STORM DRAINAGE CALCULATIONS

Whataburger

1450 NE Douglas St.

Lee's Summit, MO 64086

BY

ms consultants, inc.
COLUMBUS, OHIO

December 2020

STORMWATER DRAINAGE SUMMARY

Whataburger

Lee's Summit, MO

CONTEXT

The subject parcel is located in Lee's Summit, Missouri on the west side of NE Douglas St. just south of NE Mulberry St. The subject parcel is 1.39 acres and is currently an undeveloped lot. The site will be developed into a Whataburger restaurant. The proposed development will utilize an ADS Stormtech underground chamber system and outlet control structure for the site stormwater management and discharge into the existing storm structure at the northeast corner of the site following existing drainage patterns.

TIME OF CONCENTRATION (Tc)

A minimum time of concentration of 5 minutes was used for both the existing and proposed time of concentration due to the minimal size of the lot and short travel time.

WEIGHTED CURVE NUMBER

The curve number for pre-development onsite conditions was determined to be 74.00 based on 1.39 acres of pasture, grassland, or range" in good condition per TR-55 method outlined in the APWA Design Criteria.

A weighted curve number was calculated for the proposed site conditions. A value of 98 was used for the impervious areas, which total 1.04 acres of the drainage area and a value of 74 was used for the areas with good grass cover which total 0.35 acres of the total drainage area. The watershed area drains via storm sewers into the proposed underground detention system and has a post development composite curve number of 92. The calculations for pre- and post-development runoff-coefficients are included in Appendix A.

RAINFALL INTENSITY

The rainfall depths and intensities were obtained from the NOAA rainfall atlas website. Rainfall intensities can be found in Appendix A.

DETENTION REQUIREMENTS

The development was designed to convey the peak discharge generated by the 1% storm per the Kansas City Metropolitan Chapter APWA Section 5600. Discharge from the developed site has been analyzed and released at a rate less than existing conditions when evaluating the runoff for the 2, 10, 50, and 100 year storm events.

The required detention volume generated by the overall development is contained in the proposed underground detention system. Calculations supporting the storm release and pond design can be found in Appendix B.

UGS

Storm Event	Pre-Dev Flow (CFS)	Allowable Release Rate (CFS)	Post Dev Rate (CFS)	Pond Discharge (CFS)	Pond Surface Elevation
2-year	2.89	2.89	5.82	1.31	1009.71
10-year	6.09	6.09	9.50	5.48	1010.74
50-year	10.54	10.54	13.98	8.76	1012.12
100-year	12.70	12.70	16.08	10.47	1012.78

STORM SEWER DESIGN

The site consists of a proposed onsite stormwater pipe network that drains to an underground detention system, an outlet control structure, and a discharge pipe which outfalls to the existing storm system at the northeast corner of the parcel. The on-site storm sewer system has been designed using the rational method to convey the 25 year storm and checked to ensure that there will be no surcharging during a 25 year storm event. Catchment areas and drainage map can be found in Appendix C and storm sewer conveyance calculations are included in Appendix D.

OUTLET CONTROL STRUCTURE

The water quality volume is controlled within the outlet control structure by a 1.1" circular orifice at elevation 1006.75. The 2 yr. - 100 yr. storm is controlled within the outlet control structure by two 10" orifices at elevation 1009.25 and a 5' wide weir wall set within the structure at elevation 1011.90. The top of structure is elevation 1014.50 with the 100 yr. pond elevation at 1012.78. The outlet control structure can be found in the site civil plans in Appendix F.

WATER QUALITY

On-site water quality requirements are being met through the use of the proposed isolator row in the UGS system and additional water quality storage volume within the underground storage systems and released through the outlet control structure. The water quality orifice on the outlet control structure has been designed to release the water quality volume over a period of 48 hours for the detention storage. The MARC/APWA BMP Manual requires a water quality volume based on the equation WQv = Rv x P x A / 12. The proposed site has provide 0.11 acre-feet of water quality volume. The calculations are included in Appendix E.

SUMMARY

As indicated above and shown within the attachments, stormwater calculations have been performed using PondPack and spreadsheets to meet the City of Lee's Summit, Missouri Design Criteria including using 30% voids for the UGS instead of the industry standard of 40% and do not exceed the predevelopment runoff rate after construction.

APPENDIX A

CURVE NUMBER VALUES, & RAINFALL DATA

PondPack Pond Routing Input (UGS)

PROJECT: Whataburger
Drainage Area: 1.39 acres

Existing Conditions: Analysis Boundary

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN
Open Space - Meadow	C	60,461	1.39	74
Woods - Good Condition	-	0	0.00	77
Gravel	-	0	0.00	91
Impervious	-	0	0.00	98
TOTAL:		60,461	1.39	74

Developed Conditions: Analysis Boundary

Cover Type/Condition	Soil Type	Area (sf)	Area (ac)	CN
Open Space - Good Condition	C	15,307	0.35	74
Woods	-	0	0.00	77
Gravel	-	0	0.00	91
Impervious Area	C	45,145	1.04	98
TOTAL		60,452	1.39	92

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Location name: Lees Summit, Missouri, USA*
Latitude: 38.9425°, Longitude: -94.3752°
Elevation: 999.68 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.414 (0.330-0.516)	0.483 (0.384-0.602)	0.597 (0.474-0.746)	0.694 (0.548-0.870)	0.831 (0.636-1.07)	0.939 (0.703-1.23)	1.05 (0.761-1.40)	1.16 (0.812-1.59)	1.32 (0.887-1.85)	1.44 (0.944-2.04)
10-min	0.607 (0.483-0.756)	0.707 (0.563-0.881)	0.874 (0.694-1.09)	1.02 (0.802-1.27)	1.22 (0.932-1.57)	1.38 (1.03-1.80)	1.54 (1.12-2.05)	1.70 (1.19-2.33)	1.93 (1.30-2.71)	2.10 (1.38-2.99)
15-min	0.740 (0.589-0.921)	0.862 (0.686-1.07)	1.07 (0.846-1.33)	1.24 (0.978-1.55)	1.48 (1.14-1.92)	1.68 (1.26-2.19)	1.87 (1.36-2.50)	2.08 (1.45-2.84)	2.35 (1.59-3.30)	2.57 (1.69-3.65)
30-min	1.02 (0.817-1.28)	1.20 (0.956-1.50)	1.49 (1.18-1.87)	1.74 (1.37-2.18)	2.09 (1.60-2.69)	2.36 (1.77-3.08)	2.63 (1.91-3.52)	2.92 (2.04-3.99)	3.30 (2.22-4.63)	3.60 (2.36-5.11)
60-min	1.34 (1.07-1.67)	1.57 (1.25-1.96)	1.96 (1.56-2.45)	2.29 (1.81-2.88)	2.77 (2.12-3.58)	3.14 (2.35-4.11)	3.52 (2.56-4.71)	3.92 (2.74-5.37)	4.46 (3.01-6.26)	4.89 (3.21-6.94)
2-hr	1.65 (1.33-2.05)	1.94 (1.56-2.40)	2.43 (1.94-3.01)	2.85 (2.26-3.55)	3.44 (2.66-4.43)	3.92 (2.96-5.10)	4.41 (3.23-5.87)	4.93 (3.47-6.71)	5.63 (3.82-7.85)	6.17 (4.08-8.71)
3-hr	1.87 (1.50-2.30)	2.20 (1.77-2.71)	2.76 (2.21-3.41)	3.24 (2.58-4.02)	3.94 (3.06-5.06)	4.51 (3.42-5.85)	5.09 (3.74-6.75)	5.71 (4.04-7.75)	6.56 (4.47-9.12)	7.22 (4.80-10.2)
6-hr	2.25 (1.82-2.75)	2.66 (2.15-3.26)	3.37 (2.72-4.14)	3.99 (3.20-4.92)	4.90 (3.83-6.26)	5.64 (4.30-7.28)	6.40 (4.74-8.45)	7.22 (5.14-9.75)	8.35 (5.74-11.6)	9.24 (6.18-12.9)
12-hr	2.65 (2.16-3.22)	3.17 (2.58-3.85)	4.05 (3.29-4.94)	4.83 (3.90-5.91)	5.97 (4.70-7.58)	6.90 (5.30-8.85)	7.87 (5.86-10.3)	8.90 (6.38-11.9)	10.3 (7.14-14.2)	11.5 (7.72-15.9)
24-hr	3.11 (2.54-3.75)	3.71 (3.04-4.48)	4.76 (3.88-5.76)	5.68 (4.61-6.90)	7.02 (5.56-8.86)	8.11 (6.28-10.3)	9.26 (6.94-12.1)	10.5 (7.56-14.0)	12.2 (8.47-16.6)	13.5 (9.16-18.6)
2-day	3.66 (3.01-4.38)	4.31 (3.55-5.16)	5.44 (4.46-6.53)	6.43 (5.25-7.76)	7.89 (6.29-9.88)	9.08 (7.07-11.5)	10.3 (7.80-13.4)	11.7 (8.48-15.4)	13.5 (9.48-18.3)	15.0 (10.2-20.5)
3-day	4.06 (3.36-4.85)	4.71 (3.89-5.62)	5.83 (4.80-6.97)	6.82 (5.59-8.19)	8.29 (6.64-10.3)	9.49 (7.43-12.0)	10.8 (8.16-13.9)	12.1 (8.85-16.0)	14.0 (9.88-19.0)	15.5 (10.7-21.2)
4-day	4.40 (3.65-5.23)	5.04 (4.17-5.99)	6.15 (5.08-7.33)	7.13 (5.86-8.54)	8.59 (6.90-10.7)	9.78 (7.68-12.3)	11.0 (8.41-14.2)	12.4 (9.09-16.3)	14.3 (10.1-19.3)	15.8 (10.9-21.5)
7-day	5.21 (4.34-6.15)	5.87 (4.89-6.95)	7.02 (5.83-8.32)	8.02 (6.63-9.55)	9.47 (7.63-11.7)	10.6 (8.39-13.3)	11.9 (9.07-15.1)	13.2 (9.69-17.2)	14.9 (10.6-20.0)	16.4 (11.3-22.1)
10-day	5.89 (4.93-6.94)	6.64 (5.55-7.82)	7.88 (6.56-9.30)	8.93 (7.41-10.6)	10.4 (8.41-12.7)	11.6 (9.17-14.4)	12.8 (9.83-16.2)	14.1 (10.4-18.3)	15.8 (11.3-21.0)	17.1 (11.9-23.1)
20-day	7.85 (6.61-9.18)	8.87 (7.46-10.4)	10.5 (8.81-12.3)	11.8 (9.87-13.9)	13.6 (11.0-16.4)	15.0 (11.9-18.3)	16.3 (12.5-20.4)	17.6 (13.0-22.6)	19.3 (13.8-25.4)	20.5 (14.4-27.5)
30-day	9.49 (8.02-11.0)	10.7 (9.06-12.5)	12.7 (10.7-14.8)	14.3 (11.9-16.7)	16.3 (13.2-19.5)	17.8 (14.1-21.6)	19.2 (14.8-23.9)	20.6 (15.3-26.3)	22.4 (16.0-29.2)	23.6 (16.6-31.5)
45-day	11.6 (9.82-13.4)	13.1 (11.1-15.2)	15.4 (13.0-17.9)	17.2 (14.5-20.1)	19.6 (15.9-23.3)	21.3 (16.9-25.7)	22.8 (17.6-28.2)	24.3 (18.1-30.7)	26.1 (18.8-33.9)	27.2 (19.2-36.2)
60-day	13.4 (11.4-15.5)	15.1 (12.8-17.4)	17.7 (15.0-20.5)	19.7 (16.6-22.9)	22.3 (18.1-26.3)	24.1 (19.2-28.9)	25.7 (19.9-31.6)	27.2 (20.3-34.3)	29.0 (20.9-37.5)	30.2 (21.4-40.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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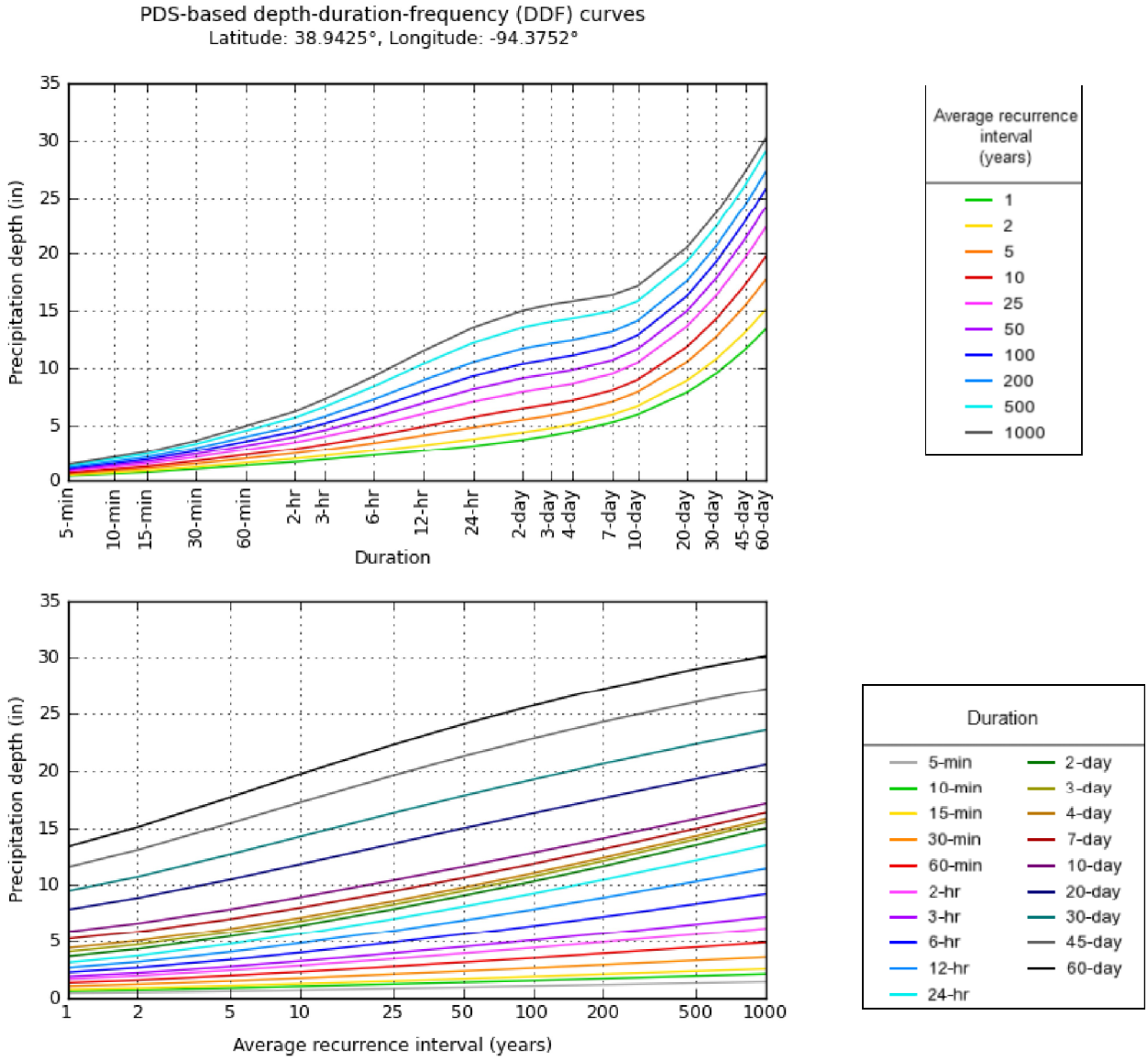

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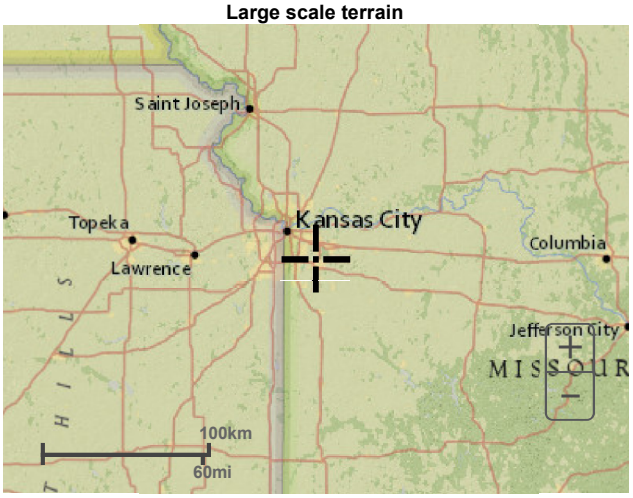

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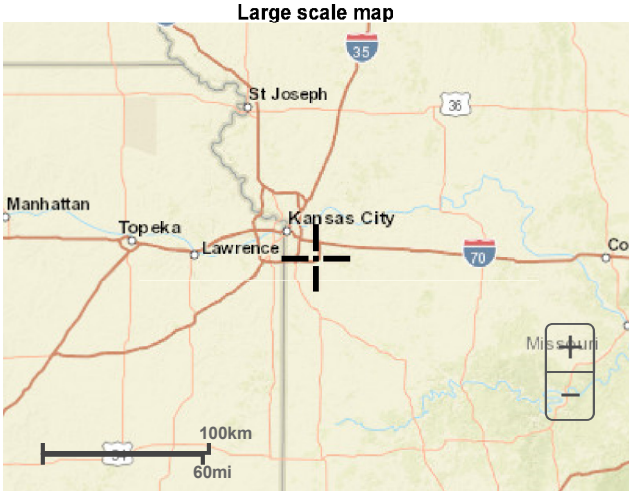

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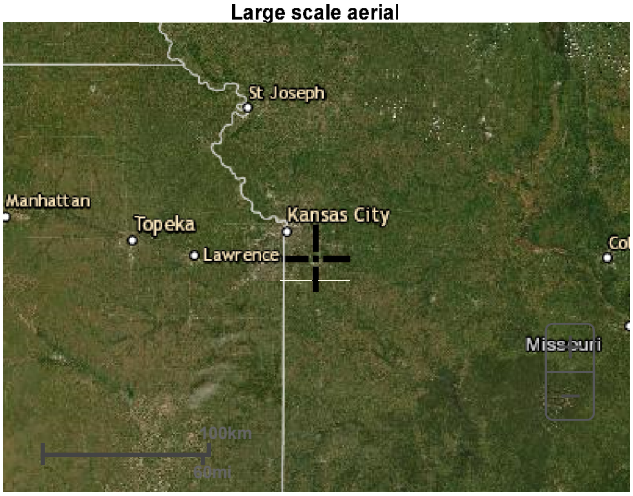

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Location name: Lees Summit, Missouri, USA*
Latitude: 38.9391°, Longitude: -94.3793°
Elevation: 1017.4 ft**
* source: ESRI Maps
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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.97 (4.00-6.13)	5.80 (4.66-7.15)	7.16 (5.74-8.86)	8.33 (6.62-10.3)	9.97 (7.69-12.8)	11.3 (8.50-14.6)	12.6 (9.19-16.7)	14.0 (9.79-18.9)	15.8 (10.7-22.0)	17.3 (11.4-24.3)
10-min	3.64 (2.93-4.49)	4.24 (3.41-5.23)	5.24 (4.20-6.49)	6.10 (4.85-7.57)	7.30 (5.63-9.34)	8.25 (6.22-10.7)	9.22 (6.73-12.2)	10.2 (7.17-13.9)	11.6 (7.83-16.1)	12.6 (8.32-17.8)
15-min	2.96 (2.38-3.65)	3.45 (2.77-4.26)	4.26 (3.41-5.28)	4.96 (3.95-6.16)	5.94 (4.58-7.60)	6.71 (5.06-8.69)	7.50 (5.47-9.92)	8.31 (5.83-11.3)	9.42 (6.36-13.1)	10.3 (6.77-14.5)
30-min	2.05 (1.65-2.53)	2.40 (1.93-2.96)	2.99 (2.39-3.69)	3.48 (2.77-4.32)	4.17 (3.22-5.34)	4.71 (3.56-6.10)	5.27 (3.84-6.97)	5.84 (4.09-7.92)	6.61 (4.46-9.18)	7.20 (4.74-10.1)
60-min	1.34 (1.08-1.65)	1.57 (1.26-1.94)	1.96 (1.57-2.42)	2.29 (1.83-2.85)	2.76 (2.13-3.54)	3.14 (2.37-4.07)	3.52 (2.57-4.67)	3.92 (2.75-5.33)	4.47 (3.02-6.22)	4.89 (3.22-6.89)
2-hr	0.826 (0.668-1.01)	0.970 (0.784-1.19)	1.21 (0.977-1.49)	1.42 (1.14-1.76)	1.72 (1.34-2.19)	1.96 (1.49-2.53)	2.21 (1.62-2.91)	2.46 (1.74-3.33)	2.82 (1.92-3.90)	3.09 (2.05-4.33)
3-hr	0.622 (0.504-0.759)	0.731 (0.592-0.893)	0.917 (0.741-1.12)	1.08 (0.867-1.33)	1.31 (1.02-1.67)	1.50 (1.15-1.93)	1.70 (1.25-2.23)	1.90 (1.35-2.56)	2.19 (1.49-3.01)	2.41 (1.60-3.36)
6-hr	0.376 (0.306-0.455)	0.445 (0.362-0.539)	0.563 (0.457-0.684)	0.667 (0.539-0.814)	0.818 (0.643-1.04)	0.941 (0.723-1.20)	1.07 (0.795-1.40)	1.21 (0.862-1.62)	1.40 (0.961-1.91)	1.55 (1.03-2.14)
12-hr	0.220 (0.180-0.265)	0.263 (0.215-0.317)	0.336 (0.275-0.406)	0.401 (0.326-0.486)	0.496 (0.392-0.624)	0.572 (0.442-0.728)	0.653 (0.488-0.849)	0.738 (0.531-0.983)	0.857 (0.594-1.17)	0.951 (0.642-1.31)
24-hr	0.129 (0.107-0.155)	0.155 (0.127-0.185)	0.198 (0.163-0.238)	0.237 (0.193-0.285)	0.292 (0.233-0.366)	0.338 (0.263-0.427)	0.386 (0.290-0.498)	0.436 (0.316-0.577)	0.506 (0.353-0.686)	0.562 (0.382-0.768)
2-day	0.076 (0.063-0.090)	0.090 (0.074-0.107)	0.113 (0.093-0.135)	0.134 (0.110-0.160)	0.164 (0.131-0.204)	0.189 (0.148-0.237)	0.215 (0.163-0.275)	0.242 (0.177-0.318)	0.281 (0.198-0.378)	0.311 (0.213-0.423)
3-day	0.056 (0.047-0.067)	0.065 (0.054-0.077)	0.081 (0.067-0.096)	0.095 (0.078-0.113)	0.115 (0.092-0.142)	0.132 (0.103-0.165)	0.149 (0.114-0.191)	0.168 (0.123-0.220)	0.194 (0.137-0.260)	0.215 (0.148-0.291)
4-day	0.046 (0.038-0.054)	0.052 (0.044-0.062)	0.064 (0.053-0.076)	0.074 (0.061-0.088)	0.089 (0.072-0.110)	0.102 (0.080-0.127)	0.115 (0.088-0.146)	0.129 (0.095-0.168)	0.149 (0.105-0.199)	0.164 (0.113-0.222)
7-day	0.031 (0.026-0.036)	0.035 (0.029-0.041)	0.042 (0.035-0.049)	0.048 (0.040-0.056)	0.056 (0.046-0.069)	0.063 (0.050-0.078)	0.070 (0.054-0.089)	0.078 (0.058-0.101)	0.089 (0.063-0.118)	0.097 (0.067-0.130)
10-day	0.025 (0.021-0.029)	0.028 (0.023-0.032)	0.033 (0.027-0.038)	0.037 (0.031-0.044)	0.043 (0.035-0.053)	0.048 (0.038-0.059)	0.053 (0.041-0.067)	0.059 (0.043-0.075)	0.066 (0.047-0.087)	0.071 (0.050-0.095)
20-day	0.016 (0.014-0.019)	0.018 (0.016-0.021)	0.022 (0.018-0.025)	0.025 (0.021-0.029)	0.028 (0.023-0.034)	0.031 (0.025-0.038)	0.034 (0.026-0.042)	0.037 (0.027-0.047)	0.040 (0.029-0.052)	0.043 (0.030-0.057)
30-day	0.013 (0.011-0.015)	0.015 (0.013-0.017)	0.018 (0.015-0.020)	0.020 (0.017-0.023)	0.023 (0.018-0.027)	0.025 (0.020-0.030)	0.027 (0.021-0.033)	0.029 (0.021-0.036)	0.031 (0.022-0.040)	0.033 (0.023-0.043)
45-day	0.011 (0.009-0.012)	0.012 (0.010-0.014)	0.014 (0.012-0.016)	0.016 (0.013-0.018)	0.018 (0.015-0.021)	0.020 (0.016-0.024)	0.021 (0.016-0.026)	0.022 (0.017-0.028)	0.024 (0.017-0.031)	0.025 (0.018-0.033)
60-day	0.009 (0.008-0.011)	0.010 (0.009-0.012)	0.012 (0.010-0.014)	0.014 (0.012-0.016)	0.015 (0.013-0.018)	0.017 (0.013-0.020)	0.018 (0.014-0.022)	0.019 (0.014-0.024)	0.020 (0.015-0.026)	0.021 (0.015-0.028)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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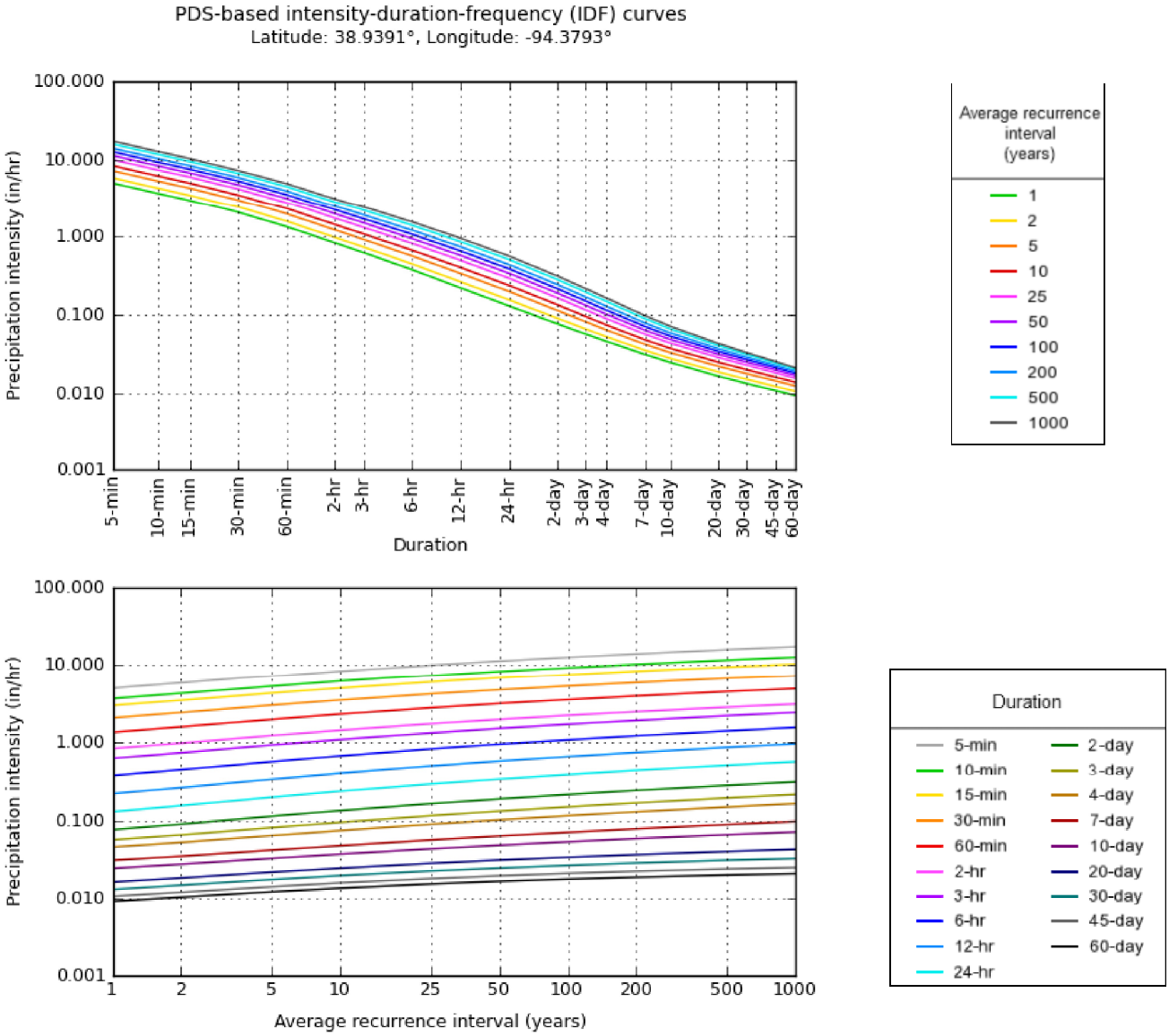

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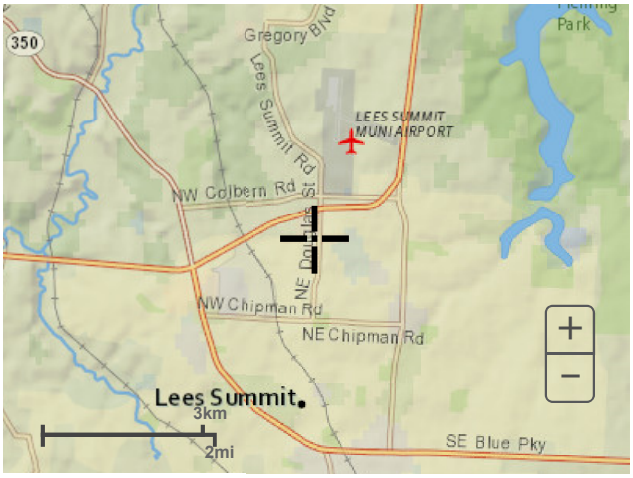
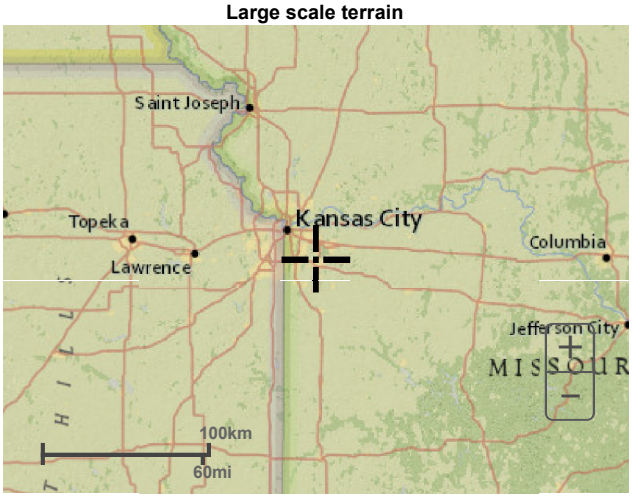
Maps & aerials

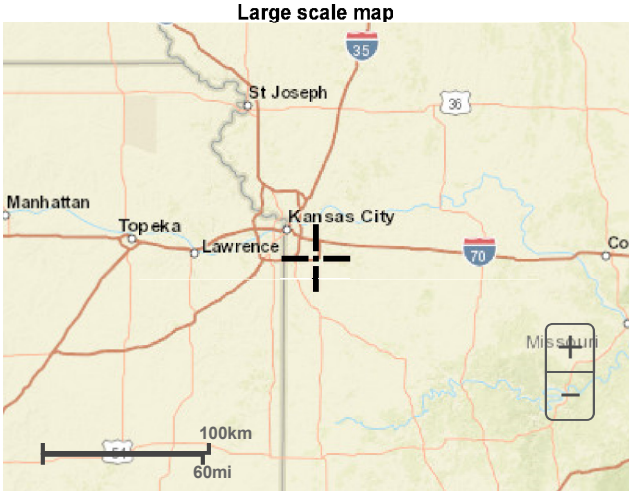
Small scale terrain



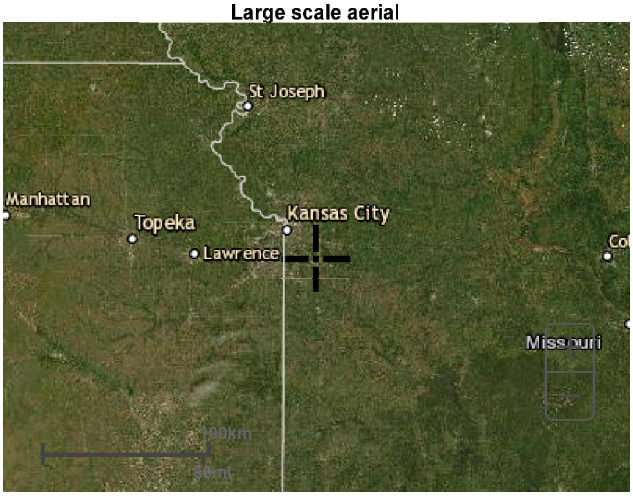
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Job Description: **Whataburger**
Job No: 62-40497
Computed By: JML
Date: 10/16/2020
Checked By:
Date:

POST CONSTRUCTION STORMWATER MANAGEMENT SUMMARY

Lee's Summit NOAA - 24-Hour Rainfall Totals						
Return Period (yr)	*2-yr*	*5-yr*	*10-yr*	*25-yr*	*50-yr*	*100-yr*
24-hr Depth (in)	3.70	X	5.70	X	8.10	9.30

Project Peak Runoff Volume Mitigation Summary			
	UGS		
Pre-Development			
Project Drainage Area (ac)	1.39		
Curve Number (CN)	74		
Impervious Area (ac)	0.00		
Post-Development			
Project Drainage Area (ac)	1.39		
Curve Number (CN)	92		
Impervious Area (ac)	1.04		
Increase in Impervious Area (ac)	1.04		

