

ADDENDUM NO. 1

TO: PLANS AND SPECIFICATIONS FOR STATE OF MISSOURI

**New Columbarium Plaza and
Pre-Placed Crypts
Springfield Veterans Cemetery
Springfield, MO
PROJECT No.: U241901**

Bid Opening Date is: 1:30 PM, Tuesday, July 21, 2026 (Not Changed)

Bidders are hereby informed that the Construction Plans and/or Specifications are modified as follows:

SPECIFICATION CHANGES:

1. Section 329219-Seeding
 - a. REMOVE AND REPLACE section in its entirety. Maintenance requirements have been changed..
2. Section 329223-Sodding
 - a. REMOVE AND REPLACE section in its entirety. Maintenance requirements have been changed..
3. Section 329300-Plants
 - a. REMOVE AND REPLACE section in its entirety. Maintenance requirements have been changed.
4. Appendix
 - a. Add the attached Geotechnical Report.

DRAWING CHANGES:

1. SHEET C400 – Site Utilities Plan
 - a. REMOVE AND REPLACE WITH NEW DRAWING SHEET
 - b. Flowlines for columbarium drain lines added.
 - c. Slope for columbarium drain lines added.

GENERAL COMMENTS:

1. The Pre-Bid Meeting was held July 8, 2026, at 10:00 AM, followed by a walk-through of the site. The Pre-Bid Meeting sign-in sheet is attached.
2. Bidders needing additional site inspection should contact Anthony Cupples, Director (417) 823-3944 to schedule a time if access to the facility is required.
3. Please contact Mandy Roberson, Contract Specialist, at 573-690-9411 or mandy.roberson@oa.mo.gov, for questions about bidding procedures, MBE\WBE\SDVE goals, and submittal requirements.
4. The deadline for technical questions was Tuesday, July 14, 2026, at noon.
5. Changes to, or clarification of, the bid documents are only made as issued in the addenda.
6. All correspondence with respect to this project must include the State of Missouri project number as indicated above.

7. Current Planholders list is available online at: <https://www.oafmdcplanroom.com/projects/3340/plan-holders/u2419-01-new-columbarium-plaza-pre-placed-crypts-missouri-veterans-cemetery-springfield>
8. Prospective Bidders contact American Document Solutions, 1400 Forum Blvd Suite 1C, Columbia MO 65201, 573-446-7768 to order official plans and specifications.
9. All bids shall be submitted on the bid form without additional terms and **conditions**, modifications, or stipulations. Each space on the bid form shall be properly filled including a bid amount for the alternate. Failure to do so will result in rejection of the bid.
10. MBE/WBE/SDVE participation requirements can be found in DIVISION 00. The MBE/WBE/SDVE participation goals are 10%/10%/3%, respectively. Only certified firms as of the bid opening date can be used to satisfy the MBE/WBE/SDVE participation goals for this project. If a bidder is unable to meet a participation goal, a Good Faith Effort Determination Form must be completed. Failure to complete this process will result in rejection of the bid.
11. The Contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations. Bidders are to adhere to Prevailing Wage Hourly Rate of Wages, and the Department of Labor and Industrial Relations can be contacted to determine the applicable wage rate for the work on this project.

ATTACHMENTS:

1. Pre-bid Meeting Sign-In Sheet
2. Section 329219-Seeding
3. Section 329229-Sodding
4. Section 329300-Plants
5. Drawing Sheet C400-Site Utilities Plan
6. Geotechnical Report

July 15, 2026 *issued date

END ADDENDUM NO. 1

July 8, 2026, Pre-bid Meeting
Project: U2419-01, Springfield, Missouri Veterans Cemetery Expansion

NAME & TITLE	COMPANY NAME	PHONE	EMAIL
Joe Wright Sales Mgr.	Willbart	214 399 6973	joewright@willbart.com
Kyle Morrison Architect	Archimages Inc	816-516-3907 816-516-3907	kmorrison@archimages-stl.com
Scott Smith Springfield Cemetery Supervisor	MUC Springfield	417 823 3944	scott.smith@muc.aps.mo.gov
Tony Cupples Springfield Cemetery Director	" "	" "	anthony.cupples@muc.aps.mo.gov
Andy Carson FMDC PM	FMDC	573.291.6086	andy.carson@dm.mo.gov
Guy Pardenew	Olympus Con.	870-932-6670	guy@olympusgc.com
Brett Fickle Estimator	Westport Construction	660-885-2231	westport@wccmo.com
Scott Foster Estimator MidAmerica Excavations			
Patricia Schultz Project Professional	Better By Design, LLC	573-727-4182	pschultz@betterbydesignllc.com
Stam Schultz	" "	573-776-8726	sschultz@betterbydesignllc.com
Kevin Collier Superintendent	Carson-Mitchell Inc	417-576-2482	Kevin@carson-mitchell.com
Daniel Essary P-M	Carson-Mitchell	417-425-4747	Daniel@carson-mitchell.com

July 8, 2026, Pre-bid Meeting
Project: U2419-01, Springfield, Missouri Veterans Cemetery Expansion

Project: U2419-01, Springfield, Missouri Veterans Cemetery Expansion

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SECTION 329219 SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer.

1.02 RELATED REQUIREMENTS

- A. Section 329119 - Landscape Grading: Topsoil placement and finish grading.

1.03 REFERENCE STANDARDS

- A. ASTM D7322/D7322M - Standard Test Method for Determination of Erosion Control Product (ECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions; 2023.
- B. Turfgrass Water Conservation Alliance (TWCA) Qualified.

1.04 DEFINITIONS

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.05 SUBMITTALS

- A. Product data: Submit a label from one of the seed bags which is representative of all seed to be used.
- B. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer ; and recommended practices for irrigation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

2.02 SEED MIXTURE

- A. Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Each container of seed shall be fully labeled in accordance with the Federal Seed Act and seed certifications shall be signed and made part of seed invoices.
- C. Provide seed in sealed containers. Wet, moldy, or otherwise damaged seed is not acceptable.
- D. Seed Manufacturer: Advanced Turf Solutions, Inc., 2630 North Westgate Ave. Suite 108, Springfield, MO 65803, (417) 288-4812.
 - 1. Product: Advanced TTF (Turf-Type Tall Fescue) Coated with Foliar-Pak XCD.
 - 2. Substitutions: Not permitted.
- E. Rate of application: 12 pounds per 1,000 square feet.

2.03 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, gravel or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.
 - 1. Topsoil excavated and stockpiled from the site is acceptable if free of weeds and rocks.

2.04 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Recommended for grass and acceptable to seed manufacturer, with 50 percent of the elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil, to the following proportions:
 - 1. Nitrogen: 12 percent.
 - 2. Phosphoric Acid: 12 percent.
 - 3. Soluble Potash: 12 percent.
- C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.
- D. Erosion Fabric: Jute matting, open weave.
- E. Stakes: Softwood lumber, chisel pointed.
- F. Edging: Galvanized steel.

2.05 TESTS

- A. Provide analysis of topsoil fill under provisions of Section 014000.
- B. Analyze topsoil to ascertain recommended percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION

- A. Prepare subgrade in accordance with Section 312200.
- B. Place topsoil in accordance with Section 329119.
- C. Install edging at periphery of seeded areas in straight lines to consistent depth.

3.03 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.04 SEEDING

- A. Apply seed at a rate of 12 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: March 1 through May 15, or September 1 through November 15.
- D. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- E. Roll seeded area with roller not exceeding 112 lbs.

- F. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- G. Protect seeded areas with slopes exceeding 1:3 by use of straw grass seed germination blankets. Pin blankets to the ground at a rate of one pin every ten feet.
- H. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 HYDROSEEDING (OPTIONAL)

- A. Apply seeded slurry with a hydraulic seeder at a rate to provide seed in quantity specified above, evenly in two intersecting directions.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.06 PROTECTION

- A. Cover seeded slopes where grade is 4 inches per foot or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- B. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- C. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

3.07 MAINTENANCE

- A. Provide maintenance as described herein at no extra cost to Owner.
- B. Irrigation water supply source:
 - 1. Owner's existing water supply piping. Water is supplied by a well. Well pump gauge indicates 300 kPa. There are 8 connection points around Garden I with valve points for 1-1/2" couplers. The Owner uses this system to supply water for reel irrigators and similar equipment.
 - 2. Contractor shall provide all required irrigation equipment to connect to the 1-1/2" coupler and to provide watering as necessary for establishing grass.
- C. Provide watering and maintenance of seeded areas from planting through Date of Substantial Completion.
 - 1. Established grass exhibiting vigorous growing condition will be a requirement of Substantial Completion.
- D. Mow grass at regular intervals to maintain at a maximum height of 3 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- E. Neatly trim edges and hand clip where necessary.
- F. Water to prevent grass and soil from drying out.
- G. Roll surface to remove minor depressions or irregularities.
- H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- I. Immediately reseed areas that show bare spots.

3.08 SATISFACTORY TURF

- A. At end of the maintenance period, a healthy uniform, close stand of grass, free of weeds and surface irregularities, with coverage exceeding 90% over any 10 square feet and bare spots not exceeding 4 by 4 inches.

END OF SECTION

SECTION 329223 SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Fertilizing.
- D. Sod installation.
- E. Maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 312200 - Grading: Topsoil material.
- B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- C. Section 329119- Landscape Grading: Topsoil placement and finish grading.

1.03 DEFINITIONS

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REFERENCE STANDARDS

- A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

1.05 SUBMITTALS

- A. See Section 01 3300 – Submittals for submittal procedures.
- B. Certificate: Certify grass species and location of sod source.
- C. Certificate: Certify fertilizer and herbicide mixture approval by authority having jurisdiction.

1.06 QUALITY ASSURANCE

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Missouri.
- B. Installer Qualifications: Company approved by the sod producer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod in rolls. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours.

1.08 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

2.02 MATERIALS

- A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

1. Fescue Grass 95% tall fescue varieties
 2. Thickness: "Thick" sod, minimum 1 inch and maximum 1-3/8 inch topsoil base.
 3. Cut sod in area not exceeding 1 sq yd.
 4. Machine cut sod and load on pallets in accordance with TPI (SPEC) Guidelines.
- B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.
1. Topsoil excavated and stockpiled from the site is acceptable if free of weeds and rocks.
- C. Fertilizer: Slow-release fertilizer; recommended for grass and acceptable to sod supplier, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions:
1. Nitrogen: 12 percent.
 2. Phosphoric Acid: 12 percent.
 3. Soluble Potash: 12 percent.
- D. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

2.03 ACCESSORIES

- A. Wood Pegs: Softwood, sufficient size and length to ensure anchorage of sod on slope.
- B. Edging: Galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION

- A. Prepare subgrade in accordance with Section 312200.
- B. Place topsoil in accordance with Section 312200.

3.03 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

3.04 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately after delivery to site to prevent deterioration.
- C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Where new sod adjoins existing grass areas, align top surfaces.
- E. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.
- F. On slopes 6 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.
- G. Prior to placing sod, on slopes exceeding 8 inches per foot or where indicated, place wire mesh over topsoil. Securely anchor in place with wood pegs sunk firmly into the ground.
- H. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

- I. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller.

3.05 MAINTENANCE

- A. Provide maintenance at no extra cost to Owner.
- B. Irrigation water supply source:
 - 1. Owner's existing water supply piping. Water is supplied by a well. Well pump gauge indicates 300kPa. There are 8 connection points around Garden I with valve points for 1-1/2" couplers. The Owner uses this system to supply water for reel irrigators and similar equipment.
 - 2. Contractor shall provide all required irrigation equipment to connect to the 1-1/2" coupler and to provide watering as necessary for establishing grass.
- C. Provide watering and maintenance of sodded areas from planting through Date of Substantial Completion.
 - 1. Established grass exhibiting vigorous growing condition will be a requirement of Substantial Completion.
- D. Mow grass at regular intervals to maintain at a maximum height of 3 inches. Do not cut more than 1/3 of grass blade at any one mowing.
- E. Neatly trim edges and hand clip where necessary.
- F. Water to prevent grass and soil from drying out.
- G. Roll surface to remove irregularities.
- H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- I. Immediately replace sod to areas that show deterioration or bare spots.
- J. Protect sodded areas with warning signs during maintenance period.

END OF SECTION

SECTION 329300 PLANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Topsoil bedding.
- C. New trees and plants.
- D. Relocated trees and plants.
- E. Mulch and Fertilizer.
- F. Maintenance.
- G. Tree Pruning.

1.02 RELATED REQUIREMENTS

- A. Section 329119- Landscape Grading: Topsoil placement and finish grading.

1.03 DEFINITIONS

- A. Weeds: Any plant life not specified or scheduled.
- B. Plants: Living trees, plants, and ground cover specified in this Section , and described in ANSI Z60.1.

1.04 REFERENCE STANDARDS

- A. ANSI A300 Part 1 - American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Management - Standard Practices (Pruning); 2017.
- B. ANSI/AHIA Z60.2 - American Standard for Nursery Stock; 2025.

1.05 SUBMITTALS

- A. See Section 01 3300 – Submittals for submittal procedures.
- B. Certificate: Certify fertilizer mixture approval by authority having jurisdiction.
- C. Maintenance Data: Include cutting and trimming method .
- D. Submit list of plant life sources.

1.06 QUALITY ASSURANCE

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with five years documented experience.
- B. Installer Qualifications: Company specializing in installing and planting the plants with five years experience.
- C. Tree Pruning: Comply with ANSI A300 Part 1.
- D. Maintenance Services: Performed by installer.
- E. Non-native, Invasive Plant Species: Do not introduce, grow, or cultivate plant species that are non-native to the ecosystem of the project site, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.
 - 1. Comply with laws regulating non-native and invasive plant species in the State in which the Project is located.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Protect and maintain plant life until planted.
- C. Deliver plant life materials immediately prior to placement. Keep plants moist.

1.08 FIELD CONDITIONS

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year warranty.
- C. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.
- D. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

2.02 PLANTS

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

2.03 SOIL MATERIALS

- A. Topsoil: Excavated from site.

2.04 SOIL AMENDMENT MATERIALS

- A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis.
 - 1. Nitrogen: 20 percent.
 - 2. Phosphoric Acid: 10 percent.
 - 3. Soluble Potash: 5 percent.

2.05 ACCESSORIES

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.
- C. Cable, Wire, Eye Bolts and Turnbuckles: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.
- D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.
- E. Weed Suppressing Fabric: Heavy-duty, non-woven, 4 oz., UV resistant.
 - 1. Resistant to rodent and insect damage.
 - 2. Will not rot or mildew
- F. Decorative Cover: Smooth gravel, 2 inch minimum and 0.75 inch maximum size.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared subsoil and planters are ready to receive work.
- B. Saturate soil with water to test drainage.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.

- C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 6 inches larger than plant root system.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

3.05 PLANTING

- A. Set plants vertical.
- B. Remove root containers.
- C. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.
- D. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- E. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.06 PLANT SUPPORT

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:
 - 1. Tree Caliper: 2 to 4 inches; Tree Support Method: 3 guy wires with eye bolts and turn buckles

3.07 WEED SUPPRESSING FABRIC

- A. Unroll and cut fabric to the appropriate length, allow for a 4" - 6" overlap. Cut an "X" slit in the location where each plant will be placed. Secure the fabric with fabric staples, staggering the staples at an approximate rate of 1 staple per 5 feet.

3.08 DECORATIVE GRAVEL COVER

- A. Apply 2"-4" thick on top of weed suppressing f

3.09 TREE PRUNING

- A. Prune trees as recommended in ANSI A300 Part 1.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.

3.10 FIELD QUALITY CONTROL

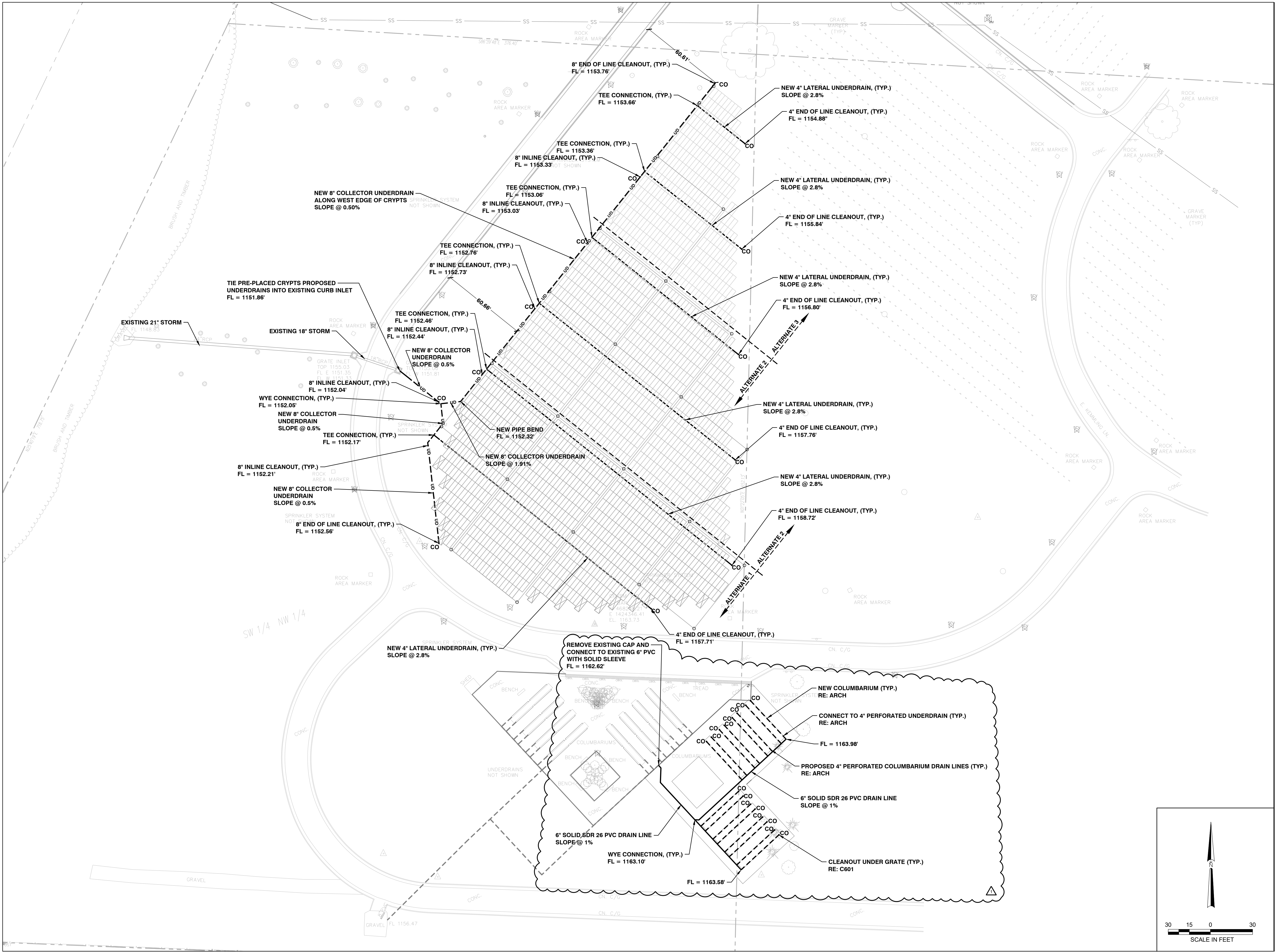
3.11 MAINTENANCE

- A. Provide maintenance as described herein at no extra cost to Owner.
- B. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- C. Provide maintenance at no extra cost to Owner.
 - 1. Irrigation water supply source: Owner's existing water supply piping. Water is supplied by a well. Well pump gauge indicates 300kPa. There are multiple connection points near the

planting area with valve points for 1-1/2" couplers. The Owner uses this system to supply water for reel irrigators and similar equipment.

