LEE'S SUMMIT
MISSOURI

DESIGN AND CONSTRUCTION MANUAL DESIGN MODIFICATION REQUEST

PROJECT NAME: Longview Mansion – Parking Lot Addition

PREMISE ADDRESS: 1200 SW Longview Park Drive

PERMIT NUMBER: _____

OWNER'S NAME: NLV Mansion, LLC Mark Moberly

TO: The City Engineer

In accordance with the Lee's Summit Design and Construction Manual (DCM) Section 1002.A, I wish to apply for a modification to one or more specification (s). The following articulates my request for your review and action. (NOTE: Cite specific code sections and engineering justification and drawings.)

See attached.

SUBMITTED BY:

NAME: Stephen Saylor ( ) OWNER (X) OWNER'S AGENT

ADDRESS: 1301 Burlington St. Suite 100 Tel.# 816-442-6061

CITY, STATE, ZIP North Kansas City, MO 64116

Email: ssaylor@olsson.com SIGNATURE: _____

FORWARDING MANAGER: _____ RECOMMENDATION ( ) APPROVAL ( ) DENIAL

SIGNATURE: _____ DATE: _____

GEORGE BINGER III, P.E. – CITY ENGINEER: ( ) APPROVED ( ) DENIED

SIGNATURE: _____ DATE: _____

COMMENTS _____

_____

_____

A COPY MUST BE ATTACHED TO THE APPROVED PLANS

January 23, 2024

City of Lee's Summit, Missouri
220 SE Green Street
Lee's Summit, MO 64063

RE: PL2023291 – Longview Mansion – Parking Lot Addition

Dear Mr. Binger:

We are submitting this memorandum to support the attached waiver request for the Longview Mansion - Parking Lot Addition to remove the detention requirement as established in Section 5601.5.A.4 of the Kansas City Metropolitan Chapter, American Public Works Association, Standard Specifications & Design Criteria, Section 5600 – Storm Drainage System & Facilities.

The need to remove the detention requirement is driven by:

- The proposed parking lot improvements are located approximately ¼ mile upstream of Longview Lake. Due to this proximity, the timing of peak flowrates generated by the property will impact the hydraulic performance of the pond. The timing of peak flowrates will line up with upstream peak flowrates, potentially resulting in higher peak flows into the lake than currently seen.
- Existing stormwater issues of an existing 24" CMP culvert at the county road downstream of the project overtops the road in 10- and 100-year conditions. A proposed 15" HDPE pipe running next to the 24" CMP will reduce stormwater impacts to the road and culvert.

An existing 24" CMP (Point of Interest A) is located at the low point of the road lying west of the proposed parking lot. The drainage area for this pipe does not increase due to the proposed parking lot and results of the stormwater model demonstrate that the culvert will convey storm peak flows up to and including the 2-year storm event in existing conditions under the road. Larger storms reviewed, including the 10-, and 100-year storm events, result in the overtopping of the road in existing conditions. To reduce the impact of the proposed parking lot on this road due to the increase of stormwater, a 15" pipe is proposed to run next to the 24" CMP. The 15" pipe increases stormwater flows in the 2- and 100-year storm events to Longview Lake; however, stormwater does not overtop the road in the 2- or 10-year proposed conditions and stormwater flowing over the road is reduced in the 100-year storm event. Increases in flowrates from the stormwater study are summarized below:

Proposed Conditions vs. Existing Conditions Peak Flowrate

Point of Interest	Q_2 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
A	+0.99	-3.73	+2.19

There is an existing unnamed tributary between the county road and the lake that collects stormwater for a watershed of 133.66 acres, for which the proposed site accounts for ~0.75% of the watershed. This tributary was analyzed in existing conditions with a 5' bottom width and 8' depth with 3:1 slopes, and was determined to have flowrates at the point of entry to the lake (Point of Interest B, see Exhibit EX-04) as shown in the table below:

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Existing Tributary Conditions Peak Flowrate

Point of Interest	Q_2 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
B	337.72	656.07	1100.26

Percent Difference of Peak Flowrate with Proposed Parking Lot

Point of Interest	Q_2 (%)	Q_{10} (%)	Q_{100} (%)
B	+0.293	-0.569	+0.199

As shown in the table above, the percent increase of stormwater flow in the tributary area is less than 0.3% for the watershed in all stormwater events, and even decreased in the 10-year event.

