



# PRELIMINARY DRAINAGE REPORT

## Storyrock Phase 1B

Prepared for:

**CAV-RANCH, LLC.**  
14400 North 7<sup>th</sup> Place  
Scottsdale, Arizona 85260

Plan #	_____
Case #	<u>5-PP-2016 #2</u>
Q-S #	_____
<input checked="" type="checkbox"/> Accepted	
<input type="checkbox"/> Corrections	
<u>N. BARONAS</u>	<u>10-3-17</u>
Reviewed By	Date

Prepared by:

# Kimley » Horn



## City of Scottsdale Stormwater Management

### Drainage Review Memorandum

**From:** Nerijus Baronas, P.E., CFM  
Senior Stormwater Engineer  
City of Scottsdale  
480-312-7072  
nbaronas@scottsdaleaz.gov

**Re:** Storyrock - Phase 1B  
Case number: 5-PP-2016 #2

Review comments for preliminary drainage report prepared by Kimley-Horn, sealed February 21, 2017. Our review comments reflect the preliminary grading and drainage plan and other information submitted on February 22, 2017 as contained in the 5-PP-2016 #2 case folder. The date of our review is March 9, 2017. Our review comments are as follows:

1. **COS 1<sup>st</sup> Review:** In general, preliminary drainage reports and related information submitted in support of preliminary plat and development review applications should include a 90% level of design and analysis to allow an accurate analysis of the viability of the proposed project and an in-depth evaluation of the function and design of the stormwater management system by City staff. A number of our comments contained below relate to meeting this requirement and our ability to understand and evaluate the proposed stormwater management system.

**KHA Response:** Additional analysis and detail have been provided to the drainage report and preliminary plat to support the proposed Stormwater management system. See comment responses below for extent of additional information provided as discussed with the City at meeting held Tuesday, January 10.

**COS 2<sup>nd</sup> Review:** Additional analysis and detail provided with 2<sup>nd</sup> review submittal of subject case demonstrates advancement; however, bulk of most significant comments were not addressed. Please see 2<sup>nd</sup> review comments below.

**KHA 2<sup>nd</sup> Response:** The City's 2<sup>nd</sup> review comments have been reviewed and additional detail has been provided to the preliminary plat documents to support the proposed Stormwater Management system. See "KHA 2<sup>nd</sup> Response" responses below for extent of additional information provided as discussed with the City at meeting held Wednesday, April 12.



2. The preliminary grading and drainage plan (plan), in conjunction with the preliminary drainage report (report), comprise the two primary pieces of information we review to evaluate the proposed project from a stormwater perspective. As such, the two must provide adequate information to allow this evaluation. Accordingly, we have the following comments based on our review of the plan that will need to be addressed in a revised plan for resubmittal. It should be noted the report did not contain a more detailed on-site drainage exhibit which is typically included in a report in support of a preliminary plat application. The on-site drainage exhibit typically will provide much of the information that illustrates the design of the on-site stormwater management system which is currently not being provided or is difficult to determine. A number of our comments below relate to providing information on the plan to address these deficiencies.

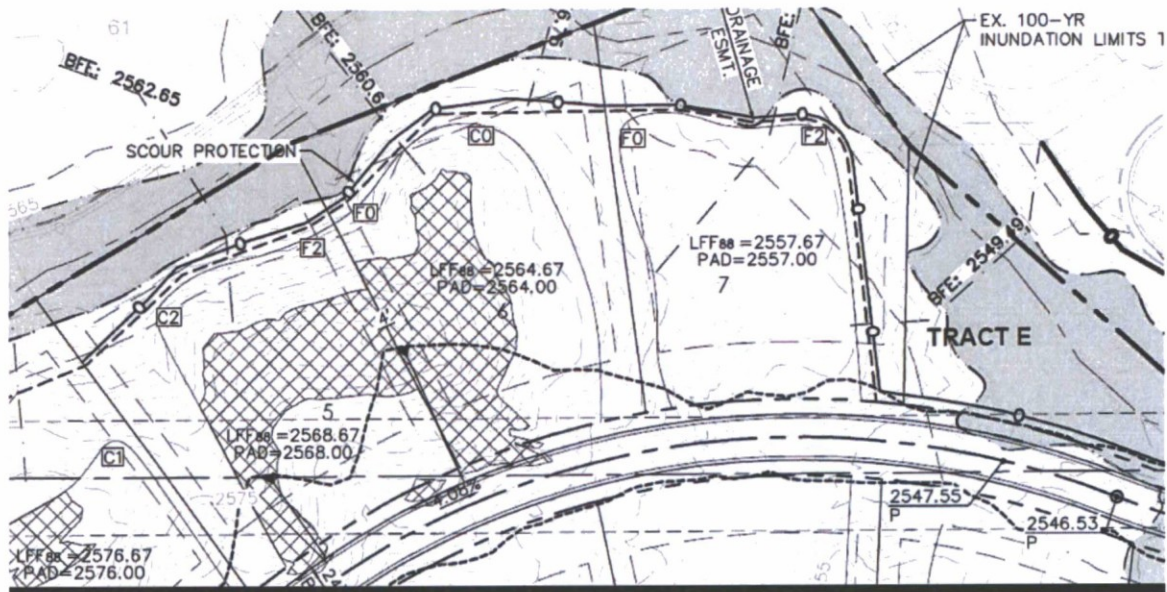
- a. **COS 1<sup>st</sup> Review:** Existing contours should be labeled much more frequently so that the elevation of any existing contour within the development can easily be determined. At present, the bulk of the lots do not include any existing contour elevations within or near the lot.

**KHA Response:** Existing contours labeled more frequently and indicate existing contour elevations near or within all lots.