2. Contractor shall provide all required irrigation equipment to connect to the 1-1/2" coupler and to provide watering as necessary for establishing grass.
- D. Provide watering and maintenance of plantings through Date of Substantial Completion.
 1. Established plants exhibiting vigorous growing condition will be a requirement of Substantial Completion.
 - E. Remove dead or broken branches and treat pruned areas or other wounds.
 - F. Neatly trim plants where necessary.
 - G. Immediately remove clippings after trimming.
 - H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
 - I. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.
 - J. Remedy damage from use of herbicides and pesticides.
 - K. Replace mulch when deteriorated.
 - L. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

END OF SECTION



STATE OF MISSOURI
MIKE KEHOE,
GOVERNOR



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DEPARTMENT OF
PUBLIC SAFETY, DIVISION OF
MISSOURI VETERANS
COMMISSION

CONSTRUCT NEW
COLUMBARIUM WALL AND
PRE-PLACED CRYPTS
MISSOURI VETERANS
CEMETERY - SPRINGFIELD
SPRINGFIELD, MO

STATE OF MO # U2419-01
VCGP # MO-22-17
ARCHIMAGES # K26501
SITE # 6901
ASSET # 8136901009

REVISION: Addendum 1
DATE: 07-16-2026
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE : 6/1/2026

CAD DWG FILE: -
DRAWN BY: - SG
CHECKED BY: - SM
DESIGNED BY: - SM

SHEET TITLE:
SITE UTILITIES PLAN

SHEET NUMBER:

C400

GEOTECHNICAL ENGINEERING REPORT

MISSOURI VETERANS CEMETERY

NEW CEMETERY ADDITIONS

5201 SOUTH SOUTHWOOD ROAD

SPRINGFIELD, MISSOURI

Prepared for:

Archimages, Inc.
9300 West 110th Street, Suite 235
Overland Park, Kansas 66210

Prepared by:



Springfield, MO

4168 W. Kearney Springfield, MO 65803
Call 417.864.6000 Fax 417.864.6004
www.ppimo.com

PROJECT NUMBER: 26-0970

April 09, 2026

April 09, 2026

Archimages, Inc.
9300 West 110th Street, Suite 235
Overland Park, Kansas 66210

Attn: Mr. Kile Morrison, RA, NCARB
Email: kmorrison@archimages-stl.com

RE: Geotechnical Engineering Report
New Cemetery Additions
5201 South Southwood Road
Springfield, Missouri
PPI Project Number: 26-0970

Dear Mr. Morrison:

Attached, please find the report summarizing the results of the geotechnical investigation conducted for the proposed New Cemetery Additions in Springfield, Missouri. We appreciate this opportunity to be of service, and if you have any questions, please do not hesitate to contact this office.

PALMERTON & PARRISH, INC.
By:



Taylor Anderson

Taylor Anderson, P.E.
Geotechnical Engineer

April 09, 2026

PALMERTON & PARRISH, INC.
By:

Brandon R. Parrish

Brandon R. Parrish, P.E.
Vice-President

Submitted: One (1) Electronic .pdf Copy

BRP/TA

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APPENDICES

Appendix I - Figures

Appendix II - Boring Logs & Key To Symbols

Appendix III - General Notes

Appendix IV - Grain Size Analysis

Appendix V - Important Information Regarding Your Geotechnical Report

EXECUTIVE SUMMARY

A Geotechnical Investigation was performed for the New Cemetery Additions at the existing Missouri Veterans Cemetery located at 5201 South Southwood Road in Springfield, Missouri. It is understood that this project consists of the construction of a new Columbarium Expansion Area and new grave areas. Columbarium loading is anticipated to be light to moderate. In addition, bedrock at the project site is highly variable and has been encountered as shallow as 4 feet in some areas based upon past investigations. Depth to bedrock within the planned new grave areas was requested. Cut and fill depths in the Columbarium area are anticipated to be between 1 to 2 feet across the subject site to provide finished subgrade elevations.

Based upon the information obtained from the borings drilled and subsequent laboratory testing, the site is suitable for the proposed New Cemetery Additions. Important geotechnical considerations for the project are summarized below. However, users of the information contained in the report must review the entire report for specific details pertinent to geotechnical design considerations.

- The surface at the subject site contains topsoil. Topsoil was noted in Borings 1, 2, and 5 of the subsurface exploration to depths between 3 to 6 inches;
 - Moisture sensitive lean clays were noted near the surface of the subgrade exploration. This material is generally stable in dry conditions but is sensitive to the addition of moisture and repeated traffic. Some over excavation and replacement or stabilization may be required of these soils;
 - Foundations bearing on native soil/controlled fill for the New Cemetery Additions can be designed for an allowable bearing capacity of 2,500 psf for column footings and 2,000 psf for continuous footings;
 - The project site classifies as a Site Class C in accordance with Section 1613 of the 2018 International Building Code (IBC);
-

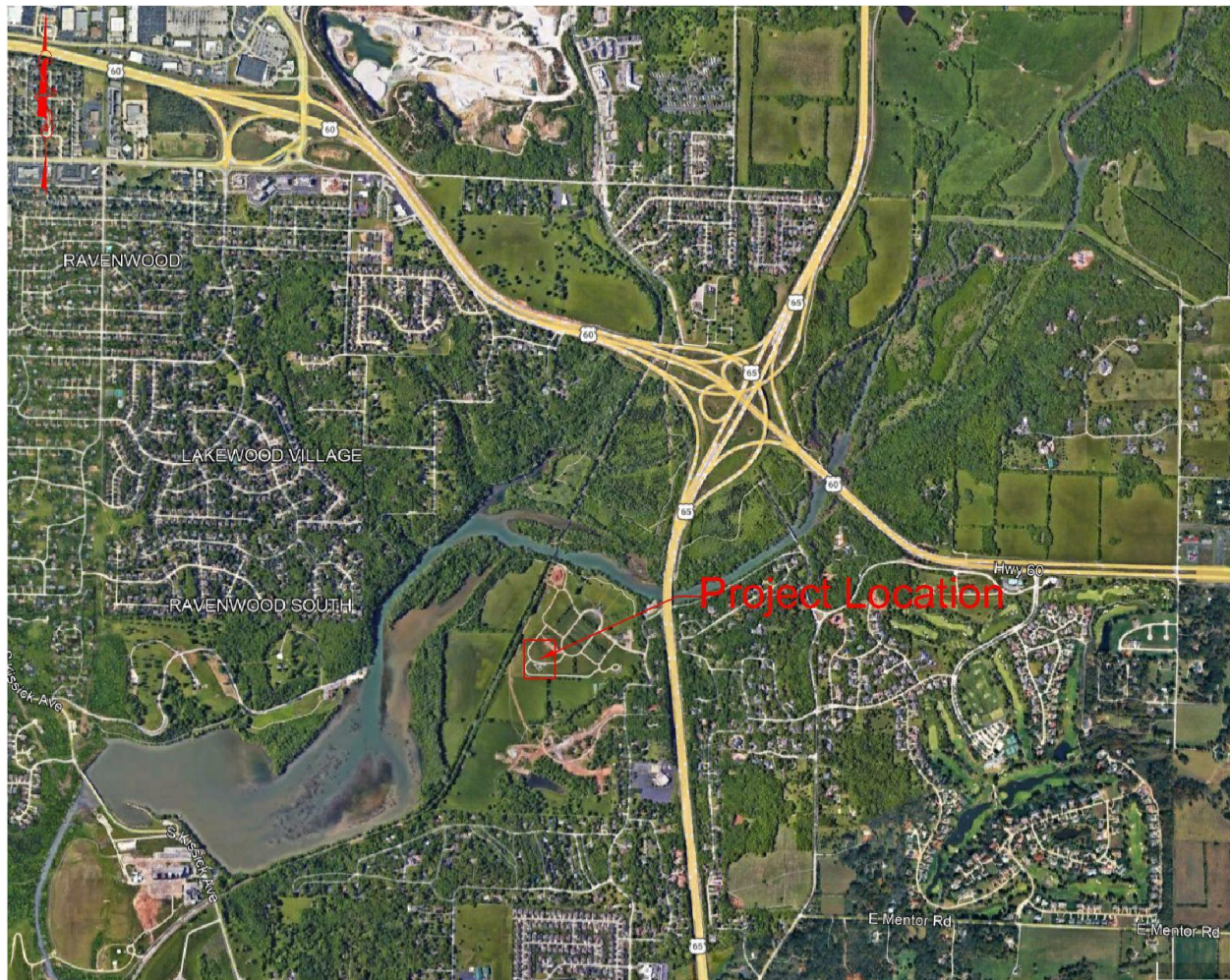
EXECUTIVE SUMMARY - CONTINUED

- Palmerton & Parrish, Inc. should be retained for construction observation and construction materials testing. Close monitoring of subgrade preparation work is considered critical to achieve adequate pavement and subgrade performance.

GEOTECHNICAL ENGINEERING REPORT
MISSOURI VETERANS CEMETERY
NEW CEMETERY ADDITIONS
5201 SOUTH SOUTHWOOD ROAD
SPRINGFIELD, MISSOURI

1.0 INTRODUCTION

This is the report of the Geotechnical Investigation performed for the proposed New Cemetery Additions at the Missouri Veterans Cemetery located at 5201 South Southwood Road in Springfield, Missouri. This investigation was authorized by a letter proposal dated January 26, 2026, and signed by Mr. Kile Morrison, RA, NCARB, representing Archimages, Inc.. The approximate site location is shown below:



The purpose of the Geotechnical Investigation was to provide information for foundation design and construction planning, and to aid in site development. Palmerton & Parrish Inc.'s (PPI) scope of services included field and laboratory investigation of the subsurface conditions in the vicinity of the proposed project site, engineering analysis of the collected data, development of recommendations for foundation design and construction planning, and preparation of this engineering report.

2.0 PROJECT DESCRIPTION

Item	Description
Site Layout	See Figure 1 : Boring Location Plan
New Cemetery Additions	• Columbarium Expansion Area; and • New grave areas.
Foundation Loadings	Light to moderate.
Grading	Based on the existing site grading, the proposed New Cemetery Additions is anticipated to have cut and/or fill depths of 1 to 2 feet.

3.0 SITE DESCRIPTION

Item	Description
Physical Location	5201 South Southwood Road in Springfield, Missouri
Latitude: Longitude: (± Center of Project Site)	37.116839°N -93.241317°W
Available Historic Aerial Photography	Based on historical Google Earth imagery, the site was a grass covered open field since prior to 1936. By 1960, a road was built north of the project area, with some pads present from 1980 through 1999. The current Veterans Cemetery was built in 1999, but the current project site was still a grass covered field. The existing roadways around the project site and columbarium were constructed around 2018, with little to no additional improvements to present day.
Current Ground Cover	Grass Covered.
Existing Topography	Gently sloping from east to west with elevations ranging from 1167 to 1156.
Drainage Characteristics	Poor to fair.

