Ronald A. Jones
Vice President
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April 3, 2014
NND-14-0188
10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3
Combined License Nos. NPF-93 and NPF-94
Docket Nos. 52-027 & 52-028

Subject: LAR 14-01 License Amendment Request: Auxiliary Building Structural Floor Details

In accordance with the provisions of 10 CFR 50.90, South Carolina Electric & Gas Company (SCE&G) requests an amendment to the Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3 combined licenses (COLs) numbers NPF-93 and NPF-94, respectively. The proposed amendment would depart from VCSNS Units 2 and 3 plant-specific Design Control Document (DCD) Tier 2* material contained within the Updated Final Safety Analysis Report (UFSAR) to identify design details of the floors of the auxiliary building that may vary due to design and loading conditions, in accordance with code requirements.

Enclosure 1 provides the description, technical evaluation, regulatory evaluation (including the Significant Hazards Consideration determination) and environmental considerations for the proposed changes. Enclosure 2 provides markups to publicly releasable information, depicting the requested changes to the VCSNS Units 2 and 3 UFSAR. **Enclosure 3 provides markups to the figure containing security-related information protected under 10 CFR 2.390d. Please withhold Enclosure 3 from public release.**

SCE&G requests NRC staff review and approval of the license amendment by July 22, 2014. Approval by this date will allow sufficient time to implement the licensing basis changes prior to placement of concrete on affected auxiliary building floor precast panels. SCE&G expects to implement the proposed amendment within 30 days of approval.

This letter contains no regulatory commitments.

In accordance with 10 CFR 50.91, SCE&G is notifying the State of South Carolina of this LAR by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Alfred M. Paglia by telephone at (803) 941-9876, or by email at apaglia@scana.com.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 3RD day of April, 2014.

Sincerely,

Ronald A. Jones
Vice President
New Nuclear Operations

JRB/RAJ/jrb

Enclosure 1: Virgil C. Summer Nuclear Station Units 2 and 3 – License Amendment Request: Auxiliary Building Structural Floor Details (LAR 14-01)

Enclosure 2: Virgil C. Summer Nuclear Station Units 2 and 3 – Proposed Changes to Licensing Basis Documents (LAR 14-01)

Enclosure 3: Virgil C. Summer Nuclear Station Units 2 and 3 – Proposed Changes to Licensing Basis Documents To Be Withheld from Public Disclosure Under 10 CFR 2.390d (LAR 14-01)

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South Carolina Electric & Gas Company

Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3

NND-14-0188

Enclosure 1

License Amendment Request:

Auxiliary Building Structural Floor Details

(LAR 14-01)

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1. Summary Description

In accordance with 10 CFR 50.90, South Carolina Electric and Gas Company(SCE&G), the licensee for Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3, requests an amendment to Combined License (COL) Numbers NPF-93 and NPF-94, for VCSNS Units 2 and 3, respectively.

Changes are proposed to the Updated Final Safety Analysis Report (UFSAR) descriptions and figures related to the structural design of the floors in the auxiliary building. These changes are primarily for constructability. The UFSAR text and figures proposed to be changed provide information for these floors and are identified as Tier 2* information or related Tier 2 information that involves changes to Tier 2* information. Changes identify how the floors other than the critical sections vary from the detail design shown on the figures. Notes are added to the figures to describe the specific variations in the detail design. The variations in the detail design, which include information such as size and spacing of reinforcement in the floors and the spans of the floors, are the result of variations in the geometry of the floors and variations in the loads for which the floors are designed. The floor designs with the design variations satisfy applicable design code requirements.

The floors of the auxiliary building are constructed with concrete placed on metal decking set on structural steel beams. Floors are also constructed with cast-in-place concrete over precast concrete panels.

Changes to the figure (Figure 3H.5-8) showing the floor design of concrete placed on precast panels are proposed to change the representation of the reinforcement in the precast panel and the cast-in-place panel. This figure is also changed to incorporate the requirements for development and anchoring of headed reinforcement from ACI 318-11, Section 12.6, which were previously incorporated into the UFSAR via COL license amendments. The representation of the beam supports and panel supports is changed to show the use of deformed wire anchors instead of headed studs for the embedment in the concrete.

The figure (Figure 3H.5-1) showing the location of the critical section is changed to make the designation on the figure match the item number in the list of critical sections in the text in Subsection 3H.5.

2. Detailed Description

The affected UFSAR subsections and figure are proposed to be modified as discussed below and shown in Enclosure 2.

A. UFSAR Subsection 3H.1, second paragraph, is revised to clarify the information about the 3H.5 figures included in the UFSAR. An editorial correction is made to capitalize the first word (“subsections”).

B. UFSAR Subsection 3H.5, first paragraph, is revised to note that twelve of the critical sections are included in Figure 3H.5-1. Reference to APP-GW-GLR-602 is added for two of the critical sections.

C. UFSAR Subsection 3H.5.2, first paragraph, is revised to clarify and add to the information on span and spacing of beams in composite floor structures. Reference to AISC N690 requirements for the design of beams is added.

D. UFSAR Subsection 3H.5.2, second paragraph, information is added to define the variances between the figure and other floor sections. Explicit conformance to AISC N690 and ACI 349 for this design is added. Information is added for a third size of metal decking.

E. UFSAR Subsection 3H.5.2.2, first paragraph, is revised to clarify that the reference to the design summary table is specific to the floor identified in the table. The size of the beam is removed and replaced with reference to the figure. Also, an editorial correction is made to the number in reference to Table 3H.5-11 by removing an extra period.

F. UFSAR Subsection 3H.5.3, first paragraph, is revised to identify that the size of the precast concrete panels varies from 8 to 12 inches thick in structures other than the critical section. The thickness values for the cast-in-place reinforced concrete based on a specific 8 inch precast panel thickness are removed. Information on the range of span and width of the precast panels is added. The sentence identifying the examples of reinforced concrete floors is moved to after the revised first paragraph. The description of the reinforcement design is separated into a separate paragraph and the location of the main reinforcement is changed to the cast-in-place concrete. Information is added to identify that dimensions, reinforcement and other design details vary at locations other than the critical sections. The information about the precast panels is expanded and separated into a separate paragraph. Reference to ACI 349, Chapter 17 requirements is added for the shear reinforcement connecting the precast panel and the cast-in-place concrete. A phrase is added to explain how the cast-in-place concrete and precast panel act together as a composite reinforced concrete slab. A new paragraph is added to describe the differences in the structural model and detail design of the floor to wall connections. A new paragraph is added to describe the evaluation of the difference in the response frequency of the floor with the detail design of the connections.

G. UFSAR Subsection 3H.5.3.1, first paragraph, is revised and to clarify that reference to the design summary table is specific to the floor identified in the table. Also, an editorial correction is made to the number in reference to Table 3H.5-12 by removing an extra period.

H. UFSAR Figure 3H.5-1 is revised as follows:

    1. On Sheet 1 between column lines M and P change the “7” label to “6”
    2. On Sheet 1 between column lines I and L change the “9” label to “8”
    3. On Sheet 1 between column lines 7.3 and 9.2 change the “8” label to “7”
    4. On Sheet 2 Move the arrows for Item 5 to near the intersection of wall N and the shield building cylinder wall.

5. On Sheet 2 between column line N and K-2 change the “6” label to “5”
6. On Sheet 3 at elevation 135′-3″ change the “7” to “6”
7. On Sheet 3 at the intersection of the shield building roof and the outer tank wall change the “10” label to “9”
8. On Sheet 3 at the intersection of the shield building roof and the inner tank wall add a circle and label it “10”

I. UFSAR Figure 3H.5-6 is revised as follows:

1. In Section A-A; Remove the “TYP.” from the W 14x26 floor beam designation consistent with adding the notes
2. Revise the representation of the beam support to show deformed wire anchors embedded in the wall instead of headed studs.
3. In Section A-A, add a designation “Mechanical Couplers (As Required)” to the reinforcement couplers shown at the interface of the floor and wall
4. To the Label “PLAN VIEW” add “Notes 1, 3, 6”
5. To the Label “SECTION A-A” add “Notes 1, 2, 3, 4, 5, 6, & 7”
6. Move note 1 to the new list of notes and renumber to Note 2.
7. Add notes 1 and 3 through 7 to the figure. Renumber current note 1 to note 2.

   1) DETAIL SHOWN IS SPECIFIC TO THE COMPOSITE FLOOR AT EL. 135′-3″ AT INTERSECTION WITH WALL M. REFER TO SUBSECTION 3H.5.2 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.

   2) REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.

   3) FLOOR BEAM SIZE AND SPACING ARE DESIGNED BASED ON FLOOR LOAD AND GEOMETRY TO SATISFY AISC N690 REQUIREMENTS. THE BEAM SIZES USED ARE PREDOMINATELY W14X26 AND W14X48. THE RANGE OF BEAM SIZES USED IN OTHER LOCATIONS IS FROM W10 TO W44. THE SPACING BETWEEN THE BEAMS IS PREDOMINATELY IN A RANGE OF 5 TO 6 FEET.

   4) THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.

   5) REINFORCEMENT SIZE AND SPACING ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.

   6) THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.

7) THE DETAIL DESIGN, LOCATION AND EMBEDMENT OF THE BEAM SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.

J. UFSAR Figure 3H.5-8 is revised as follows:

1. In Section F Looking North, replace the bottom #8@12″ reinforcement bar extending into the walls with a bar that is contained within the precast panel.
2. In Section F Looking North, add a #8@12″ reinforcement bar extending into the walls with headed reinforcement to the lower portion of the cast-in-place concrete. Add a label to this bar identifying the #8 @ 12" reinforcement arrangement.
3. In Section F Looking North, extend the length of the reinforcement bars terminated with headed reinforcement
4. In Section F Looking North, on the left side of the section view, replace "Anchor Plate" with "T-Head"
5. In the floor in the left side of the Section F View shift the misplaced small circle representing a north south reinforcement bar to the correct location above the east west rebar.
6. At each end of the Section F View the drawing convention to define the 3″ distance is changed to move the arrows.
7. In Section F Looking North, revise the representation of the panel support to show deformed wire anchors embedded in the wall instead of headed studs.
8. To the Label "Section F Looking North" add "Notes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15"
9. In Section C Looking West, extend the length of the reinforcement bars terminated with headed reinforcement
10. In Section C Looking West, add designation of perpendicular longitudinal reinforcement above lower reinforcement bar in cast-in-place concrete and add arrow from "#8@12″" to rebar.
11. In Section C Looking West, replace "Anchor Plate" with "T-Head"
12. In Section C Looking West, add "(As Required)" to the designation "Mechanical Couplers" for the reinforcement couplers shown at the interface of the floor and wall
13. At the left end of the Section C View, the drawing convention to define the 3″ distance is changed to move the arrows.

