GEOTECHNICAL EXPLORATION
FOR
LOT 6, BLOCK 11,
GILCREST TOWN,
GILCREST,
WELD COUNTY, COLORADO
FOR
JONOECO, LLC

CDS ENGINEERING CORPORATION
LOVELAND, COLORADO
PROJECT NUMBER
23-1947
MAY 8, 2023

CDS Engineering Corporation

May 8, 2023
Project No. 23-1947

Madeline Pitts
JONOECO, LLC
631 O Street
Greeley, CO 80631

Dear Madeline,

Enclosed is the report you requested of the geotechnical exploration for the proposed buildings to be located on Lot 6, Block 11, Gilcrest Town, Gilcrest, Weld County, Colorado.

The site appears to be suitable for the construction of the proposed buildings, provided the design criteria and recommendations given in this report are followed.

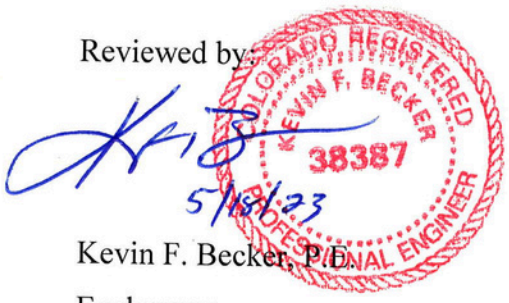
If you have any further questions concerning the information in this report, please contact this office.

Respectfully,

FOR AND ON BEHALF OF
CDS ENGINEERING CORPORATION

Marin Shaffer, Engineering Technician

Reviewed by:



5/18/23

Kevin F. Becker, P.E.

Enclosures

165 2nd Street S.W. • Loveland, CO 80537 • (970) 667-8010 • Fax (970) 667-8024 • www.cds-eng.net

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ATTACHMENTS

SCOPE

This report presents the results of our geotechnical exploration for the proposed buildings to be located at the project site. The buildings are anticipated to be of typical wood frame construction. Crawlspace construction is anticipated for these structures.

This exploration was conducted to provide recommendations pertaining to the type and depth of foundation system, allowable soil bearing pressures, groundwater conditions, and to identify any complications that may be encountered during or after construction due to subsurface conditions.

This report has been prepared for the exclusive use of our client for the project discussed. If the building location or the scope of the project should change, CDS Engineering shall be notified prior to construction to review the report and provide alternate recommendations if deemed necessary. Additional borings may be required to provide the alternate recommendations. Additional fees may apply.

SITE INVESTIGATION

The field investigation performed on April 20, 2023, consisted of drilling, logging, and sampling three (3) test borings within the approximate building envelope at the site. The borings ranged in depth from twelve (12) to sixteen (16) feet. The location of the Test Holes are shown on Figure No. 1.

Boring locations were established by a representative of CDS Engineering Corporation based on locations provided by the client. Graphical logs of the borings are shown on Figure No. 3. The descriptions of the soils are based, primarily, on visual and tactual methods which are subject to interpretation.

The test borings were advanced using a truck mounted, four (4) inch diameter, continuous flight auger drill rig. Laboratory samples were obtained by driving a two and one-half (2½) inch diameter California-type, split barrel sampler twelve (12) inches (or as shown) into undisturbed soils with a 140-pound hammer falling thirty (30) inches. Bag samples of auger cuttings may have also been collected.

Laboratory tests performed were - Natural Moisture and Grain Size Analysis. All tests were conducted in accordance with ASTM standards. A Summary of Test Results is shown on Table No. 1.

SITE LOCATION AND DESCRIPTION

The site is located in Gilcrest, north of 10th Street, west of Vine Street, and on the south side of 11th Street, County, Colorado. The site is in a developed urban subdivision with dirt roads and utilities, and vegetation consists primarily of grasses. The site has a gentle slope to the south.

SUBSURFACE CONDITIONS

Based on the borings drilled within the proposed building footprint, the subsurface conditions at the site consist of sand.

Groundwater levels were recorded after completion of the drilling operations. During our field exploration groundwater was not encountered in the test borings. The groundwater table should be expected to fluctuate throughout the year depending on seasonal moisture variations. Refer to the Log of Borings, Figure No. 3, for additional details specific to each boring.

Although evidence of underground facilities such as, but not limited to, septic tanks/fields, cesspools, cisterns, foundations, utilities or mining operations were not observed during our exploration, such features could be encountered during construction. If unexpected fill or underground facilities are encountered, proper remediation should be taken. Alternate recommendations, other than those provided in this report, may be required.

FOUNDATION RECOMMENDATIONS

The type of foundation best suited for a particular building site is dependent not only on the characteristics of the soil and rock but also depends on the type of structure, depth to groundwater, the proposed depth of excavation, and owner preference. The recommendations that follow are primarily based on the type of soil or bedrock encountered.

