PRELIMINARY DRAINAGE REPORT

Storyrock Phase 1C

Prepared for:

Taylor-Morrison, Inc.
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Scottsdale, Arizona 85258

Plan # _____
Case # 5-PP-2016#3
Q-S # _____
☑ Accepted
☐ Corrections
N. Baronas 10-3-17
Reviewed By Date

Prepared by:

Kimley»Horn

191919000
September 2017

5-PP-2016#3

City of Scottsdale
Stormwater Management

Drainage Review Memorandum

From: Nerijus Baronas, P.E., CFM
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City of Scottsdale
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Re: Storyrock - Phase 1C
Case number: 5-PP-2016 #3

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 #3 case folder. The date of our review is March 21, 2017. Our review comments are as follows:

1. **COS 1st 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 2nd Review: Additional analysis and detail provided with 2nd review submittal of subject case demonstrates advancement; however, bulk of most significant comments were not addressed. Please see 2nd review comments below.
   KHA 2nd Response: The City's 2nd 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 2nd Response" responses below for extent of additional information provided as discussed with the City at meeting held Wednesday, April 12.

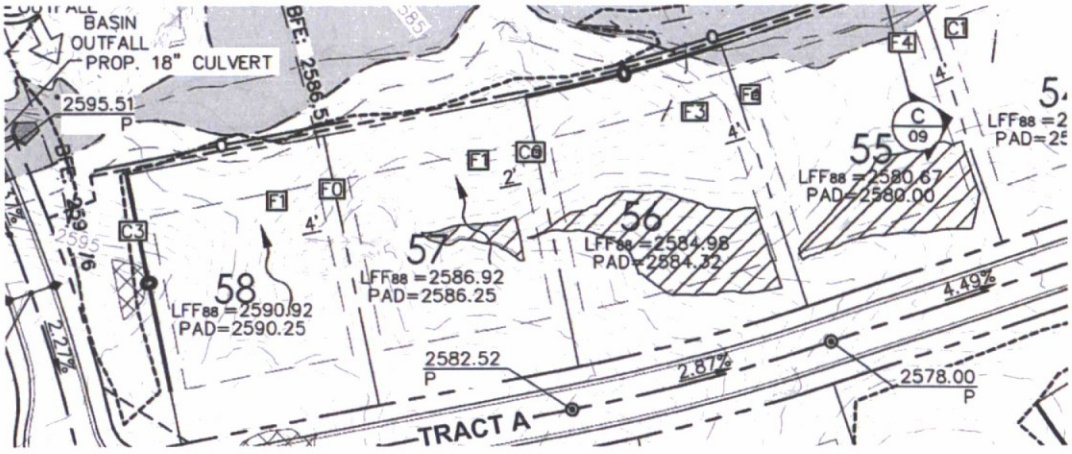
2. The preliminary grading and drainage plan (plan), in conjunction with the preliminary drainage report (report), comprise the two primary pieces of information we review to evaluate the proposed project from a stormwater perspective. As such, the two must provide adequate information to allow this 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 1st 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 2nd Review: Additional labels are required. Please see grading and drainage plan screen capture below:

      KHA 2nd Response: Existing contours have been extensively labeled throughout the preliminary plat with this submittal.



b. **COS 1st 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 2nd Review: Major contours need to be bold enough so they can easily be distinguished when compared to minor contours.

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

c. **COS 1st 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-plat.

COS 2nd 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 2nd 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 1st 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 2nd Review: Addressed.

e. **COS 1st 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 2nd Review: Addressed.

f. **COS 1st 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 2nd Review: Addressed.

g. **COS 1st 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. 128th 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 2nd Review: Addressed.

h. **COS 1st 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 2nd Review: Please address mark up of preliminary lot grading details depicted in the grading and drainage plans. See sheet 2 of 9.

KHA 2nd 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 1st 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 on the south side of Lot 62. Approximate 100-year floodplain limits should be shown and labeled on moderate to larger sized washes impacting proposed lots or other improvements.

COS 2nd 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 along south side of Lot 62 of Phase 1C. Depict all proposed flow re-routing and associated limits of disturbance. Please see preliminary grading and drainage plan mark-up and address locations where sump(s) are created. Limits of disturbance depicted on grading and drainage plan may be not consistent with NAOS exhibit. Latest limits of disturbance should be reflected in NAOS area analysis tables and exhibits.

