

N.E.S., Inc.
Geologic Hazard Investigation
Tax Schedule No. 63200-00-122
4785 Stanton Road
Newman Center
Colorado Springs, Colorado

and width, can carry water in the subsurface. Builders should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site.

Floodplain and Drainage Areas

The site does not lie within any floodplains according to the FIRM Map, No. 08041C0518F (Reference 9, Figure 6). A drainage currently exists on the site mapped as psw: potentially seasonal shallow groundwater areas. In these areas we would anticipate the potential for shallow water within the drainage area due to seasonal surface flows. Site grading should be modified to direct surface flows around the structures or roads, or carried off-site so as to not produce any areas of ponded water. Additionally, subsurface perimeter drains may be required. Specific floodplain locations and drainage studies are beyond the scope of this report.

A preliminary drainage report for the site has been prepared by Classic Consulting (Reference 10). Additional drainage analysis will be required for the channel. It is anticipated that the specific channel improvements will be determined in the final drainage report.



Debris Fans

The entire site is mapped as older fan deposits according to *Geologic Map of the Pikeview Quadrangle*, distributed by the Colorado Geological Survey in 2001 (Reference 3, Figure 4). Evidence of past debris or hyperconcentrated flows were observed in historical photos of the area. The potential for debris or hyperconcentrated flows exist in the drainage in the southern portion of the site. Based on current site conditions and proposed grading the proposed building is located at sufficient distance away and topographically higher than the drainage that it should not affect the proposed structure. Proper erosion control should be implemented to protect the banks of the drainage from significant erosion in the future. The proposed finish floor elevation of the building is 6,331 feet, and the elevation of the roadway at the location of the two 60-inch concrete culverts are located is 6,318 feet.

Mitigation: Mitigation will be required along the drainage channel to protect the site from damaging effect of future hyperconcentrated flows. These flows could have the potential to cause severe erosion and have the potential to cause blockages in downstream culverts. The 100-year flow potential for the drainages that flow into the site is 332 cfs. The planned drainage improvements should account for these quantities of flows and also account for the increased sediment and debris transported in the hyperconcentrated flows.

Faults

The closest fault is the Ute Pass Fault, located approximately 4 miles to the west of the site. No faults are mapped on the site itself. Previously, Colorado was mapped entirely within Seismic Zone 1, a very low seismic risk. Additionally, the Uniform Building code (UBC), 1997 currently places this area in Seismic Risk Zone 1. According to a report by the Colorado Geological Survey by Robert M. Kirkman and William P. Rogers, Bulletin 43 (1981) (Reference 11), this area should be designed for Zone 2 due to more recent data on the potential for movement in this area, and any resultant earthquakes.

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Dipping Bedrock

The bedrock underlying the site is the Lower part of the Dawson Formation of Cretaceous Age. According to the map of *Areas Susceptible to Differential Heave in Expansive, Steeply Dipping Bedrock* by Himmelreich and Noe in 1999 (Reference 12), the site lies to the east of the area mapped with steeply dipping bedrock (>30°). The bedrock in this area is dipping in an easterly direction according to the *Geologic Structure Map of the Pueblo 1x2 Quadrangle, South-Central Colorado* (1978) (Reference 13). Bedrock was encountered at 18 to 19 feet in the two of the test borings drilled on the site by Entech (Reference 2, Appendix B). The test borings were drilled to 20 feet. Mitigation is typically recommended for steeply dipping expansive bedrock encountered within 10 feet of foundation members. Based on the site plan and materials encountered in the test borings, mitigation for steeply dipping bedrock will not be required for this site.

Radon

Radon levels for the area have been reported by the Colorado Geologic Survey in the open file, Report No. 91-4 (Reference 14). Average Radon levels for the 80918-zip code are 2.87 pCi/l have been measured in the area. The following is a table of radon levels in this area:

| | |
|---------------|--------|
| 0 < 4 pCi/l | 77.78% |
| 4 < 10 pCi/l | 16.67% |
| 10 < 20 pCi/l | 5.56% |
| > 20 pCi/l | 0.00% |

Mitigation:

The potential for high radon levels is present for the site. Build-up of radon gas can usually be mitigated by providing increased ventilation of basement and crawlspace and sealing joints. Site specific radon testing is recommended for this lot. Specific requirements for mitigation should be based on site specific testing.

RELEVANCE OF GEOLOGIC CONDITIONS TO DEVELOPMENT

The proposed development is to consist of the construction of a Catholic Campus Ministry Center and associated site improvements. A shallow foundation bearing on compacted structural fill or medium dense native sands is anticipated for the proposed structure on the site. It is our opinion that the existing geologic and engineering geologic conditions will have some minor constraints on the proposed development and construction. The most significant problems affecting development will be that associated with the artificial fill and potentially seasonal shallow groundwater areas within the drainage area. These problems can be satisfactorily mitigated through proper engineering design and construction practices and avoidance.

