

11301 Fallbrook Drive, Suite 320
Houston, Texas 77065
832-678-2110 Fax 832-678-2115

April 21, 2022

Steven Loo, P.E.
Managing Engineer
City of Houston Public Works
Street & Bridge Maintenance
Transportation & Drainage Operations

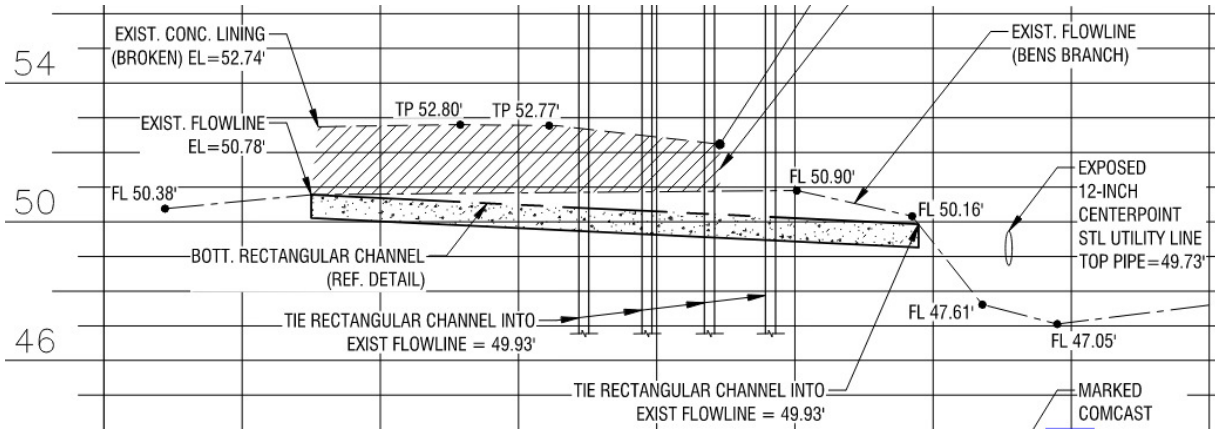
Subject: Report of Findings
Tree Lane Bridge
CSF Project No. 4624

Mr. Loo:

CSF Consulting, LP, was engaged to perform a topographic survey of the Tree Lane bridge to establish a condition assessment of the rip rap that has failed underneath the bridge. Additionally, we are to provide the preliminary design for remedial repair of failed concrete rip rap along with upstream improvement of the channel. A cost estimate is included for the proposed remedial repairs.

Attached to this report is a topographic survey that provides the information used to determine remedial repair of rip rap under the bridge.

Based on elevation information gathered and an inspection of the conditions at the bridge, we have determined that the main cause of failure is the undermining of the bridge rip rap by the water flow in the bayou. The below figure is a profile of the existing conditions of flow under the bridge. Basically, the flow line on the upstream side of the bridge almost matches the downstream side. Typically, this is not a problem, but at the bridge location, there was to be a drop of two feet from upstream to downstream where the drop of two feet occurs just outside the bridge plan downstream side. The flow line of the stream has dropped several hundred feet back of the upstream side of the bridge and now nearly matches the downstream flow line of the bridge. Thus, in doing so, it has undermined all the concrete rip rap in the interior section of the bayou and along its east bank as well. The hatch area in the flowing figure indicates the void created under the rip rap.



