

June 8, 2018

City of Lee's Summit, Missouri
Public Works Engineering Division
220 SE Green Street
Lee's Summit, MO 64063

RE: PL2018074 The Grove – Mass Grading and Stormwater Plans Review

We have received your comments dated May 24, 2018 for the above referenced project. Our responses follow each comment. The comment responses have been organized by the review section they pertain to.

Engineering Review:

1. The "Final Stormwater Management Study for the Grove at Lee's Summit", dated May 3, 2018 (hereinafter referred to as "the stormwater study") appears to be missing the following items:

1) discussion of wetland and USACE issues

GBA Response: A 404 permit has been secured and stream/wetland credits have been purchased. Permit and purchase confirmation has been included in stormwater report Appendix A. Discussion added to narrative.

2) an existing condition drainage area map, with points of interest defined for each subarea, including any off-site contributors to the drainage areas with contours.

GBA Response: See Exhibit 4 in Appendix A of the Stormwater report.

3) a proposed condition drainage area map, with the same information listed for the existing condition map

GBA Response: See Exhibit 7, Summit and Decker Sheet 10.1, and Phase 1A FDP Sheet C4.0 in Appendix B of the Stormwater Report

4) elevation-area-volume curves for the storage facility including notation of the storage volumes allocated to runoff, sediment, and permanent residual water storage for other uses (wet basins only)

GBA Response: HEC-HMS curves added to appendix B. Summary table 7 added to stormwater report.

5) inflow hydrographs for all (1, 10, and 50-percent) design storms

GBA Response: See Appendix B for inflow hydrographs.

6) stage-discharge rating curves for each emergency spillway, primary outlet works and combined outlets and overflows

GBA Response: See HEC-HMS Summary in Appendix B for elevation discharge graph.

7) routing curves for all (1, 10 and 50-percent) design storms with time plotted as the abscissa and the following plotted as ordinates:

- Cumulative inflow volume
- Cumulative discharge

- Stage elevation
- Cumulative storage

GBA Response: Routing curves have been added to Appendix B.

2. The stormwater study did not appear to discuss details concerning the emergency spillway. Will the emergency spillway be incorporated into the riser structure, or will a separate emergency spillway be constructed (e.g., earthen spillway)?

GBA Response: The emergency spillway will overflow through the top of the outflow structure. The downstream culvert has been sized as a triple 48" to handle this flow.

3. The stormwater study discusses blockage of the low flow orifice (i.e., the 8" orifice). Section 5600 of the Design and Construction Manual requires that the 100 year water surface elevation be calculated assuming 100% clogging of the primary outlet works, and assuming zero available storage. In other words, it does not appear this was taken into account during design of the detention basin or the emergency spillway.

GBA Response: A scenario showing clogged outlet works and a 100-year storm bypass has been added to the narrative and appendix B HEC-HMS summary. The outflow structure emergency bypass and triple 48" culvert will handle the 100-year storm.

4. Section 5600 of the Design and Construction Manual has specific requirements for an effective emergency spillway system. It must have a crest elevation of no less than 0.5 feet above the 100 year water surface elevation (unclogged primary outlet works condition), and there must be a minimum of 1.0 feet of freeboard between the 100% clogged-condition 100 year water surface elevation and the top of the dam. It does not appear these conditions have been met, since there appear to be no calculations showing the 100% clogged/zero available storage water surface elevations for the 100 year event.

GBA Response: The emergency spillway has been noted on the plans (sheet C7.8) and added to the narrative. The emergency spillway is elevation 1007.75, peak elevation is 1010.04 during the 100-year bypass, and top of the basin is 1011.04.

5. The stormwater study did not appear to discuss sedimentation allowance within the basin in accordance with Section 5600 of the Design and Construction Manual. This would include calculations of sedimentation of not less than 5 years accumulation.

GBA Response: Sedimentation storage is accounted for in the basin permanent pool, see Water Quality and Sedimentation Calculations in Appendix B.

6. Will the pond include fish? If so, please be aware of the depth requirements contained in Section 5600.

GBA Response: Pond will not include fish.

7. A sediment forebay appears to be missing from the pond. Please see Section 5600 of the Design and Construction for specific requirements.

GBA Response: 5 year sediment storage is achieved at a 6 inch depth in the proposed basin. With 5 years of sediment stored, the permanent pool is 7.5 feet deep, greater than the minimum 4' depth per APWA 5600 and the MARC BMP Manual.

8. Drawdown provisions within the retention pond appear to be missing (i.e., siphon or drain). If these are not being utilized, discuss in the report and provide justification for their exclusion. This provision is

needed in case the water level in the pond needs to be lowered during an emergency situation, such as a dam breach or other issue.

