

Mr. Hannan, P.E., CFM  
Page 2  
February 5, 2014

Gully. The flow through the golf course split reach was estimated based on calibrating the water surface elevations in the split reach at the upstream end of the reach where the flow from Brickhouse Gully would enter the reach (i.e. river station 4319.499 in the split reach and river station 31683.4 in the Golf Course reach).

For all flood profiles in the model, the revisions in this request tie back to effective model flood profile elevations downstream of Clay Road to the downstream end of the model. The flood profiles in the revised Corrected Effective model are reduced from Clay Road to the upstream limits of the model based on the flow across the golf course that is being accounted for in the revised model.

The following attachments related to the paragraphs above are included with this letter:

- Attachment 1 - Water Surface Elevation Comparison Tables (100-year)
- Attachment 2 - Revised Steady Flow Data for Split Reach Model
- Attachment 3 - Comparison Tables between Split Reach and Brickhouse Gully Main Stem (10-year, 50-year, 100-year, and 500-year)
- Revised Annotated FIRM
- Revised LOMR Work Map

#### Floodway Model

For the floodway plan run, the floodway plan flows were adjusted based on the flow through Pine Crest Golf Course as described above. Encroachment stations were defined across the split reach to define the floodway for the split reach representing the significant overflows through the Pine Crest Golf Course. The encroachment stations for Brickhouse Gully were not modified from the effective model. Floodway comparison tables (Attachment 4) for the Effective and Corrected Effective models are included with this letter.

2. **Comment:** Please provide justification for the changes in manning's n and explain based on your XP model.

**Response:** The manning's n values were modified in the right overbank areas of the Brickhouse Gully model from river stations 32382.3 to 26768.1 to reflect the existing land use in these areas. The commercial and residential areas between Brickhouse Gully and Gessner Road were given a manning's n of 0.99 based on how the commercial and residential structures will restrict conveyance in these areas. Gessner Road right-of-way was given a manning's n of 0.015. The Pine Crest golf course area was given a manning's n value of 0.05 as the golf course grasses are cut relatively short in regular golf course maintenance and allow for less obstructed flow than in typical overbank areas.

3. **Comment:** During our review of the submitted model, we found that the flow is not contained within the cross section for cross sections 32382.3 through 25717.2, 25569.5, 25168.3, and 24912.8 through 23509.6. Please extend the cross sections to contain the flow or map that area as overflow.

APPENDIX A - p. 23

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**Response:** Cross sections within the LOMR revision area have been extended or cut to points with elevations containing the 100-year WSE within the cross sections. The LOMR revision area is from river station 32382.3 to 26768.1. Ineffective areas were extended for the extended cross sections where applicable. Cross sections outside the revision area have not been revised. A revised 100-year WSE comparison and Corrected Effective HEC-RAS output is included in the Response to Comments. The revised S\_XS shapefile is included with this submittal.

4. **Comment:** Please provide the GIS shapefiles as mentioned in the HCFCFCD GIS Standards document that can be found at: <http://www.hcfcd.org/M3/Default.asp>

**Response:** We have carefully reviewed the Harris County Flood Control District Engineering and Construction Division Development Services guide, GIS Standards Document, and have revised and provided shapefiles accordingly.

We look forward to your approval of our submittal. For your convenience, we have included an .mxd file with the shapefile included to help expedite your review. Upon your approval, we will send hard copies of the submittal with the Community Acknowledgement forms.

Sincerely,



Eric Lisenbe, P.E., CFM

EDL/  
P:\PROJECTS\SR0060\006\General\Letters\Response\_to\_LOMR\_Review\_Comments 080113.doc  
Enclosures



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Texas Board of Professional Engineers Registration No. F-439

March 12, 2014

Mr. Ataul Hannan, P.E., CFM  
Harris County Flood Control District  
Engineering and Construction Division  
9900 Northwest Fwy.,  
Houston, Texas 77092

Re: Response to Comments for LOMR for Brickhouse Gully;  
City of Houston  
Brickhouse Gully (E115-00-00)

Dear Mr. Hannan:

Below are our responses to the second HCFCD courtesy review comments for the LOMR for Brickhouse Gully dated March 4, 2014.

1. **Comment:** Please provide us documentation of how you calculated the flow of the new defined channel through the golf course.

**Response:** The original effective flows in the effective Brickhouse Gully model were balanced between Brickhouse Gully and the newly defined split reach through the golf course. The flows in the channel through the golf course were calculated based on a calibration of water surface elevations. The calibration location was where the flow leaves Brickhouse Gully at Gessner Drive and overflows to the golf course reach.

For example, for the 100-year event, HEC-RAS calculates a water surface elevation of 94.47 at the upstream end of the golf course reach. Flows in Brickhouse Gully were reduced by 850 cfs from river station 31836 (where the overflow occurs at Gessner) to river station 26924 (where the flow through the golf course re-enters the system). The water surface elevation calculated at river station 31836 is 94.43. This is within a tenth of a foot of the corresponding water surface elevation in the split reach. Calibrations were made to within a tenth of a foot for the 10-year, 50-year, 100-year, and 500-year profiles. See Attachment 3 with this letter.

A slight revision to the steady flow data was made to the models in this response from the previous submittal. The river station where flows began to be reduced in the main stem is now river station 31836 (immediately downstream of Gessner) instead of river station 31967 (upstream of Gessner) based on where the overflow occurs. Updated comparison tables and models are included with this letter.

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Texas Board of Professional Engineers Registration No. F-439

Mr. Hannan, P.E., CFM

Page 2

March 12, 2014

2. **Comment:** Please provide documentation of how the flow is entering and exiting the channel in the golf course.

