



**Foundation Recommendations and Design Parameters –**

The test borings indicate the proposed Retail # 1 and Retail # 2 Buildings may be founded on a shallow foundation consisting of individual column and continuous wall footings bearing on controlled fill, colluvium or residuum. An allowable bearing value not to exceed 2,500 PSF should be utilized for design.

All continuous wall footings should be at least two (2) feet wide and reinforced with one (1) No. 5 bar for each eight (8) inches of footing depth.

The materials exposed in all footing excavations should be examined by a soils engineer or engineering geologist, prior to pouring concrete, to assure the adequacy of the founding materials.

The Rome Formation contains some beds of carbonate bedrock. Consequently, there is some potential for the development of sinkholes. All site and roof drainage should be rapidly conveyed away from the building areas in a closed (pipe) system. During construction, surface drainage should not be allowed to accumulate or pond anywhere on-site, particularly in any excavation.

If the existing founding materials will vary significantly, consisting of alternating beds of harder shale, limestone or dolomite bedrock; highly weathered to decomposed shale; firm residual soil; and some very soft mud seams. The exposed materials are expected to be highly variable in the north-south direction (across strike) and more uniform in the east-west direction (along strike). Where the mud seams or soft soils are too wide to span, some undercutting and backfilling will be required to achieve adequate founding materials. Due to the variable site conditions, it is very difficult to estimate these quantities.

Provided the man-made fill is properly compacted, the differential settlement for masonry wall footings will not exceed 0.5 inch in forty (40) feet. Differential settlement between adjacent columns shall not exceed 0.75 inch, and total settlement will not exceed 1 inch.

A subgrade material of well graded crushed stone aggregate (VDOT No. 57 or No. 68) should be utilized as a vapor barrier beneath the concrete slabs-on-grade. While it is a common construction practice to place the crushed stone on the subgrade prior to installing the footings, it is our opinion the crushed stone should not be placed until the contractor is ready to pour the slabs-on-grade. The subgrade materials should be recompacted to at least 95 % of Standard Proctor, and the stone placed and the slab poured as soon as possible. This approach minimizes the adverse effect of accumulated water on the subgrade materials. If the stone is placed too far in advance of pouring the floor slabs, some undercutting will invariably be required to provide adequate support to the slabs-on-grade.

A subgrade material of at least 95% of Standard Proctor, may be used in designing slab-on-grade provided the subgrade materials (in both cut and fill areas) are estimated to be at least 95% of Standard Proctor. Where soft mud seams are encountered at subgrade, some undercutting and backfilling may be required to achieve adequate compaction beneath the slabs-on-grade. Again, it is very difficult to estimate these quantities due to the variable subsurface conditions.

Some seepage is typically encountered thru the weathered rock or along the contact of the rock and the adjacent soil. Where the footings bear on cut, a foundation drain should be installed adjacent to the perimeter footings. Likewise, underdrains are sometimes required to accommodate seepage in paved areas. Underdrains should be installed, as needed, if seepage is encountered during construction.

The following earth pressure coefficients may be utilized for designing below grade foundation and retaining walls provided the materials are properly compacted and drainage provisions are included to prevent the development of hydrostatic pressures:

	On-site soil	Select Stone Backfill
	Open-Graded or Dense-Graded VDOT No. 57	VDOT No. 21-A
Active Pressure (Ka)	0.36	0.22
At-Rest Pressure (Ko)	0.53	0.36
Passive Pressure (Kp)	2.77	4.6
Sliding Friction Factor	0.3	0.4
Equiv. Active Fluid (PCF)	49	33

In the event that an open-graded aggregate is utilized for backfilling foundation of retaining walls, the open stone should be wrapped in a filter fabric envelope to prevent infiltration of fine soil particles into the voids in the stone. Open-graded aggregate should not be utilized for backfill beneath any foundation.

Local concrete suppliers typically obtain cement from Roanoke Cement Company in Botetourt County, Virginia. The cement is manufactured as Type I-II and is suitable for use in the Roanoke area.

According to the BOCA Code, the proposed site is located in Seismic Performance Category C.

Groundwater was not encountered in the test borings and is not anticipated to pose a problem provided the grading work is not performed during or immediately after a prolonged wet period.

- (A) ROOF LEADER (RL). SEE PLAN FOR SIZE.
- (B) NEW STORM DRAIN. REFER TO STORM DRAIN (SD) PROFILES ON SHEET C-24 & C-25 FOR PIPE AND STRUCTURE DESIGN DATA.
- (C) NEW RETAINING WALL. SEE ENLARGED PLAN ON SHEET C-19 AND TYPICAL WALL SECTIONS ON SHEET C-20.
- (D) STORMWATER DETENTION BASIN #1. REFER TO SHEET C-15 FOR DETAILS.
- (E) 6" HIGH LANDSCAPE BERM. REFER TO SHEET L-2 FOR PLANTINGS IN THIS AREA. BERM TO BE CONSTRUCTED OF STRIPED TOPSOIL AND OTHER MATERIAL UNSUITABLE FOR STRUCTURAL FILL.
- (F) NOT USED
- (G) SLOPES STEEPER THAN 3H:1V SHALL HAVE APPROPRIATE SLOPE STABILIZATION MEASURES APPLIED.
- (H) CONTRACTOR TO ERECT TREE PROTECTION FENCE AS REQUIRED TO PROTECT EXISTING TREES TO REMAIN.
- (I) CONNECT DOWNSPOUTS TO ROOF LEADERS (RL). SEE BUILDING PLANS FOR CONNECTION BOOT DETAIL
- (J) CONNECT DRAIN FROM TRUCK WELL TO STORM DRAIN (SD)
- (K) 15' GRAVEL ACCESS DRIVE TO DETENTION BASIN. CONSTRUCT WITH 8" DEPTH OF VDOT STD. 21A STONE.
- (L) 4" TRENCH DRAINS IN GARDEN CENTER. CONNECT TO 12" SD IN PAVEMENT.
- (M) PROVIDE 2" P.V.C. DRAIN LINE FROM SUMP PUMP. REFER TO BUILDING PLANS FOR LOCATION OF SUMP PUMP.

TC - TOP OF CURB/CONCRETE  
TP - TOP OF PAVEMENT  
SD - STORM DRAIN  
RL - ROOF LEADER