4.0 SUBSURFACE INVESTIGATION

Subsurface conditions were investigated through completion of nine (9) subsurface borings and subsequent laboratory testing.

4.1 Subsurface Borings

Boring locations were selected and staked in the field by PPI using a site plan provided by the Client. Approximate boring locations are shown on Figure 1, Boring Location Plan. The Missouri One-Call System was notified prior to the investigation to assist in locating buried public utilities.

Logs of the borings showing descriptions of soil and rock units encountered, as well as results of field tests, laboratory tests, and a “Key to Symbols” are presented in Appendix II.

Borings were drilled on March 25, 2026, using 4.5-inch O.D. continuous flight augers powered by a track-mounted drill-rig. Soil samples were collected at 2.5 to 5-foot centers during drilling within Boring 9 for the Columbarium. Soil sample types included split spoon samples collected while performing the Standard Penetration Test (SPT) in general accordance with ASTM D1586 and thin-walled Shelby tubes pushed hydraulically in advance of drilling in accordance with ASTM D1587. Please refer to Appendix III for general notes regarding boring logs and additional soil sampling information.

4.2 Laboratory Testing

Collected samples were sealed and transported to the laboratory for further evaluation and visual examination. Laboratory soil testing included the following:

- Moisture Content (ASTM D2216);
- Atterberg Limits (ASTM D4318);
- Grain Size Analysis (ASTM D6913); and
- Pocket Penetrometers.

Laboratory test results are shown on each boring log in Appendix II and are summarized in the following table. Grain Size Analysis results are included in Appendix IV.

Boring	Depth (ft.)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Percentage <#200 Sieve (%)	Moisture Content (%)	USCS Symbol
9	1.0	31	18	13	-	19.4	CL
	3.4	-	-	-	22	8.8	GC

5.0 SITE GEOLOGY

The general site area is underlain at depth by Osagean Series Bedrock. This unit characteristically consists of limestone with some amount of chert and dolomite. Trace shales are also noted within this series. Overburden soils are usually composed of red clay and chert and are residual, having developed from physical and chemical weathering of the parent limestone. The chert fragments were interbedded with the limestone but are much more resistant to weathering and retain rock-like properties. The contact between comparatively unweathered bedrock and the residual soils is usually abrupt.

The general site area is located within the Ozarks Physiographic Region of Missouri, which is characterized by rugged to rolling hill terrain, meandering streams, and karst topography. Karst topography forms over areas of carbonate bedrock where groundwater has solutionally enlarged openings to form a subsurface drainage system. Springs, caves, losing streams, and sinkholes are common in karst areas. Sinkholes are defined as a depression in the landscape with an internal drainage system.

Based upon readily available digital topographic information, as well as conditions encountered within the borings drilled, no indications of sinkhole activity were identified. However, the Owner and contractor should be aware that it is possible for karst features to be encountered at the project site during construction. If a karst feature is identified during site grading, PPI should be contacted immediately for evaluation on a case-by-case basis.

6.0 GENERAL SITE SUBSURFACE CONDITIONS

Based upon subsurface conditions encountered within the borings drilled at the project site, generalized subsurface conditions are summarized below. Soil stratification lines on the boring logs indicate approximate boundary lines between different types of soil units

based upon observations made during drilling. In-situ transitions between soil and some rock types are typically gradual.

6.1 Soils

Generalized subsurface conditions are summarized in the table below:

Boring 9 Only – Columbarium Expansion Area					
Description	Borings	Approx. Depth to Bottom of Stratum	Material Encountered	Moisture	Consistency/ Density
Stratum 1	9	3.4	Lean Clay, Trace Gravel	Moist	Stiff
Stratum 2	9	6.0	Clayey Gravel, w/ Sand	Moist	Dense
Stratum 3	9	Top of Bedrock	Fat Clay, Trace Gravel	Moist	Medium Stiff
Stratum 4	9	Boring Completion	Limestone	-	Medium Hard

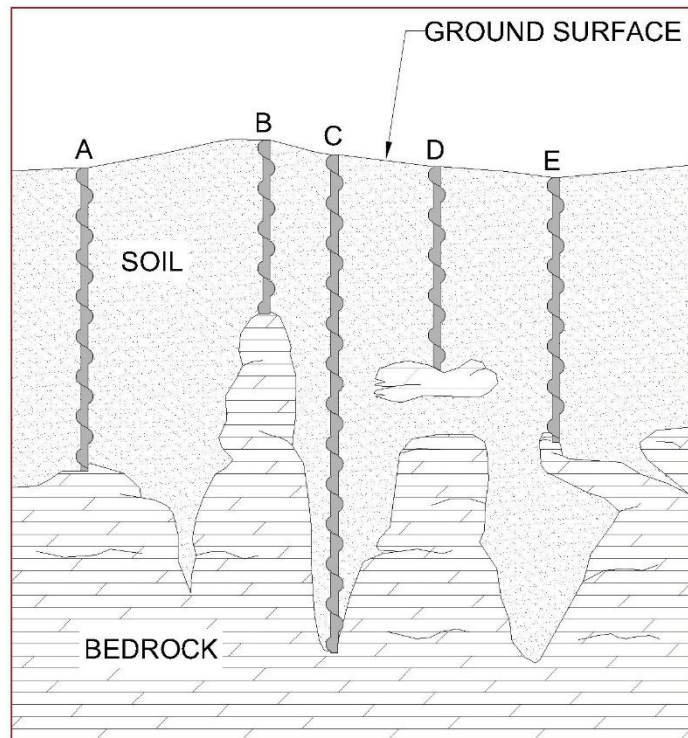
6.2 Auger Refusal & Bedrock

The depth to top of bedrock ranged from 7.5 to greater than 10 ft. PPI extended borings using augers to the depth where bedrock exhibited auger refusal. Top of bedrock depths and bedrock types are summarized in the table below.

Boring	Top of Bedrock		Auger Refusal
	Depth (ft.)	Type	Depth (ft.)
1	>10.0	-	-
2	>10.0	-	-
3	>10.0	-	-
4	8.8	Limestone	9.2
5	7.5	Limestone Pinnacle	8.5
6	>10.0	-	-
7	>10.0	-	-
8	>10.0	-	-
9	9.4	Limestone	9.4

Auger refusal is defined as the depth below the ground surface at which a boring can no longer be advanced with the soil drilling technique being used. Auger refusal is subjective and is based upon the type of drilling equipment and types of augers being used, as well as the effort exerted by the driller. Several different auger refusal conditions are possible in the general site area. These conditions are represented

graphically in the adjacent figure: (A) on the upper surface of continuous bedrock, (B) on rock “pinnacles”, (C) in widened joints that may extend well below the surrounding bedrock surface, (D) slabs of unweathered rock suspended in the residual soil matrix, or “floaters”, or (E) on the upper surface of discontinuous bedrock.



Note: The bedrock conditions illustrated above are for reference only and do not indicate conditions encountered at the project site.

Due to the possibility that some or all of these features exist at this project site, estimating the exact quantity of rock excavation is difficult. Linear interpolation of apparent bedrock elevations based upon the boring data is often used but can misrepresent actual rock removal quantities where such anomalies exist.

6.3 Groundwater

Shallow groundwater was not observed within the borings on the date drilled. Groundwater levels should be expected to fluctuate with changes in site grading, precipitation, and regional groundwater levels. Groundwater may be encountered at shallower depths during wetter periods. Development of perched groundwater at the soil-bedrock contact can occur in the general site area.

7.0 EARTHWORK

7.1 Site Preparation

Grading plans for the proposed New Cemetery Additions were not provided. Grading for the project site is anticipated to have between 1 and 2 feet of cut and/or fill to establish final grades. The initial phase of site preparation should include the steps listed below;

- **It is recommended that a representative from PPI be present during site preparation to help identify the conditions described below;**
- Stripping and removal of all topsoil and vegetation as described in Section 7.2;
- Areas of lean clay may be sensitive to moisture and require over excavation and replacement or stabilization if exposed to rain, excessive moisture, or repeated traffic as described in Section 7.3;
- All areas scheduled to receive new fill should be proof-rolled as described below. Fill should not be placed on a frozen subgrade; and
- All structural fill should be placed a minimum of 5 ft. (horizontally) beyond the outside edge of footings to ensure proper fill placement for soils within the zone of footing influence.

Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber-tired construction equipment and noting any areas which rut or deflect during rolling. All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. Proof-rolling, undercutting, and replacement should be monitored by a qualified representative of the Geotechnical Engineer. The depth and areal extent of undercutting, if any, should be minimal but will be largely dependent upon the time of year and related soil moisture conditions. If construction is initiated during wetter spring or winter months, the requirement for undercutting soft surficial soils below normal topsoil stripping should be anticipated and reflected in contract documents. As

previously mentioned, lean clays at the project site are moisture sensitive and may pose difficulties regarding subgrade stability and proper compaction.

7.2 Topsoil

Topsoil was noted in the subsurface exploration to depths between 0.3 to 0.5 feet below the ground surface. Due to the influence of vegetation and trees, this material should be stripped from construction areas and stockpiled for use in non-structural areas or removed from the site. Large root systems, such as root balls from trees or any root over 6 inches in diameter should be included in the removal of topsoil from beneath structures and pavements. Root systems may extend to depths deeper than those noted in the subsurface exploration. It should be noted that the use of the term topsoil within this report is for site construction and does not imply that the material is suitable for sale as topsoil. Due to the increased gravel and sand contents and the plasticity of some of the topsoil, some of this material may not be suitable for re-use as a surficial landscaping material.

7.3 Soft Surficial Soils

Areas of lean clay with little to no gravel/sand content were noted near the surface in the Columbarium Expansion Area. Generally, these materials may be stable during dry weather; however, these materials are anticipated to be sensitive to the addition of moisture. **During wet seasons or rain events or when exposed to repeated traffic, the near surface lean clay soils may become unstable and require over excavation and replacement or stabilization.** The amount of over excavation will be dependent upon conditions encountered during construction.