**Response:** The channel overflows at Gessner Drive and enters the golf course on the western boundary of the golf course and Gessner Drive. The flow re-enters Brickhouse Gully through a concrete overflow structure approximately 175 feet south of where Brickhouse Gully crosses Clay Road.

3. **Comment:** Please provide documentation that there is a defined flow path through the new channel in the golf course.

**Response:** Attached is an exhibit from the City of Houston Geographic Information Systems (GIMS) website showing sheetflow patterns in the LOMR revision area. The exhibit shows there are well-defined sheetflow paths down Gessner and through the golf course lake system. As discussed in the response to comment 2 above, flow enters the golf course channel on the western boundary of the golf course with Gessner Drive.

4. **Comment:** The corrected effective model shows flow in the E115-09-00 channel adjacent to the golf course but the area has not been mapped in the floodplain. Please end your cross section at the high berm dividing the golf course and E115-09-00 or show the mapped flood area for E115-00-00.

**Response:** Agree. The high berm of the golf course separates the floodplain from E115-00-00 from the floodplain of E115-09-00 which is mapped as a backwater from E115-00-00 further downstream. We have adjusted our cross-sections accordingly.

5. **Comment:** Please provide a topographic workmap certified by a registered professional engineer that shows boundary delineations of the post-project floodplains and floodway, boundary delineations of the effective floodplains and floodway, cross sections, flow line, contours, scale, and north arrow.

**Response:** We will revise our LOMR workmap to include boundary delineations of the effective floodplain and floodway and cross-sections. The other elements were included in previously submitted LOMR Work Map.

6. **Comment:** Our review revealed that changes were made to the manning's n in the left overbank on E115-00-00 near the golf course. Please justify.

**Response:** Manning's n values have been reverted back to the effective values for the left overbanks in the revised model. Some of the differences in manning's n were adjustments based on actual conditions. Some of the changes may have been in error. The majority of the left overbank areas are ineffective, however, and do not have a significant effect on the model output.

7. **Comment:** Please revise the following GIS shapefiles:

a. S\_BFE

- i. FIDs 11 and 15 should be extended to span Zone AE  
ii. Field BFE\_LN\_ID should be left blank



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Texas Board of Professional Engineers Registration No. F-439



Mr. Hannan, P.E., CFM  
Page 2  
May 22, 2014

May 22, 2014

Mr. Ataul Hannan, P.E., CFM  
Harris County Flood Control District  
Engineering and Construction Division  
9900 Northwest Fwy.,  
Houston, Texas 77092

Re: Response to Comments for LOMR for Brickhouse Gully;  
City of Houston  
Brickhouse Gully (E115-00-00)

Dear Mr. Hannan:

Below are our responses to the third HCFCO courtesy review comments to the LOMR for Brickhouse Gully dated April 4, 2014.

- Comment:** Previous coordination reveals that you have created a 1D/2D analysis to model this area. Please provide information from the analysis showing that flow is reasonable similar to the flow used in the HEC-RAS model for the split at the golf course.

**Response:** The previously created 1D/2D analysis XPSTORM model was used to show the general direction of overland flow leaving Brickhouse Gully. Peak flows in this model were not calibrated to peak flows in the steady HEC-RAS model due to the complexity of running the XPSTORM model with bridges.

A simplified 1D/2D XPSTORM model was made in response to this comment in order to verify the magnitude of flows leaving Brickhouse Gully and overflowing down Gessner Drive. The following data and parameters were used to develop the XPSTORM model:

- HEC-RAS cross sections from immediately upstream of Gessner Drive (HEC-RAS cross section 31967.0) to immediately upstream of Talina Way Drive (HEC-RAS cross section 31559.8) were input into the XPSTORM model.
- An SCS Typ II distribution hydrograph was used in the XPSTORM model. Rainfall depths were adjusted in the hydrologic parameters of the XPSTORM model in order to generate peak flows that were representative of the peak flows in HEC-RAS for the 10-year, 50-year, 100-year, and 500-year storm events. XPSTORM models for each rainfall event are attached.
- A stage-discharge relationship was developed in HEC-RAS based on running a series of flows in the Brickhouse Gully hydraulic model and checking the water surface elevation upstream of Talina Way Drive. This relationship was used as the tail water condition in the simplified XPSTORM model which terminates at Talina Way Drive.

- A typical section for a two-lane divided median curb and gutter representing the overflow along Gessner Drive was added to a link in the XPSTORM model at the node 31836.0. The link represents allows flow above elevation 34.0' to overflow into the link representing Gessner Drive. The elevation of 34.0' is the approximate elevation of Gessner Drive at Brickhouse Gully and the elevation at which water is able to leave Brickhouse Gully and overflow down Gessner Drive.

The results of the XPSTORM evaluation show the flows used in HEC-RAS for the golf course split are reasonably similar to the results found using the dynamic 1D/2D modeling approach. The table below compares the results of the XPSTORM evaluation with the golf course split HEC-RAS model.

| Storm Event | Effective Model Peak HEC-RAS Flow at River Station 31967.0 (cfs) | Effective Model Peak HEC-RAS Flow at River Station 31559.8 (cfs) | Peak Flow in XPSTORM Model (cfs) | Flow added to Golf Course Split in HEC-RAS (Flow Leaving Brickhouse Gully) (cfs) | XPSTORM Modeled Flow Leaving Brickhouse Gully (cfs) |
|-------------|--|--|----------------------------------|--|---|
| 10-Year     | 900  | 980  | 856                              | 490  | 276   |
| 50-Year     | 1080   | 1200   | 1121                             | 680  | 498   |
| 100-Year    | 1200   | 1350   | 1320                             | 850  | 682   |
| 500-Year    | 1280   | 1500   | 1518                             | 1100   | 866   |

- Comment:** From your analysis, flow is not going to E115-09-00, so please adjust the most upstream cross sections accordingly.

