MULTIPLE EXISTING PUBLIC AND PRIVATE UTILITY LINES EXIST ON THIS SITE. THE UTILITY LINES SHOWN ON THESE DRAWINGS REFLECT INFORMATION OBTAINED FROM RECORD DRAWINGS AND MAY NOT INCLUDE ALL EXISTING UTILITIES. CONTRACTOR IS TO USE EXTREME CAUTION DURING ALL CONSTRUCTION ACTIVITIES AND IS SOLELY RESPONSIBLE FOR DAMAGE TO EXISTING FACILITIES.

FLOODPLAIN NOTE:

BFE = 66.00' (100–YR) & 68.75' (500–YR)

ACCORDING THE MAP NO. 48201C0295M AND 48201C0315L OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S FLOOD RATE MAPS, DATED JUNE 9, 2014 AND JUNE 18, 2007, THE SITE LIES IN UNSHADED ZONE "X", SHADED ZONE "X", ZONE "AE"

DETENTION FACILITY MAINTENANCE NOTE:

THE PROPOSED PRIVATE DETENTION FACILITY IS TO BE MAINTAINED BY THE PROPERTY OWNER.

MITIGATION CALCS:

TOTAL FLOODPLAIN FILL	10,619 CY
TOTAL FLOODPLAIN CUT	10,869 CY
NET CUT	250 CY CUT

*ALL NUMBERS HAVE BEEN CALCULATED THROUGH AUTOCAD 2020 CIVIL 3D MODELING.

GENERAL NOTES

1. CONTRACTOR TO ADJUST ALL EXISTING AND PROPOSED UTILITY APPURTENANCES TO FINISHED GRADE.
2. ALL EXCAVATED MATERIAL TO BE HAULED OFFSITE.

City of Houston Texas

BENCHMARK:
PROJECT BENCHMARK: ... FLOODPLAIN REFERENCE MARK NO. 100005 BEING A... FROM THE INTERSECTION OF US 59 AND FM 1960, NORTH AL... 2.2 MILES TO SPORTERS/MCCLELLAN. WEST ALONG SPORTERS... APPROXIMATELY 300 FEET TO THE FIRST DRIVEWAY ON THE RIGHT AND... ON THE RIGHT. (NAVD 88, 2001 ADJ.)
ELEVATION = 78.70

TEMPORARY BENCHMARK "A":
TEMPORARY BENCHMARK "A" IS A BOX CUT SET ON A STORM INLET FOUND ON WEST R.O.W. OF LAUREL SPRINGS LANE BEING AT THE INTERSECTION OF THE SOUTHERLY MYSTIC GLEN LOOP AND LAUREL SPRINGS LANE.
ELEVATION = 81.24

TEMPORARY BENCHMARK "B":
TEMPORARY BENCHMARK "B" IS A BOX CUT SET ON A STORM INLET FOUND ON THE WEST R.O.W. OF LAUREL SPRINGS LANE BEING AT THE INTERSECTION OF THE NORTHERLY MYSTIC TRAIL LOOP AND LAUREL SPRINGS LANE.
ELEVATION = 83.71

21078162
REVIEWED FOR COMPLIANCE
Performance of this review does not relieve the applicant from full responsibility to comply with all applicable codes, ordinances and regulations. 10/27/21

FAA RESTRICTED NOTE:

PURSUANT TO FAA ADVISORY CIRCULAR 150\5200-33B 2-3 SUB-SECTION B: STORM WATER DETENTION PONDS SHOULD BE DESIGNED, ENGINEERED, CONSTRUCTED, AND MAINTAINED FOR A MAXIMUM 48-HOUR DETENTION PERIOD AFTER THE DESIGN STORM AND REMAINS COMPLETELY DRY BETWEEN STORMS.

01

DETENTION DRAINAGE NOTE:

ALL SUBSURFACE DRAINAGE SYSTEMS ARE REQUIRED TO BE DRAINED IN 48 HOURS.

