

ENVIRONMENT CANADA MAINTENANCE INSPECTION

24m (79 ft) KNOCK-DOWN SELF-SUPPORT TOWER

XNC Chipman, NB



Prepared by:



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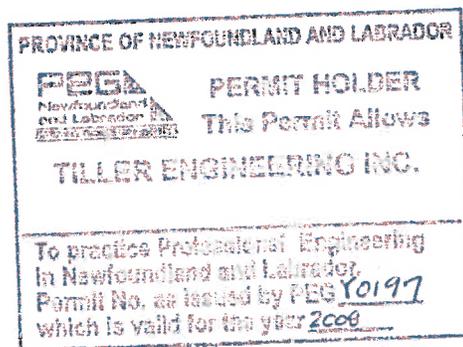
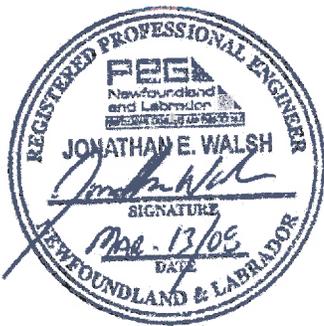
Prepared for:

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National Radar Network Support
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1.0 SITE INFORMATION

Site Name: XNC Chipman Radar Site

Tower Owner: Environment Canada

Coordinates: Latitude: N 46° 13' 20.2"
Longitude: W 65° 41' 56.6"

Tower Structure: Height: 24 m (79 ft.)
Construction Type: 4 Leg Self-support, Knock-down
Panel Height: Varies
Face Width: Varies
Manufacturer: Mechanic Settlement Tower

Site Access: 2WD

Inspected by: Joe Parsons & Keith Martin

Personnel on site: Doug Greer and Steve Collins of Environment Canada

Weather Conditions: -2.5°C, 1.5 mph

Date of Inspection: March 03, 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 snow covered but appeared clear of brush and debris. See Appendix A, Photos #1, #6, and #8.
- 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.
- C. Fencing:** The fence appears satisfactory. See Appendix A, Photos #1, and #8.
- The fence had the barbed wire removed.
- There is no grounding installed on fence post.
- There is no grounding installed on the fence gates.
- D. Security:** There was a anti-climb gate installed at the base of the access stairs to the tower. Gate was not locked and was ineffective to prevent entry. See Appendix A, Photo # 9.
- E. