Kimley»Horn

February 4, 2022

City of Bryant - Engineering & Construction Department
210 SW 3rd St.
Bryant, Arkansas 72022

RE: ***Church's Chicken (1901 N Reynolds Rd)***
Drainage Submittal Explanation Letter

To Whom It May Concern:

Please accept this letter as part of the permit submittal requirements for the proposed Church's Chicken restaurant, located in Lot 2 of the 10 Fitness subdivision, 1901 N. Reynolds Road, in Bryant Arkansas.

A drainage report for the 10 Fitness subdivision that encompassed Lots 1 and 2 was completed May 9, 2018 by Whitlow Engineering Services, Inc. The report originally established a blanket "C" factor of 0.67 for Lots 1 and 2 (3.465 acres) and determined that 6,435 cubic-feet of detention storage would be required (10,183 cubic-feet provided) for the subdivision. Upon further analysis of the report, it was discovered that the "C" factor established was not an appropriate value based on the development of Lot 1 and the proposed development of Lot 2. A composite "C" factor of 0.817 was established by breaking down the square footage of the existing and proposed surfaces types and assigning the correct "C" value shown in Table 400-1 of the City of Bryant, Arkansas Stormwater Management Manual. The required detention storage for the subdivision will increase due to the updated "C" factor by a ratio of 0.817/0.67. It was determined that the increase in the "C" factor would require 7,847 cubic feet of detention storage which is less than the total detention storage provided. Therefore, a detention pond will not be required for the development of Lot 2. However, Lot 2 will have an on-site storm system to capture and convey runoff to the 10 Fitness detention pond in order to limit the amount of release to predevelopment conditions.

Please feel free to contact me at 210-321-3433, if additional information is required.

Sincerely,

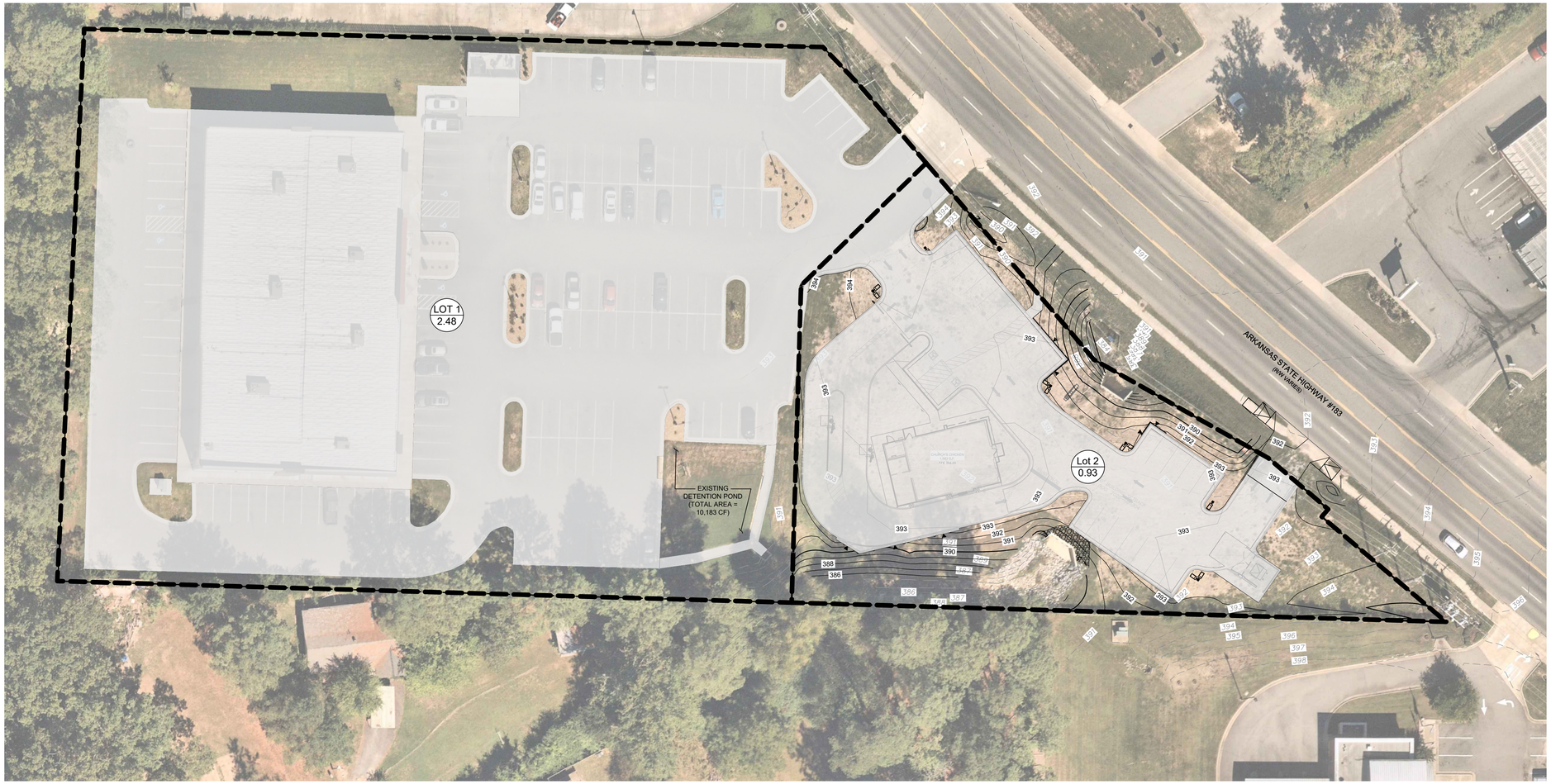
KIMLEY-HORN AND ASSOCIATES, INC.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 10453
CHRISTOPHER ROGERS
02/04/22

