TENNESSEE VALLEY AUTHORITY

Units 1 and 2
Watts Bar Nuclear Plant
Rhea County, Tennessee

(Docket Nos. 50-390 and 50-391)

INFORMATION PURSUANT TO 10 CFR SECTION 50.12 IN SUPPORT OF A REQUEST FOR AN EXEMPTION FROM THE LICENSING REQUIREMENTS OF 10 CFR SECTION 50.10(c) FOR THE CONDUCT OF CERTAIN SITE PREPARATION ACTIVITIES.

CONTENTS

I. INTRODUCTION

This document contains information required by 10 CFR Section 50.12, Specific Exemptions, in support of a request for an exemption from the licensing requirements of 10 CFR Section 50.10(c) for the conduct of certain site preparation activities for the Watts Bar Nuclear Plant, Docket Nos. 50-390 and 50-391.

A. Licensing Status

The license application in Dockets 50-390 and 50-391 was filed May 18, 1971. TVA, as a corporate agency and instrumentality of the United States, is itself subject to the requirements of the National Environmental Policy Act of 1969 (NEPA; P.L. 91-190). Pursuant to Section 102(2)(c) of that Act it prepares detailed statements of environmental considerations connected with the construction and operation of its facilities including nuclear power plants. Accordingly, a copy of TVA's draft environmental statement was filed with the license application as applicant's environmental report.

As a part of normal staff review, seven meetings between applicant and the regulatory staff have been held through September 18, 1972, and 16 amendments to the application have been submitted. On July 7, 1972, a subcommittee of the Advisory Committee on Reactor Safeguards met with applicant at the plant site. A second subcommittee meeting and a full committee meeting were held in Washington, DC, on September 13 and 14, respectively.

The original plant schedule submitted in the PSAR provided for commercial operation of units 1 and 2 on August 1, 1976, and May 1, 1977, respectively. Based upon these operating dates, site preparation activities were scheduled to begin January 1, 1972, with the issuance of a construction permit anticipated by August 1, 1972. Contracts with vendors of plant equipment and TVA construction planning were based upon these dates. However, site preparation activities were not commenced in January, due primarily to TVA's judgment that such activities should only be undertaken after completion of its final environmental statement. Before the final statement could be completed, however, changes to 10 CFR Section 50.10 became effective prohibiting certain pre-construction site preparation activities of the type that had previously been scheduled.

As a result of these and other factors, scheduled commercial operating dates were changed to May 1, 1977, and February 1, 1978. In TVA's opinion, May 1977, operation of unit 1 is vital in order to permit TVA to meet its summer 1977 peak loads. In order to meet the scheduled operation dates, it is essential that the onsite work described herein be commenced in early October 1972.

B. Environmental Review Status

TVA's draft environmental statement, a copy of which was filed with the Watts Bar Nuclear Plant PSAR, was filed with the Council on Environmental Quality and circulated for comment by state and Federal review agencies on May 14, 1971. A supplement

to the draft statement, containing information responding to revisions to Appendix D to 10 CFR Part 50, was circulated for review and comment on April 7, 1972. A lead agency arrangement, as contemplated by the Council on Environmental Quality NEPA guidelines, dealing with environmental statements for TVA nuclear plants was established by letter of June 30, 1971, from Harold L. Price (AEC) to J. E. Watson (TVA). Pursuant to these arrangements, TVA sent a proposed final environmental statement on Watts Bar Nuclear Plant to AEC on August 26, 1972, for AEC's review. It is anticipated that consultation with AEC can be completed soon and the final statement filed with the Council on Environmental Quality (CEQ) shortly thereafter.

C. Construction Planning and Scheduling and Plant Design Status

1. Construction Planning

Design and coordination of the construction plant requirements have been essentially completed. This includes the detailed drawing requirements for all temporary shops, office buildings, warehouse structures, roads, railroads, concrete mixing plant, electrical substation and distribution systems, fire protection, potable water, service air, sewage treatment, surface drainage system, grading plans, and miscellaneous other requirements necessary for a planned approach to a force account operation. The major portion of the equipment, buildings, and material for this temporary plant has been requisitioned and much of it has been delivered to offsite locations for temporary storage.

2. Construction Scheduling

The Critical Path Method (CPM) of scheduling will be used in constructing the Watts Bar plant, along with a computerized cost control program. Key project personnel were assigned in July 1972 to develop the details of the CPM schedule. This group moved into an existing farmhouse on the site to undertake these duties full time.

Three dwelling houses on the site will be used by construction personnel for offices until the temporary offices are constructed. Several large barns and sheds will be used for early construction maintenance and storage facilities.

3. Plant Design

Design of the permanent plant facility has proceeded to the extent to permit commencement of the site preparation activities described herein.

D. Site Description

The plant will be in Rhea County, Tennessee, located on a tract of land adjacent to the TVA Watts Bar Steam Plant at Tennessee River Mile (TRM) 528 on the west shore of Chickamauga Lake about 8 miles southeast of Spring City, Tennessee.

Both the site and neighborhood are in a sparsely populated rural area of the county with farming being the principal income-producing land use. Since the river frontage is located downstream from

Watts Bar Lake on a narrow segment of Chickamauga Lake, it has virtually no recreational potential.

Land recently acquired for the plant site and reservation was contained in 6 ownerships totalling 967 acres. These ownerships, which were acquired during the period January-July 1971, ranged in size from a low of 2.2 acres--the site of a long-abandoned county school--to a high of 433 acres which was utilized as a dairy farm. The remaining 4 ownerships were operated for production of beef cattle and grain and row crops.

Topographically, the site consists of two major land categories--river bottoms, which are level to gently undulating and located between elevations 690 and 695, and valley land, located between elevation 695 and 740. Bottom land used for the production of corn and silage amounted to 19 percent of the acquisition area. Valley land used principally for cattle grazing, hay and timber production, and rural homesites comprised the remaining 81 percent. Topography of the valley land ranges from gently rolling to steep with the steeper areas being located adjacent to the river bottoms. Twenty-seven percent (263 acres) are wooded or semicleared. This area contains some merchantable size hardwood and pine saw timber, as well as pulp size pine. Among the hardwood species are white oak, red oak, hickory post oak, and black oak. As with most of the timber stands in the area, this timber has been cut over from 5 to 20 years prior and contains few trees in excess of 18 inches (measured at a height of 4.5 feet), the chief exception to this being a number of yard and shade trees. Field pine has become

established in several areas formerly cultivated. These trees together with loblolly pine are thinly dispersed throughout the wooded upland zones. Other species within the woodlands are poplar and beech.

All of the plant site and railroad right of way is located on the elevated valley lands and excavation along the river bottom land is limited to approximately 9.5 acres for the intake pumping station and channels. Initial construction needs require the clearance of only 26.5 acres of semicleared and woodlands which represent roughly 10 percent of total wooded area on the acquired land.

E. Site Status

Foundation investigations, terrestrial, and meteorological monitoring have been conducted on the site.

1. Foundation Investigation

Fifty-nine core holes were drilled in the plant area to determine capability of the rock to support plant structure loads. Static and dynamic physical testing were also conducted. Soil investigations were conducted to determine the properties of the earth overburden in the plant area and to locate and ensure that sufficient material of proper quality is available for fill requirements.

2. Meteorological Monitoring

A 130-foot meteorological tower has been erected on the site to collect data required to establish background information related to the suitability of the site and the protection of

environmental values. A second tower (300-foot) that could be utilized as the permanent meteorological tower is now being erected in an area that was cleared by the previous landowners. Data from this tower will be correlated with that from the 130-foot tower in order to refine data required to assure environmental protection.

3. Terrestrial Ecosystem Survey

Detailed terrestrial surveys of the site have been made to identify species of flora and fauna which might potentially be affected by the construction and operation of the proposed nuclear plant.

During and following construction of the nuclear plant the impact area will be resurveyed periodically to assess vegetational changes.

II. DESCRIPTION OF ACTIVITIES

The following site preparation activities are those for which an exemption is sought herein. It is estimated that 6 months will be required to complete these activities.

Environmental impacts associated with these activities are discussed in Section III.

A. General Site Clearing and Grading

1. General Site Clearing

TVA has acquired approximately 967 acres of land for the site to supplement land already owned along the shoreline of Chickamauga Reservoir and the adjacent Watts Bar Reservation. The acquired land has been generally cleared by previous owners except for some 263 acres of woodland which is broken up into three major woodland stands plus some minor scattered areas along drainage sloughs and in the vicinity of tenant housing locations. An aerial view of the site with the principal plant features and areas to be cleared designated by heavy and light lines respectively, is presented in Figure 1.

Only 26.5 acres of woodland must be cleared for initial construction needs. (A total of 53.5 acres is required for construction needs, but the clearing of 27 acres in the holding pond area, shown in Figure 1 as the part of area 2 enclosed by the dashed line, will be deferred until a construction permit is received.) The following tabulation indicates the areas and the approximate acreage of woodland that will be cleared under the exemption:

Area*	Description	Approximate Area Required (acres)	Approximate Area to be Cleared (acres)
1	Powerhouse complex including switchyard	90	6
2	Holding ponds and dikes	40	3
3	Cooling towers	10	1
4	Railroads and access roads	5	2.5
5	Construction plant shops and administration buildings	50	8
6	Parking lots	11	4
7	Warehouse and storage area	60	2
	TOTAL	266 acres	26.5 acres

*See Figures 1 and 2 for locations of areas

Disposal of cleared material will be effected as follows: Merchantable timber will be sold with the purchaser hauling it off the site. Other trees, stumps, and brush will be disposed of by one or more of the following: (a) controlled burning, (b) burying on the premises, and (c) mechanical chipping machines. Any burning will be conducted in accordance with applicable Federal, state, and local air quality standards.

Indiscriminate clearing will be avoided and clearing will be effected in a manner such that the construction areas will be screened from public roads. As many tree stands as possible will

be left in the construction plant area, shown as area 5 in Figure 1, for their aesthetic value and to minimize environmental impact.

2. General Site Grading

Grading operations will be sequenced to remove and store topsoil before conducting a general grading and excavation program. The initial grading operation will remove the overburden from the main powerhouse complex and cooling tower areas down to final plant grade (elevation 728) as shown in Figure 3. Existing ground elevations in these areas range up to elevation 740, requiring a maximum cut of 12 feet to reach plant grade. Excavated material will be used to fill low areas in the construction plant as shown in Figure 10 and in the general yard areas. Any excess material removed in the general grading process and not required for the fill will be used for permanent embankments and dikes or will be stored in rolled (compacted) mounds for future use. The construction plant and general yard areas will be contoured to provide drainage.

3. Redress

These areas would be restored by contouring for drainage and replanting with vegetation and trees should redress be deemed necessary.

B. Excavation for Powerhouse Building Foundation, Intake Channel, and Pumping Station

1. Powerhouse Building Foundation Excavation

The powerhouse complex will be excavated below plant grade (elevation 728) as shown in Figure 4. The excavation for the reactor, auxiliary,

control, and turbine buildings will be approximately 800 by 450 feet. Excavation for the service building will be about 225 by 130 feet.

Earth overburden will be removed with large rubber-tired panscrapers. Usable material will be stored for future use, and spoil material will be wasted in preselected areas, where it will be graded to conform to the surrounding landscape, covered with topsoil, and seeded and mulched to prevent erosion. Top of rock varies from 25 to 35 feet below plant grade. The lowest points for rock excavation in the building complex are as follows:

Reactor Building (see Figures 5 and 6) - Elevation 664

Control Building (see Figures 5 and 6) - Elevation 684.5

Auxiliary Building (see Figures 5 and 6) - Elevation 659

Turbine Building (see Figures 7 and 8) - Elevation 652

The rock will be removed with panscrapers, large dozers equipped with ripper attachments, and other special equipment. Blasting will not be permitted. If the heavy equipment excessively disturbs the rock, the final 4 to 6 inches of rock will be removed manually.

Because the shale bed underlying the site and serving as the rock foundation tends to weather badly on exposure, the final rock surfaces will be covered for protection within 48 hours of exposure by a 4-inch minimum concrete fill.

Grading and excavation quantities for the plant are tabulated below:

Description	Grading and Excavation, Earth (CY)	Excavation, Rock (CY)	Backfill or Embankment (CY)
Main powerhouse complex	419,160	120,000	96,820
Switchyard	168,360	--	35,370
General yard	517,070	--	457,500
Dikes	39,580	--	66,000
Intake channel	200,000	2,500	--
Pumping station	31,000	10,000	8,000 (est.)
Construction plant	5,000	--	90,000
TOTALS	1,380,170	132,500	753,690

The general locations of areas to be graded are shown in Figures 9 and 10.

2. Intake Channel and Pumping Station Excavation

Excavation for the intake channel and pumping station for essential cooling, raw cooling, makeup, and raw water systems will be conducted with the excavation program for the powerhouse complex. Quantities are tabulated in section B.1.

A temporary dike will be left at the reservoir end of the channel to allow excavation to be conducted in the dry. The dike will not be breeched until the pumping station is completed. Construction of the pumping station will be deferred until after a construction permit is received.

3. Redress

Restoration of excavated areas would be effected by conventional backfilling methods, covering with topsoil, and planting with vegetation should redress be deemed necessary.

C. Erection of Temporary Construction Plant Facilities

The construction plant shops and service facilities will be built during the excavation program. These temporary facilities, shown in Figure 10, have been designed to provide the maximum efficiency in their construction and eventual service requirements.

1. Construction Craft Shops

The 12 construction craft shops will be Pascoe-type prefabricated metal buildings ranging in size from 40 by 100 feet to 60 by 224 feet. Some will be equipped with overhead crane rails running the full length of the buildings. All buildings will be constructed on concrete slabs and will be provided with air, water, and electrical power.

2. Administration Building and Miscellaneous Office Buildings

The administration building and miscellaneous office buildings will be one-story prefabricated metal buildings ranging in size from the 40 by 80 feet concrete lab to the 70 by 220 feet administration building complex. The buildings in this complex will be equipped with central air conditioning and heating system, potable water, sanitary systems, and electrical power. The construction vault for quality assurance documentation storage will also be located in this complex.

3. Warehouse, Storage Yards, and Buildings

The main warehouse will consist of two prefabricated metal buildings,

each 80 by 160 feet, complete with office area and sanitary facilities. A large storage yard facility will be provided in a previously cleared area near the warehouse. An additional yard storage space, about 17 acres, will be developed on the Watts Bar Steam Plant property adjacent to the proposed nuclear plant in an existing cleared area. The storage yards will be graded, contoured for drainage, and surfaced with crushed stone. Several 40- by 100-foot storage buildings, which will be used to provide protection for permanent material as it is received at the site will be constructed near the main warehouse. A subwarehouse for issuing expendable material and supplies will be located near the powerhouse.

