# DESIGN CALCULATIONS

FOR

# CIRCLE K #9831
# PANELS AT FUEL CANOPY

**US HWY 90 & Centurion Ct – Lake City**

**GENERAL NOTES:**

1. Design is in accordance with the Florida Building Code 7th Edition (2020) for use within and outside the High Velocity Hurricane Zone (HVHZ).
2. Wind loads have been calculated per the requirements of ASCE 7-16 as shown herein.
3. These engineering calculations pertain only to the structural integrity of those systems, components, and/or other construction explicitly specified herein and/or in accompanying engineering drawings. The existing host structure (if any) is assumed to be in good condition, capable of supporting the loaded system, subject to building department approval. No warranty, either expressed or implied, is contained herein.
4. System components shall be as noted herein. All references to named components and installation shall conform to manufacturer's or industry specifications as summarized herein.
5. Where site conditions deviate from those noted herein, revisions may be required or a separate site-specific engineering evaluation performed.
6. Aluminum components in contact with steel or embedded in concrete shall be protected as prescribed in the 2015 Aluminum Design Manual, Part 1. Steel components in contact with, but not encased in, concrete shall be coated, painted, or otherwise protected against corrosion.
7. Engineer seal affixed hereto validates structural design as shown only. Use of this specification by contractor, et. Al, indemnifies and saves harmless this engineer for all costs & damages including legal fees & apellate fees resulting from deviation from this design.

This document has been digitally signed and sealed by Christian Langley, PE on the date noted in this digital signature. Printed copies of this document are not considered signed & sealed, & the signature must be verified on any electronic copies.
Serial: 4A 49 8F 53 22 18 30 0D 22 9D 96 67

Digitally signed by Christian Langley
Date: 2022.10.10 22:03:02 -04'00'

**Index:**



Engineer's signature and seal valid for pages 1 through 3

CHRISTIAN LANGLEY LICENSE No. 67382 STATE OF FLORIDA PROFESSIONAL ENGINEER

Oct 10 2022

Christian Langley PE # 67382
**Easy Seals** Cert Auth # 31124

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# ASCE 7-16 Design Wind Loads

## WALL-MOUNTED SIGNS

### Building Specs

| | | |
|---|---|---|
| V = | 130 mph | *Basic wind speed (Vult)* |
| Exposure | C | |

ASD Load Combo Coeff: 0.6

### Calculations

| | | |
|---|---|---|
| α = | 9.5 | *3-sec gust speed power law exponent* |
| $z_g$ = | 900' | *Nominal ht. of atmos. boundary layer* |
| Gcpi = | 0 | *Internal pressure coeff* |

| | | |
|---|---|---|
| Kd = | 0.85 | *Directionality factor* |
| Kzt = | 1.0 | *Topographic factor* |
| Ke = | 1.0 | *Ground elevation factor* |
| A = | 10 sq ft | *Tributary area* |

**130 mph - Exp "C"**
**WALL-MOUNTED SIGNS**

| SIGN HEIGHT | ASD WIND PRESSURES CENTER (Zone 4) | CORNER (Zone 5) | Kh = Kz | $q_z$ | GCp (4) | GCp (5) |
|---|---|---|---|---|---|---|
| 15 ft | **20.6 psf** | **26.2 psf** | 0.85 | 18.7 | -1.10 | -1.40 |
| 20 ft | **21.9 psf** | **27.9 psf** | 0.90 | 19.9 | -1.10 | -1.40 |
| 25 ft | **22.9 psf** | **29.2 psf** | 0.95 | 20.9 | -1.10 | -1.40 |
| 30 ft | **23.8 psf** | **30.3 psf** | 0.98 | 21.7 | -1.10 | -1.40 |
| 35 ft | **24.6 psf** | **31.3 psf** | 1.01 | 22.4 | -1.10 | -1.40 |
| 40 ft | **25.3 psf** | **32.2 psf** | 1.04 | 23.0 | -1.10 | -1.40 |
| 45 ft | **26.0 psf** | **33.0 psf** | 1.07 | 23.6 | -1.10 | -1.40 |
| 50 ft | **26.5 psf** | **33.8 psf** | 1.09 | 24.1 | -1.10 | -1.40 |
| 55 ft | **27.1 psf** | **34.5 psf** | 1.12 | 24.6 | -1.10 | -1.40 |
| 60 ft | **27.6 psf** | **35.1 psf** | 1.14 | 25.1 | -1.10 | -1.40 |
| 70 ft | **23.3 psf** | **46.6 psf** | 1.17 | 25.9 | -0.90 | -1.80 |
| 80 ft | **24.0 psf** | **48.0 psf** | 1.21 | 26.6 | -0.90 | -1.80 |
| 90 ft | **24.6 psf** | **49.2 psf** | 1.24 | 27.3 | -0.90 | -1.80 |
| 100 ft | **25.1 psf** | **50.3 psf** | 1.27 | 27.9 | -0.90 | -1.80 |
| 110 ft | **25.6 psf** | **51.3 psf** | 1.29 | 28.5 | -0.90 | -1.80 |
| 120 ft | **26.1 psf** | **52.2 psf** | 1.32 | 29.0 | -0.90 | -1.80 |
| 130 ft | **26.6 psf** | **53.1 psf** | 1.34 | 29.5 | -0.90 | -1.80 |
| 140 ft | **27.0 psf** | **54.0 psf** | 1.36 | 30.0 | -0.90 | -1.80 |
| 150 ft | **27.4 psf** | **54.7 psf** | 1.38 | 30.4 | -0.90 | -1.80 |
| 175 ft | **28.3 psf** | **56.6 psf** | 1.42 | 31.4 | -0.90 | -1.80 |
| 200 ft | **29.1 psf** | **58.2 psf** | 1.46 | 32.3 | -0.90 | -1.80 |
| 250 ft | **30.5 psf** | **61.0 psf** | 1.53 | 33.9 | -0.90 | -1.80 |

# Wall Sign Anchor Design

## Structure Dimensions & Loading

Design wind pressure: **P = 30.3 psf**

Sign type: Raceway
Sign size: h = 36.0 inches (height)

Wall material: Metal — Steel studs or extrusions/shapes
Anchor type/size: #14 SMS
Ref: Min 18ga studs (grd 33) or 0.090" 6063-T6
Min Embedment: Full
Min edge dist: 0.75"

Anchor tensile capacity: **Tcap = 152.0 lb** (per anchor)

## Check Anchors for Pullout

| | | | | |
|---|---|---|---|---|
| Total Reaction: | Rt = | 91 | lb/ft | ... = P*h (along raceway) |
| Anchor spacing req'd | s = | 40.1 | in O.C. | ... = (2*cap)/Rt |

**Pairs of anchors at 40 inches on center (max)**
3.3 feet on center

**OK, use anchors at 40" O.C. max along top & bottom.**