Matt Gatto, EIT
Project Manager

Chris Rogers, P.E.
Project Engineer

Attachments:
- *Church's Chicken (Bryant) – Detention Pond Analysis (Sheet 2.3.3)*
- *Church's Chicken (Bryant) – Drainage Area Map(Existing and Proposed Conditions) (Sheet 2.3.2)*



NORTH

GRAPHIC SCALE IN FEET
0 15 30 60

10 Fitness (Lot 1) - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	24,814	0.570	0.97	0.553
Asphalt	59,737	1.371	0.95	1.303
Lawn (good condition, average 2%-7%)	23,594	0.542	0.46	0.249
Total	108,145	2.483		2.105
Composite C				**0.848**

Proposed Site (Lot 2)- Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	9,945	0.228	0.97	0.221
Asphalt	12,384	0.284	0.95	0.270
Lawn (good condition, average 2%-7%)	18,077	0.415	0.46	0.191
Total	40,406	0.928		0.682
Composite C				**0.736**

10 Fitness (Lots 1 & 2) - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	34,759	0.798	0.97	0.774
Asphalt	72,121	1.656	0.95	1.573
Lawn (good condition, average 2%-7%)	41,671	0.957	0.46	0.440
Total	148,551	3.410		2.787
Composite C				**0.817**

Existing Site (Lot 1) - Rational Method Calculations						
Storm	2	5	10	25	50	100
C	0.848	0.848	0.848	0.848	0.848	0.848
I	5.9	6.85	7.5	8.5	9.45	10
A	2.483	2.483	2.483	2.483	2.483	2.483
Q (cfs)	**12.42**	**14.42**	**15.78**	**17.89**	**19.89**	**21.05**

Proposed Site (Lot 2) - Rational Method Calculations						
Storm	2	5	10	25	50	100
C	0.736	0.736	0.736	0.736	0.736	0.736
I	5.9	6.85	7.5	8.5	9.45	10
A	0.928	0.928	0.928	0.928	0.928	0.928
Q (cfs)	**4.03**	**4.68**	**5.12**	**5.81**	**6.45**	**6.83**

Proposed Site (Lots 1 & 2) - Rational Method Calculations						
Storm	2	5	10	25	50	100
C	0.817	0.817	0.817	0.817	0.817	0.817
I	5.9	6.85	7.5	8.5	9.45	10
A	3.410675	3.410675	3.410675	3.410675	3.410675	3.411
Q (cfs)	**16.45**	**19.09**	**20.90**	**23.69**	**26.34**	**27.87**

DETENTION POND CALCULATIONS

PREVIOUSLY APPROVED CALCULATIONS:

TOTAL DRAINAGE STUDY AREA = 3.465 ACRES
PROPOSED RUNOFF COEFFICIENT: C=0.67
TIME OF CONCENTRATION: T_C=5 MINUTES
REQUIRED DETENTION VOLUME = 6,435 CF
DETENTION VOLUME PROVIDED = 10,183 CF

PROPOSED CALCULATIONS:

TOTAL DRAINAGE AREA = 3.410 ACRES
PROPOSED RUNOFF COEFFICIENT: C=0.819
TIME OF CONCENTRATION: T_C=5 MINUTES
REQUIRED DETENTION VOLUME: 6,435 CF x $\frac{0.817}{0.67}$ = 7,847 CF
DETENTION VOLUME PROVIDED = 10,183 CF > 7,847 CF

LEGEND

LOT 1 / 2.48	BASIN NAME / ACRES
	PROPERTY BOUNDARY
	DRAINAGE AREA
	IMPERVIOUS COVER (CONCRETE / ROOFS / ETC.)

NOTES

1. DRAINAGE CALCULATIONS ARE PERFORMED ACCORDING TO THE CITY OF BRYANT STORMWATER MANAGEMENT MANUAL.
2. THE SUBJECT PROPERTY CONFORMS TO THE DRAINAGE ANALYSIS AS OUTLINED IN THE APPROVED DRAINAGE REPORT FOR THE 10 FITNESS COMMERCIAL SUBDIVISION DATED MAY 9, 2018 BY WHITLOW ENGINEERING SERVICES, INC.

DRAINAGE CALCULATIONS

BY RATIONAL METHOD:
Q = CIA

C - RUNOFF COEFFICIENT PER THE CITY OF BRYANT STORMWATER MANAGEMENT MANUAL
I - VARIES PER TIME OF CONCENTRATION BASED OFF OF PRECIPITATION AREA PER THE APPROVED DRAINAGE REPORT FOR THE 10 FITNESS COMMERCIAL SUBDIVISION DATED MAY 9, 2018 BY WHITLOW ENGINEERING SERVICES, INC.
A - DRAINAGE BASIN AREA

REVISIONS:

DETENTION POND ANALYSIS

Church's Chicken
1901 N. Reynolds Rd.
Bryant, AR 72022

Kimley»Horn
© 2022 KIMLEY-HORN AND ASSOCIATES, INC.
601 NW LOOP 410, SUITE 350, SAN ANTONIO, TEXAS 78216
PHONE: 210-541-9166 FAX: 210-541-8699
WWW.KIMLEY-HORN.COM TBPE FIRM NO. 928

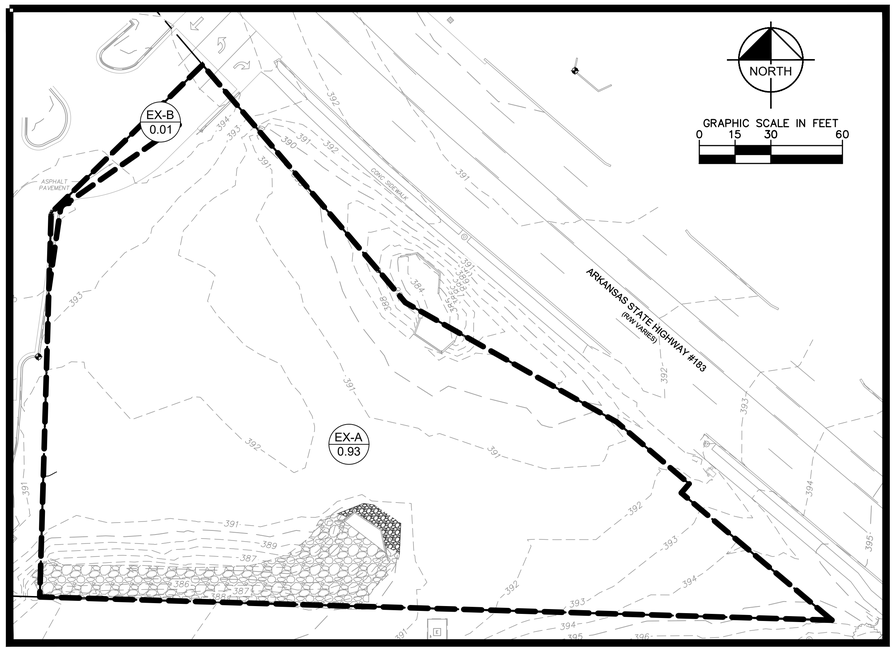
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Charles William Pope & Associates
ARCHITECTURE PLANNING CONSULTING
7400 BLANCO RD., Suite 257, SAN ANTONIO, TEXAS 78216 TEL: (210) 349-6505

