Job No. 163892

June 19, 2018

Reserve at North Creek, LLC
8605 Explorer Dr.
Suite 250
Colorado Springs, CO 80920

Re: Open Excavation Observation
11315 and 11311 Rill Point
Lots 77 and 78, Reserve at North Creek
Colorado Springs, Colorado

Dear Reserve at North Creek, LLC:

RMG – Rocky Mountain Group has observed the foundation excavation at the above referenced address on June 13, 2018. Our findings, conclusions and recommendations are provided in this report. RMG should be made aware of subsequent changes to the excavation.

Subsurface Soil Investigation: A Subsurface Soil Investigation was performed which included the referenced site. Results can be seen in the report by CTL Thompson, Inc., last dated May 3, 2016, Job No. CS18557-120. The homeowners should carefully familiarize themselves with the information in the report that may affect residential construction. Additionally, the homeowners should carefully familiarize themselves with the information contained in the attached Appendix A.

Subsurface Materials: 0' – 4': Fill: Silty sand.
4' – 9': Silty sand.

Expansion Potential: Low.

Moisture Conditions: Moist.

Maximum Allowable Bearing Pressure: 3,000 psf.

Minimum Dead Load Pressure: None.

Equivalent Fluid Pressure (EFP): 50 pcf. See **Lateral Earth Pressures** section.

Fill:

Overlot grading fill was exposed in the excavation. We understand this fill was observed and tested during placement by others. The excavation penetrated the fill.

Foundation Recommendations:

The foundation should conform to the master foundation plan for Challenger Homes model 1265 provided by RMG, Job No. 158465, last dated September 27, 2017.

Subsurface Drainage Recommendations:

A subsurface perimeter drain is recommended around portions of the structure which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable. A typical drain detail is presented in the Appendix A (attached and included herein).

Open Hole Observation:

The recommendations provided in this report are based on the conditions exposed in the excavation at the time of our observation and information contained in the Subsurface Soil Investigation referenced above. These recommendations are based on accepted local engineering practice and are intended for individuals familiar with local construction practices and standards. If exposure to the elements results in a change to these conditions at any point prior to foundation construction and/or backfilling the foundation, we recommend that RMG be contacted to re-evaluate the excavation to determine suitability of the recommendations contained herein.

All previous recommendations included in the Subsurface Soil Investigation referenced above and not specifically addressed herein remain valid.

Should you have questions, please do not hesitate to call.

Cordially,

RMG – Rocky Mountain Group

Tony Munger, P.E.
Geotechnical Project Manager

Appendix A – Supplementary Information

Floor Slabs:

Vertical slab movement of one to three inches is considered possible for soils/bedrock of low to moderate expansion potential and for structural fill after recommended removal (overexcavation) of expansive soils/bedrock. In unusual cases, vertical movement may exceed this range. If movement and associated damage to floors and finish cannot be tolerated, a structural floor system should be used.

Floor slabs should be separated from structural components to allow for vertical movement. Slab construction, including placement of expansion and construction joints, should be completed in accordance with the latest guidelines and standards published by the American Concrete Institute (ACI) and applicable local Building Code requirements.

Recommendations for exterior concrete slabs, such as patios, driveways, and sidewalks, are not included in this report.

Interior Partitions:

Interior non-bearing partitions and attached furnishings (e.g., cabinets, shower stalls, etc.) on concrete slabs should be constructed with a void so that they do not transmit floor slab movement to the roof or overlying floor. A void of at least 1-1/2 inches is recommended beneath non-bearing partitions. The void may require reconstruction over the life of the structure to re-establish the void due to vertical slab movement.

Lateral Earth Pressures:

Foundation and basement walls should be designed to resist lateral pressures. The Equivalent Fluid Pressure (EFP) previously presented applies to on-site backfill materials and level, drained backfill conditions. EFPs for sloping/undrained conditions should be determined on an individual basis. Expansive soils or bedrock should not be used as backfill against foundation and basement walls.

Surface Grading and Drainage:

The ground surface should be sloped away from the building with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum of 5 feet from the foundation and sloped parallel with the wall at a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas. Homeowners should maintain the surface grading and drainage recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements, and irrigated grass should not be located within 5 feet of the foundation.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

Subsurface Drainage Recommendations:

Subsurface drainage recommendations made in the attached Open Excavation Observation report shall be installed per the typical drain details included in this Appendix.

It must be understood that a subsurface drains are designed to intercept some types of subsurface moisture and not others. Therefore, the drains could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

Concrete:

Type I/II cement is recommended for concrete in contact with the subsurface materials. Calcium chloride should be used with caution for soils with high sulfate contents. The concrete should not be placed on frozen ground. If placed during periods of cold temperatures, the concrete should be kept from freezing. This may require covering the concrete with insulated blankets and heating. Concrete work should be completed in accordance with the latest applicable guidelines and standards published by ACI.