14. To Label “Section C Looking West”, add “Notes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15”
15. In FLOOR EL. 135′ 3″ view, add “#8@12 B” for Bottom rebar.
16. To Label FLOOR EL. 135′ 3″ add “NOTES 1, 5, 7, 9, 13, 15”
17. To Label FLOOR EL. 133′ 11″ add “NOTES 1, 3, 6, 7, 16, 17”
18. Add the following Notes to the figure

    1) DETAIL SHOWN IS SPECIFIC TO THE REINFORCED CONCRETE FLOOR AT EL. 135′-3″ (OPERATIONS WORK AREA CEILING). REFER TO SUBSECTION 3H.5.3 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.

    2) REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.

    3) THE PRECAST PANEL THICKNESSES ARE NOMINALLY 8, 10, AND 12 INCHES.

    4) THE OVERALL FLOOR THICKNESSES ARE NOMINALLY 24 AND 36 INCHES

    5) THE THICKNESSES OF THE CAST-IN-PLACE CONCRETE ARE NOMINALLY 14, 16, 24, AND 28 INCHES.

    6) REINFORCEMENT SIZE AND SPACING FOR THE PRECAST PANEL ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.

    7) THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.

    8) REINFORCEMENT SIZE AND SPACING IN THE CAST-IN-PLACE CONCRETE ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.

    9) THE SIZE AND SPACING OF THE SHEAR STIRRUPS SATISFY ACI 349 REINFORCEMENT REQUIREMENTS FOR IN PLANE SHEAR AND TO PROVIDE FOR COMPOSITE ACTION.

    10) THE DETAIL DESIGN, LOCATION, AND EMBEDMENT OF THE PANEL SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE, INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.

    11) THE THICKNESS OF THE ADJACENT WALL IS BASED ON THE WALL DESIGN REQUIREMENTS AND LOCATION.

    12) THE ADJACENT WALL MAY EXTEND ABOVE THE ELEVATION OF THE FLOOR.

13) THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.
14) THE DESIGNS OF THE ADJACENT FLOORS ARE BASED ON THE FLOOR DESIGN REQUIREMENTS.
15) THE ELEVATION OF THE TOP OF CONCRETE IS BASED ON LOCATION AND DESIGN REQUIREMENTS FOR THE FLOORS.
16) THE WIDTH OF THE PRECAST PANELS IS DETERMINED BY LOCAL GEOMETRY.
17) THE TOP OF CONCRETE ELEVATION FOR THE PRECAST PANELS IS BASED ON THE FLOOR DESIGN REQUIREMENTS AND LOCATION.

Basis for the Requested Changes

The proposed changes revise the descriptions of the design of the auxiliary building floors in UFSAR Subsection 3H.5 and the associated figures to change the descriptions of the floor structures to identify and describe how detail design information varies in the floor locations other than the critical sections. The descriptions of the floors are rewritten to separate the general description of the floor design from the description of the critical sections. Notes are added to the figures to identify the variations. Design of the critical sections does not vary from the details provided in the UFSAR figures. The changes in the description identify and describe differences between the critical section design and the design of similar floors in other locations.

Subsection 3H.1 is revised to clarify the reference to the 3H.5 figures for the critical sections.

First paragraph of Subsection 3H.5 is revised to note that twelve of the critical sections are included in Figure 3H.5-1. Reference to APP-GW-GLR-602 is added for the two critical sections which are not shown on Figure 3H.5-1.

The introductory paragraphs of Subsection 3H.5.2 provide a general description of composite floors, that is, concrete over metal decking floors. The metal decking is corrugated to provide strength and stiffness to resist the load of wet concrete prior to the concrete setting. The proposed changes revise the description of the design of the floor with concrete placed on metal decking in UFSAR Subsection 3H.5.2 to change the description of the floor structure to identify how the information varies from that shown in UFSAR Figure 3H.5-6 for key structural design elements other than in the critical sections. The changes in the description identify and describe detail design differences between the critical section design and the design of similar floors in other locations. Information is added to identify that the reinforcement size and spacing, beam size, beam support and configuration of adjacent walls and floors varies in locations other than the critical sections. The beam sizes used are predominately W14x26 and W14x48. The range of beam sizes used in other locations is from W10 to W44. The smaller beams are used in locations where clearance is an issue or because of very short spans. The largest beams are used because the geometry requires a long span or other beams tie into a supporting beam. Most of the beams have a span of 15 to 25 feet. The span ranges from as short as 2 feet 6 inches to as large as 38 feet 6 inches. The spacing between the beams is predominately in a range of 5 to 6 feet. In some places due to geometry considerations the spacing is as small as 3 feet and as large as 8 feet. The specific changes to the UFSAR are identified below. The changes include an addition to the size of metal decking used. Explicit conformance to AISC

N690 and ACI 349 is added. Reference to the design summary is clarified as applying to the specific floor identified in the table. An editorial change corrects the number in reference to Table 3H.5-11 by removing an extra period. Reference to the floor beams as typically W14x26 is removed and replaced with a reference to the figure.

The proposed change revises the description of the design of the floors in the UFSAR Subsection 3H.5.3 to change the description of the reinforced concrete slabs, that is cast-in-place concrete over precast concrete panels, to identify how information for structural design elements varies in final design in locations other than the critical sections. The thickness values for the cast-in-place reinforced concrete based on a specific 8 inch precast panel thickness are removed from the general description. The description of floors using precast panels is changed to identify a range of precast panel thickness used in the design. The overall thicknesses of these types of floor are not changed. The span of the panels is mostly between 13 to 20 feet; the overall range of spans is from 5 to 21 feet. The width of the panels ranges from 4 to 19 feet with most being 7 to 14 feet. The number of panels side by side across the floor section ranges from one to eight.

Information is added to Subsection 3H.5.3 to note that the figure shows key structural elements for this type of floor at other locations. The added information clarifies how the design of other similar floors varies from the design details shown in the figure and describes the variations. A statement is added to state conformance to ACI 349 and ACI 318-11, Section 12.6 requirements for reinforcement.

The proposed change activity includes the change in the location of the main reinforcement to the cast-in-place concrete. The UFSAR is rewritten to describe the design of the precast panels, the cast-in-place concrete, and the stirrups tying the two elements together. For the design of the cast-in-place portion of the floor, post-construction loads are conservatively assumed to be resisted only by the cast-in-place concrete and the reinforcement placed within it. The precast panel reinforcement is designed to resist the weight of the panel and the wet weight of the cast-in-place concrete during construction. Although the precast panels are not credited in the design evaluation of post construction loads, the precast panels and the cast-in-place concrete are made to act together as a composite reinforced concrete slab by roughening the top surface of the precast panel and providing shear ties between the two elements. Reference to ACI 349, Chapter 17 is added for the shear reinforcement connecting the precast panel and the cast-in-place concrete.

Text is added to explain the impact of the detail design of the floor system on the structural analyses. The structural model used to analyze the auxiliary building is a finite element model used to evaluate seismic and other global loads on the structure. The structural model does not include the detail design of the floor to wall connection and assumes a homogeneous thickness of concrete over the entire floor system. The detail design of the floor system is different than this assumption because it includes a small gap between the precast panel and the wall and the precast panel reinforcement does not extend into the wall. Evaluation of the design of the connection of the floor and wall using a detailed finite element analysis of the floor and connection to the wall shows that the differences in the design detail of the connection is not a significant effect on the design and analysis of the overall auxiliary building structure. The differences are not significant because the small changes in natural frequencies do not result in a significant change in the seismic response of the floor system.

The structural model of the auxiliary building includes floor to wall connections for the reinforced concrete floor that are fixed over the full thickness of the floor system. The detail design of the connections, with direct contact with the wall only in the cast-in-place portion, maintains the fixed connection condition. In the detail design the thickness of the cast-in-place concrete is in direct contact with the wall over half of the total floor thickness. The design of the reinforcement satisfies the requirement, including fully developing the floor reinforcement in the wall, for seismic design in ACI 349, Chapter 21. These design elements of the floor system and the connection with the wall provide a fixed connection that transfers forces and moments from the floor to the wall.

The change in stiffness of the floor system with the detail design of the connection is another important consideration in the seismic response of the overall structure. Evaluation of the floor system and connection detail design shows change of the stiffness of the floor system is not significant. Because the precast panel and the cast-in-place concrete act together as a composite floor system, much of the stiffness provided by the precast panel acts in the composite system. That is, much of the stiffness of the floor is due to the composite action of the precast concrete and cast-in-place concrete acting together and not due to the connection of the precast panel and wall. There is a reduction in stiffness in the floor due to the gap between the panel and wall and due to edge effects consideration in the precast panel adjacent to the wall. In a similar manner, when two way action is considered, the gap between precast panels and between the side of the panels and the walls results in a reduction in stiffness. The reduction in the stiffness of the floor system is not significant because the floors, when the effective contribution of the precast panel is included, are rigid with a natural frequency above 33 Hz. The 33 Hz threshold is established as the minimum cut off frequency for rigid structures in Subsection 3.7.2 of the UFSAR.

An editorial change corrects the number in reference to UFSAR Table 3H.5-12 by removing an extra period. Reference to the design summary is clarified as applying to the specific floor identified in the table.

The labels for the designation of the critical sections on UFSAR Figure 3H.5-1 are changed to match the item numbers in the list in UFSAR Subsection 3H.5.1. A new label for Item 10 is added to the figure.

Changes to UFSAR Figure 3H.5-6 remove the designation of the floor beam size as typical (TYP). The representation of the beam supports is changed to show use of deformed wire anchors embedded in the concrete. Notes are added to define the variations in other similar floor sections from the critical section design shown in the figure. The notes are described below in the Licensing Basis Change Description. The design of the critical section depicted in UFSAR Figure 3H.5-6 is unchanged.

