



CITY OF LA PORTE DRAINAGE AND FLOODING COMMITTEE MEETING AGENDA

Notice is hereby given of a meeting of the Drainage and Flooding Committee of the City Council of the City of La Porte, to be held July 8, 2019, in the City Hall Council Chambers, 604 West Fairmont Parkway, La Porte, Texas, beginning at 5:00 pm to consider the following items of business.

1. **Call to order**
2. **Statutory Agenda**
 - (a) Approve minutes of the meeting held on May 13, 2019. [Jay Martin, Chairman]
 - (b) Receive report from Harris County Flood Control District regarding current and future plans relating to flooding in the City of La Porte. [Lorenzo Wingate, P.E., City Engineer]
 - (c) Presentation, discussion, and possible action regarding the status of current drainage projects. [Lorenzo Wingate, P.E., City Engineer]
 - (d) Presentation, discussion, and possible action regarding additional drainage concerns and providing staff with direction. [Lorenzo Wingate, P.E., City Engineer]
3. **Set date for next Drainage and Flooding Committee Meeting**
4. **Committee Member Comments** *Hear announcements concerning matters appearing on the agenda; items of community interest; and/or inquiries of staff regarding specific factual information or existing policy from the Committee members and City staff, for which no formal action will be discussed or taken.*
5. **Adjournment**

If, during the course of the meeting and discussion of any items covered by this notice, the Drainage and Flooding Committee determines that a Closed or Executive Session of the Committee is required, then such closed meeting will be held as authorized by Texas Government Code, Chapter 551, Section 551.071 - consultation with counsel on legal matters; Section 551.072 - deliberation regarding purchase, exchange, lease or value of real property; Section 551.073 - deliberation regarding a prospective gift; Section 551.074 - personnel matters regarding the appointment, employment, evaluation, reassignment, duties, discipline, or dismissal of a public officer or employee; Section 551.076 - implementation of security personnel or devices; Section 551.087 - deliberation regarding economic development negotiation; Section 551.089 - deliberation regarding security devices or security audits, and/or other matters as authorized under the Texas Government Code. If a Closed or Executive Session is held in accordance with the Texas Government Code as set out above, the Drainage and Flooding Committee will reconvene in Open Session in order to take action, if necessary, on the items addressed during Executive Session.

Persons with disabilities who plan to attend this meeting and who may need auxiliary aids or services are requested to contact the City Secretary's office (281-470-5019), two working days prior to the meeting for appropriate arrangements.

Councilmembers may attend in numbers constituting a quorum. This is a Drainage and Flooding Committee Meeting at which there will be no deliberation or formal action taken by City Council as a governmental body.

CERTIFICATE

I, Lee Woodward, City Secretary, do hereby certify that a copy of the July 8, 2019, Drainage and Flooding Committee agenda was posted on the City Hall bulletin board, a place convenient and readily accessible to the general public at all times, and to the City's website, www.LaPorteTX.gov, in compliance with Chapter 551, Texas Government Code.

DATE OF
POSTING _____
TIME OF
POSTING _____
TAKEN DOWN _____

Lee Woodward, City Secretary

JAY MARTIN
Chairman

DANNY EARP
Vice-Chairman



CHUCK ENGELKEN
Member

JOHN ZEMANEK
Alternate Member

MINUTES OF DRAINAGE AND FLOODING COMMITTEE MEETING HELD MAY 13, 2019

The Drainage and Flooding Committee of the City of La Porte met on **Monday, May 13, 2019**, at the City Hall Council Chambers, 604 West Fairmont Parkway, La Porte, Texas, at **5:00 p.m.** to consider the following items of business:

Committee Members present: Jay Martin, Danny Earp, Chuck Engelken (*arrived at 5:32 p.m.*)

Committee Members absent: John Zemanek

Council-appointed officers present: Corby Alexander, City Manager; Lee Woodward, City Secretary

1. **Call to Order** - Chairman Martin called the meeting to order at 5:02 p.m.

2. **Authorizations**

(a) Approve the minutes of the meeting held on April 8, 2019. [Lee Woodward, City Secretary]

Vice Chairman Earp moved to approve the minutes of the meeting held on April 8, 2019; the motion was unanimously adopted, 2-0.

3. **Staff Reports**

(a) **Receive report from Harris County Flood Control District regarding current and future plans relating to flooding in the City of La Porte.** [Lorenzo Wingate, City Engineer, and Don Pennell, Public Works Director]

Jeremy Ratcliff of Harris County Flood Control District (HCFCD) said he hoped he could attend the first meeting of the month every other month. He said that on Brookglen, three alternatives were proposed in draft and needed some additional modeling and move to a PER stage this summer and added that Russ Poppe was including a benefits matrix for all their projects. Committee member Earp asked to also note timing of the entire project life cycle.

Mr. Ratcliff said that F-10106 (Lomax/Pipeline Corridor) would begin this summer. Vice Chairman Earp said two projects in that area needed a greatly increased timetable, especially at the dam at the pipeline. Mr. Wingate reminded all that City spending was holding for state grant funding, but Mr. Ratcliff said it would not hold up the HCFCD work. Mr. Ratcliff said the desilt would probably happen early this summer (as part of the Choctaw Package) but there were utility and other conflicts for the portion across the top and that HDR would review it. Mr. Pennell said the City had done the flow work and were waiting on HCFCD for design.

Vice Chairman Earp said the work at Sens Road to the railroad tracks was coming along. Mr. Ratcliff said it was possible HCFCD would need some assistance with the railroad. Mr. Wingate noted Flood Control did not have easements or legal access to but the City did and could clear and clean there. Mr. Pennell said his department would propose to buy new equipment and take care of it in house.

Chairman Martin asked about the Brookglen buyout situation and Mr. Ratcliff said there were two-three homes with offers and six waiting on appraisals. Mr. Ratcliff said the summer mowing agreement would be reviewed for lots and channel work cycles and were expected to begin in June (HCFCD, HC Precinct 2, and the City were all participating).

- (b) Discussion regarding Texas Department of Emergency Management (TDEM) Hurricane Harvey DR-4332 Section 404 Hazard Mitigation Grant Program (HMGP) funding. [Lorenzo Wingate, City Engineer and Don Pennell, Public Works Director]**

Mr. Wingate said the City has submitted eight projects and had been told selection was expected in July and those chosen could begin in January 2020. Chair Martin asked what would occur then and Mr. Wingate said procuring engineering services and beginning design.

- (c) Presentation, discussion, and possible action regarding the status of current drainage projects. [Lorenzo Wingate, City Engineer, and Don Pennell, Public Works Director]**

Mr. Wingate referred to information included on the project list.

- (d) Presentation, discussion and possible action regarding additional drainage concerns and provide staff with direction. [Lorenzo Wingate, City Engineer, and Don Pennell, Public Works Director]**

Mr. Wingate referred to information included on the project list.

4. Set date for next Drainage and Flooding Committee Meeting

The next meeting date was set for June 10, 2019 at 5:00 p.m.

5. Committee Comments

No comments were offered.

6. ADJOURN – The meeting was adjourned without objection at 5:40 p.m.

Lee Woodward, City Secretary



REQUEST FOR DRAINAGE & FLOODING COMMITTEE AGENDA ITEM

Agenda Date Requested: <u>July 8, 2019</u>
Requested By: <u>Lorenzo Wingate, P.E.</u>
Department: <u>Public Works</u>
<input checked="" type="radio"/> Report <input type="radio"/> Resolution <input type="radio"/> Ordinance

Appropriation	
Source of Funds:	_____
Account Number:	_____
Amount Budgeted:	_____
Amount Requested:	_____
Budgeted Item:	<input type="radio"/> Yes <input type="radio"/> No

Exhibits:

SUMMARY

Receive report regarding Harris County Flood Control District current and future plans relating to flooding in the City of La Porte.

RECOMMENDED MOTION

Approved for Drainage Committee Agenda

Corby D. Alexander, City Manager

Date



REQUEST FOR DRAINAGE & FLOODING COMMITTEE AGENDA ITEM

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Amount Requested:	_____
Budgeted Item:	<input type="radio"/> Yes <input type="radio"/> No

Exhibits: Map
Project update chart

SUMMARY

Refer to attached Exhibit(s) for updates on various drainage projects throughout the City.

