VLMK CONSULTING ENGINEERS
3933 SW Kelly Avenue • Portland • OR • 97239-4393

P 503.222.4453
F 503.248.9263
E vlmk@vlmk.com
W www.vlmk.com

STRUCTURAL CALCULATIONS

for

CENTRAL EASTSIDE BUSINESS CENTER

STOREFRONT ATTACHMENT

2502 SE 8th Avenue
Portland, Oregon 97202

for

RIVER CITY GLASS

12432 SE Capps Road
Clackamas, Oregon 97015

REGISTERED PROFESSIONAL ENGINEER
65684PE
OREGON
JULY 12, 2005
KEN D. RUST JR.
02/01/13
EXPIRES: 12/31/20 14

Prepared By: Ken Rust, P.E.

VLMK Job Number: 20130059

January 2013

Central Eastside Business Center
STOREFRONT ATTACHMENT

2502 SE 8th Avenue
Portland, Oregon 97202

VLMK JOB NO. 20130059

STRUCTURAL CALCULATIONS FOR BUILDING PERMIT

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DESCRIPTION OF STRUCTURAL SYSTEM

The Central Eastside Business Center Storefront Attachment project consists of determining the anchorage of exterior storefront by others to different materials due to wind loads. Storefront design is not included.

DESIGN CRITERIA

CODES:

2010 Oregon Structural Specialty Code (Based on the 2009 International Building Code)

DESIGN LOADS:

Wind:

Basic Wind Speed (3-second gust)	95 mph
Wind Importance Factor, I_w	$I_w = 1.0$
Occupancy Category	II
Wind Exposure	B
Internal Pressure Coefficient	$GC_{pi} = +/- 0.18$

MATERIALS

Drilled Anchors:

Concrete Screw Anchors	Simpson Titen HD Screw Anchor	ICC ESR-2713
Masonry Screw Anchors	Simpson Titen HD Screw Anchor	ICC ESR-1056

SPECIAL INSPECTIONS

	COMMENTS	DURATION	INSPECTION AGENCY
CONCRETE:			
Drilled-in Screw Anchors in Concrete	per ICC report	C	Testing Lab
MASONRY:			
Drilled-in Screw Anchors in Masonry	per ICC report	C	Testing Lab

Special Inspection Notes:

Duration refers to time and frequency of inspection for the portions of work indicated above.

C = Continuous inspection in which the special inspector is on site at all times observing the work requiring special inspection.

P = Periodic inspection in which the special inspector in on site at time intervals necessary to confirm that the work requiring special inspection is in conformance with approved permit drawings and specifications.

The inspection agencies are as follows:
Engineer: VLMK Consulting Engineers
Testing Lab: To Be Determined

Owner shall hire Special Inspector at owner's expense. The contractor shall notify the special inspector when work is ready for inspection and maintain accessibility of work until it is reported to be in conformance and approved by the Building Official.

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Job	CEBC Storefront
Job No.	20130059
Date	01/13
Sheet No.	C-1

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Wind Loads - Components and Cladding

Based on the 2009 International Building Code and ASCE 7-05, 6.4 (Method 1 - Simplified Procedure)

	B	Exposure Category [Section 6.5.6.3]
K_{zt} =	1.00	Topographic Factor [Figure 6-4]
I =	1.00	Importance Factor [Table 6-1]
Roof Slope =	0 to 7	Degrees
V =	95 mph	Basic Wind Speed 3-Second Gust [Figure 6-1]
Effective Area =	50 sf	Span Length x Effective Width (Not Less Than Span Length/3)

Per ASCE 7-05, 6.4.2.2 and Figure 6-3

Horizontal Loads

Height (ft)	Adjustment λ	Wall - Interior Zone 4 (psf)		Wall - End Zone 5 (psf)	
15	1.00	14.6	-16.0	14.6	-18.4
20	1.00	14.6	-16.0	14.6	-18.4
25	1.00	14.6	-16.0	14.6	-18.4
30	1.00	14.6	-16.0	14.6	-18.4
35	1.05	15.3	-16.7	15.3	-19.3
40	1.09	15.9	-17.4	15.9	-20.1
45	1.12	16.3	-17.9	16.3	-20.6
50	1.16	16.9	-18.5	16.9	-21.3
55	1.19	17.3	-19.0	17.3	-21.9
60	1.22	17.8	-19.5	17.8	-22.4

Vertical Loads

Height (ft)	Adjustment λ	Roof - Interior Zone 1 (psf)		Roof - End Zone 2 (psf)		Roof - Corner Zone 3 (psf)	
15	1.00	5.7	-15.3	5.7	-20.6	5.7	-24.7
20	1.00	5.7	-15.3	5.7	-20.6	5.7	-24.7
25	1.00	5.7	-15.3	5.7	-20.6	5.7	-24.7
30	1.00	5.7	-15.3	5.7	-20.6	5.7	-24.7
35	1.05	6.0	-16.1	6.0	-21.6	6.0	-25.9
40	1.09	6.2	-16.7	6.2	-22.4	6.2	-26.9
45	1.12	6.4	-17.1	6.4	-23.0	6.4	-27.7
50	1.16	6.6	-17.7	6.6	-23.8	6.6	-28.7
55	1.19	6.8	-18.2	6.8	-24.5	6.8	-29.4
60	1.22	7.0	-18.7	7.0	-25.1	7.0	-30.1

