E.W. Howell Co., LLC
113 Crossways Park Drive
Woodbury, NY 11797
Phone: 516-921-7100
Fax: 516-921-7920

REQUEST FOR INFORMATION
No. 00024

TITLE: Prefabricated Building Anchorage

DATE: 10/2/2009

PROJECT: BNL CCWF-II

JOB:

TO: Attn: Alan Raphael
Brookhaven National Laboratory
Brookhaven Sciences Associates, LLC
Project Modernization Office
Upton, NY 11973-5000
Phone: 631-344-5854

STARTED:
COMPLETED:
REQUIRED: 10/9/2009

WORK IMPACT:	SCHEDULE IMPACT:	COST IMPACT:
Unknown	Unknown	Unknown

QUESTION:

October 2, 2009
Prefabricated Building Anchorage

We propose to use adhesive anchors for the anchorage of the steel structure of the prefabricated buildings 600A and 600C. Please clarify type and embed depth.

CC: File
3/12/2010
Follow-up:

Please see attached cut sheets. We propose to use ¾" anchor bolts with to 8 ¼" embedment using the Hilti HIT-RE 500-SD for anchorage of building 600A.

ANSWER: Re: Follow-up 3/12/10
Proposed ¾" diameter Hilti RE-500 Adhesive anchors are acceptable. However, considering the edge conditions, combined shear and tension load reactions provided by Nucor and based upon concrete 28 days design strength of 4000 psi, a revised full embedment of 9" instead of the proposed 8 ¼" embedment is recommended.
Sam Muddappa, Giffels March 12, 2010

ANSWER:

October 26, 2009

Prefab buildings are to be designed by Contractor retained Registered Design Professional/Prefab Building manufacturer, per performance based specifications, included in the Contract. The anchor bolt sizes and forces are to be submitted as part of this design. Adhesive anchors, if used, should also be accepted by the Design Professional/Prefab Manufacturer. Hilti RE-500 anchorage system with double embedment is recommended, if adhesive anchors are used.

Requested By: E.W. Howell Co., LLC **Date:** _____

Signed: _____
Lauren Bergin

E.W. Howell Co., LLC
113 Crossways Park Drive
Woodbury, NY 11797
Phone: 516-921-7100
Fax: 516-921-7920

REQUEST FOR INFORMATION
No. 00024

TITLE: Prefabricated Building Anchorage

DATE: 10/2/2009

PROJECT: BNL CCWF-II

JOB:

TO: Attn: Alan Raphael
Brookhaven National Laboratory
Brookhaven Sciences Associates, LLC
Project Modernization Office
Upton, NY 11973-5000
Phone: 631-344-5854

STARTED:
COMPLETED:
REQUIRED: 10/9/2009

WORK	SCHEDULE	COST
IMPACT: Unknown	**IMPACT:** Unknown	**IMPACT:** Unknown

CC: Frank Cook, File

Requested By: E.W. Howell Co., LLC

Date: _____

Signed: _____
Lauren Bergin

NY Metro area & Hudson valley distributor
The E Kelly Company
21 Knollwood Rd Cortlandt Manor, NY 10567
914-743-1202 www.ekellycompany.com
914-232-3191 x5 914-232-3812 fax

3-12-2010

Mr. Hans Laros
E.W. Howell Co. LLC
113 Crossways Park Dr.
Woodbury, NY 11797

RE: Nucor Building expansion of existing endwall at 600A unit

Dear Mr. Laros:

It is my understanding that the Nucor building addition to existing building 600A will be anchored with the following epoxy adhesive anchoring system:

Hilti HIT-RE 500-SD

This system is in compliance with the 2006 IBC. See attached report ESR-2322.

According to the attached Nucor column base reactions for this building the maximum uplift global Y would occur at load case 7 and generate -15 kips.

Nucor requires the use of 4 anchor bolts at ¾" diameter per column base.

Based on the attached report from Hilti, when installed properly the ¾" HIS carbon Steel anchor bolt embedded at 8 ¼" will yield a tensile strength of 9,030 lbs. When all 4 of the ¾" anchor bolts are installed to 8 ¼" embedment using the Hilti HIT-RE 500-SD anchoring system the combined strength is sufficient.