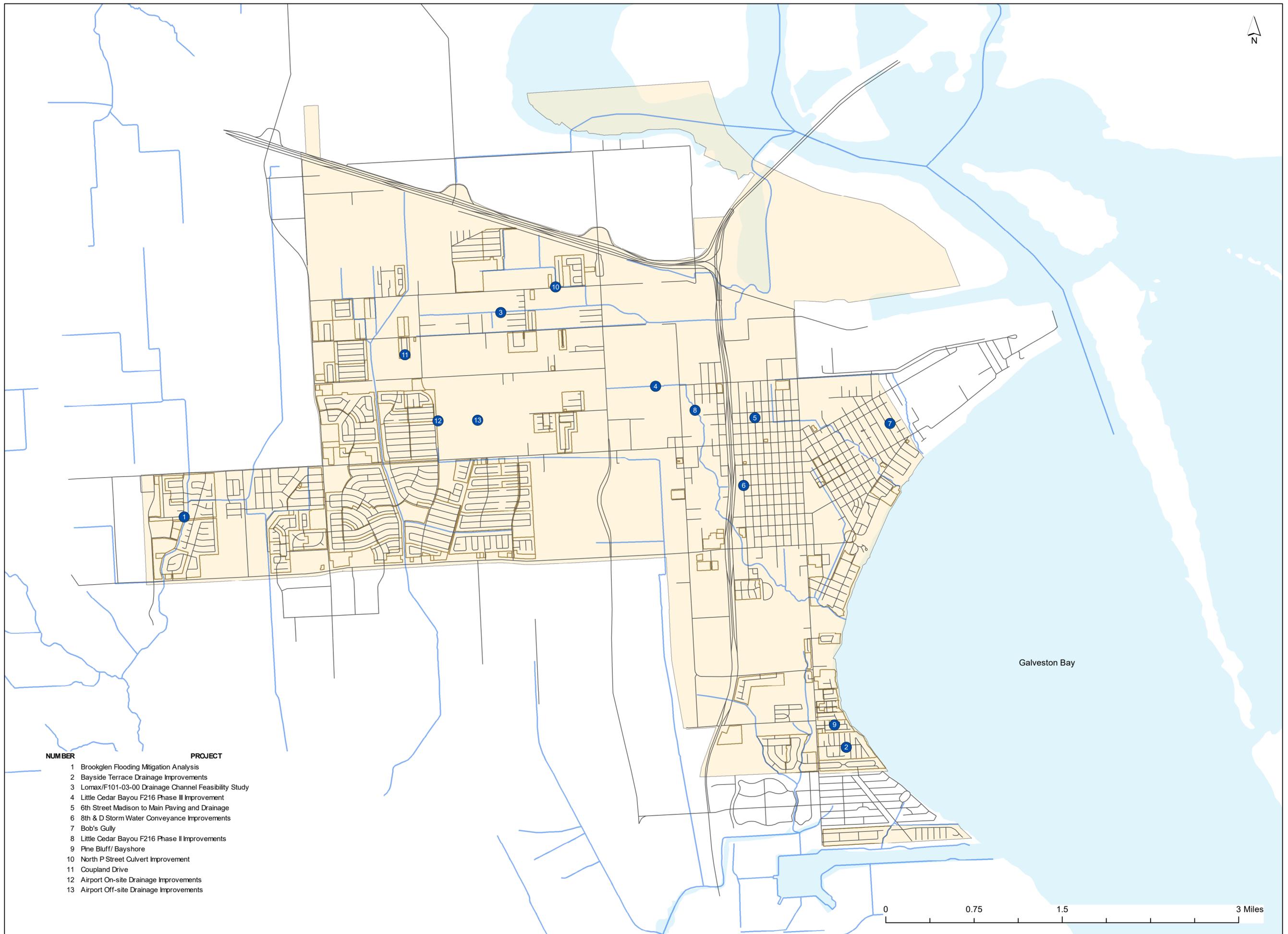
RECOMMENDED MOTION

Approved for Drainage Committee Agenda

Corby D. Alexander, City Manager

Date

The City of La Porte Drainage Projects 2019



DRAINAGE PROJECTS

NO.	PROJECT	DESCRIPTION	Status	Potential Grant Funding	Potential COLP Cost Share	COLP Budgeted	Estimated Completion Date
1	Brookglen Flooding Mitigation Analysis	The 2009 City-wide Drainage Study identifies the Brookglen subdivision as an area with significant drainage/flooding problems, attributed to a mixture of inadequate sewerage and insufficient channel capacity within the B112-00-00 Channel. Compounded improvements recommended within the City-wide Drainage Study could reduce the flood risk within the Brookglen area. This analysis would expand upon the recommendations provided within 2009 study.	Staff working with HCFCD to develop regional solution. HCFCD currently finalizing Technical Update. Staff submitted HMGP grant application for supplemental funding on October 17, 2018. Application pending TDEM selection. Awarded projects are anticipated to begin as early as January 2020.	\$4,000,021.50	\$1,000,005.38	\$275,000.00	March 2022
2	Bayside Terrace Drainage Improvements	Approximately 800 linear feet of RCP pipe, ranging in size from 15" to 24", exists within the Bayside Terrace Subdivision, which has not been properly maintained due to access issues attributed to limited access to infrastructure, provided within a five foot utility easement. Portions of Hamilton Street and Fondren Street utilize this system to convey stormwater to its outfall point of Galveston Bay. The system fails to function properly, causing flooding within the adjacent portion(s) of the subdivision. A proposed drainage study would discuss feasibility of rerouting this flows from the 800 feet of RCP, towards Bayside Dr. and utilizing the existing system within Bayside Dr. to convey the storm water within the existing system.	Staff submitted HMGP grant application for supplemental funding on November 26, 2018. Application pending TDEM selection. Awarded projects are anticipated to begin as early as January 2020.	\$2,200,000.00	\$550,000.00	\$100,000.00	March 2022
3	Lomax/F101-03-00 Drainage Channel Improvements	Harris County Flood Control District's (HCFCD) F101-06-00 Channel system conveys storm water runoff from the Lomax area and ultimately outfalls into Lower San Jacinto Bay. The downstream section of the channel has been improved to ultimate capacity. An existing pipeline corridor, containing several pipelines located at depths ranging from approximately 2' to 18', cross the channel, limiting the depth of potential channel improvements. Moderate/heavy rain events, compounded with backwater conditions from this section of the channel, contributes to wide-spread flooding within the Lomax Area.	Staff submitted HMGP grant application for supplemental funding on November 26, 2018. Application pending TDEM selection. Awarded projects are anticipated to begin as early as January 2020. HCFCD finalizing Technical Update. Staff to receive status update from HCFCD on 7/3/19.	\$3,200,155.00	\$800,038.75	\$150,000.00	March 2022
4	Little Cedar Bayou F216 Phase III Improvements	Phase I and Phase II Improvements to Little Cedar Bayou, from Hwy 146 to Madison, have either been completed or are currently awarded for construction. Phase I and Phase II improvements include, but are not limited to, excavating and disposing off-site soil as required for the new channel alignment, clearing and grubbing, demolition of existing structures, erosion control, and site restoration for approximately 5,533 LF of channel. Approximately 4,680 LF of channel remains unimproved upstream, with those improvements slated to be included within this project, to be considered Phase III. Survey data has been collected on this most upstream section. Routine maintenance of clearing overgrowth, trees, and obstructions; minor erosion control and slope stabilization; and desilting is planned to maintain existing conveyance capacity. Those maintenance operations are projected to begin late 4th quarter 2018 or early 1st quarter 2019 (calendar year). The following Phase III mitigation action is proposed, as recommended within the Hydraulic Analysis for Little Cedar Bayou Watershed HCFCD Unit F216-00-00: lowering the flow line of the Bayou 1 - 2 feet, from W. Madison to Sens Rd. Current channel side slopes would be modified to achieve 3:1 side slopes from W Madison St. to Sens Rd. An estimated 200,000 cubic yards are to be excavated from the channel. Over excavation is provided to yield sufficient storage volume in the pond after siltation and build-up in the pond bottom.	Staff submitted HMGP grant application for supplemental funding on December 20, 2018. Application pending TDEM selection. Awarded projects are anticipated to begin as early as January 2020.	\$2,500,000.00	\$625,000.00	\$825,000.00	March 2022
5	6th Street Madison to Main Paving and Drainage	The segment of 6th St from W. Madison St to W. Main St is considered part of Old La Porte, which was generally noted in the City-Wide Drainage Study as not having sufficient storm sewer capacity due to undersized storm sewer, undersized storm inlets, or not enough storm inlets. RPS-Klotz provided an analysis of the existing storm sewer system and identified problem areas within the project limits. Additional analysis is required to determine most efficient improvement alternative.	Executed contract with GLO effective March 9, 2019 through August 5, 2021. Staff currently negotiating scope of work for design phase services with engineering consultant. Agenda request including recommendation to award preliminary engineering services contract has been prepared for July 8th Council meeting.	\$325,775.30 & \$3,472,757.00	\$125,000.00	\$1,140,000.00	August 2021
6	8th & D Storm Water Conveyance Improvements	The area generally bounded by 8th Street to the west, Main Street to the north, 5th Street to the east, and D Street to the south experiences flooding during heavy rain events due to undersized culverts within the area. Increasing culvert sizes within the area will provide additional conveyance capacity within the existing open ditch system.	Proposed improvements to be completed in phases in-house, contingent upon available funding.	N/A			March 2025
7	Bob's Gully	Obtained drainage easement along East B Street ROW in Morgans Point from Boys and Girls Harbor. Coordinate with Harris County Flood Control & the Army Corp of Engineers to determine maintenance responsibilities. Consultant to provide technical memo analyzing channel capacity.	Notice to Proceed is expected to be issued the 1st week of July.	N/A		\$50,000.00	September 2019

NO.	PROJECT	DESCRIPTION	Status	Potential Grant Funding	Potential COLP Cost Share	COLP Budgeted	Estimated Completion Date
8	Little Cedar Bayou F216 Phase II Improvements	Improvements to Little Cedar Bayou, from Madison Street to 450 feet south of Spencer Highway. Work of the Contract includes, but is not limited to, excavating and disposing off-site approximately 25,984 CY of soil as required for the new channel alignment. Clearing and grubbing, demolition of existing structures, erosion control, and site restoration for approximately 7 acres and planting approximately 400 3-gallon trees. Construction contract awarded to Paskey.	Project is substantially complete.	\$1,337,422.22			June 2019
9	Pine Bluff/ Bayshore	Pine Bluff Subdivision Improvements project includes the reconstruction of streets and storm facilities along Bay Shore Drive, Pine Bluff Street and the lettered streets (A thru F) within the Pine Bluff Subdivision. Construction contract awarded to Angel Bros.	Project is substantially complete.	N/A			April 2019
10	North P Street Culvert Improvement	Using the January 2009 City Wide Drainage Study prepared by Klotz Associates, Inc., Klotz Associates, Inc. provided a report in 2011 analyzing flooding in the Battleground Estates which indicated that flows within segments of the F101 Channel, north of N 'P' Street, rise to a level creating capacity limitations which produce frequent out of banks occurrences. The unimproved upstream channel flows into two forty-two inch (42") corrugated metal pipes (CMP), which feed into the improved two 8' x 10' reinforced concrete boxes downstream. LJA Engineering, Inc. provided Engineering Design Services for the recommended improvements of removing the two upstream forty-two inch (42") corrugated metal pipes and extending the dual 8' x 10' reinforced concrete boxes across N 'P' Street. Construction contract awarded to Paskey.	Project is substantially complete. Pending HCFCO inspection/approval.	N/A			April 2019
11	Coupland Drive	The proposed storm sewer improvements include re-sloping Coupland Drive to drain towards inlets located throughout the subdivision. The inlets will drain into proposed storm sewer ranging in size from 24" to 30" RCP. This storm sewer will then flow underneath the existing roadside ditch along L Street to a combined outfall with the existing roadside ditch to Big Island Slough. The proposed storm sewer underneath the existing ditch on L Street will be 42" RCP and the combined outfall will need to be a 60" RCP. These improvements will result in no net fill within the Big Island Slough 100-year floodplain. The proposed storm sewer was sized for the 5 year storm event, per the City of La Porte drainage criteria.	HDR is awaiting comments from TWDB before beginning 60% design. Construction to be incorporated into Lomax Lift Station Consolidation Project.	N/A		\$1,110,000.00	July 2022
12	Airport Off-site Drainage Improvements	Evaluation of the performance of airport drainage system at the west and north boundaries of the airport to address concerns that the airport drainage system may be overwhelmed, in extreme events, leading to stormwater flowing into neighborhoods adjacent to the airport.	Drainage report completed. Report identified on-site improvements anticipated to reduce off-site runoff.	N/A			December 2019
13	Airport On-site Drainage Improvements	On-site and offsite study determined there is no impact from airport drainage run off to the area north(Lomax) of the airport. The study determined there is impact to the Glen Meadows Subdivision. Onsite detention and increased capacity will be designed to mitigate the impact on Glen Meadows.	Design phase has been completed. Pre-bid meeting scheduled for July 9, 2019.	N/A			December 2019



REQUEST FOR DRAINAGE & FLOODING COMMITTEE AGENDA ITEM

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Department: <u>Public Works</u>
<input checked="" type="radio"/> Report <input type="radio"/> Resolution <input type="radio"/> Ordinance

Appropriation	
Source of Funds:	_____
Account Number:	_____
Amount Budgeted:	_____
Amount Requested:	_____
Budgeted Item:	<input type="radio"/> Yes <input type="radio"/> No

Exhibits: Sens Road construction drawings
LCB Watershed study data
Roseberry Junction Box

SUMMARY

Opportunity to discuss any drainage concerns not covered by previous items.

