RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**557-9199**
SRP Section:	**03.08.05- Foundations**
Application Section:	**Tier 2, Section 3.8.5 and Tier 1**
Date of RAI Issue:	**12/01/2017**

Question No. 03.08.05-20

10 CFR Part 52, Section 52.54, “Issuance of standard design certification,” paragraph (a) states that the Commission may issue a standard design certification in the form of a rule for the design if the Commission determines that, among other things, “There is reasonable assurance that the standard design conforms with the provisions of the Act, and the Commission’s regulations.” When certified, the Appendix to Part 52 that constitutes the standard design certification will include or reference information that is approved and certified by the staff. This information, designated as Tier 1, generally includes, but is not limited to, design descriptions for significant aspects of the design. Tier 1 information is derived from the broader set of information contained in Tier 2 the Design Control Document (DCD), but is generally limited to the subset of the most safety significant information needed to support the staff’s approval basis. Therefore, the staff’s reasonable assurance finding for design certification relies, on the applicant’s DCD Tier 1 and DCD Tier 2 information.

10 CFR 52.47(a)(2) requires, in part, that a design certification application include a description and analysis of the structures of the facility, with emphasis upon performance requirements, the bases, with technical justification therefor, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished. When evaluating the acceptability of this information for seismic Category I structures, the staff’s review focuses on a subset of structural information that includes seismic analysis methods, key dimensions of seismic Category I structures, and design of “critical sections.” The use of critical sections in the design of safety-related structures is a risk- informed graded approach to achieve the reasonable assurance of safety. In lieu of the safety review of a large number of structural component designs, the staff performs a detailed review of a limited number of critical sections described in Section 3.8 of the DCD that contributed to the overall risk significance of the structures. This approach provides the staff with reasonable assurance of the overall safety performance of the structures based on the successful performance of these limited but critical risk significant locations. However, even minor changes to these critical sections could, when applied to the entire safety-related structure, result in significant changes to the overall performance of the structure, and therefore, invalidate the basis for the staff’s approval.

Therefore, the applicant is requested to incorporate as DCD Tier 1 Design Descriptions, certain characteristic of the seismic analysis and design of “critical sections” for seismic Category I structures. This information needs to be designated as Tier 1 information to support the staff’s reasonable assurance finding. The additional information to be included in APR1400 DCD Tier 1, based on DCD Tier 2, Rev. 1, is given below. This list provides examples and does not constitute a complete set of items to be included in DCD Tier 1. The information to be included in DCD Tier 1 may be in the form of text, tables, and/or figures, which are based on the design presented in DCD Tier 2.

- Identification of the ASME Code(s), Concrete Code, and Structural Steel Code with editions used in the design of safety related structures (e.g., ASME Section III, Division 1, Subsection NE and Division 2, Subsection CC; ACI-349, and ANSI/AISC- 690; with the applicable editions/dates identified).

- Key dimensions of seismic Category I structures (e.g., for the containment - DCD Figures 3.8-1, 2, 4, and 5).

- Design details for critical sections corresponding to reinforced concrete members and structural steel members for safety-related structures (e.g., reactor building, auxiliary building, and emergency diesel generator building). For critical sections, the information to be included is essentially the list of critical sections, locations of the critical sections, and the design details showing what design parameters are provided. An example of design parameters for concrete members is the reinforcement (either the location, direction, size, and spacing; or area of steel per unit length), concrete compressive strength, and wall/floor thickness. For structural steel members, this would typically consist of either the type and size (e.g., W21 X 147) or the equivalent steel member properties. For connections, this would typically consist of key details of the welds or bolts, and if applicable, plate/stiffening elements). The information on demand forces (e.g., FX, MX, etc.) calculated for the design of the sections, calculated stresses, and the available margins are not required. What is required is the design that is provided as described above. Examples of design parameters for critical sections of reinforced concrete and steel members in DCD Tier 2, Rev. 1, to be included in DCD Tier 1 may be obtained from the following:

    - For reinforced concrete members - Tables 3.8A-3, 5, 11, 12, 13, 21, 23, 24, 27, 29, 33, 36, 37, and 44, or alternatively, comparable design parameters presented in Figures 3.8A-6 through 10, 15 through 17, 25 through 28, 36 through 39, and 40 through 57.

    - For structural steel members - steel beams and connections supporting the concrete slabs inside containment as shown in the markups for DCD Figure 3.8A-60.

    - Along with the above information, the material types/designations should be provided (e.g., for concrete - the compressive strength and for steel - the type and grade).

- A summary description of the seismic analysis method(s) (e.g., equivalent static, response spectra, time history) that was used for each of the seismic Category I

structures. In addition, DCD Tier 1 should identify the in-structure response spectra for the key locations that would be needed by a COL applicant if a site-specific dynamic analysis evaluation is required.

Response

NRC Item 1

KHNP Original Response

The APR1400 is designed to meet the current NRC approved applicable codes and standards, including ASME, concrete, and structural steel codes. Any deviation from the current approved code or standards will be documented in the Design Report (Table 2.2.1-2 Item No. 5 [RCB and AB], Table 2.2.2-2 Item No. 4 [EDGB]) as described in Attachment 1 and noticed to the NRC through the approved design change process. This change process, as stated in 10 CFR Part 50.59, is summarized below:

(2) A licensee shall obtain a license amendment pursuant to Sec. 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would:

(viii) The source terms in Table 11.1-2 are used in calculation of the normal TIDs for equipment qualification. These source terms are the design basis source terms based upon 1.0% failed fuel with continuous gas stripping operation. This description will be updated for clarification in DCD Subsection 3.11.5.2, as indicated in the markups attached to this response, Attachment 4.

This regulation would govern any applicable changes to the design basis and their applicable codes and /or standards. This regulation is applicable to the technical analyses summarized in Tier 2, rather than the Tier 1 summary information, which is based on this same Tier 2 information.

NRC Feedback 3/05/2018

1. As discussed in the February 23, 2018 public meeting, using the “50.59 Like Process,” is not appropriate for screening information that is already in Tier 1 (e.g., the ASME code).

   KHNP Revised Response to NRC Feedback

   Reference to the 50.59 process has been deleted.

2. As agreed to by both the NRC staff and the applicant during the February 23, 2018 public meeting, the phrase, “The APR1400 is designed to meet the current NRC approved applicable codes and standards,” is broad and needs to be more specific. To help bridge the gap, the NRC RAI identified the addition of the following specific codes and standards that should be include in DCD Tier 1 which would be acceptable to the staff:

   - ASME Section III, Division 1, Subsection NE, “Class MC Components,” The American Society of Mechanical Engineers, the 2007 Edition with the 2008 Addenda

- ASME Section III, Division 2, “Code of Concrete Containments,” Subsection CC, American Society of Mechanical Engineers, the 2001 Edition with the 2003 Addenda
- ACI 349, “Code Requirements for Nuclear Safety-Related Concrete Structures,” American Concrete Institute, 1997.
- ANSI/AISC N690 including Supplement 2 (2004), “Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities,” American Institute of Steel Construction, 1994.

KHNP Revised Response to NRC Feedback

The principal design codes with applicable editions/dates used in the design of safety related structures will be added as Table 2.2.1-5 in Tier 1, as shown in Attachment 1.

3. KHNP is requested to provide markups in DCD Tier 1 (e.g., Sections 2.2.1 and 2.2.2) with this information

KHNP Revised Response to NRC Feedback

Related markups in DCD Tier 1 are provided as Attachment 1.

NRC Item 2

KHNP Original Response

Dimensions of seismic Category I structures (e.g., Reactor Containment Building, Auxiliary Building, Emergency Diesel Generator Building), represented as plan and section views at several levels, are included in Tier 1 Figures 2.2.1-2 through 2.2.1-13 (RCB and AB) and Figures 2.2.2-1 through 2.2.2-2 (EDGB). Tier 1 Table 2.2.1-2 Item No. 4 (RCB and AB) and Tier 1 Table 2.2.2-2 Item No. 3 (EDGB) references key building information and dimensions. Further detail is provided in Tier 2 DCD Section 3.8. Note that these figures as shown in the Attachment 2 have been revised to reflect the appropriate level of information and precision for Tier 1.

