Enclosure 2 (Non-SRI)

Docket No. 05200046

Supplemental Reply to NOV 05200046/2016-202

December 2017

Supplemental Reply to a Notice of Violation (NOV): NRC Inspection Report No.05200046/2016-202

The post-inspection investigation identified several actions that bring the APR 1400 design into full compliance with 10 CFR 50.150. As part of the Korea Hydro and Nuclear Power Co., Ltd. (KHNP) corrective action process, all actions have been taken to ensure all specific design control documents (DCD) and technical issues are addressed. KHNP has identified necessary design changes, and it has taken to update the aircraft impact assessment (AIA) report as appropriate to resolve each specific issue associated with the NOV. The resolution of the issues is provided as DCD markups in the attachment and will be incorporated into Revision 2 of the DCD. Furthermore, in support of this response to the NOV, KHNP has performed an extent of condition review to determine if the AIA contains any additional issues similar to those identified during the inspection. The corrective actions taken as long term actions and extent of condition (EOC) review are as follows;

1. Corrective actions that have been taken and the results achieved

a. Corrective actions for the first example of Violation

KHNP performed the corrective actions as identified below to address first example of violation. Through the corrective action process, KHNP has reviewed and prepared markups for the APR1400 DCD of the following items. The AIA report is also revised in order to incorporate the results of the corrective actions.

Long term actions taken:

As part of the long term corrective actions, KHNP has performed a further review of design changes in DCD related to AIA. This review of design changes also includes a review of success criteria and systems interactions to ensure that no other systems require assessment in the AIA. This addresses the extent of condition for failure to include ECWS in the AIA assessment. The key design features which are identified as a result of the extent of condition review are shown in the attachment (DCD Markup) and will be incorporated into DCD Rev.2.

Extent of review:

The results of extent of condition review which is performed to identify the key design features are follows.

As a result of the extent of review, the results on the extent of condition review are presented in the previous NOV reply (ML 17272A600).

In addition, the design information on north/south walls of main steam isolation

valve rooms and north/east walls of SFP area is incorporated into Section 19.5.4.2, Table 19.5-2 and Figure 19.5-12 through 13 (Refer to attachment page 12, 17, 39 and 40). The property and size of polar crane bracket and rail girder is revised to Section 19.5.4.1 and Table 19.5-1 (Refer to attachment page 11 and 16). The AIA DBDs are revised to incorporate the recently updated background General Arrangement drawing. Therefore, DCD Figure 19.5-1 ~ 19.5-10 are revised as shown in the attachment (Refer to attachment page 18 through 37).

b. Corrective actions for the second example of Violation

The ECW was not identified as a key feature and damage to the ECWS was not assessed in the heat removal assessment. Evaluation and assessment of the potential physical damage to the ECWS has been initiated. A complete assessment of the location of ECW piping for each strike has been performed to ensure that there are no other locations that are problematic. The heat removal part of AIA report (TeR) (APR1400-E-P-NR-14002-P-SGI) is updated to include a discussion of the ECWS assessment and to identify the ECWS as a key design feature.

AIA report is reviewed and updated by authorized personnel due to SGI nature. The revision of AIA report, therefore, is performed by cognizant representatives of the consulting company.

Long term actions taken:

The strengthening measures have been implemented in both the AB and EDGB for physical protection of some of the ECW equipment. The following actions are identified for the AIA report;

Protection of ECW in AB

The structural assessments have been performed to identify strengthening measures sufficient to protect the ECWS on West side of AB at El 174'. An existing finite element model has been modified to configure the exterior and first interior wall so that the ECWS is protected from a strike from the West between El 174' and 195'. The structural assessment identified a configuration such that all wreckage and debris is stopped at the interior wall and the identified ECW components are fully protected from physical damage. These walls are identified as key features, and Revision 2 of structural assessment part of AIA report includes the details of the assessment performed (Refer to attachment page 12, 17 and 41).

In addition, another strike on West side of AB was identified by heat removal review where both divisions of ECW are vulnerable to physical damage. This is a strike at El 137' 6" between column lines AG and AH (Refer to attachment page

11, 12, 17 and 41). Structural assessments were performed to identify enhanced reinforcement in the 4' exterior wall panel between AE and AH such that it can fully resist the impact forces and provide physical protection to the ECW components in the room interior to this wall. This enhanced wall panel is identified as a key design feature, and Revision 2 of structural assessment part of AIA report includes the details of the assessment performed.

Additional locations on the North and South side of the AB were identified by heat removal review where both divisions of ECW are vulnerable to physical damage. These strikes are at elevation 174 between column lines 13 and 14. The ECW system is protected by combination of awning thickness and interior walls. These enhancements ensure that only one division of ECW is vulnerable at each strike location. These enhanced hoods are identified as a key design feature and are shown on the attachment (Refer to attachment page 12 and 43).

Protection of ECW in EDGB

The structural assessments have been performed to identify strengthening measures sufficient to protect the South side ECWS in the EDGB for a strike from the North and the North side ECWS in the EDGB for a strike from the South. The proposed approach was to strengthen the interior E-W running interior wall at elevation 100 and 120 that separates the two divisions so that all debris will stop at the interior wall, either from a North or South strike. Again, it is desired to strengthen the wall with added reinforcement or a steel plate so as not to change the thickness of the interior wall. Another option identified in the structural assessment was to strengthen the North and South exterior walls with additional reinforcement such that any wreckage and debris perforating these walls can be stopped by the as-designed E-W running interior wall. This option was chosen by the applicant as the best option. The North and South exterior wall configurations of EDGB are identified as key design feature, and Revision 2 of structural assessment part of AIA report includes the details of the assessments performed (Refer to attachment page 11, 12, 17 and 45). At elevation 135', the North wall of the EDGB and the south wall of the EDGB were increased in wall thickness to 24" to protect ECW equipment and is a key design feature (Refer to attachment page 11, 12, 17 and 45).

At elevation 120, two room coolers were relocated to ensure that strikes from the East cannot disable both divisions of ECW and is a key design feature (Refer to attachment page 37).

The GA drawings for EDGB are revised to incorporate required modification and DCD chapter 1 will be revised accordingly as shown in the attachment (Refer to attachment page 2 through 5).

Extent of review:

The extent of condition review which is addressed in long term action has been performed and the result of the extent of condition review is included in the final revised AIA report.

c. Corrective action for the third example of Violation

KHNP has performed corrective actions for the items that can be corrected through immediate action and closed as of 29 September, 2017 (ML 17272A600). The structural assessment part of AIA report (APR1400-E-P-NR-14002-P-SGI) has been updated to include the clarification as key design features.

2. Summary of actions taken

The corrective actions taken for full compliance of NOV are as follows;

a. The key design features identified as a result of corrective actions are included in the attachment. (The DCD change from previous reply is marked as red color and the additional change from supplemental reply is marked as blue color.)

b. The results of corrective actions for the second example are incorporated into AIA report (APR1400-E-P-NR-14002-P-SGI). In addition, DCD markups are included in the attachment.

c. The corrective action for the third example was provided in the previous NOV reply (ML 17272A600) and incorporated into structural assessment part of AIA report (APR1400-E-P-NR-14002-P-SGI).

