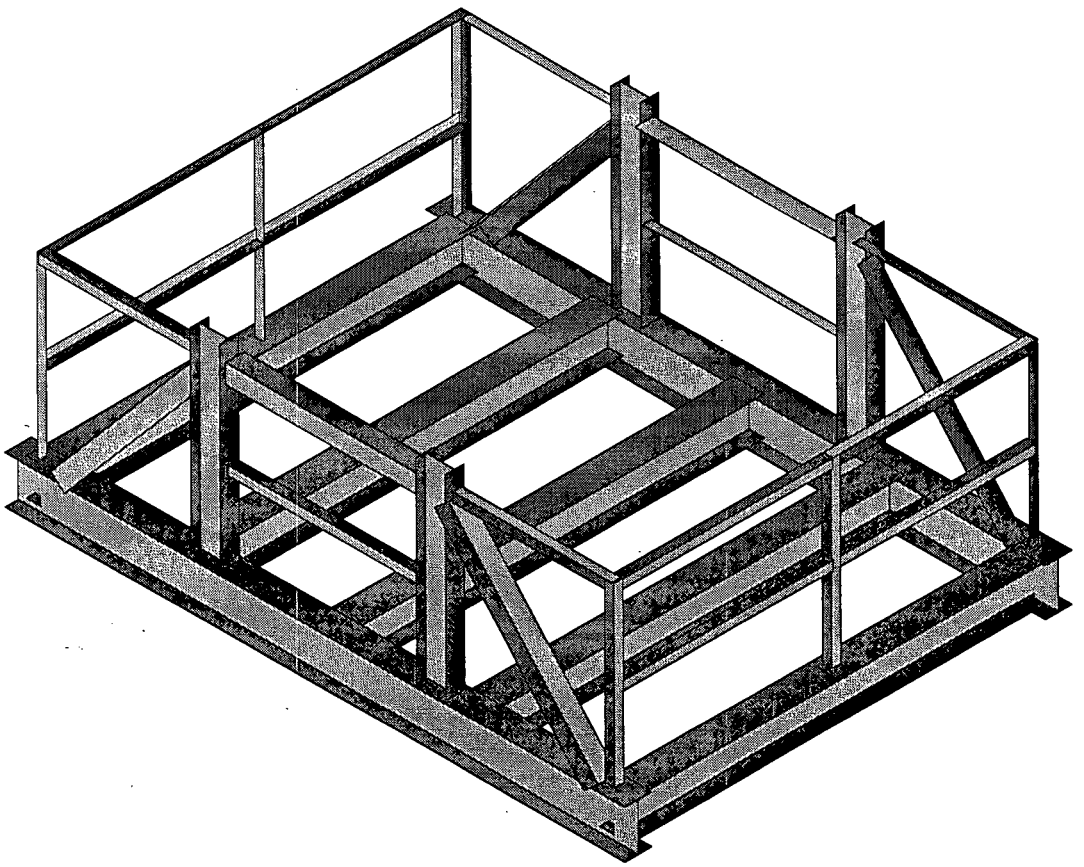
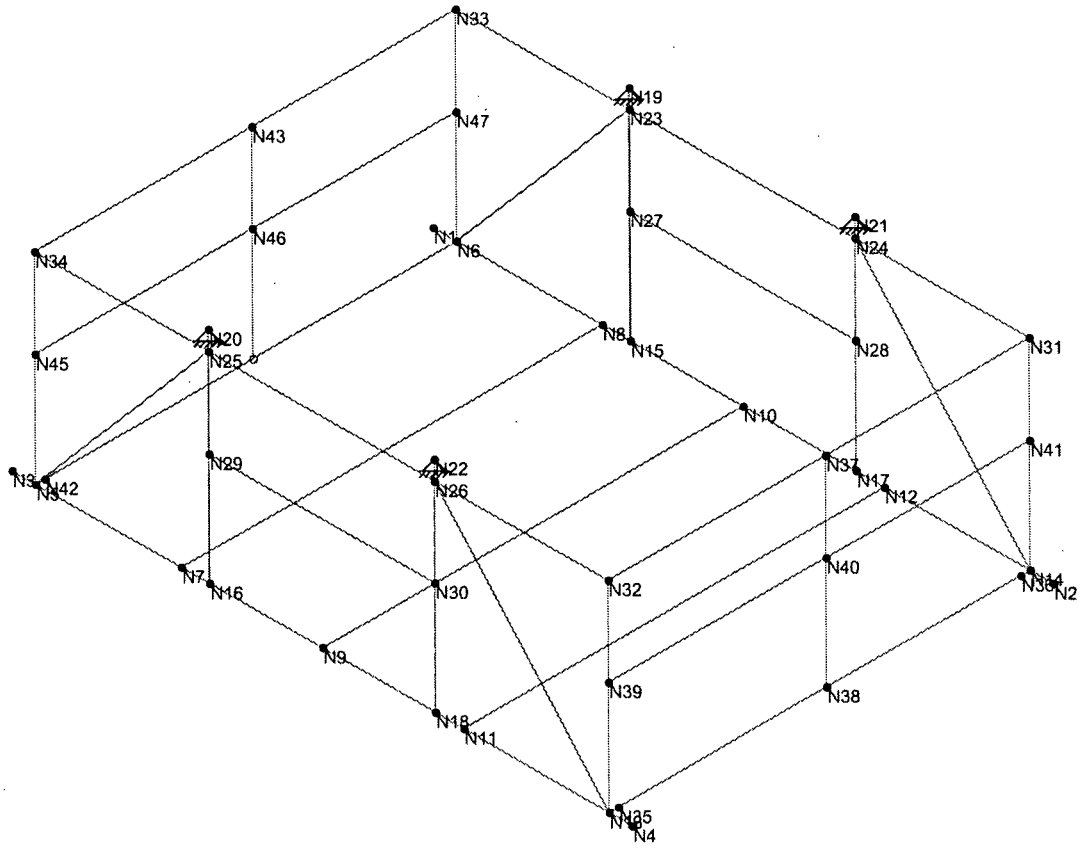
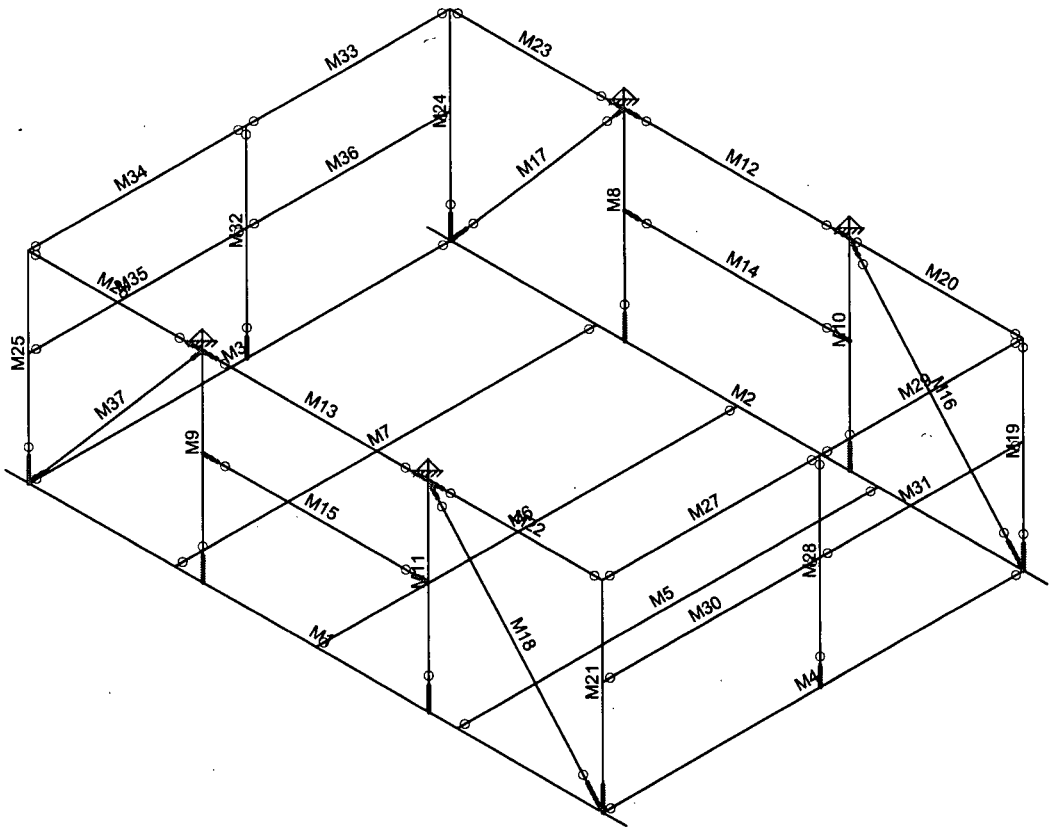
ATTACHMENT H – CR-N1002-102, "WORK PLATFORM DESIGN"



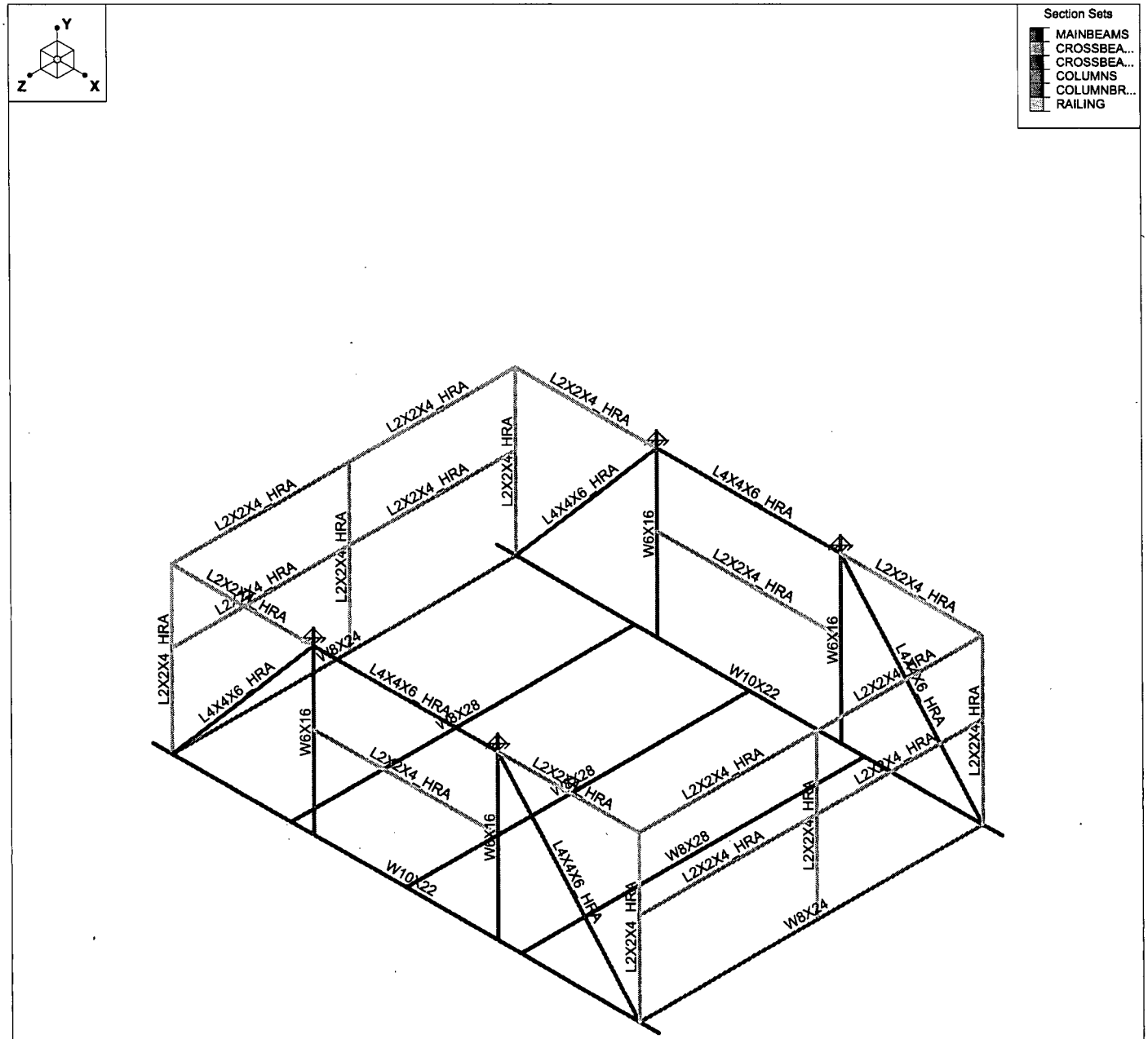
Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:45 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D



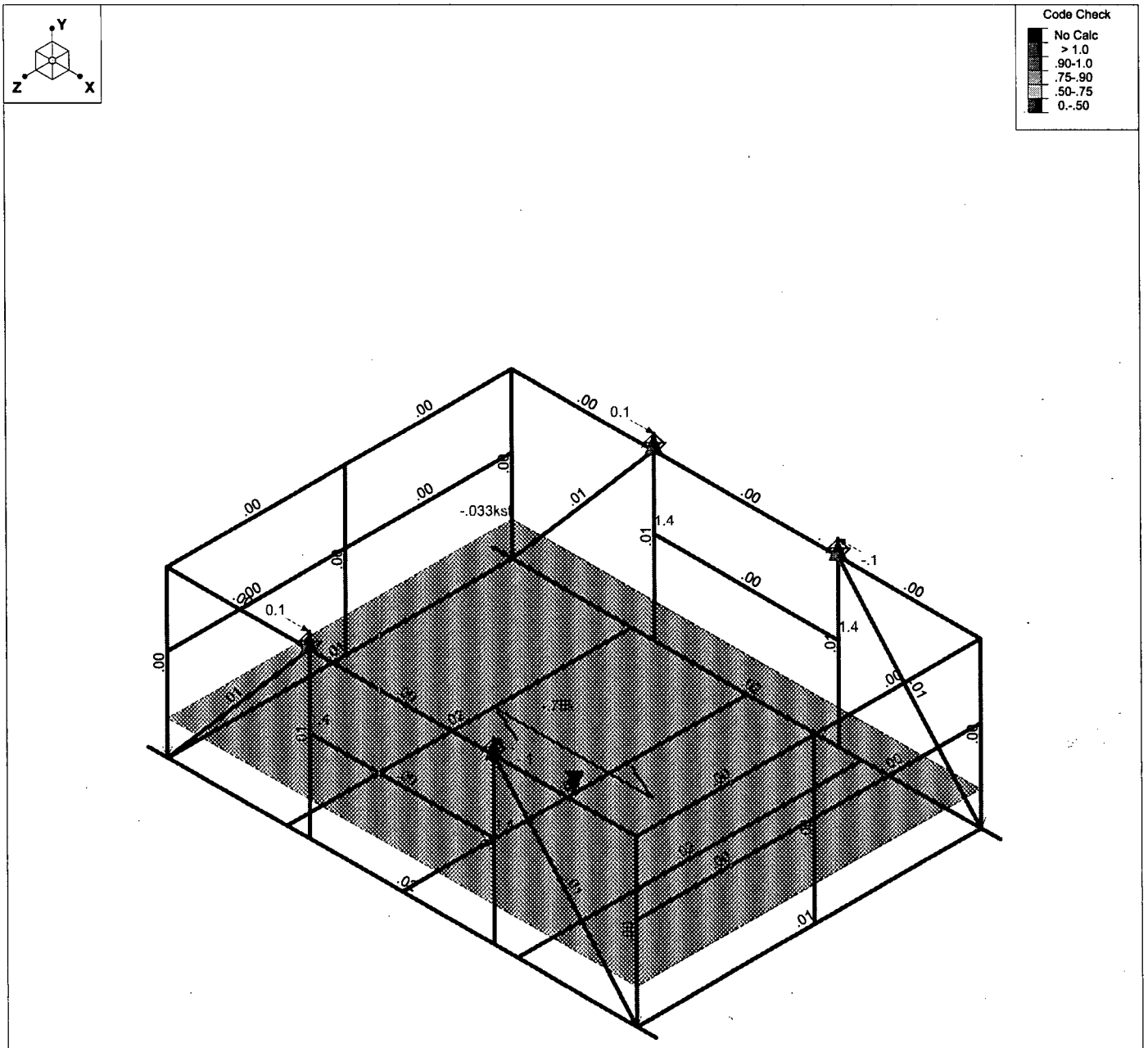
Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:46 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D



Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:47 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D

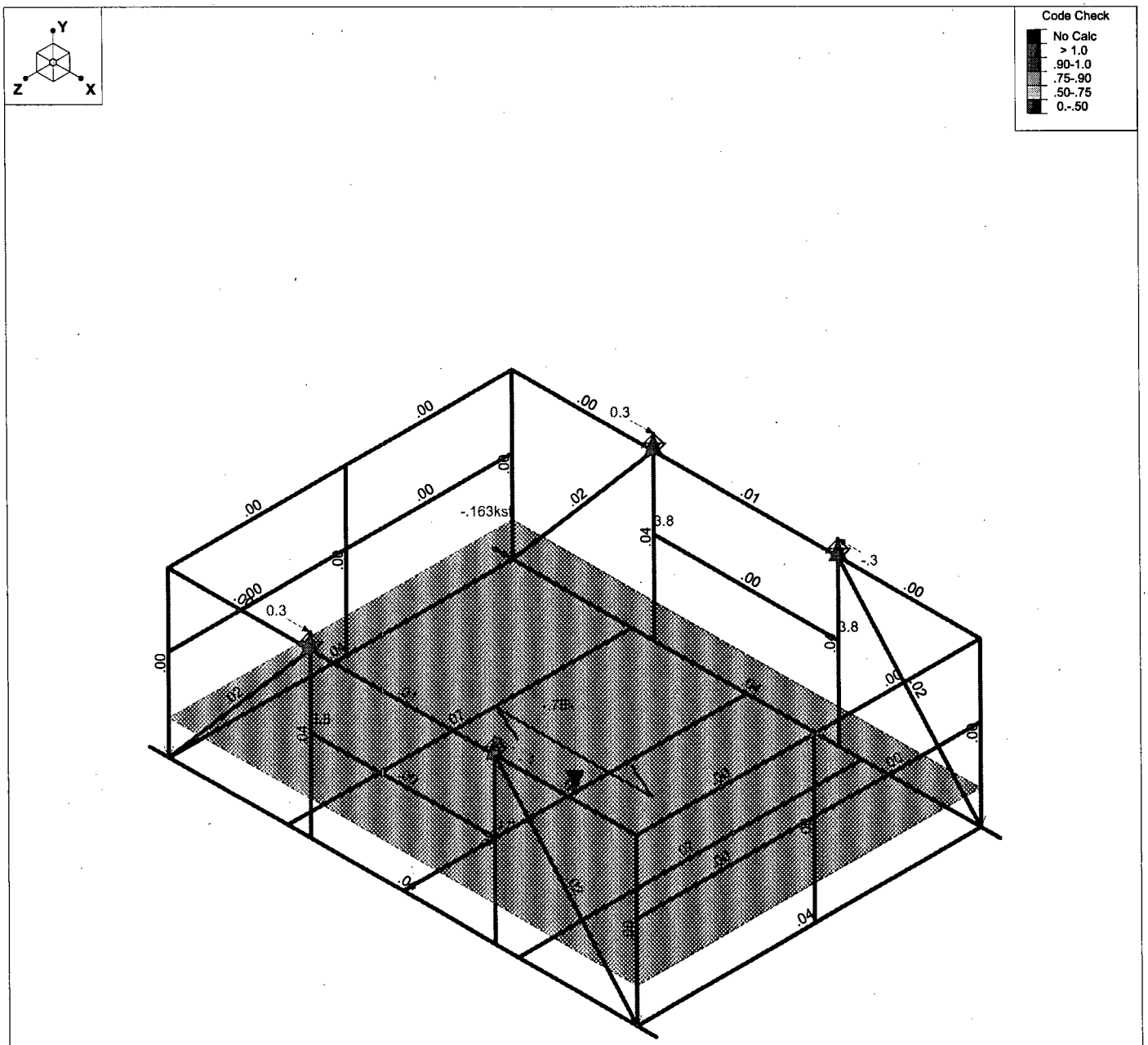


Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:47 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D



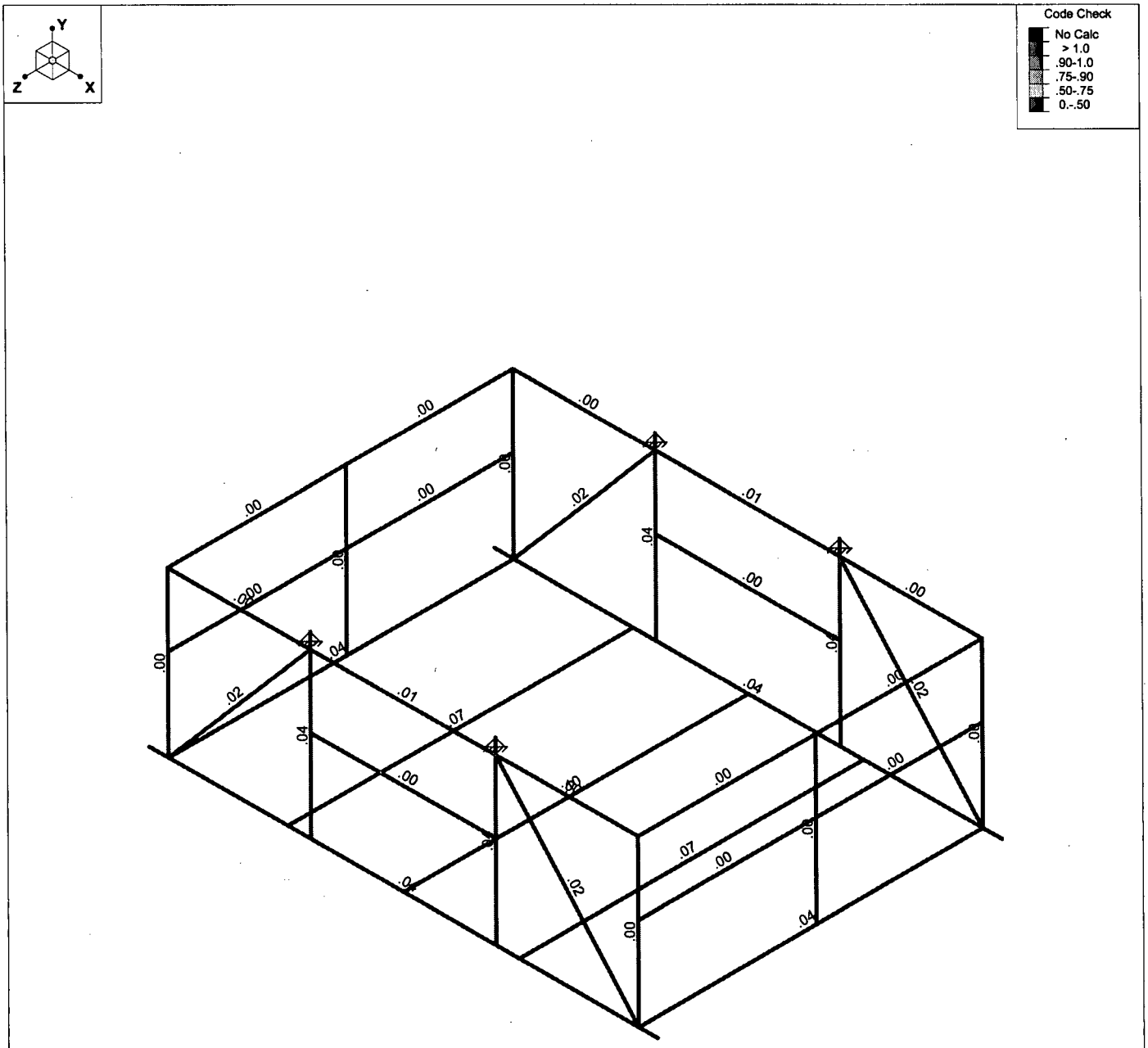
Member Code Checks Displayed
Loads: LC 1, WORKING LOAD
Results for LC 1, WORKING LOAD
Reaction units are k and k-ft

Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:48 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D



Member Code Checks Displayed
Loads: LC 2, 5:1 LIVE LOAD
Results for LC 2, 5:1 LIVE LOAD
Reaction units are k and k-ft

Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:49 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D



Member Code Checks Displayed
Solution: Envelope
Reaction units are k and k-ft

Precision Surveillance Co...	Crystal River Work Platform Design	
Brian Giometti		Aug 6, 2007 at 1:49 PM
CR-N1002-102		CR-N1002-102 PLT Design.R3D

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC: ASD 9th
Cold Formed Steel Code	AISI 99: ASD
Wood Code	NDS 91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 1999

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	HR_STL	29000	11154	.3	.65	.49	36

Material Takeoff

	Material	Size	Pieces	Length[ft]	Weight[K]
1	Hot Rolled Steel				
2	HR_STL	L2X2X4_HRA	20	67.7	.2
3	HR_STL	L4X4X6_HRA	6	23.1	.2
4	HR_STL	W10X22	2	22	.5
5	HR_STL	W6X16	4	14	.2
6	HR_STL	W8X24	2	15	.4
7	HR_STL	W8X28	3	22.5	.6
8	Total HR Steel		37	164.3	2.1

Hot Rolled Steel Section Sets

	Label	Shape	Design List	Type	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	MAINBEAMS	W10X22	Wide Flange	Beam	HR_STL	Typical	6.49	11.4	118	.24
2	CROSSBEA..	W8X24	Wide Flange	Beam	HR_STL	Typical	7.08	18.3	82.8	.35
3	CROSSBEA..	W8X28	Wide Flange	Beam	HR_STL	Typical	8.25	21.7	98	.54
4	COLUMNS	W6X16	Wide Flange	Beam	HR_STL	Typical	4.74	4.43	32.1	.22
5	COLUMNBR..	L4X4X6_HRA	Single Angle	Beam	HR_STL	Typical	2.86	4.36	4.36	.141
6	RAILING	L2X2X4_HRA	Single Angle	Beam	HR_STL	Typical	.938	.348	.348	.02

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Design List	Type	Material	Design Rules
1	M1	N3	N4			MAINBEAMS	Wide Flange	Beam	HR_STL	Typical
2	M2	N1	N2			MAINBEAMS	Wide Flange	Beam	HR_STL	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Design List	Type	Material	Design Rules
3	M3	N5	N6			CROSSBEAM...	Wide Flange	Beam	HR_STL	Typical
4	M4	N13	N14			CROSSBEAM...	Wide Flange	Beam	HR_STL	Typical
5	M5	N11	N12			CROSSBEAM...	Wide Flange	Beam	HR_STL	Typical
6	M6	N9	N10			CROSSBEAM...	Wide Flange	Beam	HR_STL	Typical
7	M7	N7	N8			CROSSBEAM...	Wide Flange	Beam	HR_STL	Typical
8	M8	N15	N19			COLUMNS	Wide Flange	Beam	HR_STL	Typical
9	M9	N16	N20			COLUMNS	Wide Flange	Beam	HR_STL	Typical
10	M10	N17	N21			COLUMNS	Wide Flange	Beam	HR_STL	Typical
11	M11	N18	N22			COLUMNS	Wide Flange	Beam	HR_STL	Typical
12	M12	N23	N24		90	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical
13	M13	N25	N26		180	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical
14	M14	N27	N28		90	RAILING	Single Angle	Beam	HR_STL	Typical
15	M15	N29	N30		180	RAILING	Single Angle	Beam	HR_STL	Typical
16	M16	N14	N24		180	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical
17	M17	N6	N23		90	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical
18	M18	N13	N26		90	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical
19	M19	N14	N31			RAILING	Single Angle	Beam	HR_STL	Typical
20	M20	N31	N24		180	RAILING	Single Angle	Beam	HR_STL	Typical
21	M21	N13	N32		270	RAILING	Single Angle	Beam	HR_STL	Typical
22	M22	N32	N26		90	RAILING	Single Angle	Beam	HR_STL	Typical
23	M23	N33	N23		90	RAILING	Single Angle	Beam	HR_STL	Typical
24	M24	N6	N33		90	RAILING	Single Angle	Beam	HR_STL	Typical
25	M25	N5	N34		180	RAILING	Single Angle	Beam	HR_STL	Typical
26	M26	N34	N25		180	RAILING	Single Angle	Beam	HR_STL	Typical
27	M27	N32	N37		180	RAILING	Single Angle	Beam	HR_STL	Typical
28	M28	N38	N37		270	RAILING	Single Angle	Beam	HR_STL	Typical
29	M29	N31	N37		90	RAILING	Single Angle	Beam	HR_STL	Typical
30	M30	N39	N40		180	RAILING	Single Angle	Beam	HR_STL	Typical
31	M31	N40	N41		180	RAILING	Single Angle	Beam	HR_STL	Typical
32	M32	N44	N43		180	RAILING	Single Angle	Beam	HR_STL	Typical
33	M33	N33	N43		180	RAILING	Single Angle	Beam	HR_STL	Typical
34	M34	N43	N34		180	RAILING	Single Angle	Beam	HR_STL	Typical
35	M35	N45	N46			RAILING	Single Angle	Beam	HR_STL	Typical
36	M36	N46	N47			RAILING	Single Angle	Beam	HR_STL	Typical
37	M37	N5	N25		180	COLUMNBRA...	Single Angle	Beam	HR_STL	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	TOM	Inactive
1	M1						Yes		
2	M2						Yes		
3	M3	BenPIN	BenPIN				Yes		
4	M4	BenPIN	BenPIN				Yes		
5	M5	BenPIN	BenPIN				Yes		
6	M6	BenPIN	BenPIN				Yes		
7	M7	BenPIN	BenPIN				Yes		
8	M8	BenPIN		M2			Yes		
9	M9	BenPIN		M1			Yes		
10	M10	BenPIN		M2			Yes		
11	M11	BenPIN		M1			Yes		
12	M12	BenPIN	BenPIN	M8	M10		Yes	Yes	
13	M13	BenPIN	BenPIN	M9	M11		Yes	Yes	
14	M14	BenPIN	BenPIN	M8	M10		Yes	Yes	
15	M15	BenPIN	BenPIN	M9	M11		Yes	Yes	
16	M16	BenPIN	BenPIN	M2	M10		Yes	Yes	
17	M17	BenPIN	BenPIN	M2	M8		Yes	Yes	
18	M18	BenPIN	BenPIN	M1	M11		Yes	Yes	

Member Advanced Data (Continued)

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	TOM	Inactive
19	M19	BenPIN	BenPIN	M2			Yes	Yes	
20	M20	BenPIN	BenPIN				Yes	Yes	
21	M21			M1			Yes	Yes	
22	M22	BenPIN	BenPIN		M11		Yes	Yes	
23	M23	BenPIN	BenPIN		M8		Yes	Yes	
24	M24	BenPIN		M2			Yes	Yes	
25	M25	BenPIN		M1			Yes	Yes	
26	M26	BenPIN	BenPIN		M9		Yes	Yes	
27	M27	BenPIN	BenPIN				Yes	Yes	
28	M28	BenPIN	BenPIN	M4			Yes	Yes	
29	M29	BenPIN	BenPIN				Yes	Yes	
30	M30	BenPIN	BenPIN				Yes	Yes	
31	M31	BenPIN	BenPIN				Yes	Yes	
32	M32	BenPIN	BenPIN	M3			Yes	Yes	
33	M33	BenPIN	BenPIN				Yes	Yes	
34	M34	BenPIN	BenPIN				Yes	Yes	
35	M35	BenPIN	BenPIN				Yes	Yes	
36	M36	BenPIN	BenPIN				Yes	Yes	
37	M37			M1	M9		Yes	Yes	

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	11	0	0	0	
3	N3	0	0	7.5	0	
4	N4	11	0	7.5	0	
5	N5	.417	0	7.5	0	
6	N6	.417	0	0	0	
7	N7	3	0	7.5	0	
8	N8	3	0	0	0	
9	N9	5.5	0	7.5	0	
10	N10	5.5	0	0	0	
11	N11	8	0	7.5	0	
12	N12	8	0	0	0	
13	N13	10.583	0	7.5	0	
14	N14	10.583	0	0	0	
15	N15	3.5	0	0	0	
16	N16	3.5	0	7.5	0	
17	N17	7.5	0	0	0	
18	N18	7.5	0	7.5	0	
19	N19	3.5	3.924	0	0	
20	N20	3.5	3.924	7.5	0	
21	N21	7.5	3.924	0	0	
22	N22	7.5	3.924	7.5	0	
23	N23	3.5	3.59	0	0	
24	N24	7.5	3.59	0	0	
25	N25	3.5	3.59	7.5	0	
26	N26	7.5	3.59	7.5	0	
27	N27	3.5	2.007	0	0	
28	N28	7.5	2.007	0	0	
29	N29	3.5	2.007	7.5	0	
30	N30	7.5	2.007	7.5	0	
31	N31	10.583	3.59	0	0	
32	N32	10.583	3.59	7.5	0	
33	N33	.417	3.59	0	0	
34	N34	.417	3.59	7.5	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
35	N35	10.583	0	7.333	0	
36	N36	10.583	0	.167	0	
37	N37	10.583	3.59	3.625	0	
38	N38	10.583	0	3.625	0	
39	N39	10.583	2.007	7.5	0	
40	N40	10.583	2.007	3.625	0	
41	N41	10.583	2.007	0	0	
42	N42	.417	0	7.333	0	
43	N43	.417	3.59	3.625	0	
44	N44	.417	0	3.625	0	
45	N45	.417	2.007	7.5	0	
46	N46	.417	2.007	3.625	0	
47	N47	.417	2.007	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N20	Reaction	Reaction	Reaction				
2	N22	Reaction	Reaction	Reaction				
3	N21	Reaction	Reaction	Reaction				
4	N19	Reaction	Reaction	Reaction				
5	N1				Reaction			

Member Distributed Loads (BLC 5 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,d...	Start Location[ft,%]	End Location[ft,%]
1	M3	Y	-.052	-.052	6.75	7.5
2	M4	Y	-.052	-.052	0	.75
3	M4	Y	-.026	-.026	.75	1.5
4	M4	Y	-.052	-.052	1.5	2.25
5	M4	Y	-.026	-.026	2.25	3
6	M4	Y	-.052	-.052	3	3.75
7	M4	Y	-.052	-.052	3.75	4.5
8	M4	Y	-.026	-.026	4.5	5.25
9	M4	Y	-.052	-.052	5.25	6
10	M4	Y	-.026	-.026	6	6.75
11	M4	Y	-.052	-.052	6.75	7.5
12	M5	Y	-.105	-.105	1.5	2.25
13	M5	Y	-.052	-.052	2.25	3
14	M5	Y	-.105	-.105	3	3.75
15	M5	Y	-.105	-.105	3.75	4.5
16	M5	Y	-.052	-.052	4.5	5.25
17	M5	Y	-.105	-.105	5.25	6
18	M5	Y	-.052	-.052	6	6.75
19	M5	Y	-.105	-.105	6.75	7.5
20	M6	Y	-.105	-.105	3	3.75
21	M6	Y	-.105	-.105	3.75	4.5
22	M6	Y	-.052	-.052	4.5	5.25
23	M6	Y	-.105	-.105	5.25	6
24	M6	Y	-.052	-.052	6	6.75
25	M6	Y	-.105	-.105	6.75	7.5
26	M7	Y	-.105	-.105	5.25	6
27	M7	Y	-.052	-.052	6	6.75
28	M7	Y	-.105	-.105	6.75	7.5
29	M3	Y	-.052	-.052	0	.75
30	M3	Y	-.026	-.026	.75	1.5
31	M3	Y	-.052	-.052	1.5	2.25

Member Distributed Loads (BLC 5 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,d...	Start Location[ft,%]	End Location[ft,%]
32	M3	Y	-.026	-.026	2.25	3
33	M3	Y	-.052	-.052	3	3.75
34	M3	Y	-.052	-.052	3.75	4.5
35	M3	Y	-.026	-.026	4.5	5.25
36	M3	Y	-.052	-.052	5.25	6
37	M3	Y	-.026	-.026	6	6.75
38	M5	Y	-.105	-.105	0	.75
39	M5	Y	-.052	-.052	.75	1.5
40	M6	Y	-.105	-.105	0	.75
41	M6	Y	-.052	-.052	.75	1.5
42	M6	Y	-.105	-.105	1.5	2.25
43	M6	Y	-.052	-.052	2.25	3
44	M7	Y	-.105	-.105	0	.75
45	M7	Y	-.052	-.052	.75	1.5
46	M7	Y	-.105	-.105	1.5	2.25
47	M7	Y	-.052	-.052	2.25	3
48	M7	Y	-.105	-.105	3	3.75
49	M7	Y	-.105	-.105	3.75	4.5
50	M7	Y	-.052	-.052	4.5	5.25

Member Distributed Loads (BLC 6 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,d...	Start Location[ft,%]	End Location[ft,%]
1	M3	Y	-.259	-.259	6.75	7.5
2	M4	Y	-.259	-.259	0	.75
3	M4	Y	-.129	-.129	.75	1.5
4	M4	Y	-.259	-.259	1.5	2.25
5	M4	Y	-.129	-.129	2.25	3
6	M4	Y	-.259	-.259	3	3.75
7	M4	Y	-.259	-.259	3.75	4.5
8	M4	Y	-.129	-.129	4.5	5.25
9	M4	Y	-.259	-.259	5.25	6
10	M4	Y	-.129	-.129	6	6.75
11	M4	Y	-.259	-.259	6.75	7.5
12	M5	Y	-.518	-.518	1.5	2.25
13	M5	Y	-.259	-.259	2.25	3
14	M5	Y	-.518	-.518	3	3.75
15	M5	Y	-.518	-.518	3.75	4.5
16	M5	Y	-.259	-.259	4.5	5.25
17	M5	Y	-.518	-.518	5.25	6
18	M5	Y	-.259	-.259	6	6.75
19	M5	Y	-.518	-.518	6.75	7.5
20	M6	Y	-.518	-.518	3	3.75
21	M6	Y	-.518	-.518	3.75	4.5
22	M6	Y	-.259	-.259	4.5	5.25
23	M6	Y	-.518	-.518	5.25	6
24	M6	Y	-.259	-.259	6	6.75
25	M6	Y	-.518	-.518	6.75	7.5
26	M7	Y	-.518	-.518	5.25	6
27	M7	Y	-.259	-.259	6	6.75
28	M7	Y	-.518	-.518	6.75	7.5
29	M3	Y	-.259	-.259	0	.75
30	M3	Y	-.129	-.129	.75	1.5
31	M3	Y	-.259	-.259	1.5	2.25
32	M3	Y	-.129	-.129	2.25	3
33	M3	Y	-.259	-.259	3	3.75
34	M3	Y	-.259	-.259	3.75	4.5
35	M3	Y	-.129	-.129	4.5	5.25

Member Distributed Loads (BLC 6 : BLC 4 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,d...	Start Location[ft,%]	End Location[ft,%]
36	M3	Y	-.259	-.259	5.25	6
37	M3	Y	-.129	-.129	6	6.75
38	M5	Y	-.518	-.518	0	.75
39	M5	Y	-.259	-.259	.75	1.5
40	M6	Y	-.518	-.518	0	.75
41	M6	Y	-.259	-.259	.75	1.5
42	M6	Y	-.518	-.518	1.5	2.25
43	M6	Y	-.259	-.259	2.25	3
44	M7	Y	-.518	-.518	0	.75
45	M7	Y	-.259	-.259	.75	1.5
46	M7	Y	-.518	-.518	1.5	2.25
47	M7	Y	-.259	-.259	2.25	3
48	M7	Y	-.518	-.518	3	3.75
49	M7	Y	-.518	-.518	3.75	4.5
50	M7	Y	-.259	-.259	4.5	5.25

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[k,k-ft in,rad k*s^2/ft]
No Data to Print ...			

Member Point Loads (BLC 3 : Hydraulic Pump)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M6	y	-.75	%50

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Me...	Surface (...
1	Live Load	LL							1	
2	Self Weight	DL		-1						
3	Hydraulic Pump	LL					1			
4	5:1 Platform Live Load	LLS							1	
5	BLC 1 Transient Area...	None						50		
6	BLC 4 Transient Area...	None						50		

Load Combinations

	Description	Solve	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	WORKING L...	Yes			1	1	2	1	3	1										
2	5:1 LIVE LO...	Yes			2	1	3	1	4	1										

Load Combination Design

	Description	ASIF	CD	ABIF	Service	Hot Rolled	Cold Formed	Wood	Concrete	Footings
1	WORKING LOAD					Yes	Yes	Yes	Yes	Yes
2	5:1 LIVE LOAD					Yes	Yes	Yes	Yes	Yes

Envelope Joint Displacements

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation [...	lc
1	N1	max	0	2	0	1	0	1	0	2	-5.867e-7	1	2.859e-6	2
2		min	0	1	-.001	2	0	2	0	1	-1.763e-6	2	1.419e-6	1
3	N2	max	0	1	0	1	0	1	2.008e-6	2	-5.903e-7	1	-1.422e-6	1
4		min	0	2	-.001	2	0	2	6.209e-7	1	-1.773e-6	2	-2.862e-6	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation [...	lc
5	N3	max	0	2	0	1	0	1	3.946e-7	2	-5.74e-7	1	3.651e-6	2
6		min	0	1	-.001	2	0	2	-1.584e-7	1	-1.722e-6	2	1.278e-6	1
7	N4	max	0	1	0	1	0	1	6.227e-6	2	-5.901e-7	1	-1.261e-6	1
8		min	0	2	-.001	2	0	2	1.597e-6	1	-1.772e-6	2	-2.596e-6	2
9	N5	max	0	2	0	1	0	1	3.946e-7	2	-5.74e-7	1	3.64e-6	2
10		min	0	1	-.001	2	0	2	-1.584e-7	1	-1.722e-6	2	1.267e-6	1
11	N6	max	0	2	0	1	0	1	2.354e-7	2	-5.867e-7	1	2.848e-6	2
12		min	0	1	-.001	2	0	2	6.999e-8	1	-1.763e-6	2	1.407e-6	1
13	N7	max	0	2	0	1	0	1	2.853e-6	2	-5.902e-7	1	6.97e-7	2
14		min	0	1	-.001	2	0	2	5.815e-7	1	-1.774e-6	2	-2.329e-6	1
15	N8	max	0	2	0	1	0	1	7.669e-7	2	-5.885e-7	1	7.758e-7	2
16		min	0	1	-.001	2	0	2	2.349e-7	1	-1.768e-6	2	-2.289e-6	1
17	N9	max	0	2	0	1	0	1	4.145e-6	2	-5.871e-7	1	0	1
18		min	0	1	-.002	2	0	2	9.709e-7	1	-1.763e-6	2	-1.591e-8	2
19	N10	max	0	2	0	1	0	1	1.194e-6	2	-5.866e-7	1	0	2
20		min	0	1	-.002	2	0	2	3.671e-7	1	-1.761e-6	2	0	1
21	N11	max	0	1	0	1	0	1	5.166e-6	2	-5.874e-7	1	2.381e-6	1
22		min	0	2	-.001	2	0	2	1.279e-6	1	-1.764e-6	2	-6.275e-7	2
23	N12	max	0	1	0	1	0	1	1.597e-6	2	-5.873e-7	1	2.283e-6	1
24		min	0	2	-.001	2	0	2	4.922e-7	1	-1.764e-6	2	-7.815e-7	2
25	N13	max	0	1	0	1	0	1	6.227e-6	2	-5.901e-7	1	-1.25e-6	1
26		min	0	2	-.001	2	0	2	1.597e-6	1	-1.772e-6	2	-2.584e-6	2
27	N14	max	0	1	0	1	0	1	2.008e-6	2	-5.903e-7	1	-1.411e-6	1
28		min	0	2	-.001	2	0	2	6.209e-7	1	-1.773e-6	2	-2.851e-6	2
29	N15	max	0	2	0	1	0	1	8.698e-7	2	-5.883e-7	1	-6.89e-6	1
30		min	0	1	0	2	0	2	2.669e-7	1	-1.767e-6	2	-9.654e-6	2
31	N16	max	0	2	0	1	0	1	3.329e-6	2	-5.854e-7	1	-6.937e-6	1
32		min	0	1	0	2	0	2	7.248e-7	1	-1.757e-6	2	-9.775e-6	2
33	N17	max	0	1	0	1	0	1	1.517e-6	2	-5.868e-7	1	9.647e-6	2
34		min	0	2	0	2	0	2	4.673e-7	1	-1.762e-6	2	6.884e-6	1
35	N18	max	0	1	0	1	0	1	4.961e-6	2	-5.869e-7	1	9.744e-6	2
36		min	0	2	0	2	0	2	1.217e-6	1	-1.762e-6	2	6.953e-6	1
37	N19	max	0	1	0	1	0	1	1.401e-5	2	-1.391e-6	1	-3.296e-6	1
38		min	0	2	0	2	0	2	4.243e-6	1	-4.415e-6	2	-1.036e-5	2
39	N20	max	0	1	0	1	0	2	1.346e-5	2	1.936e-5	2	-1.141e-6	1
40		min	0	2	0	2	0	1	4.115e-6	1	5.629e-6	1	-5.996e-6	2
41	N21	max	0	2	0	1	0	1	1.193e-5	2	1.438e-7	2	1.059e-5	2
42		min	0	1	0	2	0	2	3.554e-6	1	-2.347e-8	1	3.523e-6	1
43	N22	max	0	2	0	1	0	2	1.152e-5	2	-2.287e-7	1	1.212e-5	2
44		min	0	1	0	2	0	1	3.463e-6	1	-7.475e-7	2	4.212e-6	1
45	N23	max	0	1	0	1	0	1	1.4e-5	2	-1.391e-6	1	-2.427e-6	1
46		min	0	2	0	2	0	2	4.243e-6	1	-4.415e-6	2	-7.752e-6	2
47	N24	max	0	2	0	1	0	1	1.193e-5	2	1.438e-7	2	7.979e-6	2
48		min	0	1	0	2	0	2	3.554e-6	1	-2.347e-8	1	2.654e-6	1
49	N25	max	0	1	0	1	0	1	1.346e-5	2	1.936e-5	2	-2.16e-7	1
50		min	0	2	0	2	0	2	4.115e-6	1	5.629e-6	1	-3.277e-6	2
51	N26	max	0	2	0	1	0	1	1.152e-5	2	-2.287e-7	1	9.405e-6	2
52		min	0	1	0	2	0	2	3.463e-6	1	-7.475e-7	2	3.287e-6	1
53	N27	max	0	1	0	1	0	1	1.403e-5	2	-9.894e-7	1	6.954e-6	2
54		min	0	2	0	2	0	2	4.251e-6	1	-3.091e-6	2	2.728e-6	1
55	N28	max	0	2	0	1	0	1	1.193e-5	2	-3.051e-7	1	-2.718e-6	1
56		min	0	1	0	2	0	2	3.555e-6	1	-8.09e-7	2	-6.943e-6	2
57	N29	max	0	1	0	1	0	1	1.379e-5	2	8.803e-6	2	7.105e-6	2
58		min	0	2	0	2	0	2	4.212e-6	1	2.522e-6	1	2.809e-6	1
59	N30	max	0	2	0	1	0	1	1.152e-5	2	-4.078e-7	1	-2.558e-6	1
60		min	0	1	0	2	0	2	3.464e-6	1	-1.255e-6	2	-6.641e-6	2
61	N31	max	0	2	0	1	0	1	1.193e-5	2	-5.903e-7	1	-3.595e-6	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation [...	lc
62		min	0	1	-.001	2	0	2	3.554e-6	1	-1.773e-6	2	-1.199e-5	2
63	N32	max	0	2	0	1	0	1	9.543e-6	2	-5.901e-7	1	-3.595e-6	1
64		min	0	1	-.001	2	0	2	2.379e-6	1	-1.772e-6	2	-1.199e-5	2
65	N33	max	0	1	0	1	0	1	1.007e-5	2	-5.867e-7	1	9.819e-6	2
66		min	0	2	-.001	2	0	2	3.02e-6	1	-1.763e-6	2	3.153e-6	1
67	N34	max	0	1	0	1	0	1	1.007e-5	2	-5.74e-7	1	9.166e-6	2
68		min	0	2	-.001	2	0	2	3.006e-6	1	-1.722e-6	2	3.022e-6	1
69	N35	max	0	1	0	1	0	1	-7.593e-5	1	2.355e-7	2	-1.253e-6	1
70		min	0	2	-.002	2	0	2	-2.47e-4	2	1.201e-7	1	-2.59e-6	2
71	N36	max	0	1	0	1	0	1	2.47e-4	2	2.355e-7	2	-1.407e-6	1
72		min	0	2	-.002	2	0	2	7.598e-5	1	1.201e-7	1	-2.845e-6	2
73	N37	max	0	2	-.003	1	0	1	0	1	2.355e-7	2	-3.595e-6	1
74		min	0	1	-.009	2	0	2	0	2	1.201e-7	1	-1.199e-5	2
75	N38	max	0	1	-.003	1	0	1	1.243e-5	2	2.355e-7	2	-1.333e-6	1
76		min	0	2	-.009	2	0	2	3.743e-6	1	1.201e-7	1	-2.722e-6	2
77	N39	max	0	1	0	1	0	1	9.512e-6	2	-5.901e-7	1	-3.135e-6	1
78		min	0	2	-.001	2	0	2	2.398e-6	1	-1.772e-6	2	-1.011e-5	2
79	N40	max	0	1	-.003	1	0	1	8.328e-6	2	2.355e-7	2	-3.093e-6	1
80		min	0	2	-.009	2	0	2	2.043e-6	1	1.201e-7	1	-9.782e-6	2
81	N41	max	0	1	0	1	0	1	9.531e-6	2	-5.903e-7	1	-3.054e-6	1
82		min	0	2	-.001	2	0	2	2.391e-6	1	-1.773e-6	2	-9.476e-6	2
83	N42	max	0	2	0	1	0	1	-7.659e-5	1	2.053e-7	2	3.622e-6	2
84		min	0	1	-.002	2	0	2	-2.493e-4	2	1.035e-7	1	1.27e-6	1
85	N43	max	0	1	-.003	1	0	1	0	1	2.053e-7	2	9.503e-6	2
86		min	0	2	-.01	2	0	2	0	2	1.035e-7	1	3.09e-6	1
87	N44	max	0	2	-.003	1	0	1	1.01e-5	2	2.053e-7	2	3.231e-6	2
88		min	0	1	-.01	2	0	2	3.082e-6	1	1.035e-7	1	1.34e-6	1
89	N45	max	0	2	0	1	0	1	1.061e-5	2	-5.74e-7	1	9.48e-6	2
90		min	0	1	-.001	2	0	2	3.204e-6	1	-1.722e-6	2	3.139e-6	1
91	N46	max	0	2	-.003	1	0	1	9.388e-6	2	2.053e-7	2	9.484e-6	2
92		min	0	1	-.01	2	0	2	2.797e-6	1	1.035e-7	1	3.1e-6	1
93	N47	max	0	2	0	1	0	1	1.063e-5	2	-5.867e-7	1	9.488e-6	2
94		min	0	1	-.001	2	0	2	3.173e-6	1	-1.763e-6	2	3.064e-6	1

Envelope Joint Reactions

	Joint		X [k]	lc	Y [k]	lc	Z [k]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	N20	max	.315	2	3.831	2	0	1	0	1	0	1	0	1
2		min	.107	1	1.353	1	0	2	0	1	0	1	0	1
3	N22	max	-.107	1	3.831	2	0	1	0	1	0	1	0	1
4		min	-.315	2	1.353	1	0	2	0	1	0	1	0	1
5	N21	max	-.101	1	3.832	2	0	2	0	1	0	1	0	1
6		min	-.303	2	1.354	1	0	1	0	1	0	1	0	1
7	N19	max	.303	2	3.831	2	0	2	0	1	0	1	0	1
8		min	.101	1	1.353	1	0	1	0	1	0	1	0	1
9	N1	max	0	1	0	1	0	1	0	1	0	1	0	1
10		min	0	1	0	1	0	1	0	2	0	1	0	1
11	Totals:	max	0	2	15.324	2	0	1						
12		min	0	1	5.412	1	0	2						

Envelope Member Section Forces

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	0	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1
9		5	max	0	1	0	1	0	1	0	1	0	1	0	1
10			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
11	M2	1	max	0	1	0	1	0	1	0	1	0	1	0	1
12			min	0	1	0	1	0	1	0	2	0	1	0	1
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1
20			min	0	1	0	1	0	1	0	1	0	1	0	1
21	M3	1	max	0	1	.884	2	0	1	0	1	0	1	0	1
22			min	0	2	.264	1	0	1	0	2	0	1	0	1
29		5	max	0	2	-.265	1	0	1	0	1	0	1	0	1
30			min	0	1	-.885	2	0	1	0	2	0	1	0	1
31	M4	1	max	0	1	.884	2	0	1	0	1	0	1	0	1
32			min	0	2	.264	1	0	1	0	2	0	1	0	1
39		5	max	0	2	-.265	1	0	1	0	1	0	1	0	1
40			min	0	1	-.885	2	0	1	0	2	0	1	0	1
41	M5	1	max	0	1	1.659	2	0	1	0	1	0	1	0	1
42			min	0	2	.42	1	0	1	0	2	0	1	0	1
49		5	max	0	1	-.42	1	0	1	0	1	0	1	0	1
50			min	0	2	-1.659	2	0	1	0	2	0	1	0	1
51	M6	1	max	0	2	2.034	2	0	1	0	2	0	1	0	1
52			min	0	1	.795	1	0	1	0	1	0	1	0	1
59		5	max	0	2	-.795	1	0	1	0	2	0	1	0	1
60			min	0	1	-2.034	2	0	1	0	1	0	1	0	1
61	M7	1	max	0	1	1.659	2	0	1	0	2	0	1	0	1
62			min	0	2	.42	1	0	1	0	1	0	1	0	1
69		5	max	0	1	-.42	1	0	1	0	2	0	1	0	1
70			min	0	2	-1.659	2	0	1	0	1	0	1	0	1
71	M8	1	max	-.939	1	-.006	1	0	1	0	2	0	1	0	1
72			min	-2.786	2	-.013	2	0	2	0	1	0	1	0	1
79		5	max	-1.353	1	.303	2	0	1	0	1	0	1	0	1
80			min	-3.831	2	.101	1	0	2	0	1	0	1	0	1
81	M9	1	max	-.94	1	-.004	1	0	1	0	1	0	1	0	1
82			min	-2.782	2	-.008	2	0	2	0	2	0	1	0	1
89		5	max	-1.353	1	.315	2	0	2	0	1	0	1	0	1
90			min	-3.831	2	.107	1	0	1	0	1	0	1	0	1
91	M10	1	max	-.939	1	.013	2	0	1	0	1	0	1	0	1
92			min	-2.786	2	.007	1	0	2	0	2	0	1	0	1
99		5	max	-1.354	1	-.101	1	0	1	0	1	0	1	0	1
100			min	-3.832	2	-.303	2	0	2	0	1	0	1	0	1
101	M11	1	max	-.939	1	.017	2	0	2	0	1	0	1	0	1
102			min	-2.785	2	.009	1	0	1	0	2	0	1	0	1
109		5	max	-1.353	1	-.107	1	0	2	0	1	0	1	0	1
110			min	-3.831	2	-.315	2	0	1	0	1	0	1	0	1
111	M12	1	max	-.15	1	0	1	-.017	1	0	2	.03	2	.03	2
112			min	-.454	2	0	1	-.017	1	0	1	.01	1	.01	1
119		5	max	-.15	1	0	1	.017	1	0	2	.03	2	.03	2
120			min	-.454	2	0	1	.017	1	0	1	.01	1	.01	1
121	M13	1	max	-.145	1	-.017	1	0	1	0	2	.03	2	-.01	1
122			min	-.444	2	-.017	1	0	1	0	1	.01	1	-.03	2
129		5	max	-.145	1	.017	1	0	1	0	2	.03	2	-.01	1
130			min	-.444	2	.017	1	0	1	0	1	.01	1	-.03	2
131	M14	1	max	-.009	1	0	1	-.006	2	0	2	.001	2	.001	2
132			min	-.039	2	0	1	-.006	1	0	1	0	1	0	1
139		5	max	-.009	1	0	1	.006	2	0	2	.001	2	.001	2
140			min	-.039	2	0	1	.006	1	0	1	0	1	0	1
141	M15	1	max	-.006	1	-.006	1	0	1	0	2	.001	2	0	1
142			min	-.033	2	-.006	1	0	1	0	1	0	1	-.001	2
149		5	max	-.006	1	.006	1	0	1	0	2	.001	2	0	1
150			min	-.033	2	.006	1	0	1	0	1	0	1	-.001	2
151	M16	1	max	-.395	1	-.013	1	0	1	0	2	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
152			min	-1.227	2	-.013	2	0	1	0	1	0	1	0	1
159		5	max	-.425	1	.013	1	0	1	0	2	0	1	0	1
160			min	-1.256	2	.013	2	0	1	0	1	0	1	0	1
161	M17	1	max	-.394	1	0	1	-.013	2	0	1	0	1	0	1
162			min	-1.226	2	0	1	-.013	1	0	2	0	1	0	1
169		5	max	-.424	1	0	1	.013	2	0	1	0	1	0	1
170			min	-1.256	2	0	1	.013	1	0	2	0	1	0	1
171	M18	1	max	-.394	1	0	1	-.013	2	0	2	0	1	0	1
172			min	-1.227	2	0	1	-.013	1	0	1	0	1	0	1
179		5	max	-.424	1	0	1	.013	2	0	2	0	1	0	1
180			min	-1.257	2	0	1	.013	1	0	1	0	1	0	1
181	M19	1	max	.027	2	0	1	0	1	0	1	0	1	0	1
182			min	.027	1	0	2	0	2	0	1	0	1	0	1
189		5	max	.011	1	0	1	0	2	0	1	0	1	0	1
190			min	.011	1	0	2	0	1	0	1	0	1	0	1
191	M20	1	max	0	1	-.005	1	0	1	0	1	0	1	0	1
192			min	0	2	-.005	2	0	1	0	1	0	1	0	1
199		5	max	0	1	.005	1	0	1	0	1	0	1	0	1
200			min	0	2	.005	2	0	1	0	1	0	1	0	1
201	M21	1	max	.027	2	0	2	0	2	0	1	0	1	0	1
202			min	.027	1	0	1	0	1	0	1	0	2	0	2
209		5	max	.011	2	0	1	0	2	0	1	0	1	0	2
210			min	.011	1	0	2	0	1	0	1	0	2	0	1
211	M22	1	max	0	2	0	1	-.005	2	0	2	0	1	0	1
212			min	0	1	0	1	-.005	1	0	1	0	2	0	2
219		5	max	0	2	0	1	.005	2	0	2	0	1	0	1
220			min	0	1	0	1	.005	1	0	1	0	2	0	2
221	M23	1	max	0	2	0	1	-.005	2	0	1	0	1	0	1
222			min	0	1	0	1	-.005	1	0	2	0	1	0	1
229		5	max	0	2	0	1	.005	2	0	1	0	1	0	1
230			min	0	1	0	1	.005	1	0	2	0	1	0	1
231	M24	1	max	.026	2	0	1	0	2	0	1	0	1	0	1
232			min	.026	1	0	2	0	1	0	1	0	1	0	1
239		5	max	.01	1	0	2	0	2	0	1	0	2	0	1
240			min	.01	2	0	1	0	1	0	1	0	1	0	2
241	M25	1	max	.027	2	0	1	0	2	0	1	0	1	0	1
242			min	.027	1	0	2	0	1	0	1	0	1	0	1
249		5	max	.011	1	0	1	0	1	0	1	0	1	0	1
250			min	.011	1	0	2	0	2	0	1	0	2	0	2
251	M26	1	max	0	1	-.005	2	0	1	0	1	0	1	0	1
252			min	0	2	-.005	1	0	1	0	2	0	1	0	1
259		5	max	0	1	.005	2	0	1	0	1	0	1	0	1
260			min	0	2	.005	1	0	1	0	2	0	1	0	1
261	M27	1	max	0	1	-.006	1	0	1	0	1	0	2	0	1
262			min	0	2	-.006	1	0	1	0	1	0	1	0	2
269		5	max	0	1	.006	1	0	1	0	1	0	2	0	1
270			min	0	2	.006	1	0	1	0	1	0	1	0	2
271	M28	1	max	.034	2	0	1	0	1	0	1	0	1	0	1
272			min	.034	1	0	2	0	1	0	1	0	1	0	1
279		5	max	.012	1	0	2	0	1	0	1	0	1	0	1
280			min	.012	2	0	1	0	1	0	1	0	1	0	1
281	M29	1	max	0	2	0	1	-.006	2	0	1	0	1	0	1
282			min	0	1	0	1	-.006	1	0	1	0	2	0	2
289		5	max	0	2	0	1	.006	2	0	1	0	1	0	1
290			min	0	1	0	1	.006	1	0	1	0	2	0	2
291	M30	1	max	0	2	-.006	1	0	1	0	2	0	1	0	2
292			min	0	1	-.006	1	0	1	0	1	0	2	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
299		5	max	0	2	.006	1	0	1	0	2	0	1	0	2
300			min	0	1	.006	1	0	1	0	1	0	2	0	1
301	M31	1	max	0	1	-.006	1	0	1	0	2	0	2	0	1
302			min	0	2	-.006	2	0	1	0	1	0	1	0	2
309		5	max	0	1	.006	1	0	1	0	2	0	2	0	1
310			min	0	2	.006	2	0	1	0	1	0	1	0	2
311	M32	1	max	.034	2	0	1	0	1	0	1	0	1	0	1
312			min	.034	1	0	1	0	2	0	1	0	1	0	1
319		5	max	.012	1	0	1	0	2	0	1	0	1	0	1
320			min	.012	1	0	1	0	1	0	1	0	1	0	1
321	M33	1	max	0	2	-.006	2	0	1	0	2	0	1	0	2
322			min	0	1	-.006	1	0	1	0	1	0	2	0	1
329		5	max	0	2	.006	2	0	1	0	2	0	1	0	2
330			min	0	1	.006	1	0	1	0	1	0	2	0	1
331	M34	1	max	0	1	-.006	1	0	1	0	2	0	2	0	1
332			min	0	2	-.006	1	0	1	0	1	0	1	0	2
339		5	max	0	1	.006	1	0	1	0	2	0	2	0	1
340			min	0	2	.006	1	0	1	0	1	0	1	0	2
341	M35	1	max	0	2	.006	1	0	1	0	2	0	2	0	1
342			min	0	1	.006	1	0	1	0	1	0	1	0	2
349		5	max	0	2	-.006	1	0	1	0	2	0	2	0	1
350			min	0	1	-.006	1	0	1	0	1	0	1	0	2
351	M36	1	max	0	1	.006	2	0	1	0	2	0	1	0	2
352			min	0	2	.006	1	0	1	0	1	0	2	0	1
359		5	max	0	1	-.006	2	0	1	0	2	0	1	0	2
360			min	0	2	-.006	1	0	1	0	1	0	2	0	1
361	M37	1	max	-.39	1	-.004	2	0	1	0	1	.002	1	.007	2
362			min	-1.223	2	-.01	1	0	2	0	2	-.006	2	-.002	1
369		5	max	-.42	1	.022	2	0	1	0	1	.02	2	-.01	1
370			min	-1.253	2	.016	1	0	2	0	2	.01	1	-.02	2

