REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

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

Docket No. 52-046

RAI No.:	**227-8274**
SRP Section:	**03.08.04 – Other Seismic Category I Structures**
Application Section:	**03.08.04**
Date of RAI Issue:	**09/25/2015**

Question No. 03.08.04-7

10 CFR 50.55a and 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 1, 2, 4 and 5 provide the regulatory requirements for the design of seismic Category I structures. Standard Review Plan (SRP) 3.8.4, Section II.4.H indicates that consideration of dynamic lateral soil pressures on embedded walls is acceptable if the lateral earth pressure loads are evaluated for the governing of the following three cases. These are (1) lateral earth pressure equal to the sum of the static earth pressure plus the dynamic earth pressure calculated in accordance with ASCE 4-98, Section 3.5.3.2(2); (2) lateral earth pressure equal to the sum of the static earth pressure plus the dynamic earth pressure calculated using an embedded SSI/ Finite Element Model (FEM) analysis model; and (3) lateral earth pressure equal to the fraction of the passive earth pressure that is effectively mobilized, which is dependent on the relative magnitude of the wall displacements against the soil that may occur for a given wall configuration. For case (3), the analysis should include, as a minimum, the fraction of the passive earth pressure assumed in the stability calculations performed in accordance with SRP Section 3.8.5.

In APR 1400 DCD Tier 2, Section 3.8.4.4, “Design and Analysis Procedures,” the applicant did not describe the analysis and design of below grade walls for lateral earth pressure loads. In DCD Appendix 3.8A, subsection 3.8A.2.4.2, “Shear Walls,” for the auxiliary building, the applicant states that “The exterior walls below the grade are designed to resist the worst-case lateral earth pressure loads (static and dynamic), soil surcharge loads, and loads due to groundwater. Lateral earth pressure equal to the summation of the static earth pressure plus the dynamic earth pressure is calculated in accordance with ASCE 4. The hydrodynamic effect of pure water is determined based on the hydrodynamic formula suggested by Matuo and O’Hara.” However, in DCD Appendix 3.8A, subsection 3.8A.3.4.2, “Shear Walls,” the applicant did not provide design and analysis procedures for the below grade walls of the emergency diesel generator building and diesel fuel oil storage tank rooms.

Furthermore, in subsection 3.8.4.3.4, “Extreme Environmental Loads,” the applicant stated that “For seismic Category I structures, E_s are the loads generated by the SSE. Hydrodynamic load and dynamic soil pressure are included in E_s.” However, it is not clear how the hydrodynamic load and dynamic soil pressure were included in loads generated by the SSE. Therefore, the applicant is requested to address the following, and include this information in the DCD:

a) Applicant is requested to describe how all walls below grade were analyzed and designed for dynamic lateral earth pressures for all structures, and if the approach was consistent with that described in SRP 3.8.4 II.4.H. If not, provide the basis for using the alternative approach. In addition, for the calculation of the hydrodynamic effect of pure water, determined based on the hydrodynamic formula suggested by Matuo and O'Hara, the formula used should be provided and the full reference designation for this, as well as any other references discussed in the DCD should be identified in the DCD.

b) Applicant is also requested to provide how the hydrodynamic load and dynamic soil pressure were included in loads generated by the SSE.

Response – (Rev.1)

a) According to SRP 3.8.4 II.4.H, lateral earth pressure is considered by following three items.

1) Exterior walls below grade in all structures were analyzed with consideration of the surcharge pressure, the static soil pressure, the dynamic earth pressure and the static and dynamic groundwater pressure. Lateral earth pressure was calculated by taking the sum of the static earth pressure plus the dynamic earth pressure calculated in accordance with ASCE 4-98. The dynamic earth pressure was calculated by the tangent line shown in red below. Although the poisson's ratio of the backfill material was 0.33, the shape of the pressure distribution was conservatively simplified to be trapezoidal.

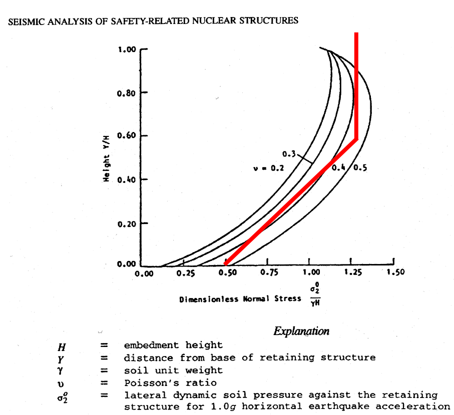

FIGURE 3.5-1. Variation of Normal Dynamic Soil Pressures for the Elastic Solution

For the calculation of the hydrodynamic effect of pure water, dynamic groundwater pressure was calculated by using the equation suggested by Matsuo and O'Hara on Westergaard theory shown in "Principles of Soil Dynamics," Braja M. Das. The equation is as follows. These explanations will be added in DCD Tier 2 Subsection 3.8.7, 3.8A.2.4.2, and 3.8A.3.4.2 as shown in attachment 1 associated with response.

$$p = 0.7(\frac{7}{8}k_h r_w h^{0.5} y^{0.5})$$

2) The fraction of the passive earth pressure assumed in the stability check should be considered in the NI common basemat analysis. In APR14010 basemat analysis, the passive earth passive pressure is not considered because the passive earth pressure effect is not used in overturning and sliding check for basemat stability.

3) The dynamic earth pressures were determined based on the results of the SSI/SSSI analyses, as discussed in the response to the RAI 226-8235 Question No. 03.07.02-6. For the Auxiliary Building, the dynamic earth pressures determined from the SSI and SSSI analyses are much larger than those calculated in accordance with ASCE 4-98, as shown in the following table. The north and south walls are divided into the two parts, east part and west part, with the column line 19 of the Auxiliary Building where a wall discontinuity occurs due to the geometry change.

Elevation (ft)	Dynamic Earth Pressure (ksf) in Auxiliary Building				
	ASCE 4-98	SSI/SSSI Analyses			
	All Walls	East Wall	West Wall	North Wall	South Wall
100	2.98	6.37	3.44	6.18 (East Part) / 4.96 (West Part)	4.56 (East Part) / 4.39 (West Part)
95.6	2.25				
91.2	2.08				
86.8	1.94				
82.4	1.81				
78	1.67				
73	1.52				
68	1.36				
63.7	1.23				
59.3	1.10				
55	0.96				

Based on the revised analyses, the dynamic earth pressures determined from the SSI and SSSI analyses are the governing case. Therefore, the structural analysis of the Auxiliary Building was revised using the governing dynamic earth pressure obtained from the SSI and SSSI analyses. Based on the results of the revised structural analysis, the structural member forces of the exterior walls below grade level were determined, and the design of these exterior walls was evaluated again. Consequently, the increased dynamic earth pressure led to an increase in the amount of reinforcement steel required in the Auxiliary Building walls. Therefore, Tables 3.8A-28, 3.8A-29 and Figures 3.8A-40, 3.8A-41, 3.8A-43, 3.8A-44 will be revised as shown in Attachment 3 associated with this response.