TOTAL DETENTION/MITIGATION POND VOLUME SUMMARY

TOTAL DETENTION VOLUME PROVIDED	334,638 CU FT
TOTAL MITIGATION VOLUME PROVIDED	293,463 CU FT
TOTAL STORAGE VOLUME PROVIDED	628,101 CU FT

IMPERVIOUS COVER CALCS:

TOTAL SITE ACREAGE – 20.032 ACRES
TOTAL IMPERVIOUS COVER – 13.349 ACRES
PERCENTAGE OF TOTAL IMPERVIOUS COVER – 66.64%

GRAPHIC SCALE: 0 15 30 60; 1 inch = 30 ft.

RESTRICTOR CALCULATIONS

MAX WSE = 67.35
75% WSE = 64.98
25% WSE = 60.23

℄ OF PRIMARY RESTRICTOR – N/A
℄ SECONDARY RESTRICTOR – N/A

LOW LEVEL RESTRICTOR (25% FLOW)

TOTAL DRAINAGE AREA=		20.032 ACRES
OUTFLOW RATE ALLOWED FOR LOW FLOW Q^{L1} =	0.50 * TOTAL DRAINAGE AREA = 0.50 * 20.032	10.016 CFS (BASED ON 0.5 CFS/AC)
HEAD H^{L1} (WATER SURFACE DIFFERENTIAL FOR LOW FLOW=	25% WSE – CL OF PRIMARY RESTRICTOR = 60.23 – 58.18	2.05
CALCULATED LOW LEVEL RESTRICTOR SIZE D^{L}=	$Q^{L1\ 1/2}/(2.25H^{L1\ 1/4})$ = $10.016^{1/2}/(2.25*2.05^{1/4})$	1.18 FEET
PROVIDED/ DESIGNED LOW LEVEL RESTRICTOR SIZE D^{L1}=		1 PUMP RUNNING @ 1610 GPM = 3.59 CFS

HIGH LEVEL RESTRICTOR (75% FLOW)

TOTAL DRAINAGE AREA=		20.032 ACRES
TOTAL OUTFLOW RATE ALLOWED (100%) Q=	2.00 * TOTAL DRAINAGE AREA = 2.00 * 20.032	40.064 CFS (BASED ON 2.0 CFS/AC)
RE–CALCULATED HEAD H^{L2} (WATER SURFACE DIFFERENTIAL) FOR LOW LEVEL RESTRICTOR =	MAX WSE – CL OF PRIMARY RESTRICTOR = 67.35 – 58.18	9.17 FT
RE–CALCULATED LOW FLOW Q^{L2} FOR LOW FLOW LEVEL RESTRICTOR=	$CA\sqrt{2GH^{L2}}$ = 0.80 * 1.05 $\sqrt{2*32.2*9.17}$	20.316 CFS (BASED ON D_{L1} AND H_{L2})
OUTFLOW RATE ALLOWED FOR HIGH FLOW Q^{H1} (75%)= *	Q – Q^{L2} = 40.064 – 20.316	19.748 CFS (BASED Q AND Q_{L2})
HEAD H^{H2}(WATER SURFACE DIFFERENTIAL FOR HIGH LEVEL RESTRICTOR=	MAX WSE – ℄ SECONDARY RESTRICTOR = 67.35 – 65.73	1.62
CALCULATED HIGH LEVEL RESTRICTOR SIZE D^{H}=	$Q^{H1\ 1/2}/(2.25H^{H2\ 1/4})$ = 1.75 FT	D^{H}= 18 INCHES
OUTFLOW RATE PROVIDED FOR HIGH FLOW Q^{H2}=		2 PUMPS RUNNING @ 1610 GPM = 7.18 CFS

DETENTION CALCULATIONS

TOTAL SERVICE AREA=	20.032 AC
EXISTING IMPERVIOUS COVER=	0 AC
PROPOSED IMPERVIOUS COVER=	13.349 AC
INCREASED IMPERVIOUS COVER=	13.349 AC
REQUIRED DETENTION VOLUME=	6.675 AC–FT
PROVIDED DETENTION VOLUME=	7.682 AC–FT
OUTFLOW RATE ALLOWED FOR LOW FLOW=	10.016 CFS
OUTFLOW RATE ALLOWED FOR HIGH FLOW=	19.748 CFS
OUTFLOW RATE PROVIDED FOR LOW FLOW=	3.59 CFS
OUTFLOW RATE PROVIDED FOR HIGH FLOW=	7.18 CFS
PRIMARY RESTRICTOR SIZE=	1 PUMP RUNNING
SECONDARY RESTRICTOR SIZE=	2 PUMPS RUNNING

