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ICC-ES Evaluation Report

ESR-4238

Issued 04/2019

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This report is subject to renewal 04/2020.

DIVISION: 03 00 00—CONCRETE

SECTION: 03 48 00—PRECAST CONCRETE SPECIALTIES

DIVISION: 31 00 00—EARTHWORK

SECTION: 31 60 00—SPECIAL FOUNDATIONS AND LOAD-BEARING ELEMENTS

REPORT HOLDER:

PERMA-COLUMN, LLC

EVALUATION SUBJECT:

PERMA COLUMN: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500



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ICC-ES Evaluation Report

ESR-4238

Issued April 2019

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DIVISION: 03 00 00—CONCRETE
Section: 03 48 00—Precast Concrete Specialties

DIVISION: 31 00 00—EARTHWORK
Section: 31 60 00—Special Foundations and Load-Bearing Elements

REPORT HOLDER:

PERMA-COLUMN, LLC

LISTEES:

MIDWEST PERMA-COLUMN, INC.

PERMA COLUMN EAST, LLC

EVALUATION SUBJECT:

PERMA-COLUMN: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018 and 2015 *International Building Code*® (IBC)
- 2018 and 2015 *International Residential Code*® (IRC)

Property evaluated:

- Structural

2.0 USES

Perma-Column columns described in this report are used as embedded pre-cast concrete foundations for vertical wood posts or laminated wood columns supporting post frame buildings.

3.0 DESCRIPTION

3.1 General:

The Perma-Column columns are factory manufactured precast reinforced concrete columns with a steel “U” shaped bracket on the top for attachment to a wood post or laminated wood column. The column protrudes above finish grade, to allow for the attachment of a wood post or laminated wood column. See Figure 1 for an illustration of a typical Perma-Column column.

3.2 Materials:

3.2.1 Concrete: The concrete used for the Perma-Column column complies with the requirements shown in

Table 19.3.2.1 of ACI 318 for exposure classes F2 and C1, defined in Table 19.3.1.1 of ACI 318. The concrete has a minimum compressive strength (f'_c) of 10,000 psi (70 MPa) at 28 days.

3.2.2 Reinforcement: The concrete reinforcement used in the Perma-Column column is No. 4 or No. 5 ASTM A706 Grade 60 deformed rebar.

3.2.3 Bracket: The Perma-Column column bracket is manufactured from $\frac{1}{4}$ inch (6 mm) thick steel complying with ASTM A1018 SS Grade 40. The bracket has nominal dimensions equal to the concrete portion of the column it is mated with. The legs of the bracket are 13 inches (330 mm) or 18 inches (457 mm) long with pre-drilled holes for the placement of fasteners. The bracket is powder coated with an epoxy coating.

4.0 DESIGN AND INSTALLATION

Perma-Column columns must be installed in accordance with Perma-Column’s published installation instructions, the applicable code, the approved plans, and this report. If there is a conflict between the plans submitted for approval and this report, this report governs.

The Perma-Column columns must be placed directly into the ground with the end protruding above finish grade no more than 12 inches (305 mm) and the hole must be backfilled. See Tables 1 and 2, and Figure 1 of this report for columns sizes, and design information.

A maximum of four $\frac{3}{16}$ inch (4.8 mm) diameter holes, $1\frac{1}{4}$ inches (32 mm) deep may be post installed into the concrete portion of the Perma-Column column protruding from the ground. A minimum edge distance of $1\frac{1}{2}$ inches (38 mm) must be provided and the holes must be spaced at least $2\frac{1}{2}$ inches (64 mm) apart.

5.0 CONDITIONS OF USE

The Perma-Column columns described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** The columns must be installed in accordance with the applicable code, the approved plans and this report.
- 5.2** Complete plans and calculations demonstrating compliance with this report must be submitted to the code official for approval when required. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.3 The interaction between the soil and the Perma-Column column and the connection between the support column and the Perma-Column column are outside the scope of this report, and must be justified to the satisfaction of the code official.
- 5.4 Use of Perma-Column columns with chemically-treated wood is outside the scope of this report.
- 5.5 Other than as noted in Section 4.0, the Perma-Column columns must not be field modified (e.g. cut, drilled, torched, etc.) in any way.

6.0 EVIDENCE SUBMITTED

- 6.1 Manufacturer’s descriptive literature and installation instructions.
- 6.2 Engineering calculations in accordance with ACI 318 and AISC 360.
- 6.3 Quality documentation in accordance with ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated January 2018.

7.0 IDENTIFICATION

- 7.1 The precast columns bear the name of the report holder (Perma-Column, LLC) and listee (Midwest Perma-Column, Inc.), Model ID, date of manufacture, and the evaluation report number (ESR-4238).

- 7.2 The report holder’s contact information is the following:

PERMA-COLUMN, LLC
400 CAROL ANN LANE
OSSIAN, INDIANA 46777
(260) 622-7190
www.permacolumn.com
sales@permacolumn.com

- 7.3 The Additional Listee’s contact information is the following:

MIDWEST PERMA-COLUMN, INC.
7407 NORTH KICKAPOO-EDWARDS ROAD
EDWARDS, ILLINOIS 61528
(309) 589-7949
www.midwestpermacolumn.com
info@midwestpermacolumn.com

PERMA COLUMN EAST, LLC
POST OFFICE BOX 87
LENHARTSVILLE, PENNSYLVANIA 19534
(610) 562-7161
www.permacolumneast.com
permacolumneast@verizon.net

TABLE 1—COLUMNS^{1,2,3}

| LOAD AND RESISTANCE FACTOR DESIGN (LRFD) | | | | | | | |
|--|-------------------------------|-------------------------------|--------------------------------|------------------------|-----------------------------|-----------------------------|------------------------|
| MODEL ID | WIDTH (in) | DEPTH (in) | LENGTH ⁴ (in) | P _{LRFD} (lb) | M _{LRFD-x} (ft-lb) | M _{LRFD-z} (ft-lb) | T _{LRFD} (lb) |
| PC6300 | 5 ³ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 113100 | 6517 | 6620 | 10320 |
| PC6400 | 6 ⁷ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 140100 | 9217 | 6723 | 9070 |
| PC6600 | 6 ³ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 131100 | 8317 | 6694 | 9360 |
| PC8300 | 5 ³ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 153100 | 9781 | 14545 | 15710 |
| PC8400 | 6 ⁷ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 188900 | 13966 | 14792 | 13590 |
| PC8500 | 8 ³ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 223000 | 17955 | 14945 | 12340 |
| ALLOWABLE STRENGTH DESIGN (ASD) | | | | | | | |
| MODEL ID | WIDTH (in) | DEPTH (in) | LENGTH ⁴ (in) | P _{ASD} (lb) | M _{ASD-x} (ft-lb) | M _{ASD-z} (ft-lb) | T _{ASD} (lb) |
| PC6300 | 5 ³ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 70700 | 4073 | 4137 | 6870 |
| PC6400 | 6 ⁷ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 87600 | 5761 | 4202 | 6030 |
| PC6600 | 6 ³ / ₈ | 5 ³ / ₈ | 59 ³ / ₄ | 82000 | 5198 | 4184 | 6230 |
| PC8300 | 5 ³ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 95700 | 6113 | 9091 | 10450 |
| PC8400 | 6 ⁷ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 118100 | 8729 | 9245 | 9040 |
| PC8500 | 8 ³ / ₈ | 7 ¹ / ₈ | 59 ³ / ₄ | 139400 | 11222 | 9341 | 8210 |

For SI: 1 inch = 25.4 mm, 1 pound = 4.4482 N

¹For biaxial bending: $\frac{m_x}{M_x} + \frac{m_z}{M_z} \leq 1$

²The tabulated values account for combined axial compression load and bending moment load. No reduction in axial compression loads and bending moment loads for combined axial compression and bending moment is required.

³For combined tension loads and bending moment loads: $\frac{t}{T} + \frac{m}{M} \leq 1$

⁴Length is measured from the top of the concrete to the bottom of the concrete.

