



March 14, 2025

Mayor and City Council
City of Hilshire Village
8301 Westview Drive
Houston, Texas 77055

Re: Engineer's Report for March 18, 2025, Council Meeting
HDR Job No. 10420677

Dear Mayor and Council Members:

HDR Engineering, Inc. (HDR) is pleased to submit this report on engineering related issues from February 15, 2025 to March 14, 2025:

1) On-Going Services (10420677):

a) 1201 Archley Drive –

- On February 21, 2025, HDR reviewed and returned to the City the 1st Drainage Plan submittal for 1201 Archley Drive. The drainage plan requires corrections (e.g. inlets, junction boxes need to be labeled etc.); therefore, it needs to be revised and resubmitted.
- On March 6, 2025, HDR reviewed and returned to the City the 2nd Drainage Plan submittal for 1201 Archlet Drive. The Drainage Plan was approved with exceptions as noted.

b) 8005 Anadell Street –

- On March 11, 2025, HDR received the 3rd As-Built Drainage Plan Submittal for the 8005 Anadell Street. The As-Built Drainage Plan is currently under review.

c) 8013 Anadell Street –

- On March 4, 2025, HDR reviewed and returned to the City the 3rd Drainage Plan submittal for 8013 Anadell Street. The Drainage Plan was approved with exceptions as noted.

d) 1226 Glourie Drive –

- On February 19, 2025, HDR reviewed and returned to the City the 2nd Pool As-Built Drainage Plan submittal for 1226 Glourie Drive. The As-Built Drainage Plan requires corrections (e.g. missing elevations along property lines, missing storm sewer pipes between inlets, missing impervious calculations, missing professional seal, etc.); therefore, it needs to be revised and resubmitted.

e) 1234 Glourie Drive –

- On March 3, 2025, HDR reviewed and returned to the City the 3rd Drainage Plan submittal for 1234 Glourie Drive. The Drainage Plan was approved with exceptions as noted.

f) 1306 Glourie Drive –

- On March 14, 2025, HDR reviewed and returned to the City the 4th As-Built Drainage Plan submittal for 1306 Glourie Drive. The As-Built Drainage Plan was approved with exceptions as noted.

g) 1117 Guinea Drive –

- On March 10, 2025, HDR reviewed and returned to the City the 1st Comcast ROW Permit Application submittal for 1117 Guinea Drive. The Comcast ROW Permit Application requires correction (e.g. showing existing City utilities, etc.); therefore, it needs to be revised and resubmitted.

h) 1118 Guinea Drive –

- On February 21, 2025, HDR reviewed and returned to the City the 3rd As-Built Drainage Plan submittal for 1118 Guinea Drive. The As-Built Drainage Plan requires corrections (e.g. missing elevations, storm sewers without labels, etc.); therefore, it needs to be revised and resubmitted.

i) 1119 Guinea Drive –

- On March 4, 2025, HDR reviewed and returned to the City the 1st Pool As-Built Drainage Plan submittal for 1119 Guinea Drive. The As-Built requires corrections (e.g. missing elevations, missing finished floor elevations, missing ditch flow lines, etc.), therefore, it needs to be revised and resubmitted.
- On March 12, 2025, HDR received the 2nd Pool As-Built Drainage Plan submittal for 1119 Guinea Dr. The As-Built Drainage Plan is currently under review.

j) 1311 Pine Chase Drive –

- On March 6, 2025, HDR reviewed and returned to the City the 1st Drainage Plan submittal for 1311 Pine Chase Drive. The Drainage Plan requires corrections (e.g. missing elevations, not showing positive drainage, pipes not properly sloped, bends in pipes, etc.); therefore, it needs to be revised and resubmitted.

k) 14 Pine Creek Lane –

- On March 10, 2025, HDR reviewed and returned to the City the 1st CenterPoint (CNP) Gas ROW Permit Application submittal for 14 Pine Creek Lane. The CNP Gas ROW Permit Application requires correction (e.g. method of construction, showing existing City utilities, etc.); therefore, it needs to be revised and resubmitted.

l) 1323 Ridgeley Drive –

- On March 10, 2025, HDR received the 1st Pool Drainage Plan submittal for 1323 Ridgeley Drive. The Drainage Plan is currently under review.

m) 7907 South Villa Court –

- On February 21, 2025, HDR reviewed and returned to the City the 2nd Drainage Plan submittal for 7907 South Villa Court. The Drainage Plan requires corrections (e.g. not demonstrating positive drainage, bends in pipes, missing perimeter and finished floor elevations etc.); therefore, it needs to be revised and resubmitted.
- On March 4, 2025, HDR reviewed and returned to the City the 3rd Drainage Plan submittal for 7907 South Villa Court. The Drainage Plan was approved with exceptions as noted.

n) 1307 Friarcreek Ln & 1209 Pine Chase Dr Drainage Easement Improvements –

- 1307 Friarcreek Lane Drainage Easement – HDR has conducted drainage area calculations for the Friarcreek Subdivision in order to estimate flows and evaluate pipe or open channel options and sizes for this drainage easement. HDR has preliminarily evaluated three (3) different options: (1) installation of RCP pipe with drop manhole at outfall, (2) RCP pipe with rip-rap at outfall, and (3) concrete channel lining. Refer to attached drainage area calculations, Exhibits for Options 1, 2 & 3, and pictures of existing drainage easement area at the end of the report for additional information. HDR will discuss these options with City Council to select the preferred option. HDR will prepare a proposal to perform the topographic survey, design and construction services associated with these drainage improvements.