In Tier 1, key dimensional information or reference dimensions are provided representing an accumulation of other dimensions. These dimensions state either the mean or nominal dimension and are not relied on for construction, manufacturing or inspection purposes to ensure as-built configurations. Individual tolerances which are adopted in the generic APR1400 DCD comply with the plant’s licensing design basis.

The tolerances shall be in accordance with ACI 117 for the dimensions of concrete structures, and ASME Section III, Division 2, CC-4522 & Appendix F (see DCD Tier 2 for containment shell & dome). As-built dimensions will be evaluated to verify compliance with the design bases and applicable codes and standards. Where a tolerance is exceeded, the structure may be accepted if it meets one of the following criteria: a) exceeding the tolerances does not affect the structural integrity, legal boundaries, or architectural requirements of the element; or b) the element or total erected assembly can be modified to meet all structural and architectural requirements.

Tolerance deviations may be acceptable, subject to regulatory approval, in part because of the general purpose tolerances serve: Tolerances are a means to establish permissible variation in dimension and location, and they are the means by which the designer conveys to the contractor the performance expectations upon which the design is based or that the project requires. Such specified tolerances should reflect design assumptions and project needs, being neither overly restrictive nor lenient. Thus, tolerances are not absolute requirements (See LBP-16-05, April 29, 2016).

For clarity purposes, the following general statements will be added to Subsection 1.2.1.

Dimensions used to describe a reference elevation, length, thickness, etc., are in nominal values, and a dimension should always be considered to mean dimension with appropriate tolerance as specified in the NRC approved code and standards in the Design Certification.

Deviation from identified dimensions and tolerance requirements is permissible when an adequate justification or analysis is provided demonstrating structural integrity and radiation protection margin exists within the plant's licensing design bases.

NRC Feedback 3/05/2018

1. As discussed in the public meeting in relation to the NRC RAI, additional information to be included in DCD Tier 1 includes generic dimensions of seismic Category I structures as shown in the following figures:

   - Figure 3.8-1, "Typical Section of Containment Structures" (Looking North)
   - Figure 3.8-2, "Typical Section of Containment Structures" (Looking East)
   - Figure 3.8-4, "Arrangement of Containment Post-Tensioning System"
   - Figure 3.8-5, "Liner Plate and Anchorage System"

   Also, dimensional information, such as between column lines on some of the figures that were removed, should be reinserted into DCD Tier 1. Apparently, these were removed because of concerns about construction tolerances; however, those concerns can now be addressed by Item 2 below.

   KHNP Revised Response to NRC Feedback

   The above suggested figures have not been added to Tier 1. They are part of Tier 2. Any changes to the key dimensions in these figures will be addressed through the 50.59 change process.

2. In view of the agreement during the public meeting on February 23, 2018 to include a paragraph on tolerances, the staff concludes that the proposed paragraph provided in the RAI response, as modified below, would be acceptable for inclusion in an applicable section of the Tier 1 document.

"The tolerances shall be in accordance with ACI 117 [Edition/Date XXXX] for concrete structures, Code of Standard Practice for Steel Buildings and Bridges [Edition/Date XXXX], and ASME Section III, Division 2, Subsection CC & applicable appendices related to tolerances [Edition/Date XXXX] for containment. As-built dimensions will also be evaluated to verify compliance with the design bases and applicable codes and standards."

KHNP Revised Response to NRC Feedback

The following general statements will be added to Subsection 1.2.1 as shown in the Attachment 2:

Dimensions used to describe a reference elevation, length, thickness, etc., are in nominal values, and a dimension should always be considered to mean dimension with appropriate tolerance as specified in the NRC approved code and standards in the Design Certification.

Deviation from identified dimensions and tolerance requirements is permissible when an adequate justification or analysis is provided demonstrating structural integrity and radiation protection margin exists within the plant's licensing design bases.

The following paragraph will be added to Tier 1 sections 2.2.1.1 and 2.2.2.1 as shown in the Attachment 2:

The tolerances shall be in accordance with ACI 117(2010 edition) for concrete structures, Code of Standard Practice for Steel Buildings and Bridges(2010 edition), and ASME Section III, Division 2, Subsection CC & applicable appendices related to tolerances(2001 edition with 2003 Addenda) for containment. As-built dimensions will also be evaluated to verify compliance with the design bases and applicable codes and standards. Where a tolerance is exceeded, the structure may be accepted if it meets one of the following criteria: a) exceeding the tolerances does not affect the structural integrity, legal boundaries, or architectural requirements of the element; or b) the element or total erected assembly can be modified to meet all structural and architectural requirements.

3. KHNP is requested to provide markups in DCD Tier 1 with this information.

KHNP Revised Response to NRC Feedback

Related markups in DCD Tier 1 are provided as Attachment 2.

NRC Item 3

KHNP Original Response

The principal critical structural sections and material identification for seismic Category I structures will be added in Tier 1 Table 2.2.1-4, as described in the Attachment 3. Also, an ITAAC governing critical sections will be added to Table 2.2.1-2 Item No.6 and Table 2.2.2-2 Item No.5, as shown in the Attachment 3.

DCD section for detailed design information. Any change to the design basis would be governed under 10 CFR 50.59 process, as discussed in Item No. 1 above. Tables and figures in DCD Tier 2 Section 3.8A summarize the detailed design information for the critical section.

NRC Feedback 3/05/2018

1. In the February 23, 2018 public meeting with the applicant, the staff discussed in great detail the pertinent information regarding the critical sections that would be acceptable to the staff. The applicant was presented with two options which list the critical sections and the design attributes: Option A, in the case of concrete members, includes the minimum area of reinforcement per unit length provided in the design and Option B includes the ratio of demand to capacity. The demand to capacity ratio for concrete members can be defined as the ratio of required reinforcement obtained from the demand loads to the provided reinforcement. This ratio is a measure of the design margin to be maintained for the critical sections. Thus, any design changes made in the future would need to demonstrate that the ratio is equal to or less than (≤) the DCD Tier 1 design ratios. Both options were provided to the applicant by the NRC Project Manager. The applicant is requested to choose the option that's best suitable for its design of the APR1400 plant.

   KHNP Revised Response to NRC Feedback

   The principal critical sections and design attributes for seismic Category I structures will be added in Tier 1 Table 2.2.1-4, as described in Attachment 3. The design attribute is defined as the ratio of demand/capacity. The design attributes may be modified, based on site-specific details, by the COL Applicant. However, this ratio must always be equal to or less than the values stated in Table 2.2.1-4 in order to maintain the structural integrity of seismic Category I structures.

2. Feedback for acceptable tabulation of material types/designations was explained to the applicant during the February 23, 2018 public meeting and also provided subsequent to this meeting by the NRC Project Manager as discussed in Item 1 above.

   KHNP Revised Response to NRC Feedback

   See KHNP Revised Response above.

3. In ITAAC 5, Attachment 1 (2/4); ITAAC 4, Attachment 1 (4/4); ITAAC 5, Attachment 3 (4/9) and ITAAC 4, Attachment 3 (9/9), the applicant used the phrase, "designed in accordance with the NRC approved code and standards in the design certification." Given that the staff only certifies the Tier 1 information, the phrase seems to be contradictory to the information presented. The staff considers the phrase to be adequate only if the codes identified in the staff feedback to Item 1 above are Tier 1 information and reference is made only to these codes and standards within DCD Tier 1.

   KHNP Revised Response to NRC Feedback

   See KHNP Revised Response for Item 1.

NRC Item 4

KHNP Original Response

A description regarding the seismic analysis methods used for seismic Category I structures will be added to DCD Tier 1 Section 2.2.10 as shown in the Attachment 4.

NRC Feedback 3/05/2018

The staff reviewed the applicant response and considered the information provided to be adequate.

