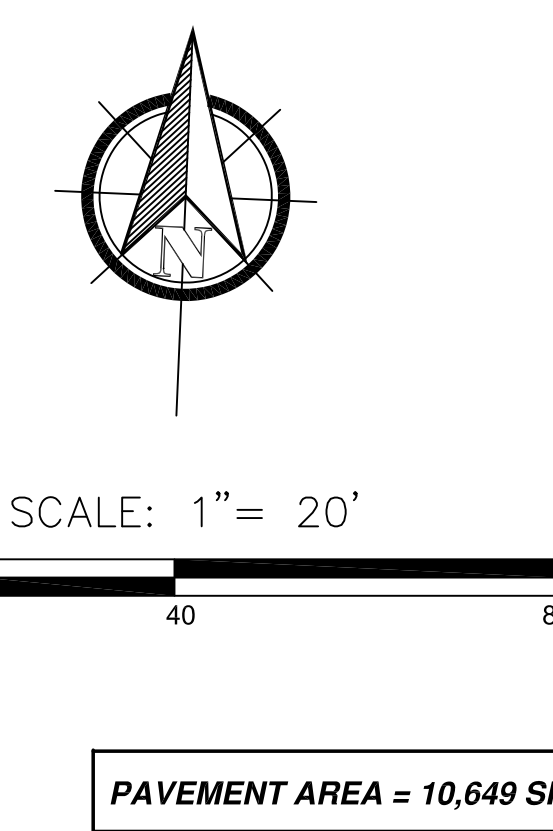
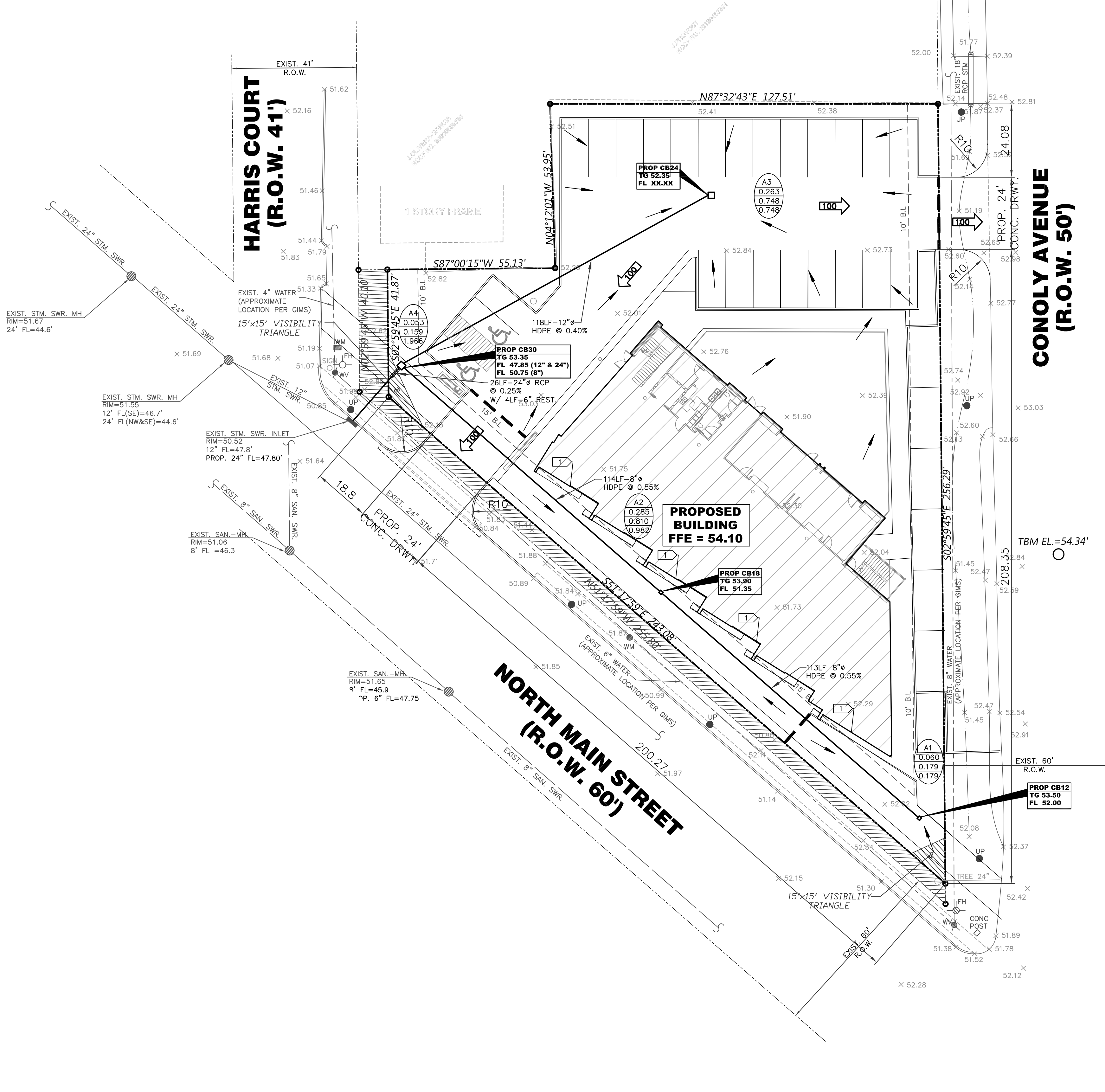


