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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director
STOLZ,J.F. Operating Reactors Branch 4

SUBJECT: Advises that Figures 1 & 2 were omitted from util 810421 response to NRC 810209 requet for addl info on siesmic design of standby shutdown facility.Complete response encl.

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# DUKE POWER COMPANY

POWER BUILDING

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VICE PRESIDENT
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April 27, 1981

RECEIVED
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U.S. NUCLEAR REGULATORY COMMISSION

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. J. F. Stolz, Chief (40)
Operating Reactors Branch No. 4

Re: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

My letter of April 21, 1981 submitting the responses to questions concerning the seismic design of the Standby Shutdown Facility at the Oconee Nuclear Station was submitted to your office with Figures 1 and 2 inadvertently omitted. Please find attached Duke Power Company's complete response to Mr. R. W. Reid's letter dated February 9, 1981.

Very truly yours,

William O. Parker, Jr.

JLJ:pw
Attachment

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REQUEST FOR ADDITIONAL INFORMATION
OCONEE NUCLEAR STATION
DUKE POWER COMPANY
DOCKET NOS. 50-269, 50-270, 50-287

Question 1 - Provide the mathematical model that is used in your earthquake response analysis of SSF. The model should show mass points, their coordinates, damping and spring arrangements and their corresponding numerical values as well as appropriate configurations of soil and bedrock foundation. In particular, provide a reasonable discussion as to how the embedded portion of the building below the ground level is modeled and how soil-structure interaction is considered. If no such soil-structure interaction is considered, please justify the proposed design by discussing why the model without soil-structure interaction represents a conservative dynamic model.

Response - The mathmatical model used in the analysis of the Standby Shutdown Facility (SSF) is illustrated in Figures 1 and 2 attached. The model accurately represents the geometry of the structure, and is analyzed both dynamically and statically as a space frame. A damping ratio of .05 (5%) was used in the seismic analysis. One-half of the inertia (mass) of each beam is lumped at each model node. One-quarter of the mass of quadrilateral elements and one-third of the mass of triangular elements are applied to each mass point (model node).

The Standby Shutdown Facility is a reinforced concrete structure erected on continuous rock. The rock properties are similar to those used for the soil-structure interaction analysis for the Catawba Nuclear Station (Reference: Catawba Nuclear Station PSAR, 3.7.1.6, Docket Nos. 50-413 and 50-414). Since the structures at the two stations are similar, the results of the interaction analysis for Catawba are also applicable here. It was concluded in the Catawba analysis that the effect of soil-structure interaction on the frequencies and mode shapes was small and can be neglected. Consequently, for the purpose of seismic analysis, the structure is considered with a fixed base.

Question 2 - Discuss where the 0.10g bedrock acceleration is applied. Indicate the location of application in the model requested in Question 1 above.

Response - The 0.1g bedrock acceleration is applied to the model nodes located at the base of the structure.

Question 3 - Provide the reference from which the proposed load combinations of SSF are obtained. Discuss and justify any deviations from the SRP either in the actual combination formulas or the definition of the terms.

Response - The load combinations for the Standby Shutdown Facility analysis were obtained from the NRC Standard Review Plan, Section 3.8.4, November 24, 1975. The load combinations do not deviate from the Standard Review Plan either in actual combination formula or in the definition of the terms.

