ADDENDUM NUMBER ONE MEMO

May 22, 2020

From: McAdams

RE: **Cleveland County Foothills Public Shooting Complex Expansion**
Skeet and Trap Expansion
Cleveland County, North Carolina
McAdams Project: CCY-18010

NOTICE TO BIDDERS:

Bidder is hereby notified that this Addendum shall become a part of the Contract Documents and shall be attached to the Project Manual for the Project.

The following items are intended to revise and clarify the Drawings and the Project Manual.

The bidder shall ensure that his Sub-Bidders are in full receipt of the information contained herein.

ADDENDA ITEMS:

1. Coordinate future site visits with Greg Pering, Cleveland County.
2. For bid clarification, the allowances quantities in the bid documents shall be included in the base bid amount. The prices included by the contractor shall be used as unit prices for future change order, if required. The unit of measurement for each unit price is listed in Section 012200 and on the Form of Proposal.
3. The deadline for questions is 8:00am Tuesday, May 25, 2020. If a final addendum is needed, it will be issued by 2:00pm on May 25, 2020.
4. Debris may be hauled to the landfill and dumped without a tipping fee. Concrete must be broken to pieces smaller than 2'x2' and can't have any rebar.
5. The geotechnical report for the site has been provided.
6. A burn permit may be obtained to burn debris on site.
7. The existing trap houses are to be relocated to the new range location. Where the trap houses are removed, the area is to be backfilled and seeded.
8. Contractor is to protect existing concrete and other improvements on existing shotgun ranges when moving trap houses. The contractor shall be responsible for repairing any damaged caused.
9. Trap shooting position shall be marked by a 1" wide by 18" long brass strip and 3" tall distance numbers cast into the surface of the concrete (flush).

10. Skeet shooting positions shall be marked by a 1" wide by 18" long brass strip and 3" tall station number cast into the surface of the concrete (flush).
11. The following flowrates were calculated for the 60" culvert:
    - 10-year storm: 187 cfs
    - 25-year storm: 211 cfs
12. Rutherford Electric will provide the pad mounted transfer near the proposed parking lot. Rutherford Electric will install the transfer and run the electric service from the existing shooting range site. The electrical service alternate bid shall include running service from the pad mounted transformer to the various launcher locations.
13. The existing conditions/survey plans have been included.
14. The NRA standard range details show 4" concrete while other site details show 6" concrete. All concrete sidewalk on the project shall be 6".
15. A wood fence detail has been included.
16. The Owner shall be responsible for moving throwers from existing locations to the proposed range.
17. The contractor shall be responsible for disconnecting the electrical connections and controls from the existing trap houses, prior to relocation.
18. A revised Utility Plan, Sheet C-6 has been included, which shows additional conduit installation.
19. The knee wall note has been removed from the Utility Plan, Sheet C-6.
20. A construction trailer may be located in the existing overflow parking lot near the existing range entrance.
21. CAD file has been included.
22. All concrete sidewalks/flat work shall have a broom finish.
23. Electrical plans (Sheets E0.00, E1.00 and E2.00) have been provided. These plans depict the site with the third range from the west being a trap only field. The current bid documents show this field being a combination skeet/trap field. The alternate bid for electrical service should provide service as shown on the electrical plans included with this addendum, and additional dedicated circuit and electrical power outlet panel with all associated electrical infrastructure to the additional skeet house locations, matching requirement of currently shown skeet house locations. A future bulletin drawing will show the electrical service going to the additional skeet house serving the combination skeet/trap field.

PROJECT MANUAL

None at the time.

DRAWINGS

Revised Construction Drawings

- C-6 – Utility Plan
    - Additional Conduit
    - Knee Wall Removed

Additional Construction Drawings Provided

- S-1 – Existing Conditions
- S-2 – Offsite Parking – Existing Conditions
- E0.00 – Elec. Symbols, Legends and Abbreviations
- E1.00 – Electrical Site Plan
- E5.00 – Elect. Details

Exhibit Drawings

- Wood fence detail

END OF TITLE PAGE

Geotechnical Engineering Report
Foothills Shooting Range – Access Drive and Parking Lot
Cleveland County, North Carolina
S&ME Project No. 1305-19-062

PREPARED FOR:

McAdams
2905 Meridian Parkway
Durham, North Carolina 27713

PREPARED BY:

S&ME, Inc.
3201 Spring Forest Road
Raleigh, North Carolina 27616

July 15, 2019

July 15, 2019

McAdams
2905 Meridian Parkway
Durham, North Carolina 27713

Attention: Mr. Mark Hamlett, P.E.

Reference: **Geotechnical Engineering Report**
Foothills Shooting Range – Access Drive and Parking Lot
Cleveland County, North Carolina
S&ME Project No. 1305-19-062
NC PE Firm License No. F-0176

Dear Mark:

This report presents the results of the geotechnical exploration performed by S&ME, Inc. (S&ME) for the referenced project. Our geotechnical exploration was completed in general accordance with our Proposal No. 13-1800334 REV1, dated May 9, 2019. The purpose of our exploration was to explore and evaluate subsurface conditions as they relate to the planned access drive and parking lot for the referenced project.

This report describes our understanding of the project, presents the results of our field exploration, and our recommendations for a pavement section. A Boring Location Plan, Generalized Subsurface Profile, Boring Logs and laboratory test records are appended.

S&ME appreciates the opportunity to provide our professional engineering services on this project. Should you have any questions concerning this report or if we may be of further assistance, please contact us at your convenience.

Sincerely,

S&ME, Inc.

Joseph R. Williamson, P.E.
Geotechnical Engineer

J. Adam Browning, P.E.
Jul 15 2019 11:15 AM

DocuSign

J. Adam Browning, P.E.
Senior Project Manager
Registration No. 034984

Table of Contents

Appendices

1.0 Project Information

Information for this project is based on email correspondence between Mr. Mark Hamlett, P.E. with McAdams and Mr. Adam Browning, P.E. with S&ME on July 11 through July 12, 2018, and subsequent email with site grading plan provided on May 9, 2019.

We understand that additional development is planned at the Foothills Shooting Complex of Cleveland County located at 283 Fielding Road in Cherryville, North Carolina. We understand the additional development will include the following:

- New parking lot south of the proposed skeet/trap fields. Excavation depths on the order of 1 to 10 feet are anticipated in this parking lot based on the site grading plan provided. We anticipate this parking lot will be gravel paved.
- An approximately 800-feet long access drive from the existing parking lot south of the existing power line easement to the proposed new parking lot south of the proposed skeet/trap fields. We understand the proposed access drive will cross a drainage feature along the proposed alignment. Maximum excavation and fill depths on the order of 4 and 6 feet are anticipated, respectively, based on the site grading plan provided.

Based on our site reconnaissance, the southern portion of the proposed access drive traverses through a wooded area. The northern portion of the access road and the proposed parking lot is currently open, but overgrown with light to moderately thick underbrush. The proposed skeet/trap fields are currently an open field. Based on the topographic information provided, the existing grades at the site range from approximately 848 feet at the existing parking lot area to approximately 794 feet at the creek bottom. The existing grades within the proposed parking area are as high as approximately 834 feet.

2.0 Field Exploration

S&ME performed six (6) soil test borings including four borings along the proposed access drive (A-1 through A-4) and two within the proposed parking lot (P-1 and P-2). Borings were drilled using a CME 550X ATV-mounted drill rig. Borings were advanced using 3¼-inch inside-diameter hollow stem augers. Standard penetration testing (SPT) and split-spoon soil sampling were performed in general accordance with ASTM D1586-11 at 2½-foot intervals to a depth of 10 feet and at 5 foot intervals thereafter. Standard penetration testing was conducted with an autohammer. A bulk sample of auger cuttings was obtained from below the topsoil to a depth of 5 feet in boring P-2. Water levels were measured after completion of drilling. Borings were then backfilled with soil cuttings and a borehole closure appliance.

Ground surface elevations presented on the boring logs were estimated from the site grading plan provided and should be considered approximate.

3.0 Regional Geology

The site is located within the Inner Piedmont Belt of the Piedmont Physiographic Province of North Carolina, as shown in Figure 3-1. The Piedmont Province generally consists of well-rounded hills and ridges, which are dissected by a well-developed system of draws and streams. The Piedmont Province is predominantly underlain by metamorphic rock (formed by heat, pressure and/or chemical action) and igneous rock (formed directly from molten material), which were initially formed during the Precambrian and Paleozoic eras. The volcanic and sedimentary rocks deposited in the Piedmont Province during the Precambrian eras were the host for the metamorphism and were changed to gneiss and schist. The more recent Paleozoic era had periods of igneous emplacement, with at least several episodes of regional metamorphism resulting in the majority of the rock types seen today. The Inner Piedmont Belt is described as a fault bounded stack of thrust sheets containing metamorphic and intrusive rock types. The metamorphic rocks found in this terrain include schist, gneiss, metagraywacke and amphibolite. Intrusive rocks found include granite and diabase dikes.

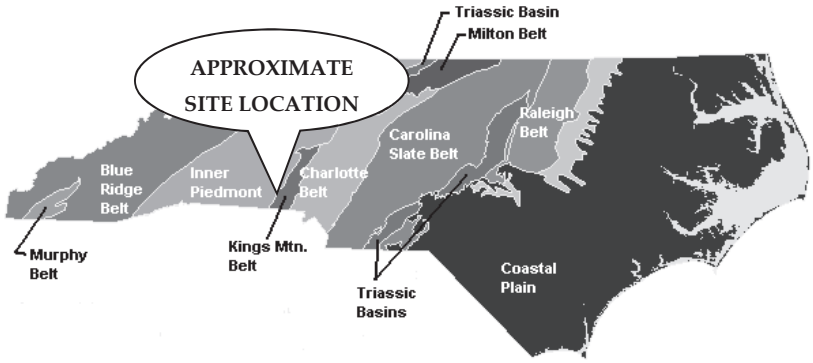


Figure 3-1: Physiographic Provinces of North Carolina

The topography and relief of the Piedmont Province have developed from differential weathering of the igneous and metamorphic rock. Because of the continued chemical and physical weathering, the rocks in the Piedmont Province are now generally covered with a mantle of soil that has weathered in place from the parent bedrock. These soils have variable thicknesses and are referred to as residuum or residual soils. The residuum is typically finer grained and has higher clay content near the surface because of the advanced weathering. Similarly, the soils typically become coarser grained with increasing depth because of decreased weathering. As the degree of weathering decreases, the residual soils generally retain the overall appearance, texture, gradation and foliations of the parent rock.

The boundary between soil and rock in the Piedmont is not sharply defined. A transitional zone termed "partially weathered rock" is normally found overlying the parent bedrock. Partially weathered rock (PWR) is defined for engineering purposes as residual material with Standard Penetration Resistances (N-values) exceeding 100 blows per foot (bpf). The transition between hard/dense residual soils and partially weathered rock occurs at irregular depths due to variations in degree of weathering. A graphic depiction of typical Piedmont weathering profiles is presented in Figure 3-2.

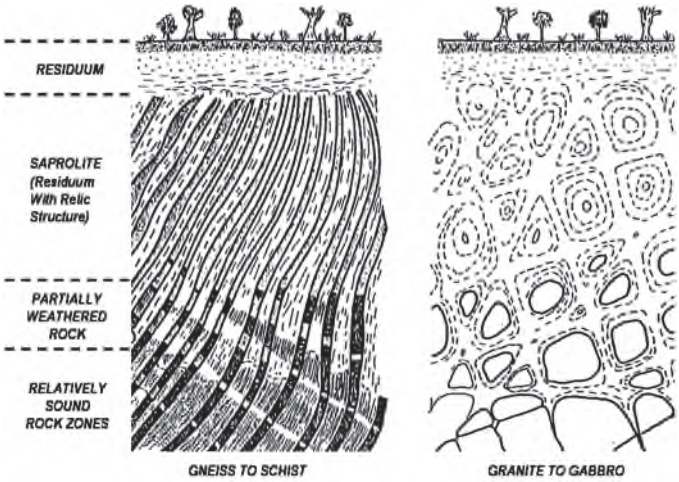


Figure 3-2: Typical Piedmont Weathering Profiles (after Sowers/Richardson, 1983)

Water is typically present in the residual soils and within fractures in the PWR or underlying bedrock in the Piedmont. On upland ridges in the Piedmont, water may or may not be present in the residual soils above the PWR and bedrock. Fluctuations in water levels are typical in residual soils and PWR in the Piedmont, depending on variations in precipitation, evaporation and surface water runoff. Seasonal high water levels are expected to occur during or just after the typically wetter months of the year (November through April).

4.0 Surface & Subsurface Conditions

General descriptions of encountered soils are presented below. More detailed information is available on individual boring logs. Please note that changes in soil type with depth is often gradual. Stratification lines shown on boring logs should be considered approximate.

Topsoil (cultivated soil with organics) was encountered at the surface of all borings, ranging in thickness from 2 to 3 inches. Topsoil is typically a dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is unsuitable for engineering purposes. The topsoil depths provided in this report are based on measurements made during drilling and should be considered approximate. We note that the transition from topsoil to underlying natural soils may be gradual.

Existing fill soils were encountered beneath the topsoil in borings A-1 and A-2 to approximate depths of 3 and 1.5 feet, respectively. Existing fill materials consist of silty sands (USCS classification SM). Trace rock pieces were observed in the existing fill sampled from A-2. Standard penetration test (SPT) N-values in the existing fill ranged from 6 to 7 blows per foot (bpf) indicating loose relative densities. The fill was visually observed as dry to moist.

Alluvial (water-deposited) soils were encountered below the topsoil to an approximate depth of 2 feet in A-3. The alluvial soils consisted of very loose silty sand (SM) with an SPT N-value of 4 bpf. The alluvial soils were visually observed as moist.

Residual soils were encountered below the topsoil, fill and alluvial soils to the boring termination depths ranging from 10 to 30 feet. Residual soils encountered consist of silty sand (SM), low-plasticity silts (ML), and moderately plastic clayey silts (MH). SPT N-values in the residual soils ranged from 3 to 26 bpf indicating loose to medium dense relative densities for sands and soft to stiff consistencies for silts. The residual soils were visually observed as moist to wet.

Groundwater level measurements were attempted in all borings at completion of drilling. Groundwater was observed in boring A-3 at a depth of 8 feet after a waiting period of 2 hours. The remaining borings were observed dry at termination of boring. Water levels tend to fluctuate with seasonal or climatic variations, and proximity to local water features (creeks, streams, swales, etc.). Therefore, groundwater or perched water may be encountered during construction at depths not indicated by the borings.

