

# PRELIMINARY STORMWATER REPORT

FOR

## JOURNEY CHURCH INTERNATIONAL EXPANSION

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## **APPENDICES**

### **Appendix A – Reference Documents**

- A1. Aerial Photograph of Project Area
- A2. National Wetland Inventory Map
- A3. NRCS Soils Report
- A4. FEMA Firmette – Panel 29095C0531G

### **Appendix B – Drainage Maps**

- B1. Existing Drainage Area Map
- B2. Proposed Drainage Area Map

### **Appendix C – Calculations**

- C1. PondPack Output

## **1.0 GENERAL INFORMATION**

This preliminary stormwater report is in support of an expansion for Journey Church International. The existing church is located on an approximately 11-acre parcel of land located on the south side of M-150 highway between SW Pryor Road and SW Ward Road in Lee's Summit, Missouri. The site currently has an approximately 20,000 square foot building, parking lot, and existing detention basin. As part of the project, the church has purchased the approximately 11-acre property to the east of their current property, which will be used as part of the expansion. This property currently has an existing single-family residence, accessory structures, gravel drive, and two ponds at the south end of the property. The site lies within the northwest quarter of Section 36, Township 47, Range 32, in Jackson County. The site lies entirely within the Middle Big Creek watershed.

The site is generally rectangular. The site is bounded on the north by M-150 highway and single family residential to the east, west, and south. Refer to the aerial photograph in Appendix A for existing cover conditions and surrounding land use.

The proposed project consists of a building addition that will include a 1200 seat auditorium, an atrium joining the addition to the existing building, as well as other various office and support spaces. The total building addition will be approximately 48,000 square feet. The project will also include the relocation of the drive into the site off M-150, additional parking lot and drive aisles, sidewalks, storm drainage improvements, and utilities.

The overall site is generally split by a ridge running east-west through the middle. This generally creates two watersheds to the north and south. The north watershed drains to an existing stream that cuts across the northeast corner of the site. The south watershed drains to an existing stream that runs along the south property line. There are offsite drainage areas from the north and west that also drain through the north watershed. All existing drainage patterns will be maintained.

There is a portion of the very south end of the property located in the floodplain. However, this is in a part of the site that is not proposed to be disturbed with the project. The rest of the property has no special flood hazard areas located on them. Thus, there will be no floodplain issues with the project and no permitting will be needed with FEMA.

There is a section of stream that runs through the northeast part of the property. This stream will be disturbed with the proposed drive relocation into the property which will require a crossing. This will be permitted through the USACE and will be covered under a nationwide permit as the disturbance will be less 300 feet. Through an initial field survey by an environment engineer, there are also some small pockets of wetlands of less than 1/10<sup>th</sup> of an acre located along the north side of the existing parking lot on the site. This area will include proposed parking and a new road. These pockets of wetland will also

be permitted through the USACE and will be covered under a nationwide permit as they total less than a half-acre.

The soil types that have been identified on the site for the areas to be disturbed are Arisbug-Urban land complex (1-5% slopes), Sampsel silty clay loam (2-5% slopes), Sampsel silty clay loam (5-9% slopes), and Udarents-Urban land-Sampsel complex (5-9% slopes). The soil type falls within Hydraulic Soil Group (HSG) C for the middle part of the site and HSG C/D for the rest of the site. For additional information pertaining to the soils, refer to the NRCS soils report included in Appendix A.

The purpose of this plan is to identify existing and potential drainage issues, delineate required stormwater facilities and document that stormwater runoff from the development will not have an adverse impact on existing properties adjacent to or downstream of the project.

## 2.0 METHODOLOGY

To calculate stormwater runoff rate, the software Bentley PondPack V8i was used to model the drainage basins and ponds. The unit hydrograph method is used to determine runoff levels, based on the SCS, Type II 24-hour rainfall. The hydrograph routing through the ponds uses the modified-Puls level pool routing method. Storm events for the 50%, 10%, and 1% chance events were evaluated based on the comprehensive control requirements. As well, the 90% mean annual event was modeled to be released over a 40-hour period. The rainfall depths used are from "Precipitation Frequency Estimates for the Kansas City Metropolitan Area" (McEnroe, 2002) as shown below in Table 1.

