



wallace
design
collective

PRELIMINARY DRAINAGE REPORT
DENTAL DEPOT – LEE’S SUMMIT, MO
1501 NE Rice Rd
Lee’s Summit, MO
March 24, 2023

For:
Ashmore Investments, LLC
3104 NW 23rd Street
Oklahoma, OK 73107
T: 405.830.4608

BY:
Wallace Design Collective
Josh Lipscomb, P.E.
1703 Wyandotte St
Kansas City, MO 64108
816.421.8282



TABLE OF CONTENTS

Introduction	1
Drainage Criteria	1
Rainfall Data	2
Existing Conditions	2
Developed Conditions	3
Detention Design	4
Recommendations and Conclusions	5

APPENDIX

Location Photo, FEMA map & Survey	A
USDA Soil Information	B
PondPack Reports, Existing conditions	C
PondPack Reports, Developed conditions	D
PondPack Reports, Developed Pond Outlet Structure	E
Existing & Developed Drainage Maps	F

INTRODUCTION

The Dental Depot – Lee’s Summit project consists of the construction of a 6,070 sf dental office, with associated drives, parking and utilities. An underground detention system will also be installed to control the runoff from the site. The development is located at on the northeast corner of NE Rice Road and NE Mulberry Street on Lot 11, Gregory Estates, Lots 6 – 11, in Lee’s Summit, MO, and will disturb approximately 1.32 acres.

An aerial photo is shown in Appendix A.

GENERAL INFORMATION

The existing Lot 11, Gregory Estates, Lots 6-11, is 1.32 acres of undeveloped grass covered lot. The site slopes generally from north to south. The west 35 ft slopes to Rice Road. The existing runoff travels overland to the streets and is intercepted by the existing inlets in NE Mulberry St. The southeast corner of the property is encroached upon by FEMA Flood Plain Zone AE as shown is FEMA Flood Map 29095C0430G, dated January 20, 2017. According to the National Wetlands Inventory, there are no wetlands within this property.

The Jackson County Soil Survey on the USDA website shows the existing soils to primarily belong to hydrologic soil group “D,” as shown in Appendix B. The following table summarizes the soil classification.

SOIL TYPE	HYDROLOGIC RATING	PERCENT OF SITE
Snead-Rock outcrop complex, warm, 5 to 14 percent slopes	D	100 %

DRAINAGE CRITERIA AND METHODOLOGY

The City of Lee’s Summit Section 5600 Design Criteria supplement requires that the discharges expected from post-construction of the site shall conform to prescribed release rate per acre for the 1%, 10% and 50% (100, 10 and 2 year) storm events. The required release rates are listed in the Required Release Rate table on page 4. The 90% storm event will be controlled for an extended 40 hour release. The underground detention system will convey the runoff from all storms up to the 100 year storm and provide a minimum of 1 foot of freeboard. An emergency overflow route is required to be capable of conveying the 100 year storm in the event that the primary outlet is totally clogged. APWA Section 5600 Design Criteria will be used for all other storm drainage design elements not modified by the Lee’s Summit Design Criteria Supplement.

Bentley’s PondPack software package was used to determine the preliminary flows for the site and preliminary detention design. PondPack uses the NRCS – TR55 and SCS hydrograph methodology for stormwater and detention analysis.

RAINFALL DATA

The 24-hour total rainfall depths were used for all storm events. These depths were used in accordance with APWA Section 5600 Design Criteria Manual and the Lee’s Summit Section 5600 Design Criteria Supplement. The SCS Type II rainfall distribution was used to model the storms, with the total rainfall depths from NOAA Atlas 14 for the Lee’s Summit area as provided in the following table.

