Appendix B

Construction Specifications and Construction Documentation

DETAILED SPECIFICATIONS
FOR
PUMP HOUSE, PONDS AND MISCELLANEOUS CONSTRUCTION

SPECIAL CONDITIONS

GENERAL: The City of Ames, Iowa is strengthening its electrical utility system by adding a 65,000 KW generating unit to the existing Municipal Power Plant located in the City of Ames, Iowa.

This Pump House, Ponds and Miscellaneous Construction Contract is one of many contracts that will be a part of the Utility System improvement program. Additional construction and equipment contracts associated with the utility system improvements at Ames, Iowa have been either awarded, are in the process of being bid or will be released for bids in the near future.

LOCATION: The Ames Municipal Power Plant is located south of the 5th Street and Carroll street intersection in the City of Ames, Iowa. The plant elevation is approximately 930 feet above sea level. The plant site is served by a railroad spur track off of the Chicago and North Western Railroad mainline. The plant site railroad spur may be used only for receiving equipment and materials that will be immediately installed in the new power plant.

INTENT OF SPECIFICATIONS: It is the intent of these specifications to describe in detail the complete construction of the Pump House, Ponds and Miscellaneous Construction for the Ames Municipal Electric System Unit No. 8 and the Lime Pond Project (Item 2). Materials and workmanship which are obviously necessary to complete the project in accordance with the type of construction shown on the accompanying plans but not specifically mentioned in these specifications shall be furnished complete.

The lump sum price named in these specifications shall include the furnishing of all labor, material, equipment, transportation costs, equipment rental, storage, etc., necessary to construct the project as herein specified and as shown on the accompanying drawings.

SCOPE OF CONTRACT: This Contract shall include furnishing all material, transportation costs, storage, equipment, labor and tools necessary to construct complete the Pump House, Ponds and Miscellaneous Construction in accordance with the specifications as herein outlined and as shown on the accompanying drawings.

Plans and specifications for contracts which have been previously awarded are available for review at the office of the Owner or the Engineer. The Contractor shall not be allowed any extra compensation by reason of any matter or thing concerning which such bidder might have fully informed himself prior to the bidding.

The following description, while not intended to cover all finite details, outlines the major items of work to be accomplished under this Contract:

A. Item No. 1 - Unit No. 8 Construction:

1. Preparation, checking and submit for approval shop drawings, concrete mix designs and compression tests, mill tests, aggregate tests, schedules, etc., as required by the specifications.

2. Clear and grub areas as required by these specifications.

3. Construct temporary earthen overburden to consolidate subsoils in areas of structure foundations at ash disposal area.

4. Earthwork including embankment, ramps, berms, excavation and grading for construction of the ash and clear water ponds at ash disposal area.

5. Construct retention pond water control structures at ash disposal area.

6. Construct pump house complete including associated foundation, metal building, equipment and piping.

7. Construct drainage ditch including associated culvert pipe and outfall structure at south of existing ash and lime ponds.

8. Construct gravel roadways.

9. Construct truck platform scale foundation including drainage piping.

10. Renovate existing diesel building as required by these specifications.

11. Construct miscellaneous foundations, platforms, walkways, hand railing and guard posts.

12. Furnish and install yard and drainage piping as described herein and on the Contract drawings.

13. Finish grading.

14. Mulch, fertilize and seed designated areas.

15. Soil sterilization of designated areas.

16. Furnish and place in storage at the job site Reinforced Thermosetting Resin Pipe (RTRP) as required by these specifications.

17. Furnish and place in storage at the job site ash pipe, Reinforced Thermosetting Resin Pipe with high alumina ceramic liner (RTRP-11FD), as required by these specifications.

18. Final clean-up of area.

B. Item No. 2 - Lime Pond Project
(See the accompanying drawings for limits of work for Item No. 2.)

1. Preparation, checking and submit for approval shop drawings, schedules, etc., as required by the specifications.

2. Clear and grub lime pond area as required by these specifications.

3. Earthwork including embankment, ramps, berms, excavation and grading for construction of lime pond.

4. Finish grade lime pond area.

5. Mulch, fertilize and seed desingated lime pond area.

6. Soil sterilization of designated lime pond area.

7. Final clean-up of lime pond area.

In addition to the above mentioned items, this Contract shall include minor items not specifically mentioned herein, but shown on the accompanying plans, or obviously necessary to provide a complete job.

During the duration of this Contract 76-11-32 a close overlapping of work under this Contract and that of other construction Contracts will prevail. It is required that excellent cooperation between all Contractors associated with this utility system improvement program be exercised to expedite and produce a timely first-class job.

DRAWINGS: The drawings accompanying these specifications show in detail the extent of the work to be performed and are made an integral part hereof. The drawings are as follows:

Sheet No.	Drawing No.	Title
1 of 14	76-11-PP-5	Plot Plan
2 of 14	76-11-ASH-6	Ash Truck Scale Pit Plan, Section & Details
3 of 14	76-11-ASH-7	Fly Ash Pipe & Conduit Support Bridge
4 of 14	76-11-ASH-8	Ash Handling Pump House - Elevations & Details
5 of 14	76-11-ASH-9	Ash Handling Pump House - Floor Plan & Details
6 of 14	76-11-ASH-10	Ash Handling Pump House - Miscellaneous Details
7 of 14	76-11-ASH-11	Lime and Ash Pond Plan
8 of 14	76-11-ASH-12	Lime Pond Dike Cross Sections

Sheet No.	Drawing No.	Title
9 of 14	76-11-ASH-13	Ash Pond Dike Cross Sections
10 of 14	76-11-ASH-14	Ash Disposal Area Test Borings
11 of 14	76-11-ASH-15	Outlet Structures and Details
12 of 14	76-11-AR-22	Diesel Building Renovation Building Elevation
13 of 14	76-11-AR-23	Diesel Building Renovation Floor Plans, Wall Sections, Miscellaneous Details
14 of 14	76-11-P36	Line Specification SW-Sluice Water
14 of 14	76-11-P37	Flow Diagram Legend
14 of 14	76-11-P38	Flow Diagram SW-Sluice Water
14 of 14	76-11-P39	Miscellaneous Details

The accompanying drawings indicate the size, location and general arrangement of the proposed construction. Dimensions lacking, but required shall not be scaled, but shall be referred to the Engineer for the correct interpretation. Any inconsistencies or discrepancies which require correction or consideration shall also be referred xo the Engineer in writing.

TENTATIVE SCHEDULE OF EQUIPMENT DELIVERY AND ON-SITE CONSTRUCTION: The following is a tentative schedule of equipment delivery which is to be erected and placed in operation as herein specified by this Contractor plus a list of on-site construction contracts which is or is to be in progress during the duration of this Contract. This tentative schedule of installation and construction is tabulated to the best knowledge of the Engineer at the present time and is listed only to give this Contractor some indication of when some of the associated contracts of the overall project will be delivered or will start construc-tion. Construction schedules of other contracts are available for review at the office of the Engineer or the Resident Engineer. This Contractor is responsible for keeping informed of additional construction information required by this Contract and of any deviations of other contract schedules affecting this Contract. Deviations by other contractors from this schedule shall not affect the bid price of this Contract nor shall this Contractor be allowed any extra compensation with regard to time or money resulting from such deviations.

Contract Number	Item	Contractor	Anticipated Delivery(D) or Start of Construction(C)
76-11-1	Turbo-Generator	General Electric	On Site (D)
76-11-2 Item 1	Boiler	Babcock & Wilcox	In Progress (C)
76-11-2 Item 2	Precipitator	Babcock & Wilcox	In Progress (C)
76-11-2 Item 3	Building Steel Erection	Babcock & Wilcox	In Progress (C)
76-11-3	Condenser	Ecolaire	In Progress (C)
76-11-4	Evaporator	Yuba	In Place
76-11-5	Closed Heat Exchangers	Struthers Wells	On Site (D)
76-11-6	Deaerator	Chicago Heater	In Place
76-11-7	Boiler Feed Pumps	Byron Jackson	On Site (D)
76-11-8	Air Compressors	Gardner-Denver	On Site (D)
76-11-9	Circulating Water Pumps	Worthington	On Site (D)
76-11-10	Cooling Tower	Marley Company	Nov, 1980
76-11-12	Condensate Pumps	Goulds	On Site (D)
76-11-14	Ash Handling Equipment	Hydro Ash	Partially Delivered, remainder by July, 1980
76-11-15 Item 1	High Pressure Valves	ITT Grinnell	Partially Delivered, remainder by Nov, 1980
76-11-15 Item 2	Butterfly Valves	Henry Pratt	On Site (D)
76-11-17			
76-11-20 Item 1	Panels, Instruments and Controls	Westinghouse	Oct, 1980
76-11-20 Item 2	Annunciator	Beta	Oct, 1980

Contract Number	Item	Contractor	Anticipated Delivery(D) or Start of Construction(C)
76-11-21 Item 1	69 KV Power Cable	Kerrite	July, 1980
76-11-21 Items 2 & 3	Power & Control Cable	American Insulated Wire	Sept, 1980
76-11-21 Item 4	Instrumentation Cable	Brand Rex	Sept, 1980
76-11-22	Data Logging System	Howell	Oct, 1980
76-11-23	Turbine Erection	Babcock & Wilcox	In Progress (C)
76-11-24 Item 1	Bus Duct & Protective Equipment	General Electric	Nov, 1980
76-11-24 Item 2	Oil Circuit Breakers	Siemans-Allis	On Site (D)
76-11-25	Switchgear	Pederson Power	Partially Delivered, complete by July, 1980
76-11-26	480 V Load Centers	Federal Pacific	Oct, 1980
76-11-27	Generator Relay Panel	Pederson Power	Oct, 1980
76-11-31	Superstructure	James Thompson	In Progress (C)
76-11-33	Power Piping	Gibson Hart, Inc	In Progress (C)
76-11-34	Power Wiring	Keith Electric Co.	In Progress (C)
76-11-35	Painting	N/A	
Steam Line Project			
78-20-1R	Evaporator	Yuba Heat Transfer	In Place (C)

TIME OF COMPLETION: The time of completion is of the essence for this Contract 76-11-32. The completion of this Contract will permit other contracts to be started. The timely completion of this Contract is imperative for maintaining projected schedules of other contracts either already awarded or yet to be awarded.

