

PERFORMANCE SPECIFICATION
SPECIFICATION 02517
EARTHWORK AND LEAK DETECTION WELL
FOR

Axia Energy, LLC

Completion Pit – Bulldog #5-31H-790
012-1222

PART 1 GENERAL

Related specifications: 02530 GEOSYNTHETICS INSTALLATION AND TESTING.

These technical specifications establish the quality of materials and workmanship and define how quality is measured for earthwork, hard material subgrade, and leak detection wells. They apply to lined containment pond areas. It also establishes the quality of materials and workmanship for furnishing, delivering, installing and constructing hard material subgrade and standard leak detection wells for double-lined systems.

The word “Owner,” as used here shall mean Axia Energy, LLC.

1.1 ABBREVIATIONS

The abbreviation below shall mean:

AASHTO American Association of State Highway and Transportation Officials

ASTM..... American Society for Testing Materials

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1.2 CODES AND STANDARDS

Unless otherwise specified or shown on drawings, the following codes and standards shall apply to the extent indicated herein:

- ASTM D422..... Standard Method of Test for Particle-Size/Analysis of Soils
- ASTM D2487..... Standard Test Methods for Classification of Soils for Engineering Purposes
- ASTM D2488..... Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
- ASTM D3740..... Evaluation of Agencies engaged in Testing and/or Inspection of Soil and Rock as used in Engineering Designing Construction

1.3 QUALITY ASSURANCE

- A. Quality assurance during preparation of subgrade shall be performed by Owner or Owner's representative. Inspections during field construction shall be visual and the subgrade shall be approved by the Owner or Owner's representative prior to placement of the liner system.
- B. The owner shall engage a third party independent Engineering firm for quality control.
- C. Inspections during field construction shall be visual and the subgrade shall be approved by the Owner or Owner's representative prior to placement of the leak detection well and related liners. The leak detection well shall be approved by the Owner or Owner's representative prior to backfill of the well.

1.4 PROJECT SITE CONDITIONS

- A. Data on indicated subsurface conditions are made available for the convenience of the earthwork contractor and are not intended as representations or warranties of continuity of such conditions.
- B. Protect existing benchmarks and monuments and other reference points; if disturbed or destroyed, replace as directed by Owner.
- C. Erect and maintain such safeguards as required by construction operations, codes or existing conditions, for the safety of persons or property and to protect the same from damage, injury or loss.

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- D. Provide for diversion of surface drainage during the period of earthwork, keeping excavations free of water during entire process of work, regardless of cause, source or nature of the water.

PART 2 MATERIALS

3.1 SUBGRADE

- A. Any earthen surface upon which the GCL is installed shall be prepared and compacted to obtain a smooth, firm, and unyielding surface that is free of:
 - 1. Vegetation
 - 2. Construction Debris
 - 3. Sticks
 - 4. Sharp rocks
 - 5. Void spaces
 - 6. Ice
 - 7. Abrupt elevation changes
 - 8. Standing water
 - 9. Cracks larger than one-quarter inch in width
 - 10. Any other foreign matter that could contact the GCL.

If drill cuttings or other recycled soils are used as subgrade, such material must have passed the testing required by COGCC in Table 910-1 of the 900 Series Rules.

- B. Subgrade surfaces consisting of granular soils or gravels may not be acceptable due to their large void fraction and puncture potential. Subgrade soils should range between fines and 1-inch.
- C. Immediately prior to GCL deployment, the subgrade shall be final-graded to fill in all voids or cracks and then smooth-rolled and pre-moistened to provide the best practicable surface for the GCL. At completion of this activity, no wheel ruts, footprints, or other irregularities shall exist in the subgrade. Furthermore, all protrusions extending more than one-half inch from the surface shall either be removed, crushed, or pushed into the surface with a smooth-drum compactor.
- D. Contractor shall notify the Owner or Owner's representative of any change in the condition of the subgrade that could cause the subgrade to be out of compliance with any of the requirements listed in this Section.
- E. At the top of sloped areas of the job site, an anchor trench for the geosynthetics shall be excavated. The trench surface shall also be approved by the Owner or Owner's representative prior to placement of the GCL. No loose soil shall be allowed at the bottom of the trench and no sharp corners or protrusions shall exist anywhere within the trench.