Since the EDG Building stands on the ground without embedded walls, the dynamic earth pressures are not applicable to the EDG Building. For the DFOT structure which is embedded below grade level, the dynamic earth pressures were considered for design of embedded exterior walls. As in the Auxiliary Building, the dynamic earth pressures determined from the SSI and SSSI analyses were also turned out to be the governing case for the DFOT structure. The following table shows the comparison of the dynamic earth pressures applicable to the DFOT structure.

Elevation (ft)	Dynamic Earth Pressure (ksf) in DFOT				
	ASCE 4-98	SSI/SSSI Analyses			
	All Walls	East Wall	West Wall	North Wall	South Wall
96.5	2.04	1.9	2.4	6.5	1.7
91.1	1.79				
85.8	1.37				
80.4	1.23				
75	1.08				
70.3	0.96				
65.7	0.84				
61	0.71				

In spite of the exception of the uppermost elevations of east and south walls, the dynamic earth pressures determined from SSI and SSSI analyses are generally larger than those determined from ASCE 4-98. Therefore, the structural analysis of the DFOT structure was revised using the governing dynamic earth pressure obtained from the SSI and SSSI analyses. Based on the results of the revised structural analysis, the structural member forces of the exterior walls below grade level were determined, and the design of these exterior walls was evaluated as shown in the following table.

Design Results	North Wall	South Wall	East Wall	West Wall
Wall Thk.	4'-0"	4'-0"	4'-0"	2'-6"
Hor. Reinf.	3-#11 @ 9"	2-#11 @ 12"	3-#11 @ 9"	3-#11 @ 9"
Ver. Reinf.	2-#11 @ 9"	2-#11 @ 12"	2-#11 @ 12"	2-#14 @ 12"
Stirrup	#5 @ 12"	#6 @ 12"	#6 @ 9"	#6 @ 6"

The EDG Building Block consists of the EDG Building and the DFOT structure, and its critical sections are selected at basemat, west wall, and center wall of the EDG Building. Since the DFOT structure has not been considered for critical sections in DCD, markups for the DFOT structure are not submitted.

b) The hydrodynamic load and dynamic soil pressure were included in the abnormal/extreme environmental loading condition with seismic load. The hydrodynamic load and dynamic soil pressure were added to the SRSS-combined seismic load by the absolute sum methodology. Therefore, Subsection 3.8.4.3.4 will be revised as shown in the attachment 2 associated with this response.

Impact on DCD

DCD Tier 2 Subsections 3.8.4.3.4, 3.8.7, 3.8A.2.4.2, 3.8A.3.4.2 and Tables 3.8A-28, 3.8A-29 and Figures 3.8A-40, 3.8A-41, 3.8A-43, 3.8A-44 will be revised as indicated in the attached markup.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environmental Report.

element with 6 degrees of freedom at each node. The 3-D view (toward -XY) of the FEM model for the AB is shown Figure 3.8A-30.

The element forces of the AB shear wall are calculated in each level, individual shear wall and all loading combinations, and these are used for shear wall design. The main output data on shell elements by the ANSYS program are composed of in-plane axial forces, in-plane shear forces, out-of-plane bending moments, and transverse shear forces.

The AB shear walls are analyzed and designed in accordance with the requirements of ACI 349. The required reinforcements are designed by the following procedure:

a. Design for in-plane shear forces

~~(Reference 41), Section 3.5.3, Figure 3.5-1, "Variation of Normal Dynamic Soil Pressure for the Elastic Solution".~~

b. Design for out-of-plane bending moments with axial forces

c. Combine the required reinforcement calculated above procedure

d. Check for shear capacity: in-plane shear forces, out-of-plane shear forces, and shear friction forces between wall and floor.

(Reference 42), Section 8.10, Equation 8.40 "Principles of Soil Dynamics," Braja M.Das

Out-of-plane forces and moments are considered in the shear wall design, which are determined by hand calculations or local structural analysis as well as the global analysis. Out-of-plane loads include attachment loads and seismic loads such as the associated hydrodynamic loads and dynamic incremental soil pressure.

is

(static and dynamic)

The exterior walls below the grade are designed to resist the worst-case lateral earth pressure loads (static and dynamic), soil surcharge loads, and loads due to groundwater. Lateral earth pressure equal to the summation of the static earth pressure plus the dynamic earth pressure ~~is calculated in accordance with ASCE 4~~. The hydrodynamic effect of pure water is determined based on the hydrodynamic formula suggested by Matuo and O'Hara. Design forces and moments are summarized in Table 3.8A-28 for the critical sections.

The local structural analysis is performed for the tanks in the AB such as the AFWT and SFP. Local loads such as hydrodynamic and hydrostatic pressures loads or thermal loads acting on the walls are considered in the analysis. The hydrodynamic analysis includes two horizontal modes and one vertical mode of combined fluid-tank vibration. The horizontal

The dynamic earth pressures are determined as the governing case between the dynamic earth pressures calculated in accordance with ASCE 4-98 (Reference 41), Section 3.5.3, Figure 3.5-1, "Variation of Normal Dynamic Soil Pressure for the Elastic Solution" and those calculated based on the results of the SSI/SSSI analyses.

30. Regulatory Guide 1.91, "Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants," Rev. 2, U.S. Nuclear Regulatory Commission, April 2013.

31. Regulatory Guide 1.115, "Protection Against Low-Trajectory Turbine Missiles," Rev. 2, U.S. Nuclear Regulatory Commission, January 2012.

32. Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Rev. 2, U.S. Nuclear Regulatory Commission, November 2001.

33. ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures," American Society of Civil Engineering/Structural Engineering Institute, 2006.

34. GTSTRUDL User Guide, GTSTRUDL Version 31, Georgia Institute of Technology, August 2010.

35. Research Council on Structural Connections, "Specification for Structural Joints Using ASTM A325 or A490 Bolts," 2004.