KHA 2nd Response: Only minor flow exists in the wash along the south side of lot 62. The plans have been updated to reflect a drainage swale that routes through the back side of Lot 61, which is significantly oversized for the minimum lot size for R1-18. This allows for substantial area to route drainage to the back of lot 61 where it will discharge back into an existing wash that traverses through Phase 1C. See the preliminary grading and drainage plan for the revised lot and swale grading.

j. **COS 1st 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 2nd Review: Depict pre and post development flows for above identified storm frequency intervals on the preliminary grading plan.

KHA 2nd 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.

k. **COS 1st Review:**For basin DB 160 and DB 182 (an in-line basin); the basin identifier/information, high water limits, proposed detention volume, and outflow rate should be shown and labeled. This requirement applies to all stormwater storage facilities.

KHA Response: All Stormwater storage facilities include detention volumes, high water and bottom of basin elevations, and outflow rates shown on the preliminary grading plan.

COS 2nd Review: Addressed.

The revised plan will be reviewed in detail on second review in conjunction with the revised report to provide a more in-depth evaluation of the proposed stormwater management system.

3. **COS 1st 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 2nd 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 2nd Response: Typical lot grading details are shown on sheet 2 as discussed in our April 12th 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.

4. **COS 1st 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 2nd Review: Addressed.

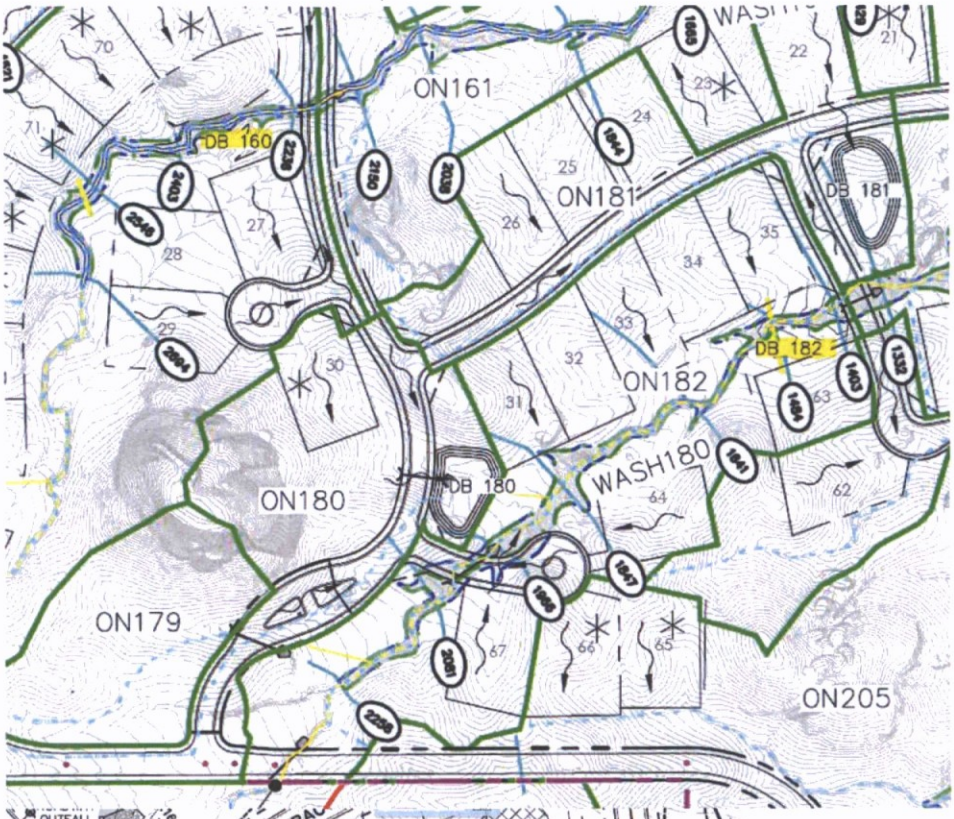
5. **COS 1st Review:** In-line Basin DB 160 is proposed to retain stormwater runoff with depth of 6 feet. Within a stormwater storage facility, safety concerns increase with an increase in potential water depth. A facility with a potential water depth of 2 to 3 feet (less than the head height of most users) is typically less dangerous than a facility with a potential water depth of 5 to 6 feet, or more. For reasons of safety, potential water depth in detention/retention facilities should be kept to a minimum. When possible, potential water depth of 3 feet or less is recommended for small stormwater storage basins immediately next to residential areas. In all facilities, regardless of depth, slopes in flood-prone areas should be kept as shallow as possible. This will allow users who find themselves caught in flooded areas (or users who deliberately enter flooded areas) to walk out and up to non-flooded zones. It is recommended that slopes in flood-prone areas be 4(H): 1(V) or flatter. Provide drain time analysis for DB 160 and discuss any physical barriers that will be implemented to prevent or discourage access to high depth storage facilities.

