

# CASE

Engineering Inc.

796 Merus Ct  
St. Louis, MO 63026  
OFFICE: 636-349-1600  
Website: [www.caseengineeringinc.com](http://www.caseengineeringinc.com)

## Structural Calculations

Client:

**Solidcore**

Project:

**Union Market**

1326 5<sup>th</sup> Street,  
Northeast Washington, DC 20002

**Project #: SOL-DC-01-25**

**Date: 03/06/2026**

Updated: 05/12/26



05/12/26

## PREFACE

### Background

The 2017 *District of Columbia Construction Codes*, effective May 29, 2020, consist of the following 12 codes:

- **2017 District of Columbia Building Code [2015 edition of the International Building Code®]** published by the International Code Council (ICC) as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12A, Building Code Supplement).<sup>1</sup>
- 2017 *District of Columbia Residential Code* [2015 edition of the *International Residential Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12B, Residential Code Supplement)].
- 2017 *District of Columbia Electrical* [2014 edition of the *National Electrical Code* published by the National Fire Protection Association (NFPA) as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12C, Electrical Code Supplement)].
- 2017 *District of Columbia Fuel Gas Code* [2015 edition of the *International Fuel Gas Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12D, Fuel Gas Code Supplement)].
- 2017 *District of Columbia Mechanical Code* [2015 edition of the *International Mechanical Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12E, Mechanical Code Supplement)].
- 2017 *District of Columbia Plumbing Code* [2015 edition of the *International Plumbing Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12F, Plumbing Code Supplement)].
- 2017 *District of Columbia Property Maintenance Code* [2015 edition of the *International Property Maintenance Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12G, Property Maintenance Code Supplement)].
- 2017 *District of Columbia Fire Code* [2015 edition of the *International Fire Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12H, Fire Code Supplement)].
- 2017 *District of Columbia Energy Conservation Code* [2013 edition of the Energy Standard for Buildings Except Low-Rise Residential Buildings (ANSI/ASHRAE/IES 90.1-2013) published by ASHRAE (formerly known as the American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.) and the 2015 edition of the *International Energy Conservation Code®—Residential Provisions* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12I, Energy Conservation Code Supplement)].
- 2017 *District of Columbia Existing Building Code* [2015 edition of the *International Existing Building Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12J, Existing Building Code Supplement)].
- 2017 *District of Columbia Green Construction Code* [2012 edition of the *International Green Construction Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017* (DCMR 12K, Green Construction Code Supplement)].
- 2017 *District of Columbia Swimming Pool and Spa Code* [2015 edition of the *International Swimming Pool and Spa Code®* published by the ICC as amended by the *District of Columbia Construction Codes Supplement of 2017*, 12 DCMR L, Swimming Pool and Spa Code Supplement)].

1. The District of Columbia Municipal Regulations (DCMR) is the official compilation of rules and regulations issued by government agencies and the Council and is available online at: <http://dcregs.dc.gov/>.

www.hilti.com

Company:		Page:	1
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	Solidcore Union Market, Washington DC Railing BP	Date:	3/6/2026
Fastening point:			

**Specifier's comments:**

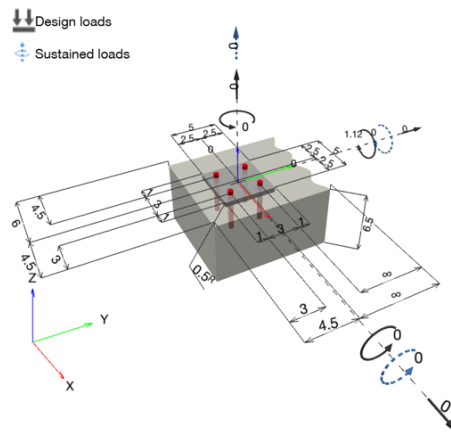
**1 Input data**



<b>Anchor type and diameter:</b>	<b>KWIK-X (Carbon Steel) 1/2 (3) hnom1</b>
Item number:	418073 KH-EZ 1/2"x4" (element) / 2346810 KHC 1/2" SMALL (capsule)
Specification text:	Hilti $\varnothing$ 1/2 in KWIK-X (Carbon Steel) with KH-EZ with KHC 1/2" SMALL with 3.375 in nominal embedment depth per ICC-ES ESR-5065, Hammer drill bit installation per MPII
Effective embedment depth:	$h_{ef,act} = 3.375$ in. ( $h_{ef,limit} = -$ in.), $h_{nom} = 3.375$ in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-5065
Issued   Valid:	10/1/2025   12/1/2025
Proof:	Design Method ACI 318-14 / Chem
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-14 Fig. R.17.5.2.1b)
Stand-off installation:	$e_b = 0.000$ in. (no stand-off); $t = 0.500$ in.
Anchor plate <sup>R</sup> :	$l_x \times l_y \times t = 5.000$ in. x 5.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 4000, $f_c' = 4,000$ psi; $h = 6.500$ in., Temp. short/long: 32/32 °F
<b>Installation:</b>	<b>Hammer drilled hole, Installation condition: Dry</b>
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar

<sup>R</sup> - The anchor calculation is based on a rigid anchor plate assumption.