5.0 Laboratory Testing

Split-spoon samples and a bulk sample were returned to S&ME's Charlotte laboratory for visual classification in general accordance with the Unified Soil Classification System (USCS) by a geotechnical professional. The soil samples were visually examined to estimate the distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams, and apparent geological origin. Similar soils were grouped into strata on the logs. The strata contact lines represent approximate boundaries between the soil types; the actual transition between the soil types in the field may be gradual in both the horizontal and vertical directions. The results of the classifications are presented on the individual boring logs included in Appendix III.

Natural moisture content testing on split-spoon and bulk samples indicated moisture contents ranging from 25 to 38.4 percent.

Atterberg limits testing was performed on the bulk sample obtained from boring P-2. Testing recorded a liquid limit of 40, plastic limit of 36 and plasticity index of 4 indicating low-plasticity soils. Atterberg limits testing was also performed on a split-spoon sample obtained from 3.5 to 5 feet in boring A-1. Testing recorded a liquid limit of 55, plastic limit of 31, and plasticity index of 24 indicating high-plasticity soils.

Standard Proctor testing on the bulk sample recovered from P-2 determined a maximum dry density (MDD) of 100.2 pounds per cubic foot at an optimum moisture content (OMC) of 18.2 percent. Natural moisture content testing on the bulk sample indicated a moisture content of 31.2 percent which is 13 percent wet of its optimum value.

California bearing ratio (CBR) testing was performed on a recompacted specimen from the bulk sample taken from P-2. The specimen was recompacted to approximately 98 percent of its standard Proctor maximum dry density near its optimum moisture content. The specimen was soaked for 96 hours prior to testing. A CBR value of 5.8 percent was determined. The sample swelled 2.4 percent during soaking under a surcharge pressure of about 100 pounds per square foot (psf).

All laboratory testing was performed in general accordance with applicable ASTM standards. Individual laboratory test results are contained in Appendix III.

6.0 Conclusions and Recommendations

The following sections provide geotechnical engineering recommendations regarding site development and pavement thickness design. The recommendations presented herein are based upon review of our field and laboratory test data our understanding of the proposed construction, our engineering analyses, and experience with similar projects and subsurface conditions. If subsurface conditions adverse to those indicated by this report are encountered during construction, those differences should be reported to us for review and comment.

6.1 Earthwork

6.1.1 Site Preparation

Initial site preparation should consist of stripping the existing topsoil. We recommend surface materials containing more than 5 percent organic material be removed. We recommend that stripping operations be performed with light, tracked equipment to minimize disturbance and mixing of topsoil into subgrade soils.

After stripping, the exposed subgrade of areas to receive fill and areas near final grades should be evaluated by the geotechnical engineer or their representative. This evaluation should include proofrolling with a fully loaded tandem-axle dump truck or similar rubber-tired construction equipment. Any areas that deflect excessively and cannot be densified by further rolling should be undercut to suitable soils. Low-consistency soils likely requiring repair were encountered below the topsoil in borings A-3 and A-4. Depending on the time of year earthwork is performed, subgrade repair may be required due to the near-surface, fine-grained soils' potential to soften in wet conditions.

A ditch/stream crosses the proposed access drive near boring A-3. We anticipate that a culvert will be installed along the stream channel. Loose/soft alluvial (water-deposited) soils are likely to be encountered in the stream and/or on either side. Undercut and replacement of loose/soft alluvial soils will likely be required. Where required, we recommend a woven geotextile (Mirafi 500x or equivalent) be placed along the bottom of the excavation. Washed #57 stone or compacted structural fill (depending on conditions at time of construction) may be placed as backfill material above the woven geotextile. If washed stone is utilized, we recommend a non-woven geotextile (Mirafi 160N or equivalent) be placed above the washed stone before the structural fill or ABC stone is placed above to keep fines from contaminating the washed stone below.

Site grading will be difficult during periods of extended rainfall that generally occur during the winter and early spring months. Near-surface soils are moisture sensitive, and when wet, will soften and tend to rut and pump under rubber-tired traffic and provide poor subgrade support for structures and pavements. To reduce potential earthwork problems, site preparation and grading should be scheduled during the typically drier months of May through November, if possible. If winter or early spring grading is attempted, repair of near-surface soils and possible use of select off-site borrow will be necessary to adequately prepare subgrades for new construction. Heavy rubber-tired construction equipment should not be allowed to operate on exposed subgrades during wet conditions. Even during drier periods of the year, we recommend that exposed subgrades be sloped and sealed at the end of each day to promote runoff and reduce infiltration from rainfall.

6.1.2 *Excavations*

Based on subsurface conditions encountered and assumed site grading, low to moderate consistency soils will be encountered within anticipated excavation depths at the site. Past experience indicates that these materials can be excavated by routine earth moving equipment. Local excavations for shallow utility trenches can be accomplished by a conventional backhoe or track-mounted backhoe.

Groundwater was encountered at an approximate depth of 8 feet below the existing ground surface 2 hours after drilling in boring A-3. Groundwater or perched water conditions may be encountered in deeper excavations such as utility trenches, particularly during wet periods of the year or after heavy rainfall. The contractor should be prepared to control any water that collects in excavations. The contractor should be responsible for determining water control measures.

Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually responsible for site safety. This information is provided only as a service and under no circumstances should we be assumed responsible for construction site safety.

6.1.3 *Structural Fill*

Soils having Unified Soil Classifications of SP, SM, SC, ML, CL or any combination of these should be suitable for reuse as structural fill provided that the moisture content is properly controlled during placement and compaction. Highly plastic soils (CH, MH) may be used as structural fill at depths of at least 2 feet below final subgrade elevations.

Structural fill should contain less than 5 percent organics, be free of trash or other deleterious materials, have a maximum particle size of 2 inches or less, and minimum standard Proctor maximum dry density of 100 pounds per cubic foot.

All new structural fill soil should be placed in 8 to 10-inch loose lifts and compacted to at least 95 percent of the standard Proctor maximum dry density (MDD) (ASTM D698). The top 12 inches should be compacted to at least 98 percent of the materials standard Proctor MDD. The moisture content of structural fill should be maintained at +/- 2% of optimum moisture during compaction. A qualified soil technician working under the supervision of the geotechnical engineer should observe fill placement and compaction. An appropriate number of soil density tests should be conducted to confirm that adequate fill compaction is achieved.

The moisture condition of near-surface soils will be influenced by prevailing weather conditions. Some moisture conditioning (most likely drying) of on-site soils should be expected.

6.1.4 *Subgrade Repair and Improvement Methods*

The exposed subgrade of both cut and fill areas can deteriorate and lose support when exposed to construction traffic and adverse weather conditions. Deterioration can occur in the form of rutting, pumping, freezing, or erosion. We recommend that, during construction, exposed subgrade surfaces be sealed at the end of each day or when wet weather is forecast. Water should not be allowed to pond in fill or cut areas. Immediately prior to

pavement construction, exposed subgrade soils should be evaluated by proofrolling to determine their stability. Soils which rut, pump, or deflect under proofrolling should be repaired prior to ABC stone placement. Repair measures may include scarifying/drying/recompacting, undercutting, placement of geotextiles, or some combination of these. Actual repair measures will be influenced by project schedule and weather conditions and can only be determined in the field.

6.2 Pavements

6.2.1 Access Drive

The following sections provide both asphalt and concrete pavement recommendations. Proposed grades for the access drive indicate relative steep slopes along portions of the alignment. Compaction of asphalt pavement on steep grades is difficult to achieve. Insufficient compaction results in additional air voids in the asphalt mix and potential for faster than normal asphalt deterioration. In addition, asphalt has the potential to shove under heavy breaking on relatively steep inclinations. Thus, it is our recommendation concrete pavement be utilized where possible.

6.2.1.1 Asphalt Pavement

Based on laboratory CBR testing and geotechnical experience in this geologic area, a design CBR value of 5 percent was used for the pavement design. The CBR value is based on the subgrade soils being uniformly compacted to at least 98% of the soil's standard Proctor MDD. Pavement design procedures are based on AASHTO "Guide for Design of Pavement Structures" (1993) and associated literature. Pavement analyses were based on an initial serviceability index of 4.2, a terminal serviceability index of 2.0. We have estimated that the access drive will be subjected to a maximum of 60,000 18-kip equivalent single-axle loads (ESALs), respectively, over a 20-year design life. We recommend the proposed asphalt pavement section consist of the following:

Table 6-1 Pavement Thickness Recommendations

Section Type	Access Drive
Asphalt Surface Course (Type S-9.5 B)	3 (placed in two, 1.5" lifts)
Aggregate Base Course (ABC)	6

All materials and construction methods should conform to the 2018 edition of the NCDOT "Standard Specifications for Roads and Structures." The aggregate base course (ABC) stone should consist of stone meeting the requirements under Section 520. ABC stone should be compacted to at least 100 percent of the maximum dry density as determined by the modified Proctor compaction test, AASHTO T-180 as modified by NCDOT. To confirm that the base course stone has been uniformly compacted, in place density tests should be performed by a qualified soils technician and the area should be thoroughly proofrolled under his observation.

Asphaltic concrete should conform to Section 610 in the 2018 edition of the NCDOT "Standard Specifications for Roads and Structures." Sufficient testing and observation should be performed during pavement construction to confirm that the required thickness, density, and quality requirements of the specifications are achieved.

Although our analysis was based on traffic loading for a 20-year design life, our experience indicates that pavement maintenance is necessary due to normal weathering of the asphaltic concrete. Normal weathering (i.e., oxidation) causes asphalt to become more brittle resulting in loss of tensional strength. This loss in strength can cause minor cracking which provides access for water infiltration into the stone base and subgrade. As the degree of saturation of the subgrade increases, the strength of the subgrade decreases leading to pavement failure. Routine maintenance in the form of sealing, patching, and maintaining proper drainage is required to increase pavement life. It is not uncommon for overlays to be required after 10 to 12 years.

6.2.1.2 Concrete Pavement

The concrete pavement design was performed using the same design traffic as in the heavy-duty asphalt pavement areas (60,000 ESALs). The compressive strength of the concrete was assumed to be 4,000 psi. A modulus of subgrade reaction of 125 pci was used for design assuming 6 inches of compacted ABC stone is placed beneath the concrete pavement. We have assumed that load transfer across contraction (saw) joints will be handled by aggregate interlock. ABC should meet the material and compaction requirements stated in the "Flexible (Asphalt) Pavement" section above. The table below presents our recommended concrete pavement section thickness.

Table 6-2 – Concrete Pavement Recommendations

Material Type	Concrete Pavement Design
Air Entrained Concrete (4000 psi)	5 inches
Aggregate Base Course (ABC) stone	6 inches
Maximum Joint Spacing	12 feet in all directions

Saw joints should be cut to a depth of at least ¼ of the thickness of the concrete pavement to promote shrinkage cracking along the joint. The ABC stone should be compacted to at least 98 percent of its modified Proctor maximum dry density.

6.2.2 Parking Lot – Gravel Pavement

We understand the proposed parking lot will be a gravel section. We anticipate the parking lot will be subjected to up to 30,000 ESALs over 20-year design life.

After the parking lot subgrade has been approved for stone placement, we recommend placing 8 inches of compacted ABC stone over the properly prepared subgrade. In order to reduce disturbance of the subgrade soils from construction traffic, we recommend that the stone be end dumped and pushed out onto the subgrade with a dozer, and dump truck traffic not be allowed to travel on the subgrade soils but rather on the ABC stone.

We recommend that the ABC stone be compacted to at least 100% of its modified Proctor maximum dry density, near its optimum moisture content. All materials and construction methods should conform to the 2018 edition of the NCDOT "Standard Specifications for Roads and Structures." The aggregate base course (ABC) stone should consist of stone meeting the requirements under Section 520.

Prevention of infiltration of water into the subgrade is essential for the successful performance of the gravel parking area. The gravel surface should be sloped to promote surface drainage away from the pavement structure. The gravel surface will be susceptible to deterioration (e.g. raveling and rutting) due to exposure to weather and traffic. Routine maintenance including leveling with a motor grader, filling in low or rutted areas with ABC stone, and vibratory smooth drum rolling should be anticipated.

7.0 Limitations of Geotechnical Report

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on data from a field exploration program. Subsurface conditions can vary widely outside the explored area. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants. If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

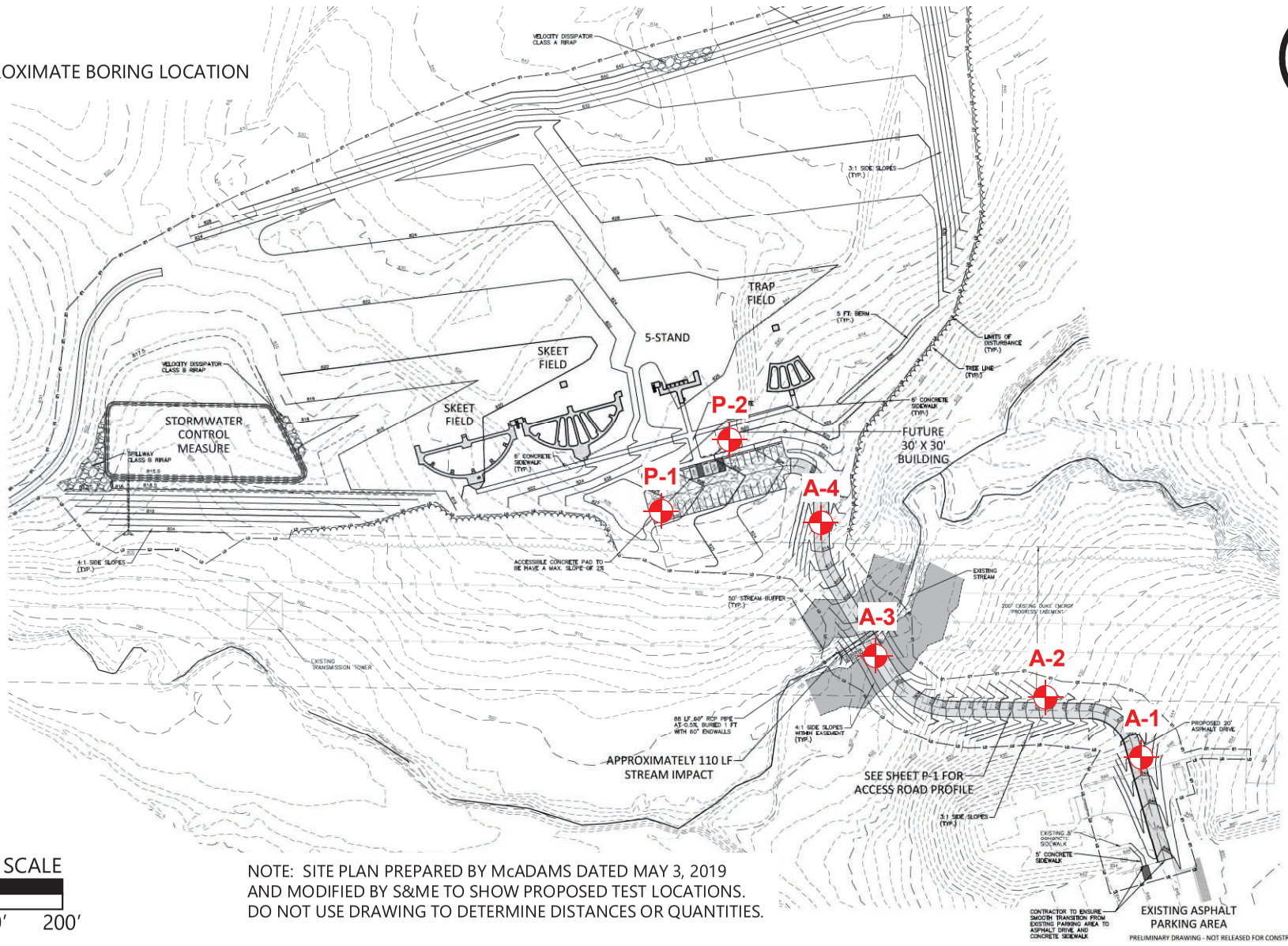
S&ME should be provided the opportunity to review the final plans and specifications to confirm that our recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by observation and monitoring during construction activities.

