ILLINOIS POWER COMPANY

U-0315
L30-81(10-20)-6
500 SOUTH 27TH STREET, DECATUR, ILLINOIS 62525

October 20, 1981

Mr. James R. Miller, Chief
Standardization & Special Projects Branch
Division of Licensing
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Miller:

Reference: Geotechnical Engineering Branch
Review Question No. 241.3(b)

Clinton Power Station Unit 1
Docket No. 50-461

Responses to the Geotechnical Engineering Branch review questions were provided in Amendment 7 to the CPS-FSAR. Specifically, question No. 241.3(b) requested a copy of certain specifications for structural fill and backfill materials. Transmitted herewith are the following specifications:

K-2892 - Ultimate Heat Sink
K-2942 - Earthwork
Form 1714 - Standard Specification for Earthwork

Sincerely,

G. E. Wuller
Supervisor - Licensing
Nuclear Station Engineering

GEW/em

Enclosure

cc: Mr J. H. Williams, NRC Clinton Project Manager (w/o enc.)
Mr. H. H. Livermore, NRC Resident Inspector (w/o enc.)
Mr. D. Jagannath, NRC Geotechnical Engrg. Branch (w/o enc.)

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ULTIMATE HEAT SINK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

APPROVAL PAGE

NUCLEAR SAFETY RELATED ITEMS ARE PART OF THIS SPECIFICATION

Issue				
Purpose	Date	Prepared by	Reviewed by	Approved by
Comments	03-12-76	N. Horin	L. L. Helish	R.A. Witt
Construction	05-18-76	N. Horin	L. L. Helish	R. A. Witt
Amendment 1	07-16-76	L. J. Esposito	J. L. Wood	R. A. Witt
Comments Amendment 2	03-15-77	L. J. Esposito	J. V. Constantine	R. A. Witt
Amendment 2	06-29-77	L. J. Esposito	S E Hancock	R. A. Witt
Amendment 3	08-10-77	L. J. Esposito	S E Hancock	R. A. Witt
Amendment 4	02-08-78	L. J. Esposito	[illegible]	S. [illegible]
Amendment 5	06-16-78	L. J. Esposito	D. C. Kocunik	R. A. Witt

ULTIMATE HEAT SINK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

ISSUE SUMMARY PAGE

Purpose of Issue	Date	Pages Affected
Com - Spec. K-2892 issued for Owner's comments	03-12-76	All
Const- Spec. K-2892 issued for Construction	05-18-76	All
Amd.1 - Spec. K-2892 issued for Amendment 1	07-16-76	AP-1, IS-1, CP-1, 2-2, 3-2, 3-3 and 3-13.
Com, Amd. 2 - Amendment 2 to Spec. K-2892 issued for Owner's comments	03-15-77	AP-1, IS-1, CP-1, TC-2, 1-2, 2-1, 3-2, 3-3, 3-3A, 3-14, 3-15, 3-16, 3-17, 3-18, 3-19, 3-20, 3-21, 3-22, 3-23, and 3-24.
Amd. 2 - Amendment 2 to Spec. K-2892 issued	06-29-77	AP-1, IS-1, CP-1, TC-2, 1-2, 2-1, 3-2, 3-3, 3-3A, 3-14, 3-15, 3-16, 3-17, 3-18, 3-19, 3-20, 3-21, 3-22, 3-23 and 3-24.
Amd. 3 - Amendment 3 to Spec. K-2892 issued	08-10-77	AP-1, IS-1, CP-1, 3-2, 3-3, 3-3A, 3-18, 3-18A, 3-20, 3-20A and 3-21.
Amd. 4 - Amendment 4 to Spec. K-2892 issued	02-08-78	AP-1, IS-1, CP-1, 3-3A, 3-22 and 3-23.
Amd. 5 - Amendment 5 to Spec. K-2892 issued	06-16-78	AP-1, IS-1, CP-1, 3-3A and 3-15.

SARGENT & LUNDY
ENGINEERS
CHICAGO

NUCLEAR SAFETY RELATED
Project No.: 4536/4597

Spec. No. K-2892
Issue: Amd. 5, 06-16-78

CERTIFICATION OF SPECIFICATION

FOR

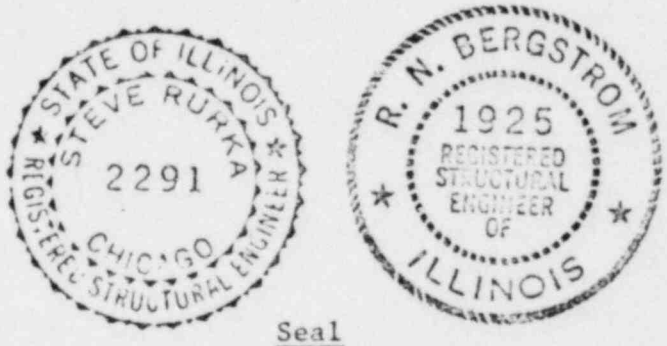
ULTIMATE HEAT SINK

CLINTON POWER STATION - UNITS 1 AND 2

ILLINOIS POWER COMPANY

I certify that this Specification was prepared by me or under my supervision and that I am a registered structural engineer under the laws of the State of Illinois.

Certified By: R. N. Bergstrom Date: 05-18-76



Seal

Revision:		Certified By:	Date:
Amendment 1		R. N. Bergstrom	07-16-76
Amendment 2		S. Rurka	06-29-77
Amendment 3		S. Rurka	08-10-77
Amendment 4		S. Rurka	02-08-78
Amendment 5		S. Rurka	06-16-78

ULTIMATE HEAT SINK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

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SPECIFICATION FOR ULTIMATE HEAT SINK

DIVISION 1 - GENERAL REQUIREMENTS

101. PROJECT ORGANIZATION

101.1 OWNER: ILLINOIS POWER COMPANY

101.2 CONTRACTOR: BALDWIN ASSOCIATES

101.3 CONSULTING ENGINEERS: SARGENT & LUNDY

101.4 TESTING AGENCY: UNITED STATES TESTING COMPANY, INC.

102. NAME OF PROJECT: CLINTON POWER STATION - UNITS 1 AND 2

103. LOCATION OF PROJECT
The site of the Clinton Power Station is in De Witt County, Illinois, approximately six (6) miles east of the city of Clinton.

104. TRANSPORTATION FACILITIES
As specified in Article 1 of Standard Requirements for Erection Work for Illinois Power Company (Form CPS).

105. SCOPE OF WORK

105.1 Contractor shall perform the following WORK for and at the above Station site:

ULTIMATE HEAT SINK, complete as indicated on the drawings and as hereinafter specified.

105.2 Work Furnished and Installed or Performed: Contractor shall furnish deliver, and unload materials for, shall store and remove materials from storage for, and shall construct, erect, install and/or perform and finish the following WORK:

a. Clearing and grubbing.

b. Diversion and care of water from dikes and excavation.

c. Excavation of Ultimate Heat Sink storage capacity.

d. Excavation of Ultimate Heat Sink baffle dike, retaining dike, foundations and abutments.

e. Grading of Ultimate Heat Sink side slopes.

f. Construction of the Ultimate Heat Sink compacted earth fill baffle dike.

g. Construction of the Ultimate Heat Sink compacted earth fill retaining dike.

h. Soil-cement slope protection. Amd.2

i. Handling and stockpiling of all material including top soil and compacted earthfill, disposal and placing of excavated material.

j. Provide equipment and manpower required to prepare any test pits or trenches as required by Owner or the Consulting Engineers.

k. Clearing, grubbing and backfilling of the valley south of the proposed Outlet Structure.

l. Perform evaluation of test results, provided by Owner's testing agency, to ensure that the technical requirements of this Project Specification K-2892 are met.

m. All other work as indicated on the drawings, as herein specified, or as required to properly complete the WORK.

105.3 Special Provisions: The WORK shall also conform to the following Special Provisions:

a. Location of Existing Underground Facilities:

a1. Existing underground facilities may run parallel to, or cross, construction for the new work, although not indicated on the drawings. These underground facilities include, but are not limited to, a power and/or control cable, lighting cable, conduit, grounding cable, gas line, etc.

a2. Prior to performing excavation work in any area, or any other work which might result in damage to these existing facilities, Contractor shall hand excavate as required to determine the exact location of these facilities.

a3. Contractor shall provide all required temporary protection and support for these existing facilities.

106. WORK BY OTHERS
The following related work will be furnished and installed, or performed, by others:

106.1 Circulating water piping.

106.2 Screen House.

106.3 Soil borings.

106.4 Soil Testing.

106.5 Bridges for County Route 14, State Highways 48, 54 and 10, Parnell Road and construction bridges.

106.6 Lake Clearing.

106.7 Discharge Flume.

106.8 Cooling Lake Main Dam.

106.9 Ultimate Heat Sink Inlet Structure.

107. DEFINITIONS

107.1 See Standard List, Form 1708.

107.2 Wherever the term "Job Specification" appears or is implied in the Specification, it shall be construed to mean "Project Specification.

107.3 Wherever the terms "ASA", "USA", "USAS" or "USASI" appears or is implied in the Specification, it shall be construed to mean "ANSI", American National Standard Institute, Inc., formerly the United States of America Standards Institute, Inc.

107.4 Wherever the terms "Owner" or "Purchaser" appear or are implied in the Specification, they shall be construed to mean "Illinois Power Company".

107.5 Wherever the term "Contractor" appears or is implied in the Specification, it shall be construed to mean "Baldwin Associates".

107.6 Wherever the term "Inspector" appears or is implied in the Specification, it shall be construed to mean "Contractor's Quality and Technical Services Organization".

107.7 Contractor is herewith designated as the Ultimate Heat Sink Work Contractor.

107.8 The Consulting Engineers, Sargent & Lundy, will act as an agent of the Owner concerning all matters pertinent to the technical requirements of earthwork operations.

108. ORIGIN OF COMPONENTS

The WORK shall not include any components manufactured outside the United States of America, unless specifically agreed upon in writing by Owner or the Consulting Engineers. If foreign manufactured components are included in the WORK without such prior approval, Contractor shall, upon notice in writing, replace them at his own expense, including installation, and he shall be liable to Owner for any damage to Owner's plant and any losses due to any delay caused Owner by such replacement.

109. LINES AND GRADES

109.1 Contractor shall lay out lines and grades from existing base lines and bench marks on property and be fully responsible for correctness of such lines and grades and for proper execution of WORK to such lines and grades.

109.2 Owner reserves right to verify correctness of lines and grades during progress of WORK. Such verification by Owner will not relieve Contractor of responsibility as specified foregoing.

109.3 Contractor shall notify Consulting Engineers of any differences in location of existing work from that indicated, wherever such differences may affect new work.

109.4 Contractor shall preserve and maintain all bench marks and reference points established by Owner. Should Contractor, during prosecution of WORK, destroy or remove any bench marks and/or reference points established by Owner, the cost to Owner of re-establishing these bench marks and/or reference points will be charged to Contractor.

109.5 Documentation Requirements: Contractor shall provide as-built drawings of completed WORK.

110. SITE CONDITIONS

Public Good Will: Contractor shall carry on the WORK at all times as to maintain the best possible relations among Owner, the Public and Public Authorities. Contractor shall provide Courtesy signs for detours and for other inconveniences to the Public as necessary and also if requested to do so by Owner.

111. QUALITY ASSURANCE AND CONTROL REQUIREMENTS

111.1 Contractor shall have a program that meets the requirements of 10CFR50, Appendix B and ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants", as applicable. In addition, Contractor shall comply with the following ANSI N45.2 Daughter Standards, where applicable:

a.	ANSI N45.2.3-1973	Housekeeping During the Construction Phase of Nuclear Power Plants.
b.	ANSI N45.2.6-1973	Qualification of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants.
c.	ANSI N45.2.9 Draft 15, Rev. 0 - April 3, 1974	Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants.
d.	ANSI N45.2.10-1973	Quality Assurance Terms and Definitions
e.	ANSI N45.2.12 Draft 3, Rev. 4 Feb. 22, 1974	Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants.

111.2 The Owner's copy of the Quality Assurance Program shall be controlled and maintained for the duration of the WORK covered by this Specification K-2892.

111.3 Contractor shall submit a preliminary list of the procedures and documentation which applies to the WORK and which he intends to submit to the Owner. The preliminary list will be reviewed, and a mutually agreed upon detailed list of procedures and documentation shall be developed.

111.4 A suggested inspection point program shall be submitted by the Contractor and shall include pertinent construction and inspection operations relative to Quality Control. The final Inspection Point Program, which will be applied to the WORK, shall be jointly developed with the Owner in writing, prior to the start of any work affected by the program. Owner and/or their designated representative shall be notified prior to start of specified tests and inspection points agreed upon as part of the final inspection point program.

111.5 Two (2) copies of the detailed procedures for the WORK shall be submitted to the Owner and Consulting Engineers for review and comment. Prior to the start of any work affected by the procedure, the Contractor shall resolve, to the satisfaction of the Owner and Consulting Engineers, all comments resulting from their review. The procedures to be submitted shall include, but shall not be limited to, the following:

a. Inspection of Structural Fill

b. Placement Procedures (Construction)

c. Sample Quality Control Records

111.6 The Owner, designated representative and/or other parties authorized by the Owner, such as regulatory agencies, shall have full access to the Contractor's and Subcontractor's facilities for audits during the WORK to review progress and determine acceptability of the WORK.

111.7 Nonconformances, deviations to the Specification requirements, and subsequent proposed resolutions shall be promptly submitted to the Owner and the Consulting Engineers. Such submittals do not relieve the Contractor from compliance with applicable codes, standards, and regulatory requirements stipulated in this technical specification and its included documents.

111.8 Contractor shall submit documentation, as defined in other articles of this Specification or as required by applicable codes, standards and regulatory criteria, to the Owner upon completion of the WORK, or concurrent with execution of the WORK if requested.

111.9 All paper documentations shall be clear, legible and of suitable quality for microfilming and/or storage for the life of the plant.

111.10 Contractor shall establish and maintain on site complete detailed records of all laboratory and field tests performed, in a manner approved by Owner's representatives and the Consulting Engineers. These records shall include all criteria and results of each test performed. Information on the records shall include at least the following:

a. Name of Project

b. Project Location

c. Owner

d. Date

e. Identity of Inspector

f. Type of Observation

g. Report Number

h. Location of Test, including elevation and test number

i. Acceptance or rejection of test

j. Corrective action taken in connection with noted deficiencies

111.11 After a test has been performed by the Testing Agency, all records for that test shall be executed in the shortest possible time.

111.12 Completion Letter:
After delivery of all documentation required by the Specification, the Contractor shall submit a letter to the Owner and Consulting Engineers listing all of the documentation delivered and stating that all requirements of the Specification have been fulfilled.

ULTIMATE HEAT SINK
CLINTON POWER STATION - UNITS 1 AND 2

DIVISION 2 - SUPPLEMENTS, STANDARDS AND DRAWINGS

201. SUPPLEMENTS

201.1 The following is attached hereto and forms a part hereof:

a. Form CPS: Standard Requirements for Erection Work (2-18-77). Amd. 2

201.2 The Consulting Engineers' "Soil Data Book, Clinton Power Station - Units 1 and 2", approved October 1, 1975 (and all subsequent revisions thereto), forms a part hereof, but is not attached.

201.3 The following Reference Project Specification, dated or revised as indicated (and all subsequent revisions thereto) forms a part hereof for reference only, but is not attached hereto: Amd. 2

a. Specification K-2944: Concrete and Grout Work (6-25-75).

Note: In event of conflict between the above supplements and the Project Specification, the Project Specification shall apply.

202. STANDARDS (CONSULTING ENGINEERS')

202.1 The following Standards are attached hereto and form a part hereof:

a. Structural Standard Specifications:

Form 1703: Standard Requirements for Structural Shop Drawings, Design Calculations and Instruction Books.

Form 1708-A: Standard List of Definitions and Reference Publications.

Form 1714: Standard Specification for Earthwork.

202.2 Dates for the foregoing Standard Specifications are indicated on the final page of written material for each Standard Specification. Suffix letters A, B, C, etc., indicate revisions, and the latest date for each Standard Specification is for the latest revision (if any). References to these Standard Specifications elsewhere in this Project Specification or on drawings do not include the letter suffix after the form number.

202.3 References throughout this Project Specification to specific Articles or Paragraphs of the foregoing Standard Specifications are for convenience only and shall not relieve Contractor from all obligations of all other applicable Standard Specifications.

202.4 In event of variation between the foregoing Standard Specifications and this Specification or Design Drawings, this Specification and the Design Drawings shall govern.

202.5 Wherever the terms "approve", "approval", "approved", etc., appear in Sargent & Lundy Standard Specifications, in reference to Contractor's drawings and data, they shall be construed to mean "review, "reviewal", "reviewed", etc.

203. DESIGN DRAWINGS (CONSULTING ENGINEERS')

203.1 The following design drawings by the Consulting Engineers, dated or revised, May 18, 1976, unless otherwise indicated, form a part hereof:

a. Structural Design Drawings:

S04-1089: Boring Location Plan Ultimate Heat Sink

S04-1090: Boring Profile Ultimate Heat Sink - Sheet 1

S04-1091: Boring Profile Ultimate Heat Sink - Sheet 2

S04-1094: Ultimate Heat Sink Plan

S04-1095: Ultimate Heat Sink Sections

S04-1096: Ultimate Heat Sink Foundation Verification (6-28-76) Amd.1

203.2 The following design drawings by the Consulting Engineers form a part hereof for reference only:

a. Structural Design Drawings:

S03-0019: Boring Location Plan - Sheet 8 of 9

S03-0020: Boring Location Plan - Sheet 9 of 9

S03-0021: Boring Location Plan - Sheet 1 of 9

S03-0022: Boring Location Plan - Sheet 2 of 9

S03-0023: Boring Location Plan - Sheet 3 of 9

S03-0024: Boring Location Plan - Sheet 4 of 9

S03-0025: Boring Location Plan - Sheet 5 of 9

S03-0026: Boring Location Plan - Sheet 6 of 9

S03-0027: Boring Location Plan - Sheet 7 of 9

S03-1040: Site Development - Key Plan

S03-1044: Site Development Plan - Sheet 4

S03-1045: Site Development Plan - Sheet 5

S03-1104: Grading and Drainage Plan Plant Area - Sheet 3

S03-1109: Grading and Drainage Plan Plant Area - Sheet 8

S03-1110: Grading and Drainage Plan Plant Area - Sheet 9

204. DRAWINGS AND DATA (CONTRACTOR'S)
Conform to the applicable requirements of Form 1703.

ULTIMATE HEAT SINK
CLINTON POWER STATION - UNITS 1 AND 2

DIVISION 3 - TECHNICAL REQUIREMENTS

301. GENERAL

301.1 Conform to applicable requirements of the Standard Specifications indicated in Division 2 and to the requirements of this Division 3.

301.2 Ultimate Heat Sink Subsurface Conditions:

a. The emergency core cooling systems Ultimate Heat Sink will be formed by constructing a submerged pond in the North Fork of Salt Creek. The pond's required capacity of 750 acre-feet will be developed by constructing an earth fill across the natural stream channel and excavating upstream from the berm. This stream channel presently flows on alluvial material filling the original channel carved by the stream in the Illinoian till. The total alluvial fill, including the topsoil, ranges in thickness from 12 feet to 23 feet. The upper weathered zone is 5 to 10 feet in thickness and composed of silty clay and/or clayey silt. In the unweathered alluvium, medium to coarse sand predominates. Hard, dense, sandy silt and clayey silt and occasional intervals of permeable, thin layers of sand and gravel, underlie the alluvium and comprise the Illinoian till zone. The Illinoian till is underlain by pre-Illinoian glacial till which is comprised principally of clayey silt and sandy silt.

b. At the Ultimate Heat Sink site, the water table slopes downward in the westerly direction from approximately Elevation 678 to 665, and is located within the alluvial floodplain soils of the North Fork of Salt Creek slightly below the existing ground surface. Excavations will extend into and through the alluvium and into the underlying impervious Illinoian till.