7.3.1 Inclement Weather

If construction is initiated during wetter months, the requirement for undercutting soft surficial soils below normal site stripping should be anticipated and reflected in contract documents in areas where new construction is anticipated for the Columbarium Expansion. Undercut depths on the order of 2 or more ft. are considered possible within the development area. The shallow lean clay subgrade

at the site is known to significantly lose strength when saturated and disturbed by construction equipment. Further, material removed from undercuts may not be suitable for use as compacted fill due to high soil moisture if poor drying conditions (cool temperatures and/or frequent precipitation) occur during site grading. If the construction schedule will not permit delay for better drying conditions, the project budget should include an allowance for subgrade undercut and replacement soil material containing appreciable quantities of chert or sand and gravel from an off-site borrow area that meet the requirements above. As an alternate to select fill, rock fill subbase (4 to 6-inch top size stone) may be placed to improve subgrade stability.

7.3.2 Subgrade Remediation Alternates

Subgrade remediation alternates should be evaluated on a case-by-case basis. Variables that should be considered include overall construction schedule, weather forecast, depth to a firm bottom within the area being remediated, areal extents of the area being remediated, fill thickness remaining to be placed on top of the area in question, and other factors. Possible remediation alternates that could be considered depending on the specific conditions encountered are listed below.

- The area could be scarified, allowed to dry, recompacted, and then proof-rolled again;
- The area could be over-excavated to firm bottom, the bottom proof-rolled and approved, and then new controlled fill placed and compacted;
- The area could be over-excavated to firm bottom, the bottom proof-rolled and approved, a geogrid installed (not in foundation excavations), and replaced with controlled fill; and
- If more than a few feet of fill are scheduled to be placed on the area in need of remediation, the alternates below may be considered:
 - Partial removal and replacement of the soft soils;

- Placement of a geogrid on top of the failing proof-roll subgrade (not in foundation areas); or
- Placement of a bridge lift of open-graded rock (not in foundation areas).

PPI is available to work with the Project Team to evaluate remediation alternates on a case-by-case basis during construction.

7.4 Shallow Groundwater Considerations

Groundwater was not encountered during the subsurface exploration at depths explored below the ground surface. As previously mentioned, water levels at the subject site should be anticipated to fluctuate with seasonal changes in moisture. Contractors should be prepared to encounter areas of shallow groundwater at the subject site. Generally, the shallow groundwater should be able to be removed with conventional pumping equipment.

7.5 Scarifying and Recompacting

Subgrade areas approved after proof-rolling should be scarified to a depth of at least 8 inches and soil moisture adjusted and compacted to comply with project specifications.

7.6 Fill Material Types

The below table provides the anticipated material types to be utilized at the site for structural fill and their respective acceptable placement location. While little grading is anticipated at the project site, any fill material is placed within 2 ft. below floor slabs or footings, the fill material should classify as an LVC material as specified in the table below.

Fill Type ¹	USCS Classification	Acceptable Location for Placement
Low Volume Change (LVC) Engineered Fill ²	Non-shaley CL ⁵ , GC &/or SC (LL < 50%)	All locations and elevations
On-Site Natural Soils	CL ⁵ , & GC	All locations and elevations
	CH	See Note 3
Potential Borrow Material	CL, CL-CH, SC, & GC	All locations and elevations
	CH	See Note 3
Rock Fill ⁴	GW	All locations and elevations
1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris and contain maximum rock size of 4 to 6 in. Frozen material should not be used and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to its use. 2. Non-shaley, low plasticity cohesive soil or granular soil having at least 15% low plasticity fines. 3. CH clays with a Liquid Limit equal to or above 50% are considered suitable for use as controlled fill, only if the percentage of rock fragments exceeds 30% or if placed 2 feet below shallow foundations, or slab areas. 4. If rock fill will be utilized at the project site, see Section 7.6.1. 5. Caution should be exercised when utilizing on-site lean clays as fill material. These soils are moisture sensitive and may not provide a stable subgrade even when properly compacted when soil moisture is above optimum.		

7.6.1 Rock Fill

If rock is to be used as the primary filling medium, embankments should be constructed using rock having maximum dimensions in excess of 4 inches, but no greater than 8 inches. Rock material should be placed in horizontal layers having a thickness of approximately the maximum size of the larger rock comprising the lift, but not greater than 12 inches. Rocks or boulders too large to permit placing in a 12-inch-thick lift should be reduced in size as necessary to permit placement or be bladed over the edge of the fill and not used in the compacted fill. Rock fill should not be dumped into place but should be distributed in horizontal lifts by blading and dozing in such a manner as to ensure proper placement into final position in the embankment. Finer material including rock fines and limited soil fines should be worked into the rock voids during this blading operation. Excessive soil and rock fine particles preventing interlock of cobble and boulder sized rock should be prohibited. Rock fill should be consolidated by a minimum of three (3) passes of a large diameter self-propelled vibratory compactor. Terminal fill slopes using rock may be constructed 1.5 horizontal to 1 vertical for fill height of 15 feet

or less. The testing of rock fill quality should include the requirements that a representative of the Geotechnical Engineer be present daily, but not necessarily continuously during the placement of the fill to observe the placement of rock fill in order to determine fill quality and to observe that the contractors work sequence is in compliance with this specification. Progress reports indicative of the quality of the fill should be made at regular intervals to the Owner. If improper placement procedures are observed during the placement of the fill the Geotechnical Engineer should inform the Contractor, and no additional fill should be permitted on the affected area until the condition causing the low densities has been corrected and the fill has been reworked to obtain sufficient density.

7.7 Compaction Requirements

Item	Description
Subgrade Scarification Depth	At least 8 inches
Fill Lift Thickness	8-inch (loose)
Compaction Requirements ¹	95% Standard Proctor Density (ASTM D-698)
Moisture Content	± 2% optimum moisture for CL, SC, or GC soil types; or 0 to 4% above optimum for CL-CH or CH soil types
Recommended Testing Frequency	- One (1) Field Density (compaction) test for each 2,500 sq. ft. of fill within structure areas; and - A minimum of three (3) tests per lift.
1. We recommend that engineered fill (including scarified compacted subgrade) be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.	

7.8 Landscaping & Site Drainage

Rapid, efficient runoff away from the Columbarium area should also be provided. In addition, landscaping requiring frequent watering should be prohibited adjacent to Columbarium foundations.

In addition, provisions should be implemented to reduce the potential for large fluctuations in moisture within the subgrade soils adjacent to the structure. Ponding of surface water immediately adjacent to the structure can significantly increase subgrade moisture and may result in undesirable subgrade movement. As previously

mentioned, careful consideration should be given to the landscaping and drainage elements to be installed at the project site adjacent to structure areas. **Trees and some large bushes can draw significant moisture from the subgrade soils, resulting in shrinkage and subsequent foundation movement.**

7.9 Earthwork Construction Considerations

Once grading and filling operations have been completed, the moisture within the subgrade should be maintained, and soils should not be allowed to dry and desiccate prior to construction of floor slabs and footings. Grading of the site should be performed in such a manner that ponding of surface water on prepared subgrade or in excavations is avoided. During construction, if the prepared subgrade should become frozen, desiccated, saturated, or disturbed, the affected material should be scarified or removed, moisture conditioned, and recompact prior to floor slab construction.

7.10 Excavations

Based upon the subsurface conditions encountered during this investigation, the on-site soils typically classify as Type C in accordance with OSHA regulations. Temporary excavations in soils classifying as Type C with a total height of less than 20 feet should be cut no steeper than 1.5H:1V in accordance with OSHA guidelines. If stable limestone bedrock is encountered in excavations, the bedrock may be cut to near vertical sidewalls. Confirmation of soil classification during construction, as well as construction safety (including shoring, if required), is the responsibility of the contractor.

8.0 FOUNDATIONS

8.1 Structure Foundations

Based upon the subsurface conditions encountered near the proposed Columbarium structure and anticipated site grading, footings for the proposed structure are anticipated to bear in stiff natural soils or controlled fill. If shallow rock is encountered

the shallow rock should be over excavated and replaced to provide a cushion as described in Section 7.6.

Please refer to the section below for recommendations regarding shallow foundations.

8.2 Shallow Foundation Design Recommendations

Description	Column (Spread Footing)	Wall (Continuous Footing)
Net allowable bearing pressure ¹	Native Soil/Controlled Fill: 2,500 psf	Native Soil/Controlled Fill: 2,000 psf
Minimum dimensions	2.5 feet	1.5 feet
Minimum embedment below finished grade for frost protection ² (footings on soil) Per City of Springfield and 2018 IBC Specifications	2.0 feet	2.0 feet
Minimum embedment below finished grade for variation in soil moisture ² (footings on soil)	2.5 feet	2.5 feet
Estimated total settlement ³	1 inch or less	1 inch or less
Allowable passive pressure ⁴	600 psf	600 psf
Coefficient of sliding friction ⁵	0.4 (natural soils/controlled fill)	0.4 (natural soils/controlled fill)
1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The recommended pressure considers all unsuitable and/or soft or loose soils, if encountered, are undercut and replaced with tested and approved new engineered fill. Footing excavations should be free of loose and disturbed material, debris, and water when concrete is placed. A factor of safety value of 3 has been applied to these values. 2. For perimeter footings and footings beneath unheated areas. 3. The foundation movement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. 4. Allowable passive pressure value considers a factor of safety of about 2. Passive pressure value applies to undisturbed native clay or properly compacted fill. If formed footings are constructed, the space between the formed side of a footing and excavation sidewall should be cleaned of all loose material, debris, and water and backfilled with tested and approved fill compacted to at least 95% of the material's Standard Proctor dry density. Passive resistance should be neglected for the upper 2.0 feet of the soil below the final adjacent grade due to strength loss from freeze/thaw and shrink/swell. 5. Coefficient of friction value is an ultimate value and does not contain a factor of safety.		