RAINFALL DATA	
STORM FREQUENCY	TOTAL RAINFALL DEPTH (IN)
90% (1 Year)	1.37
50% (2 Year)	3.71
10% (10 Year)	5.67
1% (100 Year)	9.24

EXISTING CONDITIONS

The proposed Dental Depot office is located on Lot 11 of Gregory Estates, Lots 6 - 11, on the northeast corner of NE Rice Road and NE Mulberry Street. The property consists of 1.32 acres of grass covered undeveloped land. The property is bound on the north by an existing commercial development, Savanna Square, 1st Plat, on the west by NE Rice Road, on the south by NE Mulberry St and to the east by single family residential Mulberry East Subdivision. Missouri Highway 291 is west of NE Rice Rd and floodplain owned by the city of Lee’s Summit lies south of NE Mulberry St.

The majority of this property is located in Zone X, area of minimal flood hazard, but the Zone AE floodplain encroaches on the southeast corner of the property as shown on the Existing Drainage Map and FEMA Flood Map 29095C0430G, dated January 20, 2017.

The site slopes generally from north to south with 26 feet of elevation difference. A slight ridge line bisects the site causing a portion of the site to drain to NE Rice Road where the remainder flows to the low point in NE Mulberry St. The runoff to NE Rice Rd also reaches the low point in NE Mulberry St. Refer to the Existing Drainage Map in Appendix F. A small portion of the adjacent residential development, 0.29 ac, drains through this property. There are no existing storm drainage improvements within the property. The existing site runoff flow values are shown in the table below. The Point of Interest for this preliminary analysis is the curb inlet in NE Rice Road near the NW corner of the property. The drainage areas are shown in the existing drainage map in Appendix F. The FEMA Flood Map is shown in Appendix A.

The Jackson County Soil Survey on the USDA website shows the existing soils to primarily belong to hydrologic soil group “D”, as shown in Appendix B. The SCS method was used for runoff using type “D” soils with a “curve number” (CN) value of 80 for meadow. There were no existing impervious areas on site. The Time of Concentration, T_c, was calculated using NRCS TR-55 methods in line with APWA 5600. The existing CN for the property is 80 and the T_c is 0.127 hours. The CN Value and Time of Concentration used for existing conditions are shown in Appendix C.

Bentley’s PondPack software package was used to determine flows from the site. PondPack uses the NRSC – TR55 and curve number hydrograph methodology to analyze the site.

The PondPack results for the existing conditions can be seen in Appendix C.

Existing flows:

STORM EVENT	TOTAL EXISTING SITE RUNOFF (CFS)	OFFSITE RUNOFF THROUGH SITE (CFS)
90% (1 Year)	0.36	0.08
50% (2 Year)	3.49	0.77
10% (10 Year)	6.74	1.48
1.0% (100 Year)	12.85	2.82

DEVELOPED CONDITIONS

The proposed Dental Depot consists of a 6,070 sf building with parking lot, drive and utilities. The development will add 31,676 sf (0.73 ac) of impervious area. The floodplain for the Tributary to Prairie Lee Lake encroaches on the southeast corner of the property. The development will not impact the floodplain area. No improvements or grading are planned for this area. An underground detention basin is proposed to control the runoff from the property. Due to the location of the floodplain the detention system will be designed to provide release rates prescribed in the Default Strategy, Comprehensive Protection for the 50%, 10% and 1% storm events. The detention will also provide a 40 hour extended detention for the 90% storm event. Refer to the Proposed Drainage Map in Appendix F for additional information.

The Dental Depot development is designed to collect the maximum amount of runoff from the site in an internal drainage system and direct it to the underground detention system on the west side of the property. A small portion along the street right-of-way will continue to drain to the streets. A portion of the adjacent residential property, 0.18 ac will drain onto the Dental Depot property and be collected in the storm system. The remaining 0.11 acres will flow along the east side of the property to the inlet in NE Mulberry St. The proposed Curve Number for the area reaching the detention system is 92 and the developed Tc is 0.09 hours. Refer to the proposed conditions calculations in Appendix D. The developed condition peak runoff rates are found in the Proposed Runoff Table on the following page.