Very Truly Yours

Eric Kelly

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

HIT-RE 500 Allowable Bond/Concrete Capacity and Steel Strength for HIS Carbon Steel and HIS-R Stainless Steel Internally Threaded Inserts

Anchor Diameter in. (mm)	Embedment Depth in. (mm)	HIT-RE 500 Allowable Bond/Concrete Capacity[2]		Steel Bolt Strength[1,2]			
		Tensile $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	Shear $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	ASTM A 325 Carbon Steel		ASTM F 593 Stainless Steel	
				Tensile[1] lb (kN)	Shear[1] lb (kN)	Tensile[1] lb (kN)	Shear[1] lb (kN)
3/8 (9.5)	4-1/4 (108)	2870 (12.8)	1565 (7.0)	4370 (19.4)	2250 (10.0)	3645 (16.2)	1875 (8.3)
1/2 (12.7)	5 (127)	4530 (20.1)	2890 (12.9)	7775 (34.6)	4005 (17.8)	6480 (28.8)	3335 (14.8)
5/8 (15.9)	6-5/8 (168)	8255 (36.7)	4635 (20.6)	12150 (54.0)	6260 (27.8)	10125 (45.0)	5215 (23.2)
3/4 (19.1)	8-1/4 (210)	9030 (40.1)	6695 (29.8)	17945 (77.8)	9010 (40.1)	12395 (55.1)	6385 (28.4)

HIT-RE 500 Ultimate Bond/Concrete Capacity and Steel Strength for HIS Carbon Steel and HIS-R Stainless Steel Internally Threaded Inserts

Anchor Diameter in. (mm)	Embedment Depth in. (mm)	HIT-RE 500 Ultimate Bond/Concrete Capacity[2]		Ultimate Bolt Strength[1,2]			
		Tensile $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	Shear $f'_c \geq 2000$ psi (13.8 MPa) lb (kN)	ASTM A 325 Carbon Steel		ASTM F 593 Stainless Steel	
				Tensile[1] lb (kN)	Shear[1] lb (kN)	Tensile[1] lb (kN)	Shear[1] lb (kN)
3/8 (9.5)	4-1/4 (108)	11480 (51.0)	6260 (27.8)	9935 (44.2)	5960 (26.5)	8280 (36.8)	4970 (22.1)
1/2 (12.7)	5 (127)	18115 (80.5)	11565 (51.4)	17665 (78.6)	10600 (47.2)	14720 (65.5)	8835 (39.3)
5/8 (15.9)	6-5/8 (168)	33025 (146.9)	18550 (82.5)	27610 (122.8)	16565 (73.7)	23010 (102.4)	13805 (61.4)
3/4 (19.1)	8-1/4 (210)	36125 (160.6)	26775 (119.1)	39760 (176.9)	23855 (106.1)	28165 (125.3)	16900 (75.1)

1 Steel values in accordance with AISC

ASTM A 325 bolts: $F_y = 92$ ksi , $F_u = 120$ ksi

ASTM F 593 (AISI 304/316): $F_y = 65$ ksi, $F_u = 100$ ksi for 3/8" thru 5/8"

$F_y = 45$ ksi, $F_u = 85$ ksi for 3/4"

Allowable Load Values

Tension = $0.33 \times F_u \times A_{nom}$

Shear = $0.17 \times F_u \times A_{nom}$

Ultimate Load Values

Tension = $0.75 \times F_u \times A_{nom}$

Shear = $0.45 \times F_u \times A_{nom}$

2 Use lower value of either bond/concrete capacity or steel strength.

HIT-RE 500 Epoxy Adhesive Anchoring System 4.2.7

HIT-RE 500 Allowable and Ultimate Bond/Concrete Capacity for HAS Rods in Normal Weight Concrete[1,2,3,4]