Storm Sewer Calculation Form																				
PROJECT: GH SCHOOL																				
JOB NO: 19-1006		DESIGN STORM = 2 YEAR CURVE			2 YR		100 YR		I = b/(d+TC) ^e			FL=Flowline								
SYSTEM:		b=		75.01		b=		125.4		Tc = 10xA ^{0.1761} + 15			HG=Hydraulic Gradient							
BY: CW		d=		16.2		d=		21.8		C = 0.60 la + 0.20			UP=Upstream							
CHECKED BY: CW		e=		0.8315		e=		0.75		Q = C x I x A			G=Gutter							
				2 YR		100 YR							R=Top of Rim							
MH	MH	AREA	TOTAL	RUNOFF	SUM OF	TC	INTENSITY	SUM OF	REACH	DIAM.	Slope	Manning's	Design	Design	Fall	FL	FL	Actual		
FROM	TO	(ACRES)	AREA	COEFF.	C * A	(MIN.)	I	FLOW	LENGTH	OR RISE	%	"n"	(CFS)	(ft/s)	(FT)	Elev.	Elev.	Velocity		
			(ACRES)	C	C * A		(NHR)	(CFS)	(FT)	(IN)			(CFS)	(ft/s)	(FT)	UP	DS	(ft/s)		
DA-1	DA-2	0.06	0.06	0.80	0.05	21.10	3.70	0.179	7.48	0.362	113	8	0.55	0.011	1.06	3.04	0.62	51.99	51.37	0.51
DA-2	DA-4	0.29	0.35	0.80	0.28	23.29	3.55	0.982	7.21	1.993	114	8	0.55	0.011	1.06	3.04	0.63	51.37	50.75	2.81
DA-3	DA-4	0.26	0.26	0.80	0.21	22.90	3.56	0.748	7.25	1.526	118	12	0.40	0.011	2.67	3.40	0.47	48.34	47.87	0.95
DA-4	OUT	0.05	0.66	0.80	0.53	24.30	3.71	1.966	7.09	3.755	26	24	0.25	0.013	11.34	3.61	0.07	47.87	47.80	0.63