The hydraulic grade line changes have been analyzed for the design storm events through the pipes and the existing tributary as seen in the table below between the existing and proposed conditions.

Hydraulic Grade Line (HGL) Differences between Existing and Proposed Conditions

Conveyance Type	Condition	Q_2 Depth (ft)	Q_{10} Depth (ft)	Q_{100} Depth (ft)
24” CMP and 15” HDPE	Existing (No 15” HDPE)	1.63	4.63	4.75
	Proposed (With 15” HDPE)	1.01	3.96	4.72
	Difference	-0.62	-0.67	-0.03 (Overtop Road)
Existing Tributary	Existing	2.77	3.73	4.67
	Proposed	2.77	3.72	4.67
	Difference	+0.00	-0.01	+0.00

The table above shows that the hydraulic grade line is reduced in the 24” CMP and 15” HDPE under the county road, and does not increase (negligible) or is reduced in the existing tributary to the lake.

To protect the water quality of stormwater runoff from the proposed improvements, an infiltration trench will be constructed around the north, west, and south sides of the parking lot. The infiltration trench will capture and treat the entire parking lot to a Level of Service rating of 9.00. Stormwater flowing to the 24” CMP and 15” pipe will be reduced by the trench for the water quality storm event.

Peak runoff rate results shown above do not include analysis of the effects of the water quality infiltration trench. Although not modeled, the infiltration trench will provide a storage volume of 0.09 acre-feet, which exceeds the increase in volume runoff produced by the parking lot improvements in the 2-yr and 10-yr storm events, and the majority of the increase in volume produced by the 100-yr storm event. Existing and proposed volumes are summarized below:

Proposed Conditions vs. Existing Conditions Runoff Volume

Storm Event	Condition	Volume		Difference	Infiltration Trench Volume	Existing vs. Proposed
2-Yr	Existing	1.54	ac-ft	0.07	0.09	-0.02
	Proposed	1.61	ac-ft			
10-Yr	Existing	2.85	ac-ft	0.09		0.00
	Proposed	2.94	ac-ft			
100-Yr	Existing	4.92	ac-ft	0.11		0.02
	Proposed	5.03	ac-ft			

With the close proximity of the site to Longview Lake, reduction in impacts to the existing road, and the water quality volume provided by the infiltration trench offsetting the majority of the additional runoff volume produced by the site, we request this waiver be approved.

Should you have any questions, please contact me at (816) 442-6061 or ssaylor@olsson.com.

Sincerely,

Stephen Saylor, PE
Project Civil Engineer

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O 816.361.1177 / **olsson.com**

Stormwater Management Study Excerpt

1301 Burlington Street / Suite 100 / North Kansas City, MO 64116
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NEW LONGVIEW MANSION PARKING LOT STORMWATER DRAINAGE STUDY

Prepared for:

NLV Mansion, LLC
1125 Grand Blvd Ste 202
Kansas City, MO 64106

Prepared By:

Olsson, Inc.
1301 Burlington, Suite 100
North Kansas City, MO 64116
(816) 361-1177

Revised January 2024

Revised December 2023

October 2023

Olsson Project No. 022-06318

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1. INTRODUCTION

This Stormwater Drainage Study has been prepared to evaluate the stormwater hydrology of a proposed parking lot within the New Longview Mansion (NLV Mansion) property. The proposed parking lot will be placed on portions of developed and undeveloped areas.