UFSAR Figure 3H.5-8 is revised to change the representation of the flexural reinforcement design shown in the figure. The original figure shows reinforcement extending from the precast panel into the adjacent wall. This design is changed to support construction sequencing in which the concrete for the walls is placed before the precast panel is put in place. The figure is changed to show the reinforcement terminating within the precast slab and reinforcement added to the bottom of the cast-in-place portion. This additional reinforcement in the cast-in-place portion extends into the wall. The figure is also changed to fix discrepancies with drawing convention to show thicknesses in adjacent floors. The representation of the panel supports is

changed to show use of deformed wire anchors embedded in the concrete. In the plan view of the floor the bottom reinforcement (#8@12″) is added. Notes are added to define the variations in other similar sections from the critical section design shown in the figure. The notes are described below in the Licensing Basis Change Description.

UFSAR Figure 3H.5-8 is also changed to modify the location of the T-Heads on headed reinforcements to be consistent with the criteria for development of headed reinforcement. The description on the figure for the anchoring of reinforcement is changed from Anchor Plate to T-Head to accurately reflect the use of headed reinforcement. A note referring to UFSAR Subsection 3.8.4.4.1 for the requirements for development of headed reinforcement is added to the figure. These criteria use ACI 318-11, Section 12.6 requirements and have been previously approved and incorporated into the licensing basis as part of the license amendment to include the use of headed reinforcement above the basemat. UFSAR Subsections 3.8.3.5, 3.8.4.4.1, and 3.8.4.5.1 of the licensing basis were previously revised with a license amendment request to incorporate these criteria. See SCE&G COL Amendments 2 and 5 (Adams Accession Numbers ML13056A183 and ML13149A314, respectively).The figure is also changed for consistency with drawing conventions.

3. Technical Evaluation

Structure, System, Component and/or Analysis Description

The nuclear island structures consist of the containment, shield building, and auxiliary building. The functions of the nuclear island structures are to provide support, protection, and separation for the seismic Category I mechanical and electrical equipment located in the nuclear island.

The nuclear island structures provide protection for the safety-related equipment against the consequences of either a postulated internal or external event. The nuclear island structures are designed to withstand the effects of natural phenomena such as hurricanes, floods, tornados, tsunamis, and earthquakes without loss of capability to perform safety functions. The nuclear island structures are designed to withstand the effects of postulated internal events such as fires and flooding without loss of capability to perform safety functions. Some floors provide radiation shielding.

The floors in the auxiliary building are seismic Category I structures and provide support and anchorage for component and piping supports and other attachments. Some floor structures in the auxiliary building are constructed with metal decking supporting the wet concrete prior to the concrete setting. These floor structures in the auxiliary building are designed as composite slabs in accordance with AISC N690. Other floor structures in the auxiliary building are designed as reinforced concrete slabs with cast-in-place concrete placed on precast panels in accordance with ACI 349.

The design of headed reinforcement is consistent with the criteria for development of headed reinforcement which utilize ACI 318-11, Section 12.6 requirements and which have been previously approved and incorporated into UFSAR Subsections 3.8.3.5, 3.8.4.4.1, and 3.8.4.5.1 of the licensing basis.

Supporting Technical Details

The auxiliary building floors are seismic Category I structures and are designed for dead, live, thermal, pressure, safe shutdown earthquake, and loads due to postulated pipe breaks. The variation in these loads and in the geometry of the structure results in the variation of design details, including reinforcement arrangement, size of supporting beams, design of beam and panel supports, and the size of ribs from the use of corrugated metal decking. The licensing basis changes note that floors in the auxiliary building, other than the critical sections, vary in design details from the details shown in the UFSAR figures. The detail design changes do not change the design loads. The design of the floors, including those with variances with the details shown in the figures, remains in conformance with applicable requirements in ACI 349, AISC N690, and supplemental requirements in Section 3.8 of the UFSAR including the requirements for headed reinforcement in ACI 318-11, Section 12.6. These requirements were confirmed during the review of the design certification and the review of previous license amendment requests and provide a sufficient margin of safety to structural failure for the design basis loads. The editorial changes in reference to the table and figure numbers do not change the design or the design requirements.

The addition of 2.5 inch metal decking to the design of the metal decking in a composite floor, concrete over metal decking, is based on the use of stronger, heavier metal decking where

geometry considerations require longer spans between beams. The heavier decking is manufactured with thicker plate and shallower corrugations (ribs). There is no adverse impact on the floor design because the more shallow corrugations result in a thicker floor above the ribs. There is no change in the conformance of the design with the applicable codes and standards.

The design of the concrete and reinforcement in the floor sections satisfies the requirements of ACI 349 for reinforcement. Where headed reinforcement is used the requirements of ACI 318-11, Section 12.6 identified in UFSAR Subsection 3.8.4.4.1 are satisfied. The reinforcement designs for floor sections other than the critical sections use many combinations of size and spacing of reinforcement bars depending on the loading conditions and geometry. In the vicinity of openings and penetrations the size and spacing of the reinforcement varies as necessary to satisfy ACI 349 requirements. The design information for the adjacent wall and floors shown in Figure 3H.5-8 is specific to the critical section. For other floor sections the designs for the adjacent walls and floors, including thickness, reinforcement design, and type of construction, are different based on design requirements and geometry for the wall or adjacent floor. In some locations the adjacent wall is a structural module. The differences in the wall and adjacent floor design do not change the design requirements for the floors.

The design of the supporting beams, beam supports, shear connectors, and the composite action of the floor of concrete on metal decking is evaluated according to the requirements of AISC N690. Predominately the beams used for the composite floor are W14x26 and W14x48. The range of beam sizes used in other locations is from W10 to W44. The smaller beams are used to provide clearance or for very short spans. The heavier beams are used because of heavier loads or longer spans of beams. In a few cases large beams are used where other beams tie into a large beam. The beams usually have a span of 15 to 25 feet with an overall range of spans of 2 feet 6 inches to 38 feet 6 inches. The beam spacing and beam to wall spacing is usually approximately 5 to 6 feet with an overall range of 3 to 8 feet. The variation in the length of spans and spacing between beams is generally required by the local geometry. The addition of the range of beam sizes to the UFSAR does not require a change in the nuclear island seismic model and the various beam sizes were previously included in the design because these beams were already represented in the models.

The beam supports and panel supports are shown with deformed wire anchors embedded in the concrete in the revised figures. The deformed wire anchors are used at the critical section as well as other floor sections. The embedment design satisfies the requirements of ACI 349, Appendix B and other sections of ACI 349 as required by Appendix B for deformed wire anchors. The number and spacing of the anchors can be different than that shown in the figure based on local loads. Headed shear studs can be used in lieu of deformed wire anchors. The design of the portion of the support exterior to the wall satisfies AISC N690 requirements. Gussets and supporting plates can have a different size or shape based on the local loading condition and orientation between the beam and wall. Additional plates or structural shapes not shown in the figure can be used. In some locations the beam and panel supports are connected to a structural wall module.

The changes in the design of the cast-in-place concrete over precast concrete panel type of floor replace the description of the design of the floor system. The original design includes precast panel reinforcement anchored in the wall. In this original design the full depth composite section is used in the longitudinal reinforcement design for the precast panel in the

direction parallel with the reinforcement that extends out of the precast panel and is anchored into the wall. The new design is such that the flexural reinforcement for the cast-in-place portion of the floor is designed to resist the floor design loads. As explained below, although the capacity of the precast panels is neglected in the design of the floor reinforcement design, the precast panels and the cast-in-place concrete act together as a reinforced slab in the auxiliary building finite element analysis.

The precast panels are neglected in determining floor strength and load carrying capacity. That is, the longitudinal reinforcement in the cast-in-place portion of the floor is sized to resist the design loads on the floor without reliance on the longitudinal reinforcement in the precast panel. The floor reinforcement located in the cast-in-place portion of the floor is fully developed in the walls in accordance with ACI 349 Chapter 12 and Chapter 21. The design of the connection provides a fixed connection between the floor and wall. Out-of-plane shear forces from both the precast panel and cast-in-place concrete portions of the floor slab are transferred to the supporting wall by means of the horizontal floor slab reinforcement located within the cast-in-place portion of the floor. The floor reinforcement transfers the out-of-plane shear forces through shear friction in accordance with ACI 349, Section 11.7. The design of these floors, with the reliance on only the longitudinal reinforcement in the cast in-place concrete sized to resist design loads, is a conservative approach in conformance with applicable requirements in ACI 349, Section 17.2 which permits a portion of the member to be used for resisting shear and moment. The design of these floors also remains in conformance with supplemental requirements in Section 3.8 of the UFSAR. The floors with variations in the design details including the span, width, and thickness of the floor satisfy the design requirements for the floors.

The precast panel is part of the seismic Category I floor slab. The reinforcement in the precast panel is sized to support the weight of the panels and the weight of the wet concrete during construction. The precast panels are counted on for mass and stiffness in the structural analysis of the structure. The stiffness of the floor is based on the combined thicknesses of the concrete in the cast-in-place portion and the precast concrete panel. The shear reinforcement tying the precast and cast-in-place portions of the floor system together is detailed and analyzed for post-construction loading as a composite floor comprised of the precast panels and the cast-in-place concrete working together. Although it is not relied on for post construction loads, the reinforcement in the bottom of the precast panel is evaluated using ACI 349 Chapter 10 criteria for minimum and maximum reinforcement. The reinforcement in precast panel satisfies the ACI 349 limits. The precast panels are included in the floor thickness for evaluation of radiation protection.

ACI 349 Chapter 17, including requirements for shear stirrups and preparation of the surface of the precast panels, is followed in order to achieve the composite behavior between the precast panel and the cast-in-place concrete for analysis purposes. The behavior of the slab in the overall building structure is based on the composite action. The precast concrete panel is anchored to the cast-in-place concrete through the shear stirrups and is an essential structural element of the floor. Transfer of horizontal shear is accomplished through roughening of the precast panel top surface in accordance with ACI 349-01 Section 17.5.2.3 and shear ties provided in accordance with ACI 349-01 Sections 17.5 and 17.6. The precast panel is considered seismic Category I because of the composite behavior of the floor system and the effect on the structure response. The seats on which the precast panels are placed support the

precast panel and the wet concrete loads but are not relied on for support of the floor system once the concrete is set.