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Job: CEBC STOREFRONT
Client: RIVERCITY
Job No.: 20130059 By: KDR
Date: 02/13 Sheet No.: C-2

STOREFRONT ANCHORAGE:

MULLION REACTION:

$P_W = 16.0\ PSF\ (4')(5') = 320\#$ MAXIMUM

[SEE SIMPSON OUTPUT]

$V_u = 320\#(1.6) = 512\#$

USE 3/8" DIA x 3" EMBED INTO CONCRETE/CMU

$V_{ALLOW} = 160\#$ (CMU)

USE (2) 1/2" DIA x 4 1/2" EMBED SCREW ANCHORS INTO CMU

$V = 160\#(2) = 320\#$ (OK)

Anchor Calculations

Anchor Selector (Version 4.11.0.0)

Job Name : CEBC Storefront

Date/Time : 2/1/2013 12:58:57 PM

Calculation Summary - ACI 318 Appendix D For Cracked Concrete per ACI 318-08

Anchor

Anchor	Steel	Code Report	# of Anchors	Embedment Depth (in)	Category
3/8" Titen HD	N/A	ICC-ES ESR-2713	1	3	1

Concrete

Concrete	Cracked	f'_c(psi)	$\Psi_{c,V}$
Normal weight	Yes	3000.0	1.00

Condition	Thickness (in)	Suppl. Edge Reinforcement
B tension and shear	12	No

Anchor Layout Dimensions

c_{x1} (in)	c_{x2} (in)	c_{y1} (in)	c_{y2} (in)
48	48	48	3

Factored Loads

N_{ua} (lb)	V_{uax} (lb)	V_{uay} (lb)	M_{ux} (lb*ft)	M_{uy} (lb*ft)
0	0	512	0	0

e_x(in)	e_y(in)	Mod/high seismic	Apply entire shear @ front row
0	0	No	No

Individual Anchor Tension Loads

N_{ua1} (lb)
0.00

e'_{Nx}(in)	e'_{Ny}(in)
0.00	0.00

Individual Anchor Shear Loads

V_{ua1} (lb)
512.00

e'_{Vx}(in)	e'_{Vy}(in)
0.00	0.00

Tension Strengths

Steel (Φ = 0.65)

N_{sa}(lb)	ΦN_{sa}(lb)	N_{ua}(lb)	$N_{ua}/\Phi N_{sa}$
10890	7078.50	0.00	0.0000

Concrete Breakout (Φ = 0.65)

N_{cb}(lb)	ΦN_{cb}(lb)	N_{ua}(lb)	$N_{ua}/\Phi N_{cb}$
2811.66	1827.58	0.00	0.0000

Pullout (Φ = 0.65)

N_{pn}(lb)	ΦN_{pn}(lb)	N_{ua}(lb)	$N_{ua}/\Phi N_{pn}$
2423.12	1575.03	0.00	0.0000

Side-Face Blowout does not apply

Shear Strengths

Steel (Φ = 0.60)

V_{sa}(lb)	ΦV_{sa} (lb)	V_{ua}(lb)	$V_{ua}/\Phi V_{sa}$
4460	2676.00	512.00	0.1913

Concrete Breakout (case 1) (Φ = 0.70)

V_{cbx}(lb)	ΦV_{cbx}(lb)	V_{uax}(lb)	$V_{uax}/\Phi V_{cbx}$
11548.58	8084.01	0.00	0.0000

V_{cby}(lb)	ΦV_{cby}(lb)	V_{uay}(lb)	$V_{uay}/\Phi V_{cby}$	$V_{ua}/\Phi V_{cb}$
1736.36	1215.45	512.00	0.4212	0.4212

Concrete Breakout (case 2) does not apply to single anchor layout

Concrete Breakout (case 3) (Φ = 0.70)

c_{x1} edge

V_{cby}(lb)	ΦV_{cby}(lb)	V_{uay}(lb)	$V_{uay}/\Phi V_{cby}$
32135.18	22494.63	512.00	0.0228

c_{y1} edge

V_{cbx}(lb)	ΦV_{cbx}(lb)	V_{uax}(lb)	$V_{uax}/\Phi V_{cbx}$
60489.76	42342.83	0.00	0.0000

c_{x2} edge

V_{cby}(lb)	ΦV_{cby}(lb)	V_{uay}(lb)	$V_{uay}/\Phi V_{cby}$
32135.18	22494.63	512.00	0.0228

c_{y2} edge

V_{cbx}(lb)	ΦV_{cbx}(lb)	V_{uax}(lb)	$V_{uax}/\Phi V_{cbx}$	$V_{ua}/\Phi V_{cb}$
3472.71	2430.90	0.00	0.0000	0.0228

Pryout (Φ = 0.70)

V_{cp}(lb)	ΦV_{cp}(lb)	V_{uax}(lb)	$V_{uax}/\Phi V_{cp}$
2811.66	1968.16	0	0.0000

V_{cp}(lb)	ΦV_{cp}(lb)	V_{uay}(lb)	$V_{uay}/\Phi V_{cp}$	$V_{ua}/\Phi V_{cp}$
2811.66	1968.16	512	0.2601	0.2601

Interaction check

T.Max(0) <= 0.2 and V.Max(0.42) <= 1.0 [Sec D.7.2]

Interaction check: PASS

Use 3/8" diameter Titen HD anchor(s) with 3 in. embedment