The Jackson County Soil Survey on the USDA website shows the existing soils to primarily belong to hydrologic soil group “D”, as shown in Appendix B. The SCS method was used for runoff using type “D” soils with a CN value of 80 for meadow, and a CN value of 98 for all impervious surfaces including pavement, and building roofs. The Tc for each drainage area was calculated using TR-55 methods as outlined in APWA Section 5600. The CN Values and Times of Concentration used for developed conditions are shown in Appendix D.

The PondPack results for the developed conditions can be found in Appendix D.

Proposed Areas:

Drainage area to detention: 44,075 sf / 1.01 ac CN 92
 Drainage area from residential: 7,798 sf / 0.18 ac CN 80
 Drainage area to R/W: 12,492 sf / 0.29 ac CN 85

Proposed Runoff:

STORM EVENT	TOTAL PROPOSED RUNOFF (CFS)
90% (1 Year)	1.17
50% (2 Year)	5.48
10% (10 Year)	9.21
1% (100 Year)	15.95

DETENTION DESIGN

The Dental Depot development is designed to collect the maximum amount of runoff in the proposed drainage system and direct it to the underground detention system. The area south and west of the retaining walls will drain to the street and be intercepted by the curb inlet at the low point in NE Mulberry Street. The area from the residential development to the east which drains through the Dental Depot property collected in the drainage system will make up for most of the area draining off undetained. The detention system will consist of 4,200 sf of detention cell system. The detention system outlet will connect to the existing inlet in NE Rice Rd. in order to avoid any impact on the floodplain. Detention will be provided by an underground arched cell system designed with 30% void space in the backfill aggregate per the City supplement. The detention outlet structure will contain 3 orifice outlets at different elevations to provide the reduced release rates and the extended release for the 90% storm event. A 2” outlet at the bottom of the detention system and two 6” orifice outlets 1 ft and 2 ft above the basin flowline. An overflow weir will be provided in the outlet structure in case of clogging. The maximum elevation of the detention system will be 943.50. The maximum storage volume for the 1% storm will be 17,338 cu ft at elevation 942.12. Additional detention information is in the table below.

For PondPack input/output regarding the proposed detention and outlet structure, see Appendix E. The results for the proposed pond can be seen below.

Detention Release Rates:

STORM EVENT	REQUIRED DETENTION RELEASE RATE (CFS)	PROPOSED DETENTION MAX RELEASE RATE (CFS)
90% (1 Year)	40 hr release	0.04
50% (2 Year)	0.66	0.48
10% (10 Year)	2.64	0.76
1% (100 Year)	3.96	2.81

Preliminary Detention Flows:

STORM EVENT	EXISTING RUNOFF (CFS)	TOTAL DEVELOPED FLOW INTO POND (CFS)	REQUIRED MAX RELEASE RATE (CFS)	MAX DETENTION RELEASE RATE (CFS)	VOLUME DETAINED (CU-FT)	PEAK STAGE ELEVATION (FT)
90% (1 Year)	0.36	1.17	40 hr release	0.04	1,421	938.34
50% (2 Year)	3.49	5.48	0.66	0.48	6,122	939.45
10% (10 Year)	6.74	9.21	2.64	0.76	10,687	940.54
1% (100 Year)	12.85	15.95	3.96	2.81	17,338	942.12

- Top of pond elevation at 943.50

RECOMMENDATIONS AND CONCLUSIONS

Due to the increase in impervious area as a result of the Dental Depot development and the project’s proximity to the floodplain for the Tributary to Prairie Lee Lake, stormwater detention with 40 hour extended detention for the 90% storm event will be provided. The storm drainage system and detention design will conform to the City of Lee’s Summit drainage criteria. The final design for the Dental Depot development will incorporate a storm drainage system, stormwater BMP and stormwater detention system that conforms to the Lee’s Summit Section 5600 Default Strategy, Comprehensive Protection, APWA Section 5600 and the recommendations of the Pre-Application meeting. The detention system will provide control for the 90%, 50%, 10% and 1% storm events with release rates meeting the requirements of the Default Strategy and the 90% storm event will be detained and released over a span 40 hours or greater.