8.3 Uplift

Resistance of shallow spread footings to uplift (U_p) may be based upon the dead weight of the concrete footing structure (W_c) and the weight of soil backfill contained in an inverted cone or pyramid directly above the footings (W_s). The following parameters may be used in design:

Description	Weights
Weight of Concrete (W_c)	150 pcf
Weight of Soil Resistance (W_s)	100 pcf
Weight for on-site soils placed in accordance with <u>Section 7</u>	

The base of the cone or pyramid should be the top of the footing and the pyramid or cone sides should form an angle of 30 degrees with the vertical. Allowable uplift capacity (U_p) should be computed as the lesser of the two (2) equations listed below:

$$U_P = (W_s/2.0) + (W_c/1.25) \text{ or } U_P = (W_s + W_c)/1.5$$

9.0 SEISMIC CONSIDERATIONS

Code Used	Site Classification
2018 International Building Code (IBC) ¹	C
1. In general accordance with the <i>2018 International Building Code</i> , Section 1613	

10.0 FLOOR SLABS

A slab-on-grade or slab-on-fill floor system is considered appropriate at the site based upon subsurface conditions encountered and future site grading. Listed below are key considerations for design purposes of the floor slab.

- Floor slabs can be designed based on a modulus of subgrade reaction as noted below:
 - Native soils/new controlled soil fill passing a proof-roll: 150 psi/in.;
 - New controlled fill consisting of cherty clays/clayey gravels: 200 psi/in.; or
 - New controlled fill consisting of crushed limestone/dolomite: 225 psi/in.
- Prior to placement of **controlled** fill, if any, natural soils should be scarified, moisture content adjusted, and re-compacted in accordance with Section 7 of this report; and
- Prior to slab placement, soil moisture should be adjusted and maintained within the parameters specified in Section 7 of this report.

Placement of 4 or more inches of compacted free-draining granular base course below slabs that are not below grade is recommended to limit moisture rise through slabs and to improve slab support, particularly at joints. An impervious moisture barrier consisting of 6-mil plastic sheeting or equivalent should be provided in accordance with the 2018 IBC. Use of a 10-mil vapor barrier is recommended below all slab areas with an intended use sensitive to slab moisture.

11.0 CONSTRUCTION OBSERVATION & TESTING

The construction process is an integral design component with respect to the geotechnical aspects of a project. Since geotechnical engineering is influenced by variable depositional and weathering processes, and because we sample only a small portion of the soils affecting the performance of the proposed Columbarium Expansion, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the Geotechnical Engineer the opportunity to evaluate assumptions made during the design process. Therefore, we recommend that PPI be kept apprised of design modifications and construction schedule of the proposed project to observe compliance with the design concepts and geotechnical recommendations, and to allow design changes in the event that subsurface conditions or methods of construction differ from those assumed while completing this study. We recommend that during construction all earthwork be monitored by a representative of PPI, including site preparation, placement of all engineered fill and trench backfill, and all foundation excavations as outlined below.

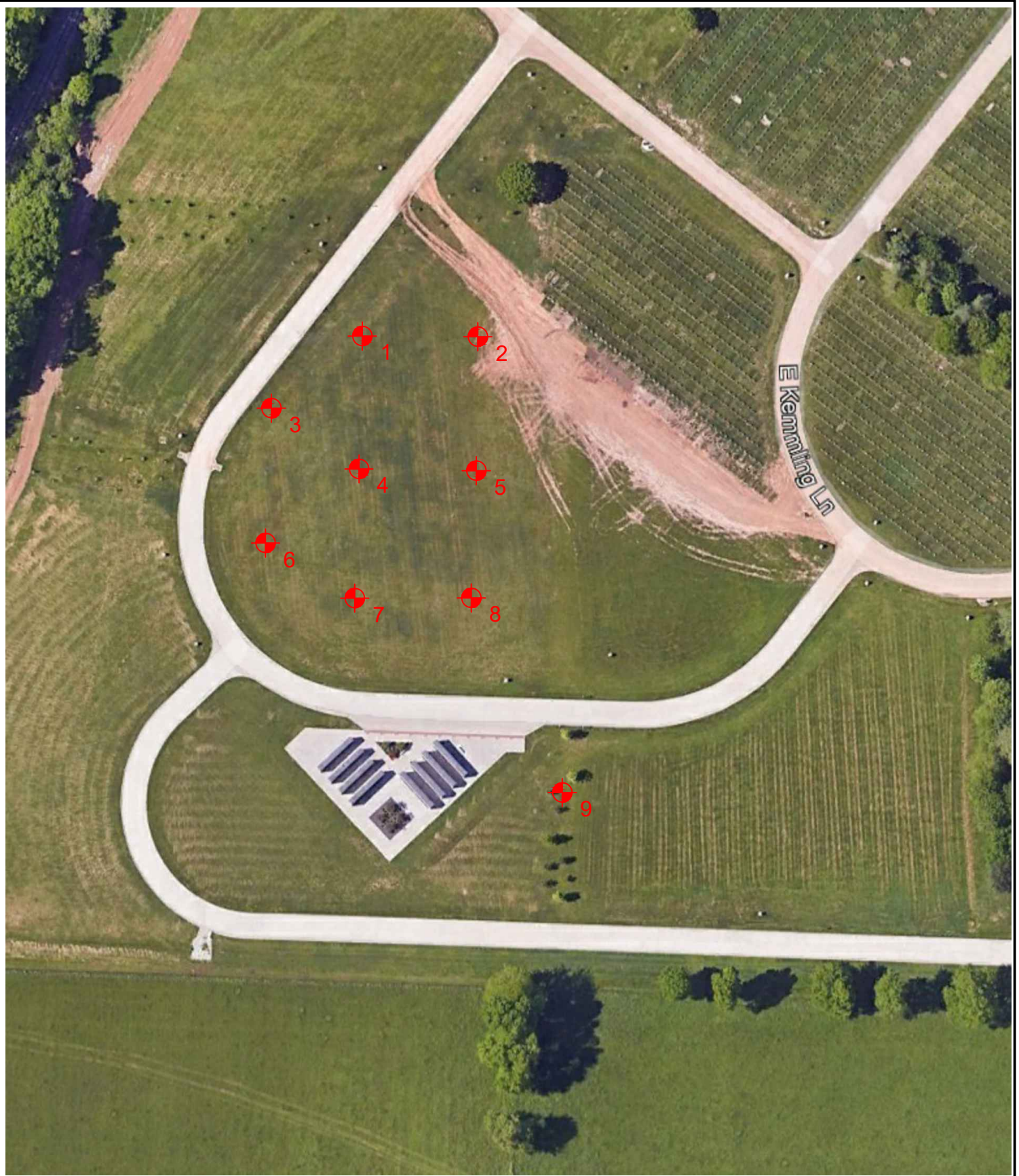
- An experienced Geotechnical Engineer or Engineering Technician of PPI should observe the subgrade throughout the proposed project site immediately following stripping to evaluate the native clay, identify areas requiring undercutting, and evaluate the suitability of the exposed surface for fill placement;
- An experienced Engineering Technician of PPI should monitor and test all fill placed within the structure area to determine whether the type of material, moisture content, and degree of compaction are within recommended limits;

- An experienced Technician or Engineer of PPI should observe and test all footing excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays; and
- The condition of the subgrade should be evaluated immediately prior to construction of the structure floor slabs to determine whether the moisture content and relative density of the subgrade soils are as recommended.

12.0 REPORT LIMITATIONS

This report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc. observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgment concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.

APPENDIX I - FIGURES



LEGEND

 Boring Location

SCALE
1" = 100'

Project: Missouri Veterans Cemetery Additions - Springfield, Missouri
Client: Archimages, Inc.

Boring Location Plan

DATE: April 9, 2026

Project Number: 26-0970



PALMERTON & PARRISH, INC.
GEOTECHNICAL AND MATERIALS ENGINEERS/
MATERIALS TESTING LABORATORIES / ENVIRONMENTAL SERVICES

FIGURE 1

APPENDIX II - BORING LOGS & KEY TO SYMBOLS



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GEOTECHNICAL BORING LOG

BORING NUMBER

1

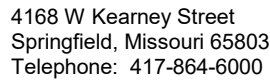
PAGE 1 OF 1

CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	N VALUE	PL	MC	LL	SHEAR STRENGTH (ksf)	ELEVATION (ft)
								20	40	60	80	100		
								20	40	60	80			
								20	40	60	80			
0.0			TOPSOIL, Grass Covered (6")											
			0.5 ft											
			LEAN CLAY, Red Brown, Moist (CL)											
2.5														
			4.0 ft											
			FAT CLAY, Red, Moist (CH)											
5.0														
7.5														
10.0														

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.



BORING NUMBER

PAGE 1 OF 1

NOTES

10.0

Bottom of borehole at 10.0 feet.



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CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 4/9/26 11:01 - S:_MASTER PROJECT FILE\2026\ MO\ARCHIMAGES INC-26-0970-MO VETERANS CEMETERY ADDITIONS-SPFLD, MO-SUBBORING LOGS\26-0970 BORING LOGS.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80			
										20 40 60 80		
0.0			GRAVELLY LEAN CLAY, Brown, Moist (CL)									
			1.0 ft									
			LEAN CLAY, Red Brown, Moist (CL)									
2.5												
5.0			GRAVELLY FAT CLAY, Red, Moist (CH)									
			5.0 ft									
7.5												
10.0			10.0 ft									

10.0

Bottom of borehole at 10.0 feet.



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GEOTECHNICAL BORING LOG

BORING NUMBER

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PAGE 1 OF 1

CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80			
										20 40 60 80		
											1 2 3 4	
0.0			GRAVELLY LEAN CLAY, Brown, Moist, Grass Covered (CL)									
			1.0 ft									
			LEAN CLAY, Brown Red, Moist (CL)									
2.5												
5.0												
7.5												
			8.8 ft									
			LIMESTONE, Weathered									
			9.2 ft									

Refusal at 9.2 feet.
Bottom of borehole at 9.2 feet.

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 4/9/26 11:01 - S:_MASTER PROJECT FILE\2026\ MOVAARCHIMAGES INC-26-0970-MO VETERANS CEMETERY ADDITIONS-SPFLD, MO-SUBBORING LOGS\26-0970 BORING LOGS.GPJ



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GEOTECHNICAL BORING LOG

BORING NUMBER

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PAGE 1 OF 1

CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80			
										20 40 60 80		
0.0			TOPSOIL, Grass Covered (3")									
			LEAN TO FAT CLAY, Brown Red, Moist (CL-CH)									
2.5			FAT CLAY, Red, Moist (CH)									
5.0												
7.5			LIMESTONE, Pinnacle, Weathered									
8.5												

Refusal at 8.5 feet.
Bottom of borehole at 8.5 feet.

