2. The liner pipe shall be removed or perforated to assure placement of the seal. All casings and screen may be salvaged.

3. The top 10 feet of the hole shall be filled with bentonite grout to within two feet of the "land surface" (bottom of the pond excavation).

4. Casing remaining in the hole shall be cut off at least two feet below the "land surface" (bottom of the pond excavation). The remaining top two feet of the hole shall be filled with "native topsoil".

C. EARTHWORK

1. Compaction:

a. General:

(1) Excavate or backfill as required to construct subgrades to the elevations and grades indicated.

(2) Remove all unsuitable material and replace with acceptable fill material and perform all wetting, drying, shaping and compacting required to prepare subgrade.

b. Subgrade for Fills and Embankments:

Roughen by discing or scarifying and wet or dry top 6 inches as required to bond with fill or embankment.

2. Embankments and Fills:

   a. Construct embankments to the contours and elevations indicated, using suitable approved material from excavations and borrow areas.

      (1) Place fill material in 4-inch to 8-inch layers.

      (2) Place embankment only on subgrades approved by Engineer.

      (3) Do not place snow, ice or frozen earth in fill and do not place fill on a frozen surface.

      (4) Compact to 95 percent of maximum density at optimum moisture content as determined by ASTM D698.

   b. Obtain compaction by the controlled movement of equipment during the placing and grading of layers and to the minimum density specified for indicated locations.

3. Pipe Embedment:

   a. Pipe bedding shall be as indicated using granular material.

   b. Place granular embedment as follows:

      (1) With level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.

      (2) Form depression under each joint such that no part of bell or coupling is in contact with trench when pipe is placed in position.

      (3) Add second layer simultaneously to both sides of the pipe with care to avoid displacement.

      (4) Complete promptly after completion of jointing operations.

      (5) Substitute for any part of earth backfill to within 2 feet of final grade at Contractor's option.

   c. Compact Granular Embedment as follows:

      (1) In lifts not exceeding 12 inches in compacted depth.

(4) Tolerance for areas within 10 feet of building and areas to be paved shall not exceed 0.15-foot above or below established subgrade.

(5) Finish all ditches, swales and gutters to drain readily.

c. Finish Grading:

(1) Finish grade the pond basin such that there is a constant negative slope from all parts of the pond to the pumping station in the southwest corner of the pond (elev. 460.0).

(2) All surfaces that receive the synthetic pond liner shall be free of all rocks, roots, construction debris, etc. for a depth of 6".

(3) Recompact and proof roll all surfaces that will receive the synthetic pond liner with a drum type roller such that the surface is smooth with no ridges or gullies.

(4) The synthetic liner installer shall certify is writing that the base subgrade is suitable and acceptable for installation of the liner.

6. Topsoiling:

a. Material:

Use the most suitable material obtained from excavation and stripping operations and borrow.

b. Placement:

(1) Clear areas free of vegetation, rock and other materials which would interfere with grading and tillage operations.

(2) Bond topsoil to the subgrade by scarifying the subgrade to a depth of 2 inches.

(3) Spread topsoil to a minimum depth of 4 inches where grading operations have left less than 4 inches of topsoil in place.

(4) Grade topsoil to bring areas to grades as indicated and to insure that all surfaces are left in an even and properly compacted condition and to prevent ponding of water in depressions.

SECTION 02400

HIGH DENSITY POLYETHYLENE (HDPE) MEMBRANE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide and install 40 mil (pond basin) and 60 mil (interior face of surrounding dikes) High Density Polyethylene (HDPE) geomembrane. Material shall be provided and installed by and approved HDPE geomembrane manufacturer/installer.

B. Provide design of HDPE geomembrane panel layout diagram.

C. Provide required sealing around objects penetrating the liner.

D. Provide quality control testing of HDPE geomembrane as specified in the approved QC manual.

E. Provide supervision of HDPE geomembrane anchoring and covering.

F. Provide adequate men, materials and equipment so the mechanical breakdowns do not affect the progress of work. (Any such interruption and the resulting loss of time for the independent quality assurance team shall be payable by the General Contractor.)

