

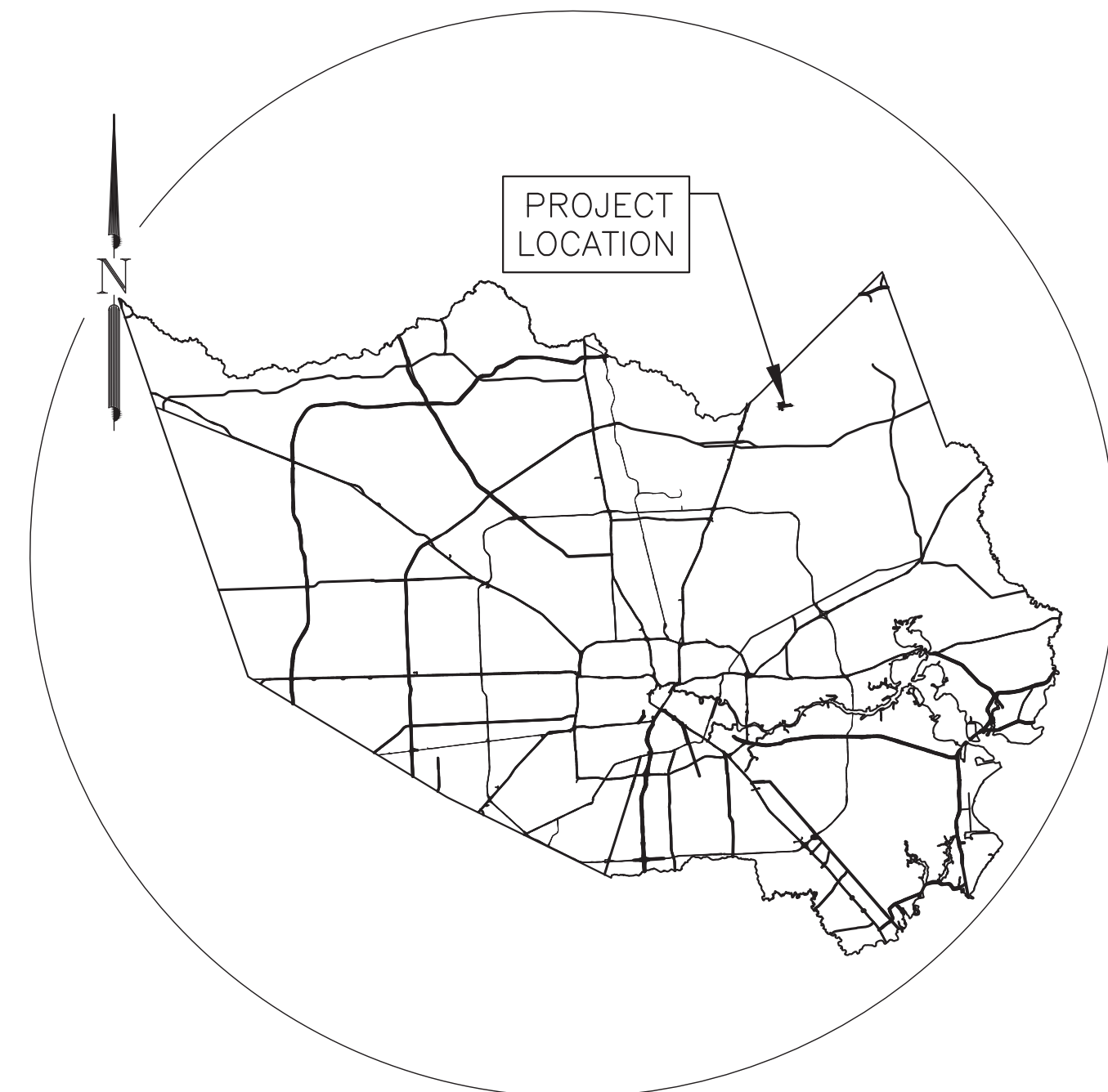
PRELIMINARY DRAINAGE PLAN FOR TWO HOTELS LOCATED ON WOODLAND HILLS DRIVE KINGWOOD, TEXAS

B&L JOB No. 16112

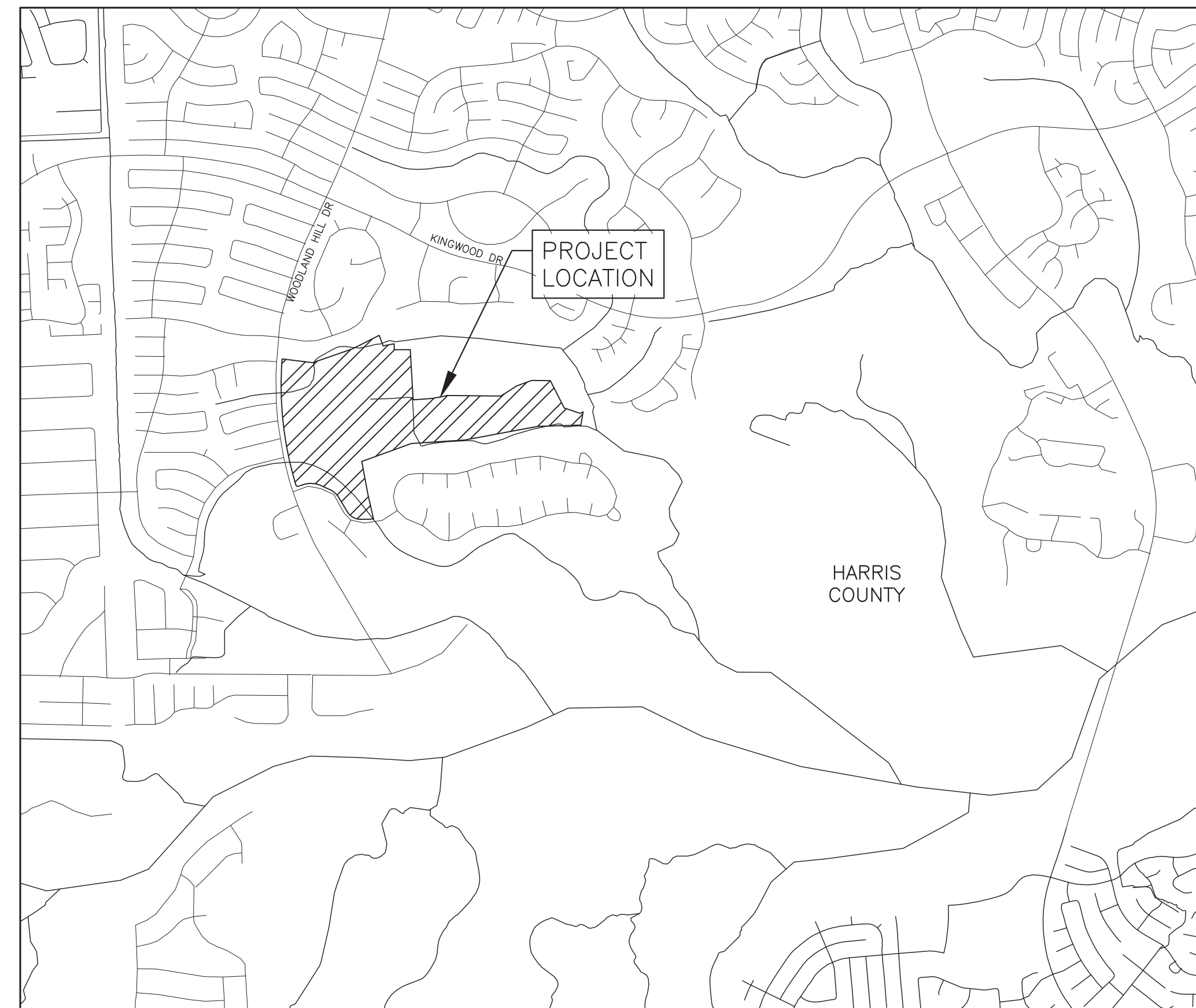
February 19, 2025

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VICINITY MAP
SCALE: NONE
HARRIS COUNTY
KEY MAP PANEL NO. 336G & 336H



LOCATION MAP

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET-FINAL.DWG PLOT DATE: 2/19/2025 jhramilton

NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

B & L
BAKER & LAWSON, INC.
ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6661
REG. NO. F-825

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02-19-2025

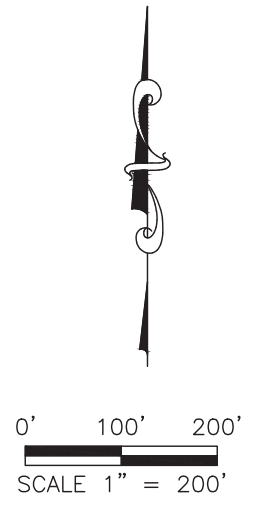
OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: _____
PROFILE: _____
HORIZONTAL: _____
VERTICAL: _____

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

TITLE SHEET
PROJECT NO. 16112

16112_SHEET_SET-FINAL.DWG



DRAINAGE PLAN FOR FLOODPLAIN PROJEC

**FLOODPLAIN GROUP
APPROVED FOR PLAT**

Date: Juan R. Diaz Oct
By: _____
Phone: _____

**ENGINEERING SERVICE SECTION
APPROVED FOR PLAT**

Date: 03/03/2025
By: Shaima Aziz

Line No.	Length	Direction
L1	180.72'	S20°37'13"E
L2	180.01'	N79°16'48"E
L3	94.30'	S00°00'07"E
L4	260.00'	N89°59'53"E
L5	75.40'	S03°14'15"E
L6	315.45'	N85°47'47"E
L7	242.63'	N78°54'36"E
L8	299.09'	N57°17'09"E
L9	260.80'	N69°50'21"E
L10	299.40'	S89°07'54"E
L11	274.47'	S71°21'52"E
L12	52.03'	N59°12'15"E
L13	230.00'	S09°45'46"W
L14	23.40'	N54°41'15"W
L15	152.25'	S89°00'23"W
L16	145.09'	N65°02'01"W
L17	255.84'	N30°53'20"W
L18	90.89'	S72°14'05"W

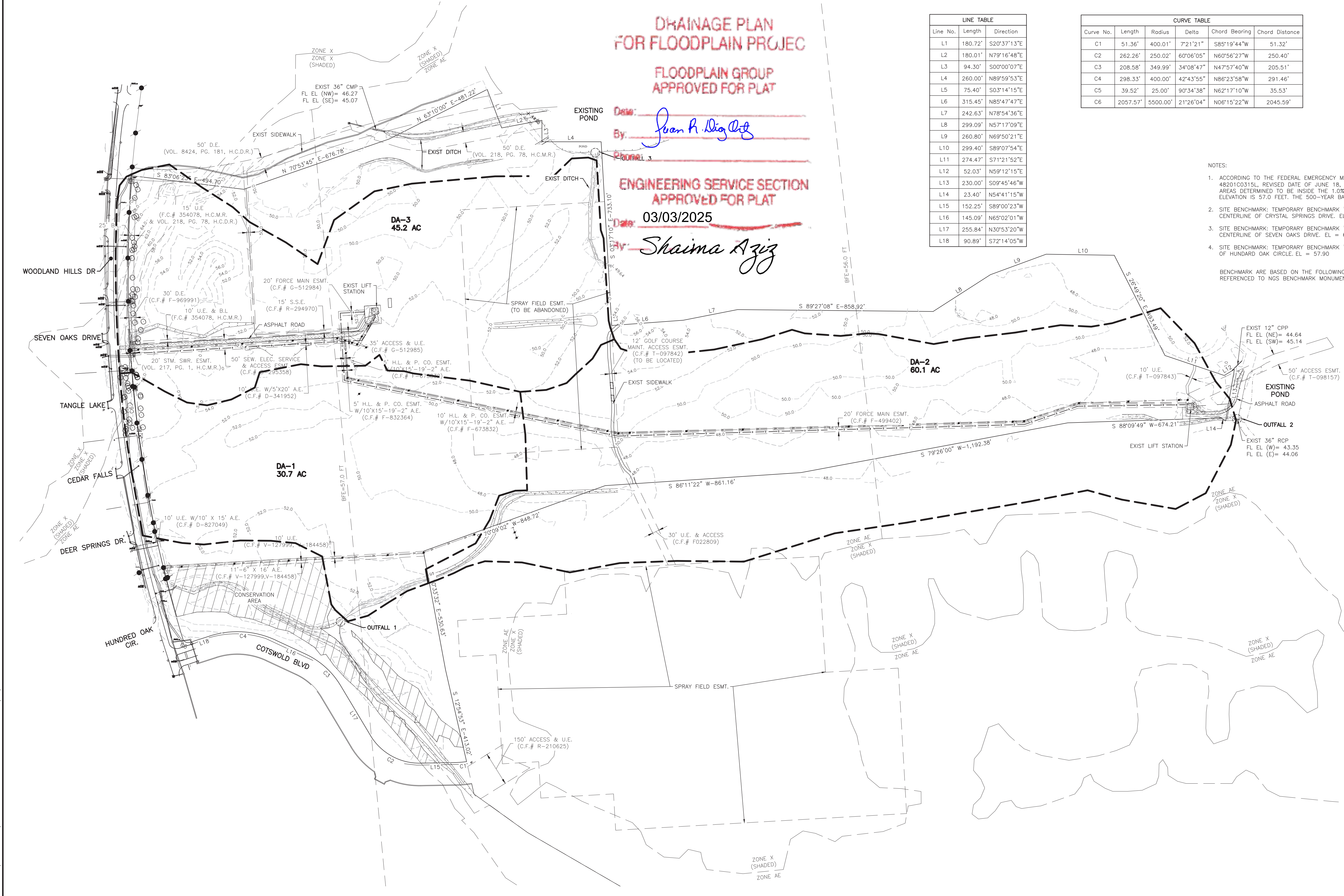
Curve No.	Length	Radius	Delta	Chord Bearing	Chord Distance
C1	51.36'	400.01'	7°21'21"	S85°19'44"W	51.32'
C2	262.26'	250.02'	60°06'05"	N60°56'27"W	250.40'
C3	208.58'	349.99'	34°08'47"	N47°57'40"W	205.51'
C4	298.33'	400.00'	42°43'55"	N86°23'58"W	291.46'
C5	39.52'	25.00'	90°34'38"	N62°17'10"W	35.53'
C6	2057.57'	5500.00'	21°26'04"	N06°15'22"W	2045.59'

- NOTES:
- ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP No. 4820100315L, REVISED DATE OF JUNE 18, 2007, THE SURVEYED PROPERTY LIES PARTIALLY IN ZONE "AE" AREAS DETERMINED TO BE INSIDE THE 1.0% ANNUAL CHANCE FLOODPLAIN. THE 100-YEAR BASE FLOOD ELEVATION IS 57.0 FEET. THE 500-YEAR BASE FLOOD ELEVATION IS 62.5 FEET.
 - SITE BENCHMARK: TEMPORARY BENCHMARK "A" RR SPIKE IN POWER POLE LOCATED 265'± NORTHEAST OF CENTERLINE OF CRYSTAL SPRINGS DRIVE. EL = 74.53
 - SITE BENCHMARK: TEMPORARY BENCHMARK "B" 60D NAIL IN POWER POLE LOCATED 124'± SOUTHEAST OF CENTERLINE OF SEVEN OAKS DRIVE. EL = 61.08
 - SITE BENCHMARK: TEMPORARY BENCHMARK "C" LL @ MUELLER ON FIRE HYDRANT 65'± SOUTH OF CENTERLINE OF HUNDARD OAK CIRCLE. EL = 57.90
- BENCHMARK ARE BASED ON THE FOLLOWING:
REFERENCED TO NGS BENCHMARK MONUMENT HGCS07 (PID:AW5615) EL = 69.80 FEET (NAVD 88).

- NOTES:
- ELEVATIONS BASED ON NAVD88
REFERENCE BENCHMARK:
NGS MONUMENT: L1149 (PID: BL1164).
PUBLISHED ELEVATION: 166.90 FEET.
PK NAIL W/BAKER & LAWSON WASHER
LOCATED 26'± FROM SOUTHWEST CORNER OF
PROPERTY IN ASPHALT OF HIGHLINE BLVD.
ELEVATION 187.65 FEET.
 - ALL BEARINGS SHOWN HEREON ARE BASED ON
THE TEXAS COORDINATE SYSTEM OF 1983,
(NAD83) CENTRAL ZONE, PER GPS
OBSERVATIONS.

SYMBOLS

⊙	= FND IMPLEMENT AS NOTED
○	= SET 5/8" IRON ROD
●	= BENCHMARK
⊕	= GAS VALVE
⊖	= GAS METER
⊗	= IRRIGATION CONTROL
⊘	= WATER VALVE
⊙	= WATER METER
⊕	= FIRE HYDRANT
⊖	= GUY WIRE
⊗	= POWER POLE
⊘	= SIGNAL POLE
⊙	= LIGHT POLE
⊕	= LIGHT BOLLARD
○	= BOLLARD
●	= MONITOR WELL
⊕	= CLEANOUT
⊖	= SIGN
⊗	= TELE PEDESTAL
⊘	= TREE
⊙	= MANHOLE
⊕	= INLET

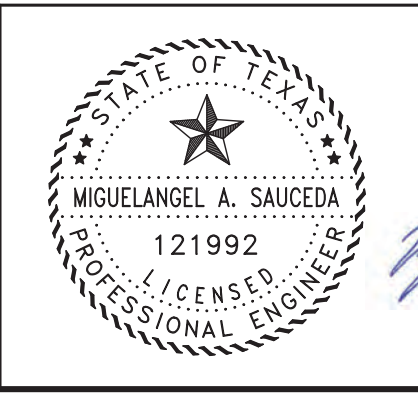


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NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

BAKER & LAWSON, INC.
ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6681
REG. NO. F-825