- Sens Rd/H Street Drainage
- Outfalls along Roseberry

RECOMMENDED MOTION

Approved for Drainage Committee Agenda

Corby D. Alexander, City Manager

Date

POINT	EASTING	NORTHING	ELEV	POINT	EASTING	NORTHING	ELEV
①	3223979.5352	13814948.9246	20.0	⑪	3223489.1989	13814939.7709	16.5
②	3223943.7735	13814979.2762	20.0	⑫	3223471.3062	13814915.9217	16.3
③	3223489.1029	13814954.7936	20.0	⑬	3223474.4998	13814859.6180	16.3
④	3223456.3715	13814917.8768	20.0	⑭	3223494.9461	13814837.9330	16.5
⑤	3223459.8826	13814855.9762	20.0	⑮	3223944.0885	13814864.6822	16.1
⑥	3223495.7287	13814823.9549	20.0	⑯	3223970.1837	13814889.8118	16.1
⑦	3223954.2477	13814849.6266	20.0	⑰	3223473.7017	13814887.8161	16.1
⑧	3223986.1534	13814887.1980	20.0	⑱	3223522.0256	13814890.5290	15.0
⑨	3223963.3284	13814938.7420	15.7	⑲	3223918.0464	13814912.7015	14.6
⑩	3223948.4786	13814961.4678	15.6	⑳	3223955.9144	13814956.6386	14.5



LEGEND:

- PROP. BROKEN CONC. RIPRAP (18") (SEE SHT 52 FOR STORM SEWER AND RIPRAP DETAILS)
- PROP. 5" CONCRETE LINING

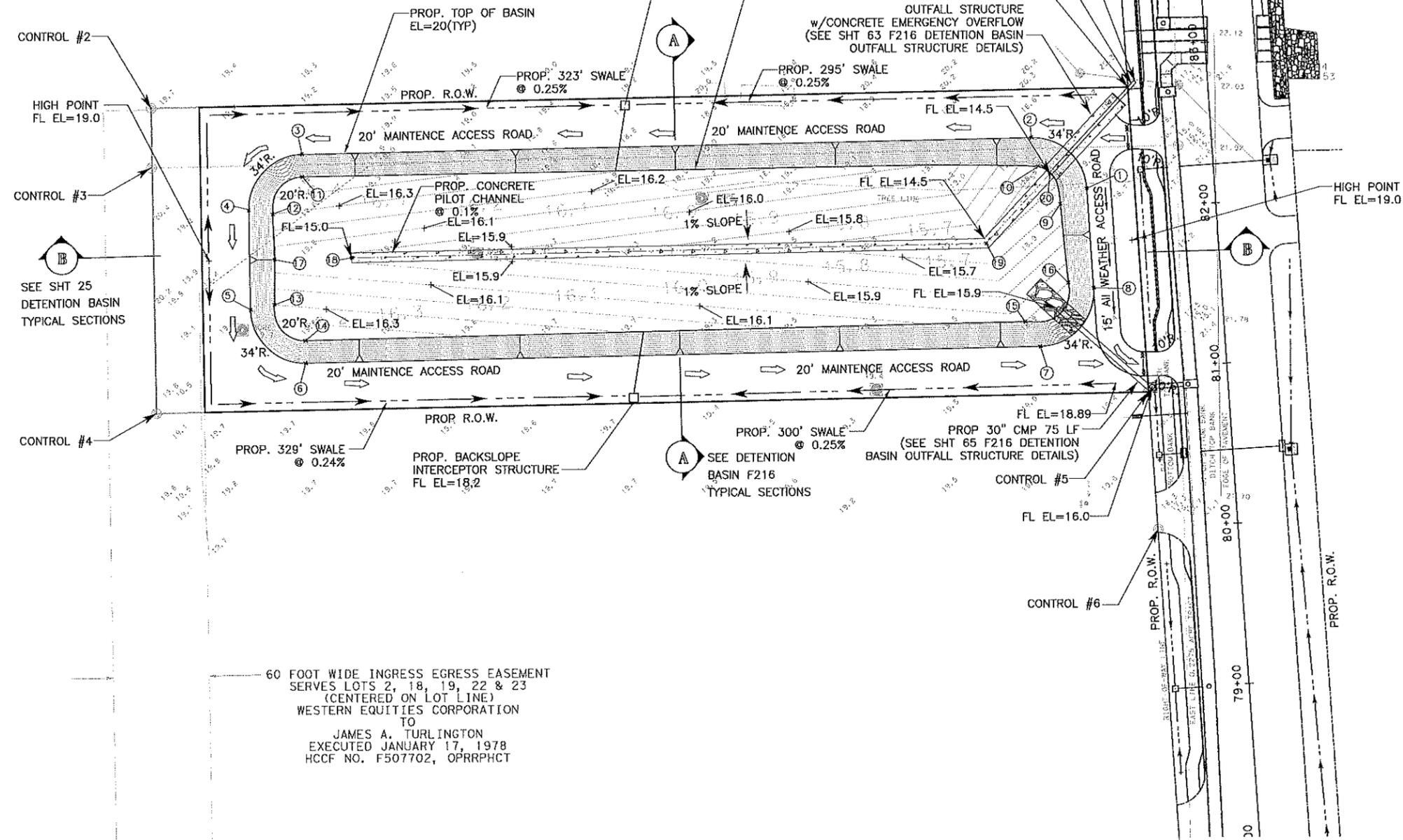
NOTES:

1) THE BASIN IS DESIGNED BASED ON "GEOTECHNICAL ENGINEERING SERVICES REPORT FOR PROPOSED DETENTION BASINS- HCPID A104-07-00 BASIN AND F216-00-00 BASIN", PREPARED BY PIS ON FEB. 8, 2010

POINT #1	EASTING	NORTHING	DESCRIPTION
1	3224002.88	13815012.60	FND
2	3223392.80	13814979.17	FND
3	3223394.38	13814942.02	FND
4	3223403.33	13814789.46	SET
5	3224022.94	13814823.41	SET
6	3224032.26	13814738.30	FND

SENS ROAD		
DETENTION STORAGE REQUIRED	3.5 ACRE-FEET	
DETENTION STORAGE PROVIDED	4.73 ACRE-FEET	
FLOOD EVENT	10% (10-YR)	1% (100-YR)
DESIGN WATER SURFACE ELEVATION	17.4	19.1
DETENTION BASIN MAXIMUM ALLOWABLE OUTFLOW (CFS)	94.6	162.5
DETENTION BASIN MAXIMUM OUTFLOW PROVIDED (CFS)	92.1	162.5

* DETAIL CALCULATION SEE "SENS ROAD & BAY AREA BLVD DRAINAGE ANALYSIS" PREPARED BY R.G. MILLER, INC., DATED NOVEMBER 2009.



60 FOOT WIDE INGRESS EGRESS EASEMENT SERVES LOTS 2, 18, 19, 22 & 23 (CENTERED ON LOT LINE) WESTERN EQUITIES CORPORATION TO JAMES A. TURLINGTON EXECUTED JANUARY 17, 1978 HCCF NO. F507702, OPRRHCT

1"=80'

HCPID A104-07-00
 CAD: Tomasz
 DATE: 3/20/2015
 FILE: \\houffile\bbi\Trans\102301\20130329\Sens_Drainage_Revisions\Drawing\DRDB\F216bas.in.dgn

Designed By:	Job No.:	102301
Drawn By:	Date:	MAR 2015
Checked By:	Scale:	
App.:	Approved By:	

