Progress Energy

Serial: NPD-NRC-2010-063
July 23, 2010

10CFR52.79

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

LEVY NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 52-029 AND 52-030
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 085 RELATED TO SEISMIC SYSTEM ANALYSIS

Reference: Letter from Terri Spicher (NRC) to Garry Miller (PEF), dated March 16, 2010, "Request for Additional Information Letter No. 085 Related to SRP Section 3.7.2 for the Levy County Nuclear Plant, Units 1 and 2 Combined License Application"

Ladies and Gentlemen:

Progress Energy Florida, Inc. (PEF) hereby submits a response to the Nuclear Regulatory Commission's (NRC) request for additional information provided in the referenced letter.

A partial response to the NRC request is addressed in the enclosure. The enclosure also identifies changes that will be made in a future revision of the Levy Nuclear Plant Units 1 and 2 application.

If you have any further questions, or need additional information, please contact Bob Kitchen at (919) 546-6992, or me at (727) 820-4481.

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

Executed on July 23, 2010.

Sincerely,

John Elnitsky
Vice President
New Generation Programs & Projects

Enclosure/Attachments

cc : U.S. NRC Region II, Regional Administrator
Mr. Brian C. Anderson, U.S. NRC Project Manager

Progress Energy Florida, Inc.
P.O. Box 14042
St. Petersburg, FL 33733

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NRO

Levy Nuclear Plant Units 1 and 2
Response to NRC Request for Additional Information Letter No. 085 Related to SRP Section 3.7.2 for the Combined License Application, dated March 16, 2010

NRC RAI #	Progress Energy RAI #	Progress Energy Response
03.07.02-1	L-0736	Response enclosed – see following pages
03.07.02-2	L-0737	Future submittal

NRC Letter No.: LNP-RAI-LTR-085

NRC Letter Date: March 16, 2010

NRC Review of Final Safety Analysis Report

NRC RAI #: 03.07.02-01

Text of NRC RAI:

LNP FSAR Figure 2.5.4.5-201B indicates that a cementitious fill will be placed adjacent to the NI structures and fill the region between the NI structures and the diaphragm wall. FSAR Section 3.7.2.8 indicates that structure to structure interaction will not occur since the gap between the NI and adjacent structures is larger than the expected movement based on the maximum displacement seen in the GMRS. The construction details provided in Figure 2.5.4.5-201B indicate that the adjacent buildings rest on the diaphragm wall. Since there is no gap between the diaphragm wall and NI, it appears that the construction detail does not provide a gap as required by the AP1000 DCD.

The GMRS is a ground motion which has been developed based on a UHRS motion modified by a scale factor to account for the fragility inherent in the structural system. However, the level of relative displacement that is expected to occur at the ground surface is the displacement that is associated with the UHRS at the performance goal level without the scale factor included.

1. Please provide the basis, including details of construction (diaphragm wall, cementitious fill, location of adjacent structures, etc.), for neglecting potential coupling between the NI and the adjacent structures. If a gap is to be provided, please provide the construction detail of this joint that demonstrates that a gap is in fact assured over the life span of the facility.
2. Please provide the basis for the use of the GMRS associated displacement in lieu of that associated with the performance goal level UHRS.

PGN RAI ID #: L-0736

PGN Response to NRC RAI:

Figure RAI 03.07.02-01-1 shows the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mats of the adjacent Turbine Building, Annex Building, and the Radwaste Building. This design detail provides the 2 inch gap between the adjacent buildings' foundation mat and the NI consistent with DCD Subsection 3.8.5.1. In addition, the top of the diaphragm wall and controlled low strength material fill between the diaphragm wall and the NI wall is at least 1.5 m (5 ft.) below the bottom of the adjacent buildings' foundation mat. Engineered fill is used from the top of the controlled low strength material fill to the bottom of the adjacent buildings' foundation mat. This interface is designed to avoid hard contact between the NI and the adjacent building foundations resulting from the relative displacements during the seismic event. LNP will implement the AP1000 standard plant design provisions to ensure that the 2-inch gap between the adjacent building foundations and the NI is assured over the life span of the facility.

Figures 2.5.4.5-201B and 2.5.4.5-202B have been revised to show the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mats of the adjacent buildings by adding reference to Figure RAI 03.07.02-01-1.

In response to the NRC's request for information, UHRS relative displacements between the NI and the adjacent building drilled shaft supported foundation mats were computed and are presented in the response to NRC Letter 086 RAI 03.08.05-7.

Associated LNP COL Application Revisions:

The following changes will be made to Subsections 2.5 and 3.7 of the FSAR in a future revision:

1) Text and Table changes for Subsections 2.5.4.5 as noted below;
2) Text changes for 3.7.2 as noted below;
3) Revised Figures for Subsection 2.5.4.5 and new Figure for Subsection 3.7.2 (see attachments).

Text changes:

1. *The following text will be added to the second paragraph in Subsection 2.5.4.5.1:*

"For the portion of the diaphragm wall under the Turbine Building, Annex Building, and the Radwaste Building foundation mat, the top of the diaphragm wall will be at least 1.5 m (5 ft.) below the bottom of the respective buildings' foundation mat as shown in Figure RAI 03.07.02-01-1."

2. *Subsection 2.5.4.5.1.1.1 will be deleted because the same information is presented in Subsection 2.5.4.5.1*

3. *The 3rd paragraph of Subsection 2.5.4.5.1 will be modified from:*

"The diaphragm walls will include seven rows of prestressed anchors, spaced as shown on Figure 2.5.4.5-203. Figure 2.5.4.5-203 shows the required bonding lengths of each anchor, as well as maximum tieback force in each anchor. The anchors will be inclined at 45 degrees and bonded into the limestone of the Avon Park Formation. The prestressed anchors will be placed at 3 m (10 ft.) spacing around the entire perimeter of each diaphragm wall."

To read:

"The diaphragm walls will include seven rows of prestressed anchors, spaced as shown on Figure 2.5.4.5 203. The anchors will be inclined at 45 degrees and bonded into the limestone of the Avon Park Formation. The prestressed anchors will be placed at 3 m (10 ft.) spacing around the entire perimeter of each diaphragm wall."

4. *The last paragraph of Subsection 2.5.4.5.1.1* "The spacing of the seven rows of prestressed anchors ..... spacing around the entire perimeter of each diaphragm wall." will be deleted because the same information is presented in the 3rd paragraph of Subsection 2.5.4.5.1.

5. *The last paragraph of Subsection 2.5.4.5.2 will be modified from:*

"Nonsafety-related structures will be supported on drilled shaft foundations. Considering the soil conditions at the site and the anticipated structural loads, shallow foundations will not provide adequate bearing capacity within permissible settlement and differential settlement requirements, and soil improvement techniques are not recommended due to the high water table and wetland conditions at the site. The specific design of these drilled shafts will be finalized prior to construction. Foundation concepts under nonsafety-related structures are shown on Figures 2.5.4.5-201A, 2.5.4.5-201B, 2.5.4.5-202A, and 2.5.4.5-202B."

To read:

"Non safety-related structures will be supported on drilled shaft foundations. Considering the soil conditions at the site and the anticipated structural loads, shallow foundations will not provide adequate bearing capacity within permissible settlement and differential settlement requirements, and soil improvement techniques are not recommended due to the high water table and wetland conditions at the site. The specific design of these drilled shafts will be finalized prior to construction. Foundation design concepts under non safety-related structures are shown on Figures 2.5.4.5-201A, 2.5.4.5-201B, 2.5.4.5-202A, 2.5.4.5-202B, and RAI 03.07.02-01-1."

6. *The last paragraph starting on page 2.5-291 in Subsection 2.5.4.5.4 will be modified from:*

"Concrete-type fill material will be placed adjacent to the sidewalls of the nuclear islands. Figures 2.5.4.5-201B and 2.5.4.5-202B show the approximate planned limits of concrete fill adjacent to nuclear island structures at LNP 1 and LNP 2, respectively."

