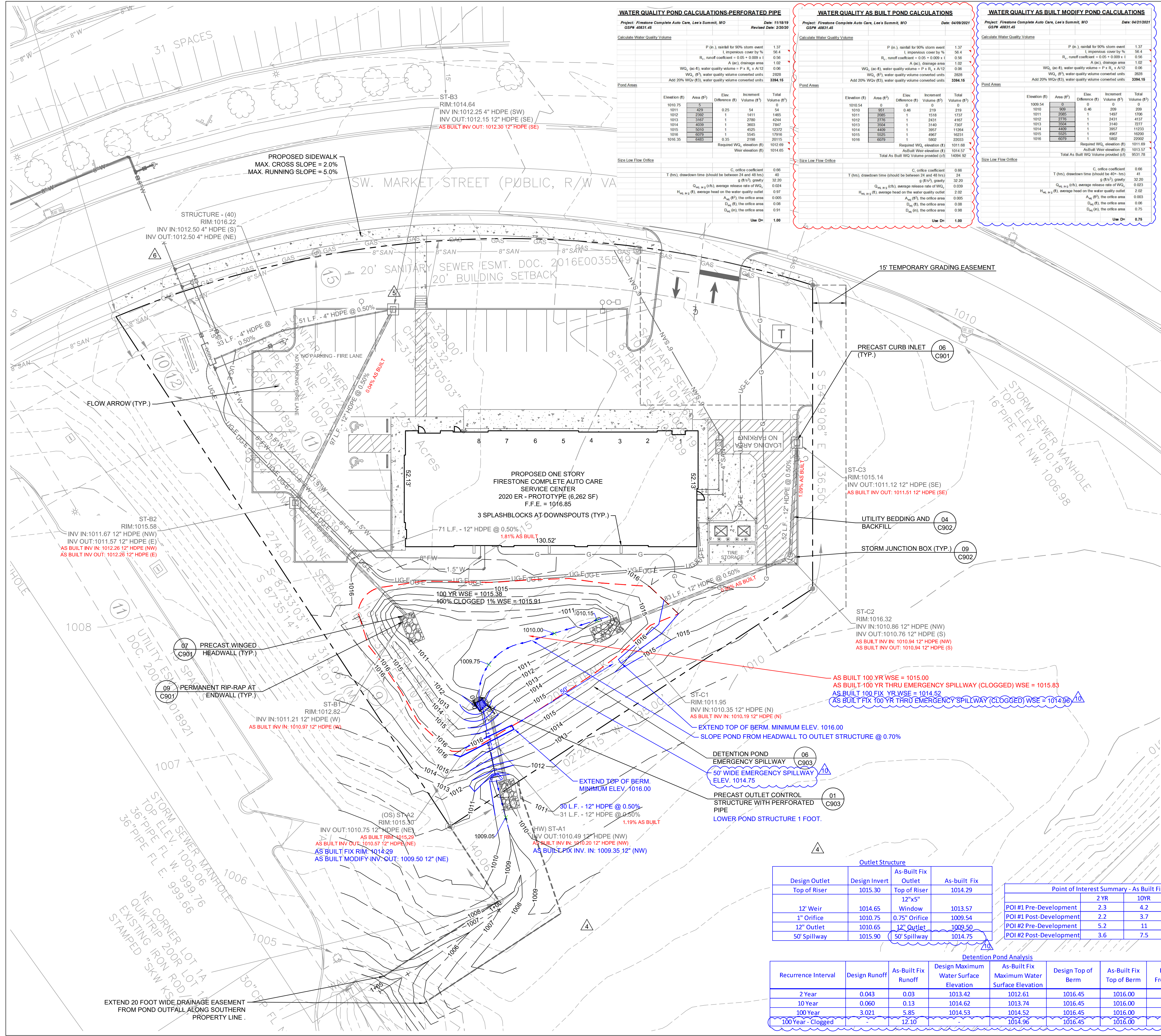


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WATER QUALITY POND CALCULATIONS-PERFORATED PIPE

Project: Firestone Complete Auto Care, Lee's Summit, MO
GSP# 40831.45
Date: 11/18/19
Revised Date: 2/20/20

Calculate Water Quality Volume

P (in.), rainfall for 90% storm event	1.37
I, impervious cover by %	56.4
R _n , runoff coefficient = 0.05 + 0.009 x I	0.56
A (ac), drainage area	1.02
WQ ₁ (ac-ft), water quality volume = P x R _n x A x I/2	0.08
WQ ₂ (ft ³), water quality volume converted units	2828
Add 20% WQ ₂ (ft ³), water quality volume converted units	3394.15