Impact on DCD

DCD Tier 1, Subsections 1.2.1, 2.2.1.1, 2.2.2.1, 2.2.10, Tables 2.2.1-1, 2.2.1-2, 2.2.1-4, 2.2.1-5, 2.2.2-2, 2.2.10-1, Figures 2.2.1-4 through 2.2.1-11, and Figures 2.2.2-1 through 2.2.2-2 will be revised or added, as described in the attachments associated with this response.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on the Technical/Topical/Environmental Report.

personnel air locks and an equipment hatch. Penetrations are provided for electrical and mechanical components and for the transport of nuclear fuel.

The containment internal structures consist of reinforced concrete and structural steels that support reactor vessel and reactor coolant system. The primary shield wall supports and laterally surrounds the reactor vessel. The secondary shield wall laterally surrounds the primary shield wall and is structurally connected to the primary shield wall by reinforced concrete slabs, beams, and walls. The secondary shield wall supports steam generators and pressurizer. The containment internal structures enclose a reactor cavity area below the reactor vessel which can be flooded during a postulated accident. An indirect gas vent path is provided between the reactor cavity and the free volume of the containment.

The reactor cavity has a corium debris chamber. And the reactor cavity floor is constructed with a fill concrete on steel liner plate. The reactor cavity floor area is free from obstructions to corium debris spreading.

The AB is a reinforced concrete structure which consists of the electrical and control area, the fuel handling area, the chemical and volume control system area, the main steam valve house, and the emergency diesel generator area. The AB laterally surrounds the RCB and is divided by divisional walls.

The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads associated with:

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrodynamic loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, tornado or hurricane, tornado or hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

Seismic classification of the building is shown in Table 2.2.1-3.

1. The basic configuration of the NI structure is as shown in Figure 2.2.1-1 through Figure 2.2.1-13.

The NI structures are designed in accordance with the requirements of ASME Section III Div.2 CC, ASME Section III Div.1 NE, ACI 349 and ANSI/AISC N690 as described in the Table 2.2.1-5.

2.a The containment is designed and constructed to meet the requirements of ASME Section III, Div. 2.

2.b The containment penetrations are designed and constructed to meet ASME Section III.

2.c The containment and its penetrations retain their pressure boundary integrity associated with the design pressure.

2.d The containment and its penetrations maintain the containment leakage rate less than or equal to the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident.

3. The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads.

4. The key dimensions of the NI structures are described in Table 2.2.1-1.

5. Nuclear Island (NI) Structures are designed in accordance with the NRC approved code and standards in the design certification.

2.2.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for nuclear island structures are specified in Table 2.2.1-2.

Table 2.2.1-2 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The NI structures are seismic Category I, and are designed and constructed to withstand the structural design basis loads.	3. A structural analysis will be performed to reconcile the as-built NI structures with the structural design basis loads.	3. A report exists and concludes that the NI structures can withstand the design basis loads.
4. The key dimensions of the NI structures are described in Table 2.2.1-1 and Figures 2.2.1-1 through 2.2.1-13.	4. Inspection will be performed to verify that the as-built wall and slab thickness conform with the structural configuration.	4. A report exists and concludes that the NI structure as-built wall and slab thickness conform with the structural configuration as described in Table 2.2.1-1 and Figures 2.2.1-1 through 2.2.1-13.

Add item 5 in next page

5. Nuclear Island (NI) Structures are designed in accordance with the NRC approved code and standards in the design certification.	5. An inspection for any deviation from the approved codes and standards will be performed.	5. A reports existsand concludes that the as-built NI structures conform to the NRC approved codes and standards.

Table 2.2.1-5

Principal Design Codes

Document Designation	Edition	Document Tit1e
ASME CC	2001 with 2003 Addenda	Code for Concrete Containment
ACI 349	1997	Code requirements for nuclear safety related concrete structure
AISC N690	1994 including Supp. 2(2004)	Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities
ASME NE	2007 with 2008 Addenda	Class MC Components

Abbreviation

ACI American Concrete Institute
AISC American Institute of Steel Construction
ASME American Society of Mechanical Engineers

Add new Table

2.2.2 Emergency Diesel Generator Building

2.2.2.1 Design Description

The emergency diesel generator (EDG) building block is located adjacent to east side of the Nuclear Island with seismic isolation gap, and comprises two buildings, one that houses additional two generators and the other for the diesel fuel oil tank (DFOT). Both EDG and DFOT buildings are single-story structures which are composed of reinforced concrete basemat, shearwalls and slabs. The two basemats are horizontally separated by seismic isolation gap. The EDB building block is designed in accordance with the requirements of ACI 349 and ANSI/AISC N690 as described in the Table 2.2.1-5.

The EDG building block is designed and constructed to withstand the structural design basis loads associated with:

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

   a) The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.

   b) The EDG building block is designed and constructed to withstand the structural design basis loads.

   c) The key dimensions of the EDG building block are described in Table 2.2.2-1.

2.2.2.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the EDG building block are specified in Table 2.2.2-2.

4. The EDG building block is designed in accordance with the NRC approved code and standards in the design certification.

Table 2.2.2-2

Emergency Diesel Generator Building Block (1) ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.	1. Inspection of the basic configuration of the as-built EDG building block will be conducted.	1. The EDG building block conforms with the basic configuration as shown in Figures 2.2.2-1 and 2.2.2-2.
2. The EDG building block is designed and constructed to withstand the structural design basis loads.	2. A structural analysis will be performed to reconcile the as-built EDG building block structure with the structural design basis loads.	2. A report exists and concludes that the EDG building block can withstand the structural design basis loads.
3. The key dimensions of the EDG building block are as described in Table 2.2.2-1, Figure 2.2.2-1, and Figure 2.2.2-2.	3. Inspection will be performed to verify that the as-built wall and slab thickness conform to the structural configuration.	3. A report exists and concludes that the EDG building block as-built wall and slab thickness conform with the structural configuration as described in Table 2.2.2-1, Figure 2.2.2-1, and Figure 2.2.2-2.

(1) EDG building block includes EDG building and DFOT building.

Add item 4 in next page

4. The EDG building block is designed in accordance with the NRC approved code and standards in the design certification.	4. An inspection for any deviation from the approved codes and standards will be performed.	4. A reports exists and concludes that the as-built NI structures conform to the NRC approved codes and standards.

1.2 General Provisions

The following general provisions are applicable to the Design Descriptions and the associated ITAAC:

1.2.1 Treatment of Individual Items

The absence of any discussion or depiction of an item in the Design Description or accompanying Figures shall not be construed as prohibiting a licensee from utilizing such an item, unless it would prevent an item from performing its safety function as discussed or depicted in the Design Description or accompanying Figures.

When the term "operate", "operates", or "operation" is used with respect to an item discussed in the Acceptance Criteria, it refers to the actuation and running of the item. When the term "exist", "exists", or "existence" is used with respect to an item discussed in the Acceptance Criteria, it means that the item is present and meets the Design Description.

Many of the Acceptance Criteria include the words "A report exists and concludes that…" When these words are used, it indicates that the ITAAC for that Design Commitment will be met when it is confirmed that appropriate documentation exists and the documentation shows that the Design Commitment is met. Appropriate documentation can be a single document or a collection of documents that show that the stated acceptance criteria are met. Examples of appropriate documentation include data reports, test reports, inspection reports, analysis reports, evaluation reports, design and manufacturing procedures, certified data sheets, commercial dedication procedures and records, quality assurance records, calculation notes, and equipment qualification data packages.

Add "A" in next page

1.2.2 Implementation of ITAAC

The ITAAC are provided in tables with the following three column format:

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria

Each Design Commitment in the left-hand column of the ITAAC tables has an associated Inspections, Tests, or Analyses (ITA) requirement specified in the middle column of the tables.

"A"

Dimensions used to describe a reference elevation, length, thickness, etc., are in nominal values, and a dimension should always be considered to mean dimension with appropriate tolerance as specified in the NRC approved code and standards in the Design Certification.

