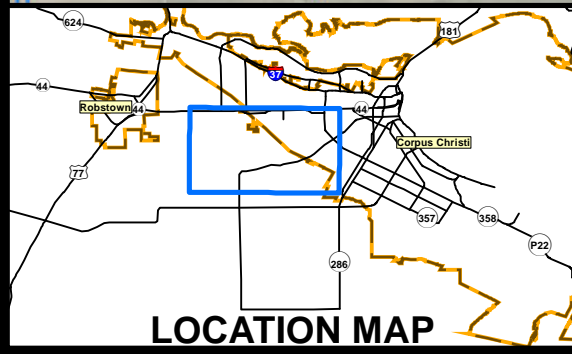




**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- FEMA CL
- - - Ditch CL
- Proposed Improvements**
- Channel
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

- NOTES:**
1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
  2. Project scope and cost do not include full street replacement or utility relocation.
  3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
  4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements to widen and deepen main channel along centerline of Oso Creek from Hwy 44 downstream to La Volla Creek confluence to improve conveyance and provide additional capacity within the high banks of Oso Creek.

**Council District 3**      **Commissioner Precincts 2, 3, 4**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$18,645,108
ROW Acquisition:	\$2,750,000
MB&I (15%):	\$2,796,766
Contingency (30%):	\$5,593,532
Design & Inspection (15%):	\$2,796,766
<b>Project Total:</b>	<b>\$32,582,173</b>

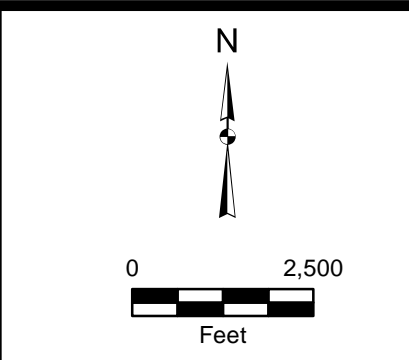
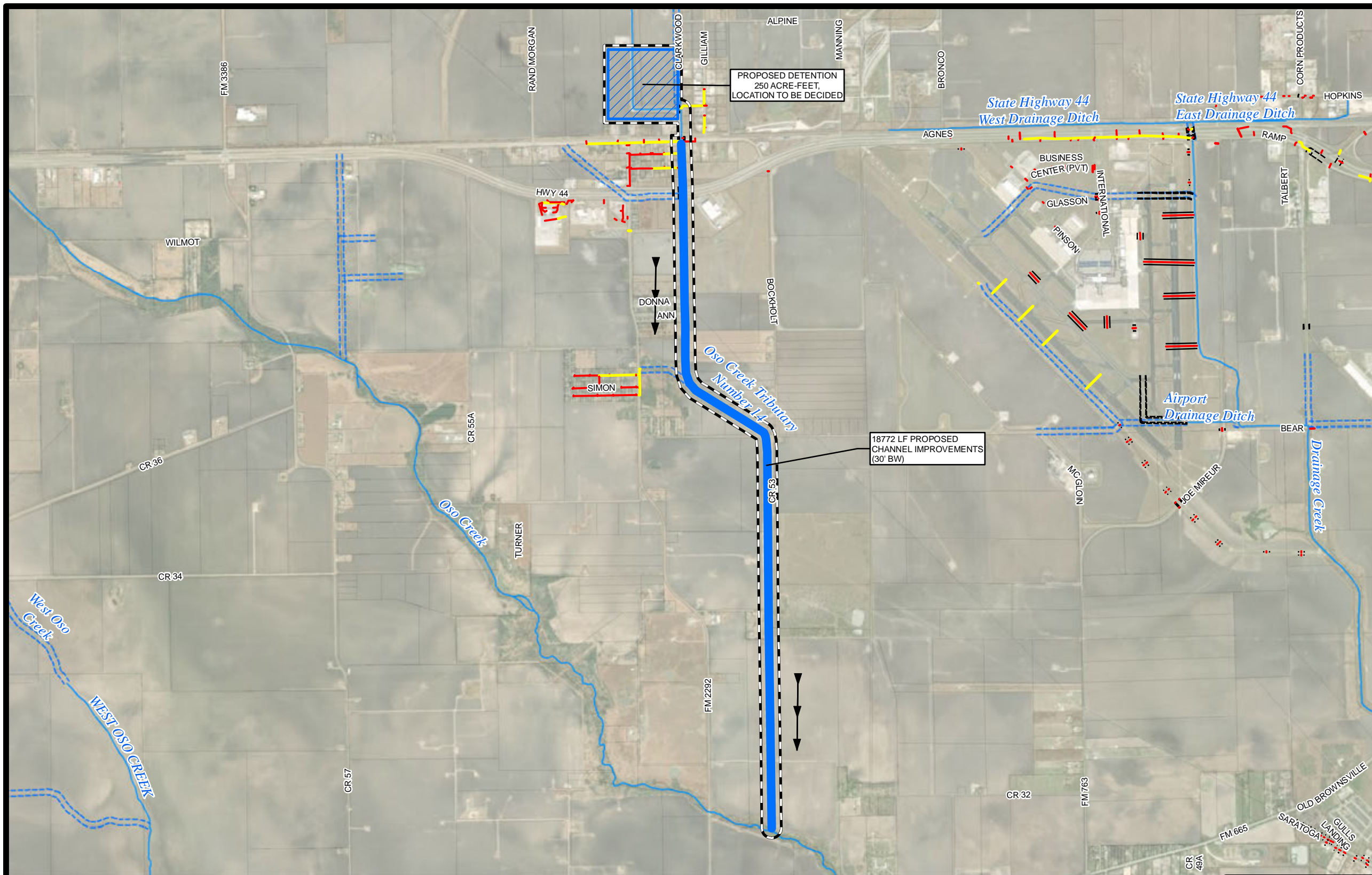
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 3 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES DRAWN RG
SHEET	QS Oso 3





**Legend**

- Flow Direction
- Detention
- Project Limits
- FEMA CL
- Ditch CL

**Proposed Improvements**

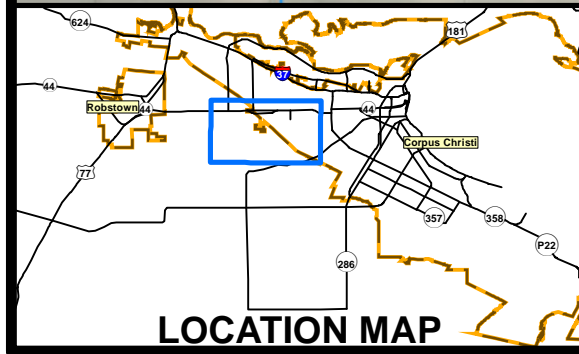
- Channel

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Improvements to Clarkwood Ditch/Oso Trib 14 from Hwy 44 to Oso Creek; and potential detention pond north of Hwy 44 to reduce flooding along Clarkwood Rd, near Hwy 44, and in nearby properties.

**Council District 1, 3**      **Commissioner Precincts 2, 3**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$23,304,888
ROW Acquisition:	\$2,650,000
MB&I (15%):	\$3,495,733
Contingency (30%):	\$6,991,466
Design & Inspection (15%):	\$3,495,733
<b>Project Total:</b>	<b>\$39,937,821</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 4 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

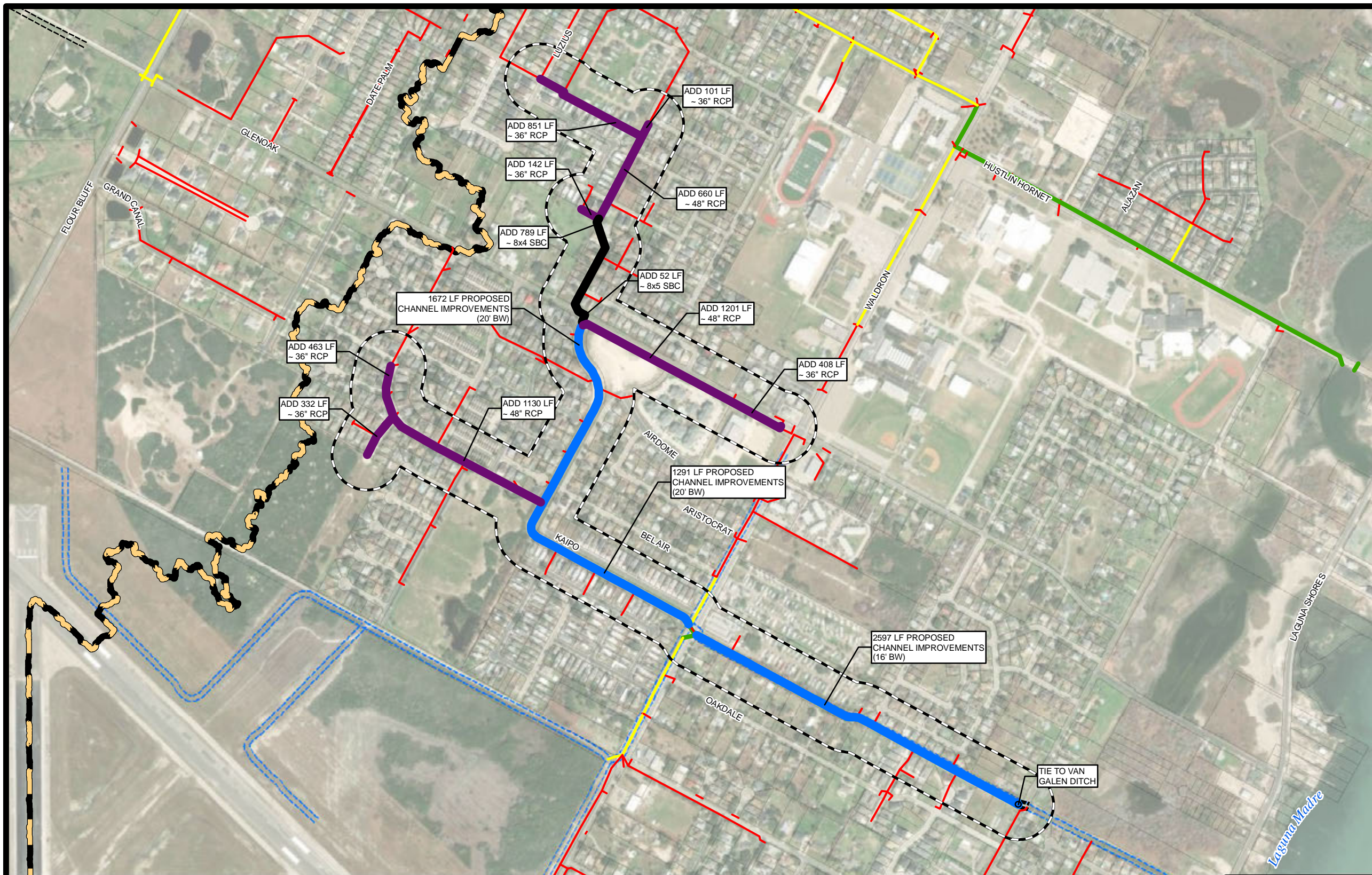
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 4









N

0 725  
Feet

**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL

**Proposed Improvements**

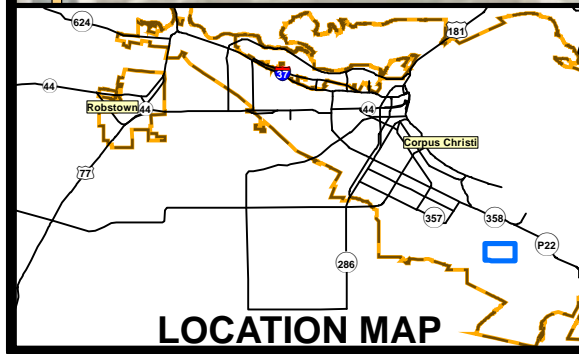
- Channel
- Culvert
- Pipe

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Channel improvements between Glen Oak and Waldron Road, and proposed storm drain system improvements upstream of Glen Oak to relieve neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds


**COST(2023 \$):**

Construction:	\$6,433,426
ROW Acquisition:	\$50,000
MB&I (15%):	\$965,014
Contingency (30%):	\$1,930,028
Design & Inspection (15%):	\$965,014
<b>Project Total:</b>	<b>\$10,343,481</b>



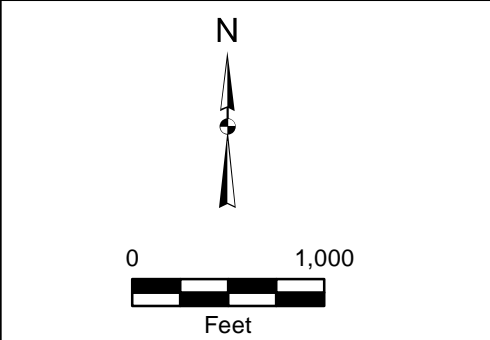
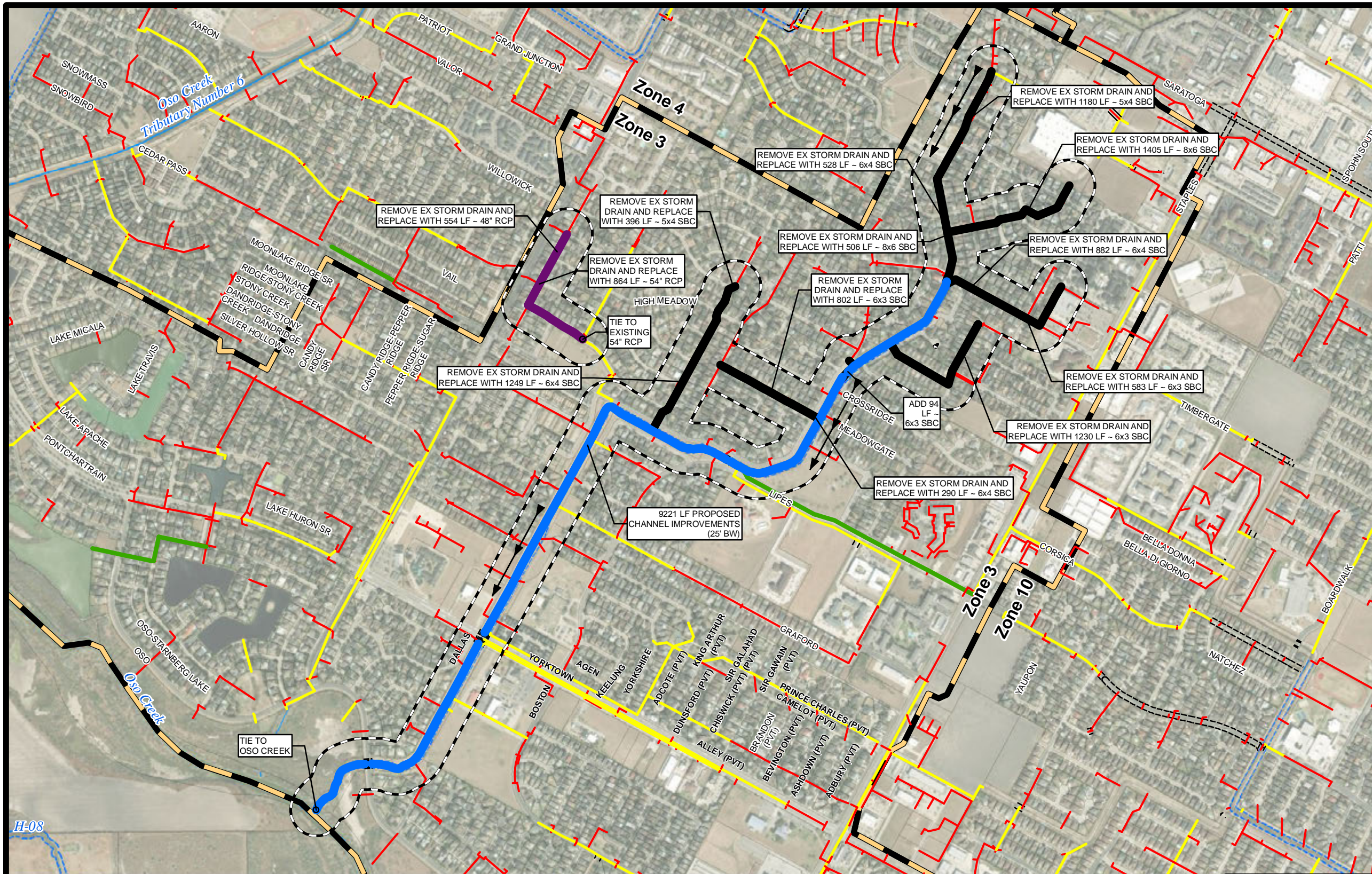
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**01-B PROPOSED IMPROVEMENTS**

JOB NO. 12383-00  
DATE Sep 2023  
DESIGNER JP  
CHECKED BES DRAWN RG  
SHEET QS 01-B



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

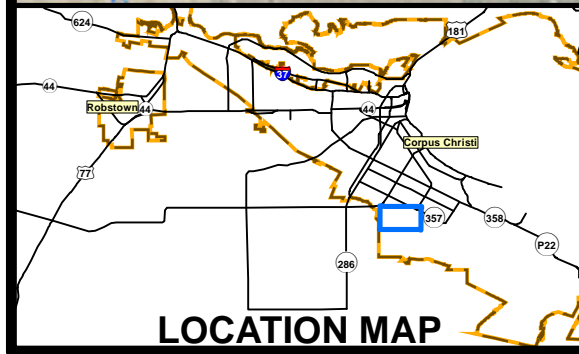
- Channel
- Culvert
- Pipe

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain/culvert improvements along Edgebrook Dr, Wake Forest Dr, Pepper Mill Dr, Woodgate Dr, Heavens Gate Dr, Timbergate Dr, and Hunt Dr; and channel improvements along Lipses Blvd and across Yorktown Blvd to relieve neighborhood flooding.

**Council District 5**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$18,687,461
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,803,119
Contingency (30%):	\$5,606,238
Design & Inspection (15%):	\$2,803,119
<b>Project Total:</b>	<b>\$29,999,937</b>

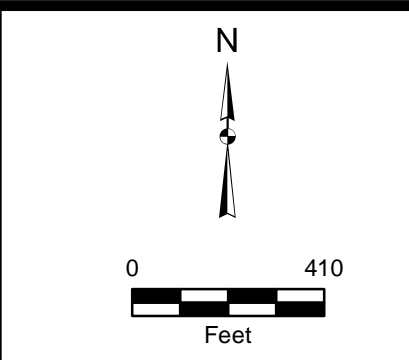
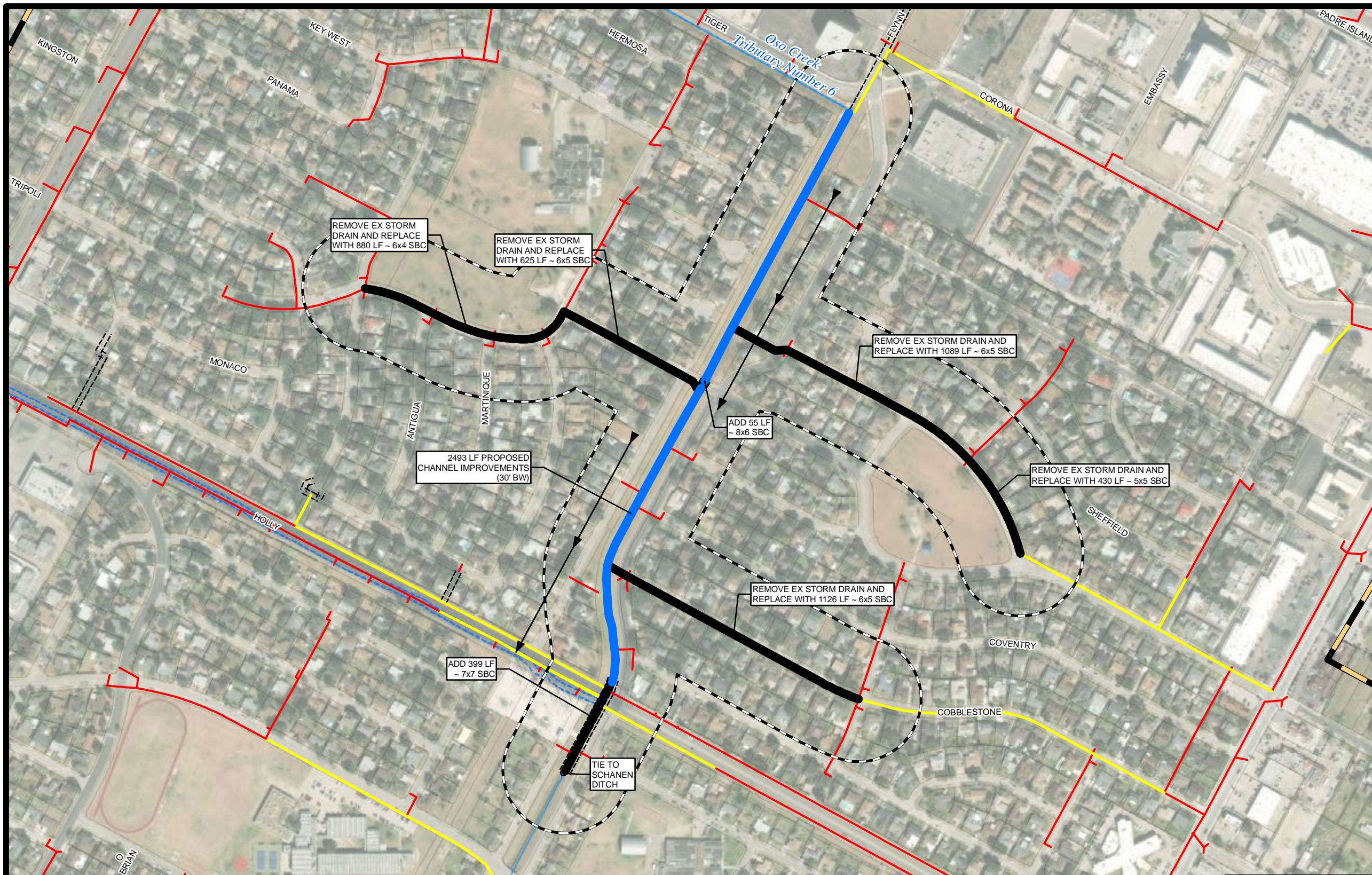
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**03-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 03-A





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

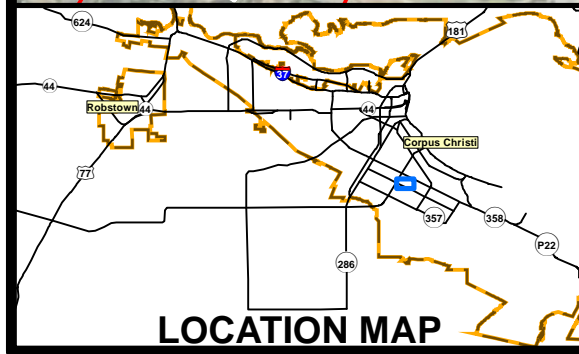
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements along Flynn Parkway; storm drain improvements along Cobblestone Ln, Oxford Dr, and Philippine Dr; and culvert improvements at Holly Rd to reduce neighborhood flooding. Drains to project 4-B.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$8,312,021
ROW Acquisition:	\$50,000
MB&I (15%):	\$1,246,803
Contingency (30%):	\$2,493,606
Design & Inspection (15%):	\$1,246,803
<b>Project Total:</b>	<b>\$13,349,233</b>

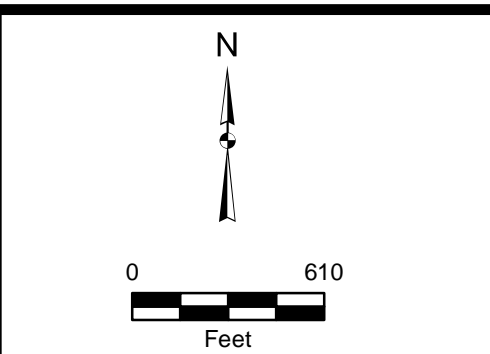
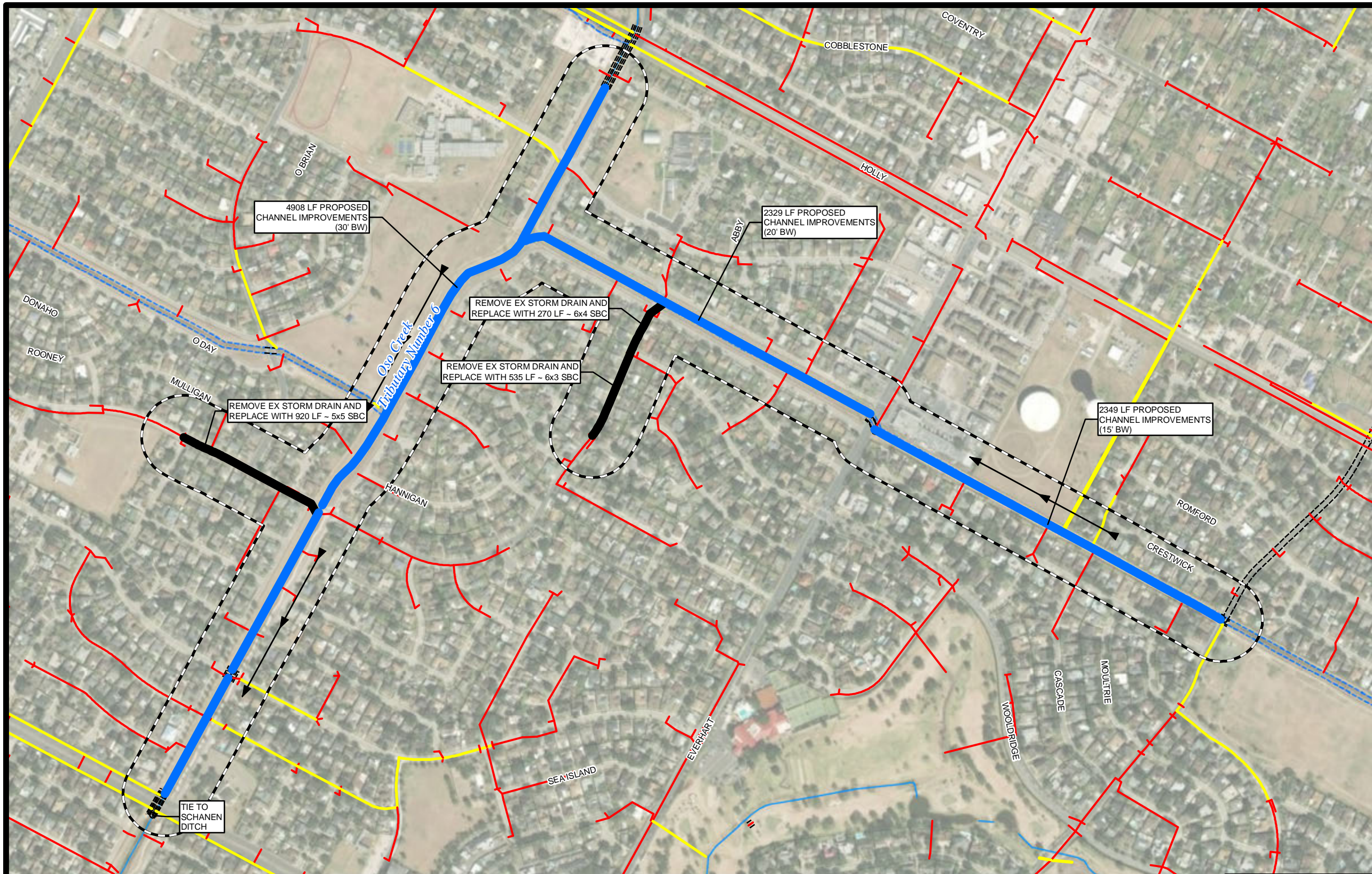
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 04-A





**Legend**

- Flow Direction
- Project Limits
- FEMA CL
- Ditch CL

**Proposed Improvements**

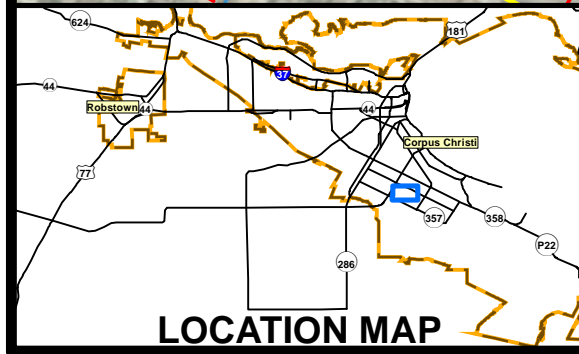
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements along Shea Parkway and Flynn Parkway to Saratoga Blvd; and storm drain improvements along Killarmet Dr to reduce neighborhood flooding. Accepts runoff from project 4-A.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$4,943,109
ROW Acquisition:	\$100,000
MB&I (15%):	\$741,466
Contingency (30%):	\$1,482,933
Design & Inspection (15%):	\$741,466
<b>Project Total:</b>	<b>\$8,008,974</b>

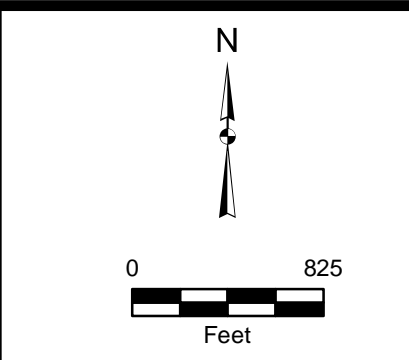
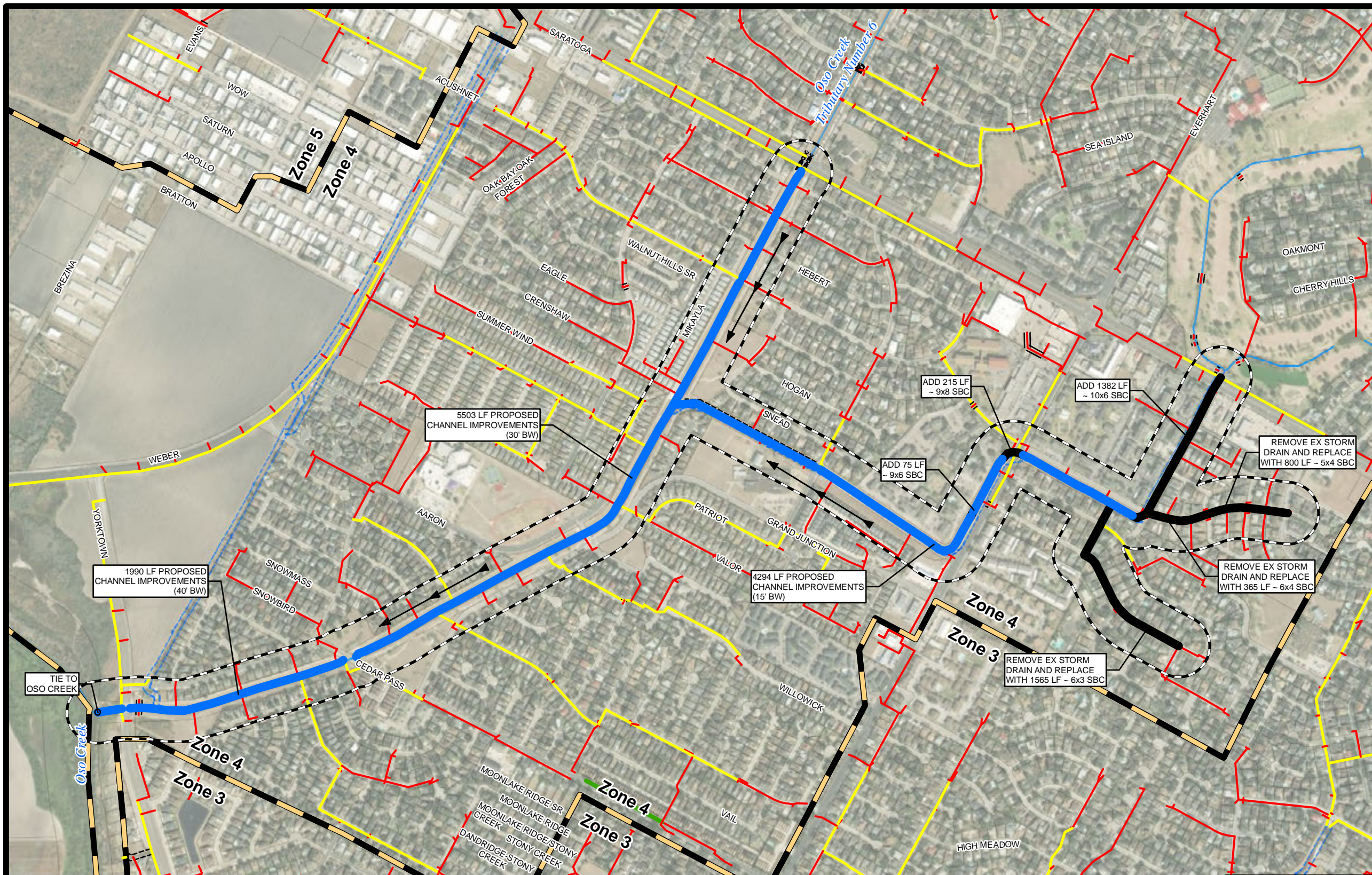
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-B PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 04-B





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements from Saratoga through Acushnet Park and along Grand Junction Dr to Oso Creek; and storm drain improvements along Middlecoff Rd and nearby streets to reduce neighborhood flooding. Accepts runoff from projects 4-A, and 4-B.

**Council District 5**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$10,839,372
ROW Acquisition:	\$100,000
MB&I (15%):	\$1,625,906
Contingency (30%):	\$3,251,812
Design & Inspection (15%):	\$1,625,906
<b>Project Total:</b>	<b>\$17,442,995</b>

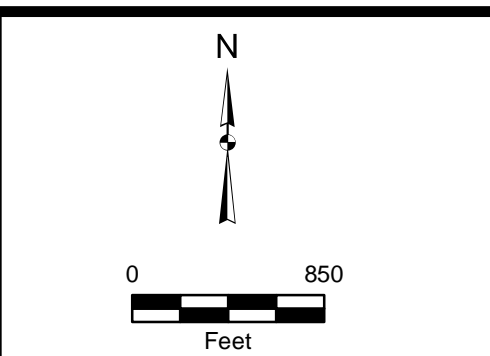
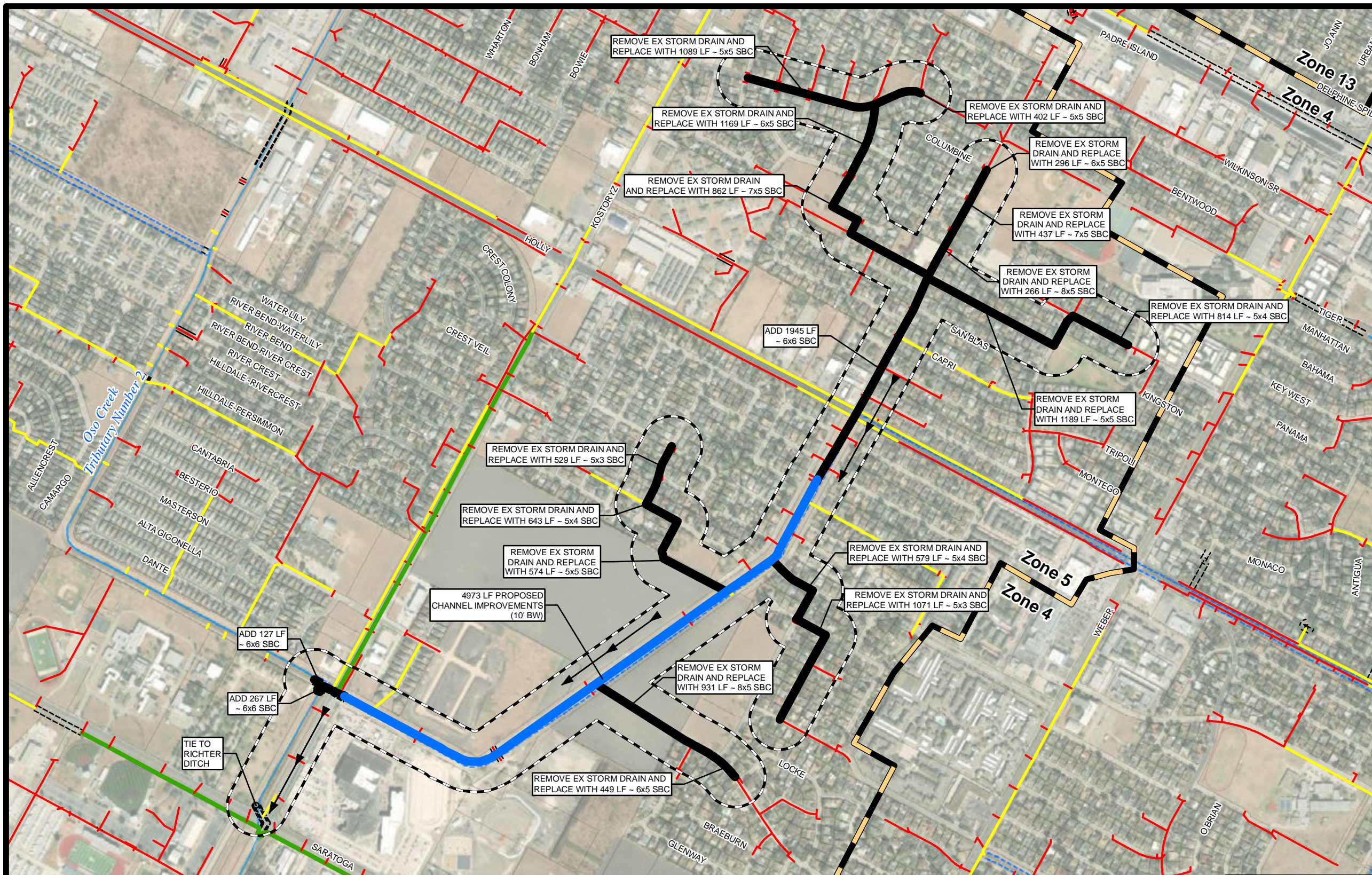
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-D PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 04-D



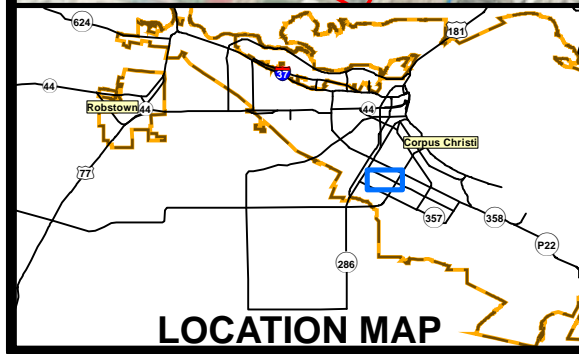


**Legend**

- Flow Direction (arrow symbol)
- Project Limits (dashed line symbol)
- ICM Zones (shaded area symbol)
- FEMA CL (blue line symbol)
- Ditch CL (dashed blue line symbol)
- Proposed Improvements**
  - Channel (blue line)
  - Culvert (thick black line)
- Existing Storm Drain**
  - Unknown Size (red line)
  - 4" - 34" (red line)
  - 36" - 60" (yellow line)
  - 60" > (green line)
  - Box Culvert (dashed line)

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Storm drain system improvements along Carroll Ln and Waterloo Dr systems; channel and storm drain improvements along Carroll Ln to Saratoga Blvd; and culvert improvements at Holly Rd and Kostoryz Rd to reduce neighborhood flooding. Accepts runoff from project 5-B.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$23,505,278
ROW Acquisition:	\$100,000
MB&I (15%):	\$3,525,792
Contingency (30%):	\$7,051,583
Design & Inspection (15%):	\$3,525,792
<b>Project Total:</b>	<b>\$37,708,444</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**05-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 05-A

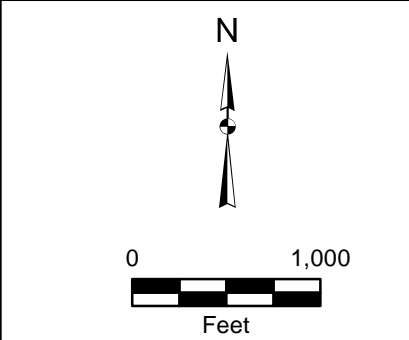
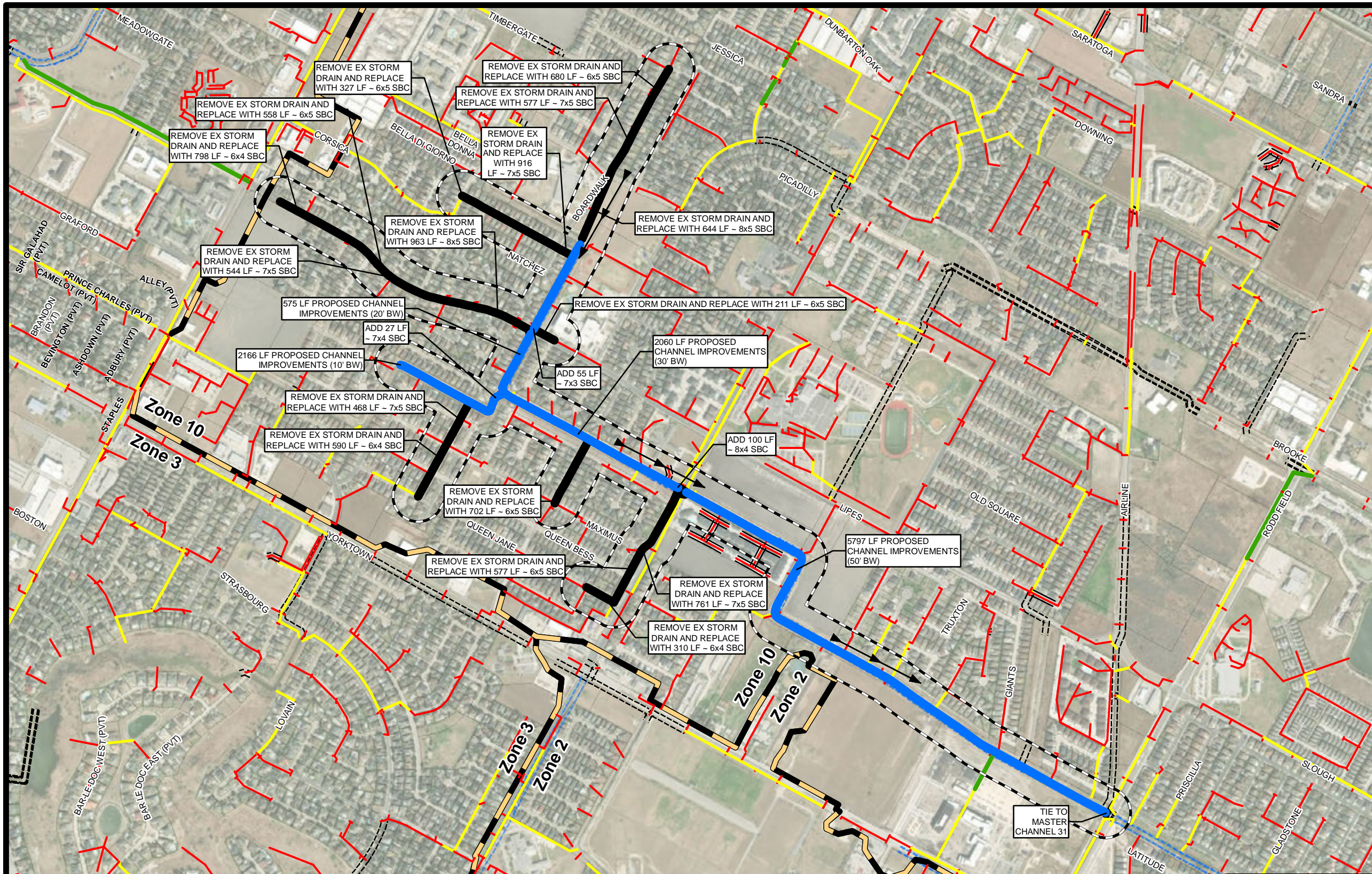












**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Lipes Blvd, and Boardwalk Ave; storm drain and culvert improvements along Cimarron Blvd; and channel improvements from Boardwalk Ave to downstream of Cimarron Blvd to reduce neighborhood flooding.