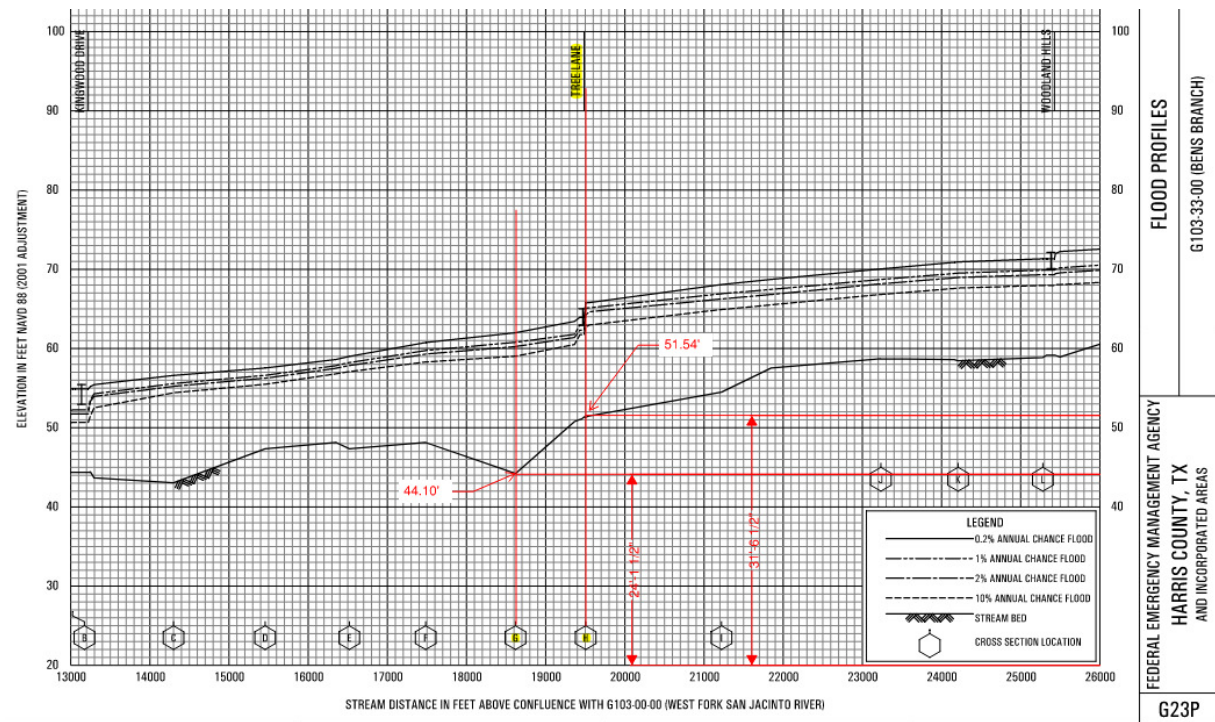
Profile of Bayou Both Existing and Proposed



Photograph Looking Upstream

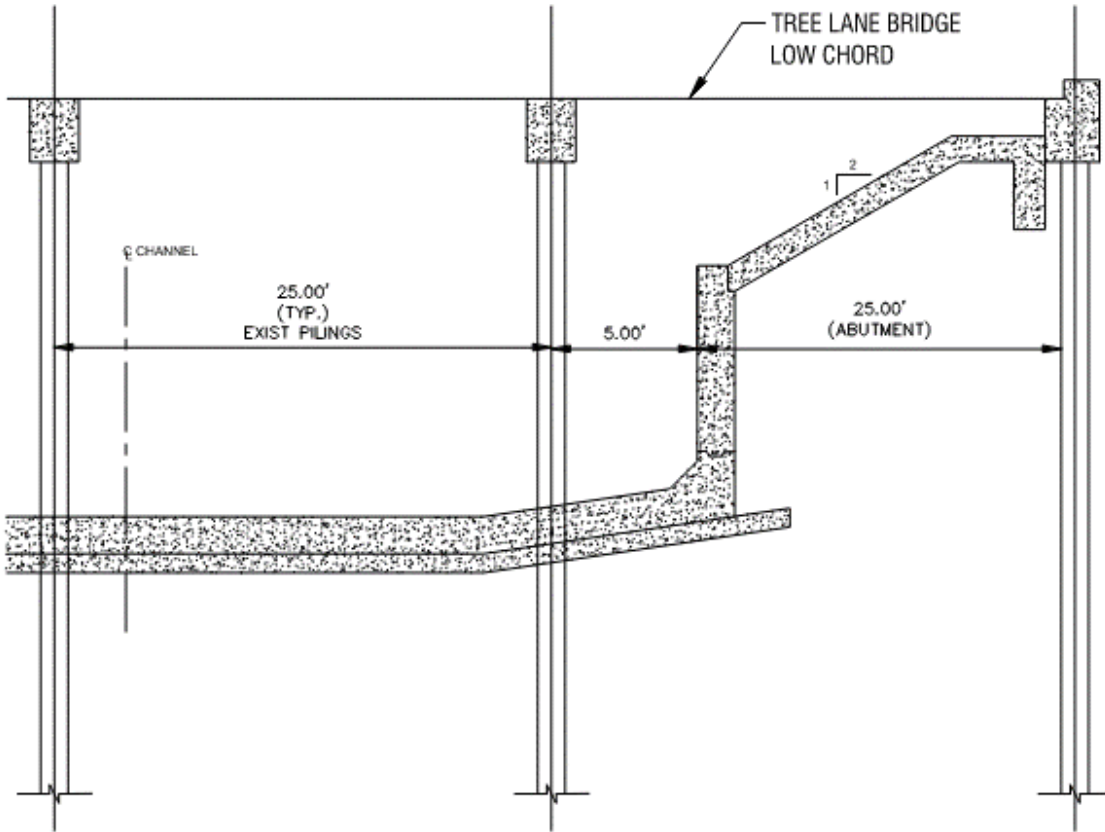
The photograph of the view looking upstream, clearly shows the flow of water under the concrete rip rap and void under the concrete rip rap.