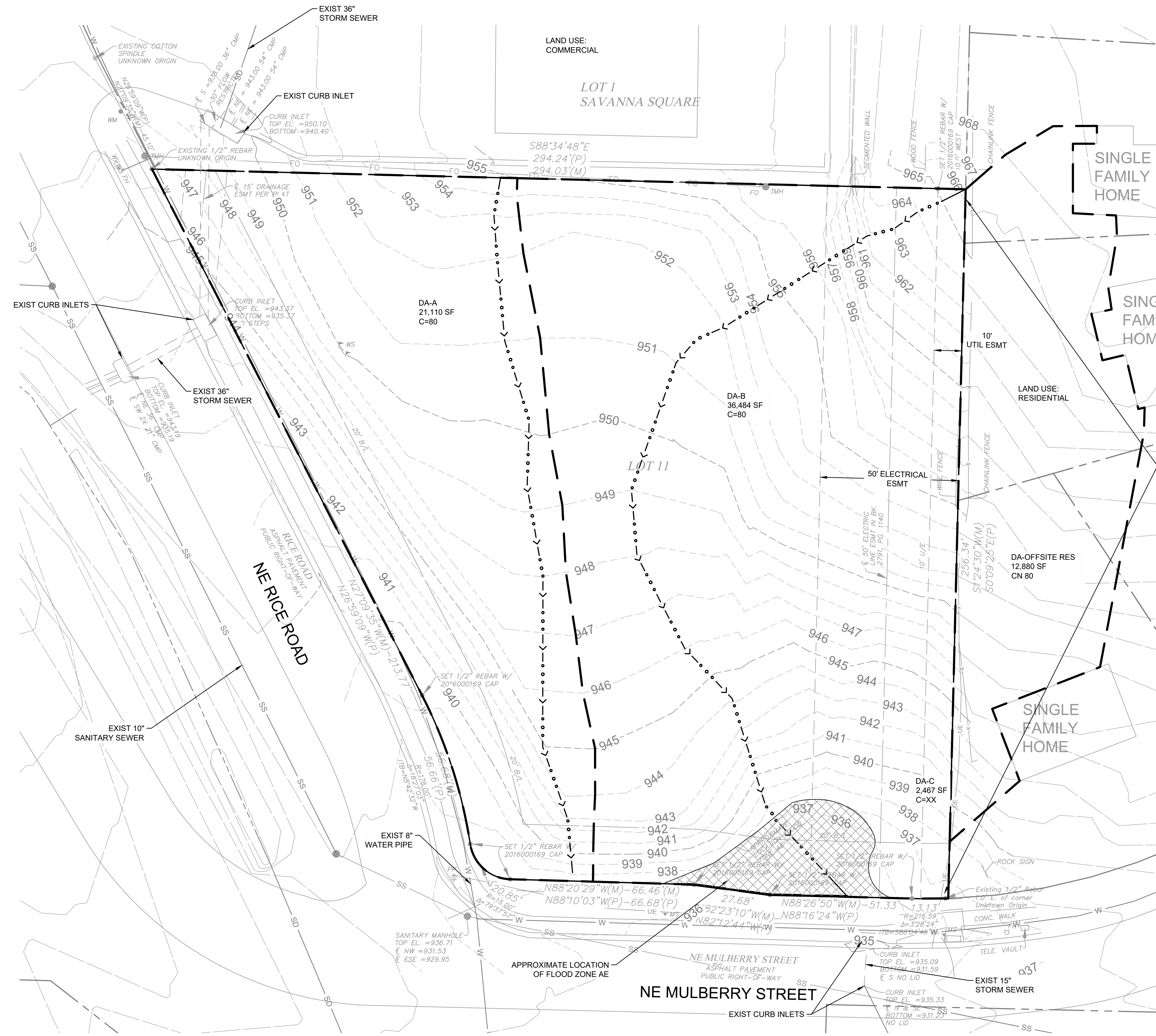
The Dental Depot development will not have an adverse impact on the downstream storm drainage system or floodplain. Additional information and data can be found in the attached Appendices.