The site is located northwest of the NLV Mansion building in Lee's Summit, Jackson County, Missouri. Figure 1 shows the general location of the proposed parking lot within the NLV Mansion property.

Stormwater runoff from the project site is tributary to Longview Lake, approximately 1/4 mile downstream of the study area.

This report is intended to serve as the project Stormwater Drainage Study for the NLV Mansion parking lot and has been prepared to evaluate the Existing and Proposed Conditions stormwater hydrology. Refer to Appendix B and C for hydrologic model input data and simulation results for Existing and Proposed Conditions. Refer to Appendix A for maps and exhibits.

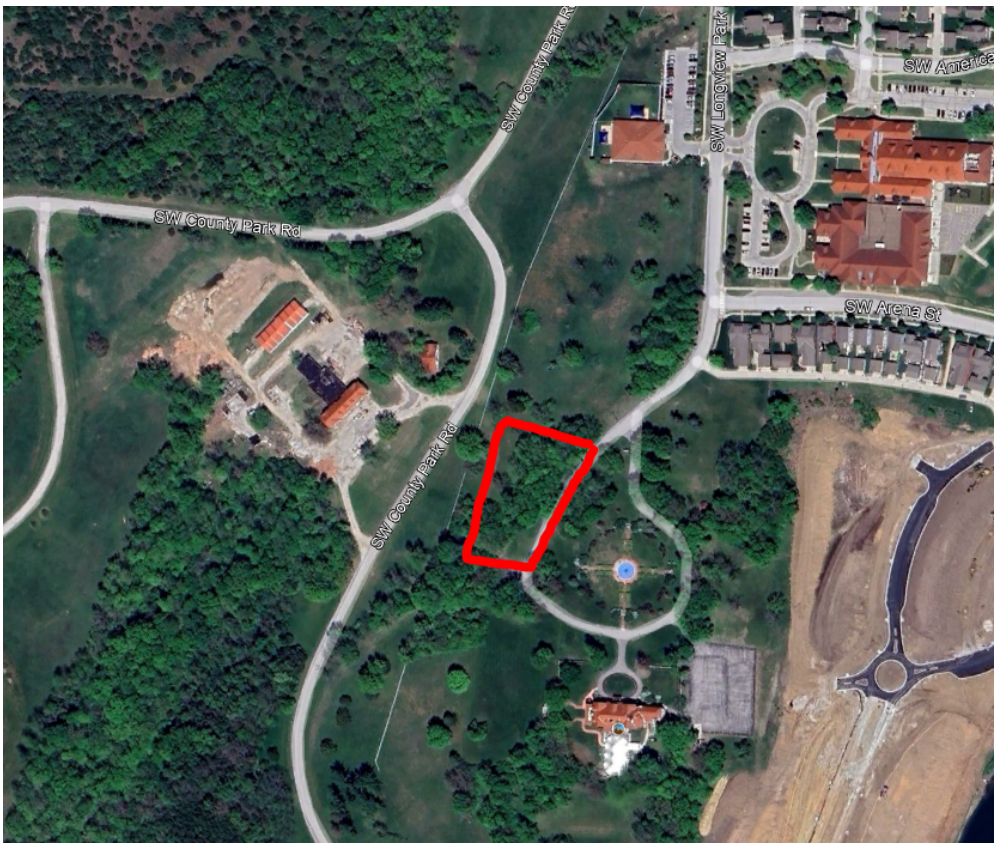

Figure 1. Vicinity Map

1.1. FEMA Floodplain Classification

The FEMA FIRM Panel 29095C0414G (eff. January 20, 2017) depicts the proposed development areas as “Zone X.” This zone is described as “areas determined to be outside the 0.2% annual-chance floodplain.” Refer to the attached FEMA Floodplain Map (Exhibit 8-1.1) for depiction of the established floodplains relative to the project site.