36. AWS D1.1, "Structural Welding Code," American Welding Society, 2010.

37. ASTM C191, "Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle," American Society for Testing and Materials.

38. ASTM C109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars," American Society for Testing and Materials.

39. ASTM A36, "Standard Specification for Carbon Structural Steel," American Society for Testing and Materials.

40. APR1400-E-S-NR-14006-P, "Stability Check for NI Common Basemat" Rev. 0, KHNP, November 2014.

41. ASCE 4-98. "Seismic Analysis of Safety Related Nuclear Structures and Commentary," American Society of Civil Engineers, January 2000.

42. Braja M.Das and G.V.Ramana, "Principles of Soil Dynamics", Second Edition, pp. 362

Analysis and Design Methods

The global static analysis is performed using the ANSYS structural analysis program to evaluate element forces of the shear walls. Shear walls are modeled by the Shell 181 element in ANSYS, while Beam 188 is used to model the concrete frame. The Link 180 element is applied to consider the effects of soil spring on the basemat analysis. The FEM representing the whole EDG building for structural analysis is shown in Figure 3.8A-34.

Before determining the required reinforcing steel in the shear walls, the acceptability of concrete shear stresses is checked. In-plane shear stress, out-of-plane shear stress, and combined concrete shear stresses are calculated for each shear wall to provide reasonable assurance that the shear stress does not exceed the acceptable values in accordance with ACI 349. The horizontal and vertical reinforcements required for the shear walls are computed by combining the individual reinforcement requirements resulting from the various load conditions.

The exterior walls below the grade are designed to resist the worst-case lateral earth pressure loads (static and dynamic), soil surcharge loads, and loads due to groundwater (static and dynamic). Lateral earth pressure is equal to the summation of the static earth pressure plus the dynamic earth pressure. The dynamic earth pressure are determined as the governing case between the dynamic earth pressures calculated in accordance with ASCE 4-98 (Reference 41) and those calculated based on the results of the SSI/SSSI analyses. The hydrodynamic effect of pure water is determined based on the hydrodynamic formula suggested by Matuo and O'Hara (Reference 42).

Design Summary

Table 3.8A-35 shows the summary of the element forces for the critical shear walls of the EDG building. The final vertical and horizontal reinforcing steel required in each shear wall are determined based on both calculation requirements and practicable considerations such as placement of the reinforcing steel in the shear walls. The results of the shear wall analysis and design, in the form of horizontal and vertical reinforcement quantities required and provided for each shear wall at basemat level and margins of safety, are summarized in Table 3.8A-36. The margin of safety is the ratio of required reinforcement and provided reinforcement.

The structural design for the critical section provides reinforcement to resist element forces and moments as described as follows:

a. Center wall located in the middle of the EDG building: The center wall of the EDG building extends from the top of the basemat at El. 100 ft 6 in to the roof at El. 135 ft 0 in. It is 0.76 m (2 ft 6 in.) thick. The reinforcing steel arrangements of the center wall of the EDG building are shown in Figure 3.8A-55.

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c. Operating basis earthquake

The operating basis earthquake (OBE) is defined as one-third of the SSE. Therefore, an analysis or design of APR1400 seismic Category I SSCs based on OBE is not required in accordance with Appendix S of 10 CFR Part 50.

3.8.4.3.4 Extreme Environmental Loads

a. Safe shutdown earthquake – (E_s)

SSE loads are considered as follows:

~~To consider the effect of seismic direction,hydrodynamic load and dynamic soil pressure are added to the seismic load using the SRSS method. The sign of the seismic load was chosen both plus(+) and minus (-) to give the most severe loading combination.~~

1) Seismic Category I structures

For seismic Category I structures, E_s are the loads generated by the SSE. Hydrodynamic load and dynamic soil pressure are included in E_s.

The hydrodynamic load and dynamic soil pressure are added to the SRSS-combined seismic load by the absolute sum.

Seismic response for SSE is determined using a dynamic analysis. Enveloped floor response spectra in both the horizontal (N-S and E-W) and vertical directions are prepared for all major building floor elevations. An equivalent static method is used to determine SSE loads on structural components (e.g., floor slabs, beams).

2) Combination of SSE loads

For each load, the responses from all three directional earthquakes are combined simultaneously. The independent directional responses are combined using the square root of the sum of the squares (SRSS) method or the 100-40-40 percent rule described in ASCE 4, Subsection 3.2.7. The 100-40-40 percent rule is based on the observation that the maximum increase in the resultant for two orthogonal forces occurs when these forces are equal. The maximum value is 1.4 times one component. All possible combinations of the three orthogonal responses are considered. The 100-40-40 percent rule may also be applied for combining responses in the same direction due to different components of motion.

Table 3.8A-28

Enveloped Design Forces of the AB Shear Wall

Element Set No.	Zone	Elevation	Governing Load Combinations	N11 kip/ft	N22 kip/ft	M11 kip-ft/ft	M22 kip-ft/ft	Qout kip/ft	N12 kip/ft
North wall of north MSIV house	1	55′-0″ to 100′-0″	LC15C	44.8	32.9	106.5	106.1	64.8	191.5
	2	100′-0″ to 120′-0″	LC15C	30.6	87.6	152.0	147.1	70.9	259.2
	3	120′-0″ to 137′-6″	LC15A	68.9	29.5	128.4	72.8	34.4	218.5
	4	137′-6″ to 174′-0″	LC15A	112.8	7.5	55.1	65.5	2.1	120.9
North wall of north AFWST	1	100′-0″ to 137′-6″	LC15B	-53.9	-144.0	74.3	124.5 9	68.9	165.6
West wall of MCR	1	55′-0″ to 100′-0″	LC15B	-56.3	-305.0	86.8	53.3	55.5	228.42
	2	100′-0″ to 137′-6″	LC15C	-59.6	-277.4	76.8	67.7	56.1	166.1
	3	137′-6″ to 156′-0″	LC15C	-196.9	-146.7	29.3	27.1	12.8	194.5
	4	156′-0″ to 174′-0″	LC15B	20.1	-15.4	28.9	51.8	39.6	90.3
	5	174′-0″ to 195′-0″	LC15C	-87.2	-18.8	44.7	73.9	17.5	65.0
West wall of SFP	1	114′-0″ to 156′-0″	LC15B	-51.3	-270.0	248.9	288.4	118.8	291.2
East wall of FHA	1	156′-0″ to 174′-0″	LC15C	72.4	-1.6	69.5	69.2	59.7	131.2
	2	174′-0″ to 213′-6″	LC15B	-68.2	-155.8	125.8	222.1	20.1	165.6

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(1) 11 is in horizontal direction, and 22 is in vertical direction.