The detail design includes a ½ inch wide gap between the precast panel and the walls and no reinforcement directly tying the precast panel to the walls. Along the sides of two precast panels placed next to each other will be a ½ inch gap equal in depth of the panels. The reinforcement in the precast panel running perpendicular to this gap is not continuous between two panels nor does it extend out of the panel into the wall parallel to the gap.

The auxiliary building floor response and design forces/moments are calculated from the building finite element analysis (FEA) model. Reinforced concrete structures are modeled with linear elastic uncracked properties; however, the modulus of elasticity is reduced to 80 percent of its value to represent the stiffness that reflects the observed behavior of concrete when stresses do not result in significant cracking. The floors constructed with precast panels are considered in the building FEA model as homogeneous units of thickness equivalent to the combination of the cast-in-place thickness plus the precast panel thickness. The presence of the gaps and discontinuity of reinforcement in the precast panels has an impact on the out-of-plane response of the floors. The one-way and two-way behavior is affected by the ½ inch gaps between the precast panels and the wall as well as the regions of undeveloped reinforcement at the edges of the precast panels. The two-way behavior is further affected by the ½ inch gap between precast panels because the gap occurs in a region where the precast panel is in tension due to two-way action, and the tension section is interrupted by the presence of the gaps and undeveloped reinforcement. In order for the response of the floor to remain rigid, the effect of the gaps and discontinuity of reinforcement must not degrade the floor response below 33 Hz. Therefore, justification is provided to demonstrate that (1) 80 percent effective modulus remains acceptable for predicting cracked concrete behavior for the design loads; and (2) the floor response is not degraded below 33 Hz.

Because there are several combinations of pre-cast panel thickness, span length, and aspect ratio for both the one-way and two-way floors, bounding conditions were chosen for evaluation. The bounding condition for one-way behavior was created by combining the longest span with the highest ratio of precast to cast-in-place thickness from all of the one-way spans. For two-way behavior, the additional effect of the ½ inch gap between panels was studied for the bounding section.

In order to demonstrate that the 80 percent effective modulus remains acceptable, various one-way and two-way floor FEA models were studied. Linear FEA were performed with a homogenous material property equivalent to an 80 percent effective modulus, and include the ½ inch gaps between the precast panels and the walls, and the ½ inch gap between adjacent precast panels. Non-linear FEA were also performed for comparison to the linear FEA.

The non-linear FEA models include both concrete and reinforcement modeled directly, with undeveloped reinforcing bar at the edges of the precast panels removed. The non-linear FEA uses a concrete cracking model to predict regions of concrete cracking due to tension. The non-linear FEA also includes the ½ inch gaps between the precast panels and the walls, and the ½ inch gap between adjacent precast panels. In order to predict the level of cracking, a uniform load combining dead load, live load, and seismic loads equivalent to 1.67 times SSE were applied to the non-linear FEA.

Displacement results between the linear and non-linear models were compared. For one-way action, the displacement due to the non-linear models predicting cracking was 12 percent less than the displacement from the linear model with 80 percent effective modulus. For two-way action, the displacement due to the non-linear models predicting cracking was 8 percent greater than the displacement from the linear model with 80 percent effective modulus. Therefore, because the displacements from the linear and cracked concrete model are substantially in agreement for both one-way and two-way action, the use of an 80 percent effective modulus in linear analysis remains appropriate for predicting the level of cracking for design loads.

The bounding level of “softening” (that is, a reduced effective section modulus) was determined by reducing the effective modulus of the linear one-way model with full composite section depth (i.e. no gaps) to achieve a displacement equivalent to the displacement from the model that includes the ½ inch gaps and concrete cracking. The bounding result is a 53 percent effective modulus, or an additional 34 percent reduction to the 80 percent effective modulus.

The bounding change to the floor response was calculated by performing a modal analysis of the bounding floor. The bounding floor vertical response at 80 percent effective modulus is 45 Hz. After “softening” to 53 percent effective modulus, the bounding floor vertical response is 37 Hz, a 17 percent reduction in vertical response. The vertical floor response remains well within the rigid range of response. The change in seismic demand due to “softening” was studied by comparison of floor and adjacent wall demand from the original building response spectra analysis and from the building response spectra analysis that includes “softened” floors constructed with precast panels. The comparison of demand demonstrates that the additional softening of the floors constructed with precast panels results in insignificant change to the seismic force demand.

Further conservatism is achieved by considering only the cast-in-place portion of the floors for comparison of strength to demand in the code evaluation. For one-way floors, the precast panels are detailed to be effective in carrying demand, but are neglected in the design. For two-way floors, the presence of the gaps between the precast panels and regions of undeveloped reinforcement in the precast panels reduces their effectiveness in one direction, and their strength contribution is neglected in both directions in the code evaluation.

The effect of the ½ inch gaps on the membrane stiffness of the floors is also evaluated. The change in the in-plane axial and in-plane shear stiffness is evaluated by comparing a FEA model including the ½ inch gaps to a FEA model without the gaps. The resulting change in stiffness is less than 1 percent. Therefore, global effects due to the presence of the ½ inch gaps, concrete cracking, and undeveloped reinforcement at the edges of the precast panels is acceptably represented in the building FEA by the 80 percent effective modulus.

The mass of the precast panel is considered in the seismic analysis of the floor and is not significantly changed with the inclusion of the gap between the precast panel and the wall. The impact of the mass change in the finite element model is insignificant.

As outlined above, the capacity of the reinforced concrete floor system is provided by design in conformance with ACI 349. Composite action assumed in the evaluation of the seismic response of the structure is provided by conformance with ACI 349 Chapter 17. The floors constructed with precast panels have vertical response greater than 33 Hz and remain rigid.

The existing nuclear island seismic models remain consistent with the methodology described in Section 3.7 of the UFSAR.

The changes in the description of the cast-in-place concrete over precast concrete panel type of floor identify possible differences in the details for this type of floor design including the thickness of the precast panels. This is a clarification that there are variances in the floor design for sections in locations other than the critical sections from the design details shown for the critical section. As noted above the floor designs with the design variances are in conformance with ACI 349.

The change to Figure 3H.5-1 is an administrative change so that the labels on the figure conform to the Item numbers in the list In UFSAR Subsection 3H.5-1. This change does not change the definition of critical sections, technical information, design requirements, or conformance with regulatory information.

The proposed changes include implementation of requirements for development of headed reinforcement. These changes include, changing the term “Anchor Plates” to “T-Heads”, extending the lengths of the reinforcement into the walls, and adding a note to the drawing identifying the requirements for development of headed reinforcement on Figure 3H.5-8. These requirements are based on requirements in ACI 318-11, Section 12.6. The use of these requirements was approved in a previous license amendment and incorporated into Subsections 3.8.3.5, 3.8.4.4.1, and 3.8.4.5.1 of the licensing basis. See SCE&G COL Amendments 2 and 5 (Adams Accession Numbers ML13056A183 and ML13149A314, respectively).

The proposed changes to the reinforcement in UFSAR Figure 3H.5-8 are incorporated to provide reinforcement in the cast-in-place concrete consistent with the analysis to resist the loads in the cast-in-place concrete without relying on the flexural reinforcement in the precast panels. The figure is also revised to make a minor change to be consistent with drawing convention. The revised design is in conformance with ACI 349. The drafting convention changes do not change design information or design requirements.

The proposed changes to the detail design of the auxiliary building floors do not change the function, design, or operation of the systems and components supported by the floors in the auxiliary building. The proposed changes do not change the function, design, or operation of the containment vessel and passive containment cooling system. The proposed changes do not affect the prevention and mitigation of abnormal events, e.g., accidents, anticipated operational occurrences, earthquakes, floods and turbine missiles, or their safety or design analyses. The proposed changes do not involve, nor interface with, any structure, system or component accident initiator or initiating sequence of events, and thus, the probabilities of the accidents evaluated in the UFSAR are not affected.

The detail design changes to the floors in the auxiliary building do not interface with or affect safety-related equipment or a fission product barrier. No system or design function or equipment qualification would be adversely affected by the proposed changes. The changes do not result in a new failure mode, malfunction or sequence of events that could adversely affect a radioactive material barrier or safety-related equipment. The proposed changes do not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures.

The proposed changes do not adversely affect any safety-related system or component, equipment, design code, design code allowable value, function or design analysis, nor do they adversely affect any safety analysis input or result, or design/safety margin.

The proposed activity has no adverse effect on the ex-vessel severe accident. The design, geometry, and strength of the containment internal structures are not changed. The design and material selection of the concrete floor beneath the reactor vessel is not altered. The response of the containment to a postulated reactor vessel failure, including direct containment heating, ex-vessel steam explosions, and core concrete interactions is not altered by the changes to the detail design of floors in the auxiliary building. The design of the reactor vessel and the response of the reactor vessel to a postulated severe accident are not altered by the changes to the detail design of floors in the auxiliary building.

The proposed activity has no impact on the Aircraft Impact Assessment. The changes described to the floors are internal to the structures and do not impact the design or response of the containment vessel and shield building. The changes to the auxiliary building do not change the thickness or strength of the shield building roof. There is no change to protection of plant structures, systems, and components against aircraft impact provided by the design of the shield building. There is no change to the design of any of the key design features described in UFSAR Appendix 19F. The activity described does not change the overall design or construction of the shield building.

The proposed changes associated with this license amendment request include a change in the detail design of floors in the auxiliary building. The changes are internal to the structures and the configuration, thickness, and density of the structures are not changed. The proposed changes do not affect the radiological source terms (i.e., amounts and types of radioactive materials released, their release rates and release durations) used in the accident analyses, thus, the consequences of accidents are not affected. These changes do not affect the containment, control, channeling, monitoring, processing or releasing of radioactive and non-radioactive materials. The location and design of penetrations and the permeability of the concrete structures is not changed. No effluent release path is affected. The types and quantities of expected effluents are not changed. The functionality of the design and operational features that are credited with controlling the release of effluents during plant operation is not diminished. Therefore, neither radioactive nor non-radioactive material effluents are affected.

