LEE'S SUMMIT
MISSOURI

DEVELOPMENT SERVICES

Date: Thursday, May 06, 2021

To: CFS ENGINEERS
1421 EAST 104TH STREET STE 100
KANSAS CITY, MO 64131

From:

Application Number:	PL2021139
Application Type:	Engineering Plan Review
Application Name:	Base Flood Determination in Unnumbered A Zone - HEC-RAS Study for Summit Point Apartments Phase 2

The Development Services Department received documents for this project on April 22, 2021. We have completed our review and offer the following comments listed below.

- See comments below to determine the required revisions and resubmit to the Development Services Department public portal located at **devservices.cityofls.net**. Digital documents shall follow the electronic plan submittal guides as stated below.
- Revised plans will be reviewed within ten (10) business days of the date received.

Engineering Review

1. The study should be renamed to an appropriate title, such as "Base Flood Elevation Determination in Unnumbered A Zone at Summit Point Apartments Phase 2" or equivalent language. Preparation of this study is a UDO requirement to comply with the City's Floodplain Ordinance, and as such, the title should reflect the purpose of the study.

2. Body of the report still references an incorrect assumption concerning the end of the flood zone prior to Independence Ave. Our records indicate the flood zone extends the entire length between Independence Ave. and Swann Cir., and overtopping on each during the 100 year event.

3. Purpose of the report shall be discussed within the body of the report. The purpose of the study is to delineate the floodplain for the site, and to establish base flood elevations along the stream abutting the development.

4. The report did not discuss model setup, including whether this is a 1D model, steady or unsteady state model, special considerations such as treating roadway tops as a weir, elimination of diverted flow using ineffective flow tool or other method used to eliminate divided flow from the model calculations, safety factors to ensure a conservative base flood elevation(s) is obtained, best practices for establishment of base flood elevations in an unnumbered A zone as published by FEMA circular using conservative values

for flow rates, model calibration and sensitivity analysis, or reasoning behind the discounting of the StreamStats program which the report states was "overly conservative".

6. Peak flow rates at each cross-section were only briefly discussed within the report, and a review would suggest these figures were based on the TR-55 method to determine time of concentration and resultant peak flows. Guidance from FEMA does not recommend this method be used when flow is divided between closed storm systems and overland flow systems. In addition, the results disagree from the StreamStats method ran by the City during an independent run (results of StreamStats or TR-55 method were not shown in appendix despite the statement they were provided). It also appears no provision was made for future conditions upstream of the project site. Time of concentration values were not presented, only mentioned with a short discussion within the report which stated that the TR-55 method was used and compared with the "overly conservative" values obtained using USGS StreamStats.

7. Despite the report stating otherwise, no information was provided within the appendix concerning the discussion about TR-55 method versus the StreamStats method, and why the less conservative values were used. If the StreamStats method yielded a more conservative value for peak flowrate, why was it not used?

8. Mannings n values were low for existing stream conditions. Staff has walked the stream from Independence Ave. to a point northwest of the existing apartment complex, and this stream is not a clean channel as implied by the low mannings n values used in the model. This area is heavily brushed, with stream channel containing small pools and small riffles. This might partially explain the lower than expected HGL values shown in the report.

9. Cross-sections starting at river station 10658 and progressing downward (i.e., river stations 10658, 10495.and 10280) include errors in model setup. HEC-RAS software was used by the City during an independent model run to show where these errors exist, and was not dicussed within the report. Ineffective flow tool or other methods were apparently not used to remove the “divided flow” sections. This would likely explain the very low HGLs (in addition to the low mannings n values).

10. Drainage areas shown in the report upstream of the site appear to be lower than StreamStats USGS web based software, and our estimates by a significant amount. Drainage area subbasin east of the triple culvert was also not shown correctly since a large portion of this subarea drains to the triple culvert, not after the triple culvert. Both our estimate and StreamStats yielded a value of 132 acres draining to the triple box culvert at Swann Cir. A conservative approach shall be utilized, and it would appear this was not done.

12. General comment concerning this report: The floodplain delineation shall use a conservative approach during all aspects of model setup. It would appear the model includes assumptions which are not conservative, and the cumulative effect of these non-conservative assumptions is a lower than expected HGL for this unnumbered A zone. We would recommend the applicant review guidance produced by FEMA when performing HEC-RAS studies to determine base flood elevations in unnumbered A zones. There are conservative approaches that must be followed to ensure the development is not affected by future changes to the floodplain. The intent is to err on the side of caution in the model setup for

determining the base flood elevations within an unnumbered A zone, and the proposed model does not appear to have utilized this methodology.

13. Since model calibration data does not appear to exist, a sensitivity analysis of the model should be performed. The sensitivity analysis should include model runs with a few progressively higher flow rates, and a few varied mannings n values. Results should be discussed within the body of the report.

14. For purposes of specifyinig the lowest floor elevation for any habitable building constructed with this project, the highest base flood elevation that crosses the property line shall be utilized as a reference point. Lowest floor elevations shall be set at a minimum of 2.00 feet above this elevation, preferably higher. This elevation shall be discussed and shown within the report.

15. No presentation of the error log was provided or discussed within the report. As ran by the City using the applicant's model, the model included divided flow errors, area ratio warnings and exceedances in the energy loss of 1.0 feet which would indicate additional cross-sections be provided.

16. Drainage area setup exhibit shown within the report was not divided correctly, and was also missing drainage areas. StreamStats and our own independent analysis shows the total area upstream of Swann Cir. is approximately 132 acres rather than 115 acres. A portion of the drainage area shown draining to point 3 is also shown incorrectly since the majority shown within the subarea to the east of the triple culvert at Swann Cir. flows to join the main channel prior to flowing beneath Swann Cir. There are also additional drainage areas to the south of Chipman Rd. within the residential subdivisions that were not extended far enough. This may partially explain the lower-than-expected flowrates and lower-than-expected 100 year WSEs.

17. Peak flowrate calculations for all cross-sections is low compared with StreamStats USGS web-based analysis software. For example, CFS calculated a peak 100 year flowrate of 454 cfs at the upstream end of the triple culvert. StreatStats showed 604 cfs. This is only one example, as all the peak flowrates show disagreement with StreamStats.

Public Works Comments from Karen Quackenbush, P.E. - See Separate Document (attached)

Electronic Plans for Resubmittal

All Planning application and developmrnt engineering plan resubmittals shall include an electronic copy of the documents as well as the required number of paper copies.

Electronic copies shall be provided in the following formats

- Plats – All plats shall be provided in multi-page Portable Document Format (PDF).
- Engineered Civil Plans – All engineered civil plans shall be provided in mulit-page Portable Document Format (PDF).

- Studies – Studies, such as stormwater and traffic, shall be provided in Portable Document Format (PDF).

Please contact me if you have any questions or comments.

Sincerely,

Gene Williams electronically signed May 6, 2021

cc: Development Engineering Project File