302. TESTING REQUIREMENTS

302.1 A Testing Laboratory will be furnished by Owner.

302.2 Services of Contractor:

a. Contractor shall permit and provide for inspection, testing, and approval of the WORK at all times by Owner or the Consulting Engineers.

b. Acceptance of fill materials will be made only after such materials have been incorporated into the WORK. However, rejection of such materials by Owner can be made in the borrow areas, transportation vehicles, or in-place in the completed WORK. Contractor shall cooperate with Owner to ensure that only acceptable materials will be incorporated into the completed WORK.

302.3 Services of Testing Laboratory:

a. Testing Requirements: During the course of the WORK, Testing Laboratory will perform the following tests, either in the field or within an earthwork laboratory, in order to identify materials, to determine their compaction characteristics, to define the moisture content of fill materials prior to, during, and after compaction, to determine the in-place density of compacted fill:

a1. Density of soil and soil-cement in place by sand cone method ASTM - D1556, nuclear density ASTM D2922, Washington densometer method ASTM D2167, or direct method such as the Corps of Engineers Method as approved by the Consulting Engineers. Amd. 2 Amd. 1

a2. Grain size analysis of soils and soil-cement ASTM D422. Amd. 2

a3. Moisture Content: Amd. 2

a3.1 Soil: ASTM D2216 and D3017 and from microwave oven by a procedure as approved by the Consulting Engineers. Amd. 2

a3.2 Soil-Cement: ASTM D2216 and D3017. Amd. 2

a4. Laboratory classification of soil and rock samples in accordance with unified classification system ASTM D653, D2487 and D2488.

a5. Moisture-Density relationship (Modified Proctor) ASTM D1557, by full five-point Proctor test and one-point Proctor test, as approved by the Consulting Engineers. Amd. 1

a6. Determination of Atterberg limits ASTM D423 and D424.

a7. Moisture-Density relationship of soil-cement mixtures by five point Proctor method, ASTM D588, and field control by three point Proctor method, as specified in Paragraph 309.8b. Amd. 3

b. Material Testing and Frequency: Field and laboratory test measurements shall be performed to the following minimum test frequencies:

TEST	FREQUENCY (SEE NOTE 1)	
FIELD DENSITY (See Note 2)		
Compacted Earthfill, Type A Material	A,B,C,E,F,K,G	
Compacted Backfill, Type C Material	A,B,D,G	
Excavated Subgrade	K,G	
Compacted Soil-Cement	A,B,C,E,F,G,K	Amd. 2
COMPACTION (Modified Proctor)		
Compacted Earthfill, Type A Material:		
One Point Proctor	D,F,G	Amd. 1
Five Point Proctor	F,G,L	
Compacted Backfill, Type C Material:		
One Point Proctor	D,F,G	Amd. 2

TEST	FREQUENCY (SEE NOTE 1)	
Five Point Proctor	F,G,L	Amd.2
MOISTURE CONTENT		
Borrow	C,D,H,G	
Compacted Earthfill, Type A Material	C,H,K,G	
Compacted Backfill, Type C Material	C,D,H,G	
Soil-Cement	C,H,G,K	Amd.3
COMPACTION		
Moisture-Density relationship of Soil-Cement (See Note 4)		Amd.2
Five Point Test	F,G,M	Amd.2
Three Point Test	F,G,J	Amd.3
GRAIN SIZE ANALYSIS AND ATTERBERG LIMITS AND SOIL CLASSIFICATION (see Note 3)		
Compacted Earthfill, Type A Material	F,D,G	
Compacted Backfill, Type C Material	D,G	
Bedding Material	J,G	
Soil-Cement	F,G,J	Amd.2
LIFT THICKNESS		
Compacted Earthfill, Type A Material	C,D,G	
Compacted Backfill, Type C Material	C,D,G	
Soil-Cement	C,D,G	Amd.2

NOTE 1: Testing frequency letter designations are as follows:

A = In areas where degree of compaction is doubtful.

B = In areas where earth fill operations are concentrated.

C = At least one for each earth fill shift.

D = One for every 6,000 cubic yards of fill. Amd.2

E = For record tests at location of any embedded items.

F = Where material identity is questionable to Inspector, Owner or the Consulting Engineers.

G = As requested by the Consulting Engineers.

H = Where soil appears too wet or too dry.

J = One for every 4,000 cubic yards.

K = One for every 10,000 square feet.

L = One for every 30,000 cubic yards of fill. Amd.1

M = One for every 20,000 cubic yards. Amd.2

NOTE 2: One direct field density test for every ten indirect field density tests will be required for Type A, Type C and Soil cement.

NOTE 3: Grain size analysis shall be limited to sieve analysis at the indicated frequencies D and J. One Hydrometer analysis for every two sieve analyses for Type A Material.

NOTE 4: Three Point method shall be used to control in-situ density and moisture. Five Point method shall be used for documentation of soil cement characteristics. Amd.3

c. To expedite identification and any required communication, laboratory samples shall be identified by one tag attached to the exterior and an identical tag placed within the sample container indicating Clinton Power Station, material description, material source, date placed, elevation and sample number.

d. Re esting: Retesting of failing density and moisture contents of soil cement shall conform to the following: Amd.5

d1. Two additional tests shall be performed on the same lift of material within ten feet of the initial failing test. Amd.4

d2. The results of all three tests shall be averaged and the area represented by the tests shall be considered acceptable if the average density and moisture content conform with the requirements of this Specification K-2892. Amd.4

d3. All retests shall be identified as such in the test reports and inspector's reports. Amd.4

303. SOIL DATA AND TOPOGRAPHY

303.1 General: A soils investigation was performed at the Project Site and is summarized in the Soil Data Book, Clinton Power Station. The information furnished was taken from the soils investigation reports and forms a part hereof for reference only. This information is furnished for Contractor's convenience; in using it Contractor assumes the risk, as Owner and the Consulting Engineers assume no responsibility for accuracy of information. Additional information will be available for inspection upon request. Contractor will be permitted to make his own soil investigations.

303.2 Test Borings:

a. The subsurface soil, rock and water conditions at the project site were explored by drilling borings to various depths below the ground surface at the locations indicated on the drawings.

b. A graphical representation of the soils and rock encountered in the borings, including standard penetration test data, sampling, and coring information is indicated in the Soil Data Book, Clinton Power Station.

c. Piezometers were installed in the boreholes to observe groundwater conditions. They consist of 3/4-inch-diameter PVC pipe having an 18-inch-long porous stone at the bottom. A summary of the elevations and locations at which piezometers were installed and observations of water levels is available for inspection upon request.

303.3 Compaction Tests: Compaction tests were performed on representative bulk samples of Wisconsinan till (Type A material). The compaction tests were performed in accordance with the Modified Proctors Test ASTM D1557.

303.4 Particle Size Analyses and Atterberg Limits: Particle size distributions were determined for representative soil samples to aid in classification and correlation of the physical soil properties. The results of these tests are indicated in the Soil Data Book. These tests were performed according to ASTM D422, D423, and D424.

303.5 Topography: Drawings indicate elevations, dimensions and/or cross sections, profiles and contour lines of existing ground. This information furnished for Contractor's convenience; in using it Contractor assumes the risk, as Owner and the Consulting Engineers assume no responsibility for accuracy of information shown thereon. Contractor will be permitted to make his own investigation of topography.

304. REMOVAL OF SOD AND TOPSOIL

Stockpile topsoil on Project site, where and as requested by Owner, for later reuse by Contractor or by others. Disposal of sod on Project site shall be as requested by Owner.

305. DIVERSION AND CARE OF WATER

305.1 General: Contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, and sumps, and shall furnish, install, and operate all pumps needed for diversion and care of water from any source, so that all work can be performed.

305.2 Hydraulic Data: The hydraulic data furnished herein are intended solely for Contractor's information. He may use the information in preparing plans for the diversion and care of water during construction of the Ultimate Heat Sink. This information is furnished for Contractor's convenience; in using it Contractor assumes the risk,

as Owner and the Consulting Engineers assume no responsibility for the accuracy of information. Additional information will be available for inspection upon request.

305.3 Hydrologic Conditions:

a. The Ultimate Heat Sink lies in the North Fork of Salt Creek stream valley. The North Fork of Salt Creek rises about 7 miles northeast of LeRoy, McLean County, State of Illinois, and flows in a southwesterly direction into DeWitt County where it joins Salt Creek approximately 4 miles downstream from the Ultimate Heat Sink.

b. The North Fork of Salt Creek drains approximately 124 square miles upstream of the Ultimate Heat Sink site. The nearest permanent USGS stream gaging station lies on Salt Creek approximately 12 miles downstream from the Salt Creek - North Fork of Salt Creek confluence, or approximately 16 miles downstream from the Ultimate Heat Sink site. This is known as Rowell gaging station.

c. This station gages the runoff from 334 square miles. Records have been maintained at this gaging station since October of 1942, and the following is a summary of basic stream flow data for the Ultimate Heat Sink site, which have been estimated using the gage records as a guide:

	Location	Drainage Area Sq. Mi.	Discharge (cfs) Average	Minimum	Maximum
c1.	UHS Site	124	84 (29 Year)	0.3 (Oct. 1954)	14928 (May 1968)

305.4 Flow-Duration Curve:

a. A flow-duration analysis was performed using observed data at the Rowell gaging station for the period 1943-1973. The results of the analysis when extrapolated to the Ultimate Heat Sink site is indicated in Figure 1.

b. The following indicates some of the extrapolated values of the flows and corresponding duration at the Ultimate Heat Sink site:

	Flow (cfs)	Percent of Time Flow is Exceeded
b1.	0.3	100
b2.	11.7	75
b3.	49.0	50
b4.	115.0	25
b5.	230.0	10

305.5 Discharge-Frequency Curve:

a. Hydraulic analysis indicates that the mean annual flood (recurrence interval - 2.33 years) will have a peak discharge of about 2,376 cfs at the Ultimate Heat Sink site. The discharge-frequency curve for the Ultimate Heat Sink site is indicated in Figure 2.

b. The following indicates some of the expected peak flows for various recurrence intervals:

	Recurrence Interval	Maximum Flow (cfs)
b1.	1 in 5 years	4,207
b2.	1 in 10 years	6,172
b3.	1 in 50 years	12,013
b4.	1 in 100 years	15,164

305.6 Rating Curve: A stage-discharge relation (rating curve) in the vicinity of the Ultimate Heat Sink area is indicated in Figure 3.

305.7 Review of Plans: Contractor's plans for diversion and care of water shall be subject to review. Before commencement of the WORK, Contractor shall accordingly submit to the Consulting Engineers for review, drawings and data indicating Contractor's proposed plans for diversion and care of water.

305.8 Responsibility for Restriction of Natural Drainage by Levees, Dikes and Embankments:

a. Contractor shall not place any fill for levees, dikes or embankments across routes of natural drainage until provisions are made to drain surface runoff into the new lake area or into drainage ditches forming part of the WORK.

b. No surface runoff shall be ponded or restricted to a greater degree than would have occurred naturally either before the beginning of construction or after completion of the WORK, unless approved by Owner.

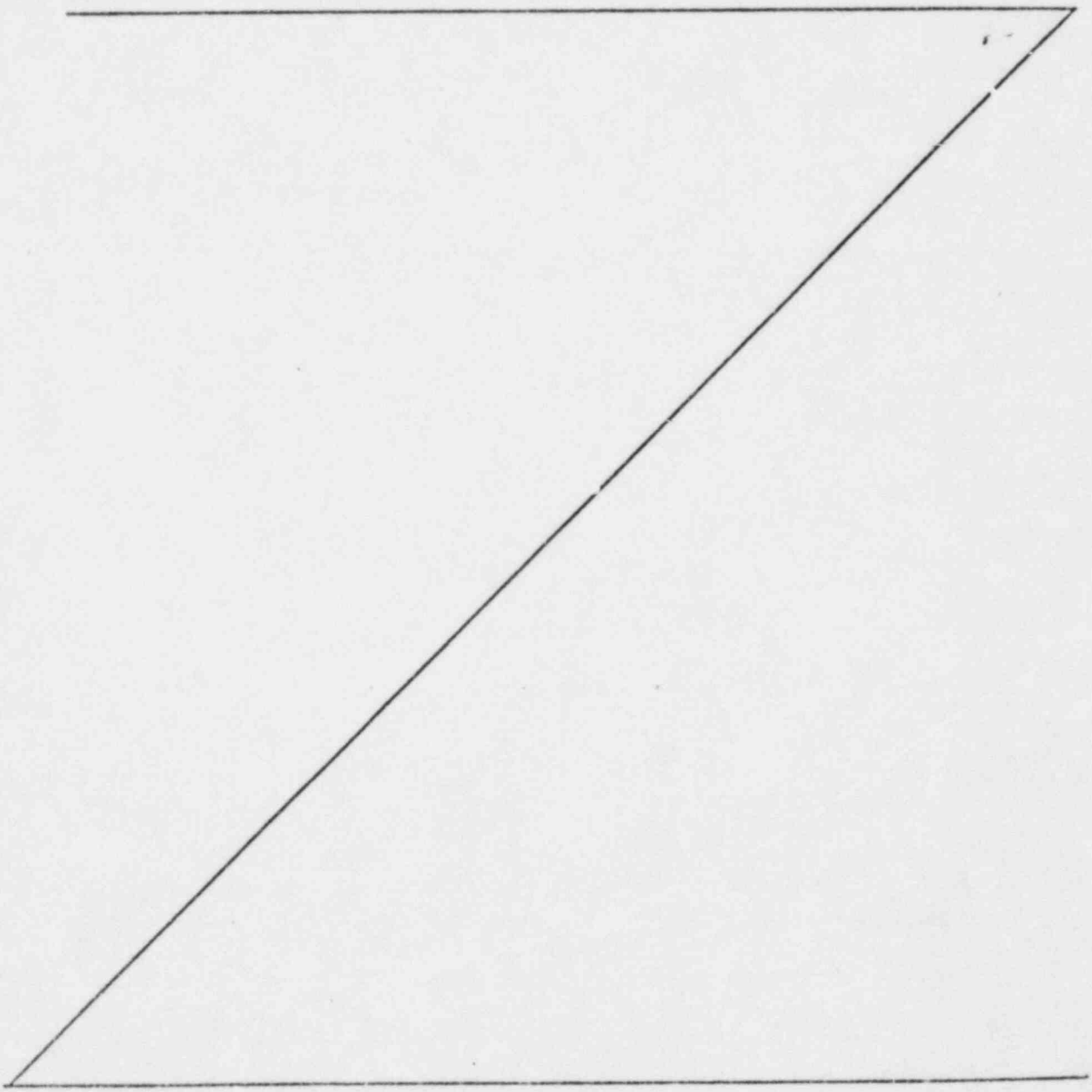
c. Should ponding or restriction of surface runoff result in water being backed up onto property not owned by Owner or onto Owner's property where work by other contractors is either under way or completed or where materials or equipment are being stored, all damages resulting therefrom shall be the responsibility of Contractor.

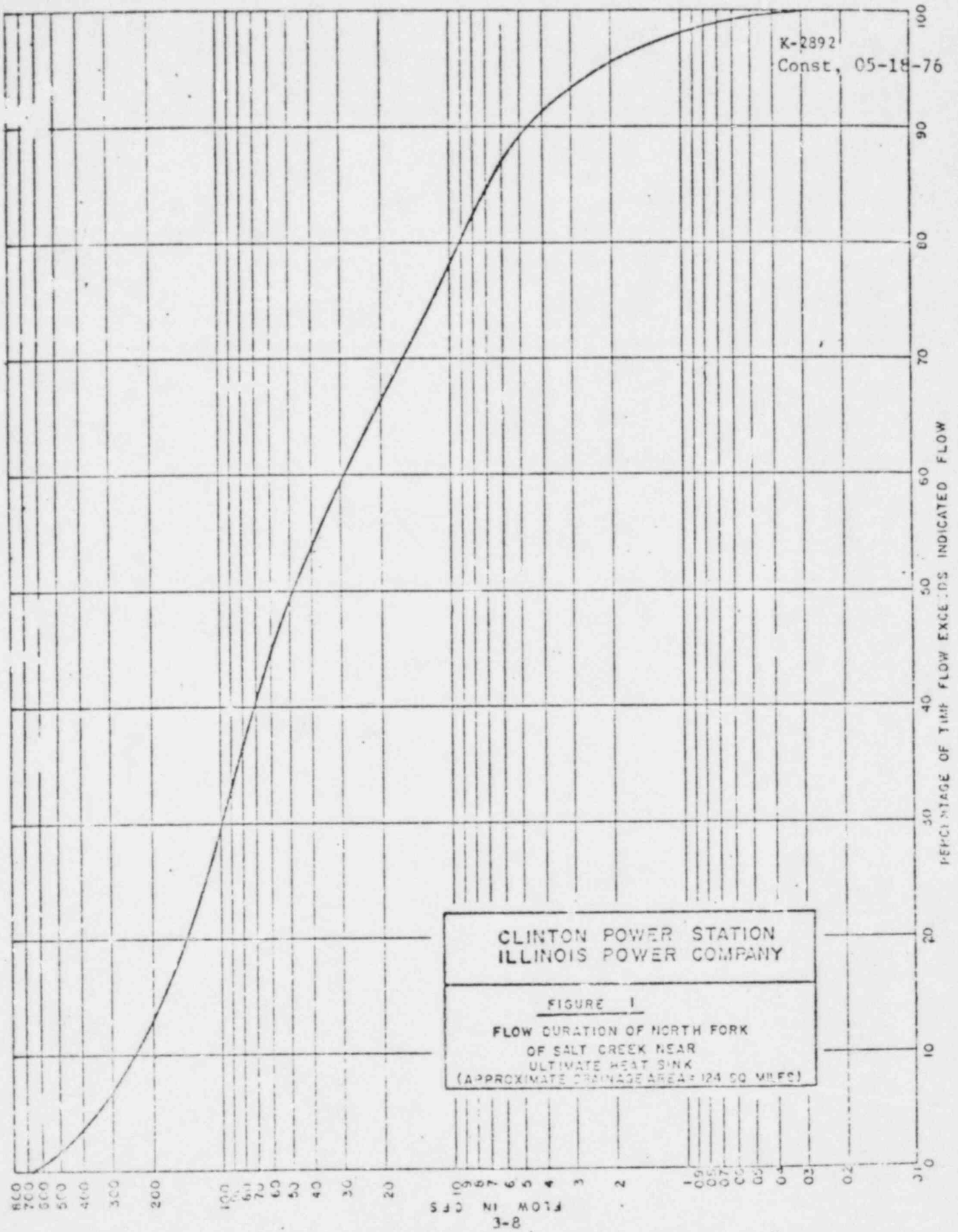
305.9 Dewatering:

a. Contractor shall maintain all necessary slopes, ditches, subgrade slopes, and shall furnish and operate all pumps needed such that dewatering can be accomplished in a manner that will prevent loss of fines from the foundation, maintain stability of excavated slopes,

