GARDNER ENGINEERING
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MUNICIPAL · LAND SURVEYING

September 15, 2020

Attn: Chad Meyerhoffer

RE: Crimson Ridge Phase 2 & 3

We have addressed the plan review comments dated August 20, 2020 as follows:

1. Please see redlines on Reserve at Crimson Ridge PH2&3_Engineering_Review_Aug2020pdf.

See revised plans and responses to comments as follows:

Plat sheet S1. Right if way was updated to be 66' right of way (as requested). Lot layout was updated to include the allowed extra lot 208 (with the 25% allowance for stream corridor credit). UDOT letter on access to be provided with final approval.

Cover sheet. Updated Sanitary Sewer General Note 1 (as requested).

C1 – have updated calculations and layout for drain field and sewer effluent lines. See revised sheet C1. UDOT letter to be submitted when we have their approval. Bottom comment does not apply seeing as how we are doing gravity sewer. Refer to note 10 for correspondence with Geotech regarding cut fill slopes.

C2 – Added note to refer to plat for recommended non buildable areas. In regards to the comment regarding the civil engineer to address debris flow, the report by ___ under section 7.9 second paragraph states, "Although debris flows and floods may occur in areas adjacent to the unnamed creek, the current development plan designates this area as open space. Given this, the risk would be lower." We have also added catchbasins which will help channel excess water to detention basins which will help to reduce the risk of debris flows. Also the new proposed pipe has more slope than the existing upstream 5' diameter pipe. The HOA will be responsible for removing any debris from the storm drain culverts to allow storm water to flow unrestricted through the newly proposed culvert crossing for the seasonal stream under Skyline Drive. See also added Note 1 to sheet PP3. In addition, the upstream pipe crossing (where the existing road connects has 10' of additional storage height above the pipe culvert. The newly installed pipe crossing shown on sheet PP3 at station 18+01 will have approximately 14' of additional storage height above the culvert crossing. In the event of a debris flow, this additional height would provide additional storage for debris should this be needed.

C3 – See updated engineered design of the upgrades to the sewer system. Approval from the State and Local Health Department to be submitted for final approval.

C5 – See updated drainage calculations with 0.1 cfs maximum allowed release rate.

C6 – No slope easement will be needed. (Note, improvements that were on sheet C6 are now shown on sheet C8).

PP1 - Updated Cross Section as requested.

PP3 - See Provided Calcs for the existing and proposed pipe sizing as follows:

Existing Upstream 60” Culvert, Q = 582 cfs:

Manning Formula Uniform Pipe Flow at Given Slope and Depth

Check out our spreadsheet version of this calculator Download Spreadsheet Open Google Sheets version View All Spreadsheets

Existing Upstream 60" Pipe Flow Calculations

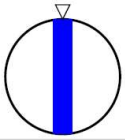
Crimson Ridge Project

Inputs

Pipe diameter, d_0	5	ft
Manning roughness, n	.015	
Pressure slope (possibly ? equal to pipe slope), S_0	.0665	rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	1	fraction

Results

Flow, Q	582.0291	cfs
Velocity, v	29.6428	ft/sec
Velocity head, h_v	13.6564	ft H2O
Flow area	19.6356	ft^2
Wetted perimeter	15.7080	ft
Hydraulic radius	1.2500	ft
Top width, T	0.0000	ft
Froude number, F	0.00	
Shear stress (tractive force), tau	0.0000	



Proposed 60” RCP Culvert, Q = 648 cfs:

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Manning Formula Uniform Pipe Flow at Given Slope and Depth

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New 60" Pipe Flow Calculations

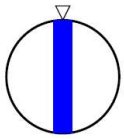
Crimson Ridge Project

Inputs

Pipe diameter, d_0	5	ft
Manning roughness, n	.015	
Pressure slope (possibly ? equal to pipe slope), S_0	.0825	rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	1	fraction

Results

Flow, Q	648.2774	cfs
Velocity, v	33.0169	ft/sec
Velocity head, h_v	16.9422	ft H2O
Flow area	19.6356	ft^2
Wetted perimeter	15.7080	ft
Hydraulic radius	1.2500	ft
Top width, T	0.0000	ft
Froude number, F	0.00	
Shear stress (tractive force), tau	0.0000	



Alternative Proposed 4’ x 5’ box Culvert, Q = 736.89 cfs:

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Manning Formula Uniform Trapezoidal Channel Flow at Given Slope and Depth

Printable Title

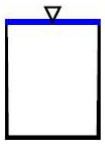
Printable Subtitle

Inputs

Bottom width	4	ft
Side slope 1 (horiz./vert.)	.01	
Side slope 2 (horiz./vert.)	.01	
Manning roughness, n ?	0.015	
Channel slope	.0825	rise/run
Flow depth	5	ft
Bend Angle? (for riprap sizing)	0	
Stone specific gravity (2.65)	2.65	

Results

Flow area	20.2507	ft^2
Wetted perimeter	14.0005	ft
Hydraulic radius	1.4464	ft
Velocity, v	36.3901	ft/sec
Flow, Q	736.8917	cfs
Velocity head, h_v	20.5809	ft
Top width, T	4.1000	ft
Froude number, F	2.89	
Shear stress (tractive force), tau	0.0000	
Implied design ? riprap size based on n	0.0033	ft
Required bottom angular riprap size, D50, Maricopa County	2.8536	ft
Required side slope 1 angular riprap size, D50, Maricopa County	2.8536	ft
Required side slope 2 angular riprap size, D50, Maricopa County	2.8536	ft
Required angular riprap size, D50, per Maynord, Ruff, and Abt (1989)	33.0927	ft
Required angular riprap size, D50, per Searcy (1967)	8.8799	ft



PP4 – Updated low pressure tie in location (as suggested). And upsized new sewer manhole to be 5' diameter.