wallace design collective, pc
 structural • civil • landscape • survey
 1703 wyandotte street, suite 200
 kansas city, missouri 64108
 816.421.8282 • 800.364.5868
 MISSOURI CA #001266 EXP 12/31/23

DATE	DESCRIPTION

STAMP:



- SITE DRAINAGE NOTES:
1. PROPERTY IS CURRENTLY VACANT. PROPOSED USE IS DENTAL OFFICE.
 2. THIS LOT IS LOCATED WITH IN ZONE X (AREA OF MINIMAL FLOOD), AND ZONE AE (0.2% ANNUAL FLOOD CHANCE) HAZARD PER FEMA FLOOD MAP 29095C0438G, DATED 1/20/2017. A FLOOD PLAIN FOR THE EAST FORK OF THE LITTLE BLUED RIVER IS LOCATED APPROXIMATELY 1300 FT DOWNSTREAM OF THIS PROPERTY.

LEGEND	
	EX MINOR CONTOUR
	EX MAJOR CONTOUR
	PRELIM DRAINAGE AREA
	PRELIM FLOW LINE
	ON-SITE ZONE AE PER FEMA FLOOD PLAIN 29095C0438G, DATED 1/20/2017

FITZGERALD ASSOCIATES
 architects & design consultants
 (405) 821-8999
 3800 N. NORTH FOR AVENUE
 OKLAHOMA CITY, OKLAHOMA 73118

COPYRIGHT © 2023
 FITZGERALD ASSOCIATES ARCHITECTS
 ALL RIGHTS RESERVED

• DENTAL DEPOT •
 LEE'S SUMMIT, MO

OWNER:
 ASHMORE INVESTMENTS, LLC
 3104 NW 23RD STREET
 OKLAHOMA CITY, OK 73107

LOCATION:
 1501 RICE ROAD
 LEE'S SUMMIT, MO 64086

JOB NUMBER:
2350014

DRAWN BY:
 TTL

CHECKED BY:
 JAL

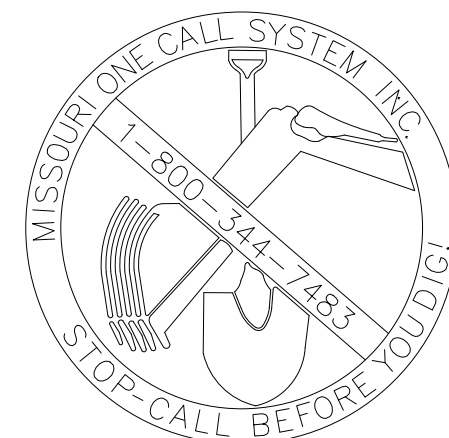
SHEET TITLE:
EXIST DRAINAGE PLAN

DATE:
2023.03.24

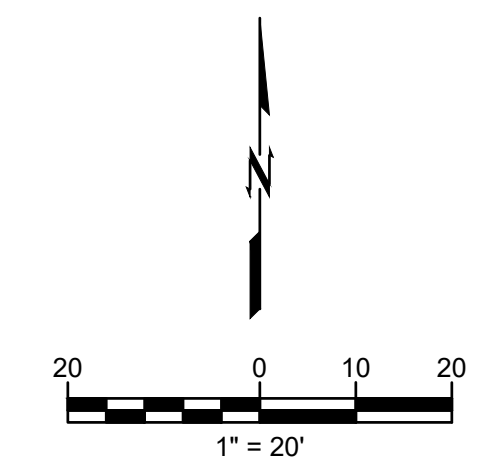
SHEET NUMBER:

PDP101

\\ke-cad-server\Civil\Projects\2350014\Production\2350014_Dental Depot - Lee's Summit.dwg
 PLOT: 3/24/2023 3:22:52 PM
 ORIG SIZE: 24"x36"