1.02 REFERENCES STANDARDS

A. National Sanitation Foundation (NSF) Standard Number 54.

1.03 QUALIFICATIONS OF CONTRACTOR WORK ACTIVITIES

A. Manufacturer

1. The Manufacturer shall be listed by the National Sanitation Foundation as having met Standard 54 for Flexible Membrane Liners, and shall have at least five (5) years continuous experience in the

manufacture of HDPE geomembrane rolls and/or experience totaling 10,000,000 square feet of manufactured HDPE geomembrane.

2. The manufacturer shall permit the owner or his authorized representatives to visit the manufacturing plant.

B. Installer

1. The installation contractor shall be the manufacturer or an approved contractor trained and licensed to install the manufacturer's geomembrane.

2. Installation shall be performed under the constant direction of a single Field Installation Supervisor who shall remain on site and be responsible, throughout the liner installation, for liner layout, seaming, patching, testing, repairs, and all other activities by the installer.

3. The Installation Supervisor shall have installed or supervised the installation and seaming of a minimum of 2,000,000 square feet of HDPE geomembrane.

4. Actual seaming shall be performed under the direction of a Master Seamer (who may also be the Installation Supervisor) who has seamed a minimum of 2,000,000 square feet of HDPE geomembrane, using the same type of seaming apparatus specified in the current project.

5. Only welders having a weld failure rate less than 1 test in 50 will be allowed to perform welding on the membrane. The installer shall submit the performance records for approval by the owner of welders who will be welding 7 days prior to the start of work. The performance records shall include approximate quantity of linear feet of weld performed in the last 6 months and number of samples tested and weld failure rate as a percentage of samples tested.

6. The Installation Supervisor and/or Master Seamer shall be present whenever seaming is performed.

1.04 SUBMITTALS

A. Manufacturer - The manufacturer shall submit the following information:

Submittals With Bid Documents:

1. Liner material samples, name of manufacturer and minimum material specifications. The specifications shall include the manufacturer's minimum physical properties of the material, test methods (ASTM Standards) used and factory and site seaming methods.

2. A list documenting no less than 10 completed facilities totaling a minimum of 3,000,000 square feet. Each entry in this list should specify the name and purpose of the facility, its location and date of installation, the name of the owner, the project manager, designer, fabricator (if any), and the installer, as well as the name and telephone number of the contact at the facility who can discuss the project. In addition, the geomembrane thickness and total square footage of the installation surface should be included.

Submittals After Contract Award And Prior To Liner Installation:

1. Certification that all resin used in the manufacture of geomembrane for this job meets the specifications.

2. A quality control certificate is required for each roll stating that the product meets or exceeds the project specification.

   a. Any rolls without roll certification will not be accepted and shall be immediately rejected and removed from the site.

3. Properties of the batch of materials proposed for welding HDPE geomembrane.

B. Installation Contractor - The Installer shall provide the following written information:

Submittals With Bid Documents:

1. Certification that both the Installation Supervisor for the installer and the Master Seamer have reviewed the Quality Assurance Plan, the Project Plans, and these specifications.

2. Brief historical background, insurance coverage, installation capabilities and information on equipment and personnel.

3. A list documenting no less than 10 completed facilities totaling a minimum of 2,000,000 square feet for which the Contractor has installed an HDPE geomembrane. Each entry in this list should specify the name and purpose of the facility, its location and date of installation, the name of the owner, the project manager, designer, fabricator (if any), as well as the name and telephone number of the contact at the facility who can discuss the project. In addition, the geomembrane thickness and total square footage of the installation surface should be included.

4. A Quality Control manual describing the details including, but not limited to sampling frequency, standard testing procedures, certification labeling of products and submission of all QC data.

Submittals After Contract Award And Prior To Liner Installation:

1. Written instruction for the storage, handling, installation, seaming, overlap requirements and repair including conditions and limitations of its warranty.

2. Panel dimensions and a detailed layout plan as required for the liner installation.

3. Details showing how the material will be anchored.

4. Details showing the liner configuration around the liner penetrations.

5. A list of the equipment to be used for seaming and

repair of the liner and a description of the seaming and repair procedures so as to ensure changes in environmental conditions will not effect the integrity of the weld.

