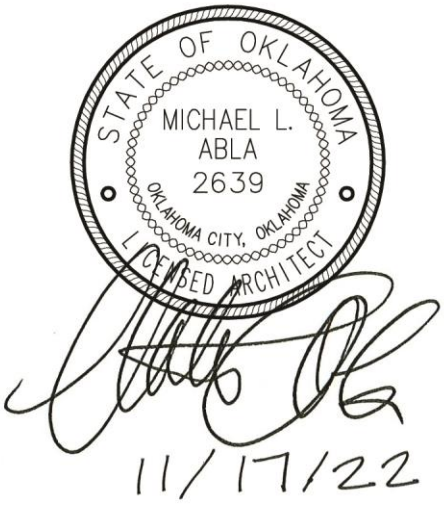
MOORE PUBLIC SCHOOLS -
KELLEY ELEMENTARY SCHOOL
NEW ADDITION / STORM SHELTER
Moore Public Schools - Moore, Oklahoma
AGP - Moore, Oklahoma

ADDENDUM NO. 2
November 17, 2022



This addendum applicable to work designated herein, shall be understood to be an Addendum, and as such shall be included in the Contract Agreement.

Receipt of this Addendum shall be acknowledged by the Construction Management Firm notifying this office in writing, and by any applicable subcontractor to the CM.

This addendum consists of two (2) pages with attachments of sixty-six four (66) 8.5″x11″ page and eleven (11) 24″x36″ sheet.

A. General:

1. Refer to attached completed Geotechnical Engineering Report from PSI / Intertek.

B. Drawings:

Civil

1. Refer to attached Drainage Report Review Response Letter from the City of Moore.
2. Sheet C501, Detail 1, Utility Site Plan: added note “10” and revised note “10” in General Notes as indicated on attached replacement sheet.
3. Sheet C900, Detail 8, French Drain Detail: revised trench width as indicated on attached replacement sheet.

Structural

1. Refer to attached replacement sheets.

Architectural

1. Sheet A601, Detail 2, Color Schedule: added brick veneer colors “A” and “B”. Refer to attached replacement sheet.

2. Sheet A601, Detail 4, Door Schedule: revised door materials in schedule. There are NO wood doors on this project. Refer to replacement sheet.

Mechanical, Electrical, and Plumbing

1. Refer to attachments.

C. Specifications:

No changes.

END OF ADDENDUM NO. 2

GEOTECHNICAL ENGINEERING REPORT

Kelley Elementary School Shelter Addition
1900 N. Janeway Avenue,
Moore, Oklahoma 73164

PSI Project No. 05462609

PREPARED FOR:

AGP - the Abla Griffin Partnership LLC
201 North Broadway, Suite 210
Moore, Oklahoma 73160

November 14, 2022

BY:

PROFESSIONAL SERVICE INDUSTRIES, INC.
11825 S. Portland Avenue
Oklahoma City, OK 73107
Phone: (405) 735–6052

Professional Services Industries, Inc.
11825 S. Portland Avenue
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Phone: (405) 735–6052

November 14, 2022

AGP - the Abla Griffin Partnership LLC
201 North Broadway, Suite 210
Moore, Oklahoma 73160

Attn.: Mr. Michael L. Abla, AIA
Mabla@theAGP.net
405.735.3477

Re: Geotechnical Engineering Report
Kelley Elementary School Shelter Addition
1900 N. Janeway Avenue,
Moore, Oklahoma
PSI Project No. 05462609

Professional Service Industries, Inc. (PSI), an Intertek company, is pleased to submit this Geotechnical Engineering Report for the referenced project. This report includes the results from the field exploration and laboratory testing along with recommendations for use in preparation of the appropriate design and construction documents for this project.

PSI appreciates the opportunity to provide this Geotechnical Engineering Report and looks forward to continuing participation during the design and construction phases of this project. PSI also has great interest in providing materials testing and inspection services during the construction of this project and will be glad to meet with you to further discuss how we can be of assistance as the project advances.

If there are questions pertaining to this report, or if PSI may be of further service, please contact us at your convenience.

Respectfully submitted,
Professional Services Industries, Inc.
Certificate of Authorization No. 1111; Expires 06/30/2023

Stephen Schnabel, E.I.
Staff Geotechnical Engineer

Thomas M. Vick, P.E., PMP *11/14/22*
Senior Engineer | Principal Consultant

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1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI), an Intertek company, has completed a field exploration and geotechnical evaluation for the Kelley Elementary School Shelter Addition to be located at 1900 N. Janeway Avenue in Moore, Oklahoma. Mr. Michael L. Abla, AIA, representing AGP - the Abla Griffin Partnership LLC, authorized PSI's services on October 6, 2022 by signing PSI Proposal No. 0546-384428.

1.2 PROJECT DESCRIPTION

Based on information provided by the client, a summary of our understanding of the proposed project is provided below.

- A new single-story school shelter building with an approximate footprint of 3,900 square feet.

PSI was provided approximate structural loads by Mr. Brandon Birch, P.E., S.E., of KFC Engineering. PSI has prepared this report based on the anticipated loads detailed bellow:

- Pier foundations expect with pier reactions between 100 kips to 150 kips;
- Wall loads on the order of 8 kips per linear foot or less, however void forms are expected.

Site grading information was not provided at the time of this report. This report has been developed based on finished grades being within two (2) feet of existing site grade.

The geotechnical recommendations presented in this report are based on the available project information, structure locations, and the subsurface materials encountered during the field investigation. Should any of the above information or design basis made by PSI be inconsistent with the planned construction, it is requested that you contact us immediately to allow us to make any necessary modifications to this report. PSI will not be held responsible for changes to the project if not provided the opportunity to review the information and provide modifications to our recommendations.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE GEOLOGY

As shown on the geologic map database for the State of Oklahoma, the site is located in an area where the Salt Plains Formation (Psp) is present at or near the ground surface. The Salt Plains Formation (Psp) consists of red to brown block shale and orange brown siltstone. The formation grades southward into Purcell Sandstone (Pp) in the Norman area. Thickness ranges about 200 feet.

2.2 SITE DESCRIPTION

The project site is located at 1900 N. Janeway Avenue in Moore, Oklahoma. The latitude and longitude of the proposed construction site are approximately at 35.3553° N and 97.5024° W. The project site currently consists of an open grass area with minor tree coverage. The site is bordered by the existing school building to the north, east and west, and the existing playground to the south. The truck-mounted drill rig did not experience significant mobility difficulty in accessing the boring at the time of the field work. The site is generally flat.

2.2.1 SEISMIC DESIGN PARAMETERS

We understand that the project is governed by the International Building Code (IBC), 2018 edition. As part of this code, the design of structures must consider dynamic forces resulting from seismic events. These forces are dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site.

As part of the procedure to evaluate seismic forces, the code requires the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface. Our borings extended to depths of 30 feet bgs, but to define the Site Class for this project, we have interpreted the results of soil test borings drilled within the project site and estimated appropriate soil properties below the base of the borings to a depth of 100 feet as permitted by the code. The estimated soil properties were based upon the soils encountered at the site, data available in published geologic reports, and our experience with subsurface conditions in the general site area.

Based upon our evaluation, the subsurface conditions at the site are consistent with the characteristics of a **Site Class "C"** as defined in Chapter 20.3-1 of the ASCE 7-16. The associated probabilistic ground acceleration values and site coefficients for the general site area were obtained from the USGS geohazards web page (https://seismicmaps.org/) using the **ASCE 7-16** option and are presented in the table below.

TABLE 2.1: GROUND MOTION VALUES

Period (sec)	Mapped MCE Spectral Response Acceleration (g)		Site Coefficients		Adjusted MCE_R Spectral Response Acceleration (g)		Design Spectral Response Acceleration (g)	
0.2	S_s	0.33	F_a	1.3	S_{Ms}	0.429	S_{Ds}	0.286
1.0	S_1	0.083	F_v	1.5	S_{M1}	0.125	S_{D1}	0.083

2% Probability of Exceedance in 50 years for Latitude, Longitude: 35.35532° N, -97.50238° W
MCE_R = Maximum Considered Earthquake

2.3 FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

2.3.1 FIELD EXPLORATION

Subsurface conditions at the site were explored by drilling two (2) borings at the approximate locations shown on the Boring Location Plan included in the Appendix. The boring locations were approximately located in the field by the drilling crew by estimating distances from known site reference points and with the aid of a handheld GPS device. The boring elevations on the boring logs are estimated from Google Earth and should be considered as accurate as the means and methods used to obtain them. The boring location information is included in the table below.

TABLE 2.2: BORING LOCATION INFORMATION

Boring Number	Boring Location	Depth(ft)
DB-1	School Shelter	28¾
DB-2	School Shelter	29

The borings were advanced utilizing solid flight auger drilling methods from an ATV CME-750 drill rig equipped with an automatic hammer using a weight of 140 pounds dropping 30 inches, and soil samples were routinely obtained during the drilling process. Drilling and sampling techniques were accomplished generally in accordance with ASTM procedures.

Groundwater level measurements were recorded at the boring locations during the field operations and were noted on the boring logs. The borings were backfilled with soil cuttings after the drilling operations were completed as per the local regulatory requirements.

Elevations of the ground surface at the boring locations were not provided and should be surveyed by others prior to construction. The references to elevations of various subsurface strata are based on depths below existing grade at the time of drilling. The approximate boring locations are depicted on the Boring Location Plan provided in the Figures.

During field activities, the encountered subsurface conditions were observed, logged, and visually classified (in general accordance with ASTM D 2488/D 2487). Field notes were maintained to summarize soil types and descriptions, water levels, changes in subsurface conditions, and drilling conditions. Samples were identified in the field, placed in sealed containers, and transported to the laboratory for further classification and testing.

PSI supplemented the field exploration with a laboratory testing program to determine additional engineering characteristics of the subsurface soils encountered. The laboratory testing program was conducted in general accordance with applicable ASTM Test Methods, and is included in Appendix A. Portions of samples not altered or consumed by laboratory testing will be discarded 30 days from the date shown on this report.

The geotechnical laboratory program included the following tests:

- Classification (ASTM D 2487 / 2488)
- Moisture Content (ASTM D 2216)
- Atterberg Limits (ASTM D 4318)
- Percent Soil Particles Finer than No. 200 Sieve (ASTM D 1140)

The samples not tested in the laboratory will be stored for a period of 30 days subsequent to submittal of this report and will be discarded after this period, unless other arrangements are made prior to the disposal period.

2.4 SUBSURFACE CONDITIONS

The results of the field and laboratory testing have been used to generalize a subsurface profile at the project site. The following subsurface descriptions provide a highlighted generalization of the major subsurface stratification features and material characteristics.

TABLE 2.3: GENERALIZED SOIL PROFILE

Stratum	Top (ft)	Bottom (ft)	Description
I	0	6	Lean CLAY (CL), medium stiff to very stiff, dark reddish brown, light gray inclusions, trace sand
II	6	13½ to 14½	Shaley Lean CLAY (CL), hard, reddish brown
III	13½ to 14½	30	Clayey SHALE, hard, light reddish brown, with silt seams and sand

The boring logs included in Appendix A should be reviewed for specific information at individual boring locations. The boring logs include soil descriptions, stratifications, locations of the samples, and field and laboratory test data. The descriptions provided on the logs only represent the conditions at that actual boring location; the stratifications represent the approximate boundaries between subsurface materials. The actual transitions between strata may be more gradual and less distinct. Variations will occur and should be expected across the site.

2.5 GROUNDWATER INFORMATION

The initial water levels were monitored in the open boreholes during drilling and attempts were made to measure final water levels. Groundwater information is summarized below in Table 2.4

TABLE 2.4: SUMMARY OF GROUNDWATER CONDITIONS

Boring Number	Boring Depth	Measured Groundwater Levels		
		While Drilling	Upon Completion	24 Hour Delay
DB-1	28¾ feet	22 feet	15 feet	7 feet
DB-2	29 feet	7 feet	25 feet	7.5 feet

Groundwater levels fluctuate seasonally as a function of rainfall, proximity to creeks, rivers and lakes, the infiltration rate of the soil, seasonal and climatic variations, and land usage. In relatively pervious soils, such as sandy soils, the indicated depths are a relatively reliable indicator of groundwater levels. In relatively impervious soils, water levels observed in the borings may not provide a reliable indication of groundwater elevations, even after several days. If a detailed water level evaluation is required, observation wells or piezometers can be installed at the site to monitor water levels.

The groundwater levels presented in this report were measured at the time of PSI field activities. The contractor should determine the actual groundwater levels at the site before construction activities.

3.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

3.1 GEOTECHNICAL DISCUSSION

The primary geotechnical consideration at this site is the presence of low to medium plasticity soils. These conditions will govern the site preparation and earthwork activities and the project foundation designs. Should changes in the project criteria occur, a review must be made by PSI to determine if modifications to our recommendations will be required.

The following geotechnical design recommendations have been developed based on the previously described project characteristics and subsurface conditions encountered. The proposed construction should be performed in accordance with these recommendations and the applicable building code, and local governmental standards which have jurisdiction over this project. If there are changes in the project criteria, PSI should be retained to determine if modifications in the recommendations will be required. The findings of such a review would be presented in a supplemental report. Once final design plans and specifications are available, a general review by PSI is recommended to confirm that the conditions anticipated in preparing this geotechnical report are consistent with the earthwork and foundation recommendations contained within the construction documents.

3.1.1 SOIL SHRINK-SWELL POTENTIAL

The results of laboratory plasticity tests indicate that low to medium plasticity clay soils are present on site, particularly at the vicinity of boring DB-2. The materials generally have a low to moderate potential for shrinking and swelling. The amount of potential soil movement due to shrinking and swelling with soil moisture variations for this site could be on the order of 1-inch or less for these soils, assuming that the subgrade materials are allowed to increase in moisture content from a relatively dry condition to a relatively wet condition over a depth of approximately 8 feet. The relatively dry condition can occur with severe dry weather situations, thereby resulting in a significant degree of shrinkage and eventual potential swell in the foundation material. Differential movements are expected to be about ½ of the PVR. However, it should be noted that for extreme conditions (i.e., soils dry and shrink in one area with soils in another area being exposed to water and swelling) differential movement can be equal to or even double the PVR.

Poor drainage and water infiltration into the foundation soils may result in reduction of soil strength, thereby causing adverse and damaging movements. It is recommended that the moisture-related problems be corrected immediately as they can be detrimental to the ground supported structures.

It is important to control the possibility of moisture changes by following the precautions shown below:

- Direct surface runoff away from structures by sloping the subgrade away from the structure.
- Extend impervious coverings, such as sidewalks, to the structure's edge.
- Extend roof drain downspouts so that the discharge is at least 5 feet from the structure.
- Avoid placing trees or shrubs adjacent to structure.
- Avoid excessive drying of soil around the structure.

3.2 SITE PREPARATION

The proposed building pad areas should be stripped and grubbed of any construction debris, trash, vegetation, organic laden materials, and other structures in conflict with the proposed construction a minimum 5 feet outside the structural limits. Depressions or low areas resulting from stripping and grubbing should be backfilled with approved soil and compacted in accordance with *EARTHWORK* section herein.

3.2.1 BUILDING PAD PREPARATION

A ground supported slab can be constructed provided the movements associated with shrinking and swelling soils are reduced to a tolerable level and the owner understands the risk associated with such movements. To provide uniform support to the shallow foundation system discussed in the *FLOOR SLAB* section of this report and the floor slab-on-grade, the following options for subgrade preparation are provided to reduce the soil movements. Depending on the amount of risk that the owner is willing to take, the owner must select the following preparation option for this project.

3.2.1.1 SELECT FILL/STRUCTURAL FILL

In order to provide uniform support to the floor slab-on-grade and to reduce the potential movements associated with shrink/swell soils that may be encountered at the vicinity of boring DB-2, the recommended soil layers to be placed below the floor slab are given in the table below.

TABLE 3.1: PVR REDUCTION FOR BUILDING PAD PREPARATION

PVR	Material Type	Layer Thickness (feet)	Elevation [a] (feet)
1-inch	Select fill	1	+0 to -1
	Remove and Replace with Clean Compacted Imported Common fill	As Needed [b]	-1 to -X (Bottom of fill materials or To the Top of Natural soils if Site Grade Raised)

Note(s):
a) Existing grade is anticipated to be finished grade at +0 feet.
b) Fill should be as per *FILL MATERIAL* section of this report.

The select/structural fill should be placed within the plan area of the structure and to a distance of at least 5 feet beyond the perimeter of the structure and include building entrances and flatwork sensitive to movements. Plasticity and compaction requirements for the select fill are provided later in this section. On-site materials are mostly marginal to unsuitable for use as structural fill without modification (lime or cement, or fly ash or CKD treated) as described later in this report, but the material may be stockpiled for use in non-load bearing areas such as landscaping.

3.3 EARTHWORK

Following site preparation and any excavation to proposed grades, the newly exposed subgrades in site improvement areas intended for structures must be approved by the Geotechnical Engineer prior to fill placement. These exposed subgrades should be proof rolled with a loaded tandem axle dump truck or similar piece of rubber-tired equipment (20 tons or greater) in the presence of the Geotechnical Engineer's representative. The purpose of the proof rolling is to detect the existence of marginal or loose near-surface materials or unsuitable soils that may require undercutting. Areas which deflect, rut or pump excessively during proof rolling, and which cannot de densified in-place, should be undercut to suitable soils and backfilled and/or as directed by the geotechnical engineer. Proof rolling should not be performed on saturated, frozen or during wet weather conditions. Once approved, the soils exposed at the base of all excavations should be scarified to a depth of at least 12 inches, moisture conditioned and then compacted as described below prior to placing Engineered Fill above.

3.3.1 FILL MATERIALS

The resulting engineered fill must produce a stable, uniform, and consistent compacted fill body. Fill materials should be free of organic or other deleterious materials and should be placed in maximum lifts of 8 inches of loose material and should be compacted in accordance with the below table. Compaction of the fill material should be performed with appropriate types of power, pneumatic or tamping equipment. Monitoring of the backfilling should include sufficient compaction testing by the Geotechnical Engineering representative to document that each lift of fill has been compacted to the required density. Each lift of compacted engineered fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts. If any lift or portion of a lift does not conform to the density requirements, the lift should be thoroughly scarified and re-compacted until the required density is obtained. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Care should be taken to apply compactive effort throughout the fill and fill slope areas. The moisture content and the degree of compaction of the engineered fill soils should be maintained until the construction of the structures within the area.

All proposed fill materials should be tested and approved by the geotechnical engineer prior to placement in the field, in accordance the *Compaction Criteria and Testing Frequency* table below. The following types of fill can be used as recommended in this report.

Common Fill: Common fill may consist of on-site or imported materials. Common fill should be free of organics or other deleterious materials and have a particle size of 3 inches or less. Common fill materials shall be classified in accordance with ASTM D2487. Satisfactory soils will be Clayey SAND (SC), Sandy lean CLAY or lean clay (CL) soils. Common fill shall have a plasticity index of less than 30.

Select Fill: Select fill should be free of organic or other deleterious materials, should have a maximum particle size less than 3 inches, and at least 35% fines (passing #200 sieve). Select fill materials shall be classified in accordance with ASTM D 2487. Satisfactory soils will be Sandy lean CLAY or lean CLAY (CL) soils. Select fill shall have a liquid limit not greater than 35 and a plasticity index between 8 and 20.

On-site soils: The onsite soils can be stockpiled and tested in bulk for compliance with the fill specifications prior to their reuse.

Lime, Cement, Fly Ash, and CKD Treated Soils: The lime and Portland cement treated soils are soils that are treated with 4 to 6% of lime or cement expressed as percent of the dry weight of the soil to be treated. The fly ash and cement kiln dust (CKD) treated soils are soils that are treated with 12 to 14% of fly ash or CKD expressed as percent of the dry weight of the soil to be treated. Lime, cement, fly ash, and CKD treated soils can also be used as Select Fill materials and also to strengthen the subgrade. These treated/modified soils, if used, should be placed and compacted to the specifications as shown in the below table.

- **Lime Treatment** should be performed when the wet subgrade soils are classified as CL or CH or SC in accordance with ASTM D 2487.
- **Lime-Fly Ash Treatment** should be performed when the wet subgrade soils are classified as SC, SC-SM, CL-ML, ML, SM in accordance with ASTM D 2487.
- **Cement Treatment** should be performed when the wet subgrade soils are classified as SM with less than 20% fines, SP-SC, SP-SM, SW-SC, SW-SM, SP, SW in accordance with ASTM D 2487.

Flexible Base: Flexible base materials should meet ODOT Type A Aggregate Base. Recycled concrete can be used. Flexible base should be placed and compacted to the specifications as mentioned in table below.

TABLE 3.2: COMPACTION CRITERIA AND TESTING FREQUENCY

Material Type (Location)	Per Standard Proctor Test (ASTM D 698)			
	Minimum Compaction (%)	Moisture Content Range (ref. to optimum moisture content)		Testing Frequency (min. 3 per lift)
		Minimum	Maximum	
Common Fill or On-Site Soils	95	-2%	+3%	1 per 2,500 sf
Select Fill	95	-1%	+3%	1 per 2,500 sf
Modified/Treated Soil	95	0%	+4%	1 per 2,500 sf
Flexible Base	95	-2%	+2%	1 per 5,000 sf
Utility Backfill	95	-1%	+4%	1 per 1,000 lf

3.3.2 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or other parties' compliance with local, state, and federal safety or other regulations.

3.3.3 SLOPES

Any permanent cut or fill slopes should not exceed 2 Horizontal to 1 Vertical (2H:1V). Excavations extending below a 1H:1V plane extending down from any adjacent footings should be shored for safety. All excavations should be inspected by a representative of the geotechnical engineer during construction to allow any modifications to be made due to variation in the soil types. All work should be performed in accordance with Department of Labor Occupational Safety and Health Administration (OSHA) guidelines as described in the previous section.

3.3.4 UTILITIES

Utility trenches may be backfilled with suitable onsite native soils or imported soil above the pipe zone. If rocks larger than 3-inches in maximum size are encountered, they should be removed from the backfill material prior to placement in the utility trenches. Pipe zone backfill requirements should be in conformance with the requirements of the local agencies having jurisdiction. Jetting or flooding of utility backfill is not recommended. If smaller compaction equipment such as jumping jacks or plate compactors are used, thinner lifts will be required to achieve compaction. Where utilities cross building perimeters, concrete or concrete slurry should be used for backfilling around the utility to prevent moisture from migrating along the utility trench and entering the building envelope.

3.3.5 FLATWORK

For sidewalks or other flatwork located adjacent to grade-supported foundations, the undercutting and select fill placement operations for the building should extend beyond the perimeter of the building to at least the width of the adjacent sidewalk or flatwork.

Any other sidewalks or flatwork not adjacent to buildings should be placed on an improved subgrade meeting or exceeding the subgrade improvement methods previously recommended. If the sidewalk subgrade consists of material with a plasticity index of 20 or greater, a 12-inch-thick layer of material satisfying the requirements of select fill provided in the *FILL MATERIALS* section must be placed below the sidewalk.

Proper drainage around grade-supported sidewalks and flatwork is also very important to reduce potential movements. Elevating the sidewalks where possible and providing rapid, positive drainage away from them will reduce moisture variations within the underlying soils and will therefore provide valuable benefit in reducing the full magnitude of potential movements from being realized.

3.4 FOUNDATIONS

In our opinion, the structural loads of the proposed development can be supported on deep foundations constructed in accordance with the following design criteria. Alternatively, the structurally supported foundation can be used in lieu of the building pad preparation of removal and replacement activity. Additionally, PSI recommends that foundation type and bearing strata be consistent throughout a structure.

3.5 DRILLED PIER RECOMMENDATIONS

The subgrade conditions encountered in the borings appear suitable for use of a drilled shaft (aka drilled pier) foundation system bearing in the underlying hard shaley clay or clayey shale bedrock materials. The following considerations should be given to a drilled shaft foundation system at the project site.

The shafts should be a minimum total length of 5 feet or a ratio of length to diameter (L/D) not less than 3, whichever is longer, below the grade beam, when applicable, and should bear a minimum of 2 feet or one pier diameter, whichever is greater, below the bearing layer. In addition, a minimum of 2 shaft-diameter of the bearing layer materials should be below the tip of the shaft to use the allowable end bearing capacities provided in the below table.

TABLE 3.3: DRILLED PIER ALLOWABLE SKIN FRICTION & ALLOWABLE END BEARING CAPACITY

Drilled Pier Allowable Skin Friction & Allowable End Bearing Capacity				
Stratum	**Material**	**Approximate Depth Range (ft)***	**Allowable Skin Friction (psf)**	**Allowable End Bearing Capacity (psf)**
I	Clay (Ave. N-value of 15)	3** to 6	500	---
II	Shaley Clay (N-value 34 to 50 blows for 5.5 inches penetration)	6 to 14.5	700	7,000
III	Clayey Shale (N-value of 50 blows for 3 to 5 inches penetration)	14.5 to BTD***	1,750	17,800

Note:
* Approximate depth below existing subgrade surface at the time for our field exploration.
** First three feet ignored due to frost depth, effects of moisture variations, and possible separation of subsurface clays from the shafts.
*** BTD: Bore Termination Depth

The resistance against external uplift forces is equal to sum of dead loads and the soil resistance. The soil resistance could be considered equal to two-thirds of the allowable skin friction provided in the above table.

The shafts should be reinforced for the full depth to resist uplift forces due to the expansive clays. Reinforcement quantity should be adequate to resist tensile uplift forces generated by the clay soils equal to 30xd kips over the upper 8 feet of the pier shaft, which "d" is the diameter of shaft in foot.

Piers should be designed with a shaft diameter of at least 18 inches. Properly constructed piers bearing in the recommended materials are expected to experience total maximum settlement on the order of 1 inch or less.

The pier construction should also be observed by a representative of the Geotechnical Engineer to assess that the foundation materials have adequate strength to support the design loads and are consistent with the materials recommended in this report. Particular attention should be given to observation at locations where soil sloughing or groundwater inflow problems may occur.

Soft or loose soil zones encountered at the bearing level should be removed from the drilled shafts. If the exposed bearing materials become significantly wet or dry, they should be removed, and the pier deepened until more uniform moisture conditions are achieved. Concrete should be placed in the piers the same day they are excavated to prevent weakening of the shaft wall and bottom.

Groundwater was encountered during our field exploration. Casing and/or slurry may be required to advance the drilled piers, especially if sloughing soil and/or groundwater is encountered. Concrete placed in the piers should have a slump in the range of 5 to 7 inches. This range of slump will help to reduce the potential for formation of voids, especially as casing is extracted. The concrete mix should be designed to attain the required strength when placed at such a slump. The drilled shafts should be filled with concrete as soon as practical to reduce the potential of groundwater related problems and weathering of the excavation wall. During simultaneous concrete placement and casing removal operations, sufficient concrete head should be maintained inside the casing to offset hydrostatic head outside the casing, and to prevent the intrusion of soil and possible groundwater into the pier concrete, if present.

3.5.1.1 LPILE DESIGN CRITERIA

Piers having lateral loads should be designed utilizing the following LPILE input parameters for this project.