- 1209 Pine Chase Drive Drainage Easement – HDR finalized the drawings/exhibits and quote form for the installation of a concrete headwall for the 24-inch and 30-inch pipes at the outfall entrance, regrading of the existing ditch between the street and outfall entrance, removal and replacement of deteriorating concrete slope paving on the upstream end of this ditch area, and installation of mortar coating on the concrete slope paving areas recently stabilized by Uretek. HDR has requested quotes from four (4) Contractors and will present a recommendation to the City to award the work at the April 15, 2025 City Council Meeting.

o) Hilshire Green Paving, Drainage & Utility Improvements –

ANTICIPATED PROJECT TIMELINE:

Contract Award:	Tuesday, December 17, 2024
Pre-Construction Meeting:	Thursday, January 16, 2025
Construction NTP:	Monday, January 27, 2025
Construction Completion:	Thursday, June 26, 2025

- Twenty-six (26) out of twenty-nine (29) Submittals received to date have been reviewed and returned to the Contractor as of the date of this report.
- Two (2) out of three (3) RFIs (Request for Information) received to date have been reviewed and returned to the Contractor as of the date of this report.
- On the week of February 17, 2025, the Contractor installed the new water service lines to the new water line only, performed the pressure test (passed on February 17th) and disinfection tests (samples collected on February 19th & 20th, and passing test results were received on February 20th & 21st, respectively) on the new water line. Contractor coordinated with City and HDR to request Valve Assistance from InfraMark (City's Operation & Maintenance Company) to perform the wet connection of the new water line to the existing water distribution system once all tests passed. Contractor also started the partial removal of concrete pavement on the south side of Hilshire Green (e.g. eastbound lane) to begin the installation of the new storm sewer system.
- On the week of February 24, 2025, after confirmation that the new water line passed the pressure and disinfection tests, HDR released the new water line for connection to the existing water distribution system. The Contractor continued working on installation of water service lines and new storm sewer system, and provided temporary water cut-off notifications to residents for the wet connection and transfer of water line services to take place on March 4, 2025.

- On the week of March 3, 2025, the Contractor continued working on the installation of the new storm sewer system, performed the wet connection of the new water line to the existing water distribution system and transferred all water service lines to the new water line.
- On the week of March 10, 2025, the Contractor provided pavement work notifications to residents, completed the installation of the new storm sewer system, and started the pavement demolition work on the Hilshire Green eastbound lane (e.g. south side).
- The second Monthly Construction Progress Meeting was held on Thursday, March 13, 2025 at City Hall.
- Next week, the Contractor will be mobilizing the concrete crew to begin pavement reconstruction work. Contractor also anticipates working on the rehabilitation of existing sanitary sewer manholes and performing the Post-CCTV Inspection of the rehabilitated sanitary sewer system.
- Upon the completion of the paving reconstruction work on the south side of Hilshire Green (e.g. eastbound lane), the Contractor will switch to the north side (e.g. westbound lane) to complete the paving reconstruction work on that side.
- On March 14, 2025, HDR reviewed and transmitted to the City, the Contractor's Pay Estimate No. 1 for work performed from January 27, 2025 through March 7, 2025. As of March 7, 2025, the Contract Time expended is 26.67% and the Contract Progress is 38.62%, therefore, the Contractor is well ahead of schedule.

p) Wirt Road Safety Project –

ANTICIPATED PROJECT TIMELINE:

Approval from COH:

March 10, 2025

Construction NTP:

TBD with Harris County Precinct 3

- On March 10, 2025, HDR contacted Mr. Jason Hains (Project Manager at Harris County Precinct 3). Mr. Hains will be the main HC point of contact moving on forward instead of Ms. Tina Liu. HDR provided a brief history of the project to Mr. Hains, as well as current status update on the City of Houston (COH) review and approval, easement dedication from The School of the Woods, tree preservation and coordination efforts with property owners at 18 Hickory Shadows, and TDLR/ADA review and approval of the project. Once the COH approves the plans, HDR will submit a copy of these plans to HC for final review and approval. Mr. Hains will follow up with his team to determine the next steps that will be required to begin construction of the project.

- On March 11, 2025, HDR received the official approval from the COH for the Wirt Road Sidewalk Improvement Project.
- The City of Hilshire Village and HDR have been coordinating with The School of the Woods on the execution of the ROW/Easement Dedication package.
- The City of Hilshire Village, Olson & Olson (City Legal Counsel) and HDR have also been coordinating regarding the notification to residents on potential impact/damage to existing trees due to the construction of the proposed sidewalk. Property owners will be meeting with the City at City Hall, immediately before the March 18, 2025 Regular City Council Meeting to discuss this matter.

q) Hickory Shadows Paving, Drainage & Water Line Improvements Project –

ANTICIPATED PROJECT TIMELINE:

70% Submittal:	Thursday, April 24, 2025
Public Meeting:	Thursday, May 1, 2025
100% Submittal:	Thursday, June 5, 2025
City Council (Authorization to Bid):	Tuesday, June 17, 2025
Advertisements (2 weeks):	Weeks of July 7 and 14, 2025
Pre-Bid Meeting:	Thursday, July 17, 2025
Bid Opening:	Thursday, August 7, 2025
Recommendation to Award:	Thursday, August 14, 2025
City Council (Contract Award):	Tuesday, August 19, 2025
Construction NTP:	Monday, September 15, 2025

- HDR completed a 30% Drawing Set for Internal QC Review on March 13, 2025. The 30% Drawings include cover sheets, general notes, standard details, drainage area calculations, Plan & Profiles for proposed paving, drainage and water line improvements, traffic control plans, and storm water pollution prevention plan. As previously reported, HDR will utilize the 30% Drawings to coordinate and begin the Tree Protection Plan Design by C.N. Koehl Urban Forestry (HDR's Tree Protection Plan Subconsultant).
- HDR has also prepared the Technical Specifications for the project. The Project Manual is approximately 85% complete, excluding Front End Documents.
- Please refer to above anticipated project timeline for more information.

r) Pine Chase Grove Water Meters –

- As previously reported, Infrastructure Construction Services (ICS) was awarded the contract for the Pine Chase Grove Water Meters for a total amount of \$23,900.00 at the January 28, 2025, Council Meeting.