Based on the conditions observed in the field and laboratory tests, we recommend the foundation be a continuous spread footing and isolated pad foundation.

Continuous Spread Footing and Isolated Pad Foundation

The foundation should be a continuous spread footing and isolated pad foundation designed for a maximum allowable bearing capacity of 1,000 pounds per square foot (dead load plus full live load). The foundation is to bear on the native, undisturbed sands or gravel mat, and not on unapproved fill, topsoil, or frozen ground. The bottom of all foundation components should be kept at least thirty (30) inches (or per local code) below finished grade for frost protection. The open excavation should not be left open for an extended period of time or exposed to adverse weather conditions. Excessive wetting or drying of the excavation should be avoided during construction. Excavations that are inundated with water may soften and require re-compaction, or removal, of the exposed subgrade soils. The completed open excavation should be observed by a representative of CDS Engineering Corporation in order to verify the subsurface conditions from test-hole data.

In the event that low strength soils are encountered in the excavation, we recommend a layer of washed gravel, or equivalent, be placed in the excavation to provide a stabilizing layer under the footings. The gravel shall have a minimum diameter of ¾" and should have no more than 5% passing the #200 sieve. The gravel should be a minimum of twelve (12) inches thick; however, this depth may be revised at the time of the open hole observation. The gravel should be worked into the excavation with heavy equipment until stable. The placement operations should be observed by the engineer to help assure compliance with the recommendations.

LATERAL EARTH PRESSURES

Lateral earth pressures are forces exerted on earth retaining structures and foundation components, by the soil. The pressure exerted is influenced by wetting of the backfill soils, type and compaction of the backfill and the methods used to compact the backfill. For the soils, above the free groundwater surface at this site, we recommend the foundation components be designed using the following equivalent fluid pressures.

- Active Pressure = 35 pcf
- At Rest Pressure = 50 pcf

These values assume that the positive drainage will be maintained throughout the life of the structure. It is our opinion that the on-site soils encountered could be used as backfill material against foundation walls. The soils shall be moisture conditioned and well pulverized so that all fragments are smaller than six (6) inches. Refer to Appendix 1 for additional backfill information. If there is opportunity for the backfill soils to become saturated, we shall be notified to revise the minimum equivalent fluid density. These values do not include a factor of safety or take into account any surcharge loading.

SLAB CONSTRUCTION

Although crawl space construction is anticipated for this structure, the following may benefit garage slabs and exterior flatwork. Changes in the moisture contents may result in consolidation or swelling of the subsoil, resulting in differential slab movement. The soils encountered and tested at this site are anticipated to exhibit no swell potential as moisture contents are increased. According to the *Guideline for Slab Performance Risk Evaluation* and *Residential Basement Floor System Recommendations*, developed by the Colorado Association of Geotechnical Engineers, slab performance risk at this site would be considered low. Slabs placed on the native, unaltered soils at this site may experience slight heaving and cracking, but should not be excessive.

If slabs-on-grade are chosen and the owner is willing to accept the risks of potential damage from slab movement, slabs should be constructed to be "free-floating" and isolated from all structural members of the foundation, utility lines, and partition walls. There should be a minimum two (2) inch void constructed below partition walls located over slabs-on-grade. The void should be increased to four (4) inches for slabs placed on potentially expansive bedrock stratum. Eliminate under-slab plumbing where feasible. Where such plumbing is unavoidable, it should be pressure tested before and after slab construction to minimize leaks which would result in wetting of the subsoil. Failure to allow the slab to float independently could result in functional, structural, architectural, and utility line damage. All slabs should be scored into maximum 225 square foot areas or maximum dimensions of fifteen (15) feet with a minimum depth of one (1) inch to localize and control any cracking due to heaving. Any slabs less than thirty (30) square feet should be

scored at least once in each direction. The minimum slab thickness should be four (4) inches, with four (4) inches of clean, washed gravel under the slab. Slabs should be reinforced with welded wire fabric, or equivalent, to help control cracking and separation. Fiber mesh shall not be considered an equivalent substitute for the welded wire fabric. Slab-on-grade areas should not be finished for at least two (2) years (preferably three (3) to five (5) years) from the time of substantial completion, to allow for initial movement.

FOUNDATION DRAIN SYSTEM

A perimeter drain system shall be installed where below grade habitable spaces are constructed. The drain shall be constructed around the entire exterior perimeter of the foundation of any below grade habitable space. Perimeter drains around crawl space areas, shall be installed as required by the current building code or by local jurisdictions.