4. Access Roads and Parking Facilities

Work on the main construction access road will involve widening about one mile of an existing hardtop road leading from State Highway 68, shown in Figure 1 as area 4, and constructing a new road about 0.4 mile long into the administration building complex as shown in Figure 10. Both of these roads will be constructed by laying a subbase of crushed stone, priming with asphalt, and finishing with chipped stone. The roads encompassing the construction plant area will be constructed of rock and gravel except for 2,000 feet of existing hard-surfaced road between the shop area and the main warehouse. This is part of approximately 8,000 feet of paved roadway on the site previously used for public roads by Rhea County. The permanent access road will be temporarily constructed to near the employee parking facilities and will be used as an alternate access to the construction area.

Temporary employee parking facilities, shown in Figure 10 and noted as area 6 in Figure 1, will require an area of about 11 acres. The parking lots will be surfaced with crushed stone, divided into parking lanes, and surrounded by security fencing.

5. Installation of Temporary Construction Power Substation and Distribution System

The construction electrical distribution system for the project originates at the Watts Bar Steam Plant. A new incoming 15-kV power line, shown in Figure 11, will be constructed to the site substation. The line, about 0.75 mile long, will require a minimum amount of clearing and affords good clearance for movement of heavy construction equipment.

All aboveground line construction will be of wood poles and horizontal-post-type insulators with no overhead ground wire.

The temporary substation transformer bank will consist of six 1,000-kVA transformers. The switching station is a galvanized steel structure with aluminum bus work. The total area required for the substation is approximately 75 feet wide by 125 feet long. The substation will be enclosed by a protective fence.

At the present time it is planned to have six primary circuits feeding out of the substation to various locations in the plant area, as shown in Figure 11. Where they may interfere with movement of equipment, primary and secondary circuits in the construction shop and administration areas will be buried underground. Telephone cable may be in the same ditch with power cable.

6. Concrete Mixing Plant Facility

The concrete mixing plant facility, having a capacity of 160 yards of concrete per hour, is shown in Figure 10. The facility will require a 100 by 600 feet area for mixing equipment and controls, aggregate storage, aggregate washing equipment and conveyor belts,

and mix-water heating and cooling equipment. Aggregates will be obtained from a commercial source off the site and stockpiled near the mixing plant. Stockpiles will be sprayed with water as required to control dust.

7. Installation of Piping and Equipment for Construction Drainage, Air, Water, and Sewage Systems

The construction potable water, air, and raw water piping systems will be placed in a common trench. These systems will provide service and fire protection to all construction facilities and to permanent plant locations for construction use.

The yard drainage system, shown in Figure 10, is designed to collect a major portion of the construction plant surface drainage in settling ponds which will be used to control reservoir siltation. The sewage system, shown in Figure 12, utilizes three 10,000-GPD treatment plants. Effluent from the sewage treatment plant will be piped to the plant drainage system settling pond.

The potable water system will be supplied by three existing wells having a total capacity of 500 gal/min. Approximately one and one half miles of 16-inch pipeline will be installed along Highway 68 from the well network for use by the Watts Bar Hydro Plant, Watts Bar Resort, and possible future use by nearby towns. A 6-inch pipe approximately one and one half miles long will supply the plant from the 16-inch main.

The raw water system will incorporate two electric pumps with a capacity of 1,000-gal/min each and a 500-gal/min diesel standby pump located at the Chickamauga Reservoir, which is the source of

supply for the raw water system. A 50,000-gallon tower reservoir is planned for the general plant area.

Compressed air will be supplied from a multiunit system using five portable screw-type compressors, each having a capacity of 1,280 ft^3/min.

8. Redress

Restoration would be effected by removing the buildings, including foundations and slabs to below grade, grading and grassing the area, and planting trees where appropriate should redress be deemed necessary.

D. Construction of Railway Spur

A spur track from the existing TVA-owned Watts Bar Steam Plant railroad track will be constructed into the plant area as shown in Figure 2. The total length of the spur will be about 1800 feet.

The spur track would be removed and the area graded and reseeded should redress be deemed necessary.

E. Construction of Holding Pond Dikes

Material excavated at the powerhouse will be used for embankments required to form holding ponds as shown in Figure 2. The material will be compacted in 6-inch layers, and dust will be controlled by sprinkling with water from tank trucks. Slopes of the dikes will be protected from erosion with riprap and grass.

Restoration would be accomplished by removing the fill material, returning it to its original location, and replanting the area should redress be deemed necessary.

F. Upgrading of Existing Dock Facility

The existing dock facility for the Watts Bar Steam Plant, indicated by an "A" in Figure 1, will be used to receive barge shipments of large components such as nuclear vessels and steam generators. The dock facility will be modified to accommodate greater surcharge loads. Only minor roadwork will be required.

G. Cooling Tower Foundation Tests

The cooling tower contractor has requested permission to perform tests at the site to determine the final design requirements for the tower foundation. Such tests would determine the rock refusal point for load carrying piles in order to set the pile limits and include load tests to determine the adequacy of design. Only a few piles would be driven under these conditions and these could be extracted and the area restored should redress be deemed necessary. No permanent tower construction would be started prior to receipt of a construction permit.

III. ENVIRONMENTAL IMPACT OF ACTIVITIES

The total environmental impact of constructing and operating the Watts Bar Nuclear Plant is considered in detail in the final environmental statement. The principal impacts resulting from the activities to be performed under the exemption request are as follows:

1. The clearing of trees and vegetation from 26.5 acres of the site
2. Limited turbidity and siltation of Chickamauga Reservoir resulting from erosion of cleared areas
3. Waste disposal

The following discussion assesses the probable impact of the activities to be performed during the exemption. All practicable measures will be taken to mitigate these impacts.

A. Impacts on Vegetation

As previously stated, clearing of the site will affect only about 26.5 acres of woodland. Of this amount it is estimated that 10 to 11 acres are covered with trees which may be classified as brush or as having no particular or unique value. The value of all presently merchantable timber will be salvaged. There will be some loss associated with terminating the growth of merchantable trees and trees which might attain merchantability if allowed to grow. These losses are not considered to constitute a significant impact on forest resources of the area because of the small amount involved. Losses associated with clearing brush and other

nonmerchantable species are not considered significant since no rare, endangered, or unique species have been identified in any of the areas to be cleared. One species found in the study area is proposed as a rare and endangered species--the spider-lily, Hymenocallis occidentalis. The species is found on the U.S. Forest Service - Southern Region list of rare and endangered species. It is also listed in several floral manuals as being rare. Several spider-lilies were found in the proposed nuclear plant site area, but none were found in the areas to be cleared or altered for construction. Thus the population should not be threatened by any direct impact of the proposed nuclear plant.

The following paragraphs generally describe on a task-oriented basis the vegetation to be cleared as identified on Figure 1.

Area 1, containing the powerhouse complex and switchyard, contains 90 acres of gently to moderately rolling pasture and woodland. Of the 6 acres of woodland requiring clearance, it is estimated that 2 acres are windbreaks and hedgerows while 4 acres consist of a medium growth stand of mostly hardwood trees containing white oak, hickory, red oak, and other minor species.

Area 2, holding ponds and dikes, contains 40 acres of young to medium-size hardwoods with scattered pines. Three acres situated in 1-acre noncontiguous parcels comprise the areas required to be cleared in this zone. Each of these areas is a low-lying depression located between hills and contain standing water following significant rainfalls. Soil conditions are accordingly poor in their present state.

Area 3, to be utilized for cooling towers, contains 10 acres, one acre of which has several small shade trees and a partial cover of brush. Topography of the land is gently to moderately rolling and the land is presently in a grass sod.

Area 4, the railroad and access road, will occupy a total of 5 acres, 2.5 of which are wooded. Of this woodland roughly one acre consists of medium to mature pine and hardwood trees located along the west side of the county road passing through the Watts Bar Dam reservation. Since a portion of the pine in this zone is mature, it can be marketed for saw and pulpwood. Hardwoods in this area are chiefly below merchantable size. The remaining 1.5 acres of timber in area 4 consist of a continuation of the clearance strip along the county road and an area of mixed pine and hardwoods lying on and adjoining the Watts Bar Dam reservation. Only a few mature hardwood trees are within this area. The remaining timber coverage consists of young to medium growth pine.

Area 5 is allocated to construction plant shops and administration buildings and contains 50 acres, 8 acres of which are hedgerows, semicleared brush, and timber land. A proper land utilization program would necessitate the clearance and seeding to grass of the zones within these 8 acres which were formerly cleared. About 3 acres contain a medium growth of hardwood and pine.

Area 6 will be utilized for parking and contains 11 acres including 4 acres of medium to mature hardwood timber consisting mainly of oak and hickory with a few pines. Topography of the area ranges from gently to moderately rolling.

In area 7 only 2 acres along the road frontage will be needed for clearance for initial construction out of this 110-acre area.

Approximately 0.25 acre of the 2 acres is thinly wooded while the remaining 1.75 acres contain a young stand of hardwood interspersed with pine. Most of this timber has been previously cut over and is now below merchantable size.

It is concluded that losses of vegetation which are caused by clearing of the site will not constitute a significant environmental impact.

B. Siltation of the Reservoir

Much consideration has been given to control of erosion and resultant reservoir siltation during construction. Following clearing and grubbing, usable topsoil will be removed and stored for future use in final landscape work. The topsoil will be stored in a manner to minimize loss due to erosion. Grading work will be accomplished according to the grading plans, which include the construction roadway system, drainage ditches, catch basins, sloping of areas to drain, and filled areas for construction shops and administrative office buildings. These grading operations are conducted to provide and maintain a controlled surface drainage system to avoid erosion and resultant silting of the Chickamauga Reservoir. Methods of erosion control used in conjunction with a master grading plan include the use of berms, diversion dikes, check dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, special drains, and other control devices such as the "diaper" technique developed by the Florida Department of Transportation.

The former owners of a large dairy farm obtained by TVA for a portion of the plant site constructed a dike in a twin fork slough which has backed up two large ponds. The construction plant drainage system has been designed to discharge into this slough area. By constructing a weir in the dike to control outflow and protect the dike and by placing a "diaper" across the ponded area several feet upstream of the dike, it appears that a natural silt pond can be developed.

Some material which is to be excavated will be stored in a rolled and sloped (mounded) fashion to avoid saturation and erosion so that it may later be used as fill. Temporary construction sumps will be constructed in the powerhouse area for the diversion and control of runoff inside the excavated area.

Gravel will be used in the construction areas to provide mudfree parking, storage, and work areas. Heavy rock bases will be laid for construction roadways to avoid rutting and erosion from the use of heavy equipment. Side ditches will be cleaned out periodically for proper drainage and side slopes protected where deemed feasible by seeding, matting, or mulching.

The estimated amount of soil displaced by erosion due to site preparation activities during the first six months is estimated to be approximately 1,000 tons. This is about one-half of one percent of the total deposition that can be expected to occur in Chickamauga Reservoir during the same period. This estimate includes the effects of direct erosion of cleared land at an erosion rate of 10 tons per acre per year. This will result in a certain amount of increased turbidity and siltation of the reservoir along the right bank side

downstream from the construction site. However, due to the relatively high velocity of Chickamauga Reservoir in this area the eroded material will be widely dispersed downstream and no significant adverse impacts on reservoir biota are anticipated.

C. Solid Waste

Trees which must be removed that have no commercial value, stumps, and brush will be disposed of by burning or mechanical chipping machines and using or disposing of chips as the need dictates. Burning will result in releasing some particulates and gases; however, these effects will be minor since they are local and generally short-lived. All burning will be performed in compliance with Federal, state, and local air quality standards.

Residue from burning and other unburnable type trash will be collected for disposal in a sanitary landfill operation on the site proper. Metal and lumber scraps and other salvable materials will be collected for periodic sale and removal from the site. Minor construction waste items may be disposed of by controlled burning or by collecting in large containers and hauling away under contract. No significant adverse environmental impacts are anticipated from the disposal of solid wastes.

D. Sanitary Wastes

Extended aeration sewage treatment facilities will be provided to treat the domestic wastes. Effluent from the plant will be chlorinated before entering the river.

In addition, chemical toilets will be used in isolated or remote areas during the construction period and the servicing contractor

will be required to dispose of raw sewage in a manner which is environmentally acceptable. Generally, sewage is collected in contractor-owned tank trucks and is hauled to a local community sewage treatment plant for disposal.

The extended aeration facility will be operated to prevent untreated effluents from entering the river. The design will be in accordance with approved sanitation standards applicable to TVA facilities and will meet with Tennessee Pollution Control Board requirements.

E. Historical and Archaeological Impacts

No sites listed in the National Register of Historic Places, or known to be under consideration for such listing, are located at or near the proposed Watts Bar Nuclear Plant.

The project has been reviewed by the Tennessee Historical Commission and other appropriate agencies, and no specific items of particular historical significance have been identified.

Two archaeological sites on the project area were known to exist and had been previously recorded by the Department of Anthropology of the University of Tennessee. Following an examination of these sites in December of 1970, it was agreed that archaeological investigations should be undertaken with the necessary funds being provided by TVA. Findings on 40Rh6 (the Leuty site) were of some importance with a lengthy occupation indicated. A date of 1,100 A.D., plus or minus 100, was established for one phase of this occupation by

radiocarbon dating, placing it in the Mississippian cultural period. Investigation of the principal portion of the site has been completed, but additional work is being done at two associated areas near the reservoir shoreline which will be affected by construction activity. This work will be completed within a few weeks and prior to the planned initiation of construction in these areas.

Investigation of 40Rh7 (the McDonald site) was considered quite significant. A charcoal sample from a Hamilton (late Woodland) mound (Mound D) on this site established a date of 705 A.D., plus or minus 120 years, and laboratory analysis of artifacts and other material recovered is continuing. While this work was in progress, the remainder of the project area was surveyed and other potential sites were identified. The crew currently completing investigation of the Leuty site will proceed to these other areas; however, they closely parallel the reservoir edge and are downstream from the construction area. Accordingly, they will not be affected.

F. Aesthetics

Clearing plans were coordinated with the TVA architectural personnel to avoid indiscriminate clearing and to provide screening of the construction area from public roads. Coordination of the construction project with architectural personnel assures that as many tree stands as possible will be left within the construction plant area for their aesthetic value where these will not create costly and dangerous obstacles to construction equipment and personnel movements. Much of the wooded area will remain undisturbed.