TABLE 3.4: PARAMETERS FOR LATERAL DESIGN USING LPILE

Soil Type	Depth (ft)	γ_e, pcf	c, psf	ϕ, Deg.	k_s or k, pci	k_c, pci	ε_{50} or k_{rm}
Stiff Clay w/o Free Water	0 to 6	125	1,500	—	500	—	0.007
Stiff Clay w/ Free Water	6 to 14½	130	3,000	—	1,000	400	0.005
[Clayey Shale] Stiff Clay w/ free water	14½ to BTD	135	5,000	—	2,000	800	0.004

Note:
γ_e: Effective Soil Unit Weight
c: Undrained Cohesion for Clay
ϕ: Friction Angle for Sand ($\phi = (12N)^{0.5} + 15 \leq 32$; Dunham (1954))
k_s: Clay Static Loading Modulus of Subgrade Reaction (LPILE Manual Table 3-3)
RQD: Rock Quality Designation
ε_{50}: Axial Strain Factor for Soil (LPILE Manual Table 3-2 and 3-4)
BTD: Bore Termination Depth

3.5.1.2 GENERAL PIER CONSTRUCTION RECOMMENDATIONS

The performance of the foundation system is highly dependent on the quality of the installation. PSI recommends the installation procedure in accordance with FHWA-NHI-10-016, May 2010.

PSI recommends that the drilling contractor review the field exploration logs of this report before starting excavations for the drilled piers. If used, temporary casing must be removed during concrete placement, keeping a concrete head of at least 2 feet above the bottom of the casing as it is being removed. A representative of the Geotechnical Engineer should be on site to observe and document the entire drilling and installation of the deep foundation system, if used.

When the drilling processes are completed for the pier, the reinforcing steel and the concrete should be placed immediately after the final cleanout pass is conducted on the base. The tremie method of concrete placement should be adopted when placing concrete below the groundwater table (if present) to prevent segregation of the concrete materials. If concrete is placed by the free-fall method into a dry excavation, it should be placed to avoid contact with the excavation sidewalls to prevent segregation and be limited to a drop of less than 4 feet.

Concrete placed in the pier excavations should have a slump in the range of 7 to 9 inches to reduce the potential for the formation of voids as the temporary pier casing is extracted. The concrete mix should be designed to attain the required 28-day design strength when placed at this slump. PSI should be retained to observe and document the drilled pier construction and to evaluate whether the subsurface and pier bearing conditions are as anticipated in this report. The contractor should submit their procedures for drilled pier installation to the Geotechnical Engineer for approval prior to the start of the drilled pier construction.

3.6 FLOOR SLABS

The grade supported floor slab used in conjunction with a conventional shallow foundation or drilled pier and grade beam foundation system should be grade supported on a properly compacted and moisture conditioned select fill material as per the *BUILDING PAD PREPARATION* section. Proof-rolling should be accomplished to identify any soft or unstable soils which should be removed from the floor slab area prior to fill placement and/or floor slab construction.

An allowable net bearing pressure of 600 psf can be used for slab-on-grade bearing on compacted fill. If the site is prepared as recommended below, total settlement of the ground supported slab should not exceed one inch. A vapor retarder such as polyethylene sheeting should be provided beneath the ground supported slab in accordance with ACI procedures. Adequate construction joints and reinforcement should be provided to reduce the potential for cracking of the floor slab due to differential movement.

For the properly constructed grade supported floor slab, a modulus of subgrade, k, value of 120 pci is applicable in the grade supported floor slab design based on a typical 1 ft. x 1 ft. plate load test. However, depending on how the slab load is applied, the value will have to be geometrically modified. The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soils:

Modulus of Subgrade Reaction:

$k_s = \frac{k}{B}$ for cohesive soil, and

$k_s = k\left(\frac{B+1}{2B}\right)^2$ for cohesionless soil (not recommended in undercut)

where:

- k_s = coefficient of vertical subgrade reaction for loaded area,
- k = coefficient of vertical subgrade reaction for 1x1 square foot area,
- B = width of area loaded, in feet (or effective width, B', for grade beam, continuous footing, or mat/raft foundation)

PSI recommends that a minimum four-inch-thick free draining granular mat be placed beneath the building floor slabs to enhance drainage. Prior to placing drainage layer, the subgrade should be graded to drain and not provide pockets to trap water. In moisture sensitive areas for equipment and flooring, vapor retarder should be installed with the grade supported slab construction according to ACI criteria. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage.

3.7 PLAN REVIEW AND CONSTRUCTION OBSERVATION

After final plans and specifications are complete, PSI should review the final design and specifications so that the earthwork and foundation recommendations are properly interpreted and implemented. It is considered imperative that the Geotechnical Engineer and/or their representative be present during earthwork operations and foundation installations to observe the field conditions with respect to the design documents and specifications. PSI will not be responsible for changes in the project design or project information it was not provided, or interpretations and field quality control observations made by others. PSI would be pleased to provide these services for this project.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 SECONDARY DESIGN CONSIDERATIONS

The following information has been developed after review of numerous problems concerning foundations throughout the area. It is presented here for your convenience. If these features are incorporated in the overall design and specifications for the project, performance of the project will be improved.

Prior to construction, the area to be covered by building should be prepared so that water will not pond beneath or around the building after periods of rainfall.

Roof drainage should be collected and transmitted by pipe to a storm drainage system or to an area where the water can drain away from buildings and pavements without entering the soils supporting buildings and pavements.

Sidewalks should not be structurally connected to buildings. They should be sloped away from buildings so that water will be drained away from structures.

Paved areas and the general ground surface should be sloped away from buildings on all sides so that water will always drain away from the structures. Water should not be allowed to pond near buildings after the floor slabs and foundations have been constructed.

Backfill for utility lines that are located in sidewalk or building areas should consist of on-site fill. The backfill should be compacted as described in the *EARTHWORK* sections of this report. Lesser lift thicknesses may be required to obtain adequate compaction.

Care should be exercised to make sure that ditches for utility lines do not serve as conduits that transmit water beneath structures or pavements. The top of the ditch should be sealed to inhibit the inflow of surface water during periods of rainfall.

Flower beds and planting areas should not be constructed along building perimeters. Constructing sidewalks adjacent to buildings would be preferable. If required, flower beds and planting areas could be constructed beyond the sidewalks away from the buildings. If it is desired to have flower beds and planting areas adjacent to a building, the use of above grade concrete box planters, or other methods that reduce the likelihood of large changes in moisture content of soils adjacent to or below structures should be considered.

Water sprinkling systems should not be located where water will be sprayed onto building walls and subsequently drain downward and flow into the soils beneath foundations.

Trees in general should not be planted closer to a structure than the mature height of the tree. A tree planted closer to a structure than the recommended distance may extend its roots beneath the structure, allowing removal of subgrade moisture and/or causing structural distress.

Utilities that project through the floor slab should be designed with some degree of flexibility and/or with a sleeve to reduce the potential for damage to the utilities should movement occur.

Soil supported floor slabs are subject to vertical movements. This often causes distress to interior wall partitions supported on soil supported floor slabs. This should be considered in the design of soil supported floor slabs.

4.2 CONSTRUCTION MATERIALS TESTING

It is recommended that PSI be retained to provide observation and testing of construction activities involved in the foundations, earthwork, and related activities of this project. PSI cannot accept any responsibility for any conditions that deviates from those described in this report, nor for the performance of the foundations if not engaged to also provide construction observation and testing for this project.

Observation of all foundation bearing materials, pier construction activities, structural steel and subgrade treatment operations should be performed by a representative of PSI.

4.3 MOISTURE SENSITIVE SOIL / WEATHER RELATED CONCERNS

The upper fine-grained soils discovered at this site could be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. Construction schedules should account for these conditions during wetter times of the year.

4.4 DRAINAGE AND GROUNDWATER CONCERNS

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, ground water, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

PSI recommends that the contractor determine the actual ground water levels at the site at the time of the construction activities. It may be expedient to drill auger holes or excavate test pits adjacent to the building area immediately prior to construction to determine the prevailing water level elevation. Any water accumulation should be removed from excavations by pumping. Should excessive and uncontrolled amounts of seepage occur, the geotechnical engineer should be consulted.

5.0 GEOTECHNICAL RISK AND REPORT LIMITATIONS

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitute PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and PSI's experience in working with these conditions.

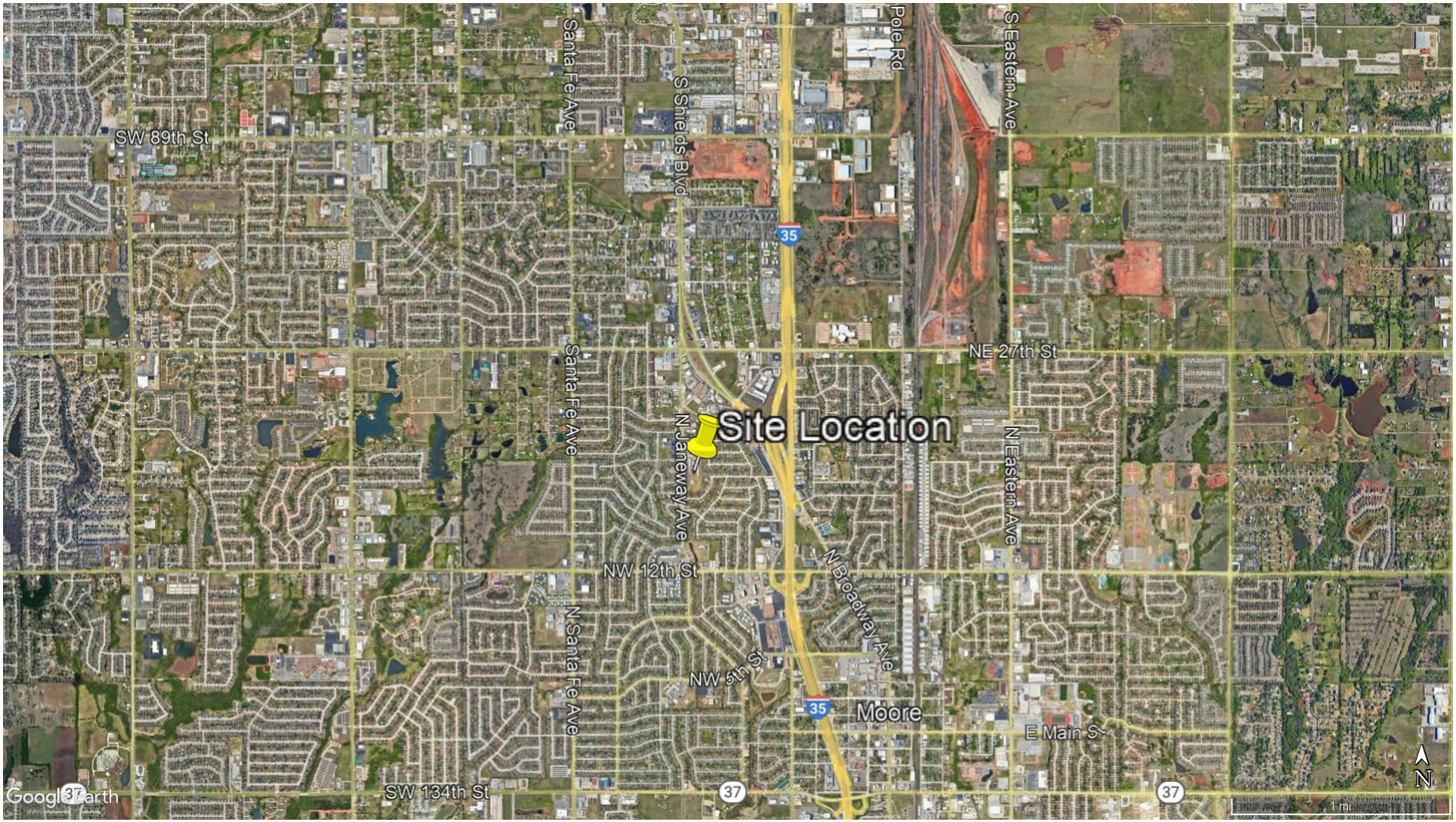
Services performed by PSI for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area. No warranty, expressed or implied, is made.

The recommendations submitted are based on the available subsurface information obtained by PSI, and information provided by the client, client's representative and client's design consultants. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation and/or other recommendations are required. If PSI is not retained to perform these functions, PSI cannot be responsible for the impact of those conditions on the performance of the project.

The Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations.

This report has been prepared for the exclusive use of Client and their design consultants, for the aforementioned project parameters.

FIGURES



Professional Service Industries, Inc.
11825 S. Portland Avenue
Oklahoma City, OK 73107
Phone: (405) 735–6052

Site Vicinity Map

PSI Project No. 05462609

Kelley Elementary School Shelter Addition
1900 N. Janeway Avenue
Moore, Oklahoma

Professional Service Industries, Inc.
11825 S. Portland Avenue
Oklahoma City, OK 73107
Phone: (405) 735–6052

BORING LOCATION PLAN

PSI Project No. 05462609

Kelley Elementary School Shelter Addition
1900 N. Janeway Avenue
Moore, Oklahoma

APPENDIX A

Field Exploration & Laboratory Testing Program

BORING DB-1

DATE STARTED:	10/14/22	**DRILL COMPANY:**	DSO
DATE COMPLETED:	10/14/22	**DRILLER:** TS	**LOGGED BY:** JS
COMPLETION DEPTH	28.8 ft	**DRILL RIG:**	CME 750
BENCHMARK:	N/A	**DRILLING METHOD:**	Auger
ELEVATION:	1268 ft	**SAMPLING METHOD:**	SS
LATITUDE:	35.35527°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-97.50248°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	SLS

REMARKS:

Water

While Drilling	22	feet
Upon Completion	15	feet
Delay	7	feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft / STRENGTH, tsf	Additional Remarks
	0					**Lean CLAY**, very stiff to stiff, dark reddish brown			10		
				1	8	... 0.5 to 3.5 feet, with trace roots and gravel		6-12-15 N=27			
1265				2	5		CL	8-6-5 N=11	13		
	5			3	12	... 3.5 to 5 feet, with silt seams		5-6-7 N=13	13		
						Shaley Lean CLAY, hard, reddish brown			16		
				4	15			8-15-19 N=34			
1260				5	12			16-50/5.5"	10	>>	LL = 32 PL = 16 Fines=90.1%
	10						CL				
1255									12		
				6	16			10-35-50/3.5"			
	15					**Clayey SHALE**, hard, light reddish brown					
1250				7	3	... 18.5 to 23.5 feet, with silt seams and sand		50/3"	9	>>	
	20										
1245				8	4			50/3.5"	11	>>	
	25										
1240				9	3			50/3"	12	>>	
						End of boring					

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ✕ PL ◪ LL ✚
0 25 50
STRENGTH, tsf
Qu ▲ Qp ✳
0 2.0 4.0

LL = 29
PL = 15
Fines=72.1%

intertek psi

Professional Service Industries, Inc.
11825 S. Portland Avenue
Oklahoma City, OK 73170
Telephone: (405) 735-6052

PROJECT NO.: 05462609
PROJECT: Kelley Elementary School Shelter
LOCATION: 1900 N. Janeway Ave.
Moore, OK

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING DB-2

DATE STARTED:	10/14/22	**DRILL COMPANY:**	DSO
DATE COMPLETED:	10/14/22	**DRILLER:** TS	**LOGGED BY:** JS
COMPLETION DEPTH	28.8 ft	**DRILL RIG:**	CME 750
BENCHMARK:	N/A	**DRILLING METHOD:**	Auger
ELEVATION:	1268 ft	**SAMPLING METHOD:**	SS
LATITUDE:	35.35538°	**HAMMER TYPE:**	Automatic
LONGITUDE:	-97.50229°	**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	SLS

REMARKS:

Water

While Drilling	7 feet
Upon Completion	25 feet
Delay	7.5 feet

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture PL LL (0 25 50) STRENGTH, tsf Qu Qp (0 2.0 4.0)	Additional Remarks
	0										
				1	6	**Lean CLAY**, very stiff to medium stiff, dark reddish brown ... 0.5 to 2 feet, with trace roots and gravel		8-8-8 N=16	13		
1265				2	12	... 2 to 3.5 feet, with ferrous nodules	CL	5-7-9 N=16	13		
	5			3	18	... 3.5 to 5 feet, reddish brown and gray, trace sand		1-2-4 N=6	24		LL = 40 PL = 17 Fines=84.9%
				4	17	**Shaley Lean CLAY**, hard, reddish brown		6-38-50/4.5"	11		
1260											
				5	18		CL	12-17-38 N=55	14	>>	
	10										
1255											
				6	12	**Clayey SHALE**, hard, light reddish brown, with silt seams		10-50/6"	12	>>	LL = 34 PL = 18 Fines=85.9%
	15										
1250				7	5	... 18.5 to 23.5 feet, reddish and light gray, with sand		50/5"	11	>>	
	20										
1245				8	5			50/5"	9	>>	
	25										
1240				9	4			50/4"	13	>>	
						End of boring					

intertek psi

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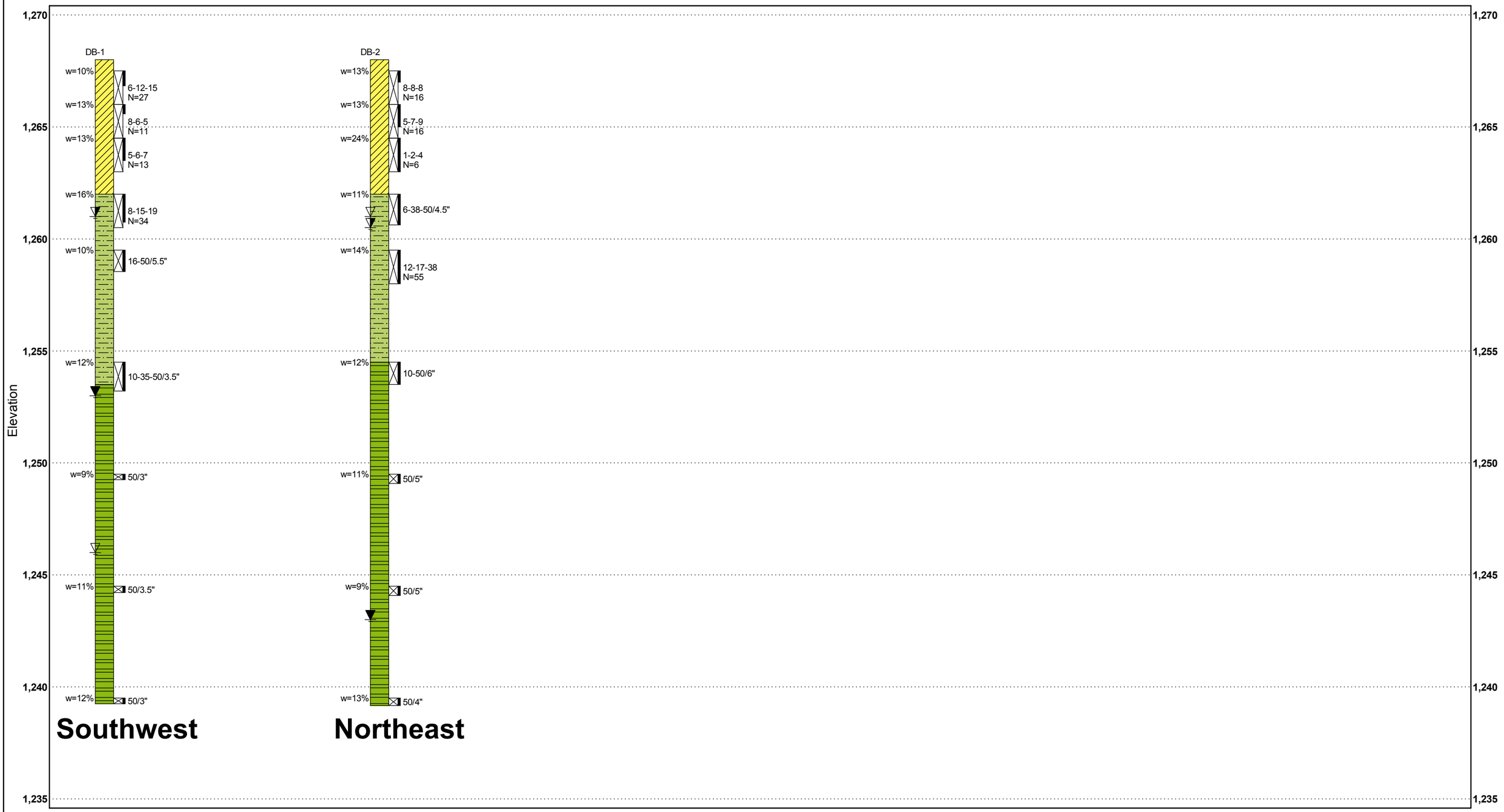
PROJECT NO.: 05462609
PROJECT: Kelley Elementary School Shelter
LOCATION: 1900 N. Janeway Ave.
Moore, OK

The stratification lines represent approximate boundaries. The transition may be gradual.

APPENDIX B

Subsurface Profiles



Professional Service Industries, Inc.
11825 S. Portland Avenue
Oklahoma City, OK 73170

Profile

Kelley Elementary School Shelter
PSI Project Number: 05462609

1900 N. Janeway Ave.
Moore, OK

APPENDIX C

General Notes

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,▼ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 1	Very Soft
0.25 - 0.50	2 - 3	Soft
0.50 - 1.00	4 - 6	Medium Stiff
1.00 - 2.00	7 - 12	Stiff
2.00 - 4.00	13 - 26	Very Stiff
4.00 +	26+	Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

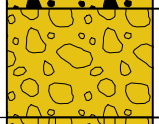
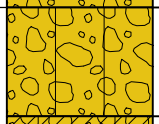
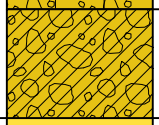
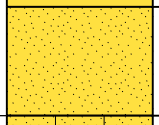
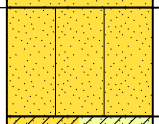
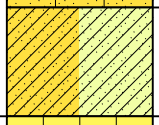
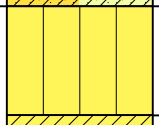
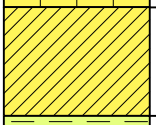
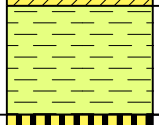
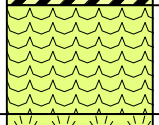
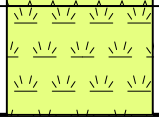
Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		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 SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

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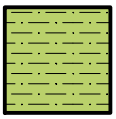
Graphic Symbols for Materials and Rock Deposits

CONCRETE
Portland Cement Concrete

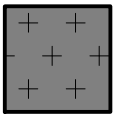
BITUMINOUS CONCRETE



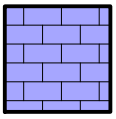
CLAYSTONE

COAL
Coal, Anthracite Coal

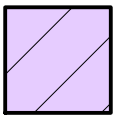
CONGLOMERATE/BRECCIA
Conglomerate, Breccia



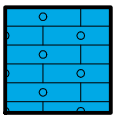
IGNEOUS ROCK
Anorthsite, Basalt, Metabasalt, Diabase (Gabbro), Gabbro, Granite/Granodionite, Homfels, Pegmatite, Rhyolite/Metarhyolite



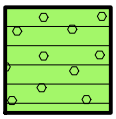
LIMESTONE
Limestone, Dolomite



METAMORPHIC ROCK
Amphibolite, Gneiss, Marble, Phyllite, Quartzite, Schist, Serpentinite, Slate

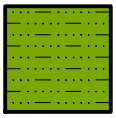


CHERT

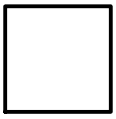


SANDSTONE
Sandstone, Orthoquarzite (Sandstone)

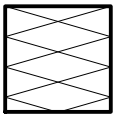
SHALE



SILTSTONE



NO RECOVERY



VOID

intertek
psi

October 19, 2022

FROM: Andrew Wilson, PE
TO: Elizabeth Weitman, City of Moore

RE: Kelly Elementary Storm Shelter – Drainage Report Review Response Letter

On October 10th, 2022 Cedar Creek Engineering, Inc. received the Drainage Report Review for the Kelley Elementary Storm Shelter. The review firm for this report is Meshek & Associates, LLC.

There were four outstanding comments per the review. The following response addresses the comments:

COMMENT

A. Volume calculation for development mitigation cannot use the rational method. Use a unit hydrograph method; NRCS curve number runoff method is most commonly used. Updated to utilize NRCS curve number.
B. Describe how runoff from ground surface or storm shelter roof will flow into proposed infiltration trench. There is backfill between the gravel trench and the ground surface. Roof drains will be collected and taken underground, and dispersed into trench via the perforated pvc pipe.
C. Describe how the pipe or inflow will fill the gravel trench to utilize the volume. The pressure head from the roof drains will cause the volume in the infiltration trench to fill.
D. Describe the outflow from the infiltration trench. The stormwater held in the infiltration trench will infiltrate directly into the surrounding soils. Any overflow will be released from a proposed 6" stormwater popup at the end of the trench.

October 4, 2022
Revised 10.19.22

Elizabeth Weitman, Director
Community Development
City of Moore
301 N. Broadway
Moore, Oklahoma 73160

Re: Infiltration Trench at Kelly Elementary

Dear Ms. Weitman,

According to current City of Moore Stormwater Management Criteria, section 8.1.1 the city allows the use of Low Impact Development used in any zoning district. For the 2760 S.F. referenced Kelly Elementary storm shelter addition, Moore Public Schools would propose to use 137 linear feet of 3-foot-wide by 3-foot-deep infiltration trench per the attached detail.

Please review the enclosed drainage calculations.

The existing 2760 S.F. where the new storm shelter addition will be placed is currently grass, with a CN value of 80. The unit hydrograph method is used for calculations, and the time of concentration is set at a minimum of 5 minutes, which is converted to lag time through hydrocad. The total runoff volume for this area historically in 24 hour calculations is 1393.92 cubic feet.

The proposed 2760 S.F. storm shelter addition has a CN value of 98. The unit hydrograph method is used for calculations, and the time of concentration is set at a minimum of 5 minutes, which is converted to lag time through hydrocad. The total runoff volume for this developed area in 24 hour calculations is 1785.96 cubic feet. The difference in total runoff volume in the 100-year storm event is 392.04 cubic feet of water to be stored to offset the 2760 S.F. storm shelter addition. The stormwater from the proposed roof, is to be collected and taken underground and discharged directly into the infiltration trench, and infiltrated into the ground though the perforated pvc pipe. As stormwater pushes off of the roof, the infiltration trench will fill through the perforations in the PVC pipe. A nyoplast pop up will be installed at the end of the trench in order to serve as an emergency overflow release point.

CEDAR CREEK

The proposed 3-foot-wide by 3-foot-deep infiltration trench consists of a 6” perforated PVC pipe that catches all roof water from the storm shelter addition, rock backfill with a porosity of 0.32 (AASHTO #57 stone), and a filter fabric with 1’ of overlap. Considering the void area of 1.92 square feet, the infiltration trench is required to provide a total length of 137 feet in order to mitigate the additional stormwater caused by the storm shelter addition.