- HDR is awaiting confirmation from Mr. Telley Dennis (COH Customer Account Services) regarding the relocation of the meter vaults control panels that would require the trench excavation and backfill by ICS (Contractor) and the COH installation of the conduits and wires, as well as other items of work to be performed by the COH (e.g. painting of water meter vault covers, locks for meter vault hatches, and addition of safety bumpers to meter vault corners), so it is scheduled and coordinated with ICS (Contractor). Once the schedule is confirmed, HDR will issue the Notice to Proceed (NTP) to the Contractor.

s) City-Wide Ditch Cleaning –

- As previously reported, HDR updated and submitted to the City the exhibit and photographs of the proposed ditches to be cleaned for the City's final review and approval before HDR requests proposals/quotes from Contractors to perform this work. City Staff is currently reviewing this information.

t) City-Wide No Parking Study –

- On March 7, 2025, HDR met with City Staff to discuss the City-Wide No Parking Study. City Staff and Mrs. Harini Arjun, P.E. (HDR Traffic Engineer) discussed the objectives/goals, issues and constraints related to the No Parking Zone Areas in order to provide preliminary recommendations to the City. In general, the following four (4) No Parking Zone Areas were discussed:

(1) Ridgeley Drive at Wirt Road Entrance

(2) Ridgeley Drive at Westview Drive Entrance

(3) Glourie Drive at Westview Drive Entrance

(4) Ridgeley Drive Curve between Mallie Court and Guinea Drive

- For the first three (3) areas, the City already has No Parking Signs in place on both sides of the street; however, they must have two (2) signs on each side of the street, angled at 45 degrees to face the direction of traffic and denote the beginning and end of the No Parking Zone Area.
- For the Ridgeley Drive Curved area, the City already has No Parking Signs in place defining the beginning and end of the No Parking Zone Area; however, HDR recommends a sight triangle evaluation of this area using 35 MPH instead of the posted 20 MPH to confirm the sight distance that must be kept clear of obstructions in order to allow drivers to see unexpected objects (e.g. vehicles, pedestrians, animals, etc.) in time to avoid collision.

- There is an existing parking pad at 8201 Mallie Court that will not meet the sight triangle requirements, therefore, the City shall consult with City Legal Counsel (Olson & Olson) on the legal steps required to remove this parking pad. The City shall also inquire with the Spring Valley Village Police Department to determine if any accidents or near missed accidents have been reported in this area to support the need to remove the parking pad and enforce the No Parking Zone Area on the basis of public safety. HDR also recommends that the No Parking Signs be considered on both sides of Ridgeley Drive from Mallie Court to Guinea Drive; however, HDR will provide a preliminary sight triangle evaluation for this area and provide final recommendations to the City.
- The group discussed the possible conversion of the Ridgeley Drive and Burkart Road intersection from a two-way stop to a four-way stop intersection. Mrs. Arjun noted that converting this intersection to a four-way stop would alleviate and help reduce the traffic speed issue along the Ridgeley Drive Curve between Mallie Court and Guinea Drive.
- Mrs. Arjun also confirmed that the No Parking Striping/Painting cannot be enforced by the Spring Valley Village Police Department; however, regulatory signs can be. She also confirmed that the No Parking Signs cannot be installed on the same poles as existing regulatory signs (e.g. Stop signs, speed signs, etc.); they will need to be mounted on their own poles.
- Based on this initial discussion, Mrs. Arjun does not believe a full No Parking Study will be required or warranted for the City of Hilshire Village. HDR can provide consulting services under the On-Going Services Project to provide assistance to the City on this matter on an as-needed basis; however, if the City would prefer to perform the No Parking Study, HDR will be glad to prepare a proposal for review and consideration by the City.

If there are any questions concerning the information contained in this report, we will be glad to discuss them with you.

Sincerely,

HDR Engineering, Inc.



Efrain Him, P.E.

City Engineer for City of Hilshire Village

cc: Files (10420677)