Attachment

Docket No. 05200046

DCD markups

December 2017

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 1.2-20 General Arrangement EDG Building El. 63′-0″, Sections A-A and B-B

Replaced with a figure in next page

Security-Related Information – Withhold Under 10 CFR 2.390

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 1.2-21 General Arrangement EDG Building El. 100′-0″ and El. 121′-6″

Replaced with a figure in next page

Security-Related Information – Withhold Under 10 CFR 2.390

Attachment (6/45)
Reply to a NOV 05200046
Supplemental Reply to a NOV 05200046

Table 3.8A-29

Required Reinforcement and Margins of Safety for the AB Shear Wall

Critical Section	Zone	Elevation	Horizontal			Vertical			Shear		
			Required in^2	Provided	Ratio(1)	Required in^2	Provided	Ratio(1)	Required in^2	Provided	Ratio(1)
North wall of north MSIV house	1	55′-0″ to 100′-0″	3.6	2-#11@9″	1.16	3.23	2-#11@9″	1.29	-	-	-
	2	100′-0″ to 120′-0″	3.49	~~2-#11@9″~~	1.19	3.58	~~2-#11@9″~~	1.16	0.18	~~#6@9″~~	3.26
	3	120′-0″ to 137′-6″	3.23	~~2-#11@9″~~	1.29	2.76	~~2-#11@9″~~	1.51	-	-	-
	~~4~~	~~137′-6″ to 174′-0″~~	~~3.59~~	~~2-#11@9″~~	~~1.16~~	~~4.13~~	~~2-#14@9″~~	~~1.45~~	~~0.29~~	~~#5@9″~~	~~1.43~~
	4 ~~(For AIA)~~	137′-6″ to 174′-0″	-	3-#14@9″	-	-	3-#14@9″	-	-	~~#6@9″~~	-
North wall of north AFWST	1	100′-0″ to 137′-6″	3.16	2-#11@9″	1.32	2.97	2-#11@9″	1.40	-	-	-
West wall of MCR	1	55′-0″ to 100′-0″	2.7	2-#11@12″	1.56	2.85	2-#11@12″	1.10	0.22	#5@12″	1.41
	2	100′-0″ to 137′-6″	2.59	2-#11@12″	1.20	2.71	2-#11@12″	1.15	-	-	-
	3	137′-6″ to 156′-0″	2.39	~~2-#10@12″~~	1.06	2.03	~~2-#10@12″~~	1.25	-	-	-
	4	156′-0″ to 174′-0″	1.28	#11@12″	1.22	1.31	2-#10@12″	1.94	0.27	#6@12″	1.63
	5	174′-0″ to 195′-0″	1.42	#11@12″	1.10	1.13	#11@12″	1.38	-	-	-
West wall of SFP	1	114′-0″ to 156′-0″	4.79	2-#14@9″	1.25	4.82	3-#11@9″	1.29	0.19	#5@12″	1.63
East wall of FHA area	1	156′-0″ to 174′-0″	2.73	2-#11@9″	1.52	2.78	2-#14@9″	2.16	0.16	#7@9″	5.00
	2	174′-0″ to 213′-6″	2.67	2-#10@9″	1.27	2.61	2-#11@9″	1.59	-	-	-

(1) Ratio = Provided Reinforcement / Required Reinforcement

3-#14@9"
#9@9"
#9@9"
3-#11@9"
3.59
2.51
4.13
2.18
0.29
4.60

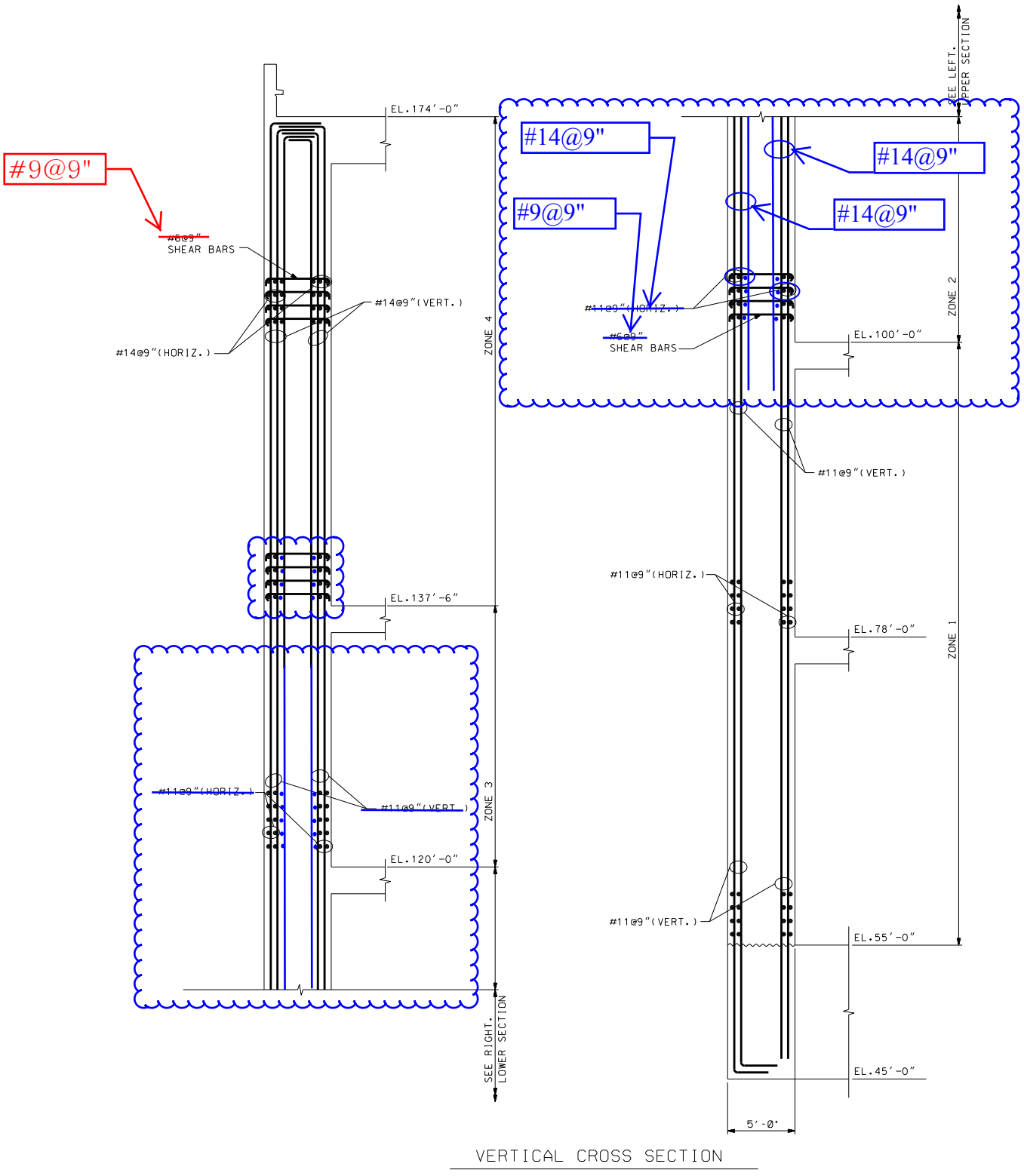

Figure 3.8A-40 Reinforcement Arrangement of the AB MSIV House Wall (Section 1)