G. Impacts on Wildlife Habitat

Investigative programs have been conducted for upland wildlife. At least seven game species are supported by the upland wildlife habitats present in the three counties (Rhea, Meigs, McMinn) surrounding the plant site. These include white-tailed deer, gray squirrel, raccoon, wild turkey, ruffed grouse, cottontail rabbit, and bobwhite quail. However, the site activities are not considered to present a significant impact on wildlife of the area.

Alteration of ground cover due to clearing and paving and resulting habitat modification will have direct and indirect effects on numerous faunal species. The irretrievable loss of hardwood and pines and associated understory species will destroy habitats used by forest-dwelling songbirds, arboreal nesting birds and mammals, insects and birds that feed, nest, roost, seek protection and rely on the forest areas that will be cleared. The impact on these species will be severe but highly localized and is not considered to be significant in terms of fauna of the area.

H. Miscellaneous Impacts

To minimize effects of dust during construction, the use of special tank trucks equipped with sprinkler equipment will be employed.

Excavation activities during construction may temporarily affect ground water movement in the immediate vicinity of the excavations, but no public or private use of ground water is expected to be affected.

TVA plans to provide its own treated (potable) and raw water supply systems. The treated water supply will be pumped from deep wells drilled near the site. Raw water for construction needs will be pumped from Chickamauga Reservoir. Since both treated and raw water facilities will be constructed for use by TVA, there should be no significant impact on the local community water systems and no significant depletion of water resources.

A central compressor plant will be located at a sufficient distance from the primary work area to avoid excessive noise problems associated with stationary-type air compressor operation.

IV. REDRESS OF ENVIRONMENTAL IMPACT

Means of restoring the site to its original condition are addressed specifically under the description of each activity in section II.

The estimated costs of performing the activities described in section II and of restoring the site are summarized below:

Nuclear Plant Features	Cost to Install	Cost to Restore Site
Railroad	$ 185,000	$ 60,000
Highway	200,000	
Site clearing	60,000	
Site grading	880,000	375,000
Potable water	500,000	
Foundation Exc. - Earth	260,000	
- Rock	355,000	
Protect exposed rock surfaces		500,000
Manual Exc.	160,000	
Surfacing	530,000	
Temporary Construction Facilities		
Clearing	20,000	
Grading	35,000	
Roads and parking	165,000	
Telephone and radio	65,000	5,000
Surface drainage	85,000	
Sanitary sewer	360,000	25,000
Barge terminal	600,000	125,000
Administration complex	935,000	125,000
Warehouse and storage	1,050,000	200,000
Electric distribution	765,000	125,000
Air, potable and raw water	705,000	125,000
Shops	1,665,000	250,000
Railroad spurs	80,000	25,000
Misc. equipment and tools	600,000	
Concrete plant	500,000	50,000
Totals	$10,760,000	$1,990,000

The $10,760,000 assumes that all of the activities will be commenced and completed as scheduled. This maximizes the efficient uses of manpower and equipment and represents the most economical method of achieving the proposed plant construction schedule.

The estimated cost of restoring the site following the completion of the activities described in section II is $1,990,000.

Investments in the Watts Bar Nuclear Plant through June 30, 1972, total $7,969,000, including $3.6 million for design and engineering; $2.4 million for progress payments on nuclear plant equipment; $0.9 million for land acquisition; and approximately $1 million for interest and miscellaneous plant charges. It is estimated that approximately $2,800,000 of site related charges would be irrevocably lost if a construction permit were not granted. The site related charges include preliminary site investigations, environmental studies, and portions of the preliminary design.

Because of the limited scope of the activities that will be conducted under the exemption, redress of the majority of the effects of conducting the activities described in section II can be reasonably effected if necessary.

Replacement of larger specimens of vegetation such as large trees is not considered practicable. Therefore, larger vegetation which is removed during clearing operations must be considered an irreversible loss. However, due to the general abundance and the relatively small value of the species involved, these losses are not considered significant.

It is considered that the most suitable use for the site is for agricultural purposes although industrial potential exists. Therefore, redress of site preparation activities would be most suitably accomplished by restoring the land to a condition amenable to these purposes. In this regard it is judged that the commercial value of the land following this restoration would be at least as high as at present.

For example, the wooded area, shown on Figure 1 as area 5, located east of the county road traversing the acquisition area, was largely cleared by previous owners except for small areas adjoining a creek. In view of the soil capability of this zone, proper farm management would include a reclearance program with establishment of a grass sod. Similarly, land shown on Figure 1 as area 7 consists of a thinly wooded and overgrown tract, portions of which were at one time cleared and semicleared.

V. FORECLOSURE OF ALTERNATIVES

The activities that will be conducted under the exemption are limited in scope and do not involve the construction of permanent plant structures. The work to be done will not foreclose the selection of any alternatives that could result from completion of the review by the Atomic Safety and Licensing Board. Alternative types of generating capacity, alternative sites for locating the capacity addition, and alternative design concepts for major plant subsystems are described in the environmental statement.

VI. EFFECTS OF DELAY

A. Power Needs

The importance of an adequate supply of power on the TVA system is by no means limited to electric consumers in the area which TVA supplies directly. This system, which with 19.8 million kilowatts of presently installed generating capacity is the Nation's largest, is interconnected at 26 points with neighboring systems with which TVA exchanges power. The TVA system is, in effect, part of a huge power network. In a time of power emergency, operation of the TVA power system could have a definite impact on power supply conditions from the Great Lakes to the Gulf of Mexico, and from New England to Oklahoma and Texas.

The TVA power system is a winter and summer peaking system with the highest annual peak loads in the TVA service area usually occurring between November and March. Due to seasonal power exchange arrangements with other power systems, however, the loads which the TVA generating capacity must actually serve during the remainder of this decade will be greater in the summer than in the preceding winter. The following tabulation indicates TVA's power supply projection during the 1977-79 peak load seasons based on current capacity installation schedules. This projection includes the contribution of the Watts Bar Nuclear Plant and assumes commercial operation dates of May 1, 1977, and February 1, 1978, for units 1 and 2 respectively. It is based on construction starting on October 1, 1972, a 50-month construction period, and a 5-month period for fuel loading and low-power testing.

Period	Estimated Peak Demand TVA System-MW	Interchange Delivered or Received-MW	Load Served by TVA-MW	Dependable Capacity-MW	Margins Available MW	%
Winter 1976-77	26,050	-2,060	23,990	28,595	4,605	19.2
Summer 1977	22,700	+2,060	24,760	29,936	5,176	20.9
Winter 1977-78	27,400	-2,060	25,340	29,765	4,425	17.5
Summer 1978	28,830	+2,060	25,890	31,106	5,216	20.1
Winter 1978-79	28,800	-2,060	26,740	30,935	4,195	15.7

The available margins as shown in the above tabulation are expected to be extremely tight, particularly during the winter period, even if the currently projected schedules of all planned capacity additions are achieved. Any delays in operation of the Watts Bar Nuclear Plant could prevent the TVA system from meeting adequately its obligations under peak load conditions during 1977-78. The total consequences of any delay would necessarily be determined by the extent of the delay and the date on which the delay could be identified.

Should the commencement of construction be delayed by 6 months, the commercial operating dates of units 1 and 2 would be delayed a like amount, or until November 1, 1977, and August 1, 1978, respectively. Unit 1 would not be available by the summer of 1977, and the reserve margin would be reduced from 20.9 to 16.2 percent, representing a deficiency of 543 MW from the desired reserve margin. In addition, unit 2 may not be available for the summer peak of 1978. (The summer peak normally occurs in August but has occurred as early as June.) If unit 2 is not available for the 1978 summer peak, the reserve margin would be reduced from 20.1 to 15.6 percent, representing

a deficiency of 545 MW from the desired reserve margin. TVA's desired reserve margins are determined by utilization of the loss of load probability method which has been adapted to the characteristics of the TVA system. The planning criteria are to maintain a desired reserve margin within a reliability risk level of one day in 10 years and any reduction below these margins greatly increases the risk to serve firm load.

The 50-month construction period scheduled for the Watts Bar Nuclear Plant does not allow any time for contingencies. TVA normally allows 54 months to construct a nuclear plant; however, in the present case, this time was reduced to 50 months because of the similarity between the Watts Bar and Sequoyah Nuclear Plants. If 54 months are required for construction in addition to the 6-month delay in the commencement of construction (a total delay of 10 months from the present schedule), units 1 and 2 could not begin commercial operation until March 1978 and December 1978, respectively. Unit 1 would not be available to meet the peak in the winter of 1977-78 and the reserve margin for this period would be reduced from 17.5 to 12.8 percent, representing a deficiency of 1,919 MW from the desired reserve margin. In addition, unit 2 would definitely not be available for the summer of 1978 and the possible 545-MW deficiency discussed above would become a certainty.

The winter peak normally occurs in January but has occurred as early as December. If the winter peak of 1978-79 does occur in December and if unit 2 is not available for this peak, an intolerable situation

will prevail. The reserve margin for the winter 1978-79 peak period would be reduced from 15.7 to 11.3 percent, representing a deficiency of 2,337 MW from the desired reserve margin.

B. Alternative Sources

Reserve deficiencies of the magnitude that would be caused by the aforementioned delays of the Watts Bar Nuclear Plant must be replaced either by the installation of additional generating capacity on the TVA system or by the import of power from other utility systems; otherwise, the reliability of power supply to TVA's customers will be drastically reduced.

TVA's experience has shown that the period from the time the decision is made to build a fossil-fired plant to the time the plant can begin commercial operation is from 5 to 6 years. Therefore, by the time that any delay in the Watts Bar Nuclear Plant could be confirmed, it is extremely unlikely that additional fossil-fired generating capacity could be installed in time to compensate for the deficiencies that would result.

It is extremely unlikely that power of the magnitude that would be needed to make up deficiencies that would result from delays in the commercial operation of the Watts Bar Nuclear Plant would be available from other utilities when it would be needed on the TVA system.

Therefore, the only feasible means of obtaining sufficient additional generating capacity on the TVA system in the time period

that would be necessary is by the installation of an alternative type of capacity having a short lead time such as combustion turbines or a combination of combustion turbines with waste heat boilers used to generate steam for steam turbines (combined-cycle units).

C. Delay Costs

The commercial operation of the Watts Bar Nuclear Plant will be delayed if the activities described in section II are not begun by early October 1972. The cost of this delay consists of increased cost of construction, cost of replacement capacity, increased cost of production, and increased environmental impact. These increased costs will ultimately be borne by the consumer.

1. Cost of Construction

Since January 1972, all scheduling, design, procurement, and mobilization have assumed that construction activity would begin no later than October 1, 1972. If the construction starting date is delayed 6 months, plant construction costs will be increased by about $20,000,000, or approximately $3,333,000 for each month of the 6 months' delay.

2. Cost of Replacement Capacity

In the event the beginning of construction of the Watts Bar Nuclear Plant is delayed by 6 months, it would be necessary to purchase approximately 500 MW of replacement capacity. The estimated cost of this capacity is approximately $65 million. Annual fixed charges of about $6.5 million on such

an investment will be borne by consumers in the form of higher rates until the effect of these additions can be absorbed in later years by system growth. The present value of these fixed charges (assuming an 8 percent discount rate and a discount period of 3 years) would be about $17 million.

If an additional 4 months is required for construction, the winter 1977-78 capacity deficiencies dictate that 1,000 megawatts of replacement capacity be installed at an estimated cost of $130 million.

The annual fixed charges on this investment would be approximately $13 million. These costs must be borne by consumers until such capacity additions are absorbed by system growth which would involve a period of about 4 years. The present value of the annual cost of investment in combustion turbines for 4 years would be approximately $43 million.

3. Cost of Production

Fuel, operating, and maintenance expense for the Watts Bar Nuclear Plant is estimated to be from 2.1 to 2.2 mills per kWh during the 1977-78 period. Replacement energy which would be used in lieu of this nuclear energy in the event of further delays would cost from 3.5 to 10 mills per kWh, depending on its source. Studies of the effects of delays on the Watts Bar Nuclear Plant indicate that each month's delay would result in increased production expenses on the TVA system of approximately $3.5 million.

4. Environmental Impact

Each month's delay in the Watts Bar Nuclear Plant could necessitate the burning of an additional 560,000 tons of coal and 6.1 million gallons of oil in plants on the TVA or other system to replace the lost nuclear energy. This would result in increased emission to the atmosphere of particulates, sulfur dioxide, and other materials.

5. Summary of Delay Costs

6-month Delay: The total estimated monetary cost to the consumers of TVA power would be about $58 million for a 6-month delay in operation of the Watts Bar Nuclear Plant. In addition to the monetary effects, TVA would be required to burn about 3.4 million additional tons of coal and about 36 million gallons of fuel oil in its plants with attendant atmospheric emissions which would not otherwise be required.

10-month Delay: The total estimated cost to TVA power consumers from a 10-month delay in the operation of Watts Bar Nuclear Plant is estimated at about $110 million and would require that an additional 5.6 million tons of coal and 61 million gallons of fuel oil be consumed at existing fossil-fired plants.

D. Impact on Local Community

TVA coordinates with local governments all of its projects which will have an impact upon local communities. A number of discussions have been held with government officials and private interests in Rhea County and other counties which might be affected by the construction of Watts Bar Nuclear Plant.

Based upon these discussions, local officials and business interests in Rhea County had made plans for the beginning of construction activities in their community by September 1971. Later, when TVA had to change the construction schedule to reflect an October 1972 start, their plans were again changed. In the meantime, however, merchants have made substantial expenditures for inventories to serve the expected worker consumption; several housing starts have been made on subdivisions for workers; and extensive provisions made for development of mobile home parks to accommodate workers and their families. This investment by the private sector is already in excess of $100,000, which for a relatively small community is a substantial sum of money.

The public sector has also made arrangements necessitated by a fall 1972 start of construction. This is particularly true of the local school systems which have been readied for enrollment increases. These and other arrangements would be severely interrupted by any further delay.

VII. UNIQUE CONSIDERATIONS

TVA, a corporate agency of the Federal government, has prepared a detailed statement of environmental considerations for the Watts Bar Nuclear Plant. This statement is being reviewed by AEC under the terms of the TVA-AEC lead agency agreement for environmental statements on TVA nuclear plants. It is anticipated that consultations with AEC can be completed soon and the final statement filed with CEQ shortly thereafter.

The Watts Bar Nuclear Plant site is located adjacent to the Watts Bar Steam Plant which has long been dedicated to the production of electrical power. Electrical power has been produced by the Watts Bar Dam and the Watts Bar Steam Plant since February 1942. Therefore, the conduct of the activities described in section II will not alter the purpose for which this land has been, is, and will continue to be used.

