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GEOTECHNICAL ENGINEERING STUDY AND PAVEMENT DESIGN PROPOSED SUMMIT AT GRANBY APARTMENTS GRANBY, COLORADO

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Project No. 26-6-101

March 27, 2026

TABLE OF CONTENTS

SUMMARY

1. A total of seven (7) exploratory borings were drilled for this study. The borings generally encountered nil to about 1-foot of man-placed fill at the ground surface. Boring 3 encountered several inches of topsoil at the ground surface. Below the topsoil or fill materials, naturally deposited granular soils were found to extend to the explored depths ranging from about 4 to 14 feet below the ground surface. All but one of the borings encountered practical auger refusal and were terminated as indicated on the boring logs.

   Groundwater was encountered in several of the borings at the time of drilling at depths ranging from about 4 to 5½ below the existing site grade.

2. With proper subgrade preparation, shallow foundations and slab-on-grade construction is feasible for the buildings. Shallow spread footings placed as described herein may be designed for net allowable bearing pressures of 3,500 psf. Design recommendations for mat or stiffened slabs are also presented herein. Further discussion on subgrade preparation is presented in the "Foundation Recommendations" section of this report.

3. Floor slabs should be placed on undisturbed natural soils or moisture conditioned and compacted structural fill extending to undisturbed natural soils.

4. The following table presents the recommended pavement thicknesses:

LOCATION	Full Depth Asphalt Pavement (inches)	Asphalt Over Aggregate Base Course (inches)
Light-Duty Pavements	4.5	3.5 over 6
Heavy-Duty Pavements	5	3.5 over 6

ABC – Aggregate Base Course

Dumpster pads and other areas where truck turning movements are concentrated should be paved with a minimum of 6.0 inches of Portland cement concrete.

PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical engineering study and pavement thickness design for the proposed Summit at Granby Apartments to be located in Granby, Colorado. The study was conducted for the purpose of developing building foundation, floor slab and pavement recommendations for the proposed apartment buildings and associated parking. This study was performed in general accordance with our Proposal No. P6-25-221R to Summit Housing Group, dated October 9, 2025.

A field exploration program consisting of exploratory borings and a site reconnaissance was conducted to obtain information on subsurface conditions. Samples of the subsoils obtained during the field exploration were tested in the laboratory to determine their classification and other engineering characteristics. The results of the field exploration and laboratory testing were analyzed to develop recommendations for foundation types, depths, and allowable pressures for the proposed structure foundations.

This report summarizes the data obtained during this study and presents our conclusions, design recommendations and other geotechnical engineering considerations based on the proposed construction and the subsoil conditions encountered.

PROPOSED CONSTRUCTION

Based on the information provided, we understand that the proposed construction will consist of two, three-story multi-family apartment buildings and associated parking. The proposed apartment buildings will be of volumetric modular construction. Grading for the proposed construction is assumed to be relatively minor with cuts of approximately 2 to 4 feet below the adjacent ground surface, and below grade construction is not planned. We assume light to moderate foundation loadings, typical of the proposed type of construction.

If the proposed construction varies significantly from that described above or as depicted in this report, we should be notified to re-evaluate the recommendations presented in this report.

SITE CONDITIONS

At the time of our field exploration, the site was vacant of structures. The site is bounded to the north and east by Pioneer Drive, to the west by Morris Drive, and to the south by Ten Mile Drive West in Granby, Colorado. The site is relatively flat and vegetation at the site consists of sparse to thick native grasses and weeds.

FIELD EXPLORATION

The field exploration for the project was conducted on March 4, 2026. Seven (7) exploratory borings were drilled within the area of the proposed construction to evaluate the subsurface conditions as shown on Fig. 1. The borings were advanced with 4-inch diameter continuous flight solid stem augers powered by a track-mounted CME-45 drill rig. The borings were logged by a representative of Kumar and Associates, Inc.

Samples of the subsoils were obtained with either a 1-3/8-inch I.D. split-spoon sampler or 2-inch-I.D. California-liner sampler driven into the various strata with blows from a 140-pound hammer falling 30 inches. Sampling with the split-spoon sampler is the standard penetration test (SPT) described by ASTM International (ASTM) Method D1586. Sampling with the California-liner sampler is similar to the SPT and is used locally for obtaining relatively undisturbed samples of cohesive soils and bedrock materials. Sampler penetration resistance values (blow counts), when properly evaluated, indicate the relative density or consistency of the soils. Depths at which the samples were obtained and the associated blow count values are shown adjacent to the boring logs on Fig. 2, with a legend and explanatory notes presented on Fig. 3.

SUBSURFACE CONDITIONS

Soil Types Encountered: Graphic logs of the subsurface conditions encountered at the site are shown on Fig. 2. Borings 1, 2, and 7 encountered approximately 1 foot of existing fill overlying naturally deposited poorly- graded gravel with silt, sand and cobbles (natural), extending to depths of approximately 4, 7½, and 4 feet (respectively) below the existing site grade, at which depth practical refusal to auger drilling was encountered. Boring 3 encountered a relatively thin veneer of topsoil overlying approximately 2½ feet of naturally deposited sandy silt. The silty soils in Boring 3 were underlain by poorly- graded gravel with silt, sand and cobbles, extending to a depth of approximately 6 feet below the existing site grade, at which depth practical refusal to auger drilling was encountered. The soils encountered in Borings 4 and 6 consisted of natural soils to the respective depths of approximately 11 and 14 feet below the existing site grade, at which depths practical refusal to auger drilling was encountered. The soils encountered in Boring 5 consisted of natural soils to a depth of approximately 7 feet below the existing site grade, at which depth practical refusal to auger drilling was encountered.

Groundwater: Groundwater measurements were made in the borings by lowering a weighted tape measure into the open hole shortly after completion of drilling. Groundwater was encountered in borings 3, 4, 5 and 6 at the time of drilling at approximate depths of 5, 4, 5½, and 5 feet below the existing site grade, respectively. The depth of the water level measured in the borings at the time of drilling is shown adjacent to the log on Fig. 2. It is our experience in mountainous areas that the depth to groundwater can vary based on seasonal and climatic conditions, and perched water can occur seasonally or over frozen ground. Dewatering of foundation and utility excavations may be necessary.

LABORATORY TESTING

Samples obtained from the exploratory borings were visually classified by the project engineer. Laboratory testing was performed on selected representative samples to evaluate in-situ soil moisture content and dry density, liquid and plastic limits, and moisture-density relationships. The testing was conducted in general accordance with recognized ASTM test procedures. The results of the laboratory testing program are shown adjacent to the boring logs on Fig. 2 and summarized in Table I.

Index Properties: Samples were classified into categories of similar engineering properties in general accordance with the Unified Soil Classification System. This system is based on index properties, including liquid limit and plasticity index and grain size distribution. Values for moisture content, dry density, liquid limit and plasticity index, and the percent of soil passing the U.S. No. 4 and 200 sieves are presented in Table I and adjacent to the corresponding sample on the boring logs. Gradation test results are presented on Figs. 4 through 6.

Moisture-Density Relationships: Representative bulk samples were collected from Boring 1 and Boring 7 between the depths of 1 and 5 feet for evaluation of the moisture-density relationships in accordance with the standard Proctor method (ASTM D698). Results of the tests are presented on Fig. 7. The maximum dry density of the sample was 134.4 pcf at an optimum moisture content of 7.9 percent.

GEOTECHNICAL ENGINEERING CONSIDERATIONS

Subsurface data indicate that natural granular soils will likely be the predominant soil types encountered beneath shallow foundation, floor slab and flatwork areas. The anticipated natural soils at the foundation level are considered good for shallow foundation support. Existing fill, if any, should be removed from the building pad area and replaced with new structural fill as needed to re-establish floor slab subgrade elevations.

SITE GRADING

If grading is performed during times of cold weather, the fill should not contain frozen materials. If the subgrade is allowed to freeze, all frozen material should be removed prior to additional fill placement or footing, slab or pavement construction. The following recommendations should be followed for grading, site preparation, and fill compaction.

