ENVIRONMENT CANADA
MAINTENANCE INSPECTION

18m (60 ft) KNOCK-DOWN
SELF-SUPPORT TOWER

XMB Marion Bridge, NS

Prepared by:

TILLER
Tiller Engineering Inc.
119 Springdale St.
St. John's, NL, Canada

Prepared for:

Environment Canada
National Radar Network Support
4905 Dufferin Street
Toronto, ON
M3H 5T4

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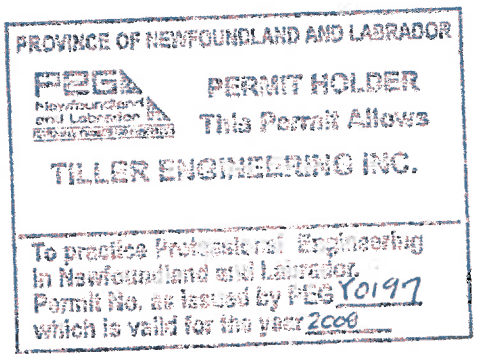


1.0 SITE INFORMATION

Site Name:	XMB Marion Bridge Radar Site	
Tower Owner:	Environment Canada	
Coordinates:	Latitude:	N 45° 56′ 58.4″
	Longitude:	W 60° 12′ 19.5″
Tower Structure:	Height:	18 m (60 ft.)
	Construction Type:	4 Leg Self-support, Knock-down
	Panel Height:	Varies
	Face Width:	Varies
	Manufacturer:	Curtis Wright
Site Access:	2WD	
Inspected by:	Joe Parsons & Keith Martin	
Personnel on site:	Doug Greer and Steve Collins of Environment Canada	
Weather Conditions:	1.5ºC, 13 mph, Sunny	
Date of Inspection:	March 04, 2008	
Project Manager:	Leonard Szarko, P. Eng.	
Report Preparation:	Joe Parsons	
Report Review:	Jonathan E. Walsh, P. Eng.	
Report Approved By:	Jonathan E. Walsh, P. Eng.	

2.0 SCOPE

Tiller Engineering Inc. was retained by Environment Canada to perform tower maintenance inspections as per Appendix D of CSA S37-01 Antennas, Towers, and Antenna-Supporting Structures.

3.0 INSPECTION OBSERVATIONS

3.1 GENERAL SITE

A. General: The compound was clear of brush and debris. See Appendix A, Photo #6, #8, #9, and #10.

B. Access: The tower access road was snow covered at the time of inspection but appeared satisfactory. The site parking was clear and appeared satisfactory. See Appendix A, Photo #1.

C. Fencing: The fence appears satisfactory. See Appendix A, Photo #1, #10, and #16.

The north corner of fence was approximately one foot above ground level. See Appendix A, Photo #10.

The fence had the barbed wire removed.

Grounding is broken from corner post on north side.

There is no grounding installed on any fence post other than corners.

There is no grounding installed on the fence gates.

D. Security: The anti-climb installed at the base of the tower appears satisfactory. See Appendix A, Photo #9.

E. Due Diligence: There is no site warning signage installed on tower compound, fence or tower. Warning sign on building door is satisfactory.

3.2 TOWER STRUCTURE

A. Tower Members: There is a bent member on face 1-2 at 25 feet.

Sub-horizontal disconnected on one side at 55 feet on face 1-2. See Appendix A, Photo #28.

B. Connections: The splice connections appear satisfactory. The sub-horizontals at 50 feet off leg three have stainless steel bolts installed with galvanized nuts. See Appendix A, Photo #26.

C. Foundations: The four foundations appear satisfactory.

3.3 STAIRS AND FALL ARREST SYSTEM

A. Stairs: The integral stairs and platforms appear satisfactory. See Appendix A, Photo #5.

The safety rail exhibits minor to moderate surface corrosion at the top level and at various welds throughout the tower. See Appendix A, Photos #20 and #23.

B. Fall Arrest System: The tower is not equipped with a fall arrest system. The stairs and platforms are equipped with a hand rail. See Appendix A, Photo #5.