- P_{LRFD} = Maximum compression/gravity load capacity (ΦP_n) of the column based on Load and Resistance Factor Design (LRFD).
- P_{ASD} = Maximum compression/gravity load capacity (P_n/Ω) of the column based on Allowable Strength Design (ASD).
- M_{LRFD-x} = Maximum moment capacity (ΦM_n) of the column about the x-axis based on LRFD.
- M_{ASD-x} = Maximum moment capacity (M_n/Ω) of the column about the x-axis based on ASD.
- M_{LRFD-z} = Maximum moment capacity (ΦM_n) of the column about the z-axis based on LRFD.
- M_{ASD-z} = Maximum moment capacity (M_n/Ω) of the column about the z-axis based on ASD.
- T_{LRFD} = Maximum tension/wind uplift load capacity (ΦP_n) of the column based on LRFD.
- T_{ASD} = Maximum tension/wind uplift load capacity (P_n/Ω) of the column based on ASD.
- m = Design moment load.
- t = Design tension load.

TABLE 2—SHEAR CAPACITIES¹

| LOAD AND RESISTANCE FACTOR DESIGN (LRFD) | | | | | | | | | | | | |
|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| P (lb) | PC6300 | | PC6400 | | PC6600 | | PC8300 | | PC8400 | | PC8500 | |
| | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) | V _{LRFD-x} (lb) | V _{LRFD-z} (lb) |
| 10000 | 3722 | 3706 | 4610 | 4977 | 4314 | 4556 | 5121 | 4640 | 6386 | 6305 | 7592 | 7878 |
| 9000 | 3668 | 3652 | 4555 | 4918 | 4260 | 4498 | 5063 | 4587 | 6327 | 6247 | 7533 | 7817 |
| 8000 | 3614 | 3598 | 4501 | 4860 | 4205 | 4441 | 5004 | 4534 | 6269 | 6190 | 7475 | 7756 |
| 7000 | 3559 | 3544 | 4447 | 4801 | 4151 | 4384 | 4946 | 4481 | 6210 | 6132 | 7416 | 7695 |
| 6000 | 3505 | 3490 | 4392 | 4742 | 4097 | 4326 | 4887 | 4428 | 6151 | 6074 | 7357 | 7634 |
| 5000 | 3451 | 3436 | 4338 | 4684 | 4042 | 4269 | 4828 | 4375 | 6093 | 6016 | 7299 | 7573 |
| 4000 | 3397 | 3382 | 4284 | 4625 | 3988 | 4212 | 4770 | 4321 | 6034 | 5958 | 7240 | 7513 |
| 3000 | 3342 | 3328 | 4229 | 4566 | 3934 | 4154 | 4711 | 4268 | 5976 | 5900 | 7181 | 7452 |
| 2000 | 3288 | 3274 | 4175 | 4507 | 3879 | 4097 | 4653 | 4215 | 5917 | 5843 | 7123 | 7391 |
| 1000 | 3234 | 3220 | 4120 | 4449 | 3825 | 4039 | 4594 | 4162 | 5858 | 5785 | 7064 | 7330 |
| 0 | 3180 | 3166 | 4066 | 4390 | 3771 | 3982 | 4535 | 4109 | 5800 | 5727 | 7005 | 7269 |
| -1000 | 2963 | 2950 | 3849 | 4155 | 3553 | 3753 | 4301 | 3897 | 5566 | 5495 | 6771 | 7026 |
| -2000 | 2746 | 2734 | 3631 | 3921 | 3336 | 3523 | 4067 | 3684 | 5331 | 5264 | 6536 | 6782 |
| -3000 | 2528 | 2518 | 3414 | 3686 | 3119 | 3294 | 3832 | 3472 | 5097 | 5033 | 6301 | 6539 |
| -4000 | 2311 | 2302 | 3196 | 3451 | 2901 | 3064 | 3598 | 3260 | 4862 | 4801 | 6067 | 6295 |