To read:

"Controlled low strength material fill will be placed adjacent to the sidewalls of the nuclear islands to an elevation at least 1.5 m (5 ft.) below the bottom of the adjacent buildings' foundation mat. Engineered fill will be placed from the top of the controlled low strength material fill to the bottom of the foundation mats of the adjacent Turbine Building, Annex Building, and the Radwaste Building. Figure RAI 03.07.02-01-1 shows the approximate planned limits of controlled low strength material fill adjacent to nuclear island structures at LNP 1 and LNP 2."

7. *Revise the following text in Table 2.5.4.5-201 (revised in responses to NRC Letter 046 RAI 03.07.01-1 and NRC letter 088 RAI 02.05.04-26) from:*

Table 2.5.4.5-201

Engineering Properties of Structural Fill and Backfill

	AS-PLACED ENGINEERING PROPERTIES[a]	
Backfill Type	**Strength Parameters**	**V_S (fps)**
Roller Compacted Concrete Bridging Mat	1-Year Compressive Strength: 2500 psi	3500 fps
Concrete Backfill[b]	28-Day Compressive Strength: 500 psi	1000 fps
Engineered fill[c]	Drained friction angle of 34 degrees (or equivalent shear strength); SM-SC USCS Classification	850[d] fps

Notes:

a) These engineering properties are considered representative values of the backfill type.

b) Values are typical for concrete backfill, conservatively based on engineering judgment.

c) Engineered fill will be compacted to 95 percent of its maximum dry density as determined by ASTM D 1557, Modified Proctor method, with a dry unit weight of 110 pcf. The moisture content of the fill will be controlled to within +/- 2 percent of its optimum moisture.

d) Expected range of the average shear wave velocity in the Engineered fill is 500 fps to 1000 fps.

V_S = Shear Wave Velocity

psi = pound per square inch

fps = foot per second

To read:

Table 2.5.4.5-201

Engineering Properties of Structural Fill and Backfill

Backfill Type	AS-PLACED ENGINEERING PROPERTIES[a]	
	Strength Parameters	V_S (fps)
Roller Compacted Concrete Bridging Mat	1-Year Compressive Strength: 2500 psi	>3500 fps
Controlled Low Strength Material Backfill	Not Applicable	1000[b] fps
Engineered fill[c]	Drained friction angle of 34 degrees (or equivalent shear strength); SM-SC USCS Classification	850[d] fps

Notes:

a) These engineering properties are considered representative values of the backfill type.

b) Value is typical for controlled low strength material fill, conservatively based on engineering judgment.

c) Engineered fill will be compacted to 95 percent of its maximum dry density as determined by ASTM D 1557, Modified Proctor method, with a dry unit weight of 110 pcf. The moisture content of the fill will be controlled to within +/- 2 percent of its optimum moisture.

d) Expected range of the average shear wave velocity in the Engineered fill is 500 fps to 1000 fps.

V_s = Shear Wave Velocity

psi = pound per square inch

fps = foot per second

8. *Subsection 3.7.2.8.1 text in the revised response to NRC Letter 055 RAI 03.08.05-3 will be revised from:*

"Add the following text to the end of DCD Subsection 3.7.2.8.1.

LNP SUP 3.7-5

In DCD Subsection 3.7.2.8.1, the maximum displacement of the roof of the Annex Building is reported as 1.6 inches for response spectra input at the base of the building that envelops the SSI spectra for the six soil profiles and also the CSDRS. The Annex Building foundation (top of mat) is at finished grade. RAI 03.07.01-01 Figure 1 shows a comparison of the LNP scaled performance based surface response spectra (PBSRS) at the plant finished grade and the CSDRS. The CSDRS envelops the LNP PBSRS by a wide margin. Thus, the LNP Annex Building roof displacement relative to its foundation is expected to be less than the 1.6 inches in the DCD for the CSDRS. The foundation displacement during SSE of the drilled shaft supported Annex Building is computed to be less than 1 inch. Thus, the LNP Annex building

roof displacement during SSE is expected to be less than 2.6 inches. As stated in DCD Subsection 3.7.2.8.1, the minimum clearance between the structural elements of the Annex Building above grade and the nuclear island (NI) is 4 inches. The gap between the Annex Building foundation and the Nuclear Island is 2 inches. Thus, no seismic interaction between the Annex Building and the NI is expected."

