



January 12, 2015

Ms. Maurine Irvine-Trujillo
Ryka Communications, LLC
918 S. Horton St., Ste 1002
Seattle, WA 98134
(206) 523-1941

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
btwo@btgrp.com

Subject: **Structural Analysis**

Carrier Designation: **Carrier Site Number:** 11462-A
Carrier Site Name: Carillon PT

Ryka Communication, Designation: **Site Number:** SB13
Site Name: Carillon PT

Engineering Firm Designation: **B+T Group Project Number:** 90140.001.02a

Site Data: **2000 Carillon Point, Kirkland, WA, King County**
Latitude 47.65528°, Longitude -122.20611°
Rooftop Mounted Antennas at 65'

Dear Maurine Irvine-Trujillo,

B+T Group is pleased to submit this “**Structural Analysis**” to determine the structural integrity of the above mentioned rooftop supported telecommunications site.

The purpose of the analysis is to determine acceptability of the existing mounts and building to sufficiently support the telecommunications equipment presented in this report. Based on our analysis we have determined the suitability for the structure and foundation, under the following load case, to be:

Existing + Proposed Equipment

Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

Sufficient Capacity

The analysis has been performed in accordance with the Seattle Building Code, the ASCE 7 standard, and the 2012 IBC based upon a wind speed of 110 mph 3-second gust.

All equipment proposed in this report shall be installed in accordance with the drawings for the determined available structural capacity to be effective.

We at B+T Group appreciate the opportunity of providing our continuing professional services to you and Ryka communications. If you have any questions or need further assistance on this or any other projects please give us a call.

Respectfully submitted by:
B+T Engineering, Inc.

Josh Griffin
Project Engineer

John W. Kelly, P.E., S.E.
Vice President



1/12/15

TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Antenna and Cable Information

Table 2 - Existing and Reserved Antenna and Cable Information

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

4.1) Recommendations

5) APPENDIX A

1) INTRODUCTION

The proposed telecommunications equipment will be located on an existing penthouse located on the building rooftop. There are existing telecommunications antennas mounted on the penthouse wall. The proposed loading consists of replacing (3) antennas and adding (3) new antennas and their associated equipment.

2) ANALYSIS CRITERIA

The structural analysis was performed for this structure in accordance with the 2012 International Building Code and the ASCE 7 Design Standard. The TIA-222-F and TIA-222-G apply to telecommunications towers. Although telecommunications equipment is present, this structure is primarily a building and is more appropriately assessed with the ASCE 7 Standard. The design wind speed for this location is 110 mph 3-second gust.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Type	Note
65	3	Alcatel Lucent	3JR52703AAAA	--	--	Equipment to be Added

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Type	Note
65	5	Kathrein	742-264	12 2 1	7/8" DC Fiber	Equipment to Remain
	1	Powerwave	7721			
	1	Kathrein	739 684			
	6	--	LGP 21401 (TMA)			
	6	Nokia	MHA CS72993.08 (TMA)			
	3	--	RRH2x40W-07L (external)			
	1	KWM	AM-X-CD-16-65-00T-RET	2	7/8"	Equipment to be Removed
	1	Kathrein	80010764			
	1	Powerwave	P65-17-XLH-RR			

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
Photos	--	Date: 04/20/2014	B+T Group
Existing Loading	RFDS 6.0	Date: 12/23/2014	Ryka
Proposed Loading			
Structural Analysis	By CG Engineering	Date: 05/23/2002	Ryka
CD's	By LDC	Date: 12/28/2010	Ryka

3.1) Analysis Method

This building is a substantial structure and currently supports telecommunications equipment. Three antennas will be removed and replaced with (3) new antennas will be added. The new antennas will be attached to the existing penthouse wall. There is no increase in exposed wind area since all the antennas are on the face of the penthouse. The increase in seismic load is negligible when compared with the overall demand of the structure. Calculations have been provided for the mounting of the antennas.

3.2) Assumptions

- 1) The structure was built in accordance with the designer's specifications.
- 2) The structure has been maintained and is free of damage.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.
- 4) Existing loading was assumed based on final proposed loading.

This analysis may be affected if any assumptions are not valid or have been made in error. B+T Group should be notified to determine the effect on the structural integrity of the structure.

4) ANALYSIS RESULTS

4.1) Recommendations

- 1) The support system for the telecommunications equipment is structurally sufficient at this site.