The drain system should contain a four (4) inch diameter perforated drainpipe surrounded by clean, washed rock. There should be a minimum of six (6) inches of gravel over the top of the pipe, for the full width of the trench. The gravel shall be covered with untreated building paper or geotextile fabric to minimize clogging by backfill material. The drain should have a positive slope to a non-perforated sump pit or to daylight, well away from the foundation. The sump pit should be a minimum of twenty-four (24) inches in diameter by two (2) feet deep and should be surrounded by at least six (6) inches of clean gravel similar to that provided around the drain. The sump pit shall be capable of positive gravity or mechanical drainage to remove any accumulated water. The drainage system shall discharge a minimum of five (5) feet beyond the backfill zone. The discharge area should be placed so that it does not interfere with adjacent properties. Typical drain details are provided in Appendix 2 of this report.

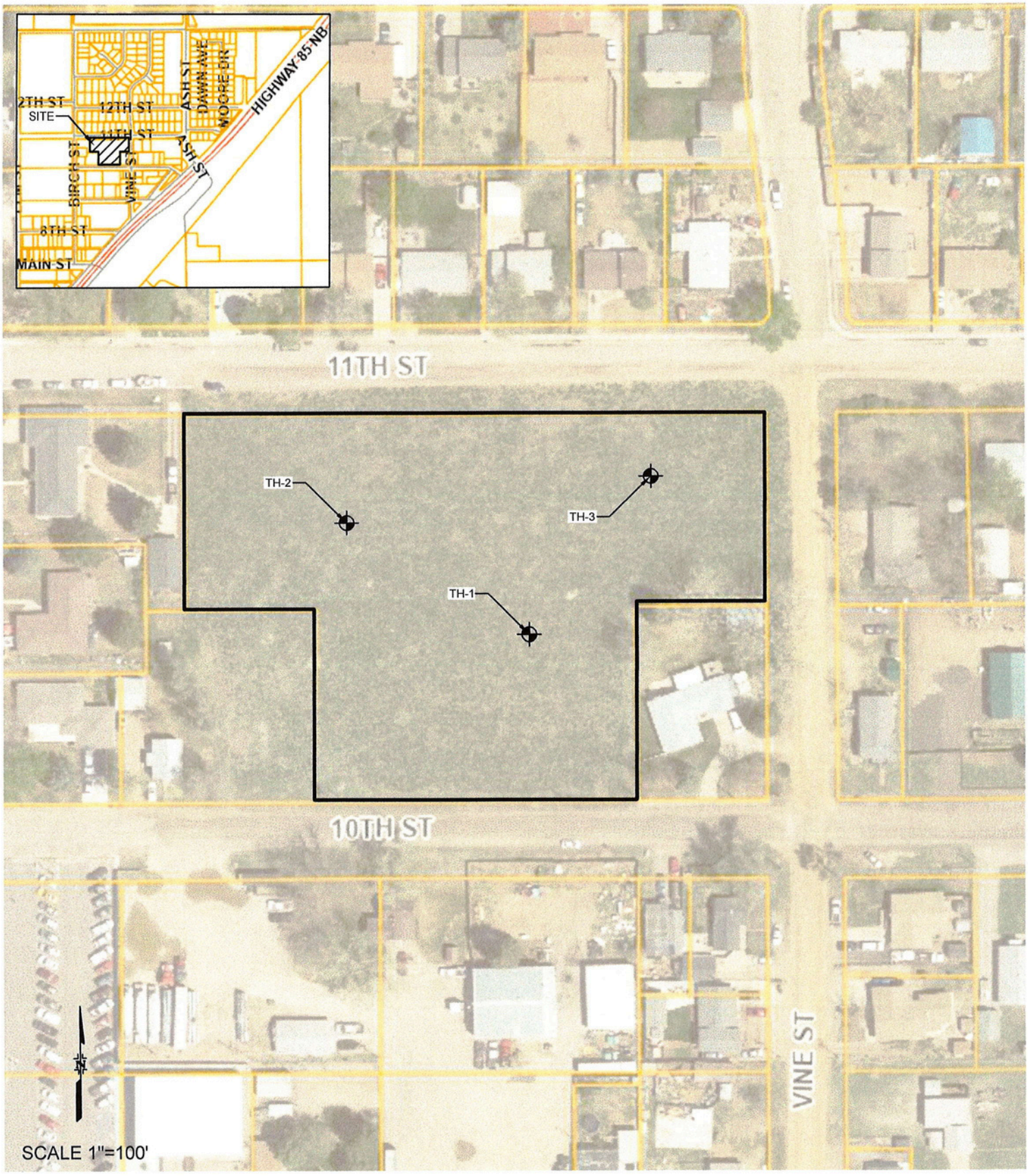
CONCLUSIONS

The soils encountered at this site are anticipated to exhibit no swell potential as moisture contents are increased. Owners should be cautioned of the risk of damage caused by the introduction of excess water to the soils and/or rock. Due to the expansive soils and/or bedrock located within the test perimeter for this analysis, and recognizing the high probability of

construction phase and/or post construction wetting potentials of these soils, it is recommended that the contractor/owner refrain from installing any in-ground or underground water features at this site. In-ground and/or underground water features may consist of, but are not limited to: swimming pools, hot tubs, ponds, on/under-surface streams, fountains, etc.

