

Job No. 193810

June 26, 2023

Vanguard Homes  
7025 Tall Oak Drive, Ste 210  
Colorado Springs, CO 80919

Re: Open Excavation Observation  
11705 Justify Dr  
Lot 9, The Farm, Filing No. 7  
Colorado Springs, Colorado

Dear Vanguard Homes:

RMG – Rocky Mountain Group has observed the foundation excavation at the above referenced address on June 21, 2023. The purpose of our observation was to confirm that the exposed materials encountered are generally consistent with those found in the referenced Subsurface Soil Investigation report and to verify the applicable parameters pertinent to this site presented therein. Our findings, conclusions and requirements are provided in this report. RMG must be notified in writing of any subsequent changes to the excavation. If RMG is not notified of any subsequent changes, the findings, conclusions and requirements contained herein cannot be relied upon to any extent.

**Subsurface Soil Investigation:** A Subsurface Soil Investigation (SSI) which included the above-referenced site was performed by RMG last dated October 1, 2021, Job No. 183235. The results of that investigation were considered in the preparation of this report. The homeowners should carefully familiarize themselves with the information contained in the attached Appendix A.

**Subsurface Materials:** 0' – 12': Fill: Clayey sand and sandy clay (Northern portion of the excavation).  
0' – 3': Clayey to silty sand and sandy clay (Southern portion of the excavation).  
3' – 11': Silty sand (Southern portion of the excavation).

**Expansion Potential:** Low.

**Moisture Conditions:** Moist.

**Maximum Allowable Bearing Pressure:** See **Special Considerations** section.

**Minimum Dead Load Pressure:** None.

**Equivalent Fluid Pressures (EFP):**

Active EFP = 40 pcf.

At Rest EFP = 60 pcf.

Passive EFP = 300 pcf.

These EFP's are applicable for granular, non-expansive backfill materials. Expansive soils or bedrock shall not be used as backfill against foundation and basement walls. See the **Lateral Earth Pressures** section in Appendix A.

**Fill:**

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

**Special Considerations:**

The clay materials in the basement portion of the excavation were considered expansive. We recommended that this expansive material, where encountered within 3 feet of the bottom of foundation components, be removed and replaced with a structural fill. The zone of overexcavation is to extend horizontally a minimum of 3 feet beyond the edge of the foundation components, including beyond the perimeter of counterfort and "T" wall footings.

Based upon the recommendations provided at the time of the excavation observation, the unsuitable materials in the basement portion of the excavation were reportedly overexcavated to a depth of approximately 2 feet below basement foundation grade, at which point suitable materials were encountered. Subsequent to our next observation, the removed materials were replaced with structural fill. Field density tests performed on June 22, 2023 indicated that the structural fill was selected, placed, and compacted as recommended in the **Structural Fill** section of this report. Results of the field density tests are attached.

The field density tests were conducted on a periodic, "on-call" basis, meaning that a limited portion of the fill operation was observed and tested by RMG. The test results may not be representative of all fill placed.

We have relied on the contractor to apply the necessary compactive effort and moisture to achieve recommended compaction during the time our observer was not present and at locations other than those tested. We have also relied on the contractor to establish the proper foundation bearing elevation and to verify that the overexcavation extends to at least the minimum depths and widths recommended herein. In all cases, contractors shall retain the responsibility for excavating to the appropriate line and grade, for the quality of their work, for adhering to plans and specifications and for repairing defects regardless of when they are discovered.

A maximum allowable bearing pressure of 2,000 psf may be used for design of shallow foundations supported on structural fill. Shallow foundations should be designed to span a minimum of 10 feet and should extend a minimum of 30 inches below finished grade for frost protection.

### **Foundation Recommendations:**

The foundation should conform to a site-specific foundation plan provided for the address referenced above (by others).

Note, the site-specific foundation plan has not been provided to RMG at this time. As such, RMG has not performed a verification of the adequacy of the referenced foundation design to support the anticipated loads or to resist the anticipated pressures. Nor have we reviewed the foundation plan to verify that it has been designed for the allowable soil bearing capacity, minimum dead load, and/or lateral earth pressures presented herein. It is the responsibility of the foundation engineer of record to verify that the foundation design is in compliance with the recommendations presented herein.