**COS 2<sup>nd</sup> Review:** Additional labels are required. Please see grading and drainage plan screen capture below:

**KHA 2<sup>nd</sup> Response:** Existing contours have been extensively labeled throughout the preliminary plat with this submittal.





- b. **COS 1<sup>st</sup> Review:** The existing 5-foot contour should be bolded relative to minor contours for plan readability

**KHA Response:** 5-foot contours have been bolded.

**COS 2<sup>nd</sup> Review:** Major contours need to be bold enough so they can easily be distinguished when compared to minor contours.

**KHA 2<sup>nd</sup> Response:** Contours have been darkened in general and major contours are shown bolder to better distinguish between major and minor contours.

- c. **COS 1<sup>st</sup> Review:** The plan is grossly lacking in illustrating grading associated with proposed roadways, stormwater storage facilities and lots. As a minimum, the plan should be revised to accurately show limits of disturbance with slope direction indicators for all areas of grading. It should be noted this requirement is a substantial reduction from the aforementioned 90% level of detail requirement. Substantial cut and fill areas should be labeled with slope in the format xH:1V.

**KHA Response:** Per discussion with the City at meeting held Tuesday, January 10, all R1-18 areas will indicate proposed retaining wall locations and limits of grading. Additionally, typical lot grading details have been included on sheet 2. It was discussed with the City that for R1-35 and R1-43 areas, retaining wall and limits of grading are not required at this level and can be covered with a typical lot grading detail. Roadways cut and fill limits have been shown on the pre-plot.

**COS 2<sup>nd</sup> Review:** Proposed roadways, stormwater storage facilities and lot grading are lacking the level of detail required to illustrate compliance with the City design criteria in support of proposed development.





**KHA 2<sup>nd</sup> Response:** Per discussion with the City on April 12, the preliminary grading plans have provided additional grading limits (cut and fill limits) for all development areas, including the roadway, proposed basins, drainage swales, R1-18, R1-35, and R1-43 lots. As discussed, the limits of grading for the roadway improvements has also been shown for areas that are not allowed for mass grading for reference. Retaining walls where construction envelopes and lots are adjacent to open space areas have been shown as well. As shown with the previous submittal, typical lot grading details are shown to identify typical drainage patterns for rear or front yard draining in all zoning categories.

- d. **COS 1<sup>st</sup> Review:** Drainage arrows on roadways are barely readable due to overlap with road centerline. The arrows should be offset for readability or this issue addressed in some other manner.

**KHA Response:** Drainage arrows have been offset from centerline and enlarged to better indicate direction.

**COS 2<sup>nd</sup> Review:** Addressed.

- e. **COS 1<sup>st</sup> Review:** Roadway high and low points should be clearly indicated.

**KHA Response:** Roadway high and low points have been labeled on the pre-plat and drainage arrows enlarged to indicate slope direction.

**COS 2<sup>nd</sup> Review:** Addressed.

- f. **COS 1<sup>st</sup> Review:** Curb cuts or other drainage exits from the roadway or entries into stormwater storage basins should be clearly shown on the plan.

**KHA Response:** Roadway outfall locations have been clearly identified on the preliminary plat. Curb inlet/curb opening design is beyond the scope of the preliminary plat and will be provided at final design.

**COS 2<sup>nd</sup> Review:** Addressed.

- g. **COS 1<sup>st</sup> Review:** The plan should clearly indicate improvements and show and provide preliminary grading for proposed perimeter half and full street improvements.

**KHA Response:** On-site roadway grading has been shown to preliminary plat level on the preliminary grading plan. 128<sup>th</sup> Street and Alameda Road improvement plans will be provided to the City under separate plan review as discussed with the City and identified with the Master Plat submittal under separate case. Discussion of off-site roadway improvements and drainage has been added to the report.

**COS 2<sup>nd</sup> Review:** Addressed.

- h. **COS 1<sup>st</sup> Review:** The plan should include typical preliminary lot grading details for the various lot grading scenarios associated with different lot sizes and zoning





showing lot drainage. (It is our understanding that all lots will be designed to drain to streets with streets acting as water carriers to drain to proposed stormwater storage basins.) The plan should provide preliminary information of perimeter walls to be used for proposed lots.

**KHA Response:** Typical preliminary lot grading details for R1-18, R1-35, and R1-43 lots have been added to sheet 2 of the preliminary plat. Lots are designed to drain to streets wherever possible, however, it is important to note that this site warrants side and rear yard drainage in various areas to grade the site appropriately. Specific lots are graded to rear or side yards to maintain building heights, minimize cut/fill depths, minimize retaining wall heights, and protect natural area open space and other environmental features such as natural washes that traverse the property. Lot drainage indicators have been added to both the preliminary grading plan and drainage exhibits to identify lots that are rear or side yard drained.

**COS 2<sup>nd</sup> Review:** Please address mark up of preliminary lot grading details depicted in the grading and drainage plans. See sheet 2 of 8.

**KHA 2<sup>nd</sup> Response:** Typical preliminary lot grading detail markups on sheet 2 have been reviewed and revised per our discussion on April 12. For each phase, a rear and front yard typical drainage condition is shown and lot drainage indicators have been added to the preliminary grading plan and drainage exhibits to identify which lots are rear or side yard drained. As discussed in our meeting, the rear/side drained lots are driven by the various site development constraints discussed in KHA's previous response and create a condition where front lot drainage is not a possibility.

- i. ~~The presence of smaller washes will need to be clearly indicated on the plan via flow line and 100-year flow rate. For example, it is unclear if there is a moderately sized wash located between lots 5 and 6. Approximate 100-year floodplain limits should be shown and labeled on moderate to larger sized washes impacting proposed lots or other improvements. Depict cut limits as this wash appears to be crossing a ridge, which will require significant grading work.~~

**KHA Response:** The specific location referred to in this comment between lots 5 and 6 has been revised to clearly indicate flow conveyance path. Limits of inundation are shown and identified for flows greater than 50 cfs throughout the development. Grading has been provided if wash/swale grading impacts ridgelines or other areas on the property. Additional drainage swales have been added to the plan, indication to indicate how flows are routed around lots and roadways when necessary.

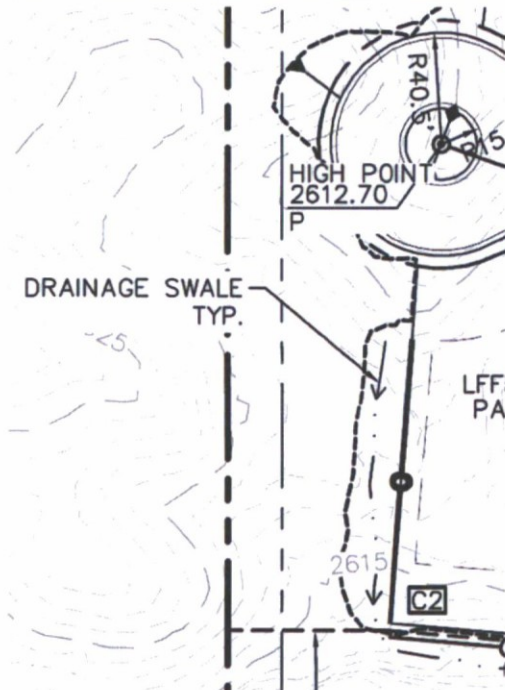
**COS 1<sup>st</sup> Review:** The presence of smaller washes will need to be clearly indicated on the plan via flow line and 100-year flow rate. For example, it is unclear if there is a moderately sized wash located west of Lot 76. Approximate 100-year floodplain limits should be shown and labeled on moderate to larger sized washes impacting proposed lots or other improvements.



**COS 2<sup>nd</sup> Review:** It appears that above response is to a comment (i) of Phase 2, referencing Lots 5 and 6. Please review and depict proposed flow routing for Lot 76 of Phase 1B. Depict all proposed flow re-routing and associated limits of disturbance. Limits of disturbance depicted on grading and drainage plan are not consistent with NAOS exhibit. Latest limits of disturbance should be reflected in NAOS area analysis tables and exhibits.

**KHA 2<sup>nd</sup> Response:** The grading limits adjacent to Lot 76 has been updated to appropriately depict the limits of disturbance and swale grading adjacent to the lot. The flow is not significant but has been accounted for in the limits of disturbance. A swale with flowline information is depicted on the preliminary plat.

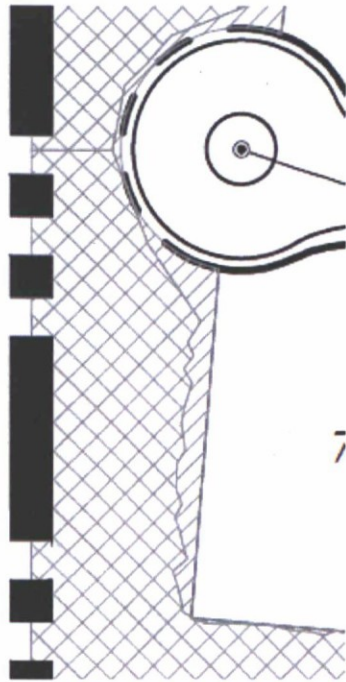
**Grading & Drainage Plan – Lot 76 (Sheet 6 of 8):**







LVA NAOS Plan – Lot 76:



- j. **COS 1<sup>st</sup> Review:** Existing and proposed condition 2, 10 and 100-year flows from the report should be provided at entries and exits of the development.

**KHA Response:** Existing and proposed flows have been included in the drainage exhibits and discharge flows (2, 10, and 100) have been provided on the preliminary grading plan.

**COS 2<sup>nd</sup> Review:** Depict pre and post development flows for above identified storm frequency intervals on the preliminary grading plan.

**KHA 2<sup>nd</sup> Response:** Pre and Post development flows for the 2/10/100 year storm frequencies have been depicted on the preliminary grading plan at discharge locations.

3. **COS 1<sup>st</sup> Review:** The report and plan are somewhat unclear as to whether the lots are to be mass graded or not. The preliminary grading and drainage plan does not show proposed grading contours and cut/fill slopes indicative of mass grading. The situation should be clarified in the report and plan. If lots are not mass graded, the plan and report will need to address how undisturbed areas around lots will drain. It is our understanding that all lots will be designed to drain to streets with streets acting as water carriers to drain to proposed stormwater storage facilities. Provide detailed discussion in the report to address this subject.





**KHA Response:** Additional discussion in the report has been provided to discuss the R1-18 (mass graded) vs R1-35, and R1-43 (single lot). Additionally, the preliminary grading plan includes limits of grading for reference. The roadway grading is shown for areas within R1-35 and R1-43 areas that will require single lot grading plans and not be mass graded. Furthermore, sheet 2 includes typical lot grading details that indicate lot grading and various drainage routing that will occur in with each lot type. It is important to note that all R1-35 and R1-43 lots will be custom grading and require individual lot grading and drainage plans for City review.

**COS 2<sup>nd</sup> Review:** Revise lot grading details per mark-up in the preliminary grading plans. Depict flow line elevation(s) and show limits of disturbance at all locations outside of proposed building envelope.

**KHA 2<sup>nd</sup> Response:** Typical lot grading details are shown on sheet 2 as discussed in our April 12<sup>th</sup> meeting with the City and additionally, drainage swale grading limits, elevations, and NAOS areas have been revised accordingly throughout the preliminary grading and drainage plan.

- COS 1<sup>st</sup> Review:** The report will need to include a summary table for proposed on-site stormwater storage basins. The table should include basin identifiers, proposed basin volumes, orifice size, maximum side slopes, maximum stage depth, inflow rates, peak outflow rates, the difference between peak inflow and outflow rates (attenuation), drain times, maximum storage volumes as determined from HEC-1 model for the 2, 10, and 100-year events, and whether the basin is off-line or in-line.

**KHA Response:** Summary table provided and updated to include the requested information.

**COS 2<sup>nd</sup> Review:** Addressed.

- COS 1<sup>st</sup> Review:** What sediment transport and culvert sedimentation consideration was provided in sizing culverts conveying natural wash flows?

**KHA Response:** Culverts conveying natural washes are set to match the existing grade whenever possible to minimize change in velocity and limit sedimentation. In general, most culverts are “oversized” due to limitation of headwater elevations, and box culverts are provided in a few areas along larger washes.

**COS 2<sup>nd</sup> Review:** Please identify approximate percentage of “oversizing”.

**KHA 2<sup>nd</sup> Response:** Roadway culverts are sized to convey the 100-year storm under the roadway without overtopping. Sedimentation is minimized with the proposed crossings by maintaining existing wash grades and velocities wherever possible.





6. **COS 1<sup>st</sup> Review:** Show details of proposed improvements within the City right of way. Roadway improvement information is missing on submitted subdivision plans. Provide roadway vertical alignment profiles, horizontal alignment information on plan sheets, fill and cut limits, roadway drainage analysis and culvert crossing information.

**KHA Response:** Locations where inlets are proposed have been identified within the roadway tracts throughout the development. Per discussions with the City, 128<sup>th</sup> Street and Ranch Gate will be submitted under separate plan and review. Phase 1B roadway alignment profiles and drainage analysis for street conveyance is beyond the level of the preliminary plat analysis. All street conveyance for the private roadways will be provided with final design, however, 128<sup>th</sup> Street and Ranch Gate final design will be submitted separately for review as discussed with the City. Discussion of 128<sup>th</sup> and Ranch Gate roadway improvements and drainage design, in relation to the proposed on-site drainage, has been added to the report.

**COS 2<sup>nd</sup> Review:** Above discussion referred to Phase 2, should be Phase 1B. Current roadway grading information calls out high and low points only. Additional detail is needed to verify viability of identified LFF elevations in relation to proposed curb and depiction of limits of disturbance.

**KHA 2<sup>nd</sup> Response:** Additional limits of disturbance has been provided with the Preliminary Grading Plan. Roadway elevations for Ranch Gate Road have been shown for reference to Phase 1B and HWEL adjacent via washes or proposed detention basins. Roadway geometric points and high/low grade breaks are identified on the Preliminary Grading Plan and provide sufficient detail for Preliminary Plat.

7. **COS 1<sup>st</sup> Review:** The preliminary drainage report will need to illustrate the project is meeting first flush requirements in general. The report should address whether proposed stormwater storage basins have been sized to meet the first flush requirement.

**KHA Response:** Detention basins proposed in the development meet first flush criteria. Some areas throughout the property propose to directly discharge into washes/channels that meander through the property. These areas have been identified in the drainage report and on the preliminary grading plan for alternative methods to stormwater pollution such as a stormceptor inlet structure. These areas are specifically proposed for alternative methods because the existing terrain and locations do not provide for adequate space or ability to grade a first flush basin to meet requirements. Furthermore, existing grades in these areas far exceed 5% slope and in some areas may require blasting. Stormceptor systems would be contained within the roadway tracts proposed and provide for an acceptable method to mitigate stormwater pollution exiting the property, however, additional alternatives may be proposed at final design and provided to staff for review and approval.



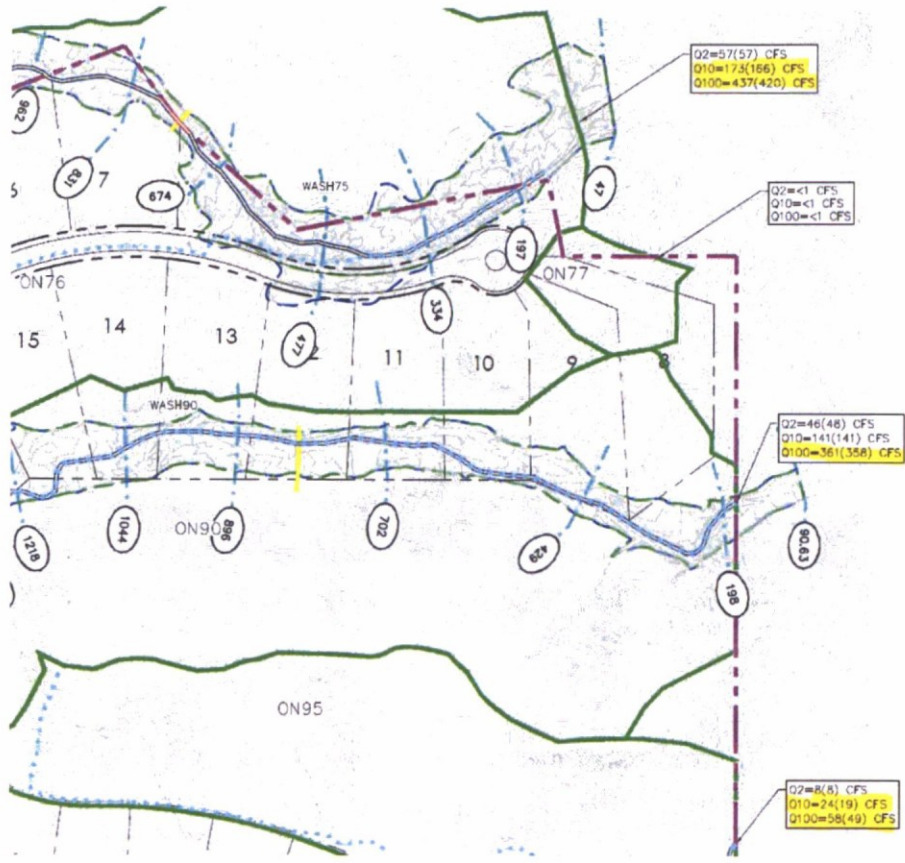


**COS 2<sup>nd</sup> Review:** Proposed alternative methods have to be approved by Stormwater Quality Coordinator (SQC). Any areas that are discharged directly to natural conveyance corridors have to be identified. Stormwater group is coordinating acceptable alternative methods with (SQC). Identify limits of disturbance required for implementation of alternative methods.

**KHA 2<sup>nd</sup> Response:** The alternative method proposed in various locations within the project are identified on the preliminary plat and discussed further in the drainage report. The areas shown are specifically proposed for alternative methods because the existing terrain and locations do not provide for adequate space or ability to grade a first flush basin.

As discussed with the City on April 12, a spillway and dissipation basin is an acceptable method by the Stormwater Quality Coordinator (SQC) to capture sedimentation and potential contaminants from street runoff in the areas constrained throughout the project. As requested, a detail has been provided with the Preliminary Plat and a discussion for the basin pool dimensions and have been provided in the drainage report.

8. **COS 1<sup>st</sup> Review:** The report will need to show and label concentration points on Figure 4, Proposed Drainage Condition exhibit. Additionally, this exhibit identifies existing and proposed flows that are not consistent with the discharge summary table provided in the report; see highlighted flows for locations of discrepancy with the discharge summary table.



**KHA Response:** Concentration points have been added to the summary table and figure 4. The callouts have been corrected to match orientation.

**COS 2<sup>nd</sup> Review:** Addressed.

- COS 1<sup>st</sup> Review:** For proposed site, privacy, or retaining walls, the top and base of wall elevations should be provided on the plans. Elevations should be provided at ends, changes in elevation, or as needed to provide a reasonable level of definition of the elevations of the walls.

**KHA Response:** Retaining wall locations have been added to the preliminary grading plan for R-18 areas. Providing detailing wall plan callouts such as wall heights and specific elevations is beyond the scope of a preliminary grading plan, and will be provided at final design.

**COS 2<sup>nd</sup> Review:** Addressed.

- COS 1<sup>st</sup> Review:** Lateral erosion setback analysis is required. Expand “Erosion Setback Analysis” discussion in the preliminary drainage report. Please note, minimum setback for straight and curved wash reaches is 20’ and 50’, respectively.





**Table 1: Peak Discharge Summary**

Add column with concentration point ID's.

Discharge Sub-Basin	Ex. Cond. 2-Year (cfs)	Prop. Cond. 2-Year (cfs)	Ex. Cond. 10-Year (cfs)	Prop. Cond. 10-Year (cfs)	Ex. Cond. 100-Year (cfs)	Prop. Cond. 100-Year (cfs)
ON75	56	54	169	159	434	409
Lateral Weir	0	0	0	0	11	9
ON76	57	57	173	166	437	420
ON77	1	1	1	1	1	1
ON90	46	48	141	141	361	358
ON95	8	8	24	19	58	49
ON105	1	1	2	1	5	2
ON170	11	11	34	34	89	88

**KHA Response:** Concentration points added to the summary table and figure 4.

**COS 2<sup>nd</sup> Review:** Addressed.

13. **COS 1<sup>st</sup> Review:** The report will need to include wash hydraulics summary table, which will identify wash entrance and exit locations to the proposed development with the following parameters (at a minimum): water surface elevations, critical water surface elevations, velocities, flow areas and channel top widths for pre and post development conditions. Note, wash 160 shows significant water surface elevation increase in the post development condition.

WASH160	84.23	100-Yr	Encroach	83.00	2540.35	2.47	33.55
WASH160	84.23	100-Yr	Ex	79.00	2540.35	2.43	32.49
WASH160	84.23	100-Yr_Encroache	Encroach	83.00	2540.35	2.47	33.55

**KHA Response:** A wash hydraulic summary table was added to the reports. Due to limits on size, only the WSE is included in the summary table. The rest of the requested hydraulic information is provided in the hydraulic summary tables in Appendix C. To help with review, the exit and entrance locations were highlights on the summary table.

**COS 2<sup>nd</sup> Review:** Addressed.

14. **COS 1<sup>st</sup> Review:** Detention basin ID's shall be consistent on HEC-1 Map, Proposed Drainage Condition Figure 4, Preliminary Grading and drainage plan and Detention Basin Calculation tables.

**KHA Response:** Basin ID corrected

**COS 2<sup>nd</sup> Review:** Addressed.

15. **COS 1<sup>st</sup> Review:** Callout and show all spillways for proposed detention basins on Preliminary Grading and Drainage Map. Review and revise HEC-1 model input to



match Detention basin calculations. Submit rating curves for the basin outflow and weir discharge analysis.

Proposed Condition HEC-1, 2-yr 6 hr

KK	DB60 STORAGE									
KO										
RS	1	STOR								
SV		0.06	0.12	0.18	0.26	0.35	0.45	0.45		
SQ			1.00	1.00	2.00	2.00	19.00			
SE		0.50	1.00	1.50	2.00	2.50	3.00	3.01		
*										

**KHA Response:** Basin Discharge tables corrected to match between tables and ddmsw output.

**COS 2<sup>nd</sup> Review:** Addressed.

16. **COS 1<sup>st</sup> Review:** Submit analysis documenting how RTIMP is derived for post development condition HEC-1 model. Add discussion to address LG record value differences between pre and post development conditions. Below you will find a sample basin analysis, which applies to number of basins analyzed with this submittal. Basin ON102 (approximately ON100 in ex. cond. HEC-1) is Zoned Residential R1 18, modeling it with 22% impervious area appears to be low.