FRIARCREEK DRAINAGE EASEMENT EVALUATION

DRAINAGE AREA MAP AND CALCULATIONS

OPTION 1 - RCP PIPE WITH DROP MANHOLE

OPTION 2 - RCP PIPE WITH RIPRAP AT OUTFALL

OPTION 3 - CONCRETE CHANNEL LINING

TRAPEZOIDAL CHANNEL CALCULATIONS

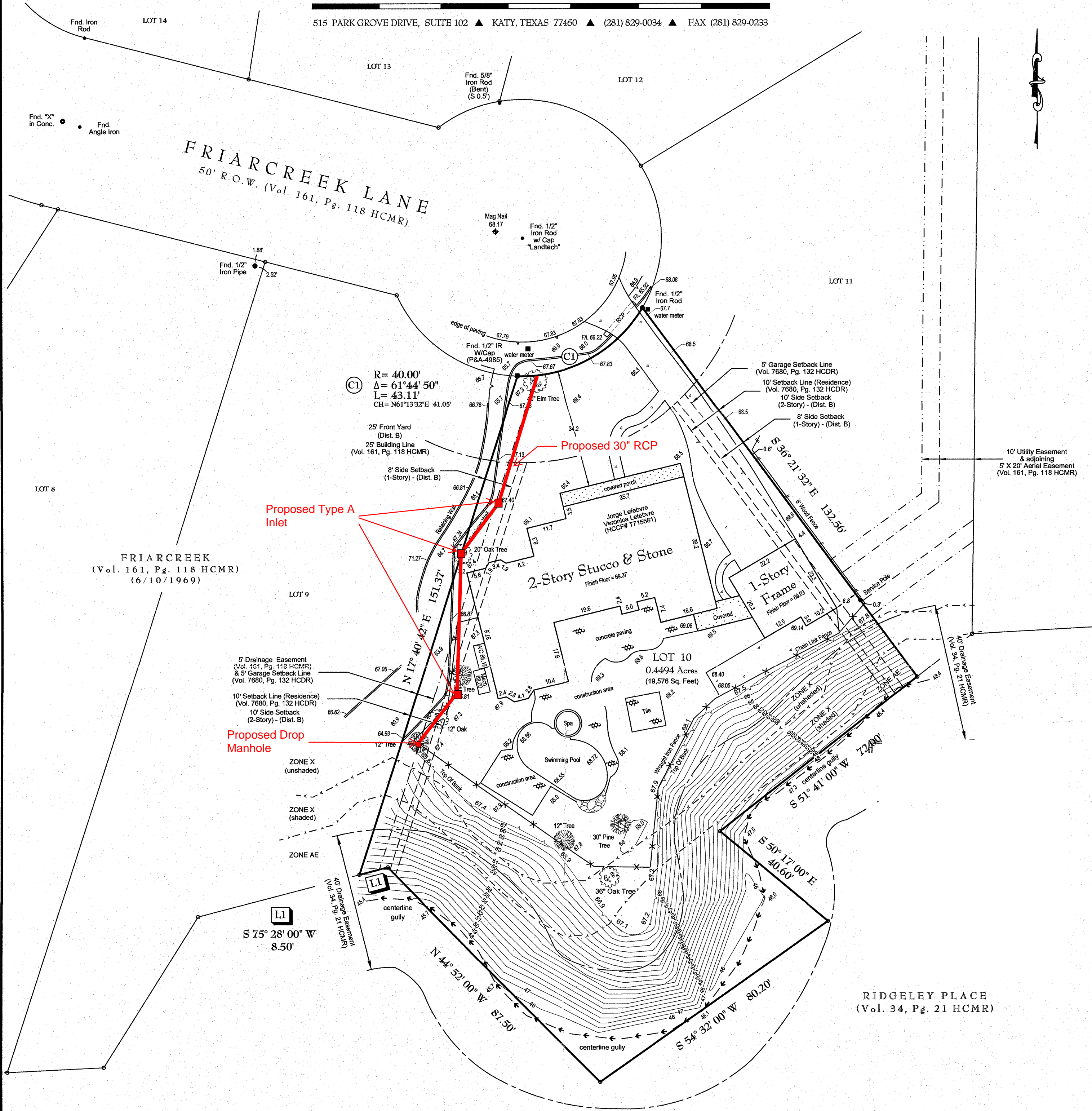
PICTURES OF EXISTING DRAINAGE EASEMENT



OPTION 1

PROBSTFELD & ASSOCIATES
PROFESSIONAL LAND SURVEYORS

515 PARK GROVE DRIVE, SUITE 102 ▲ KATY, TEXAS 77450 ▲ (281) 829-0034 ▲ FAX (281) 829-0233



PLAT OF PROPERTY
FOR: **JORGE LEFEBVRE & VERONICA LEFEBVRE**
AT: **1303 FRIARCREEK LANE • HILSHIRE VILLAGE, TX**
LGL: **LOT 10**
FRIARCREEK
VOLUME 161, PAGE 118 OF THE MAP RECORDS OF
HARRIS COUNTY, TEXAS
SCALE: 1" = 20'
DATE: 3/23/2011 REVISED DATE: 3/14/2018
This Property DOES Lie within the designated 100 year Floodplain.
PANEL NO: 48201C 0665 M FIS PROFILE: K-L
ZONE: X, SHADED X, AE EFF. DATE: 6/9/2014
BASE FLOOD ELEVATION: 100YR: 56.5 | 500YR: 59.5
LOCATED BY GRAPHIC PLOTTING ONLY AND NOT RESPONSIBLE FOR ACTUAL DETERMINATION.
THIS SURVEY WAS PERFORMED IN ACCORDANCE WITH TITLE COMMITMENT
PROVIDED BY: TEXAS AMERICAN TITLE COMPANY
GF#: 675-99-1102 (4/04/1999)