The proposed remedial repair is to remove the concrete rip rap as it exists and install a new concrete channel that will maintain the new flow line that was formed by the bayou. The channel would have a 2-foot, U-shaped section, that will allow for keeping the current side slopes of the bridge at the abutments, while allowing the current flow line to continue. It would be an extreme condition to raise the flow line of the bayou back to its original position. Below is profile of the ditch as it was recorded that indicates the drop right at the Tree Lane bridge.



FEMA FLOOD Profile G103-33-00 Bens Branch

As indicated in the profile, the elevation of the flow line should be at 51.54 feet. The flow line determined by our topographic survey is 50.50 feet, indicating a drop in the flow line.



SECTION A-A
TYPICAL RECTANGULAR CONCRETE
CHANNEL LINING HALF SECTION

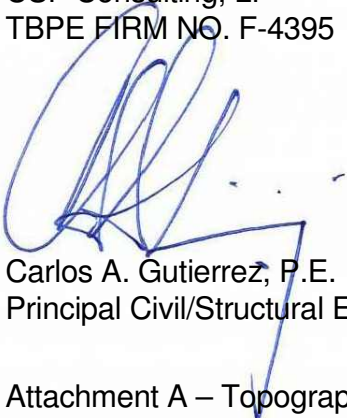
The figure above shows the proposed U-shaped channel that will hold the current side slopes of the bridge and allow for the drop in the flow line.

The cost for the proposed remedial repair is \$717,459. A breakdown of the proposed cost is in Attachment C to this report. Preliminary schematic drawings for remedial repair are also attached and are in Attachment B.

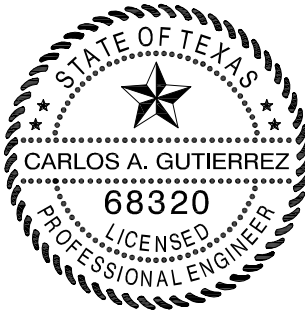
Thank you for allowing us to provide you this service.