1. Where fill is to be placed, topsoil, existing fill, loose, or otherwise unsuitable material should be removed prior to placement of new fill. The exposed soils should then be scarified to a depth of 12 inches, moisture-conditioned and compacted to the minimum requirements of the overlying fill. Soils should be compacted with appropriate equipment for the lift thickness placed. Lift thickness should be no more than 8-inch, loose lifts, subsequently compacted at the recommended moisture content and to at least the minimum required density.

2. Permanent unretained cut and fill slopes should be graded at 2 horizontal to 1 vertical (2:1) or flatter and protected against erosion by revegetation or other means. The risk of slope instability will be increased if seepage is encountered in cuts and flatter slopes may be necessary. If seepage is encountered in permanent cuts, an investigation should be conducted to determine if the seepage will adversely affect the cut stability. This office should be retained to review site grading plans for the project prior to construction to check for conformance to this report or to identify possible concerns associated with the proposed grading.

3. Slopes of 4:1 or steeper should be benched to provide a level surface for compaction of new fill materials.

4. All backfill should be processed so that it does not contain fragments larger than 6-inches in diameter and placed at the recommended moisture content.

5. Fill materials should be compacted at moisture contents within 2 percentage points of the optimum moisture content.

6. The following compaction requirements should be used:

Compaction Criteria

TYPE OF FILL PLACEMENT	SOIL TYPE - Compaction Percent (ASTM D698 – Standard Proctor)
Below Foundations	98%
Foundation Wall Backfill	95%
Below Floor Slabs	95%
Landscape Areas	90%
Below Concrete Flatwork/Pavements	95%
Utility Trenches	95%

Site Preparation: Prior to placing new fills or concrete, the exposed subgrade should be scarified and well-mixed to a depth of 12 inches, adjusted to a moisture content within 2 percentage points of optimum, and recompacted to at least 95% of the standard Proctor (ASTM D698) maximum dry density. Soft or unstable areas should be removed and replaced to achieve a reasonably stable subgrade prior to placement of structural fill.

Suitability of On-Site Soil: The on-site natural granular soils and existing fill materials are considered suitable as backfill after processing to remove all plus 6-inch material and moisture treatment.

Imported Fill: Import structural fill material, if necessary, should contain less than 60 percent passing the No. 200 sieve, have a maximum liquid limit of 30, and a maximum plasticity index of 15. Imported fill materials not meeting the above liquid limit and plasticity index criteria should be further evaluated by K+A for suitability of the proposed imported fill for its intended use.

Excavations: It is the responsibility of the Contractor to provide safe working conditions and to comply with the regulations in OSHA Standards, Excavations, 29CFS Part 1926. The on-site soils will likely classify as “Type C” in accordance with OSHA regulations. The regulations allow slopes of 1½ horizontal to 1 vertical (1½:1) for **dry** temporary excavations less than 20 feet deep in Type C soils.

The presence of water, seepage, fissuring, vibrations or surcharge loads will require temporary excavation to have flatter slopes. **A Contractor’s competent person should make decisions regarding cut slopes.** A qualified Geotechnical engineer should observe any questionable slopes or conditions. Temporary shoring may be necessary to establish safe working conditions in the excavation areas.

FOUNDATIONS

Considering the subsoil conditions encountered in the exploratory borings and the nature of the proposed construction, we recommend the structures be founded with spread footings bearing on competent undisturbed natural granular soils or properly compacted new structural fill extending to competent undisturbed natural granular soils. Mat slabs or stiffened slabs with a post-tension element are also considered acceptable to support structures on the site.

Spread Footings: The design and construction criteria presented below should be observed for a spread footing foundation system.

1. Footings placed on the undisturbed natural granular soils or properly compacted structural fill extending to undisturbed natural granular soils should be designed for a net allowable soil bearing pressure of 3,500 pounds per square foot (psf). Based on experience, we expect settlement of footings designed and constructed as discussed in this section will be about 1 inch or less.

2. The footings should have a minimum width of 16 inches for continuous walls and 24 inches for isolated pads.

3. The lateral resistance of foundation or retaining wall footings will be a combination of the sliding resistance of the footing on the foundation materials and passive earth pressure against the side of the footing. Resistance to sliding at the bottoms of the footings can be calculated based on a coefficient of friction of 0.45 for footings bearing on natural granular soils or properly compacted structural fill. Passive pressure of compacted backfill against the sides of the footings can be calculated using an equivalent fluid unit weight of 400 pcf. The coefficient of friction and passive pressure values recommended above assume ultimate soil strength. Suitable factors of safety should be included in the design to limit the strain which will occur at the ultimate strength, particularly in the case of passive resistance. Fill placed against the sides of the footings to resist lateral loads should be an on-site granular material compacted to at least 95% of the maximum standard Proctor dry density at a moisture content near optimum.

4. Exterior footings and footings beneath unheated areas should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 40 inches below exterior grade, or in accordance with local building code requirements, is recommended. Concrete should not be placed on frost, frozen soil, snow or ice.

5. Continuous foundation walls should be reinforced top and bottom to span local anomalies such as by assuming an unsupported length of at least 10 feet. Foundation walls acting as retaining structures should also be designed to resist lateral earth pressures as discussed in the "FOUNDATION AND RETAINING WALLS" section of this report.

6. Topsoil, existing fill, and any loose or disturbed soils should be removed, and the footing bearing level extended down to the relatively undisturbed natural granular soils. If water seepage is encountered, the footing areas should be dewatered before concrete placement and we shall be contacted for further evaluation.

7. Voids created by boulder removal in foundation areas should be backfilled with properly compacted structural fill, lean mix concrete or structural concrete to re-establish bearing elevations.

8. Structural fill used for support of the foundation should meet the requirements listed in the “SITE GRADING” section of this report.

9. A representative of the geotechnical engineer should observe all footing excavations prior to forming footings and concrete placement to evaluate bearing conditions.

<u>Mat Slab – Stiffened Slab</u>: The design and construction criteria presented below should be observed for a mat slab or stiffened slab foundation system. Construction details should be considered when preparing project documents. The site soils classify as BRAB Type II materials, and therefore would not require post-tension (PT) elements for stiffened slab design; however, many owners/designers choose to add PT elements for added structural benefits. Adding PT elements to a slab on this site is acceptable.

1. A mat foundation placed on the undisturbed natural soils or properly compacted structural fill may be designed for an allowable contact pressure of 2,500 psf. This contact pressure may be increased by 1/3 for transient loadings.

2. We estimate settlements beneath a rigid mat will be on the order of 1-inch or less and differential settlements are estimated to be approximately 75% of the total settlement. Nonuniformity of the subsurface conditions, (stress overlap between adjacent mat foundations) and deviation from the rigid mat assumption will contribute to total and differential settlements.

   Rigidity of the mat is dependent on the mat dimensions, column spacing, rigidity of the superstructure and the modulus of subgrade reaction of the supporting soils. We recommend the foundation be analyzed to determine if the rigidity assumption is valid.

   If the mat cannot be considered rigid, the soil pressure distribution should be computed using a method which models the soil-structure interaction, such as the beam on an elastic foundation procedure. A modulus of vertical subgrade reaction equal to 150 pci may be used for granular soil. The modulus value given is for a 1-foot square plate and must be corrected for mat shape and size.

3. Other applicable design criteria and design parameters listed above in the Spread Footings section should be applied to design of a mat or stiffened slab foundation.

FOUNDATION AND RETAINING WALLS

Foundation walls and retaining structures which are laterally supported and can be expected to undergo only a slight amount of deflection should be designed for the at-rest lateral earth pressure condition computed on the basis of an equivalent fluid unit weight of at least 50 pounds per cubic foot (pcf) for backfill consisting of the on-site processed granular soils. Cantilevered retaining structures which are separate from the foundation and can be expected to deflect sufficiently to mobilize the full active earth pressure condition should be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of at least 40 pcf for backfill consisting of the processed on-site granular soils. The backfill should not contain rock larger than about 4 inches in diameter.