**Council District 5**      **Commissioner Precincts 2, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$17,255,608
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,588,341
Contingency (30%):	\$5,176,682
Design & Inspection (15%):	\$2,588,341
<b>Project Total:</b>	<b>\$27,708,972</b>

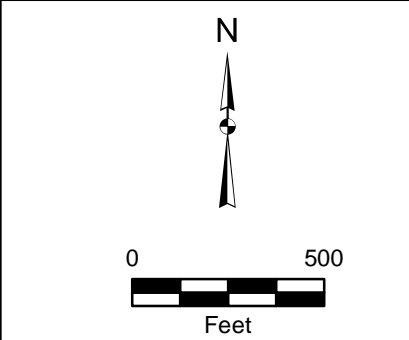
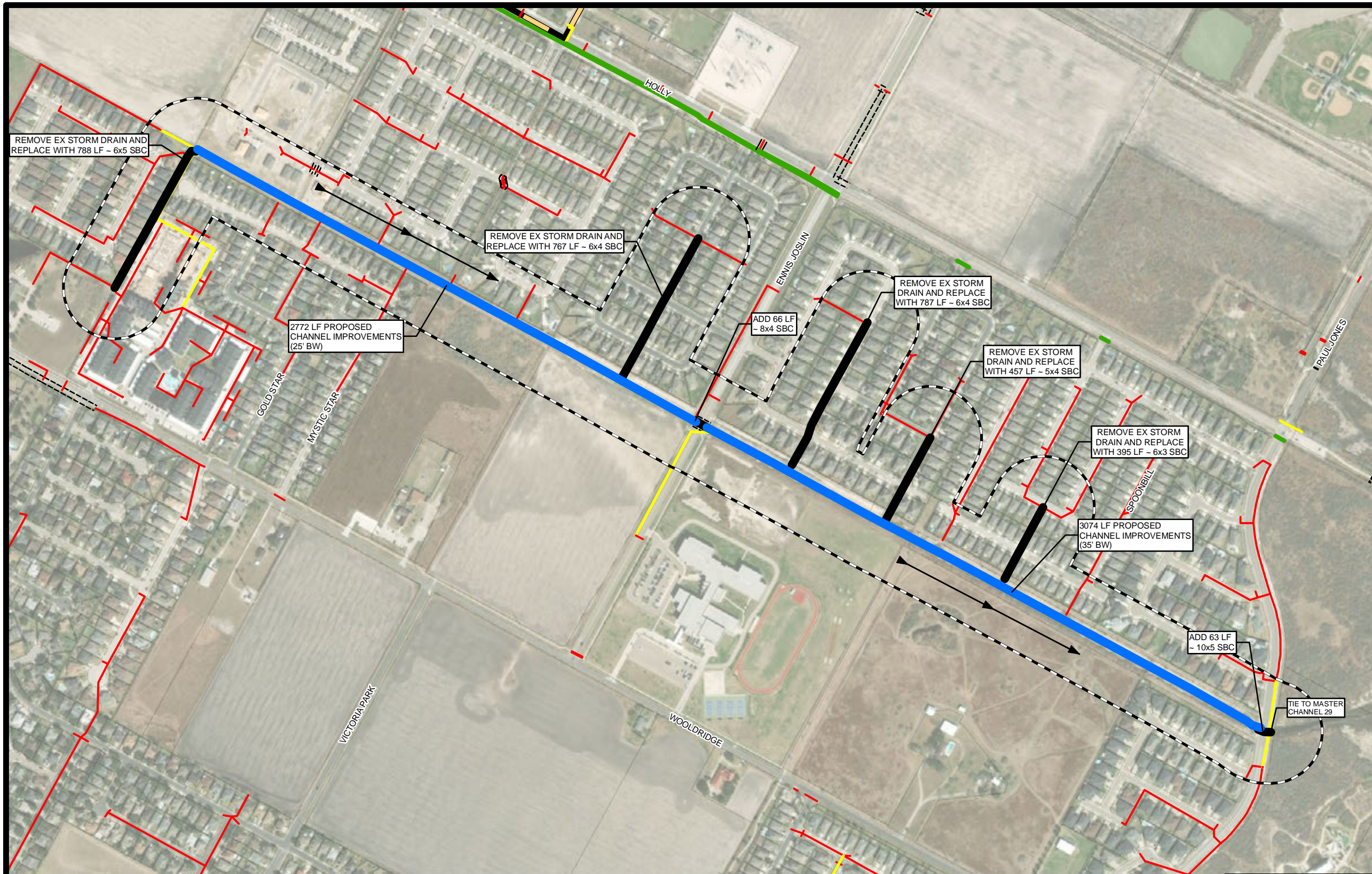
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**10-B2 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-B2





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

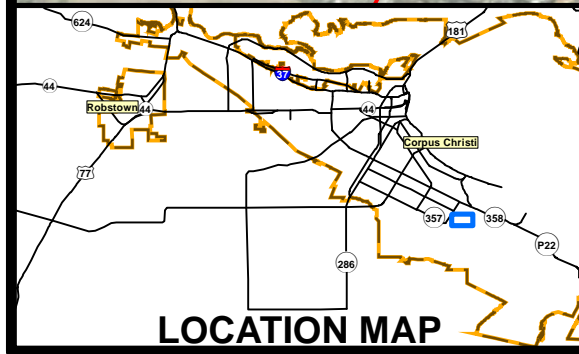
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements from Vaughan Dr to N Oso Parkway and nearby storm drain improvements to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$6,136,528
ROW Acquisition:	\$50,000
MB&I (15%):	\$920,479
Contingency (30%):	\$1,840,958
Design & Inspection (15%):	\$920,479
<b>Project Total:</b>	<b>\$9,868,445</b>

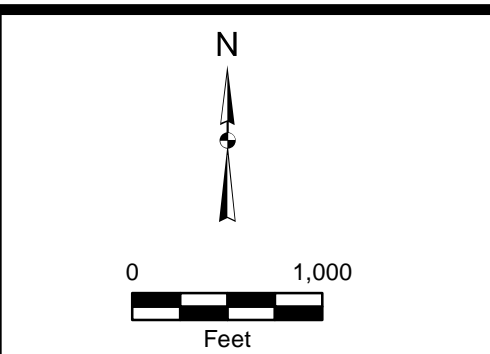
**CITY OF CORPUS CHRISTI**  
COMPREHENSIVE MASTER PLAN  
10-C PROPOSED IMPROVEMENTS

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-C



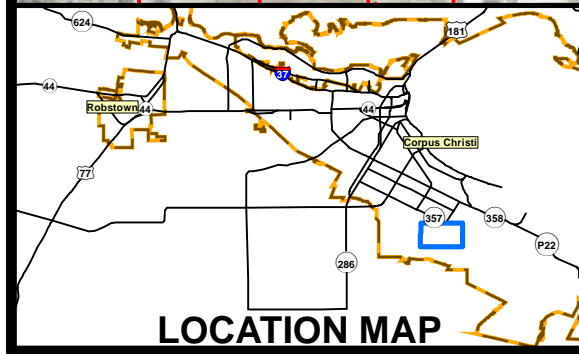


**Legend**

- Flow Direction (arrow symbol)
- Project Limits (dashed line symbol)
- ICM Zones (yellow outline symbol)
- FEMA CL (blue line symbol)
- Ditch CL (dashed blue line symbol)
- Proposed Improvements**
  - Channel (solid blue line)
  - Culvert (thick black line)
- Existing Storm Drain**
  - Unknown Size (red line)
  - 4" - 34" (red line)
  - 36" - 60" (yellow line)
  - 60" > (green line)
  - Box Culvert (dashed black line)

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Storm drain improvements along Brooke Rd and Airline Rd; channel improvements along Brooke Rd; and channel and improvements from near Cimarron Blvd to Oso Bay including culvert improvements at Rodd Field Rd to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$13,832,639
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,074,896
Contingency (30%):	\$4,149,792
Design & Inspection (15%):	\$2,074,896
<b>Project Total:</b>	<b>\$22,232,222</b>

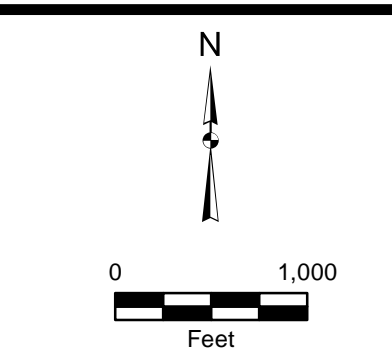
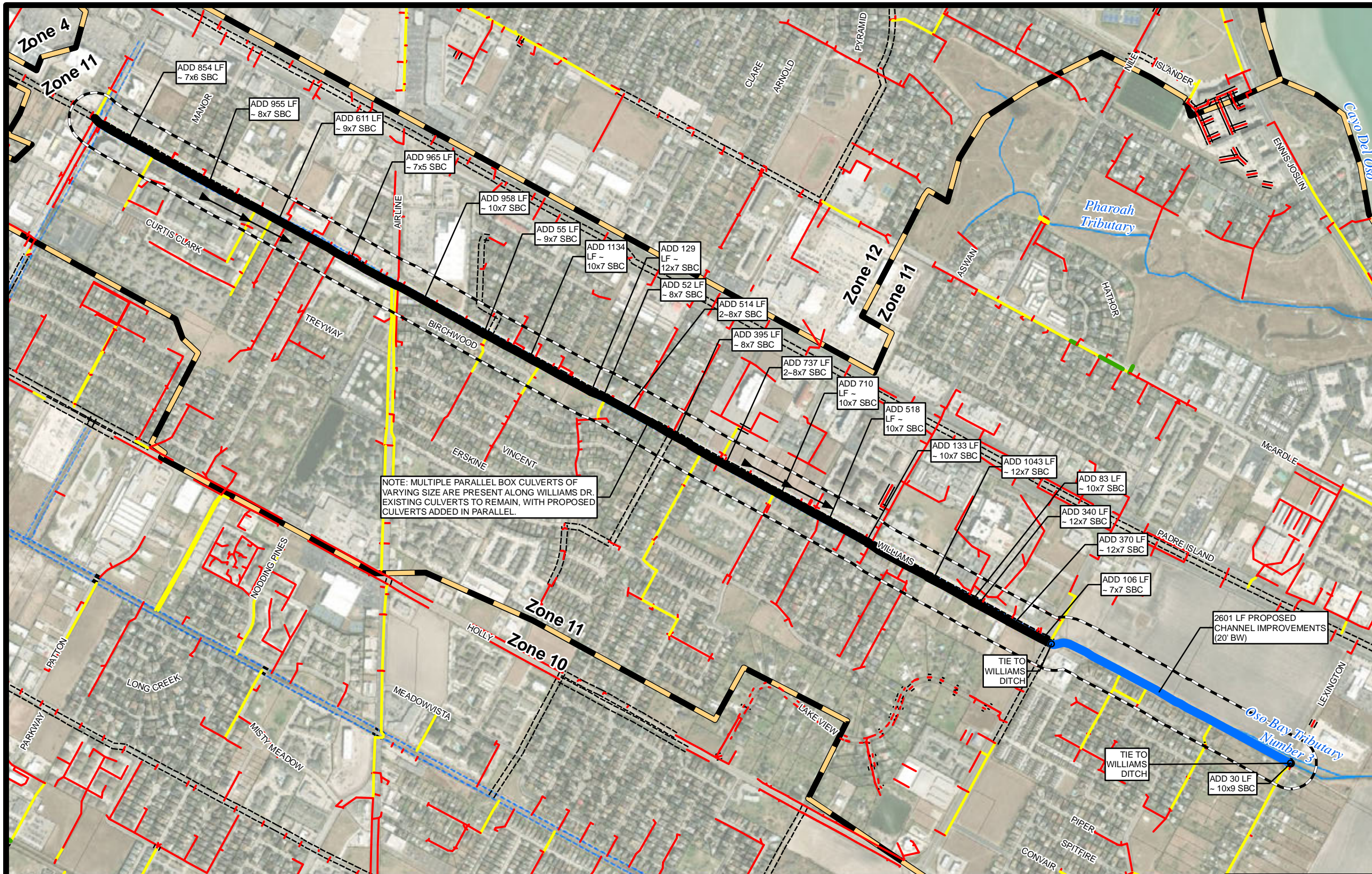
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**10-D PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-D





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

NOTE: MULTIPLE PARALLEL BOX CULVERTS OF VARYING SIZE ARE PRESENT ALONG WILLIAMS DR. EXISTING CULVERTS TO REMAIN, WITH PROPOSED CULVERTS ADDED IN PARALLEL.

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel and storm drain system improvements along Williams Dr from current Williams Ditch project upstream to Staples St to reduce flooding for neighborhoods and businesses.

**Council Districts 3, 4**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$18,845,581
ROW Acquisition:	\$50,000
MB&I (15%):	\$2,826,837
Contingency (30%):	\$5,653,674
Design & Inspection (15%):	\$2,826,837
<b>Project Total:</b>	<b>\$30,202,930</b>

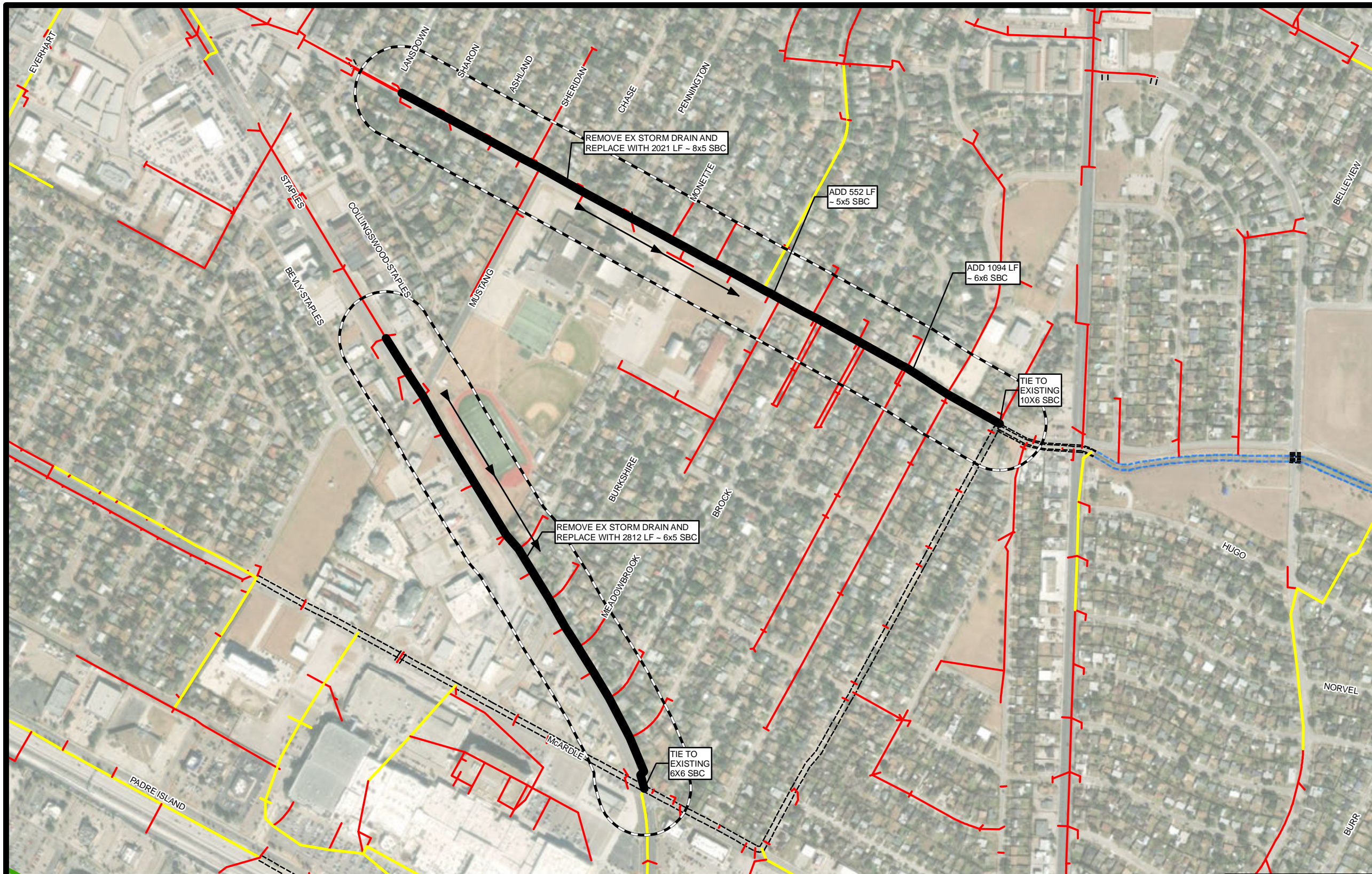
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**11-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 11-A



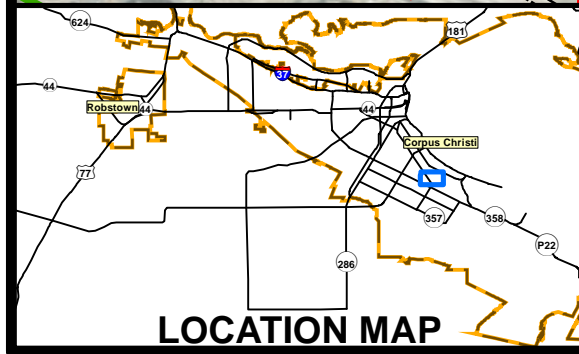


**Legend**

- ◄◄ Flow Direction
- ▭ Project Limits
- FEMA CL
- - - Ditch CL
- Proposed Improvements**
- ▬ Culvert
- Existing Storm Drain**
- ▬ Unknown Size
- ▬ 4" - 34"
- ▬ 36" - 60"
- ▬ 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain improvements along Gollihar Rd and S. Staples St; and channel improvements from Airline Rd to Oso Municipal Golf Course to relieve flooding for neighborhoods and businesses.

**Council District 2**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds


**COST(2023 \$):**

Construction:	\$10,638,376
ROW Acquisition:	\$25,000
MB&I (15%):	\$1,595,756
Contingency (30%):	\$3,191,513
Design & Inspection (15%):	\$1,595,756
<b>Project Total:</b>	<b>\$17,046,401</b>



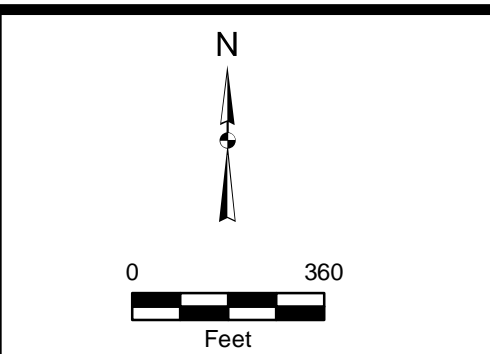
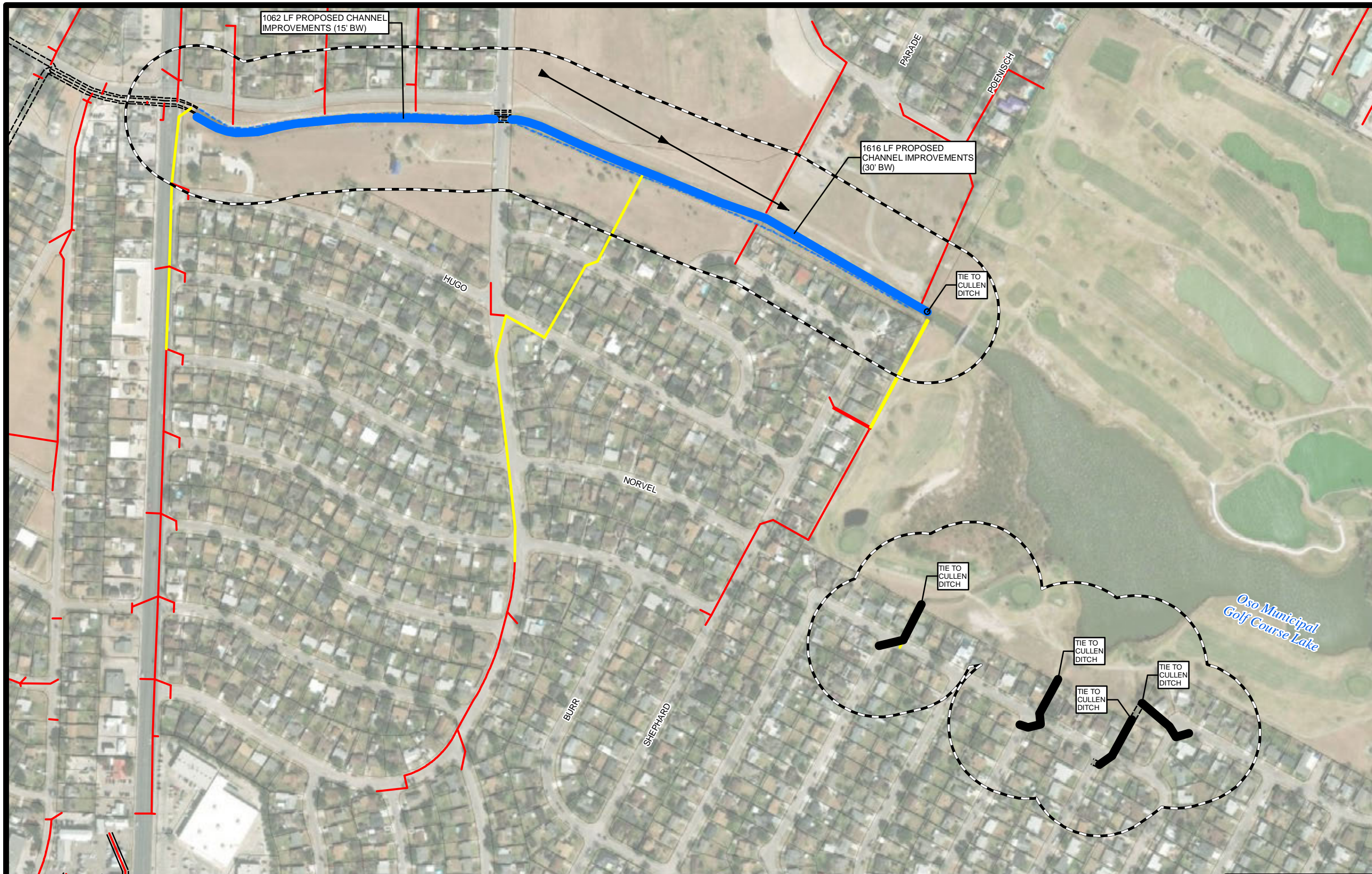
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-A PROPOSED IMPROVEMENTS**

**JOB NO.** 12383-00  
**DATE** Aug 2023  
**DESIGNER** JP  
**CHECKED** BES **DRAWN** RG  
**SHEET** QS 12-A



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800





**Legend**

- ➔ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- Proposed Improvements**
- Channel
- Culvert
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along Shephard Dr and across Whitaker Dr and Cleopatra Dr to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds


**COST(2023 \$):**

Construction:	\$2,974,077
ROW Acquisition:	\$50,000
MB&I (15%):	\$446,112
Contingency (30%):	\$892,223
Design & Inspection (15%):	\$446,112
<b>Project Total:</b>	<b>\$4,808,524</b>



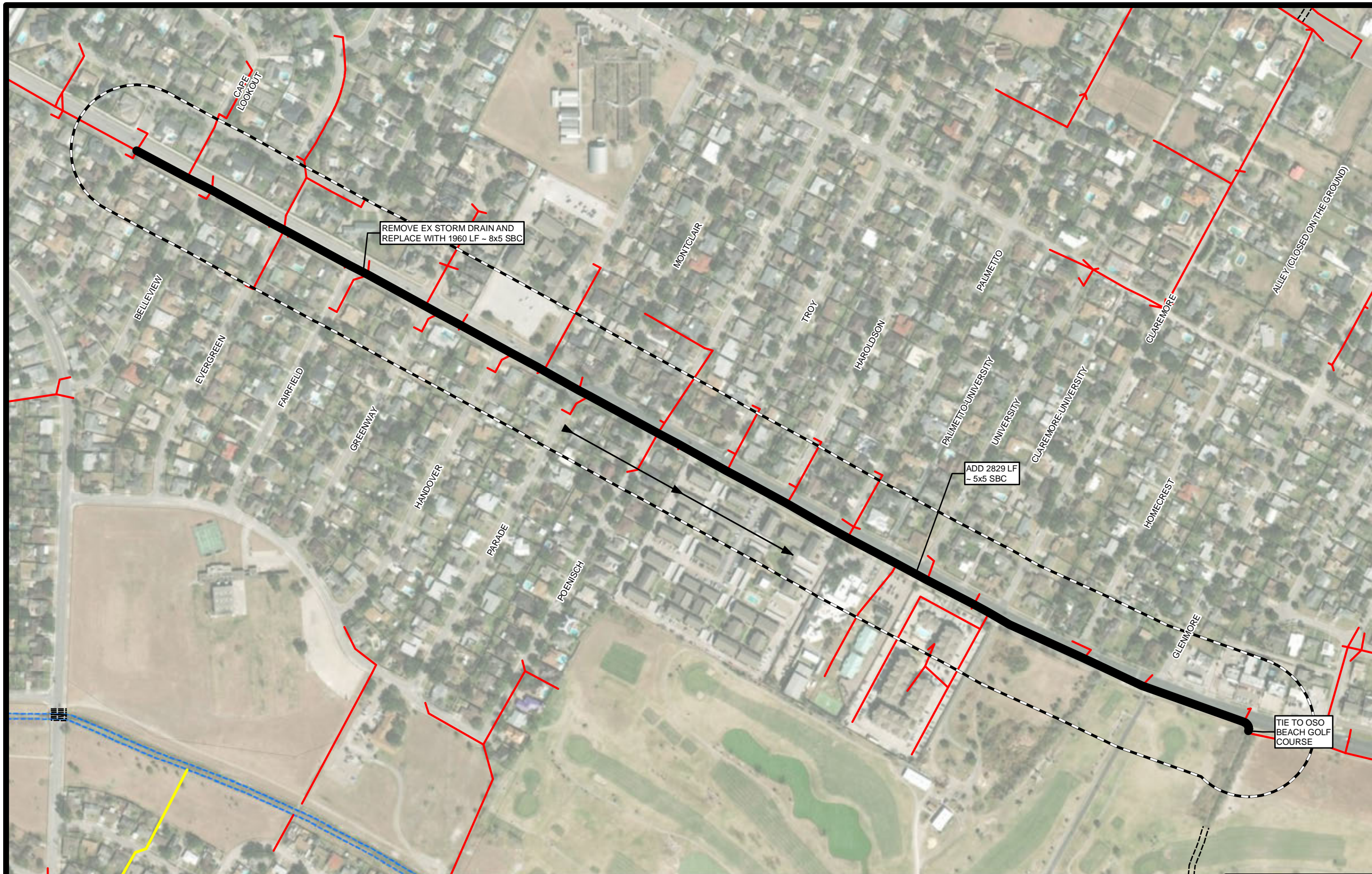
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-B PROPOSED IMPROVEMENTS**

JOB NO. 12383-00  
DATE Sep 2023  
DESIGNER JP  
CHECKED BES DRAWN RG  
SHEET QS 12-B



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800





**Legend**

- Flow Direction
- Project Limits
- FEMA CL
- Ditch CL

**Proposed Improvements**

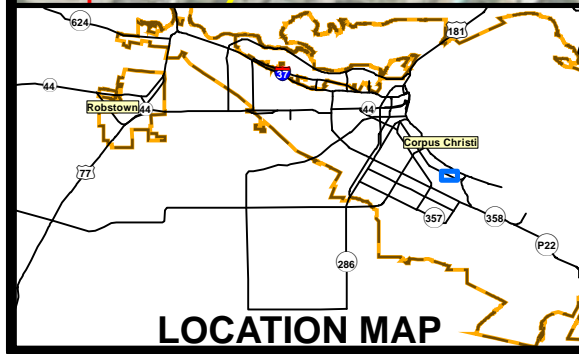
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Alameda from Ronson Dr to Glenmore Street to reduce neighborhood and street flooding.

**Council Districts 2, 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$7,624,765
ROW Acquisition:	\$25,000
MB&I (15%):	\$1,143,715
Contingency (30%):	\$2,287,430
Design & Inspection (15%):	\$1,143,715
<b>Project Total:</b>	<b>\$12,224,624</b>

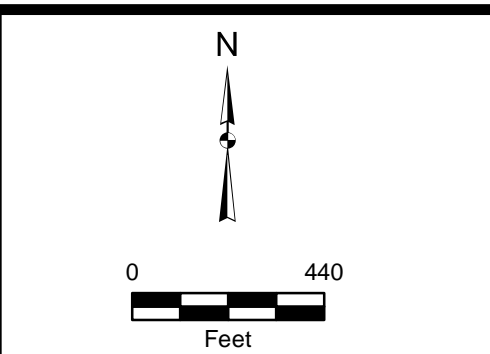
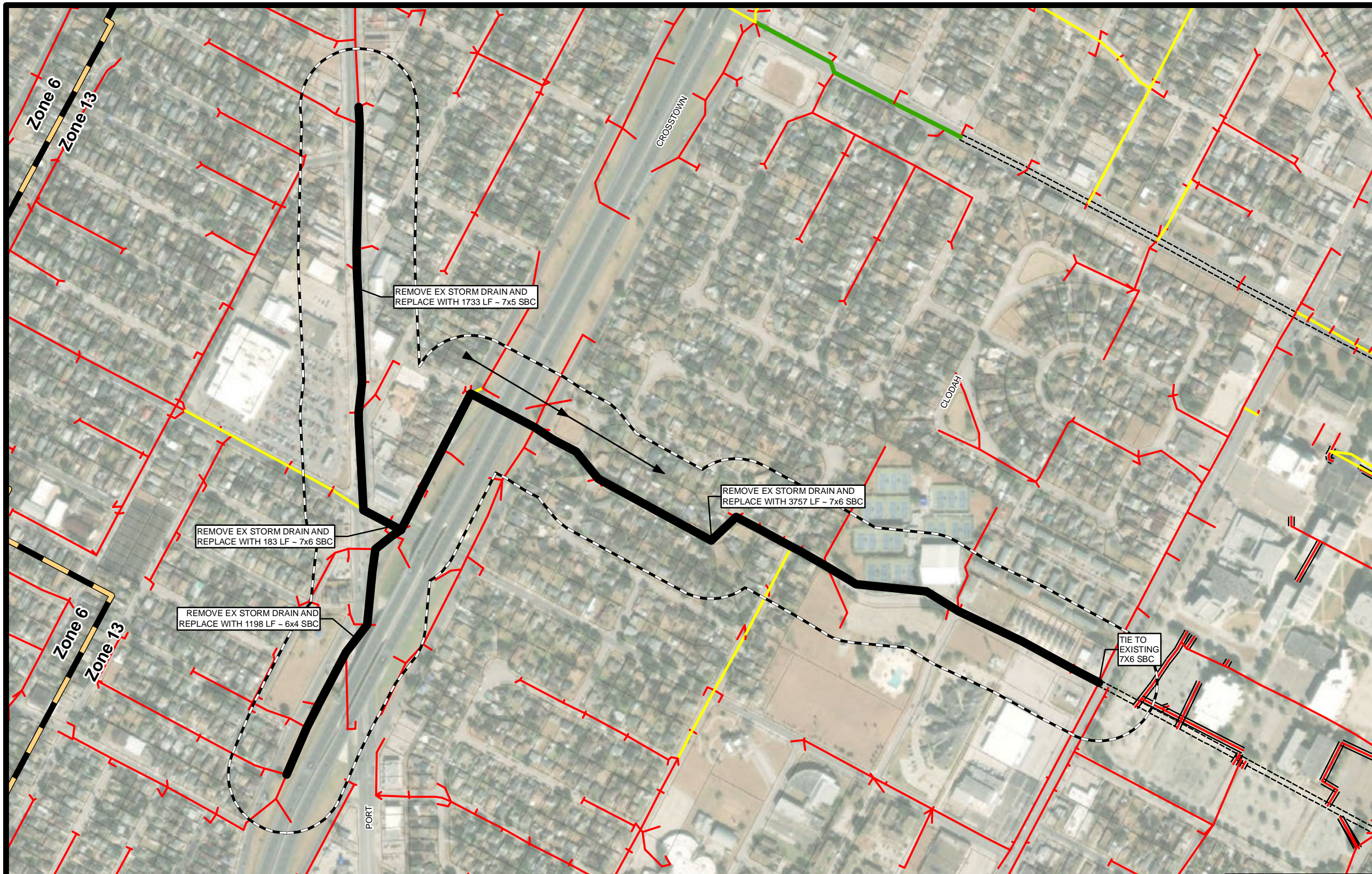
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 12-C





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along S. Port Ave, across Crosstown Expressway, and along Shely St; and culvert and storm drain improvements along Logan and Louisiana to reduce flooding west of Crossown and near Staples and Brownlee.