### **Foundation Drain(s):**

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

### **General Drain Notes:**

With respect to the foregoing drain requirements, the Builder/Developer for the Project shall notify RMG in writing of any inconsistencies or deviations in the construction of the drain based on the typical detail provided and shall notify RMG in writing of any field conditions that impact the constructability of the drain as detailed prior to completion of the drain installation. Builder/Developer is responsible for any and all claims arising from its failure to so notify RMG or for Builder/Developer's failure to construct the drain as detailed.

It must be understood that the required drains are each 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.

### **Open Hole Observation:**

The requirements provided in this report are based on the conditions exposed in the excavation at the time of our observation and the information contained in the Subsurface Soil Investigation referenced above. These requirements are based on accepted local engineering practice and are intended for individuals familiar with local construction practices and standards. If the conditions present during our observations change at any point prior to foundation construction and/or backfilling the foundation, such as from inclement weather or if the excavation is disturbed, RMG must be contacted to re-evaluate the excavation to determine the suitability of the requirements contained herein. If RMG is not contacted, the requirements previously made cannot be relied upon to any extent.

The Builder/Developer understands that the requirements contained in the Subsurface Soil Investigation are material to the reasonably anticipated performance of the foundation system the Builder/Developer elects to install at this Project. The Builder/Developer fully accepts the risk of

potential movement of the foundation system and/or floor slabs as outlined in this report and the Subsurface Soil Investigation, as each foundation alternative comes with varying risks of future movement and performance, in comparison to the related costs of construction. The decision regarding which foundation system alternative to install at the residence is entirely the decision of the Builder/Developer, and not RMG.

The Builder/Developer further understands that its (or its subcontractors') failure to strictly adhere to the requirements contained in this report, the referenced Subsurface Soil Investigation, and the foundation design if provided by RMG, constitute material deviations from RMG's requirements and design, for which RMG is not responsible.

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

Attached is **Appendix A – Supplementary Information**, which is made a part of this Report, and must be reviewed by the addressee or any recipient of this report. This Appendix must be included when this report is provided to any other parties, including the Builder/Developer, Developer, and Purchaser, as applicable and described in the Appendix.

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

Cordially,

RMG – Rocky Mountain Group

Brian Griffith, P.E.  
Geotechnical Project Engineer



# FIELD DENSITY REPORT



**Client:** Vanguard Homes  
7025 Tall Oak Drive, Ste 210  
Colorado Springs, CO 80919

**Job No.:** 193810  
**Project:** 11705 Justify Dr  
Lot 9, The Farm, Filing No. 7  
Colorado Springs, Colorado

Moisture-Density Test Information		Laboratory Test Data			Project Specifications	
Sample No.	Classification and Description	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)	Water Content Range (%)	
1	SC	ASTM D-1557	129.8	7.1	NA	NA

## Field Test Results

Date(s) Tested: June 22, 2023		Test Type <sup>(1)</sup>	Test Depth (ft)	Elevation Datum <sup>(2)</sup>	Dry Density (pcf)	Water Content (%)	Moisture Density Sample No.	Percent Compaction (%)	Minimum Percent Compaction (%)	Test Pass
Technician(s): Edward Skelton										
Test No.	Location									
1	10' W & 8' N of SE corner of excavation	ST	0	E	122.9	8.4	1	95	92	Y
2	6' E & 10' N of SW corner of excavation	ST	0	E	121.8	8.9	1	94	92	Y

### <sup>(1)</sup> Test Type Key

UT – Utility Trench Backfill  
EB – Exterior Backfill  
IB – Interior Backfill  
ST – Structural Fill  
SG – Subgrade

### <sup>(2)</sup> Elevation Datum Key

A – Existing Ground Surface  
B – Top Back of Curb  
C – Pavement/Slab Elevation  
D – Top of Pipe  
E – Foundation/Footing Grade  
F – Finished Grade Surface



Brian Griffith, P.E.