**Table 1 - Rainfall Depth (in.)**

Storm Event	90%	50%	10%	1%
Depth	1.37	3.55	5.25	7.94

Analysis of the storm drainage systems followed all adopted City of Lee's Summit codes, ordinances and design criteria. The stormwater facility design was analyzed using the current Section 5600 of KCAPWA and APWA/MARC BMP Manual design criteria.

### 3.0 EXISTING CONDITIONS ANALYSIS

#### 3.1 WATERSHED

The site is generally split into two larger watersheds by a ridge that runs east-west through the middle of the property. The north watershed discharges to an existing channel that cuts across the northeast corner of the property. There are also offsite drainage areas that contribute to this watershed both from the west and north. The south watershed discharges to an existing stream that runs along the south property line. This south watershed is further split into southwest and southeast watersheds. The southwest watershed consists of the existing extended dry detention basin located on the church property. The southeast watershed will include the newly acquired property that currently has two ponds on it. The entire site is within the Middle Big Creek Watershed. Refer to the Existing Drainage Area Map in Appendix B. Table 2 below summarizes the tributary area of the watersheds on the property.

**Table 2 – Existing Watershed Areas**

Drainage Sub-Basin	Area (acres)	Runoff Coeff. (CN)	Time of Conc. (min.)	50% Runoff Rate (cfs)	10% Runoff Rate (cfs)	1% Runoff Rate (cfs)
North	9.64	80	11	21.76	40.23	70.53
Southwest	6.90	89	6	16.84	27.33	43.74
Southeast	5.52	80	6	20.18	32.76	52.43

#### 3.2 CALCULATIONS

The site will need to follow the comprehensive control requirements outlined in section 5608.4 of the APWA design criteria. This allows 0.5 cfs per acre for the 50% event, 2.0 cfs per acre for the 10% event, and 3.0 cfs per acre for the 1% event. Refer to Table 3 below for the allowable release rates for each watershed for each respective storm event

**Table 3 – Allowable Release Rates (cfs)**

Drainage Sub-Basin	50%	10%	1%
North	4.82	19.28	28.92
Southwest	3.45	13.80	20.70
Southeast	2.76	11.04	16.56

## 4.0 PROPOSED CONDITIONS ANALYSIS

### 4.1 WATERSHED

The site will generally maintain the same drainage patterns as currently exist. The major difference will be that a portion of the east property that currently drains to the north will be piped around to the southeast part of the property to the detention basin that is being created to replace the existing ponds on the property. Refer to the Proposed Drainage Map in Appendix B for more detailed information.

### 4.2 CALCULATIONS

To analyze the proposed conditions, the software Bentley PondPack V8i was used to model the drainage basins and ponds. The unit hydrograph method was used to determine runoff levels for the proposed conditions, based on the SCS, Type II 24-hour rainfall. The hydrograph routing through the ponds used the modified-Puls level pool routing method. The ponds and their outlets were designed so that the peak flows for the 50%, 10%, and 1% storm events at the proposed condition would not exceed the allowable release rates. The primary outlet control for the ponds will consist of an outlet control structure containing multiple orifices. This will then have a discharge pipe. The ponds are also designed to release the water quality event over a 40-hour period. See Table 4 below for a summary of the peak flows and water surface elevations for the ponds and refer to the runoff calculations in Appendix C for detailed calculations. Table 4 shows a comparison between the allowable and proposed peak runoff rates. The proposed condition produces lower peak runoff rates than the allowable runoff rates.