| -5000 | 2094 | 2086 | 2979 | 3216 | 2684 | 2835 | 3363 | 3047 | 4628 | 4570 | 5832 | 6051 |
| ALLOWABLE STRENGTH DESIGN (ASD) | | | | | | | | | | | | |
| P (lb) | PC6300 | | PC6400 | | PC6600 | | PC8300 | | PC8400 | | PC8500 | |
| | V _{ASD-x} (lb) | V _{ASD-z} (lb) | V _{ASD-x} (lb) | V _{ASD-z} (lb) | V _{ASD-x} (lb) | V _{ASD-z} (lb) | V _{ASD-x} (lb) | V _{ASD-z} (lb) | V _{ASD-x} (lb) | V _{ASD-z} (lb) | V _{ASD-x} (lb) | V _{ASD-z} (lb) |
| 6250 | 2326 | 2316 | 2881 | 3111 | 2696 | 2847 | 3201 | 2900 | 3991 | 3941 | 4745 | 4924 |
| 5625 | 2292 | 2283 | 2847 | 3074 | 2662 | 2812 | 3164 | 2867 | 3954 | 3905 | 4708 | 4886 |
| 5000 | 2259 | 2249 | 2813 | 3037 | 2628 | 2776 | 3128 | 2834 | 3918 | 3869 | 4672 | 4848 |
| 4375 | 2225 | 2215 | 2779 | 3001 | 2594 | 2740 | 3091 | 2800 | 3881 | 3832 | 4635 | 4810 |
| 3750 | 2191 | 2181 | 2745 | 2964 | 2560 | 2704 | 3054 | 2767 | 3845 | 3796 | 4598 | 4771 |
| 3125 | 2157 | 2148 | 2711 | 2927 | 2526 | 2668 | 3018 | 2734 | 3808 | 3760 | 4562 | 4733 |
| 2500 | 2123 | 2114 | 2677 | 2891 | 2492 | 2632 | 2981 | 2701 | 3771 | 3724 | 4525 | 4695 |
| 1875 | 2089 | 2080 | 2643 | 2854 | 2458 | 2596 | 2944 | 2668 | 3735 | 3688 | 4488 | 4657 |
| 1250 | 2055 | 2046 | 2609 | 2817 | 2425 | 2561 | 2908 | 2635 | 3698 | 3652 | 4452 | 4619 |
| 625 | 2021 | 2013 | 2575 | 2780 | 2391 | 2525 | 2871 | 2601 | 3662 | 3615 | 4415 | 4581 |
| 0 | 1987 | 1979 | 2541 | 2744 | 2357 | 2489 | 2835 | 2568 | 3625 | 3579 | 4378 | 4543 |
| -625 | 1852 | 1844 | 2405 | 2597 | 2221 | 2345 | 2688 | 2435 | 3478 | 3435 | 4232 | 4391 |
| -1250 | 1716 | 1709 | 2270 | 2450 | 2085 | 2202 | 2542 | 2303 | 3332 | 3290 | 4085 | 4239 |
| -1875 | 1580 | 1574 | 2134 | 2304 | 1949 | 2058 | 2395 | 2170 | 3186 | 3145 | 3938 | 4087 |
| -2500 | 1445 | 1439 | 1998 | 2157 | 1813 | 1915 | 2249 | 2037 | 3039 | 3001 | 3792 | 3934 |
| -3125 | 1309 | 1303 | 1862 | 2010 | 1677 | 1772 | 2102 | 1905 | 2893 | 2856 | 3645 | 3782 |

For **SI**: 1 inch = 25.4 mm, 1 pound = 4.4482 N

¹The tabulated shear values are for columns with axial compression or axial tension load (ACI 318-14 Eq. 22.5.6.1 and 22.5.7.1 respectively)

- P = Axial design load (negative value represents axial compression, positive value represents axial tension)
- V_{LRFD-x} = Maximum shear capacity (ΦV_n) of the column parallel to the x-axis based on LRFD.
- V_{ASD-x} = Maximum shear capacity (V_n/Ω) of the column parallel to the x-axis based on ASD.
- V_{LRFD-z} = Maximum shear capacity (ΦV_n) of the column parallel to the z-axis based on LRFD.
- V_{ASD-z} = Maximum shear capacity (P_n/Ω) of the column parallel to the z-axis based on ASD.

