SECTION 31 23 00

EXCAVATION AND BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Furnish labor and materials for all work under this section.

1.2 RELATED SECTIONS

A. Construction Manager's Manual – Proposal for Lump Sum Contract: Unit Prices

B. Section 01 22 13 – Measurement & Payment

C. Section 01 40 00 – Quality Control: Required Special Inspections

D. Section 02 32 00 – Earthwork

E. Section 03 30 00 – Cast-In-Place Concrete

F. Section 31 11 00 - Site Preparation

G. Section 31 22 00 - Site Grading

H. Section 32 11 16 - Crushed Stone Base Course

I. Section 32 92 19 – Seeding

J. Section 32 92 20 – Hydroseeding

K. Section 32 92 23 – Sodding

1.3 SOILS VERIFICATION

A. The **Contractor** shall be responsible for having, UES Professional Solutions 25, LLC, Springdale, AR, the registered soils engineer, present on site to examine and conduct tests of soils preparation and construction per IBC required special inspections including filling and grading. The soils engineer shall inspect excavations for foundations, footings, and paving areas perform bearing testing, and will submit a report to general contractor with a copy to the Architect stating conditions observed meet or exceed the limits found in the specifications and are consistent with acceptable construction practices. Construction shall not begin before report is received by the Architect. **Contractor** shall be responsible for any costs for meeting these requirements. **Contractor** shall coordinate inspections, testing, and observation with soils engineer.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.1 TOPSOIL AND UNSUITABLE SOILS EXCAVATION

A. Strip off topsoil (4”-6”) and organic material refer to soils report, at new building, building addition, paving, equipment pads, sidewalks and plaza areas. Remove all vegetation, rocks, and any soft soils. Grading to extend a minimum of 5’ pasta building lines. Haul away and dispose of unsuitable fill material and excess excavated topsoil material off site. Excavate to minimum thicknesses as follows:
   1. Locker Room Building: at footings only excavate to stratum II material an average of +/- 2’-6”, ranging from 1’-6” to 3’-6” of material after topsoil removal. Excavation width to be footing width plus a 1 horizontal unit to 2 vertical units projection from the footing edge. At higher existing elevations, remove additional material beyond topsoil & organics at building pad as needed to reach sub-grade elevation. See 3.6 for flowable fill option.
   2. Music Classroom Addition including exterior ramps and retaining walls: At higher existing elevations, remove additional material beyond topsoil and organics at building pad as needed to reach subgrade elevation.
   3. Concrete Paving area south of locker room building: excavate to subgrade elevation
   4. Sidewalks: excavate to subgrade elevation.

B. After stripping unsuitable soils as described in soils report to required depth (refer to “Preparation Of Original Earth” section), the entire building area, drives, walks, and all areas to be paved shall be proof-rolled with a loaded rubber-tired tandem-axle dump truck or scraper weighing at least 25 tons, and any soft soils are to be undercut and replaced with properly compacted fill. Soils engineer shall be present when proof rolling is being performed.

C. Retain sufficient topsoil on site to accomplish final grading.

D. Use no topsoil for compacted fill inside building perimeter.

E. Use no on-site excavated material for fill inside building perimeter, below footings, or behind retaining walls.

F. If insufficient topsoil on site, furnish good topsoil, approved by Architect, for finish grading and planting areas.

3.2 EARTH EXCAVATION

A. Excavation for walks, pavements, curbs, gutters, roof drainage, conductors, retaining walls, building volume below grade, underfill below slabs on grade, foundation walls, footings and other items indicated by drawings or otherwise necessary for construction.

B. Excavate to elevations and dimensions indicated, plus minimum, yet sufficient, space to permit erection of forms, shoring, drain tile waterproofing, masonry and the inspection of foundations.

C. Dress earth banks and bottoms for footings forms. At locker room building bear footings on engineered fill. At music addition bear footing on undisturbed soil Stratum I at elevations shown on drawings.

D. Ensure all exterior footing excavations are below frost line at a minimum of 24" below final finish grade.

E. If footings occur in poor materials at footing depths indicated (as determined by soils engineer), over excavate as required and compact with approved fill compacted to 98% of standard Proctor density (ASTM D-698).

F. Remove any existing foundations, footings, piers, and other construction found in the area of new construction.

G. Material to be excavated is assumed to be earth and other materials that can be removed with a Caterpillar D-8 Dozer with single tooth ripper (mass grading), a Caterpillar 330B tracked excavator equipped with rock teeth (utility trenches) or equipment of similar power and capability. If unanticipated rock is encountered within limits of excavation, contractor shall immediately notify Architect and not proceed further until instructions are given and measurements made for purpose of establishing volume of rock excavation. Rock is defined as any stone or boulders that cannot be removed with the use of a Caterpillar D-8 Dozer with single tooth ripper (mass grading), a Caterpillar 330B tracked excavator equipped with rock teeth (utility trenches) or equipment of similar power and capability.