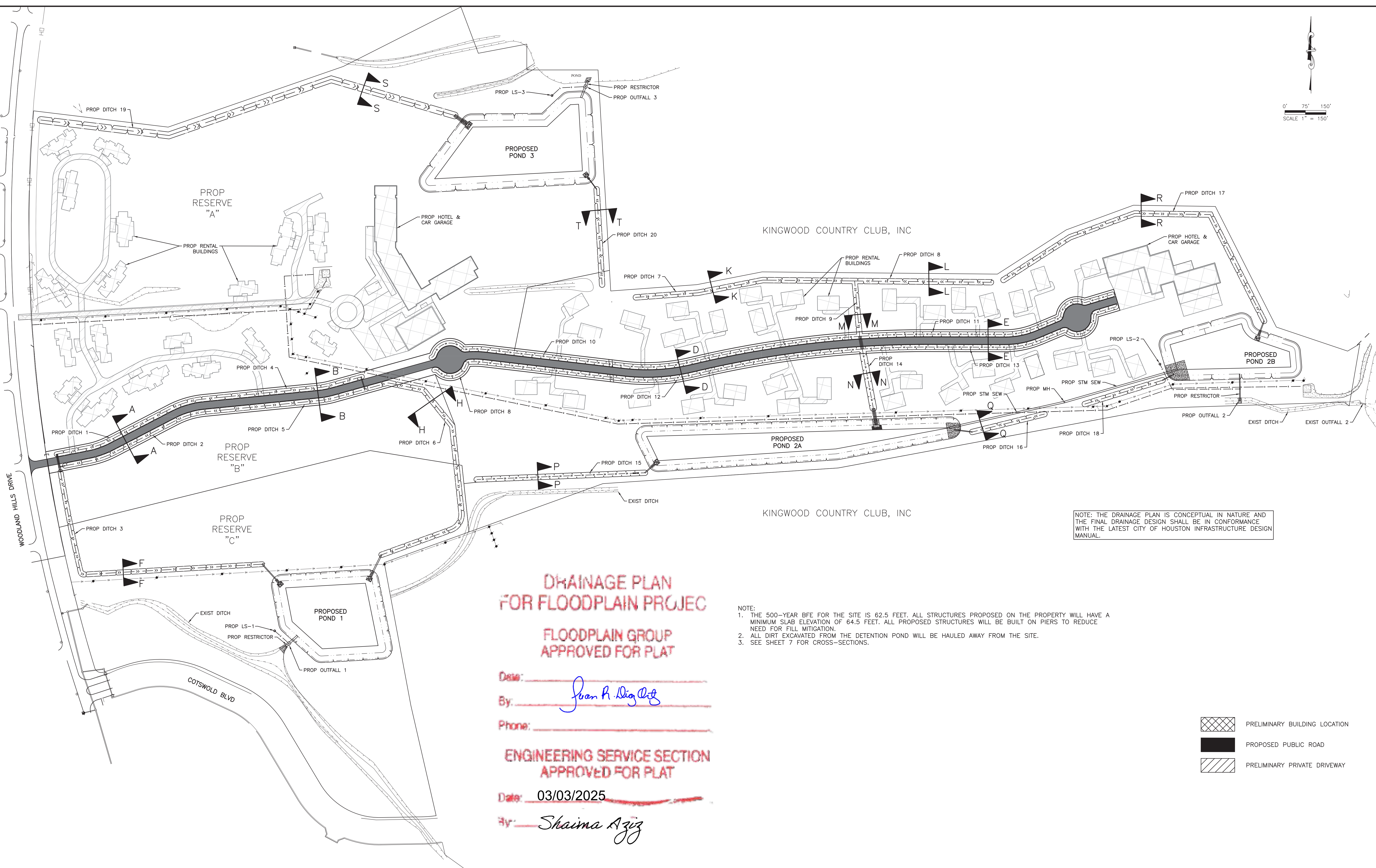
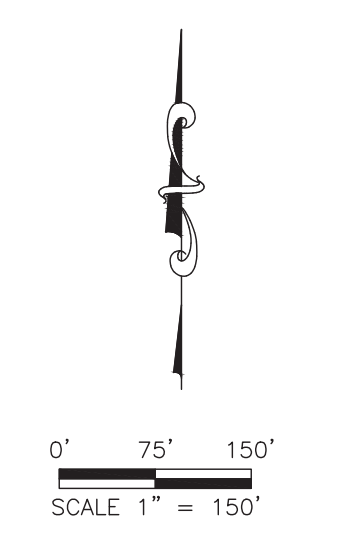
The seal appearing on this document was authorized by Miguelangel A. Saucedo P.E. 121992
02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 200'
PROFILE:
HORIZONTAL:
VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

EXISTING CONDITIONS
PROJECT NO. 16112



NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

**DRAINAGE PLAN
FOR FLOODPLAIN PROJEC**

**FLOODPLAIN GROUP
APPROVED FOR PLAT**

Date: _____
By: *Juan P. Diaz Ortiz*
Phone: _____

**ENGINEERING SERVICE SECTION
APPROVED FOR PLAT**

Date: 03/03/2025
By: *Shaima Aziz*

- NOTE:
1. THE 500-YEAR BFE FOR THE SITE IS 62.5 FEET. ALL STRUCTURES PROPOSED ON THE PROPERTY WILL HAVE A MINIMUM SLAB ELEVATION OF 64.5 FEET. ALL PROPOSED STRUCTURES WILL BE BUILT ON PIERS TO REDUCE NEED FOR FILL MITIGATION.
 2. ALL DIRT EXCAVATED FROM THE DETENTION POND WILL BE HAULED AWAY FROM THE SITE.
 3. SEE SHEET 7 FOR CROSS-SECTIONS.

- PRELIMINARY BUILDING LOCATION
- PROPOSED PUBLIC ROAD
- PRELIMINARY PRIVATE DRIVEWAY

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET-FINAL.DWG PLOT DATE: 2/19/2025 jhrmilton

NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

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ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6681
REG. NO. F-825

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OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
PROFILE:
HORIZONTAL:
VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

SITE PLAN
PROJECT NO. 16112

16112_SHEET_SET-FINAL.DWG

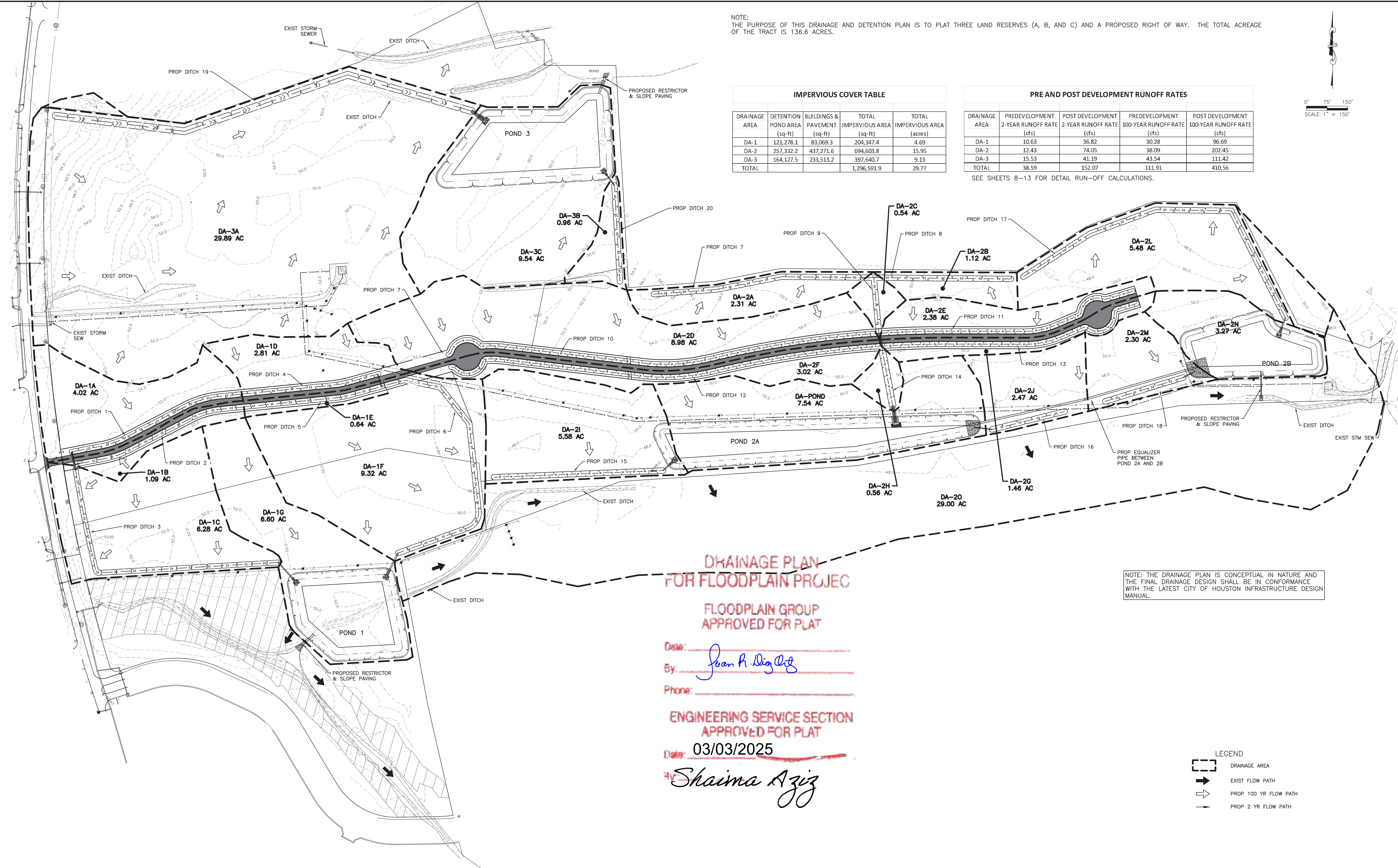
NOTE:
THE PURPOSE OF THIS DRAINAGE AND DETENTION PLAN IS TO PLAT THREE LAND RESERVES (A, B, AND C) AND A PROPOSED RIGHT OF WAY. THE TOTAL ACREAGE OF THE TRACT IS 136.6 ACRES.

0' 75' 150'
SCALE 1" = 150'

IMPERVIOUS COVER TABLE				
DRAINAGE AREA	DETENTION POND AREA (sq-ft)	BUILDINGS & PAVEMENT (sq-ft)	TOTAL IMPERVIOUS AREA (sq-ft)	TOTAL IMPERVIOUS AREA (acres)
DA-1	121,278.1	83,069.3	204,347.4	4.69
DA-2	257,332.2	437,271.6	694,603.8	15.95
DA-3	164,127.5	233,513.2	397,640.7	9.13
TOTAL			1,296,591.9	29.77

PRE AND POST DEVELOPMENT RUNOFF RATES				
DRAINAGE AREA	PREDEVELOPMENT 2-YEAR RUNOFF RATE (cfs)	POST DEVELOPMENT 2-YEAR RUNOFF RATE (cfs)	PREDEVELOPMENT 100-YEAR RUNOFF RATE (cfs)	POST DEVELOPMENT 100-YEAR RUNOFF RATE (cfs)
DA-1	10.63	36.82	30.28	96.69
DA-2	12.43	74.05	38.09	202.45
DA-3	15.53	41.19	43.54	111.42
TOTAL	38.59	152.07	111.91	410.56

SEE SHEETS 8-13 FOR DETAIL RUN-OFF CALCULATIONS.



DRAINAGE PLAN FOR FLOODPLAIN PROJEC
FLOODPLAIN GROUP APPROVED FOR PLAT

Date: _____
By: *Juan R. Diaz*
Phone: _____

ENGINEERING SERVICE SECTION APPROVED FOR PLAT
Date: 03/03/2025
By: *Shaima Aziz*

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

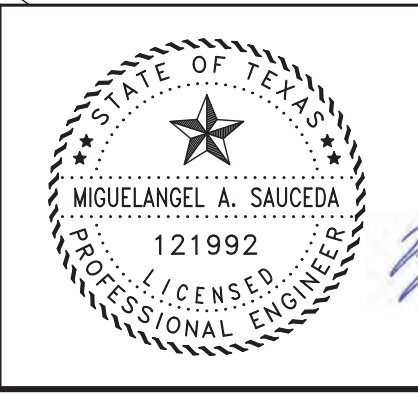
- LEGEND
- DRAINAGE AREA
 - EXIST FLOW PATH
 - PROP 100 YR FLOW PATH
 - PROP 2 YR FLOW PATH

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NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED MS
DRAWN JLH
CHECKED _____
DATE 2/19/2025

B & L
BAKER & LAWSON, INC.
ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6681
REG. NO. F-825



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02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
PROFILE: _____
HORIZONTAL: _____
VERTICAL: _____

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

DRAINAGE AREA MAP
PROJECT NO. 16112

REQUIRED DETENTION VOLUME CALCULATIONS

DETENTION CALCULATION METHOD	DETENTION RATE (ac-ft/ac)	PROJECT AREA (acres)	DETENTION REQUIRED (ac-ft)
CITY OF HOUSTON	0.75	118.88	89.16
HARRIS COUNTY	0.65	136.10	88.47
HCFC		136.10	52.46

FOR HCFC REQUIRED DETENTION CALCULATIONS SEE SHEETS 8, 9, AND 10

THE CITY OF HOUSTON DETENTION RATE OF 0.75 AC-FT/AC GOVERNS AND THE SITE SHALL PROVIDE 89.16 AC-FT OF DETENTION

DETENTION AND MITIGATION VOLUME REQUIRED

	VOLUME (cu-ft)	VOLUME (ac-ft)
DETENTION REQUIRED	3,883,809.6	89.16
MITIGATION REQUIRED	16,966.0	0.39
TOTAL DETENTION & MITIGATION REQUIRED	3,900,775.6	89.55
TOTAL DETENTION PROVIDED	3,972,018.2	91.18
EXCESS DETENTION PROVIDED	71,242.6	1.64

THE TOTAL DETENTION REQUIRED FOR THE SITE IS 89.55 AC-FT. THE FILL MITIGATION FOR THE SITE IS 0.39 AC-FT. THE VOLUME REQUIRED IS 89.70 AC-FT. THE VOLUME PROVIDED IS 91.18 AC-FT.

PRE AND POST DEVELOPMENT RUNOFF RATES

DRAINAGE AREA	PREDEVELOPMENT 2-YEAR RUNOFF RATE (cfs)	POST DEVELOPMENT 2-YEAR RUNOFF RATE (cfs)	PREDEVELOPMENT 100-YEAR RUNOFF RATE (cfs)	POST DEVELOPMENT 100-YEAR RUNOFF RATE (cfs)
DA-1	10.63	36.82	30.28	96.69
DA-2	12.43	74.05	38.09	202.45
DA-3	15.53	41.19	43.54	111.42
TOTAL	38.59	152.07	111.91	410.56

DRAINAGE PLAN FOR FLOODPLAIN PROJEC

FLOODPLAIN GROUP APPROVED FOR PLAT

Date: Juan R. Diaz Ortiz
By: _____

Phone: _____

ENGINEERING SERVICE SECTION APPROVED FOR PLAT

Date: 03/03/2025

By: Shaima Aziz

DETENTION POND 1 VOLUME CALCULATIONS

WATER ELEVATION (ft)	DEPTH, h (ft)	BOTTOM SURFACE AREA (sq-ft)	TOP SURFACE AREA (sq-ft)	AVERAGE SURFACE AREA (sq-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
39.50	0.00	62,620.5	62,620.5	62,620.5	0.0	0.00
40.00	0.50	62,620.5	64,640.4	63,630.5	31,815.2	0.73
41.00	1.50	62,620.5	68,774.3	65,697.4	98,546.1	2.26
42.00	2.50	62,620.5	73,033.4	67,827.0	169,567.4	3.89
43.00	3.50	62,620.5	77,405.5	70,013.0	245,045.5	5.63
44.00	4.50	62,620.5	81,878.1	72,249.3	325,121.9	7.46
45.00	5.50	62,620.5	86,451.2	74,535.9	409,947.2	9.41
46.00	6.50	62,620.5	91,124.9	76,872.7	499,672.6	11.47
47.00	7.50	62,620.5	95,899.1	79,259.8	594,448.5	13.65
48.00	8.50	62,620.5	100,773.9	81,697.2	694,426.2	15.94
49.00	9.50	62,620.5	105,749.1	84,184.8	799,755.6	18.36
50.00	10.50	62,620.5	110,824.9	86,722.7	910,588.4	20.90
51.00	11.50	62,620.5	116,001.3	89,310.9	1,027,075.4	23.58
52.00	12.50	62,620.5	121,278.1			

GRAVITY DRAIN

100-YEAR WSEL FREEBOARD

DETENTION POND 2A VOLUME CALCULATIONS

WATER ELEVATION (ft)	DEPTH, h (ft)	BOTTOM SURFACE AREA (sq-ft)	TOP SURFACE AREA (sq-ft)	AVERAGE SURFACE AREA (sq-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
40.00	0.00	66,083.6	66,083.6	66,083.6	0.0	0.00
41.00	1.00	66,083.6	75,249.1	70,666.4	70,666.4	1.62
42.00	2.00	66,083.6	84,515.6	75,299.6	150,599.2	3.46
43.00	3.00	66,083.6	93,882.6	79,983.1	239,949.3	5.51
44.00	4.00	66,083.6	103,350.2	84,716.9	338,867.6	7.78
44.50	4.50	66,083.6	108,121.6	87,102.6	391,961.7	9.00
45.00	5.00	66,083.6	112,918.3	89,501.0	447,504.8	10.27
46.00	6.00	66,083.6	122,586.9	94,335.3	566,011.5	12.99
47.00	7.00	66,083.6	132,356.1	99,219.9	694,539.0	15.94
48.00	8.00	66,083.6	142,225.9	104,154.8	833,238.0	19.13
49.00	9.00	66,083.6	152,196.2	109,139.9	982,259.1	22.55
50.00	10.00	66,083.6	162,267.0			

GRAVITY DRAIN

100-YEAR WSEL FREEBOARD

DETENTION POND 2B VOLUME CALCULATIONS

WATER ELEVATION (ft)	DEPTH, h (ft)	BOTTOM SURFACE AREA (sq-ft)	TOP SURFACE AREA (sq-ft)	AVERAGE SURFACE AREA (sq-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
40.00	0.00	47,975.2	47,975.2	47,975.2	0.0	0.00
41.00	1.00	47,975.2	52,231.8	50,103.5	50,103.5	1.15
42.00	2.00	47,975.2	56,588.9	52,282.1	104,564.1	2.40
43.00	3.00	47,975.2	61,046.6	54,510.9	163,532.7	3.75
44.00	4.00	47,975.2	65,604.8	56,790.0	227,160.0	5.21
45.00	5.00	47,975.2	70,263.6	59,119.4	295,597.0	6.79
45.30	5.30	47,975.2	71,444.0	59,709.6	316,460.9	7.26
46.00	6.00	47,975.2	75,022.9	61,499.1	368,994.3	8.47
47.00	7.00	47,975.2	79,882.7	63,929.0	447,502.7	10.27
48.00	8.00	47,975.2	84,843.0	66,409.1	531,272.8	12.20
49.00	9.00	47,975.2	89,903.8	68,939.5	620,455.5	14.24
50.00	10.00	47,975.2	95,065.2			

GRAVITY DRAIN

100-YEAR WSEL FREEBOARD

DETENTION POND 3 VOLUME CALCULATIONS

WATER ELEVATION (ft)	DEPTH, h (ft)	BOTTOM SURFACE AREA (sq-ft)	TOP SURFACE AREA (sq-ft)	AVERAGE SURFACE AREA (sq-ft)	CUMULATIVE VOLUME (cu-ft)	CUMULATIVE VOLUME (ac-ft)
38.00	0.00	86,906.6	86,906.6	86,906.6	0.0	0.00
39.00	1.00	86,906.6	92,729.3	89,818.0	89,818.0	2.06
40.00	2.00	86,906.6	98,698.9	92,802.8	185,605.5	4.26
41.00	3.00	86,906.6	104,792.0	95,849.3	287,547.9	6.60
42.00	4.00	86,906.6	110,985.1	98,945.9	395,783.4	9.09
43.00	5.00	86,906.6	117,278.0	102,092.3	510,461.5	11.72
44.00	6.00	86,906.6	123,671.0	105,288.8	631,732.8	14.50
45.00	7.00	86,906.6	130,163.9	108,535.3	759,746.8	17.44
46.00	8.00	86,906.6	136,756.7	111,831.7	894,653.2	20.54
47.00	9.00	86,906.6	143,449.5	115,178.1	1,036,602.5	23.80
48.00	10.00	86,906.6	150,242.2	118,574.4	1,185,744.0	27.22
49.00	11.00	86,906.6	157,134.9	122,020.8	1,342,228.3	30.81
50.00	12.00	86,906.6	164,127.5	125,517.1		

GRAVITY DRAIN

100-YEAR WSEL FREEBOARD

DETENTION POND VOLUME SUMMARY

DETENTION POND	POND VOLUME (ac-ft)
POND 1	23.58
POND 2A	22.55
POND 2B	14.24
POND 3	30.81
TOTAL	91.18

DRAINAGE HYDRAULIC CALCULATIONS FOR THE 100-YEAR STORM EVENT (POND 1)