The thickness of the floors and the density of the concrete are not changed; therefore, there is no adverse change to the shielding provided by the floors. There is no change to plant systems or the response of systems to postulated accident conditions. There is no change to the predicted radioactive releases due to normal operation or postulated accident conditions. Plant radiation zones, controls under 10 CFR Part 20, and expected amounts and types of radiologically controlled materials are not affected by the proposed changes. Therefore, individual and cumulative radiation exposures do not change.

The change activity has no impact on the emergency plans or the physical security evaluation since there are no changes to the external configuration of the roof, walls, doors, or access to the Nuclear Island.

<u>Summary</u>

The proposed changes revise Tier 2* information and associated Tier 2 information in the UFSAR in regard to requirements for detail design of floors in the auxiliary building. These changes include design changes to the cast-in-place concrete and precast concrete panels, the rearrangement of reinforcement bars to make the design practicable, and the size of metal decking supporting wet concrete. Changes to the licensing basis text and figures identify design variations of similar floor sections. The proposed changes also incorporate the requirements for development and anchoring of headed reinforcement previously approved. The proposed changes do not adversely affect the strength or response of the nuclear island seismic Category I structures.

The above proposed changes do not adversely affect any safety-related equipment or function, design function, radioactive material barrier or safety analysis.

4. Regulatory Evaluation

4.1 Applicable Regulatory Requirements/Criteria

10 CFR Part 50, Appendix A, General Design Criterion (GDC) 1 requires that structures be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety functions to be performed. The proposed change does not change the criteria for the design, analysis, and construction of the floors in the auxiliary building. The design of the portions of the auxiliary building affected by this activity remains in conformance with the code requirements identified and supplemented in the UFSAR.

10 CFR Part 50, Appendix A, GDC 2 states structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. The structures affected by this activity maintain compliance with GDC 2. The thickness, geometry, and strength of the structures are not altered. The response of the structure to seismic motions is not significantly altered by the changes in the design details of the floors.

10 CFR Part 50, Appendix A, GDC 4 states structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. The structures affected by this activity maintain compliance with GDC 4. The thickness, geometry, and strength of the structures are not altered. The response of the structure to the effects of extreme winds and external missiles is not altered by the change in the design details of the structure. The response of the structure to the effects of seismic ground motion is not significantly altered by the change in the design details of the structure.

10 CFR Part 52, Appendix D, Section VIII.B.6 and VIII.B.5a require prior NRC approval for Tier 2* information departures and for Tier 2 information departures that involve changes to Tier 2* information respectively. Although this departure does not adversely affect safety, it does involve departures from Tier 2* and related Tier 2 information. Therefore, NRC approval is required prior to implementing the Tier 2* and associated Tier 2 departures addressed in this departure.

4.2 Precedent

As described in Section 2 of this amendment request, the proposed changes would allow use of headed reinforcement (also referred to as T-headed anchors) for development of the longitudinal reinforcement in subject floors. This amendment proposes to modify UFSAR Subsections 3H.5.2 and 3H.5.3, as well as UFSAR Figures 3H.5-6 and 3H.5-8, to allow headed reinforcement in these applications, in accordance with ACI 318-11, Section 12.6. The UFSAR was previously updated to apply the requirements of ACI 318-11, Section 12.6 to the design and construction of T-headed anchors used to develop reinforcement in other applications on the nuclear island. These requirements for development of headed reinforcement were previously approved and incorporated into UFSAR Subsections 3.8.3.5, 3.8.4.4.1, and 3.8.4.5.1 of the licensing basis. See SCE&G COL Amendments 2 and 5 (Adams Accession Numbers ML13056A183 and ML13149A314, respectively)

4.3 Significant Hazards Consideration Determination

The proposed amendment would revise the plant-specific design control document (DCD) Tier 2* and associated Tier 2 material incorporated into the Updated Final Safety Analysis Report (UFSAR) to incorporate changes to UFSAR descriptions and figures which are proposed to address changes in the design of floors in the auxiliary building.

An evaluation to determine whether or not a significant hazards consideration is involved with the proposed amendment was completed by focusing on the three standards set forth in 10 CFR 50.92, “Issuance of amendment,” as discussed below:

4.3.1 Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The design functions of the auxiliary building floors are to provide support, protection, and separation for the seismic Category I mechanical and electrical equipment located in the auxiliary building. The auxiliary building is a seismic Category I structure and is designed for dead, live, thermal, pressure, safe shutdown earthquake loads, and loads due to postulated pipe breaks. The proposed changes to UFSAR descriptions and figures are intended to address changes in the detail design of floors in the auxiliary building. The proposed changes also incorporate requirements for development and anchoring of headed reinforcement. The properties of the concrete and reinforcement included in the auxiliary building structure are not altered. As a result, the

design function of the auxiliary building structure is not adversely affected by the proposed changes. There is no change to plant systems or the response of systems to postulated accident conditions. There is no change to the predicted radioactive releases due to postulated accident conditions. The plant response to previously evaluated accidents or external events is not adversely affected, nor do the changes described create any new accident precursors. Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

4.3.2 Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes to UFSAR descriptions and figures are proposed to address changes in the detail design of floors in the auxiliary building. The proposed changes also incorporate the requirements for development and anchoring of headed reinforcement which were previously approved. The thickness, geometry, and strength of the structures are not adversely altered. The concrete and reinforcement materials are not altered. The properties of the concrete are not altered. The changes to the design details of the auxiliary building structure do not create any new accident precursors. As a result, the design function of the auxiliary building structure is not adversely affected by the proposed changes. Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

4.3.3 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The criteria and requirements of American Concrete institute (ACI) 349 and American Institute of Steel Construction (AISC) N690 provide a margin of safety to structural failure. The design of the auxiliary building structure conforms to applicable criteria and requirements in ACI 349 and AISC N690 and therefore maintains the margin of safety. The proposed changes to the UFSAR address changes in the detail design of floors in the auxiliary building. The proposed changes also incorporate the requirements for development and anchoring of headed reinforcement which were previously approved. There is no change to design requirements of the auxiliary building structure. There is no change to the method of evaluation from that used in the design basis calculations. There is not a significant change to the in structure response spectra. Therefore the proposed amendment does not result in a significant reduction in a margin of safety.

Based on the above, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of “no significant hazards consideration” is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. Environmental Considerations

The proposed amendment departs from Tier 2* and associated Tier 2 material in the UFSAR (Appendix 3H) structural detail design of the floors for the auxiliary building. The proposed amendment includes changes to allow variances in the thickness of precast panels and nominal size of metal decking in locations other than the critical section. The proposed amendment also departs from information on a Tier 2* figure in the UFSAR by implementing in the floor detail design development requirements for headed reinforcement.

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20, or would change an inspection or surveillance requirement. However, facility construction and operation following implementation of the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9), in that:

(i) *There is no significant hazards consideration.*

As documented in Section 4.3, Significant Hazards Consideration Determination, of this license amendment request, an evaluation was completed to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment." The Significant Hazards Consideration determined that (1) the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the proposed amendment does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

(ii) *There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.*

The proposed amendment involves structural design changes which do not change the as-built configuration of the plant systems and thus do not introduce any changes to effluent

types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents) or affect any plant radiological or non-radiological effluent release quantities. Furthermore, these changes do not diminish the functionality of any design or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the proposed amendment does not involve a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed amendment involves structural detail design changes to floors and inclusion in the floor detail design of development requirements for headed reinforcement without impacting the radiation protection evaluation, and thus, do not affect any plant structure, system or component, their function, plant effluent, or radiation controls. This proposed amendment does not change the as-built configuration of the plant systems. Consequently, these changes have no effect on individual or cumulative occupational radiation exposure during plant operation. Therefore, it is concluded that the proposed amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the proposed amendment, it has been determined that anticipated construction and operational impacts of the proposed amendment do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

South Carolina Electric & Gas Company

Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3

NND-14-0188

Enclosure 2

Proposed Changes to Licensing Basis Documents

(LAR 14-01)

Revise the second paragraph of Subsection 3H.1 as follows:

~~s~~Subsections 3H.2 through 3H.5 include a general description of the auxiliary building and shield building, a summary of the design criteria and the global analyses. ~~Examples of~~ The 3H.5 figures referenced in the descriptions show the structural designs ~~are shown~~ for ~~14~~ critical sections which are identified in subsection 3H.5 and shown in Figure~~s~~ 3H.5-1 (3 sheets). The exact locations of the critical sections related to the shield building cylinder shown in Figure 3H.5-16. Representative design details are provided for these structures in subsection 3H.5.]*

Revise the first paragraph of Subsection 3H.5 as follows:

[*This subsection summarizes the structural design of representative seismic Category I structural elements in the auxiliary building and shield building. ~~These structures~~ Critical sections are listed below and the corresponding location numbers are shown on Figure 3H.5-1 for twelve of the critical sections. Items 13 and 14 in the list below are located in the shield building cylinder and are discussed in APP-GW-GLR-602 (Reference 1). The basis for their selection to this list is also provided for each critical section~~structure~~.*

Revise the first paragraph of UFSAR Subsection 3H.5.2 as follows:

3H.5.2 Composite Structures (Floors and Roof)

[*The floors consist of a concrete slab on metal deck, which rests on structural steel floor beams. Several floors in the auxiliary building are designed as one-way reinforced concrete slabs supported continuously on steel beams. Typically, the beams span between two reinforced concrete walls. The beams are designed as composite with formed metal deck spanning perpendicular to the members. Unshored construction is used. For the floors, beams are ~~typically~~ predominately spaced at about 5- to 6-feet intervals and spans are between ~~16~~ 15 feet and 25 feet. Based on local geometry considerations, the intervals and spans are outside these ranges in a limited number of locations. The spacing between the beams or between beams and walls is as small as 3 feet and as large as 8 feet. The span of the beams is as small as 2 feet, 6 inches and as large as 38 feet, 6 inches. The designs of the beams satisfy the requirements in AISC N690 for composite structures.*]*

Revise the second paragraph of UFSAR Subsection 3H.5.2 as follows:

[*A typical layout of these floors is shown in Figure 3H.5-6. The metal deck rests on the top flange of the structural steel floor beam, with the longitudinal axes of the metal deck ribs and floor beams placed perpendicular to each other. Figure 3H.5-6 shows the key structural elements in composite floors. The reinforcement size and spacing are based on loads and spans for this type of floor and are determined at each location based on the requirements in ACI 349 and ACI 318-11, Section 12.6. The development of the floor reinforcement in the walls can be either headed reinforcement or standard hooks. The beam size and spacing and beam support designs are based on loads and spans for this type of floor as noted on the figure. The beam support designs include beam seats or shear plates connected to the web of the beam. The detail design of the support for the beam, including the portion embedded in the concrete wall, is based on the load and structural system configuration as noted on the figure. The designs of*

these floors are in conformance with AISC N690 and ACI 349. The depth of the ribs for 9-inch concrete floor slabs, 9.5-inch concrete floor slabs, and 15-inch deep concrete roof slabs are 3 inches, 2.5 inches, and 4.5 inches respectively. The concrete slab is tied to the structural steel floor beam by shear connectors, which are welded to the top flange of the floor beam. The concrete slab and the floor beams form a composite floor system. For the design loads after hardening of concrete, the transformed section is used to check the stresses.