To read:

"Add the following text to the end of DCD Subsection 3.7.2.8.1.

LNP SUP 3.7-5

In DCD Subsection 3.7.2.8.1, the maximum displacement of the roof of the Annex Building is reported as 1.6 inches for response spectra input at the base of the building that envelops the SSI spectra for the six soil profiles and also the CSDRS. The Annex Building foundation (top of mat) is at finished grade. RAI 03.07.01-01 Figure 1 shows a comparison of the LNP scaled performance based surface response spectra (PBSRS) at the plant finished grade and the CSDRS. The CSDRS envelops the LNP PBSRS by a wide margin. Thus, the LNP Annex Building roof displacement relative to its foundation is expected to be less than the 1.6 inches in the DCD for the CSDRS. The foundation displacement during SSE of the drilled shaft supported Annex Building is computed to be less than 1 inch. Thus, the LNP Annex building roof displacement during SSE is expected to be less than 2.6 inches. As stated in DCD Subsection 3.7.2.8.1, the minimum clearance between the structural elements of the Annex Building above grade and the nuclear island (NI) is 4 inches. Figure RAI 03.07.02-01-1 shows the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mat of the Annex Building. This design detail provides the 2 inch gap between the Annex Building foundation and the NI consistent with DCD Subsection 3.8.5.1. The top of the diaphragm wall and controlled low strength material fill between the diaphragm wall and the NI wall is at least 1.5 m (5 ft.) below the bottom of the Annex Building foundation mat as stated in Subsection 2.5.4.5.1. Engineered fill is used from the top of the controlled low strength material fill to the bottom of the Annex Building foundation as stated in Subsection 2.5.4.5.4. This interface is designed to avoid hard contact between the NI and the Annex Building foundation resulting from the relative displacements during the seismic event. Thus, no seismic interaction between the Annex Building and the NI is expected."

9. *Subsection 3.7.2.8.2 text in the revised response to NRC Letter 055 RAI 03.08.05-3 will be revised from:*

"Add the following text to the end of DCD Subsection 3.7.2.8.2.

LNP SUP 3.7-5

Peak foundation elevation displacement resulting from a Performance Based Surface Response Spectra (PBSRS) is conservatively computed to be less than 2.5 cm (1 in.). Considering that 5 cm (2 in.) seismic gaps are installed between the Radwaste Building foundation and the Nuclear Island Structures, no seismic interaction at the Radwaste Building foundation elevation is expected."

To read:

"Add the following text to the end of DCD Subsection 3.7.2.8.2.

LNP SUP 3.7-5

Peak foundation elevation displacement resulting from a Performance Based Surface Response Spectra (PBSRS) is conservatively computed to be less than 2.5 cm (1 in.). Figure RAI 03.07.02-01-1 shows the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mat of the Radwaste Building. This design detail provides the 2 inch gap between the Radwaste Building foundation and the NI consistent with DCD Subsection 3.8.5.1. The top of the diaphragm wall and controlled low strength material fill between the diaphragm wall and the NI wall is at least 1.5 m (5 ft.) below the bottom of the Radwaste Building foundation mat as stated in Subsection 2.5.4.5.1. Engineered fill is used from the top of the controlled low strength material fill to the bottom of the Radwaste Building foundation as stated in Subsection 2.5.4.5.4. This interface is designed to avoid hard contact between the NI and the Radwaste Building foundation resulting from the relative displacements during the seismic event. Thus, no seismic interaction between the Radwaste Building and the NI is expected."

10. Subsection 3.7.2.8.3 text in the revised response to NRC Letter 055 RAI 03.08.05-3 will be revised from:

Subsection 3.7.2.8.3 will be modified from:

"Add the following text to the end of DCD Subsection 3.7.2.8.3.

