REVIEWED FOR CODE COMPLIANCE
09/07/2022

SUBSOIL AND FOUNDATION INVESTIGATION
LOCKHART SUBDIVISION AKA: Eagles Vista
RIVER QUEEN LANE
STEAMBOAT SPRINGS, COLORADO

Prepared by

NWCC, Inc.
2580 Copper Ridge Drive
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NorthWest Colorado Consultants, Inc.
Geotechnical / Environmental Engineering • Materials Testing

Prepared for

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830 Lincoln Avenue
Steamboat Springs, CO 80847

NWCC Project NO. 17-10640

September 5, 2017

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List of Figures, Tables and Appendices.

1.0 CONCLUSIONS

Based on results of the field and laboratory investigations, NWCC, Inc. (NWCC) recommends the proposed single-family residences and garages to be constructed within this subdivision be founded on footings placed on the natural sands and clays and/or natural sands and gravels encountered beneath the existing fill materials and the topsoil and organic materials.

2.0 PURPOSE AND SCOPE OF WORK

This report presents the results of the Subsoil and Foundation Investigation completed for the Lockhart Subdivision to be constructed within a vacant parcel of land located at the southwest end of River Queen Lane in Steamboat Springs, Colorado. The approximate location of the project site is shown in Figure #1.

The scope of our work included obtaining data from a visual inspection of the site; the excavation of seven (7) test pits; sampling of the soils and the laboratory testing of the samples obtained. This report summarizes the results of the field investigation and the laboratory test results, as well as our recommendations for foundation design, floor slabs, foundation walls, site grading and pavement sections based on the proposed construction and the subsurface conditions encountered.

3.0 PROPOSED CONSTRUCTION

NWCC understands the proposed construction will consist of six (6) single family residences within the subdivision. The lot sizes will range from 0.23 to 0.48 acres in size. NWCC has assumed the residences will consist of 1 to 2 story wood framed structures constructed with attached garages and walkout basement levels. NWCC has assumed the lower levels of the residences and garages will be constructed with concrete slab-on-grade floor systems. We have assumed the loads generated by the proposed building structures will be variable and range from light to moderate, typical of this type of residential construction.

Some overlot site grading, roadway and utility construction will be required. The majority of the grading will occur at the end of the existing cul-de-sac; at the west end of the property for the water quality detention pad; and cut and fill placement within a majority of the lot entrances. NWCC has assumed that the remaining cuts and fills constructed within each of the individual lots will be on the order of 5 to 15 feet or less to bring the sites to the finish grades.

4.0 SITE CONDITIONS

The project site is located at the southwest end of River Queen Lane in Steamboat Springs, Colorado. The site is bordered on the north, south and west by developed single and multi-family homes and on the east by existing townhomes.

A majority of the site consists of vacant, undisturbed land that is vegetated with native grasses, weeds, scrub oaks and sage brush. Previous site grading, which appears to consist of fill placement on the order of 5 to 10 feet in depth, has occurred at and around the existing cul-de-sac.

The topography of the project site is variable and the central portion of the lot, where the road and pond will be constructed, sits on a ridgeline that slopes gently to strongly down to the west. The remainder of the property, proposed building lots and greenbelt area, generally slope moderately to steeply down to the south, southwest and northwest at 5 to 25 percent. Steeper natural slopes, greater than 30%, are situated along the southern and northern edges of the property. A maximum elevation difference of approximately 25 to 60 feet appears to exist at each of the lots.

5.0 FIELD INVESTIGATION

The field investigation for this project was conducted on August 18, 2017. Seven (7) test pits were advanced at the approximate locations shown in Figure #2. The test pits were excavated with a PC 138 trackhoe. The test pits were logged and samples were obtained at the time of excavation by an engineer from NWCC. Graphic logs of the exploratory test pits are shown in Figure #3 and #4 along with the associated Legend and Notes.

6.0 LABORATORY INVESTIGATION

Samples obtained from the test pits were examined and classified in the laboratory by the project engineer. Laboratory testing included standard index property tests including natural densities and moisture contents, dry unit weights, grain size analyses and liquid and plastic limits. Swell-consolidation testing was also conducted on relatively undisturbed samples of the natural sands and clays. Swell-consolidation test results are shown in Figures #5 to #7 and the results are discussed in the following section. The results of the laboratory testing are summarized in the Table #1 that follows the figures. Laboratory testing was conducted in general accordance with applicable ASTM specifications.

7.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered in the test pits excavated across the proposed subdivision were highly variable and generally consisted of a layer of natural topsoil and organic materials or existing fill materials overlying natural sands and clays or sands and gravels to the maximum depth investigated, 12 feet beneath existing ground surface (bgs).

Natural topsoil and organic materials were encountered at the ground surface or beneath the existing fill materials in all of the test pits. The layers of topsoil and organic materials were approximately 1 ½ to 3 feet in thickness. The natural topsoil and organic materials were silty dry to moist and dark brown to black in color.

Sand and gravel fill materials were encountered at the ground surface in the central portion of the site (Test Pits 3 and 4) and beneath the proposed roadway and pond. The fill materials ranged from 4 ½ to 9 feet in thickness. The sand and gravel fill materials were silty to clayey, fine to coarse grained with cobbles and boulders, non to very low plastic, medium dense, slightly moist and brown in color. Samples of the fill materials classified as SM and GM soils in accordance with the Unified Soil Classification System (USCS).

Natural sands and clays were encountered below the natural topsoil and organic material and natural sands and gravels in all but two of the test pits. The sands and clays were fine to coarse grained with gravels, low plastic, very stiff to dense, moist to slightly moist and brown in color. Samples of the natural sands and clays classified as SC to CL soils in accordance with the USCS.

Sands and gravels were also encountered below the natural topsoil and organic materials and existing fill materials. The sands and gravels were clayey, fine to coarse grained with cobbles and boulders, low plastic, dense, dry to moist and brown to gray in color.

Swell-consolidation testing conducted on relatively undisturbed samples of the natural sands and clays indicate that the materials tested will exhibited a low swell potential when wetted under a constant load. The swell-consolidation test results are shown in Figures #5 through #7, and all of the other test results are summarized in the associated Table 1.

Groundwater seepage was not encountered in any of the test pits at the time of excavation and no signs of a seasonal high groundwater table were observed. It should be noted that the groundwater conditions at this site can be expected to fluctuate with precipitation and seasonal runoff.

Based on the subsurface conditions encountered at the site, the laboratory test results and our review of the available literature, NWCC recommends that a Site Class C be used for the foundation designs in accordance with Table 20.3-1 in Chapter 20 of ASCE 7-10.

8.0 FOUNDATION RECOMMENDATIONS

Based on the subsurface conditions encountered in the test pits, the results of the field and laboratory investigations and our assumptions regarding the proposed building construction, NWCC believes an economically feasible and safe type of foundation system is spread footings or individual pads with grade beams founded on the natural sand and clays and/or sands and gravels encountered below the topsoil and organic materials and any existing fill materials. The precautions and recommendations itemized below will not prevent the movement beneath the foundation if the underlying sands and clays swell. However, they should reduce the amount of differential movement beneath the foundation system.

1) Footings placed on the undisturbed natural sands and clays and/or sands and gravels should be designed using an allowable soil bearing pressure of 3,000 psf. Based on the swell-potential of

the natural sands and clays, the footings should also be designed for a minimum dead load pressure of at least 700 psf. Increasing minimum dead load pressures will help reduce differential foundation movement if the sands and clays become wetted and swell.

2) Footings or pad sizes should be computed using the above soil pressures and placed on the natural undisturbed sands and clays and/or sands and gravels found beneath the existing topsoil and fill materials and any fill materials.

3) Any topsoil, as well as any existing fill materials or loose and soft natural soils encountered within the foundation excavations should be removed and the excavations extended to competent natural soils prior to concrete placement. The footings may have to be narrow or interrupted to maintain the minimum dead load. The foundation design should be closely checked to assure that it distributes the loads per the allowable pressures given.

4) Foundation walls should be designed and reinforced to span an unsupported distance of 10 feet or the length between pads, whichever is greater.

5) Footings or pads should be placed well enough below final backfill grades to protect them from frost heave. Forty-eight (48) inches is typical for this location considering normal snow cover and other winter factors.

6) Based on experience, we estimate the total settlement for footings and pads designed and constructed as discussed in this section will be approximately 1 inch. Additional bearing capacity values along with the associated settlements are presented in Figure #8.