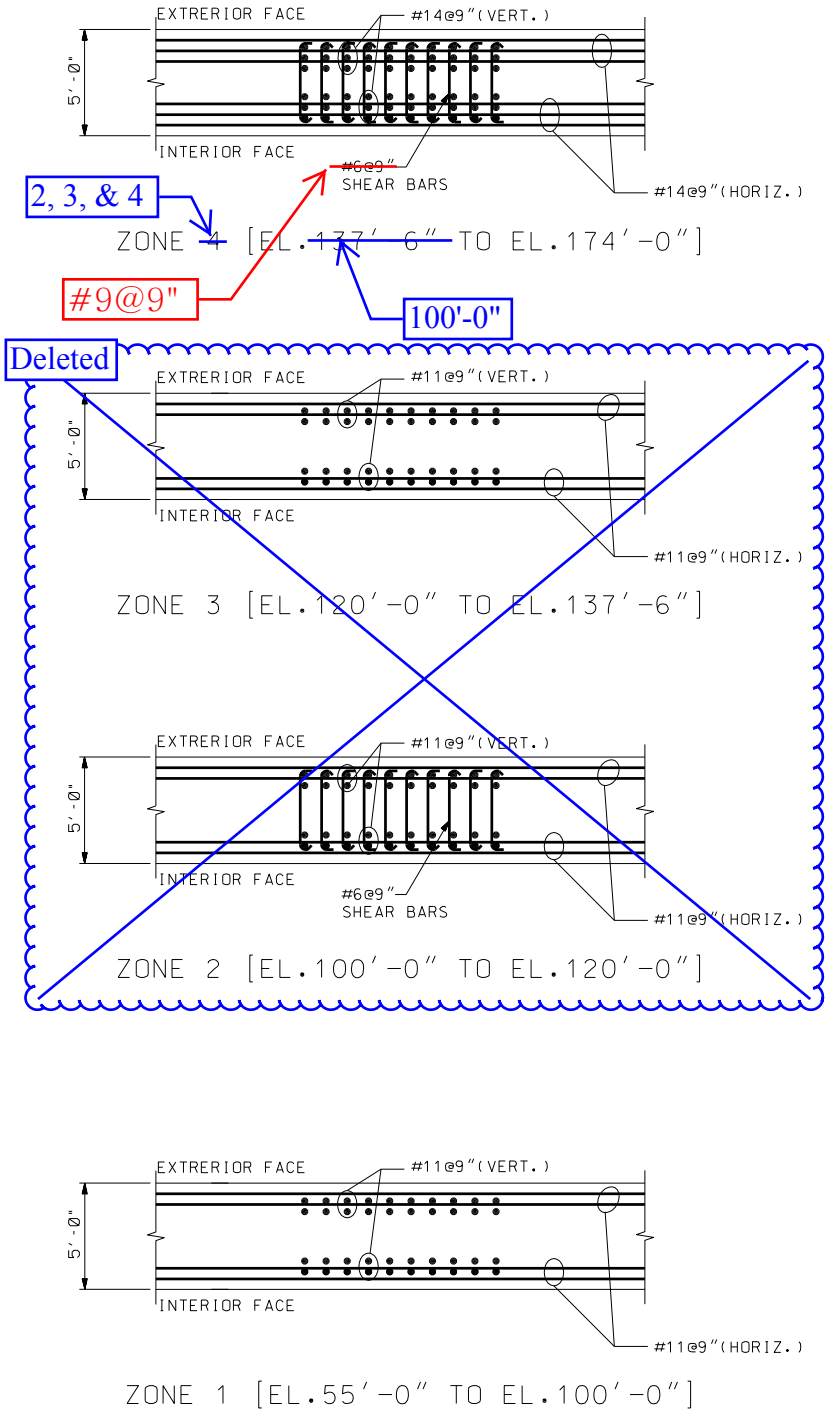

Figure 3.8A-41 Reinforcement Arrangement of the AB MSIV House Wall (Section 2)

19.5 Aircraft Impact Assessment

19.5.1 Introduction and Background

The design of the APR1400 takes into account the potential effects of the impact of a large commercial aircraft, which the NRC has determined is a beyond design basis event. In accordance with 10 CFR 50.150(a), a design-specific assessment has been performed for the APR1400 using realistic analysis to demonstrate that, in the event an APR1400 is struck by a large commercial aircraft, design features and functional capabilities exist to ensure that the following functions are maintained:

a. The reactor core remains cooled, and

b. Spent fuel pool integrity is maintained.

The assessment demonstrates the inherent robustness of the APR1400 design with regard to potential large aircraft impacts.

Specific assumptions used in the APR1400 aircraft impact assessment are based on NRC requirements, and guidance provided by the NRC and the Nuclear Energy Institute (NEI). The methodology for assessing effects for aircraft impact are described in NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 8 (Reference 1). These guidelines were fully followed with no exceptions taken.

This section describes the design features and functional capabilities of the APR1400 identified in the detailed assessment that assure the reactor core remains cooled and spent fuel pool integrity is maintained. These identified design features are designated as "key" design features.

19.5.2 Scope of the Assessment

The evaluation of plant damage caused by the impact of a commercial aircraft is a complex problem involving phenomena associated with structural damage resulting from the initial impact, shock-induced vibration, and the effects of an aviation fuel-fed fire. The analysis assessed the following effects of a large commercial aircraft impact on the APR1400.

a. damage resulting from the impact of the aircraft fuselage and wing structure;

b. shock-induced vibration on systems, structures, and components (SSC);

c. penetration of hardened aircraft components, such as engine rotors and landing gear; and

d. the extent of damage from fires fed by aviation fuel.

The analysis assessed the above effects of a large commercial aircraft impact at multiple locations where a large commercial aircraft could potentially strike critical APR1400 structures.

Perforation of the Spent Fuel Pool (SFP) and Reactor Containment Building (RCB) is not predicted; therefore, realistic assessments of the damage to internal SSCs within the RCB caused by 1) burning aviation fuel and 2) secondary impacts are not required. Realistic best estimate assessments of the damage to internal SSCs within the Auxiliary Building (AB) and Emergency Diesel Generator Building (EDGB) caused by 1) burning aviation fuel and 2) secondary impacts are performed.

19.5.3 Assessment Methodology

Methods described in NEI 07-13 (Reference 1) were followed to assess the effects on the structural integrity of the RCB and the SFP and to assess the physical, fire and vibration effects of the aircraft impact on SSCs in the AB and EDGB to ensure continued core cooling capability. The aircraft impact assessment was performed by qualified personnel.

19.5.4 Assessment Results

The APR1400 Aircraft Impact Assessment concludes that the APR1400 can continue to provide adequate protection of the public health and safety with respect to a large commercial aircraft impact as defined by the NRC. Such an aircraft impact would not impair the APR1400's core cooling capability or spent fuel pool integrity as required by 10 CFR 50.150.

The assessment resulted in the identification of the benefits of the key design features and functional capabilities described below, changes to which are evaluated and reported in accordance with 10 CFR 50.150(c). These key design features and functional capabilities ensure that the APR1400 design fully meets the requirements of 10 CFR 50.150 by maintaining core cooling of fuel in the reactor vessel and the integrity of the spent fuel pool following the impact of a large commercial aircraft on the AB and EDGB, including the effects of burning aviation fuel and secondary impacts.

Attachment (11/45)
Reply to a NOV 05200046
Supplemental Reply to a NOV 05200046

19.5.4.1 RCB and SFP

The RCB, as described in Sections 3.8.1 and 3.8.2 and shown on Figures 3.8-1 and 3.8-2 is a key design feature for the protection of the safety systems located inside containment from the impact of a large commercial aircraft. The assessment concludes that a strike upon the RCB would not result in the perforation of the containment, such as to cause direct damage or exposure to jet fuel of the systems within the containment.

The assessment also determined that key components located inside the RCB, including the reactor pressure vessel, steam generators, reactor coolant loop piping, pilot operated safety relief valves, control element drive mechanism, the safety injection and shutdown cooling system suction line motor operated valves, discharge line check valves and instrumentation and control equipment associated with core cooling are unaffected by shock-induced vibrations resulting from the impact of a large commercial aircraft.

The location and design of the control element drive mechanism described in Sections 3.9.4 and 4.6, with the control element drive mechanism located inside of the RCB on top of the reactor vessel closure head such that upon loss of internal power distribution the control rods drop into the reactor core by gravity, are key design features for ensuring that the reactor will be tripped following the impact of an aircraft.

Regarding the SFP, the assessment determined that there are no aircraft impact scenarios that result in leakage from the SFP below the required minimum water level. The pool liner is not perforated and all SFP piping attachments are configured such that they will not allow water in the SFP to drain below the minimum water level. The design and location of the SFP and its supporting structures as described in Sections 3.8A.2 and 9.1.2 are key design features for protecting the integrity of the SFP such that an impact of a large commercial aircraft would not result in leakage from the SFP below the required minimum water level.