LNP SUP 3.7-5

Peak foundation elevation displacement resulting from a Performance Based Surface Response Spectra (PBSRS) is conservatively computed to be less than 2.5 cm (1 in.). Considering that 5 cm (2 in.) seismic gaps are installed between the Turbine Building foundation and the Nuclear Island Structures, no seismic interaction at the Turbine Building foundation elevation is expected. "

To read:

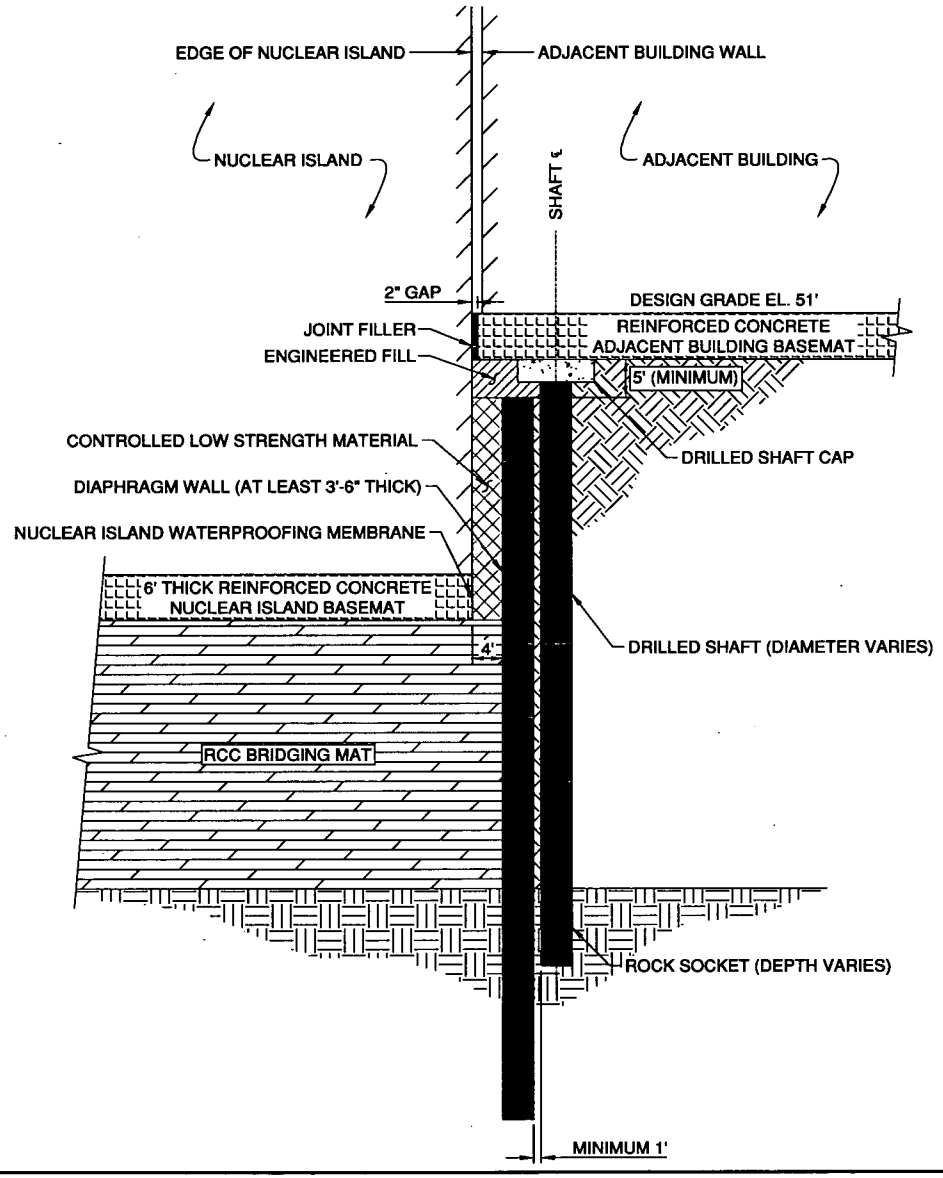
"Add the following text to the end of DCD Subsection 3.7.2.8.3.