Project Peak Runoff Rate Mitigation Summary				
Pre-Development				
POI Drainage Area (ac)		1.39		
Curve Number (CN)		74		
Time of Concentration, T_c (min.)		5.00		
Post-Development				
POI Drainage Area (ac)		1.39		
Curve Number (CN) to Pond		92		
Time of Concentration, T_c,to Pond (mins)		5.00		
	Storm Frequency	**UGS**		
Pre-project Peak Runoff Rate to POI (cfs)	2-yr	2.89	2-yr Pre	
Post-project Peak Runoff Rate to POI (cfs) - No Control		5.82		
Required Peak Runoff Release Rate (cfs)		2.89		
Post-project Peak Runoff Rate to POI (cfs) - Outlet Structure		1.31		
Net Change to Peak Runoff Rate to POI (cfs)		-1.58		
Release Rate Percentage at POI		45%		
Pre-project Peak Runoff Rate to POI (cfs)	10-yr	6.09	10-yr Pre	
Post-project Peak Runoff Rate to POI (cfs) - No Control		9.50		
Required Peak Runoff Release Rate (cfs)		6.09		
Post-project Peak Runoff Rate to POI (cfs) - Outlet Structure		5.48		
Net Change to Peak Runoff Rate to POI (cfs)		-0.61		
Release Rate Percentage at POI		90%		
Pre-project Peak Runoff Rate to POI (cfs)	50-yr	10.54	50-yr Pre	
Post-project Peak Runoff Rate to POI (cfs) - No Control		13.98		
Required Peak Runoff Release Rate (cfs)		10.54		
Post-project Peak Runoff Rate to POI (cfs) - Outlet Structure		8.76		
Net Change to Peak Runoff Rate to POI (cfs)		-1.78		
Release Rate Percentage at POI		83%		
Pre-project Peak Runoff Rate to POI (cfs)	100-yr	12.70	100-yr Pre	
Post-project Peak Runoff Rate to POI (cfs) - No Control		16.08		
Required Peak Runoff Release Rate (cfs)		12.70		
Post-project Peak Runoff Rate to POI (cfs) - Outlet Structure		10.47		
Net Change to Peak Runoff Rate to POI (cfs)		-2.23		
Release Rate Percentage at POI		82%		

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APPENDIX B

POND DETENTION CALCULATIONS

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Wataburger Lees Summit

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
CM-1	Pre 2 yr	2	0.160	11.950	2.89
CM-1	Post 2 yr	2	0.328	11.900	5.82
CM-1	Pre 10 yr	10	0.337	11.900	6.09
CM-1	Post 10 yr	10	0.550	11.900	9.50
CM-1	Pre 50 yr	50	0.580	11.900	10.54
CM-1	Post 50 yr	50	0.827	11.900	13.98
CM-1	Pre 100 yr	100	0.701	11.900	12.70
CM-1	Post 100 yr	100	0.958	11.900	16.08

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
O-1	Pre 2 yr	2	0.160	11.950	2.89
O-1	Post 2 yr	2	0.184	12.100	1.31
O-1	Pre 10 yr	10	0.337	11.900	6.09
O-1	Post 10 yr	10	0.405	12.050	5.48
O-1	Pre 50 yr	50	0.580	11.900	10.54
O-1	Post 50 yr	50	0.681	12.050	8.76
O-1	Pre 100 yr	100	0.701	11.900	12.70
O-1	Post 100 yr	100	0.812	12.050	10.47

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
PO-1 (IN)	Post 2 yr	2	0.328	11.900	5.82	(N/A)	(N/A)
PO-1 (OUT)	Post 2 yr	2	0.184	12.100	1.31	1,009.71	0.175
PO-1 (IN)	Post 10 yr	10	0.550	11.900	9.50	(N/A)	(N/A)
PO-1 (OUT)	Post 10 yr	10	0.405	12.050	5.48	1,010.74	0.237
PO-1 (IN)	Post 50 yr	50	0.827	11.900	13.98	(N/A)	(N/A)
PO-1 (OUT)	Post 50 yr	50	0.681	12.050	8.76	1,012.12	0.304
PO-1 (IN)	Post 100 yr	100	0.958	11.900	16.08	(N/A)	(N/A)
PO-1 (OUT)	Post 100 yr	100	0.812	12.050	10.47	1,012.78	0.324

Storm Event	2 year
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	5.97 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.82 ft³/s

Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	0.328 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.328 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 2 years
Storm Event: 2 year

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2 year
Return Event	2 years
Duration	24.000 hours
Depth	3.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	2.98 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	2.89 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.4 in
Runoff Volume (Pervious)	0.160 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.160 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 2 years
Storm Event: 2 year

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	10 year
Return Event	10 years
Duration	24.000 hours
Depth	5.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	9.70 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	9.50 ft³/s

Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.8 in
Runoff Volume (Pervious)	0.550 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.550 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 10 years
Storm Event: 10 year

Storm Event	10 year
Return Event	10 years
Duration	24.000 hours
Depth	5.7 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	6.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	6.09 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.337 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.337 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 10 years
Storm Event: 10 year

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 50 years
Storm Event: 50 year

Storm Event	50 year
Return Event	50 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	14.24 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	13.98 ft³/s

Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	7.2 in
Runoff Volume (Pervious)	0.827 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.827 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 50 years
Storm Event: 50 year

Storm Event	50 year
Return Event	50 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	10.94 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	10.54 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.0 in
Runoff Volume (Pervious)	0.581 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.580 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 100 years
Storm Event: 100 year

Storm Event	100 year
Return Event	100 years
Duration	24.000 hours
Depth	9.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	16.37 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	16.08 ft³/s

Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.3 in
Runoff Volume (Pervious)	0.959 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.958 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Wataburger Lees Summit

Subsection: Unit Hydrograph Summary
Label: CM-1

Return Event: 100 years
Storm Event: 100 year

Storm Event	100 year
Return Event	100 years
Duration	24.000 hours
Depth	9.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	1.388 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	13.13 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	12.70 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	1.388 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.1 in
Runoff Volume (Pervious)	0.702 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.701 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670

SCS Unit Hydrograph Parameters	
Unit peak, qp	18.87 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,006.75 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,014.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	1,006.75	1,014.50
Orifice-Circular	Orifice - 2	Forward	Culvert - 1	1,009.25	1,014.50
Rectangular Weir	Weir - 1	Forward	Culvert - 1	1,011.90	1,014.50
Culvert-Circular	Culvert - 1	Forward	TW	1,005.75	1,014.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	1,006.75 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600

Structure ID: Orifice - 2 Structure Type: Orifice-Circular	
Number of Openings	2
Elevation	1,009.25 ft
Orifice Diameter	10.0 in
Orifice Coefficient	0.600

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	1,011.90 ft
Weir Length	5.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	12.0 in
Length	53.70 ft
Length (Computed Barrel)	53.74 ft
Slope (Computed)	0.040 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.031
Kr	0.200
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900

Inlet Control Data	
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.177
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	1,005.75 ft	T1 Flow	2.75 ft³/s
T2 Elevation	1,006.93 ft	T2 Flow	3.14 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Wataburger Lees Summit

Subsection: Level Pool Pond Routing Summary
Label: PO-1 (IN)

Return Event: 100 years
Storm Event: 100 year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,006.75 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	16.08 ft³/s	Time to Peak (Flow, In)	11.900 hours
Flow (Peak Outlet)	10.47 ft³/s	Time to Peak (Flow, Outlet)	12.050 hours

Elevation (Water Surface, Peak)	1,012.78 ft
Volume (Peak)	0.324 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.958 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.812 ac-ft
Volume (Retained)	0.146 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-1	0.328	11.900	5.82
Flow (In)	PO-1	0.328	11.900	5.82

Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-1	0.550	11.900	9.50
Flow (In)	PO-1	0.550	11.900	9.50

Wataburger Lees Summit

Subsection: Pond Inflow Summary
Label: PO-1 (IN)

Return Event: 50 years
Storm Event: 50 year

Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-1	0.827	11.900	13.98
Flow (In)	PO-1	0.827	11.900	13.98

Summary for Hydrograph Addition at 'PO-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	CM-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	CM-1	0.958	11.900	16.08
Flow (In)	PO-1	0.958	11.900	16.08

Wataburger Lees Summit

Index

C

CM-1 (Unit Hydrograph Summary, 10 years)...6, 7, 8, 9

CM-1 (Unit Hydrograph Summary, 100 years)...14, 15, 16, 17

CM-1 (Unit Hydrograph Summary, 2 years)...2, 3, 4, 5

CM-1 (Unit Hydrograph Summary, 50 years)...10, 11, 12, 13

Composite Outlet Structure - 1 (Outlet Input Data, 2 years)...18, 19, 20, 21

M

Master Network Summary...1

P

PO-1 (IN) (Level Pool Pond Routing Summary, 100 years)...22

PO-1 (IN) (Pond Inflow Summary, 10 years)...24

PO-1 (IN) (Pond Inflow Summary, 100 years)...26

PO-1 (IN) (Pond Inflow Summary, 2 years)...23

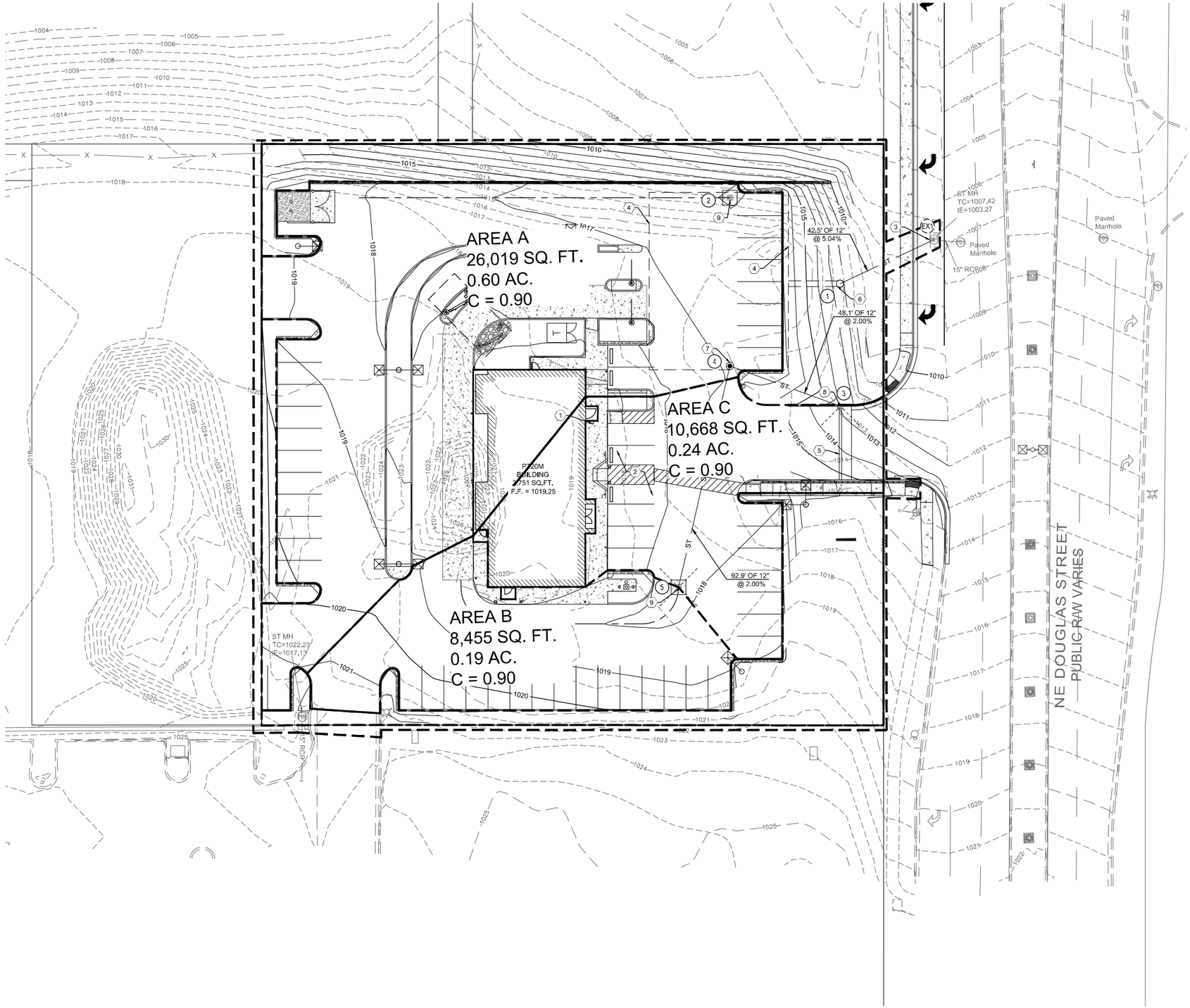
PO-1 (IN) (Pond Inflow Summary, 50 years)...25

APPENDIX C

CATCHMENT AREAS & DRAINAGE MAP

Catchment Areas
Project Name: WB Lees Summit
Project Number: 62-40497
Date: 10/16/2020

Catchment Areas			
	sq.ft.	Ac.	c
A			
Impervious	26,019	0.60	0.90
Gravel	0	0.00	0.50
Grass	0	0.00	0.30
Total	26,019	0.60	0.90
B			
Impervious	8,455	0.19	0.90
Gravel	0	0.00	0.50
Grass	0	0.00	0.30
Total	8,455	0.19	0.90
C			
Impervious	10,668	0.24	0.90
Gravel	0	0.00	0.50
Grass	0	0.00	0.30
Total	10,668	0.24	0.90



N:\03\62\40497\01-Lees Summit, MO\Docs\Calcs\Civil\Storm\Catchment Areas.dwg, 12/16/2020 4:26 PM, lee. jesse

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE

CATCHMENT AREA PLAN

MISSOURI ONE CALL SYSTEM

The Missouri One Call System is a communications system which was established to help prevent damage to underground facilities and to promote safety. Missouri One Call operators are on duty 24 hours a day, seven days a week.

Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

CA

APPENDIX D

STORM CONVEYANCE
CALCULATIONS

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	92.9	0.19	0.19	0.90	0.17	0.17	5.0	5.0	9.9	1.69	5.46	4.06	12	2.00	1010.00	1011.86	1010.50	1012.41	1016.85	1017.70	5 to 4

WB Lees Area B | Number of lines: 1 | Run Date: 12/16/2020

NOTES:Intensity = 37.95 / (Inlet time + 3.40) ^ 0.63; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	48.0	0.24	0.24	0.90	0.22	0.22	5.0	5.0	9.9	2.14	5.46	4.15	12	2.00	1010.00	1010.96	1010.63	1011.59	1016.85	1013.00	

WB Lees Area C

Number of lines: 1

Run Date: 12/16/2020

NOTES:Intensity = 37.95 / (Inlet time + 3.40) ^ 0.63; Return period =Yrs. 25 ; c = cir e = ellip b = box

APPENDIX E

WATER QUALITY CALCULATION

WATER QUALITY VOLUME CALCULATIONS- Drainage Area into Pond

Project Name: **WB Lees Summit**

Project Number: **62-40497**

Date: **10/16/2020**

UGS 1

WQ_v = Rv * P * A / 12

Post Construction				
Total Area	60,452	SF	1.39	acres
Impervious Area	45,145	SF	1.04	acres
Gravel Area	0.0	SF	0.00	acres
i =	0.75			

Rv = 0.05 + 0.9i

Rv= 0.72 Volumetric Runoff Coefficient

P = 0.90 inch precipitation depth

A = Area draining into the BMP in acres

P =	1.37			
A =	1.39			
WQ_v =	0.11	ac-feet	4,983.73	ft^3

WATER QUALITY VOLUME CALCULATIONS- Drainage Area into Pond

Project Name: WB Lees Summit
Project Number: 62-40497
Date: 10/16/2020

UGS

VOLUMETRIC STAGE STORAGE

STAGE	TOT VOL (ft^3)	TOT VOL (ac-ft)
1006.75	0.00	0.000
1007.00	310.00	0.007
1008.00	2,497.00	0.057
1009.00	5,544.00	0.127
1010.00	8,412.00	0.193
1011.00	9,746.00	0.224
1013.50	15,024.00	0.345

WQv = 4,983.73 cf **WQelev =** 1008.91

WQv- Orifice #1:

PIPE DIA.	1.2	in	0.100	ft			
total PIPE A	1.131	in^2	0.008	ft^2			
C	0.6						
INV.	1006.75						
STAGE	**Q1 (CFS)**	**Q2 (CFS)**	**Q (CFS)**	**Q AVG (CFS)**	**INC VOL (CFT)**	**INC DRAW (HR)**	**TOT DRAW (HR)**
1006.75	0.000	0	0				
				0.03	5165	52.2	
1008.91	0.055	0.000	0.05				52.2

APPENDIX F

COMPLETE SITE CIVIL PLANS

WHATABURGER

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO 64086
JACKSON COUNTY

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		CONSTRUCTION LIMITS
		PROPERTY LINE
R/W		RIGHT-OF-WAY LINE
		EASEMENT
X		FENCE
		LIGHT POLE
		UTILITY POLE
		POLE GUY
OE		OVERHEAD ELECTRIC LINE
UE	UE	UNDERGROUND ELECTRIC LINE
FO	FO	UNDERGROUND FIBER-OPTIC LINE
G		GAS LINE
W	W	WATER LINE
		FIRE HYDRANTS
SAN	SAN	SANITARY LINE
		SANITARY STRUCTURE
ST	ST	STORM LINE
		STORM STRUCTURE
1015	1015	CONTOUR
1019.00 EX. 1018.50 EX.	1019.00 1018.50	TOP OF CURB TOP OF PAVEMENT
1019.00 EX.	1019.00	FINISHED GRADE SPOT ELEVATION
	1.00%	GRADE SLOPE
		MAJOR FLOOD ROUTING
	HP HP	HIGH POINT
		SEEDING/LANDSCAPE AREA
		CONCRETE
		STRUCTURAL CONCRETE

VICINITY MAP
N.T.S.

SHEET INDEX

COVER SHEET	C-1
SURVEY	C-2
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SITE DIMENSION PLAN	C-4
CONCRETE JOINTING PLAN	C-5
SITE GRADING PLAN	C-6
SITE UTILITY PLAN	C-7
FIRE PROTECTION PLAN	C-8
SITE DETAILS	C-9
SITE DETAILS	C-10
SITE DETAILS	C-11
DETENTION SYSTEM DETAILS	C-12
DETENTION SYSTEM DETAILS	C-13
STORMWATER POLLUTION PREVENTION PLAN	C-14
SWPPP NOTES & DETAILS	C-15
SWPPP NOTES & DETAILS	C-16
LANDSCAPE PLAN	C-17
IRRIGATION PLAN	C-18
PHOTOMETRIC PLAN	C-19

OWNER
WHATABURGER
300 CONCORD PLAZA DR.
SAN ANTONIO, TX 78216
PHONE: (210) 476-6000
CONTACT: CLINT SAAVEDRA
EMAIL: csaavedra@wbhq.com

ENGINEER
ms consultants, inc.
2221 SCHROCK ROAD
COLUMBUS, OHIO 43229
PHONE: (614) 898-7100
CONTACT: KAILEN AKERS
EMAIL: kakers@msconsultants.com

SURVEYOR
YOUNG - HOBBS AND ASSOCIATES
1202 CROSSLAND AVE.
CLARKSVILLE, TN 37040
PHONE: (931) 645-2524
CONTACT: DAVE R. HOBBS

GEOTECHNICAL ENGINEER
TERRACON CONSULTANTS, INC.
15620 W. 113th STREET
LENEXA, KANSAS 66219
PHONE: (913) 492-7777
CONTACT: KOLE C. BERG, P.E.

BENCHMARK
TBM:

5/8" IRON PIN SET
ELEVATION = 1014.41

BASIS OF BEARINGS:
MO (W) STATE PLANE COORDINATE SYSTEM SPC
(2403 MO W)

FLOOD INFORMATION
THIS PROPERTY IS LOCATED WITHIN AN AREA HAVING ZONE DESIGNATIONS OF "X" BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, ON FLOOD INSURANCE RATE MAP NO. 29095C0409G, WITH A MAP REVISED DATE OF JANUARY 20, 2017, IN JACKSON COUNTY, STATE OF MISSOURI, WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PROPERTY IS SITUATED.

MISSOURI ONE CALL SYSTEM

The Missouri One Call System is a communications system which was established to help prevent damage to underground facilities and to promote safety. Missouri One Call operators are on duty 24 hours a day, seven days a week.

Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE

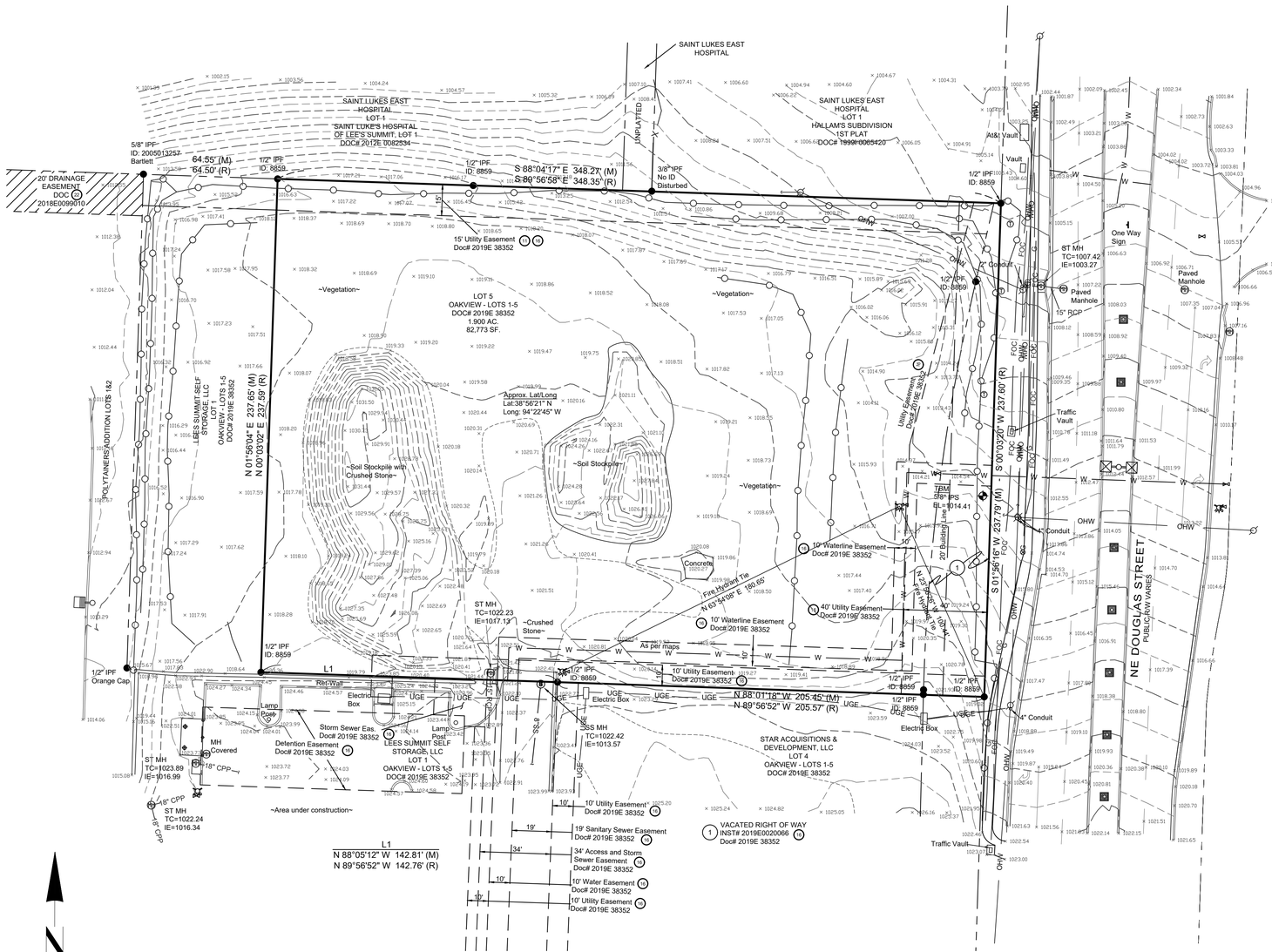
COVER SHEET

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-1

811 Know what's **below.** **Call** before you dig.



BASIS OF BEARINGS
MO (W) STATE PLANE COORDINATE SYSTEM
SPC (2403 MO W)

0 30 60 90
SCALE 1"=30'

SITE ADDRESS

1450 NE DOUGLAS ST
LEES SUMMIT, MO

PARKING COUNT

REGULAR SPACES:	0
HANDICAP SPACES:	0
TOTAL SPACES:	0

LEGEND

- IRON PIN SET (IPS)
- IRON PIN FOUND, AS NOTED
- BENCHMARK, AS NOTED
- BOLLARD
- SIGN, AS NOTED
- SEWER MANHOLE
- FIRE HYDRANT
- WATER VALVE
- UTILITY POLE
- GUY WIRE
- ELECTRIC METER
- GAS VALVE
- TELEPHONE BOX
- GATE POST
- GRATE INLET
- STORM MANHOLE
- LANDSCAPE GRATE
- PROPERTY LINE
- EASEMENT LINE
- SETBACK LINES
- OHW — OVERHEAD WIRE
- UGE — UNDERGROUND ELECTRIC
- X — FENCE LINE
- SILT FENCE LINE
- W — WATER LINE, AS NOTED
- SS — SANITARY SEWER, AS NOTED
- G — GAS LINE, AS NOTED
- FOC — UNDERGROUND FIBER OPTIC
- ST — STORM SEWER PIPE, AS NOTED
- LIGHT POLE
- LIGHT POLE(2-WAY)

TABLE A NOTES:

ITEM 2: THE PHYSICAL ADDRESS OF THE SITE WAS OBTAINED PLAT RECORD IN DOC# 2019E 38352.

ITEM 3: THIS PROPERTY IS LOCATED WITHIN AN AREA HAVING ZONE DESIGNATIONS OF "X" BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, ON FLOOD INSURANCE RATE MAP NO 29095C0409G, WITH A MAP REVISED DATE OF JANUARY 20, 2017, IN JACKSON COUNTY, STATE OF MISSOURI, WHICH IS THE CURRENT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PROPERTY IS SITUATED."

ITEM 5: CONTOURS WERE DERIVED FROM RANDOM SHOTS AND CROSS SECTIONS AND ARE SHOWN AT ONE FOOT INTERVALS. ELEVATIONS SHOWN HEREON ARE BASED ON GPS OBSERVATIONS TOGETHER WITH AN OPUS SOLUTION, DATED 8/10/2020 (NAVD88,GEOID18).

ITEM 6A: NO ZONING REPORT PROVIDED TO THIS SURVEYOR.

ITEM 16: THERE WAS EVIDENCE OF RECENT EARTH MOVING, BUILDING CONSTRUCTION, OR BUILDING ADDITIONS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELDWORK.

ITEM 17: THERE WAS EVIDENCE OF RECENT CHANGES IN STREET RIGHT OF WAY LINES. THERE WAS EVIDENCE OF RECENT OR STREET SIDEWALK CONSTRUCTION OR REPAIRS OBSERVED IN THE PROCESS OF CONDUCTING THE FIELDWORK.

ITEM 18: THERE WAS NO WETLAND DELINEATION OBSERVED IN THE PROCESS OF CONDUCTING THE FIELDWORK.

LAND DESCRIPTION (PER TITLE):

Tract 1:
Lot 5, OAKVIEW - LOTS-1-5, a subdivision in Lee's Summit, Jackson County, Missouri, according to the recorded plat thereof.

Tract 2:
Non-exclusive, perpetual drainage easements and temporary construction easement created by Easements and Maintenace Agreement dated November 14, 2018 and recorded November 15, 2018 as Document No. 2018E0099010. Subject to the terms, provisions and conditions set forth in said instrument.

Tract 3:
Non-exlusive perpetual appurtenant easement for pedestrian and vehicular ingress and egress and maintenance created by Maintenance Agreement (for platted ingress and egress easement) dated November 14, 2018 as Document No. 2018E0099011. Subject to the terms, provisions and conditions set forth in said instrument.

Tract 4:
Non-exclusive easement for maintenance, repair and replacement of common facilities created by Common Facilities Maintenance and Reimbursement Agreement dated July 11, 2019 and recorded July 12, 2019 as Document No. 2019E0053459. Subject to the terms, provisions and conditions set forth in said instrument.

SURVEY NOTES:

INFORMATION REGARDING THE PRESENCE, SIZE AND LOCATION OF UNDERGROUND UTILITIES IS SHOWN HEREON. THIS INFORMATION HAS BEEN SHOWN BASED ON THE LOCATION OF ABOVE GROUND APPURTENANCES, AVAILABLE DESIGN PLANS, AND FLAGES AND PAINT PLACED BY THE UNDERGROUND PROTECTION SERVICE. NO CERTIFICATION IS MADE AS TO THE ACCURACY OF THOROUGHNESS OF THE INFORMATION CONCERNING UNDERGROUND UTILITIES AND STRUCTURES SHOWN HEREON. (MISSOURI ONE CALL 1-800-DIG-RITE). THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A PRIVATE UTILITY LOCATE.

CONTACT PROPER AUTHORITIES BEFORE BUILDING NEAR UTILITY LINES, FOR EASEMENT WIDTH AND RESTRICTIONS. UTILITIES ARE APPROXIMATE AND SHOULD BE VERIFIED PRIOR TO ANY CONSTRUCTION.

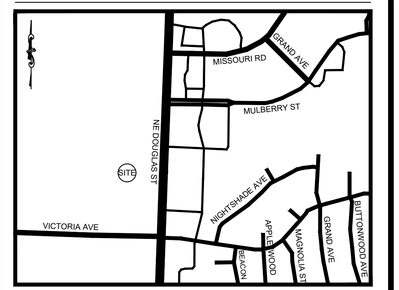
UNLESS STATED OTHERWISE, ANY MONUMENT REFERRED TO HEREIN AS AN "IRON PIN SET" IS A SET 5/8" DIAMETER REBAR, WITH AN YELLOW PLASTIC CAP STAMPED "YOUNG-HOBBS"

THIS SURVEY HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF THE PERSON OR ENTITIES NAMED HERON. NO EXPRESS OR IMPLIED WARRANTIES WITH RESPECT TO THE INFORMATION SHOWN HEREON IS TO BE EXTENDED TO ANY PERSONS OR ENTITIES OTHER THAN THOSE SHOWN HEREON.

LIST OF ENCROACHMENTS: NONE, THE OWNERSHIP OF CURB, UTILITIES, FENCES, AND/OR PERIMETER WALLS SHOWN HEREON ARE NOT KNOWN AND THUS ARE NOT LISTED AS ENCROACHMENTS. CURB, UTILITIES, FENCES, AND/OR PERIMETER WALLS ARE SHOWN IN THEIR RELATIVE POSITION TO THE BOUNDARY.

I DO HEREBY STATE THAT THIS IS A TRUE, COMPLETE AND CORRECT SURVEY OF THE DESCRIBED REAL PROPERTY SITUATED IN THE COUNTY OF CASS, MISSOURI AND THAT THIS SURVEY WAS EXECUTED IN ACCORDANCE WITH THE CURRENT MISSOURI MINIMUM STANDARDS FOR PROPERTY SURVEYS (URBAN SURVEY 1:20,000)

LOCATION MAP NTS



SURVEYOR'S CERTIFICATION:

TO: OAK VIEW LEE'S SUMMIT, LLC, A TEXAS LIMITED LIABILITY COMPANY AND CHICAGO TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 6(a), 6(b), 7(a-c), 8, 9, 13, 16, 17, 18, AND 20 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON JUNE 4, 2020.

DATE OF PLAT OR MAP: AUGUST 10, 2020.

DAVE R. HOBBS, PLS 2014020711 DATE
dave@younghobbs.com

NOTES CORRESPONDING TO SCHEDULE B:

CHICAGO TITLE INSURANCE COMPANY
COMMITMENT DATE: MAY 28, 2020.
COMMITMENT NO.: 200889

-Items 1-7 are either standard exceptions or are not surveying related.