Revise the first paragraph of UFSAR Subsection 3H.5.2.2 as follows:

[*The design of a typical composite floor is shown in Figure 3H.5-6. The design summary for the floor between column lines M and P at elevation 135'-3" is shown in Table 3.H.5-11. The concrete slab is 9 inches thick, plus 3-inch deep metal deck ribs. The floor beam size are is shown in Figure 3H.5-6. typically W14x26.*

Revise the first paragraph of UFSAR Subsection 3H.5.3 as follows:

[*Reinforced concrete floors in auxiliary building are 24 inch or 36 inch thick. These floors are constructed with 16" or 28" of reinforced concrete placed on the top of 8 to 12 inch thick precast concrete panels. The 8" thick precast concrete panels are installed at the bottom to serve as the formwork and withstand the load of wet concrete slab. The spans of the floors are predominately 13 feet to 20 feet, and the precast panels are predominately 7 to 14 feet wide. Based on local geometry considerations, the widths and spans are outside these ranges in a limited number of locations. The spans of the floor are as small as 5 feet and as large as 21 feet. The width of the precast panels is as small as 4 feet and as large as 19 feet. The number of side-by-side precast panels ranges from one to eight.*

Examples of such floors are the Operations Work Area (Tagging Room) ceiling slab at elevation 135'-3' in Area 2, and the Area 5/6 elevation 100'-0" slab between column lines 1 & 2.

Figure 3H.5-8 shows the key structural elements in reinforced concrete floor slabs. The precast panels and the cast-in-place concrete are designed to act together as a composite reinforced slab so that the floor dynamic response is consistent with the auxiliary building finite element analysis. However, the precast panels are neglected in determining floor strength and load carrying capacity. The reinforcement size and spacing are determined for each location, based on specific loads and spans, and satisfy the requirements in ACI 349 and ACI 318-11, Section 12.6. The floor thickness and precast panel thickness for this type of floor are based on specific loads and spans as noted on the figure. The type and thickness of adjacent walls and floors vary as noted on the figure. The main reinforcement is provided in the cast-in-place concrete. Reinforcement is placed in both the top and bottom layers of the cast-in-place concrete in both directions. For the design of the reinforcement in the cast-in-place floors, post-construction loads are conservatively assumed to be resisted only by the cast-in-place concrete and the reinforcement placed within it. The reinforcement in the cast-in-place portion is fully developed into supporting adjacent walls such that the connection is assumed to be a fixed connection. The development of the floor reinforcement in the walls is achieved using either headed reinforcement or standard hooks.

The precast panel reinforcement is designed to resist the weight of the panel and the wet weight of the cast-in-place concrete during construction. Reinforcement is placed within the precast

panel portion in both top and bottom layers in both directions. The precast panel reinforcement is contained within the panel. The reinforcement is discontinuous with a design gap between adjacent precast panels and between precast panels and walls. The precast panels ~~which~~ are connected to the concrete placed above ~~it~~ them by shear reinforcement, which satisfies the requirements of ACI 349 Chapter 17. The precast panels and the cast-in-place concrete are made to act together as a composite reinforced concrete slab by roughening the top surface of the precast panel and providing shear ties between the two elements. The detail designs of the supports for the precast panels are based on the loading and design requirements. ~~Examples of such floors are the Operations Work Area (Tagging Room) ceiling slab at elevation 135 ft 3 inches in Area 2, and the Area 5/6 elevation 100'-0" slab between column lines 1 & 2.~~

The finite element analysis model used for the auxiliary building seismic response assumes a homogenous thickness of concrete for the floor system, and includes floor-to-wall connections that are fixed over the full thickness of the reinforced concrete floor. The detailed design of the floor system includes a gap between the precast panel and the wall and between adjacent precast panels. Although the gap between the precast panels and the wall reduces the thickness of the floor in direct contact with the wall, the design of the floor system satisfies the requirements of ACI 349, including fully developing the floor reinforcement in the wall. The design of the floor system and the connection with the wall provide a fixed connection that transfers forces and moments from the floor to the wall.

Detailed analysis of the floor system connection design details, including the gap between the precast panel and wall, is performed for the floor constructed with precast panels and is consistent with the nuclear island seismic model. The effects of stiffness, reinforcement anchorage, and concrete cracking are considered in the detailed analyses. The detailed analyses demonstrate that these floors have vertical response above 33 Hz and are rigid, which is consistent with the nuclear island seismic model.]*

Revise UFSAR Subsection 3H.5.3.1 as follows:

The tagging room (room number 12401) location is shown on Figure 1.2-8. [*Figure 3H.5-8 shows the typical cross section and reinforcement. The design summary for this location is shown in Table 3~~.~~H.5-12. Design dimensions of the Operations Work Area (Tagging Room) Ceiling are as follows:*

UFSAR Chapter 3, Appendix 3H, Figure 3H.5-1 (Sheet 1 of 3) [Nuclear Island Critical Sections Plan at El. 135’-3”]* - Revise Tier 2* information as detailed in Section 2 of Enclosure 1 and as shown in the following figure markups.

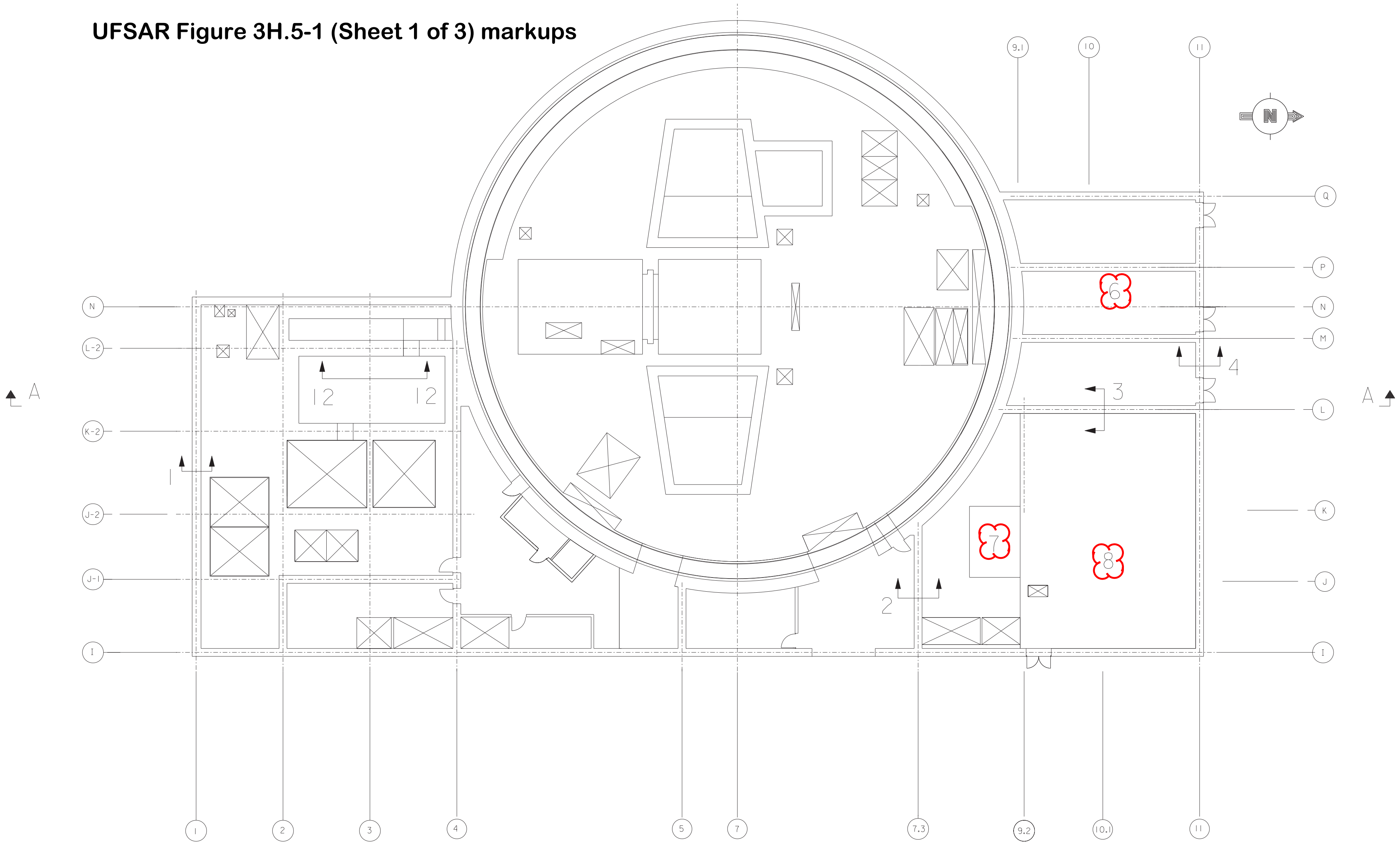
UFSAR Chapter 3, Appendix 3H, Figure 3H.5-1 (Sheet 2 of 3) [Nuclear Island Critical Sections Plan at El. 180’-0”]* - Revise Tier 2* information as detailed in Section 2 of Enclosure 1 and as shown in the following figure markups.