Anchor Diameter	Embedment Depth	HIT-RE 500 Allowable Bond/Concrete Capacity				HIT-RE 500 Ultimate Bond/Concrete Capacity			
		Tensile		Shear		Tensile		Shear	
		f'_c = 2000 psi (13.8 MPa)	f'_c = 4000 psi (27.6 MPa)	f'_c = 2000 psi (13.8 MPa)	f'_c = 4000 psi (27.6 MPa)	f'_c = 2000 psi (13.8 MPa)	f'_c = 4000 psi (27.6 MPa)	f'_c = 2000 psi (13.8 MPa)	f'_c = 4000 psi (27.6 MPa)
in (mm)	in (mm)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)	lb (kN)
3/8 (9.5)	1-3/4 (44)	645 (2.9)	1095 (4.9)	1510 (6.7)	2135 (9.5)	2580 (11.5)	4370 (19.4)	4530 (20.2)	6405 (28.4)
	3-3/8 (86)	2190 (9.7)	2585 (11.5)	3155 (14.0)	4460 (19.8)	8760 (39.0)	10345 (46.0)	9460 (42.1)	13380 (59.5)
	4-1/2 (114)	2420 (10.8)	2585 (11.5)	4855 (21.6)	6860 (30.5)	9685 (43.1)	10335 (46.0)	14560 (64.8)	20580 (91.5)
1/2 (12.7)	2-1/4 (57)	1130 (5.0)	1965 (8.7)	2510 (11.2)	3550 (15.8)	4530 (20.2)	7860 (35.0)	7525 (33.5)	10640 (47.3)
	4-1/2 (114)	4045 (18.0)	5275 (23.5)	5610 (25.0)	7935 (35.3)	16185 (72.0)	21095 (93.8)	16820 (74.8)	23800 (105.9)
	6 (152)	4775 (21.2)	5380 (23.9)	8635 (38.4)	12210 (54.3)	19095 (84.9)	21520 (95.7)	25900 (115.2)	36620 (162.9)
5/8 (15.9)	2-7/8 (73)	1690 (7.5)	3045 (13.5)	5245 (23.3)	7420 (33.0)	6770 (30.1)	12175 (54.2)	15735 (70.0)	22250 (99.0)
	5-5/8 (143)	6560 (29.2)	7355 (32.7)	8760 (39.0)	12395 (55.1)	26240 (116.7)	29420 (130.9)	26280 (116.9)	37180 (165.4)
	7-1/2 (190)	7320 (32.6)	7515 (33.4)	13615 (60.6)	19080 (84.9)	29290 (130.3)	30060 (133.7)	40480 (180.1)	57240 (254.6)
3/4 (19.1)	3-3/8 (86)	2310 (10.3)	4515 (20.1)	7335 (32.6)	10370 (46.1)	9250 (41.1)	18065 (80.4)	22000 (97.9)	31108 (138.4)
	6-3/4 (172)	8670 (38.6)	10755 (47.8)	12615 (56.1)	17840 (79.4)	34685 (154.3)	43020 (191.4)	37840 (168.3)	53520 (238.1)
	9 (229)	10385 (46.2)	12995 (57.8)	19430 (86.4)	27470 (122.2)	41535 (184.8)	51985 (231.2)	58280 (259.2)	82400 (366.5)
7/8 (22.2)	4 (101)	3005 (13.4)	5665 (25.2)	7795 (34.7)	11020 (49.0)	12030 (53.5)	22670 (100.8)	23375 (104.0)	33050 (147.0)
	7-7/8 (200)	12495 (55.6)	15875 (70.6)	17175 (76.4)	24290 (108.0)	49975 (222.3)	63495 (282.4)	51520 (229.2)	72860 (324.1)
	10-1/2 (267)	14705 (65.4)	16185 (72.0)	26440 (117.6)	37390 (166.3)	58820 (261.6)	64730 (287.9)	79320 (352.8)	112160 (498.9)
1 (25.4)	4-1/2 (114)	3945 (17.5)	8440 (37.5)	10035 (44.6)	14190 (63.1)	15790 (70.2)	33765 (150.2)	30104 (133.9)	42565 (189.3)
	9 (229)	13845 (61.6)	17365 (77.2)	22435 (99.8)	31720 (141.1)	55380 (246.3)	69465 (309.0)	67300 (299.4)	95160 (423.3)
	12 (305)	17935 (79.8)	17935 (79.8)	34535 (153.6)	48830 (217.2)	71740 (319.1)	71740 (319.1)	103600 (460.8)	146480 (651.6)
1-1/4 (31.8)	5-5/8 (143)	5760 (25.6)	12815 (57.0)	14760 (65.7)	20870 (92.8)	23045 (102.5)	51270 (228.1)	44280 (197.0)	62610 (278.5)
	11-1/4 (286)	24610 (109.5)	31620 (140.7)	35050 (155.9)	49570 (220.5)	98430 (437.8)	126480 (562.6)	105140 (467.7)	148710 (661.5)
	15 (381)	34130 (151.8)	35270 (156.9)	53960 (240.0)	76300 (339.4)	136525 (607.3)	141090 (627.6)	161880 (720.1)	228900 (1018.2)