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PART 3 EXECUTION

3.1 SURVEY

- A. The Owner will establish the control point(s) to be utilized by the Contractor. The Contractor shall be responsible for all construction surveying to control the work.
- B. Cross-sections of the original surface and the as-built condition will be provided to the Owner.
- C. Prior to installation of any geosynthetic liners, Contractor shall verify with grading level that the pit side slopes are 2H:1V maximum, the bottom of the pit slopes as designed for the leak detection system, and the pit depth and general layout is per the design drawings.
- D. All survey work will be subject to checking by the Owner or Owner's representative.

3.2 CLEARING AND GRUBBING

- A. Clearing and grubbing shall be performed as required.
- B. Clearing will consist of the removal and disposal of all brush, grass, rubbish, and other obstructions resting on the surface of the original ground. Unless otherwise indicated, clearing shall be performed within the limits of and ten feet outside of the pits.

3.3 DUST PALLIATIVE

- A. Apply water or chemical for the control of airborne dust originating as a result of earthwork operations in accordance with applicable ordinances and regulations. Chemicals if utilized are to be approved in advance of use by field.

3.4 EXCAVATION

- A. Classification of all excavated materials shall be included in the following:
 - 1. Common and Rippable Excavation shall consist of all materials that can be excavated without blasting. Rippable excavation shall consist of all materials that can be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated equal to or better than a D-9 Caterpillar flywheel horsepower, operating in low gear. Additionally, all boulders or detached pieces of solid rock less than 2 cubic yards in volume will be classified as Common and Rippable Excavation.
 - 2. Rock Excavation - For the purpose of classification of excavation, rock is defined as sound and solid masses, layers, or ledges of mineral matter in place

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and of such hardness and texture that it cannot be effectively loosened or broken down by a hydraulic ripper specified above. Testing to determine compliance with this classification shall be made when requested. All boulders or detached masses of solid rock larger than 2 cubic yards in volume will be classified as rock.

- B. Suitable excavated materials conforming to the requirements of Section 4.0 shall be utilized in backfills. Unsuitable material within the limits of excavation shall be removed and disposed or stockpiled at a location approved by the Owner. Unsuitable or excess excavated material shall be disposed of at Owner's designated locations.
- C. The method of excavation shall not weaken surrounding areas or damage structures or parts thereof that are completed or under construction. Existing structures and utilities adjacent to excavations shall be protected and supported to prevent displacement.
- D. Excavations shall conform within the tolerances specified to the lines, grades, sections and elevations shown on Design Drawings.
- E. Except as otherwise shown, grading tolerances shall be zero to minus 2 inches for horizontal and sloped planes of excavation in earth.
- F. Over-excavated areas within the pit area shall be restored with properly compacted spoils to the elevations shown on Design Drawings. Compaction equipment shall be suitable for the size and depth of the holes being filled.
- G. If any areas outside of the pit area are over-excavated in rock, the over-excavation shall be restored by backfilling spaces under and adjacent to footings, foundations or other bearing portions of structures with concrete having a 28-day compressive strength of 2000 psi. Restoration of over-excavated areas in rock and soil shall provide uniform bearing values at least equivalent to that previously given by the excavation prior to the over-excavation.
- H. Areas being excavated and areas to be backfilled shall be maintained in a clean condition free from debris.
- I. Compaction shall be "Ordinary compaction" without field testing but shall require close observation to ensure that the materials are being densified and that no soft or loose spots remain. Loose lifts shall be no more than six inches in thickness prior to compaction. Care must be taken to ensure that tracks compact evenly and do not 'bridge' between hard points leaving uncompacted material between. Tracked equipment exerts fairly low ground pressures but may be suitable for this project if closely observed. For reference the following equipment exerts pressure on the soil.
 - 1. D8 Tractor with standard track and dozer
Ground pressure is 1884 pounds per square foot (13.1 psi).
 - 2. 345 D Hydraulic excavator with 36" track

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Ground pressure is 1163 pounds per square foot (8.1 psi).