These tests were conducted on a periodic, “on-call” basis, meaning that a limited portion of the fill operation was observed and tested by RMG. The test results may not be representative of all fill placed. In all cases, contractors shall retain the responsibility for the quality of their work, for adhering to plans and specifications, and for repairing defects regardless of when they are discovered.

## Appendix A – Supplementary Information

### Floor Slabs:

Up to three inches of vertical slab movement, differential or total, is probable for soils/bedrock of low-to-moderate expansion potential and for structural fill after required removal (overexcavation) of expansive soils/bedrock. In some cases, or if all the requirements provided herein have not been strictly complied with, heave and/or settlement vertical movement will exceed this probable slab movement. The Builder/Developer and Purchaser must understand that with the prevalence of installing interior finishes in the basement slab-on-grade and other interior areas, this probable slab movement must be considered in their decision to use an interior slab-on-grade. If movement and associated damage to floors and finishes cannot be tolerated, a structural floor system must be installed.

Floor slabs shall be separated from structural, framing, drywall and finish 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.

Interior backfill below slabs shall consist of granular, nil to low expansive material compacted to a minimum 92 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557).

Recommendations for exterior concrete slabs, such as patios, driveways, and sidewalks, are not included in this report. RMG has no responsibility for the performance of these elements.

### Interior Partitions/Finishes:

Interior non-bearing partitions, trim work, finish materials and all attached furnishings (e.g., cabinets, shower stalls, etc.) on or over concrete slabs-on-grade shall be constructed with a void, or appropriate slip joint, so that they do not transmit the probable slab-on-grade movement noted above to the roof, overlying floor or other elements of the structure. Failure to strictly comply with this requirement is a material deviation from RMG's design and construction requirements and may result in distress to structural and non-structural finish elements, including but not limited to cracked drywall and flooring, nail pops, cracked tile, jammed windows and doors, cracked window glass, etc. Typical construction practice is to install a void of not less than 1-1/2 inches beneath non-bearing partitions. The void may require reconstruction over the life of the structure to re-establish the void as the vertical slab movement may exceed the height of the initial void provided. Builder/Developer separately shall notify the owner of these conditions and requirements.

### Lateral Earth Pressures:

Foundation and basement walls should be designed to resist lateral pressures. The equivalent fluid pressures previously presented apply to specific backfill materials, as described in the **Equivalent Fluid Pressures (EFP)** section, and level, drained backfill conditions. It is the responsibility of the design engineer to determine whether walls should be designed with "restrained" or "unrestrained" conditions and to select the corresponding EFP for use in their design. EFPs for sloping/undrained conditions should be determined on an individual basis. Materials other than those identified above should not be used as backfill against foundation and basement walls.

## **Surface Grading and Drainage:**

The ground surface must 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, a well-defined swale shall 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 must be non-perforated and extend beyond all backfill zones and discharge to a location that is graded to direct water off-site. Hard landscape features must incorporate components that will allow for unimpeded migration of surface and subsurface water away from the structure. Because the performance of the Foundation System is dependent on the surface drainage conditions, the Builder/Developer and/or Purchaser should obtain a post-construction surface drainage survey to confirm compliance with these drainage requirements.

Landscape vegetation shall be selected to reduce irrigation requirements. Plants installed close to foundation walls shall be limited to those with low moisture requirements, and irrigated grass cannot be located within 5 feet of the foundation. Irrigation devices cannot be placed within 5 feet of the foundation. Irrigation shall be limited to the amount sufficient to maintain vegetation. Application of more water will increase the probability of slab and foundation movements.

The recommendations listed in this report are intended to address normal surface drainage conditions, assuming the presence of groundcover (established vegetation, paved surfaces, and/or structures) in the areas upslope from this structure. However, groundcover may not be present due to a variety of factors (ongoing construction/development, wildfires, etc.). During periods when groundcover is not present in the “upslope” areas, higher than normal surface drainage conditions may occur, resulting in perched water tables, excess runoff, flash floods, etc. In these cases, the surface drainage requirements presented herein (even if properly maintained) may not mitigate all groundwater problems or moisture intrusion into the structure. Builder/Developer also accepts the risk that existing surface drainage at the project and adjacent lots may change post-construction due to changes in surrounding surface drainage conditions, civil infrastructure construction or modifications, irrigation and surface run-off, or buried drainage conditions that were not identified in RMG’s Subsurface Soil Investigation or Open Excavation Observations. RMG is not responsible for these unknown and unforeseeable conditions. We recommend that the site drainage plan (by others) be prepared with consideration of increased runoff during periods when groundcover is not present on the upslope areas or the anticipated post-construction modifications are not complete.