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	lc	y Shea...	lc	z Shea...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[k...	lc	z-Bot[k...	lc
1	M1	1	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
2			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
9		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
10			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
11	M2	1	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
12			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
19		5	max	0	1	0	1	0	1	0	1	0	1	0	1	0	1
20			min	0	1	0	1	0	1	0	1	0	1	0	1	0	1
21	M3	1	max	0	1	.455	2	0	1	0	1	0	1	0	1	0	1
22			min	0	2	.136	1	0	1	0	1	0	1	0	1	0	1
29		5	max	0	2	-.137	1	0	1	0	1	0	1	0	1	0	1
30			min	0	1	-.455	2	0	1	0	1	0	1	0	1	0	1
31	M4	1	max	0	1	.455	2	0	1	0	1	0	1	0	1	0	1
32			min	0	2	.136	1	0	1	0	1	0	1	0	1	0	1
39		5	max	0	2	-.137	1	0	1	0	1	0	1	0	1	0	1
40			min	0	1	-.455	2	0	1	0	1	0	1	0	1	0	1
41	M5	1	max	0	1	.722	2	0	1	0	1	0	1	0	1	0	1
42			min	0	2	.183	1	0	1	0	1	0	1	0	1	0	1
49		5	max	0	1	-.183	1	0	1	0	1	0	1	0	1	0	1
50			min	0	2	-.722	2	0	1	0	1	0	1	0	1	0	1
51	M6	1	max	0	2	.885	2	0	1	0	1	0	1	0	1	0	1
52			min	0	1	.346	1	0	1	0	1	0	1	0	1	0	1
59		5	max	0	2	-.346	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shea...	lc	z Shea...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[k...	lc	z-Bot[k...	lc
60			min	0	1	-.885	2	0	1	0	1	0	1	0	1	0	1
61	M7	1	max	0	1	.722	2	0	1	0	1	0	1	0	1	0	1
62			min	0	2	.183	1	0	1	0	1	0	1	0	1	0	1
69		5	max	0	1	-.183	1	0	1	0	1	0	1	0	1	0	1
70			min	0	2	-.722	2	0	1	0	1	0	1	0	1	0	1
71	M8	1	max	-.198	1	-.004	1	0	1	0	1	0	1	0	1	0	1
72			min	-.588	2	-.008	2	0	2	0	1	0	1	0	1	0	1
79		5	max	-.285	1	.185	2	0	1	0	1	0	1	0	1	0	1
80			min	-.808	2	.062	1	0	2	0	1	0	1	0	1	0	1
81	M9	1	max	-.198	1	-.002	1	0	1	0	1	0	1	0	1	0	1
82			min	-.587	2	-.005	2	0	2	0	1	0	1	0	1	0	1
89		5	max	-.285	1	.193	2	0	2	0	1	0	1	0	1	0	1
90			min	-.808	2	.066	1	0	1	0	1	0	1	0	1	0	1
91	M10	1	max	-.198	1	.008	2	0	1	0	1	0	1	0	1	0	1
92			min	-.588	2	.004	1	0	2	0	1	0	1	0	1	0	1
99		5	max	-.286	1	-.062	1	0	1	0	1	0	1	0	1	0	1
100			min	-.808	2	-.185	2	0	2	0	1	0	1	0	1	0	1
101	M11	1	max	-.198	1	.011	2	0	2	0	1	0	1	0	1	0	1
102			min	-.588	2	.005	1	0	1	0	1	0	1	0	1	0	1
109		5	max	-.285	1	-.066	1	0	2	0	1	0	1	0	1	0	1
110			min	-.808	2	-.193	2	0	1	0	1	0	1	0	1	0	1
111	M12	1	max	-.052	1	0	1	-.014	1	-.047	1	.142	2	.278	2	-.109	1
112			min	-.159	2	0	1	-.014	1	-.142	2	.047	1	.092	1	-.331	2
119		5	max	-.052	1	0	1	.014	1	-.047	1	.142	2	.278	2	-.109	1
120			min	-.159	2	0	1	.014	1	-.142	2	.047	1	.092	1	-.331	2
121	M13	1	max	-.051	1	-.014	1	0	1	.139	2	-.045	1	.272	2	-.105	1
122			min	-.155	2	-.014	1	0	1	.045	1	-.139	2	.088	1	-.324	2
129		5	max	-.051	1	.014	1	0	1	.139	2	-.045	1	.272	2	-.105	1
130			min	-.155	2	.014	1	0	1	.045	1	-.139	2	.088	1	-.324	2
131	M14	1	max	-.01	1	0	1	-.013	2	-.009	1	.039	2	.075	2	-.023	1
132			min	-.041	2	0	1	-.013	1	-.039	2	.009	1	.018	1	-.094	2
139		5	max	-.01	1	0	1	.013	2	-.009	1	.039	2	.075	2	-.023	1
140			min	-.041	2	0	1	.013	1	-.039	2	.009	1	.018	1	-.094	2
141	M15	1	max	-.007	1	-.013	1	0	1	.033	2	-.006	1	.064	2	-.016	1
142			min	-.035	2	-.013	1	0	1	.006	1	-.033	2	.013	1	-.08	2
149		5	max	-.007	1	.013	1	0	1	.033	2	-.006	1	.064	2	-.016	1
150			min	-.035	2	.013	1	0	1	.006	1	-.033	2	.013	1	-.08	2
151	M16	1	max	-.138	1	-.01	1	0	1	0	1	0	1	0	1	0	1
152			min	-.429	2	-.01	2	0	1	0	1	0	1	0	1	0	1
159		5	max	-.148	1	.01	1	0	1	0	1	0	1	0	1	0	1
160			min	-.439	2	.01	2	0	1	0	1	0	1	0	1	0	1
161	M17	1	max	-.138	1	0	1	-.01	2	0	1	0	1	0	1	0	1
162			min	-.429	2	0	1	-.01	1	0	1	0	1	0	1	0	1
169		5	max	-.148	1	0	1	.01	2	0	1	0	1	0	1	0	1
170			min	-.439	2	0	1	.01	1	0	1	0	1	0	1	0	1
171	M18	1	max	-.138	1	0	1	-.01	2	0	1	0	1	0	1	0	1
172			min	-.429	2	0	1	-.01	1	0	1	0	1	0	1	0	1
179		5	max	-.148	1	0	1	.01	2	0	1	0	1	0	1	0	1
180			min	-.439	2	0	1	.01	1	0	1	0	1	0	1	0	1
181	M19	1	max	.028	2	0	1	0	1	0	1	0	1	0	1	0	1
182			min	.028	1	0	2	0	2	0	1	0	1	0	1	0	1
189		5	max	.011	1	0	1	0	2	0	1	0	1	0	1	0	1
190			min	.011	1	0	2	0	1	0	1	0	1	0	1	0	1
191	M20	1	max	0	1	-.012	1	0	1	0	1	0	1	0	1	0	1
192			min	0	2	-.012	2	0	1	0	1	0	1	0	1	0	1
199		5	max	0	1	.012	1	0	1	0	1	0	1	0	1	0	1
200			min	0	2	.012	2	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shea...	lc	z Shea...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[k...	lc	z-Bot[k...	lc
201	M21	1	max	.029	2	0	2	0	2	.007	2	-.002	1	-.003	1	.016	2
202			min	.029	1	0	1	0	1	.002	1	-.007	2	-.013	2	.004	1
209		5	max	.011	2	0	1	0	2	0	1	0	2	0	1	0	2
210			min	.011	1	0	2	0	1	0	2	0	1	0	2	0	1
211	M22	1	max	0	2	0	1	-.011	2	0	2	0	1	0	1	0	2
212			min	0	1	0	1	-.011	1	0	1	0	2	0	2	0	1
219		5	max	0	2	0	1	.011	2	0	2	0	1	0	1	0	2
220			min	0	1	0	1	.011	1	0	1	0	2	0	2	0	1
221	M23	1	max	0	2	0	1	-.011	2	0	1	0	1	0	1	0	1
222			min	0	1	0	1	-.011	1	0	1	0	1	0	1	0	1
229		5	max	0	2	0	1	.011	2	0	1	0	1	0	1	0	1
230			min	0	1	0	1	.011	1	0	1	0	1	0	1	0	1
231	M24	1	max	.028	2	0	1	0	2	0	1	0	1	0	1	0	1
232			min	.028	1	0	2	0	1	0	1	0	1	0	1	0	1
239		5	max	.011	1	0	2	0	2	0	2	0	1	0	2	0	1
240			min	.011	2	0	1	0	1	0	1	0	2	0	1	0	2
241	M25	1	max	.029	2	0	1	0	2	0	1	0	1	0	1	0	1
242			min	.029	1	0	2	0	1	0	1	0	1	0	1	0	1
249		5	max	.011	1	0	1	0	1	0	2	0	1	0	1	0	2
250			min	.011	1	0	2	0	2	0	1	0	2	0	2	0	1
251	M26	1	max	0	1	-.011	2	0	1	0	1	0	1	0	1	0	1
252			min	0	2	-.011	1	0	1	0	1	0	1	0	1	0	1
259		5	max	0	1	.011	2	0	1	0	1	0	1	0	1	0	1
260			min	0	2	.011	1	0	1	0	1	0	1	0	1	0	1
261	M27	1	max	0	1	-.015	1	0	1	0	2	0	1	0	2	0	1
262			min	0	2	-.015	1	0	1	0	1	0	2	0	1	0	2
269		5	max	0	1	.015	1	0	1	0	2	0	1	0	2	0	1
270			min	0	2	.015	1	0	1	0	1	0	2	0	1	0	2
271	M28	1	max	.037	2	0	1	0	1	0	1	0	1	0	1	0	1
272			min	.037	1	0	2	0	1	0	1	0	1	0	1	0	1
279		5	max	.013	1	0	2	0	1	0	1	0	1	0	1	0	1
280			min	.013	2	0	1	0	1	0	1	0	1	0	1	0	1
281	M29	1	max	0	2	0	1	-.014	2	0	2	0	1	0	1	0	2
282			min	0	1	0	1	-.014	1	0	1	0	2	0	2	0	1
289		5	max	0	2	0	1	.014	2	0	2	0	1	0	1	0	2
290			min	0	1	0	1	.014	1	0	1	0	2	0	2	0	1
291	M30	1	max	0	2	-.015	1	0	1	0	1	0	2	0	1	0	2
292			min	0	1	-.015	1	0	1	0	2	0	1	0	2	0	1
299		5	max	0	2	.015	1	0	1	0	1	0	2	0	1	0	2
300			min	0	1	.015	1	0	1	0	2	0	1	0	2	0	1
301	M31	1	max	0	1	-.014	1	0	1	0	2	0	1	0	2	0	1
302			min	0	2	-.014	2	0	1	0	1	0	2	0	1	0	2
309		5	max	0	1	.014	1	0	1	0	2	0	1	0	2	0	1
310			min	0	2	.014	2	0	1	0	1	0	2	0	1	0	2
311	M32	1	max	.037	2	0	1	0	1	0	1	0	1	0	1	0	1
312			min	.037	1	0	1	0	2	0	1	0	1	0	1	0	1
319		5	max	.013	1	0	1	0	2	0	1	0	1	0	1	0	1
320			min	.013	1	0	1	0	1	0	1	0	1	0	1	0	1
321	M33	1	max	0	2	-.014	2	0	1	0	1	0	2	0	1	0	2
322			min	0	1	-.014	1	0	1	0	2	0	1	0	2	0	1
329		5	max	0	2	.014	2	0	1	0	1	0	2	0	1	0	2
330			min	0	1	.014	1	0	1	0	2	0	1	0	2	0	1
331	M34	1	max	0	1	-.015	1	0	1	0	2	0	1	0	2	0	1
332			min	0	2	-.015	1	0	1	0	1	0	2	0	1	0	2
339		5	max	0	1	.015	1	0	1	0	2	0	1	0	2	0	1
340			min	0	2	.015	1	0	1	0	1	0	2	0	1	0	2
341	M35	1	max	0	2	.015	1	0	1	0	2	0	1	0	2	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	lc	y Shea...	lc	z Shea...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[k...	lc	z-Bot[k...	lc
342			min	0	1	.015	1	0	1	0	1	0	2	0	1	0	2
349		5	max	0	2	-.015	1	0	1	0	2	0	1	0	2	0	1
350			min	0	1	-.015	1	0	1	0	1	0	2	0	1	0	2
351	M36	1	max	0	1	.014	2	0	1	0	1	0	2	0	1	0	2
352			min	0	2	.014	1	0	1	0	2	0	1	0	2	0	1
359		5	max	0	1	-.014	2	0	1	0	1	0	2	0	1	0	2
360			min	0	2	-.014	1	0	1	0	2	0	1	0	2	0	1
361	M37	1	max	-.136	1	-.003	2	0	1	.01	1	.03	2	.02	1	.069	2
362			min	-.428	2	-.008	1	0	2	-.03	2	-.01	1	-.058	2	-.024	1
369		5	max	-.147	1	.018	2	0	1	.094	2	-.048	1	.182	2	-.112	1
370			min	-.438	2	.013	1	0	2	.048	1	-.094	2	.094	1	-.217	2

Envelope AISC ASD Steel Code Checks

	Member	Shape	Code C...	Loc[ft]	lc	Shear C...	Loc[ft]	Dir	lc	Fa [ksi]	Ft [ksi]	Fb y-y [...	Fb z-z [...	Cb	Cmy	Cmz	ASD Eqn
1	M1	W10X22	.038	5.5	2	.049	7.563	y	2	13.029	21.6	27	18.504	1	.6	.85	H1-2
2	M2	W10X22	.038	5.5	2	.049	3.438	y	2	13.029	21.6	27	18.504	1	.6	.85	H1-2
3	M3	W8X24	.045	3.828	2	.032	7.5	y	2	17.809	21.6	27	21.6	1	.6	1	H2-1
4	M4	W8X24	.045	3.828	2	.032	7.5	y	2	17.809	21.6	27	21.6	1	.6	1	H2-1
5	M5	W8X28	.071	3.75	2	.050	0	y	2	17.855	21.6	27	21.6	1	.6	1	H2-1
6	M6	W8X28	.103	3.75	2	.061	0	y	2	17.855	21.6	27	21.6	1	.6	1	H1-3
7	M7	W8X28	.071	3.75	2	.050	7.5	y	2	17.855	21.6	27	21.6	1	.6	1	H2-1
8	M8	W6X16	.042	3.172	2	.013	3.172	y	2	18.91	21.6	27	23.76	1	.6	.6	H2-1
9	M9	W6X16	.042	3.172	2	.013	3.172	y	2	18.91	21.6	27	23.76	1	.6	.6	H2-1
10	M10	W6X16	.042	3.172	2	.013	3.172	y	2	18.91	21.6	27	23.76	1	.6	.6	H2-1
11	M11	W6X16	.042	3.172	2	.013	3.172	y	2	18.91	21.6	27	23.76	1	.6	.6	H2-1
12	M12	L4X4X6_...	.007	0	2	.001	3.477	z	2	18.088	21.6	- Code ...					H2-1
13	M13	L4X4X6_...	.007	0	2	.001	3.477	y	2	18.088	21.6	- Code ...					H2-1
14	M14	L2X2X4_...	.002	0	2	.001	3.477	z	2	12.112	21.6	- Code ...					H2-1
15	M15	L2X2X4_...	.002	0	2	.001	3.477	y	2	12.112	21.6	- Code ...					H2-1
16	M16	L4X4X6_...	.020	4.047	2	.001	0	y	2	17.273	21.6	- Code ...					H2-1
17	M17	L4X4X6_...	.020	4.047	2	.001	4.047	z	2	17.273	21.6	- Code ...					H2-1
18	M18	L4X4X6_...	.020	4.047	2	.001	4.047	z	2	17.273	21.6	- Code ...					H2-1
19	M19	L2X2X4_...	.002	0	2	.000	1.583	z	2	13.332	21.6	- Code ...					H1-1
20	M20	L2X2X4_...	.000	0	2	.001	3.083	y	1	13.648	21.6	- Code ...					H2-1
21	M21	L2X2X4_...	.002	0	2	.000	1.583	z	2	13.332	21.6	- Code ...					H1-1
22	M22	L2X2X4_...	.000	0	2	.001	2.821	z	2	14.606	21.6	- Code ...					H1-1
23	M23	L2X2X4_...	.000	0	2	.001	2.821	z	2	14.606	21.6	- Code ...					H1-1
24	M24	L2X2X4_...	.002	0	2	.000	1.583	y	2	13.332	21.6	- Code ...					H1-1
25	M25	L2X2X4_...	.002	0	2	.000	1.583	z	2	13.332	21.6	- Code ...					H1-1
26	M26	L2X2X4_...	.000	0	2	.001	2.821	y	2	14.606	21.6	- Code ...					H2-1
27	M27	L2X2X4_...	.000	0	2	.001	0	y	1	10.436	21.6	- Code ...					H2-1
28	M28	L2X2X4_...	.003	0	2	.000	1.698	y	2	12.973	21.6	- Code ...					H1-1
29	M29	L2X2X4_...	.000	0	2	.001	3.625	z	2	11.502	21.6	- Code ...					H1-1
30	M30	L2X2X4_...	.000	0	2	.001	0	y	2	10.436	21.6	- Code ...					H1-1
31	M31	L2X2X4_...	.000	0	2	.001	0	y	2	11.502	21.6	- Code ...					H2-1
32	M32	L2X2X4_...	.003	0	2	.000	1.698	z	2	12.973	21.6	- Code ...					H1-1
33	M33	L2X2X4_...	.000	0	2	.001	3.625	y	2	11.502	21.6	- Code ...					H1-1
34	M34	L2X2X4_...	.000	0	2	.001	0	y	2	10.436	21.6	- Code ...					H2-1
35	M35	L2X2X4_...	.000	0	2	.001	0	y	1	10.436	21.6	- Code ...					H1-1
36	M36	L2X2X4_...	.000	0	2	.001	0	y	1	11.502	21.6	- Code ...					H2-1
37	M37	L4X4X6_...	.020	4.047	2	.001	4.047	y	2	17.273	21.6	- Code ...					H2-1

DOCUMENT COVER SHEET

Document No: CR-1002-104

Title: JIB ARM ASSEMBLY DESIGN

1	Updated Information	*B.A. GIOMETTI*	*10/04/07*	*C.E. COX*	*10/04/07*
0	Original Issue	*B.A. GIOMETTI*	*9/11/07*	*C.E. COX*	*9/11/07*
No.	**Description**	**Prepared By**	**Date**	**Reviewed By**	**Date**
		PSC SIGN OFF			

REVISIONS

1.0 PURPOSE

1.1 During a walk down of the tendons selected for the 8th Period (30th Year) Tendon Surveillance at Crystal River Unit 3, it was observed that Tendon End 62H30/BT6 was located inside of an adjacent building. This tendon is scheduled to have liftoff testing performed, and because it is located inside, the hydraulic stressing ram must to be supported in a method that does not involve using the standard Upper Support Frames provided by PSC, located on the exterior of the containment building.

1.2 In order to support the hydraulic stressing ram PSC will provide and install a custom jib arm assembly. The purpose of this calculation is to evaluate the jib arm assembly's ability to support the required load of the stressing ram. The evaluation is done using a combination of hand calculations and computerized output from RISA 3D version 5.5. RISA-3D calculates both the force and stress in each individual member with respect to the member size designation. The entire evaluation has been performed in accordance with AISC 9th Ed. ASD

2.0 EQUIPMENT ARRANGEMENT

2.1 The jib arm assembly will be installed onto the bearing plates of the two tendons above tendon 62H30 (i.e. 62H31 & 62H32). The bottom attachment point of the jib arm, which supports the monorail, will be bolted to the top two holes of the bearing plate for tendon 62H31. The top attachment, which supports the tensile brace, will be bolted the bottom two holes of the bearing plate for tendon 62H32. This arrangement will allow the jib arm to be installed, and utilized without interfering with either tendon or its grease can.

2.2 The Jib Arm Assembly has a safe working load (5:1 factor of safety) capacity of 2 Ton (4,000 lb). Figure 1 below identifies the major components of the jib arm. Figure 2 below identifies the pertinent dimensions used in the evaluation of the jib arm assembly.

2.3 The hydraulic stressing ram will be raised and lowered using a 2 Ton chain fall. The stressing ram weighs approximately 3,000 lb, which is well within the safe working capacity of the assembly.

FIGURE 1

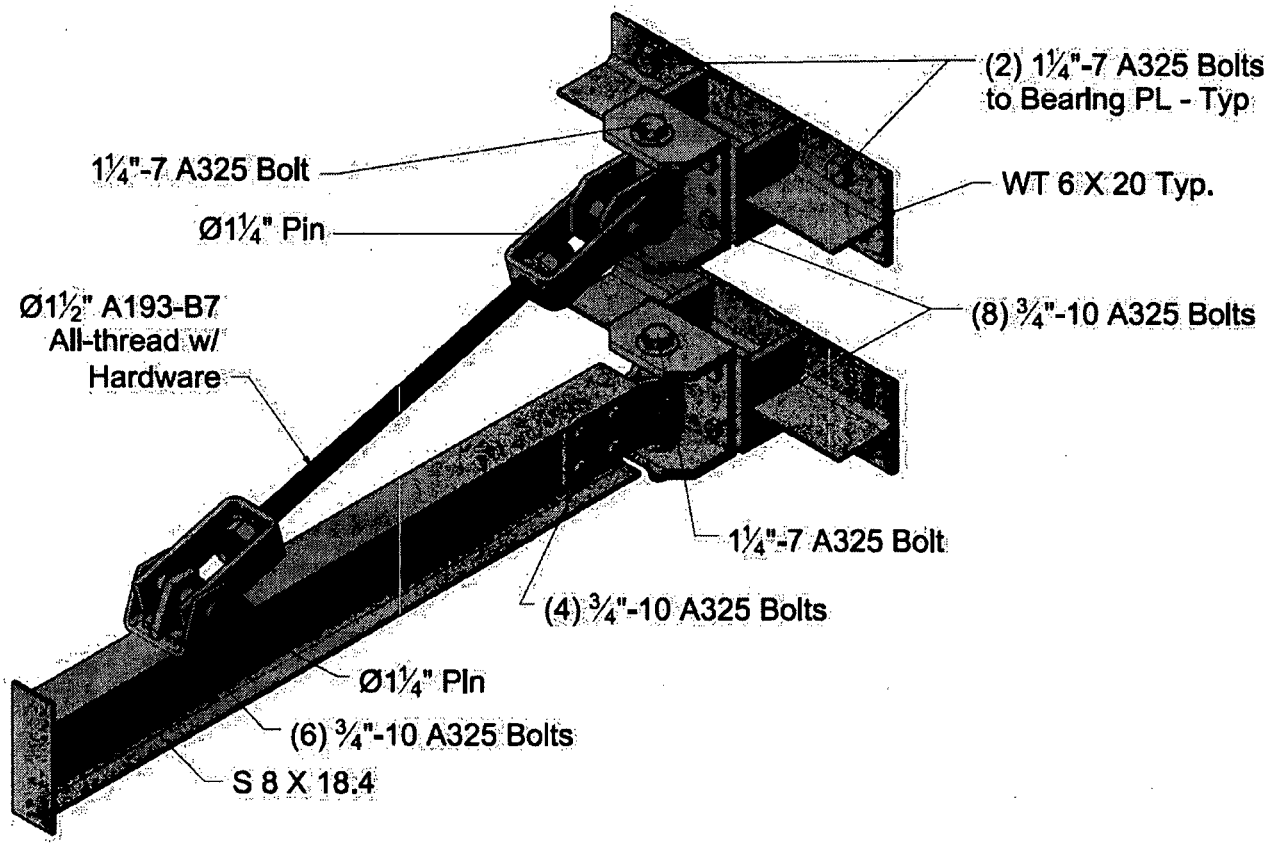
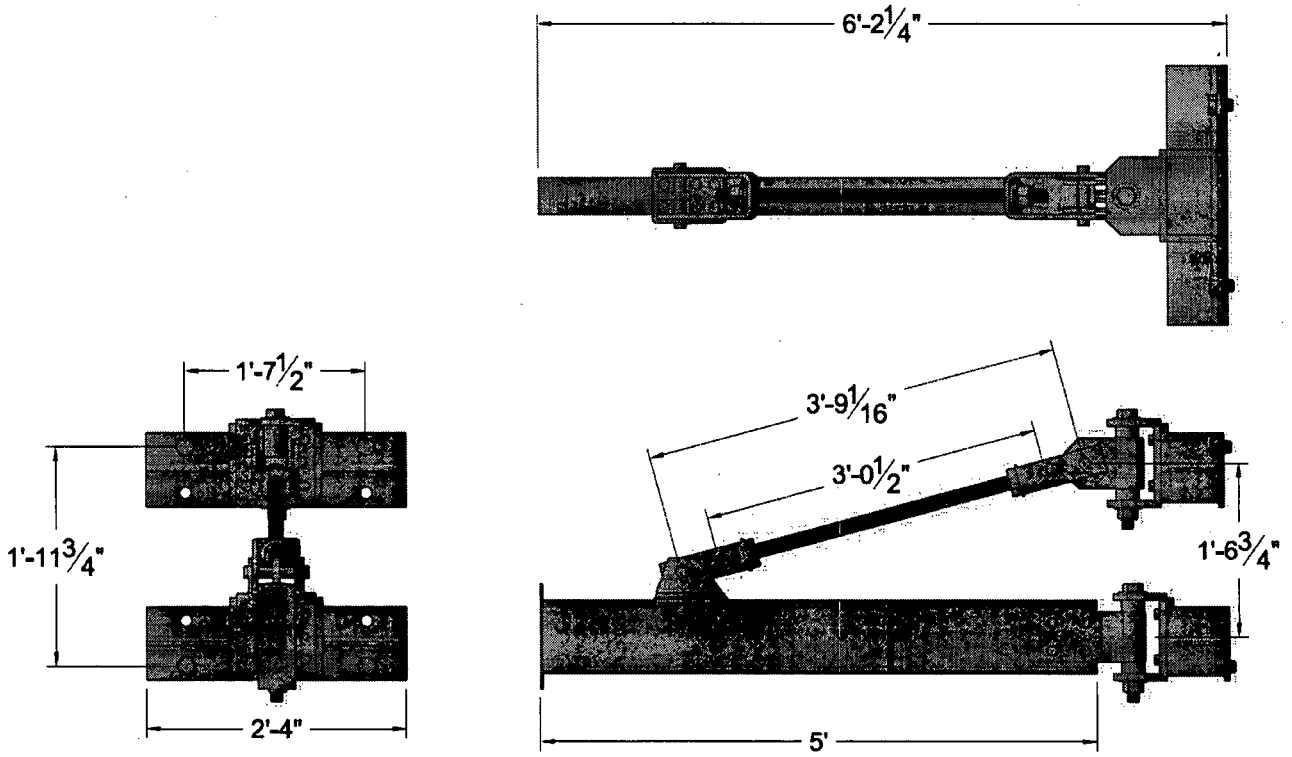


FIGURE 2



3.0 CALCULATIONS

3.1 Computer Calculation

3.1.1 The computer model has been simplified into two (2) members: the monorail and the tension brace. A total of 10 load combinations were analyzed. The load combinations fall into two groups, working load (4kip) and 5:1 ultimate load (20kip). Each group of load combinations was evaluated at 5 locations, namely every foot starting at the end of the monorail. An allowable stress increase of 1/3 has been applied to compensate for the ultimate loading conditions (LC6 – LC10).

3.1.2 The provided solution consists of the envelop of all the applied load combinations, and presents the data from the worst-case loading scenario. All of the members' stresses, code checks and boundary condition reactions are acceptable. The results of the evaluation are included in Attachment 1 of this document, and the pertinent information from the results that is used in the following hand calculations is summarized below in Table 1.

TABLE 1

Member Label	Section / Shape	Max. Member Forces			Max Code Check
		Axial	Shear	Moment	
M2	Tension / 1-1/2" All-Thread	70.282^K	0^K	0^K	0.475^K
M3	Horizontal / S8X18.4	64.173^K	20.023^K	25.014^K	0.977^K

Joint Label	Joint Coordinates		Max. Joint Reactions			Max. Displacement	
	X-Dir	Y-Dir	X-Dir	Y-Dir	Z-Dir	X-Dir	Y-Dir
N1	0 ft.	0 ft.	64.173^K	14.312^K	0^K	0	0
N2	0 ft.	1.5625 ft.	-64.173^K	28.66^K	0^K	0	0
N3	5.0 ft.	0 ft.	0^K	0^K	0^K	-0.31 in.	-0.344 in.

3.2 Hand Calculation

3.2.1 The following hand calculations are included to demonstrate the ability of the connections to withstand the calculated loads from RISA. These calculations are necessary because of the simplified nature of the computer model.

3.2.2 Because of considering the 5:1 ultimate strength condition in the envelope solution, all of the maximum loads taken from the computer model correspond to that condition. Where appropriate, the 5:1 loads are compared with the yield strength of the member in question (instead of 0.6Fy). This remains a conservative approach because the member will not be allowed to yield, even under the maximum loading.

3.2.3 Tension to Horizontal Connection

3.2.3.1 Check (6) – ¾" A325 Bolts in single shear:

Max Load, $P_{max} = 70.282^K$ @ 15°

$P_{max,X} = 70.282^K \cdot \cos(15) = 67.887^K$

$P_{max,Y} = 70.282^K \cdot \sin(15) = 18.190^K$

Capacity of (6) ¾" A325 Bolts (Per AISC ASD 9th Ed., Section 4-3, Table I-A & I-D)

Allowable Shear, $F_V = 18.6^K$ *per bolt* $= 6 \cdot 18.6^K = \mathbf{111.6^K > 67.887^K}$ **∴Acceptable**

Allowable Tension, $F_t = 19.4^K$ *per bolt* $= 6 \cdot 19.4^K = \mathbf{116.4^K > 18.190^K}$ **∴Acceptable**

3.2.3.2 Check Ø1¼ Pin in double shear:

$$\text{Max Shear on each plane, } F_{vp} = \frac{70.282^K}{2} = 35.141^K$$

$$\text{Area of Shear Plane, } A_v = \frac{\pi d^2}{4} = \frac{\pi(1.25)^2}{4} = 1.227in^2$$

$$\text{Stress on Shear Plane, } f_v = \frac{F_{vp}}{A_v} = \frac{35.141^K}{1.227in^2} = \mathbf{28.64ksi < 36ksi\ for\ A36}$$ **∴Acceptable**

3.2.3.3 Check Plates in shear at Tension-Horizontal Connection:

3.2.3.3.1 Three Plate connection (Bottom):

$$\text{Shear per plate, } F_v = \frac{70.282^K}{3} = 23.427^K$$

$$\text{Shear Area for 3/8" Plate (Outside), } A_v = 2 \cdot [0.375in \cdot 2.1875in] = 1.64in^2$$

$$\text{Stress on 3/8" Plate, } f_v = \frac{F_v}{A_v} = \frac{23.427^K}{1.64in^2} = \mathbf{14.28ksi < 36ksi\ for\ A36}$$ **∴Acceptable**

$$\text{Shear Area for 3/4" Plate (Inside), } A_v = 2 \cdot [0.75in \cdot 1.25in] = 1.875in^2$$

$$\text{Stress on 3/8" Plate, } f_v = \frac{F_v}{A_v} = \frac{23.427^K}{1.875in^2} = \mathbf{12.49ksi < 36ksi\ for\ A36}$$ **∴Acceptable**

3.2.3.3.2 Double Plate connection (Top):

Shear per plate $= 35.141^K$ (from 3.2.3.2)

$$\text{Shear Area for 1/2" Plate, } A_v = 2 \cdot [0.5in \cdot 2.125in] = 2.125in^2$$

$$\text{Stress on 1/2" Plate, } f_v = \frac{F_v}{A_v} = \frac{35.141^K}{2.125in^2} = \mathbf{16.54ksi < 36ksi\ for\ A36}$$ **∴Acceptable**

1 3.2.4 Tension Member

Max Load, $P_{max} = 70.282^K$, *Axial*

Allowable Tensile Stress, $F_t = 0.33F_u$ (Per AISC ASD 9th Ed., Section 4-3, Table I-A)

Minimum Tensile Strength, $F_u = 125{,}000 psi$ (McMaster-Carr Part No. 98957A645)

Tensile Area, $A_t = \frac{\pi \cdot d^2}{4} = \frac{\pi \cdot (1.5)^2}{4} = 1.77 in^2$

Allowable Tensile Force, $T = 0.33F_u \cdot A_t = 0.33 \cdot 125 \cdot 1.77 = \mathbf{73.0^K > 70.282^K}$ ∴**Acceptable**

3.2.5 Tension to Bearing Plate Connection

3.2.5.1 Check Ø1¼ Pin in double shear:

See 3.2.3.2 ∴**Acceptable**

3.2.5.2 Check Plates in Shear and Tension-Bearing Plate Connection:

All Plates t = 1/2", with 2.125" Edge Distance, see 3.2.3.3.2 ∴**Acceptable**

1 3.2.5.3 Check Ø1¼ - 7 A325 Bolt in double shear:

Max Load, $P_{max} = 70.282^K$ @ 15°

$P_{max,X} = 70.282^K \cdot \cos(15) = 67.887^K$

$P_{max,Y} = 70.282^K \cdot \sin(15) = 18.190^K$

Capacity of Ø1¼ - 7 A325 Bolt (Per AISC ASD 9th Ed., Section 4-3, Table I-D)

Allowable Shear, $F_V = \mathbf{73.6^K > 67.887^K}$ ∴**Acceptable**

3.2.5.4 Check (4) – ¾" A325 Bolts in single shear:

$P_{max,X} = 64.173^K$ *from Joint N2 Reaction*

$P_{max,Y} = 28.66^K$ *from Joint N2 Reaction*

Capacity of (4) ¾" A325 Bolts (Per AISC ASD 9th Ed., Section 4-3, Table I-A & I-D)

Allowable Shear, $F_V = 18.6^K$ *per bolt* $= 4 \cdot 18.6^K = \mathbf{74.4^K > 28.66^K}$ ∴**Acceptable**

Allowable Tension, $F_t = 19.4^K$ *per bolt* $= 4 \cdot 19.4^K = \mathbf{77.6^K > 64.173^K}$ ∴**Acceptable**

3.2.5.5 Check 3/4" Plates to transfer force to WT6X20:

2 Plates, tension per plate, $T_P = \frac{70.282^K}{2} = 35.141^K$

Each plate has area, $A_T = \frac{3}{4} in \cdot 7\frac{1}{2} in = 5.625 in^2$

Stress on Plate, $f_T = \frac{F_T}{A_T} = \frac{35.141^K}{5.625 in^2} = \mathbf{6.25ksi < 36ksi\ for\ A36}$ ∴**Acceptable**

3.2.5.6 Check 2 Ø1¼ - 7 A325 Bolt in double shear at bearing plate:

$P_{max,X}$ = 64.173^K *from Joint N2 Reaction*

$P_{max,Y}$ = 28.66^K *from Joint N2 Reaction*

Capacity of (2) Ø1¼ A325 Bolts (Per AISC ASD 9th Ed., Section 4-3, Table I-A & I-D)

Allowable Shear, F_V = 25.8^K *per bolt* = 2 · 25.8^K = **51.6^K > 28.66^K** ∴**Acceptable**

Allowable Tension, F_t = 54.0^K *per bolt* = 2 · 54.0^K = **108.0^K > 64.173^K** ∴**Acceptable**

3.2.6 Horizontal to Bearing Plate Connection

3.2.6.1 Check (4) – ¾" A325 Bolts in double shear:

$P_{max,X}$ = 64.173^K *from Joint N1 Reaction*

$P_{max,Y}$ = 14.312^K *from Joint N1 Reaction*

See 3.2.5.4 ∴**Acceptable**

3.2.6.2 Check Ø1¼ Pin in double shear:

Max Applied force for Joint N2 is worst case, See 3.2.3.2 ∴**Acceptable**

3.2.6.3 Check Plates in Shear and Tension-Bearing Plate Connection:

Max Applied force for Joint N2 is worst case, See 3.2.5.2 ∴**Acceptable**

3.2.6.4 Check Ø1¼ - 7 A325 Bolt in double shear:

Max Applied force for Joint N2 is worst case, See 3.2.5.3 ∴**Acceptable**

3.2.6.5 Check (4) – ¾" A325 Bolts in single shear:

Max Applied force for Joint N2 is worst case, See 3.2.5.4 ∴**Acceptable**

3.2.6.6 Check 3/4" Plates to transfer force to WT6X20:

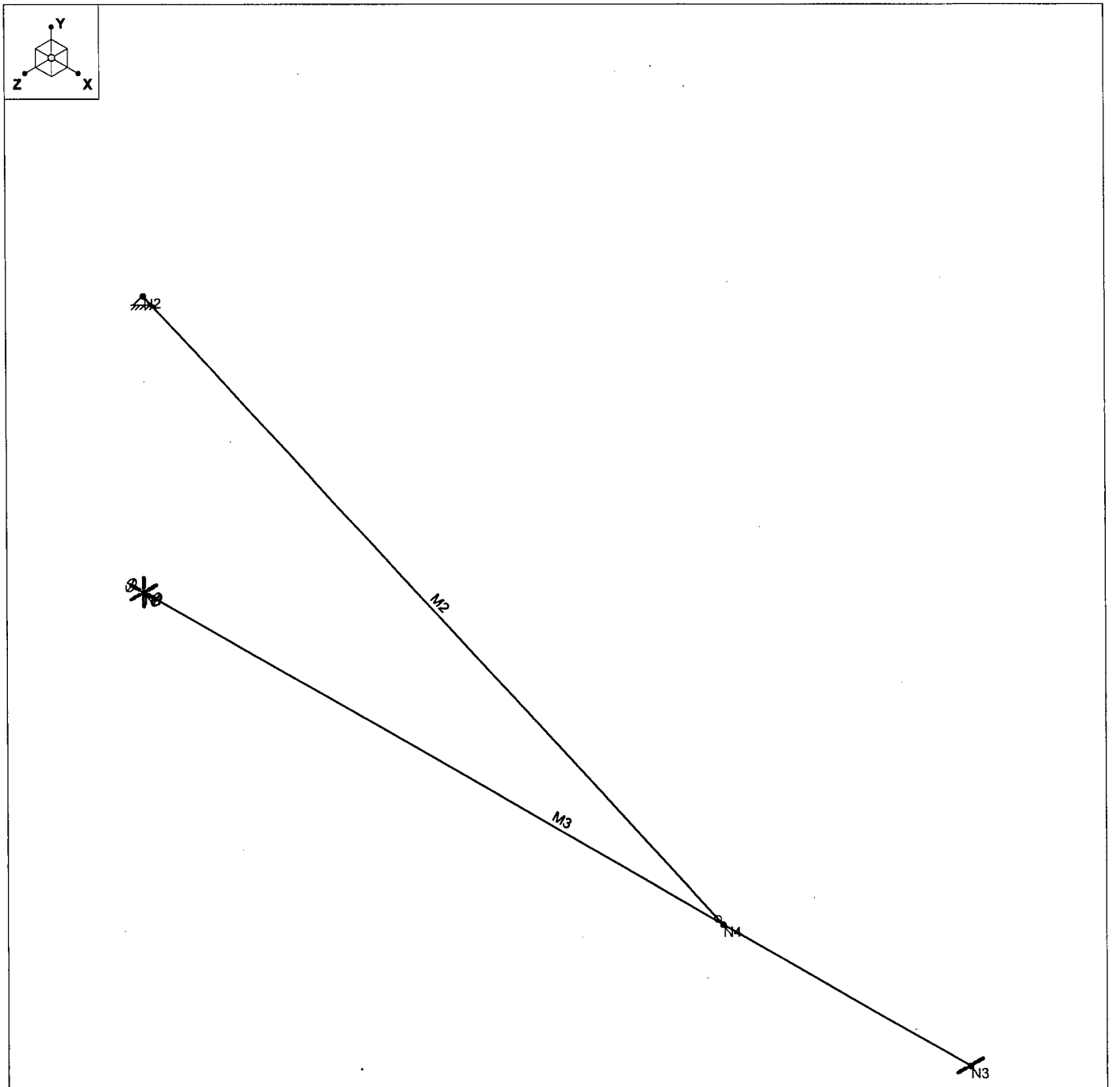
Max Applied force for Joint N2 is worst case, See 3.2.5.5 ∴**Acceptable**

3.2.6.7 Check 2 Ø1¼ - 7 A325 Bolt in double shear at bearing plate:

Max Applied force for Joint N2 is worst case, See 3.2.5.6 ∴**Acceptable**

4.0 CONCLUSION

4.1 From the above calculations, it is concluded that the Bearing Plate Jib Arm Assembly is acceptable for use during the 8th Period (30th Year) Tendon Surveillance at Crystal River Unit 3.



Precision Surveillance Corp	CR Jib Arm Assembly	
Brian Giometti		Sept 11, 2007 at 10:43 AM
CR-N1002-104		ram hanger 100903.r3d

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC: ASD 9th
Cold Formed Steel Code	AISI 99: ASD
Wood Code	NDS 91/97: ASD
Wood Temperature	< 100F
Concrete Code	ACI 2002

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[k/ft^3]	Yield[ksi]
1	HR_STL	29000	11154	.3	.65	.49	36
2	HR_LINK	1e+6		.3	.65	0	36
3	ASTMA193-B7	29000	11154	.3	.65	.49	105

Hot Rolled Steel Section Sets

	Label	Shape	Design List	Type	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	TENSION	1 1/2	Round Default	Beam	ASTMA193-...	Default	1.767	.249	.249	.497
2	HORIZONTAL	S8X18.4	Wide Flange	Beam	HR_STL	Default	5.41	3.73	57.6	.34

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Design List	Type	Material	Design Rules
1	M2	N2	N4			TENSION	Round Default	Beam	ASTMA19...	Default
2	M3	N1	N3			HORIZONTAL	Wide Flange	Beam	HR_STL	Default

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	TOM	Inactive
1	M2		BenPIN			Euler Buckling	Yes		
2	M3						Yes	Yes	

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	1.5625	0	0	
3	N3	5	0	0	0	
4	N4	3.5	0	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]	Footing
1	N2	Reaction	Reaction	Reaction				
2	N1	Reaction	Reaction	Reaction	Reaction			
3	N3			Reaction				
4	N4							

Member Point Loads (BLC 1 : 1 foot)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-4	1

Member Point Loads (BLC 2 : 2 foot)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-4	2

Member Point Loads (BLC 3 : 3 foot)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-4	3

Member Point Loads (BLC 4 : 4 foot)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-4	4

Member Point Loads (BLC 5 : 5 foot)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M3	Y	-4	5

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Me...	Surface (...
1	1 foot	None					1			
2	2 foot	None					1			
3	3 foot	None					1			
4	4 foot	None					1			
5	5 foot	None					1			
6	Self Weight	None		-1						

Load Combinations

	Description	So...	P...	S...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	1 ft 4 kip	Yes			1	1	6	1												
2	2 ft 4 kip	Yes			2	1	6	1												
3	3 ft 4 kip	Yes			3	1	6	1												
4	4 ft 4 kip	Yes			4	1	6	1												
5	5 ft 4 kip	Yes			5	1	6	1												
6	5:1 - 1 ft - 4 kip	Yes			1	5	6	1												
7	5:1 - 2 ft - 4 kip	Yes			2	5	6	1												
8	5:1 - 3 ft - 4 kip	Yes			3	5	6	1												
9	5:1 - 4 ft - 4 kip	Yes			4	5	6	1												
10	5:1 - 5 ft - 4 kip	Yes			5	5	6	1												

Load Combination Design

	Description	ASIF	CD	ABIF	Service	Hot Rolled	Cold Formed	Wood	Concrete	Footings
1	1 ft 4 kip					Yes	Yes	Yes	Yes	Yes
2	2 ft 4 kip					Yes	Yes	Yes	Yes	Yes
3	3 ft 4 kip					Yes	Yes	Yes	Yes	Yes
4	4 ft 4 kip					Yes	Yes	Yes	Yes	Yes
5	5 ft 4 kip					Yes	Yes	Yes	Yes	Yes
6	5:1 - 1 ft - 4 kip	1.33				Yes	Yes	Yes	Yes	Yes
7	5:1 - 2 ft - 4 kip	1.33				Yes	Yes	Yes	Yes	Yes
8	5:1 - 3 ft - 4 kip	1.33				Yes	Yes	Yes	Yes	Yes
9	5:1 - 4 ft - 4 kip	1.33				Yes	Yes	Yes	Yes	Yes
10	5:1 - 5 ft - 4 kip	1.33				Yes	Yes	Yes	Yes	Yes

Envelope Joint Displacements

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation [...	lc
1	N1	max	0	1	0	10	0	1	0	1	0	1	-7.488e-4	1
2		min	0	10	0	6	0	1	0	1	0	1	-7.124e-3	10
3	N2	max	0	10	0	1	0	1	0	1	0	1	-5.786e-4	1
4		min	0	1	0	10	0	1	0	1	0	1	-4.658e-3	10
5	N3	max	-.004	5	-.015	1	0	1	0	1	0	1	-4.125e-5	1
6		min	-.031	8	-.344	10	0	1	0	1	0	1	-7.133e-3	10
7	N4	max	-.004	1	-.015	1	0	1	0	1	0	1	-4.036e-5	1
8		min	-.031	8	-.211	10	0	1	0	1	0	1	-5.193e-3	10

Envelope Joint Reactions

	Joint		X [k]	lc	Y [k]	lc	Z [k]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	N2	max	-2.733	1	28.66	10	0	1	0	1	0	1	0	1
2		min	-64.173	10	1.232	1	0	1	0	1	0	1	0	1
3	N1	max	64.173	10	14.312	6	0	1	0	1	0	1	0	1
4		min	2.733	1	-8.545	10	0	1	0	1	0	1	0	1
5	N3	max	0	1	0	1	0	1	0	1	0	1	0	1
6		min	0	1	0	1	0	1	0	1	0	1	0	1
7	Totals:	max	0	7	20.115	10	0	1						
8		min	0	5	4.115	1	0	1						

Envelope Member Section Forces

	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
1	M2	1	max	-2.998	1	.011	9	0	1	0	1	0	1	0	1
2			min	-70.282	10	.011	5	0	1	0	1	0	1	0	1
3		2	max	-2.995	1	.005	9	0	1	0	1	0	1	-.008	5
4			min	-70.28	10	.005	5	0	1	0	1	0	1	-.008	9
5		3	max	-2.993	1	0	1	0	1	0	1	0	1	-.01	5
6			min	-70.278	10	0	1	0	1	0	1	0	1	-.01	9
7		4	max	-2.991	1	-.005	9	0	1	0	1	0	1	-.008	5
8			min	-70.275	10	-.005	5	0	1	0	1	0	1	-.008	9
9		5	max	-2.988	1	-.011	9	0	1	0	1	0	1	0	1
10			min	-70.273	10	-.011	5	0	1	0	1	0	1	0	1
11	M3	1	max	64.173	10	14.312	6	0	1	0	1	0	1	-.911	1
12			min	2.733	1	-8.545	10	0	1	0	1	0	1	-21.391	10
13		2	max	64.173	10	8.575	7	0	1	0	1	0	1	-2.2	5
14			min	2.733	1	-8.568	10	0	1	0	1	0	1	-19.324	7
15		3	max	64.173	10	2.837	8	0	1	0	1	0	1	.029	10
16			min	2.733	1	-11.448	7	0	1	0	1	0	1	-20.028	7
17		4	max	0	1	20.023	10	0	1	0	1	0	1	25.014	10

Envelope Member Section Forces (Continued)

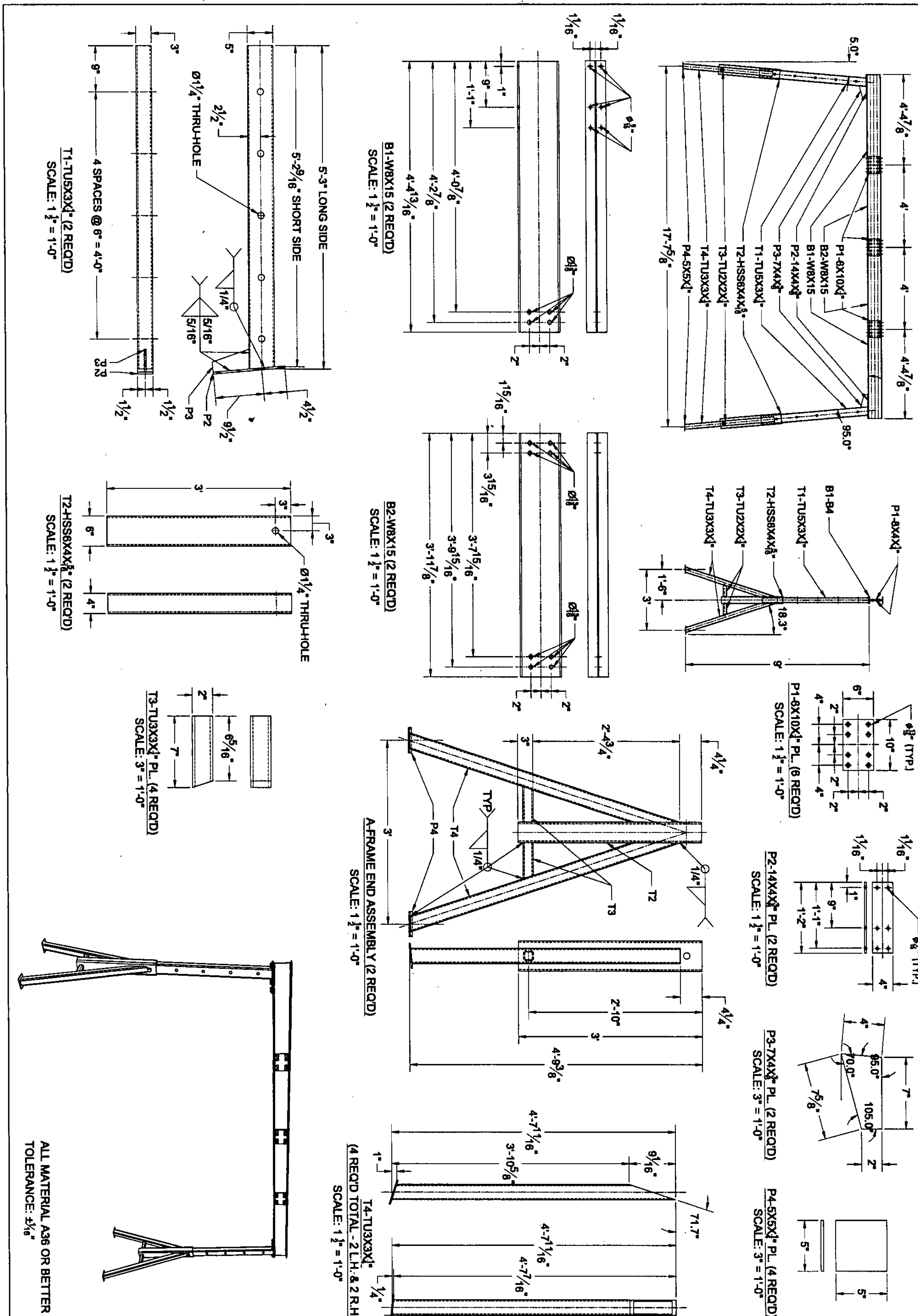
	Member	Sec		Axial[k]	lc	y Shear[k]	lc	z Shear[k]	lc	Torque[k-ft]	lc	y-y Momen...	lc	z-z Momen...	lc
18			min	0	10	.023	1	0	1	0	1	0	1	.014	8
19		5	max	0	1	20	10	0	1	0	1	0	1	0	1
20			min	0	10	0	1	0	1	0	1	0	1	0	10

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	lc	y Shea...	lc	z Shea...	lc	y-Top[ksi]	lc	y-Bot[ksi]	lc	z-Top[k...	lc	z-Bot[k...	lc
1	M2	1	max	-1.696	1	.008	9	0	1	0	1	0	1	0	1	0	1
2			min	-39.772	10	.008	5	0	1	0	1	0	1	0	1	0	1
3		2	max	-1.695	1	.004	9	0	1	.274	9	-.274	5	0	1	0	1
4			min	-39.77	10	.004	5	0	1	.274	5	-.274	9	0	1	0	1
5		3	max	-1.694	1	0	1	0	1	.365	9	-.365	5	0	1	0	1
6			min	-39.769	10	0	1	0	1	.365	5	-.365	9	0	1	0	1
7		4	max	-1.692	1	-.004	9	0	1	.274	9	-.274	5	0	1	0	1
8			min	-39.768	10	-.004	5	0	1	.274	5	-.274	9	0	1	0	1
9		5	max	-1.691	1	-.008	9	0	1	0	1	0	1	0	1	0	1
10			min	-39.766	10	-.008	5	0	1	0	1	0	1	0	1	0	1
11	M3	1	max	11.862	10	6.601	6	0	1	17.826	10	-.759	1	0	1	0	1
12			min	.505	1	-3.941	10	0	1	.759	1	-17.826	10	0	1	0	1
13		2	max	11.862	10	3.955	7	0	1	16.103	7	-1.833	5	0	1	0	1
14			min	.505	1	-3.952	10	0	1	1.833	5	-16.103	7	0	1	0	1
15		3	max	11.862	10	1.309	8	0	1	16.69	7	.024	10	0	1	0	1
16			min	.505	1	-5.281	7	0	1	-.024	10	-16.69	7	0	1	0	1
17		4	max	0	1	9.236	10	0	1	-.012	8	20.845	10	0	1	0	1
18			min	0	10	.011	1	0	1	-20.845	10	.012	8	0	1	0	1
19		5	max	0	1	9.225	10	0	1	0	1	0	1	0	1	0	1
20			min	0	10	0	1	0	1	0	1	0	1	0	1	0	1

Envelope AISC ASD Steel Code Checks

	Member	Shape	Code C...	Loc[ft]	lc	Shear C...	Loc[ft]	Dir	lc	Fa [ksi]	Ft [ksi]	Fb y-y [...	Fb z-z [...	Cb	Cmy	Cmz	ASD Eqn
1	M2	1 1/2	.475	0	10	.000	0		4	13.202	83.79	104.738	104.738	1	.6	1	H2-1
2	M3	S8X18.4	.977	0	10	.482	3.542	y	10	27.825	28.728	35.91	31.601	1	.6	.85	H1-2



Project Name	**CRYSTAL RIVER** TENDON SURVEILLANCE
Drawing Name	A-FRAME SPENT FUEL POOL A-FRAME
Current Revision	Rev. 0
Drawing No.	CR-N1002-105
Sheet	1 of 1

PSC
Precision Surveillance Corporation
3468 Watling St. East Chicago, IN 46312
(219)397-5826 (P)
(219)397-6867 (F)

Date	Rev.	Description	Approved
	0		

Designed By:	CEC 09/14/2007
Drawn By:	CEC 09/14/2007
Checked/Approved By:	BAG 09/13/07

M:\NUCLEAR\N1002 Crystal River Surveillance 2007\CAD\CR07 SFP AFrame.dwg

Calculation S07-0033 Revision 0
Attachment 4 Page 1 of 1

1967

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 10-15-69

Mgr. - Power Engr. _____ Date 10-15-69

Nuclear Proj. Mgr. _____ Date 10-15-69

SPECIFICATIONS

REACTOR BUILDING LINER AND PENETRATIONS
AND
PERSONNEL ACCESS LOCKS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5566 JULY 25, 1968

FPC-321-331 and B4.2

_____ 10-2-69
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 10-2-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G. - E.K.A
W.O. 4203.00
Addendum A
August 21, 1968
Addendum B
March 4, 1969
Addendum C
October 2, 1969

Addendum C - October 2, 1969

This Addendum includes changes in Sections 4, 5 and 6 as previously set forth in Addendum A dated August 21, 1968, and Addendum B dated March 4, 1969, and are noted by]A]B in the margin of this Addendum. Additional changes to date are also included and are noted]C in the margin. Balance of wording is same as original Specification SP-5566 dated July 25, 1968, and is presented in this form for clarity and continuity.

SPECIFICATION

REACTOR BUILDING LINER AND PENETRATIONS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5566

JULY 25, 1968
REVISED October 2, 1969

FPC-321-B4.2

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania 19603

R.L.G. - E.K.A.
W.O. 4203.00

PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish and install on Florida Power Corporation's Crystal River Plant near Crystal River, Florida, the materials set forth in the attached Specifications No. SP-5566.

Firm Lump Sum Price for furnishing and constructing reactor building liner, penetrations and personnel access locks as specified:

_____

_____ ($)
(Price in Words)

Test channels over and above those outlined in 1:02.4 of Instructions to Bidders shall be furnished at a cost of _____ (per lin ft)

If WORK specified herein is not continuous, additional costs of mobilization and demobilization shall be _____ per occurence.

Alternate design, fabrication, and attaching supports complete with wheels for the removable section of the equipment hatch, including provisions for leveling, shall be provided at a cost of _____.

The Bidder shall clean all steel surfaces exposed to the interior of the reactor building as specified in SSPC - SP-5-63, "White Metal Blast Cleaning" and shop coat with one coat of Carbozinc No. 11 to a dry film thickness of 3.5 mills for the sum of _____.

Unit prices for each of the Penetration Types shall be as listed below (Ref. Dwg. E-521-034):

1. Hot Penetration - Type I
Having expansion bellow and cooling each $_____

2. Mechanical Penetration - Type II
Having expansion bellow without cooling each $_____

3. Mechanical For Cold Penetration - Type III
Without bellow and without cooling each $_____

4. Spare Penetration - Type V
Sleeve and end covers only each $_____

4. Spare Penetration - Type V
Sleeve and end covers only — each — $_____

5. Purge Piping Penetration - Type VI — each — $_____

6. Equipment Access Penetration - Type VII — each — $_____

The Bidder shall omit priming the exterior surface of the liner plate (Section 4:12.3) for a deduct sum of — $_____

Unit prices for items as set forth in Addendum A, Item 1:02.15 as follows:

1. Additional crane rail support assemblies — each — $_____

2. Anchor bolts for steam generator rigging crane anchor — each — $_____

3. Ladder and cage — $_____

The unit price per pound of plate material including all fabrication, shop, and field welding, detailing, and erection costs as set forth in item 4:02-3.h:

Price per pound — $_____

Cost of Performance and Payment Bond, per $1,000, if requested: — $_____

If this Proposal is accepted the undersigned hereby agrees to begin WORK promptly and complete the WORK in accordance with the time schedule stipulated in the attached Specifications.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SECTION IV

DETAILED SPECIFICATIONS

INDEX

4:01 Scope of Work

4:01.1 The WORK to be performed under this Contract shall include the design, furnishing, fabrication, delivery, unloading, storage as necessary, erection of the steel liner including penetration sleeves and installation of penetration inserts, supplied by others and all necessary testing of steel liner and penetration installation for the Reactor Building, complete and as specified herein and/or as shown on Drawings. C

4:01.2 The reactor building for the Crystal River Plant, Unit No. 3 of the Florida Power Corporation will be a steel lined concrete shell in the form of a vertical right cylinder with an ellipsoidal dome and flat base. The concrete thickness will be 3'-6" for the cylindrical walls and 3'-0" for the dome.

4:01.3 The CONTRACTOR shall be responsible for erecting a leak tight liner. The degree of leak tightness shall ensure a containment leak rate of no greater than 0.25 per cent by weight of contained air in 24 hours at 55 psig. The CONTRACTOR shall be fully responsible for designing liner reinforcement adequate to resist all erection loads including those additional erection loads specified herein, but excluding those erection loads resulting from using the liner as a form for concrete work. The CONTRACTOR shall also be responsible for properly fabricating a liner which will be an element of the composite steel and concrete shell. The structural design of that portion of the equipment access door extending beyond the reinforced concrete shell shall be the CONTRACTOR'S responsibility. C

4:01.4 In addition, the CONTRACTOR shall be responsible for the shop or field installation of all Mechanical and Electrical penetration inserts, including all testing as specified herein. Any leak detected, requiring repair, shall be the responsibility of those making the weld. C

4:02 Work Included

The WORK shall include, but not necessarily be limited to, the following:

1. Detailed design of:

   a. Equipment access penetration in collaboration with the ENGINEER based upon the parameters specified hereinafter and/or as shown on the Drawings, except that the CONTRACTOR shall be totally responsible for the structural design of that portion of the equipment access door extending beyond the reinforced concrete shell. C

   b. Liner reinforcement about openings.

c. Reinforcement to resist all erection loads except concrete placement.] C

2. Preparation of shop details and erection drawings for the liner and penetrations.] C

3. Furnishing, fabricating, erecting, and specified testing of the following:

a. Liner main shell including cylindrical walls, dome and flat base

b. One equipment access hatch with a minimum inside diameter of 22'-4".

c. All sleeves as indicated on attached Penetration List.

d. Delete.] C

e. Crane girder brackets and anchorage plates.

f. Liner anchors

g. Six (6) grounding studs 6" x 4" x 3/8" steel, welded on one end to the liner and suitable for Cadwelding to OWNER'S cable, spaced around the outside surface at azimuths and elevation to be specified later; and four grounding studs made from 6" x 3-1/2" x 1/4" angle, welded at quadrant locations, with 9/16" hole suitable for bolted cable connection, on the inside surface.] A

h. All brackets and hanger supports for piping and ventilating systems including fabrication, shop and field welding, and detailing.] A] C

i. Insulation as required for mechanical penetrations.] C

4. Installation of the cooling coils in the hot penetrations.

5. Designing reinforcement and performing all WORK for required temporary access opening.

6. Performing all quality control measures and preliminary tests as specified hereinafter.

7. Preparation of the surfaces, one coat of primer, and one coat of finish paint on all surfaces exposed to the interior of the Reactor Building.] B] C

8. Installation of electrical and mechanical inserts, furnished by Others, in penetration sleeves.] B] C

4:03 Work Not Included

The following items associated with the reactor building liner and penetrations are not included under this Contract but will be furnished and erected by Others.

1. Concrete WORK

2. Backup bars embedded in the concrete base mat. Base mat will be sloped for adequate drainage.

3. Deleted.] B

4. Deleted.] C

5. The furnishing of electrical and mechanical penetration inserts including process pipe, attachments to process pipe, bellows and heat exchangers.] C

4:04 Codes and Regulations

Except as noted hereinafter, the materials, details of fabrication, and workmanship shall conform to the requirements of the ASME Nuclear Vessels Code for Class B Vessels. The containment liner and penetrations shall conform in all respects to the applicable sections of USA Standards Institute N 6.2-1965, "Safety Standard for Design, Fabrication and Maintenance of Steel Containment Structures for Stationary Nuclear Power Reactors." That portion of the equipment access door extending beyond the reinforced concrete shell shall conform in all respects to the requirements of the ASME Nuclear Vessels Code for Class B Vessels.

4:05 Design Requirements

4:05.1 Technical Parameters:

The technical conditions applicable to the complete reactor building are as follows:

Inside diameter	130 ft
Tangent length	157 ft
Ellipsoidal Dome:	
1. Short Radius	20.5 ft
2. Long Radius	110 ft
Design pressure	55 psig
Design temperature	281 F
Operating pressure, range	+1 to -1 psig
Operating temperature, range:	
1. Inside	+90 to 110 F
2. Outside	+25 to 100 F
Design vacuum	2.5 psig
Liner leak rate at 55 psig	0.25%/24 hours

4:05.2 Cylinder Reinforcement:

Liner Plate Reinforcement:

1. The cylinder walls shall be reinforced so as to support the dead load of the liner plus erection and wind loads. An additional 6 in. WF 15.5 lb member shall be located at each buttress centerline as shown on the Drawings. B

2. The dome shall be reinforced to withstand a superimposed load of 100 pounds per square foot. C

3. The outside walls shall be reinforced on the outside face so as to support the dead load of the liner plus erection and wind loads or by other methods approved by the ENGINEER. C

4:05.3 Opening Reinforcement:

The liner shall be reinforced about all openings in accordance with the ASME Unfired Pressure Vessels Code (i.e., by replacing the cut out area of the 3/8 in. liner plate).

4:05.4 Plate Thickness:

The steel plate for the main shell, including the cylindrical walls and the dome but excluding specially reinforced areas, shall be 3/8 inches thick. The steel plate for the containment base liner including the sump shall be 1/4 in. thick.

4:05.5 Engineer's Review:

The CONTRACTOR shall submit design calculations and detail drawings to the ENGINEER for review and record prior to initiating fabrication. Review and/or approval of information submitted to the ENGINEER shall not relieve the CONTRACTOR of any responsibility for design, fabrication, erection, and testing as herein specified.

4:06 Materials

4:06.1 Main Shell:

Steel plate for the main shell including the dome, cylindrical walls, and base shall conform to "Low and Intermediate Tensile Strength Carbon-Steel Plates of Structural Quality, Spec. for," ASTM A 283-67, Grade C. Rolled sections including test channels and stiffeners shall conform to "Structural Steel, Spec. for," ASTM A 36-67.