It is also imperative that certain portions of this Contract 76-11-32 be completed at the earliest time to tooth-in with critical schedules of equipment and material shipments, other contract schedules, etc.

This Contractor shall furnish labor and tools necessary to accomplish the following items of work by the specified times. It is the direct intention of these specifications that this Contractor shall be working simultaneously on various areas of the project in order to meet the specified times. Additionally, it is the specific intention of this specification that to accomplish these specified times. this Contractor shall plan, schedule, and adequately staff the project with supervision and manpower to include any necessary working overtime and weekend work.

The specified times for construction of certain specific areas of work included in this Contract (76-11-32) are as follows:

1. All retention pond work, except seeding and roadway surfacings, in the ash disposal area for construction of the lime pond (Item No. 2), the ash pond and the clear water pond shall be completed by no later than January 1, 1981.

2. The drainage ditch and associated culvert pipe and outfall structure, except seeding, at south of existing ash and lime ponds shall be completed by no later than January 1, 1981.

3. The pump house and associated water control structures in the ash disposal area and all other remaining work associated with this Contract 76-11-32 shall be completed by no later than April 1, 1981.

ACCESS ROADS: All access to the construction site shall be from DUFF AVENUE, between the Chicago and North Western railroad tracks and Munn Lumber Company property.

Access to the construction site for construction of the truck platform scale foundation shall be from EAST FIFTH STREET located adjacent to and immediately north of the power plant site. An access road off EAST FIFTH STREET south into the plant site exists immediately east of the existing power plant building.

These access roads continuously serve not only plant personnel but also other contractors in erection of the power plant addition and associated components. This Contractor (76-11-32) shall perform construction of all work under this Contract in a manner that will not obstruct or restrict bringing in of materials for erection by other Contractors at the job site.

SITE VISIT: It is required that the Contractor visit the site of the project before submitting his Proposal for this work so that he might be fully informed of the existing field conditions and the obstacles which he might encounter. This Contractor will not be allowed additional compensation for any reason or any matter or thing concerning which the Contractor might have fully informed himself of prior to submitting a bid proposal.

CONTRACTOR COORDINATION: The Contractors for this project will be required to maintain close coordination between one another, the Resident Engineer and the Plant Superintendent. The work and storage areas are limited, therefore, the Contractors shall not plan on leaving any more equipment or material on the job site than that which is required for current construction. Any work that will affect the operation of the existing power plant shall be scheduled in advance with the Resident Engineer and the Plant Superintendent. The Contractor shall not be entitled to any extra compensation for inconveniences or delays on the job site.

CONTRACTORS WORK AREA: The Contractors will be permitted to store equipment and material in areas shown on the Ames City Map, Figure No. 1. The Resident Engineer shall assign each Contractor storage areas based on need and priority of work. The Contractor shall submit a request for storage area to the Resident Engineer at least two weeks in advance of the date the space is needed. The power plant personnel will continue to receive and unload coal through their existing facilities. Close coordination between the Contractors and the plant personnel shall be required in order to not interfere with normal plant operation.

DEWATERING: All waste water from necessary dewatering work and associated with construction of this Contract shall be piped with temporary piping to an existing drainage ditch south and east of the plant or to curb inlets on Fifth Street.

All excavated areas, open excavations, concrete sumps and pipe chases associated with and/or resulting from work by this Contract shall be kept properly drained and pumped to prevent flooding.

All temporary piping shall be removed by this Contractor at the completion of this Contract.

In addition to the general dewatering requirements above, this Contractor is referred to the REMOVAL OF WATER in the EXCAVATION AND BACKFILL section of the specifications for further dewatering requirements under this Contract.

Further, it is the direct intention that this Contractor shall be responsible for the pumping out of any water or removing any solid materials including mud that accumulates in the excavations or in the structures to be constructed by this Contract during the period from award of Contract to the date of completion and final acceptance of all work under this Contract.

UNDERGROUND FACILITIES: Underground facilities now existing are shown on the accompanying plans to the extent that is possible. There may be additional facilities underground that are not known at the present time to the Engineer or the location as shown on the plans may not be exact. If such underground facilities are encountered by this Contractor during construction of this project, the Contractor shall immediately notify the Engineer.

If it is necessary, in the Engineer's opinion, to remove and relocate existing underground facilities, or to reroute Contractor's work to avoid existing underground facilities, the Contractor will be reimbursed for the extra expense

incurred in accordance with the paragraph EXTRA AND/OR ADDITIONAL WORK AND CHANGES in the CONTRACT STIPULATIONS.

Unless given prior permission by the Engineer, the Contractor shall take all necessary precautions to see that underground facilities remain in proper operation during the completion of this project.

Underground facilities shall be uncovered by hand excavation and shall be suitably supported and protected until they are restored to their original buried condition.

The Contractor shall keep an accurate plot plan drawing, showing the exact location of each underground facility encountered, and at the completion of the job he shall give this plot plan to the Resident Engineer as part of his permanent records.

OVERHEAD FACILITIES: There are potentially dangerous electrical equipment and high voltage overhead electric lines, all of which are energized, in the area of this Contract. Extreme caution shall be taken by this Contractor to insure that all of his personnel are working under safe conditions at all times. It is hereby understood that this Contractor shall be responsible for his workmen's safety.

USE OF EXISTING PLANT FACILITIES: The existing power plant operation is one of continuous operation; consequently any interference with this power generating operation will affect the City of Ames, Iowa as a whole. Therefore, this Contractor shall notify all employees associated with this Contract that they are not permitted to enter the existing plant or to use the power plant facilities at any time. Any exceptions to this requirement not covered in the specifications will require the permission of the Resident Engineer.

BASELINES AND BENCHMARKS: The Engineer shall establish baselines and benchmark locations and elevations. From the baselines and benchmarks established by the Engineer, the Contractor shall complete the layout of the work and shall be responsible for all measurements that may be required for the execution of the work to the lines and grades prescribed in the specifications or on the plans, and to such modifications as the Engineer may require as a result of necessary modifications to the Contract work. All field notes and data used by the Contractor for purposes of layout of the work shall be available for review by the Engineer. Such review will not relieve the Contractor of the responsibility for constructing the improvements to the lines and grades prescribed in the specifications or shown on the plans. The Contractor shall furnish, at his own expense, all labor, materials and equipment as may be required in laying out any part of the work from the baselines and benchmarks established by the Engineer. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks established by the Engineer. If such marks are destroyed by the Contractor, without authorization by the Engineer, the marks may be replaced by the Engineer at the expense of the Contractor.

TESTING: Testing of materials in excavated areas for classifications and compaction shall be made by an independent testing laboratory selected and paid for by the Owner.

Every operation of construction shall be subject to inspection by the Engineer and his representatives and they shall have free access to all operations and all parts of the work at all times whether at or away from the site.

WEATHER PROTECTION: This Contractor will be performing work under this Contract 76-11-32 such as excavation, backfill, concreting, construction of embankments, etc., during the late fall and winter months. This Contractor shall include in his bid all necessary cold weather protection including labor, materials, heated enclosures, heating fuels, insulated blankets, etc., as required to produce the quality of work as specified hereinafter in these specifications.

Cold weather protective measures proposed shall be submitted to the Engineer for review well in advance of the placing of any concrete or backfill in this Contract.

This Contractor will not be allowed any added compensation for such winter protection. The Contractor alone shall be responsible for the safety and adequacy of cold weather protective measures to insure the quality and rate of progress of the work that is required by this Contract.

REFERENCE DRAWINGS: Drawings on the existing adjacent construction are available for review at the office of the Owner and the Engineer.

RESPONSIBILITY TO RAILROAD: Whenever the term "Railroad" is used herein it shall mean the Chicago North Western Transportation Company, 915 9th St., Boone, Iowa 50036, represented by G. J. Kerbs, Assistant Division Manager of Engineering, or his duly authorized agent, who will be acting for the Chicago North Western Transportation Company.

The Contractor or his subcontractors will not be permitted to enter upon or perform any work contemplated upon railroad property unless or until the railroad insurance specified in the CONTRACT STIPULATIONS section of the specifications shall be delivered to and accepted by the railroad and that said insurance shall be kept in full force and effect during the times any work is being performed on railroad property by this Contractor or his subcontractors.

All proposed methods and procedures of work to be performed on railroad property shall be approved by the railroad before starting work. The railroad shall advise the City whether or not the Contractor's proposed methods and procedures for performing the work on railroad property are satisfactory within 20 calendar days after submission thereof by Contractor, or the City to the railroad.

If the Contractor or his subcontractors performing work upon railroad property shall prosecute the work thereon contrary to the plans and specifications, or if such Contractor shall prosecute the work on railroad property in a manner deemed hazardous by the railroad to its property and facilities or the safe and expeditious movement of its traffic, or if the railroad insurance requirement

specified in the CONTRACT STIPULATIONS section of the specifications hereof, shall be cancelled during progress of the work, the railroad shall have the right to stop the work on railroad property until the acts of omissions of such Contractor have been fully rectified to the satisfaction of the railroad or additional insurance has been delivered to and accepted by the railroad.

If the railroad exercises their right to stop work for reasons that the Contractor is not complying with specified conditions, then the Contractor will not be permitted an extension of construction time or extra monetary compensation by the Owner. If the railroad requests work stoppage for reasons that were not stated in the specifications or by separate letter, then the Owner will consider time extension and/or a change order to the Contract price as approved by the Engineer.