APPENDIX A
ADDITIONAL CALCULATIONS

PROJECT	SB13 - CARILLON PT	JDG
SUBJECT	DESIGN CRITERIA	
DATE	07/11/14	PAGE OF



DESIGN CRITERIA

Code : International Building Code , 2012 Edition
ASCE 7-10

SEISMIC

I_e : 1.00
Occupancy Category : II
Site Class : D
 S_S : 1.27 g
 S_1 : 0.488 g
 S_{DS} : 0.847 g
 S_{D1} : 0.492 g
Seismic Design Category : D
 a_p : 1
 R_p : 2.5

$$F_p = 0.4a_p S_{DS} W_p (1 + 2z/h) / (R_p / I_p) : 0.407 W_p$$

$$F_p = 1.6 S_{DS} W_p I_p : 1.355 W_p$$

$$F_p = 0.3 S_{DS} W_p I_p : 0.254 W_p$$

$$F_p : \mathbf{0.407 W_p}$$

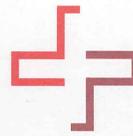
WIND

V : 110 mph
Exposure : B
Risk Category : II
Height : 65.0 ft
 K_z : 0.874
Topo. Factor, K_{zt} : 1.00
Direct. Factor, K_d : 0.95
 (GC_r) : 1.9

$$q_h = 0.00256 (K_z K_{zt} K_d V^2) : \mathbf{25.7} \text{ psf}$$

$$F_h = q_h (GC_r) A_f : \mathbf{48.85 A_f} \text{ lbs}$$

PROJECT	SB13-CARILTON PT		
SUBJECT	ROOFTOP ANALYSIS		
DATE	07/11/14	PAGE	OF



B+T GRP

1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

ANTENNA MOUNTING



DETAIL A

$$V = 169 \text{ LB}$$

$$H = 322 \text{ LB}$$

MT-221 COMMSCOPE MOUNT:

REF. ATTACHED RATING LETTER PROVIDED BY COMMSCOPE

MT-221 MOUNT IS RATED FOR 150 MPH WIND @ 200' AGL

∴ MT-221 MOUNT IS ACCEPTABLE

HILTI ADHESIVE ANCHORS:

LOAD PER ANCHOR

$$V_z = 169/8 = 21 \text{ LB}$$

$$V_x = 322/8 = 41 \text{ LB}$$

$$V_{\text{ALLOW.}} = 1045(0.52) = 543 \text{ LB}$$

$$\left(\frac{21}{543} + \frac{41}{543} \right) = 0.11 < 1.0 \text{ OK}$$

(8) $\frac{3}{8}$ " ϕ THREADED RODS W/ HILTI HIT-HY 70 SYSTEM IS ACCEPTABLE
(3/8" MIN. EMBED)



July 12, 2011

Tom Palmer
Andrew Corporation
33 Union City Road, Unit 2C
Prospect, CT 06712

Subject: MT-221L Adjustable Hollow Wall Mount with 4 1/2" OD Pipe Mount

Dear Mr. Palmer,

Per your request, we have performed a structural analysis for the adjustable antenna wall mount referenced above. It is our understanding this kit consists of the following Andrew Corporation parts:

1. (2) – MT221L Adjustable Hollow Wall Mount Brackets w/ 5/8" Ø A36 U-Bolts (1 per bracket)
2. (1) – 4 1/2" OD x 0.237w x 12' long A53 Gr. B Pipe

The analysis was performed using the following design criteria and loading conditions:

Design Standards: ANSI/TIA 222-G, 2006 IBC, ASCE/SEI 7-05, 2007 FBC w/2009 Suppl.
 Design Loading: (1) – 4' HP Microwave, C.L. @ 200' ± AGL (Arrangement 2)
 Design Wind: 150 mph (3-Sec Gust), Exp. D per 2009 IBC, ASCE/SEI 7-05,
 & 2007 FBC w/2009 Suppl.
 150 mph (3-Sec Gust), Exp. D, SC III, Topo. 1 per ANSI/TIA 222-G

Materials: Pipes: ASTM A53, Gr. B ($F_y \geq 35$ ksi)
 U-Bolts: ASTM A36 ($F_y \geq 36$ ksi)
 Plates: ASTM A36 ($F_y \geq 36$ ksi)

Based on our analysis, we have determined the antenna wall mounting kit is structurally adequate for the loading and conditions shown. The analysis assumes a vertical separation between the wall brackets of 10', and the antenna attachment centered between the upper and lower wall brackets.

The maximum anticipated reactions at each wall bracket are as follows:

Horizontal Compression / Tension: 1,150 lbs.
 Horizontal Shear: 1,150 lbs.
 Vertical Shear: 150 lbs.

The maximum anticipated tension on any single anchor is approximately 1,360 lbs.

If you have any questions relating to the above information, please contact me at (503) 587-0101.

Sincerely,

Adrian McJunkin, PE
President

PO Box 7293 • Salem, OR 97303 • 503.587.0101 • fax 503.316.1864
www.wscengineering.com