6. A detailed description including equipment to be used, how the integrity of the field seams and penetrations will be tested and documented.

7. A resume of the qualifications for all personnel who will be involved in the installation, quality control and supervision of the HDPE geomembrane construction including their education and previous HDPE geomembrane installation experience.

8. Weld test data demonstrating the accumulated weld test failures for both peel and shear does not exceed one (1) per every fifty (50) tests or increment thereof for welds performed under normal environmental and operating conditions.

1.05 QUALITY ASSURANCE

A. The manufacturer/installer shall provide the services to perform all required quality assurance testing.

1. The manufacturer/installer shall provide an experienced and qualified inspection team.

a. The inspection team shall be on-site at all times during the HDPE geomembrane installation to observe installation procedures and quality control procedures, coordinate quality assurance tests, and collect data for documentation.

b. The team will take samples of the material at the time of manufacture for conformance testing. The sampling frequency shall be one per 100,000 square feet.

B. Observation of Installation

1. The inspection team shall observe and record the following with handwritten notes and photographs:

a. HDPE geomembrane packaging identification

slips.

b. Subgrade conditions prior to liner installation.

c. Handling of HDPE geomembrane sections.

d. Unfolding and unrolling of each liner panel.

e. Temporary and permanent anchoring of HDPE geomembrane.

f. Confirm that required overlap distances are met.

g. Preparation and cleaning of HDPE geomembrane prior to seaming.

h. Seaming products for proper products, equipment and techniques.

i. Visual inspection of the HDPE geomembrane to ensure it is free from pores, pinholes and other detrimental defects.

j. Visual inspection of fusion welds. Mark all breaks or holes for repairs.

C. Destructive Quality Assurance Testing

1. The installer shall obtain samples of the field seamed HDPE geomembrane of approximately 48 inches along and 18 inches across the seam and centered over the seam prioritized as follows:

a. All areas identified as suspect during non-destructive testing/inspection.

b. A minimum of one sample for each HDPE geomembrane seamer.

c. A minimum of one sample for each seaming condition.

d. A minimum of one sample for each representative working conditions (i.e. weather conditions).

e. A minimum of one every 500 feet of seaming

f. Seams that appear suspect to the inspector.

2. Each sample shall be subject to the following tests at the installer's laboratory:

a. Seam Shear Strength - ASTM D3083.

b. Peel Strength - ASTM 413.

c. Thickness - ASTM D1593.

3. The installer shall be responsible for patching all areas cut for test samples in accordance with the manufacturer's requirements and testing the seams using a vacuum box. Installer shall record locations.

4. Failed tests shall be subject to additional testing until a passing area is found. A passing area is defined as a seam(s) bounded by a passing destructive test. Seams will be tracked until a passing destructive test is found or until a previous passing destructive test is reached. Seams will be tracked to the welding apparatus and the machine operator. At the Company's discretion, trail seams may be substituted for tracking the geomembrane seam beyond the limits of each seaming period. Trial seams will be subject to a destructive testing in accordance with items D.1 and 2 of this section.

D. Non-Destructive Quality Control Testing By Installer

1. The installer shall inspect all field seaming using one or more non-destructive test methods.

2. The installer shall perform testing at the beginning of each crew shift and immediately following any work stoppage (i.e. for lunch, weather, etc.) of 30 minutes or more.

a. Seaming operation shall not commence until the Construction Supervisor has determined that the seaming process is meeting the specification requirements and is acceptable.

b. Testing shall include visual observation of a test weld three (3) feet long on scrap HDPE geomembrane material.

1) Mark date, ambient temperature, welding machine number, welding technicians initials, machine temperature and speed. For extrusion welding record the nozzle and extrusion settings.

2) Test seams by pulling by hand in peel.

The welds should not peel.

3. Non-destructive testing shall consist of the following techniques:

a. Vacuum chamber testing of the whole seam or pressure testing if double hot shoe welding is used.

b. Mechanical point stressing.

4. The installer is responsible for formulating a program meeting the minimum requirements of the specifications for non-destructive testing.