Foundation and retaining structures should be designed for appropriate hydrostatic and surcharge pressures such as adjacent footings, traffic, construction materials and equipment. The pressures recommended above assume drained conditions behind the walls and a horizontal backfill surface. The buildup of water behind a wall or an upward sloping backfill surface will increase the lateral pressure imposed on a foundation wall or retaining structure. An underdrain should be provided to limit hydrostatic pressure buildup behind walls. Care should be taken not to overcompact the backfill or use large equipment near the wall, since this could cause excessive lateral pressure on the wall. Some settlement of deep foundation wall backfill should be expected, even if the material is placed correctly, and could result in distress to facilities constructed on the backfill.

FLOOR SLABS

The natural on-site granular soils and properly compacted new structural fill extending to natural granular soils are suitable to support lightly loaded slab-on-grade construction. Topsoil and existing fill soils should be removed from floor slab areas to expose the underlying natural granular soil and replaced with new structural fill as needed to re-establish slab bearing elevations.

To reduce the effects of some differential movement, floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement. Floor slab control joints should be used to reduce damage due to shrinkage cracking. The requirements for joint spacing and slab reinforcement should be established by the designer based on experience and the intended slab use. All backfill under floor slabs should be placed in accordance with the "SITE GRADING" section of this report.

If moisture-sensitive floor coverings will be used, mitigation of moisture into the slabs, such as by use of a vapor retarder may be required. If a vapor retarder membrane is used, special precautions will be required to prevent differential curing problems which could cause the slabs to warp. American Concrete Institute (ACI) 302.1R addresses this topic.

UNDERDRAIN SYSTEM AND DAMP-PROOFING

As previously mentioned, groundwater was encountered in Borings 3, 4, 5 and 6 during our field exploration, and it has been our experience in mountainous areas that groundwater levels can rise, and that local perched groundwater can develop during times of heavy precipitation or seasonal runoff. Frozen ground during spring runoff can create a perched condition. We recommend below-grade construction (if planned), such as retaining walls, crawlspace, and basement areas, be protected from wetting and hydrostatic pressure buildup by an underdrain and wall drain system.

The underdrain should consist of perforated drainpipe placed in the bottom of the foundation wall backfill surrounded above the invert level with free-draining gravel. The drain should be placed at each level of excavation and at least 24-inches below lowest adjacent finish grade and sloped at a minimum 1% to a suitable gravity outlet, sump and pump system or drywell. Free-draining gravel used in the underdrain system should contain less than 3% passing the No. 200 sieve, less than 50% passing the No. 4 sieve and have a maximum size of 1-inch. The drain gravel backfill should be at least 1½ feet deep and protected by filter fabric. A typical drain detail is shown on Figure 8.

For exterior below grade foundation walls, we recommend, as a minimum, damp-proofing consist of bituminous material, 3 lbs per square yard, extending from the top of the footing to above ground level. A wall drain system consisting of a geocomposite, MiraDrain 6000, or equivalent, should be placed adjacent to below grade construction walls, with 100 percent coverage on the foundation wall facing the uphill slope and a minimum of 50 percent coverage for the adjacent foundation walls. The wall drain system should connect into the underdrain and extend to within 1 to 2 feet of the ground surface.

SURFACE DRAINAGE

The following drainage precautions should be observed during construction and maintained at all times after the residence has been completed:

1. Inundation of the foundation excavations and underslab areas should be avoided during construction.

2. Exterior backfill placed in landscape areas should be compacted to at least 90% of the maximum standard Proctor dry density at a moisture content near optimum.

3. The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 6 inches in the first 10 feet in unpaved areas and a minimum slope of 3 inches in the first 10 feet in paved areas.

4. Roof downspouts and drains should discharge well beyond the limits of all backfill.

PAVEMENT SECTION DESIGN

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade. Performance of the pavement structure is directly related to the physical properties of the subgrade soils and traffic loadings. Soils are represented for pavement design purposes by means of a subgrade resilient modulus (M_R) for flexible pavements. We assume concrete (rigid) pavements will not be used for the proposed parking lots.

Subgrade Materials: Based on the results of the field exploration and laboratory testing programs, the majority of the near-surface subgrade materials at the site generally classify as between A-1-b and A-2-4 soils with group indices of 0 in accordance with the American Association of State Highway and Transportation Officials (AASHTO) classification. Soils classifying as A-1-b and A-2-4 are generally considered to provide good to excellent subgrade support. For design purposes, a resilient modulus value of 6,000 psi was selected for flexible pavements.

Design Traffic: Since anticipated traffic loading information was not available at the time of this report preparation, an 18-kip equivalent single axle loading (ESAL) value of 36,500 was assumed for the paved automobile parking surfaces (Light-Duty), and an ESAL of 73,000 was assumed for parking lot drive, fire lanes and areas accessed by trash collection vehicles (Heavy-Duty). These values were selected based on our past experience with construction of this nature. The heavy-duty pavement section should be constructed in locations where heavy vehicle traffic movements are concentrated.

If estimated daily traffic volumes for the facility are known to be different from those assumed, we should be provided with this information in order to reevaluate the pavement sections provided below.

Pavement Thickness Requirements: Recommendations for a full-depth asphalt section and a composite section of hot mix asphalt (HMA) over aggregate base course (ABC) are presented in the table below. The pavement sections were determined in accordance with the 1993 AASHTO pavement design procedures. For design purposes, a design reliability of 75% was assumed for all pavement areas. The following table presents the minimum pavement thickness alternatives for the project:

LOCATION	Full Depth Asphalt Pavement (inches)	Asphalt Over Aggregate Base Course (inches)
Light-Duty Pavements	4.5	3.5 over 6
Heavy-Duty Pavements	5	3.5 over 6

Dumpster pads and other areas where truck turning movements are concentrated should be paved with a minimum of 6.0 inches of Portland cement concrete.

In our experience, composite pavements generally perform better than full depth pavements over their design life, and are the preferred section for this site.

Pavement Materials: The following are recommended material and placement requirements for pavement construction for this project site. We recommend that properties and mix designs for all materials proposed to be used for pavements be submitted for review to the geotechnical engineer prior to placement.

1. *Aggregate Base Course*: Aggregate base course (ABC) used beneath hot mix asphalt (HMA) pavements or as a working surface below PCCP, should meet the material specifications for Class 6 ABC stated in the current CDOT Specifications. The ABC should be placed and compacted as outlined in the "Site Grading and Earthwork" section of this report.

2. *Hot Mix Asphalt:* Hot mix asphalt (HMA) materials and mix designs should meet the applicable requirements indicated in the current CDOT Specifications. We recommend that the HMA used for this project is designed in accordance with the SuperPave gyratory mix design method. The mix should generally meet Grading S or SX specifications with a SuperPave gyratory design revolution (N_{DESIGN}) of 75. The mix design for the HMA should use a performance grade PG 58-28 asphalt binder. A PG 64-22 binder will also be sufficient to carry the traffic loads, but will be more susceptible to low temperature cracking. Placement and compaction of HMA should follow current CDOT standards and specifications.

Subgrade Preparation: Subgrade preparation below the proposed pavements should consist of thorough scarification and well-mixing to a minimum depth of 12 inches for flexible pavement, moisture-conditioning, and recompacting the material in accordance with the "Site Grading and Earthwork" section of this report.

Structural fill, if used, the material and placement criteria should follow the structural fill material and placement criteria presented in the "Site Grading and Earthwork" section of this report.

Excessive wetting and drying of excavations and prepared subgrade areas should be avoided during construction. It is extremely important that moisture-conditioned fill placed during construction is not allowed to dry out. Allowing the fill to dry after placement increases the materials' potential to heave if the moisture content of the fill is increased in the future.

Pavement design procedures assume a stable subgrade. Prior to placing the pavement section, the pavement subgrade should be proof-rolled with a heavily loaded pneumatic-tired vehicle with a tire pressure of at least 100 psi capable of applying a minimum load of 18-kips per axle. Areas that deform excessively under heavy wheel loads are not stable and should be removed and replaced with structural fill to achieve a stable subgrade prior to paving. Areas where excessive deflection occurs should be ripped, scarified, wetted, or dried if necessary and re-compacted to the required moisture and density specifications.