**Response:** Upstream cross-sections have been trimmed accordingly.

- Comment:** Please provide a topographic workmap certified by a registered professional engineer that shows boundary delineations of the revised floodplains and floodway, boundary delineations of the effective floodplains and floodway, cross sections, flow line, contours, scale, and north arrow.

**Response:** A topographic map is included showing the above information.

- Comment:** Please provide a topographic map clearly showing the high ridge on the right overbank in the golf course.

**Response:** High ridge has been labeled on topographic workmap.

- Comment:** Please revise the following GIS shapefiles:

- S\_BFE
  - Field BFE\_LN\_ID should be left blank
- S\_FLD\_HAZ\_AR

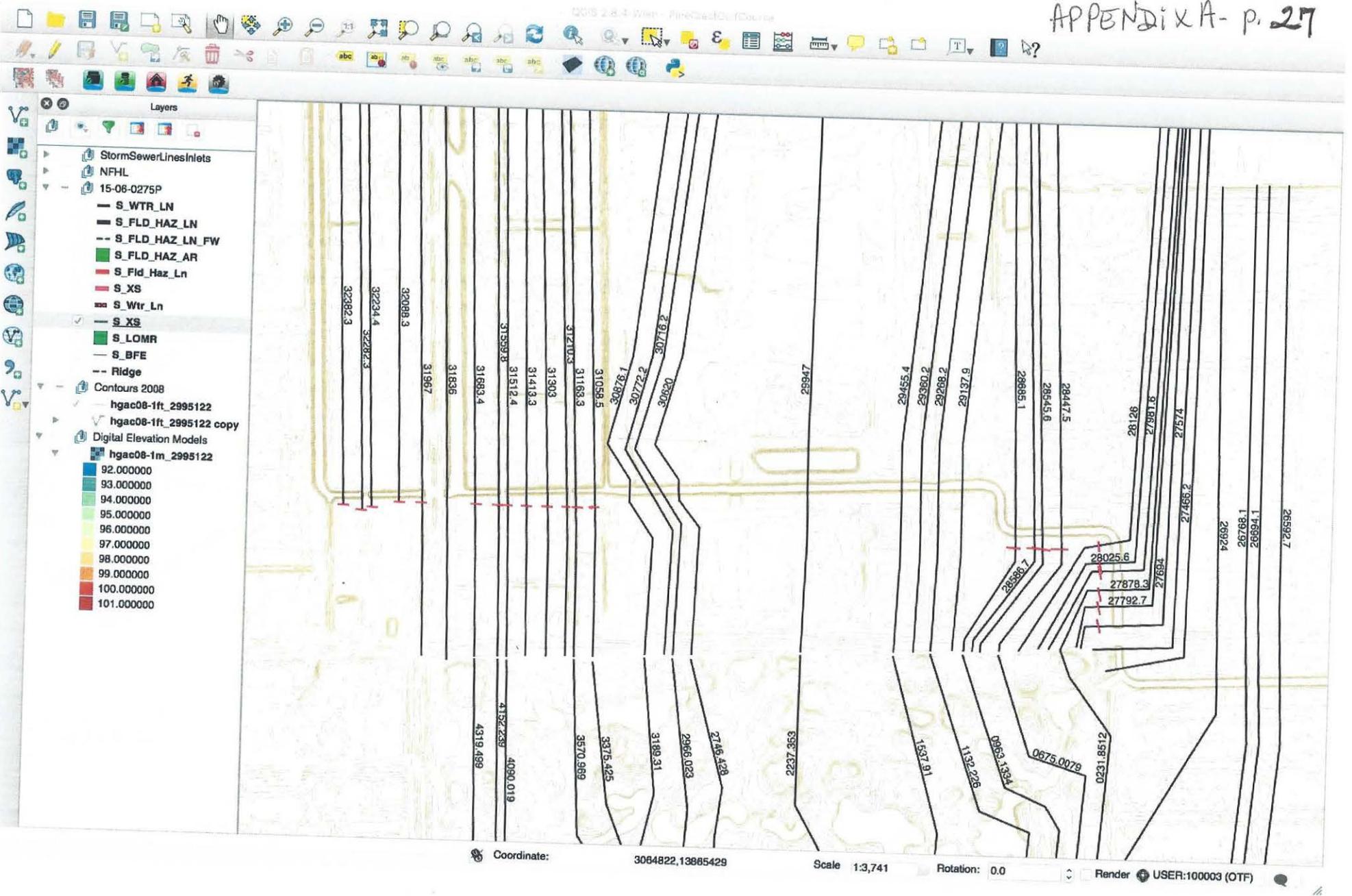
**DRAINAGE AND DETENTION ANALYSIS FOR  
PINECREST  
HOUSTON, TEXAS**

**EXECUTIVE SUMMARY**

This report describes the conceptual design for detention and floodplain mitigation for a 116-acre tract located within the City of Houston City Limits. The tract is located in the White Oak Bayou Watershed and detention outflow drains into Brickhouse Gully (HCFCD Unit No. E115-00-00). The tract consists of an existing golf course with a man-made lake system. Based on the proposed CLOMR (FEMA Case No. 17-06-0297R), a channel is proposed to convey the overflow from Gessner Road through the project tract. Detention for the tract will be located within an expanded portion of the channel. This study utilizes a combination of Site Runoff Curves, Small Watershed Method, Manning's Equation, and XPSTORM to evaluate the existing and proposed conditions of the development to show no adverse impact in the 1% and 10% exceedance storm events. The report will be submitted to the Harris County Flood Control District (HCFCD) and City of Houston (COH) for review and approval.