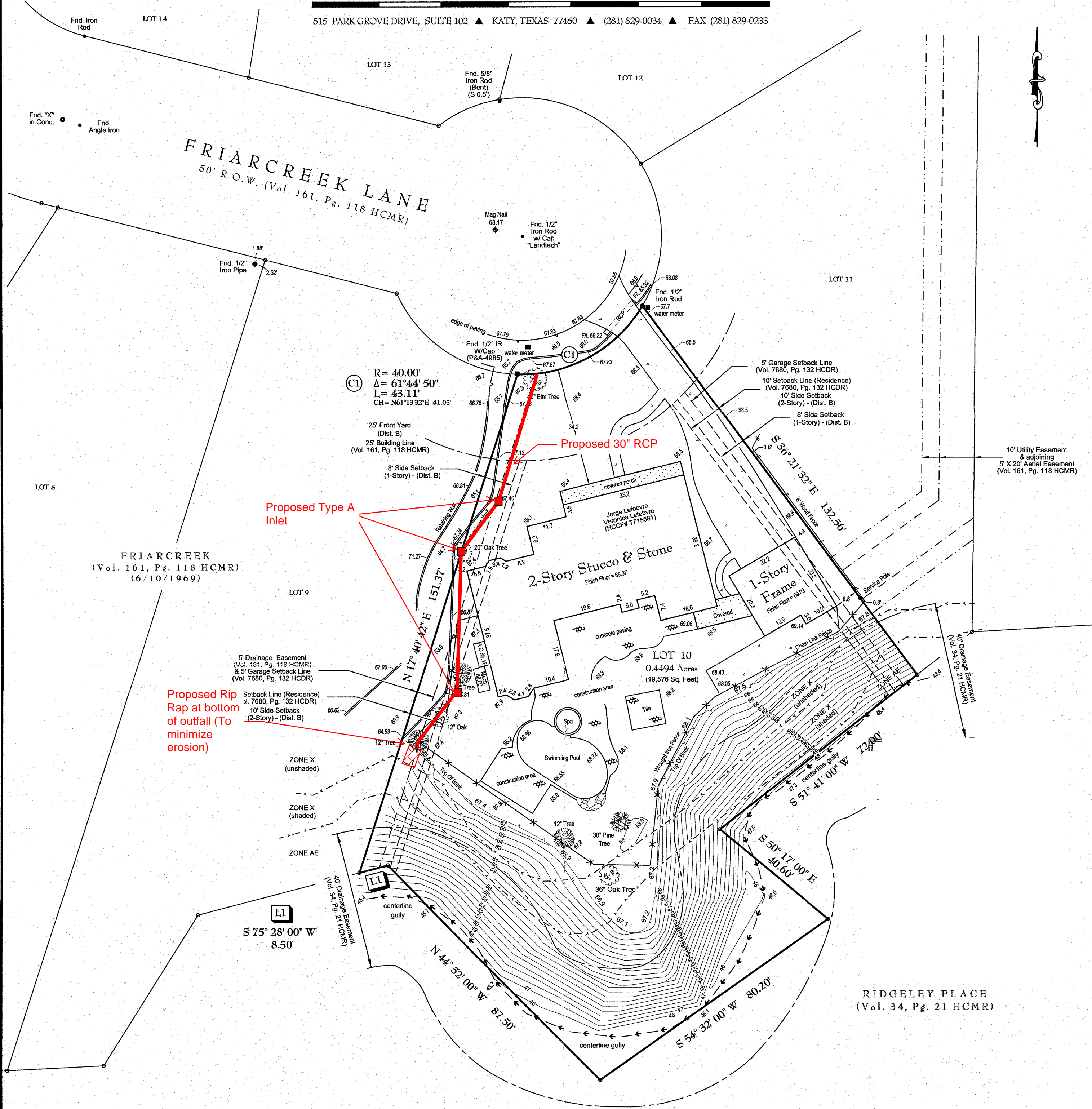
- NOTES:**
- Elevations shown based on Harris County Floodplain Reference Marker No. 210215 Elevation = 68.31 NAVD88 (2001 adjustment)
 - Location of floodzones by graphic plotting only from City of Houston Geographic Information Management System (GIMS) data.
 - Fences & retaining wall do not follow boundary lines as shown above.
 - 2-Story Stucco & Stone (residence) extends across 10 foot side setback lines. 1-Story Frame (garage) extends across 5 foot garage setback line.
 - 40 foot drainage easement centered on centerline of gully reflected per the recorded plat of Ridgeley Place.
 - Lot subject to any and all zoning ordinances or proposed zoning ordinances including those by the City of Hilshire Village, Texas. The above shown tract lies within Zoning District B per the City Zoning Map. Front and side yards shown above for main residence only as set forth under Ordinance No. 108. Rear yards lie South of top of bank area as shown above. Maximum structure height shall not exceed 35 feet in height including chimneys and attachments to the structure. Additional restrictions for accessory structures, swimming pools, sports courts, fences, etc., are not shown and should be verified prior to any planning or construction.
 - Surveyor has not abstracted this property. This survey has been prepared based upon information provided by the title company. No independent investigation of the accuracy of the title company's work has been performed by the surveyor. Zoning ordinances and zoning building setback lines (if any) are not shown. Surveyor has not reviewed restrictive covenants as set forth under Exceptions From Coverage in Schedule B of the Title Commitment.
 - Lot subject to a 10 foot Rear Building Line along the South line of subject tract as recorded in Volume 7680, Page 132 of the Deed Records of Harris County, Texas.
 - All bearings are based on the South right of way line of Friarcreek Lane. (CH = N 61° 13' 32" E)

THIS SURVEY IS THE PROPERTY OF PROBSTFELD & ASSOCIATES, INC., IS CERTIFIED FOR THIS TRANSACTION ONLY, AND IS NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR OWNERS.

OPTION 2

PROBSTFELD & ASSOCIATES
PROFESSIONAL LAND SURVEYORS

515 PARK GROVE DRIVE, SUITE 102 ▲ KATY, TEXAS 77450 ▲ (281) 829-0034 ▲ FAX (281) 829-0233



PLAT OF PROPERTY
FOR: **JORGE LEFEBVRE & VERONICA LEFEBVRE**
AT: **1303 FRIARCREEK LANE • HILSHIRE VILLAGE, TX**
LGL: **LOT 10**
FRIARCREEK
VOLUME 161, PAGE 118 OF THE MAP RECORDS OF
HARRIS COUNTY, TEXAS
SCALE: 1" = 20'
DATE: 3/23/2011 REVISED DATE: 3/14/2018
This Property DOES Lie within the designated 100 year Floodplain.
PANEL NO: 48201C 0665 M FIS PROFILE: K-L
ZONE: X, SHADED X, AE EFF. DATE: 6/9/2014
BASE FLOOD ELEVATION: 100YR: 56.5 | 500YR: 59.5
LOCATED BY GRAPHIC PLOTTING ONLY AND NOT RESPONSIBLE FOR ACTUAL DETERMINATION.
THIS SURVEY WAS PERFORMED IN ACCORDANCE WITH TITLE COMMITMENT
PROVIDED BY: TEXAS AMERICAN TITLE COMPANY
GF#: 675-99-1102 (4/04/1999)