Special Note: Steel plate material per ASTM A283-67 does not meet the requirements for a Class B Nuclear Vessel, but conformance is not required since the liner is not a load-carrying component. B

Special Note: The steel plate for the main shell, excluding the base mat plate, the knuckle plate, and the thickened portion of the cylindrical wall plate in the area of the crane girder bracket, shall have a minimum copper content of 0.2%. The material for the thickened portion of the cylindrical wall plate in the area of the crane girder bracket shall be ASTM A516, Grade 60. C

4:06.2 Penetration Sleeves

The materials for penetration sleeves including the equipment access hatch as well as the mechanical and electrical penetrations shall conform with the requirements of the ASME Nuclear Vessels for Class "B" Vessels and shall exhibit ductility and welding characteristics compatable with the main shell material. The selection of materials for penetration sleeves shall consider a lowest service metal temperature of 140 F within containment and +25 F without containment. All materials for penetration sleeves shall exhibit impact properties as required for Class "B" Vessels. The materials for penetration sleeves shall be carbon steel except as otherwise specified herein or shown on the Drawings. B C

4:06.3 Delete B C

4:06.4 Material Restriction and Cleanliness Requirements:

1. Process piping materials shall contain no lead, mercury, or zinc, and care shall be taken to prevent contamination of these materials by halides, sulphur, and phosphorus.

2. The following restrictions are applicable to avoid contamination of the piping exposed to the reactor coolant or steam and water of the steam system:

   a. Mercury or mercury compound-containing instruments or equipment such as thermometers, manometer, and vacuum pumps shall not be used for any service in connection with fluid system or fluid system components during fabrication, assembly packaging, installation, examination, testing, or repair.

   b. Every effort shall be made to prevent lead or lead compounds as a basic chemical constituent from coming into contact with parts of a component that will be exposed to reactor coolant or steam and water of the steam system. Lead contaminants which are unavoidably present shall be removed prior to heat treatment, hot forming, repair welding and shipment. The final cleaned surfaces of the equipment prior to operation shall be free of lead or lead compound contamination.

   c. Materials such as oils, greases, rubber and plastics containing sulphur, phosphorus, and halides shall not be present on the final cleaned surfaces which will be exposed to reactor coolant or steam and water of the steam systems.

C

4:07 Welding

4:07.1 General:

1. The qualification of the welding procedures and welders for the liner plate shall be in accordance with the requirements of Section IX, "Welding Qualifications" of the ASME Boiler and Pressure Vessel Code. The qualification procedures and welders for the welding of the attachment plate to the sleeve, and the welding of the liner plate to the sleeve shall be in accordance with the requirements of Section IX, "Welding Qualifications" and paragraph N-541 of Section III of the ASME Boiler and Pressure Vessel Code. The repair of defective welds shall be in accordance with paragraph N-528, Section III. The CONTRACTOR shall submit welding procedures to the OWNER for review.. The review and/or approval of procedures shall not relieve the CONTRACTOR of welding responsibility. B C

2. Welding procedures and qualifications shall incorporate instructions designed to control porosity. These instructions shall cover allowable welding currents, removal of slag and flux and welding techniques to control porosity. Porosity shall meet the requirements of Appendix IV of Section VIII of the ASME Code.

3. Postweld heat treatment shall be conducted in accordance with Section III of the ASME Boiler and Pressure Vessel Code for Class B Vessels. All welds that are designated to be fabricated to Section III, Class B shall have postweld heat treatment if the Code so requires. B C

4. The use of low hydrogen electrodes or automatic submerged arc welding is required for field welding. Uphill welding of vertical welds shall be required, except that cover passes and back-gouged cover passes will be qualified and can be welded by downhill welding. B C

4:07.2 Quality Control:

1. Longitudinal and circumferential welded joints within the main shell, the welded joint connecting the dome to the cylindrical side walls, and any welded joints within the dome shall be inspected by the liquid penetrant method and spot radiography, all as hereinafter specified. All penetrations including the equipment access door shall be examined in accordance with the requirements of the ASME Nuclear Vessels Code for Class "B" Vessels. All other shop fabricated components, including the reinforcement about openings, shall be fully radiographed. All other joint details shall be examined by the liquid penetrant method as specified in Item 4:07.2 - 3. of this Specification.

2. Full radiography shall be in accordance with N-1350, Section III, ASME Boiler and Pressure Vessel Code. The procedure and acceptance criteria shall conform to UW-51, Section VIII, ASME Code. Spot radiography shall be in accordance with the procedures and governed by the acceptance criteria of Paragraph UW-52, Section VIII, ASME Boiler and Pressure Vessel Code with the following conditions: B

   a. Two percent of all welds shall be radiographed. Care should be taken to include approximately 2% of welds by each welder. C

      Special Note: The 2% spot radiography shall include all radiographable welds in the liner that are not covered by the full radiography specification. C

   b. Spot radiography shall be at the frequency of twelve (12) inches in every fifty (50) feet of welding. B C

   c. The quality assurance inspector shall select the spots to be radiographed on a timely basis except in those specific instances where he waives this privilege to the CONTRACTOR'S quality control supervisor. B C

3. Methods of liquid penetrant examination shall be in accordance with Appendix VIII of the ASME Unfired Pressure Vessels Code, except that 20% of the welds shall be tested by liquid penetrant.

4. A visual inspection for defects shall be made of all liner welds.

5. Certified copies of mill test reports describing the chemical and physical properties of the steel plate materials used for the liner plate and the reinforcing plates to the penetration sleeves shall be submitted to the OWNER for approval. Certificates of compliance or typical certificates of analyses for the weld rod or weld filler metal for the main liner welds are acceptable and they shall be submitted to the OWNER for approval. The penetration welds and penetration assembly material is covered by Section III, Class B and shall have the necessary traceability of materials as covered by this Code The plate material shall be identifiable with specific mill test reports through a numbering system and/or sketches, such that at any time during construction or after completion of construction, any plate or piece of plate can be positively identified. B C

6. Results of weld radiography, liquid penetrant inspection, leak testing by halogen sniffing and vacuum box methods, and visual inspection shall be recorded as part of construction records. After completion of construction, these records shall be delivered to the OWNER.

f. The thickened liner plate at the elevation of the crane girder brackets shall be ultrasonically inspected to insure the steel is free from gross internal discontinuities such as pipes, ruptures, and laminations. The procedures and acceptance standards shall be in accordance with "Longitudinal-Wave Ultrasonic Inspection of Steel Plates for Pressure Vessels," ASTM A 435-67

g. The CONTRACTOR shall, before receipt of material, submit a Quality Control Manual to the OWNER or his Agent for review and comment. This document shall contain at least the following items

a. Clear procedures for NDT inspection techniques

b. Material Control Procedures.

c. Electrode Control Procedures.

d. Marking and Material Identification procedures.

e. Control of construction conditions by a dimensional check procedure

f. Qualification requirements for NDT personnel and welders.

g. Document and drawing control procedures. C

h. Non-conformance procedures.

i. Control and storage of inspection test records.

j. Control of purchase parts.

k. Criteria for approval and rejection work.

l. Examination checklists.

m. Corrective action procedures.

n. Traceability coding

o. Pneumatic test procedures.

4.06 Test Channels

Steel channels shall be provided along all weld seams which will be inaccessible when all construction is completed. The channels shall be segmented so as to ensure that any length of weld covered by any one channel segment will not exceed the greatest dimension of one plate. One fitting shall be provided in each channel segment and shall extend through and clear of any covering material including concrete,

2. Delete.]C

3. The penetration sleeves material shall be compatible with liner materials and must be approved for Class B Nuclear Vessels.]B

4. Where thermal insulation is required, the material shall be "Unibestos." Specification for insulation shall be submitted to the ENGINEER for review and comment.

5. All penetration sleeves shall be Schedule 80 except as noted on the "Penetration List," or subsequent lists.

6. Delete.]C

7. The locations of penetrations with regard to azimuth location shall be within ±1/2 in., measured on the circular section. The horizontal and vertical dimensions associated with the radial dimension shall be ±1/2 in. for all pipe lines.

8. All penetrations shall be installed in the respective plate sections prior to testing.

9. All mechanical penetrations shall have double barriers designed for pressurization with air to 63.3 psig for leak testing.

10. All pipe ends shall be protected for shipping and erection as indicated on the Drawings.

11. Delete.]C

12. Bellows shall be provided on mechanical penetrations as indicated on the Penetration Lists.

13. Delete.]B]C

4:10.3 Electrical Penetrations:

All electrical penetrations shall be designed as follows:

1. Penetration cartridges will be supplied by Others but installed in the penetration sleeves by the CONTRACTOR.]B

2. The penetration sleeves to accommodate the aforementioned cartridges shall be 12 in., Schedule 80, carbon steel pipe of a grade approved for Class B. Nuclear Vessels. Penetration sleeves shall be shop welded to the liner plate.]B

3. The weight of the liner cartridges will not exceed 500 lbs. but shall be capable of supporting an additional weight of 500 lbs.]A

4:10.4 Mechanical Penetration Shop Testing:

The following tests shall be applied to all mechanical penetrations:

1. A pneumatic test shall be applied to each penetration which will pressurize the penetration annulus to 63.3 psig. The pressure shall be reduced to 55 psig and held at this pressure to soap bubble and sniff test all welds and mated surfaces. If leaks are found, they shall be repaired and retested. This procedure shall be followed until no leaks exist. Test shall be conducted as hereinafter set forth in this Specification.

2. Local tests shall be conducted in accordance with "Proposed Standard for Leak Rate Testing of Containment Structures for Nuclear Reactors," ANS 7.60, Appendix A.

3. The OWNER reserves the right to witness shop tests and shall be notified at least two weeks in advance of all shop tests.

4:10.5 Penetration Appurtenances:

The following shall apply to all penetrations:

1. Reinforcing shall be designed to support penetration in liner for shop testing, shipping, and field erection.

2. Bellows are to be suitably protected against field damage and will remain as part of the permanent installation.

4:10.6 Special Penetrations:

1. Two penetrations requiring special attention are the "Containment Supply" and "Exhaust Purge Ducts" noted in the Penetration List attached hereto. The following additional requirements are imposed on these penetrations:

   a. Formed heads shall be supplied with the penetration and shall be suitable for use during liner tests.

   b. Each penetration shall be provided with two test connections, not less than 1/4 in. pipe size to test both pipe and annulus spaces.

2. Mechanical and electrical spares, as so designated in the Penetration List, shall have both ends of the sleeves capped. The outside cap (concrete side) shall be equipped with a test connection no less than 1/4 in. pipe size. Unless otherwise stated, all spare mechanical sleeves shall be 10 inch diameter, schedule 80 pipe and spare electrical sleeves shall be 12 inch diameter, schedule 80 pipe.

4:10.7 Fuel Transfer Penetration:

The fuel penetration shall be as detailed on the Drawings. The pipe insertion will be supplied by Others. The tolerance on location and orientation shall be as shown on the Drawings.

4:11 Preliminary Tests

All testing, as hereinafter described, shall be performed by the CONTRACTOR. These tests shall include the following:

1. All weld seams on the base, pits, and between penetration sleeves and liner plate and any additional weld seams which are covered by steel test channels shall be examined by detecting leaks at 63.3 psig using a mixture of air and freon. For the freon test, all exposed seams shall be checked with a halogen leak detector and 100 per cent of detectable leaks corrected. The tests on welds shall be conducted in accordance with those set forth in Item 4:10.4.

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.] B

2. All weld seams not covered with test channels shall be tested using a soap film and vacuum box. The pressure differential shall not be less than 4 psig. The rate of inspection shall not exceed two feet of weld per minute. The box shall overlap a minimum of six inches over the previously tested section. All detectable leaks shall be corrected

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.

3. Embedded test connections shall bear metal stamped identification tags firmly affixed and referenced on Drawings to test channel section to which it is attached. All other test connections will be dimensioned on "as built" drawings. Any field changes will be subject to the approval of the ENGINEER and shall be kept current and revised drawings shall be issued at completion of erection.

4. The CONTRACTOR shall provide adequate documentation for all tests and submit copies of such documentation in triplicate to the OWNER

4:12 Painting

After erection of the liner plate is completed, all surfaces of the cylinder, dome, penetrations, crane brackets and miscellaneous attachments exposed to the interior of the Reactor Building, shall be sandblasted to a near white metal in accordance with "Steel Structures Painting Council Specification", SSPC-SP-10-63T.] B C

The abrasive shall be selected to obtain a profile as required by the manufacturer. As soon as practicable after the steel is cleaned, all surfaces shall receive one (1) coat of Wisconsin Protective Coating Co.'s Plasite 7155 NP Primer. The dry film thickness of the primer at any point shall not be less than 2.5 mils. After an adequate curing period, as recommended by the manufacturer, the primed surfaces shall be cleaned and free of all foreign matter before finish painting can begin. The finish painting shall consist of one (1) coat of Wisconsin Protective Coating Co.'s Plasite 9009. The dry film thickness of the paint at any point shall not be less than 4 mils. Both the prime coat and the finish coat shall be applied in accordance with the manufacturer's printed instructions. B C

4:13 Material Damages

All materials shall be carefully handled so that members or parts which have become damaged after fabrication shall be straightened by methods which will not produce fracture or other injury, and without heating, unless approved in writing by the ENGINEER. Any members which are so damaged that it is inadvisable to correct them in the field shall be replaced with new members at no cost to the OWNER. Hammering which will injure or distort the members will not be permitted.

4:14 Penetration List

The "Penetration List" consists of eight sheets, copies of which are attached hereto and are hereby expressly made a part of this Specification. C

4:15 Inspection

The OWNER or his Agents reserves the right to inspect fully all phases of manufacture of the materials included hereunder and to witness all tests. Any item found to be unsatisfactory shall be rejected or repaired at no additional cost to the OWNER. Any inspection by the OWNER or his Agents shall not relieve the CONTRACTOR of any responsibility for conformance with stated conditions and shall not be considered as a waiver of warranty or other right.

4:16 Lightning Protection During Liner Erection

If the permanent grounding system for the unit has not been completed at the time of liner erection, the supplier shall drive four ground rods, each with a minimum length of twenty feet at ninety degree (90°) intervals, around the periphery of the liner and connect each rod to each end of the angle clips as soon as that portion of the liner plate is erected. Ground cable shall be No. 2/0 bare, stranded copper minimum. A

SECTION V

DETAILED SPECIFICATIONS

INDEX

5:01 Scope of Work

5:01.1 The WORK to be performed under this Contract shall include the design, furnishing, fabrication, delivery, unloading, storage as necessary, erection and testing of two personnel access locks for the reactor building, complete, and as specified herein and/or as shown on the Drawings.

5:01.2 The reactor building for the Crystal River Plant, Unit No. 3 of the Florida Power Corporation will be a steel lined concrete shell in the form of a vertical right cylinder with ellipsoidal dome and flat base. The concrete thickness for the shell will be 3'-6" for the cylindrical walls and 3'-0" for the dome.

5:01.3 The CONTRACTOR shall be responsible for erecting a leak tight liner. The degree of leak tightness shall ensure a containment leak rate of no greater than 0.25 percent by weight of contained air in 24 hours at 55 psig. The CONTRACTOR shall be responsible for the structural design of the two personnel access locks.

5:02 Work Included

The WORK shall include, but not necessarily be limited to, the following:

1. Detailed design of two personnel access locks.

2. Preparation of shop details and erection drawings for the locks.

3. Furnishing, fabricating, erecting and testing two personnel air locks with a minimum inside diameter of 8'-6". One of these personnel locks shall be mounted in the equipment access hatch. The air lock in the equipment access hatch shall measure 18 feet plus one door dimension, from door to door. The other air lock shall measure 9 feet from door to door. Doors shall be pressure seated type 3'-6" x 6'-8" and provision shall be made to test between doors at 63.3 psig.

4. Performing all quality control measures and preliminary tests as specified hereinafter.

5. Preparation of the surfaces, one coat of primer, and one coat of finish paint on all non-machined surfaces.] B C

6. Proper bracing and crating of locks for safe shipment to the field and outdoor storage in the field until installed.

F-23 Work Not Included

The following items associated with the personnel locks are not included in this Contract but will be provided by Owners:

1. Delete.] C

2. Furnishing and applying insulation to the Locks.

F-24 Codes and Regulations

The personnel locks shall shall conform in all respects to the requirements of the ASME Nuclear Vessels Code for Class B Vessels and to the applicable sections of USA Standards Institute N6.2-1965, "Safety Standard for Design, Fabrication and Maintenance of Steel Containment Structures for Stationary Nuclear Power Reactors."

F-25 Design Requirements

F-25.1 Technical Parameters:

The technical conditions applicable to the composite reactor building are as follows:

Vessel inside diameter	ft	25
Design pressure	psig	55
Design temperature	F	250
Operating pressure, range	psig	+1 to -1
Operating temperature, range	F	
Inside vessel		90 to 110
Outside vessel		25 to 100
Design vacuum	psig	2.5
Liner leak rate @ psig (minimum pressurization of penetrations	% /24 hrs	1.25

F-25.2 Engineer's Review:

The CONTRACTOR shall submit design calculations and detail drawings to the ENGINEER for review and record prior to initiating fabrication. Review and or approval of information submitted to the ENGINEER shall not relieve the CONTRACTOR of any responsibility for design, fabrication, erection and testing, as herein specified.

5:06 Materials

5:06.1 The materials for the personnel locks shall conform with the requirements of the ASME Nuclear Vessels Code for Class "B" Vessels and shall exhibit ductility and welding characteristics compatible with the main shell material. The selection of materials shall consider a lowest service metal temperature of 120 F within containment and +25 F outside containment. All materials shall exhibit impact properties as required for Class "B" Vessels.

Special Note: Zinc and zinc rich materials or coatings, aluminum and aluminum rich materials or coatings, and galvanized steel shall not be used for the fabrication of the lock, or any components which are a part of the locks. C

5:06.2 Plate materials for pressure parts in the personnel access locks, including inserts, shall be tested at the fabrication shop to assure that applicable ASTM specifications have been satisfied. In addition to these tests, certified copies of mill test reports describing the chemical and physical properties of the material accompanied by a numbering system and sketches (if necessary) showing the location of the material in the personnel access locks shall be submitted to the OWNER for approval. C

Special Note: The following tests shall be made on a per Slab basis for the plate materials for pressure parts used in the fabrication of the personnel locks, including inserts:

a. Impact testing to ASTM A300, Class I

b. Tensile Test.

c. Bend Test.

d. Check Analysis. C

5:07 Welding

5:07.1 General:

1. The qualification of welding procedures and welders shall be in accordance with Section IX "Welding Qualifications" and paragraph N-541, Section III, of the ASME Boiler and Pressure Vessel Code. The repair of defective welds shall be in accordance with Paragraph N-528 of the ASME Nuclear Vessels Code. The CONTRACTOR shall submit welding procedures to the OWNER for review. Review and/or approval of procedures does not relieve the CONTRACTOR of welding responsibility. B

2. Welding procedures and qualifications shall incorporate instructions designed to control porosity. These instructions shall cover allowable welding currents, removal of slag and flux and welding techniques to control porosity. Porosity shall meet the requirements of Appendix IV of Section VIII of the ASME Code.

3. Delete [B] [C]

5:07.2 Quality Control:

1. The personnel locks shall be examined in accordance with the requirements of the ASME Nuclear Vessels Code for Class "B" Vessels and so stamped. Radiography shall be in accordance with the procedure and governed by the acceptability standards of Paragraph N-1350 of the ASME Nuclear Vessels Code. Methods for magnetic particles and liquid penetrant examination shall be in accordance with Appendices VI and VIII respectively of the ASME Unfired Pressure Vessels Code. [C]

2. The CONTRACTOR shall, before receipt of material, submit a Quality Control Manual to the OWNER, or his Agent for review and comment. This document shall contain the following items: [B] [C]

   a. Clean procedures for NDT inspection techniques.

   b. Material Control Procedures.

   c. Welding and Electrode Control Procedures.

   d. Marking and Material Identification Procedures.

   e. Control of Construction Conditions by a dimensional check procedure.

   f. Qualification requirements for NDT personnel and welders.

   g. Document and Drawing Control Procedures.

   h. Non-conformance Procedures.

   i. Control and storage of Inspection and Test Records.

   j. Control of purchased parts.

   k. Criteria for approval and rejection of work.

   l. Examination checklists.

   m. Corrective Action Procedures.

   n. Traceability coding.

   o. Proof Test Procedures.

5:08 Personnel Access Locks

The following shall apply to both personnel access locks in the reactor building:

1. All flanged joints shall be designed in such a manner that a double tongue double groove seal can be employed This seal shall be capable of being continuously pressurized between tongues to 63.3 psig.

2. The material used in the construction of the openings shall be compatible with the liner material metallurgical characteristics.

3. The personnel opening doors shall be interlocked to prevent both doors being opened simultaneously. Interlocks shall be so connected that one door must be completely closed before the opposite door can be opened. Provision shall be made so that either door can be opened or closed from the inside or outside of the locks.

4. For the personnel openings the following shall be provided:

   a. Two limit switches on each door which will be actuated whenever the door dogs are not in the fully closed position.

   b. Two limit switches, on each interlock mechanism, which will be actuated when the interlock is defeated.

   c. Leak tight electrical penetrations, thru inner bulkheads, to which the OWNER can connect his cables for the limit switches, lock lighting and communications.

   d. Detail Drawings of items a, b and c to be furnished with the Proposal.

   e. All limit switches shall be National Acme Snaplock.

5. Provisions in personnel locks shall be made to accommodate an interior lighting system to be provided by the OWNER which will be capable of operating from OWNER'S emergency 125 volt d-c power supply.

6. Provisions in personnel locks shall be made to accommodate an emergency communication system to be provided by the OWNER. Communication penetrations must be provided with seven (7) conductors to accommodate paging system requirements.] B

7. Provisions on personnel locks shall be made so as to permit bypassing the door interlocking system to allow doors to be left open when plant is shutdown.

8. The floor system of the personnel locks shall be designed so that they can be easily removed.

9. The personnel locks shall be designed, fabricated, tested, and stamped in accordance with the ASME Nuclear Vessel Code for Class "B" Vessels.

10. The personnel locks shall be designed so as to be capable of testing to 63.3 psig in the interspace between doors.

11. All personnel lock hinges shall be capable of a three-dimensional adjustment to assist proper seating. Hinges shall be capable of independent adjustment.

12. All seals, gaskets, O-rings, or other seating materials shall be suitable to withstand design temperature conditions.

13. Personnel lock equalizing valves shall be of the quick-acting type with interior globe valves.

14. The personnel lock-to-liner weld shall be covered by a canopy which may be pressurized to 63.3 psig from outside the reactor building.

15. All pressurization paths for the canopy, between doors and tongues shall have leads to the outside of the reactor building.

16. All bellows, expansion joints, gaskets, canopies, protectors, or other flexible members shall be designed for a minimum of 500 cycles for the movement associated with each penetration.

17. The locations of penetrations with regard to azimuth location shall be within ±1/2 inch measured on the circular section. The horizontal and vertical dimensions associated with the radial dimension shall be ±1/2 inch.

18. Each lock shall be installed in its respective insert plate prior to testing.

19. Personnel locks electrical penetrations wires shall be at least No. 14 AWG solid copper with flame resistant cross linked polyethelyne insulation.] R

20. A connection box with terminal blocks shall be provided over the electrical penetrations to permit making good electrical connections.] R

5:09 Shop Tests

The following tests shall be applied to each lock:

1. A proof test shall be applied to each lock which will pressurize the lock between doors to 63.3 psig. The pressure shall be reduced to 55 psig and held at this pressure to soap bubble and sniff test all welds and mated surfaces. If leaks are found, the welds and/or seals shall be repaired and retested. This procedure shall be followed until no leaks exist.

2. Local tests shall be conducted in accordance with ANS 7.60, "Proposed Standard for Leak Rate Testing of Containment Structures for Nuclear Reactors." Appendix A.

3. Copies of detail procedures for above tests shall be submitted to the OWNER or his Agent for review and comment.] B

5:10 Appurtenances

Reinforcing shall be designed to support penetration in liner insert plate for shop testing, shipping, and field erection.

5:11 Preliminary Tests

All testing as hereinafter described shall be performed by the CONTRACTOR. These tests shall include the following:

1. After the shop test, canopies and/or channels installed in the field shall be pressurized to 55 psig with a mixture of air and Freon and leaks detected and corrected as hereinbefore described. This test shall be performed at any time convenient to the liner erection schedule and mutually agreeable with the OWNER. Tests shall be conducted in accordance with item 5:09 of this Specification.

   Copies of detail test procedures must be submitted to the OWNER or his agent for review and comment.] B

2. All test connections shall be dimensioned on "as built" drawings. Any field changes will be subject to the approval of the ENGINEER and shall be kept current, and revised drawings issued at completion of erection.

3. The CONTRACTOR shall provide adequate documentation for all tests.

5:12 Painting

After installation, all non-machined surfaces shall be sandblasted to a near white metal in accordance with "Steel Structures Painting Council Specification", SSPC-SP-1063T, and the abrasive shall be selected to obtain a profile as required by the manufacturer. As soon as practicable after the steel is cleaned, all surfaces shall receive one (1) coat of Wisconsin Protective Coatings Co.'s, Plasite 7155 NP Primer. The dry film thickness of the primer at any point shall not be less than 2.5 mils. Where field welding is to be performed, the surface shall be left uncoated for a distance of approximately two inches from the joint. After installation is completed and all field welds have been made the unprimed surfaces shall be prepared in accordance with the preceeding specification and given one (1) coat of the above primer. After an adequate curing period, as recommended by the manufacturer, all primed surfaces shall be cleaned and free of all foreign matter before finish painting can begin. The finish painting shall consist of one (1) coat of Wisconsin Protective Coatings Co.'s Plasite 9009. The dry film thickness of the paint at any point shall not be less than 4 mils. Both the prime coat and the finish coat shall be applied in accordance with the manufacturer's printed instructions. B C

5:13 Material Damages

All materials shall be carefully handled so that members or parts which have been bent after fabrication shall be straightened by methods which will not produce fracture or other injury, and without heating, unless approved in writing by the ENGINEER. Any members which are so damaged that the OWNER considers it inadvisable to correct them in the field shall be rebuilt as directed or shall be replaced with new members. Hammering which will injure or distort the members will not be permitted.

5:14 Inspection

The OWNER or his Agents reserves the right to inspect fully all phases of manufacture of the materials included hereunder and to witness all tests. Any item found to be unsatisfactory shall be rejected or repaired at no additional cost to the OWNER. Any inspection by the OWNER or his Agents shall not relieve the CONTRACTOR of any responsibility for conformance with stated conditions and shall not be considered as a waiver of warranty or other right.

5:15 Shipping

5:15.1 Marking and Stenciling:

The CONTRACTOR shall identify equipment and material by means of attachment of a metal tag or stenciling to crates or skids. The identification shall contain the following information:

1. Complete order number.

2. Equipment or material item number or name.

5:15.2 Protection and Cleanliness:

The CONTRACTOR shall comply with the following requirements for ensuring cleanliness and protection from damage during shipment and storage at the job site:

1. Furnish provisions for preventing damage to the equipment and material and its temporary protection so as to maintain the specified cleanliness.

2. Clean and protect with suitable material all gasketed surfaces, flange faces and exposed threaded parts.

3. Close all female threaded openings with protective plugs.

4. Provide all equipment and material with suitable weather protection, blocking, straps, and skids.

5. Adequately and securely support the equipment and material to protect against physical damage and permit ready handling at the site.

5:15.3 Handling:

The CONTRACTOR shall furnish special handling, rigging, or other devices required to pick up equipment and material and install it in position. Those devices shall include provisions for connecting to equipment and material. These special devices shall become the property of the OWNER.

SECTION VI

LIST OF BID DRAWINGS

The following Gilbert Associates, Inc. Drawings set forth the location and extent of the work to be done under this Contract and are hereby expressly made a part of these Specifications.

Original Drawings

E-521-030 Reactor Building - Containment Vessel - Steel Liner Details

E-521-034 Reactor Building - Containment Vessel - Penetrations & Details

E-400-004 Reactor Building - Floor Elev. 122'-0" - Preliminary Penetration Locations

E-400-006 Reactor Building Personnel and Equipment Access Opening Details

D-036-001 Plot Plan

Revised Drawings

E-521-030 Reactor Building - Containment Vessel - Steel Liner Details

a) Revised construction opening from 24'-0" wide and 35'-0" high to 35'-0" wide and 50'-6" high.

b) Added anchor bolts for steam generator rigging crane anchor.

c) Added ladder, cage, and associated platforms.

E-400-006 Reactor Building Personnel and Equipment Access Opening Details

a) Revised equipment access opening from 9'-0" radius to 11'-2" radius.

A

Added Drawings

E-521-035 Reactor Building - Penetration Locations

E-521-036 Reactor Building - Penetration Details

E-521-037 Reactor Building - Penetration Details

SS-301-601 Thru SS-301-608 Penetration List

C

Added Drawings (Continued)

E-304-714	Reactor Building Spray - Plan	C
E-304-715	Reactor Building Spray - Sections	
SS-219-059	Electrical - Location and Details - Welded Grounding Connections to Containment Liner	
E-521-017	Reactor Building - Miscellaneous Steel - Steam Generator Base and Anchor Assembly	
E-521-018	Reactor Building - Bottom Liner Plate Anchors	
B-311-790	Reactor Building - Ventilation Duct Supports	
S-521-019	Reactor Building - Lug Derrick Dome Bracket	

Deleted Drawings

D-300-004	Piping Layout - Reactor Building Spray Piping - Sections and Details	C

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer [signature] Date 3-29-71

Mgr. - Power Engr. [signature] Date 3-30-71

Nuclear Proj. Mgr. [signature] Date 3/30/71

SPECIFICATION

REACTOR BUILDING LINER AND PENETRATIONS
AND
PERSONNEL ACCESS LOCKS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5566 JULY 25, 1969

FPC - 321-B31 and B4.2

[signature] 3-18-1971
APPROVED - DEPT. PROJECT ENGR. DATE

E R Hottenstein 3-18-1971
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G.-E.K.A.
W.O. 4203-00
Addendum A
August 21, 1968
Addendum B
March 4, 1969
Addendum C
October 2, 1969
Addendum D
March 18, 1971

A ✓
B ✓
C ✓
D ✓

ADDENDUM D

March 18, 1971

SECTION IV - DETAILED SPECIFICATIONS

4:02 Work Included

Subitem 7.:

Delete this subitem in its entirety and replace with the following revised subitem:

"7. Preparation of the surfaces and one coat of primer on all surfaces above elevation 103'-0" exposed to the interior of the Reactor Building."

4:07 Welding

4:07.2 Quality Control:

Subitem 1.:

Line 4:

After the word "method" add the following words:

"(or by the magnetic particle method)"

Line 11:

After the word "method" add the following words:

"or magnetic particle testing"

Subitem 3.:

Delete this subitem in its entirety and replace with the following revised subitem:

"3. Methods of liquid penetrant examination shall be in accordance with Appendix VIII of Section VIII of the ASME Unfired Pressure Vessels Code, except that 20% of the welds shall be tested by liquid penetrant. Methods of magnetic particle examination shall be in accordance with Appendix VI of Section VIII of the above Code."

ADDENDUM D

Sheet 2 of 3
March 18, 1971

Subitem 6.:

After the word "inspection," add the following words:

"magnetic particle testing,"

4:10 Penetration and Openings

4:10.3 Electrical Penetrations:

Subitem 2., line 2:

After the words "shall be 12 in." add "or 18 in."

Subitem 3. :

Delete this subitem in its entirety

4:11 Preliminary Tests

Subitem 2., line 1:

Delete the words "not covered with test channels"

Subitem 3."

Delete the first sentence in its entirety and replace with the following revised sentence:

"Embedded test connections shall bear stamped or stenciled identification affixed and referenced on Drawings to test channel section to which it is attached."

4:12 Painting

Delete this Item in its entirety and replace with the following revised Item:

"All surfaces of the cylinder, dome, penetrations, crane brackets and miscellaneous attachments exposed to the interior of the Reactor Building and above elevation 103'-0" shall be sandblasted to a near white metal in accordance with "Steel Structures Painting Council Specification" SSPC-SP-1063T. This sandblasting shall be performed in the CONTRACTOR'S shop. The abrasive shall be selected to obtain a profile as required by the manufacturer. As soon as practicable after the steel is

ADDENDUM D

cleaned, all surfaces shall receive one (1) coat of Wisconsin Protective Coating Co.'s Plasite 7155 NP primer. The dry film thickness of the primer at any point shall not be less than 2.5. mils. The prime coat shall be applied in accordance with the manufacturer's printed instructions. Machined surfaces and edges of plates and angles which are to be field welded shall not be painted. The cleaning and priming of all interior surfaces excluded above, along with finish painting of the entire interior, shall be done by Others."

SECTION V - DETAILED SPECIFICATIONS

5:02 Work Included

Subitem 3., line 8:

Delete "63.3" and replace with "69"

5:08 Personnel Access Locks

Subitem 10., line 2:

Delete "63.3" and replace with "69"

5:09 Shop Tests

Subitem 1., line 2:

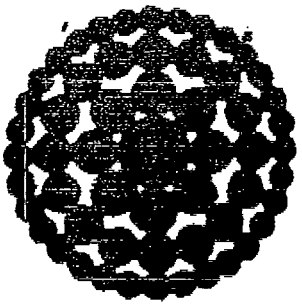
Delete "63.3" and replace with "69"

Subitem 3:

Delete this subitem in its entirety and replace with the following subitems:

"3. The interspace between door gaskets shall be tested to 63.3 psig. Since this pressure operates against the normal pressure seating of the doors, this testing may be performed with 55 psig pressure in the lock and/or securing mechanisms to simulate 55 psig pressure seating the door.

4. Copies of detail procedures for above tests shall be submitted to the OWNER or his Agent for review and comments."



THESE PAGES HAVE BEEN SUPERSEDED. THEY ARE BEING RETAINED FOR INFORMATION ONLY.

5. Purge Piping Penetration - Type VI each $_____

6. Equipment Access Penetration - Type VII each $_____

Cost of Performance and Payment Bond per $1,000, if requested: $_____

If this Proposal is accepted the undersigned hereby agrees to begin WORK promptly and complete the WORK in accordance with the time schedule stipulated in the attached Specifications.

Date of Bid _____ Signed _____

By _____ _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SP-5566
7-25-68
Revised
8-30-68

SECTION VI

LIST OF BID DRAWINGS

The following Gilbert Associates, Inc. Drawings set forth the location and extent of the WORK to be done under this Contract and are hereby expressly made a part of these Specifications.

W.O. No.	Drawing No.	Rev.	Date	Status	Title
4203	D-300-004	-	8-21-68	Not Checked	Piping Layout - Reactor Building Spray Piping (Sections & Details)
4203	E-521-030	-	8-30-68	Not Checked	Reactor Building - Containment Vessel - Steel Liner Details
4203	E-521-034	-	5-2-68	Not Checked	Reactor Building - Containment Vessel - Penetrations & Details
					For Reference and Information Only
4203	E-400-004	-	7-24-68	Not Checked	Reactor Building - Floor Elev. 122'-0" Preliminary Penetration Locations
4203	E-400-006	-	8-30-68	Not Checked	Reactor Building Personnel & Equipment Access Opening Details
4203	D-036-001	II	4-1-68	Not Checked	Plot Plan
4203	D-50125	1	9-13-57	Checked	GAI Standard - Structural Design - Ladders & Ladder Platforms

SP/RO?

Installation, Operation and Maintenance Procedure
Wheeled Support for Equipment Door and Personnel Lock

FLORIDA POWER CORPORATION
CRYSTAL RIVER PLANT - UNIT NO. 3

NUS-4322

1. Scope: This procedure covers installation, operation and maintenance procedures for the modified wheeled support for the equipment door and personnel lock at the Reactor Building of the Florida Power Corporation, Crystal River Plant, Unit No. 3.

2. Purpose: The wheeled support removes the equipment door and personnel lock from the building hatchway to provide material access into the Reactor Building.

3. Description: The wheeled support has been modified to provide greater stability to the existing support by addition/modification as follows:
   a. Increase the counterweight to a minimum of 10 ton to provide greater longitudinal stability.
   b. Change bearings, shafts and support wheels to provide more dependable operation and better adjustment of the support.
   c. Add wheeled outrigger to provide greater transverse stability.

4. Reference Interim Drawings:
   8803-C-5500, Sh. 1 of 1, Structural Modifications
   8803-C-5501, Sh. 1 of 1, General Arrangement & Modifications
   8803-M-2501, Sh. 1 of 1, Outrigger Wheel Assembly and Details
   8803-M-2502, Sh. 1 of 2, Support Wheel Mtg. Assembly
   8803-M-2502, Sh. 2 of 2, Support Wheel Mtg. Assembly and Details

5. Adjustments:

   Vertical: Plus or minus 2 inches
   Transverse: Plus or minus 1 inch

REVISION 4

SPECIFICATIONS
FOR
REACTOR BUILDING LINER
AND PENETRATIONS AND
PERSONNEL ACCESS LOCKS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5566 JULY 25, 1968

FPC-321-~~B31~~ and B4.2

3-7-69
APPROVED - DEPT. PROJECT ENGR. DATE

3-7-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G.-L.K.A.
W.O. 4203-00
Addendum A
August 21, 1968
Addendum B
March 4, 1969

Addendum B

SECTION IV - REACTOR BUILDING LINER AND PENETRATIONS

4:02 Work Included

7. Delete this subitem in its entirety and replace with the following:

The CONTRACTOR will be advised of the required preparation and coating of the liner surfaces.

Add new subitem as follows:

8. Installation of electrical penetration cartridges, furnished by Others, in penetration sleeves.

4:03 Work Not Included

3. Delete this subitem in its entirety.

Renumber subitem 4, subitem 3.

4:05 Design Requirements

4:05.2 Cylinder Reinforcement:

Delete this item in its entirety and replace with the following:

Liner Plate Reinforcement:

1. The cylinder walls shall be reinforced so as to support the dead load of the liner plus erection and wind loads. An additional 6 in. WF 15.5 lb member shall be located at each buttress centerline as shown on the Drawings.

2. The dome shall be reinforced to withstand in addition to the wind loading a construction load of 100 pounds per square foot.

4:06 Materials

4:06.1 Add the following to this item:

Special Note: Steel plate material per ASTM A 283-67 does not meet the requirements for a Class B Nuclear Vessel, but conformance is not required since the liner is not a load carrying component.

4:06.2 Delete this item in its entirety and replace with the following:

Penetration Sleeves:

The materials for penetration sleeves including the equipment access hatch as well as the mechanical and electrical penetrations shall conform with the requirements of the ASME Nuclear Vessels Code for Class "B" Vessels and shall exhibit ductility and welding characteristics compatible with the main shell material. The selection of materials for penetration sleeves shall consider a lowest service metal temperature of 120 F within containment and +25 F without containment. All materials for penetration sleeves shall exhibit impact properties as required for Class "B" Vessels. The materials for penetration sleeves shall be carbon steel except as otherwise specified herein or shown on the Drawings.

Add new item as follows:

4:06.3 Mechanical Penetrations:

The materials for process piping for mechanical penetrations shall be as specified on the attached "Penetration List" Drawings SS-301-601 thru SS-301-606 and shall conform with the requirements of the applicable USAS Power Piping Code B31.1.0 or Nuclear Power Piping Code B31.7 (Tentative) as noted.

4:07 Welding

4:07.1 General:

1. Change first sentence of this subitem as follows:

   The qualification of welding procedures and welders shall be in accordance with Section IX "Welding Qualifications" and paragraph N-541, Section III of the ASME Boiler and Pressure Vessel Code.

Add following new subitems:

3. The requirement for postweld heat treatment is waived.

4. The use of low hydrogen electrodes is required.

4:07.2 Quality Control:

2. Delete this subitem in its entirety and replace with the following:

Full radiography shall be in accordance with N-1350, Section III, ASME Boiler and Pressure Vessel Code. The procedure and acceptance criteria shall conform to UW-51, Section VIII, ASME Code. Spot radiography shall be in accordance with the procedures and governed by the acceptance criteria of Paragraph UW-52, Section VIII, ASME Boiler and Pressure Vessel Code with the following conditions:

a. Two percent of the welds made by each welder shall be radiographed.

b. Radiographs shall be at the frequency of six inches every 25 feet rather than 12 inches every 50 feet.

c. The quality assurance inspector shall select the spots to be radiographed, except in those specific instances where he waives this privilege to the CONTRACTOR'S quality control supervisor.

5. Delete first sentence of this subitem and replace with the following:

Certified copies of mill test reports describing the chemical and physical properties of the steel plate material, welding electrodes and/or weld filler metal shall be submitted to the OWNER for approval.

Add the following new subitem:

8. The CONTRACTOR shall, before starting fabrication, submit a Quality Control Manual to the OWNER or his Agent for review and comment. This document shall contain at least the following items:

a. Explicit procedures for NDT inspection techniques.

b. Material Control Procedures

c. Electrode Control Procedures

d. Marking and Material Identification procedures

e. Control of construction conditions

f. Qualification requirements for inspectors, welders, procedures, and equipment

g. Document and drawing control procedures

h. Non-conformance procedures

i. Control and storage of inspection test records

j. Control of purchase parts

k. Criteria for approval and rejection work

l. Examination checklists

m. Corrective action procedures

n. Traceability coding

o. Proof test procedures

4:10 Penetrations and Openings

4:10.2 Mechanical Penetrations:

3. Delete this subitem in its entirety and replace with following:

The penetration sleeves material shall be compatible with liner materials and must be approved for Class B Nuclear Vessels.

Add the following new subitem:

13. Process piping for the mechanical penetrations shall be fabricated and installed in the penetration assembly in accordance with the requirements of the applicable USAS Power Piping Code B31.1.0 or Nuclear Power Piping Code B31.7 (Tentative) as noted on the attached "Penetration List" Drawings SS-301-601 thru SS-301-606. Weld ends for process piping shall be machined in accordance with Drawings PD-301-001, "Welding End Details."

4:10.3 Electrical Penetrations:

1. Delete this subitem in its entirety and replace with following:

   Penetration cartridges will be supplied by Others but installed in the penetration sleeves by the CONTRACTOR.

2. Change this subitem as follows:

   At end of first sentence, after "carbon steel pipe" add, "of a grade approved for Class B Nuclear Vessels."

4:11 Preliminary Tests

1. Add following sentence to this subitem:

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.

2. Add following sentence to this subitem:

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.

4:12 Painting

Delete the text of this Item in its entirety and replace with following:

The CONTRACTOR will be advised of the acceptable surface preparation and coating for all surfaces of the liner and penetrations.

SECTION V - REACTOR BUILDING PERSONNEL ACCESS LOCKS

5:02 Work Included

5. Delete this subitem in its entirety and replace with the following:

   The CONTRACTOR will be advised of the required preparation and coating of the locks surfaces.

5:07 Welding

5:07.1 1. Change the first sentence of this subitem as follows:

The qualification of welding procedures and welders shall be in accordance with Section IX "Welding Qualifications" and paragraph N-541, Section III, of the ASME Boiler and Pressure Vessel Code.

Add following new subitem:

3. The use of low hydrogen electrodes is required.

5:07.2 Quality Control:

Number existing paragraph subitem 1.

Add following new subitem:

2. The CONTRACTOR shall, before starting fabrication, submit a Quality Control Manual to the OWNER, or his Agent for approval. This document shall contain at least the following items:

a. Explicit procedures for NDT inspection techniques

b. Material Control Procedures

c. Electrode Control Procedures

d. Marking and Material Identification Procedures

e. Control of Construction Conditions

f. Qualification requirements for Inspectors, Welders, Procedures, and equipment

g. Document and Drawing Control Procedures

h. Non-Conformance Procedures

i. Control and storage of Inspection and Test Records

Addendum B

Sheet 7 of 8
March 4, 1969

j. Control of purchased parts

k. Criteria for approval and rejection work

l. Examination checklists

m. Corrective action procedures

n. Traceability coding

o. Proof test procedures

5:08 Personnel Access Locks

Add following sentence to subitem 6:

Communication penetrations must be provided with seven (7) conductors to accommodate paging system requirements.

Add following new subitems:

19. Personnel locks electrical penetrations wires shall be at least No. 14 AWG solid copper with flame resistant cross linked polyethelyne insulation.

20. A connection box with terminal blocks shall be provided over the electrical penetrations to permit making good electrical connections.

5:09 Shop Tests

Add new subitem as follows:

3. Copies of detail procedures for above tests shall be submitted to the OWNER or his Agent for review and comment.

5:11 Preliminary Tests

1. Add following sentence to this subitem:

Copies of detail test procedures must be submitted to the OWNER or his Agent for review and comment.

Addendum B

March 4, 1969

5:12 Painting

Delete the text of this Item in its entirety and replace with the following:

The CONTRACTOR will be advised of the acceptable surface preparation and coating of the access locks surfaces.

SPECIFICATIONS

REACTOR BUILDING

LINER AND PENETRATIONS
AND
PERSONNEL ACCESS LOCKS

SP-5566 JULY 25, 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

FPC-321-B31 and B4.2

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G. - E.K.A.
W.O. 4203.00
Addendum A
August 21, 1968

ADDENDUM A

August 21, 1968

[redacted]

SECTION I - INSTRUCTIONS TO BIDDERS

1:02 Submission of Proposals

Add the following new item 1:02.15:

"The Bidder shall submit unit prices for the following, as shown on Drawing E-521-030:

a. Unit price for additional crane rail support assemblies.

b. Unit price for anchor bolts for steam generator rigging crane anchor.

c. Unit price for ladder and cage."

Add the following new item 1:02.16:

"The Bidder shall submit unit price base per pound of plate material including all fabrication, shop, and field welding, detailing, and erection costs set forth in item 4:02-3.h.

SECTION IV - DETAILED SPECIFICATIONS

4:02 Work Included

4:02-3.g Fifth line: change 6" x 3-1/2" x 3/16" angle to read:

"6" x 3-1/2" x 1/4" angle"

Add the following new item h.

"All brackets and hanger supports for piping and ventilating systems including fabrication, shop, and field welding, and detailing (See Drawing D-300-004 for details.)"

ADDENDUM A

August 21, 1968

4:10 Penetrations and Openings

4:10.3 Electrical Penetrations:

After last word in sentence, change period mark to a comma and add the following:

"but shall be capable of supporting an additional weight of 500 lbs."

4:12.2 Fifth and sixth sentences: change to read as follows:

"Approved alternate coating systems in lieu of Carbozinc No. 11 are Dimetcote No. 5 as manufactured by the Amercoat Corporation or Plasite No. 1100 as manufactured by Wisconsin Protective Coating Corporation. If an alternate material is used, surface preparation and application methods shall be in accordance with the manufacturer's printed instructions."

5:12.2 Same revision as stated in 4:12.2.

SECTION VI - LIST OF BID DRAWINGS

The following Drawings have been revised:

E-521-030
a. Revised construction opening from 24'-0" wide and 35'-0" high to 35'-0" wide and 50'-6" high.
b. Added anchor bolts for steam generator rigging crane anchor.
c. Added ladder, cage and associated platforms.

E-400-006 Revised equipment access opening from 9'-0" radius to 11'-2" radius.

E-521-030 Revised date from 7-24-68 to 8-30-68.

E-400-006 Revised date from 7-24-68 to 8-30-68.

The following Drawings have been added:

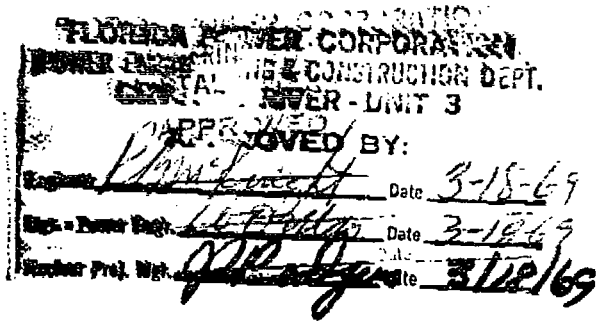
D-300-004 and D-50125, Rev. L.

The Drawing List is hereby replaced in its entirety incorporating revisions as set forth above.

ATTACHMENTS

PROPOSAL FORM

Attached to this Addendum is revised page 2 of the Proposal Form.



SPECIFICATIONS
FOR
REACTOR BUILDING LINER
AND PENETRATIONS AND
PERSONNEL ACCESS LOCKS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5566 JULY 25, 1966

FPC-321-B31 and B4.2

3-7-69
APPROVED - DEPT. PROJECT ENGR. DATE

3-7-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G.-L.K.A.
W.O. 4203-00
Addendum A
August 21, 1968
Addendum B
March 4, 1969

Addendum B

Sheet 1 of 8
March 4, 1969

SECTION IV - REACTOR BUILDING LINER AND PENETRATIONS

4:02 Work Included

7. Delete this subitem in its entirety and replace with the following:

The CONTRACTOR will be advised of the equired preparation and coating of the liner surfaces.

Add new subitem as follows:

8. Installation of electrical penetration cartridges, furnished by Others, in penetration sleeves.

4:03 Work Not Included

3. Delete this subitem in its entirety.

Renumber subitem 4, subitem 3.

4:05 Design Requirements

4:05.2 Cylinder Reinforcement:

Delete this item in its entirety and replace with the following:

Liner Plate Reinforcement:

1. The cylinder walls shall be reinforced so as to support the dead load of the liner plus erection and wind loads. An additional 6 in. WF 15.5 lb member shall be located at each buttress centerline as shown on the Drawings.

2. The dome shall be reinforced to withstand in addition to the wind loading a construction load of 100 pounds per square foot.

4:06 Materials

4:06.1 Add the following to this item:

Special Note: Steel plate material per ASTM A 283-67 does not meet the requirements for a Class B Nuclear Vessel, but conformance is not required since the liner is not a load carrying component.

4:06.2 Delete this item in its entirety and replace with the following:

Penetration Sleeves:

The materials for penetration sleeves including the equipment access hatch as well as the mechanical and electrical penetrations shall conform with the requirements of the ASME Nuclear Vessels Code for Class "B" Vessels and shall exhibit ductility and welding characteristics compatible with the main shell material. The selection of materials for penetration sleeves shall consider a lowest service metal temperature of 120 F within containment and +25 F without containment. All materials for penetration sleeves shall exhibit impact properties as required for Class "B" Vessels. The materials for penetration sleeves shall be carbon steel except as otherwise specified herein or shown on the Drawings.

Add new item as follows:

4:06.3 Mechanical Penetrations:

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4:07 Welding

4:07.1 General:

1. Change first sentence of this subitem as follows:

The qualification of welding procedures and welders shall be in accordance with Section IX "Welding Qualifications" and paragraph N-541, Section III of the ASME Boiler and Pressure Vessel Code.

Add following new subitems:

3. The requirement for postweld heat treatment is waived.

4. The use of low hydrogen electrodes is required.

4:07.2 Quality Control:

2. Delete this subitem in its entirety and replace with the following:

Full radiography shall be in accordance with N-1350, Section III, ASME Boiler and Pressure Vessel Code. The procedure and acceptance criteria shall conform to UW-51, Section VIII, ASME Code. Spot radiography shall be in accordance with the procedures and governed by the acceptance criteria of Paragraph UW-52, Section VIII, ASME Boiler and Pressure Vessel Code with the following conditions:

a. Two percent of the welds made by each welder shall be radiographed.

b. Radiographs shall be at the frequency of six inches every 25 feet rather than 12 inches every 50 feet.

c. The quality assurance inspector shall select the spots to be radiographed, except in those specific instances where he waives this privilege to the CONTRACTOR'S quality control supervisor.

5. Delete first sentence of this subitem and replace with the following:

Certified copies of mill test reports describing the chemical and physical properties of the steel plate material, welding electrodes and/or weld filler metal shall be submitted to the OWNER for approval.

Add the following new subitem:

8. The CONTRACTOR shall, before starting fabrication, submit a Quality Control Manual to the OWNER or his Agent for review and comment. This document shall contain at least the following items:

a. Explicit procedures for NDT inspection techniques.

b. Material Control Procedures

c. Electrode Control Procedures

Addendum B

Sheet 4 of 8
March 4, 1969

d. Marking and Material Identification procedures

e. Control of construction conditions

f. Qualification requirements for inspectors, welders, procedures, and equipment

g. Document and drawing control procedures

h. Non-conformance procedures

i. Control and storage of inspection test records

j. Control of purchase parts

k. Criteria for approval and rejection work

l. Examination checklists

m. Corrective action procedures

n. Traceability coding

o. Proof test procedures

4:10 Penetrations and Openings

4:10.2 Mechanical Penetrations:

3. Delete this subitem in its entirety and replace with following:

The penetration sleeves material shall be compatible with liner materials and must be approved for Class B Nuclear Vessels.

Add the following new subitem:

13. Process piping for the mechanical penetrations shall be fabricated and installed in the penetration assembly in accordance with the requirements of the applicable USAS Power Piping Code B31.1.0 or Nuclear Power Piping Code B31.7 (Tentative) as noted on the attached "Penetration List" Drawings SS-301-601 thru SS-301-606. Weld ends for process piping shall be machined in accordance with Drawings PL-301-001, "Welding End Details."

Addendum B

March 4, 1969

4:10.3 Electrical Penetrations:

1. Delete this subitem in its entirety and replace with following:

   Penetration cartridges will be supplied by Others but installed in the penetration sleeves by the CONTRACTOR.

2. Change this subitem as follows:

   At end of first sentence, after "carbon steel pipe" add "of a grade approved for Class B Nuclear Vessels."

4:11 Preliminary Tests

1. Add following sentence to this subitem:

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.

2. Add following sentence to this subitem:

   Copies of detail test procedures shall be submitted to the OWNER or his Agent for review and comment.

4:12 Painting

Delete the text of this Item in its entirety and replace with following:

The CONTRACTOR will be advised of the acceptable surface preparation and coating for all surfaces of the liner and penetrations.

SECTION V - REACTOR BUILDING PERSONNEL ACCESS LOCKS

5:02 Work Included

5. Delete this subitem in its entirety and replace with the following:

   The CONTRACTOR will be advised of the required preparation and coating of the locks surfaces.

Addendum B

5:07 Welding

5:07.1 1. Change the first sentence of this subitem as follows:

The qualification of welding procedures and welders shall be in accordance with Section IX "Welding Qualifications" and paragraph N-541, Section III, of the ASME Boiler and Pressure Vessel Code.

Add following new subitem:

3. The use of low hydrogen electrodes is required.

5:07.2 Quality Control:

Number existing paragraph subitem 1.

Add following new subitem:

2. The CONTRACTOR shall, before starting fabrication, submit a Quality Control Manual to the OWNER, or his Agent for approval. This document shall contain at least the following items:

a. Explicit procedures for NDT inspection techniques

b. Material Control Procedures

c. Electrode Control Procedures

d. Marking and Material Identification Procedures

e. Control of Construction Conditions

f. Qualification requirements for Inspectors, Welders, Procedures, and equipment

g. Document and Drawing Control Procedures

h. Non-Conformance Procedures

i. Control and storage of Inspection and Test Records

j. Control of purchased parts

k. Criteria for approval and rejection work

l. Examination checklists

m. Corrective action procedures

n. Traceability coding

o. Proof test procedures

5:08 Personnel Access Locks

Add following sentence to subitem 6:

Communication penetrations must be provided with seven (7) conductors to accommodate paging system requirements.

Add following new subitems:

19. Personnel locks electrical penetrations wires shall be at least No. 14 AWG solid copper with flame resistant cross linked polyethelyne insulation.

20. A connection box with terminal blocks shall be provided over the electrical penetrations to permit making good electrical connections.

5:09 Shop Tests

Add new subitem as follows:

3. Copies of detail procedures for above tests shall be submitted to the OWNER or his Agent for review and comment.

5:11 Preliminary Tests

1. Add following sentence to this subitem:

Copies of detail test procedures must be submitted to the OWNER or his Agent for review and comment.

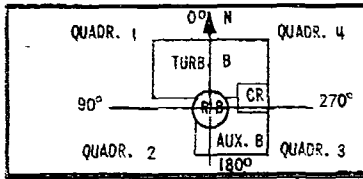
Addendum B

Sheet 8 of 8
March 4, 1969

5:12 Painting

Delete the text of this Item in its entirety and replace with the following:

The CONTRACTOR will be advised of the acceptable surface preparation and coating of the access locks surfaces.



NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 6 of 6

PENETRATION LIST

CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

PENETRATIONS IN QUADRANT I

MADE	GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PENNA. AND NEW YORK, N.Y.
CHK'D.	
SQ. CF.	
CF. DFN.	4203
ENG.	WORK ORDER
REV. CH. APP. DATE	SIZE DRAWING / REV.

PEN. NO.	QUADR NO.	PROCESS PIPE SIZE	PROCESS PIPE SCH	PROCESS PIPE MATL	SLEEVE SIZE	SLEEVE SCH	SLEEVE MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP °F	PROCESS psia	INS. THKS.	REFERENCE DETAILS
136	1				12"	80	CS	RC Bldg. Cooling System Electric								Type No. IV
126	1				12"	80	CS	RC Bldg. Cooling System Electric								"
216	1				12"	80	CS	RC Bldg. Cooling System Electric								"
127	1				12"	80	CS	Crane & Elevator Power Supply								"
105	1	24"	60	CS	40"	3/4	CS	Main Steam from Steam Generator "A"	B 31.1	I		Yes				Type No. I RIP Cooled
106	1	24"	60	CS	40"	3/4	CS	Main Steam from Steam Generator "A"	B 31.1	I		Yes				" "
107	1	24"	60	CS	40"	3/4	CS	Main Steam from Steam Generator "B"	B 31.1	I		Yes				" "
108	1	18"	60	CS	40"	3/4	CS	Feedwater to Steam Generator "A" "B"	B 31.1	I		Yes				" "
109	1	6"	40	CS	12"	80	CS	Emergency Feedwater to Steam Generator "A" "B"	B 31.1	I		Yes				Type No. II
110	1	3"	40	CS	8"	80	CS	Service Air Supply to RX Bldg.	B 31.1	II		No				Type No. III
111	1	3"	40	CS	6"	80	CS	Instrument Air Supply to RX Bldg.	B 31.1	II		No				"
122	1	2"	40		10"	80	CS	Piping Spare								Type No. V
113	1	43"	0.5	CS	54"	0.5	CS	Purge Supply	B 31.7 III	I						Type No. VI
114	1				12"	80	CS	Electrical Spare								Type No. V
[illegible]	1				[illegible]			[illegible]								"
[illegible]	1				[illegible]			[illegible]								[illegible]
[illegible]	1				[illegible]			[illegible]								"
23					[illegible]			[illegible]								[illegible]
24					[illegible]			[illegible]								"

QUADR. 1 — 0° N — QUADR. 4

TURB. B — R.B — CR — AUX. B

90° — 270°

QUADR. 2 — 180° — QUADR. 3

NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 5 of 6

PENETRATION LIST

CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

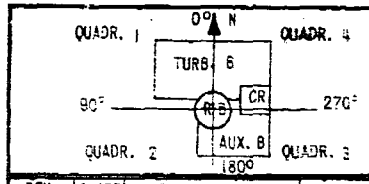
PENETRATIONS IN QUADRANT II

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA. AND NEW YORK, N.Y.

MADE | CHK'D. | SQ. CK. | CK. DWN. | ENG. | REV. CH. APP. DATE

WORK ORDER: 4203 | SIZE | DRAWING | REV.

	PEN. NO.	QUADR. NO.	PROCESS PIPE SIZE	PROCESS PIPE SCH	PROCESS PIPE MATL	SLEEVE SIZE	SLEEVE SCH	SLEEVE MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP °F	PROCESS psia	INS. THKS.	REFERENCE DETAILS
	201	2	24"	60	CS	40"	3/4	CS	Main Steam from Steam Generator "B"	B 31.1	I		Yes				Type No. I Air Cooled
423	202	2	18"	60	CS	40"	3/4	CS	Feedwater to Steam Generator "B"	B 31.1	I		Yes				" "
424	203	2	6"	40	CS	12"	80	CS	Emergency Feedwater to Steam Generator "B"	B 31.1	I		Yes				~~Type No. II~~
321	204	2	8"	40	CS	12"	80	CS	Shield Cooling System A + Letdown Cooler A In	B 31.1	I		No				Type No. III
322	205	2	8"	40	CS	12"	80	CS	Shield Cooling System A + Letdown Cooler A Out	B 31.1	I		No				"
327	206	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 1 Cooling Water In	B 31.1	I		No				"
328	207	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 1 Cooling Water Out	B 31.1	I		No				"
206	208	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 2 Cooling Water In	B 31.1	I		No				"
207	209	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 2 Cooling Water Out	B 31.1	I		No				"
[illegible]	210	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 3 Cooling Water In	B 31.1	I		No				"
[illegible]	211	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	Fan Motor No. 3 Cooling Water Out	B 31.1	I		No				"
[illegible]	212	2	8"	40	CS	12"	80	CS	Emergency Coil No. 1 Cooling Water In	B 31.1	I		Yes				Type No. II
354	213	2	8"	40	CS	12"	80	CS	Emergency Coil No. 1 Cooling Water Out	B 31.1	I		Yes				"
[illegible]	214	2	8"	40	CS	12"	80	CS	Emergency Coil No. 2 Cooling Water In	B 31.1	I		Yes				"
369	215	2	8"	40	CS	12"	80	CS	Emergency Coil No. 2 Cooling Water Out	B 31.1	I		Yes				"
[illegible]	216	2	8"	40	CS	12"	80	CS	Emergency Coil No. 3 Cooling Water In	B 31.1	I		Yes				"
[illegible]	217	2	8"	40	CS	12"	80	CS	Emergency Coil No. 3 Cooling Water Out	B 31.1	I		Yes				"
119	218	2	10"	40	CS	14"	80	CS	Ventilation Main Coil Cooling Water In	B 31.1	II		No				Type No. III
120	219	2	10"	40	CS	14"	80	CS	Ventilation Main Coil Cooling Water Out	B 31.1	II		No				"
121	220	2	6"	40	CS	12"	80	CS	RX Bldg. Leak Test Pressurization	B 31.7 III	I		No				"
[illegible]	221	2	6"	40	CS	12"	80	CS	RX Bldg. Leak Test Relief	B 31.7 III	I		No				"
	222	2				22'-4"		CS	Equipment Access								
430	223	2	2"	40S	SS	6"	80	CS	R.C. Drain Tank Demin. Water Makeup	B 31.1	II		No				Type No. III
374	224	2	3"	40S	SS	8"	80	CS	Drain from R.C. Drain Tank	B 31.7 III	II		No				"
[illegible]	225	2	$1\frac{1}{2}$"	80	CS	6"	80	CS	N_2 Supply to R.C. Drain Tank	B 31.1	II		No				"
214	226	2				12"	80	CS	Electrical Spare [illegible]								Type No. V
217	227	2				12"	80	CS	Electrical Spare								"
300	228	2	8"	40	CS	12"	80	CS	Shield Cooling Syst. B + Letdown Cooler B In	B 31.1	I		No				Type No. III
[illegible]	229	2	8"	40	CS	12"	80	CS	Shield Cooling Syst. B + Letdown Cooler B Out	B 31.1	I		No				"
125	230	2				12"	80	CS	Piping Spare								Type No. V
	[illegible]	[illegible]				[illegible]	[illegible]		[illegible] Piping Spare								Type No. V
	[illegible]	[illegible]				[illegible]	[illegible]										"
	[illegible]	[illegible]				[illegible]											"



NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 5 of 6

PENETRATION LIST

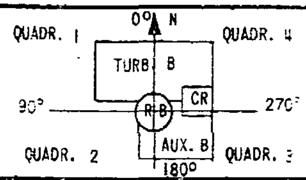
CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

PENETRATIONS IN QUADRANT III

MADE	GILBERT ASSOCIATES, INC.
CHK'D.	"ENGINEERS AND CONSULTANTS
SQ. CF.	READING, PENNA. AND NEW YORK, N.Y.
CF. DFN.	4303 : 455-3 [illegible]
ENG.	WORK ORDER : SIZE : DRAWING : REV.
REV. CH. APP. DATE	

PEN. NO.	QUADR NO.	PROCESS PIPE SIZE	SCH	MATL	SLEEVE SIZE	SCH	MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP OF	PROCESS PS'a	INS. THKS.	REFERENCE DETAILS
302	3				18"	80	CS	RCP No. 3B Power Supply								Type No. IV
302	3				18"	80	CS	RCP No. 3B Power Supply								"
303	3				18"	80	CS	RCP No. 3C Power Supply								"
304	3				18"	80	CS	RCP No. 3C Power Supply								"
305	3				12"	80	CS	Control Rod Drive Power Supply								"
306	3				12"	80	CS	Control Rod Drive Power Supply								"
307	3				12"	80	CS	Control Rod Drive Power Supply Spare								Type No. V
308	3				12"	80	CS	Thermocouples								Type No. IV
309	3				12"	80	CS	Miscellaneous Control Circuits								Type No. IV
310	3				12"	80	CS	Coax/Triax Cables for In-core Instrumentation								Type No. IV
311	3				12"	80	CS	Coax/Triax Cables for In-core Instrumentation								"
312	3				12"	80	CS	Low Voltage DC Instrumentation, Control Rods								"
313	3				12"	80	CS	Electrical Spare								Type No. V
314	3	4"	40	CS	10"	80	CS	Sec. Drain from Steam Generator "A"	B 31.1	II		Yes				Type No. II
315	3				8"	80	CS	Piping Spare				No				Type No. V
316	3	1½"	80	CS	8"	80	CS	Sec. Vent line from Steam Generator "A"	B 31.1	II		Yes				Type No. II
317	3	4"	80	CS	10"	80	CS	N2 Fill line to Steam Generator "A" & "B" Sec.	B 31.1	II		No				Type No. III
318	3	4"	40	CS	10"	80	CS	Sec. Drain from Steam Generator "B"	B 31.1	II		Yes				Type No. II
319	3				8"	80	CS	Piping Spare				No				Type No. V
320	3	1½"	80	CS	8"	80	CS	Sec. Vent from Steam Generator "B"	B 31.1	II		Yes				Type No. II
321	3				8"	80	CS	Blowdown line from Steam Generator "A"	B 31.1	II		No				Type No. V
322	3				8"	80	CS	Blowdown line from Steam Generator "B"	B 31.1	II		No				"
323	3	4"	40	CS	10"	80	CS	RCP No. 3B-1 Cooling Water In	B 31.1	I		No				Type No. III
324	3	4"	40	CS	10"	80	CS	RCP No. 3B-1 Cooling Water Out	B 31.1	I		No				"
325	3	4"	40	CS	10"	80	CS	RCP No. 3B-2 Cooling Water In	B 31.1	I		No				"
326	3	4"	40	CS	10"	80	CS	RCP No. 3B-2 Cooling Water Out	B 31.1	I		No				"
327	3	3"	40S	SS	8"	80	CS	Demin. Water Supply into FH Bldg.	B 31.1	II		No				"
328	3	3"	40S	SS	8"	80	CS	Demin. Water Supply into FH Bldg.	B 31.1	II		No				"
329	3				12"	80	CS	N2 Supply to FH Bldg.	B 31.1	II		No				Type No. V
330	3	3"	40	CS	8"	80	CS	Control Rod Drive Cooling In	B 31.1	I		No				Type No. III
331	3	3"	40	CS	8"	80	CS	Control Rod Drive Cooling Out	B 31.1	I		No				"
332	3	2"	40	CS	6"	80	CS	FH Bldg. Air Sample	B 31.7 III	I		No				"
333	3	3½"	160S	SS	8"	80	SS	Letdown Flow	B 31.7 II	I		Yes				Type No. II
334	3	4"	160S	SS	10"	80	CS	RCP Seal Return	B 31.7 II	I		Yes				"



NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 4 of 6

PENETRATION LIST

CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

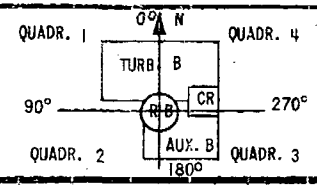
PENETRATIONS IN QUADRANT III (cont'd)

MADE	
CHK'D.	
SQ. CF.	
CF. DFN.	
ENG.	
REV. CH. APP DATE	

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA. AND NEW YORK, N.Y.