Deviation from identified dimensions and tolerance requirements is permissible when an adequate justification or analysis is provided demonstrating structural integrity and radiation protection margin exists within the plant's licensing design bases.

personnel air locks and an equipment hatch. Penetrations are provided for electrical and mechanical components and for the transport of nuclear fuel.

The containment internal structures consist of reinforced concrete and structural steels that support reactor vessel and reactor coolant system. The primary shield wall supports and laterally surrounds the reactor vessel. The secondary shield wall laterally surrounds the primary shield wall and is structurally connected to the primary shield wall by reinforced concrete slabs, beams, and walls. The secondary shield wall supports steam generators and pressurizer. The containment internal structures enclose a reactor cavity area below the reactor vessel which can be flooded during a postulated accident. An indirect gas vent path is provided between the reactor cavity and the free volume of the containment.

The reactor cavity has a corium debris chamber. And the reactor cavity floor is constructed with a fill concrete on steel liner plate. The reactor cavity floor area is free from obstructions to corium debris spreading.

The AB is a reinforced concrete structure which consists of the electrical and control area, the fuel handling area, the chemical and volume control system area, the main steam valve house, and the emergency diesel generator area. The AB laterally surrounds the RCB and is divided by divisional walls.

Add "B" in next page

The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads associated with:

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrodynamic loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, tornado or hurricane, tornado or hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

Seismic classification of the building is shown in Table 2.2.1-3.

1. The basic configuration of the NI structure is as shown in Figure 2.2.1-1 through Figure 2.2.1-13.

"B"

The tolerances shall be in accordance with ACI 117(2010 edition) for concrete structures, Code of Standard Practice for Steel Buildings and Bridges(2010 edition), and ASME Section III, Division 2, Subsection CC & applicable appendices related to tolerances(2001 edition with 2003 Addenda) for containment. As-built dimensions will also be evaluated to verify compliance with the design bases and applicable codes and standards. Where a tolerance is exceeded, the structure may be accepted if it meets one of the following criteria: a) exceeding the tolerances does not affect the structural integrity, legal boundaries, or architectural requirements of the element; or b) the element or total erected assembly can be modified to meet all structural and architectural requirements.

Table 2.2.1-1 (32 of 32)

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness ~~(1)~~	Applicable Radiation Shielding Wall (Yes/No)
Floors	From AB to AD From 15 to 16	213'-0"	1'-6"	No
Floors	From AI to AK From 20 to 22	215'-0"	2'-0"	Yes
Floors	From AF to AK From 23 to 26	215'-0"	1'-6"	Yes
Floors	From AI to AJ From 22 to 23	226'-6"	1'-6"	Yes

~~(1) Tolerance for the thickness of the walls and slabs is -1/4 inch and + 1 inch.~~ deleted

(2) Reduction of the basemat thickness is less than - 5 % of specified thickness.

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-4 Nuclear Island Structure Plan at Level 1

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-5 Nuclear Island Structure Plan at Level 2

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-6 Nuclear Island Structure Plan at Level 3

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-7 Nuclear Island Structure Plan at Level 4

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-8 Nuclear Island Structure Plan at Level 5

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-9 Nuclear Island Structure Plan at Level 6

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-10 Nuclear Island Structure Plan at Level 7

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 2.2.1-11 Nuclear Island Structure Plan at Roof

Replaced by next page

Security-Related Information – Withhold Under 10 CFR 2.390

2.2.2 Emergency Diesel Generator Building

2.2.2.1 Design Description

The emergency diesel generator (EDG) building block is located adjacent to east side of the Nuclear Island with seismic isolation gap, and comprises two buildings, one that houses additional two generators and the other for the diesel fuel oil tank (DFOT). Both EDG and DFOT buildings are single-story structures which are composed of reinforced concrete basemat, shearwalls and slabs. The two basemats are horizontally separated by seismic isolation gap.

Add "C" in next page

The EDG building block is designed and constructed to withstand the structural design basis loads associated with:

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

   a) The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.

   b) The EDG building block is designed and constructed to withstand the structural design basis loads.

   c) The key dimensions of the EDG building block are described in Table 2.2.2-1.

2.2.2.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the EDG building block are specified in Table 2.2.2-2.

"C"

The tolerances shall be in accordance with ACI 117(2010 edition) for concrete structures. As-built dimensions will also be evaluated to verify compliance with the design bases and applicable codes and standards. Where a tolerance is exceeded, the structure may be accepted if it meets one of the following criteria: a) exceeding the tolerances does not affect the structural integrity, legal boundaries, or architectural requirements of the element; or b) the element or total erected assembly can be modified to meet all structural and architectural requirements.

Table 2.2.2-1

Definition of Wall and Floor Thicknesses for Emergency Diesel Generator Building

Wall or Section Description	Column Lines	Floor Elevation or Elevation Range	Concrete Thickness ~~(1)~~	Applicable Radiation Shielding Wall (Yes/No)
EDG Building				
Basemat	Not Applicable	100'-0"	4'-0"	No
Column Line 26.1 Wall	From AC.8 to AH.2	From 100'-0" to 135'-0"	3'-0"	No
Column Line 28 Wall	From AC.8 to AH.2	From 100'-0" to 135'-0"	3'-0"	No
Column Line AC.8 Wall	From 26.1 to 28	From 100'-0" to 135'-0"	3'-0"	No
Column Line AF Wall	From 26.1 to 28	From 100'-0" to 135'-0"	2'-6"	No
Column Line AH.2 Wall	From 26.1 to 28	From 100'-0" to 135'-0"	3'-0"	No
Floors	Not Applicable	121'-6"	2'-0"	No
Floors	Not Applicable	135'-0"	Variable From 1'-6" to 3'-0"	No
DFOT Building				
Basemat	Not Applicable	63'-0"	4'-0"	No
Column Line 26.1 Wall	From AA.1 to AC.6	From 63'-0" to 100'-0"	2'-6"	No
Column Line 27 Wall	From AA.1 to AC	From 63'-0" to 97'-6"	2'-6"	No
Column Line 28 Wall	From AA.1 to AC.6	From 63'-0" to 100'-0"	4'-0"	No
Column Line AA.1 Wall	From 26.1 to 28	From 63'-0" to 97'-6"	4'-0"	No
Column Line AC.6 Wall	From 26.1 to 28	From 63'-0" to 100'-0"	4'-0"	No
Floors	Not Applicable	97'-6"	2'-0"	No
Floors	Not Applicable	100'-0"	3'-0"	No

~~(1) Tolerance for the thickness of the walls and slabs is -1/4 inch and + 1 inch.~~ deleted