19.5.4.2 Plant Arrangement

The APR1400 plant design and arrangement of major structures described in Section 1.2.14 and Figures 1.2-1 through 1.2-27 are key design features. Specifically, the assessment credited the arrangement of, and design of, the following building features to limit the location and effects of potential aircraft strikes on the RCB ~~and AB~~ , AB and EDGB in the following locations:

A key design feature is the nominal compressive strength of the RCB concrete reaching 6900 psi at 28 days.

The polar crane bracket and rail girder shown in Figure 19.5-11, are key design features to protect the safety system located inside containment from the drop of polar crane due to the impact of a large commercial aircraft. The polar crane brackets and girders shall be ASTM ~~A588 Grade A or B~~ A572 Grade 50 and the bolts for the connection between polar crane bracket and rail girder shall be minimum 1.5" diameter ASTM A490X. The design of polar crane bracket and rail girder is performed to maintain adequate design margins. The summary of design results and material properties are shown in Table 19.5-1.

The configurations of the AB credited as key design features for aircraft impact are shown in Table 19.5-2 and Figures 19.5-12 through ~~19.5-16.~~

a. The location and design of the Auxiliary Building (AB) structure as described in Section 3.8.4 are key design features in protecting the RCB [ ]^{SRI} from the impact of a large commercial aircraft. Additionally, portions of quadrant B, C, and D of the AB provide protection of the RCB on the northeast sides [ ]^{SRI}.

and window size of [ ]^{SRI} on veiwing areas in the A and B diesel generator control room are

b. The location and design of the EDGB as described in Section 3.8.4 are key design features including protecting portions of the adjacent wall of the AB [ ]^{SRI} from the impact of a large commercial aircraft.

, Table 19.5-2, and Figure 19.5-18

features

c. The physical separation of the EDGs in AB and EDGB, as described in Section 8.3, Figure 1.2-14 and Figure 1.2-21, ~~is a~~ key design ~~feature~~ in limiting the loss of electrical power to key core cooling systems from the impact of a large commercial aircraft.

A key design feature is the nominal compressive strength of the AB concrete reaching 5900 psi at 28 days.

d. Properties of concrete and reinforcement bars, as described in Appendix 3.8A, are key design features in protecting key equipment in the AB and EDGB. These properties meet the minimum requirements for physical damage rule sets as shown in Table 3-2 of NEI 07-13 Revision 8.

e. The location of the AAC GTG as shown on Figure 1.2-1 relative to the EDGs is a key design feature in limiting the loss of electrical power to key safety systems from the impact of a large commercial aircraft. The AAC GTG building will be located at least 100 yards from the auxiliary building.

as shown on Figure 1.2-21

f. The separation between electrical divisions, specifically EDGs, is adequate to preclude the failure of both electrical divisions due to smoke effects.

as shown on Figure 1.2-16

19.5.4.3 Fire Barriers and Fire Protection Features

The design and location of 3-hour fire barriers, including fire doors, penetration seals and dampers within the AB and EDGB are key design features for the protection of core cooling equipment within these buildings from the impact of a large commercial aircraft. The assessment credited the design and location of fire barriers (including doors) as depicted on Figures 9.5A-1 through 9.5A-11 to limit the effects of internal fires created by the impact of a large commercial aircraft. The EDGB contains key design features and fuctions for emergency AC power, such as the emergency diesel generators and associated components. In addition, certain fire barriers, including blast doors, fast-acting blast

dampers and penetration seals, are credited for 5 psid. These 5 psid barriers are identified on Figures 19.5-1 through 19.5-10. These key design features ensure at least one complete train of secondary heat removal equipment and necessary support systems to include cooling water, electrical power supply and distribution, and instrument and control within the AB and EDGB is available to provide core cooling following the impact of a large commercial aircraft.

cooling water systems (CCW and ECW) are

The piping layout of safety - related ~~cooling water system is~~ to be designed so that piping failure from an aircraft impact shall not cause the total loss of cooling capability.(COL 19.5(2))

19.5.4.4 Core Cooling Features

The design and physical separation (by fire barriers as described in Section 9.5A) of the safety injection and shutdown cooling system (described in Sections 6.3 and 5.4.7), of the auxiliary feedwater system (described in Section 10.4.9), of the main steam safety valves and main steam atmospheric dump valves (described in Sections 10.3.2.2.3 and 10.3.2.2.4) and of the charging pumps and auxiliary charging pump (described in Section 9.3.4) are key system design features for assuring core cooling following a reactor trip in response to an aircraft impact event. The design of the RPV and associated reactor coolant system components located in the RCB as described in Sections 5.3 and 5.4 are key design features.

~~The design and physical separation of the component cooling water system (CCWS) (described in Section 9.2.2), of those portions of the essential service water system located in the ESW Building (described in Section 9.2.1),~~ of the Class 1E electrical power supply and distribution system (described in Section 8.3), and of the safety-related instrumentation and control system (described in Chapter 7) including the physical separation between the MCR, RSR and the RCC and the ability to power the SI pumps, charging pumps, CS pumps and SC pumps from the AAC GTG (described in section 8.4.1.3) are key supporting system design features for assuring core cooling following a reactor trip in response to an aircraft impact event. The action of tripping or shutting down the reactor ensures that the fuel in the reactor is kept subcritical.

Following shutdown from power operation, core cooling is maintained by the auxiliary feedwater system as described in Section 10.4.9. Primary system is maintained at operating pressure and temperature by adjusting auxiliary feedwater flow to match the decay heat rate from the reactor core. Heat is discharged to the atmosphere using the main steam safety valves or main steam atmospheric dump valves. Under these conditions, additional boration is unnecessary to maintain subcriticality.

the RCC

this is also a key

Cables between channel "A" & "B" I&C equipment and ~~RCC~~ shall be routed via each of division I & II areas through ~~the~~ embedded conduits and ~~this design is also one of key~~ supporting system design features.

The design and physical separation of those portion of the essential service water system (ESWS)(described in section 9.2.1), the component cooling water system (CCWS)(described in section 9.2.2), and the ultimate heat sink (UHS)(described in section 9.2.5), the essential chilled water system (ECWS)(described in section 9.2.7),

In the event CCW RCP seal cooling is unavailable, the capability of the chemical volume and control system to provide seal-water flow to the reactor coolant pump seals described in Section 9.3.4.2.1 is a key design feature. In the event both CCW RCP seal cooling and RCP seal injection are unavailable, the capability to maintain RCS inventory with the SI system and to remove containment heat using the containment spray pumps and heat exchangers as described in Section 6.2.2 is a key design feature. The auxiliary feedwater system is available to provide decay heat removal.

For an aircraft impact during plant shutdown with the reactor vessel head removed and water level at or near the reactor vessel head flange, the reactor core is cooled by the shutdown cooling system as described in Section 5.4.7. In the event that the shutdown cooling system is unavailable, the ability to keep the fuel in the vessel covered with water using the safety injection system described in Section 6.3 or charging pumps described in Section 9.3.4 are key design features. To ensure that one train of fuel cooling or inventory makeup is available following the impact of a large commercial aircraft on the AB, administrative controls require that no trains of the safety injection and shutdown cooling system and necessary support systems are out of service when the reactor vessel head is untensioned and the reactor vessel water level is at or near the reactor vessel head flange. (COL 19.5(1))

If all Class 1E power from the EDGs is unavailable due to the loss of the ultimate heat sink or loss of all CCW, the capability of the safety injection pumps taking suction from the IRWST as described in Section 6.3, and the charging pumps and auxiliary charging pump taking suction from the VCT or BAST as described in Section 9.3.4, all powered from the AAC GTG, in order to provide make-up water for the reactor coolant system, are key design features. The AAC GTG is available to power auxiliary feedwater pumps for secondary heat removal.