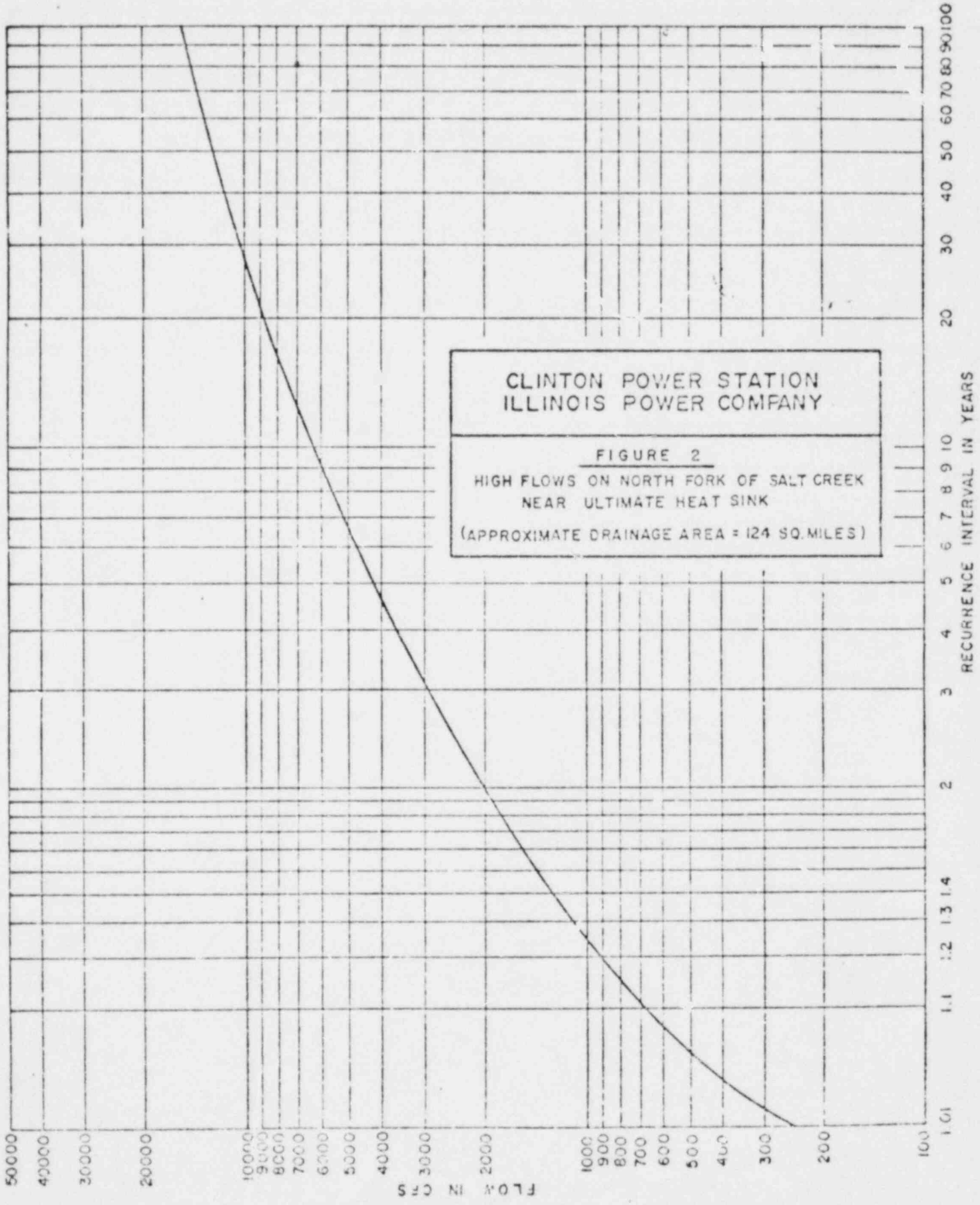
and allow the WORK to be performed to the requirements of this Specification K-2892.

b. Contractor shall be responsible for proper functioning of the dewatering system and shall be liable for any damage to subgrade, foundation, or structures and shall be required to make necessary adjustmer at his own expense, regardless of previous approval given by Own. .




K-2892
Const. 05-18-76
PERCENTAGE OF TIME FLOW EXCEEDS INDICATED FLOW
FLOW IN CFS
CLINTON POWER STATION
ILLINOIS POWER COMPANY
FIGURE 1
FLOW DURATION OF NORTH FORK
OF SALT CREEK NEAR
ULTIMATE HEAT SINK
(APPROXIMATE DRAINAGE AREA = 124.00 MILES)

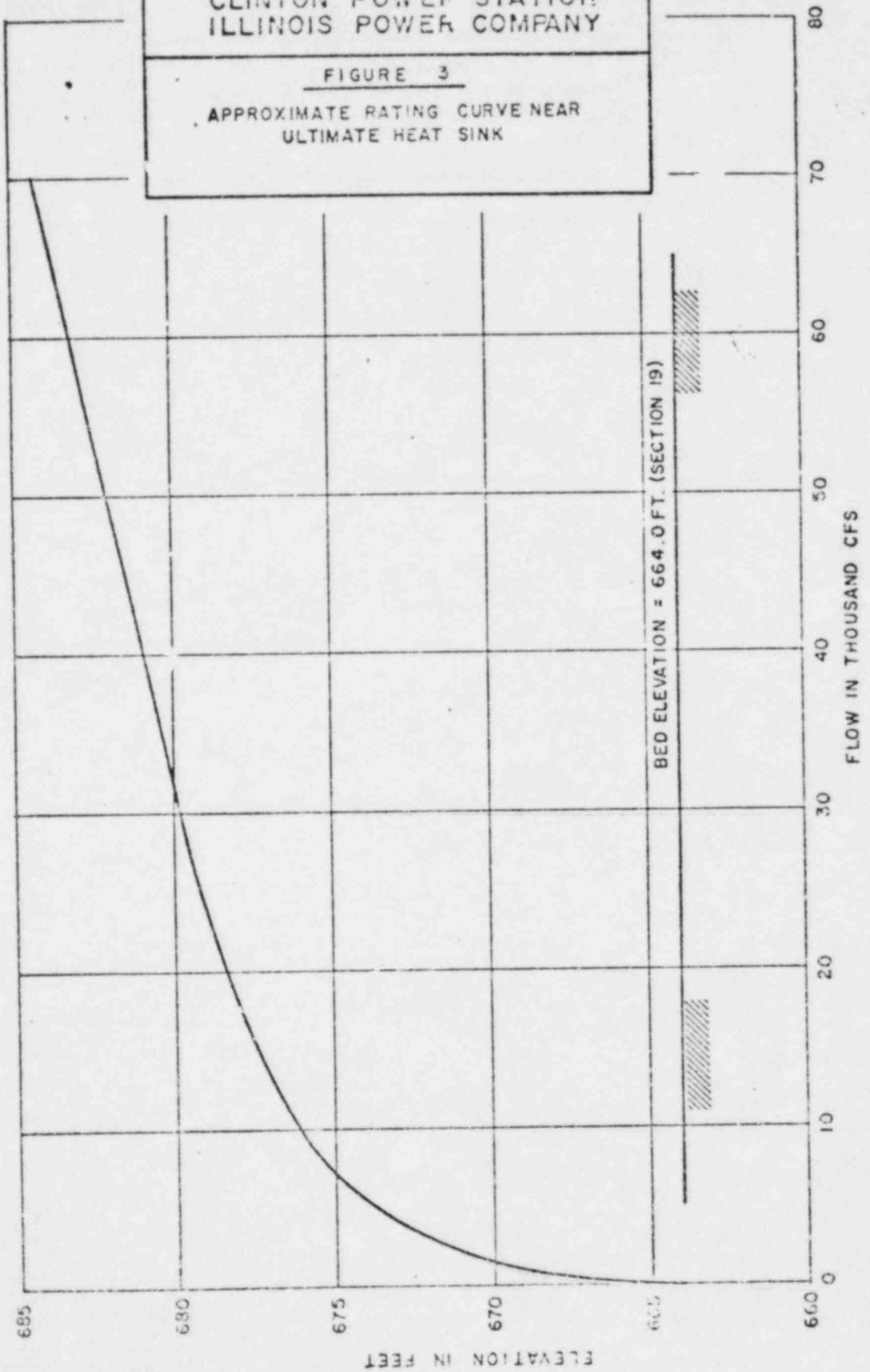
NOTE: DATA EXTRAPOLATED FROM THE VALUES AT ROWELL GAGING STATION FOR THE PERIOD 1943-1970.



CLINTON POWER STATION
ILLINOIS POWER COMPANY

FIGURE 3

APPROXIMATE RATING CURVE NEAR ULTIMATE HEAT SINK



306. EXCAVATION

306.1 General: All excavation shall conform to applicable requirements of Article 5 of Form 1714 and to requirements of this Article 306.

306.2 Definitions: As specified in Paragraph 5.2 of Form 1714 and as follows:

a. Stripping is defined as complete removal of sod, topsoil, organic matter and rubbish in areas indicated on the drawings and in borrow areas within the limits of the machinery. Contractor shall separate stumps and roots from stripped materials. Stripped materials shall be disposed of or stockpiled as herein specified.

b. Common excavation is defined as excavation of all materials other than solid rock or boulders and detached pieces of rock exceeding 2 cu. yd. in volume. Included in the common excavation category is excavation of all earth, sand, gravel, topsoil and hardpan, which can be removed without continuous and systematic blasting. Stripping of topsoil which is covered under another section of this Specification is excepted.

c. Borrow excavation is defined as all excavation in borrow areas, except stripping shall not be included unless otherwise indicated.

306.3 Borrow areas shall be as approved by Owner or the Consulting Engineers.

306.4 Procedures: Excavation may be accomplished by any method and by use of any excavation and hauling equipment best adapted to the WORK.

306.5 Limits: All excavation shall be performed to neat lines and grades indicated on the drawings. Any over-excavation or excess excavation, not requested by Owner, shall be at the expense of Contractor.

306.6 Over-excavation of the areas under the dikes shall be filled with compacted Earthfill Type A Material, or as approved by the Consulting Engineers.

306.7 Reasonable care shall be taken to protect finished excavated bearing surfaces against damage by movements of construction equipment, rain, frost or other causes which can impair the bearing capacity of the subgrade. Structural fill shall not be placed until the subgrade has been reviewed by the Consulting Engineers.

306.8 If unsuitable soils are found during excavation, as determined by the Consulting Engineers, Contractor shall be requested to carry the excavation deeper to more suitable materials.

306.9 All cohesionless soil exposed at the bottom of the bearing excavation shall be removed and replaced by same soil as to be used for construction of dikes, Type A Material or other suitable material. The decision regarding the suitability of the soil and overexcavation will be by the Consulting Engineers.

306.10 Material from Ultimate Heat Sink:

a. Material excavated from the Ultimate Heat Sink which meets the requirements of Article 307 may be used as Type C Material. Materials may be placed either immediately or may be stockpiled.

b. Materials excavated from the Ultimate Heat Sink shall be spoiled in the areas as indicated on the drawings or as requested by Owner.

c. Stumps, slash and brush obtained from stripping may be buried or burned in areas designated by Owner or disposed of off the site.

307. STRUCTURAL FILL

307.1 General:

a. Structural fill is herewith defined as any fill or backfill that is designed to possess certain characteristics, such as high density, high strength, low compressibility, and that is constructed in such a way that the desired characteristics are attained.

b. Subgrade to receive controlled compacted fill shall be inspected by Owner or the Consulting Engineers to determine if it is suitable and has sufficient bearing capacity for the fill material and loads to be placed over it, by taking in-place density tests. If subgrade is not suitable, as determined by Owner or the Consulting Engineers, Contractor may be requested to perform additional excavation as specified in Article 306.

c. Prior to placing structural fill, strip all areas to be covered, of all vegetation, top soil and all organic material or other foreign or deleterious materials.

307.2 Fill Materials: Structural fill materials to be used in earthwork operations shall consist of Type A and Type C materials obtained from the following on-site sources:

a. The Main Building excavation.

b. The Screen House and pipeline excavation.

c. Discharge Flume excavation.

d. Borrow area and/or areas designated by Owner.

e. Ultimate Heat Sink excavation.

307.3 Compacted Earthfill, Type A Material (Wisconsin Glacial Till):

a. Type A Material is composed of silt and silty clay and will be considered suitable structural cohesive fill and backfill if it contains no topsoil, organic material, loess, foreign deleterious material or highly compressible pockets. In addition, Type A Material shall meet the following requirements:

a1. Minimum of 100 percent pass 3 inch Standard sieve. Amd.1

a2. Minimum of 70 percent pass No. 40 U.S. Standard sieve.

a3. Minimum of 45 percent pass No. 200 U.S. Standard sieve.

a4. Plasticity Index shall exceed 4. Amd.1

b. Type C Material is composed of silt and silty clay and will be considered suitable structural cohesive fill and backfill if it contains no topsoil, organic material, loess, foreign deleterious material, or highly compressible pockets. In addition, Type C Material shall meet the following requirements:

b1. Minimum of 100 percent pass 3 inch Standard sieve. Amd.1

b2. Minimum of 65 percent pass No. 40 U.S. Standard sieve.

b3. Minimum of 45 percent pass No. 200 U.S. Standard sieve.

b4. Plasticity Index shall exceed 4. Amd.1

307.4 Borrow Area for Structural Fill:

a. Owner does not guarantee that the designated borrow areas or excavations shall supply all the types of materials necessary for the completion of the WORK.

b. Owner does not guarantee that all material within designated borrow areas or excavations will meet requirements of the Specification. Selective loading placing and mixing might be necessary to produce required quality and uniformity of fills.

307.5 Handling and Stockpiling:

a. Structural fill shall be handled and stockpiled in such a manner to reduce any intermixing of granular and cohesive material.

b. Areas approved for stockpiling backfill and fill material for future use shall be grubbed and cleared.

c. Contractor shall provide and maintain suitable drainage in the stockpile area to prevent excessive wetting of the structural fill. Stockpiled material shall be maintained with a smooth surface with sufficient slope to cause rapid runoff of rainwater.

307.6 Compaction Densities:

a. Type A Material: Type A fill and backfill used for construction of dikes shall be placed in layers not exceeding eight inches in loose thickness and compacted to obtain not less than 90 percent of the maximum Modified Proctor dry density in accordance with ASTM D1557 latest edition test. The placement water content must fall within 4.5 percent above the optimum moisture content to 2.0 percent below the optimum moisture content. Amd.2

b. Type C Material used as compacted backfill and placed other than to support foundation loads, shall be compacted to obtain not less than 85 percent of maximum Modified Proctor density in accordance with ASTM D1557 latest edition test. The placement water content shall fall within the interval of 6.0 percent above to 3.0 percent below the optimum water content. The soil shall be placed in layers not exceeding 10 inches in loss thickness. Amd.2

c. Fill Placement: As specified in Paragraph 6.4.5 of Form 1714, and as follows:

c1. Structural fill shall be placed in near horizontal layers to the loose thicknesses. Distribution and gradation of materials throughout rolled till shall be such that fill will be free from lenses, pockets, streaks or layers of material differing materially in texture or gradation from surrounding material. Combined excavation and placing operations shall be such that materials when compacted in the fill shall be blended sufficiently to secure the best practicable degree of compaction and stability. Travel on the fill shall be satisfactorily controlled to minimize tracking or cutting fill.

c2. Successive loads of material shall be dumped so as to produce the best practicable distribution of material and for this purpose locations in earth fill where individual loads shall be deposited may be designated. If the surface of any layer of rolled fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, or has formed a hard overcompacted crust from traffic, it shall be moistened or both moistened and scarified as required before the succeeding layer of material is placed.

c3. The surface of the fill shall at all times be kept reasonably smooth and free from humps or hollows. The fill surface shall be sloped transverse to the axis of the embankments with a grade sufficient to cause rapid runoff of rain water.

c4. If the rolled surface of any layer of earth fill in place is too wet for proper compaction of fill thereon, it shall be removed, allowed to dry, or shall be worked with a harrow, scarifier, or other suitable equipment, to reduce water content to specification requirement and then shall be recompacted.

c5. Compaction of fill materials shall not be commenced if the moisture content is not within the specified limits. Any materials which are placed but not compacted prior to drying out or becoming too wet, due to rain or other causes, shall be removed and replaced or reprocessed.

c6. Earthwork During Freezing Weather: Amd. 2

c6.1 Structural fill shall not be placed on frozen receiving surfaces having visible signs of frost, including snow.

c6.2 Before resumption of earthwork, after freezing weather, the receiving areas shall be stripped to a depth of 12 inches and scarified to a depth of six inches, or as determined by the Consulting Engineers. Amd.5

c6.3 The receiving areas shall be approved before the placement of a new lift.

c6.4 The total lift thickness, prior to the start of compaction, shall meet the requirements specified in Paragraph 307.6.

c6.5 In no instance shall frozen earth material be incorporated into the compacted earth fill.

c7. Where compacted earthfill is to be placed against existing cut slopes, or adjacent to previous compacted fill, each lift shall be keyed into the existing slope by removing existing slope material in steps as each lift is placed and by compacting the lift over the cut surface. Amd.2

c8. All openings through embankments required for construction and temporary drainage purposes shall be subject to approval by Owner or the Consulting Engineers. Approach or construction ramps for dikes and embankments shall be removed and those on the outside face shall be removed and/or trimmed, as requested.

c9. The Inspector shall make continuous surveillance and measurement checks on the placement of structural fill and shall determine the in-place density of the fill materials. Contractor shall furnish data to the Inspector as to the elevation of the top of each layer of fill placed.

c10. The in-place density of structural fill shall be determined during its placement and compaction by a continuous program of field testing. The type of test and the frequency will be determined as indicated in Paragraph 302.2.

c11. Working on top of the buried structure before it is backfilled to grade is not permitted except as may be necessary in backfilling or compacting.

c12. Heavy rolling equipment shall not be permitted to operate closer than five feet to the subsurface structures on foundations, as determined by Owner or the Consulting Engineers. In such cases, light vibrating base-plate compactors or power tampers shall be used.

c13. If stockpiled material is too wet, it shall be allowed to dry, and if necessary to assure the moisture content being uniform throughout, the depth of the layer shall be disced, harrowed, bladed and aerated.

308. EQUIPMENT

308.1 Compacting Equipment: Compacting equipment shall be of such design, weight, and quality as to obtain the required density in accordance with the specification. Areas inaccessible to mobile compacting equipment shall be compacted or consolidated by hand mechanical tampers or vibrators.

308.2 In addition to the foregoing equipment, Contractor shall have the following equipment available at the WORK.

a. Power tampers to be used for compaction of material in areas where it is impractical to use a roller or tractor.

b. Discs and motor graders for drying and maintaining fill.

309. SOIL-CEMENT SLOPE PROTECTION Amd.2

309.1 Materials: Amd.2

a. Cement: Cement shall be Type I or Type II and shall comply with the latest specification (ASTM C150). The amount of cement required will be based on results of the Moisture-Density Relations, ASTM D558, Wetting and Drying Test, ASTM D559, and Freezing and Thawing Test, ASTM D560.

b. Soil: The soil shall be selected material free from roots, sticks, sod tufts, and other organic matter, obtained from the designated borrow areas as directed by the Consulting Engineers. Contractor's excavation operation in the borrow area and selection of material shall result in an acceptable gradation of the materials when incorporated in the soil-cement slope protection. Soil material introduced into the mixing unit shall not contain clay lumps larger than 1-inch in size. Clay lumps larger than 1-inch in size shall be screened out of the raw soil on a 1-inch screen or shall be pulverized prior to mixing.

b1. Soil material introduced into mixing unit shall meet the following gradation requirements:

Sieve No./Size (U.S. Standard)	Percent Passing Minimum/Maximum
2"	100
1"	90-100
3/8"	75-100
4	65- 90
10	45- 75
20	30- 60
40	15- 45
200	0- 13

Note: Percentages shall be measured as a percent of dry weight.

c. Water: Water shall be free from substances deleterious to hardening and durability of soil-cement.