**Table 1 – Detention Summary Table**

| <i>Project Name: Pinecrest</i>                                |                         |
|---|-------------------------|
| <i>Total Project Area</i>                                     | 116 Acres               |
| <i>Min. Detention Storage Rate Required (HCFCD)</i>           | 0.55 acre-feet per acre |
| <i>Min. Detention Storage Required (HCFCD)</i>                | 63.8 acre-feet          |
| <i>Min. Detention Storage Rate Required (Small Watershed)</i> | 0.62 acre-feet per acre |
| <i>Min. Detention Storage Rate Required (Small Watershed)</i> | 71.60 acre-feet         |
| <i>Detention Storage Provided (XPSTORM)</i>                   | 87.74 acre-feet         |
| <i>Detention Storage Rate Provided (XPSTORM)</i>              | 0.76 acre-feet per acre |
| <i>1% Allowable Release Rate</i>                              | 1020.03 cfs             |
| <i>1% Release Rate Provided</i>                               | 1008.80 cfs             |
| <i>10% Allowable Release Rate</i>                             | 595.02 cfs              |
| <i>10% Release Rate Provided</i>                              | 442.59 cfs              |



Approximate locations of Manning' n of .99 used along Brickhouse Gully.

Search  
houston texas  
ex: 37.407229, -122.107152  
Get Directions History

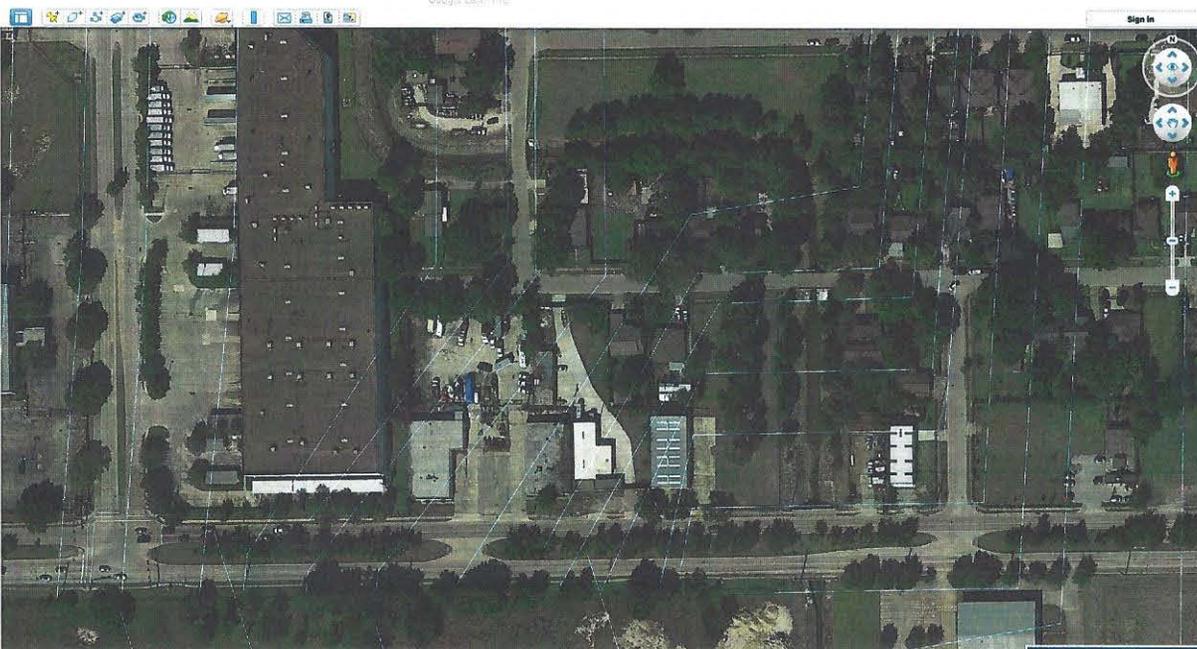
Houston

Places

- Legend
  - NFHL
    - NEHL Availability
      - Layer draws above 25 mi. altitude
    - Flood Hazard Zones
      - Layer draws below 27000 ft. altitude
    - Flood Hazard Zone Labels
      - Layer draws below 2500 ft. altitude
    - Base Flood Elevations
      - Layer draws below 13000 ft. altitude
    - Cross Sections and Coastal Transects

Layers

- Primary Database
  - Borders and Labels
  - Places
  - Photos
  - Roads
  - 3D Buildings
  - Ocean