7) We strongly recommend that the client retain NWCC to observe the foundation excavations when they are near completion to identify the bearing soils and confirm the recommendations in this report.

9.0 FLOOR SLAB RECOMMENDATIONS

NWCC has assumed the proposed residences and garages will be constructed with concrete slab-on-grade floor systems placed at varying depths across the site. The on-site soils, apart from the existing topsoil and organic materials, are capable of supporting slab-on-grade construction. However, floor slabs present a very difficult problem where swelling materials are present near floor slab elevation because sufficient dead load cannot be imposed on them to resist the uplift pressure generated when the materials are wetted and expand. Based on the moisture-volume change characteristics of the sands and clays encountered at this site, we recommend that structural floor systems over well-ventilated crawlspaces or void form be used in the proposed residences.

If the client elects to construct concrete slab-on-grade floor systems, we recommend the following special design and construction precautions be followed so that the amount of movement in the floor slabs can be reduced, if the sands and clays become wetted.

1) Floor slabs should be separated from all bearing walls, columns and their foundation supports with a positive slip joint. We recommend the use of ½-inch thick cellotex or impregnated felt.

2) Interior non-bearing partition walls resting on the floor slabs should be provided with a slip joint, preferably at the bottom, so that in the event the floor slab moves, this movement is not transmitted to the upper structure. This detail is also important for wallboard and doorframes and is shown in Figure #9.

3) A minimum 6-inch gravel layer should be provided beneath all floor slabs to act as a capillary break and to help distribute pressures. Prior to placing the gravel, the excavation should be shaped so that if water does get under the slab, it will flow to the low point of the excavation. In addition, all of the topsoil and organic materials should be removed prior to placement of the underslab gravels or new structural fill materials.

4) Floor slabs should be provided with control joints placed a maximum of 12 feet on center in each direction to help control shrinkage cracking. The location of the joints should be carefully checked to assure that the natural, unavoidable cracking will be controlled. The depth of the control joints should be a minimum of ¼ the thickness of the slab.

5) Underslab soils should be kept as close as possible to their in-situ moisture content. Excessive wetting or drying of these soils prior to placement of the floor slab could result in differential movement after the slabs are constructed.

6) It has been our experience that the risk of floor slab movement can be reduced by removing at least 2 feet of the expansive materials and replacing them with a well compacted, non-expansive fill. If this is done, or if fills are required to bring the underslab soils to the desired grade, the fill should consist of non-expansive, granular materials. The fill should be uniformly placed and compacted in 6 to 8 inch lifts to at least 95% of the maximum standard Proctor density at or near the optimum moisture content, as determined by ASTM D-698/AASHTO T-99.

The above precautions and recommendations will not prevent floor slab movement in the event the sands and clays beneath the floor slabs undergo moisture changes. However, they should reduce the amount of damage if such movement occurs. The only way to eliminate the risk of all floor slab movement is to construct a structural floor over a well-vented crawl space or void form materials.

10.0 PERIMETER DRAINAGE SYSTEM RECOMMENDATIONS

Any floor levels or crawl space areas constructed below the existing or finished ground surfaces and the foundations should be protected by underdrain systems to help reduce the problems associated with surface and subsurface drainage during high runoff periods.

Localized perched water or runoff can infiltrate the lower levels of the structures at the foundation levels. This water can be one of the primary causes of differential foundation and slab movement. Especially, when expansive soils are encountered. Excessive moisture in crawl space areas or lower levels can also lead to rotting and mildewing of wooden structural members and the formation of mold and mold spores. Formation of mold and mold spores could have detrimental effects on the air quality in these areas, which in turn can lead to potential adverse health effects.

Drains should be located around entire perimeter of the lower levels and be placed and at least 12 inches below any floor slab or crawl space levels and at least 6 inches below the foundation voids and bottom of the foundation walls or footings. NWCC recommends the use of perforated PVC pipe for the drainpipe, which meets or exceeds ASTM D-3034/SDR 35 requirements, to minimize potential for pipe crushing during backfill operations. Holes in the drainpipe should be oriented down between 4 o'clock and 8 o'clock to promote rapid runoff of water. Drainpipe should be surrounded with at least 12 inches of free draining gravel and should be protected from contamination by a filter covering of Mirafi 140N subsurface drainage fabric or an equivalent product. Drains should have a minimum slope of 1/8 inch per foot and be daylighted at positive outfalls protected from freezing, or be led to sumps from which water can be pumped. The use of interior laterals, multiple daylights or sumps may be required for the proposed structure. Caution should be taken when backfilling so as not to damage or disturb the installed underdrains. NWCC recommends the drainage systems include a cleanout every 100 feet, be protected against intrusion by animals at outfalls and be tested prior to backfilling. NWCC also recommends the client retain our firm to observe the underdrain systems during construction to verify that they are being installed in accordance with recommendations provided in this report and observe a flow test prior to backfilling the system.

In addition, NWCC recommends an impervious barrier be constructed to keep water from infiltrating through the voided areas and/or under the foundation footings. Barrier should be constructed of an impervious material, which is approved by this office and placed below the perimeter drain and up against the sides of the foundation walls. A typical perimeter/underdrain detail is shown in Figure #10.

Placement of and impervious membrane and/or properly compacted clays in crawl space areas to the top of the footings or at least 12 inches above the top of the foundation voids or bottom of the foundation walls should help reduce the moisture problems in these areas.

11.0 FOUNDATIONS WALLS AND RETAINING STRUCTURE RECOMMENDATIONS

Foundation walls and retaining structures, which are laterally supported and can be expected to undergo only a moderate amount of deflection (at rest), may be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of 45 pcf for imported, free draining granular backfill and 55 pcf for the on-site soils.

Cantilevered retaining structures on the site can be expected to deflect sufficiently to mobilize the full active earth pressure condition. Therefore, cantilevered structures may be designed for a lateral earth pressure computed on the basis of an equivalent fluid unit weight of 35 pcf for imported, free draining granular backfill and 45 pcf for the on-site soils.

Foundation walls and retaining structures should be designed for appropriate hydrostatic and surcharge pressures such as adjacent buildings, traffic and construction materials. An upward sloping backfill and/or natural slope will also increase the earth pressures on foundation walls and retaining structures.

NWCC recommends imported granular soils for backfilling foundation walls and retaining structures because their use results in lower lateral earth pressures. The imported granular materials should be placed to within 2 to 3 feet of the ground surface. Imported granular soils should be free draining and have less than 7 percent passing the No. 200 sieve. The granular soils behind foundation and retaining walls should be sloped from the base of the wall at an angle of at least 45 degrees from the vertical. The upper 2 to 3 feet of fill should be a relatively impervious soil or pavement structure to prevent surface water infiltration into the backfill.

Wall backfill should be carefully placed in uniform lifts and compacted to at least 95 % of the maximum standard Proctor density and within 2% of the optimum moisture content. Care should be taken not to overcompact the backfill since this could cause excessive lateral pressure on the walls. Some settlement of deep foundation wall backfill materials will occur even if the material is placed correctly.

12.0 SITE DRAINAGE RECOMMENDATIONS

Proper surface drainage at these lots is of paramount importance for minimizing the infiltration of surface drainage into the wall backfill and bearing soils, which could result in increased wall pressures, differential foundation and slab movement. The following drainage precautions should be observed during construction and at all times after the structures have been completed:

1) Ground surface surrounding the structures should be sloped (minimum of 1.0 inch per foot) to drain away from the structure in all directions to a minimum of 10 feet. Ponding must be avoided. If necessary, raising the top of foundation walls to achieve a better surface grade is advisable.

2) Non-structural backfill placed around the structures should be compacted to at least 95% of the maximum standard Proctor density at or near the optimum moisture content in order to minimize future settlement of the fill. Backfill should be placed immediately after the braced foundation walls are able to structurally support the fill. Puddling or sluicing must be avoided.

3) Top 2 to 3 feet of soil placed within 10 feet of the foundations should be impervious in nature to minimize infiltration of surface water into the wall backfill.

4) Roof downspouts and drains should discharge well beyond the limits of all backfill. Roof overhangs, which project two to three feet beyond the foundations, should be considered if gutters are not used.

5) Landscaping, which requires excessive watering and lawn sprinkler heads, should be located a minimum of 10 feet from the foundation walls of the structures.