5. There shall be no limit to the non-destructive quality assurance testing if deemed necessary by the Construction Supervisor.

E. Report of Quality Control Testing Inspection

1. Installer shall provide written quality control reports for all testing and observations made.

a. Provide reports to the Construction Supervisor at the end of each day.

b. Provide copies of all field laboratory test results within 24 hours of completion of tests.

F. Warranty and Guarantee

1. A written Warranty shall be obtained from the Manufacturer (for material) and the Installation Contractor (for workmanship). These documents

shall warrant both the quality of the material and workmanship for 20 years.

PART 2 PRODUCTS

2.01 HDPE GEOMEMBRANE - GENERAL

A. The geomembrane shall be high density polyethylene containing approximately 97% to 98% polymer and 2% to 3% of carbon black, anti-oxidants and heat stabilizers.

B. HDPE geomembrane shall be:

1. Pond bottom: 40 mil (1.0 mm) **(minimum certifiable thickness)** with no factory seams.

2. Inside dike face: 60 mil (1.5 mm) **(minimum certifiable thickness)** with no factory seams.

C. HDPE geomembrane shall be manufactured for exposure at the Labadie Power Plant, Labadie, Missouri.

D. HDPE geomembrane shall contain no additive which will leach out or cause deterioration over time.

E. HDPE geomembrane shall be free of holes, blisters, undispersed raw materials and any sign of contamination by foreign matter.

F. HDPE geomembrane shall be manufactured in panels having a minimum width of twenty-two (22) feet and minimum length of four hundred (400) feet. Labels on rolls shall identify thickness, length, width and manufacturer's mark number.

G. HDPE geomembrane liner shall be manufactured and installed by **Gundle Lining Systems Inc.** or **Poly-Flex Polyethylene Geomembranes.** Alternates may be submitted in addition to Gundle or Poly-Flex for consideration.

2.02 HDPE GEOMEMBRANE - WELDING PRODUCTS

A. HDPE geomembrane field welding material shall be manufactured from the same materials used in the manufacture of the HDPE geomembrane.

B. HDPE geomembrane field welding shall result in a

homogeneous bond which is durable, strong, and air tight.

2.03 HDPE GEOMEMBRANE SPECIFICATION

See Appendix "C"

PART 3 EXECUTION

3.01 SHIPPING AND DELIVERY OF HDPE GEOMEMBRANE

A. All materials shall be suitably prepared and packaged to prevent damage or deterioration such as excessive aging or puncturing during shipment.

B. All material packaging shall identify the thickness, length, width and manufacturer's mark.

1. QC data shall be provided with each HDPE geomembrane material package (roll certifications).

C. All material shall be dry upon arrival on site (i.e. free of water, snow, etc.).

D. All packaging cores shall be open such that a metal rod can be inserted for deployment.

E. Rolls shall be stored appropriately to allow the Construction Supervisor access to the packaging slips of each roll so that verification of the roll inventory can be performed prior to job start-up.

3.02 SURFACE PREPARATION

A. Surface preparation including grading, recompaction and proof rolling shall be the responsibility of the general contractor.

B. The installer shall certify in writing that the base subgrade is suitable and acceptable for installation of the HDPE geomembrane.

3.03 SUPERVISION OF HDPE GEOMEMBRANE INSTALLATION

A. A daily meeting shall be held at the work area just prior to commencement of the work day. At a minimum, the meeting will be attended by the Installer and the

Inspector. The purpose of the meeting is to:

1. Review the work activity and location for the day.

2. Discuss the Installer's personnel assignment for the day.

3. Review the previous day's activity.

4. Review the work schedule.

5. Discuss possible problem areas and situations.

3.04 INSTALLATION OF HDPE GEOMEMBRANE

A. Climatic Conditions

1. Temperature: Unless otherwise authorized by the Construction Supervisor, the temperature range for HDPE geomembrane installation is 5 to 40 degrees C (40 to 104 degrees F). As a minimum, the Construction Supervisor will require that a performance evaluation of temperatures outside this range be made through a trial seam and destructive testing program.