Before commencing work on railroad property, the Contractor shall be required to give written notice to Chicago North Western Transportation Company, at least ten days in advance of the date on which the Contractor expects to begin work on railroad property.

All correspondence to the Chicago North Western Transportation Company shall be sent to:

Mr. G. J. Kerbs,
Assistant Division Manager of Engineering
Chicago North Western Transportation Company
915 9th Street
Boone, Iowa 50036

and a copy shall be sent to:

1. Mr. Merlin Hove, Associate Director
   Ames Municipal Electric System

2. Resident Engineer

3. Lutz, Daily & Brain
   Consulting Engineers

The Contractor shall be required to use the utmost care in protecting railroad property and in avoiding accidents. All railroad tracks and grade shall be kept free, by Contractor, of earth, rock, construction materials, debris and any other obstructions, so as to permit safe and expeditious movement of rail traffic. All work shall be performed without interference with tracks, facilities, or the operations of the railroad or its tenants except under specific arrangements effected between the Contractor and the railroad.

The Contractor and the railroad shall agree, in advance of the Contractor's performing the work, upon methods and procedures covering all construction on railroad property, and, when required by the railroad, Contractor shall submit such proposals in writing.

The Contractor shall not be permitted to place or permit to be placed or to remain any scaffold, material or other temporary construction closer to the railroad's operative tracks than 8'-6" measured horizontally from centerline of track.

New road crossings, at grade, of railroad tracks, or roadways, on railroad right-of-way shall not be established or used by the Contractor except by agreement between the Contractor and the railroad and under such flag or other protection or protective devices as shall be approved or designated by the Division Superintendent of the railroad. The railroad may perform all or any part of the work incidental to establishing any such road crossing at grade or roadways or removing the same and restoring its tracks and roadbed involved therewith, or may require the Contractor to perform all or any portion of such work. The Contractor shall be required to maintain any such crossing so established in first-class condition at all times and to keep flangeways free of ice, snow, dirt, rock and debris. The Contractor shall be required to install, operate, maintain and remove in a manner satisfactory to the railroad, suitable barricades adequate to prevent unauthorized vehicles or equipment from using said road crossings or roadways. All cost and expense incidental to establishment, maintenance, operation and removal of any such crossings or roadways and barricades, whether the work be performed by the railroad or by the Contractor, shall be borne and paid by the Contractor as part of the Contract with the City. The Contractor will not be reimbursed by the City for these services and material costs. Notwithstanding anything elsewhere contained in this Contract, it is understood and agreed that the City will prohibit the Contractor from crossing the railroad tracks with vehicles or equipment of any kind or character, except at existing public crossings or at crossings established as provided for herein.

The Contractor is required to bear and pay all costs of protecting railroad property and traffic made necessary or accasioned by Contractor's operations under this Contract. The railroad will furnish, at the expense of Contractor, such switch tenders, flagmen, telegraph and telephone operations, watchmen and other protective services, together with a walkie-talkie or such other means of communications as in the judgment of the Division Superintendent of the railroad are required to insure the safety and continuity of rail traffic during Contractor's operations on railroad property. All flagging and ptotective services shall be performed strictly in accordance with directives and instructions issued by the railroad. The Contractor shall be required to confer with the Division Superintendent of the railroad prior to commencing any operations on railroad property, with respect to the protective services and devices which will be required, and the City will permit its Contractor to use said railroad right-of-way and property and to cross the tracks, in performing its said contract with said City, only in the manner, and at such times and locations and under such protective measures as are designated by the railroad. The City will require its Contractor to notify the railroad at least seven days in advance of commencing any operations which require the railroad to furnish protective services or devices.

The Contractor shall be required to reimburse the railroad for the cost of all services and materials supplied to and work performed for the Contractor, within 30 days after receipt of bills therefor from the railroad. The Contractor

will be reimbursed by the City for these service and material costs. Cost of labor furnished to the Contractor by the railroad including protective services, will be charged in accordance with the then current working agreements between the railroad and its employees. Reimbursement costs shall include, but shall not be limited to, labor plus actual costs incurred for rental rates, as well as cost of any materials and supplies, f.o.b. railroad rails, plus actual transportation and handling costs, plus any excise taxes on such materials and supplies. The City warrants reimbursement of the railroad by the Contractor for work performed by the railroad for the Contractor including cost of protective services and devices. The Contractor shall not include in the lump sum price of the PROPOSAL any anticipated costs for services or materials furnished by the railroad.

The Contractor shall be responsible to the railroad and its tenants for all damages accounted to delays which may be sustained by the railroad or its tenants, its or their employees, passengers or freight in its or their care, caused by any interference which could have been avoided by proper handling of the work.

Upon completion of the work the Contractor shall remove all machinery, equipment, temporary buildings falsework, debris and rubbish from the railroad's right-of-way, restore proper drainage away from the railroad's tracks and leave the railroad tracks and right-of-way in a neat condition, satisfactory to the Assistant Division Manager - Engineering, or his authorized representative.

SUBSURFACE EXPLORATION

GENERAL: A legend and logs of the most recent borings of test holes on the plant site are included in the back of these specifications for the information of the Contractor. The logs represent the soils only at the particular location at which each of the test holes were drilled. Any interpretation of soil conditions between test holes shall be the responsibility of the Contractor. Location of test holes is shown on Drawings 76-11-PP-5 and 76-11-ASH-11.

The following is a tabulation of additional boring and soil reports which are available for review at the office of the Owner or the Engineer.

Patzig Testing Laboratories Co., Inc.
Des Moines, Iowa

Soils report dated February 24, 1965, Soil Investigation, which includes borings.

Soils report dated April 18, 1966, Soil Investigation, which includes boring.

Soils report dated July 31, 1978, Soil Investigation.

Soils report dated February 16, 1979, Soil Investigation, which includes borings.

Soils report dated December 26, 1979, Soil Investigation, which includes borings.

Soils report dated June 27, 1980, Soil Investigation, Proposed Lagoon System and Pump House, which includes borings.

Soils report dated September 12, 1980, Geotechincal Investigation, Lagoon System and Borrow Area, which includes borings.

This data is included and made available in order to give the Contractor available information. The Owner does not guarantee the information to be factual. If the Contractor desires he may do additional subsurface exploration at his own expense.

Data included is as follows:

LOGS OF TEST BORINGS:

Project: Ames Power Plant - Ames, Iowa
Generalized Test Boring Summary/Soils Legend (Borings No. 1-8)

Boring No. 1, 6-5-78	Boring No. 10, 1-12-79
Boring No. 2, 6-16-78	Boring No. 11, 1-17-79
Boring No. 3, 6-12-78	Boring No. 12, 1-11-79
Boring No. 4, 6-5-78	Boring No. 13, 1-16-79

Boring No. 5, 6-6-78
Boring No. 6, 6-14/15-78
Boring No. 7, 6-6-78
Boring No. 8, 6-13-78
Boring No. 9, 1-16-79
Boring No. 14, 1-16-79
Boring No. 15, Not Drilled
Boring No. 16, Not Drilled
Boring No. 17, Not Drilled
Boring No. 18, 9-17-79
Boring No. 19, 9-20-79

Test Boring Location Plan

Project: Proposed Lagoon System and Pump House - Ames Municipal Power Plant System Ames, Iowa

Boring No. 1, 3-21-80
Boring No. 2, 3-21-80
Boring No. 3, 3-21-80
Boring No. 4, 3-19-80
Boring No. 5, 3-19-80
Boring No. 6, 3-19-80
Boring No. 7, 3-19-80
Boring No. 8, 3-19-80
Boring No. 9, 3-19-80
Boring No. 10, 3-19-80
Boring No. 11, 3-21-80
Boring No. 12, 3-21-80

Test Boring Summary Sheet/Legend (Borings No. 1-12)

Project: Lagoon System Borrow Site - Ames Municipal Power Plant City of Ames

Boring No. P1 (Piezometer), 7-29-80
Boring No. P2 (Piezometer), 7-29-80
Boring No. P3 (Piezometer), 7-29-80

Boring No. BA 1, 7-29-80
Boring No. BA 2, 7-29-80
Boring No. BA 3, 7-29-80
Boring No. BA 4, 7-29-80
Boring No. BA 5, 7-29-80
Boring No. BA 6, 7-29-80
Boring No. BA 7, 7-29-80
Boring No. BA 8, 7-29-80
Boring No. BA 9, 7-29-80
Boring No. 13, 8-27-80
Boring No. 14, 8-27-80
Boring No. 15, 8-27-80
Boring No. 16, 8-27-80

Test Boring Summary Sheet (TB#13 - #16)
Test Boring Summary Sheet (BA#1 - BA#9)

CLEARING AND GRUBBING

SCOPE OF WORK: The work covered by this section consists of furnishing all labor, equipment, tools and materials and performing all operations necessary for clearing and grubbing the areas specified herein or indicated on the Drawings and for the removal or disposal of all cleared and grubbed materials as specified herein.

ORDER OF WORK: All clearing and grubbing shall be completed at least 300 feet in advance of embankment or fill construction, required excavation, ditch excavation and all areas where structures are to be located or other required construction. In locations where work on proposed structures must be performed prior to the construction of embankment fills, structures, ditch excavation or other work under this Contract, clearing and grubbing shall be completed in advance for at least 50 feet in all directions.

CLEARING: Clearing shall consist of the complete removal to the ground surface of trees, brush, trash, slash, stone, metal, stumps, down timber, structures and other obstructions. Trees shall be felled in such a manner as to avoid damage to trees to be left standing, to the existing structures and installations, or those under construction, as well as to safeguard employees and others.

Construction areas for roads, embankments and structures shall be cleared within the limits of the fill for this work, together with strips five feet wide, beyond and contiguous thereto.