Sincerely,

Andrew Wilson, PE
Encl. Drainage calculations (PDF)
Infiltration Trench Detail (PDF)

Infiltration Trench Sizing

Section	Area (sf)	Area (ac)	CN	Tc	Q100
Historic	2760	0.06	80	0.00	0.70
Developed	2760	0.06	98	0.00	0.80

Tc converted to Lag through attached hydrocad report

Q100 computed in attached hydrocad report

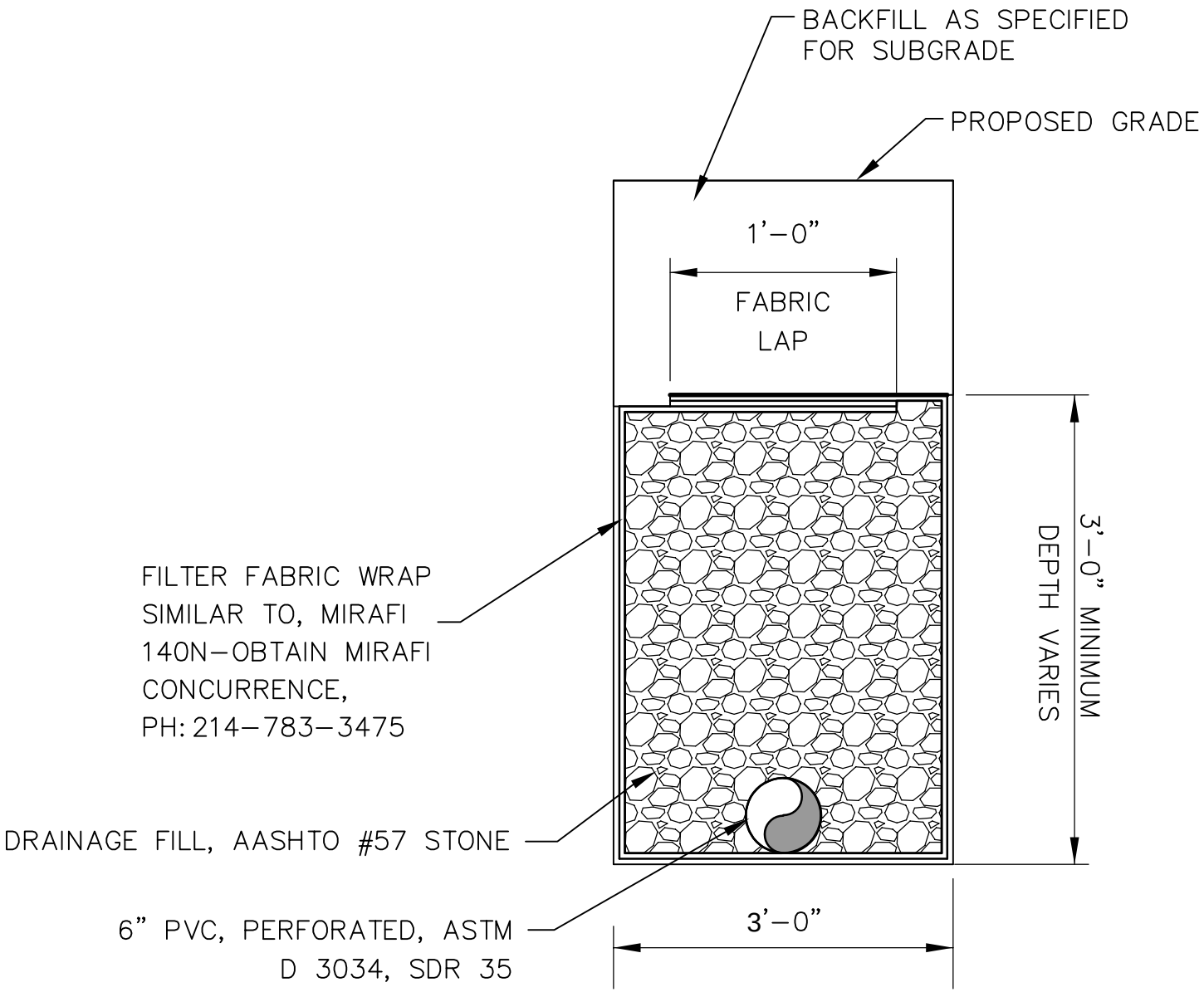
Volume

	Peak Flow (cfs)	Time (sec)	Volume(cf)
Historic	0.70	1440	1393.92
Developed	0.80	1440	1785.96
Volume to Retain			392.04

Volume given in hydrocad report

Trench Size

Required Volume	Porosity	Provided Area (sq.ft)	Void Area (sq.ft)	Length Required (ft.)
392.04	0.32	9	2.88	136.13



FRENCH DRAIN DETAIL

NOT TO SCALE

Summary for Subcatchment 1S: historic

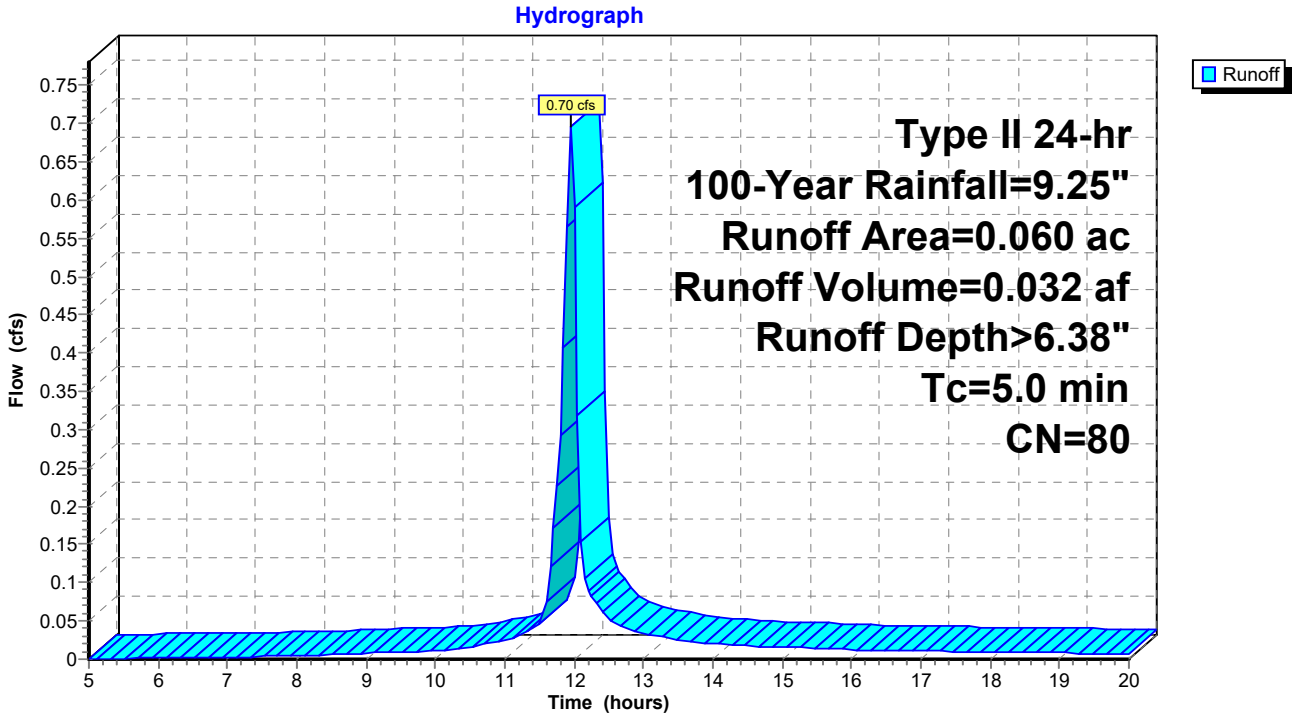
Runoff = 0.70 cfs @ 11.95 hrs, Volume= 0.032 af, Depth> 6.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.25"

	Area (ac)	CN	Description
*	0.060	80	grass cover over 75%
	0.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, TC**

Subcatchment 1S: historic



Hydrograph for Subcatchment 1S: historic

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.58	0.00	0.00
5.25	0.62	0.01	0.00
5.50	0.66	0.01	0.00
5.75	0.70	0.01	0.00
6.00	0.74	0.02	0.00
6.25	0.78	0.03	0.00
6.50	0.83	0.04	0.00
6.75	0.87	0.05	0.00
7.00	0.92	0.06	0.00
7.25	0.96	0.07	0.00
7.50	1.01	0.09	0.00
7.75	1.06	0.10	0.00
8.00	1.11	0.12	0.00
8.25	1.16	0.14	0.00
8.50	1.22	0.16	0.01
8.75	1.29	0.19	0.01
9.00	1.36	0.22	0.01
9.25	1.43	0.25	0.01
9.50	1.51	0.29	0.01
9.75	1.59	0.33	0.01
10.00	1.67	0.38	0.01
10.25	1.77	0.43	0.01
10.50	1.89	0.49	0.02
10.75	2.02	0.57	0.02
11.00	2.17	0.67	0.02
11.25	2.37	0.80	0.03
11.50	2.62	0.97	0.04
11.75	3.58	1.70	**0.23**
12.00	6.13	3.90	**0.59**
12.25	6.53	4.26	0.08
12.50	6.80	4.51	0.05
12.75	6.98	4.68	0.04
13.00	7.14	4.82	0.03
13.25	7.27	4.95	0.03
13.50	7.39	5.06	0.03
13.75	7.49	5.15	0.02
14.00	7.59	5.24	0.02
14.25	7.67	5.31	0.02
14.50	7.75	5.39	0.02
14.75	7.82	5.46	0.02
15.00	7.89	5.53	0.02
15.25	7.96	5.59	0.02
15.50	8.03	5.65	0.01
15.75	8.08	5.70	0.01
16.00	8.14	5.76	0.01
16.25	8.19	5.81	0.01
16.50	8.24	5.85	0.01
16.75	8.29	5.90	0.01
17.00	8.34	5.95	0.01
17.25	8.39	5.99	0.01
17.50	8.43	6.03	0.01
17.75	8.48	6.07	0.01
18.00	8.52	6.11	0.01
18.25	8.56	6.15	0.01
18.50	8.60	6.19	0.01
18.75	8.64	6.23	0.01
19.00	8.67	6.26	0.01
19.25	8.71	6.29	0.01
19.50	8.74	6.32	0.01
19.75	8.78	6.36	0.01
20.00	**8.81**	**6.38**	0.01

Summary for Subcatchment 2S: Developed

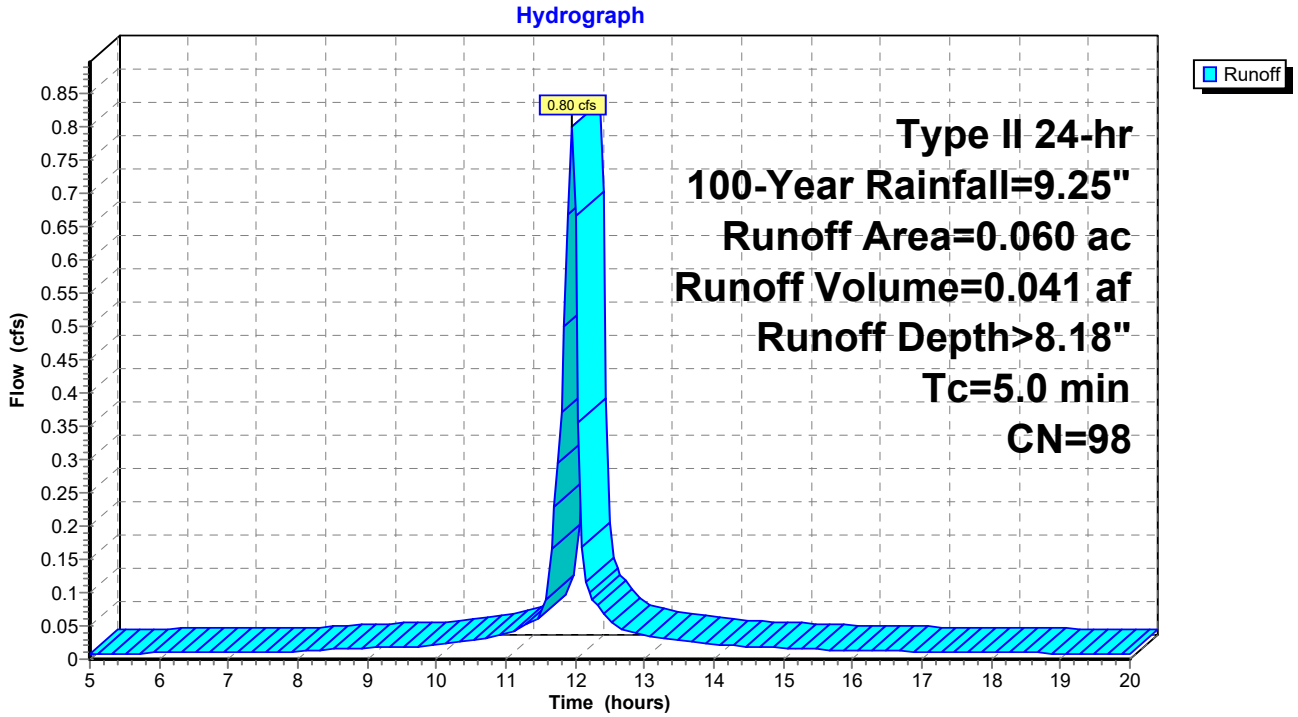
Runoff = 0.80 cfs @ 11.95 hrs, Volume= 0.041 af, Depth> 8.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=9.25"

	Area (ac)	CN	Description
*	0.060	98	roof top
	0.060		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 2S: Developed



Hydrograph for Subcatchment 2S: Developed

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
5.00	0.58	0.39	0.01
5.25	0.62	0.43	0.01
5.50	0.66	0.46	0.01
5.75	0.70	0.50	0.01
6.00	0.74	0.54	0.01
6.25	0.78	0.58	0.01
6.50	0.83	0.62	0.01
6.75	0.87	0.67	0.01
7.00	0.92	0.71	0.01
7.25	0.96	0.75	0.01
7.50	1.01	0.80	0.01
7.75	1.06	0.85	0.01
8.00	1.11	0.90	0.01
8.25	1.16	0.95	0.01
8.50	1.22	1.01	0.01
8.75	1.29	1.07	0.02
9.00	1.36	1.14	0.02
9.25	1.43	1.21	0.02
9.50	1.51	1.29	0.02
9.75	1.59	1.37	0.02
10.00	1.67	1.45	0.02
10.25	1.77	1.55	0.02
10.50	1.89	1.66	0.03
10.75	2.02	1.79	0.03
11.00	2.17	1.95	0.04
11.25	2.37	2.14	0.05
11.50	2.62	2.39	0.06
11.75	3.58	3.35	**0.30**
12.00	6.13	5.89	**0.67**
12.25	6.53	6.29	0.09
12.50	6.80	6.56	0.06
12.75	6.98	6.75	0.04
13.00	7.14	6.90	0.04
13.25	7.27	7.03	0.03
13.50	7.39	7.15	0.03
13.75	7.49	7.25	0.02
14.00	7.59	7.35	0.02
14.25	7.67	7.43	0.02
14.50	7.75	7.51	0.02
14.75	7.82	7.58	0.02
15.00	7.89	7.66	0.02
15.25	7.96	7.72	0.02
15.50	8.03	7.79	0.02
15.75	8.08	7.84	0.01
16.00	8.14	7.90	0.01
16.25	8.19	7.95	0.01
16.50	8.24	8.00	0.01
16.75	8.29	8.05	0.01
17.00	8.34	8.10	0.01
17.25	8.39	8.15	0.01
17.50	8.43	8.19	0.01
17.75	8.48	8.24	0.01
18.00	8.52	8.28	0.01
18.25	8.56	8.32	0.01
18.50	8.60	8.36	0.01
18.75	8.64	8.40	0.01
19.00	8.67	8.43	0.01
19.25	8.71	8.47	0.01
19.50	8.74	8.50	0.01
19.75	8.78	8.53	0.01
20.00	**8.81**	**8.57**	0.01

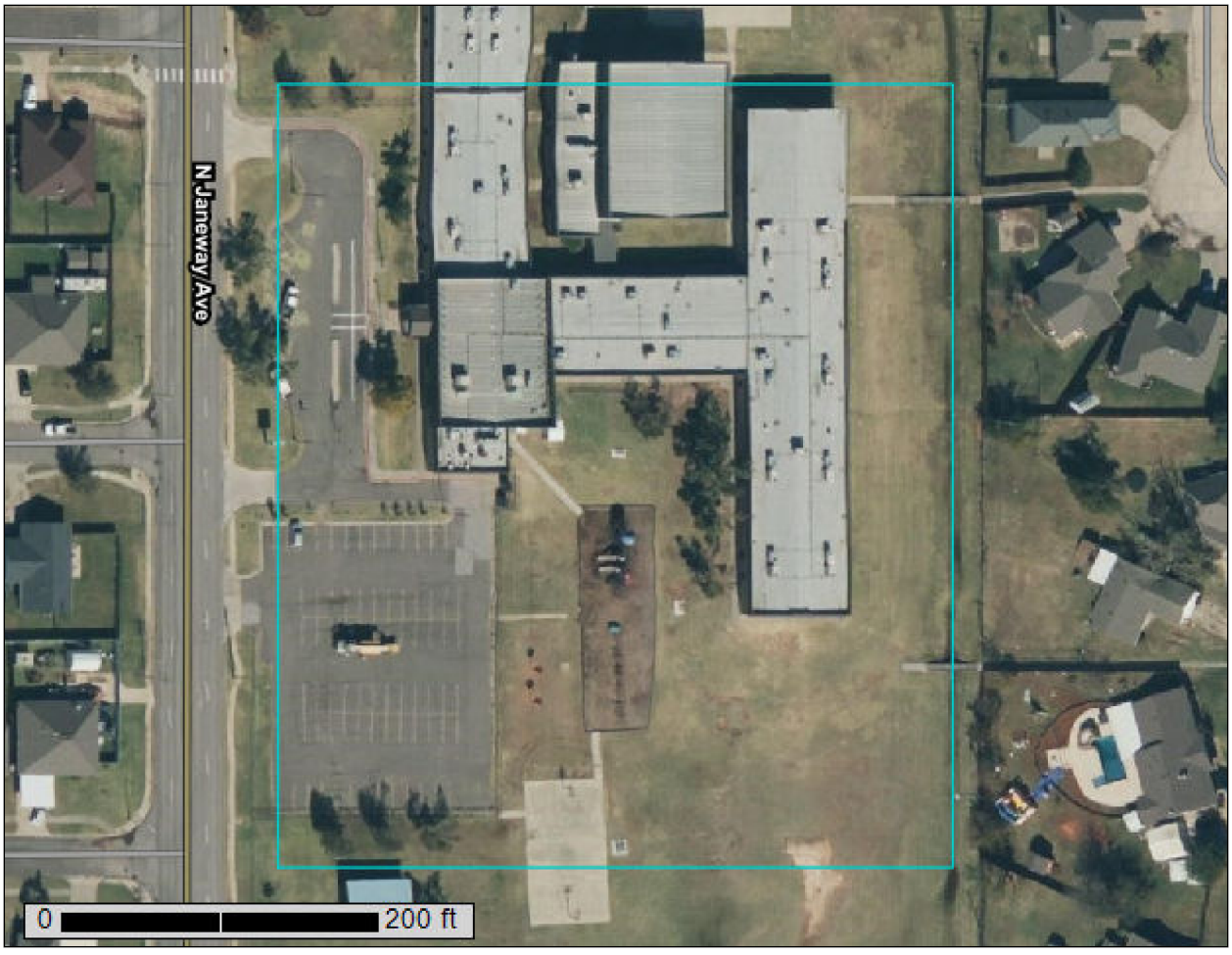
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Cleveland County, Oklahoma



October 19, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

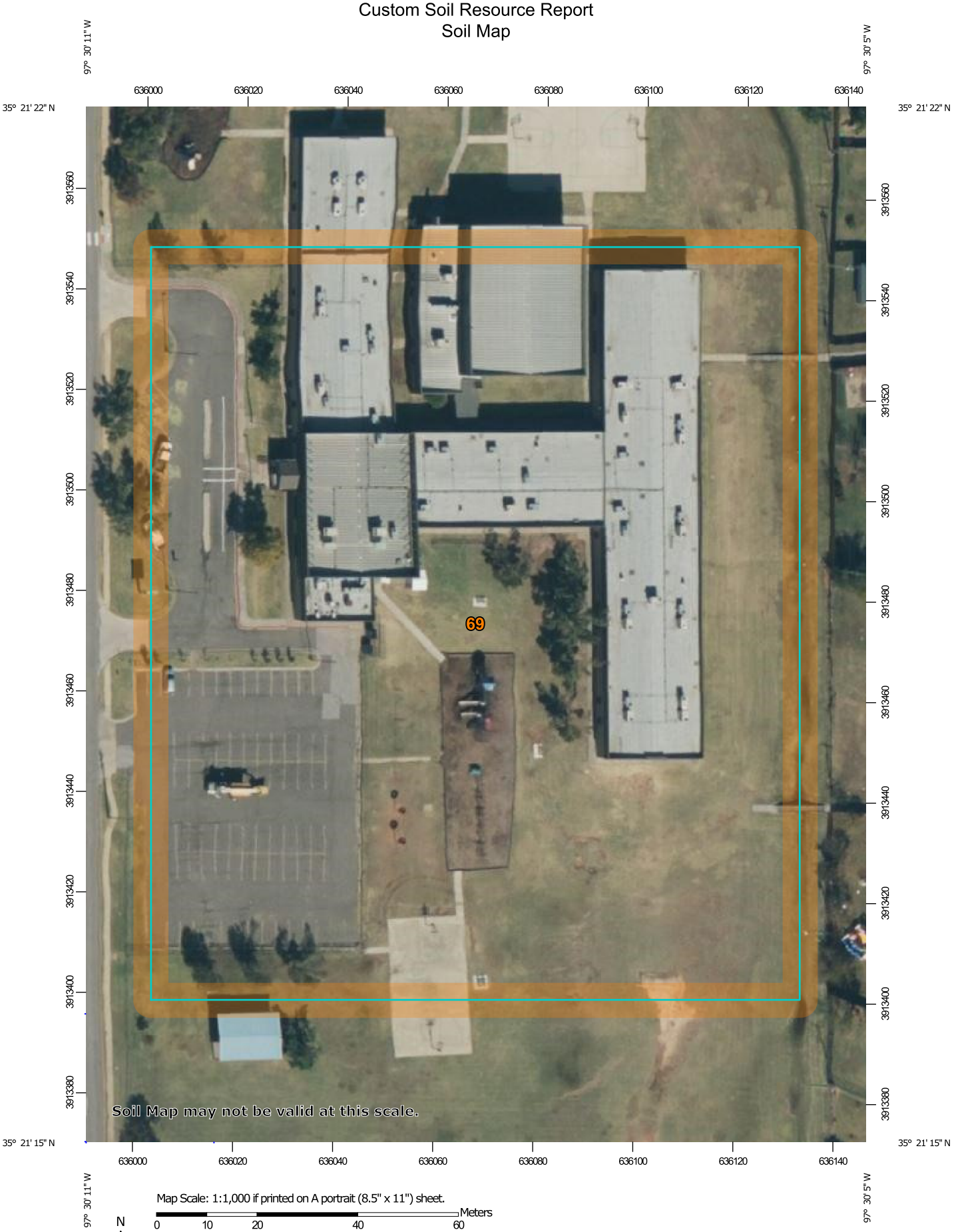
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:1,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cleveland County, Oklahoma
Survey Area Data: Version 20, Sep 2, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 14, 2020—Nov 2, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
69	Renfrow-Urban land-Huska complex, 1 to 5 percent slopes	4.8	100.0%
Totals for Area of Interest		**4.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Cleveland County, Oklahoma

69—Renfrow-Urban land-Huska complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: dtmv
Elevation: 700 to 2,000 feet
Mean annual precipitation: 22 to 40 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 185 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Renfrow and similar soils: 36 percent
Urban land: 34 percent
Huska and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renfrow

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 8 inches: silt loam
BA - 8 to 12 inches: silty clay loam
Btk1 - 12 to 52 inches: silty clay
Btk2 - 52 to 62 inches: silty clay
Cr - 62 to 84 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 60 to 80 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 4.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R080AY010OK - Claypan Upland (North)

Hydric soil rating: No

Description of Urban Land

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey mine spoil or earthy fill derived from clayey shale

Typical profile

C - 0 to 60 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Huska

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saline clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 4 inches: silt loam
Bt - 4 to 19 inches: silty clay
Btkn1 - 19 to 40 inches: silty clay
Btkn2 - 40 to 46 inches: silty clay loam
Cr - 46 to 56 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 55.0
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Ecological site: R080AY091OK - Slickspot
Hydric soil rating: No

Minor Components

Piedmont
Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R080AY010OK - Claypan Upland (North)
Hydric soil rating: No

Grainola
Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R080AY010OK - Claypan Upland (North)
Hydric soil rating: No

Grant
Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R080AY056OK - Loamy Upland
Hydric soil rating: No

Kirkland
Percent of map unit: 2 percent
Landform: Plains on paleoterraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R080AY010OK - Claypan Upland (North)
Hydric soil rating: No

Pawhuska
Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R080AY091OK - Slickspot
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or

soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Cleveland County, Oklahoma			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
69—Renfrow-Urban land-Huska complex, 1 to 5 percent slopes			
Renfrow	36	Very high	D
Urban land	34	Low	D
Huska	15	Very high	D

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

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Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
69—Renfrow-Urban land-Huska complex, 1 to 5 percent slopes			
Renfrow	36	Very high	D
Urban land	34	Low	D
Huska	15	Very high	D

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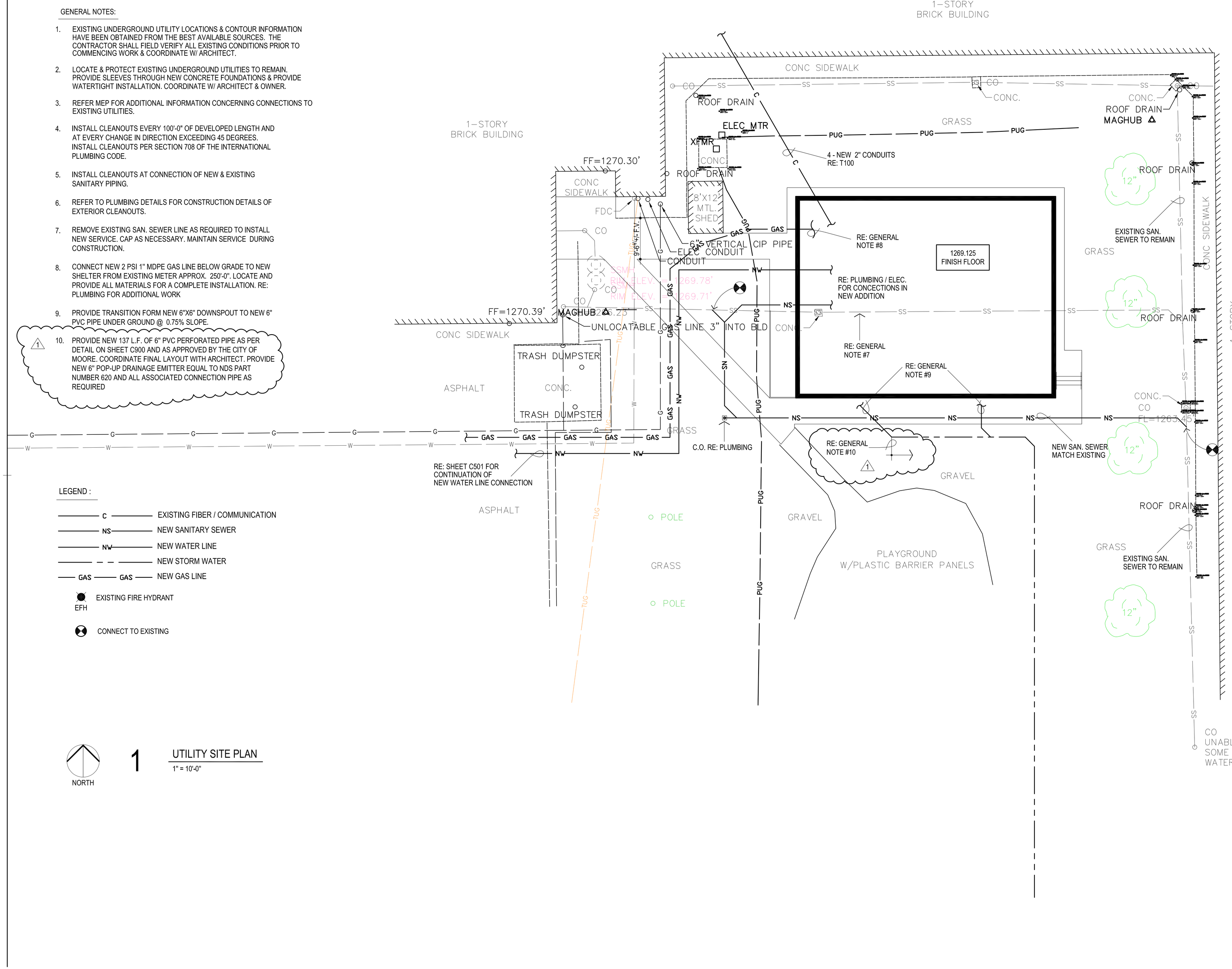
GENERAL NOTES:

1. EXISTING UNDERGROUND UTILITY LOCATIONS & CONTOUR INFORMATION HAVE BEEN OBTAINED FROM THE BEST AVAILABLE SOURCES. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO COMMENCING WORK & COORDINATE W/ ARCHITECT.
2. LOCATE & PROTECT EXISTING UNDERGROUND UTILITIES TO REMAIN. PROVIDE SLEEVES THROUGH NEW CONCRETE FOUNDATIONS & PROVIDE WATERTIGHT INSTALLATION. COORDINATE W/ ARCHITECT & OWNER.
3. REFER MEP FOR ADDITIONAL INFORMATION CONCERNING CONNECTIONS TO EXISTING UTILITIES.
4. INSTALL CLEANOUTS EVERY 100'-0" OF DEVELOPED LENGTH AND AT EVERY CHANGE IN DIRECTION EXCEEDING 45 DEGREES. INSTALL CLEANOUTS PER SECTION 708 OF THE INTERNATIONAL PLUMBING CODE.
5. INSTALL CLEANOUTS AT CONNECTION OF NEW & EXISTING SANITARY PIPING.
6. REFER TO PLUMBING DETAILS FOR CONSTRUCTION DETAILS OF EXTERIOR CLEANOUTS.
7. REMOVE EXISTING SAN. SEWER LINE AS REQUIRED TO INSTALL NEW SERVICE. CAP AS NECESSARY. MAINTAIN SERVICE DURING CONSTRUCTION.
8. CONNECT NEW 2 PSI 1" MDPE GAS LINE BELOW GRADE TO NEW SHELTER FROM EXISTING METER APPROX. 250'-0". LOCATE AND PROVIDE ALL MATERIALS FOR A COMPLETE INSTALLATION. RE: PLUMBING FOR ADDITIONAL WORK
9. PROVIDE TRANSITION FORM NEW 6"X6" DOWNSPOUT TO NEW 6" PVC PIPE UNDER GROUND @ 0.75% SLOPE.
10. PROVIDE NEW 137 L.F. OF 6" PVC PERFORATED PIPE AS PER DETAIL ON SHEET C900 AND AS APPROVED BY THE CITY OF MOORE. COORDINATE FINAL LAYOUT WITH ARCHITECT. PROVIDE NEW 6" POP-UP DRAINAGE EMITTER EQUAL TO NDS PART NUMBER 620 AND ALL ASSOCIATED CONNECTION PIPE AS REQUIRED

LEGEND :

- C — EXISTING FIBER / COMMUNICATION
- NS — NEW SANITARY SEWER
- NW — NEW WATER LINE
- — — NEW STORM WATER
- GAS GAS — NEW GAS LINE
- EFH — EXISTING FIRE HYDRANT
- CONNECT TO EXISTING



NORTH

1 UTILITY SITE PLAN

1" = 10'-0"

AGP
the Abla Griffin Partnership L.L.C.
201 N. BROADWAY
SUITE 210
MOORE, OK. 73160
405.735.3477
AGP@theAGP.net
www.theAGP.net

CEDAR CREEK INC.
CIVIL

KFC ENGINEERING
STRUCTURAL

SALAS O'BRIEN
MECHANICAL / ELECTRICAL

STATE OF OKLAHOMA
MICHAEL L. ABLA
2639
REGISTERED PROFESSIONAL ENGINEER
10/14/22

CG
drawn by

MA
checked by

OCTOBER 2022
date

revisions
1 ADD. #2

MOORE PUBLIC SCHOOLS
BOARD OF EDUCATION
MOORE, OKLAHOMA

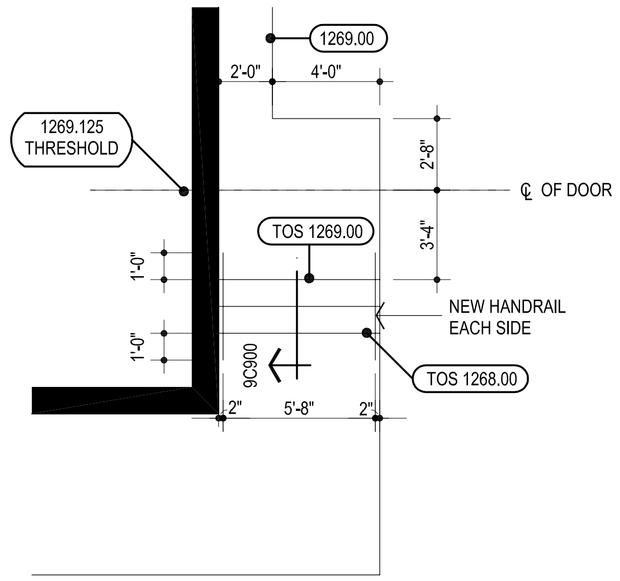
MOORE Public Schools
LEARNING FOR LIFE

NEW ADDITION
KELLEY ELEMENTARY SCHOOL

sheet no:

C501

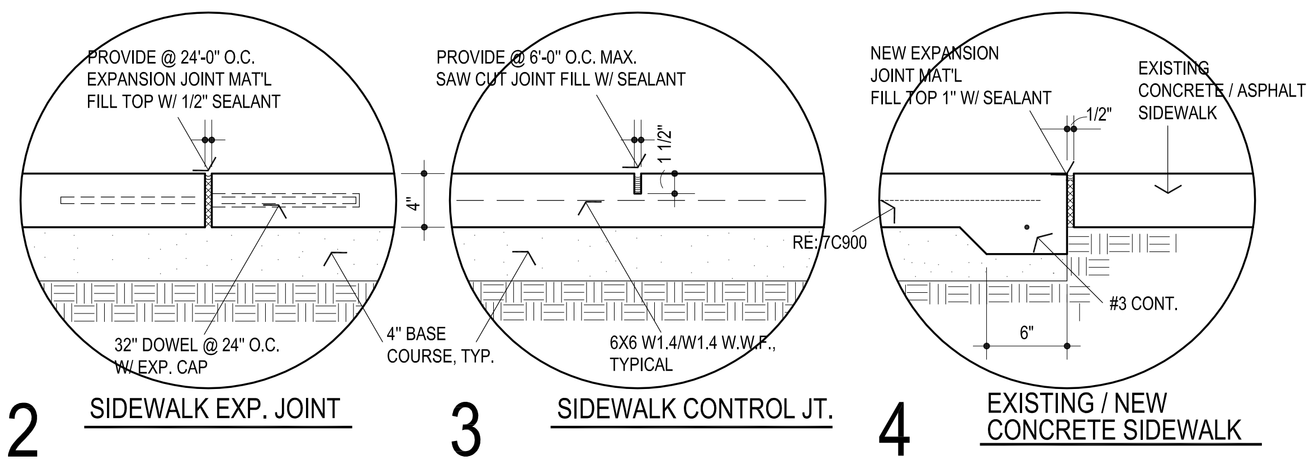
UTILITY SITE PLAN



NORTH

1 ENLARGED PLAN

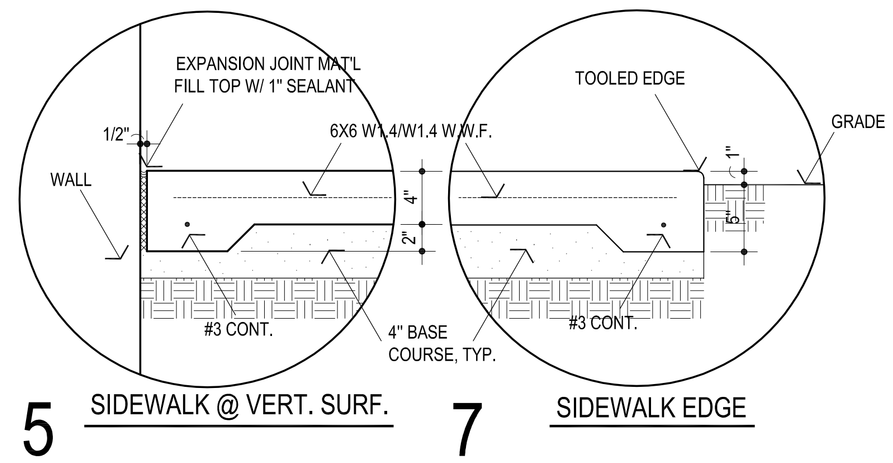
1/4" = 1'-0"



2 SIDEWALK EXP. JOINT

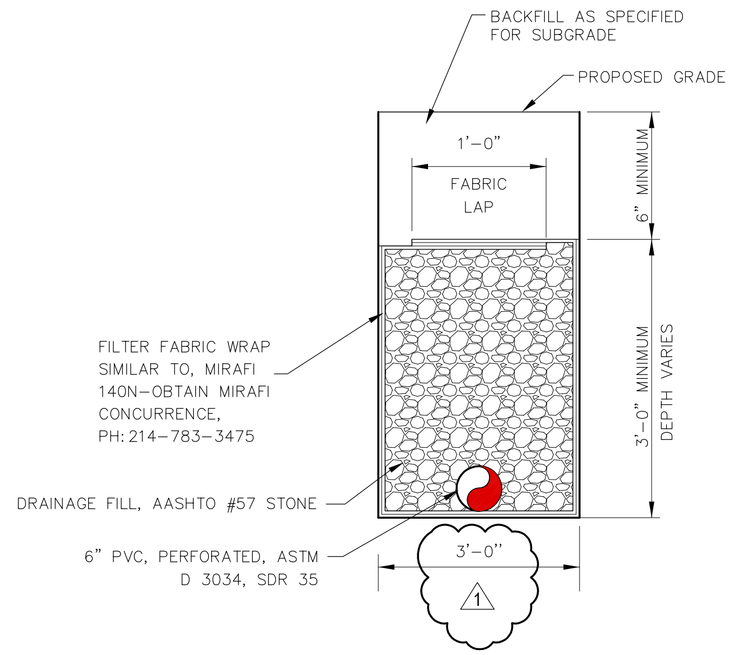
3 SIDEWALK CONTROL JT.

4 EXISTING / NEW CONCRETE SIDEWALK



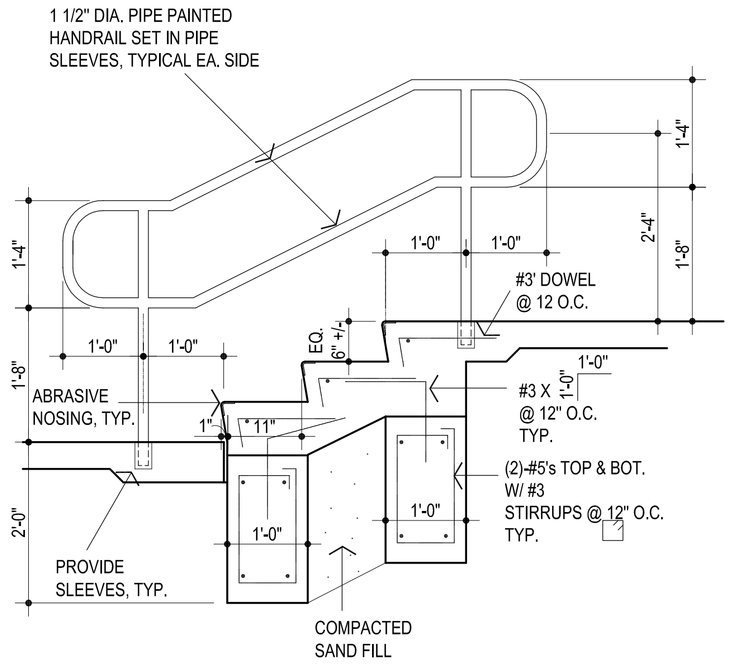
5 SIDEWALK @ VERT. SURF.

7 SIDEWALK EDGE



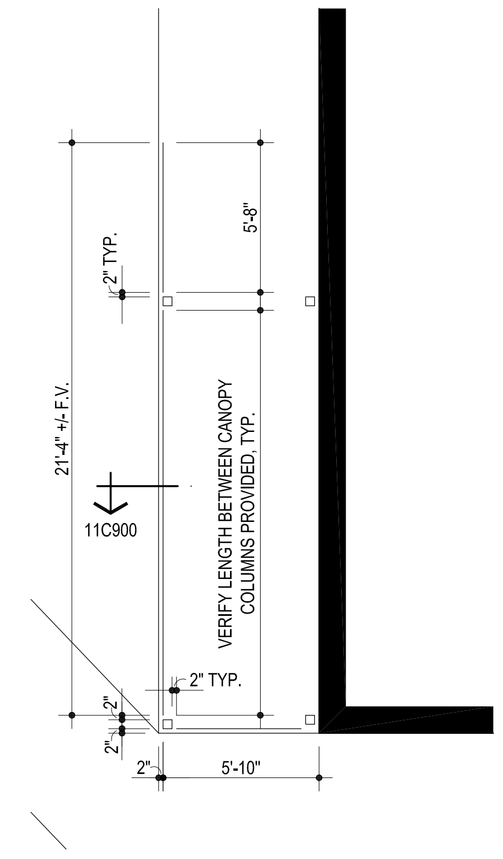
8 FRENCH DRAIN DETAIL

NOT TO SCALE



9 SECTION @ STEPS

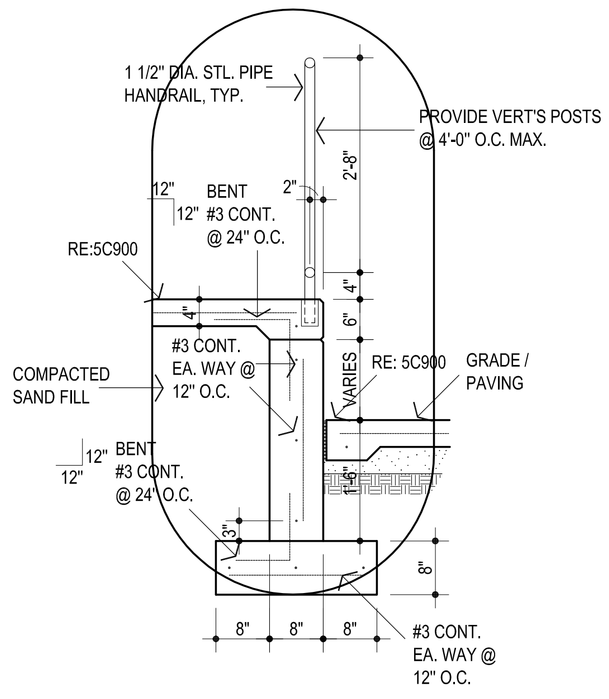
3/4" = 1'-0"



NORTH

10 ENLARGED PLAN

1/4" = 1'-0"



11 SIDEWALK EDGE

3/4" = 1'-0"

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CEDAR CREEK INC.
CIVIL

KFC ENGINEERING
STRUCTURAL

SALAS O'BRIEN
MECHANICAL / ELECTRICAL

STATE OF OKLAHOMA
MICHAEL L. ABLA
2639
REGISTERED PROFESSIONAL ENGINEER
10/14/22

CG
drawn by

MA
checked by

OCTOBER 2022
date

revisions

1 ADD. #2

MOORE PUBLIC SCHOOLS
BOARD OF EDUCATION
MOORE, OKLAHOMA

MOORE Public School
LEARNING FOR LIFE

NEW ADDITION
KELLEY ELEMENTARY
SCHOOL

sheet no:

C900

1. GENERAL INFORMATION

A. GOVERNING BUILDING CODE: 2015 INTERNATIONAL BUILDING CODE (IBC-2015).

B. BUILDING RISK CATEGORY: THE BUILDING RISK CATEGORY ACCORDING TO IBC-2015 TABLE 1604.5 AND ASCE 7-10 TABLE 1.5-1 IS CATEGORY II.

C. ELEVATIONS: REFERENCE FINISHED FLOOR ELEVATIONS OF 100'-0" EQUALS ACTUAL EXISTING FINISH FLOOR ELEVATION OF 1269.125'.

D. CONTRACT DOCUMENTS:

1) THE CONTRACT DOCUMENTS CONSIST OF THE AGREEMENT BETWEEN THE OWNER AND CONTRACTOR, CONDITIONS OF THE CONTRACT, DRAWINGS, SPECIFICATIONS, ADDENDA ISSUED PRIOR TO EXECUTION OF THE CONTRACT, OTHER DOCUMENTS LISTED IN THE AGREEMENT AND MODIFICATIONS ISSUED AFTER EXECUTION OF THE CONTRACT.

2) THE GENERAL CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND DISSEMINATING ALL CONTRACT DOCUMENTS AND LATEST ADDENDA TO ALL SUB-CONTRACTORS PRIOR TO DETAILING, FABRICATION OR INSTALLATION OF WORK.

3) CORRELATION OF THE CONTRACT DOCUMENTS: THE CONTRACT DOCUMENTS ARE COMPLEMENTARY, AND WHAT IS REQUIRED BY ONE SHALL BE AS BINDING AS IF REQUIRED BY ALL. IF CONFLICTING REQUIREMENTS ARE FOUND BETWEEN THE DRAWINGS, SPECIFICATIONS AND/OR THESE GENERAL NOTES, THE MORE STRINGENT AND HIGHEST COST REQUIREMENT SHALL CONTROL UNLESS DIRECTED OTHERWISE IN WRITING BY THE OWNER'S REPRESENTATIVE.

4) THE GENERAL CONTRACTOR SHALL COMPARE THE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DISCREPANCIES BETWEEN EACH SET, AND WITHIN EACH SET OF DRAWINGS, AND REPORT DISCREPANCIES, IF ANY, TO THE OWNER'S REPRESENTATIVE PRIOR TO THE DETAILING, FABRICATION AND INSTALLATION OF AFFECTED WORK.

5) GENERAL CONTRACTOR SHALL COORDINATE SIZES AND LOCATIONS OF OPENINGS THROUGH FLOORS, ROOF, AND WALLS SHOWN ON ELECTRICAL, PLUMBING, AND FIRE SUPPRESSION SYSTEM DESIGN DOCUMENTS WITH ASSOCIATED SUBCONTRACTORS.

6) ALTHOUGH NOT NECESSARILY SPECIFICALLY REFERENCED IN THE CONTRACT DOCUMENTS, TYPICAL DETAILS AND GENERAL NOTES APPLY TO THE ENTIRE PROJECT WHEREVER CONDITIONS SIMILAR TO THOSE DETAILED OR NOTED EXIST.

7) THE USE OF ELECTRONIC FILES OR REPRODUCTION OF CONTRACT DOCUMENTS BY ANY TRADE OR MATERIAL SUPPLIER IN LIEU OF COMPLETELY INDEPENDENT PREPARATION OF SHOP DRAWINGS SIGNIFIES THE SUPPLIER'S CERTIFICATION THAT ALL INFORMATION SHOWN IN THE SHOP DRAWINGS IS CORRECT, AND ASSIGNS THEMSELVES TO RESPONSIBILITY FOR ANY JOB EXPENSE ARISING DUE TO ANY ERRORS OCCURRING THEREIN.

2. SHELTER DESIGN LOADS

A. DEAD LOAD: SELF WEIGHT OF MATERIALS, UNLESS NOTED OTHERWISE

B. ROOF DEAD LOAD:
1) BUILT UP ROOFING SYSTEM....................6 PSF
2) RIGID INSULATION....................2 PSF
3) CONCRETE DECK (4" NW CONC ON 2" COMP. DECK - 6" TOTAL)................63 PSF
4) STEEL BEAMS....................7 PSF
5) MISC (MEP, CEILING, ETC.)....................7 PSF
6) TOTAL....................85 PSF

C. UNIFORM LIVE LOADS:
1) ROOF LIVE LOAD (UNREDUCIBLE)....................100 PSF

D. CONCENTRATED LIVE LOADS:
1) ROOFS (ON AN AREA 2.5 FT. X 2.5 FT.)....................300 LBS

E. WIND LOADS:
1) GOVERNING CODE:....................ICC 500-2014
2) EXPOSURE CATEGORY:....................C
3) INTERNAL PRESSURE COEFFICIENT, GCPI:....................+/- 0.55
4) TOPOGRAPHIC FACTOR, KZT:....................1.0
5) DIRECTIONALITY FACTOR, KD:....................1.0
6) ULTIMATE DESIGN WIND SPEED, Vult:....................250 MPH

F. SNOW LOADS:
1) GOVERNING CODE:....................ASCE 7-10
2) SNOW IMPORTANCE FACTOR, Is:....................1.1
3) GROUND SNOW LOAD, Pg:....................10 PSF
4) EXPOSURE OF ROOF:....................PARTIALLY EXPOSED
5) EXPOSURE FACTOR, Ce:....................1.0
6) THERMAL FACTOR, Ct:....................1.0
7) ROOF SLOPE FACTOR, Cs:....................1.0
8) CALCULATED FLAT ROOF SNOW LOAD, Pf:....................7.7 PSF
9) MINIMUM FLAT ROOF SNOW LOAD, I*Pg:....................11 PSF
10) RAIN ON SNOW SURCHARGE LOAD:....................5 PSF

G. RAIN LOADS:
1) GOVERNING CODE:....................ASCE 7-10
2) DEPTH OF WATER ON THE UNDEFLECTED ROOF UP TO THE INLET OF THE SECONDARY DRAINAGE SYSTEM IS BLOCKED (I.E., THE STATIC HEAD), ds....................4.0 INCHES
3) ADDITIONAL DEPTH OF WATER ON THE UNDEFLECTED ROOF ABOVE THE INLET OF THE SECONDARY DRAINAGE SYSTEM AT ITS DESIGN FLOW (I.E., THE HYDRAULIC HEAD), dh....................2.0 INCHES

H. SEISMIC DESIGN CRITERIA: (INFORMATION TBD FROM SITE SPECIFIC GEOTECHNICAL REPORT)
1) GOVERNING CODE:....................ASCE 7-10
2) SEISMIC IMPORTANCE FACTOR, Ie:....................1.25
3) SOIL SITE CLASSIFICATION:....................C
4) 0.2 SEC. MAPPED SPECTRAL ACCELERATION, Ss:....................0.272
5) 1.0 SEC. MAPPED SPECTRAL ACCELERATION, S1:....................0.079
6) SITE COEFFICIENT, 0.2 SEC. PERIOD, Fa:....................1.2
7) SITE COEFFICIENT, 1.0 SEC. PERIOD, Fv:....................1.7
8) 0.2 SEC. DESIGN SPECTRAL ACCELERATION, Sds:....................0.217
9) 1.0 SEC. DESIGN SPECTRAL ACCELERATION, Sd1:....................0.089
10) SEISMIC DESIGN CATEGORY:....................B
11) SEISMIC PARAMETERS FOR BUILDING:
A) SEISMIC FORCE RESISTING SYSTEM: ORDINARY REINFORCED CONCRETE SHEAR WALLS
B) RESPONSE MODIFICATION COEFFICIENT, R:....................4.00
C) SYSTEM OVERSTRENGTH FACTOR, O:....................2.50
D) DEFLECTION AMPLIFICATION FACTOR, Cd:....................4.00
E) ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE METHOD.
F) SEISMIC RESPONSE COEFFICIENT, Cs:....................0.068
G) TOTAL LATERAL BASE SHEAR, V:....................55 KIPS

3. MATERIAL DESIGN VALUES

A. CONCRETE (MIN. ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS, NORMAL WEIGHT U.N.O.)
1) FOUNDATIONS:....................3,500 PSI
2) SLABS:....................4,000 PSI
3) WALLS:....................4,000 PSI
4) ALL OTHER STRUCTURAL CONCRETE, U.N.O:....................4,000 PSI

B. REINFORCED CONCRETE MASONRY
1) DETERMINATION OF COMPRESSIVE STRENGTH:....................UNIT STRENGTH METHOD
2) DESIGN COMPRESSIVE STRENGTH OF CONCRETE MASONRY, f'm:....................2,000 PSI
3) NET AREA COMPRESSIVE STRENGTH OF CONCRETE MASONRY UNITS (ASTM C90)....................2,000 PSI
4) MORTAR (ASTM C270, PROPORTION SPECIFICATION, TYPE S)....................1,800 PSI
5) GROUT (ASTM C476, PROPORTION SPECIFICATION)....................2,000 PSI

C. CONCRETE AND MASONRY REINFORCEMENT (MINIMUM YIELD STRENGTH)
1) ALL PLAIN AND DEFORMED BARS (ASTM A615, GRADE 60)....................FY = 60 KSI
2) WELDABLE REINFORCING BARS (ASTM A706)....................FY = 60 KSI

D. STRUCTURAL STEEL (MINIMUM YIELD STRENGTH)
1) ALL WIDE FLANGE SHAPES (ASTM A992)....................FY = 50 KSI
2) SQUARE AND RECTANGULAR HSS (ASTM A500, GRADE C)....................FY = 50 KSI
3) ANCHOR RODS (ASTM F1554, GRADE 105)....................FY = 105 KSI
4) DEFORMED BAR ANCHORS (AWS D1.1 TYPE C, ASTM A496)....................FY = 70 KSI
5) HEADED STUD ANCHORS (AWS D1.1 TYPE B, ASTM A29, GRADES 1010 THROUGH 1020)....................FY = 51 KSI
6) ALL OTHER SHAPES AND PLATES UNLESS NOTED (ASTM A36)....................FY = 36 KSI

E. COLD FORMED STEEL (MINIMUM YIELD STRENGTH)
1) ROOF DECK (ASTM A653, SS GRADE 33, G-60 GALVANIZED)....................FY = 33 KSI
2) COMPOSITE DECK (ASTM A653, SS GRADE 40, G-60 GALV.)....................FY = 40 KSI
3) COLD FORMED METAL STUDS, 43 MIL AND LIGHTER (ASTM A1003/A, GRADE ST33H, G-60 GALVANIZED)....................FY = 33 KSI
4) COLD FORMED METAL STUDS, 54 MIL AND HEAVIER (ASTM A1003/A, GRADE ST50H, G-60 GALVANIZED)....................FY = 50 KSI
5) COLD FORMED METAL CLIPS (ASTM A653, SS GRADE 50,G-90 GALVANIZED)....................FY = 50 KSI

4. CONSTRUCTION LOADS AND STABILITY

A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL TEMPORARY CONSTRUCTION LOADS CAN BE SAFELY SUPPORTED BY THE STRUCTURE DURING CONSTRUCTION.