3.4 ANTENNAS AND TRANSMISSION LINES

A. Antennas: The 5.5m radome appears satisfactory. See Appendix A, Photo #3.

B. Transmission Line: The existing hard line appears satisfactory.

C. Antenna Building The metal siding is faded and flaking.

The sweep at the bottom of the door is broken. See Appendix A, Photo #21.

Antenna Schedule:			
Ant #	**Antenna Type and Model**	**TX Line**	**Azimuth**
1	Andrew 73217 s/n W7311	Hard Line	Omni
Comments:			

3.5 WAVEGUIDE BRIDGE, PORT AND CABLE TRAYS

A. Waveguide Bridge: The waveguide bridge appears satisfactory. See Appendix A, Photo #6.

B. Waveguide Port: The waveguide port appears satisfactory.

The seal is broken around the PVC pipe entering building. See Appendix A, Photo #4.

3.6 GROUNDING

A. Tower: The tower grounding appears satisfactory. See Appendix A, Photo #2.

B. Waveguide Post: The waveguide posts are not grounded. See Appendix A, Photo #7.

C. Equipment Shelter: The equipment shelter's grounding appears satisfactory.

3.7 OBSTRUCTION MARKING

A. Lighting: The lighting summary is as follows:

Light	Type/Make	Location	Elev. m (ft.)	Ice Shield (Y/N)	Teck Line (in)
1	D.O.L.	Top	20(65.6)	N/A	Unknown
Comments: D.O.L's were on photo cell located on radome.					
2	Stairs access lighting	3 places		No	In conduit
Comments: Light were not working at time of inspection.					

B. Paint: The tower paint is faded and flaking. See Appendix A, Photo #1.

C. Lighting electrical: The first level tower access light is broken clear of its connection. See Appendix A, Photo #13.

The second level tower access light exhibits heavy corrosion on back mounting bracket. See Appendix A, Photo #14.

3.8 GALVANIZING

A. General: Bolts throughout the tower exhibit minor surface corrosion. See Appendix A, Photo #22.

The welds on the plates connecting the tower to the building exhibits moderate surface corrosion. See Appendix A, Photo #18.

The connection plate for the diagonals to the horizontal on face 4-1 at top level had the holes burned through. This area exhibits moderate surface

corrosion. See Appendix A, Photo #27.

The diagonal welded to the leg plate on leg 4 at 60 feet exhibits moderate surface corrosion. See Appendix A, Photo #24.

3.9 EQUIPMENT SHELTER

A. Condition:

The buildings soffit above the waveguide port is out of the siding trim. See Appendix A, Photo # 4.

There is a damaged piece of siding on the East side of the building. See Appendix A, Photo #29.

The air conditioning control box support exhibits moderate surface corrosion. See Appendix A, Photo #19.

B. Electrical:

The exterior power outlets are not equipped with GFI plugs. See Appendix A, Photo #11.

3.10 ADDITIONAL COMMENTS

- The propane tank is un-protected from falling ice. See Appendix A, Photo #16.
- The winch and winch mounting bolts exhibits moderate surface corrosion. See Appendix A, Photo #25.

4.0 ALIGNMENT & TWIST

A. Tower Alignment:

The tower alignment is within allowable tolerances.

B. Tower Twist:

The tower twist is within allowable tolerances.

5.0 CONCLUSIONS AND RECOMMENDATIONS:

Item	Description	Priority
1	Raise level of ground on back corner to bottom of fence.	B
2	Install warning signs around perimeter of site, on buildings, and tower.	C
3	Wire brush and cold galvanize surface corrosion on bolts, welds, handrails, and steel throughout tower.	C
4	Re-attach tower access light at level one.	C
5	Replace tower access light at level two.	C
6	Clean and repaint building at top of tower.	C
7	Replace sweep on exterior door to building at top of tower.	C
8	Wire brush and paint corroded air conditioning control box support.	C
9	Install GFI approved plugs in all exterior outlets.	C
10	Relocate photocell to a more accessible location.	C
11	Re-lamp access lighting on tower and building.	C
12	Reseal PVC pipe at waveguide port.	C
13	Install ice protection over propane tanks.	C
14	Replace damaged piece of siding on building	C
15	Install grounding on all waveguide posts.	C
16	Install grounding on every second fence post.	C
17	Install grounding from fence gates to fence posts.	C
18	Replace stainless steel bolts at 50 feet with galvanized A325 structural bolts of proper size and dimensions.	C
19	Wire brush and repaint winch and winch supports.	C
20	Install additional clips on teck cable on lower level stairs.	C
21	Remove disconnected steel on face 1-2 at 55 feet.	C