VIII. CONCLUSIONS

The present schedule for constructing the Watts Bar Nuclear Plant is predicated on beginning construction in October 1972. This schedule is extremely tight and failure to begin construction in October casts serious doubts on TVA's ability to meet its load commitments in the 1977-78 period. Since it is doubtful that a construction permit will be granted before February or March 1973 at the earliest, TVA must be granted an exemption for site preparation activities if the schedule is to be maintained.

An analysis of these activities both in this document and the final environmental statement has shown that these activities can be accomplished without significant adverse environmental impact. Furthermore, redress of the activities could reasonably be effected. Conduct of the site preparation activities would involve the expenditure of some $10 million, with the possible expenditure of $2 million for redress.

If an exemption is not granted, the construction start will be delayed approximately 6 months with a commensurate delay in the operating date. This delay will result in additional costs of $58 million to TVA consumers and entail the burning of 3,360,000 tons of coal and 36.1 million gallons of oil to replace the power.

TVA recognizes that the granting of this exemption will have no bearing on the subsequent granting or denial of a construction permit for the Watts Bar Nuclear Plant and that site preparation activities performed pursuant to this exemption will be performed entirely at the risk of the Tennessee Valley Authority.

TVA has considered the economic and environmental risk associated with proceeding with the requested activities along with the environmental and economic costs associated with a 6-month delay in the start of these activities. It is concluded that the risk involved in proceeding with the requested activities before a construction permit is issued is small when compared to the economic and environmental costs associated with delaying site preparation.

Figure 1

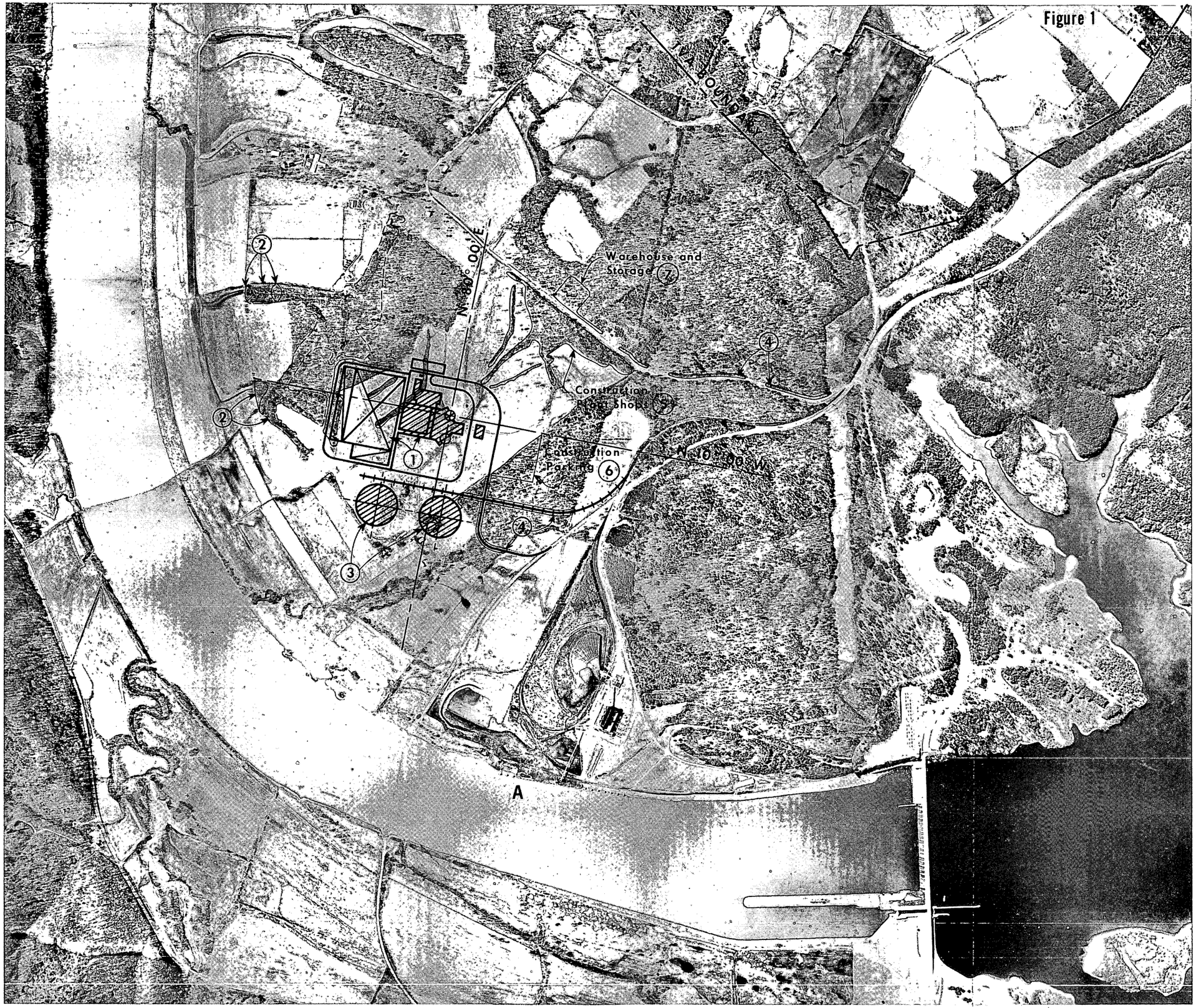
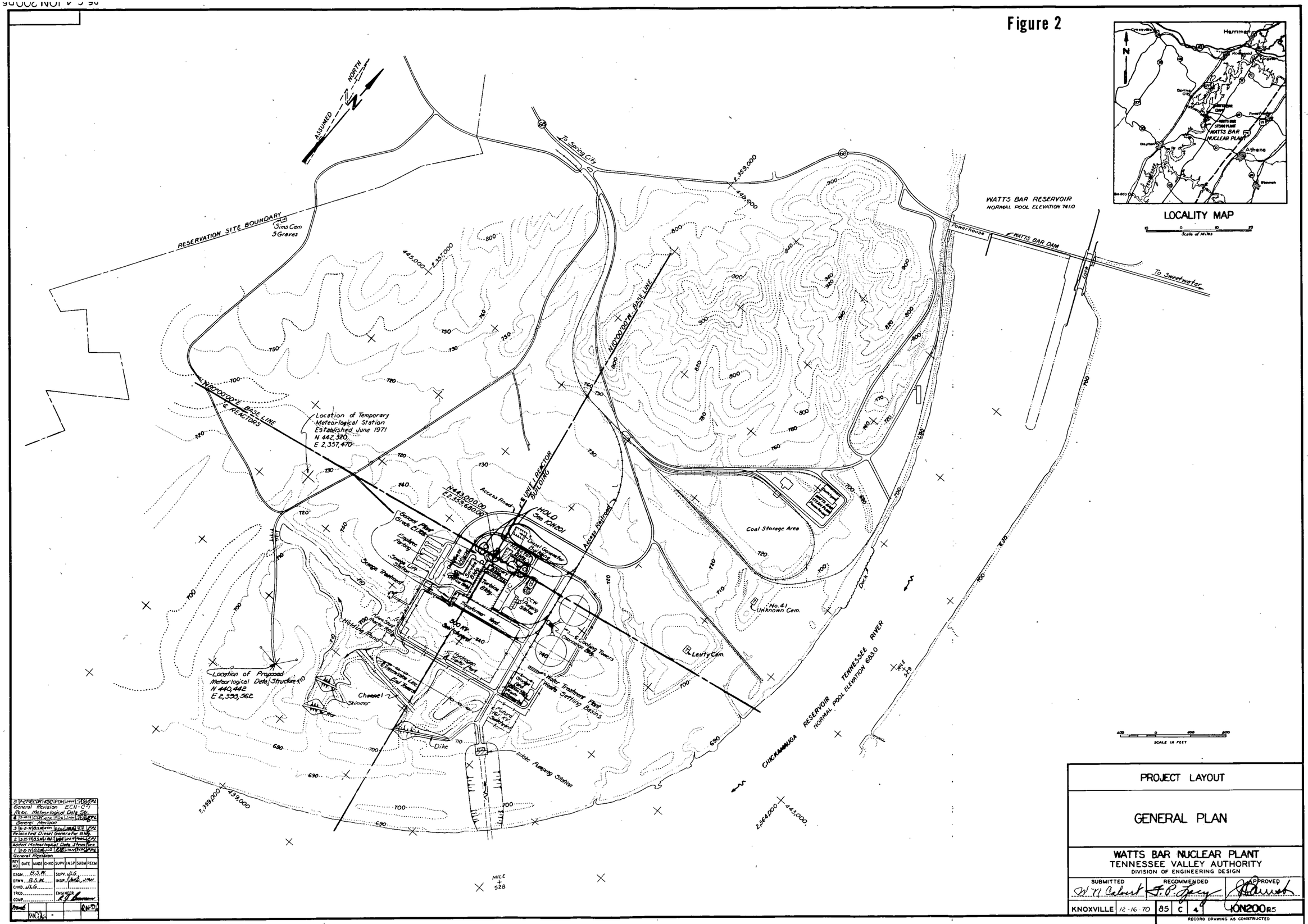

TAR POUNDS
N 80° 00' E
Warehouse and Storage 7
Construction Plant Shops 5
Construction Parking 6
N 10° 00' W
A
1
2
3
4

Figure 2



REV NO	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
5	3-26-72	CDR	ADC	PDH	LMM		
General Revision ECN-C-1							
Prop. Meteorological Data Str.							
4	3-17-71	CDR	ADC	PDH	LMM		
General Revision							
3	6-2-71	BSM	PDH	LMM	WG		
Relocated Diesel Generator Bldg.							
2	3-25-71	BSM	RJ	LMM	LMM		
Added Meteorological Data Structure							
1	3-5-71	BSM	WG	LMM	LMM		
General Revision							

DSGN. B.S.M. SUPV. W.G.
DRWN. B.S.M. INSP. L.M.M.
CHKD. W.G.
TRCD. ENGINEER
COMP.

PROJECT LAYOUT

GENERAL PLAN

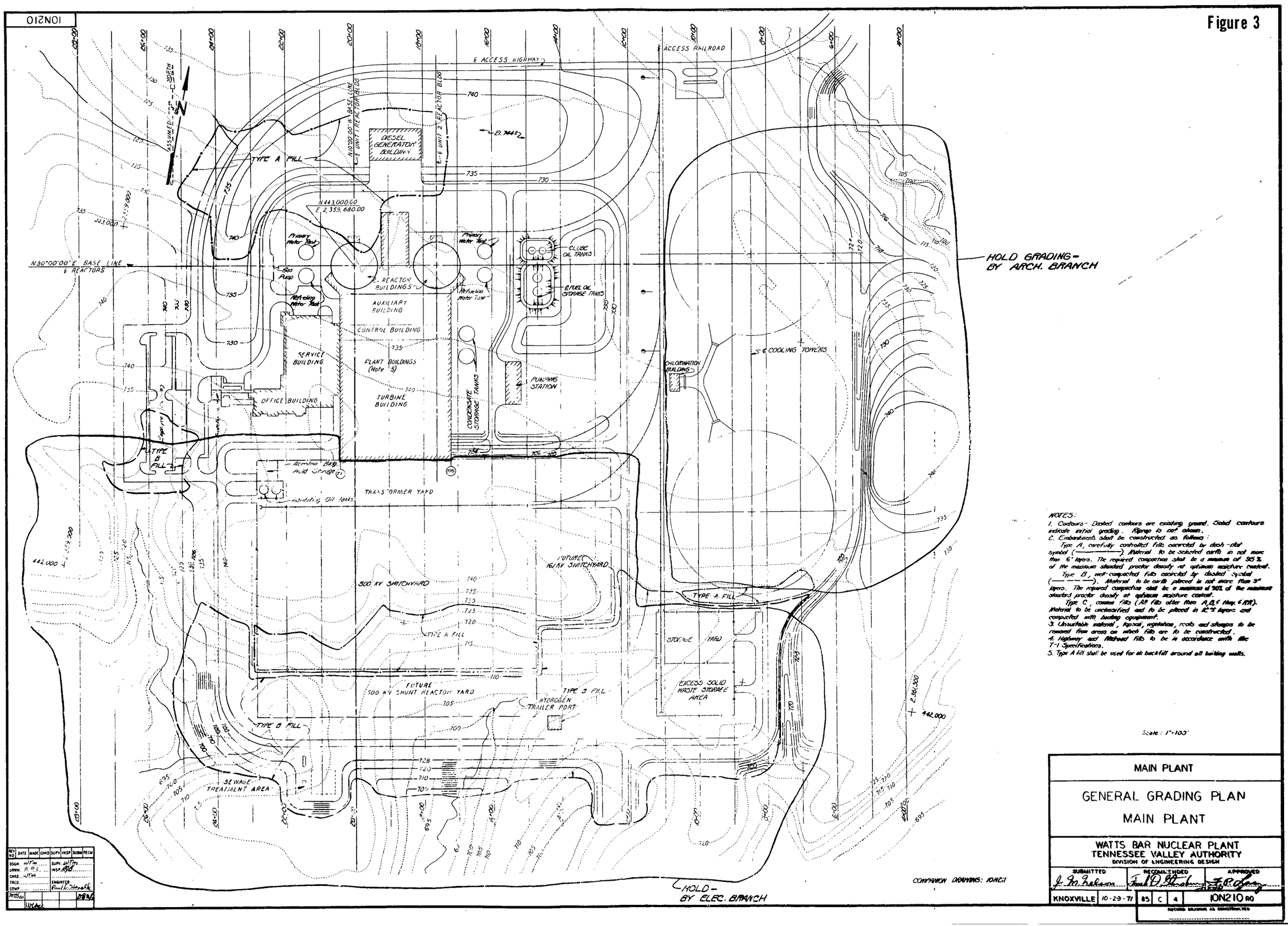
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
W. N. Cabert	F. P. Gary	[illegible]

KNOXVILLE 12-16-70 85 C 4 10N200RS

RECORD DRAWING AS CONSTRUCTED

Figure 3



NOTES:

1. Contours - Dashed contours are existing ground. Solid contours indicate initial grading. Riprap is not shown.
2. Embankments shall be constructed as follows:

   Type A, carefully controlled fills excavated by dash-dot symbol (————). Material to be selected earth in not more than 6" layers. The required compaction shall be a minimum of 95% of the maximum standard proctor density at optimum moisture content.

   Type B, well compacted fills excavated by dashed symbol (— — — —). Material to be earth placed in not more than 9" layers. The required compaction shall be a minimum of 90% of the maximum standard proctor density at optimum moisture content.