Appendices

Appendix I –Figures

LEGEND

APPROXIMATE BORING LOCATION



GRAPHIC SCALE

0′ 100′ 200′

NOTE: SITE PLAN PREPARED BY McADAMS DATED MAY 3, 2019
AND MODIFIED BY S&ME TO SHOW PROPOSED TEST LOCATIONS.
DO NOT USE DRAWING TO DETERMINE DISTANCES OR QUANTITIES.

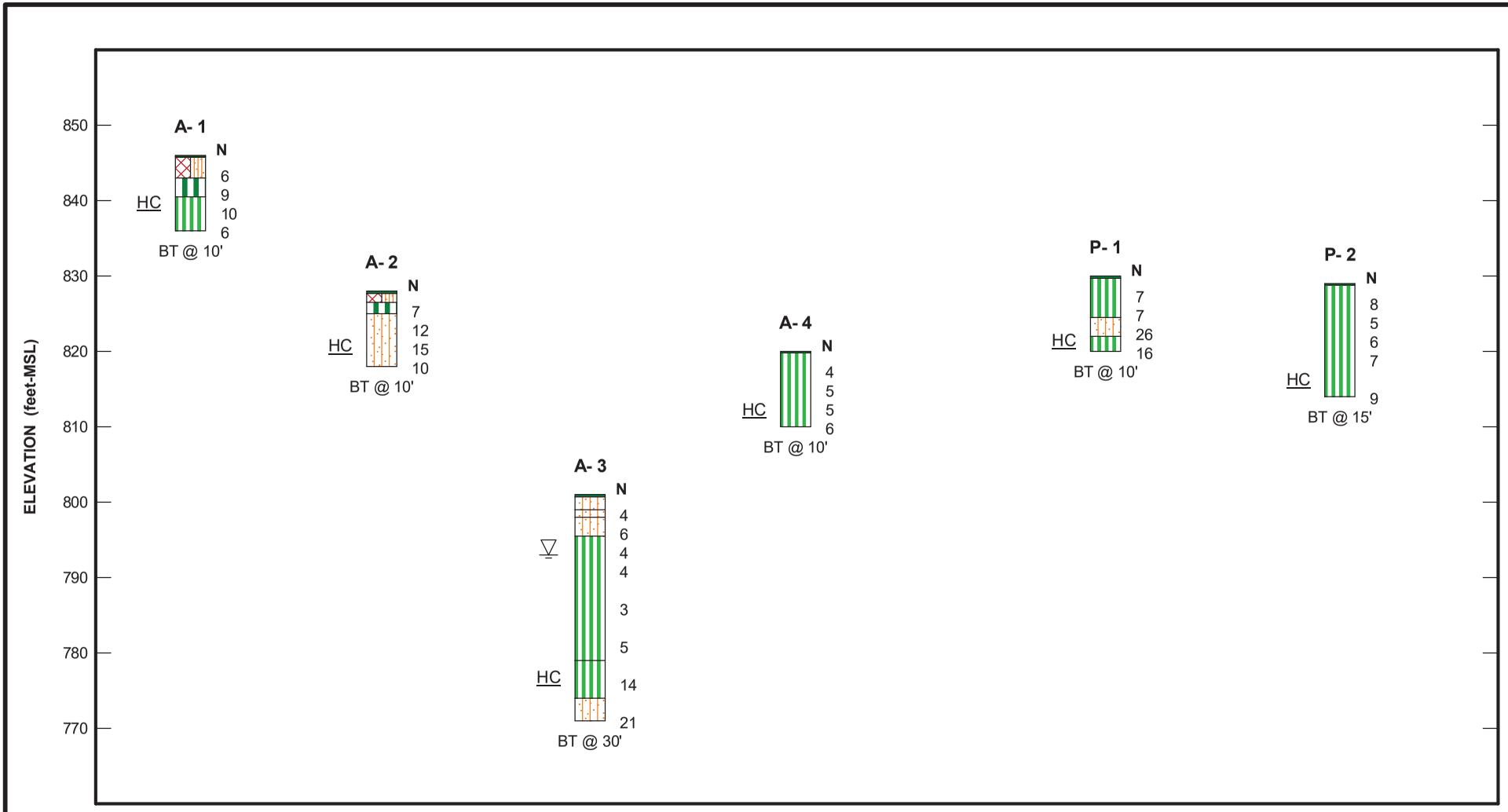
BORING LOCATION PLAN

FOOTHILLS SHOOTING COMPLEX IMPROVEMENTS

283 FIELDING ROAD

CHERRYVILLE, NORTH CAROLINA

SCALE: 1″ = 200′	DRAWN BY: JRW	FIGURE NO. 1
DATE: 6/28/2019	CHECKED BY: JAB	
PROJECT NO: 1305-19-062		



N = Standard Penetration Test resistance value (blows per foot). BT = Boring Terminated. HC = Hole Cave.
The depicted stratigraphy is shown for illustrative purposes only. The actual subsurface conditions will vary between boring locations.

JOB NO: 1305-19-062	S&ME, INC. 9751 SOUTHERN PINE BOULEVARD CHARLOTTE, NORTH CAROLINA 28273 P: (704) 523-4726 F: (704) 525-3953	Diagram: Generalized Subsurface Conditions Project: Foothills Shooting Range Location: Durham, North Carolina	Figure: 2
DATE: 6/28/19			

Appendix II – Boring Logs

LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES
(Shown in Graphic Log)


Fill


Asphalt


Concrete


Topsoil


Partially Weathered Rock


Cored Rock


GW — WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES


GP — POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES


GM — SILTY GRAVELS, GRAVEL- SAND - SILT MIXTURES


GC — CLAYEY GRAVELS, GRAVEL - SAND-CLAY MIXTURES


SW — WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES


SP — POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES


SM — SILTY SANDS, SAND - SILT MIXTURES


SC — CLAYEY SANDS, SAND - CLAY MIXTURES


ML — INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY


CL — INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS


OL — ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY


MH — INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS, ELASTIC SILTS


CH — INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS


OH — ORGANIC SILTS AND ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY

WATER LEVELS
(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES
(Shown in Samples Column)


Shelby Tube


Split Spoon


Rock Core


No Recovery

CONSTITUENT MODIFIERS

Trace: <5%
Few: 5 to <15%
Little: 15 to <30%
Some: 30 to <50%
Mostly: 50 to 100%

TERMS

Standard Penetration Resistance - The Number of Blows of 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split Spoon Sampler 1 Foot. As Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

TOB - Termination of Boring

PROJECT: **Foothills Shooting Range**
Durham, North Carolina
S&ME Project No. 1305-19-062

BORING LOG **A- 1**

DATE DRILLED: **6/20/19**	ELEVATION: **846.0 ft**
DRILL RIG: **CME 550X**	BORING DEPTH: **10.0 ft**
DRILLER: **J. Marlowe**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **3¼" H.S.A.**	

NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS	N VALUE
	Topsoil (2 inches)									
	FILL: SILTY SAND (SM) loose, tan red, fine to coarse grained, dry to moist					2	3	3		6
	RESIDUUM: CLAYEY SILT (MH) stiff, dark brown, moist			SS-2		4	3	6		9
5			841.0							
	SANDY SILT (ML) stiff to firm, brown, moist	HC				4	5	5		10
				SS-4		2	3	3		6
10			836.0							
	Boring terminated at 10 ft									

STANDARD PENETRATION TEST DATA (blows/ft): 10 20 30 60 80

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Foothills Shooting Range**
Durham, North Carolina
S&ME Project No. 1305-19-062

BORING LOG **A- 2**

DATE DRILLED: **6/20/19**	ELEVATION: **828.0 ft**
DRILL RIG: **CME 550X**	BORING DEPTH: **10.0 ft**
DRILLER: **J. Marlowe**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **3¼" H.S.A.**	

NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS	N VALUE
	Topsoil (3 inches)									
	FILL: SILTY SAND (SM) loose, gray, trace rock pieces, fine to coarse grained, dry					2	3	4		7
	RESIDUUM: CLAYEY SILT (MH) firm, red, moist to wet					8	6	6		12
5			823.0							
	SILTY SAND (SM) medium dense to loose, gray orange, trace rock pieces, fine to coarse grained, moist	HC				4	4	11		15
						3	3	7		10
10			818.0							
	Boring terminated at 10 ft									

10 20 30 60 80

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT:	**Foothills Shooting Range** **Durham, North Carolina** **S&ME Project No. 1305-19-062**	**BORING LOG**	**A- 3**

DATE DRILLED: **6/20/19**	ELEVATION: **801.0 ft**	NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**
DRILL RIG: **CME 550X**	BORING DEPTH: **30.0 ft**	
DRILLER: **J. Marlowe**	WATER LEVEL: **8.0 feet 2 hours after TOB**	
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**	
SAMPLING METHOD: **Split spoon**		
DRILLING METHOD: **3¼" H.S.A.**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS	N VALUE
	Topsoil (3 inches)									
	ALLUVIAL: SILTY SAND (SM) very loose, gray, fine to medium grained, moist					1	2	2		4
	RESIDUUM: SILTY SAND (SM) very loose, dark gray, fine to medium grained, moist					4	3	3		6
5			796.0							
	SILTY SAND (SM) loose, brown, trace rock pieces, fine to coarse grained, wet					2	2	2		4
	SANDY SILT (ML) soft to firm, tan gray, wet	▽				2	1	3		4
10			791.0							
						1	1	2		3
15			786.0							
						2	2	3		5
20			781.0							
	SANDY SILT (ML) stiff, brown gray, wet	HC				2	3	11		14
25			776.0							
	SILTY SAND (SM) medium dense, dark brown, trace rock pieces, fine to coarse grained, wet					8	10	11		21
30			771.0							
	Boring terminated at 30 ft									

STANDARD PENETRATION TEST DATA (blows/ft): 10 20 30 60 80

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. ***THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.***
2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Foothills Shooting Range**
Durham, North Carolina
S&ME Project No. 1305-19-062

BORING LOG **A- 4**

DATE DRILLED: **6/20/19**	ELEVATION: **820.0 ft**
DRILL RIG: **CME 550X**	BORING DEPTH: **10.0 ft**
DRILLER: **J. Marlowe**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **3¼" H.S.A.**	

NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS 10 20 30 60 80	N VALUE
	Topsoil (2 inches)									
	RESIDUUM: SANDY SILT (ML) soft to firm, tan brown, moist					2	2	2		4
						2	2	3		5
5			815.0							
						2	2	3		5
		HC				2	3	3		6
10			810.0							
	Boring terminated at 10 ft									

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Foothills Shooting Range**
Durham, North Carolina
S&ME Project No. 1305-19-062

BORING LOG **P- 1**

DATE DRILLED: **6/20/19**	ELEVATION: **828.0 ft**
DRILL RIG: **CME 550X**	BORING DEPTH: **10.0 ft**
DRILLER: **J. Marlowe**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **3¼" H.S.A.**	

NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**

***Bulk sample obtained from 0.3 to 5 feet.**

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS 10 20 30 60 80	N VALUE
		Topsoil (3 inches)									
		RESIDUUM: SANDY SILT (ML) firm, brown orange, trace mica, moist					1	3	4		7
							2	3	4		7
5				823.0							
		SILTY SAND (SM) medium dense, tan white, fine to coarse grained, moist					12	13	13		26
		SANDY SILT (ML) stiff, brown, trace rock pieces, moist	HC				3	4	12		16
10				818.0							
		Boring terminated at 10 ft									

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

PROJECT: **Foothills Shooting Range**
Durham, North Carolina
S&ME Project No. 1305-19-062

BORING LOG **P- 2**

DATE DRILLED: **6/20/19**	ELEVATION: **830.0 ft**
DRILL RIG: **CME 550X**	BORING DEPTH: **15.0 ft**
DRILLER: **J. Marlowe**	WATER LEVEL: **Not Encountered**
HAMMER TYPE: **Automatic**	LOGGED BY: **C. Phillips**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **3¼" H.S.A.**	

NOTES: **Ground surface elevation extrapolated from site grading plan and should be considered approximate.**

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet-MSL)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN#	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) REMARKS	N VALUE
	Topsoil (2 inches)									
	RESIDUUM: SANDY SILT (ML) firm to stiff, tan gray, moist to wet					2	4	4		8
						2	2	3		5
5			825.0			2	2	4		6
						1	3	4		7
10			820.0							
		HC		SS-4		2	5	4		9
15			815.0							
	Boring terminated at 15 ft									

10 20 30 60 80

S&ME BORING LOG NO NORTHING AND EASTING 1305-19-062 FOOTHILLS SHOOTING RANGE.GPJ S&ME.GDT 7/12/19

NOTES:

1. *THIS LOG IS ONLY A PORTION OF A REPORT PREPARED FOR THE NAMED PROJECT AND MUST ONLY BE USED TOGETHER WITH THAT REPORT.*
2. *BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.*
3. *STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.*
4. *WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.*