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 4/9/26 11:01 - S:_MASTER PROJECT FILE\2026\ MOVAARCHIMAGES INC-26-0970-MO VETERANS CEMETERY ADDITIONS-SPFLD, MO-SUBBORING LOGS\26-0970 BORING LOGS.GPJ



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GEOTECHNICAL BORING LOG

BORING NUMBER

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PAGE 1 OF 1

CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	♦ DRY UNIT WT (pcf) ♦	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80			
0.0			FILL - LEAN CLAY, Brown, Moist, Grass Covered (CL)									
			1.0 ft									
			LEAN CLAY, Red Brown, Moist (CL)									
2.5												
			4.0 ft									
			FAT CLAY, Red, Moist (CH)									
5.0												
7.5												
10.0												

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.



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GEOTECHNICAL BORING LOG

BORING NUMBER

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CLIENT	Archimages, Inc.	PROJECT NAME	Missouri Veterans Cemetery - New Additions
PROJECT NO.	26-0970	PROJECT LOCATION	Springfield, Missouri
DATE STARTED	3/25/26	COMPLETED	3/25/26
DRILLER	MR	DRILL RIG	2008 CME 55
HAMMER TYPE	Auto	GROUND WATER LEVELS	
LOGGED BY	BC/StP	AT TIME OF DRILLING	None
CHECKED BY	TA	AT END OF DRILLING	
NOTES			

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80			
0.0			LEAN CLAY, Brown, Moist, Grass Covered (CL)									
			1.0 ft									
			LEAN CLAY, Red Brown, Moist (CL)									
2.5			3.0 ft									
			FAT CLAY, Red, Moist (CH)									
5.0												
7.5												
10.0												

CFA - 4.5" O.D.

Bottom of borehole at 10.0 feet.



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GEOTECHNICAL BORING LOG

BORING NUMBER

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PAGE 1 OF 1

CLIENT Archimages, Inc.

PROJECT NAME Missouri Veterans Cemetery - New Additions

PROJECT NO. 26-0970

PROJECT LOCATION Springfield, Missouri

DATE STARTED 3/25/26

COMPLETED 3/25/26

SURFACE ELEVATION BENCHMARK EL.

DRILLER MR

DRILL RIG 2008 CME 55

GROUND WATER LEVELS

HAMMER TYPE Auto

AT TIME OF DRILLING None

LOGGED BY BC/StP

CHECKED BY TA

AT END OF DRILLING

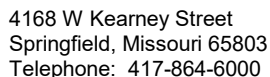
NOTES

BORING LOG - PPI - PPI STD TEMPLATE.GDT - 4/9/26 11:01 - S:_MASTER PROJECT FILE\2026\ MOVAARCHIMAGES INC-26-0970-MO VETERANS CEMETERY ADDITIONS-SPFLD, MO-SUBBORING LOGS\26-0970 BORING LOGS.GPJ

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆	▲ N VALUE ▲	PL MC LL	■ SHEAR STRENGTH (ksf) ■	ELEVATION (ft)
								20 40 60 80 100	20 40 60 80	20 40 60 80		
0.0			GRAVELLY LEAN CLAY, Brown, Moist, Grass Covered (CL)									
			1.5 ft									
			GRAVELLY LEAN CLAY, Brown Red, Moist (CL)									
2.5												
			4.0 ft									
			GRAVELLY FAT CLAY, Red, Moist (CH)									
5.0												
7.5												
10.0												

10.0

Bottom of borehole at 10.0 feet.



GEOTECHNICAL BORING LOG

BORING NUMBER

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CLIENT Archimages, Inc.

PROJECT NAME Missouri Veterans Cemetery - New Additions

PROJECT NO. 26-0970

PROJECT LOCATION Springfield, Missouri

DATE STARTED 3/25/26

COMPLETED 3/25/26

SURFACE ELEVATION	BENCHMARK EL.
-------------------	---------------

DRILLER MR

DRILL RIG 2008 CME 55

GROUND WATER LEVELS

HAMMER TYPE Auto

AT TIME OF DRILLING None

LOGGED BY BC/StP

CHECKED BY TA

AT END OF DRILLING

NOTES

DEPTH (ft)	DRILLING METHOD	STRATA SYMBOL	MATERIAL DESCRIPTION Unified Soil Classification System	SAMPLE TYPE NUMBER	RECOVERY % (RQD %)	CORRECTED BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	◆ DRY UNIT WT (pcf) ◆				ELEVATION (ft)
								▲ N VALUE ▲				
								PL MC LL				
								■ SHEAR STRENGTH (ksf) ■				
0.0	CFA - 4.5" O.D.		LEAN CLAY, Trace Gravel, Brown, Stiff, Moist (CL)			6-6-7 (13)	1					
2.5												
				3.4 ft		0						
			CLAYEY GRAVEL, w/ Sand, Brown Tan, Dense, Moist (GC)			18-23-26 (49)	1.75					
5.0				6.0 ft								
			FAT CLAY, Trace Gravel, Red, Medium Stiff, Moist (CH) - No Recovery on 6' SPT Sample. Auger Cuttings Collected			5-4-1 (5)						
7.5												
						2-62/5"	1.25					
			- Auger Refusal on Apparent Limestone Refusal at 9.4 feet. Bottom of borehole at 9.4 feet.									



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KEY TO SYMBOLS

CLIENT Archimages, Inc.

PROJECT NAME Missouri Veterans Cemetery - New Additions

PROJECT NO. 26-0970

PROJECT LOCATION Springfield, Missouri

LITHOLOGIC SYMBOLS

(Unified Soil Classification System)



CH: USCS High Plasticity Clay



CHG: USCS High Plasticity Gravelly Clay



CL: USCS Low Plasticity Clay



CL-CH: USCS Low to High Plasticity Clay



CLG: USCS Low Plasticity Gravelly Clay



FILL: Fill (made ground)



GC: USCS Clayey Gravel



LIMESTONE PINNACLE & CH:
Limestone Pinnacle Next to USCS Fat Clay



TOPSOIL: Topsoil



WEATHERED LIMESTONE: Weathered Limestone

SAMPLER SYMBOLS



Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time Drilling, or as Shown
▼ Water Level at End of Drilling, or as Shown
▽ Water Level After 24 Hours, or as Shown

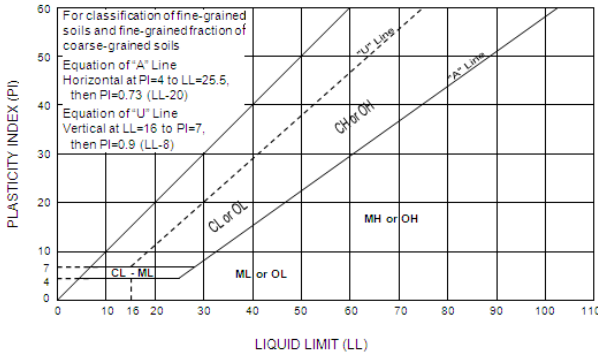
APPENDIX III - GENERAL NOTES

GENERAL NOTES

SOIL PROPERTIES & DESCRIPTIONS

COHESIVE SOILS

Consistency	Unconfined Compressive Strength (Qu)	Pocket Penetrometer Strength	N-Value
	(psf)	(tsf)	(blows/ft)
Very Soft	<500	<0.25	0-1
Soft	500-1000	0.25-0.50	2-4
Medium Stiff	1001-2000	0.50-1.00	5-8
Stiff	2001-4000	1.00-2.00	9-15
Very Stiff	4001-8000	2.00-4.00	16-30
Hard	>8000	>4.00	31-60
Very Hard			>60



Group Symbol	Group Name
CL	Lean Clay
ML	Silt
OL	Organic Clay or Silt
CH	Fat Clay
MH	Elastic Silt
OH	Organic Clay or Silt
PT	Peat
CL-CH	Lean to Fat Clay

Plasticity		Moisture	
Description	Liquid Limit (LL)	Descriptive Term	Guide
Lean	<45%	Dry	No indication of water
Lean to Fat	45-49%	Moist	Indication of water
Fat	≥50%	Wet	Visible water

Fine Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: SILT, LEAN CLAY, FAT CLAY, ELASTIC SILT Sandy, gravelly, abundant cobbles, abundant boulders with sand, with gravel, with cobbles, with boulders scattered sand, scattered gravel, scattered cobbles, scattered boulders a trace sand, a trace gravel, a few cobbles, a few boulders	PRIMARY CONSTITUENT >30-50] >15-30] – secondary coarse grained constituents 5-15] <5]
The relationship of clay and silt constituents is based on plasticity and normally determined by performing index tests. Refined classifications are based on Atterberg Limits tests and the Plasticity Chart.	

NON-COHESIVE (GRANULAR) SOILS

RELATIVE DENSITY	N-VALUE	MOISTURE CONDITION	
		Descriptive Term	Guide
Very Loose	0-4	Dry	No indication of water
Loose	5-10	Moist	Damp but no visible water
Medium Dense	11-24	Wet	Visible free water, usually soil is below water table.
Dense	25-50		
Very Dense	≥51		

**GRAIN SIZE IDENTIFICATION		
Name	Size Limits	Familiar Example
Boulder	12 in. or more	Larger than basketball
Cobbles	3 in. to 12 in.	Grapefruit
Coarse Gravel	¾-in. to 3 in.	Orange or lemon
Fine Gravel	No. 4 sieve to ¾-in.	Grape or pea
Coarse Sand	No. 10 sieve to No. 4 sieve	Rock salt
Medium Sand	No. 40 sieve to No. 10 sieve	Sugar, table salt
Fine Sand*	No. 200 sieve to No. 40 sieve	Powdered sugar
Fines	Less than No. 200 sieve	

*Particles finer than fine sand cannot be discerned with the naked eye at a distance of 8 inches.