Existing channels, ditches, and depressions to be filled shall be cleared within the limits of the proposed fills.

Borrow areas, including pond excavation areas and other areas or embankments that are to be used as a source of borrow material, shall be cleared to the extent necessary to provide material meeting the specified requirements for fill materials.

GRUBBING: Grubbing shall consist of the removal of all stumps, roots, buried logs, pipes, debris, metal, existing structures of any kind that have been abandoned or are to be abandoned, and other objectionable matter below the ground surface.

Construction area for structures shall be thoroughly grubbed within the limits of the structure.

Borrow areas shall be grubbed to the extent necessary to provide borrow materials acceptable to the Resident Engineer.

DISPOSAL: Except as hereinafter specified, all logs, brush, slash, trash, and other combustible debris, which are the products of the clearing and grubbing operation, may be disposed of by burning in an air-curtain type destructor upon permission obtained in writing by this Contractor from the Ames, Iowa County Department of Health. Air curtain open pit destructor shall be in strict accord-

ance with the above agency's requirements. If burning is not permitted or desirable, all material shall be disposed of by the Contractor at offsite landfills approved by the governing agency. Open burning will not be permitted. The Contractor shall be responsible for compliance with all Federal, State, County and City laws and regulations reltative to the disposal of combustibles by burning.

Stumps or debris which, in the opinion of the Engineer, are impractical to burn and stones, broken concrete, metal, and other similar solid objects, which are the products of removal of structures and foundations, wire fencing, metal fenceposts, and pipes to be removed, shall be disposed of by the Contractor at offsite landfills acceptable to the governing agency.

FILLING OF DEPRESSIONS AND HOLES: The filling of depressions and holes excavated below the original ground surface as a result of clearing and grubbing operations is specified in section EMBANKMENT.

EXCAVATION AND BACKFILL

SCOPE OF WORK: The Contractor shall furnish all materials, machinery, equipment, and labor necessary to perform all stripping operations, excavation work, backfilling and grading indicated on the drawings or herein stipulated. This work shall include necessary preparation of the site, removal and disposal of all debris, the handling, storage, transportation and disposal of all excavated material, all necessary sheeting, shoring and protection work, preparation of grades and final grading, including repair or replacement of disturbed surface material and dressing of the site to the grades and elevations shown on the drawings or specified to be done.

This Contract shall include excavation for all foundations, sumps, pits, piping, drain lines or any other construction which shall require excavation to construct the project as shown on the accompanying plans.

This work shall be done so as to conform with all local and state ordinances and laws with respect to safety and excavation including safety provisions of the Williams-Steiger Occupational Safety and Health Act of 1970 and its latest revisions and regulations.

TEST HOLES: The log of test holes on the building site is included in these specifications (see section SUBSURFACE EXPLORATION in these specifications).

GENERAL: Excavation shall be done carefully to lines and elevations shown on the drawings, and shall provide proper room for all construction operations. Work shall be done so that the premises shall be as free as possible from all obstructions and from interference with transportation, storage or handling of materials. Care should be taken at all times to conduct the work safely, with all precautions against hazards of any kind. Before placing pipe or concrete structures upon any subgrade, all loose material shall be removed so that the pipe or structure will rest on solid, undisturbed ground.

Concrete forms will be required for foundations, walls and footings of any kind; therefore, the excavation shall provide adequate clearance for their installaw tion and removal. In no case shall excavation faces be undercut to provide for extended footings.

EXISTING BURIED UTILITIES: Underground utilities consisting of water lines, telephone cable and power circuits exist on the plant site. This Contractor shall exercise extreme caution in the excavation work performed in the area of the utilities and shall protect the services from damage.

APPROVAL OF OPERATION: All excavation of every description and of whatever substance encountered shall be performed in accordance with a plan of operation reviewed by the Engineer. Removal and relocation of utilities shall be coordinated with Owner. Hand excavation shall be used to the extent necessary to insure that the pipes and structures are placed at the proper elevation and that existing structures to remain are not damaged. Excavation for pipes and

structures shall be in accordance with the applicable provisions and classifications under that section specifying the structure or pipe to be constructed or removed.

DEFINITIONS: Terminology for this section are defined as follows:

Natural Blanket Soil: Natural blanket soils (or materials) refers to the natural deposit of finegrained soils. The surface soils encountered by the test borings primarily consist of silty clays and clayey silts varying in thickness and containing a slight to moderate sand content at various locations. The silty clayey surface soil is principally underlain by a brown silty medium fine textured sand which may contain clayey levels and seams and becoming courser with depth, altering to a course textured sand. These soils are typically stratified having been water-deposited and reworked many time. The natural moisture of these materials varies generally with the season of the year and stage of the river.

Pervious Fill: Pervious materials shall be free-draining sand or gravelly sand consisting of sound durable particles and shall contain not over 10% passing the U.S. standard No. 200 sieve.

Impervious Fill: Impervious materials shall be fine-grained materials of low permeability consisting of clays, clay silts, or silts, and shall be free of plant growth, roots, and humus. In general, the particle size of impervious material shall be such that a minimum of 50 percent of the soil particles shall pass a U.S. Standard No. 200 screen and, where possible, shall be material classified as CL or CH on the plasticity chart of the Unified Soil Classification Chart, revised 1960 and published in Vicksburg Experiment Station Technical Memorandum 3-357.

Top Soil: Soil with sufficient humus and of approximate texture to be used to support plant growth.

REQUIRED OVER EXCAVATION: Any pipe or structure subgrade that is less than three feet above the bottom of the pond impervious soil liner or embankment impervious zone within the pond limits, the trench or excavation shall be over-excavated to three feet below and three feet beyond the limits of the pipe or structure and backfilled to the top of the pond impervious soil liner or embankment impervious zone with impervious material compacted as hereinafter specified.

ZONED BACKFILL: Except in the case of overexcavation as described above, all backfill shall be zoned to match the adjacent material.

MIXING OF MATERIALS: When materials in borrow areas and required excavations are considerably stratified or when the natural moisture content varies considerably from the optimum value for proper placement and obtaining maximum density in compacted fill, the Engineer may require that excavation be done in a manner

to provide mixing during excavation to obtain a more homogenous material and with a more desirable moisture content after required manipulation of the fill.

LINES AND GRADES: The natural and existing ground surfaces shown on the drawings are approximate only. Material shall be excavated at the locations as specified and to the lines and grades as shown on the drawings. Any excessive excavation, including borrow excavation, shall be backfilled as specified herein.

SEGREGATION OF MATERIAL: Suitable material shall be used in the respective zone of the work. Excess or unsuitable material shall be disposed of as hereinafter specified. Excavated material shall be segregated into three stockpiles: top soil, pervious material and impervious material to permit replacement in the proper lone.

BORROW: Any random material borrow required for work under this Contract shall be obtained from the designated borrow area as shown on the drawings for use in random fill zones.

The limits of this borrow are shown on the drawings. Any excavation beyond and outside the lines, elevations, and dimensions shown on the drawings or referred to herein shall be backfilled to the allowable excavation limits with material similar to the original soil at no additional cost to the Owner. When directed, the backfill shall be compacted to a density at least equal to 95 percent of maximum density at optimum moisture as defined in section EMBANKMENT. Side slopes of excavated borrow areas shall be four horizontal to one vertical except as shown on the drawings. Construction haul roads and access ways along traverses and adjacent to borrow areas shall be maintained and left in a smooth and reasonably level condition. Upon completion of the levees and berms, and prior to acceptance, all disturbed area surrounding excavated borrow areas and the borrow areas themselves shall be graded smooth and left in a clean, neat, and workmanlike condition. Drainage of the borrow areas shall be the Contractor's responsibility during his operations in the borrow area.

REMOVAL OF WATER: The Contractor shall provide and maintain proper and adequate dewatering equipment for the removal and disposal of all surface and ground water entering excavations or other parts of the work, and shall keep each such excavation dry until the structure or embankment to be built therein is completed to the extent that no damage from hydrostatic pressure, flotation or otherwise will result from contact with such water. No reinforcement steel shall be placed in water, and no water shall be permitted to rise over such steel before the concrete has been deposited. Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches, to the greatest extent practicable without causing damage to adjacent property.

The Contractor will be held responsible for the condition of any sewer drain, or other conduit or pipe line which may be used for drainage purposes, and all such pipes or conduits shall be clean and free from sediment before acceptance thereof by the Owner.

SHEETING AND SHORING: The Contractor, as his subsidiary obligation, shall provide and construct all sheeting and shoring required to protect and maintain the stability of existing structures, or of banks or sides of excavation, and to prevent caving, sliding or any movement of such banks into the excavated area. This provision shall apply equally to excavation for structures and to trench work. Such excavations shall be sheeted and braced as required by any governing state laws and as may be necessary to protect life, property or the work.

Sheeting, bracing and shoring shall be adequate in design and construction to withstand all loads that might be caused by earth movement or pressure, and it shall be rigid, maintaining its shape and position under all circumstances. When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the excavation either below or through such sheeting. Where sheeting and bracing are used, the excavation width shall be increased accordingly.

In all cases, the safety of personnel shall be maintained, and hazardous and dangerous conditions shall be prevented.

The stability of existing structures shall not be impaired or endangered by any excavation work hereunder. The Contractor shall at his own expense install and maintain adequate shoring or sheeting to protect all existing structures adjacent to his areas of excavation. Such protection shall extend to the prevention of hazard to all structures or to their safety. The Contractor alone shall be responsible for the safety and adequacy of all bracing, sheeting, shoring, and methods of corstruction used.

CLASSIFICATION OF EXCAVATION: The term "excavation" shall include all materials excavated or removed on the site or sites of the work regardless of the type, character, composition or condition of the materials so excavated, and shall further include all debris, junk, broken concrete, brick, stone, pipe, logs, stumps, roots and all other materials encountered within the specified excavation limits.