WORK ORDER	SIZE DRAWING	REV.
4209	SS-301-004	

PEN. NO.	QUADR NO.	PROCESS PIPE SIZE	PROCESS PIPE SCH	PROCESS PIPE MATL	SLEEVE SIZE	SLEEVE SCH	SLEEVE MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP °F	PROCESS psia	INS. THKS.	REFERENCE DETAILS
336	3	2½"	160S	SS	8"	80	CS	High Pressure Injection Line to Loop "B"	B 31.7 I	I		Yes				Type No. II
337	3	2½"	160S	SS	8"	80	CS	High Pressure Injection Line to Loop "B"	B 31.7 I	I		Yes				"
338	3	4"	160S	SS	10"	80	CS	RCP Seal Water Supply	B 31.7 I	I		No				Type No. III
339	3	4"	40S	SS	10"	80	CS	RB Sump Discharge	B 31.1	II		No				"
340	3	8"	40S	SS	14"	80	CS	Reactor Bldg. Spray Supply Ring No. 1	B 31.7 II	I		Yes				Type No. II
341	3	8"	40S	SS	14"	80	CS	Reactor Bldg. Spray Supply Ring No. 2	B 31.7 II	I		Yes				"
342	3	10"	160S	SS	30"	80	CS	Decay Heat Loop to Reactor Vessel	B 31.7 II	I		Yes				Type No. I Air Cooled
343	3	10"	160S	SS	30"	80	CS	Decay Heat Loop to Reactor Vessel	B 31.7 II	I		Yes				" "
344	3	12"	40S	SS	30"	80	CS	Decay Heat Loop from Reactor Vessel	B 31.7 II	I		Yes				" "
345	3	14"	40S	SS	Sleeve is attach-			Recirculation Line	B 31.7 I	I		No				
346	3	14"	40S	SS	ed to pipe			Recirculation Line	B 31.7 I	I		No				
347	3	10"	10S	SS	14"	80	CS	Fuel Transfer Canal Fill Line	B 31.7 III	I		No				Type No. III
348	3	Supplied by others			40"	0.375	CS	Fuel Transfer Tube No. 2	B 31.7 III	I		No				Type No. VIII
349	3	2"	10S	SS	6"	80	CS	R.C. Drain Tank Vent to WD	B 31.7 III	II		No				Type No. III
350	3	1"	40S	SS	6"	80	CS	N_2 and Borated Water Supply to C.F. Tank "B"	B 31.7 III	I		No				"
351	3	1½"	40S	SS	6"	80	CS	Vent to W.D. from C.F. Tanks "A" and "B"	B 31.7 III	I		No				"
352	3	1"	40S	SS	6"	80	CS	Bleed Line from C.F. Tank "A" and "B" to W.D.	B 31.7 III	I		No				"
353	3				14"	80	CS	Piping Spare								Type No. V
354	3	1½"	160S	SS	8"	80	CS	Vent Header	B 31.7 III	II		Yes				Type No. II
355	3	1½"	160	CS	6"	80	CS	N_2 Fill Line to Steam Generator "A" & "B" Prim.	B 31.1	II		No				Type No. III
356	3	1"	40	CS	6"	80	CS	RX Bldg. Air Sampling	B 31.7 III	II		No				"
357	3	48"	0.5	CS	54"	0.5	CS	Purge Exhaust	B 31.7 III	I						Type No. VI
[illegible]	3				[illegible]	[illegible]	[illegible]	[illegible] Drive Power Supply								Type N. II



NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 1 of 6

PENETRATION LIST

CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

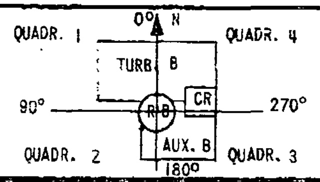
PENETRATIONS IN QUADRANT IV

MADE
CHK'D.
SQ CF.
CP. DPN.
ENG.
REV. CH APP DATE

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA. AND NEW YORK, N.Y.

WORK ORDER 4203 . 55-201-605
SIZE DRAWING REV.

PEN. NO.	QUADR NO.	PROCESS PIPE SIZE	SCH	MATL	SLEEVE SIZE	SCH	MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP °F	PROCESS psia	INS. THKS.	REFERENCE DETAILS
401	4				18"	80	CS	RCP No. 3A Power Supply								Type No. IV
402	4				18"	80	CS	RCP No. 3A Power Supply								"
403	4				18"	80	CS	RCP No. 3C Power Supply								"
404	4				18"	80	CS	RCP No. 3C Power Supply								"
405	4				12"	80	CS	RC Building Lights + Small AC & DC Motors								"
406	4				12"	80	CS	Press. Heater Power Supply								"
407	4				12"	80	CS	Press. Heater Power Supply								"
408	4				12"	80	CS	Press. Heater Power Supply								"
409	4				12"	80	CS	Control Rod Drive Power Supply								"
420	4				12"	80	CS	Control Rod Drive Power Supply								"
411	4				12"	80	CS	Control Rod Drive Power Supply								"
412	4				12"	80	CS	In-core Instrumentation - Coax/Triax								"
413	4				12"	80	CS	In-core Instrumentation - Coax/Triax								"
414	4				12"	80	CS	In-core Instrumentation								"
415	4				12"	80	CS	In-core Instrumentation								"
416	4				12"	80	CS	Thermocouples								"
417	4				12"	80	CS	Miscellaneous Control Circuits								"
418	4				12"	80	CS	Low Voltage DC Instrumentation - Control Rods								"
418	4				12"	80	CS	Misc. Instrumentation								Type No. IV
420	4				12"	80	CS	Misc. Instrumentation								"
421	4				12"	80	CS	Electrical Spare								"
422	4				12"	80	CS	Electrical Spare								"
423	4	4"	40	CS	10"	80	CS	RCP No. 3A-1 Cooling Water In	B 31.1	I		No				Type No. III
424	4	4"	40	CS	10"	80	CS	RCP No. 3A-1 Cooling Water Out	B 31.1	I		No				"
425	4	4"	40	CS	10"	80	CS	RCP No. 3A-2 Cooling Water In	B 31.1	I		No				"
426	4	4"	40	CS	10"	80	CS	RCP No. 3A-2 Cooling Water Out	B 31.1	I		No				"
427	4				12"	80	CS	Piping Spare								Type No. V
428	4				12"	80	CS	Piping Spare								"
429	4	2"	40	CS	6"	80	CS	Containment Bldg. Pressure Sensing	B 31.7 III	I		No				Type No. III
430	4	2"	40	CS	6"	80	CS	Containment Bldg. Pressure Sensing	B 31.7 III	I		No				"
431	4	2"	40	CS	6"	80	CS	Containment Bldg. Pressure Sensing	B 31.7 III	I		No				"
432	4	2"	40	CS	6"	80	CS	Containment Bldg. Pressure Sensing	B 31.7 III	I		No				"
433	4				9"-6"		CS	Personnel Access								



NOTE: CS = ASTM A 106 Gr. B up to 24" O.D.
SS = ASTM A 312, Tp 304 up to 12" O.D., 14" O.D. and larger ASTM A 358 Tp 304

Sheet 2 of 5

PENETRATION LIST

CRYSTAL RIVER UNIT NO. 3

FLORIDA POWER CORPORATION

PENETRATIONS IN QUADRANT IV (cont'd)

MADE
CHK'D.
SQ. CF.
CF. DFN.
ENG.
REV. CH. APP. DATE

GILBERT ASSOCIATES, INC.
ENGINEERS AND CONSULTANTS
READING, PENNA. AND NEW YORK, N.Y.

4203 | [illegible]
WORK ORDER | SIZE | DRAWING | REV.

	PEN. NO.	QUADR NO.	PROCESS PIPE SIZE	PROCESS PIPE SCH	PROCESS PIPE MATL	SLEEVE SIZE	SLEEVE SCH	SLEEVE MATL	DESIGNATION	PIPING CODE	SEISMIC CLASS	LOCATION	BELLOWS	PROCESS TEMP °F	PROCESS psia	INS. THKS.	REFERENCE DETAILS
	434	4	2½"	160S	SS	8"	80	CS	High Pressure Injection Line to Loop "A"	B 31.7 I	I		Yes				Type No. II
	435	4	2½"	160S	SS	8"	80	CS	High Pressure Injection Line to Loop "A"	B 31.7 I	I		Yes				"
	436	4	supplied by	others		40"	0.375	CS	Fuel Transfer Tube No. 1	B 31.7 III	I		No				~~Type No. VIII~~
373	~~437~~	~~4~~ 3	1"	40 S	SS	6"	80	CS	~~N₂ and~~ Borated Water Supply to C.F. Tank "A"	B 31.7 III	I		No				Type No. III
372	~~438~~	~~4~~ 3	1"	80	CS	6"	80	CS	N_2 Fill Line to Pressurizer	B 31.1	II		No				"
	439	4	3/8"	0.065	SS	6" [illegible]	80	CS	Sampling Line from Pressurizer	B 31.7 II	II		Yes				Type No. ~~II~~ I [illegible]
	440	4	3/8"	0.065	SS	6" [illegible]	80	CS	Sampling Line from Steam Generator "A" Sec.	B 31.1	II		Yes				"
	441	4	3/8"	0.065	SS	6" [illegible]	80	CS	Sampling Line from Steam Generator "B" Sec.	B 31.1	II		Yes				"
	442	4				12"	80	CS	Piping Spare								Type No. V
212	~~443~~	~~4~~ 2				12"	80	CS	Low Voltage DC Instrumentation - Control Rods								Type No. IV
	413	[illegible]				12"	80	[illegible]	Electrical Spare [illegible]								Type [illegible] V
	414	4				12	80	CS	Electrical Spare [illegible]								
	415	[illegible]				12"	[illegible]	CS	Electrical Spare [illegible]								
	416	[illegible]				12"	80	CS	Electrical Spare								

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer ORIGINAL SIGNED BY Date 7-2-71
Mgr. - Power Eng. W. A. SZELISTOWSKI Date 7-2-71
Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 7-2-71

SPECIFICATION

FOR

FURNISHING AND DELIVERING OF

STRUCTURAL CONCRETE

SP-5569 OCTOBER 17, 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

FPC - 321-A3.2

6-23-71
APPROVED - DEPT. PROJECT ENGR. DATE

6-23-71
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B			
C			
D		✓	

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - W.A.D.
W.O. 4203-00
Addendum A
October 17, 1968
Addendum B
January 22, 1969
Addendum C
March 13, 1969
Addendum D
June 23, 1971

ADDENDUM D

Sheet 1 of 1
June 23, 1971

SECTION III - DETAILED SPECIFICATIONS

3:09 Admixtures

3:09.1 Air Entraining Admixture:

Subitem 1.:

Delete this subitem as written in Addendum B (dated January 22, 1969) in its entirety and replace with the following:

"1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in	3 - 6
1-1/2 in	3 - 6 "

3:11 Mixing Concrete

3:11.2 Transit Mixing:

Third sentence - Lines 5, 6, and 7:

Delete this sentence in its entirety and replace with the following:

"The maximum number of revolutions at mixing speed shall be 110; any additional mixing shall be at agitating speed, as required by ASTM C 94-67."

2-4 Rec. Doc

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 3-21-69

Mgr. - Power Engr. _____ Date 3-21-69

Nuclear Proj. Mgr. _____ Date 3-21-69

SPECIFICATION
FOR
FURNISHING AND DELIVERING OF
STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5569 OCTOBER 17, 1968

FPC-321-A3.2

_____ 3-13-69
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 3-13-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - W.A.D.
W.O. 4203-00
Addendum A
October 17, 1968
Addendum B
January 22, 1969
Addendum C
March 13, 1969
See Add. D

ADDENDUM A

Sheet 1 of 2
October 17, 1968

SECTION II - PROPOSAL

Attached to this addendum is Alternate Proposal Form for use as specified in this addendum, subitem 3:07.1.

SECTION III - DETAILED SPECIFICATIONS

3:07 Aggregates

3:07.1 Fine Aggregates:

Add the following paragraph to this subitem:

Alternate prices for concrete made with the following fine aggregate ASTM C 33-67 modified sieve analysis:

Sieve	Percentage Passing
No. 4	99-100
No. 8	85-100
No. 16	65-97
No. 30	30-70
No. 50	5-35
No. 100	0-5

3:09 Admixtures

3:09.2 Fourth line, after "Master Builders Co.," add the following:

"Daratard HC, a product of W. R. Grace and Company,"

ADDENDUM B

Sheet 1 of 3
January 22, 1969

SECTION III - DETAILED SPECIFICATIONS

3:05 Design Mixes

3:05.1 Structural Concrete Containing No Fly Ash:

Delete contents of this subitem in its entirety and replace with the following:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Maximum Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-3	5000	3	1-1/2"
70 F	5000-3	5000	3	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

3:06 Cement

3:06.2 Delete this subitem in its entirety and replace with the following:

The cement manufacturer shall provide, for the OWNER'S use, four certified copies of mill test reports showing physical and chemical composition on each mill run or sealed storage bin and certifying that the cement complys with the Specification on each shipment delivered to the Supplier.

3:07 Aggregates

3:07.1 Fine Aggregates:

Delete the contents of this subitem in its entirety and replace with the following:

1. Fine aggregate shall conform to ACI-301-66, Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the Testing Laboratory for testing to insure compliance with concrete aggregates, Spec. for, ASTM C 33-67 except as modified herein.

ADDENDUM A

Sheet 2 of 2
October 17, 1968

ALTERNATE PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit No. 3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Addendum 1, Spec. No. SP-5569 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

(70 F) Class 5000-2 (1-1/2" Agg.)	$_____ per cubic yard
(70 F) Class 5000-2 (3/4" Agg.)	$_____ per cubic yard
Class 5000-4 (1-1/2" Agg.)	$_____ per cubic yard
Class 5000-4 (3/4" Agg.)	$_____ per cubic yard
Class 3000-4 (1-1/2" Agg.)	$_____ per cubic yard
Class 3000-4 (3/4" Agg.)	$_____ per cubic yard
Class 3000-4 (3/8" Agg.)	$_____ per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____ per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated:

Class 3000-4 (1-1/2" Agg.)	$_____ per cubic yard
Class 3000-4 (3/4" Agg.)	$_____ per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____ per cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

ADDENDUM B

Sheet 2 of 3
January 22, 1969

2. The grading and uniformity of the fine aggregate shall conform to the following requirement as delivered to the mixers:

Sieve Designation, U.S. Standard Square Mesh	Percentage by Weight Passing
No. 4	95 - 100
No. 8	85 - 100
No. 16	65 - 97
No. 30	30 - 70
No. 50	5 - 35
No. 100	0 - 5

3. In addition to the grading limits above, the fine aggregate, as delivered to the mixer shall have a fineness modulus of not less than 2.20 nor more than 2.70; however, the fineness modulus may not vary more than 0.20 from the value assumed in selecting properties for the concrete. This variation to be based on an average of the last ten gradation samples. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:09 Admixtures

3:09.1 Air Entraining Admixtures:

1. Delete the contents of this subitem in its entirety and replace with the following:

1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	4-6
1-1/2 in.	4-6

ADDENDUM B

Sheet 3 of 3
January 22, 1969

3:12 Quality Control

Delete the contents of this Item in its entirety and replace with the following:

3:12.1 The OWNER will furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content and record weather conditions. With OWNER and/or ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally the OWNER and/or ENGINEER will have the right to reject any concrete which does not meet or can not be adjusted to meet the requirements of this Specification.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Whenever tests of the laboratory cure cylinders fail to meet the requirements set forth in this Specification, the OWNER/ ENGINEER shall have the right, at the supplier's expense to order changes to the proportions of the mix to meet design mix requirements. The supplier shall reimburse the OWNER for the cost of removing and replacing defective concrete including the cost of forming, form removal, reinforcing steel, imbedments, and all other related work and materials when and if the defective concrete is the fault of the supplier.

3:12.3 Quality Control - The supplier will furnish in writing his batch plant operating procedures as well as his Quality Control procedures which he intends to use to insure that his product meets the requirements as outlined in these Specifications. In addition the supplier will provide, for the OWNER'S use, four copies each of the following reports:

1. Reports as listed under Section 1:03 of these Specifications.

2. Mill test reports as outlined under 3:06.2 of these Specifications.

3. Lab tests of batch plant water as listed under 3:08 of these Specifications.

Copies of reports will be mailed to:

Florida Power Corporation
P. O. Box 276
Crystal River, Florida

Attention: Mr. Ed Froats

SP-5569
10-17-69

ADDENDUM C

Sheet 1 of 1
March 13, 1969

SECTION III DETAILED SPECIFICATIONS

3:07 Aggregates

Add new item "3:07.3" to read as follows:

"Freezing and Thawing Tests:

"The freezing and thawing tests as required by ASTM C 33-67, Paragraph 10.1.16, shall be waived."

ADDENDUM B, January 22, 1969

SECTION III DETAILED SPECIFICATIONS

3:05 Design Mixes

3:05.1 Structural Concrete Containing No Fly Ash:

Delete the contents of this subitem in its entirety and replace with the following:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Maximum Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-3	5000	3	1-1/2"
70 F	5000-3	5000	3	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

C O N T E N T S

ADDENDUM D

Sheet 1 of 1
June 23, 1971

SECTION III - DETAILED SPECIFICATIONS

3:09 Admixtures

3:09.1 Air Entraining Admixture:

Subitem 1.:

Delete this subitem as written in Addendum B (dated January 22, 1969) in its entirety and replace with the following:

"1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in	3 - 6
1-1/2 in	3 - 6 "

3:11 Mixing Concrete

3:11.2 Transit Mixing:

Third sentence - Lines 5, 6, and 7:

Delete this sentence in its entirety and replace with the following:

"The maximum number of revolutions at mixing speed shall be 110; any additional mixing shall be at agitating speed, as required by ASTM C 94-67."

3-Spec. file

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3
APPROVED BY:
Engineer _____ Date 3-21-69
Mgr. - Power Engr. _____ Date 3-21-69
Nuclear Proj. Mgr. _____ Date 3-21-69

SPECIFICATION
FOR
FURNISHING AND DELIVERING OF
STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5569 OCTOBER 17, 1968

FPC-321-A3.2

_____ 3-13-69
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 3-13-69
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - W.A.D.
W.O. 4203-00
Addendum A
October 17, 1968
Addendum B
January 22, 1969
Addendum C
March 13, 1969

See Add. D

ADDENDUM A

Sheet 1 of 2
October 17, 1963

SECTION II - PROPOSAL

Attached to this addendum is Alternate Proposal Form for use as specified in this addendum, subitem 3:07.1.

SECTION III - DETAILED SPECIFICATIONS

3:07 Aggregates

3:07.1 Fine Aggregates:

Add the following paragraph to this subitem:

Alternate prices for concrete made with the following fine aggregate ASTM C 33-67 modified sieve analysis:

Sieve	Percentage Passing
No. 4	99-100
No. 8	85-100
No. 16	65-97
No. 30	30-70
No. 50	5-35
No. 100	0-5

3:09 Admixtures

3:09.2 Fourth line, after "Master Builders Co.," add the following:

"Daratard HC, a product of W. R. Grace and Company,"

ADDENDUM A

Sheet 2 of 2
October 17, 1968

ALTERNATE PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit No. 3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Addendum 1, Spec. No. SP-5569 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

(70 F) Class 5000-2 (1-1/2" Agg.) $_____ per cubic yard

(70 F) Class 5000-2 (3/4" Agg.) $_____ per cubic yard

Class 5000-4 (1-1/2" Agg.) $_____ per cubic yard

Class 5000-4 (3/4" Agg.) $_____ per cubic yard

Class 3000-4 (1-1/2" Agg.) $_____ per cubic yard

Class 3000-4 (3/4" Agg.) $_____ per cubic yard

Class 3000-4 (3/8" Agg.) $_____ per cubic yard

Class 1500-4 (1-1/2" Agg.) $_____ per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated:

Class 3000-4 (1-1/2" Agg.) $_____ per cubic yard

Class 3000-4 (3/4" Agg.) $_____ per cubic yard

Class 1500-4 (1-1/2" Agg.) $_____ per cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

ADDENDUM B

Sheet 1 of 3
January 22, 1969

SECTION III - DETAILED SPECIFICATIONS

3:05 Design Mixes

3:05.1 Structural Concrete Containing No Fly Ash:

Delete contents of this subitem in its entirety and replace with the following:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Maximum Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-3	5000	3	1-1/2"
70 F	5000-3	5000	3	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

3:06 Cement

3:06.2 Delete this subitem in its entirety and replace with the following:

The cement manufacturer shall provide, for the OWNER'S use, four certified copies of mill test reports showing physical and chemical composition on each mill run or sealed storage bin and certifying that the cement complys with the Specification on each shipment delivered to the Supplier.

3:07 Aggregates

3:07.1 Fine Aggregates:

Delete the contents of this subitem in its entirety and replace with the following:

1. Fine aggregate shall conform to ACI-301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the Testing Laboratory for testing to insure compliance with concrete aggregates, Spec. for, ASTM C 33-67 except as modified herein.

ADDENDUM B

Sheet 2 of 3
January 22, 1969

2. The grading and uniformity of the fine aggregate shall conform to the following requirement as delivered to the mixers:

Sieve Designation, U.S. Standard Square Mesh	Percentage by Weight Passing
No. 4	95 - 100
No. 8	85 - 100
No. 16	65 - 97
No. 30	30 - 70
No. 50	5 - 35
No. 100	0 - 5

3. In addition to the grading limits above, the fine aggregate, as delivered to the mixer shall have a fineness modulus of not less than 2.20 nor more than 2.70; however, the fineness modulus may not vary more than 0.20 from the value assumed in selecting properties for the concrete. This variation to be based on an average of the last ten gradation samples. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:09 Admixtures

3:09.1 Air Entraining Admixtures:

1. Delete the contents of this subitem in its entirety and replace with the following:

1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	4-6
1-1/2 in.	4-6

ADDENDUM 3

Sheet 3 of 3
January 22, 1969

3:12 Quality Control

Delete the contents of this Item in its entirety and replace with the following:

3:12.1 The OWNER will furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content and record weather conditions. With OWNER and/or ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally the OWNER and/or ENGINEER will have the right to reject any concrete which does not meet or can not be adjusted to meet the requirements of this Specification.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Whenever tests of the laboratory cure cylinders fail to meet the requirements set forth in this Specification, the OWNER/ ENGINEER shall have the right, at the supplier's expense to order changes to the proportions of the mix to meet design mix requirements. The supplier shall reimburse the OWNER for the cost of removing and replacing defective concrete including the cost of forming, form removal, reinforcing steel, imbedments, and all other related work and materials when and if the defective concrete is the fault of the supplier.

3:12.3 Quality Control - The supplier will furnish in writing his batch plant operating procedures as well as his Quality Control procedures which he intends to use to insure that his product meets the requirements as outlined in these Specifications. In addition the supplier will provide, for the OWNER'S use, four copies each of the following reports:

1. Reports as listed under Section 1:03 of these Specifications.
2. Mill test reports as outlined under 3:06.2 of these Specifications.
3. Lab tests of batch plant water as listed under 3:08 of these Specifications.

Copies of reports will be mailed to:

Florida Power Corporation
P. O. Box 276
Crystal River, Florida

Attention: Mr. Ed Froats

ADDENDUM C

Sheet 1 of 1
March 13, 1969

SECTION III DETAILED SPECIFICATIONS

3:07 Aggregates

Add new item "3:07.3" to read as follows:

"Freezing and Thawing Tests:

"The freezing and thawing tests as required by ASTM C 33-67, Paragraph 10.1.16, shall be waived."

ADDENDUM B, January 22, 1969

SECTION III DETAILED SPECIFICATIONS

3:05 Design Mixes

3:05.1 Structural Concrete Containing No Fly Ash:

Delete the contents of this subitem in its entirety and replace with the following:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Maximum Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-3	5000	3	1-1/2"
70 F	5000-3	5000	3	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

C O N T E N T S

SECTION I

INSTRUCTIONS TO BIDDERS

INDEX

1:00 INSTRUCTIONS TO BIDDERS

1:01 Invitation

Proposals are hereby requested by the Florida Power Corporation for the furnishing and delivering of all structural concrete as set forth in the attached Specification No. SP-5569, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation prior to twelve noon _____.

1:02.3 Each Proposal shall be prepared using the Proposal Form, and any data forms, attached hereto. Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Bidder shall furnish unit price quotations for the various classes of concrete as listed under 3:05. Approximately 86,000 cubic yards will be required. This quantity is intended only as a guide and is not guaranteed. However, all unit prices shall be firm and shall not be subject to adjustment because of greater or lesser total quantities than anticipated.

1:02.5 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed WORK. Exception: Unless otherwise stated herein, Florida Sales and Use Tax shall not be included in the bid price.

1:02.6 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.7 Bidders shall also state in their Proposals the complete terms of their guarantee applicable to the materials and/or equipment they propose to furnish under these Specifications.

1:02.8 Bidders shall set forth in their Proposals the terms of payment normal to their company, including cash and/or trade discounts allowed, if any.

1:03 Preliminary Approval

1:03.1 Certified reports prepared by an independent testing laboratory and covering the materials and proportions of each class of concrete shall be submitted with each Bidders' Proposal.

1:03.2 Laboratory testing required for preliminary approval shall be done by an acceptable independent testing laboratory retained and paid by the Bidder.

1:03.3 Reports on cement shall include the type, brand, manufacturer, composition, and method of handling (sack or bulk).

1:03.4 Reports on aggregates shall include the source, type, gradation and specific gravity of each aggregate and the results of all tests required to verify compliance with ASTM C 33-67.

1:04 Evaluation of Proposals

1:04.1 The rate of supply of materials is a basic consideration of the Contract. The Proposals shall be based on the Bidders' ability to satisfy Florida Power Corporation of their ability to furnish concrete at an adequate rate of supply to meet the project requirements. The minimum acceptable delivery rate shall be 150 cubic yards/hour. Bidders shall state in their proposals their maximum rate of supply in cy/hr.

1:04.2 It shall be understood that the evaluation of proposals received in accordance with these Instructions to Bidders and the attached Specifications will be conducted solely by Florida Power Corporation.

1:05 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:06 Shipping Information

Bidders are advised that delivery shall be made to the plant site in accordance with ASTM C 94-67 as specified in Item 3:11.3.

PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit No. 3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Specification No. SP-5569 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

(70 F) Class 5000-2 (1-1/2" Agg.)	$_____	per cubic yard
(70 F) Class 5000-2 (3/4" Agg.)	$_____	per cubic yard
Class 5000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 5000-4 (3/4" Agg.)	$_____	per cubic yard
Class 3000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 3000-4 (3/4" Agg.)	$_____	per cubic yard
Class 3000-4 (3/8" Agg.)	$_____	per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____	per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated:

Class 3000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 3000-4 (3/4" Agg.)	$_____	per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____	per cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SPECIFICATION DATA. Each bidder shall describe the materials, equipment, procedures, and personnel he proposes to use for the work.

Note: Write entries boldly with black ink, or type entries using carbon back or ozalid ribbon. Do not use blue ink or a ball point pen.

Plant location:

Plant capacity cu yd/hr:

Delivery capacity cu yd/hr:

Delivery time from plant to main power plant building:

Brief description of qualifications of supervisory and technical personnel:

(Bidder's Name)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

(70 F) Concrete Class 5000-2
(1-1/2" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

(70 F) Concrete Class 5000-2
(3/4" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

Concrete Class 5000-4
(1-1/2" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

Concrete Class 5000-4
(3/4" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

	Without Fly Ash	With Fly Ash
Concrete Class 3000-4 (1-1/2" Agg.)		
Total gallons of water per cubic yard:		
Cement factor per cubic yard:		
Fly ash per cubic yard:		
Ratio of fine to total aggregates:		
Weight (surface dry) of each aggregate per cubic yard:		
Quantity & Name of each admixture:		
Air content:		
Concrete Class 3000-4 (3/4" Agg.)		
Total gallons of water per cubic yard:		
Cement factor per cubic yard:		
Fly ash per cubic yard:		
Ratio of fine to total aggregates:		
Weight (surface dry) of each aggregate per cubic yard:		
Quantity & Name of each admixture:		
Air content:		

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

Concrete Class 3000-4
(3/8" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

Concrete Class 1500-4
(1-1/2" Agg.)

	Without Fly Ash	With Fly Ash
Total gallons of water per cubic yard:		
Cement factor per cubic yard:		
Fly ash per cubic yard:		
Ratio of fine to total aggregates:		
Weight (surface dry) of each aggregate per cubic yard:		
Quantity & Name of each admixture:		
Air content:		

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

SECTION III

DETAILED SPECIFICATIONS

INDEX

3:00 DETAILED SPECIFICATIONS

3:01 Scope of Work

This Specification covers the furnishing and delivering of all structural concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately five miles northwest of Crystal River, Florida.

3:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "OWNER" shall mean the Florida Power Corporation.
2. "ENGINEER" shall mean Gilbert Associates, Inc., Consulting Engineers.
3. "SUPPLIER" shall mean the successful bidder for the material as outlined in these Specifications.
4. "TESTING LABORATORY" shall mean an independent testing laboratory selected and paid for by Florida Power Corporation except as otherwise noted in these Specifications.

3:03 Payment

3:03.1 Payment for furnishing concrete will be made on the basis of the delivery tickets described hereinafter. Each request for payment shall be accompanied by one copy of the delivery tickets for which payment is requested. Requests for payment may be made weekly, but shall not be made less often than monthly.

3:03.2 Total payment for the concrete furnished under these Specifications shall be the sum of the unit prices stated in the Proposal multiplied by the actual number of corresponding units of each class furnished and accepted for placement.

3:04 Reference Codes and Specifications

All concrete shall be in accordance with the "Specification for Structural Concrete for Buildings," ACI 301-66, "Building Code Requirements for Reinforced Concrete," ACI 318-63, and all current editions of applicable codes as referred to herein, except as may be modified by these Specifications.

3:05 Design Mixes

Each concrete mix shall be designed and concrete shall be controlled to meet the following requirements.

3:05.1 Structural Concrete Containing No Fly Ash:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-2	5000	2	1-1/2"
70 F	5000-2	5000	2	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

3:05.2 Structural Concrete Containing Fly Ash:

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000-4	3000	4	1-1/2"
3000-4	3000	4	3/4"
1500-4	1500	4	1-1/2"

3:05.3 Maximum Fly Ash Content

1. The maximum fly ash content for any mix shall not exceed 20 percent of the total weight of the cement and fly ash used in the mix.

2. Fly ash accumulation, resulting from the OWNER'S operation of Crystal River Plant Unit No. 1, will be made available free of charge at the hopper of the OWNER'S storage bin at the Crystal River Plant. OWNER-furnished fly ash shall be transported to the concrete plant with suitable equipment designed to control dust.

3:05.4 The minimum strength specified shall be compressive strength at age 28 days as determined by ASTM C 39-66.

3:05.5 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestressed and ultimate strength types, and the remainder of the concrete for working stress type. The SUPPLIER shall submit to the OWNER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

3:06 Cement

3:06.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be confined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by OWNER.

3:06.2 The manufacturer shall submit certified copies of mill test reports to the OWNER showing chemical composition and certifying that the cement complies with the Specifications.

3:06.3 The SUPPLIER shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

3:07 Aggregates

3:07.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:07.2 Coarse Aggregate:

Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the OWNER.

3:08 Water

Independent lab tests furnished by the SUPPLIER, of batch plant water shall be submitted initially and periodically as requested by OWNER to insure the mixing water shall be clean and potable, and shall not contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

3:09 Admixtures

3:09.1 Air Entraining Admixture:

1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

2. An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

3:09.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, "Pozzolith, 100-R," a product of the Master Builders Co., or "Protard", a product of Protex Industries, Inc. These products shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-67 T, Type D. The quantity to be added, the controlling temperatures, and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

3:09.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

3:10 Water-Cement Ratio

Maximum water-cement ratio for various strength of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

3:11 Mixing Concrete

3:11.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to insure that the mix

proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall insure that a ticket is provided for each batch as specified in Item 3:11.6 of this Specification.

3:11.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

3:11.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or OWNER. Concrete which does not meet this requirement may be rejected at no cost to the OWNER. However, the SUPPLIER will not be responsible for delays at the site which are beyond his control.

3:11.4 Hot Weather Concrete:

1. Except as modified herein, hot weather concrete shall comply with ACI 605. At air temperatures of 90 F or above, special procedures shall be adopted to keep the concrete as cool as possible. The temperature of the concrete when it is unloaded from the trucks shall not exceed 90 F.

2. Concrete for the containment structural walls, dome, and mat shall have a placing temperature of not more than 70 F.

3:11.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the OWNER.

3:11.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination

as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy to the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

3:12 Quality Control

3:12.1 The OWNER will obtain the services of a TESTING LABORATORY which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C 29-67 T "Unit Weight of Aggregate, Test for."

   b. C 40-66 "Organic Impurities in Sands for Concrete, Test for."

   c. C 127-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C 128-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C 136-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content, and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the SUPPLIER'S expense, to order changes to the proportions of the mix to increase the strength.

3:12.3 The SUPPLIER shall reimburse the OWNER for the cost of removing and replacing defective concrete including the costs of forming, form removal, reinforcing steel, embedments, and all other related WORK and materials when and if the defective concrete is the fault of the SUPPLIER.

8 WS
GP
#3 - Spec. Book

SUGGESTED PRESTRESSING
BIDDERS LIST

Freyssinet Company, Inc. 432 Park Avenue, South New York, New York 10016	Base Bid Alternate Bid	12/600 strands 24/600 strands 36/600 strands
Stressteel Corporation 221 Conyngham Avenue Wilkes-Barre, Pennsylvania 18702	Base Bid Alternate Bid	S 28-5 S 49-5
Prestressing Industries 1338 North W.W. White Road San Antonio, Texas 78219	Base Bid Alternate Bid Alternate Bid	90 - 1/4"ø wire 170 - 1/4"ø wire 184 - 1/4"ø wire
The Prescon Corporation Corpus Christi State National Bldg. Box 2723 Corpus Christi, Texas 78403	Base Bid Alternate Bid Alternate Bid	90 - 1/4"ø wire 170 - 1/4"ø wire 184 - 1/4"ø wire
VSL Corporation P.O. Box 922 236 North Santa Cruz Avenue Los Gatos, California 95030	Base Bid	E5-31 strands
Inland - Ryerson Construction Products Company Box 5532 Chicago, Illinois 60680	Base Bid Alternate Bid Alternate Bid	90 - 1/4"ø wire 170 - 1/4"ø wire 184 - 1/4"ø wire

STRUCTURAL + FILL CONCRETE

Spec. No. 321-A3.2

-C.P

#3 A/...

3

INSTRUCTIONS TO BIDDERS

1:01 Invitation

Proposals are hereby requested by the Florida Power Corporation for the furnishing and delivery of all structural and fill concrete as set forth in the attached Specification No. 321-A3.2, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation prior to twelve noon ________________________________.

1:02.3 Each Proposal shall be prepared using the Proposal Form, and any data forms, attached hereto. Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Bidder shall furnish unit price quotations for the various classes of concrete as listed under 3:05. Approximately 86,000 cubic yards will be required. This quantity is intended only as a guide and is not guaranteed. However, all unit prices shall be firm and shall not be subject to adjustment because of greater or lesser total quantities than anticipated.

1:02.5 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed WORK. Exception: Unless otherwise stated herein, Florida Sales and Use Tax shall not be included in the bid price.

1:02.6 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.7 Bidders shall also state in their Proposals the complete terms of their guarantee applicable to the materials and/or equipment they propose to furnish under these Specifications.

1:02.8 Bidders shall set forth in their Proposals the terms of payment normal to their company, including cash and/or trade discounts allowed, if any.

1:03 Preliminary Approval

1:03.1 Certified reports prepared by an independent testing laboratory and covering the materials and proportions of each class of concrete shall be submitted with each bidders' proposal.

1:03.2 Laboratory testing required for preliminary approval shall be done by an acceptable independent testing laboratory retained and paid by the bidder.

1:03.3 Reports on cement and fly ash shall include the type, brand, manufacturer, composition, and method of handling (sack or bulk).

1:03.4 Reports on aggregates shall include the source, type, gradation and specific gravity of each aggregate and the results of all tests required to verify compliance with ASTM C33.

1:04 Evaluation of Proposals

1:04.1 The rate of supply of materials is a basic consideration of the Contract. The Proposals shall be based on the Bidders' ability to satisfy Florida Power Corporation of their ability to furnish concrete at an adequate rate of supply to meet the project requirements. The minimum acceptable delivery rate shall be 150 cubic yards/hour. Bidders shall state in their proposals their maximum rate of supply in cy/hr.

1:04.2 It shall be understood that the evaluation of Proposals received in accordance with these Instructions to Bidders and the attached Specifications will be conducted solely by Florida Power Corporation.

1:05 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:06 Shipping Information

Bidders are advised that Delivery shall be made to the plant site in accordance with ASTM C94-67 as specified in Items 3:11.3.

PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit #3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Spec. No. 321-A3.2 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

Class 5000 - 3 1/2 $_____ per cubic yard

Class 3000 - 3 1/2 $_____ per cubic yard

Class 1500 - 3 1/2 $_____ per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated, including furnishing of fly ash which shall be by the undersigned:

Class 3000 - 3 1/2 $_____ cubic yard

Class 1500 - 3 1/2 $_____ cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SPECIFICATION DATA. Each bidder shall describe the materials, equipment, procedures, and personnel he proposes to use for the work.

Note: Write entries boldly with black ink, or type entries using carbon back or ozalid ribbon. Do not use blue ink or a ball point pen.

(Bidder's Name) _____

Plant location _____

_____

_____

Plant capacity cu yd/hr _____

Delivery capacity cu yd/hr _____

Delivery time from plant to main power plant building _____

Brief description of qualifications of supervisory and technical personnel. _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

Concrete Class 5000 - 3 1/2

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Fly ash per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity of each admixture _____

_____

Air content _____

Concrete Class 5000 - 3 1/2

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Fly ash per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity of each admixture _____

_____

Air content _____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

	Without Fly Ash	With Fly Ash
Concrete Class 3000 - 3 1/2		
Total gallons of water per cubic yard		
Cement factor per cubic yard		
Fly ash per cubic yard		
Ratio of fine to total aggregates		
Weight (surface dry) of each aggregate per cubic yard		
Quantity of each admixture		
Air content		
Concrete Class 3000 - 3 1/2		
Total gallons of water per cubic yard		
Cement factor per cubic yard		
Fly ash per cubic yard		
Ratio of fine to total aggregates		
Weight (surface dry) of each aggregate per cubic yard		
Quantity of each admixture		
Air content		

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

	(Bidder's Name)
Concrete Class 3000 - 3 1/2	
Total gallons of water per cubic yard	
Cement factor per cubic yard	
Fly ash per cubic yard	
Ratio of fine to total aggregates	
Weight (surface dry) of each aggregate per cubic yard	
Quantity of each admixture	
Air content	
Concrete Class 1500 - 3 1/2	
Total gallons of water per cubic yard	
Cement factor per cubic yard	
Fly ash per cubic yard	
Ratio of fine to total aggregates	
Weight (surface dry) of each aggregate per cubic yard	
Quantity of each admixture	
Air content	

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

DETAILED SPECIFICATIONS FOR READY-MIXED CONCRETE

3:01 Scope of Work

This Specification covers the furnishing and delivery of all structural and fill concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately five miles northwest of Crystal River, Florida.

3:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "Owner" shall mean the Florida Power Corporation.

2. "Engineer" shall mean Gilbert Associates, Inc. Consulting Engineers.

3. "Supplier" shall mean the successful bidder for the material as outlined in these Specifications.

4. "Testing Laboratory". An independent testing laboratory selected and paid for by Florida Power Corporation except as otherwise noted in these Specifications.

3:03 Payment

Payment for furnishing concrete will be made on the basis of the delivery tickets described hereinafter. Each request for payment shall be accompanied by one copy of the delivery tickets for which payment is requested. Requests for payment may be made weekly, but shall not be made less often than monthly.

Total payment for the concrete furnished under these specifications shall be the sum of the unit prices stated in the Proposal multiplied by the actual number of corresponding units of each class furnished and accepted for placement.

3:04 Reference Codes and Specifications

All concrete shall be in accordance with the "Specification for Structural Concrete for Buildings," ACI 301-66 and "Building Code Requirements for Reinforced Concrete," ACI 318-63. Where differences between the aforementioned codes and specifications occur, ACI 301-66 shall apply.

3:05 Design Mixes

Each concrete mix shall be designed and concrete shall be controlled to meet the following requirements.

3:05.1 STRUCTURAL CONCRETE CONTAINING NO FLY ASH

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
5000 - 3 1/2	5000	3 1/2	1 1/2"
5000 - 3 1/2	5000	3 1/2	3/4"
3000 - 3 1/2	3000	3 1/2	1 1/2"
3000 - 3 1/2	3000	3 1/2	3/4"
3000 - 3 1/2	3000	3 1/2	3/8"

3:05.2 STRUCTURAL CONCRETE CONTAINING FLY ASH

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000 - 3 1/2	3000	3 1/2	1 1/2
3000 - 3 1/2	3000	3 1/2	3/4"

3:05.3 FILL CONCRETE

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000 - 3 1/2	3000	3 1/2	1 1/2
1500 - 3 1/2	1500	3 1/2	1 1/2

3:05.4 The minimum strength specified shall be compressive strength at age 28 days as determined by ASTM C39.

3:05.5 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestressed and ultimate strength types, and the remainder of the concrete for working stress type. The SUPPLIER shall submit to the OWNER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

3:06 Cement

3:06.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be confined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by OWNER.

3:06.2 The manufacturer shall submit certified copies of mill test reports to the OWNER showing chemical composition and certifying that the cement complies with the Specifications.

3:06.3 The SUPPLIER shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

3:07 Aggregates

3:07.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:07.2 Coarse Aggregate:

1. Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the OWNER.

3:08 Water

Independent lab tests furnished by the SUPPLIER, of batch plant water shall be submitted initially and periodically as requested by OWNER to insure the mixing water shall be clean and potable, and shall not

contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

3:09 Admixtures

3:09.1 Air Entraining Admixture:

All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

3:09.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, "Pozzolith, 100-R," a product of the Master Builders Co., or "Protard", a product of Protex Industries, Inc., these products shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-67 T, Type D. The quantity to be added, the controlling temperatures and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

3:09.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

3:10 Water-Cement Ratio

Maximum Water-cement ratio for various strength of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

3:11 Mixing Concrete

3:11.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to insure that the mix proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall insure that a ticket is provided for each batch as specified in Item 3:11.6 of this Specification.

3:11.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

3:11.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or OWNER. Concrete which does not meet this requirement may be rejected at no cost to the Company. However, the Supplier will not be responsible for delays at the site which are beyond his control.

3:11.4 Hot Weather Concrete:

Except as modified herein, hot weather concrete shall comply with ACI 605. At air temperatures of 90°F or above, special procedures shall be adopted to keep the concrete as cool as possible. The temperature of the concrete when it is unloaded from the trucks shall not exceed 90°F.

3:11.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the OWNER.

3:11.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy of the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

3:12 Quality Control

3:12.1 The OWNER will obtain the services of a TESTING LABORATORY, which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C [illegible]-67 T "Unit Weight of Aggregate, Test for."

   b. C [illegible]-66 "Organic Impurities in Sands for Concrete, Test for."

   c. C [illegible]-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C [illegible]-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C [illegible]-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the SUPPLIER'S expense, to order changes to the proportions of the mix to increase the strength.

SPECIFICATIONS & DOCUMENTS
FOR
READY-MIXED CONCRETE
FLORIDA POWER CORP.
CRYSTAL RIVER PLANT-UNIT NO. 3

SPECIFICATION NO. 321-A3.2

INSTRUCTIONS TO BIDDERS

1:01 Invitation

Proposals are hereby requested by the Florida Power Corporation for the furnishing and delivery of all structural concrete as set forth in the attached Specification No. 321-A3.2, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation prior to twelve noon NOV 8 1968.

1:02.3 Each Proposal shall be prepared using the Proposal Form, and any data forms, attached hereto. Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Bidder shall furnish unit price quotations for the various classes of concrete as listed under 3:05. Approximately 86,000 cubic yards will be required. This quantity is intended only as a guide and is not guaranteed. However, all unit prices shall be firm and shall not be subject to adjustment because of greater or lesser total quantities than anticipated.

1:02.5 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed WORK. Exception: Unless otherwise stated herein, Florida Sales and Use Tax shall not be included in the bid price.

1:02.6 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.7 Bidders shall also state in their Proposals the complete terms of their guarantee applicable to the materials and/or equipment they propose to furnish under these Specifications.

1:02.8 Bidders shall set forth in their Proposals the terms of payment normal to their company, including cash and/or trade discounts allowed, if any.

1:03 Preliminary Approval

1:03.1 Certified reports prepared by an independent testing laboratory and covering the materials and proportions of each class of concrete shall be submitted with each bidders' proposal.

1:03.2 Laboratory testing required for preliminary approval shall be done by an acceptable independent testing laboratory retained and paid by the bidder.

1:03.3 Reports on cement shall include the type, brand, manufacturer, composition, and method of handling (sack or bulk).

1:03.4 Reports on aggregates shall include the source, type, gradation and specific gravity of each aggregate and the results of all tests required to verify compliance with ASTM C33.

1:04 Evaluation of Proposals

1:04.1 The rate of supply of materials is a basic consideration of the Contract. The Proposals shall be based on the Bidders' ability to satisfy Florida Power Corporation of their ability to furnish concrete at an adequate rate of supply to meet the project requirements. The minimum acceptable delivery rate shall be 150 cubic yards/hour. Bidders shall state in their proposals their maximum rate of supply in cy/hr.

1:04.2 It shall be understood that the evaluation of Proposals received in accordance with these Instructions to Bidders and the attached Specifications will be conducted solely by Florida Power Corporation.

1:05 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:06 Shipping Information

Bidders are advised that Delivery shall be made to the plant site in accordance with ASTM C94-67 as specified in Items 3:11.3.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:
Engineer [signature] Date 10/31/73
Dept. - Power Engr. ORIGINAL SIGNED BY W. A. SZELISTOWSKI Date 10/31/73
Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 10/31/73

REVISED

SPECIFICATION

TENDONS AND ASSOCIATED CONDUIT
REACTOR BUILDING

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5583 SEPTEMBER 15, 1968

NOV 1973
RECEIVED
DOC. CONTROL
CRYSTAL RIVER
NUCLEAR PLANT

FPC-321-B4.3

[signature] 10-11-73
APPROVED - DEPT. PROJECT ENGINEER DATE

[signature] 10-11-73
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

A	✓		SNB
B	✓		SNB

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-W.A.D.
W.O. No. 044203-000
ADDENDUM A
June 7, 1972
ADDENDUM B
October 17, 1973

SPECIFICATION

FOR

FURNISHING AND DELIVERING OF

STRUCTURAL CONCRETE

SP-5569 October 17, 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

FPC-321-A3.2

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - W.A.D.
W.O. 4203.00
Addendum A
October 17, 1968

SECTION I

DETAILED SPECIFICATIONS

INDEX

1:01 Scope of Work

This Specification covers all cast-in-place structural and fill concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately 6 miles northwest of Crystal River, Florida.

1:02 Reference Codes and Specifications

All concrete and concrete WORK shall be in accordance with the "Specifications for Structural Concrete for Buildings," ACI 301-66 and "Building Code Requirements for Reinforced Concrete," ACI 318-63. Where differences between the aforementioned codes and specifications occur, ACI 301-66 shall apply.

1:03 Design Type

All concrete structures except as noted hereinafter are designed on the basis of a working stress design. The shell and foundation mat of the reactor building is designed on the basis of ultimate strength.

1:04 Concrete Strength

1:04.1 Structural concrete shall have a minimum ultimate compressive strength of 3000 psi in 28 days except as otherwise shown on the Drawings. Concrete fill shall have a minimum ultimate compressive strength in 28 days of 3000 psi or 1500 psi as designated on the Drawings. The structural concrete for the reactor building shell, including the foundations, cylindrical walls, and dome, shall have a minimum ultimate compressive strength of 5000 psi in 28 days. The detailed requirements for high strength concrete in the reactor building will be designated on the Drawings.

1:04.2 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 (b) of ACI 301-66. The CONTRACTOR shall submit to the ENGINEER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

1:05 Cement

1:05.1 All cement for the reactor building shell and foundation shall be Portland Cement conforming to "Portland Cement, Spec. for", ASTM C 150-67, Type II, for moderate heat of hydration. All other cement shall be Portland Cement conforming to "Portland Cement, Spec. for", ASTM C 150-67, Type I. The cement for the reactor building shell and foundation shall be confined to a

single brand and shall whenever possible be from the same silo. When a new silo is used the cement shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by ENGINEER.

1:05.2 The manufacturer shall submit certified copies of mill test reports to the ENGINEER showing chemical composition and certifying that the cement complies with the Specifications.

1:05.3 The CONTRACTOR shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

1:06 Aggregates

1:06.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to ensure compliance with "Concrete Aggregates, Spec. for", ASTM C 33-67. The aggregate shall not be used unless approved by the ENGINEER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the ENGINEER.

1:06.2 Coarse Aggregate:

1. Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to ensure compliance with "Concrete Aggregates, Spec. for", ASTM C 33-67. The aggregate shall not be used unless approved by the ENGINEER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the ENGINEER.

2. The maximum size of aggregate shall be not larger than 1/3 of the minimum dimension of the member nor larger than 3/4 of the clear distance between reinforcing bars. The maximum size of aggregate where concrete is used for fire proofing of structural steel shall be not larger than 1/5 the distance between form and steel member.

3. In addition to the above mentioned limitations, the maximum size of coarse aggregate for the various portions of a structure shall not exceed the following:

Portion of Structure	Maximum Size of Coarse Aggregate Based on Square Screen Openings
Reinforced foundation walls, footings, piers, plinths, plain footings, caissons, and substructure walls	1-1/2 inches
Supporting slabs, beams, and reinforced walls	3/4 inches
Fire-proofing of structural steel	3/8 inch stone or pea gravel
Pavement and slabs on fill	2 inches

1:07 Water

The mixing water shall be clean and potable, and shall not contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

1:08 Admixtures

1:08.1 Air Entraining Admixture:

All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following table:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/8 in.	7-9
1/2 in.	6-8
3/4 in.	5-7
1 in.	4.5-6
1-1/2 in.	4.5-5
2 in.	4-5

An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for", ASTM C 260-66 T.

1:08.2 Water Reducing Densifier;

A water reducing densifier shall be added to all structural concrete with a required ultimate compressive strength equal to or greater than 3000 psi at 28 days. The admixture shall be "Plastiment," a product of Sika Chemical Company, or "Pozzolith," a product of the Master Builders Co., and both shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for", ASTM C494-67T, Type D. The quantity to be added, the controlling temperatures and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

1:08.3 Calcium Chloride: PROHIBITED

Admixtures containing calcium chloride shall not be used.

1:09 Water-Cement Ratio

Maximum water-cement ratio for various strengths of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

1:10 Formwork

1:10.1 General:

All poured concrete shall be formed, including the sides of footings and other portions of structures below grade, except that rock cuts may be used as forms for vertical surfaces when shown on the Drawings and/or as directed by the CMCR. Earth cuts shall not be used as forms for vertical surfaces. All exposed edges shall be chamfered. The size of the chamfer strip shall be 3/4 inches, unless otherwise noted on the Drawings.

1:10.2 Material:

1. Forms shall be wood or metal that are of sufficient strength and rigidity, and have a surface suitable for the required finish. If wood is used to form concrete that will be exposed to view, it shall be made with 3/4 in. thick Douglas fir B/B "Plyform" as graded by D.F.P.A. Concrete that will be concealed

from view may also be formed with 3/4 in. thick "Plyform," as above, or else shall be formed with seasoned wood boards of not less than 1 in. stock thickness. Boards shall be free from excessive warpage or other defects that would prevent tight joints or affect the true lines and surfaces of the concrete.

2. All form lumber shall be new, but it may be reused in various parts of this construction as long as it remains in good condition.

3. Metal forms shall be straight and free from distortion that would be apparent in the poured concrete. The forms shall be accurately assembled and fitted so that joints will be straight and continuous and so that adjoining surfaces will be flush.

4. Forms shall be thoroughly cleaned after each use, and surfaces in contact with concrete shall be coated with form oil which has been approved by the OWNER.

1:10.3 Formwork Design:

The design and engineering of the formwork shall be the responsibility of the CONTRACTOR. No shop or field drawings for formwork need be submitted to the ENGINEER.

Centering for beams and girders shall be so designed that they can be stripped without disturbing the intermediate supporting posts or can be removed in an acceptable manner.

1:10.4 Camber:

The ENGINEER shall be consulted regarding the cambering of beams and slabs to compensate for anticipated deflections in the formwork.

1:10.5 Tolerances:

Except as noted hereinafter, formwork shall be constructed so as to ensure that the concrete surfaces will conform to the tolerances of ACI 301-66. The steel plate liner on the reactor building wall used as a concrete form shall be braced and shored to ensure that the deflection does not exceed 1/4 in. for an arc length of 10 ft.

1:10.6 Form Removal:

The removal of formwork shall be in accordance with the requirements of ACI 301-66. The following table shows suggested minimum strengths required before the forms are removed. The minimum time

limits are average values based on 3000 psi concrete, attaining strength under normal job conditions at a temperature of 70 degrees F. The time limits shall be increased for concrete having slower strength development due to lower temperatures or other conditions and may be reduced for concrete developing strength more rapidly, all subject to the approval of the ENGINEER:

Structural Classification	Min. Strength Required - Psi	Min. Period - Days
Sides of footings, walls	500	1
Sides of beams, girders, columns	1500	3
Forms under floor slabs	2000	7
Centering under beams, girders, flat slabs	2500	10

1:11 Reinforcement

1:11.1 Reinforcing Steel:

1. Concrete reinforcing steel shall have a 40,000 psi yield point and shall be deformed bars of intermediate grade billet-steel conforming to "Billet-Steel Bars for Concrete Reinforcement, Spec. for", ASTM A 15-61, with deformations conforming to "Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement, Spec. for", ASTM A305-56. Special large size concrete reinforcing bars shall be deformed bars of intermediate grade billet-steel conforming to "Special Large Size Deformed Billet Steel Bars for Concrete Reinforcement, Spec. for", ASTM A408-56. All reinforcing steel shall be from domestic sources.

2. The ENGINEER shall receive a certified mill test report for each heat of steel covering chemical composition and specification requirements on mechanical properties.

3. Tests shall be performed on reinforcing steel by the TESTING LABORATORY to confirm compliance with physical requirements and verification of mill test results. The frequency of testing shall be two specimens taken from each heat of material in excess of ten tons and within one heat of material, a series of tests for each twenty-five tons of steel. The tests shall determine yield and ultimate strength and elongation. If test results do not meet specification requirements or deviate more than 10% from the mill test results, further testing of that heat of material and an engineering investigation shall be required.

4. All reinforcing bar material shall be kept separated by size and heat in the fabricator's yard. In addition, when loaded for mill shipment, all bars shall be properly separated by size and heat and tagged with the manufacturer's identification number.

1:11.2 Welded Wire Fabric:

Welded wire fabric concrete reinforcement shall conform to "Welded Steel Wire Fabric for Concrete Reinforcement, Spec for", ASTM A 185-64. All welded wire fabric is designated as load carrying reinforcement and shall be spliced in accordance with Section 505 (b) of ACI 301-66.

1:11.3 Detailing Concrete Reinforcement:

The placing Drawings and reinforcing bar details will be furnished by the ENGINEER.

1:11.4 Reinforcing Steel Splices:

No splices of reinforcement shall be made except as shown on the Drawings, or as specified herein, or as approved by the ENGINEER. Minimum lap splice lengths shall be in accordance with ACI 318-63. Lapped splices in tension shall not be used for bar sizes larger than No. 11. Where the bar size exceeds No. 11, "Cadweld" splices shall be used to develop the minimum guaranteed ultimate strength of the bar. Testing of "Cadweld" splices will be based on a [illegible] sampling procedure utilizing a statistical evaluation and shall meet the following Quality Control Requirements for "Cadweld" splices:

1. Prior to the production splicing of reinforcing bars, each operator or crew shall prepare and test two joints for each bar size and position (i.e. vertical, horizontal, side entry, top entry) to be used in the production work. To qualify, the completed splices shall meet the following acceptance standards for workmanship:

   a. Sound, nonporous filler material shall be visible at both ends of the splice sleeve and at the top hole in the center of the sleeve. Filler material is usually recessed 1/4 in. from the end of the sleeve due to the packing material, and is not considered a poor fill.

   b. Splices which contain slag or porous metal in the riser, top hole, or at the ends of the sleeve shall be rejected. A single shrinkage bubble present below the riser is not detrimental and should be distinguished from general porosity as described above.

c. There shall be evidence of filler material between the sleeve and bar for the full 100 percent; however, the splice sleeves need not be exactly concentric or axially aligned with the bars.

d. The strength of the "Cadweld" splice shall be equal to or greater than the specified minimum ultimate tensile strength of the bar.

2. A manufacturer's representative, experienced in "Cadweld" splicing of reinforcing bars, shall be present at the job site at the outset of the WORK to demonstrate the equipment and techniques used for making quality splices. He shall also be present for at least the first 25 production splices to observe and verify that the equipment is being used correctly and that quality splices are being obtained. The following quality control procedures shall be followed to ensure acceptable splices:

a. The splice sleeve, powder, and molds shall be stored in a clean dry area with adequate protection from the elements to prevent absorption of moisture.

b. Each splice sleeve shall be visually examined immediately prior to use to ensure the absence of rust and other foreign material on the inside surface.

c. The molds shall be preheated to drive off moisture at the beginning of each shift when the molds are cold or when a new mold is used.

d. Bar ends to be spliced shall be brushed to remove all loose mill scale, rust, concrete and other foreign material. Prior to brushing, all water, grease and paint shall be removed by heating the bar ends with a torch.

e. A prick punch line shall be marked from the end of each bar for a reference point to confirm that the bar ends are properly centered in the splice sleeves.

f. Before the splice sleeve is placed into final position, the bar ends shall be examined to ensure that the surface is free from moisture. If moisture is present, the bar ends shall be heated until dry.

g. Special attention shall be given to maintaining the alignment of sleeve and guide tube to ensure a proper fill.

h. When the temperature is below freezing the splice sleeve shall be protected after all materials and equipment are in position.

i. All completed splices shall be visually inspected at both ends of the splice sleeve and at the top hole in the center of the splice.

3. To ensure the integrity of the "Cadweld" splice, the quality control procedure shall provide for a random sampling of splices in the field. The selected splices shall be removed and tested to destruction by the TESTING LABORATORY. A sampling of at least sixteen splices shall be initially tested to destruction to develop an average ($\bar{X}$) and standard deviation (σ). Sufficient samples will, therefore, be tested to provide 99% assurance that 95% of the splices meet the Specification requirements. As additional data becomes available, the average ($\bar{X}$) and standard deviation (σ) shall be updated and the quantity of samples revised accordingly. The distribution established on this basis will develop the lower limit below which no test data should fall. If the result of any test falls below this limit, the subsequent or previous splice shall be sampled. If this result is above the lower limit, the process is considered to be in control. If this result is again below the lower limit, the process average must have changed and an engineering investigation will be required to determine the cause of the excess variation and re-establish control.

1:12 Joints and Embedded Items

1:12.1 Construction Joints:

1. Joints not shown on the Drawings shall be made and located in accordance with the requirements of ACI 301-66 and shall be approved in writing by the ENGINEER. Construction joint surfaces except as noted otherwise hereinafter, shall be prepared for the placement of concrete thereon by cleaning thoroughly with wire brushes, water under pressure, or other means to remove all coatings, stains, debris, or other foreign material.

2. Horizontal and vertical construction joints in the reactor building cylindrical shell and dome shall be prepared for receiving the next pour by either sandblasting, air water jet, brush hammering, or other means to remove all coatings, stains, debris, or other foreign material. The horizontal joints shall be dampened (but not saturated), then thoroughly covered with a coat of neat cement mortar of similar

proportions to the mortar in the concrete. The mortar shall be at least 1/2 inch thick and fresh concrete shall be placed before the mortar has attained its initial set. The vertical joints shall be dampened (but not saturated) before concrete is placed.

1:12.2 Expansion Joints:

Premolded expansion joint filler shall conform to "Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Nonbituminous Types), Spec. for", ASTM D 1752-67. The location size and detail of fillers shall be as shown on the Drawings. The expansion joints shall be sealed with a material compatible with the premolded expansion joint filler.

1:12.3 Water Stops:

Water stops shall be polyvinylchloride water stop of the dumbbell or serrated type as manufactured by Servicised Products Corporation or W. R. Meadows, Inc., or approved equal. The location, size and detail of water stops shall be as shown on the Drawings.

1:12.4 Anchor Bolts and Pipe Sleeves:

All anchor bolts and pipe sleeves shall be furnished and installed as shown on the Drawings. Steel for anchor bolts shall conform to "Structural Steel, Spec. For", ASTM A 36-67. Except as otherwise noted on the Drawings, all pipe sleeves shall be USAS, Schedule No. 40. The embedded materials shall be adequately secured in position before placing concrete. After concrete is placed all anchor bolt threads shall be coated with grease. Embedded items shall be checked for line and grade after concrete is placed.