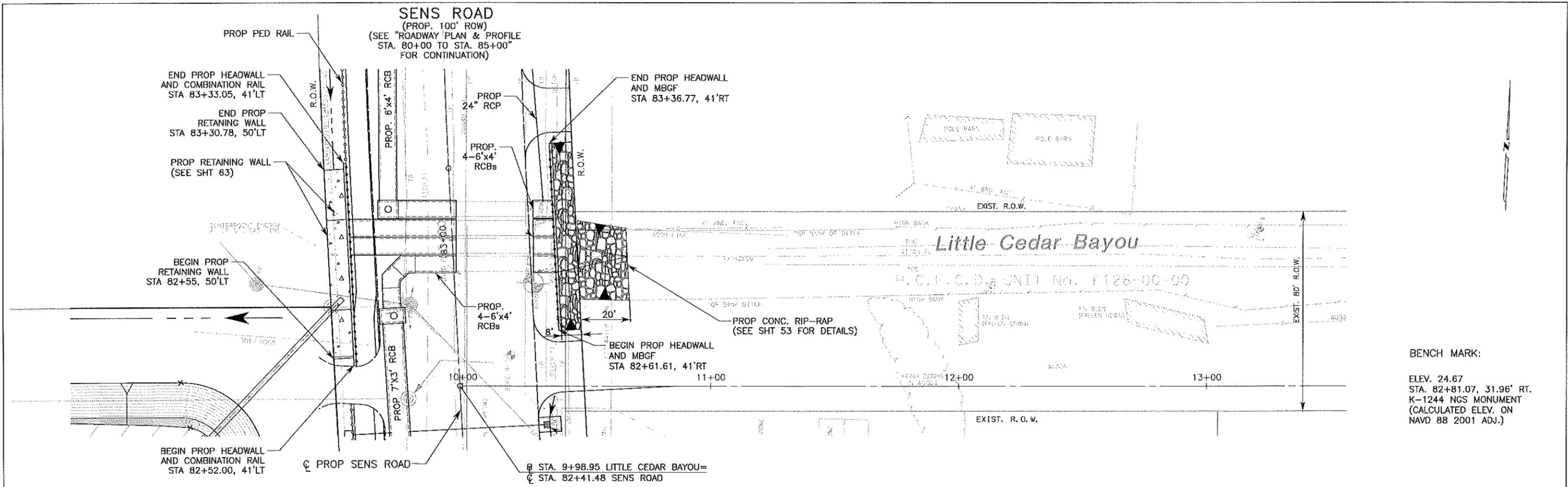


HARRIS COUNTY PUBLIC INFRASTRUCTURE DEPARTMENT ARCHITECTURE AND ENGINEERING DIVISION

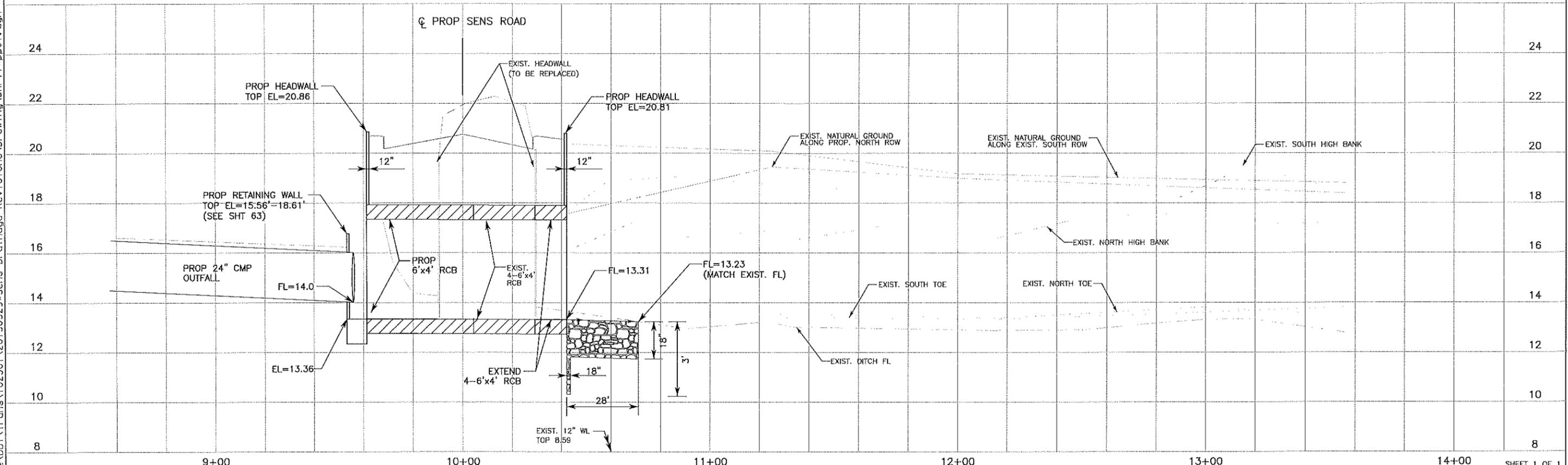
SENS ROAD		Sheet No:
STORM WATER DETENTION BASIN F216		24
		of 268

SENS ROAD

(PROP. 100' ROW)
(SEE "ROADWAY PLAN & PROFILE"
STA. 80+00 TO STA. 85+00"
FOR CONTINUATION)



BENCH MARK:
ELEV. 24.67
STA. 82+81.07, 31.96' RT.
K-1244 NGS MONUMENT
(CALCULATED ELEV. ON
NAVD 88 2001 ADJ.)



HCPID: APIN: 0210200008
 CADOP: Yambtz
 STATUS: 100 percent
 DATE: 3/20/2015
 FILE: \\Houfile\Trans\102301\20130329*Sens Drainage Revisions\DRPY1*pp01.dgn
 11:44:46 AM

Rev.	Date	Description	App.	Approved By:

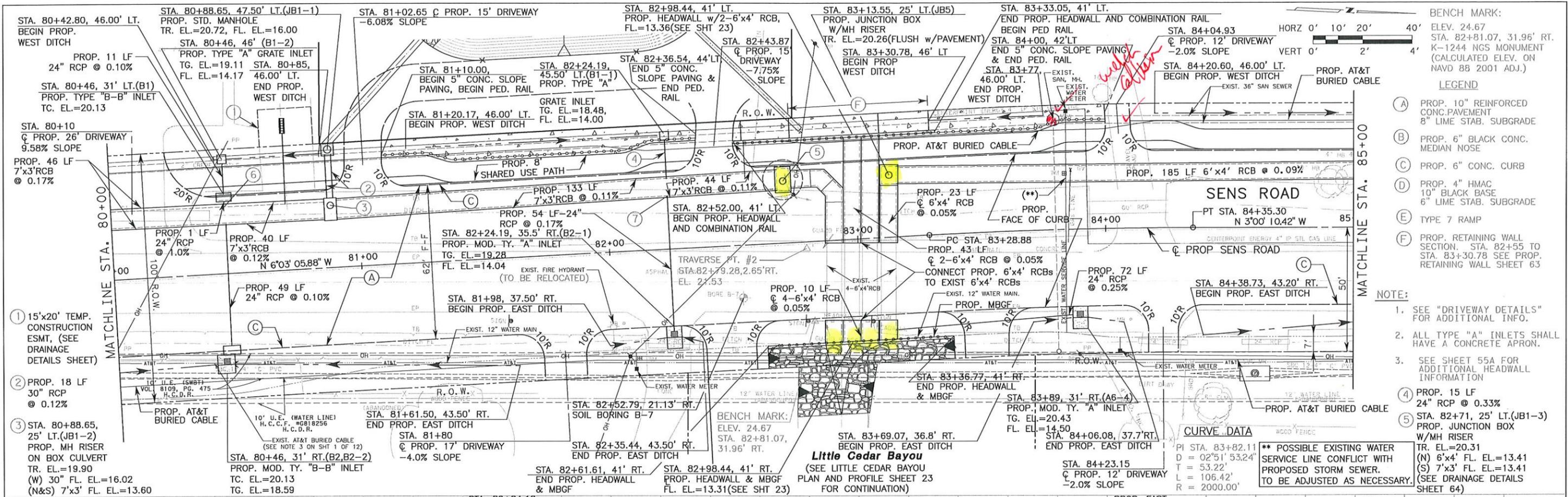
Job No.: 102301 Date: MAR 2015 Scale:		<p>Binkley & Barfield, Inc. consulting engineers Texas Registration Number F-257</p>
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HARRIS COUNTY PUBLIC
INFRASTRUCTURE DEPARTMENT
ARCHITECTURE AND
ENGINEERING DIVISION

LITTLE CEDAR BAYOU
HCFC UNIT NO. F126-00-00

PLAN AND PROFILE

SHEET 1 OF 1
Sheet No: 23
of 268

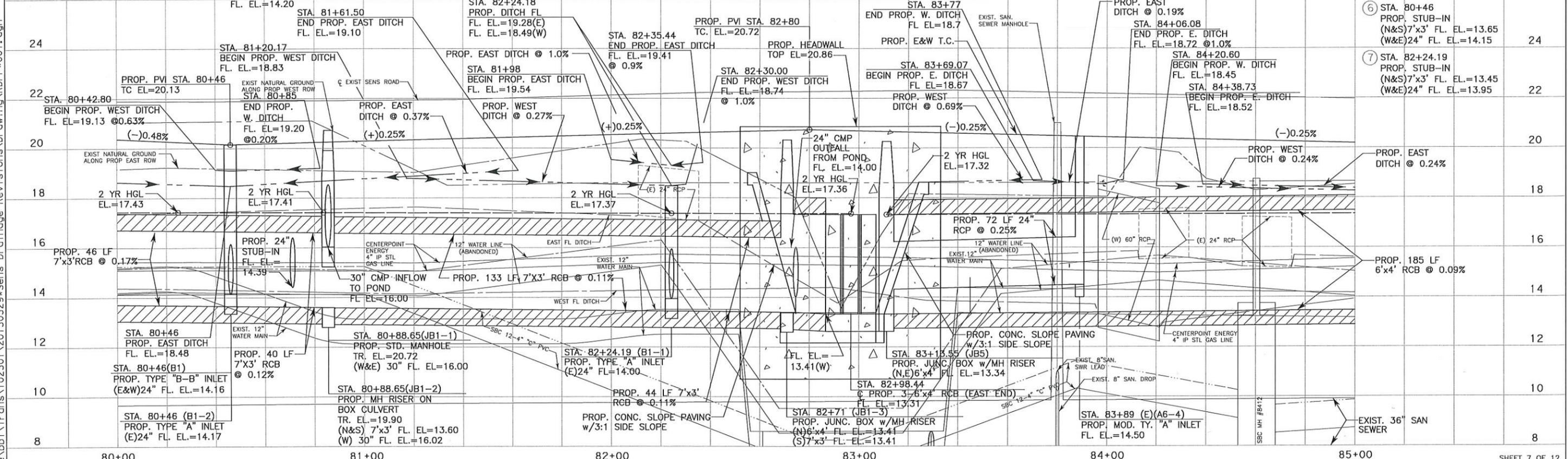


BENCH MARK:
 ELEV. 24.67
 STA. 82+81.07, 31.96' RT.
 K-1244 NGS MONUMENT
 (CALCULATED ELEV. ON
 NAVD 88 2001 ADJ.)