PREPARATION OF CONSTRUCTION AREA: Vegetation shall be stripped from all areas to be excavated or to receive compacted fill to a depth sufficient to remove top soil, grass, weeds and roots. Stripping of borrow areas will be required insofar as it is necessary to provide suitable material for required fills. Stripped topsoil shall be stockpiled separately as directed by the Resident Engineer for replacement by this Contractor on the project.

All combustible debris resulting from preparation shall be disposed of by burning in an air-curtain type destructor. The Contractor shall be responsible for compliance with all Federal, State, County and City laws and regulations relative to the disposal of combustibles by burning.

In areas to be occupied by the embankment and related fills, any material designated as objectionable material by the Engineer, such as soft, low shear strength clays, muck, trash and excessively wet foundation soils or material determined to be objectionable because of high permeability, stability or is

otherwise unsuitable as a foundation for compacted fill, shall be removed to the limits shown on the drawings, or as directed by the Engineer within reasonable limits.

Drainage ditches and inlet and outlet ditches to drainage structures shall be excavated at the locations and to the cross sections and grades shown.

VERTICAL TRENCH WIDTH: Where vertical trench walls are permitted the trench shall be ample to permit the pipe to be laid and joined properly, and the backfill to be placed and compacted as hereinafter specified. The following are minimum trench widths:

Pipe Outside Diameter or Ductbank Width	Minimum Trench Width
12 inch and under	OD + 1 foot
14 inch through 21 inch	OD + 2 feet
24 inch through 42 inch	OD + 3 feet
48 inch and over	OD + 4 feet

EXCAVATION TO SUBGRADE: Except where over excavation is required for pipe or structure as specified hereinbefore, all excavation shall be made to the depth required so as to provide a uniform and continuous bearing and support for the pipe or structure on solid and undisturbed ground. Any part of the bottom of the pipe trench excavated below the specified grade shall be corrected with approved material, thoroughly compacted as directed by the Engineer. The finished subgrade shall be prepared accurately by means of hand tools. In the case of pipe installation, a maximum length of 18 inches near the middle of each length of pipe may be left only sufficiently low to permit withdrawal of pipe slings or other lifting tackle.

If, in the opinion of the Engineer, soil conditions are encountered at subgrade which require all or part of the work to be performed in accordance with the paragraph EXCAVATION IN POOR SOIL the Engineer shall have the authority to require the work to be so performed.

REQUIRED EXCAVATION BELOW SUBGRADE: Where the trench or excavation is required to be excavated below pipe or structure subgrade by these specifications, the subgrade shall be made by backfilling with an approved material in three inch to six inch uncompacted layers. The layers shall be thoroughly tamped or otherwise compacted as specified under COMPACTION to subgrade elevation or in the case of pipe to an elevation which is at least 0.1 of the pipe diameter above pipe subgrade and re-excavated to grade in such manner as to provide a uniform continuous bearing support for the pipe.

EXCAVATION IN POOR SOIL: Material, which at the bottom of the trench or excavation at subgrade is found to be, in the judgement of the Engineer, unstable or to include ashes, cinders, any type of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material shall be removed. The Contractor shall excavate and remove such unsuitable material to the width

and depth required by the Engineer. The subgrade shall be reconstructed as specified in the paragraphs REQUIRED EXCAVATION BELOW SUBGRADE and COMPACTION.

UNAUTHORIZED EXCAVATION: All material excavated below the bottoms of concrete walls, footings and foundations shall be replaced, by and at the expense of the Contractor, with concrete placed at the same time and monolithic with the concrete above, unless noted otherwise in these specifications.

SUBGRADE INSPECTION AND SOIL TESTS: The opened excavation shall be examined and approved by the Engineer before concrete or footings are poured. The Engineer may then order the surfaces to be placed in better condition, may order a test of the bearing capacity. Cost of such tests would be borne by the Owner and shall not be a part of this Contract.

SUBSOIL STABILIZATION: Subgrade soil for all concrete structures regardless of type or location, shall be firm, dense, and thoroughly compacted and consolidated, shall be free from mud and muck, and shall be sufficiently stable to remain firm and intact under the feet of the workmen engaged in subgrade surfacing or laying reinforcement steel, and depositing concrete thereon.

Subsoil which is otherwise solid, but which becomes mucky on top due to construction operations, shall be, unless specified otherwise, reinforced with one or more layers of crushed stone or gravel as directed by the Engineer at no additional cost to the Owner. Pervious material, crushed rock or other layer materials through which seepage might pass will not be permitted within the impervious fill zones of the ash disposal area.

Concrete shall not be placed on frozen subsoil.

EXCAVATION AND REMOVAL OF EXISTING PIPES AND STRUCTURES: Any existing culverts, sewers, water and gas lines and telephone conduit including valves, gates, concrete, brick and masonry manholes, headwalls, and other structures which are abandoned or are to be abandoned during the course of the work, as defined on the accompanying drawings, shall be removed within the limits shown. Ends of pipes remaining in place beyond the limits of removal shall be plugged with concrete for a minimum distance of 12 inches.

HAND EXCAVATION: Hand excavation shall be employed where shown on the drawings or where required to protect existing structures. Elsewhere machine excavation may be employed.

BACKFILLING IN FREEZING WEATHER: When frozen soil exists in either the surface of the original ground, excavation, trench, backfill material or partially constructed backfill, work shall not proceed until such time that the area in question has been prepared in a manner that is acceptable to the Resident Engineer.

BACKFILL MATERIAL: All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stone, frozen material or other material which is unsuitable. All suitable backfill material shall have a moisture content to enable satisfactory placement and compaction.

USE OF EXCAVATED MATERIAL AS BACKFILL: Except as shown on the plans, backfill of pipes and structures shall be zoned to match the material in the adjacent undisturbed sides of the excavation, i.e., impervious material shall be placed against impervious material and pervious (sand and gravel) against pervious material. The Engineer shall designate the zones of material if there is any question.

Material from excavation for pipes and structures shall be reused as backfill insofar as it meets the requirements for the materials specified in each zone of the work. Impervious material that is mixed with sand during the excavation process or any excess material will be disposed of on the site in an area acceptable for random fill as directed by the Engineer.

EXCAVATED MATERIALS FROM PONDS AND OTHER REQUIRED EXCAVATIONS: Materials obtained from these sources may be used in the embankments and required fills insofar as the materials meet the requirements of section EMBANKMENT.

COMPACTION: Compaction shall be performed at moisture content necessary to achieve required results with equipment used. Compaction of backfill materials shall be performed with spreading equipment supplemented by hand-operated equipment and rollers as required to obtain density specified. Backfilling and compaction shall be accomplished without inundation or flooding. Unless otherwise specified, compaction shall be adequate to prevent significant future settlement.

Impervious material shall be compacted to at least 95 percent of maximum density at optimum moisture content as determined by ASTM D-698 (Standard Proctor). Pervious material shall be compacted to at least 80 percent relative density, as determined by ASTM Specification D-2049. When backfill material is a combination of pervious and impervious material and there is a question as to which method of compaction should be used, the method of compaction shall be determined by the Engineer.

Tractors and other heavy construction equipment will not be permitted on pipes or conduit until at least two feet of compacted material is in place over the pipes. Power tampers shall be used, as necessary, for compaction of backfill in areas adjacent to pipes and structures. Placement of backfill materials shall be layers of thickness within compacting ability of equipment used, except that within two feet of any pipe or wall the lift thickness shall be from three to six inch layers of uncompacted thickness.

BACKFILL PLACED AGAINST STRUCTURES: Backfill material shall be brought up evenly on all sides of the structures and shall be compacted as specified under COMPACTION. Care shall be exercised in the use of heavy equipment to prevent damage or displacement of structures. Backfill shall not be placed against or over structures until the concrete has attained a minimum compressive strength of 4000 psi as determined by authorized laboratory test results unless specifically authorized by the Engineer.

BACKFILL OF TRENCH EXCAVATION FOR INSTALLATION OF PIPES, OR OTHER ITEMS: All trenches where the pipe, fittings and appurtenances are installed at subgrade in accordance with paragraph entitled EXCAVATION TO SUBGRADE shall be backfilled

by hand, from the bottom of the trench to a plane located one foot above the top of the pipe, with suitable excavated material placed in layers of three inches and compacted by tamping with particular care given to the lower 90 degrees of the pipe and the bell holes. Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously. Care shall be taken not to damage the pipe in any way while backfilling and tamping.

DISPOSAL OF DEBRIS: Broken pipe, concrete, masonry, brick and other products of removal of existing pipes and structures shall be disposed of as directed by the Engineer. Salvageable items shall remain the property of the Owner and shall be stored on the site as directed by the Engineer.

FINISH GRADING: All backfilled area and areas disturbed by excavation and backfill operation shall be graded and hand dressed as required to restore the terrain to its original shape or to the grade and cross-section shown on the drawings.

EXCESS EXCAVATED MATERIAL: Excess excavated material that is left after backfilling and dressing with top soil at the power plant addition proper shall be placed at the designated borrow area as shown on the plans.

STOCKPILING EXCAVATED MATERIAL: All excavated material shall be stockpiled in a manner that will not endanger the work and that will avoid obstructing the work of other contractors.

All excavated material suitable for compacted fills and backfill shall be stockpiled as specified under the paragraph SEGREGATION OF MATERIAL.

All stumps, roots or other debris shall be disposed of off the plant site by this Contractor at an authorized dumping site approved by the City of Ames, Iowa.

This Contractor shall stockpile all topsoil excavated in this Contract. To the extent of topsoil available this topsoil shall be placed on the surface of all cuts, fills and on adjacent areas where topsoil has been stripped during construction under this Contract to the finish grades shown on the contract drawings to a uniform depth of six inches.