**Council District 2**      **Commissioner Precincts 1, 2**


**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$20,645,774
ROW Acquisition:	\$200,000
MB&I (15%):	\$3,096,866
Contingency (30%):	\$6,193,732
Design & Inspection (15%):	\$3,096,866
<b>Project Total:</b>	<b>\$33,233,238</b>



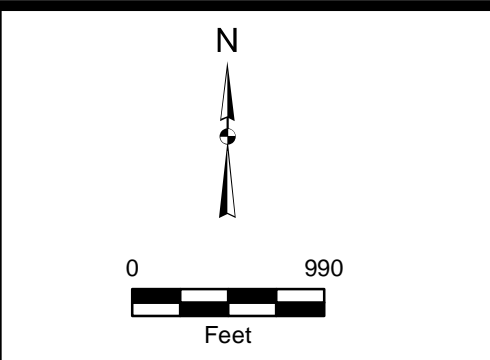
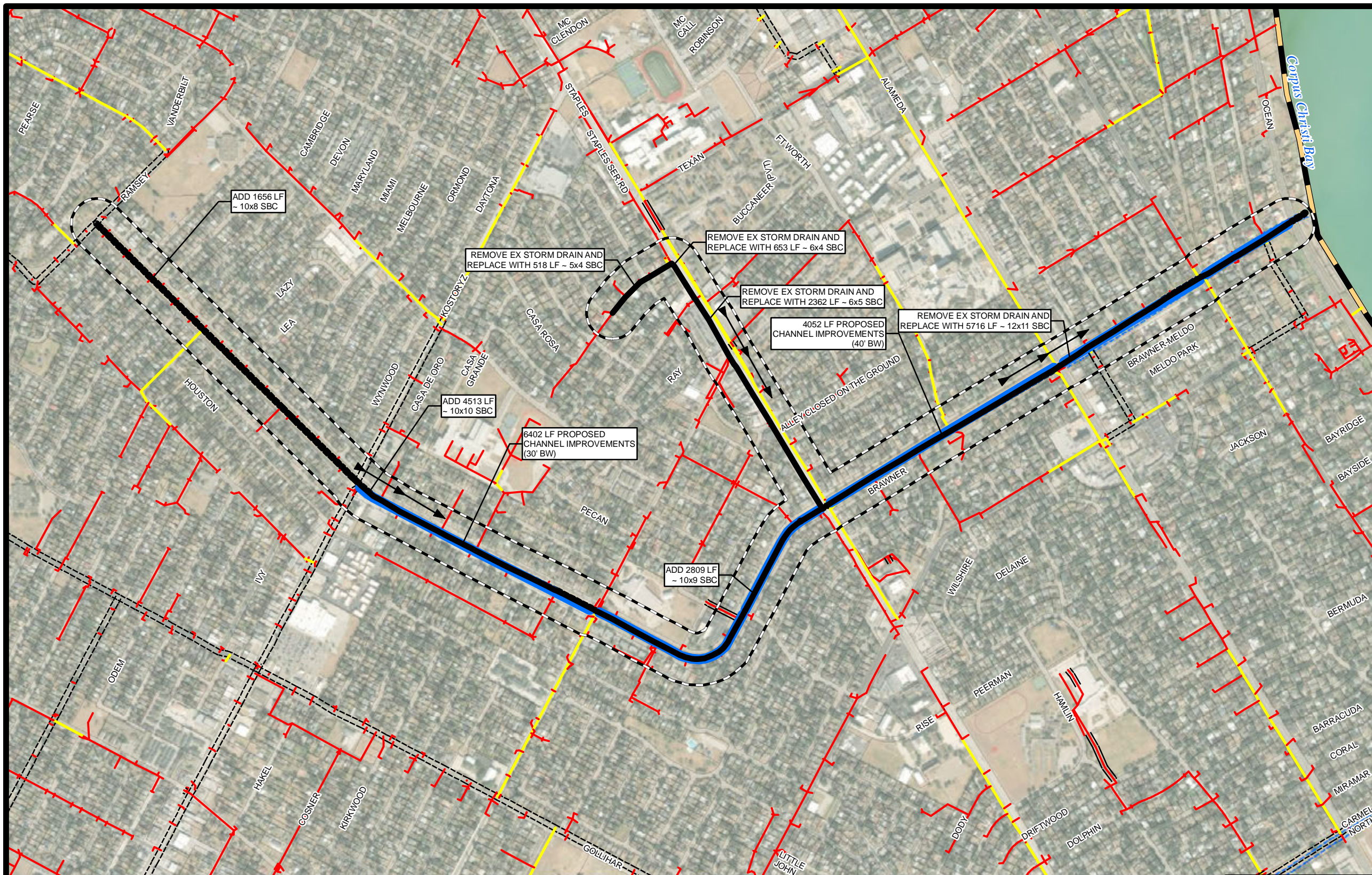
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-A PROPOSED IMPROVEMENTS**



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 13-A



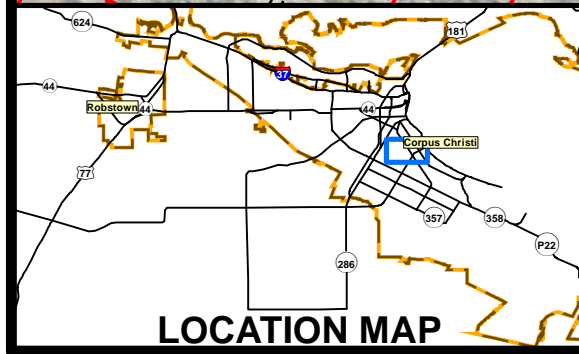


**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Culvert and channel improvements along Brawner Pkwy from Ramsey St to Corpus Christi Bay; and storm drain system improvements along S Staples St from Buccaneer Dr to Brawner to relieve neighborhood flooding.

**Council District 2**      **Commissioner Precinct 3**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$38,366,139
ROW Acquisition:	\$100,000
MB&I (15%):	\$5,754,921
Contingency (30%):	\$11,509,842
Design & Inspection (15%):	\$5,754,921
<b>Project Total:</b>	<b>\$61,485,822</b>



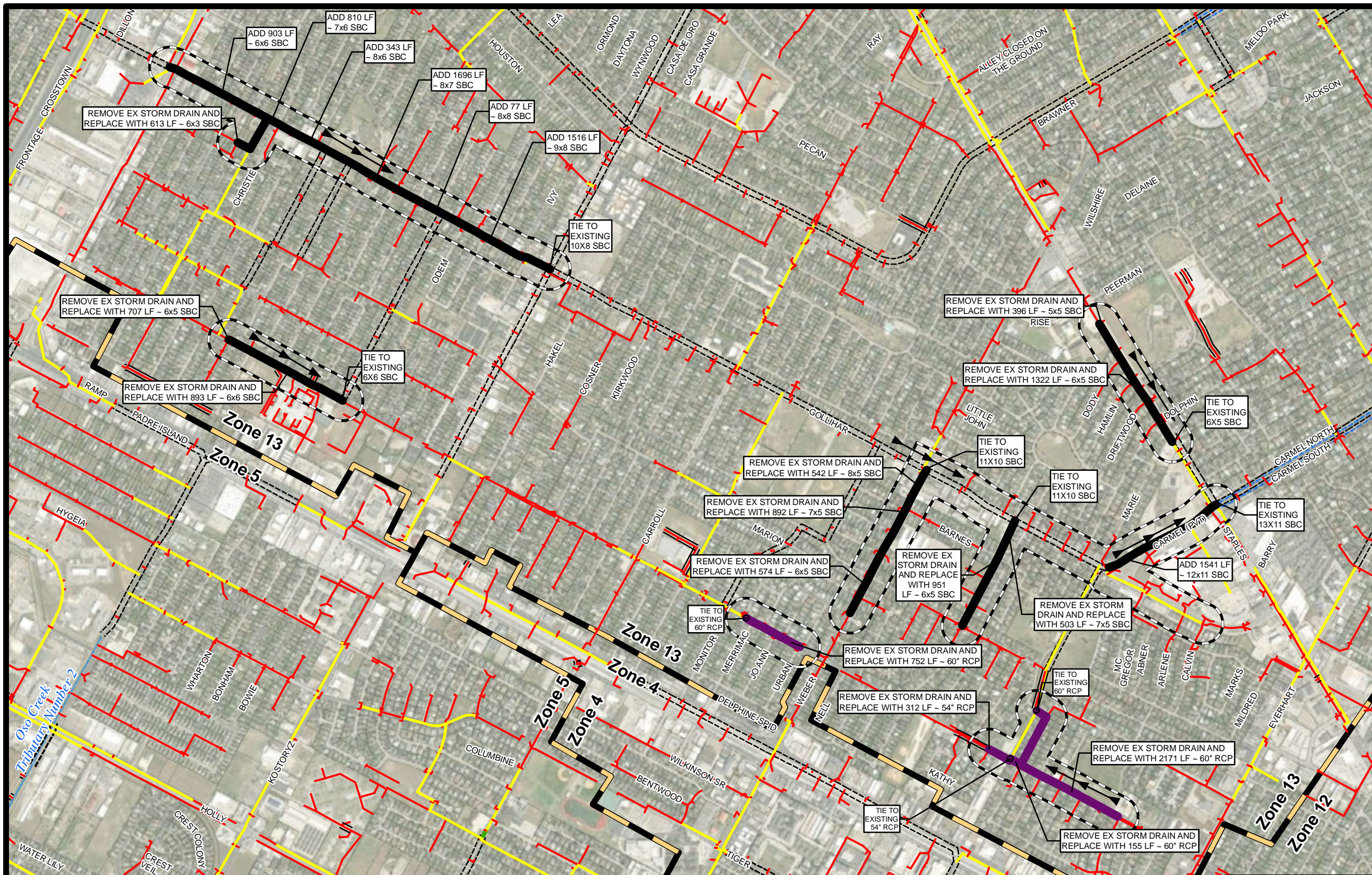
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 13-C





N

0 1,200  
Feet

**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

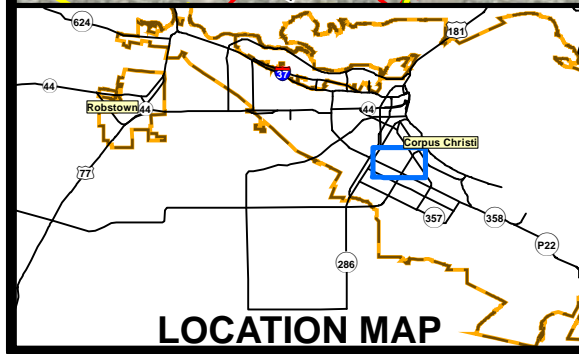
- ▬ Culvert
- ▬ Pipe

**Existing Storm Drain**

- ▬ Unknown Size
- ▬ 4" - 34"
- ▬ 36" - 60"
- ▬ 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along Gollihar Rd, Weber Rd, McArdle Rd, and Carmel Pkwy; and culvert improvements along Carmel Pkwy to relieve neighborhood flooding.

**Council District 2, 3**      **Commissioner Precincts 2, 3**


**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$29,433,600
ROW Acquisition:	\$150,000
MB&I (15%):	\$4,415,040
Contingency (30%):	\$8,830,080
Design & Inspection (15%):	\$4,415,040
<b>Project Total:</b>	<b>\$47,213,760</b>



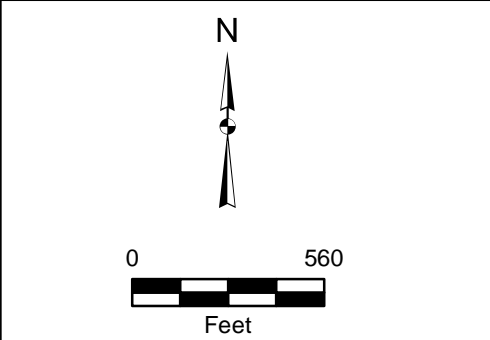
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-D PROPOSED IMPROVEMENTS**



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES DRAWN RG
SHEET	QS 13-D





**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL

**Proposed Improvements**

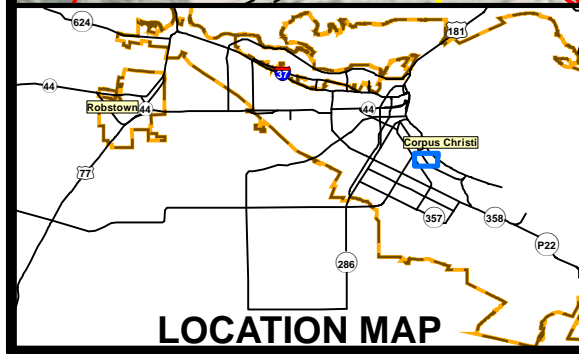
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Channel improvements along Carmel Pkwy from S. Staples St to Corpus Christi Bay; and storm drain improvements along Santa Fe St to reduce neighborhood flooding. Accepts runoff from project 13-D.

**Council District 2**      **Commissioner Precinct 3**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$3,744,262
ROW Acquisition:	\$100,000
MB&I (15%):	\$561,639
Contingency (30%):	\$1,123,279
Design & Inspection (15%):	\$561,639
<b>Project Total:</b>	<b>\$6,090,820</b>



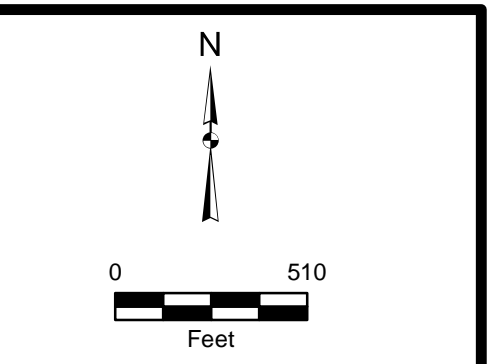
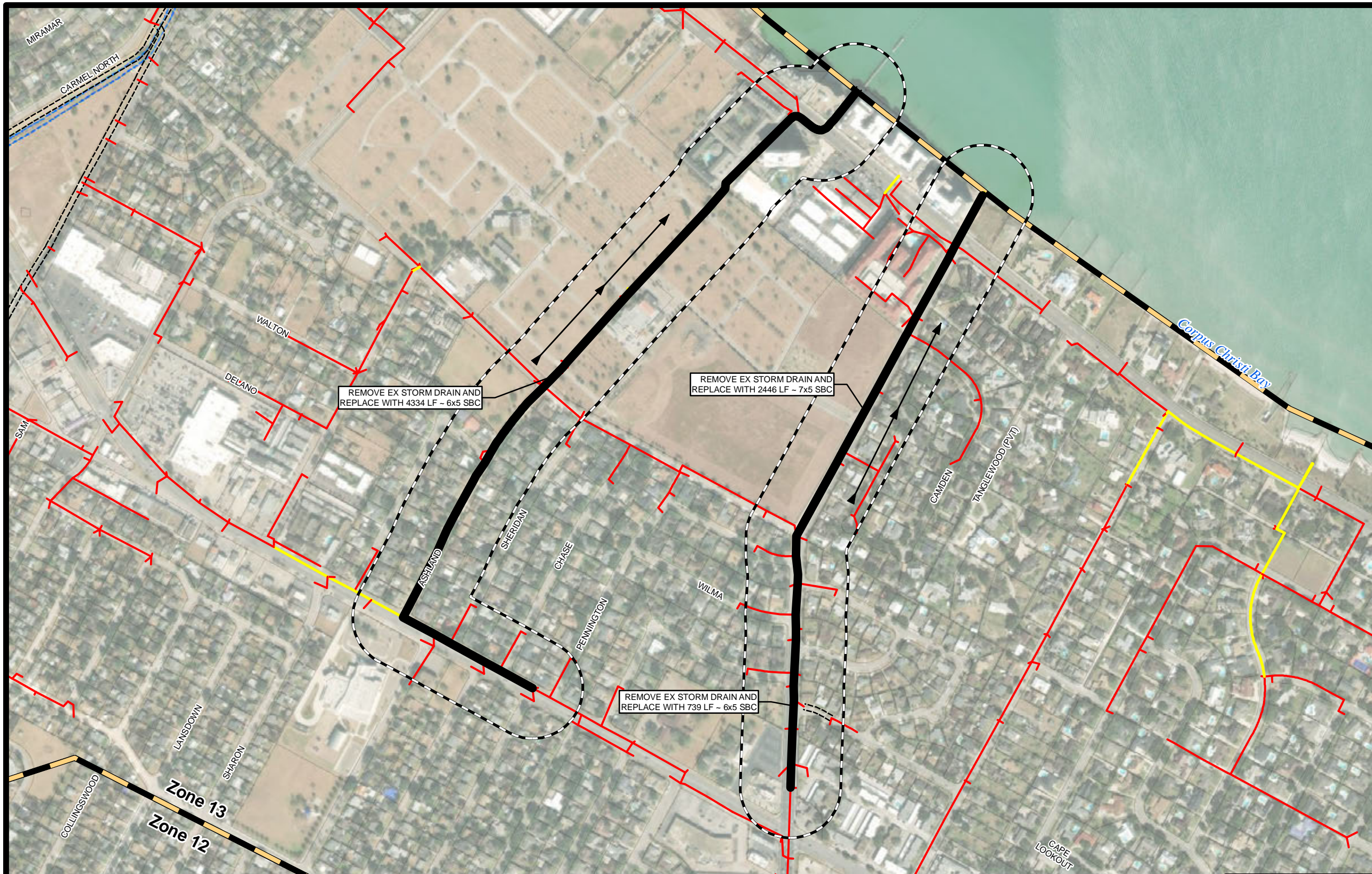
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-E PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES DRAWN RG
SHEET	QS 13-E



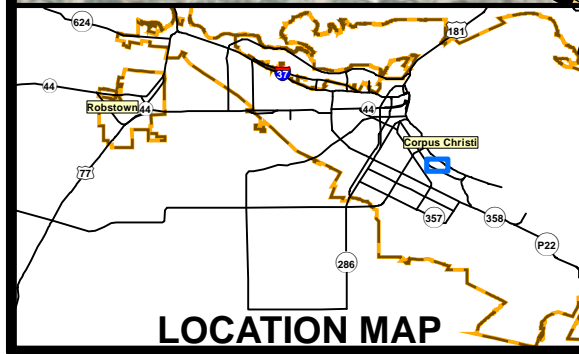


**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- Proposed Improvements**
- Culvert
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain improvements along Ashland Dr and Airline Rd from S Alameda St to Corpus Christi Bay to relieve neighborhood flooding.

**Council District 2**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$12,907,594
ROW Acquisition:	\$50,000
MB&I (15%):	\$1,936,139
Contingency (30%):	\$3,872,278
Design & Inspection (15%):	\$1,936,139
<b>Project Total:</b>	<b>\$20,702,150</b>



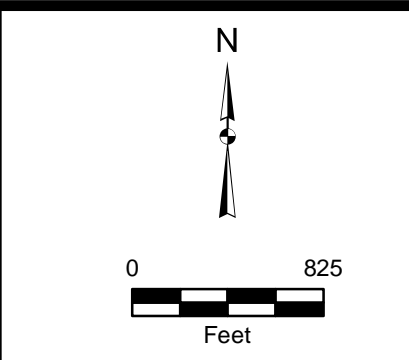
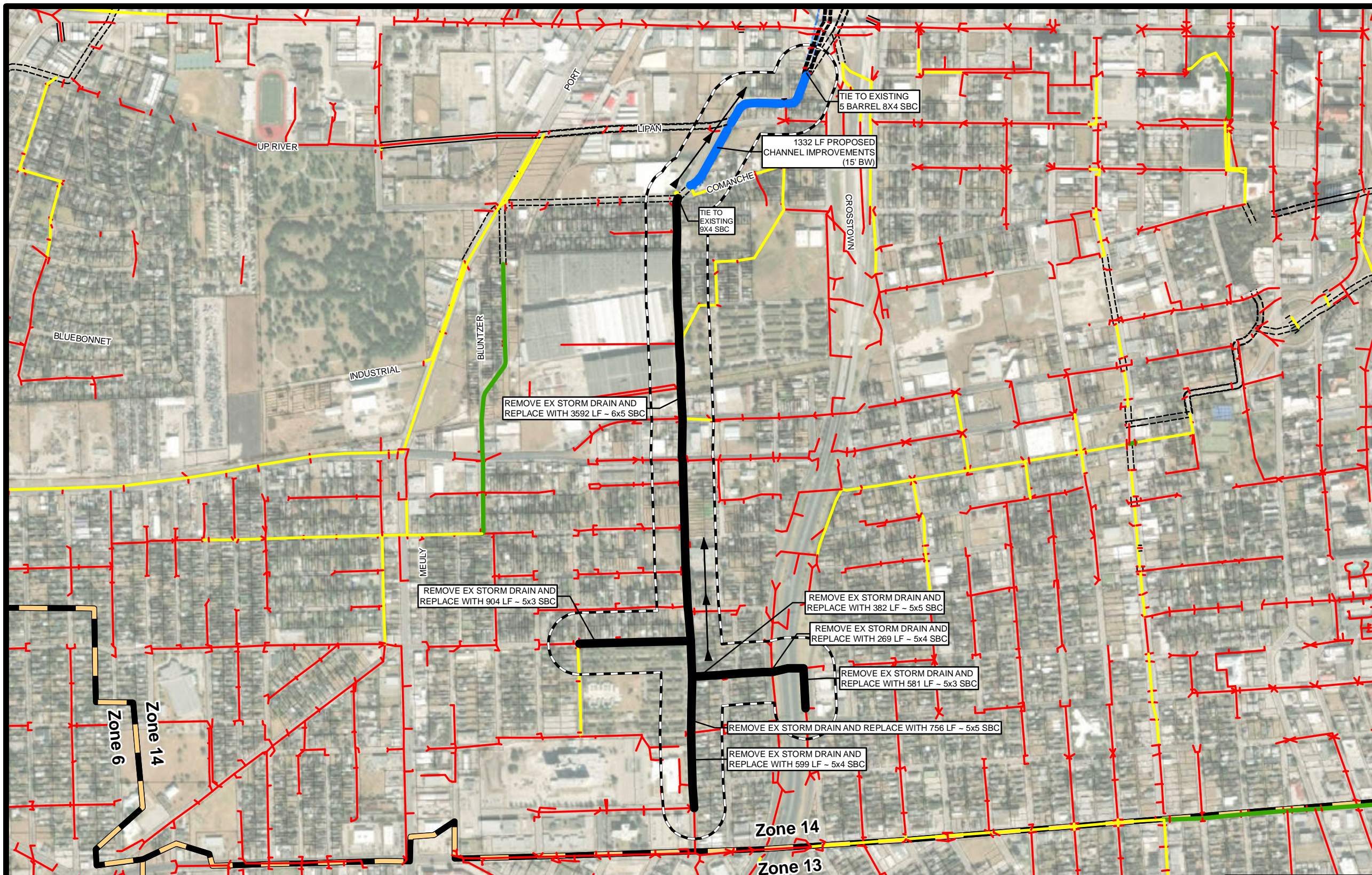
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-F PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 13-F





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along S. 19th St from Hospital St to Comanche St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.

**Council District 1**      **Commissioner Precinct 1**


**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$11,013,710
ROW Acquisition:	\$100,000
MB&I (15%):	\$1,652,057
Contingency (30%):	\$3,304,113
Design & Inspection (15%):	\$1,652,057
<b>Project Total:</b>	<b>\$17,721,936</b>



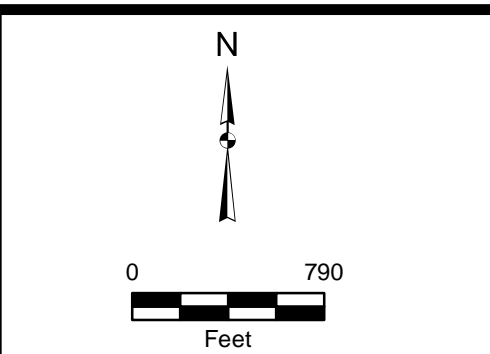
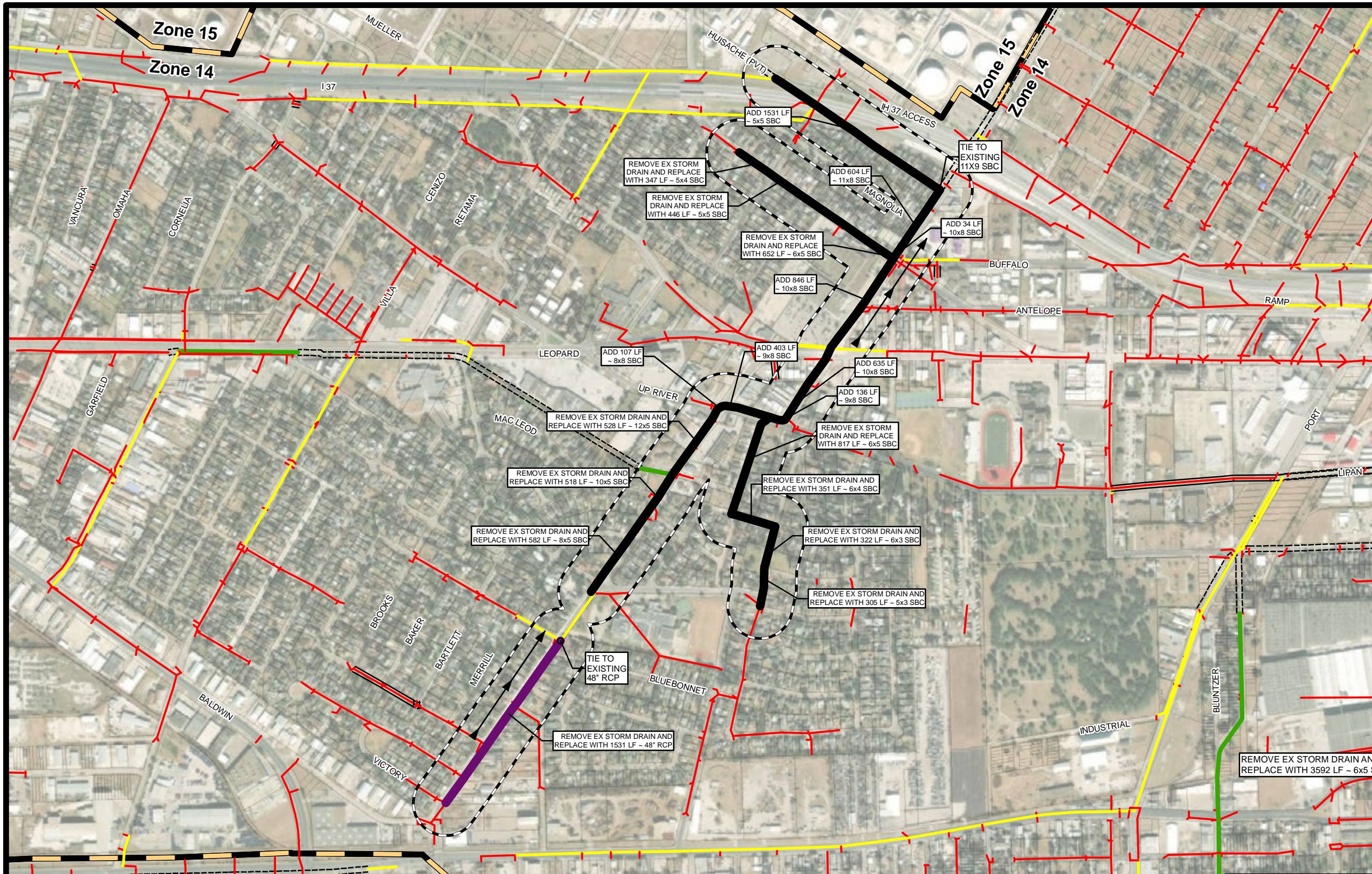
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**14-A2 PROPOSED IMPROVEMENTS**



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 14-A2





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

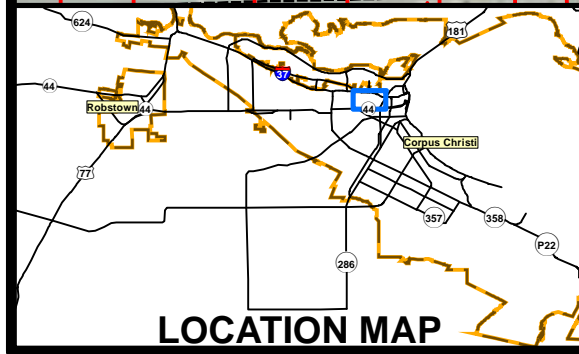
- Culvert
- Pipe

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Old Robstown Rd and Nueces Bay Blvd from Liberty Dr to I-37 to relieve flooding for neighborhoods and businesses.

**Council District 1**      **Commissioner Precinct 1**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$17,035,841
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,555,376
Contingency (30%):	\$5,110,752
Design & Inspection (15%):	\$2,555,376
<b>Project Total:</b>	<b>\$27,357,346</b>

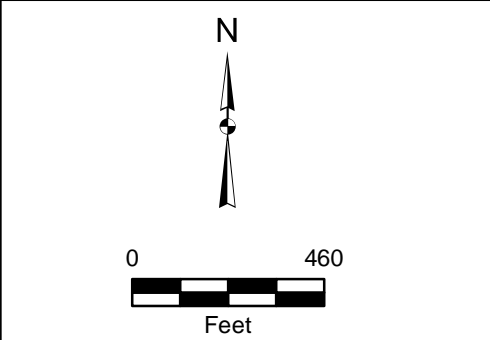
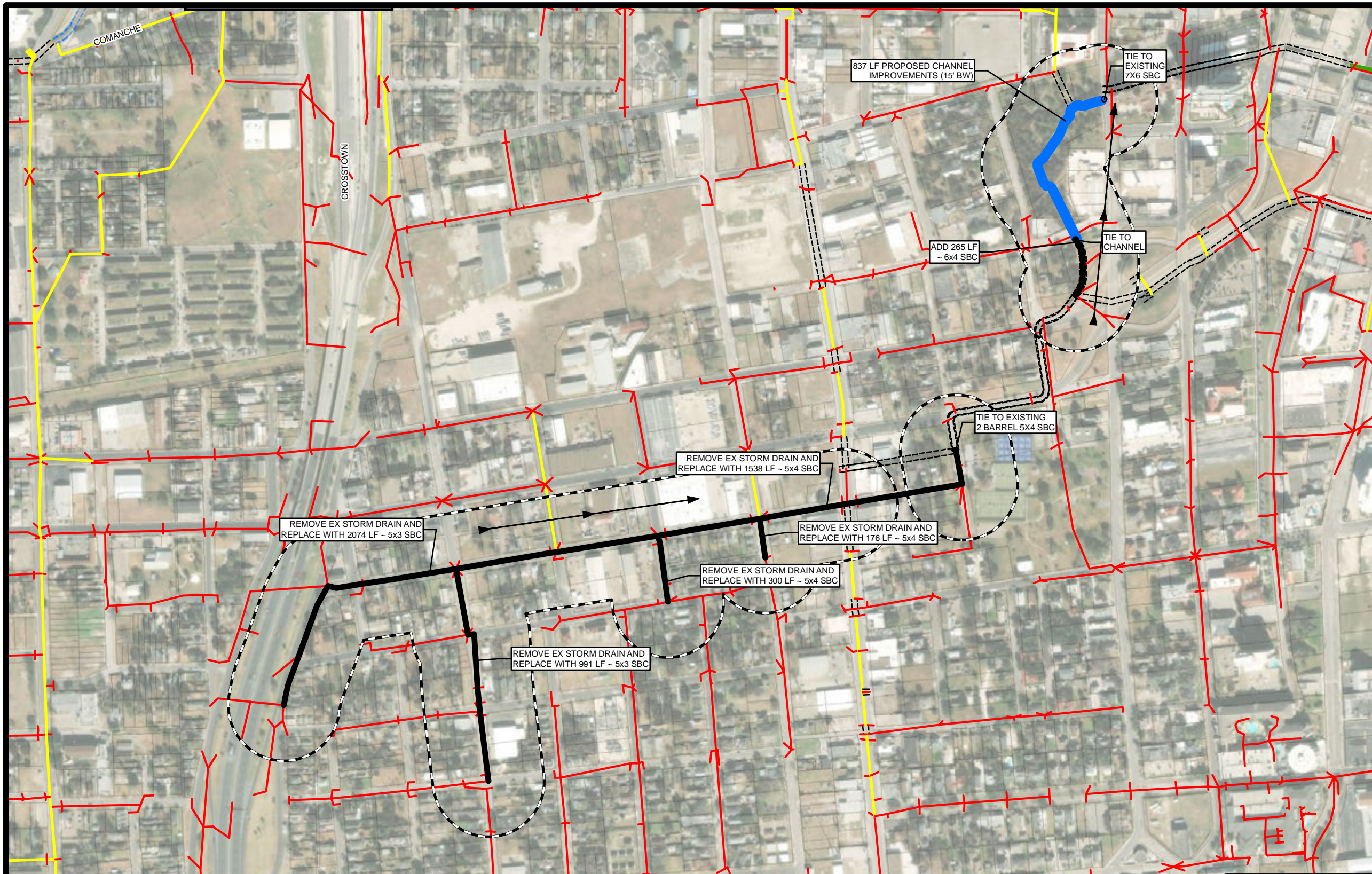
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**14-B PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 14-B





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along S. Brownlee Blvd and Marguerite St from 16th St to King St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.

**Council District 1**      **Commissioner Precinct 1**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$7,581,349
ROW Acquisition:	\$100,000
MB&I (15%):	\$1,137,202
Contingency (30%):	\$2,274,405
Design & Inspection (15%):	\$1,137,202
<b>Project Total:</b>	<b>\$12,230,158</b>



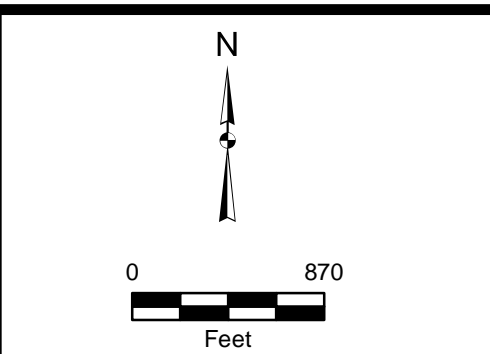
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**14-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 14-C



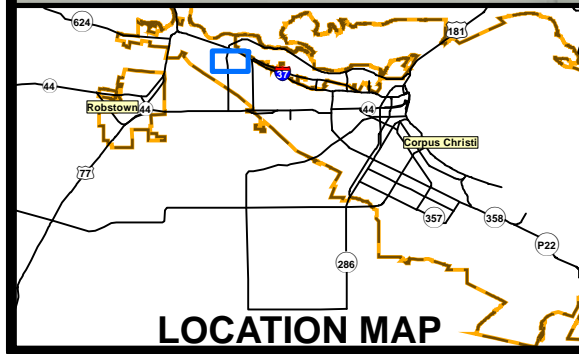


**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain improvements along McKinzie, Mayfield Dr and Starlite Ln, and Tumbleweed Dr and Rockwood St; and channel improvements from Rockwood St to Leopard to reduce flooding for neighborhoods and businesses.

**Council District 1**      **Commissioner Precinct 1**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$13,439,923
ROW Acquisition:	\$200,000
MB&I (15%):	\$2,015,988
Contingency (30%):	\$4,031,977
Design & Inspection (15%):	\$2,015,988
<b>Project Total:</b>	<b>\$21,703,877</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**15-D1 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

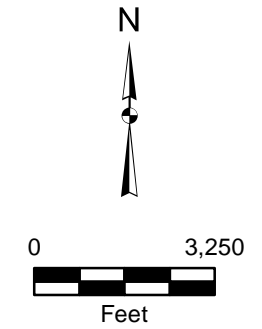
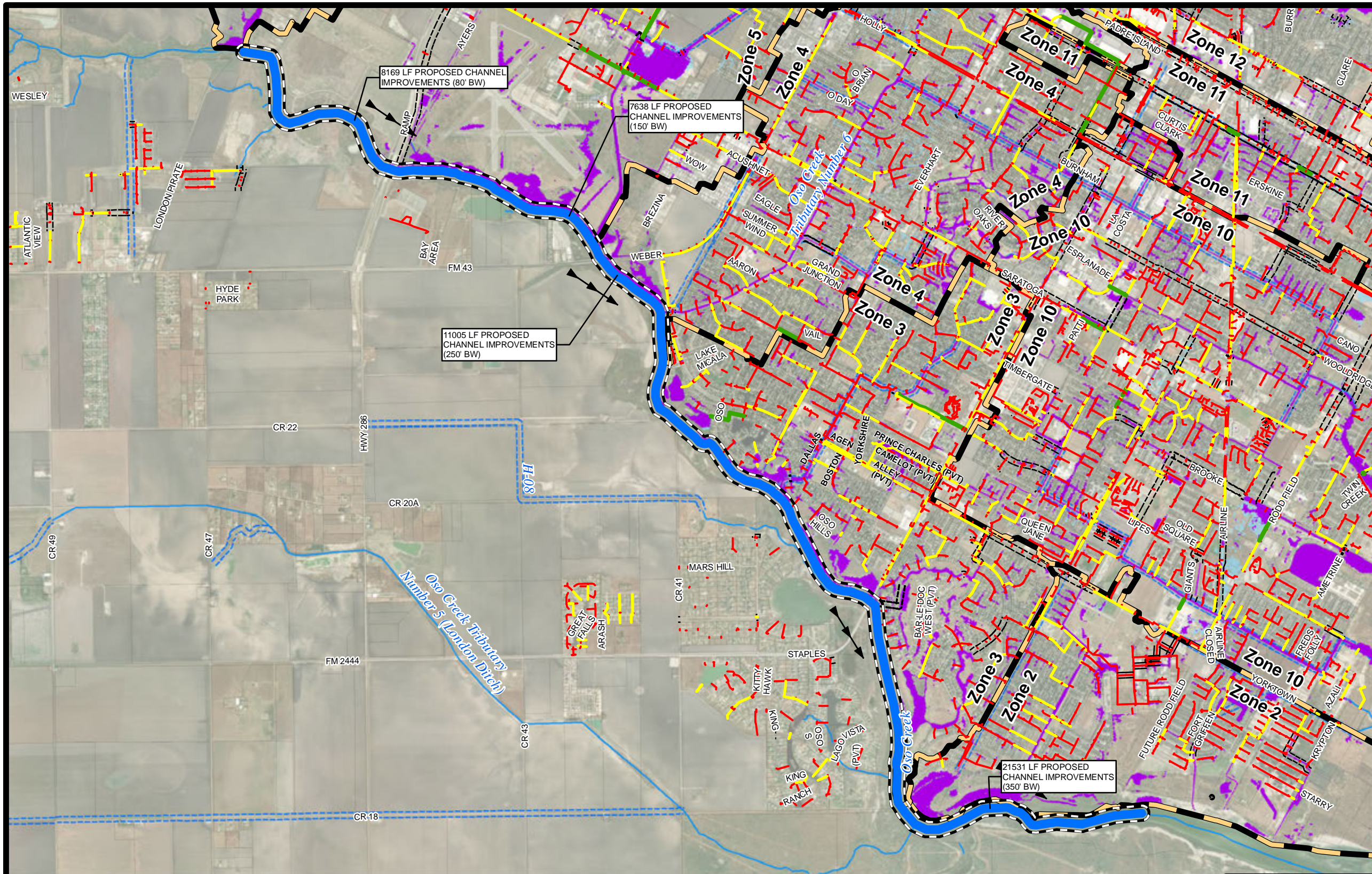
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 15-D1



**APPENDIX D**  
**Project Quad Sheets with**  
**Inundation Mapping**





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

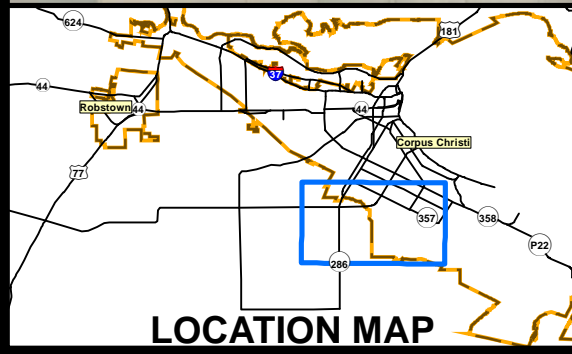
- Channel

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements to widen and deepen main channel along centerline of Oso Creek from La Volla Creek confluence to Oso Bay to improve conveyance and provide additional capacity within the high banks of Oso Creek.