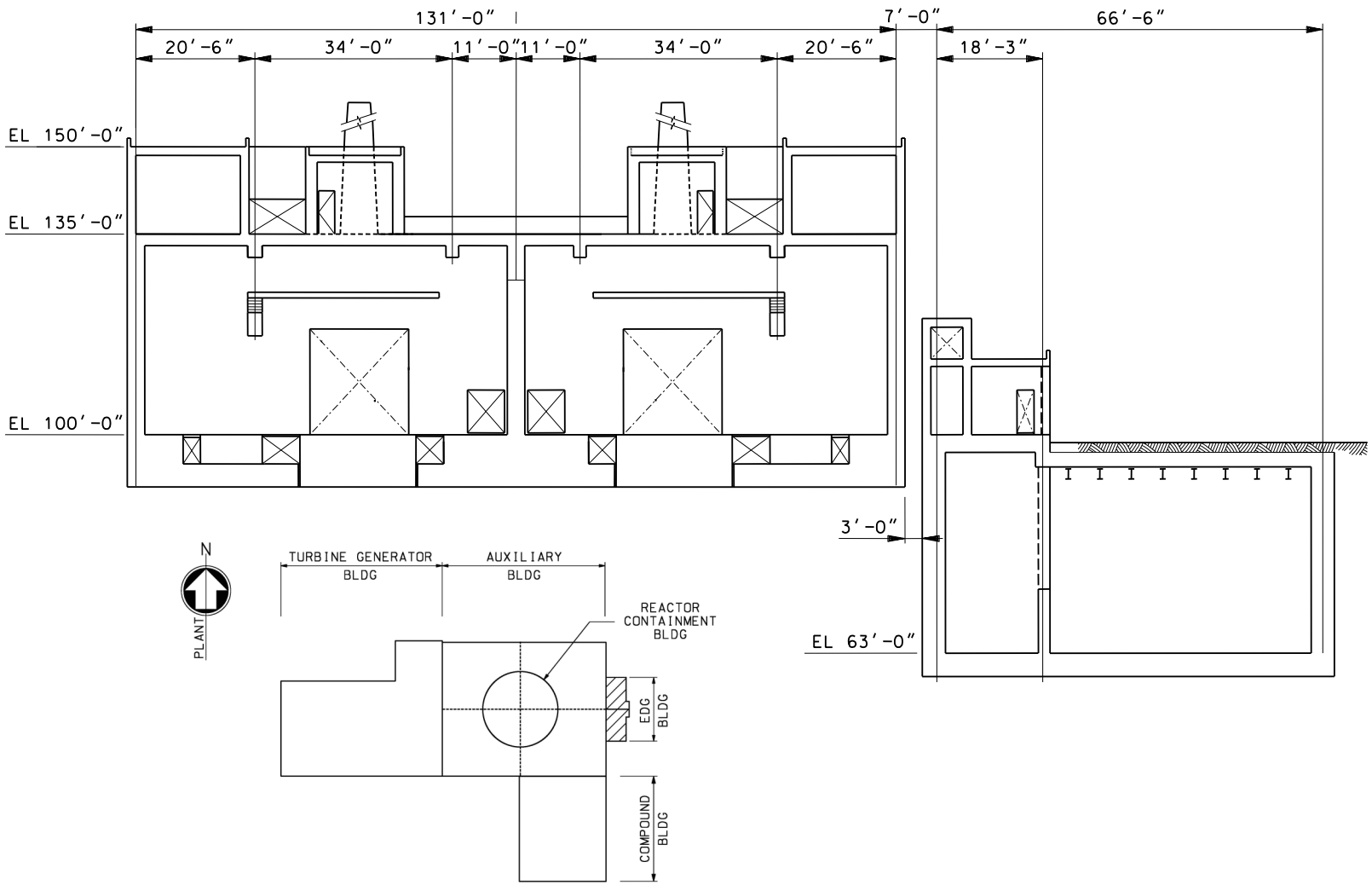

Figure 2.2.2-1 Emergency Diesel Generator Building Block Section

Replaced by next page

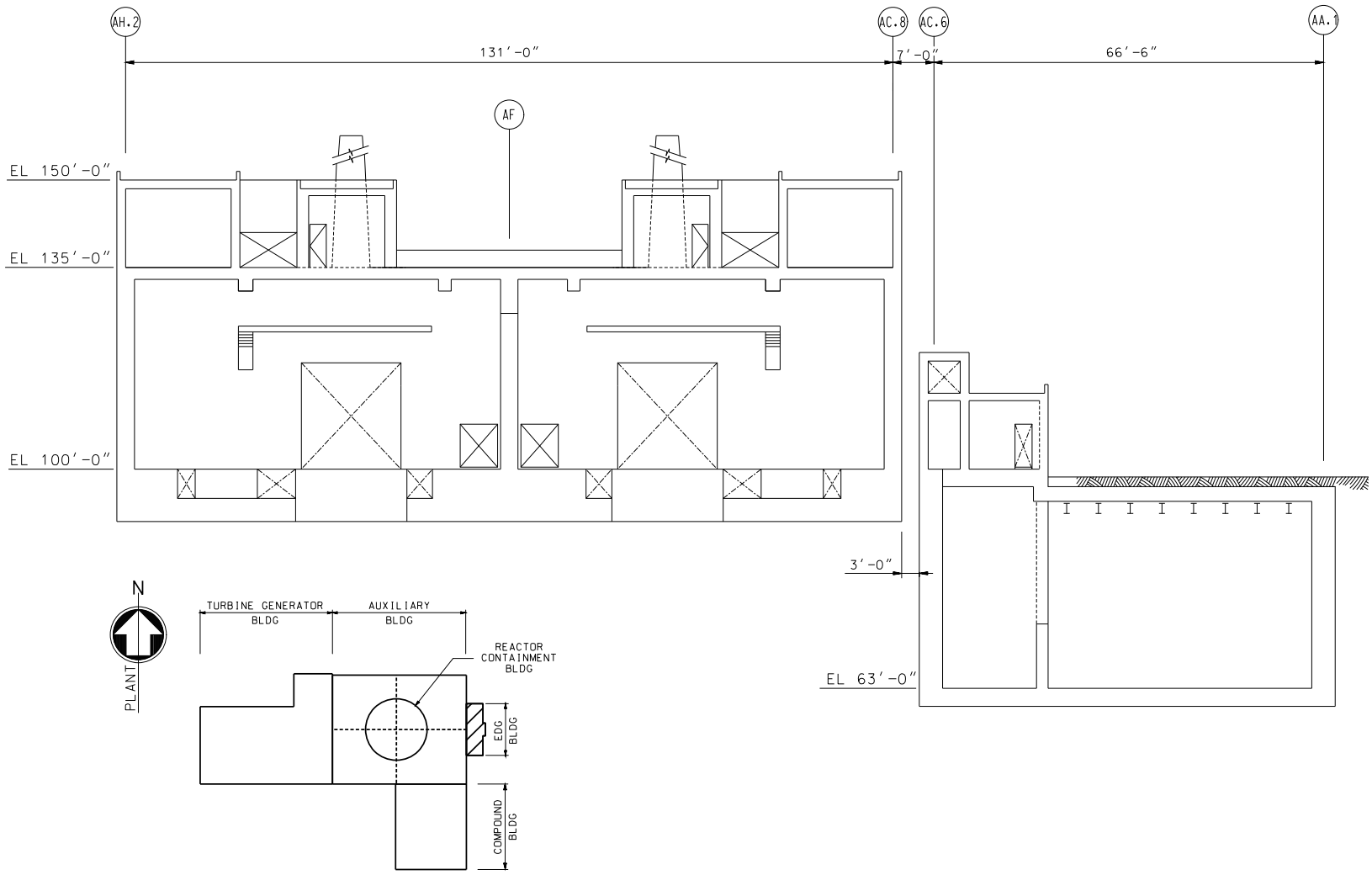

Figure 2.2.2-1 Emergency Diesel Generator Building Block Section

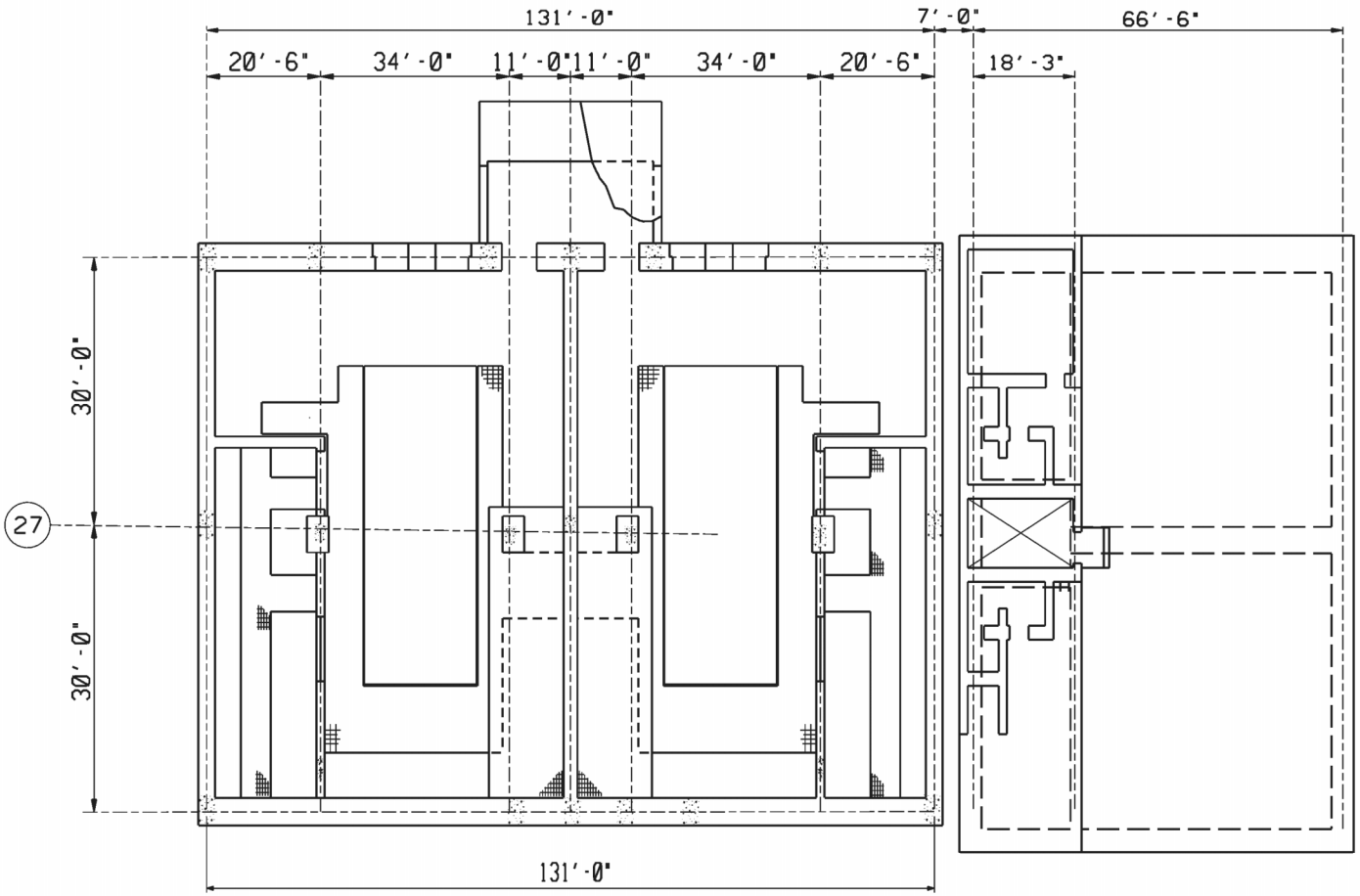

Figure 2.2.2-2 Emergency Diesel Generator Building Block Plan

Replaced by next page

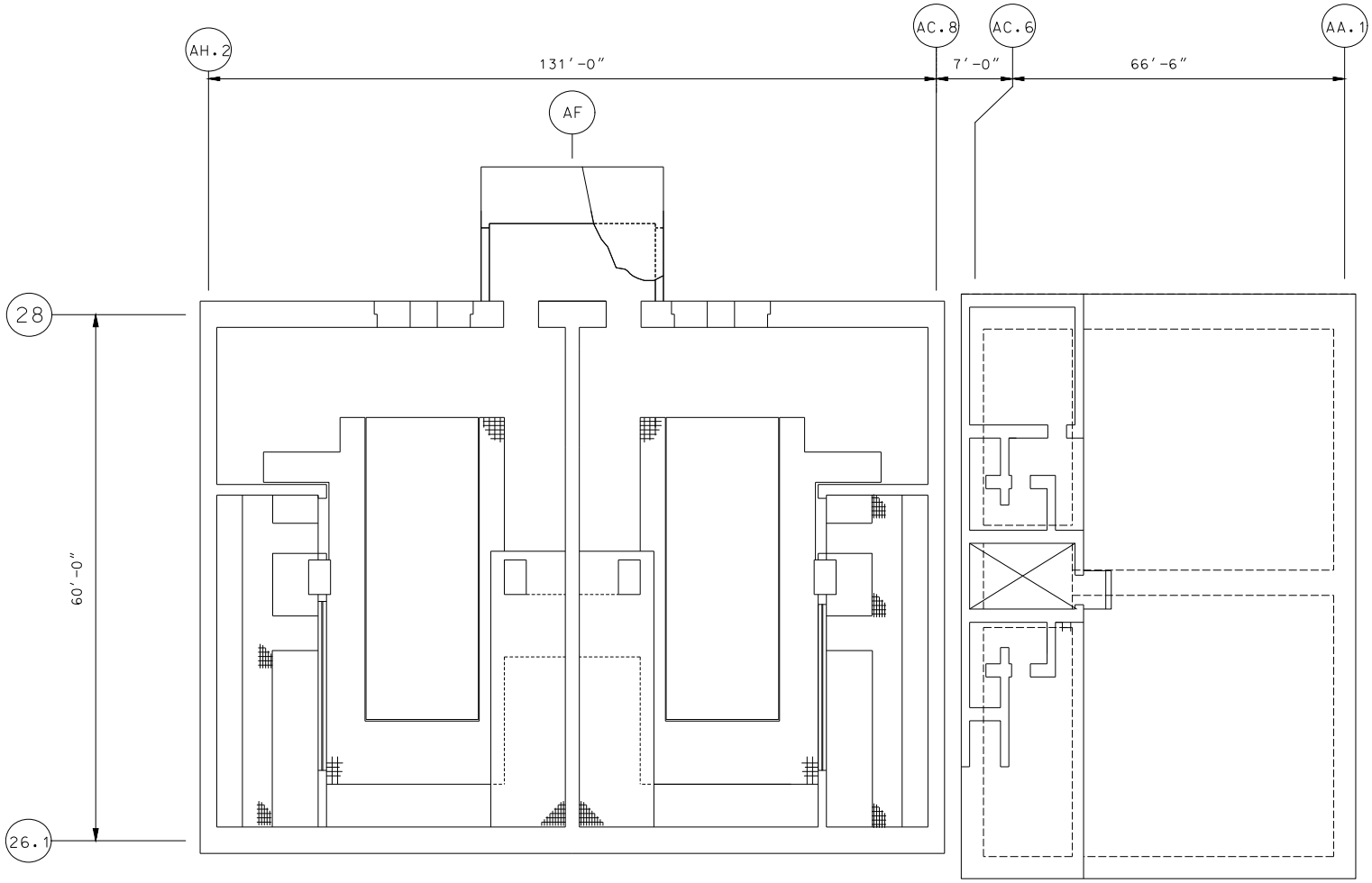

Figure 2.2.2-2 Emergency Diesel Generator Building Block Plan

personnel air locks and an equipment hatch. Penetrations are provided for electrical and mechanical components and for the transport of nuclear fuel.

The containment internal structures consist of reinforced concrete and structural steels that support reactor vessel and reactor coolant system. The primary shield wall supports and laterally surrounds the reactor vessel. The secondary shield wall laterally surrounds the primary shield wall and is structurally connected to the primary shield wall by reinforced concrete slabs, beams, and walls. The secondary shield wall supports steam generators and pressurizer. The containment internal structures enclose a reactor cavity area below the reactor vessel which can be flooded during a postulated accident. An indirect gas vent path is provided between the reactor cavity and the free volume of the containment.

The reactor cavity has a corium debris chamber. And the reactor cavity floor is constructed with a fill concrete on steel liner plate. The reactor cavity floor area is free from obstructions to corium debris spreading.

The AB is a reinforced concrete structure which consists of the electrical and control area, the fuel handling area, the chemical and volume control system area, the main steam valve house, and the emergency diesel generator area. The AB laterally surrounds the RCB and is divided by divisional walls.

The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads associated with: , including the critical sections and design attributes listed in Table 2.2.1-4,

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrodynamic loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, tornado or hurricane, tornado or hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

Seismic classification of the building is shown in Table 2.2.1-3.