Proposed Condition HEC-1, 100-yr 6 hr

KK	ON102	BASIN								
BA	0.017									
LG	0.31	0.28	6.00	0.21	22					
UC	0.170	0.180								
UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
UA	100									
*										

Existing Condition HEC-1, 100-yr 6 hr

KK	ON100	BASIN								
BA	0.011									
LG	0.35	0.40	6.00	0.18	0					
UC	0.247	0.412								
UA	0	3.0	5.0	8.0	12.0	20.0	43.0	75.0	90.0	96.0
UA	100									
*										

It should be noted that higher developed condition RTIMP values will result in higher developed condition runoff values, which will require larger on-site stormwater storage basins to attenuate the associated increases. This issue can have a substantial impact on the grading and drainage design and layout of the proposed project.





**KHA Response:** Per discussion with the City at meeting held Tuesday, January 10, it is our belief that our selected land use values are appropriate for the proposed development. They are in-line with, and more conservative than the county land use parameter for similar zoning/lot sized. It is important to note, that the R<sub>time</sub> value is not comparable as a Rational method run-off coefficient. Furthermore, when looking at the weighted R<sub>time</sub> for a sub-basin, please note that many of the subbasins include portions of desert land use, which further reduce the weighted R<sub>time</sub> value of the entire subbasin. A copy of Table 4.2 from the Drainage Design Manual for Maricopa County has been provided in Appendix B for representative land uses and RTIMP %'s.

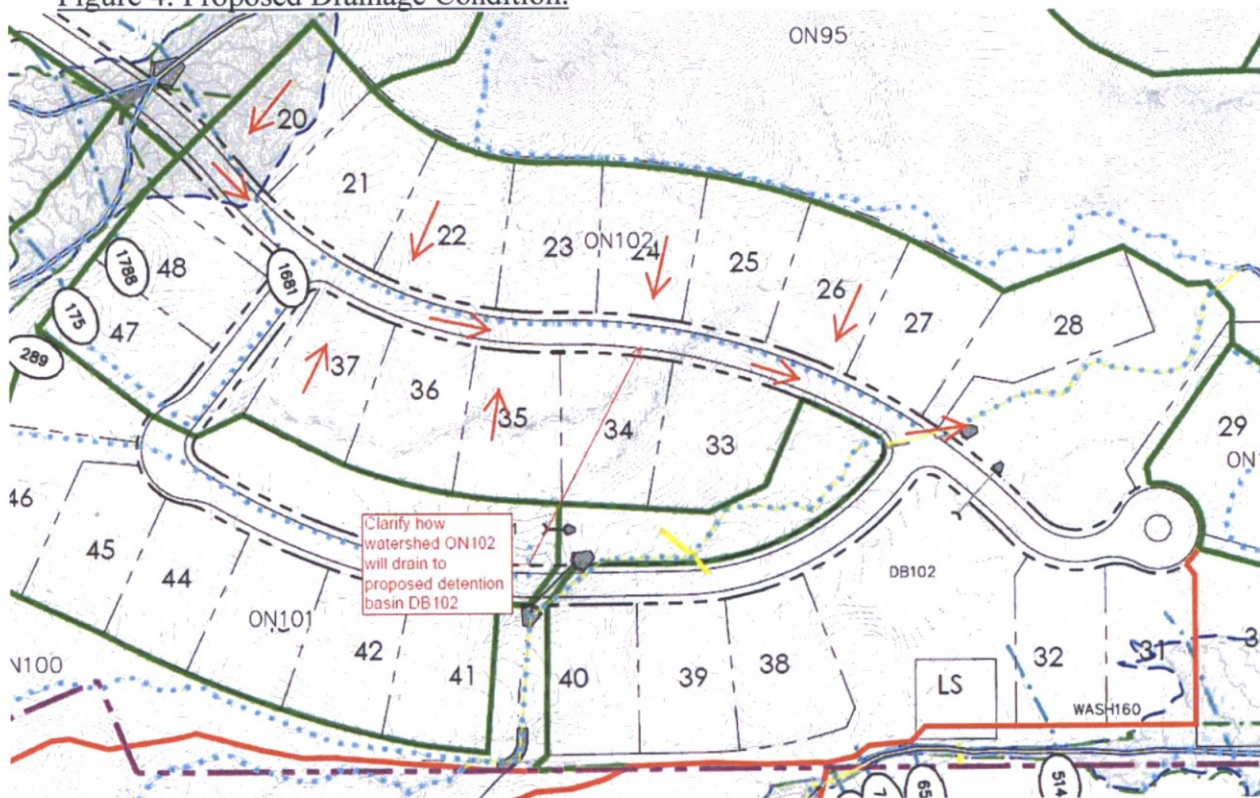
**COS 2<sup>nd</sup> Review:** Not addressed. Please review and address 1<sup>st</sup> review comment. Note, Maricopa County Drainage Policies and Standards, Table 6.5 identifies RTIMP of 30% for R1-18 zoning. Based on our experience, full build-out condition in Scottsdale typically results in a higher percent of impervious area when compared to the same zoning in the County.

**KHA 2<sup>nd</sup> Response:** As discussed with the City on April 12, a RTIMP comparison exhibit for each zoning category (R1-18, R1-35, and R1-43) has been provided to indicate that the percent impervious RTIMP selected for this project is appropriate and more conservative than calculating a weighted RTIMP for the entire development. The exhibits provided highlight the selected RTIMP for each zoning category versus a representative weighted RTIMP value for the development. The additional exhibits and reference to Maricopa County Drainage Policies and Standards should provide the background required by the City to support the selected RTIMP for the project.