Drainage: The collection and diversion of surface drainage away from paved areas is extremely important to the satisfactory performance of pavement. Drainage design should provide for the removal of water from paved areas and prevent the wetting of the subgrade soils both during and after construction. Joints should be routinely inspected, and joints and cracks that develop after construction should be sealed to reduce the potential for water to migrate through the pavement.

CONTINUING SERVICES

K+A should be retained to review the project plans and specifications for conformance with the recommendations provided in our report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project, and performing additional studies, if necessary to accommodate possible changes in the proposed construction.

We recommend that K+A be retained to provide construction observation and testing services to document that the intent of this report and the requirements of the plans and specifications are being followed during construction. This will allow us to identify possible variations in subsurface conditions from those encountered during this study and to allow us to re-evaluate our recommendations, if needed. We will not be responsible for implementation of the recommendations presented in this report by others, if we are not retained to provide construction observation and testing services.

LIMITATIONS

This study has been conducted for the exclusive use by the client and for project design and construction. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings at the locations indicated on Fig. 1 or as described in the report, and the proposed type of construction. This report may not reflect subsurface variations that occur between the exploratory borings, and the nature and extent of variations across the site may not become evident until site grading and excavations are performed. If during construction, fill, soil, bedrock or groundwater conditions appear to be different from those described herein, K+A should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. K+A is not responsible for liability associated with interpretation of subsurface data by others.

The scope of services for this project does not include any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

KLS/as
Rev. by JLB
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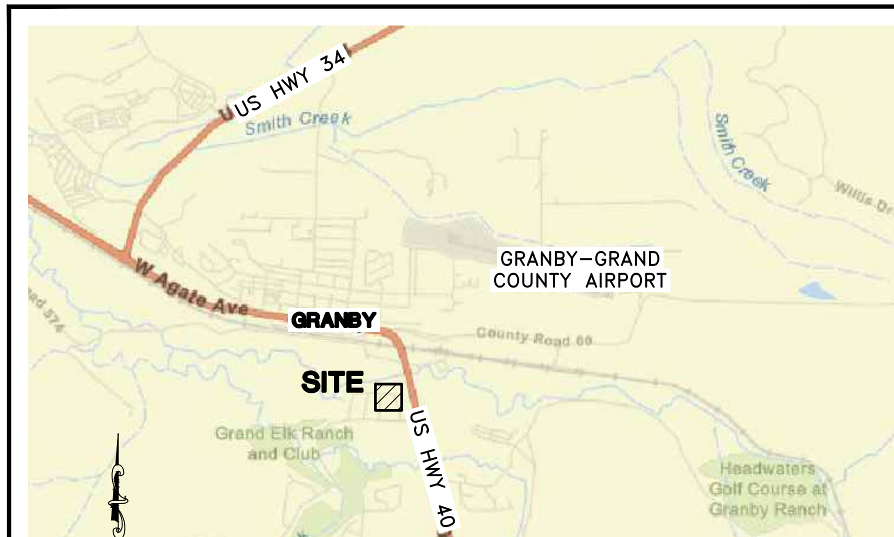
APPROXIMATE SCALE–FEET



VICINITY MAP
NOT TO SCALE

26–6–101	Kumar & Associates	SUMMIT AT GRANBY APARTMENTS	LOCATION OF EXPLORATORY BORINGS	Fig. 1

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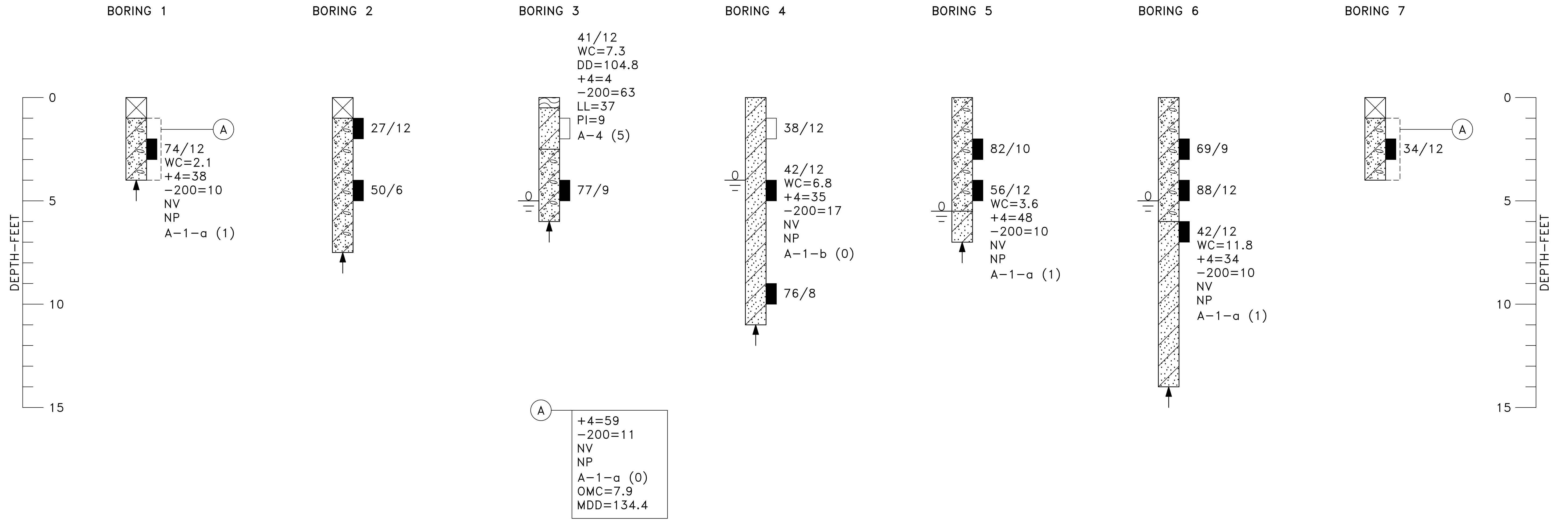


26–6–101	Kumar & Associates	SUMMIT AT GRANBY APARTMENTS	LOGS OF EXPLORATORY BORINGS	Fig. 2

LEGEND

TOPSOIL: FINE TO COARSE-GRAINED, LOOSE, SLIGHTLY MOIST, DARK BROWN.

FILL: CLAYEY SAND (SC) TO POORLY GRADED GRAVEL WITH SILT AND SAND (GP-GM), FINE TO COARSE-GRAINED, LOOSE, SLIGHTLY MOIST, GRAY-BROWN

POORLY-GRADED SAND WITH SILT, GRAVEL AND COBBLES (SP-SM), MEDIUM-DENSE TO DENSE, SLIGHTLY MOIST TO WET, TAN TO BROWN.

POORLY-GRADED GRAVEL WITH SILT, SAND AND COBBLES (GP-GM), DENSE, SLIGHTLY MOIST TO WET, TAN TO BROWN.

DRIVE SAMPLE, 2-INCH I.D. CALIFORNIA LINER SAMPLE.

DRIVE SAMPLE, 1 3/8-INCH I.D. SPLIT SPOON STANDARD PENETRATION TEST.

DISTURBED BULK SAMPLE.

27/12 DRIVE SAMPLE BLOW COUNT. INDICATES THAT 27 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE THE SAMPLER 12 INCHES.

DEPTH TO WATER LEVEL ENCOUNTERED AT THE TIME OF DRILLING.

PRACTICAL AUGER REFUSAL.

NOTES

1. THE EXPLORATORY BORINGS WERE DRILLED ON MARCH 4, 2026 WITH A 4-INCH-DIAMETER CONTINUOUS-FLIGHT POWER AUGER.

2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE MEASURED APPROXIMATELY BY PACING FROM FEATURES SHOWN ON THE SITE PLAN PROVIDED.