Topsoil shall be placed on slopes after the fill or excavation is completed to the final grade shown on the accompanying drawings. The surfaces shall be chiseled to bind the topsoil to the fill or excavated area.

RESPONSIBILITY FOR DAMAGE: This Contractor will be excavating near and around existing and new construction and shall take all necessary precautions to prevent damage as he will be held solely responsible for damage done.

EMBANKMENT

SCOPE OF WORK: The work covered by this section consists of furnishing all plant, equipment, tools, labor and materials and performing all operations necessary for constructing all required fills, embankments and any other required fill as shown on the drawings and/or as specified herein.

The natural and existing ground surfaces as shown on the drawings are approximate only. Embankments and fills shall be constructed to the net grade and cross section shown and except as otherwise specified without additional allowance for shrinkage of the fill.

MATERIALS: Embankment materials shall be obtained from required pond excavations and if necessary from the designated borrow area as shown on the drawings and as specified in the EXCAVATION AND BACKFILL section of the specification. All impervious embankment and fill materials shall be obtained from required pond excavations. Material shall be free of roots, stone, debris, or similar objects larger than two inches in diameter.

Pervious materials shall be free-draining sand or gravelly sand consisting of sound durable particles and shall contain not over 10% passing the U.S. standard No. 200 sieve.

Impervious materials shall be fine-grained materials of low permeability consisting of clays, clay silts, or silts, and shall be free of plant growth, roots, and humus. In general, the particle size of impervious material shall be such that a minimum of 50 percent of the soil particles shall pass a U. S. Standard No. 200 screen and, where possible, shall be material classified as CL or CH on the plasticity chart of the Unified Soil Classification Chart, revised 1960 and published in Vicksburg Experiment Station Technical Memorandum 3-357.

Random materials shall consist of pervious materials, impervious materials or any combination thereof.

Natural blanket soils (or materials) refers to the natural deposit of fine-grained soils. The surface soils encountered by the test borings primarily consist of silty clays and clayey silts varying in thickness and containing a slight to moderate sand content at various locations. The silty clayey surface soil is principally underlain by a brown silty medium fine textured sand which may contain clayey levels and seams and becoming courser with depth, altering to a course textured sand. These soils are typically stratified having been water-deposited and reworked many times. The natural moisture of these materials varies generally with the season of the year and stage of the river.

Waste fill is any existing sanitary and trash landfill excavated. The waste fill shall be removed to a licensed sanitary landfill approved by the Engineer.

The degree of compaction for impervious materials expressed hereinafter as a percentage of maximum density refers to a maximum density at optimum moisture, determined in accordance with test procedures presented in ASTM D-698 (Standard Proctor). The degree of compaction for pervious materials placed, expressed hereinafter as a percentage of relative density, shall be determined in accordance with the test procedures presented in ASTM D-2049.

The location in the work for materials will be classified by the Engineer and shall be placed within the proper fill zones of the embankments, as shown.

FOUNDATION PREPARATION: After stripping, horizontal surfaces to receive fill shall be thoroughly scarified to a depth of six inches immediately prior to compaction and compacted as specified. If, for any reason, the surface to receive fill becomes compacted in such a manner or growth of vegetation develops to such an extent that in the opinion of the Engineer, a plane, seepage, or weakness might be induced, the surface shall again be thoroughly scarified. Where embankments are constructed against an existing slope (either a natural or excavated slope or that of a previously placed portion of embankment), the existing slope, after stripping operations, shall be cut or notched through any loose or dried material on the surface, and the compaction equipment shall work on both the existing material and the new fill to bond them together. Excavation for removal of objectionable material for embankment and drainage ditches, depressions and holes resulting from clearing and grubbing operations and voids caused by the removal or part removal of old foundations and structures or any other excavation required for removal of materials considered objectionable by the Engineer shall be backfilled and compacted to original grade or to the excavation shown on the applicable drawings, with impervious material compacted to at least 95 percent of maximum density and pervious material compacted to at least 80 percent of relative density.

GROUND WATER CONTROL: Where excavation is to be performed below ground water level and placement of compacted fill is required, placement of fill shall be conducted in the dry. If seepage occurs and results in any loosening of the foundation soils, or if, in the opinion of the Engineer, there is reason to believe loosening of the foundation soils will occur, the Contractor shall install a suitable dewatering system which will nullify the excess seepage gradient. Any loosened foundation material shall be compacted to at least 95 percent of maximum density. The water level shall be allowed to rise only after sufficient fill has been placed to offset the uplift pressure of the water. Methods for care of water and controlling the ground water level and seepage gradients shall be subject to review by the Engineer.

PLACEMENT AND COMPACTION REQUIREMENTS: The embankment and fills shall be constructed of compacted earth fill zones as indicated. Except on surfaces of impervious fill material, the top six inches of material placed on surfaces of ramps, road and pond embankment fills shall consist of topping material consisting of friable clay silts possessing characteristics of representative soils in the vicinity which produce a heavy growth of vegetation and meet the requirements for impervious material. The surfaces shall be chiseled to bind the topping material to the fill material. The material shall be free from stones or similar objects larger than two inches in diameter, stumps, roots, and any

toxic substance or substances which may be harmful to plant growth or be a hindrance to grading, planting and maintenance operations. The fill areas shall be graded to drain and shall be left in a reasonably smooth condition that will not result in the ponding of water.

EQUIPMENT: Tamper-type rollers shall consist of a heavy-duty, double drum unit with a drum diameter not less than 60 inches and an individual drum length of not less than 60 inches. The drums shall be liquid, or sand and liquid ballasted during use. Each drum shall have staggered feet uniformly spaced over the cylindrical surface such as to provide approximately three tamping feet for each two feet of drum surface. The tamper feet shall be seven to nine and a half inches in clear projection from the cylindrical surface of the roller and shall have a face area of not less than six or more than 10 square inches. The rolling units of multiple-type tamping rollers shall be pivoted on the main frame in a manner which will permit the units to adapt themselves to uneven ground surfaces and to rotate independently. The roller shall be equipped with cleaner bars, designed and attached to prevent the accumulation of material between the tamping feet; and these cleaner bars shall be maintained at their full length throughout the period of roller use. The weight of the roller shall be between 1000 pounds and 1500 pounds per linear foot of drum length empty and be capable of being ballasted to at least 2000 pounds per foot of linear drum length. The design and operation of the tamping roller shall be acceptable to the Engineer. At any time during prosecution of the work, repairs to the tamping feet, minor alterations in the rollers, and variations in the weight as may be found necessary to secure optimum compaction of the earth fill materials shall be performed. Rollers shall be self-propelled or drawn by a crawler-type tractor. Self-propelled rollers exceeding the empty weight requirement may be used provided that by the substitution of tamping feet having a face area not exceeding 14 square inches, the nominal foot pressure on the tamping feet of the self-propelled roller can be adjusted to approximate the nominal foot pressure of the towed roller for the particular working condition required for the towed rollers. If the self-propelled rollers cause shearing of the fill or laminations in the fill, the Engineer may direct that the self-propelled rollers be removed from the fill and that tractor-drawn tamping rollers be used. For self-propelled rollers, in which steering is accomplished through the use of rubber-tired wheels, the tire pressure shall not exceed 40 pounds per square inch. Rollers shall be operated at a speed not to exceed 3.5 miles per hour.

Crawler-type tractors used for compaction shall weigh not less than 40,000 pounds.

Power tampers will be acceptable subject to obtaining densities comparable to that specified for the material and zone of the embankment being compacted.

Sprinkling equipment shall consist of pressure distributors designed to apply water in controlled quantities to variable widths of surface. Sprinkling equipment depending solely on gravity flow for dispensing water to the fill will not be permitted.

COVERAGE:

a. Tamping Rollers. A complete pass shall consist of complete coverage of the area to be compacted with each trip of the roller overlapping the adjacent trip by not less than one foot.

b. Crawler Tractor. One pass shall consist of complete coverage by the tractor with sufficient overlap of successive tread paths to ensure complete coverage.

c. Power Tampers. Surfaces to be compacted in confined areas inaccessible for rolling shall be tamped uniformly with power tampers to obtain densities equal to that obtained by rollers or crawler tractors as applicable.

PLACEMENT AND COMPACTION: Layers shall be started full width out to the slope stakes and shall be carried substantially horizontal with sufficient slope to provide satisfactory drainage during construction. Portions of the fill, which are inaccessible to rolling, shall be compacted in three inch uncompacted lifts with power tampers. Hauling equipment shall be operated to avoid tracking insofar as practicable. When ruts appear in the surface of any layer of material to be rolled, the surface shall be scarified so that all ridges and bridging between ruts are broken down and the surface of the layer regraded and made uniform before compaction. Where the surface of any layer in the impervious fill or random fill has been made too smooth to bond properly with the succeeding layer, it shall be loosened by scarifying and recompacted. If the work is stopped for 24 hours or more, or if rainfall is imminent and is anticipated in sufficient amounts to cause temporary shutdown of operations, the impervious or random zones (except where the random fill is pervious material) shall be smooth bladed to drain and sealed with rubber-tired rollers, or other acceptable equipment as required to inhibit absorption of rainfall. Embankment and fills shall be scarified and recompacted after becoming unduly wet or after freezing before additional fill material is placed. Finished slopes shall present a uniform appearance without pronounced irregularities.

An overbuild of 0.5 foot above the prescribed grades will be permitted in the final dressing, provided any excess material is so distributed that there are no abrupt humps or depressions in the surfaces or bulges in the width of the crown. The above grade tolerance may be modified at locations where such modifications will not impair the design or appearance of the embankment. Fill material shall not be placed upon frozen surfaces nor shall frozen earth, snow, or ice be placed in the fill.