(2) Design forces and moments in this table are the enveloped values of the following load combinations;

L.C.4 : $1.4\ D + 1.7\ (L + L_{g\_s}) + 1.4\ L_h + 1.4\ R_o$

L.C.6 : $1.4\ D + 1.7\ (L + L_{g\_s}) + 1.4\ L_h + 1.7\ W$

L.C.15A : $1.0\ D + 1.0\ L + 1.0\ L_h + 1.0\ L_{g\_s} + 1.0\ E_s + 1.0\ L_{g\_d}$

L.C.15B : $1.0\ D + 1.0\ L + 1.0\ L_h + 1.0\ Lg\_s - 1.0\ E_s + 1.0\ L_{g\_d}$

L.C.15C : $0.9\ D + 1.0\ L_h + 1.0\ L_{g\_s} + 1.0\ Es + 1.0\ L_{g\_d}$

L.C.15D : $0.9\ D + 1.0\ L_h + 1.0\ L_{g\_s} - 1.0\ Es + 1.0\ L_{g\_d}$

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Element Set No.	Zone	Elevation	Governing Load Combinations	N11 kip/ft	N22 kip/ft	M11 kip-ft/ft	M22 kip-ft/ft	Qout kip/ft	N12 kip/ft
North wall of north MSIV house	1	55′-0″ to 100′-0″	LC15C	**91.8**	**159.9**	**467.4**	**271.0**	**235.0**	**286.3**
West wall of MCR	1	55′-0″ to 100′-0″	LC15B	**14.3**	**109.0**	**73.3**	**70.0**	**54.6**	**245.3**

Table 3.8A-29

Required Reinforcement and Margins of Safety for the AB Shear Wall

Critical Section	Zone	Elevation	Horizontal			Vertical			Shear		
			Required in²	Provided	Ratio(1)	Required in²	Provided	Ratio(1)	Required in²	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

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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″	**5.85**	**2-#14@9"**	**1.03**	**5.11**	**2-#14@9"**	**1.17**	**0.87**	**2-#6@9"**	**1.34**
West wall of MCR	1	55′-0″ to 100′-0″	**3.99**	**2-#14@12"**	**1.17**	**3.47**	**2-#14@12"**	**1.30**	**0.31**	**#6@12"**	**1.42**

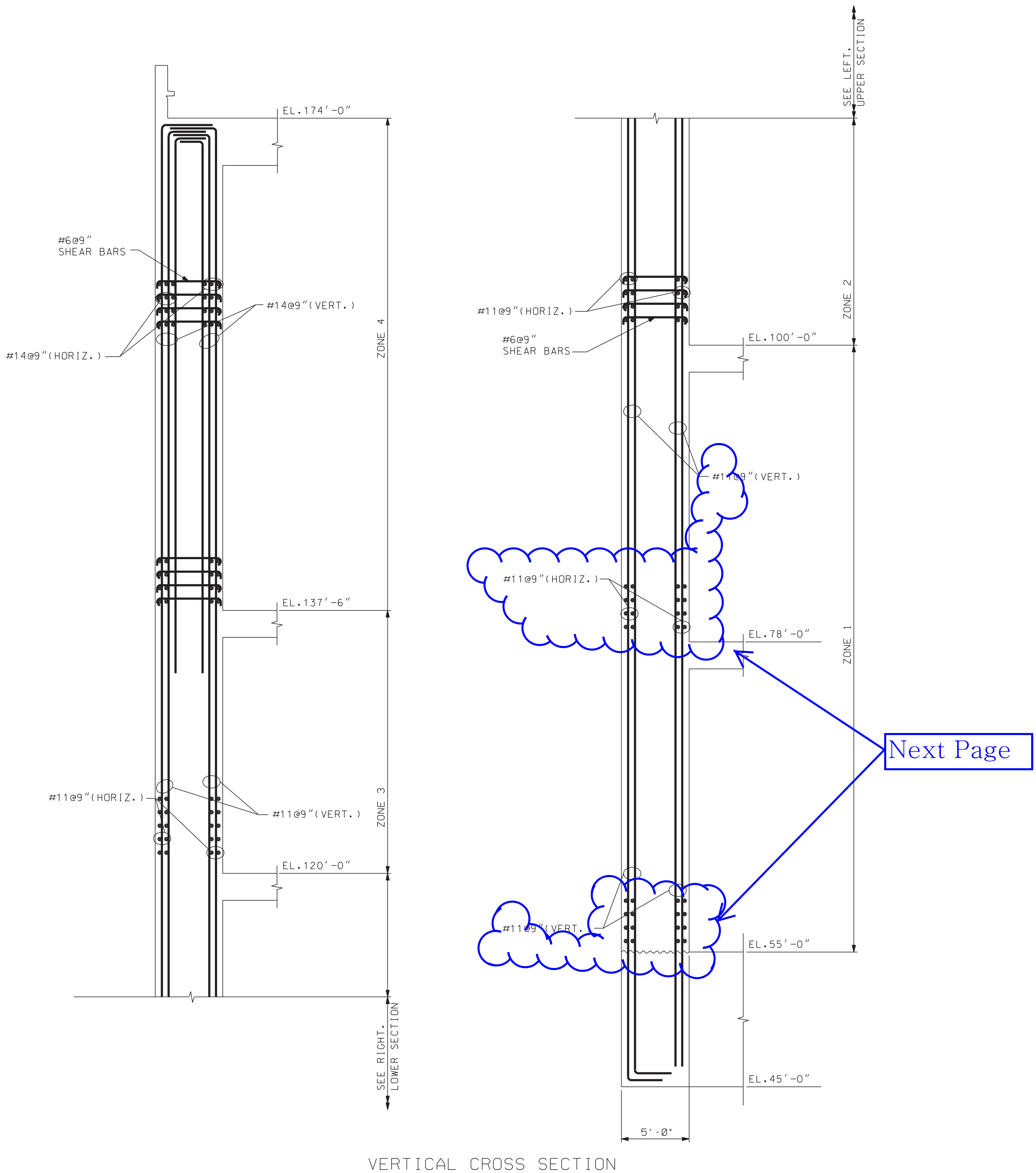

Figure 3.8A-40 Reinforcement Arrangement of the AB MSIV House Wall (Section 1)