GBA Response: Draw down riser with gate valve added to detail sheet 7.8.

9. The outlet structure appears to be missing anti-clogging measures. In accordance with Section 5600 of the Design and Construction Manual, a reverse slope pipe which draws from below the permanent pool, or other method must be utilized. As proposed, the outlet structure will likely clog on a frequent basis.

GBA Response: A hood has been added to the low flow opening on sheet C7.8. Detail shown on sheet C7.7.

10. The stormwater study contradicts the detention basin outlet structure shown on Sheet C7.8. There are too many discrepancies to list in this comment letter, so we are asking that a thorough review be conducted. Orifices are called-out in the stormwater study, while the plans appear to show weirs. This must be reconciled.

GBA Response: Elevation-Discharge table and sheet C7.8 updated.

11. The shoo-fly appears to propose MoDOT Type 5 for the surface course. This design, including the simple subgrade design (i.e., compacted native subgrade) does not appear to be capable of supporting the weight of emergency vehicles. As design must be presented showing how this will be capable of supporting the weight of a fully-loaded fire apparatus truck.

GBA Response: The geotechnical engineer is working on a new section which will be provided.

12. Sheet 7.2: The PPP pipe appears to be laid on native subgrade, according to the detail. The City requires an aggregate bedding be placed.

GBA Response: Aggregate bedding added.

13. Sheet 7.2: A mud mat is not desired when using pre-cast box culvert structures. If pre-cast, then do not specify its use. If cast-in-place, then a mud mat is required. It must be 6 inches thickness rather than the 4 inch thickness shown in the plans.

GBA Response: Thickness changed to 6". Note specifying mud mat for cast-in-place only added.

14. Where are the calculations for energy dissipation at the end of the triple PPP? Will the flow be supercritical? If so, additional energy dissipation structures are required. Rip-rap is not sufficient in this instance. Keep in mind that the calculations of velocity on the storm calculation tables would appear to represent steady sub-critical flow rather than supercritical flow.

GBA Response: A rip rap basin has been designed per HEC-14 and shown on sheet C7.4.

15. The triple PPP culvert appears to be too shallow beneath the roadway. It would appear these culverts will tend to float, and also are not capable of withstanding loading requirements for the roadway. It is likely that a RCB structure is warranted at this location.

GBA Response: PPP culvert lowered to allow for adequate cover. ADS specifications show for 12" of cover plus pavement section as minimum cover, which has been provided.

16. The current storm drainage beneath 16th Street daylight into what appears to be a natural stilling basin. The proposed replacement does not appear to incorporate this design element into the design, and there is a significant concern about downstream erosion issues.

GBA Response: A rip rap/stilling basin has been designed per HEC-14 to help protect downstream from erosion.

17. An enlarged grading plan for the retention basin is warranted. Sheet C4.0 shows the grading for the retention basin, but contours are shown very close to each other, with no clear definition between successive contours.

GBA Response: Enlarged grading plan added (sheet C4.1).

18. Please be aware that an as-graded and as-built plan for the detention basin shall be required prior to issuance of a Certificate of Substantial Completion. This includes both the grading, and the outlet structure construction details.

GBA Response: Acknowledged.

19. The hydraulic grade line for the 100 year storm event was not shown on the profile views for any of the storm lines. This is required.

GBA Response: The storm sewer is designed to carry the 10-year storm with 100-year overflow per APWA 5600.

20. If the hydraulic grade line for the 100 year event is above the crown of the pipe, then justification must be given for this design. Section 5603.1 of the Design and Construction Manual specifies that "...pressure flow may be justified in certain instances." If the hydraulic grade line for the 100 year event is above the crown of the pipe, then justification must be given for this design.

GBA Response: Per APWA 5601.8 A.1.b, when the total drainage area is 2 acres or more and the enclosed system carries the 10% storm, pipe systems must convey the design storm under a regime of pressure flow with no overflow at inlets or manholes.

21. Sheet C5.5: The outlet for storm line for the Summit Street RCB is shown in what appears to be supercritical flow at the outlet. Although this is partially submerged at the end of pipe, there may be significant issues with this design. For example, it is likely that submerged erosion will occur within the retention basin, and will eventually lead to undermining of the end section and eventual failure.

GBA Response: MODOT Type 3 Riprap protection added to Summit Street RCB.

22. Sheet C5.6: Are these calculations assuming steady uniform, subcritical flow? If so, then it would appear many of the calculations of velocity at the end of pipe are in error?