**Table 4 – Proposed Watershed Conditions**

Drainage Sub-Basin	Runoff Coeff. (CN)	Time of Conc. (min)	Area (AC)	Proposed 50% Peak Flow (cfs)	50% Max. W.S.E.	Proposed 10% Peak Flow (cfs)	10% Max. W.S.E.	Proposed 1% Peak Flow (cfs)	1% Max. W.S.E.
North	83	11	6.43	16.51	-	29.13	-	49.42	-
Southwest	89	6	6.47	21.37	-	35.00	-	56.36	-
SW Pond	-	-	-	2.16	993.06	4.86	993.67	9.01	994.56
Southeast	89	7	9.16	29.86	-	48.90	-	78.75	-
SE Pond	-	-	-	1.72	990.89	3.39	991.57	8.37	992.53

**Table 3 –Allowable vs. Proposed Release Rates (cfs)**

Condition	50%	10%	1%
North Existing	21.76	19.28	28.92
North Proposed	16.51	29.13	49.42
Southwest Allowable	3.45	13.80	20.70
Southwest Proposed	2.16	4.86	9.01
Southeast Allowable	2.76	11.04	16.56
Southeast Proposed	1.72	3.39	8.37
Total Allowable	11.03	44.12	66.18
Total Proposed	20.39	37.38	66.80

The existing site currently does not provide any detention for the north watershed. It is allowed to drain undetained to the creek while the south portion of the site provides extra detention to account for this runoff. Both watersheds eventually combine just southeast of the property. When looking at the overall 22 acres, the three combined watersheds meet the allowable release rate for the 10% and 1% storm events. The detained portions also meet the allowable release rate for the 50% storm event. While the north watershed in the proposed condition exceeds the allowable release rate, it will result in a reduction of the runoff from the existing condition, due to the fact a portion of this watershed will be piped to the proposed southeast detention basin. Thus, we request that the north watershed be allowed to exceed the allowable release rate as set forth by the comprehensive control. Per the approved storm study for the original church construction, this was the same condition that was allowed.

We also request a waiver for a reduction to the 60-foot stream buffer setback at the northeast part of the site. We will already need a waiver for the drive crossing into the site. The proposed drive is located 40 feet from the ordinary high-water mark, with an additional 10 feet of grading required into it. The area in question is already fenced off to those limits and has no vegetation other than grass. Thus we feel the impact to the existing stream would be negligible.



## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

This preliminary stormwater report is in support of an expansion for Journey Church International. The site currently has an approximately 20,000 square foot building, parking lot, and existing detention basin. As part of the project, the church has purchased the approximately 11-acre property to the east of their current property, which will be used as part of the expansion. The proposed project consists of a building addition that will include a 1200 seat auditorium, an atrium joining the addition to the existing building, as well as other various office and support spaces. The project will also include the relocation of the drive into the site off M-150, additional parking lot and drive aisles, sidewalks, storm drainage improvements, and utilities.

The north half of the property drains to an existing stream along the northeast part of the site. The south half of the site drains to existing detention ponds, that discharge to another stream that runs along the south property line.

Based on the codes of the City of Lee's Summit, detention is being provided to limit the proposed peak runoff rates to the allowable rates for the 50%, 10%, and 1% storm events. No detention is provided for the north half of the site as the south detention ponds will over detain to limit the release from the overall property. We are requesting that the north watershed be allowed to exceed the allowable release rates as outlined in the comprehensive control for the 50% storm event. It will still release less runoff than the existing condition and this is how the existing church property was proposed and approved.

An existing extended dry detention basin exists at the southwest part of the site and will be maintained. This pond was originally designed for a full building out of the western portion of the property. A new extended wet detention basin is proposed where two existing ponds exist at the southeast corner of the property. This will serve the proposed building expansion and proposed parking lots on the east side of the site. It will also serve as an amenity for the church. Both basins are designed to release the water quality event over a 40-hour period utilizing a v-notch weir in the outlet structure.

The project will not produce any impacts to the downstream system as the rates of runoff will be limited to below the existing conditions. The project will not impact any FEMA floodplains. The project will impact a jurisdictional stream at the northeast corner of the site for the new drive into the site off M-150 Highway. This will be permitted through a nationwide 404 permit through the USACE.