- LEGEND**
- (A) PROP. 10" REINFORCED CONC. PAVEMENT 8" LIME STAB. SUBGRADE
 - (B) PROP. 6" BLACK CONC. MEDIAN NOSE
 - (C) PROP. 6" CONC. CURB
 - (D) PROP. 4" HMAC 10" BLACK BASE 6" LIME STAB. SUBGRADE
 - (E) TYPE 7 RAMP
 - (F) PROP. RETAINING WALL SECTION. STA. 82+55 TO STA. 83+30.78 SEE PROP. RETAINING WALL SHEET 63
- NOTE:**
1. SEE "DRIVEWAY DETAILS" FOR ADDITIONAL INFO.
 2. ALL TYPE "A" INLETS SHALL HAVE A CONCRETE APRON.
 3. SEE SHEET 55A FOR ADDITIONAL HEADWALL INFORMATION
 4. PROP. 15 LF 24" RCP @ 0.33%
 5. STA. 82+71, 25' LT. (JB1-3) PROP. JUNCTION BOX W/MH RISER TR. EL.=20.31 (N) 6'x4' FL. EL.=13.41 (S) 7'x3' FL. EL.=13.41 (SEE DRAINAGE DETAILS SHEET 64)

CURVE DATA

PI STA. 83+82.11	** POSSIBLE EXISTING WATER SERVICE LINE CONFLICT WITH PROPOSED STORM SEWER. TO BE ADJUSTED AS NECESSARY.
D = 02°51' 53.24"	
T = 53.22'	
L = 106.42'	
R = 2000.00'	



Rev.	Date	Description	App.	Approved By:

Designed By:	Job No.:	102301
Drawn By:	Date:	MAR 2015
Checked By:	Scale:	

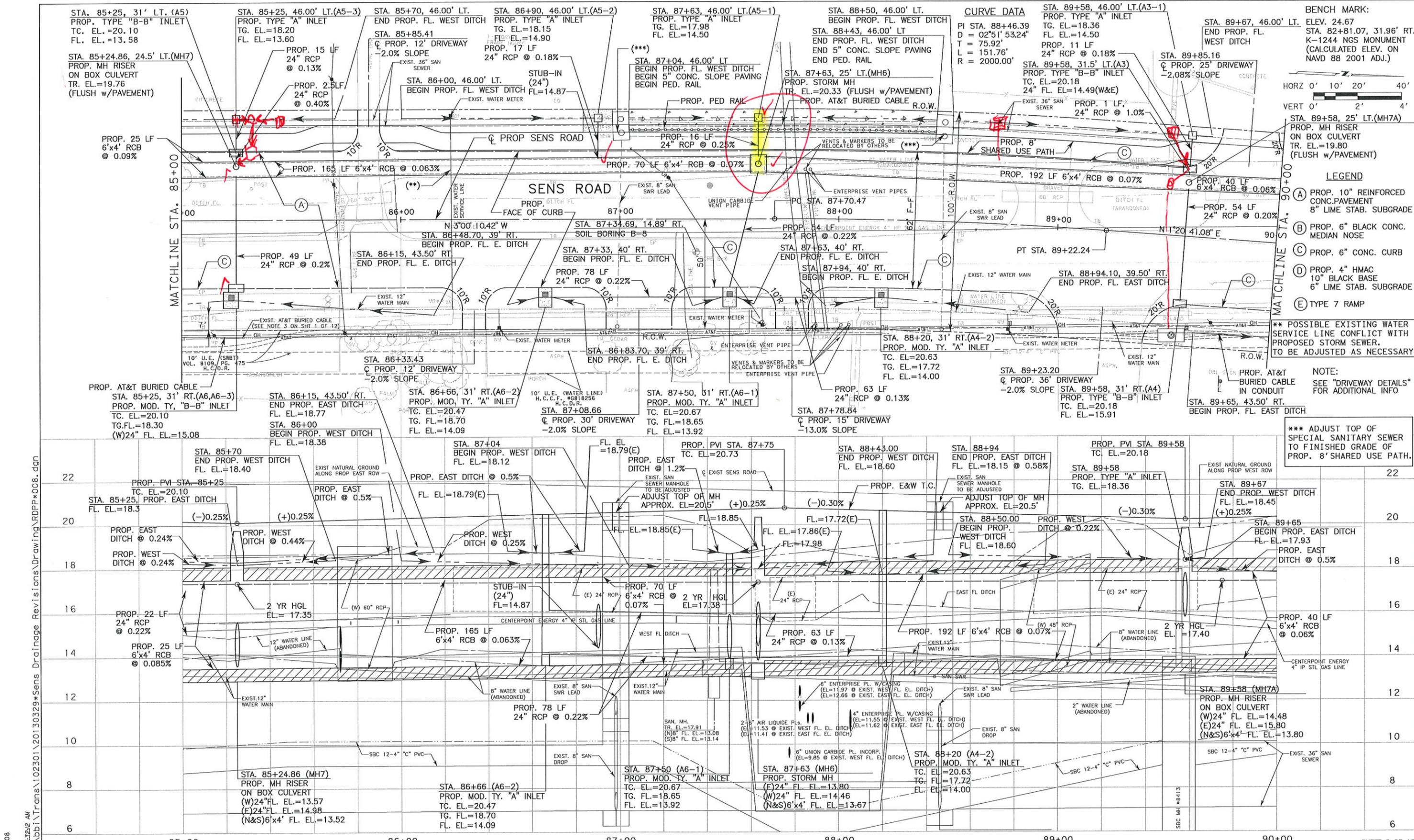
Binkley & Barfield, Inc.
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HARRIS COUNTY PUBLIC INFRASTRUCTURE DEPARTMENT
ARCHITECTURE AND ENGINEERING DIVISION

SENS ROAD
 ROADWAY PLAN & PROFILE
 STA. 80+00 TO STA. 85+00

Sheet No:
17
 of 268

HCPID APIN: 0210200008
 CADD: fcmbriz
 STATUS: 100 percent
 DATE: 3/20/2015
 FILE: \\houf1\trans\102301\20130329*SENS Drainage Revisions\Drawing\RDPP*007.dgn



BENCH MARK:
 STA. 82+81.07, 31.96' RT.
 K-1244 NGS MONUMENT
 (CALCULATED ELEV. ON
 NAVD 88 2001 ADJ.)
 ELEV. 24.67

CURVE DATA
 PI STA. 88+46.39
 D = 02°51'53.24"
 T = 75.92'
 L = 151.76'
 R = 2000.00'

LEGEND

- (A) PROP. 10" REINFORCED CONC. PAVEMENT
- (B) PROP. 6" BLACK CONC. MEDIAN NOSE
- (C) PROP. 6" CONC. CURB
- (D) PROP. 4" HMAC 10" BLACK BASE 6" LIME STAB. SUBGRADE
- (E) TYPE 7 RAMP

NOTE:
 ** POSSIBLE EXISTING WATER SERVICE LINE CONFLICT WITH PROPOSED STORM SEWER. TO BE ADJUSTED AS NECESSARY.

NOTE:
 SEE "DRIVEWAY DETAILS" FOR ADDITIONAL INFO

NOTE:
 *** ADJUST TOP OF SPECIAL SANITARY SEWER TO FINISHED GRADE OF PROP. 8" SHARED USE PATH.

HCPID APIN: 0210200008
 CADD: fambiz
 STATUS: 100 PERCENT
 DATE: 3/20/2015
 FILE: \\houfile\bb\Trans\102301\20130329*Sens Drainage Revisions\Drawing\RDPP*008.dgn

Rev.	Date	Description	App.	Approved By:

Job No.: 102301
 Date: MAR 2015
 Scale:
 Designed By:
 Drawn By:
 Checked By:
 Approved By:

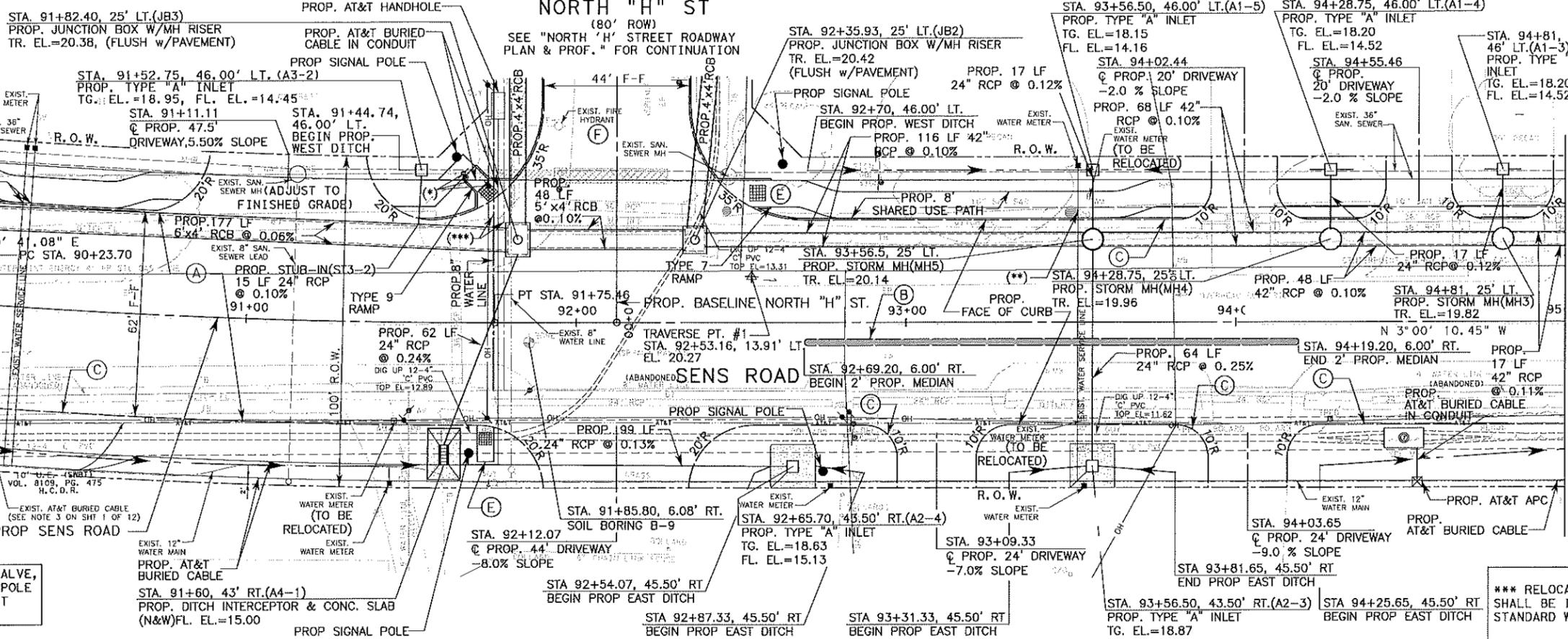

Binkley & Barfield, Inc.
 consulting engineers
 Texas Registration Number F-257

HARRIS COUNTY PUBLIC
 INFRASTRUCTURE DEPARTMENT
 ARCHITECTURE AND
 ENGINEERING DIVISION

SENS ROAD
 ROADWAY PLAN & PROFILE
 STA. 85+00 TO STA. 90+00

Sheet No: 18
 of 268

CURVE DATA
 PI STA. 90+99.62
 D = 02°51' 53.24"
 T = 75.92'
 L = 151.76'
 R = 2000.00'