2. Wind: Do not attempt installation when wind velocity and/or dusty conditions interfere with liner placement, alignment of seams or cleanliness of seam area.

3. Precipitation: Do not attempt installation when precipitation interferes with having a dry seaming surface (i.e., rain, sleet, snow or heavy dew).

B. HDPE Geomembrane Layout

1. Layout HDPE geomembrane, overlap a minimum of 4 inches.

2. Prepare areas for welding in accordance with the manufacturers/installer's requirements including cleaning.

3. Place temporary anchoring such as sand bags on 2 foot centers on liner immediately after layout.

4. HDPE geomembrane installer shall provide sufficient personnel to properly place the HDPE geomembrane and to operate the equipment so that the project proceeds in a workmanlike manner to completion.

C. HDPE Geomembrane Welding

1. Weld together by extrusion welding or by hot shoe welding.

2. Welding equipment shall be capable of continuously monitoring and controlling the temperature in the zone of contact or on the extrusion welder.

3. Seams parallel to the toe of the slopes shall be located 10 to 15 feet from the toe.

4. Installer shall mark any burnouts or defects found along the seam while welding.

5. A minimum of three hot shoe welders and three extrusion welders shall be on-site all times.

6. Welds shall extend a minimum of 1 foot into the anchor trench.

D. HDPE Geomembrane Repair

1. Repair and patch all areas of the HDPE geomembrane which show injury, scuffing, puncture or distress.

2. Repair and patch all defective welds.

3. Repairing and patching shall be completed in accordance with the manufacturer's recommendations.

E. HDPE Geomembrane Anchoring

1. Anchor in accordance with the anchoring details shown on the drawings. Excavate the trench only for such lengths as will be used for anchoring on any particular day. Use temporary anchors until the panels are welded and are ready for anchoring.

2. Excavation of anchor trench and compacting soil in anchor trench to 90% of the Standard Proctor Maximum Density (ASTM D-698) is the responsibility

of the general contractor.

F. HDPE Geomembrane Joints To Structures

1. Attach HDPE geomembrane to structures in accordance with the details shown on the drawings.

2. Provide manufacturer fabricated boots for joints.

3. Joints shall be constructed in accordance with the manufacturer's recommendations.

G. QC Testing

1. Complete quality control testing in accordance with 1.05 of this section and the manufacturer/installer's requirements.

2. One or more rolls of HDPE geomembrane material shall be set aside for the purpose of patching.

3. A minimum of two vacuum boxes shall be on-site at all times.

3.05 RESPONSIBILITY FOR LINER LEAKAGE AND INTEGRITY

A. The installer is responsible for maintaining the integrity of the HDPE geomembrane until final payment and acceptance by the Construction Supervisor.

1. The installer shall coordinate and supervise the activities of the general contractor during the installation, anchoring and covering of the HDPE geomembrane.

B. The installer is responsible for providing a watertight basin.

1. If leakage is detected within the warranty period, the installer shall repair leaks at no charge.

2. All leaks discovered shall be repaired immediately and tested as per 1.04 of this section.

SECTION 02500

COMPACTED EARTH LINER
(ALTERNATE)

PART 1 GENERAL

A. WORK INCLUDED

Construct a one foot thick pond liner from imported clay.

B. RELATED WORK

Section 02000 - Sitework

C. SUBMITTALS

1. Sufficient boring or test pit logs shall be submitted to indicate a volume of borrow soils for a earth liner greater than 125 percent of the estimated volume of liner material to be place at 95 percent of Standard proctor density. For each soil type the following minimum tests results are required:

Target Property	Test Method
Moisture/density curve standard Proctor	ASTM D 698
In-situ moisture/density drive cylinder method or undisturbed thin-walled sampler	ASTM D 2937
Laboratory Hydraulic Conductivity back-pressure saturated	COE EM 1110-2-1906
Plasticity; Atterberg limits	ASTM D 4318
Grain size distribution sieve and hydrometer	ASTM D 422

2. The laboratory hydraulic conductivity test shall be performed at 95 percent standard Proctor at moisture contents 2 to 3 percent above optimum.