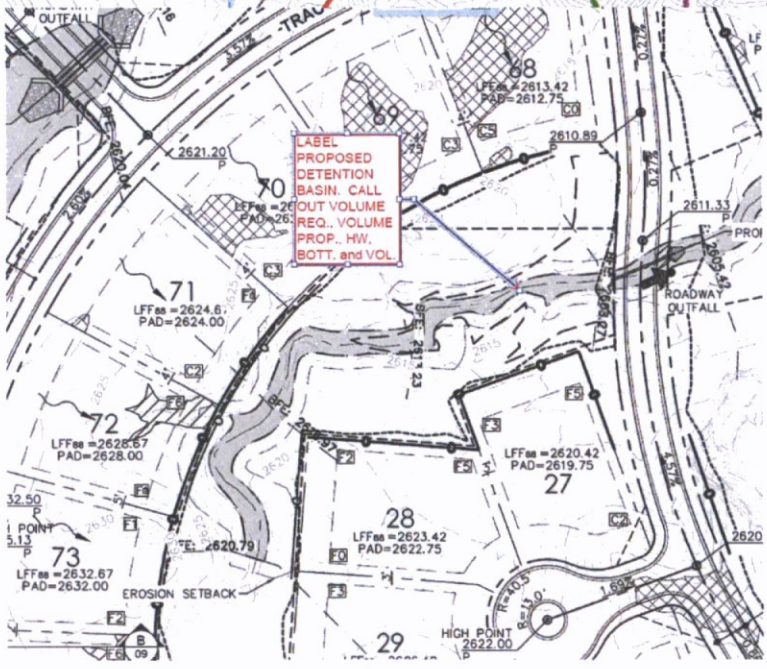
KHA Response: DB 160 is an in-line detention basin and roadway culvert crossing within the community. As with any culvert crossing located along an existing wash roadway crossing, peak flows will result in depths upstream greater than 3', as allowed. The headwall for DB 160 culvert inlet will include safety barriers to deter the community from access in this location, similar to many culvert crossings throughout the development. Drain time calculations have been added to the report to clearly show the minimal timeframe in which the basin will pond in this area.

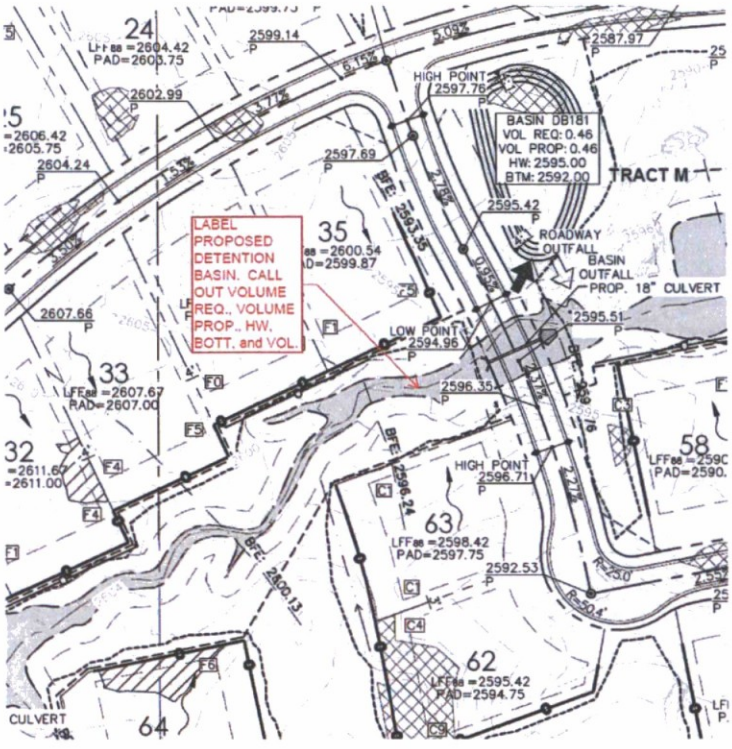
COS 2nd Review: Drainage report discussion on page 8 and basin summary table are not consistent, please review and revise basin label DB180 in discussion to DB182. Depict proposed in-line storage basin inundation limits and add basin callouts to preliminary grading and drainage sheets. Depict above discussed access barrier. Please address culvert sedimentation.

KHA 2nd Response: DB180 has been revised to read correctly as DB182. Inundation limits and basin callouts were also added to the preliminary grading and drainage sheets. The headwalls for DB 182 and 160 culvert inlets will include standard headwall safety rail, similar and most common with roadway culverts throughout the City. DB 182 and 160 will operate in a similar fashion to any incised was crossing in Scottsdale ESLO in a majority of the storm events and only experience depths greater than 3 feet for a very minimal timeframe, as provided in the drainage report. The adjacent roadway network is a private tract and does not provide for any trails or sidewalks near the culvert crossing.

Sedimentation is minimized through these crossing by maintaining existing wash grades and velocities through the culvert. The HOA will be responsible for maintaining the culvert and upstream condition of the inlet to remove periodic sedimentation that may occur. As discussed with the City, a maintenance report could be provided by the HOA to the City twice a year or after a larger storm event documenting the condition of the culvert crossing for DB 182 and 160 and any sedimentation removal performed. A discussion has been added to the drainage report.


ON161
DB 160
ON181
DB 181
DB 182
ON182
WASH180
ON180
DB 180
ON179
ON205


OUTFALL
LABEL PROPOSED DETENTION BASIN. CALL OUT VOLUME REQ., VOLUME PROP., HW, BOTT. and VOL
ROADWAY OUTFALL
EROSION SETBACK
HIGH POINT 2622.00



Drainage Report, Proposed On-Site Hydrology Section, Page 8:

storm events. The total drain time for all basins is less than 36 hours. Detention Basin 160 (DB160) and DB180 are in-line basins and takes advantage of the natural detention and attenuation created by a roadway culvert crossing which allows for minimal disturbance to NAOS in the area. These specific in-line basins experiences depths greater than 3 feet for a very short period during the peak of larger storm events. DB160 and DB180 provides a drain time of 14 and 20 minutes respectively, which helps minimize safety concerns in this location. Furthermore, the basins are located within the private community, setback from

Basin Summary Table:

Basin ID	Volume (ac-ft)	Max Depth (ft)	Max Side Slope (ft, H:V)	100 Yr Peak Inflow Rate (cfs)	100 Yr Peak Outflow Rate (cfs)	100 Yr Peak Flow Attenuation (cfs)	Orifice Size (ft)	Drain Time (hr)	Type	2 Year Storage Volume (ac-ft)	10 Year Storage Volume (ac-ft)	100 Year Storage Volume (ac-ft)
DB160	0.45	6.00	*	62	62	0	1.50	0.24	In-Line	0.11	0.33	0.45
DB180	0.40	3.00	4:1	12	6	6	1.00	1.83	Standard	0.06	0.14	0.26
DB181	0.46	3.00	4:1	10	2	8	0.50	7.06	Standard	0.06	0.06	0.20
DB182	0.34	4.00	*	44	44	0	1.50	0.34	In-Line	0.04	0.18	0.34
DB184	0.67	3.00	4:1	23	10	13	0.50	8.81	Standard	0.24	0.24	0.72

6. **COS 1st 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, 128th Street and Alameda will be submitted under separate plan and review. Phase 1C 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, 128th Street and Alameda final design will be submitted separately for review as discussed with the City. Discussion of 128th and Alameda roadway improvements and drainage design, in relation to the proposed on-site drainage, has been added to the report.