D.A. NO.	RUN	AREA (AC)	C	Ditch Length	Tc (MIN)	I 100-YR (in/hr)	Q 100-YR (CFS)
DA-1A	DITCH 1	4.02	0.39	665	25.07	7.00	13.7
DA-1B	DITCH 2	1.09	0.39	640	17.24	8.03	4.3
DA-1A THRU DA-1C	DITCH 3	6.28	0.39	1040	33.73	6.16	18.9
USE 30" CULVERT FOR OUTFALL INTO POND							
DA-1D	DITCH 4	2.81	0.39	500	25.12	6.99	9.6
DA-1D & DA-1E	DITCH 5	0.64	0.39	505	29.33	6.56	2.0
DA-1D THRU DA-1F	DITCH 6	12.77	0.39	1065	30.30	7.76	48.3
USE 42" CULVERT FOR OUTFALL INTO POND							

DITCH SIZING CALCULATIONS FOR THE 100-YEAR STORM EVENT (POND 1)

ID	MINIMUM DEPTH (FT)	DITCH BOTTOM WIDTH (B) FT	CROSS SECTION AL AREA	SIDE SLOPE (X:1)	WET PERIMETER (FT)	HYDRAULIC RADIUS (R)'	ROUGHNESS COEFFICIENT (N)	AVERAGE SLOPE (S) FT/FT	VELOCITY (V) FPS	CAPACITY (Q) CFS	REQUIRED CAPACITY (Q) CFS
DITCH 1	2.0	0	12.00	3	12.6	0.95	0.04	0.0017	1.14	17.8	13.7
DITCH 2	1.5	0	6.75	3	9.5	0.71	0.04	0.0017	0.63	8.3	4.3
DITCH 3	2.0	0	12.00	3	12.6	0.95	0.04	0.0025	1.57	21.6	18.9
DITCH 4	1.5	0	6.75	3	9.5	0.71	0.04	0.0059	1.42	15.4	9.6
DITCH 5	1.5	0	6.75	3	9.5	0.71	0.04	0.0059	0.30	15.4	2.0
DITCH 6	1.5	14	27.75	3	23.5	1.18	0.04	0.0010	1.74	36.5	48.3

DRAINAGE HYDRAULIC CALCULATIONS FOR THE 100-YEAR STORM EVENT (POND 2A)

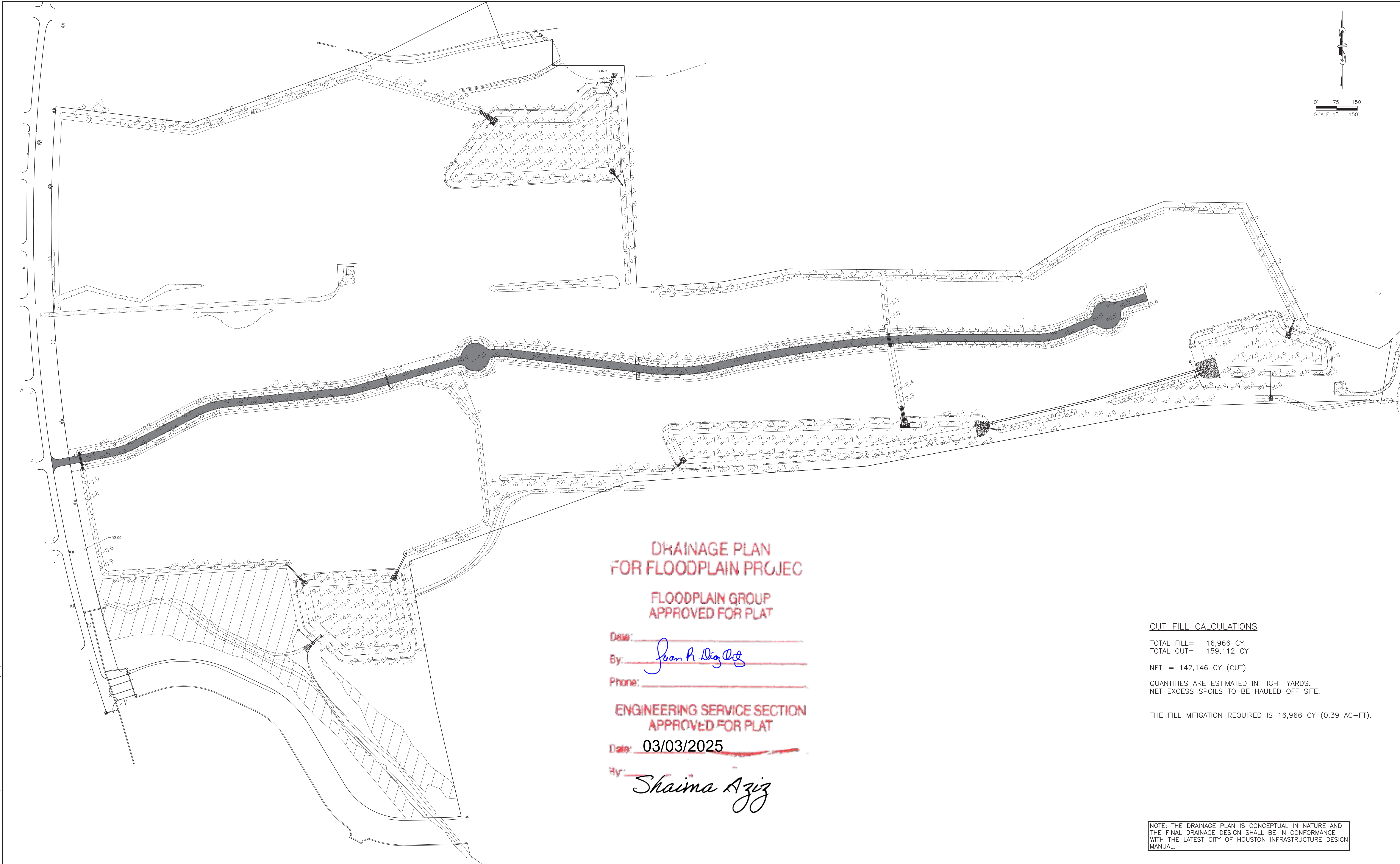
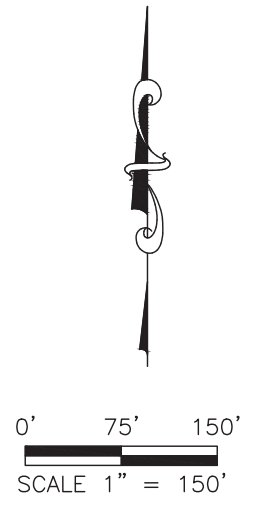
D.A. NO.	RUN	AREA (AC)	C	Ditch Length	Tc (MIN)	I 100-YR (in/hr)	Q 100-YR (CFS)
DA-2A	DITCH 7	2.31	0.39	850	19.46	7.70	8.7
DA-2B	DITCH 8	1.12	0.39	505	19.92	7.64	4.2
DA-2A THRU DA-2C	DITCH 9	3.97	0.39	205	21.63	7.41	14.3
DA-2D	DITCH 10	8.98	0.39	1785	37.26	5.89	25.8
DA-2E	DITCH 11	2.38	0.39	970	21.89	7.38	8.6
DA-2A THRU DA-2E	ROAD CULVERT	15.33	0.39		37.26	6.98	52.1
USE 3-30" RCP CULVERTS FOR ROAD CULVERT							
DA-2F	DITCH 12	3.02	0.39	1680	26.4	8.31	12.2
DA-2G	DITCH 13	1.46	0.39	995	22.1	9.07	6.5
DA-2A THRU DA-2H	DITCH 14	21.38	0.39	220	39.1	6.81	70.9
USE 3-30" RCP CULVERTS FOR OUTFALL INTO POND							
DA-2I	DITCH 15	5.58	0.39	675	33.0	7.43	20.2
USE 30" RCP CULVERT FOR OUTFALL INTO POND							
DA-2J	DITCH 16	2.47	0.39	275	27.1	8.21	9.9
USE 24" RCP CULVERT FOR OUTFALL INTO POND							

DITCH SIZING CALCULATIONS FOR THE 100-YEAR STORM EVENT (POND 2A)

ID	MINIMUM DEPTH (FT)	DITCH BOTTOM WIDTH (B) FT	CROSS SECTION AL AREA	SIDE SLOPE (X:1)	WET PERIMETER (FT)	HYDRAULIC RADIUS (R)'	ROUGHNESS COEFFICIENT (N)	AVERAGE SLOPE (S) FT/FT	VELOCITY (V) FPS	CAPACITY (Q) CFS	REQUIRED CAPACITY (Q) CFS
DITCH 7	1.5	0	6.75	3	9.5	0.71	0.04	0.0034	1.28	11.7	8.7
DITCH 8	1.5	0	6.75	3	9.5	0.71	0.04	0.0016	0.62	8.0	4.2
DITCH 9	1.5	0	6.75	3	9.5	0.71	0.04	0.0064	2.13	16.0	14.3
DITCH 10	2.0	2	16.00	3	14.6	1.09	0.04	0.0020	1.61	28.3	25.8
DITCH 11	1.5	0	6.75	3	9.5	0.71	0.04	0.0027	1.27	10.4	8.6
DITCH 12	1.5	2	9.75	3	11.5	0.85	0.04	0.0020	1.26	14.6	12.2
DITCH 13	1.5	0	6.75	3	9.5	0.71	0.04	0.0027	0.96	10.4	6.5
DITCH 14	2.0	8	28.00	3	20.6	1.36	0.04	0.0055	2.53	94.8	70.9
DITCH 15	2.0	2	16.00	3	14.6	1.09	0.04	0.0022	1.26	29.6	20.2
DITCH 16	1.5	0	6.75	3	9.5	0.71	0.04	0.0031	1.46	11.2	9.9

DRAINAGE HYDRAULIC CALCULATIONS FOR THE 100-YEAR STORM EVENT (POND 2B)

D.A. NO.	RUN	AREA (AC)	C	Ditch Length	Tc (MIN)	I 100-YR (in/hr)	Q 100-YR (CFS)
DA-2L	DITCH 17	6.50	0.39	1250	26.85	6.81	21.6
DA-2M	DITCH 18						



**DRAINAGE PLAN
FOR FLOODPLAIN PROJEC**

**FLOODPLAIN GROUP
APPROVED FOR PLAT**

Date: _____
By: Juan A. Diez Ortiz
Phone: _____

**ENGINEERING SERVICE SECTION
APPROVED FOR PLAT**

Date: 03/03/2025
By: Shaima Aziz

CUT FILL CALCULATIONS

TOTAL FILL= 16,966 CY
TOTAL CUT= 159,112 CY
NET = 142,146 CY (CUT)

QUANTITIES ARE ESTIMATED IN TIGHT YARDS.
NET EXCESS SPOILS TO BE HAULED OFF SITE.

THE FILL MITIGATION REQUIRED IS 16,966 CY (0.39 AC-FT).

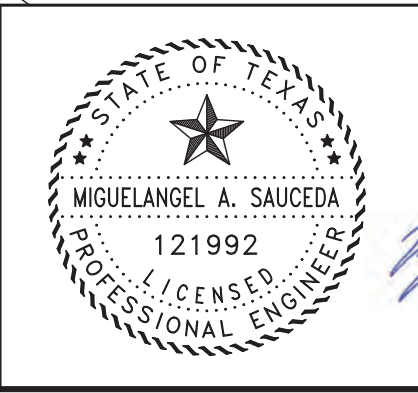
NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112 SHEET SET-FINAL.DWG PLOT DATE: 2/19/2025 jhrmilton

NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED MS
DRAWN JLH
CHECKED _____
DATE 2/19/2025

B & L
BAKER & LAWSON, INC.
ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6661
REG. NO. F-825



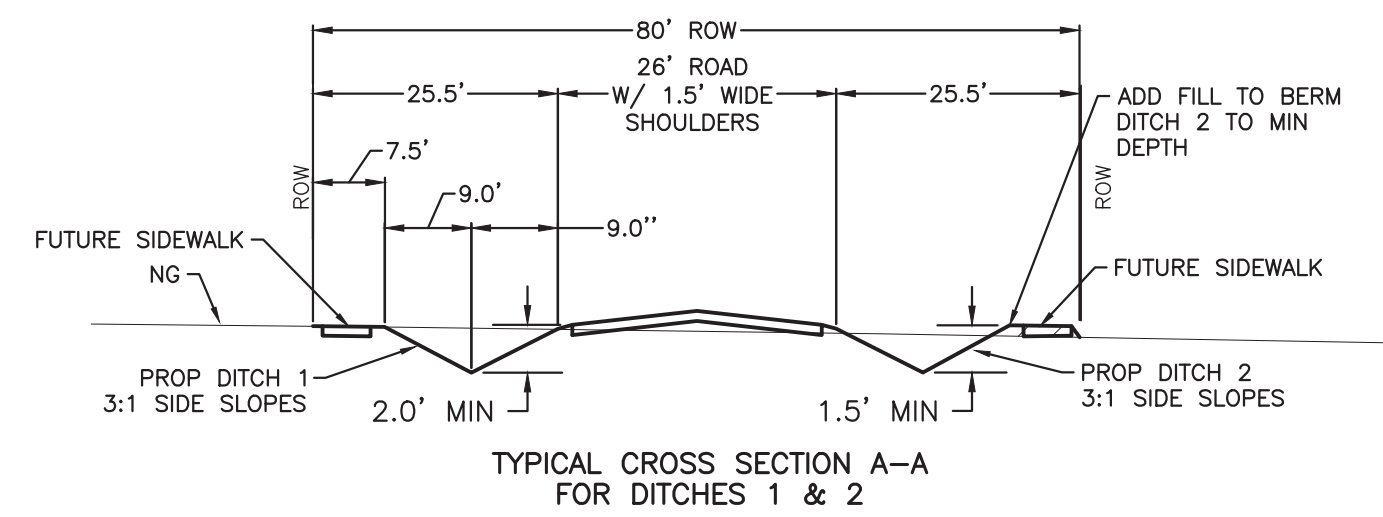
The seal appearing on this document was authorized by Miguelangel A. Saucedo P.E. 121992
02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

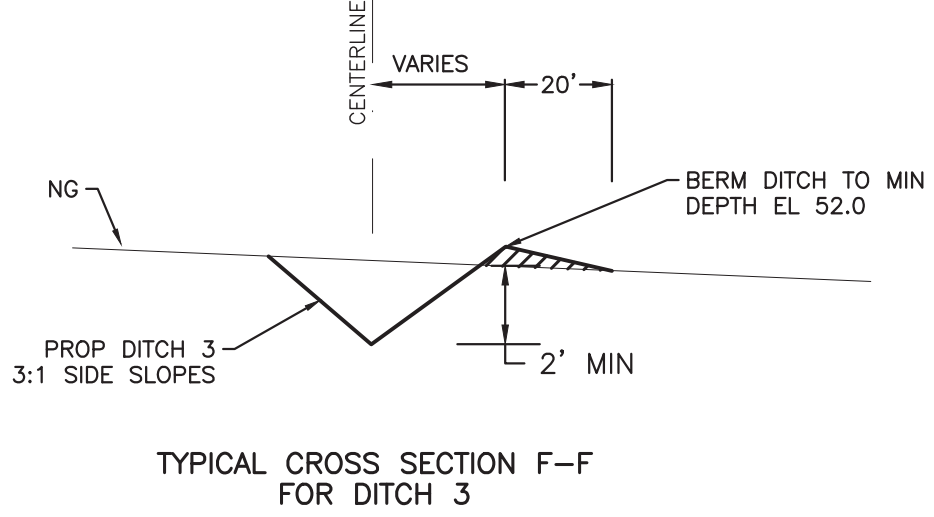
PLAN: 1" = 150'
PROFILE: _____
HORIZONTAL: _____
VERTICAL: _____

PROJECT:
**TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339**
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

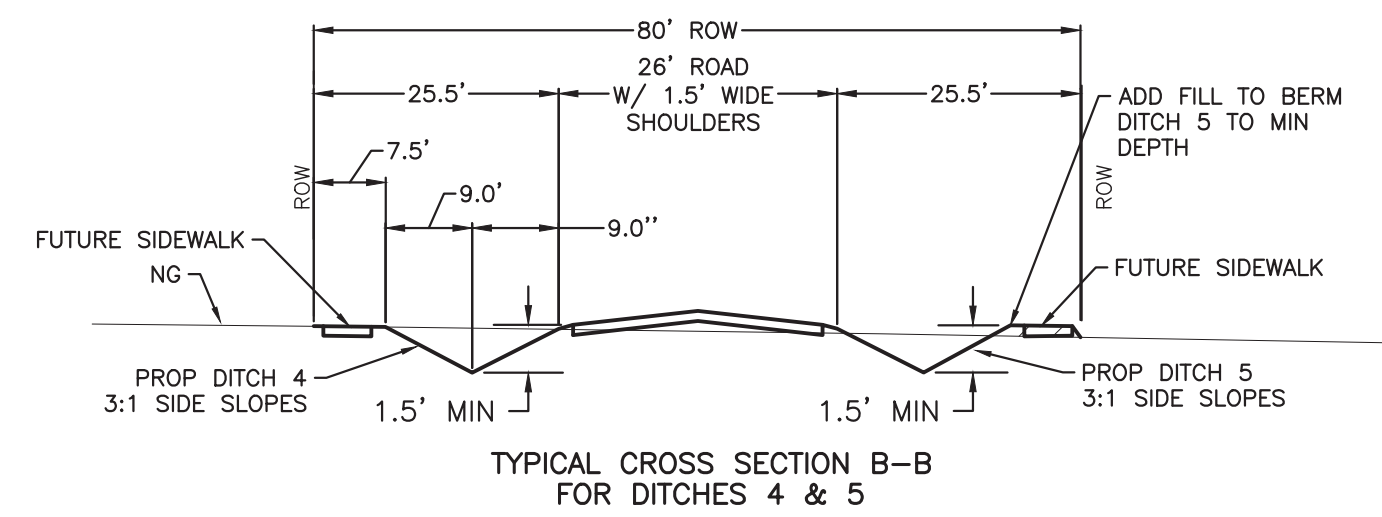
CUT/FILL MAP
PROJECT NO. 16112



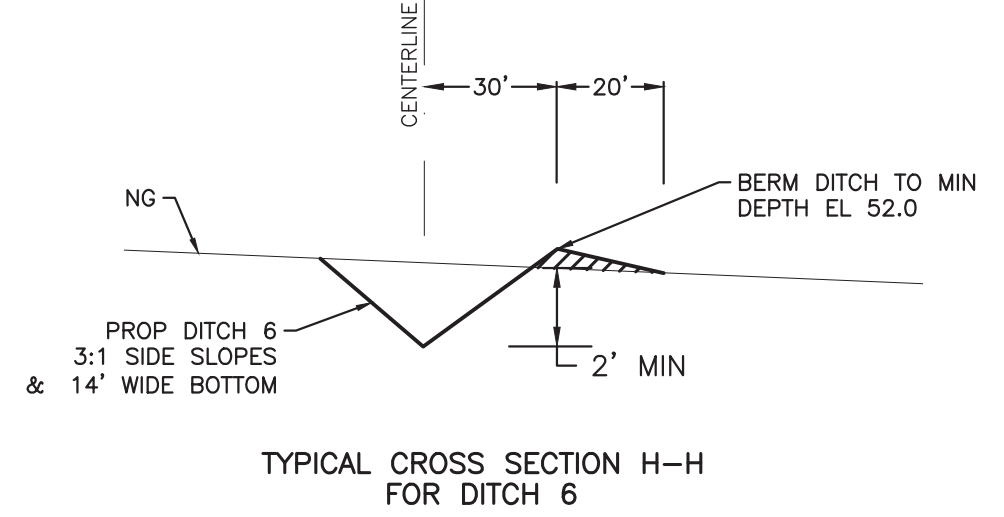
TYPICAL CROSS SECTION A-A FOR DITCHES 1 & 2