6) Plastic membranes should not be used to cover the ground surface adjacent to foundation walls.

13.0 SITE GRADING RECOMMENDATIONS

All fill materials placed beneath the interior floor slabs, exterior flat work, pavement areas, underground utilities and within the proposed pond should be compacted to at least 95 percent of the maximum standard Proctor density and within 2 percent of the optimum moisture content as determined in accordance with ASTM D698/AASHTO T99. The fills placed in these areas should not contain boulders, topsoil, organics or other deleterious substances. The fill materials placed in the landscaped areas should be compacted to at least 90 percent of the maximum standard Proctor density. The materials not suitable for use under the buildings and pavement areas should be placed in the bottom of the fills in landscaped areas, where some settlement can be tolerated.

Site grading should be carefully planned to provide positive surface drainage away from all the buildings and pavement areas. The buildings and pavement areas should be placed as high as possible on the sites so that positive drainage away from these structures can be provided. Surface diversion features should be provided around the paved areas to prevent surface runoff from flowing across the paved surfaces.

Although site grading plans for each of the lots were not available at the time of this report, we have assumed that cuts and fills of up to 5 to 15 feet in depth may be required to develop the individual lots. We recommend that the final fill slopes not exceed 2 (H) to 1 (V) configuration if they are properly compacted and drained. Positive surface drainage should be provided around all permanent cut and fill slopes to direct surface drainage away from the slope faces. All cut and fill slopes and other stripped areas should be protected against erosion by revegetation or other methods.

14.0 PAVEMENT RECOMMENDATIONS

Pavement section alternatives presented below are based on laboratory test results, assumed traffic loadings indicated below, pavement design procedures presented in the AASHTO Guide for Design of Pavement Structures and our experience with similar sites and conditions in the Steamboat Springs area. AASHTO pavement design procedures have been adopted and are used by the Colorado Department of Transportation (CDOT).

Based on the results of the field and laboratory investigations and our understanding of the proposed construction, it appears the materials to be encountered at proposed pavement subgrade elevations along

River Queen Lane will likely consist of existing sand and gravel fill materials. These materials generally classified as SC to GC soils in accordance with the Unified Soil classification system and as A-4 to A-6 soils in accordance with the AASHTO classification system. These materials are generally considered to provide adequate to fair support for pavement structures. Using these classifications and our experience with similar soils, NWCC has correlated the soil classification to a modulus of subgrade reaction of 3,750 psi, which was used in the pavement design calculations.

NWCC recommends the pavement areas subjected to both automobile and truck traffic, such as the new along River Queen Lane be constructed with a composite pavement section consisting of at least 4 inches of asphalt placed over 4 inches of Class 6 aggregate base course and 8 inches of subbase materials consisting of Class 2 aggregate base course. Pavements for driveways and other areas subjected to automobile traffic only should receive a composite pavement section consisting of at least 3 inches of asphalt placed over 4 inches of Class 6 aggregate base course and 8 inches of subbase materials.

NWCC recommends the areas subjected to heavy truck traffic turning movements, such as in the apron areas in front of the trash dumpster approach areas be paved with a rigid pavement section consisting of at least 7 inches of Portland cement concrete (PCC). Sidewalks subjected to pedestrian traffic should be paved using at least 4 inches of PCC and 5 inches in areas where occasional emergency or snow removal vehicle traffic is anticipated.

Prior to placement of subbase materials, NWCC recommends the exposed subgrade soils be uniformly mixed, moisture treated to within 2 % of the optimum moisture content and then be recompacted to at least 95 % of the maximum standard Proctor density. Depending on the time of year when subgrade preparation is considered, moisture conditioning including drying and/or moistening of subgrade materials will most likely be required in order to attain uniform compaction. NWCC also recommends that the properly moisture conditioned and recompacted subgrade soils be proofrolled with a loaded tandem dump truck prior to placing the subbase gravels. Areas exhibiting deflection and rutting will most likely require deeper stabilization. The depth and type of stabilization should be determined at the time of construction.

NWCC recommends the asphalt pavement material consist of an approved "Superpave" mix designed by a qualified, registered engineer. The mix design should be designed using the SX gradation and mixed with PG 58-28 oil or other performance graded asphaltic materials. The mix should be produced and placed by a qualified contractor and should be compacted to between 92 and 96 percent of the maximum theoretical (Rice) density. Quality control activities should be conducted on paving materials at the time of placement.

Base course materials should consist of a well-graded aggregate base course material that meets CDOT Class 6 ABC grading and durability requirements. Base course and subbase materials (Class 2 ABC) should be uniformly placed and compacted in 4 to 6-inch loose lifts to at least 95 % of the maximum modified Proctor density and within +/- 2 % of the optimum moisture content as determined by ASTM D1557.

Concrete pavement materials shall be based on a mix design established by a qualified engineer. Concrete should have a minimum 28-day compressive strength of 4,500 psi, be air entrained with approximately 6 percent air and have a maximum water/cement ratio of 0.42. Concrete should have a maximum slump of 4 inches and should contain control joints not greater than 12 feet on centers. The depth of the control joints should be at least ¼ of the slab thickness.

The collection and diversion of surface and subsurface drainage away from the paved areas is extremely important to satisfactory performance of the pavement. The design of the surface and subsurface drainage features should be carefully considered to remove all water from paved areas and to prevent ponding of water on and adjacent to paved areas. NWCC recommends subgrade areas be graded to drain if feasible so that surface runoff is not allowed to pond on the subgrade surface.

15.0 LIMITATIONS

The recommendations given in this report are based on the subsurface conditions encountered in the test pits advanced across the project site, our assumptions regarding the proposed construction and the behavior of structures at neighboring, similar sites. We believe that this information gives a high degree of reliability for anticipating the behavior of the proposed structures; however, our recommendations are professional opinions and cannot control nature, nor can they assure the soils profiles beneath those or adjacent to those observed. No warranties expressed or implied are given on the content of this report.

Swelling soils were encountered throughout the subdivision. These soils are stable at their natural moisture content but can shrink or swell with changes in moisture. The behavior of swelling soils is not fully understood. The swell potential of any particular site can change erratically both in lateral and vertical extent. Moisture changes also occur erratically, resulting in conditions, which cannot always be predicted. The recommendations presented in this report are based on the current state of the art for foundations and floor slabs on swelling soils. The owner should be aware that there is a risk in construction on these types of soil. Performance of the structures will depend on following the recommendations and in proper maintenance after construction is complete. As water is the main cause for volume change in these soils, it is necessary that the changes in moisture content be kept to a minimum. This requires judicious irrigation and providing positive surface drainage away from the structures. Any distress noted in the structures should be brought to the attention of this office.

This report is based on the investigation at the described site and on the specific anticipated construction as stated herein. If either of these conditions is changed, the results would also most likely change. Therefore, we strongly recommend that our firm be contacted prior to finalizing the construction plans so that we can verify that our recommendations are being properly incorporated into the construction plans. Man-made or natural changes in the conditions of a property can also occur over a period of time. In addition, changes in requirements due to state of the art knowledge and/or legislation do from time to time occur. As a result, the findings of this report may become invalid due to these changes. Therefore, this report is subject to review and not considered valid after a period of 3 years or if conditions as stated above are altered. It is the responsibility of the owner or his representative to insure that the information in this report is incorporated into the plans and/or specifications and construction of the project. It is advisable that a contractor familiar with construction details typically used to dealing with the local subsoils and climatic conditions be retained to build the structures.