1.2. Soil Classification

Soil Maps published in the Soil Survey for Jackson County, Missouri categorizes soils in the study area as:

Table 1. Soil Classifications

Hydrologic Soil Group	Map Symbol	Type	Slopes
C/D	30080	Greenton silty clay loam	5-9%
D	10128	Sharpsburg-Urban land complex	2-5%
C/D	10117	Sampsel silty clay loam	5-9%
C	99034	Udarents-Urban land complex	9-20%

NRCS Runoff Curve Numbers (CN’s) in this study have been assigned to tributary areas based upon these Hydrologic Soil Groups (HSG’s) and associated existing and proposed land use. Land uses in the study area include open space, streets, and residential lots for twin gallery homes. The CN’s are assigned accordingly. Refer to the Soils Map in Appendix A for distribution of soil types throughout the sub-watersheds.

2. METHODOLOGY

The base data for the models prepared for this report has been obtained from available online maps and aerial imagery. Stormwater management is based upon methods and objectives defined in the Kansas City Metropolitan Chapter of the American Public Works Association's (KC-APWA) 2011 design guidance document called "Section 5600 Storm Drainage Systems & Facilities" (2011).

Runoff rates were analyzed using Autodesk Storm and Sanitary Analysis 2022 (SSA). SSA utilizes the following methods to model Existing and Proposed Conditions for stormwater runoff.

- NRCS TR-55 Unit Hydrograph Method
- 2-, 10-, and 100-year Return Frequency, 24-hour Storm Precipitation Depths (TP-40)
    - ARC Type II Soil Moisture Conditions
    - 24-Hour NRCS Type II Rainfall Distribution
    - Runoff Curve Numbers per NRCS TR-55 (Tables 2-2a – 2-2c) and KCAPWA Section 5602.3
    - NRCS TR-55 Methods for determination of Time of Concentration and Travel Time.
        - Note: SSA models use "Time of Concentration" for computing subarea hydrology.

Stormwater runoff models were created for the 2-, 10-, and 100-year design storm events. The precipitation depths used in the analysis have been interpolated from the "Technical Paper No. 40 Rainfall Frequency Atlas of the United States" (TP-40) isopluvial maps (May 1961). Table 2 below summarizes the rainfall depths used in this analysis:

Table 2. Precipitation Depths.

Return Period	24-Hour Precipitation Depth (inches)
Water Quality Storm* (WQ)	1.37
2-Year (50% Storm)	3.60
10-year (10% Storm)	5.34
100-Year (1% Storm)	7.90

*The "Water Quality Storm" is defined in the MARC & APWA "Manual of Best Management Practices for Stormwater Quality" as a 24-hour 1.37" rainfall depth. This particular storm event is utilized for proposed water quality analysis.

3. EXISTING CONDITIONS ANALYSIS

To quantify the effects of the proposed parking lot, the following area and point of interest have been chosen for existing and proposed conditions analysis. See Exhibit 01 – Existing Conditions Drainage Map in Appendix A for a visual depiction of the drainage area and point of interest.

Drainage Area represents the area north of the NLV Mansion building, which slopes westward toward SW County Park Road, then discharges to an existing 24” CMP running under the existing road. In existing conditions, the drainage area has an area of 10.56 acres.

Point of Interest A is located at the downstream invert of the existing 24” CMP on the west side of SW County Park Road and includes stormwater overtopping the road. The model references this point of interest as “Out-01” which stands for “outfall”.

Existing Detention is located at the upstream invert of the existing 24” CMP, on the east side of SW County Park Road. This detention is dry and is purely used in this study to effects of stormwater events at the road. The depth of Detention is 4.5’, from the invert of the 24” CMP and the crown of the roadway. See below for a brief description of the detention:

- Top of Roadway Elevation = 930.50
- Bottom of Basin / 24” CMP Invert = 926.00
- Outlet Pipe
    - 24” Corrugated Metal Pipe
    - Invert In = 926.00
    - Invert Out = 924.65
    - Pipe slope = 2.70%
    - Pipe length = 50.00’

Tables 3, 4, and 5 below summarize the results of the existing conditions analysis. The proposed conditions data is compared to these results in Section 4 of this report. Refer to Appendix B for output and a schematic for the existing conditions model and detailed calculations for the time of concentration.