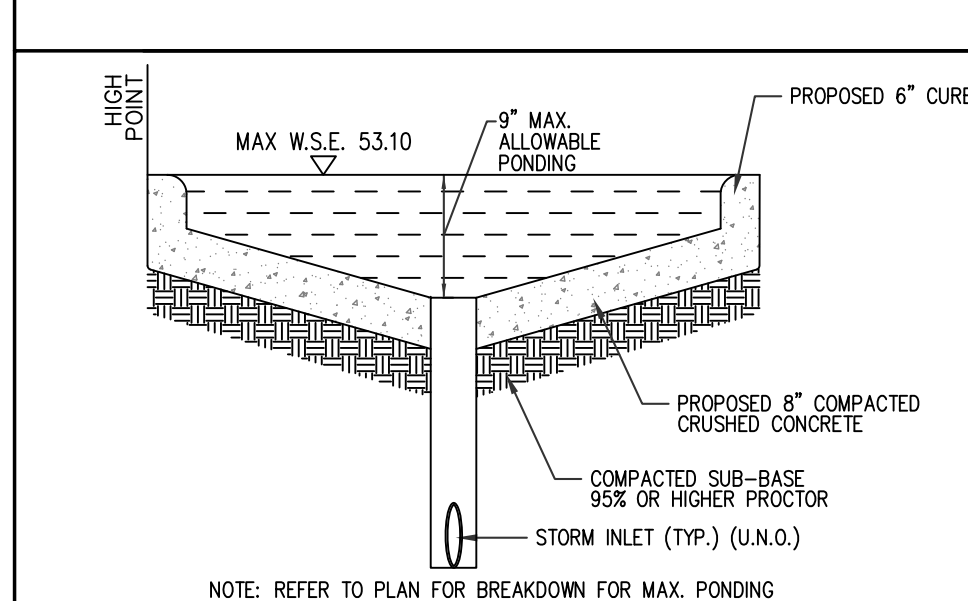
KEYED PLAN NOTES:

1 CONTRACTOR SHALL CONNECT ALL DOWNSPOUTS W/ 8" HDPE PIPE TO UNDERGROUND STM SWR (TYP). RE: ARCH.PLAN FOR DOWNSPOUT SIZE AND LOCATION.

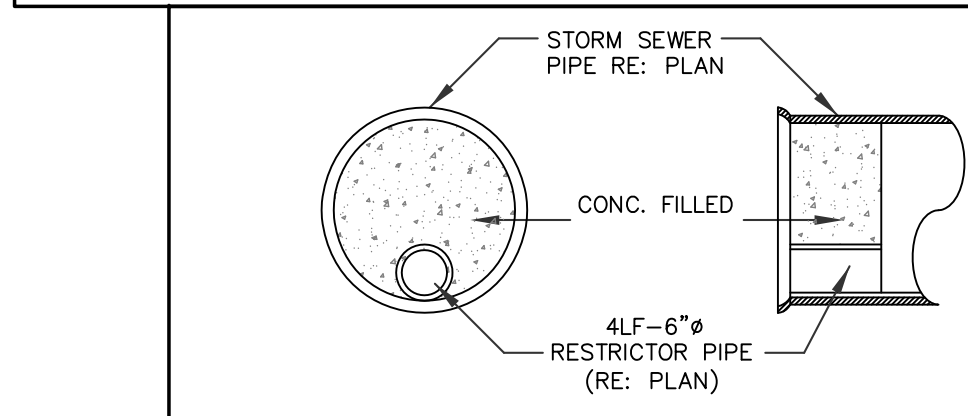
ANALYSIS OF IMPERVIOUS COVER

IMPERVIOUS TYPE	AREA OF EXISTING IMPERVIOUS COVER	AREA OF PROPOSED IMPERVIOUS COVER
BUILDING	0	7,341
PARKING LOT/DRIVEWAY	0	10,649
SIDEWALKS/PATIO	0	3,490
DETENTION POND	0	0
TOTAL AREA	0	21,480

SIZE OF LOT SF. OR ACRES	TOTAL IMP. COVER SF. OR ACRES	PERCENTAGE OF IMPERVIOUS COVER
0.704	0.493	70.00%



RESTRICTOR PIPE DETAIL (TYPICAL) (N.T.S)