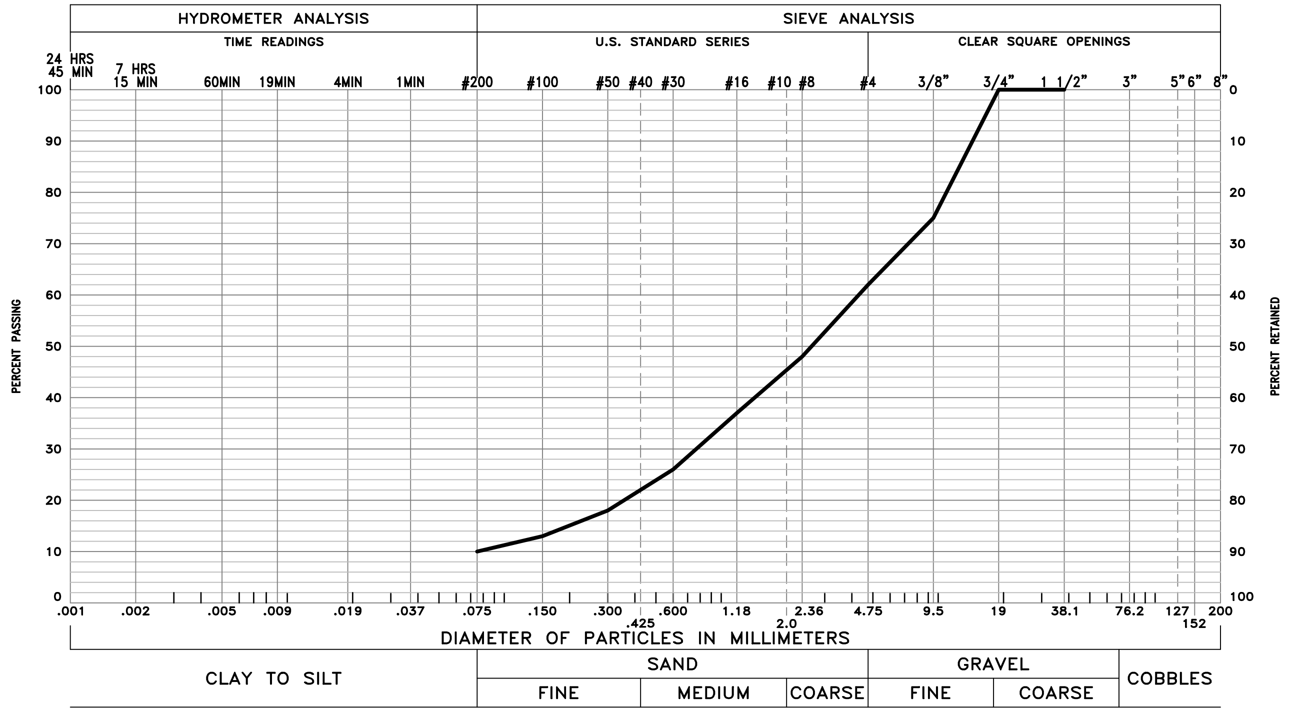
3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE NOT MEASURED AND THE LOGS OF THE EXPLORATORY BORINGS ARE PLOTTED TO DEPTH.

4. THE EXPLORATORY BORING LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

5. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.

6. GROUNDWATER LEVELS SHOWN ON THE LOGS WERE MEASURED AT THE TIME AND UNDER CONDITIONS INDICATED. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.

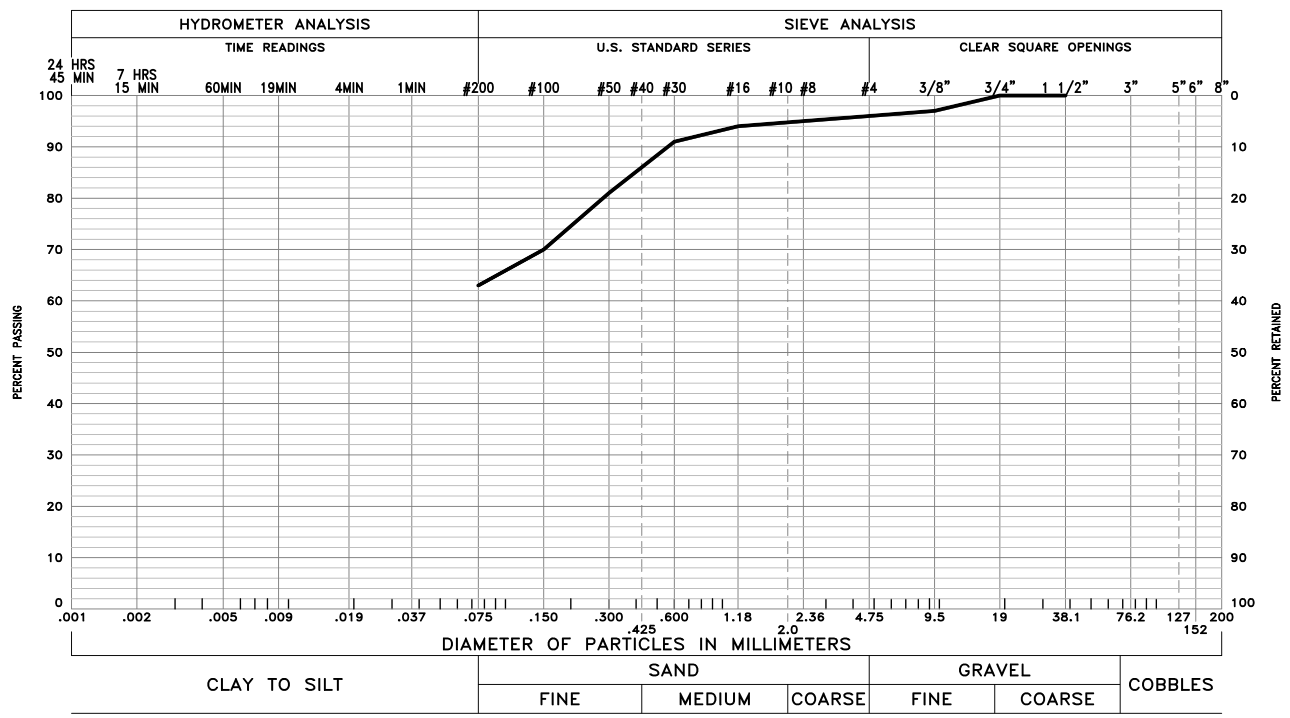
7. LABORATORY TEST RESULTS:
   WC = WATER CONTENT (%) (ASTM D2216);
   DD = DRY DENSITY (pcf) (ASTM D2216);
   +4 = PERCENTAGE RETAINED ON NO. 4 SIEVE (ASTM D6913);
   -200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D1140);
   LL = LIQUID LIMIT (ASTM D4318);
   PI = PLASTICITY INDEX (ASTM D4318);
   NV = NO LIQUID LIMIT VALUE (ASTM D4318);
   NP = NON-PLASTIC (ASTM D4318);
   A-1-a (1) = AASHTO CLASSIFICATION (GROUP INDEX) (AASHTO M 145);
   OMC = OPTIMUM MOISTURE CONTENT (%) (ASTM D698);
   MDD = MAXIMUM DRY DENSITY (pcf) (ASTM D698).