Impervious materials shall be placed in impervious fill zones in approximately horizontal layers not exceeding eight inches in thickness. Each layer shall be compacted to at least 95 percent of maximum density at optimum moisture. Before rolling is started, each layer shall be dried by aeration or have moisture added as necessary to obtain a uniform moisture content within the limits of three percent above and three percent below the optimum moisture for maximum density.

Random materials shall be placed in the random fill zones where shown on the drawings.

When random fill consists of impervious materials, it shall be placed and compacted in accordance with all requirements specified for impervious fill. When random fill consists of pervious material and is placed by rolled fill method, it shall be placed in maximum 12 inch uncompacted lifts. Each lift of pervious material when placed as fill shall be wetted as directed to facilitate compaction by not less than three passes of a crawler type tractor or vibrating roller acceptable to the Engineer. Pervious material placed by roll filled methods shall be compacted to at least 80 per cent relative density, as determined by ASTM Specification D-2049. When the random fill is a combination of pervious and impervious material and there is a question as to which method of compaction should be used, the method of compaction shall be determined by the Engineer.

After each layer of material is finished, it shall be inspected by the Engineer or his representative before beginning a new layer. If the material fails to meet the density specified, the course shall be reworked as necessary to obtain the specified compaction, and the compaction method or subsequent work shall be altered to obtain the specified density. Such procedure shall be determined by the Engineer.

Materials placed in area fill shall meet the requirements for embankment fill.

Materials placed in the required area fill shall be placed and compacted as described for rolled fill.

ACCESS ROADS, HAUL ROADS AND RAMPS: At locations where access roads to fields or buildings are destroyed because of the work required under this Contract, the Contractor shall provide temporary access roads during the construction period. Such facilities shall be removed to the extent required by the Engineer. Excavated materials or stockpiles of supplies shall not be placed, nor shall equipment be stored or operated in such manner as to preclude ingress to or egress from the fields and buildings.

Haulroads and ramps constructed for the prosecution of the work shall be to such line, grade, and width as to fulfill the requirements for safe and efficient hauling operations, and shall be subject to review and acceptance by the Engineer. Construction of ramps by excavation into the side slopes of the new or existing embankments will not be permitted., Subsequent to the completion of the work prior to acceptance by the Owner, the Contractor shall, where so directed by the Engineer, remove temporary construction ramps, and plow, scarify or otherwise loosen all haul roads, the areas occupied by ramps, and the access way (other than existing roads) to a minimum depth of six inches and the surface left in a reasonably smooth condition.

CRUSHED ROCK ROAD SURFACING AND BASE COURSE

SCOPE OF WORK: The work covered under this section consists of furnishing all plant, labor, supplies, equipment and materials, and performing all operations in connection with the preparation of subgrade, construction of crushed stone base course and the construction of a crushed stone surface course for the access roads, as specified herein and shown on the drawings.

Hauling of surfacing and base course materials will not be permitted on the subgrade or the finished surface when the road crown conditions are such that hauling operations will cause rutting of the surfaces.

MATERIALS: Roadway gravel and base course shall be granular surface in conformance with "Class B Crushed Stone" as specified in the Standard Specifications for Highway and Bridge Construction" series of 1977, as published by the Iowa Department of Transportation. The crushed stone shall pass 20% through a 1/8" sieve.

SAMPLING AND TESTING: The source of the materials shall be designated, and suitably processed samples representative of the material proposed for use in the work shall be obtained by the Contractor. All tests necessary to determine the suitability of materials to conform to the requirements of these specifications will be performed by the Contractor at no expense to the Owner. The samples shall be delivered to a point designated at least 30 days in advance of the time when the need therefore arises, and all materials shall be reviewed prior to delivery to the site of the work. Material may be sampled periodically during the work for compliance with specification requirements.

SUBGRADE PREPARATION: The areas to receive base course or be surfaced shall be shaped to line, grade, and cross section, and shall be compacted as specified below. This operation shall include any reshaping required along with the rolling of the subgrade to obtain compaction. When completed and ready for base course or surfacing, the areas to be surfaced shall be reasonably smooth and uniform with irregularities bladed out or rolled down.

Compaction shall be accomplished with four passes of an acceptable smooth-drum roller weighing not less than 150 pounds per lineal inch of drum, or four passes of a crawler-type tractor weighing not less than 10,000 pounds or other acceptable roller.

COVERAGE: One pass is defined as one complete coverage of the entire surface with the roller or tractor treads.

PLACEMENT OF MATERIALS: The crushed rock base course and surfacing shall be placed upon a previously approved subgrade. Immediately prior to placing the crushed rock material, the subgrade shall be checked as to conformity with plans and specifications and corrections made if necessary.

Crushed rock surfacing or base course material deposited on the subgrade shall be spread and shaped the same day. In event inclement weather or other unforeseen circumstances render impractical the spreading of the deposited crushed rock material during the first 24 hour period, the crushed rock material shall be rescarified and respread. The crushed rock shall be sprinkled as required during the above operations for the abatement of fugitive dust. If the required compacted thickness exceeds six inches, the surfacing and base course shall be constructed in two or more layers of equal thickness. The maximum thickness of any layer to be compacted shall not exceed six inches.

FINISHING AND COMPACTION: The crushed rock base course and surfacing shall be constructed in layers which do not exceed six inches and each layer shall be sprinkled as required and rolled until uniform compaction at the required density is obtained.

Compaction of the base course and surfacing shall be accomplished with a pneumatic tired roller. Rolling shall continue until the base course and surfacing materials have been compacted to a minimum of 95% of the maximum density determined by testing in accordance with ASTM D-698 (standard proctor). Moisture content shall be within $\pm$ two percent of optimum moisture content. The Owner at his own expense may take compaction tests to verify proper compaction.

Rolling with a pneumatic tired roller shall start longitudinally at the outside edge and proceed towards the center, uniformly overlapping on successive trips by at least one-half of the width of the pneumatic tired roller. The rollers shall be operated at speeds between two and six miles per hour.

Throughout the entire compacting operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical sections shown on plans and to the established lines and grades. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by sprinkling and rolling.

The Owner shall have full authority to require at any time, the suspension of delivery of material to the roadway until previously delivered materials are properly placed and preceding layers are satisfactorily smooth and compacted to the density specified.

Should the base course or surfacing, due to any reason or cause, lose the required stability, density, or finish, it shall be recompacted and refinished at the sole expense of the Contractor. Excessive loss of moisture in the subgrade shall be prevented by sprinkling or sealing. Excessive loss of moisture shall be construed to exist when the subgrade soil moisture content is more than three percent below the optimum for the density specified.

MAINTENANCE: Surfacing material shall be maintained until final acceptance and any material displaced by any cause shall be replaced at no additional cost to the Owner and to the lines, grades, and section shown.

STONE RIPRAP

SCOPE OF WORK: This item shall consist of furnishing all plant, labor, equipment, and materials and performing all operations in connection with the construction of stone riprap protection in conformity with the required lines and grades as shown on the plans.

Riprap shall consist of local rock, and shall be reasonably uniformly graded within the following limits:

Weight in Pounds	Percent of Total Weight Lighter Than
300	Maximum Allowable Size
200	85-95
50	30-50
10	0-15

Riprap material shall have the approval of the Engineer before delivery to the site.

Material used for riprap shall be hard, durable stone that will withstand weathering for an extended period. It shall be free from cracks, seams and other defects which would tend to increase unduly its deterioration from natural causes and shall be reasonably well graded within the limits specified.

The weight of the stone shall be a minimum of 150 pounds per solid cubic foot calculated from the bulk specific gravity (saturated surface dry) of the sample determined in accordance with ASTM C-127, "Methods of Test for Specific Gravity and Absorption of Coarse Aggregate." The maximum loss shall not exceed 20 percent weighted average at 5 cycles when tested for soundness in magnesium sulfate in accordance with ASTM C-88, using particles passing a 2-1/2 inch sieve and retained on a 1-1/2 inch sieve.

Riprap shall be placed to full layer thickness in one operation in such a manner as to minimize segregation and avoid displacing the underlying material. Stone for riprap shall be placed, beginning at the bottom of the section, in a manner that will produce a well-keyed and stable mass of rock with a finished surface corresponding to the lines and grades shown on the drawings. Distribution shall be obtained by selective loading at the quarry, together with controlled dumping at the site, or by other acceptable methods. Hauling over bedding or riprap after placement will not be permitted. Stone shall be placed by direct dumping in place by means of truck, skip box, clam, rock bucket, or orange peel. The larger stones shall be well-distributed and the finished stone protection shall be free from pockets of small stones and clusters of large stones. Final finishing of the slope shall be done as material is being placed. Dumping of stone at the top of the slopes and rolling into place will not be permitted. Moving stone by drifting and manipulating stone by means of dozers or whole blade equipment will not be permitted. A tolerance of plus 0.5 feet

from the thickness shown on the drawings will be allowed in the finished surface of the riprap. When necessary, the Contractor shall hand place riprap to the extent necessary to secure the results specified herein.

The Contractor shall maintain the riprap protection until accepted and any material displaced by any cause shall be replaced at his expense to the lines and grades shown on the plans.

CLASS B BEDDING

SCOPE OF WORK: This section of the specifications covers all labor and equipment necessary for transporting and placing the Class B bedding as required by the drawings and as herein specified.

The bedding material shall consist of natural gravel materials provided by the Owner and available in borrow areas on the plant site.

The available bedding material is graded within the following limits:

Sieve Size	Percent Passing by Weight
1"	85-100
3/8"	70-85
No. 4	55-75
No. 10	35-60
No. 40	10-35
No. 200	2-20

Areas on which bedding is to be placed shall be trimmed and dressed to conform to cross sections shown on the plans within an allowable tolerance of plus or minus two inches from the theoretical slope lines and grades. Where such areas are below the allowable minus tolerance, they shall be brought to grade by filling with earth similar to the adjacent material and well compacted.