309.2 Proportioning: Standard Method: Contractor shall use the soil aggregate, cement content, and moisture content determined by the Consulting Engineers in accordance with standard laboratory tests. Proportions will be provided by the Consulting Engineers. Amd.2

309.3 Mixing Plant: The soil-cement shall be central-plant mixed in a continuous-flow on batch-type pugmill, as approved by the Consulting Engineers. Amd.2

a. The plant shall be equipped with metering and feeding devices that will add the soil, cement, and water into mixer in the specified quantities.

b. Soil and cement shall be mixed sufficiently to prevent cement lumps from forming when water is added and the resulting mixture is a uniform material.

c. The soil-cement mixture should be handled in a manner such that the segregation of the materials is minimized.

d. General Requirements for Mixing:

d1. The mixing time shall be that which is required to secure an intimate, uniform mixture of the soil, cement, and water as determined by the Consulting Engineers.

d2. The plant shall be calibrated at the start of construction, and the calibration shall be checked at least once a day. The calibration shall be checked as often as directed by Owner or the Consulting Engineers and whenever a change is noted in the stockpile or the mixture. Plant calibration shall follow the general guidelines outlined in the PCA publication, "Soil-Cement Slope Protection for Embankments: Construction."

d3. Inspector and the Consulting Engineers shall have free access at all times to all parts of the plant for checking the adequacy of the equipment in use, for inspecting the operation of the plant, for verification of weights or proportions, and for sampling the soil-cement mixture and its components.

d4. The control unit shall provide satisfactory means, either by weighing or metering to obtain the proper proportions of cement, soil and water. The variation of the weights of the actual mixed quantities of soil and water shall not be more than 3 percent by weight of the specified quantities. The variation of the weight of the actual mixed quantity of cement shall not be LESS THAN 3 percent or MORE THAN 10 percent by weight of the specified quantity of cement. Amd.3

d5. When the actual mixed quantities vary by more than that specified in Paragraph 309.3d4, Contractor shall make necessary adjustments in the plant operations to ensure that the mixed quantities are within the allowable tolerances of Paragraph 309.3d4.

e. Special Requirements for Continuous-Mixing Type Plants:

e1. The plant shall include means for accurately proportioning soil, cement and water and shall be equipped to insure positive interlocking control of the flow of soil and cement from bins, or stockpiles to the mixer.

e2 The plant shall include a continuous mixer of an approved twin-shaft-pugmill type and shall be capable of producing a uniform mixture.

f. Special Requirements for Batch-Type Plants:

f1. The batching plants shall include means of accurately weighing soil and cement in a weight box or hopper suspended on scales. The weight box or hopper shall be supported on fulcrums and knife edges.

f2. The batching plant shall include a batch mixer of twin-shaft pugmill type and shall be capable of producing a uniform mixture.

f3. Plant scales may be either of the beam type, with over-and-under indicator, or springless-dial type, and shall be of a standard make and design. If the beam-type scale is used, there shall be included a separate beam for soil and for cement, each beam being connected so as to actuate the over-and-under indicator, and a tare beam for balancing the hopper. The plant scales shall be sensitive to 3 percent of maximum load that may be required.

309.4 Definitions: Amd.2

a. Mixing Time: Mixing time shall be considered as the interval between the time the cement comes in contact with water and the time the mixture leaves the mixing unit.

b. Haul Time: Haul time shall be considered as the time elapsed from the time the material leaves the mixer until the same mixture is loaded on suitable spreading equipment.

c. Spreading Time: Spreading time shall be considered as the time elapsed from the time the soil-cement mixture is loaded on the spreader box to the time the same mixture is spread to the specified lift thickness.

d. Compaction Time: Compaction time shall be considered as the time elapsed from the time the material is spread to the specified lift thickness until the lift is compacted by suitable means.

e. Moist Surface: The surface of the placed soil-cement shall be considered moist if by a visual inspection the surface appears at least as wet as the soil-cement at the end of compaction time.

309.5 Transporting Soil-Cement Mixture: Amd.2

a. The soil-cement mixture shall be transported from the mixing plant to the embankment in clean equipment provided with suitable covers in wet weather. The total elapsed time between the addition of water to the mixture and the start of compaction shall be the minimum possible. Haul time shall not exceed 30 minutes.

b. The mixed soil-cement in loose state shall not be left undisturbed for longer than 30 minutes at any time.

c. The Contractor shall take all necessary precautions to avoid damage to completed soil-cement by the equipment and to avoid the deposition of raw earth or foreign material between layers of soil-cement. Earth ramps crossing completed soil-cement shall be of moist earth and must have at least two feet of compacted thickness.

309.6 Preparation of Foundation: Amd.2

a. The surface of earthfill (embankment) area, upon which soil-cement is to be placed, shall be free from deleterious and foreign matter, shall be firm and compact, and shall be visually approved by Owner or the Consulting Engineers prior to placement of overlying soil-cement lift.

b. The receiving areas shall be moistened and shall be kept moist until overlying soil-cement is placed.

309.7 Placing of Soil-Cement: Amd.2

a. The soil-cement mixture shall be placed on the moistened embankment slope or previously completed soil-cement layer to provide the thickness indicated on the drawings, in approximately horizontal layers, or in layers parallel to the slope of the embankments.

b. The equipment for spreading the soil-cement mixture shall be suitable for the purpose as approved by the Consulting Engineers and shall be operated to produce a reasonably smooth uniform surface. The equipment shall be controllable to produce layers of widths and uncompacted thickness that, when compacted, each layer shall be a maximum of 8-inches in thickness and shall meet all the requirements of Paragraph 309.8.

c. Each successive layer in a section shall be placed as soon as practicable after the preceding layer is completed. Contractor shall avoid the deposition of raw earth or foreign materials between layers of soil-cement. Finished surfaces of soil-cement shall be kept moist in accordance with Paragraph 309.9.

d. Soil-cement shall not be mixed and placed when the air temperature is below 45°F, unless the temperature is at least 40°F and rising. The soil-cement also shall not be placed when the subgrade and the soil to be processed is frozen, or when the weather conditions are such that the material being processed cannot be completely compacted and protected for seven days before the advent of freezing temperatures.

309.8 Compaction of Soil-Cement: Amd.2

a. Contractor may use track-type tractors, pneumatic rollers, tamping rollers, vibratory rollers, or pan vibrator compaction equipment to obtain the specified percent compaction of the soil-cement mixture, provided the equipment does not have any projection or tamping feet which will penetrate and damage previously compacted layers of soil-cement below the fresh layer.

b. Compaction Criteria: The soil-cement mixture shall be uniformly compacted to a density not less than 95 percent of the maximum density as determined by the following field control method: Amd.3

b1. The apparatus shall be as described in ASTM D558-71.

b2. The soil cement material shall be sampled from the deposited mixture prior to any compaction effort.

b3. The coarse material shall be removed by passing the soil cement mixture through a 3/4 inch sieve.

b4. The sample shall then be prepared into three different moisture contents; one as received, one higher, and one lower.

b5. The three soil cement points shall then be determined as described in ASTM D558-71, paragraphs 4.2.3, 4.2.4, 4.2.5, 5.1, 6.1, 6.2, 6.3, 7.1, 7.1.1, and 7.1.2.

c. The moisture content in the mixture on a basis of oven-dry weight, shall be such that it shall not be more than one percentage point below the specified optimum nor more than two percentage points above the specified optimum. The moisture content shall be maintained uniformly throughout the material being compacted.

d. After the soil-cement mixture is spread, the compaction shall start as soon as possible and in no case shall the time elapsed between the time cement came in contact with water and the start of compaction shall exceed 60 minutes.

e. Compaction time shall not exceed 2 hours.

f. If the surface of a layer of soil-cement has been unduly rutted by hauling of other equipment, Contractor shall be required to scarify such surfaces, as directed by the Consulting Engineers, prior to continuation of compaction.

g. When any of the compaction operations are interrupted prior to completion of compaction, the soil-cement mixture, which has not been completely compacted and is left for more than 30 minutes or the soil-cement mixture, before completion of compaction, is wetted by rain so that the average moisture content exceeds the tolerance given in Paragraph 309.8c at the time of final compaction the entire layer affected shall be replaced.

h. During and/or before compaction, the soil-cement layer shall be further shaped to the required lines, grades, and cross-sections.

309.9 Protecting and Curing Surfaces of Soil-Cement: Amd.2

a. General: Surfaces to be treated by moist curing as specified herein shall be kept continuously moist by fog spraying for the minimum time period beginning at the predicted sunrise to two hours after the predicted sunset. Sunrise and sunset times shall be as predicted by National Weather Service or by an approved agency.

b. Bonding Surfaces:

b1. All compacted soil-cement surfaces, which will be in contact with succeeding layers of soil-cement shall be kept continuously moist by fog spraying until placement of the next layer.

b2. Within 3 hours after completion of compaction, the top surface of the completed layer shall be broomed with a power driven broom to provide a suitable bonding surface as approved by the Consulting Engineers. Loose material and accumulated debris shall be swept off immediately prior to placement of the next layer. The final application of water shall be made on the broomed surface just prior to when the soil-cement material for the next layer is placed. Amd.3

b3. Sealing Membranes:

b3.1 Contractor may use sealing membranes in place of moist curing, as approved by the Consulting Engineers. The proposed sealing membrane shall be white pigmented membrane conforming to ASTM C309 and shall be applied adequately as approved by the Inspector or the Consulting Engineers.

b3.2 Before placing the overlying lift, the receiving lift shall be scarified by means of power driven stiff wire broom, or other suitable means as approved by the Consulting Engineers, to remove the sealing membrane. The receiving lift shall then be moistened, with a fog spray, to ensure a bond between the lifts and shall be approved by the Inspector or the Consulting Engineers prior to placing the next lift.

c. Permanently Exposed Surfaces

c1. Permanently exposed surfaces shall be kept in a moist condition for 7 days, or they may be covered with a suitable curing membrane, subject to the Consulting Engineers approval. Any damage to the protective covering within 7 days shall be repaired.

c2. After a soil-cement section has been completed, the surfaces to be permanently exposed shall be protected against drying by being moistened and by being kept moist until a protective cover of curing

compound has been applied. Curing compound shall be applied to the exposed outer surfaces of each completed section soil-cement slope protection as soon after completion as practicable.

c3. The curing compound shall be either the sealing membrane specified in Paragraph 309.9b3, Rapid Curing Type Cut-Back Asphalt RC-250 in accordance with AASHTO M-1 or Rapid Setting Emulsified Asphalt Type RS-1 or RS-2 in accordance with AASHTO M-140. Curing compound for permanently exposed soil cement at the closure and adjacent abutment of the Ultimate Heat Sink only shall be clear Horncure 30, as manufactured by A.C. Horn Products. The curing compound shall not be placed on bonding surfaces. Amd.4

c4. The curing compound shall be applied to the soil-cement surfaces by a pressure distributor spraying in one coat to provide a continuous, uniform membrane cover over the entire area. The curing compound shall be applied at a minimum rate of 0.2 gallon per square yard, except that the rate shall be increased, if necessary, as directed by Owner or the Consulting Engineers to obtain the required continuous membrane cover over an entire area.

c5. The surfaces of each section of soil-cement to be treated with curing compound shall be moistened by fog spraying immediately after the section has been completely compacted and shall be kept wet until the surface will not absorb more moisture. As soon as the surface film of moisture disappears but while the surface still has a damp appearance, the curing compound shall be applied. Special care shall be taken to insure ample coverage of the curing compound at edges, corners, and rough spots. After application of the curing compound has been completed and the coating is dry to touch, any required repair of soil-cement surfaces shall be performed. Each repair, after being finished, shall be moistened and coated with the curing compound in accordance with the requirements of this Paragraph 309.9c.

c6. Operations by Contractor shall be such as to avoid damage to coatings of curing compound for a period of not less than 7 days. Any curing membrane that is damaged or that peels from soil-cement surfaces within 7 days after application, shall be repaired without delay by application of an additional coat of curing compound.

c7. Curing compounds and sealing membranes will be accepted on manufacturer's written certification of compliance with specifications but permission to ship on certification shall in no way relieve Contractor of the responsibility for furnishing a compound or membrane meeting specification requirements. Curing compounds and sealing membranes shall be subject to sampling and testing as requested by Owner or the Consulting Engineers.

c8. Completed soil-cement shall be protected against freezing for at least seven days after completion of compaction. All damage during this period shall be repaired by Contractor.

309.10 Construction Joints: At the end of each day's work, or whenever construction operations are interrupted for more than 3 hours, a transverse construction joint shall be formed by cutting back into the completed work to form a full depth vertical face. Longitudinal and transverse construction joints shall be staggered at least one foot between lifts. Amd.2 Amd.4

310. (Deleted)

311. TEST PITS AND TRENCHES

311.1 Test pits and trenches may be required to establish the suitability of the soil beneath the subgrade.

311.2 The need for these pits and trenches, location and type, will be determined by Owner or the Consulting Engineers, based on the field conditions.

311.3 Contractor will be given advance notice to prepare for the test pits and trenches and allow time for procurement of equipment to conduct these tests.

312. REPORTS AND RECORDS

312.1 Daily reports are required to provide a permanent record of the adequacy of construction methods and of progress, as observed by those closest to the operation. The reports shall present a complete record of the areas worked, the type and source of materials, the areas compacted, the quantity of material removed from the fill and reason for removal, and the approximate volume of materials placed from the borrow areas. Inspectors shall be alert to record pertinent data even when fill operations are apparently routine and stereotyped and that all data is recorded, i.e., no omissions of an essential item. These items shall include:

a. Changes in equipment or techniques.

b. Starting or stopping of dewatering operations, and reasons for this.

c. Starting or stopping of fill operations due to weather, plant breakdowns, Inspector's or Engineers' instructions, etc., and reasons for this.

d. Delays due to any other reasons caused either by Owner, the Consulting Engineers, or Contractor.

e. Location of any piping or other objects not provided in the Construction Drawings and embedded in the fill, when started, when finished and whether removed, grouted up, backfilled, etc.

f. The effects of weather on the fill operations such as freezing, ponding of water on surfaces, erosion of slopes, softening of fill surfaces, etc.

312.2 A marked up drawing indicating areas worked and the number of lifts placed on each shift and the location of anything of special interest, such as rejected areas and areas of wet fill form an essential part of the daily report.

312.3 A daily report shall be kept of the number of layers placed. The report shall contain information regarding areas worked, shift, types of tests conducted and the location of each test.

3.2 Extensions from Owner's centers of distribution shall be furnished, installed, maintained, and removed by Contractor. Contractor shall also furnish and install necessary fused switching equipment required for his extensions. All wiring inside the buildings shall be done with multiconductor rubber jacketed cable.

3.3 Any non-permanent lighting facilities required by Contractor shall be provided, maintained and removed by him.

3.4 Power supply is 480 V, 3-phase, 60 Hz. The lighting circuit to Contractor's construction buildings will be 120/240 V, single-phase, 60 Hz, 3-wire. The lighting circuit inside of the plant will include 120/208 V, 3-phase, 60 Hz, 4-wire. Lighting circuit may be used for small tools, such as hand drills.

3.5 Owner's power shall not be used for space heating without prior approval of Owner.

3.6 Contractor shall provide and maintain suitably sized (including fault interrupting capability) distribution centers as required where Contractor's loads cannot be conveniently served by the Owner's distribution centers.

3.7 All electrically driven equipment and light and power extensions furnished by Contractor shall, in opinion of Owner, be of such quality that they will not be hazardous to life or property.

3.8 All salvaged material from the extensions from power and light distribution centers shall become Contractor's property.

4. WATER

4.1 Contractor will not be charged for water usage.

4.2 Contractor shall use due precaution to protect Owner's domestic water supply from contamination. No connections shall be made or any water used without approval from Owner's representative for each connection. A positive disconnection shall be maintained between domestic supply and containers used on job for construction purposes or during filling of tanks or equipment, etc. Similar precautions shall be followed to prevent contamination by interflow or siphonage through direct connection to waste or drain lines.

4.3 Contractor shall provide his own drinking water storage vessels, coolers, ice, water containers, etc., as required for his own drinking water use, except that refrigerated water coolers installed for construction use shall be available to all.

STANDARD REQUIREMENTS FOR ERECTION WORK
CLINTON POWER STATION
ILLINOIS POWER COMPANY
(Form CPS - 2-18-77)

1. RAILROAD FACILITIES

A railroad sidetrack connecting to the Illinois Central Gulf Railroad runs on the station property.

2. CRANE FACILITIES

2.1 Containment Building Polar Crane: A 100-ton electric traveling bridge crane with a circular runway and with an auxiliary 5-ton hoist will be located in the containment building, and will be available for handling equipment and materials which are to be installed in the containment building.

2.2 Turbine Room Crane: A 210-ton electric traveling bridge crane, with a 45-ton auxiliary hook located in the turbine room, will be available for handling equipment and materials in the turbine room and limited areas of the turbine room basement.

2.3 Fuel Building Crane: A 125-ton electric traveling bridge crane, with a 5-ton auxiliary hook located in the fuel building, will be available for handling equipment and materials in the fuel building. This crane does not span the fuel pool.

2.4 Jib Crane: A 10-ton electric operated jib crane is located in the heating, ventilating and air conditioning room on the floor above the control room and will be available for handling equipment and materials in the HVAC equipment room.

2.5 Owner will schedule crane use after they have been installed and tested out. Contractor shall cooperate with the Owner and others who require the use of cranes. Contractor shall obtain permission from Owner's Construction Department prior to the use of any crane, and shall carry out his crane usage with promptness in order that each crane may be utilized efficiently.

2.6 Contractor shall furnish other hoisting equipment required for handling material and equipment at the site.

3. ELECTRIC POWER FACILITIES

3.1 Electric power required for operation of Contractor's tools, shops, lighting, etc., will be furnished by Owner free of charge. Contractor shall advise Owner of his electric power requirements (including connected load, maximum expected coincidental load) in sufficient time to allow for purchase and installation of necessary distribution centers.

9. ERECTION

9.1 Contractor shall advise Owner and receive approval of his proposed rigging procedures for all safety-related equipment and materials and the method of unloading and bringing all equipment and materials into place for erection.

9.2 Work shall be done so as not to interfere with the installation of other equipment being installed in the station. Where connections are to be made to work in place which has been installed by others, they shall be made at such times as may be directed by Owner.

9.3 Any existing work that may be removed by Contractor shall be either stored on the premises and shall remain Owner's property, or shall be removed from the premises and disposed of, as may be directed by Owner.

10. SAFETY REQUIREMENTS

10.1 At all times the Contractor shall perform his work in conformity with good safety practices, and the safety requirements of the Illinois Industrial Commission, and with all other applicable laws, ordinances, and regulations. He shall furnish such safety equipment as is necessary to meet these practices and requirements.

The above-mentioned laws, codes, and ordinances will be enforced by the Job Safety Supervisor. The Safety Supervisor will act as the direct representative concerning all safety matters for the Owner. The Safety Engineer shall be designated by the Owner as the Job Safety Supervisor.

Contractor or subcontractors and their employees shall abide by the same safety requirements.

The Contractor's or subcontractor's representative shall familiarize himself with all safety rules and regulations upon his arrival at the jobsite and have a meeting with the Safety Supervisor prior to commencing the WORK.

10.2 On any accident requiring a Report of Industrial Injury to the Bureau of Workmen's Compensation, the Contractor shall immediately notify the Safety Supervisor of such accident and furnish him with a copy of the report submitted to the Bureau of Workmen's Compensation.

11. STATION RULES

Contractor shall abide by any/all rules of Owner in effect at the station site pertaining to the handling of men, equipment and materials.

4.4 Contractor shall furnish labor and material for all temporary connections he requires. Contractor shall provide his own shutoff valves and hose connections.

5. TOILET FACILITIES

Toilet facilities will be provided by the Owner for the use of all Contractor's employees. Portable facilities, if deemed necessary by Contractor, shall be furnished by Contractor.

6. COMPRESSED AIR

If compressed air is required for the WORK, Contractor shall furnish and operate his own air compressing equipment.

7. STORAGE, ETC.

7.1 Outdoor space as designated by Owner for the location of Contractor's offices, shops or warehouses, or for the storage of materials, will be provided by Owner without charge. Owner will designate the area that will be available for Contractor's office, shops, etc., at the time Bidder visits the job. Any additional facilities required by Contractor shall be provided by Contractor. Note: Quality Material storage will be required to comply with Quality Assurance Standards and Procedures.

7.2 All temporary buildings or trailers required by Contractor, including associated electrical work, and heating facilities shall be erected and maintained by him, and shall be removed by Contractor at the termination of their usefulness or termination of the job. Any temporary construction office or other enclosure deemed necessary by Owner to be erected within the main power station building shall be of sheet metal construction with a steel frame and shall have a main power disconnect switch on the outside of the structure.