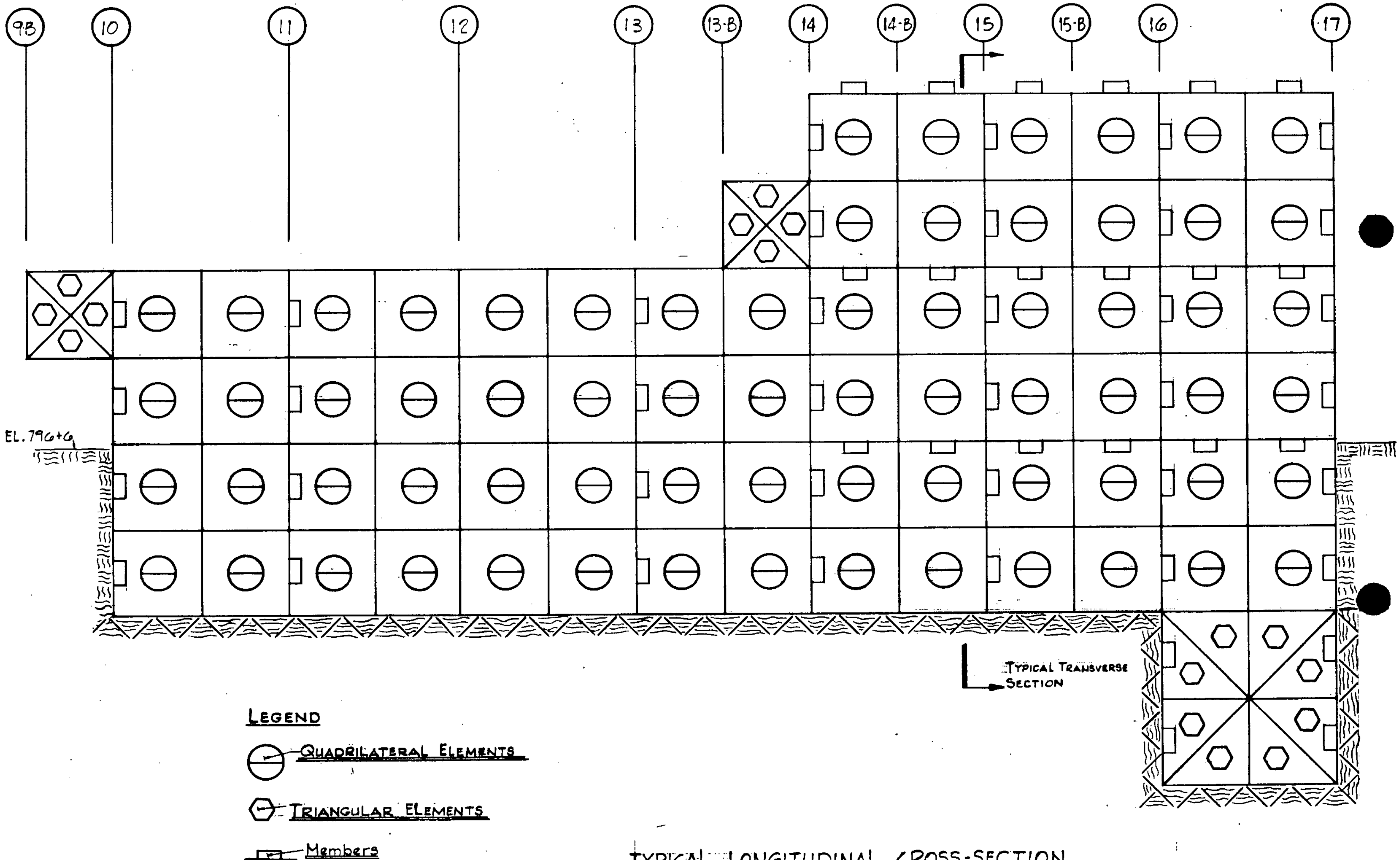
Question 4 - Describe any safety grade structures such as cable tunnels or buried piping systems that connect SSF with other facilities (e.g. reactor building). Discuss design limits and associated safety analysis for such structures.

Response - The Standby Shutdown Facility Cable Trench, which carries electrical cables from the SSF to each units' Auxiliary Building, is a reinforced concrete structure which extends from grade level to a maximum internal depth of 3'-9"; the maximum width based on inside dimensions is 3'-0". Load conditions considered in analysis and design include dead, live, wind, seismic, and tornado missile loads; the minimum barrier thickness is three times the postulated tornado missiles depths of penetration calculated in accordance with the modified Petry formula.

Buried piping associated with the Standby Shutdown Facility is described in the response to Questions 1 and 2, provided by Mr. William O. Parker, Jr.'s letter to Mr. H. R. Denton, dated February 16, 1981.

