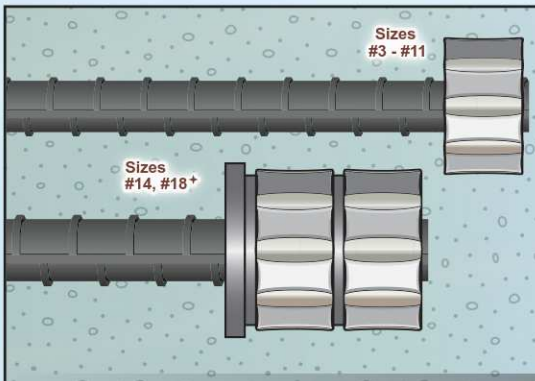
ButtonHead

HEADED ENDS FOR DEVELOPMENT AND EXTENSION OF REINFORCING BARS

BarSplice PRODUCTS INC.

A SUBSIDIARY OF FC INDUSTRIES, INC.

BPI® BUTTONHEAD MECHANICAL END ANCHORAGE FOR REINFORCING BARS



BPI® BUTTONHEAD, BNH, 5Ab

COLD SWAGED HEADED REBAR DEVICE

- ***BNH 5Ab HEAD –*** for transmitting bond force from the reinforcing bar to concrete by a combination of head bearing & development length.* A 'standard' head size for most applications. CALTRANS Reduced Size Head Approved.
- ***IBC Evaluation Report Approved –*** shows compliance with IBC, IRC, ACI 318, ASTM A970. IAPMO UES Evaluation Report # 0331.
- ***SHOP INSTALLATION –*** Attaches directly to the reinforcing bar - no thread cutting required. Shop swaged quickly and efficiently.
- ***HIGH STRENGTH –*** Connections to bar exceed the specified yield strength of the bar, f_y, for ASTM A615 and A706, Grades 60, 75 and 80 as required by ACI 318. Confirming in-air tests meet ASTM A970 Class A and Class HA for uncoated Grade 60, 75, 80, 100 and 120 reinforcing bars.
- ***REPLACES HOOKS –*** **No special bend direction** – alleviates congestion – for beam-column joints, knee joints, pile caps, column roof slab connections; replaces stirrup bars used as confinement steel.
- ***KEY ADVANTAGES –*** Avoids lengthy hook extensions / complex stress patterns. No heat, welding or hot forging – no special chemistry or rebar grade requirements, no bending or cracking of rebars.

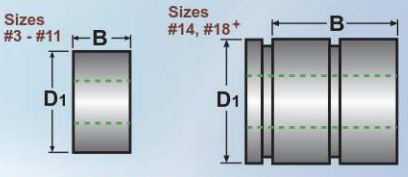
BPI® BUTTONHEAD, BNX, 10Ab

COLD SWAGED HEADED REBAR DEVICE

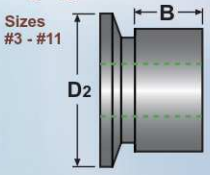
- ***BNX 10Ab HEAD –*** has larger area to transmit full force in bar by head bearing alone. Generally used in sections that may be required to withstand higher forces. CALTRANS Full Size Head Approved.
- ***IBC Evaluation Report Approved –*** shows compliance with IBC, IRC, ACI 318, ASTM A970. IAPMO UES Evaluation Report # 0331.
- ***SHOP INSTALLATION –*** Attaches directly to the reinforcing bar - no thread cutting required. Shop swaged quickly and efficiently.
- ***HIGH STRENGTH –*** Connections to bar exceed the specified yield strength of the bar, f_y, for ASTM A615 and A706, Grades 60, 75 and 80 as required by ACI 318. Confirming in-air tests meet ASTM A970 Class A and Class HA for uncoated Grade 60, 75, 80, 100 and 120 reinforcing bars.
- ***KEY ADVANTAGES –*** Capable of developing the reinforcing bar at the head without the need for additional rebar development length. Alleviates congestion. Quick Assembly. Easy jobsite placement.