Priority Rating System A Priority Rating System of A, B, C, D or E is to be placed on each conclusion. Recommendation, or item identified in the tower inspection report as requiring attention. The ratings are related to safety, structural integrity, system performance, and proper maintenance of the tower and attachments. In all cases, safety of the public and Environment Canada personnel is of paramount importance.

Priority A—Safety – Includes items or faults which, if not corrected, may lead to collapse or failure of the structural system or antenna or may pose a threat to the safety of personnel that might be on site. Such faults would include:

- Damaged members
- Loose connections
- Excessively poor alignment of the tower or guy tensions
- Extreme corrosion of structural elements
- Damaged guys or hardware
- Lack of adequate daylight and night obstruction markings

Priority B—Performance – Includes items or faults, which have or will significantly impact on the quality or reliability of transmission signals. These faults are generally related to:

- Antennas and transmission lines, their mountings, connectors, and groundings.
- Loose connectors, safety cables, and anti-rotation chain at anchors (on FM and AM towers).
- Poor guy grounding on low band VHF transmitters, which may also result in poor performance.

Note – Priority A and B have to be addressed as soon as possible, if not completed during the inspection. If there are issues of a critical nature, they should be reported to the control base when discovered.

Priority C—Maintenance – Includes items or faults, which do not have a immediate effect on the performance or safety but rather items and faults, if not corrected, will in time shorten the service life of the antenna or tower or its elements. Faults in this category might include:

- Corrosion on parts such as conduit and lighting hardware.
- Other non-structural elements and minor corrosion on structural elements.
- Damage grounding of the tower base and guys.

Priority D—Future Attention – Includes items or faults, which require attention during the next scheduled visit. These faults are not expected to cause further damage or outages if corrections of the item or fault, is delayed.

Priority E—Housekeeping – Includes items or faults related to the general condition of the transmitter site, access road, which when corrected will improve the overall workmanship and ease of maintenance at the site. Includes items such as condition of:

- Ladder, Safety Rail, Anti-climb
- Access Road, Fencing, Gate, Locks
- Antenna and Transmission Line
- And the Ease of Access to the Site.