1. The basic configuration of the NI structure is as shown in Figure 2.2.1-1 through Figure 2.2.1-13.

2.a The containment is designed and constructed to meet the requirements of ASME Section III, Div. 2.

2.b The containment penetrations are designed and constructed to meet ASME Section III.

2.c The containment and its penetrations retain their pressure boundary integrity associated with the design pressure.

2.d The containment and its penetrations maintain the containment leakage rate less than or equal to the maximum allowable leakage rate associated with the peak containment pressure for the design basis accident.

3. The NI structures are seismic Category I, and are designed and constructed to withstand the design basis loads.

4. The key dimensions of the NI structures are described in Table 2.2.1-1.

2.2.1.2 Inspections, Tests, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for nuclear island structures are specified in Table 2.2.1-2.

6. The critical sections and design attributes of the NI structures are described in Table 2.2.1-4.

Table 2.2.1-2 (2 of 2)

critical section layout and elevations, including wall and slab thickness

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
3. The NI structures are seismic Category I, and are designed and constructed to withstand the structural design basis loads.	3. A structural analysis will be performed to reconcile the as-built NI structures with the structural design basis loads.	3. A report exists and concludes that the NI structures can withstand the design basis loads.
4. The key dimensions of the NI structures are described in Table 2.2.1-1 and Figures 2.2.1-1 through 2.2.1-13.	4. Inspection will be performed to verify that the as-built ~~wall and slab thickness~~ conform with the structural configuration.	4. A report exists and concludes that the NI structure as-built ~~wall and slab thickness~~ conform with the structural configuration as described in Table 2.2.1-1 and Figures 2.2.1-1 through 2.2.1-13.

Add item 6 in next page

critical section layout and elevations, including wall and slab thickness

, Table 2.2.1-4,

6. The critical sections and design attributes of the NI structures are described in Table 2.2.1-4.	6. Inspection will be performed to verify that the as-built NI structural design, including critical sections and design attributes are in accordance with codes and standards approved in the design certification. Deviations from the design due to as-built conditions will be reconciled for the design basis loads.	6.i A reports exists and concludes that the as-built NI structural design conform with the critical sections and design attributes as described in Table 2.2.1-4.
		6.ii A report exists which reconciles deviations during construction and concludes that as-built NI structures, including the critical sections and design attributes, conform to the approved design in the design certification and will withstand the design basis loads.

Table 2.2.1-4 (1 of 4)

Critical Sections and Design Attributes

Critical Sections	Design Attributes R(1),(2),(3),(4),(5) (as appropriate) ≤ D/C {Maximum} Ratio ≤ Demand/Capacity	
Containment Wall and Dome		
Cylindrical Wall-Basemat Junction Area	Meridional Direction	0.80 (Inside Layers)
		0.99 (Outside Layers)
	Hoop Direction	0.60 (Inside Layers)
		0.96 (Outside Layers)
	Shear Reinforcement	0.79
Thickened Sections Around Large Penetrations (Equipment Hatch and Personnel Airlocks)	Meridional Direction	0.73 (Inside Layers)
		1.00 (Outside Layers)
	Hoop Direction	0.60 (Inside Layers)
		0.96 (Outside Layers)
	Shear Reinforcement	0.85
Polar Crane Brackets Area Level and Springline	Meridional Direction	0.51 (Inside Layers)
		0.88 (Outside Layers)
	Hoop Direction	0.80 (Inside Layers)
		0.81 (Outside Layers)
	Shear Reinforcement	0.79
Containment Dome	Meridional Direction	0.09 (Inside Layers)
		0.93 (Outside Layers)
	Hoop Direction	0.37 (Inside Layers)
		0.94 (Outside Layers)
	Shear Reinforcement	N/A
Mid-Height of Wall	Meridional Direction	0.87 (Inside Layers)
		0.85 (Outside Layers)
	Hoop Direction	0.73 (Inside Layers)
		0.93 (Outside Layers)
	Shear Reinforcement	0.74
Containment Liner Plate/Anchorage	Liner Plate	1.00
	Liner Anchorage	0.33
Containment Internal Structures		
North wall of Primary Shield Wall	Meridional Direction	0.87
	Hoop Direction	0.80
	Shear Reinforcement	0.92
East wall of Primary Shield Wall	Meridional Direction	0.75
	Hoop Direction	0.89
	Shear Reinforcement	0.65

Add new Table

Table 2.2.1-4 (2 of 4)

Critical Sections	Design Attributes R(1),(2),(3),(4),(5) (as appropriate) ≤ D/C {Maximum} Ratio ≤ Demand/Capacity	
Containment Internal Structures (cont.)		
South wall of Primary Shield Wall	Meridional Direction	0.83
	Hoop Direction	0.79
	Shear Reinforcement	0.19
Secondary Shield Wall	Meridional Direction	0.86
	Hoop Direction	0.92
	Shear Reinforcement	0.72
Refueling Pool Wall (S/N & W Wall)	Meridional Direction	0.88
	Hoop Direction	0.89
	Shear Reinforcement	0.91
Steam Generator Enclosure Wall (Circular & Straight Wall)	Meridional Direction	0.78
	Hoop Direction	0.9
	Shear Reinforcement	0.85
Pressurizer Enclosure Wall	Meridional Direction	0.82
	Hoop Direction	0.76
	Shear Reinforcement	0.91
Top Slab and Outer Wall in IRWST	Meridional Direction	0.94
	Hoop Direction	0.68
Operating Floor Slab at Elevation 156 ft 0 in	Radial Direction (at SSW Area)	0.85
	Radial Direction (at Central Area)	0.98
	Tangential Direction	0.93
Nuclear Island (NI) Common Basemat		
Tendon Gallery Outside Area of RCB Basemat (Section–01)	Flexural Rebar	0.91
	Shear Reinforcement	0.84
Tendon Gallery Upper Area of RCB Basemat (Section–02)	Flexural Rebar	0.81
	Shear Reinforcement	0.73
Tendon Gallery Below Area of RCB Basemat (Section–03)	Flexural Rebar	0.42
	Shear Reinforcement	0.46
R = 63.25’ to 70.5’ at El. 45’ to El. 78’ of RCB Basemat (Section-04)	Flexural Rebar	0.73
	Shear Reinforcement	0.1
R = 42.5’ to 63.25’ exclude Design Sections -06, -07, -08 (Section-05)	Flexural Rebar	0.99
	Shear Reinforcement	0.53
Cavity Area at El. 55’ to 66’ of RCB Basemat (Section-06)	Flexural Rebar	0.57
	Shear Reinforcement	0.9
x = 22’ to 39’ and y = 0’ to 18.75’ at El. 55’ to 76’ of RCB Basemat (Section-07)	Flexural Rebar	0.67
	Shear Reinforcement	0.74
x,y = 0’ to 42.5’ exclude Design Sections -06, 07 of RCB Basemat (Section-08)	Flexural Rebar	0.95
	Shear Reinforcement	0.81

Add new Table

Table 2.2.1-4 (3 of 4)