**Council District 3, 4, 5**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$32,163,920
ROW Acquisition:	\$1,500,000
MB&I (15%):	\$4,824,588
Contingency (30%):	\$9,649,176
Design & Inspection (15%):	\$4,824,588
<b>Project Total:</b>	<b>\$52,962,272</b>

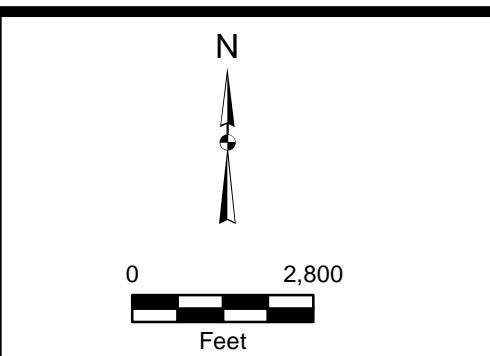
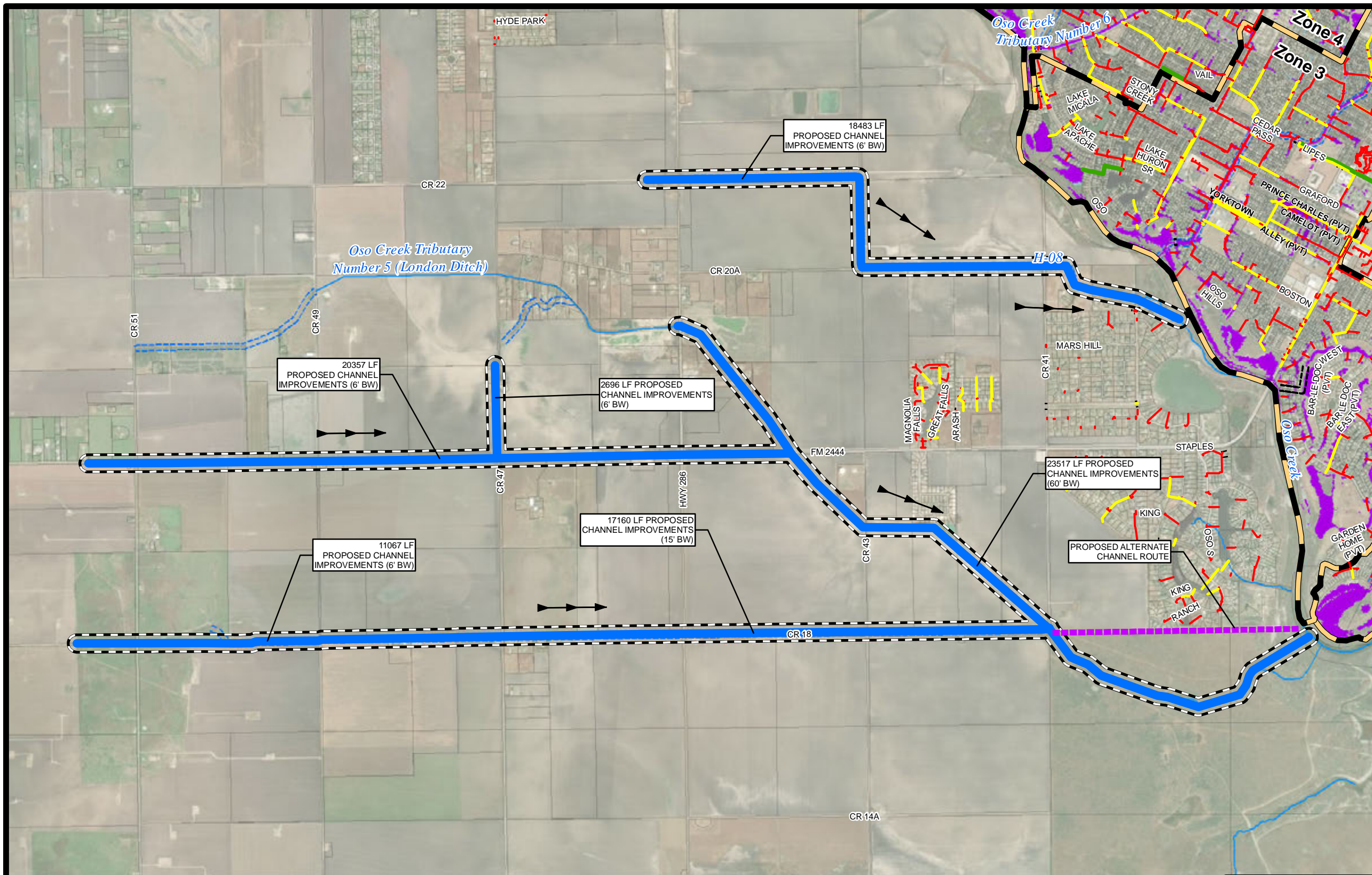
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 1 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 1





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

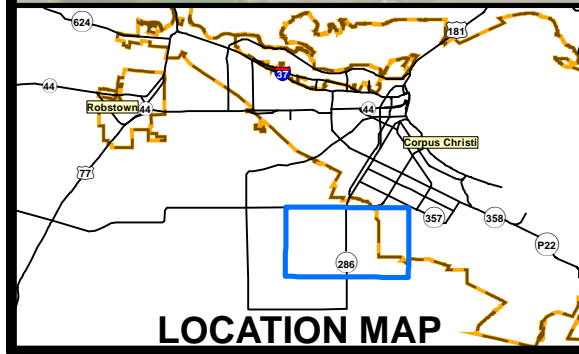
- Channel
- Alternate Channel

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements along London Ditch from Crosstown Expwy to Oso Creek; and channel improvements along ditches/tributaries in London Area to provide conveyance through London area including potential Nueces County and TxDOT improvements.

**Council District 4, 5**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$4,707,236
ROW Acquisition:	\$3,450,000
MB&I (15%):	\$706,085
Contingency (30%):	\$1,412,171
Design & Inspection (15%):	\$706,085
<b>Project Total:</b>	<b>\$10,981,578</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 2 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

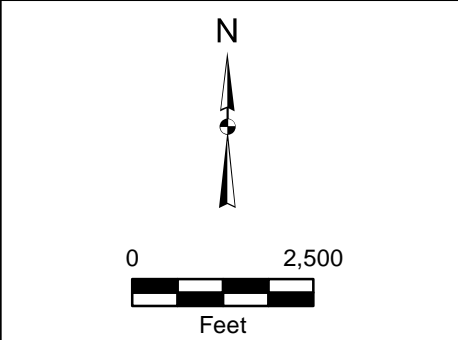
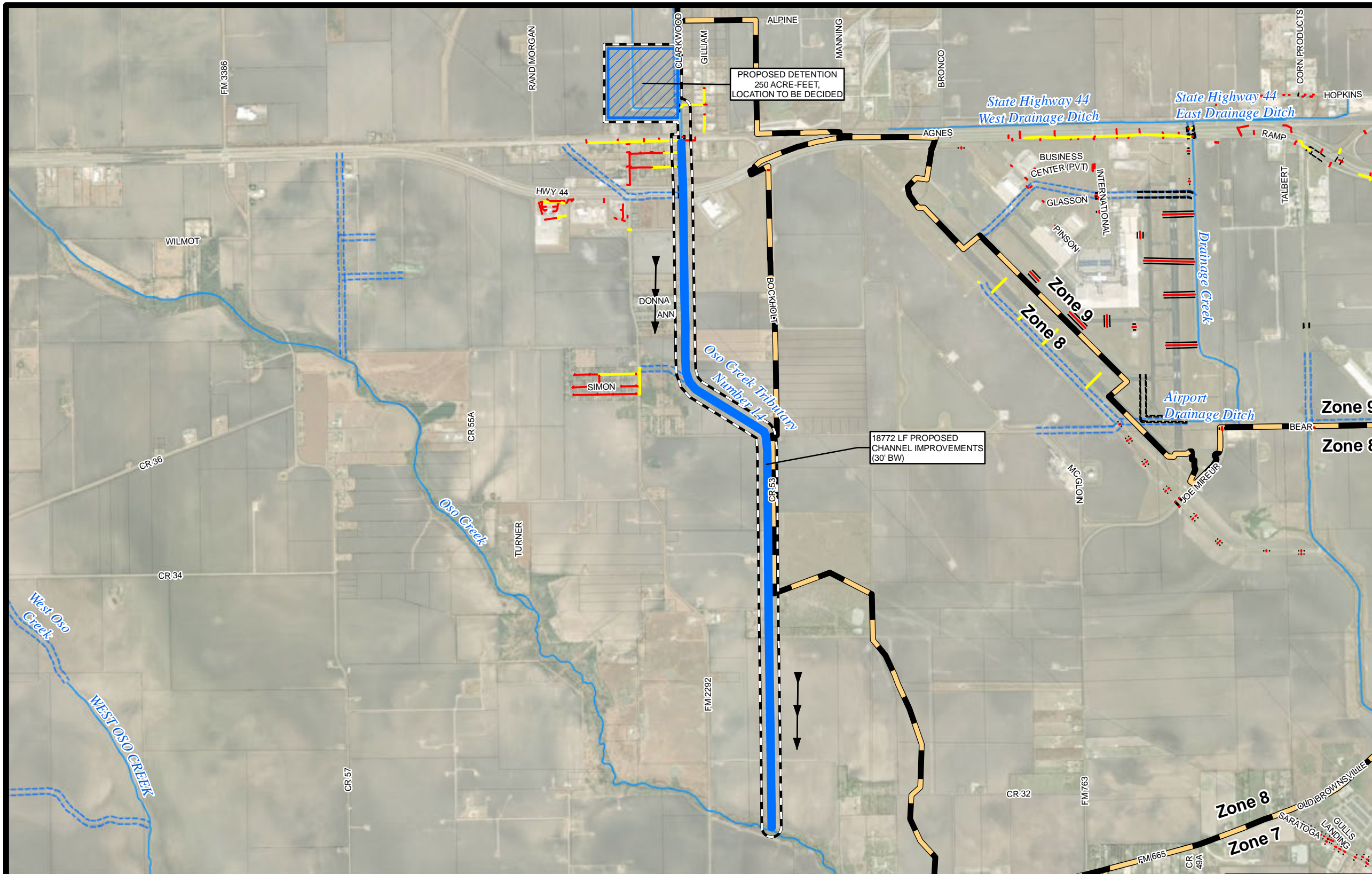
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 2









**Legend**

- ◄◄ Flow Direction
- ▨ Detention
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

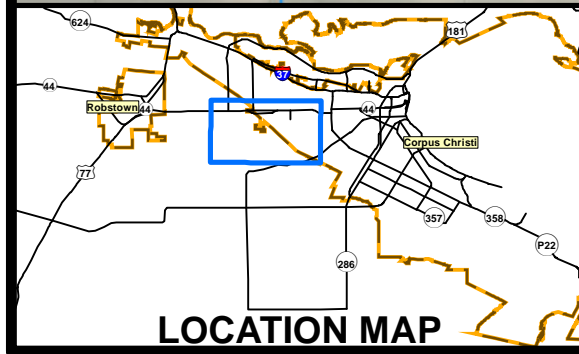
- ▬ Channel

**Existing Storm Drain**

- ▬ Unknown Size
- ▬ 4" - 34"
- ▬ 36" - 60"
- ▬ 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Improvements to Clarkwood Ditch/Oso Trib 14 from Hwy 44 to Oso Creek; and potential detention pond north of Hwy 44 to reduce flooding along Clarkwood Rd, near Hwy 44, and in nearby properties.

**Council District 1, 3**      **Commissioner Precincts 2, 3**


**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

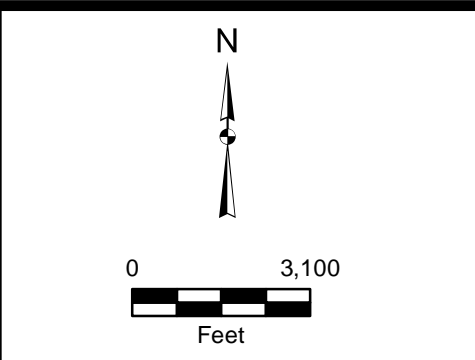
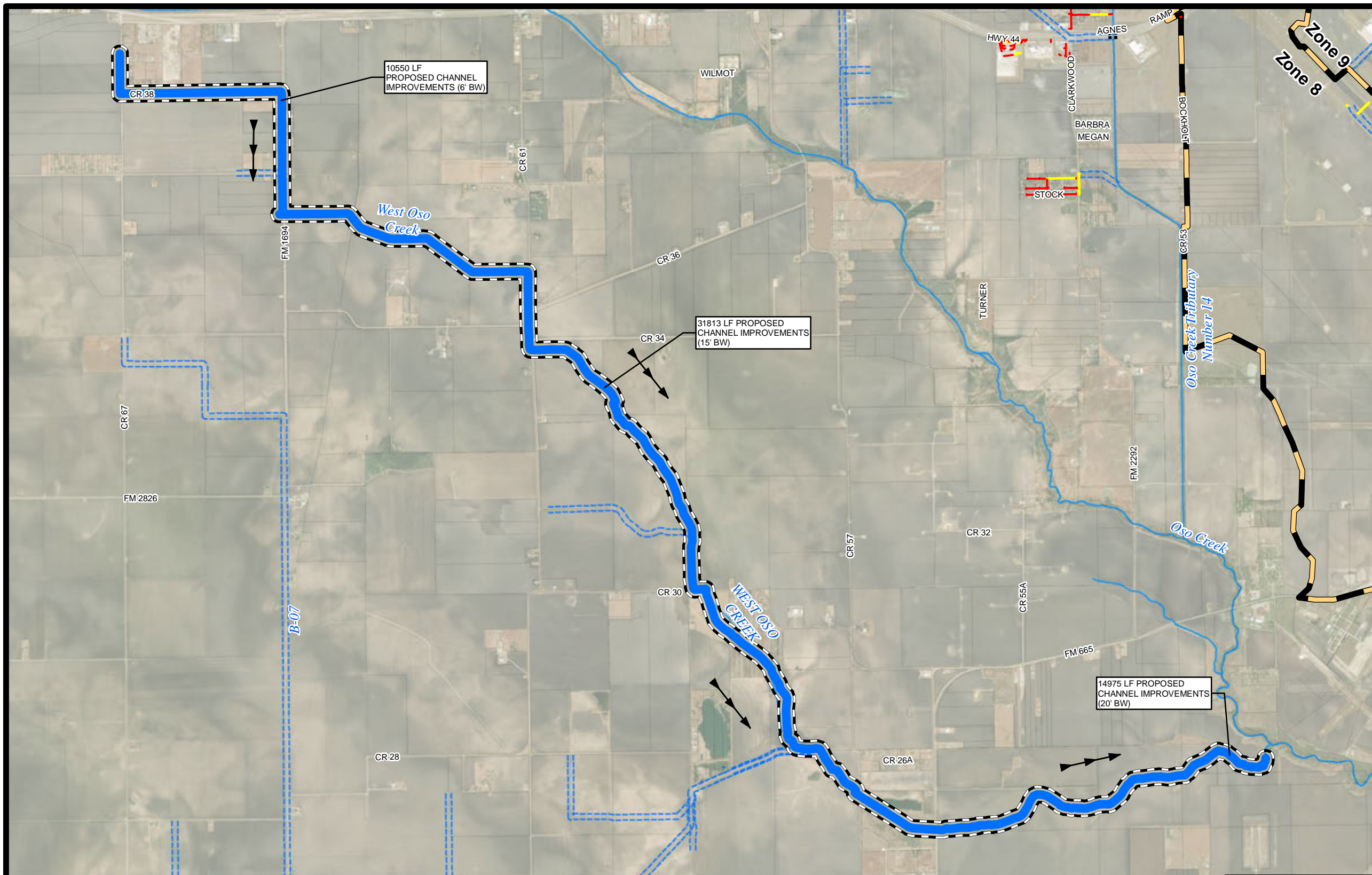
Construction:	\$23,304,888
ROW Acquisition:	\$2,650,000
MB&I (15%):	\$3,495,733
Contingency (30%):	\$6,991,466
Design & Inspection (15%):	\$3,495,733
<b>Project Total:</b>	<b>\$39,937,821</b>



**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 4 PROPOSED IMPROVEMENTS**

 <p>2000 NW LOOP 410   SAN ANTONIO, TX 78213   210.375.9000 TEXAS ENGINEERING FIRM #470   TEXAS SURVEYING FIRM #10028800</p>	JOB NO.	12383-00
	DATE	Aug 2023
	DESIGNER	JP
	CHECKED	BES DRAWN RG
	SHEET	QS Oso 4



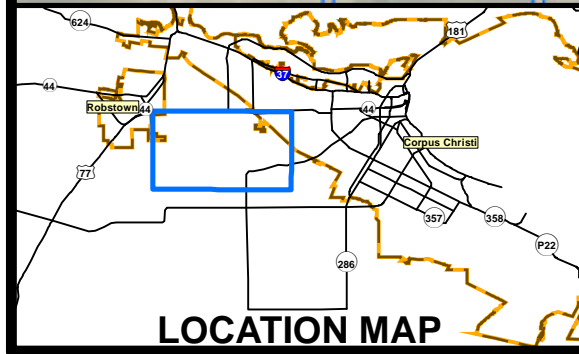


**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
- Channel
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements along centerline of West Oso Creek to improve conveyance to Oso Creek.

**Outside City Limits**      **Commissioner Precincts 1, 2, 3**

**POTENTIAL FUNDING SOURCES:** Impact Fees, Bonds

**COST(2023 \$):**

Construction:	\$6,193,482
ROW Acquisition:	\$2,000,000
MB&I (15%):	\$929,022
Contingency (30%):	\$1,858,045
Design & Inspection (15%):	\$929,022
<b>Project Total:</b>	<b>\$11,909,572</b>

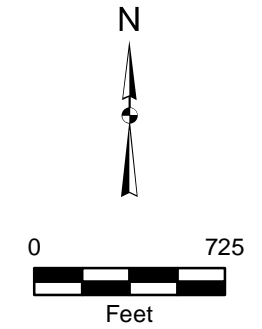
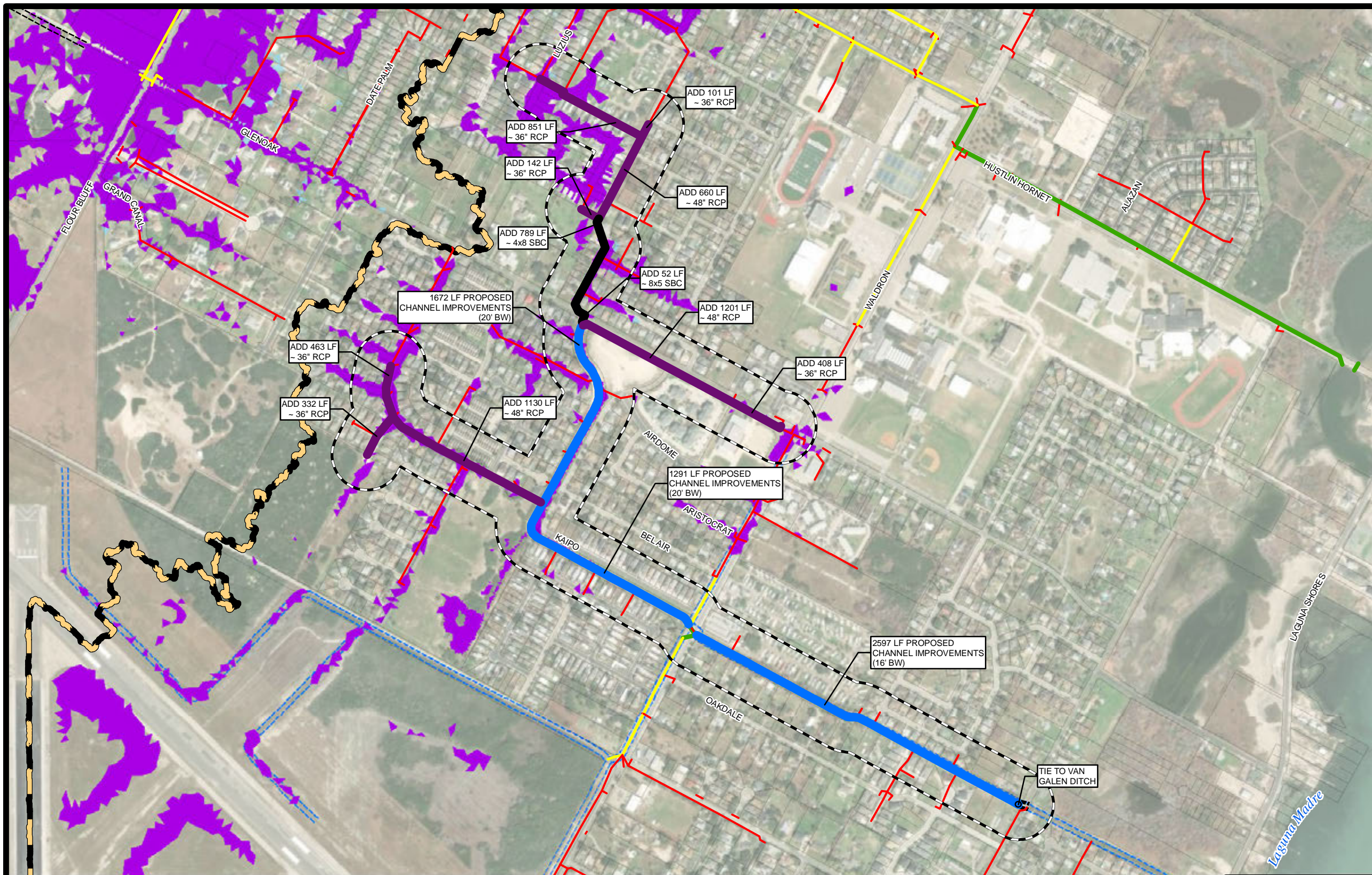
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**Oso 5 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS Oso 5



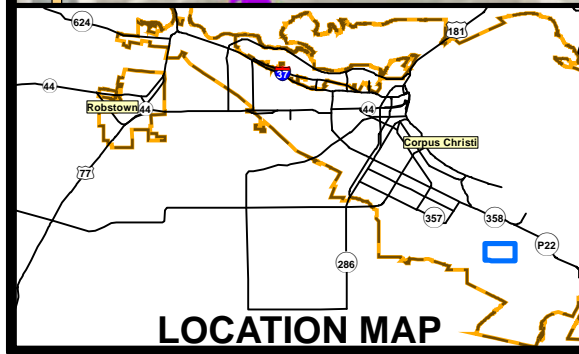


**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
  - Channel
  - Culvert
  - Pipe
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements between Glen Oak and Waldron Road, and proposed storm drain system improvements upstream of Glen Oak to relieve neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$6,433,426
ROW Acquisition:	\$50,000
MB&I (15%):	\$965,014
Contingency (30%):	\$1,930,028
Design & Inspection (15%):	\$965,014
<b>Project Total:</b>	<b>\$10,343,481</b>

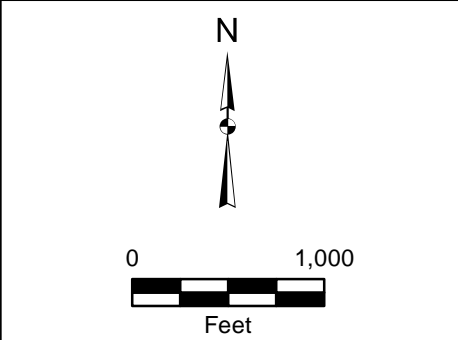
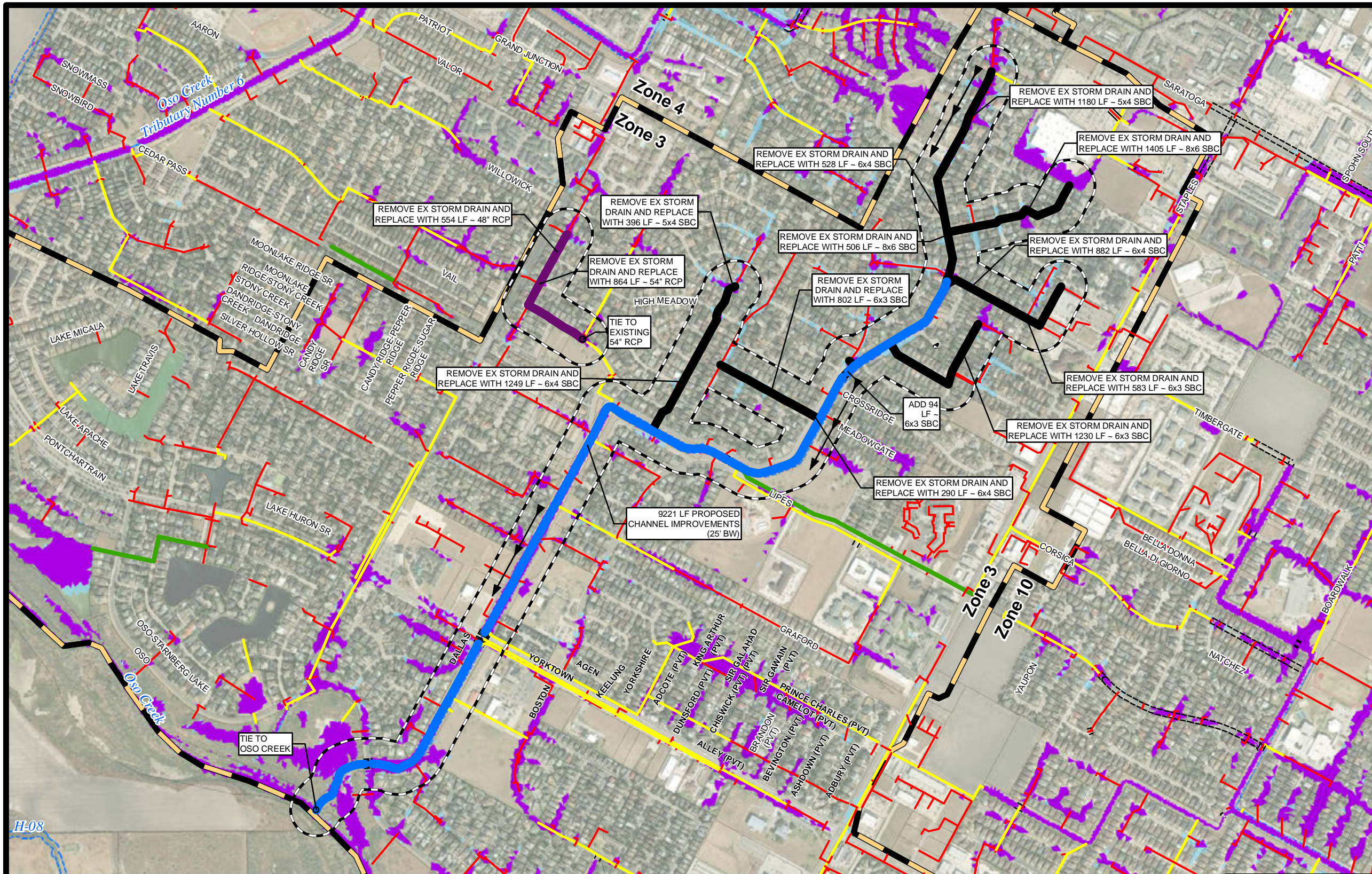
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**01-B PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 01-B





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

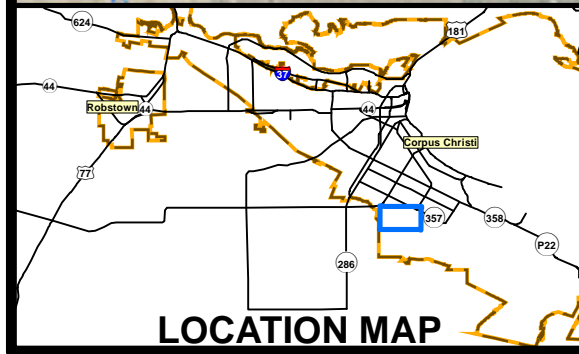
- Channel
- Culvert
- Pipe

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain/culvert improvements along Edgebrook Dr, Wake Forest Dr, Pepper Mill Dr, Woodgate Dr, Heavens Gate Dr, Timbergate Dr, and Hunt Dr; and channel improvements along Lipes Blvd and across Yorktown Blvd to relieve neighborhood flooding.

**Council District 5**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$18,687,461
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,803,119
Contingency (30%):	\$5,606,238
Design & Inspection (15%):	\$2,803,119
<b>Project Total:</b>	<b>\$29,999,937</b>

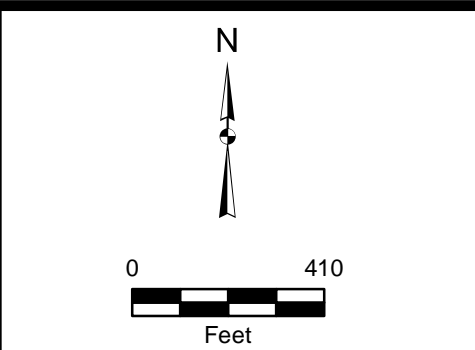
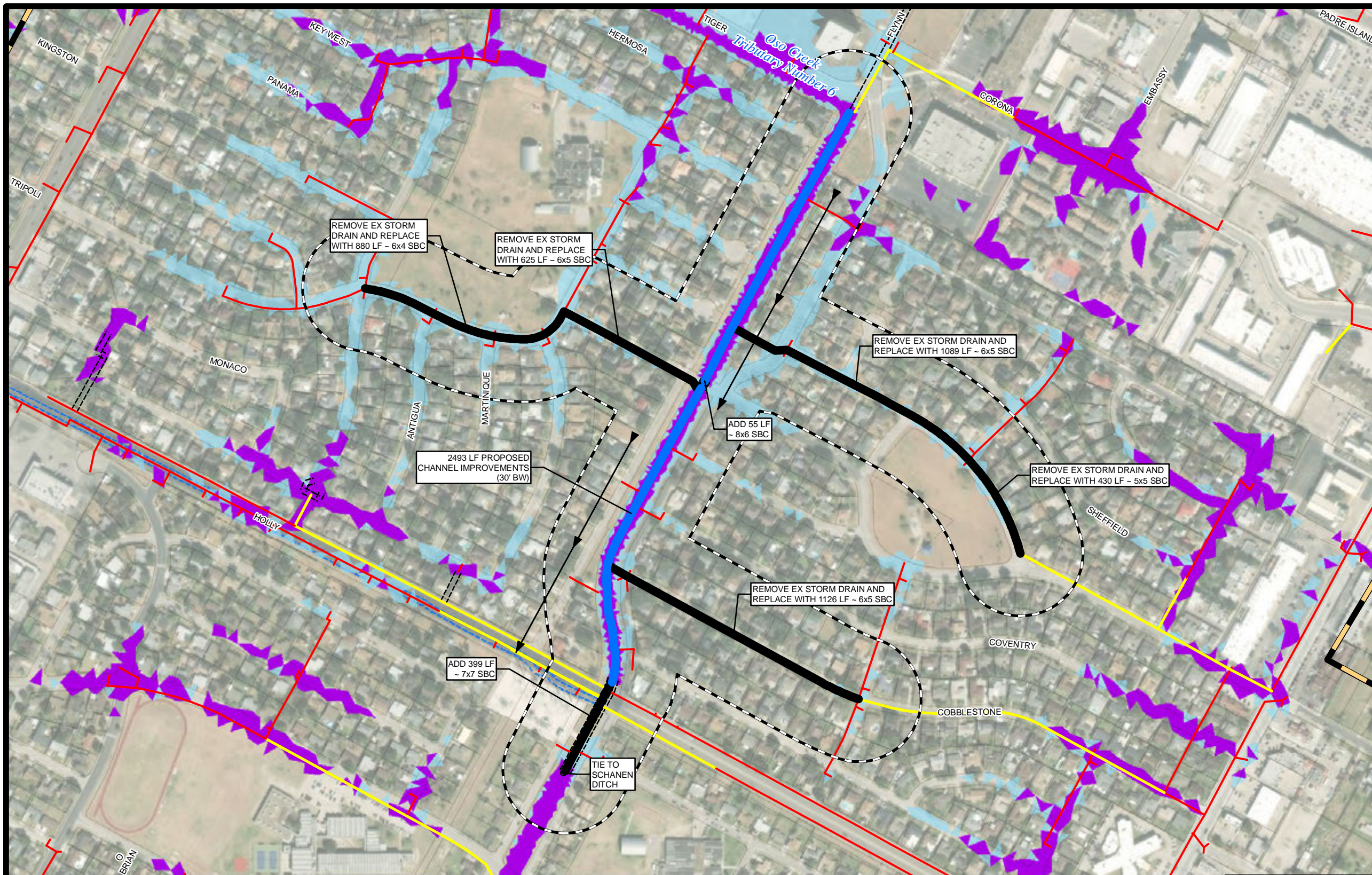
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**03-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 03-A



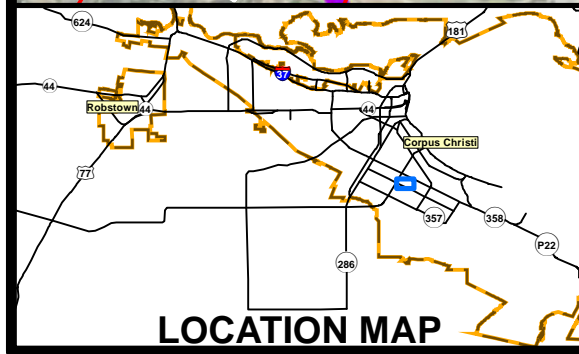


**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
- Channel
- Culvert
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Channel improvements along Flynn Parkway; storm drain improvements along Cobblestone Ln, Oxford Dr, and Philippine Dr; and culvert improvements at Holly Rd to reduce neighborhood flooding. Drains to project 4-B.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds


**COST(2023 \$):**

Construction:	\$8,312,021
ROW Acquisition:	\$50,000
MB&I (15%):	\$1,246,803
Contingency (30%):	\$2,493,606
Design & Inspection (15%):	\$1,246,803
<b>Project Total:</b>	<b>\$13,349,233</b>



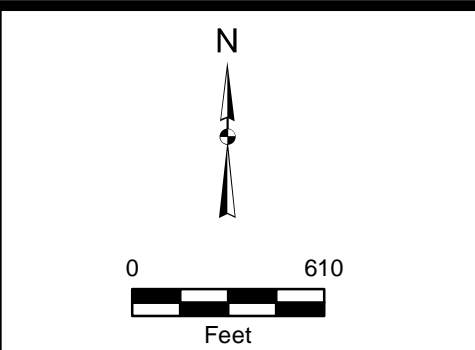
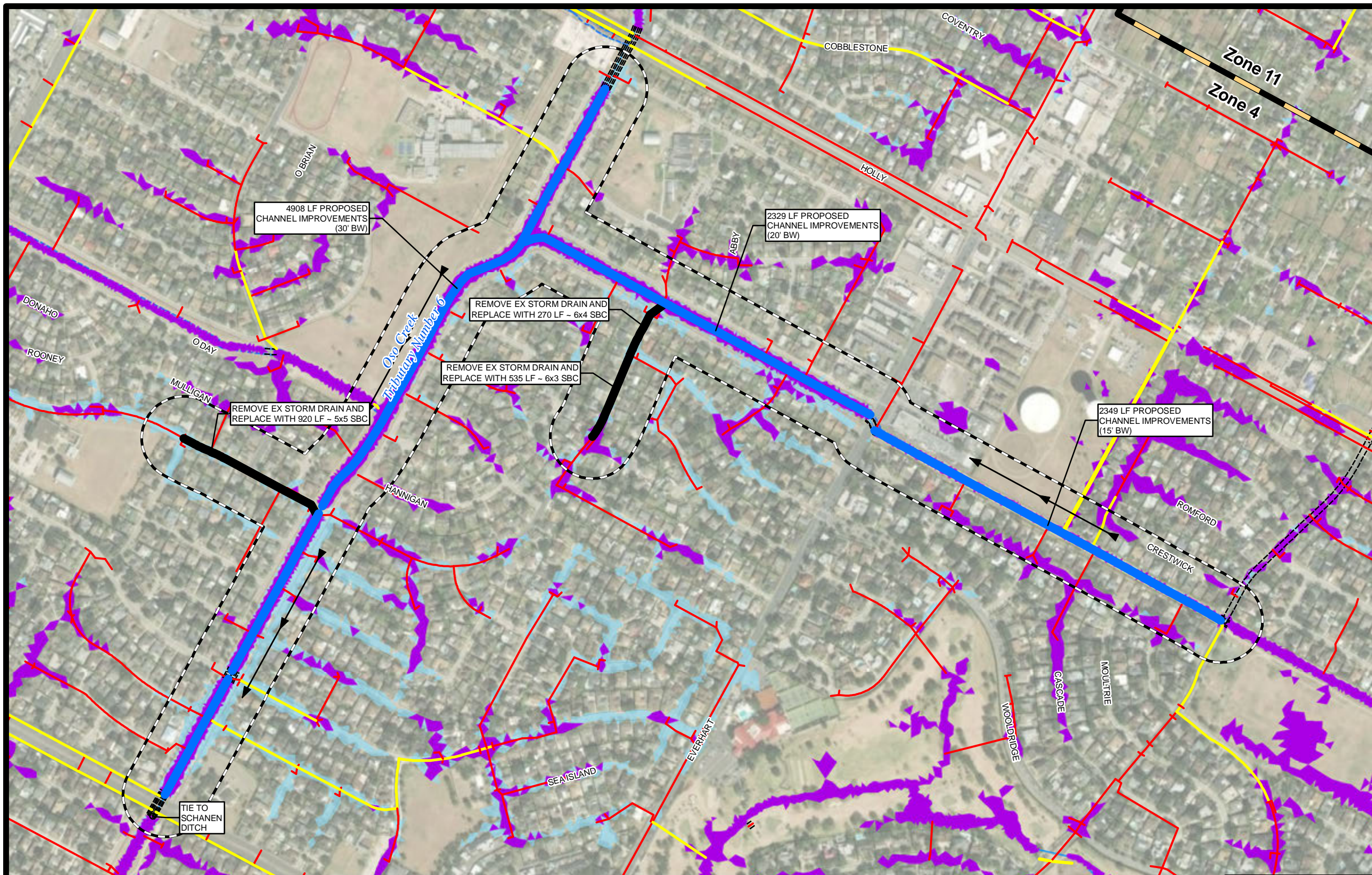
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-A PROPOSED IMPROVEMENTS**

JOB NO. 12383-00  
DATE Sep 2023  
DESIGNER JP  
CHECKED BES DRAWN RG  
SHEET QS 04-A



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements along Shea Parkway and Flynn Parkway to Saratoga Blvd; and storm drain improvements along Killarmet Dr to reduce neighborhood flooding. Accepts runoff from project 4-A.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$4,943,109
ROW Acquisition:	\$100,000
MB&I (15%):	\$741,466
Contingency (30%):	\$1,482,933
Design & Inspection (15%):	\$741,466
<b>Project Total:</b>	<b>\$8,008,974</b>

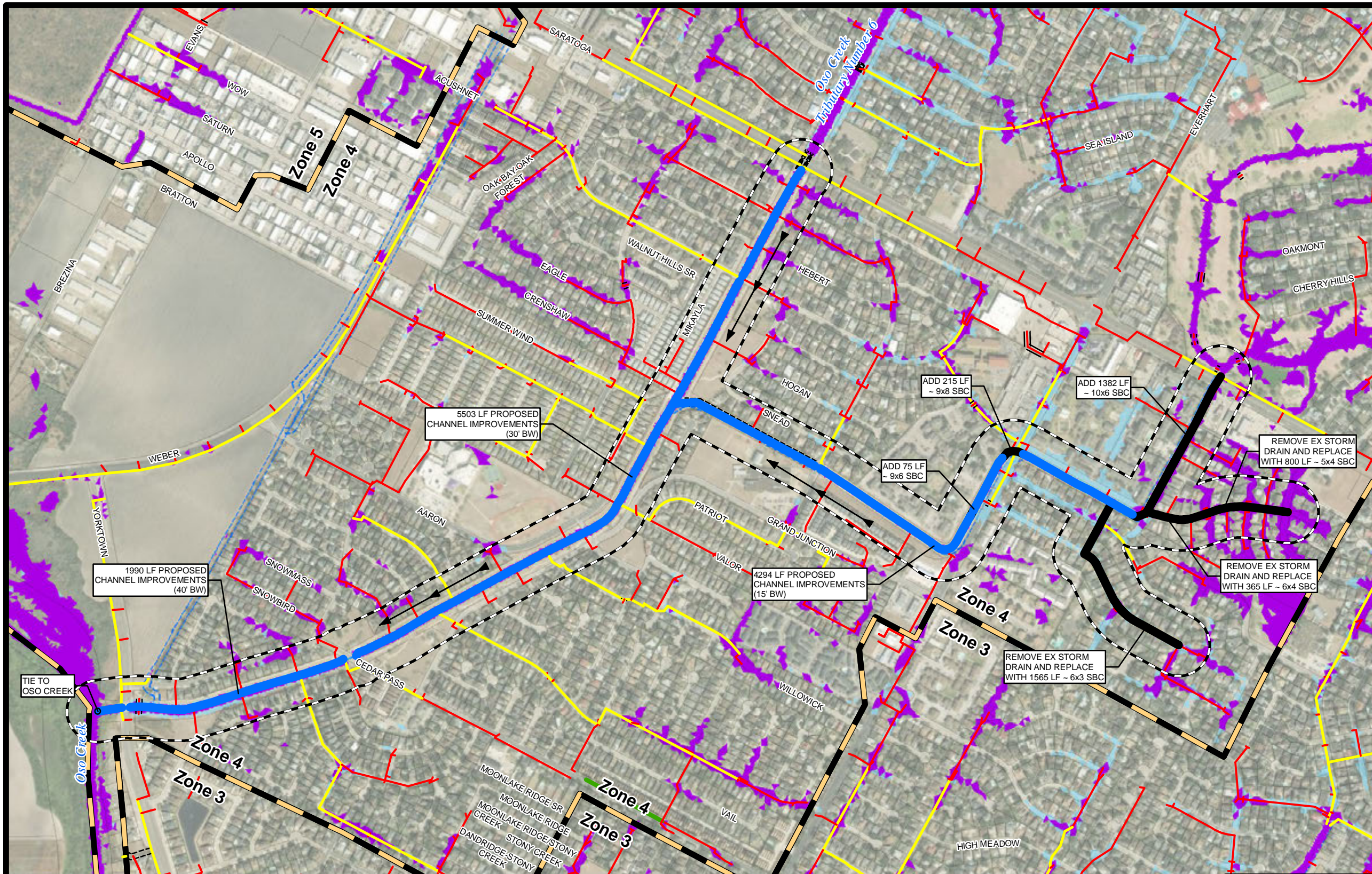
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-B PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 04-B





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Channel improvements from Saratoga through Acushnet Park and along Grand Junction Dr to Oso Creek; and storm drain improvements along Middlecoff Rd and nearby streets to reduce neighborhood flooding. Accepts runoff from projects 4-A, and 4-B.