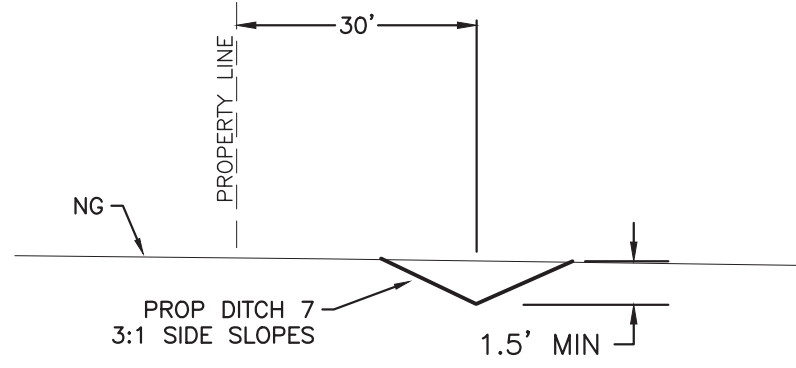
TYPICAL CROSS SECTION F-F FOR DITCH 3



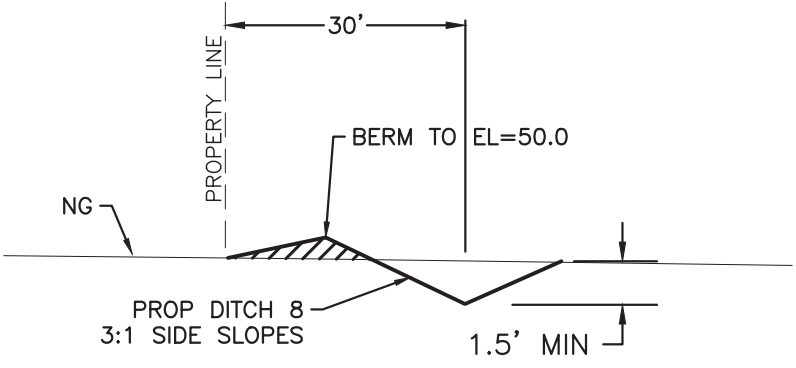
TYPICAL CROSS SECTION B-B FOR DITCHES 4 & 5



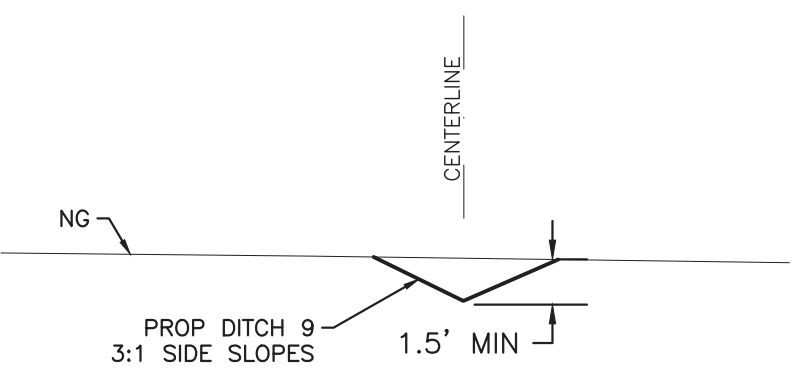
TYPICAL CROSS SECTION H-H FOR DITCH 6



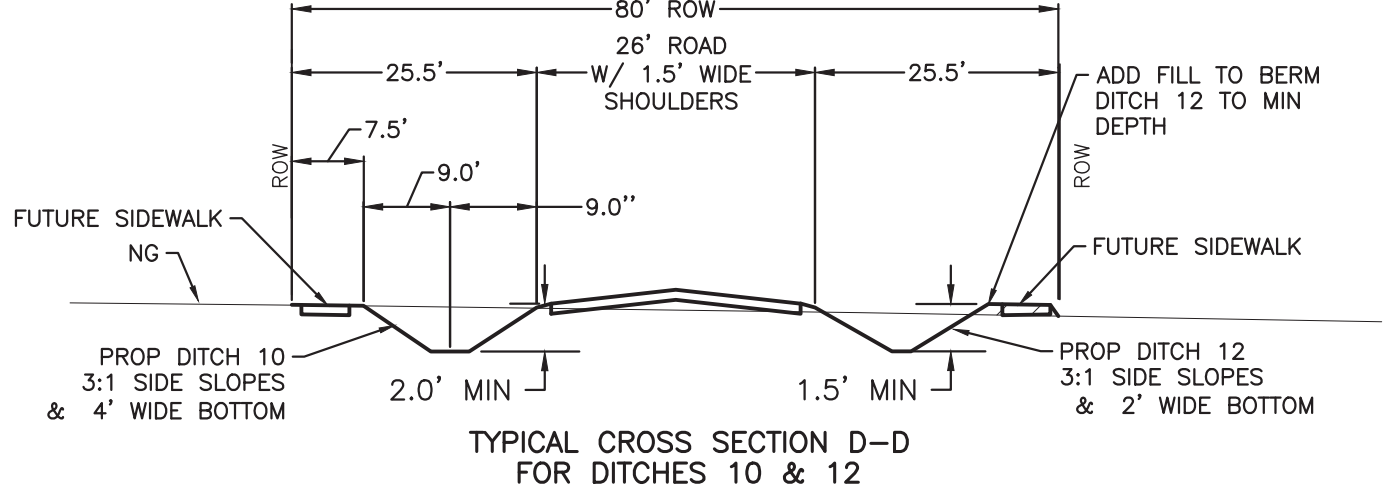
TYPICAL CROSS SECTION K-K FOR DITCH 7



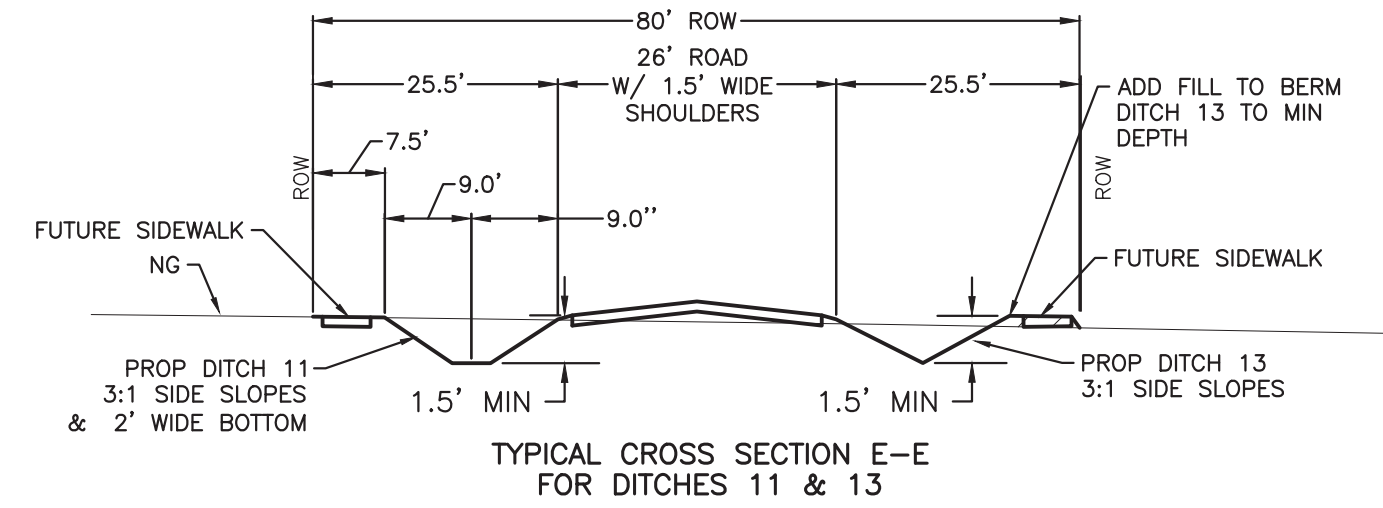
TYPICAL CROSS SECTION L-L FOR DITCH 8



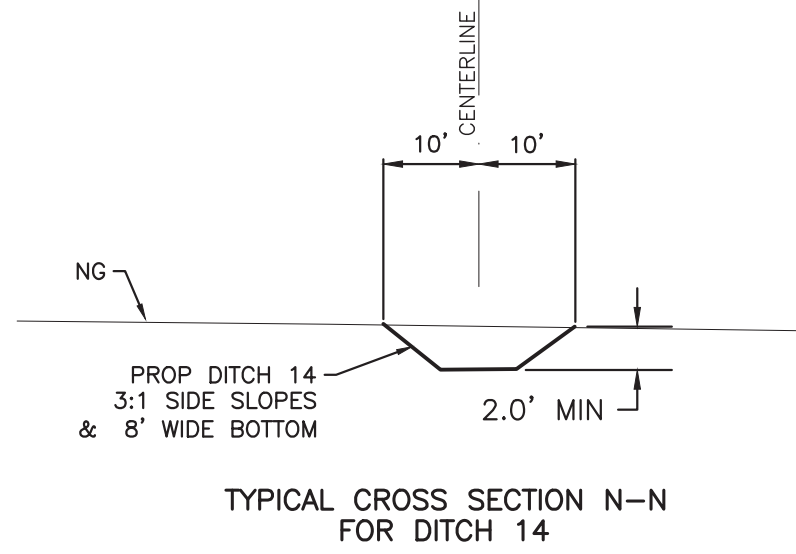
TYPICAL CROSS SECTION M-M FOR DITCH 9



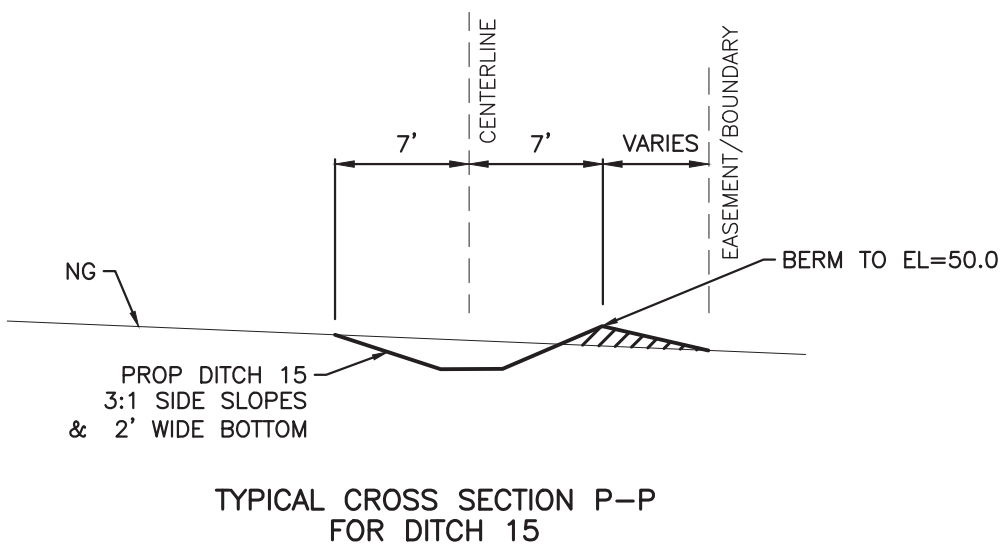
TYPICAL CROSS SECTION D-D FOR DITCHES 10 & 12



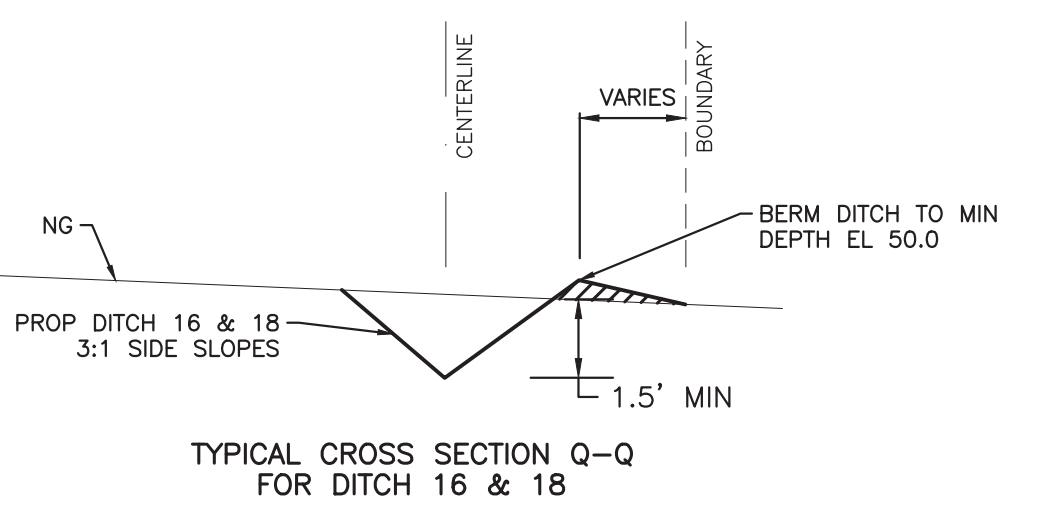
TYPICAL CROSS SECTION E-E FOR DITCHES 11 & 13



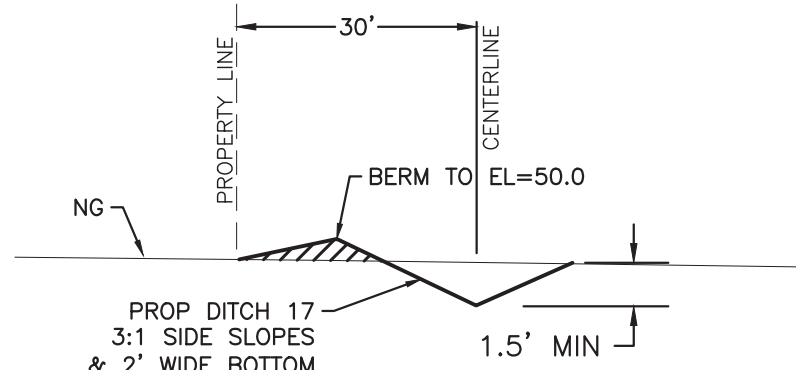
TYPICAL CROSS SECTION N-N FOR DITCH 14



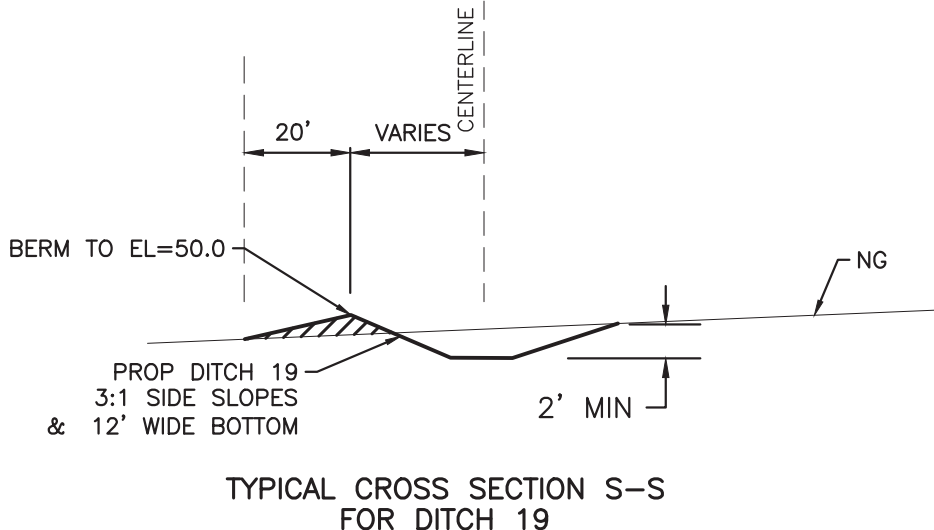
TYPICAL CROSS SECTION P-P FOR DITCH 15



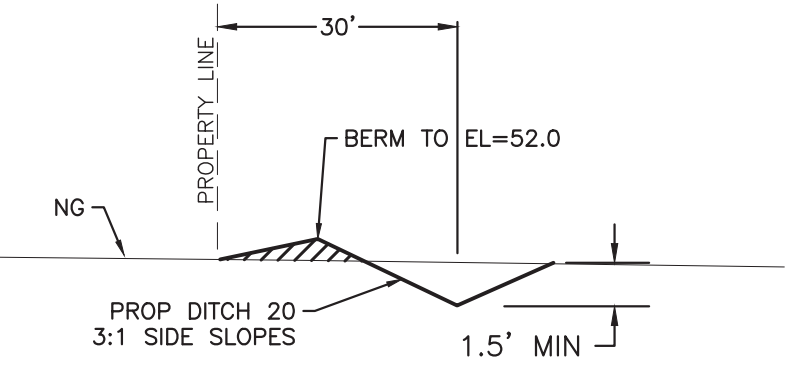
TYPICAL CROSS SECTION Q-Q FOR DITCH 16 & 18



TYPICAL CROSS SECTION R-R FOR DITCH 17



TYPICAL CROSS SECTION S-S FOR DITCH 19



TYPICAL CROSS SECTION T-T FOR DITCH 20

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET-FINAL.DWG PLOT DATE: 2/19/2025 jhrmilton

NO.	DATE	DESCRIPTION	APPROVED
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DESIGNED MS
 DRAWN JLH
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 DATE 2/19/2025

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PLAN: 1" = 150'
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TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 045127000001, 045127000145,
0451270000147, 0451270000151, 047230000007

TYPICAL CROSS-SECTIONS SHEET
 PROJECT NO. 16112

16112_SHEET_SET-FINAL.DWG

Drainage Analysis (Harris County)
Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

i = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript i=1 = 2 year storm
i=2 = 5 year storm
i=3 = 10 year storm
i=4 = 25 year storm
i=5 = 50 year storm
i=6 = 100 year storm

b ₁	S ₁	d ₁
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

T₆₀ = 65.7 ENTER PREDEVELOPMENT TIME OF CONCENTRATION

I₁ = $\frac{b_i}{(d_1 + T_0)^{e_i}}$ I₆ = 4.383 in/hr Predevelopment Intensity of Interest

C = 0.18 ENTER PREDEVELOPMENT C VALUE

A = 30.70 ENTER AREA (acres)

C_r = 1.25

Q = C_r I₆ A Must insert correct subscript for I to obtain the relevant Q
Q = 30.277 cfs

P = 17.2 in Enter Atlas 14 Rainfall Depth

V_{st} = (C_r) A 43560 $\frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C_r) A with A converted to square feet multiplied by rainfall depth (P)
V = 3.45 x 10⁵

DEVELOPMENT OF RUNOFF HYDROGRAPH

T = $\frac{V}{1.39 Q}$ T = 8.198 x 10³ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

t = 0, 1000, 84000

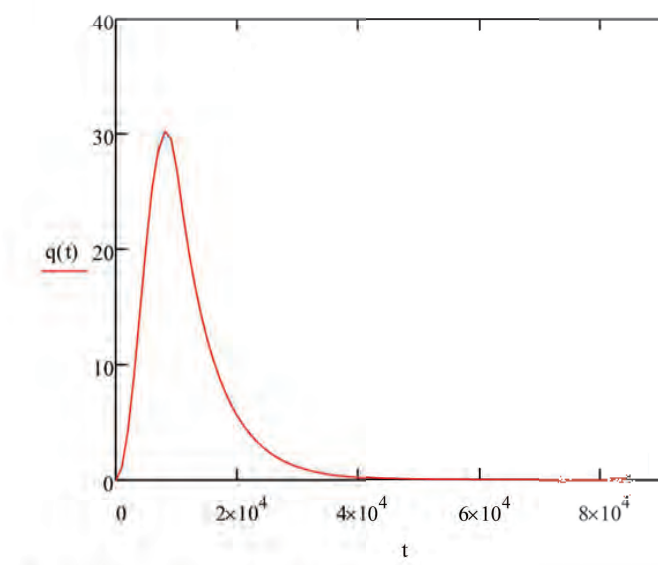
f(t) = $\left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

g(t) = 4.34 Q exp[-1.30 $\left(\frac{t}{T}\right)^2]$ g(t) describes descending limb of hydrograph

q(t) = if(t ≤ 1.25 T, f(t), g(t))