All new and future owners should be directed to those items under "Post-Construction Site Preparation and Maintenance" in Appendix 1, included in this report. Our experience has shown that damage to foundations usually results from saturation of the foundation soils. Homeowners must assume responsibility for maintaining positive drainage around the structure and incorporating appropriate landscaping that will not interfere with the positive drainage. It is recommended that a copy or summary of this report be provided to any new or future owners of this property. A copy of *A Guide to Swelling Soils for Colorado Homebuyers and Homeowners, Colorado Geological Survey Special Publication 43* should also be provided to any new or future owners of the property.

The findings and recommendations of this report have been obtained in accordance with accepted professional engineering practices in the field of Geotechnical Engineering. However, standard Geotechnical Engineering practices and related government regulations are subject to change. The recommendations provided in this report are for the exclusive use of our client and are not valid for use by others. If the construction takes place approximately three (3) years beyond the date of this report, we should be contacted to review the information with regard to updated governmental requirements or industry standards. Additional fees may apply. There is no other warranty, either expressed or implied. We do not guarantee the performance of the project in any respect, but only that our engineering work and judgments rendered meet the standard of care of our profession. This report applies only to the type of construction anticipated in the area tested. The current technology is not at a stage where a guarantee of "absolutely no damage" can be assured by design and construction practices.