**Council District 5**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$10,839,372
ROW Acquisition:	\$100,000
MB&I (15%):	\$1,625,906
Contingency (30%):	\$3,251,812
Design & Inspection (15%):	\$1,625,906
<b>Project Total:</b>	<b>\$17,442,995</b>

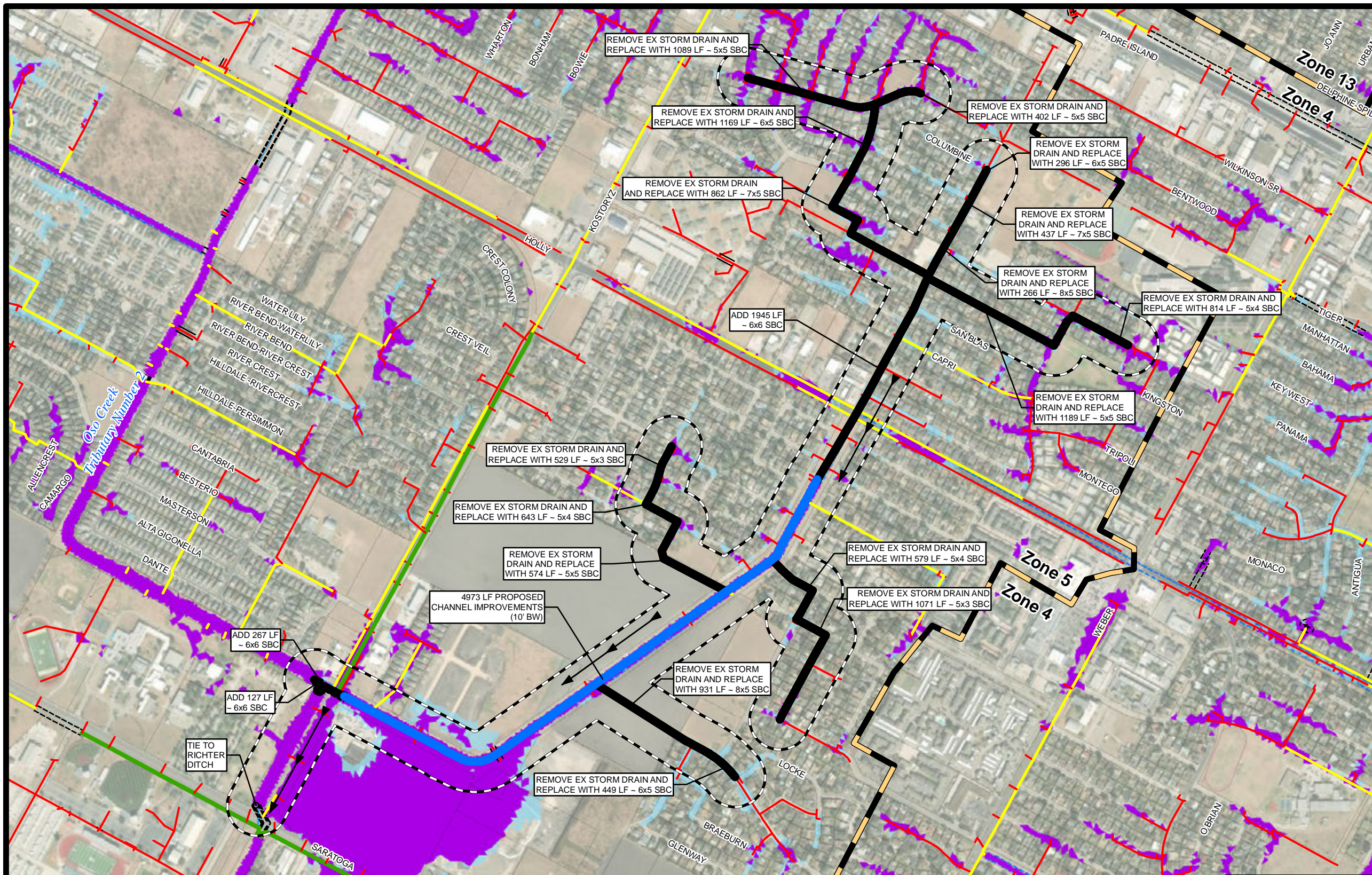
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**04-D PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 04-D





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

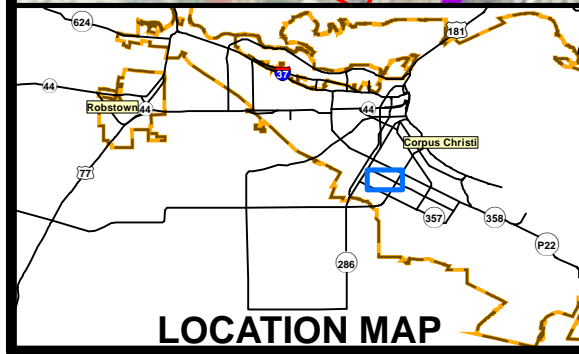
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Carroll Ln and Waterloo Dr systems; channel and storm drain improvements along Carroll Ln to Saratoga Blvd; and culvert improvements at Holly Rd and Kostoryz Rd to reduce neighborhood flooding. Accepts runoff from project 5-B.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$23,505,278
ROW Acquisition:	\$100,000
MB&I (15%):	\$3,525,792
Contingency (30%):	\$7,051,583
Design & Inspection (15%):	\$3,525,792
<b>Project Total:</b>	<b>\$37,708,444</b>

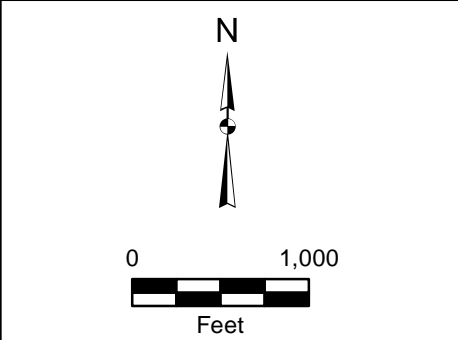
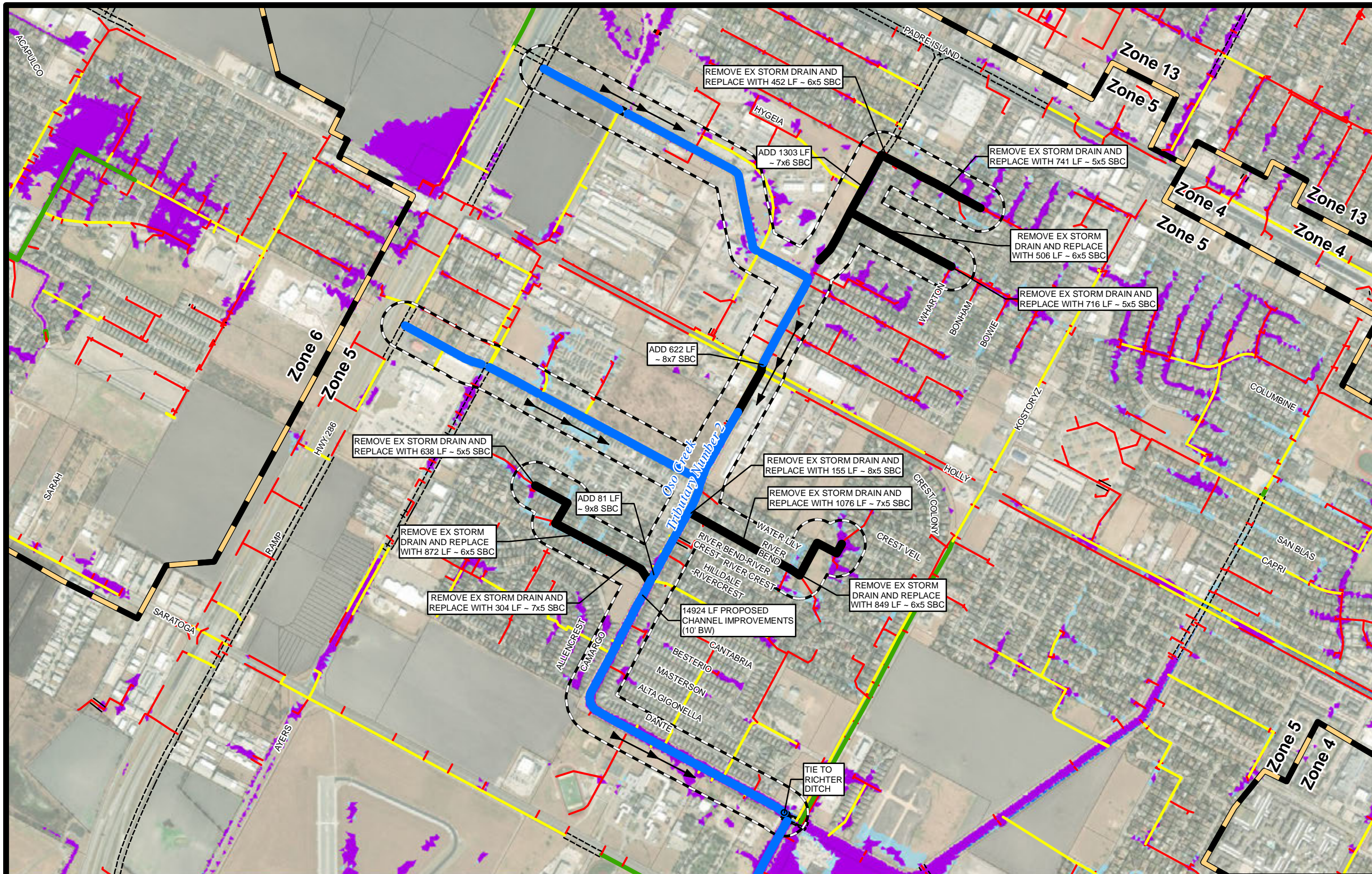
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**05-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 05-A





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
  - Channel
  - Culvert
- Existing Storm Drain**
  - Unknown Size
  - 4" - 34"
  - 36" - 60"
  - 60" >
  - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel and storm drain improvements along Civitan Dr and Richter St; culvert improvements at Holly Rd; and channel and storm drain sytem improvements from Holly Rd to Kostoryz Rd to reduce neighborhood flooding. Drains to project 5-A.

**Council District 3**      **Commissioner Precinct 2**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$15,813,927
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,372,089
Contingency (30%):	\$4,744,178
Design & Inspection (15%):	\$2,372,089
<b>Project Total:</b>	<b>\$25,402,283</b>

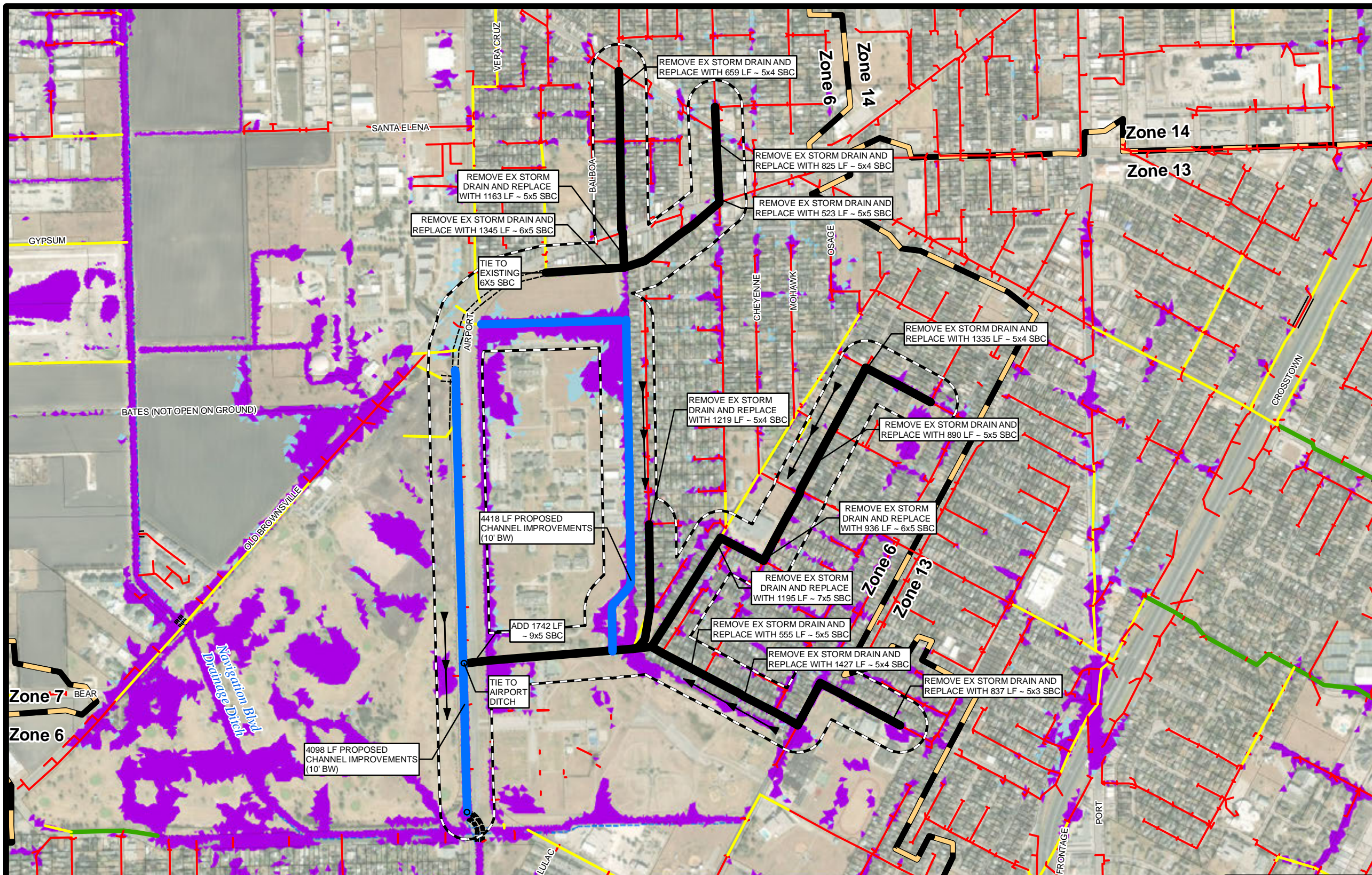
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**05-B PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 05-B





N

0 950  
Feet

**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
- Channel
- Culvert
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Old Brownsville Rd, Lawton St, Washington St, and Post Ave; and channel improvements along Airport Rd and Post Rd to reduce flooding to neighborhoods and businesses.

**Council Districts 1, 2, 3**      **Commissioner Precincts 1, 2, 3**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$24,503,353
ROW Acquisition:	\$100,000
MB&I (15%):	\$3,675,503
Contingency (30%):	\$7,351,006
Design & Inspection (15%):	\$3,675,503
<b>Project Total:</b>	<b>\$39,305,365</b>

**CITY OF CORPUS CHRISTI**

**COMPREHENSIVE MASTER PLAN**  
**06-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO. 12383-00

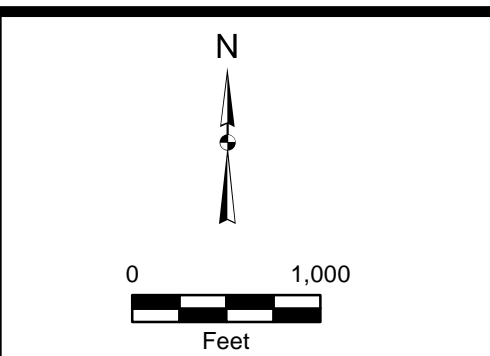
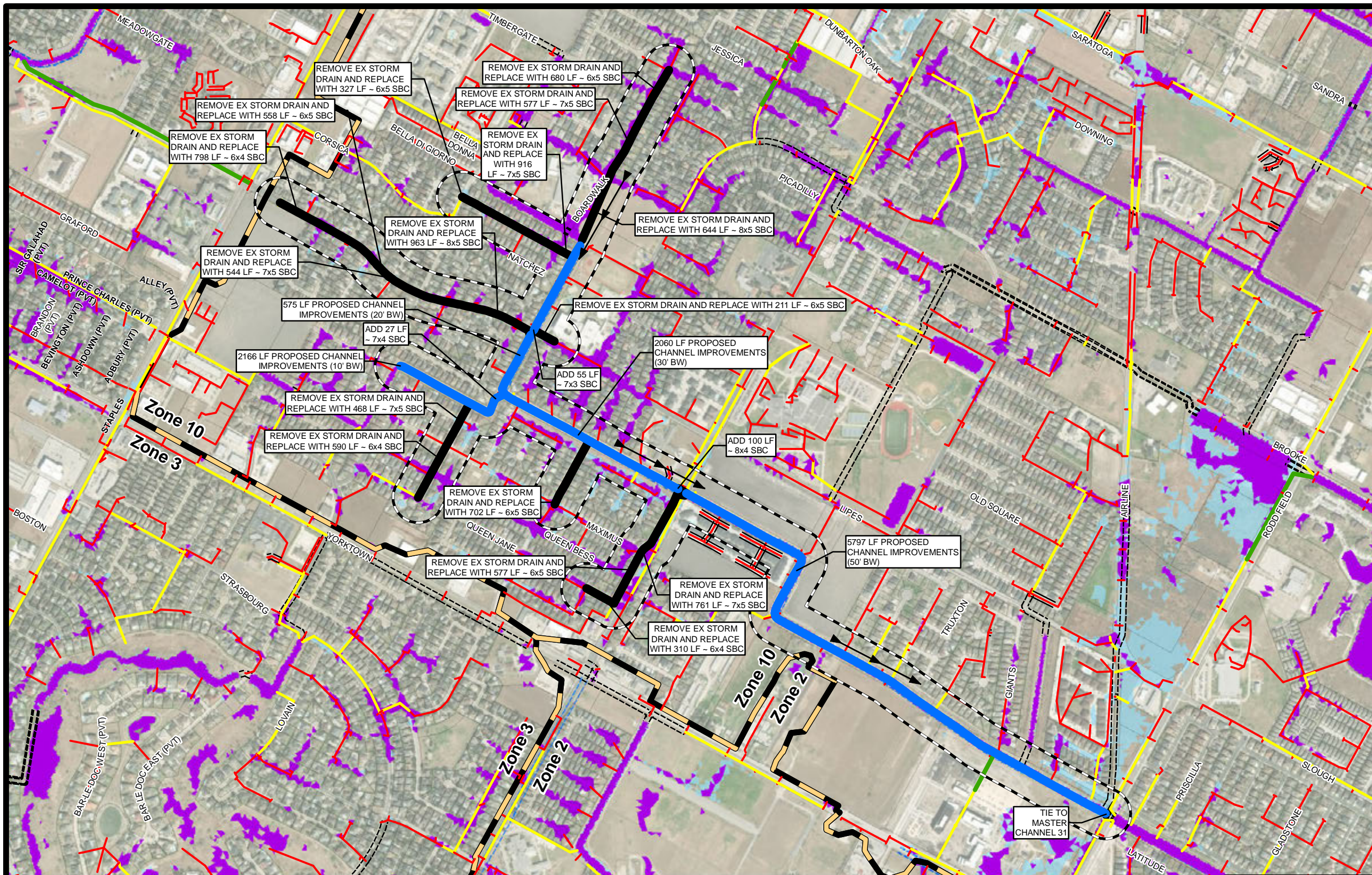
DATE Sep 2023

DESIGNER JP

CHECKED BES DRAWN RG

SHEET **QS 06-A**





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Lipes Blvd, and Boardwalk Ave; storm drain and culvert improvements along Cimarron Blvd; and channel improvements from Boardwalk Ave to downstream of Cimarron Blvd to reduce neighborhood flooding.

**Council District 5**      **Commissioner Precincts 2, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$17,255,608
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,588,341
Contingency (30%):	\$5,176,682
Design & Inspection (15%):	\$2,588,341
<b>Project Total:</b>	<b>\$27,708,972</b>

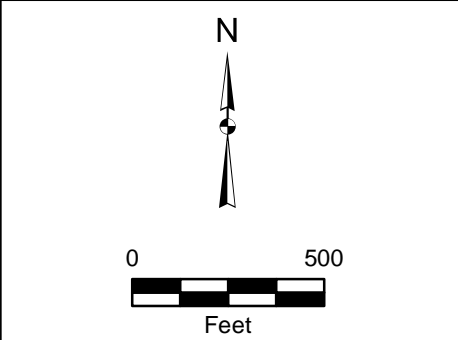
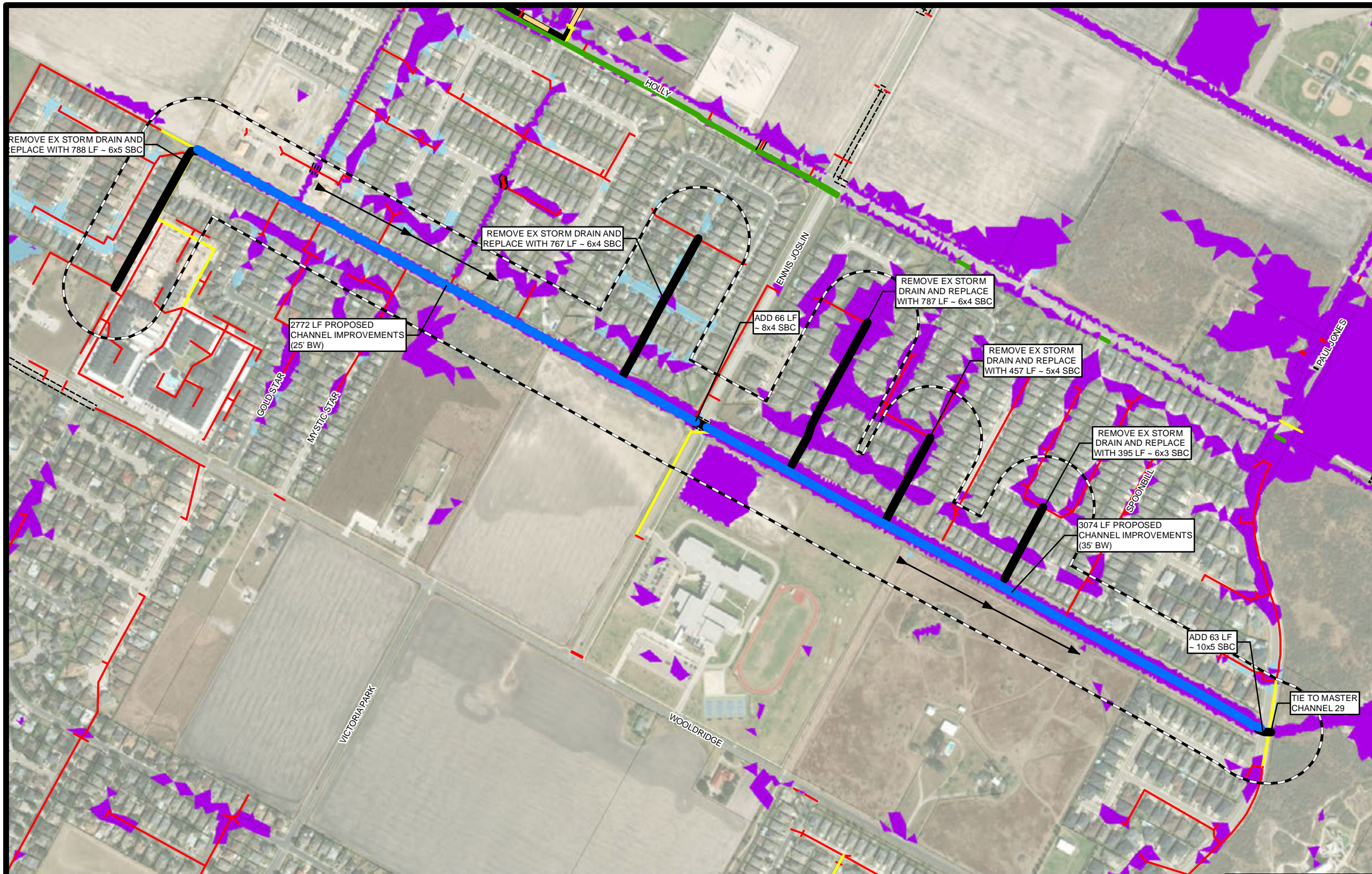
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**10-B2 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-B2





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

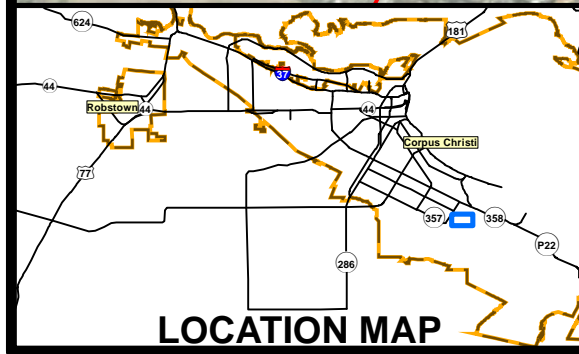
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel improvements from Vaughan Dr to N Oso Parkway and nearby storm drain improvements to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$6,136,528
ROW Acquisition:	\$50,000
MB&I (15%):	\$920,479
Contingency (30%):	\$1,840,958
Design & Inspection (15%):	\$920,479
<b>Project Total:</b>	<b>\$9,868,445</b>

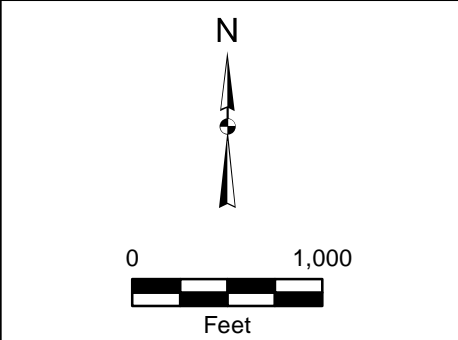
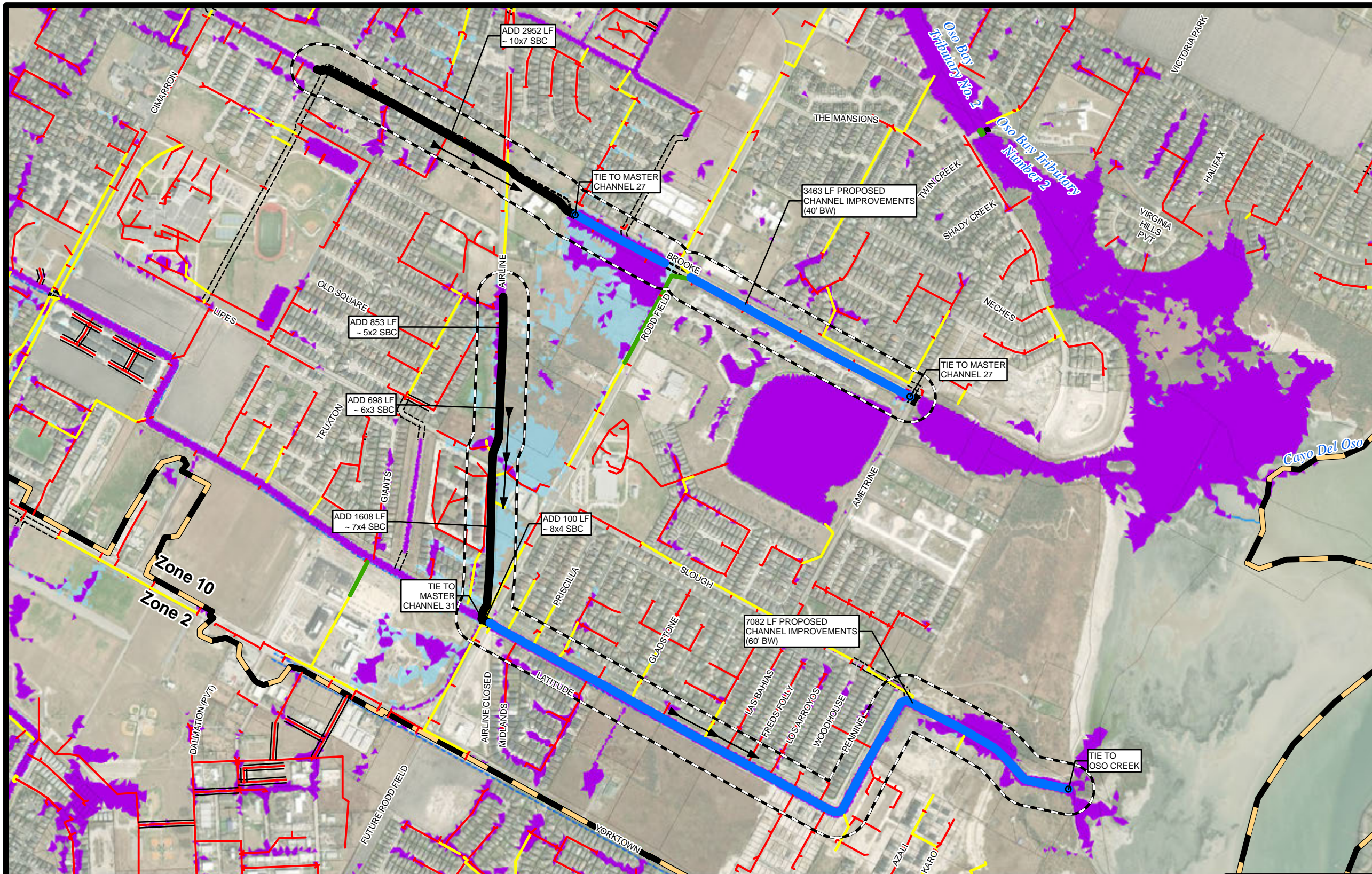
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**10-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-C





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

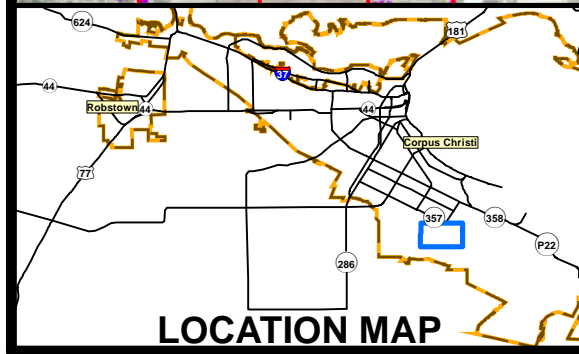
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
 Storm drain improvements along Brooke Rd and Airline Rd; channel improvements along Brooke Rd; and channel and improvements from near Cimarron Blvd to Oso Bay including culvert improvements at Rodd Field Rd to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$13,832,639
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,074,896
Contingency (30%):	\$4,149,792
Design & Inspection (15%):	\$2,074,896
<b>Project Total:</b>	<b>\$22,232,222</b>

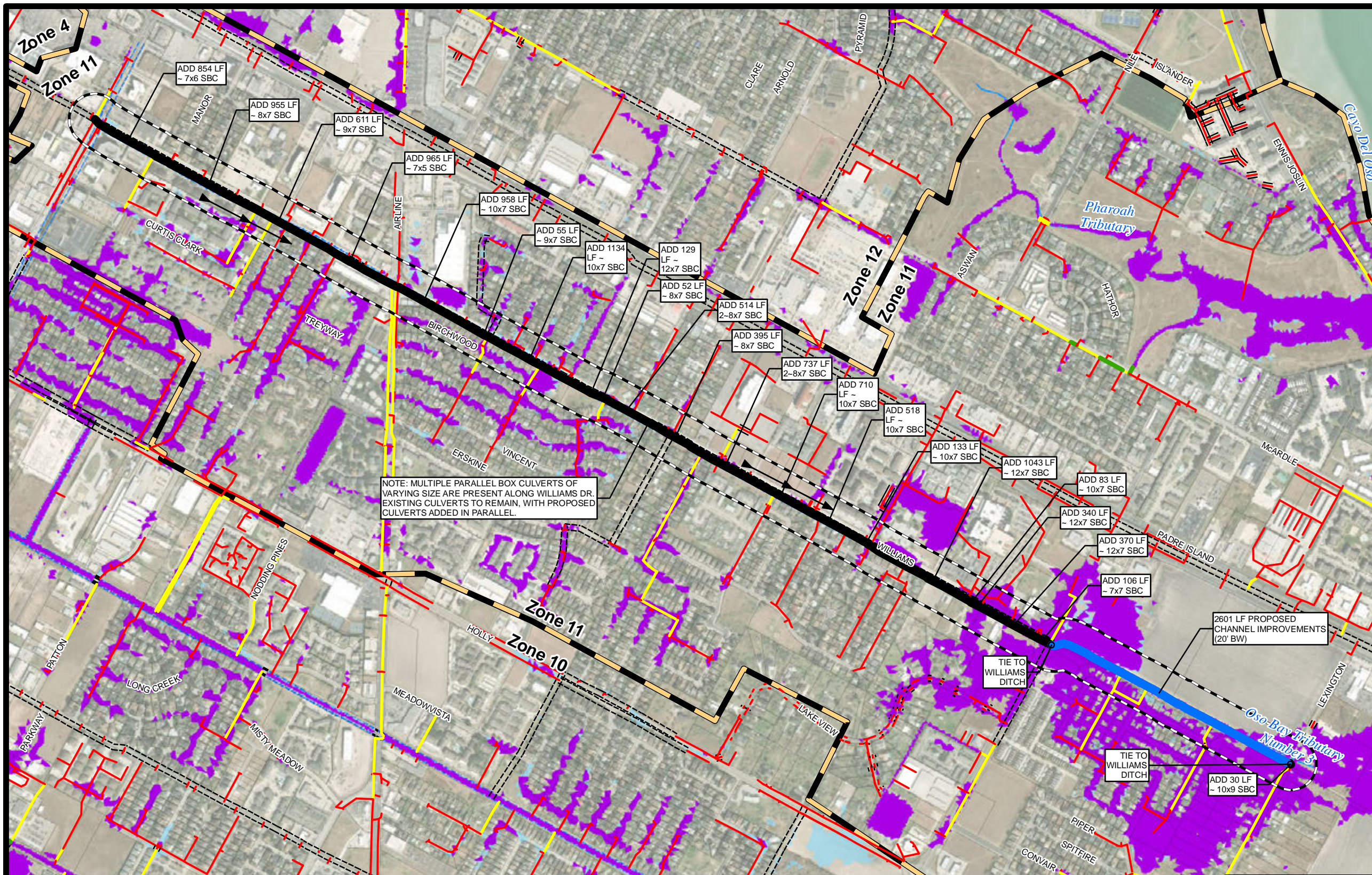
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**10-D PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
 TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 10-D





N

0 1,000  
Feet

**Legend**

- ← Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

- Channel
- ▭ Culvert

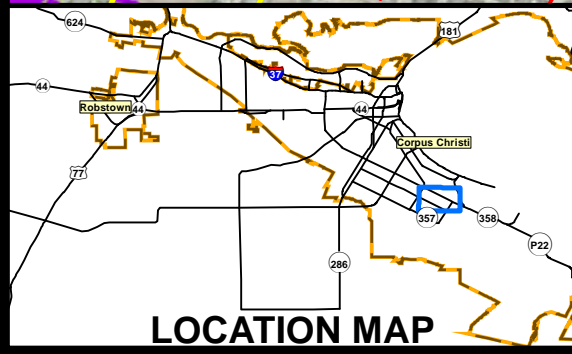
**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

NOTE: MULTIPLE PARALLEL BOX CULVERTS OF VARYING SIZE ARE PRESENT ALONG WILLIAMS DR. EXISTING CULVERTS TO REMAIN, WITH PROPOSED CULVERTS ADDED IN PARALLEL.

NOTES:

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Channel and storm drain system improvements along Williams Dr from current Williams Ditch project upstream to Staples St to reduce flooding for neighborhoods and businesses.