## **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 is understood that subsurface drains are designed to intercept some types of subsurface moisture and not others. Therefore, the drains can operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area. The recommendations provided are based on moisture conditions encountered during the referenced investigations for this site. Fluctuations in groundwater and subsurface moisture conditions may occur due to subsequent circumstances not anticipated, such as variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels, for which RMG is not responsible and cannot reasonably anticipate.

**Concrete:**

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

**Exterior Backfill:**

Backfill shall be placed and compacted in a manner to reduce settlement. In addition, compaction methods utilized shall avoid creating excessive dynamic loads against foundation walls which can result in damage. Placing backfill in loose lifts not exceeding 8 inches, moisture-conditioned to facilitate compaction (usually within  $\pm 2$  percent of the optimum moisture content) and compacted to 90 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698), or 85 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D-1557), at a minimum, should provide adequate density to reduce settlement. This specification is not intended to address the performance of any exterior structure, flatwork, etc. which may be placed over exterior backfill. Contact RMG for specifications for elements placed on backfill which may be sensitive to movement. Reference the Equivalent Fluid Pressure section above for the appropriate backfill material to be used behind foundation walls. RMG has no liability for settling or swelling of backfill material unless there has been documented compaction testing, performed during placement, demonstrating compliance with all of the recommendations provided herein. The Builder/Developer and/or excavator accept all responsibility for the adequate placement, moisture-conditioning, and compaction of all exterior backfill. To the extent RMG performs compaction or moisture testing at the Project, the Builder/Developer understands that such results are limited to only those areas tested as requested by Builder/Developer and are not representative of overall compaction or moisture content at the site. The Builder/Developer and its excavator remain responsible for achieving the required compaction and moisture-conditioning of all backfill soils.

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

The appropriate government/utility specifications shall be used for fill placed in utility trenches. To the extent those specifications are more strict than the backfill requirements provided herein, such specifications shall control and be complied with by the Builder/Developer. If material is imported for backfill, the material should be approved by the Geotechnical Engineer prior to delivery to the site.

The backfill shall not be placed on frozen subgrade or allowed to freeze during moisture-conditioning and placement. Backfill must be compacted by mechanical means, and foundation walls shall be braced during backfilling and compaction. Prior to placing backfill, it is the contractor's responsibility to remove all frozen soil from below areas to be backfilled. It is also the contractor's responsibility to ensure that the backfill materials are not allowed to freeze, prior to or during placement.

**Structural Fill:**

Areas to receive structural fill must have topsoil, organic material, or debris removed. The upper 6 inches of the exposed surface soils must be scarified and moisture-conditioned to facilitate



compaction (usually within 2 percent of the optimum moisture content) and compacted to the specifications as noted below, prior to placing structural fill.

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

Structural fill must be placed in loose lifts not exceeding 12 inches and compacted to the specifications as noted below. The materials must be compacted by mechanical means.

Materials used for structural fill must be approved by RMG prior to use. Structural fill shall be moisture-conditioned to facilitate compaction (usually 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), or 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). Structural fill cannot 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. Density tests should be conducted at intervals not to exceed 24 inches of fill. RMG is not liable for any settling or swelling of structural fill material unless there has been strict compliance with all recommendations provided herein. RMG does not direct, supervise or manage the fill placement operations. The Builder/Developer and/or excavator accept all responsibility for the adequate placement, moisture-conditioning, and compaction of all structural fill.