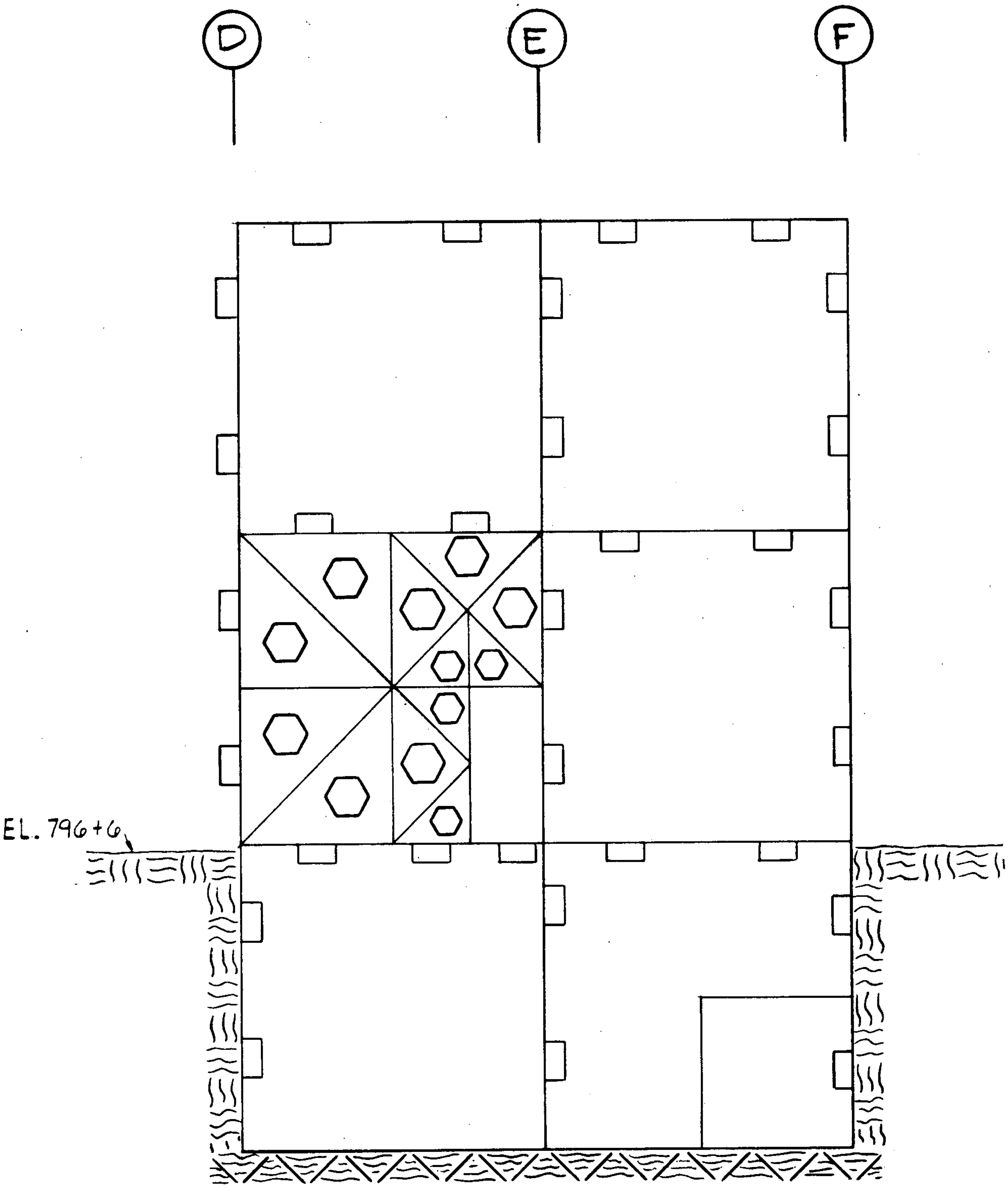
Question 5 - It is not clear whether your submittal was written before or after the completion of the SSF design. Indicate if the proposed design criteria contained in the present report have been met in the final design. Should there be any deviations from it, identify and discuss such deviations. Indicate also if the design has met all the pertinent regulations and therefore public safety is assured.

Response - The design criteria and regulations contained in Section 2 of the document "Duke Power Company, Oconee Nuclear Station, Information in Support of Standby Shutdown Facility," and as further described in this submittal and Mr. William O. Parker, Jr.'s letter to Mr. H. R. Denton, dated February 16, 1981, have been met in the final design.




TYPICAL LONGITUDINAL CROSS-SECTION

Fig. 1




TYPICAL TRANSVERSE CROSS-SECTION

Fig. 2