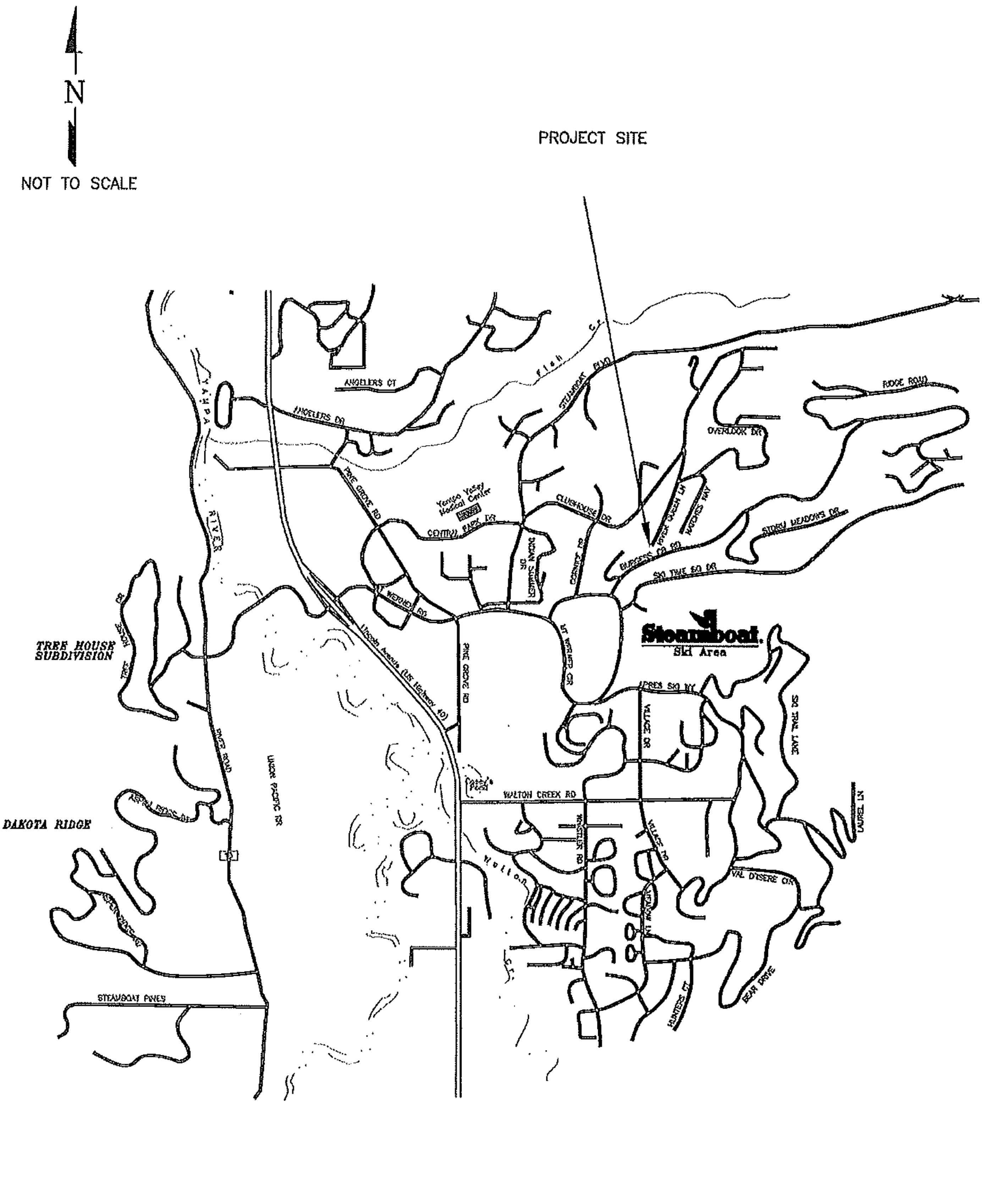
If you have any questions regarding this report or if we may be of further service, please do not hesitate to contact us.

Sincerely,
NWCC, INC.