Location of Test Borings

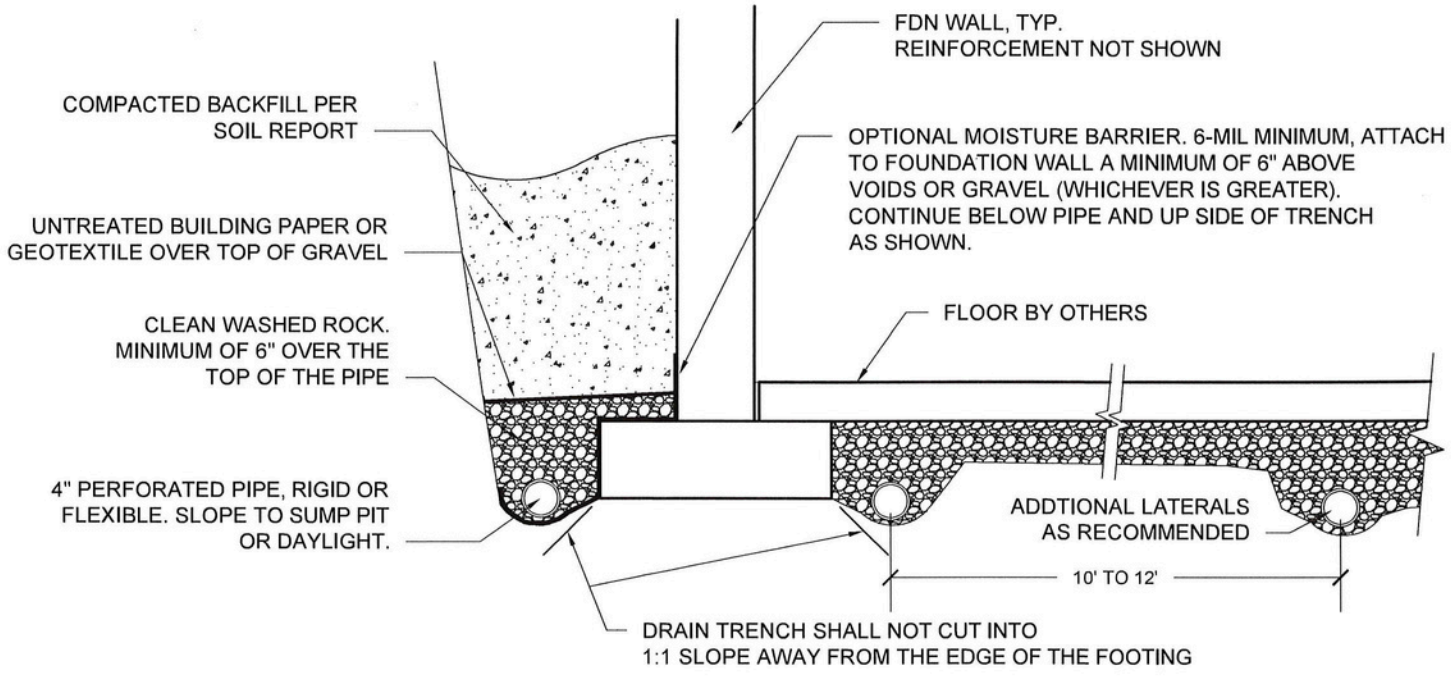
Client: Jonoeco, LLC

Project: Lot 6, Block 11, Gilcrest Town, Gilcrest, Weld County, Colorado

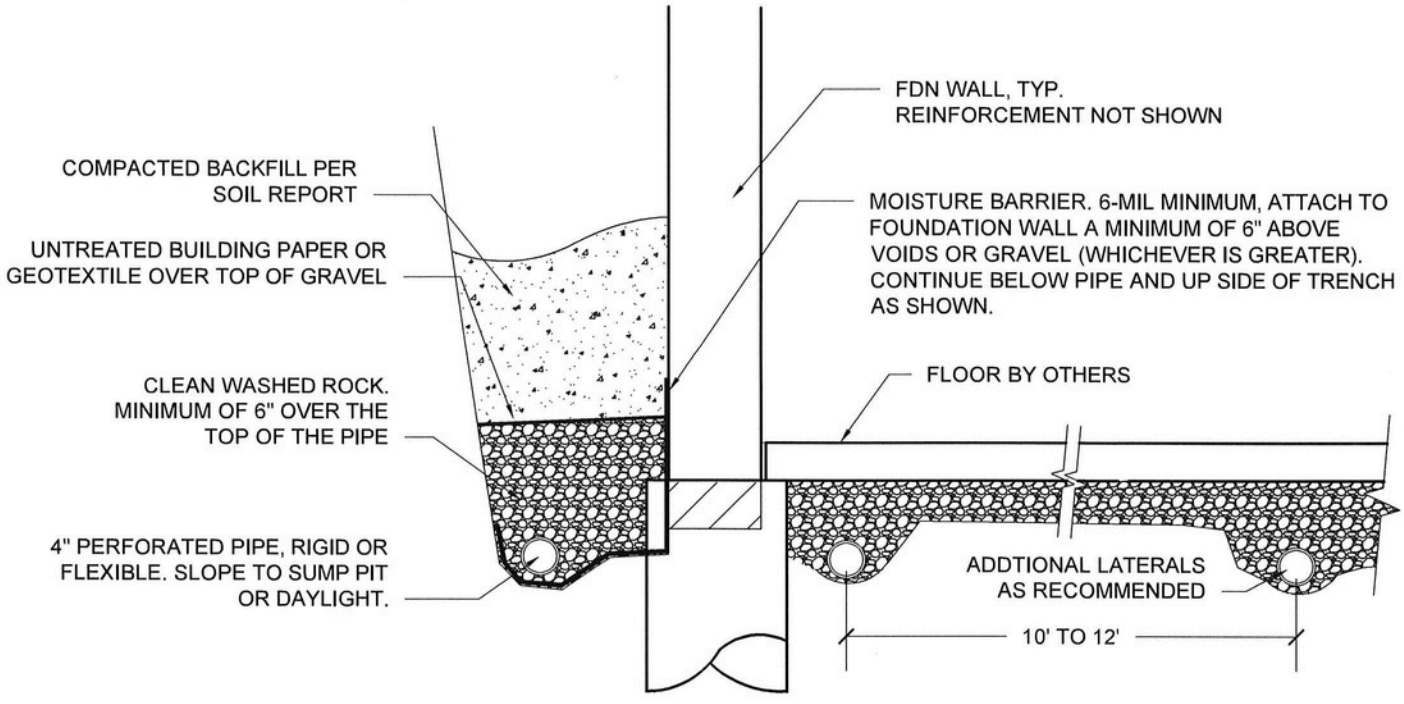
CDS Engineering Corporation
165 2nd St. S.W.,
Loveland, Colorado 80537
Tele: (970) 667-8010