   Type C, common fills (All fills other than A, B, & F Hyp. 6 PM). Material to be unclassified and to be placed in 12" ± layers and compacted with hauling equipment.
3. Unsuitable material, topsoil, vegetation, roots and stumps to be removed from areas on which fills are to be constructed.
4. Highway and flathead fills to be in accordance with the T-1 Specifications.
5. Type A fill shall be used for all backfill around all building walls.

Scale: 1"=100'

REV NO	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN. WJTm				SUPV. WJTm			
DRWN. G.P.L.				INSP. RJd			
CHKD. WJTm							
TRCD.				ENGINEER Frank D. Stephens			
COMP.							
PATSW						DBM	
	WJTm						

MAIN PLANT

GENERAL GRADING PLAN

MAIN PLANT

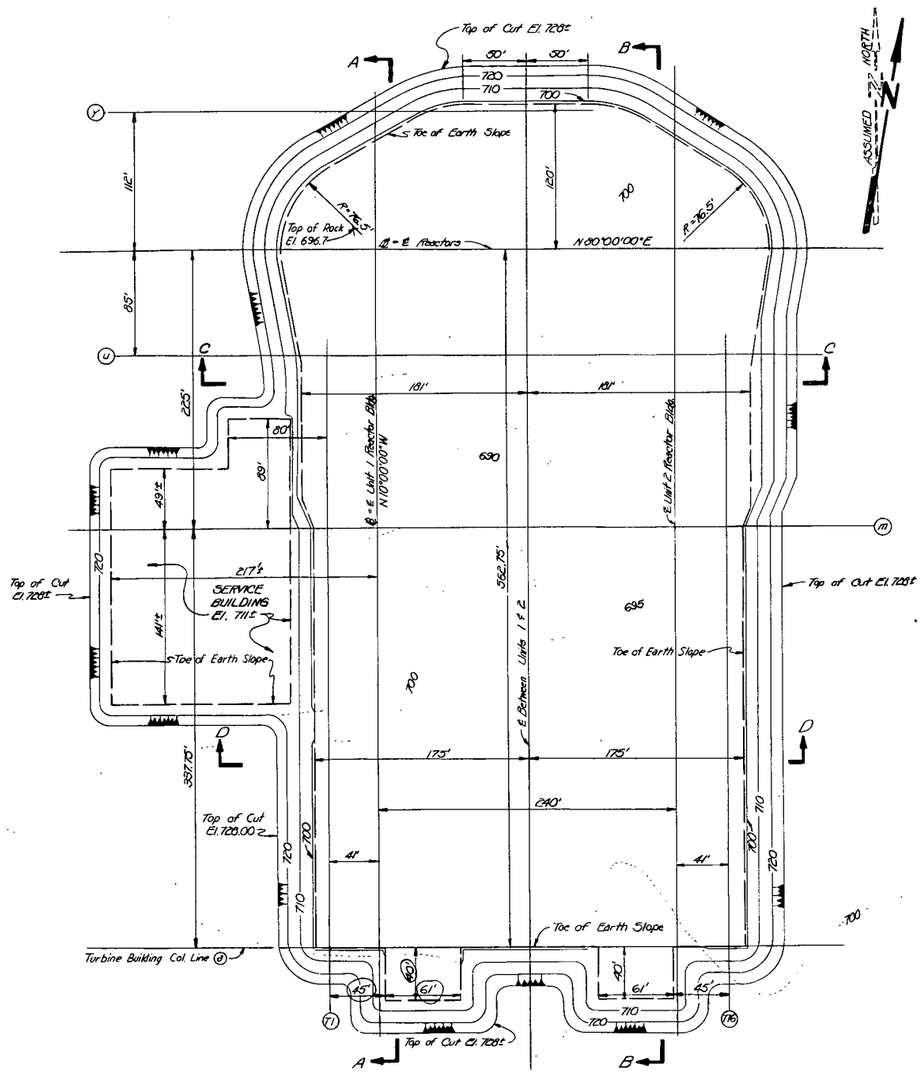
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
J. M. Jackson	Frank D. Stephens	F. P. Gray

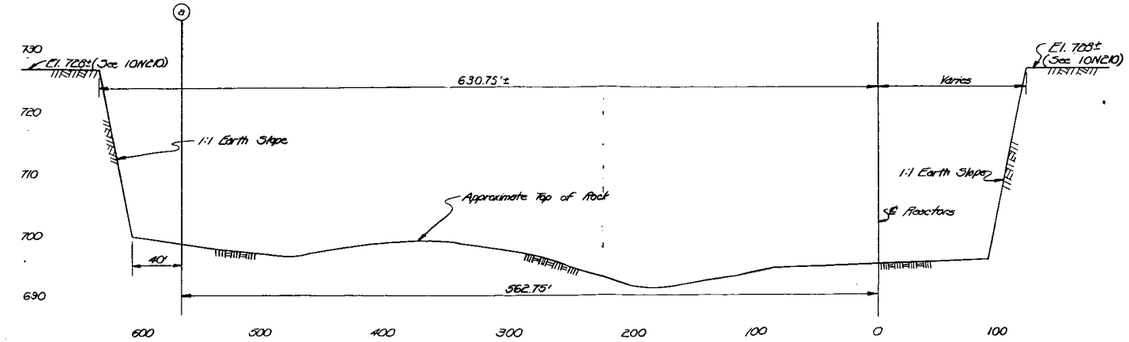
KNOXVILLE	10-29-71	85	C	4	10N210 R0

RECORD DRAWING AS CONSTRUCTED

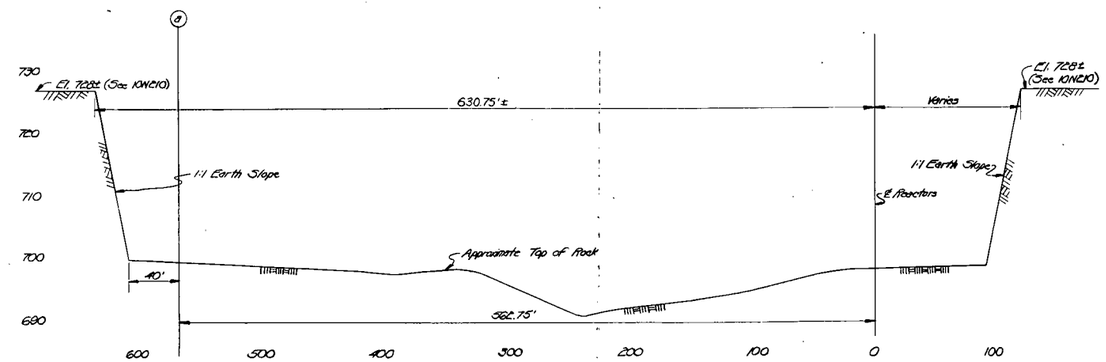
Figure 4



PLAN
Scale 1" = 50'

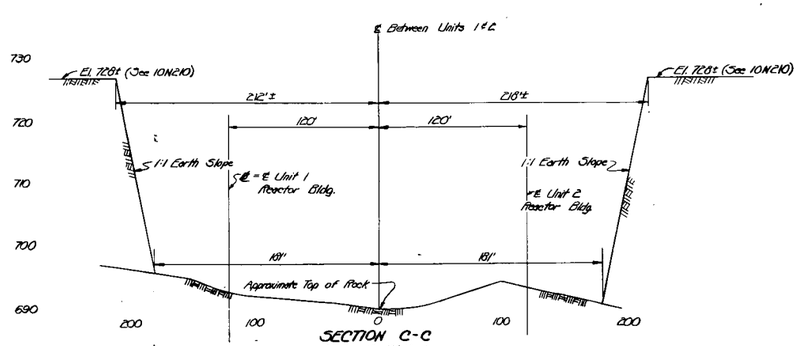


SECTION A-A
Scale 1" = 10' Vert.
1" = 50' Horiz.

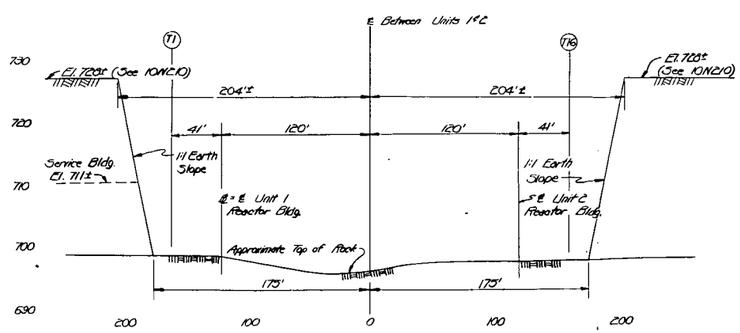


SECTION B-B
Scale 1" = 10' Vert.
1" = 50' Horiz.

NOTES:
1. Dashed contours indicate approximate top of rock.
2. Solid contours indicate proposed excavation.



SECTION C-C
Scale 1" = 10' Vert.
1" = 50' Horiz.



SECTION D-D
Scale 1" = 10' Vert.
1" = 50' Horiz.

COMPANION DRAWINGS : 10N205, 210

Scale as shown

REV NO.	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
1	12-26-71	CDR	G-M	DCJ	RDW	V-M	V-M

Revised Floor Limits ECN C.C.

DSGN. W.T.M. SUPV. W.T.M.
DRWN. C.D.R. INSP. R.D.W.
CHKD. G.H.K.
TRCD. ENGINEER Paul Hinchcliff
COMP.

PLANT AREA

BUILDING EXCAVATION FROM EL. 728± TO TOP OF ROCK

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

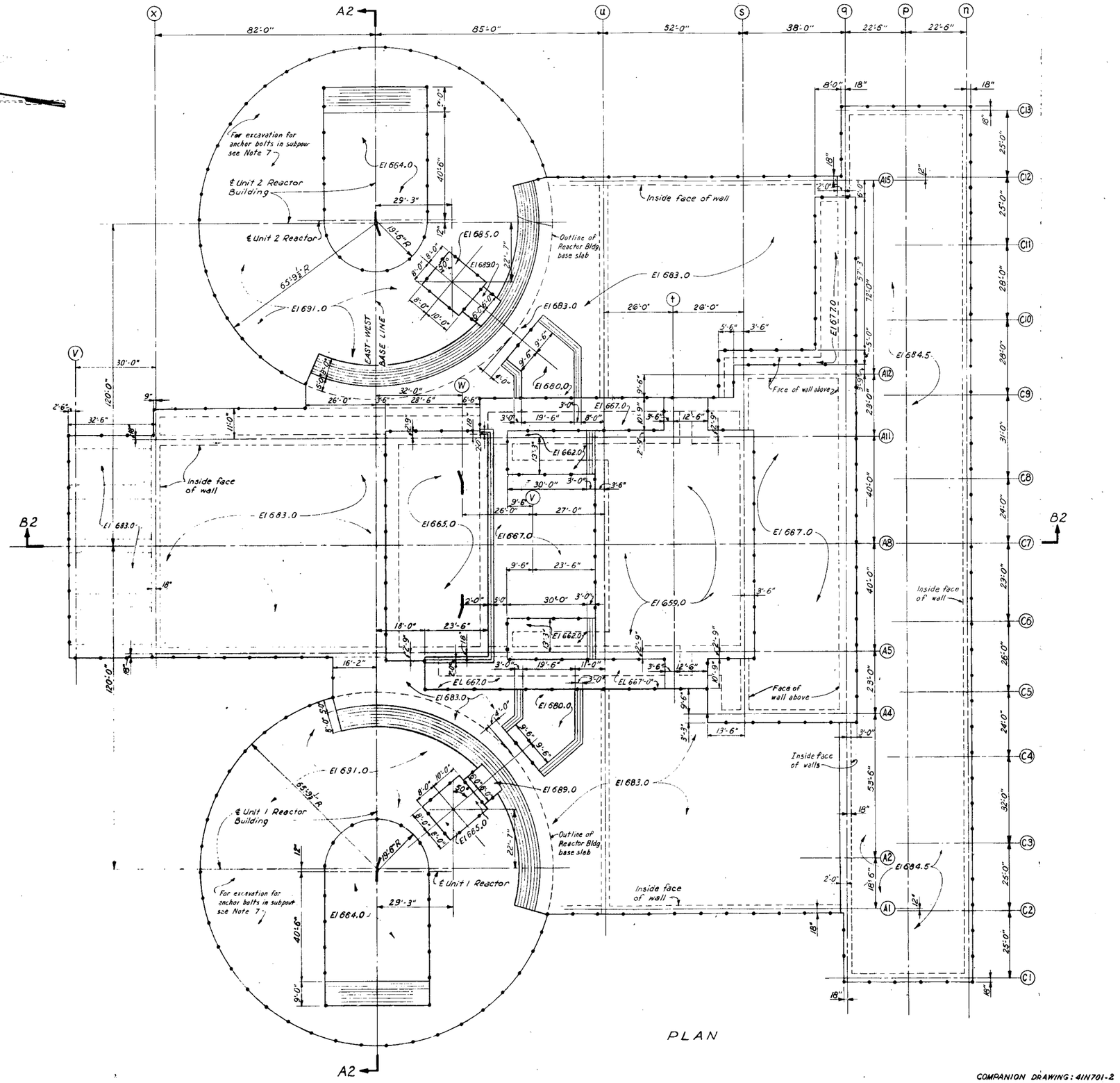
SUBMITTED	RECOMMENDED	APPROVED
J. M. Nelson	Fred D. Hornsby	F. P. Gray

KNOXVILLE | 10-29-71 | 85 | C | 4 | 10N211R1

RECORD DRAWING AS CONSTRUCTED

41N701-1

Figure 5



PLAN

NOTES:

1. The elevations shown in Plan are bottom of structural concrete and top of concrete subpour.
2. Excavate rock in a saw tooth manner to final grade, a minimum of 4 inches below the elevations shown. Excavation shall be kept to a minimum. Place a concrete subpour to elevations shown. For recommended sequence of excavation and method of protection of the rock, see Detail A2. Concrete for subpour shall be class 201.5 BFW in accordance with Construction Specification G2.
3. Where excavation exposes unusual or unexpected rock conditions notify the Division of Engineering Design. Inspections by representatives of the Division of Engineering Design shall be made as the rock foundation is exposed and prior to placing of subpours.
4. It is anticipated that excavations of this rock (interbedded layers of shale and limestone) can be accomplished with power equipment and blasting will not be permitted without prior approval of the Division of Engineering Design.
5. Surfaces of rock covered by the concrete subpour shall be cleaned of all loose and scaly material by use of all or combinations of the following: hand shovels, stiff brooms, and jets of water.
6. For general excavation, see 10N211.
7. Excavate rock to clear anchor bolts in subpour of Reactor Building. For location see 48N401 and for details see 48N402 Detail E.