H. Only as a last resort, should explosives be used. Should explosives be necessary, work shall be done by experienced powder men using small charges and in strict accordance with all regulations governing this work. Contractor secure permits required for such work and correct any damage to foundations and/or property caused by improper use of explosives at his expense. Architect to be notified and approval granted before explosives are allowed.

I. Specifically notify Architect to inspect excavations, and receive the Architect’s approval before placing concrete.

J. Provide unit price for rock excavation on Bid Form. Rock shall be measured per cubic yard for rock in place. This shall include associated costs for quantity verification by soils engineer.

K. Provide unit prices for engineered fill/placement/compaction and existing earth excavation/removal/haul-off in spaces provided on Bid Form. This shall include associated costs for quantity verification by soils engineer. These unit prices are for

Owner's information only. Provide all fill and cut in contract as required to meet requirements shown on drawings and specifications.

3.3 PREPARATION OF ORIGINAL EARTH

A. Floor slab areas should be stripped of all surface vegetation, topsoil and unsuitable soil to depths as called for in paragraph 3.1. Any soft or unstable materials should be removed and replaced with engineered fill. The subgrade should then be compacted to at least 98 percent of the material's maximum laboratory dry density determined in accordance with ASTM Specification D-698, the Standard Proctor procedure.

B. Remove all topsoil below areas to receive sidewalks. Bear concrete sidewalks on natural earth or engineered fill as required to meet elevations as shown on grading plan.

3.4 FILL MATERIAL AND GRADING

A. Place imported engineered fill material beneath the slab as required to meet subgrade elevations is in addition to granular under slab fill.

B. Bear concrete sidewalks on natural earth after removal of top soil or engineered fill as required to meet elevations as shown on grading plan. Thickness as required to meet subgrade elevations is in addition to 4"granular under slab fill.

C. Locker room building footings to bear on engineered fill. The over excavation of existing low strength materials should extend a sufficient distance beyond the edge of the building such that the engineered fill placed beneath footings will extend laterally beyond the edge of the footing at least 1 unit horizontal for 2 units vertical of engineered fill placed beneath the footing.

D. At music addition footings to bear in native soils consisting of Stratum I or II.

E. Excavations resulting from the removal of existing site features should be cleaned of loose material and properly back filled as recommended in this report.

F. If soils engineer determines less fill material or more is required, it shall be provided or deducted from contract. Refer to proposal form for unit pricing.

G. In general, place no interior or exterior fills less than 3 days after concrete forms for structure have been removed, and then only when approval is received from Architect.

H. Place fill in layers not exceeding 8" in loose thickness, thoroughly compacting with powered tamp. Moisture content of fill material is to be controlled to +/- 3 percent of optimum value as determined by ASTM D698. Compact fill material to a minimum of 98 percent of the maximum Standard Proctor dry density, ASTM Specification D-698.

I. All imported engineered fill to consist of approved, material that is free from organic matter and debris. Engineered fill shall have liquid limits less than 45. Imported borrow for engineered fill to consist of (hillside) sandy clay, silty/clayey gravel that classified as CL or GM by the Unified Soil Classification system materials that are required to be approved prior to their use. No rock greater than 6" shall be allowed in fill material. Submit test results of fill material from borrow pit proposed for use to Architect for approval prior to procurement.

J. Final fill under concrete floor slabs shall consist of 4 inches of granular sub-base material immediately below the concrete floor slab. Refer to Section 32 11 16 for base requirements below paving areas. The sub-base material shall be clean, washed, crushed limestone conforming to ASTM C33, Size 57, or equal spread level to allow for minimum required concrete thickness. The upper portion (approximately 2 inches) to be "choked" off with limestone fines or sand. Tamp tightly into place, prior to placement of termite treatment and vapor barrier. Crushed stone base to be compacted to a minimum of 95% of Modified Proctor (ASTM D1557 maximum dry density at moisture content close to optimum.

K. Backfill around foundations, grade beams, and retaining walls with debris-free earth having no stones larger than 3" and no frozen materials. Take precautions not to damage waterproofing membrane. Repair any damage to same.

L. Roll, tamp and otherwise compact other site fill.

M. Cut and fill with debris-free earth to bring lawn areas affected by this construction to approximately 4" below finish grades. Grade uniformly between elevations give and "round-out" any abrupt changes in slope during final grading operations.