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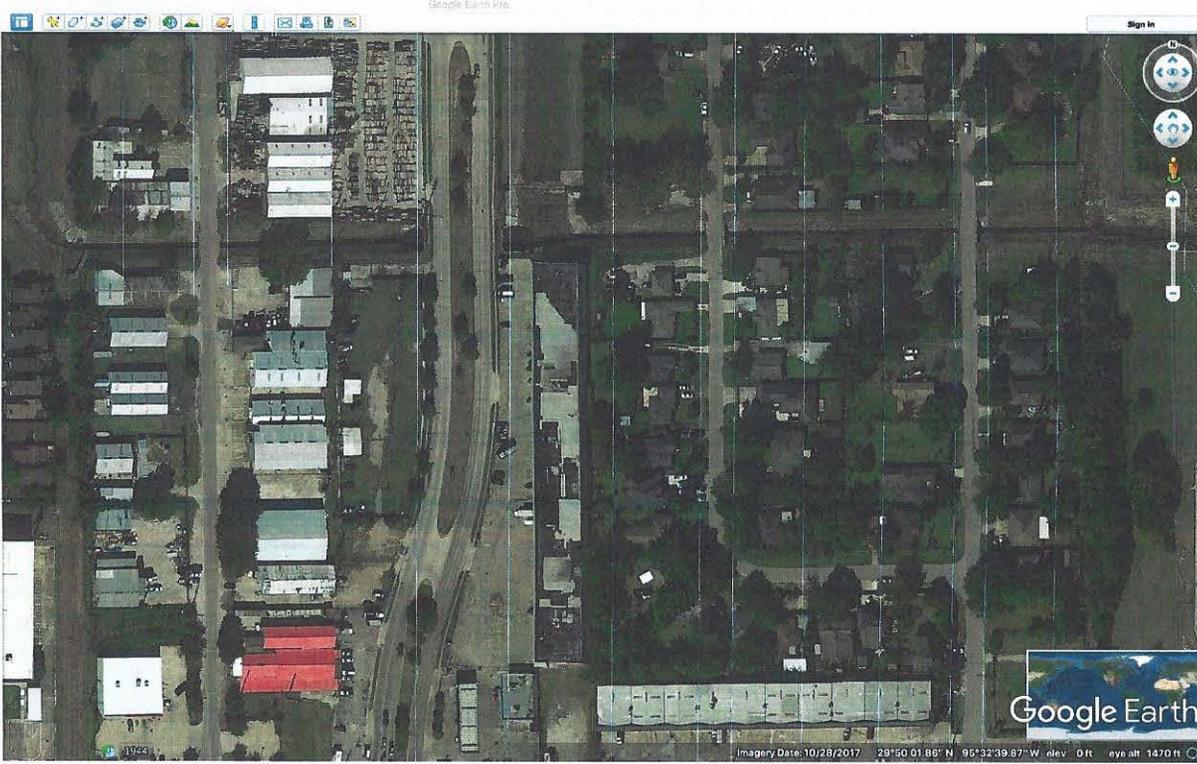
Houston

Places

- Legend
  - NFHL
    - NEHL Availability
      - Layer draws above 25 mi. altitude
    - Flood Hazard Zones
      - Layer draws below 27000 ft. altitude
    - Flood Hazard Zone Labels
      - Layer draws below 2500 ft. altitude
    - Base Flood Elevations
      - Layer draws below 13000 ft. altitude
    - Cross Sections and Coastal Transects

Layers

- Primary Database
  - Borders and Labels
  - Places
  - Photos
  - Roads
  - 3D Buildings
  - Ocean
  - Weather
  - Gallery
  - Global Awareness
  - More
  - Terrain



Google Earth Pro



Sign In



1/2017



Imagery Date: 1/23/2017 29°49'46.69"N 95°32'21.28"W elev 0ft eye alt 3953ft

Google Earth Pro



Sign in



1944

Imagery Date: 10/28/2017 29°49'46.69" N 95°32'21.28" W elev 0 ft eye alt 3953 ft

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1944

Imagery Date: 1/23/2017 29°49'54.35" N 95°32'03.08" W elev 0 ft eye alt 829 ft



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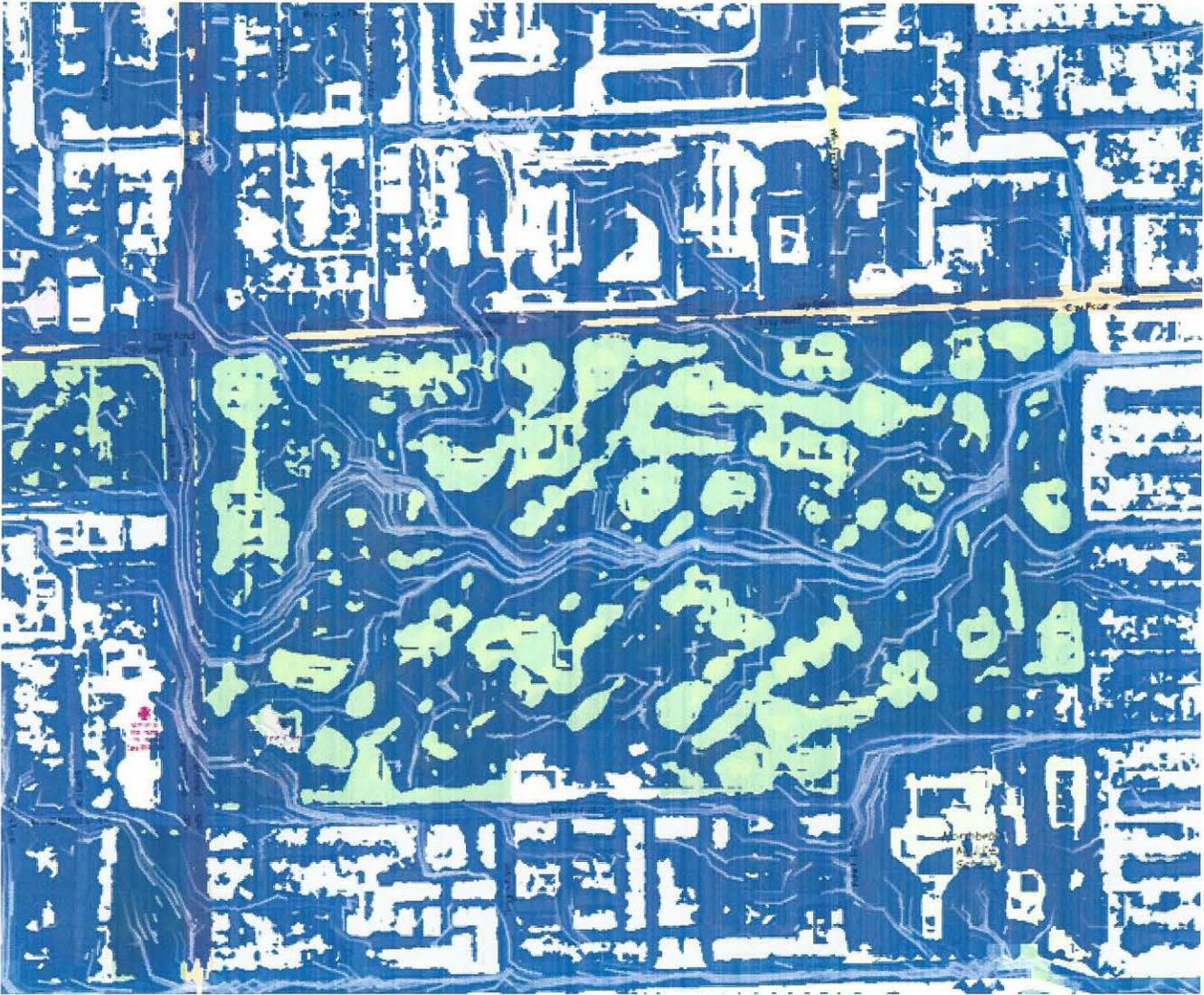


