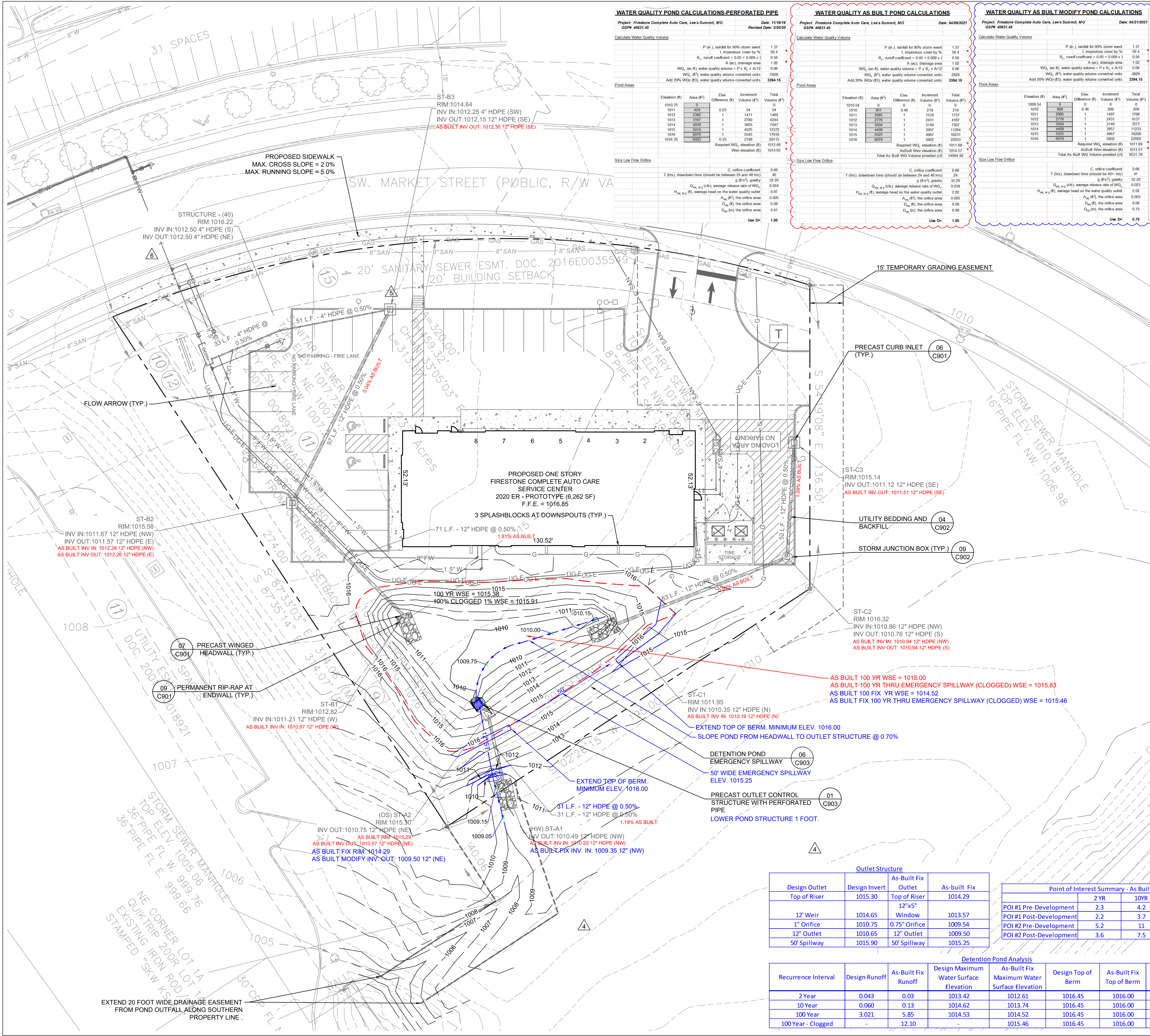


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WATER QUALITY POND CALCULATIONS-PERFORATED PIPE

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

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	5545	17916
1016.35	6483	0.35	2198	20115
Required WQ ₂ elevation (ft)		1012.69		1012.69
Actual WQ ₂ elevation (ft)		1014.57		1014.57

See Low Flow Office

T (hrs), drawdown time (should be between 24 and 48 hrs)	40
C, orifice coefficient	0.66
g (ft/s ²), gravity	32.20
Q _{avg} (cfs), average release rate of WQ ₂	0.024
H _{avg} (ft), average head on the water quality outlet	0.97
A _{orif} (ft ²), 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 Date: 04/09/2021
GSP# 40831.45

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

Elevation (ft)	Area (ft ²)	Elev. Difference (ft)	Increment Volume (ft ³)	Total Volume (ft ³)
1010.54	0	0	0	0
1010	909	0.46	209	209
1011	2085	1	1467	1706
1012	2776	1	2431	4137
1013	3504	1	3140	7277
1014	4409	1	3957	11233
1015	5525	1	4967	16200
1016	6079	1	5802	22002
Required WQ ₂ elevation (ft)		1011.69		1011.69
Actual WQ ₂ elevation (ft)		1014.57		1014.57
Total As Built WQ Volume provided (cf)		14694.92		

See Low Flow Office

T (hrs), drawdown time (should be between 24 and 48 hrs)	24
C, orifice coefficient	0.66
g (ft/s ²), gravity	32.20
Q _{avg} (cfs), average release rate of WQ ₂	0.039
H _{avg} (ft), average head on the water quality outlet	2.02
A _{orif} (ft ²), the orifice area	0.005
D _{orif} (ft), the orifice area	0.08
D _{orif} (in), the orifice area	0.98
Use D=	1.00

WATER QUALITY AS BUILT MODIFY POND CALCULATIONS

Project: Firestone Complete Auto Care, Lee's Summit, MO Date: 04/23/2021
GSP# 40831.45

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

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	209	209
1011	2085	1	1467	1706
1012	2776	1	2431	4137
1013	3504	1	3140	7277
1014	4409	1	3957	11233
1015	5525	1	4967	16200
1016	6079	1	5802	22002
Required WQ ₂ elevation (ft)		1011.69		1011.69
Actual WQ ₂ elevation (ft)		1013.57		1013.57
Total As Built WQ Volume provided (cf)		9531.78		

See Low Flow Office

T (hrs), drawdown time (should be between 24 and 48 hrs)	41
C, orifice coefficient	0.66
g (ft/s ²), gravity	32.20
Q _{avg} (cfs), average release rate of WQ ₂	0.023
H _{avg} (ft), average head on the water quality outlet	2.02
A _{orif} (ft ²), 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	7,277
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	As-Built Fix Top of Riser
12" Weir	1015.30	12"x5" Window	1014.29
1" Orifice	1010.75	0.75" Orifice	1009.54
12" Outlet	1010.65	12" Outlet	1009.50
50' Spillway	1015.90	50' Spillway	1015.25

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
2 Year	0.043	0.03	1013.42	1012.61	1016.45	1016.00
10 Year	0.060	0.13	1014.62	1013.74	1016.45	1016.00
100 Year	3.021	5.85	1014.53	1014.52	1016.45	1016.00
100 Year - Clogged	-	12.10	-	1015.46	1016.45	1016.00

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COMPLETE AUTO CARE

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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

GRADING AND DRAINAGE PLAN

C300

40831.45
JANUARY 8, 2020

This Line Is 3 Inches When Printed Full Size