1 Influence factors for spacing and/or edge distance are applied to concrete/bond values above, and then compared to the steel value. The lesser of the values is to be used for the design.

2 Average ultimate concrete shear capacity based on Concrete Capacity Design (CCD) method for standard and deep embedment and based on testing for shallow embedment.

3 All values based on holes drilled with carbide bit and cleaned with brush per manufacturer's instructions. Ultimate tensile concrete/bond loads represent the average values obtained in testing.

4 For underwater applications up to 165 feet/50m depth reduce the tabulated concrete/bond values 30% to account for reduced mechanical properties of saturated concrete.

NUCOR BUILDING SYSTEMS GROUP
305 Industrial Parkway
Waterloo, IN 46793
Ph: (260) 837-7891
Fax: (260) 837-7384

GENERAL INFORMATION FOR COLUMN BASE REACTIONS

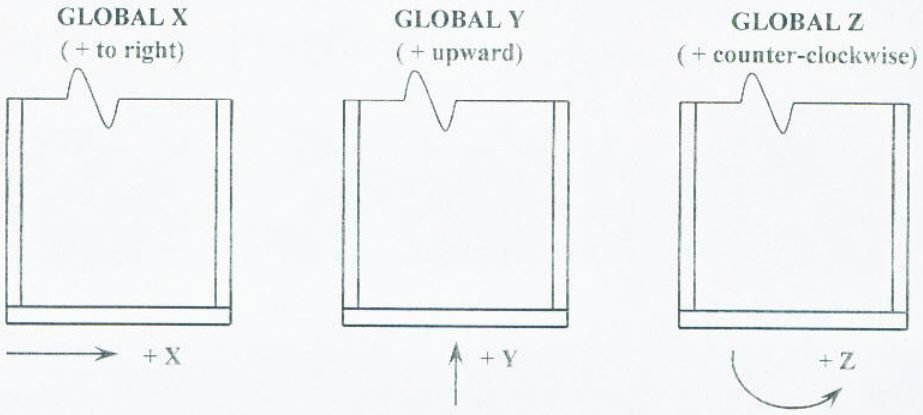
○ FOR REVIEW ◉ FOR CONSTRUCTION

Project Name: BLDG 600A-111309
NBS Project Number: W09M0619A
Customer: THE E KELLY CO. INC.
Nucor Engineer: Charles M. Manns

Column base reactions are included in this packet for a building designed by Nucor Building Systems. These reactions result from frame analysis done by a Nucor Engineer for this specific job. They reflect all loading to which the building may be subject, per the appropriate building code and loading information provided to Nucor Building Systems at the date of design. Reaction packets marked "PRELIMINARY" are subject to change and are usually provided at the request of the customer, although the Nucor Engineer believes he is working with undefined, incomplete or assumed information.

Reactions are provided by load case in order to aid the foundation engineer in determining the appropriate load factors and combinations to be used with either Working Stress or Ultimate Strength design methods. Wind load cases are given for each primary wind direction, and the case which produces the largest reaction at a particular column should be used for design.

Sign conventions for computer generated frame reactions are as follows and should be taken in the sense of the frame sketch given on the reactions sheets.