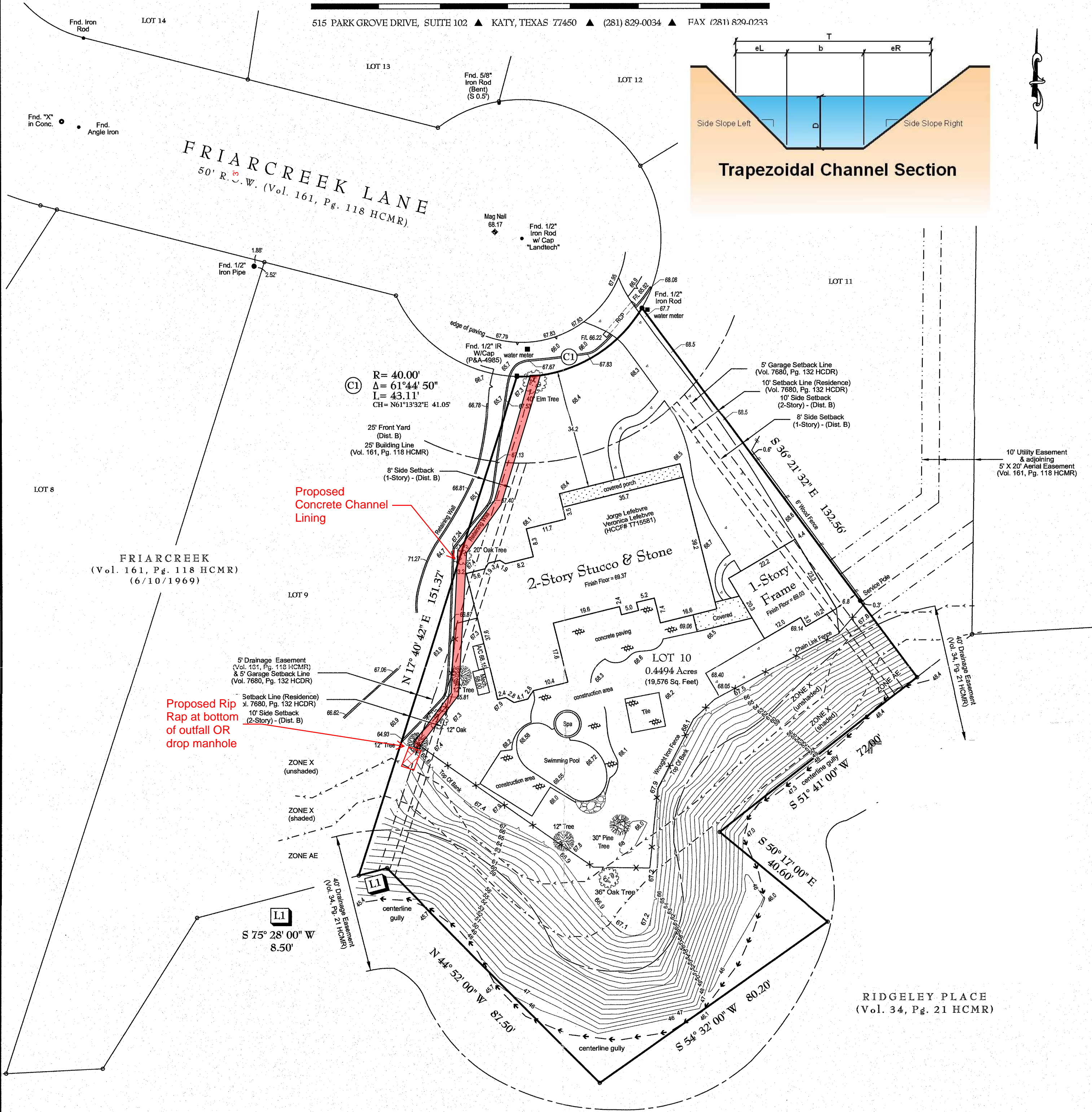
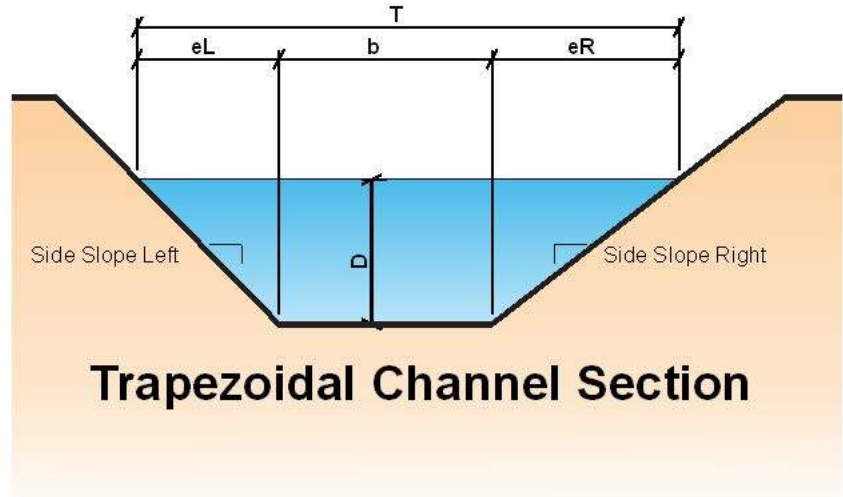
- NOTES:**
- Elevations shown based on Harris County Floodplain Reference Marker No. 210215 Elevation = 68.31 NAVD88 (2001 adjustment)
 - Location of floodzones by graphic plotting only from City of Houston Geographic Information Management System (GIMS) data.
 - Fences & retaining wall do not follow boundary lines as shown above.
 - 2-Story Stucco & Stone (residence) extends across 10 foot side setback lines. 1-Story Frame (garage) extends across 5 foot garage setback line.
 - 40 foot drainage easement centered on centerline of gully reflected per the recorded plat of Ridgeley Place.
 - Lot subject to any and all zoning ordinances or proposed zoning ordinances including those by the City of Hilshire Village, Texas. The above shown tract lies within Zoning District B per the City Zoning Map. Front and side yards shown above for main residence only as set forth under Ordinance No. 108. Rear yards lie South of top of bank area as shown above. Maximum structure height shall not exceed 35 feet in height including chimneys and attachments to the structure. Additional restrictions for accessory structures, swimming pools, sports courts, fences, etc., are not shown and should be verified prior to any planning or construction.
 - Surveyor has not abstracted this property. This survey has been prepared based upon information provided by the title company. No independent investigation of the accuracy of the title company's work has been performed by the surveyor. Zoning ordinances and zoning building setback lines (if any) are not shown. Surveyor has not reviewed restrictive covenants as set forth under Exceptions From Coverage in Schedule B of the Title Commitment.
 - Lot subject to a 10 foot Rear Building Line along the South line of subject tract as recorded in Volume 7680, Page 132 of the Deed Records of Harris County, Texas.
 - All bearings are based on the South right of way line of Friarcreek Lane. (CH = N 61° 13' 32" E)