1:13 <u>Mixing Concrete</u>

1:13.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for", ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to ensure that the mix proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall ensure that a ticket is provided for each batch as specified in Item 1:13.6, of this Specification.

1:13.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for", ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

1:13.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or ENGINEER.

1:13.4 Rejected Concrete:

The concrete will be rejected if there is any evidence of "setting up" in the mixer.

1:13.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the ENGINEER.

1:13.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy of the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

1:14 Placing Concrete

1:14.1 Preparation of Subgrade:

1. Where the foundations or concrete structures are shown on the Drawings as being placed on ground, the subgrade supporting them shall be level and trimmed to the lines and dimensions shown and shall be free of debris and organic material. The subgrade shall be compacted by using a suitable compactor to a density of at least 95% of Modified AASHO maximum density. Immediately prior to placing the concrete the subgrade shall be thoroughly wetted. Under no conditions shall concrete be placed on frozen subgrade material.

2. Immediately before any concrete is placed on or against rock, the rock shall be carefully cleaned of all dirt, gravel, boulders, scale, loose fragments and other objectionable substances by air and/or water jetting and brooming, and shall then be thoroughly wetted.

3. Ample notification shall be given to the ENGINEER and/or TESTING LABORATORY prior to placing concrete on subgrade to permit them to inspect the subgrade. It is the intent of the ENGINEER to make a photographic record of the subgrade for selected areas of the containment vessel.

1:14.2 Concreting Under Water:

Concrete shall not be deposited under water without the specific prior approval of the ENGINEER.

1:14.3 Adverse Weather Conditions:

Concrete shall be protected against adverse weather conditions in accordance with "Recommended Practice for Cold Weather Concreting", ACI 306-66, and "Recommended Practice for Hot Weather Concreting", ACI 605-59, except that accelerators such as calcium chloride and anti-freeze compounds shall not be used.

1:15 Floor Hardener

The finished concrete surface of all floors, except those floors shown on the "Floor Finishing Schedule" that require other finishes, shall have a non-metallic hardening compound applied. The hardener shall be Harcol Standard Natural as manufactured by Sonneborn Building Products, Inc. The preparation, placing, finishing and curing of the hardener shall be in accordance with the manufacturer's printed instructions.

1:16 Curing and Protection

Curing methods detailed in ACI 301-66 shall be used except that a curing compound shall not be used for initial and final curing of concrete in the containment shell.

1:17 Grouting Base Plates

1:17.1 Material:

Grout for base plates shall be 1 part cement and 2 parts sand and shall be carefully placed so as to completely fill the voids below the base plates.

1:17.2 Preparation of Surfaces:

Where exposed concrete surfaces are to be covered with grout, the CONTRACTOR shall prepare the surface of the concrete so that a good bond between concrete and grout can be obtained. The surfaces shall be scarified, roughened and all laitance removed.

1:18 Vapor Barrier

The CONTRACTOR shall provide and install a vapor barrier under concrete slabs poured on grade, as shown on the Drawings. The subgrade shall be level and well tamped before installing the vapor barrier. Where necessary, a layer of sand shall be applied to prevent any protrusions from rupturing the vapor barrier. Permanent Moistop as manufactured by the American Sisalkraft Company shall be used. The vapor barrier shall be installed in accordance with the manufacturer's printed instructions in the widest practicable width with all joints lapped no less than 6 inches.

1:19 Perimeter Insulation

The perimeter insulation to be placed vertically against the foundation walls and horizontally under slabs on grade shall be Styrofoam SM expanded polystyrene insulation board as manufactured by the Dow Chemical Company. The insulation board shall be one inch thick and shall be installed in accordance with the manufacturer's printed instructions.

1:20 Quality Control

1:20.1 Preliminary Tests:

1. The OWNER will obtain the services of a TESTING LABORATORY which will, prior to the CONTRACTOR commencing concrete WORK, make preliminary determinations of controlled mixes,

using the materials proposed and consistencies suitable for the WORK, in order to determine the mix proportions necessary to produce concrete conforming to the type and strength requirements called for herein or on the Drawings. Aggregates shall be tested in accordance with the latest editions of the following ASTM Specifications: C 29-67-T, C 40-66, C 127-59, C 128-59 and C 136-67. Compression tests shall conform to ASTM Specification C 39-66 and C 192-66. The CONTRACTOR shall submit to the TESTING LABORATORY, a sufficient time before concrete WORK will commence, all concrete ingredients required by the TESTING LABORATORY for these preliminary tests.

2. The proportions for the concrete mixes will be determined by Method 2 of Section 308 of ACI 301-66 and as hereinbefore specified.

3. The ENGINEER shall have the right to make adjustments in concrete proportions if necessary, to meet the requirements of this Specification.

4. In the event the CONTRACTOR furnished reliable test records of concrete made with materials from the same sources and of the same quality in connection with current WORK, then all or a part of the preliminary strength tests specified hereinbefore may be waived by the ENGINEER, subject, however, to any provisions to the contrary of building codes or ordinances of the governing authority.

1:20.2 Field Tests:

1. During concrete operations, the TESTING LABORATORY will have an inspector at the batch plant who will certify the mixed proportions of each batch delivered to the site, and sample and test periodically all concrete ingredients. Another inspector, at the construction site, will inspect reinforcing and form placements, make slump tests, make test cylinders, check air content, and record weather conditions. Except as noted hereinafter, test cylinders will be molded, cured, capped, and tested in accordance with ACI 301-66. For the reactor building shell, a set of six cylinders will be made for each 50 cubic yards or fraction thereof placed in any one day. Two cylinders shall be tested at 7 days, two cylinders in 28 days and the remaining cylinders at 90 days. Slump tests will be made at random with a minimum of one test for each 10 cubic yards of concrete placed. Slump tests will also be made on the concrete batch used for test cylinders.

2. In the event that concrete is poured during freezing weather or that a freeze is expected during the curing period, an additional cylinder will be made for each set and be cured under the same conditions as the part of the structure which it represents. This cylinder shall be tested at 28 days.

3. The TESTING LABORATORY shall also perform the following tests:

   a. Test "Cadweld" splices, based on a random sampling procedure as specified in Item 1:11.4, subitems 1 thru 3.

   b. Perform user tests and randomly sample reinforcing steel bars in the field and test them to destruction, as specified in Item 1:11.1.

   c. Sample and test cement when cement from a new silo is used, as specified in Item 1:05.

   d. Test samples of proposed fine and coarse aggregate as required by the ENGINEER.

   e. Conduct periodic tests of all mix ingredients including measurement of the content of surface moisture on the aggregates as required by the ENGINEER.

1:20.3 Test Evaluation:

The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification.

1:20.4 Deficient Concrete:

Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER and/or ENGINEER shall have the right, at the CONTRACTOR'S expense, to:

1. Order changes to the proportions of the mix to increase the strength.

2. Require additional tests of specimens cured entirely under field conditions.

3. Order changes to improve procedures for protecting and curing the concrete.

4. Require additional tests in accordance with "Securing, Preparing, and Testing Specimens from Hardened Concrete for Compressive and Flexural Strengths."

If the aforementioned tests fail to prove that the questionable concrete is of the specified quality, the CONTRACTOR shall replace the concrete WORK as directed, by the OWNER and/or ENGINEER all at the CONTRACTOR'S expense.

1:20.5 Records:

1. The TESTING LABORATORY shall be responsible for maintenance of all quality control and test records. The forms and data sheets on which required qualification and tests results and information are to be recorded shall be submitted to the ENGINEER for approval prior to WORK. Completed forms shall be maintained in a manner which makes them available for retrieval within 48 hours for review by cognizant personnel. All quality control and test records shall be delivered to the OWNER on completion of construction.

2. In addition to records of test results, the quality control records to be maintained by the TESTING LABORATORY include the following items:

   a. Certified copies of mill test reports for the cement together with written approval of cement manufacturer by the ENGINEER.

   b. Written approval of the fine and coarse aggregates from the ENGINEER.

   c. Certified mill test reports for the reinforcing steel.

   d. Batch tickets for each batch of concrete.

PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit #3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Spec. No. 321-A3.2 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

(70°F)	Class 5000-2 (1 1/2" Agg.)	$_____ per cubic yard
(70°F)	Class 5000-2 (3/4" Agg.)	$_____ per cubic yard
	Class 5000-4 (1 1/2" Agg.)	$_____ per cubic yard
	Class 5000-4 (3/4" Agg.)	$_____ per cubic yard
	Class 3000-4 (1 1/2"Agg.)	$_____ per cubic yard
	Class 3000-4 (3/4" Agg.)	$_____ per cubic yard
	Class 3000-4 (3/8" Agg.)	$_____ per cubic yard
	Class 1500-4 (1 1/2" Agg.)	$_____ per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated:

	Class 3000-4 (1 1/2" Agg.)	$_____ per cubic yard
	Class 3000-4 (3/4" Agg.)	$_____ per cubic yard
	Class 1500-4 (1 1/2" Agg.)	$_____ per cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SPECIFICATION DATA. Each bidder shall describe the materials, equipment, procedures, and personnel he proposes to use for the work.

Note: Write entries boldly with black ink, or type entries using carbon back or ozalid ribbon. Do not use blue ink or a ball point pen.

_____
(Bidder's Name)

Plant location _____

_____

_____

Plant capacity cu yd/hr _____

Delivery capacity cu yd/hr _____

Delivery time from plant to main power plant building _____

Brief description of qualifications of supervisory and technical personnel.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

_____
(Bidder's Name)

(70°F) Concrete Class 5000-2 (1 1/2" Agg.)

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity & Name of each admixture _____

_____

Air content _____

(70°F) Concrete Class 5000-2 (3/4" Agg.)

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity & Name of each admixture _____

_____

Air content _____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

_____
(Bidder's Name)

Concrete Class 5000-4 (1 1/2" Agg.)

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity & Name of each admixture _____

_____

Air content _____

Concrete Class 5000-4 (3/4" Agg.)

Total gallons of water per cubic yard _____

Cement factor per cubic yard _____

Ratio of fine to total aggregates _____

Weight (surface dry) of each aggregate per cubic yard _____

_____

Quantity & Name of each admixture _____

_____

Air content _____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

_____
(Bidder's Name)

	Without Fly Ash	With Fly Ash
Concrete Class 3000-4 (1 1/2" Agg.)		
Total gallons of water per cubic yard	_____	_____
Cement factor per cubic yard	_____	_____
Fly ash per cubic yard		_____
Ratio of fine to total aggregates	_____	_____
Weight (surface dry) of each aggregate per cubic yard	_____	_____
	_____	_____
Quantity & Name of each admixture	_____	_____
	_____	_____
Air content	_____	_____
Concrete Class 3000-4 (3/4" Agg.)		
Total gallons of water per cubic yard	_____	_____
Cement factor per cubic yard	_____	_____
Fly ash per cubic yard		_____
Ratio of fine to total aggregates	_____	_____
Weight (surface dry) of each aggregate per cubic yard	_____	_____
	_____	_____
Quantity & Name of each admixture	_____	_____
	_____	_____
Air content	_____	_____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

_____
(Bidder's Name)

Concrete Class 3000-4 (3/8" Agg.)

Total gallons of water per cubic yard	_____
Cement factor per cubic yard	_____
Ratio of fine to total aggregates	_____
Weight (surface dry) of each aggregate per cubic yard	_____
	_____
Quantity & Name of each admixture	_____
	_____
Air content	_____

Concrete Class 1500-4 (1 1/2" Agg.)

	Without Fly Ash	With Fly Ash
Total gallons of water per cubic yard	_____	_____
Cement factor per cubic yard	_____	_____
Fly ash per cubic yard	_____	_____
Ratio of fine to total aggregates	_____	_____
Weight (surface dry) of each aggregate per cubic yard	_____	_____
	_____	_____
Quantity & Name of each admixture	_____	_____
	_____	_____
Air content	_____	_____

(Trim Line)

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

DETAILED SPECIFICATIONS FOR READY-MIXED CONCRETE

3:01 Scope of Work

This Specification covers the furnishing and delivery of all structural concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately five miles northwest of Crystal River, Florida.

3:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "Owner" shall mean the Florida Power Corporation.
2. "Engineer" shall mean Gilbert Associates, Inc. Consulting Engineers.
3. "Supplier" shall mean the successful bidder for the material as outlined in these Specifications.
4. "Testing Laboratory". An independent testing laboratory selected and paid for by Florida Power Corporation except as otherwise noted in these Specifications.

3:03 Payment

Payment for furnishing concrete will be made on the basis of the delivery tickets described hereinafter. Each request for payment shall be accompanied by one copy of the delivery tickets for which payment is requested. Requests for payment may be made weekly, but shall not be made less often than monthly.

Total payment for the concrete furnished under these specifications shall be the sum of the unit prices stated in the Proposal multiplied by the actual number of corresponding units of each class furnished and accepted for placement.

3:04 Reference Codes and Specifications

All concrete shall be in accordance with the "Specification for Structural Concrete for Buildings," ACI 301-66, "Building Code Requirements for Reinforced Concrete," ACI 318-63, and all current editions of applicable codes as referred to herein, except as may be modified by these specifications.

3:05 Design Mixes

Each concrete mix shall be designed and concrete shall be controlled to meet the following requirements.

3:05.1 STRUCTURAL CONCRETE CONTAINING NO FLY ASH

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70°F	5000-2	5000	2	1 1/2"
70°F	5000-2	5000	2	3/4"
90°F	5000-4	5000	4	1 1/2"
90°F	5000-4	5000	4	3/4"
90°F	3000-4	3000	4	1 1/2"
90°F	3000-4	3000	4	3/4"
90°F	3000-4	3000	4	3/8"

3:05.2 STRUCTURAL CONCRETE CONTAINING FLY ASH

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000-4	3000	4	1 1/2"
3000-4	3000	4	3/4"
1500-4	1500	4	1 1/2"

3:05.3 MAXIMUM FLY ASH CONTENT. The maximum fly ash content for any mix shall not exceed 20 per cent of the total weight of the cement and fly ash used in the mix.

Fly ash accumulation, resulting from the Owner's operation of Crystal River Plant Unit No. 1, will be made available free of charge at the hopper of the Owner's storage bin at the Crystal River Plant. Owner-furnished fly ash shall be transported to the concrete plant with suitable equipment designed to control dust.

3:05.4 The minimum strength specified shall be compressive strength at age 28 days as determined by ASTM C39.

3:05.5 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestresed and ultimate strength types, and the remainder of the concrete for working stress type. The SUPPLIER shall submit to the OWNER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

3:06 Cement

3:06.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be confined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by OWNER.

3:06.2 The manufacturer shall submit certified copies of mill test reports to the OWNER showing chemical composition and certifying that the cement complies with the Specifications.

3:06.3 The SUPPLIER shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

3:07 Aggregates

3:07.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:07.2 Coarse Aggregate:

1. Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the OWNER.

3:08 Water

Independent lab tests furnished by the SUPPLIER, of batch plant water shall be submitted initially and periodically as requested by OWNER to insure the mixing water shall be clean and potable, and shall not contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

3:09 Admixtures

3:09.1 Air Entraining Admixture:

All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

3:09.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, "Pozzolith, 100-R," a product of the Master Builders Co., or "Protard", a product of Protex Industries, Inc., these products shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-67 T, Type D. The quantity to be added, the controlling temperatures and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

3:09.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

3:10 Water-Cement Ratio

Maximum Water-cement ratio for various strength of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

3:11 Mixing Concrete

3:11.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to insure that the mix proportions comply with those for the

design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall insure that a ticket is provided for each batch as specified in Item 3:11.6 of this Specification.

3:11.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

3:11.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or OWNER. Concrete which does not meet this requirement may be rejected at no cost to the Owner. However, the Supplier will not be responsible for delays at the site which are beyond his control.

3:11.4 Hot Weather Concrete:

Except as modified herein, hot weather concrete shall comply with ACI 605. At air temperatures of 90°F or above, special procedures shall be adopted to keep the concrete as cool as possible. The temperature of the concrete when it is unloaded from the trucks shall not exceed 90°F.

Concrete for the containment structural walls, dome and mat shall have a placing temperature of not more than 70°F.

3:11.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the OWNER.

3:11.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design

strength, destination as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy to the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

3:12 Quality Control

3:12.1 The OWNER will obtain the services of a TESTING LABORATORY, which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C 29-67 T "Unit Weight of Aggregate, Test for."

   b. C 40-66 "Organic Impurities in Sands for Concrete, Test for."

   c. C 127-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C 128-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C 136-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the SUPPLIER'S expense, to order changes to the proportions of the mix to increase the strength.

The supplier shall reimburse the owner for the cost of removing and replacing defective concrete including the costs of forming, form removal, reinforcing steel, embedments, and all other related work and materials when and if the defective concrete is the fault of the supplier.

SPECIFICATION

FOR

FURNISHING AND DELIVERING OF

STRUCTURAL CONCRETE

SP-5569 OCTOBER 17, 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

FPC-321-A3.2

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.- W.A.D.
W.O. 4203.00

C O N T E N T S

SECTION I

INSTRUCTIONS TO BIDDERS

INDEX

1:00 INSTRUCTIONS TO BIDDERS

1:01 Invitation

Proposals are hereby requested by the Florida Power Corporation for the furnishing and delivering of all structural concrete as set forth in the attached Specification No. SP-5569, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation prior to twelve noon _____.

1:02.3 Each Proposal shall be prepared using the Proposal Form, and any data forms, attached hereto. Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Bidder shall furnish unit price quotations for the various classes of concrete as listed under 3:05. Approximately 86,000 cubic yards will be required. This quantity is intended only as a guide and is not guaranteed. However, all unit prices shall be firm and shall not be subject to adjustment because of greater or lesser total quantities than anticipated.

1:02.5 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed WORK. Exception: Unless otherwise stated herein, Florida Sales and Use Tax shall not be included in the bid price.

1:02.6 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.7 Bidders shall also state in their Proposals the complete terms of their guarantee applicable to the materials and/or equipment they propose to furnish under these Specifications.

1:02.8 Bidders shall set forth in their Proposals the terms of payment normal to their company, including cash and/or trade discounts allowed, if any.

1:03 Preliminary Approval

1:03.1 Certified reports prepared by an independent testing laboratory and covering the materials and proportions of each class of concrete shall be submitted with each Bidders' Proposal.

1:03.2 Laboratory testing required for preliminary approval shall be done by an acceptable independent testing laboratory retained and paid by the Bidder.

1:03.3 Reports on cement shall include the type, brand, manufacturer, composition, and method of handling (sack or bulk).

1:03.4 Reports on aggregates shall include the source, type, gradation and specific gravity of each aggregate and the results of all tests required to verify compliance with ASTM C 33-67.

1:04 Evaluation of Proposals

1:04.1 The rate of supply of materials is a basic consideration of the Contract. The Proposals shall be based on the Bidders' ability to satisfy Florida Power Corporation of their ability to furnish concrete at an adequate rate of supply to meet the project requirements. The minimum acceptable delivery rate shall be 150 cubic yards/hour. Bidders shall state in their proposals their maximum rate of supply in cy/hr.

1:04.2 It shall be understood that the evaluation of proposals received in accordance with these Instructions to Bidders and the attached Specifications will be conducted solely by Florida Power Corporation.

1:05 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:06 Shipping Information

Bidders are advised that delivery shall be made to the plant site in accordance with ASTM C 94-67 as specified in Item 3:11.3.

PROPOSAL

To: Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

Gentlemen:

The undersigned hereby proposes to furnish ready-mixed concrete for the Unit No. 3 addition to Florida Power Corporation's Crystal River Plant, in accordance with Specification No. SP-5569 for the following prices:

Unit prices for furnishing ready-mixed concrete containing no fly ash and of the classes indicated:

(70 F) Class 5000-2 (1-1/2" Agg.)	$_____	per cubic yard
(70 F) Class 5000-2 (3/4" Agg.)	$_____	per cubic yard
Class 5000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 5000-4 (3/4" Agg.)	$_____	per cubic yard
Class 3000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 3000-4 (3/4" Agg.)	$_____	per cubic yard
Class 3000-4 (3/8" Agg.)	$_____	per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____	per cubic yard

Unit prices for furnishing ready-mixed concrete containing fly ash and of the classes indicated:

Class 3000-4 (1-1/2" Agg.)	$_____	per cubic yard
Class 3000-4 (3/4" Agg.)	$_____	per cubic yard
Class 1500-4 (1-1/2" Agg.)	$_____	per cubic yard

It is hereby stated that the undersigned can maintain delivery of ready-mixed concrete at a maximum rate of _____ cubic yards per hour continuously.

Date of Bid _____ Signed _____

By _____

Title _____

Business Address of Bidder _____

State of Incorporation _____

Address of Principal Office _____

SPECIFICATION DATA. Each bidder shall describe the materials, equipment, procedures, and personnel he proposes to use for the work.

Note: Write entries boldly with black ink, or type entries using carbon back or ozalid ribbon. Do not use blue ink or a ball point pen.

Plant location:

Plant capacity cu yd/hr:

Delivery capacity cu yd/hr:

Delivery time from plant to main power plant building:

Brief description of qualifications of supervisory and technical personnel:

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

(Bidder's Name)

(70 F) Concrete Class 5000-2
(1-1/2" Agg.)

Total gallons of water per cubic yard:

Cement factor per cubic yard:

Ratio of fine to total aggregates:

Weight (surface dry) of each aggregate per cubic yard:

Quantity & Name of each admixture:

Air content:

(70 F) Concrete Class 5000-2
(3/4" Agg.)

Total gallons of water per cubic yard:

Cement factor per cubic yard:

Ratio of fine to total aggregates:

Weight (surface dry) of each aggregate per cubic yard:

Quantity & Name of each admixture:

Air content:

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

Concrete Class 5000-4
(1-1/2" Agg.)

Total gallons of water per cubic yard:

Cement factor per cubic yard:

Ratio of fine to total aggregates:

Weight (surface dry) of each aggregate per cubic yard:

Quantity & Name of each admixture:

Air content:

Concrete Class 5000-4
(3/4" Agg.)

Total gallons of water per cubic yard:

Cement factor per cubic yard:

Ratio of fine to total aggregates:

Weight (surface dry) of each aggregate per cubic yard:

Quantity & Name of each admixture:

Air content:

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

	Without Fly Ash	With Fly Ash
Concrete Class 3000-4 (1-1/2" Agg.)		
Total gallons of water per cubic yard:		
Cement factor per cubic yard:		
Fly ash per cubic yard:		
Ratio of fine to total aggregates:		
Weight (surface dry) of each aggregate per cubic yard:		
Quantity & Name of each admixture:		
Air content:		
Concrete Class 3000-4 (3/4" Agg.)		
Total gallons of water per cubic yard:		
Cement factor per cubic yard:		
Fly ash per cubic yard:		
Ratio of fine to total aggregates:		
Weight (surface dry) of each aggregate per cubic yard:		
Quantity & Name of each admixture:		
Air content:		

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

(Bidder's Name)

Concrete Class 3000-4
(3/8" Agg.)

Total gallons of water per cubic yard: _____

Cement factor per cubic yard: _____

Ratio of fine to total aggregates: _____

Weight (surface dry) of each aggregate per cubic yard: _____

_____

Quantity & Name of each admixture: _____

_____

Air content: _____

Concrete Class 1500-4
(1-1/2" Agg.)

	Without Fly Ash	With Fly Ash
Total gallons of water per cubic yard:	_____	_____
Cement factor per cubic yard:	_____	_____
Fly ash per cubic yard:	_____	_____
Ratio of fine to total aggregates:	_____	_____
Weight (surface dry) of each aggregate per cubic yard:	_____	_____
	_____	_____
Quantity & Name of each admixture:	_____	_____
	_____	_____
Air content:	_____	_____

(FLORIDA POWER CORPORATION)
(READY-MIXED CONCRETE)

SECTION III

DETAILED SPECIFICATIONS

INDEX

3:00 DETAILED SPECIFICATIONS

3:01 Scope of Work

This Specification covers the furnishing and delivering of all structural concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately five miles northwest of Crystal River, Florida.

3:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "OWNER" shall mean the Florida Power Corporation.
2. "ENGINEER" shall mean Gilbert Associates, Inc., Consulting Engineers.
3. "SUPPLIER" shall mean the successful bidder for the material as outlined in these Specifications.
4. "TESTING LABORATORY" shall mean an independent testing laboratory selected and paid for by Florida Power Corporation except as otherwise noted in these Specifications.

3:03 Payment

3:03.1 Payment for furnishing concrete will be made on the basis of the delivery tickets described hereinafter. Each request for payment shall be accompanied by one copy of the delivery tickets for which payment is requested. Requests for payment may be made weekly, but shall not be made less often than monthly.

3:03.2 Total payment for the concrete furnished under these Specifications shall be the sum of the unit prices stated in the Proposal multiplied by the actual number of corresponding units of each class furnished and accepted for placement.

3:04 Reference Codes and Specifications

All concrete shall be in accordance with the "Specification for Structural Concrete for Buildings," ACI 301-66, "Building Code Requirements for Reinforced Concrete," ACI 318-63, and all current editions of applicable codes as referred to herein, except as may be modified by these Specifications.

3:05 Design Mixes

Each concrete mix shall be designed and concrete shall be controlled to meet the following requirements.

3:05.1 Structural Concrete Containing No Fly Ash:

Max. Placing Temp.	Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
70 F	5000-2	5000	2	1-1/2"
70 F	5000-2	5000	2	3/4"
90 F	5000-4	5000	4	1-1/2"
90 F	5000-4	5000	4	3/4"
90 F	3000-4	3000	4	1-1/2"
90 F	3000-4	3000	4	3/4"
90 F	3000-4	3000	4	3/8"
90 F	1500-4	1500	4	1-1/2"

3:05.2 Structural Concrete Containing Fly Ash:

Concrete Class	Minimum Strength (PSI)	Slump (Inches)	Maximum Size Coarse Aggregate (Inches)
3000-4	3000	4	1-1/2"
3000-4	3000	4	3/4"
1500-4	1500	4	1-1/2"

3:05.3 Maximum Fly Ash Content

1. The maximum fly ash content for any mix shall not exceed 20 percent of the total weight of the cement and fly ash used in the mix.

2. Fly ash accumulation, resulting from the OWNER'S operation of Crystal River Plant Unit No. 1, will be made available free of charge at the hopper of the OWNER'S storage bin at the Crystal River Plant. OWNER-furnished fly ash shall be transported to the concrete plant with suitable equipment designed to control dust.

3:05.4 The minimum strength specified shall be compressive strength at age 28 days as determined by ASTM C 39-66.

3:05.5 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestressed and ultimate strength types, and the remainder of the concrete for working stress type. The SUPPLIER shall submit to the OWNER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

3:06 Cement

3:06.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be confined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by OWNER.

3:06.2 The manufacturer shall submit certified copies of mill test reports to the OWNER showing chemical composition and certifying that the cement complies with the Specifications.

3:06.3 The SUPPLIER shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

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3:07.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the OWNER.

3:07.2 Coarse Aggregate:

Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the TESTING LABORATORY for testing to insure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the OWNER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the OWNER.

3:08 Water

Independent lab tests furnished by the SUPPLIER, of batch plant water shall be submitted initially and periodically as requested by OWNER to insure the mixing water shall be clean and potable, and shall not contain greater than 100 ppm each of chlorides, sulfides, and nitrates, and the turbidity shall not exceed 2000 ppm.

3:09 Admixtures

3:09.1 Air Entraining Admixture:

1. All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

2. An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

3:09.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, "Pozzolith, 100-R," a product of the Master Builders Co., or "Protard", a product of Protex Industries, Inc. These products shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-67 T, Type D. The quantity to be added, the controlling temperatures, and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

3:09.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

3:10 Water-Cement Ratio

Maximum water-cement ratio for various strength of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

3:11 Mixing Concrete

3:11.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to insure that the mix

proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall insure that a ticket is provided for each batch as specified in Item 3:11.6 of this Specification.

3:11.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The maximum number of revolutions at mixing speed shall be 100; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

3:11.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or OWNER. Concrete which does not meet this requirement may be rejected at no cost to the OWNER. However, the SUPPLIER will not be responsible for delays at the site which are beyond his control.

3:11.4 Hot Weather Concrete:

1. Except as modified herein, hot weather concrete shall comply with ACI 605. At air temperatures of 90 F or above, special procedures shall be adopted to keep the concrete as cool as possible. The temperature of the concrete when it is unloaded from the trucks shall not exceed 90 F.

2. Concrete for the containment structural walls, dome, and mat shall have a placing temperature of not more than 70 F.

3:11.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no changes in quantity of mixing water shall be made without the approval of the OWNER.

3:11.6 Batch Record:

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination

as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy to the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

3:12 Quality Control

3:12.1 The OWNER will obtain the services of a TESTING LABORATORY which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C 29-67 T "Unit Weight of Aggregate, Test for."

   b. C 40-66 "Organic Impurities in Sands for Concrete, Test for."

   c. C 127-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C 128-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C 136-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content, and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

3:12.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the SUPPLIER'S expense, to order changes to the proportions of the mix to increase the strength.

3:12.3 The SUPPLIER shall reimburse the OWNER for the cost of removing and replacing defective concrete including the costs of forming, form removal, reinforcing steel, embedments, and all other related WORK and materials when and if the defective concrete is the fault of the SUPPLIER.

#3 - Spec. Book

3

PRELIMINARY

SPECIFICATIONS

STURCTURAL CONCRETE

P-SP-5569 JUNE 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G. - E.K.A.
W.O. 1203.00

PRELIMINARY

SPECIFICATION

STRUCTURAL CONCRETE

P-SP-5569 JULY 1968

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

R.L.G. - E.K.A.
W.O. 4203.00

C O N T E N T S

SECTION I

INSTRUCTIONS TO BIDDERS

INDEX

1:01 Invitation

Proposals are hereby requested by the Florida Power Corporation for the furnishing and delivery of all structural and fill concrete as set forth in the attached Specification SP-5569, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P.O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation prior to twelve noon _____.

1:02.3 Each Proposal shall be prepared using the Proposal Form, and any data forms, attached hereto. Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Bidder shall furnish unit price quotations for the several classes of concrete based on the estimated quantities of each stated in Item 4:03.

1:02.5 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed work. Exception: Unless otherwise stated herein, Florida Sales and Use Tax shall not be included in the bid price.

1:02.6 The Bidders shall state in their Proposals that the materials and/or equipment will meet the specifications as set forth herein. Any exceptions to the specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.7 Bidders shall also state in their Proposals the complete terms of their guarantee applicable to the materials and/or equipment they propose to furnish under these specifications.

1:02.8 Royalties and fees for patents covering materials, articles, apparatus, devices or equipment used in the WORK shall be included in the Contract Price.

1:02.9 The Bidders shall not include, in their Proposals, the costs of insurance described in 3:18, which will be covered by the OWNER.

1:02.10 Bidders shall set forth in their Proposals the terms of payment normal to their company, including cash and/or trade discounts allowed, if any. The unit prices shall include the cost of delivery to the job site, and unloading where and as required by the OWNER for placement by Others.

1:03 Evaluation of Proposals

1:03.1 The rate of supply of materials is a basic consideration of the Contract. The Proposals shall be based on the Bidders' ability to satisfy Florida Power Corporation of their ability to furnish concrete at an adequate rate or supply to meet the project requirements. Bidders shall state in their Proposals their maximum rate of supply in cy/hr.

1:03.2 It shall be understood that the evaluation of Proposals received in accordance with these Instructions to Bidders and the attached Specifications will be conducted solely by Florida Power Corporation.

1:04 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:05 Awards to Bidders and Payment

Florida Power Corporation will issue all purchase orders and make payment for the materials and/or equipment purchased.

1:06 Shipping Information

Bidders are advised that delivery shall be made to the plant site in accordance with ASTM C94-67 as specified in Item 4:08.3.

2:00 PROPOSAL

This Section to be added later by Florida Power Corporation.

3:00 GENERAL CONDITIONS

This Section to be prepared later.

SECTION IV

DETAILED SPECIFICATIONS

INDEX

SECTION IV

DETAILED SPECIFICATIONS

INDEX

4:01 Scope of Work

This Specification covers the furnishing and delivery of all structural and fill concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately 5 miles northwest of Crystal River, Florida.

4:02 Reference Codes and Specifications

All concrete and concrete WORK shall be in accordance with the "Specifications for Structural Concrete for Buildings," ACI 301-66 and "Building Code Requirements for Reinforced Concrete," ACI 318-63. Where differences between the aforementioned codes and specifications occur, ACI 301-66 shall apply.

4:03 Concrete Strengths

4:03.1 The specified 28 day minimum ultimate compressive strengths, and the estimated quantities of each, shall be as follows:

1. Structural Concrete:

5000 psi	19,000 cy
3000 psi 1-1/2 in. ca	36,000 cy
3000 psi 3/4 in. ca	29,000 cy

2. Fill Concrete:

3000 psi	1000 cy
1500 psi	1000 cy

4:03.2 The determination of the water-cement ratio to attain the required strength shall be in accordance with Method 2, Section 308 of ACI 301-66. The 5000 psi concrete shall be designed for prestressed and ultimate strength types, and the remainder of the concrete for working stress type. The CONTRACTOR shall submit to the ENGINEER for approval the proportions proposed for use and shall also furnish the required test data as evidence that the proportions selected will produce concrete of the specified quality.

4:04 Cement

4:04.1 All cement shall be Portland Cement conforming to "Portland Cement, Spec. for," ASTM C 150-67, Type II, for moderate heat hydration. All cement shall be combined to a single brand and whenever required by the OWNER, shall be sampled and tested by the TESTING

LABORATORY to ascertain conformance with ASTM C 150-67, Type II. All cement shall have an established reputation for being uniform in character and shall be approved in writing by ENGINEER.

4:04.2 The manufacturer shall submit certified copies of mill test reports to the ENGINEER showing chemical composition and certifying that the cement complies with the Specifications.

4:04.3 The CONTRACTOR shall store the cement in a dry place and in such a manner as to permit easy access for proper inspection and identification of each shipment. All cement stored at the mixing plant or construction site more than six months shall be resampled and tested before used.

4:05 Aggregates

4:05.1 Fine Aggregates:

Fine aggregate shall conform to ACI 301-66. Only natural sand shall be used. Samples of the proposed aggregate shall be submitted to the ENGINEER LABORATORY for testing to ensure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the ENGINEER in writing after the results of the test have been ascertained. The source of the fine aggregate shall not be changed without the written approval of the ENGINEER.

4:05.2 Coarse Aggregate:

1. Coarse aggregate shall conform to ACI 301-66. Samples of the proposed aggregate shall be submitted to the ENGINEER LABORATORY for testing to ensure compliance with "Concrete Aggregates, Spec. for," ASTM C 33-67. The aggregate shall not be used unless approved by the ENGINEER in writing after the results of the test have been ascertained. The source of the coarse aggregate shall not be changed without the written approval of the ENGINEER.

2. The maximum size of aggregate for the 3000 psi concrete based on square screen openings shall be 1-1/2 inches. For the 3000 psi structural concrete, one mix shall be designed with the maximum size of aggregate of 1-1/2 inches, and another mix with the maximum size of aggregate of 3/4 inches. The maximum size of aggregate for the fill concrete shall be 1-1/2 inches.

4:06 Water

The mixing water shall be clean and potable, and shall not contain greater than 350 ppm each of chlorides, sulfides, and nitrates, and the total solids shall not exceed 1000 ppm.

4:07 Admixtures

4:07.1 Air Entraining Admixture:

All structural concrete shall be considered subject to potentially destructive exposure and shall contain entrained air in amounts conforming with the following:

Nominal Maximum Size of Coarse Aggregate	Total Air Content % by Volume
3/4 in.	5-7
1-1/2 in.	4.5-5

An air entraining admixture shall be used conforming to "Air-Entraining Admixtures for Concrete, Spec. for," ASTM C 260-66 T.

4:07.2 Water Reducing Densifier:

A water reducing densifier shall be added to all structural concrete. The admixture shall be "Plastiment," a product of Sika Chemical Company, or "Pozzolith, 100-R," a product of the Master Builders Co., and both shall conform in all respects to "Chemical Admixtures for Concrete, Spec. for," ASTM C 494-65 T, Type D. The quantity to be added, the controlling temperature, and the method of mixing shall conform to the manufacturers' recommendations for use of their product.

4:07.3 Calcium Chloride:

Admixtures containing calcium chloride shall not be used.

4:08 Water-Cement Ratio

Maximum water-cement ratio for various strengths of concrete shall be as follows:

Compressive Strength (psi at 28 days)	Gallons of Water/ Sack of Cement
5000	5
3000	6

4:09 Mixing Concrete

4:09.1 Measuring Materials:

A concrete batch plant shall be utilized which complies in all respects including provisions for storage and precision of measurements with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The TESTING LABORATORY will maintain an inspector at the batch plant to ensure that the mix proportions comply with those for the design mixes with water content modified as required by measurements to be made of content of surface moisture on the aggregates. This inspector will test periodically all mix ingredients and shall ensure that a ticket is provided for each batch as specified in Item 4:09.6, of this Specification.

4:09.2 Transit Mixing:

Ready-mixed concrete shall be mixed and transported in accordance with "Ready-Mixed Concrete, Spec. for," ASTM C 94-67. The minimum amount of mixing in truck mixers loaded to maximum capacity shall be 70 revolutions of the drum or blades after all of the ingredients, including water, are in the mixer. The minimum number of revolutions at mixing speed shall be 300; any additional mixing shall be at agitating speed, as required by ASTM C 94-67. All trucks shall be equipped with a revolution counter.

4:09.3 Delivery:

The concrete shall be delivered to the site and discharge shall be completed within 1-1/2 hours or before the drum has been revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates, or the introduction of the cement to the aggregates. In hot weather, the 1-1/2 hour time limit shall be reduced, as directed by the TESTING LABORATORY and/or ENGINEER.

4:09.4 Rejected Concrete:

The concrete will be rejected if there is any evidence of "setting up" in the mixer.

4:09.5 Mixing Water:

The proportion of water in each strength mix shall be adjusted daily as required by the content of surface moisture on the aggregates. Except for this adjustment, no change in quantity of mixing water shall be made without the approval of the ENGINEER.

4:09.6 **Batch Record:**

Each batch of concrete shall be recorded on a ticket which provides the date, actual proportions of the mix, concrete design strength, destination as to portion of structure, and identification of transit mixer. The truck driver shall deliver this record to the OWNER with a copy to the TESTING LABORATORY personnel at the location where the concrete is delivered. As required by ASTM C 94-67, the batch ticket shall also include the time loaded, amount of concrete, and reading of revolution counter at first addition of water.

4:10 **Quality Control**

4:10.1 The OWNER will obtain the servies of a TESTING LABORATORY, which will perform the functions hereinafter specified:

1. Sample and test cement, when required by the OWNER, to ascertain conformance with ASTM C 150-67, Type II.

2. Test samples of fine and coarse aggregates to ascertain conformance with the following ASTM specifications:

   a. C 29-67 T "Unit Weight of Aggregate, Test for."

   b. C 40-66 "Organic Impurities in sands for Concrete, Test for."

   c. C 127-59 "Specific Gravity and Absorption of Coarse Aggregate, Test for."

   d. C 128-59 "Specific Gravity and Absorption of Fine Aggregate, Test for."

   e. C 136-67 "Sieve or Screen Analysis of Fine and Coarse Aggregates, Test for."

3. Conduct periodic tests to determine surface moisture content of aggregates.

4. During concreting operations, furnish the services of an inspector at the batch plant who will certify the mix proportions and conduct the tests itemized above.

5. Furnish the services of an inspector at the site who will make slump tests, make test cylinders, check air content and record weather conditions. With OWNER/ENGINEER approval, he will make adjustments in the mix proportions, if necessary, to meet the requirements of this Specification. Finally, he will have the right to reject any concrete which does not meet or cannot be adjusted to meet the requirements of this Specification.

6. Maintain all quality control and test records, which will include certified copies of mill test reports for the cement and batch tickets for each batch of concrete.

4:10.2 The evaluation of test results will be in accordance with Chapter 17 of ACI 301-66. Sufficient tests will be conducted to provide an evaluation of concrete strength in accordance with this Specification. Whenever it appears that tests of the laboratory cured cylinders fail to meet the requirements set forth in this Specification, the OWNER/ENGINEER shall have the right, at the CONTRACTOR'S expense, to order changes to the proportions of the mix to increase the strength.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer: [illegible] Date 10/31/73
ORIGINAL SIGNED BY
Mgr. - Power Engr. W. A. SZELISTOWSKI Date 10/31/73
Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 10/31/73

REVIEW [illegible]
RECEIVED

SPECIFICATION

TENDONS AND ASSOCIATED CONDUIT
REACTOR BUILDING

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5583 SEPTEMBER 18, 1968

NOV 1973
RECEIVED
DOC. CONTROL
CRYSTAL RIVER
NUCLEAR PLANT

FPC-321-B4.3

[signature] 10-11-73
APPROVED - DEPT. PROJECT ENGINEER DATE

[signature] 10-11-73
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

A	✓		SNO
B	✓		SNO

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-W.A.D.
W.O. No. 044203-000
ADDENDUM A
June 7, 1972
ADDENDUM B
October 17, 1973

ADDENDUM B

Sheet 1 of 2
October 17, 1973

SECTION IV - DETAILED SPECIFICATIONS

4:01 Scope of Work

4:01.2 Alternate Scope of Work:

Subitem 1. (as amended by Addendum A, dated June 7, 1972):

Line 2, after the third word (and) delete the words "temporary closures" and replace with the following:

"end caps"

Subitem 5, line 1, after the fourth word (and) delete the words "temporary end closures" and replace with the following:

"end caps"

4:06 Manufacturing Procedures

Add the following new subitem:

"8. End Caps:

Permanent end caps and gasket design shall be tested using fluid corrosion protection wax specified in this item, by the CONTRACTOR to ensure that leakage of the corrosion protection wax will not occur. The criterion shall be no leakage of wax for a minimum pressure of equal to or greater than one and one half (1-1/2) times the maximum bulk filling pressure. This test shall demonstrate that there is no permanent distortion of the cap. The type of wax shall be Viscocrust 2090P-2 or EQUAL as approved by the ENGINEER. The test report shall be submitted to the ENGINEER for approval at least 30 days prior to end cap fabrication. The report shall give details of cap and gasket including securing to the bearing plate requirements so that a comparison with shop drawings can be made. The gasket material shall be capable of maintaining its required performance, when exposed to the environment of the job site, for a minimum period of 5 years. All surfaces of the end caps shall be coated with a minimum of 5 mils thickness of Carbo Zinc 11, as manufactured by Carboline, St. Louis, Missouri, or EQUAL. Surface preparation of the end cap shall be in accordance with the coating manufacturer's recommendations. The end cap fabrication and inspection shall be subject to the quality control measures and procedures indicated under Item 4:12 of this Specification. Inspection procedures, testing procedures, welding procedures, and fabrication procedures covering end cap fabrication not previously approved by the ENGINEER shall be submitted as part

ADDENDUM B

of the CONTRACTOR'S quality control program to the ENGINEER for approval at least 30 days prior to fabrication. The CONTRACTOR'S end cap fabrication procedures and fabrication shall be in accordance with the following:

a. At least 10% of all end caps, selected at random, shall be inspected for hole and thread tolerances, alignment, dimensional control, weld porosity, coating coverage, etc. The tolerances, alignment, dimensional control, weld porosity, coating coverage, etc., shall be submitted for approval to the ENGINEER.

b. To test the leak integrity of the welds and fitments in the end cap, but not the seal between the end cap and the bearing plate, the CONTRACTOR shall pneumatically test all end caps. The welds and fitments shall be soap bubble tested with a minimum air pressure of 100 psig. Caps found to leak shall be rejected. The CONTRACTOR shall develop written procedures for testing the end caps. The procedures shall include test methods, acceptance criteria, rework if applicable, etc.

c. Weld and welder qualification shall be in accordance with the requirements of the American Welding Society publication "Structural Welding Code", AWS D1.1-72, or EQUAL.

d. The CONTRACTOR shall develop check-off sheets and other record sheets as required in order that the inspection requirements noted in subitems a and b above can be recorded. The format of the sheets shall be submitted to the ENGINEER for approval.

NOTE: Attached hereto is a copy of revised pages IV-1 and IV-6, and appended page IV-6a incorporating the changes set forth by this Addendum B. The revised pages should replace the correspondingly numbered pages previously issued to you, and the appended page should be added in proper sequence.

4:00 DETAILED SPECIFICATIONS

4:01 Scope of Work

4:01.1

D E L E T E D A

4:01.2 Alternate Scope of Work:

The WORK to be performed under this alternate shall include the furnishing, fabricating, and delivering the tendons for the reactor building of the Crystal River Plant, Unit #3. The WORK shall be as specified herein and/or as shown on the Drawings and shall include, but not necessarily be limited to, the following: A

1. Furnishing all materials required for tendons, including all hardware and end caps. A B
2. Fabricating all components complete.
3. Coating tendons with wax. Coating of conduit by Others.
4. Delivering completed assemblies to the job site.
5. Installing tendons, conduits, and end caps by Others. B
6. Tensioning of the tendons by Others with manufacturer's supervision.

D E L E T E D

A

d. After fabrication tendons shall be banded at a spacing of no greater than 10 ft on centers following twisting to equalize wire length across the bundle. These bandings shall be removed immediately before the tendon is inserted in the conduit. The bands shall be approved by the ENGINEER.

e. Prestressing wires which are rejected as not meeting Specification requirements on buttonhead imperfections shall be tested to destruction to determine the extent to which the imperfections would have influenced the ultimate strength of the wires. A written report of each test shall be submitted to the ENGINEER.

2. Strand System:

All strands in the tendon shall be cut under the same conditions. All strands in the tendon shall be cut to plus or minus 1/8 inch of the specified length. After assembly with the end anchors, all strands under 50 feet in length shall be within a tolerance of plus 3/32 inch of the shortest strand in the tendon. The anchor fittings shall be machined and threaded prior to the assembly. After assembly, the axis of the anchor fitting and strand circle shall not be more than 1/4 inch apart nor 1/4 inch from the original axis. Prior to fabrication, procedures shall be developed to ensure that the above tolerances have been met. These procedures shall be submitted to the OWNER for review and approval. Tendons that do not meet the above tolerances shall be rejected. Tendons shall be banded at a spacing of no greater than 10 ft on centers following twisting so as to equalize the strand length across the bundle. The bands shall be approved by the ENGINEER. These bandings shall be removed immediately before the tendon is inserted in the conduit.

3. End Caps:

End caps and gasket design shall be tested using fluid corrosion protection wax specified in this item, by the CONTRACTOR to ensure that leakage of the corrosion protection wax will not occur. The criterion shall be no leakage of wax for a minimum pressure of equal to or greater than one and one half (1-1/2) times the maximum bulk filling pressure. This test shall demonstrate that there is no permanent distortion of the cap. The type of wax shall be Viscomorust 2090F-2 or EQUAL as approved by the ENGINEER. The test report shall be submitted to the ENGINEER for approval at least 30 days prior to end cap fabrication. The report shall give details of cap and gasket including securing to the bearing plate requirements so that a comparison with shop drawings can be made. The gasket material shall be capable of maintaining its

B

required performance, when exposed to the environment of the jobsite, for a minimum period of 5 years. All surfaces of the end caps shall be coated with a minimum of 3 mils thickness of Carbo Zinc 11, as manufactured by Carboline, St. Louis, Missouri, or EQUAL. Surface preparation of the end cap shall be in accordance with the coating manufacturer's recommendations. The end cap fabrication and inspection shall be subject to the quality control measures and procedures indicated under Item 4:12 of this Specification. Inspection procedures, testing procedures, welding procedures, and fabrication procedures covering end cap fabrication not previously approved by the ENGINEER shall be submitted as part of the CONTRACTOR'S quality control program to the ENGINEER for approval at least 30 days prior to fabrication. The CONTRACTOR'S end cap fabrication procedures and fabrication shall be in accordance with the following:

a. At least 10% of all end caps, selected at random, shall be inspected for hole and thread tolerances, alignment, dimensional control, weld porosity, coating coverage, etc. The tolerances, alignment, dimensional control, weld porosity, coating coverage, etc., shall be submitted for approval to the ENGINEER.

b. To test the leak integrity of the welds and fitments in the end cap, but not the seal between the end cap and the bearing plate, the CONTRACTOR shall pneumatically test all end caps. The welds and fitments shall be soap bubble tested with a minimum air pressure of 100 psig. Caps found to leak shall be rejected. The CONTRACTOR shall develop written procedures for testing the end caps. The procedures shall include test methods, acceptance criteria, rework if applicable, etc. B

c. Weld and welder qualification shall be in accordance with the requirements of the American Welding Society publication "Structural Welding Code", AWS D1.1-72, or EQUAL.

d. The CONTRACTOR shall develop check-off sheets and other record sheets as required in order that the inspection requirements noted in subitems a and b above can be recorded. The format of the sheets shall be submitted to the ENGINEER for approval.

4:07 Conduit

4:07.1 D E L E T E D A

SPECIFICATION

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

1-8-73
APPROVED - DEPT. PROJECT ENGR. DATE

E R Watterston 1-8-73
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

APPROVED	DESIGN ENGINEER
A	
B C F	
D E	
G	

QUALITY PROGRAM
FOLLOW QA DOCUMENTATION
REQUIRED

S.H.D.-H.E.A.
W.O. 044203-000
ADDENDUM A
February 13, 1969
ADDENDUM B
June 23, 1971
ADDENDUM C
July 12, 1971
ADDENDUM D
March 30, 1972
ADDENDUM E
April 14, 1972
ADDENDUM F
April 24, 1972
ADDENDUM G
January 8, 1973

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

ADDENDUM C

ADDENDUM D, dated March 30, 1972

SECTION 4:00, JOINTS

4:04 Adhesive Joints

4:04.6 Cube Test Procedure:

Subitem 4.; Sampling:

Line 1, after the fifth word (representative) and before the sixth word (of) insert the following word:

"sample"

Subitem 7.; Casting the Cubes:

Subitem c; delete this subitem in its entirety and replace with the following:

"c. Any excess mortar and COLMA FIX 8X shall be discarded and all equipment shall be cleaned immediately with Colma equipment cleaner, or EQUAL, taking the necessary toxicity preventive measures recommended by the manufacturer."

Subitem e.; line 3, after the "50%" add the following:

"± 15%"

Subitem 9.; Report:

Delete this subitem in its entirety and replace with the following:

"9. Report:

The test report for each set of cubes shall include the following information:

a. By ERECTOR'S field laboratory:

1) COLMA FIX 8X SUPPLIER'S batch number.

2) Sample number.

3) Date and time at which sample was taken.

4) Time at which sample arrived at the testing laboratory and remainder of test procedure commenced.

5) Humidity and temperature of the storage area measured and recorded daily.

6) Total load attained by each cube at failure (in pounds).

7) Average compressive stress (in pounds per square inch).

b. By ERECTOR:

1) COLMA FIX BY SUPPLIER'S batch number.

2) Date and time at commencement of mixing.

3) Temperature of mixture at commencement of mixing.

4) Sample number if sample taken.

5) Location where adhesive was applied.

6) The ambient air temperature at or close to the joint surface at commencement of application.

7) Time at commencement of application.

8) Time of commencement of pouring wet concrete.

9) Time at completion of application.

10) Time at completion of pouring wet concrete which is actually in direct contact with the adhesive.

c. By SUPPLIER:

The test report from the SUPPLIER shall include the information listed above in a. subitems 1) to 3) and 5) to 7) inclusive. The test report shall be furnished by the SUPPLIER to the OWNER prior to shipment of each new batch."

4:04.7 Documentation Records:

Delete this item in its entirety and replace with the following:

"4:04.7 Documentation Records:

In addition to the requirements listed for sample testing in item 4:04.8, subitem 2., the ERECTOR shall keep records of subitems 1) to 10) in subitem 9-b of item 4:04.6 for each pour."

4:04.8 Frequency of Testing:

Subitem 2.-a.; after seventh word (new) and before eighth word (batch) add the following:

"SUPPLIER'S"

4:04.9 Joint Surface Condition:

Subitem 2.; Degree of Wetness:

Delete this subitem in its entirety and replace with the following:

"2. Degree of Wetness:

It is permissible to spray the adhesive on to a saturated concrete surface, but surface water shall be removed from the joint before commencing application."

4:04.14 Accidental Coating:

Delete this item in its entirety and replace with the following:

"4:04.14 Accidental Coating:

1. Accidental coating of rebar and embedded hardware with adhesive is permitted provided they are covered with fresh concrete within the specified contact time. Accidental spraying of large areas of rebar or embedded hardware which have heavy moisture present on the surface shall be avoided. Coating under the above conditions will trap a bond breaking film of moisture against the surface of the rebar or embedment. Should the foregoing occur, the area shall be wiped clean as is practicable with a cleaner approved by the SUPPLIER. Care shall be taken to keep the removable formwork free of adhesive by protective coating.

2. Application of form removal oil, resin type curing compound, or other suitable fluids to the formwork surfaces as provided by other items of this Specification shall be considered suitable precautions against direct contact of the adhesive with the formwork, but particular care shall be taken to ensure that the total contact surface is well covered with the fluid selected to act as bond breaker."

4:04.18 Health Precautions:

Subitem 2.; Toluene:

Delete this subitem in its entirety and replace with the following:

"2. Equipment Cleaner:

Great care shall be exercised in use of selected equipment cleaner for cleaning the test cube molds. Due to the toxic and flammable nature of the substance, the manufacturer's safety recommendations shall be strictly enforced."

SECTION 5:00. QUALITY CONTROL

5:02 Adhesive Joints

5:02.2 Line 1, after the ninth word (the), delete the word "ERECTOR" and replace with the following:

"OWNER"

5:02.4 Line 2, after the tenth word (the), delete the word "ERECTOR" and replace with the following:

"OWNER"

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer James L. Miller Date 5-2-72

Mgr. - Power Engr. ORIGINAL SIGNED BY W. A. SZELISTOWSKI Date 5-3-72

Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 5-4-72

SPECIFICATION

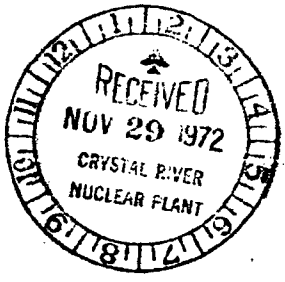
PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT 3
FLORIDA POWER CORPORATION

SP-5618 **JANUARY 22, 1969**

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

A. W. Schmidt 4-24-72
APPROVED - DEPT. PROJECT ENGR. DATE



E. R. Hollenstein 4-24-72
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B-C		–	
D-E	–		
F		–	SWB

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-E.K.A.
W.O. 4203-00
Addendum A
February 13, 1969
Addendum B
June 23, 1971
Addendum C
July 12, 1971
Addendum D
March 30, 1972
Addendum E
April 14, 1972
Addendum F
April 24, 1972

ADDENDUM F

Sheet 1 of 1
April 24, 1972

This ADDENDUM F, dated April 24, 1972, hereby voids ADDENDUM C, dated July 12, 1971, in its entirety.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer [signature] Date 4-24-72

Mgr. - Power Engrg. ORIGINAL SIGNED BY S-3-72

Nuclear Proj. Engr. ORIGINAL SIGNED BY 3-4-72
J. T. ROGERS

SPECIFICATION

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

[signature] 4-24-72
APPROVED - DEPT. PROJECT ENGR. DATE

E. R. Hollenstein 4-24-72
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

REVISION	QUALITY ASSURANCE DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B-C		✓	
D-E	✓		
F		✓	JWG

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.E.D.-S.E.A.
W.O. 4203-00
Addendum A
February 13, 1969
Addendum B
June 23, 1971
~~Addendum C~~
~~July 19, 1971~~
Addendum D
March 30, 1972
Addendum E
April 14, 1972
Addendum F
April 24, 1972

SP-5418
1-22-69

ADDENDUM F

Sheet 1 of 1
April 24, 1972

This ADDENDUM F, dated April 24, 1972, hereby replaces ADDENDUM C, dated July 12, 1971, in its entirety.

7973

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer [signature] Date 4-20-72

Mgr. - Power Engr. ORIGINAL SIGNED BY W. A. SZELISTOWSKI Date 4-21-72

Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 4-24-72

SPECIFICATION

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

[signature] 4-14-72
APPROVED - DEPT. PROJECT ENGR. DATE

E R Hollenstein 4-14-72
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B		✓	
C		✓	
D	✓		
E	✓		SHB

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-E.K.A.
W.O. 4203-00
Addendum A
February 13, 1969
Addendum B
June 23, 1971
Addendum C
July 12, 1971
Addendum D
March 30, 1972
Addendum E
April 14, 1972

ADDENDUM E

Sheet 1 of 1
April 14, 1972

SECTION 4:00, JOINTS

4:01 Construction Joints

4:01.2 Line 5:

After the word "joints" and before the word "shall" insert the following words:

"in the Reactor Building walls below 250'-0" level"

Line 9:

After the sentence ending with ".....initial set." insert the following sentence:

"For horizontal and vertical joints in the Reactor Building at and above 250'-0" level refer to Addendum D (dated March 30, 1972) for epoxy adhesive requirements at the joints."

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer James L Duey Date 4-11-72

Mgr. - Power Engr. ORIGINAL SIGNED BY W. A. SZELISTOWSKI Date 4-12-72

Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 4-13-72

SPECIFICATION

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

RECEIVED
NOV 29 1972
CRYSTAL RIVER
NUCLEAR PLANT

APPROVED - DEPT. PROJECT ENGR. 3-29-72 DATE

ISSUED FOR CRYSTAL RIVER UNIT 3 3-30-72 DATE

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B		✓	
C		✓	
D	✓		[illegible]

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-E.K.A.
W.O. 4203-00
Addendum A
February 13, 1969
Addendum B
June 23, 1971
Addendum C
July 12, 1971
Addendum D
March 30, 1972

ADDENDUM D

Sheet 1 of 11
March 30, 1972

INDEX PAGE

Add the following new Items and titles:

Under Section 4:00, JOINTS:

"4:04 Adhesive Joints"

Under Section 5:00, QUALITY CONTROL:

"5:02 Adhesive Joints"

SECTION 4:00, JOINTS

Add the following item:

"4:04 Adhesive Joints

"4:04.1 Scope:

The following specification items 4:04.1 through 4:04.18 for bonding fresh concrete to hardened concrete is for use at construction joints in the Ring Girder and Dome at, and above 250'-0" level of the Reactor Building as noted on the Drawings.

"4:04.2 Definitions:

In addition to the definitions in Item 2:02 of the GENERAL CONDITIONS, the following definitions shall apply:

1. "SUPPLIER" shall mean the supplier of the approved adhesive.

2. "ERECTOR" shall mean the OWNER'S Generation Construction Department.

3. "COLMA FIX 8%" identifies the product with the previous adhesive formula made by Sika Corporation which was known by the name "Colma Bonding Compound." COLMA FIX 8% is not identical to "Colma Fix" but is identical to "Colma Bonding Compound" by reason of its longer pot-life and curing time.

ADDENDUM D

Sheet 2 of 11
March 30, 1972

"4:04.3 General Description of Adhesive:

The adhesive shall be COLMA FIX 8Z supplied by Sika or EQUAL approved by the ENGINEER. The adhesive shall consist of two components 'A' the base resin, and 'B' the curing agent, giving an epoxy polysulfide system with 1:1 ratio by volume producing a buff-brown liquid of light consistency when mixed.

"4:04.4 Design Requirements:

The adhesive shall be selected to achieve the following:

1. Selection:

a. Minimum Pot Life:

	Adhesive Temperature	Minimum Pot Life (Approximately)
(1)	60 F	1-1/4 hr
(2)	75 F	40 min
(3)	90 F	30 min

b. Minimum Contact Time:

	Ambient or Surface Temperature	Minimum Contact Time (Approximately)
(1)	60 F	4-1/2 hr
(2)	75 F	3 hr
(3)	90 F	1 hr

c. Shelf life shall be a minimum of 6 months duration.

ADDENDUM D

Sheet 3 of 11
March 30, 1972

2. Strength:

a. The following minimum strengths shall be achieved:

	Supplier's Test	Field Test (By Erector)
(1) Compressive strength at 10 days,	9,000 psi	8,000 psi
(2) Tensile strength at 14 days,	3,000 psi	-
(3) Shear strength at 14 days,	1,000 psi	-

b. For tensile and shear strength, field tests are not required. The SUPPLIER shall submit to the ENGINEER evidence from previous history test results showing that the tensile and shear strengths required have been consistently achieved with the adhesive.

"4:04.5 Identification of Material:

1. Each container shall be clearly marked 'A' or 'B' component by the SUPPLIER and shall include the batch certificate number and end of shelf life date.

2. The SUPPLIER shall forward to the OWNER the batch certificate including the test results.

"4:04.6 Cube Test Procedure:

1. Scope:

The test procedure describes materials and methods for testing in compression an epoxy mortar made with COLMA FIX 8% and Colma Quartzite Aggregate.

ADDENDUM D

Sheet 4 of 11
March 30, 1972

2. General:

a. In general, the test procedure utilizes equipment and methods outlined in ASTM Standard C 109-64 with modifications, exceptions, and additions.

b. The adhesive is applied to the joints without the addition of aggregate. The purpose of adding quartzite aggregate to the test cubes is to enable accurate load indicator readings to be made on an otherwise very elastic material. The use of Colma Quartzite Aggregate in preference to other aggregates is necessary so that the cube test strengths are valid in relation to those called for under item 4:04.4 subitem 2-a. Strengths required under item 4:04.4 subitem 2-a are based on Sika Corporation's own research test data using Colma Quartzite Aggregate, which when oven dried, has consistent uniform properties not found with other types of aggregates.

3. Materials:

a. COLMA FIX 8% or EQUAL approved by the ENGINEER.

b. Colma Quartzite Aggregate supplied by Sika or EQUAL approved by the SUPPLIER and ENGINEER.

c. Paraffin or household wax.

d. Paste automobile wax.

e. Electric hot plate.

f. Graduated measuring pitchers.

4. Sampling:

For SUPPLIER'S testing, a representative of mixed COLMA FIX 8% shall be taken from each batch of material produced for this work. For field testing by the ERECTOR, a representative sample shall be taken just prior to adding the mixture to the spraying equipment. The field sample shall be taken to an on-site laboratory. The time interval between sampling and arrival at the laboratory shall not exceed 15 minutes.

ADDENDUM D

Sheet 5 of 11
March 30, 1972

5. Procedure:

Prior to the arrival at the laboratory of the sample of COLMA FIX 8%, the following shall have been accomplished:

a. The ASTM C 109-70T cube molds shall be cleaned of any residue or foreign particles. The cube molds shall be free of any oil or water.

b. A thin film of presoftened paste automobile wax shall be placed over the interior surface of the molds and onto the horizontal surfaces and base plate. The wax film shall be allowed to dry. It shall not be buffed or polished in any way.

c. The molds shall be assembled. After assembly, all joints shall be sealed from the exterior of the molds with melted paraffin or household wax. The wax shall be allowed to harden. Molds are now ready for use.

6. Mixing Mortar:

a. The representative sample of COLMA FIX 8% shall be hand stirred. Eight fl oz of the COLMA FIX 8% shall be measured out into the mixing bowl as described in ASTM C 109-70T.

b. Three parts by loose volume (24 fl oz) of Colma Quartzite Aggregate shall be measured out. The sand shall not be compacted while measuring. One-third of the sand shall be added to the COLMA FIX 8%. The sand shall be mixed into the COLMA FIX 8% with a steel trowel constantly scraping the sides of the mixing bowl. While mixing continues, the remainder of the sand shall be added. The mortar shall be mixed for a total of approximately 5 minutes. The mortar shall be checked for any lumps of dry sand. If any are present, the lumps shall be remixed until they are blended into the mortar.