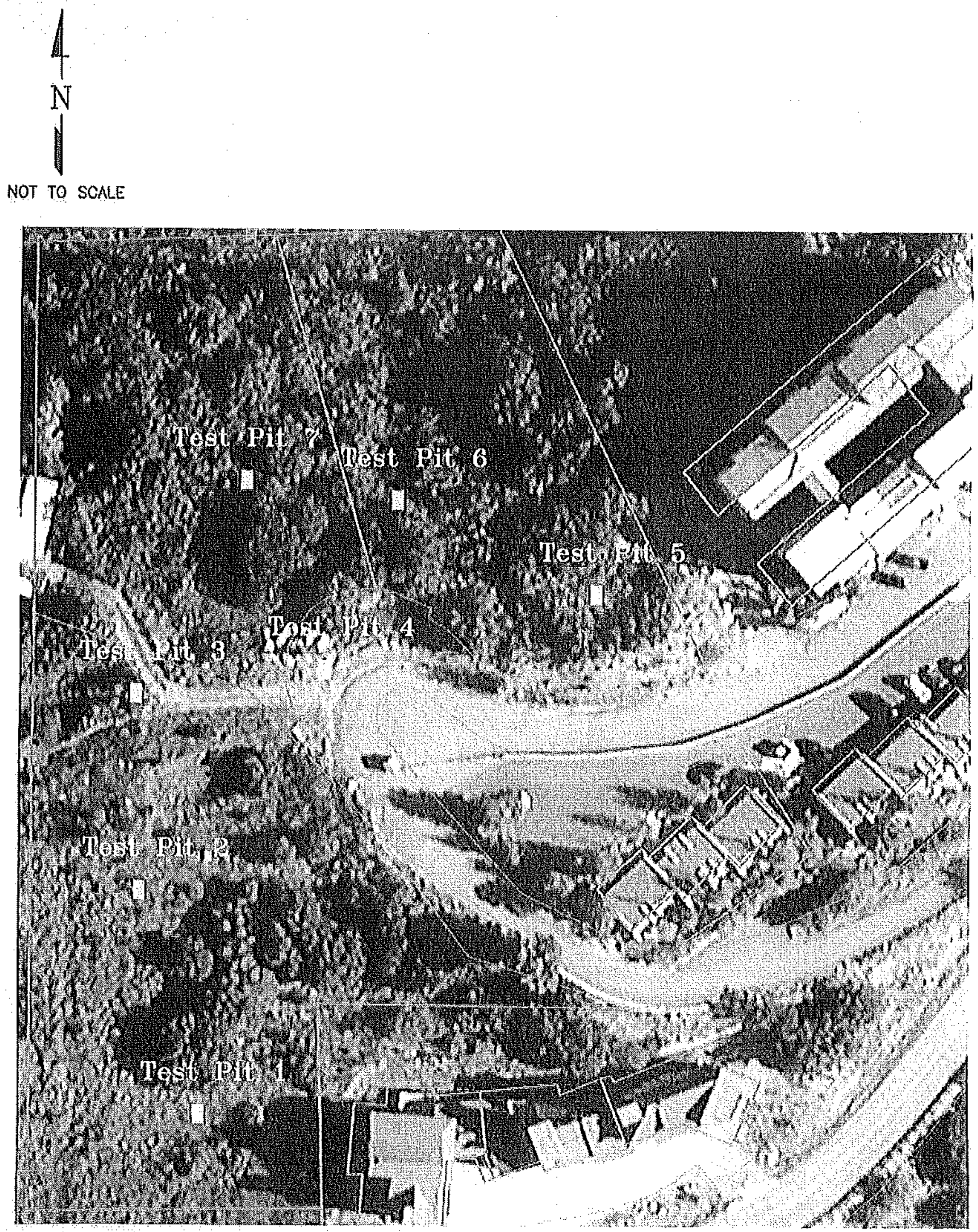
Brian D. Len, P.E.
Principal Engineer

Reviewed by Timothy S. Travis, P.E.
Sr. Project Engineer

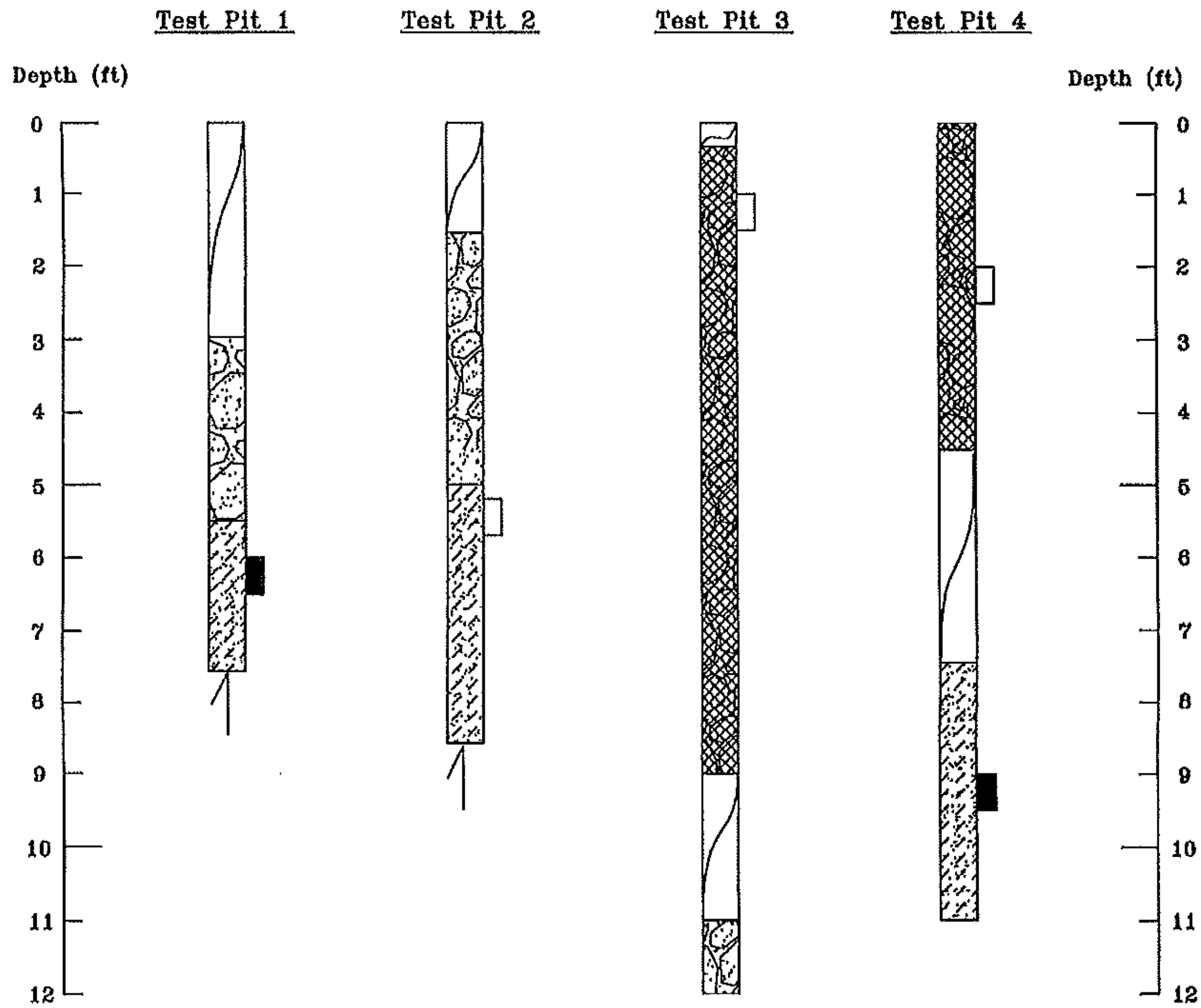
cc: Erik Griepentrog – Landmark Consultants



Title: VICINITY MAP	Date: 9/5/2017	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering · Materials Testing (970)879-7888 · Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Lockhart Subdivision	Job No. 17-10640	
Location: River Queen Lane, Steamboat Springs, CO	Figure #1	



Title: SITE PLAN – TEST HOLE LOCATIONS	Date: 9/6/2017	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering · Materials Testing
Job Name: Lockhart Subdivision	Job No. 17-10640	
Location: River Queen Lane, Steamboat Springs, CO	Figure #2	



LEGEND:

Topsoil and Organics: Silty, dry to moist, and dark brown to black.

FILL: Sand and gravel, silty to clayey, fine to coarse grained with cobbles and boulders, non to very low plastic, medium dense, slightly moist and brown.

SANDS AND GRAVELS: Clayey, fine to coarse grained with cobbles and boulders, low plastic, dense, dry to moist and brown to gray.

SANDS AND CLAYS: Fine to coarse-grained with gravels, low plastic, very stiff to dense, moist to slightly moist and brown.

Small Disturbed Bag Sample.

Small Disturbed Bag Sample.

Indicates depth of practical rig refusal on cobbles and boulders.

NOTES:

1) Test pits were excavated on August 18, 2017 with a Komatsu PC 138 trackhoe.

2) Test pit locations were determined by pacing from existing site features.

3) Elevations of the test pits were not measured and the logs are drawn to the depths investigated.

4) The lines between materials shown on the test pit logs represent the approximate boundaries between material types and transitions may be gradual.

Title: LOGS, LEGEND AND NOTES	Date: 9/5/2017
Job Name: Lockhart Subdivision	Job No. 17-10640
Location: River Queen Lane, Steamboat Springs, CO	Figure #3

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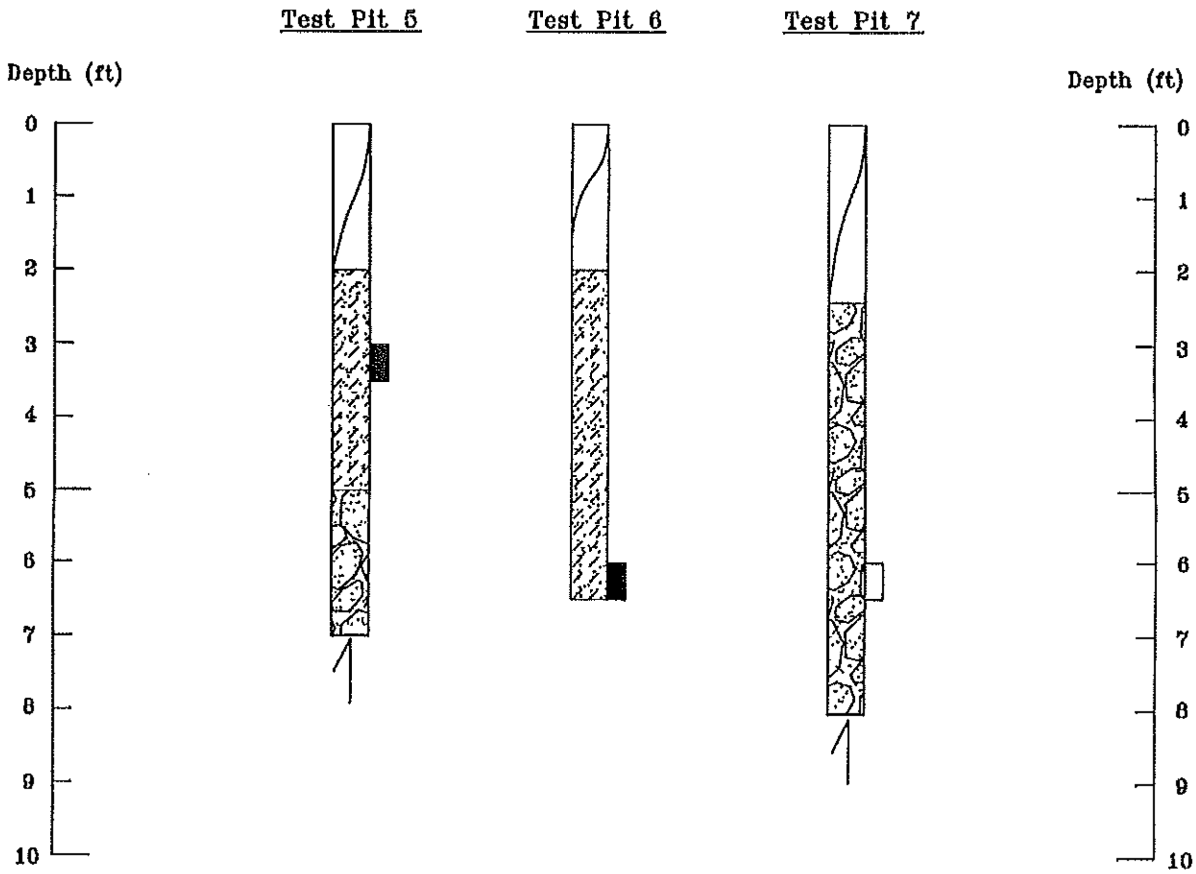

LEGEND:

- Topsoil and Organics: Silty, dry to moist, and dark brown to black.
- FILL: Sand and gravel, silty to clayey, fine to coarse grained with cobbles and boulders, non to very low plastic, medium dense, slightly moist and brown.
- SANDS AND GRAVELS: Clayey, fine to coarse grained with cobbles and boulders, low plastic, dense, dry to moist and brown to gray.
- SANDS AND CLAYS: Fine to coarse-grained with gravels, low plastic, very stiff to dense, moist to slightly moist and brown.
- Small Disturbed Bag Sample.
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- Indicates depth of practical rig refusal on cobbles and boulders.