19.5.5 Conclusions of Assessment

This assessment concludes that key design features and functional capabilities of the APR1400 ensure adequate protection of public health and safety in the event of an impact of a large commercial aircraft, as defined by the NRC. The postulated aircraft impacts would not impair the APR1400 core cooling capability or spent fuel pool integrity. The assessment resulted in identification of key design features and functional capabilities described in Section 19.5.4, changes to which are required to be controlled in accordance with 10 CFR 50.150(c).

19.5.6 Combined License Information

COL 19.5(1) When the reactor head is untensioned and before the refueling pool is flooded up, administrative controls will be in place to ensure that no trains of SI and shutdown cooling, including the necessary power and cooling water support systems are out of service for maintenance.

19.5.7 References

1. NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs," Revision 8, April 2011.

~~COL 19.5(2) When the piping layout of essential chilled water system on auxiliary building FL EL. 174' 0" is designed, at least their piping of one train in the corridor should be survived from effect of an aircraft impact.~~

COL 19.5(2) The piping layout of safety - related cooling water systems (CCW and ECW) are to be designed so that piping failure from an aircraft impact shall not cause the total loss of cooling capability.

Table 19.5-1

Material property and Member Stress Check of Polar Crane Bracket and Rail Girder

Member	Property and Size	Interaction Ratio (IR)
Polar Crane Bracket	~~ASTM A588 Grade A or B~~	0.412
Rail Girder	~~ASTM A588 Grade A or B~~	0.538
Connection Bolt	ASTM A490X, 1.5 inch	0.397

ASTM A572 Grade 50

Add table 19.5-1 and 19.5-2

Table 19.5-2

Required Rebar Area of Wall & Slab for AIA in Auxiliary Building and EDG Building

Section	Thickness	Elevation	Required Horizontal Rebar	Required Vertical Rebar	Required Shear Rebar	Remark
			in^2	in^2	in^2	
North wall of SFP area (AB exterior wall)	4 ft	100'-0" to 156'-0"	2-#11@9"	1-#14@12" 1-#11@12"	-	-
East wall of SFP area (AB exterior wall)	4 ft	100'-0" to 137'-6"	2-#11@12"	1-#14@12" 1-#11@12"	-	-
West Wall of below MCR	4 ft	137'-6" to 156'-0"	3-#11@9"	3-#11@9"	-	For required design rebar area, See Table 3.8A-29
West Wall of MCR	3 ft	156'-0" to 174'-0"	2-#10@12"	2-#11@12"	-	
		174'-0" to 195'-0"	#11@9"	2-#9@12"	-	
Interior Wall of MCR	3 ft	156'-0" to 195'-0"	#11@9"	2-#10@12"	-	-
North/South Wall of MSIV House(AB exterior wall)	5 ft	100'-0" to 174'-0"	3-#14@9"	3-#14@9"	#9@9"	See Table 3.8A-29
East Wall of MSIV House (AB interior wall)	4 ft	137 -6" to 174'-0"	2-#10@12"	#10@9"	-	-
East Wall of FHA (AB exterior wall)	4 ft	Above 137'-6"	2-#11@12"	2-#14@12"	-	-
West Wall of FHA	3 ft	Above 156'-0"	2-#10@12"	2-#11@12"	-	-
North Wall of FHA (AB exterior wall)	4 ft	Above 156'-0"	2-#11@9"	2-#14@12"	-	-
South Wall of FHA (AB exterior wall)	4 ft	Above 156'-0"	2-#11@9"	2-#14@12"	-	-
Wall of SFP(East)	7 ft	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	-
Wall of SFP(West)	7 ft	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	For required design rebar area, See Table 3.8A-29
Wall of SFP(North)	5.5 ft	114'-0" to 156'-0"	2-#11@9"	2-#14@9"	-	-
Wall of SFP(South)	7 ft	114'-0" to 156'-0"	3-#11@9"	2-#14@9"	-	-
Lv5 Exterior Wall #1	4 ft	137'-6" to 156'-0"	2-#11@9"	2-#11@12"	-	-
Lv5 Interior Wall #1	4 ft	137'-6" to 156'-0"	#11@9"	#11@9"	-	-
Lv5 Interior Wall #2	4 ft	137'-6" to 156'-0"	2-#11@9"	2-#10@9"	-	-
Lv5 Interior Wall #3	4 ft	137'-6" to 156'-0"	3-#11@12"	2-#11@9"	-	-
Lv5 Interior Wall #4	4 ft	137'-6" to 156'-0"	2-#11@9"	2-#11@9"	-	-
Lv5 Interior Wall #5	3 ft	137'-6" to 156'-0"	#10@9"	2-#10@12"	-	-
Lv5 Interior Wall #6	3 ft	137'-6" to 156'-0"	#11@9"	2-#10@12"	-	-
Lv6 Exterior Wall #1	3 ft	156'-0" to 174'-0"	2-#10@9"	2-#11@12"	-	-
Lv6 Interior Wall #1	3 ft	156'-0" to 174'-0"	#11@9"	#11@9"	-	-
Floor slab of SFP	6.08 ft	114'-0"	2-#14@12"	2-#14@12"	#4@9"	For required design rebar area, See Table 3.8A-33
Interior wall above MCR	3ft	174'-0" to 195'-0"	#11@12"	#11@12"	-	-
North/South wall of the EDGB (EDGB exterior wall)	3ft	100'-0" to 135'-0"	2-#11@12"	2-#11@9"	-	For required design rebar area, See Table 3.8A-36
North/South wall of the EDGB (EDGB exterior wall)	2ft	135'-0" to 150'-0"	#11@12"	#11@9"	-	
Center wall of the EDGB	3ft	100'-0" to 135'-0"	#11@12"	#11@9"	-	