8) Covenants, conditions and restrictions but omitting any covenants or restrictions, if any,including but not limited to those based upon race, color,religion,sex, sexual orientation, familial status, marital status, disability,handicap, national origin,ancestry, source of income, gender,gender identity,gender expression, medical condition or genetic information,as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law, as set forth in the document
Recording Date: February 10, 1989
Recording No: Recording No:1-886908,in Book 1-1888, Page 1123, as affected by Waiver of Use Restriction recorded June 2,2016 as Document No. 2016E0048717.
(SUBJECT TO THIS ITEM)

9) Easement granted to the City of Lee's Summit, recorded March 16,1989 as Document No.1-901781,in Book 1-1897, Page 480.
(DOES NOT AFFECT)

10) Drainage and Sewer Easement granted to the City of Lee's Summit, recorded March 1,1990 as Document No. 1-963299,in Book 1-2000, Page 1089.
(DOES NOT AFFECT)

11) Building lines,restrictions, utility, drainage, storm sewer,sanitary sewer,and waterline easements shown onthe plat recorded March 21,2016 as Document No. 2016E0023636 in Plat Book 161at Page 47.
(AFFECTS, AS SHOWN HEREON)

12) Sign and Access Easement granted to 1400 North Douglas Corporation,recorded March 23, 2016 as Document No. 2016E0024979.
(DOES NOT AFFECT)

13) Ingress and Egress Easement established by the plat recorded March 21,2016 as Document No. 2016E0023636, in Book 161,Page 47.
(DOES NOT AFFECT)

14) Approval of Development recorded February 21,2018 as Document No.2018E0013736.
(SUBJECT TO THIS ITEM)

15) Terms, provisions and easements of Maintenance Agreement recorded November 15, 2018 as Document No. 2018E0099011.
(DOES NOT AFFECT)

16) Building lines,restrictions, utility, drainage, storm sewer,sanitary sewer,and waterline easements shown onthe plat, OAKVIEW - LOTS 1-5,recorded May 24, 2019 as Document No.2019E0038352.
(AFFECTS, AS SHOWN HEREON)

17) Terms and provisions of Ordinance No.8630 of the City of Lee's Summit, Missouri recorded May 24,2019 as Document No.2019E0038456,for the purpose of approving the plat of OAKVIEW - LOTS 1-5.
(SUBJECT TO THIS ITEM)

18) Covenants, conditions and restrictions but ommitting any covenants or restrictions, if any,including but not limited to those based upon race, color,religion,sex, sexual orientation, familial status, marital status, disability,handicap, national origin,ancestry, source of income, gender,gender identity,gender expression,medical condition or genetic information,as set forth in applicable state or federal laws, except to the extent that said covenant or restriction is permitted by applicable law, as sat forth in the Common Facilities Maintenance and Reimbursement Agreement

Recording Date: July 12,2019
Recording No: 2019E0053459.
(SUBJECT TO THIS ITEM)

19) Connection Easement recorded July 12, 2019 as Document No. 2019E0053544.
(MAY AFFECT; PARTIAL DOCUMENT SENT TO SURVEYOR)

20) State court judgments, state tax liens, and federal tax liens, if any, against the party(ies) to be insured as owner(s).
(SUBJECT TO THIS ITEM)

21) Tenancy rights, either as month to month or by virtue of written leases, of persons now in possession of any part of the Land.
(SUBJECT TO THIS ITEM)

22) ADDED 6.30.2020
Terms, provisions and easements of Easements and Maintenace Agreement dated November 14, 2018 and recorded November 15, 2018 as Document No. 2018E0099010.
(DOES NOT AFFECT)

23) ADDED 6.30.2020
Terms, provisions and easements of Common Facilities Maintenance and Reimbursement Agreement dated July 11, 2019 and recorded July 12, 2019 as Document No. 2019E0053459.
(SUBJECT TO THIS ITEM)

YOUNG - HOBBS AND ASSOCIATES
1202 CROSSLAND AVE.
CLARKSVILLE, TN 37040
PHONE 931-645-2524
FAX 931-645-2768

PRELIMINARY - NOT FOR RECORDING OR LAND TRANSFER

DAVE R. HOBBS, PLS 2014020711

No.	Date	Revision
1		

CLIENT

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

ALTA/NSPS LAND TITLE SURVEY

OWNER INFORMATION

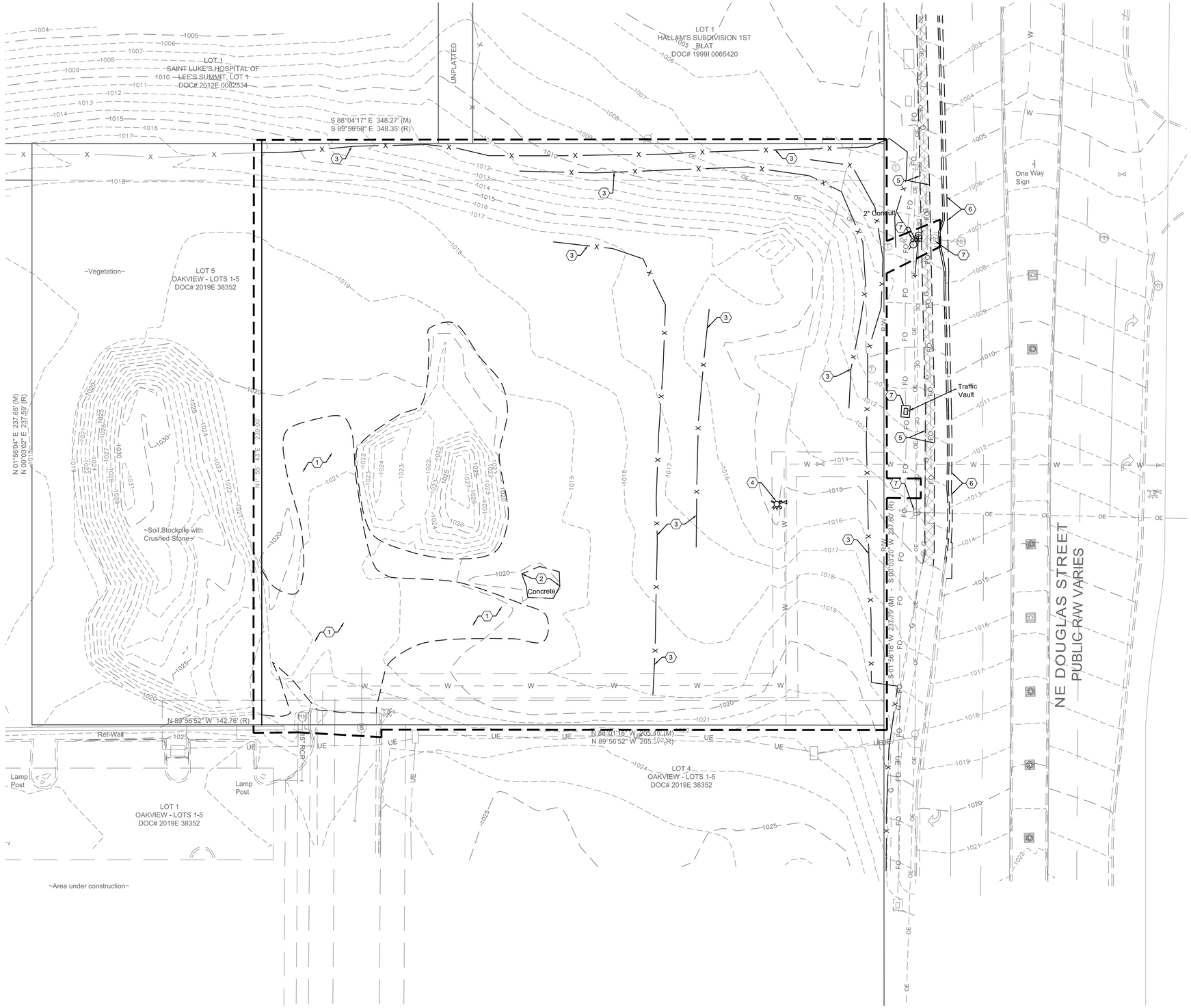
OAK VIEW LEES SUMMIT LLC PROPERTY
201 HAWKS RIDGE TRL
COLLEYVILLE, TX 76034
PARCEL:
52-900-02-37-00-0-00-000

LOT 5
DOC# 2019E 38352

CITY OF LEES SUMMIT
COUNTY OF JACKSON
STATE OF MISSOURI

DRAWN BY:	CLH/KAB
APPROVED BY:	DRH
DATE: (FIELD)	8/10/2020
DATE: (OFFICE)	9/2/2020
YHA PRO. #	165-20

SHEET 1 OF 1



GENERAL NOTES:

A. ALL EXISTING CONDITIONS, TOPOGRAPHY, UTILITIES AND PROPERTY INFORMATION ARE TAKEN FROM A SURVEY OF LAND SITUATED IN THE CITY OF LEE'S SUMMIT, COUNTY OF JACKSON, AND STATE OF MISSOURI, BY SURVEYOR: YOUNG - HOBBS AND ASSOCIATES, 1202 CROSSLAND AVE., CLARKSVILLE, TN 37040, PHONE: (931) 645-2524

B. AT START OF PROJECT AND PRIOR TO DEMOLITION OF EXISTING CONDITIONS, CONTRACTOR SHALL BE IN CONTACT WITH ADJACENT PROPERTY OWNERS, CITY REPRESENTATIVE, UTILITY REPRESENTATIVES AND OWNER REPRESENTATIVE TO COORDINATE DEMOLITION TIMING.

C. CONTRACTOR TO REMOVE AND DISPOSE OF ALL DEBRIS AND OTHER MATERIALS RESULTING FROM DEMOLITION AND CONSTRUCTION OPERATIONS. DISPOSAL WILL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.

D. CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO AVOID DAMAGE TO ADJACENT PROPERTIES DURING CONSTRUCTION PHASES OF THIS PROJECT. CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR DAMAGE TO NEIGHBORING PROPERTIES OCCURRING AS A RESULT OF CONSTRUCTION ACTIVITIES.

E. ALL EXISTING UTILITIES ARE SHOWN HEREIN AS REFERENCE ONLY AND ARE BASED ON RECORD OF THE VARIOUS UTILITY COMPANIES. A FIELD SURVEY AND EXISTING PLANS. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATIONS OF ALL UTILITIES PRIOR TO DEMOLITION ACTIVITIES. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES DURING CONSTRUCTION.

F. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES 48 HOURS BEFORE CONSTRUCTION IS TO START, TO VERIFY IF ANY UTILITIES ARE PRESENT ON SITE. ALL VERIFICATIONS (LOCATION, SIZE AND DEPTH) SHALL BE MADE BY THE APPROPRIATE UTILITY COMPANIES. WHEN EXCAVATION IS AROUND OR OVER EXISTING UTILITIES, THE CONTRACTOR MUST NOTIFY THE UTILITY SO A REPRESENTATIVE OF THAT UTILITY COMPANY CAN BE PRESENT TO INSTRUCT AND OBSERVE DURING CONSTRUCTION.

G. CONTRACTOR SHALL CONFINE ALL STOCKPILING OF DEMOLITION MATERIALS TO WITHIN THE LIMITS OF THE SUBJECT PROPERTY.

KEYED NOTES:

1. EXISTING CRUSHED STONE AND GRAVEL TO BE REMOVED AND DISPOSED OF.
2. EXISTING CONCRETE TO BE REMOVED AND DISPOSED OF.
3. EXISTING FENCE TO BE REMOVED AND RETURNED TO OWNER.
4. EXISTING FIRE HYDRANT AND WATER VALVE TO BE REMOVED AND RELOCATED. COORDINATE WITH OWNER AND WATER COMPANY.
5. EXISTING SIDEWALK TO BE DEMOLISHED BY OTHERS.
6. EXISTING CURB AND GUTTER TO BE DEMOLISHED BY OTHERS.
7. EXISTING UTILITY STRUCTURE TO BE RELOCATED BY OTHERS.

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		CONSTRUCTION LIMITS
		LIGHT POLE
		UTILITY POLE
		POLE GUY
OE		OVERHEAD ELECTRIC LINE
UE		UNDERGROUND ELECTRIC LINE
FO	FO	UNDERGROUND FIBER-OPTIC LINE
G		GAS LINE
W		WATER LINE
		FIRE HYDRANTS
SAN		SANITARY LINE
S		SANITARY STRUCTURE
ST		STORM LINE
MH		STORM STRUCTURE
		DEMOLISHED SIDEWALK

0 10 20 30 40
SCALE: 1"=20'

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REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

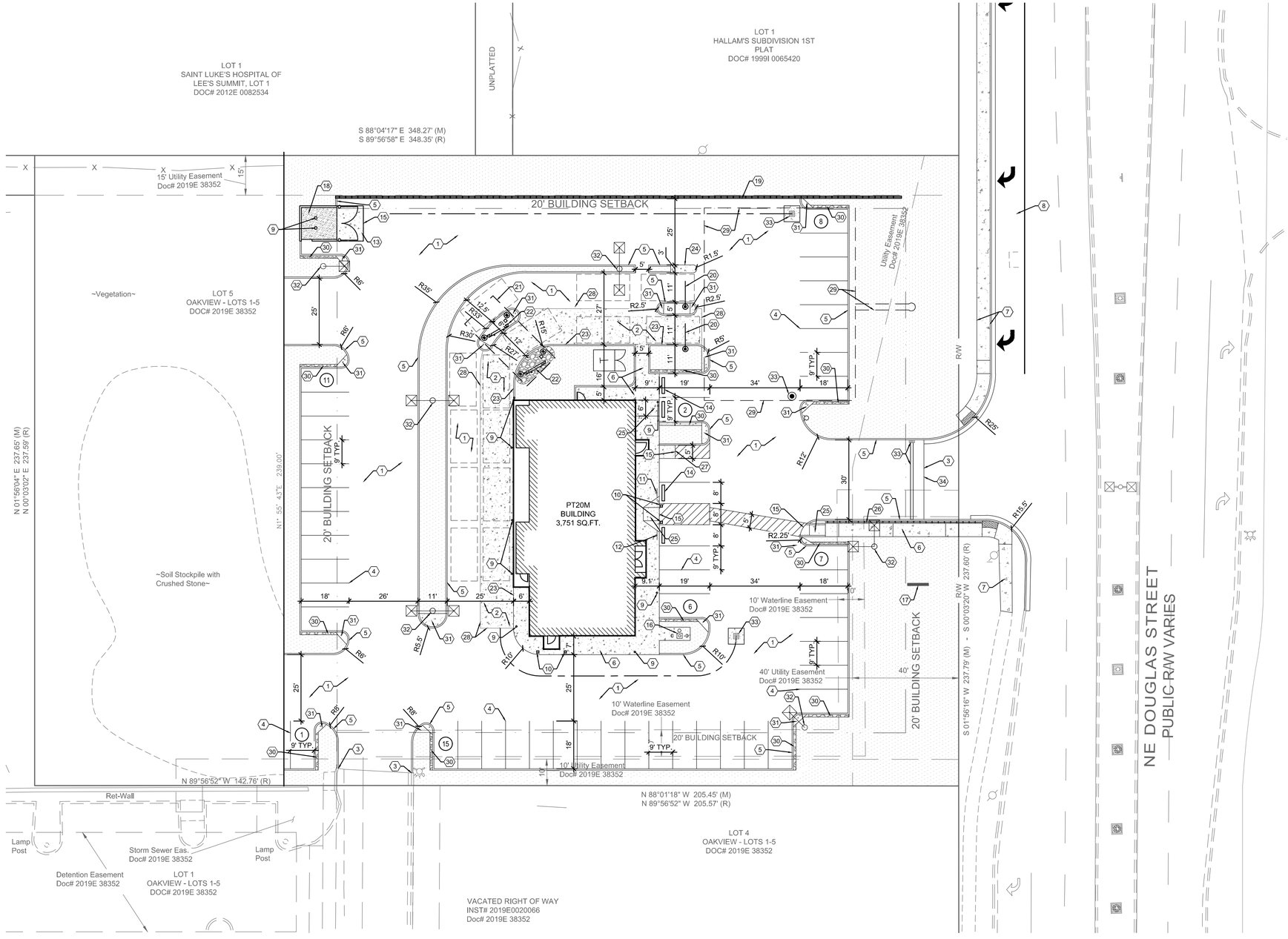
SHEET TITLE

SITE DEMOLITION PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-3



GENERAL NOTES:

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B. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND VERIFYING ALL EXISTING UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION, AND IS RESPONSIBLE FOR ANY DAMAGE TO THEM DURING CONSTRUCTION.

C. PROVIDE SMOOTH TRANSITION FROM NEWLY PAVED AREAS TO EXISTING PAVED AREAS AS NECESSARY. THE EXISTING EDGE OF PAVEMENT SHALL BE FREE OF ALL LOOSE DEBRIS AT ALL AREAS WHERE PROPOSED PAVEMENT MEETS EXISTING PAVEMENT. THE EDGE OF EXISTING ASPHALT PAVEMENT SHALL BE PROPERLY SEALED WITH A TACK COAT MATERIAL IN ALL AREAS WHERE NEW ASPHALT PAVEMENT IS INDICATED TO JOIN EXISTING.

D. ALL DIMENSIONS TO FACE OF CURB AND/OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.

E. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR AND TAKE ALL PRECAUTIONS NECESSARY TO AVOID DAMAGE TO ADJACENT PROPERTIES DURING THE CONSTRUCTION PHASES OF THIS PROJECT.

F. REFER TO ARCHITECTURAL DRAWINGS FOR BUILDING DIMENSIONS AND ADDITIONAL INFORMATION.

G. ALL CONSTRUCTION METHODS AND MATERIALS MUST CONFORM TO CURRENT STANDARDS AND SPECIFICATIONS OF THE FEDERAL, STATE, COUNTY, CITY OR LOCAL REQUIREMENTS, WHICHEVER HAS JURISDICTION.

H. ALL EXCAVATED AREAS TO BE SEEDED AND/OR SODDED AFTER FINISH GRADING UNLESS OTHERWISE NOTED. ALL NEWLY SEEDED/SODDED AREAS SHALL HAVE A MINIMUM OF 4" OF TOPSOIL. HOLD SOIL DOWN 1" FROM PAVEMENT ELEVATION. CONTRACTOR TO SUPPLY STRAW MULCH WHERE GRASS SEED HAS BEEN PLANTED.

I. ALL RADII ARE 3.0 FEET UNLESS OTHERWISE SHOWN. ALL RADII INDICATED ON PLANS SHALL BE CONSTRUCTED AS CIRCULAR ARCS.

KEYED NOTES:

1. PROPOSED HEAVY DUTY ASPHALT PAVEMENT, SEE DETAIL ON SHEET C-9.
2. PROPOSED HEAVY DUTY CONCRETE PAVEMENT, SEE DETAIL ON SHEET C-6.
3. PROPOSED ASPHALT PAVEMENT TO BE FLUSH WITH EXISTING.
4. PROPOSED PAINTED PARKING STRIPING (TYPICAL). ALL PARKING STRIPES ARE TO BE 4" PAINTED WHITE, UNLESS OTHERWISE NOTED ON THE PLANS, DETAILS OR SPECIFICATIONS.
5. PROPOSED 6" CONCRETE CURB. SEE DETAIL ON SHEET C-9.
6. PROPOSED CONCRETE SIDEWALK. SEE DETAIL ON SHEET C-9.
7. PROPOSED CONCRETE SIDEWALK, SEE DEVELOPER ROADWAY PLANS FOR MORE DETAILS.
8. PROPOSED RIGHT-TURN LANE, SEE DEVELOPER ROADWAY PLANS FOR MORE DETAILS.
9. PROPOSED BOLLARD, TYP. OF 8. SEE ARCHITECTURAL AND STRUCTURAL PLANS FOR DETAILS.
10. PROPOSED ILLUMINATED BOLLARD, TYP. OF 4. SEE ARCHITECTURAL AND STRUCTURAL PLANS FOR DETAILS.
11. GENERAL CONTRACTOR TO PROVIDE AND INSTALL (1) POLE-MOUNTED HANDICAP PARKING SIGNS. SIGNS PROVIDED BY CONTRACTOR TO MEET LOCAL REQUIREMENTS, SEE DETAIL ON SHEET C-9.
12. GENERAL CONTRACTOR TO PROVIDE AND INSTALL (1) POLE-MOUNTED HANDICAP PARKING SIGN WITH "VAN ACCESSIBLE" SIGN. SIGNS PROVIDED BY CONTRACTOR TO MEET LOCAL REQUIREMENTS, SEE DETAIL ON SHEET C-9.
13. CONCRETE DUMPSTER ENCLOSURE APRON . SEE DETAIL ON SHEET C-9.
14. PROPOSED PRE-CAST CONCRETE WHEEL STOP (TYP. OF 8), SEE DETAIL ON SHEET C-9.
15. CONCRETE TO BE FLUSH WITH ADJACENT ASPHALT PAVEMENT.
16. FLAGPOLE WITH GROUND-MOUNTED LIGHTS, UNITEDFLAG AND BANNER, GARRISON TYPE OR OWNER APPROVED EQUAL, 30' HIGH, 5" BUTT ALUMINUM WITH 14 GAUGE ALUMINUM BALL FINIAL. INCLUDE ALUMINUM ROLLER AND SLEEVE. HARDWARE TO INCLUDE STATIONARY STRUCK, NYLON FLAGSNAPS, AND HALYARDS. ENTIRE ASSEMBLY (INCLUDING FOUNDATION) TO CONFORM TO APPLICABLE CODES, INCLUDING WIND LOADS. SEE ARCHITECTURAL AND STRUCTURAL PLANS FOR DETAILS.
17. PROPOSED MONUMENT SIGN, CONTRACTOR TO COORDINATE WITH OWNER. SEE ELECTRICAL PLANS AND SIGNAGE PACKAGE FOR DETAILS.
18. PROPOSED DUMPSTER ENCLOSURE AND CONCRETE PAD. SEE ARCHITECTURAL AND STRUCTURAL PLANS FOR DETAILS.
19. PROPOSED 215' REDI-ROCK RETAINING WALL WITH PEDESTRIAN RAILING. SEE GRADING PLAN ON SHEET C-6 FOR WALL HEIGHT.
20. PROPOSED HEADACHE BAR. SEE ARCHITECTURAL PLANS FOR DETAILS.
21. PROPOSED MENU BOARD CANOPY. SEE ARCHITECTURAL PLANS FOR DETAILS.
22. PROPOSED EXTERIOR MENU BOARD. SEE ARCHITECTURAL PLANS FOR DETAILS.
23. PROPOSED 6" MONOLITHIC CURB, SEE DETAIL ON SHEET C-11.
24. TYPE N MOUNTABLE CURB PER MODOT STANDARD DRAWING 609.00P, SEE DETAIL ON SHEET C-11.
25. CURB RAMPS, SEE DETAIL ON SHEET C-11.
26. PROPOSED PEDESTRIAN RAILING TO MATCH RAILING INSTALLED AT NORTHERN RETAINING WALL.
27. RAMP WITH ADA STRIPING, SEE DETAIL ON SHEET C-11.
28. CONCRETE TO BE FLUSH WITH ADJACENT ASPHALT PAVEMENT, SEE DETAIL ON SHEET C-11.
29. PROPOSED UNDERGROUND STORAGE, SEE DETAILS ON SHEETS C-12 AND C-13.
30. 1' WIDE CRUSHED GRANITE STRIP. SEE DETAIL ON SHEET C-11.
31. CONCRETE ISLAND NOSE. SEE DETAIL ON SHEET C-11.
32. LIGHTPOLE AND FOUNDATION.SEE STRUCTURAL PLANS FOR DETAILS.
33. PROPOSED STORM SEWER STRUCTURE, SEE SITE GRADING PLAN, SHEET C-6 FOR MORE INFORMATION.
34. PRIVATE SITE AND DEVELOPER WORK INTERFACE.

LEGEND

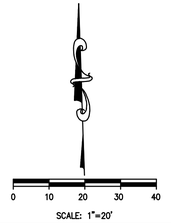
EXISTING	PROPOSED	DESCRIPTION
		PROPERTY LINE
R/W		RIGHT-OF-WAY LINE
X		FENCE
		LIGHT POLE
		SEEDING/LANDSCAPING AREA, SEE LANDSCAPE PLAN
		CONCRETE
		STRUCTURAL CONCRETE

PARKING DATA

	REQUIRED	PROVIDED*
STANDARD	50	48
HANDICAP	3	2
TOTAL	53	50
14 PARKING SPACE REQUIRED PER 1,000 S.F. OF GROSS FLOOR AREA.		
*FEWER SPACES ALLOWABLE IF EVIDENCE OF SUCCESS ON SIMILAR PROJECTS CAN BE PROVIDED		

SITE DATA

	SQ. FT.	ACRES	PERCENT
TOTAL SITE AREA	60,774	1.40	-
EXISTING PERVIOUS	60,774	1.40	100.0
EXISTING IMPERVIOUS	0	0.00	0.0
TOTAL PROPOSED PERVIOUS	13,427	0.31	22.1
TOTAL PROPOSED IMPERVIOUS	47,347	1.09	77.9



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PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

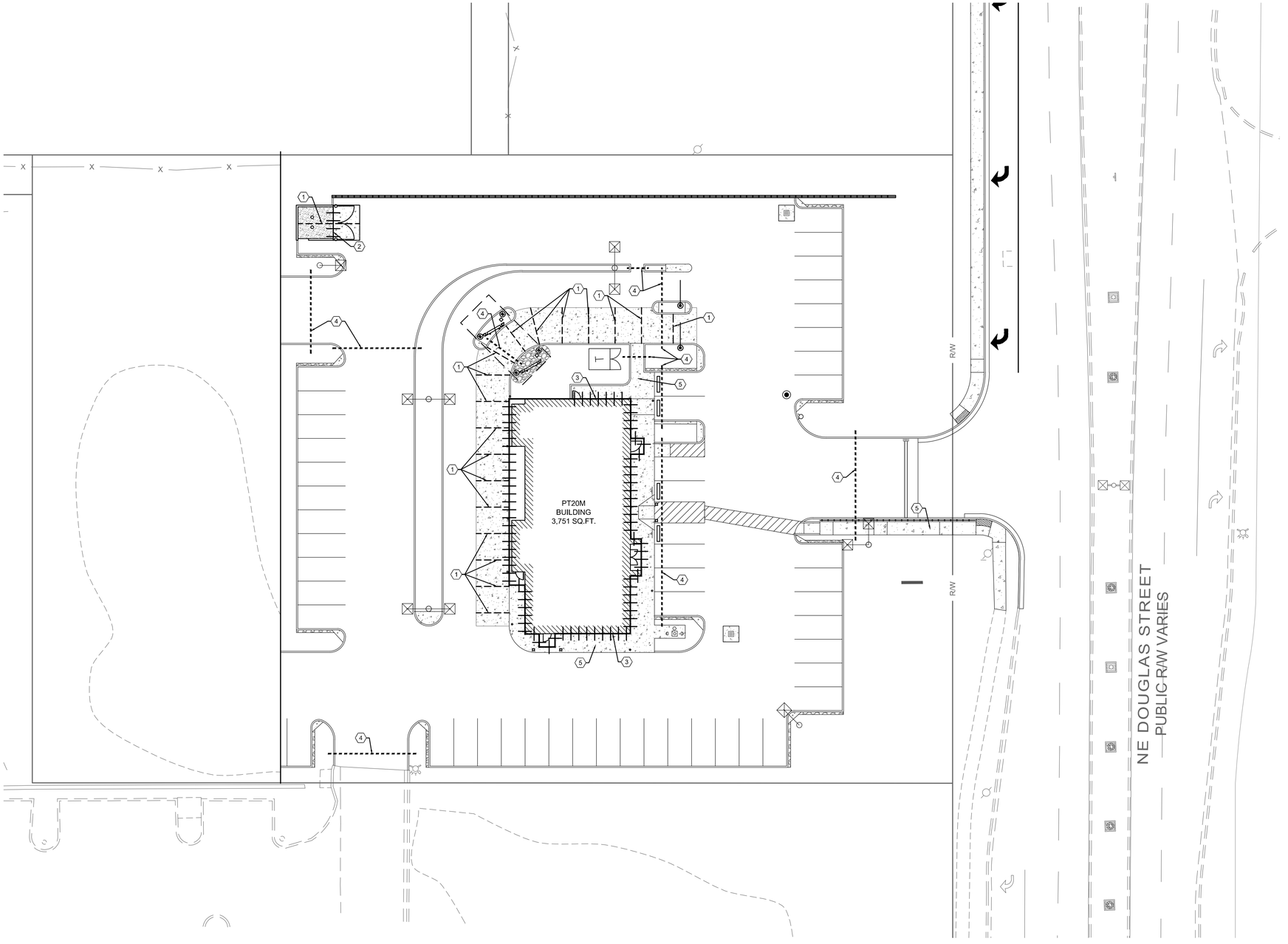
SHEET TITLE

SITE DIMENSION PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-4



GENERAL NOTES:

A. PAVEMENT SPECIFICATION AND RECOMMENDATIONS ARE TAKEN FROM GEOTECHNICAL REPORT PROVIDED BY TERRACON CONSULTANTS, INC., PROJECT #02205198REV1, DATED SEPTEMBER 2, 2020.

B. PORTLAND CEMENT CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.

C. MAXIMUM CONTROL JOINT SPACING SHALL NOT EXCEED 12 FEET.

D. EXPANSION JOINTS SHALL BE USED WHEREVER THE PAVEMENT WILL ABUT A STRUCTURAL ELEMENT SUBJECT TO DIFFERENT MAGNITUDE OF MOVEMENT (E.G., LIGHT POLES, RETAINING WALLS, EXISTING PAVEMENT, STAIRWAYS, ENTRYWAY PIERS, BUILDING WALLS, MANHOLES, ETC.)

E. EXPANSION JOINTS SHALL BE SEALED PER DETAILS ON SHEET C-9 TO MINIMIZE MOISTURE INFILTRATION INTO SUBGRADE SOILS AND RESULTANT CONCRETE DETERIORATION AT THE JOINTS.

F. SLEEVES SHOWN ARE FOR IRRIGATION ONLY. ADDITIONAL SLEEVES MAY BE REQUIRED FOR OTHER FRANCHISE UTILITIES. CONTRACTOR SHALL COORDINATE LOCATION AND SUPPLY ADDITIONAL SLEEVES REQUIRED FOR ELECTRICAL AND TELECOMMUNICATION SERVICES.

G. ALL CONCRETE JOINTS SHALL RUN CONTINUOUSLY THROUGH CURBS.

KEYED NOTES:

1. SAWED CONSTRUCTION JOINT REQUIRED, TYPICAL. SEE DETAIL H ON SHEET C-9 .
2. DOWELED EXPANSION JOINT REQUIRED, TYPICAL. SEE DETAIL H ON SHEET C-9 .
3. EXPANSION JOINT REQUIRED WHERE CONCRETE OR CURB ABUTS BUILDING FOUNDATION, STORM STRUCTURE, FLUME, OR SIDEWALK OPENING. SEE DETAIL H ON SHEET C-9 .
4. SCHEDULE 40 PVC IRRIGATION SLEEVE, COORDINATE WITH IRRIGATION PLAN.
5. FOR SIDEWALK JOINTING, SEE DETAILS ON SHEET C-9.

LEGEND

PROPOSED	DESCRIPTION
- - - - - - - - - -	CONTRACTION JOINT
++++++++++	EXPANSION JOINT
----------	4" SCHEDULE 40 PVC SLEEVE, SEE IRRIGATION PLAN

0 10 20 30 40
SCALE: 1"=20'

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phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

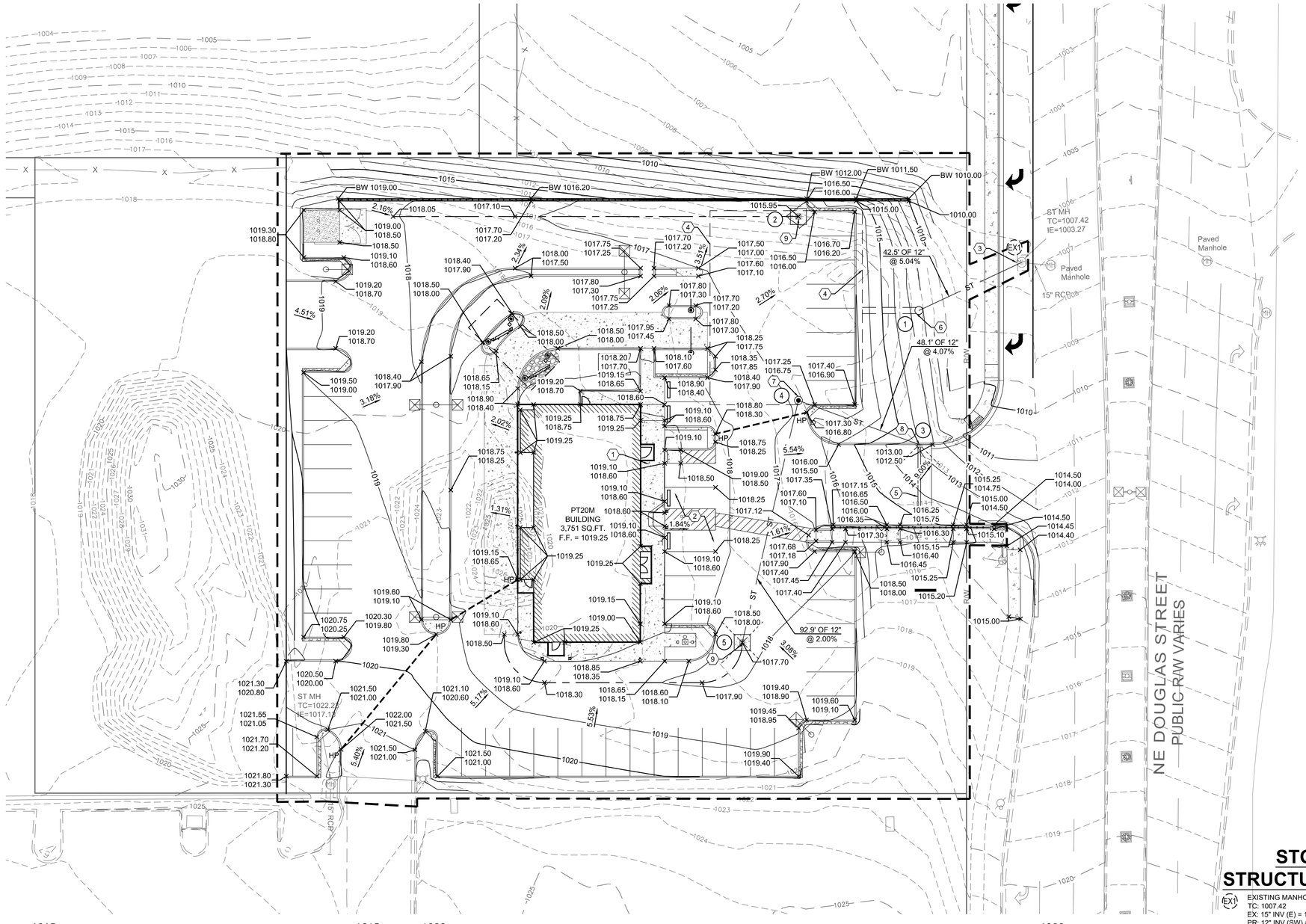
SHEET TITLE

CONCRETE JOINTING PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-5



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B. ALL CONSTRUCTION METHODS AND MATERIAL MUST CONFORM TO CURRENT STANDARDS AND SPECIFICATIONS OF THE FEDERAL, STATE, COUNTY, CITY OR LOCAL REQUIREMENTS, WHICHEVER HAS JURISDICTION.

C. ALL PROPOSED SPOT ELEVATIONS SHOWN ARE TOP OF CURB AND FINAL GRADE ELEVATIONS UNLESS OTHERWISE NOTED.

D. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND VERIFYING ALL EXISTING UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.

E. CONTRACTOR TO VERIFY ALL EXISTING GRADES AND CONTACT ENGINEER PRIOR TO BEGINNING WORK IF DISCREPANCY IS FOUND. CONTRACTOR TO VERIFY ASSUMED FINISHED FLOOR ELEVATION PRIOR TO BEGINNING WORK.

F. THE EXCAVATING CONTRACTOR MUST TAKE PARTICULAR CARE WHEN EXCAVATING IN AND AROUND EXISTING UTILITY LINES AND EQUIPMENT. VERIFY COVER REQUIREMENTS BY UTILITY CONTRACTORS AND/OR UTILITY COMPANIES SO AS TO NOT CAUSE DAMAGE.

G. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES 48 HOURS BEFORE CONSTRUCTION IS TO START, TO VERIFY IF ANY UTILITIES ARE PRESENT ON SITE. ALL VERIFICATIONS (LOCATION, SIZE AND DEPTH) SHALL BE MADE BY THE APPROPRIATE UTILITY COMPANIES. WHEN EXCAVATION IS AROUND OR OVER EXISTING UTILITIES, THE CONTRACTOR MUST NOTIFY THE UTILITY SO A REPRESENTATIVE OF THAT UTILITY COMPANY CAN BE PRESENT TO INSTRUCT AND OBSERVE DURING CONSTRUCTION.

H. ALL WORK SHALL BE PERFORMED FROM PRIVATE PROPERTY. ALL TRAFFIC LANES MUST REMAIN OPEN AT ALL TIMES.

I. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING UTILITIES DURING CONSTRUCTION AND ALL DAMAGE SHALL BE REPAIRED TO ORIGINAL CONDITION AT NO ADDITIONAL COST TO THE OWNER OR CITY.

J. CONTRACTOR SHALL INSTALL AND BACKFILL STRUCTURES AND TRENCHES PER DETAILS ON SHEET C-10.

K. ALL EXISTING UTILITIES ARE TAKEN FROM SURVEY AND DO NOT NECESSARILY REPRESENT ALL UNDERGROUND UTILITIES ADJACENT TO OR UPON PREMISES SHOWN ON PLAN.

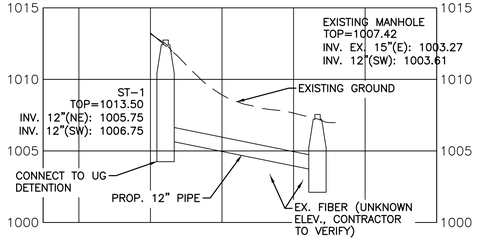
L. 12" STORM CONDUITS ARE ADS N-12 SMOOTH INTERIOR HDPE PIPE OR APPROVED EQUAL.