APPENDIX A
PHOTOGRAPHS

Photo #1: Tower Profile

Photo #2: Tower Foundation Typical 4 Locations

Photo #3: Building and Radome

Photo #4: Port Entry

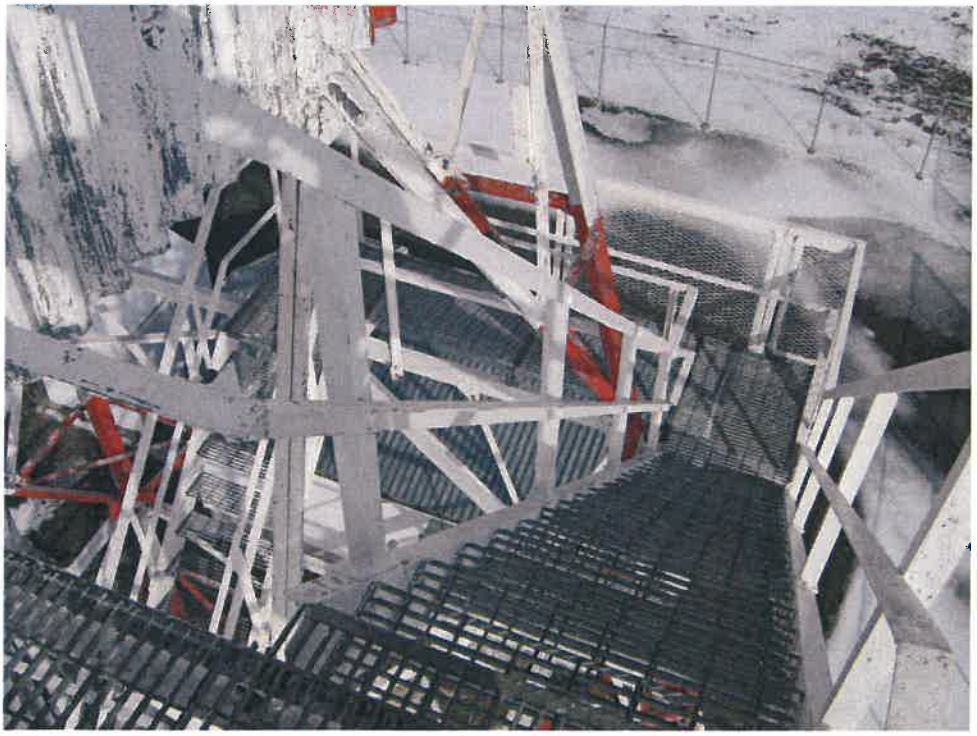


Photo #5: Integral Stairs and Platforms

Photo #6: Waveguide Bridge

Photo #7: Waveguide Post Grounding Typical

Photo #8: Site Buildings

Photo #9: Anti-Climb

Photo #10: Damaged Fencing North Side

Photo #11: Outside Outlets

Photo #12: Photocell

Photo #13: Damaged Access Lighting Level One

Photo #14: Access Lighting Level Two

Photo #15: Access Light on Building

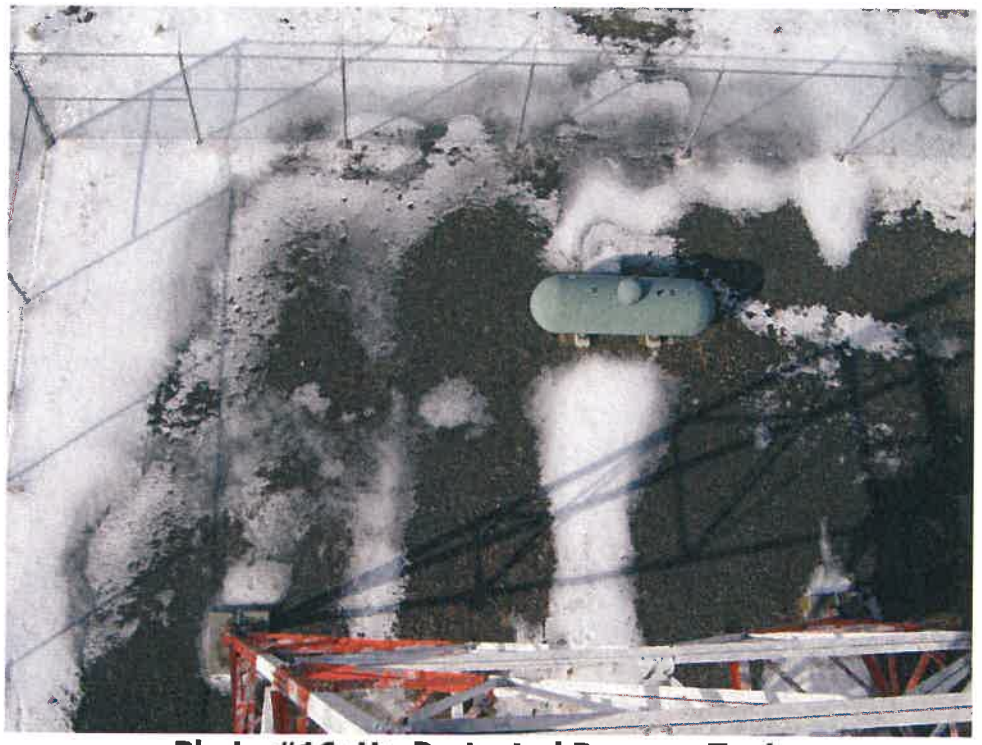


Photo #16: Un-Protected Propane Tanks

Photo #17: Loose Teck Cable

Photo #18: Surface Corrosion Typical 4 Locations

Photo #19: Air Conditioning Control Box Supports

