

Preliminary Stormwater Management Plan

Market Street Center

M291 and SW Market Street
Lee's Summit, Missouri

Prepared by:



PLANNING
ENGINEERING
IMPLEMENTATION

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APPENDICES

A. Site Conditions

- NRCS Web Soil Survey
- Existing Drainage Map

B. Detention & BMPs

- Proposed Grading Plan
- WQV 40 Hour Drawdown Calculation
- Proposed HydroCAD Model

1. INTRODUCTION

This report is a preliminary stormwater management plan for the proposed Market Street Center development prepared by Phelps Engineering, Inc.

The proposed site is bounded by SW Market Street to the north, Missouri Highway 291 to the east, an existing commercial development to the west, and an existing commercial development to the south. The proposed development is approximately 5.03 acres and consists of 3 commercial buildings and parking lot. The existing site consists of undeveloped open space.

The property lies within Zone X, defined as areas determined to be outside the 0.2% annual chance floodplain, as shown on the flood insurance rate map prepared by the Federal Emergency Management Agency for the City of Lee's Summit, Community No. 290172, Jackson County, Missouri, Map No. 29095C0291G, and dated January 20, 2017.

See the Vicinity Map below.



2. STORMWATER REQUIREMENTS

Stormwater design criteria are in accordance with City of Lee's, Missouri Technical Specifications and Design Criteria.

Stormwater detention and BMPs shall be provided per APWA 5608.4.C.1, comprehensive control measures, as follows:

1. Post-development peak discharge rates from the site shall not exceed those indicated below:
 - 50% storm peak rate less than or equal to 0.5 cfs per site acre
 - 10% storm peak rate less than or equal to 2.0 cfs per site acre
 - 1% storm peak rate less than or equal to 3.0 cfs per site acre

The calculated allowable release rates are:

- 50% storm (2-year) - 0.5 cfs x 5.03 acres = 2.51 cfs
 - 10% storm (10-year) - 2.0 cfs x 5.03 acres = 10.06 cfs
 - 1% storm (100-year) - 3.0 cfs x 5.03 acres = 15.09 cfs
2. 40-hour extended detention of runoff from the local 90% mean annual event (1.37"/24-hour rainfall).

3. SITE SOIL CONDITIONS

Soils data for the property was determined using the NRCS Web Soil Survey for Jackson County. The property consists of Arisburg-Urban land complex, Udarents-Urban land-Sampsel complex, Arisburg silt loam, and Sampsel silty clay loam, which designates the site as Type C Hydrologic Soil Group (HSG). The site watershed soil properties and the Existing Drainage Map can be found in Appendix A of this report.

4. EXISTING CONDITIONS

The existing property consists of undeveloped open space. The property surface drains southeasterly to an existing culver which discharges to the MODOT right of way ditch.

There are 3 point discharges from off-site drainage areas that flow onto the site. See the preliminary off-site drainage area map included in Appendix A.

#1 – An existing 48” storm sewer discharges onto the property at the northern end of the site. This discharge point consists of a portion of SW Market Street right of way drainage and a portion of the southern existing Walmart development. The existing Walmart development discharge is detained upstream of the discharge point via an existing detention basin; therefore, discharge from the existing 48” storm sewer tributary is not included in the on-site detention analysis.

#2 – An existing 12” storm sewer discharges onto the property at the western end of the site. This discharge point consists of the existing Firestone development. The existing Firestone development discharge is detained upstream of the discharge point via an existing detention basin; therefore, discharge from the existing 48” storm sewer tributary is not included in the on-site detention analysis.

#3 – An existing 36” storm sewer discharges onto the property at the southwest corner of the site. This discharge point consists of the existing commercial development west of SW Market Street. It is unknown if this area is detained upstream. If there is no existing upstream detention for the 36” storm sewer tributary area, the area shall be included as an off-site discharge source into the detention basin. This information will need to be determined and provided with the Final Stormwater Study.

5. PROPOSED CONDITIONS

The proposed development will capture and route stormwater via a new private underground enclosed storm sewer system. Stormwater runoff will be routed to the proposed detention basin at the southern extent of the site.

The proposed detention basin has a bottom elevation of 995.50 and a top of berm elevation of 1004.00. The basin consists of an outlet control structure with a 1.5” orifice and 36” outlet pipe. The orifice was sized to drawdown the water quality volume, generated by the 5.03 acre site, over 40 hours. See the water quality drawdown calculations in Appendix B. Orifice opens are provided above the water quality volume to detain the 2-year, 10-year, and 100-year events.

The outlet pipe will discharge to the existing MODOT ditch directly east of the southeast corner of the site, matching the existing conditions. The detention basin provides a total available storage of 75,410 cubic feet which equates to approximately 15,000 CF / acre. See Appendix B of this report for Proposed Grading Plan.

6. STORMWATER DETENTION RESULTS

Composite CNs were determined using SCS TR-55 methods. The SCS Type II 24 hour duration storm event was utilized for the stormwater analysis. A minimum time of concentration of 5 minutes was utilized for all drainage areas based on the size of the site. For the preliminary stormwater study, the entire site was assumed to be routed to the detention basin. There is a very small amount of surface runoff along the eastern property line that will bypass the detention basin. This area will be further analyzed with the Final Stormwater Management Study.

The proposed drainage sub-basin characteristics and composite curve numbers are shown in Table 1 below. See Appendix B of this report for the Proposed Drainage Map.

Table 1 – Proposed Runoff Conditions

Drainage Sub-Basin	Open Space (acres)	Impervious (acres)	Total (acres)	Composite CN	Time of Conc. (min)
Detention	2.70	2.33	5.03	85	5.0

Using HydroCAD, the proposed 2-year, 10-year, and 100-year site peak discharge was determined with the proposed detention basin included. The proposed 100-year site peak discharge and allowable release rate is shown in Table 2 below. The proposed detention basin results are shown in Table 3 below.

See Appendix B of this report for proposed HydroCAD calculations.

Table 2 – Proposed Runoff Results

Storm Event	Allowable Release Rate (cfs)	Peak Discharge (cfs)
2-Year	2.51	2.43
10-Year	10.06	9.93
100-Year	15.09	15.00

Table 3 – Proposed Detention Basin Results

Basin	Detention Inflow (cfs)	Detention Outflow (cfs)	Maximum WSEL (ft.)	Maximum Storage (cf)
2-Year	18.57	2.43	999.28	17,711
10-Year	32.63	9.93	1,000.57	29,773
100-Year	51.41	15.00	1,002.03	46,763

7. CONCLUSION

The detention basin results in a proposed peak discharge less than the allowable release rates for the 2-year, 10-year, and 100-year storm events meeting APWA 5608.4.C.1 comprehensive control measures.

The detention basin provides an orifice opening sized to ensure 40-hour extended detention of runoff from the local 90% mean annual event (1.37"/24-hour rainfall) meeting APWA 5608.4.C.1 comprehensive control measures.

The proposed plan meets all City of Lee's Summit stormwater requirements.

This report and attached appendices complete Phelps Engineering Inc.'s submittal of the Preliminary Stormwater Management Plan for Market Street Center. Please feel free to contact PEI at (913) 393-1155 if you require additional information.

Sincerely,

PHELPS ENGINEERING, INC.



Judd D. Claussen, P.E.

Enclosures