Volume_{pre} = $\int_0^{86400} q(t) dt$
Volume_{pre} = 3.462 x 10⁵

Predevelopment hydrograph



T₆₀ = 30.5 min ENTER POST DEVELOPMENT TIME OF CONCENTRATION

I₁ = $\frac{b_i}{(d_1 + T_0)^{e_i}}$ I₆ = 6.448 in/hr Post development I of interest

C_{post} = 0.39 ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY

C_{pre} = 1.25 Note: Product of C x C_r = 1.00 (maximum)

A = 30.76 ENTER AREA

Q = C_{post} I₆ A C_r

Q = 96.69 cfs

V_{st} = (C_{post}) A 43560 $\frac{P}{12}$

V = 7.49 x 10⁵ cf

T = $\frac{V}{1.39 Q}$ T = 5.573 x 10³

t = 0, 1000, 25000

f(t) = $\left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$

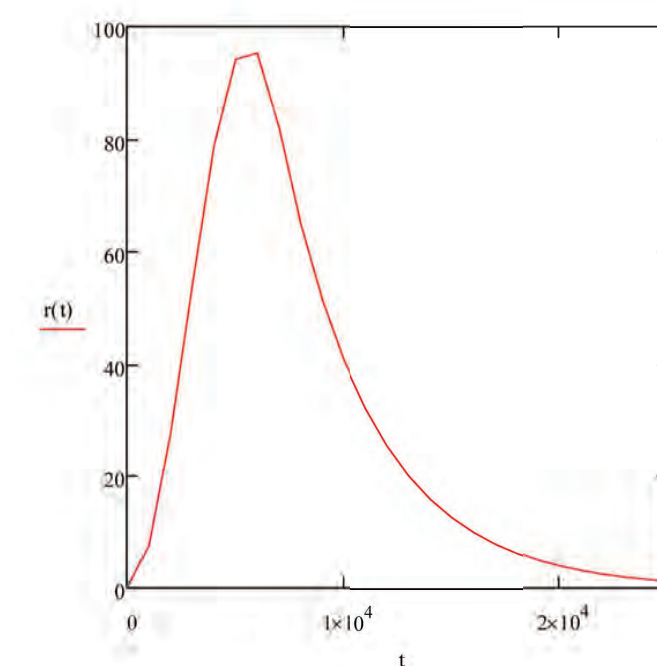
g(t) = 4.34 Q exp[-1.30 $\left(\frac{t}{T}\right)^2]$

q(t) = if(t ≤ 1.25 T, f(t), g(t))

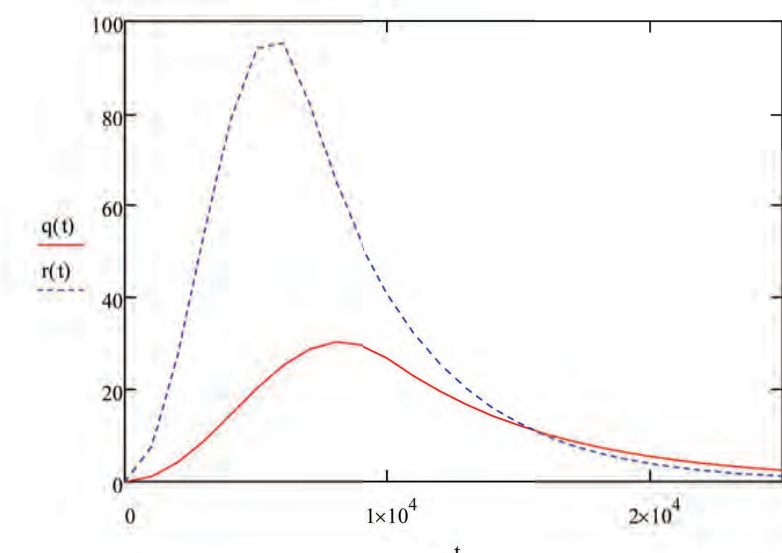
Volume_{post} = $\int_0^{86400} q(t) dt$

Volume_{post} = 7.516 x 10⁵

Post development hydrograph



Combined pre and post development hydrographs



f(t) = ((q(t) - q(t)) - 1)

v(t) = if(f(t) > 0, f(t), 0)

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET

$\int_0^{86400} v(t) dt = 9.825$ ac-ft

Hydrological and Hydraulic Impacts
Two Hotels on 1705 Woodland Hills Dr
Kingwood, Texas
Job # 16112

Harris County, Texas

Pre Development:

A = 30.70 acres
C = 0.18 (undeveloped)
T_c = 15.0 min + 1520 ft grass @ 0.5 fps = 65.7 min
I = 4.383 in/hr
Q = 100 Year Storm = 30.277 cfs

Post Development

A = 30.76 acres
C = 0.39
T_c = 10 min + 200 ft grass @ 0.5 fps + 2080 ft ditch @ 2.5 fps = 30.5 min
I = 6.448 in/hr
Q = 100 Year Storm = 96.69 cfs

Calculated Detention (Rational Method):

9.825 acre - feet

Minimum Detention Rate:

30.70 ac x (0.75 ac-ft/ac) = 23.03 ac-ft

Detention Required:

23.03 ac-ft

Miguel Saucedo, PE January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

B & L
BAKER & LAWSON, INC.
ENGINEERS • PLANNERS • SURVEYORS
4005 TECHNOLOGY DRIVE, SUITE 1530
ANGLETON, TEXAS 77515 (979) 849-6681
REG. NO. F-825

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02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
PROFILE:
HORIZONTAL:
VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR. KINGWOOD, TEXAS 77339
PID NO. 045127000001, 0451270000145, 0451270000147, 0451270000151, 047230000007

100-YEAR DETENTION CALCULATIONS (POND 1)
PROJECT NO. 16112

Drainage Analysis (Harris County)
 Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

I = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript
 i=1 = 2 year storm
 i=2 = 5 year storm
 i=3 = 10 year storm
 i=4 = 25 year storm
 i=5 = 100 year storm

b_1	b_2	b_3
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

$T_{p0} = 136$ ENTER PREDEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_1}{(d_1 + T_0)^{e_1}}$ $I_6 = 2.817$ in/hr Predevelopment Intensity of Interest

$C = 0.18$ ENTER PREDEVELOPMENT C VALUE

$A = 60.10$ ENTER AREA (acres)

$C_r = 1.25$

$Q = C_r C_p I_c A$ Must insert correct subscript for I to obtain the relevant Q
 $Q = 38.087$ cfs

$P = 17.2$ in Enter Atlas 14 Rainfall Depth

$V_{pr} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C) A with A converted to square feet multiplied by rainfall depth (P)
 $V = 6.754 \times 10^5$

DEVELOPMENT OF RUNOFF HYDROGRAPH

$T = \frac{V}{1.39 \cdot Q}$ $T = 1.276 \times 10^4$ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

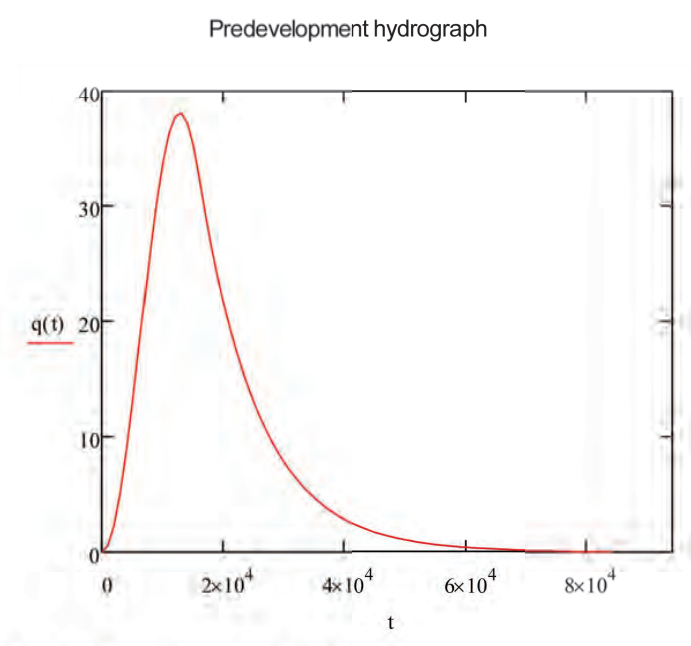
$t = 0, 1000, 84000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$ g(t) describes descending limb of hydrograph

$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

$\text{Volume}_{pre} = \int_0^{86400} q(t) dt$
 $\text{Volume}_{pre} = 6.776 \times 10^5$



$T_{p0} = 44.6$ min ENTER POST DEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_1}{(d_1 + T_0)^{e_1}}$ $I_6 = 5.391$ in/hr Post development I of interest

$C_p = 0.39$ ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY

$C_{pr} = 1.25$ Note: Product of C x C_r = 1.00 (maximum)

$A = 77.03$ ENTER AREA

$Q = C_r C_p I_c A$
 $Q = 202.445$ cfs

$V_{pr} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$
 $V = 1.876 \times 10^6$ cf

$T = \frac{V}{1.39 \cdot Q}$ $T = 6.666 \times 10^3$

$t = 0, 1000, 25000$

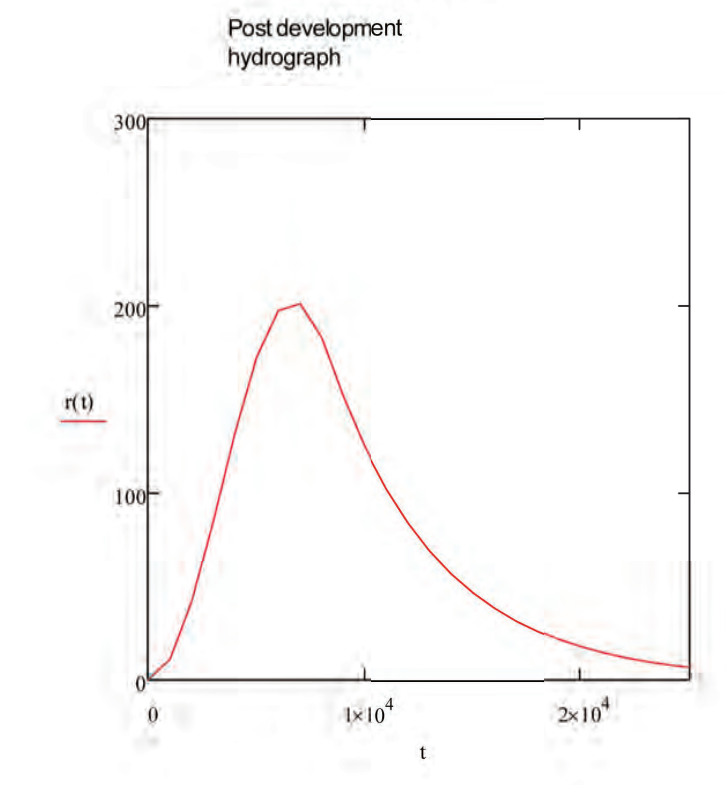
$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$

$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$

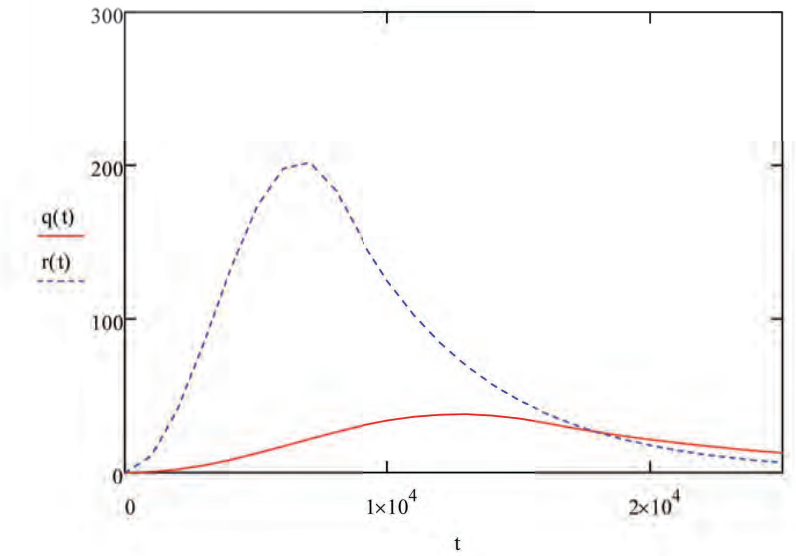
$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

$\text{Volume}_{post} = \int_0^{86400} q(t) dt$

$\text{Volume}_{post} = 1.882 \times 10^6$



Combined pre and postdevelopment hydrographs



$\bar{q}(t) = (q(t) - q_0) \cdot 1$
 $v(t) = \text{if}(f(t) > 0, f(t), 0)$

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET

$\int_0^{86400} v(t) dt = 30.511$ ac-ft

Hydrological and Hydraulic Impacts
 Two Hotels on 1705 Woodland Hills Dr
 Kingwood, Texas
 Job # 16112

Harris County, Texas

Pre Development:

A = 60.10 acres
 C = 0.18 (undeveloped)
 $T_c = 15.0$ min + 3640 ft grass @ 0.5 fps = 136 min
 $I = 2.817$ in/hr
 $Q = 100$ Year Storm = 38.087 cfs

Post Development

A = 77.03 acres
 C = 0.39
 $T_c = 10$ min + 380 ft grass @ 0.5 fps + 3290 ft ditch @ 2.5 fps = 44.6 min
 $I = 5.391$ in/hr
 $Q = 100$ Year Storm = 202.445 cfs

Calculated Detention (Rational Method):

30.511 acre - feet

Minimum Detention Rate:

48.03 ac x (0.75 ac-ft/ac) = 36.02 ac-ft

Detention Required:

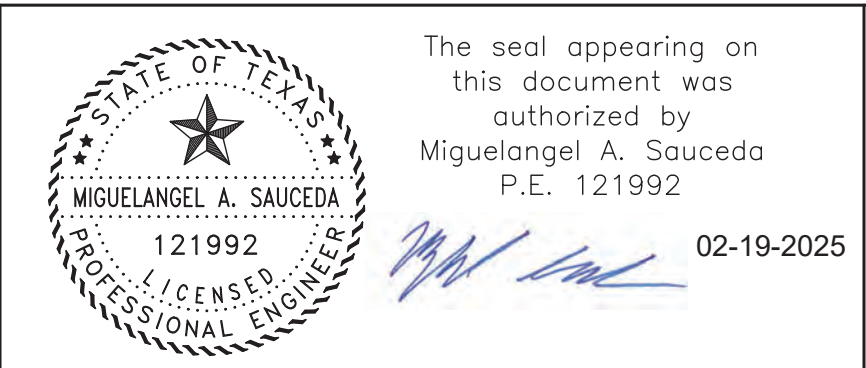
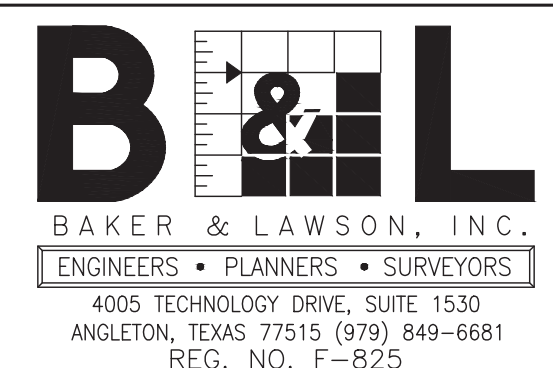
36.02 ac-ft

Miguel Saucedo, PE January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET_FINAL.DWG PLOT DATE: 2/19/2025 jhamilton

DESIGNED MS
 DRAWN JLH
 CHECKED
 DATE 2/19/2025



OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
 PROFILE:
 HORIZONTAL:
 VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 045127000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

100-YEAR DETENTION CALCULATIONS (PONDS 2A & 2B)

Drainage Analysis (Harris County)
 Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

I = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript
 i=1 = 2 year storm
 i=2 = 5 year storm
 i=3 = 10 year storm
 i=4 = 25 year storm
 i=5 = 100 year storm

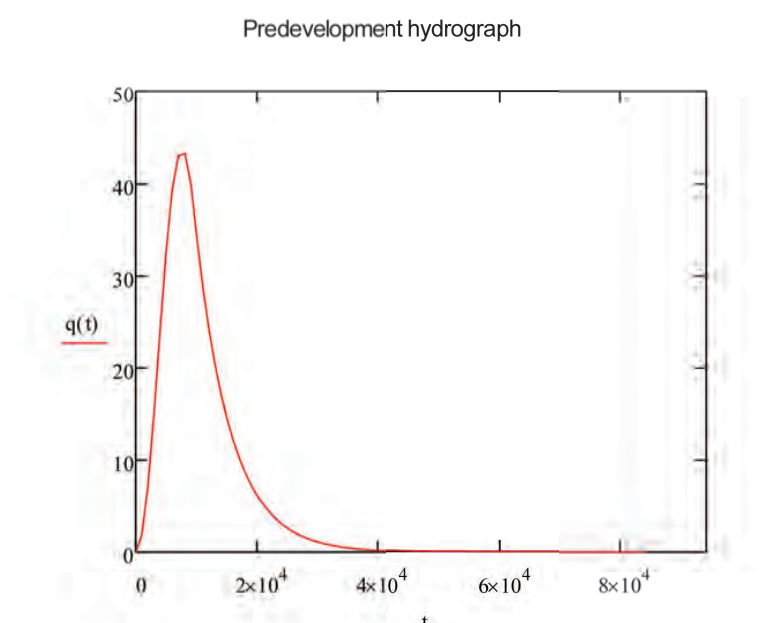
b_1	b_2	b_3
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

$T_{p0} = 56.7$ ENTER PREDEVELOPMENT TIME OF CONCENTRATION
 $I_1 = \frac{b_1}{(d_1 + T_{p0})^{e_1}}$ $I_6 = 4.755$ in/hr Predevelopment Intensity of Interest
 $C = 0.18$ ENTER PREDEVELOPMENT C VALUE
 $A = 40.70$ ENTER AREA (acres)

$C_r = 1.25$
 $Q = C_r C_1 A$ Must insert correct subscript for I to obtain the relevant Q
 $Q = 43.543$ cfs
 $P = 17.2$ in Enter Atlas 14 Rainfall Depth
 $V_{stor} = (C) A 43560 \frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C) A with A converted to square feet multiplied by rainfall depth (P)
 $V = 4.574 \times 10^5$

DEVELOPMENT OF RUNOFF HYDROGRAPH
 $T = \frac{V}{1.39 Q}$ $T = 7.557 \times 10^3$ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration
 $t = 0, 1000, 84000$
 $f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph
 $g(t) = 4.34 Q \exp\left[-1.30\left(\frac{t}{T}\right)\right]$ g(t) describes descending limb of hydrograph
 $q(t) = \text{if}(t \leq 1.25 T, f(t), g(t))$