**Council Districts 3, 4**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$18,845,581
ROW Acquisition:	\$50,000
MB&I (15%):	\$2,826,837
Contingency (30%):	\$5,653,674
Design & Inspection (15%):	\$2,826,837
<b>Project Total:</b>	<b>\$30,202,930</b>

**CITY OF CORPUS CHRISTI**

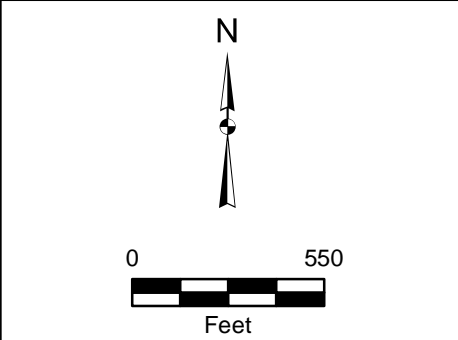
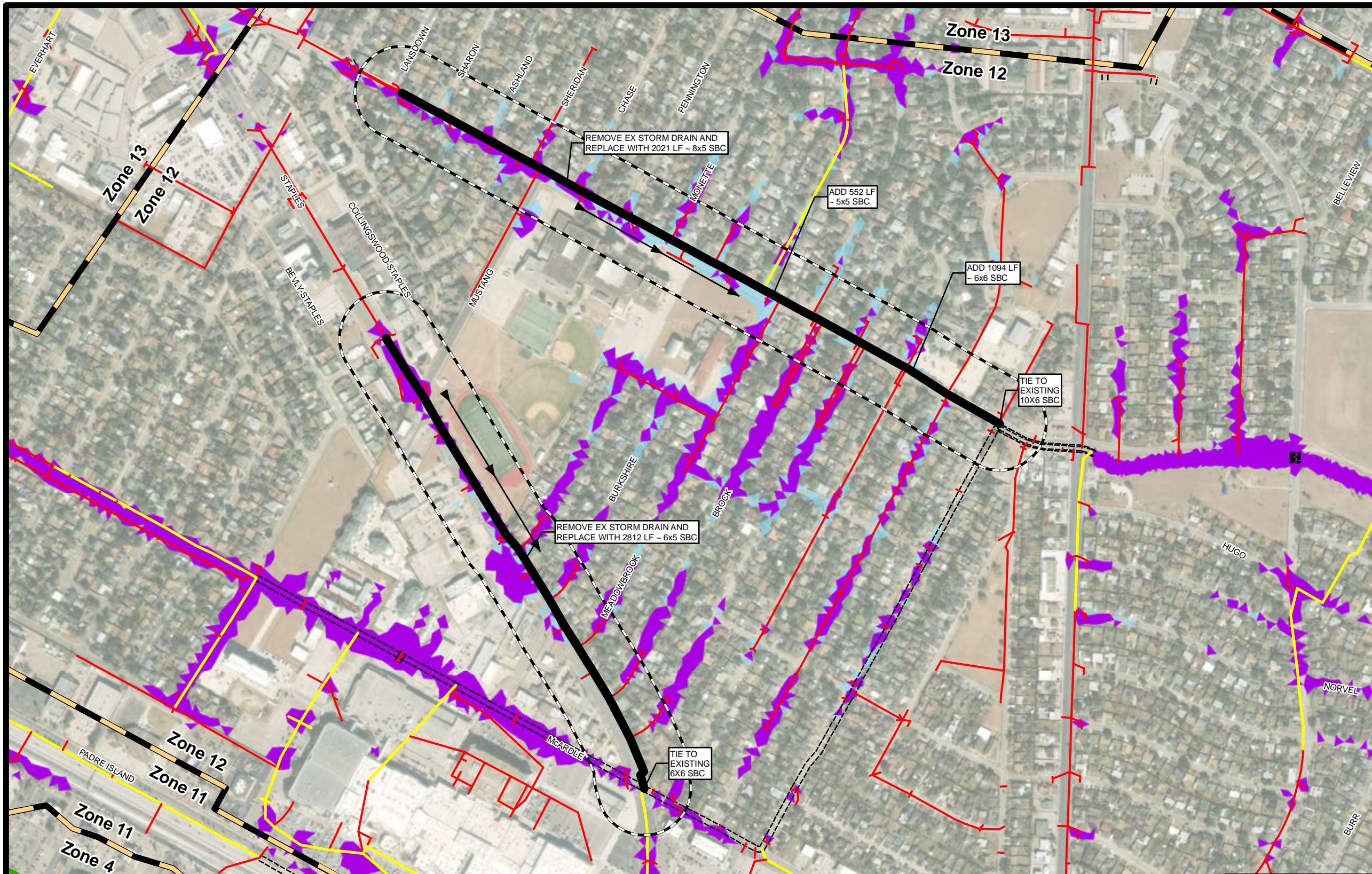
**COMPREHENSIVE MASTER PLAN**  
**11-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 11-A





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

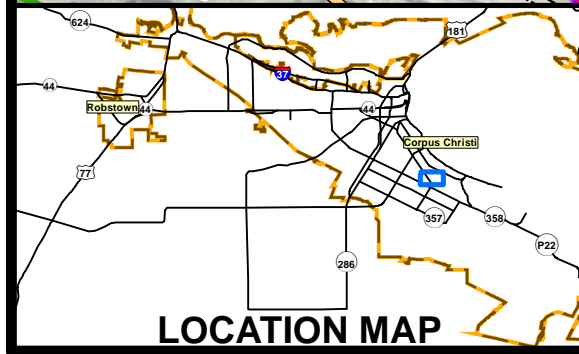
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain improvements along Gollihar Rd and S. Staples St; and channel improvements from Airline Rd to Oso Municipal Golf Course to relieve flooding for neighborhoods and businesses.

**Council District 2**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$10,638,376
ROW Acquisition:	\$25,000
MB&I (15%):	\$1,595,756
Contingency (30%):	\$3,191,513
Design & Inspection (15%):	\$1,595,756
<b>Project Total:</b>	<b>\$17,046,401</b>

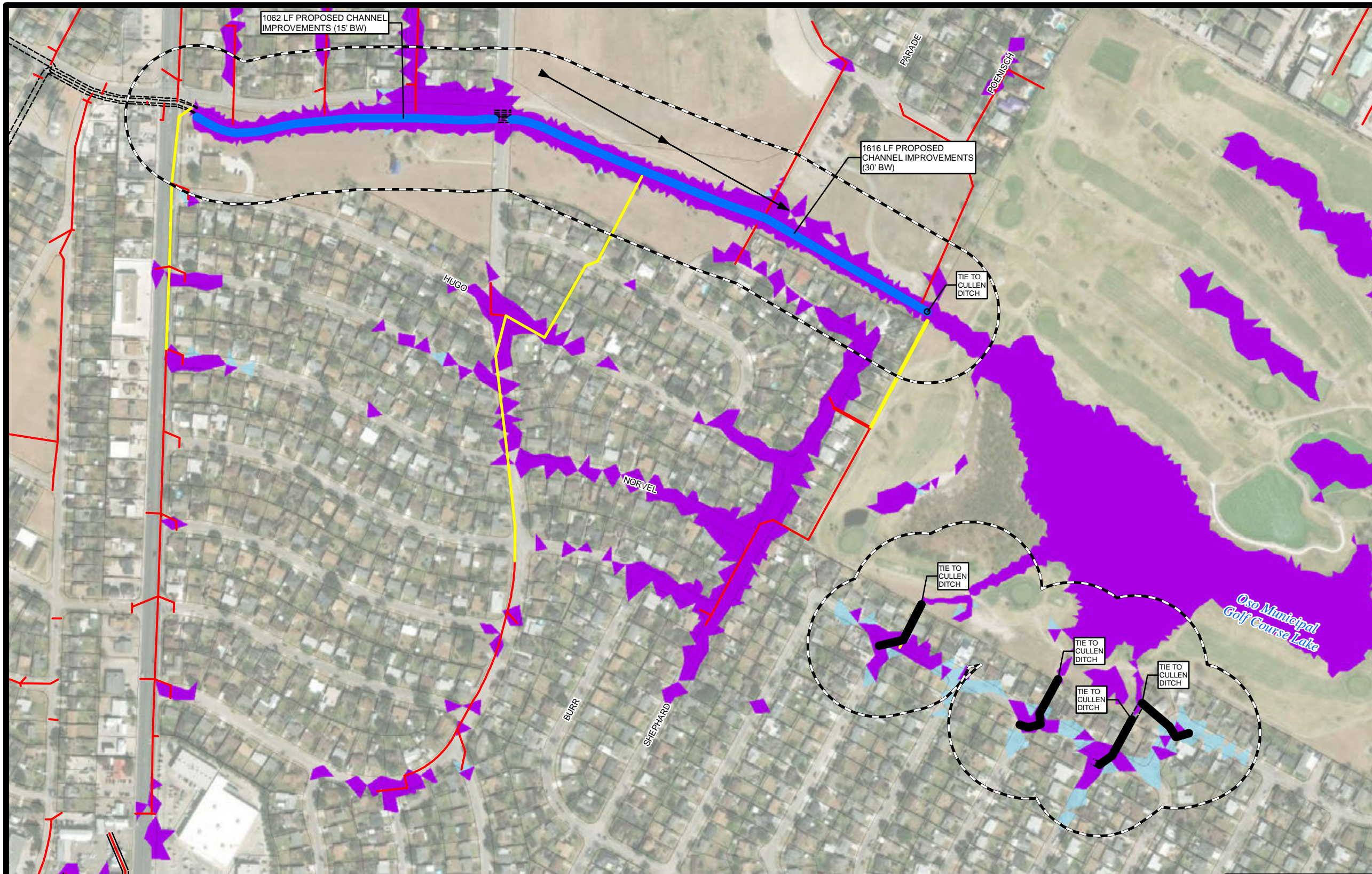
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-A PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 12-A





N

0 360  
Feet

**Legend**

- ➔ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing
- Proposed Improvements**
- Channel
- Culvert
- Existing Storm Drain**
- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Shephard Dr and across Whitaker Dr and Cleopatra Dr to reduce neighborhood flooding.

**Council District 4**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

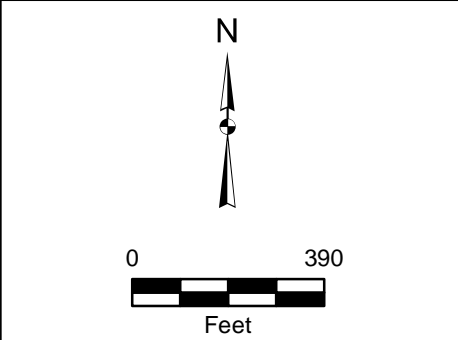
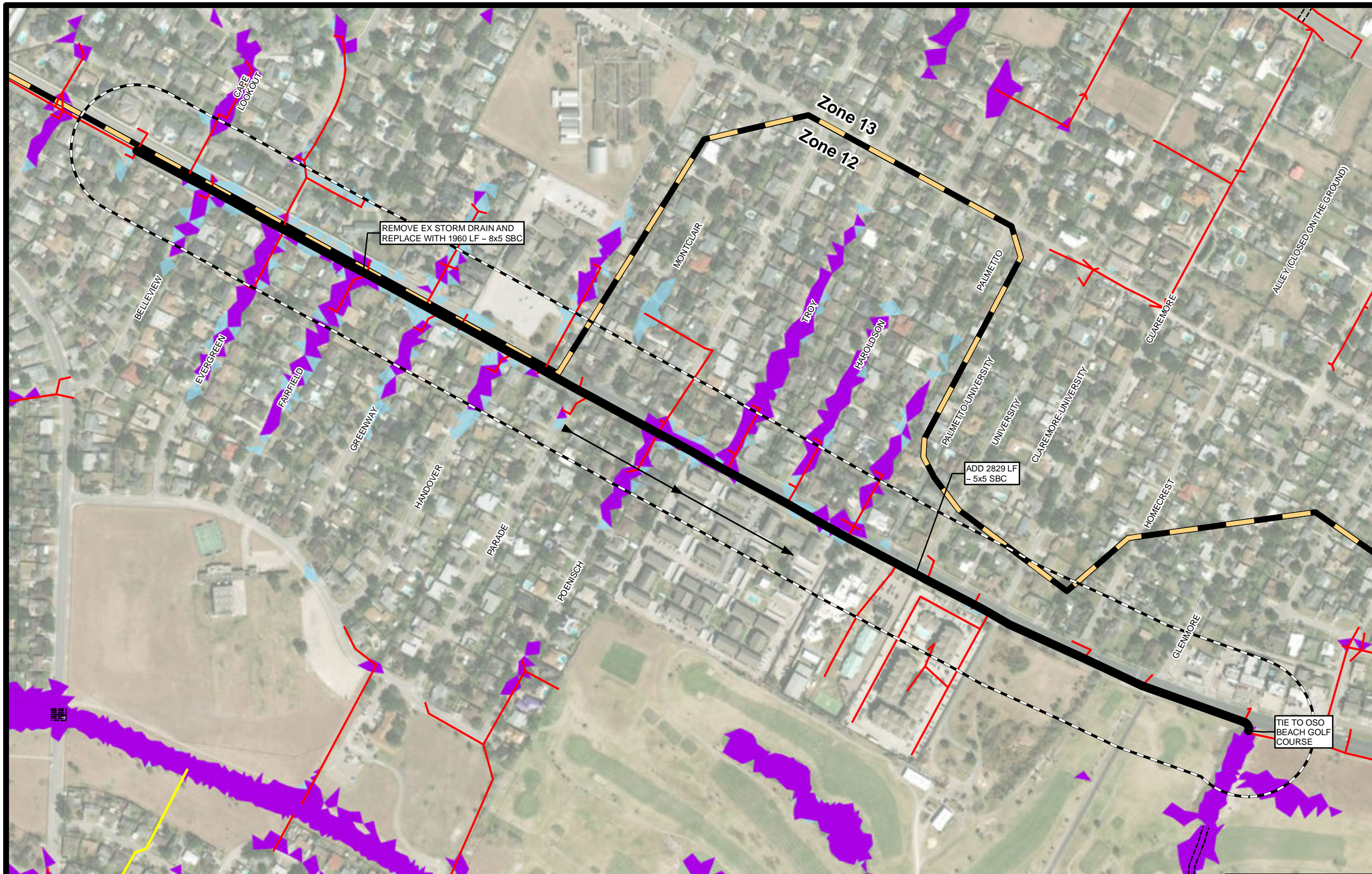
Construction:	\$2,974,077
ROW Acquisition:	\$50,000
MB&I (15%):	\$446,112
Contingency (30%):	\$892,223
Design & Inspection (15%):	\$446,112
<b>Project Total:</b>	<b>\$4,808,524</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-B PROPOSED IMPROVEMENTS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES    DRAWN    RG
SHEET	QS 12-B





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

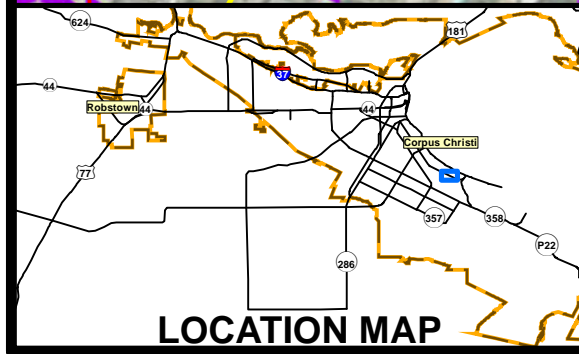
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along Alameda from Ronson Dr to Glenmore Street to reduce neighborhood and street flooding.

**Council Districts 2, 4**      **Commissioner Precinct 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$7,624,765
ROW Acquisition:	\$25,000
MB&I (15%):	\$1,143,715
Contingency (30%):	\$2,287,430
Design & Inspection (15%):	\$1,143,715
<b>Project Total:</b>	<b>\$12,224,624</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**12-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

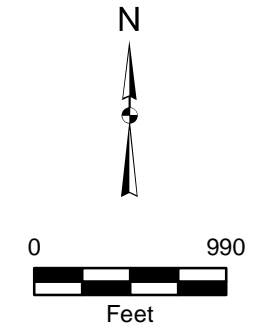
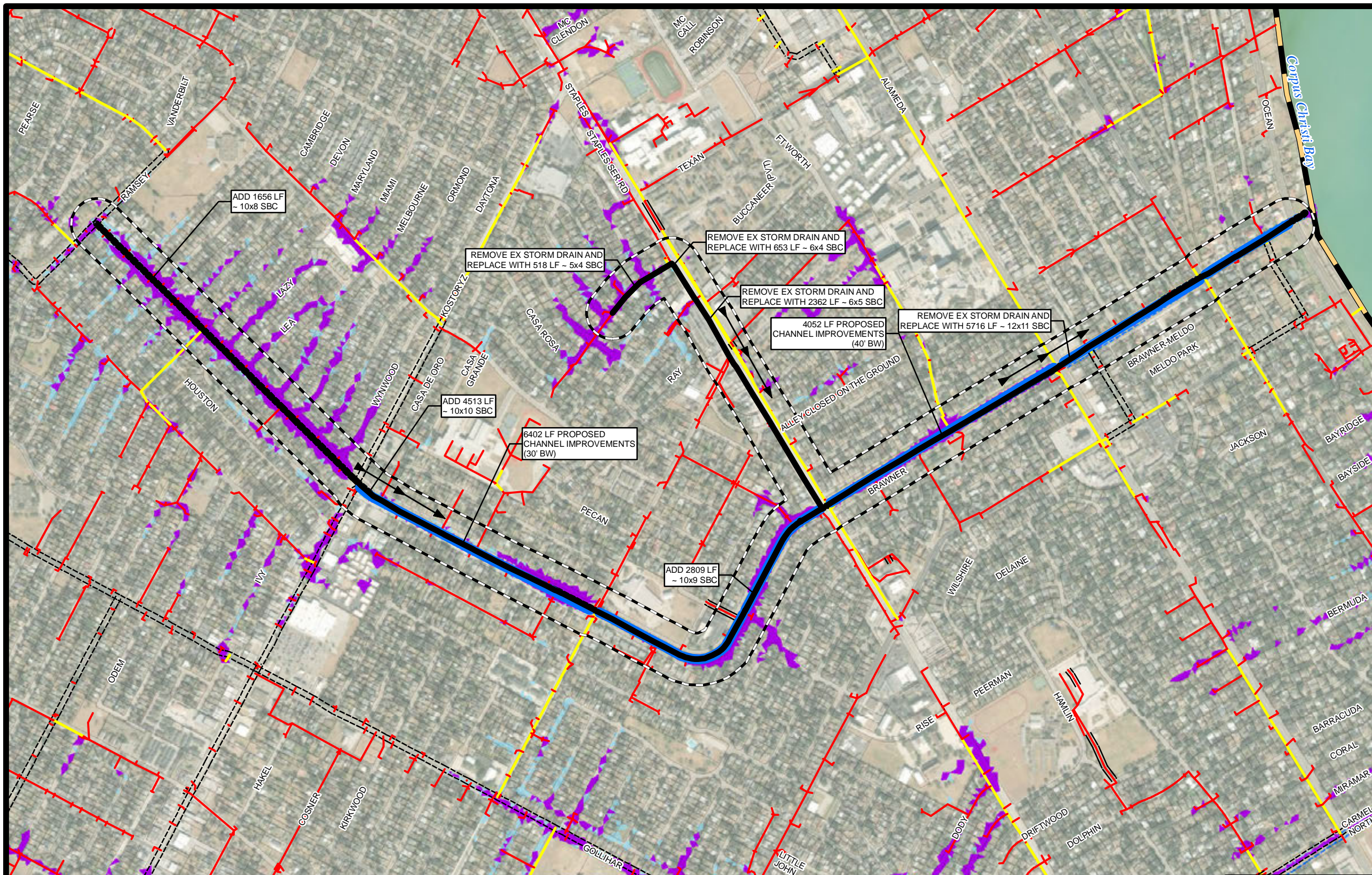
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Aug 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 12-C









**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

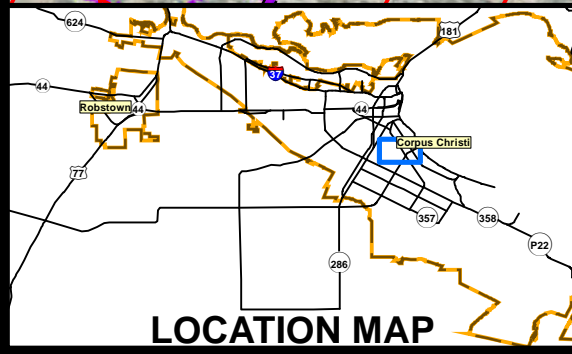
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Culvert and channel improvements along Brawner Pkwy from Ramsey St to Corpus Christi Bay; and storm drain system improvements along S Staples St from Buccaneer Dr to Brawner to relieve neighborhood flooding.

**Council District 2**      **Commissioner Precinct 3**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$38,366,139
ROW Acquisition:	\$100,000
MB&I (15%):	\$5,754,921
Contingency (30%):	\$11,509,842
Design & Inspection (15%):	\$5,754,921
<b>Project Total:</b>	<b>\$61,485,822</b>

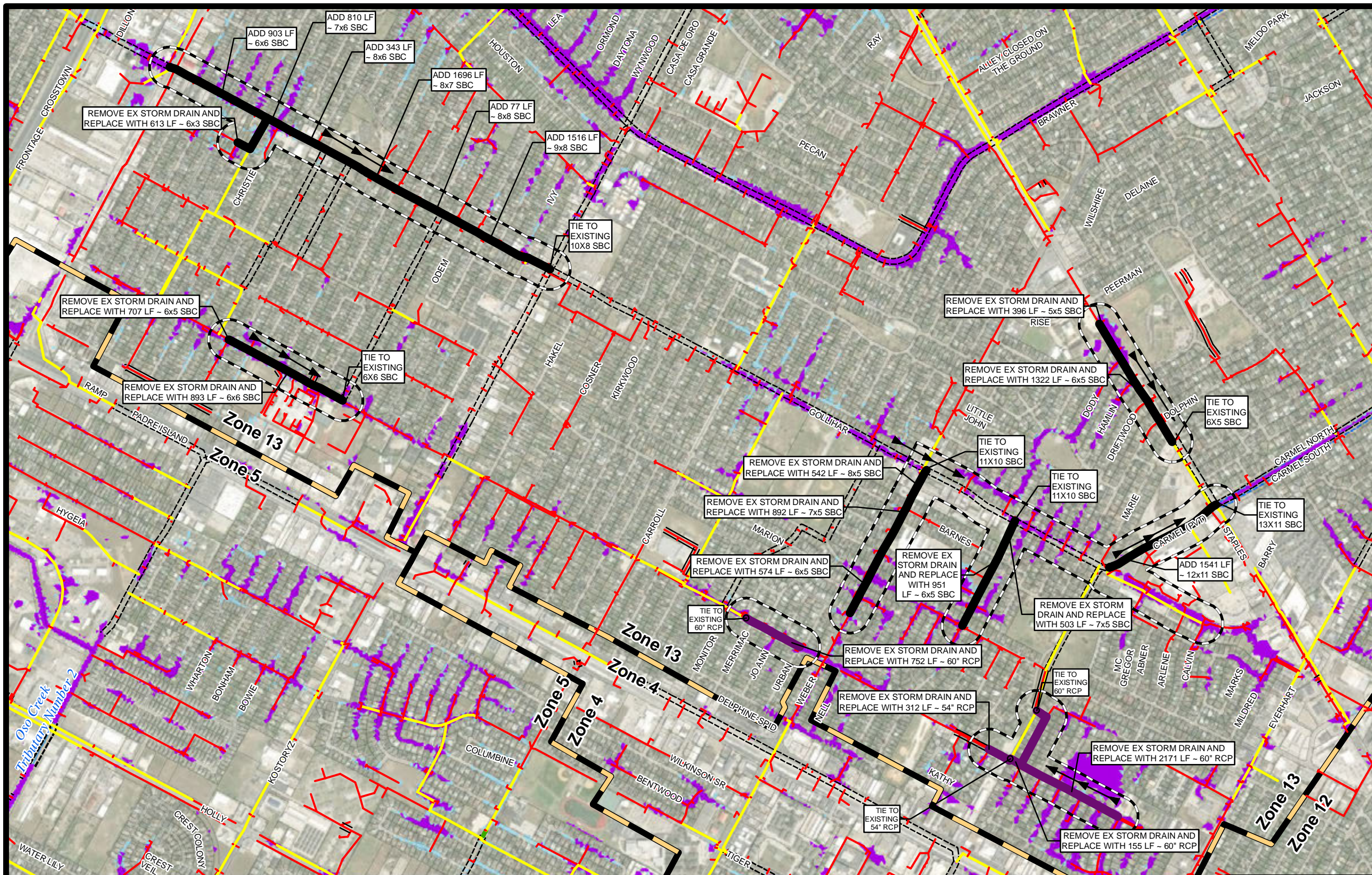
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-C PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 13-C





N

0 1,200  
Feet

**Legend**

- ➔ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

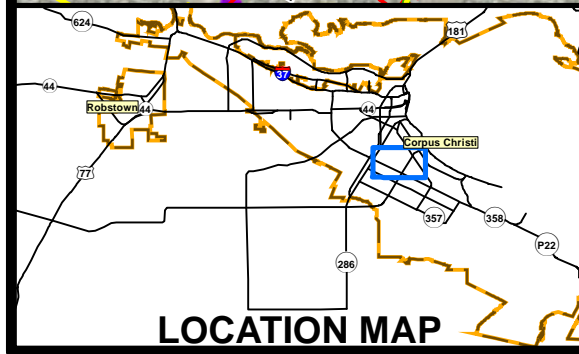
- ▭ Culvert
- ▭ Pipe

**Existing Storm Drain**

- ▭ Unknown Size
- ▭ 4" - 34"
- ▭ 36" - 60"
- ▭ 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along Gollihar Rd, Weber Rd, McArdle Rd, and Carmel Pkwy; and culvert improvements along Carmel Pkwy to relieve neighborhood flooding.

**Council District 2, 3**      **Commissioner Precincts 2, 3**


**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$29,433,600
ROW Acquisition:	\$150,000
MB&I (15%):	\$4,415,040
Contingency (30%):	\$8,830,080
Design & Inspection (15%):	\$4,415,040
<b>Project Total:</b>	<b>\$47,213,760</b>



**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-D PROPOSED IMPROVEMENTS**



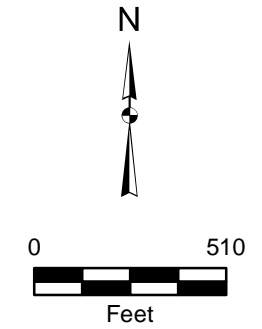
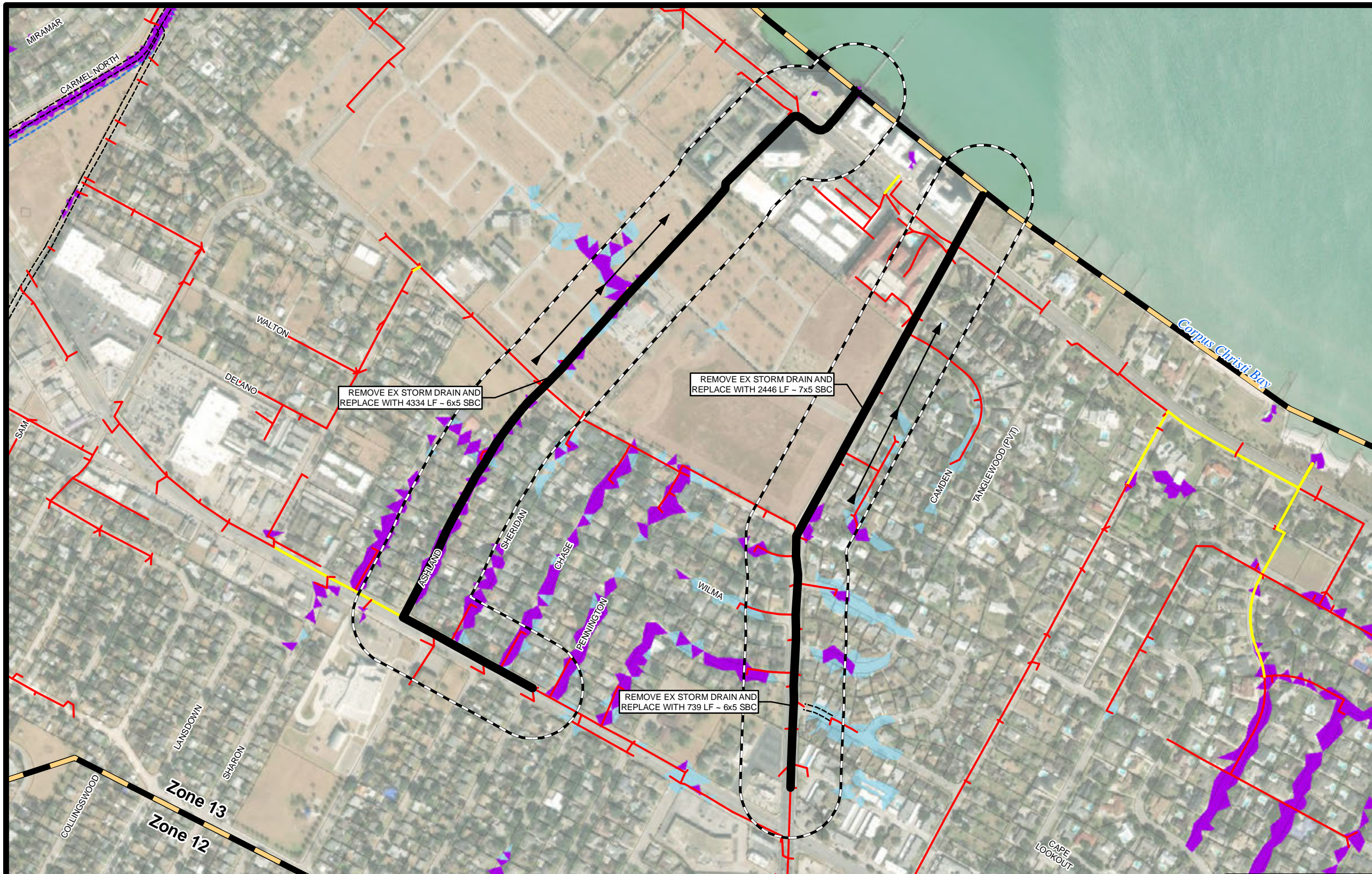
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 13-D









**Legend**

- ▲ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

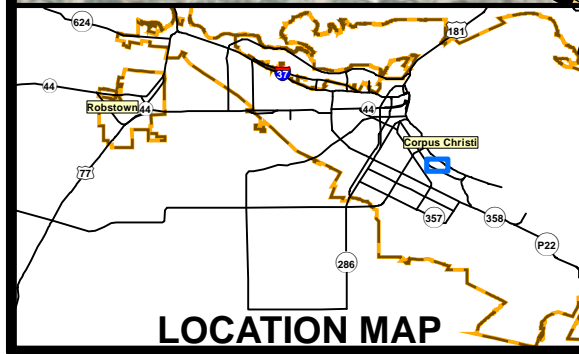
- ▬ Culvert

**Existing Storm Drain**

- ▬ Unknown Size
- ▬ 4" - 34"
- ▬ 36" - 60"
- ▬ 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain improvements along Ashland Dr and Airline Rd from S Alameda St to Corpus Christi Bay to relieve neighborhood flooding.

**Council District 2**      **Commissioner Precincts 3, 4**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds


**COST(2023 \$):**

Construction:	\$12,907,594
ROW Acquisition:	\$50,000
MB&I (15%):	\$1,936,139
Contingency (30%):	\$3,872,278
Design & Inspection (15%):	\$1,936,139
<b>Project Total:</b>	<b>\$20,702,150</b>



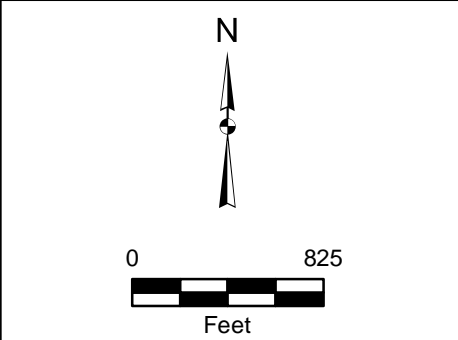
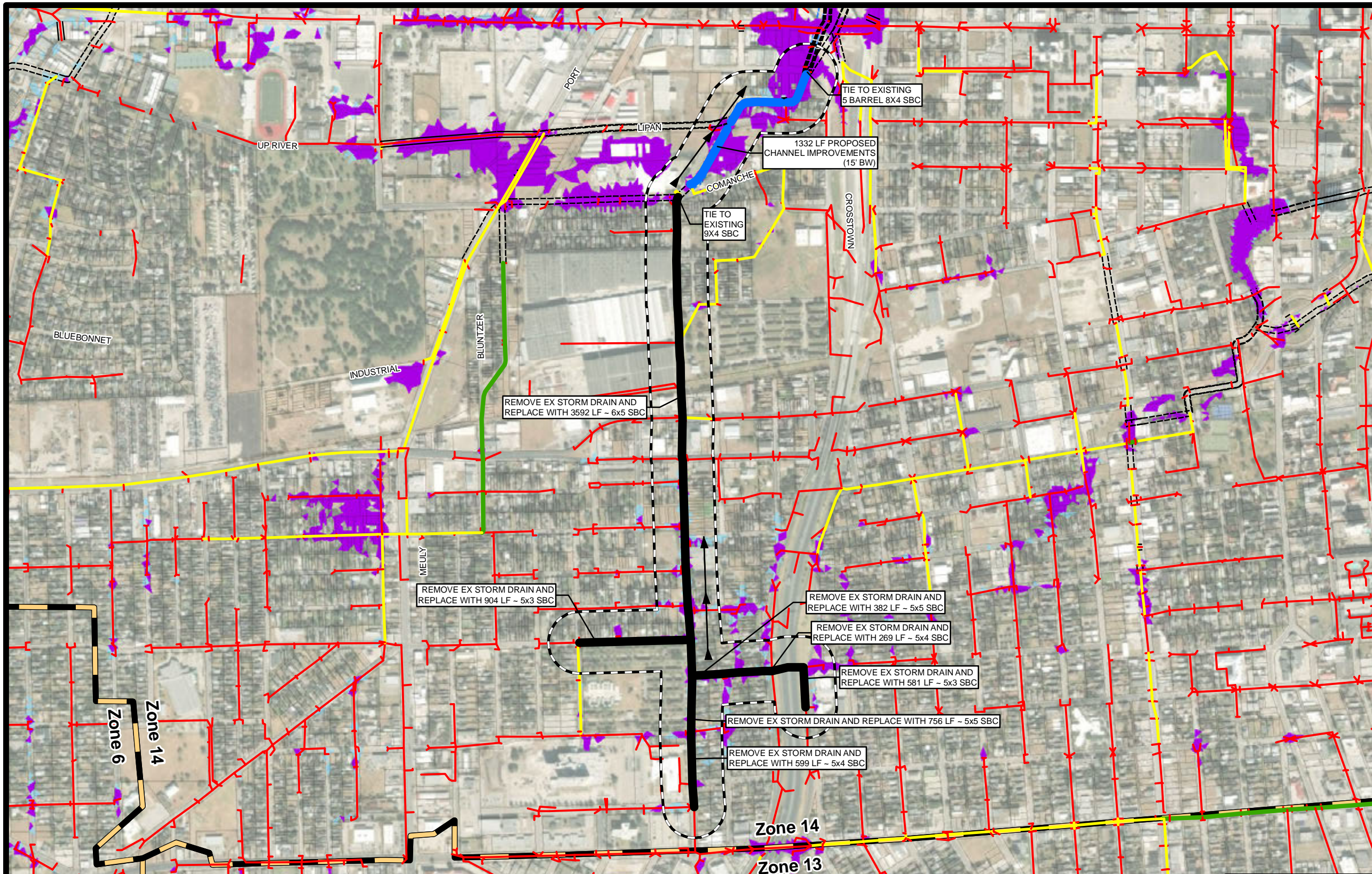
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**13-F PROPOSED IMPROVEMENTS**

**JOB NO.** 12383-00  
**DATE** Sep 2023  
**DESIGNER** JP  
**CHECKED** BES **DRAWN** RG  
**SHEET** QS 13-F



2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800





**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain system improvements along S. 19th St from Hospital St to Comanche St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.

**Council District 1**      **Commissioner Precinct 1**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$11,013,710
ROW Acquisition:	\$100,000
MB&I (15%):	\$1,652,057
Contingency (30%):	\$3,304,113
Design & Inspection (15%):	\$1,652,057
<b>Project Total:</b>	<b>\$17,721,936</b>

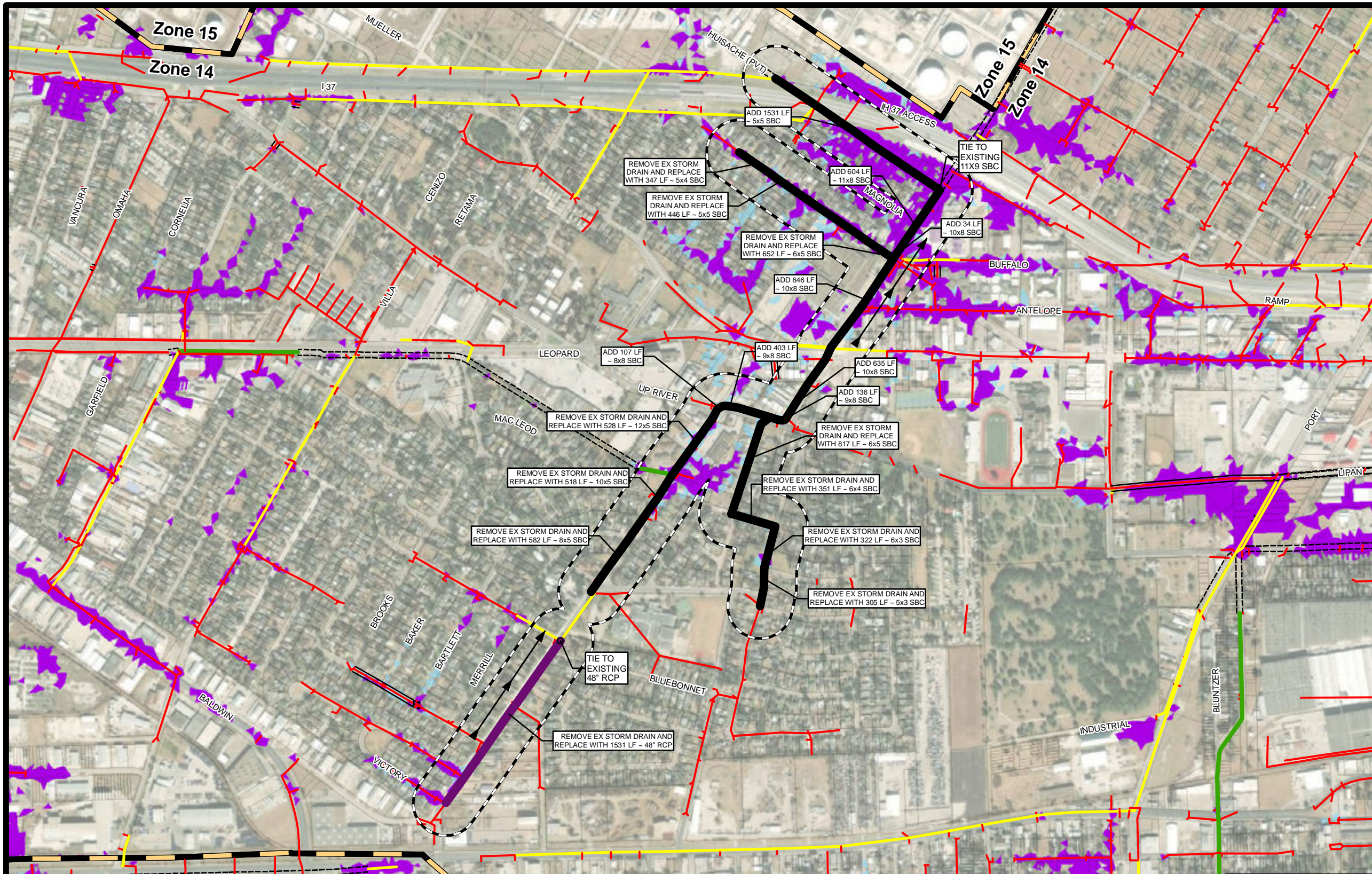
**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**14-A2 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 14-A2





N

0 790  
Feet

**Legend**

- ➔ Flow Direction
- ▭ Project Limits
- ▭ ICM Zones
- FEMA CL
- - - Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

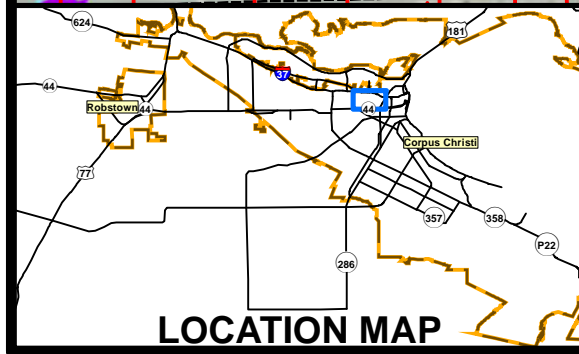
- ▬ Culvert
- ▬ Pipe

**Existing Storm Drain**

- ▬ Unknown Size
- ▬ 4" - 34"
- ▬ 36" - 60"
- ▬ 60" >
- - - Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.