Appendix III – Laboratory Test Results

Form No: TR-D2216-T265-1
Revision No. 1
Revision Date: 08/16/17

LABORATORY DETERMINATION OF WATER CONTENT

ASTM D 2216 ☑ *AASHTO T 265* ☐

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1305-19-110 Phase 110	Report Date:	7/3/19
Project Name:	Foothills Shooting Range	Test Date(s):	6/27-28/19
Client Name:	McAdams Company		
Client Address:	2905 Meridian Parkway, Durham, NC 27713		
Sample by:	NI	Sample Date(s):	6/20/19
Sampling Method:	NI	Drill Rig :	NI

Method: **A (1%)** ☐ **B (0.1%)** ☑ Balance ID. 20233 Calibration Date: 9/25/18 Oven ID. 10844 Calibration Date: 9/25/18

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
A-1	SS-2	3.5-5	G-11	82.96	169.44	152.17	17.27	25.0%	
A-1	SS-4	8.5-10	T-1	84.01	317.43	275.43	42.00	21.9%	
P-2	SS-4	8.5-10	GP	83.03	292.90	234.66	58.24	38.4%	
P-2	S-1	0-5	S-5	82.48	306.30	253.09	53.21	31.2%	

Notes / Deviations / References

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Karen Warner		NICET #117900	7/9/2019
Technician Name	*Signature*	*Certification Type / No.*	*Date*
Joe Williamson, P.E.		Geotech Group Leader	
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

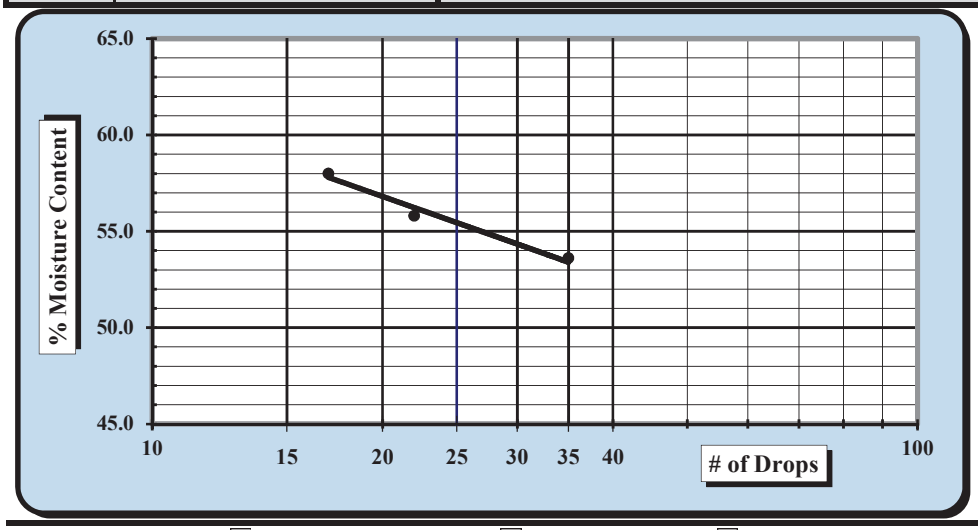
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1305-19-062 Phase 110	Report Date:	7/9/19
Project Name:	Foothills Shooting Range	Test Date(s)	6/26/19-7/9/19
Client Name:	McAdmans Company		
Client Address:	2905 Meridian Parkway, Durham, NC 27713		
Boring #:	A-1	Sample #: SS-2	Sample Date: 6/20/19
Location:	Boreholes	Offset: NI	Elevation: 3.5-5'
Sample Description:	Brown Orange Clayey Silt w/Sand (MH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/30/2018	Grooving tool	30339	10/23/2018
LL Apparatus	30336	2/22/2019	Grooving tool		
Oven	10844	9/25/2018	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	J47	J19	J36				J23	J41	
A	Tare Weight	13.98	14.19	14.02				14.19	14.06	
B	Wet Soil Weight + A	25.73	30.53	27.09				20.31	20.45	
C	Dry Soil Weight + A	21.63	24.68	22.29				18.86	18.93	
D	Water Weight (B-C)	4.10	5.85	4.80				1.45	1.52	
E	Dry Soil Weight (C-A)	7.65	10.49	8.27				4.67	4.87	
F	% Moisture (D/E)*100	53.6%	55.8%	58.0%				31.0%	31.2%	
N	# OF DROPS	35	22	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**31.1%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**55**
Plastic Limit	**31**
Plastic Index	**24**
Group Symbol	**MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:* 15%

Notes / Deviations / References:

ND: Not Determined NI: No Information Provided

Moisture Content: 25.0%

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Gustavo Salazar	7/9/2019	Joe Williamson, P.E.	
Technician Name	*Date*	*Technical Responsibility*	*Date*

Form No. TR-D4318-T89-90
Revision No. 1
Revision Date: 7/26/17

LIQUID LIMIT, PLASTIC LIMIT, & PLASTIC INDEX

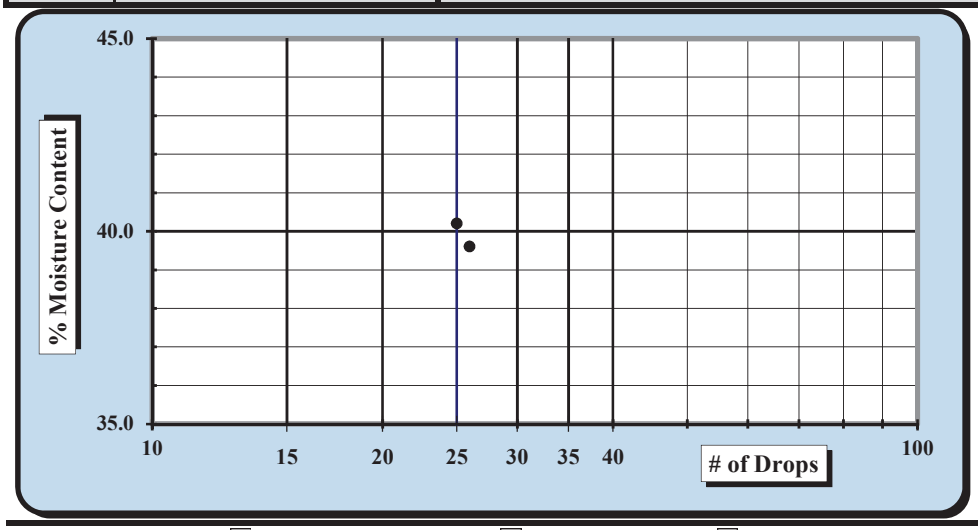
ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1305-19-062 Phase 110	Report Date:	7/9/19
Project Name:	Foothills Shooting Range	Test Date(s)	6/26/19-7/9/19
Client Name:	McAdmans Company		
Client Address:	2905 Meridian Parkway, Durham, NC 27713		
Boring #:	P-2	Sample #: S-1	Sample Date: 6/20/19
Location:	Boreholes	Offset: NI	Elevation: 0-5'
Sample Description:	Tan Silt (ML)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/30/2018	Grooving tool	30339	10/23/2018
LL Apparatus	30336	2/22/2019	Grooving tool		
Oven	10844	9/25/2018	Grooving tool		

	Pan #	Liquid Limit						Plastic Limit		
	Tare #:	J9	J40					J22	J34	
A	Tare Weight	14.04	14.06					14.07	14.08	
B	Wet Soil Weight + A	30.20	30.91					20.16	20.98	
C	Dry Soil Weight + A	25.57	26.15					18.55	19.17	
D	Water Weight (B-C)	4.63	4.76					1.61	1.81	
E	Dry Soil Weight (C-A)	11.53	12.09					4.48	5.09	
F	% Moisture (D/E)*100	40.2%	39.4%					35.9%	35.6%	
N	# OF DROPS	25	26					*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR	**40.2%**	39.6%							
Ave.	*Average*	**39.9%**						**35.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit	**40**
Plastic Limit	**36**
Plastic Index	**4**
Group Symbol	**ML**

Multipoint Method ☐
One-point Method ☑

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:* 7%

Notes / Deviations / References:

ND: Not Determined NI: No Information Provided

Moisture Content: 31.2%

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Gustavo Salazar	7/9/2019	Joe Williamson, P.E.	
Technician Name	*Date*	*Technical Responsibility*	*Date*

Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

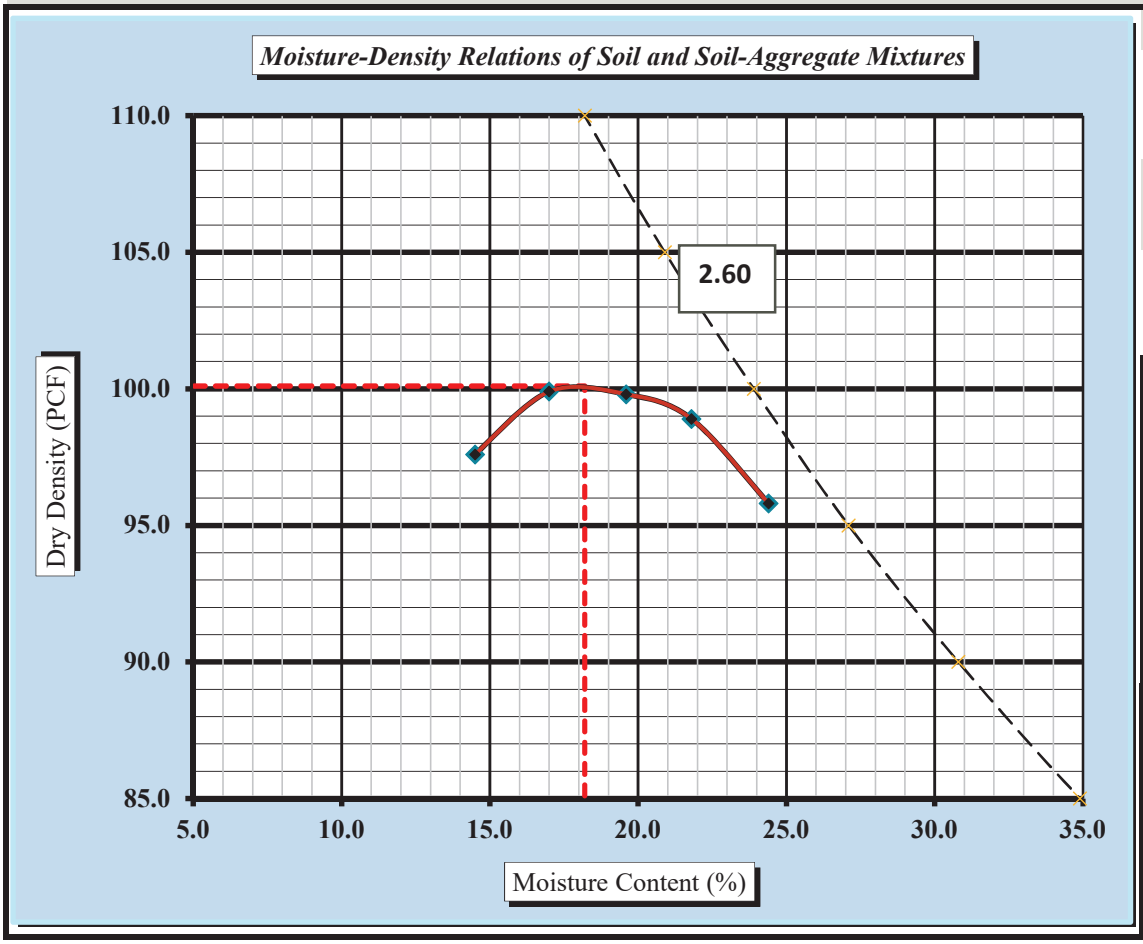
Quality Assurance

	S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273		
S&ME Project #:	1305-19-062-110	Report Date:	7/9/19
Project Name:	Foothills Shooting Range	Test Date(s):	6/26/19-7/1/19
Client Name:	McAdams Company		
Client Address:	2905 Meridian Parkway, Durham, NC 27713		

Boring #:	P-2	Sample #:	S-1	Sample Date:	6/20/2019
Location:	Boreholes	Offset:	NI	Depth:	0-5'
Sample Description:	Tan Silt (ML)				

Maximum Dry Density **100.2** **PCF.** **Optimum Moisture Content** **18.2%**

ASTM D 698 - - Method A



Soil Properties	
Natural Moisture Content	31.2%
Specific Gravity of Soil	ND
Liquid Limit	40
Plastic Limit	36
Plastic Index	4
% Passing	
3/4"	
3/8"	
#4	100.0%
Oversize Fraction	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: ND: Not Determined NI: No Information Provided

ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Joe Williamson, P.E.		Geotech Group Leader	
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

ASTM D 1883

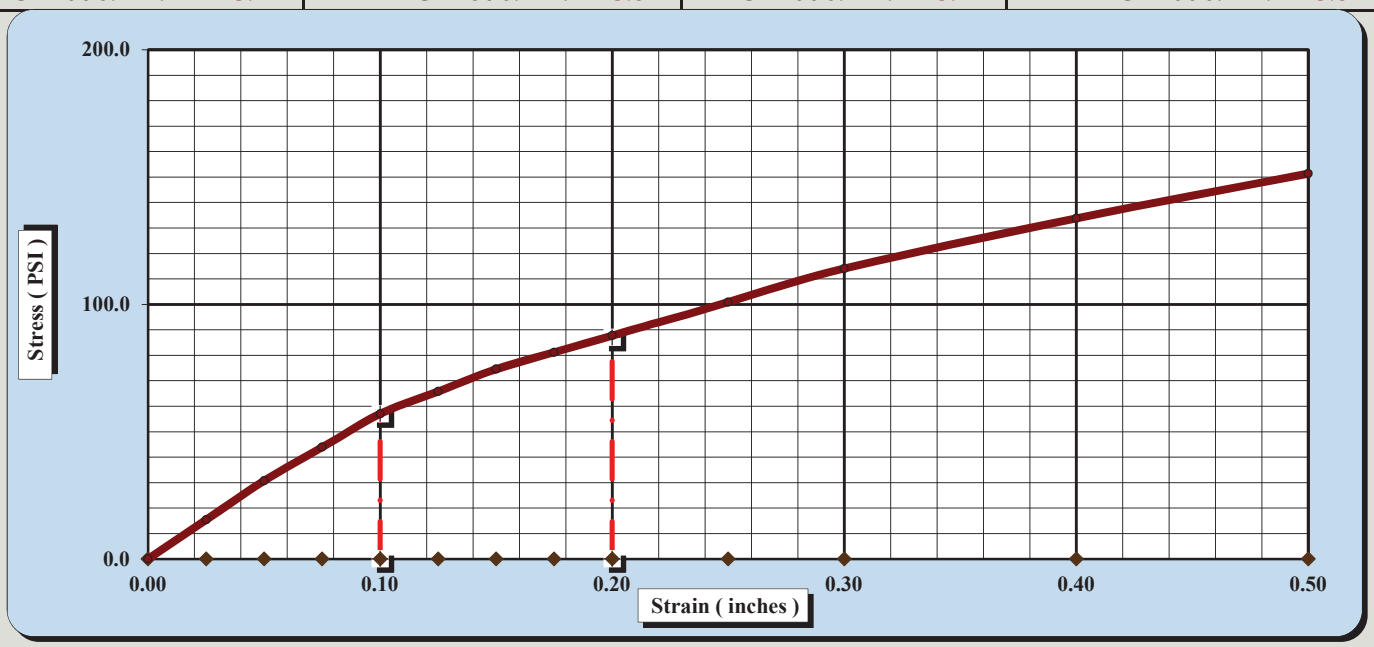
S&ME, Inc. Charlotte: 9751 Southern Pine Boulevard, Charlotte, NC 28273