Sign in



1944

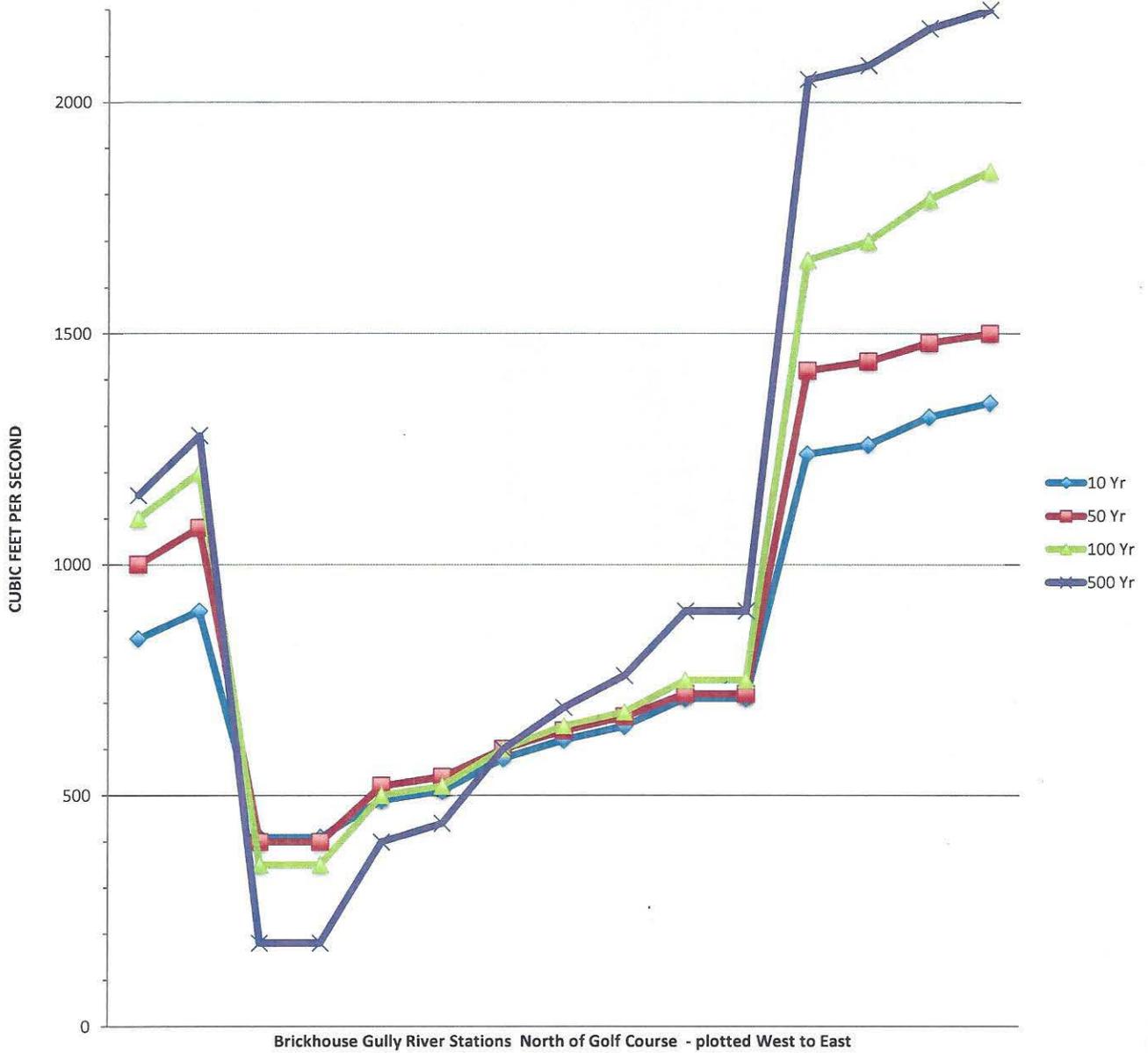
Imagery Date: 10/28/2017 29°49'54.14" N 95°32'02.77" W elev 0 ft eye alt 708 ft



APPENDIX A - P. 33



Revised Steady Flow Data for Brickhouse Gully after flow is diverted to the golf course