7.3 Temporary buildings shall be equipped with adequate means for fire protection, as approved by Owner.

7.4 Prior to erection of any temporary buildings, Contractor shall submit plans to Owner for general approval of construction and appearance before building may be erected.

8. TEMPORARY HEAT

8.1 Temporary heating equipment operation and maintenance thereof, shall be such as to cause no fire hazard and will require prior approval by Owner.

8.2 Contractor shall provide and maintain all temporary heating and temporary enclosures as required to insure continuous efficient and uninterrupted erection of the work.

8.3 Temporary enclosures shall be weather tight and shall provide for proper access to all work.

17. EQUIPMENT SETTING RECORDS

Owner's representative will witness all final alignment checks on equipment. A permanent record will be made of final alignment measurements; these records will be signed by all manufacturers' representatives involved and verified by the installing Contractor's and Owner's authorized representatives.

18. SCAFFOLDING

Contractor must include in his bid all scaffolding required to complete the work included in the contract. Scaffolding shall conform to the Federal Scaffolding Act and OSHA requirements. Scaffold boards shall be treated with Fire Retardant material.

19. ON-SITE STORAGE OF FUELS AND OTHER VOLATILE LIQUIDS

Contractor shall comply with safety regulations and codes pertaining to handling and storage of fuel and other volatile liquids.

20. REMOVAL OF TEMPORARY FACILITIES

Contractor shall remove all temporary facilities provided on premises for his own use at termination of their usefulness or termination of WORK, or when requested, and shall leave premises, and adjacent property affected by the WORK, in condition satisfactory to Purchaser's representative and Public Authorities in every respect.

21. FIRST AID

First Aid Station and ambulance service will be made available by the Contractor at the job site for the benefit of any persons requiring this service. Subcontractors will be billed for this service to his employees on an individual visit or use basis.

22. WORKING HOURS

The Contractor or subcontractor shall maintain the same 40-hour work schedule as established for the job site. He shall require his employees to comply with established job rules.

23. VEHICLES

23.1 The Contractor or subcontractor shall abide by traffic and parking rules specified at the job site. He shall be responsible for the enforcement of these rules to his employees.

23.2 Parking of private vehicles shall be in designated parking lots only. The Contractor will be permitted to have company-owned vehicles necessary in the performance of his work within the fenced boundaries of the job site, however, he shall have prior approval by the Owner.

12. IDENTIFICATION AND ADMITTANCE OF WORKMEN

12.1 The Owner will provide and maintain strict job site security for benefit of all contractors and subcontractors at the site. The Contractor or subcontractor and their employees shall comply and be governed by all rules and regulations set forth in the security program.

12.2 Security gate officers are not permitted to admit Contractor's or his Subcontractor employees until they have been identified by Contractors or his Subcontractor delegated representative on the work. The Contractor or Subcontractor shall require his employees to pass in and out of assigned gates using brassing system as means of identification.

13. TEMPORARY WELDING

13.1 Welding of temporary brackets, hangers, lugs, etc., to structural steel for construction purposes shall be permitted. In no case shall welds be made across flanges of any structural members. After construction is completed, Contractor shall remove these temporary hangers, lugs, brackets, etc., and shall grind any projections, etc., so as to leave a smooth surface.

14. BURNING OF DEBRIS ON PREMISES

Burning of materials for disposal purposes on premises is permitted only in areas designated by Owner's Supervisor of Construction and in strict conformance with his requirements and governing regulations of Public Authorities having jurisdiction in the area of the WORK.

15. FIRE PROTECTION

15.1 Contractor shall furnish a suitable quantity and type of portable fire extinguishers, satisfactory to the Safety Supervisor. Contractor shall be responsible for handling this equipment and maintaining fire protection for his work. Fire connections and hoses shall not be used for any other purposes.

15.2 The use of inflammable materials, or the installation of systems employing inflammable materials such as propane and acetylene, will require the prior approval of the Safety Supervisor.

16. PROTECTION

16.1 Adjacent public and private property shall be placed and left in as good a condition as it was before the WORK started.

16.2 Barricades, warning signs, danger lights, etc., shall comply with all requirements of Owner, OSHA, and of other authorities having jurisdiction.

23.3 Such approved vehicles shall be designated by permits or suitable decals displayed on the windshield or other location designated by the Owner's Security Supervisor.

24. INSURANCE

Owner will provide a "wrap-up" insurance program for the benefit of the Owner and all Contractors and Subcontractors. Contractor shall provide his own automobile liability insurance as described in Exhibit "A-1".

Project: 4536/4597-00

SARGENT & LUNDY
ENGINEERS
CHICAGO

Spec. No. K-2942
Issue: Amd. 8, 03-28-80

EARTHWORK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

APPROVAL PAGE

NUCLEAR SAFETY RELATED ITEMS ARE PART OF THIS SPECIFICATION

Issue Purpose	Issue Date	Prepared by	Date	Reviewed by	Date	Approved by	Date
Comments	05-06-75	N. Horin	05-02-75	R. A. Witt	05-02-75	R.A. Witt	05-02-75
(The above typed signatures are for record purposes. The signatures originally appeared on the Issue Summary Page as issued for Comments)							
Construction	06-25-75	N. Horin	06-25-75	L.L. Holish	06-25-75	R.A. Witt	06-25-75
Amd. 1	02-27-76	N. Horin	02-27-76	L.L. Holish	02-27-76	R.A. Witt	02-27-76
Amd. 2	05-21-76	N. Horin	05-21-76	L.L. Holish	05-21-76	R.A. Witt	05-21-76
Com, Amd. 3	03-17-77	F.J. Esposito	03-17-77	J.P. Constantin	03-17-77	R.A. Witt	03-17-77
Amd. 3	05-19-77	F.J. Esposito	05-19-77	J.P. Constantin	05-19-77	R.A. Witt	05-19-77
Amd. 4	07-20-77	F.J. Esposito	07-20-77	R.A. Witt	07-20-77	S. Rusha	07-20-77
Amd. 5	02-27-78	F.J. Esposito	02-27-78	N. Kumar	02-27-78	R.A. Witt	02-27-78
Amd. 6	07-17-78	F.J. Esposito	07-17-78	C.P. Bastidas (by F.J.E.)	07-17-78	R.A. Witt	07-17-78
Amd. 7	03-14-80	J.M. Scannuchio	03-14-80	P.K. Agarwal	03-14-80	S. Rusha	03-14-80
Amd. 8	03-28-80	J.M. Scannuchio	03-28-80	R.A. Witt	03-28-80	S. Rusha	03-28-80

EARTHWORK

CLINTON POWER STATION - UNITS 1 AND 2

ILLINOIS POWER COMPANY

ISSUE SUMMARY PAGE

Purpose of Issue	Date	Pages Affected
Com - Spec. K-2942 issued for Owner's comments	05-06-75	All
Const - Spec. K-2942 issued for Construction	06-25-75	All
Amd 1 - Spec. K-2942 issued for Amendment 1	02-27-76	All
Amd 2 - Spec. K-2942 issued for Amendment 2	05-21-76	AP-1, IS-1, CP-1, 1-4, 3-2, 3-2A, 3-3, 3-3A, 3-5, 3-6A, 3-6B, 3-7, 3-9, and 3-10.
Com, Amd 3 - Amendment 3 to Spec. K-2942 issued for Owner's comments	03-17-77	AP-1, IS-1, CP-1, 3-2, 3-3A, 3-6A, 3-6B, 3-7, 3-9, 3-10, 3-11 and 3-11A.
Amd. 3 - Amendment 3 to Spec. K-2942 issued	05-19-77	AP-1, IS-1, CP-1, 3-2, 3-3A, 3-6A, 3-6B, 3-7, 3-9, 3-10, 3-11 and 3-11A.
Amd. 4 - Amendment 4 to Spec. K-2942 issued	07-20-77	AP-1, IS-1, CP-1, 3-3A, 3-7, 3-9, 3-9A and 3-11.
Amd. 5 - Amendment 5 to Spec. K-2942 issued	02-27-78	AP-1, IS-1, CP-1, 3-6A, 3-9 and 3-9A.

ISSUE SUMMARY PAGE, Cont.

Purpose of Issue	Date	Pages Affected
Amd. 6 - Amendment 6 to Spec. K-2942 issued	07-17-78	AP-1, IS-1, IS-2, CP-2, 3-3, 3-3A, 3-8, 3-9, 3-9A, 3-10, 3-10A, 3-10B, 3-11 and 3-11A.
Amd. 7 - Amendment 7 to Spec. K-2942 issued to incorporate Field Change Requests FCR-1865 and FCR-2216 (covers NCR-1974). Also the following NCR's were covered in Amd. 5, dated 02-27-78, NCR-591 and NCR-592.	03-14-80	AP-1, IS-1 of 2, IS-2 of 2, CP-1 of 2, CP-2 of 2, 3-3, 3-3A, 3-6B, 3-8, 3-9A, 3-10, and 3-10B.
Amd. 8 - Amendment 8 to Spec. K-2942 issued. Revised page number per R. A. Witt's Memo dated 03-25-80.	03-28-80	AP-1, IS-2 of 2, CP-2 of 2 and 3-9B.

NUCLEAR SAFETY RELATED
Project: 4536-00
4597-00

SARGENT & LUNDY
ENGINEERS
CHICAGO

Spec. No. K-2942
Issue: Amd. 7, 03-14-80

CERTIFICATION OF CONSTRUCTION SPECIFICATION
FOR
EARTHWORK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

I hereby certify that this plan, specification or report was prepared under my supervision, and that I am a duly registered Structural Engineer under the laws of the State of Illinois.

6-25-75
Date

S. Rurka
Signature

R. N. BERGSTROM
1925
REGISTERED STRUCTURAL ENGINEER OF
ILLINOIS

STATE OF ILLINOIS
STEVE RURKA
2291
CHICAGO
REGISTERED STRUCTURAL ENGINEER

(SEAL)

Revision:		Certified By:	Date:
Amendment 1		S. Rurka	2-27-76
Amendment 2		R N Bergstrom	05-21-76
Amendment 3		S. Rurka	05-19-77
Amendment 4		S. Rurka	07-20-77
Amendment 5		S. Rurka	02-27-78

CERTIFICATION OF CONSTRUCTION SPECIFICATION, Cont.

Revision:	Certified By:	Date:
Amendment 6	S. Burka	07-17-78
Amendment 7	S. Burka	03-14-80
Amendment 8	S. Burka	03-28-80

EARTHWORK
CLINTON POWER STATION - UNITS 1 AND 2
ILLINOIS POWER COMPANY

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SPECIFICATION FOR EARTHWORK

DIVISION 1 - GENERAL REQUIREMENTS

101. PROJECT ORGANIZATION

101.1 OWNER: ILLINOIS POWER COMPANY

101.2 CONTRACTOR: BALDWIN ASSOCIATES

101.3 CONSULTING ENGINEERS: SARGENT & LUNDY

102. NAME OF PROJECT: CLINTON POWER STATION - UNITS 1 AND 2

103. LOCATION OF PROJECT
The site of the Clinton Power Station is in De Witt County, Illinois, approximately six (6) miles east of the city of Clinton.

104. TRANSPORTATION FACILITIES
As specified in Article 1 of Standard Requirements for Erection Work for Illinois Power Company (Form CPS).

105. SCOPE OF WORK

105.1 Contractor shall perform the following WORK for and at the above Station site:

EARTHWORK, complete as indicated on the drawings and as hereinafter specified.

105.2 Work Furnished and Installed or Performed: Contractor shall furnish, deliver, and unload materials for, shall store and remove materials from storage for, and shall construct, erect, install and/or perform and finish the following WORK:

a. Earthwork as follows:

a1. Excavation and backfill for the following structures, to foundation levels indicated, with disposal of excavated materials on the site as hereinafter specified and as indicated on the drawings (for convenience of reference, structures indicated in Paragraphs 105.2a1.1 through 105.2a1.8 will hereinafter be referred to as the Main Building): Amd. 1

a1.1 Two Containment Buildings.

a1.2 One Radwaste Building.

a1.3 Two Turbine Buildings.

a1.4 Two Auxiliary Buildings.

a1.5 Two Heater Bay Buildings.

Amd. 1

a1.6 One Control Building.

a1.7 One Diesel Generator Building.

a1.8 Two Fuel Buildings.

a1.9 Circulating Water Screen House.

a1.10 Ultimate Heat Sink Outlet Structure.

a2. Excavation for the following piping, down to elevations indicated on the drawings, with disposal of excess excavated materials on the site:

Amd. 1

a2.1 Essential Services Piping.

a3. It is the intent of this Contract that all suitable excavated materials shall be immediately moved by the most direct routes from the areas of excavation to the closest areas of fill, without stockpiling of excavated materials unless absolutely essential.

a4. However, excavation shall also include stockpiling of excavated materials on the site as required and where indicated, and disposal of unsuitable and excess excavated materials on the site where and as indicated.

a5. Clearing and grubbing for the foregoing work.

a6. Compacted fill and backfill for foundations, piping, etc., using approved material previously excavated on the site by Contractor, or using approved material excavated by Contractor from borrow areas on the project site as indicated on the drawings. This work shall include subgrade preparation, cut-off trenches where required or indicated, impervious earth fill and rough and finish grading.

Amd. 1

a7. Dewatering and diversion and care of water for the following:

a7.1 Main Building.

a7.2 Circulating Water Screen House. Amd. 1

a7.3 Essential Services Piping.

a8. Perform evaluation of test results, provided by Owner's Testing Agency, to ensure that the technical requirements of this Project Specification K-2942 are met.

a9. If special tests are required by Owner or the Consulting Engineers, Contractor shall provide equipment and labor for Owner's Testing Agency to properly perform the tests. Amd. 1

b. All other work as indicated on the drawings, as herein specified, or as required to properly complete the WORK.

105.3 Special Provisions: The WORK shall also conform to the following Special Provisions:

a. Mobilization and Demobilization: This item shall include all of the following and all items of a similar nature:

a1. Moving-in of all equipment and supplies.

a2. Setting-up all facilities for the WORK, including all temporary facilities.

a3. All provisions for temporary diversion and care of water.

a4. Moving-out of all equipment and supplies and removal of all temporary facilities at completion of the WORK.

b. Location of Existing Underground Facilities:

b1. Existing underground facilities may run parallel to, or cross, construction for the new work, although not indicated on drawings. These underground facilities include, but are not limited to, a power and/or control cable, lighting cable, conduit, grounding cable, gas line, etc.

b2. Prior to performing excavation work in any area, or any other work which might result in damage to these existing facilities, Contractor shall hand excavate as required to determine the exact location of these facilities.

b3. Contractor shall provide all required temporary protection and support for these existing facilities.

106. WORK BY OTHERS

The following related work will be furnished and installed, or performed, by others:

106.1 Circulating water piping and discharge structures. Amd. 1

106.2 Soil Borings.

106.3 Soil Testing. Amd. 1

106.4 Bridges for County Route 14, State Highway 48, 54 and 10, Parnell Road and construction bridges. Amd. 1

106.5 Ultimate Heat Sink.

106.6 Discharge Flume.

106.7 Cooling Lake Main Dam.

107. DEFINITIONS

107.1 See Standard List, Form 1708.

107.2 Wherever the term "Job Specification" appears or is implied in the Procurement Documents, it shall be construed to mean "Project Specification".

107.3 Wherever the term "ASA", "USA", "USAS" or "USASI" appears or is implied in the Procurement Documents, it shall be construed to mean "ANSI", American National Standard Institute, Inc., formerly the United States of America Standards Institute, Inc.

107.4 Wherever the terms "Owner" or "Purchaser" appear or are implied in the Procurement Documents, they shall be construed to mean "Illinois Power Company".

107.5 Wherever the term "Contractor" appears or is implied in the Procurement Documents, it shall be construed to mean "Baldwin Associates".

107.6 Wherever the term "Inspector" appears or is implied in the Procurement Documents, it shall be construed to mean "Contractor's Quality and Technical Services Organization". Amd. 2

107.7 Contractor is herewith designated as the Earthwork Work Contractor.

107.8 The Consulting Engineers, Sargent & Lundy, will act as an agent of the Owner concerning all matters pertinent to the technical requirements of earthwork operations. Amd. 1

108. ORIGIN OF COMPONENTS

The WORK shall not include any components manufactured outside the United States of America, unless specifically agreed upon in writing by Owner or the Consulting Engineers. If foreign manufactured components are included in the WORK without such prior approval, Contractor shall, upon notice in writing, replace them at his own expense, including installation, and he shall be liable to Owner for any damage to Owner's plant and any losses due to any delay caused Owner by such replacement.

109. LINES AND GRADES Amd. 1

109.1 Contractor shall lay out lines and grades from existing base lines and bench marks on property and be fully responsible for correctness of such lines and grades and for proper execution of WORK to such lines and grades.

109.2 Owner reserves right to verify correctness of lines and grades during progress of WORK. Such verification by Owner will not relieve Contractor of responsibility as specified foregoing.

109.3 Contractor shall notify Consulting Engineers of any differences in location of existing work from that indicated, wherever such differences may affect new work.

109.4 Contractor shall preserve and maintain all bench marks and reference points established by Owner. Should Contractor, during prosecution of WORK, destroy or remove any bench marks and/or reference points established by Owner, the cost to Owner of re-establishing these bench marks and/or reference points will be charged to Contractor.

110. SITE CONDITIONS Amd. 1

Public Good Will: Contractor shall carry on the WORK at all times as to maintain the best possible relations among Owner, the Public and Public Authorities. Contractor shall provide Courtesy signs for detours and for other inconveniences to the Public as necessary and also if requested to do so by Owner.

111. QUALITY ASSURANCE AND CONTROL REQUIREMENTS Amd. 1

111.1 The Contractor shall submit to the Owner and the Consulting Engineers, one (1) copy of his Quality Assurance Program for review. This program shall meet the requirements of AEC 10CFR50, Appendix B and ANSI-N45.2-1971 "Quality Assurance Program Requirements for Nuclear Power Plants", as applicable. In addition, Contractor shall

comply with the following ANSI-N45.2 Daughter Standards, where applicable:

a.	ANSI-N45.2.5 Draft 3, Rev. 1 - January, 1974	Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants.
b.	ANSI-N45.2.6 - 1973	Qualification of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants.
c.	ANSI-N45.2.9 Draft 15, Rev. 0 - April 3, 1974	Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants.
d.	ANSI-N45.2.10 - 1973	Quality Assurance Terms and Definitions.

111.2 The Owner's copy of the Quality Assurance Program shall be controlled and maintained for the duration of the WORK covered by this Specification K-2942.

111.3 Two (2) copies of the detailed Quality Control and Special Process procedures for the WORK shall be submitted to the Owner and Consulting Engineers for review and comment. Prior to the start of any work affected by the procedure, the Contractor shall resolve, to the satisfaction of the Owner and Consulting Engineers, all comments resulting from their review. The procedures to be submitted shall include, but shall not be limited to, the following:

a. Administrative procedures necessary to implement each requirement of 10CFR50 Appendix B applicable to the WORK. These procedures shall designate who is responsible for the implementation of each of the applicable requirements and define the authority and duties of personnel.

b. Sample quality control records.

111.4 The Owner, designated representative and/or other parties authorized by the Owner, such as regulatory agencies, shall have full access to the Contractor's and Subcontractor's facilities for audits during the WORK to review progress and determine acceptability of Quality Control Work.

111.5 Nonconformances, deviations to the procurement document requirements, and subsequent proposed resolutions shall be promptly submitted to the Owner. Such submittals do not relieve the Contractor from compliance with applicable codes, standards, and regulatory requirements stipulated in this technical specification and its included documents.

111.6 Contractor shall submit documentation, as defined in other articles of this Specification or as required by applicable codes, standards and regulatory criteria, to the Owner upon completion of the WORK, or concurrent with execution of the WORK if requested.

