

Teixeira, Rachel

From: Maring, Lydia
Sent: Friday, February 12, 2016 4:13 PM
To: Teixeira, Rachel
Cc: Kuehster, Steve
Subject: CGS review - Magnolia Apartments
Attachments: EP-15-0002_2 Magnolia Apartments.pdf; EP150002 (MagnoliaAppts).pdf

Rachel,

I have attached both review letters from CGS for the Geologic Hazard Study by RMG dated 7/28/2014 and the Mine Subsidence Investigation by CTL Thompson dated 7/15/2015. Both reports should be finalized and include the applicable CGS letter and response to CGS's comments as well as a signed planning application form for geologic hazard reports. Standard Geologic hazard disclosure statements for both reports should be included on both the development plan and the plat. In addition, a note disclosing the geologic hazards of potential subsidence due to abandoned underground mining activity and uncontrolled fill should be included on the development plan and plat. Additional notes pertaining to mitigation measures should be included on the development plan. Please note the reports will need to be reviewed again prior to signature by the city engineer and planning director. Please forward this information to the applicant and RMG and CTL Thompson. Thanks.

Lydia

*Lydia Maring, P.E.
Civil Engineer II
Public Works/City Engineering
City of Colorado Springs
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From: Teixeira, Rachel
Sent: Thursday, February 11, 2016 2:13 PM
To: Maring, Lydia
Subject: FW: CGS review - Magnolia Apartments

CGS's comments.

From: Jill Marie Carlson [<mailto:carlson@mines.edu>]
Sent: Thursday, February 11, 2016 1:26 PM
To: Teixeira, Rachel
Subject: CGS review - Magnolia Apartments

Hi Rachel,

I apologize that it took me a few extra days to complete this review. If the applicant or CTL produces subsurface information for the western portion of the site, characterizing the location, depth, and condition of the mine haulageway/slope entry, then the foundation reinforcement recommendation may be withdrawn.

Please call or email if you have any questions.

Thanks,

Jill

[Colorado Geological Survey](#)
1801 19th Street ([map](#))
Golden, CO 80401
303-384-2643

COLORADO GEOLOGICAL SURVEY

1801 19th Street
Golden, Colorado 80401



Karen Berry
State Geologist

February 11, 2016

Rachel Teixeira, Planner II
Planning & Development, Land Use Review Division
City of Colorado Springs
P.O. Box 1575, Mail Code 155
Colorado Springs, CO 80901

Location:
SE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 29,
T13S, R66W of the 6th P.M.
38.8862, -104.8045

Subject: Magnolia (aka Crestmoor Park) Student Apartment Complex
City of Colorado Springs, El Paso County, CO; CGS Unique No. EP-15-0002_2

Dear Rachel:

Colorado Geological Survey has reviewed the Magnolia/Crestmoor Park Apartment Complex resubmittal. I understand the applicant proposes 54 apartment units intended as student housing in three buildings on approximately 2.8 acres located northwest of Westmoreland Road and N. Hancock Avenue. With this referral, I received a request for CGS review (January 8, 2016), a Mine Subsidence Investigation (CTL|Thompson, July 15, 2015), a Preliminary Drainage Report (Galloway, December 18, 2015), and a set of nine development, site, utility, grading, landscape etc. plans (Challenger Homes, December 22, 2015). CGS previously reviewed a set of development plans, drainage report and geologic hazard study for this site; comments were provided in a letter dated August 18, 2014.

CTL's report contains a valid description of the site's geology, surface and subsurface conditions, soil and bedrock engineering properties, mine subsidence hazard, and potential development constraints. CGS agrees that the site is suitable for the proposed development, provided CTL's, RMG's, and the following recommendations regarding 1) subsidence, and 2) possible uncontrolled fill are strictly adhered to. Specifically:

Subsidence. CGS agrees with CTL that most of the subsurface, mining-related voids beneath the three proposed apartment buildings appear to have collapsed. Aerial imagery from 1947 through about 1960 indicates significant sinkholes on and near the property. These features become obscured through grading and/or dumping when the area begins to experience development after about 1960, and new sinkholes and other subsidence-related features are not apparent in more recent imagery.

CTL's development recommendations are generally valid. CGS agrees that the planned reinforced concrete mat foundations will be more rigid and resistant to differential movement resulting from subsidence or settlement than a standard shallow spread footing foundation, and that utilities that penetrate foundation walls should be flexible and capable of accommodating strain and differential movement.