+ SIZE #18 REQUIRES THREE (3) SWAGING CRIMPS FOR FULL ASSEMBLY

ButtonHead BNH, 5Ab (Before Swaging)



ButtonHead BNX, 10Ab (Before Swaging)



Rebar Size US [Metric]	ButtonHead Swaging Die Color Code	BNH Head Product Code	BNX Head Product Code	Swage Length B (in.)	Head Diameter & Weight * BNH Series [5Ab] D1 (in.)	Wt (lb.)	Head Diameter & Weight ** BNX Series [10Ab] D2 (in.)	Wt (lb.)
#3 [10]	RED	3BNH	3BNX	3/4	1 1/16	0.16	1 3/8	0.25
#4 [13]	YELLOW	4BNH	4BNX	7/8	1 3/8	0.31	1 3/4	0.50
#5 [16]	BLACK	5BNH	5BNX	1 1/16	1 3/4	0.61	2 3/16	0.96
#6 [19]	RED	6BNH	6BNX	1 5/16	1 7/8	0.77	2 3/8	1.23
#7 [22]	BLUE	7BNH	7BNX	1 1/2	2 3/8	1.53	2 7/8	2.37
#8 [25]	BLACK	8BNH	8BNX	1 3/4	2 3/4	2.38	3 1/4	3.64
#9 [29]	PINK	9BNH	9BNX	1 15/16	2 7/8	2.86	3 9/16	4.41
#10 [32]	GRAY	10BNH	10BNX	2 3/16	3 3/8	4.50	4	6.80
#11 [36]	RED	11BNH	11BNX	2 7/16	3 13/16	6.80	4 1/2	10.1
#14 [43]	RED	14BNH	14BNX	2 7/8	3 7/8	9.55		
#18 [57]	YELLOW	18BNH	18BNX	4 3/8	5	18.6		

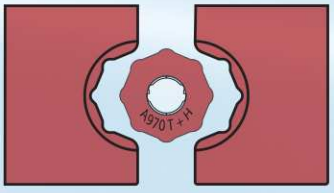
* Head Cross Sectional Area is approximately 5 x Rebar Area ** Head Cross Sectional Area is approximately 10 x Rebar Area

❋❋ HOW TO SPECIFY BPI® BUTTONHEAD HEADED DEVICES

	By Name:	By Generic Description:
BAR-TO-HEAD	**BPI® ButtonHead** *by* **BarSplice Products, Inc., Dayton OH**	***Headed Ends for reinforcing bars shall be the cold-swaged head type, installed by octagonal dies to produce a 5Ab or 10Ab Head size*** *(Specify Head Size).*

❋❋ Include bar size(s), bar type and grade. Include statement: "Parts shall be manufactured to the quality requirements of ISO 9001."

BPI® ButtonHead cold-swaged headed devices are made from high quality steel that meets the chemistry and grade requirements of ASTM A519 or A576. Installed performance satisfies the **CLASS A** and **CLASS HA** requirements of ASTM A970-15 and ACI 318-14 Section 20.2.1.6 [ACI 318-11 Section 3.5.9]. Develops the specified tensile strength of uncoated Grade 60, 75, 80, 100 and 120 reinforcing bar.



Powerful hydraulically actuated presses with color-coded octagonal die sets are utilized in fabricating shops for the most efficient swaging operation. Swaging pressure is factory preset and equipment is automated to release after each swaging 'bite' or pressing. When components have been compressed onto the reinforcing bar by cold-swaging they become mechanically interlocked with the rebar deformation.

Cold swaging technology for mechanical anchorage and splicing is one of the most established, developed, and refined connection methods worldwide. Key to cold swaging success is its simplicity, low cost and adaptability. There is no loss of reinforcing bar cross-sectional area at the anchorage location so the system is a natural choice when considering the objectives of seismic design and safety related applications. BPI-Grip swaging equipment is easy to use and may be leased or purchased. Splicing manuals provided with equipment explain step-by-step installation and safety information.

While the information contained in this document is believed to be accurate at the time of publication, BPI reserves the right to make changes, design modifications, corrections and other revisions as it sees fit, without notice. All products described herein are supplied in accordance with BPI's standard Terms and Conditions of Sale. This document is of a promotional nature only. Aspects of structural design, evaluation of product fitness for use, suitability or similar attributes are the responsibility of others.