GBA Response: Pipe velocities are calculated based on actual pipe design, whether it be subcritical or supercritical.

23. Voided. Please disregard this deleted comment.

24. Have all the necessary drainage easements, water line easements, and utility easements been obtained?

GBA Response: Yes, water line plans have been approved.

25. Sheet C7.7: A 4' by 5' Reinforced Concrete Box is shown. What does this detail refer to? Where is the plan view? Are there pipes connected to the box?

GBA Response: Plan and profile for 4'x5' RCB shown on sheet C5.5. A 36" HDPE pipe will be connected at RCB station 1+54.97.

26. Sheet C7.8: Significant issues remain unresolved concerning the details shown on this sheet. Please see previous comments related to the detention basin outlet structure. If elevations are shown, they must be clearly identified with a specific orifice or weir or other opening. As shown, it is impossible to say with any certainty what these elevations represent. In addition, they do not agree with the stormwater report.

GBA Response: Detail sheet updated for clarity.

27. Plan and Profile Sheets for Triple Culvert: Please see previous comment related to the proximity of the PPP to the pavement. In addition, it appears the wall thickness was not accounted when drawing the pipe. In other words, the pipe will be even closer to the surface than shown.

GBA Response: PPP culvert lowered to provide adequate cover.

28. It is our understanding that the "cut-off channel" to the east of the 102 SE 16th St. will be piped, and eventually connected to a box within the triple culvert system. It is our understanding these plans will be provided as part of the 16th Street project. As such, no approval for the Mass Grading and Stormwater shall be granted until the 16th Street plans have been approved. Simultaneous construction shall be required, since this is integral to the entire system.

GBA Response: Acknowledged, 16th Street plans will be submitted.

29. Concerning the Downstream Hydraulics: Was the 100 year 100% clogged condition for the primary outlet works (i.e., all orifices and weirs excluding the emergency spillway) considered when calculating the capacity of the downstream triple culvert? Was the assumption of "zero available storage" (i.e., essentially, was the 100 year event upstream of the retention basin) taken into account for this condition? In accordance with the Design and Construction Manual, if this triple culvert is being utilized as the emergency overflow system, then it must be sized to handle the 100 year storm event upstream of the retention basin. In other words, the upstream hydrograph must pass through the triple culvert without surcharging.

GBA Response: A 100 year storm bypass has been designed in the event all outflows are blocked. The triple culvert has been upsized to a triple 48" to carry this event.

30. Please submit a hardcopy version of the stormwater study. The electronic version contained a font type that was not recognized, and the resulting printout contained printing errors.

GBA Response: Hard Copy submitted.

31. Please define "BHC Watershed" mentioned in the stormwater study.

GBA Response: BHC Rhodes originally assigned identifiers to the watersheds. BHC label removed.

Traffic Review

1. Shoo-Fly requires more detail in the plans. The alignment should be established in the plans, rather than referencing another planset. The width should be dimensioned, temporary traffic control plan detailed (not TBD in coordination with inspections), and surface (and typical section) shall comply with Fire Department requirements capable of accommodating emergency vehicle apparatus weight.

GBA Response: Width and Traffic Control added to detail sheet. Geotechnical engineer section and calculation to be provided.

In order to calculate the Engineering Plan Review and Inspection Fee, a sealed Engineer's Opinion of Probable Construction Costs shall accompany your final submittal copies. The itemized estimate

(material and installation) shall be sufficiently broken down and shall include the following items, as applicable.

- Public infrastructure, both onsite and offsite.
- Private street construction, including parking lots and driveways.
- Sidewalks located within the right-of-way.
- ADA accessible ramps.
- Sanitary sewer manholes and piping between manholes, including private mains.
- Connection of the building sanitary sewer stub to the public main.
- Waterlines larger than 2 inches in diameter, valves, hydrants, and backflow preventer with vault, if outside the building.
- Stormwater piping greater than 6 inches in diameter, structures, and detention / retention facilities -public or private.
- Water quality features installed to meet the 40-hour extended duration detention requirements.
- Grading for detention / retention ponds.
- Grading to establish proper site drainage.
- Utility infrastructure adjustments to finished grade (i.e. manhole lids, water valves, etc.).
- Erosion and sediment control devices required for construction.
- Re-vegetation and other post-construction erosion and sediment control activities.

GBA Response: Acknowledged. Full cost estimate included.

We believe we have addressed all comments on this project. If you have any additional questions or concerns, please feel free to contact us.

Sincerely,

GEORGE BUTLER ASSOCIATES, INC.

Clint Loumaster, P.E.