   COS 2nd Review: Above discussion referred to Phase 2, should be Phase 1C. 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 2nd Response: Additional limits of disturbance has been provided with the Preliminary Grading Plan. Roadway elevations for Alameda have been shown for reference to Phase 1C. Roadway geometric points and high/low grade breaks are identified on the Preliminary Grading Plan and provide sufficient detail for Preliminary Plat.

7. **COS 1st 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.

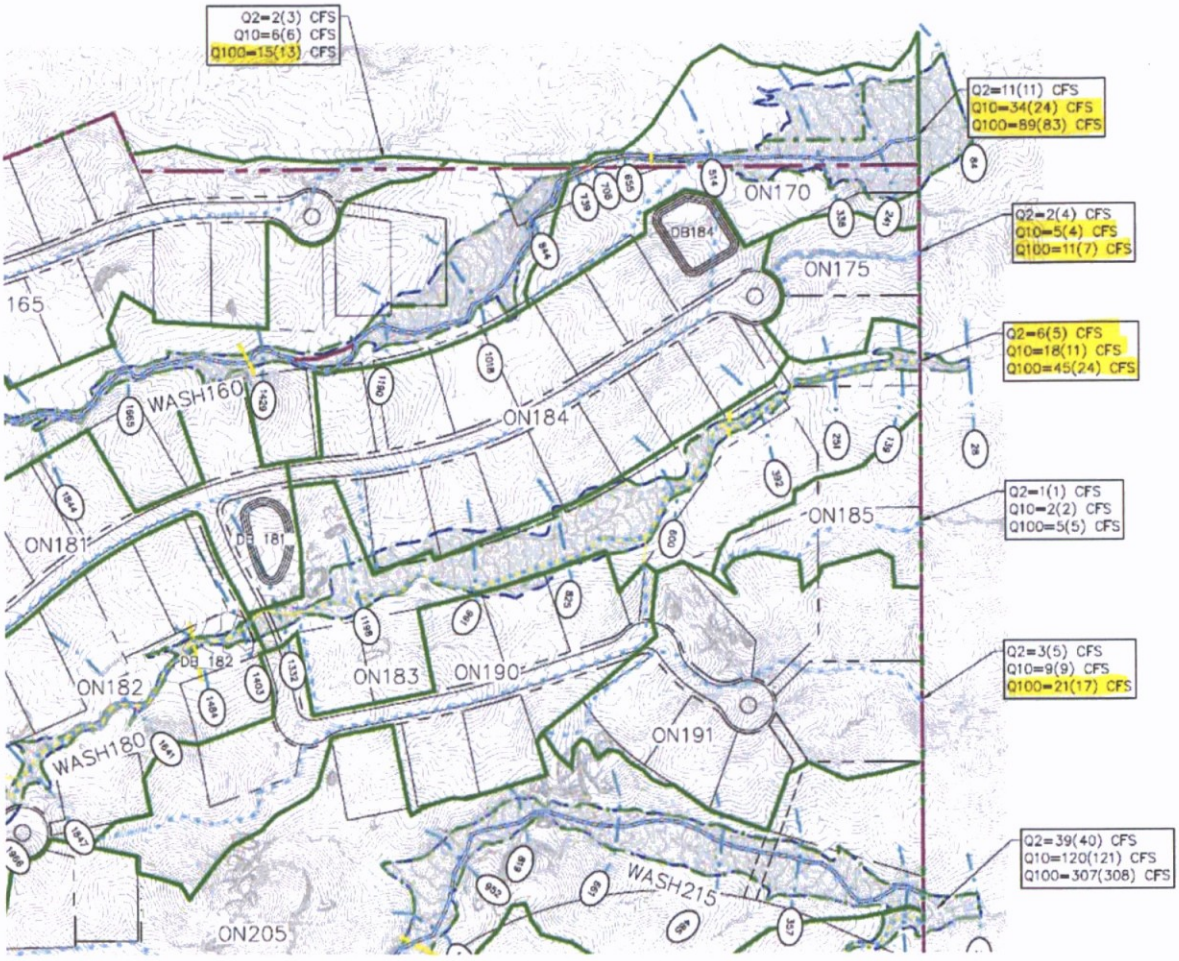
   KHA Response: Detention basins proposed in the development meet first flush criteria. Some areas throughout the property propose to directly discharge into washes/channels that meander through the property. These areas have been identified in the drainage report and on the preliminary grading plan for 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 2nd 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 identified. Stormwater group is coordinating acceptable alternative methods with (SQC). Identify limits of disturbance required for implementation of alternative methods.