SYMBOL:

Excavate as near vertical as possible.

Scale 1/16" = 1'-0"

COMPANION DRAWING: 41N701-2

REV NO.	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN. CAI				BUPV CAI			
DRWN. MSC				INSP.			
CHKD. CAI							
TRCD.				ENGINEER			
COMP.							
		MSC					

REACTOR, AUXILIARY & CONTROL BUILDINGS

STRUCTURAL EXCAVATION

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

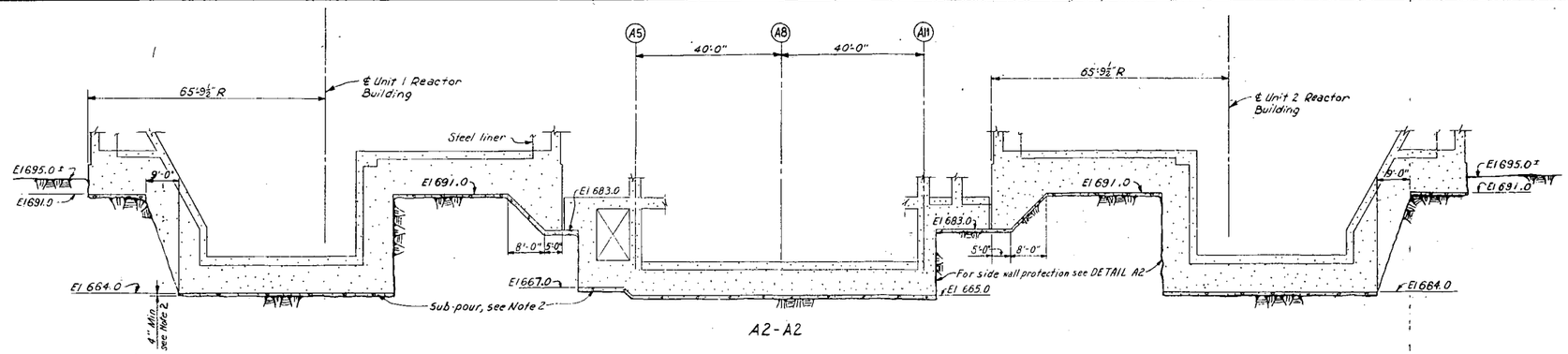
SUBMITTED	RECOMMENDED	APPROVED
J. W. McReynolds	J. W. Smith	F. P. Gary

KNOXVILLE | 1-18-72 | 83 | C | 4 | 41N701-1 RO

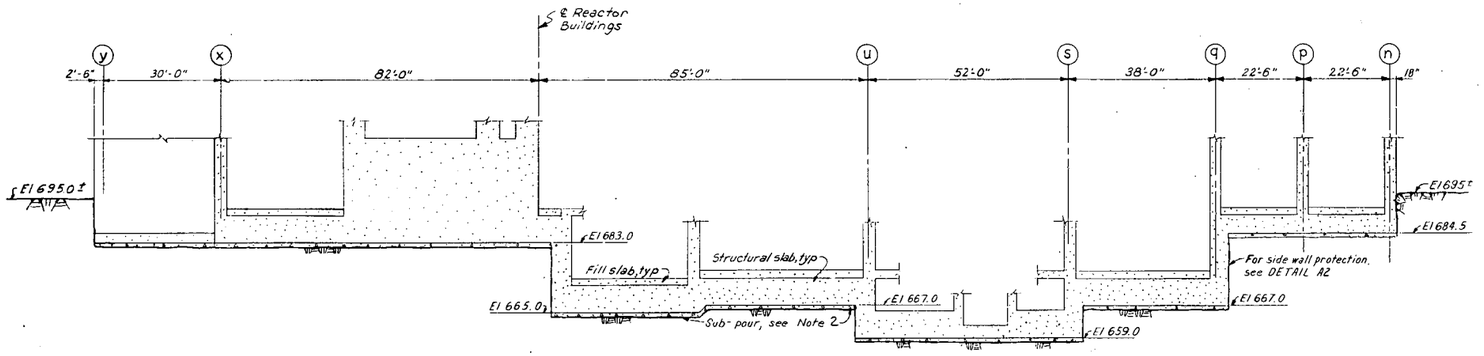
RECORD DRAWING AS CONSTRUCTED

4IN701-2

Figure 6



A2-A2

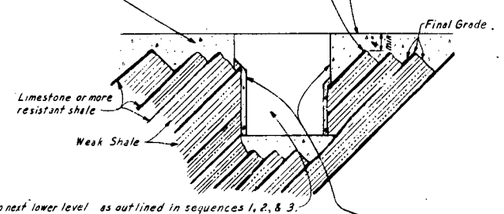


B2-B2

Sequence 1. Excavate rock to elevations shown in plan using heavy equipment. However, if this disturbs rock below the final grade, discontinue excavating with heavy equipment and proceed with sequence number 2.

2. Excavate rock to final grade high points using light equipment and without delay complete excavation, in a saw-tooth manner, and final cleanup by hand. See Note 5 of General Notes.

3. Once final grade is reached in local area concrete subpour shall be placed within 48 hours



4. Excavate to next lower level as outlined in sequences 1, 2, & 3.

5. Protect sidewalls with shotcrete as req'd, 4" minimum thickness recommended. Inside face of shotcrete should not fall within the neat lines shown for excavation in PLAN. Where it is anticipated that shotcrete will be required, allowance for it should be made in the initial excavation

DETAIL A2
NTS

NOTE:
1. For general notes & symbols, see 4IN701-1.

Scale 1/16" = 1'-0"

COMPANION DRAWING: 4IN701-1

REV NO.	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM

DSGN. CWJ
DRWN. KSC
CHKD. CWJ
TRCD.
COMP.
SUPV. CWJ
INSP.
ENGINEER B. W. Whittier

WSC

REACTOR, AUXILIARY, & CONTROL BUILDINGS

STRUCTURAL EXCAVATION

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

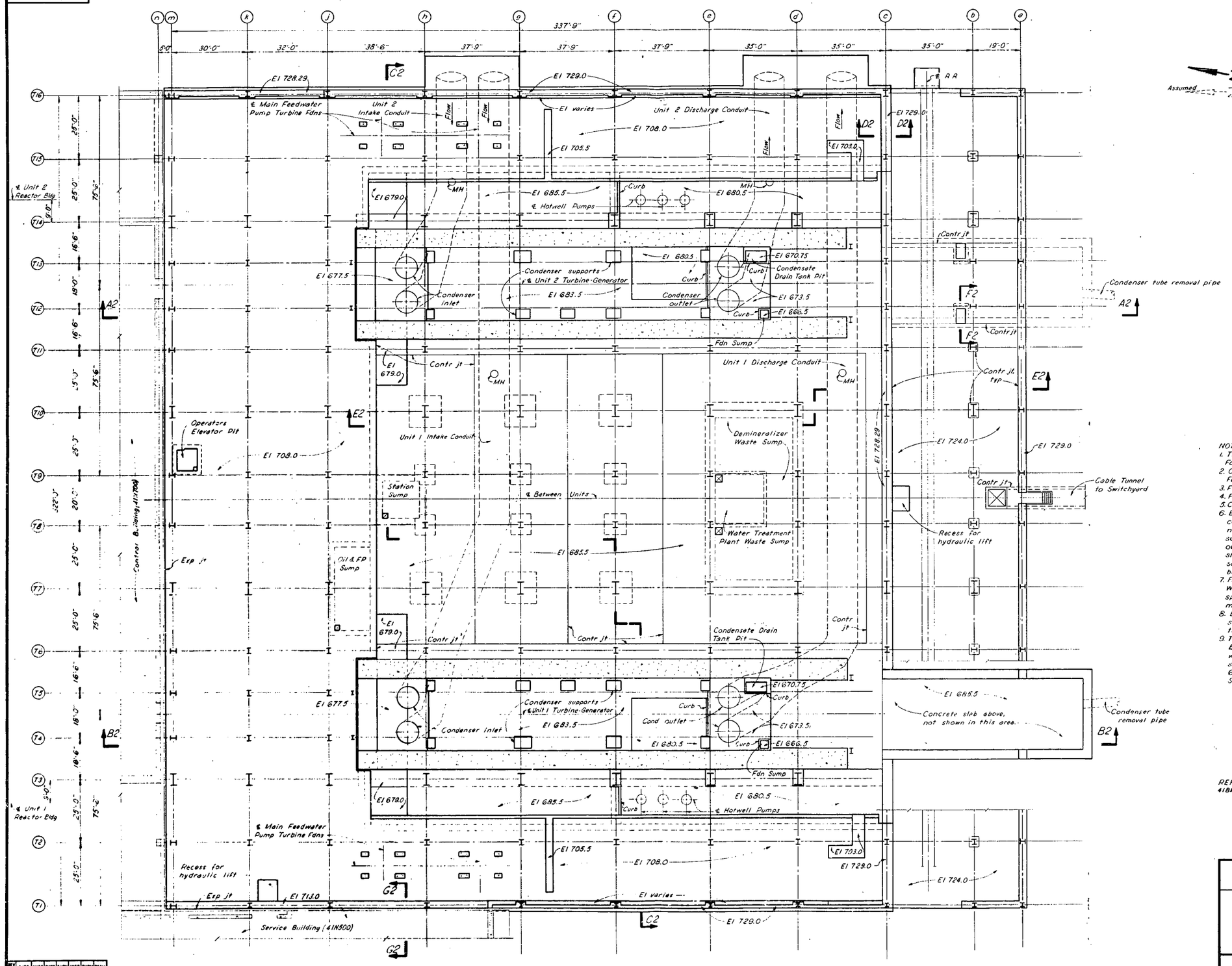
SUBMITTED	RECOMMENDED	APPROVED
J. W. McReynolds		

KNOXVILLE	1-18-72	85	C	4	4IN701-2 R0

RECORD DRAWING AS CONSTRUCTED

41N200-1

Figure 7



PLAN

COMPANION DRAWING: 41N200-2

NOTES:

1. These drawings are for general information only. For details see outline drawings.
2. Construction Specification G-2 applies unless otherwise noted. For class of concrete required, see outline drawings.
3. For construction joints see outline drawings.
4. For water seal details see standard drawing 208526.
5. Chamfer all exposed edges ¾" unless otherwise noted.
6. Exposure of final rock grade to weather in advance of concrete and/or drainage blanket construction shall be for not more than 2 days. Load bearing surfaces and vertical surfaces against which concrete will be placed shall be overexcavated 4" min and protected by concrete or shotcrete. Drainage areas shall be protected with the same material which is to be used for the drainage blanket.
7. For details of drainage blanket and underdrain see 41N222-1. Where overexcavation occurs in these areas the resulting space shall be filled and compacted with the same material used for the drainage blanket.
8. Do not place wall blocks separated by vertical joints sooner than 4 days after the removal of forms from the adjacent section.
9. The backfill, against C-line wall, supporting the slab at El 724 shall be well compacted crushed stone in accordance with Sect 1032 of T-1 Specification. Backfill against other substructure walls shall be clay fill placed in not more than 6" layers and compacted to 95 percent of the maximum Standard Proctor density at optimum moisture content.

REFERENCE DRAWING:
41BM200... BILL OF MATERIAL.

Scale: ½" = 1'-0"

REV NO	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN. J.T.D.				SUPV. H.G.			
DRWN. J.T.D.				INSP. R.J. Nash			
CHKD. H.G.							
TRCD.				ENGINEER			
COMP.							
APPR.							
U.M.A.							

POWERHOUSE SUBSTRUCTURE
TURBINE BUILDING - UNITS 1 & 2

CONCRETE
GENERAL OUTLINE FEATURES

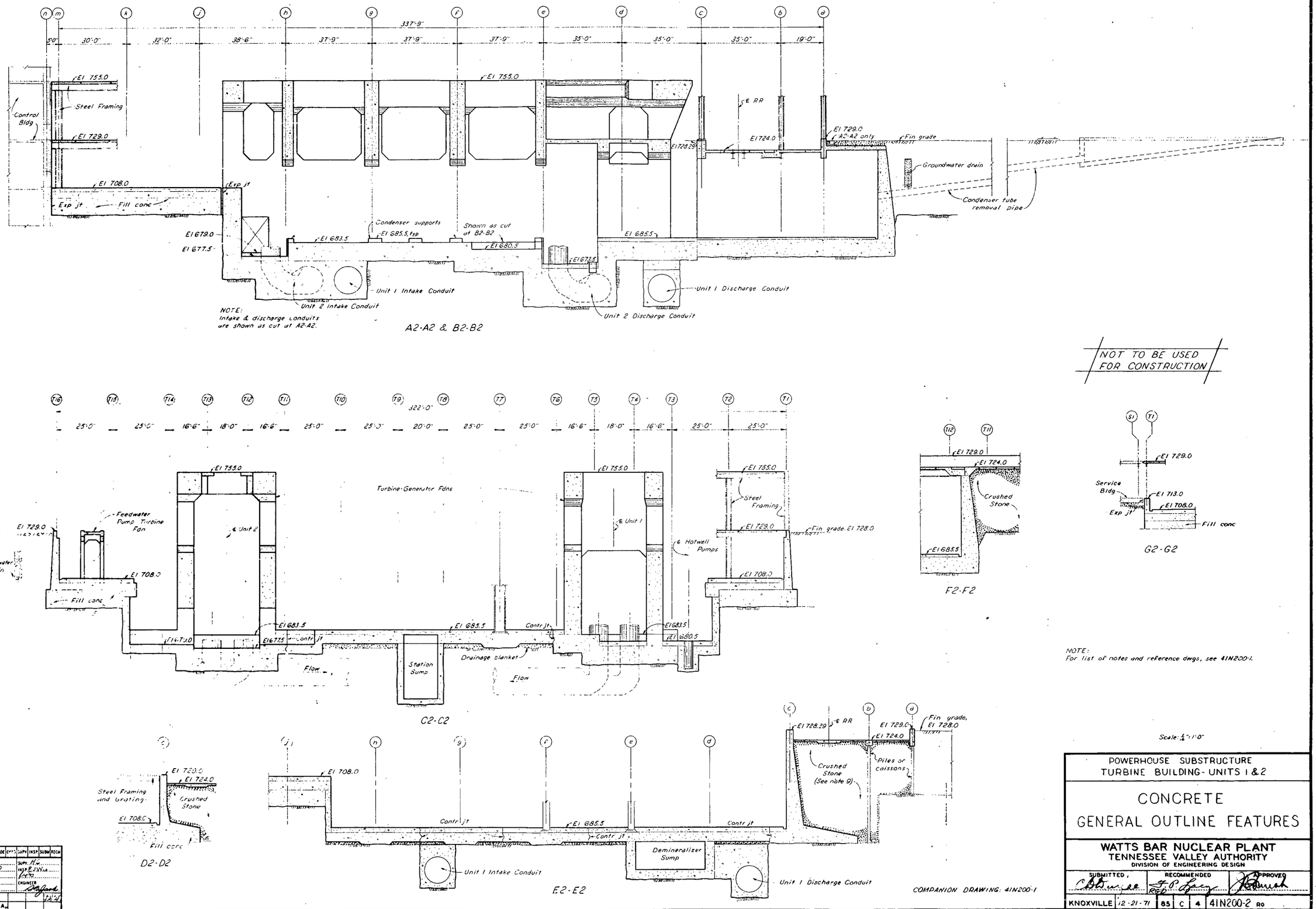
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED

KNOXVILLE | 12-21-71 | 85 | C | 4 | 41N200-1 R0

RECORD DRAWING AS CONSTRUCTED

Figure 8



REV NO	DATE	MADE	CHK'D	SUPV	INSP	SUBM	RECM

DSGN
DRWN J.T.D.
CHKD K.C.
TRCD
COMP
SUPV H.W.
INSP
ENGINEER

POWERHOUSE SUBSTRUCTURE
TURBINE BUILDING - UNITS 1 & 2

CONCRETE
GENERAL OUTLINE FEATURES

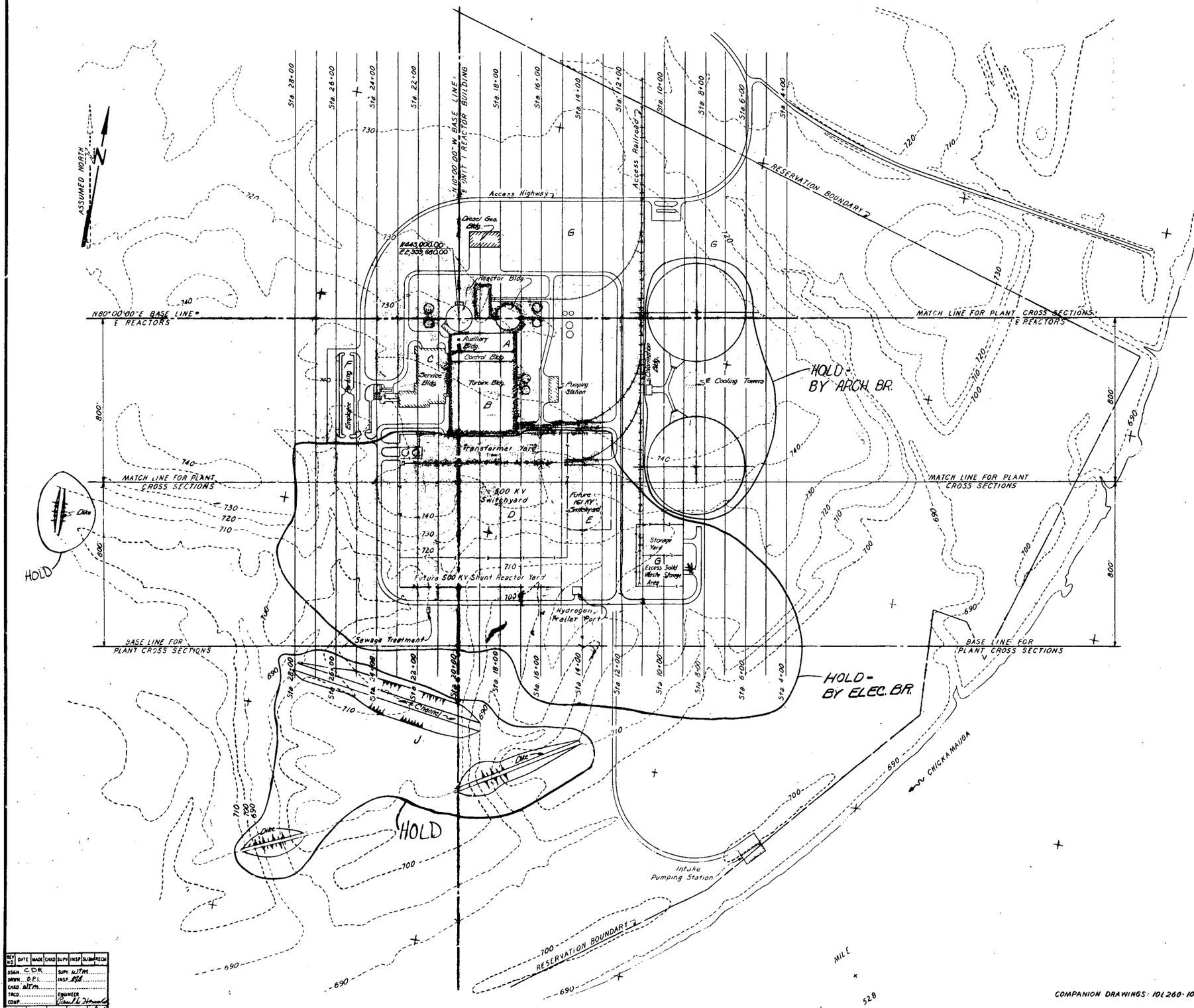
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED, RECOMMENDED APPROVED

KNOXVILLE 12-21-71 85 C 4 41N200-2 R0
RECORD DRAWING AS CONSTRUCTED

10N205

Figure 9



SUMMARY OF QUANTITIES (Cu. Yds.)							
DESCRIPTION		EXCAVATION		EMBANKMENT		* BACKFILL	
ITEM	AREA	EARTH	ROCK	EARTH	RIPRAP	EARTH	ROCK
Auxiliary, Reactor & Control Bldgs.	A	14,810					
Turbine Bldg.	B	43,040					
Service & Office Bldgs.	C	23,050					
Transformer & Switchyards	D	140,850		35,110			
161 KV Switchyard	E	27,510		240			
Parking Areas	F			1,650			
Storage Yards	G	1817,070		155,550			
Intake Channel	H						
Dikes & Holding Pond	J	39,580		16,600			
Auxiliary, Reactor & Control Bldgs. Below El. 728.0	A'	155,720				48,960	
Turbine Bldg. Below El. 728.0	B'	153,630				46,340	
Service & Office Bldg. Below El. 708.0	C'	21,010				7,120	
TOTALS		1414,190		208,690		102,420	

* Backfill to be "Type A" See Note 2 DWG 250

HOLD

HOLD

NOTES:
1. For General Notes see 10N210.

Scale: 1" = 200'

COMPANION DRAWINGS: 10L260-10L283.

REV NO	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN. C.D.R.				SUPV. W.T.M.			
DRWN. B.P.L.				INSP. R.D.C.			
CHKD. W.T.M.							
TRCD.				ENGINEER			
COMP.							
PROFILE							

MAIN PLANT

GRADING QUANTITIES.

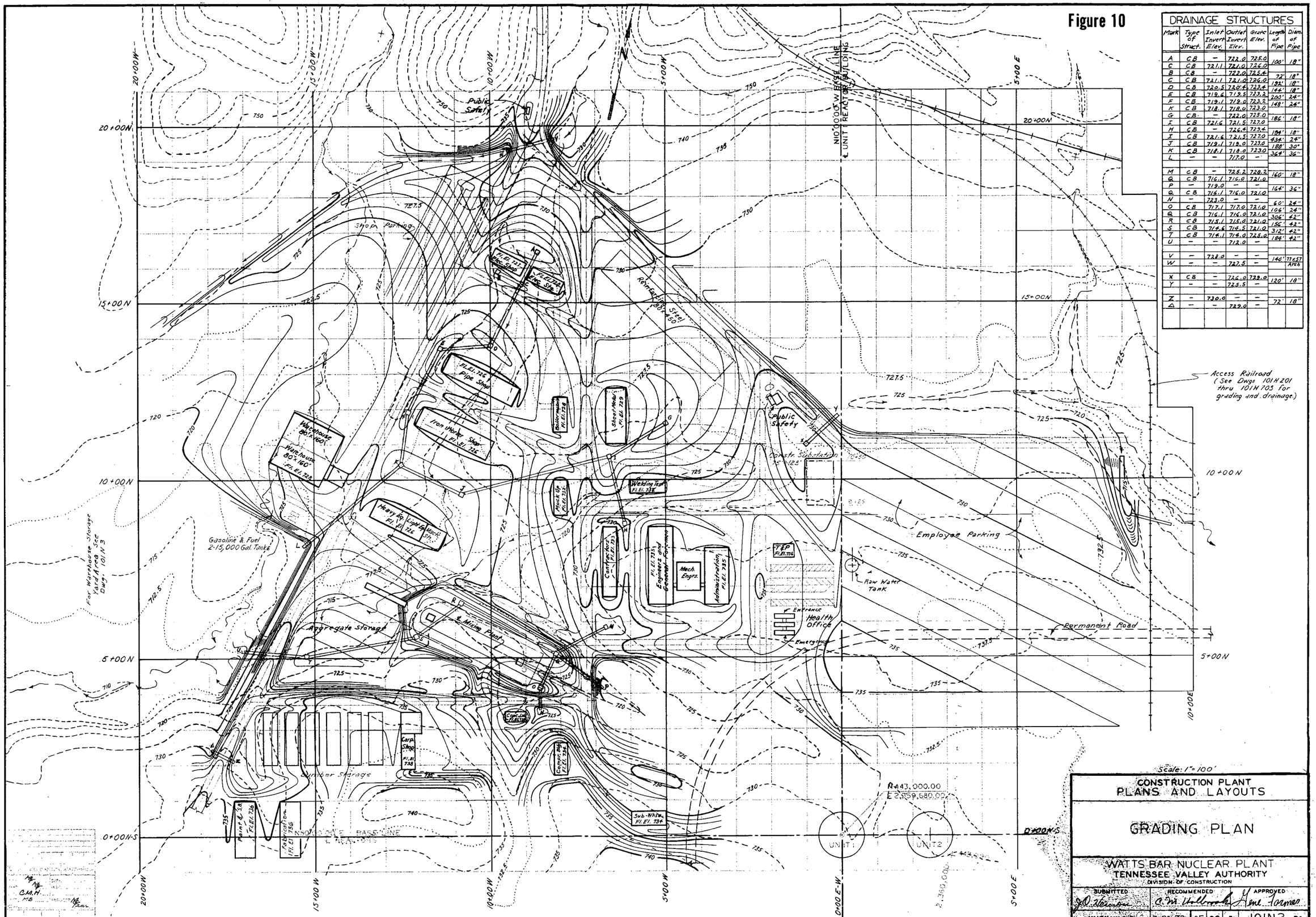
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF ENGINEERING DESIGN

SUBMITTED	RECOMMENDED	APPROVED
J. M. Nelson		

KNOXVILLE	10-29-71	85	C	4	10N205 R0

RECORD DRAWING AS CONSTRUCTED

Figure 10



DRAINAGE STRUCTURES						
Mark	Type of Struct.	Inlet Invert Elev.	Outlet Invert Elev.	Grade Elev.	Length of Pipe	Diam. of Pipe
A	CB	–	722.0	725.0	100'	18"
C	CB	721.1	721.0	726.0		
B	CB	–	722.0	725.4	72'	18"
C	CB	721.1	721.0	726.0		
D	CB	720.5	720.4	723.4	192'	18"
E	CB	719.6	719.5	723.2	146'	18"
F	CB	719.1	719.0	723.2	200'	24"
K	CB	718.1	718.0	723.0	148'	24"
G	CB	–	722.0	725.0		
I	CB	721.6	721.5	727.0	186'	18"
H	CB	–	726.4	729.4		
I	CB	721.6	721.5	727.0	194'	18"
J	CB	719.1	719.0	723.0	434'	24"
K	CB	718.1	718.0	723.0	188'	30"
L	–	–	717.0	–	364'	36"
M	CB	–	725.2	728.2	160'	18"
Q	CB	716.1	716.0	721.0		
P	–	719.0	–	–	164'	36"
Q	CB	716.1	716.0	721.0		
N	–	723.0	–	–		
O	CB	717.1	717.0	721.0	60'	24"
Q	CB	716.1	716.0	721.0	106'	24"
R	CB	715.1	715.0	721.0	306'	42"
S	CB	714.6	714.5	721.0	156'	42"
T	CB	714.1	714.0	725.0	312'	42"
U	–	–	712.0	–	184'	42"
V	–	728.0	–	–		
W	–	–	727.5	–	140'	77x57 Arch
X	CB	–	726.0	729.0		
Y	–	–	723.5	–	120'	18"
Z	–	730.0	–	–		
Δ	–	–	729.0	–	72'	18"

Scale: 1" = 100'

CONSTRUCTION PLANT
PLANS AND LAYOUTS

GRADING PLAN

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF CONSTRUCTION

SUBMITTED	RECOMMENDED	APPROVED		
J.O. Nerren	C.M. Holbrook	Hene Farmer		
KNOXVILLE	7-26-72	85 CS 3	101N2	RO

RECORD DRAWING AS CONSTRUCTED

MC 21471

Figure 11

LEGEND

- Transformer bank, size and type as indicated
- Overhead 4160V, 4-wire primary conductors
- Underground 4160V primary conductors
- Underground secondary conductors— 120, 240, or 480 V. as indicated
- 4160Y — Indicated voltage connected wye
- 480Δ — Indicated voltage connected delta
- 60' — Creosoted wood pole, length as indicated
- 60' — Two-pole structure, 60' tall
- Pole guy and anchor-log expanding rock or expanding earth as required. Number of arrowheads denotes number of guys.

CIRCUIT ROUTING

Circ. no. 1 —— Welding Test, Shop Buildings, & Public Safety Bldg.