17. **COS 1<sup>st</sup> Review:** Provide sufficient level of information to demonstrate how proposed on-site watersheds will be routed through stormwater detention facilities. Add flow direction arrows to Figure 4, Proposed Drainage Condition map to clearly demonstrate intended flow patterns. HEC-1 model proposes routing of most watersheds through detention facilities in effort to reduce post development peak flows. See sample watershed below, how are the two northerly lots draining to proposed detention basin? Preliminary Grading and Drainage plan (sheet 7 of 8) does not show flow interception and routing to the proposed detention basin, that is not consistent with HEC-1 analysis.



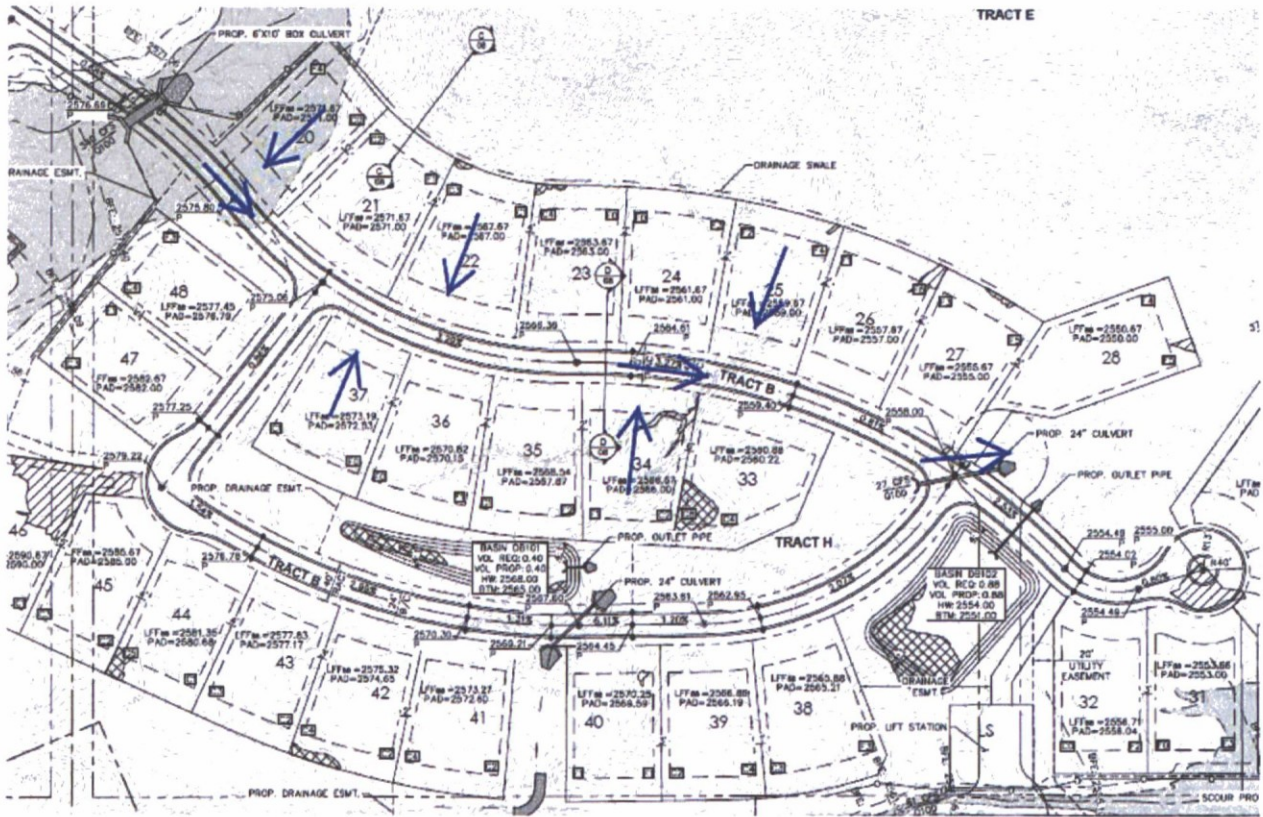
Figure 4. Proposed Drainage Condition.







Preliminary Grading and Drainage Plan. Sheet 7 of 8.



**KHA Response:** Figure 4 and preliminary grading plan have been updated to better show proposed routing of onsite flows.

**COS 2<sup>nd</sup> Review:** Addressed.

18. **COS 1<sup>st</sup> Review:** Above ground storage basins contained by an earthen dam or levee are prohibited unless the fill is part of an approved street or road design or the potential for failure of the levee is mitigate by other measures.

**KHA Response:** Earthen fill to support basins is minimized, however may be necessary in some location due to steep grade of existing terrain. In these situations, additional protection such as cutoff walls or other measures will be proposed.



Locations downstream of this condition do not route to lots/habitable structures and are located adjacent to existing wash outfalls.

**COS 2<sup>nd</sup> Review:** Please discuss “other measures” mentioned above.

**KHA 2<sup>nd</sup> Response:** The “other measures” mentioned above is referring to rip-rap slope protection. Rip-rap protection is the preferred protection method where earthen fill is proposed. As mentioned previously, the conditions where earthen fill will occur adjacent to a storage basin does not discharge to lots/habitable structures and are located adjacent to existing wash outfalls.

19. **COS 1<sup>st</sup> Review:** Show proposed grading on preliminary Grading and Drainage sheets consistent with the following Preliminary Drainage Report section:

#### LOWEST FINISH FLOORS

The pad elevations for each lot are set eight inches above the adjacent BFE, ensuring the lowest finished floor will be at least one foot about the BFE. See Appendix C for complete hydraulic results and Appendix E for a copy of the preliminary grading plan with BFEs and pad elevations.