KHA 2nd 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 have been provided in the drainage report.

8. **COS 1st 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 2nd Review: Addressed.

9. **COS 1st 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 2nd Review: Addressed.

10. **COS 1st 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.

KHA Response: Analysis has been expanded, summary table is provided.

COS 2nd Review: Addressed.

11. **COS 1st Review:** Non default values of Tc are used in DDMSW to generate HEC-1 models in both existing and proposed conditions. Please provide rational and calculations to support Tc values used in HEC-1 models. Submit DDMS digital files.

	Return Period Parameters					
	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Tc (Hrs)	0.247*	0.230*	0.205*	0.181*	0.166*	0.154 *
Vel (f/s)	0.89	0.96	1.07	1.22	1.33	1.43
R (Hrs)	0.290	0.268	0.236	0.205	0.187	0.172
Tc (Hrs)	0.374	0.348	0.310	0.273*	0.251*	0.233 *
Vel (f/s)	1.29	1.39	1.56	1.77	1.93	2.08
R (Hrs)	0.489	0.452	0.398	0.346	0.315	0.290
Tc (Hrs)	0.403	0.375	0.335	0.295*	0.271*	0.252 *
Vel (f/s)	1.31	1.41	1.58	1.79	1.95	2.10
R (Hrs)	0.608	0.562	0.495	0.429	0.391	0.361
Tc (Hrs)	0.349	0.325	0.290*	0.255*	0.235*	0.218 *
Vel (f/s)	1.34	1.44	1.62	1.84	2.00	2.15
R (Hrs)	0.341	0.316	0.278	0.241	0.219	0.202

* Non default value or value out of range

KHA Response: As discussed within Data Analysis section of the report.

"Time of Concentration calculations were calculated using DDMSW. Values that show non-default values or out-of-range results are due to the NMIN parameter selected for the HEC-1 Model. Because of the varying sub-basin sizes, the selected NMIN parameter will not meet the time of concentration requirements specified in the FCDMC Drainage Design Manual - Hydrology for each sub-basin."

None of the sub basins utilize customs parameters. Digital DDMSW files are provided with the drainage reports.

COS 2nd Review: Addressed.

12. **COS 1st Review:** Add concentration point ID column to peak discharge summary table. Specify when different ID's are used for existing and proposed conditions.

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)
ON155	20	20	61	60	153	153
ON165	2	3	6	β	15	13
ON170	11	11	34	24	89	83
ON175	2	4	5	4	11	7
ON183	6	5	18	11	54	24
ON185	1	1	2	2	5	5
ON191	3	5	9	9	21	17
ON210	39	40	120	121	307	308

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

COS 2nd Review: Addressed.

13. **COS 1st 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.

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 2nd Review: Addressed.

14. **COS 1st 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. Detention Basin Calculation for DB182 is missing.

KHA Response: Basin ID corrected

COS 2nd Review: Addressed.

15. **COS 1st 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    DB160 STORAGE
KO
RS        1    STOR
SV             0.01    0.05    0.11    0.16    0.27    0.45    0.45
SQ             3.00    7.00    9.00   14.00   17.00   20.00   65.00
SE             1.00    2.00    3.00    4.00    5.00    6.00    6.24
*
```

12 19 31 39 26 35

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

COS 2nd Review: Addressed.

16. **COS 1st 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 ON184 (approximately ON175 in ex. cond. HEC-1) is Zoned Residential R1 18, modeling it with 27% impervious area appears to be low.
Proposed Condition HEC-1, 100-yr 6 hr

```
KK    ON184   BASIN
BA    0.009
LG     0.30    0.25    6.00    0.22      27
UC    0.129   0.141
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    ON175   BASIN
BA    0.005
LG     0.35    0.40    6.00    0.18       0
UC    0.257   0.368
UA        0     3.0     5.0     8.0    12.0    20.0    43.0    75.0    90.0    96.0
UA      100
*
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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.