B. THE STRUCTURAL FRAMING SYSTEM AND FOUNDATIONS HAVE BEEN DESIGNED AS A COMPLETE STRUCTURAL SYSTEM FOR SUPPORT OF THE LOADS INDICATED IN THE CONSTRUCTION DOCUMENTS. THE STRUCTURE HAS NOT BEEN DESIGNED OR CHECKED FOR TEMPORARY CONSTRUCTION LOADS NOR HAS IT BEEN DESIGNED OR CHECKED FOR ADEQUACY OR STABILITY AS A PARTIALLY ERECTED STRUCTURE.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE ABILITY OF THE PARTIALLY COMPLETED OR FULLY COMPLETED STRUCTURE TO RESIST ALL CONSTRUCTION LOADS INCLUDING BUT ARE NOT NECESSARILY LIMITED TO MATERIAL STAGING, PERSONNEL, AND EQUIPMENT.

D. THE CONTRACTOR SHALL PROVIDE TEMPORARY SHORES, GUYS, BRACES, AND OTHER SUPPORTS DURING CONSTRUCTION TO KEEP STRUCTURAL FRAMING COMPONENTS SECURE, PLUMB, AND IN ALIGNMENT AGAINST TEMPORARY CONSTRUCTION LOADS AND LOADS EQUAL IN INTENSITY TO DESIGN LOADS. THE TEMPORARY SUPPORTS SHALL BE SUFFICIENT TO SECURE THE PARTIALLY ERECTED STRUCTURE OR ANY PORTION THEREOF AGAINST LOADS THAT ARE LIKELY TO BE ENCOUNTERED DURING CONSTRUCTION, INCLUDING THOSE DUE TO WIND AND THOSE THAT RESULT FROM CONSTRUCTION OPERATIONS.

E. THE CONTRACTOR SHALL NOT REMOVE TEMPORARY SUPPORTS UNTIL THE INSTALLATION OF ALL STRUCTURAL ELEMENTS IS COMPLETE. FOR THE PURPOSES OF THIS PARAGRAPH, "ALL STRUCTURAL ELEMENTS" INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, THE FOLLOWING STRUCTURAL ELEMENTS:
1) FOUNDATIONS
2) STRUCTURAL STEEL FRAMING WITH COMPLETED STEEL CONNECTIONS, INCLUDING PERMANENT VERTICAL AND/OR HORIZONTAL BRACING
3) STEEL JOISTS INCLUDING JOIST BRIDGING
4) ROOF DECK

5. FOUNDATION NOTES

A. GEOTECHNICAL REPORT: A SITE SPECIFIC GEOTECHNICAL ENGINEERING SERVICES REPORT FOR THE NEW SHELTER ADDITION AT KELLEY ELEMENTARY SCHOOL, IN MOORE, OKLAHOMA WAS PERFORMED BY PROFESSIONAL SERVICE INDUSTRIES, PSI, DATED NOVEMBER 14, 2022. (PSI PROJECT NO. 054626609)

B. SITE SUB-GRADE PREPARATION:

1) STRIPPING: VEGETATION, CONCRETE, DELETERIOUS MATERIALS, AND SOFT AND LOOSE SOIL IN THE CONSTRUCTION AREAS, SHALL BE STRIPPED FROM THE SITE. THE DEPTH OF REMOVAL SHALL BE DETERMINED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION. UTILITIES SHALL BE LOCATED AND REROUTED AS NECESSARY.

2) UNDERCUTTING: AFTER STRIPPING AND MAKING ANY REQUIRED CUTS, THE BUILDING PAD SHALL BE UNDERCUT TO A MINIMUM OF 1'-0" AND REPLACED WITH LOW VOLUME CHANGE STRUCTURAL FILL AS OUTLINED BELOW.

3) PROOF-ROLLING: AFTER STRIPPING AND UNDERCUTTING, BUT BEFORE PLACING FILL,THE CONSTRUCTION AREA SHALL BE PROOF-ROLLED WITH A TANDEM AXLE DUMP TRUCK WEIGHING ATLEAST 25 TONS. THE PROOFROLLING SHOULD INVOLVE OVERLAPPING PASSES IN MUTUALLY PERPENDICULAR DIRECTIONS AND SOILS WHICH ARE OBSERVED TO RUT OR DEFLECT EXCESSIVELY UNDER THE MOVING LOAD SHALL BE UNDERCUT AND RECOMPACTED IN PLACE OR REPLACED WITH PROPERLY COMPACTED ENGINEERED FILL. THE RECOMPACTED SOIL OR STRUCTURAL FILL SHALL BE MOISTURE CONDITIONED DURING PLACEMENT. THE PROOF-ROLLING AND UNDERCUTTING ACTIVITIES SHALL BE WITNESSED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER AND SHALL BE PERFORMED DURING A PERIOD OF DRY WEATHER.

4) SCARIFICATION: AFTER STRIPPING, UNDERCUTTING AND PROOF ROLLING, BUT BEFORE FILL PLACEMENT, THE EXPOSED SOILS SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 8 INCHES AND THEN PROCESSED AT A MOISTURE CONTENT AT OR ABOVE ITS OPTIMUM VALUE AS DETERMINED BY THE STANDARD PROCTOR TEST. THE SUBGRADE SOILS SHALL BE RECOMPACTED TO AT LEAST 95 PERCENT OF ITS MAXIMUM DRY DENSITY AS DETERMINED BY THE STANDARD PROCTOR TEST METHOD (ASTM D-698).

5) ACCEPTABLE FILL: STRUCTURAL FILL MATERIALS SHALL BE FREE OF ORGANIC OR OTHER DELETERIOUS MATERIAL, HAVE A MAXIMUM PARTICLE SIZE OF 3 INCHES, HAVE A LIQUID LIMIT NOT MORE THAN 35, A PLASTICITY INDEX IN THE RANGE OF 5 AND 18 AND FINE MATERIAL PASSING THE NO. 200 SEIVE NOT LESS THAN 60%.

6) FILL PLACEMENT: FILL SHALL BE PLACED IN MAXIMUM LIFTS OF 8 INCHES OF LOOSE MATERIAL AND SHALL BE COMPACTED WITHIN THE RANGE OF 2 PERCENTAGE POINTS BELOW AND 3 PERCENTAGE POINTS ABOVE THE OPTIMUM MOISTURE CONTENT. EACH LIFT OF COMPACTED ENGINEERED FILL SHALL BE TESTED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF SUBSEQUENT LIFTS. THE EDGES OF COMPACTED FILL SHALL EXTEND 1 FOOT LATERALLY BEYOND THE BUILDING FOOTPRINT FOR EACH FOOT OF FILL REQUIRED. STRUCTURAL FILL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF STANDARD PROCTOR MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D698.

7) DEPTH OF FILL: SLABS SHALL BE GRADE SUPPORTED ON 1'-0" OF COMPACTED STRUCTURAL FILL PLACED AS DESCRIBED ABOVE.

8) FILL PLACEMENT TESTING: EACH LIFT OF COMPACTED FILL SHALL BE TESTED BY A GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF SUBSEQUENT LIFTS. FIELD DENSITY TESTS SHALL BE TAKEN AT A MINIMUM OF ONE PER EVERY 2500 SF, BUT AT LEAST THREE SETS OF DENSITY TESTS SHALL BE TAKEN FOR EACH LIFT.

9) SITE DRAINAGE: GRADING OF THE SITE AROUND THE STRUCTURE'S PADS SHALL BE ACCOMPLISHED TO ENABLE POSITIVE DRAINAGE AWAY FROM THE PADS BY PROVIDING AN ADEQUATE GRADIENT. THE SURFACE GRADIENT PROVIDED WILL BE DEPENDENT ON THE LANDSCAPING TYPE AND VEGETATION. WATER INFILTRATION AND SEEPAGE INTO THE FOUNDATION SHALL BE REDUCED AS MUCH AS POSSIBLE. IF IT IS POSSIBLE FOR WATER TO COLLECT BENEATH THE FOUNDATION AND FOUNDATION AREAS, IT WILL BE NECESSARY TO USE INTERCEPTOR DRAINS TO REMOVE THE COLLECTED WATER.

10) MAINTENANCE OF SOIL MOISTURE: SOIL MOISTURE SHALL BE MAINTAINED UP UNTIL CONCRETE PLACEMENT TO PREVENT SHRINKAGE AND SUBSEQUENT POST-CONSTRUCTION SWELL OF SUBGRADE SOILS.

C. DRILLED PIER FOUNDATIONS:

1) PIER DESIGN PARAMETERS: THE PROPOSED SHELTER SHALL BE SUPPORTED ON DRILLED PIER FOUNDATIONS BASED ON THE FOLLOWING DESIGN PARAMETERS:
A) BEARING STRATUM: CLAYEY SHALE
B) ALLOWABLE END BEARING PRESSURE: 17,800 PSF
C) ALLOWABLE SKIN FRICTION (DOWNWARD LOADS): 1,750 PSF

2) MINIMUM EMBEDMENT: DRILLED SHAFTS SHALL BEAR A MINIMUM OF 2 FEET OR ONE PIER DIAMETERS INTO THE BEARING STRATUM INDICATED ABOVE. SKIN FRICTION IS BASED UPON THE ACTUAL PORTION OF DRILLED PIER EMBEDDED MORE THAN 3 FEET INTO THE BEARING STRATUM.

3) EXPECTED SETTLEMENT: PROPERLY CONSTRUCTED PIERS BEARING IN THE UNDERLYING WEATHERED SHALE BEDROCK ARE EXPECTED TO EXPERIENCE TOTAL MAXIMUM SETTLEMENTS ON THE ORDER OF 1/2 INCH.

4) CASING REQUIREMENTS: TEMPORARY CASING MAY BE REQUIRED IN ORDER TO SEAL OUT GROUNDWATER OR SLOUGHING SOILS, HOWEVER THE FINAL DETERMINATION SHALL BE MADE AT THE TIME OF CONSTRUCTION.
A) THE CONTRACTOR SHALL PROVIDE UNIT PRICING TO ADD THE COST OF EACH LINEAL FOOT OF CASING FOR EACH PIER DIAMETER IN THE EVENT CASINGS ARE REQUIRED. UNIT LENGTHS OF CASING SHALL BE FROM DETAILED TOP OF PIER ELEVATION TO TOP OF BEARING STRATUM ELEVATION.
B) THE CONTRACTOR SHALL PROVIDE UNIT PRICING FOR THE COST OF ABANDONED CASINGS THAT CANNOT BE REMOVED FOR REASONS BEYOND THE CONTROL OF THE CONTRACTOR.

5) PIER LENGTHS AND BIDDING CONSIDERATIONS: TOP OF PIER ELEVATIONS SHOWN IN THE DRAWINGS ARE RELATIVE TO A REFERENCE FINISHED FLOOR ELEVATION OF 100'-0". THE OVERALL PIER LENGTHS INDICATED IN THE PLAN ARE APPROXIMATE AND ARE BASED ON ESTIMATED CONTOURS DEVELOPED FROM THE BEARING STRATA DETERMINED FROM THE GEOTECHNICAL REPORT BORING LOGS. ACTUAL PIER LENGTHS MAY VARY AS UNDULATIONS IN THE BEARING STRATA ELEVATION ARE ENCOUNTERED. LENGTH OF PIERS SHALL BE DETERMINED ONCE THE MINIMUM EMBEDMENT INTO THE SPECIFIED BEARING STRATA IS ACHIEVED. THE CONTRACTOR SHALL PROVIDE ADD/DEDUCT UNIT PRICING FOR ALL PIER SIZES SHOWN.

6) PIER CONSTRUCTION:
A) THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES, BOTH CHARTED AND UNCHARTED, PRIOR TO COMMENCING WITH EXCAVATION OR PIER DRILLING OPERATIONS AND SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE OF ANY POTENTIAL CONFLICTS BETWEEN EXISTING CONDITIONS AND PLANNED CONSTRUCTION.
B) SOFT OR LOOSE SOIL ZONES ENCOUNTERED AT THE BEARING LEVEL SHALL BE REMOVED FROM THE DRILLED SHAFTS. IF THE EXPOSED BEARING MATERIALS BECOME SIGNIFICANTLY WET OR DRY, THEY SHALL BE DEEPENED UNTIL MORE UNIFORM MOISTURE CONDITIONS ARE ACHIEVED AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
C) CONCRETE FOR PIERS SHALL BE CAST AS SOON AS PRACTICAL AFTER DRILLING. IN GENERAL, NO PIER HOLE SHALL BE LEFT OPEN OVERNIGHT. IF THE PIERS ARE LEFT OPEN OVERNIGHT OR LONGER, THE PIER DRILLING CONTRACTOR SHALL DEEPEN PIERS A MINIMUM OF ONE PIER DIAMETER AT THE CONTRACTOR'S EXPENSE.
D) CONCRETE PLACEMENT FOR PIERS:
(i) PIERS WITH A DIAMETER LESS THAN 30-INCHES SHALL BE DEPOSITED USING A TREMMIE OR PUMPED THROUGH A HOSE. CONCRETE SHALL NOT BE ALLOWED TO FALL MORE THAN 10 FEET TO THE BOTTOM OF THE EXCAVATION.
(ii) PIERS WITH A DIAMETER EQUAL TO OR GREATER THAN 30-INCHES AND A DEPTH OF UP TO 60 FEET MAY BE PLACED AS FREE-FALL.
(iii) PIERS WITH A DIAMETER EQUAL TO OR GREATER THAN 30-INCHES AND A DEPTH EXCEEDING 60 FEET SHALL BE DEPOSITED USING A TREMMIE OR PUMPED THROUGH A HOSE. CONCRETE SHALL NOT BE ALLOWED TO FALL MORE THAN 10 FEET TO THE BOTTOM OF THE EXCAVATION.
E) THE TOP FIVE FEET OF ALL PIERS SHALL BE VIBRATED AFTER TEMPORARY CASING HAS BEEN WITHDRAWN OR WHEN CASING IS PERMANENT AND CONCRETE SLUMP IS LESS THAN 6 INCHES.
F) ANY CONCRETE OVERPOUR AT TOP OF PIERS (MUSHROOMS) SHALL BE REMOVED TO PRODUCE THE SPECIFIED PIER DIAMETER.

D. GRADE BEAMS AND PIER CAPS:

1) CONSTRUCTION: GRADE BEAMS AND PIER CAPS SHALL BE STRUCTURALLY CONNECTED TO THE TOP OF SUPPORTING PIERS. GRADE BEAMS SHALL EXTEND AT LEAST TWENTY FOUR (24) INCHES BELOW THE FINAL EXTERIOR ADJACENT GRADE. A MINIMUM VOID SPACE OF FOUR (4) INCHES BENEATH GRADE BEAMS AND PIER CAPS SHALL BE MAINTAINED USING VOID FORMS. EXCAVATIONS FOR GRADE BEAMS AND PIER CAPS SHALL BE FREE OF LOOSE MATERIAL.

2) VOID FORMS: VOID FORMS SHALL BE CONSTRUCTED OF BIODEGRADABLE PAPER SURFACE, TREATED FOR MOISTURE RESISTANCE, AND STRUCTURALLY SUFFICIENT TO SUPPORT WEIGHT OF PLASTIC CONCRETE AND OTHER SUPERIMPOSED LOADS. TRAPEZOIDAL VOID FORMS ARE PROHIBITED. BACKFILL RETAINERS ARE REQUIRED ON BOTH SIDES OF GRADE BEAMS AND PIER CAPS.

3) EARTH FORMING:
A) EARTH-FORMED GRADE BEAMS AND PIER CAPS ARE NOT PERMITTED WHERE BRICK LEDGES OR EXPOSED SURFACES REQUIRE FORMING AND/OR WHERE SOIL SIDE WALLS SLOUGH INTO THE TRENCH.
B) IF GRADE BEAMS AND PIER CAPS ARE SPECIFIED TO HAVE VOID FORMS, EARTH FORMING IS NOT ALLOWED.

4) PIPE PENETRATIONS: ALL HORIZONTAL PIPE OR SIMILAR PENETRATIONS OR SLEEVES THROUGH GRADE BEAMS SHALL PREFERABLY OCCUR WITHIN THE MIDDLE THIRD OF THE GRADE BEAM DEPTH AND SHALL HAVE A MAXIMUM OPENING DIAMETER OF ONE-FOURTH THE GRADE BEAM DEPTH. AT PENETRATIONS, PROVIDE FOUR (4) #5 DIAGONAL BARS AT EACH FOOTING FACE THREE (3) INCHES CLEAR BETWEEN BAR AND PENETRATION AND THREE (3) INCHES CLEAR FROM FOOTING BEARING). IF PENETRATION MUST OCCUR NEAR THE BOTTOM OF THE GRADE BEAM, REFER TYPICAL DETAILS FOR STANDARD DETAIL TO TRANSITION & THICKEN GRADE BEAM TO ACCOMMODATE PENETRATION.

E. SLAB-ON-GRADE CONSTRUCTION:

1) SLAB THICKNESS AND REINFORCING: SLABS-ON-GRADE SHALL BE 4" THICK CONCRETE REINFORCED WITH #3 BARS AT 15" ON CENTER EACH WAY. REINFORCING BARS SHALL BE PLACED 1½" CLEAR FROM TOP OF SLAB USING CHAIRS OR SLAB BOLSTERS COMPLYING WITH CRSI'S "MANUAL OF STANDARD PRACTICE".

2) SLAB SUBGRADE: THE FLOOR SLAB SHALL BE GRADE-SUPPORTED ON 1'-0" OF STRUCTURAL FILL AS OUTLINED IN THE SITE SUB-GRADE PREPARATION NOTES SHOWN ABOVE.

3) CONSTRUCTION MONITORING: CONSTRUCTION ACTIVITY MAY CAUSE DAMAGE AND DETERIORATION TO THE PREPARED SUBGRADE. A FIELD REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER SHALL OBSERVE THE FINAL SUBGRADE PRIOR TO PLACEMENT OF THE SLAB ON GRADE, PERFORM FURTHER TESTING AS NECESSARY, AND DETERMINE IF ANY REMEDIAL MEASURES ARE NECESSARY PRIOR TO SLAB PLACEMENT.

4) AGGREGATE BASE COURSE: A 4-INCH THICK, FREE-DRAINING AGGREGATE BASE COURSE SHALL BE PLACED BENEATH THE FLOOR SLAB TO ENHANCE DRAINAGE AND PROVIDE INCREASED SUBGRADE STRENGTH. AT THE TIME OF THE SLAB PLACEMENT, THE GRANULAR BASE SHALL BE MOIST, BUT FREE OF ANY STANDING OR SELF-DRAINING WATER. THE AGGREGATE BASE COURSE MATERIAL SHALL MEET THE FOLLOWING CRITERIA:
A) 100 PERCENT SHALL PASS THE 1½" SIEVE
B) LESS THAN 5 PERCENT SHALL PASS THE #8 SIEVE
C) PLASTICITY INDEX, PI, SHALL BE LESS THAN OR EQUAL TO 6
D) COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY.

5) VAPOR RETARDER: A 15 MIL VAPOR RETARDER SHALL BE PLACED IMMEDIATELY BELOW THE CONCRETE SLAB. VAPOR RETARDER SHALL BE SEALED AT ALL LAPS AND SEALED TO PREVIOUSLY PLACED CONCRETE AS RECOMMENDED BY VAPOR RETARDER MANUFACTURER. BEFORE PLACING CONCRETE, PATCH AND SEAL ANY RIPS, TEARS OR HOLES IN VAPOR RETARDER INCURRED DURING CONSTRUCTION.

6) MOIST CURING OF SLAB: SLABS-ON-GRADE SHALL BE WATER CURED FOR A MINIMUM OF 7 DAYS BY PONDING, SPRAYING, SPRINKLING OR BY USE OF SATURATED COVERINGS. CURING COMPOUNDS ARE EXPRESSLY PROHIBITED.

7) ISOLATION JOINTS: PROVIDE SLAB ISOLATION AROUND COLUMNS PENETRATING THE SLAB-ON-GRADE. PROVIDE 1/2 INCH PREMOLDED EXPANSION JOINT MATERIAL AROUND PERIMETER OF ISOLATION JOINTS. REFER TO TYPICAL DETAILS AND ADDITIONAL INFORMATION.

8) SLAB JOINTS: SLAB JOINTS SHALL BE PROVIDED AS SHOWN ON THE PLANS AND TYPICAL DETAILS. THE FOLLOWING JOINT TYPES ARE SHOWN ON THE DRAWINGS:
A) CJ = CONSTRUCTION JOINT
B) SJ = SAWED CONSTRUCTION JOINT

F. FOUNDATION MISCELLANEOUS

1) GROUNDWATER CONDITIONS: GROUNDWATER WAS ENCOUNTERED IN SOME OF THE BORINGS AT THE TIME OF DRILLING. HOWEVER, IT IS POSSIBLE THAT TRANSIENT OVER-SATURATED GROUND CONDITIONS COULD DEVELOP AT SHALLOWER DEPTHS AT A LATER TIME DUE TO PERIODS OF HEAVY PRECIPITATION, LANDSCAPE WATERING, LEAKING WATER LINES, OR OTHER UNFORESEEN CAUSES. THE CONTRACTOR SHALL DETERMINE THE ACTUAL GROUNDWATER LEVELS AT TIME OF CONSTRUCTION. IF GROUNDWATER ISSUES ARE ENCOUNTERED DURING CONSTRUCTION, THE GEOTECHNICAL ENGINEER SHALL BE CONTACTED.

2) DRAINAGE CONSIDERATIONS DURING CONSTRUCTION: DUE TO ADVERSE EFFECT ON STRUCTURES, WATER SHALL NOT BE ALLOWED TO COLLECT IN THE FOUNDATION EXCAVATION OR ON PREPARED SUBGRADE OF THE CONSTRUCTION AREA EITHER DURING OR AFTER CONSTRUCTION. UNDERCUT OR EXCAVATED AREAS SHALL BE SLOPED TOWARD ONE CORNER TO FACILITATE REMOVAL OF ANY COLLECTED RAINWATER, OR POSITIVE RUNOFF SHALL BE PROVIDED. THE CONTRACTOR SHALL EXERCISE CARE IN CREATING DRAINAGE PATHS FOR WATER DURING THE CONSTRUCTION PHASE OF THE PROJECT. TO REDUCE INFILTRATION OF SURFACE WATER AROUND THE PERIMETER OF THE BUILDING AND BENEATH THE FLOOR SLABS, POSITIVE DRAINAGE SHALL BE PROVIDED DURING ALL PHASES OF CONSTRUCTION.

3) FINAL SITE GRADING: PER SECTION 1804.4 OF IBC-2015, THE GROUND IMMEDIATELY ADJACENT TO THE FOUNDATION SHALL BE SLOPED AWAY FROM THE BUILDING AT A SLOPE OF NOT LESS THAN ONE UNIT VERTICAL IN 20 UNITS HORIZONTAL (5-PERCENT SLOPE) FOR A MINIMUM DISTANCE OF 10 FEET PERPENDICULAR TO THE FACE OF THE WALL. IF PHYSICAL OBSTRUCTIONS OR LOT LINES PROHIBIT 10 FEET OF HORIZONTAL DISTANCE, A 5-PERCENT SLOPE SHALL BE PROVIDED TO AN APPROVED ALTERNATIVE METHOD OF DIVERTING WATER AWAY FROM THE FOUNDATION. SWALES USED FOR THIS PURPOSE SHALL BE SLOPED A MINIMUM OF 2-PERECNT WHERE LOCATED WITHIN 10 FEET OF THE BUILDING FOUNDATION. IMPERVIOUS SURFACES WITHIN 10 FEET OF THE BUILDING SHALL BE SLOPED A MINIMUM OF 2-PERCENT AWAY FROM THE BUILDING.

4) EXCAVATION AND TEMPORARY SLOPES: THE CONTRACTOR, DESIGNATED AS "RESPONSIBLE PERSON" IN OSHA CONSTRUCTION STANDARDS FOR EXCAVATIONS, 29 CFR PART 1926, IS SOLELY RESPONSIBLE FOR PLANNING AND IMPLEMENTING ALL SAFETY PROCEDURES. ALL EXCAVATION HEIGHT, SLOPE, AND DEPTH MUST ADHERE TO ALL SPECIFICATIONS OUTLINED IN LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS. THE STRUCTURAL ENGINEER DOES NOT ASSUME ANY RESPONSIBILITY FOR CONSTRUCTION SITE SAFETY OR ANY PARTY'S, INCLUDING THE CONTRACTOR'S, COMPLIANCE WITH THE APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS OR ANY OTHER APPLICABLE REGULATIONS.

5) TRENCH BACKFILL: ALL REQUIRED TRENCH BACKFILL SHALL BE ACCEPTABLE FILL MATERIAL AS DEFINED ABOVE AND SHALL BE MECHANICALLY COMPACTED IN LAYERS TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DENSITY AS DETERMINED BY ASTM D 698. SOME SETTLEMENT OF THE BACKFILL MAY BE EXPECTED AND ANY UTILITIES WITHIN THE TRENCHES SHALL BE CONSTRUCTED TO ALLOW THESE DIFFERENTIAL MOVEMENTS. REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

6) CONSTRUCTION MONITORING: A GEOTECHNICAL ENGINEER SHALL BE RETAINED TO PROVIDE OBSERVATIONS AND TESTING OF SOILS EXPOSED DURING PROJECT CONSTRUCTION IN ORDER TO VERIFY THAT SOIL CONDITIONS ARE AS ANTICIPATED. CONSTRUCTION ACTIVITIES PERTAINING TO EARTHWORK AND OTHER RELATED ACTIVITIES SHALL ALSO BE OBSERVED BY THE GEOTECHNICAL ENGINEER AS OUTLINED ABOVE.

6. CONCRETE CONSTRUCTION NOTES

A. DESIGN CRITERIA: THE DESIGN OF CONCRETE IS GOVERNED BY "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318-14) AND COMMENTARY (ACI 318R-14)."

B. CONCRETE CONSTRUCTION CRITERIA: ALL CONCRETE CONSTRUCTION SHALL COMPLY WITH THE PROVISIONS OF "SPECIFICATIONS FOR STRUCTURAL CONCRETE (ACI 301-16)."

C. TOLERANCES: TOLERANCES FOR CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH "SPECIFICATION FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS (ACI 117-10) AND COMMENTARY (ACI 117R-10)."

D. CONCRETE MIXTURES:

1) CEMENTITIOUS MATERIALS
A) PORTLAND CEMENT: ASTM C150 TYPE I OR II UNLESS SPECIFICALLY NOTED OTHERWISE.
B) FLY ASH: ASTM C618 CLASS F OR C. THE MAXIMUM PERCENTAGE OF FLY ASH SHALL NOT EXCEED 25 PERCENT OF THE TOTAL CEMENTITIOUS MATERIAL FOR FOOTINGS AND 5 PERCENT OF THE TOTAL CEMENTITIOUS MATERIAL FOR SLABS.