Mine maps indicate that a slope entry/haulageway traverses approximately the center third of the site. CTL's boring TH-1, located in the northwest corner of planned Building 1, encountered loss of circulation fluid at 50-68 feet, and a rubble zone from approximately 76 to 108 feet. However, the downhole caliper "showed little deflection throughout the boring, indicating the rubble zone was comparatively tightly packed" (page 9). The slope entry/haulageway is therefore interpreted to be west of the buildings, beneath the parking lot. Neither CTL nor RMG drilled any borings in this portion of the site to characterize the depth and condition of the slope entry/haulageway (a sketch provided by CTL in May 2015 indicates four

RMG borings on this side of the site - TB-5 through TB-8 - but RMG's 7/28/14 geologic hazard report does not include or discuss these borings). Haulageways tended to be larger and more heavily reinforced than typical mine rooms, and significant subsurface voids may remain. The possibility of pavement and building damage resulting from void collapse, strain, and surface deformation cannot be ruled out.

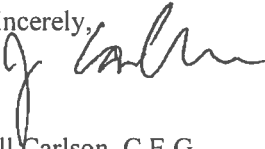
Unless additional investigations are conducted to locate and characterize the depth and condition of the haulageway, RMG's 7/28/2014 recommendation (page 15) that foundations should be designed and reinforced to span minimum unsupported distance of 25 feet under design loads should be adhered to.

Uncontrolled fill. A large northeast-southwest trending drainage or subsidence- or settlement-related scarp is visible on historic aerial imagery in the eastern portion of the site, beneath the planned apartment buildings. The feature appears to have been filled in after 1960, and loose, low density, potentially compressible, debris-laden fill material may be present in this and other areas of the site.

- Fill encountered during grading, foundation and utility excavations and containing organic material, lignite fragments, or debris **MUST** be removed and disposed of offsite.
- Fill determined to be clean and suitable for reuse must be excavated and replaced as a properly compacted structural fill.

Thank you for the opportunity to review and comment on this project. If you have questions, need clarification of issues identified during this review, or require additional review, please call me at (303) 384-2643, or e-mail carlson@mines.edu.

Sincerely,



Jill Carlson, C.E.G.
Engineering Geologist

COLORADO GEOLOGICAL SURVEY

1500 Illinois Street
Golden, Colorado 80401
Phone 303.384.2655



Karen Berry
Acting State Geologist

August 18, 2014

Lonna Thelen
City of Colorado Springs
Planning and Development
P.O. Box 1575
Colorado Springs, CO 80903

Location:
SW ¼ Section 29,
T13S, R66W of the 6th P.M.

Subject: Magnolia Apartments
City of Colorado Springs, El Paso County, CGS Unique Number EP-15-0002

Dear Ms. Thelen:

Colorado Geological Survey has reviewed the above-referenced submittal. The applicant, Rivers Development, proposes a 40-unit apartment complex on 4 lots encompassing 1.34 acres located southwest of the Magnolia Street and Hancock Avenue north of the Templeton Gap Floodway. The site is currently vacant, with a few trees and several piles of debris. The proposed development will include underground parking and common open space.

Included in this referral were: a development referral requesting CGS's review (July 30, 2014), site development plans (7/9/14) by Two Point Consulting, preliminary drainage report (7/11/14) by Ensign Engineering, and geologic hazard study (7/28/14) by RMG Engineers.

The property is undermined at relatively shallow depths by the Danville, Climax No 2, and several unknown mines. Multi-level mining may have occurred in some areas, the mine maps are probably incomplete (based on discrepancies between the mine map dates and known mine closing dates), and there is uncertainty associated with the location, orientation and extent of the mining in the area. Aerial photos dating back to the 1930s show significant subsidence and sinkholes have occurred in the area over time. Recent subsidence calls to the Inactive Mine Program at DRMS in the area indicate that subsidence is still occurring in this area, and may well continue to occur over time.

Unpredictable collapse of mine workings can cause damage to improvements such as structures, pavement, roads and utilities as a result of voids propagating to the surface and causing sinkholes, trough subsidence, surface strain (deformation due to stress), differential movement, etc. Room-and-pillar mines can fail unpredictably, often causing subsidence features to develop many years after the mine was abandoned. The boundary zone between worked-out and unmined areas can be problematic as well.

The development plans indicate a single building of 66,314 square feet will be built, and will include an underground parking garage. The geologic hazard study references four residences with light to moderate foundation loading. This is a discrepancy that could greatly impact foundation design

recommendations and needs clarification and specific analysis pertaining to the actual design proposed, particularly if underground development is occurring as that will reduce overburden over the mine workings. The RMG borings indicate that 12-15 foot open voids were present 62-75 feet below ground surface in two of the four borings drilled on site.

Additional investigations (including, at a minimum, drilling and downhole geophysical and caliper logging) and analysis are needed to characterize the depth, extent and condition of mine workings beneath the proposed development, and to determine whether the proposed structures are exposed to a subsidence hazard. Mitigation recommendations for the specific grading, structures, paved areas, utilities, and the water quality pond should be included.

In addition to the subsidence potential at this site, the area is known to have expansive soil and bedrock, which will also require mitigative design.

If you have any questions or concerns regarding this review, please email me at tc.wait@state.co.us.

Sincerely,

TC Wait

TC Wait
Engineering Geologist

Cc: Jill Carlson, CGS
File