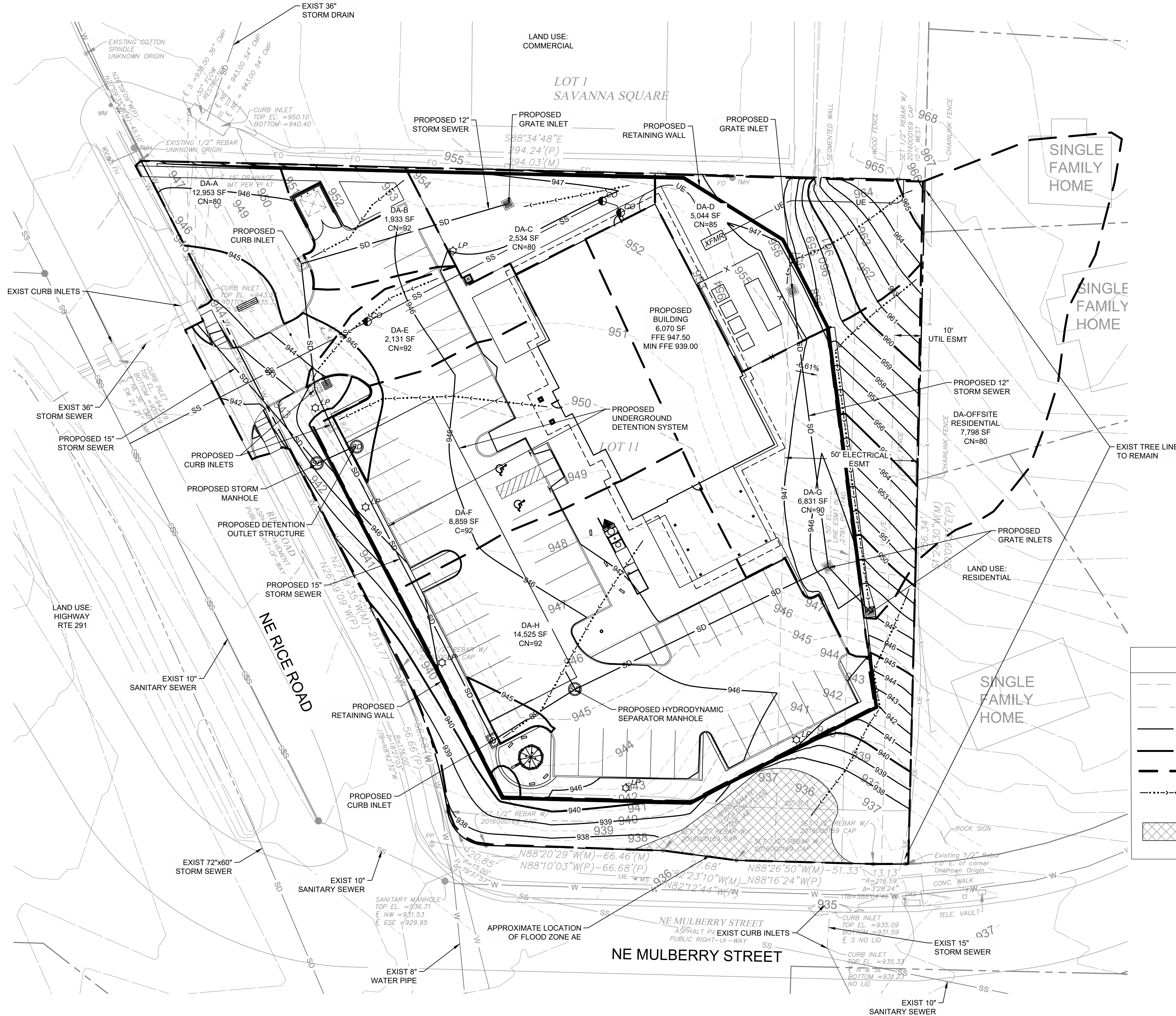


CAUTION
 NOTICE TO CONTRACTOR
 THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 2 WORKING DAYS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES



DATE	DESCRIPTION

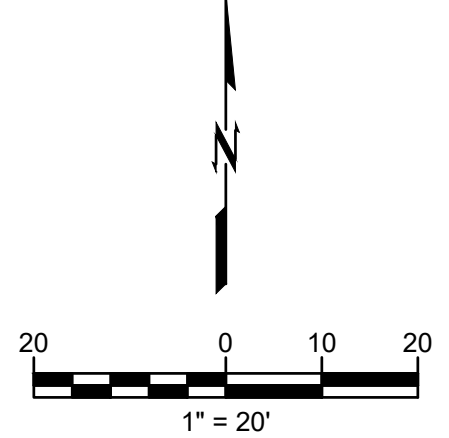
STAMP:



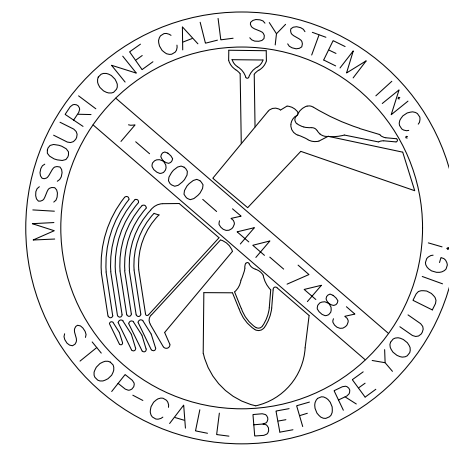
LEGEND

- - - 941 - - - EX MINOR CONTOUR
- - - 940 - - - EX MAJOR CONTOUR
- 941 — PROP MINOR CONTOUR
- 940 — PROP MAJOR CONTOUR
- PROP DRAINAGE AREA
- PROP FLOW PATH
- [Hatched Box] ON-SITE ZONE AE PER FEMA FLOOD PLAN 29095C0438G, DATED 1/20/2017

- SITE DRAINAGE NOTES:**
- PROPERTY IS CURRENTLY VACANT. PROPOSED USE IS DENTAL OFFICE.
 - THIS LOT IS LOCATED WITH IN ZONE X (AREA OF MINIMAL FLOOD), AND ZONE AE (0.2% ANNUAL FLOOD CHANCE) HAZARD PER FEMA FLOOD MAP 29095C0438G, DATED 1/20/2017. A FLOOD PLAN FOR THE EAST FORK OF THE LITTLE BLUED RIVER IS LOCATED APPROXIMATELY 1300 FT DOWNSTREAM OF THIS PROPERTY.



CAUTION
NOTICE TO CONTRACTOR
THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 2 WORKING DAYS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES



FITZGERALD ASSOCIATES
architects & design consultants
(405) 521-9999
3800 N. Meeks, 6th Avenue
Oklahoma City, Oklahoma 73118

COPYRIGHT © 2023
FITZGERALD ASSOCIATES ARCHITECTS
ALL RIGHTS RESERVED

•DENTAL DEPOT•
LEE'S SUMMIT, MO

OWNER: ASHMORE INVESTMENTS, LLC
3104 NW 23RD STREET
OKLAHOMA CITY, OK 73107

LOCATION:
1501 RICE ROAD
LEE'S SUMMIT, MO 64086

JOB NUMBER:
2350014

DRAWN BY: TTL
CHECKED BY: JAL

SHEET TITLE:

PROPOSED DRAINAGE PLAN

DATE:
2023.03.24

SHEET NUMBER:

PDP102

ORIG SIZE: 24"x36"
 PLOT: 3/24/2023 3:22:58 PM
 \\ke-cad-server\Civil\Projects\2350014 Dental Depot - Lee's Summit\Draw\PRODUCTION\2350014 Drainage Plans.dwg