THIS SURVEY IS THE PROPERTY OF PROBSTFELD & ASSOCIATES, INC., IS CERTIFIED FOR THIS TRANSACTION ONLY, AND IS NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR OWNERS.

OPTION 3

PROBSTFELD & ASSOCIATES
PROFESSIONAL LAND SURVEYORS

515 PARK GROVE DRIVE, SUITE 102 ▲ KATY, TEXAS 77450 ▲ (281) 829-0034 ▲ FAX (281) 829-0233



PLAT OF PROPERTY
FOR: **JORGE LEFEBVRE & VERONICA LEFEBVRE**
AT: **1303 FRIARCREEK LANE • HILSHIRE VILLAGE, TX**
LGL: **LOT 10**
FRIARCREEK
VOLUME 161, PAGE 118 OF THE MAP RECORDS OF
HARRIS COUNTY, TEXAS
SCALE: 1" = 20'
DATE: 3/23/2011 REVISED DATE: 3/14/2018
This Property DOES Lie within the designated 100 year Floodplain.
PANEL NO: 48201C 0665 M FIS PROFILE: K-L
ZONE: X, SHADED X, AE EFF. DATE: 6/9/2014
BASE FLOOD ELEVATION: 100YR: 56.5 | 500YR: 59.5
LOCATED BY GRAPHIC PLOTTING ONLY AND NOT RESPONSIBLE FOR ACTUAL DETERMINATION.
THIS SURVEY WAS PERFORMED IN ACCORDANCE WITH TITLE COMMITMENT
PROVIDED BY: TEXAS AMERICAN TITLE COMPANY
GF#: 675-99-1102 (4/04/1999)

- NOTES:**
- Elevations shown based on Harris County Floodplain Reference Marker No. 210215 Elevation = 68.31 NAVD88 (2001 adjustment)
 - Location of floodzones by graphic plotting only from City of Houston Geographic Information Management System (GIMS) data.
 - Fences & retaining wall do not follow boundary lines as shown above.
 - 2-Story Stucco & Stone (residence) extends across 10 foot side setback lines. 1-Story Frame (garage) extends across 5 foot garage setback line.
 - 40 foot drainage easement centered on centerline of gully reflected per the recorded plat of Ridgeley Place.
 - Lot subject to any and all zoning ordinances or proposed zoning ordinances including those by the City of Hilshire Village, Texas. The above shown tract lies within Zoning District B per the City Zoning Map. Front and side yards shown above for main residence only as set forth under Ordinance No. 108. Rear yards lie South of top of bank area as shown above. Maximum structure height shall not exceed 35 feet in height including chimneys and attachments to the structure. Additional restrictions for accessory structures, swimming pools, sports courts, fences, etc., are not shown and should be verified prior to any planning or construction.
 - Surveyor has not abstracted this property. This survey has been prepared based upon information provided by the title company. No independent investigation of the accuracy of the title company's work has been performed by the surveyor. Zoning ordinances and zoning building setback lines (if any) are not shown. Surveyor has not reviewed restrictive covenants as set forth under Exceptions From Coverage in Schedule B of the Title Commitment.
 - Lot subject to a 10 foot Rear Building Line along the South line of subject tract as recorded in Volume 7680, Page 132 of the Deed Records of Harris County, Texas.
 - All bearings are based on the South right of way line of Friarcreek Lane. (CH = N 61° 13' 32" E)

Open Channel Hydraulics
Trapezoidal Channel

Flow (Q)	10.15	cfs
n	0.015	
slope	0.060%	
bottom width	3	ft.
side slope left	1	to 1
side slope right	1	to 1
Normal Depth	5.26458	ft.

eL	5.26458	ft.
eR	5.26458	ft.
x	1.75486	sq.ft.
a	43.50950	sq.ft.
p	20.89047	ft.
F(D)	0.00000	

(use goal seek tool to set "B18" to 0 by adjusting "B12")

Critical Depth 5.28696

eL	5.28696	ft.
eR	5.28696	ft.
x	1.76232	sq.ft.
a	43.81277	sq.ft.
p	20.95377	ft.
T	13.57391	ft.
f(D)	0.99948	

(use goal seek tool to set "B27" to 0 by adjusting "B21")

Normal Velocity	3.95765	fps
Critical Velocity	3.96792	fps

V-Ditch Channel

Flow (Q)	10.15	cfs
n	0.015	
slope	0.060%	
side slope left	1	to 1
side slope right	1	to 1
Normal Depth	4.11928	ft.