Date:	05/05/23
Project No.	23-1947
Drawn By:	MES
Figure:	1

EXTERIOR AND/OR INTERIOR PERIMETER DRAIN FOOTING FOUNDATION



EXTERIOR AND/OR INTERIOR PERIMETER DRAIN DRILLED PIER FOUNDATION



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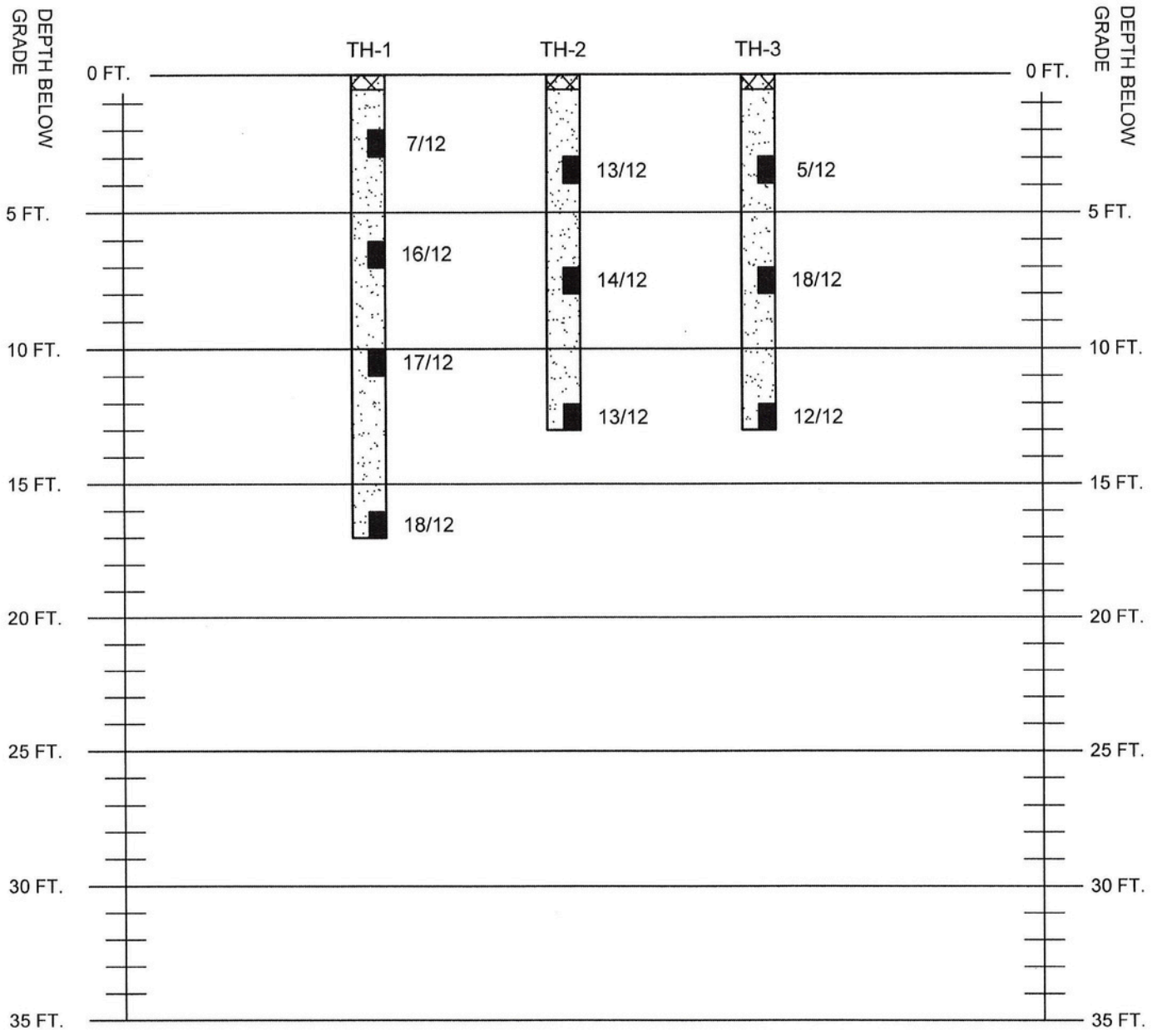
TYPICAL PERIMETER DRAIN RECOMMENDATIONS

SITE CONDITIONS MAY WARRANT REVISIONS TO TYPICAL DETAILS

Scale: N.T.S.	APPENDIX 2



TOP SOIL

SAND: silt lenses, brown/lt. brown/grey, damp to moist, v. loose/loose to medium

Borings drilled 04/20/23
using a 4" diameter, continuous flight truck mounted drilling rig.

Groundwater @ drilling

Groundwater on 04/26/23

All soil and/or rock contacts shown on boring logs are approximate and represent subsurface conditions at time of drilling. Boring logs and information presented on logs are subject to discussion and limitations of this report.

Boring Log			
Client:	Jonoeco, LLC	Date:	05/08/23
Project:	Lot 6, Block 11, Gilcrest Town, Gilcrest, Weld County, Colorado	Project No.	23-1947
		Drawn By:	MES
		Figure:	3

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SUMMARY OF TEST RESULTS
TABLE NO. 1

Project No.: 23-1947

Boring No.	Depth (ft)	# of blows / penetration	Natural Moisture (%)	Natural Dry Density (pcf)	Swell* (%)	Swell Pressure (psf)	Surcharge (psf)	Atterberg Limits LL (%)	Atterberg Limits PI (%)	Unconfined Compressive Strength (psf)	Passing #4 / #200 Seive (%)	Description
1	2	7/12	4.4								100.0 / 14.5	Sand
1	6	16/12	11.3								100.0 / 51.8	Silt
1	10	17/12	11.0								80.2 / 29.5	Sand
1	16	18/12	13.0								96.2 / 19.4	Sand
2	3	13/12	2.8								100.0 / 17.5	Sand
2	7	14/12	12.3								100.0 / 57.1	Silt
2	12	13/12	5.2								100.0 / 8.9	Sand
3	3	5/12	4.6								100.0 / 18.3	Sand
3	7	18/12	13.4								99.7 / 49.7	Sand
3	12	12/12	14.4								99.2 / 17.6	Sand