Circ. no. 2 —— Administration Complex, Contractors' Bldg., Lower Shop Bldgs., Air Comp. Plant, Warehouse Area, Mixing Pl. Area

Circ. no. 3 —— Powerhouse—Reactor Area, Health Offices, Time & Personnel

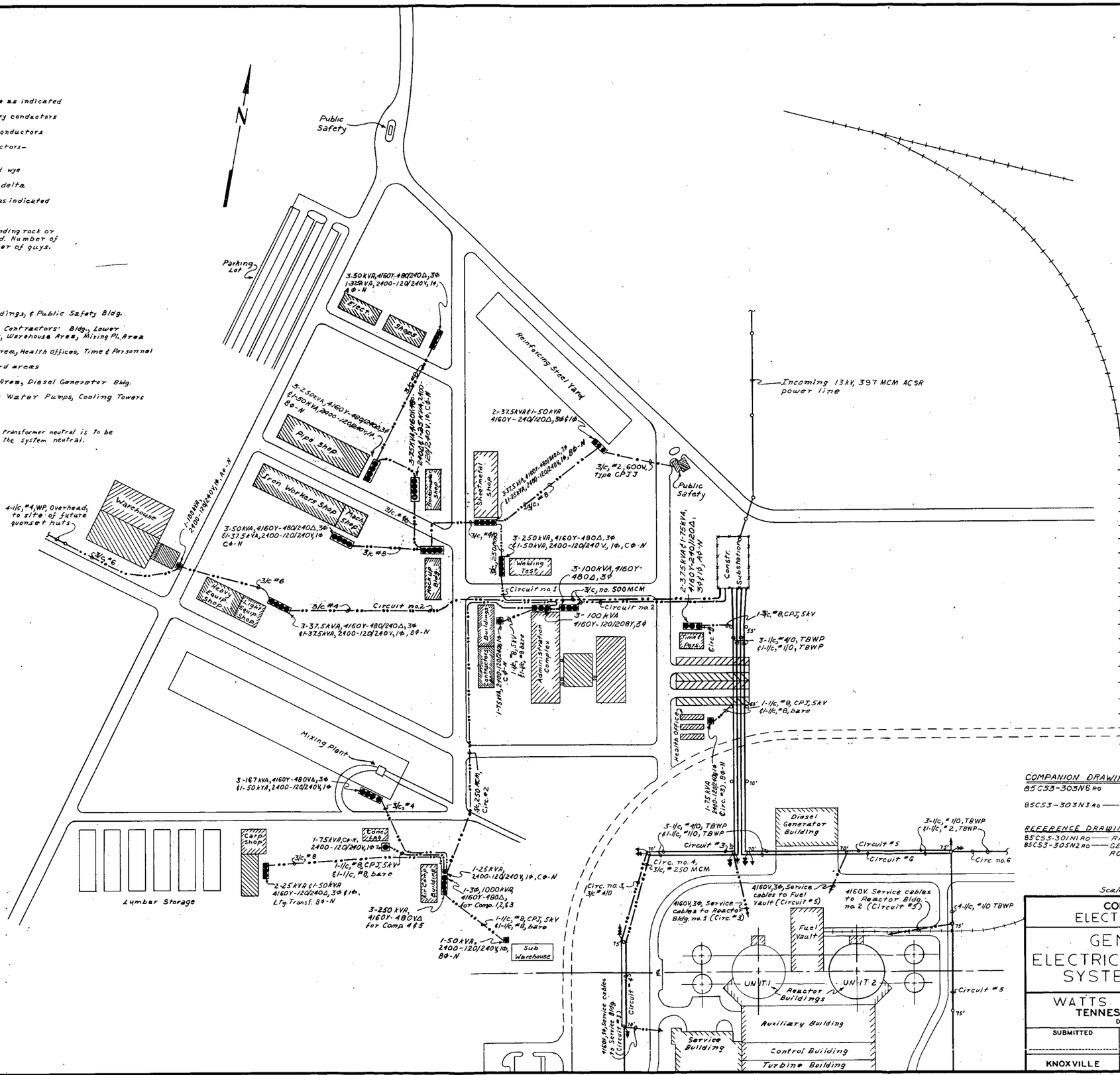
Circ. no. 4 —— Powerhouse & Switchyard areas

Circ. no. 5 —— Powerhouse—Reactor Area, Diesel Generator Bldg.

Circ. no. 6 —— Switchyard Area, Raw Water Pumps, Cooling Towers

NOTES

1. On all Y-Δ connected transformer banks, the transformer neutral is to be effectively insulated from ground and from the system neutral.



COMPANION DRAWINGS:

85CS3-303N6 R0 —— ELECTRICAL DISTRIBUTION SYSTEM WIRING DETAILS

85CS3-303N3 R0 —— GENERAL PLAN, ELECTRICAL DISTRIBUTION SYSTEM-SHEET 1

REFERENCE DRAWINGS:

85CS3-301N1 R0 —— RAW WATER DISTRIBUTION SYSTEM

85CS3-305N2 R0 —— GENERAL PLAN, TELEPHONE CABLE ROUTING

Scale: 1" = 100'

REV NO	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN.				SUPV.			
DRWN.				INSP.			
CHKD.							
TRCD.				ENGINEER			
COMP.							

CONSTRUCTION PLANT
ELECTRIC POWER LINES

GENERAL PLAN
ELECTRICAL DISTRIBUTION SYSTEM—SHEET 2

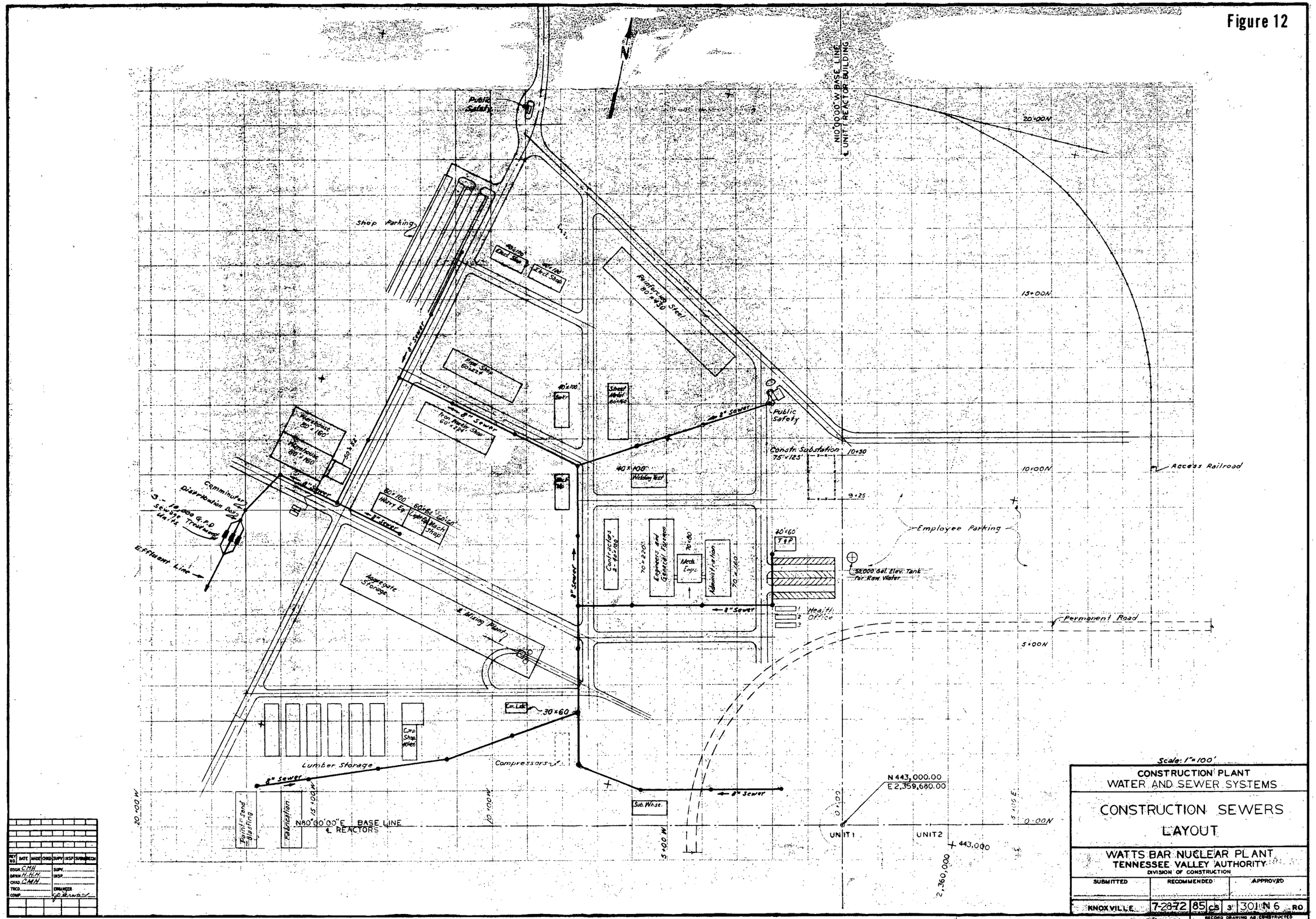
WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF CONSTRUCTION

SUBMITTED	RECOMMENDED	APPROVED
KNOXVILLE	9-16-71	85 CS 3 303N4 R0

RECORD DRAWING AS CONSTRUCTED

MC 21476

Figure 12



REV. NO.	DATE	MADE	CHKD	SUPV	INSP	SUBM	RECM
DSGN. C.M.H.				SUPV.			
DRWN H.H.M.				INSP.			
CHKD. C.M.H.							
TRCD.				ENGINEER			
COMP.				G.D. Brown			

Scale: 1" = 100'

CONSTRUCTION PLANT
WATER AND SEWER SYSTEMS

CONSTRUCTION SEWERS LAYOUT

WATTS BAR NUCLEAR PLANT
TENNESSEE VALLEY AUTHORITY
DIVISION OF CONSTRUCTION

SUBMITTED	RECOMMENDED	APPROVED

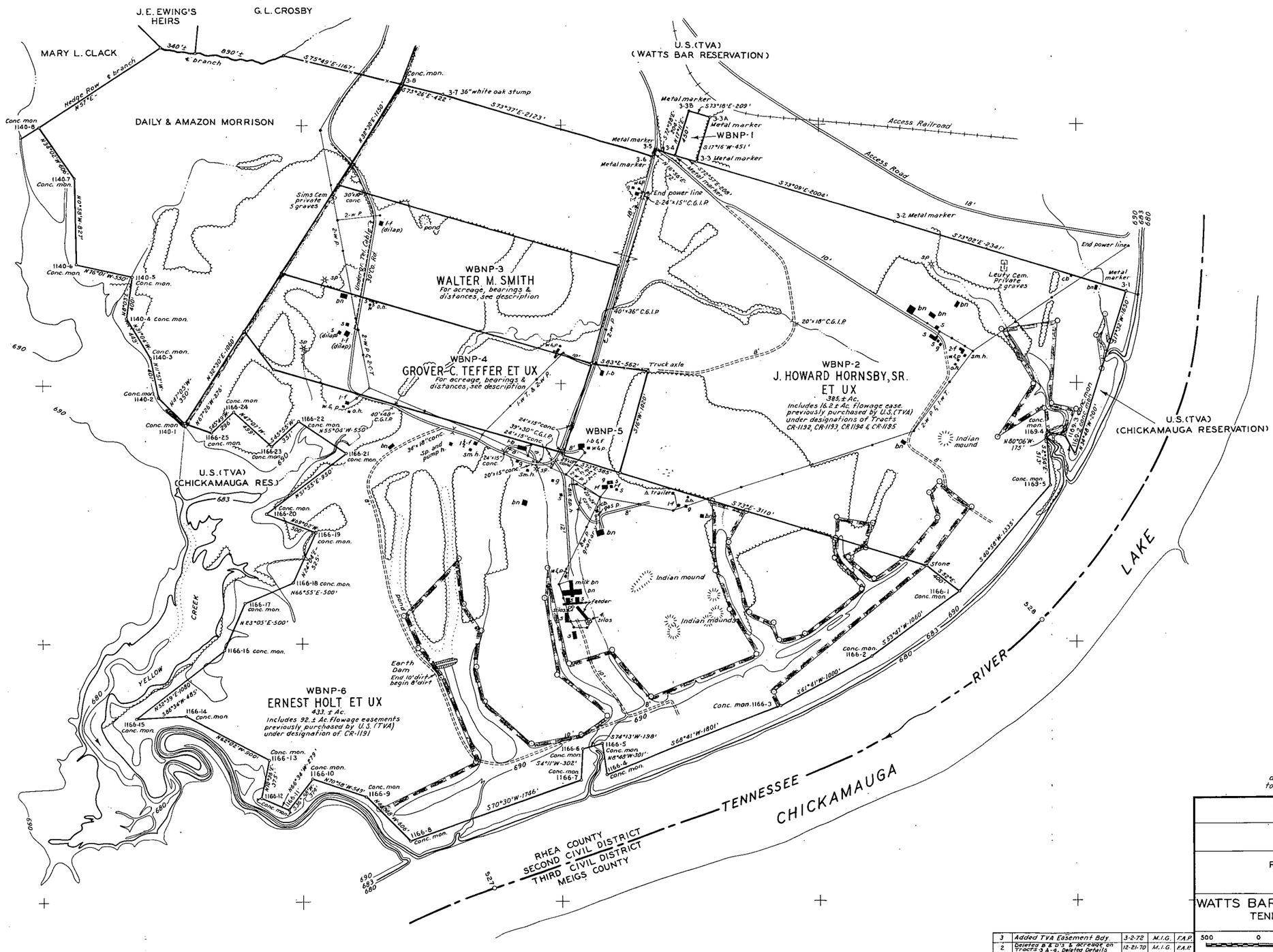
KNOXVILLE 7-28-72 85 CS 3 301 N 6 RO

MC 21509

RECORD DRAWING AS CONSTRUCTED

Figure 13

TRACT NO.	NAME	TOTAL ACREAGE
WBNP-1	Rhea Co Board of Education (Mc Donald School)	2.2 ±
WBNP-5	Lee Roy Holt et ux	12.5 ±



Compiled from:
Chickamauga Land Acq. Map 69
Chickamauga Reservation Map 69
Photo 118-5B-4

The positions of corners and directions of lines are referred to the Tennessee Coordinate System

NO.	REVISION	DATE	MADE	CKD
3	Added TVA Easement Bdy.	3-2-72	M.I.G.	F.A.P.
2	Deleted B & D's & Acreage on Tracts 3A-9. Deleted Details	12-21-70	M.I.G.	F.A.P.
1	Added Detail No. 2	10-6-70	M.I.G.	F.A.P.

LAND ACQUISITION

LAND MAP

RHEA COUNTY, TENNESSEE
SECOND CIVIL DISTRICT

WATTS BAR NUCLEAR PLANT PROJECT
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH

500 0 500 1000 1500 2000
SCALE OF FEET

CHATTANOOGA | SEPT. 1970 | 85 | MS | 421K501 | R.5

SURVEYED JENKINS/PARKER 10-3-70 DATE 9-8-70 SUPERVISED W. B. C. DATE 9-17-70
TRACED M.I.G. DATE 9-15-70 APPROVED G. E. S. DATE 9-17-70
CHECKED F.A.P. DATE 9-17-70 PASSED DATE