Project #:	1305-19-062 Phase 110	Report Date:	7/13/19
Project Name:	Foothills Shooting Range	Test Date(s)	6/27/19-7/13/19
Client Name:	McAdams Company		
Client Address:	2905 Meridian Parkway, Durham, NC 27713		
Boring #:	P-2	Sample #: S-1	Sample Date: 6/20/19
Location:	Boreholes	Offset: NI	Elevation: 0-5'
Sample Description:	Tan Silt (ML)		

ASTM D 698 *Method A* Maximum Dry Density: 100.2 PCF Optimum Moisture Content: 18.2%

% Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 5.7	CBR at 0.2 in. 5.8	CBR at 0.1 in. 5.7	CBR at 0.2 in. 5.8



CBR Sample Preparation:

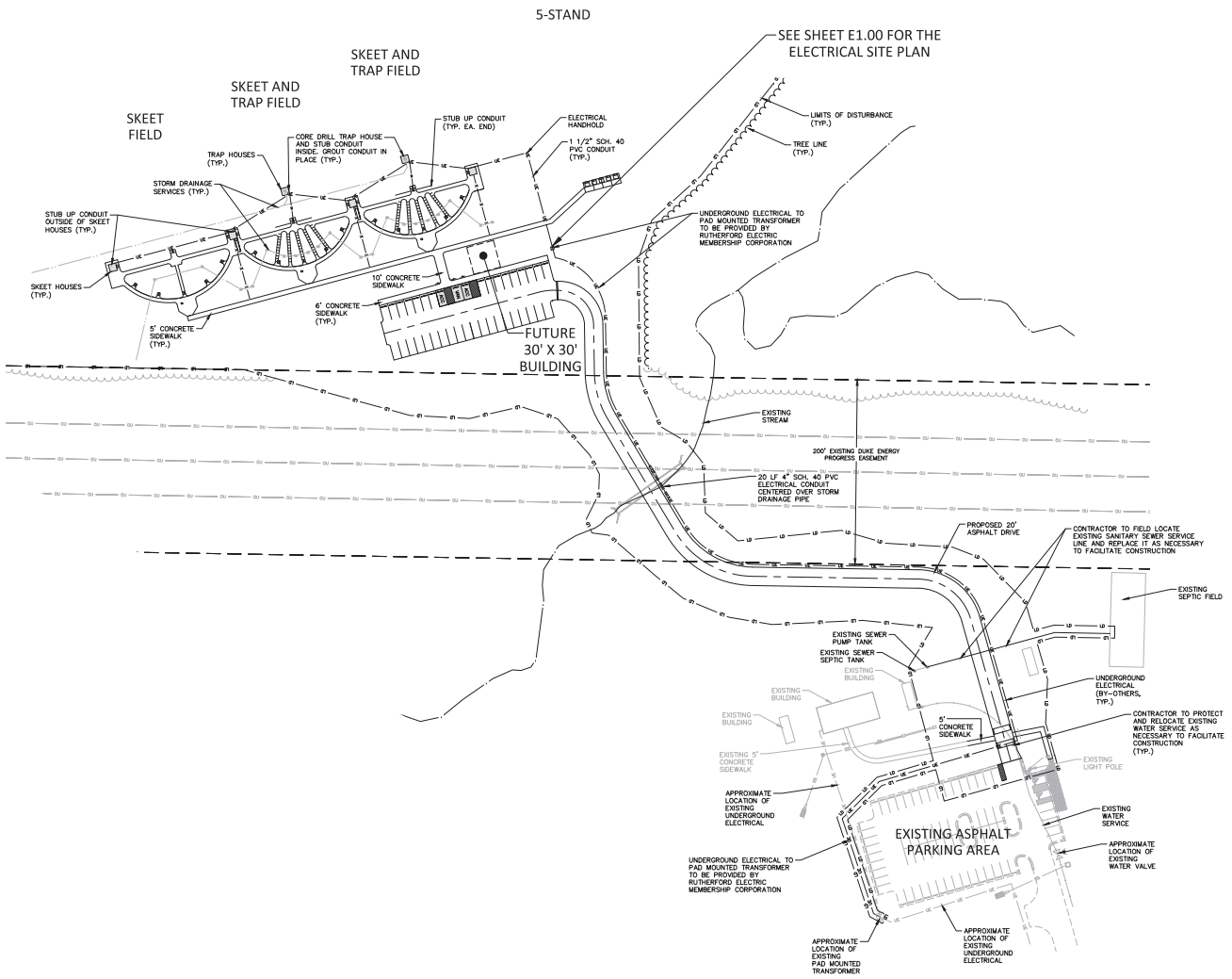
The entire gradation was used and compacted in a 6" CBR mold in accordance with

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	43		
Initial Dry Density (PCF)	98.3	Final Dry Density (PCF)	95.7
Moisture Content of the Compacted Specimen	18.5%	Moisture Content (top 1" after soaking)	27.0%
Percent Compaction	98.1%	Percent Swell	2.4%

Soak Time:	96 Hrs.	Surcharge Weight	155.0	Surcharge Wt. per sq. Ft.	788.9
Liquid Limit	40	Plastic Index	4	Assumed Apparent Relative Density	2.650

Notes/Deviations/References:

Joe Williamson, P.E. — *Technical Responsibility*
_____ — *Signature*
Geotech Group Leader — *Position*
_____ — *Date*



UTILITY NOTES:

SANITARY SEWER:

1. MINIMUM COVER OF 5 FEET IN TRAFFIC AREAS TO BE PROVIDED FOR ALL COLLECTOR LINES 4 INCHES AND LARGER. IF LESS THAN 5 FEET, DUCTILE IRON PIPE SHALL BE REQUIRED.
2. ALL SANITARY SEWER TO BE SCH 40 PVC.
3. ALL WATER LINES SHALL HAVE 18" VERTICAL AND 10 FT. HORIZONTAL SEPARATION AROUND SEWER LINES UNLESS OTHERWISE SHOWN. IF UNABLE TO MAINTAIN CLEARANCES, OR SANITARY CROSSES ABOVE WATER, BOTH LINES SHALL BE DUCTILE IRON FOR A MINIMUM OF 10 FT. ON EITHER SIDE OF THE CROSSING.
4. ALL STORM LINES SHALL HAVE 24" OF VERTICAL SEPARATION FROM SEWER LINES UNLESS OTHERWISE SHOWN.

WATER:

1. ALL WATER LINES SHOWN ARE TO BE C900/DR18 PVC OR TYPE K COPPER TUBING ASTM B-88 WITH A MINIMUM OF 36" COVER.
2. ALL WATERLINES TO BE INSTALLED WITH 18" OF VERTICAL SEPARATION AND 10' OF HORIZONTAL SEPARATION FROM OTHER UTILITIES UNLESS OTHERWISE SHOWN.
3. SHUT DOWN OF WATER MAIN SHALL BE COORDINATED WITH NORTH CAROLINA WILDLIFE RESOURCES COMMISSION MANAGEMENT, UTILITY OWNER AND ANY AFFECTED RESIDENCES.
4. ALL WATER SERVICES PROPOSED BY THIS PROJECT WILL BE PRIVATE SYSTEMS.
5. ALL ABANDONED WATER LINE TO BE FILLED WITH FLOWABLE FILL AND ABANDONED IN PLACE UNLESS OTHERWISE APPROVED BY THE OWNER AND ENGINEER.

UTILITY LEGEND

- LD —— LD —— LIMITS OF DISTURBANCE
- WOODED AREA
- UE —— UE —— UNDERGROUND ELECTRIC
- EASEMENT LINE
- SEWER SERVICE LINE

NC GRID (NAD83)

GRAPHIC SCALE
0 30 60 120
1 inch = 60 ft.

FINAL DRAWING - FOR CONSTRUCTION

McADAMS
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phone 919. 361. 5000
fax 919. 361. 2269
license number: C-0293, C-187

www.mcadamsco.com

CLIENT

CLEVELAND COUNTY
P.O. BOX 1210
SHELBY, NORTH CAROLINA 28151

FOOTHILLS SHOOTING COMPLEX IMPROVEMENTS

SKEET AND TRAP EXPANSION

283 FIELDING ROAD, CHERRYVILLE, CLEVELAND COUNTY, NC. 28021

NORTH CAROLINA PROFESSIONAL SEAL 33728 ENGINEER MARK A. HAM, PE

REVISIONS

NO. DATE

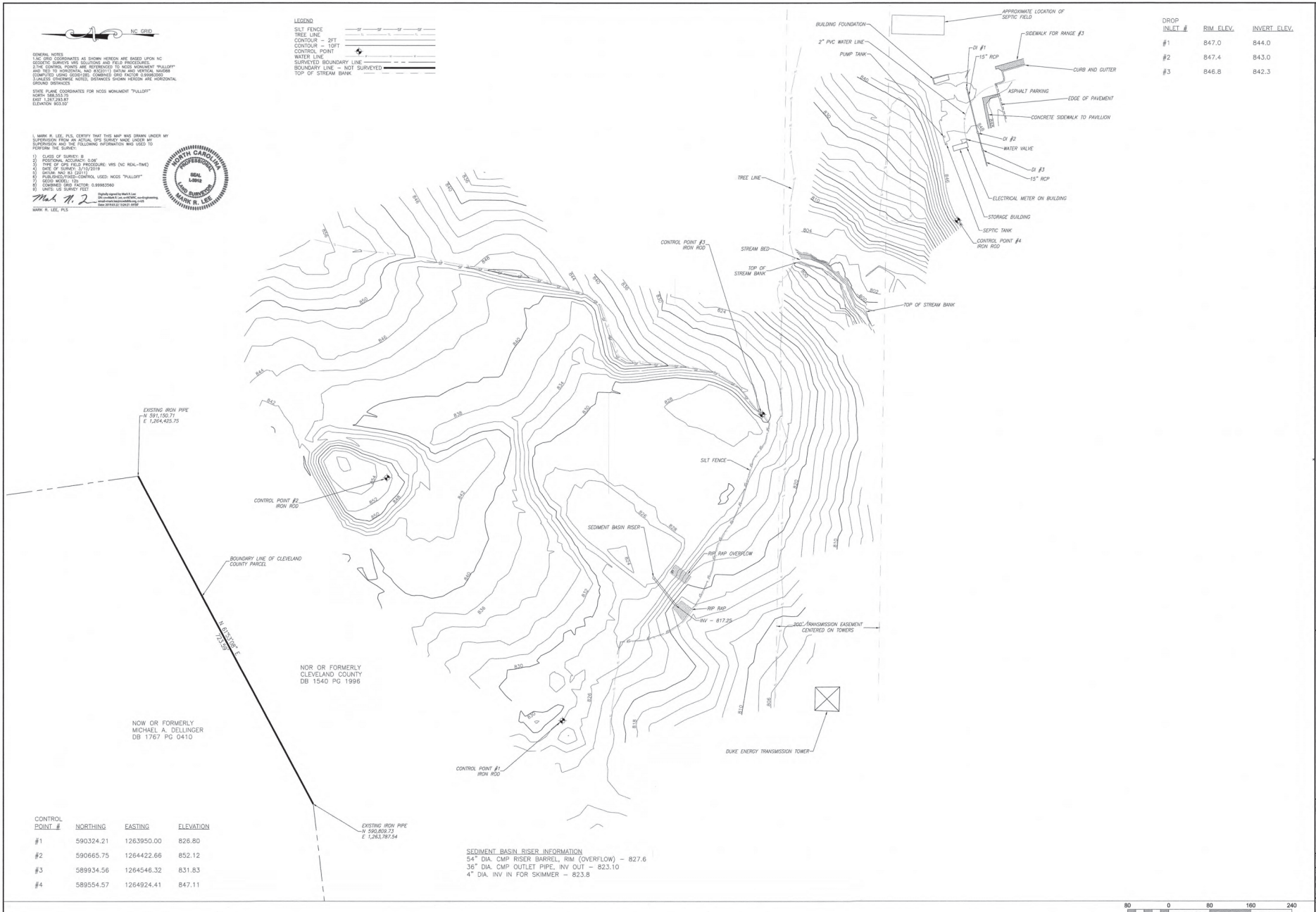
PLAN INFORMATION

PROJECT NO.	CCY-18010
FILENAME	CCY18010-U1
CHECKED BY	MJM
DRAWN BY	SMP
SCALE	1"=60'
DATE	07.11.2019

SHEET

UTILITY PLAN

C-6



NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
DIVISION OF ENGINEERING SERVICES
MAIN OFFICE
1720 MAIL SERVICE CENTER
RALEIGH, NC 27699
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www.ncwildlife.org

NORTH CAROLINA Wildlife RESOURCES COMMISSION

FOOTHILLS PUBLIC SHOOTING COMPLEX

CLEVELAND COUNTY, NC

TOPOGRAPHICAL AND LIMITED BOUNDARY SURVEY FOR PROPOSED SHOTGUN AREA

Date: 3/19/2019
Revision:

File Name:

Surveyed:
Designed:
Drawn: SPB
Approved: MRL

Sheet No. S-1

GENERAL NOTES
1.NC GRID COORDINATES AS SHOWN HEREON ARE BASED UPON NC GEODETIC SURVEYS VRS SOLUTIONS AND FIELD PROCEDURES.
2.THE CONTROL POINTS ARE REFERENCED TO NCGS MONUMENT "PULLOFF" AND TIED TO HORIZONTAL NAD 83(2011) DATUM AND VERTICAL NAVD88 (COMPUTED USING GEOID12B). COMBINED GRID FACTOR 0.99983560
3.UNLESS OTHERWISE NOTED, DISTANCES SHOWN HEREON ARE HORIZONTAL GROUND DISTANCES

STATE PLANE COORDINATES FOR NCGS MONUMENT "PULLOFF"
NORTH 588,553.75
EAST 1,287,293.87
ELEVATION 903.50'

I, MARK R. LEE, PLS, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THE SURVEY:

1) CLASS OF SURVEY: B
2) POSITIONAL ACCURACY: 0.08'
3) TYPE OF GPS FIELD PROCEDURE: VRS (NC REAL-TIME)
4) DATE OF SURVEY: 6/17/2019
5) DATUM: NAD 83 (2011)
6) PUBLISHED/FIXED-CONTROL USED: NCGS "PULLOFF"
7) GEOID MODEL: 12b
8) COMBINED GRID FACTOR: 0.99983560
9) UNITS: US SURVEY FEET

Digitally signed by Mark R. Lee
DN: cn=Mark R. Lee, ou=NCWRC, ou=Engineering, email=mark.lee@ncwildlife.org, c=US
Date: 2019.07.08 22:49:08 -04'00'

MARK R. LEE, PLS

NORTH CAROLINA PROFESSIONAL SEAL L3918 LAND SURVEYOR MARK R. LEE

NC GRID

LEGEND
EDGE OF PAVEMENT
EDGE OF GRAVEL
CONTOUR - 2FT
CONTOUR - 10FT
CONTROL POINT
CHAIN LINK FENCE

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
DIVISION OF ENGINEERING SERVICES

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NORTH CAROLINA Wildlife RESOURCES COMMISSION

FOOTHILLS PUBLIC SHOOTING COMPLEX

CLEVELAND COUNTY, NC

TOPOGRAPHICAL SURVEY OF OVERFLOW PARKING AREA

Date: 7/8/2019
Revision:

File Name:

Surveyed: MRL
Designed:
Drawn: SPB
Approved:

Sheet No.
S-2

SITE LEGEND

- CABLE TO GROUND CONNECTION
- 3/4" x 10'-0" COPPER CLAD GROUND ROD
- CABLE TO CABLE CONNECTION
- CABLE TO STRUCTURAL STEEL CONNECTION
- EM — ELECTRIC MANHOLE
- TM — TELEPHONE MANHOLE
- EH — ELECTRIC HAND HOLE
- TH — TELEPHONE HAND HOLE
- GROUND CABLE
- —UE— UNDERGROUND ELECTRIC
- —UT— UNDERGROUND TELEPHONE
- —UF— UNDERGROUND FIRE ALARM
- —OE— OVERHEAD ELECTRIC
- —OT— OVERHEAD TELEPHONE
- —OF— OVERHEAD FIRE ALARM
- UNDERGROUND SECTION, REFER TO SECTION DETAIL "A" INDICATES DETAIL LETTER "#" INDICATES DRAWING NUMBER

ONE LINE SYMBOLS LEGEND

- DISCONNECT SWITCH, UNFUSED
- DISCONNECT SWITCH, FUSED "XXAF" INDICATES FUSE RATING "XXAS" INDICATES SWITCH SIZE
- CIRCUIT BREAKER, FIXED "XXAF" INDICATES FRAME SIZE "XXAT" INDICATES TRIP
- CIRCUIT BREAKER, DRAW OUT "XXAF" INDICATES FRAME SIZE "XXAT" INDICATES TRIP
- PRIMARY DRAWOUT CIRCUIT BREAKER "XXAF" INDICATES FRAME SIZE "XXAT" INDICATES TRIP
- LIGHTNING ARRESTOR
- SPD 2 160KA — SURGE-PROTECTIVE DEVICE "2" INDICATES NEC/UL TYPE. "160KA" INDICATES MAXIMUM SURGE CURRENT RATING.
- GROUND CONNECTION
- K — KIRK KEY INTERLOCK
- A — AMMETER
- V — VOLTMETER
- W — WATT METER
- WH — WATTHOUR METER
- ST — SHUNT TRIP DEVICE
- HOA — HAND/OFF/AUTO SELECTOR SWITCH
- SS — SELECTOR SWITCH
- FUSE
- STRESS CONE
- POT HEAD
- POTENTIAL TRANSFORMER "2" INDICATES QUANTITY
- CURRENT TRANSFORMER "3" - INDICATES QUANTITY "500:5A" - INDICATES PRIMARY TO SECONDARY TURNS RATIO
- TRANSFORMER
- 3 PHASE, 3 WIRE DELTA CONNECTION
- 3 PHASE, 4 WIRE WYE SOLIDLY GROUNDED
- 3 PHASE, 4 WIRE WYE RESISTANCE GROUNDED
- AUTOMATIC TRANSFER SWITCH
- AUTOMATIC TRANSFER SWITCH WITH BYPASS MAINTENANCE
- R21A — PANELBOARD

BRANCH CIRCUIT & FEEDER LEGEND

- BRANCH CIRCUIT OR FEEDER CONCEALED IN FINISHED AREAS
- BRANCH CIRCUIT OR FEEDER, CONCEALED IN OR UNDER FLOOR SLAB
- BRANCH CIRCUIT OR FEEDER TURNING UP TOWARDS OBSERVER
- BRANCH CIRCUIT OR FEEDER TURNING DOWN AWAY FROM OBSERVER
- CONDUIT STUBBED ABOVE CEILING
- R22A-1,3,5 — BRANCH CIRCUIT HOME RUN TICKS INDICATE QUANTITY OF CONDUCTORS, GROUND CONDUCTORS ARE NOT INDICATED. NO TICKS INDICATES 2#12 & 1#12G IN 3/4"C MINIMUM. R22A-1,3,5 INDICATES PANEL AND CIRCUIT DESIGNATION FROM WHICH HOMERUN SHALL ORIGINATE. EACH CIRCUIT SHALL BE 20A-1P (20AMP SINGLE POLE) UNLESS NOTED OTHERWISE.
- H42B-1 100A-3P — FEEDER HOMERUN, REFER TO LEGEND OF FEEDER SIZES FOR CONDUCTOR AND RACEWAY REQUIREMENTS DESIGNATED INSIDE TAG. H42B-1 INDICATES PANEL AND CIRCUIT NUMBER DESIGNATION FROM WHICH HOME RUN SHALL ORIGINATE, 100A-3P INDICATES 100 AMPERE, 3 POLE CIRCUIT BREAKER.
- FLEXIBLE CONNECTION TO EQUIPMENT, RACEWAY AND CONDUCTOR RATING TO MATCH ASSOCIATED BRANCH CIRCUIT OR FEEDER
- —E— BRANCH CIRCUIT FOR EMERGENCY BATTERY DC CIRCUIT, MINIMUM 2#10 IN 3/4"C, UNLESS OTHERWISE NOTED

POWER DISTRIBUTION

- 208Y/120 VOLT PANELBOARD, SURFACE MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- 208Y/120 VOLT PANELBOARD, RECESSED MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- 480Y/277 VOLT PANELBOARD, SURFACE MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- 480Y/277 VOLT PANELBOARD, RECESSED MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- GROUND BAR
- T3 — DRY TYPE TRANSFORMER "T3" - INDICATES KVA RATING OF TRANSFORMER REFER TO DRY TYPE TRANSFORMER SCHEDULE
- KT3 — DRY TYPE TRANSFORMER K-RATED "KT3" - INDICATES KVA RATING OF TRANSFORMER REFER TO DRY TYPE K-RATED TRANSFORMER SCHEDULE
- CT — CURRENT TRANSFORMER CABINET
- M — CUSTOMER METER
- UTILITY METER AND SOCKET
- BUSWAY, VERTICAL, REFER TO RISER FOR RATING
- BW — BUSWAY, HORIZONTAL WITH FUSED PLUG-IN DISCONNECT

WIRING DEVICE LEGEND

- 5 GFI — DUPLEX RECEPTACLE, GROUNDING TYPE, RATED 20A, 125V "5"- INDICATES CIRCUIT NUMBER "GFI"- INDICATES INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER "IG"- INDICATES ISOLATED GROUND TYPE "WP" - INDICATES WEATHERPROOF "SP" - INDICATES SURGE PROTECTION "T" - INDICATES TAMPER RESISTANT SAFETY "C" - INDICATES COUNTER HEIGHT
- SINGLE RECEPTACLE, GROUNDING TYPE, RATED 20A, 125V
- DOUBLE DUPLEX RECEPTACLE, GROUNDING TYPE, RATED 20A, 125V
- GFI — DUPLEX HOSPITAL GRADE RECEPTACLE, GROUNDING TYPE RATED 20A, 125V
- J — JUNCTION BOX
- PB — PULLBOX
- P1 — SURFACE, HORIZONTALLY MOUNTED MULTI-OUTLET RACEWAY SYSTEM. "P1" - INDICATES TYPE, SIZE AND QUANTITY OF DEVICES AS PER ASSOCIATED NOTES, AND/OR SCHEDULES
- P1 — SURFACE MULTI-OUTLET RACEWAY SYSTEM VERTICALLY MOUNTED. "P1" - INDICATES TYPE, SIZE AND QUANTITY OF DEVICES AS PER ASSOCIATED NOTES, AND/OR SCHEDULES
- P1 — SURFACE MOUNTED MULTI-OUTLET RACEWAY SYSTEM, PROVIDE DEVICES AS SHOWN ON FLOOR PLANS. "P1" - INDICATES TYPE

PANELBOARD RPA

PANEL: RPA — VOLTS: 208Y/120V — MOUNT: SURFACE — GROUND BUS: Y
MAIN: 100A MCB — AMPS: 125A — AIC: 42,000 — ISOLATED GROUND BUS: N
MANUF/MODEL: SQUARE D OR EQUAL — PH/WIRE: 3PH / 4W — LOC.: OUTDOOR — 200% NEUTRAL: N
FED FROM: UTIL XFMR

CIR.	AMPS/ POLES	DESCRIPTION OF LOAD	LOAD kVA	LOAD BY PHASE, kVA A	B	C	LOAD kVA	DESCRIPTION OF LOAD	AMPS/ POLES	CIR.
1	30/1	POP-1	1.20	2.40			1.20	POP-4	30/1	2
3	30/1	POP-2	1.20		2.40		1.20	POP-5	30/1	4
5	30/1	POP-3	1.20			2.40	1.20	POP-6	30/1	6
7	20/1	SPARE		0.18			0.18	OUTDOOR REC	20/1	8
9	20/1	SPARE			0.00			SPARE	20/1	10
11	20/1	SPARE				0.00		SPARE	20/1	12
13	20/1	SPARE		0.00				SPARE	20/1	14
15	20/1	SPARE			0.00			SPARE	20/1	16
17	20/1	SPARE				0.00		SPARE	20/1	18
19	-	RESERVED FOR SPD		0.00				SPACE	-	20
21	-	RESERVED FOR SPD			0.00			SPACE	-	22
23	-	RESERVED FOR SPD				0.00		SPACE	-	24
		TOTAL kVA BY PHASE -		2.58	2.40	2.40		TOTAL CONNECTED KVA-	7.38	
	NOTES:							DEMAND FACTOR	1.01	
								TOTAL DEMAND KVA-	7.43	
								TOTAL AMPERES-	20.61	

ABBREVIATIONS

A/AMP	AMPERE	KWH	KILOWATT HOURS
AC	ALTERNATING CURRENT	LTG	LIGHTING
ADA	AMERICAN WITH DISABILITIES ACT	MCB	MAIN CIRCUIT BREAKER
AF	AMPERE FRAME	MEC	MASSACHUSETTS ELECTRICAL CODE
AFF	ABOVE FINISHED FLOOR	M/G	MOTOR/GENERATOR SET
AFG	ABOVE FINISHED GRADE	MH	MANHOLE
AIC	AMPERE INTERRUPTING CAPACITY	MLO	MAIN LUGS ONLY
AL	ALUMINUM	MTD	MOUNTED
AT	AMPERE TRIP	MTG	MOUNTING
ATS	AUTOMATIC TRANSFER SWITCH	NC	NORMALLY CLOSED CONTACT
AWG	AMERICAN WIRE GAUGE	NEC	NATIONAL ELECTRICAL CODE
B	BURIED	NO	NORMALLY OPEN CONTACT
C	CONDUIT	NTS	NOT TO SCALE
CA	CABLE	#	NUMBER
CATV	CABLE TELEVISION	OPD	OVER CURRENT PROTECTION DEVICE
CCTV	CLOSED CIRCUIT TELEVISION SYSTEM	POS	PROVIDED UNDER OTHER SECTIONS
CB	CIRCUIT BREAKER	PVC	POLYVINYL CHLORIDE
CKT	CIRCUITS	PWR	POWER
CPU	CENTRAL PROCESSING UNIT	RGS	RIGID GALVANIZED STEEL
℄	CENTERLINE	RMS	ROOT MEAN SQUARE VALUE
dB	DECIBEL	RPM	REVOLUTIONS PER MINUTE
DC	DIRECT CURRENT	SPD	SURGE PROTECTIVE DEVICE
DWG	DRAWING	SN	SOLID NEUTRAL
EC	ELECTRICAL CONTRACTOR	SWBD	SWITCHBOARD
EMT	ELECTRIC METALLIC TUBING	TB	TERMINAL BLOCK
FDR	FEEDER	TEL	TELEPHONE
FLMT	FLEXIBLE LIQUID TIGHT METALLIC TUBING	TERMN	TERMINAL
FREQ	FREQUENCY	TSP	TWISTED SHIELDED-PAIR
GEC	GROUNDING ELECTRODE CONDUCTOR	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
GFI	GROUND FAULT INTERRUPTING	TYP	TYPICAL
GND	GROUND	UG	UNDERGROUND
HH	HANDHOLE	UNO	UNLESS NOTED OTHERWISE
HP	HORSEPOWER	UPS	UNINTERRUPTIBLE POWER SUPPLY
HVAC	HEATING, VENTILATING AND AIR CONDITIONING	UTP	UNSHIELDED TWISTED-PAIR
HZ	HERTZ	V	VOLTS
IG	ISOLATED GROUND	VA	VOLT-AMPERE
JB	JUNCTION BOX	VSD	VARIABLE SPEED DRIVE
KVA	KILOVOLT-AMPERE	W	WATTS
KW	KILOWATT	WP	WEATHERPROOF

BUILDING GROUNDING GRID LEGEND

- GROUND ROD
- GROUNDING CABLE
- EXOTHERMIC BONDING CONNECTION
- BOLTED BONDING CONNECTION

GENERAL NOTES:

A. DO NOT SCALE DRAWINGS. VERIFY DIMENSIONS IN FIELD PRIOR TO COMMENCEMENT OF WORK

B. ALL 125V, SINGLE PHASE, 15 AND 20 AMP RECEPTACLE OUTLETS THAT ARE USED AS TEMPORARY POWER DURING CONSTRUCTION SHALL HAVE GFCI PROTECTION.

C. PROVIDE EQUIPMENT BONDING JUMPER GROUND CONNECTION IN ALL BOXES AND ENCLOSURES FROM THE EQUIPMENT GROUNDING CONDUCTOR.