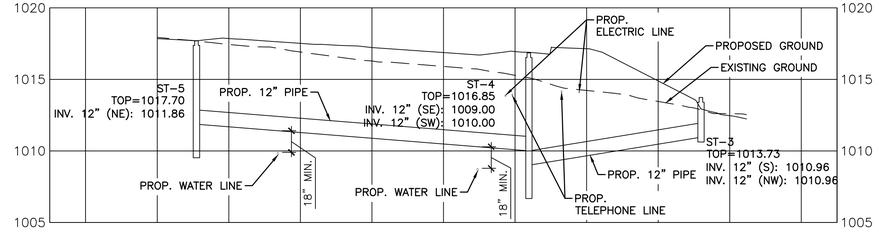
KEYED NOTES:

1. CONTRACTOR TO MAINTAIN 2.00% MAX CROSS SLOPE ON SIDEWALK.
2. CONTRACTOR TO MAINTAIN MAX 2.00% SLOPE IN ALL DIRECTIONS IN HANDICAP ACCESSIBLE AREA.
3. CONNECT PROPOSED STORM SYSTEM OUTLET TO EXISTING STORM SEWER SYSTEM.
4. PROPOSED UNDERGROUND DETENTION, ADS STORMTECH MC-4500 CHAMBER SYSTEM, 14,400 CF. SEE DETAILS ON SHEETS C-12 AND C-13.
5. 30' PROPOSED TRENCH DRAIN, 12" ACO S300K POWERDRAIN HEAVY DUTY MODULAR TRENCH SYSTEM WITH 878Q LONGITUDINAL DUCTILE IRON ADA GRATE, OR APPROVED EQUAL. SEE DETAILS ON SHEET C-13.
6. PROPOSED OUTLET CONTROL STRUCTURE. SEE DETAILS ON SHEET C-10.
7. PROPOSED MANHOLE PER MODOT STANDARD DRAWING 731.00U.
8. PROPOSED CURB INLET. SEE DETAILS ON SHEET C-10.
9. PROPOSED CATCH BASIN WITH CONCRETE COLLAR. SEE DETAILS ON SHEET C-10.

LEGEND

EXISTING	PROPOSED	DESCRIPTION
ST	ST	STORM LINE
MH		STORM STRUCTURE
1015	1015	CONTOUR
1019.00 EX. 1018.50 EX.	1019.00 1018.50	TOP OF CURB TOP OF PAVEMENT
1019.00 EX.	1019.00	FINISHED GRADE SPOT ELEVATION
	1.00%	GRADE SLOPE
		MAJOR FLOOD ROUTING
HP	HP	HIGH POINT





1 C6 PROFILE VIEW – ST-1 – EX1

2 C6 PROFILE VIEW – ST-3 – ST-5

STORM STRUCTURE DATA

EX1 EXISTING MANHOLE
TC: 1007.42
EX: 15" INV (E) = 1003.27
PR: 12" INV (SW) = 1003.61

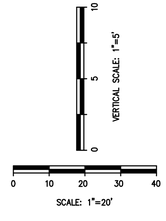
1. PROPOSED OUTLET CONTROL STRUCTURE
TC: 1013.50
PR: 12" INV (NE) = 1005.75
PR: 12" INV (SW) = 1006.75

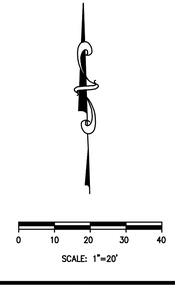
2. PROPOSED CATCH BASIN
TC: 1015.95

3. PROPOSED CURB INLET
TC: 1013.00
PR: 12" INV (S) = 1010.96
PR: 12" INV (NW) = 1010.96

4. PROPOSED MANHOLE
TC: 1016.85
PR: 12" INV (SE) = 1009.00
PR: 12" INV (SW) = 1010.00

5. PROPOSED CATCH BASIN
TC: 1017.70
PR: 12" INV (NE) = 1011.86





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PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

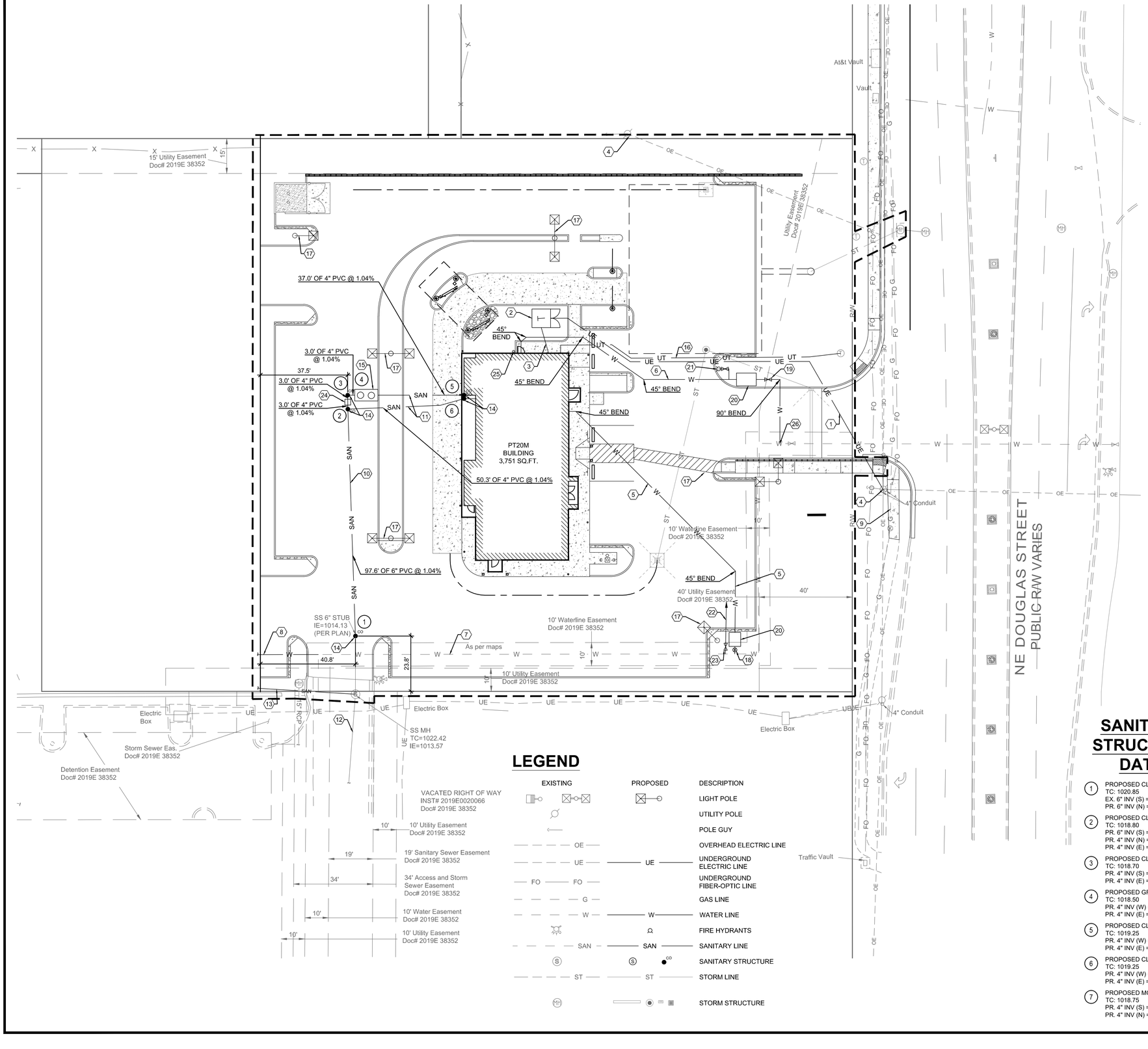
SHEET TITLE

SITE GRADING PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-6



LEGEND

EXISTING	PROPOSED	DESCRIPTION
		LIGHT POLE
		UTILITY POLE
		POLE GUY
OE		OVERHEAD ELECTRIC LINE
UE	UE	UNDERGROUND ELECTRIC LINE
FO	FO	UNDERGROUND FIBER-OPTIC LINE
G		GAS LINE
W	W	WATER LINE
		FIRE HYDRANTS
SAN	SAN	SANITARY LINE
S	S CO	SANITARY STRUCTURE
ST	ST	STORM LINE
MH		STORM STRUCTURE

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B. ALL EXISTING UTILITIES, ARE TAKEN FROM SURVEY AND DO NOT NECESSARILY REPRESENT ALL UNDERGROUND UTILITIES ADJACENT TO OR UPON PREMISES SHOWN ON PLAN.

C. CONTRACTOR RESPONSIBLE FOR MAINTAINING A MIN. COVER OF 42" OVER PROPOSED WATER SERVICE.

D. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND VERIFYING ALL EXISTING UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION, AND IS RESPONSIBLE FOR ANY DAMAGE TO THEM DURING CONSTRUCTION.

E. CLEANOUT LOCATIONS ARE NUMBERED ON PLAN. ALL CLEANOUTS IN PAVEMENT AREAS ARE TO BE H-20 RATED. CLEANOUTS SHALL BE INSTALLED PER DETAIL ON SHEET C-10.

F. CONTRACTOR IS RESPONSIBLE FOR LOCATING THE EXISTING UTILITY LINES. PROPOSED UTILITIES SHOULD TIE INTO EXISTING UTILITIES AT A POINT INDICATED ON PLANS.

G. SEE PLUMBING PLANS FOR CONTINUATION OF UTILITY LINES INTO BUILDING.

H. CONTRACTOR SHALL INSTALL AND BACKFILL ALL TRENCHES AND STRUCTURES PER DETAIL ON SHEET C-10.

I. STORM SEWER SHOWN HERE FOR REFERENCE ONLY. SEE GRADING PLAN FOR DESIGN DATA.

J. THERE SHALL BE A MINIMUM 18" SEPARATION BETWEEN WATER TAPS, WATER SERVICES, PRIVATE WATER SYSTEMS, AND SANITARY AND/OR STORM SEWER SYSTEMS.

K. THE EXCAVATING CONTRACTOR MUST TAKE PARTICULAR CARE WHEN EXCAVATING IN AND AROUND EXISTING UTILITY LINES AND EQUIPMENT. VERIFY COVER REQUIREMENTS BY UTILITY CONTRACTORS AND/OR UTILITY COMPANIES SO AS TO NOT CAUSE DAMAGE.

L. CAUTION: OVERHEAD LINES ARE PRESENT ON SITE. CONTRACTOR TO TAKE SPECIAL CARE TO PREVENT DAMAGE TO THE LINES AND COORDINATE WITH UTILITY OWNER.

KEYED NOTES:

1. PROPOSED PRIMARY ELECTRICAL SERVICE. CONTRACTOR TO COORDINATE CONDUIT SIZE, NUMBER OF CONDUITS, CONNECTIONS, AND BEND RADII WITH UTILITY OWNER AND MEP PLANS. CONTRACTOR TO COORDINATE CONNECTION WITH UTILITY OWNER.
2. PROPOSED ELECTRIC TRANSFORMER. COORDINATE LOCATION WITH UTILITY OWNER AND ELECTRICAL PLANS.
3. PROPOSED SECONDARY ELECTRICAL SERVICE. CONTRACTOR TO COORDINATE CONDUIT SIZE, NUMBER OF CONDUITS, CONNECTIONS, AND BEND RADII WITH UTILITY OWNER AND MEP PLANS. CONTRACTOR TO COORDINATE CONNECTION WITH UTILITY OWNER.
4. EXISTING POWER POLE TO REMAIN. CONTRACTOR TO TAKE CARE NOT TO DISTURB EXISTING POLE AND GUY WIRES.
5. PROPOSED 1.5" DOMESTIC WATER SERVICE. INCLUDE IN BASE BID ALL VALVES, PIPING, STRUCTURES, ETC. THAT WILL BE REQUIRED. SEE MEP PLANS FOR CONTINUATION INTO BUILDING.
6. PROPOSED 6" FIRE SERVICE. INCLUDE IN BASE BID ALL VALVES, PIPING, STRUCTURES, ETC. THAT WILL BE REQUIRED. SEE MEP PLANS FOR CONTINUATION INTO BUILDING.
7. EXISTING PRIVATE WATER MAIN.
8. PROPOSED PRIVATE WATER MAIN EXTENSION BY DEVELOPER.
9. EXISTING GAS MAIN. CONTRACTOR TO TAKE CARE EXCAVATING NEAR MAIN AND CONTACT ENGINEER IF ELEVATION OF GAS LINE INTERFERES WITH UTILITY CONNECTIONS.
10. PROPOSED 6" SANITARY SEWER. ASTM D3034, SDR-26. SEWER TO HAVE MINIMUM SLOPE OF 1.04%. CONTRACTOR TO MAINTAIN A MINIMUM OF 36" OF COVER OVER SEWER LINES.
11. PROPOSED 4" SANITARY SEWER. ASTM D3034, SDR-26. SEWER TO HAVE MINIMUM SLOPE OF 1.04%. CONTRACTOR TO MAINTAIN A MINIMUM OF 36" OF COVER OVER SEWER LINES.
12. EXISTING SANITARY SEWER MAIN.
13. PROPOSED SANITARY SEWER MAIN EXTENSION BY DEVELOPER.
14. PROPOSED SANITARY CLEANOUT (TYP.). SEE DETAIL ON SHEET C-10.
15. GREASE TRAP REQUIRED. SEE PLUMBING SHEETS FOR DETAILS.
16. 2" PVC CONDUIT FOR UNDERGROUND TELEPHONE SERVICE. CONTRACTOR TO COORDINATE WITH UTILITY OWNER.
17. SITE LIGHT, SEE PHOTOMETRIC LIGHTING PLAN.
18. PROPOSED DOMESTIC WATER METER PER CITY OF LEE'S SUMMIT STANDARD DRAWING WAT-11, SEE SHEET C-11.
19. PROPOSED VALVE PER CITY OF LEE'S SUMMIT STANDARD DRAWING WAT-9, SEE SHEET C-11.
20. PROPOSED BACKFLOW PREVENTER VAULT PER CITY OF LEE'S SUMMIT STANDARD DRAWING WAT-12, SEE SHEET C-11.
21. PROPOSED FIRE HYDRANT RELOCATION. HYDRANT TO BE INSTALLED PER CITY OF LEE'S SUMMIT STANDARD DRAWING WAT-8, SEE SHEET C-11.
22. PROPOSED 1" IRRIGATION LINE WITH METER VAULT, SEE IRRIGATION PLAN FOR MORE INFORMATION.
23. PROPOSED VALVE PER LOCAL REGULATIONS AND DETAILS.
24. MONITORING WELL, SEE PLUMBING PLANS FOR DETAILS.
25. FIRE DEPARTMENT CONNECTION PER LOCAL REGULATIONS.
26. FIRE SERVICE TAP PER LOCAL REGULATIONS.

SANITARY STRUCTURE DATA

1. PROPOSED CLEANOUT
   TC: 1020.85
   EX. 6" INV (S) = 1014.13
   PR. 6" INV (N) =1014.13
2. PROPOSED CLEANOUT
   TC: 1018.80
   PR. 6" INV (S) = 1015.15
   PR. 4" INV (N) = 1015.28
   PR. 4" INV (E) = 1015.28
3. PROPOSED CLEANOUT
   TC: 1018.70
   PR. 4" INV (S) = 1015.34
   PR. 4" INV (E) =1015.34
4. PROPOSED GREASE TRAP
   TC: 1018.50
   PR. 4" INV (W) = 1015.37
   PR. 4" INV (E) =1015.37
5. PROPOSED CLEANOUT
   TC: 1019.25
   PR. 4" INV (W) = 1016.71
   PR. 4" INV (E) =1016.71
6. PROPOSED CLEANOUT
   TC: 1019.25
   PR. 4" INV (W) = 1015.80
   PR. 4" INV (E) =1015.80
7. PROPOSED MONITORING WELL
   TC: 1018.75
   PR. 4" INV (S) = 1015.31
   PR. 4" INV (N) =1015.31

0 10 20 30 40
SCALE: 1"=20'

MISSOURI ONE CALL SYSTEM

The Missouri One Call System is a communications system which was established to help prevent damage to underground facilities and to promote safety. Missouri One Call operators are on duty 24 hours a day, seven days a week.

Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION	
60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

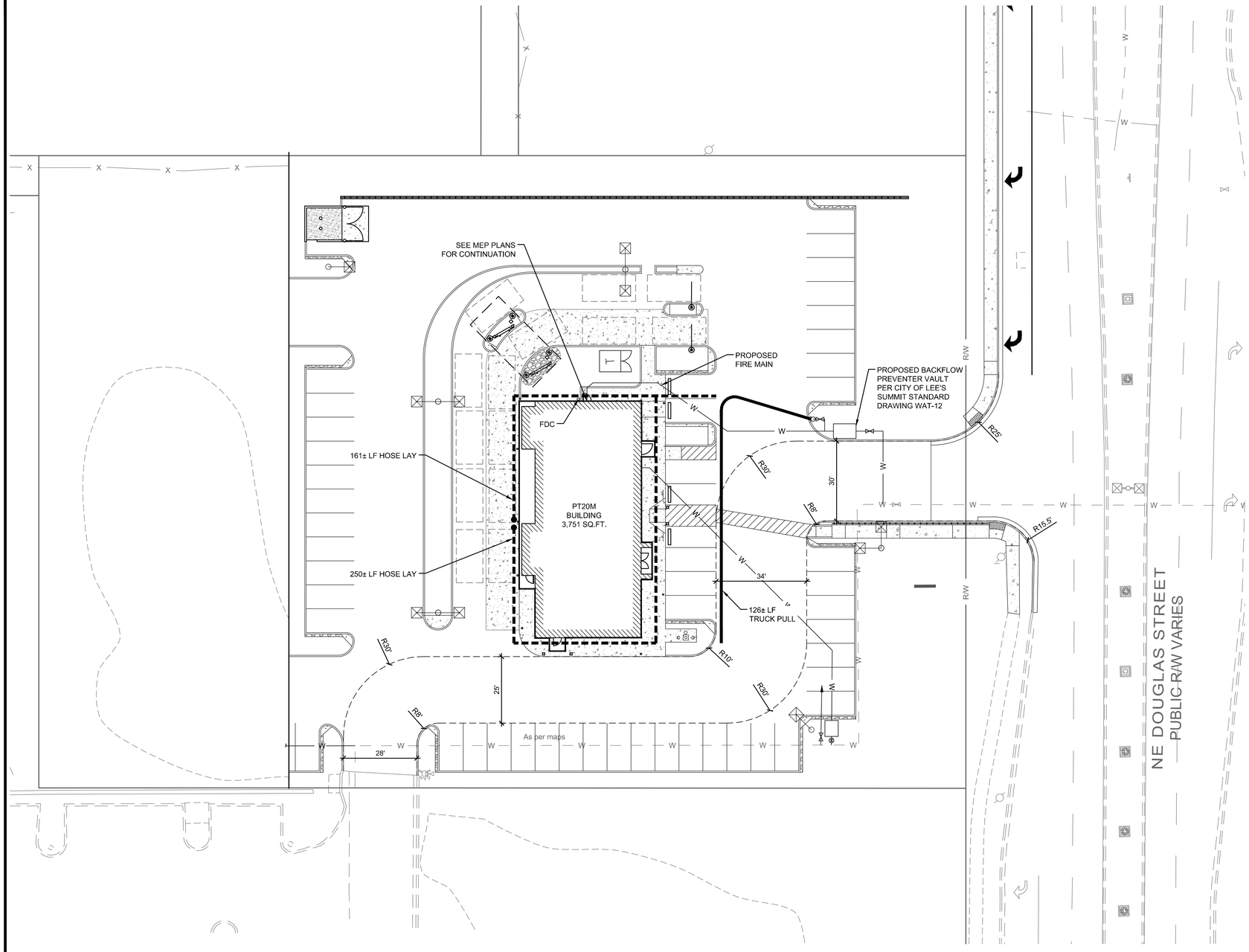
SHEET TITLE

SITE UTILITY PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-7



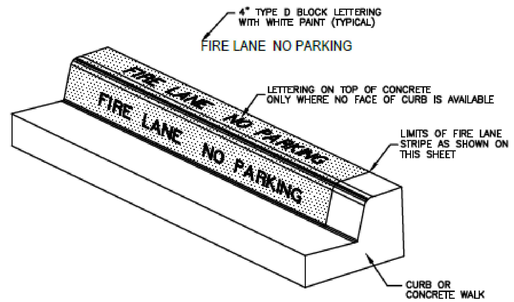
LEGEND

EXISTING	PROPOSED	DESCRIPTION
		PROPERTY LINE
R/W		RIGHT-OF-WAY LINE
W	W	WATER LINE
		FIRE HYDRANTS
		FIRE LANE
		FIRE HOSE TRUCK PULL
		FIRE HOSE HAND LAY

0 10 20 30 40
SCALE: 1"=20'

GENERAL NOTES:

A. DETAILS SHOWN ON THIS SHEET ARE SCHEMATIC. CONTRACTOR TO CONFIRM MARKINGS CONFORM TO ALL CODES AND REGULATIONS.



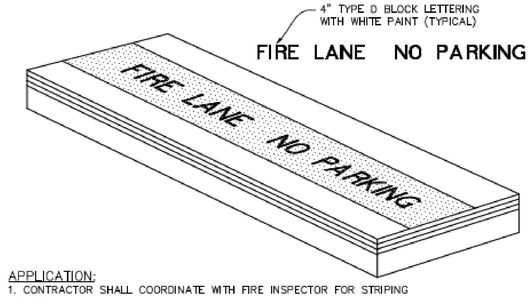
MARKINGS

APPLICATION:

1. ON 6" CURB:
   PAINT RED LANE STRIPE ON BOTH FACE AND TOP OF CURB
   PAINT WHITE LETTERS ON FACE OF CURB ONLY
2. LOW CURB (HEADER CURB) OR CONCRETE PAVEMENT:
   PAINT RED LANE STRIPE AND WHITE LETTERS ON TOP OF CURB
3. 15 FEET SPACING BETWEEN THE BEGINNING OF THE WHITE LETTERING.

FIRE LANE STRIPING DETAIL

NOT-TO-SCALE



APPLICATION:

1. CONTRACTOR SHALL COORDINATE WITH FIRE INSPECTOR FOR STRIPING LOCATIONS
2. PAINT A 6" WIDE RED STRIPE LOCATED 3" OFF EDGE OF PAVEMENT WITH 4" WHITE LETTERING ON RED STRIPE.
3. SEE SITE, STRIPING AND DIMENSIONAL CONTROL PLAN FOR CURB TYPES & LOCATIONS.
4. 15 FOOT SPACING BETWEEN THE BEGINNING OF THE WHITE LETTERING.

TYPICAL FIRE LANE MARKING DETAIL

NOT TO SCALE

MISSOURI ONE CALL SYSTEM

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1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

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PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

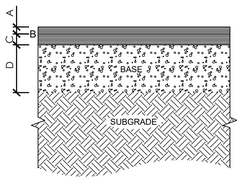
SHEET TITLE

FIRE PROTECTION PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-8



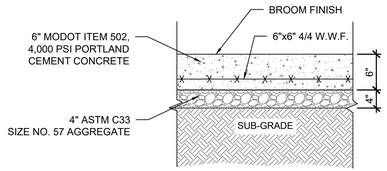
HEAVY DUTY PAVING

A = 2" ASPHALT CONCRETE
(MODOT ITEM 403, SURFACE COURSE)
B = TACK COAT (0.05 GAL/S.Y.)
C = 4" ASPHALT CONCRETE
(MODOT ITEM 403, INTERMEDIATE COURSE)
D = 6" AGGREGATE BASE
(MODOT ITEM 304, TYPE 5)

PAVEMENT AND BASE THICKNESSES AND MATERIAL PER GEOTECHNICAL REPORT PROVIDED BY TERRACON CONSULTANTS, INC.

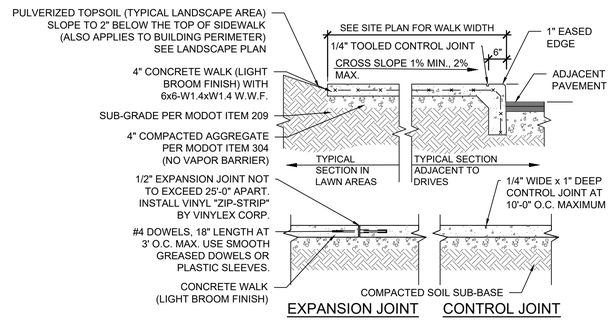
NOTES
A. SUBGRADE COMPACTION: CBR= 5
B. BASE COURSE TO CONFORM TO MODOT STANDARDS FOR BASE COURSE COMPACTED TO 100% OF THE MODIFIED PROCTOR (ASTM D-1557) MAXIMUM DRY DENSITY
C. ALL SUBGRADE AND PAVEMENT OPERATIONS AND MATERIALS SHALL MEET THE MINIMUM REQUIREMENTS OF THE CURRENT MODOT SPECIFICATIONS

A / C9 ASPHALT PAVING SECTION
N.T.S.



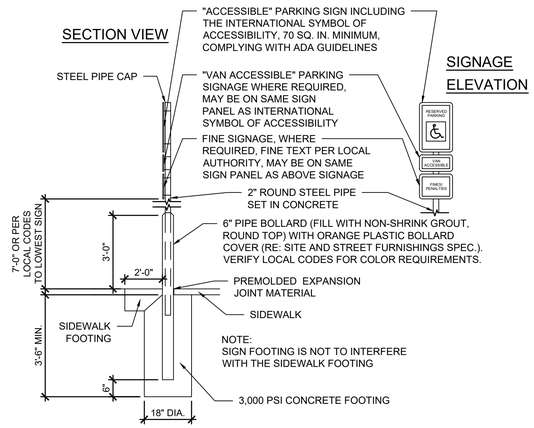
PAVEMENT AND BASE THICKNESSES AND MATERIAL PER GEOTECHNICAL REPORT PROVIDED BY TERRACON CONSULTANTS, INC.

B / C9 TRASH ENCLOSURE APRON DETAIL
N.T.S.

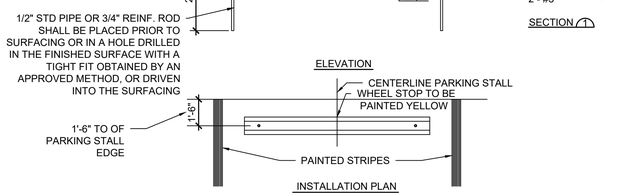


NOTES:
A. LOCATE CONTROL JOINTS AS SHOWN ON PLAN OR 10' O.C. MAXIMUM. VERIFY WITH SITE REPRESENTATIVE.
B. CONCRETE WALKS AGAINST THE BUILDING OR CONCRETE PAVEMENT SHALL HAVE ½" PREFORMED EXPANSION JOINT BETWEEN WALK AND BUILDING OR WALK AND CONCRETE PAVEMENT.
C. CONCRETE PADS OVER 4" THICK REQUIRE CONTROL JOINTS TO BE 12' O.C. MAXIMUM.

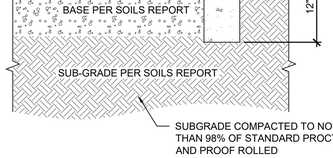
C / C9 CONCRETE WALK
N.T.S.



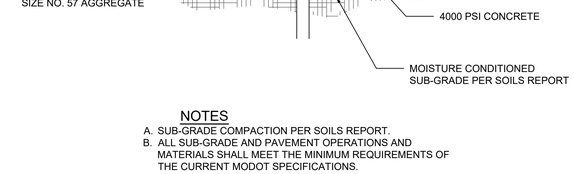
D / C9 POLE-MOUNTED HANDICAP PARKING SIGN
N.T.S.



E / C9 PRE-CAST CONCRETE WHEEL STOP
N.T.S.

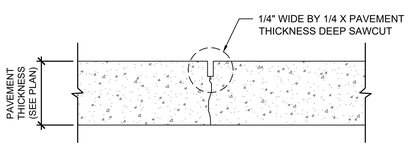


F / C9 CURB DETAIL
N.T.S.



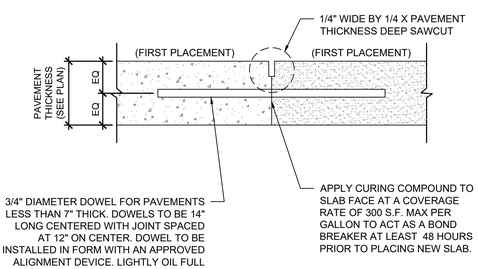
NOTES
A. SUB-GRADE COMPACTION PER SOILS REPORT.
B. ALL SUB-GRADE AND PAVEMENT OPERATIONS AND MATERIALS SHALL MEET THE MINIMUM REQUIREMENTS OF THE CURRENT MODOT SPECIFICATIONS.

G / C9 HEAVY DUTY CONCRETE PAVEMENT
N.T.S.

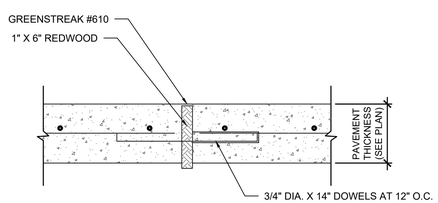


NOTE:
A. SEE PLAN FOR JOINT SPACING.

CONTRACTION JOINT



CONSTRUCTION JOINT



NOTES:
A. ENSURE JOINTS ARE CLEAN AND DRY PRIOR TO THE APPLICATION OF THE GREENSTREAK #610.
B. INSTALL REDWOOD PLANK AFTER JOINTS HAVE BEEN CLEANED AND DRIED.
C. GREENSTREAK #610 APPLICATION SHALL BE IN STRICT COMPLIANCE WITH MANUFACTURER'S REQUIREMENTS.

EXPANSION JOINT

H / C9 CONCRETE JOINT DETAILS
N.T.S.

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
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PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

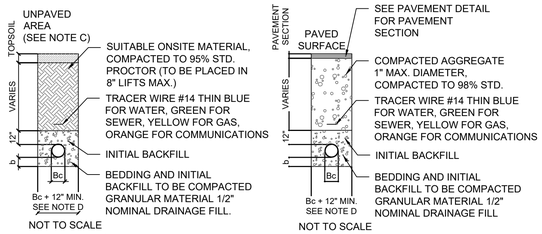
SHEET TITLE

SITE DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-9

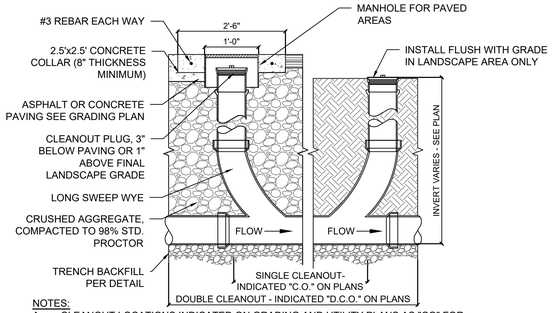


NOT TO SCALE

TRENCH / BACKFILL NOTES

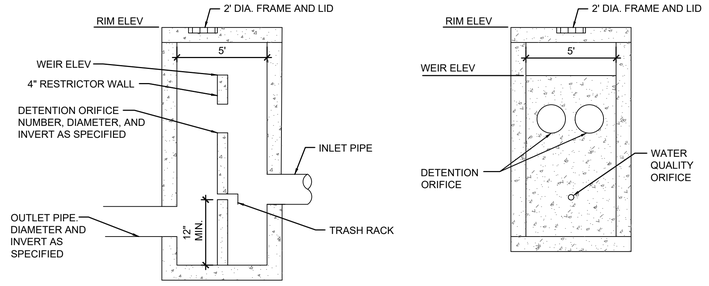
A. BEDDING THICKNESS UNDER PIPE BARREL b, SHALL BE 1/8 OF Bc; 6" MIN. Bc IS OUTSIDE DIAMETER OF PIPE AT BELL.
B. THE HAUNCH AREA OF THE PIPE MUST BE FULLY SUPPORTED; THEREFORE THE BEDDING MATERIAL SHALL BE HAND PLACED AND COMPACTED UNDER THE PIPE HAUNCH.
C. IF UNPAVED AREA IS WITHIN 10' OF PAVEMENT OR STRUCTURE THEN FOLLOW TRENCH GUIDELINES FOR PAVED AREA.
D. PIPE DIAMETER OF 4" OR SMALLER SHALL HAVE A MAXIMUM TRENCH WIDTH OF 12".
E. BEDDING AND INITIAL BACKFILL SHALL BE SAND FOR ALL UTILITY CONDUIT CARRYING WATER, ELECTRIC, GAS, AND TELEPHONE.

A / C10 TRENCH BACKFILL DETAIL
N.T.S.



NOTES:
A. CLEANOUT LOCATIONS INDICATED ON GRADING AND UTILITY PLANS AS "CO" FOR SINGLE CLEANOUT AND "DCO" FOR DOUBLE CLEAN OUT.
B. PROVIDE CLEANOUTS AS SPECIFIED:
1. ZURN Z-1400 CLEANOUTS IN NON-TRAFFIC AREAS AND SIDEWALKS
2. ZURN-1449 CLEANOUTS IN LANDSCAPED AREAS
3. ZURN Z-1400 HD CLEANOUTS IN TRAFFIC AREAS WITH A "SERVICE STATION" TYPE MANHOLE, OPW #104 A12 - DOVER CORP./OPW DIV.

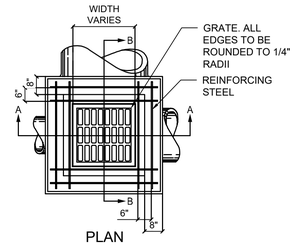
B / C10 PIPE CLEANOUT DETAIL
N.T.S.



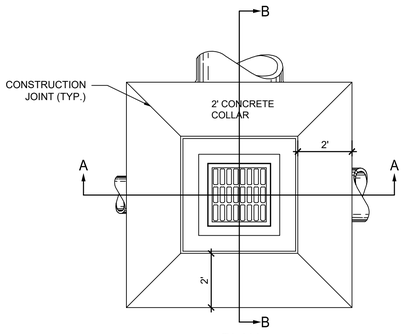
NOTES:
1. CONTROL STRUCTURE SHALL BE A STANDARD MODOT MANHOLE PER STANDARD DRAWING 731.00U, MODIFIED AS SHOWN.
2. PROVIDE MANHOLE STEPS ON ACCESS SIDE OF WEIR WALL.

				OUTLET PIPE		WATER QUALITY ORIFICE		DETENTION ORIFICE(S)			WEIR		
STRUCTURE	TC/RIM ELEVATION	UGS	WATER QUALITY VOL ELEV	DIA.	INV.	DIA.	INV.	NO.	DIA.	INV.	WIDTH	ELEV	100-YR WSE
6	1014.50	1	1008.91	12"	1005.75	1.2"	1006.75	2	10"	1009.25	5'	1011.90	1012.78

C / C10 OUTLET CONTROL STRUCTURE
N.T.S.