**DESCRIPTION:**  
Storm drain system improvements along Old Robstown Rd and Nueces Bay Blvd from Liberty Dr to I-37 to relieve flooding for neighborhoods and businesses.

**Council District 1**      **Commissioner Precinct 1**


**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$17,035,841
ROW Acquisition:	\$100,000
MB&I (15%):	\$2,555,376
Contingency (30%):	\$5,110,752
Design & Inspection (15%):	\$2,555,376
<b>Project Total:</b>	<b>\$27,357,346</b>



**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**14-B PROPOSED IMPROVEMENTS**



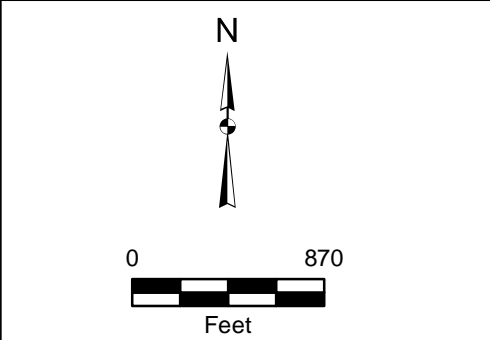
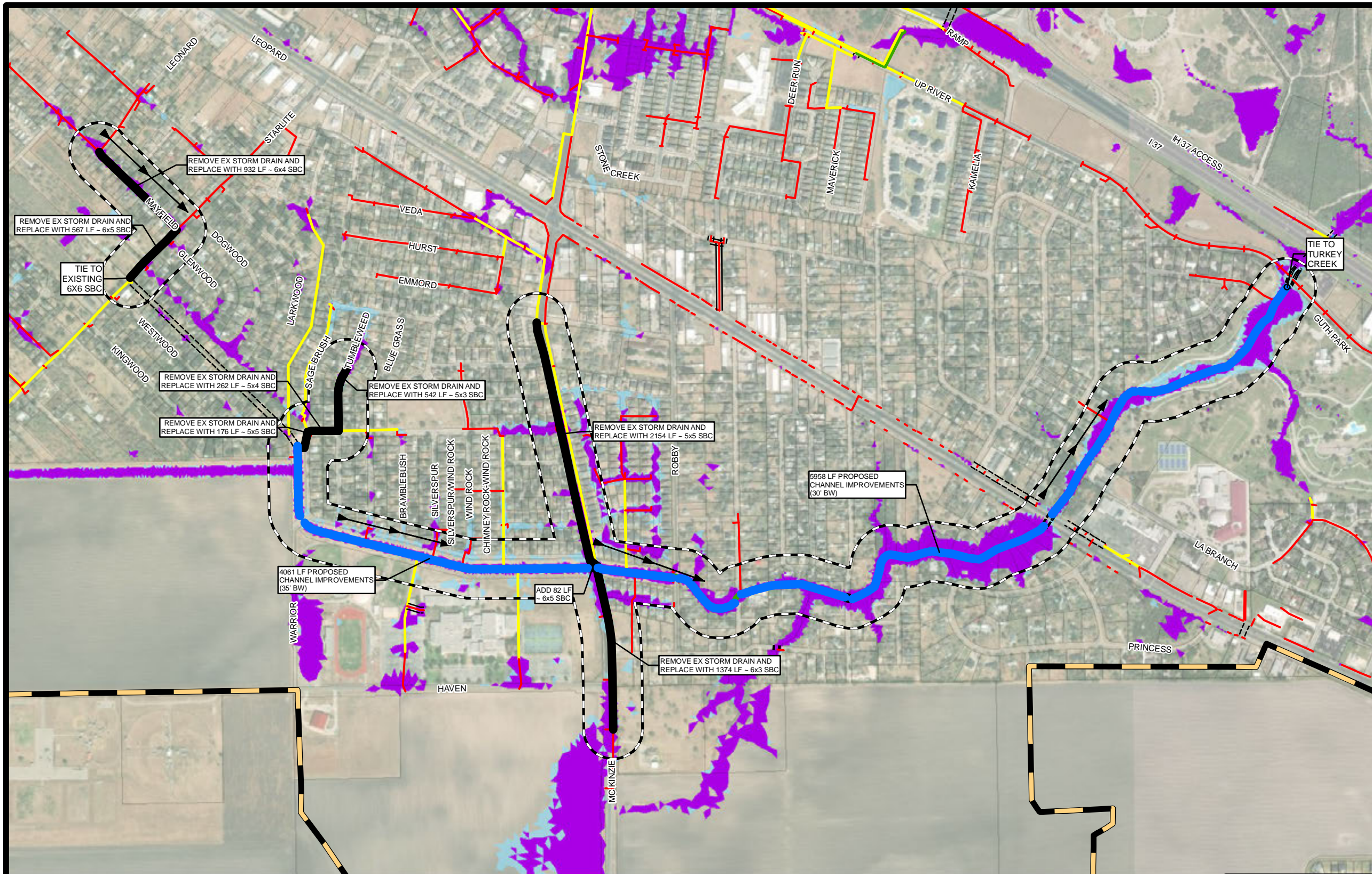
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES    DRAWN    RG
SHEET	QS 14-B









**Legend**

- Flow Direction
- Project Limits
- ICM Zones
- FEMA CL
- Ditch CL
- 10yr 12" Depth Proposed
- 10yr 12" Depth Existing

**Proposed Improvements**

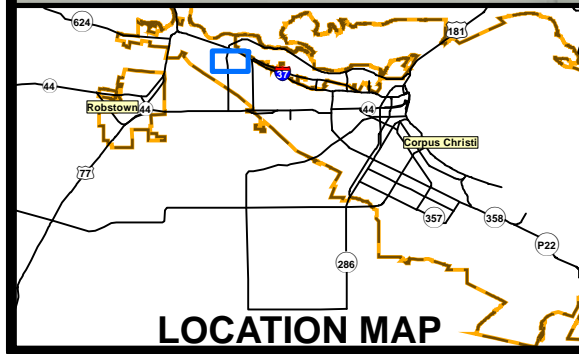
- Channel
- Culvert

**Existing Storm Drain**

- Unknown Size
- 4" - 34"
- 36" - 60"
- 60" >
- Box Culvert

**NOTES:**

1. Project scope and cost are based on high-level hydrologic and hydraulic analysis and do not represent an inlet-level analysis. Further detailed analysis is required at the time of project design.
2. Project scope and cost do not include full street replacement or utility relocation.
3. Projects may be split into multiple projects or combined with other CIP projects depending on city budget and project timing.
4. Project costs are based on 2023 dollars and are not adjusted for further inflation.



**DESCRIPTION:**  
Storm drain improvements along McKinzie, Mayfield Dr and Starlite Ln, and Tumbleweed Dr and Rockwood St; and channel improvements from Rockwood St to Leopard to reduce flooding for neighborhoods and businesses.

**Council District 1**      **Commissioner Precinct 1**

**POTENTIAL FUNDING SOURCES:** SW Utility Fee, Bonds

**COST(2023 \$):**

Construction:	\$13,439,923
ROW Acquisition:	\$200,000
MB&I (15%):	\$2,015,988
Contingency (30%):	\$4,031,977
Design & Inspection (15%):	\$2,015,988
<b>Project Total:</b>	<b>\$21,703,877</b>

**CITY OF CORPUS CHRISTI**  
**COMPREHENSIVE MASTER PLAN**  
**15-D1 PROPOSED IMPROVEMENTS**

**PAPE-DAWSON ENGINEERS**

2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000  
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

JOB NO.	12383-00
DATE	Sep 2023
DESIGNER	JP
CHECKED	BES
DRAWN	RG
SHEET	QS 15-D1



# **APPENDIX E**

## **Project Cost Estimates**



**Opinion of Probable Construction Cost  
Corpus Christi Stormwater Master Plan Summary  
October 16, 2023**

NAME	SUBTOTAL (\$)	ROW ACQUISITION (\$)	MOBILIZATION/ BOND/INSURANCE (15%)	CONTINGENCY (30%)	DESIGN & INSPECTION (15%)	Total Cost
01-B	\$ 6,433,426	\$ 50,000	\$ 965,014	\$ 1,930,028	\$ 965,014	\$ 10,343,481
03-A	\$ 18,687,461	\$ 100,000	\$ 2,803,119	\$ 5,606,238	\$ 2,803,119	\$ 29,999,937
04-A	\$ 8,312,021	\$ 50,000	\$ 1,246,803	\$ 2,493,606	\$ 1,246,803	\$ 13,349,233
04-B	\$ 4,943,109	\$ 100,000	\$ 741,466	\$ 1,482,933	\$ 741,466	\$ 8,008,974
04-D	\$ 10,839,372	\$ 100,000	\$ 1,625,906	\$ 3,251,812	\$ 1,625,906	\$ 17,442,995
05-A	\$ 23,505,278	\$ 100,000	\$ 3,525,792	\$ 7,051,583	\$ 3,525,792	\$ 37,708,444
05-B	\$ 15,813,927	\$ 100,000	\$ 2,372,089	\$ 4,744,178	\$ 2,372,089	\$ 25,402,283
06-A	\$ 24,503,353	\$ 100,000	\$ 3,675,503	\$ 7,351,006	\$ 3,675,503	\$ 39,305,365
10-B2	\$ 17,255,608	\$ 100,000	\$ 2,588,341	\$ 5,176,682	\$ 2,588,341	\$ 27,708,973
10-C	\$ 6,136,528	\$ 50,000	\$ 920,479	\$ 1,840,958	\$ 920,479	\$ 9,868,445
10-D	\$ 13,832,639	\$ 100,000	\$ 2,074,896	\$ 4,149,792	\$ 2,074,896	\$ 22,232,222
11-A	\$ 18,845,581	\$ 50,000	\$ 2,826,837	\$ 5,653,674	\$ 2,826,837	\$ 30,202,930
12-A	\$ 10,638,376	\$ 25,000	\$ 1,595,756	\$ 3,191,513	\$ 1,595,756	\$ 17,046,402
12-B	\$ 2,974,077	\$ 50,000	\$ 446,112	\$ 892,223	\$ 446,112	\$ 4,808,524
12-C	\$ 7,624,765	\$ 25,000	\$ 1,143,715	\$ 2,287,430	\$ 1,143,715	\$ 12,224,624
13-A	\$ 20,645,774	\$ 200,000	\$ 3,096,866	\$ 6,193,732	\$ 3,096,866	\$ 33,233,238
13-C	\$ 38,366,139	\$ 100,000	\$ 5,754,921	\$ 11,509,842	\$ 5,754,921	\$ 61,485,822
13-D	\$ 29,433,600	\$ 150,000	\$ 4,415,040	\$ 8,830,080	\$ 4,415,040	\$ 47,243,760
13-E	\$ 3,744,263	\$ 100,000	\$ 561,639	\$ 1,123,279	\$ 561,639	\$ 6,090,820
13-F	\$ 12,907,594	\$ 50,000	\$ 1,936,139	\$ 3,872,278	\$ 1,936,139	\$ 20,702,150
14-A2	\$ 11,013,710	\$ 100,000	\$ 1,652,057	\$ 3,304,113	\$ 1,652,057	\$ 17,721,936
14-B	\$ 17,035,841	\$ 100,000	\$ 2,555,376	\$ 5,110,752	\$ 2,555,376	\$ 27,357,346
14-C	\$ 7,581,349	\$ 100,000	\$ 1,137,202	\$ 2,274,405	\$ 1,137,202	\$ 12,230,158
15-D1	\$ 13,439,923	\$ 200,000	\$ 2,015,988	\$ 4,031,977	\$ 2,015,988	\$ 21,703,877
Oso 1	\$ 32,163,920	\$ 1,500,000	\$ 4,824,588	\$ 9,649,176	\$ 4,824,588	\$ 52,962,272
Oso 2	\$ 4,707,236	\$ 3,450,000	\$ 706,085	\$ 1,412,171	\$ 706,085	\$ 10,981,578
Oso 3	\$ 15,645,108	\$ 2,750,000	\$ 2,346,766	\$ 4,693,532	\$ 2,346,766	\$ 27,782,173
Oso 4	\$ 23,304,888	\$ 2,650,000	\$ 3,495,733	\$ 6,991,466	\$ 3,495,733	\$ 39,937,821
Oso 5	\$ 6,193,482	\$ 2,000,000	\$ 929,022	\$ 1,858,045	\$ 929,022	\$ 11,909,572
<b>Totals</b>	<b>\$ 426,528,345</b>	<b>\$ 14,550,000</b>	<b>\$ 63,979,252</b>	<b>\$ 127,958,504</b>	<b>\$ 63,979,252</b>	<b>\$ 696,995,352</b>



**City of Corpus Christi  
Storm Water Master Plan  
Cost-Benefit Summary  
October 16, 2023**

Note: Cost-benefits are for projects in developed areas and exclude the undeveloped Oso Creek Watershed.

Project Name	Potentially Inundated Structures (10-year storm, 12" depth)			Cost (2023 \$)	Cost Rank	Cost-Benefit Ratio (\$/structure)	CBR Rank
	Existing Conditions	Proposed Conditions	Reduced Risk (Ex - Prop)				
01-B	52	20	32	\$ 10,343,481	5	\$ 323,234	5
03-A	102	56	46	\$ 29,999,937	18	\$ 652,173	13
04-A	124	43	81	\$ 13,349,233	8	\$ 164,805	2
04-B	127	44	83	\$ 8,008,974	3	\$ 96,494	1
04-D	115	109	6	\$ 17,442,995	10	\$ 2,907,166	23
05-A	143	69	74	\$ 37,708,444	21	\$ 509,574	7
05-B	157	70	87	\$ 25,402,283	15	\$ 291,980	4
06-A	164	125	39	\$ 39,305,365	22	\$ 1,007,830	18
10-B2	150	123	27	\$ 27,708,973	17	\$ 1,026,258	20
10-C	101	51	50	\$ 9,868,445	4	\$ 197,369	3
10-D	51	39	12	\$ 22,232,222	14	\$ 1,852,685	22
11-A	542	512	30	\$ 30,202,930	19	\$ 1,006,764	17
12-A	98	62	36	\$ 17,046,402	9	\$ 473,511	6
12-B	48	39	9	\$ 4,808,524	1	\$ 534,280	8
12-C	30	14	16	\$ 12,224,624	6	\$ 764,039	14
13-A	77	67	10	\$ 33,233,238	20	\$ 3,323,324	24
13-C	192	132	60	\$ 61,485,822	24	\$ 1,024,764	19
13-D	354	279	75	\$ 47,243,760	23	\$ 629,917	12
13-E	42	32	10	\$ 6,090,820	2	\$ 609,082	11
13-F	60	22	38	\$ 20,702,150	12	\$ 544,793	9
14-A2	25	4	21	\$ 17,721,936	11	\$ 843,902	15
14-B	195	148	47	\$ 27,357,346	16	\$ 582,071	10
14-C	17	8	9	\$ 12,230,158	7	\$ 1,358,906	21
15-D1	99	76	23	\$ 21,703,877	13	\$ 943,647	16
<b>Totals:</b>	<b>3747</b>	<b>2852</b>	<b>895</b>	<b>\$ 553,421,937</b>			



**City of Corpus Christi  
Storm Water Master Plan  
Cost-Benefit Summary  
October 16, 2023**

Note: Cost-benefits are for projects in developed areas and exclude the undeveloped Oso Creek Watershed.

Project Name	Potentially Inundated Structures (10-year storm, 12" depth)			Cost (2023 \$)	Cost Rank	Cost-Benefit Ratio (\$/structure)	CBR Rank
	Existing Conditions	Proposed Conditions	Reduced Risk (Ex - Prop)				
04-B	127	44	83	\$ 8,008,974	3	\$ 96,494	1
04-A	124	43	81	\$ 13,349,233	8	\$ 164,805	2
10-C	101	51	50	\$ 9,868,445	4	\$ 197,369	3
05-B	157	70	87	\$ 25,402,283	15	\$ 291,980	4
01-B	52	20	32	\$ 10,343,481	5	\$ 323,234	5
12-A	98	62	36	\$ 17,046,402	9	\$ 473,511	6
05-A	143	69	74	\$ 37,708,444	21	\$ 509,574	7
12-B	48	39	9	\$ 4,808,524	1	\$ 534,280	8
13-F	60	22	38	\$ 20,702,150	12	\$ 544,793	9
14-B	195	148	47	\$ 27,357,346	16	\$ 582,071	10
13-E	42	32	10	\$ 6,090,820	2	\$ 609,082	11
13-D	354	279	75	\$ 47,243,760	23	\$ 629,917	12
03-A	102	56	46	\$ 29,999,937	18	\$ 652,173	13
12-C	30	14	16	\$ 12,224,624	6	\$ 764,039	14
14-A2	25	4	21	\$ 17,721,936	11	\$ 843,902	15
15-D1	99	76	23	\$ 21,703,877	13	\$ 943,647	16
11-A	542	512	30	\$ 30,202,930	19	\$ 1,006,764	17
06-A	164	125	39	\$ 39,305,365	22	\$ 1,007,830	18
13-C	192	132	60	\$ 61,485,822	24	\$ 1,024,764	19
10-B2	150	123	27	\$ 27,708,973	17	\$ 1,026,258	20
14-C	17	8	9	\$ 12,230,158	7	\$ 1,358,906	21
10-D	51	39	12	\$ 22,232,222	14	\$ 1,852,685	22
04-D	115	109	6	\$ 17,442,995	10	\$ 2,907,166	23
13-A	77	67	10	\$ 33,233,238	20	\$ 3,323,324	24
<b>Totals:</b>	<b>3747</b>	<b>2852</b>	<b>895</b>	<b>\$ 553,421,937</b>			



**Opinion of Probable Construction Cost  
Corpus Christi Stormwater Master Plan Summary (Oso Creek Only)  
October 16, 2023**

<b>NAME</b>	<b>SUBTOTAL (\$)</b>	<b>ROW ACQUISITION (\$)</b>	<b>MOBILIZATION/ BOND/INSURANCE (15%)</b>	<b>CONTINGENCY (30%)</b>	<b>DESIGN &amp; INSPECTION (15%)</b>	<b>Total Cost</b>
Oso 1	\$ 32,163,920	\$ 1,500,000	\$ 4,824,588	\$ 9,649,176	\$ 4,824,588	\$ 52,962,272
Oso 2	\$ 4,707,236	\$ 3,450,000	\$ 706,085	\$ 1,412,171	\$ 706,085	\$ 10,981,578
Oso 3	\$ 15,645,108	\$ 2,750,000	\$ 2,346,766	\$ 4,693,532	\$ 2,346,766	\$ 27,782,173
Oso 4	\$ 23,304,888	\$ 2,650,000	\$ 3,495,733	\$ 6,991,466	\$ 3,495,733	\$ 39,937,821
Oso 5	\$ 6,193,482	\$ 2,000,000	\$ 929,022	\$ 1,858,045	\$ 929,022	\$ 11,909,572
<b>Totals</b>	<b>\$ 82,014,635</b>	<b>\$ 12,350,000</b>	<b>\$ 12,302,195</b>	<b>\$ 24,604,390</b>	<b>\$ 12,302,195</b>	<b>\$ 143,573,415</b>

PREPARED BY: JJP

DATE: 10/16/2023

DOC ID: P:\123\83\00\Excel\CIP\Stormwater\SW\_Estimates\_REFORMAT\20230920\1238300\_Estimate\_Summary\_20230919.xlsm





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>Oso 1</b>
<b>Project Number:</b>	Oso 1	<b>Channel improvements to widen and deepen main channel along centerline of Oso Creek from La Volla Creek confluence to Oso Bay to improve conveyance and provide additional capacity within the high banks of Oso Creek.</b>		
<b>Potential Funding Sources:</b>	Impact Fees, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	483	STA	\$2,250	\$ 1,086,750
2	EXCAVATION (SPECIAL - DREDGING)	467,705	CY	\$50	\$ 23,385,250
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 24,472,000</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ -
Traffic Control Plan		1%	\$ -
√ Stormwater Pollution Prevention Plan		1%	\$ 244,720
√ Misc Bridge/Culvert Adjustments		LS	\$ 5,000,000
√ Misc Bank Stabilization		10%	\$ 2,447,200
		<b>Allowance Subtotal:</b>	<b>\$ 7,691,920</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 32,163,920</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction Cost:</b>			<b>\$ 32,163,920</b>
<b>Construction Contingency</b>		30%	<b>\$ 9,649,176</b>
<b>Engineering/Survey/Testing:</b>		15%	<b>\$ 4,824,588</b>
<b>Mobilization</b>		15%	<b>\$ 4,824,588</b>
<b>ROW/Easement Acquisition:</b>		LS	<b>\$ 1,500,000</b>
<b>Project Cost TOTAL:</b>			<b>\$ 52,962,272</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



8/23/2023

Project Information:		Description:	Project No.
Project Number:	Oso 2	<b>Channel improvements along London Ditch from Crosstown Expy to Oso Creek; and channel improvements along ditches/tributaries in London Area to provide conveyance through London area including potential Nueces County and TxDOT improvements.</b>	<b>Oso 2</b>
Potential Funding Sources:	Impact Fees, Bonds		

Drainage Construction Cost Projection					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	932	STA	\$2,250	\$ 2,097,000
2	EXCAVATION (CHANNEL)	39,384	CY	\$40	\$ 1,575,360
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 3,672,360</b>

Major Construction Component Allowances:			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ -
Traffic Control Plan		1%	\$ -
√ Stormwater Pollution Prevention Plan		1%	\$ 34,876
√ Misc Bridge/Culvert Adjustments		LS	\$ 1,000,000
<b>Allowance Subtotal:</b>			<b>\$ 1,034,876</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 4,707,236</b>

Impact Fee Project Cost Summary			
Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 4,707,236
Construction Contingency:		30%	\$ 1,412,171
Engineering/Survey/Testing:		15%	\$ 706,085
Mobilization		15%	\$ 706,085
ROW/Easement Acquisition:		LS	\$ 3,450,000
<b>Project Cost TOTAL:</b>			<b>\$ 10,981,578</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>Oso 3</b>
<b>Project Number:</b>	Oso 3	<b>Channel improvements to widen and deepen main channel along centerline of Oso Creek from Hwy 44 downstream to La Volla Creek confluence to improve conveyance and provide additional capacity within the high banks of Oso Creek.</b>		
<b>Potential Funding Sources:</b>				
Impact Fees, Bonds				

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	618	STA	\$2,250	\$ 1,390,500
2	EXCAVATION (CHANNEL)	204,992	CY	\$40	\$ 8,199,688
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 9,590,188</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ -
Traffic Control Plan		1%	\$ -
√ Stormwater Pollution Prevention Plan		1%	\$ 95,902
√ Misc Bridge/Culvert Adjustments		LS	\$ 3,000,000
√ Misc Bank Stabilization		10%	\$ 959,019
√ Misc Adjustments at HWY 44/Railroad		LS	\$ 2,000,000
<b>Allowance Subtotal:</b>			<b>\$ 6,054,921</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 15,645,108</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 15,645,108</b>
<b>Construction Contingency:</b>		30%	\$ 4,693,532
<b>Engineering/Survey/Testing:</b>		15%	\$ 2,346,766
<b>Mobilization</b>		15%	\$ 2,346,766
<b>ROW/Easement Acquisition:</b>		LS	\$ 2,750,000
<b>Project Cost TOTAL:</b>			<b>\$ 27,782,173</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>Oso 4</b>
<b>Project Number:</b>	Oso 4	<b>Improvements to Clarkwood Ditch/Oso Trib 14 from Hwy 44 to Oso Creek; and potential detention pond north of Hwy 44 to reduce flooding along Clarkwood Rd, near Hwy 44, and in nearby properties.</b>		
<b>Potential Funding Sources:</b>	Impact Fees, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	189	STA	\$2,250	\$ 425,250
2	EXCAVATION (CHANNEL)	37,303	CY	\$40	\$ 1,492,131
3	EXCAVATION (POND)	403,333	CY	\$50	\$ 20,166,667
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 22,084,048</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ -
Traffic Control Plan		1%	\$ -
✓ Stormwater Pollution Prevention Plan		1%	\$ 220,840
✓ Misc Adjustments at HWY 44/Railroad		LS	\$ 1,000,000
<b>Allowance Subtotal:</b>			<b>\$ 1,220,840</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 23,304,888</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 23,304,888</b>
<b>Construction Contingency:</b>		30%	\$ 6,991,466
<b>Engineering/Survey/Testing:</b>		15%	\$ 3,495,733
<b>Mobilization</b>		15%	\$ 3,495,733
<b>ROW/Easement Acquisition:</b>		LS	\$ 2,650,000
<b>Project Cost TOTAL:</b>			<b>\$ 39,937,821</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>Oso 5</b>
<b>Project Number:</b>	Oso 5	<b>Channel improvements along centerline of West Oso Creek to improve conveyance to Oso Creek.</b>		
<b>Potential Funding Sources:</b>	Impact Fees			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	565	STA	\$2,250	\$ 1,271,250
2	EXCAVATION (CHANNEL)	109,147	CY	\$40	\$ 4,365,861
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 5,637,111</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ -
Traffic Control Plan		1%	\$ -
✓ Stormwater Pollution Prevention Plan		1%	\$ 56,371
✓ Misc Bridge/Culvert Adjustments		LS	\$ 500,000
<b>Allowance Subtotal:</b>			<b>\$ 556,371</b>
<b>Construction Cost TOTAL:</b>			<b>\$ 6,193,482</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 6,193,482</b>
<b>Construction Contingency:</b>		30%	\$ 1,858,045
<b>Engineering/Survey/Testing:</b>		15%	\$ 929,022
<b>Mobilization</b>		15%	\$ 929,022
<b>ROW/Easement Acquisition:</b>		LS	\$ 2,000,000
<b>Project Cost TOTAL:</b>			<b>\$ 11,909,572</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>1-B</b>
<b>Project Number:</b>	1-B	<b>Channel improvements between Glen Oak and Waldron Road, and proposed storm drain system improvements upstream of Glen Oak to relieve neighborhood flooding.</b>		
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	117	STA	\$2,250	\$ 263,250
2	EXCAVATION (CHANNEL)	9,994	CY	\$40	\$ 399,760
3	CUT & RESTORING PAV	6,426	SY	\$170	\$ 1,092,420
4	FLOWABLE BACKFILL	2,468	CY	\$350	\$ 863,800
5	TRENCH EXCAVATION PROTECTION	12,258	LF	\$10	\$ 122,580
6	RIPRAP (CONC)	24	CY	\$800	\$ 19,200
7	RC PIPE (36 IN)	2,297	LF	\$300	\$ 689,100
8	RC PIPE (48 IN)	2,991	LF	\$450	\$ 1,345,950
9	JUNCTION BOX	16	EA	\$10,000	\$ 160,000
10	4'x5' SBC	789	LF	\$775	\$ 611,475
11	8'x5' SBC	52	LF	\$910	\$ 47,320
12	CURB INLET (10')	41	EA	\$9,525	\$ 390,525
13	SAFETY END TREATMENT (36" TO 60")	2	EA	\$9,100	\$ 18,200
14	SAFETY END TREATMENT (BOX CULVERT)	1	EA	\$13,700	\$ 13,700
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 6,037,280</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 270,000
√ Traffic Control Plan		1%	\$ 63,073
√ Stormwater Pollution Prevention Plan		1%	\$ 63,073
<b>Allowance Subtotal:</b>			<b>\$ 396,146</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 6,433,426</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 6,433,426</b>
<b>Construction Contingency:</b>		30%	\$ 1,930,028
<b>Engineering/Survey/Testing:</b>		15%	\$ 965,014
<b>Mobilization</b>		15%	\$ 965,014
<b>ROW/Easement Acquisition:</b>		LS	\$ 50,000
<b>Project Cost TOTAL:</b>			<b>\$ 10,343,481</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>
<b>Project Number:</b>	3-A	<b>3-A</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds	Storm drain/culvert improvements along Edgebrook Dr, Wake Forest Dr, Pepper Mill Dr, Woodgate Dr, Heavens Gate Dr, Timbergate Dr, and Hunt Dr; and channel improvements along Lipes Blvd and across Yorktown Blvd to relieve neighborhood flooding.	

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	201	STA	\$2,250	\$ 452,250
2	EXCAVATION (CHANNEL)	35,572	CY	\$40	\$ 1,422,880
3	CUT & RESTORING PAV	14,478	SY	\$170	\$ 2,461,260
4	FLOWABLE BACKFILL	6,464	CY	\$350	\$ 2,262,400
5	TRENCH EXCAVATION PROTECTION	21,516	LF	\$10	\$ 215,160
6	RIPRAP (CONC)	72	CY	\$800	\$ 57,600
7	RC PIPE (48 IN)	554	LF	\$450	\$ 249,300
8	RC PIPE (54 IN)	865	LF	\$525	\$ 454,125
9	JUNCTION BOX	27	EA	\$10,000	\$ 270,000
10	5'x4' SBC	1,578	LF	\$810	\$ 1,278,180
11	5'x5' SBC	61	LF	\$840	\$ 51,240
12	6'x3' SBC	2,709	LF	\$860	\$ 2,329,740
13	6'x4' SBC	3,079	LF	\$875	\$ 2,694,125
14	8'x6' SBC	1,912	LF	\$940	\$ 1,797,280
15	CURB INLET (10')	72	EA	\$9,525	\$ 685,800
16	REMOVE STR (PIPE)	10,664	LF	\$100	\$ 1,066,400
17	SAFETY END TREATMENT (BOX CULVERT)	9	EA	\$13,700	\$ 123,300
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 17,871,040</b>

<b>Major Construction Component Allowances:</b>				
Item Description	Notes	Allowance		Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$	450,000
✓ Traffic Control Plan		1%	\$	183,210
✓ Stormwater Pollution Prevention Plan		1%	\$	183,210
<b>Allowance Subtotal:</b>				<b>\$ 816,421</b>
<b>Construction Cost Subtotal:</b>				<b>\$ 18,687,461</b>

<b>Impact Fee Project Cost Summary</b>				
Item Description	Notes:	Allowance		Item Cost
<b>Construction:</b>			\$	<b>18,687,461</b>
<b>Construction Contingency:</b>		30%	\$	5,606,238
<b>Engineering/Survey/Testing:</b>		15%	\$	2,803,119
<b>Mobilization</b>		15%	\$	2,803,119
<b>ROW/Easement Acquisition:</b>		LS	\$	100,000
<b>Project Cost TOTAL:</b>				<b>\$ 29,999,937</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



8/23/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>
<b>Project Number:</b>	4-A	<b>Channel improvements along Flynn Parkway; storm drain improvements along Cobblestone Ln, Oxford Dr, and Philippine Dr; and culvert improvements at Holly Rd to reduce neighborhood flooding. Drains to project 4-B.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	80	STA	\$2,250	\$ 180,000
2	EXCAVATION (CHANNEL)	13,999	CY	\$40	\$ 559,960
3	CUT & RESTORING PAV	6,234	SY	\$170	\$ 1,059,780
4	FLOWABLE BACKFILL	2,791	CY	\$350	\$ 976,850
5	TRENCH EXCAVATION PROTECTION	9,212	LF	\$10	\$ 92,120
6	RIPRAP (CONC)	56	CY	\$800	\$ 44,800
7	JUNCTION BOX	12	EA	\$10,000	\$ 120,000
8	5'x5' SBC	430	LF	\$840	\$ 361,200
9	6'x4' SBC	881	LF	\$875	\$ 770,875
10	6'x5' SBC	2,841	LF	\$890	\$ 2,528,490
11	7'x7' SBC	399	LF	\$960	\$ 383,040
12	8'x7' SBC	55	LF	\$1,010	\$ 55,550
13	CURB INLET (10')	31	EA	\$9,525	\$ 295,275
14	REMOVE STR (PIPE)	4,152	LF	\$100	\$ 415,200
15	SAFETY END TREATMENT (BOX CULVERT)	7	EA	\$13,700	\$ 95,900
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 7,939,040</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 210,000
✓ Traffic Control Plan		1%	\$ 81,490
✓ Stormwater Pollution Prevention Plan		1%	\$ 81,490
<b>Allowance Subtotal:</b>			<b>\$ 372,981</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 8,312,021</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>		0%	\$ 8,312,021
<b>Construction Contingency:</b>		30%	\$ 2,493,606
<b>Engineering/Survey/Testing:</b>		15%	\$ 1,246,803
<b>Mobilization</b>		15%	\$ 1,246,803
<b>ROW/Easement Acquisition:</b>		LS	\$ 50,000
<b>Project Cost TOTAL:</b>			<b>\$ 13,349,233</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>
<b>Project Number:</b>	4-B	<b>Channel improvements along Shea Parkway and Flynn Parkway to Saratoga Blvd; and storm drain improvements along Killarmet Dr to reduce neighborhood flooding. Accepts runoff from project 4-A.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	84	STA	\$2,250	\$ 189,000
2	EXCAVATION (CHANNEL)	45,418	CY	\$40	\$ 1,816,720
3	CUT & RESTORING PAV	2,345	SY	\$170	\$ 398,650
4	FLOWABLE BACKFILL	1,020	CY	\$350	\$ 357,000
5	TRENCH EXCAVATION PROTECTION	3,668	LF	\$10	\$ 36,680
6	RIPRAP (CONC)	16	CY	\$800	\$ 12,800
7	JUNCTION BOX	5	EA	\$10,000	\$ 50,000
8	5'x5' SBC	1,029	LF	\$840	\$ 864,360
9	6'x3' SBC	535	LF	\$860	\$ 460,100
10	6'x4' SBC	270	LF	\$875	\$ 236,250
11	CURB INLET (10')	13	EA	\$9,525	\$ 123,825
12	REMOVE STR (PIPE)	1,834	LF	\$100	\$ 183,400
13	SAFETY END TREATMENT (BOX CULVERT)	2	EA	\$13,700	\$ 27,400
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 4,756,185</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 90,000
√ Traffic Control Plan		1%	\$ 48,462
√ Stormwater Pollution Prevention Plan		1%	\$ 48,462
<b>Allowance Subtotal:</b>			<b>\$ 186,924</b>

**Construction Cost TOTAL: \$ 4,943,109**

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 4,943,109
Construction Contingency:		30%	\$ 1,482,933
Engineering/Survey/Testing:		15%	\$ 741,466
Mobilization		15%	\$ 741,466
ROW/Easement Acquisition:		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 8,008,974</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>4-D</b>
<b>Project Number:</b>	4-D	<b>Channel improvements from Saratoga through Acushnet Park and along Grand Junction Dr to Oso Creek; and storm drain improvements along Middlecoff Rd and nearby streets to reduce neighborhood flooding. Accepts runoff from projects 4-A, and 4-B.</b>		
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds			

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	168	STA	\$2,250	\$ 378,000
2	EXCAVATION (CHANNEL)	69,931	CY	\$40	\$ 2,797,240
3	CUT & RESTORING PAV	6,643	SY	\$170	\$ 1,129,310
4	FLOWABLE BACKFILL	3,125	CY	\$350	\$ 1,093,750
5	TRENCH EXCAVATION PROTECTION	8,804	LF	\$10	\$ 88,040
6	RIPRAP (CONC)	48	CY	\$800	\$ 38,400
7	JUNCTION BOX	12	EA	\$10,000	\$ 120,000
8	5'x4' SBC	800	LF	\$810	\$ 648,000
9	6'x3' SBC	1,565	LF	\$860	\$ 1,345,900
10	6'x4' SBC	365	LF	\$875	\$ 319,375
11	9'x6' SBC	75	LF	\$1,060	\$ 79,500
12	9'x8' SBC	215	LF	\$1,090	\$ 234,350
13	10'x6' SBC	1,382	LF	\$1,110	\$ 1,534,020
14	CURB INLET (10')	30	EA	\$9,525	\$ 285,750
15	REMOVE STR (PIPE)	2,730	LF	\$100	\$ 273,000
16	SAFETY END TREATMENT (BOX CULVERT)	6	EA	\$13,700	\$ 82,200
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 10,446,835</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 180,000
√ Traffic Control Plan		1%	\$ 106,268
√ Stormwater Pollution Prevention Plan		1%	\$ 106,268
<b>Allowance Subtotal:</b>			<b>\$ 392,537</b>
<b>Construction Cost TOTAL:</b>			<b>\$ 10,839,372</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 10,839,372</b>
<b>Construction Contingency:</b>		30%	\$ 3,251,812
<b>Engineering/Survey/Testing:</b>		15%	\$ 1,625,906
<b>Mobilization</b>		15%	\$ 1,625,906
<b>ROW/Easement Acquisition:</b>		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 17,442,995</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>5-A</b>
<b>Project Number:</b>	5-A	<b>Storm drain system improvements along Carroll Ln and Waterloo Dr systems; channel and storm drain improvements along Carroll Ln to Saratoga Blvd; and culvert improvements at Holly Rd and Kostoryz Rd to reduce neighborhood flooding. Accepts runoff from project 5-B.</b>		
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	200	STA	\$2,250	\$ 450,000
2	EXCAVATION (CHANNEL)	41,887	CY	\$40	\$ 1,675,480
3	CUT & RESTORING PAV	18,143	SY	\$170	\$ 3,084,310
4	FLOWABLE BACKFILL	8,020	CY	\$350	\$ 2,807,000
5	TRENCH EXCAVATION PROTECTION	27,512	LF	\$10	\$ 275,120
6	RIPRAP (CONC)	64	CY	\$800	\$ 51,200
7	JUNCTION BOX	35	EA	\$10,000	\$ 350,000
8	5'x3' SBC	1,600	LF	\$675	\$ 1,080,000
9	5'x4' SBC	2,037	LF	\$810	\$ 1,649,970
10	5'x5' SBC	3,370	LF	\$840	\$ 2,830,800
11	6'x5' SBC	1,914	LF	\$890	\$ 1,703,460
12	6'x6' SBC	2,339	LF	\$900	\$ 2,105,100
13	7'x5' SBC	1,299	LF	\$920	\$ 1,195,080
14	8'x5' SBC	1,197	LF	\$910	\$ 1,089,270
15	CURB INLET (10')	92	EA	\$9,525	\$ 876,300
16	REMOVE STR (PIPE)	11,417	LF	\$100	\$ 1,141,700
17	SAFETY END TREATMENT (BOX CULVERT)	8	EA	\$13,700	\$ 109,600
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 22,474,390</b>