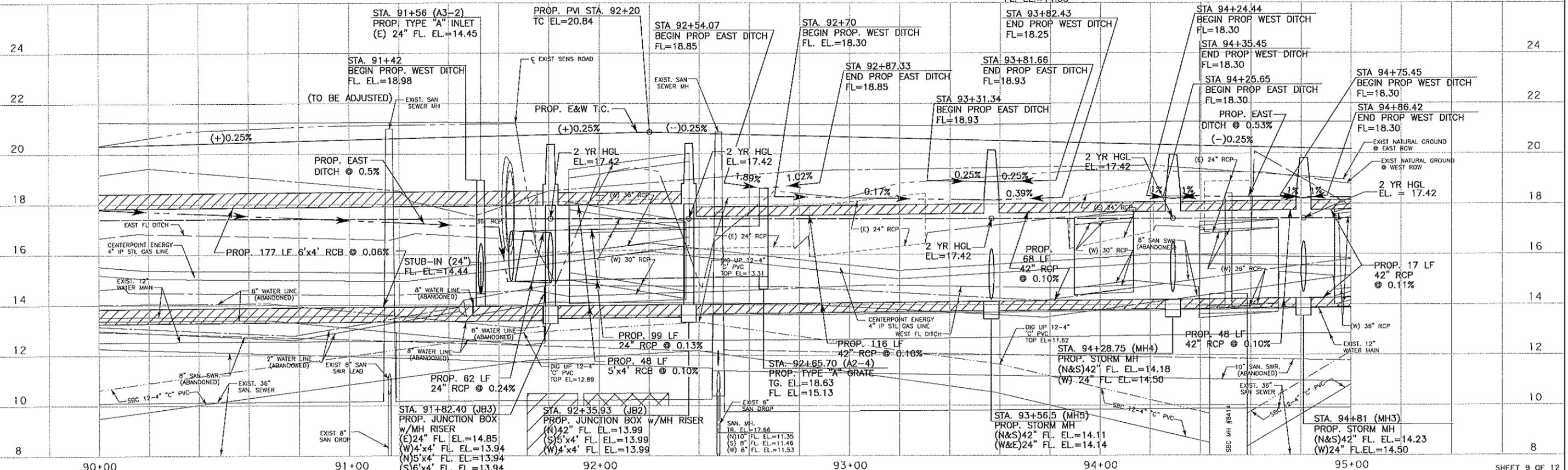
BENCH MARK:
 ELEV. 24.67, STA. 82+81.07, 31.96' RT.
 K-1244 NGS MONUMENT (CALCULATED ELEV. ON NAVD 88 2001 ADJ.)

LEGEND
 (A) PROP. 10" REINFORCED CONC. PAVEMENT 8" LIME STAB. SUBGRADE
 (B) PROP. 6" BLACK CONC. MEDIAN NOSE
 (C) PROP. 6" CONC. CURB
 (D) PROP. 4" HMAC 10" BLACK BASE 6" LIME STAB. SUBGRADE
 (E) TYPE 7 RAMP
 (F) FH TO BE RELOCATED TO 3 LF FROM PROP. PAVEMENT

- NOTE:**
- SEE "DRIVEWAY DETAILS" FOR ADDITIONAL INFO.
 - ALL TYPE "A" INLETS SHALL HAVE A CONCRETE APRON.

* RELOCATE EXIST WATER VALVE, FIRE HYDRANT, AND POWER POLE AS NECESSARY TO CONSTRUCT TYPE 9 RAMP.

*** RELOCATE EXISTING WATERLINE. WATERLINE SHALL BE INSTALLED PER CITY OF LA PORTE STANDARD WATERLINE DETAILS, SHEETS 63-63A.



Rev.	Date	Description	App.	Approved By:

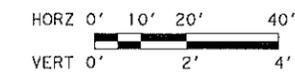
Designed By: _____
 Drawn By: _____
 Checked By: _____
 Job No.: 102301
 Date: MAR 2015
 Scale: _____



HARRIS COUNTY PUBLIC
 INFRASTRUCTURE DEPARTMENT
 ARCHITECTURE AND
 ENGINEERING DIVISION

SHEET 9 OF 12
 SENS ROAD
 ROADWAY PLAN & PROFILE
 STA. 90+00 TO STA. 95+00
 Sheet No: 19
 of 268

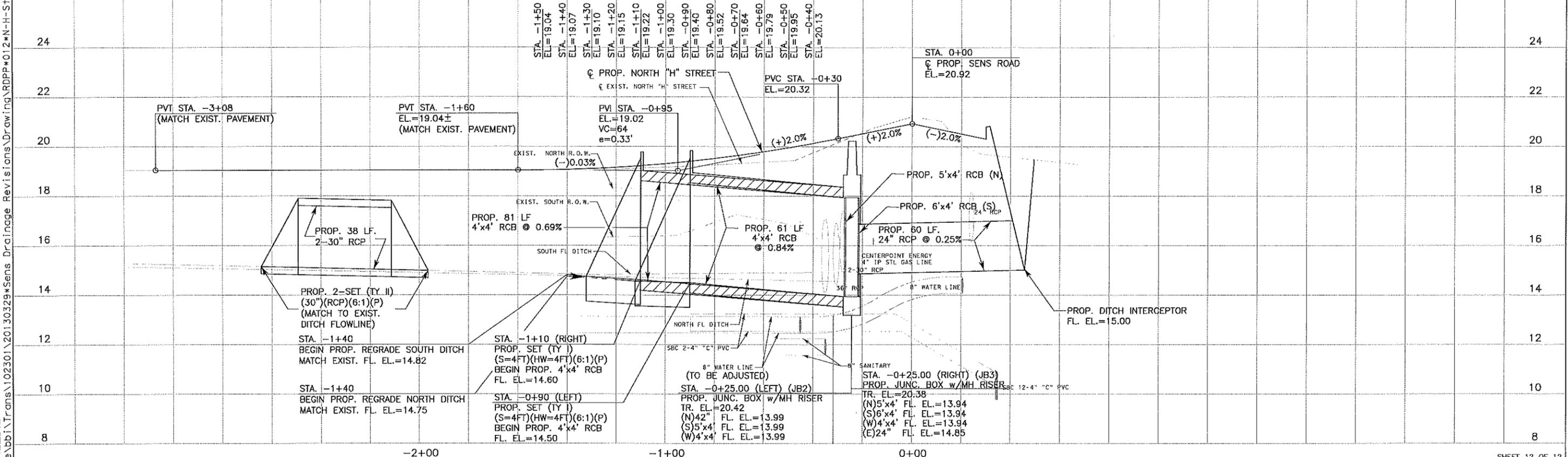
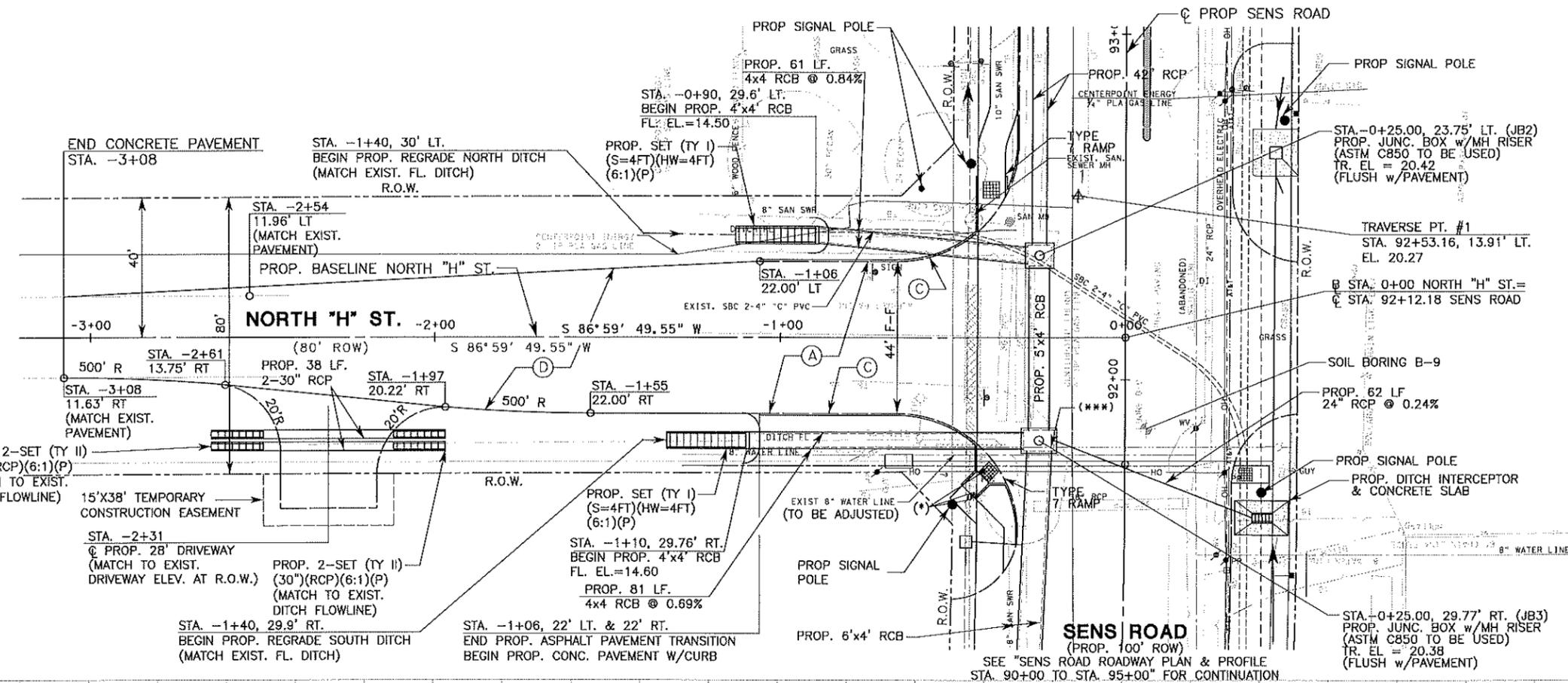
BENCH MARK:
 TBM #2 - ELEV. 24.53
 STA. 82+81.07, 31.96' RT.
 K-1244 NGS MONUMENT
 (CALCULATED ELEV. ON NAVD 88 2001 ADJ.)



- LEGEND**
- (A) PROP. 10" REINFORCED CONC. PAVEMENT
 - (B) PROP. 6" BLACK CONC. MEDIAN NOSE
 - (C) PROP. 6" CONC. CURB
 - (D) 3" HOT MIX ASPHALT

* RELOCATE EXIST WATER VALVE, FIRE HYDRANT, AND POWER POLE AS NECESSARY TO CONSTRUCT TYPE 9 RAMP.

*** CONTRACTOR SHALL FIELD VERIFY LOCATION OF EXISTING WATERLINE. WATERLINE SHALL BE ADJUSTED PER CITY OF HOUSTON TYPICAL STEEL PIPE OFFSET SECTION FOR WATER LINES (DWG NO. 02511-01).