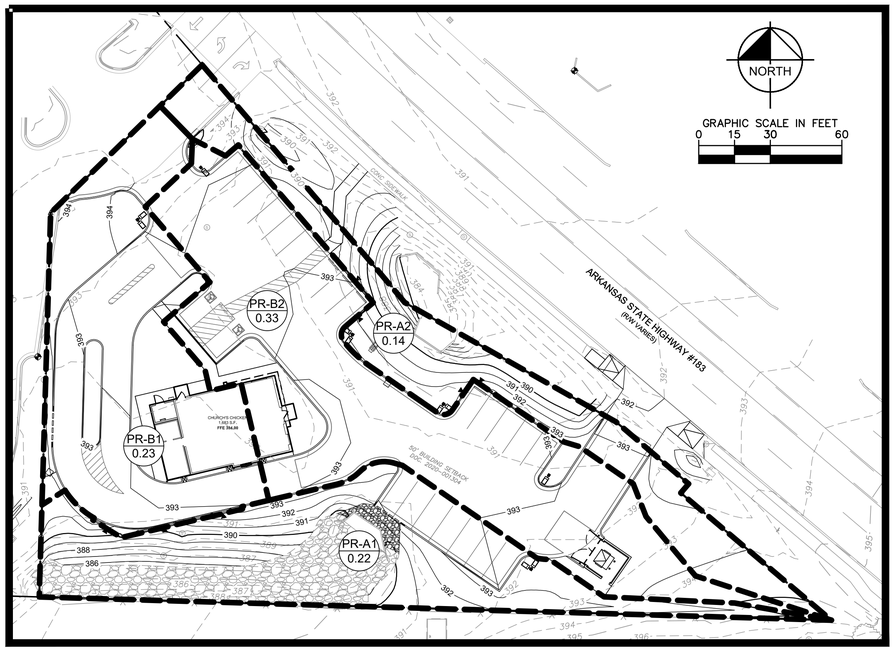
DATE: 02.15.2022
JOB NO: 068693645
DRAWN BY: MJG
SHEET NUMBER:
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OF

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Drawing name: K:\sna_Civil\068693645-churchschickenbryant\c\VDA\plansheet\c\--PWD--068693645.dwg 2.3.3 DRAINAGE AREA MAP (PROPOSED CONDITIONS) Feb 18, 2022 - 2:36pm - by Matthew.Gatto
This document, together with the concepts and design presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document

Drawing name: K:\ans_dal\068693645-churchschickentpointe\CAD\plansheets\C-DMP-068693645.dwg 2.3.3 DRAINAGE AREA MAP (PROPOSED CONDITIONS) Feb 18, 2022 - 2:36pm by Matthew.Goto
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EXISTING DRAINAGE AREA MAP



PROPOSED DRAINAGE AREA MAP

PR-A1 - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	206	0.005	0.97	0.005
Asphalt	1,116	0.026	0.95	0.024
Lawn (good condition, average 2%-7%)	8,194	0.188	0.46	0.087
Total	9,516	0.218		0.115
Composite C				0.53

PR-A2 - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	175	0.004	0.97	0.004
Asphalt	763	0.018	0.95	0.017
Lawn (good condition, average 2%-7%)	5,282	0.121	0.46	0.056
Total	6,220	0.143		0.076
Composite C				0.53

PR-B1 - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	6,023	0.138	0.97	0.134
Asphalt	1,155	0.027	0.95	0.025
Lawn (good condition, average 2%-7%)	2,779	0.064	0.46	0.029
Total	9,957	0.229		0.189
Composite C				0.83

PR-B2 - Composite C				
Type	Area (sf)	Area (ac)	C	CA
Concrete / Roof	3,133	0.072	0.97	0.070
Asphalt	9,350	0.215	0.95	0.204
Lawn (good condition, average 2%-7%)	1,795	0.041	0.46	0.019
Total	14,278	0.328		0.293
Composite C				0.89