3. To meet the intent of the design, the specifications for soil and soil placement are more stringent than the minimum required by the Department of Natural Resources. In accordance with 10 CSR 20-8 (17) (C) 1. of the Department of Natural Resources, soils used to construct a liner should meet the following minimum specifications:

A. Be classified under the Unified Soil Classification System as Cl, Ch, Gc, or Sc;

B. Allow more than fifty percent (50%) passage through a No. 200 sieve;

C. Have a liquid limit equal to or greater than thirty (30);

D. Have a plasticity index equal to or greater than twenty (20); and

E. Have a coefficient of permeability equal to or less than 1 x 10-7 centimeters per second when compacted to ninety percent (90%) of standard Proctor density with moisture content between two percent (2%) below and four percent (4%) above the optimum moisture content.

4. Prior to award of contract the Owner may require additional exploration and testing of the borrow source. It shall be the Bidder's responsibility to provide site access and cooperate with the Owner during the exploration.

PART 2 EXECUTION

2.01 SUBGRADE PREPARATION

A. Subgrade for earth liner shall be stripped of all deleterious materials including rocks greater than 4 inches, roots, stumps, and debris. The subgrade shall be scarified and compacted to ninety percent (90%) of standard Proctor density. Wet, loose or soft areas that can not be adequately compacted shall be removed and replaced with compacted soil. Before placing earth liner the subgrade shall be shaped uniformly, compacted and continuous, and shall not contain standing water.

B. Subgrade for earth liner that is also the inside slope of the levee shall be compacted to 95 percent of standard Proctor density.

2.02 EARTH LINER

A. The compacted earth liner shall have a minimum thickness of not less than one foot. The soil shall be compacted to a minimum density of 95 percent Standard Proctor (ASTM D-698) at 2 to 3 percent above optimum moisture content, compacted in 6- to 8-inch lifts (loose thickness). The resulting earth liner shall be a homogeneous mass that has a maximum hydraulic conductivity of 1 x 10-7 cm/sec.

B. Liner Installation. Construction of the liner shall be accomplished as follows:

1. Coverage by compaction equipment shall be uniform;

2. The maximum speed of compaction equipment during compaction shall be 5 miles per hour;

3. The initial lift and successive lifts shall be bonded together by scarifying the surface and by using a sheepsfoot roller, or equivalent, for compaction;

4. Earth liner shall be protected from drying and desiccation by wetting, covering with a protective layer of soil or other methods with the approval of the Owner;

5. Frozen material shall not be used for liner construction;

6. Earth liner material shall be at specified range of moisture content prior to and during placement;

7. To prevent damage to completed sections of liner, work areas shall be maintained in the immediate area of liner construction; haul roads shall not be routed over completed sections of liner;

8. The Contractor shall be responsible for repair of damage to the completed liner caused by his methods of operation;

9. Construction of earth liner shall only be accomplished during favorable weather conditions;

10. Sufficient one-foot thickness of liner shall be verified by accomplishing two surveys: the first survey shall be conducted upon completion of the subgrade and the second survey shall be conducted after liner has been placed. The surveys shall be conducted along profiles a minimum of 50 feet apart and under the direction of the site surveyor; and

11. At the end of each workday, lifts will be staggered to limit vertical interfaces between subsequent placing of earth liner.

C. Sampling and Testing To verify that the properties of the liner meets the specifications set forth in 10 CSR 20-8 (17) (C) 1., the following tests will be performed by Owner's representative:

1. In-situ moisture/density tests will be performed at random during liner construction, averaging a minimum of one test for every 1000 cubic yards of material placed. Moisture/density curves of imported material will be performed at random during construction averaging a minimum of one test for every 10,000 cubic yards of material placed.

D. Test Liner Acceptability. The minimum acceptable values for moisture/density test results will be equal to or greater than 95 percent of standard Proctor maximum density and the moisture content is between optimum and 4 percent above optimum.

C. Sampling Methodology. Prior to liner construction, a plot of density versus moisture content (moisture/density curve) will be determined using the Standard Proctor method, for each type of material used for liner construction. During construction, frequent in-situ moisture/density tests will be performed and compared to the maximum density and optimum moisture content of the liner material as determined from the standard Proctor test(s).