3.5 PIPE TRENCH EXCAVATION

- A. The pipeline route for the leak detection system shall be over excavated and backfilled with Class 2 backfill or other approved material so that the pipe rests in bedding material, as indicated on the Design Drawings. The bottom and sides of the trench shall be finished as smooth as the pit subgrade with similar surface treatment. The pipe will be onsite and used to test the slope of the trench to ensure a uniform slope to the top. No bends will be allowed in the pipe.
- B. The 8 oz non-woven textile liner shall wrap around the outside of the gravel sump. The bottom geosynthetic clay liner shall deform into the trench beneath the 8 oz non-woven textile liner. The geocomposite conduction liner shall continue over the top of the pit until the reaching the pipe and shall also be positioned underneath the pipe, as indicated on the Design Drawings. Ensure that the 30 mil RPE geomembrane liner is not significantly deformed over the pipe. Backfill around the pipe with clean drill cuttings.
- C. The leak detection sump shall be excavated so as to provide the cover, bedding depth, and minimum width as shown on the drawings.
- D. The bottom of the pit shall be graded to drain to the leak detection system sump as indicated on the Design Drawings.
- E. The method of excavation shall not weaken surrounding areas or damage structures or parts thereof that are completed or under construction.
- F. All excavation shall conform within the tolerances specified to the lines, grades, sections and elevations shown on drawings and shall be shaped on the bottom to the bedding details shown to provide uniform bearing and support of each pipe section for the entire length.
- G. In all excavation requiring blasting, care shall be taken to minimize overbreak. Material outside the authorized cross section, which has been shattered or loosened by blasting, shall be removed.
- H. Precautions shall be taken so as not to excavate below the depths indicated on the drawings. Where excessive or unauthorized excavation occurs, backfill the depth to the proper grade with compacted sand and or pea gravel or other suitable material.
- I. Except as otherwise shown, grading tolerances shall be plus zero to minus 2 inches.
- J. Remove excavated material not required or suitable for backfill from the excavation area and dispose of it at an onsite, designated location.

3.6 PIT SURFACE TREATMENT

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A. Benching of Sloped Surfaces

Pit side slopes will be no steeper than 2 to 1 (horizontal to vertical) as indicated on Design Drawings. Tolerance for side slopes will be 2 inches in a 4 foot length of straight edge provided the transitions are smooth curves.

B. Surface Preparation:

Existing material on the exposed surface of the pit bottom and side slopes shall be reduced in size to a maximum of 1-inch in diameter. Ensure that there are no protrusions above the planar surface of the pit bottom, side walls, and anchor trench.

C. Filling Holes, Depressions and Cavities

Depressions and other cavities shall be filled in with clean material to the elevations of the pit bottom and side slopes indicated on the Design Drawings. Non-angular crushed rock less than 1 inch in diameter may also be used to fill in holes, depressions, and cavities. Compaction equipment shall be suitable for the size and depth of the holes being filled.

3.7 ANCHOR TRENCHES

- A. Geosynthetic runout and anchor trench shall be constructed to the dimensions as indicated on Design Drawings. The subgrade surface of the anchor trench runout shall be of the same material as the side slope of the pit and will be smooth for placement of the liner system. Subgrade will be approved by the Owner or Owner's representative prior to placement of geosynthetics.
- B. Class 2 Backfill as defined in Section 4.0 shall be used to backfill over the geosynthetic runout and in the anchor trench. Class 2 Backfill shall be used on top of the geosynthetic runout to a minimum depth of 12 inches and will match existing depth and grade as indicated on Design Drawings.
- C. Backfill within anchor trench and over geosynthetic runout shall be placed in 6-inch lifts with a vibratory plate compactor. Do not use the plate compactor immediately adjacent to the liner since this could damage the liner. Tolerance for final grade over runout and anchor trench shall be minus zero to plus 2 inches. Compaction efforts will be observed and approved by the Owner or Owner's representative to ensure sufficient compaction in required lifts.

3.8 STOCKPILING

- A. As part of earthwork operations, stockpiling of excavated or borrowed material may be required.
- B. Different classes of material shall be stockpiled separately if required by Owner.
- C. Stockpiles and waste material shall be placed in such a manner to provide natural

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drainage and a stable embankment as approved by Owner.

- D. Stockpiles shall be constructed with maximum height not exceeding 40 feet.
- E. Location of stockpiles to be determined by Owner.

3.9 RESHAPING AND GRADING EXISTING IMPROVEMENTS

- A. Prior to commencing finish grading, existing improvements shall be checked for their compliance with rough grading requirements shown on design drawings and restored to original lines, grade and cross section if required.
- B. Clean and reshape previously constructed ditches of sedimentation and debris to original lines, grade and cross section.
- C. Clean all previously constructed culverts of sedimentation and debris.

3.10 FINISH GRADING TOLERANCES

- A. The finish grade tolerance shall be plus zero and minus 4 inches to the lines and grades as indicated on the Design Drawings.
- B. Areas not within the allowable tolerances shall be corrected by breaking, scarifying, placing additional material, remixing, and reshaping to the specifications herein.

3.11 CLEANUP

- A. Leave area in a clean and neat condition. Grade all disturbed surfaces to prevent standing surface water.

-- END OF SECTION 02517 --