GRAVEL 38 % SAND 52 % SILT AND CLAY 10 %

LIQUID LIMIT NV PLASTICITY INDEX NP

SAMPLE OF: Poorly-Graded Sand with Silt and Gravel (SP-SM) FROM: Boring 1 @ 2'



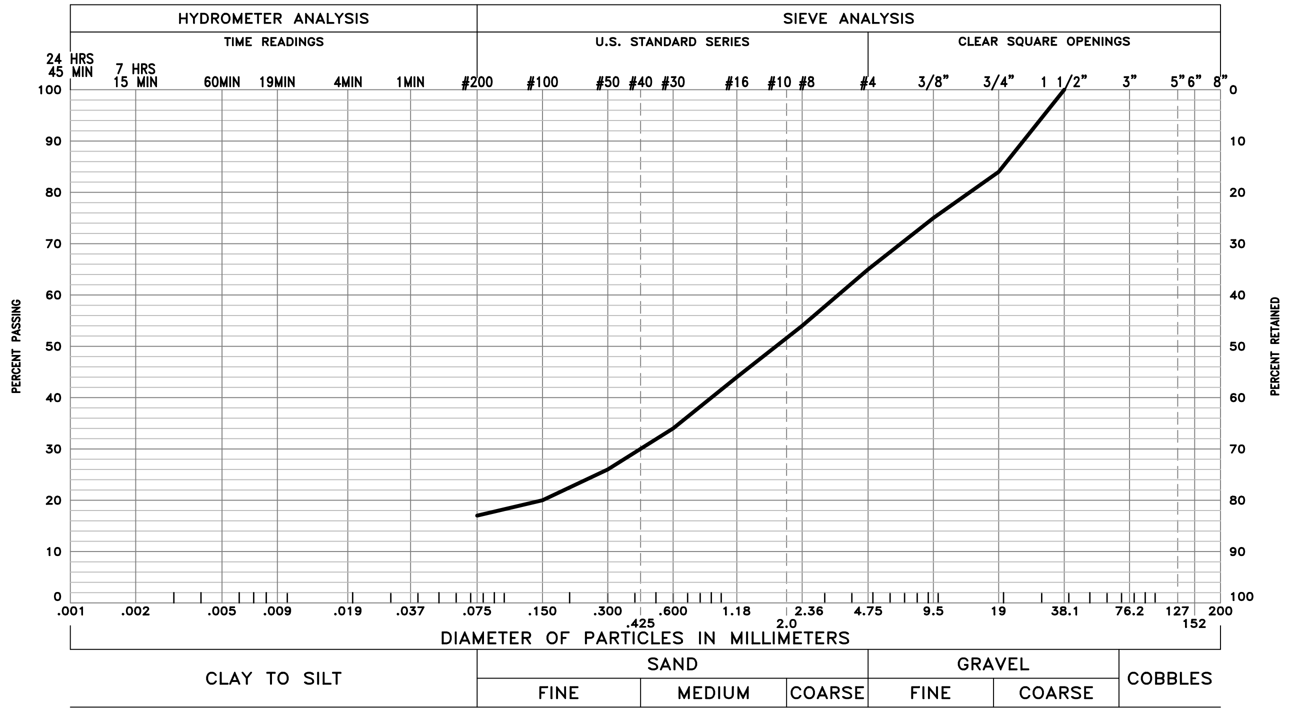
GRAVEL 4 % SAND 33 % SILT AND CLAY 63 %

LIQUID LIMIT 37 PLASTICITY INDEX 9

SAMPLE OF: Silty Clay (CL-ML) FROM: Boring 3 @ 1'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

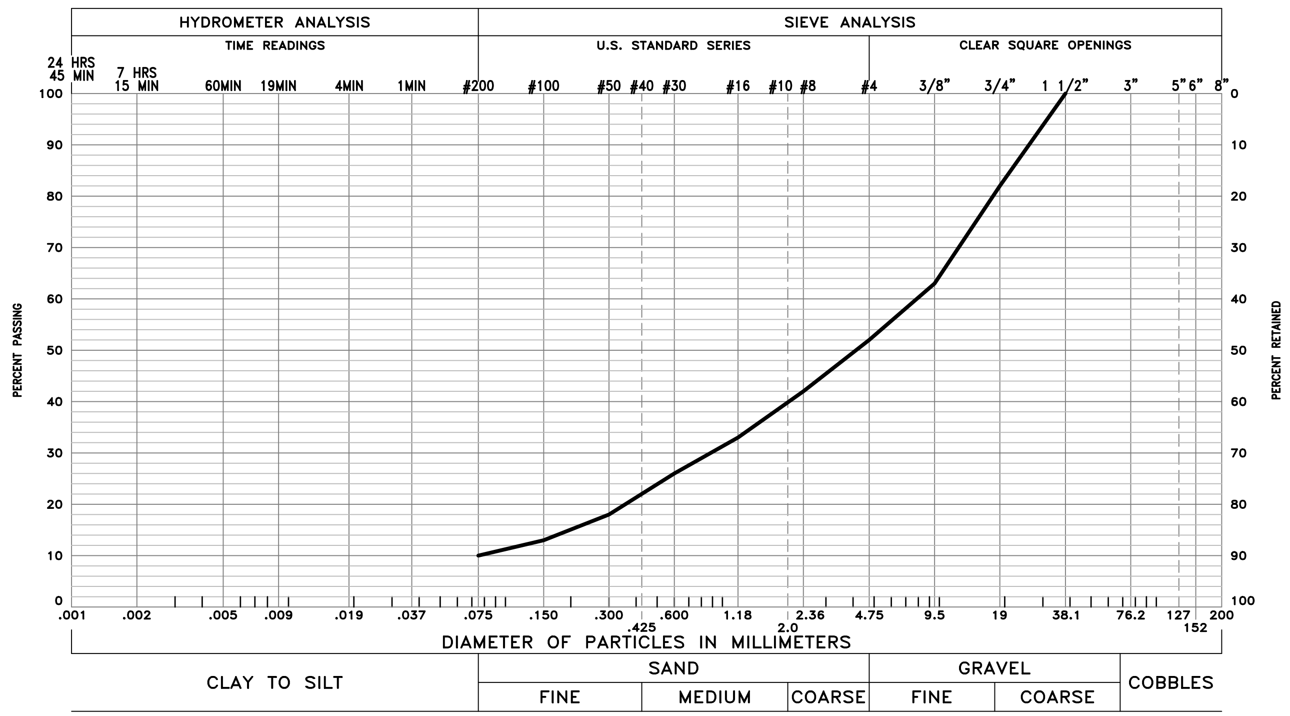
26-6-101	Kumar & Associates	GRADATION TEST RESULTS	Fig. 4



GRAVEL 35 % SAND 48 % SILT AND CLAY 17 %

LIQUID LIMIT NV PLASTICITY INDEX NP

SAMPLE OF: Silty Sand with Gravel (SM) FROM: Boring 4 @ 4'



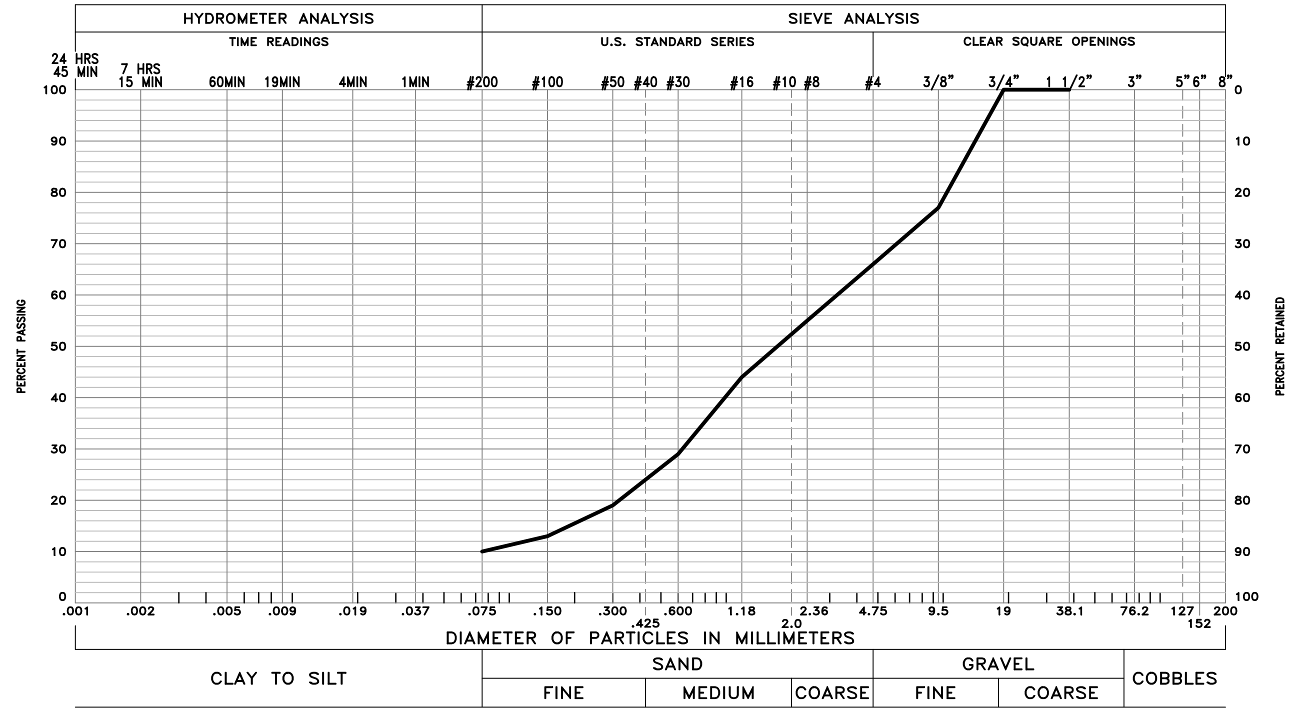
GRAVEL 48 % SAND 42 % SILT AND CLAY 10 %