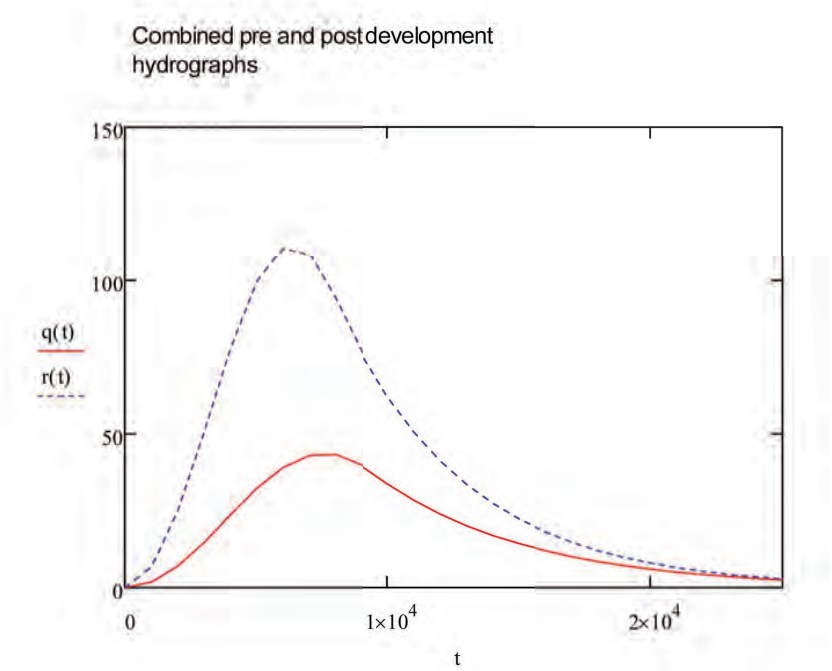
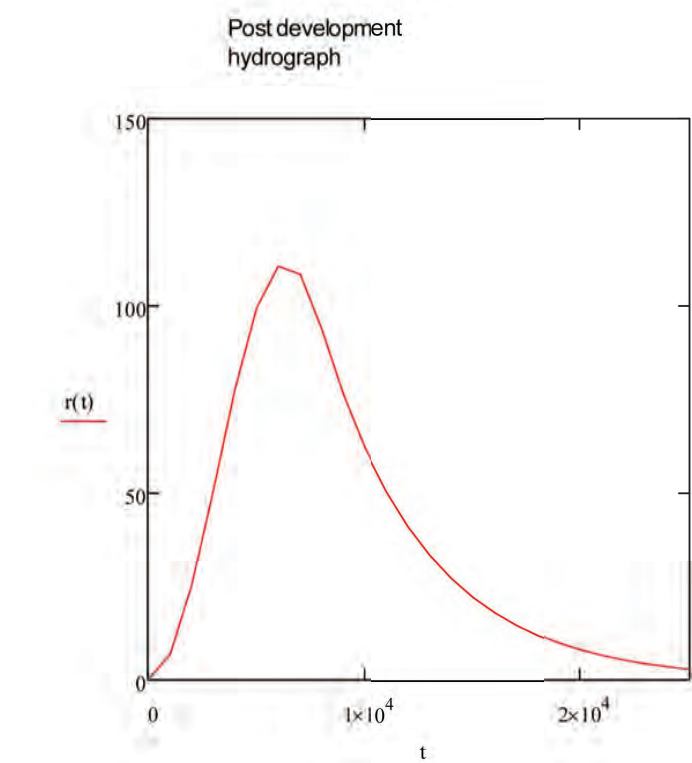
$\text{Volume}_{pre} = \int_0^{86400} q(t) dt$
 $\text{Volume}_{pre} = 4.59 \times 10^5$



$T_{p0} = 40.34$ min ENTER POST DEVELOPMENT TIME OF CONCENTRATION
 $I_1 = \frac{b_1}{(d_1 + T_{p0})^{e_1}}$ $I_6 = 5.666$ in/hr Post development I of interest
 $C_{dev} = 0.39$ ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY
 $C_{dev} = 1.25$ Note: Product of C x Cf = 1.00 (maximum)
 $A = 40.34$ ENTER AREA
 $Q = C_1 C_r A C_r$
 $Q = 111.424$ cfs
 $V_{stor} = (C) A 43560 \frac{P}{12}$
 $V = 9.823 \times 10^5$ cf

$T = \frac{V}{1.39 Q}$ $T = 6.342 \times 10^3$
 $t = 0, 1000, 25000$
 $f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$
 $g(t) = 4.34 Q \exp\left[-1.30\left(\frac{t}{T}\right)\right]$
 $q(t) = \text{if}(t \leq 1.25 T, f(t), g(t))$

$\text{Volume}_{post} = \int_0^{86400} r(t) dt$
 $\text{Volume}_{post} = 9.858 \times 10^5$



$\bar{r}(t) = (r(t) - q(t)) - 1$
 $v(t) = \text{if}(r(t) > 0, \bar{r}(t), 0)$
 THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH
 ACRE- FEET
 $\int_0^{86400} v(t) dt$
 $\frac{86400}{43560} = 12.122$ ac-ft

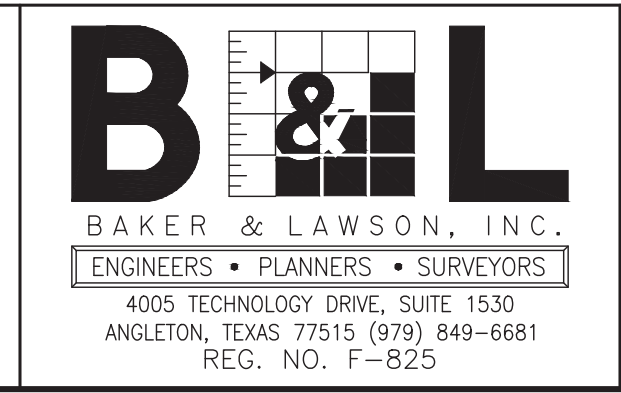
Hydrological and Hydraulic Impacts
 Two Hotels on 1705 Woodland Hills Dr
 Kingwood, Texas
 Job # 16112
Harris County, Texas
Pre Development:
 A = 40.70 acres
 C = 0.18 (undeveloped)
 Tc = 15.0 min + 1000 ft grass @ 0.5 fps
 + 1250 ft ditch @ 2.5 fps
 = 56.7 min
 I = 4.755 in/hr
 Q = 100 Year Storm = 43.543 cfs
Post Development
 A = 40.34 acres
 C = 0.39
 Tc = 10 min + 50 ft grass @ 0.5 fps
 + 2100 ft ditch @ 2.5 fps
 = 25.7 min
 I = 5.666 in/hr
 Q = 100 Year Storm = 111.424 cfs
Calculated Detention (Rational Method):
 12.122 acre-feet
Minimum Detention Rate:
 40.34 ac x (0.75 ac-ft/ac) = 30.26 ac-ft
Detention Required:
 30.26 ac-ft
 Miguel Saucedo, P.E. January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET_FINAL.DWG PLOT DATE: 2/19/2025 jhramilton

DESIGNED	MS		
DRAWN	JLH		
CHECKED			
DATE	2/19/2025		
REVISIONS			
NO.	DATE	DESCRIPTION	APPROVED

BAKER & LAWSON, INC.
 ENGINEERS • PLANNERS • SURVEYORS
 4005 TECHNOLOGY DR., SUITE 1530
 ANGLETON, TEXAS 77515 (979) 849-6681
 REG. NO. F-825



The seal appearing on this document was authorized by Miguel Saucedo, P.E. 121992
 02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
 PROFILE:
 HORIZONTAL:
 VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 045127000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

100-YEAR DETENTION CALCULATIONS (POND 3)
 PROJECT NO. 16112

Drainage Analysis (Harris County)
 Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

I = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript
 i=1 = 2 year storm
 i=2 = 5 year storm
 i=3 = 10 year storm
 i=4 = 25 year storm
 i=5 = 100 year storm

b_i	d_i	e_i
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

$T_{p0} = 65.7$ ENTER PREDEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_i}{(d_i + T_0)^{e_i}}$ $I_1 = 1.924$ in/hr Predevelopment Intensity of Interest

$C = 0.18$ ENTER PREDEVELOPMENT C VALUE

$A = 30.70$ ENTER AREA (acres)

$C_r = 1.00$

$Q = C_r C I_1 A$ Must insert correct subscript for I to obtain the relevant Q
 $Q = 10.632$ cfs

$P = 5.17$ in Enter Atlas 14 Rainfall Depth

$V_{pre} = (C) A 43560 \frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C) A with A converted to square feet multiplied by rainfall depth (P)
 $V = 1.037 \times 10^5$

DEVELOPMENT OF RUNOFF HYDROGRAPH

$T = \frac{V}{1.39 Q}$ $T = 7.017 \times 10^3$ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

$t = 0, 1000, 84000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

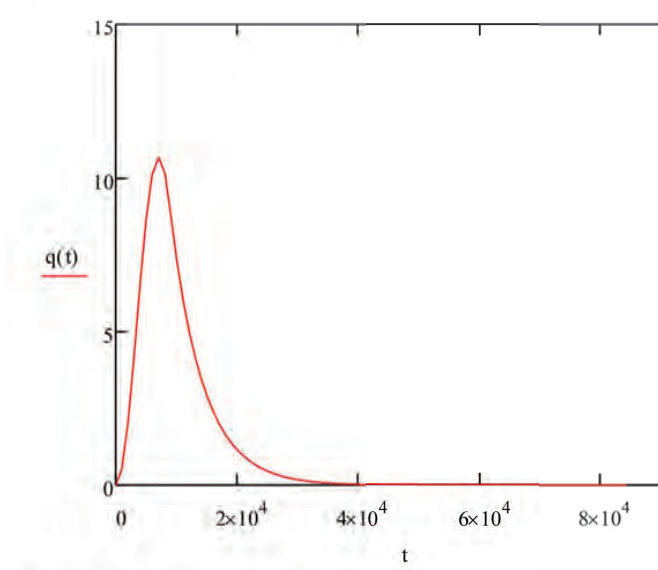
$g(t) = 4.34 Q \exp\left[-1.30\left(\frac{t}{T}\right)\right]$ g(t) describes descending limb of hydrograph

$q(t) = \text{if}(t \leq 1.25 T, f(t), g(t))$

$$\text{Volume}_{pre} = \int_0^{86400} q(t) dt$$

$$\text{Volume}_{pre} = 1.041 \times 10^5$$

Predevelopment hydrograph



$T_{p0} = 30.5$ min ENTER POST DEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_i}{(d_i + T_0)^{e_i}}$ $I_1 = 3.07$ in/hr Post development I of interest

$C = 0.39$ ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY

$C_{adj} = 1.00$ Note: Product of C x Cf = 1.00 (maximum)

$A = 30.76$ ENTER AREA

$Q = C I_1 A C_r$

$Q = 36.824$ cfs

$V_{pre} = (C) A 43560 \frac{P}{12}$

$V = 2.251 \times 10^5$ cf

$$T = \frac{V}{1.39 Q}$$

$$T = 4.398 \times 10^3$$

$t = 0, 1000, 25000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$

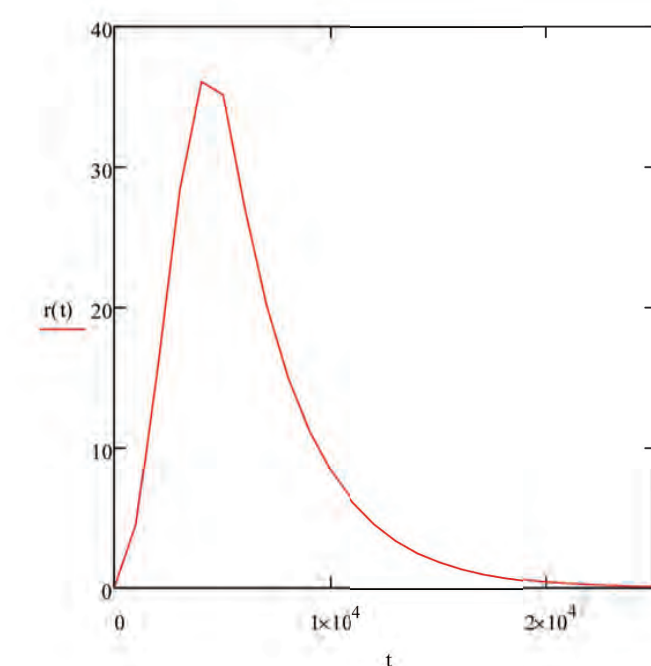
$g(t) = 4.34 Q \exp\left[-1.30\left(\frac{t}{T}\right)\right]$

$q(t) = \text{if}(t \leq 1.25 T, f(t), g(t))$

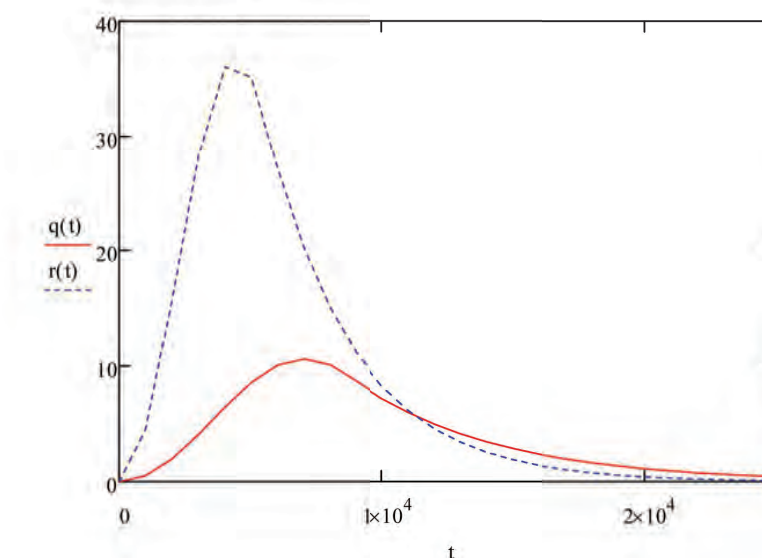
$$\text{Volume}_{post} = \int_0^{86400} q(t) dt$$

$\text{Volume}_{post} = 2.259 \times 10^5$

Post development hydrograph



Combined pre and post development hydrographs



$\Delta q(t) = (q(t) - q_0(t))$

$v(t) = \text{if}(f(t) > 0, f(t), 0)$

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET

$$\int_0^{86400} v(t) dt = 3.062 \text{ ac-ft}$$

Hydrological and Hydraulic Impacts
 Two Hotels on 1705 Woodland Hills Dr
 Kingwood, Texas
 Job # 16112

Harris County, Texas

Pre Development:

A = 30.70 acres
 C = 0.18 (undeveloped)
 $T_c = 15.0$ min + 1520 ft grass @ 0.5 fps = 65.7 min
 $I = 1.924$ in/hr
 $Q = 2$ Year Storm = 10.632 cfs

Post Development

A = 30.76 acres
 C = 0.39
 $T_c = 10$ min + 200 ft grass @ 0.5 fps + 2080 ft ditch @ 2.5 fps = 30.5 min
 $I = 3.07$ in/hr
 $Q = 2$ Year Storm = 36.824 cfs

Calculated Detention (Rational Method):

3.062 acre - feet

Miguel Saucedo, P.E. January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET_FINAL.DWG PLOT DATE: 2/19/2025 jhamilton

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

B & L
 BAKER & LAWSON, INC.
 ENGINEERS • PLANNERS • SURVEYORS
 4005 TECHNOLOGY DRIVE, SUITE 1530
 ANGLETON, TEXAS 77515 (979) 849-6681
 REG. NO. F-825

The seal appearing on this document was authorized by Miguelangel A. Saucedo P.E. 121992

 02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
 PROFILE:
 HORIZONTAL:
 VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 045127000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

2-YEAR DETENTION CALCULATIONS (POND 1)
 PROJECT NO. 16112

Drainage Analysis (Harris County)
 Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

I = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript
 i=1 = 2 year storm
 i=2 = 5 year storm
 i=3 = 10 year storm
 i=4 = 25 year storm
 i=5 = 100 year storm

b_1	b_2	b_3
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

$T_{p0} = 136$ ENTER PREDEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_1}{(d_1 + T_0)^{e_1}}$ $I_1 = 1.149$ in/hr Predevelopment Intensity of Interest

$C = 0.18$ ENTER PREDEVELOPMENT C VALUE

$A = 60.10$ ENTER AREA (acres)

$C_r = 1.00$

$Q = C_r C_1 I_1 A$ Must insert correct subscript for I to obtain the relevant Q
 $Q = 12.433$ cfs

$P = 5.17$ in Enter Atlas 14 Rainfall Depth

$V_{stor} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C) * A with A converted to square feet multiplied by rainfall depth (P)
 $V = 2.03 \times 10^5$

DEVELOPMENT OF RUNOFF HYDROGRAPH

$T = \frac{V}{1.39 \cdot Q}$ $T = 1.175 \times 10^4$ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

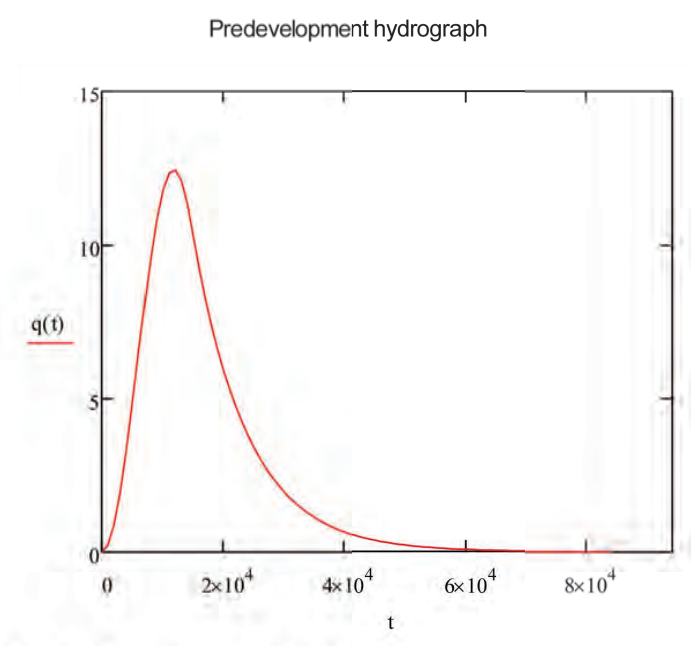
$t = 0, 1000, \dots, 84000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$ g(t) describes descending limb of hydrograph

$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

$\text{Volume}_{pre} = \int_0^{86400} q(t) dt$
 $\text{Volume}_{pre} = 2.037 \times 10^5$



$T_{p0} = 44.6$ min ENTER POST DEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_1}{(d_1 + T_0)^{e_1}}$ $I_1 = 2.465$ in/hr Post development I of interest

$C_{dev} = 0.39$ ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY

$C_{dev} = 1.00$ Note: Product of C x C1 = 1.00 (maximum)