Curve numbers were determined for existing and proposed conditions as shown in Table 3.

Table 3. Curve Numbers.

Land Use	Hydrologic Soil Group	Curve Number
Woods & Grass Combination	D	79
Paved Parking & Roofs	D	98

Table 4. Existing Conditions Area Data.

Area Name	Total Area (acres)	T_C (hours)	Weighted Curve Number	Q_2 (cfs*)	Q_{10} (cfs*)	Q_{100} (cfs*)
A	10.56	0.294	80.47	20.52	39.26	65.27

*cfs = cubic feet per second

Table 5. Existing Conditions at Point of Interest.

Flowrate at Outfall	Q_2 (cfs*)	Q_{10} (cfs)	Q_{100} (cfs)
A	20.52	36.37	63.10

*cfs = cubic feet per second

Table 6. Existing Conditions Detention Basin Data.

	Peak Q In (cfs)	T_P In (hr.)	Peak Q Out (cfs)	T_P Out (hr.)	Max V_R (ac-ft)	Peak W.S.E. (ft)
2-Year	20.44	12.17	20.02	12.17	0.008	927.64
10-Year	39.09	12.17	33.48	12.17	0.175	930.63 (Overtop)
100-Year	64.58	12.17	62.86	12.17	0.235	930.75 (Overtop)

*cfs = cubic feet per second

As seen in Table 6, the 10- and 100-year storm events overtop the crown of the roadway under existing conditions.

Per APWA Section 5608.4 and the City of Lee's Summit criteria, the performance criteria for comprehensive control is to provide detention to limit peak flow rates at downstream points of interest to maximum release rates:

- 50 percent storm peak rate less than or equal to 0.5 cubic feet per second (cfs) per site acre
- 10 percent storm peak rate less than or equal to 2.0 cfs per site acre
- 1 percent storm peak rate less than or equal to 3.0 cfs per site acre

Extended detention of the 90 percent mean annual event is also required for comprehensive control per APWA Section 5608.4.

Allowable release rates were calculated for the point of interest. Table 6 below summarizes the amount of area and the allowable discharges for each storm event.

Table 7. Allowable Peak Flow Rates.

Point of Interest	Allowable 2-Year (cfs)	Allowable 10-Year Q (cfs)	Allowable 100-Year Q (cfs)
A	5.28	21.12	31.68

4. PROPOSED CONDITIONS ANALYSIS

The proposed conditions sections of this analysis assume the parking lot at NLV Mansion is fully constructed. This analysis includes the construction of the pavement, curb, and BMPs. The difference between the existing conditions model and the proposed conditions model will be evaluated in this section as well as the allowable release rates. Refer to Exhibit 02 – Proposed Conditions Drainage Map in Appendix A for a visual depiction of the drainage area and point of interest.

During the pre-application meeting for this project, it was agreed upon with City of Lee's Summit officials that detention for this project should be waived due to the proximity of the parking lot and Longview Lake at ¼ mile. To keep the balance of stormwater that drains from the site to Longview Lake close to the current time of concentration, detention of stormwater will not be included for this project on site. BMPs are still required to meet the MARC manual water quality volume requirements.

4.1. Effects of Development

The proposed conditions analysis assumes completion of the parking lot at New Longview Mansion. The modeled point of interest is the same as the existing conditions model. The drainage area also remains the same since the parking lot is surrounded by the drainage area boundary. The following is a summary of the proposed conditions drainage area. See Exhibit 02 – Proposed Conditions Drainage Map in Appendix A. Table 7 summarizes the proposed conditions area data.

Drainage Area represents the same area as described in the existing conditions. Impervious area and curve number have been increased due to the parking lot.