D. Test Methods. The liner will be sampled and tested by the following methods:

Target Property	Test Method
Moisture/density curve Proctor	ASTM D 698 Standard
In-situ moisture/density nuclear methods	ASTM D 2922 and 3017
Laboratory Hydraulic Conductivity back-pressure saturated	COE EM 1110-2-1906
Plasticity Atterberg limits	ASTM D 4318
Grain size distribution and hydrometer	ASTM D 422 sieve

SECTION 02936

SEEDING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Preparation of topsoil.

B. Fertilizing.

C. Seeding.

D. Mulching.

E. Maintenance.

1.2 REFERENCES

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.3 REGULATORY REQUIREMENTS

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

B. Use of herbicides shall be subject to approval by Union Electric.

1.4 QUALITY ASSURANCE

A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Seeding shall not begin before September 1, 1992, and shall be completed by October 1, 1992.

1.5 TESTS

A. Analyze soils to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

B. Submit minimum 10 oz. sample of each soil type. Forward sample to approved testing laboratory in sealed containers to prevent contamination.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS

2.1 SEED MIXTURE

A. Seed Mixture:

1.	Kentucky 31:	60 lb/ACRE
2.	Annual Rye Grass:	60 lb/ACRE
3.	Perennial Rye Grass:	75 lb/ACRE
4.	Redtop:	15 lb/ACRE
5.	Birdsfoot Trefoil:	10 lb/ACRE
		250 lb/ACRE

2.2 SOIL MATERIALS

A. 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.

B. Topsoil: Excavated from site and free of weeds.

2.3 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: FS O-F-241, recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in analysis; otherwise, use the following proportions: Nitrogen 12 percent, phosphoric acid 12 percent, soluble potash 12 percent.

C. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

PART 3 EXECUTION

3.1 INSPECTION

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

B. Beginning of installation means acceptance of existing site conditions.

3.2 PREPARATION OF TOPSOIL

A. Prepare topsoil to eliminate uneven areas and low spots. Maintain lines, levels, 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 soil.

C. Scarify topsoil to a depth of 3 inches (75 mm). Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.3 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions at a rate of 305 lb/ACRE.

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.

3.4 SEEDING

A. Apply seed evenly in two intersecting directions, to obtain the coverages specified in paragraph 2.1A. Rake in lightly. Do not seed area in excess of that which can be mulched on same day.

B. Do not sow immediately following rain, when ground is too dry, or during windy periods.

C. Immediately following seeding apply mulch at a rate of two tons per acre. Ditch bottoms and other erosion susceptible areas should receive a double application of mulch.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.5 HYDROSEEDING

A. At contractors option, seeding may be done with a hydraulic seeder. Do not hydroseed area in excess of that which can be mulched on the same day.

3.6 SEED PROTECTION

A. Seeded areas subject to traffic damage should be identified with stakes and string. Set string height at approx. 30 inches.

B. Protect seeded areas with waring signs during maintenance period.

3.7 MAINTENANCE

A. Immediately reseed areas which show bare spots.

B. New seedlings shall be kept moist by watering, for a period of six weeks after planting. Frequency of watering shall not exceed 7 days.

C. Maintain seeded areas for six weeks from date of seeding.

D. Water will be available on site.

SECTION 03001

CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Formwork, shoring, bracing and anchorage.

B. Concrete reinforcement and accessories.

C. Cast-in-place concrete.

1.02 REFERENCES

A. ACI 301 Specifications of Structural Concrete for Buildings.

B. ACI 305R - Hot Weather Concreting.

C. ACI318, Parts 1,2,and 3 - Building Code Requirements for Reinforced Concrete.

D. ACI 347 - Recommended Practice for Concrete Formwork.

E. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

F. ASTM A615 - Deformed and Plain Billet Steel for Concrete Reinforcement.

G. ASTM C33 - Concrete Aggregates.

H. ASTM C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.

I. ASTM C42 - Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

J. ASTM C94 - Ready-Mixed Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C260 - Air Entraining Admixtures for Concrete.