D. WIRE TERMINATION PROVISIONS FOR PANELBOARDS, CIRCUIT BREAKERS, SAFETY SWITCHES, AND ALL OTHER ELECTRICAL APPARATUS SHALL BE LISTED AS SUITABLE FOR 75°C.

E. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO THE SUBMISSION OF BIDS TO BECOME FAMILIAR WITH THE ACTUAL CONDITIONS AND EXTENT OF WORK. HERE SHALL BE NO INTERRUPTION OF SERVICE TO ANY AREA OUTSIDE THE SCOPE LIMITS WITHOUT APPROVAL FROM THE OWNER'S REPRESENTATIVE.

F. REFER TO CIVIL DRAWINGS FOR ASSOCIATED NOTES, MOUNTING DETAILS, HEIGHTS AND EXACT LOCATIONS OF ALL DEVICES PRIOR TO WORK

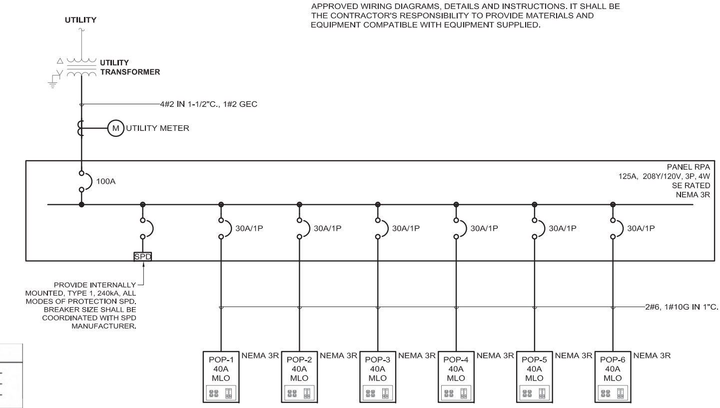
G. CIRCUIT NUMBERS ARE DIAGRAMMATIC, EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD AND REFLECTED ON AS-BUILT DOCUMENTATION BY THE ELECTRICAL CONTRACTOR. THE ASSOCIATED CIRCUIT NUMBERS THAT ARE APPLIED TO EACH DEVICE AND PIECE OF EQUIPMENT INFERS INTERCONNECTING BRANCH CIRCUITRY. INTERCONNECTING BRANCH WIRING SHALL BE SIZED EQUAL TO THE HOMERUN UNLESS NOTED OTHERWISE.

H. VOLTAGE DROP HAS BEEN CONSIDERED IN THE DESIGN OF ALL BRANCH CIRCUITRY AND FEEDER SIZES BASED UPON THE ILLUSTRATED EQUIPMENT LAYOUTS AND SHORTEST CONDUCTOR/RACEWAY ROUTING. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR DEVIATIONS TAKEN THAT WILL INCREASE CONDUCTOR/RACEWAY ROUTING LENGTHS. BRANCH CIRCUITS LONGER THAN 75' FOR 120V FROM PANEL TO LAST OUTLET SHALL BE INCREASED A MINIMUM OF ONE SIZE ABOVE THAT SPECIFIED TO LIMIT VOLTAGE DROP TO LESS THAN 3%. FEEDERS SHALL FOLLOW SIMILAR GUIDELINES AND BE LIMITED TO 2% DROP.

I. PANELBOARDS AND METER SOCKET ENCLOSURES SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE ELECTRICAL CONTRACTOR SHALL HAVE AN ARC FAULT STUDY DONE ON ALL NEW POWER DISTRIBUTION EQUIPMENT. ADJUSTABLE ELECTRONIC BREAKERS SHALL BE SET AND ARC FAULT LABELS APPLIED PER THE ANALYSIS. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE TO HAVE THIS STUDY PERFORMED AND IMPLEMENTED AND PROVIDE ANY INFORMATION REQUIRED. THE MARKING LABELS SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.

J. POWER BRANCH CIRCUITRY SHALL BE INSTALLED IN CONDUIT.

K. FINAL CONNECTIONS TO EQUIPMENT SHALL BE PER MANUFACTURER'S APPROVED WIRING DIAGRAMS, DETAILS AND INSTRUCTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE MATERIALS AND EQUIPMENT COMPATIBLE WITH EQUIPMENT SUPPLIED.



1 E-0.00 ELECTRICAL RISER DIAGRAM
NOT TO SCALE

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FOOTHILLS SHOOTING COMPLEX IMPROVEMENTS
SKEET AND TRAP EXPANSION
283 FIELDING ROAD, CHERRYVILLE, CLEVELAND COUNTY, NC. 28021

RDK ENGINEERS, ENGINEERING CORPORATION, CERT. NO. C-3240, NORTH CAROLINA, DURHAM, N.C.
NORTH CAROLINA, SEAL 041500, ENGINEER, STEPHEN R. VAUGHN
DATE: 03-05-2020

REVISIONS
NO. DATE

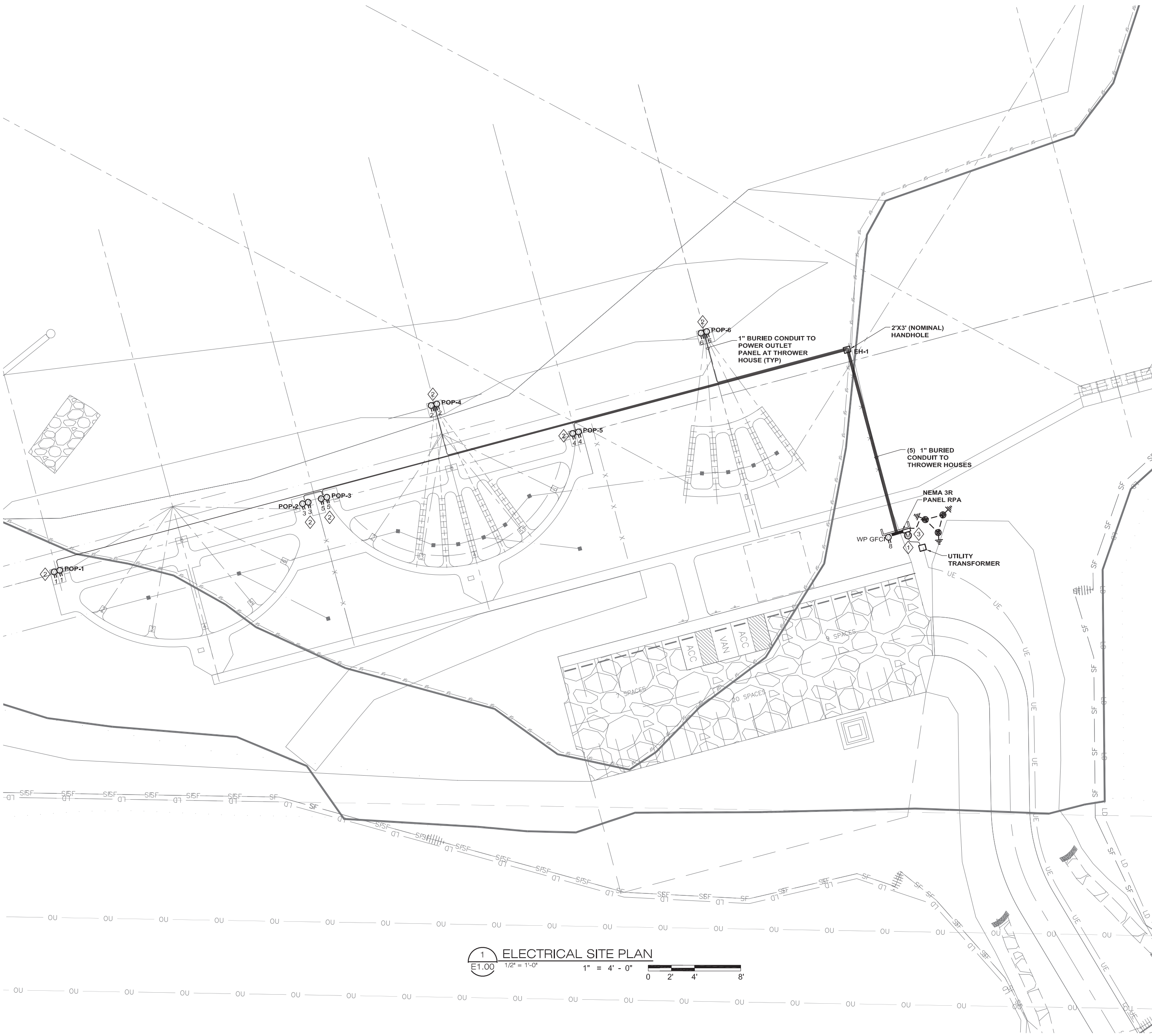
PLAN INFORMATION

PROJECT NO.	C019009
FILENAME	E0.00.DWG
CHECKED BY	FGE
DRAWN BY	SRV
SCALE	AS NOTED
DATE	03.05.2020

SHEET
ELEC. SYMBOLS, LEGENDS AND ABBREVIATIONS
E0.00

FINAL DRAWING - FOR CONSTRUCTION

W:\BLD3\Projects\2019\C019009 - Foothills Public Shooting Complex NC\500 Drawings\505 Electrical\Plot Files\E0.00.dwg, 3/5/2020 4:48 PM, Friedrich Guerrero



SITE NOTES:

A. REFER TO DRAWING E-0.00 FOR SYMBOLS, ABBREVIATIONS AND GENERAL NOTES.

B. COORDINATE INSTALLATION OF NEW CONDUITS WITH EXISTING UTILITIES. NO INTERRUPTION OF EXISTING UTILITIES SHALL BE ALLOWED DURING INSTALLATION OF NEW CONDUIT

C. ALL EXISTING TO REMAIN ASPHALT, CONCRETE CURBS, AND VEGETATION DISTURBED BY CONDUIT/EQUIPMENT INSTALLATION SHALL BE RESTORED TO IT'S ORIGINAL STATE.

D. CONDUIT ROUTING SHOWN IS DIAGRAMMATIC. FOR ELECTRICAL CONDUITS THERE SHALL BE NO MORE THAN 270 DEGREES OF CONDUIT BENDS BETWEEN HANDHOLES OR ELECTRICAL EQUIPMENT. CONTRACTOR SHALL PROVIDE ADDITIONAL HANDHOLES REQUIRED TO MEET THESE INSTALLATION REQUIREMENTS.

E. ALL RECEPTACLES AND POWER OUTLET PANELS ARE TO TO BE SERVED FROM PANEL RPA.

ELECTRICAL KEYNOTES #

1. CONTRACTOR SHALL TRENCH AND INSTALL FEEDER TO PANEL RPA. CONDUIT SHALL BE INSTALLED A MINIMUM OF 36" BELOW GRADE. ALL CONDUCTORS SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR. COORDINATE CONNECTION TO UTILITY TRANSFORMER WITH UTILITY COMPANY.

2. RECEPTACLES SHALL BE INTEGRAL TO A POLE MOUNTED NEMA 3R UNMETERED POWER OUTLET PANEL (POP-X). EACH POWER OUTLET PANEL SHALL BE PROVIDED WITH A BOLT-ON CLOSING CAP FACTORY INSTALLED AT THE TOP ENDWALL, BOTTOM FED FROM CONDUIT RISER AND BE PROVIDED WITH (2) NEMA 5-20R RECEPTACLES. EACH RECEPTACLE SHALL BE PROTECTED BY AN INTEGRAL 20A GROUND FAULT CIRCUIT INTERRUPTER CIRCUIT BREAKER. PANELS SHALL BE PROVIDED WITH CUTOUTS IN THE BOTTOM ENDWALL SO POWER CORDS REMAIN CONNECTED WHEN DOORS IS CLOSED. PROVIDE MOUNTING POLE, SUPPORTS AND ALL WORK TO MAKE SYSTEM OPERATIONAL.

3. PROVIDE CT CABINET, METER SOCKET, SUPPORT FRAME AND CONNECTIONS PER UTILITY COMPANY STANDARDS. COORDINATE REQUIREMENTS WITH UTILITY COMPANY PRIOR TO WORK.

NV5
RDK Engineers,N.C.,Inc.
630 Davis Drive, Suite 203
Morrisville, NC 27560
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FOOTHILLS SHOOTING COMPLEX IMPROVEMENTS

SKEET AND TRAP EXPANSION

283 FIELDING ROAD, CHERRYVILLE, CLEVELAND COUNTY, NC. 28021

RDK ENGINEERS REGISTERED ENGINEERING CORPORATION CERT. NO. C-3240 NORTH CAROLINA DURHAM, N.C.

NORTH CAROLINA PROFESSIONAL SEAL 041500 ENGINEER STEPHEN R. VAUGHN

DATE: 03-05-2020

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	C019009
FILENAME	E1.00.DWG
CHECKED BY	FGE
DRAWN BY	SRV
SCALE	AS NOTED
DATE	03.05.2020

SHEET

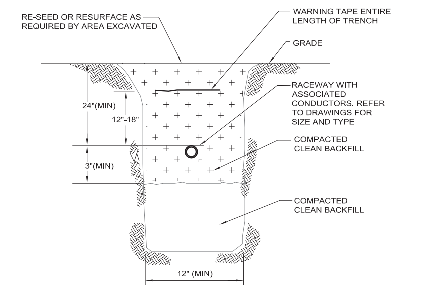
ELECTRICAL SITE PLAN

E1.00

FINAL DRAWING - FOR CONSTRUCTION

W:\BLD3\Projects\2019\C019009 - Foothills Public Shooting Complex NC\500 Drawings\505 Electrical\Plot Files\E1.00.dwg, 3/5/2020 4:47 PM, Friedrich Guerrero

BURIED CONDUIT DETAIL (E6)



NOTES:
1. THIS DETAIL IS INTENDED TO ILLUSTRATE REQUIREMENTS WHICH EXCEED THOSE REQUIRED BY NEC TABLE 300-5.

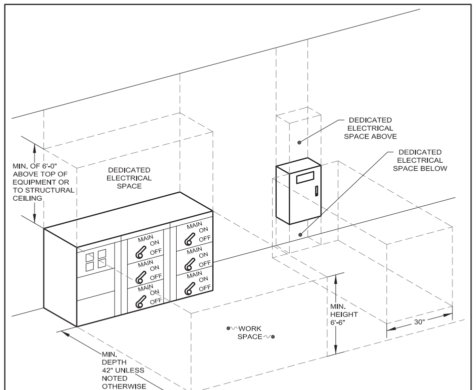
2. WARNING TAPE SHALL BE DETECTABLE TYPE FOIL BACKED 4MIL POLYETHYLENE WITH FADE RESISTANT "BURIED ELECTRIC LINE BELOW" A MINIMUM OF 18 INCHES ABOVE THE BURIED SERVICE. TAPE SHALL BE EQUAL TO T&B NAF-0708.