111.7 In the event that any quality documentation, as set forth in Paragraph 111.6, is retained by Contractor or his Subvendors, Contractor shall furnish Owner a certificate containing the following elements:

a. A list of records retained.

b. Storage location of the records.

c. A commitment to the availability of such records to the Owner for scheduled audits and verification throughout the life of the plant.

d. A commitment to retain the records for the life of the plant. A commitment to notify Owner prior to disposing of the records.

In the event that Contractor or his Subvendors do not retain quality records, Contractor shall furnish a certificate so stating.

111.8 All paper documentations shall be clear, legible and of suitable quality for microfilming and/or storage for the life of the plant.

111.9 Payment claims for WORK completed will not be honored until all documentation has been received and complies with procurement documents.

111.10 Contractor shall establish and maintain on site complete detailed records of all laboratory and field tests performed, in a manner approved by Owner's representatives and the Consulting Engineers. These records shall include all criteria and results of each test performed. The identification markings of the records shall include at least the following information:

a. Name of Project

b. Project Location

c. Owner

d. Date

e. Identity of Inspector

f. Type of Observation

g. Report Number

h. Location of Test, including elevation and test number

i. Acceptance or rejection of test

j. Corrective action taken in connection with noted deficiencies

111.11 After a test has been performed, all documentation for that test shall be executed in the shortest possible time.

111.12 Completion Letter:

After delivery of all documentation required by the procurement specification, the Contractor shall submit a letter to the Owner and Consulting Engineers listing all of the documentation delivered and stating that all requirements of the procurement specification have been fulfilled.

EARTHWORK
CLINTON POWER STATION - UNITS 1 AND 2

DIVISION 2 - SUPPLEMENTS, STANDARDS AND DRAWINGS

201. SUPPLEMENTS
The following is attached hereto and forms a part hereof:

201.1 Form CPS: Standard Requirements for Erection Work (9-25-74).

201.2 The Consulting Engineers' "Soil Data Book, Clinton Power Station - Units 1 and 2", approved October 1, 1975, (and all subsequent revisions thereto), forms a part hereof, but is not attached hereto. Amd.1

Amd. 1

Note: In event of conflict between the above supplement and the Project Specification, the Project Specification shall apply.

202. STANDARDS (CONSULTING ENGINEERS')
The following Standards are attached hereto and form a part hereof:

202.1 Structural Standard Specifications:

a. Form 1708-A: Standard List of Definitions and Reference Publications.

b. Form 1714: Standard Specification for Earthwork.

c. Form 1703: Standard Requirements for Structural Shop Drawings, Design Calculations and Instruction Books. Amd.1

202.2 Dates for the foregoing Standard Specifications are indicated on the final page of written material for each Standard Specification. Suffix letters A, B, C, etc., indicate revisions, and the latest date for each Standard Specification is for the latest revision (if any). References to these Standard Specifications elsewhere in this Project Specification or on drawings do not include the letter suffix after the form number.

202.3 References throughout this Project Specification to specific Articles or Paragraphs of the foregoing Standard Specifications are for convenience only and shall not relieve Contractor from all obligations of all other applicable Standard Specifications.

202.4 In event of variation between the foregoing Standard Specifications and this Specification or Design Drawings, this Specification and the Design Drawings shall govern.

202.5 Wherever the terms "approve", "approval", "approved", etc., appear in Sargent & Lundy Standard Specifications, in reference to Contractor's drawings and data, they shall be construed to mean "review", "reviewal", "reviewed", etc.

203. DESIGN DRAWINGS (CONSULTING ENGINEERS') Amd.1

203.1 The following design drawings by the Consulting Engineers, dated or revised, February 9, 1976, unless otherwise indicated, form a part hereof:

a. Structural Design Drawings:

S21-1401: General Excavation Plan

S21-1402: Plan of Compacted Fill in General Excavation Pit

S21-1403: Excavation and Backfill Sections - Sheet 1

S21-1404: Excavation and Backfill Sections - Sheet 2

S21-1405: Foundation Excavation Subgrade Testing Information

203.2 The following design drawings by the Consulting Engineers form a part hereof for reference only:

a. Structural Design Drawings:

S03-0019: Boring Location Plan - Sheet 8 of 9

S03-0020: Boring Location Plan - Sheet 9 of 9

S03-0021: Boring Location Plan - Sheet 1 of 9

S03-0022: Boring Location Plan - Sheet 2 of 9

S03-0023: Boring Location Plan - Sheet 3 of 9

S03-0024: Boring Location Plan - Sheet 4 of 9

S03-0025: Boring Location Plan - Sheet 5 of 9

S03-0026: Boring Location Plan - Sheet 6 of 9

S03-0027: Boring Location Plan - Sheet 7 of 9

204. DRAWINGS AND DATA (CONTRACTOR'S) Amd.1

Conform to the applicable requirements of Form 1703.

EARTHWORK
CLINTON POWER STATION - UNITS 1 AND 2

DIVISION 3 - TECHNICAL REQUIREMENTS Amd.1

301. GENERAL
Conform to applicable requirements of the Standard Specifications indicated in Division 2 and to the requirements of this Division 3.

301.1 Station Subsurface Conditions:

a. The subsurface conditions at the Plant site consist of approximately five feet of windblown loess underlain by tills of various geological origin; uppermost of these is Wisconsinan till (hereinafter referred as Type A material) underlain successively by Illinoian till and materials of probable pre-Illinoian age. These latter deposits lie in direct contact with the bedrock. The Wisconsinan till is separated from the underlying Illinoian till by Sangamonian inter-glacial soil zone.

b. The Wisconsinan till (Type A material) ranges from 20 to 55 feet in thickness (bottom Elevation 692'-0" to 705'-0") and is composed of a stiff to very stiff, brown to gray silt and silty clay. Sand and gravel sized particles are interspersed randomly throughout the finer till materials and also occur as relatively clean and well-sorted lenses ranging in thickness from 1 to 9 feet and in Elevation from 655'-0" to 682'-0". The Sangamonian interglacial zone (bottom Elevation 675'-0" to 705'-0") consists of a medium-stiff to very stiff, dark gray organic silt or silty clay underlain by greenish to bluish gray clayey silt with sand and gravel (reworked and weathered glacial till). Below the interglacial interval, Illinoian till is encountered and ranges in thickness from 90 to 140 feet (bottom Elevation 565'-0" to 572'0"). It is a very dense, gray to brown clayey silt with occasional gravel-sized particles. Thin layers of possible pre-Illinoian till materials consisting of granular soils underlie the Illinoian till at the Plant site and are in direct contact with the bedrock.

c. The bedrock at the Plant site consists of thinly bedded Pennsylvania limestone and shale to Elevation 475'-0". Below this depth, shale and siltstone predominate.

d. The water table in the Plant site vicinity occurs as a ridge-like mound in the glacial drift between Salt Creek and the North Fork of Salt Creek. This is a normal configuration under such topographic conditions.

302. SERVICES OF TESTING LABORATORY

302.1 A testing laboratory shall be furnished by Owner, as follows, for use in connection with controlled compacted fill:

a. Contractor shall provide inspection, and audit functions to assure that the requirements of the Project Specification have been met.

b. Contractor shall permit and provide for inspection, testing, and approval of the WORK at all times by Owner or the Consulting Engineers.

c. Acceptance of fill materials will be made only after such materials have been incorporated into the completed WORK. However, rejection of such materials by Owner can be made in the borrow areas, transportation vehicles, or in place in the completed WORK. Contractor shall cooperate with Owner to ensure that only acceptable materials will be incorporated into the completed WORK.

d. Testing Requirements: During inspection of the foundation excavation subgrade and placement of structural fill materials it will be necessary to perform the following tests, either in the field or within an earthwork laboratory, in order to identify materials, to determine their compaction characteristics, to define the moisture content of fill materials prior to, during, and after compaction, to determine the in-place density of compacted fill:

d1. Density of soil in place by sand cone method ASTM D1556, nuclear density ASTM D2922 or Washington densometer method ASTM D2167, or as approved by the Consulting Engineers.

d2. Grain size analysis of soils ASTM D422.

d3. Moisture content of soil ASTM D2216 and D3017 and from microwave oven by a procedure approved by the Consulting Engineers. Amd.3

d4. Laboratory classification of soil samples in accordance with Unified Classification system ASTM D653, D2487 and D2488.

d5. Moisture-Density relationship (Modified Proctor) ASTM D1557, by full five-point proctor test and one-point proctor test, as approved by the Consulting Engineers. Amd.3

d6. Determination of Relative Density ASTM D2049, with the following exceptions: Amd.2

d6.1 Revise last sentence of Paragraph 3.1.1 as follows:

"The vibrator shall have a frequency of 3600 vibrations per minute, a vibrator amplitude variable between 0.002 inches and 0.014 inches under a 250 lb load and shall be suitable for use with 230 V ac."

d6.2 Mold of size 0.1 ft^3 will be permitted, provided the following conditions are met:

d6.2.1 No more than 6 percent (by weight) of the total sample is retained in the 1-1/2 inch sieve.

d6.2.2 That portion of the sample which passes through the 1-1/2 inch sieve shall be used for determining the maximum and minimum densities.

d7. Determination of Atterberg Limits ASTM D423, D424.

302.2 Frequency of Testing:

a. The in-place density of structural fill shall be determined during its placement and compaction by a continuous program of field testing under the surveillance of the Consulting Engineers. The type of test and the minimum frequency shall be as follows:

	Area	Type of Fill	Number of In-Place Density Tests and Moisture Content Tests	Units
a1.	Plant fill	B	4	Per 10,000 sq. ft. per lift
a2.	Plant fill and backfill	A, B2	2	Per 10,000 sq. ft. per lift Amd.7
		C	1	Per 10,000 sq. ft. per lift. Amd.6
a3.	Pipeline	B, B2	4	Per 5,000 cu.ft. Amd.7
		A	2	Per 5,000 cu.ft.
		C	1	Per 1,000 cu. yds. Amd.6

b. One direct field density test for every ten (10) indirect field density tests will be required.

c. Retesting of In-Place Density of Compacted Fill: Amd.2

c1. If the in-place density tests do not meet the minimum density requirements specified in Paragraph 307.6, retesting will be permitted, provided the following conditions are met:

c1.1 The entire lift shall have been covered by the same compaction effort.

c1.2 No more than 25 percent of the total initial tests in a single compacted lift shall be less than the minimum density specified in Paragraph 307.6

c1.3 Retests shall not be performed for in-place density tested by direct methods.

c2. Two retests shall be required for every initial test that is less than minimum density specified in Paragraph 307.6.

c3. All retests shall be performed within 10 feet of the initial tests; retests shall not be performed within 10 feet of each other. All retests shall be identified as such in the as-built report.

c4. Acceptance Requirements for Retests:

c4.1 The area represented by initial tests shall be considered to have met the minimum density requirements specified in Paragraph 307.6, if the average of the three in-place density tests (one initial and two retests) show in-place density equal to or greater than as specified in Paragraph 307.6

c4.2 The area represented by the initial tests shall be corrected, if the average of three in-place density tests (one initial and two retests) show in-place density less than as specified in Paragraph 307.6.

c4.2 The area represented by the initial tests shall be corrected, if the average of three in-place density tests (one initial and two retests) show in-place density less than as specified in Paragraph 307.6.

302.3 Lift Thickness:

a. One for every 10,000 sq. ft. of each lift.

b. At least one for each earthwork shift.

c. Where Owner or the Consulting Engineers deem necessary.

302.4 Material Identification and Control Tests:

a. Identification tests shall be made at frequencies identified below. All identification tests shall be conducted in accordance with the requirements of Paragraph 302.1.

	Type of Test	Type of Material	Minimum Frequency	
a1.	Grain Size Analysis	A, C	1 Test/ 6,000 yd^3	Amd. 6
a2.	Grain Size Analysis	B, B2	1 Test/ 5,000 yd^3	Amd. 7
a3.	Modified Proctor:			Amd. 3
a3.1	One-point proctor test	A, C, B2	1 Test/ 6,000 yd^3	Amd. 7
a3.2	Five-point proctor test	A, C, B2	1 Test/30,000 yd^3	Amd. 7
a4.	Relative Density Test	B	1 Test/ 5,000 yd^3	
a5.	Classification of Soil in Unified Soil Classification System	B, B2	1 Classification/ 5,000 yd^3	Amd. 7
a6.	Classification of Soil in Unified Soil Classification System	A, C	1 Classification/ 6,000 yd^3	Amd. 4 Amd. 6

b. Additional material identification tests shall be conducted where material identity is questionable or when requested by the Consulting Engineers.

302.5 To expedite identification and any required communication, all material used for testing shall be identified by one tag attached to the exterior and an identical tag placed within the sample container indicating Clinton Power Station, contract number, material description, material source, date placed and elevation.

303. SOIL DATA AND TOPOGRAPHY

303.1 General: A soils investigation was performed at the Project Site and is summarized in the Soil Data Book, Clinton Power Station. The information furnished was taken from the soils investigation reports and forms a part hereof for reference only. This information is furnished for Contractor's convenience; in using it Contractor assumes the risk, as Owner and the Consulting Engineers assume no responsibility for accuracy of information. Additional information will be available for inspection upon request. Contractor will be permitted to make his own soil investigations.

303.2 Test Borings:

a. The subsurface soil, rock and water conditions at the project site were explored by drilling borings to various depths below the ground surface at the locations indicated on the drawings.

b. A graphical representation of the soils and rock encountered in the borings, including standard penetration test data, sampling, and coring information is indicated in the Soil Data Book, Clinton Power Station.

c. Piezometers were installed in the boreholes to observe groundwater conditions. They consist of 3/4-inch-diameter PVC pipe having an 18-inch-long porous stone at the bottom. A summary of the elevations and locations at which piezometers were installed and observations of water levels is available for inspection upon request.

303.3 Compaction Tests: Compaction tests were performed on representative bulk samples of Wisconsinan till (Type A material) and granular borrow (Type B material). The compaction tests were performed in accordance with the Modified Proctors Test ASTM D1557.

303.4 Particle Size Analyses and Atterberg Limits: Particle size distributions were determined for representative soil samples to aid in classification and correlation of the physical soil properties. The results of these tests are indicated in the Soil Data Book. These tests were performed according to ASTM D422, D423, and D424.

303.5 Relative Density Tests: Relative density tests were performed on selected, representative samples of coarse-grained soils to determine the minimum and maximum densities. These tests were performed according to ASTM D2049.

303.6 Topography: Drawings indicate elevations, dimensions and/or cross sections, profiles and contour lines of existing ground. This information furnished for Contractor's convenience; in using it Contractor assumes the risk, as Purchaser and the Consulting Engineers assume no responsibility for accuracy of information shown thereon. Contractor will be permitted to make his own investigation of topography.

304. REMOVAL OF SOD AND TOPSOIL

Stockpile topsoil on Project site, where and as requested by Owner, for later reuse by Contractor or by others. Disposal of sod on Project site shall be as requested by Owner.

305. DIVERSION AND CARE OF WATER

305.1 General: Contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, and sumps, and shall furnish, install, and operate all pumps needed for diversion and care of water from any source, so that all work can be performed to the requirements of this Project Specification K-2942.

305.2 Approval of Plans: Contractor's plans for diversion and care of water shall be subject to review. Before commencement of the WORK, Contractor shall accordingly submit to the Consulting Engineers for review, drawings and data indicating Contractor's proposed plans for diversion and care of water.

305.3 Responsibility for Restriction of Natural Drainage by Levees, Dikes and Embankments:

a. Contractor shall not place any fill for levees, dikes or embankments across routes of natural drainage until provisions are made to drain surface runoff into the new lake area or into drainage ditches forming part of the WORK.

b. No surface runoff shall be ponded or restricted to a greater degree than would have occurred naturally either before the beginning of construction or after completion of the WORK, unless approved by Owner.

c. Should ponding or restriction of surface runoff result in water being backed up onto property not owned by Owner or onto Owner's property where work by other contractors is either under way or completed or where materials or equipment are being stored, all damages resulting therefrom shall be the responsibility of Contractor.

305.4 Dewatering:

a. Contractor shall maintain all necessary slopes, ditches, subgrade slopes, and shall furnish and operate all pumps needed such that dewatering can be accomplished in a manner that will prevent loss of fines from the foundation, maintain stability of excavated slopes, and allow the WORK to be performed to the requirements of this Specification. Amd. 2

b. Contractor shall employ proper method for dewatering, subject to the approval of Owner. During the Earthwork operations in the Main Plant area the water surface elevation in the fill and backfill shall be maintained at least three feet below the working surface, while the WORK is in progress. This criteria shall not be applicable to the in-situ soil.

c. Contractor shall be responsible for improper functioning of the dewatering system and shall be liable for any damage to subgrade, foundation, or structures and shall be required to make necessary adjustments at his own expense, regardless of previous approval given by Owner.

306. EXCAVATION

306.1 General: All excavation shall conform to applicable requirements of Article 5 of Form 1714 and to requirements of this Article 306.

306.2 Definitions: As specified in Paragraph 5.2 of Form 1714 and as follows:

a. Stripping is defined as complete removal of sod, topsoil, organic matter and rubbish in areas indicated on the drawings and in borrow areas. Contractor shall separate stumps and roots from stripped materials within the limits of the machinery. Stripped materials shall be disposed of or stockpiled as herein specified.

b. Common excavation is defined as excavation of all materials other than solid rock or boulders and detached pieces of rock exceeding 2 cu. yd. in volume. Included in the common excavation category is excavation of all earth, sand, gravel, topsoil, hardpan, and rippable rock which can be removed without continuous and systematic blasting. Stripping of topsoil which is covered under another section of this Specification is excepted. No additional allowance will be made for excavation even though blasting of rippable rock may be used for its removal.

c. Borrow excavation is defined as all excavation in borrow areas, except stripping shall not be included unless otherwise indicated.

306.3 Borrow areas other than as indicated on drawings shall be as approved by Owner or the Consulting Engineers.

306.4 Procedures: Excavation may be accomplished by any method and by use of any excavation and hauling equipment best adapted to the WORK.

306.5 Limits: All excavation shall be performed to neat lines and grades indicated on the drawings. Any over-excavation or excess excavation, not requested by Owner, shall be at the expense of Contractor.

306.6 Over-excavation under the Plant area shall be filled with granular fill, Type B, or as approved by the Consulting Engineers.

306.7 Finished excavated surfaces shall be protected against damage by movements of construction equipment, rain, frost, or other causes which can impair the bearing capacity of the subgrade. The damaged area due to any of the causes mentioned above will be removed at the expense of Contractor.

306.8 If unsuitable soils are found during excavation, as determined by Owner or the Consulting Engineers, Contractor shall be requested to carry the excavation deeper to more suitable materials.

306.9 Excavated Surface Monitoring: The surface of foundation excavations shall be tested prior to fill placement as indicated on drawings to verify adequacy of the base.