RESTRICTOR CALCULATION

$Q = CA \times (2g)^{1/2} \times (H)^{3/2}$
 $D = Q^{2/3} / (2.25 H^{1/4})$
 $Q = 0.50 \text{ CFS/AC} \times 0.70 \text{ AC} = 0.35 \text{ CFS}$
 $C = \text{RUNOFF COEFFICIENT} = 0.8$
 $A = \text{ORIFICE AREA (S.F.)}$
 $g = \text{GRAVITATIONAL FACTOR} = 32.20$
 $MWSE = 53.10$
 $OUTFALL FL = 47.80$
 $25\% \text{ WSE} = 49.15$
 $H = \text{HEAD (FEET)}$
 $H = (25\% \text{ WSE}) - (\text{CENTER OF OUTFALL PIPE})$
 $H = 49.15 - (47.80 + 0.25) = 1.10'$
 $D = 0.35^{1/2} / (2.25 \times 1.10^{1/4}) = 0.256 \text{ FEET}$
 $D = 3.08 \text{ INCHES} \sim \text{USE } 6 \text{ INCHES}$
 ALLOWED OUTFALL = 0.35 CFS DISCHARGE FROM 6" PRIMARY RESTRICTOR:
 $Q = CA \times (2g)^{1/2} \times (H)^{3/2}$
 $Q = (0.8 \times 0.196) \times (2 \times 32.2)^{1/2} \times (1.10)^{3/2}$
 $Q = 1.320 \text{ CFS} > 0.35 \text{ CFS (ALLOWED)}$
 THEREFORE, NO SECONDARY RESTRICTOR IS REQUIRED

LEGAL DESCRIPTION

A SUBDIVISION OF 0.704 ACRES, BEING REPLAT ON LOT 1, AND SOUTH 16 FEET LOT 3, HARRIS COURT RECORDED AT VOL. 572 PG. 565, H.C.D.R. AND TRACT 18, RECORDED AT H.C.C.F. NO. 20140275130, ROSS AND MASTERSON UNRECORDED IN JOHN SURVEY, A-1.

BENCHMARK

ALL THE ELEVATIONS SHOWN HEREON ARE IN NAVD 1988 DATUM, 2001 AD. AND ARE BASED ON HARRIS CO. TSARP RM 050145, ELEVATION, 47.24'

FLOOD PLAIN DATA

ALL OF THIS PROPERTY LIES IN ZONE "X" AS PER F.E.M.A. AND DOES NOT LIE ON THE 100 YEAR FLOOD PLAN. THE FLOOD INSURANCE RATE PANEL IS NO. 48201C-0670M, DATED JUNE 09, 2014.

NOTE: PRIOR TO CONSTRUCTION

ALL DIMENSIONS MUST BE CHECKED AND VERIFIED BEFORE CONSTRUCTION MAY BEGIN. IN CASE OF A DISCREPANCY/ERROR CONTACT GENERAL CONTRACTOR IMMEDIATELY.

LEGEND

- PROPERTY LINE
- STORM SEWER PIPE
- HIGH POINT
- FLOW DIRECTION
- STORM GRATE INLET
- STORM JUNCTION BOX
- STORM/SANITARY SEWER MANHOLE
- A1
- 0.123
- 0.155
- 0.256
- 100
- 100-YR SHEET FLOW
- OFF-SITE SHEET FLOW ARROWS
- EXISTING GRADE ELEVATIONS
- FFE 88.00
- FINISH FLOOR ELEVATION
- PROPOSED TOP OF GRATE ELEVATION
- FLOW LINE ELEVATION
- G 88.00
- PROPOSED GUTTER ELEVATION
- TP 88.00
- PROPOSED TOP OF PAVEMENT ELEVATION
- TC 88.00
- PROPOSED TOP OF CURB ELEVATION
- TW 88.00
- PROPOSED TOP OF SIDEWALK ELEVATION
- FG 88.00
- PROPOSED FINISHED GRADE ELEVATION
- ME 88.00
- MATCH EXISTING ELEVATION

GENERAL NOTES

1. ALL SPOT ELEVATIONS ARE TO TOP OF PAVEMENT UNLESS OTHERWISE NOTED.
2. ALL SIDEWALKS AND ACCESSIBLE ROUTES, INCLUDING DRIVEWAY CROSSWALKS, SHALL CONFORM TO ALL APPLICABLE AMERICANS WITH DISABILITIES ACT STANDARDS AND THE TEXAS ACCESSIBILITY STANDARDS. IF ANY DISCREPANCY IS DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO POURING ANY PAVEMENT.
3. ALL SIDEWALKS AND ACCESSIBLE ROUTES, INCLUDING DRIVEWAY CROSSWALKS, SHALL NOT EXCEED A RUNNING SLOPE OF 5% (1:20) WITHOUT A RAMP, AND SHALL NOT EXCEED A 2% (1:50) IN ANY DIRECTION.
4. THE ACCESSIBLE PARKING AND PASSENGER LOADING AREAS SHALL NOT EXCEED A SLOPE OF 2% (1:50) IN ANY DIRECTION.
5. ALL EXISTING APPURTENANCES ON SITE SHALL BE ADJUSTED TO PROPOSED GRADE AS APPLICABLE.
6. CONTRACTOR SHALL REFERENCE GEOTECHNICAL REPORT AND ALL ADDENDA FOR BUILDING PAD LIMITS AND PREPARATION REQUIREMENTS.
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM BUILDING IN ALL AREAS. CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OF ANY DISCREPANCY PRIOR TO COMMENCEMENT OF CONSTRUCTION.