To meet or reduce the increase of stormwater overtopping SW County Park Road compared to existing conditions, a 15" HDPE pipe is proposed to run parallel to the existing 24" CMP with the same invert elevations.

The analysis provided in Section 3 established existing conditions of the parking lot's drainage area.

The following tables summarize the results of the proposed conditions analysis. Tables 7 and 8 shows the effects of the parking lot for the drainage area. Refer to Appendix C for output and a schematic of the proposed conditions Storm and Sanitary Analysis 2022 model.

Table 8. Proposed Conditions Area Data.

Area Name	Total Area (acres)	T_C* (hours)	Weighted Curve Number	Q_2 (cfs*)	Q_{10} (cfs*)	Q_{100} (cfs*)
A	10.56	0.294	81.58	21.56	40.49	66.57

*Tc = Time of Concentration

Table 9. Proposed Conditions at Point of Interest.

Point of Interest	Q_2 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
A	21.51	32.64	65.29

Table 10. Proposed Conditions Detention Basin Data.

	Peak Q In (cfs)	T_P In (hr.)	Peak Q Out (cfs)	T_P Out (hr.)	Max V_R (ac-ft)	Peak W.S.E. (ft)
2-Year	21.51	12.08	21.47	12.10	0.002	927.01
10-Year	40.45	12.08	32.17	12.10	0.102	929.96
100-Year	66.44	12.08	64.22	12.10	0.215	930.72 (Overtop)

*cfs = cubic feet per second

Table 11 shows post-development peak discharge values at the points of interest.

Table 11. Proposed Conditions vs. Allowable Release Rates.

Point of Interest	Q_2 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
A	+16.07	+11.32	+32.54

Table 12. Proposed Conditions vs. Existing Conditions at Point of Interest A.

Point of Interest	Q_2 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
A	+0.99	-3.73	+2.19

Table 13. Proposed Conditions vs. Existing Conditions at Existing Detention Basin.

	Peak Q In (cfs)	T_P In (hr.)	Peak Q Out (cfs)	T_P Out (hr.)	Max V_R (ac-ft)	Peak W.S.E. (ft)
2-Year						
Existing	20.44	12.17	20.02	12.17	0.008	927.64
Proposed	21.51	12.08	21.47	12.10	0.002	927.01
Difference	+1.07	-0.09	+1.45	-0.07	-0.006	-0.63
10-Year						
Existing	39.09	12.17	33.48	12.17	0.175	930.63 (Overtop)
Proposed	40.45	12.08	32.17	12.10	0.102	929.96
Difference	+1.36	-0.09	-1.31	-0.07	-0.073	-0.67
100-Year						
Existing	64.58	12.17	62.86	12.17	0.235	930.75 (Overtop)
Proposed	66.44	12.08	64.22	12.10	0.215	930.72 (Overtop)
Difference	+1.86	-0.09	+1.36	-0.07	-0.020	-0.03

Tables 11, 12, and 13 show increases of flow from the proposed condition compared to the allowable release rates and existing conditions at the Point of Interest, except for the 10-year flow due to the proposed 15” pipe. The 15” pipe removes the overtopping of stormwater of the road in the 10-year proposed condition and reduces the amount of stormwater overtopping the road in the 100-year proposed condition.

With the reduction in stormwater overtopping SW County Park Road and the increase of stormwater being directed under the road towards Longview Lake, a waiver is requested that the proposed conditions be accepted as is, with the increase of these flows. It should be noted that the increase of the flow to existing conditions is not more than 5% for all storm events.

4.2. Proposed BMP Facilities

Although detention for the proposed parking lot is requested to be waived, water quality volume requirements must be met through BMPs. The treatment area for the BMPs will only include areas of disturbance, and not the entire drainage area. BMP Worksheet 1 in Appendix C shows that the level of service required for the parking lot is a 7, with most of the disturbed area being impervious.