Sincerely,

CSF Consulting, LP
TBPE FIRM NO. F-4395



Carlos A. Gutierrez, P.E.
Principal Civil/Structural Engineer



Attachment A – Topographic Survey

Attachment B – Schematic Drawings for Analysis

S1 Bridge Plan with Remedial Repair Limits

S2 Proposed Schematic Repair Plan Profile and Section

Attachment C – Construction Cost Estimate

ATTACHMENT A

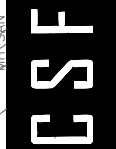
Topographic Survey

ATTACHMENT B

Schematic Drawings for Analysis

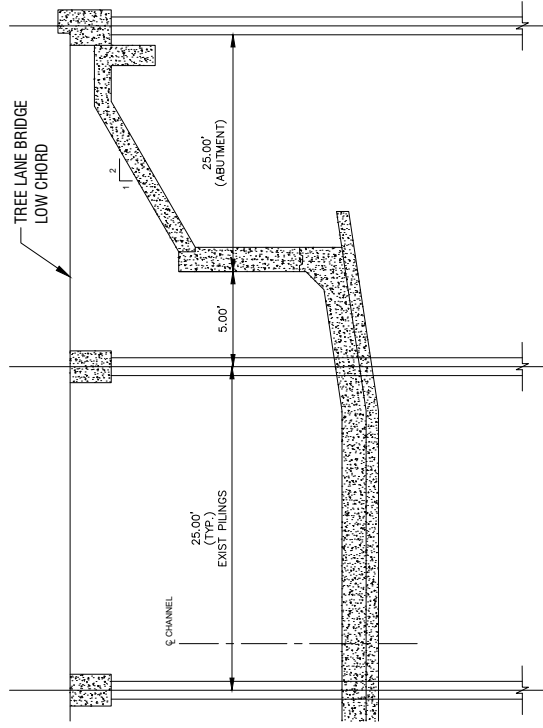
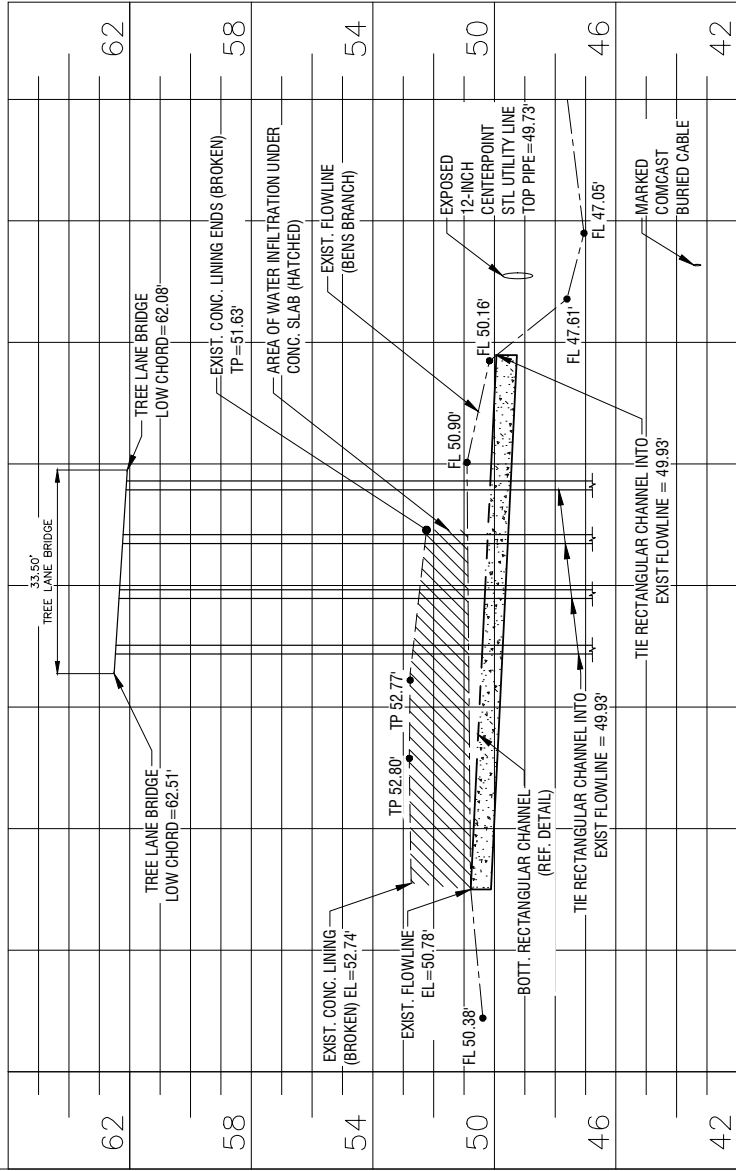