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Title: LOGS, LEGEND AND NOTES	Date: 9/5/2017
Job Name: Lockhart Subdivision	Job No. 17-10640
Location: River Queen Lane, Steamboat Springs, CO	Figure #4

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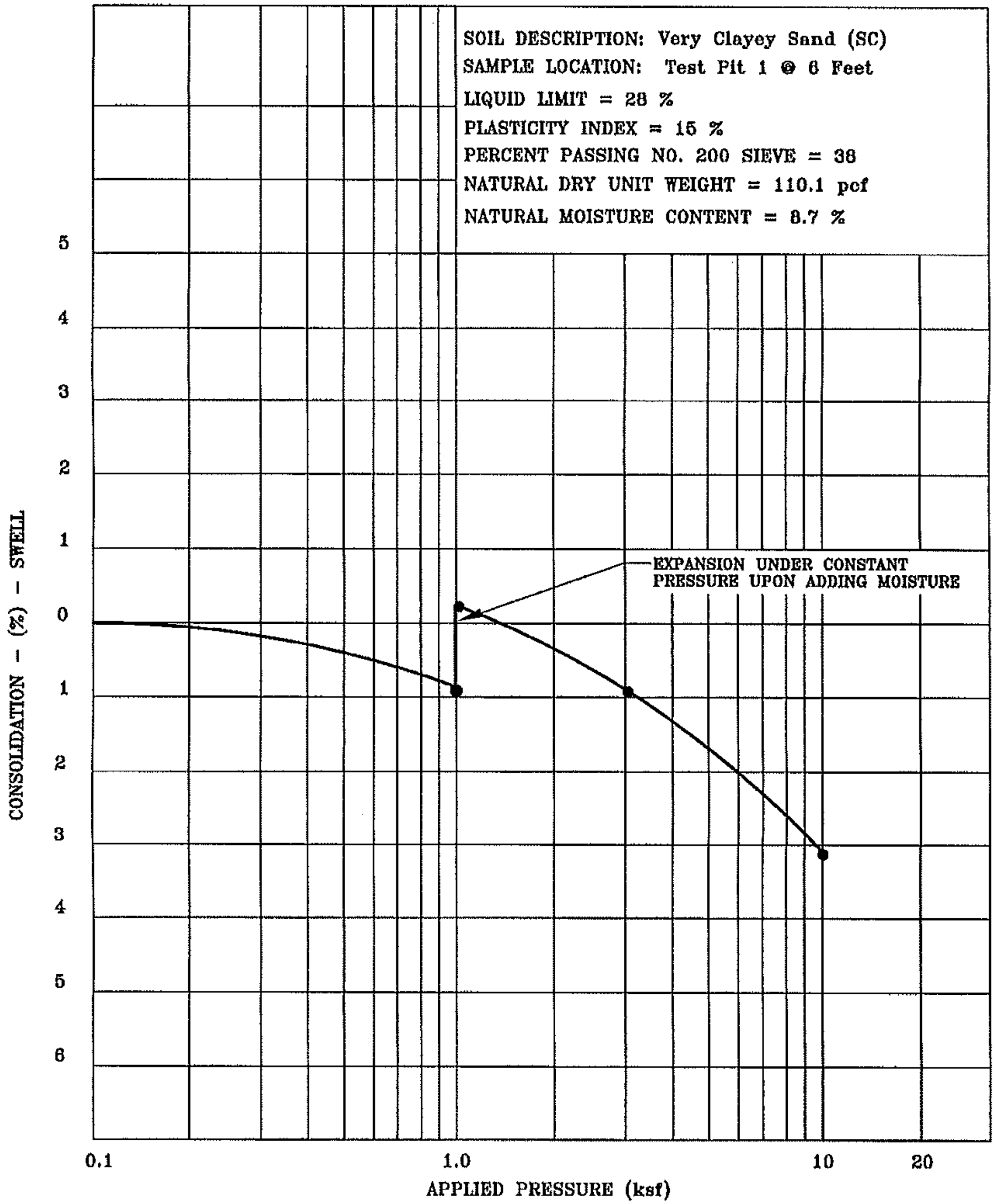
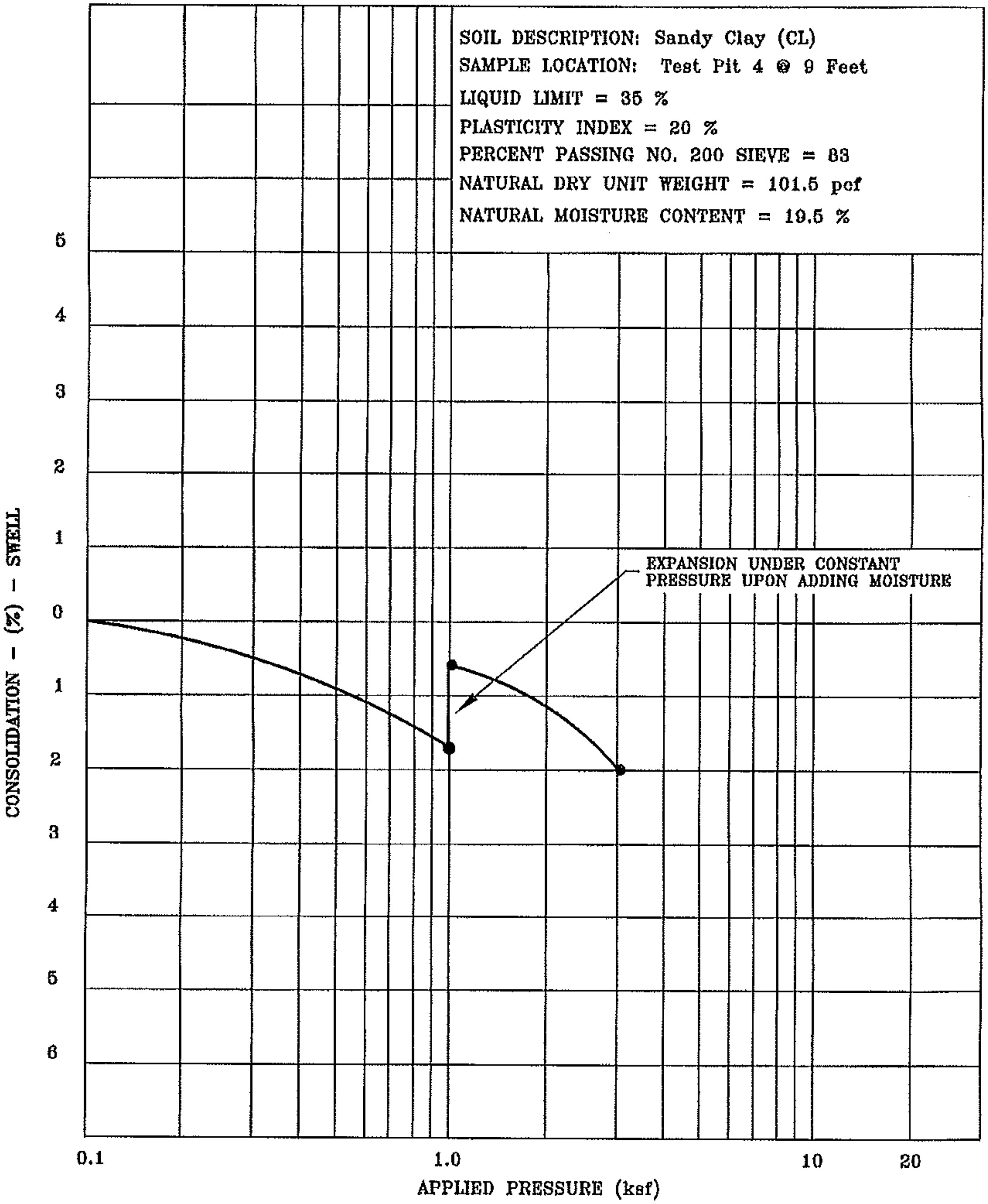
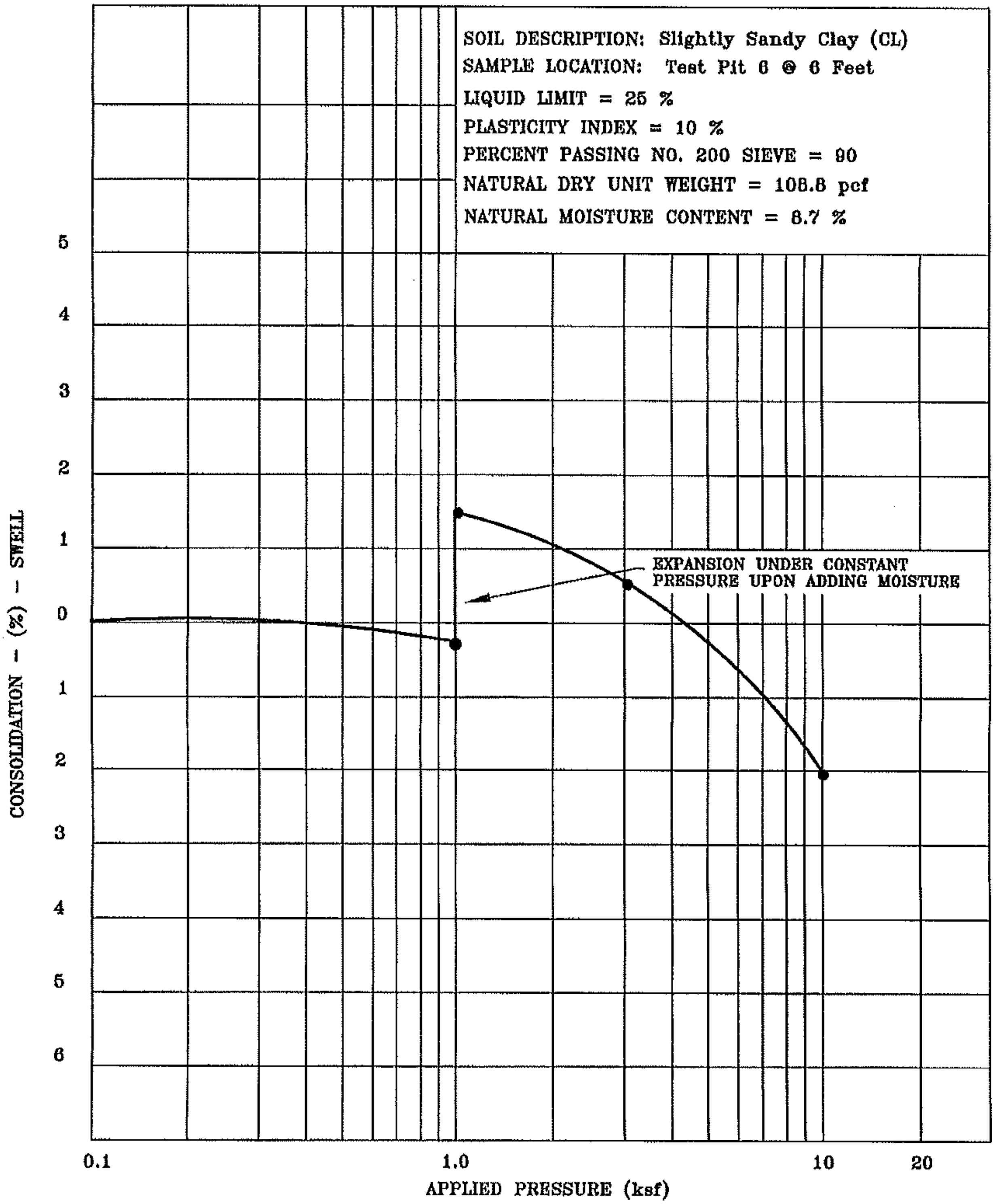