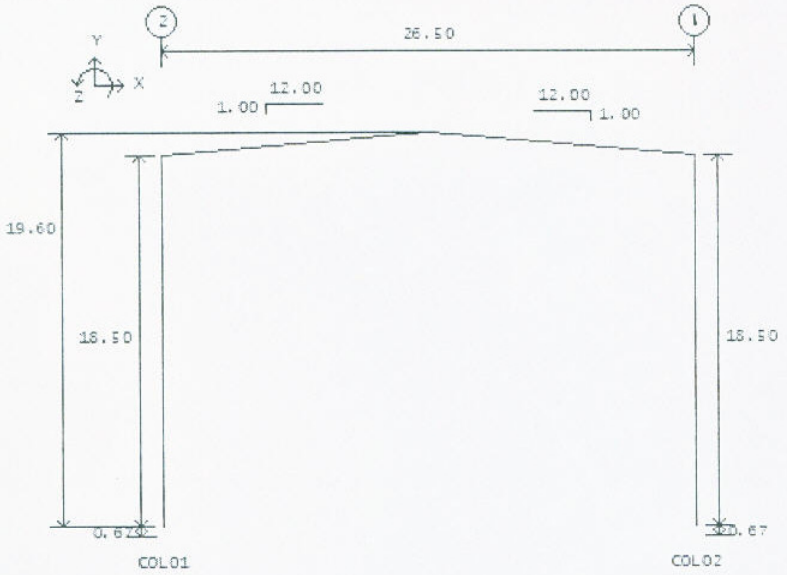
Anchor bolt diameter, grade, location and projection is provided on the Anchor Bolt Plan. Anchor bolt embedment lengths and types are not provided by Nucor Building Systems. This Information is closely related to the complete foundation design which should be done by a Registered Professional Engineer familiar with the local site conditions and construction practices.

NUCOR BUILDING SYSTEMS
Frame : FRAME LINE E & D
Job Name: BLDG 600A-111309

Job #: W09M0619A
By: NBSIN\Manns

Page:
Date: 01-18-10
File: F01

*** DESIGN SUMMARY - FRAME REACTIONS BY LOAD CASE ***



Member	X (kips)	Y (kips)	Z (kip-ft)	Member	X (kips)	Y (kips)	Z (kip-ft)
LOAD CASE 1 - DEAD				LOAD CASE 10 - LONG. WIND 1 TO FRONT			
COL01	1	2	0	COL01	1	-5	0
COL02	-1	2	0	COL02	-1	-5	0
LOAD CASE 2 - COLLATERAL				LOAD CASE 11 - LONG. WIND 2 TO BACK			
COL01	1	4	0	COL01	2	-8	0
COL02	-1	4	0	COL02	-2	-8	0
LOAD CASE 3 - ROOF LIVE				LOAD CASE 12 - LONG. WIND 2 TO FRONT			
COL01	2	13	0	COL01	2	-8	0
COL02	-2	13	0	COL02	-2	-8	0
LOAD CASE 4 - SNOW				LOAD CASE 13 - LONG. WIND 3 TO BACK			
COL01	2	12	0	COL01	1	-2	0
COL02	-2	12	0	COL02	-1	-2	0
LOAD CASE 5 - WIND CASE 1 TO RIGHT				LOAD CASE 14 - LONG. WIND 3 TO FRONT			
COL01	-8	-12	0	COL01	1	-2	0
COL02	-4	1	0	COL02	-1	-2	0
LOAD CASE 6 - WIND CASE 1 TO LEFT				LOAD CASE 15 - LONG. WIND 4 TO BACK			
COL01	4	1	0	COL01	2	-5	0
COL02	8	-12	0	COL02	-2	-5	0
LOAD CASE 7 - WIND CASE 2 TO RIGHT				LOAD CASE 16 - LONG. WIND 4 TO FRONT			
COL01	-7	-15	0	COL01	2	-5	0
COL02	-5	-3	0	COL02	-2	-5	0
LOAD CASE 8 - WIND CASE 2 TO LEFT				LOAD CASE 17 - SEISMIC TO RIGHT			
COL01	5	-3	0	COL01	-1	-1	0
COL02	7	-15	0	COL02	-1	1	0
LOAD CASE 9 - LONG. WIND 1 TO BACK				LOAD CASE 18 - SEISMIC TO LEFT			
COL01	1	-5	0	COL01	1	1	0
COL02	-1	-5	0	COL02	1	-1	0

F2