PEAK FLOW CALCULATIONS																
Basin	Tc	A	C	I2	I5	I10	I25	I50	I100	Q2	Q5	Q10	Q25	Q50	Q100	Collection Point
	(min)	(ac)		(in/hr)	(in/hr)	(in/hr)	(in/hr)	(in/hr)	(in/hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	
EX-A	5.0	0.93	0.35*	5.90	6.85	7.50	8.50	9.45	10.00	1.92	2.23	2.44	2.77	3.08	3.26	DRAINAGE CULVERT
EX-B	5.0	0.01	0.35*	5.90	6.85	7.50	8.50	9.45	10.00	0.02	0.02	0.03	0.03	0.03	0.04	DETENTION POND
PR-A1	5.0	0.22	0.53	5.90	6.85	7.50	8.50	9.45	10.00	0.69	0.80	0.87	0.99	1.10	1.16	DRAINAGE CULVERT
PR-A2	5.0	0.14	0.53	5.90	6.85	7.50	8.50	9.45	10.00	0.44	0.51	0.56	0.64	0.71	0.75	DRAINAGE CULVERT
PR-B1	5.0	0.23	0.83	5.90	6.85	7.50	8.50	9.45	10.00	1.12	1.30	1.42	1.61	1.79	1.90	DETENTION POND**
PR-B2	5.0	0.33	0.89	5.90	6.85	7.50	8.50	9.45	10.00	1.74	2.02	2.21	2.50	2.78	2.95	DETENTION POND***

NOTE:
* "C" VALUES FOR EXISTING DRAINAGE AREAS PER THE APPROVED DRAINAGE REPORT FOR THE 10 FITNESS COMMERCIAL SUBDIVISION DATED MAY 9, 2018 BY WHITLOW ENGINEERING SERVICES, INC.
** PR-B1 WILL BE CONVEYED TO THE 10 FITNESS DETENTION POND VIA SHEET FLOW
*** PR-B2 WILL BE CONVEYED TO THE 10 FITNESS DETENTION POND VIA AN ON-SITE STORM SYSTEM

DRAINAGE CULVERT COMPARISON TABLE						
Basin	Q2	Q5	Q10	Q25	Q50	Q100
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
EX-A	1.92	2.23	2.44	2.77	3.08	3.26
PR-A****	1.13	1.31	1.43	1.62	1.81	1.91
Δ	-0.79	-0.92	-1.01	-1.14	-1.27	-1.34

NOTE:
**** PR-A IS MADE UP OF THE DEVELOPED RUNOFF NOT BEING CONVEYED TO THE 10 FITNESS DETENTION POND. THE RUNOFF SHOWN FOR PR-A CONSISTS OF THE DRAINAGE BASINS PR-A1 AND PR-A2 COMBINED.

LEGEND

EX-A 0.93	BASIN NAME / ACRES
	PROPERTY BOUNDARY
	DRAINAGE AREA
393	EXISTING CONTOUR (SEE NOTE 3 THIS SHEET)
393	PROPOSED CONTOUR

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3. ON SITE TOPOGRAPHIC INFORMATION IS TAKEN FROM A TOPOGRAPHIC SURVEY PREPARED BY YOUNG - HOBBS AND ASSOCIATES FROM NOVEMBER 2021.

DRAINAGE CALCULATIONS

BY RATIONAL METHOD:
Q = CIA

C - RUNOFF COEFFICIENT PER THE CITY OF BRYANT STORMWATER MANAGEMENT MANUAL
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A - DRAINAGE BASIN AREA

INLET CAPCITY CALCULATIONS

ORIFICE EQUATION
$Q=CA(2gh)^{0.5}$
C=0.70

2'X2' GRATE INLET (V5622):
AREA = 266 SQ. IN
*50% CLOGGED AREA = 133 SQ. IN
h=0.50 FT
Q_{CAP}= 3.67 CFS
Q_{100}= 2.95 CFS

REVISIONS:

DRAINAGE AREA MAP (EXISTING AND PROPOSED CONDITIONS)

Church's Chicken
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Bryant, AR 72022

Kimley»Horn
© 2022 KIMLEY-HORN AND ASSOCIATES, INC.
601 MAGNOLIA, SUITE 1000, FORT WORTH, TEXAS 76216
PHONE: 210-541-1881 FAX: 210-541-1889
WWW.KIMLEY-HORN.COM TBPE FIRM NO. 928

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