N. Haul in additional earth required. Should there be an excess of excavated material, haul it to area off site.

O. Haul away and dispose of any surface rubble and debris.

P. Remove any groundwater accumulated in excavations prior to placement of concrete. Soils Engineer to verify conditions are acceptable and bearing capacity is at or exceeds specified bearing pressure

3.5 SHOT ROCK MATERIAL AND INSTALLATION
(Use only when recommended by soils engineer and approved by Architect)
(Provide Unit Price in space provided on Proposal Form.)

A. Shotrock shall be quarried sandstone,, Limestone, or other hard durable stone with a percent wear no greater than 50% by Los Angeles Test (AASHTO T 96) with angular or fractured faces with pieces no greater than 12-14 inches in any dimension, more than 40% greater than 8 inches in size, 10-30% passing the 3 inch sieve and no more than 15% passing the 0.5 inch sieve.

Screen Size	% Passing

12-14 inch	100
8 inch	60-100
3 inch	10-30
0.5 inch	0-15

B. Excavate to the planned depth.

C. Place first shot rock layer no deeper than the largest rock.

D. Force the shot rock into the soft soil until it becomes buried or refuses to penetrate into the soil.

E. Perform additional layers as described in #C and #D above until the shot rock is no longer accepted by the soil (this operation should be witnessed by the inspector).

F. Place and compact 1 inch base rock on top of the stabilized shot rock to fill any voids present.

G. Continue with planned construction.

3.6 CONTROLLED LOW STRENGTH MATERIAL (CLSM) / FLOWABLE FILL AND INSTALLATION

(Use only when recommended by soils engineer and approved by Architect)
(Provide Unit Price in space provided on Proposal Form.)
(May be bid as an alternate option to engineered fill below footings, eliminating the requirement for additional cut at 1 unit horizontal to 2 units vertical beyond footing, excavation can be limited to footing width)

A. CLSM fill to be 150 PSI minimum or meeting DOT specifications.

B. Excavate or over-excavate unsuitable soil per soils engineer's instruction to the required depth.

C. Following verification of required bearing by soils engineer, place CLSM to proper depth for footing bearing elevation

D. Construction shall continue after material has taken initial set, is stable, and does not displace under equipment; minimum of 24 hours.

3.7 TOPSOIL

A. After rough grading is completed and approved, scarify subsoil in areas to be lawns to a depth of 3" and place a layer of topsoil there over, providing additional topsoil required to give thickness specified.

B. Topsoil material: Fertile, natural topsoil, typical of locality, free from stones, debris, clay and weeds.

C. Topsoil minimum thicknesses: 4" seeded and sodded areas, 12” landscaped areas. (Adjust final cut and fill depth as required to accommodate lawn type.)

D. Fill to finish grade indicated, eliminate water pockets and irregularities, ready to receive seed or sod.

E. Finish site grading to be smooth throughout contours. Abrupt changes, uneven, or undulating grading will not be accepted unless shown as such on grading plan.

3.8 EXTENT OF FINISH GRADING

A. Cut, fill and grade to extent of contours and elevations indicated by drawings.

B. At building perimeter, keep finish grades generally 6” below finish floor elevation with exception of areas at drives and walks.

3.9 QUANTITY VERIFICATION

A. Contractor to be responsible for costs incurred by Surveyor Geotechnical Engineer, or other qualified individuals to verify quantity of rock or additional unsuitable soil removed. This shall be included in the unit price costs.

3.10 OBSERVATION AND SPECIAL INSPECTIONS

A. Soils cut and fill operations shall be observed periodically by the Architect/Engineer prior to placing of concrete footings and slabs, and paving. Inspection of soils bearing pressure, verification of soils, and cut/fill operations for conformance to the construction documents and IBC shall be performed by the designated third party Special Inspector.

3.10 TEST REQUIRED:

Contractor shall coordinate compaction tests on the building and paving areas from a recognized testing laboratory, approved by the Architect, at the following intervals. Contractor is to pay for compaction testing. **Location of each test shall be noted on report.**

A. Minimum three tests per each layer of fill placed, one per each 2,500 sq. ft. of building area.

B. Minimum three tests per each layer of fill placed, one per each 5,000 square feet of pavement area.

C. Density testing of any gravel or crushed stone base course with fines to be compacted to a minimum of 95 percent of the maximum Modified Proctor dry density, ASTM Specification D-1557 or any over-excavated footing is to be compacted to a minimum of 98 percent of the maximum Standard Proctor dry density, ASTM Specification D-698.

D. If any test results fall below required minimum, the testing company is required to contact Contractor and Architect immediately.

END OF SECTION