BarSplice Products, Inc., 4900 Webster Street, Dayton OH 45414, USA
●Tel: (937) 275-8700 ●Fax: (937) 275-9566 ●E-mail: bar@barsplice.com

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aci MEMBER

CRSI MEMBER

REV.L 3/18/2016

EVALUATION SUBJECT:
THE BUTTONHEAD BNH AND BNX HEADED DEVICE FOR REINFORCEMENT BARS IN TENSION

REPORT HOLDER:
Barsplice Products, Inc.
4900 Webster Street
Dayton, OH 45414
(937) 275-8700
www.barsplice.com

CSI Division: 03 CONCRETE
CSI Section: 032100 Reinforcing Steel

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:
- 2012 and 2009 International Building Code® (IBC)
- 2012 and 2009 International Residential Code® (IRC)

1.2 Evaluated in accordance with:
- IAPMO UES EC 006-2014

1.3 Properties assessed:
- Structural

2.0 PRODUCT USE

The ButtonHead BNH and BNX Headed Device for Reinforcing Bars in Tension are Class HA headed deformed bars complying with Section 12.6 of ACI 318-11 for use as mechanical anchorage to develop steel reinforcing bars in tension in normal-weight concrete as an alternative to standard hooks or development lengths of straight deformed reinforcing bars in reinforced concrete.

3.0 PRODUCT DESCRIPTION

3.1 Product information: The Buttonhead BNH and BNX Headed Devices for Reinforcing Bar in Tension are Class HA headed deformed bars complying with the requirements ASTM A970. The BNH headed devices are composed of No. 4 through No.18 size reinforcing steel bars and the BNX are composed of No. 4 through No. 11 size reinforcing steel bars with a cold-swaged headed device at one end or both ends of the bar. The net bearing area of the BNH and BNX headed systems exceed four times the nominal cross-sectional area of the reinforcing bar. Dimensions and illustrations are shown in Table 1 and Figure 1 of this report.

3.2 Material information

3.2.1 Headed Ends: The ButtonHead BNH and BNX headed devices are formed from steel conforming to ASTM A108 or ASTM A576.

3.2.2 Steel Reinforcing Bars: Steel reinforcing bars shall be uncoated, Grade 60 deformed reinforcing bars complying with ASTM A615 or ASTM A706.

4.0 DESIGN AND INSTALLATION

4.1 General: The ButtonHead BNH and BNX headed devices shall be installed in accordance with the IBC, ACI 318, this evaluation report and the manufacturer's installation instructions. Where conflicts occur the more restrictive shall govern.

4.2 Design

4.2.1 Development Length: When utilizing the equation in Section 12.6.2 of ACI 318-11 and ACI 318-08 to calculate development length of deformed bars in tension, the proposed heads conforms with ASTM A970-09, the maximum compressive design strength of the concrete used in the calculation is 6,000 psi (41.4 MPa), and those conditions referenced in Section 12.6.1 of ACI 318-11 have been achieved.

Development lengths specified for the development and splices of reinforcement shall not require a strength reduction factor in accordance with Section 9.3.3 of ACI 318.

Splices of reinforcement to headed deformed reinforcing bars in tension shall comply with Sections 12.14 and 12.15 of ACI 318-11.

4.2.2 Design of Anchorage to Concrete: For compliance with Section 1909 of the IBC and ACI 318 Appendix D as anchorage, additional data needs to be prepared by a registered design professional and approved by the building official to justify how the No.14 and No.18 headed bars are substantiated per Section D.2.3 of ACI 318-11 or comply with ANSI/ASME B1.1, B18.2.1 and B18.2.6.

4.2.3 Termination of Headed Bars: When designed in accordance with Section 12.6.2 of ACI 318-11, longitudinal headed deformed bars extending from a beam or a slab terminating at a support member, such as a column shall extend through the joint to the far face of the confined supporting member per ACI 318 Figure R12.6 (b).

4.3 Special Inspection: Special inspection of the headed bars shall be provided at the jobsite as required by Sections 1704 and 1705 of the 2012 IBC (Section 1704 of the 2009 IBC), as applicable. The special inspector is responsible for verifying identification of the headed deformed reinforcing

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safely, as applicable, in accordance with IBC Section 104.11.

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bars, grade and size of reinforcing bars, installation of reinforcing bar splices to the headed deformed reinforcing bars, as well as placement of the headed bars.

5.0 LIMITATIONS

The Buttonhead BNH and BNX Headed Devices described in this report comply with, or are suitable alternatives to what is specified in, the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The headed devices shall be installed in accordance with the applicable code, the manufacturer's instructions, and this report. In the event of a conflict, the more restrictive governs.