3. ALL ROADWAY CROSSING SHALL BE ENCASED WITH A MINIMUM OF 2 INCHES OF CONCRETE (TOP BOTTOM AND SIDES) EXTENDING A MINIMUM OF 2 FEET BEYOND EACH SIDE OF CROSSING.

4. ALL CONDUIT RISERS SHALL UTILIZE LONG RADIUS GALVANIZED RIGID STEEL SWEEPS.

NV5 BURIED CONDUIT DETAIL E6

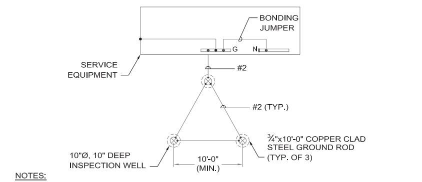
ELECTRICAL WORK AND DEDICATED SPACE (E4)



NOTES:
1. NO EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION (PIPING, DUCTS, ETC.) SHALL ENTER THE DEDICATED SPACE ABOVE OR BELOW ELECTRICAL POWER EQUIPMENT INCLUDING SWITCHGEAR, SWITCHBOARDS, PANELBOARDS, & MOTOR CONTROL CENTERS.
2. PIPING SYSTEMS INSTALLED ABOVE THE DEDICATED ELECTRICAL SPACE SHALL BE ALLOWED WHERE DRIP PANS ARE INSTALLED TO CAPTURE LEAKS, RUPTURES OR CONDENSATION DRIPS. THE PIPING AND DRIP PANS SHALL BOTH BE OUTSIDE THE DEDICATED SPACE ENVELOPE.
3. WORK SPACE SHALL BE PROVIDED AT ALL EQUIPMENT UNDER 600V REQUIRING ACCESS INCLUDING BUT NOT LIMITED TO PANELS, DISCONNECTS, STARTERS, CONTROL PANELS INTEGRATED INTO HVAC/PLUMBING/FP EQUIPMENT, ETC.
4. NO EQUIPMENT SHALL PROTRUDE INTO THE WORK SPACE.
5. WORK SPACE DEPTH BASED UPON NEC TABLE 110.26(A)(1) CONDITION 2 150V TO GROUND.

NV5 ELECTRICAL WORK AND DEDICATED SPACE E4

SITE ELECTRIC SERVICE GROUNDING ELECTRODE DETAIL (E1)

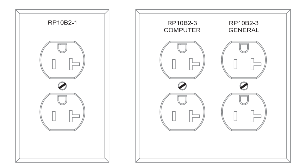


NOTES:
1. THIS DRAWING IS INTENDED TO ILLUSTRATE THE SERVICE GROUNDING REQUIREMENTS. REFER TO NEC ARTICLE 250 FOR ADDITIONAL DETAILS.

2. ALL CONNECTIONS SHALL BE EXOTHERMIC WELDS WITH THE EXCEPTION OF MECHANICAL LUGS IN THE SERVICE EQUIPMENT.

NV5 SITE ELECTRIC SERVICE GROUNDING ELECTRODE DETAIL E1

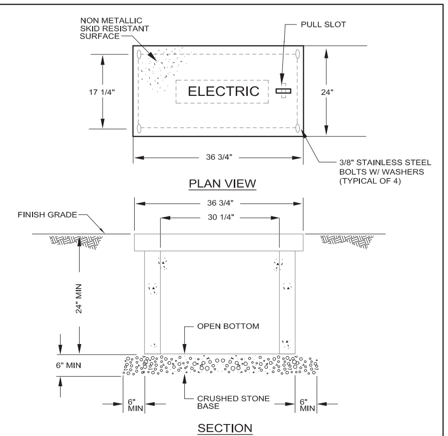
COMMERCIAL DUTY RECEPTACLE LABEL REQUIREMENTS (E2)



NOTES:
1. LABEL ALL RECEPTACLES WITH PANEL DESIGNATION AND CIRCUIT NUMBER.
2. LABEL SHALL BE BLACK LETTERING ON CLEAR TAPE EQUAL TO P-TOUCH EXTRA STRENGTH ADHESIVE TZ LAMINATED TAPE.

NV5 COMMERCIAL DUTY RECEPTACLE LABEL REQUIREMENTS E2

TYPICAL PREFABRICATED HANDHOLE DETAIL (E7)



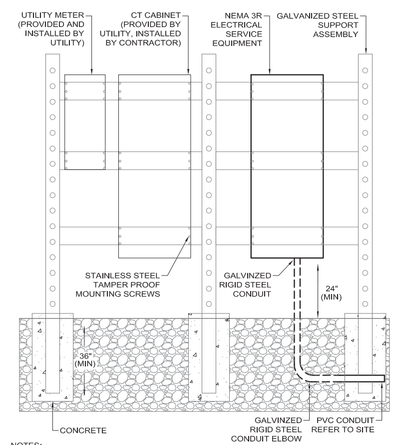
NOTES:
1. THIS IS A TYPICAL DETAIL. REFER TO DRAWING FOR ACTUAL DIMENSIONS OF HANDHOLE WHICH MAY DEVIATE FROM THESE DIMENSIONS. REFER TO THE SITE PLAN FOR QUANTITY OF CONDUITS AND THE "SERVICE" REQUIRED ON THE COVER.

2. THIS HANDHOLE IS INTENDED FOR NON-DELIBERATE VEHICULAR TRAFFIC ONLY. ANSI TIER 22 (22,500 POUND DESIGN LOAD)

3. HANDHOLE SHALL BE PREFABRICATED POLYMER CONCRETE AGGREGATE EQUAL TO QUAZITE OR EQUAL PRE CAST CONCRETE CONSTRUCTION.

NV5 TYPICAL PREFABRICATED HANDHOLE DETAIL E7

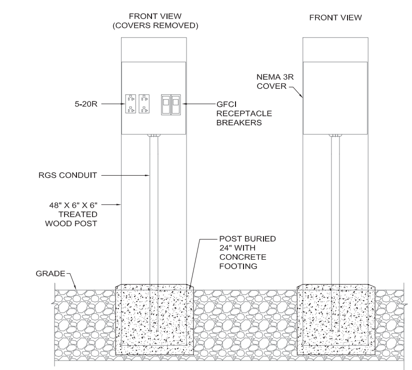
FREE STANDING EQUIPMENT MOUNTING DETAIL (E5)



NOTES:
1. REFER TO SITE PLANS AND SINGLE LINE DIAGRAMS FOR QUANTITIES OF CONDUITS AND FEEDERS.
2. CONFIRM ALL CONNECTION REQUIREMENTS WITH UTILITY COMPANY PRIOR TO INSTALLATION. PROVIDE ALL WORK TO MAKE SYSTEM OPERATIONAL.
3. PROVIDE BOLLARDS SPACED 5FT ACROSS FRONT OF SERVICE EQUIPMENT FOR PROTECTION AGAINST VEHICLES
4. REFER TO SITE GROUNDING DETAIL FOR GROUNDING REQUIREMENTS.

NV5 FREE STANDING EQUIPMENT MOUNTING DETAIL E5

TYPICAL POWER OUTLET PANEL DETAIL (E3)



NOTES:
1. ALL SCREWS FOR PEDESTAL SHALL BE TAMPER PROOF.

2. REFER TO MANUFACTURER INSTALLATION DETAILS FOR ALL INSTALLATION REQUIREMENTS.

6. PROVIDE LAMINATED WARNING LABEL ON PEDESTAL AS FOLLOWS: "ELECTRICAL HAZARD INSIDE. DISCONNECT POWER BEFORE REMOVING COVERS"

7. PROVIDE 3/4" X 10FT GROUND ROD AT EACH PEDESTAL. CONNECT TO PEDESTAL GROUNDING BAR WITH #2 AWG GROUND ELECTRODE CONDUCTOR.

NV5 TYPICAL POWER OUTLET PANEL DETAIL E3

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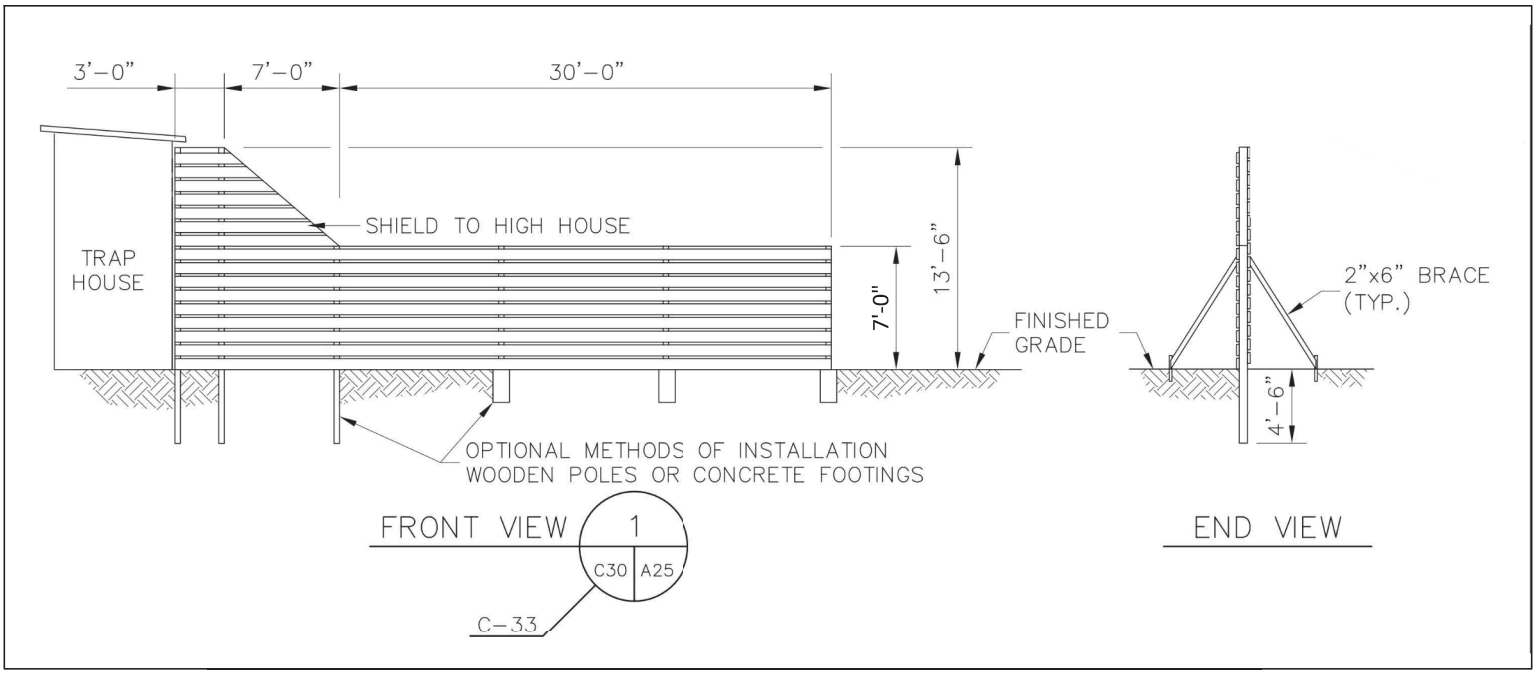

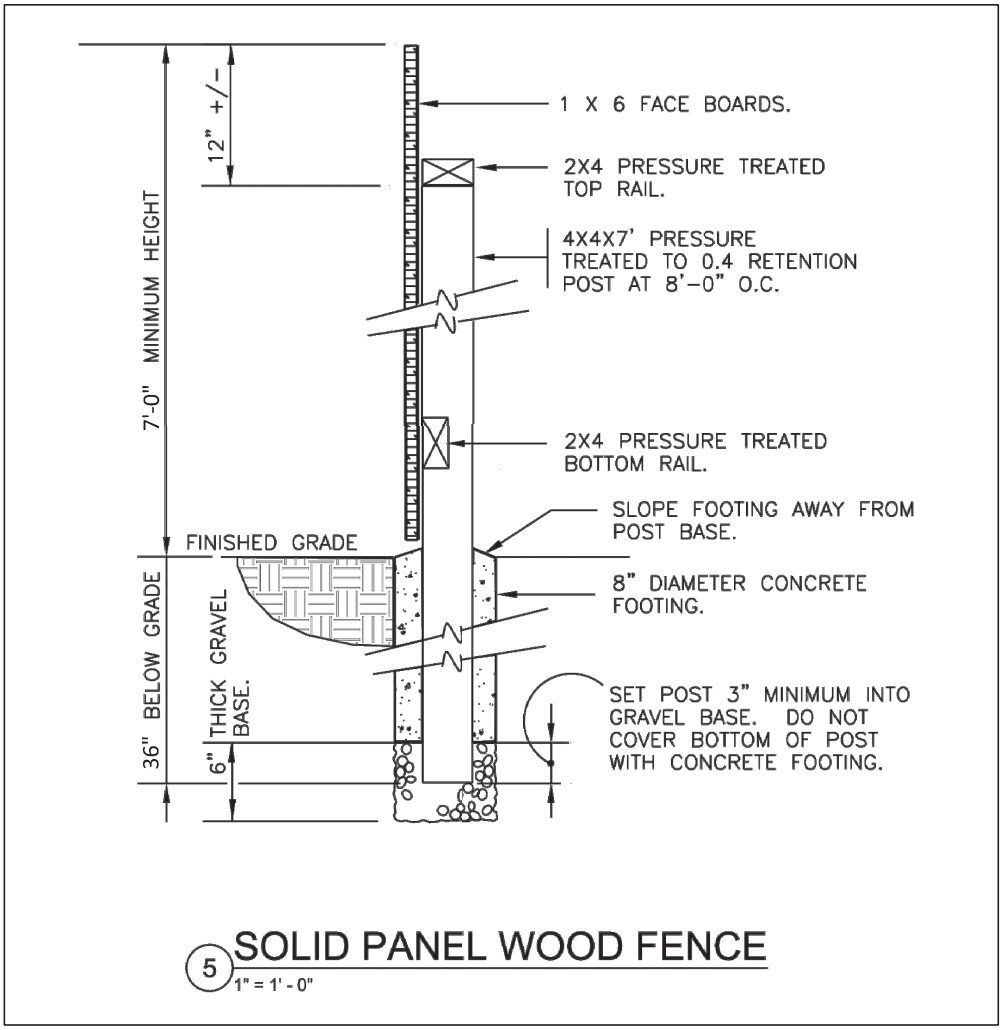

5 SOLID PANEL WOOD FENCE

1" = 1' - 0"