PLAN



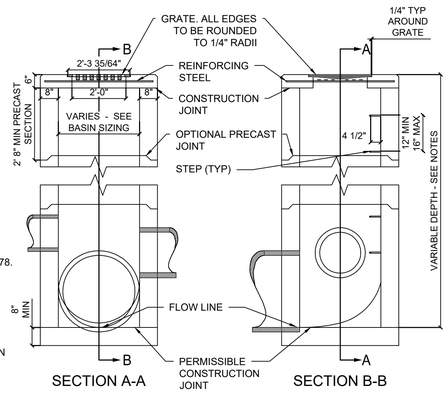
PLAN

BASIN SIZING		
INSIDE DIMENSION	PIPE SIZE	TOP SLAB REINFORCING AT 6" O.C.
3'-0" x 3'-0"	12" TO 33"	(8) #4 BARS
4'-0" x 4'-0"	36" TO 42"	(12) #4 BARS

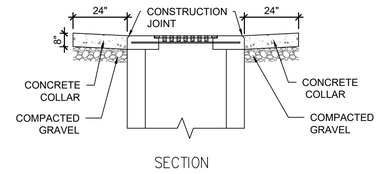
CONCRETE TABLE					
AGGREGATE	DRY AGGREGATES (LB/C.Y.)			CEMENT CONTENT (LB/C.Y.)	WATER-CEMENT RATIO (MAX)
	FINE	COARSE	TOTAL		
GRAVEL	1160	1735	2895	600	0.5
LIMESTONE	1285	1630	2915	600	0.5
SLAG	1350	1360	2710	600	0.5

NOTES

A. GRATE: EJ NO. 5115M2, 5115Z OR APPROVED EQUAL.
NEENAH NO. 4852, 1893-0018 OR APPROVED EQUAL.
WALLS: CAST-IN-PLACE WALLS SHALL HAVE A NOMINAL THICKNESS OF 8". PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND BE REINFORCED SUFFICIENTLY TO SHIPPING AND HANDLING WITHOUT DAMAGE. PRECAST TOPS SHALL BE 8" THICK.
STEPS: STEPS SHALL BE PROVIDED WHERE THE DEPTH OF THE STRUCTURE EXCEEDS 6'.
CONCRETE: CAST-IN-PLACE CONCRETE TO MEET THE COMPOSITION SPECIFIED IN THE CONCRETE TABLE. ALL PRECAST CONCRETE SHALL MEET THE REQUIREMENTS OF ASTM C478.
B. INLETS OVER 12' IN DEPTH SHALL BE PRECAST OR CAST-IN-PLACE CONCRETE; REINFORCED WITH #4 BARS ON 12" CENTERS BOTH VERTICALLY AND HORIZONTALLY WITH 2" CLEARANCE FROM INSIDE WALL FACE.
PRECAST BASE: IF A PRECAST BASE IS USED, IT SHALL BE SET DEEP ENOUGH SO THAT THE TOP CAN BE PLACED ON THE BASE TO PROVIDE THE GRATE ELEVATION SPECIFIED IN THE PLANS. PRECAST GRADE RINGS MAY BE USED TO ADJUST THE TOP ELEVATION. MINIMUM OF TWO COURSES OF BRICK SHALL BE USED TO ADJUST THE TOP ELEVATION.
LOCATION AND ELEVATION: WHEN GIVEN ON THE PLANS, THE LOCATION AND THE ELEVATION ARE AT THE TOP CENTER OF THE GRATE.
MINIMUM DEPTH: THE MINIMUM DEPTH SHALL BE THE OUTSIDE DIAMETER (O.D.) OF THE OUTLET PIPE PLUS 7".
OPENINGS: PIPE OPENINGS SHALL BE THE O.D. OF THE PIPE BEING SUPPLIED PLUS 2" WHEN PREFABRICATED OR FIELD CUT. THE INTERSTITIAL SPACE SHALL BE FILLED WITH GROUT.



D / C10 SQUARE CATCH BASIN DETAIL
N.T.S.

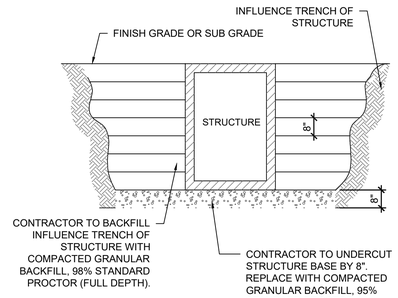


SECTION

NOTES

A. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI
B. CONCRETE COLLAR SHALL SLOPE TO GRATE AT 5.0%

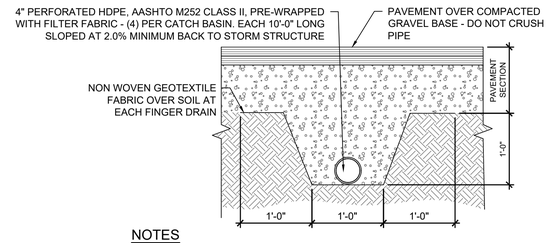
E / C10 CATCH BASIN CONCRETE COLLAR
N.T.S.



STRUCTURE BACKFILL NOTES

A. BACKFILL TO BE PLACED IN 8" LIFTS
B. NO ON SITE FILL WILL BE ALLOWED FOR UTILITY STRUCTURES.

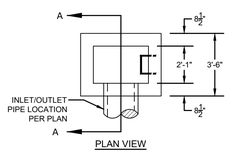
G / C10 STRUCTURE BACKFILL
N.T.S.



NOTES

A. THE INTENTION OF THE FINGER DRAIN SYSTEM IS TO PREVENT EXCESS WATER ACCUMULATION AT THE LOW POINTS IN THE GRAVEL BASE AT DRAINAGE STRUCTURES. SYSTEM TO BE INSTALLED TO ASSURE ADEQUATE DRAINAGE OF PAVEMENT BASE.

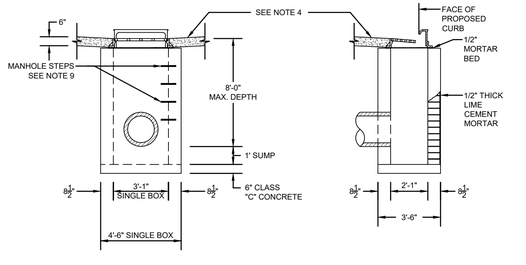
F / C10 FINGER DRAIN
N.T.S.



PLAN VIEW
(CASTING REMOVED)

CASTING SPECIFICATIONS		
	NEENAH	EAST JORDAN
SINGLE BOX FRAME	R-3290	7030
DOUBLE BOX FRAME	R-3295-A	7031
TRIPLE BOX FRAME	R-3295-B	7032
GRATE (SUMPS)	TYPE C	TYPE M2
VANE GRATE (SLOPES)	TYPE V	TYPE M4
DRIVEWAY FRAME & GRATE	R-3290-A	7034

ALL FRAMES, GRATES & CURB BOXES FOR CURB & GUTTER INLETS SHALL MEET THE ABOVE SPECIFICATIONS, OR SHALL BE APPROVED EQUALS.



ELEVATION

SECTION A-A

NOTES:
1. PRECAST WALLS SHALL HAVE A MINIMUM THICKNESS OF 6" AND BE REINFORCED SUFFICIENTLY TO PERMIT SHIPPING AND HANDLING WITHOUT DAMAGE.
2. THE INLET BOTTOM SHALL BE SHAPED TO PROVIDE SLOPE OF 3" TO 4" TO OUTLET PIPE. THE CROSS SECTIONAL FORM OF BOTTOM AND LONGITUDINAL SLOPE IS TO BE ADAPTED TO LOCATION OF OUTLET PIPE AS DIRECTED.
3. INLET/OUTLET PIPE LOCATION PER PLAN.
4. THE EXISTING GUTTER WITHIN THE AREA AROUND THE INLET WHERE CUT OUT, SHALL BE REPLACED WITH CLASS QC1 CONCRETE OR ASPHALT CONCRETE PAVING AS ORDERED.
5. THE BACKFILLING WITHIN PROPOSED PAVED AREAS SHALL BE WELL TAMPED IN LAYERS NOT EXCEEDING 4" IN THICKNESS, LOOSE MEASUREMENT, OR BACKFILLED WITH AN APPROVED MATERIAL.
6. WALLS MAY BE BRICK, PRECAST SOLID CONCRETE BLOCKS, OR CAST IN PLACE CONCRETE, CLASS QC1 OR PRECAST CONCRETE.
7. MAXIMUM PIPE DIAMETERS ARE 18" INTO SIDE WALLS AND 27" INTO FRONT AND BACK WALLS FOR SINGLE BOX INLETS.
8. STEPS SHALL MEET THE REQUIREMENTS OF ASTM C478, AND SHALL BE INSTALLED WITH A UNIFORM VERTICAL SPACING OF 12" TO 16".

H / C10 CURB INLET DETAIL
N.T.S.

MISSOURI ONE CALL SYSTEM

The Missouri One Call System is a communications system which was established to help prevent damage to underground facilities and to promote safety. Missouri One Call operators are on duty 24 hours a day, seven days a week.

Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

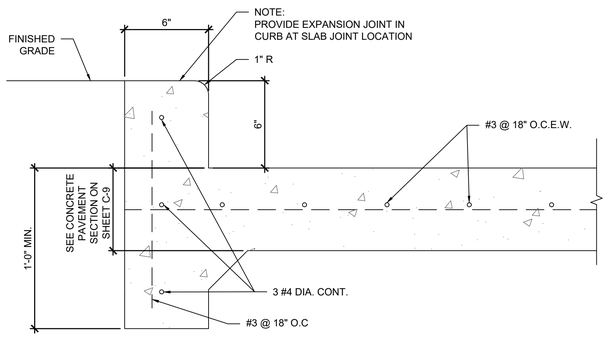
SHEET TITLE

SITE DETAILS

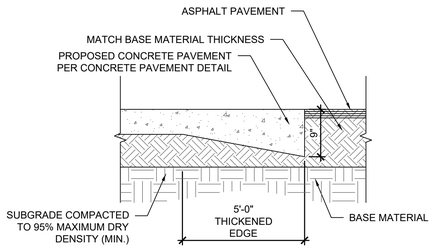
DRAWN BY: LLK/AMA
CHECKED BY: KEA
PROJECT NO: 40497-01

DRAWING

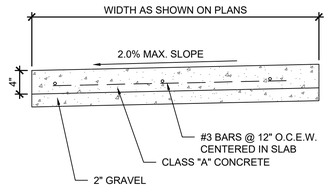
C-10



A C11 MONOLITHIC CURB DETAIL
N.T.S.



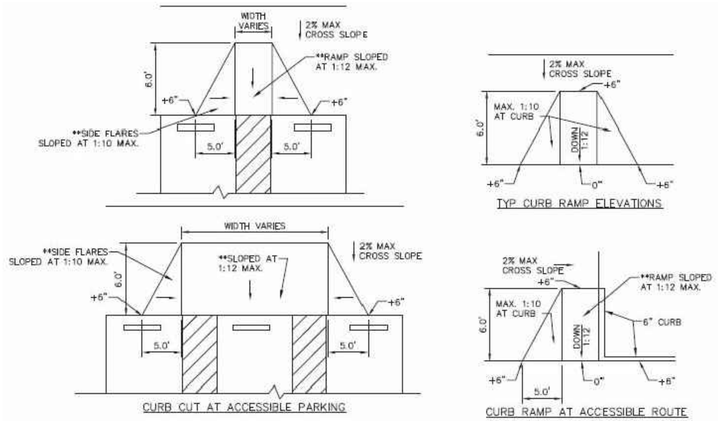
B C11 PAVEMENT TRANSITION
N.T.S.



NOTES:
1. CONCRETE FOR SIDEWALK SHALL BE 3,000 PSI MINIMUM.

2. CONCRETE NOSE SHALL BE DOWELED INTO ADJACENT CURB

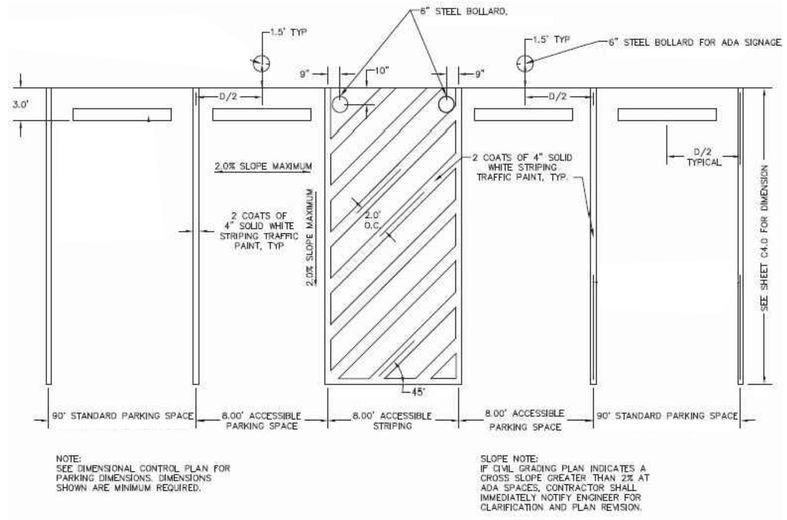
C C11 CONCRETE CURB NOSE DETAIL
N.T.S.



**NOTE:
1. DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES PER CURRENT ADA SPECIFICATIONS. COLOR: TERRA COTTA OR APPROVED COLOR BY OWNER

2. SLOPE NOTE: IF CIVIL GRADING PLAN INDICATES A CROSS SLOPE GREATER THAN 2% AT ADA SPACES, CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER FOR CLARIFICATION AND PLAN REVISION.

D C11 CURB RAMPS
N.T.S.



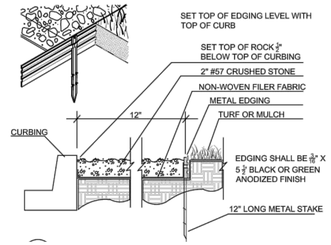
NOTE:
SEE DIMENSIONAL CONTROL PLAN FOR PARKING DIMENSIONS. DIMENSIONS SHOWN ARE MINIMUM REQUIRED.

SLOPE NOTE:
IF CIVIL GRADING PLAN INDICATES A CROSS SLOPE GREATER THAN 2% AT ADA SPACES, CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER FOR CLARIFICATION AND PLAN REVISION.

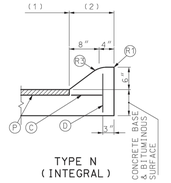
E C11 PARKING STRIPING
N.T.S.

METAL EDGING SHALL BE AS MANUFACTURED BY COL-MET OR EQUAL

CRUSHED STONE SHALL BE INSTALLED ON TOP OF NONWOVEN FILTER FABRIC. INSTALL METAL EDGING BETWEEN CRUSHED STONE AND SOD/MULCH. LAVA ROCK IS UNACCEPTABLE. SUBMIT SAMPLE TO OWNER FOR APPROVAL



F C11 GRANITE DETAIL
N.T.S.



MOUNTABLE CURBS

LEGEND
- (B) TIE BARS – 30" X #5 Ø AT 30" CTRS.
- (C) PERMISSIBLE CONSTRUCTION JOINT. IF CONSTRUCTED IN THIS MANNER TIE BARS MUST BE USED.
- (D) #4 Ø TIE BAR AT 24" CENTERS LENGTH OF THE TIE BARS EQUALS THICKNESS OF PAVEMENT PLUS HEIGHT OF CURB, LESS 3 INCHES.
- (K) TONGUE & GROOVE JOINT WITH TIE BAR – SEE DETAIL.
- (P) TOP OF PAVEMENT OR CONCRETE BASE.
- (R1) ROUND TO ½" RADIUS. (EXCEPT FOR SAWED JOINTS)
- (R3) ROUND TO ¾" RADIUS.
- (R9) CONSTRUCT TO 9" RADIUS
- (1) PAY LIMIT FOR PAVEMENT
- (2) PAY LIMIT FOR CURB, OR CURB & GUTTER.

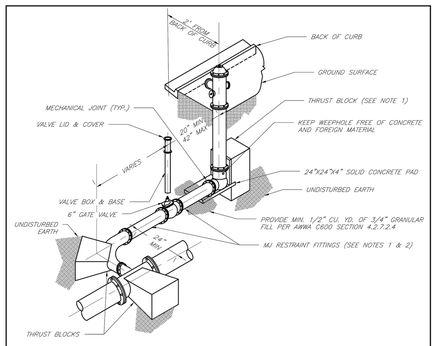
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI · SCHROCK · NUMBER PE-2007 · PROFESSIONAL ENGINEER
THIS SHEET WAS SEALED, SIGNED, DATED AND ELECTRONICALLY

CONCRETE CURB, CURB AND GUTTER AND GUTTER

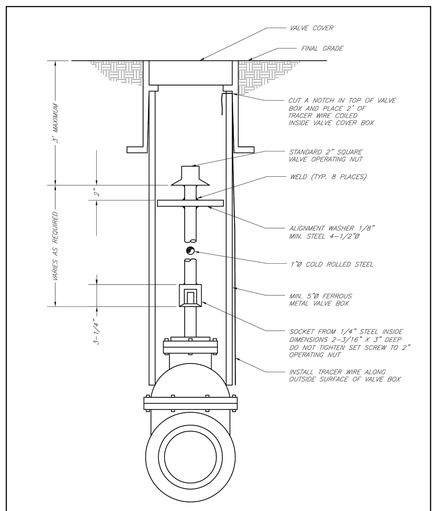
DATE EFFECTIVE:	07/01/2018	609.00P	SHEET NO.
DATE PREPARED:	5/3/2018		2 OF 2

G C11 MODOT TYPE N MOUNTABLE CURB
N.T.S.

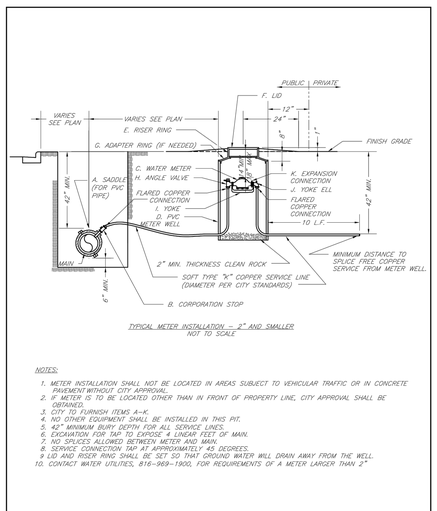


NOTES:
1. WHEN RETAINER GLANDS ARE USED IN LIEU OF MECHANICAL JOINT (MJ) RESTRAINT FITTINGS, HORIZONTAL THRUST BLOCKS ARE REQUIRED.
2. GATE VALVE MAY BE BOLTED DIRECTLY TO MJ RESTRAINT TEE.
3. SEE APPROVED PRODUCTS LIST FOR WATER UTILITIES FOR FIRE HYDRANT, VALVES, VALVE BOX LID, AND COVER.
4. BOTTOM HYDRANT FLANGE SHALL BE 2" TO 6" ABOVE FINISHED GRADE.
5. FOR STREETS WITHOUT CURBS FIRE HYDRANTS SHALL BE PLACED WITHIN 1 FOOT OF THE R/W LINE, BUT NOT MORE THAN 10' FROM EDGE OF PAVEMENT. FIRE HYDRANT SHALL NOT BE PLACED IN BOTTOM OF DITCH.
6. HYDRANT SHALL BE ROTATED AS DIRECTED BY INSPECTOR.

LS LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
HYDRANT WITH 90 DEGREE BEND
Date: 02/13 | Drawn By: JH | Checked By: DL | FILE: WAT-8 | Rev: 1/14 | Rev:



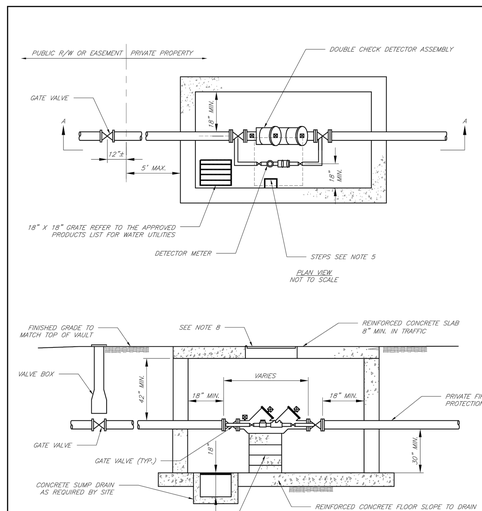
LS LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
VALVE STEM EXTENSION AND VALVE BOX
Date: 02/13 | Drawn By: JH | Checked By: DL | FILE: WAT-9 | Rev: 1/14 | Rev:



TYPICAL METER INSTALLATION – 2" AND SMALLER
NOT TO SCALE

NOTES:
1. METER INSTALLATION SHALL NOT BE LOCATED IN AREAS SUBJECT TO VEHICULAR TRAFFIC OR IN CONCRETE PAVEMENT WITHOUT CITY APPROVAL.
2. 1" METER IS TO BE LOCATED OTHER THAN IN FRONT OF PROPERTY LINE, CITY APPROVAL SHALL BE OBTAINED.
3. CITY TO FURNISH ITEMS A-K.
4. NO OTHER EQUIPMENT SHALL BE INSTALLED IN THIS PIT.
5. 42" MINIMUM BURY DEPTH FOR ALL SERVICE LINES.
6. EXCAVATION FOR TAP TO EXPOSE 4 LINEAR FEET OF MAIN.
7. NO SPLICES ALLOWED BETWEEN METER AND MAIN.
8. SERVICE CONNECTION TAP AT APPROXIMATELY 45 DEGREES.
9 LID AND RISER RING SHALL BE SET SO THAT GROUND WATER WILL DRAIN AWAY FROM THE WELL.
10. CONTACT WATER UTILITIES, 816-969-1900, FOR REQUIREMENTS OF A METER LARGER THAN 2"

LS LEE'S SUMMIT MISSOURI
PUBLIC WORKS ENGINEERING DIVISION | 220 SE GREEN STREET | LEE'S SUMMIT, MO 64063
SERVICE CONNECTION/METER WELL
Date: 02/13 | Drawn By: JH | Checked By: DL | FILE: WAT-11 | Rev: 1/14 | Rev:



SECTION A-A
NOT TO SCALE

GENERAL NOTES:
1. METER VAULT WALLS TO BE POURED OR PRECAST CONCRETE. METER VAULT ROOF TO BE REINFORCED CONCRETE WITH OPENING CENTERED OVER DETECTOR METER. REINFORCED WALLS AND SLABS ARE TO BE DESIGNED BY THE OWNER'S ENGINEER OR PRECAST ENGINEER.
2. METER VAULT TO BE LOCATED, WHEN POSSIBLE, OUTSIDE TRAFFIC AREA AND WHERE SURFACE WATER WILL NOT DRAIN INTO IT. PROVIDE CONCRETE SUMP TO DRAIN, TO AN ABOVE GROUND DISCHARGE POINT.
3. ALL PIPE AND FITTINGS FROM THE CITY WATER MAIN THROUGH THE VAULT SHALL BE PROVIDED WITH RESTRAINED JOINT FITTINGS.
4. ALL FITTINGS FOR THE DETECTOR METER TO BE BRASS.
5. STEPS SHALL BE IN ACCORDANCE WITH THE APPROVED PRODUCTS LIST FOR WATER UTILITIES AND SHALL BE ON 16" CENTERS.
6. A DEPARTMENT OF NATURAL RESOURCES APPROVED DOUBLE CHECK DETECTOR ASSEMBLY BACKFLOW PREVENTER MUST BE USED. FOR A COPY OF THE MISSOURI DEPARTMENT OF NATURAL RESOURCES APPROVED BACKFLOW PREVENTION ASSEMBLIES, CONTACT WATER UTILITIES AT 816-969-1900.
7. ALL VALVES SHALL HAVE RISING STEMS.
8. MANHOLE COVER SHALL BE A BILCO K-1 MODEL UNLESS IN A VEHICLE TRAFFIC AREA. SEE THE APPROVED PRODUCTS LIST FOR WATER UTILITIES FOR TRAFFIC CONDITIONS. THE COVER SHALL HAVE A 1-3/4" ø HOLE DRILLED FOR A TOUCH/READ DEVICE.
9. A MINIMUM OF 18" CLEARANCE SHALL BE PROVIDED AROUND ALL PIPING, VALVES, APPURTENANCES, ETC.
10. CONTACT PUBLIC WORKS ENGINEERING FOR VAULTS THAT INCLUDE A FIRE DEPARTMENT CONNECTION OR A 3" OR LARGER METER.

CITY OF LEE'S SUMMIT, MO
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
LEE'S SUMMIT, MISSOURI

STANDARD DRAWINGS

VAULT FOR DOUBLE CHECK DETECTOR CHECK

Drawn By: AR
Checked By: DL
Date: 1/14
Rev: 1/14
or
WAT-12

REVISION/DATE/DESCRIPTION	
60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE

SITE
DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-11

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	DIRK HUDSON 816-602-4201 DIRK.HUDSON@ADS-PIPE.COM
ADS SALES REP:	###### ####### ########## ###### ########@ADS-PIPE.COM
PROJECT NO:	#######

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST by StormTech
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

##########
##########

MC-4500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-4500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-4500 CHAMBER SYSTEM

1. STORMTECH MC-4500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-4500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-4500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

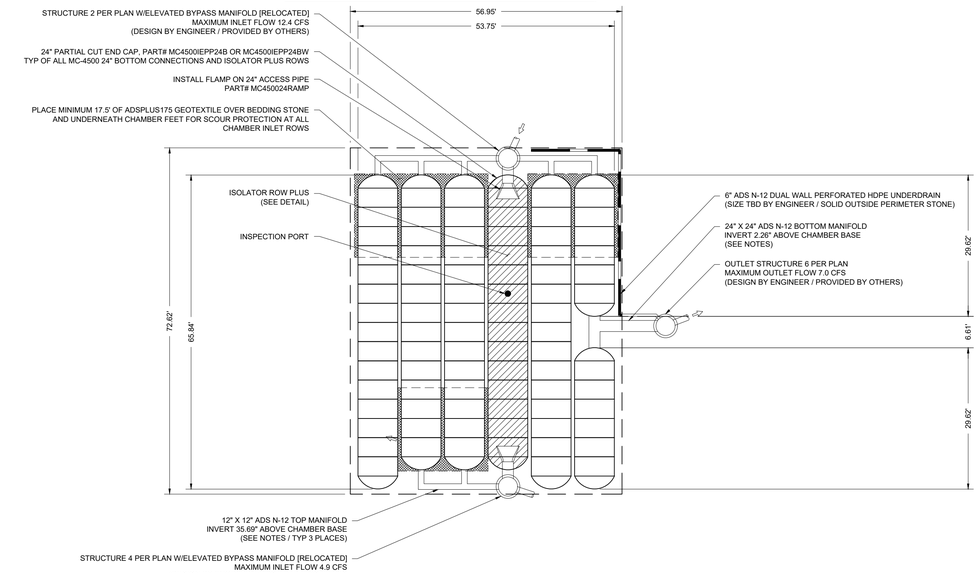
84	STORMTECH MC-4500 CHAMBERS
14	STORMTECH MC-4500 END CAPS
12	STONE ABOVE (in)
9	STONE BELOW (in)
30	% STONE VOID
14403	**INSTALLED SYSTEM VOLUME (CF) BELOW ELEVATION 1013.00 (PERIMETER STONE INCLUDED)**
4135	SYSTEM AREA (ft²)
259	SYSTEM PERIMETER (ft)

PROPOSED ELEVATIONS

1019.50	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
1015.00	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
1014.50	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
1014.50	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
1014.50	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
1013.50	TOP OF STONE
1012.50	TOP OF MC-4500 CHAMBER
1010.47	12" TOP MANIFOLD INVERT
1007.69	24" ISOLATOR ROW PLUS CONNECTION INVERT
1007.69	24" BOTTOM MANIFOLD INVERT
1007.50	BOTTOM OF MC-4500 CHAMBER
1006.75	UNDERDRAIN INVERT
1006.75	BOTTOM OF STONE

NOTES

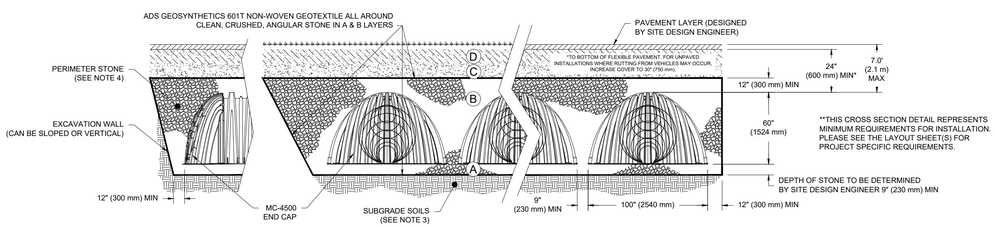
- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

MISSOURI ONE CALL SYSTEM

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Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION	
60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE

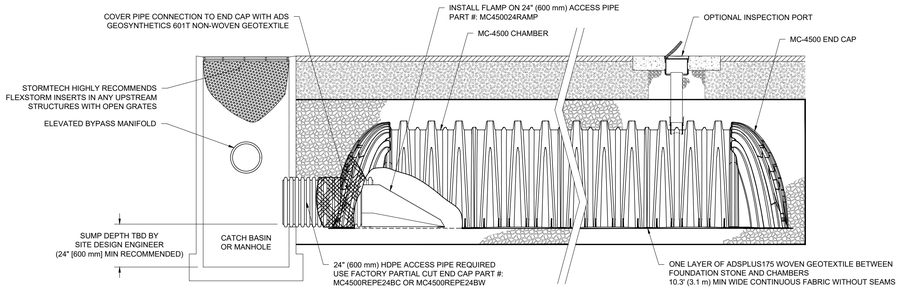
DETENTION SYSTEM DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-12

N:\03\62404497\01-Lees Summit, MO\Docs\CAD\Civil\C12 - Detention System Details.dwg, 12/21/2020 3:45 PM, zahorchak, sara



MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

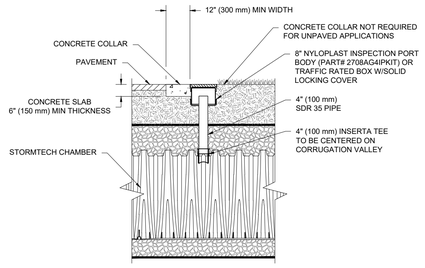
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

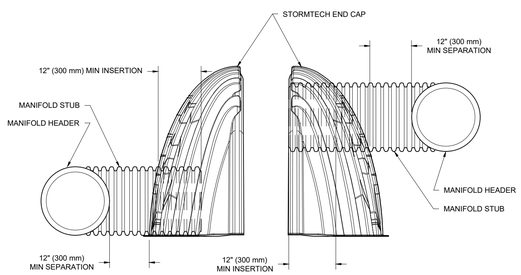
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

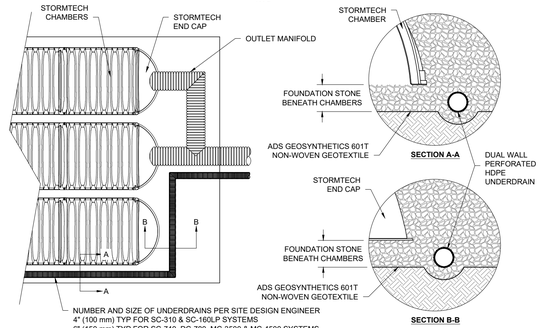
4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)
NTS

MC-SERIES END CAP INSERTION DETAIL
NTS

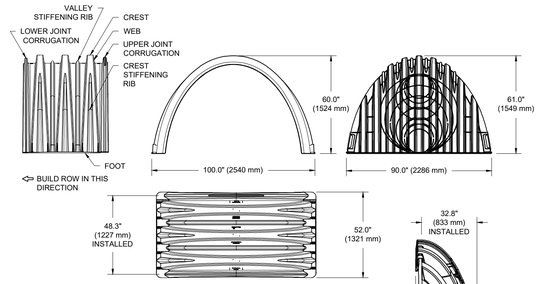


NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

UNDERDRAIN DETAIL
NTS



MC-4500 TECHNICAL SPECIFICATION
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

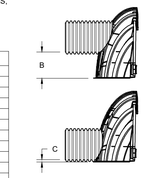
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

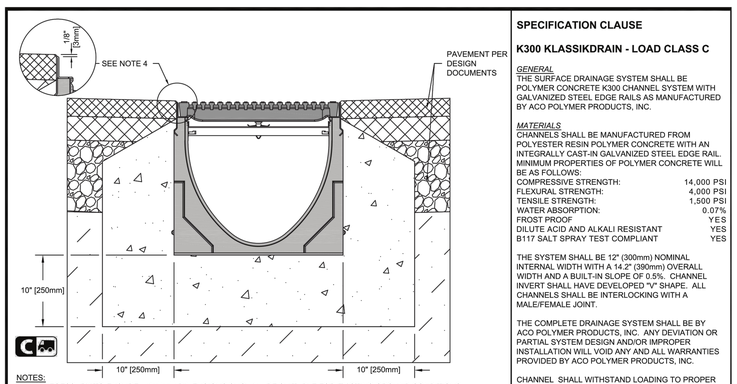
PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.



NOTES:
1. IT IS NECESSARY TO ENSURE MINIMUM DIMENSIONS SHOWN ARE SUITABLE FOR EXISTING GROUND CONDITIONS. *ENGINEERING ADVICE MAY BE REQUIRED.*
2. MINIMUM CONCRETE STRENGTH OF 4,000 PSI IS RECOMMENDED. CONCRETE SHOULD BE VIBRATED TO ELIMINATE AIR POCKETS.
3. EXPANSION AND CONTRACTION CONTROL JOINTS AND REINFORCEMENT ARE RECOMMENDED TO PROTECT CHANNEL AND CONCRETE SURROUND. *ENGINEERING ADVICE MAY BE REQUIRED.*
4. THE FINISHED LEVEL OF THE CONCRETE SURROUND MUST BE APPROX. 1/8" [3mm] ABOVE THE TOP OF THE CHANNEL EDGE.
5. CONCRETE BASE THICKNESS SHOULD MATCH SLAB THICKNESS. ENGINEERING ADVICE MAY BE REQUIRED TO DETERMINE PROPER LOAD CLASS.
6. REFER TO ACO'S LATEST INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS.

SPECIFICATION CLAUSE

K300 KLASSIKDRAIN - LOAD CLASS C

GENERAL
THE SURFACE DRAINAGE SYSTEM SHALL BE POLYMER CONCRETE K300 CHANNEL SYSTEM WITH GALVANIZED STEEL EDGE RAILS AS MANUFACTURED BY ACO POLYMER PRODUCTS, INC.