5.2 The use of headed and mechanical anchored deformed reinforcement for lap splices is outside the scope of this criteria.

5.3 Anchorage system calculations and installation details shall be designed in conformance with the IBC and ACI 318 by the registered design professional and approved by the building official.

5.4 For structures regulated by ACI 318 Chapter 21, as required by 2012 IBC Section 1905.1 (2009 IBC Section 1908.1), where the ButtonHead BNH and BNX Headed reinforcing bars resisting earthquake-induced flexure, axial force, or both, in special moment frames, special structural walls, and all components of special structural walls including coupling beams and wall piers, mill certificates shall be submitted to the code official as evidence that the steel reinforcing bars comply with Section 21.1.5.2 of ACI 318.

5.5 Special inspections shall be provided in accordance with Section 4.3 of this report.

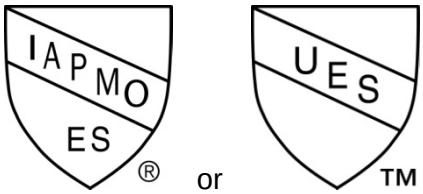
5.6 Minimum concrete cover shall be in accordance with Section 7.7 of ACI 318-11, and shall be measured from the outer surface of the ButtonHead reinforcing bar's head.

6.0 SUBSTANTIATING DATA

Data in accordance with IAPMO UES Evaluation Criteria for Headed and Mechanically Anchored Deformed Reinforcement Bars in Tension (EC 006-2014), approved April 2014.

7.0 IDENTIFICATION

All Buttonhead BNH and BNX are packaged with a label bearing the manufacturer's name (BarSplice Products, Inc.), address, model, size, the IAPMO Uniform ES Mark of Conformity and the Uniform Evaluation Report Number (ER-331). The heads are permanently marked with the letter "H" to indicate that the product has been produced to the ASTM A970 Annex A1 specification.



IAPMO ER #331

Brian Gerber, P.E., S.E.
Vice President, Technical Operations
Uniform Evaluation Service

Richard Beck, PE, CBO, MCP
Director of Uniform Evaluation Service

GP Russ Chaney
CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email at info@uniform-es.org

TABLE 1 – Dimensions of ButtonHead BNH and BNX Headed Devices

BUTTONHEAD HEADED DEVICES EVALUATED							
		REBAR		HEAD			
Bar Size	Head Type	Diameter, db (in)	Area, Ab (in)	Bmin (in)	D (in)	Abrg (in^2)	Abrg > 4Ab
No. 4	BNH	0.500	0.20	0.875	1.375	1.28	YES
No. 5	BNH	0.625	0.31	0.938	1.750	2.10	YES
No. 6	BNH	0.750	0.44	1.250	1.875	2.32	YES
No. 7	BNH	0.875	0.60	1.375	2.375	3.83	YES
No. 8	BNH	1.000	0.79	1.500	2.750	5.15	YES
No. 9	BNH	1.128	1.00	1.750	2.875	5.49	YES
No. 10	BNH	1.270	1.27	1.875	3.375	7.68	YES
No. 11	BNH	1.410	1.56	2.125	3.813	9.86	YES
No. 14[1]	BNH	1.693	2.25	2.875	3.875	9.54	YES
No. 18[1]	BNH	2.257	4.00	4.375	5.045	16.0	YES
Bar Size	Head Type	Diameter, db (in)	Area, Ab (in)	Bmin (in)	D (in)	Abrg (in^2)	Abrg > 9Ab
No. 4	BNX	0.500	0.20	0.875	1.750	2.21	YES
No. 5	BNX	0.625	0.31	0.938	2.188	3.45	YES
No. 6	BNX	0.750	0.44	1.250	2.375	3.99	YES
No. 7	BNX	0.875	0.60	1.375	2.875	5.89	YES
No. 8	BNX	1.000	0.79	1.500	3.250	7.51	YES
No. 9	BNX	1.128	1.00	1.750	3.570	9.01	YES
No. 10	BNX	1.270	1.27	1.875	4.030	11.5	YES
No. 11	BNX	1.410	1.56	2.125	4.500	14.3	YES

For SI: 1 inch = 25.4 mm, 1 sq.in. = 645 mm^2, 1 foot = 305 mm

[1]Note: For compliance with the IBC and ACI 318 Appendix D as anchorage, additional data needs to be prepared by the registered design professional and approved by the building official to justify how the No.14 and No.18 headed bars are substantiated per Section D.2.3 of ACI 318-11 or comply with ANSI/ASME B1.1, B18.2.1 and B18.2.6.