Coarse Grained Soil Sub Classification	Percent (by weight) of Total Sample
Terms: GRAVEL, SAND, COBBLES, BOULDERS Sandy, gravelly, abundant cobbles, abundant boulders with gravel, with sand, with cobbles, with boulders scattered gravel, scattered sand, scattered cobbles, scattered boulders a trace gravel, a trace sand, a few cobbles, a few boulders Silty (MH & ML)*, clayey (CL & CH)* (with silt, with clay)* (trace silt, trace clay)*	PRIMARY CONSTITUENT >30-50] >15-30] – secondary coarse grained constituents 5-15] <5] <15] 5-15] – secondary fine grained constituents <5]
*Index tests and/or plasticity tests are performed to determine whether the term "silt" or "clay" is used.	

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

GENERAL NOTES

BEDROCK PROPERTIES & DESCRIPTIONS

ROCK QUALITY DESIGNATION (RQD)	
Description of Rock Quality	*RQD (%)
Very Poor	< 25
Poor	25-50
Fair	50-75
Good	75-90
Excellent	90-100
*RQD is defined as the total length of sound core pieces 4 in. or greater in length, expressed as a percentage of the total length cored. RQD provides an indication of the integrity of the rock mass and relative extent of seams and bedding planes.	

SCALE OF RELATIVE ROCK HARDNESS		
Term	Field Identification	Approx. Unconfined Compressive Strength (tsf)
Extremely Soft	Can be indented by thumbnail	2.6-10
Very Soft	Can be peeled by pocket knife	10-50
Soft	Can be peeled with difficulty by pocket knife	50-260
Medium Hard	Can be grooved 2 mm deep by firm pressure of knife	260-520
Moderately Hard	Requires one hammer blow to fracture	520-1040
Hard	Can be scratched with knife or pick only with difficulty	1040-2610
Very Hard	Cannot be scratched by knife or sharp pick	>2610

DEGREE OF WEATHERING	
Slightly Weathered	Rock generally fresh, joints stained and discoloration extends into rock up to 25mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered	Rock mass is decomposed 50% or less, significant portions of 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.

GRAIN SIZE (TYPICALLY FOR SEDIMENTARY ROCKS)		
Description	Diameter (mm)	Field Identification
Very Coarse Grained	>4.76	Individual grains can easily be distinguished by eye.
Coarse Grained	2.0-4.76	
Medium Grained	0.42-2.0	Individual grains can be distinguished by eye.
Fine Grained	0.074-0.42	Individual grains can be distinguished by eye with difficulty.
Very Fine Grained	<0.074	Individual grains cannot be distinguished by unaided eye.

VOIDS	
Pit	Voids barely seen with the naked eye to 6mm *1/4-inch)
Vug	Voids 6 to 50mm (1/4 to 2 inches) in diameter
Cavity	50 to 6000mm (2 to 24 inches) in diameter
Cave	> 600mm

BEDDING THICKNESS	
Very Thick Bedded	> 3' Thick
Thick Bedded	1' to 3' Thick
Medium Bedded	4" to 1' Thick
Thin Bedded	1-1/4" to 4" Thick
Very Thin Bedded	1/2" to 1-1/4" Thick
Thickly Laminated	1/8" to 1/2" Thick
Thinly Laminated	1/8" or less (paper thin)

DRILLING NOTES

Drilling & Sampling Symbols		
NQ – Rock Core (2-inch diameter)	CFA- Continuous Flight (Solid Stem) Auger	WB – Wash Bore or Mud Rotary
HQ – Rock Core (3-inch diameter)	SS – Split Spoon Sampler	TP – Test Pit
HSA – Hollow Stem Auger	ST – Shelby Tube	HA – Hand Auger
Soil Sample Types		
Shelby Tube Samples: Relatively undisturbed soil samples were obtained from the borings using thin wall (Shelby) tube samplers pushed hydraulically into the soil in advance of drilling. This sampling, which is considered to be undisturbed, was performed in accordance with the requirements of ASTM D 1587. This type of sample is considered best for the testing of "in-situ" soil properties such as natural density and strength characteristics. The use of this sampling method is basically restricted to soil containing little to no chert fragments and to softer shale deposits.		
Split Spoon Samples: The Standard Penetration Test is conducted in conjunction with the split-barrel sampling procedure. The "N" value corresponds to the number of blows required to drive the last 1 foot of an 18-inch long, 2-inch O.D. split-barrel sampler with a 140 lb. hammer falling a distance of 30 inches. The Standard Penetration Test is carried out according to ASTM D-1586.		
Water Level Measurements		
Water levels indicated on the boring logs are levels measured in the borings at the times indicated. In permeable materials, the indicated levels may reflect the location of groundwater. In low permeability soils, shallow groundwater may indicate a perched condition. Caution is merited when interpreting short-term water level readings from open bore holes. Accurate water levels are best determined from piezometers.		
Automatic Hammer		
Palmerton and Parrish, Inc.'s CME's are equipped with automatic hammers. The conventional method used to obtain disturbed soil samples used a safety hammer operated by company personnel with a cat head and rope. However, use of an automatic hammer allows a greater mechanical efficiency to be achieved in the field while performing a Standard Penetration resistance test based upon automatic hammer efficiencies calibrated using dynamic testing techniques.		

*Modified after Ref. ASTM D2487-93 & D2488-93

**Modified after Ref. Oregon DOT 1987 & FHWA 1997

***Modified after Ref. AASHTO 1988, DM 7.1 1982, and Oregon DOT 1987

APPENDIX IV - GRAIN SIZE ANALYSIS

GRAIN SIZE - PPI STD TEMPLATE.GDT - 4/7/26 14:40 - \\MAIN-SERVER\NETWORK\SHARED\ MASTER PROJECT FILE\2026\ MO\ARCHIMAGES INC-26-0970-MO VETERANS CEMETERY ADDITIONS-SPFLD. MO-SUBBORING LOGS\26-0970 BORING LOGS.GPJ



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Springfield, MO
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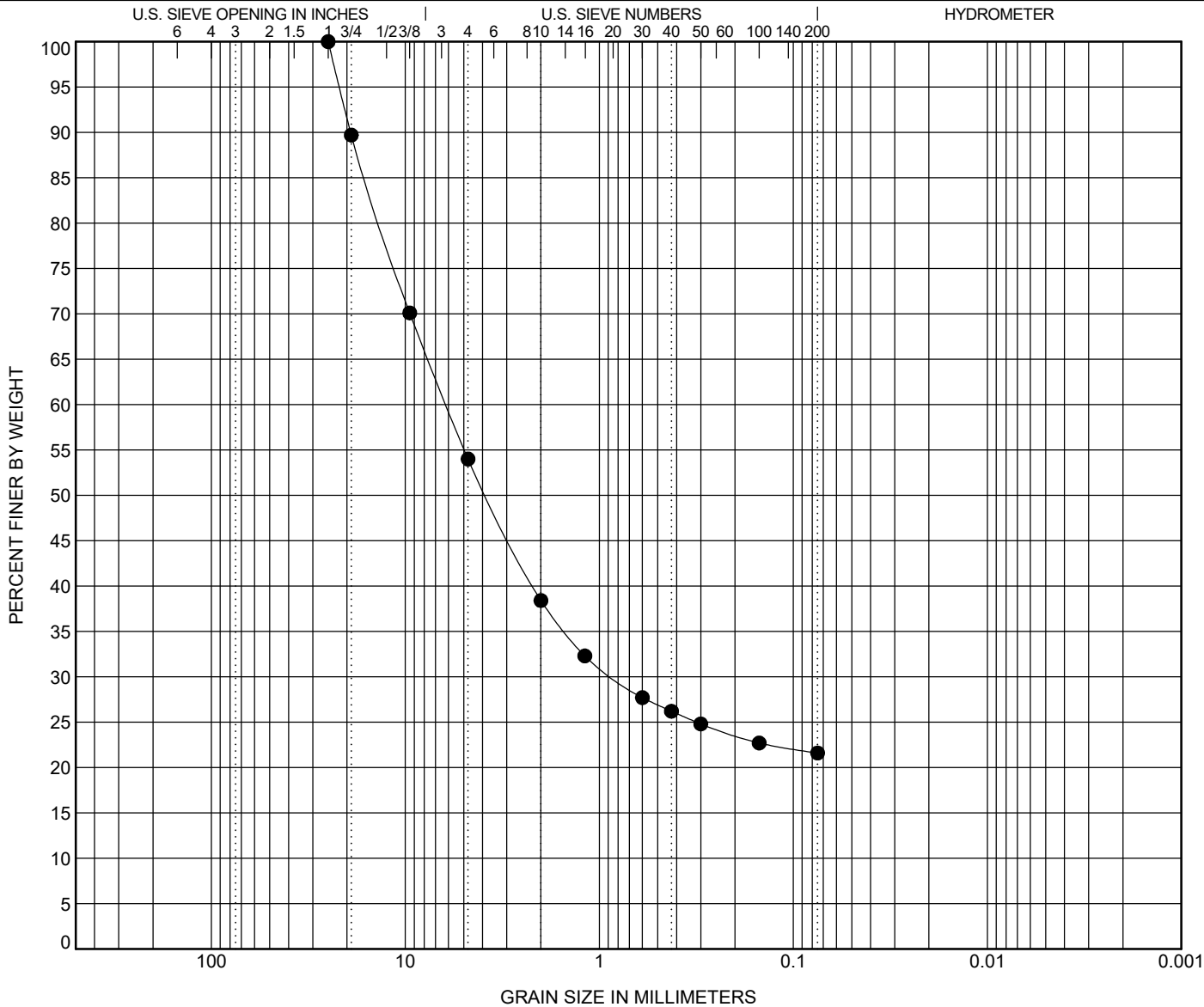
GRAIN SIZE DISTRIBUTION

CLIENT Archimages, Inc.

PROJECT NAME Missouri Veterans Cemetery - New Additions

PROJECT NO. 26-0970

PROJECT LOCATION Springfield, Missouri



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● 9	3.4	CLAYEY GRAVEL with SAND(GC)									
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt		%Clay	
● 9	3.4	25	6.15	0.844		46.0	32.4	21.6			

APPENDIX V - IMPORTANT INFORMATION REGARDING YOUR GEOTECHNICAL REPORT

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be, and, in general, if you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying it.* A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



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