

February 17, 2018

Friendship Alliance

Carlos Torres-Verdin

Subject: MBWV Development plans

Dear Carlos,

The purpose of this letter is to present my opinion on the drainage designs for the Mark Black Wedding Venue (MBWV) development. The following comments are based on my review of the plans submitted by Kimley-Horn on December 18, 2017. I used the following code references to conduct my evaluation outlined below:

- Hays County Development Regulations, February 21, 2017
- Dripping Springs TCSS Manual
- City of Austin Drainage and Environmental Criterial Manuals (DCM, ECM)

Overall, I found the drainage study (November 2017) to be too general in defining the proposed improvement areas, and the engineer's report offers too little explanation of assumptions and calculations. The drainage map does not provide enough sub-area definition for the developed portions of the site. This lack of definition is out of compliance the City's standards, both DCM and ECM, and makes it difficult to evaluate the proposed drainage designs. For some proposed structures, the contributing drainage area is not delineated on the drainage map, and flows cannot be independently reviewed for accuracy, which is a violation of standard engineering practice. There have been recent updates to clarify design elements, and we have found errors in the flow rate calculations, particularly the allowable flows for erosion control. The code on limiting flows and erosion is focused on controlling the substantial flow increases immediately downstream of the impervious areas. In general, the drainage system design basis has not been adequately presented, and in my opinion this work is incomplete and not compliant with city codes. I would like to see the drainage map provide more clear definition of drainage subarea boundaries for each drainage design element.

Given the sensitive characteristics of this project's receiving waters and the difficult siting conditions for sedimentation and erosion controls, I recommend more design effort on stormwater management of the construction activities prior to approval of these plans and issuance of a building permit. As currently proposed, there is a very high risk for sediment to be discharged into the Bear Creek tributary (and the Edwards Aquifer Recharge Zone) immediately downslope of the venue site. The plan notes make it clear that this work will be the responsibility of the contractor. However, the NPDES permittee and those responsible for discharges downstream would benefit by making stormwater discharges a design priority - now.

Drainage Study Comments

1. The study presents a comparison between existing and proposed drainage conditions for only one location. I assume the intended point of comparison is the lowest point on the property, where the Bear Creek Tributary flows cross the northern property boundary (point of interest not labeled). This comparison is not useful for design of the various stormwater control facilities shown on the plans. The Engineer concludes that since no change in peak discharge can be discerned at this point, the proposed development will have no hydrologic impact on the site; implying also that

there will be no adverse floodplain impacts further downstream. Given that over 6 acres of impervious cover would be added to the site, the conclusion of no hydrologic impact must be examined more closely. Except for the rain collection systems proposed for the entrance road, no effective storage of excess runoff is provided in the drainage system. The developed portions of the site would direct runoff to the creek with little or no attenuation. In my opinion, the analysis of pre- and post-development drainage conditions is incomplete, and the drainage analysis and design of stormwater controls **do not satisfy the City's TCSS manual guidance to follow City of Austin Drainage Criteria Manual (DCM) design methodologies.**

2. The proposed condition drainage analysis does not show the drainage subareas that contribute flows to the various stormwater management facilities. These plans do not allow for an independent review of the assumed design flows.
3. The table of drainage calculations shown on Plan Sheet 25, indicates runoff routing segments that were evaluated. However, these segments are not defined on the plan sheet. There is no way to conduct an independent review of the method used to determine runoff travel times and all necessary parameters that were used to determine flows from the developed site.
4. The analysis of pre-and post-development peak discharges does not adequately address floodplain impacts. The comparison of peak flows hides the effects of the extensive changes to the site's impervious cover by lumping the calculation into a single drainage area. In reality, the impervious areas will contributing to the creek well before the undeveloped portions of the site. I recommend that the site rainfall runoff response be modeled using more subareas that highlight the changes in site hydrology. Without more definition in the drainage areas, and taking storm routing into account, it is not reasonable to assert no adverse floodplain impacts.
5. The depicted floodplain limits (by others) should be verified by the local floodplain administrator. The modeling associated with these floodplain limits must be reviewed for consistency between the floodplain's modeled flows and those contributed by the MBWV project.