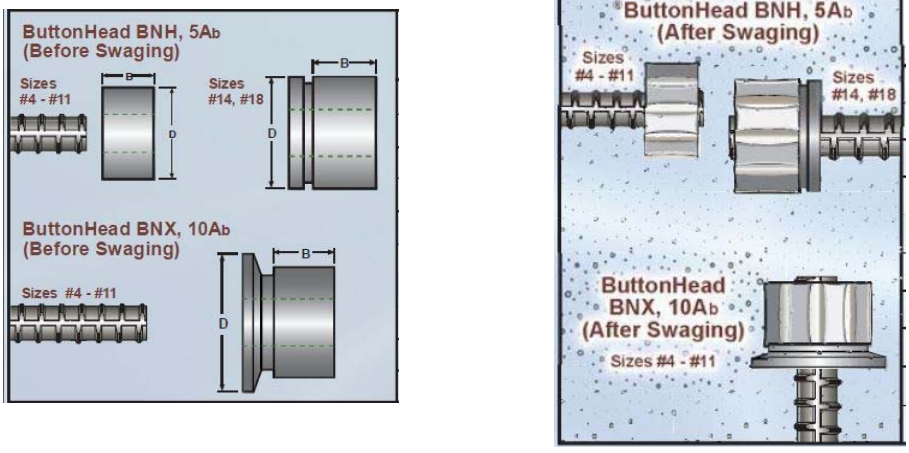


FIGURE 1— ButtonHead BNH and BNX Headed Devices

KCI Construction Company, Inc.
ST. LOUIS: 10315 Lake Bluff Drive | St. Louis, MO 63123
LEBANON: 119 West Fremont | Lebanon, MO 65536

O: 314.894.8888
F: 314.894.7418
www.kciconstruction.com

SUBMITTAL TRANSMITTAL

Date Sent: 04/18/2016

Project: Webster University – Interdisciplinary Science Building

Project #: 16-008

Subject: 31 6329 Drilled Concrete Piers and Shafts – Steel Reinforcing Shop Drawings

Submittal ID: 0003

Type: Submittal

Purpose: For Approval

Sent Via: Email (PDF)

Transmitted To:

Devin Gates
Paric
77 Westport Plaza, Suite 250
St. Louis, MO, 63146
Phone: (636) 561-9592
Email: ddgates@paric.com

Transmitted From:

Kyle Nieman
KCI Construction Company
10315 Lake Bluff Drive
St. Louis, MO 63123
Phone: (314) 200-6486
Email: knieman@kciconstruction.com

Contents:

Qty: 1 Dated: 04/18/2016 Submittal Package No.: 0003 – 31 6329 – 00

Description: 31 6329-00_Drilled Concrete Piers and Shafts – Steel Reinforcing Shop Drawings

Remarks: LEED worksheet and supporting documentation included as well as product data cut sheets for bar terminators. Please review and return at your earliest opportunity. Thanks,

04/18/16

Kyle Nieman
KCI Construction Company

KCI Construction Company, Inc.
ST. LOUIS: 10315 Lake Bluff Drive | St. Louis, MO 63123
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WEBSTER UNIVERSITY – INTERDISCIPLINARY SCIENCE BUILDING

St. Louis, MO

Submittal Description: Drilled Concrete Piers and Shafts – Steel Reinforcing Shop Drawings

Submittal #: 0003 – 31 6329 – 00

Notes: LEED worksheet and supporting documentation included as well as product data cut sheets for bar terminators.

This submittal/drawing has been reviewed and found to be in general conformance with the contract documents.

APPROVED	X
APPROVED AS NOTED	
REVISE AND RESUBMIT	

31 6329
SPEC SECTION

04/18/2016
DATE

04/18/16

KYLE NIEMAN
KCI CONSTRUCTION CO.