Add table 19.5-1 and 19.5-2

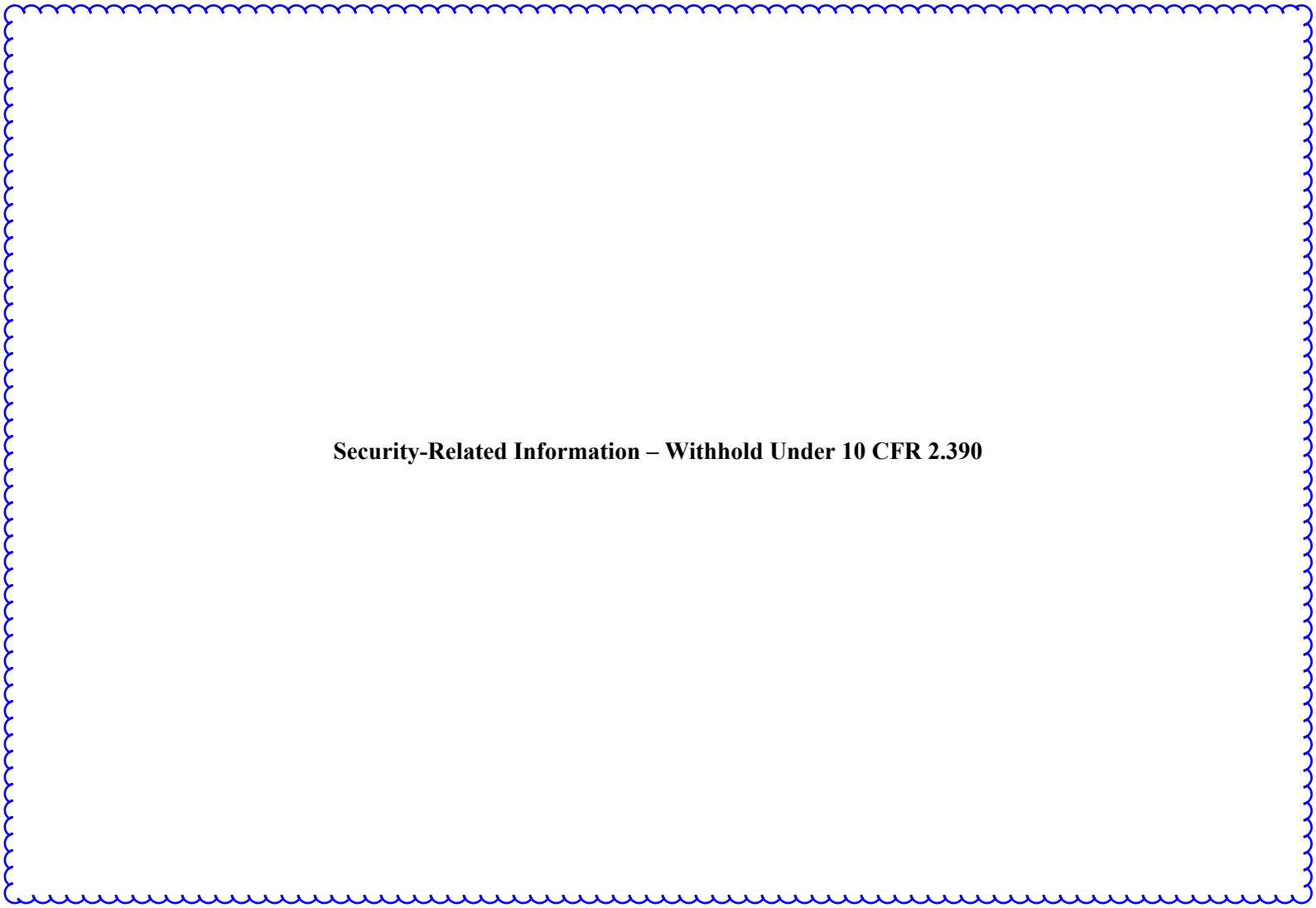

Figure 19.5-1 5-psid barrier – AB El. 55'-0"

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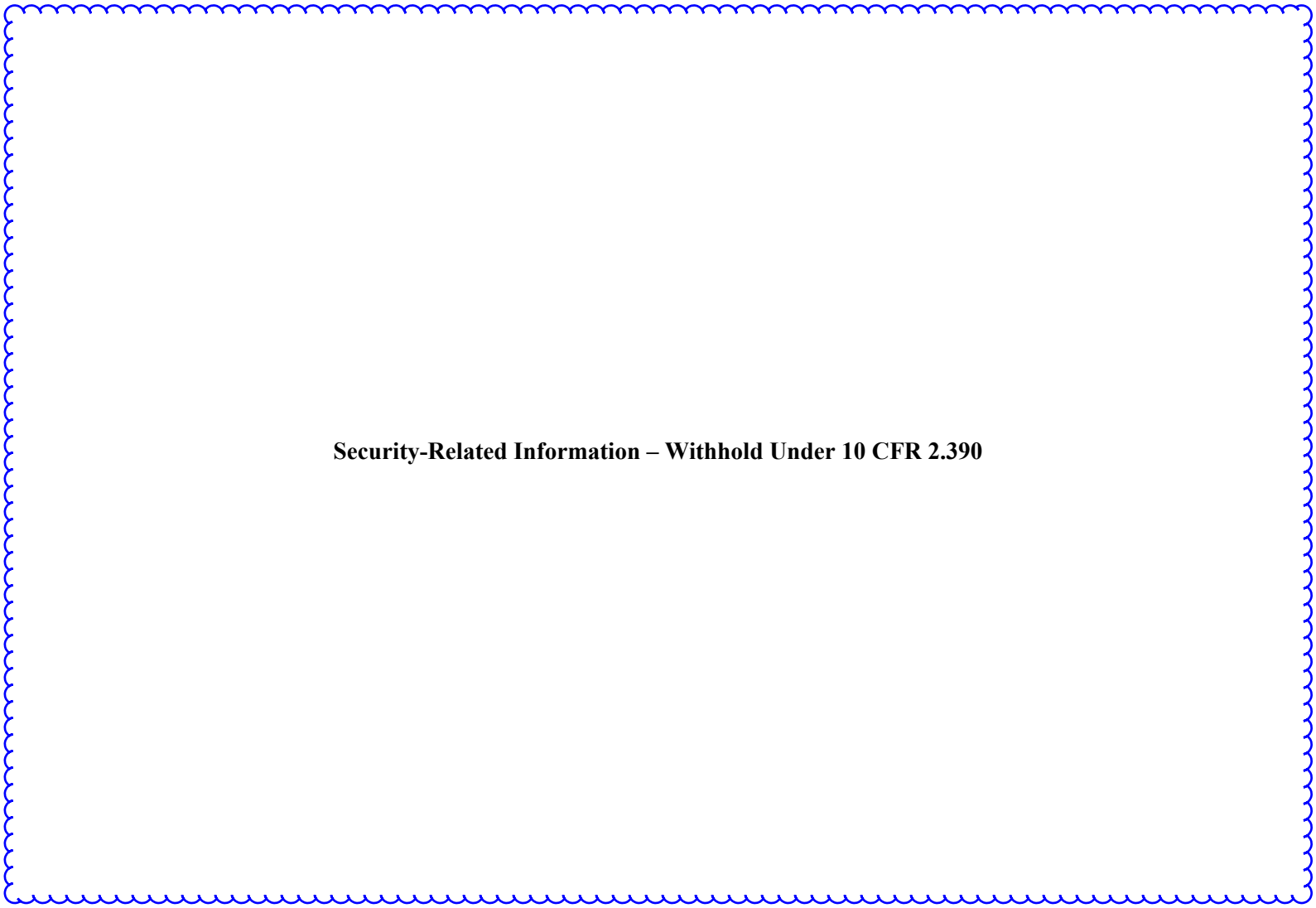

Figure 19.5-2 5-psid barrier – AB El. 68'-0"