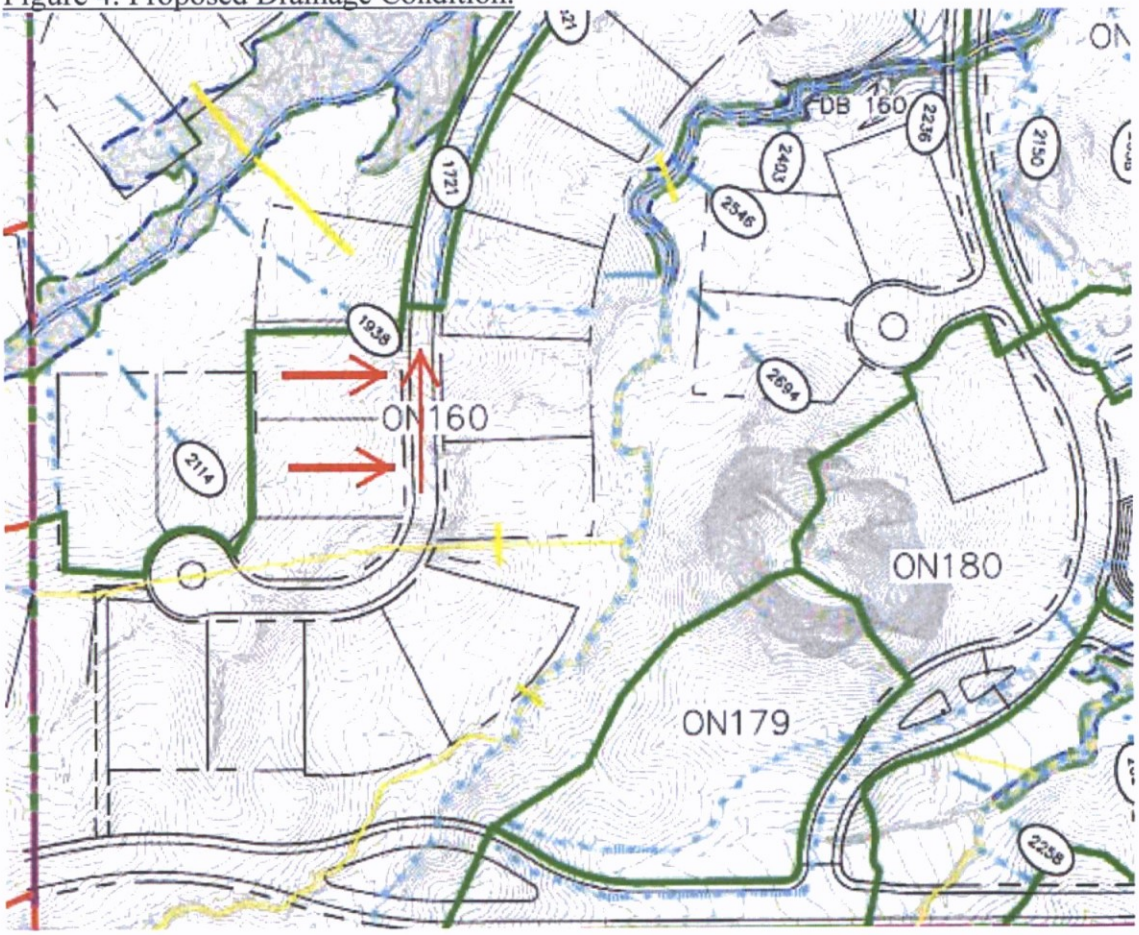
KHA Response: Per discussion with the City at meeting held Tuesday, January 10, it is our belief that our selected land use values are appropriate for the proposed development. They are in-line with, and more conservative than the county land use parameter for similar zoning/lot sized. It is important to note, that the Rtimp value is not comparable as a Rational method run-off coefficient. Furthermore, when looking at the weighted Rtimp for a sub-basin, please note that many of the subbasins include portions of desert land use, which further reduce the weighted Rtimp 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 2nd Review: Not addressed. Please review and address 1st 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.