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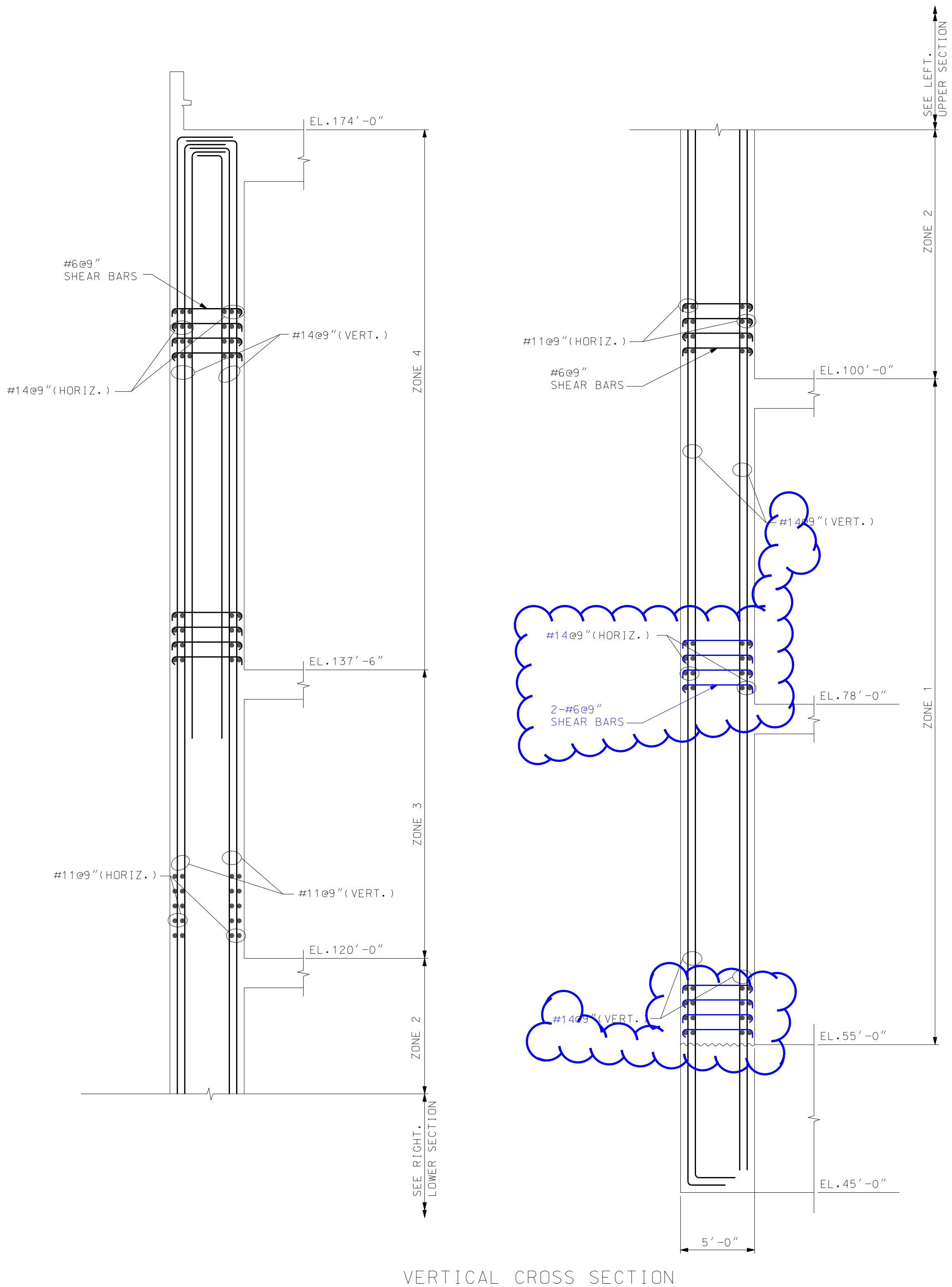

Figure 3.8A-40 Reinforcement Arrangement of the AB MSIV House Wall (Section 1)

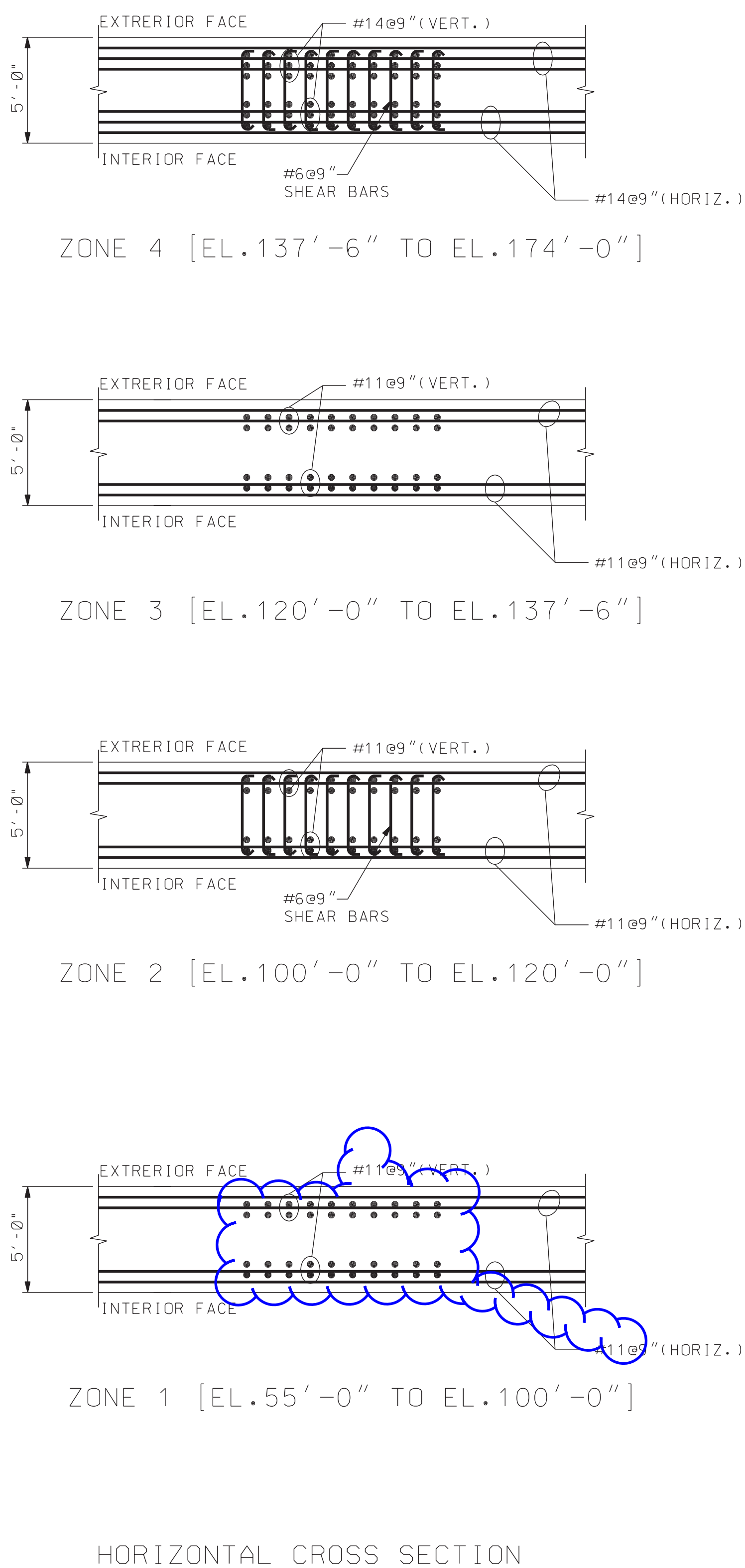

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Figure 3.8A-41 Reinforcement Arrangement of the AB MSIV House Wall (Section 2)