2) ALL CONCRETE MIXES SHALL BE COMPRISED OF NORMAL WEIGHT AGGREGATES CONFORMING TO ASTM C33, EXCEPT WHERE SPECIFICALLY INDICATED AS LIGHTWEIGHT, IN WHICH CASE AGGREGATES SHALL CONFORM TO ASTM C330.

3) MIXING WATER SHALL CONFORM TO ASTM C1062. MIXING WATER, INCLUDING THAT PORTION OF MIXING WATER CONTRIBUTED IN THE FORM OF FREE MOISTURE ON AGGREGATES, SHALL NOT CONTAIN DELETERIOUS AMOUNTS OF CHLORIDE IONS.

4) ADMIXTURES, IF USED, SHALL CONFORM TO THE FOLLOWING:
A) WATER REDUCTION AND SETTING TIME MODIFICATION: ASTM C494.
B) PRODUCING FLOWING CONCRETE: ASTM C1017.
C) AIR ENTRAINMENT: ASTM C260.
D) INHIBITING CHLORIDE INDUCED CORROSION: ASTM C1582.
E) MOISTURE VAPOR REDUCING ADMIXTURE, MVRA: ASTM C494 & ASTM D5084

5) MIX DESIGNS SHALL BE PROPORTIONED BASED ON THE FOLLOWING MIX CHARACTERISTICS;

A) DRILLED CONCRETE PIERS AND SHAFTS
1) FREEZING AND THAWING EXPOSURE CATEGORY (F): CLASS F0
2) SULFATE EXPOSURE CATEGORY (S): CLASS S0
3) WATER EXPOSURE CATEGORY (W): CLASS W1
4) CORROSION PROTECTION CATEGORY (C): CLASS C0
5) 28-DAY COMPRESSIVE STRENGTH: 3,500 PSI
6) MAXIMUM WATER/CEMENT RATIO: 0.55
7) MAXIMUM AGGREGATE SIZE: 1 1/2 INCHES
8) TARGET AIR CONTENT: NO AIR ENTRAINMENT REQUIRED.
9) SLUMP: 5 TO 7 INCHES
10) MAXIMUM WATER-SOLUBLE CHLORIDE ION CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT: 0.30
11) WATER REDUCING AND RETARDING ADMIXTURE: AS REQUIRED TO ENSURE MINIMUM SLUMP REQUIREMENT IS MAINTAINED DURING REMOVAL OF TEMPORARY CASINGS.

B) BELOW GRADE FOUNDATIONS
1) FREEZING AND THAWING EXPOSURE CATEGORY (F): CLASS F1
2) SULFATE EXPOSURE CATEGORY (S): CLASS S0
3) WATER EXPOSURE CATEGORY (W): CLASS W0
4) CORROSION PROTECTION CATEGORY (C): CLASS C1
5) 28-DAY COMPRESSIVE STRENGTH: 3,500 PSI
6) MAXIMUM WATER/CEMENT RATIO: 0.55
7) MAXIMUM AGGREGATE SIZE: 1 1/2 INCHES
8) TARGET AIR CONTENT: 4.5 PERCENT PLUS OR MINUS 1.5 PERCENT
9) MAXIMUM WATER-SOLUBLE CHLORIDE ION CONTENT IN CONCRETE, PERCENT BY WEIGHT OF CEMENT: 0.30

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1 ADDENDUM 2 11/16/2022

MOORE PUBLIC SCHOOLS
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MOORE, OKLAHOMA

MOORE Public Schools
LEARNING FOR LIFE

NEW ADDITION
KELLEY ELEMENTARY
SCHOOL

sheet no:

S100

1. SHELTER GENERAL INFORMATION

A. TYPE OF SHELTER: TORNADO.

B. SHELTER WIND DESIGN GUIDELINES: ICC/NSSA STANDARD FOR THE DESIGN AND CONSTRUCTION OF STORM SHELTERS - 2014 (ICC 500-2014).

C. ROOF SYSTEMS HAVE BEEN SELECTED IN ACCORDANCE WITH DEBRIS IMPACT TESTING IN ACCORDANCE WITH ASTM E 1886 AT TEXAS TECH UNIVERSITY (REFER SUMMARY REPORT DATED JUNE 2003 PREPARED BY WIND SCIENCE AND ENGINEERING RESEARCH CENTER). REFER SECTION A1 4" THICK CONCRETE-#4 REBAR REINFORCEMENT 12 INCHES ON CENTER EACH WAY (TESTED FOR 162 MPH)-67 MPH REQUIRED.

D. WALL SYSTEMS HAVE BEEN SELECTED IN ACCORDANCE WITH DEBRIS IMPACT TESTING IN ACCORDANCE WITH ASTM E 1886 AT TEXAS TECH UNIVERSITY (REFER SUMMARY REPORT DATED JUNE 2003 PREPARED BY WIND SCIENCE AND ENGINEERING RESEARCH CENTER). REFER SECTION A1 6" THICK CONCRETE WALLS-#4 REBAR REINFORCEMENT 12 INCHES ON CENTER EACH WAY (TESTED FOR 162 MPH) - 100 MPH REQUIRED.

E. REFERENCE ELEVATION OF 100'-0" EQUALS DATUM FINISHED FLOOR ELEVATION OF 1269.125' FOR THE STORM SHELTER.

F. BASED ON THE FLOOD INSURANCE RATE MAPS (FIRM) FOR OKLAHOMA COUNTY (MAP NUMBER 40027C0160J) THE FINISHED FLOOR ELEVATION OF 1269.125' FOR THE STORM SHELTER IS GREATER THAN THE HIGHEST FLOOD ELEVATION OF 1266.00' WHICH HAS A 0.2-PERCENT ANNUAL CHANCE OF BEING EQUALED OR EXCEEDED IN ANY GIVEN YEAR. THE SHELTER IS NOT LOCATED IN AN AREA SUSCEPTIBLE TO FLOODING.

G. REFER MECHANICAL DRAWINGS FOR LOCATIONS OF SHELTER VENTILATION.

H. FURNISH LOOSE CONNECTION HARDWARE AND ANCHORAGE ITEMS TO BE EMBEDDED IN OR ATTACHED TO OTHER CONSTRUCTION BEFORE STARTING THAT WORK. PROVIDE LOCATIONS, SETTING DIAGRAMS, TEMPLATES, INSTRUCTIONS, AND DIRECTIONS, AS REQUIRED, FOR INSTALLATION.

2. SHELTER DESIGN LOADS

A. DEAD LOAD: SELF WEIGHT OF MATERIALS, UNLESS NOTED OTHERWISE

B. ROOF DEAD LOAD:
1) BUILT UP ROOF.....6 PSF
2) RIGID INSULATION.....2 PSF
3) CONCRETE DECK (4" NW CONC. ON 2" COMP. - 6" TOTAL).....63 PSF
4) STEEL BEAMS.....7 PSF
5) MISC (LIGHTING, DUCTWORK, PIPING, ETC.).....7 PSF
6) TOTAL.....85 PSF

C. LIVE LOADS:
1) ROOF LIVE LOAD (SHELTER).....100 PSF

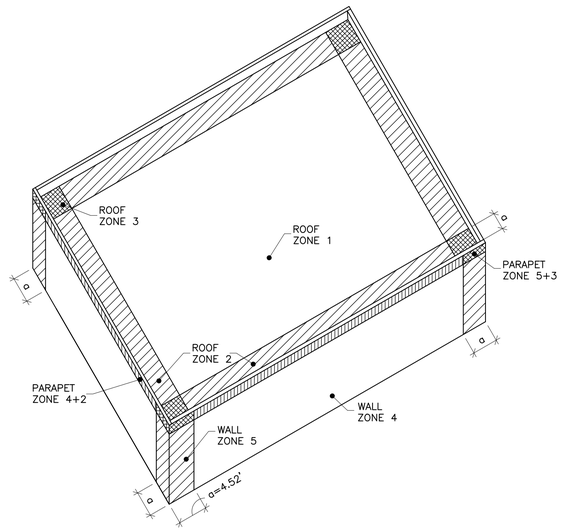
D. SHELTER WIND PARAMETERS:
1) GOVERNING CODE:.....ICC 500-2014
2) EXPOSURE CATEGORY:.....C
3) INTERNAL PRESSURE COEFFICIENTS, PARTIALLY ENCLOSED, GCPI.....+/-0.55
4) TOPOGRAPHIC FACTOR, KZT.....1.0
5) DIRECTIONALITY FACTOR, KD.....1.0
6) WIND VELOCITY, V:.....250 MPH

E. EXTREME WIND PRESSURES-MAIN WIND FORCE RESISTING SYSTEM:
1) +GCPI
A) WINDWARD WALL:.....18 PSF IN
B) LEEWARD WALL:.....132 PSF OUT
C) SIDE WALL:.....156 PSF OUT
2) -GCPI
A) WINDWARD WALL:.....167 PSF IN
B) LEEWARD WALL:.....24 PSF IN
C) SIDE WALL:.....6 PSF OUT
3) WINDWARD PARAPET:.....207 PSF IN
4) LEEWARD PARAPET:.....138 PSF OUT
5) ROOF 0'-0" TO 12'-8" FROM LEADING EDGE:.....179 PSF OUT
6) ROOF 12'-8" TO 25'-4" FROM LEADING EDGE:.....132 PSF OUT
7) ROOF BEYOND 25'-4" FROM LEADING EDGE:.....109 PSF OUT
8) ROOF:.....54 PSF IN

F. SNOW LOADS:
1) GOVERNING CODE:.....ASCE 7-10
2) IMPORTANCE FACTOR, Is:.....1.10
3) GROUND SNOW LOAD, Pg:.....10 PSF
4) EXPOSURE FACTOR, Ce:.....1.0
5) THERMAL FACTOR, Ct:.....1.0
6) ROOF SLOPE FACTOR, Cs:.....1.0
7) CALCULATED FLAT ROOF SNOW LOAD, Pf:.....7.7 PSF
8) MINIMUM FLAT ROOF SNOW LOAD, I*Pf:.....11 PSF
9) RAIN ON SNOW SURCHARGE LOAD (3/8" PER FT > W/50):.....5 PSF
10) DRIFT LOADS:.....ASCE 7-10 (1)

G. SEISMIC DESIGN CRITERIA:
1) GOVERNING CODE:.....ASCE 7-10
2) IMPORTANCE FACTOR, Ie:.....1.25
3) SOIL SITE CLASSIFICATION:.....C
4) 0.2 SEC. MAPPED SPECTRAL ACCELERATION, Ss:.....0.272
5) 1.0 SEC. MAPPED SPECTRAL ACCELERATION, S1:.....0.079
6) SITE COEFFICIENT, 0.2 SEC. PERIOD, Fa:.....1.2
7) SITE COEFFICIENT, 1.0 SEC. PERIOD, Fv:.....1.7
8) 0.2 SEC. DESIGN SPECTRAL ACCELERATION, Sds:.....0.217
9) 1.0 SEC. DESIGN SPECTRAL ACCELERATION, Sd1:.....0.089
10) SEISMIC DESIGN CATEGORY:.....B
11) SEISMIC PARAMETERS:
A) SEISMIC FORCE RESISTING SYSTEM: ORDINARY REINFORCED CONCRETE SHEAR WALLS
B) RESPONSE MODIFICATION COEFFICIENT, R:.....4.00
C) SYSTEM OVERSTRENGTH FACTOR, O:.....2.50
D) DEFLECTION AMPLIFICATION FACTOR, Cd:.....4.00
E) ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE METHOD.
F) SEISMIC RESPONSE COEFFICIENT, Cs:.....0.068
G) TOTAL LATERAL BASE SHEAR, V:.....55 KIPS

H. IN ADDITION TO REQUIREMENTS OF THE SPECIAL INSPECTOR, THE OWNER SHALL EMPLOY A LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO INSPECT THE FOLLOWING ELEMENTS OF THE MAIN WIND FORCE RESISTING SYSTEM OF THE SHELTER TO VERIFY CONFORMANCE WITH THE CONTRACT DOCUMENTS:
1) CONCRETE REBAR SIZE, SPACING, LAP LENGTHS AND EMBED PLATES
2) BEAM/COLUMN SIZE AND CONNECTIONS
3) HEADED STUD ANCHORS AND THE QUALITY OF THEIR CONNECTION TO THE TOP OF BEAM FLANGES
4) COMPOSITE METAL DECK SIZE AND ATTACHMENT

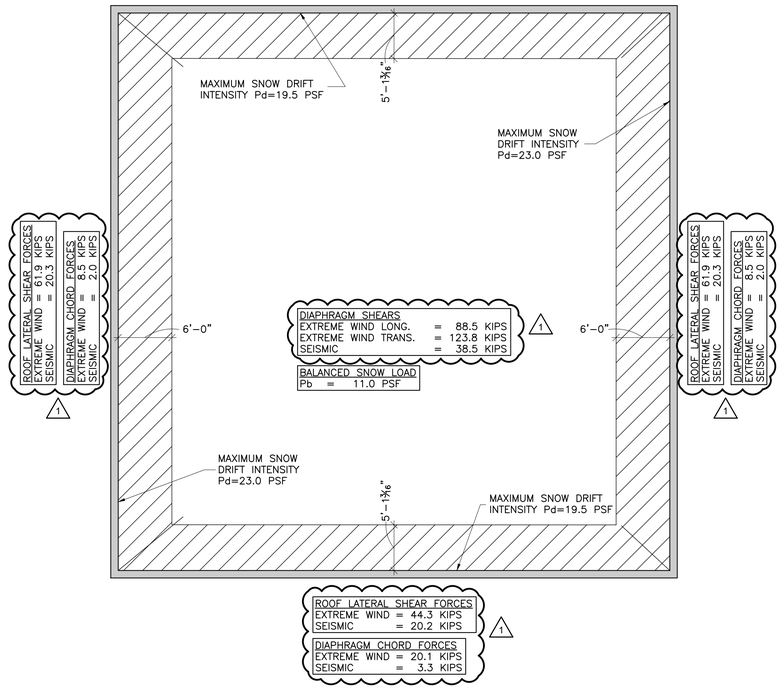


1 S103 COMPONENT AND CLADDING ISOMETRIC
SCALE: 1/16"=1'-0"

NOTE: POSITIVE PRESSURES ARE DIRECTED INWARD ON THE EXTERIOR SURFACE. NEGATIVE PRESSURES ARE DIRECTED OUTWARD ON THE EXTERIOR SURFACE.

EXTREME WIND COMPONENTS AND CLADDING LOADS

BUILDING ELEMENT	SPAN (FT)	WIDTH (FT)	AREA (FT^2)	WIND PRESSURE ZONE 1 (PSF)	WIND PRESSURE ZONE 2 (PSF)	WIND PRESSURE ZONE 3 (PSF)	WIND PRESSURE ZONE 4+2 (PSF)	WIND PRESSURE ZONE 5+3 (PSF)	WIND PRESSURE ZONE 4 (PSF)	WIND PRESSURE ZONE 5 (PSF)
12'-8" WALL	12.67	1.00	54						-193/181	-214/181
14'-0 1/4" WALL	14.02	1.00	66						-191/179	-210/179
WINDWARD + LEEWARD PARAPET	3.33	1.00	4				372	509		
ROOF BEAM	43.50	6.33	631	-197/102	-224/102	-224/102				
ROOF DECK	6.33	1.00	13	-209/114	-307/114	-426/114				
STORM DOOR	-	-	10						-209/197	-246/197



2 S103 SHELTER LOAD PLAN
SCALE: 1/8"=1'-0"

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1. STATEMENT OF SPECIAL INSPECTIONS NOTES:

A. THIS STATEMENT OF SPECIAL INSPECTIONS IS INCLUDED AS REQUIRED BY CHAPTER 17 OF 2015 INTERNATIONAL BUILDING CODE AND AISC 360.

B. SPECIAL INSPECTIONS SHALL CONFORM TO CHAPTER 17 OF THIS SHEET, SPECIFICATIONS, AISC 360, AND 2015 INTERNATIONAL BUILDING CODE. GENERAL REQUIREMENTS ARE LISTED BELOW AND IN THE ATTACHED INSPECTION TABLES.

C. REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL SPECIAL INSPECTION REQUIREMENTS. IF CONFLICTING REQUIREMENTS ARE FOUND BETWEEN STATEMENTS OF SPECIAL INSPECTIONS AND THE PROJECT SPECIFICATIONS, THE MORE STRINGENT PROVISION SHALL CONTROL UNLESS DIRECTED OTHERWISE IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD.

D. THE GENERAL CONTRACTOR SHALL EMPLOY ONE OR MORE SPECIAL INSPECTORS FOR THIS PROJECT. THE SPECIAL INSPECTOR SHALL BE A QUALIFIED PERSON WHO SHALL DEMONSTRATE COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR THE INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION.

E. THE SPECIAL INSPECTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO THE BUILDING OFFICIAL DEMONSTRATING HIS OR HER COMPETENCE AND RELEVANT EXPERIENCE OR TRAINING. EXPERIENCE OR TRAINING SHALL BE CONSIDERED RELEVANT WHEN THE DOCUMENTED EXPERIENCE OR TRAINING IS RELATED IN COMPLEXITY TO THE SAME TYPE OF SPECIAL INSPECTION ACTIVITIES FOR PROJECTS OF SIMILAR COMPLEXITY AND MATERIAL QUALITIES.

F. THE SPECIAL INSPECTOR SHALL PROVIDE CONTINUOUS OR PERIODIC INSPECTIONS AS SHOWN IN THE ATTACHED INSPECTION TABLES

1) CONTINUOUS INSPECTION: THE SPECIAL INSPECTOR SHALL BE PRESENT AT ALL PROCEDURAL EVENTS.
2) PERIODIC INSPECTION: THE SPECIAL INSPECTOR SHALL BE PRESENT AT THE START OF THE WORK AND PERIODIC INSPECTION IS MADE TO VERIFY PROGRESS OF WORK IS IN COMPLIANCE.

G. INSPECTION OF FABRICATORS: WHERE FABRICATION OF STRUCTURAL LOADBEARING MEMBERS AND ASSEMBLIES IS BEING PERFORMED ON THE PREMISES OF A FABRICATOR'S SHOP, SPECIAL INSPECTION OF THE FABRICATED ITEMS SHALL BE REQUIRED BY SECTION 1704.2.5 OF THE 2015 INTERNATIONAL BUILDING CODE AND AS REQUIRED ELSEWHERE IN THE CODE.

H. FABRICATOR APPROVAL: SPECIAL INSPECTIONS REQUIRED BY SECTION 1704 ARE NOT REQUIRED WHERE THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION. APPROVAL SHALL BE BASED UPON REVIEW OF THE FABRICATOR'S WRITTEN PROCEDURAL AND QUALITY CONTROL MANUALS AND PERIODIC AUDITING OF FABRICATION PRACTICES BY AN APPROVED SPECIAL INSPECTION AGENCY. AT COMPLETION OF FABRICATION, THE APPROVED FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE TO THE BUILDING OFFICIAL STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DOCUMENTS.

I. REPORT REQUIREMENTS: SPECIAL INSPECTORS SHALL KEEP RECORDS OF INSPECTIONS. THE SPECIAL INSPECTOR SHALL FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL, AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. REPORTS SHALL INDICATE THAT WORK INSPECTED WAS OR WAS NOT COMPLETED IN CONFORMANCE TO APPROVED CONSTRUCTION DOCUMENTS. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF THEY ARE NOT CORRECTED, THE DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE PRIOR TO THE COMPLETION OF THAT PHASE OF THE WORK. A FINAL REPORT DOCUMENTING REQUIRED SPECIAL INSPECTIONS AND CORRECTION OF ANY DISCREPANCIES NOTED IN THE INSPECTIONS SHALL BE SUBMITTED AT A POINT IN TIME AGREED UPON PRIOR TO THE START OF WORK BY THE APPLICANT AND THE BUILDING OFFICIAL.

J. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING REASONABLE NOTICE TO THE SPECIAL INSPECTOR(S) REGARDING WHEN ELEMENTS OF THE PROJECT WILL BE READY FOR EFFICIENT IMPLEMENTATION OF SPECIAL INSPECTIONS.

K. THE CONTRACTOR SHALL PROVIDE ACCESS TO THE LATEST VERSION OF ALL APPROVED PLANS AND SHOP DRAWINGS FOR THE SPECIAL INSPECTOR'S USE IN PERFORMING SPECIAL INSPECTIONS.

L. CONTRACTOR SHALL GRANT ACCESS TO OWNER'S SPECIAL INSPECTOR AS IS REASONABLY NECESSARY FOR THE PROPER PERFORMANCE OF SPECIAL INSPECTIONS.

M. SPECIAL INSPECTIONS DO NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO COMPLY WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. CONSTRUCTION MEANS AND METHODS AND JOBSITE SAFETY ARE SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.

N. STEEL QUALITY INSPECTOR QUALIFICATIONS.

1) QUALITY CONTROL INSPECTOR OF ERECTOR/FABRICATOR SHALL BE QUALIFIED TO THE SATISFACTION OF THE ERECTOR/ FABRICATOR'S QC PROGRAM AND AISC 360 SECTION N.4.1 REQUIREMENTS.
2) QUALITY ASSURANCE INSPECTOR SHALL BE QUALIFIED BY A QA AGENCY AND AISC 360 SECTION N.4.2 REQUIREMENTS.
3) NON-DESTRUCTIVE TESTING PERSONNEL, OR OTHER THAN VISUAL, SHALL BE QUALIFIED IN ACCORDANCE W/ EMPLOYER'S WRITTEN PRACTICE MEETING OR EXCEEDING REQUIREMENTS OF AWS D1.1/D1.1M AND EITHER ANST SNT-TC-1A OR ANST CP-189 REQUIREMENTS.

P. EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION, FABRICATION, OR INSTALLATION OF A MAIN WINDFORCE-RESISTING SYSTEM OR ANY COMPONENT LISTED IN THE OWNER'S QUALITY ASSURANCE PLAN SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE AUTHORITY HAVING JURISDICTION, THE RESPONSIBLE DESIGN PROFESSIONAL AND THE OWNER PRIOR TO THE COMMENCEMENT OF WORK ON THE SYSTEM OR COMPONENT. THE CONTRACTOR'S STATEMENT OF RESPONSIBILITY SHALL CONTAIN:

1) ACKNOWLEDGEMENT OF AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED IN THE QUALITY ASSURANCE PLAN.
2) ACKNOWLEDGEMENT THAT QA/QC WILL BE EXERCISED TO OBTAIN COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS.
3) PROCEDURES FOR EXERCISING QA/QC WITHIN THE CONTRACTOR'S ORGANIZATION, THE METHOD AND FREQUENCY OF REPORTING AND THE DISTRIBUTION OF QA/QC REPORTS.
4) IDENTIFICATION AND QUALIFICATIONS OF THE PERSON(S) EXERCISING SUCH CONTROL AND THEIR POSITION(S) IN THE ORGANIZATION.

Q. IN ADDITION TO THE REQUIREMENTS OF THE SPECIAL INSPECTOR, THE GENERAL CONTRACTOR SHALL EMPLOY A LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO INSPECT THE FOLLOWING ELEMENTS OF THE MAIN WIND FORCE RESISTING SYSTEM OF THE SHELTER TO VERIFY CONFORMANCE WITH THE CONTRACT DOCUMENTS:
1) CONCRETE REBAR SIZE, SPACING, LAP LENGTHS AND EMBED PLATES.
2) BEAM/COLUMN SIZE AND CONNECTIONS.
3) HEADED STUD ANCHORS AND THE QUALITY OF THEIR CONNECTION TO THE TOP OF BEAM FLANGES.
4) METAL DECK SIZE AND ATTACHMENT.

REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	FREQUENCY OF INSPECTION: CONTINUOUS (inspect each joint/member)	FREQUENCY OF INSPECTION: PERIODIC (inspect random joint/members)	REFERENCED STANDARD
1. Material verification of high-strength bolts, nuts and washers:			
a. Identification markings to conform to ASTM standards specified in the approved construction documents.	-	QC and QA	AISC 360, Section A3.3 and applicable ASTM material standards
b. Manufacturer's certifications available for fastener materials.	QA	QC	AISC 360, Table N5.6-1
c. Fasteners marked in accordance with ASTM requirements.	-	QC and QA	
d. Proper fasteners selected for the joint detail (grade, type, bolt length if threads are to be excluded from shear plane).	-	QC and QA	
e. Proper bolting procedure selected for joint detail.	-	QC and QA	
f. Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.	-	QC and QA	
g. Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used.	QC	QA	
h. Proper storage provided for bolts, nuts, washers and other fastener components.	-	QC and QA	
2. Inspection of high-strength bolting: • For bolts requiring pretensioning, the special inspector shall observe the preinstallation testing and calibration procedures; determine that all plies of connected materials have been drawn together and properly snugged prior to pretentioning and monitor the installation of bolts to verify that fasteners are pretensioned in accordance with the RCSC Specification, progressing systematically from the most rigid point to the free edges. • For joints required to be tightened only to the snug-tight condition, the special inspector need only verify that the connected materials have been drawn together and properly snugged.			
a. Snug-tight joints.	-	QC and QA	AISC 360, Section M2.5
b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation.	-	QC and QA	
c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.	QC and QA	-	
d. Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.	-	QC and QA	AISC 360, Table N5.6-2
e. Fastener component not turned by the wrench prevented from rotating.	-	QC and QA	
f. Document acceptance or rejection of bolted connections.	QC and QA	-	AISC 360, Table N5.6-3
3. Material verification of structural steel and cold-formed steel deck U.N.O.:			
a. For structural steel, identification markings to conform to AISC 360.	-	QC and QA	AISC 360, Section M1
b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.	-	QC and QA	Applicable ASTM material standards
4. Inspection prior to welding:			
a. Verify identification markings of weld filler materials conform to AWS specification in the approved construction documents.	-	QC and QA	AISC 360, Section A3.5 and applicable AWS AS documents
b. Welding procedure specifications are available.	QC and QA	-	AISC 360, Table N5.4-1
c. Manufacturer certifications for welding consumables available.	QC and QA	-	
d. Material identification (type/grade) and welded identification system.	-	QC and QA	
e. Fit-up of welds including but not limited to joint preparation, dimensions, cleanliness, tacking, and backing type/fit as applicable.	-	QC and QA	
f. Configuration and finish of access holes	-	QC and QA	
g. Check welding equipment.	-	QC	

REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION

VERIFICATION AND INSPECTION	FREQUENCY OF INSPECTION: CONTINUOUS (inspect each joint/member)	FREQUENCY OF INSPECTION: PERIODIC (inspect random joint/members)	REFERENCED STANDARD
5. Inspection of welding:			
a. AISC 360 requirements for welding structural steel			
1) Use of qualified welders	-	QC and QA	AISC 360, Table N5.4-2 During Welding
2) Packaging and exposure control and handling of welding consumables.	-	QC and QA	
3) Welding over cracked tack welds	-	QC and QA	
4) Environmental conditions including but not limited to precipitation, temperature and wind.	-	QC and QA	
5) Verify settings on equipment, travel speeds, elected materials, shielding gas type/flow rate, preheating interpass temperatures and proper position meets WPS standards.	-	QC and QA	
6) Verify welding techniques for interpass, final cleaning, profile limitations, and quality requirements.	-	QC and QA	
7) Welds are cleaned and painted where required.	-	QC and QA	AISC 360, Table N5.4-2 After Welding
8) Verify size, length and locations of welds.	QC and QA	-	
9) Visually verify welds for crack prohibition, weld/base-metal fusion, crater cross section, weld profiles, weld size, undercutting, and porosity.	QC and QA	-	
10) Arc strikes, k-area cracks within 3" of weld, removal of backing, and repair activities as applicable.	QC and QA	-	
11) Documentation of acceptance or rejection of welded joint or member.	QC and QA	-	
b. American Welding Society requirements for structural steel and cold-formed steel deck:			
1) Complete and partial joint penetration groove welds.	X	-	AWS D1.1
2) Multipass fillet welds.	X	-	
3) Single-pass fillet welds > 5/ 16"	X	-	
4) Plug and slot welds.	X	-	
5) Single-pass fillet welds ≤ 5/ 16"	-	X	
6) Floor and roof deck welds.	-	X	AWS D1.3
7) Welded studs & deformed bar anchors (DBA's).	-	X	AWS D1.1
8) Welded sheet steel for cold-formed steel members	-	X	AWS D1.3
9) Welding of stairs & railing systems	-	X	AWS D1.1
c. Reinforcing steel:			AWS D1.4, ACI 318: Section 3.5.2
1) Verification of weldability of reinforcing steel other than ASTM A 706.	-	X	
2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.	X	-	
3) Shear reinforcement.	X	-	
4) Other reinforcing steel.	-	X	
6. Inspection of steel elements of composite construction prior to concrete placement:			
a. Placement and installation of steel deck.	QC and QA	-	AISC 360, Table N6.1
b. Placement and installation of steel HSA.	QC and QA	-	AISC 360, Table N6.1
c. Documentation of acceptance or rejection of steel elements.	QC and QA	-	AISC 360, Table N6.1

TABLE 1705.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD	IBC REFERENCE
1) Inspect reinforcement, including prestressing tendon, and verify placement.	-	X	ACI 318 Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	1908.4
2) Reinforcing bar welding: a) Verify weldability of reinforcing bars other than ASTM A706; b) Inspect single-pass fillet welds, maximum 5/16"; and c) Inspect all other welds.	- / - / X	X / X / -	AWS D1.4 ACI 318: 26.5.4	-
3) Inspect anchors cast in concrete.	-	X	ACI 318:17.8.2	-
4) Inspect size, embedment, and installation of post-installed anchors.	X	-	Manuf. Requirements	
5) Verify use of required design mix.	-	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6) Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	-	ASTM C 172 ASTM C 31 ACI 318: 26.4, 26.12	1908.10
7) Inspect concrete and shotcrete placement for proper application techniques.	X	-	ACI 318: 26.5	1908.6, 1908.7, 1908.8
8) Verify maintenance of specified curing temperature and techniques.	-	X	ACI 318: 26.5.3-26.5.5	1908.9
9) Inspect prestressed concrete for: a) Application of prestressing forces; and b) Grouting of bonded prestressing tendons.	X / X	- / -	ACI 318: 26.10	-
10) Inspect erection of precast concrete members.	-	X	ACI 318: Ch. 26.8	-
11) Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	-	X	ACI 318: 26.11.2	-
12) Inspect formwork for shape, location and dimensions of the concrete member being formed.	-	X	ACI 318: 26.11.1.2(b)	-

TABLE 1705.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	-	X
2. Verify excavations are extended to proper depth and have reached proper material.	-	X
3. Perform classification and testing of compacted fill materials.	-	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	X	-
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	-	X

TABLE 1705.8
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN-PLACE DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	-
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable), and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	-
3. For concrete elements, perform tests and additional special inspections in accordance with Section 1705.3.	-	-

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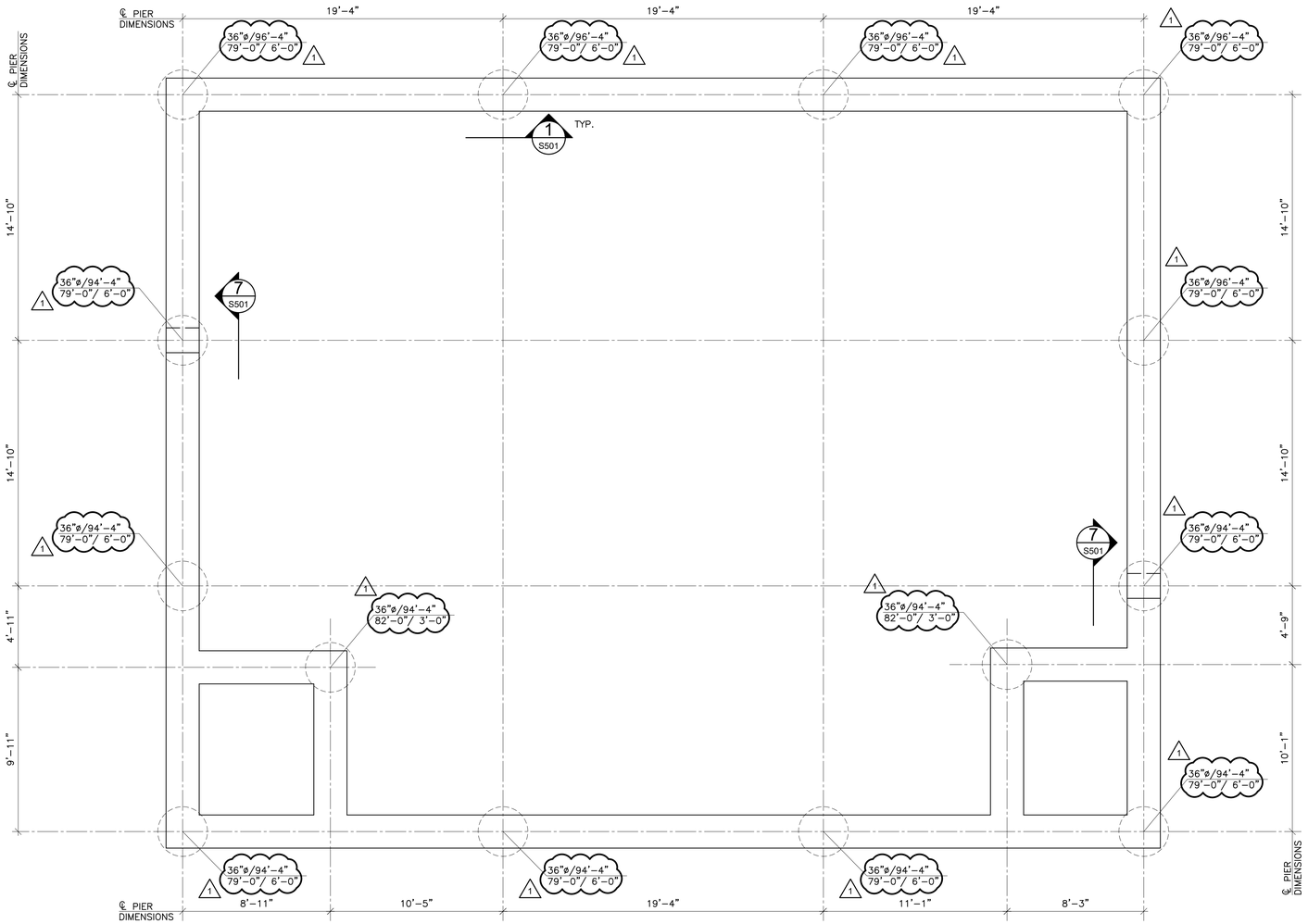


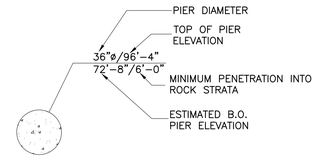
NORTH

1 SHELTER PIER PLAN

S200 SCALE: 1/4"=1'-0"

1

PIER PLAN LEGEND:



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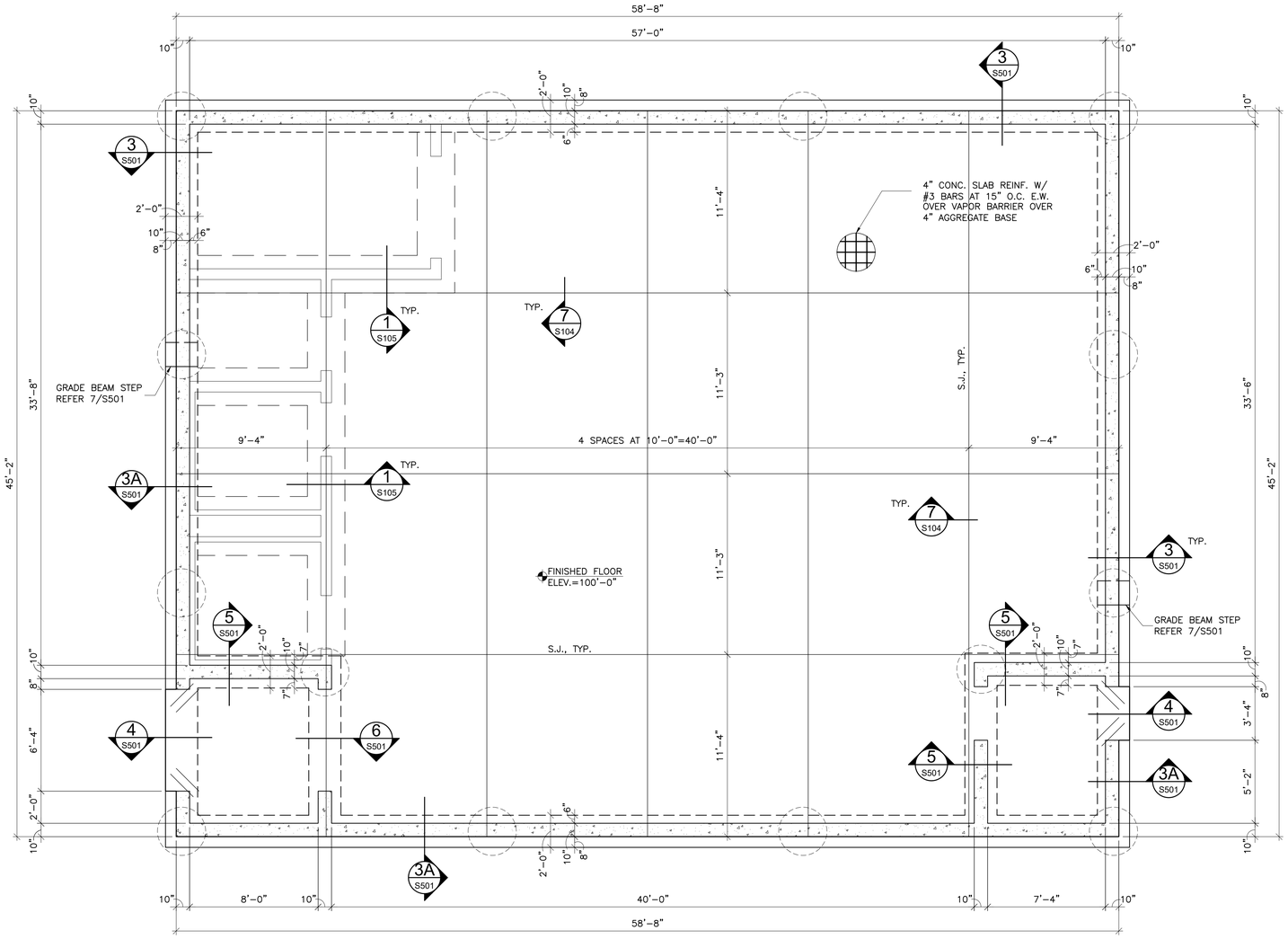

NORTH

1 S201 SHELTER FOUNDATION PLAN

SCALE: 1/4"=1'-0"

1

FOUNDATION PLAN NOTES:

1. FOUNDATION AND SLAB SUBGRADE SHALL BE PREPARED AS OUTLINED IN THE STRUCTURAL GENERAL NOTES.
2. REFERENCE ELEVATION OF 100'-0" EQUALS DATUM FINISHED FLOOR ELEVATION OF 1269.125' FEET FOR THE NEW AND EXISTING BUILDING.MATCH EXISTING ELEVATION.
3. EXCEPT WHERE SHOWN OTHERWISE, SLABS-ON-GRADE SHALL BE 4" THICK CONCRETE REINFORCED WITH #3 BARS AT 15" ON CENTER EACH WAY OVER A 15 MIL VAPOR RETARDER OVER A 4" AGGREGATE BASE COURSE. REINFORCING BARS SHALL BE PLACED 1½" CLEAR FROM TOP OF SLAB USING CHAIRS OR SLAB BOLSTERS COMPLYING WITH CRSI'S "MANUAL OF STANDARD PRACTICE".
4. SLABS-ON-GRADE SHALL BE WATER CURED FOR A MINIMUM OF 7 DAYS BY PONDING, SPRAYING, SPRINKLING OR BY USE OF SATURATED COVERINGS. THE USE OF CURING COMPOUNDS FOR SLABS-ON-GRADE IS PROHIBITED.
5. SAWED JOINTS (SJ) AND REQUIRED CONSTRUCTION JOINTS (CJ) ARE SHOWN ON THE DRAWINGS. AT THE CONTRACTOR'S OPTION, ADDITIONAL CONSTRUCTION JOINTS MAY BE PLACED AT LOCATIONS INDICATED TO BE SAWED JOINTS.
6. // INDICATES (2)#4 BARSx4'-0" TO BE PLACED IN SLAB-ON-GRADE AT ALL RE-ENTRANT CORNERS. RE-ENTRANT CORNERS ARE DEFINED AS INTERIOR CORNERS WHERE JOINTS DO NOT OCCUR IN BOTH DIRECTIONS. SIMILAR BARS SHALL BE PLACED AT ANY DISCONTINUOUS ENDS OF SAWED JOINTS OR CONSTRUCTION JOINTS.
7. REFER MECHANICAL FOR FLOOR DRAIN (F.D.) INFORMATION.

FOUNDATION PLAN LEGEND:

= CAST-IN-PLACE CONCRETE SHELTER LOAD BEARING WALLS

= NON-LOAD BEARING CMU WALLS

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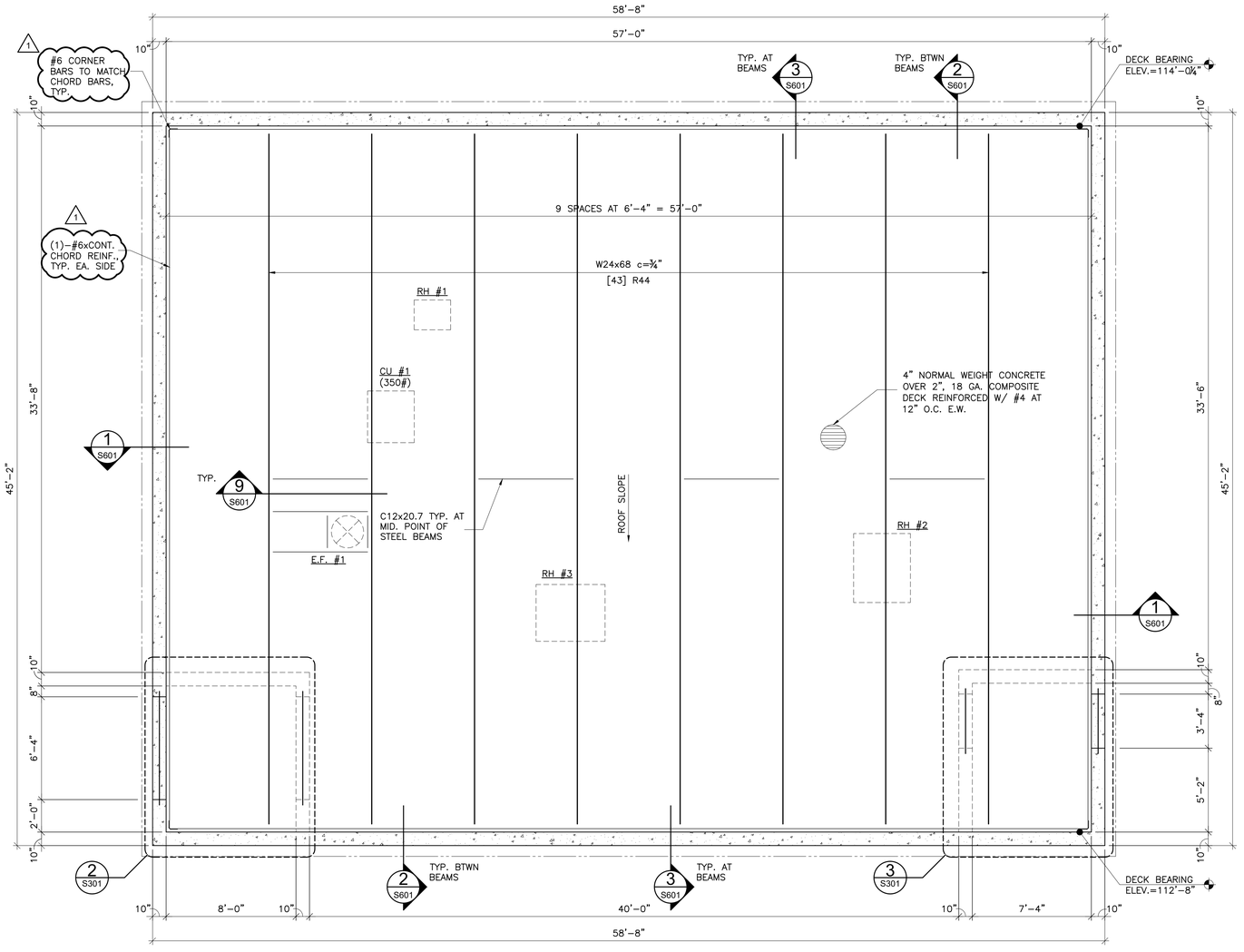
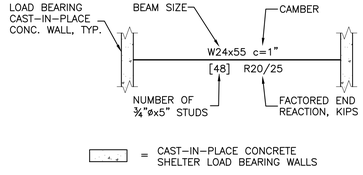


NORTH

1 S301 **SHELTER ROOF FRAMING PLAN**
SCALE: 1/4"=1'-0"

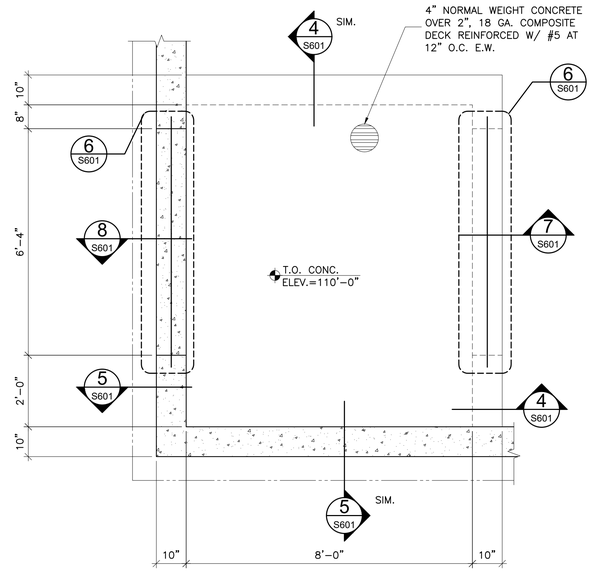
FRAMING PLAN LEGEND:



NOTE:
IF ONLY ONE NUMBER IS PROVIDED FOR END REACTIONS, REACTION APPLIES TO BOTH ENDS. WHERE NO REACTION IS GIVEN, USE 10K.

SHELTER ROOF FRAMING PLAN NOTES:

1. ALL ELEVATIONS ARE REFERENCED FROM FINISHED FLOOR DATUM OF 100'-0". REFER GENERAL NOTES FOR ACTUAL ELEVATION.
2. [10] INDICATES THE NUMBER OF 3/4"øx5" HEADED STUDS THAT ARE REQUIRED. AT BEAMS, HEADED STUDS ARE UNIFORMLY SPACED ALONG BEAM LENGTH. AT GIRDERS, STUDS ARE UNIFORMLY SPACED BETWEEN INTERSECTING TRANSVERSE BEAMS. LENGTH OF STUD IS THE FINAL INSTALLED LENGTH AFTER WELDING. SELECT LENGTH OF STUD PRIOR TO WELDING BASED ON BURN THROUGH CONDITIONS, I.E., THROUGH METAL DECK OR DIRECTLY TO STEEL.
3. AT COMPOSITE BEAMS, PLACE HEADED STUDS IN THE "STRONG" POSITION. REFER TYPICAL DETAILS.
4. PROVIDE [2]-#4x4'-0" DIAGONAL BARS AT ALL RE ENTRANT CORNERS.
5. ALL CONCRETE SLABS SHALL BE WET CURED FOR A MINIMUM OF 7 DAYS. USE OF SPRAY-ON OR ROLL-ON CURING COMPOUND IS PROHIBITED.
6. PROVIDE CONTINUOUS BUTT SPLICE WELDING IN FIELD AT DECK ANGLES.
7. ALL ROOF OPENINGS FOR MECHANICAL ROOF TOP UNITS ARE APPROXIMATELY LOCATED. EXACT SIZE AND LOCATIONS SHALL BE COORDINATED WITH THE SUCCESSFUL MECHANICAL CONTRACTOR. ALL ROOF/WALL OPENINGS SHALL BE SUPPORTED WITH TYPICAL ANGLE FRAME AND PENETRATION/SHROUD DETAILS.
8. DETAILING FOR CAST IN PLACE CONSTRUCTION ALLOWS FOR SHEAR WALLS TO BE PLACED VERTICALLY BEFORE PLACING ADDITIONAL FRAMING. THIS WILL REQUIRE TEMPORARY BRACING OF VERTICAL 10" WALLS UNTIL ROOF LEVELS ARE PLACED. COORDINATE BRACING OF WALLS WITH ARCHITECT IF BRACING TO EXPOSED STRUCTURE.
9. T.O. PARAPET REFERS TO THE TOP OF CONCRETE WALL ELEVATION WITH REFERENCE TO FINISH FLOOR ELEVATION SPECIFIED ON THE FOUNDATION PLAN U.N.O.
10. MECHANICAL OPENINGS SHALL NOT OCCUR WITHIN 24" OF EMBEDDED STUD ANCHORS.



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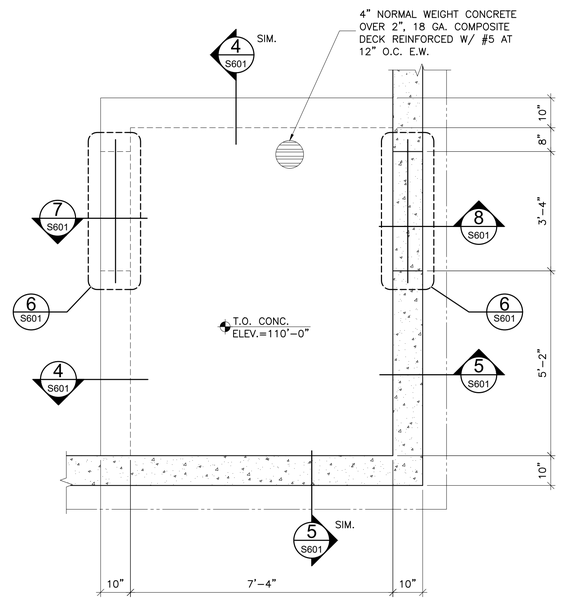
2 S301 **ENLARGED PLAN**
SCALE: 1/2"=1'-0"



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3 S301 **ENLARGED PLAN**
SCALE: 1/2"=1'-0"

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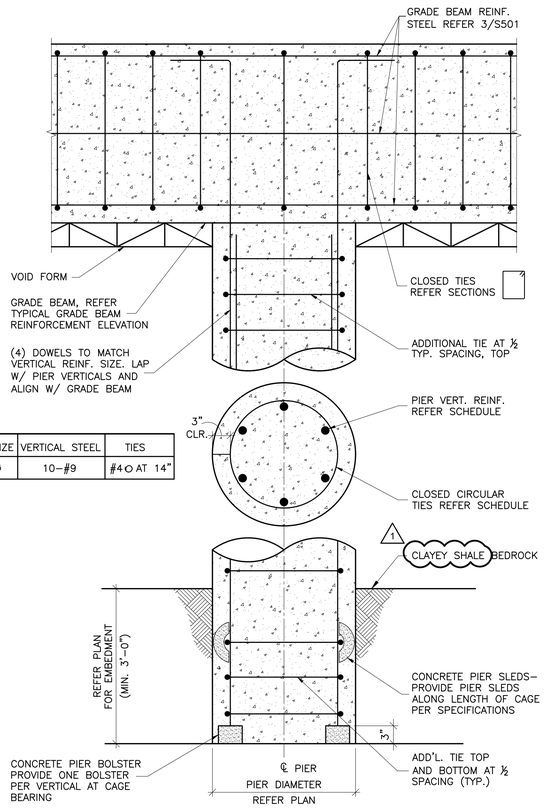
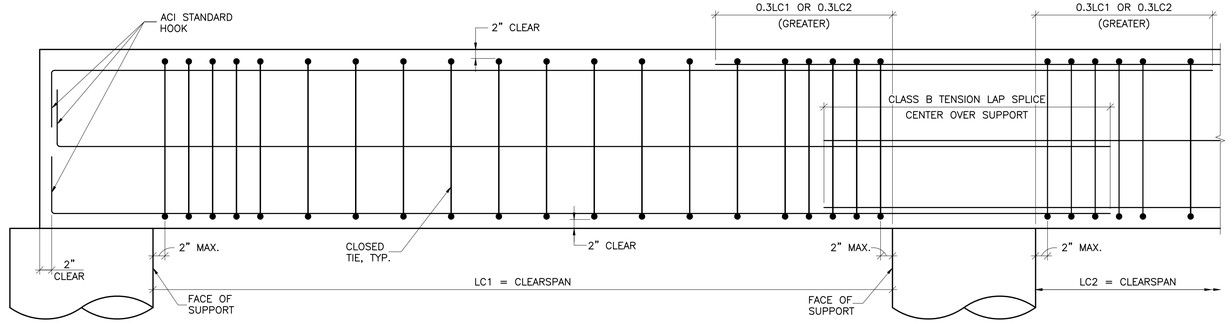
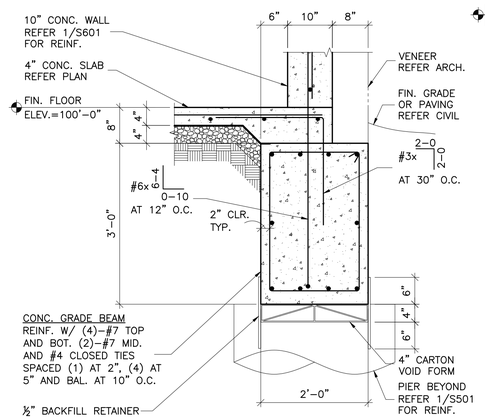


PIER SIZE	VERTICAL STEEL	TIES
36"ø	10-#9	#4 ○ AT 14"