Photo #20: Corroded Rail Connection

Photo #21: Damaged Door Sweep

Photo #22: Surface Corrosion on Bolts Typical

Photo #23: Surface Corrosion on Hand Rail

Photo #24: Surface Corrosion on Welded Diagonal

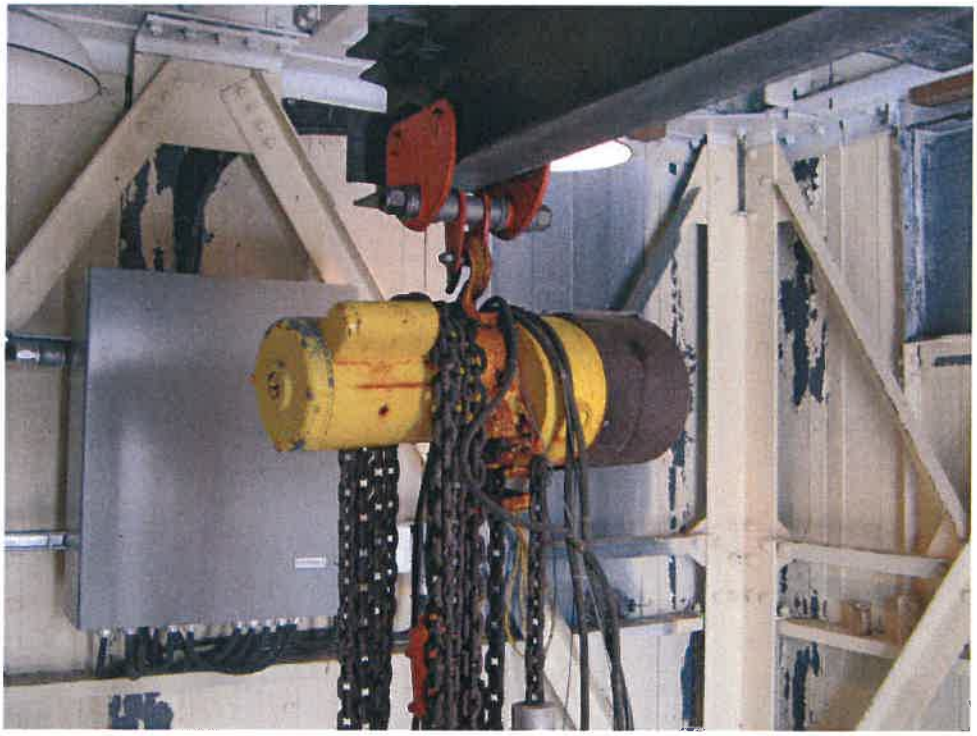


Photo #25: Winch

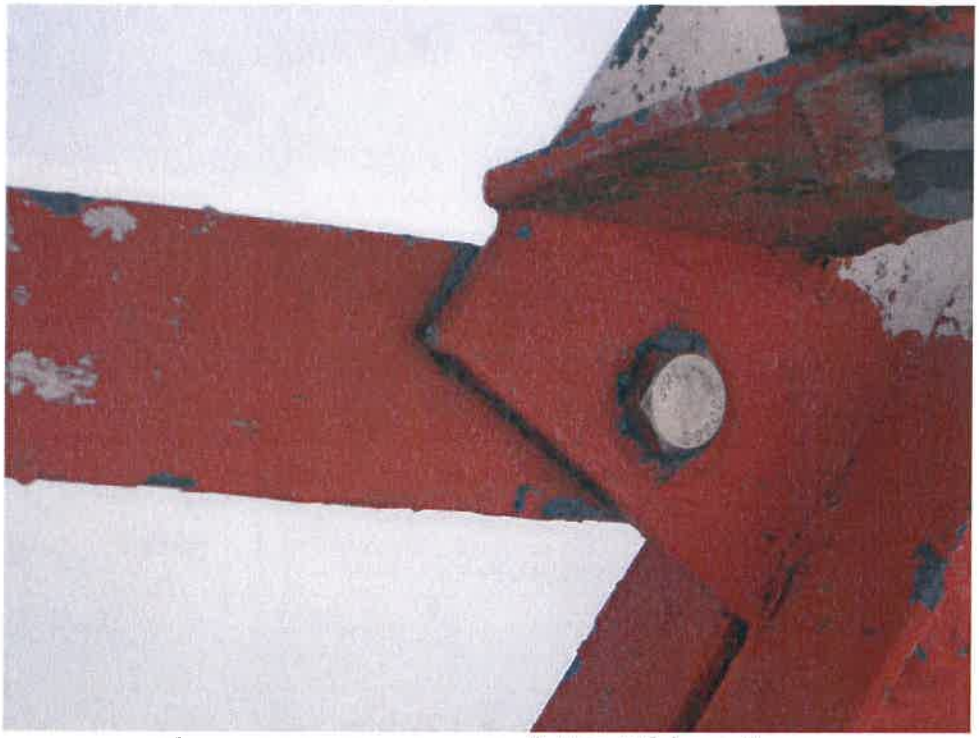


Photo #26: Stainless Bolt Used 2 Locations

Photo #27: Burned Holes in Diagonals

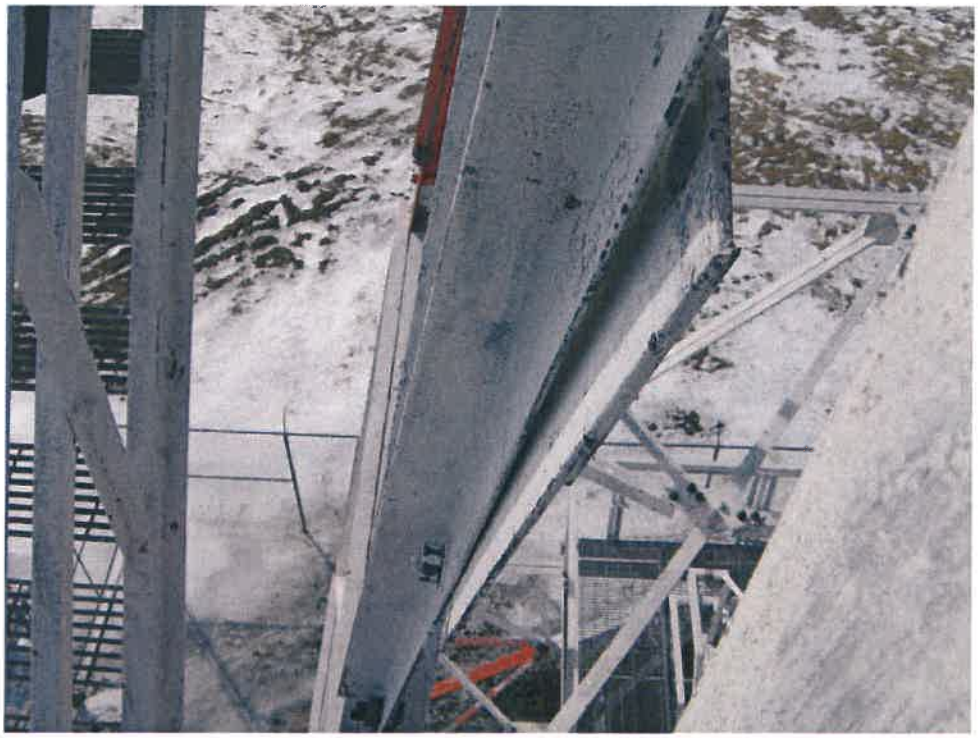


Photo #28: Disconnected Steel

Photo #29: Damaged Siding

APPENDIX B
GENERAL NOTES

USE OF INFORMATION IN THIS REPORT

This report was prepared by Tiller Engineering Inc. for the client noted for purposes described in the "Scope of Work" in this report. The material reflects Tiller Engineering Inc.'s best judgment based on the information made available, at the time of report preparation and the time allocated to complete the work. This inspection is not a guarantee or warranty of the installation.

Any use which a third party makes of this report or reliance on or decisions made based on it, are the responsibility of such third parties. Tiller Engineering Inc. accepts no responsibility for damages, if any, suffered by any third party or use of the report information by anyone, outside the specific indicated scope, as a result of decisions made or actions based on this report. Further, any use outside the specific indicated scope is done at the full responsibility of the user. Maximum liability pursuant to this report is the total fee received.