Title: SWELL-CONSOLIDATION TEST RESULTS	Date: 9/5/17	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing (970)879-7888 • Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Lockhart Subdivision	Job No. 17-10640	
Location: River Queen Lane, Steamboat Springs, CO	Figure #5	

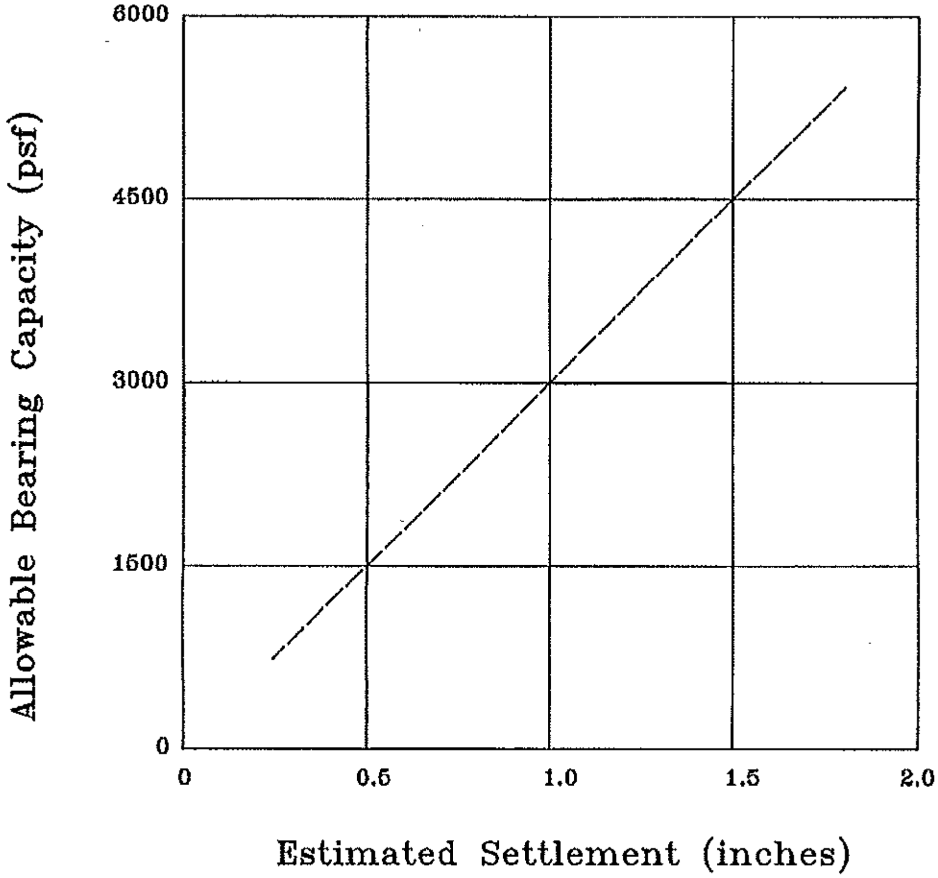


Title: SWELL-CONSOLIDATION TEST RESULTS	Date: 9/5/17
Job Name: Lockhart Subdivision	Job No. 17-10640
Location: River Queen Lane, Steamboat Springs, CO	Figure #6

North West Colorado Consultants, Inc.
Geotechnical / Environmental Engineering - Materials Testing
(970)879-7888 - Fax (970)879-7891
2580 Copper Ridge Drive
Steamboat Springs, Colorado 80487