*Swell due to wetting under a specified surcharge - Negative values indicate consolidation

APPENDIX 1

POST-CONSTRUCTION SITE PREPARATION AND MAINTENANCE

Backfill

When encountering potentially expansive or consolidating soils, measures should be taken to prevent the soil from being wetted during and after construction. Generally, this can be accomplished by ensuring only minimal settlement of the backfill placed around the foundation walls. It should be understood that some backfill settlement is normal and should be anticipated. Areas that do settle should be repaired immediately to prevent ponding around the foundation. Water may need to be added to backfill material to allow proper compaction -- do not puddle or saturate. Backfill should be mechanically compacted to at least 90% of Standard Proctor. Compaction requirements could be verified with field tests by the Engineer. It is the contractor's responsibility to contact the engineer for such tests.

Surface Drainage

The final grade should have a positive slope away from the foundation walls on all sides. At minimum, the slope shall meet the requirements of the governing Building Code. Where site grading allows, we recommend a minimum of six inches (6") in the first five feet (5'). Downspouts and sill cocks should discharge into splash blocks that extend beyond the limits of the backfill. Splash blocks should slope away from the foundation walls. The use of long downspout extensions in lieu of splash blocks is advisable. Surface drainage away from the foundation shall be maintained throughout the lifetime of the structure.

Lawn Irrigation

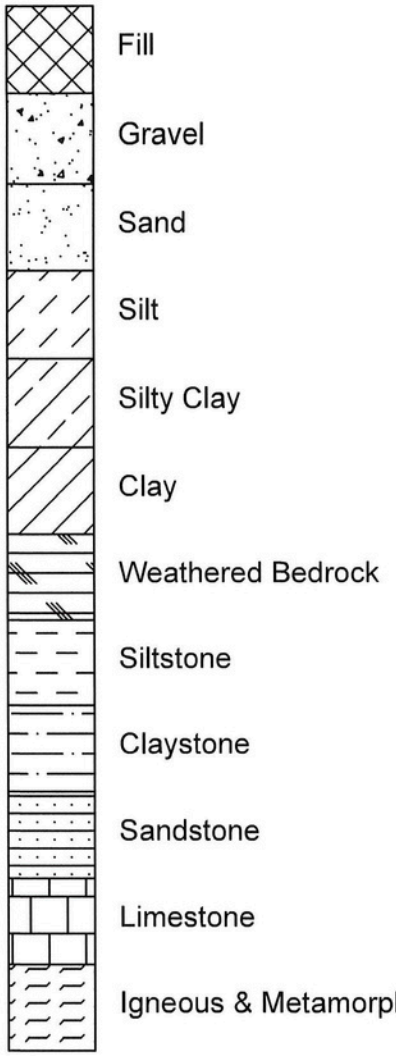
Do not install sprinkler systems next to foundation walls, porches, or patio slabs. If sprinkler systems are installed, the sprinkler heads should be placed so that the spray from the heads under full pressure does not fall within five feet (5') of foundation walls, porches, or patio slabs. Lawn irrigation must be carefully controlled.

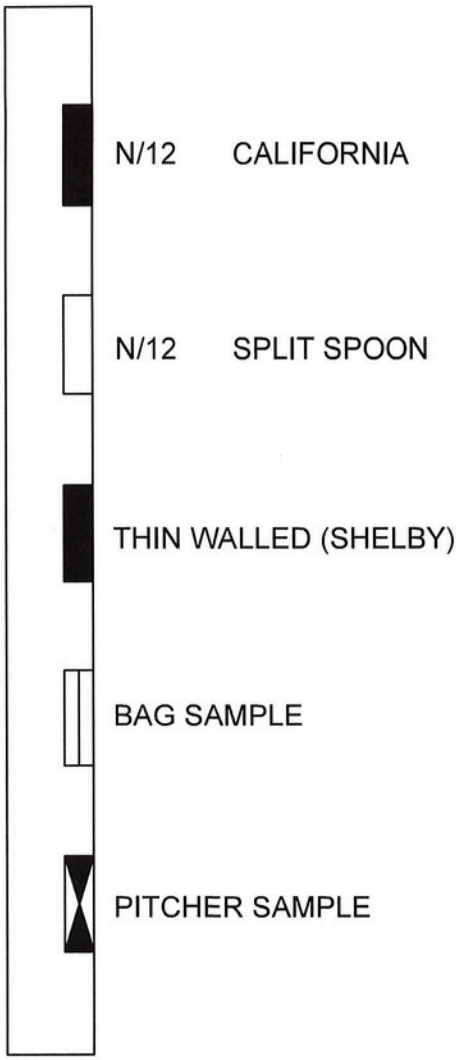
If the future owners desire to plant next to foundation walls, porches, or patio slabs, and are willing to assume the risk of structural damage, etc., then it is advisable to plant only flowers and shrubbery (no lawn) of varieties that require very little moisture. These flowers and shrubs should be hand watered only. Landscaping with a plastic covering around the foundation area is not recommended.