ADDENDUM D

Sheet 6 of 11
March 30, 1972

7. Casting the Cubes:

a. The mortar shall be placed in the cube molds in three layers, tamping each layer 25 times firmly with the tamper described in ASTM C 109-70T.

b. After the three layers have been placed and tamped, the tops of the cubes shall be firmly steel troweled to ensure compacting the mortar. With the steel trowel, any excess mortar shall be removed using a trowelling motion so that the tops of the cubes are level with the top of the mold.

c. Any excess mortar and COLMA FIX 8% shall be discarded and all equipment shall be cleaned immediately with toluene, taking the necessary fire, explosion, and toxicity preventive measures recommended by the manufacturers.

d. The cubes shall remain in the molds for 24 hours at standard conditions at 75 F ±3 F and 50% ±10% relative humidity.

e. The cubes shall be carefully removed from the molds at the end of 24 hours and shall continue to cure for an additional 9 days at 75 F and 50% relative humidity.

8. Testing:

Using the equipment and methods outlined in ASTM C 109-70T, a compression test shall be made on the three cubes at the age of 10 days. Maximum load as indicated by the load dial shall be recorded.

9. Report:

The test report for each set of cubes shall include the following information:

a. By ERECTOR:

(1) COLMA FIX 8% batch number.

ADDENDUM D

(2) Time at commencement of mixing.

(3) Temperature of mixture at commencement of mixing.

(4) Location where adhesive was applied.

(5) Time at commencement of application.

(6) The ambient temperature at the joint surface at commencement of application.

(7) Time at completion of pouring wet concrete which is actually in direct contact with the adhesive.

(8) Sample numbers.

(9) Time at which sample was taken.

(10) Time at which sample arrived at the testing laboratory and remainder of test procedure commenced.

(11) Total load attained by each cube.

(12) Average cube strength.

(13) Humidity and temperature of the test cube storage area shall be measured and recorded daily.

b. By SUPPLIER:

The test report from the SUPPLIER shall include the information listed above in subitems (1), (2), (3), (8), (9), (10), (11), and (12). The test report shall be furnished by the SUPPLIER to the ERECTOR prior to shipment of each new batch.

"4:04.7 Documentation Records:

In addition to the requirements listed for sample testing in item 4:04.9, the ERECTOR shall keep records of subitems (1) to (7) in subitem 9 of 4:04.6 for each pour.

ADDENDUM D

Sheet 8 of 11
March 30, 1972

"4:04.8 Frequency of Testing:

A set of three cubes shall be made for each of the following requirements:

1. Testing by SUPPLIER:

At least one set for each new batch number.

2. Field Testing by ERECTOR:

Frequency of testing sets of three cubes shall meet the following criteria:

a. At least one set for each new batch number.

b. At least one set for every 360° ring of pours.

c. At least one set daily for each set of mixing equipment in use.

d. At least one set per mixing crew.

"4:04.9 Joint Surface Condition:

1. Cleaning:

Joint surfaces shall be sand-blasted clean and all loose material removed to produce a clean rough surface.

2. Degree of Wetness:

It is permissible to spray the adhesive on to a saturated surface but application of the adhesive shall not be permitted during rain periods, and surface water shall be removed from the joint, and also from the rebar and embedments in the immediate area before commencing application.

"4:04.10 Mixing:

Mixing procedure shall be as recommended and agreed with the SUPPLIER.

ADDENDUM D

"4:04.11 Thickness of Coating:

The joint surface shall be coated so that the entire surface receives an evenly distributed film of adhesive of approximately 0.015" thickness.

"4:04.12 Method of Application:

The adhesive may be applied with brush, roller, or by spraying with extension wand, whichever is most suitable having regard to access availability and the recommendations of the SUPPLIER.

"4:04.13 Viscosity of Mixture:

1. Solvents shall not be added.

2. To improve spraying capability, adjustment may be achieved by the following methods as recommended by the SUPPLIER:

   a. Increasing pot pressure.

   b. Increasing wand orifice size.

   c. Increasing hose size.

"4:04.14 Accidental Coating:

1. Accidental coating of rebar and embedded hardware with adhesive is permitted but care shall be taken that the removable formwork be kept free of adhesive by taking suitable precautions.

2. Application of form removal oil or fluids to the formwork surfaces as provided by other items of this Specification shall be considered suitable precautions against direct contact of the adhesive with the formwork, but particular care shall be taken to ensure that the total contact surface is well oiled.

"4:04.15 Contact Time:

This shall be defined as the period during which adhesion is experienced at light contact with the coated surface such that a noticable effort is required to remove the body in contact. An acceptable method of testing would be

ADDENDUM D

by finger tip or the end of a wood pole. This test shall always be made immediately prior to placing fresh concrete against the coated surface. Should the adhesion state be found unsatisfactory, the surface shall be re-coated before placing fresh concrete.

"4:04.16 Pre-Trial Application of Adhesive:

The ERECTOR, under supervision of the SUPPLIER, shall carry out the mixing, application, and testing procedure with a pre-trial demonstration under the anticipated working conditions or alternatively during the first pour segment to be worked. The SUPPLIER shall in particular assist the ERECTOR in gaining working knowledge of the requirements for items 4:04.6 and 4:04.9 through 4:04.15.

"4:04.17 Limiting Temperature:

Application of the adhesive shall not be made when the concrete surface or air temperature is below 40 F.

"4:04.18 Health Precautions:

1. Adhesive:

The mixture contains epoxy resin, organic amine, and polysulfide. All are toxic before curing; therefore, inhalation of vapors and contact with skin or eyes shall be avoided.

2. Toluene:

Great care shall be exercised in use of toluene for cleaning the test cube molds. Due to the toxic, flammable, and explosive nature of the substance, the manufacturer's safety recommendations shall be strictly enforced."

SECTION 5:00, QUALITY CONTROL

"5:01 Concrete

"5:01.6 After the second word "concrete" and before the third word "is," insert the following words:

"of the reactor building wall below elevation 250 ft"

ADDENDUM D

Sheet 11 of 11
March 30, 1972

Add the following Item:

"5:02 Adhesive Joints

"5:02.1 The ERECTOR shall prepare written procedure(s) in addition to item 4:04.16 for the mixing, application, and testing of the adhesive. These procedures shall be written prior to the starting of any WORK and shall be submitted to the OWNER'S Quality Assurance Agent for review and comment.

"5:02.2 The SUPPLIER shall submit to the ENGINEER and the ERECTOR, prior to manufacture of the material, the evidence required in item 4:04.4 to ensure that the adhesive selected is acceptable both as regarding strength and requirements for application in the field.

"5:02.3 The ERECTOR shall pay special attention to the shelf-life period of the material when scheduling quantities and delivery dates required by the work program.

"5:02.4 The SUPPLIER shall comply with items 4:04.2, 4, 5, 6, and 8 and shall submit test results for each batch to the ERECTOR prior to delivery of material to the field.

"5:02.5 The ERECTOR shall develop documentation forms for each pour with the information specified under items 4:04.6 subitem 9 and 4:04.7 and shall submit these to the OWNER weekly. The frequency of testing shall be as specified under item 4:04.8.

"5:02.6 The joint surface preparation and degree of wetness shall be as specified under item 4:04.9.

"5:02.7 Mixing and application shall comply with items 4:04.10 through 15 and 5:02.1.

"5:02.8 The Contact Time test made by the ERECTOR as specified under item 4:04.15 shall be made initially under supervision of the SUPPLIER as per item 4:04.16 so that experience in determining hardening of the adhesive can be gained.

"5:02.9 The ERECTOR shall not apply the adhesive when the surface or air temperature is less than 40 F.

"5:02.10 Where this Specification differs specifically from the SUPPLIER'S recommendation's handbook, this Specification shall be the binding document."

EF

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer [signature] Date 2-2-71
ORIGINAL SIGNED BY
Mgr. - Power Engr. ~~SZELICTOWSKI~~ Date 2-2-71
ORIGINAL SIGNED BY
Nuclear Proj. Mgr. ~~J. T. RODGERS~~ Date 2-2-71

SPECIFICATIONS

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC - 321-A3.2, 321-B3.2, & 321-C3.2

[signature] 6-23-71
APPROVED - DEPT. PROJECT ENGR. DATE

[signature] 6-23-71
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A			
B		✓	[initials]

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - E.K.A.
W.O. 4203-00
Addendum A
February 13, 1969
Addendum B
June 23, 1971

ADDENDUM B

Sheet 1 of 1
June 23, 1971

2:00 CONCRETE WORK

2:04 Concrete Finishes

2:04.1 Ordinary Surface Finish:

Subitem 1.:

Add the following sentence to this subitem:

"Prior to pointing with mortar, W. R. Grace Epoxtite Binder Code 2385 may be applied over concrete surfaces described under subitem 2."

2:04.2 Steel Troweled Finish:

Line 1:

Delete the words, "Except where otherwise shown on the drawings,"

Add the following item:

"2:04.6 Wood Float Finish:

Floor slabs to receive protective coating finish shall have a smooth wood float finish."

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 4-16-69

Mgr. - Power Engr. _____ Date 4-16-69

Nuclear Proj. Mgr. _____ Date 4-16-69

SPECIFICATIONS

PLACEMENT OF STRUCTURAL CONCRETE

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5618 JANUARY 22, 1969

FPC-321-A3.2, 321-B3.2, & 321-C3.2

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

_____ 2-13-69
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 2-13-69
ISSUED FOR CRYSTAL RIVER UNIT 3 DATE

S.N.D.-E.K.A.
W.O. 4203-00
Addendum A
2-13-69

ADDENDUM A

Sheet 1 of 1
February 13, 1969

Item 4:00 JOINTS

4:03 **Water Stops**

4:03.2 Delete this subitem in its entirety and replace with the following:

"Vulcanizing of water stop shall be inspected and approved by the Inspector or OWNER. Nailing of water stop shall not be allowed. Water stop shall be free of oil. grease, grout, or any other material that prevents good seal."

DETAILED SPECIFICATIONS

INDEX

1:00 GENERAL

1:01 Scope of Work

This Specification covers all cast-in-place structural and fill concrete for Crystal River Station - Unit No. 3 of the Florida Power Corporation. The station site is located approximately 6 miles northwest of Crystal River, Florida.

1:02 Reference Codes and Specifications

All concrete and concrete WORK shall be in accordance with the "Specifications for Structural Concrete for Buildings," ACI 301-66 and "Building Code Requirements for Reinforced Concrete," ACI-318-63. Where differences between the aforementioned codes and specifications occur, ACI 301-66 shall apply.

1:03 Structural Design

1:03.1 The concrete structures except as noted hereinafter are designed on the basis of a working stress design.

1:03.2 The shell and foundation mat of the reactor building is designed on the basis of ultimate strength design.

1:04 Concrete Selection

1:04.1 Ready-mixed concrete will be delivered to the site in accordance with "Specification for Furnishing and Delivering of Structural Concrete SP-5569, FPC-321-A3.2.

1:04.2 The above mentioned Specifications describe the different strength, slump, temper ture, aggregate and fly ash combinations available for selection.

1:04.3 The ultimate compressive strength of the concrete will be noted on the drawings. In addition, more detailed selection requirements will be furnished as an Appendix to this Specification which will be expanded to cover different structures of the plant as the work progresses.

2:00 CONCRETE WORK

2:01 Preparation of Subgrade

2:01.1 Where the foundations or concrete structures are shown on the Drawings as being placed on ground, the subgrade supporting them shall be level and trimmed to the lines and dimensions shown or as directed by the OWNER and/or ENGINEER and shall be free of debris and organic material. The subgrade shall be compacted by using a suitable compactor to a density of at least 95% of Modified AASHO maximum density.

Immediately prior to placing the concrete the subgrade shall be thoroughly wetted. Under no conditions shall concrete be placed on frozen subgrade material.

2:01.2 Immediately before any concrete is placed on or against rock, the rock shall be carefully cleaned of all dirt, gravel, boulders, scale, loose fragments and other objectionable substances by air and/or water jetting and brooming, and shall then be thoroughly wetted.

2:01.3 Ample notification shall be given to the ENGINEER and/or TESTING LABORATORY prior to placing concrete on subgrade to permit them to inspect the subgrade. It is the intent of the ENGINEER to make a photographic record of the subgrade for selected areas of the containment vessel.

2:01.4 Vapor barrier under concrete slabs poured on ground will be called for on the Drawings where required. The subgrade shall be level and well tamped before installing the vapor barrier. Where necessary a layer of sand shall be applied to prevent any protrusions from rupturing the vapor barrier. Permanent Moistop as manufactured by the American Sisalkraft Company shall be used. The vapor barrier shall be installed in accordance with the manufacturers printed instructions in the widest practical width. All joints shall be lapped no less than 6 inches.

2:02 Placing

2:02.1 The placement of concrete shall be in accordance with "Recommended Practice for Measuring, Mixing, and Placing Concrete ACI 614-59."

2:02.2 Slabs on ground shall be of thicknesses shown on the drawings. The subgrade supporting the slabs shall be level and trimmed to the lines and dimensions shown on the drawings, and it shall be thoroughly wetted immediately prior to placing the concrete. Tops of all finished slabs shall be true plane surfaces with a tolerance of 1/8 inch in 10 feet.

2:02.3 Supported basement floor slabs shall be placed in two layers. The lower layer shall be placed prior to erection of structural steel and heavy equipment. The top layer shall be placed after all major construction work is completed. Thicknesses of the layers shall be as shown on the drawings. If the top layer is a finished slab, it shall be a true plane surface with a tolerance of 1/8 inch in 10 feet.

2:02.4 Slabs on structural steel framing shall be of uniform thickness as shown on the drawings. Top of all finished slabs shall be true plane surfaces with a tolerance of 1/8 inch in 10 feet unless otherwise indicated on the drawings.

2:02.5 Concrete walls shall be of thicknesses shown on the drawings. Walls shall be set in correct position and shall not deviate more than 1/4 inch in any bay or 20 feet maximum, from dimensions shown on the drawings.

2:02.6 Foundations shall be placed on sound ground. Use lean concrete fill to provide base for foundations in excess excavations. Column pedestals shall be placed monolithically with foundations.

2:02.7 Equipment foundations shall be as shown and detailed on the drawings.

2:03 Curing and Protection

2:03.1 Curing methods detailed in ACI 301-66 shall be used except that a curing compound shall not be used for initial and final curing of concrete in the containment shell.

2:03.2 Concrete shall be protected against adverse weather conditions in accordance with "Recommended Practice for Cold Weather Concreting," ACI 306-66 and "Recommended Practice for Hot Weather Concreting," ACI 605-59 except that accelerations such as calcium chloride and anti-freeze compound shall not be used.

2:04 Concrete Finishes

2:04.1 Ordinary Surface Finish

All concrete finish work should be in strict accordance with references outlined in the ACI, Part I, Page 304-31. The reference is made to the U. S. Bureau of Reclamations Concrete Manual, Chapter VII, which outlines this work.

All concrete surfaces, both exposed and unexposed, except those specifically covered below shall be finished as follows:

1. Immediately following the removal of the forms, all fins and irregular projections shall be carefully chipped off of all surfaces which are to be exposed. XX See Addendum B for addition

2. On all surfaces, the cavities produced by form ties, and all other small pits or openings, shall be cleaned of loose particles and thoroughly saturated with water, after which, all such cavities, pits or openings shall be neatly stopped with pointing mortar consisting of cement and fine aggregate mixed in the same proportions as used in the respective concrete. The mortar shall be worked into the cavities and smoothed even with the concrete surface by means of a wooden float. The mortar shall be mixed in small quantities, and shall be used only while plastic. Cement used in the mortar for exposed surfaces shall consist of one-third white cement and two-thirds standard portland cement or a variation thereof to match adjacent concrete.

XX Add Add. B

3. No mortar or cement shall be applied to the surface except to fill the cavities, pits or openings as described above and the resulting surfaces shall be left true and uniform.

4. All construction and expansion joints in the completed work shall be left carefully tooled and free from all mortar and concrete.

2:04.2 Steel Troweled Finish:

Delete words in parentheses

** See Addendum B

(Except where otherwise shown on the drawings) floor slabs shall be finished by tamping the concrete with special tools to force the coarse aggregate away from the surface, then screeding and floating with straight edges to bring the surface to the required finish level. While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood-floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring moisture to the surface. After surface moisture has disappeared, surfaces shall be steel-troweled to a smooth, even, impervious finish, free from trowel marks. After having set sufficiently to ring the trowel, the surface of all slabs, except slabs to receive resilient flooring, shall be given a second steel-troweling to a burnished finish.

2:04.3 Rough Slab Finish:

Floor slabs to receive ceramic tile shall be finished by tamping the concrete with suitable tools to force the aggregate away from the surface, then screeding with a straight edge to produce a reasonably true and uniform surface.

2:04.4 Broomed Finish:

Exterior concrete slabs, platforms and steps shall be finished by tamping the concrete with special tools to force the aggregate away from the surface, screeding and floating to bring the surface to the required finish level, steel-troweling to an even smooth surface, and brooming with a fiber-bristle brush in a direction transverse to that of the main traffic.

2:04.5 Finish of Exposed Vertical Surfaces:

1. Special finish on concrete may be required at the direction of OWNER and/or ENGINEER on the following surfaces only:

   a. The exposed surfaces of walls.

   b. The exterior faces of the turbine generator foundation pedestal.

* **

* Addition of 2:04.6
** See Addendum B

2. Special finish for the above surfaces shall be performed as follows:

   a. As soon as the WORK specified in Item 2:04.5 has been performed and the pointing mortar sufficiently set, the surfaces shall be wetted with a brush and rubbed with a No. 16 carborundum stone or an abrasive of equal quality, bringing the surface to a paste. The rubbing shall be continued enough to remove all form marks and projections producing a smooth dense surface without pits or irregularities. The material which, in the above process has been ground to a paste, shall be carefully spread, or brushed uniformly over the entire area and allowed to "reset." No additional mortar shall be added during this operation.

   b. The final finish shall be obtained by a thorough rubbing with a No. 30 carborundum stone or an abrasive of equal quality. This rubbing shall continue until the entire area of the surfaces is of a smooth texture and uniform in color.

   c. During the rubbing and after final rubbing is complete, curing shall proceed as herein specified.

2:05 Field Testing at Construction Site

2:05.1 During concrete placement operations, the testing laboratory will have an inspector(s) at the construction site who will inspect the concrete pour for formwork, reinforcing, cleanliness, and concrete placement. The inspector shall inspect and test the first load of concrete delivered to the site for batch ticket information, slump, air content, and temperature. Batch ticket information shall be checked on each load delivered. Slump tests will be taken at random with a minimum of one test for each 10 cubic yards of concrete placed. Air content tests and temperatures shall be taken on every 50 cubic yards placed or at the direction of the Inspector.

2:05.2 Except as noted, hereinafter, test cylinders will be molded, cured, stored, capped, and tested in accordance with ACI 301-66. A set of 4 cylinders shall be cast for each 50 cubic yards or fraction thereof placed in any one day. Two cylinders shall be tested at 7 days and two at 28 days. For the reactor building shell, a set of 6 cylinders shall be cast. Two cylinders will be tested at 7 days, 28 days, and 90 days.

2:05.3 In the event that concrete is placed during freezing weather or that a freeze is expected during the curing period, an additional cylinder will be cast for each set and shall be cured under the same conditions as the part of the structure which it represents. This cylinder shall be tested at 28 days.

3:00 FORMWORK

3:01 General

3:01.1 All formwork shall be in accordance with "Recommended Practice for Concrete Formwork" ACI 347-68.

3:01.2 All poured concrete shall be formed, including the sides of footings and other portions of structures below grade, except that rock cuts shall be used as forms for vertical surfaces as shown on the Drawings and/or as directed by the ENGINEER. Earth cuts shall not be used as forms for vertical surfaces.

3:01.3 All exposed concrete edges shall be chamfered. The size of the chamfer strip shall be 3/4 inches unless otherwise noted on the Drawings.

3:02 Materials

3:02.1 Forms shall be wood or metal that are of sufficient strength and rigidity, and have a surface suitable for the required finish. If wood is used to form concrete that will be exposed to view, it shall be made with at least 5/8 in. thick Douglas fir B/B "Plyform" as graded by D.F.P.A. Concrete that will be concealed from view may also be formed with 5/8 in. thick "Plyform," as above, or else shall be formed with seasoned wood boards of not less than 1 in. stock thickness. Boards shall be free from excessive warpage or other defects that would prevent tight joints or affect the true lines and surfaces of the concrete.

3:02.2 All form lumber may be reused in various parts of this construction as long as it remains in good condition.

3:02.3 Metal forms shall be straight and free from distortion that would be apparent in the poured concrete. The forms shall be accurately assembled and fitted so that joints will be straight and continuous and so that adjoining surfaces will be flush.

3:02.4 Forms shall be thoroughly cleaned after each use, and surfaces in contact with concrete shall be coated with form oil which has been approved by the OWNER.

3:03 Design

3:03.1 The design and engineering of the formwork shall be the responsibility of the CONTRACTOR. No shop or fiel drawings for formwork need be submitted to the ENGINEER.

3:03.2 Centering for beams and girders shall be so designed that they can be stripped without disturbing the intermediate supporting posts or can be reshored in an acceptable manner.

3:03.3 The ENGINEER shall be consulted regarding the cambering of beams and slabs to compensate for anticipated deflections in the formwork.

3:03.4 Except as noted hereinafter, formwork shall be constructed so as to ensure that the concrete surfaces will conform to the tolerances of ACI 301-66. The steel plate liner on the reactor building when used as a concrete form shall be braced and shored to ensure that the deflection does not exceed 1/4 in. for an arc length of 10 ft of the plate as installed.

3:04 Form Removal

3:04.1 The removal of formwork shall be in accordance with the requirements of ACI 301-66.

3:04.2 The following table shows required minimum strengths required before the forms are removed:

Structural Classification	Min. Strength Required - Psi	Min. Period - Days
Sides of footings, walls	500	1
Sides of beams, girders, columns	1500	3
Forms under floor slabs	2000	7
Centering under beams, girders, flat slabs	2500	10

3:04.3 The minimum time limits are average values based on 3000 psi concrete, attaining strength under normal job conditions at a temperature of 70 degrees F.

3:04.4 The time limits shall be increased for concrete having slower strength development due to lower temperatures or other conditions and may be reduced for concrete developing strength more rapidly, all subject to the approval of the ENGINEER.

4:00 JOINTS

4:01 Construction Joints

4:01.1 Joints not shown on the Drawings shall be made and located in accordance with the requirements of ACI 301-66 and shall be approved in writing by the ENGINEER. Construction joint surfaces except as noted otherwise hereinafter, shall be prepared for the placement of concrete thereon by cleaning thoroughly with wire brushes, water under pressure, or other means to remove all coatings, stains, debris or other foreign material.

4:01.2 Horizontal and vertical construction joints in the reactor building cylindrical shell and dome shall be prepared for receiving the next pour by either sandblasting, air water jet, bush hammering, or other means to remove all coatings, stains, debris or other foreign material. The horizontal joints shall be dampened (but not saturated), then thoroughly covered with a coat of neat cement mortar of similar proportions to the mortar in the concrete. The mortar shall be at least 1/2 inch thick and fresh concrete shall be placed before the mortar has attained its initial set. The vertical joints shall be dampened (but not saturated) before concrete is placed.

4:02 Expansion Joints

4:02.1 Premolded expansion joint filler shall conform to "Spec. for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Non-bituminous Types)," ASTM D 1752-66.

4:02.2 The location size and detail of fillers shall be as shown on the Drawings.

4:02.3 The expansion joints shall be sealed with a material compatible with the premolded expansion joint filler.

4:03 Water Stops

4:03.1 Water stops shall be polyvinyl chloride water stop of the dumbbell, bulb or serrated type as manufactured by W. R. Grace & Co. or approved equal. The location, size and detail of water stops will be as shown on the Drawings.

4:03.2 Vulcanizing of water stop shall be inspected and approved by the Inspector or OWNER. Nailing of water stop shall be free of oil, grease, grout, or any other material that prevents good seal.

5:00 QUALITY CONTROL

5:01 Concrete

5:01.1 Each week the CONTRACTOR shall submit to the ENGINEER a concrete pour schedule. (This schedule will give the ENGINEER advance notice so he may check the drawings ahead of time and help eliminate possible problems before pour time.)

The CONTRACTOR shall initiate a concrete pour checkout form to assure that all crafts have completed their work prior to concrete placement. After the form has been signed by each craft, it shall be given to the TESTING LABORATORY and/or ENGINEER prior to concrete placement. This form shall be kept as a record for that pour. Each pour shall have a checkout form.

See addendum D. See add E.

5:01.2 The CONTRACTOR shall be responsible for the preparation of written procedure(s) to set forth how the work to be performed under the specification will be carried out. The party performing the work shall also prepare a written quality control procedure setting forth what tests will be executed to substantiate compliance with the specification. Such written procedures shall be submitted to the ENGINEER for review and comment. These procedures shall be written prior to the starting of any of the work.

5:01.3 Prior to placing of concrete on compacted fill, the fill shall be checked for the percentage compaction required under Section 2:01.1. The subgrade shall be free of debris and organic material and shall be wetted thoroughly.

5:01.4 Before concrete is placed on a hardened concrete surface, it shall be free of laitance and foreign material. Horizontal and vertical construction joints in the reactor building cylindrical shell and dome shall be prepared for receiving the next pour by either sandblasting, air water jet, bush hammering, or other means to remove all coatings, stain, debris, or other foreign material.

5:01.5 In conveying of concrete from mixer to concrete in place, only those methods and arrangements of equipment should be used which will reduce to a minimum any separation of coarse aggregate from the concrete. Equipment should be capable of expeditiously handling and placing concrete of such a proper consistency, grading, and maximum size of aggregate, at the rate most favorable to good quality and workmanship. The conveying equipment shall be in accordance with ACI 301-67, Chapter 8 and ASTM C-94-67.

★★★★ 5:01.6 If concrete is deposited on a hardened concrete surface, a 1/2 inch layer of neat grout shall be applied before concrete is deposited. Concrete shall be deposited continuously and in horizontal layers not exceeding 18 inches, avoiding inclined construction joints. It is important that each layer be shallow enough so as to be placed while the previous layer is still soft and that the two layers be vibrated together. No concrete shall be deposited in concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Concrete shall be placed with the required consistency to assure proper workability. The placing of concrete around reinforcing and embedded items shall be by methods that will not cause movement or damage. The maximum free fall of concrete shall be three feet.

5:01.7 All concrete shall be consolidated by vibration, spading, or rodding so that the concrete is thoroughly worked around the reinforcement, embedded items, and into corners of forms, eliminating all air or rock pockets which may cause honeycombing, pitting, or planes of weakness. If vibrators are used, they shall have adequate power and be of high frequency, rugged, and reliable. When immersed in concrete, the vibrator shall have a minimum frequency of 7000 rpms. Over-vibrating and the use of vibrators to transport concrete within the

★★★★ See Add. D

forms shall not be allowed. Care shall be taken to prevent the vibrator from coming into contact with the forms. Consolidation and vibrator procedures shall be in accordance with ACI Committee 609.

5:01.8 Concrete finishes shall be applied in accordance with Section 2:04 of this specification and ACI 301. The ENGINEER will provide a schedule designating the type of finish to be applied to the pertaining structure. If excessive bleeding occurs, the water shall be extracted and not worked into the concrete. The use of cement to absorb surface water shall not be allowed. Mortar for finishing exposed surfaces shall consist of one-third white cement and two-thirds standard portland cement or a variation to match existing concrete. All holes left by form ties shall be filled and cured.

5:01.9 Curing methods detailed in ACI 301-66 shall be used except that a curing compound shall not be used for initial and final curing of concrete in the containment shell. Curing shall start as soon as the forms are removed. Curing of unformed concrete shall start immediately after the concrete has taken its initial set. A curing log shall be set up to keep a record of structure cured, methods, and duration.

5:01.10 Concrete shall be protected against adverse weather conditions in accordance with "Recommended Practice for Cold Weather Concreting," ACI 306-66, and "Recommended Practice for Hot Weather Concreting," ACI 605-59. During the curing period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and rain or running water.

★★★★

See Addendum D

Document Header Sheet

RAN	90048- 7924
DOC NO	SP5648
3F3N #	

ENCLOSURE 2

FLORIDA POWER CORPORATION
QUALITY ASSURANCE RECORD
TRANSMITTAL 7924

ATTENTION: RECORDS MANAGEMENT SECTION (NR2A)
CRYSTAL RIVER UNIT NO. 3

DOCUMENTS TRANSMITTED: SPECIFICATION

Note* Documents are being transmitted for "HISTORICAL PURPOSES". These documents were transported to CR3 Site in the 1995 Engineering Migration from St. Pete to Crystal River

SP-5648, dated 5/2/69 (Includes Addendums A, B & C)

(44 pages)

The Quality Assurance Records listed above are hereby transmitted for inclusion in the Plant Quality File.

These records are complete and in compliance with the requirement of Florida Power Corporation's Quality Program.

Candace Butler DATE 12/6/00
Responsible Supervisor/Designee

RECEIPT ACKNOWLEDGEMENT BY:

J. Wells DATE 12/7/00
Manager, Nuclear Information Resources/Designee

FUTURE RETENTION OF THESE RECORDS IS THE RESPONSIBILITY OF RECORDS MANAGEMENT.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 1-13-70

Mgr. - Power Engr. _____ Date 1-13-70

Nuclear Proj. Mgr. _____ Date 1-13-70

SPECIFICATION

PLACING OF REINFORCING STEEL

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5648

MAY 2, 1969

FPC-321-A3.3, B3.3, C3.3

APPROVED - DEPT. PROJECT ENGR. 5-2-69 DATE

ISSUED FOR CRYSTAL RIVER - UNIT 3 5-2-69 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

SND.-M.L.L.
W.O. 4203-00

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

Table of Contents

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

Table of Contents (Cont'd)

1:00 INSTRUCTIONS TO BIDDERS

1:01 Invitation

Proposals are requested by the Florida Power Corporation for the equipment, materials, and related WORK, set forth in the attached Specification, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Proposals shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation or post marked prior to twelve noon _____.

1:02.3 Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Each Bidder shall submit with his Proposal the name of the manufacturer and the type or model of each principal item of the equipment or material he proposes to furnish. He shall also submit drawings and descriptive matter which will show general arrangement and dimensions, appearance, principle of operation, and extent of factory assembly.

1:02.5 If the equipment cannot be shipped completely factory assembled, Bidders shall include with their Proposal the number, dimensions, and weight of each shipping unit and the amount of field work required to assemble the equipment completely.

1:02.6 The successful bidder may be required to furnish a service representative to work with Florida Power Corporation's personnel during the initial operation of the equipment. The services of this representative shall be outlined in the Proposal and the per diem charges stated separately.

1:02.7 One copy of provisional recommendations for spare parts shall be furnished with each Proposal.

1:02.8 Each Bidder shall include in his Proposal the cost of furnishing one complete set of all special tools, suitably packed and all in first class condition, which may be required for maintenance of the equipment covered by the Proposal.

1:02.9 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder, in connection with the proposed WORK. Exception:

1. If the price stated in the Proposal is for the furnishing of materials and/or equipment only and does not include field labor for erection and/or installation, do not include Florida State Sales Tax in your bid. Florida Power Corporation will pay such tax direct to the State of Florida.

2. If the price includes erection and/or installation labor to be performed at the job site, the Florida State Sales and Use Tax must be paid by the Bidder on the cost of the materials and supplies furnished. The Bidder awarded a Contract for this WORK shall be responsible for the payment of this tax to the State of Florida and should take this into account in his bid price.

1:02.10 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.11 Bidders shall state in their Proposals the complete terms of their warranty applicable to the materials and/or equipment they propose to furnish under this Specification, and the terms of extension of the warranty in the event of repair or replacement being required.

1:02.12 Bidders shall also state, in their Proposals, the extent of their guarantees for the performance of the equipment offered and for correction of items which fail to meet the warranty.

1:02.13 Royalties and fees for patents covering materials, articles, apparatus, devices or equipment used in the WORK shall be included in the Contract Price.

1:02.14 The Bidders shall not include, in their Proposals, the costs of insurance for equipment subsequent to receipt by the OWNER on the job site.

1:02.15 Bidders are advised that, due to the scope of this construction project, certain materials and equipment are required of necessity to be delivered considerably in advance of the actual commercial operation of the equipment. It is presently anticipated that actual commercial use, other than preliminary testing, of the material or equipment will not commence until April, 1972. Bidders are requested to take this into consideration in setting forth their warranty and guarantee terms.

1:02.16 Bidders shall set forth in their Proposals the terms of payment normal to their company or industry, including cash and/or trade discounts allowed, if any. Transportation charges shall be included from Shipping Point with full freight allowed to destination.

1:03 Evaluation of Proposals

1:03.1 Bidders' ability to satisfy OWNER of their capability to perform the WORK within the scheduled dates set forth herein will be a basic consideration in evaluating the Proposal.

1:03.2 It shall be understood that the evaluation of Proposals received in accordance with these Instructions to Bidders and the attached Specification will be conducted solely by Florida Power Corporation.

1:04 Insurance Requirements

Florida Power Corporation Contract insurance requirements are set forth in paragraphs 5 and 6 of Contract Form OD-17-A (copy attached). The successful bidder shall comply with these requirements prior to performing any WORK specified herein.

1:05 Performance and Payment Bond

Bidders are advised that a Performance and Payment Bond may be required from the successful bidder. The cost of such Performance and Payment Bond is to be set forth as a separate item in the Proposal. In the event Florida Power Corporation elects not to require a Performance and Payment Bond, 10 percent of each progress payment, if any, will by withheld until completion and acceptance of all WORK and receipt of CONTRACTOR'S Affidavit (copy attached) properly executed in duplicate.

1:06 Contract Forms and Certificates

1:06.1 The following documents will be incorporated into or referenced by the Contract awarded to the successful bidder:

1. Contract Form - OD-17-A.
2. Contractor's Affidavit - OD-28-A, B, or C.
3. Insurance Certificate - OD-17-C.

1:06.2 Copies of these documents are attached herewith and Bidders shall thoroughly familiarize themselves with all of the terms, conditions and instructions contained therein prior to submitting their Proposal.

1:07 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:08 Awards to Bidders and Payment

Florida Power Corporation will issue all purchase orders and make payment for the materials and/or equipment purchased.

1:09 Shipping Information

Bidders are advised that the shipments may be made to the plant site by the following carriers. All shipments shall be consigned to Florida Power Corporation, Crystal River Plant Unit No. 3:

Via Railroad:	Seaboard Coast Line (SCL) delivering carrier: Carload shipments only-destination station Red Level Junction, Florida. L.C.L. Shipments-destination station Crystal River, Florida.
Via Truck Lines:	Commercial Carriers-destination Red Level, Florida.
Water Transportation:	A 15 foot deep barge channel has been dredged from the Gulf of Mexico to the plant site. Contact Florida Power Corporation for particulars if barge delivery is contemplated.

2:00 GENERAL CONDITIONS

2:01 Scope

These General Conditions are applicable to equipment, materials and related WORK which will be incorporated in the new addition to Florida Power Corporation's Crystal River Plant.

2:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

"OWNER" shall mean the FLORIDA POWER CORPORATION.

"ENGINEER" shall mean GILBERT ASSOCIATES, INC., Consulting Engineers.

"CONTRACTOR" shall mean the successful bidder for the WORK who will undertake the performance of the WORK required by the Contract.

"WORK" shall mean labor, services, materials and equipment as set forth in the CONTRACT DOCUMENTS.

"EQUAL" shall mean equal as approved by the OWNER or the ENGINEER.

"CONTRACT DOCUMENTS" shall mean all Drawings, Specifications and Addenda thereto as prepared and issued by the OWNER, the Invitation to Bid, the CONTRACTOR'S Proposal, and Manufacturer's Drawings as approved by the ENGINEER, all of which are part of the CONTRACTOR'S Contract with the OWNER. These CONTRACT DOCUMENTS are complementary, and what is called for by any one of them shall be as binding as if called for by all. Any conflicts in the CONTRACT DOCUMENTS shall be resolved by the OWNER.

2:03 Equipment and Materials to be Supplied by the Contractor

All equipment and materials furnished under these Specifications shall be manufactured within the continental limits of the United States of America.

2:04 Codes and Standards

Unless specified otherwise herein, equipment and materials shall comply with all governing regulations and with the applicable standard specifications and codes of USAS, ASTM, ASME, IPCEA, NEMA, EEI, IEEE, UL and other such regular published and accepted standards. The regulation, specification or code applied in each case shall be the latest version of such regulation or standard adopted and published at the date of taking bids. Any conflict between standards shall be referred to the OWNER who will determine which standard shall govern.

2:05 Laws and Regulations

All equipment and WORK shall be in accordance with the laws of the State of Florida and the Rules of the Florida Industrial Commission.

2:06 Engineering and Drawings, Shop and Erection Drawings

2:06.1 Upon Award of a Contract, engineering data covering all equipment and fabricated materials to be furnished shall be submitted promptly by the CONTRACTOR for approval.

2:06.2 The CONTRACTOR shall submit 2 sepia copies and 2 prints of preliminary drawings and necessary data for approval, to the ENGINEER, at the address below:

Gilbert Associates, Inc.
Consulting Engineers
525 Lancaster Avenue
Reading, Pennsylvania 19603

Attention: Mr. E. R. Hottenstein

2:06.3 These drawings shall be sufficient and complete for system design purposes and for use in designing associated systems.

2:06.4 For final approval, the CONTRACTOR shall submit 2 sepia copies and 2 prints of drawings and necessary data for approval to the ENGINEER.

2:06.5 On each drawing submission (original, revisions, and final) the CONTRACTOR shall send one copy of each drawing and data direct to:

Florida Power Corporation
P.O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. W. O. May
Manager - Power Engineering

2:06.6 These drawings shall be sufficient and complete for adequate erection, operation and maintenance of the equipment. The engineering data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement and operation of component materials and devices; the external connections, anchorages and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. Data submitted shall include all required piping arrangement drawings, design calculations, pneumatic control system schematic diagrams, detailed drawings and data for structural systems, and complete power and control circuit logic diagrams, schematics, and wiring diagrams.

2:06.7 No WORK shall be performed in connection with the fabrication or manufacture of materials and equipment, nor shall any accessory or appurtenance be purchased until the drawings and data therefore have been approved, except at the CONTRACTOR'S own risk and responsibility.

2:06.8 Exceptions to paragraph 2:06.7 shall be by agreement with the OWNER.

2:07 Instruction Manuals

2:07.1 The CONTRACTOR shall furnish eleven complete and final copies of instruction manuals not later than 60 days prior to shipment of the equipment. Ten copies shall be sent to:

Florida Power Corporation
P.O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. W. O. May
Manager - Power Engineering

One copy shall be sent to:

Gilbert Associates, Inc.
Consulting Engineers
525 Lancaster Avenue
Reading, Pennsylvania 19603

Attention: Mr. E. R. Hottenstein

2:07.2 The instruction manuals shall cover complete installation, operating and maintenance instructions, drawings and parts lists for each item of equipment furnished.

2:07.3 The instruction manuals shall be bound with covers suitable for rough usage. The front covers shall be stamped with lettering indicating the OWNER'S name, unit number, name of power plant, location of power plant, name of equipment, basic capacity rating of equipment and name of manufacturer.

2:08 Recommended Spare Parts

The list of recommended spare parts, with the price of each such item, and a schedule of required lubricants, as recommended by the manufacturer of each item of equipment, shall be included in the instruction manuals.

2:09 Design and Manufacturing Program

2:09.1 The manufacturer's design engineer shall be prepared to visit the office of the OWNER or the ENGINEER for design conference at such times as are required to expedite the handling of engineering matters.

2:09.2 The Contract program will be controlled by CPM diagrams and the CONTRACTOR shall provide all necessary information requested by the OWNER or the ENGINEER for compilation of these. In general, information required will include drawing schedules, purchasing schedules for major equipment items, and delivery dates.

2:10 Manufacturing Errors

Equipment and materials shall be complete in all respects within the limits herein outlined. All manufacturing errors or omissions required to be corrected in the field shall be performed by the CONTRACTOR, at his expense; or if done by the OWNER, the cost of same shall be borne by the CONTRACTOR.

2:11 Bill of Material

2:11.1 The CONTRACTOR shall prepare a Bill of Material covering all material and equipment furnished under this Specification. The Bill of Material shall be submitted in a preliminary form with the preliminary drawing submission and be finalized approximately two weeks before the scheduled arrival time of the first shipment. The Bill of Material shall be itemized in sufficient detail to permit an accurate determination of the completion of shipment of the material and equipment furnished under these Specifications.

2:11.2 The mailing address for the finalized Bill of Material is:

Florida Power Corporation
Crystal River Plant Unit No. 3
P.O. Box 276
Crystal River, Florida 32629

Attention: Mr. H. L. Bennett
Construction Manager

2:11.3 All items of equipment delivered to site shall be marked adequately to allow identification from the Bill of Materials.

2:11.4 If the equipment is to be shipped in sections, with accessories or appurtenances detached, or otherwise not completely factory assembled, the extent of assembly shall be in accordance with the information submitted with the Proposal regarding the number, dimensions and weight of each section, accessory or appurtenance and the amount of field WORK required to assemble completely the equipment.

2:11.5 Suitable labels shall be affixed to all pre-assembled/pre-fabricated parts.

2:12 Manufacture and Inspection of Equipment

2:12.1 The CONTRACTOR shall advise the OWNER of all his major subcontractors before orders are placed and he shall not place orders with any subcontractor until approval of the OWNER has been obtained. The CONTRACTOR shall indicate where the equipment will be fabricated and the OWNER and/or its representative shall have the right to inspect all manufacturing facilities before approving the subcontractor.

2:12.2 The OWNER and/or its representative reserves the right to inspect fully all phases of manufacture of the equipment included in the Contract. Any item found to be unsatisfactory shall be replaced or repaired at no cost to the OWNER. Any inspection by the OWNER and/or its representative shall not relieve the CONTRACTOR of his responsibility for conforming to the stated conditions and shall not be considered a waiver of warranty, or other rights. No repairs or changes in excess of original Specifications or applicable codes, if requested by the inspector, shall be made without the approval of the OWNER.

2:12.3 All shop tests required for certification and proof that the equipment conforms to all applicable codes and standards shall be made at the expense of the CONTRACTOR. Any additional tests required by the OWNER and/or its representative shall be at OWNER'S expense with price to be negotiated for each individual case.

2:12.4 All parts of the equipment shall be protected against damage or corrosion during and following any tests.

2:12.5 The OWNER and the ENGINEER shall have the right of representation at all shop tests and they shall be notified at least one (1) week in advance of all shop tests and inspection.

2:12.6 One (1) properly identified copy of the CONTRACTOR'S welding procedures, and other special fabrication data for the equipment, shall be submitted the ENGINEER for review and approval and three (3) copies shall be sent to the OWNER.

2:12.7 One (1) certified copy of all shop test data for the equipment, properly identified, shall be forwarded to the ENGINEER for acceptance, and three (3) copies shall be sent to the OWNER.

2:13 Shipment of Completed Work

All equipment shall be shipped completely factory assembled, except when the physical size, arrangement or configuration of the equipment, or shipping and handling limitations, make the shipment of completely assembled equipment impracticable.

2:14 Special Tools

2:14.1 The CONTRACTOR shall furnish one complete set of all special tools, all in first class condition, which will be required for maintenance of the equipment covered by the Contract. Identification of all tools by name and number shall be provided, and this number shall appear on drawings and instructions to indicate the application of the tools furnished and to permit ordering replacements.

2:14.2 The tools shall be shipped in a separate, heavily constructed, wooden box or boxes provided with hinged covers and padlock clasps. The boxes shall be marked with a large painted legend as follows:

Florida Power Corp. - Crystal River Unit No. 3

Maintenance Tools - (Name of equipment)

2:15 Protection During Shipment and Storage

2:15.1 Except as specified otherwise herein, exposed iron and steel surfaces of all equipment shall be given one coat of primer paint before shipment of the equipment to the jobsite. Before application of paint, all surfaces shall be free of rust, scale, lubricants, moisture, and other substances. Surfaces prepared for field welding shall be left unpainted for a distance of two inches from the weld. These surfaces shall be given a protective film of oil or other easily removed material to prevent rusting before erection.

2:15.2 The CONTRACTOR will be advised of the acceptable prime paint for exposed carbon steel surfaces of equipment and material to be installed inside the reactor building.

2:15.3 All exposed carbon steel surfaces of all other equipment shall be painted with zinc chromate pigment, rust inhibitive, metal primer paint recommended by the paint manufacturer for the service intended, and for application to metals prepared for painting by wire brushing. Paint shall be applied in accordance with the paint manufacturer's recommendations.

2:15.4 Machined surfaces such as shafts, pins, bushings, shaft couplings and other similar parts whose operation would be impaired by painting shall not be painted. These surfaces shall be protected by application of an easily removable rust preventative compound.

2:15.5 Plastics, corrosion resistant metals such as aluminum, brass, bronze, or stainless steel, and chrome plate or galvanized surfaces shall not be painted.

2:15.6 Each piece of equipment shall be cleaned thoroughly and dried prior to shipment. Equipment made of carbon steel shall contain adequate bags of silica-gel or approved equivalent desiccant to maintain a dew point of 40F. Desiccant bags shall be securely anchored within the equipment. All openings of all equipment shall be closed prior to shipment with an easy to remove plug of suitable material.

2:15.7 All equipment and accessory items shall be suitably boxed, crated, wrapped or covered to the extent practicable, to prevent entrance of dirt or moisture and to prevent accidental damage during shipment to the job site and during outdoor storage at the job site. Where necessary a desiccant shall be included within the packing enclosure of items sensitive to changes in humidity.

2:15.8 All accessory items shall be shipped with the equipment. Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of the boxes and crates shall also be indicated.

2:16 Shipping Notices

2:16.1 The CONTRACTOR shall provide two copies of a shipping notice describing each shipment of material or equipment. The shipping notice shall be mailed on a schedule so that the notice will arrive approximately three days ahead of the estimated arrival time of the shipment.

2:16.2 The shipping notice shall be identified with the OWNER'S name, purchase order number, and name of the item of equipment or material.

The mailing address for the shipping notice is:

Florida Power Corporation
Crystal River Plant Unit No. 3
P. O. Box 276
Crystal River, Florida 32629

Attention: Mr. H. L. Bennett
Construction Manager

2:17 Patents

The CONTRACTOR shall satisfy all demands that may be made at any time for royalties and fees, and he shall be liable for any damages or claims, for patent infringements. The CONTRACTOR shall, at his own cost and expense, defend all suits or proceedings that may be instituted against the OWNER for infringement or alleged infringement of any patents involved in the WORK, and, in the case of an award of damages, the CONTRACTOR shall pay such award.

2:18 Conflicts

In the event of discrepancies between the detailed requirements of this Specification and those of the General Conditions, the detailed requirements shall prevail.

3:00 DETAILED SPECIFICATIONS

3:01 Scope of Work

The WORK to be performed under this Specification shall include the unloading, storing, and placing of reinforcing steel, as shown on the Drawings and specified herein, at Crystal River Unit No. 3.

3:02 Reinforcing Steel

3:02.1 Delivery and Storage:

Reinforcement and welded wire fabric will be delivered to the site by Others, in accordance with SP-5646.

3:02.2 Cleaning:

Reinforcement shall be cleaned free from any loose rust, grease, or other foreign material which may destroy bond, before being placed.

3:02.3 Placing:

1. Placing, spacing, etc., shall be as shown on the Drawings and in accordance with Chapter 8, ACI 318-63, "Building Code Requirements for Reinforced Concrete."

2. Wire ties shall be used for securing reinforcement. Fusion welding of reinforcement for any purpose will not be permitted.

3:03 Reinforcing Steel Splices

3:03.1 No splices of reinforcement shall be made except as shown on the Drawings, or as specified herein, or as approved by the ENGINEER.

3:03.2 Minimum lap splice lengths shall be in accordance with ACI 318-63.

3:03.3 Lapped splices in tension shall not be used for bar sizes larger than No. 11.

3:03.4 Where the bar size exceeds No. 11, "Cadweld" splices shall be used to develop the specified minimum ultimate tensile strength of the bar. Testing of "Cadweld" splices will be based on a random sampling procedure of approved splices utilizing a statistical evaluation and shall meet the quality requirements as set forth in Item 3:04.

3:04 Cadweld Splices

3:04.1 General:

The permissible splices to be used at all times shall be the T-series splices. These shall be Cadweld full tension splices.

3:04.2 Cadweld Operator or Crew Qualification:

Prior to the performing of production or pilot splices of reinforcing bar, each operator or crew shall prepare and test a splice for each bar size and position (i.e. vertical, horizontal, side entry, top entry) to be used in the production work. These qualification splices shall be tested to destruction and, in addition, shall be further examined to establish that each crew can perform reproducible splices of acceptable quality. See item 3:04.3 for acceptance criteria for Cadweld splices.

3:04.3 Acceptance Criteria for Cadweld Splices:

1. Sound, nonporous filler material shall be visible at both ends of the splice sleeve and at the top hole in the center of the sleeve. Filler material is usually recessed 1/4 in. from the end of the sleeve due to the packing material, and is not considered a poor fill.

2. Splices which contain slag or porous metal in the riser, top hole or at the ends of the sleeve shall be rejected. A single shrinkage bubble present below the riser is not detrimental and should be distinguished from general porosity as described above.

3. There shall be evidence of filler material between the sleeve and bar for the full 360 degrees; however, the splice sleeves need not be exactly concentric or axially aligned with the bars.

4. The strength of the "Cadweld" splices to be tested shall be equal to or greater then the specified minimum ultimate tensile strength of the bars.

3:05 Quality Control

3:05.1 General:

CONTRACTOR shall submit a written procedure, covering the placing of reinforcement bar, for review and comment by OWNER and ENGINEER. His procedure shall include, but not necessarily be

limited to the requirements set forth in item 3:05.2.

3:05.2 Procedure Requirements:

1. A manufacturer's representative, experienced in "Cadweld" splicing of reinforcing bars, shall be present at the job site at the outset of the WORK to demonstrate the equipment and techniques used for making quality splices. The manufacturer's recommendations shall be followed, except where in conflict with this Specification.

2. The following is a list of points for inclusion in the CONTRACTOR'S procedure:

   a. The splice sleeve, powder and molds shall be stored in a clean dry area with adequate protection from the elements to prevent absorption of moisture.

   b. Each splice sleeve shall be visually examined immediately prior to use, to ensure the absence of rust and other foreign material on the inside surface.

   c. The molds shall be preheated to drive off moisture at the beginning of each shift when the molds are cold or when a new mold is used.

   d. Bar ends to be spliced shall be power wire brushed for a distance of two inches plus 1/2 the sleeve length from end of bar to remove mill scale, rust, concrete and other foreign material. Prior to brushing, water, grease, and paint shall be removed by heating the bar ends with a torch. The bars shall be bright and shiny prior to the performance of the "Cadweld".

   e. A permanent line shall be marked on the bar for a reference point to confirm that the bar ends are properly centered in the splice sleeve.

   f. Before the splice sleeve is placed into final position, the bar ends shall be examined to ensure that the surface is free from moisture. If moisture is present, the bar ends shall be heated until dry.

   g. Special attention shall be given to maintaining the alignment of sleeve and guide tube to ensure a proper fill.

   h. The splice sleeve shall be preheated in accordance with the manufacturer's recommendations after all materials and equipment are in position.

i. All completed splices shall be visually inspected at both ends of the splice sleeve and at the top hole in the center of the splice.

j. The CONTRACTOR shall keep a record of all "Cadweld" splices placed. This record will then enable a test splice to be chosen at random and its location established. The record documents plus test results of all "Cadweld" splices tested shall be kept up-to-date and shall be available to all inspectors. The CONTRACTOR shall furnish one (1) copy of the record documents and test results to the OWNER'S Quality Engineer. The record must show:

(1) The number assigned to each splice.

(2) The date that the splice was formed.

(3) The crew which carried out the welding.

(4) The exact location of the splice.

k. Cadwelding of splices shall not be performed during any form of precipitation.

3:05.3 Frequency of Testing:

1. After the crews have completed the qualification "Cadweld" splices for each size bar and each position, the crews shall then perform pilot splices. All of these pilot splices shall be tested to destruction to develop an average ($\bar{X}$) and a standard deviation (σ). The destruction of a splice shall be defined as the tensile failure of the rebar adjacent to the sleeve or the tensile failure of the sleeve or the failure of the weld metal. Each crew shall perform an approximately equal number of pilot splices so that the total number of pilot splices will be 20. Any pilot splice that fails below 70,000 psi shall be rejected and replaced by a further pilot splice and the cause for failure shall be investigated. The crews shall have established that they can perform acceptable and reproducible splices during the performance of qualification splices.

2. Then to ensure the integrity of the "Cadweld" splices, the quality control procedure shall provide for a random sampling of field splices. All random splices shall be taken from splices intended for use. No "Companion" splices will be used,

as the crews may take more care in the performance of "Companion" splices. These are not considered representative of the production splices and are not an acceptable means for judgement.

3. The initial random sampling rate shall be one in every 25 splices produced by each crew until the results of 50 tests have been compiled. These 50 tests shall include the first 20 pilot splices and the random production splices from all the crews.

4. At that time, statistical methods may be employed to determine the possibility of decreasing the sampling rate. The lower statistical tolerance limit shall be based on the criteria of 99 percent assurance that 95 percent of all splices have strengths in excess of this limit and in all cases the lower statistical limit should be 70,000 psi and above. The lower tolerance limit shall be calculated from the average ($\bar{X}$) and the standard deviation (σ). This lower tolerance limit is: X minus A(σ). The "A" factor can be found in the table at the end of this discussion.

5. The random sampling rate may be decreased after a total of 50 tests if the lower tolerance limit shows the "Cadweld" strength to be above 70,000 psi. This first decrease will be to a rate of 3 per 100 splices by each crew. A final decrease may be made after 100 more tests or a total of 150 tests if the previous criteria is met. This final minimum rate will be 2 tests per 100 splices by each crew. This lower rate may be maintained as long as the lower tolerance limit is above the 70,000 psi level. If at any time the lower tolerance limit goes below this minimum strength, then the frequency shall be increased to the level of one test in every 25 splices produced by each crew.

6. If an individual test fails below the lower tolerance limit or below the lower control limit, the splice just prior to or just after the low strength splice performed by the same crew shall be tested. The lower control limit is again determined by the average ($\bar{X}$) and the standard deviation (σ). The lower control limit is: $\bar{X}$ minus E_1 or $\bar{X}$ minus E_2 (range) whichever is higher. The range is defined as the difference between the highest and lowest tensile breaks.

7. E_1 and E_2 can be found in the table at the end of this discussion.

8. If the second test is above these previous lower control limits, then the process is considered under control and the testing frequency shall continue as established. If the second test is below one of these control limits, the results shall be submitted to the OWNER'S Quality Engineer for evaluation and the crew responsible for this deviation will not be permitted to produce further splices, until the results can be studied. The average (X), the standard deviation (σ), and the other statistical factors shall be recalculated after every group of 20 tests are compiled. The following table gives the statistical factors needed for this progressive evaluation of the test results:

Number of Tests	"A"	"E_1"	"E_2"
20	3.17	3.119	0.803
40	2.68	3.000	0.763
60	2.50	3.000	0.763
80	2.41	3.000	0.763
100	2.35	3.000	0.763

3:05.4 Test Type:

The test of the splices shall conform to ACI 318-63, for tensile tests.

3:06 Site Storage Requirements

The CONTRACTOR shall develop written procedures for the on-site storage of the reinforcement steel. These reinforcing bars shall be stored in an orderly fashion at the site so that they are compatible with the placement procedure and that the final cleanliness is assured.

#1

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 3-25-70

Mgr. - Power Engr. _____ Date 3-25-70

Nuclear Proj. Mgr. _____ Date 3-26-70

SPECIFICATION

PLACING OF REINFORCING STEEL

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5648 MAY 2, 1969

FPC-321-A3.3, B3.3, C3.3

_____ 3-13-70
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 3-13-70
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-M.L.L.
W.O. 4203-00
ADDENDUM A
March 11, 1970

ADDENDUM A

Sheet 1 of 1
March 11, 1970

SECTION 3:00 DETAILED SPECIFICATIONS

Delete this Section in its entirety and substitute the attached revised pages.

3:00 DETAILED SPECIFICATIONS

3:01 Scope of Work

The WORK to be performed under this Specification shall include the unloading, storing, and placing of reinforcing steel, as shown on the Drawings and specified herein, at Crystal River Unit No. 3.

3:02 Reinforcing Steel

3:02.1 Delivery and Storage:

Reinforcement and welded wire fabric will be delivered to the site by Others, in accordance with SP-5646.

3:02.2 Cleaning

Reinforcement shall be cleaned free from any loose flaky rust, grease, or other foreign material which may destroy bond, before being placed.

3:02.3 Placing:

1. Placing, spacing, etc., shall be as shown on the Drawings and in accordance with Chapter 8, ACI 318-63, "Building Code Requirements for Reinforced Concrete."

2. Wire ties shall be used for securing reinforcement. Welding of reinforcement for any purpose will not be permitted.

3:03 Reinforcing Steel Splices

3:03.1 No splices of reinforcement shall be made except as shown on the Drawings, or as specified herein, or as approved by the ENGINEER.

3:03.2 Minimum lap splice lengths shall be in accordance with ACI 318-63.

3:03.3 Lapped splices in tension shall not be used for bar sizes larger than No. 11.

3:03.4 Where the bar size exceeds No. 11, Cadweld splices shall be used to develop the specified minimum ultimate tensile strength of the bar. Testing of Cadweld splices will be based on a random sampling procedure of approved splices utilizing a statistical evaluation and shall meet the quality requirements as set forth in Item 3:04.

3:04 Cadweld Splices

3:04.1 General:

The permissible splices to be used at all times shall be the T-series splices. These shall be Cadweld full tension splices.

3:04.2 Cadweld Operator or Crew Qualification:

Prior to the performing of production or pilot splices of reinforcing bar, each operator or crew shall prepare and test a splice for each bar size and position (i.e. vertical, horizontal, side entry, top entry) to be used in the production work. These qualification splices shall be tested to destruction and, in addition, shall be further examined to establish that each crew can perform reproducible splices of acceptable quality. See item 3:04.3 for acceptance criteria for Cadweld splices.

3:04.3 Acceptance Criteria for Cadweld Splices:

1. Sound, nonporous filler material shall be visible at both ends of the splice sleeve and at the top hole in the center of the sleeve. Filler material is usually recessed 1/4 in. from the end of the sleeve due to the packing material, and is not considered a poor fill.

2. Splices which contain slag or porous metal in the riser, top hole, or at the ends of the sleeve, shall be rejected. A single shrinkage bubble present below the riser is not detrimental and should be distinguished from general porosity as described above.

3. There shall be evidence of filler material between the sleeve and bar for the full 360 degrees; however, the splice sleeves need not be exactly concentric or axially aligned with the bars.

4. The average strength of the Cadweld splices to be tested shall be equal to or greater then the specified minimum ultimate tensile strength of the bars.

3:05 Quality Control

3:05.1 General:

CONTRACTOR shall submit a written procedure, covering the placing of reinforcement bar, for review and comment by OWNER and ENGINEER. His procedure shall include, but not necessarily be limited to, the requirements set forth in item 3:05.2.

3:05.2 Procedure Requirements:

1. A manufacturer's representative, experienced in Cadweld splicing of reinforcing bars, shall be present at the job site at the outset of the WORK to demonstrate the equipment and techniques used for making quality splices. The manufacturer's recommendations shall be followed, except where in conflict with this Specification.

2. The following is a list of points for inclusion in the CONTRACTOR'S procedure:

   a. The splice sleeve, powder and molds shall be stored in a clean dry area with adequate protection from the elements to prevent absorption of moisture.

   b. Each splice sleeve shall be visually examined immediately prior to use, to ensure the absence of rust and other foreign material on the inside surface.

   c. The molds shall be preheated to drive off moisture at the beginning of each shift when the molds are cold or when a new mold is used.

   d. Bar ends to be spliced shall be power wire brushed for a distance of two inches plus 1/2 the sleeve length from end of bar to remove mill scale, rust, concrete and other foreign material. Prior to brushing, water, grease, and paint shall be removed by heating the bar ends with a torch. The bars shall be bright and shiny prior to the performance of the Cadweld.

   e. A permanent line shall be marked on the bar for a reference point to confirm that the bar ends are properly centered in the splice sleeve.

   f. Before the splice sleeve is placed into final position, the bar ends shall be examined to ensure that the surface is free from moisture. If moisture is present, the bar ends shall be heated until dry.

   g. Special attention shall be given to maintaining the alignment of sleeve and guide tube to ensure a proper fill.

   h. The splice sleeve shall be preheated in accordance with the manufacturer's recommendations after all materials and equipment are in position.

i. All completed splices shall be visually inspected at both ends of the splice sleeve and at the top hole in the center of the splice.

j. The CONTRACTOR shall keep a record of all Cadweld splices placed. This record will then enable a test splice to be chosen at random and its location established. The record documents plus test results of all Cadweld splices tested shall be kept up-to-date and shall be available to all inspectors. The CONTRACTOR shall furnish one (1) copy of the record documents and test results to the OWNER'S Quality Engineer. The record must show:

(1) The number assigned to each splice.

(2) The date that the splice was formed.

(3) The crew which carried out the welding.

(4) The exact location of the splice.

k. Cadwelding of splices shall not be performed during any form of precipitation.

3:05.3 Frequency of Testing:

1. After the crews have completed the qualification Cadweld splices for each size bar and each position, the crews shall then perform pilot splices. All of these pilot splices shall be tested to destruction to develop an average $\bar{X}$ and a standard deviation σ. The destruction of a splice shall be defined as the tensile failure of the rebar adjacent to the sleeve or the tensile failure of the sleeve or the failure of the weld metal. Each crew shall perform an approximately equal number of pilot splices so that the total number of pilot splices will be 21. Any pilot splice that fails below 70,000 psi shall be rejected and replaced by a further pilot splice and the cause for failure shall be investigated. The crews shall have established that they can perform acceptable and reproducible splices during the performance of qualification splices.

2. Then, to ensure the integrity of the Cadweld splices, the quality control procedure shall provide for a random sampling of field splices. All random splices shall be taken from splices intended for use. Unless otherwise approved by the ENGINEER, no "Companion" splices will be used, as the crews may take more care in the performance of "Companion" splices. These are not considered representative of the production splices and are not an acceptable means for judgement.

3. The initial random sampling rate shall be one in every 25 splices produced by each crew until the results of 51 tests have been compiled. These 51 tests shall include the 21 pilot splices and the random production splices from all the crews.

4. At that time, statistical methods may be employed to determine the possibility of decreasing the sampling rate. The lower statistical tolerance limit shall be based on the criteria of 99 percent assurance that 95 percent of all splices have strengths lying between the values determined by the tolerance limits and in all cases the lower statistical limit should be 70,000 psi and above. The lower tolerance limit shall be calculated from the average $\overline{X}$ and the standard deviation σ. This lower tolerance limit is: $\overline{X} - A\sigma$. The "A" factor may be found in the table at the end of this discussion.

5. The random sampling may be decreased after a total of 51 tests if the lower tolerance limit shows the Cadweld strength to be above 70,000 psi. This first decrease will be to a rate of 3 per 100 splices by each crew. A final decrease may be made after 100 more tests or a total of 151 tests if the previous criteria is met. This final minimum rate will be 2 tests per 100 splices by each crew. This lower rate may be maintained as long as the lower tolerance limit is above the 70,000 psi level. If at any time the lower tolerance limit goes below this minimum strength, then the frequency shall be increased to the level of one test in every 25 splices produced by each crew.

6. If an individual test fails below the lower control limit, the splice just prior to or just after the low strength splice performed by the same crew shall be tested. The lower control limit is again determined by the average $\overline{X}$ and the standard deviation σ. The lower control limit is: $\overline{X} - E_1\sigma$ or $\overline{X} - E_2R$ whichever is higher. The range R is defined as the difference between the highest and lowest tensile breaks.