<b>Major Construction Component Allowances:</b>				
Item Description	Notes	Allowance		Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$	570,000
✓ Traffic Control Plan		1%	\$	230,444
✓ Stormwater Pollution Prevention Plan		1%	\$	230,444
<b>Allowance Subtotal:</b>				<b>\$ 1,030,888</b>
<b>Construction Cost Subtotal:</b>				<b>\$ 23,505,278</b>

<b>Impact Fee Project Cost Summary</b>				
Item Description	Notes:	Allowance		Item Cost
<b>Construction:</b>			\$	<b>23,505,278</b>
<b>Construction Contingency:</b>		30%	\$	7,051,583
<b>Engineering/Survey/Testing:</b>		15%	\$	3,525,792
<b>Mobilization</b>		15%	\$	3,525,792
<b>ROW/Easement Acquisition:</b>		LS	\$	100,000
<b>Project Cost TOTAL:</b>				<b>\$ 37,708,444</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>5-B</b>
<b>Project Number:</b>	5-B	<b>Channel and storm drain improvements along Civitan Dr and Richter St; culvert improvements at Holly Rd; and channel and storm drain sytem improvements from Holly Rd to Kostoryz Rd to reduce neighborhood flooding. Drains to project 5-A.</b>		
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	216	STA	\$2,250	\$ 486,000
2	EXCAVATION (CHANNEL)	42,831	CY	\$40	\$ 1,713,240
3	CUT & RESTORING PAV	11,512	SY	\$170	\$ 1,957,040
4	FLOWABLE BACKFILL	5,216	CY	\$350	\$ 1,825,600
5	TRENCH EXCAVATION PROTECTION	16,596	LF	\$10	\$ 165,960
6	RIPRAP (CONC)	56	CY	\$800	\$ 44,800
7	JUNCTION BOX	21	EA	\$10,000	\$ 210,000
8	5'x5' SBC	2,095	LF	\$840	\$ 1,759,800
9	6'x5' SBC	2,661	LF	\$890	\$ 2,368,290
10	7'x5' SBC	1,380	LF	\$920	\$ 1,269,600
11	7'x6' SBC	1,304	LF	\$940	\$ 1,225,760
12	8'x5' SBC	155	LF	\$910	\$ 141,050
13	8'x7' SBC	622	LF	\$1,010	\$ 628,220
14	9'x8' SBC	81	LF	\$1,090	\$ 88,290
15	CURB INLET (10')	56	EA	\$9,525	\$ 533,400
16	REMOVE STR (PIPE)	6,309	LF	\$100	\$ 630,900
17	SAFETY END TREATMENT (BOX CULVERT)	7	EA	\$13,700	\$ 95,900
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 15,143,850</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 360,000
√ Traffic Control Plan		1%	\$ 155,039
√ Stormwater Pollution Prevention Plan		1%	\$ 155,039
<b>Allowance Subtotal:</b>			<b>\$ 670,077</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 15,813,927</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 15,813,927</b>
<b>Construction Contingency:</b>		30%	\$ 4,744,178
<b>Engineering/Survey/Testing:</b>		15%	\$ 2,372,089
<b>Mobilization</b>		15%	\$ 2,372,089
<b>ROW/Easement Acquisition:</b>		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 25,402,283</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>	<b>6-A</b>
<b>Project Number:</b>	6-A	<b>Storm drain system improvements along Old Brownsville Rd, Lawton St, Washington St, and Post Ave; and channel improvements along Airport Rd and Post Rd to reduce flooding to neighborhoods and businesses.</b>		
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds			

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	238	STA	\$2,250	\$ 535,500
2	EXCAVATION (CHANNEL)	27,418	CY	\$40	\$ 1,096,720
3	CUT & RESTORING PAV	19,387	SY	\$170	\$ 3,295,790
4	FLOWABLE BACKFILL	8,583	CY	\$350	\$ 3,004,050
5	TRENCH EXCAVATION PROTECTION	29,308	LF	\$10	\$ 293,080
6	RIPRAP (CONC)	8	CY	\$800	\$ 6,400
7	JUNCTION BOX	37	EA	\$10,000	\$ 370,000
8	5'x3' SBC	837	LF	\$675	\$ 564,975
9	5'x4' SBC	5,467	LF	\$810	\$ 4,428,270
10	5'x5' SBC	3,130	LF	\$840	\$ 2,629,200
11	6'x5' SBC	2,281	LF	\$890	\$ 2,030,090
12	7'x5' SBC	1,196	LF	\$920	\$ 1,100,320
13	9'x5' SBC	1,743	LF	\$1,050	\$ 1,830,150
14	CURB INLET (10')	98	EA	\$9,525	\$ 933,450
15	REMOVE STR (PIPE)	12,912	LF	\$100	\$ 1,291,200
16	SAFETY END TREATMENT (BOX CULVERT)	1	EA	\$13,700	\$ 13,700
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 23,422,895</b>

<b>Major Construction Component Allowances:</b>				
Item Description	Notes	Allowance		Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$	600,000
√ Traffic Control Plan		1%	\$	240,229
√ Stormwater Pollution Prevention Plan		1%	\$	240,229
<b>Allowance Subtotal:</b>				<b>\$ 1,080,458</b>
<b>Construction Cost Subtotal:</b>				<b>\$ 24,503,353</b>

<b>Impact Fee Project Cost Summary</b>				
Item Description	Notes:	Allowance		Item Cost
<b>Construction:</b>			\$	<b>24,503,353</b>
<b>Construction Contingency:</b>		30%	\$	7,351,006
<b>Engineering/Survey/Testing:</b>		15%	\$	3,675,503
<b>Mobilization</b>		15%	\$	3,675,503
<b>ROW/Easement Acquisition:</b>		LS	\$	100,000
<b>Project Cost TOTAL:</b>				<b>\$ 39,305,365</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

Project Information:		Description:	Project No.
Project Number:	10-B2	Storm drain system improvements along Lipes Blvd, and Boardwalk Ave; storm drain and culvert improvements along Cimarron Blvd; and channel improvements from Boardwalk Ave to downstream of Cimarron Blvd to reduce neighborhood flooding.	10-B2
Potential Funding Sources:	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	187	STA	\$2,250	\$420,953
2	EXCAVATION (CHANNEL)	39,493	CY	\$40	\$1,579,720
3	CUT & RESTORING PAV	12,984	SY	\$170	\$2,207,280
4	FLOWABLE BACKFILL	5,960	CY	\$350	\$2,085,825
5	TRENCH EXCAVATION PROTECTION	18,202	LF	\$10	\$182,020
6	RIPRAP (CONC)	104	CY	\$800	\$83,200
7	JUNCTION BOX	23	EA	\$10,000	\$230,000
8	6'x4' SBC	1,700	LF	\$875	\$1,487,500
9	6'x5' SBC	3,062	LF	\$890	\$2,725,180
10	7'x4' SBC	83	LF	\$910	\$75,530
11	7'x5' SBC	3,189	LF	\$920	\$2,933,880
12	8'x4' SBC	101	LF	\$890	\$89,890
13	8'x5' SBC	966	LF	\$910	\$879,060
14	CURB INLET (10')	61	EA	\$9,525	\$581,025
15	REMOVE STR (PIPE)	7,881	LF	\$100	\$788,100
16	SAFETY END TREATMENT (BOX CULVERT)	13	EA	\$13,700	\$178,100
<b>Drainage Construction Cost Subtotal:</b>					<b>\$16,527,263</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	390,000
√ Traffic Control Plan		1% \$	169,173
√ Stormwater Pollution Prevention Plan		1% \$	169,173
<b>Allowance Subtotal:</b>			<b>\$ 728,345</b>
<b>Construction Cost Subtotal:</b>			<b>\$17,255,608</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 17,255,608
Construction Contingency:		30%	\$ 5,176,682
Engineering/Survey/Testing:		15%	\$ 2,588,341
Mobilization		15%	\$ 2,588,341
ROW/Easement Acquisition:		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 27,708,973</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 10-C  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Channel improvements from Vaughan Dr to N Oso Parkway and nearby storm drain improvements to reduce neighborhood flooding.**  
**Project No. 10-C**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	93	STA	\$2,250	\$209,070
2	EXCAVATION (CHANNEL)	10,499	CY	\$40	\$419,960
3	CUT & RESTORING PAV	4,421	SY	\$170	\$751,519
4	FLOWABLE BACKFILL	1,975	CY	\$350	\$691,390
5	TRENCH EXCAVATION PROTECTION	6,560	LF	\$10	\$65,600
6	RIPRAP (CONC)	72	CY	\$800	\$57,600
7	JUNCTION BOX	9	EA	\$10,000	\$90,000
8	5'x4' SBC	458	LF	\$810	\$370,980
9	6'x3' SBC	396	LF	\$860	\$340,560
10	6'x4' SBC	1,507	LF	\$875	\$1,318,625
11	6'x5' SBC	789	LF	\$890	\$702,210
12	8'x4' SBC	66	LF	\$890	\$58,740
13	10'x5' SBC	128	LF	\$1,075	\$137,600
14	CURB INLET (10')	22	EA	\$9,525	\$209,550
15	REMOVE STR (PIPE)	3,195	LF	\$100	\$319,500
16	SAFETY END TREATMENT (BOX CULVERT)	9	EA	\$13,700	\$123,300
<b>Drainage Construction Cost Subtotal:</b>					<b>\$5,866,204</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	150,000
√ Traffic Control Plan		1% \$	60,162
√ Stormwater Pollution Prevention Plan		1% \$	60,162
<b>Allowance Subtotal:</b>			<b>\$ 270,324</b>
<b>Construction Cost Subtotal:</b>			<b>\$6,136,528</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 6,136,528</b>
<b>Construction Contingency:</b>		30%	\$ 1,840,958
<b>Engineering/Survey/Testing:</b>		15%	\$ 920,479
<b>Mobilization</b>		15%	\$ 920,479
<b>ROW/Easement Acquisition:</b>		LS	\$ 50,000
<b>Project Cost TOTAL:</b>			<b>\$ 9,868,445</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

Project Information:		Description:	Project No.
Project Number:	10-D	Storm drain improvements along Brooke Rd and Airline Rd; channel improvements along Brooke Rd; and channel and improvements from near Cimarron Blvd to Oso Bay including culvert improvements at Rodd Field Rd to reduce neighborhood flooding.	10-D
Potential Funding Sources:	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	193	STA	\$2,250	\$435,038
2	EXCAVATION (CHANNEL)	65,161	CY	\$40	\$2,606,440
3	CUT & RESTORING PAV	10,001	SY	\$170	\$1,700,238
4	FLOWABLE BACKFILL	4,826	CY	\$350	\$1,688,995
5	TRENCH EXCAVATION PROTECTION	12,434	LF	\$10	\$124,340
6	RIPRAP (CONC)	40	CY	\$800	\$32,000
7	JUNCTION BOX	16	EA	\$10,000	\$160,000
8	5'x2' SBC	854	LF	\$700	\$597,800
9	6'x3' SBC	700	LF	\$860	\$602,000
10	7'x4' SBC	1,611	LF	\$910	\$1,466,010
11	8'x4' SBC	100	LF	\$890	\$89,000
12	10'x7' SBC	2,952	LF	\$1,125	\$3,321,000
13	CURB INLET (10')	42	EA	\$9,525	\$400,050
14	SAFETY END TREATMENT (BOX CULVERT)	5	EA	\$13,700	\$68,500
<b>Drainage Construction Cost Subtotal:</b>					<b>\$13,291,411</b>

Major Construction Component Allowances:			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 270,000
√ Traffic Control Plan		1%	\$ 135,614
√ Stormwater Pollution Prevention Plan		1%	\$ 135,614
<b>Allowance Subtotal:</b>			<b>\$ 541,228</b>
<b>Construction Cost Subtotal:</b>			<b>\$13,832,639</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 13,832,639
Construction Contingency:		30%	\$ 4,149,792
Engineering/Survey/Testing:		15%	\$ 2,074,896
Mobilization		15%	\$ 2,074,896
ROW/Easement Acquisition:		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 22,232,222</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 11-A  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Channel and storm drain system improvements along Williams Dr from current Williams Ditch project upstream to Staples St to reduce flooding for neighborhoods and businesses.**  
**Project No.:** 11-A

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	122	STA	\$2,250	\$274,500
2	EXCAVATION (CHANNEL)	9,265	CY	\$40	\$370,600
3	CUT & RESTORING PAV	17,242	SY	\$170	\$2,931,140
4	FLOWABLE BACKFILL	8,655	CY	\$350	\$3,029,250
5	TRENCH EXCAVATION PROTECTION	19,166	LF	\$10	\$191,660
6	RIPRAP (CONC)	24	CY	\$800	\$19,200
7	JUNCTION BOX	24	EA	\$10,000	\$240,000
8	7'x5' SBC	965	LF	\$920	\$887,800
9	7'x6' SBC	854	LF	\$940	\$802,760
10	7'x7' SBC	106	LF	\$960	\$101,760
11	8'x7' SBC	1,403	LF	\$1,010	\$1,417,030
12	9'x7' SBC	666	LF	\$1,075	\$715,950
13	10'x7' SBC	3,020	LF	\$1,125	\$3,397,500
14	10'x9' SBC	30	LF	\$1,160	\$34,800
15	12'x7' SBC	2,539	LF	\$1,190	\$3,021,410
16	CURB INLET (10')	64	EA	\$9,525	\$609,600
17	SAFETY END TREATMENT (BOX CULVERT)	3	EA	\$13,700	\$41,100
<b>Drainage Construction Cost Subtotal:</b>					<b>\$18,086,060</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	390,000
√ Traffic Control Plan		1% \$	184,761
√ Stormwater Pollution Prevention Plan		1% \$	184,761
<b>Allowance Subtotal:</b>			<b>\$ 759,521</b>
<b>Construction Cost Subtotal:</b>			<b>\$18,845,581</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 18,845,581</b>
<b>Construction Contingency:</b>		30% \$	5,653,674
<b>Engineering/Survey/Testing:</b>		15% \$	2,826,837
<b>Mobilization</b>		15% \$	2,826,837
<b>ROW/Easement Acquisition:</b>		LS \$	50,000
<b>Project Cost TOTAL:</b>			<b>\$ 30,202,930</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 12-A  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Storm drain improvements along Gollihar Rd and S. Staples St; and channel improvements from Airline Rd to Oso Municipal Golf Course to relieve flooding for neighborhoods and businesses.**  
**Project No. 12-A**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	65	STA	\$2,250	\$146,250
2	CUT & RESTORING PAV	9,174	SY	\$170	\$1,559,580
3	FLOWABLE BACKFILL	4,196	CY	\$350	\$1,468,600
4	TRENCH EXCAVATION PROTECTION	12,960	LF	\$10	\$129,600
5	JUNCTION BOX	17	EA	\$10,000	\$170,000
6	5'x5' SBC	552	LF	\$840	\$463,680
7	6'x5' SBC	3,584	LF	\$890	\$3,189,760
8	6'x6' SBC	323	LF	\$900	\$290,700
9	8'x5' SBC	2,021	LF	\$910	\$1,839,110
10	CURB INLET (10')	44	EA	\$9,525	\$419,100
11	REMOVE STR (PIPE)	4,834	LF	\$100	\$483,400
<b>Drainage Construction Cost Subtotal:</b>					<b>\$10,159,780</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	270,000
√ Traffic Control Plan		1% \$	104,298
√ Stormwater Pollution Prevention Plan		1% \$	104,298
<b>Allowance Subtotal:</b>			<b>\$ 478,596</b>
<b>Construction Cost Subtotal:</b>			<b>\$10,638,376</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 10,638,376</b>
<b>Construction Contingency:</b>		30%	\$ 3,191,513
<b>Engineering/Survey/Testing:</b>		15%	\$ 1,595,756
<b>Mobilization</b>		15%	\$ 1,595,756
<b>ROW/Easement Acquisition:</b>		LS	\$ 25,000
<b>Project Cost TOTAL:</b>			<b>\$ 17,046,402</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 12-B  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Storm drain system improvements along Shephard Dr and across Whitaker Dr and Cleopatra Dr to reduce neighborhood flooding.**  
**Project No. 12-B**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	47	STA	\$2,250	\$105,750
2	EXCAVATION (CHANNEL)	6,181	CY	\$40	\$247,237
3	CUT & RESTORING PAV	2,175	SY	\$170	\$369,750
4	FLOWABLE BACKFILL	912	CY	\$350	\$319,200
5	TRENCH EXCAVATION PROTECTION	3,630	LF	\$10	\$36,300
6	RIPRAP (CONC)	96	CY	\$800	\$76,800
7	RC PIPE (36 IN)	431	LF	\$300	\$129,300
8	RC PIPE (48 IN)	430	LF	\$450	\$193,500
9	JUNCTION BOX	5	EA	\$10,000	\$50,000
10	6'x4' SBC	404	LF	\$875	\$353,500
11	6'x5' SBC	550	LF	\$890	\$489,500
12	CURB INLET (10')	13	EA	\$9,525	\$123,825
13	REMOVE STR (PIPE)	1,759	LF	\$100	\$175,900
14	SAFETY END TREATMENT (36" TO 60")	2	EA	\$9,100	\$18,200
15	SAFETY END TREATMENT (BOX CULVERT)	10	EA	\$13,700	\$137,000
<b>Drainage Construction Cost Subtotal:</b>					<b>\$2,825,762</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	90,000
✓ Traffic Control Plan		1% \$	29,158
✓ Stormwater Pollution Prevention Plan		1% \$	29,158
<b>Allowance Subtotal:</b>			<b>\$ 148,315</b>
<b>Construction Cost Subtotal:</b>			<b>\$2,974,077</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 2,974,077</b>
<b>Construction Contingency:</b>		30%	\$ 892,223
<b>Engineering/Survey/Testing:</b>		15%	\$ 446,112
<b>Mobilization</b>		15%	\$ 446,112
<b>ROW/Easement Acquisition:</b>		LS	\$ 50,000
<b>Project Cost TOTAL:</b>			<b>\$ 4,808,524</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No. 12-C</b>
<b>Project Number:</b>	12-C	<b>Storm drain system improvements along Alameda from Ronson Dr to Glenmore Street to reduce neighborhood and street flooding.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

<b>Drainage Construction Cost Projection</b>					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	48	STA	\$2,250	\$108,000
2	CUT & RESTORING PAV	6,711	SY	\$170	\$1,140,870
3	FLOWABLE BACKFILL	3,055	CY	\$350	\$1,069,250
4	TRENCH EXCAVATION PROTECTION	9,578	LF	\$10	\$95,780
5	RIPRAP (CONC)	8	CY	\$800	\$6,400
6	JUNCTION BOX	12	EA	\$10,000	\$120,000
7	5'x5' SBC	1,819	LF	\$840	\$1,527,960
8	6'x5' SBC	1,010	LF	\$890	\$898,900
9	8'x5' SBC	1,960	LF	\$910	\$1,783,600
10	CURB INLET (10')	32	EA	\$9,525	\$304,800
11	REMOVE STR (PIPE)	1,960	LF	\$100	\$196,000
12	SAFETY END TREATMENT (BOX CULVERT)	1	EA	\$13,700	\$13,700
<b>Drainage Construction Cost Subtotal:</b>					<b>\$7,265,260</b>

<b>Major Construction Component Allowances:</b>			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 210,000
✓ Traffic Control Plan		1%	\$ 74,753
✓ Stormwater Pollution Prevention Plan		1%	\$ 74,753
<b>Allowance Subtotal:</b>			<b>\$ 359,505</b>
<b>Construction Cost Subtotal:</b>			<b>\$7,624,765</b>

<b>Impact Fee Project Cost Summary</b>			
Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 7,624,765
Construction Contingency:		30%	\$ 2,287,430
Engineering/Survey/Testing:		15%	\$ 1,143,715
Mobilization		15%	\$ 1,143,715
ROW/Easement Acquisition:		LS	\$ 25,000
<b>Project Cost TOTAL:</b>			<b>\$ 12,224,624</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 13-A  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Project No. 13-A**  
**Storm drain system improvements along S. Port Ave, across Crosstown Expressway, and along Shely St; and culvert and storm drain improvements along Logan and Louisiana to reduce flooding west of Crossown and near Staples and Brownlee.**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	124	STA	\$2,250	\$279,473
2	CUT & RESTORING PAV	17,889	SY	\$170	\$3,041,062
3	FLOWABLE BACKFILL	8,245	CY	\$350	\$2,885,820
4	TRENCH EXCAVATION PROTECTION	24,842	LF	\$10	\$248,420
5	RC PIPE (54 IN)	1,000	LF	\$525	\$525,000
6	JUNCTION BOX	32	EA	\$10,000	\$320,000
7	5'x4' SBC	383	LF	\$810	\$310,230
8	6'x3' SBC	615	LF	\$860	\$528,900
9	6'x4' SBC	1,199	LF	\$875	\$1,049,125
10	6'x5' SBC	425	LF	\$890	\$378,250
11	7'x5' SBC	3,101	LF	\$920	\$2,852,920
12	7'x6' SBC	3,942	LF	\$940	\$3,705,480
13	8'x6' SBC	348	LF	\$940	\$327,120
14	8'x7' SBC	1,408	LF	\$1,010	\$1,422,080
15	CURB INLET (10')	83	EA	\$9,525	\$790,575
16	REMOVE STR (PIPE)	10,665	LF	\$100	\$1,066,500
<b>Drainage Construction Cost Subtotal:</b>					<b>\$19,730,955</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	510,000
✓ Traffic Control Plan		1% \$	202,410
✓ Stormwater Pollution Prevention Plan		1% \$	202,410
<b>Allowance Subtotal:</b>			<b>\$ 914,819</b>
<b>Construction Cost Subtotal:</b>			<b>\$20,645,774</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 20,645,774</b>
<b>Construction Contingency:</b>		30%	\$ 6,193,732
<b>Engineering/Survey/Testing:</b>		15%	\$ 3,096,866
<b>Mobilization</b>		15%	\$ 3,096,866
<b>ROW/Easement Acquisition:</b>		LS	\$ 200,000
<b>Project Cost TOTAL:</b>			<b>\$ 33,233,238</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



8/23/2023

**Project Information:**

**Project Number:** 13-C  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Project No. 13-C**  
**Culvert and channel improvements along Brawner Pkwy from Ramsey St to Corpus Christi Bay; and storm drain system improvements along S Staples St from Buccaneer Dr to Brawner to relieve neighborhood flooding.**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	182	STA	\$2,250	\$410,108
2	EXCAVATION (CHANNEL)	34,955	CY	\$40	\$1,398,200
3	CUT & RESTORING PAV	33,393	SY	\$170	\$5,676,810
4	FLOWABLE BACKFILL	16,862	CY	\$350	\$5,901,700
5	TRENCH EXCAVATION PROTECTION	36,454	LF	\$10	\$364,540
6	JUNCTION BOX	46	EA	\$10,000	\$460,000
7	5'x4' SBC	518	LF	\$810	\$419,580
8	6'x4' SBC	653	LF	\$875	\$571,375
9	6'x5' SBC	2,362	LF	\$890	\$2,102,180
10	10'x8' SBC	1,656	LF	\$1,130	\$1,871,280
11	10'x9' SBC	2,809	LF	\$1,160	\$3,258,440
12	10'x10' SBC	4,513	LF	\$1,200	\$5,415,600
13	12'x11' SBC	5,716	LF	\$1,250	\$7,145,000
13	CURB INLET (10')	122	EA	\$9,525	\$1,162,050
14	REMOVE STR (PIPE)	7,070	LF	\$100	\$707,000
<b>Drainage Construction Cost Subtotal:</b>					<b>\$36,863,863</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS \$	750,000
✓ Traffic Control Plan		1% \$	376,138
✓ Stormwater Pollution Prevention Plan		1% \$	376,138
<b>Allowance Subtotal:</b>			<b>\$ 1,502,276</b>
<b>Construction Cost Subtotal:</b>			<b>\$38,366,139</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 38,366,139</b>
<b>Construction Contingency:</b>		30%	\$ 11,509,842
<b>Engineering/Survey/Testing:</b>		15%	\$ 5,754,921
<b>Mobilization</b>		15%	\$ 5,754,921
<b>ROW/Easement Acquisition:</b>		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 61,485,822</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>
<b>Project Number:</b>	13-D	<b>Storm drain system improvements along Gollihar Rd, Weber Rd, McArdle Rd, and Carmel Pkwy; and culvert improvements along Carmel Pkwy to relive neighborhood flooding.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	177	STA	\$2,250	\$ 397,980
2	CUT & RESTORING PAV	26,060	SY	\$170	\$ 4,430,200
3	FLOWABLE BACKFILL	12,131	CY	\$350	\$ 4,245,850
4	TRENCH EXCAVATION PROTECTION	35,376	LF	\$10	\$ 353,760
5	RC PIPE (54 IN)	312	LF	\$525	\$ 163,800
6	RC PIPE (60 IN)	3,083	LF	\$600	\$ 1,849,800
7	JUNCTION BOX	45	EA	\$10,000	\$ 450,000
8	5'x5' SBC	396	LF	\$840	\$ 332,640
9	6'x3' SBC	614	LF	\$860	\$ 528,040
10	6'x5' SBC	3,559	LF	\$890	\$ 3,167,510
11	6'x6' SBC	1,798	LF	\$900	\$ 1,618,200
12	7'x5' SBC	503	LF	\$920	\$ 462,760
13	7'x6' SBC	1,704	LF	\$940	\$ 1,601,760
14	8'x5' SBC	543	LF	\$910	\$ 494,130
15	8'x6' SBC	343	LF	\$940	\$ 322,420
16	8'x7' SBC	1,697	LF	\$1,010	\$ 1,713,970
17	8'x8' SBC	78	LF	\$990	\$ 77,220
18	9'x8' SBC	1,517	LF	\$1,090	\$ 1,653,530
23	12'x11' SBC	1,541	LF	\$1,250	\$ 1,926,250
24	CURB INLET (10')	118	EA	\$9,525	\$ 1,123,950
25	REMOVE STR (PIPE)	12,227	LF	\$100	\$ 1,222,700
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 28,136,470</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 720,000
√ Traffic Control Plan		1%	\$ 288,565
√ Stormwater Pollution Prevention Plan		1%	\$ 288,565
<b>Allowance Subtotal:</b>			<b>\$ 1,297,130</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 29,433,600</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 29,433,600</b>
<b>Construction Contingency:</b>		30%	\$ 8,830,080
<b>Engineering/Survey/Testing:</b>		15%	\$ 4,415,040
<b>Mobilization</b>		15%	\$ 4,415,040
<b>ROW/Easement Acquisition:</b>		LS	\$ 150,000
<b>Project Cost TOTAL:</b>			<b>\$ 47,243,760</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

Project Information:		Description:	Project No.
Project Number:	13-E	Channel improvements along Carmel Pkwy from S. Staples St to Corpus Christi Bay; and storm drain improvements along Santa Fe St to reduce neighborhood flooding. Accepts runoff from project 13-D.	13-E
Potential Funding Sources:			
	SW Utility Fee, Bonds		

Drainage Construction Cost Projection					
No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	74	STA	\$2,250	\$165,668
2	EXCAVATION (CHANNEL)	19,222	CY	\$40	\$768,880
3	CUT & RESTORING PAV	2,317	SY	\$170	\$393,958
4	FLOWABLE BACKFILL	1,120	CY	\$350	\$392,140
5	TRENCH EXCAVATION PROTECTION	2,866	LF	\$10	\$28,660
6	JUNCTION BOX	4	EA	\$10,000	\$40,000
7	6'x5' SBC	406	LF	\$890	\$361,340
8	9'x5' SBC	1,027	LF	\$1,050	\$1,078,350
9	CURB INLET (10')	10	EA	\$9,525	\$95,250
10	REMOVE STR (PIPE)	2,866	LF	\$100	\$286,600
<b>Drainage Construction Cost Subtotal:</b>					<b>\$3,610,846</b>

Major Construction Component Allowances:			
Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 60,000
√ Traffic Control Plan		1%	\$ 36,709
√ Stormwater Pollution Prevention Plan		1%	\$ 36,709
<b>Allowance Subtotal:</b>			<b>\$ 133,417</b>
<b>Construction Cost Subtotal:</b>			<b>\$3,744,263</b>

Impact Fee Project Cost Summary			
Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 3,744,263
Construction Contingency:		30%	\$ 1,123,279
Engineering/Survey/Testing:		15%	\$ 561,639
Mobilization		15%	\$ 561,639
ROW/Easement Acquisition:		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 6,090,820</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 13-F  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Storm drain improvements along Ashland Dr and Airline Rd from S Alameda St to Corpus Christi Bay to relieve neighborhood flooding.**  
**Project No. 13-F**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	75	STA	\$2,250	\$169,268
2	CUT & RESTORING PAV	10,485	SY	\$170	\$1,782,501
3	FLOWABLE BACKFILL	4,761	CY	\$350	\$1,666,420
4	TRENCH EXCAVATION PROTECTION	15,046	LF	\$10	\$150,460
5	RIPRAP (CONC)	16	CY	\$800	\$12,800
6	JUNCTION BOX	19	EA	\$10,000	\$190,000
7	6'x5' SBC	5,076	LF	\$890	\$4,517,640
8	7'x5' SBC	2,447	LF	\$920	\$2,251,240
9	CURB INLET (10')	51	EA	\$9,525	\$485,775
10	REMOVE STR (PIPE)	10,710	LF	\$100	\$1,071,000
11	SAFETY END TREATMENT (BOX CULVERT)	2	EA	\$13,700	\$27,400
<b>Drainage Construction Cost Subtotal:</b>					<b>\$12,324,504</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 330,000
√ Traffic Control Plan		1%	\$ 126,545
√ Stormwater Pollution Prevention Plan		1%	\$ 126,545
<b>Allowance Subtotal:</b>			<b>\$ 583,090</b>
<b>Construction Cost Subtotal:</b>			<b>\$12,907,594</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 12,907,594
Construction Contingency:		30%	\$ 3,872,278
Engineering/Survey/Testing:		15%	\$ 1,936,139
Mobilization		15%	\$ 1,936,139
ROW/Easement Acquisition:		LS	\$ 50,000
<b>Project Cost TOTAL:</b>			<b>\$ 20,702,150</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 14-A2  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Storm drain system improvements along S. 19th St from Hospital St to Comanche St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.**  
**Project No. 14-A2**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	71	STA	\$2,250	\$159,750
2	EXCAVATION (CHANNEL)	1,211	CY	\$40	\$48,440
3	CUT & RESTORING PAV	9,120	SY	\$170	\$1,550,400
4	FLOWABLE BACKFILL	3,982	CY	\$350	\$1,393,700
5	TRENCH EXCAVATION PROTECTION	14,166	LF	\$10	\$141,660
6	JUNCTION BOX	18	EA	\$10,000	\$180,000
7	5'X3' SBC	1,485	LF	\$675	\$1,002,375
8	5'x4' SBC	868	LF	\$810	\$703,080
9	5'x5' SBC	1,137	LF	\$840	\$955,080
10	6'x5' SBC	3,593	LF	\$890	\$3,197,770
11	CURB INLET (10')	48	EA	\$9,525	\$457,200
12	REMOVE STR (PIPE)	7,083	LF	\$100	\$708,300
<b>Drainage Construction Cost Subtotal:</b>					<b>\$10,497,755</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 300,000
√ Traffic Control Plan		1%	\$ 107,978
√ Stormwater Pollution Prevention Plan		1%	\$ 107,978
<b>Allowance Subtotal:</b>			<b>\$ 515,955</b>
<b>Construction Cost Subtotal:</b>			<b>\$11,013,710</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
Construction:			\$ 11,013,710
Construction Contingency:		30%	\$ 3,304,113
Engineering/Survey/Testing:		15%	\$ 1,652,057
Mobilization		15%	\$ 1,652,057
ROW/Easement Acquisition:		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 17,721,936</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No.</b>
<b>Project Number:</b>	14-B	<b>Storm drain system improvements along Old Robstown Rd and Nueces Bay Blvd from Liberty Dr to I-37 to relieve flooding for neighborhoods and businesses.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	103	STA	\$2,250	\$ 231,750
2	CUT & RESTORING PAV	15,336	SY	\$170	\$ 2,607,120
3	FLOWABLE BACKFILL	7,188	CY	\$350	\$ 2,515,800
4	TRENCH EXCAVATION PROTECTION	20,498	LF	\$10	\$ 204,980
5	RC PIPE (48 IN)	1,531	LF	\$450	\$ 688,950
6	JUNCTION BOX	26	EA	\$10,000	\$ 260,000
7	5'X3' SBC	306	LF	\$675	\$ 206,550
8	5'X4' SBC	346	LF	\$810	\$ 280,260
9	5'X5' SBC	1,531	LF	\$840	\$ 1,286,040
10	6'X3' SBC	322	LF	\$860	\$ 276,920
11	6'X4' SBC	351	LF	\$875	\$ 307,125
12	6'X5' SBC	1,470	LF	\$890	\$ 1,308,300
13	8'X5' SBC	582	LF	\$910	\$ 529,620
14	8'X8' SBC	107	LF	\$990	\$ 105,930
15	9'X8' SBC	539	LF	\$1,090	\$ 587,510
16	10'X5' SBC	517	LF	\$1,075	\$ 555,775
17	10'X8' SBC	1,515	LF	\$1,130	\$ 1,711,950
18	11'X8' SBC	604	LF	\$1,175	\$ 709,700
19	12'X6' SBC	528	LF	\$1,175	\$ 620,400
20	CURB INLET (10')	69	EA	\$9,525	\$ 657,225
21	REMOVE STR (PIPE)	6,299	LF	\$100	\$ 629,900
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 16,281,805</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 420,000
√ Traffic Control Plan		1%	\$ 167,018
√ Stormwater Pollution Prevention Plan		1%	\$ 167,018
<b>Allowance Subtotal:</b>			<b>\$ 754,036</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 17,035,841</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 17,035,841</b>
<b>Construction Contingency:</b>		30%	\$ 5,110,752
<b>Engineering/Survey/Testing:</b>		15%	\$ 2,555,376
<b>Mobilization</b>		15%	\$ 2,555,376
<b>ROW/Easement Acquisition:</b>		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 27,357,346</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

**Project Information:**

**Project Number:** 14-C  
**Potential Funding Sources:**  
 SW Utility Fee, Bonds

**Description:** **Project No. 14-C**  
**Storm drain system improvements along S. Brownlee Blvd and Marguerite St from 16th St to King St to relieve neighborhood flooding. Drains toward downtown system with storm water pump station.**

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	54	STA	\$2,250	\$ 121,500
2	EXCAVATION (CHANNEL)	6,303	CY	\$40	\$ 252,120
3	CUT & RESTORING PAV	5,927	SY	\$170	\$ 1,007,590
4	FLOWABLE BACKFILL	2,523	CY	\$350	\$ 883,050
5	TRENCH EXCAVATION PROTECTION	9,642	LF	\$10	\$ 96,420
7	JUNCTION BOX	13	EA	\$10,000	\$ 130,000
8	5'X3' SBC	3,065	LF	\$675	\$ 2,068,875
9	5'x4' SBC	2,014	LF	\$810	\$ 1,631,340
11	6'x4' SBC	265	LF	\$875	\$ 231,875
12	CURB INLET (10')	33	EA	\$9,525	\$ 314,325
13	REMOVE STR (PIPE)	4,556	LF	\$100	\$ 455,600
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 7,192,695</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 240,000
√ Traffic Control Plan		1%	\$ 74,327
√ Stormwater Pollution Prevention Plan		1%	\$ 74,327
<b>Allowance Subtotal:</b>			<b>\$ 388,654</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 7,581,349</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 7,581,349</b>
<b>Construction Contingency:</b>		30%	\$ 2,274,405
<b>Engineering/Survey/Testing:</b>		15%	\$ 1,137,202
<b>Mobilization</b>		15%	\$ 1,137,202
<b>ROW/Easement Acquisition:</b>		LS	\$ 100,000
<b>Project Cost TOTAL:</b>			<b>\$ 12,230,158</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.





**City of Corpus Christi**  
**Stormwater Master Plan**  
**Conceptual Level Project Cost Projection**



9/20/2023

<b>Project Information:</b>		<b>Description:</b>	<b>Project No. 15-D1</b>
<b>Project Number:</b>	15-D1	<b>Storm drain improvements along McKinzie, Mayfield Dr and Starlite Ln, and Tumbleweed Dr and Rockwood St; and channel improvements from Rockwood St to Leopard to reduce flooding for neighborhoods and businesses.</b>	
<b>Potential Funding Sources:</b>	SW Utility Fee, Bonds		

**Drainage Construction Cost Projection**

No.	Item Description	Quantity	Unit	Unit Price	Item Cost
1	PREPARING ROW	135	STA	\$2,250	\$ 303,750
2	EXCAVATION (CHANNEL)	89,911	CY	\$40	\$ 3,596,440
3	CUT & RESTORING PAV	7,822	SY	\$170	\$ 1,329,740
4	FLOWABLE BACKFILL	3,411	CY	\$350	\$ 1,193,850
5	TRENCH EXCAVATION PROTECTION	12,176	LF	\$10	\$ 121,760
6	RIPRAP (CONC)	40	CY	\$800	\$ 32,000
7	JUNCTION BOX	16	EA	\$10,000	\$ 160,000
8	5'x3' SBC	542	LF	\$675	\$ 365,850
9	5'x4' SBC	262	LF	\$810	\$ 212,220
10	5'x5' SBC	2,330	LF	\$840	\$ 1,957,200
11	6'x3' SBC	1,374	LF	\$860	\$ 1,181,640
12	6'x4' SBC	932	LF	\$875	\$ 815,500
13	6'x5' SBC	648	LF	\$890	\$ 576,720
14	CURB INLET (10')	41	EA	\$9,525	\$ 390,525
15	REMOVE STR (PIPE)	6,007	LF	\$100	\$ 600,700
16	SAFETY END TREATMENT (BOX CULVERT)	5	EA	\$13,700	\$ 68,500
<b>Drainage Construction Cost Subtotal:</b>					<b>\$ 12,906,395</b>

**Major Construction Component Allowances:**

Item Description	Notes	Allowance	Item Cost
Utility Adjustments	1 per 750' @ \$30K Each	LS	\$ 270,000
√ Traffic Control Plan		1%	\$ 131,764
√ Stormwater Pollution Prevention Plan		1%	\$ 131,764
<b>Allowance Subtotal:</b>			<b>\$ 533,528</b>
<b>Construction Cost Subtotal:</b>			<b>\$ 13,439,923</b>

**Impact Fee Project Cost Summary**

Item Description	Notes:	Allowance	Item Cost
<b>Construction:</b>			<b>\$ 13,439,923</b>
<b>Construction Contingency:</b>		30%	\$ 4,031,977
<b>Engineering/Survey/Testing:</b>		15%	\$ 2,015,988
<b>Mobilization</b>		15%	\$ 2,015,988
<b>ROW/Easement Acquisition:</b>		LS	\$ 200,000
<b>Project Cost TOTAL:</b>			<b>\$ 21,703,877</b>

**NOTE:** These planning level cost projections listed in this appendix have been developed based on 2023 costs and do not account for inflation beyond 2023. Additional cost estimating will be required during detailed design.