MATERIALS
CHANNELS SHALL BE MANUFACTURED FROM POLYESTER RESIN POLYMER CONCRETE WITH AN INTEGRALLY CAST-IN GALVANIZED STEEL EDGE RAIL. MINIMUM PROPERTIES OF POLYMER CONCRETE WILL BE AS FOLLOWS:

COMPRESSIVE STRENGTH:	14,000 PSI
FLEXURAL STRENGTH:	4,000 PSI
TENSILE STRENGTH:	1,500 PSI
WATER ABSORPTION:	0.07%
FROST PROOF	YES
DILUTE ACID AND ALKALI RESISTANT	YES
B117 SALT SPRAY TEST COMPLIANT	YES

THE SYSTEM SHALL BE 12" (300mm) NOMINAL INTERNAL WIDTH WITH A 14.2" (390mm) OVERALL WIDTH AND A BUILT-IN SLOPE OF 0.5%. CHANNEL INVERT SHALL HAVE DEVELOPED "V" SHAPE. ALL CHANNELS SHALL BE INTERLOCKING WITH A MALE/FEMALE JOINT.

THE COMPLETE DRAINAGE SYSTEM SHALL BE BY ACO POLYMER PRODUCTS, INC. ANY DEVIATION OR PARTIAL SYSTEM DESIGN AND/OR IMPROPER INSTALLATION WILL VOID ANY AND ALL WARRANTIES PROVIDED BY ACO POLYMER PRODUCTS, INC.

CHANNEL SHALL WITHSTAND LOADING TO PROPER LOAD CLASS AS OUTLINED BY EN 1433. GRATE TYPE SHALL BE APPROPRIATE TO MEET THE SYSTEM LOAD CLASS SPECIFIED AND INTENDED APPLICATION. GRATES SHALL BE SECURED USING 'QUICKLOK' BOLTLESS LOCKING SYSTEM. CHANNEL AND GRATE SHALL BE CERTIFIED TO MEET THE SPECIFIED EN 1433 LOAD CLASS. THE SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

K3-C-HAP	K300 - KLASSIKDRAIN - LOAD CLASS: C Haunched Asphalt Pavement	**ACO Polymer Products, Inc.**
ACO DATE: 08/25/15	INSTALLATION DRAWING - ACO DRAIN	825 W. Beechcraft St, Casa Grande, AZ 85122, Tel: 520-421-9988, Fax: 520-421-9899 9470 Pinecone Dr. Mentor, OH 44060, Tel: 440-639-7230, Fax: 440-639-7235 4211 Pleasant Rd. Fort Mill, SC 29708, Tel: 440-639-7230, Fax: 803-802-1063

Arizona Tel: 888-490-9552 e-mail: sales@acousa.com Ohio Tel: 800-543-4764 www.acousa.com South Carolina Tel: 800-543-4764

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MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

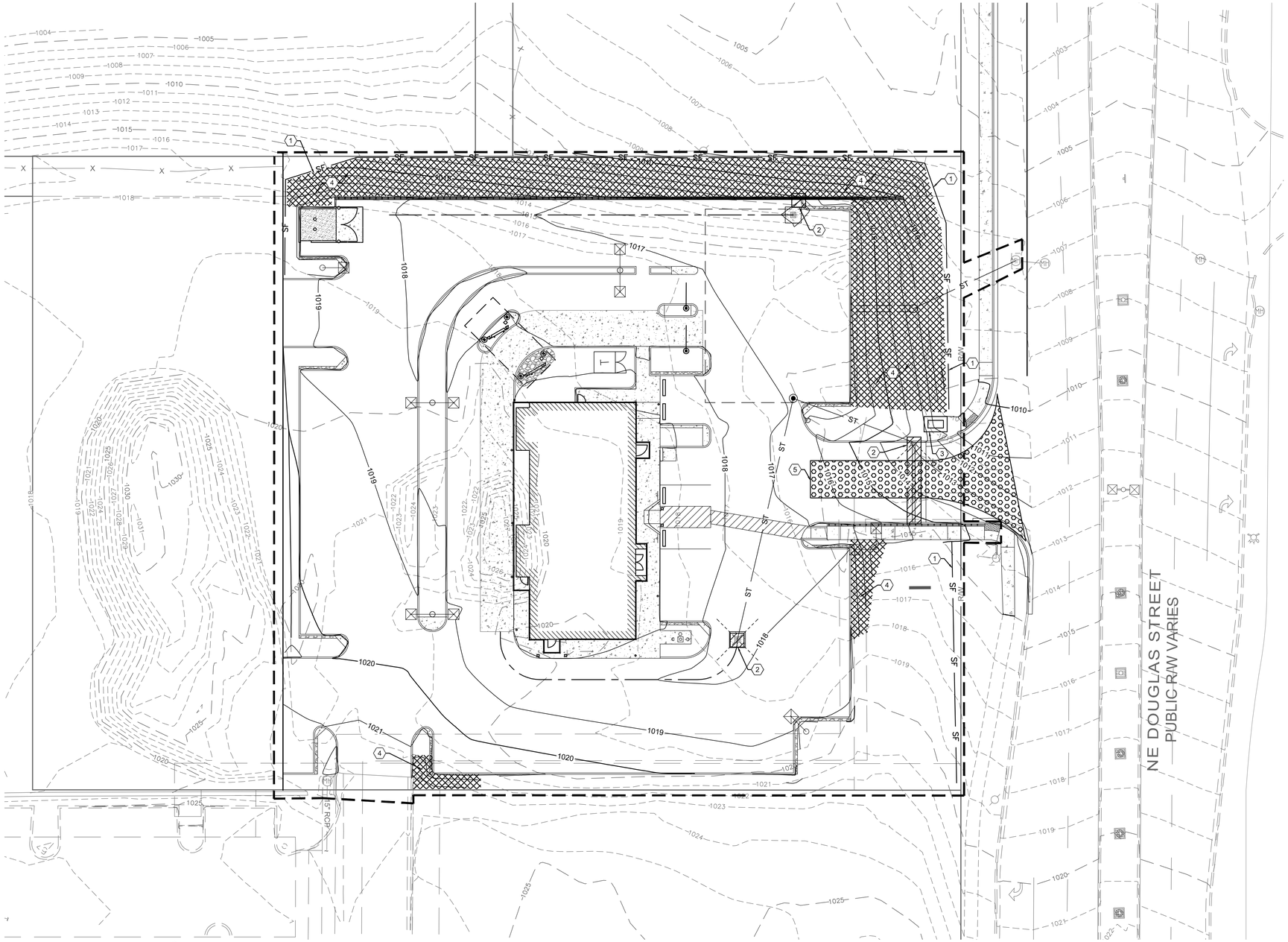
SHEET TITLE

DETENTION SYSTEM DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-13

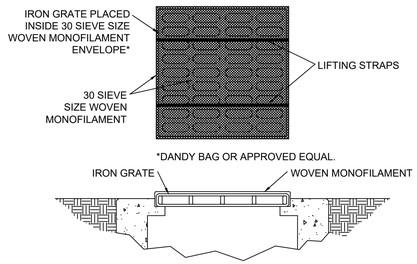


KEYED NOTES:

1. TEMPORARY SILT FENCE, SEE DETAIL A ON THIS SHEET.
2. INLET PROTECTION, SEE DETAIL B ON THIS SHEET.
3. CONCRETE WASHOUT, SEE DETAIL A ON SHEET C-15.
4. SLOPE PROTECTION, SEE DETAIL B ON SHEET C-15.
5. CONSTRUCTION ENTRANCE, SEE DETAIL ON SHEET C-16.

LEGEND

EXISTING	PROPOSED	DESCRIPTION
1015	1015	CONTOUR
	SF	SILT FENCE
		INLET PROTECTION
		CONCRETE WASHOUT
		SLOPE PROTECTION
		CONSTRUCTION ENTRANCE



INSTALLATION AND MAINTENANCE GUIDELINES

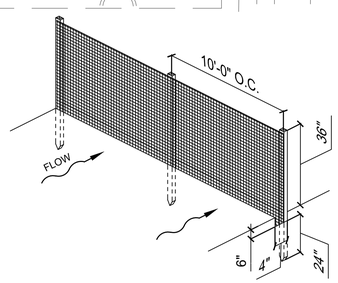
INSTALLATION:

THE EMPTY BAG SHOULD BE PLACED OVER THE GRATE AS THE GRATE STANDS ON END. IF USING OPTIONAL OIL ABSORBENTS; PLACE ABSORBENT PILLOW IN POUCH, ON THE BOTTOM (BELOW-GRADE SIDE) OF THE UNIT. ATTACH ABSORBENT PILLOW TO TETHER LOOP. TUCK THE ENCLOSURE FLAP INSIDE TO COMPLETELY ENCLOSE THE GRATE. HOLDING THE LIFTING DEVICES (DO NOT RELY ON LIFTING DEVICES TO SUPPORT THE ENTIRE WEIGHT OF THE GRATE), PLACE THE GRATE INTO ITS FRAME.

MAINTENANCE:

REMOVE ALL ACCUMULATED SEDIMENT AND DEBRIS FROM SURFACE AND VICINITY OF UNIT AFTER EACH STORM EVENT. REMOVE SEDIMENT THAT HAS ACCUMULATED WITHIN THE CONTAINMENT AREA OF THE BAG AS NEEDED. IF USING OPTIONAL OIL ABSORBENTS; REMOVE AND REPLACE ABSORBENT PILLOW WHEN NEAR SATURATION.

B / C14 INLET PROTECTION
N.T.S.

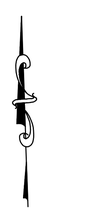


A / C14 TEMPORARY SILT FENCE
N.T.S.

1. THIS SEDIMENT BARRIER UTILIZES STANDARD STRENGTH OR EXTRA STRENGTH SYNTHETIC FILTER FABRICS. IT IS DESIGNED FOR SITUATIONS IN WHICH ONLY SHEET OR OVERLAND FLOWS ARE EXPECTED.
2. THE HEIGHT OF A SEDIMENT FENCE SHALL NOT EXCEED 36-INCHES (HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE).
3. THE FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED.
4. POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES). WHEN EXTRA STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET.
5. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 4 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
6. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1-INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
7. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 8-INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
8. WHEN EXTRA STRENGTH FILTER FABRIC AND CLOSURE POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ITEM NO. 6 APPLYING.
9. THE TRENCH SHALL BE BACKFILLED AND SOIL COMPACTED OVER THE FILTER FABRIC.
10. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

MAINTENANCE:

1. SEDIMENT FENCES AND FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC ON A SEDIMENT FENCE OR FILTER BARRIER DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER IS STILL NECESSARY, THE FABRIC SHALL BE REPLACED PROMPTLY.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE BARRIER.
4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE SEDIMENT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED, AND SEEDED.



0 10 20 30 40
SCALE: 1"=20'

MISSOURI ONE CALL SYSTEM

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1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION	
60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE

STORMWATER POLLUTION PREVENTION PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-14

PROJECT NAME AND LOCATION
WHATABURGER
1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO 64086

OWNER NAME AND ADDRESS
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2221 SCHROCK ROAD
COLUMBUS, OHIO 43229
PHONE: (614) 898-7100
CONTACT: KAILEN AKERS
EMAIL: kakers@msconsultants.com

GENERAL SCOPE OF PROJECT
THIS PROJECT WILL CONSIST OF A RESTAURANT AND THE CONSTRUCTION OF ASSOCIATED DRAINAGE FACILITIES AND OTHER MISCELLANEOUS SITE WORK.

NATURE OF CONSTRUCTION ACTIVITY (CHECK ALL THAT APPLY)

SUBDIVISION	
COMMERCIAL	X
INDUSTRIAL	
P.U.D.	
OTHER	

SOIL TYPES
10024 - GREENTON-URBAN LAND COMPLEX, 5 TO 9 PERCENT SLOPES
10082 - ARISBURG-URBAN LAND COMPLEX, 1 TO 5 PERCENT SLOPES

CONSTRUCTION SITE ESTIMATES

TOTAL SITE AREA:	1.40 AC.
CONSTRUCTION SITE AREA TO BE DISTURBED:	1.40 AC.
PERCENTAGE IMPERVIOUS AREA BEFORE CONSTRUCTION:	0.0%
RUNOFF COEFFICIENT BEFORE CONSTRUCTION:	0.30
PERCENTAGE IMPERVIOUS AREA AFTER CONSTRUCTION:	74.7%
RUNOFF COEFFICIENT AFTER CONSTRUCTION:	0.75

RECEIVING WATERS
THE SITE IS TRIBUTARY TO LITTLE CEDAR CREEK BY AN EXISTING STORM SEWER.

CONSTRUCTION SEQUENCE
THE ORDER OF MAJOR ACTIVITIES WILL BE AS FOLLOWS:

1. PRE-CONSTRUCTION MEETING
2. BEFORE AND SITE GRADING ACTIVITIES BEGIN
   a. INSTALL PERIMETER SILT FENCES
   b. INSTALL INLET PROTECTION ON EXISTING INLETS
   c. CONSTRUCT TEMPORARY CONSTRUCTION ENTRANCE
3. BEGIN SITE GRADING AND TOPSOIL STRIPPING
   a. ESTABLISH TOPSOIL STOCKPILE WITHIN SILT FENCE PERIMETER
   b. STABILIZE DENUDED AREAS AND STOCKPILES WITHIN 14 DAYS OF LAST CONSTRUCTION ACTIVITY IN THAT AREA
   c. INSTALL EROSION CONTROL MATTING AT LOCATIONS INDICATED ON PLAN
4. INSTALL UTILITIES, SANITARY SEWERS, WATER SERVICES AND STORM SEWERS
5. BEFORE INSTALLING UNDERGROUND DETENTION.
   a. PROJECT ENGINEER IS REQUIRED TO BE ONSITE DURING INSTALLATION OF UNDERGROUND DETENTION. NOTIFY ENGINEER 5 DAYS PRIOR TO INSTALLATION
   b. INSTALL GEOTEXTILE BOX INLET PROTECTION AND DANDY BAG OR APPROVED EQUAL ON ALL SITE INLETS
   c. INSTALL SILT FENCE AROUND PERIMETER OF UNDERGROUND DETENTION EXCAVATION TO PREVENT ANY SEDIMENT LADEN CONSTRUCTION RUNOFF FROM ENTERING THE SYSTEM DURING CONSTRUCTION
6. INSTALL UNDERGROUND DETENTION
7. BEGIN CONSTRUCTION OF BUILDING FOUNDATION AND STRUCTURE
8. INSTALL CURBS, PREPARE PAVEMENT SUBGRADE AND PROVIDE GOOD AGGREGATE BASE TO AREAS TO BE PAVED.
9. PAVE AREAS AND EXTERIOR BUILDING CONSTRUCTED
10. FINAL GRADING AND PERMANENT SEEDING OF THE NON-PAVED AREAS OF THE SITE WITHIN 7 DAYS OF FINISHING FINAL GRADE
11. ONCE 70% VEGETATIVE COVERAGE IS ACHIEVED, REMOVE EROSION PROTECTION.

POTENTIAL SOURCES OF POLLUTION
CONCRETE
DETERGENTS
WOOD
FERTILIZERS
PAINTS (ENAMEL AND LATEX)
CLEANING SOLVENTS
PETROLEUM BASED PRODUCTS

EROSION AND SEDIMENT CONTROLS

BMP DESCRIPTION:	CLEARING AND GRUBBING
MAINTENANCE AND INSPECTION:	AS NEEDED
REFERENCE:	TECHNICAL SPECIFICATION
BMP DESCRIPTION:	DUST CONTROL
MAINTENANCE AND INSPECTION:	AS NEEDED
REFERENCE:	E&S DETAILS
BMP DESCRIPTION:	TEMPORARY SEEDING AND MULCHING
MAINTENANCE AND INSPECTION:	WEEKLY AND AFTER HEAVY RAIN
REFERENCE:	E&S DETAILS
BMP DESCRIPTION:	PERMANENT SEEDING AND MULCHING
MAINTENANCE AND INSPECTION:	WEEKLY AND AFTER HEAVY RAIN
REFERENCE:	E&S DETAILS
BMP DESCRIPTION:	CONSTRUCTION ENTRANCE
MAINTENANCE AND INSPECTION:	AS NEEDED
REFERENCE:	E&S DETAILS
BMP DESCRIPTION:	ADS - ISOLATOR ROW
MAINTENANCE AND INSPECTION:	AS NEEDED
REFERENCE:	O&M MANUAL

POST CONSTRUCTION BMP'S

- UNDERGROUND DETENTION
- 12" SUMPS AT CATCH BASINS
- ADS - ISOLATOR ROW
- GREEN SPACE

OTHER SEDIMENT AND EROSION CONTROL NOTES
- TEMPORARY EROSION CONTROLS WILL BE APPLIED PRIOR TO ONSET OF WINTER WEATHER FOR DISTURBED AREAS THAT WILL BE LEFT IDLE OVER WINTER.
- PERMANENT EROSION CONTROLS WILL BE APPLIED WITHIN 7 DAYS FOR DISTURBED AREAS REMAINING DORMANT FOR OVER 1 YEAR OR AT FINAL GRADE.
- SEDIMENT CONTROL DEVICES WILL BE IMPLEMENTED FOR ALL AREAS REMAINING DISTURBED OVER 7 DAYS.

ADDITIONAL BMP'S
OPEN BURNING: NO MATERIALS MAY BE BURNED WHICH CONTAIN RUBBER, GREASE, ASPHALT, OR PETROLEUM PRODUCTS SUCH AS TIRES, CARS, AUTO PARTS, PLASTICS OR PLASTIC COATED WIRE. OPEN BURNING IS NOT ALLOWED IN RESTRICTED AREAS. RESTRICTED AREAS ARE DEFINED AS:

1. WITHIN CORPORATION LIMITS
2. WITHIN 1,000 FEET OF A MUNICIPAL CORPORATION
3. WITHIN A ONE MILE ZONE OUTSIDE OF A CORPORATION OF 10,000 OR MORE

OUTSIDE THE RESTRICTED AREA, NO OPEN BURNING CAN TAKE PLACE WITHIN 1,000 FEET OF AN INHABITED BUILDING LOCATED OFF THE PROPERTY WHERE THE FIRE IS SET. OPEN BURNING IS PERMISSIBLE IN A RESTRICTED AREA FOR THE FOLLOWING ACTIVITIES: HEATING TAR, WELDING AND ACETYLENE TORCHES, SMUDGE POTS AND SIMILAR OCCUPATIONAL NEEDS, AND HEATING OR WARMTH FOR OUTDOOR BARBEQUES. OUTSIDE OF RESTRICTED AREAS, OPEN BURNING IS PERMISSIBLE FOR LANDSCAPE WASTES (PLANT MATERIAL), LAND-CLEARING WASTES (PLANT MATERIAL, WITH PRIOR WRITTEN PERMISSION FROM EPA), AND AGRICULTURAL WASTES (MATERIAL GENERATED BY CROP, HORTICULTURAL, OR LIVESTOCK PRODUCTION PRACTICES.

DUST CONTROL/SUPPRESSANTS: DUST CONTROL IS REQUIRED TO PREVENT NUISANCE CONDITIONS. DUST CONTROLS MUST BE USED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATION AND NOT BE APPLIED IN A MANNER, WHICH WOULD RESULT IN A DISCHARGE TO WATERS OF THE STATE. ISOLATION DISTANCES FROM BRIDGES, CATCH BASINS, AND OTHER DRAINAGE WAYS MUST BE OBSERVED. APPLICATION (EXCLUDING WATER) MAY NOT OCCUR WHEN PRECIPITATION IS IMMINENT AS NOTED IN THE SHORT TERM FORECAST. USED OIL MAY NOT BE APPLIED FOR DUST CONTROL.

AIR PERMITTING REQUIREMENTS: ALL CONTRACTORS AND SUB CONTRACTORS MUST BE MADE AWARE THAT CERTAIN ACTIVITIES ASSOCIATED WITH CONSTRUCTION WILL REQUIRE AIR PERMITS. ACTIVITIES INCLUDING BUT NOT LIMITED TO MOBILE CONCRETE BATCH PLANTS, MOBILE ASPHALT PLANTS, CONCRETE CRUSHERS, LARGE GENERATORS, ETC., WILL REQUIRE SPECIFIC MISSOURI EPA AIR PERMITS FOR INSTALLATION AND OPERATION. THESE ACTIVITIES MUST SEE AUTHORIZATION FROM THE CORRESPONDING OF MISSOURI EPA. NOTIFICATION FOR RESTORATION AND DEMOLITION MUST BE SUBMITTED TO MISSOURI EPA FOR ALL COMMERCIAL SITES TO DETERMINE IF ASBESTOS CORRECTIVE ACTIONS ARE REQUIRED.

WASTE DISPOSAL: THE CONTRACTOR SHALL PROVIDE LITTER CONTROL AND COLLECTION OF MATERIALS WITHIN THE PROJECT BOUNDARIES DURING CONSTRUCTION. ALL FERTILIZER, HYDROCARBON, OR OTHER CHEMICAL CONTAINERS SHALL BE DISPOSED OF BY THE CONTRACTOR IN ACCORDANCE WITH THE EPA'S STANDARD PRACTICES. NO SOLID MATERIAL INCLUDING BUILDING AND CONSTRUCTION MATERIAL SHALL BE DISPOSED OF, DISCHARGED OR BURIED ONSITE.

OFFSITE VEHICLE TRACKING: LOADED HAUL TRUCKS SHALL BE COVERED WITH A TARPAULIN. EXCESS DIRT MATERIAL ON THE ROADS SHALL BE REMOVED IMMEDIATELY. HAULING ON UNPAVED SURFACES SHALL BE MONITORED TO MINIMIZE DUST AND CONTROL EROSION. HAUL ROADS SHALL BE WATERED OR OTHER CONTROLS PROVIDED AS NECESSARY TO REDUCE DUST AND CONTROL SEDIMENTS.

SANITARY WASTE: THE CONTRACTOR SHALL PROVIDE PORTABLE SANITARY WASTE FACILITIES. THESE FACILITIES SHALL BE COLLECTED OR EMPTIED BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR AS REQUIRED BY STATE REGULATIONS.

FERTILIZERS AND PESTICIDES: FERTILIZER SHALL BE APPLIED AT A RATE SPECIFIED BY THE SPECIFICATIONS OR THE MANUFACTURER. THE APPLICATION OF FERTILIZERS SHALL BE ACCOMPLISHED IN A MANNER AS DESCRIBED BY THE SPECIFICATION OR MANUFACTURER TO ENSURE THE PROPER INSTALLATION AND TO AVOID OVER FERTILIZING. PESTICIDES ARE NOT ANTICIPATED FOR THIS PROJECT.

MAINTENANCE

THE CONTRACTOR WILL BE RESPONSIBLE FOR MAINTENANCE AND REPAIRS OF EROSION AND SEDIMENT CONTROL DEVICES AND THE REMOVAL OF THE EROSION AND SEDIMENT CONTROL DEVICES AFTER THE NOTICE OF TERMINATION IS EXECUTED.

THE CONTRACTOR SHALL REVIEW THE PROJECT AND ALL EROSION AND SEDIMENT CONTROLS ON A DAILY BASIS AND DURING AND FOLLOWING RAINFALL EVENTS. AN INSPECTION FORM HAS BEEN PROVIDED IN THE SPECIFICATIONS. THE CONTRACTOR SHALL BE REQUIRED TO KEEP A LOG OF ALL THE DAILY INSPECTION REPORTS, GRADING AND STABILIZATION ACTIVITIES, AND SWPPP AMENDMENTS AT THE SITE. THE FOLLOWING PRACTICES WILL BE IMPLEMENTED TO MAINTAIN AND MONITOR EROSION AND SEDIMENT CONTROLS.

A. PROJECT REVIEW ON A DAILY BASIS.

B. PROVIDE AND MAINTAIN RAIN GAUGES ONSITE (IF NOT AVAILABLE IN THE AREA) TO RECORD RAINFALL DATA DAILY.

C. REVIEW STABILIZATION PRACTICES AND CONTROLS ON A DAILY BASIS AND MAINTAIN AND REPAIR THESE MEASURES AND CONTROLS AS NECESSARY. TEMPORARY AND/OR PERMANENT SEEDING, MULCHING AND SODDING SHALL BE REPAIRED IN BARE SPOTS AND WASHOUTS, AND HEALTHY GROWTH ESTABLISHED.

D. ONCE HEALTHY GROWTH OF TURF IS ESTABLISHED, THE CONTRACTOR SHALL MAINTAIN THESE AREAS TO INSURE THE HEIGHT OF THE GRASS DOES NOT REACH MORE THAN 6 INCHES ABOVE THE ESTABLISHED GRADE.

E. REVIEW STRUCTURAL PRACTICES ON A DAILY BASIS AND MAINTAIN AND REPAIR THESE MEASURES AND CONTROLS AS NECESSARY. BUILT UP SEDIMENTS SHALL BE REMOVED FROM SILT FENCES AND FILTER CLOTH SHALL BE REPLACED AS NECESSARY AND WHEN THEY HAVE SERVED THEIR USEFULNESS.

F. AN INSPECTION AND MAINTENANCE REPORT SHALL BE COMPLETED WEEKLY AND WITHIN 24 HOURS OF A RAINFALL EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR SHALL CREATE AN INSPECTION AND MAINTENANCE REPORT LOG AND NOTE ANY AMENDMENTS TO THE SWPPP THAT OCCUR DURING CONSTRUCTION.

G. IF THE CONTRACTOR ELECTS TO APPLY FOR PERMITS FOR DISCHARGE OF STORMWATER FROM THE SITE DURING CONSTRUCTION, ALL POINTS OF DISCHARGE OF STORMWATER RUNOFF FROM THE SITE SHALL BE INSPECTED ON A DAILY BASIS AND CONTROLS AND MEASURES REPAIRED AS NECESSARY TO MAINTAIN ACCEPTABLE WATER QUALITY AND DISCHARGE VOLUMES IN ACCORDANCE WITH THE PERMIT.

INSPECTIONS
QUALIFIED PERSONNEL SHALL INSPECT ALL POINTS OF DISCHARGE, AS APPLICABLE, FROM THE PROJECT SITE AND ALL DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN STABILIZED. DISTURBED AREAS AND AREAS USED FOR STORAGE OF MATERIALS EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF, OR POTENTIAL FOR POLLUTANTS ENTERING THE STORMWATER MANAGEMENT SYSTEM. THE STORMWATER MANAGEMENT SYSTEM AND EROSION AND SEDIMENT CONTROL MEASURES SHALL BE OBSERVED TO ENSURE THAT THEY ARE OPERATING CORRECTLY. INSPECTION AND MAINTENANCE REPORTS SHALL BE COMPLETED AT LEAST EVERY WEEK AND FOLLOWING A RAINFALL EVENT OF 0.5 INCHES OF WATER OR GREATER (SEE ATTACHED FORM). THESE FORMS SHALL BE RETAINED FOR A PERIOD OF AT LEAST 3 YEARS FOLLOWING THE DATE THE SITE IS FINALLY STABILIZED.

ALLOWABLE NON-STORMWATER DISCHARGE MANAGEMENT
ALLOWABLE NON-STORMWATER DISCHARGES AND THE MEASURES USED TO ELIMINATE OR REDUCE THEM AND TO PREVENT THEM FROM BECOMING CONTAMINATED MAY INCLUDE DEPENDING ON THE PERMIT:

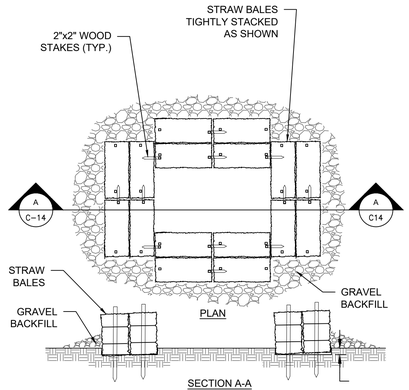
1. WATERS USED TO WASH VEHICLES WHERE DETERGENTS ARE NOT USED
2. WATER USED TO CONTROL DUST
3. POTABLE WATER INCLUDING UNCONTAMINATED WATER LINE FLUSHINGS
4. ROUTINE EXTERNAL BUILDING WASH DOWN THAT DOES NOT USE DETERGENTS
5. PAVEMENT WASH WATER WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED (UNLESS ALL SPILLED MATERIAL HAS BEEN REMOVED) AND WHERE DETERGENTS ARE NOT USED
6. UNCONTAMINATED AIR CONDITIONING OR COMPRESSOR CONDENSATE
7. UNCONTAMINATED GROUND WATER OR SPRING WATER
8. FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE NOT CONTAMINATED WITH PROCESS MATERIALS SUCH AS SOLVENTS
9. UNCONTAMINATED EXCAVATION DEWATERING
10. LANDSCAPE IRRIGATION

ESTABLISH PROPER EQUIPMENT/VEHICLE FUELING AND MAINTENANCE PRACTICES
EQUIPMENT FUELING AND MAINTENANCE, OIL CHANGING, ETC., SHALL BE PERFORMED AWAY FROM WATERCOURSES, DITCHES, OR STORM DRAINS, IN AN AREA DESIGNATED FOR THAT PURPOSE. THE DESIGNATED AREA SHALL BE EQUIPPED FOR RECYCLING OIL AND CATCHING SPILLS. SECONDARY CONTAINMENT SHALL BE PROVIDED FOR ALL FUEL OIL STORAGE TANKS. THESE AREAS MUST BE INSPECTED EVERY SEVEN DAYS AND WITHIN 24 HOURS OF A 0.5 INCH OR GREATER RAIN EVENT TO ENSURE THERE ARE NO EXPOSED MATERIALS WHICH WOULD CONTAMINATE STORM WATER.

SPILL PREVENTION CONTROL PLAN
SITE OPERATORS MUST BE AWARE THAT SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) REQUIREMENTS APPLY. AN SPCC PLAN IS REQUIRED FOR SITES WITH ONE SINGLE ABOVEGROUND STORAGE OF 1,320 GALLONS OR MORE, OR 42,000 GALLONS OF UNDERGROUND STORAGE. SOILS THAT HAVE BEEN CONTAMINATED MUST BE DISPOSED OF IN ACCORDANCE WITH SECTION "CONTAMINATED SOILS" FOUND BELOW.

SPILLS ON PAVEMENT SHALL BE ABSORBED WITH SAWDUST, CAT LITTER OR OTHER ABSORBENT MATERIAL AND DISPOSED OF WITH THE TRASH AT A LICENSED SANITARY LANDFILL. HAZARDOUS OR INDUSTRIAL WASTES SUCH AS MOST SOLVENTS, GASOLINE, OIL-BASED PAINTS, AND CEMENT CURING COMPOUNDS REQUIRE SPECIAL HANDLING. SPILLS SHALL BE REPORTED TO THE EPA (1-913-281-0991). SPILLS OF 25 GALLONS OR MORE OF PETROLEUM PRODUCTS SHALL BE REPORTED TO EPA (1-913-281-0991), THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE WITHIN 30 MINUTES OF THE DISCOVERY OF THE RELEASE. ALL SPILLS, WHICH RESULT IN CONTACT WITH WATER OF THE STATE, MUST BE REPORTED TO THE EPA'S HOTLINE.

CONTAMINATED SOILS
IF SUBSTANCES SUCH AS OIL, DIESEL FUEL, HYDRAULIC FLUID, ANTIFREEZE, ETC., ARE SPILLED, LEAKED, OR RELEASED ONTO THE SOIL, THE SOIL SHOULD BE DUG UP AND DISPOSED OF AT A LICENSED SANITARY LANDFILL OR OTHER APPROVED PETROLEUM CONTAMINATED SOIL REMEDIATION FACILITY (NOT A CONSTRUCTION/DEMOLITION DEBRIS LANDFILL). PLEASE BE AWARE THAT STORM WATER RUN OFF ASSOCIATED WITH CONTAMINATED SOILS ARE NOT BEING AUTHORIZED UNDER THE EPA'S GENERAL STORMWATER PERMIT ASSOCIATED WITH CONSTRUCTION ACTIVITIES. IN THE EVENT THERE ARE LARGE EXTENSIVE AREAS OF CONTAMINATED SOILS ADDITIONAL MEASURES ABOVE AND BEYOND THE CONDITIONS OF THE EPA'S GENERAL CONSTRUCTION STORMWATER PERMIT WILL BE REQUIRED. DEPENDING ON THE EXTENT OF CONTAMINATION, ADDITIONAL TREATMENT AND/OR COLLECTION AND DISPOSAL MAY BE REQUIRED. ALL STORMWATER DISCHARGES ASSOCIATED WITH CONTAMINATED SOILS MUST BE AUTHORIZED UNDER AN ALTERNATE NPDES PERMIT.



NOTES:
A. THE RESIDUE OR CONTENTS OF ALL CONCRETE MIXERS, DUMP TRUCKS, OTHER CONVEYANCE EQUIPMENT AND FINISHING TOOLS SHALL BE WASHED INTO CONCRETE CLEAN-OUT STRUCTURES CONSISTING OF A STRAW BALE BARRIER WITH GRAVEL BACKFILL. THE LENGTH AND WIDTH OF THESE STRUCTURES SHALL BE AS DETERMINED BY THE CONTRACTOR TO FACILITATE THE PARTICULAR EQUIPMENT USED. THESE STRUCTURES SHALL BE CONSTRUCTED ON LEVEL GROUND AT LEAST 100' FROM THE NEAREST WATERCOURSE, DRAINAGE SWALE OR INLET. AT NO TIME SHALL THE STRUCTURE BE ALLOWED TO BE MORE THAN 50% FULL. THE CONTRACTOR SHALL MAINTAIN THESE PONDS UNTIL ALL CONCRETE PLACEMENT IS COMPLETE FOR THE PROJECT.

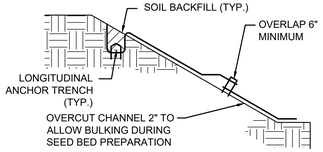
B. EMBED THE STRAW BALES 4" INTO THE SOIL. PROVIDE TWO ROWS OF BALES, AS SHOWN ON THE DETAIL, WITH ENDS AND CORNERS TIGHTLY ABUTING. ORIENT THE STRAW BALES LENGTHWISE WITH BINDINGS AROUND THE SIDES OF THE BALES SO THE WIRE DOES NOT CONTACT THE SOIL. DRIVE 2"X2" WOOD STAKES THROUGH EACH BALE, TO SECURELY ANCHOR THE BALE AND CONNECT ADJACENT BALES. GRAVEL BACKFILL SHALL BE PROVIDED AND TAMPED AROUND THE OUTSIDE PERIMETER OF THE BALES TO PREVENT EROSION AND FLOW AROUND THE BALES.

C. THE INTENT OF THESE STRUCTURES IS TO COLLECT ALL CONCRETE WASH OUT WATER AND ALLOW IT TO DRY TO A SOLID MATERIAL. AFTER DRYING, THE SOLID MATERIAL CAN BE REMOVED WITH A LOADER OR EXCAVATOR FOR PROPER DISPOSAL. WASH OUT WILL NOT BE PERMITTED IN ANY OTHER AREAS.