#### **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 shall be contacted regarding the foundation configuration.

#### **Reliance on Previous Investigations:**

RMG has relied on previous investigations performed by qualified professionals which pertain to this project, as referenced above. RMG has considered the findings, conclusions and recommendations in those investigations and, unless indicated otherwise, has accepted them as an accurate characterization and representation of subsurface conditions. Builder/Developer affirms that it has provided such previous investigation material to RMG for its use and reliance and that RMG is entitled to rely on the accuracy of such previous investigations. By usage of this report, Builder/Developer further represents to RMG that all recommendations provided in the referenced reports, and that were to have been performed prior to our investigation, have been completed in general compliance with the recommendations. The originating entity of these previous investigations retains all responsibility and liability for their findings, conclusions and recommendations.

#### **General Remarks:**

The requirements provided in this report are based upon the observed soil conditions, anticipated foundation loads, and accepted engineering procedures. The requirements are intended to reduce differential movement. *It must be recognized that the foundation will experience some movement*

*on all soil types* (See Foundation Performance Expectations section below). In addition, concrete floor slabs-on-grade will move. Therefore, the requirements regarding isolation of floor slabs from columns, walls, trim work, partitions or other structural components shall be complied with to reduce potential damage to the superstructure.

If an overexcavation and replacement system has been recommended, it is the opinion of RMG that this system meets the standard of care for the area in which it is being installed. In addition to other factors, this system has been successfully utilized extensively throughout the area by qualified engineers when all the recommendations provided herein have been implemented. All recipients of this report, including the Builder/Developer, Developer and Purchaser, have the opportunity to obtain a third-party opinion of whether this system meets the standard of care prior to implementing these recommendations or purchasing the structure placed on this system.

Note, subsequent to our observation(s) of the excavation and placement of the foundation, it is common practice for trench excavations for utility services, plumbing, and drain discharge pipes to be extended below (or within the "influence zone" of) foundation components. Unless noted otherwise in a follow-up report, personnel of RMG were not requested to observe or test the backfill placed in these trench excavations. If the soil used to backfill these trench excavations was not selected, placed, and compacted as recommended in the **Structural Fill** section of this report, additional foundation movement is expected to occur. RMG is not liable for any settling or swelling of the structural fill material unless there has been strict compliance with all recommendations provided herein. RMG does not direct, supervise or manage the fill placement operations. The Builder/Developer and/or excavator accept all responsibility for the adequate placement, moisture-conditioning, and compaction of all structural fill placed below foundations.

### **Senate Bill 13:**

This report is intended to serve as partial fulfillment of Colorado Senate Bill 13 (1984), C.R.S. 6-6.5-101, which requires every Builder/Developer or developer to provide the purchaser with a copy of this report, which serves as “a summary report of the analysis and the site recommendations”, 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 soils or hazards on the site. Geologic and environmental hazards are outside the scope of services of this report. If the **Expansion Potential** section reports “low-to-moderate,” “moderate,” or “high,” expansive soil or bedrock is present on the site. Expansive soil and bedrock will result in movement of foundation components and floor slabs regardless of compliance with all engineering requirements during construction. The effect of swelling soils can be reduced, but not eliminated, by complying with the requirements in this report. This soil report and requirements contained herein are only valid if all parts of Senate Bill 13 are satisfied.

### **Foundation System:**

This report provides pertinent geotechnical requirements for the Foundation System. All the requirements provided in this report are considered to be part of, and integral to, the entire Foundation System. In addition to the specifications provided directly on the Foundation Plans prepared for this site, all the requirements provided herein must be fully complied with and implemented for the foundation system to function as intended. If any requirement is not complied with or implemented, or is altered in the future, the performance expectations described below are no longer valid and the Builder/Developer, Developer, Purchaser, or the party responsible for the deviation accepts responsibility for any performance issues. If any of these requirements cannot

be fully implemented or maintained, then alternative Foundation Systems should be considered by the Builder/Developer, Developer, and/or Purchaser.

### **Builder/Developer Responsibilities:**

This report is based on the understanding that the Builder/Developer will serve as the director, supervisor and manager of all the entities involved with implementing every aspect of these requirements. RMG has not been hired to direct, supervise or manage the implementation of these recommendations. As such, the Builder/Developer must read this report in its entirety and understand all of its requirements to appropriately manage and implement the requirements of this report and all the previous reports referenced herein. If the Builder/Developer does not understand any aspect of these requirements, it must contact RMG in writing for clarification. The Builder/Developer must provide this report to all entities involved in implementing these requirements. Due to the critical importance of the appropriate management and implementation of these requirements, if the Builder/Developer does not intend to serve as the director, supervisor and manager, all aspects of this report are considered null and void and shall not be used in or relied on in any manner in the construction of the project.