306.10 Fly Ash Backfill: Amd.2

a. Over-excavation in the Main Building area or where excavation is carried deeper as a result of unsuitable soil found during excavation shall be filled with fly ash backfill as approved by the Owner or Consulting Engineer.

b. Suitability of the area to receive fly ash backfill shall be as determined by the Consulting Engineer, and the fly ash backfill shall not be placed until such suitability is determined.

c. The Contractor shall cooperate with the Consulting Engineer and Owner and provide equipment and manpower necessary to take soil samples and perform tests requested by the Consulting Engineer.

d. Fly ash backfill shall be composed of cement, fly ash, sand and water, as follows:

d1. Cement shall conform to one of the following:

d1.1 ASTM C150, Types I, II, III, or V.

d1.2 ASTM C595, Types IS or IP.

d2. Fly ash shall conform to the following requirements of ASTM C618-77, Amd.5 Type C or Type F:

d2.1 Fineness - 325 sieve - (1 Test every 200 Tons).

d2.2 Loss on Ignition (maximum 6 percent) - (1 Test every 200 Tons).

d2.3 Sulfur Trioxide - (1 Test every 200 Tons).

d3. Sand shall be essentially similar to the requirements of ASTM C33, Amd.3 with gradation as follows:

U.S. Standard Sieve	Percent Passing	
3/8 inch	100	
No. 4	90-100	Amd.5
No. 8	30-100	Amd.5
No. 16	10-85	Amd.5
No. 30	0-70	Amd.5
No. 50	0-10	Amd.5
No. 100	0-10	Amd.5

d4. Water shall be potable. If water is non-potable, its suitability may be demonstrated by previous successful use as mixing water for concrete or as specified in ACI-72, Section 2.3.

e. Proportions: Fly ash fill shall contain the following proportions. Any variation in proportions of cement, fly ash, or sand shall be approved by the Consulting Engineer:

Material	Weights per Cubic Yard
Cement	50 - 100 lbs.
Fly Ash	450 lbs.
Sand, ssd.	2,800 lbs.
Water, approx.	425 lbs.

e1. Fly ash and air entraining agent may be added to the present mix until a pumpable mix as determined by field trial, is obtained. Amd.7

f. Batching and mixing shall be in accordance with one of the two following procedures:

f1. Mixture shall be batched and mixed in a central concrete mixing plant.

f2. Mixture shall be batched in a dry batch plant and mixed in truck mixers.

g. Transportation and Placement:

g1. Transportation shall be by any means which will keep the mixture from sedimentation prior to deposition.

g2. Mixture shall be deposited as nearly in its final location as possible.

g3. Where mixture cannot be deposited in its final location, vibration shall be utilized if sedimentation occurs prior to material flowing into this final position.

h. Strength Requirements and Testing for Fly Ash Backfill
In place fly ash backfill shall be tested to a minimum strength of 50 psi. If material sustains this pressure with deflection not more than 0.25 in., the material shall be accepted. If material fails to meet these requirements, additional curing time will be provided until material meets these acceptance requirements, or the material shall be rejected and removed. The strength of fly ash backfill shall be tested in the field in accordance with the following requirements:

h1. Apparatus:

h1.1 An outer steel plate, 1/2" thickness, 24" x 24" with a centrally located hole 8" in diameter.

h1.2 A 4" diameter inner plate 1/2" in thickness.

h1.3 Reaction load greater than 1000 lbs.

h1.4 Four dial indicators .001" divisions.

h1.5 Four magnetic base indicator holders.

h1.6 Uniform grain size sand.

h1.7 Calibrated jack with pressure gauge.

h2. Procedure:

h2.1 Spread thin layer of sand on area to be tested such that uniform seating of outer steel plate will be achieved.

h2.2 Effect initial compaction of sand by using a hand tamper over the entire test area.

h2.3 Place outer and inner plates on the test area.

h2.4 Position reaction load over the test area such that the bearing area for jack is approximately over 4" diameter inner plate.

h2.5 Position dial indicators around inner plate at 90° increments.

h2.6 Place jack between reaction load and inner bearing plate, and apply a load to seat inner plate.

h2.7 Read and record initial dial readings.

h2.8 Apply load using the jack until a total load of 50 psi greater than the initial load has been reached. Amd.4

h2.9 Maintain test load for a minimum of three minutes.

h2.10 Read and record final dial readings.

h2.11 Subtract initial reading from readings, and calculate average deflection.

h3. Testing Frequency: Minimum of one test per 2,500 sq. ft. of exposed area or at least one per backfilled area.

h4. Result: Work shall not be permitted on fly ash backfill before strength of 50 pounds per square inch is obtained.

306.11 Material From Plant Excavation: Amd.2

a. Material excavated from the station foundation excavation which meets Clinton project earthwork specification requirements may be used in Project earthwork construction. Material shall be stockpiled in designated areas. Stockpile areas shall be cleared and grubbed prior to stockpiling operations.

307. STRUCTURAL FILL

307.1 General:

a. Structural fill is herewith defined as any fill or backfill that is designed to possess certain characteristics, such as high density, high strength, low compressibility, and that is constructed in such a way that the desired characteristics are attained.

b. Subgrade to receive controlled compacted fill shall be inspected by Owner or the Consulting Engineers to determine if it is suitable and has sufficient bearing capacity for the fill material and loads to be placed over it. If subgrade is not suitable, as determined by the Consulting Engineers, Contractor may be requested to perform additional excavation.

c. Prior to placing controlled compacted fill, strip all areas to be covered, of all vegetation, top soil and all organic material or other foreign or deleterious materials.

307.2 Fill Materials: Fill materials to be used in earthwork operations shall consist of Type A, Type B, Type B1, Type B2 and Type C materials obtained from the following on-site sources: Amd. 7

a. The Main Building excavation.

b. The Screen House and pipeline excavation.

c. Discharge Flume excavation.

d. Borrow area and/or areas designated by Owner.

307.3 Borrow Area for Granular Material: Amd. 6

a. Material for granular structural fill shall be taken from borrow areas located on Project Site.

b. Owner does not guarantee that the borrow areas or excavations will supply all the granular fill necessary for the completion of the WORK. Contractor shall locate and obtain at his own cost additional borrow areas as approved by Owner.

c. Owner does not guarantee that all material within borrow areas or excavations will meet requirements of the Specification. Selective loading placing and mixing might be necessary to produce required quality and uniformity of fills.

d. At all times during operations in borrow areas, Contractor shall maintain adequate drainage to nearest natural drainage outlets.

e. Borrow areas should be left rough graded.

307.4 Suitable Materials:

a. Type B Material: Amd. 3

a1. Granular soils shall be considered as suitable Type B fill if it contains no organic material or cobbles and in addition shall meet the following gradation requirements: Amd. 3

SIEVE NO. /SIZE (U.S. Standard)/	PERCENT PASSING MAXIMUM	PERCENT PASSING MINIMUM
3 inches	100	100
1-1/2 inches	100	94
3/8 inches	100	70
4	90	55
10	75	30
20	50	10
40	30	5
200	10	0

NOTE: PERCENTAGES SHALL BE MEASURED AS A PERCENT OF DRY WEIGHT.

a2. Type B backfill and structural fill above the main plant mat foundation shall be as specified in Paragraph 307.4a1 with a ± 3% tolerance on the material passing the No. 200 sieve. Amd. 6

a3. Granular soils, to be used for Non-Category I structural backfill, shall be considered as suitable Type B1 fill if it contains no organic material or cobbles and in addition shall meet the following gradation requirements: Amd. 5

U.S. Standard Sieve	Percent Passing
3 inch	100
1-1/2 inch	93-100
3/8 inch	70-100
No. 4	55-90
No. 10	30-80
No. 20	10-70
No. 40	5-50
No. 200	0-10

NOTE: PERCENTAGES SHALL BE MEASURED AS A PERCENT OF DRY WEIGHT.

a3.1 Testing of Type B1 fill shall be as specified in Article 302 for Type B fill.

a4. Granular backfill and structural fill above the main plant foundation mats can be classified at Type B2 material. Type B2 material shall be as specified in Paragraph 307.4a1, with a +7% tolerance on the material passing the No. 200 sieve. Amd.7

a4.1 Testing of Type B2 material shall be as specified in Article 302.

b. Type A material is composed of silt and silty clay and will be considered suitable structural cohesive fill and backfill if it contains no topsoil, organic material losses foreign deleterious material and highly compressible pockets. In addition, Type A material shall meet the following requirements:

b1. Minimum of 100 percent pass 3 inch U.S. Standard sieve. Amd. 3

b2. Minimum of 70 percent pass No. 40 U.S. Standard sieve.

b3. Minimum of 45 percent pass No. 200 U.S. Standard sieve.

b4. Plasticity Index shall exceed 4. Amd. 3

b5. Type A material shall be placed in layers not exceeding eight inches in loose thickness. Amd. 6

c. Type C material is composed of silt and silty clay and will be considered suitable structural cohesive fill and backfill if it contains no topsoil, organic material, loess, foreign deleterious material, or highly compressible pockets. In addition, Type C material shall meet the following requirements: Amd. 4

c1. Minimum of 100 percent pass 3 inch U.S. Standard sieve. Amd. 4

c2. Minimum of 65 percent pass No. 40 U.S. Standard sieve. Amd. 4

c3. Minimum of 45 percent pass No. 200 U.S. Standard sieve. Amd. 4

c4. Plasticity Index shall exceed 4. Amd. 4

c5. Type C material used as structural backfill and Non-Category I structural fill shall be placed in layers not exceeding ten inches in loose thickness. Amd. 6

c6. Type C material used as Category I structural fill shall be placed in layers not exceeding eight inches in loose thickness. Amd. 6

d. Prior to placing structural fill, Contractor shall obtain the approval of the Consulting Engineers as to the suitability of material and shall make provisions for whatever test is needed to be performed and provide samples; in doing so no compensation will be made to Contractor for any delay in WORK or additional services required. Amd. 4

307.5 Handling and Stockpiling

a. Type B material shall be handled and stockpiled in such a manner to prevent segregation. Gradation acceptance tests shall be performed on samples obtained from material deposited and prepared for compaction.

b. Structural fill shall be handled and stockpiled in such a manner to prevent intermixing of granular and cohesive material.

c. Areas approved for stockpiling backfill and fill material for future use shall be grubbed and cleared.

d. Contractor shall provide and maintain suitable drainage in the stockpile area to prevent excessive wetting.

e. If stockpiled material recovered for structural fill is too wet, it shall be allowed to dry, and if necessary to assure the moisture content being uniform throughout the depth of a layer, it shall be disced, harrowed, bladed and aerated.

307.6 Compaction Densities:

a. Type B, Type B1 and Type B2 Materials: Amd. 7

a1. The material to be used as Type B fill to support foundation loads and backfill around structures shall be placed in loose thicknesses which allow compaction to the minimum relative density as specified in Paragraph 307.6d as determined by ASTM D2049, wet method.

a2. The material used as Non-Category I Type B1 fill to support foundation loads and backfill around structures shall be placed in loose thicknesses which allow compaction to the minimum relative density as specified in Paragraph 307.6d as determined by ASTM D2049 test, wet method.

a3. The material to be used as Type B2 fill to support foundation loads and backfill around structures shall be placed in loose thicknesses which allow compaction to the minimum dry density as specified in Paragraph 307.6d. Amd. 7

b. Type A Material: The material used as Type A fill to support foundation loads and backfill around structures shall be compacted to obtain the minimum dry density as specified in Paragraph 307.6d as determined by the Modified Proctor test, ASTM D1557. Amd. 6

c. Type C Material: Type C material used as compacted fill to support foundation loads and backfill around structures shall be compacted to the minimum dry density as specified in Paragraph 307.6d as determined by the Modified Proctor test, ASTM D1557. Amd. 6

d. Summary of Compaction Densities: Amd. 6

d1. Safety Related:

LOCATION	STRUCTURAL FILL			BACKFILL			
	Material Type	Compaction	Moisture Content Range	Material Type	Compaction	Moisture Content Range	
Within the 40' Limit of the Power Block	A	95% ASTM D1557	+4.0% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B	85% ASTM D2049		B	80% ASTM D2049		
	B2	130 PCF	+4.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
Outside of 40' Limit and Within Power Block Excavation	A	95% ASTM D1557	+4.0% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B	85% ASTM D2049		B	80% ASTM D2049		
	B2	130 PCF	+4.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
				C	90% ASTM D1557	+6.0% to -3.0% of Optimum	
Outside of Power Block Excavation	A	95% ASTM D1557	+4.0% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B2	130 PCF	+4.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
	C	95% ASTM D1557	+4.5% to -2.0% of Optimum	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	
Category I Piping and Electrical Ductruns	A	95% ASTM D1557	+4.0% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B2	130 PCF	+4.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
	C	95% ASTM D1557	+4.5% to -2.0% of Optimum	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	

d2. Non-Safety Related:

LOCATION	STRUCTURAL FILL			BACKFILL			
	Material Type	Compaction	Moisture Content Range	Material Type	Compaction	Moisture Content Range	
Outside of 40' Limit and Within Power Block Excavation	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B	80% ASTM D2049		B	80% ASTM D2049		
	B1	80% ASTM D2049		B1	80% ASTM D2049		
	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	
Outside of Power Block Excavation	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	A	90% ASTM D1557	+4.5% to -2.0% of Optimum	
	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	B2	90% ASTM D1557	+5.0% to -2.0% of Optimum	Amd. 7
	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	C	90% ASTM D1557	+6.0% to -3.0% of Optimum	
	Relay	House Only:		Relay	House Only:		
	B or B1	85% ASTM D2049		B or B1	80% ASTM D2049		

NOTE: Non-Safety Related structural fill and backfill within 40 foot limit of the power block shall be Type A or Type B material and compacted to the requirements of the safety related backfill as specified in Paragraph 307.6d1.

e. Fill Placement:

e1. Structural fill shall be placed in near horizontal layers to the loose thicknesses as determined from the results of the Test Section Compaction. Distribution and gradation of materials throughout rolled fill shall be such that fill will be free from lenses, pockets, streaks or layers of material differing materially in texture or gradation from surrounding material. Combined excavation and placing operations shall be such that materials when compacted in the fill shall be blended sufficiently to secure the best practicable degree of compaction and stability. Travel on the fill shall be satisfactorily controlled to minimize tracking or cutting fill.

e2. Successive loads of material shall be dumped so as to produce the best practicable distribution of material, and for this purpose locations in earth fill where individual loads shall be deposited may be designated. If the surface of any layer of rolled fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, or has formed a hard overcompacted crust from traffic, it shall be moistened or both moistened and scarified as required before the succeeding layer of material is placed.

e3. If the rolled surface of any layer or fill in place is too wet for proper compaction of fill thereon, it shall be removed, allowed to dry, or shall be worked with a harrow, scarifier or other suitable equipment, to reduce water content to specification requirement and then shall be recompacted.

e4. The Inspector shall continuously observe the placement of structural fill and shall determine the in-place density of the fill materials. Contractor shall furnish, to the Inspector, the elevation of the top of each layer of fill placed.

e5. The in-place characteristics of all structural fill shall be determined during its placement and compaction by a continuous program of field testing conducted by the Inspector under the surveillance of Owner. The type of test and the frequency will be determined as indicated in Paragraph 302.

e6. Heavy rolling compaction equipment shall not be permitted to operate closer than the safe distance from the subsurface structures on foundations, as determined by Owner or the Consulting Engineers. In such cases, light vibrating baseplate compacters or power tampers shall be used.

e7. Earthwork During Freezing Weather: Amd. 3

e7.1 Structural fill shall not be placed on frozen receiving surfaces having visible signs of frost, including snow.

e7.2 Before resumption of earthwork after freezing weather, the receiving areas shall be stripped and/or scarified to the depth of frost, as determined by the Consulting Engineers. Amd. 4

e7.3 The receiving areas shall be approved before the placement of a new lift.

e7.4 The total lift thickness, prior to the start of compaction, shall meet the requirements specified in Paragraph 307.4 for Type A and Type C materials and Paragraph 307.6 for Type B and Type B1 materials. Amd.6

e7.5 In no instance shall frozen earth material be incorporated into the compacted earth fill.

308. EQUIPMENT

308.1 Compacting Equipment: Compacting equipment shall be of such design, weight, and quality as to obtain the required density in accordance with the Specification. Areas inaccessible to mobile compacting equipment shall be compacted or consolidated by hand mechanical tampers or vibrators.

308.2 In addition to the foregoing equipment, Contractor shall have the following equipment available at the WORK.

a. Power tampers to be used for compaction of material in areas where it is impractical to use a roller or tractor.

b. A plain cylindrical roller, weighing not less than 1,000 lbs. per lineal foot for rolling the surface of fill smooth for drainage in case of heavy precipitation.

c. Discs, harrows, and motor graders for drying and maintaining fill.

309. TEST PITS AND TRENCHES

309.1 Test pits and trenches may be required to establish the suitability of the soil beneath the subgrade.

309.2 The need for these pits and trenches, location and type, will be determined by Owner or the Consulting Engineers, based on the field conditions.

309.3 Contractor will be given advance notice to prepare for the test pits and trenches and allow time for procurement of equipment to conduct these tests.

310. REPORTS AND RECORDS

310.1 Daily reports are required to provide a permanent record of the adequacy of construction methods and of progress, as observed by those closest to the operation. The reports shall present a complete record of the areas worked, the type and source of materials, the areas compacted, the quantity of material removed from the fill whether as oversize or rejected material, and the approximate volume of materials placed from the borrow areas. Inspectors shall be alert to record pertinent data even when fill operations are apparently routine and stereotyped and that all data is recorded, i.e. no omissions of an essential item. These items shall include:

a. Changes in equipment or techniques.

b. Starting or stopping of dewatering operations, and reasons for this.

c. Starting or stopping of fill operations due to weather, plant breakdowns, Inspector's or Engineer's instructions, etc., and reasons for this.

d. Delays due to any other reasons caused either by Owner, the Consulting Engineers, or Contractor.

e. Location of any piping or other objects not provided in the Construction Drawings and embedded in the fill, when started, when finished and whether removed, grouted up, backfilled, etc.

f. The effects of weather on the fill operations such as freezing, ponding of water on surfaces, erosion of slopes, softening of fill surfaces, etc.

310.2 A marked up drawing indicating areas worked on each shift and the location of anything of special interest, such as rejected areas and areas of wet fill form an essential part of the daily report.

310.3 A daily report shall be kept of the number of layers placed and the source of material in each layer in the foundation fill. This information shall also provide an "as built" record of the construction of each area. Accuracy in maintaining this record is essential.

STANDARD SPECIFICATION FOR EARTHWORK

(Form 1714)

1. GENERAL

1.1 Earthwork shall conform to the requirements of this Standard Specification, the Job Specification, and the design drawings. In the event of variance between this Standard Specification and the Job Specification or design drawings, the Job Specification and the design drawings shall take precedence.

1.2 Where the terms "as indicated" or "indicated" are used in this Standard Specification, they shall mean "as shown, noted, called for or specified".

1.3 All references to the following publications are to the latest issue of each, together with the latest additions and/or amendments thereto, as of the date of Contract, unless otherwise indicated; references to the sponsoring agencies will be made in accordance with the abbreviations indicated:

1.3.1 ASTM ..... American Society for Testing and Materials Standard Specifications.

1.3.2 ASA ..... American Standards Association Standard Specifications.

1.3.3 AASHO ..... American Association of State Highway Officials Standard Specifications.

2. SOIL DATA AND TOPOGRAPHY

2.1 Soil Data: Drawings show borings made at site, and logs given thereon indicate character of soil. This information furnished for Contractor's convenience; in using it Contractor assumes the risk, as Purchaser and the Consulting Engineers assume no responsibility for accuracy of information shown thereon. Contractor will be permitted to make his own soil investigations, but same shall be made at no cost to Purchaser.

2.2 Topography: Drawings indicate elevations, dimensions and/or cross sections, profiles and contour lines of existing ground. This information furnished for Contractor's convenience; in using it Contractor assumes the risk, as Purchaser and the Consulting Engineers assume no responsibility for accuracy of information shown thereon. Contractor will be permitted to make his own investigation of topography during bid period, but same shall be made at no cost to Purchaser.

3. LINES AND GRADES

3.1 Contractor shall lay out lines and grades from existing base lines and bench marks on property and be fully responsible for correctness of such lines and grades and for proper execution of WORK to such lines and grades.

3.2 Purchaser reserves right to verify correctness of lines and grades during progress of WORK. Such verification by Purchaser will not relieve Contractor of responsibility as specified foregoing.

3.3 Contractor shall notify Consulting Engineers of any differences in location of existing work from that indicated, wherever such differences may affect new work.

3.4 Contractor shall preserve and maintain all bench marks and reference points established by Purchaser. Should Contractor, during prosecution of WORK, destroy or remove any bench marks and/or reference points established by Purchaser, the cost to Purchaser of re-establishing these bench marks and/or reference points will be charged to Contractor.

4. CLEARING

4.1 Prior to performing excavation or fill work, areas in which such work is to be done shall be cleared, grubbed and the top soil and sod removed. No clearing, grubbing or removal of top soil and sod shall be done outside designated areas without specific approval.