D. USE THE MINIMUM AMOUNT OF WATER TO WASH THE VEHICLES AND EQUIPMENT. NEVER DISPOSE OF WASH OUT INTO THE STREET, STORM INLET, DRAINAGE SWALE OR WATERCOURSE. DISPOSE OF SMALL AMOUNTS OF EXCESS DRY CONCRETE, GROUT AND MORTAR IN THE TRASH. ANY SOAPS THAT ARE UTILIZED SHALL BE PHOSPHATE-FREE AND BIODEGRADABLE.

E. ADDITIONAL CONCRETE CLEAN-OUT STRUCTURES SHALL BE CONSTRUCTED WITHIN THE SPECIFIED AREA AS NEEDED BASED UPON THE VOLUME OF WASH OUT GENERATED DAILY.

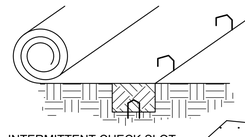
A C15 CONCRETE WASHOUT
N.T.S.



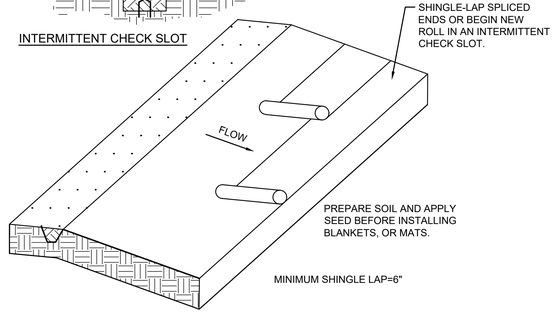
NOTE:
DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.

LONGITUDINAL ANCHOR TRENCH

* LINING TO BE TENSAR NORTH AMERICAN GREEN ERONET S75 OR APPROVED EQUAL. SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, AND VEGETATIVE STABILIZATION SPECIFICATIONS FOR SOIL AMENDMENTS, SEED MIXTURES, AND MULCHING INFORMATION. LINING TO BE TENSAR ERONET S75 OR APPROVED EQUAL.



INTERMITTENT CHECK SLOT



ISOMETRIC VIEW

B C15 SLOPE PROTECTION
N.T.S.

MISSOURI ONE CALL SYSTEM
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1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

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90% Plan Set	11/17/20
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WHATABURGER

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PROJECT
WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE
SWPPP NOTES AND DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING
C-15

TEMPORARY SEEDING

DESCRIPTION

TEMPORARY SEEDINGS ESTABLISH TEMPORARY COVER ON DISTURBED AREAS BY PLANTING APPROPRIATE RAPIDLY GROWING ANNUAL GRASSES OR SMALL GRAINS. TEMPORARY SEEDING PROVIDES EROSION CONTROL ON AREAS IN BETWEEN CONSTRUCTION OPERATIONS. GRASSES, WHICH ARE QUICK GROWING, ARE SEEDED AND USUALLY MULCHED TO PROVIDE PROMPT, TEMPORARY SOIL STABILIZATION. IT EFFECTIVELY MINIMIZES THE AREA OF A CONSTRUCTION SITE PRONE TO EROSION AND SHOULD BE USED EVERYWHERE THE SEQUENCE OF CONSTRUCTION OPERATIONS ALLOWS VEGETATION TO BE ESTABLISHED.

SPECIFICATIONS FOR TEMPORARY SEEDING

TEMPORARY SEEDING SPECIES SELECTION

SEEDING DATES	SPECIES	LB/1000 SF	LB/ACREA
MAR 1 TO AUG 15	OATS	3	128-4 BUSHEL
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
	PERENNIAL RYGRASS	1	40
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
	ANNUAL RYEGRASS	1.25	55
	PERENNIAL RYEGRASS	3.25	142
	CREEPING RED FESCUE	0.40	17
	KENTUCKY BLUEGRASS	0.40	17
	OATS	3	128-3 BUSHEL
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
AUG 16 TO NOV	RYE	3	112-3 BUSHEL
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
	WHEAT	3	120-2 BUSHEL
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
	PERENNIAL RYE	1	40
	TALL FESCUE	1	40
	ANNUAL RYEGRASS	1	40
	ANNUAL RYEGRASS	1.25	40
	PERENNIAL RYEGRASS	3.25	40
	CREEPING RED FESCUE	0.40	40
	KENTUCKY BLUEGRASS	0.40	
NOV 1 TO FEB 29	USE MULCH ONLY OR DORMANT SEEDING		

1. STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SUCH AS DIVERSIONS AND SEDIMENT TRAPS SHALL BE INSTALLED AND STABILIZED WITH TEMPORARY SEEDING PRIOR TO GRADING THE REST OF THE CONSTRUCTION SITE.
2. TEMPORARY SEED SHALL BE APPLIED BETWEEN CONSTRUCTION OPERATIONS ON SOIL THAT WILL NOT BE GRADED OR REWORKED FOR 14 DAYS OR GREATER. THESE IDLE AREAS SHALL BE SEEDED WITHIN 7 DAYS AFTER GRADING.
3. THE SEEDBED SHOULD BE PULVERIZED AND LOOSE TO ENSURE THE SUCCESS OF ESTABLISHING VEGETATION. TEMPORARY SEEDING SHOULD NOT BE POSTPONED IF IDEAL SEEDBED PREPARATION IS NOT POSSIBLE.
4. SOIL AMENDMENTS TEMPORARY VEGETATION SEEDING RATES SHALL ESTABLISH ADEQUATE STANDS OF VEGETATION, WHICH MAY REQUIRE THE USE OF SOIL AMENDMENTS. BASE RATES FOR LIME AND FERTILIZER SHALL BE USED.
5. SEEDING METHOD SEED SHALL BE APPLIED UNIFORMLY WITH A CYCLONE SPREADER, DRILL, CULTIPACKER SEEDER, OR HYDROSEEDER. WHEN FEASIBLE, SEED THAT HAS BEEN BROADCAST SHALL BE COVERED BY RAKING OR DRAGGING AND THEN LIGHTLY TAMPED INTO PLACE USING A ROLLER OR CULTIPACKER. IF HYDROSEEDING IS USED, THE SEED AND FERTILIZER WILL BE MIXED ON-SITE AND THE SEEDING SHALL BE DONE IMMEDIATELY AND WITHOUT INTERRUPTION.

MULCHING TEMPORARY SEEDING:

1. APPLICATIONS OF TEMPORARY SEEDING SHALL INCLUDE MULCH. WHICH SHALL BE APPLIED DURING OR IMMEDIATELY AFTER SEEDING. SEEDINGS MADE DURING OPTIMUM SEEDING DATES ON FAVORABLE, VERY FLAT SOIL CONDITIONS MAY NOT NEED MULCH TO ACHIEVE ADEQUATE STABILIZATION.
2. MATERIALS:
   - 2.1. STRAW IF STRAW IS USED, IT SHALL BE UNROTTED SMALL-GRAIN STRAW APPLIED AT A RATE OF 2 TONS PER ACRE OR 90 LBS./ 1,000 SQ. FT. (2-3 BALES)
   - 2.2. HYDROSEEDERS IF WOOD CELLULOSE FIBER IS USED, IT SHALL BE USED AT 2000 LBS./ AC. OR 46 LB./ 1,000-SQ.-FT.
   - 2.3. OTHER OTHER ACCEPTABLE MULCHES INCLUDE MULCH MATTINGS APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS OR WOOD CHIPS APPLIED AT 6 TON/ AC.
3. STRAW MULCH SHALL BE ANCHORED IMMEDIATELY TO MINIMIZE LOSS BY WIND OR WATER. ANCHORING METHODS:
   - 3.1. MECHANICAL A DISK, CRIMPER, OR SIMILAR TYPE TOOL SHALL BE SET STRAIGHT TO PUNCH OR ANCHOR THE MULCH MATERIAL INTO THE SOIL. STRAW MECHANICALLY ANCHORED SHALL NOT BE FINELY CHOPPED BUT LEFT TO A LENGTH OF APPROXIMATELY 6 INCHES.
   - 3.2. MULCH NETTING NETTING SHALL BE USED ACCORDING TO THE MANUFACTURERS RECOMMENDATIONS. NETTING MAY BE NECESSARY TO HOLD MULCH IN PLACE IN AREAS OF CONCENTRATED RUNOFF AND ON CRITICAL SLOPES.
   - 3.3. SYNTHETIC BINDERS SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRI-TAC), DCA-70, PETROSET, TERRA TRACK OR EQUIVALENT MAY BE USED AT RATES RECOMMENDED BY THE MANUFACTURER.
   - 3.4. WOOD-CELLULOSE FIBER WOOD-CELLULOSE FIBER BINDER SHALL BE APPLIED AT A NET DRY WT. OF 750 LB./AC. THE WOOD-CELLULOSE FIBER SHALL BE MIXED WITH WATER AND THE MIXTURE SHALL CONTAIN A MAXIMUM OF 50 LB. / 100 GAL.

DUST CONTROL

DESCRIPTION

DUST CONTROL INVOLVES PREVENTING OR REDUCING DUST FROM EXPOSED SOILS OR OTHER SOURCES DURING LAND DISTURBING, DEMOLITION AND CONSTRUCTION ACTIVITIES TO REDUCE THE PRESENCE OF AIRBORNE SUBSTANCES WHICH MAY PRESENT HEALTH HAZARDS, TRAFFIC SAFETY PROBLEMS OR HARM ANIMAL OR PLANT LIFE.

SPECIFICATIONS FOR DUST CONTROL

1. VEGETATIVE COVER AND/MULCH APPLY TEMPORARY OR PERMANENT SEEDING AND MULCH TO AREAS THAT WILL REMAIN IDLE FOR OVER 21 DAYS. SAVING EXISTING TREES AND LARGE SHRUBS WILL ALSO REDUCE SOIL AND AIR MOVEMENT ACROSS DISTURBED AREAS. SEE TEMPORARY SEEDING; PERMANENT SEEDING; MULCHING PRACTICES; AND TREE AND NATURAL AREA PROTECTION PRACTICES.
2. WATERING SPRAY SITE WITH WATER UNTIL THE SURFACE IS WET BEFORE AND DURING GRADING AND REPEAT AS NEEDED, ESPECIALLY ON HAUL ROADS AND OTHER HEAVY TRAFFIC ROUTES. WATERING SHALL BE DONE AT A RATE THAT PREVENTS DUST BUT DOES NOT CAUSE SOIL EROSION. WETTING AGENTS SHALL BE UTILIZED ACCORDING TO MANUFACTURERS INSTRUCTIONS.
3. SPRAY-ON ADHESIVES APPLY ADHESIVE ACCORDING TO THE FOLLOWING TABLE OR MANUFACTURER'S INSTRUCTIONS.
4. STONE GRADED ROADWAYS AND OTHER SUITABLE AREAS WILL BE STABILIZED USING CRUSHED STONE OR COARSE GRAVEL AS SOON AS PRACTICABLE AFTER REACHING AN INTERIM OR FINAL GRADE. CRUSHED STONE OR COARSE GRAVEL CAN BE USED AS A PERMANENT COVER TO PROVIDE CONTROL OF SOIL EMISSIONS.
5. BARRIERS EXISTING WINDBREAK VEGETATION SHALL BE MARKED AND PRESERVED. SNOW FENCING OR OTHER SUITABLE BARRIER MAY BE PLACED PERPENDICULAR TO PREVAILING AIR CURRENTS AT INTERVALS OF ABOUT 15 TIMES THE BARRIER HEIGHT TO CONTROL AIR CURRENTS AND BLOWING SOIL.
6. OPERATION AND MAINTENANCE - WHEN TEMPORARY DUST CONTROL MEASURES ARE USED; REPETITIVE TREATMENT SHOULD BE APPLIED AS NEEDED TO ACCOMPLISH CONTROL. STREET CLEANING - PAVED AREAS THAT HAVE ACCUMULATED SEDIMENT FROM CONSTRUCTION SHOULD BE CLEANED DAILY, OR AS NEEDED, UTILIZING A STREET SWEEPER OR BUCKET -TYPE END LOADER OR SCRAPER.

PERMANENT SEEDING

DESCRIPTION

PERENNIAL VEGETATION IS ESTABLISHED ON AREAS THAT WILL NOT BE RE-DISTURBED FOR PERIODS LONGER THAN 12 MONTHS. PERMANENT SEEDING INCLUDES SITE PREPARATION, SEEDBED PREPARATION, PLANTING SEED, MULCHING, IRRIGATION AND MAINTENANCE.

PERMANENT VEGETATION IS USED TO STABILIZE SOIL, REDUCE EROSION, PREVENT SEDIMENT POLLUTION, REDUCE RUNOFF BY PROMOTING INFILTRATION, AND PROVIDE STORMWATER QUALITY BENEFITS OFFERED BY DENSE GRASS COVER.

SPECIFICATION FOR PERMANENT SEEDING

SITE PREPARATION:
1. SUBSOILER, PLOW, OR OTHER IMPLEMENT SHALL BE USED TO REDUCE SOIL COMPACTION AND ALLOW MAXIMUM INFILTRATION. (MAXIMIZING INFILTRATION WILL HELP CONTROL BOTH RUNOFF RATE AND WATER QUALITY.) SUBSOILING SHOULD BE DONE WHEN THE SOIL MOISTURE IS LOW ENOUGH TO ALLOW THE SOIL TO CRACK OR FRACTURE. SUBSOILING SHALL NOT BE DONE ON SLIP-PRONE AREAS WHERE SOIL PREPARATION SHOULD BE LIMITED TO WHAT IS NECESSARY FOR ESTABLISHING VEGETATION.
2. THE SITE SHALL BE GRADED AS NEEDED TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR SEEDBED PREPARATION AND SEEDING.
3. TOPSOIL SHALL BE APPLIED WHERE NEEDED TO ESTABLISH VEGETATION.

SEEDBED PREPARATION:
1. TEST THE SOIL CONDITIONS FOR FEEDING BEFORE STARTING SEEDING AND MULCHING.
2. LIME AGRICULTURAL GROUND LIMESTONE SHALL BE APPLIED TO ACID SOIL AS RECOMMENDED BY A SOIL TEST. IN LIEU OF A SOIL TEST, LIME SHALL BE APPLIED AT THE RATE OF 100 POUNDS PER 1,000-SQ. FT. OR 2 TONS PER ACRE.
3. FERTILIZER FERTILIZER SHALL BE APPLIED AS RECOMMENDED BY A SOIL TEST. CONTRACTOR SHALL PERFORM LAB TESTING ON SOIL AND PROVIDE A CERTIFIED FERTILIZER RATIO FOR THE SITE SOILS AND SPECIFIED SEED MIX.
4. THE LIME AND FERTILIZER SHALL BE WORKED INTO THE SOIL WITH A DISK HARROW, SPRING-TOOTH HARROW, OR OTHER SUITABLE FIELD IMPLEMENT TO A DEPTH OF 3 INCHES. ON SLOPING LAND, THE SOIL SHALL BE WORKED ON THE CONTOUR.

SEEDING DATES AND SOIL CONDITIONS:
SEEDING SHOULD BE DONE MARCH 1 TO MAY 31 OR AUGUST 1 TO SEPTEMBER 30. IF SEEDING OCCURS OUTSIDE OF THE ABOVE SPECIFIED DATES, ADDITIONAL MULCH AND IRRIGATION MAY BE REQUIRED TO ENSURE A MINIMUM OF 80% GERMINATION. TILLAGE FOR SEEDBED PREPARATION SHOULD BE DONE WHEN THE SOIL IS DRY ENOUGH TO CRUMBLE AND NOT FORM RIBBONS WHEN COMPRESSED BY HAND. FOR WINTER SEEDING, SEE THE FOLLOWING SECTION ON DORMANT SEEDING.

DORMANT SEEDINGS:
1. SEEDINGS SHOULD NOT BE MADE FROM OCTOBER 1 THROUGH NOVEMBER 20. DURING THIS PERIOD, THE SEEDS ARE LIKELY TO GERMINATE BUT PROBABLY WILL NOT BE ABLE TO SURVIVE THE WINTER.
2. THE FOLLOWING METHODS MAY BE USED FOR DORMANT SEEDING :
   - 2.1.1. FROM OCTOBER 1 THROUGH NOVEMBER 20, PREPARE THE SEEDBED, ADD THE REQUIRED AMOUNTS OF LIME AND FERTILIZER, THEN MULCH AND ANCHOR. AFTER NOVEMBER 20, AND BEFORE MARCH 15, BROADCAST THE SELECTED SEED MIXTURE. INCREASE THE SEEDING RATES BY 50% FOR THIS TYPE OF SEEDING.
   - 2.2. FROM NOVEMBER 20 THROUGH MARCH 15, WHEN SOIL CONDITIONS PERMIT, PREPARE THE SEEDBED, LIME AND FERTILIZE, APPLY THE SELECTED SEED MIXTURE, MULCH AND ANCHOR. INCREASE THE SEEDING RATES BY 50% FOR THIS TYPE OF SEEDING.
   - 2.3. APPLY SEED UNIFORMLY WITH A CYCLONE SEEDER, DRILL, CULTIPACKER SEEDER, OR HYDRO-SEEDER (SLURRY MAY INCLUDE SEED AND FERTILIZER) ON A FIRM, MOIST SEEDBED.
   - 2.4. WHERE FEASIBLE, EXCEPT WHEN A CULTIPACKER TYPE SEEDER IS USED, THE SEEDBED SHOULD BE FIRMED FOLLOWING SEEDING OPERATIONS WITH A CULTIPACKER, ROLLER, OR LIGHT DRAG. ON SLOPING LAND, SEEDING OPERATIONS SHOULD BE ON THE CONTOUR WHERE FEASIBLE.

MULCHING:
1. MULCH MATERIAL SHALL BE APPLIED IMMEDIATELY AFTER SEEDING. DORMANT SEEDING SHALL BE MULCHED. 100% OF THE GROUND SURFACE SHALL BE COVERED WITH AN APPROVED MATERIAL.
2. MATERIALS:
   - 2.1. STRAW IF STRAW IS USED IT SHALL BE UNROTTED SMALL-GRAIN STRAW APPLIED AT THE RATE OF 2 TONS PER ACRE OR 90 POUNDS (TWO TO THREE BALES) PER 1,000-SQ. FT. THE MULCH SHALL BE SPREAD UNIFORMLY BY HAND OR MECHANICALLY APPLIED SO THE SOIL SURFACE IS COVERED. FOR UNIFORM DISTRIBUTION OF HAND-SPREAD MULCH, DIVIDE AREA INTO APPROXIMATELY 1,000-SQ.-FT. SECTIONS AND SPREAD TWO 45-LB. BALES OF STRAW IN EACH SECTION.
   - 2.2. HYDROSEEDERS IF WOOD CELLULOSE FIBER IS USED, IT SHALL BE APPLIED AT 2,000 LB./AC. OR 46 LB./1,000 SQ. FT.
   - 2.3. OTHER OTHER ACCEPTABLE MULCHES INCLUDE ROLLED EROSION CONTROL MATTINGS OR BLANKETS APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS OR WOOD CHIPS APPLIED AT 6 TONS PER ACRE.
3. STRAW AND MULCH ANCHORING METHODS-STRAW MULCH SHALL BE ANCHORED IMMEDIATELY TO MINIMIZE LOSS BY WIND OR WATER:
   - 3.1. MECHANICAL A DISK, CRIMPER, OR SIMILAR TYPE TOOL SHALL BE SET STRAIGHT TO PUNCH OR ANCHOR THE MULCH MATERIAL INTO THE SOIL. STRAW MECHANICALLY ANCHORED SHALL NOT BE FINELY CHOPPED BUT, GENERALLY, BE LEFT LONGER THAN 6 INCHES.
   - 3.2. MULCH NETTING NETTING SHALL BE USED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. NETTING MAY BE NECESSARY TO HOLD MULCH IN PLACE IN AREAS OF CONCENTRATED RUNOFF AND ON CRITICAL SLOPES.
   - 3.3. ASPHALT EMULSION ASPHALT SHALL BE APPLIED AS RECOMMENDED BY THE MANUFACTURE OR AT THE RATE OF 160 GALLONS PER ACRE.
   - 3.4. SYNTHETIC BINDERS SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRI-TAC), DCA-70, PETROSET, TERRA TACK OR EQUIVALENT MAY BE USED AT RATES SPECIFIED BY THE MANUFACTURER.
   - 3.5. WOOD CELLULOSE FIBER WOOD CELLULOSE FIBER SHALL BE APPLIED AT A NET DRY WEIGHT OF 750 POUNDS PER ACRE. THE WOOD CELLULOSE FIBER SHALL BE MIXED WITH WATER WITH THE MIXTURE CONTAINING A MAXIMUM OF 50 POUNDS CELLULOSE PER 100 GALLONS OF WATER.

IRRIGATION:
PERMANENT SEEDING SHALL INCLUDE IRRIGATION TO ESTABLISH VEGETATION DURING DRY WEATHER OR ON ADVERSE SITE CONDITIONS, WHICH REQUIRE ADEQUATE MOISTURE FOR SEED GERMINATION AND PLANT GROWTH. IRRIGATION RATES SHALL BE MONITORED TO PREVENT EROSION AND DAMAGE TO SEEDED AREAS FROM EXCESSIVE RUNOFF. CONTRACTOR SHALL MAINTAIN PERMANENT SEEDING FOR UP TO ONE YEAR FROM SUBSTANTIAL COMPLETION TO FIX, REPAIR, WATER, REFERTILIZE AND/OR RESEED GRASSED AREAS.

SEED MIX	SEEDING RATE		NOTES
	LBS/ACRE	LBS/1,000 SF	
GENERAL USE			
CREEPING RED FESCUE	20-40	½-1	FOR CLOSE MOWING AND FOR WATERWAYS WITH <2.0 FT/SEC VELOCITY
DOMESTIC RYEGRASS	10-20	¼-½	
KENTUCKY BLUEGRASS	20-40	½-1	
TALL FESCUE	40-50	1-1¼	
TURF-TYPE (DWARF) FESCUE	90	2¼	
STEEP BANKS OR CUT SLOPES			
TALL FESCUE	40-50	1-1¼	
CROWN VETCH	10-20	¼-½	DO NOT SEED LATER THAN AUGUST
TALL FESCUE	20-30	½-¾	
FLAT PEA	20-25	½-¾	DO NOT SEED LATER THAN AUGUST
TALL FESCUE	20-30	½-¾	
ROAD DITCHES AND SWALES			
TALL FESCUE	40-50	1-1¼	
TURF-TYPE (DWARF) FESCUE	90	2¼	
KENTUCKY BLUE GRASS	5	⅛	
LAWNS			
KENTUCKY BLUEGRASS	100-120	2	
PERENNIAL RYEGRASS		2	
KENTUCKY BLUEGRASS	100-120	2	FOR SHADED AREAS
CREEPING RED FESCUE		1-½	

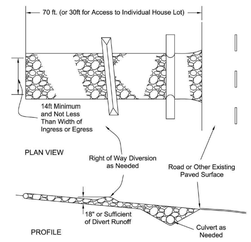
CONSTRUCTION ENTRANCE

DESCRIPTION

A CONSTRUCTION ENTRANCE IS A STABILIZED PAD OF STONE UNDERLAIN WITH GEOTEXTILE AND IS USED TO REDUCE THE AMOUNT OF MUD TRACKED OFF-SITE WITH CONSTRUCTION TRAFFIC. LOCATED AT POINTS OF INGRESS/EGRESS, THE PRACTICE IS USED TO REDUCE THE AMOUNT OF MUD TRACKED OFF-SITE WITH CONSTRUCTION TRAFFIC.

SPECIFICATIONS FOR CONSTRUCTION ENTRANCE

(Not To Scale)



1. STONE SIZE - 1.5-2.5 INCH STONE SHALL BE USED, OR RECYCLED CONCRETE EQUIVALENT.

2. LENGTH- THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 70 FT. (EXCEPTION: APPLY30 FT. MINIMUM TO SINGLE RESIDENCE LOTS).

3. THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6 INCHES THICK FOR LIGHT DUTY ENTRANCES OR AT LEAST 10 INCHES FOR HEAVY DUTY USE.

4. WIDTH - THE ENTRANCE SHALL BE AT LEAST 14 FEET WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.

5. GEOTEXTILE - A GEOTEXTILE SHALL BE LAID OVER THE ENTIRE AREA, PRIOR TO PLACING STONE. IT SHALL BE COMPOSED OF STRONG ROT-PROOF POLYMERIC FIBERS AND MEET THE FOLLOWING SPECIFICATIONS:

FIGURE 7.4.1

GEOTEXTILE SPECIFICATION FOR CONSTRUCTION ENTRANCE	
MINIMUM TENSILE STRENGTH	200 LBS.
MINIMUM PUNCTURE STRENGTH	80 PSI.
MINIMUM TEAR STRENGTH	50 LBS.
MINIMUM BURST STRENGTH	320 PSI.
MINIMUM ELONGATION	20%
EQUIVALENT OPENING SIZE	EOS < 0.6 MM.
PERMITTIVITY	1X10-3 CM/SEC.

6. TIMING - THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED AS SOON AS IS PRACTICABLE BEFORE MAJOR GRADING ACTIVITIES.

7. CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEEDED TO PREVENT SURFACE WATER FROM FLOWING ACROSS THE ENTRANCE OR TO PREVENT RUNOFF FROM BEING DIRECTED OUT ONTO PAVED SURFACES.

8. WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.

9. MAINTENANCE - TOP DRESSING OF ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADS, OR ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVED IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING OR SWEEPING.

10. CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF-SITE TRACKING. VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION-SITE SHALL BE RESTRICTED FROM MUDDY AREAS.

11. REMOVAL - THE ENTRANCE SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREA IS STABILIZED OR REPLACED WITH A PERMANENT ROADWAY OR ENTRANCE.

PERMANENT STABILIZATION

AREA REQUIRING PERMANENT STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY AREA THAT WILL LIE DORMANT FOR ONE YEAR OR MORE.	WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE.
ANY AREA WITHIN 50 FEET OF A STREAM OR A RIPARIAN SETBACK AREA AND AT FINAL GRADE.	WITHIN 2 DAYS OF REACHING FINAL GRADE.
ANY AREA AT FINAL GRADE.	WITHIN 7 DAYS OF REACHING FINAL GRADE WITHIN THAT AREA.

TEMPORARY STABILIZATION

AREA REQUIRING TEMPORARY STABILIZATION	TIME FRAME TO APPLY EROSION CONTROLS
ANY DISTURBED AREA WITHIN 50 FEET OF A STREAM OR A RIPARIAN SETBACK AREA AND NOT AT FINAL GRADE.	WITHIN 2 DAYS OF THE MOST RECENT DISTURBANCE IF THAT AREA WILL REMAIN IDLE FOR MORE THAN 14 DAYS.
FOR ALL CONSTRUCTION ACTIVITIES, ANY DISTURBED AREA, INCLUDING SOIL STOCKPILES THAT WILL BE DORMANT FOR MORE THAN 14 DAYS BUT LESS THAN ONE YEAR.	WITHIN 7 DAYS OF THE MOST RECENT DISTURBANCE WITHIN THE AREA.
DISTURBED AREAS THAT WILL BE IDLE OVER WINTER.	PRIOR TO NOVEMBER 1.

NOTE: WHERE VEGETATIVE STABILIZATION TECHNIQUES MAY CAUSE STRUCTURAL INSTABILITY OR ARE OTHERWISE UNOBTAINABLE, ALTERNATIVE STABILIZATION TECHNIQUES MUST BE EMPLOYED. THESE TECHNIQUES MAY INCLUDE MULCHING OR EROSION MATTING.

MISSOURI ONE CALL SYSTEM

The Missouri One Call System is a communications system which was established to help prevent damage to underground facilities and to promote safety. Missouri One Call operators are on duty 24 hours a day, seven days a week. Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION

60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

NOTICE

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

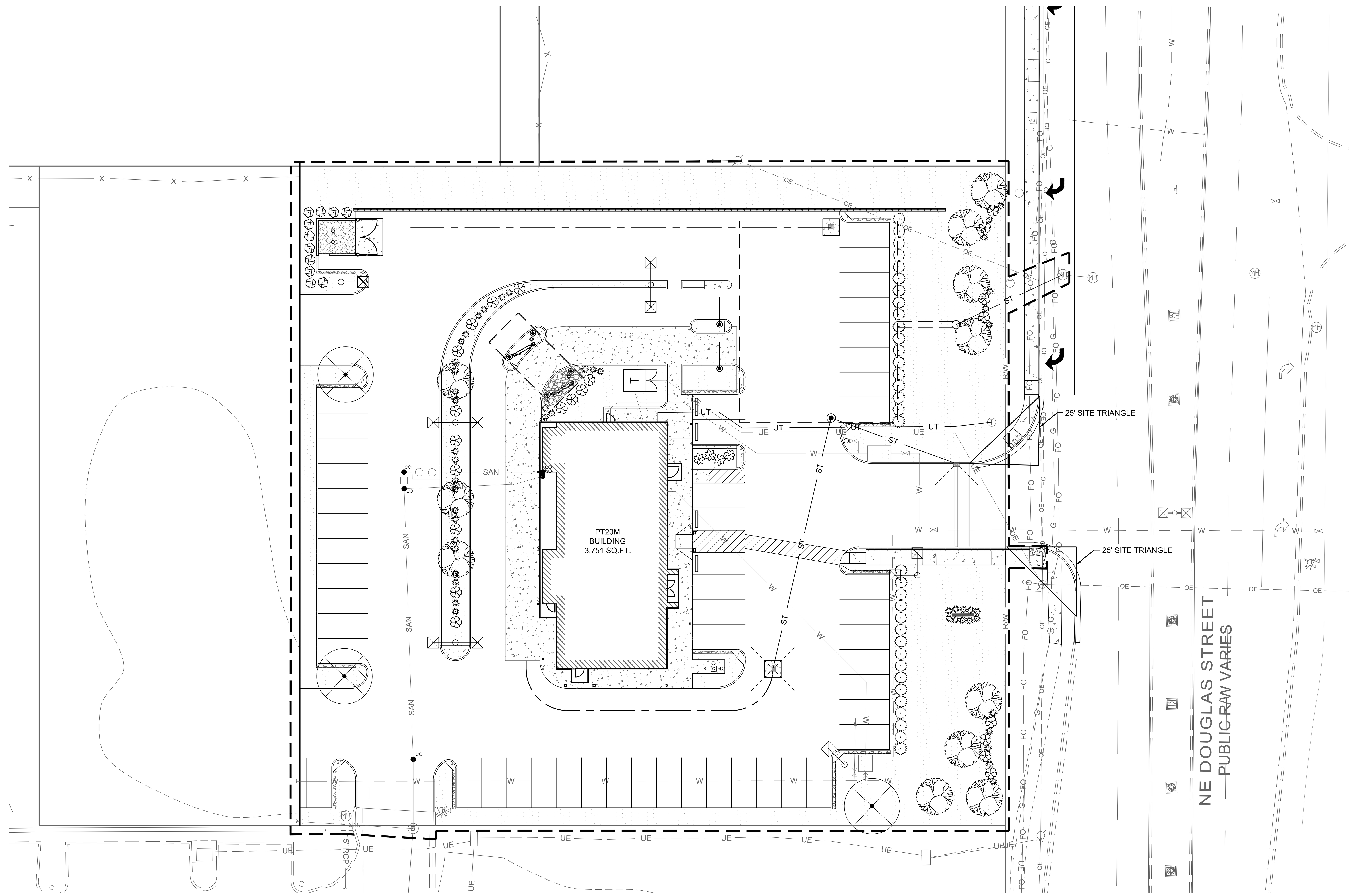
SHEET TITLE

SWPPP NOTES AND DETAILS

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-16



GENERAL NOTES:

A. ALL PLANT MATERIALS TO COMPLY WITH THE LATEST EDITION OF A.N.A. STANDARDS FOR NURSERY STOCK AND BE GUARANTEED UNTIL THE CERTIFICATE OF OCCUPANCY IS OBTAINED OR FOR A PERIOD OF ONE (1) YEAR FROM DATE OF FINAL ACCEPTANCE, WHICHEVER IS GREATER. ANY PLANTINGS NEEDING REPLACEMENT WILL BE GUARANTEED FROM THE TIME OF REPLACEMENT IF AFTER FINAL ACCEPTANCE.

B. LANDSCAPE CONTRACTOR IS TO VERIFY LOCATION OF ALL UNDERGROUND UTILITIES AND RECEIVE APPROVAL FROM GENERAL CONTRACTOR OR SITE SUPERVISOR, IF NECESSARY, TO MAKE CHANGES IN PLANT LOCATIONS.

C. LANDSCAPE CONTRACTOR MUST COORDINATE WITH GENERAL CONTRACTOR AND OTHER SITE OPERATIONS.

D. MINOR ADJUSTMENTS TO THE PLANT LOCATIONS ARE TO BE MADE IN THE CASE OF ANY CONFLICTS WITH PROPOSED UTILITIES.

E. ALL PLANTING BEDS AND FREE STANDING TREES TO BE MULCHED WITH 4" OF SHREDDED HARDWOOD MULCH. BEDS ARE TO BE GRADED SMOOTH AND FREE OF SOIL CLODS AND STONES. ALL TREES TO BE STAKED AND WRAPPED WITH KRAFT TREE WRAP.

F. ALL PLANTS ARE TO BE REMOVED FROM CONTAINERS, CAGES AND NON-BIODEGRADABLE MATERIALS.

G. GENERAL CONTRACTOR IS RESPONSIBLE FOR FINISHED GRADES; LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR FINE GRADING AND TO PROVIDE 4" OF AMENDED TOPSOIL FOR PLANTING BEDS.

H. ALL ORGANIC MATTER AND DEBRIS ARE TO BE REMOVED FROM THE SITE BY THE LANDSCAPE CONTRACTOR. LAWN AREAS AND BEDS SHOULD BE FREE OF STONES GREATER THAN 2".

I. PLANT QUANTITIES HAVE BEEN PROVIDED FOR CONVENIENCE ONLY; THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR HIS OWN "TAKE OFFS". DRAWING PREVAILS OVER WRITTEN QUANTITIES.

J. THE LANDSCAPE CONTRACTOR SHALL SUBMIT A ONE (1) YEAR MAINTENANCE CONTRACT FOR CONSIDERATION BY THE OWNER. CONTRACT SHALL BE SEPARATE FROM INSTALLATION CONTRACT.

K. PLANTING BEDS SHALL BE TREATED WITH A PRE-EMERGENT HERBICIDE APPLIED AT PRODUCT SPECIFIED RATE UNLESS OTHERWISE NOTED.

L. PLANTING SHALL BE FERTILIZED UPON INSTALLATION. RECOMMENDED FERTILIZER SHALL BE MIXED WITH BACKFILL AT PRODUCT SPECIFIED RATE.