LNP SUP 3.7-5

Peak foundation elevation displacement resulting from a Performance Based Surface Response Spectra (PBSRS) is conservatively computed to be less than 2.5 cm (1 in.). Figure RAI 03.07.02-01-1 shows the conceptual design detail for the interface between the Nuclear Island (NI) and the drilled shaft supported foundation mat of the Turbine Building. This design detail provides the 2 inch gap between the Turbine Building foundation and the NI consistent with DCD Subsection 3.8.5.1. The top of the diaphragm wall and controlled low strength material fill between the diaphragm wall and the NI wall is at least 1.5 m (5 ft.) below the bottom of the Turbine Building foundation mat as stated in Subsection 2.5.4.5.1. Engineered fill is used from the top of the controlled low strength material fill to the bottom of the Turbine Building foundation as stated in Subsection 2.5.4.5.4. This interface is designed to avoid hard contact between the NI and the Turbine Building foundation resulting from the relative displacements during the seismic event. Thus, no seismic interaction between the Turbine Building and the NI is expected."

Attachments/Enclosures to Response to NRC:

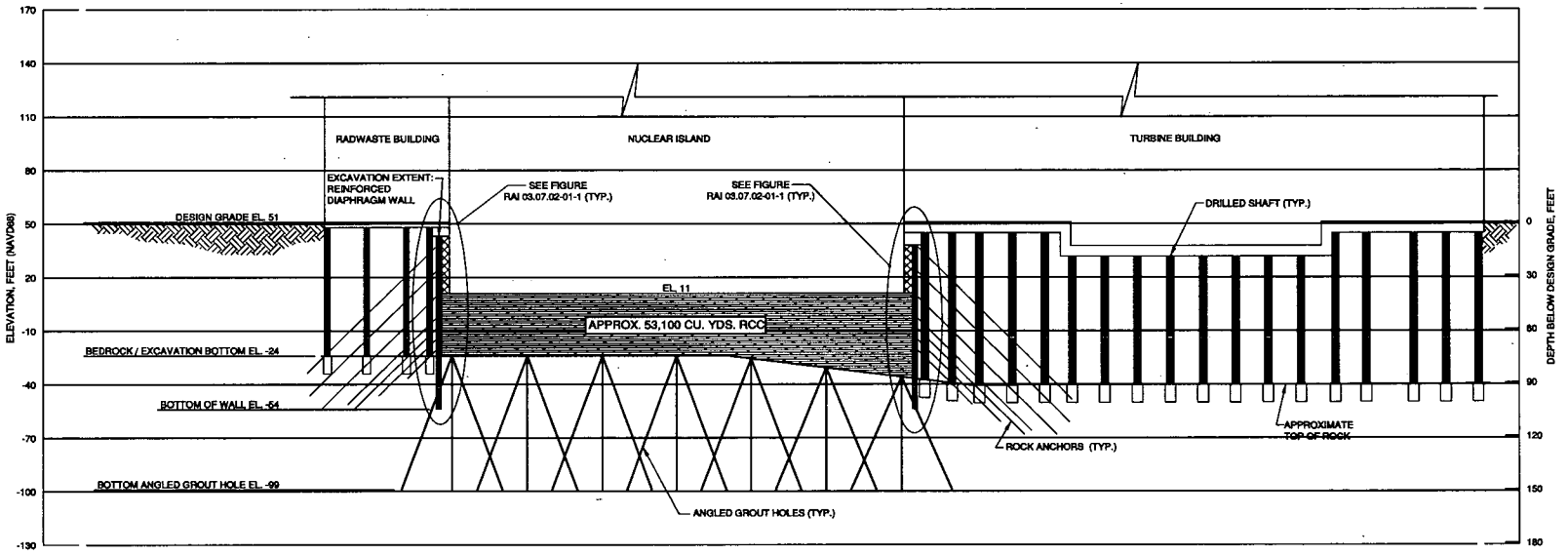
New Figure RAI 03.07.02-01-1, Revised Figures RAI 2.5.4.5-201B, 2.5.4.5 -202B, and 2.5.4.5-203 [1 page each].