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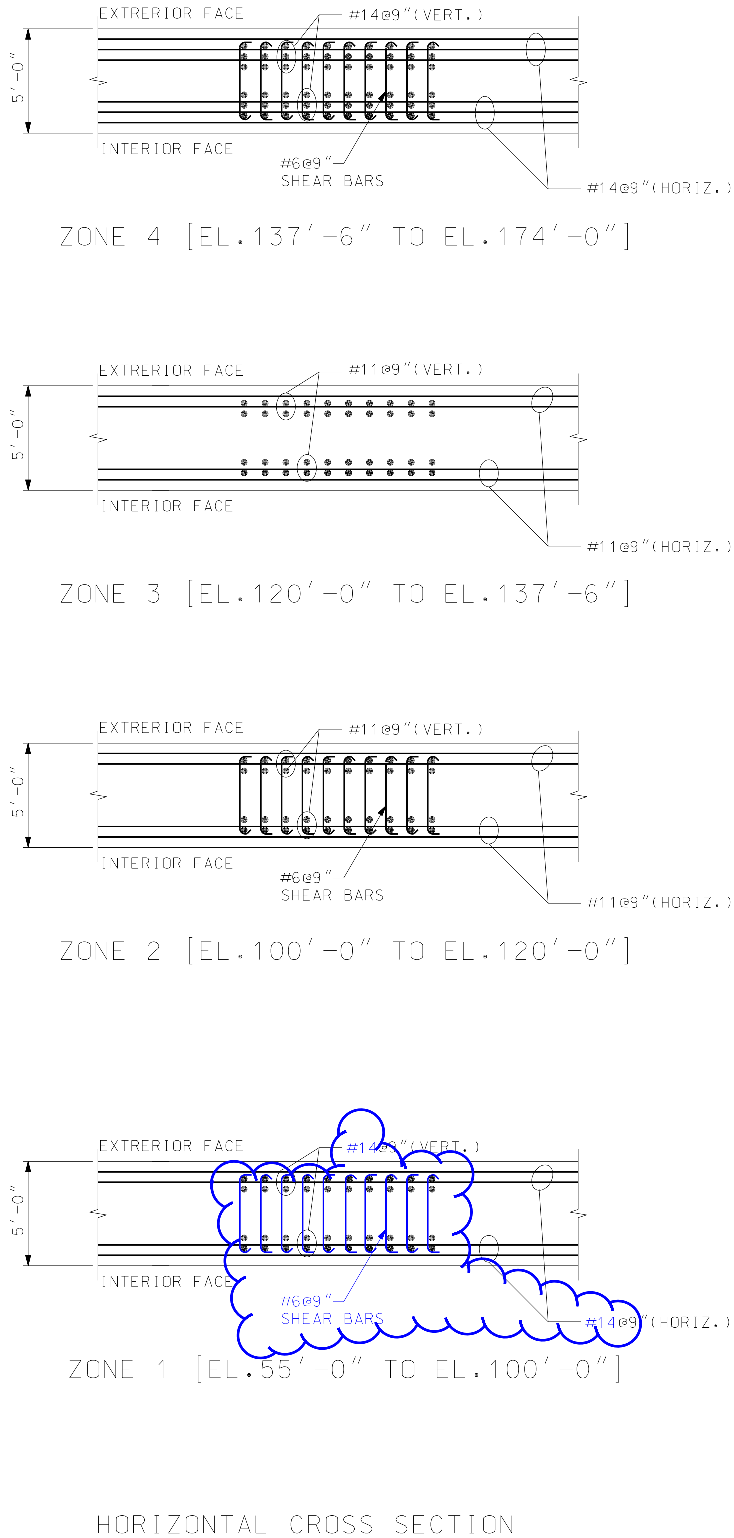

Figure 3.8A-41 Reinforcement Arrangement of the AB MSIV House Wall (Section 2)