PROJECT TITLE: TREE LN BRIDGE SHEET TITLE: PROPOSED SCHEMATIC REPAIR PLAN	PROJ. NO. 4624 DRAWN BY: SJM SCALE: 1:20	SHEET: S1 CHKD BY: CAG DATE: 4/20/22
	CIVIL • STRUCTURAL • FORENSIC ENGINEERING & SURVEYING 11301 FALLBROOK DR., SUITE 320 HOUSTON, TX, 77065 832.678.2110 FAX: 832.678.2115 TBPE FIRM NO. F-4385	

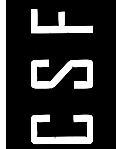


NOTE:
 BRIDGE LAYOUT SHOWN FROM ORIGINAL PLAN(S)
 FRIENDSWOOD DEVELOPMENT COMPANY
 KINGWOOD DEVELOPMENT
 CONSTRUCTION PLANS FOR TREE LANE BRIDGE
 TOMAS J. SANCHEZ
 CONSULTING ENGINEER
 HOUSTON, TEXAS
 DATED NOVEMBER, 1975

TREE LANE BRIDGE (BENS BRANCH) PROFILE



SECTION A-A
TYPICAL RECTANGULAR CONCRETE
CHANNEL LINING HALF SECTION



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PROJECT TITLE: **TREE LN BRIDGE**
SHEET TITLE: **PROPOSED SCHEMATIC
REPAIR PLAN**

PROJ. NO.: 4624
DRAWN BY: SJM
SCALE: H1:20, V1:4
CHKD BY: CAG
DATE: 4/20/22
SHE: **S2**
REV

ATTACHMENT C

Construction Cost Estimate

Tree Lane Remedial Repair Concrete Rip Rap
City Of Houston

Preliminary
CSF Consulting LP

Item No.	Spec Ref	Item Description	Unit Measure	Phase 1 Tree Lane Bridge Concrete Rip Rap		Phase II Tree Lane Bridge Concrete Rip Rap		Total Unit Quantity	Unit Price (this column controls)	Total in Figures

UNIT PRICE TABLE FOR SWPPP

1	01570	Gravel Bag Barrier	LF	200				200	\$ 2.00	\$ 400
2	01570	Filter Fabric Fence	LF	500				500	\$ 3.00	\$ 1,500
3	01570	Sheet Pile Diversion of Channel Temporary	SF	2800			1000	3800	\$ 70.00	\$ 266,000
									SWPPP Items Subtotal	\$ 267,900

UNIT PRICE TABLE FOR TRAFFIC CONTROL PLAN

3	01555	Mobilization	EA					1	\$ 3,000.00	\$ 3,000
4	01555	Temporary Barrier Barrels	LF	200			200	400	\$ 65.00	\$ 26,000
5	01555	Traffic control and regulation	LS					1	\$ 8,000.00	\$ 8,000
									Traffic Control Plan Items Subtotal	\$ 37,000

UNIT PRICE TABLE FOR MATERIAL & EQUIPMENT

Item No.	Spec Ref	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in Figures	
6	02215	Misc Earthwork	CY	269.6	\$ 65.00	\$ 17,526	
7	02221	Demolition Existing Concrete	SY	416	\$ 75.00	\$ 62,400	
8	27525	Saw Cutting	LF	68	\$ 15.00	\$ 1,020	
9	*400	Cement Stabilize Backfill	CY	138.3	\$ 40.00	\$ 11,063	
10		Broken Stone Rip Rap	SF	3600.0	\$ 7.50	\$ 27,000	
11	*420	Concrete Rip Rap /U Shape Channel and Footings	CY	154.5	\$ 950.00	\$ 293,550	
						Material & Equipment Items Subtotal	\$ 412,559

SUBTOTAL SWPPP ITEMS \$ 267,900
 SUBTOTAL TRAFFIC CONTROL PLAN ITEMS \$ 37,000
 SUBTOTAL MATERIAL & EQUIPMENT ITEMS \$ 412,559

TOTAL \$ 717,459