CANNONDESIGN

SUBMITTAL IDENTIFICATION SHEET

To be completed by Contractor/CM

WEBSTER UNIVERSITY ISB
PROJECT NAME

8274 BIG BEND BLVD
ADDRESS

NUMBER

WEBSTER UNIVERSITY
OWNER

CANNON DESIGN
ARCHITECT / ENGINEER

DEVIN D GATES
SUBMITTED BY

316329-002
CONTRACTOR / CM SUBMITTAL NO.

CANNON DESIGN SUBMITTAL NO.

STRUCTURAL
DRAWING / DETAIL REFERENCE

SPECIFICATION SECTION / PARAGRAPH

MANUFACTURER / SUPPLIER

ITEM / PRODUCT ID

REQUIRED DATE

PRIORITY

◯ CRITICAL

ITEM BEING SUBMITTED (check only one)

- ◉ Shop Drawings
- ◯ Samples (_____ copies)
- ◯ LEED Submittal
- ◯ Certification / Qualifications
- ◯ Record Documents
- ◯ Product Data
- ◯ Coordination Drawing
- ◯ Calculations
- ◯ Schedules
- ◯ O&M Manuals
- ◯ Other _____

ITEM BEING SUBMITTED FOR (check only one)

◉ Action ◯ Information Only ◯ Record

REMARKS OR DEVIATIONS

CONTRACTOR / CM CERTIFICATION
(SUBMITTALS NOT CERTIFIED WILL BE RETURNED WITHOUT REVIEW)

PARIC

PARIC CORPORATION
SUBMITTAL STAMP

THIS SHOP DRAWING HAS BEEN REVIEWED BY PARIC CORPORATION

Subcontractor remains responsible for dimensions, quantities, coordination with other trades and compliance with contract documents.

By:
Devin D. Gates

DEVIN D GATES — 4/20/16
REVIEWED BY — DATE

To be completed by Reviewer

31 6329-002
CANNON DESIGN SUBMITTAL NUMBER

4/21/16
RECEIVED DATE

- ◯ A. No Exceptions Taken
  No further review of submittal is required.
- ◯ B. Make Corrections Noted
  Incorporate corrections in work; resubmission is not required.
- ◯ C. Revise and Resubmit
  Revise as noted, and resubmit for review.
- ◯ D. Rejected
  Submittal is not in compliance with Contract Documents; provide new submittal.
- ◯ E. For Record / Information Only
  Submittal was reviewed for Record / Information purposes only.
- ◯ F. Not Required for Review
  Submittal is not required by Contract Documents and has not been reviewed.

Review is for conformance with the design concept of this project and for general compliance with contract documents. Contractor is responsible for quantities, dimensions and compliance with contract documents and for information that pertains to fabrication processes, construction techniques and coordination of this work with all trades which will be affected thereby. This review is null and void if submittal deviates from contract documents and does not indicate or note deviations.

A/E COMMENTS — ◉ See attached sheet(s) for additional comments

SHOP DRAWING / SUBMITTAL REVIEW

- ☐ NO EXCEPTION TAKEN
- ☒ EXCEPTIONS NOTED, RESUBMITTAL NOT REQUIRED
- ☐ REJECTED
- ☐ REVIEWED FOR INFORMATION ONLY
- ☐ REVISE AND RESUBMIT AS NOTED

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the plans and specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of the construction, coordination of his work with that of all other trades and the satisfactory performance of his work.

DAVID MASON & ASSOCIATES, INC.

REVIEW BY: JYW DATE: 05/05/2016

REVIEWED BY — DATE

77 Westport Plaza
Suite 250
St. Louis, MO 63146

TRANSMITTAL

No. 15051-0018

Paric Corporation

PROJECT: Webster University Interdisciplinary Science Building

DATE: 04/20/2016

TO: Cannon Design
1100 Clark Ave
St Louis MO 63102

RE: drilled piers reinforcement shop drawings

ATTN: Kelvin Patel

JOB: 15051

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
☐ Shop Drawings	☐ Approval	☐ Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as Noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Samples	**SENT VIA:**	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Corrections
☑ Other:	☐ Separate Cover Via:	☐ Due Date:

Item	*Package*	*Code*	*Rev.*	*Copies*	*Date*	*Description*	*Status*
Submittal		316329-002	1		04/20/2016	drilled piers reinforcement shop drawings	Open

NOTES:

CC:

Signed: _____

Devin Gates