LIQUID LIMIT NV PLASTICITY INDEX NP

SAMPLE OF: Poorly-Graded Gravel with Silt and Sand (GP-GM) FROM: Boring 5 @ 4'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

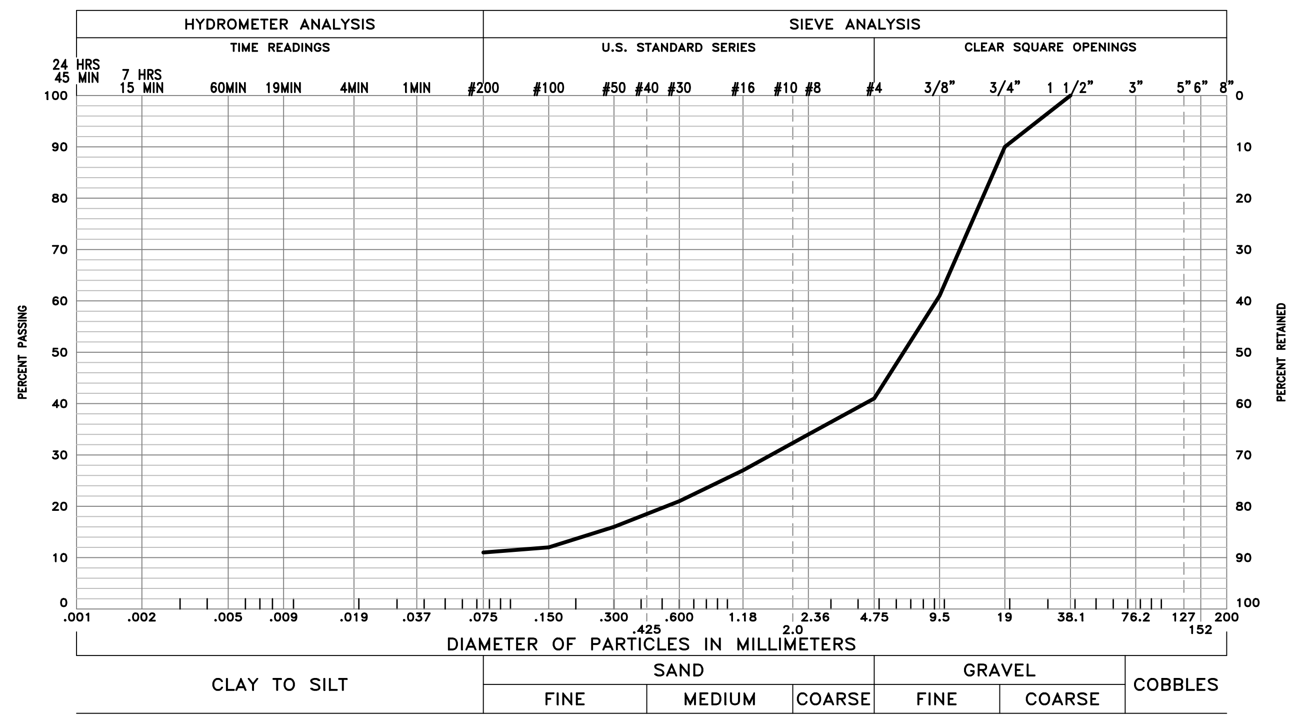
26-6-101	Kumar & Associates	GRADATION TEST RESULTS	Fig. 5



GRAVEL 34 % SAND 56 % SILT AND CLAY 10 %

LIQUID LIMIT NV PLASTICITY INDEX NP

SAMPLE OF: Poorly-Graded Sand with Silt and Gravel (SP-SM) FROM: Boring 6 @ 6'



GRAVEL 59 % SAND 30 % SILT AND CLAY 11 %

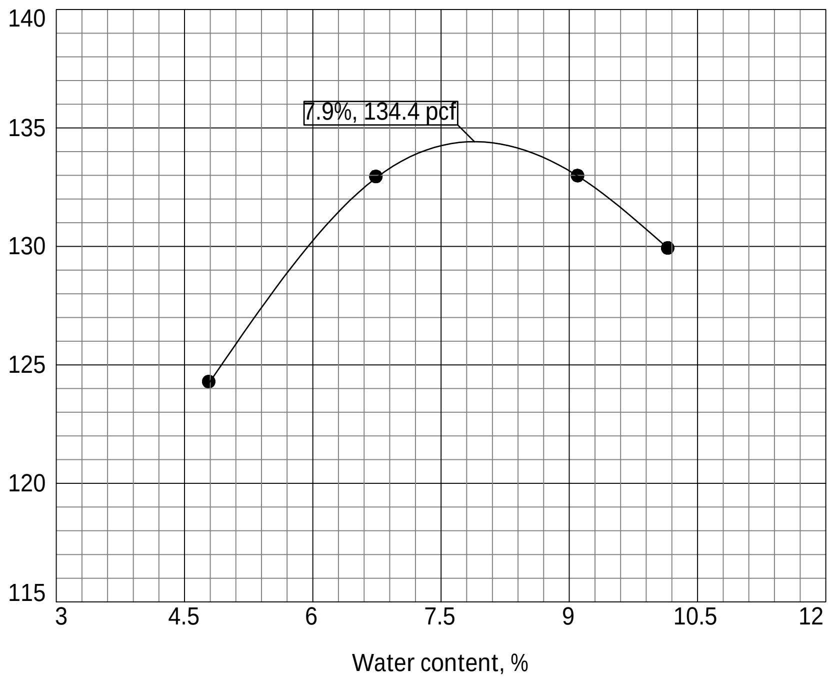
LIQUID LIMIT NV PLASTICITY INDEX NP

SAMPLE OF: Poorly-Graded Gravel with Silt and Sand (GP-GM) FROM: Borings 1 & 7 @ 1'-5'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

26-6-101	Kumar & Associates	GRADATION TEST RESULTS	Fig. 6

COMPACTION TEST REPORT



Preparation Method	
Rammer: Wt.	5.5 lb.
Drop	12 in.
Type	
Layers: No.	three
Blows per	56
Mold Size	0.075 cu. ft.
Test Performed on Material Passing	3/4 in. Sieve
%>3/4 in.	10
%<No.200	11
Atterberg (D 4318): LL	NV
PI	NP
NM (D 2216)	
Sp.G. (D 854)	
USCS (D 2487)	GP-GM
AASHTO (M 145)	A-1-a
Date: Sampled	
Received	
Tested	
Tested By	

COMPACTION TESTING DATA
ASTM D 698-91 Procedure C Standard

	1	2	3	4	5	6
WM + WS	10321.7	10718.6	10826.6	10759.7		
WM	5891.8	5891.8	5891.8	5891.8		
WW + T #1	1008.9	1390.9	1700.6	1590.8		
WD + T #1	966.8	1312.9	1577.1	1458.5		
TARE #1	88.3	156.9	221.0	156.6		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	4.8	6.7	9.1	10.2		
DRY DENS.	124.3	132.9	133.0	129.9		

SIEVE TEST RESULTS

Opening Size	% Passing	Specs.
1-1/2"	100	
1"	95	
3/4"	90	
1/2"	72	
3/8"	61	
#4	41	
#8	34	
#16	27	
#30	21	
#50	16	
#100	12	
#200	11	

TEST RESULTS

Maximum dry density = 134.4 pcf

Optimum moisture = 7.9 %

Material Description

Poorly-Graded Gravel with Silt and Sand (GP-GM)

Remarks:

These test results apply only to the samples which were tested. the testing report shall not be reproduced, except in full, without the written approval of Kumar and Associates, Inc. Moisture/density relationships performed in accordance with ASTM D698, D1557. Atterberg limits performed in accordance with ASTM D4318 sieve analysis performed in accordance with ASTM D422, D1140.