**KHA Response:** Section of the report has been updated to properly read: The finished floor elevations for each lot will have a minimum elevation of one foot above the 100-year base flood elevation (BFE).

**COS 2<sup>nd</sup> Review:** Addressed.

20. **COS 1<sup>st</sup> Review:** What sediment transport and culvert sedimentation consideration was provided in sizing culverts conveying natural wash flows?

**KHA Response:** Culverts conveying natural washes are set to match the existing grade whenever possible to minimize change in velocity and limit sedimentation. In general, most culverts are “oversized” due to limitation of headwater elevations, and box culverts are provided in a few areas along larger washes.

**COS 2<sup>nd</sup> Review:** See response to comment 5.

**KHA 2<sup>nd</sup> Response:** Roadway culverts are sized to convey the 100-year storm under the roadway without overtopping. Sedimentation is minimized with the proposed crossings by maintaining existing wash grades and velocities wherever possible.

21. **COS 1<sup>st</sup> Review:** Provide sufficient level of analysis and discussion in the drainage report to demonstrate function and purpose of proposed stormwater storage basins

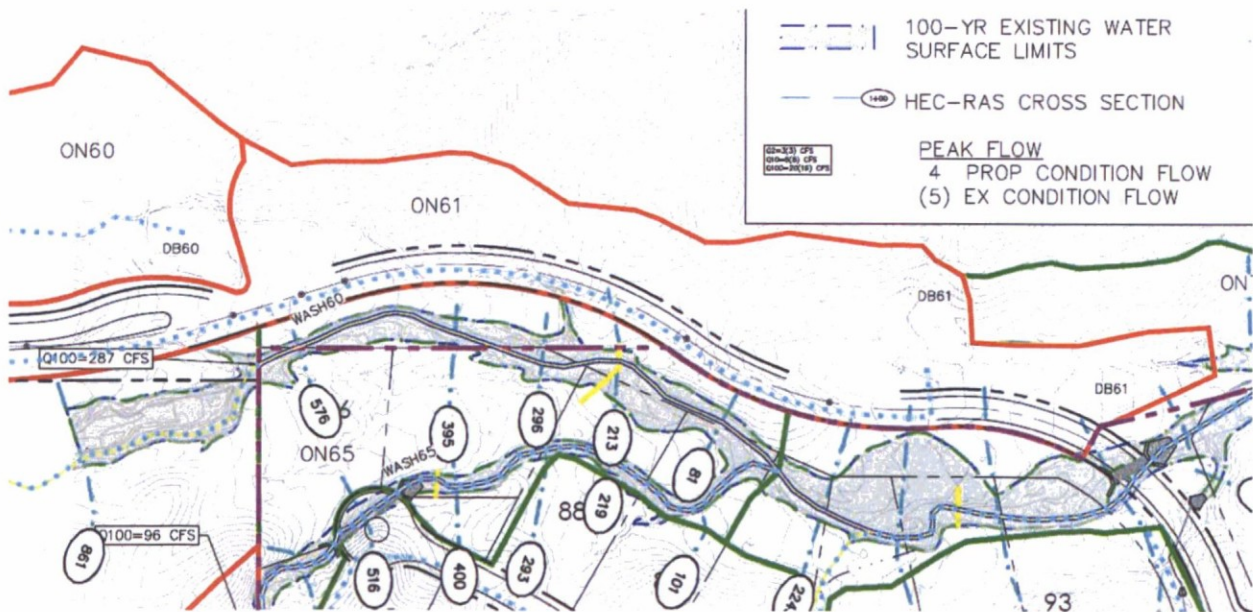




DB60 and DB61. Discuss sedimentation concerns due to upstream watershed being undeveloped. What instruments will be used to construct subject basin in event of two different ownerships between Phase 1A and Phase 1B? Use two basins ID's for DB61. Show inflow and outflow discharges. Submit grading and drainage plan for subject basins.

**KHA Response:** DB60 and DB61 are basins located within Phase 1A of the development, however, they are required with the construction of Ranch Gate Road improvements. Ranch Gate Road Improvements are being provided as part of a separate review and submittal (Master Plat Case) as discussed with the City previously. With the Master Plat submittal and review, all basin and roadway improvements to serve Phase 1A and 1B will be completed prior to parcel improvements. This is in specific response to ownership and phasing timing concerns for StoryRock.

DB60 and DB61 are sufficiently large to accommodate the drainage area of Ranch Gate Road and undeveloped Phase 1A area prior to Phase 1A being developed. The undeveloped area contributing to these basins prior to Phase 1A being developed is very small and without concentrated washes routing through the basins which provides for a very low probability for sedimentation concerns. It is important to note that all basins are to be maintained by the HOA in order to alleviate any sedimentation buildup that may occur.



**COS 2<sup>nd</sup> Review:** Add a note to grading and drainage plan, and Figure 4 identifying that subject basins are to be constructed with the Ranch Gate Road improvements.



**KHA 2<sup>nd</sup> Response:** Note has been added to the preliminary grading and drainage plan as well as Figure 4 of the drainage report.

22. As a result the amount of missing information that allows a thorough analysis of the design and the potential for changes to the stormwater management/grading and drainage design and layout of the project, there will likely be new review comments upon review of subsequent submittals of this case.

Understood. We appreciate the detailed first review, and believe we have provided the additional analysis and level of design for a complete review. We understand the city review staff is very busy at this time. Please contact us if you require any further information during your review and we can provide as allowed with “enhanced review” process and as specified with our PP case.

### **Resubmittal Checklist**

- **Please briefly respond to the above comments (or check it with marker) and include the response in the re-submittal. Please also see comments in preliminary drainage report.**
- 1 Copies of Drainage Report
- 1 CD's with pdf files of drainage report and all supporting hydrologic and hydraulic digital files.