$A = 77.03$ ENTER AREA

$Q = C_1 \cdot C_r \cdot I_1 \cdot A$
 $Q = 74.05$ cfs

$V_{stor} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$

$V = 5.638 \times 10^5$ cf

$T = \frac{V}{1.39 \cdot Q}$ $T = 5.477 \times 10^3$

$t = 0, 1000, \dots, 25000$

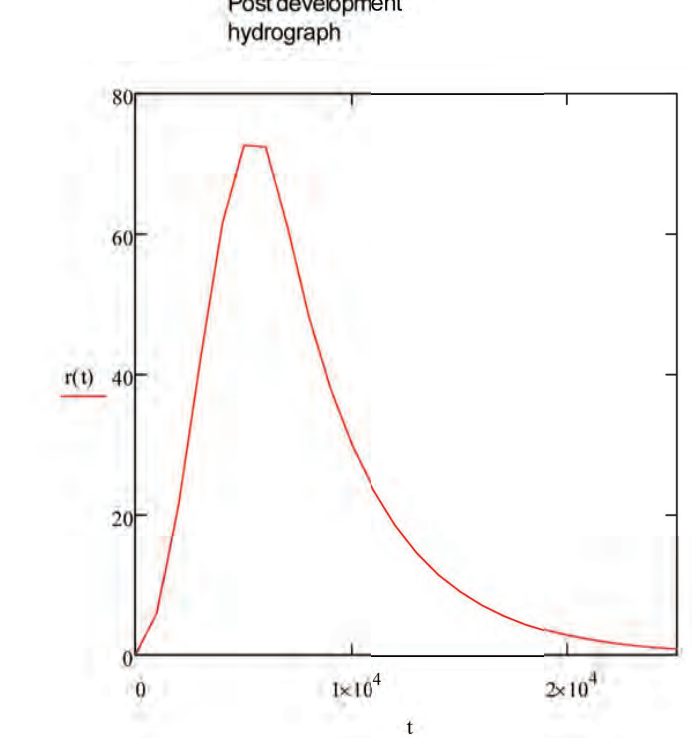
$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$

$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$

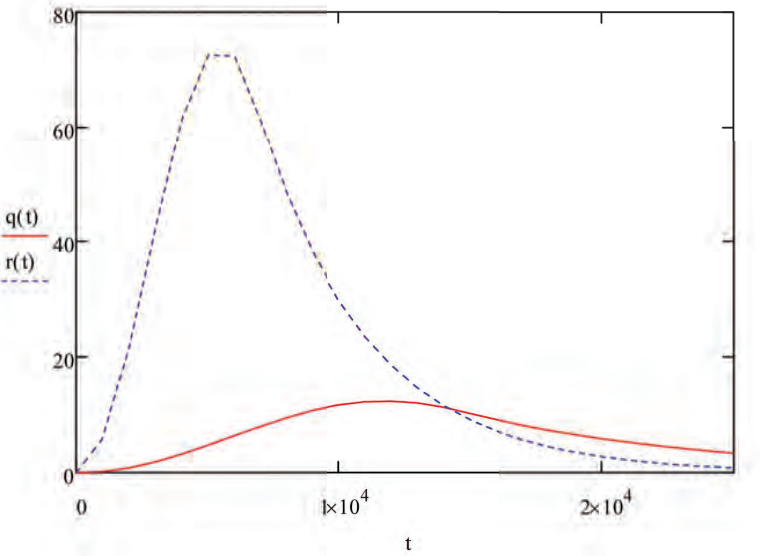
$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

$\text{Volume}_{post} = \int_0^{86400} q(t) dt$

$\text{Volume}_{post} = 5.658 \times 10^5$



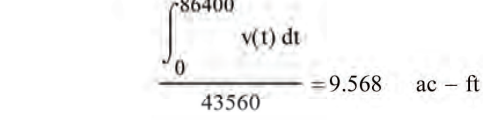
Combined pre and post development hydrographs



$\bar{q}(t) = (q(t) - q_0) / I_1$
 $v(t) = \text{if}(f(t) > 0, f(t), 0)$

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET



Hydrological and Hydraulic Impacts
 Two Hotels on 1705 Woodland Hills Dr
 Kingwood, Texas
 Job # 16112

Harris County, Texas

Pre Development:

A = 60.10 acres
 C = 0.18 (undeveloped)
 $T_c = 15.0$ min + 3640 ft grass @ 0.5 fps
 = 136 min
 $I = 1.149$ in/hr
 $Q = 2$ Year Storm = 12.433 cfs

Post Development

A = 77.03 acres
 C = 0.39
 $T_c = 10$ min + 380 ft grass @ 0.5 fps
 + 3290 ft ditch @ 2.5 fps
 = 44.6 min
 $I = 2.405$ in/hr
 $Q = 2$ Year Storm = 74.05 cfs

Calculated Detention (Rational Method):

9.568 acre - feet

Miguel Saucedo, P.E. January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

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 4005 TECHNOLOGY DR., SUITE 1530
 ANGLETON, TEXAS 77515 (979) 849-6681
 REG. NO. F-825

The seal appearing on this document was authorized by Miguelangel A. Saucedo P.E. 121992
 02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
 PROFILE:
 HORIZONTAL:
 VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

2-YEAR DETENTION CALCULATIONS (PONDS 2A & 2B)
 PROJECT NO. 16112

Drainage Analysis (Harris County)
 Job # 16112 - Two Hotels on 1705 Woodland Hills Dr, Kingwood TX

Rainfall intensity calculations

I = intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript
 i=1 = 2 year storm
 i=2 = 5 year storm
 i=3 = 10 year storm
 i=4 = 25 year storm
 i=5 = 100 year storm

b_i	d_i	e_i
75.01	0.8315	16.2
77.27	0.8075	17.1
84.14	0.7881	17.8
93.53	0.7742	18.9
115.9	0.7808	21.2
125.4	0.7500	21.8

$T_{p0} = 56.7$ ENTER PREDEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_i}{(d_i + T_{p0})^{e_i}}$ $I_1 = 2.12$ in/hr Predevelopment Intensity of Interest

$C = 0.18$ ENTER PREDEVELOPMENT C VALUE

$A = 40.70$ ENTER AREA (acres)

$C_r = 1.00$

$Q = C \cdot C_r \cdot I_1 \cdot A$ Must insert correct subscript for I to obtain the relevant Q
 $Q = 15.528$ cfs

$P = 5.17$ in Enter Atlas 14 Rainfall Depth

$V_{stor} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$ For these calculations, total volume storage is assumed to equal (C) * A with A converted to square feet multiplied by rainfall depth (P)
 $V = 1.375 \times 10^5$

DEVELOPMENT OF RUNOFF HYDROGRAPH

$T = \frac{V}{1.39 \cdot Q}$ $T = 6.37 \times 10^3$ T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

$t = 0, 1000, 84000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

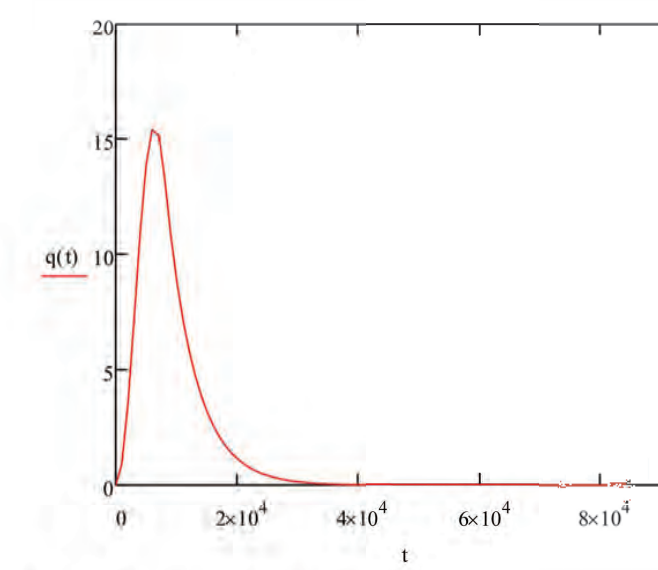
$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$ g(t) describes descending limb of hydrograph

$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

$$\text{Volume}_{\text{post}} = \int_0^{86400} q(t) dt$$

$$\text{Volume}_{\text{post}} = 1.38 \times 10^5$$

Predevelopment hydrograph



$T_{p0} = 40.34$ min ENTER POST DEVELOPMENT TIME OF CONCENTRATION

$I_1 = \frac{b_i}{(d_i + T_{p0})^{e_i}}$ $I_1 = 2.618$ in/hr Post development I of interest

$C_{\text{post}} = 0.39$ ENTER POST DEVELOPMENT C FACTOR REVERSE C AND AREA IF NECESSARY

$C_{\text{pre}} = 1.00$ Note: Product of C x C = 1.00 (maximum)

$A = 40.34$ ENTER AREA

$Q = C_1 \cdot A \cdot C_r$

$Q = 41.194$ cfs

$V_{stor} = (C) \cdot A \cdot 43560 \cdot \frac{P}{12}$
 $V = 2.953 \times 10^5$ cf

$$T = \frac{V}{1.39 \cdot Q}$$

$$T = 5.156 \times 10^3$$

$t = 0, 1000, 25000$

$f(t) = \left(\frac{Q}{2}\right) \left(1 - \cos\left(\frac{t \cdot \pi}{T}\right)\right)$

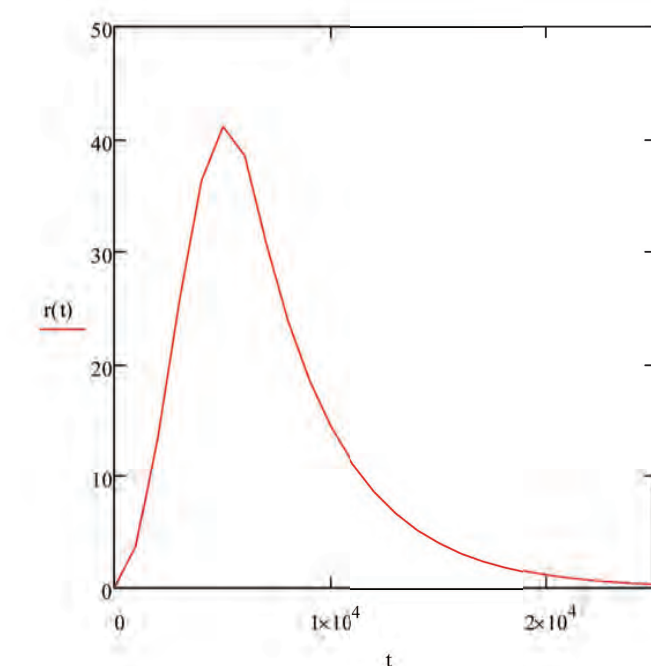
$g(t) = 4.34 \cdot Q \cdot \exp\left[-1.30 \left(\frac{t}{T}\right)\right]$

$q(t) = \text{if}(t \leq 1.25 \cdot T, f(t), g(t))$

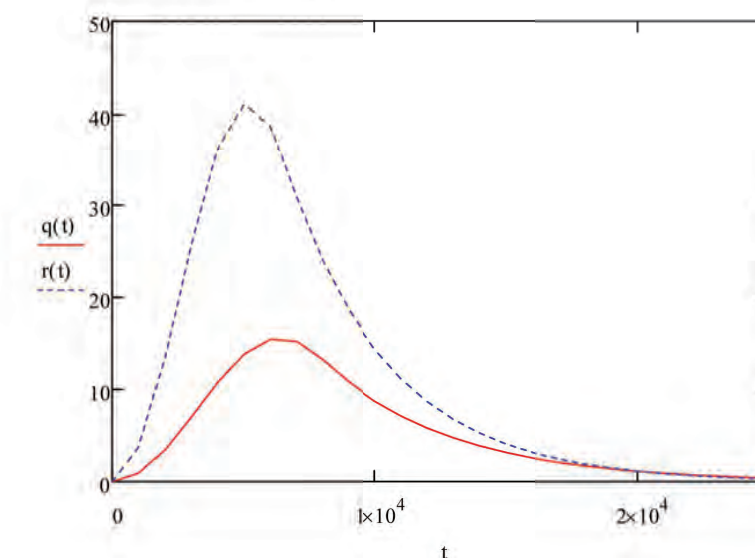
$$\text{Volume}_{\text{post}} = \int_0^{86400} q(t) dt$$

$\text{Volume}_{\text{post}} = 2.963 \times 10^5$

Post development hydrograph



Combined pre and post development hydrographs



$\Delta q(t) = (q(t) - q_0(t)) \cdot 1$

$v(t) = \text{if}(f(t) > 0, f(t), 0)$

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET

$$\int_0^{86400} v(t) dt = 3.658 \text{ ac-ft}$$

Hydrological and Hydraulic Impacts
 Two Hotels on 1705 Woodland Hills Dr
 Kingwood, Texas
 Job # 16112

Harris County, Texas

Pre Development:

A = 40.70 acres
 C = 0.18 (undeveloped)
 $T_c = 15.0$ min + 1000 ft grass @ 0.5 fps
 + 1250 ft ditch @ 2.5 fps
 = 56.7 min
 $I = 2.12$ in/hr
 $Q = 2$ Year Storm = 15.528 cfs

Post Development

A = 40.34 acres
 C = 0.39
 $T_c = 10$ min + 50 ft grass @ 0.5 fps
 + 2100 ft ditch @ 2.5 fps
 = 25.7 min
 $I = 2.618$ in/hr
 $Q = 2$ Year Storm = 41.194 cfs

Calculated Detention (Rational Method):

3.658 acre - feet

Miguel Saucedo, PE. January 2, 2025

NOTE: THE DRAINAGE PLAN IS CONCEPTUAL IN NATURE AND THE FINAL DRAINAGE DESIGN SHALL BE IN CONFORMANCE WITH THE LATEST CITY OF HOUSTON INFRASTRUCTURE DESIGN MANUAL.

J:\160005\16100\16112\ENGINEERING-SURVEY\ENGINEERING\16112_SHEET_SET_FINAL.DWG PLOT DATE: 2/19/2025 jhramilton

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

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 BAKER & LAWSON, INC.
 ENGINEERS • PLANNERS • SURVEYORS
 4005 TECHNOLOGY DRIVE, SUITE 1530
 ANGLETON, TEXAS 77515 (979) 849-6681
 REG. NO. F-825

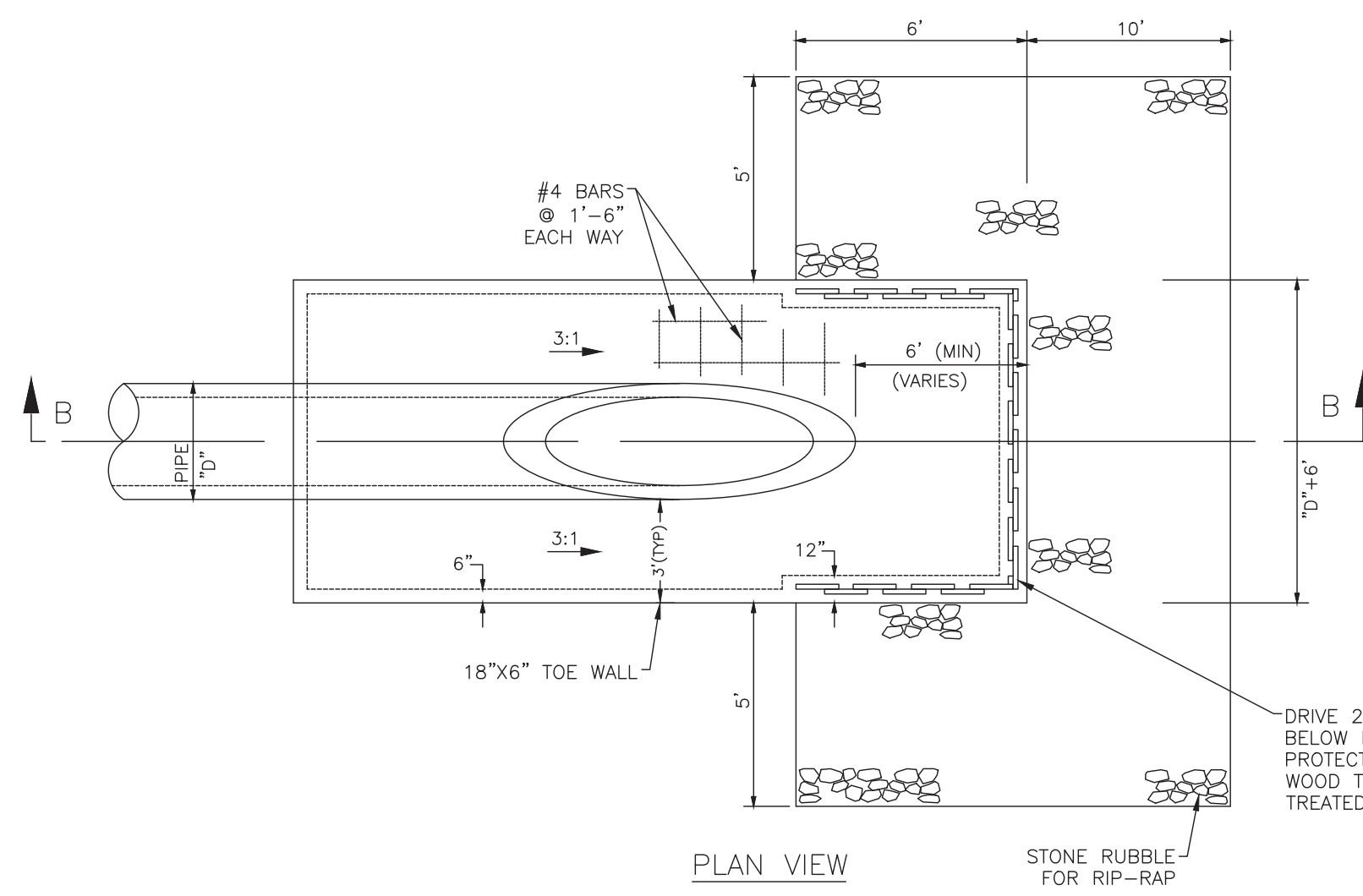
The seal appearing on this document was authorized by Miguelangel A. Saucedo P.E. 121992
 02-19-2025

OWNER:
ROMERICA LANDCO
GABRIELHADDAD@FAMADESIGN.COM
346-402-8914

PLAN: 1" = 150'
 PROFILE:
 HORIZONTAL:
 VERTICAL:

PROJECT:
TWO HOTELS ON 1705 WOODLAND HILLS DR.
KINGWOOD, TEXAS 77339
PID NO. 0451270000001, 0451270000145,
0451270000147, 0451270000151, 047230000007

2-YEAR DETENTION CALCULATIONS (POND 3)
 PROJECT NO. 16112

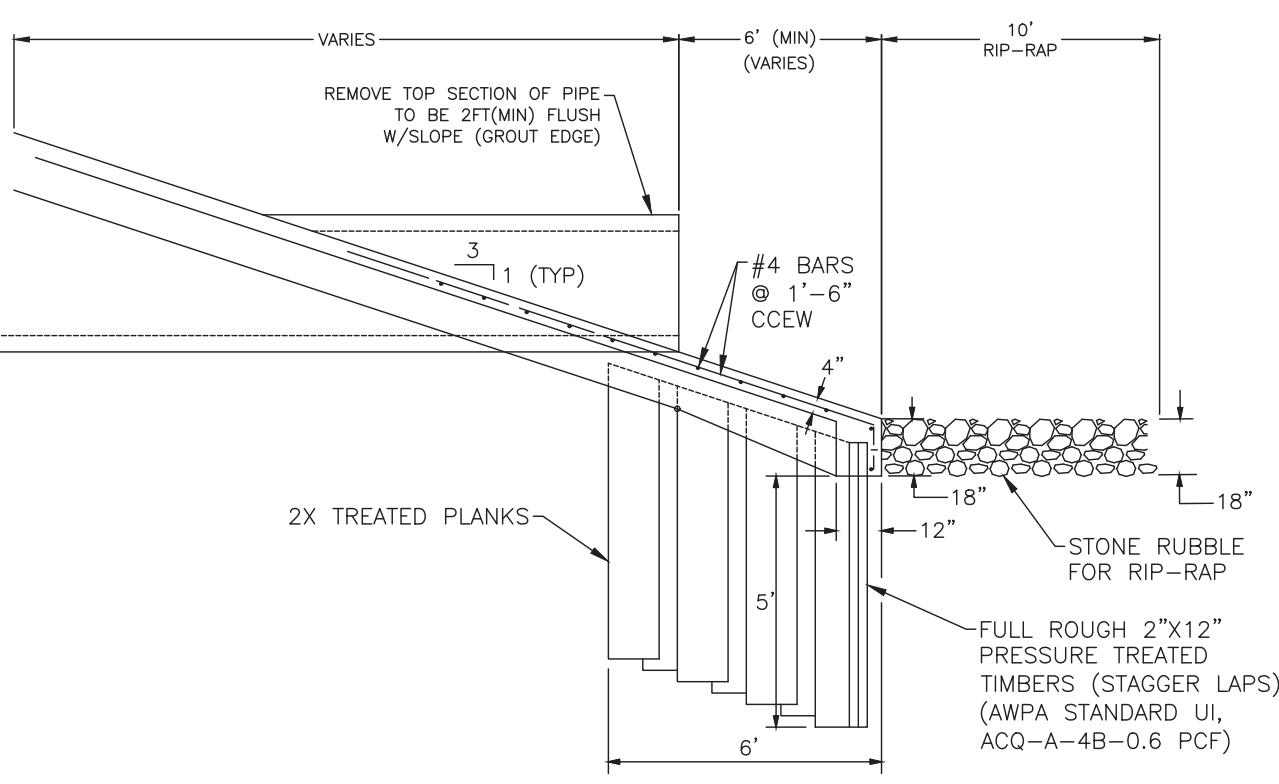


NOTES:
 1. RIP-RAP SHALL BE BROKEN CONCRETE OR NATURAL STONE:
 SPEC. GRAVITY - 2.4
 SIZE - 0.25 TO 1.25 OF (40-190#)
 DIMENSION - >3 IN.
 WIDTH - <2.5 X THICKNESS
 LENGTH - <3 X THICKNESS
 2. ALL PLANKING FOR CUT-OFF WALLS AND RUBBLE RIP-RAP TO BE INCIDENTAL TO THE ITEM-CONCRETE FOR STRUCTURES, CLASS "B" RIP-RAP.