Project No. 26-6-101 **Client:** Summit Housing Group

Project: Summit at Granby Apartments

○**Location: B-1 & B-7 (Composite Bulk Sample) Depth: 1-5'**

Checked by:

Title:

March 27, 2026 – 03:08pm
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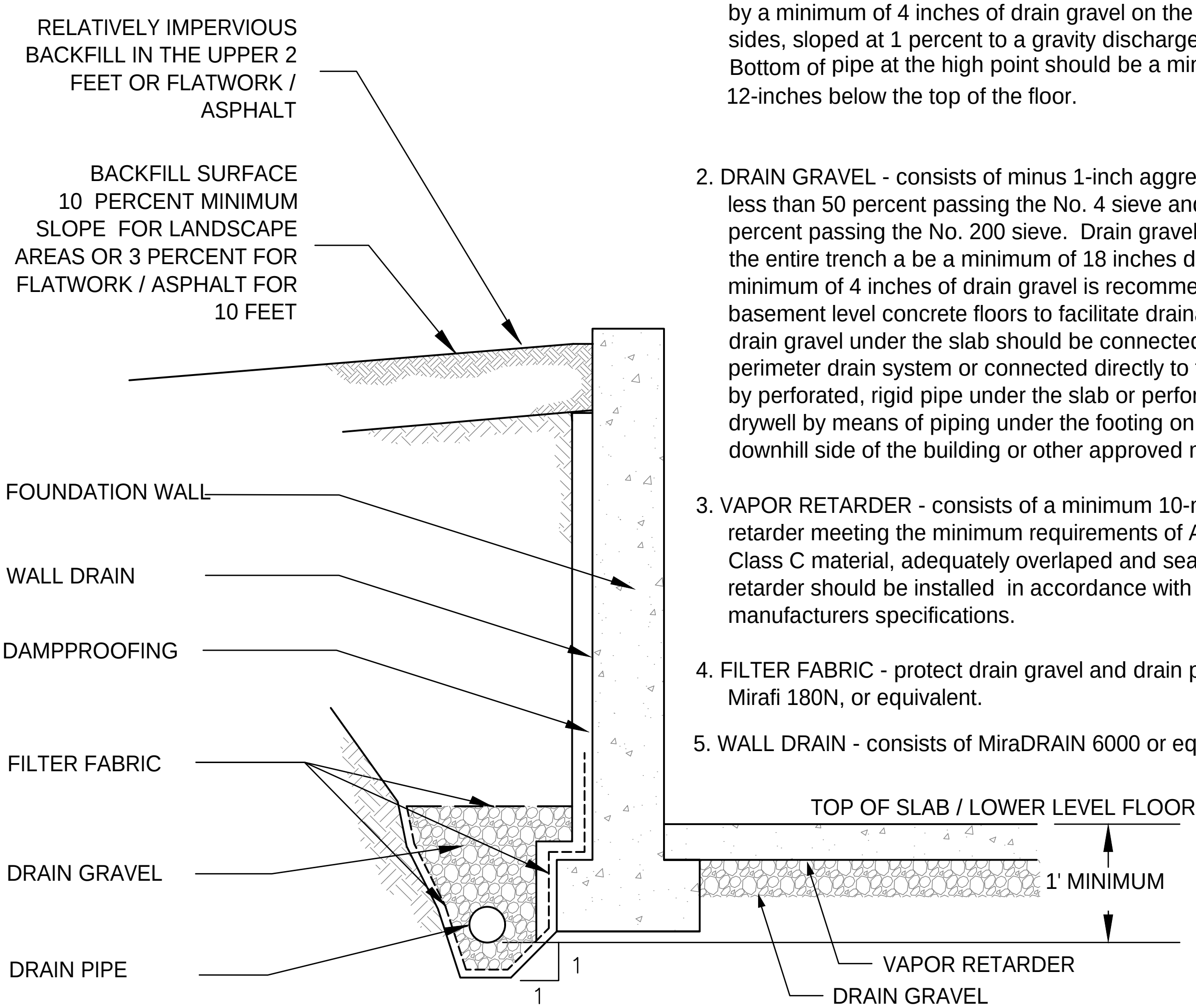

1. DRAIN PIPE - consists of 4-inch perforated PVC, surrounded by a minimum of 4 inches of drain gravel on the top and sides, sloped at 1 percent to a gravity discharge or drywell. Bottom of pipe at the high point should be a minimum of 12-inches below the top of the floor.

2. DRAIN GRAVEL - consists of minus 1-inch aggregate with less than 50 percent passing the No. 4 sieve and less than 2 percent passing the No. 200 sieve. Drain gravel should fill the entire trench a be a minimum of 18 inches deep. A minimum of 4 inches of drain gravel is recommended under basement level concrete floors to facilitate drainage. The drain gravel under the slab should be connected to the perimeter drain system or connected directly to the drywell by perforated, rigid pipe under the slab or perforation in the drywell by means of piping under the footing on the downhill side of the building or other approved method.

3. VAPOR RETARDER - consists of a minimum 10-mil vapor retarder meeting the minimum requirements of ASTM E1745 Class C material, adequately overlaped and sealed. Vapor retarder should be installed in accordance with the manufacturers specifications.

4. FILTER FABRIC - protect drain gravel and drain pipe with Mirafi 180N, or equivalent.

5. WALL DRAIN - consists of MiraDRAIN 6000 or equivalent.

NOT TO SCALE

26-6-101	Kumar & Associates	TYPICAL DRAIN DETAIL	Fig. 8

March 27, 2026 - 03:08pm
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Table I
Summary of Laboratory Test Results

Project No.: 26-6-101
Project Name: Summit at Granby Apartments
Date Sampled: March 4, 2026
Date Received: March 4, 2026

Sample Location		Date Tested	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation		Percent Passing No. 200 Sieve	Atterberg Limits		AASHTO Classification (Group Index)	Soil or Bedrock Type
Boring	Depth (Feet)				Gravel (%)	Sand (%)		Liquid Limit (%)	Plasticity (%)		
B-1	2	3/10/26	2.1		38	52	10	NV	NP	A-1-a (1)	Poorly-Graded Sand with Silt and Gravel (SP-SM)
B-3	1	3/10/26	7.3	104.8	4	33	63	37	9	A-4 (5)	Sandy Silty Clay (CL-ML)
B-4	4	3/10/26	6.8		35	48	17	NV	NP	A-1-b (0)	Silty Sand with Gravel (SM)
B-5	4	3/10/26	3.6		48	42	10	NV	NP	A-1-a (1)	Poorly-Graded Gravel with Silt and Sand (GP-GM)
B-6	6	3/10/26	11.8		34	56	10	NV	NP	A-1-a (1)	Poorly-Graded Sand with Silt and Gravel (SP-SM)
B-1 & B-7 (Composite Bulk)	1-5	3/12/26	7.9*	134.4*	59	30	11	NV	NP	A-1-a (0)	Poorly-Graded Gravel with Silt and Sand (GP-GM)

* - Optimum moisture content and maximum dry density as determined by standard Proctor (ASTM D698)