IMPORTANT NOTES

1. CONTRACTOR SHALL REVIEW ARCHITECTURAL AND CIVIL DRAWINGS JOINTLY TO ENSURE COORDINATION OF ALL PHASES OF CONSTRUCTION DESCRIBED IN THESE DRAWINGS. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF BOTH ARCHITECT AND ENGINEER, PRIOR TO PROCEEDING WITH CONSTRUCTION WORK.
2. CONTRACTOR SHALL FIELD-VERIFY ALL EXISTING DIMENSIONS & CONDITIONS & SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES THAT MAY AFFECT THE WORK DESCRIBED HEREIN.
3. OVERHEAD AND UNDERGROUND UTILITIES MAY EXIST IN THE VICINITY OF THIS PROJECT. LOCATIONS SHOWN FOR EXISTING UTILITIES ARE APPROXIMATE AND OTHER UTILITIES MAY EXIST IN THE VICINITY OF THE PROJECT WHICH ARE NOT SHOWN ON THE PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES IN THE VICINITY OF THE PROJECT, PRIOR TO BEGINNING CONSTRUCTION, OR DEMOLITION IF ANY DISCREPANCIES EXIST, NOTIFY ENGINEER IMMEDIATELY.

DETENTION CALCULATION						
1.	SITE AREA			=	30,678	S.F.
2.	EXST. IMPERVIOUS AREA (A _{EI})			=	0	S.F.
3.	PROP. IMPERVIOUS AREA			=	21,480	S.F.
4.	INCREASED IMPER. AREA (A _{I1})			=	21,480	S.F.
5.	DETENTION STORAGE RATE			=	0.20	AC-FT/AC
6.	TOTAL DETENTION REQUIRED	V _T = (43,560 x (0.20 x A _{I1}))		=	4,296	C.F.
		A _{I1} = area of increased impervious cover.	(ACRE)			
		A _{EI} = area of existing impervious cover.	(ACRE)			
7.	MAX DESIGN WATER SURFACE ELEV.			=	53.10	FT
PARKING LOT & GREEN SPACE STORAGE VOLUME:						
	DRAINAGE AREA 1 =	8,795 S.F. AREA	0.48 FT. AVG. DEPTH	=	4,222	C.F.
	TOTAL AREA =	8,795 S.F. AREA				
	TOTAL PARKING LOT STORAGE VOLUME			=	4,222	C.F.
					0.0969	AC-FT
STORM SEWER PIPE STORAGE VOLUME:						
	12-INCH PIPE RUN DATA	12 IN DIA	118 L.F.	=	93	C.F.
	8-INCH PIPE RUN DATA	8 IN DIA	227 L.F.	=	79	C.F.
	TOTAL PIPE STORAGE VOLUME			=	172	C.F.
					0.0039	AC-FT
	TOTAL DETENTION PROVIDED:			=	4,394	C.F.
					0.1009	AC-FT

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GH SCHOOL
 4780 NORTH MAIN STREET
 HOUSTON, TEXAS. 77009

REVISIONS		
No.	DATE	DESCRIPTION

GENERAL NOTES			
Scale:	HORIZ: N/A	Issue Date:	06-06-19
VERT:	N/A	CEEDC Project Number:	191006
		CEEDC File Number:	191006C20
Designed By:	CW	Date:	06-03-19
Checked By:	CW	Date:	06-03-19

DRAINAGE AND DETENTION PLAN

DRAWING: **C2.0**

SHEET: **3 / 8**