Drainage Memo

To:	Bourbon County Joint Planning Commission
From:	Stephanie Blain, PE / Erin Remley, EIT Palmer Engineering
Date:	March 14, 2023
Re:	Southern Shine Car Wash Development (Letton Drive)

1 EXECUTIVE SUMMARY

Palmer Engineering (Palmer) has completed engineering analyses for the stormwater drainage on the southern Shine Car Wash development adjacent to the Magnolia Trace Development on Letton Dr in Paris, Kentucky. Based on Palmer's field survey in March 2023, the proposed development will need a series of curb inlets, manholes, and storm pipes connecting into the existing storm system, to capture stormwater runoff. The drainage for the development of this parcel site was included in overall Drainage Report prepared for the entire Magnolia Trace Development by Thoroughbred and dated November 21, 2022. This development will utilize the regional detention that was approved as a part of that report.

This report was prepared to document the design, layout, and sizing of stormwater drainage facilities for a proposed development located in Paris, Bourbon County, Kentucky. The development project will include the construction of a car wash building and vacuum stations. Stormwater drainage facilities for the development were designed utilizing criteria from the City of Paris Ordinance section 72.212 "Storm Drainage" (2023). The following scope was completed as part of the drainage analysis:

1. Storm Sewer Evaluation
2. Pipe Sizing Calculations

Figure 1.1: Project Overview (Not to Scale)

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2 METHODOLOGY

The Rational Method of calculating storm water flow was used to properly size the proposed pipes to contain runoff from this development. The program FlowMaster, by Bentely Systems, which utilizes Manning's equation, was then used to determine the proper pipe size for the proposed flow. The Rational Method equation and values used are as follows;

$$Q = CiA$$

Q= flow (cfs) C= runoff coefficient

i= intensity (in/hr) A= area (acres)

Table 2-1: Rational Method Equation Constants

Constant	Value Used
C, Runoff Coefficient	C= .3 (grass), C= .9 (impervious surface)
i, Rainfall Intensity	4 in/hr (KYTC design standard for catchment)

2.1 SUBCATCHMENT DRAINAGE AREAS AND FLOW CALCULATIONS

The Rational Method requires the calculation of the Drainage Area for each catch basin. The Drainage Area was delineated using both proposed contours and site survey data acquired in February, 2024. It is an agreement between SSIG 3 LLC, the owner of parcel 2A, and MDAT LLC, the owner of parcel 2B to the left, that Structure 8 will receive the runoff flow from the future development of Parcel 2B. The anticipated flow from the development of Parcel 2B was calculated to be 7.77 cfs. The Drainage Area and anticipated receiving flow for each of the proposed catch basins is as follows:

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Table 2-2: Subcatchment Drainage Areas and Flows

PROPOSED STRUCTURE	DRAINAGE AREA (ACRES)	DIRECT FLOW (CFS)	CUMMULATIVE FLOW (CFS)
1	.33	1.2	2.31
2	.089	.32	1.11
3	.22	.79	.79
4	N/A	N/A	9.99
5	.35	1.26	1.26
6	.098	.35	8.73
7	.086	.21	.21
8	.11	.40	8.17
FUTURE DEVELOPMENT	N/A	7.77	7.77

3 STORMWATER SEWER DESIGN

Several different constraints and assumptions were taken into consideration during the design of the storm sewer systems. These constraints and assumptions included:

- A minimum pipe size of 12 inches was selected to minimize the potential of the storm sewer pipes clogging.
- All pipes were analyzed with a Manning's friction coefficient of 0.012.

Detailed information on the layout of the storm sewer can be found on the Development Plan and it will be further detailed in future Construction Documents. Refer to these documents for structure information. The table on the following page provides the values required for Manning's formula to appropriately size the storm water system as well as the required and designed pipe sizes.

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Table 3-1: Pipe Sizing Table

PIPE NAME	SLOPE (FT/FT)	PIPE LENGTH (FT)	FLOW (CFS)	REQUIRED PIPE SIZE	DESIGNED PIPE SIZE
EXA-1	.005	199.5	2.31	12”	12”
1-2	.005	87.6	1.11	10”	12”
2-3	.005	69.1	.79	8”	12”
EXB-4	.005	27.7	9.99	21”	21”
4-5	.005	50.5	1.26	10”	12”
4-6	.005	43.2	8.73	21”	21”
6-7	.005	27.3	.21	6”	12”
6-8	.005	198.6	8.17	21”	21”
8-FUTURE	.005	66.6	7.77	18”	21”

4 SUMMARY AND CLOSURE

In summary a total of 8 structures and approximately 770 LF of RCP pipe are being proposed to manage storm runoff from the proposed Southern Shine Car Wash development. The sizes of these pipes were determined by calculating anticipated flow via the Rational Method and then proceeding to calculate the size required via manning’s formula. If you have any questions, please contact us.

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