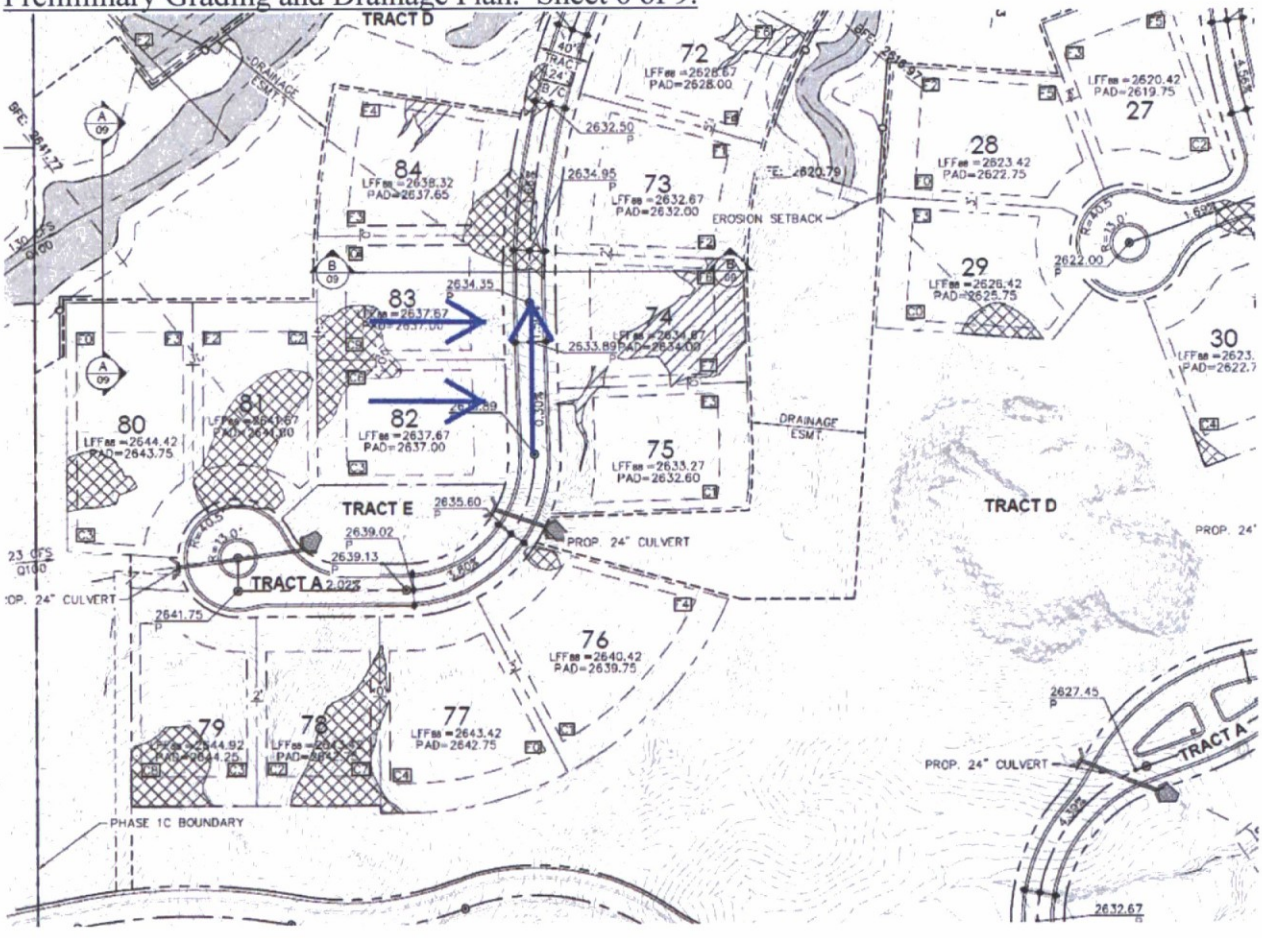
KHA 2nd Response: As discussed with the City on April 12, a RTIMP comparison exhibit for each zoning category (R1-18, R1-35, and R1-43) has been provided to indicate that the percent impervious RTIMP selected for this project is appropriate and more conservative than calculating a weighted RTIMP for 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 1st 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 6 of 9) 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 6 of 9.



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

COS 2nd Review: Addressed.

18. **COS 1st 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 2nd Review: Please discuss "other measures" mentioned above.
KHA 2nd 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 1st 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 2nd Review: Addressed.

20. **COS 1st 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 is a few areas along larger washes.

COS 2nd Review: Please identify approximate percentage of "oversizing".

KHA 2nd 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. 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.