UFSAR Chapter 3, Appendix 3H, Figure 3H.5-1 (Sheet 3 of 3) [Nuclear Island Critical Sections Section A-A]* - Revise Tier 2* information as detailed in Section 2 of Enclosure 1 and as shown in Enclosure 3. **Withheld from Public Disclosure Under 10 CFR 2.390d**

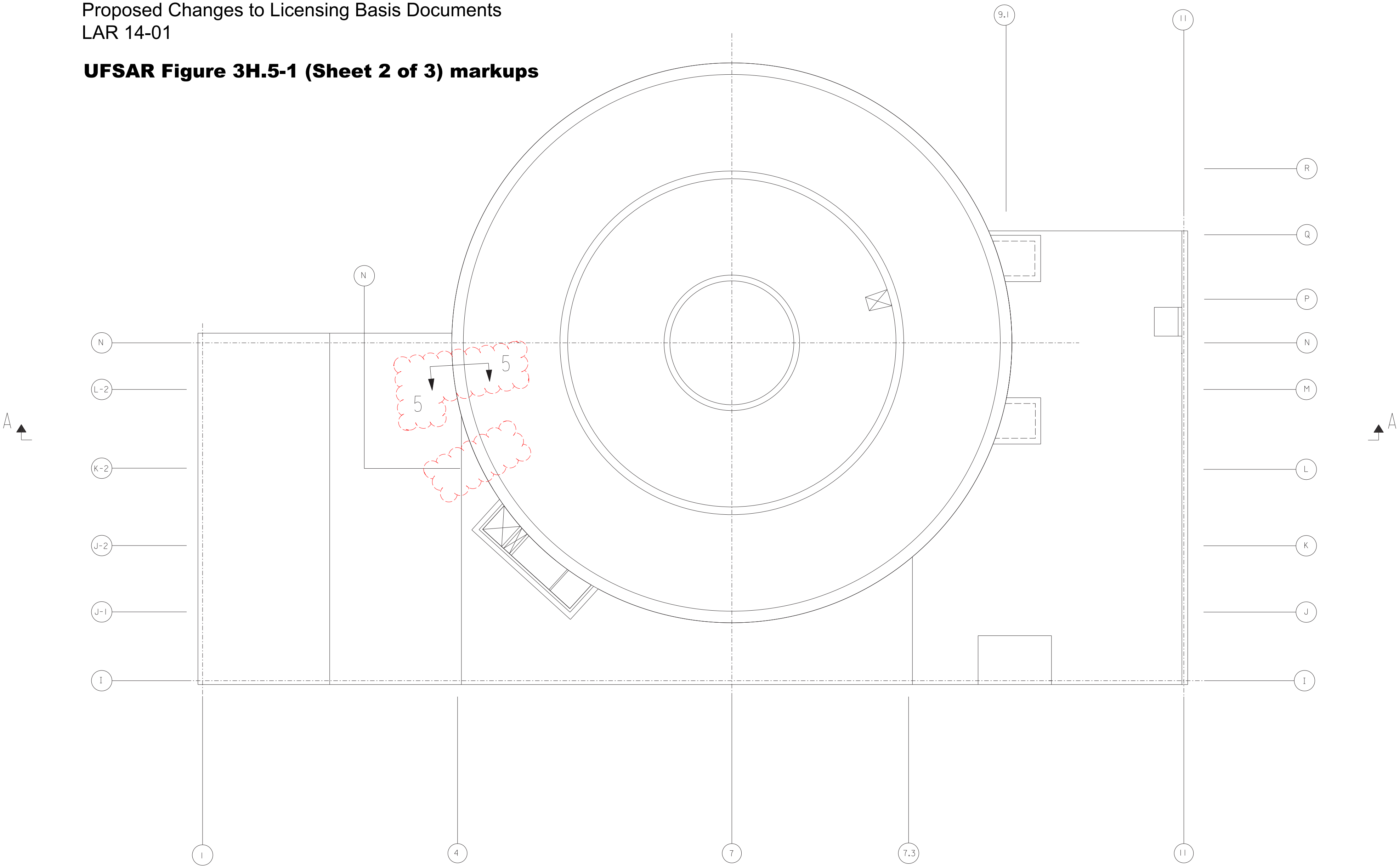
UFSAR Chapter 3, Appendix 3H, Figure 3H.5-6, [Auxiliary Building Typical Composite Floor]* - Revise Tier 2* information as detailed in Section 2 of Enclosure 1 and as shown in the following figure markups and proposed notes.

UFSAR Chapter 3, Appendix 3H, Figure 3H.5-8, [Auxiliary Building Operations Work Area (Tagging Room) Ceiling]* - Revise Tier 2* information as detailed in Section 2 of Enclosure 1 and as shown in the following figure markups and proposed notes.

UFSAR Figure 3H.5-1 (Sheet 1 of 3) markups



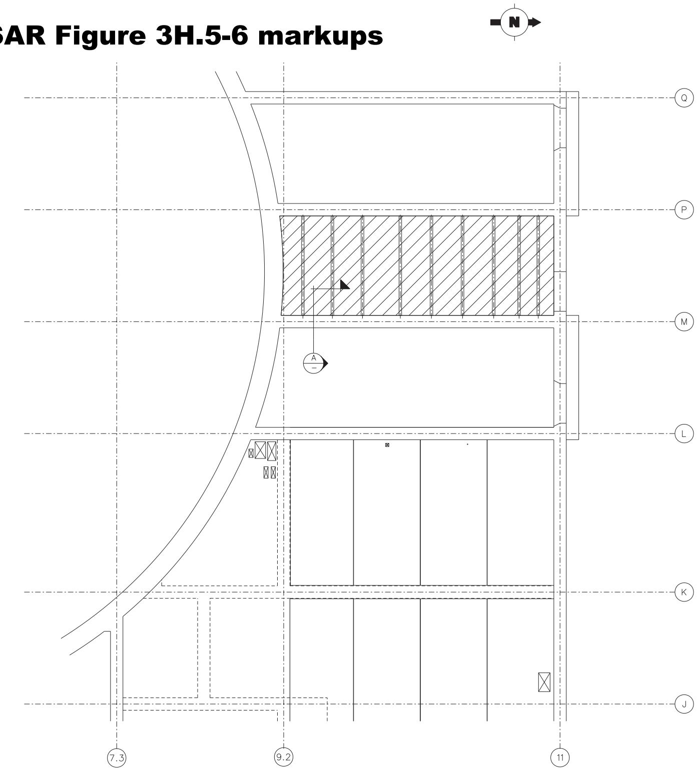
UFSAR Figure 3H.5-1 (Sheet 2 of 3) markups



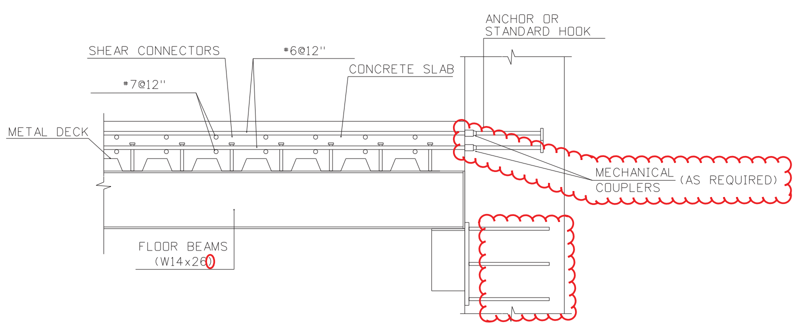
UFSAR Figure 3H.5-1 (Sheet 3 of 3) markups

Withheld from Public Disclosure Under 10 CFR 2.390d

UFSAR Figure 3H.5-6 markups



PLAN VIEW
NOTES 1, 3, 6



SECTION A-A
NOTES 1,2,3,4,5,6, & 7

NOTES:

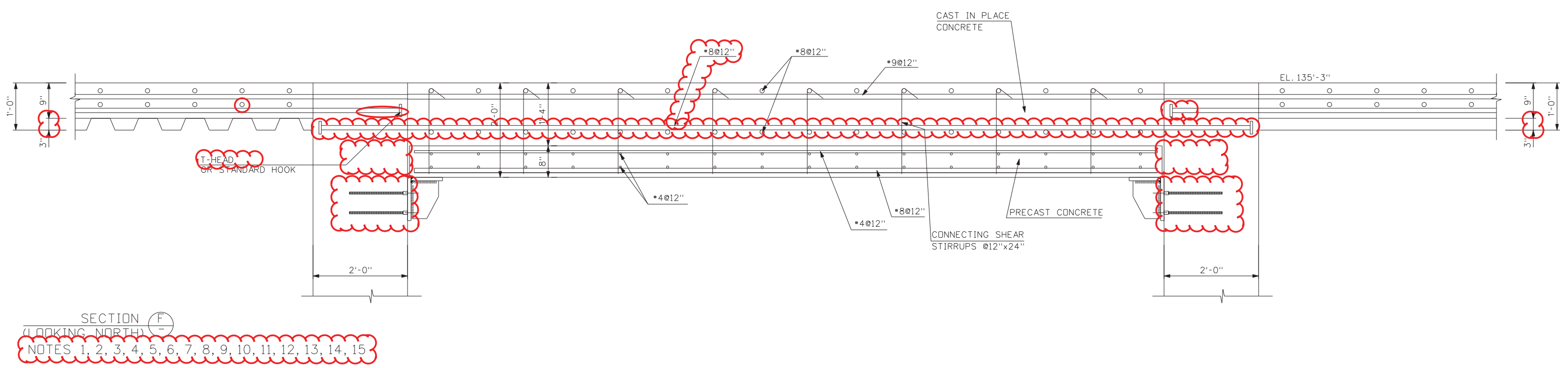
1. DETAIL SHOWN IS SPECIFIC TO THE COMPOSITE FLOOR AT EL. 135'-3" AT INTERSECTION WITH WALL M. REFER TO SUBSECTION 3H.5.2 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.
2. REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.
3. FLOOR BEAM SIZE AND SPACING ARE DESIGNED BASED ON FLOOR LOAD AND GEOMETRY TO SATISFY AISC N690 REQUIREMENTS. THE BEAM SIZES USED ARE PREDOMINATELY W14x26 AND W14x48. THE RANGE OF BEAM SIZES USED IN OTHER LOCATIONS IS FROM W10 TO W44. THE SPACING BETWEEN THE BEAMS IS PREDOMINATELY IN A RANGE OF 5 TO 6 FEET.
4. THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.
5. REINFORCEMENT SIZE AND SPACING ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
6. THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.
7. THE DETAIL DESIGN, LOCATION, AND EMBEDMENT OF THE BEAM SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.