eL	4.11928	ft.
eR	4.11928	ft.
a	16.96848	sq.ft.
p	11.65109	ft.
F(D)	0.80833	

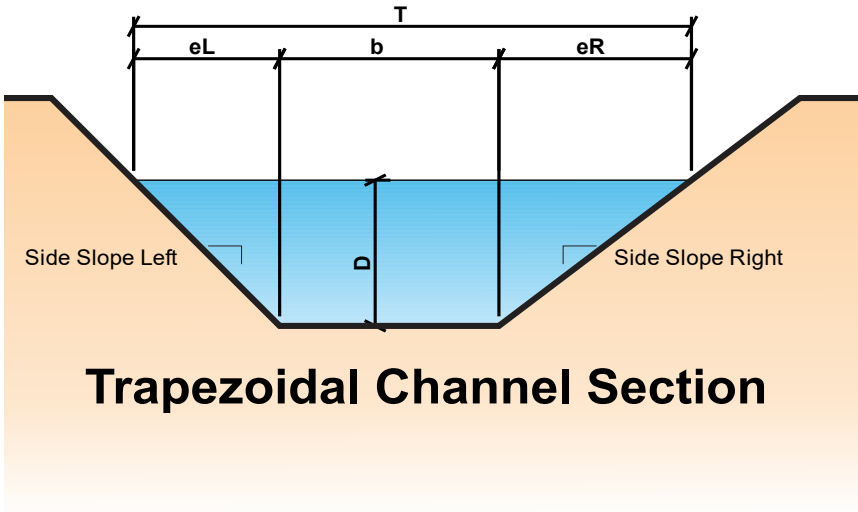
(use goal seek tool to set "G19" to 0 by adjusting "G12")

Critical Depth 2.33197

eL	2.33197	ft.
eR	2.33197	ft.
a	5.43810	sq.ft.
p	6.59582	ft.
T	4.66395	ft.
f(D)	0.90721	

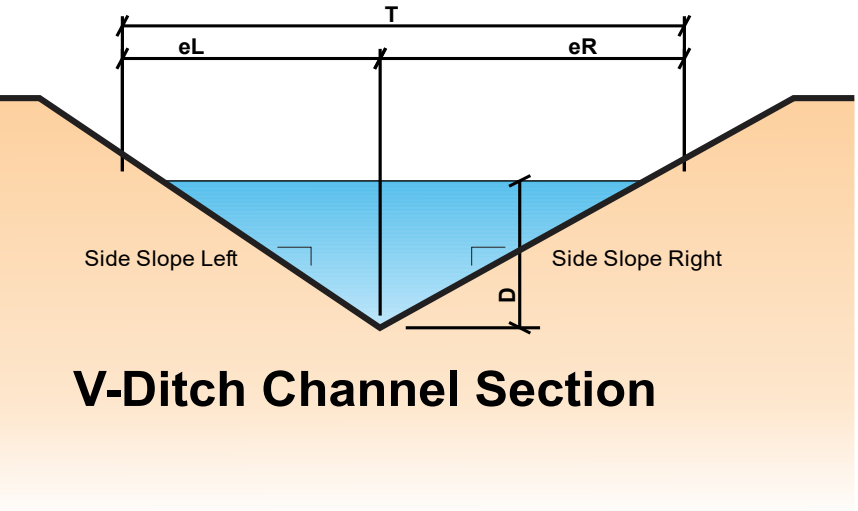
(use goal seek tool to set "G29" to 0 by adjusting "G22")

Normal Velocity	3.11788	fps
Critical Velocity	2.13364	fps



$$e = zD$$
$$z = e/D$$
$$x = D/b$$
$$a = (z + 1/x)D^2$$
$$p = [1/x + 2(z^2 + 1)^{.5}]D$$
$$F(D) = 1 - [(Qnp^{.66667}) / (1.486a^{1.6667}s^{.5})] = 0$$
$$T = b + 2e = (1/x + 2z)D$$
$$f(D) = 1 - (Q^2T/ga^3) = 0$$
$$g = 32.2$$
$$V = (1.486/n)r^{.6667}s^{.5}$$
$$r = a/p$$

$$a = (0.5*(eL*D)) + (D*b) + (0.5*(eR*D))$$
$$p = (2*((eL+eR)+D^2)^{0.5}) + (b*2)$$



$$e = zD$$
$$r = a/p$$
$$a = eD$$
$$p = 2(e^2 + D^2)^{.5}$$
$$T = 2e$$
$$F(D) = 1 - [(Qnp^{.66667}) / (1.486a^{1.6667}s^{.5})] = 0$$
$$f(D) = 1 - (Q^2T/ga^3) = 0$$
$$g = 32.2$$
$$V = (1.486/n)r^{.6667}s^{.5}$$

$$a = (eL + eR)*D$$
$$p = 2((eL*eR) + D^2)^{.5}$$
$$T = eL + eR$$

Solve For Flow based on water depth and channel geometry

Trapezoidal Channel

Water Depth	1.5	ft.
n	0.015	
slope	0.060%	
bottom width	3	ft.
side slope left	1	to 1
side slope right	1	to 1

eL	1.50000	ft.
eR	1.50000	ft.
x	0.50000	s.f..
a	6.75000	s.f..
p	10.24264	ft.

Q= 12.404 cfs

V-Ditch Channel

Water Depth	2.5	ft.
n	0.015	
slope	0.060%	
side slope left	1	to 1
side slope right	1	to 1

eL	2.50000	ft.
eR	2.50000	ft.
a	6.25000	s.f..
p	7.07107	ft.

Q= 13.968 cfs

Trapezoidal Channel

$$Q = (1.486a^{.66667}/(n*p^{.66667})) * (1.486a^{.66667}/(n*p^{.66667}))$$
$$e = zD$$
$$z = e/D$$
$$x = D/b$$
$$a = (z + 1/x)D^2$$
$$p = [1/x + 2(z^2 + 1)^{.5}]D$$

V-Ditch Channel

$$Q = (1.486a^{.66667}/(n*p^{.66667})) * (1.486a^{.66667}/(n*p^{.66667}))$$
$$e = zD$$
$$z = e/D$$
$$a = eD$$
$$p = 2(e^2 + D^2)^{.5}$$
$$a = (eL + eR)*D$$
$$p = 2((eL*eR) + D^2)^{.5}$$