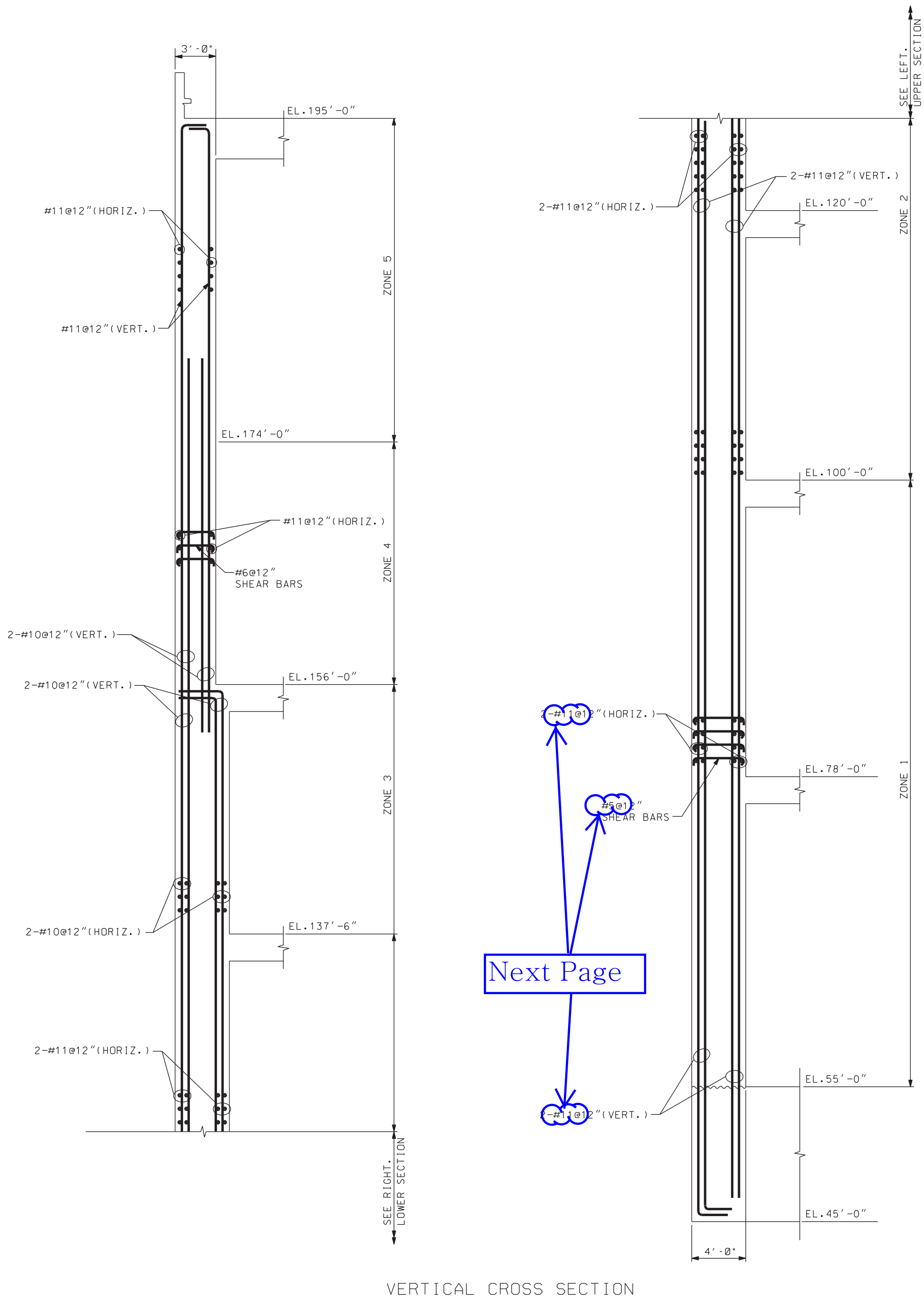

Figure 3.8A-43 Reinforcement Arrangement of the AB MCR Wall (Section 1)

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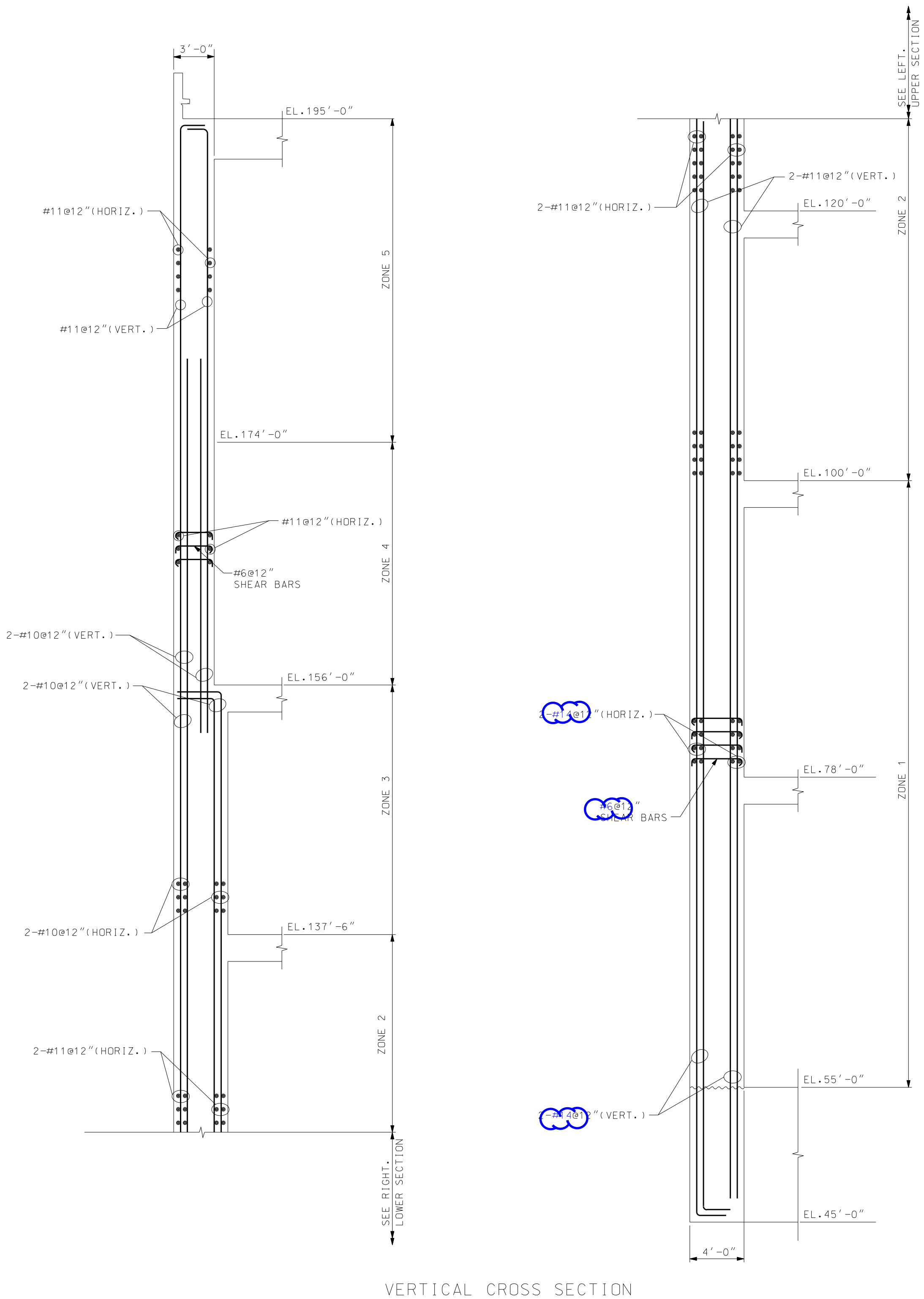

Figure 3.8A-43 Reinforcement Arrangement of the AB MCR Wall (Section 1)