DRIVE 2X PLANKS 5' BELOW FLOWLINE FOR EROSION PROTECTION PRIOR TO POURING. WOOD TO BE GROUND CONTACT TREATED.

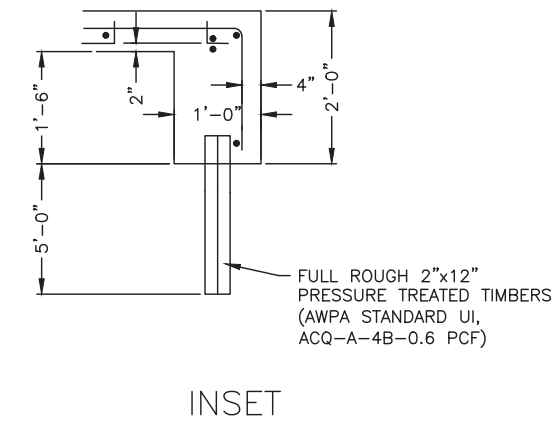
PLAN VIEW

STONE RUBBLE FOR RIP-RAP

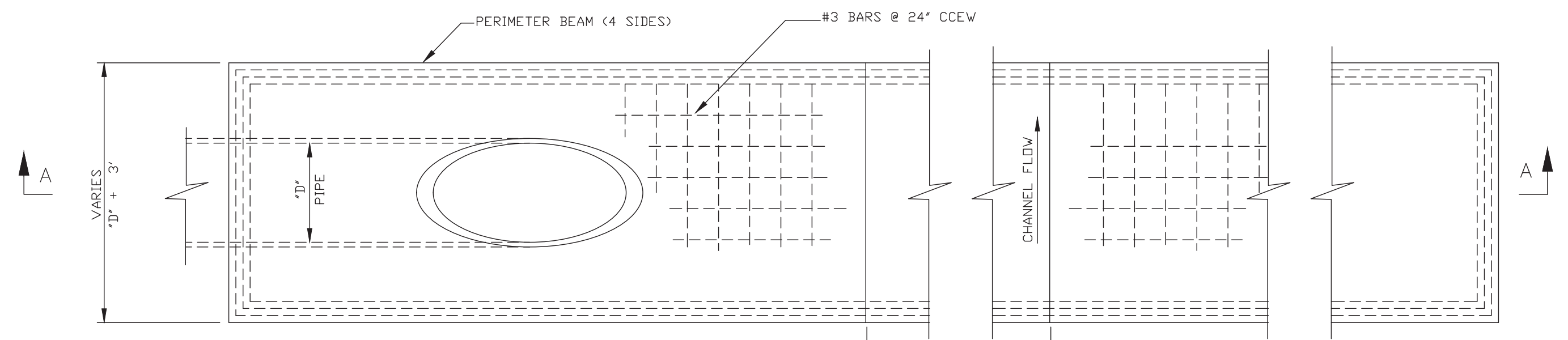


SECTION B-B

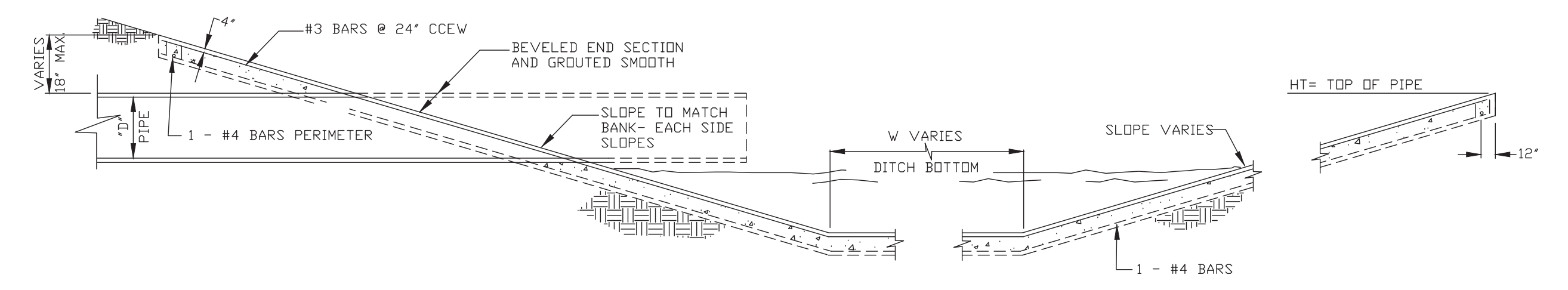
SLOPE PAVING OUTFALL DETAIL
 STORM SEWER OUTFALL INTO DETENTION POND
 NTS



INSET



PLAN VIEW

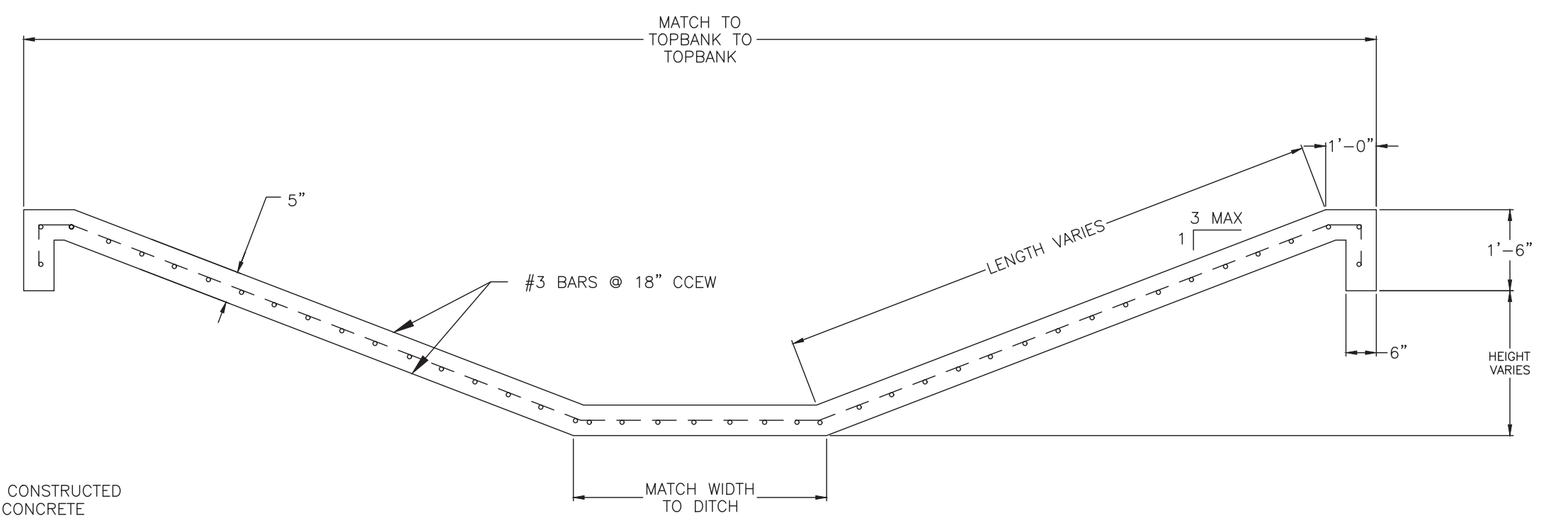


SECTION "A-A"

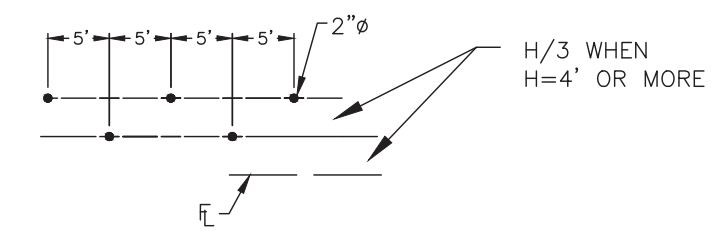
W = WIDTH PER PLAN
 D = PIPE DIAMETER PER PLAN
 S = SLOPE PER PLAN/FIELD

SLOPE PAVING OUTFALL DETAIL
 STORM SEWER OUTFALL INTO DITCH
 NTS

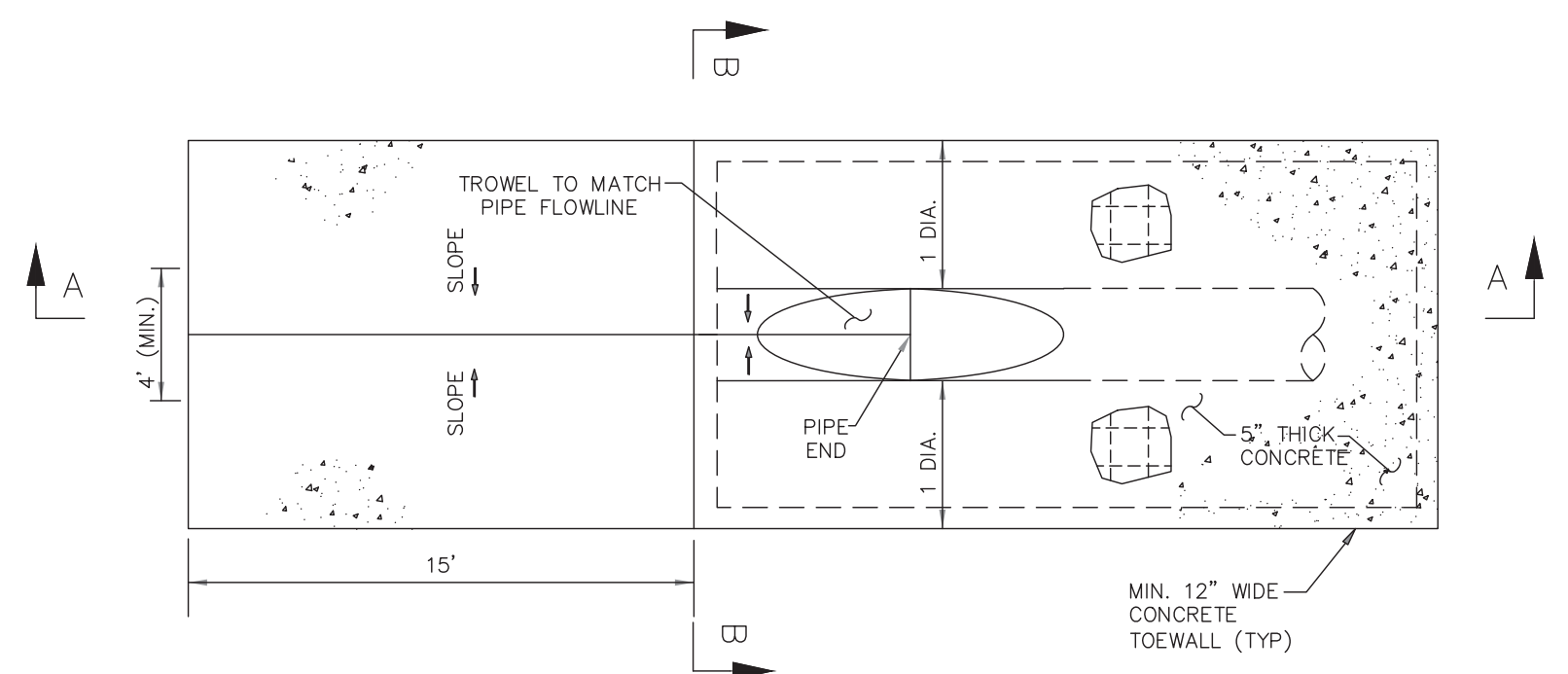
CONCRETE TO ASPHALT HEADER
 SCALE: 1" = 1'



NOTE:
 MIN 18" TOE WALL TO BE CONSTRUCTED AT BEGINNING & END OF CONCRETE DITCH CHANNEL
 28-DAY CONCRETE STRENGTH = 3000 PSI

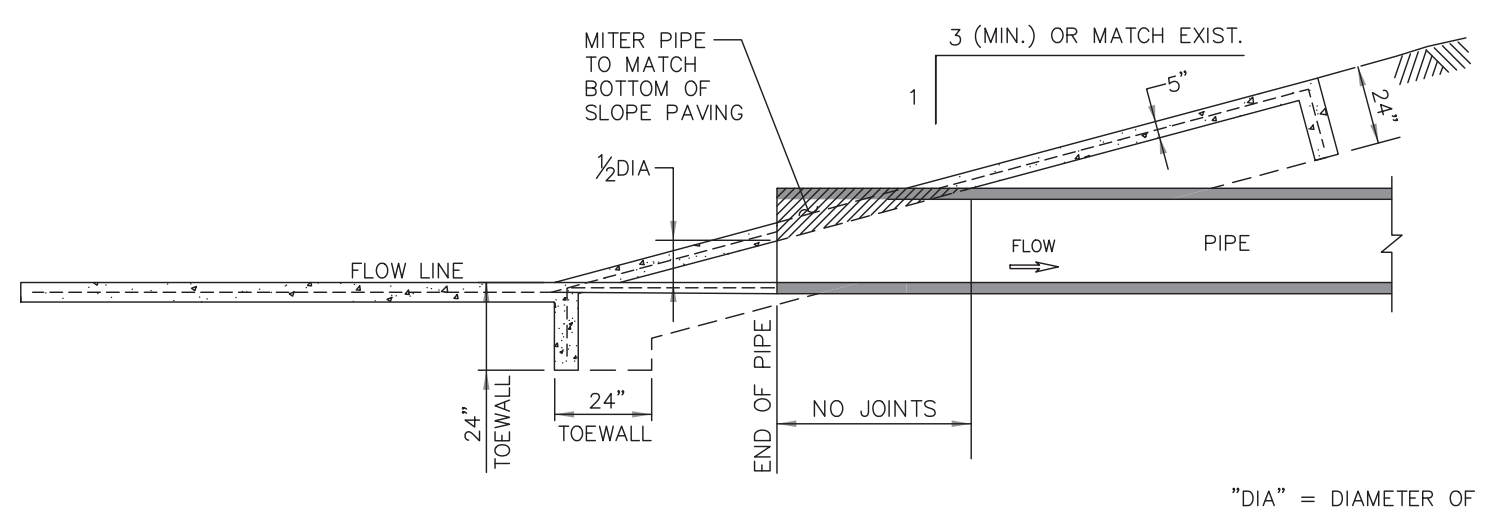


SLOPE PAVING OUTFALL DETAIL
 DITCH OUTFALL INTO DITCH
 NTS



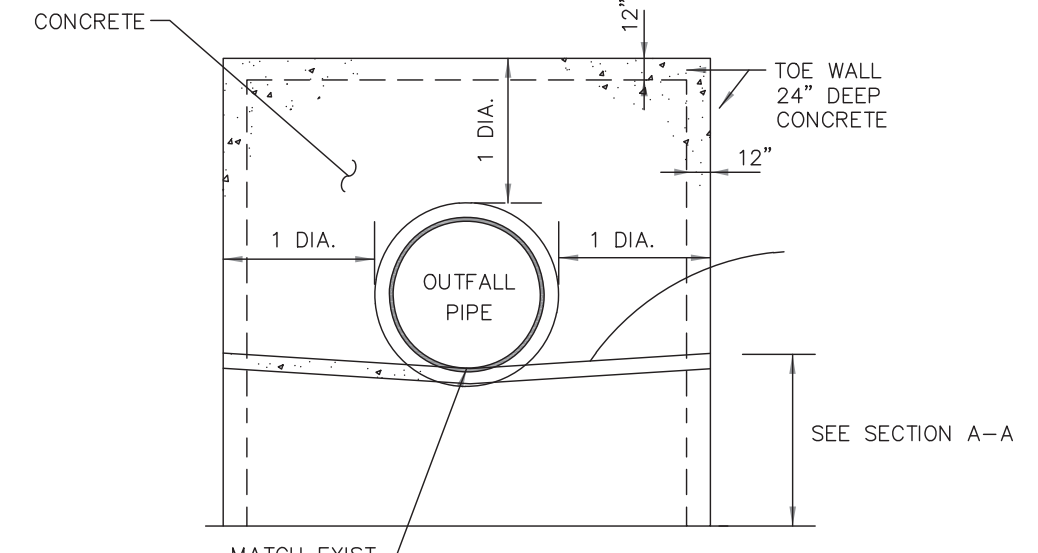
PLAN VIEW
 NTS

NOTES:
 MINIMUM YIELD STRENGTH OF REBAR SHALL BE #4 BARS, 60,000 PSI (GRADE 60) AND PLACED AT 12"
 ALL CONCRETE MUST HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.



SECTION A-A

"DIA" = DIAMETER OF PIPE



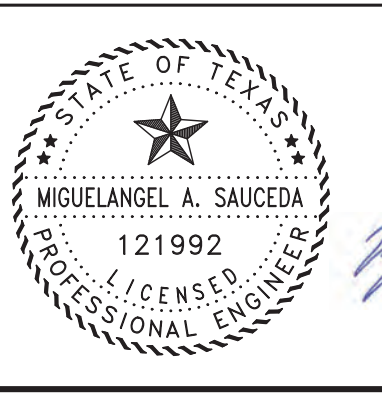
SECTION B-B

SLOPE PAVING OUTFALL DETAIL
 CHANNEL OUTFALL INTO STORM SEWER
 NTS

NO.	DATE	DESCRIPTION	APPROVED
REVISIONS			

DESIGNED	MS
DRAWN	JLH
CHECKED	
DATE	2/19/2025

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 PID NO. 045127000001, 045127000145,
 0451270000147, 0451270000151, 047230000007

SLOPE PAVING DETAILS
 PROJECT NO. 16112

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16112_SHEET_SET-FINAL.DWG