HCPID AP LNS 0210200008
 CADOP: Fambritz
 STATUS: 60 percent
 DATE: 3/20/2015
 FILE: \\Houf\jlebb\Trans\102301\20130329*Sens Drainage Revisions\Drawing\RDPP*012*N-H-St.dgn

Rev.	Date	Description	App.	Approved By:

Job No.: 102301
 Date: MAR 2015
 Scale:

Binkley & Barfield, Inc.
 consulting engineers
 Texas Registration Number F-257

HARRIS COUNTY PUBLIC
 INFRASTRUCTURE DEPARTMENT
 ARCHITECTURE AND
 ENGINEERING DIVISION

NORTH H STREET
 ROADWAY PLAN & PROFILE
 STA. 0+00 TO END

Sheet No: 22
 of 268

VIII. CONCLUSIONS

The proposed improvements analyzed in this report show that significant flood control benefits will be gained with the implementation of the proposed channel improvements and linear detention pond upstream of SH 146. The first project, which includes improvements up to the Southern Pacific Railroad (SPRR), will reduce the 100 year water surface elevation by more than a foot (1.46') and will reduce the 100 year top width by as much as 3,354' at West Barbour's Cut Boulevard. This project is estimated to cost approximately \$2 million.

The second project analyzed in this report included improving the channel all the way to Sens Road. This project produced the same results up to SPRR as the first project. Upstream of SPRR the 100 year water surface elevation is reduced an additional 0.31' over the first project at Sens Road, and the 100 year top width is reduced more than the first project by more than 950' downstream of Sens Road. The second project is estimated to cost approximately \$3.2 million. Table 1, following this page, summarizes the flood control benefits and construction costs of the plans discussed in this report.

Based on the standard analysis techniques and rainfall patterns used in this study, the proposed improvements presented in this report will produce no adverse effects on the Little Cedar Bayou Watershed, or adjoining areas.

**Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
(with Improvements to SPRR)**

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
0	3.3	-0.02	3.28	137.22	-0.08	137.14
0	4.57	-0.03	4.54	141.35	-0.08	141.27
		0			0	
528	3.96	-0.02	3.94	154.08	-0.26	153.82
528	5.22	-0.02	5.2	168.39	-0.28	168.11
		0			0	
1818	6.38	-0.03	6.35	126.57	-0.3	126.27
1818	7.65	-0.03	7.62	142.8	-0.32	142.48
		0			0	
1903	6.53	-0.02	6.51	102.46	-0.08	102.38
1903	7.82	-0.02	7.8	109.6	-0.15	109.45
		0			0	
1953	6.57	-0.03	6.54	102.58	-0.08	102.5
1953	7.87	-0.02	7.85	109.92	-0.16	109.76
		0			0	
1990	6.58	-0.02	6.56	102.62	-0.08	102.54
1990	7.89	-0.03	7.86	110.01	-0.15	109.86
		0			0	
2040	6.62	-0.03	6.59	102.74	-0.08	102.66
2040	7.94	-0.03	7.91	110.31	-0.16	110.15
		0			0	
2910	7.2	-0.03	7.17	130.51	-0.28	130.23
2910	8.68	-0.03	8.65	144.55	-0.3	144.25
		0			0	
3660	8.11	-0.03	8.08	98.38	-1.15	97.23
3660	9.61	-0.03	9.58	143.32	-1.05	142.27
		0			0	
4240	8.88	-0.04	8.84	86.63	-0.31	86.32
4240	10.51	-0.04	10.47	189.43	-3.97	185.46
		0			0	
4778	9.97	-0.04	9.93	65.42	-0.3	65.12
4778	11.53	-0.04	11.49	268.39	-11.68	256.71
		0			0	
5555	11.23	-0.04	11.19	79.46	-0.26	79.2
5555	12.79	-0.03	12.76	1308.62	-16.42	1292.2
		0			0	
5616	11.27	-0.04	11.23	85.07	-0.24	84.83
5616	12.82	-0.03	12.79	1321.96	-15.45	1306.51
		0			0	
5828	11.31	-0.05	11.26	87.28	-0.25	87.03
5828	12.86	-0.03	12.83	1076.98	-14.47	1062.51
		0			0	
5864	11.31	-0.04	11.27	87.01	-0.25	86.76
5864	12.86	-0.03	12.83	92	0	92
		0			0	
5904	11.31	-0.04	11.27	86.47	-0.26	86.21
5904	12.86	-0.03	12.83	92	0	92
		0			0	
5940	11.32	-0.05	11.27	86.49	-0.26	86.23

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Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
BASE represents the updated base model which includes survey sections to Sens Road.
PRO represents the proposed model which includes improvements up to SPRR.

**Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
(with Improvements to SPRR)**

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
5940	12.87	-0.03	12.84	1081.56	-14.41	1067.15
		0			0	
6151	11.34	-0.05	11.29	88.21	-0.27	87.94
6151	12.9	-0.03	12.87	1096.47	-14.89	1081.58
		0			0	
6274	11.35	-0.05	11.3	87.96	-0.27	87.69
6274	12.91	-0.03	12.88	542.15	-44.98	497.17
		0			0	
6696	11.41	-0.04	11.37	78.44	-0.25	78.19
6696	12.98	-0.03	12.95	388.96	-34.63	354.33
		0			0	
6746	11.46	-0.04	11.42	99.29	-0.21	99.08
6746	13.05	-0.03	13.02	428.27	-30.91	397.36
		0			0	
6840	11.5	-0.05	11.45	99.18	-0.2	98.98
6840	13.15	-0.04	13.11	482.04	-28.02	454.02
		0			0	
6889	11.49	-0.05	11.44	78.73	-0.27	78.46
6889	13.13	-0.03	13.1	535.8	-56.38	479.42
		0			0	
6959	11.51	-0.04	11.47	81.82	-0.28	81.54
6959	13.16	-0.03	13.13	475.79	-18.24	457.55
		0			0	
7434	11.64	-0.04	11.6	77.4	-0.28	77.12
7434	13.3	-0.03	13.27	301.95	-8.35	293.6
		0			0	
7494	11.65	-0.04	11.61	64.14	-0.23	63.91
7494	13.31	-0.04	13.27	296.74	-9.02	287.72
		0			0	
7514	11.65	-0.04	11.61	58.11	-0.21	57.9
7514	13.3	-0.03	13.27	281.94	-10.2	271.74
		0			0	
7534	11.65	-0.05	11.6	54.38	-0.19	54.19
7534	13.29	-0.03	13.26	274.88	-10.2	264.68
		0			0	
7899	11.7	-0.04	11.66	52.92	-0.19	52.73
7899	13.36	-0.03	13.33	65.12	-0.24	64.88
		0			0	
7947	11.76	-0.05	11.71	90.78	-2.6	88.18
7947	13.43	-0.04	13.39	304.21	-3.34	300.87
		0			0	
7992	12.16	-0.06	12.1	51	0	51
7992	14.43	-0.07	14.36	577.29	-22.39	554.9
		0			0	
8019	12.23	-0.05	12.18	137	0	137
8019	14.51	-0.07	14.44	298.78	-17.11	281.67
		0			0	
8254	12.3	-0.06	12.24	158.81	-3.06	155.75

* * * S H N B F R 1 4 6
 P A R K W A Y
 F A I R M O N T

Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
 BASE represents the updated base model which includes survey sections to Sens Road.
 PRO represents the proposed model which includes improvements up to SPRR.

**Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
(with Improvements to SPRR)**

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)			
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO	
S H 1 4 6 * M S B F R Y	8254	14.7	-0.07	14.63	168.11	-0.27	167.84
			0			0	
	8304	12.28	-0.06	12.22	129.23	-1.13	128.1
	8304	14.68	-0.07	14.61	567.8	-33.6	534.2
			0			0	
	8349	12.7	-0.08	12.62	79.83	-1.42	78.41
	8349	15.79	-0.11	15.68	1048.78	-28.82	1019.96
			0			0	
	8432	12.74	-0.07	12.67	142.36	-2.36	140
	8432	15.8	-0.11	15.69	1052.08	-28.7	1023.38
	8461		NA	12.66		NA	73.1
	8461		NA	15.68		NA	1203.77
8712	12.9	-0.11	12.79	80.33	206.46	286.79	
8712	15.86	-0.11	15.75	1303.81	-54.47	1249.34	
		0			0		
10012	14.43	-1.62	12.81	77.32	164.08	241.4	
10012	16.49	-0.73	15.76	177.98	83.98	261.96	
10900		NA	12.84		NA	214.12	
10900		NA	15.78		NA	234.63	
11124		NA	12.85		NA	132.95	
11124		NA	15.78		NA	153.62	
11174	15.18	-2.36	12.82	88.66	-41.57	47.09	
11174	16.98	-1.22	15.76	624.37	-507.74	116.63	
		0			0		
11327	15.28	-2.29	12.99	53.78	-6.63	47.15	
11327	17.04	-1.22	15.82	125.6	-49.68	75.92	
		0			0		
12098	15.91	-2.04	13.87	52.75	-9.96	42.79	
12098	17.51	-1.29	16.22	473.29	-413.44	59.85	
		0			0		
12198	15.96	-1.97	13.99	60.12	-15.26	44.86	
12198	17.55	-1.27	16.28	525.57	-452.98	72.59	
		0			0		
12248	15.98	-1.95	14.03	52.23	-7.32	44.91	
12248	17.56	-1.25	16.31	365.4	-295.23	70.17	
		0			0		
12280	16	-1.98	14.02	38.84	-10.92	27.92	
12280	17.6	-1.31	16.29	92.53	-42.9	49.63	
		0			0		
12382	16.01	-1.97	14.04	39.25	-11.27	27.98	
12382	17.6	-1.3	16.3	92.79	-42.63	50.16	
		0			0		
12414	16.07	-1.96	14.11	43.41	3.6	47.01	

Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
BASE represents the updated base model which includes survey sections to Sens Road.
PRO represents the proposed model which includes improvements up to SPRR.

Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
 (with Improvements to SPRR)

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
12414	17.62	-1.24	16.38	330.6	-269.99	60.61
		0			0	
12464	16.14	-1.98	14.16	71.48	-19.38	52.1
12464	17.71	-1.3	16.41	311.6	-236.64	74.96
		0			0	
12564	16.17	-1.97	14.2	56.72	-10.81	45.91
12564	17.72	-1.29	16.43	368.3	-303.46	64.84
		0			0	
13864	17.1	-2	15.1	37.54	9.82	47.36
13864	18.46	-1.46	17	70.96	-12.17	58.79
		0			0	
14246	17.29	-1.94	15.35	244.4	-203.31	41.09
14246	18.6	-1.42	17.18	2983.51	-2802.14	181.37
		0			0	
15321	17.48	-1.59	15.89	586.71	-505.23	81.48
15321	18.64	-1.14	17.5	3208.19	-2599.13	609.06
		0			0	
15371	17.49	-1.58	15.91	27	0	27
15371	18.64	-1.15	17.49	3212.01	-3184.84	27.17
		0			0	
15400	17.53	-1.59	15.94	27	0	27
15400	18.82	-1.21	17.61	3381.29	-3354.12	27.17
		0			0	
15450	17.56	-1.57	15.99	722.42	-634.88	87.54
15450	18.82	-1.14	17.68	3382.52	-2252.94	1129.58
		0			0	
15635	17.58	-1.52	16.06	241.45	-196.11	45.34
15635	18.82	-1.1	17.72	1649.06	-1377.03	272.03
		0			0	
15685	17.59	-1.52	16.07	242.57	-202.96	39.61
15685	18.83	-1.1	17.73	1650.88	-1377.17	273.71
		0			0	
15725	17.66	-1.5	16.16	261.08	-221.29	39.79
15725	18.83	-0.98	17.85	1658.65	-1333.07	325.58
		0			0	
15775	17.67	-1.5	16.17	260.12	-210.67	49.45
15775	18.83	-0.98	17.85	1655.92	-1331.15	324.77
		0			0	
16110	17.93	-1.64	16.29	40.03	-1.58	38.45
16110	18.97	-1.04	17.93	331.41	-273.13	58.28
		0			0	
16620	18.08	-1.61	16.47	92.39	-57.23	35.16
16620	19.1	-1.01	18.09	358.93	-266.22	92.71
		0			0	
16670	18.09	-1.61	16.48	39.28	-4.07	35.21
16670	19.1	-1	18.1	41.88	-2.56	39.32
		0			0	
16739	18.12	-1.63	16.49	39.4	-4.19	35.21
16739	19.21	-1.01	18.2	42.16	-2.6	39.56

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Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
 BASE represents the updated base model which includes survey sections to Sens Road.
 PRO represents the proposed model which includes improvements up to SPRR.

**Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
(with Improvements to SPRR)**

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
		0			0	
16789	18.13	-1.63	16.5	105.74	-70.5	35.24
16789	19.22	-1.01	18.21	397.65	-269.1	128.55
		0			0	
16821	18.13	-1.62	16.51	106.47	-71.22	35.25
16821	19.22	-1.01	18.21	400.54	-270.16	130.38
		0			0	
16855	18.12	-1.61	16.51	42.07	-17.91	24.16
16855	19.23	-1.04	18.19	2433.16	-2390.12	43.04
		0			0	
18094	18.67	-0.72	17.95	39.91	-9.44	30.47
18094	19.41	-0.27	19.14	2146.62	-1144.5	1002.12
		0			0	
18874	18.92	-0.52	18.4	36.5	-5.27	31.23
18874	19.65	-0.15	19.5	43.11	-1.25	41.86
		0			0	
18934	18.94	-0.5	18.44	22.22	-0.2	22.02
18934	19.68	-0.14	19.54	22.52	-0.06	22.46
		0			0	
18939	18.96	-0.5	18.46	20.3	0	20.3
18939	19.72	-0.15	19.57	741.91	-197.85	544.06
		0			0	
18963	18.96	-0.49	18.47	20.3	0	20.3
18963	19.74	-0.15	19.59	790	-179.6	610.4

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Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
BASE represents the updated base model which includes survey sections to Sens Road.
PRO represents the proposed model which includes improvements up to SPRR.

APPENDIX B
ATTACHMENT B-4

Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
 (with Improvements to Sens)

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
8254	14.7	-0.07	14.63	168.11	-0.27	167.84
		0			0	
8304	12.28	-0.06	12.22	129.23	-1.13	128.1
8304	14.68	-0.07	14.61	567.8	-33.6	534.2
		0			0	
8349	12.7	-0.08	12.62	79.83	-1.42	78.41
8349	15.79	-0.11	15.68	1048.78	-28.82	1019.96
		0			0	
8432	12.74	-0.07	12.67	142.36	-2.36	140
8432	15.8	-0.11	15.69	1052.08	-28.7	1023.38
8461		NA	12.66		NA	73.1
8461		NA	15.68		NA	1203.77
8712	12.9	-0.11	12.79	80.33	206.46	286.79
8712	15.86	-0.11	15.75	1303.81	-54.47	1249.34
		0			0	
10012	14.43	-1.62	12.81	77.32	164.08	241.4
10012	16.49	-0.73	15.76	177.98	83.98	261.96
10900		NA	12.84		NA	214.12
10900		NA	15.78		NA	234.63
11124		NA	12.85		NA	132.95
11124		NA	15.78		NA	153.62
11174	15.18	-2.36	12.82	88.66	-41.57	47.09
11174	16.98	-1.22	15.76	624.37	-507.74	116.63
		0			0	
11327	15.28	-2.29	12.99	53.78	-6.63	47.15
11327	17.04	-1.22	15.82	125.6	-49.68	75.92
		0			0	
12098	15.91	-2.04	13.87	52.75	-9.96	42.79
12098	17.51	-1.29	16.22	473.29	-413.44	59.85
		0			0	
12198	15.96	-1.97	13.99	60.12	-15.26	44.86
12198	17.55	-1.27	16.28	525.57	-452.98	72.59
		0			0	
12248	15.98	-1.95	14.03	52.23	-7.32	44.91
12248	17.56	-1.25	16.31	365.4	-295.23	70.17
		0			0	
12280	16	-1.98	14.02	38.84	-10.92	27.92
12280	17.6	-1.31	16.29	92.53	-42.9	49.63
		0			0	
12382	16.01	-1.97	14.04	39.25	-11.27	27.98
12382	17.6	-1.3	16.3	92.79	-42.63	50.16
		0			0	
12414	16.07	-1.96	14.11	43.41	3.6	47.01

Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
 BASE represents the updated base model which includes survey sections to Sens Road.
 PRO represents the proposed model which includes improvements up to Sens.

**Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
(with Improvements to Sens)**

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
12414	17.62	-1.24	16.38	330.6	-269.99	60.61
		0			0	
12464	16.14	-1.98	14.16	71.48	-19.38	52.1
12464	17.71	-1.3	16.41	311.6	-236.64	74.96
		0			0	
12564	16.17	-1.97	14.2	56.72	-10.81	45.91
12564	17.72	-1.29	16.43	368.3	-303.46	64.84
		0			0	
13864	17.1	-2	15.1	37.54	9.82	47.36
13864	18.46	-1.46	17	70.96	-12.17	58.79
		0			0	
14246	17.29	-1.94	15.35	244.4	-203.31	41.09
14246	18.6	-1.42	17.18	2983.51	-2802.14	181.37
		0			0	
15321	17.48	-1.59	15.89	586.71	-505.23	81.48
15321	18.64	-1.14	17.5	3208.19	-2599.13	609.06
		0			0	
15371	17.49	-1.58	15.91	27	0	27
15371	18.64	-1.15	17.49	3212.01	-3184.84	27.17
		0			0	
15400	17.53	-1.59	15.94	27	0	27
15400	18.82	-1.21	17.61	3381.29	-3354.12	27.17
		0			0	
15450	17.56	-1.57	15.99	722.42	-634.88	87.54
15450	18.82	-1.14	17.68	3382.52	-2252.94	1129.58
		0			0	
15635	17.58	-1.52	16.06	241.45	-196.11	45.34
15635	18.82	-1.1	17.72	1649.06	-1377.03	272.03
		0			0	
15685	17.59	-1.52	16.07	242.57	-202.96	39.61
15685	18.83	-1.1	17.73	1650.88	-1377.17	273.71
		0			0	
15725	17.66	-1.5	16.16	261.08	-221.29	39.79
15725	18.83	-0.98	17.85	1658.65	-1333.07	325.58
		0			0	
15775	17.67	-1.5	16.17	260.12	-210.67	49.45
15775	18.83	-0.98	17.85	1655.92	-1331.15	324.77
		0			0	
16110	17.93	-1.64	16.29	40.03	-1.58	38.45
16110	18.97	-1.04	17.93	331.41	-273.13	58.28
		0			0	
16620	18.08	-1.61	16.47	92.39	-57.23	35.16
16620	19.1	-1.01	18.09	358.93	-266.22	92.71
		0			0	
16670	18.09	-1.61	16.48	39.28	-4.07	35.21
16670	19.1	-1	18.1	41.88	-2.56	39.32
		0			0	
16739	18.12	-1.63	16.49	39.4	-4.19	35.21
16739	19.21	-1.01	18.2	42.16	-2.6	39.56

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Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
 BASE represents the updated base model which includes survey sections to Sens Road.
 PRO represents the proposed model which includes improvements up to Sens.

Water Surface Elevation and Top Width Comparison
Updated Base Model vs Proposed Model
 (with Improvements to Sens)

SECNO	Water Surface Elevation (ft.)			Top Width (ft.)		
	BASE	Δ PRO-BASE	PRO	BASE	Δ PRO-BASE	PRO
		0			0	
16789	18.13	-1.63	16.5	105.74	-70.5	35.24
16789	19.22	-1.01	18.21	397.65	-269.1	128.55
		0			0	
16821	18.13	-1.62	16.51	106.47	-71.22	35.25
16821	19.22	-1.01	18.21	400.54	-270.16	130.38
		0			0	
16855	18.12	-1.62	16.5	42.07	-14.13	27.94
16855	19.23	-1.02	18.21	2433.16	-2358.21	74.95
		0			0	
18094	18.67	-1.16	17.51	39.91	-11.07	28.84
18094	19.41	-0.52	18.89	2146.62	-2101.35	45.27
		0			0	
18874	18.92	-0.97	17.95	36.5	-3.98	32.52
18874	19.65	-0.42	19.23	43.11	0.49	43.6
		0			0	
18934	18.94	-0.97	17.97	22.22	-0.39	21.83
18934	19.68	-0.43	19.25	22.52	-0.17	22.35
		0			0	
18939	18.96	-0.97	17.99	20.3	0	20.3
18939	19.72	-0.46	19.26	741.91	-620.97	120.94
		0			0	
18963	18.96	-0.96	18	20.3	0	20.3
18963	19.74	-0.46	19.28	790	-564.72	225.28

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Notes: Each SECNO listed represents the 10- and 100-year storms, respectively.
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 PRO represents the proposed model which includes improvements up to Sens.



24" RCP

18" RCP