Bedding shall be spread uniformly to the lines and grades indicated. Placement shall be by methods which will minimize segregation. Any damage to underlying surface during placing of the bedding shall be repaired before proceeding with the work. Compaction of the bedding layer will not be required, however, the bedding surface shall be reasonably smooth.

The gravel shall be sprinkled as required during the above operations for the abatement of fugitive dust.

CLASS A BEDDING

SCOPE OF WORK: This section of the specifications covers all plant, labor, equipment and materials to furnish and completely install the Class A bedding under the riprap as required by the drawings and as herein specified.

The bedding material shall consist of crushed stone or natural gravel materials at the option of the Contractor.

MATERIALS: The materials shall conform to the following requirements. Bedding shall be sound, durable stone, free from cracks, seams, shale partings, and soil or shall be natural gravel composed of hard, tough and durable particles free from adherent coatings. Bedding larger than one inch standard sieve size shall be reasonably free from flat elongated particles. Bedding material shall be reasonably well graded within the limits specified:

Sieve Size	Percent Passing by Weight
3 inch	Maximum Allowable Size
1-1/2 inch	75-95
1/2 inch	40-60
No. 4	5-25

Areas on which bedding is to be placed shall be trimmed and dressed to conform to cross sections shown on the plans within an allowable tolerance of plus or minus two inches from the theoretical slope lines and grades. Where such areas are below the allowable minus tolerance, they shall be brought to grade by filling with Class B bedding similar to the adjacent material and well compacted.

Bedding shall be spread uniformly to the lines and grades indicated. Placement shall be by methods which will minimize segregation. Any damage to underlying surface during placing of the bedding shall be repaired before proceeding with the work. Compaction of the bedding layer will not be required, however, the bedding surface shall be reasonably smooth.

The gravel shall be sprinkled as required during the above operations for the abatement of fugitive dust.

SEEDING

SCOPE OF WORK: The work covered by this section consists of furnishing all materials and performing all work required for mulching, fertilizing and seeding the unprotected finish slopes and areas within limits shown on the accompanying drawings.

The areas to be seeded under this Contract consist of all areas of new construction under Contract 76-11-32 at the Ash Disposal Area including ponds, access roads, drainage ditch, etc., not covered with gravel, concrete, buildings and except the floor area of each pond. In addition, those areas and slopes disturbed by work under this Contract on which existing grass cover is damaged shall be repaired and reseeded under this section of the specifications.

The seeding dates for this Contract 76-11-32 shall be accomplished between March 1, 1981 and April 1, 1981.

MATERIALS:

Fertilizer: Fertilizer of 12-12-12 grade, uniform in composition, free-flowing, and suitable for application with acceptable equipment, shall be provided. The fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable State fertilizer laws, and bearing the name, trade name or trademark, and warranty of the producer.

Mulch: Mulch shall be straw of cereal grain such as oats, wheat or grass hay on flat or gentle sloping areas and wood fiber on extreme cuts and slopes. Materials that contain objectionable weed seeds as listed by the Iowa State Department of Agriculture or other species that might be detrimental to the planting being established or to adjacent farmland will not be acceptable.

Seed: Seed shall be labeled in accordance with the latest U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act. Seed shall be furnished in sealed, standard containers unless otherwise acceptable to the Engineer. Seed that is wet or moldy or that has been otherwise damaged in transit or storage will not be acceptable. The pure live grass seed mixture and application rate to be used shall be as follows:

Kind of Seed	Pounds per Acre
KY-31 Fescue	35
Smooth Brome	15
Crown Vetch	20
Total	70

Weed Seed: Weed seed shall not exceed 0.5 percent by weight of the total of pure live seed and other material in the mixture.

Pure Live Seed: The following formula shall be used to determine the amount of commercial seed required in pounds to provide in each kind of seed the specified quantities of pure live seed:

$$\frac{\text{Pounds Pure Live Seed} \times 100 \times 100}{\text{Purity (\%)} \times \text{Germination (\%)}} = \text{Pounds Commercial Seed Required}$$

Soil for Repairs: Soil for repairs shall be of at least equal quality to that which exists in areas adjacent to the area to be repaired. Soil shall be used that is free from roots, stones and other materials that hinder grading, planting and maintenance operations and that is reasonably free from objectionable weed seeds and toxic substances.

Water: Water shall be free from oil, acid, alkali, salt and other substances harmful to the growth of grass, and shall be from a source reviewed by the Engineer prior to use.

INSPECTION AND TESTS:

Fertilizer: The Engineer shall be furnished with duplicate copies of invoices for all fertilizer used on the project. Invoices for fertilizer shall show the grade furnished. Each lot of fertilizer shall be subject to sampling and testing at the discretion of the Engineer. Sampling and testing will be in accordance with the official methods of the Association of Official Agricultural Chemists. Upon completion of the project, a final check of the total quantities of fertilizer used will be made against the total area treated, and if the minimum rates of application have not been met, the Engineer may require the distribution of additional quantities of fertilizer to make up the minimum rates of application specified.

Seed: The Engineer shall be furnished signed copies of a statement from the vendor, certifying that each container of seed delivered complies with the specified requirements and is labeled in accordance with the Federal Seed Act. This certification shall be obtained from the vendor and shall be furnished on or with all copies of seed invoices. Each lot of seed will be subject to testing by the Owner in accordance with the latest Rules and Regulations under the Federal Seed Act.

PREPARATION OF SEEDBED: Equipment necessary for the proper preparation of the ground surface and for handling and placing all required materials shall be on hand, in good condition, and shall be reviewed before the work is started. The Contractor shall demonstrate to the Engineer before starting work that the application of the materials required will be made at the specified rates.

Clearing: Prior to grading and tillage operations, vegetation on the site that might interfere with grading, tillage or seeding operations shall be mowed, grubbed, raked and removed from the site and the ground surface cleared of stones, roots, cable, wire, grade stakes, and any other materials that might hinder proper grading, tillage and seeding.

Grading: Previously established grades shall be maintained on the areas to be treated in a true and even condition; necessary repairs shall be made by adding soil as necessary to previously graded areas. Where grades have not been established, the areas shall be graded as shown, and all surfaces shall be left in an even and properly compacted condition to prevent formation of depressions.

Tillage: After the areas required to be treated have been brought to the grades shown, the areas shall be thoroughly tilled to a depth of at least three inches by plowing, disking, harrowing, or other accepted methods until the condition of the soil is acceptable. Tilling of slopes shall be in a direction at right angles to the slope. The work shall be performed only during periods where beneficial results are likely to be obtained. When conditions are such, by reason of drought, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the work will be stopped and shall be resumed only when directed. Undulations or irregularities in the surface that would interfere with further construction operations or maintenance shall be leveled before the next specified operation.

Fertilizer: Fertilizer shall be distributed uniformly at a rate of 400 pounds per acre over areas to be seeded, and shall be incorporated into the soil to a depth of at least two inches by disking, harrowing, or other acceptable methods. Incorporation of fertilizer may be part of the tillage operation.

Leveling: Surface irregularities resulting from tillage, fertilizing or other operations, before seeding, shall be leveled.

Cleanup: After completion of the above operations, the surface shall be cleared of stones or other objects larger than two inches in thickness or diameter, and of roots, brush, wire, grade stakes and other objects that might be a hindrance to maintenance operations.

PLANTING SEED: A satisfactory method of sowing which distributes the seed uniformly at the specified rate shall be employed, using acceptable mechanical powerdrawn drills or seeders, mechanical hand-seeders, hydro-seeders, or other acceptable methods. Equipment shall be provided with markers or other means to insure that the successive seeded strips will overlap or be separated by a space no greater than eight inches or equipment row spacing, whichever is less. When delays in operations extend the work beyond the most favorable planting season for species designated or when conditions are such by reason of drought, high winds, excessive moisture, or other factors that satisfactory results are not likely to be obtained, work shall be halted as directed and resumed only when conditions are favorable or when acceptable alternate or corrective measures and procedures have been effected. If during or after seeding operations a show of green indicates that strips wider than the space indicated above have been left unplanted, or other areas skipped, additional seed shall be sown if so directed.

APPLYING AND ANCHORING MULCH: Mulch shall be spread uniformly in a continuous blanket, using two tons per acre. Mulch shall be spread by hand or by a manure spreader, a modified grain combine with straw-spreader attachment, a blower type mulch spreader or other suitable equipment. Mulching shall be started at

the windward side of relatively flat areas, or at the upper part of a steep slope, and continued uniformly until the area is covered. The mulch shall not be bunched. Immediately following spreading, the mulch shall be anchored to the soil by a V-type wheel land packer, a scalloped disc land packer designed to force mulch into the soil, surface, or other suitable equipment. The number of passes required will be determined by the Engineer, but shall not exceed three.

REPAIRING AND RESEEDING: The Contractor is not required to guarantee a cover crop; however, the Contractor shall be fully responsible for any damage or lack of cover caused by elements under his control. The Engineer may direct that areas that do not attain the required cover or areas that become damaged shall be repaired and reseeded to specification requirements.

SOIL STERILIZATION

GENERAL: This Contractor shall furnish and install vegetation control chemical to the entire floor areas of the Lime Pond, Ash Pond and Clear Water Pond.

The vegetation control chemical shall be that referred to by trade name UREABOR, as manufactured by the Pacific Borax Company.

Application of the vegetation control chemical shall be by a standard lawn spreader with uniform spread of one pound per 100 sq ft on the top of the pond floor surfaces. The chemical application shall occur after all excavation, backfill, embankment, foundation work and finish grading are completed.

This Contractor shall take proper precautions to insure that the vegetation control chemical does not contaminate adjacent areas or be allowed to run off to adjacent areas which would contaminate areas not intended for vegetation control.