As noted, this report must also be provided to the Purchaser. The Builder/Developer is aware and accepts that there are alternative Foundation Systems available which can also address the soil issues encountered at this site (if they are not aware, they must contact RMG for discussion prior to proceeding). The Builder/Developer has selected this Foundation System, and RMG was retained to provide the appropriate requirements for the system selected. By proceeding, the Builder/Developer is acknowledging its selection of this system based on its own judgment and decisions, which may include budgetary costs, risk tolerance and acceptable damage or maintenance obligations for the project. RMG is not responsible for the Builder/Developer's decision to proceed with a foundation system that carries more risk associated with foundation movement.

### **Foundation Performance Expectations:**

The investigation performed on this site is intended to provide requirements for a foundation system to meet performance expectations considered as acceptable within the residential industry.

These expectations include typical construction-based tolerances for levelness and plumbness, and possible movements of a structure during construction. Due to these tolerances, *the Builder/Developer and/or Purchaser should obtain a post-construction as-built elevation survey of the structure*. This survey will provide a baseline for use in measuring future movement. These typical performance expectations assume that all recommendations in this report, which are integral to the FOUNDATION SYSTEM as previously noted, have been fully implemented. Other construction requirements, for which RMG is not responsible, shall also be obtained and complied with by the Builder/Developer through adherence to the plans, specifications, and industry standards that apply to the work of the Builder/Developer and its separate consultants and subcontractors. If these requirements are not followed completely or are altered in the future, then movements in excess of the typical Performance Expectations will probably occur. In such cases, any resulting damage is not RMG's responsibility. Receipt of this document by the Builder/Developer or Purchaser represents the acceptance of this condition.

If the Builder/Developer or Purchaser encounters, or is made aware of, possible Foundation System performance issues, or if any other aspects of the requirements do not appear to be in compliance with the specifications listed, they shall contact RMG directly, in writing, for review. RMG must be provided the opportunity to address such issues immediately to assess the condition