Drainage Design Comments

1. The access road cross-culvert shows the necessary flow parameters (peak flow, velocity, depth, HGL). However, the contributing drainage area is not delineated on the plans. As presented there is no way to evaluate and affirm the proper sizing of this culvert (42" circular pipe). It is not possible to confirm road accessibility under the various design event conditions. The culvert design is incomplete according to **DCM guidance, Section 2 for determining stormwater runoff .**
2. The flows directed under the access road culvert are directed into natural drainage channel near the top of the slope. The culvert will concentrate and accelerate stormwater discharges in this existing channel. Additional energy dissipation and channel protection will be necessary to prevent scour and erosion down slope. **See DCM, Section 7.3.**
3. The depiction of temporary sedimentation basins is confusing and potentially mis-leading regarding their feasibility to effectively control sediment discharges. I believe there is a more cost-effective way to control sediment discharges from the site; one that presents less risk of sediment discharges to Bear Creek. My concerns with the feasibility of the proposed basin plans are as follows:
 - a. The proposed basin contour elevations are not specified, and the engineer's note states that the contractor will be responsible for the basin designs. According to the DCM and Environmental Control Manuals (ECM), these temporary erosion and sedimentation controls must be in place before commencement of construction. Therefore, a design

- submittal from the contractor should be provided and approved by the City before issuing a permit for construction of the temporary sedimentation basins shown on these plans.
- b. The limits of cut and fill necessary to achieve the specified basin volumes cannot be determined. As shown on plan sheet 26, these basins extend over a long moderately steep (8-10%) slopes. As shown, we assume the upper basin limits would match existing grade. The embankments on the lower slope sections would require embankment heights greater than 6 feet. Depending on the height of embankment above the basin discharge point, these temporary basin structures could be defined as dams according to TCEQ Dam Safety criteria. The TCSS Manual requires dams to meet dam safety criteria.
 - c. The amount of cut and fill suggested by the proposed basin grading would be a significant earth-moving effort with high potential for sediment discharges during their construction. Given the recharge characteristics of the Bear Creek Tributary, directly below, I strongly recommend reconsideration of sedimentation control strategies. As proposed these basins and the proposed diversion berms could very likely become the primary pollution source on this project site.
 - d. The **SWM pond criteria in DCM Section 8.3.4**, require design of an open channel to convey basin discharges for both temporary and permanent SWM ponds. The plans simply state that the contractor will be responsible for the pond design. The success of the sedimentation controls is critical for protecting the recharge zone features below the site. These designs must be worked out and approved before start of construction.

For all the reasons outlined above, I strongly recommend that the strategy for preventing sediment discharges be revised. Instead of relying on large sediment traps located on the sloped areas and all the necessary stormwater conveyance routing into and out of these basin structures, I recommend revising the sequence of construction (clearing operations) and allow for most of the sediment controls to be installed and maintained on the high, relatively flatter ground immediately adjacent to the building and pavement areas. This approach would require more coordination between clearing and construction contractors. However, it would reduce the need to manage potentially large earthen structures and the associated runoff on the sloped areas. This approach would present less risk of degradation to the recharge features of Bear Creek. In general, I believe that the current level of drainage facility design does not comply with the City's ordinance goals described under **ARTICLE 22.05 WATER QUALITY PROTECTION, Section 22.05.003, item 8:**

- (8) Establish a reasonable standard of design and performance for development which prevents erosion and sediment damage and which reduces the pollutant loading to streams, ponds and other watercourses;

We have reviewed the calculations of peak flow rates under 2-year design storm conditions. The updated proposed condition calculations submitted by K-H's Engineer do not follow the procedures stipulated in Code Section 22.05.019, Erosive Flow Control, paragraph (e), Stormwater discharge into waterway. These code procedures require limiting flows into the waterway (Bear Creek) to a level consistent with the 2-year, 3-hour storm event, evenly distributed over a 24-hour period. The K-H Engineer simply calculated a 2-year, 24-hour flow rate. The results of K-H's calculation indicate that the allowable erosive flow control rate is 27.5 cubic feet per second, essentially matching their estimate of existing conditions runoff. However, the code procedures require the calculation of the 2-year, 3-hour storm volume, and to evenly distribute this volume over a 24-hour period. My calculations based on our interpretation of this code indicate that the allowable rate for controlling erosive flow to be approximately 2 cfs, which is significantly lower than the rate calculated by the K-H Engineer. We are concerned that their published values do not properly account for the erosion potential associated with proposed runoff conditions. We would like to reach agreement with the City and the Engineer for K-H to resolve the large discrepancy in our assessments of proper erosion control for this site before the City approves these plans.

Please contact me if you have questions.

Thank you,

A handwritten signature in black ink that reads "Jeffrey S. Kessel". The signature is written in a cursive, flowing style.

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