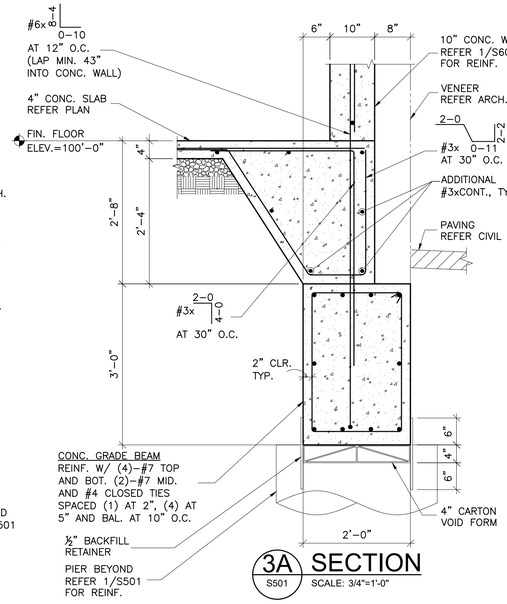
1 DRILLED PIER ELEVATION AT GRADE BEAM
S501 SCALE: NONE



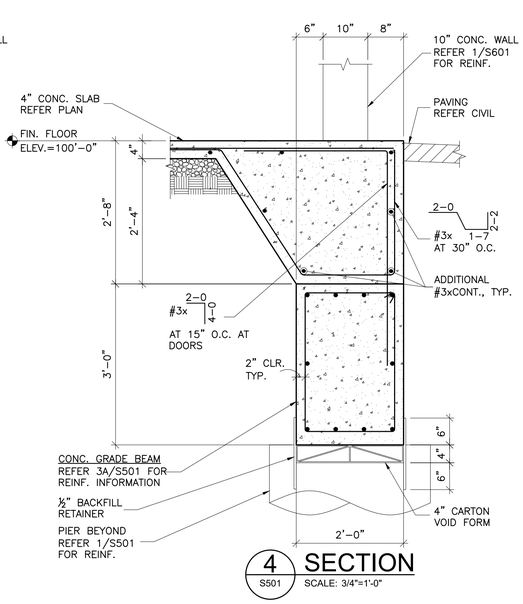
2 TYPICAL GRADE BEAM REINFORCEMENT LAYOUT
S501 SCALE: 1"=1'-0"



3 SECTION
S501 SCALE: 3/4"=1'-0"



3A SECTION
S501 SCALE: 3/4"=1'-0"



4 SECTION
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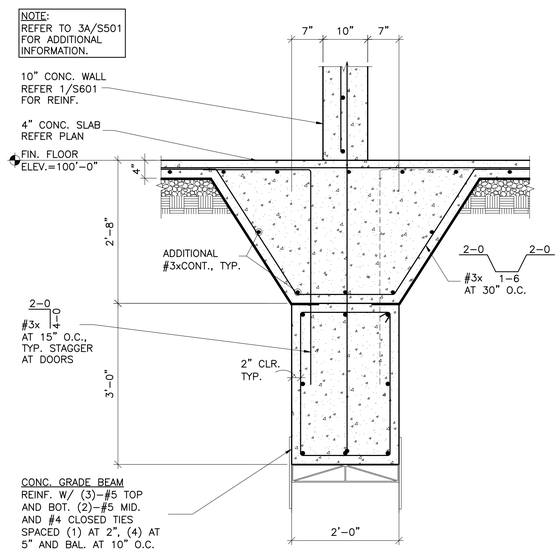

5 SECTION
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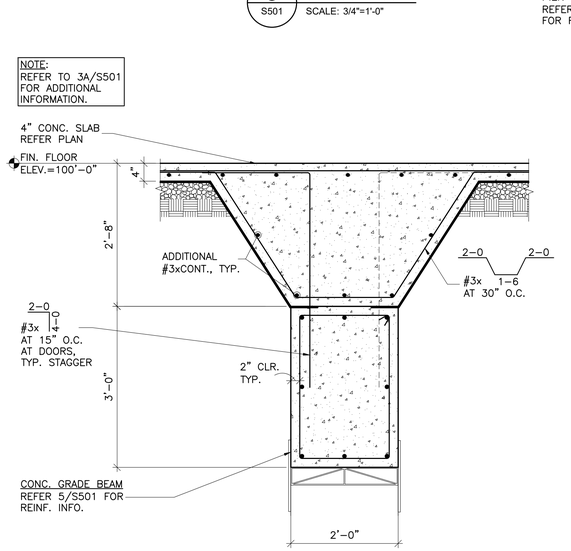
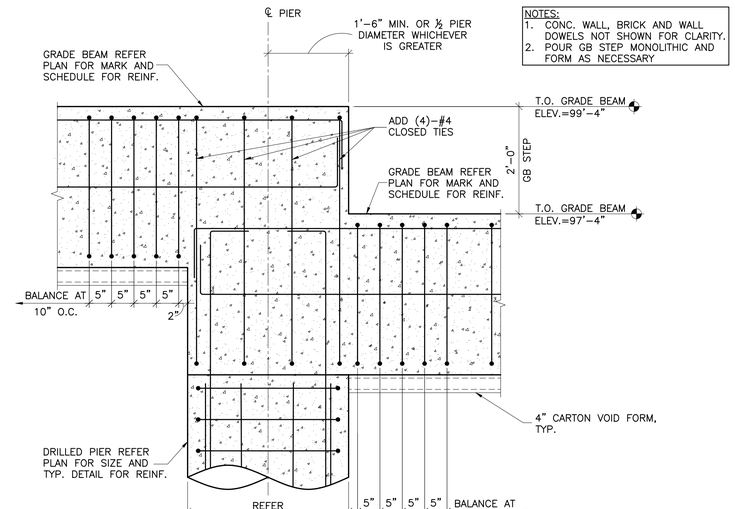


6 SECTION
S501 SCALE: 3/4"=1'-0"



7 ELEVATION AT G.B. STEP
S501 SCALE: 3/4"=1'-0"

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sheet no:

S501

DESCRIPTION	RM. NO.	FLOOR: EXPOSED CONCRETE W/ HARDENER	BASE: RUBBER BASE	BASE: NONE	CEILING: 2'X2 ACOUT. LAY-IN (TEG)	CEILING: GYP. BOARD	CEILING: EXPOSED STRUCTURE	CLG. HT.	REMARKS	RM. NO.	WALLS: CONCRETE MASONRY UNIT	WALLS: CONCRETE	PAINT / COLOR SCHEDULE: CLG.	WALLS: N	WALLS: E	WALLS: S	WALLS: W	REMARKS
MECH. / ELEC.	1	○		○			●	----		1	●		(1)	(2)	(2)	(2)	(2)	
TOILET	2	○	○			●		8'-8"	EPOXY PAINT	2	●		(1)	(2)	(2)	(2)	(2)	EPOXY PAINT (6)
TOILET	3	○	○			●		8'-8"	EPOXY PAINT	3	●		(1)	(2)	(2)	(2)	(2)	EPOXY PAINT (6)
VESTIBULE	4	○	○		○			8'-8"		4	●	●	(8)	(2)	(2)	(2)	(2)	(6)
SHELTER	5	○	○		○			8'-8"		5	●	●	(8)	(2)	(2)	(2)	(2)	(6)
VESTIBULE	6	○	○		○			8'-8"		6	●	●	(8)	(2)	(2)	(2)	(2)	(6)
GENERATOR	7	○		○			●	----		7	●		(1)	(2)	(2)	(2)	(2)	

1 ROOM FINISH SCHEDULE

- SCHEDULE ORIENTED SAME AS PLAN
- INDICATES MATERIAL IN A GIVEN AREA
- MATERIAL ON ALL SURFACES
- MATERIAL ON EACH INDIVIDUAL SURFACE
- IF CIRCLE IS BLACKENED - SURFACE TO RECEIVE PAINTER'S FINISH
- IF CIRCLE IS BLANK - SURFACE OR MATERIAL IS PREFINISHED OR NOT PAINTED

PAINT:

(1) GYP. BOARD / EXPOSED CEILINGS: SHERWIN-WILLIAMS - SW7006 - EXTRA WHITE
(2) WALLS - FIELD: SHERWIN-WILLIAMS - SW7008 - ALABASTER
(3) H.M. DOORS & FRAMES & MISC. METALS : SHERWIN-WILLIAMS - SW6992 - INKWELL
(4) MISCELLANEOUS METALS : SHERWIN-WILLIAMS - SW6992 - INKWELL
(5) WOOD DOORS: ARCHITECTURAL WOOD DOORS - CLEAR CL07

PREFINISHED COLORS:

(6) RUBBER BASE : ROPPE - BLACK
(7) NUMBER NOT USED
(8) 2 X 2 ACOUSTICAL LAY - IN TILES - SQUARE EDGE : REFER SPECIFICATIONS
(9) INTERIOR SIGNAGE: MOHAWK SIGN SYSTEMS - TO BE SELECTED BY ARCHITECT

EXTERIOR COLORS:

(10) PREFINISHED METAL COPING: MATCH EXISTING PREFINISHED WALL PANEL / COPING
(11) MASONRY BRICK VENEER : MATCH EXISTING BUILDING COLOR "A" - CLOUD CERAMICS SAHARA LT BUFF
(12) MASONRY BRICK VENEER : MATCH EXISTING BUILDING COLOR "B" - CLOUD CERAMICS COCOA BROWN

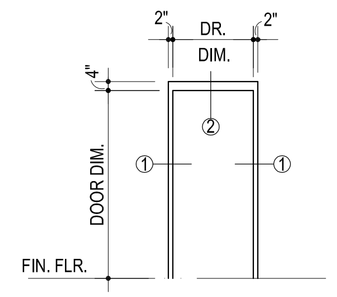
1

2 COLOR SCHEDULE

DOOR NO.	LOCATION: FROM	LOCATION: TO	DOOR ELEV.	DOOR MATL	DOOR SIZE: WIDTH	DOOR SIZE: HEIGHT	DOOR SIZE: TH' K	FRAME ELEV.	DOOR DETAILS: HEAD	DOOR DETAILS: SILL	DOOR DETAILS: JAMB	DOOR DETAILS: JAMB	REMARKS	HDWR. SET NO.
1	4	EXT.	A	STL.	PR. 3'-0"	7'-0"	1 3/4"	A	1A501	15A501	8A501	8A501		3
2	5	4	A	HM	PR. 3'-0"	7'-0"	1 3/4"	A	3A501	16A501	10A501	10A501	TORNADO DOORS	TS1
3	6	EXT.	A	STL.	3'-0"	7'-0"	1 3/4"	A	1A501	15A501	8A501	8A501		5
4	5	6	A	HM	3'-0"	7'-0"	1 3/4"	A	3A501	16A501	10A501	10A501	TORNADO DOORS	TS2
5	5	3	A	HM	3'-0"	7'-0"	1 3/4"	A	2A501	16A501	9A501	9A501	20 MIN. DR. & FRAME	2
6	5	2	A	HM	3'-0"	7'-0"	1 3/4"	A	2A501	16A501	9A501	9A501	20 MIN. DR. & FRAME	2
7	1	5	A	HM	3'-0"	7'-0"	1 3/4"	A	2A501	16A501	9A501	9A501	20 MIN. DR. & FRAME	4
8	7	5	A	HM	PR. 3'-0"	7'-0"	1 3/4"	A	2A501	16A501	9A501	9A501	90 MIN. DR. & FRAME	1

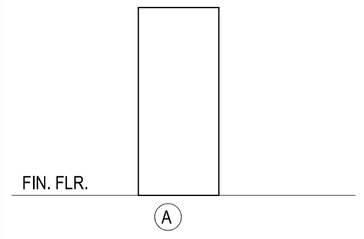
(1)

4 DOOR SCHEDULE

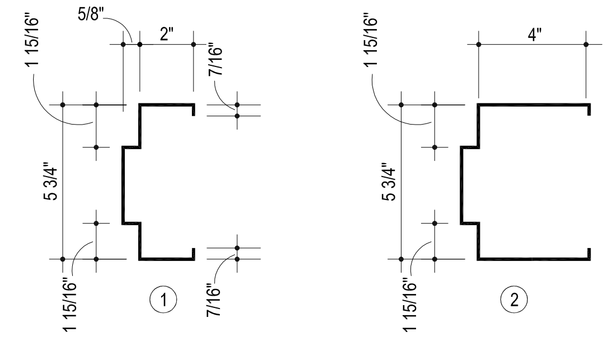


HOLLOW METAL

5 FRAME ELEVATION



6 DOOR ELEVATIONS



7 FRAME PROFILES

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CEDAR CREEK INC.
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KFC ENGINEERING
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SALAS O'BRIEN
MECHANICAL / ELECTRICAL

STATE OF OKLAHOMA
MICHAEL L. ABLA
2639
OKLAHOMA CITY, OKLAHOMA
REGISTERED ARCHITECT

10/14/22

CG
drawn by

MA
checked by

OCTOBER 2022
date

revisions
1 ADDENDUM #2

MOORE PUBLIC SCHOOLS
BOARD OF EDUCATION
MOORE, OKLAHOMA

MOORE Public Schools
LEARNING FOR LIFE

NEW ADDITION
KELLEY ELEMENTARY SCHOOL

sheet no:
A601

SCHEDULES

SALAS O'BRIEN
expect a difference
2600 Van Buren St., Suite 2635 | Norman, OK 73072
405.364.9926 | 715.832.5668 (f)
www.salasobrien.com

ADDENDUM No. ~~1~~ 2

Client: Abla Griffin Partnership
Project Name: Kelley Elementary Saferoom Addition
Project Location: Moore, OK

Issue Date: November 17, 2022

Owner: Moore Public Schools
Engineer: Salas O'Brien, LLC

MEP Project No. 2022-02064-00

To: Prospective Bidders.

This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated October 14, 2022, (and previous Addendum), with amendments and additions noted below. This Addendum consists of **(2)** pages and **(2)** attachments.

Index of Attachments
Moore Southridge JH Earthsmart Temperature Control proposal
E401

Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may disqualify Bidder.

CHANGES TO BIDDING REQUIREMENTS

- The attached Earthsmart Temperature Control proposal shall be included as part of the mechanical bid for this project.

CHANGES TO THE DRAWINGS

Revisions have been made to the following drawings and are issued in the form of full-size plans. Edits are indicated by a revision delta and a cloud surrounding the affected portion of the drawing.

- **SHEET E401 – ELECTRICAL ONE-LINE DIAGRAMS**
    - Refer to drawings for changes shown in clouds and deltas.

END OF ADDENDUM ~~[01]~~ 02

EARTHSMART CONTROLS

5305 N Santa Fe Avenue
Oklahoma City, OK 73118
www.earthsmartcontrols.com
Phone: (405) 778-8008
Fax: (866) 676-5602

To: Moore Kelley Elementary Safe Rooms Bidders **October 17, 2022**
Attn: Estimator

This is a proposal to provide controls for the Moore Kelley Elementary Safe Room Addition.

Split (1)

- Provide and install Honeywell controls.
- Install communication, 6438SR controller, supply air sensor, fan status, compressor status, digital space temperature sensor and CO2 sensor to control outside air damper (damper actuator by others).
- Commission the units to ensure proper operation.

EFs (1)

- Provide and install controls per plans and specs.
- Commission the units to ensure proper operation.

GPS Ionizers (1)

- Provide and install 1 new GPS-FC48-AC ionizer.
- Commission the unit to ensure proper operation.

Honeywell WEBS N4 Frontend

- Provide new WEB-8000 and integrate to N4 supervisor station (graphical user interface).
- Jace is licensed for 5 Devices to allow for future expansion.
- Provide 4 hours of user training.
- ***Provide 1-year parts and labor warranty.***
- Provide graphical representations of equipment listed above.
- Provide custom trending and alarming.
- Provide scheduling capabilities and remote access.

****
****

We thank you for the opportunity to bid and look forward to working with you soon.

If you have any questions, please feel free to contact us at (405) 778-8008.

Exclusions for total job: Any wiring above 24V, Supply Fan Control, smoke detectors, damper actuators and anything not mentioned in this proposal.

5305 N Santa Fe Avenue
Oklahoma City, OK 73118
www.earthsmartcontrols.com
Phone: (405) 778-8008
Fax: (866) 676-5602

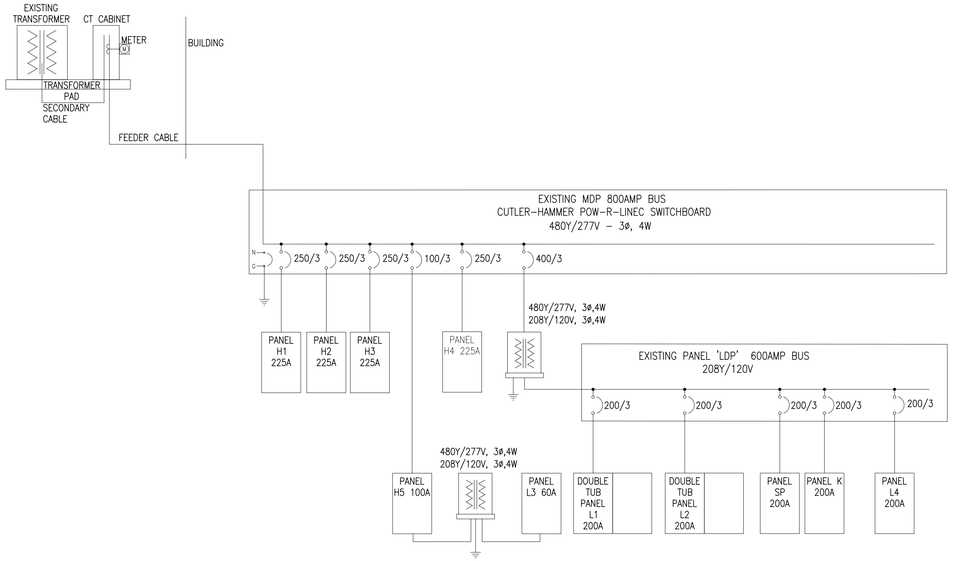
The total price for the control work above is: $12,220
Twelve Thousand Two Hundred and Twenty Dollars

Erin Bevill
Controls Manager
EarthSmart Controls, LLC

Company: _____ Signature: _____

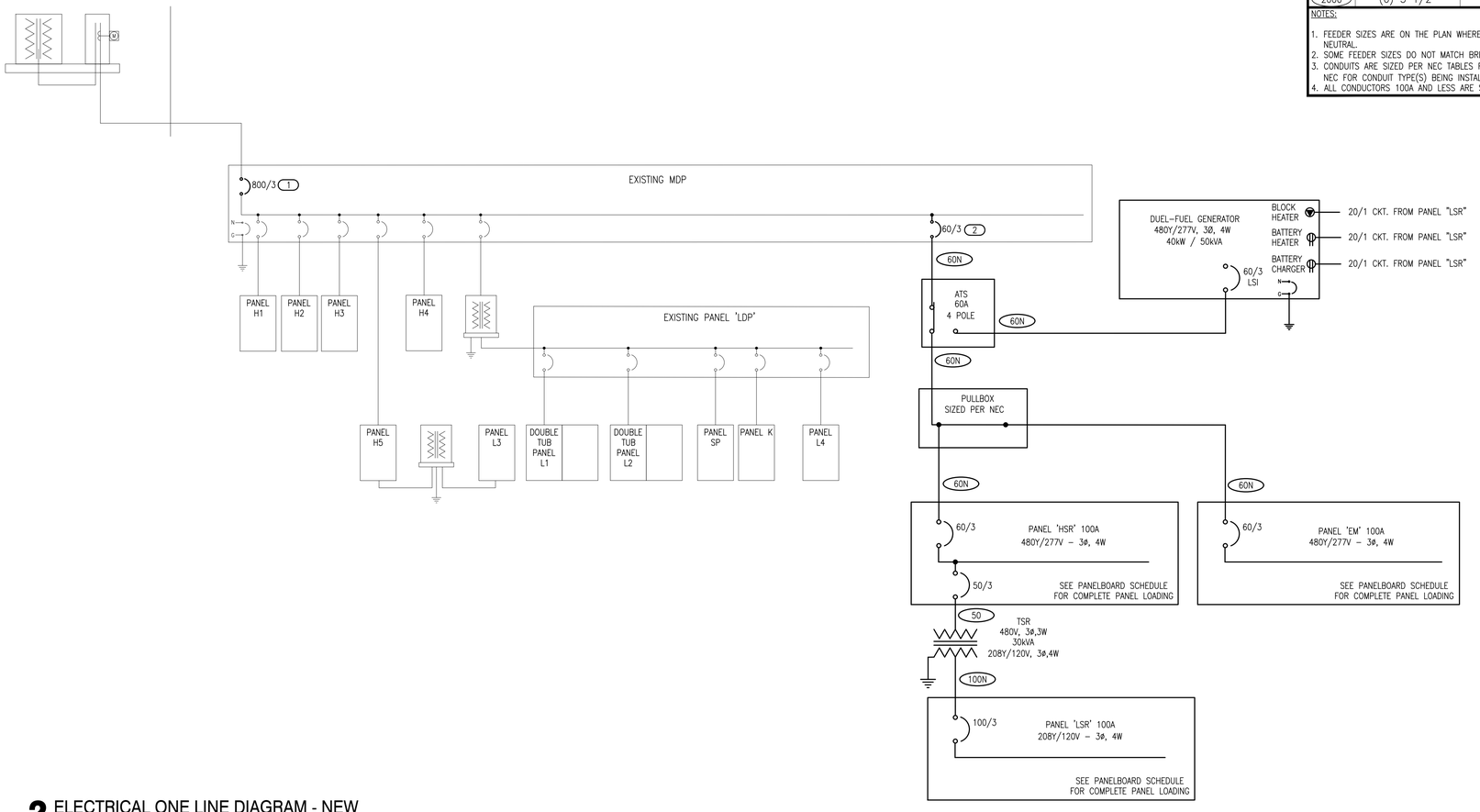
Date: _____ Printed Name: _____

Title: _____ PO #: _____



1 ELECTRICAL ONE LINE DIAGRAM - EXISTING

NO SCALE



2 ELECTRICAL ONE LINE DIAGRAM - NEW

NO SCALE

FEEDER SCHEDULE

AMPS	CONDUIT SIZE 4W	CONDUIT SIZE 3W	PHASE CONDUCTORS	EQUIPMENT GROUND CONDUCTOR
20	3/4"	3/4"	#12	#12
25	3/4"	3/4"	#10	#10
30	3/4"	3/4"	#10	#10
35	1"	3/4"	#8	#10
40	1"	3/4"	#8	#10
45	1"	1"	#6	#10
50	1"	1"	#6	#10
60	1 1/4"	1 1/4"	#4	#10
70	1 1/4"	1 1/4"	#4	#8
80	1 1/4"	1 1/4"	#3	#8
90	1 1/2"	1 1/4"	#2	#8
100	2"	1 1/2"	#1	#8
110	1 1/2"	1 1/4"	#2	#6
125	2"	1 1/2"	#1	#6
150	2"	1 1/2"	#1/0	#6
175	2"	2"	#2/0	#6
200	2"	2"	#3/0	#6
225	2 1/2"	2"	#4/0	#4
250	3"	2 1/2"	250 kcmil	#4
300	3"	3"	350 kcmil	#4
350	3 1/2"	3"	500 kcmil	#3
400	(2) 2"	(2) 2"	2 SETS OF #3/0	#3
450	(2) 2 1/2"	(2) 2"	2 SETS OF #4/0	#2
500	(2) 2 1/2"	(2) 2 1/2"	2 SETS OF 250 kcmil	#2
600	(2) 3"	(2) 3"	2 SETS OF 350 kcmil	#1
700	(2) 3 1/2"	(2) 3"	2 SETS OF 500 kcmil	#1/0
800	(3) 3"	(3) 2 1/2"	3 SETS OF 300 kcmil	#1/0
900	(3) 3 1/2"	(3) 3"	3 SETS OF 400 kcmil	#2/0
1000	(3) 3 1/2"	(3) 3"	3 SETS OF 500 kcmil	#2/0
1200	(4) 3"	(4) 3"	4 SETS OF 350 kcmil	#3/0
1600	(5) 3 1/2"	(5) 3"	5 SETS OF 500 kcmil	#4/0
1800	(6) 3 1/2"	(6) 3"	6 SETS OF 400 kcmil	250 kcmil
2000	(6) 3 1/2"	(6) 3"	6 SETS OF 500 kcmil	250 kcmil

NOTES:

1. FEEDER SIZES ARE ON THE PLAN WHERE 60 REFERS TO A 60A FEEDER WITHOUT NEUTRAL AND 60N REFERS TO A 60A FEEDER WITH NEUTRAL.
2. SOME FEEDER SIZES DO NOT MATCH BREAKER SIZE DUE TO UP-SIZING OF THE FEEDER FOR VOLTAGE DROP.
3. CONDUITS ARE SIZED PER NEC TABLES FOR THHN/THWN AND MAY BE UPSIZED FOR EASE OF PULLING OR DOWNSIZED AS ALLOWED PER NEC FOR CONDUIT TYPE(S) BEING INSTALLED.
4. ALL CONDUCTORS 100A AND LESS ARE SIZED PER 60 DEGREE LUGS, EC MAY SIZE CONDUCTORS FOR ACTUAL RATING OF LUGS PER NEC.

GENERAL NOTES

1. ELECTRICAL CONTRACTOR SHALL COORDINATE EXACT REQUIREMENTS WITH UTILITY TO PROVIDE ALL PARTS, TRENCHING, AND PAY ALL FEES NECESSARY TO BRING SERVICE TO NEW BUILDING.
2. AIC RATINGS ARE ESTIMATED BASED ON AVAILABLE DATA DURING DESIGN. CONTRACTOR TO VERIFY AVAILABLE FAULT CURRENT WITH UTILITY.
3. PROVIDE A MINIMUM OF 10 SPARE 1P20A BREAKERS FOR EACH 120V SUB-PANEL.

KEYED NOTES

(1) NEW 800A/3P MAIN CIRCUIT BREAKER SHALL BE ADDED TO EXISTING MDP. COORDINATE DOWN TIMES WITH OWNER/ARCHITECT PRIOR TO BEGINNING WORK.

ENGINEER UNABLE TO VERIFY MAIN BREAKER INSTALLATION WITH MANUFACTURER AT TIME OF DESIGN. CONTRACTOR SHALL FIELD VERIFY ABILITY TO ADD MAIN BREAKER TO MDP. CONTRACTOR SHALL REPORT FINDINGS TO ENGINEER.

(2) PROVIDE NEW 60A/3P BREAKER WITHIN EXISTING MDP TO FEED SAFEROOM ATS. IN THE CASE THAT A NEW SERVICE IS BEING PROVIDED BY UTILITY, PROVIDE 60A SERVICE DISCONNECT ON THE PRIMARY SIDE OF THE ATS.

EXISTING LOAD ANALYSIS

EXISTING PANEL 'MDP' LOAD ANALYSIS:

PEAK LOAD AS REPORTED BY OG&E FOR THE YEARS 2021/2022: 248A/PHASE

248A*1.25 (PER NEC 220.87) = 310A/PHASE

+DESIGN LOAD FROM NEW ADDITION = ~20A

=> ~330A MAX ON THE EXISTING 800A MDP.

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BB
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TVO
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OCTOBER 2022
date

AD02
1 11/17/22 ~~AD01~~
revisions

MOORE PUBLIC SCHOOLS
BOARD OF EDUCATION
MOORE, OKLAHOMA

MOORE Public Schools
LEARNING FOR LIFE

NEW ADDITION
KELLEY ELEMENTARY SCHOOL

sheet no:

E401

SALASOBRIEN
| expect a difference|
2600 Van Buren St., Suite 2635
Norman, Oklahoma 73072
P: 405.364.9926 | CA#:7058 Expiration Date: 6/30/2023

Salas O'Brien Project No.: 2022-04164-00