4.2 If extensive clearing, grubbing and removal of top soil and sod is required, the Job Specification or drawings will specifically so indicate. If such work is incidental, then it will not be specifically indicated and shall be performed prior to, but as part of, excavation work.

4.3 Clearing:

4.3.1 Clearing is defined as removal and disposal of all trees, down timber, snags, brush, hedges, bushes and all other vegetation or organic materials, and also all rubbish, debris or other foreign or objectionable materials above ground surface, except removal of sod and top soil.

4.3.2 Removal of structures, such as buildings, roadways, fences, etc., is classified as demolition and not as clearing, and will be indicated in the Job Specification (under Demolition Work) or on drawings.

4.3.3 Trees shall be filled in such manner as not to damage other trees or other vegetation which are to remain in place nor damage existing structures and facilities nor constitute a hazard to traffic or life.

4.4 Grubbing: Grubbing is defined as removal and disposal of all stumps, large roots, buried logs and all other objectionable material from below ground surface. Explosives may be used only if specifically approved and their use shall conform to all applicable laws and safety regulations.

4.5 Disposal:

4.5.1 All materials from clearing and grubbing operations shall be Contractor's property and shall be promptly disposed of off the site unless otherwise indicated in the Job Specification or on drawings; accumulation of such materials on premises not permitted.

4.5.2 Burning of Debris on Premises: If burning of debris on premises is permitted by the Job Specification, drawings or Purchaser, conform to following requirements:

4.5.2.1 Burn debris only in areas specifically designated by Purchaser.

4.5.2.2 Prior to burning any material, secure approval and permits from, and comply with all regulations of all authorities and all public bodies having jurisdication in area of WORK.

4.5.2.3 Neatly pile all combustible material and burn when in suitable condition. Do piling in such manner and in such locations as to cause least fire risk.

4.5.2.4 Burn material thoroughly and completely so that materials are reduced to ashes, with no charred pieces, such as charred logs, remaining. Ashes and charcoal residue r ed not be removed. Combustible materials difficult to burn, such as tree stumps and root clumps, may be buried below grade, with not less than 1'-0" of cover over them and level with surrounding grade, if grubbing is not required for the WORK; if grubbing is required, then all such unburnable materials shall be disposed of off the premises.

4.5.2.5 Fire Protection: Provide fire fighting facilities, satisfactory to authorities having jurisdiction and to Purchaser and maintain such facilities in first class operating condition during course of burning operations.

4.6 Removal of Top Soil and Sod:

4.6.1 Top soil and sod shall be removed as part of excavation work, unless the Job Specification or drawings indicate that top soil and/or sod shall be removed and stored for reuse by Contractor or by others.

4.6.2 If top soil is indicated to be removed for reuse, it shall be carefully stripped off, stored in separate stockpiles and kept clean and free of all foreign material. Sod and other vegetation shall be removed from the top soil before it is stockpiled.

4.6.3 If sod is indicated to be removed for reuse, it shall be carefully removed, rolled up, and stored in a suitable and well protected manner, as approved.

4.6.4 If top soil and/or sod is indicated to be reused by Contractor, any and all excess stockpiles remaining on completion of WORK shall be removed and disposed of off the premises unless otherwise requested.

5. EXCAVATION

5.1 Excavation is defined to include all incidental clearing, all excavation and disposal of excavated materials, all protection, sheeting, shoring, bracing and cofferdams, all dewatering, and preparation of bearing areas as required to properly install and complete the WORK, regardless of portions of WORK for which required, and regardless of nature of materials encountered in excavating. Dredging shall be performed only if specified in the Job Specification or on the drawings.

5.2 Classification: Excavation shall be classified as earth or rock excavation, as follows:

5.2.1 Earth excavation is all material not classified as rock excavation.

5.2.2 Rock Excavation:

5.2.2.1 Rock excavation is defined as any material that requires the continuous use of drilling and blasting, or drilling, channeling, etc., and shall include granite, trap, quartzite, chert, limestone, hard sandstone, hard shale or slate or other similarly hard materials, as

well as rocks and boulders measuring 1/2 cubic yard or more.

5.2.2.2 The Job Specification or drawings will indicate whether blasting is permitted. Blasting, if permitted, shall conform to requirements of 5.11, following.

5.3 Dewatering: Contractor shall provide and operate all dewatering equipment required for areas excavated by Contractor, and be responsible for maintaining a dry site satisfactory to Purchaser and Consulting Engineers.

5.4 Protection and Support:

5.4.1 Contractor shall provide all protection and support as required to properly install the WORK, as required for protection and support, of the WORK and of adjacent structures and improvements, and as required for safety of traffic and life.

5.4.2 Protection and support shall include temporary sheeting, bracing, shoring and cofferdams, and also, where indicated, permanent sheeting, bracing and shoring. All temporary sheeting, bracing, shoring and cofferdams shall be as approved, and all such temporary work shall be removed by Contractor when its use is no longer required, unless otherwise requested or approved.

5.4.3 Banks at excavations shall be protected and supported, where necessary or where requested, so that the banks and bottoms will be maintained and adjacent structures or other construction will be protected from damage caused by any earth or rock movement.

5.4.4 Protection and support shall be arranged for minimum interference with pipe laying, electrical ductwork installation and similar work.

5.4.5 Temporary Coiferdams: Contractor shall design temporary cofferdams required by him to perform his work and shall submit drawings thereof for approval. These drawings shall show all data on which the design is based. No such work shall be installed until such approval is received, and the work shall be done only in accordance with these approved drawings.

5.5 Earth excavations shall be of sufficient size to allow for placing of formwork for concrete, for inspection of formwork and surfaces of completed concrete, and for dampproofing, waterproofing, pipework, electrical ductwork, etc. Rock excavations shall be to neat lines unless otherwise indicated; where overbreak of rock occurs behind a vertical face of concrete placed against rock, overbreak shall be filled with the same concrete as required for the vertical face, and no payment will be made for concrete fill.

5.6 Excavations shall be carried to elevations indicated on drawings, and as follows:

5.6.1 Earth Excavation: Foundation excavations carried below the indicated level shall be filled with the same concrete as required for the foundation; other earth excavations carried below the indicated level shall be brought up to the proper level with compacted fill, sand, crushed stone, gravel or concrete, as determined most suitable by the Consulting Engineers.

5.6.2 Rock Excavation: When designated or approved elevations have been reached, rock surfaces shall be leveled off and all loose rock removed. Where overbreak of rock results in dropping elevations of rock surfaces below designated or approved elevations, overbreak shall be filled with the same concrete as required for the foundations.

5.6.3 No payment will be made for any of the foregoing specified fill required to remedy over-excavation in earth or overbreak in rock.

5.7 Hand excavation shall be used, if requested, for trenching or other excavation adjacent to structures or equipment where use of mechanical excavating equipment is not considered advisable by Purchaser or the Consulting Engineers.

5.8 Bearing Areas:

5.8.1 Bearing areas for all foundations shall be inspected and approved by Purchaser or the Consulting Engineers before any concrete is placed. If bearing areas are not suitable, as determined by the Consulting Engineers, Contractor may be requested to carry the excavations deeper to more suitable bearing material; such additional excavation will be paid for on the unit price basis set forth for the WORK. Contractor may also be requested by the Consulting Engineers to make auger borings or other tests at bearing areas to determine thickness of bearing stratum; these tests will be paid for on a unit price or cost plus basis, whichever is set forth for this item.

5.8.2 All foundations shall be placed on undisturbed soil unless otherwise indicated or approved.

5.8.3 Before placing any concrete for beams or slabs on fill, the soil shall be well tamped.

5.8.4 Before placing any concrete on soil that will absorb water, the surface of the soil shall be thoroughly wet with clean water immediately before the concrete is placed.

5.9 Excavation for Pipework and Electrical Ductwork:

5.9.1 Make excavation for this work true to grade, profile and alignment, and so as to provide full, even and continuous bedding. For pipework, normally excavate trenches to match curve of pipe; however, flat beds may be used if as economical as curved beds, or shall be used if indicated.

5.9.2 Where granular bedding under pipework or ductwork is indicated in the Job Specification or on drawings, excavate the additional amount required to place the indicated depth of bedding material.

5.10 Disposal of Excavated Materials:

5.10.1 Deposit and spread, or stockpile, excavation materials suitable (in opinion of Consulting Engineers) for fill or backfill, in quantities required and approved, on premises where requested.

5.10.2 For excavated materials not suitable for fill or backfill, the Job Specification or drawings will indicate whether such material is to be disposed of on or off premises, and disposal shall accordingly be as follows:

5.10.2.1 For such material to be disposed of on premises, deposit or spread on premises where approved or requested.

5.10.2.2 For such material to be disposed of off premises, promptly remove this material as excavated; stockpiling of such material will not be permitted.

5.10.3 After completion of fill and backfill work, or when approved or requested, dispose of any and all excess stockpiles or excess excavated materials either on or off the premises as specified in 5.10.2 foregoing.

5.11 Requirements for Blasting: If use of blasting is approved by Purchaser or Consulting Engineers, blasting shall conform to following requirements:

5.11.1 Blasting shall be performed only when proper precautions are taken for protection of persons, the work, private property, etc. Caps or other exploders or fuses shall in no case be stored or transported in same place in which dynamite or other explosives are transported. Location of storage magazines, methods of transportation and, in general, precautions taken to prevent accidents shall, at all times, be subject to approval of Purchaser or Consulting Engineers, but Contractor shall at all times be liable for any injuries to persons or property caused by explosives.

5.11.2 Every possible precaution shall be taken in blasting operations to preserve rock outside lines of excavation in soundest possible condition. Blasting shall be done only to lines and grades indicated on drawings or as approved by Consulting Engineers.

5.11.3 Explosives shall be of such quantity and power and shall be used in such locations as will not tend to open seals, or to crack or damage rock outside prescribed limits of excavation. If needed, firing of blast shall be controlled by use of delayed explosives. Whenever, in the opinion of Consulting Engineers, continuation of blasting may injure rock on which or against which concrete is to be placed, use of explosives shall be discontinued and excavation shall be completed by wedging, boring, channeling or other suitable means.

5.11.4 Contractor shall submit plans and methods of operation for rock excavation work before work is started. Approval of method of blasting or of strength and amount of explosives used will not relieve Contractor of responsibility for blasting operations.

5.11.5 For blasting, Contractor shall employ a supervisor thoroughly experienced in this type of work and shall at all times maintain rigid inspection to see that intent of these requirements are fully complied with.

5.11.6 Contractor shall maintain a complete and detailed record of blasting operations, in a form approved by Purchaser, and shall submit copies of such records to Purchaser as requested.

5.12 Dredging:

5.12.1 Before submittal of bid, Contractor shall obtain a sweeping map from The U. S. Army Corps of Engineers, and shall also determine from them the full extent of their requirements as it will affect the WORK.

5.12.2 Contractor shall furnish, establish and maintain in good order all range marks, stakes, gauges and buoys required for proper execution of this work, and furnish, on request, the use of such boats, boatmen, laborers and materials forming a part of the ordinary and usual equipment and crew used for this work as may be necessary for Purchaser, Consulting Engineers and Corps of Engineers to inspect work.

5.12.3 Contractor shall provide sounding and sweeping equipment and labor to sound and sweep dredged areas to establish that indicated grade, profile and alignment are met.

5.12.4 As soon as possible after completion of dredging work, Contractor shall thoroughly examine dredged area by sounding and sweeping to determine that completed work meets all requirements indicated on drawings and all requirements specified by Corps of Engineers. Arrange with Purchaser for representatives of Purchaser, Consulting Engineers and Corps of Engineers to be present when sounding and sweeping is performed. However, the presence of these representatives shall in no way relieve Contractor of responsibility for accuracy and proper completion of the work.

5.12.5 Any shoals, lumps or other lack of Contract dimensions disclosed by the foregoing examination shall be remedied by Contractor, and shall again be sounded, and swept if required, until the entire dredged area is satisfactory in every respect to Purchaser, Consulting Engineers and Corps of Engineers.

5.12.6 Contractor shall maintain a complete record of soundings, in a form approved by Consulting Engineers, and shall submit copies of such records to Consulting Engineers as requested.

6. FILL

6.1 Fill includes the following two classes, with two types under each class; the use of each shall be as indicated in the Job Specification or on the drawings:

6.1.1 Class 1: Regular compacted fill, Types RCF1 and RCF2.

6.1.2 Class 2: Controlled compacted fill, Types CCF1 and CCF2.

6.2 Services of Testing Laboratory: Where controlled compacted fill is specified, Purchaser will furnish services of a Testing Laboratory to determine suitability of fill material, to set optimum moisture contents, and to perform field tests to check on compliance with moisture and density requirements. Contractor shall furnish Testing Laboratory with all required quantities of fill material, from the same source as will be used for the WORK, as required for test purposes.

6.3 Class 1, Regular Compacted Fill:

6.3.1 The two types are based on the materials specified for use as fill, as follows:

6.3.1 Type RCF1: Granular material (sand, crushed stone, gravel, etc).

6.3.1.2 Type RCF2: Cohesive material (clay, sandy loam, silty loam, etc).

6.3.2 Material: The Job Specification or drawings will indicate the source of materials to be used, such as material previously excavated at the site, or from borrow pits, or from off site sources, etc. All material used shall be as approved by Purchaser and/or the Consulting Engineers.

6.3.3 Preparation of Subgrade: Prior to placing regular compacted fill, strip areas to be covered of all vegetation or other organic material or other foreign or deleterious material.

6.3.4 Compaction Densities: Build up fill to grade elevations indicated or required, with suitable moisture control and compaction throughout placing, as specified in 6.3.5 following, to produce a completed fill capable of supporting trucks and other heavy construction equipment.

6.3.5 Placing of Fill: Place as follows, unless otherwise approved or requested:

6.3.5.1 Place fill, with suitable moisture content, in uniform horizontal layers not over 9" deep before compaction.

6.3.5.2 For Type RCF1 granular fill, compact by successive high speed passage of heavy tractors (with treads covering 100% of area), or with other vibratory type equipment, as approved.

6.3.5.3 For Type RCF2 cohesive fill, compact by use of sheeps foot roller or with other ramming type equipment, as approved.

6.3.5.4 In places inaccessible to large equipment, obtain required compaction with mechanical vibrators for Type RCF1 granular fill, and with mechanical rammers for Type RCF2 cohesive fill.

6.4 Class 2, Controlled Compacted Fill:

6.4.1 The two types are based on the materials specified for use as fill, as follows:

6.4.1.1 Type CCF1: Granular material (sand, crushed stone, gravel, etc.)

6.4.1.2 Type CCF2: Cohesive material (clay, sandy loam, silty loam, etc.)

6.4.2 Material: Conform to same requirements specified in 6.3.2 for granular fill.

6.4.3 Preparation of Subgrade:

6.4.3.1 Subgrade to receive controlled compacted fill shall be inspected by Purchaser or the Consulting Engineers to determine if it is suitable and has sufficient bearing capacity for the fill material and loads to be placed over it. If subgrade is not suitable, as determined by the Consulting Engineers, Contractor may be requested to perform additional excavation as specified in 5.8 for Bearing Areas, with compensation as specified therein.

6.4.3.2 Prior to placing controlled compacted fill, strip areas to be covered of all vegetation, top soil and all organic material or other foreign or deleterious materials.

6.4.3.3 Thoroughly break and turn soil underlying the filled area to depth of 6" before deposition of fill material. Do breaking of ground no more than 200 feet in advance of placing fill.

6.4.4 Compaction Densities: Build up fill to grade elevations indicated or required, with suitable moisture control and compaction throughout placing, as specified in 6.4.5 following, to produce following densities:

6.4.4.1 Decidedly granular fill material: 90% of its maximum density.

6.4.4.2 All other fill material: 95% of its maximum density.

6.4.5 Placing of Fill: Place as follows, unless otherwise approved or requested:

6.4.5.1 Place fill, with optimum moisture content, in uniform horizontal layers not over 6" deep before compaction. Add water, or dry out fill, to maintain optimum moisture content throughout placing and compaction.

6.4.5.2 For Type CCF1 granular fill, compact by successive high speed passage of heavy tractors (with treads covering 100% of area), or with other vibratory type equipment, as approved.

6.4.5.3 For Type CCF2 cohesive fill, compact by use of sheeps foot roller or with other ramming type equipment, as approved.

6.4.5.4 In places inaccessible to large equipment, obtain required compaction with mechanical vibrators for Type CCF1 granular fill, and with mechanical rammers for Type CCF2 cohesive fill.

7. BACKFILL

7.1 Backfill includes general backfilling around all work excavated for by Contractor, and also all other backfill indicated on drawings as by Contractor.

7.2 Backfill shall be approved materials previously excavated at the site or materials obtained from approved borrow pits and shall be free of sod or other deleterious or foreign matter.

7.3 Backfill shall be built up to the grade elevations indicated or required, with suitable moisture control and compaction throughout placing, in the same manner as specified in 6.3 for Regular Compacted Fill, Types RCF1 and RCF2.

7.4 Backfill against foundation walls shall be placed only when directed.

7.5 Backfill Around Underground Piping: Place backfill around underground piping, drain lines, etc., only after piping, drain lines, etc., have been tested and/or inspected and approved. Use special care in backfilling to see that backfill is free of cinders or other materials which may be injurious, in opinion of Consulting Engineers, to such piping, drain lines, etc. Provide backfill free from rocks, hard lumps or clods larger than 3 inches. Do not use sod. Place backfill below top of piping, drain lines, etc., in alternate layers on each side of piping, drain lines, etc. Backfill around corrugated metal drainage pipe, corrugated structural plate pipe or welded steel plate pipe shall also conform to requirements specified in 7.6, following.

7.6 Backfill For Corrugated and Welded Steel Pipe:

7.6.1 Where flat beds for this piping is indicated in Job Specification or on drawings, provide flat granular bedding fill under pipe, with depth of bedding as indicated on drawings. Provide greater depth bedding fill if required by unsuitable soil conditions, as determined by the Consulting Engineers.

7.6.2 Granular Bedding: Use clean crushed stone or gravel, or other approved material, with 1-1/2" maximum size.

7.6.3 After pipe is in place on flat bed, provide controlled compacted granular fill under haunches. Use clean crushed stone, gravel or coarse sand, or other approved material, with 1-1/2" maximum size.

7.6.4 Also provide same controlled compacted granular fill up to center line of pipe.

7.6.5 Fill above center line of pipe and up to grade with select material, as approved, with controlled compaction.

7.6.6 Controlled compaction shall conform to requirements specified in 6.4 for Controlled Compacted Fill, Types CCF1 and CCF2. Services of Testing Laboratory will also be furnished for this work as specified in 6.2 foregoing.

7.6.7 Use extreme care in placing all compacted fill to maintain fill at approximately the same level (not to exceed one foot differential) on both sides of pipes throughout entire placing of compacted fill.

7.7 Backfill for Electrical Ductruns:

7.7.1 Requirement of Standard Specification STD-EF-103 that clay or loam backfill shall be used for ductruns shall not apply. Any approved previously excavated material may be used for backfill over ductruns that are cast in place, provided that maximum size of material shall not exceed two inches (2").

7.7.2 For precast concrete ductruns, provide a layer of clean, washed sand not less than 2" thick on SIDES AND TOP, with balance of backfill approved previously excavated material not exceeding 2" maximum size. Provide sand cushion for precast ductruns as specified in Job Specification under Concrete Work, or as indicated on drawings.

7.8 Backfill in Roadways: Where existing roadways are cut to install new work, backfill such areas as quickly as possible after completion (including testing, if required) of new work. Bring backfill to within 10" of road surface ready for installation of new roadway by Contractor or by others as indicated in Job Specification or on drawings.

8. GRADING: Consists of rough grading and finish grading, as follows:

8.1 Rough Grading: Cut, fill, spread and level during course of WORK to elevations indicated.

8.2 Finish Grading: Fine grade and level to provide a smooth finish grade free of debris, foreign matter, objectionable stones, slods, lumps, pockets or high spots, properly drained and true to indicated elevations. Do finish grading only near completion of WORK or when requested.