Exterior Backfill:

Backfill should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to facilitate compaction (usually within 2 percent of the optimum moisture content) and compacted to 85 percent of the maximum dry density as determined by the Modified Proctor test, ASTM D-1557 on exterior sides of walls in landscaped areas. In areas where backfill supports pavement and/or concrete flatwork, the materials should be compacted to 92 percent of the maximum dry density.

Fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

The appropriate government/utility specifications should be used for fill placed in utility trenches. If material is imported for backfill, the material should be approved by the Geotechnical Engineer prior to hauling it to the site.

The backfill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement. Backfill should be compacted by mechanical means, and foundation walls should be braced during backfilling and compaction.

Structural Fill:

Areas to receive structural fill should have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils should be scarified and moisture conditioned to within 2 percent of the optimum moisture content and compacted to a minimum of 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698) or to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557), prior to placing structural fill.

Structural fill placed on slopes should be benched into the slope. Maximum bench heights should not exceed 4 feet, and bench widths should be wide enough to accommodate compaction equipment.

Structural fill should be placed in loose lifts not exceeding 8 to 12 inches, moisture conditioned to within 2 percent of the optimum moisture content and compacted to a minimum of 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557). The materials should be compacted by mechanical means.

Materials used for structural fill should be approved by RMG prior to use. Structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

To verify the condition of the compacted soils, density tests should be performed during placement. The first density tests should be conducted when 24 inches of fill have been placed.

Foundation Configuration Remarks:

The configuration of the foundation system is critical to its performance. The position of foundation windows, jogs, steps and the relative elevation of adjacent and opposite walls can affect foundation performance. The nature of residential foundation construction does not allow for control of these conditions by the Foundation Design Engineer. Improper placement of the above can result in differential and lateral foundation movement not anticipated by the Geotechnical Engineer. The Foundation Design Engineer should be contacted regarding the foundation configuration.

General Remarks:

The recommendations provided in this report are based upon the observed soil conditions, anticipated foundation loads, and accepted engineering procedures. The recommendations are intended to reduce differential movement. *It must be recognized that the foundations will undergo some movement on all soil types*. In addition, concrete floor slabs will likely move vertically, therefore, the recommendations regarding isolation of floor slabs from columns, walls, partitions or other structural components should be implemented to reduce potential damage to the superstructure. Subsequent owners should be apprised of the soil conditions and advised to maintain good practice in the future with regard to surface and subsurface drainage, partition framing, drywall and finish work above floor slabs.

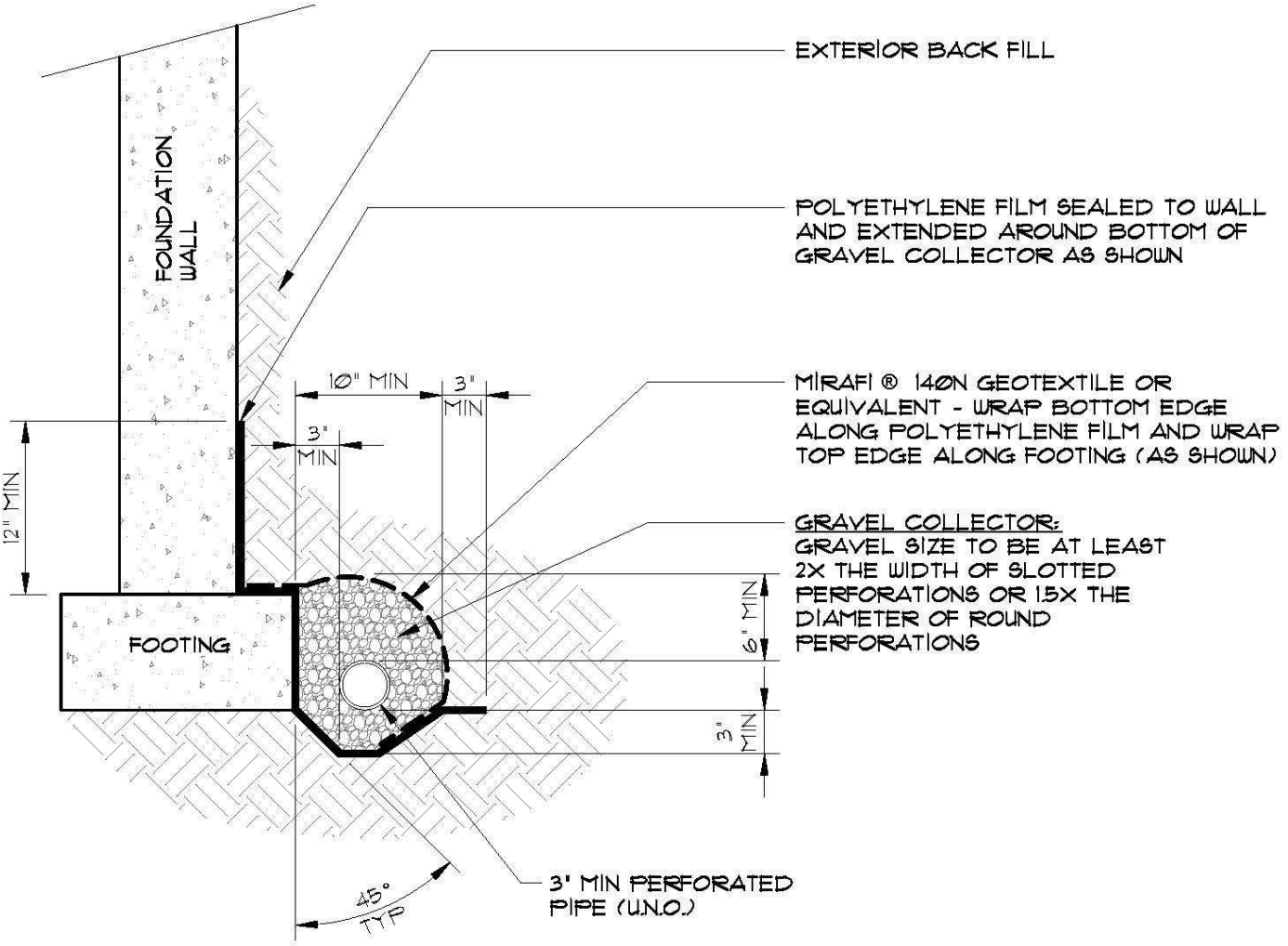
Senate Bill 13:

This report may be partial fulfillment of Colorado Senate Bill 13 (1984), C.R.S. 6-6.5-101, if the purchaser receives this report at least fourteen days prior to closing. The purchaser is strongly urged to read this section of this report on Senate Bill 13 with care and consideration.

One of the purposes of Senate Bill 13 is to inform the purchaser of the presence of expansive soil or hazards on the site. Geologic and environmental hazards are outside the scope of services of this report. If the Expansion Potential paragraph on page one or two reports low to moderate, moderate or high, then expansive soil is present on the site. Expansive soil and bedrock will result in movement of foundation components and floor slabs. The effect of swelling soils is reduced but not eliminated by the recommendations contained in this report.

The homeowner and builder should review and become familiar with Special Publication 43 issued by the Colorado Geologic Survey.

This soil report and recommendations contained herein are only valid if all parts of Senate Bill 13 are satisfied.



GENERAL NOTES:

1. BOTTOM OF DRAIN PIPE SHALL BE AT OR BELOW BOTTOM OF FOOTING AT ALL LOCATIONS
2. ALL DRAIN PIPE SHALL BE PERFORATED PLASTIC, WITH THE EXCEPTION OF THE DISCHARGE PORTION WHICH SHALL BE SOLID, NON-PERFORATED PIPE.
3. MINIMUM GRADE FOR DRAIN PIPE SHALL BE 1%, OR 3 INCHES OF FALL IN 25 FEET.
4. DRAIN PIPE SHALL BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. IF A GRAVITY OUTFALL CANNOT BE ACHIEVED, THEN A SUMP PIT AND PUMP SHALL BE USED.
5. ALL DRAIN COMPONENTS SHALL BE RATED/APPROVED BY THE MANUFACTURER FOR THE INSTALLED DEPTH AND APPLICATION
6. DRAIN SYSTEM, INCLUDING THE OUTFALL OF THE DRAIN, SHALL BE OBSERVED BY QUALIFIED PERSONNEL PRIOR TO BACKFILLING TO VERIFY INSTALLATION.

ARCHITECTS RMG ENGINEERS
ROCKY MOUNTAIN GROUP

Southern Office
Colorado Springs,CO 80918
(719) 548-0600
Central Office:
Englewood, CO 80112
(303) 688-9475
Northern Office:
Greeley / Evans, CO 80620
(970) 330-1071

PERIMETER DRAIN

Job No. 163892

June 21, 2018

Reserve at North Creek, LLC
8605 Explorer Dr.
Suite 250
Colorado Springs, CO 80920

Re: Footing and Reinforcing Observations
11315 and 11311 Rill Point
Lots 77 and 78, Reserve at North Creek
Colorado Springs, Colorado

Dear Reserve at North Creek, LLC:

At your request, RMG – Rocky Mountain Group has observed the placement of the footing forms, the reinforcing for the foundation walls, and the concrete encased electrode at the address referenced above on June 15 and 20, 2018.

The footing forms and the reinforcing were found to be placed in general compliance with the foundation design by RMG last dated September 27, 2017, Job No. 158465. The concrete encased electrode was placed according to Section 250.50 of the 2005 National Electrical Code.

Note, these observations did not include verification of anchor bolts (size, spacing, or embedment depth) or tie-downs. It is our understanding that these components are to be observed by others.

Should you have questions, please do not hesitate to call.

Cordially,

RMG – Rocky Mountain Group

Tony Munger, P.E.
Geotechnical Project Manager