7. E_1 and E_2 can be found in the table at the end of this discussion.

8. If the second test is above these previous lower control limits, then the process is considered under control and the testing frequency shall continue as established. If the second test is below one of these control limits, the results shall be submitted to the OWNER'S Quality Engineer for evaluation and the crew responsible for this deviation will not be permitted to produce further splices, until the results can be studied. The average $\overline{X}$, the standard deviation σ, and the other statistical factors shall be recalculated after every group of 20 tests are compiled. The following table gives the statistical factors needed for this progressive evaluation of the test results:

Degrees of Freedom f *	Number of Tests	"A"	"E_1"	"E_2"
20	21	3.12	3.113	0.794
30	31	2.82	3.000	0.763
40	41	2.67	3.000	0.763
50	51	2.57	3.000	0.763
60	61	2.50	3.000	0.763
70	71	2.45	3.000	0.763
80	81	2.41	3.000	0.763
90	91	2.38	3.000	0.763
100	101	2.35	3.000	0.763
110	111	2.34	3.000	0.763
120	121	2.32	3.000	0.763
130	131	2.31	3.000	0.763
140	141	2.30	3.000	0.763
150	151	2.28	3.000	0.763
160	161	2.27	3.000	0.763
170	171	2.26	3.000	0.763
180	181	2.25	3.000	0.763
190	191	2.23	3.000	0.763
200	201	2.22	3.000	0.763

* One of the variables in the formula, which is used for the calculation of the "A" values above, is the number of degrees of freedom, f. The number of degrees of freedom is one less than the number in the sample, N. i.e., f = N-1. Using an initial sample of 21 and increasing this by multiples of ten, allows the values of "A" to be read directly from the table without the use of interpolation.

3:06 Site Storage Requirements

The CONTRACTOR shall develop written procedures for the on-site storage of the reinforcement steel. These reinforcing bars shall be stored in an orderly fashion at the site so that they are compatible with the placement procedure and that the final cleanliness is assured.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineer _____ Date 6-24-70

Mgr. - Power Engr. _____ Date 6-25-70

Nuclear Proj. Mgr. _____ Date 6-26-70

SPECIFICATION

PLACING OF REINFORCING STEEL

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5648 MAY 2, 1969

FPC-321-A3.3, B3.3, C3.3

_____ 6-18-70
APPROVED - DEPT. PROJECT ENGR. DATE

_____ 6-18-70
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-M.L.L.
W.O. 4203-00
ADDENDUM A
March 11, 1970
ADDENDUM B
June 18, 1970

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

ADDENDUM B

Sheet 1 of 1
June 18, 1970

CHANGES TO ADDENDUM A

SECTION 3:00 Detailed Specifications

3:02 Reinforcing Steel

3:02.3 Subitem 2; delete last sentence as written and substitute the following:

"Welding of reinforcement will not be permitted except for the purpose of attaching form tie rods at non-critical points on the reinforcement as approved by the Engineer."

FOR REFERENCE ONLY

SPECIFICATION

PLACING OF REINFORCING STEEL

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5648 MAY 2, 1969

FPC 321-A3.3, B3.3, C3.3

APPROVED - DEPT. PROJECT ENGR. DATE

ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D. - M.L.L.
W.O. 044203-000
ADDENDUM A
March 11, 1970
ADDENDUM B
June 18, 1970
PRELIMINARY
ADDENDUM C
December 15, 1972

PRELIMINARY
ADDENDUM C

December 15, 1972

3:00 DETAILED SPECIFICATIONS

3:04 Cadweld Splices

3:04.1 General:

Number the existing paragraph "1." and add the following subitems:

"2. Two types of testing program may be used:

a. Production Splice Program.

b. Combined Splice Program.

Note: The OWNER'S construction supervision staff shall determine which program shall be applied to each concrete pour.

"3. Production Splice Program:

The Production Splice Program shall be used in those areas where production splices located on straight sections of reinforcement can be readily removed for testing. The Production Splice Program shall be used for complete concrete pours. Production Splice and Combined Splice Programs shall not be used in the same concrete pour. Only one or the other program shall be used for individual concrete pours.

"4. Combined Splice Program:

The Combined Splice Program will consist of a mixture of production and sister splices. It may be used for any location and configuration of reinforcement.

3:04.3 Acceptance Criteria for Caldweld Splices:

Subitem 4:

Change the capital "T" in the first word to a lower case "t" and add the following words before this first word:

"For the Production Splice Program"

PRELIMINARY
ADDENDUM C

Add the following subitem:

"5. Combined Splice Program:

a. Individual Splice Strength Criteria:

The tensile strength of each sample tested shall be equal to or exceed 125 percent of the minimum yield strength specified in ASTM A 615-68 for the grade of reinforcement being used.

b. Group Splice Strength Criteria:

The average tensile strength of each group of consecutive samples in each concrete pour up to a maximum group of 15 shall equal or exceed the guaranteed ultimate strength for that grade of reinforcement as specified in ASTM A 615-68."

Add the following new items:

"3:04.4 Positioning of Reinforcement for Sister Splices:

Sufficient extra lengths of reinforcement shall be positioned in those areas of reinforcement where sister splices will be required prior to any splicing taking place in that concrete pour. The reinforcement shall be cleaned and positioned in accordance with the requirements of item 3:05.2. The reinforcement shall be secured in position so that it cannot be displaced during splicing. The positioning of the reinforcement shall be such that the location and orientation of the sister splice is similar to the splices it will represent."

"3:04.5 Availability of Sample Test Results for Combined Splice Program:

Test results for the samples for a concrete pour shall be available and in conformance to the requirements of item 3:04.3 subitem 5 before any concrete in that pour is placed.

"3:04.6 Location of Failure:

The point of failure in the test sample shall be recorded for each test sample. Where failure takes place in the bar, clear of the splice at strength values less than the allowable, the production splices represented by the sample splice shall be considered acceptable.

PRELIMINARY
ADDENDUM C

"3:04.7 Failures in Reinforcement at Values Less Than the Minimum:

If during testing sample Cadweld splice, failure takes place in the reinforcement at strength values less than the minimum criteria as set forth in ASTM A 615-68, the ENGINEER shall be contacted to evaluate and recommend the required remedial action."

3:05 Quality Control

3:05.2 Procedure Requirements:

Subitem 2-i:

Line 2, after the ninth word (the) delete the word "top" and replace with the following:

"tap"

Subitem 2.-j.-(4):

After the third word "location" and before the fourth word "of" insert the following:

"and position (i.e. vertical, inclined, horizontal)"

3:05.3 Frequency of Testing:

Change this item title to read as follows:

"Frequency of Testing for the Production Splice Program:"

Subitem 2:

Lines 4, 5, 6, 7, and 8; delete the last two sentences beginning with the words "Unless otherwise approved ..." and ending with the words " ... are not an acceptable means for judgement."

Add the following new item:

"3:05.4 Frequency of Testing for Combined Splice Program:

1. Frequency of Selecting and Testing Samples:

The minimum number of splices to be tested shall conform to:

a. 3 splices per 100 production splices.

b. 2 splices per concrete pour.

c. 1 production splice per 100 production splices.

2. Sister and Production Splices:

Sister splices may be used in those areas of curved reinforcement or where insufficient room exists to remove production splices, provided that the criteria stated in item 3:04.3 subitem 5 is adhered to.

3. Procedure for Non-Conforming Individual Splice Strengths:

When a splice fails to meet the criteria noted in item 3:04.3 subitem 5a, the group represented by the failed samples shall have additional samples removed and tested. Until satisfactory resolution is obtained, splicing by the crew or crews that fabricated the nonconforming splices shall cease. After the location of the failed splice is determined, two adjacent production splices, one on each side of the failed sample, shall be removed and tested. In addition, either one randomly selected production splice per concrete pour or 4 percent of the number of production splices in a pour selected at random, whichever is greater, shall be removed and tested. If all these additional splices conform to the criteria noted in item 3:04.3 subitem 5a, then splicing is considered acceptable and in control and splicing may continue. If any one or more of the additional splices fails to conform to the criteria noted in item 3:04.3, subitem 5a, then the OWNER and the ENGINEER shall determine the necessary remedial treatment. If any or all of the additional production splices cannot be readily removed for the additional testing described in this subitem, the ENGINEER shall determine the required test splices.

4. Procedure for Non-Conforming Group Splice Strengths:

When a group of splices in a concrete pour fails to meet the criteria noted in item 3:04.3 subitem 5b, additional splices shall be selected and tested as noted in item 3:05.4 subitem 3. If any one or more of the additional splices fails to conform to the criteria noted in item 3:04.3 subitem 5b, then the OWNER and the ENGINEER shall determine the necessary remedial treatment. If any or all of the additional testing described in this subitem, the ENGINEER shall determine the required test splices."

SP-5648
5-2-69
Revised 3-11-70

PRELIMINARY
ADDENDUM C

Sheet 5 of 5
December 15, 1972

Note: Enclosed is a copy of the following revised or appended pages which reflect the changes set forth by this ADDENDUM C:

Revised - 14, 16, 19

Appended - 14a, 14b, 19a

Please replace old pages with attached revised pages and add the new pages in their proper sequence.

3:04 Cadweld Splices

3:04.1 General:

1. The permissible splices to be used at all times shall be the T-series splices. These shall be Cadweld full tension splices.

2. Two types of testing programs may be used:

   a. Production Splice Program.

   b. Combined Splice Program.

   Note: The OWNER'S construction supervision staff shall determine which program shall be applied to each concrete pour.

3. Production Splice Program:

   The Production Splice Program shall be used in those areas where production splices located on straight sections of reinforcement can be readily removed for testing. The Production Splice Program shall be used for complete concrete pours. Production Splice and Combined Splice Programs shall not be used in the same concrete pour. Only one or the other program shall be used for individual concrete pours. C

4. Combined Splice Program:

   The Combined Splice Program will consist of a mixture of production and sister splices. It may be used for any location and configuration of reinforcement.

3:04.2 Cadweld Operator or Crew Qualification:

Prior to the performing of production or pilot splices of reinforcing bar, each operator or crew shall prepare and test a splice for each bar size and position (i.e. vertical, horizontal, side entry, top entry) to be used in the production work. These qualification splices shall be tested to destruction and, in addition, shall be further examined to establish that each crew can perform reproducible splices of acceptable quality. See item 3:04.3 for acceptance criteria for Cadweld splices.

3:04.3 Acceptance Criteria for Cadweld Splices:

1. Sound, nonporous filler material shall be visible at both ends of the splice sleeve and at the top hole in center of the sleeve. Filler material is usually recessed 1/4 in. from the end of the sleeve due to the packing material, and is not considered a poor fill.

2. Splices which contain slag or porous metal in the riser, tap hole, or at the ends of the sleeve, shall be rejected. A single shrinkage bubble present below the riser is not detrimental and should be distinguished from general porosity as described above.

3. There shall be evidence of filler material between the sleeve and bar for the full 360 degrees; however, the splice sleeves need not be exactly concentric or axially aligned with the bars.

4. For the Production Splice Program the average strength of the Cadweld splices to be tested shall be equal to or greater than the specified minimum ultimate tensile strength of the bars. C

5. Combined Splice Program:

   a. Individual Splice Strength Criteria.

      The tensile strength of each sample tested shall be equal to or exceed 125 percent of the minimum yield strength specified in ASTM A 615-68 for the grade of reinforcement being used.

   b. Group Splice Strength Criteria. C

      The average tensile strength of each group of consecutive samples in each concrete pour up to a maximum group of 15 shall equal or exceed the guaranteed ultimate strength for that grade of reinforcement as specified in ASTM A 615-68.

3:04.4 Positioning of Reinforcement for Sister Splices:

Sufficient extra lengths of reinforcement shall be positioned in those areas of reinforcement where sister splices will be required prior to any splicing taking place in that concrete pour. The reinforcement shall be cleaned and positioned in accordance with the requirements of item 3:05.2. The reinforcement shall be secured in position so that it cannot be displaced during splicing. The positioning of the reinforcement shall be such that the location and orientation of the sister splice is similar to the splices it will represent.

3:04.5 Availability of Sample Test Results for Combined Splice Program:

Test results for the samples for a concrete pour shall be available and in conformance to the requirements of item 3:04.3 subitem 5 before any concrete in that pour is placed.

3:04.6 Location of Failure

The point of failure in the test sample shall be recorded for each test sample. Where failure takes place in the bar, clear of the splice at strength values less than the allowable, the production splices represented by the sample splice shall be considered acceptable.

3:04.7 Failures in Reinforcement at Values Less Than the Minimum

If, during testing sample Cadweld splice, failure takes place in the reinforcement at strength values less than the minimum criteria as set forth in ASTM A 615-68, the ENGINEER shall be contacted to evaluate and recommend the required remedial action. C

3:05 Quality Control

3:05.1 General:

CONTRACTOR shall submit a written procedure, covering the placing of reinforcement bar, for review and comment by OWNER and ENGINEER. His procedure shall include, but not necessarily be limited to, the requirements set forth in item 3:05.2.

i. All completed splices shall be visually inspected at both ends of the splice sleeve and at the tap hole in the center of the splice. | C

j. The CONTRACTOR shall keep a record of all Cadweld splices placed. This record will then enable a test splice to be chosen at random and its location established. The record documents plus test results of all Cadweld splices tested shall be kept up-to-date and shall be available to all inspectors. The CONTRACTOR shall furnish one (1) copy of the record documents and test results to the OWNER'S Quality Engineer. The record must show:

(1) The number assigned to each splice.

(2) The date that the splice was formed.

(3) The crew which carried out the welding.

(4) The exact location and position (i.e. vertical, inclined, horizontal) of the splice. | C

k. Cadwelding of splices shall not be performed during any form of precipitation.

3:05.3 Frequency of Testing for the Production Splice Program: | C

1. After the crews have completed the qualification Cadweld splices for each size bar and each position, the crews shall then perform pilot splices. All of these pilot splices shall be tested to destruction to develop an average X and a standard deviation σ. The destruction of a splice shall be defined as the tensile failure of the rebar adjacent to the sleeve or the tensile factor of the sleeve or the failure of the weld metal. Each crew shall perform an approximately equal number of pilot splices so that the total number of pilot splices will be 21. Any pilot splice that fails below 70,000 psi shall be rejected and replaced by a further pilot splice and the cause for failure shall be investigated. The crew shall have established that they can perform acceptable and reproducible splices during the performance of qualification splices.

2. Then, to ensure the integrity of the Cadweld splices, the quality control procedure shall provide for a random sampling of field splices. All random splices shall be taken from splices intended for use. | C

3:05.4 Frequency of Testing for Combined Splice Program

1. Frequency of Selecting and Testing Samples:

The minimum number of splices to be tested shall conform to:

a. 3 splices per 100 production splices.

b. 2 splices per concrete pour.

c. 1 production splice per 100 production splices.

2. Sister and Production Splices

Sister splices may be used in those area of curved reinforcement or where insufficient room exists to remove production splices, provided that the criteria stated in item 3:04.3 subitem 5 is adhered to.

3. Procedure for Non-Conforming Individual Splice Strengths

When a splice fails to meet the criteria noted in item 3:04.3 subitem 5a, the group represented by the failed samples shall have additional samples removed and tested. Until satisfactory resolution is obtained, splicing by the crew or crews that fabricated the non-conforming splices shall cease. After the location of the failed splice is determined, two adjacent production splices, one on each side of the failed sample shall be removed and tested. In addition either one randomly selected production splice per concrete pour or 4 percent of the number of production splices in a pour selected at random, whichever is greater shall be removed and tested. If all these additional splices conform to the criteria noted in item 3:04.3 subitem 5a, then splicing is considered acceptable and in control, and splicing may continue. If any one or more of the additional splices fails to conform to the criteria noted in item 3:04.3 subitem 5a, then the OWNER and the ENGINEER shall determine the necessary remedial treatment. If any or all of the additional production splices cannot be readily removed for the additional testing described in this subitem, the ENGINEER shall determine the required test splices. C

4. Procedure for Non-Conforming Group Splice Strengths

When a group of splices in a concrete pour fails to meet the criteria noted in item 3:04.3 subitem 5b, additional splices shall be selected and tested as noted in item 3:05.4 subitem 3. If any one or more of the additional splices fails to conform to the criteria noted in item 3:04.3 subitem 5b, then the OWNER and the ENGINEER shall determine the necessary remedial treatment. If any or all of the additional production splices cannot be readily removed for the additional testing described in this subitem, the ENGINEER shall determine the required test splices.

3:06 Site Storage Requirements

The CONTRACTOR shall develop written procedures for the on-site storage of the reinforcement steel. These reinforcing bars shall be stored in an orderly fashion at the site so that they are compatible with the placement procedure and that the final cleanliness is assured.

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3
APPROVED BY:

Engineer [signature] Date 6-24-70

Mgr. - Power Engr. [signature] Date 6-25-70

Nuclear Proj. Mgr. [signature] Date 6-26-70

SPECIFICATION

PLACING OF REINFORCING STEEL

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5648 MAY 2, 1969

FPC-321-A3.3, B3.3, C3.3

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

[signature] 6-18-70
APPROVED - DEPT. PROJECT ENGR. DATE

[signature] 6-18-70
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

S.N.D.-M.L.L.
W.O. 4203-00
ADDENDUM A
March 11, 1970
ADDENDUM B
June 18, 1970

SP-5648
5-2-69

ADDENDUM B

Sheet 1 of 1
June 18, 1970

CHANGES TO ADDENDUM A

SECTION 3:00 Detailed Specifications

3:02 Reinforcing Steel

3:02.3 Subitem 2; delete last sentence as written and substitute the following:

"Welding of reinforcement will not be permitted except for the purpose of attaching form tie rods at non-critical points on the reinforcement as approved by the Engineer."

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

8113

REVISION	REVIEW & DOCUMENTATION REQ'D		DESIGN ENGINEER
	YES	NO	
A	✓		
B	✓		SW

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

SPECIFICATION

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

INSTALLATION AND STRESSING OF PRESTRESSING SYSTEM TENDONS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

APPROVED BY:

Engineer _____ Date 4/15/74

Mgr. - Power Engrng. & Const. Dept. ORIGINAL SIGNED BY Date 4/16/74

Nuclear Proj. Mgr. ORIGINAL SIGNED BY J. T. RODGERS Date 4/22/74

SP-5909

MARCH 29,1971

FPC 321-84.18

4-3-74
APPROVED - DEPT. PROJECT ENGINEER **DATE**

4-3-74
ISSUED FOR CRYSTAL RIVER - UNIT 3 **DATE**

APR 1974
RECEIVED
DOCUMENT CONTROL
CRYSTAL RIVER
NUCLEAR PLANT

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

D.A.S.-H.L.L.
W.O. 044203-000
ADDENDUM A
October 17, 1973
ADDENDUM B
April 3, 1974

3:01 Scope of Work

The WORK to be performed under this Contract shall include the receiving, storing, installing, and stressing of the prestressing system tendons required for the Reactor Building for the Crystal River Unit 3, Florida Power Corporation. The WORK shall be as specified herein and/or as shown on the Drawings and shall include, but is not necessarily limited to, the following:

1. Receiving and storing on the job site - tendons, tendon anchorage components, installation and stressing equipment, all supplied by Others.

2. Measuring tendon lengths.

3. Cleaning the inside surface of the embedded tendon conduit and coating with a corrosion-protection wax.

4. Installing tendons and protective end caps.

5. Button-heading and tensioning the tendons.

6. Re-installing protective end caps, if the tendons are not stressed immediately after installation, and dry air purging of the tendons.

7. Supplying equipment for complete installation and stressing of tendons including rigging and scaffolding.

8. Developing and maintaining WORK procedures and the required records for the WORK, as detailed in this Specification.

9. Supplying small hand tools and equipment noted on page 11 of the VENDOR'S (as defined in Item 3:02) "Field Installation Manual".

10. Maintenance of the tendon installation and stressing equipment (as noted in item 3:03.3) in accordance with the minimum requirements noted in the VENDOR'S (as defined in Item 3:02) "Field Installation Manual".

11. Coordinating with the OWNER the various phases of the WORK to suit the OWNER'S construction requirements. The OWNER will supply an outline schedule of the WORK.

12. Supplying details of and embedments for support of the scaffolding at the ring girder (see item 3:04 subitem 6).

13. Supplying eccentricity and "Go" "No-Go" gauges (see item 3:08.3 subitems 3 and 4). These gauges may be obtained from the VENDOR.

14. Supplying air pressure gauges for the dry air purging.

15. Supplying dry air purging equipment capable of delivering 350 SCFM of air @ 100 psig with a dew point of -20 F.

3:02 Definitions

In addition to the definitions in Item 2:02 of the GENERAL CONDITIONS, the following definition shall apply:

"VENDOR" - shall mean The Prescon Corporation of Corpus Christi, Texas, the supplier of the prestressing system.

3:03 Work, Materials, and Equipment Not Included in Scope of Work

The following items associated with the tendons are not included in this Contract and will be provided by Others:

1. Furnishing and delivering of wrapped and coated tendons to the job site with attached stressing washers, dead end plates, stressing washers, shims and increment shims, protective end caps and gaskets, all supplied by the VENDOR.

2. Furnishing, delivery, and installation of embedded conduit and bearing plates.

3. Furnishing and delivery of the following tendon installation and stressing equipment to the job site:

   a. Three (3) uncoiling tables.

   b. Three (3) hydraulic tuggers.

   c. Three (3) units for backing the tendons into the conduit.

   d. Three (3) button-heading machines.

   e. Six (6) stressing machines.

4. Suitable on-site storage for tendons and anchorage components.

5. Suitable supply of electricity.

6. Tendon length measuring equipment.

3:04 General Information and Requirements

The following is a brief description of the WORK and associated items. Additional information may be available from the OWNER and/or ENGINEER upon request.

1. The Reactor Building is a prestressed post-tensioned concrete structure containing 144 vertical, 282 horizontal, and 123 dome tendons. Each tendon will consist of 163 7mm diameter wires and will have installed in one end a 5'-0" long wire surveillance specimen. At 70% of the wire's minimum ultimate strength, the tendon force is 1633.5 kips. The pre-stressing system tendons, anchorage components, and the equipment listed in Item 3:03 subitem 3 are to be supplied by the VENDOR.

2. The VENDOR will supply to the OWNER and the CONTRACTOR technical assistance in training the CONTRACTOR'S operators in the use and maintenance of the equipment supplied by the VENDOR. This technical assistance will be available to the CONTRACTOR during all phases of tendon installation and stressing.

3. The VENDOR will supply to the OWNER, the ENGINEER and the CONTRACTOR, copies of his "Field Installation Manual". This manual may be revised from time to time and the most recent revision shall be used at all times.

4. If the CONTRACTOR wishes to perform part of the WORK in a manner different than as specified herein, he shall make a written request to the OWNER for consideration. No WORK may be performed differently than specified, unless written approval is given by the OWNER or the ENGINEER.

5. The CONTRACTOR will have adequate access to the Reactor Building for installation and stressing tendons. An indication of the access to be provided in the Intermediate and Auxiliary Buildings is shown on Drawing SC-400-017.

6. The CONTRACTOR shall supply to the OWNER, for use by the CONTRACTOR and OWNER, permanent track for supporting scaffolding platforms at the top of the ring girder (elevation 267'-6"). Additionally, the CONTRACTOR shall supply to the OWNER and the ENGINEER details of the required embedments and, after approval of the OWNER has been obtained, he shall deliver the embedments to the job site in sufficient time to allow them to be cast into the structure. Details of ring girder are shown on Drawing SC-421-031.

7. Upon completion of the WORK, the CONTRACTOR shall make his scaffolding available to the OWNER for a limited time for the purpose of painting exposed surfaces of the bearing plates and protective end caps.

3:05 Codes and Manuals

Except as noted otherwise hereinafter, all WORK shall be in accordance with the following codes and manuals:

1. ACI 318-63 "Building Code Requirements for Reinforced Concrete".

2. ACI 301-66 "Specifications for Structural Concrete for Buildings".

3. The VENDOR'S "Field Installation Manual".

3:06 On-Site Receipt, Storage, Handling, Etc.

3:06.1 Upon delivery to the site by the VENDOR, the CONTRACTOR shall inspect, unload, and place the tendons and anchorage components in on-site storage, supplied by the OWNER (see Item 3:03 subitem 4).

3:06.2 Tendons and anchorage components delivered to the job site will have identification numbers stamped or tagged on them by the VENDOR. The CONTRACTOR shall develop written records of the identification numbers, assigned by the VENDOR, for the tendons and anchorage components received on the job site. These numbers shall be used in all the documentation developed by the CONTRACTOR, as required by this Specification. The CONTRACTOR shall notify the OWNER of discrepancies which occur between identification numbers marked or tagged and those listed on the shipping forms.

3:06.3 If the inspection reveals any tendons or anchorage components which are damaged, or have their protective coverings or corrosion-protection material damaged, they shall be documented by the CONTRACTOR. If the damage cannot be repaired, they shall be rejected. The OWNER shall be advised of all rejected material and the CONTRACTOR shall document all rejections. If the damage can be repaired, the repair work will be performed by the OWNER or the VENDOR. Tendons delivered with rust on the wire shall have their protective covering removed in order that the whole length of the tendon can be examined. The wire rust grade inspection criteria is:

DEFINITION	PHYSICAL EVALUATION
A = EXCELLENT	
Uniform color No foreign matter Slight spotting of Oxide film coating Few light scratches to bright metal No scale No pitting	No cleaning for inspection required.

DEFINITION	PHYSICAL EVALUATION
B = GOOD	
Partial loss of color Little foreign matter Dull finish of applied Oxide film Few light scratches to bright metal Small quantity light scale No pitting	Rag wipe cleaning required for visual inspection of wire metal.
C = FAIR (Minimum Storage Time)	
Major loss of color Some foreign matter Major loss of Oxide film Color and gloss Many light scratches to bright metal Large quantity light scale No pitting	Partial area requires light sanding or scratching required for visual inspection of wire metal. (10 heavy passes with 100 grit sandpaper or 2 heavy passes with a sharp edge.)
D = USABLE (Immediate Production)	
Total loss of color Much foreign matter Total loss of Oxide film Many heavy scratches to bright metal Small quantities of heavy scale. No pitting	Total area requires light sanding or scratching required for visual inspection of wire metal. (20 heavy passes with 100 grit sandpaper or 4 heavy passes with a sharp edge.)
E = FAIL (Reject to Salvage)	
Emulsion color and gloss Completely overcome by small pitting or heavy scaling Large quantities of heavy scale.	Total area requires heavy sanding or scraping for visual inspection of wire metal. (30 passes with 100 grit sandpaper or 6 passes with a sharp edge.)

Definitions:

Small Pitting - a pit is defined as an indentation 0.0156 - 1/64 inches deep and 0.0625 - 1/16 inches in diameter.

Scale - Defined as an incrustation of foreign materials, a lamina or flake such as peels off from a surface.

3:06.4 Tendons and anchorage components shall only be removed from on-site storage immediately before being placed in the structure. Should tendons or anchorage components be left out of on-site storage for a period of time exceeding eight (8) hours, they shall be returned to on-site storage. Tendons shall be protected at all times from rain, moisture, condensation, etc. If a tendon is exposed to rain, or if condensation causes moisture to form on the tendon wires, the CONTRACTOR shall remove the moisture from the tendon. Removal of moisture from the tendon shall not remove or disturb the protective coating.

3:06.5 Tendons and anchorage components shall at all times be handled in accordance with the VENDOR'S recommendations noted in the "Field Installation Manual".

3:06.6 The CONTRACTOR shall measure the required length of each tendon by means of a measuring device supplied by the VENDOR. The method of measurement shall be in accordance with the recommendations of the VENDOR. The required tendon lengths shall be transmitted to the VENDOR in writing and two copies shall be forwarded to the OWNER. The CONTRACTOR'S attention is drawn to the fact that he shall forward the required tendon lengths to the VENDOR in time to allow the VENDOR to fabricate the tendons and deliver them to the job site in accordance with the OWNER'S construction schedule. To accomplish this the CONTRACTOR, the OWNER, and the VENDOR will together establish a schedule for this WORK.

3:07 Tendon Installation

3:07.1 Prior to the installation of the tendon, the field installed temporary protective covers shall be removed from the bearing plates. The conduit shall then be cleaned to remove dirt, debris, and moisture. A suggested method of accomplishing this is:

> Use a cloth pull-through to clean the conduit. After the conduit has been pulled through and is considered clean and dry, one final pull-through shall be made using a clean white cloth. If after pulling-through the conduit the cloth is found to be clean and dry to the touch of the hand, the conduit is considered to be clean and dry. If the pull-through cloth is dirty and/or damp, pulling-through shall continue until the clean white cloth comes out clean and dry. When the inside surface of the conduit is clean and dry, it shall be coated with a corrosion-protection wax supplied by the OWNER. To accomplish this the CONTRACTOR shall pull-through cloths soaked in the corrosion-protection wax. If after pulling-through the conduit the cloth is found to be free of the corrosion-protection wax, the cloth shall be re-soaked and pulled through again. This process shall continue until the pull-through cloth comes out with corrosion-protection wax adhering to it. The CONTRACTOR shall note that it may be necessary to place a plug of corrosion-protection wax ahead of the pull-through cloth and then pull-through the cloth and plug of wax.

3:07.2 The corrosion-protection wax shall be NO-OX-ID "CH" Casing Filler, Nuclear Grade, modified as noted below in item 3:07.3, or EQUAL. The CONTRACTOR'S attention is drawn to the fact that the corrosion-protection wax may require heating to assist application to the inside of the conduit. The CONTRACTOR shall submit procedures for cleaning and coating the inside of the conduit to the OWNER and the ENGINEER for approval. Exposure of the open conduit to the atmosphere shall be kept to a minimum and shall not exceed eight (8) hours. The conduit shall not be left open during rain. To protect the conduit during rain the CONTRACTOR may either re-install the temporary protective covers or install the permanent protective end caps and gaskets as supplied by the VENDOR.

3:07.3 The corrosion-protection wax shall be NO-OX-ID "CH" Casing Filler - Nuclear Grade, as manufactured by The Dearborn Chemical Division of W. R. Grace and Company, modified so that at 115 F it will not flow down vertically oriented tendons wires. The corrosion-protection wax shall have the following additional properties:

	Item	Range	Method
1.	Specific gravity	0.88 - 0.90	ASTM D 287-67
2.	Weight per gallon	7.35 - 7.50 lbs.	-
3.	Flash point (COC)	400 F, min	ASTM D 92-66
4.	Penetration (cone) at 77 F	328 - 367	ASTM D 937-67
5.	Thermal conductivity	0.12 Btu/hr/ft^2/F/ft thickness (approx)	-
6.	Specific heat (heat capacity)	0.51 Btu/lb/F (approx)	-
7.	Shrinkage factor from 150 F to 75 F	3.5% - 4.5%	-

3:07.4 Additional tests shall be performed to determine chloride, sulphide and nitrate content. The frequency of these tests shall be dependent on the method the CONTRACTOR uses to coat the inside of the conduit. The CONTRACTOR shall propose to the OWNER and the ENGINEER the frequency of these tests based upon his method of coating the inside of the conduit. The additional tests are as follows:

a. Chlorides:

The initial screening test on both raw materials and finished product shall be the Beilstein Test. If a positive Beilstein indication is obtained, a conforming test shall be made on water extracts of the product using standard titration of colorimetric procedures described in ASTM D 512-67. A limit of 10 ppm chloride shall be set for either raw material or finished product.

b. Sulfides:

The method shall be a water extraction followed by a total sulfide determination. To the extraction water shall be added zinc acetate to precipitate sulfides. Sulfides present shall then be measured in accordance with Paragraph 8 of ASTM D 1255-65 T. An alternate colorimetric procedure may also be used in which sulfides are volatilized from an acidified extraction solution to create a colored spot on lead acetate paper. Spot intensity is measured to determine sulfide concentration. The extraction procedure shall be in accordance with ASTM D 1255-65 T. A limit of 10 ppm sulfides shall be set for either raw material or finished product.

c. Nitrates:

The method shall be a water extraction followed by chloriform extraction of the water extract, followed by colorimetric measurements, based on ASTM D 992-52. A limit of 10 ppm nitrates shall be set for either raw material or finished product.

3:07.5 The VENDOR of the tendons has assigned a unique identifying number to each tendon. This unique identifying number is marked on each tendon and is shown on the VENDOR'S tendon placement drawings. The CONTRACTOR shall follow the VENDOR'S drawings when placing tendons to ensure that each tendon is placed in its correct location in the structure.

3:07.6 Tendons may only be taken out of on-site storage for installation directly into the conduit.

3:07.7 The tendon bandings shall only be removed immediately before the tendon is inserted in the conduit. Tendons shall be inserted from the long trumpet end. This location is noted on the VENDOR'S drawings. The CONTRACTOR shall develop work-procedures for inserting the tendons in the conduit and shall submit them to the OWNER and the ENGINEER for approval.

3:07.8 The CONTRACTOR shall handle the tendons in accordance with the VENDOR'S recommendations. He shall take care in handling the tendons not to cause undue disruption of the corrosion-protection wax coating. If the CONTRACTOR elects to button-head the tendon at some later date, the protective end caps and gaskets, both supplied by the VENDOR, shall be properly secured to the bearing plates. For this condition, the CONTRACTOR shall note that when he comes to button-head the tendon, he shall be required by the VENDOR to pull the end of the tendon, which is to be button-headed, out of the conduit for approximately five (5) feet. Refer to item 3:08.2.

3:07.9 As each tendon is inserted into the conduit, the surface shall be visually inspected to ensure that it is completely coated with the corrosion-protection wax (refer to item 3:07.3). Tendons or parts of tendons not completely coated shall be recoated by the CONTRACTOR with approved corrosion-protection wax, supplied by the OWNER, before the tendons are installed. The tendons shall only be installed under dry conditions. If the tendons are not stressed immediately after installation, the protective end caps with gaskets (both supplied by the VENDOR) shall be installed to prevent entrance of moisture.

3:07.10 Field installation of tendons shall be performed so as to avoid staining of the concrete surfaces with the corrosion-protection wax. Any concrete surfaces stained with the corrosion-protection wax shall be cleaned by the CONTRACTOR at no cost to the OWNER.

3:08 Button-heading

3:08.1 The CONTRACTOR shall button-head the tendon wires, maintain the button-heading machines, and maintain the button-head dies, all in accordance with the VENDOR'S recommendations.

3:08.2 Each tendon supplied by the VENDOR will have a stressing washer button-headed on one end. The CONTRACTOR shall place on the other end of the tendon either another stressing washer or a dead end plate as called for on the VENDOR'S drawings, and shall button-head it onto that end of the tendon. The VENDOR'S procedures for backing the tendon into the conduit to allow button-heading at the other end shall be followed. The CONTRACTOR shall record the identification number of the field button-headed stressing washer or dead end plate on a form, together with tendon number, date, and inspection results.

3:08.3 The following requirements shall apply to button-heads formed in the field by the CONTRACTOR:

1. Button-heads shall be the cold upset type, made with dies supplied by the VENDOR (refer to Item 3:03 subitem 3.d. and 3:08.1) to the dimensional criteria noted in subitems 5 and 6 below. All button-heads shall be visually inspected for malformation. Any malformed button-head shall be included in the random check noted in subitem 3 below.

2. The frequency of visual inspection for splits (cracks) shall be 100%. Any button-head found to have a split (crack) or splits (cracks) shall be checked to determine if it complies with the split criteria noted in subitem 6 below.

3. A random check with "Go" and "No-Go" gauges, for sizes noted in subitem 5.a. below, shall be made of a minimum of 10% of the button-heads on each tendon. If at the inspection frequency of 10% one or more button-heads do not meet the criteria noted in subitem 5.a. the inspection frequency shall be increased to 100% for that tendon.

4. Button-head eccentricity shall be checked by means of the VENDOR'S gauge (refer to Item 3:01 subitem 13). Immediately before commencing button-heading a tendon the CONTRACTOR shall form a button-head on a sample of wire and measure the eccentricity. After 50% of the tendon has been button-headed, that is approximately 80 button-heads, the CONTRACTOR shall form another button-head on a sample of wire and measure the eccentricity. If the eccentricity of any sample button-head is unacceptable (refer to subitem 5.c.), the CONTRACTOR shall check all button-heads produced since the last sample check. The samples of wire shall be the same size and type of wire as used in the tendon and shall be purchased from the VENDOR.

5. Dimensional acceptance criteria of the button-heads shall be as follows:

   a. Diameter shall be equal to or greater than 0.400 inches and equal to or less than 0.450 inches.

   b. A bearing surface shall exist on all sides of the lower portion of the head adjacent to its connection with the wire portion.

   c. Maximum eccentricity shall be 0.015 inches.

6. Acceptance criteria for splits (cracks) in button-heads are as follows:

   a. Splits shall be inclined not more than 50 degrees to the axis of the wire.

   b. The maximum length per split shall be 0.350 inches.

   c. The maximum width per split shall be 0.060 inches.

   d. The maximum number of splits shall be four (4) per button-head.

3:08.4 If, at any field button-headed tendon end, more than three button-heads are found to exceed some or all the tolerances noted in item 3:08.3, the CONTRACTOR shall immediately advise the OWNER and the ENGINEER in writing for evaluation. The evaluation will take into account the number of unacceptable button-heads on adjacent tendons and the location of the tendons in the structure. The OWNER and the ENGINEER will advise the CONTRACTOR of the results of the evaluation and if the tendon is unacceptable it shall be rejected and replaced by the CONTRACTOR at no extra cost to the OWNER. If the field button-headed tendon end contains less than three unacceptable button-heads, the tendon is acceptable; however, the CONTRACTOR'S attention is drawn to the requirements noted in item 3:09.3 subitem 1, concerning the combination of broken wires and unacceptable button-heads.

3:08.5 Before commencing button-heading the production tendons (tendons to be placed in the structure), the CONTRACTOR shall demonstrate his ability to produce button-heads meeting the criteria noted in item 3:08.3. To accomplish this, he shall obtain sufficient lengths of wire from the VENDOR to make 50 trial button-heads. The wire shall be the same size and type as used in the tendon. This wire may be purchased from the VENDOR. These 50 trial button-heads shall all be inspected for size, eccentricity, and splits. Rejected button-heads will be examined by the VENDOR, who may make a recommendation to the CONTRACTOR to alter his procedure in order that acceptable button-heads may be produced. The CONTRACTOR may not proceed with button-heading production tendons until he has satisfactorily demonstrated his ability to produce acceptable button-heads.

3:08.6 After installing and button-heading a tendon, the CONTRACTOR may leave the tendon unstressed provided that the protective end caps and gaskets, as supplied by the VENDOR, are installed. The CONTRACTOR shall note that in order to install the protective end caps it will be necessary for him to pull the tendon back into the conduit, after button-heading. The installation of the caps shall be in accordance with the recommendations of the VENDOR. Tendons may be left unstressed in the sealed conduit for a maximum time of six (6) months.

3:08.7 The CONTRACTOR shall develop documentation records for the tendon installation and button-heading. The records shall, as a minimum, note that the conduit was cleaned and coated with the corrosion-protection wax (refer to item 3:07.1), the date and time of installation, the VENDOR'S identification number for the field button-headed stressing washer or dead end plate, the VENDOR'S tendon number, and the record of the button-head inspections. The records may also be used to record the stressing data, noted in item 3:09.8.

3:08.8 The CONTRACTOR shall develop work-procedures for button-heading the tendons, and shall submit them to the OWNER and the ENGINEER for approval before commencement of the WORK.

3:09 Tendon Stressing

3:09.1 The CONTRACTOR shall follow the maintenance, handling, and operating procedures developed by the VENDOR for the stressing equipment.

3:09.2 Tendons shall not be stressed until all concrete for the complete Reactor Building shell has been placed and has reached a minimum strength of 5,000 psi and has been in place for 28 days.

3:09.3 Force and Strain Measurements:

1. Each tendon shall be stressed to eighty percent of the minimum guaranteed ultimate capacity of the tendon. The jacking force shall then be reduced to seventy percent of ultimate capacity when locked off (shimmed in place). The wire manufacturer's stress-strain curves for the production lots used will be submitted by the VENDOR to the OWNER, the ENGINEER, and the CONTRACTOR. The CONTRACTOR shall incorporate these with the final gauge reading and elongation for each stressed tendon and shall submit them to the OWNER and the ENGINEER. If the loss of prestress force due to broken wires exceeds one wire per tendon, the OWNER and the ENGINEER shall be immediately advised. If one to three tendon wires break during stressing the tendon may be acceptable, provided that the combination of broken wires and unacceptable button-heads does not exceed three (3) wires total. If the tendon contains more than three unacceptable wires (either broken wires and/or unacceptable button-heads) the CONTRACTOR shall immediately advise the OWNER and the ENGINEER in writing for evaluation. The evaluation will take into account the number of unacceptable wires contained in adjacent tendons and the location of the tendons in the structure. The OWNER and the ENGINEER will advise the CONTRACTOR of the results of the evaluation. If the tendon is unacceptable due to unacceptable field formed button-heads, it shall be rejected and replaced by the CONTRACTOR at no extra cost to the OWNER. If the tendon is unacceptable due to broken wires, it will be rejected and replaced by the VENDOR. If the tendon is unacceptable due to a combination of broken wires and unacceptable button-heads, it shall be rejected and replaced by the VENDOR and the CONTRACTOR at no extra cost to the OWNER.

2. After taking up initial slack by jacking to a maximum jack pressure of 500 psi, force and strain measurements shall be made by measurement of elongation of the prestressing wire and comparison with the force indicated by the jack-dynamometer or pressure gauge. The gauge shall indicate the pressure in the jack within plus or minus two percent. Force-jack pressure gauge or dynamometer combinations shall be calibrated just before prestressing operations begin by using a standard whose calibration is certified as being traceable to the National Bureau of Standards. Pressure gauges and jacks so calibrated shall always be used together. During stressing, records shall be made of elongations as well as pressures obtained for each tendon. At the equivalent pressure gauge or dynamometer reading of 70% of the guaranteed ultimate tendon force, the tendon elongation shall be measured at each stressing end and compared to the elongation predicted by the VENDOR (using average load elongation curves). If the discrepancy between the measured

and predicted elongations exceeds plus or minus 5 percent, the CONTRACTOR shall immediately advise the OWNER, the ENGINEER, and the VENDOR, in writing, of the discrepancy. The VENDOR shall evaluate the discrepancy, in conjunction with the OWNER, the ENGINEER, and the CONTRACTOR, and shall instruct the CONTRACTOR to carry out the necessary remedial WORK. The CONTRACTOR shall document in writing the elongation discrepancies and the remedial action taken. Calibration of the jack-dynamometer or pressure gauge combinations shall be maintained to be accurate within the above limits and, if requested by the OWNER and the ENGINEER, shall be recalibrated, or newly calibrated combinations substituted, during and at the end of the tensioning operations.

3:09.4 The stressing sequence shall be performed in the following order:

1. Vertical tendons.

2. Dome tendons.

3. Horizontal tendons.

3:09.5 The details for stressing each type of tendon shall be as follows:

1. Vertical Tendons:

All vertical tendons shall be stressed from the top end only using six (6) sets of stressing equipment equally spaced around the ring girder according to the following sequence:

a. Begin stressing near the centerline of each buttress.

b. Stress every other tendon moving in a clockwise direction.

c. After moving 60°, or one buttress, continue in a clockwise direction stressing the unstressed tendons.

d. After all vertical tendons are stressed, each set of stressing equipment will have moved 120°.

2. Dome Tendons:

There will be six (6) sets of stressing equipment stressing three (3) tendons simultaneously. A sequence is composed of three (3) tendons which shall be stressed simultaneously. The stressing sequences are as follows:

Sequence No.			
1.	D131	D211	D331
2.	D127	D215	D327
3.	D123	D219	D323
4.	D119	D223	D319
5.	D115	D227	D315
6.	D111	D231	D311
7.	D107	D235	D307
8.	D103	D239	D303
9.	D135	D207	D335
10.	D139	D203	D339
11.	D141	D201	D341
12.	D137	D205	D337
13.	D133	D209	D333
14.	D129	D213	D329
15.	D125	D217	D325
16.	D121	D221	D321
17.	D117	D225	D317
18.	D113	D229	D313
19.	D109	D233	D309
20.	D105	D237	D305
21.	D101	D241	D301
22.	D102	D240	D302
23.	D106	D236	D306
24.	D110	D232	D310
25.	D114	D228	D314

Sequence No.			
26.	D118	D224	D318
27.	D122	D220	D322
28.	D126	D216	D326
29.	D130	D212	D330
30.	D134	D208	D334
31.	D138	D204	D338
32.	D140	D202	D340
33.	D136	D206	D336
34.	D132	D210	D332
35.	D128	D214	D328
36.	D124	D218	D324
37.	D120	D222	D320
38.	D116	D226	D316
39.	D112	D230	D312
40.	D108	D234	D308
41.	D104	D238	D304

3. Horizontal Tendons:

All horizontal tendons shall be stressed from both ends using six (6) sets of stressing equipment. Three (3) horizontal tendons shall be stressed simultaneously according to the following sequence:

a. Raise the scaffold to the bottom of the ring girder at the odd numbered buttresses (1, 3, 5).

b. Stress the top tendons on both sides of each of these buttresses.

c. Stress every other tendon down both sides of the odd numbered buttresses to the top of base slab.

d. Move scaffold to both sides of the even numbered buttresses (2, 4, 6).

e. Stress bottom tendons on both sides of each of these buttresses.

f. Stress every other tendon up both sides of the even numbered buttresses up to the bottom of the ring girder.

g. Move scaffold to both sides of the odd numbered buttresses (1, 3, 5).

h. Stress the remaining tendons down both sides of the odd numbered buttresses to the top of base slab.

i. Move scaffold to both sides of the even numbered buttresses (2, 4, 6).

j. Stress the remaining tendons up both sides of the even numbered buttresses up to the bottom of the ring girder.

3:09.6 After stressing, the end anchorages and exposed portions of the tendons shall be coated with the corrosion-protection wax, specified in item 3:07.3 and the protective end cap with gasket installed.

3:09.7 Prior to installing the protective end cap, the CONTRACTOR shall install the 5'-0" long unstressed wire surveillance specimen, supplied by the VENDOR. This specimen shall be installed in one end of every tendon and shall be completely coated with the corrosion-protection wax specified in item 3:07.3.

3:09.8 The CONTRACTOR shall develop documentation records for the tendon stressing. The records shall, as a minimum, record tendon number, date of stressing, predicted wire elongation at each stressed end (to be supplied by the VENDOR), actual measured elongation at each stressed end at lock-off, jack pressure at lock-off. These records may be integrated with those developed as specified in item 3:08.7 and shall be kept up to date. Copies of these records shall be forwarded to the OWNER and the ENGINEER. Prior to stressing, the CONTRACTOR shall forward to the OWNER and the ENGINEER, for comments and approval, samples of his proposed records.

3:09.9 The CONTRACTOR shall develop work-procedures for showing the tendons and shall submit them to the OWNER and the ENGINEER for approval before commencement of the WORK.

3:10 Tendon Conduit Dry Air Purge

3:10.1 After completion of stressing and installing the protective end caps, the CONTRACTOR shall perform the following WORK in items 3:10.2 to 3:10.4 below. This WORK shall be completed within seven (7) months of tendon installation.

3:10.2 The CONTRACTOR shall then dry air purge the tendon conduit with -20 F dew point air at 50 psig and 100 F. The connections for air lines shall be made to the protective end caps. The dry air purge may be either a recirculation or total loss method and recirculation may be made through adjacent tendon conduits. The dry air purge of the conduit shall continue until the relative humidity (R.H.) at the discharge end is 10% or less. The maximum air pressure during any phase of the dry air purge shall be 50 psig. Upon reaching this humidity, purging shall stop and the tendon sealed against ingress of air. The maximum sealing pressure maintained in the conduit shall be 10 psig.

3:10.3 The CONTRACTOR shall develop documentation records for the tendon conduit dry air purging. The records shall, as a minimum, record tendon number, date, ambient temperature, ambient relative humidity, and conduit relative humidity. The records shall be kept up to date and copies shall be forwarded to the OWNER and the ENGINEER.

3:10.4 The CONTRACTOR shall develop work-procedures for the tendon conduit dry air purge. These procedures shall be submitted to the OWNER and the ENGINEER for approval.

3:11 Quality Control

The CONTRACTOR shall perform the following:

1. Develop documentation for, and carry out inspection of, tendons and anchorage components as they are delivered to the job site.

2. Develop written work-procedures for cleaning and coating the inside of the conduit with the corrosion-protection wax. Refer to item 3:07.1.

3. Develop written work-procedures for installing the tendons. Refer to items 3:07.7 and 3:07.10.

4. Develop documentation records for conduit cleaning and coating, tendon installation, and button-heading. Refer to item 3:08.7.

5. Develop written work-procedures for button-heading the tendons. Refer to item 3:08.8.

6. Develop documentation records for the tendon stressing. Refer to item 3:09.8.

7. Develop written work-procedures for stressing the tendons. Refer to item 3:09.9.

8. Develop written work-procedures for dry air purging the conduit. Refer to item 3:10.4.

9. Develop documentation records for the dry air purging of the conduit. Refer to item 3:10.3.

SECTION IV

LIST OF BID DRAWINGS

The following ENGINEER'S and VENDOR'S drawings set forth the location and extent of the WORK to be performed under this Contract and are hereby expressly made a part of this Specification:

Drawing No.	Rev.	Date	Title
			ENGINEER'S DRAWINGS
A-101-111	2	3-26-71	Architectural Roof Plans and Sections
SC-400-007	0	6-16-70	Structural Outline - Plan
SC-400-008	0	6-16-70	Structural Outline - Sections
SC-400-009	0	6-16-70	Structural Outline - Sections
SC-400-015	0	6-16-70	Structural Outline - Plans
SC-400-017	A	5-12-71	Prestressing System - Clearances at Buttresses for Installation & Stressing of Tendons
SC-400-018	A	5-12-71	Reactor Building - Dome Tendon Stressing
SC-421-031	2	1-15-71	Reactor Building - Concrete Outline
			VENDOR'S DRAWINGS
A7	2	5-6-70	Anchor Detail at Buttress
A8	1	3-23-70	163 Wire Washer & Split Shim Details
A9	2	4-7-71	Protective End Cap - Stressing End
A9A	2	4-7-71	Protective End Cap for Bottom Verts
D8	0	12-14-70	Dome Tendon Layout
D12	1	1-18-71	Dome Section Detail

FLORIDA POWER CORPORATION

CONTRACT FORM TO BE USED FOR, BUT NOT LIMITED TO, ALL LINE CONSTRUCTION AND MAINTENANCE, BOTH OVERHEAD AND UNDERGROUND, TREE TRIMMING, RIGHT-OF-WAY CLEARING AND POWER PLANT AND SUBSTATION CONSTRUCTION.

_____ Date_____
(Name of Firm)

_____ Our Requisition No._____
(Street Address)

_____ Purchase Order No._____
(City and State)

We hereby employ you as an Independent Contractor to perform the following work and labor:

in accordance with the specifications contained in the following enumerated letters, proposals, documents, drawings, plans, exhibits and/or schedules which by this reference are incorporated as a part of this contract:

subject to and upon the following terms and conditions:

1. Time is of the essence of this contract and the foregoing work and labor are to be completed by:

2. As compensation in full for the foregoing work and labor, we shall pay you_____

_____**Dollars ($), payable as follows:**

We understand that the foregoing compensation includes $_____ for materials upon which a Florida sales or use tax is payable and that you have or will have paid $_____ of such tax.

3. The foregoing work and labor are part of a common enterprise under our general supervision and you are employed to perform said work and labor as an Independent Contractor subject only to our gen-

9. You are generally a true licensing contractor, you will obtain permission from property owners before entering upon and will perform the work in such a manner as to avoid complaints from property owners, members of the community, and city or county officials. You will obtain clearance to views in their present position, or the position in which shade trees are to be pulled, in accordance with specifications furnished with this contract, or a satisfactory explanation for failure to obtain such clearance must be made by you.

9. The foregoing work and labor shall be performed under the applicable building trade wages and conditions; and you will comply with the requirements of and the regulations promulgated under the Fair Labor Standards Act of 1938 and the Social Security Act, including State and Federal Unemployment Compensation, and will file all reports and pay all taxes required thereunder.

10. All work to be performed by you hereunder shall be delivered to us free and clear of all labor, material and mechanics' liens, and any other encumbrances whatsoever, which might be occasioned by or permitted to be created by you. Such delivery shall be on our applicable contractor's affidavit (Form OD-33-A; OD-33-B; or OD-33-C).

11. Should you become insolvent, or refuse or neglect to supply a sufficiency of properly skilled workmen or equipment, or fail to make reasonable progress with the prosecution of the work, or otherwise fail in the performance of any obligation under this contract, then, in any such event, we shall have the right to terminate this contract upon forty-eight (48) hours' written notice served upon or delivered to you or your duly authorized representative.

12. This contract constitutes the full, complete and only agreement as of the date hereof between the parties hereto with respect to the foregoing work and labor; and, anything contained in the above incorporated specifications to the contrary notwithstanding, whenever there shall be any conflict, latent or otherwise, between the provisions therein set forth and the provisions set forth on this form, the latter shall prevail.

FLORIDA POWER CORPORATION

By: _____

Title _____

I hereby undertake to perform the work and labor outlined in the foregoing in accordance with the terms thereof as of the date above stated. My Employer's Account Number under Federal Social Security is _____, and under State Unemployment Compensation is _____

Date Accepted: _____ 19____

Name of Firm: _____

_____

By: _____

Title _____

Form OD-33-A

CORPORATION FORM

CONTRACTOR'S AFFIDAVIT
To
FLORIDA POWER CORPORATION

STATE OF FLORIDA
COUNTY OF ..... } ss.

On this day before me, the undersigned authority duly authorized to take oath, personally appeared .....

..... who, being by me first duly sworn, on oath deposes and says that:

1. Affiant is the duly elected and acting Vice President of .....
(Company)
(herein called "Contractor"), a ..... Corporation, which performed the
(State)
hereinafter described contract for Florida Power Corporation (herein called "Owner"), with full authority to make this affidavit for said corporation.

2. Contractor heretofore entered into a contract, dated ..... 19....
(herein called "Contract"), with Owner to furnish materials, machinery and equipment and/or to perform labor necessary for the construction of buildings and/or repair or alteration of buildings, structures or machinery and equipment and/or construction or installation of facilities, on the Owner's land and property, all as more specifically described in the Contract, or in the Purchase and/or Work Order attached to the Contract, and the descriptions therein contained are hereby incorporated herein by this reference thereto.

3. In connection with the request of the Contractor for final payment, under the Contract, it is hereby certified that all work, labor, services, materials, machinery and equipment furnished by the Contractor have been fully paid for by the Contractor and that there are no amounts unpaid in favor of any subcontractor or any other person furnishing labor and materials to the Contractor and utilized in the performance of the obligations of the Contractor under the Contract on the basis of which any lien (commonly called a mechanic's or materialman's lien) has been or can be filed and/or perfected under the laws of Florida for work done or materials, machinery, or equipment furnished to said land, building, structure, machinery, equipment, property or facilities or any part thereof of the Owner, except as set forth in item 8 hereinafter.

4. The Contractor does hereby agree to indemnify and hold harmless the Owner against any loss, cost or damage arising out of the Contract by reason of the placing or filing or perfecting and foreclosure of liens, against said real property and the structures thereon by subcontractors or by laborers or materialmen of the Contractor or of any subcontractor of the Contractor.

5. It is further certified that all federal taxes required to be withheld from employees of the Contractor have been withheld in the manner provided by law.

6. All vouchers, receipts and other evidence of payment with respect to claims of third persons against the Contractor, arising out of, connected with or resulting from performance of the Contractor of his obligations under the Contract are in the possession of the undersigned and cover all claims of every description, kind or nature forming the basis for any mechanic's or materialman's lien against said property of Owner up to and including the date of this affidavit.

7. Receipt by the Contractor of the final payment under the Contract, or payments made in accordance with Item 8, shall constitute a full release and discharge of the Owner by the Contractor from any and all claims of the Contractor against the Owner, arising out of, connected with or resulting from performance of the obligations of the Contractor pursuant to the Contract.

8. Unpaid claims and liens which Contractor consents to Owner paying from amount due under Contract are: (Attn. h separate schedule, if necessary).

Nature of Labor, Services or Material Furnished	Amount Due	Name of Subcontractor, Laborer or Materialman
_____	$_____	_____
_____	$_____	_____
_____	$_____	_____
_____	$_____	_____

9. Contractor is making this affidavit for the purpose of inducing Owner to make final payment of $_____ (less amounts set forth in Item 8, if any) to Contractor under the Contract and Chapter 84, Florida Statutes.

_____
(Contractor)

By: _____
Vice-President

Sworn to and subscribed before me this _____ day of _____ 19____

_____
Notary Public/State of Florida, at Large.

My Commission Expires _____

INSTRUCTIONS FOR COMPLETING THIS AFFIDAVIT

1. Insert name of County where affidavit is signed.
2. The name of person in the second line of the affidavit should be the first name, middle initial and last name of the individual signing this affidavit.
3. If affidavit is signed by the President, strike the word "Vice" in the first line of Item 1 and under the "By" line in the signature spaces.
4. In "Company" space of Item 1, insert full name of the corporation; and in "State" space, insert the name of the State of its incorporation.
5. On first line of Item 2, in the case of a specific job Contract, insert date shown in the upper right hand corner of the Form OD-17 (A or B) Contract, and, in the case of a blanket or continuing Contract, insert date of the Purchase Order covering the job for which final payment is requested.
6. If no claims or liens unpaid, write None in Item 8.
7. Insert amount of final payment in Item 9, less amounts set forth in Item 8, if any.
8. In the signature spaces the name on the "Contractor" line should be the same as the name of the "Company" in Item 1 and the signature on the "By" line should be the same as that appearing in the second line of the affidavit.
9. Have Notary Public fill in, sign and seal where indicated.

eral supervision to see that the final results of such work and labor comply with the above incorporated specifications. As such Independent Contractor, you will employ as your own and pay such workers as you may require to perform said work and labor, use your own equipment unless and to the extent otherwise permitted by said specifications, follow your own working methods in complying with said specifications, and superintend said work and labor personally; and, in the event any of said work or labor shall be performed by subcontractors, you will coordinate the work and labor of such subcontractors and the same shall constitute part of the common enterprise.

4. You shall be held fully accountable, and subject to inspection and audit at any time, for materials issued by us to be used by you in connection with work to be performed hereunder. You shall pay us the cost of any material not used or not returned to us, except that reasonable allowances will be made by us for normal loss and breakage incident to the type of construction involved.

5. You will assume full responsibility for the foregoing work and labor and will defend us and hold us harmless against and indemnify us for any and all accidents or damages or claims or costs whatsoever arising within the scope thereof or in carrying out this contract, irrespective of negligence actual or claimed on our part. If any member of the public, or any employee or agent of yours, or any employee or agent of a subcontractor is injured or killed, or if any property including ours or the publics is damaged in the course of work being performed under the provisions of this contract, you will notify our company personnel who is inspecting the work or in his absence, our company supervisor who originated the contract with you. Such notification will be made immediately in person or by telephone and promptly confirmed in writing, and will include all pertinent data such as name of injured party, location of accident, description of accident, nature of injuries, names of witnesses, disposition of injured or deceased person.

6. As a safeguard in respect of paragraph 5 above, you will carry Workmen's Compensation Insurance in the maximum amounts required by statute and will also carry policies of insurance acceptable to us with respect to (a) General Liability with Bodily Injury limits not less than $200,000 each person and $500,000 each occurrence and with Property Damage limits not less than $50,000 each occurrence and $100,000 aggregate, and (b) Automobile Liability with Bodily Injury limits not less than $200,000 each person and $500,000 each occurrence and with Property Damage limits not less than $50,000 each occurrence. You will have the insurance policies mentioned in (a) and (b) above, respectively, endorsed by your insurance carrier to provide blanket contractual coverage, expressly with respect to paragraph 5 above, to the full limits of and for the liabilities insured under said policies; and, prior to the commencement of any work hereunder, you will furnish us with a certificate, in duplicate, on our form OD-17-C, completed by your insurance carrier showing that you carry the requisite insurance and that the specified policies insure the liability assumed by you under paragraph 5 above.

7. You are hereby advised that the generation, transmission and/or distribution of electrical energy involves the handling of a natural force which, when uncontrolled, is inherently hazardous to life and property. You are further hereby advised that, due to the nature of the work to be performed hereunder, other hazardous or dangerous conditions (not necessarily related to the inherent danger of electricity) may also be involved in the work. Accordingly, prior to the commencement of the work, you shall inspect the job site specifically to ascertain the actual and potential existence and extent of any hazardous or dangerous conditions, and instruct your employees with respect to said conditions and the safety measures to be taken in connection therewith; and, during the course of the work, you shall take all such measures as may be deemed necessary or advisable to protect and safeguard the person and property of your employees and of the general public against all hazardous or dangerous conditions as the same arise.

You and your duly authorized agents and employees shall, before climbing poles or structures, make certain that they are strong enough to safely sustain workmen's weight in the performance of the required work on the poles or structures. All work designated in any Letter Agreement or in any Authorization or Purchase Order given to you under this Agreement to be performed at or near or involving energized electrical conductors shall be performed under the conditions and at the place as stated, but only with the specific understanding that if you in your sole discretion regard the place where such work is to be performed, or where such work is being performed, as an unsafe place to work, either because the said conductors or other equipment are so energized, or because it is deemed unsafe for any other reason or condition or conditions then and there existing, you shall request us for a clearance to de-energize the said conductors or other equipment, or to make such other change or changes as may be necessary or desirable in your sole discretion, to render the place of performance at the job site a safe place to work for your employees. In the absence of any request by you to us it shall be conclusively presumed that the place where the work is to be performed is a safe place to work without the de-energization of such conductors or other equipment, and without making any changes whatsoever at the job site.

In the event that we have knowledge of any latent hazardous or dangerous conditions that exist within the job site, Appendix A will be attached hereto to warn you thereof. Any such notice shall not in anywise or manner diminish or release you from your responsibilities set forth in this paragraph 7 above.

8. We shall provide all easements, trimming and clearing rights, and no work on land clearing or line construction shall be started by you until specifically authorized by us in writing.

FLORIDA POWER CORPORATION

CERTIFICATE OF INSURANCE

THIS IS TO CERTIFY THAT THE .....
INSURANCE COMPANY

of ..... has issued policies of insurance, as described below and identified by a policy number, to the insured named below; and to certify that such policies are in full force and effect at this time. It is agreed that none of these policies will be cancelled or changed so as to affect this Certificate until twenty (20) days after written notice of such cancellation or change has been delivered to the Florida Power Corporation.

1. Insured .....

2. Address .....

3. State of Insured Corporation ☐ Partnership ☐ Individual ☐

4. Location of Operations Insured — State of Florida ☐ Limited to the following specific job location(s)

	INSURANCE POLICIES IN FORCE		
	FORM OF COVERAGE	POLICY NUMBER	EXPIRATION DATE
5.	WORKMEN'S COMPENSATION		
6.	MANUFACTURERS' OR CONTRACTORS' LIABILITY		
7.	CONTRACTUAL LIABILITY (Liability Assumed by Insured)		
8.	AUTOMOBILE LIABILITY		

Policy(ies) Includes Coverage For:	Yes	No
(5) Liability under the United States Longshoremen's and Harbor Workers' Compensation Act.	☐	☐
(6) Damage caused by blasting, collapse or structural injury, or damage to underground utilities.	☐	☐
(7) Liability assumed in construction agreements and other types of contracts or agreements in effect in connection with the insured operations being performed for the Florida Power Corporation.	☐	☐
(8) All owned, hired, or non-owned automotive equipment used in connection with the insured operations.	☐	☐

	FORM OF COVERAGE	LIMITS OF LIABILITY			
		BODILY INJURY		PROPERTY DAMAGE	
9.	WORKMEN'S COMPENSATION	STATUTORY		XXXXX	
10.	LIABILITY OTHER THAN AUTOMOBILE	$ $	Each Person Each Occurrence	$ $	Each Occurrence Aggregate
11.	LIABILITY — AUTOMOBILE	$ $	Each Person Each Occurrence	$	Each Occurrence

Date .....

.....
INSURANCE COMPANY

Issued at .....

.....
AUTHORIZED REPRESENTATIVE

Form CD 1742

Visual Examination of IWL (VT-3C)

NGG Nuclear Generation Group

Site/Unit: CR3 / 3 | Procedure: NAP-02 | Outage No.: RFO15-IWE

Summary No.: L1.11.0010 | Procedure Rev.: 2 | Report No.: VT-07-106

Workscope: ISI | Work Order No.: 681043 | Page: 1 of 4

Code: ASME 1992 Ed. Thru 92 Ad. | Cat./Item: L-A/L1.11 | Location: EL. 119' to EL. 267' 6"

Drawing No.: S-425-002 | Description: Concrete Surface

System ID: Concrete Containment

Component ID: RBCN-0010

Limitations: EXAMINED ALL ACCESSIBLE AREAS

Resolution: 1/10th of an inch | Surface Condition: As Found

Visual Equipment/Aids: Flashlight, 6" Scale, Binoculars, Tape Measure, Spotlight.