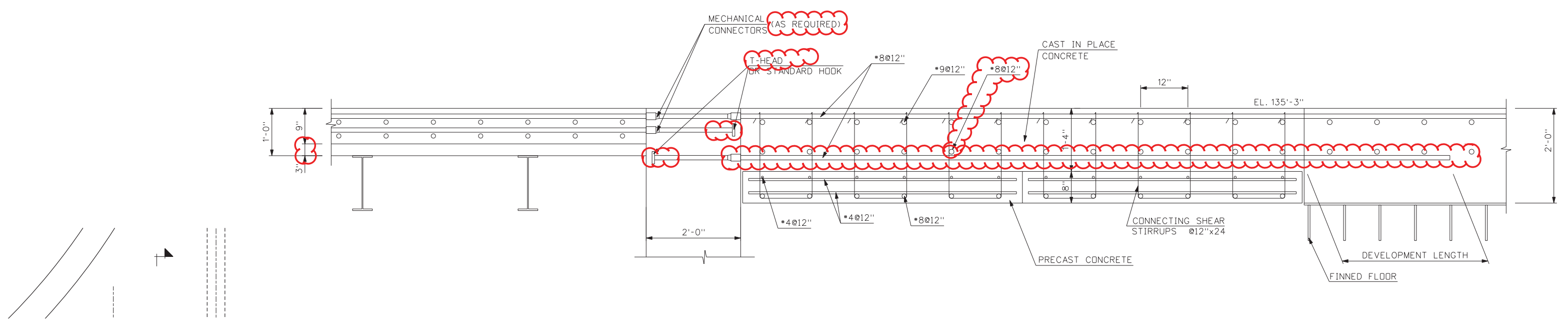
Proposed notes for Figure 3H.5-6

Notes 1 and 3 through 7 are added. The current note 1 is renumbered to note 2.

1) DETAIL SHOWN IS SPECIFIC TO THE COMPOSITE FLOOR AT EL. 135′-3″ AT INTERSECTION WITH WALL M. REFER TO SUBSECTION 3H.5.2 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.
2) REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.
3) FLOOR BEAM SIZE AND SPACING ARE DESIGNED BASED ON FLOOR LOAD AND GEOMETRY TO SATISFY AISC N690 REQUIREMENTS. THE BEAM SIZES USED ARE PREDOMINATELY W14X26 AND W14X48. THE RANGE OF BEAM SIZES USED IN OTHER LOCATIONS IS FROM W10 TO W44. THE SPACING BETWEEN THE BEAMS IS PREDOMINATELY IN A RANGE OF 5 TO 6 FEET.
4) THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.
5) REINFORCEMENT SIZE AND SPACING ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
6) THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.
7) THE DETAIL DESIGN, LOCATION AND EMBEDMENT OF THE BEAM SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.

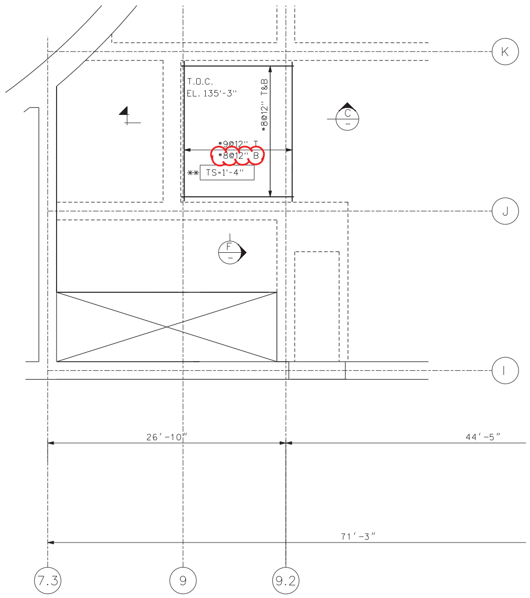
UFSAR Figure 3H.5-8 markups



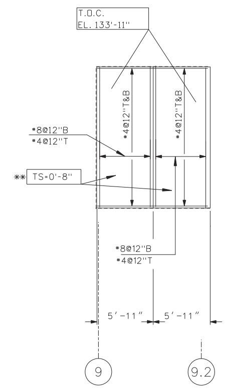


UFSAR Figure 3H.5-8 markups continued

SECTION C
(LOOKING WEST)
NOTES 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15



FLOOR EL. 135'-3"
NOTES 1, 5, 7, 9, 13, 15



FLOOR EL. 133'-11"
(PRECAST CONCRETE)
NOTES 1, 3, 6, 7, 16, 17

NOTES:

1. DETAIL SHOWN IS SPECIFIC TO THE REINFORCED CONCRETE FLOOR AT EL. 135'-3" (OPERATIONS WORK AREA CEILING). REFER TO SUBSECTION 3H.5.3 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.
2. REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.
3. THE PRECAST PANEL THICKNESSES ARE NOMINALLY 8, 10, AND 12 INCHES.
4. THE OVERALL FLOOR THICKNESSES ARE NOMINALLY 24 AND 36 INCHES.
5. THE THICKNESSES OF THE CAST-IN-PLACE CONCRETE ARE NOMINALLY 14, 16, 24, AND 28 INCHES.
6. REINFORCEMENT SIZE AND SPACING FOR THE PRECAST PANEL ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
7. THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.
8. REINFORCEMENT SIZE AND SPACING IN THE CAST-IN-PLACE CONCRETE ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
9. THE SIZE AND SPACING OF THE SHEAR STIRRUPS SATISFY ACI 349 REINFORCEMENT REQUIREMENTS FOR IN PLANE SHEAR AND TO PROVIDE FOR COMPOSITE ACTION.
10. THE DETAIL DESIGN, LOCATION, AND EMBEDMENT OF THE PANEL SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE, INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.
11. THE THICKNESS OF THE ADJACENT WALL IS BASED ON THE WALL DESIGN REQUIREMENTS AND LOCATION.
12. THE ADJACENT WALL MAY EXTEND ABOVE THE ELEVATION OF THE FLOOR.
13. THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.
14. THE DESIGNS OF THE ADJACENT FLOORS ARE BASED ON THE FLOOR DESIGN REQUIREMENTS.
15. THE ELEVATION OF THE TOP OF CONCRETE IS BASED ON LOCATION AND DESIGN REQUIREMENTS FOR THE FLOORS.
16. THE WIDTH AND NUMBERS OF THE PRECAST PANELS IS DETERMINED BY LOCAL GEOMETRY.
17. THE TOP OF CONCRETE ELEVATION FOR THE PRECAST PANELS IS BASED ON THE FLOOR DESIGN REQUIREMENTS AND LOCATION.

Proposed notes for Figure 3H.5-8

Notes 1 through 17 are added.

1) DETAIL SHOWN IS SPECIFIC TO THE REINFORCED CONCRETE FLOOR AT EL. 135′-3″ (OPERATIONS WORK AREA CEILING). REFER TO SUBSECTION 3H.5.3 AND OTHER NOTES FOR ADDITIONAL INFORMATION ABOUT DESIGN DETAILS FOR OTHER FLOOR SECTIONS.
2) REFER TO SUBSECTION 3.8.4.4.1 FOR THE REQUIREMENTS FOR DEVELOPMENT OF HEADED REINFORCEMENT.
3) THE PRECAST PANEL THICKNESSES ARE NOMINALLY 8, 10, AND 12 INCHES.
4) THE OVERALL FLOOR THICKNESSES ARE NOMINALLY 24 AND 36 INCHES
5) THE THICKNESSES OF THE CAST-IN-PLACE CONCRETE ARE NOMINALLY 14, 16, 24, AND 28 INCHES.
6) REINFORCEMENT SIZE AND SPACING FOR THE PRECAST PANEL ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
7) THE REINFORCEMENT SHOWN IS FOR LOCATIONS AWAY FROM OPENINGS, PENETRATIONS, EMBEDMENTS, AND OTHER OBSTRUCTIONS.
8) REINFORCEMENT SIZE AND SPACING IN THE CAST-IN-PLACE CONCRETE ARE BASED ON THE REQUIREMENTS IN ACI 349 AND ACI 318-11, SECTION 12.6.
9) THE SIZE AND SPACING OF THE SHEAR STIRRUPS SATISFY ACI 349 REINFORCEMENT REQUIREMENTS FOR IN PLANE SHEAR AND TO PROVIDE FOR COMPOSITE ACTION.
10) THE DETAIL DESIGN, LOCATION, AND EMBEDMENT OF THE PANEL SUPPORTS ARE DESIGNED TO THE REQUIREMENTS OF AISC N690 AND ACI 349 AS APPLICABLE. SUPPORT CONFIGURATION, INCLUDING THE USE OF PLATES, STRUCTURAL SHAPES, AND STIFFENERS, IS BASED ON LOADING AND LOCAL GEOMETRY CONSIDERATIONS. THE DESIGN OF EMBEDMENT ANCHORAGE, INCLUDING TYPE, SIZE, AND SPACING SATISFIES THE REQUIREMENTS OF APPENDIX B AS WELL AS OTHER APPLICABLE SECTIONS OF ACI 349.
11) THE THICKNESS OF THE ADJACENT WALL IS BASED ON THE WALL DESIGN REQUIREMENTS AND LOCATION.
12) THE ADJACENT WALL MAY EXTEND ABOVE THE ELEVATION OF THE FLOOR.
13) THE ADJACENT WALL MAY BE DESIGNED AS A STRUCTURAL WALL MODULE.
14) THE DESIGNS OF THE ADJACENT FLOORS ARE BASED ON THE FLOOR DESIGN REQUIREMENTS.
15) THE ELEVATION OF THE TOP OF CONCRETE IS BASED ON LOCATION AND DESIGN REQUIREMENTS FOR THE FLOORS.
16) THE WIDTH AND NUMBERS OF THE PRECAST PANELS IS DETERMINED BY LOCAL GEOMETRY.
17) THE TOP OF CONCRETE ELEVATION FOR THE PRECAST PANELS IS BASED ON THE FLOOR DESIGN REQUIREMENTS AND LOCATION.