Pond Areas

Elevation (ft)	Area (ft ²)	Elev. Difference (ft)	Increment Volume (ft ³)	Total Volume (ft ³)
1010.75	5	0	0	0
1011	429	0.25	54	54
1012	2392	1	1411	1465
1013	3167	1	2780	4244
1014	4039	1	3603	7847
1015	5010	1	4525	12372
1016	6079	1	5445	17816
1016.35	6483	0.35	2198	20115

Required WQ₂ elevation (ft) 1011.69
Actual WQ₂ elevation (ft) 1014.92

Size Low Flow Office

C, orifice coefficient 0.66
T (hrs), drawdown time (should be between 24 and 48 hrs) 24
Q_{avg} (cfs), average release rate of WQ₂ 0.024
H_{avg} (ft), average head on the water quality outlet 0.97
A_{orif} (ft²), the orifice area 0.005
D_{orif} (ft), the orifice area 0.08
D_{orif} (in), the orifice area 0.91
Use D= 1.00

WATER QUALITY AS BUILT POND CALCULATIONS

Project: Firestone Complete Auto Care, Lee's Summit, MO
GSP# 40831.45
Date: 04/29/2021

Calculate Water Quality Volume

P (in.), rainfall for 90% storm event	1.37
I, impervious cover by %	56.4
R _n , runoff coefficient = 0.05 + 0.009 x I	0.56
A (ac), drainage area	1.02
WQ ₁ (ac-ft), water quality volume = P x R _n x A x I/2	0.08
WQ ₂ (ft ³), water quality volume converted units	2828
Add 20% WQ ₂ (ft ³), water quality volume converted units	3394.15

Pond Areas

Elevation (ft)	Area (ft ²)	Elev. Difference (ft)	Increment Volume (ft ³)	Total Volume (ft ³)
1010.54	0	0	0	0
1010	867	0.46	219	219
1011	2085	1	1516	1737
1012	2776	1	2431	4167
1013	3504	1	3140	7707
1014	4409	1	3957	11664
1015	5525	1	4967	16631
1016	6079	1	5802	22433

Required WQ₂ elevation (ft) 1011.69
Actual WQ₂ elevation (ft) 1014.92

Size Low Flow Office

C, orifice coefficient 0.66
T (hrs), drawdown time (should be between 24 and 48 hrs) 24
Q_{avg} (cfs), average release rate of WQ₂ 0.024
H_{avg} (ft), average head on the water quality outlet 0.97
A_{orif} (ft²), the orifice area 0.005
D_{orif} (ft), the orifice area 0.08
D_{orif} (in), the orifice area 0.91
Use D= 1.00

WATER QUALITY AS BUILT MODIFY POND CALCULATIONS

Project: Firestone Complete Auto Care, Lee's Summit, MO
GSP# 40831.45
Date: 04/29/2021

Calculate Water Quality Volume

P (in.), rainfall for 90% storm event	1.37
I, impervious cover by %	56.4
R _n , runoff coefficient = 0.05 + 0.009 x I	0.56
A (ac), drainage area	1.02
WQ ₁ (ac-ft), water quality volume = P x R _n x A x I/2	0.08
WQ ₂ (ft ³), water quality volume converted units	2828
Add 20% WQ ₂ (ft ³), water quality volume converted units	3394.15

Pond Areas

Elevation (ft)	Area (ft ²)	Elev. Difference (ft)	Increment Volume (ft ³)	Total Volume (ft ³)
1009.54	0	0	0	0
1010	909	0.46	269	269
1011	2085	1	1467	1736
1012	2776	1	2431	4167
1013	3504	1	3140	7707
1014	4409	1	3957	11664
1015	5525	1	4967	16631
1016	6079	1	5802	22433

Required WQ₂ elevation (ft) 1011.69
Actual WQ₂ elevation (ft) 1013.57

Size Low Flow Office

C, orifice coefficient 0.66
T (hrs), drawdown time (should be between 24 and 48 hrs) 41
Q_{avg} (cfs), average release rate of WQ₂ 0.023
H_{avg} (ft), average head on the water quality outlet 2.02
A_{orif} (ft²), the orifice area 0.003
D_{orif} (ft), the orifice area 0.06
D_{orif} (in), the orifice area 0.75
Use D= 0.75