With the requirement of a level of service 7, an infiltration trench will be used with the high value rating and versatile footprint required to meet the level of service. The soil type, Greenton silty clay loam, that covers the entire disturbed area for the parking lot, has a low hydraulic conductivity and would not naturally be able to drain the treatment area under 72 hours, a requirement per the MARC Manual. Soil with a hydraulic conductivity rate of 2 micrometers/second or higher must be placed at a depth of 2’ minimum below the infiltration trench to obtain proper hydraulic conductivity. A perforated pipe to drain heavy stormwater flows to the point of interest within the drainage area (see Exhibit-03 in Appendix A). A worksheet for calculations of the infiltration trench can be found in Appendix C that show meeting the design criteria for water quality volume.

5. SUMMARY

This stormwater drainage study was prepared to evaluate the hydrologic impact generated by the development of NLV Mansion parking lot and to provide a comprehensive stormwater management plan for the proposed project. Once fully constructed, the area will include 77 parking stalls, pavement, pavement striping, and an infiltration trench.

Increases in peak flow rates caused by the project are requested to be waived per the proximity to Longview Lake, and reduction of stormwater overtopping SW County Park Road. Water quality volume and level of service will be mitigated by an infiltration trench.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis demonstrate that the proposed stormwater management plan for the project achieves compliance with water quality volume requirements. Once constructed, the 2- and 100-year flows at the point of interest are above the existing conditions and allowable release rates; however, stormwater flows in the 10-year proposed condition are below existing conditions at the point of interest. A waiver for the increases in flows to keep flowrates and concentration times to Longview Lake close to existing conditions and not withhold stormwater for an extended amount of time. We therefore request approval of this NLV Mansion Stormwater Drainage Study.

7. REFERENCES

KC-APWA (Kansas City Metropolitan Chapter of the American Public Works Association). (2011). “Section 5600 Storm Drainage & Facilities.”

United States Weather Bureau. “Technical Paper No. 40 Rainfall Frequency Atlas of the United States” (1961). Department of Commerce, Washington, D.C

APPENDIX A

Exhibits

LEGEND

- DRAINAGE AREA
- BMP TREATMENT AREA
- IMPERVIOUS AREA
- WOODS/GRASS

N

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OLSSON - CIVIL ENGINEERING
MISSOURI CERTIFICATE OF AUTHORITY # 001592

DWG: F:\2022\06001-06500\022-06318\40-Design\Reports\GNCV\Stormwater Drainage Study\Calcs\Proposed Drainage Areas_02206318_Rev1.dwg USER: ssaylor
DATE: Dec 12, 2023 3:25am XREFS: C_PBASE_02206318