PP6 – Slope easement is not required.

PP7 – See revised updated sheet. Drain field previously shown schematically on this sheet is not needed by lots 201-203. Developer will sign agreement to maintain the landscaping of the proposed round-a-bout feature near the entrance so that the center can be an entryway feature that will be maintained by the HOA (as common area). Snow storage area has been adjusted as requested with adjusted road and lot layout. Letter from UDOT will be provided for final approval. They have agreed to allow for 8 future lots to connect for the Phase 2 location.

PP8 - UDOT approval letter pending.

2. Some of the comments may not pertain to phase 2, but where the improvement plans were submitted and other information comments were given.

   Noted. Phase 3 is also being submitted for approval).

3. We will need a letter from UDOT on the access with their requirements and approval.

   UDOT letter with their approval will be provided for final approval.

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4. All the recommendations in the geology and geotechnical report will need to be followed/addressed.

   We believe that we have followed all the recommendations in the geology and geotechnical report.

5. In the Geologic Hazards Evaluation it ranks the Landslide and slope instability as high. There will need to be a slope stability evaluated by the geotechnical engineer. Some of the lots may need to be labeled as a "N" Lot to do more of a site specific study where the home will be placed.

   See more detailed slope stability evaluated by Christensen Geotechnical, prepared May 26, 2020 (and submitted with prior schematic 2nd submittal. The last sheet of the report (Plate 40) shows areas which will be called out on the plat as non-buildable areas.

6. In the Geologic Hazards Evaluation it talks about Debris Flow, Flooding, and shallow ground water as moderate risks. These items should be addressed by the geotechnical engineer/civil engineer.

   The risks for debris flows has been reduced in that storm drain detention pond will intercept much of the surface water and release it from a detention pond. Also the height of the roadway crossing the stream would provide for debris flow storage area should this occur.

7. Plate 40 shows some recommended non-buildable areas, these lots and any others with geologic issues should be labeled with an "N" and a note on the plat that they will need to go through a site specific study when submitting for building permit.

   Recommended non buildable areas will be shown on the plat with a note that any structural construction within the recommended non-buildable area requires a site specific study when submitting for building permit. There area adequate areas that meet the minimum 40'x40' buildable area for each lot where there are not identified hazards and therefore even though lots may have areas that are non-buildable, the "N" designation is not required for each lot shown. The note will be added in the case that a home owner does desire to build within the identified recommended non-buildable areas.

8. In the geotech report it states a Christensen Geotechnical representative should observe the site grading operations.

   This note has been added to sheet PP1 as geotechnical note 1.

9. The geologic and geotechnical information should be noted and available to individuals that would benefit from its information.

   The requested reference notes have been added to sheet PP1 as geotechnical note 2 and note 3.

10. Did the geologist/geotech engineer see a copy of the improvement plans, for the cut and fills that will be on site as part of this project.

A phone call was made and discussed with Mark Christensen regarding the proposed cuts and fills. A 2:1 slope he said was acceptable. Mark will be provided a copy of the plan and profiles to review to ensure he is good with the proposed design.

11. Subdivision will need to be annexed into Pineview West Sewer Improvement District if it presently is not in it.

    It is anticipated that subdivision will be annexed into Pineview West Sewer Improvement District.

12. We will need a letter from the water and secondary water district approving of the design of the new infrastructure.

    Letter from the water company to be provided for approval of the water design. A limited amount of culinary water for each lot is to be allowed to be used for irrigation purposes.

13. Make sure that the drain fields and drip irrigation meet the setbacks from drainages and ponds.

    Have updated plans so that drain fields and drip irrigation meet the setbacks from the drainages and ponds.

14. Will there be requirements for pumps on the lots? Please provide the information.

    See added pump requirements for added low pressure sewer pumps added as sheet D1.

15. The sewer system will need to be upgraded to handle the new connections.

    Noted. Upgrades to sewer system have been shown on sheet C6, C7 and sheet C8. Additional details are added on sheet D1 and D2 (additional details to be added).

16. There will need to be an escrow established for the improvements prior to recording or the improvements will need to be installed prior to final approval.

    Noted.

17. A set of as-built drawings will need to be submitted to our office when the project is completed.

    Noted.

18. The County's allowable release rate on the Storm Water Calc's had been 0.1cfs. Recently the County Engineer has gone to a pre and post construction design. Detention will need to be shown on the plat with an easement.

    Noted. Provided drainage calcs shown on C5 were just under 0.1 cfs. See updated plat with detention shown on the plat with an easement.

19. Because soil conditions vary throughout the county, it is now necessary to provide an engineered pavement design showing required sub-base, road-base, fabric, and asphalt thickness as needed for soil type. Asphalt thickness shall not be less than 3 inches. The county

engineer is now requiring a minimum of 8” of 3” minus sub-base and 6” road-base. Compaction test on both will be required.

Noted. See updated street section on sheet PP1 and sheet PP7.

20. A Storm Water Pollution Prevention Plan (SWPPP) is now required to be submitted for all new development where construction is required. The State now requires that a National Discharge Pollution Elimination Systems (NPDES) permit be acquired for all new development. A copy of the permit needs to be submitted to the county before final approval. Permits can now be obtained online thru the Utah State Dept. of Environmental Quality at the following web site: https://secure.utah.gov/swp/client (https://secure.utah.gov/swp/client).

Noted. SWPPP to be submitted with required permit prior to final approval.

21. A Storm Water Activity Permit will need to be obtained through our office before construction begins.http://www1.co.weber.ut.us/mediawiki/images/5/56/Stormwater_Construction_Activity_Permit.pdf
(http://www1.co.weber.ut.us/mediawiki/images/5/56/Stormwater_Construction_Activity_Permit.pdf)

Noted.