Fill was encountered in three of the test borings at depths ranging from 5 to 10 feet below the existing ground surface. Other areas of fill may be encountered other than those mapped. This fill is considered uncontrolled for construction purposes. The upper slightly silty to silty soils exhibit low expansion potential. Areas of expansive soils and bedrock were encountered in the test borings. If uncontrolled fill or expansive soils are encountered beneath the foundation or floor slabs, removal and replacement with compacted structural fill will be required. Structural fill placed on this site should be compacted to a minimum of 95% of its maximum Proctor Dry Density

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(ASTM D-1557). Specific foundation recommendations have been made in the Subsurface Soil Investigation, Reference 2, Appendix B. Test Pits are recommended prior to construction to determine the extent and depth of the fill. Specific foundation recommendations are presented in the Subsurface Soil Investigation by Entech attached in Appendix B (Reference 2).

A drainage is located in the southern portion of the site that flows in a southwesterly direction. At the time of our site observations the drainage was dry. The site does not lie within any FEMA floodplain zones according to the FIRM Map No. 08041CO518F. Specific floodplain locations and drainage studies are beyond the scope of this report. Evidence of past debris or hyperconcentrated flows were observed in historical photos of the area. The potential for debris or hyperconcentrated flows exist in the drainage in the southern portion of the site. It is our opinion, that based on current site conditions and proposed grading the proposed building is located at sufficient distance away and topographically higher than the drainage that it should not affect the proposed structure. Proper erosion control should be implemented to protect the banks of the drainage from significant erosion in the future. The proposed finish floor elevation of the building is 6,331 feet, and the elevation of the roadway at the location of the two 60-inch concrete culverts are located is 6,318 feet. If the culverts were to become clogged with debris during a flooding event, it is anticipated the drainage would overflow at Stanton Road before the proposed structure could be potentially affected.

The site was reviewed by the Colorado Geological Survey (CGS), May 31, 2018 (City File Number CPC CU 18-00056; CGS Unique No. EP-18-0072). A copy of the CGS letter is included in Appendix D.

In summary, development of the site can be achieved if the above-mentioned site conditions are mitigated. These items can be mitigated through proper design and construction or avoidance. Specific recommendations have been made in the Subsurface Soil Investigation (Reference 2, Appendix B).

CLOSURE

It should be pointed out that because of the nature of data obtained by random sampling of such variable nonhomogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Construction and design personnel should be made familiar with the contents of this report.

This report has been prepared for N.E.S., Inc., for application to the proposed project in accordance with generally accepted geologic, soil and engineering practices. No other warranty expresses or implied is made.

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We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact us.

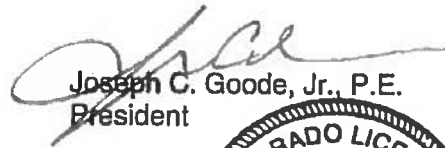
Respectfully Submitted,

ENTECH ENGINEERING, INC.

Reviewed by:



Logan L. Langford
Geologist



Joseph C. Goode, Jr., P.E.
President

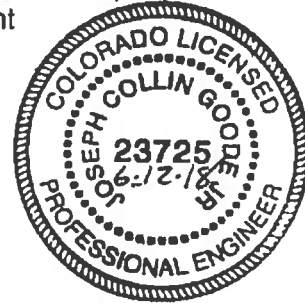


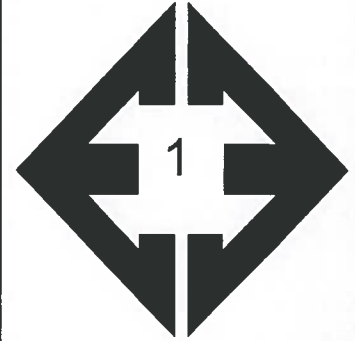
Kristen A. Andrew-Hoeser, P.G.
Engineering Geologist

LLL/rm

Encl.

Entech Job No. 180571
AAprojects/2018/180571 GeoHaz letter - City





Looking west from the central portion of the site.

April 5, 2018



Looking northwest along drainage that is located to the southwestern portion of the site.

April 5, 2018

Job No. 180571

FIGURE 8



Looking north from the southeastern portion of the site.

April 5, 2018

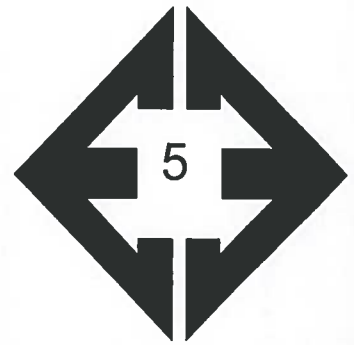


Looking north from the southeast corner of the site.

April 5, 2018

Job No. 180571

FIGURE 8



Looking west from the southeastern portion of the site.

April 5, 2018



Looking west towards depression in the proposed building area.

April 5, 2018

Job No. 180571

FIGURE 8