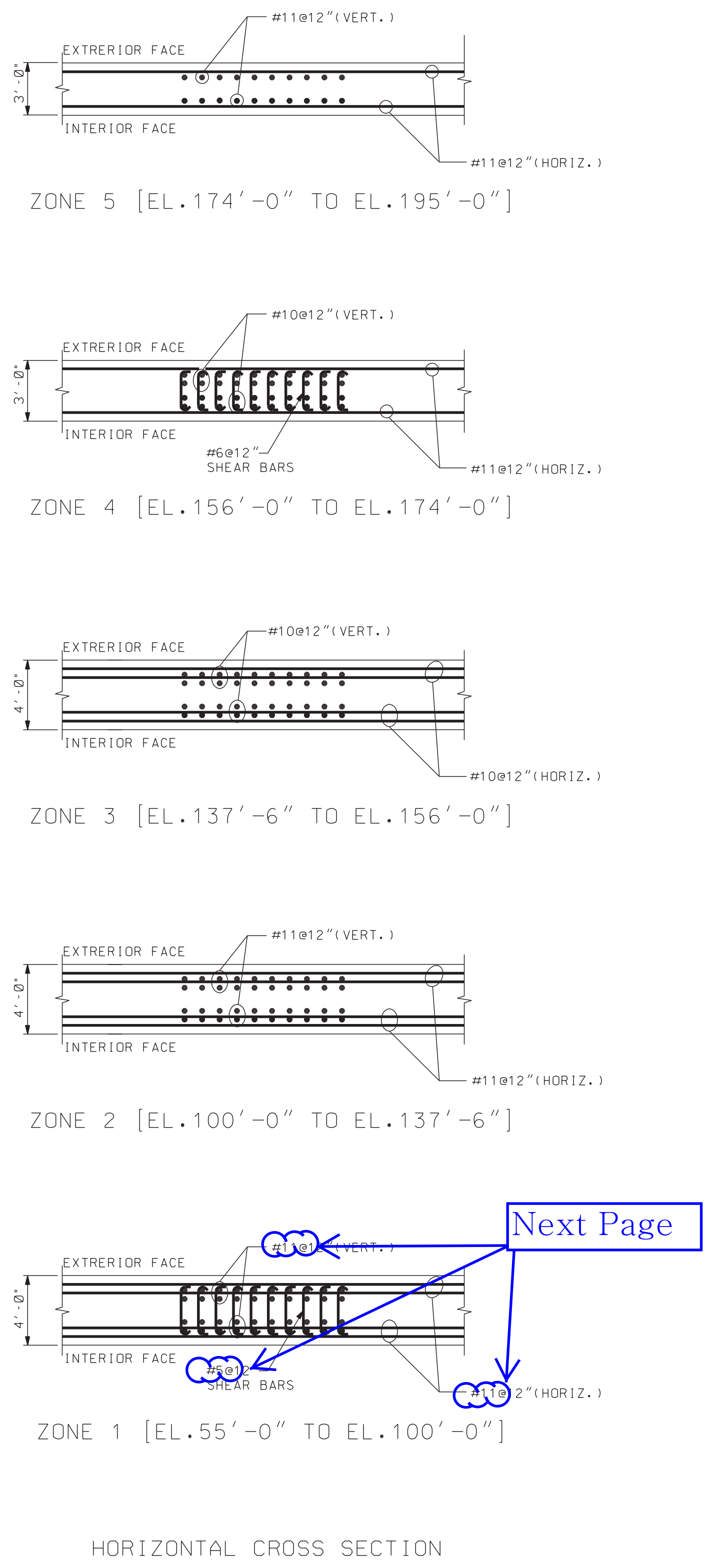

Figure 3.8A-44 Reinforcement Arrangement of the AB MCR Wall (Section 2)

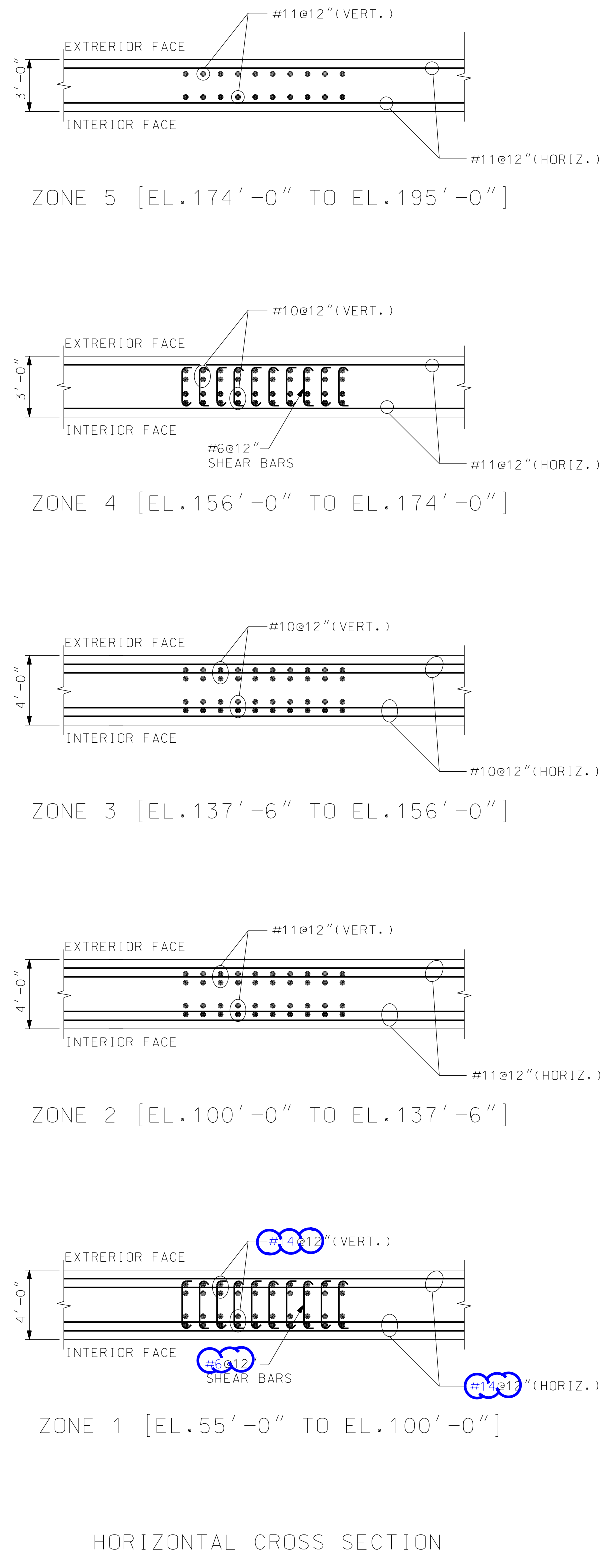

Figure 3.8A-44 Reinforcement Arrangement of the AB MCR Wall (Section 2)