MAINTENANCE REVIEW SAMPLING PROCEDURES

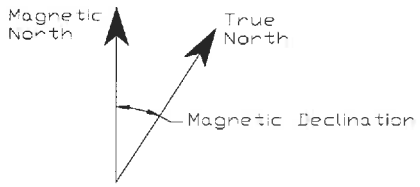
The tower inspection is limited to a random visual sampling of the steel tower members, bolts, connections, antennas, anchors, appurtenances and associated equipment. Sampling is defined as a set of observations and/or measurements on a subset of the whole that may be considered characteristic of the structure as a whole. It provides the ability to analyze the entire system and comment on general conformance. The size of the sample is based on the scope of work as defined by the client, previous information that is made available, and knowledge of the structure and systems. All inspections are performed in accordance with CSA Standard S37-01, Antennas, Towers, and Antenna-Supporting Structures. This sampling generally conforms to the guidelines noted in Appendix D of CSA Standard S37-01, Antennas, Towers, and Antenna-Supporting Structures. This inspection is not a guarantee or warranty of conformance of either component of the installation.

The inspection sampling refers to surface inspection observations only, except as noted otherwise. The foundation, guys and anchor hardware inspection is limited to an above grade surface inspection of these systems. No subsurface investigation was performed.

DISTINCTION BETWEEN TRUE AND MAGNETIC NORTH

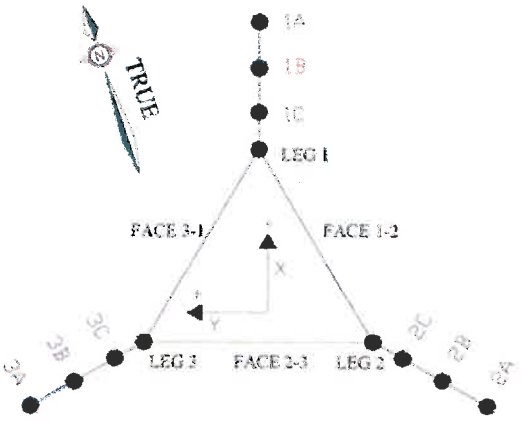
Magnetic North is the direction in which a compass points as determined by the Earth's magnetic field. This direction is constantly changing with time. True (or Geographic) North is the direction to the North Pole and is the basis for most maps because it is constant. The difference between True North and Magnetic North is called Magnetic Declination. According to Natural Resources Canada the Magnetic Declination Marion Bridge, Nova Scotia for the year 2008 is roughly 19º 36' West.

In all reports and calculations created by Tiller Engineering Inc. True North is used unless otherwise specified.



INSPECTION REFERENCES
Tower Orientation:

1. The tower legs and anchors are referenced clockwise from true north with Tower Leg 1 and Anchor 1 being the first clockwise from North.
2. If a guyed tower has only one anchor at each azimuth, anchors B and C at each azimuth can be omitted.
3. A face is labeled according to the legs between which it lies. For example, Face 1-2 is the face between Leg 1 and Leg 2.
4. When there is a torsion resistor at a guy elevation and therefore two guys at that level, the left and right guys are as observed from the anchor base, facing the tower.



Tower Alignment and Twist:

1. Measurements of deflections in the X and/or Y directions are measured from behind the anchor furthest from the base of the tower (Anchors 1A, 2A and 3A).
2. Counter clockwise tower rotation is taken as positive. (i.e. A tower leg as viewed from the associated anchor has moved to the right)

Guy Tensions:

1. Tensions are measured using a pulse or swing technique as per CSA Standard S37-01, Antennas, Towers, and Antenna-Supporting Structures.
2. Guy tension measurements are adjusted for the temperature at the time of making the measurements.
3. Initial tension is between 8% to 15% of the breaking strength, typically 10%, unless noted.

Antenna Schedule:

1. All antenna azimuths are from field measurements unless noted.
2. All elevations are to the center of the antenna unless noted. VHF and whips are referenced to their base unless noted. FM and TV antennas are referenced to bottom and top out to out unless noted.

Tower Mast:

1. Face width is the horizontal distance bolt to bolt unless noted.
2. Panel height is the vertical distance bolt to bolt of horizontals unless noted.
3. All elevations are referenced from the bottom of the tower leg (above star/tapered base).