Progress Energy Florida
Levy Nuclear Plant
Units 1 and 2
Part 2, Final Safety Analysis Report

CONCEPTUAL DESIGN DETAIL TO ACCOMMODATE NUCLEAR ISLAND AND ADJACENT BUILDING RELATIVE DISPLACEMENTS
FIGURE RAI 03.07.02-01-1 Rev 0

LNP COL 2.5-7



NOTES:

1. THE VERTICAL ELEVATION DATUM IS BASED ON NAVD 88.

0 200 400

HORIZONTAL SCALE

NOTE:
THIS FIGURE PRESENTS A CONCEPTUAL DESIGN THAT WAS DEVELOPED FOR COL APPLICATION. DETAILED DESIGN WILL BE COMPLETED PRIOR TO CONSTRUCTION, AND THE DIMENSIONS AND QUANTITIES SHOWN HEREIN ARE SUBJECT TO CHANGE AT THAT TIME.

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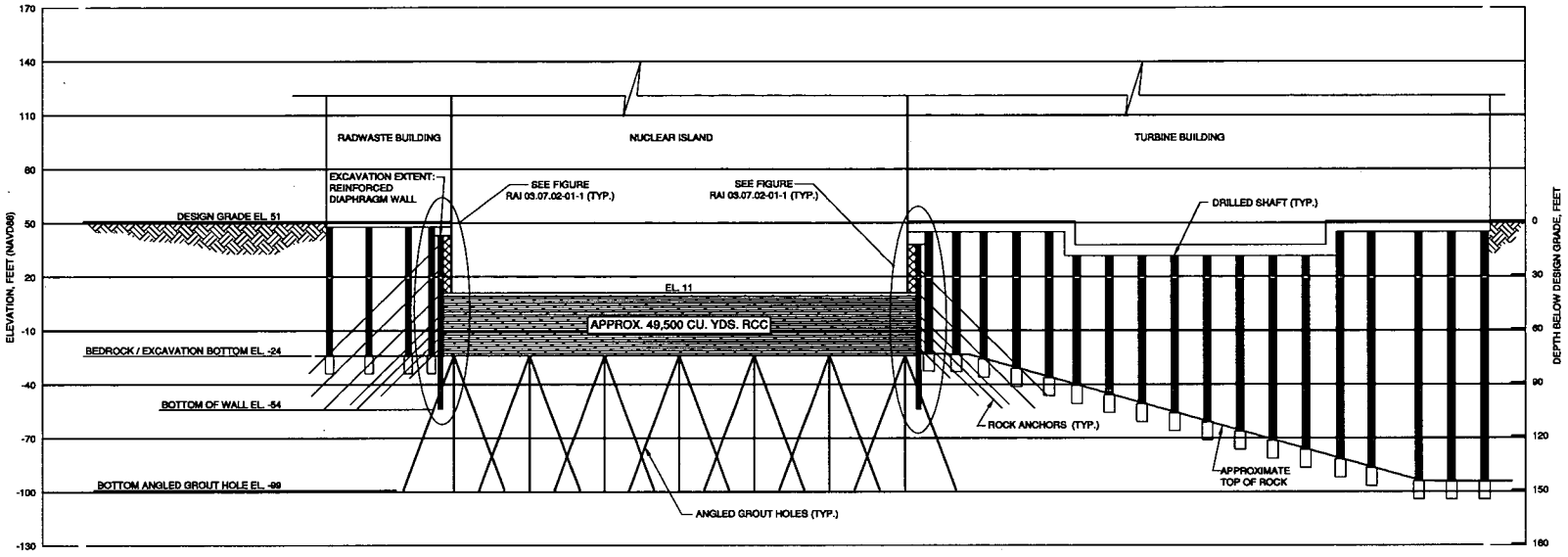
LNP 1 Nuclear Island Excavation Limits Plant South To Plant North Cross Section

Figure 2.5.4.5-201B **Rev 1**

LNP COL 2.5-7



NOTES:

1. THE VERTICAL ELEVATION DATUM IS BASED ON NAVD 88.

0 200 400
HORIZONTAL SCALE

NOTE:
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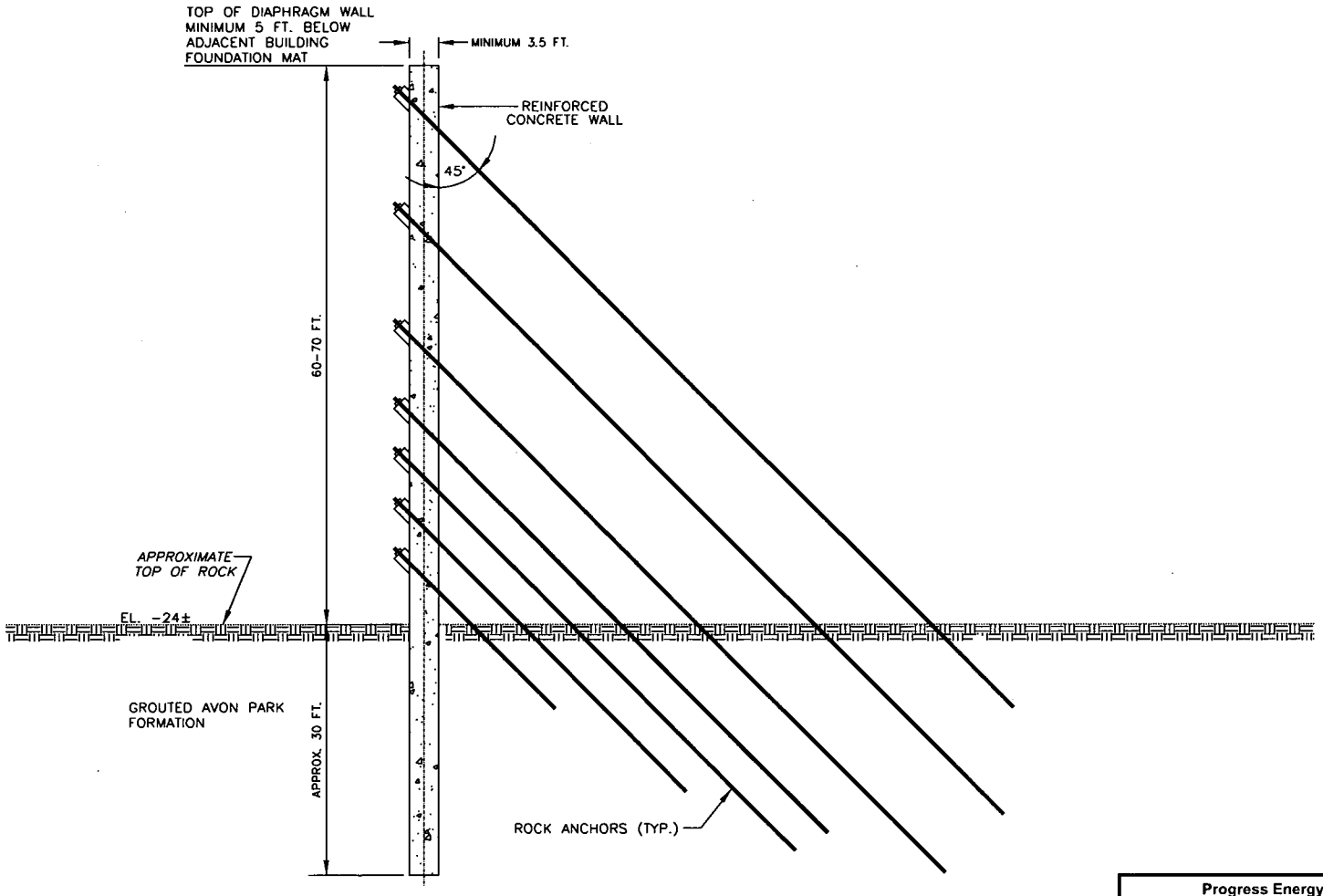
LNP 2 Nuclear Island Excavation Limits Plant South To Plant North Cross Section

Figure 2.5.4.5-202B **Rev 1**



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Diaphragm Wall With Prestressed Anchors

Figure 2.5.4.5-203 **Rev 1**