M. BED EDGE SHALL BE SMOOTH, CONSISTENT 4 1/2" DEEP AND HAND CUT, EDGES TO BE LOCATED BETWEEN ALL BEDS (INCLUDING TREES) AND LAWN AREAS.

N. CONTRACTOR TO SEED ALL DISTURBED AREAS WITH A LOCALLY ADAPTIVE SEED MIX UNLESS OTHERWISE DIRECTED BY THE GENERAL CONTRACTOR.

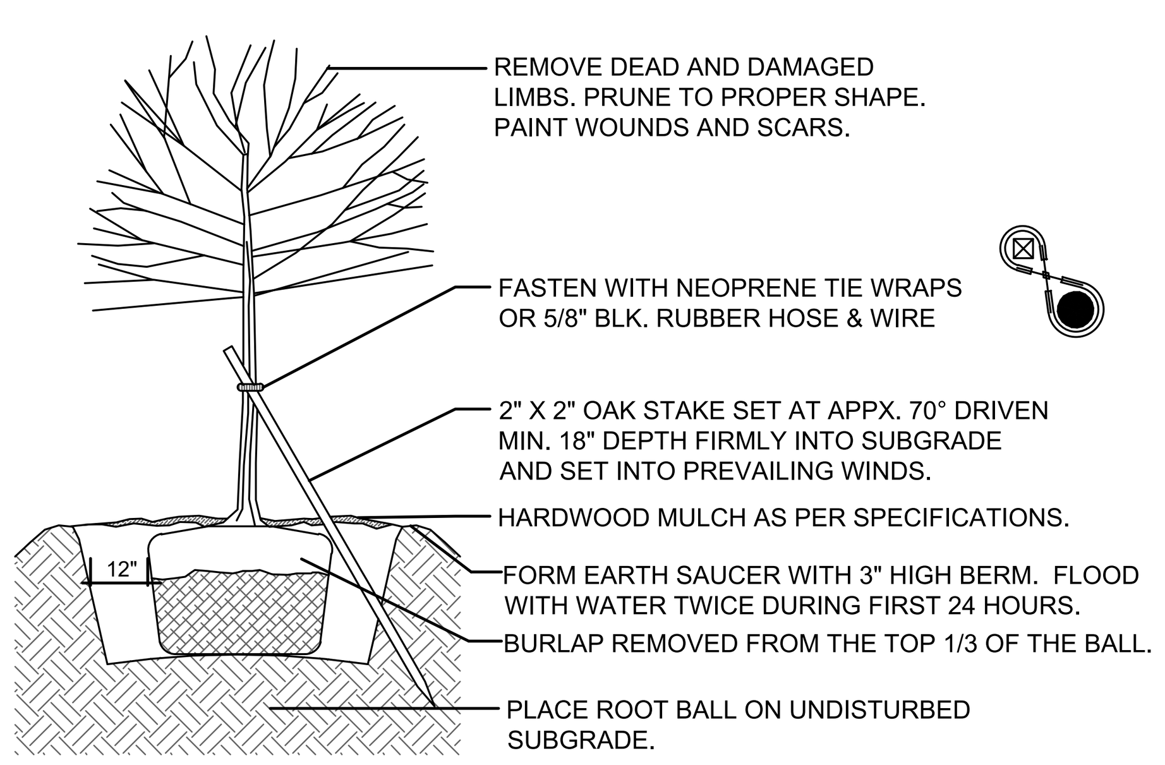
O. TOPSOIL SHALL BE BACK FILLED TO PROVIDE POSITIVE DRAINAGE OF ALL LANDSCAPE AREAS. SEE GRADING AND DRAINAGE PLAN SHEET C-6.

PROPOSED PLANT SCHEDULE

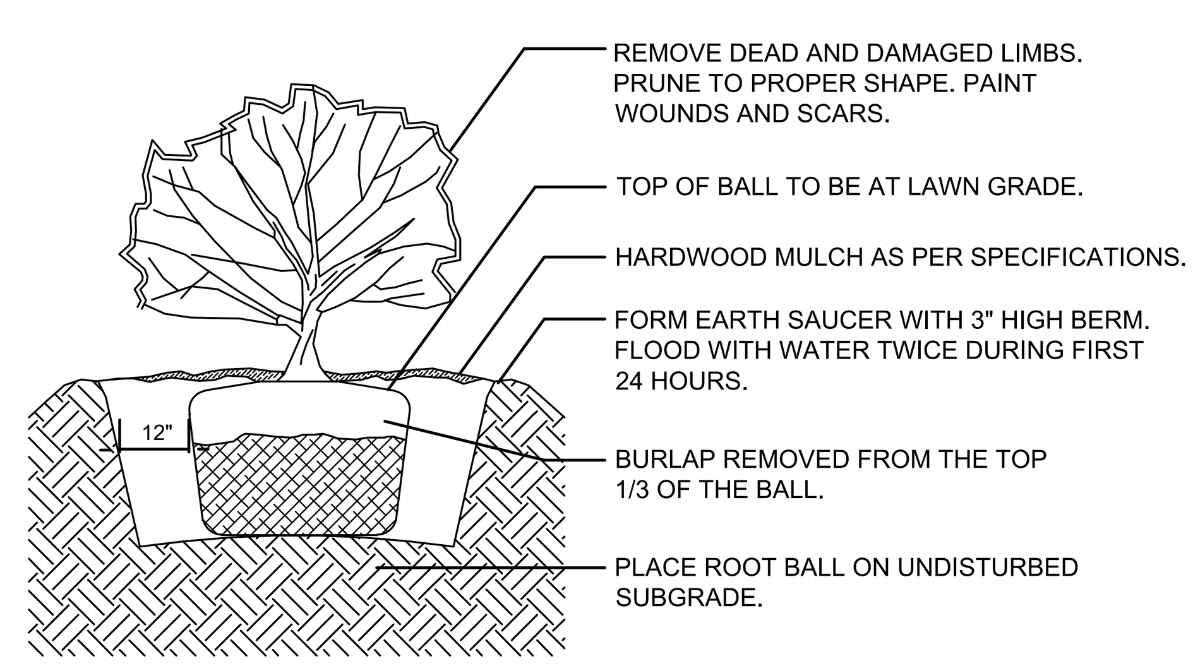
DECIDUOUS TREES		BOTANICAL NAME	COMMON NAME	QTY	CAL	CONT
	AR	ACER RUBRUM	RED MAPLE	3	1.5"	B+B
	AC	AMELANCHIER CANADENSIS	SERVICEBERRY	11	1.0"	B+B
SHRUBS		BOTANICAL NAME	COMMON NAME	QTY	HEIGHT	
	CP	CHAMAECYPARIS PISIFERA 'GOLDEN MOP'	GOLD MOP CYPRESS	49	18" MIN.	
	WF	WEIGELA FLORIDA 'ALEXANDRA'	WINE AND ROSES WEIGELA	22	18"-24"	
	RI	RHAPHIOLEPIS INDICA 'MAJESTIC BEAUTY'	MAJESTIC BEAUTY INDIAN HAWTHORN	11		
	HP	HYDRANGEA PANICULATA 'LITTLE LIME'	LITTLE LIME HYDRANGEA	4		
	IV	ILEX VOMITORIA 'NANA'	DWARF YAUPON	34		

LEGEND

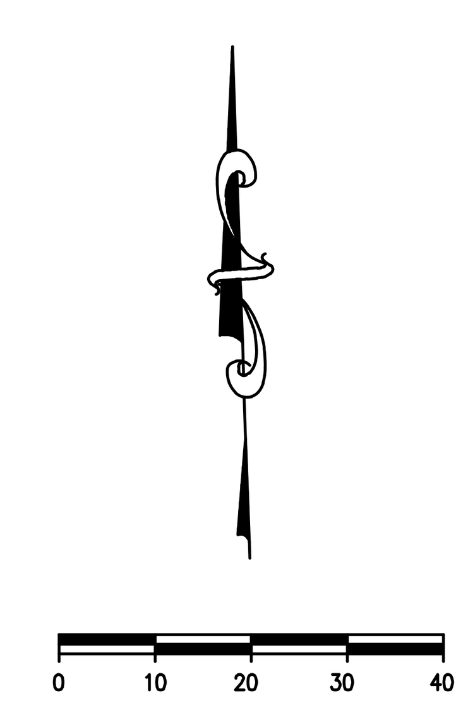
PROPOSED	DESCRIPTION
	GRASS/SEED AREA
	CONCRETE



A / C17 DECIDUOUS TREE PLANTING DETAIL
N.T.S.



B / C17 SHRUB PLANTING DETAIL
N.T.S.



MISSOURI ONE CALL SYSTEM

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Missouri One Call provides a telephone number for contractors and the general public to call for notification of their intent to use equipment for excavation, grading, blasting, boring, demolition or other types of similar work.

1-800-DIG-RITE or 811

MAKE THE CALL...IT'S THE LAW

REVISION/DATE/DESCRIPTION	
60% Plan Set	10/20/20
90% Plan Set	11/17/20
100% Plan Set/Bid Set	12/16/20

WHATABURGER

ms consultants, inc.
engineers, architects, planners
2221 Schrock Road
Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

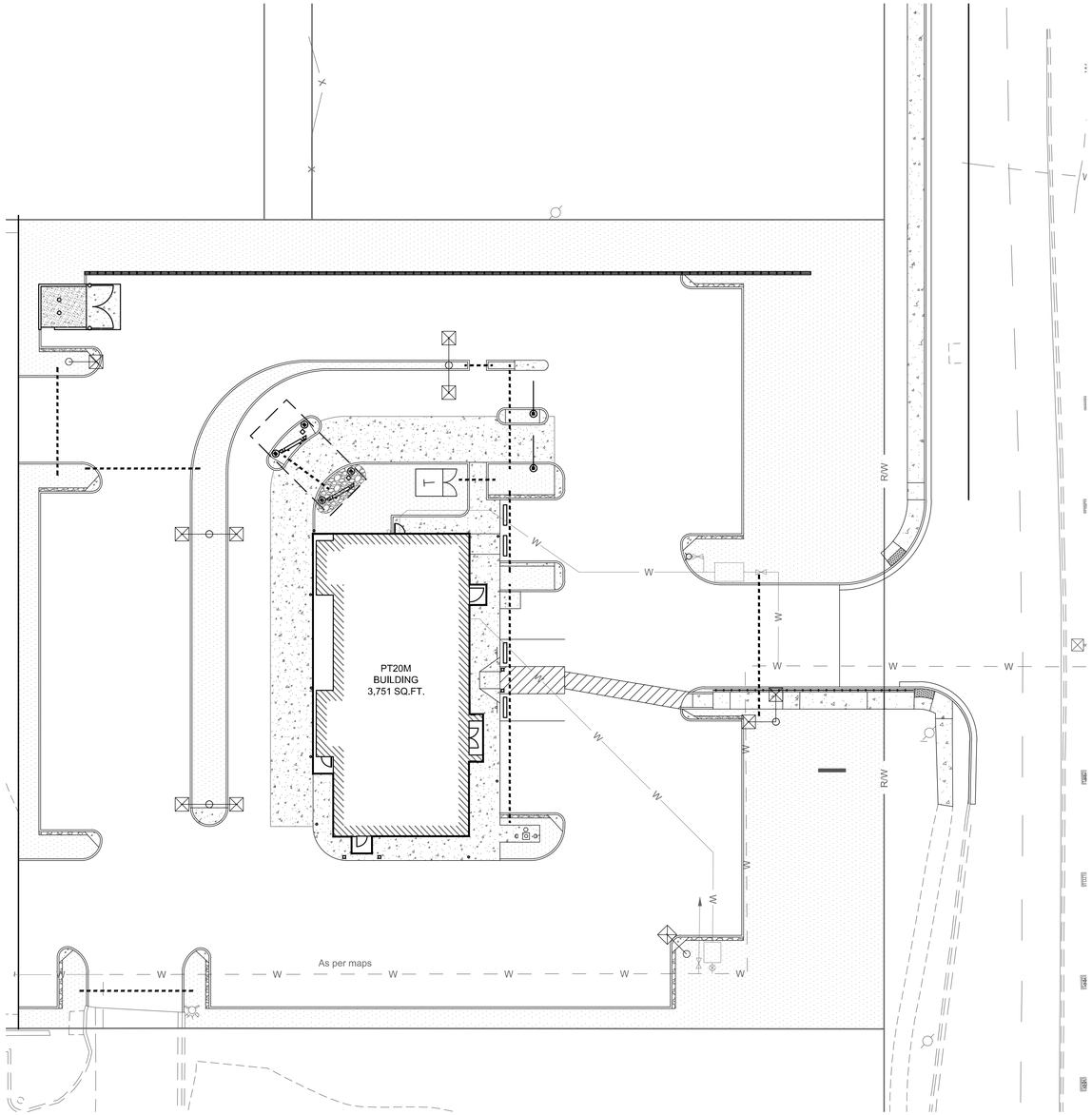
PROJECT
WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

SHEET TITLE
LANDSCAPE PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING
C-17



GENERAL

A. THE LANDSCAPE IRRIGATION SYSTEM SHALL IRRIGATE ALL PROPOSED LANDSCAPE AND GRASS AREAS ON THE PROPERTY. THE DESIGN, PERMITTING, AND INSTALLATION OF THE SYSTEM SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE/IRRIGATION CONTRACTOR (CONTRACTOR).

B. THE CONTRACTOR IS TO INSTALL EQUIPMENT NECESSARY TO PROVIDE A COMPLETE, FUNCTIONAL SYSTEM THAT IS IN COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS.

C. THE IRRIGATION CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE OWNER'S REPRESENTATIVE FOR APPROVAL, PRIOR TO CONSTRUCTION, WHICH WILL ILLUSTRATE TYPE OF HEADS, VALVES, CONTROLLER, PIPING AND ACCESSORIES. IRRIGATION HEADS, VALVES AND CONTROLLER ARE TO BE FROM A SINGLE MANUFACTURER. ALL EQUIPMENT MUST HAVE A MANUFACTURERS FIVE YEAR WARRANTY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER INSTALLATION AND FIELD ADJUSTMENT OF THE ABOVE ITEMS.

D. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE OWNER THE FINAL LOCATION OF THE CONTROL PANEL(S). NO ADDITIONAL COSTS SHALL BE ALLOWED FOR ANY ADJUSTMENTS MADE TO THE FINAL LOCATION OF ALL EQUIPMENT.

E. THE IRRIGATION CONTRACTOR SHALL SUBMIT A WARRANTY POLICY TO THE OWNER WHICH SHALL COVER THE FUNCTION OF THE ENTIRE SYSTEM FOR A PERIOD OF ONE YEAR AFTER THE ACCEPTANCE OF THE SYSTEM BY THE OWNER.

F. CONTRACTOR WILL VERIFY STATIC PRESSURE AND VOLUME OF SITE WATER SUPPLY AND ADJUST ENTIRE IRRIGATION SYSTEM ACCORDINGLY. EACH ZONE OF IRRIGATION SYSTEM IS TO BE DESIGNED WITH A MINIMUM OPERATING PRESSURE OF 45 PSI. IF THE PRESSURE IS BELOW 45 PSI, A PROPERLY SIZED BOOSTER PUMP WILL BE REQUIRED. AS PART OF THE SHOP DRAWINGS, THE IRRIGATION CONTRACTOR WILL PROVIDE CALCULATIONS SHOWING PRESSURE LOSS FROM THE POINT OF CONNECTION TO THE FURTHEST HEAD (AND FOR THE FURTHEST HEAD ON THE LARGEST ZONE). ADJUST DESIGN TO MEET AVAILABLE PRESSURES AND VOLUMES. A CURRENT STATIC PRESSURE READING AT THE POINT OF CONNECTION WAS NOT AVAILABLE PRIOR TO DESIGN.

G. THE CONTRACTOR IS TO INSTALL ALL EQUIPMENT SUCH THAT THE BUILDING, PARKING AREAS, AND SIDEWALKS ARE NOT SPRAYED OR SUBJECT TO EXCESSIVE RUNOFF. FIELD ADJUSTMENTS MAY BE NECESSARY TO AVOID UNFORESEEN OBSTACLES AND SIMPLIFY INSTALLATION. IRRIGATION SYSTEM ACCESSORIES SUCH AS QUICK COUPLER VALVES, ISOLATION VALVES, AND MANUAL DRAIN VALVES ARE TO BE LOCATED AS NECESSARY TO COMPLETE THE SYSTEM.

H. THE IRRIGATION CONTROLLER IS TO BE A HYBRID SOLID STATE TYPE WITH PLASTIC LOCKABLE CABINET. CONTROLLER MUST HAVE DUAL PROGRAMMING FOR TURF SPRAY ZONES AND SHRUB SPRAY ZONES AND BE CAPABLE OF OPERATING MULTIPLE VALVES PER STATION.

I. PROVIDE DESIGNATED PVC SLEEVES FOR IRRIGATION PIPES AND WIRING THAT CROSSES UNDER WALKS, STREETS AND CONCRETE PADS. COMBINE PIPING WHENEVER POSSIBLE TO REDUCE QUANTITY OF SLEEVING MATERIALS. WHEN INSTALLING IRRIGATION PIPE ALONG CURBS OR IN ISLANDS, PLACE PIPE AS CLOSE TO CURB AS POSSIBLE TO ALLOW FOR PLANTING OF FUTURE TREES AND SHRUBS.

PART 1 GENERAL

1.1 REFERENCES

A. ASTM INTERNATIONAL:
1. ASTM B32 - STANDARD SPECIFICATION FOR SOLDER METAL.
2. ASTM B42 - STANDARD SPECIFICATION FOR SEAMLESS COPPER PIPE, STANDARD SIZES.
3. ASTM B88 - STANDARD SPECIFICATION FOR SEAMLESS COPPER WATER TUBE.
4. ASTM D2235 - STANDARD SPECIFICATION FOR SOLVENT CEMENT FOR ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC PIPE AND FITTINGS.
5. ASTM D2241 - STANDARD SPECIFICATION FOR POLYETHYLENE (PE) PLASTIC PIPE (SIDR-PR) BASED ON CONTROLLED INSIDE DIAMETER.
6. ASTM D2564 - STANDARD SPECIFICATION FOR SOLVENT CEMENTS FOR POLY (VINYL CHLORIDE) (PVC) PLASTIC PIPING SYSTEMS.

B. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION:
1. NEMA 250 - ENCLOSURES FOR ELECTRICAL EQUIPMENT (1000 VOLTS MAXIMUM).

1.2 SYSTEM DESCRIPTION

C. HYBRID SOLID STATE CONTROLLED UNDERGROUND IRRIGATION SYSTEM, WITH PRESSURE BLOW-OUT DRAIN.

D. SOURCE POWER: 120 VOLT.

1.3 SUBMITTALS

A. SHOP DRAWINGS: INDICATE PIPING LAYOUT TO WATER SOURCE, LOCATION OF SLEEVES UNDER PAVEMENT, LOCATION AND COVERAGE OF SPRINKLER HEADS, COMPONENTS, PLANT AND LANDSCAPING FEATURES, SITE STRUCTURES, SCHEDULE OF OUTLETS AND FITTINGS TO BE USED.

B. PRODUCT DATA: SUBMIT COMPONENT AND CONTROL SYSTEM AND WIRING DIAGRAMS.

1.4 CLOSEOUT SUBMITTALS

A. PROJECT RECORD DOCUMENTS: RECORD ACTUAL LOCATIONS OF CONCEALED COMPONENTS BY NORTHING AND EASTING.

B. OPERATION AND MAINTENANCE DATA TO OWNER:
1. SUBMIT INSTRUCTIONS FOR OPERATION AND MAINTENANCE OF SYSTEM AND CONTROLS, SEASONAL ACTIVATION AND SHUTDOWN, AND MANUFACTURER'S PARTS CATALOG.
2. SUBMIT SCHEDULE INDICATING LENGTH OF TIME EACH VALVE IS REQUIRED TO BE OPEN TO DELIVER DETERMINED AMOUNT OF WATER.

1.5 QUALITY ASSURANCE

A. PERFORM WORK IN ACCORDANCE WITH MANUFACTURER'S STANDARDS.

1.6 COORDINATION

A. COORDINATE THE WORK WITH SITE BACKFILLING, PAVING, LANDSCAPE GRADING AND DELIVERY OF PLANT LIFE.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. PVC PIPE: ASTM D2241, SDR 26; 160 PSI SOLVENT WELDED SOCKETS.

B. HDPE PIPE: ASTM D-2239, SDR-15, 100 PSI.

C. COPPER TUBING: ASTM B88 TYPE K.

D. FITTINGS: TYPE AND STYLE OF CONNECTION TO MATCH PIPE.

E. SOLVENT CEMENT: [ASTM D2564 FOR PVC PIPE AND FITTINGS] [ASTM D2235 FOR ABS PIPE AND FITTINGS].

F. SLEEVE MATERIAL: PVC SCH 40.

2.2 OUTLETS

A. OUTLETS: BRASS CONSTRUCTION.

B. ROTARY TYPE SPRINKLER HEAD: POP-UP TYPE WITH SCREENS; FULLY ADJUSTABLE FOR FLOW AND PRESSURE; WITH LETTER OR SYMBOL DESIGNATING DEGREE OF ARC AND ARROW INDICATING CENTER OF SPRAY PATTERN.

C. SPRAY TYPE SPRINKLER HEAD: POP-UP HEAD WITH FULL CIRCLE PATTERN.

D. QUICK COUPLER: GALVANIZED.

2.3 MANUAL VALVES

A. VALVES: HIGHLY CORROSION RESISTANT CONSTRUCTION (BRASS, STAINLESS STEEL, ETC.). ALL VALVES SHALL BE ACCESSIBLE FROM ABOVE THROUGH A VALVE BOX.

B. BACKFLOW PREVENTERS: BRONZE BODY CONSTRUCTION, REDUCED PRESSURE TYPE OR AS DESIGNATED BY LOCAL PLUMBING CODE REQUIREMENTS.

C. VALVE BOX AND COVER: HDPE RESIN THAT IS RESISTANT TO UV LIGHT, CORROSION, MOISTURE, AND CHEMICALS.

2.4 CONTROLS AND CONTROL VALVES

A. CONTROLLER: MUST WORK WITH MANUFACTURER FLOW SENSOR, RAIN SENSOR, AND

****** [OR] ******

B. CONTROLLER: AUTOMATIC CONTROLLER, MICROPROCESSOR SOLID STATE CONTROL WITH VISIBLE READOUT DISPLAY, TEMPORARY OVERRIDE FEATURE TO BYPASS CYCLE FOR INCLEMENT WEATHER, PROGRAMMABLE FOR 7 DAYS IN QUARTER HOUR INCREMENTS, WITH AUTOMATIC START AND SHUTDOWN.

C. CONTROLLER HOUSING: NEMA 250 TYPE 3R; WEATHERPROOF, WATERTIGHT, WITH LOCKABLE ACCESS DOOR.

D. VALVES: HYDRAULIC; NORMALLY CLOSED, INCLUDING REQUIRED FITTINGS AND ACCESSORIES.

E. WIRE CONDUCTORS: COPPER CONDUCTOR, DIRECT BURIAL TYPE.

F. RAIN SENSORS: PER SELECTED MANUFACTURER.

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. ELECTRICAL CHARACTERISTICS:
1. 120 VOLTS, SINGLE PHASE, 60 HZ.

B. DISCONNECT SWITCH: FACTORY MOUNT DISCONNECT SWITCH IN CONTROL PANEL.

PART 3 EXECUTION

3.1 EXAMINATION

A. VERIFY LOCATION OF EXISTING UTILITIES.

B. VERIFY REQUIRED UTILITIES ARE AVAILABLE, IN PROPER LOCATION, AND READY FOR USE.

3.2 PREPARATION

A. ROUTE PIPING TO AVOID PLANTS, GROUND COVER, AND STRUCTURES.

B. LAYOUT AND STAKE LOCATIONS OF SYSTEM COMPONENTS.

C. REVIEW LAYOUT REQUIREMENTS WITH OTHER AFFECTED WORK. COORDINATE LOCATIONS OF SLEEVES UNDER PAVING TO ACCOMMODATE SYSTEM.

3.3 TRENCHING

A. TRENCH SIZE:
1. MINIMUM COVER OVER INSTALLED SUPPLY PIPING: 18 INCHES.
2. MINIMUM COVER OVER INSTALLED BRANCH PIPING: 15 INCHES.

B. TRENCH TO ACCOMMODATE GRADE CHANGES AND SLOPE TO DRAIN(S).

C. MAINTAIN TRENCHES FREE OF DEBRIS, MATERIAL, OR OBSTRUCTIONS DAMAGING TO PIPE.

3.4 INSTALLATION

A. CONNECT TO UTILITIES.

B. SET OUTLETS AND BOX COVERS AT FINISH GRADE ELEVATIONS.

C. PROVIDE FOR THERMAL MOVEMENT OF COMPONENTS IN SYSTEM.

D. SLOPE PIPING FOR SELF DRAINAGE TO DAYLIGHT.

E. USE THREADED NIPPLES FOR RISERS TO EACH OUTLET.

F. INSTALL CONTROL WIRING IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED INSTALLATION PRACTICES. PROVIDE 10 INCH EXPANSION COIL AT EACH CONTROL VALVE, AND AT 100 FT INTERVALS. BURY WIRE BESIDE PIPE. MARK VALVES WITH NEOPRENE VALVE MARKERS CONTAINING LOCKING DEVICE. SET VALVE MARKERS IN VALVE BOXES SET TO FINISH GRADE.

G. AFTER PIPING IS INSTALLED, BUT BEFORE OUTLETS ARE INSTALLED AND BACKFILLING COMMENCES, OPEN VALVES AND FLUSH SYSTEM WITH FULL HEAD OF WATER.

3.5 BACKFILLING

A. BACKFILL WITH COMPACTED BACKFILL IN ACCORDANCE WITH DETAIL G ON SHEET C-11.

B. INSTALL 3 INCH SAND BEDDING BELOW AND COVER OVER PIPING.

C. PROTECT PIPING FROM DISPLACEMENT.

3.6 FIELD QUALITY CONTROL

A. PRIOR TO BACKFILLING, TEST SYSTEM FOR LEAKAGE FOR WHOLE SYSTEM TO MAINTAIN 100 PSI PRESSURE FOR ONE HOUR.

B. SYSTEM IS ACCEPTABLE WHEN NO LEAKAGE OR LOSS OF PRESSURE OCCURS DURING TEST PERIOD.

C. PROVIDE ONE COMPLETE SPRING SEASON START-UP AND FALL SEASON SHUTDOWN.

3.7 ADJUSTING

A. ADJUST CONTROL SYSTEM TO ACHIEVE TIME CYCLES REQUIRED

B. ADJUST HEAD TYPES FOR FULL WATER COVERAGE AS DIRECTED BY OWNER'S REPRESENTATIVE.

3.8 DEMONSTRATION AND TRAINING

A. INSTRUCT OWNER'S PERSONNEL IN OPERATION AND MAINTENANCE OF SYSTEM, INCLUDING ADJUSTING OF SPRINKLER HEADS. USE OPERATION AND MAINTENANCE MATERIAL AS BASIS FOR DEMONSTRATION.

LEGEND

PROPOSED	DESCRIPTION
	GRASS/LANDSCAPED AREA TO BE IRRIGATED
	CONCRETE
----------	4" SCHEDULE 40 PVC SLEEVE FOR FUTURE IRRIGATION LINES. CONTRACTOR TO MARK END OF SLEEVES.

0 10 20 30 40

SCALE: 1"=20'

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WHATABURGER

ms consultants, inc.
engineers, architects, planners
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Columbus, Ohio 43229-1547
phone 614.898.7100
fax 614.898.7570

PROJECT

WHATABURGER
PT20M BUILDING

1450 NE DOUGLAS ST.
LEE'S SUMMIT, MO
64086

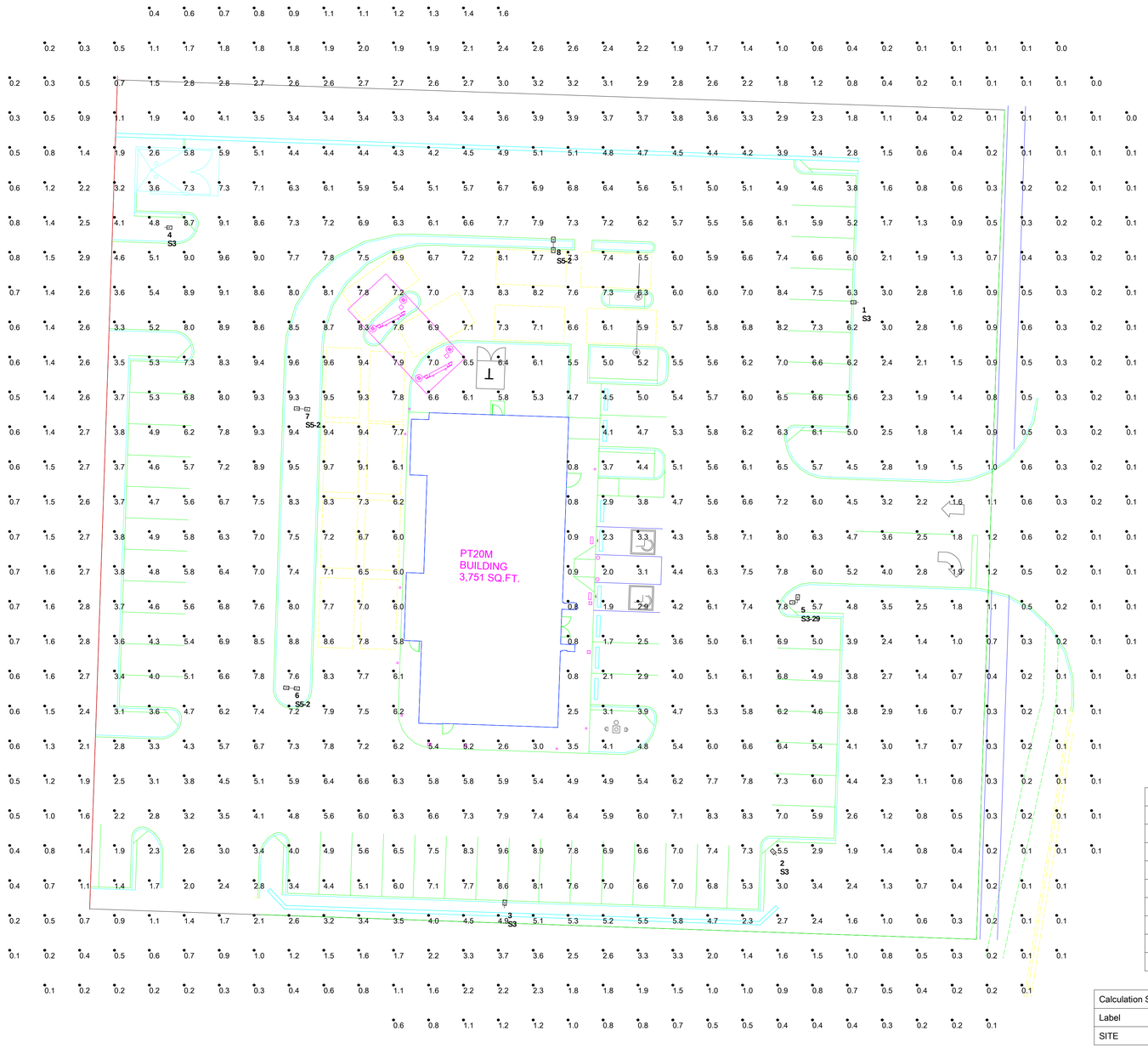
SHEET TITLE

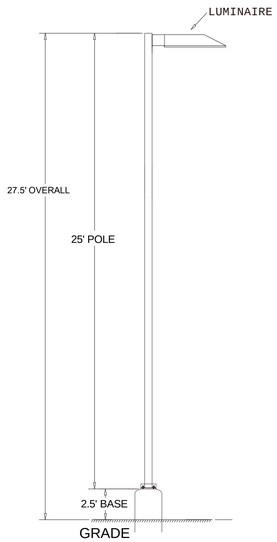
IRRIGATION PLAN

DRAWN BY:	LLK/AMA
CHECKED BY:	KEA
PROJECT NO:	40497-01

DRAWING

C-18





POLE DETAIL
(NOT TO SCALE)

FOR PRICING CONTACT:
DOUG KILE 214-957-5304
OR dkile@techlight.com

Notes:
1. Calculation 3' AFG.
2. Pole luminaire color to be white.

File:
wb-leessummit.agi
Date:
10-20-20

Luminaire Location Summary			
LumNo	Label	Z-luminaire height	Tilt
1	S3	27.5	0
2	S3	27.5	0
3	S3	27.5	0
4	S3	27.5	0
5	S3-29	27.5	0
6	S5-2	27.5	0
7	S5-2	27.5	0
8	S5-2	27.5	0

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
SITE	Illuminance	Fc	3.53	9.7	0.0	N.A.	N.A.

Luminaire Schedule						
Symbol	Qty	Label	Lumens/Lamp	Arrangement	LLF	Description
	4	S3	N.A.	SINGLE	0.900	CTL-N-35L-T3-_ -35,000 LUMEN TYPE 3 LED
	1	S3-29	N.A.	2 @ 90 DEGREES	0.900	CTL-N-20L-T3-_ -20,000 LUMEN TYPE 3 LED
	3	S5-2	N.A.	D180	0.900	CTL-N-35L-T5W-_ -35,000 LUMEN TYPE 5 LED

TECHLIGHT INC.
- DUE TO CHANGING LIGHTING ORDINANCES IT IS THE CONTRACTORS RESPONSIBILITY TO SUBMIT THE SITE PHOTOMETRICS AND LUMINAIRE SPECS TO THE LOCAL INSPECTOR BEFORE ORDERING TO ENSURE THIS PLAN COMPLIES WITH LOCAL LIGHTING ORDINACES.
- THIS LIGHTING DESIGN IS BASED ON INFORMATION SUPPLIED BY OTHERS. CHANGES IN ELECTRICAL SUPPLY, AREA GEOMETRY AND OBJECTS WITHIN THE LIGHTED AREA MAY PRODUCE ILLUMINATION VALUES DIFFERENT FROM THE PREDICTED RESULTS SHOWN ON THIS LAYOUT.
- THIS LAYOUT IS BASED ON .IES FILES THAT WERE LAB TESTED OR COMPUTER GENERATED. ACTUAL RESULTS MAY VARY.

REVISIONS:
SYM DATE DESCRIPTION BY

PROJECT:
WHATABURGER
LEE'S SUMMIT

WHATABURGER
300 CONCORD PLAZA DR.
SAN ANTONIO, TEXAS
210-476-6000 ZIP 78216

SHEET TITLE:
Photometric Plan

UNIT NO.
DATE:
SCALE:
DRAWN BY:
APPROVED BY:

SHEET NO:
PH1.0
FILE:

WHATABURGER®