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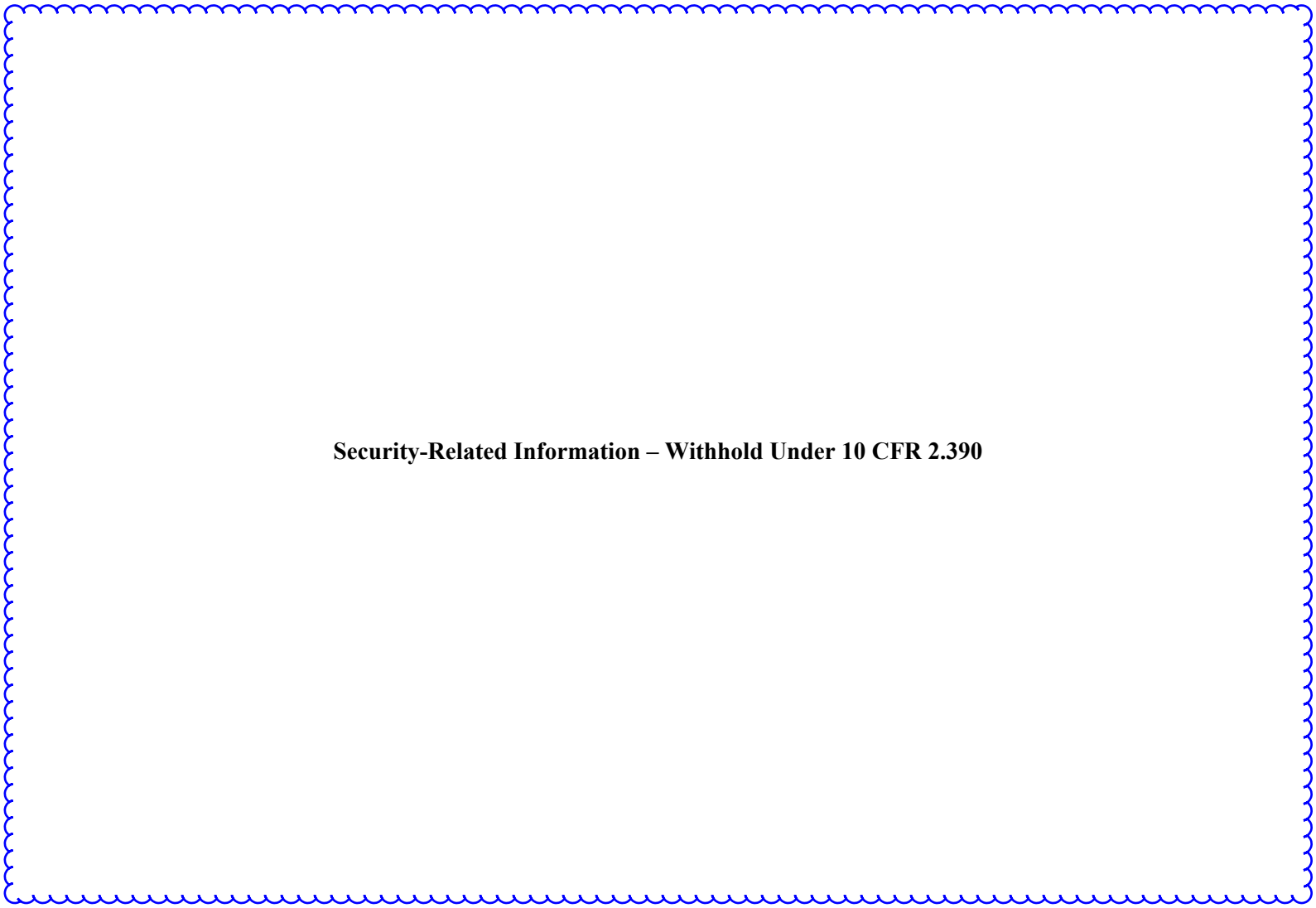

Figure 19.5-3 5-psid barrier – AB El. 78'-0"

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Figure 19.5-4 5-psid barrier – AB El. 100'-0"

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Figure 19.5-5 5-psid barrier – AB El. 120'-0"

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Figure 19.5-6 5-psid barrier – AB El. 137'-6"

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Figure 19.5-7 5-psid barrier – AB El. 156'-0"

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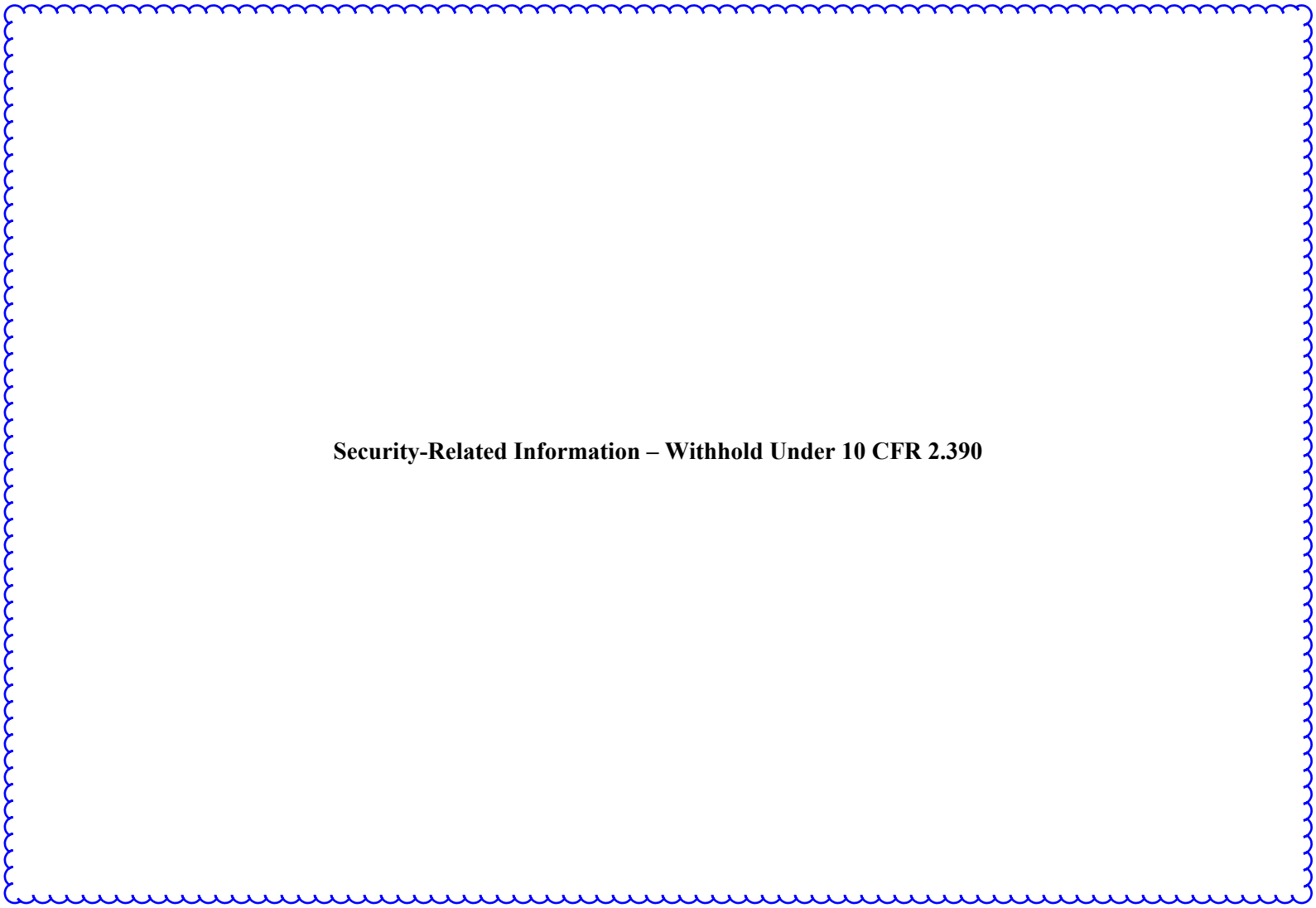

Figure 19.5-8 5-psid barrier – AB El. 174'-0"

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Figure 19.5-9 5-psid barrier – AB El. 195'-0"