TOTAL DETENTION VOLUME REQUIRED

V_T = [43,560 X (0.50 X A_{II})]
V_T = TOTAL DETENTION VOLUME FOR THE PROPOSED PROJECT (CUBIC FEET)
A_{II} = AREA OF INCREASED IMPERVIOUS COVER (ACRES)
V_T = [43,560 X (0.50 X 13.349)] = 290,763 CU FT

TOTAL DETENTION VOLUME PROVIDED

TOTAL DETENTION PROVIDED = 334,638 CU FT
DETENTION PROVIDED IN POND = 334,638 CU FT

LEGEND

●	EX. MANHOLE
― ―	EX. STORM SEWER
WL	EX. WATER LINE
SS	EX. SANITARY SEWER LINE
OH	EX. OVERHEAD POWER LINE
GAS	EX. UNDERGROUND GAS LINE
100	EX. CONTOUR
▬	PROPOSED STORM SEWER
▦	PROPOSED GRATE INLET

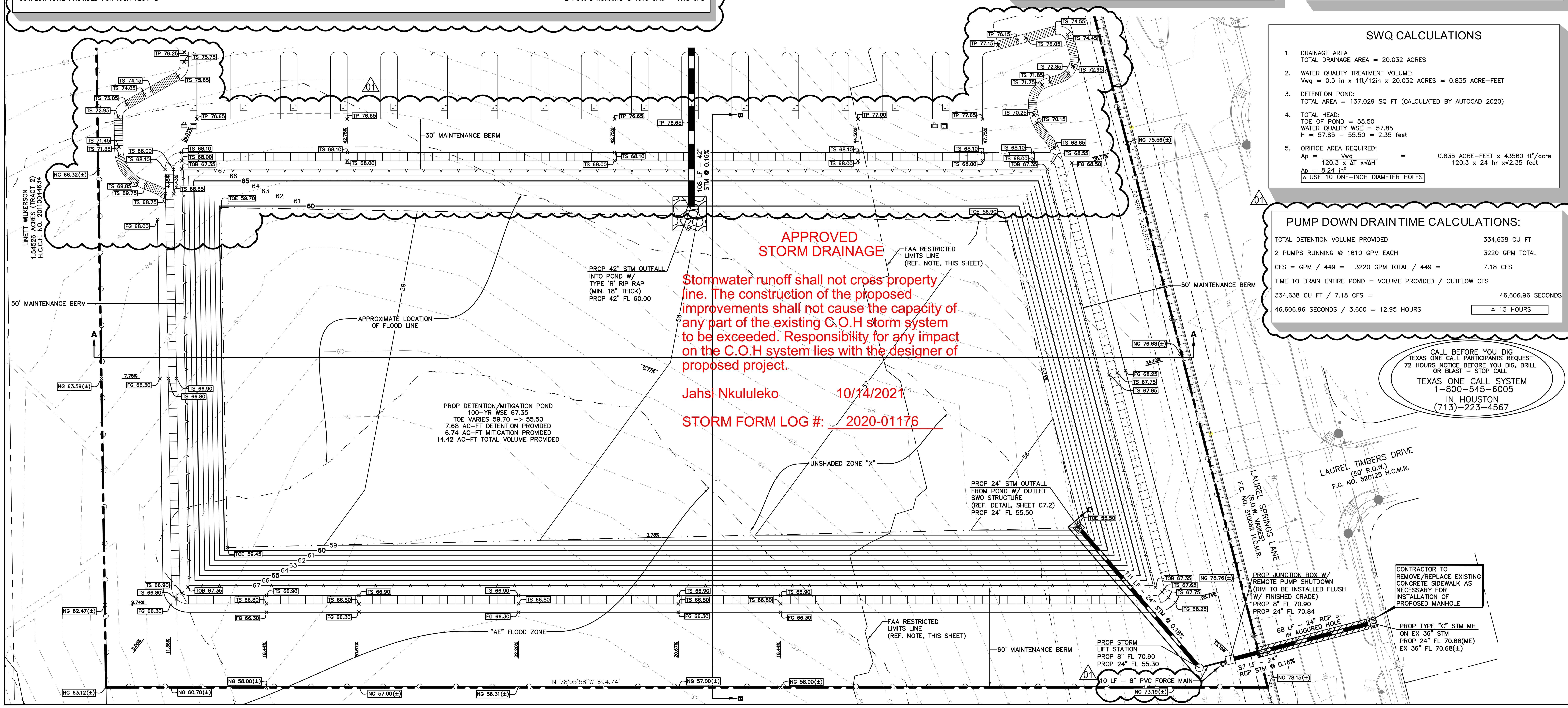
SWQ CALCULATIONS

1. DRAINAGE AREA
TOTAL DRAINAGE AREA = 20.032 ACRES
2. WATER QUALITY TREATMENT VOLUME:
Vwq = 0.5 in x 1ft/12in x 20.032 ACRES = 0.835 ACRE–FEET
3. DETENTION POND:
TOTAL AREA = 137,029 SQ FT (CALCULATED BY AUTOCAD 2020)
4. TOTAL HEAD:
TOE OF POND = 55.50
WATER QUALITY WSE = 57.85
H = 57.85 – 55.50 = 2.35 feet
5. ORIFICE AREA REQUIRED:
$$Ap = \frac{Vwq}{120.3 \times \Delta T \times \sqrt{\Delta H}} = \frac{0.835\ \text{ACRE–FEET} \times 43560\ ft^2/acre}{120.3 \times 24\ hr \times \sqrt{2.35}\ feet}$$
$Ap = 8.24\ in^2$
∴ USE 10 ONE–INCH DIAMETER HOLES

PUMP DOWN DRAIN TIME CALCULATIONS:

TOTAL DETENTION VOLUME PROVIDED	334,638 CU FT