LEGEND

- PROPERTY LINE
- BUILDING LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- MAJOR CONTOUR
- MINOR CONTOUR
- STORM PIPE
- HEADWALL
- STORM MANHOLE
- AREA INLET
- CURB INLET
- STORM CLEANOUT
- SPOT ELEVATION
- FLUSH ELEVATION
- MATCH EXISTING FINISH GRADE ELEVATION
- CURB TOP/BOTTOM ELEVATIONS
- FLOW ARROW

STORM STRUCTURE ABBREVIATIONS

(SCI)	SINGLE CURB INLET	DETAIL 06, SHEET C901
(JB)	JUNCTION BOX	DETAIL 09, SHEET C902
(HW)	HEADWALL	DETAIL 07, SHEET C901
(OS)	OUTLET STRUCTURE	DETAIL 08, SHEET C901

NOTES:

- FOR SITE PREPARATION AND GEOTECHNICAL RECOMMENDATIONS, REFER TO INTERTEK PSI GEOTECHNICAL REPORT 03381947, DATED 7/24/2019.
- ITEMS IN RED AND CLOUDED IN RED INDICATE AS BUILT CONDITIONS.
- ITEMS IN BLUE AND CLOUDED IN BLUE INDICATE AS BUILT FIX, ONCE FIX IS COMPLETED, PROVIDE TOPO SURVEY OF THE ENTIRE SITE INCLUDING PARKING, BUILDING FFE, AREA INLET TOP OF CASTING, POND, POND STRUCTURE INVERTS AND DIMENSIONS.

POND CONTOUR AREAS - DESIGN

DESIGN ELEVATION	GN CAD AREA	DESIGN CAD VOLUME (CF.)	AVG. END METHOD
1010.75	5	0	
1011.00	429	54	
1012.00	2392	1,465	
1013.00	3167	4,244	
1014.00	4039	7,847	
1015.00	5010	12,372	
1016.00	6079	17,916	
1016.35	6483	20,115	

POND CONTOUR AREAS - AS BUILT FIX

ASBUILT ELEVATION	ASBUILT modify CAD AREA (SF.)	ASBUILT CAD VOLUME (CF.)	AVG. END METHOD
1009.54	0	0	
1010.00	909	209	
1011.00	2085	1,706	
1012.00	2776	4,137	
1013.00	3504	7,777	
1014.00	4409	11,234	
1015.00	5525	16,201	
1016.00	6079	22,003	

Outlet Structure

Design Outlet	Design Invert	As-Built Fix Outlet Top of Riser	As-built Fix
12" Weir	1014.65	Window	1013.57
1" Orifice	1010.75	0.75" Orifice	1009.54
12" Outlet	1010.65	12" Outlet	1009.50
50" Spillway	1015.90	50" Spillway	1014.75

Point of Interest Summary - As Built Fix (cfs)

	2 YR	10YR	100YR
POI #1 Pre-Development	2.3	4.2	7.7
POI #1 Post-Development	2.2	3.7	6.4
POI #2 Pre-Development	5.2	11	22.7
POI #2 Post-Development	3.6	7.5	19.4

Detention Pond Analysis

Recurrence Interval	Design Runoff	As-Built Fix Runoff	Design Maximum Water Surface Elevation	As-Built Fix Maximum Water Surface Elevation	Design Top of Berm	As-Built Fix Top of Berm	Design Freeboard	As-Built Fix Freeboard
2 Year	0.043	0.03	1013.42	1012.61	1016.45	1016.00	3.03	3.39
10 Year	0.060	0.13	1014.62	1013.74	1016.45	1016.00	1.83	2.26
100 Year	3.021	5.85	1014.53	1016.45	1016.45	1016.00	1.92	1.48
100 Year - Clogged		12.10		1014.96	1016.45	1016.00		1.04

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COMPLETE AUTO CARE

3561 SW MARKET STREET
LEE'S SUMMIT, MISSOURI 64082

Revision

No.	Date	Description
1	02.07.2020	CITY COMMENTS
2	02.21.2020	CITY COMMENTS
3	03.27.2020	CITY COMMENTS
4	04.28.2020	CITY COMMENTS
5	05.15.2020	CITY COMMENTS
6	06.01.2020	CITY COMMENTS
7	04.12.2021	AS BUILT
8	04.15.2021	AS BUILT
9	04.22.2021	AS BUILT FIX
10	06.29.2021	AS BUILT FIX

GRADING AND DRAINAGE PLAN

C300

40831.45
JANUARY 8, 2020

This Line Is 3 Inches When Printed Full Size