APPENDIX A- SUPPLEMENT- P. 3

| RIVER STATION | 10 Yr | 50 Yr | 100 Yr | 500 Yr |                                   |
|---------------|-------|-------|--------|--------|-----------------------------------|
| 32382.3       | 840   | 1000  | 1100   | 1150   |                                   |
| 31967.0       | 900   | 1080  | 1200   | 1280   |                                   |
| 31836.0       | 410   | 400   | 350    | 180    | Where flow is diverted from Gully |
| 31683.4       | 410   | 400   | 350    | 180    |                                   |
| 31559.8       | 490   | 520   | 500    | 400    |                                   |
| 31210.3       | 510   | 540   | 520    | 440    |                                   |
| 30772.2       | 580   | 600   | 600    | 600    |                                   |
| 29360.2       | 620   | 640   | 650    | 690    |                                   |
| 28586.7       | 650   | 670   | 680    | 760    |                                   |
| 28025.6       | 710   | 720   | 750    | 900    |                                   |
| 27466.2       | 710   | 720   | 750    | 900    |                                   |
| 26924.0       | 1240  | 1420  | 1660   | 2050   | Where flow returns to Gully       |
| 26206.4       | 1260  | 1440  | 1700   | 2080   |                                   |
| 25072.7       | 1320  | 1480  | 1790   | 2160   |                                   |
| 24695.0       | 1350  | 1500  | 1850   | 2200   |                                   |

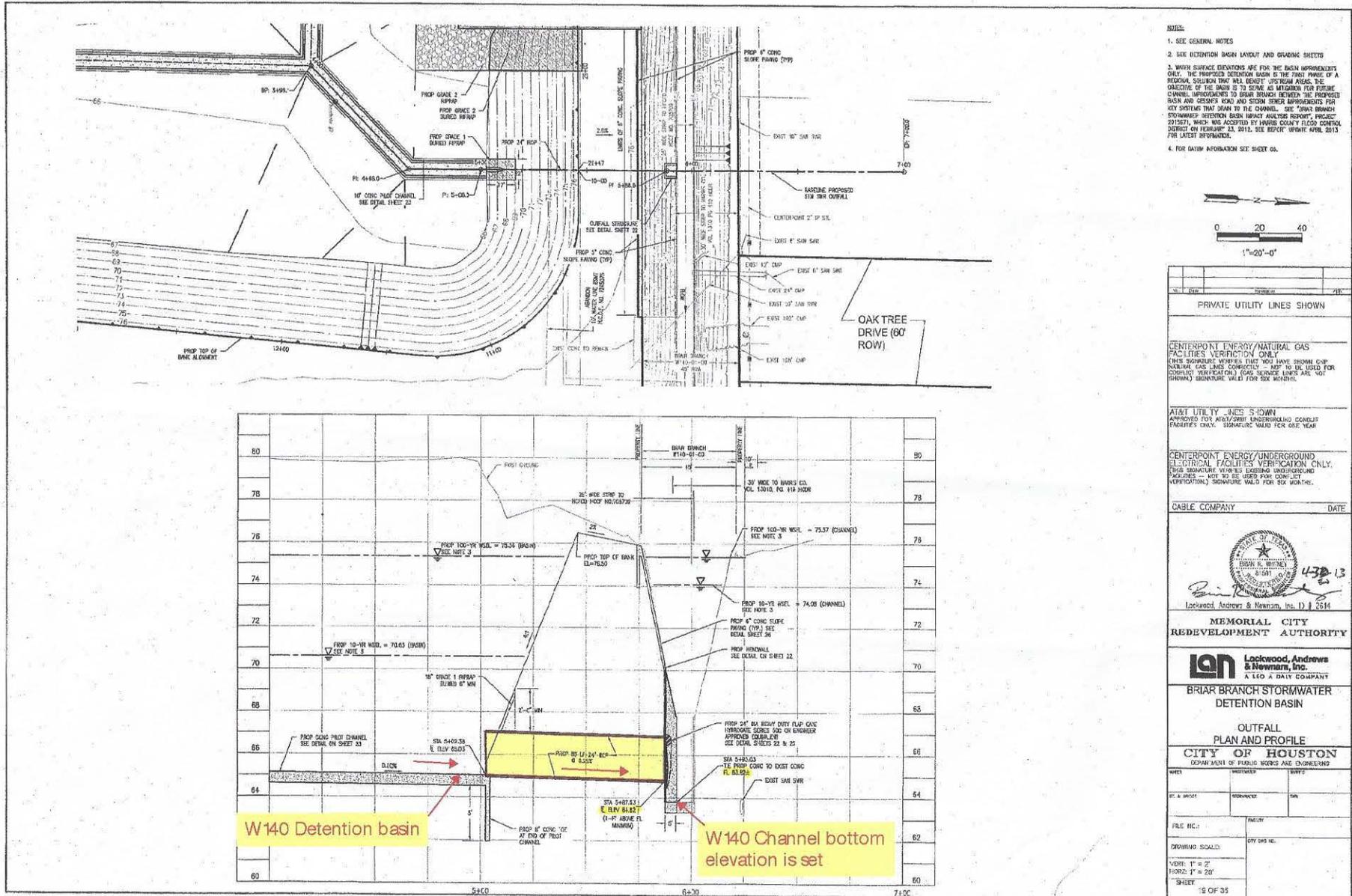
| CFS Flow through the Golf Course |       |        |        |
|----------------------------------|-------|--------|--------|
| 10 Yr                            | 50 Yr | 100 Yr | 500 Yr |
| 490                              | 680   | 850    | 1100   |

# Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

**Cover Letter for Section 10 on USACE Form 7001(Continuation)-  
Appendix B & Appendix C (PART 2).pdf**

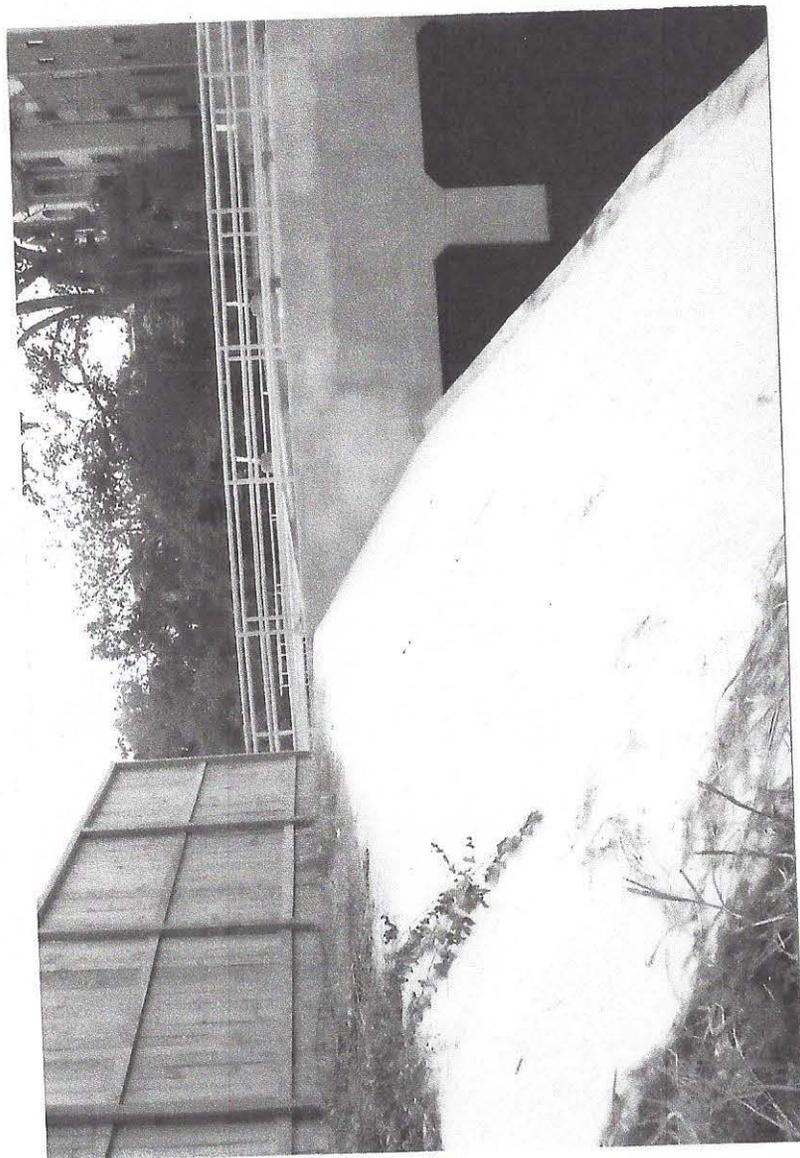
# FLAWED "BRIAR BRANCH DETENTION BASIN" - APPENDIX B - p.1



\* THIS BASIN NEEDS TO BE 2X'S LARGER, TO DETAIN RAIN RUN-OFF OF CITY TRZ 17 ReDevelopment

APPENDIX C

PHOTO OF West Side of City/TIRZ 17 BRIDGE



Reconstructed on BUNKER HILL  
Road, just N. of I# 10-W in  
Houston.

Re-DONE on Flawed Engineering  
Study OF 2007 & REBUILT  
with this Study in 2009.

Acts now as a dam,  
preventing water to flow  
under it by 3 TIMES the  
amount that previously  
flowed under it & went  
out to sea. Now Too Small.

THUS, MASSIVE FLOODING OCCURS  
now in Homes/Streets.  
CITY & COUNTY APPROVED THIS.

# FLAWED ENG. STUDY ON "BUNKER HILL BRIDGE"

APPENDIX C-p.1

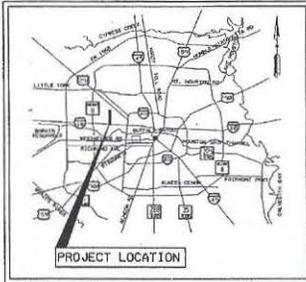
## MEMORIAL CITY REDEVELOPMENT AUTHORITY

BUNKER HILL ROAD IMPROVEMENTS  
I-10 TO LONGPOINT ROAD

### CITY OF HOUSTON

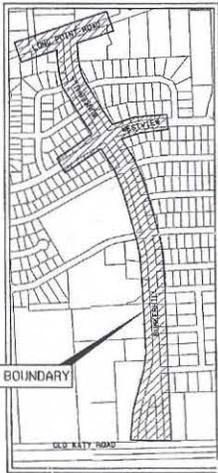
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
ENGINEERING AND CONSTRUCTION DIVISION

WBS NO. N-000767-0001-4



LOCATION MAP  
NTS

KEY MAP\* 490B, 450X  
GIMS\* 4958B, 5058A, 5058C



VICINITY MAP  
NTS

KEY MAP\* 490B, 450X  
GIMS\* 4958B, 5058A, 5058C



MAYOR  
BILL WHITE

CONTROLLER  
ANNISE D. PARKER

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DISTRICT A

JARVIS JOHNSON  
DISTRICT B

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DISTRICT C

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CHIEF ENGINEER

CITY ENGINEER DATE

DIRECTOR OF PUBLIC WORKS AND ENGINEERING DATE

SHEET NO 1 OF 146 SHEETS