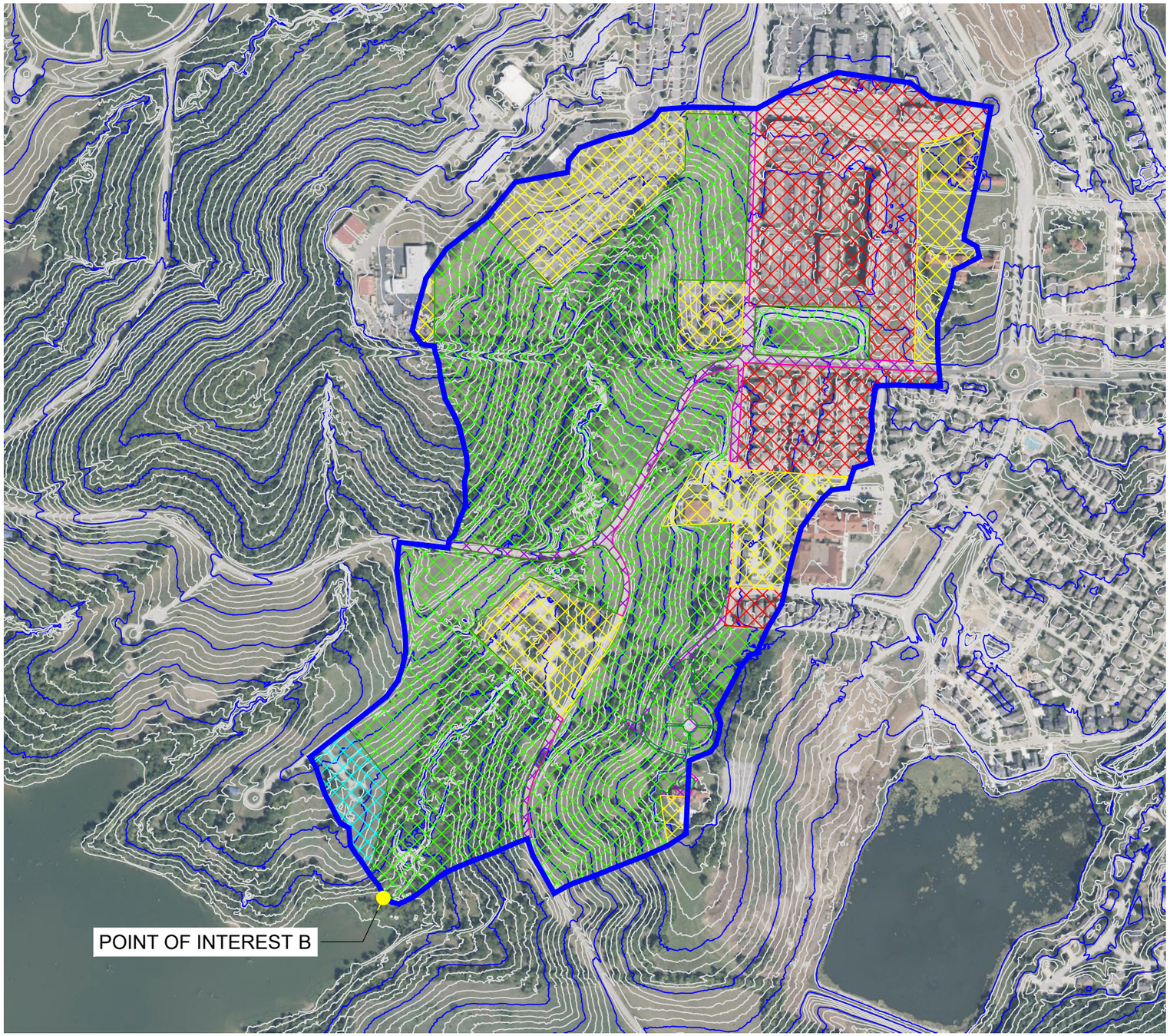
PROJECT NO: 022-06318	NLV MANSION PARKING LOT PROPOSED CONDITIONS DRAINAGE MAP	EXHIBIT
DRAWN BY: SMS		EX-02
DATE: 12/12/2023		

olsson
1301 Burlington Street
North Kansas City, MO 64116
TEL 816.361.1177

LEGEND

- DRAINAGE AREA
- IMPERVIOUS AREA
- WOODS/GRASS
- CHURCHES AND SCHOOLS
- MULTI-FAMILY
- PARKS

TOTAL DRAINAGE AREA = 133.66 ACRES
TOTAL IMPERVIOUS AREA = 4.76 ACRES
TOTAL WOODS/GRASS AREA = 77.22 ACRES
TOTAL CHURCHES/SCHOOLS AREA = 24.36 ACRES
TOTAL MULTI-FAMILY AREA = 24.88 ACRES
TOTAL PARKS AREA = 2.44 ACRES



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DATE: Jan 23, 2024 9:07am USER: ssaylor

PROJECT NO:	022-06318
DRAWN BY:	SMS
DATE:	01.23.2024

WATERSHED DRAINAGE MAP

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Olsson - Engineering
Missouri COA #001592

EXHIBIT
EX-04