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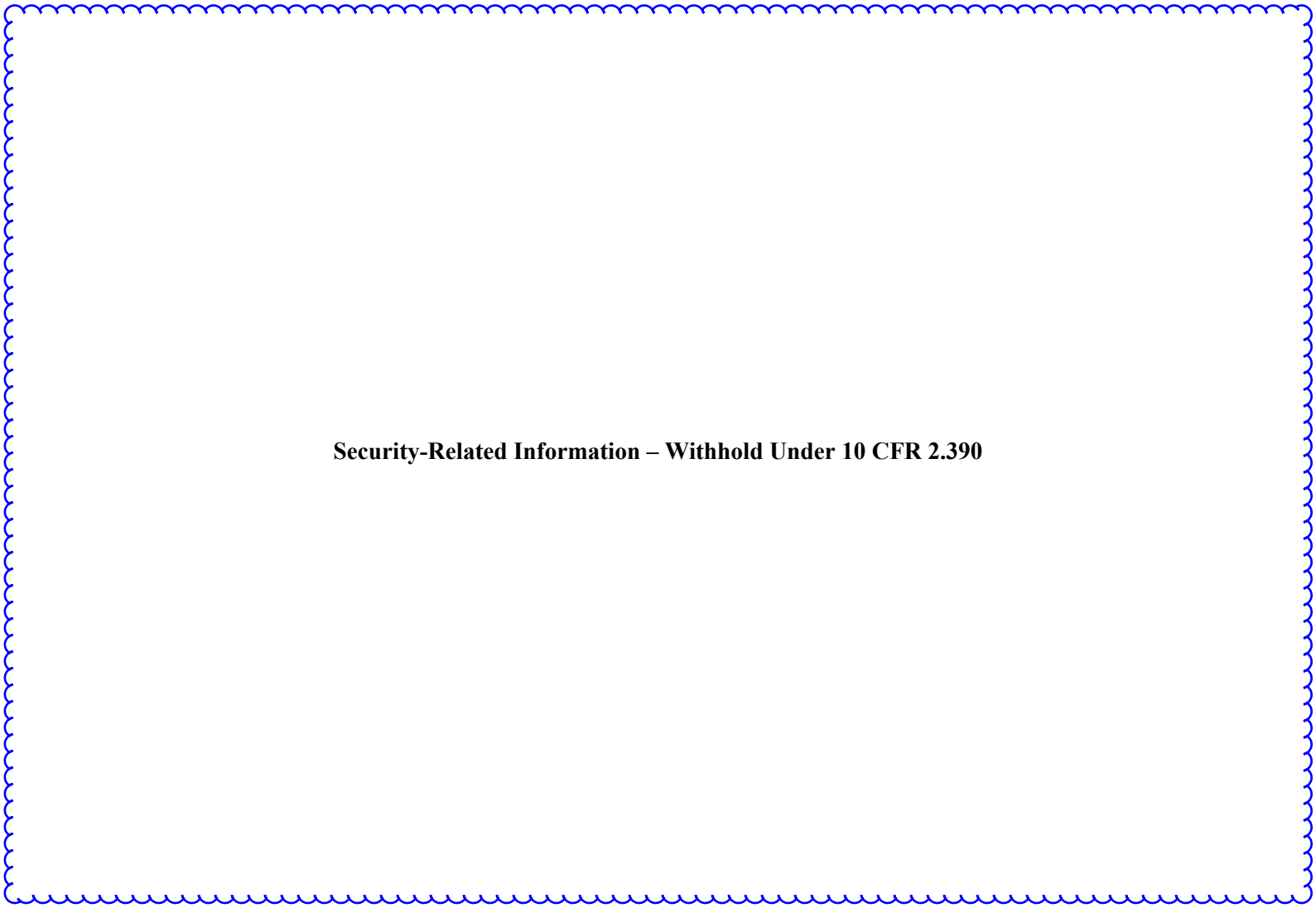

Figure 19.5-10 5-psid barrier – EDGB El. 100'-0" & 121'-6"

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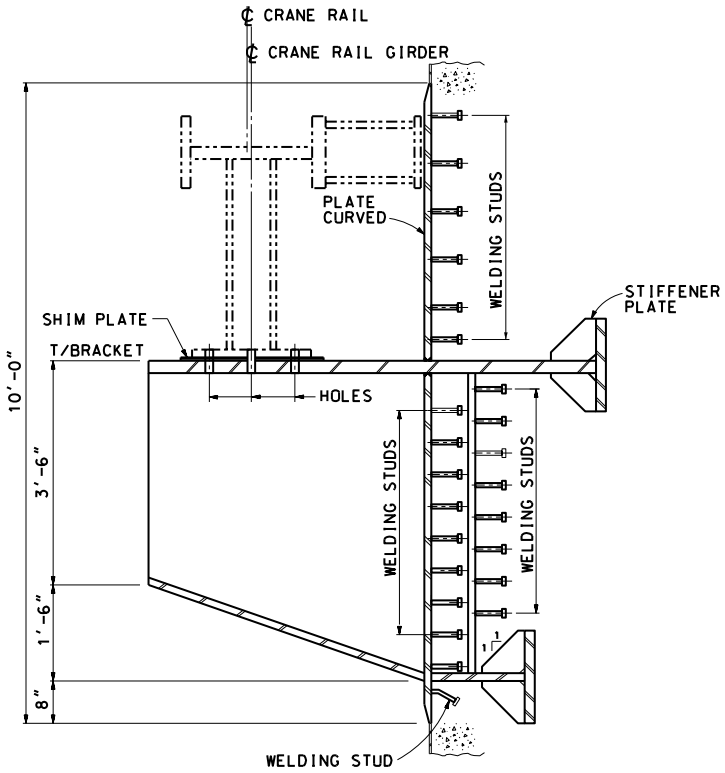

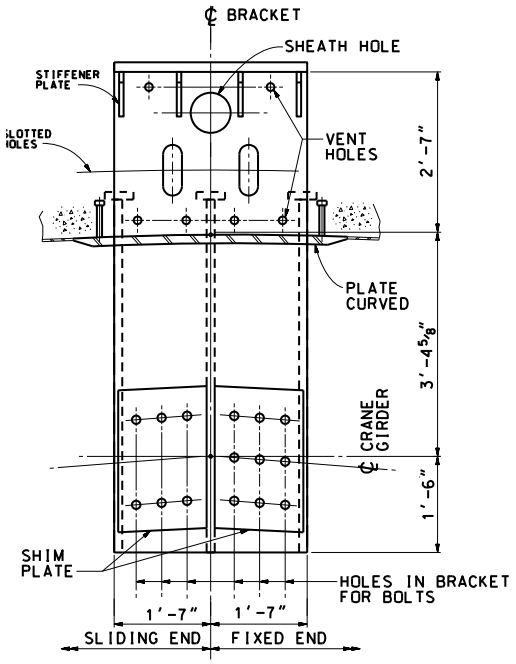

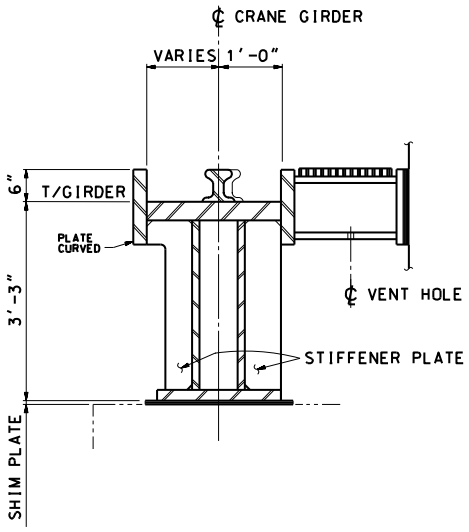

Figure 19.5-11 Polar Crane Bracket

Add figures 19.5-11 through 19.5-16

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Figure 19.5-12 Minimum Required Section for AIA, Auxiliary Building El. 100′-0″

Add figures 19.5-11 through 19.5-18

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Figure 19.5-13 Minimum Required Section for AIA, Auxiliary Building El. 120′-0″

Add figures 19.5-11 through 19.5-18

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Figure 19.5-14 Minimum Required Section for AIA, Auxiliary Building El. 137′-6″

Add figures 19.5-11 through 19.5-18

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Figure 19.5-15 Minimum Required Section for AIA, Auxiliary Building El. 156′-0″

Add figures 19.5-11 through 19.5-18

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Figure 19.5-16 Minimum Required Section for AIA, Auxiliary Building El. 174′-0″

Add figures 19.5-11 through 19.5-18

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Figure 19.5-17 Minimum Required Section for AIA, Auxiliary Building Roof El. 195′-0″

Add figures 19.5-11 through 19.5-18

Security-Related Information – Withhold Under 10 CFR 2.390

Figure 19.5-18 Minimum Required Section for AIA, EDG Building

Add figures 19.5-11 through 19.5-18