2 PUMPS RUNNING @ 1610 GPM EACH	3220 GPM TOTAL
CFS = GPM / 449 = 3220 GPM TOTAL / 449 =	7.18 CFS
TIME TO DRAIN ENTIRE POND = VOLUME PROVIDED / OUTFLOW CFS	
334,638 CU FT / 7.18 CFS =	46,606.96 SECONDS
46,606.96 SECONDS / 3,600 = 12.95 HOURS	∴ 13 HOURS

CALL BEFORE YOU DIG
TEXAS ONE CALL PARTICIPANTS REQUEST 72 HOURS NOTICE BEFORE YOU DIG, DRILL OR BLAST – STOP CALL
TEXAS ONE CALL SYSTEM
1–800–545–6005
IN HOUSTON
(713)–223–4567



APPROVED
STORM DRAINAGE

Stormwater runoff shall not cross property line. The construction of the proposed improvements shall not cause the capacity of any part of the existing C.O.H storm system to be exceeded. Responsibility for any impact on the C.O.H system lies with the designer of proposed project.

Jahsi Nkululeko 10/14/2021

STORM FORM LOG #: 2020-01176

No.	REVISIONS	DATE
01	PERMIT REVISION	07/30/2021

ALJ Lindsey
Civil Engineers
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Houston, TX 77069
281.301.5955
FRN F-11526

STATE OF TEXAS
BRETT T. HANRAHAN
112908
REGISTERED PROFESSIONAL ENGINEER
30 JULY 2021

ALJ PROJECT NO. 031.19.CV.039
DATE: JULY 2021
SCALE: 1:30
DRAWN BY: DAD
CHECKED BY: KAD

DETENTION & MITIGATION POND PLAN

LAUREL SPRINGS RV RESORT
1355 LAUREL SPRINGS LANE
HOUSTON, TEXAS

SHEET
C3.4