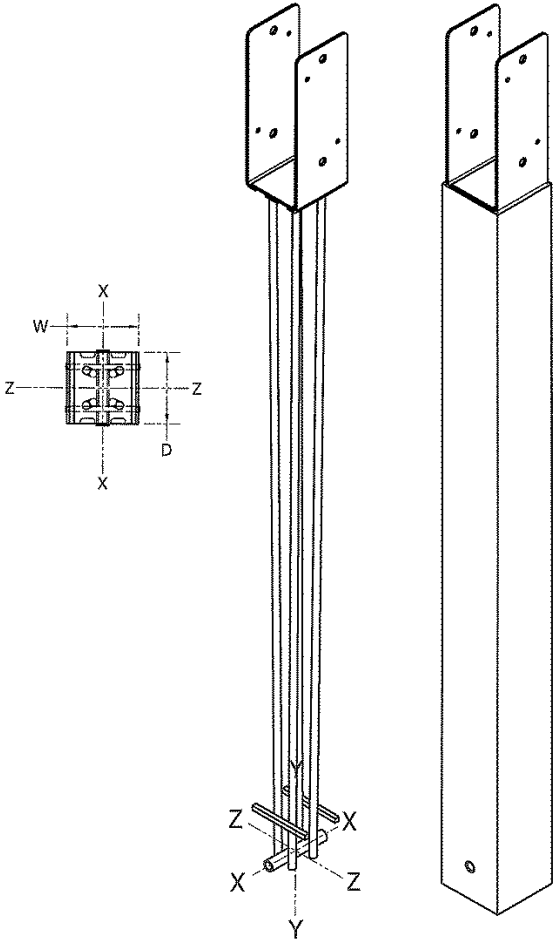


FIGURE 1—PERMA-COLUMN COLUMN

ICC-ES Evaluation Report

ESR-4238 CBC and CRC Supplement

Issued April 2019

This report is subject to renewal April 2020.

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DIVISION: 03 00 00—CONCRETE

Section: 03 48 00—Precast Concrete Specialties

DIVISION: 31 00 00—EARTHWORK

Section: 31 60 00—Special Foundations and Load-Bearing Elements

REPORT HOLDER:

PERMA-COLUMN, LLC

EVALUATION SUBJECT:

PERMA-COLUMN: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500, recognized in ICC-ES master evaluation report ESR-4238, has also been evaluated for compliance with the codes noted below.

Applicable code edition(s):

- 2016 *California Building Code* (CBC)
- 2016 *California Residential Code* (CRC)

2.0 CONCLUSIONS

The Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500, described in Sections 2.0 through 7.0 of the master evaluation report ESR-4238, complies with CBC Chapters 19 and 19A and CRC Section R301.1.3 provided the design and installation are in accordance with the 2015 *International Building Code*® (IBC) provisions noted in the master report and the additional requirements of the CBC Chapters 16, 16A, 17, 17A, 18, 18A, 19 and 19A, as applicable.

3.0 CONDITIONS OF USE

The Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500, described in this evaluation report must comply with the following conditions:

- The ASD capacities described in the master evaluation report must not be increased for seismic or wind load combinations.

This supplement expires concurrently with the master report, issued April 2019.

ICC-ES Evaluation Report

ESR-4238 FBC Supplement

Issued April 2019

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Section: 31 60 00—Special Foundations and Load-Bearing Elements

REPORT HOLDER:

PERMA-COLUMN, LLC

EVALUATION SUBJECT:

PERMA-COLUMN: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500, recognized in ICC-ES master evaluation report ESR-4238, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2017 Florida Building Code—Building
- 2017 Florida Building Code—Residential

2.0 CONCLUSIONS

The Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500, described in Sections 2.0 through 7.0 of the master evaluation report ESR-4238, complies with the *Florida Building Code—Building* and *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2015 *International Building Code*® provisions noted in the master report.

Use of the Perma-Column: PC6300, PC6400, PC6600, PC8300, PC8400, PC8500 has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and *Florida Building Code—Residential*.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report, issued April 2019.