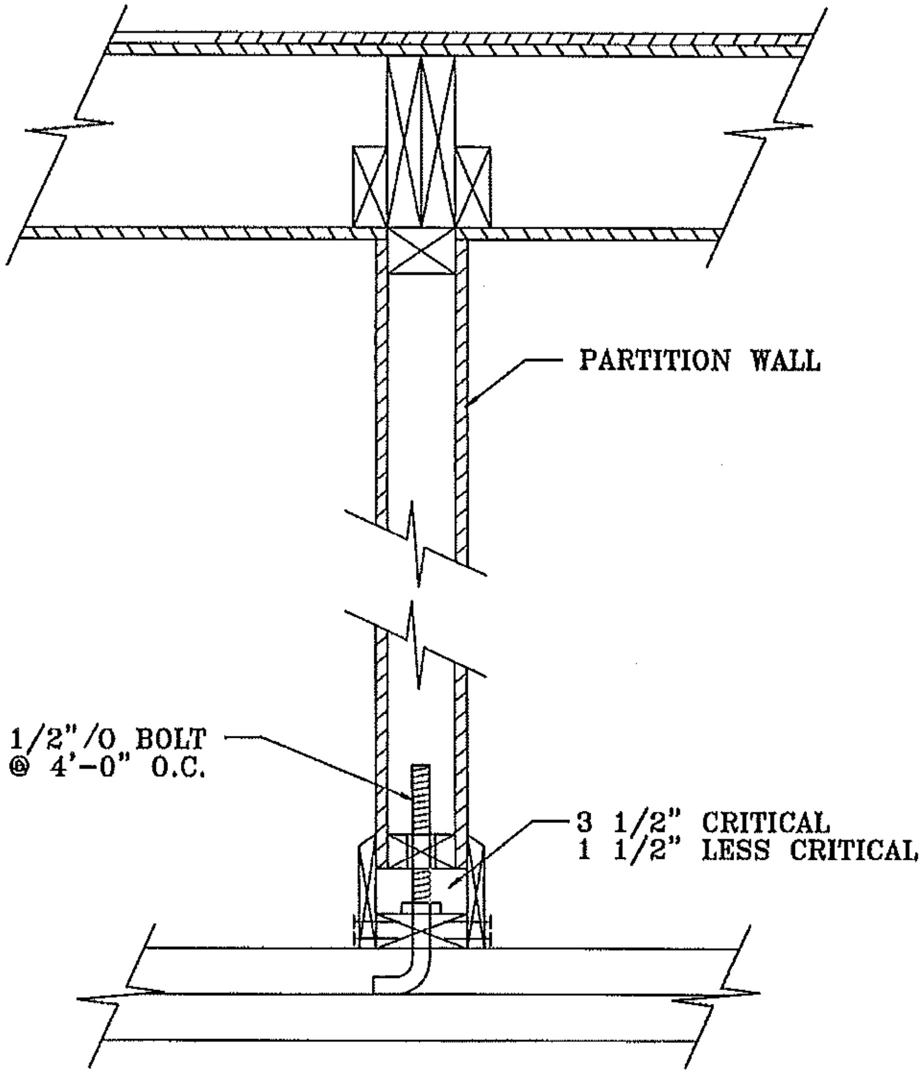


Title: SWELL–CONSOLIDATION TEST RESULTS	Date: 9/5/17		NWCC North West Colorado Consultants, Inc.
Job Name: Lockhart Subdivision	Job No. 17-10640		Geotechnical / Environmental Engineering • Materials Testing (970)879-7888 • Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Location: River Queen Lane, Steamboat Springs, CO	Figure #7		



Note: These values are based on footing widths of 1 to 4 feet. If the footing width is to be greater than 4 feet in width, then we should be notified to re-evaluate these recommendations.

Title: BEARING CAPACITY CHART	Date: 9/5/17	North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering • Materials Testing (970)879-7888 • Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Lockhart Subdivision	Job No. 17-10640	
Location: River Queen Lane, Steamboat Springs, CO	Figure #8	



Title: HUNG PARTITION WALL DETAIL	Date: 9/5/17
Job Name: Lockhart Subdivision	Job No. 17-10640
Location: River Queen Lane, Steamboat Springs, CO	Figure #9

NWCC
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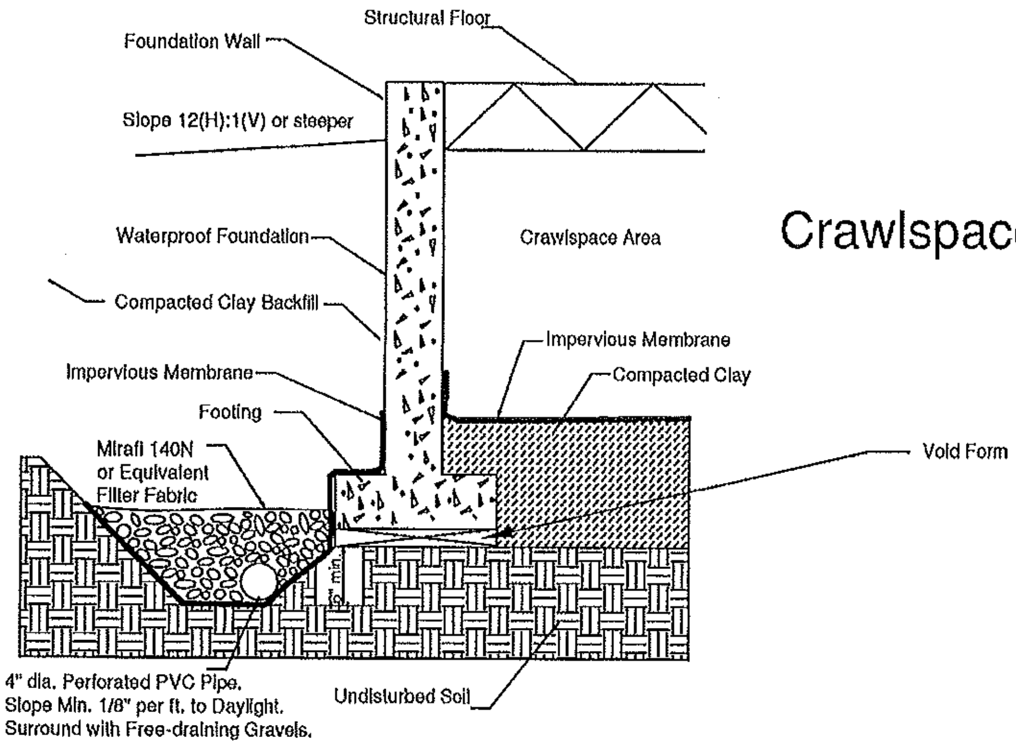
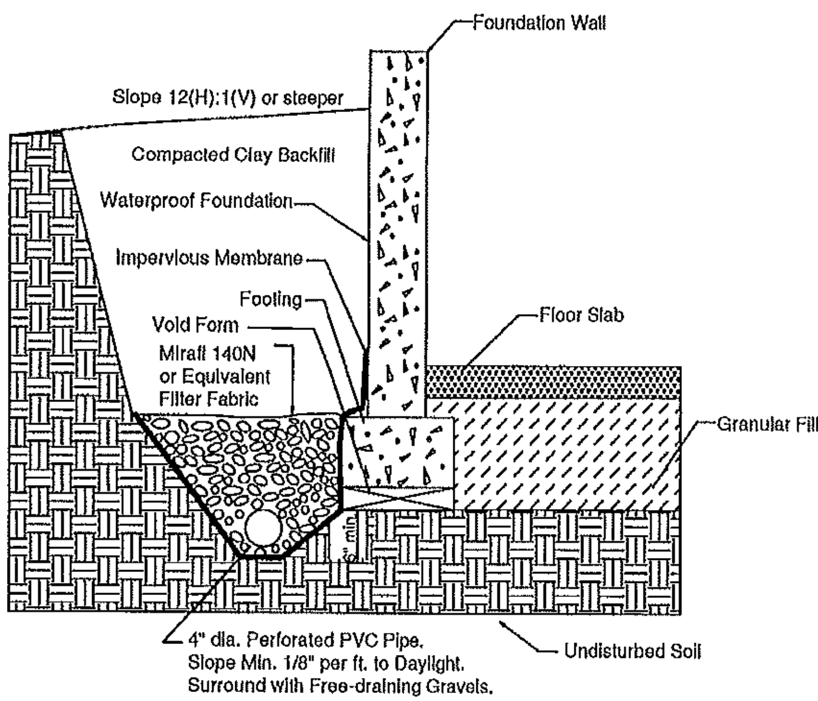


Crawlspace Area



Floor Slab

Title: PERIMETER/UNDERDRAIN DETAIL	Date: 9/5/17	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering • Materials Testing
Job Name: Lockhart Subdivision	Job No. 17-10640	
Location: River Queen Lane, Steamboat Springs, CO	Figure #10	

NWCC, Inc.

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	ATTERBERG LIMITS		GRADATION		PERCENT PASSING No. 200 SIEVE	UNCONFINED COMPRESSIVE STRENGTH (psf)	SOIL or BEDROCK DESCRIPTION	UNIFIED SOIL CLASS.
TEST PIT	DEPTH (feet)			LIQUID LIMIT (%)	PLASTICITY INDEX (%)	GRAVEL (%)	SAND (%)				
1	6	8.7	110.1	28	15	20	42	38		Gravelly Clayey Sand	SC
2	5	10.3		24	11	21	48	31		Gravelly Clayey Sand	SC
3	1–2	4.0		21	5	41	39	20		Silty Sand and Gravel Fill	GM
4	2–3	5.3		NP	NP	36	47	17		Silty Sand and Gravel Fill	SM
4	9	19.5	101.5	35	20	3	14	83		Sandy Clay	CL
5	3	10.8		32	19	0	24	76		Sandy Clay	CL
6	6	8.7	108.8	25	10	0	10	90		Slightly Sandy Clay	CL
7	6	5.3		20	5	21	53	26		Gravelly Clayey Sand	SC

JOB NUMBER: 17–10640