**Geometry [in.] & Loading [lb, ft.kip]**





## Hilti PROFIS Engineering 3.1.28

www.hilti.com

Company:		Page:	2
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	Solidcore Union Market, Washington DC Railing BP	Date:	3/6/2026
Fastening point:			

### 1.1 Design results

Case	Description	Forces [lb] / Moments [ft.kip]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V <sub>x</sub> = 0; V <sub>y</sub> = 0; M <sub>x</sub> = 0.00000; M <sub>y</sub> = 1.12000; M <sub>z</sub> = 0.00000; N <sub>sus</sub> = 0; M <sub>x,sus</sub> = 0.00000; M <sub>y,sus</sub> = 0.00000;	no	100

$$M_y = 200\text{lbs} \times 3.5\text{ft} \times 1.6 = 1120 \text{ lb-ft} \\ = 1.120 \text{ ft.kip}$$



www.hilti.com

Company:		Page:	3
Address:		Specifier:	
Phone   Fax:		E-Mail:	
Design:	Solidcore Union Market, Washington DC Railing BP	Date:	3/6/2026
Fastening point:			

### 2 Proof I Utilization (Governing Cases)

Loading	Proof	Design values [lb]		Utilization	Status
		Load	Capacity	$\beta_N / \beta_V$ [%]	
Tension	Bond Strength	3,830	3,842	100 / -	OK
Shear	-	-	-	- / -	N/A

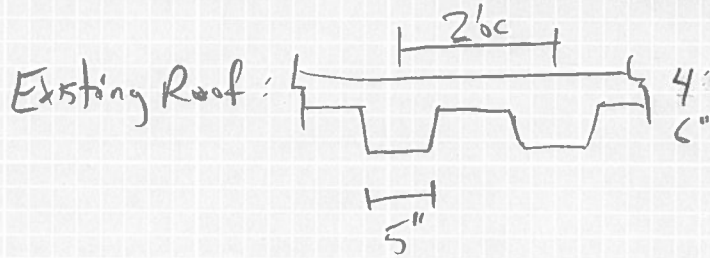
Loading	$\beta_N$	$\beta_V$	$\zeta$	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	-	-	-	-	N/A

### 3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

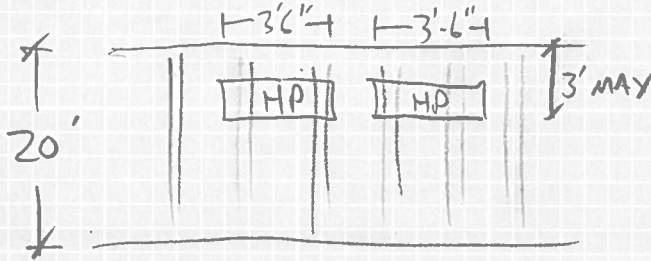
**Fastening meets the design criteria!**

## Heat Pump on Roof Calculation

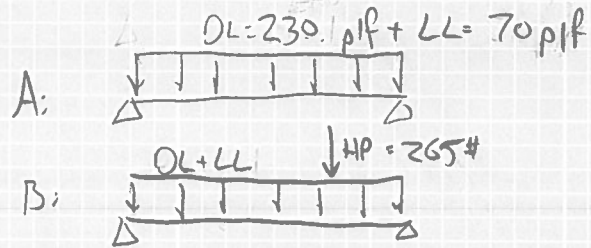


DL = 65.6 psf LL = 20 psf  
Span = 20'

New Heat Pumps: W = 265# over 3'6" width



Use comparison analysis of 3'6" wide strip of roof



$$M_A = \frac{wl^2}{8} = 15 \text{ k-ft}$$

$$M_B = M_A + \frac{Pab}{l} = 15.67 \text{ k-ft}$$

$$\frac{M_B}{M_A} = 1.045 < 5\% \text{ increase}$$

OK

# **CASE**

**Engineering Inc.**

**Office: 636-349-1600**

**Website: [www.caseengineeringinc.com](http://www.caseengineeringinc.com)**