Check with your local landscaper for fabrics which allow evaporation when inhibiting plant growth when a plastic landscape covering is desired.

Experience shows that the majority of problems with foundations due to water conditions are generally due to the owner's negligence of maintaining proper drainage of water from the foundation area. The future owners should be directed to pertinent information in this report.

REV 7/30/13





Penetration Resistance and Strength Classifications are Based on The Standard Penetration Test

Number of Blows Per foot (N)*	Relative Density Cohesionless Soils	Consistency Cohesive Soils	Approximate Cohesion ksf**
0-4	Very Loose	Soft	< 0.5
4-10	Loose	Firm	0.5-1.0
10-30	Medium	Stiff	1.0-2.0
30-50	Dense	Very Stiff	2.0-4.0
50+	Very Dense	Hard	> 4.0

* BLOWS PER FOOT - BLOWS OF 140 LB. HAMMER DROPPED 30 IN. TO DRIVE SPLIT SPOON OR CALIFORNIA SAMPLER 12 IN. (ASTM DL586-67)

** EQUIVALENT TO PP/2 AND Qu/2

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SYMBOLS & SOIL PROPERTIES

FIGURE NO. 2

APPENDIX 3

GENERAL SPECIFICATIONS FOR THE PLACEMENT OF COMPACTED FILL MATERIAL PLACED BELOW A STRUCTURE

Moisture-Density Determination

Representative samples of the materials to be used for fill shall be furnished by the contractor at least seventy two (72) hours prior to compaction testing. Samples with higher moisture contents will require extra time for test results due to the required drying for sample preparation. Tests to determine the optimum moisture and density of the given material will be made using methods conforming to the most recent procedures of ASTM D698 (standard Proctor) or other approved methods, whichever may apply. Copies of the Proctor Curves will be furnished to the contractor. These test results shall be the basis of control for the field moisture/density tests.

Materials

The soils used for compacted fill shall be selected or approved by the Engineer. The material shall be free of vegetation, topsoil or any other deleterious materials. The material should be relatively impervious and non-swelling for the depth specified in the soils report with no material greater than six (6) inches in diameter.

Site Preparation

All timber, logs, trees, brush and rubbish shall be removed from the area and disposed in a manner approved by the local governing agency. All vegetation and a substantial amount of topsoil shall be removed from the surface upon which the fill is to be placed. Where applicable, the surface shall then be scarified to a depth of at least six (6) inches, moistened or dried as necessary to allow for uniform compaction by the equipment being used. The scarified surface shall be compacted to not less than 95% of maximum dry density based on ASTM D698, or to such other density as may be determined appropriate for the materials and conditions and acceptable to the Engineer. Fill shall not be placed on frozen or muddy ground.

Moisture

The fill material, while being compacted should contain, as nearly as practical (typically +/- 2%), the optimum amount of moisture as determined by the Standard Proctor Test ASTM D698, or other approved method. The moisture shall be uniform throughout the fill material. The effort required for optimum compaction will be minimized by keeping soils near optimum moisture contents. Freezing temperatures and/or inclement weather conditions may impede moisture control and compaction operations.

Placement of Fill

The Geotechnical Engineer shall be retained to supervise the placement of fill material. The fill material shall be placed in uniform layers and be compacted to not less than 95% of maximum dry density based on ASTM D698, or to such other density as may be determined appropriate for the materials and conditions and acceptable to the Engineer. Prior to compacting, each layer shall have a maximum loose layer height of twelve (12) inches (or as dictated by the compaction equipment and/or soil conditions) with the surface relatively level. Test areas are recommended to determine the optimum layer thickness. Thinner lifts may be necessary in order to achieve the required compaction. Compacted layer thickness shall not exceed six (6) inches. Each twelve (12) inches of compacted fill shall be approved by the Engineer prior to placing succeeding lifts.

Fill shall be compacted with machinery appropriate for the type of earthen material being installed. Granular materials shall be compacted with vibratory type machinery. Clay and silt material shall be compacted with a sheepsfoot or other segmented pad type compaction equipment. "Wheel rolling" is not considered an appropriate method to achieve the recommended compaction specifications. "Wheel rolling" is not recommended for extensive areas or depths and cannot be relied upon to give uniform results.

Moisture and Density Testing

It is the contractor's responsibility to contact the Engineer with a minimum of 24-hours notice to schedule compaction testing. The density and moisture content of each layer of compacted fill will be determined by the Engineer, or qualified technician, in accordance with ASTM D6938 (nuclear method), or other approved method. If the tests show inadequate density, that layer, or portion thereof, shall be reworked until the required conditions are obtained. Additional layers shall not be placed until each underlying lift has been approved. The results of all density tests will be furnished to both the owner and the contractor by the Engineer.