Critical Sections	Design Attributes $R^{(1),(2),(3),(4),(5)\ (as\ appropriate)} \leq D/C$ {Maximum} Ratio ≤ Demand/Capacity	
Nuclear Island (NI) Common Basemat (cont.)		
NI Basemat Below Auxiliary Building	EW Direction of Each Element Set (15)	0.93 (Top Layer)
		0.93 (Bottom Layer)
	NS Direction of Each Element Set (15)	0.94 (Top Layer)
		0.94 (Bottom Layer)
	Shear Reinforcement	0.97
Auxiliary Building (AB)		
Nort+A59:C63h wall of north MSIV house (column line AK, column line 17 to 20), Elevation 55 ft. to 174 ft.	Horizontal Direction of Each Zone	0.98
	Vertical Direction of Each Zone	0.85
	Shear Reinforcement	0.74
North wall of north AFWST (column line AJ, column line 15 to 22), Elevation 100 ft. to 137.5 ft.	Horizontal Direction of Each Zone	0.76
	Vertical Direction of Each Zone	0.71
	Shear Reinforcement	N/A
West wall of MCR (column line AE to AG, column line 12), Elevation 55 ft. to 195 ft.	Horizontal Direction of Each Zone	0.91
	Vertical Direction of Each Zone	0.87
	Shear Reinforcement	0.71
West wall of SFP (column line AF to AH, column line 23), Elevation 114 ft. to 156 ft.	Horizontal Direction of Each Zone	0.80
	Vertical Direction of Each Zone	0.77
	Shear Reinforcement	0.61
East wall of FHA (column line AF to AK, column line 26), Elevation 156 ft. to 213 ft. 6 in	Horizontal Direction of Each Zone	0.81
	Vertical Direction of Each Zone	0.63
	Shear Reinforcement	0.20
Floor slab of EDG-1 room at Elevation 100 ft.	EW Direction	0.54 (Top Layer)
		0.59 (Bottom Layer)
	NS Direction	0.82 (Top Layer)
		0.44 (Bottom Layer)
Floor slab of EDG-2 room at Elevation 100 ft.	EW Direction	0.78 (Top Layer)
		0.99 (Bottom Layer)
	NS Direction	0.78 (Top Layer)
		0.78 (Bottom Layer)

Add new Table

Table 2.2.1-4 (4 of 4)

Critical Sections	Design Attributes R(1),(2),(3),(4),(5) (as appropriate) ≤ D/C {Maximum} Ratio ≤ Demand/Capacity	
Auxiliary Building (AB) (cont.)		
Bottom Slab of SFP at Elevation 114 ft.	EW Direction	0.94 (Top Layer)
		0.94 (Bottom Layer)
	NS Direction	1.00 (Top Layer)
		1.00 (Bottom Layer)
Floor slab of MSE at Elevation 137 ft. 6 in	EW Direction	0.75 (Top Layer)
		0.46 (Bottom Layer)
	NS Direction	0.49 (Top Layer)
		0.68 (Bottom Layer)
Emergency Diesel Generator Building (EDGB)		
West wall, Elevation 100 ft. to 135 ft.	Horizontal Direction	0.75
	Vertical Direction	0.86
Center wall, Elevation 100 ft. to 135 ft.	Horizontal Direction	0.42
	Vertical Direction	0.91

(1) Provided Reinforecement vs Required Reinforcement

(2) Allowable Stress vs Rebar Stress

(3) Allowabe Stress vs Maximum Stress

(4) Allowabe Stress vs Concrete Stress

(5) For Liner/Anchorage: Allowable Stress vs Maximum Stress / Allowable Displacement vs Maximum Displacement

Add new Table

2.2.2 Emergency Diesel Generator Building

2.2.2.1 Design Description

The emergency diesel generator (EDG) building block is located adjacent to east side of the Nuclear Island with seismic isolation gap, and comprises two buildings, one that houses additional two generators and the other for the diesel fuel oil tank (DFOT). Both EDG and DFOT buildings are single-story structures which are composed of reinforced concrete basemat, shearwalls and slabs. The two basemats are horizontally separated by seismic isolation gap.

The EDG building block, including the critical sections and design attributes listed in Table 2.2.1-4, is designed and constructed to withstand the structural design basis loads associated with:

1. Normal plant operation (including dead loads, live loads, lateral earth pressure loads, and equipment loads, including the effects of temperature and equipment vibration)

2. External events (including rain, snow, wind, flood, hurricane generated missiles, and earthquake)

3. Internal events (including flooding, pipe rupture, equipment failure, and equipment failure generated missile)

   a) The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.

   b) The EDG building block is designed and constructed to withstand the structural design basis loads.

   c) The key dimensions of the EDG building block are described in Table 2.2.2-1.

2.2.2.2 Inspection, Test, Analyses, and Acceptance Criteria

The inspections, tests, analyses, and associated acceptance criteria for the EDG building block are specified in Table 2.2.2-2.

5. The critical sections and design attributes of the EDG building block are described in Table 2.2.1-4.

Table 2.2.2-2

Emergency Diesel Generator Building Block (1) ITAAC

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The basic configuration of the EDG building block is as shown in Figures 2.2.2-1 and 2.2.2-2.	1. Inspection of the basic configuration of the as-built EDG building block will be conducted.	1. The EDG building block conforms with the basic configuration as shown in Figures 2.2.2-1 and 2.2.2-2.
2. The EDG building block is designed and constructed to withstand the structural design basis loads.	2. A structural analysis will be performed to reconcile the as-built EDG building block structure with the structural design basis loads.	2. A report exists and concludes that the EDG building block can withstand the structural design basis loads.
3. The key dimensions of the EDG building block are as described in Table 2.2.2-1, Figure 2.2.2-1, and Figure 2.2.2-2.	3. Inspection will be performed to verify that the as-built ~~wall and slab thickness~~ conform to the structural configuration.	3. A report exists and concludes that the EDG building block as-built ~~wall and slab thickness~~ conform with the structural configuration as described in Table 2.2.2-1, Figure 2.2.2-1, and Figure 2.2.2-2.

(1) EDG building block includes EDG building and DFOT building.

Add item 5 in next page

critical section layout and elevations, including wall and slab thickness

Table 2.2.1-4,

critical section layout and elevations, including wall and slab thickness

5. The critical sections and design attributes of the EDG building block are described in Table 2.2.1-4.	5. Inspection will be performed to verify that the as-built EDG Building block, including critical sections and design attributes are in accordance with codes and standards approved in the design certification. Deviations from the design due to as-built conditions will be reconciled for the design basis loads.	5.i A reports exists and concludes that the as-built EDG building block structural design conform with the critical sections and design attributes as described in Table 2.2.1-4.
		5.ii A report exists which reconciles deviations during construction and concludes that as-built EDG building block structures, including the critical sections and design attributes, conform to the approved design in the design certification and will withstand the design basis loads.

2.2.10 Seismic Analysis Methods

The seismic Category I safety-related structures of the APR1400 standard plant design are modeled as three-dimensional finite element models to perform seismic analyses for the safe shutdown earthquake. The structures for which seismic analyses are performed are as follows:

The time-history analyses with complex frequency response method considering the soilstructure interaction effects for the generic site conditions are performed to generate the seismic responses of above structures such as story shear forces and in-structure response spectra (ISRS). For structural design of the reactor containment building containment structure and internal structure, the response spectrum analyses with ISRS at the reactor containment building El. 78′-0″ are performed to determine design member forces and moments due to seismic loads. For structural design of the auxiliary building, emergency diesel generator building and diesel fuel oil storage tank room, the equivalent static analyses to story shear forces are performed to determine design member forces and moments due to seismic loads.

Table 2.2.10-1 shows the key locations where comparisons of ISRS are needed by a COL applicant if a site-specific seismic analysis evaluation is required. The key locations are locations that are expected to represent the minimum and maximum seismic responses in the structure and include the basemat and roof slab elevations and the support elevation of the major equipment.

Add Tier 1, Subsection 2.2.10

Table 2.2.10-1

ISRS Output Locations

Structures	Elevation	Remarks
Reactor Containment Building Internal Structure for primary shield wall and secondary shield wall	78'-0" 100'-0" 156'-0" 191'-0"	Basemat elevation Support elevation of major equipment Operation floor elevation Top of internal structure
Reactor Containment Building Containment Structure	104'-0" 160'-0" 332'-0"	Ground floor elevation Operation floor elevation Top of dome
Auxiliary Building	55'-0" 100'-0" 156'-0" 213'-0" 216'-9"	Basemat elevation Ground floor elevation Main control room floor elevation Roof of auxiliary building (1) Roof of auxiliary building (2)
Emergency Diesel Generator Building	100'-0" 135'-0"	Basemat elevation Roof slab elevation
Diesel Fuel Oil Storage Tank Room	63'-0" 100'-0"	Basemat elevation Roof slab elevation

Add Tier 1, Subsection 2.2.10