Inspected From: Outside Containment (●) Gallery/Pits ( ) Both ( )

Light Meter Mfg.: GE Lighting | Serial No.: 0699 (TI-3375) | Illumination: > 200ftc

Light Verification Times: Cal In ☑ 0900 / 1200 / 1300 | Cal Out ☑ 1645

Visual Examination: Direct/Remote

Vent System Or Containment Surfaces

Coated Areas —

	Accept	Reject	N/A	See Comments
1) Spalling	—	X	—	—
2) Cracking	—	X	—	—
3) Delaminations	—	X	—	—
4) Honeycomb	X	—	—	—
5) Water In Leakage	X	—	—	—
6) Chemical Leaching	X	—	—	—
7) Popouts	X	—	—	—
8) Deflection	X	—	—	—
9) Staining	—	X	—	—
10) Discoloration	X	—	—	—
11) Vibration Damage	X	—	—	—

Non-Coated Areas X

	Accept	Reject	N/A	See Comments
12) Reinforcing Bar Corrosion	—	—	—	X
13) Rust Bleeding	X	—	—	—
14) Tendon Surface Cracking	X	—	—	—
15) Efflorescense	X	—	—	—
16) Cosmetic Patch Bond	—	X	—	—
17) Voids	—	—	—	X
18) Erosion	X	—	—	—
19) Pitting	X	—	—	—
20) Abrasion	X	—	—	—
21) Segregation	X	—	—	—
22) Other	—	X	—	—

Comments:

RECORDING CRITERIA PER APPLICABLE PROCEDURE AND MEMO FROM P.E. DATED 9/4/01. THE FOLLOWING CHANGES TO PREVIOUSLY IDENTIFIED CONDITIONS NOTED (SEE SUPPLEMENTAL REPORT).

Results: Accept ☐ Reject ☐ Eval ☑ NCR 256010

Percent Of Coverage Obtained > 90%: N/A | Reviewed Previous Data: Yes

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Komara, Bernard P.	III	B.P. Komara	10/30/2007	Joe Lese, PE	J.A. Lese	11-22-07
Examiner	Level	Signature	Date	Site Review	Signature	Date
Sonnier, Jason B.	II	Jason Sonnier	10/30/2007	Rick Portmann	[illegible]	11/22/07
Other	Level	Signature	Date	ANII Review	Signature	Date
LeBlanc, Marc J.	II	[illegible]	10/30/2007	Tom Wyatt, ANII	[illegible]	11/27/07

NGG Nuclear Generation Group

Supplemental Report

Report No.: VT-07-106

Page: 2 of 4

Summary No.: L1.11.0010

Examiner:	Komara, Bernard P. BPK	Level:	III	Reviewer:	Joe Lese, PE	Date:	11.22.07
Examiner:	Sonnier, Jason B. JBS	Level:	II	Site Review:	Rick Portmann RJP	Date:	11/21/07
Other:	LeBlanc, Marc J. MJL	Level:	II	ANII Review:	Tom Wyatt, ANII	Date:	11/21/07

Comments:

Item #1 (Reference Page 1 – Condition 16): 2-1/2"L X 3" W X 1" Deep: Displacement of cosmetic grout patch over previously existing popout. (See VT-1C Report VT-07-288).

Item #2 (Reference Page 1 – Condition 22): Wood embedment in concrete. (See VT-1C Report VT-07-288).

Item #3 (Reference Page 1 – Condition 22): Nail embedment in concrete. (See VT-1C Report VT-07-288).

Item #4 (Reference Page 1 – Condition 02, 16): 32'L X 3/4" W (maximum) X <1/2" Deep (maximum): Cracking, deterioration of cosmetic grout patch. (See VT-1C Report VT-07-288).

Item #5 (Reference Page 1 – Condition 02, 16): ~8'L X 1" W (maximum) X 1/2" Deep (maximum): Cracking, deterioration of cosmetic grout patch. (See VT-1C Report VT-07-288).

Item #6 (Reference Page 1 – Condition 02, 16): 18"L X 3/16" W X <1/2" Deep and 12"L X 3/16" W X <1/2" Deep: Cracking, deterioration of two (2) cosmetic grout patch. (See VT-1C Report VT-07-288).

Item #7 (Reference Page 1 – Condition 22): Other (Exposed tie wire in concrete). (See VT-1C Report VT-07-288).

Item #8 (Reference Page 1 – Condition 02, 16): 16"L X 3/16" W X <1/2" Deep: Cracking, deterioration of two (2) cosmetic grout patches. (See VT-1C Report VT-07-288).

Item #9 (Reference Page 1 – Condition 22): Nail embedment in concrete. (See VT-1C Report VT-07-288).

Item #10 (Reference Page 1 – Condition 03): 30"L X 8" W (maximum) X 3/16" Deep (maximum): Delamination. (See VT-1C Report VT-07-288).

Item #11 (Reference Page 1 – Condition 02, 16): 12"L X 3/16" W X <1/2" Deep: Cracking, deterioration of two (2) cosmetic grout patches. (See VT-1C Report VT-07-288).

Supplemental Report

Report No.: VT-07-106

Page: 3 of 4

Summary No.: L1.11.0010

Examiner:	Komara, Bernard P. BPK	Level:	III	Reviewer:	Joe Lese, PE JGL	Date:	11-22-07
Examiner:	Sonnier, Jason B. JBS	Level:	II	Site Review:	Rick Portmann RIP	Date:	11/22/07
Other:	LeBlanc, Marc J. MJL	Level:	II	ANII Review:	Tom Wyatt, ANII TWW	Date:	11/27/07

Comments:

Item #12 (Reference Page 1 – Condition 22): Exposed tie wires in concrete. (See VT-1C Report VT-07-288).

Item #13 (Reference Page 1 – Condition 01): 12"L X 18" W (maximum) X 1" Deep (maximum): Spall. (See VT-1C Report VT-07-288).

Item #14 (Reference Page 1 – Condition 02, 16): 24"L X 1/2" W (maximum) X <1/2" Deep (maximum); and 14"L X 1/2" W (maximum) X <1/2" Deep (maximum); and 18"L X 1/2" W (maximum) X <1/2" Deep (maximum): Cracking, deterioration of three (3) cosmetic grout patches. (See VT-1C Report VT-07-288).

Item #15 (Reference Page 1 – Condition 02, 16): 12"L X 3/4" W X 1/2" Deep: Cracking, deterioration of cosmetic grout patches. (See VT-1C Report VT-07-288).

Item #16 (Reference Page 1 – Condition 22): Wood embedment in concrete. (See VT-1C Report VT-07-288).

Item #17 (Reference Page 1 – Condition 22): Wood embedment in concrete. (See VT-1C Report VT-07-288).

Item #18 (Reference Page 1 – Condition 22): Nail and metal embedment in concrete. (See VT-1C Report VT-07-288).

Item #19 (Reference Page 1 – Condition 22): Nail embedment in concrete. (See VT-1C Report VT-07-288).

Item #20 (Reference Page 1 – Condition 02, 16): 12"L X 5/8" W (maximum) X <1/2" Deep (maximum); and 18"L X 1" W (maximum) X 3/4" Deep (maximum); and 8'L X 1/2" W (maximum) X 1/2" Deep (maximum): Cracking, deterioration of cosmetic grout patches. (three (3) areas). (See VT-1C Report VT-07-288).

Item #21 (Reference Page 1 – Condition 02): 12"L X 1/16" W X <1/32" Deep: Crack. (See VT-1C Report VT-07-288).

Item #22 (Reference Page 1 – Condition 22): Exposed tie wires in concrete. (See VT-1C Report VT-07-288).

Item #23 (Reference Page 1 – Condition 01): 10"L X 2" W (maximum) X 1/2" Deep (maximum): Spall. (See VT-1C Report VT-07-288).

Item #24 (Reference Page 1 – Condition 22): Exposed tie wires in concrete. (See VT-1C Report VT-07-288).

Item #25 (Reference Page 1 – Condition 09): Staining. (See VT-1C Report VT-07-288).

Item #26 (Reference Page 1 – Condition 22): Embedded boxes in concrete. (See VT-1C Report VT-07-288).

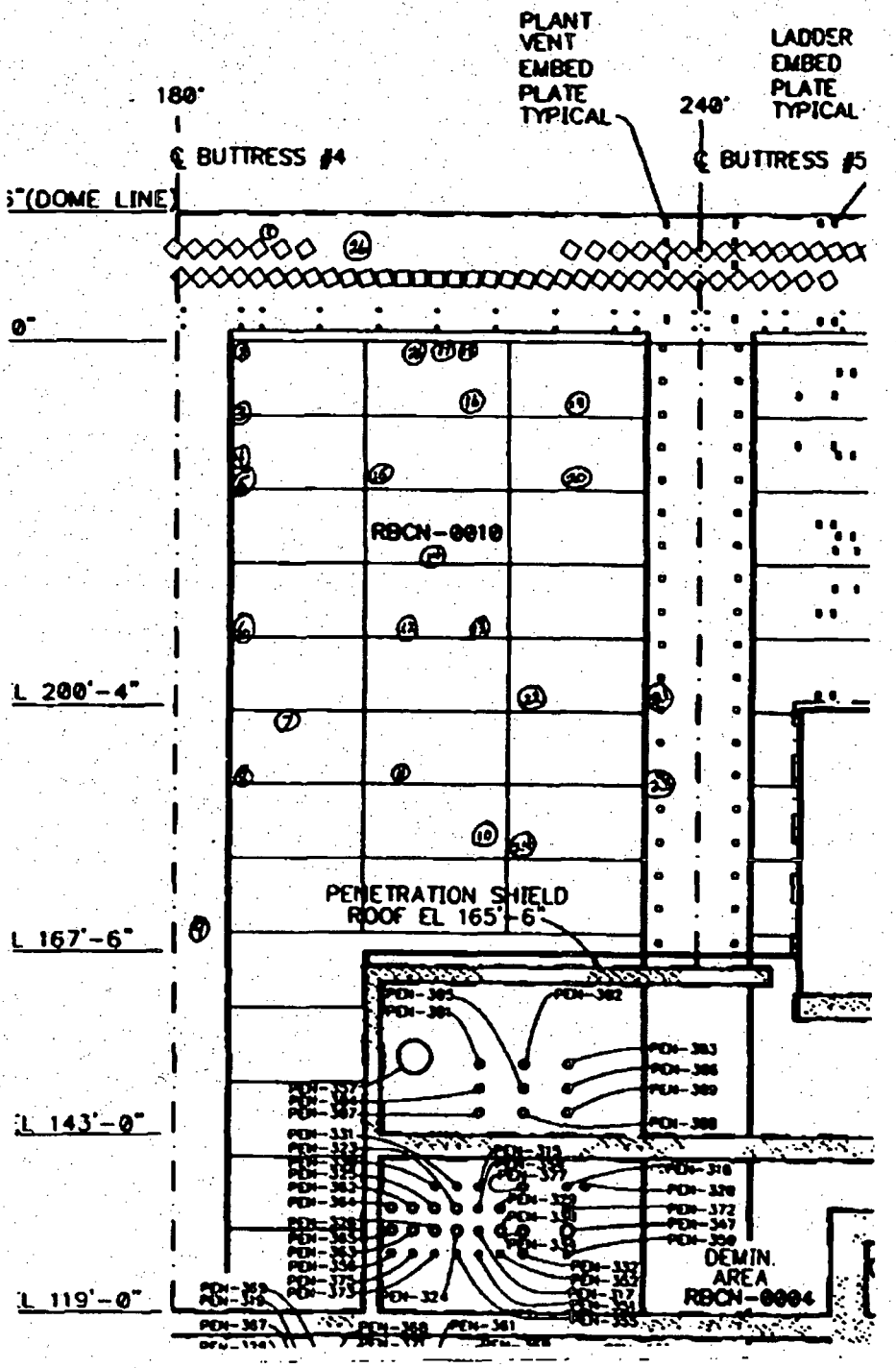
Inaccessible Areas:
Buttress #5: Area behind vent duct outside parameters for VT-3C/VT-1C

Supplemental Report

Report No.: VT-07-106

Summary No.: L1.11.0010

Sketch or Photo: L:\Engineering\Tech Services\SI IWE & IWL\Photos\2007 R15 IWL Photos\RBCN-0010.jpg



Visual Examination of IWL (VT-3C)

NGG Nuclear Generation Group

Site/Unit: CR3 / 3 | Procedure: NAP-02 | Outage No.: RFO15-IWE

Summary No.: L1.11.0015 | Procedure Rev.: 2 | Report No.: VT-07-111

Workscope: ISI | Work Order No.: 681043 | Page: 1 of 4

Code: ASME 1992 Ed. Thru 92 Ad. | Cat./Item: L-A/L1.11 | Location: EL. 119' to EL. 267' 6"

Drawing No.: S-425-001 | Description: Concrete Surface

System ID: Concrete Containment

Component ID: RBCN-0015

Limitations: EXAMINED ALL ACCESSIBLE AREAS

Resolution: 1/10th of an inch | Surface Condition: As Found

Visual Equipment/Aids: Flashlight, 6" Scale, Binoculars, Tape Measure, Spotlight

Inspected From: Outside Containment (●) Gallery/Pits ( ) Both ( )

Light Meter Mfg.: GE Lighting | Serial No.: 0699 (TI-3375) | Illumination: > 200ftc

Light Verification Times: Cal In ☑ 0830 / 1205 / 1300 Cal Out ☑ 1645

Visual Examination: Direct/Remote

Vent System Or Containment Surfaces

Coated Areas —

	Accept	Reject	N/A	See Comments
1) Spalling	—	X	—	—
2) Cracking	—	X	—	—
3) Delaminations	X	—	—	—
4) Honeycomb	—	X	—	—
5) Water In Leakage	X	—	—	—
6) Chemical Leaching	X	—	—	—
7) Popouts	—	X	—	—
8) Deflection	X	—	—	—
9) Staining	—	X	—	—
10) Discoloration	X	—	—	—
11) Vibration Damage	X	—	—	—

Non-Coated Areas X

	Accept	Reject	N/A	See Comments
12) Reinforcing Bar Corrosion	—	X	—	—
13) Rust Bleeding	X	—	—	—
14) Tendon Surface Cracking	X	—	—	—
15) Efflorescense	X	—	—	—
16) Cosmetic Patch Bond	—	X	—	—
17) Voids	X	—	—	—
18) Erosion	X	—	—	—
19) Pitting	X	—	—	—
20) Abrasion	X	—	—	—
21) Segregation	X	—	—	—
22) Other	—	X	—	—

Comments:

RECORDING CRITERIA PER APPLICABLE PROCEDURE AND MEMO FROM P.E. DATED 9/4/01. THE FOLLOWING CHANGES TO PREVIOUSLY IDENTIFIED CONDITIONS NOTED (SEE SUPPLEMENTAL REPORT)

Results: Accept ☐ Reject ☐ Eval ☑ UCR 256 010

Percent Of Coverage Obtained > 90%: N/A | Reviewed Previous Data: Yes

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Komara, Bernard P.	III	B.P. Komara	11/13/2007	Joe Lese, PE		11-22-07
Examiner	Level	Signature	Date	Site Review	Signature	Date
LeBlanc, Marc J.	II		11/13/2007	Rick Portmann		11/22/07
Other	Level	Signature	Date	ANII Review	Signature	Date
Bennett, Charles T	II		11/13/2007	Tom Wyatt, ANII		11/28/07

NGG Nuclear Generation Group

Supplemental Report

Report No.: VT-07-111

Summary No.: L1.11.0015

Examiner:	Komara, Bernard P. BPK	Level:	III	Reviewer:	Joe Lese, PE	Date:	11-22-07
Examiner:	LeBlanc, Marc J. MJL	Level:	II	Site Review:	Rick Portmann	Date:	11/22/07
Other:	Bennett, Charles T. CTB	Level:	II	ANII Review:	Tom Wyatt, ANII	Date:	11/27/07

Comments:

Item #1 (Reference Page 1 – Condition 01): 9"L X 6" W (maximum) X 1/2" Deep (maximum): Spall. (See VT-1C Report VT-07-289).
Item #2 (Reference Page 1 – Condition 12, 22): Reinforcing bar corrosion. Other - wood embedment in concrete, nail embedment in concrete. (See VT-1C Report VT-07-289).
Item #3 (Reference Page 1 – Condition 22): Other - Nail embedment in concrete, exposed tie wire in concrete. (See VT-1C Report VT-07-289).
Item #4 (Reference Page 1 – Condition 12): Reinforcing bar corrosion. (See VT-1C Report VT-07-289).
Item #5 (Reference Page 1 – Condition 12): Reinforcing bar corrosion. (See VT-1C Report VT-07-289).
Item #6 (Reference Page 1 – Condition 22): Other - Nail embedment in concrete, metal corrosion. (See VT-1C Report VT-07-289).
Item #7 (Reference Page 1 – Condition 22): Other - Nail embedment in concrete. (See VT-1C Report VT-07-289).
Item #8 (Reference Page 1 – Condition 07, 22): 2" Diameter X 1/2" Deep (maximum): Popout, wood embedment in concrete. (See VT-1C Report VT-07-289).)
Item #9 (Reference Page 1 – Condition 22): Other - Nail embedment in concrete, metal corrosion. (See VT-1C Report VT-07-289).
Item #10 (Reference Page 1 – Condition 09): Staining (rust). (See VT-1C Report VT-07-289).
Item #11 (Reference Page 1 – Condition 01, 22): 7"L X 1-1/2" W (maximum) X 1/2" Deep (maximum) Spall; and 4"L X 1" W (maximum) X 1/2" Deep (maximum) Spall; and Embedded boxes in concrete; and nail embedment in concrete. (See VT-1C Report VT-07-289).
Item #12 (Reference Page 1 – Condition 02): 40"L X 5/8" W X 1/2" Deep: Cracking. (See VT-1C Report VT-07-289).
Item #13 (Reference Page 1 – Condition 09): Staining (rust). (See VT-1C Report VT-07-289).
Item #14 (Reference Page 1 – Condition 02): 24"L X 1/8" W X <1/2" Deep: Cracking. (See VT-1C Report VT-07-289).
Item #15 (Reference Page 1 – Condition 22): Other - Nail and tie wire embedment in concrete. (See VT-1C Report VT-07-289).
Item #16 (Reference Page 1 – Condition 22): Other - wood embedment in concrete. (See VT-1C Report VT-07-289).
Item #17 (Reference Page 1 – Condition 09): Staining (rust). (See VT-1C Report VT-07-289).
Item #18 (Reference Page 1 – Condition 16): 4"L X 2-1/4" W X 1/2" Deep: Displacement of cosmetic grout patch over previously existing spall. (See VT-1C Report VT-07-289).
Item #19 (Reference Page 1 – Condition 1): 9-1/2"L X 3" W X 2-1/2" Deep: Spall. (See VT-1C Report VT-07-289.

NGG Nuclear Generation Group

Supplemental Report

Report No.: VT-07-111

Summary No.: L1.11.0015

Examiner:	Komara, Bernard P. BPK	Level:	III	Reviewer:	Joe Lese, PE	Date:	11.22.07
Examiner:	LeBlanc, Marc J. MJL	Level:	II	Site Review:	Rick Portmann	Date:	11/27/07
Other:	Bennett, Charles T. CTB	Level:	II	ANII Review:	Tom Wyatt, ANII	Date:	11/27/07

Comments:

Item #20 (Reference Page 1 – Condition 1): 12"L X 6" W X 5/8" Deep: Spall. (See VT-1C Report VT-07-289).
Item #21 (Reference Page 1 – Condition 1): 6"L X 6" W X 5/8" Deep: Spall. (See VT-1C Report VT-07-289).
Item #22 (Reference Page 1 – Condition 1): 8"L X 4" W X 1" Deep: Spall. (See VT-1C Report VT-07-289).
Item #23 (Reference Page 1 – Condition 1): 8"L X 8" W X 3/4" Deep: Spall. (See VT-1C Report VT-07-289).
Item #24 (Reference Page 1 – Condition 22): Other - wood embedment in concrete. (See VT-1C Report VT-07-289).
Item #25 (Reference Page 1 – Condition 09): Staining (rust). (See VT-1C Report VT-07-289).
Item #26 (Reference Page 1 – Condition 09): Staining (rust). (See VT-1C Report VT-07-289).
Item #27 (Reference Page 1 – Condition 1, 16): 30'L X 4" W X ½" Deep: Spall; displacement of cosmetic grout patch over previously existing spall. (See VT-1C Report VT-07-289).
Item #28 (Reference Page 1 – Condition 02): 72"L X 3/16" W X 1/8" Deep: Cracking. (See VT-1C Report VT-07-289).
Item #29 (Reference Page 1 – Condition 07): 1" Diameter X 1/2" Deep (maximum): Popout. (See VT-1C Report VT-07-289).
Item #30 (Reference Page 1 – Condition 4, 22): 6'L X 2" W X ½" Deep: Honeycomb/cold joint area with wire embedment. (See VT-1C Report VT-07-289).
Item #31 (Reference Page 1 – Condition 02, 09): Cracking (continuation of intermittent condition described in Item 12), Staining (rust). (See VT-1C Report VT-07-289).
Item #32 (Reference Page 1 – Condition 12, 16): Reinforcing bar corrosion; displacement of cosmetic grout patch over previously existing spall. (See VT-1C Report VT-07-289).
Item #33 (Reference Page 1 – Condition 09, 22): Staining (rust). Other – elastomer separation. (See VT-1C Report VT-07-289).
Item #34 (Reference Page 1 – Condition 16): 2" L X ½" W: Displacement of cosmetic grout patch over previously existing spall. (See VT-1C Report VT-07-289).
Item #35 (Reference Page 1 – Condition 1, 16): 4"L X 6" W X ¾" Deep: Spall; displacement of cosmetic grout patch over previously existing spall. (See VT-1C Report VT-07-289).
Item #36 (Reference Page 1 – Condition 1): 8"L X 4" W X 1-1/2" Deep: Spall. (See VT-1C Report VT-07-289).
Item #37 (Reference Page 1 – Condition 09): Staining. (See VT-1C Report VT-07-289).

Inaccessible Areas:
None

Supplemental Report

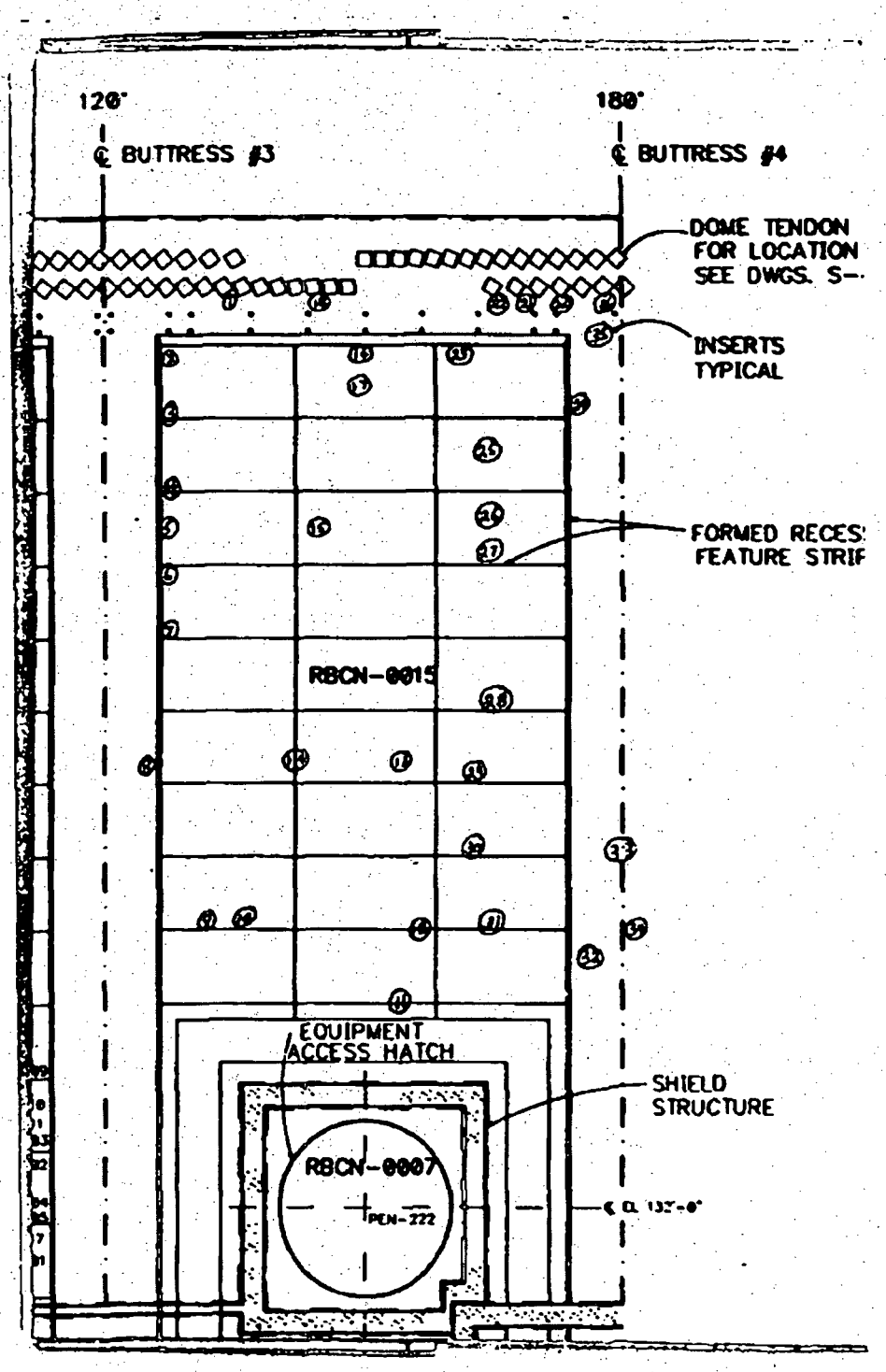
Nuclear Generation Group

Report No.: VT-07-111

Page: 4 of 4

Summary No.: L1.11.0015

Sketch or Photo: L:\Engineering\Tech Services\ISI IWE & IWL\Photos\2007 R15 IWL Photos\RBCN-0015.jpg



SECTION I

INSTRUCTIONS TO BIDDERS

INDEX

1:01 Invitation

Proposals are requested by the Florida Power Corporation for the equipment, materials, and related WORK, set forth in the attached Specification, which will be incorporated in the Crystal River Plant Unit 3, located approximately five miles northwest of Crystal River, Florida.

1:02 Submission of Proposals

1:02.1 Original and five copies of the Proposal shall be submitted in quadruplicate and shall be transmitted to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. C. H. Thompson
Purchasing Agent

1:02.2 Proposals must be received by Florida Power Corporation or post marked prior to twelve noon_____.

1:02.3 Bidders shall furnish with their Proposals all drawings, catalog data, and other supplementary information necessary to describe thoroughly the materials and equipment covered by their Proposal.

1:02.4 Each Bidder shall submit with his Proposal the name of the manufacturer and the type or model of each principal item of the equipment or material he proposes to furnish. He shall also submit drawings and descriptive matter which will show general arrangement and dimensions, appearance, principle of operation, and extent of factory assembly.

1:02.5 If the equipment cannot be shipped completely factory assembled, Bidders shall include with their Proposal the number, dimensions, and weight of each shipping unit and the amount of field work required to assemble the equipment completely.

1:02.6 The successful bidder may be required to furnish a service representative to work with Florida Power Corporation's personnel during the initial operation of the equipment. The services of this representative shall be outlined in the Proposal and the per diem charges stated separately.

1:02.7 One copy of provisional recommendations for spare parts shall be furnished with each Proposal.

1:02.8 Each Bidder shall include in his Proposal the cost of furnishing one complete set of all special tools, suitably packed and all in first class condition, which may be required for maintenance of the equipment covered by the Proposal.

1:02.9 The price stated in the Proposal shall include all taxes and licenses which might lawfully be assessed, on the date of the Proposal, against Florida Power Corporation or the Bidder in connection with the proposed WORK. Exception:

1. If the price stated in the Proposal is for the furnishing of materials and/or equipment only and does not include field labor for erection and/or installation, do not include Florida State Sales Tax in the bid. Florida Power Corporation will pay such tax direct to the State of Florida.

2. If the price includes erection and/or installation labor to be performed at the job site, the Florida State Sales and Use Tax must be paid by the Bidder on the cost of the materials and supplies furnished. The Bidder awarded the Contract for this WORK shall be responsible for the payment of this tax to the State of Florida and should take this into account in his bid price.

1:02.10 The Bidders shall state in their Proposals that the materials and/or equipment will meet the Specifications as set forth herein. Any exceptions to the Specifications set forth herein shall be stated clearly in the Bidders' Proposals.

1:02.11 Bidders shall state in their Proposals the complete terms of their warranty applicable to the materials and/or equipment they propose to furnish under this Specification, and the terms of extension of the warranty in the event of repair or replacement being required.

1:02.12 Bidders shall also state in their Proposals the extent of their guarantees for the performance of the equipment offered and for correction of items which fail to meet the warranty.

1:02.13 Royalties and fees for patents covering materials, articles, apparatus, devices or equipment used in the WORK shall be included in the Contract price.

1:02.14 The Bidders shall not include in their Proposals the costs of insurance for equipment subsequent to receipt by the OWNER on the job site.

1:02.15 The labor rates of this WORK shall be executed under the working conditions and wage rates established by the applicable collective bargaining group having jurisdiction over the area, and shall be performed in accordance with the safety regulations of the Florida Industrial Commission.

1:02.16 Bidders are advised that, due to the scope of this construction project, certain materials and equipment are required, of necessity, to be delivered considerably in advance of the actual commercial operation of the equipment. It is presently anticipated that actual commercial use, other than preliminary testing, of the material or equipment will not commence until September, 1972. Bidders are requested to take this into consideration in setting forth their warranty and guarantee terms.

1:02.17 Bidders shall set forth in their Proposals the terms of payment normal to their company or industry, including cash and/or trade discounts allowed, if any. Transportation charges shall be included from shipping point with full freight allowed to destination.

1:03 Evaluation of Proposals

1:03.1 Bidders' ability to satisfy the OWNER of their capability to perform the WORK within the scheduled dates set forth herein will be a basic consideration in evaluating the Proposals.

1:03.2 It shall be understood that the evaluation of Proposals received in accordance with these Instructions to Bidders and the attached Specification will be conducted solely by Florida Power Corporation.

1:04 Insurance Requirements

Florida Power Corporation Contract insurance requirements are set forth in paragraphs 5 and 6 of Contract Form CD-17-A (copy attached). The successful bidder shall comply with these requirements prior to performing any WORK specified herein.

1:05 Performance and Payment Bond

Bidders are advised that a Performance and Payment Bond may be required from the successful bidder. The cost of such Performance and Payment Bond is to be set forth as a separate item in the Proposal. In the event Florida Power Corporation elects not to require a Performance and Payment Bond, 10 percent of each progress payment, if any, will be withheld until completion and acceptance of all WORK and receipt of CONTRACTOR'S Affidavit (copy attached) properly executed in duplicate.

1:06 Contract Forms and Certificates

1:06.1 The following documents will be incorporated into or referenced by the Contract awarded to the successful bidder:

1. Contract Form - CD-17-A.

2. Contractor's Affidavit - CD-28-A, B, or C.

3. Insurance Certificate - CD-17-C.

1:06.2 Copies of these documents are attached herewith; and Bidders shall thoroughly familiarize themselves with all of the terms, conditions and instructions contained therein prior to submitting their Proposal.

1:07 Acceptance of Proposals

Florida Power Corporation reserves the right to accept or reject any or all Proposals.

1:08 Awards to Bidders and Payment

Florida Power Corporation will issue all purchase orders and make payment for the materials and/or equipment purchased.

1:09 Shipping Information

Bidders are advised that the shipments may be made to the plant site by the following carriers. All shipments shall be consigned to Florida Power Corporation, Crystal River Plant Unit No. 3:

Via Railroad:	Seaboard Coast Line (SCL) delivering carrier: Carload shipments only - destination station Red Level Junction, Florida. L.C.L. Shipments - destination station Crystal River, Florida.
Via Truck Lines:	Commercial Carriers - destination Red Level, Florida.
Water Transportation:	A 15 foot deep barge channel has been dredged from the Gulf of Mexico to the plant site. Contact Florida Power Corporation for particulars if barge delivery is contemplated.
Parcel Post:	P. O. Box 276, Crystal River, Florida 32629

SECTION II

GENERAL CONDITIONS

INDEX

2:01 Scope

These General Conditions are applicable to equipment, materials and related WORK which will be incorporated in the new addition to Florida Power Corporation's Crystal River Plant.

2:02 Definitions

It shall be understood that the following terms as used in the Specifications shall have the meaning herein given:

1. "OWNER" shall mean the FLORIDA POWER CORPORATION.

2. "ENGINEER" shall mean GILBERT ASSOCIATES, INC., Consulting Engineers.

3. "CONTRACTOR" shall mean the successful bidder for the WORK who will undertake the performance of the WORK required by the Contract.

4. "WORK" shall mean labor, services, materials and equipment as set forth in the CONTRACT DOCUMENTS.

5. "CONTRACT DOCUMENTS" shall mean all Drawings, Specifications and Addenda thereto as prepared and issued by the OWNER, the Invitation to Bid, the CONTRACTOR'S Proposal, and Manufacturer's Drawings as approved by the ENGINEER, all of which are part of the CONTRACTOR'S Contract with the OWNER. These CONTRACT DOCUMENTS are complementary and what is called for by any one of them shall be as binding as if called for by all. Any conflicts in the CONTRACT DOCUMENTS shall be resolved by the OWNER.

6. "EQUAL" shall mean equal as approved by the OWNER or the ENGINEER.

2:03 Equipment and Materials to be Supplied by the Contractor

All equipment and materials furnished under these Specifications shall be manufactured within the continental limits of the United States of America.

2:04 Codes and Standards

Unless specified otherwise herein, equipment and materials shall comply with all governing regulations and with the applicable standard specifications and codes of USAS, ASTM, ASME, IPCEA, NEMA, EEI, IEEE, UL, and other such regular published and accepted standards. The regulation, specification or code applied in each case shall be the latest version of such regulation or standard adopted and published at the date of taking bids. Any conflict between standards shall be referred to the OWNER who will determine which standard shall govern.

2:05 Laws and Regulations

All equipment and WORK shall be in accordance with the laws of the State of Florida and the Rules of the Florida Industrial Commission.

2:06 Engineering Data, Shop and Erection Drawings

2:06.1 Upon Award of a Contract, engineering data covering all equipment and fabricated materials to be furnished shall be submitted promptly by the CONTRACTOR for approval.

2:06.2 The CONTRACTOR shall submit 2 sepia copies and 2 prints of preliminary drawings and necessary data for approval, to the ENGINEER, at the address below:

Gilbert Associates, Inc.
Consulting Engineers
525 Lancaster Avenue
Reading, Pennsylvania 19603

Attention: Mr. E. R. Hottenstein
Project Manager

2:06.3 These drawings shall be sufficient and complete for system design purposes and for use in designing associated systems.

2:06.4 For final approval, the CONTRACTOR shall submit 2 sepia copies and 2 prints of drawings and necessary data for approval to the ENGINEER.

2:06.5 On each drawing submission (original, revisions, and final) the CONTRACTOR shall send one copy of each drawing and data direct to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. W. O. May
Manager - Power Engineering

2:06.6 These drawings shall be sufficient and complete for adequate erection, operation, and maintenance of the equipment. The engineering data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages , and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. Data submitted shall include all required piping arrangement drawings, design calculations, pneumatic control system schematic diagrams, detailed drawings and data for structural systems, and complete power and control circuit logic diagrams, schematics, and wiring diagrams.

2:06.7 No WORK shall be performed in connection with the fabrication or manufacture of materials and equipment, nor shall any accessory or appurtenance be purchased until the drawings and data therefore have been approved, except at the CONTRACTOR'S own risk and responsibility.

2:06.8 Exceptions to item 2:06.7 shall be by agreement with the OWNER.

2:07 Instruction Manuals

2:07.1 The CONTRACTOR shall furnish eleven complete and final copies of instruction manuals not later than 60 days prior to shipment of the equipment. Ten copies shall be sent to:

Florida Power Corporation
P. O. Box 14042
St. Petersburg, Florida 33733

Attention: Mr. W. O. May
Manager - Power Engineering

One copy shall be sent to:

Gilbert Associates, Inc.
Consulting Engineers
525 Lancaster Avenue
Reading, Pennsylvania 19603

Attention: Mr. E. R. Hottenstein
Project Manager

2:07.2 The instruction manuals shall cover complete installation, operating and maintenance instructions, drawings, and parts lists for each item of equipment furnished.

2:07.3 The instruction manuals shall be bound with covers suitable for rough usage. The front covers shall be stamped with lettering indicating the OWNER'S name, unit number, name of power plant, location of power plant, name of equipment, basic capacity rating of equipment, and name of manufacturer.

2:08 Recommended Spare Parts

The list of recommended spare parts, with the price of each such item, and a schedule of required lubricants, as recommended by the manufacturer of each item of equipment, shall be included in the instruction manuals.

2:09 Design and Manufacturing Program

2:09.1 The manufacturer's design engineer shall be prepared to visit the office of the OWNER or the ENGINEER for design conference at such times as are required to expedite the handling of engineering matters.

2:09.2 The Contract program will be controlled by CPM diagrams, and the CONTRACTOR shall provide all necessary information requested by the OWNER or the ENGINEER for compilation of these. In general, information required will include drawing schedules, purchasing schedules for major equipment items, and delivery dates.

2:10 Manufacturing Errors

Equipment and materials shall be complete in all respects within the limits herein outlined. All manufacturing errors or omissions required to be corrected in the field shall be performed by the CONTRACTOR at his expense; or if done by the OWNER, the cost of same shall be borne by the CONTRACTOR.

2:11 Bill of Material

2:11.1 The CONTRACTOR shall prepare a Bill of Material covering all material and equipment furnished under this Specification. The Bill of Material shall be submitted in a preliminary form with the preliminary drawing submission and be finalized approximately two weeks before the scheduled arrival time of the first shipment. The Bill of Material shall be itemized in sufficient detail to permit an accurate determination of the completion of shipment of the material and equipment furnished under these Specifications.

2:11.2 The mailing address for the finalized Bill of Material is:

Florida Power Corporation
Crystal River Plant Unit No. 3
P. O. Box 276
Crystal River, Florida 32629

Attention: Mr. H. L. Bennett
Construction Manager

2:11.3 All items of equipment delivered to site shall be marked adequately to allow identification from the Bill of Material.

2:11.4 If the equipment is to be shipped in sections, with accessories or appurtenances detached, or otherwise not completely factory assembled, the extent of assembly shall be in accordance with the information submitted with the Proposal regarding the number, dimensions and weight of each section, accessory or appurtenance, and the amount of field WORK required to completely assemble the equipment.

2:11.5 Suitable labels shall be affixed to all pre-assembled/pre-fabricated parts.

2:12 Manufacture and Inspection of Equipment

2:12.1 The CONTRACTOR shall advise the OWNER of all his major subcontractors before orders are placed, and he shall not place orders with any subcontractor until approval of the OWNER has been obtained. The CONTRACTOR shall indicate where the equipment will be fabricated, and the OWNER and/or its representative shall have the right to inspect all manufacturing facilities before approving the subcontractor.

2:12.2 The OWNER and/or its representative reserves the right to inspect fully all phases of manufacture of the equipment included in the Contract. Any item found to be unsatisfactory shall be replaced or repaired at no cost to the OWNER. Any inspection by the OWNER and/or its representative shall not relieve the CONTRACTOR of his responsibility for conforming to the stated conditions and shall not be considered a waiver of warranty or other rights. No repairs or changes in excess of original Specifications or applicable codes, if requested by the inspector, shall be made without the approval of the OWNER.

2:12.3 All shop tests required for certification and proof that the equipment conforms to all applicable codes and standards shall be made at the expense of the CONTRACTOR. Any additional tests required by the OWNER and/or its representative shall be at OWNER'S expense with price to be negotiated for each individual case.

2:12.4 All parts of the equipment shall be protected against damage or corrosion during and following any tests.

2:12.5 The OWNER and the ENGINEER shall have the right of representation at all shop tests, and they shall be notified at least one (1) week in advance of all shop tests and inspection.

2:12.6 One (1) properly identified copy of the CONTRACTOR'S welding procedures, and other special fabrication data for the equipment, shall be submitted to the ENGINEER for review and approval, and three (3) copies shall be sent to the OWNER.

2:12.7 One (1) certified copy of all shop test data for the equipment, properly identified, shall be forwarded to the ENGINEER for acceptance, and three (3) copies shall be sent to the OWNER.

2:13 Shipment of Completed Work

All equipment shall be shipped completely factory assembled, except when the physical size, arrangement or configuration of the equipment or shipping and handling limitations make the shipment of completely assembled equipment impracticable.

2:14 Special Tools

2:14.1 The CONTRACTOR shall furnish one complete set of all special tools, all in first class condition, which will be required for maintenance of the equipment covered by the Contract. Identification of all tools by name and number shall be provided, and this number shall appear on drawings and instructions to indicate the application of the tools furnished and to permit ordering replacements.

2:14.2 The tools shall be shipped in a separate, heavily constructed, wooden box or boxes provided with hinged covers and padlock clasps. The boxes shall be marked with a large painted legend as follows:

Florida Power Corp. - Crystal River Unit No. 3

Maintenance Tools - (Name of equipment)

2:15 Protection During Shipment and Storage

2:15.1 Except as specified otherwise herein, exposed iron and steel surfaces of all equipment shall be given one coat of primer paint before shipment of the equipment to the job site. Before application of paint, all surfaces shall be free of rust, scale, lubricants, moisture, and other substances. Surfaces prepared for field welding shall be left unpainted for a distance of two inches from the weld. These surfaces shall be given a protective film of oil or other easily removed material to prevent rusting before erection.

2:15.2 The CONTRACTOR will be advised of the acceptable prime paint for exposed carbon steel surfaces of equipment and material to be installed inside the reactor building.

2:15.3 All exposed carbon steel surfaces of all other equipment shall be painted with zinc chromate pigment, rust inhibitive, metal primer paint recommended by the paint manufacturer for the service intended, and for application to metals prepared for painting by wire brushing. Paint shall be applied in accordance with the paint manufacturer's recommendations.

2:15.4 Machined surfaces such as shafts, pins, bushings, shaft couplings, and other similar parts whose operation would be impaired by painting shall not be painted. These surfaces shall be protected by application of an easily removable rust preventative compound.

2:15.5 Plastics, corrosion-resistant metals such as aluminum, brass, bronze, or stainless steel, and chrome plate or galvanized surfaces shall not be painted.

2:15.6 Each piece of equipment shall be cleaned thoroughly and dried prior to shipment. Equipment made of carbon steel shall contain adequate bags of silica-gel or approved equivalent desiccant to maintain a dew point of 40 F. Desiccant bags shall be securely anchored within the equipment. All openings of all equipment shall be closed prior to shipment with an easy to remove plug of suitable material.

2:15.7 All equipment and accessory items shall be suitably boxed, crated, wrapped, or covered to the extent practicable, to prevent entrance of dirt or moisture and to prevent accidental damage during shipment to the job site and during outdoor storage at the job site. Where necessary, a desiccant shall be included within the packing enclosure of items sensitive to changes in humidity.

2:15.8 All accessory items shall be shipped with the equipment. Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of the boxes and crates shall also be indicated.

2:16 Shipping Notices

2:16.1 The CONTRACTOR shall provide two copies of a shipping notice describing each shipment of material or equipment. The shipping notice shall be mailed on a schedule so that the notice will arrive approximately three days ahead of the estimated arrival time of the shipment.

2:16.2 The shipping notice shall be identified with the OWNER'S name, purchase order number, and name of the item of equipment or material.

2:16.3 The mailing address for the shipping notice is:

Florida Power Corporation
Crystal River Plant Unit No. 3
P. O. Box 276
Crystal River, Florida 32629

Attention: Mr. H. L. Bennett
Construction Manager

2:17 Patents

The CONTRACTOR shall satisfy all demands that may be made at any time for royalties and fees, and he shall be liable for any damages or claims for patent infringements. The CONTRACTOR shall, at his own expense, defend all suits or proceedings that may be instituted against the OWNER for infringement or alleged infringement of any patents involved in the WORK, and, in the case of an award of damages, the CONTRACTOR shall pay such award.

2:18 Conflicts

In the event of discrepancies between the detailed requirements of this Specification and those of the General Conditions, the detailed requirements shall prevail.

SECTION III

DETAILED SPECIFICATIONS

INDEX

ADDENDUM B

Sheet 1 of 1
April 3, 1974

SECTION III - DETAILED SPECIFICATIONS

3:07 Tendon Installation

3:07.8 Delete the first two sentences in their entirety and replace with the following:

"The CONTRACTOR shall take care in handling the tendons not to cause undue disruption of the corrosion-protection wax coating. If excessive contamination of the wax by dirt or other foreign matter occurs, the CONTRACTOR shall advise the OWNER of it and obtain resolution before the contaminated tendons are installed."

NOTE: Attached hereto is a copy of revised page III-8 incorporating the changes set forth by this Addendum B, to replace the correspondingly numbered page previously issued to you.

b. Sulfides:

The method shall be a water extraction followed by a total sulfide determination. To the extraction water shall be added zinc acetate to precipitate sulfides. Sulfides present shall then be measured in accordance with Paragraph 8 of ASTM D 1255-65 T. An alternate colorimetric procedure may also be used in which sulfides are volatilized from an acidified extraction solution to create a colored spot on lead acetate paper. Spot intensity is measured to determine sulfide concentration. The extraction procedure shall be in accordance with ASTM D 1255-65 T. A limit of 10 ppm sulfides shall be set for either raw material or finished product.

c. Nitrates:

The method shall be a water extraction followed by chloriform extraction of the water extract, followed by colorimetric measurements, based on ASTM D 992-52. A limit of 10 ppm nitrates shall be set for either raw material or finished product.

3:07.5 The VENDOR of the tendons has assigned a unique identifying number to each tendon. This unique identifying number is marked on each tendon and is shown on the VENDOR'S tendon placement drawings. The CONTRACTOR shall follow the VENDOR'S drawings when placing tendons to ensure that each tendon is placed in its correct location in the structure.

3:07.6 Tendons may only be taken out of on-site storage for installation directly into the conduit.

3:07.7 The tendon bandings shall only be removed immediately before the tendon is inserted in the conduit. Tendons shall be inserted from the long trumpet end. This location is noted on the VENDOR'S drawings. The CONTRACTOR shall develop work-procedures for inserting the tendons in the conduit and shall submit them to the OWNER and the ENGINEER for approval.

3:07.8 The CONTRACTOR shall take care in handling the tendons not to cause undue disruption of the corrosion-protection wax coating. If excessive contamination of the wax by dirt or other foreign matter occurs, the CONTRACTOR shall advise the OWNER of it and obtain resolution before the contaminated tendons are installed. If the CONTRACTOR elects to button-head the tendon at some later date, the protective end caps and gaskets, both supplied by the VENDOR, shall be properly secured to the bearing plates. For this condition, the CONTRACTOR shall note that when he comes to button-head the tendon, he shall be required by the VENDOR to pull the end of the tendon, which is to be button-headed, out of the conduit for approximately five (5) feet. Refer to item 3:08.2. B

8114

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3

APPROVED BY:

Engineering Mgr. W. W. M. Date 11/13/73
Mgr. - Power Engr. ORIGINAL SIGNED BY W. A. SZELISTOWSKI Date 11/16/73
Nuclear Proj. ORIGINAL SIGNED BY J. T. RODGERS Date 11/20/73

SPECIFICATION

INSTALLATION AND STRESSING OF PRESTRESSING SYSTEM TENDONS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5909 MARCH 29, 1971

FPC-321-34.1B

10-11-73
APPROVED - DEPT. PROJECT ENGR. DATE

10-11-73
ISSUED FOR CRYSTAL RIVER - UNIT 3 DATE

REVISION	REVIEW & DOCUMENTATION REQUIRED		DESIGN ENGINEER
	YES	NO	
A	✓		JAR

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

D.A.S.-M.L.L.
W.O. 044203-000
ADDENDUM A
October 17, 1973

ADDENDUM A

Sheet 1 of 3
October 17, 1973

SECTION III - DETAILED SPECIFICATIONS

Index Page:

For Item 3:10, Quality Control, under Page column delete "III-17" and replace with "III-18".

3:01 Scope of Work

Subitem 6., lines 2 and 3; after the fourth word (installation), place a period and delete the following:

"and dry air purging of the tendons."

Subitem 14., delete this subitem in its entirety and replace with the following:

"14. Bulk filling the conduit with wax and supplying all plumbing, heating, and storage equipment associated with bulk filling."

Subitem 15., delete this subitem in its entirety and replace with the following:

"15. Supplying a corrosion protection wax for tendon conduit bulk filling."

3:03 Work, Materials, and Equipment Not Included in Scope of Work

Add the following subitem:

"7. The corrosion protection wax for coating the inside of the conduit shall be either Visconorust 2090P or 2090P-2.

Note: Both formulations of wax may be used as the manufacturer of them has stated that they are compatible with each other.

3:07 Tendon Installation

3:07.2 Lines 1 and 2, delete the first sentence in its entirety and replace with the following:

"The corrosion-protection wax shall be either Visconorust 2090P, or Visconorust 2090P-2, both as manufactured by the Viscosity Oil Company."

Line 10, after the seventh word (CONTRACTOR), delete "may either" and replace with the following:

"shall"

ADDENDUM A

Sheet 2 of 3
October 17, 1973

Line 11, after the seventh word (the) delete the following:

"permanent"

3:07.3 Delete this item in its entirety and replace with the following:

"The corrosion-protection wax to be used for bulk filling the conduit shall be Visconorust 2090P-2 as manufactured by The Viscosity Oil Company, or EQUAL."

3:07.4 Line 1, delete the first word "Additional" and replace with the following:

"For both coating of the conduit and bulk filling the conduit"

Line 3, first word, change the spelling of the word from "dependant" to "dependent"

Line 4, after the third word "conduit" and before the period, insert the following:

"or to bulk fill the conduit"

Line 6, after the eighth word (The) delete the following:

"additional"

3:08 Button-heading

3:08.6 Lines 7, 8, and 9; delete the last sentence in its entirety and replace with the following:

"Tendons cannot lay in the conduit without bulk filling with corrosion protection wax for more than seven (7) months."

3:10 Tendon Conduit Dry Air Purge

Delete this Item in its entirety and replace with revised Item 3:10, Tendon Corrosion Protection, as set forth on page III-17.

3:11 Quality Control

Subitem 8., delete this subitem in its entirety and replace with the following:

"8. Develop written work-procedures for tendon corrosion protection. Refer to item 3:10.3."

ADDENDUM A

Sheet 3 of 3
October 17, 1973

Subitem 9., delete this subitem in its entirety and replace with the following:

"9. Develop documentation records for tendon corrosion protection. Refer to item 3:10.4."

NOTE: Attached hereto is a copy of revised Index page for Section III and revised pages III-1, -2, -7, -11, -17, and -18, incorporating the changes set forth by this Addendum A, to replace the correspondingly numbered pages previously issued to you.

SECTION III

DETAILED SPECIFICATIONS

INDEX

3:01 Scope of Work

The WORK to be performed under this Contract shall include the receiving, storing, installing, and stressing of the prestressing system tendons required for the Reactor Building for the Crystal River Unit 3, Florida Power Corporation. The WORK shall be as specified herein and/or as shown on the Drawings and shall include, but is not necessarily limited to, the following:

1. Receiving and storing on the job site - tendons, tendon anchorage components, installation and stressing equipment, all supplied by Others.

2. Measuring tendon lengths.

3. Cleaning the inside surface of the embedded tendon conduit and coating with a corrosion-protection wax.

4. Installing tendons and protective end caps.

5. Button-heading and tensioning the tendons.

6. Re-installing protective end caps, if the tendons are not stressed immediately after installation. A

7. Supplying equipment for complete installation and stressing of tendons including rigging and scaffolding.

8. Developing and maintaining WORK procedures and the required records for the WORK, as detailed in this Specification.

9. Supplying small hand tools and equipment noted on page 11 of the VENDOR'S (as defined in Item 3:02) "Field Installation Manual".

10. Maintenance of the tendon installation and stressing equipment (as noted in item 3:03.3) in accordance with the minimum requirements noted in the VENDOR'S (as defined in Item 3:02) "Field Installation Manual".

11. Coordinating with the OWNER the various phases of the WORK to suit the OWNER'S construction requirements. The OWNER will supply an outline schedule of the WORK.

12. Supplying details of and embedments for support of the scaffolding at the ring girder (see item 3:04 subitem 6).

13. Supplying eccentricity and "Go" "No-Go" gauges (see item 3:08.3 subitems 3 and 4). These gauges may be obtained from the VENDOR.

14. Bulk filling the conduit with wax and supplying all plumbing, heating, and storage equipment associated with bulk filling. A

15. Supplying a corrosion protection wax for tendon conduit bulk filling.

3:02 Definitions

In addition to the definitions in Item 2:02 of the GENERAL CONDITIONS, the following definition shall apply:

"VENDOR" - shall mean The Prescon Corporation of Corpus Christi, Texas, the supplier of the prestressing system.

3:03 Work, Materials, and Equipment Not Included in Scope of Work

The following items associated with the tendons are not included in this Contract and will be provided by Others:

1. Furnishing and delivering of wrapped and coated tendons to the job site with attached stressing washers, dead end plates, stressing washers, shims and increment shims, protective end caps and gaskets, all supplied by the VENDOR.

2. Furnishing, delivery, and installation of embedded conduit and bearing plates.

3. Furnishing and delivery of the following tendon installation and stressing equipment to the job site:

   a. Three (3) uncoiling tables.

   b. Three (3) hydraulic tuggers.

   c. Three (3) units for backing the tendons into the conduit.

   d. Three (3) button-heading machines.

   e. Six (6) stressing machines.

4. Suitable on-site storage for tendons and anchorage components.

5. Suitable supply of electricity.

6. Tendon length measuring equipment.

7. The corrosion protection wax for coating the inside of the conduit shall be either Visconorust 2090P or 2090P-2. A

   Note: Both formulations of wax may be used as the manufacturer of them has stated that they are compatible with each other.

3:07.2 The corrosion-protection wax shall be either Visconorust 2090P, or Visconorust 2090P-2, both as manufactured by the Viscosity Oil Company. The CONTRACTOR'S attention is drawn to the fact that the corrosion-protection wax may require heating to assist application to the inside of the conduit. The CONTRACTOR shall submit procedures for cleaning and coating the inside of the conduit to the OWNER and the ENGINEER for approval. Exposure of the open conduit to the atmosphere shall be kept to a minimum and shall not exceed eight (8) hours. The conduit shall not be left open during rain. To protect the conduit during rain the CONTRACTOR shall re-install the temporary protective covers or install the protective end caps and gaskets as supplied by the VENDOR. A A

3:07.3 The corrosion-protection wax to be used for bulk filling the conduit shall be Visconorust 2090P-2 as manufactured by The Viscosity Oil Company, or EQUAL. A

3:07.4 For both coating of the conduit and bulk filling the conduit tests shall be performed to determine chloride, sulphide and nitrate content. The frequency of these tests shall be dependent on the method the CONTRACTOR uses to coat the inside of the conduit or to bulk fill the conduit. The CONTRACTOR shall propose to the OWNER and the ENGINEER the frequency of these tests based upon his methods of coating the inside of the conduit. The tests are as follows: A A

a. Chlorides:

The initial screening test on both raw materials and finished product shall be the Beilstein Test. If a positivie Beilstein indication is obtained, a conforming test shall be made on water extracts of the product using standard titration of colorimetric procedures described in ASTM D 512-67. A limit of 10 ppm chloride shall be set for either raw material or finished product.

3:08.5 Before commencing button-heading the production tendons (tendons to be placed in the structure), the CONTRACTOR shall demonstrate his ability to produce button-heads meeting the criteria noted in item 3:08.3. To accomplish this, he shall obtain sufficient lengths of wire from the VENDOR to make 50 trial button-heads. The wire shall be the same size and type as used in the tendon. This wire may be purchased from the VENDOR. These 50 trial button-heads shall all be inspected for size, eccentricity, and splits. Rejected button-heads will be examined by the VENDOR, who may make a recommendation to the CONTRACTOR to alter his procedure in order that acceptable button-heads may be produced. The CONTRACTOR may not proceed with button-heading production tendons until he has satisfactorily demonstrated his ability to produce acceptable button-heads.

3:08.6 After installing and button-heading a tendon, the CONTRACTOR may leave the tendon unstressed provided that the protective end caps and gaskets, as supplied by the VENDOR, are installed. The CONTRACTOR shall note that in order to install the protective end caps it will be necessary for him to pull the tendon back into the conduit, after button-heading. The installation of the caps shall be in accordance with the recommendations of the VENDOR. Tendons cannot lay in the conduit without bulk filling with corrosion protection wax for more than seven (7) months. A

3:08.7 The CONTRACTOR shall develop documentation records for the tendon installation and button-heading. The records shall, as a minimum, note that the conduit was cleaned and coated with the corrosion-protection wax (refer to item 3:07.1), the date and time of installation, the VENDOR'S identification number for the field button-headed stressing washer or dead end plate, the VENDOR'S tendon number, and the record of the button-head inspections. The records may also be used to record the stressing data, noted in item 3:09.8.

3:08.8 The CONTRACTOR shall develop work-procedures for button-heading the tendons, and shall submit them to the OWNER and the ENGINEER for approval before commencement of the WORK.

3:09 Tendon Stressing

3:09.1 The CONTRACTOR shall follow the maintenance, handling, and operating procedures developed by the VENDOR for the stressing equipment.

3:09.2 Tendons shall not be stressed until all concrete for the complete Reactor Building shell has been placed and has reached a minimum strength of 5,000 psi and has been in place for 28 days.

3:10 Tendon Corrosion Protection

3:10.1 After the tendons and end caps are installed, the CONTRACTOR shall perform the following WORK in items 3:10.2 to 3:10.4 below.

3:10.2 The CONTRACTOR shall fill the air space (bulk-fill) in each conduit with corrosion-protection wax as specified in item 3:07.3. The CONTRACTOR shall obtain from the supplier of the corrosion protection wax, for each batch of wax, certified test reports, showing that the wax complies with the supplier's formulation and that concentrations of chlorides, sulfides, and nitrates in the wax are less than 10 ppm each. The test reports including batch numbers shall accompany all shipments made to the site. During all phases up to bulk filling, the CONTRACTOR shall handle the corrosion protection wax, so that contamination of it will be prevented. Bulk filling of the conduit shall be accomplished to ensure that the conduit is filled with corrosion protection wax. The tests specified in item 3:07.4 shall be performed by the CONTRACTOR and the frequency of the tests shall be established by the CONTRACTOR and submitted to the ENGINEER for approval. The bulk filling for each conduit shall be completed within seven (7) months of tendon installation for that conduit. The sealing pressure shall be 0 psig and the minimum wax temperature at the discharge end shall be 115 F.

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3:10.3 The CONTRACTOR shall develop written procedures for bulk-filling. The procedures as a minimum shall include for:

1. Determination that the conduit is filled with corrosion-protection wax.
2. Pressure control in the conduit.
3. Corrosion protection wax pumping temperature range for varying conduit temperatures.
4. Testing requirements, including frequency, for the corrosion protection wax.

NOTE: These procedures shall be submitted to the OWNER and the ENGINEER for approval.

3:10.4 The CONTRACTOR shall develop documentation records for the tendon conduit bulk-filling. The records shall, as a minimum, record: tendon number; date; conduit temperature; corrosion-protection wax discharge temperature; assurance that the correct corrosion-protection wax has been used. The format of the records shall be submitted to the ENGINEER for approval. The records shall be completed as the WORK progresses. Copies of these records shall be available for the inspection of the OWNER and upon completion of the WORK duplicate copies of all records shall be forwarded to the OWNER.

3:11 Quality Control

The CONTRACTOR shall perform the following:

1. Develop documentation for, and carry out inspection of, tendons and anchorage components as they are delivered to the job site.

2. Develop written work-procedures for cleaning and coating the inside of the conduit with the corrosion-protection wax. Refer to item 3:07.1.

3. Develop written work-procedures for installing the tendons. Refer to items 3:07.7 and 3:07.10.

4. Develop documentation records for conduit cleaning and coating, tendon installation, and button-heading. Refer to item 3:08.7.

5. Develop written work-procedures for button-heading the tendons. Refer to item 3:08.8.

6. Develop documentation records for the tendon stressing. Refer to item 3:09.8.

7. Develop written work-procedures for stressing the tendons. Refer to item 3:09.9.

8. Develop written work-procedures for tendon corrosion protection. Refer to item 3:10.3. ▲

9. Develop documentation records for tendon corrosion protection. Refer to item 3:10.4.

Record of Changes
to
Specification SP-5909
Installation and Stressing of Prestressing System Tendons

Sheet 1 of 1
November 1, 1973

Note: The attached sheets (1 of 3 in the Addendum portion and the index page), issued to the OWNER with ADDENDUM A on October 17, 1973 have been revised to correct typographical errors. Because ADDENDUM A was not forwarded to the CONTRACTOR the error is not being corrected by another formal Addendum. However, this sheet sets forth the corrections, in addendum format, for record purposes only.

ADDENDUM A, dated October 17, 1973

Sheet 1 of 3 - Index Page:

Under the words "Index Page" add the following:

"For Item 3:10, delete the title 'Tendon Conduit Dry Air Purge' and replace with 'Tendon Corrosion Protection' "

For the existing wording change "Item 3:10" to "Item 3:11"

SECTION III - INDEX (as revised by Addendum A dated October 17, 1973)

For Item 3:10 change the title to read as follows:

"Tendon Corrosion Protection"

ADDENDUM A

Sheet 1 of 3
October 17, 1973

SECTION III - DETAILED SPECIFICATIONS

Index Page:

For Item 3:10, delete the title "Tendon Conduit Dry Air Purge" and replace with "Tendon Corrosion Protection".

For Item 3:11, Quality Control, under Page column delete "III-17" and replace with "III-18".

3:01 Scope of Work

Subitem 6., lines 2 and 3; after the fourth word (installation), place a period and delete the following:

"and dry air purging of the tendons."

Subitem 14., delete this subitem in its entirety and replace with the following:

"14. Bulk filling the conduit with wax and supplying all plumbing, heating, and storage equipment associated with bulk filling."

Subitem 15., delete this subitem in its entirety and replace with the following:

"15. Supplying a corrosion protection wax for tendon conduit bulk filling."

3:03 Work, Materials, and Equipment Not Included in Scope of Work

Add the following subitem:

"7. The corrosion protection wax for coating the inside of the conduit shall be either Visconorust 2090P or 2090P-2.

Note: Both formulations of wax may be used as the manufacturer of them has stated that they are compatible with each other.

3:07 Tendon Installation

3:07.2 Lines 1 and 2, delete the first sentence in its entirety and replace with the following:

"The corrosion-protection wax shall be either Visconorust 2090P, or Visconorust 2090P-2, both as manufactured by the Viscosity Oil Company."

Line 10, after the seventh word (CONTRACTOR), delete "may either" and replace with the following:

"shall"

SECTION III

DETAILED SPECIFICATIONS

INDEX

FLORIDA POWER CORPORATION
POWER ENGINEERING & CONSTRUCTION DEPT.
CRYSTAL RIVER - UNIT 3
APPROVED BY:
Engineer ______ Date 5-?-71
Mgr. - Power Engr. ______
ORIGINAL SIGNED BY
Nuclear Proj. Mgr. ______
J. T. RODGERS

8112

SPECIFICATION

INSTALLATION AND STRESSING OF PRESTRESSING SYSTEM TENDONS

CRYSTAL RIVER - UNIT NO. 3
FLORIDA POWER CORPORATION

SP-5909 MARCH 29, 1971

FPC-321-BA.1B

3-29-71
APPROVED - DEPT. PROJECT ENGR. **DATE**

3-29-71
ISSUED FOR CRYSTAL RIVER - UNIT 3 **DATE**

QUALITY PROGRAM
REVIEW and DOCUMENTATION
REQUIRED

Gilbert Associates, Inc.
525 Lancaster Avenue
Reading, Pennsylvania

D.A.S.-M.L.L.
W.O. 4263-00

CONTENTS

SECTION I

INSTRUCTIONS TO BIDDERS

INDEX