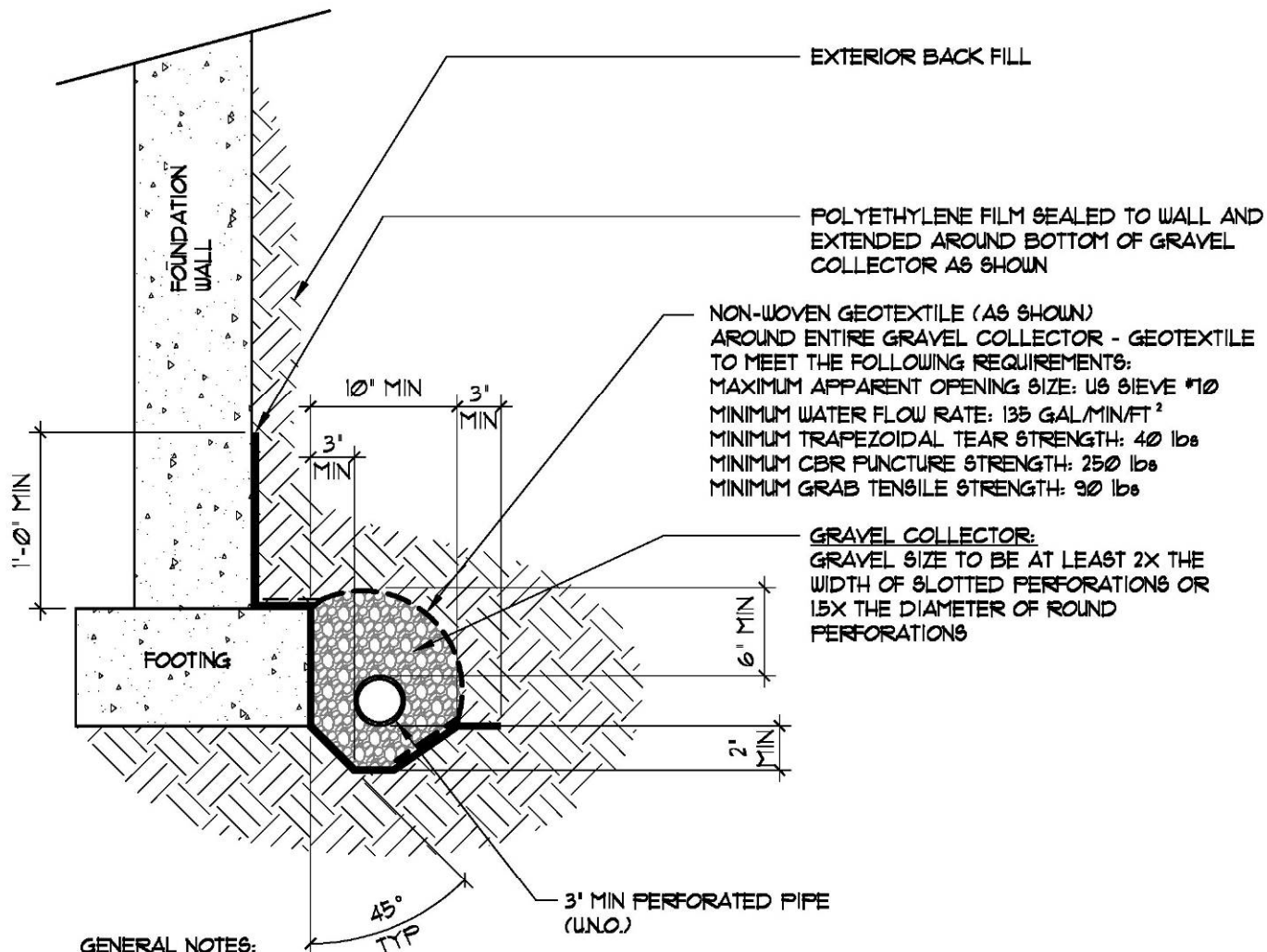
and provide recommendations, as applicable, before the condition becomes worse. RMG is not liable for any additional damage that occurs after the Builder/Developer or Purchaser becomes aware of the issues described if RMG is not provided timely and adequate written notification.

### **Maintenance Requirements by the Purchaser:**

To the Purchaser: you must read this report, especially this section regarding expectations of your foundation and YOUR responsibility to maintain specific aspects of the system. These maintenance items include, but are not limited to:

1. Maintaining proper surface and subsurface drainage around your home, as specified in this report. This responsibility requires you to provide this report to any Subcontractor/Builder/Developer you use who may modify the grading or drainage on the site.
2. Maintaining the recommendations provided in the Floor Slabs and Interior Partitions sections when implementing any future remodeling on a slab-on-grade, including, but not limited to, finishing the basement. This requires you to provide this report to any Subcontractor/Builder/Developer you use for remodeling.
3. Periodically verifying that any sump pump systems are operational and all drainpipe outlets are free and clear of debris and discharge as specified above.

If you do not understand any aspects of this section, you must contact the Builder/Developer or RMG in writing for clarification. The requirements listed above, and all the requirements provided in this report, are critical to the performance of your Foundation System and the structure it supports. Feel free to contact RMG if you have any concerns with the performance of your foundation system in the future. The purchaser should review and become familiar with Special Publication 43 issued by the Colorado Geologic Survey regarding swelling (expansive) soils.



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. DRAIN PIPE SHALL HAVE POSITIVE FALL THROUGHOUT.
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. THE OUTFALL SHOULD EXTEND PAST BACKFILL ZONES AND DISCHARGE TO A LOCATION THAT IS GRADED TO DIRECT WATER OFF-SITE.
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.
7. A VERTICAL SEGMENT OF PERFORATED DRAIN PIPE, CAPPED AT THE TOP, SHALL EXTEND TO FINISH GRADE WITHIN ALL WINDOW WELLS.



ROCKY MOUNTAIN GROUP

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PERIMETER DRAIN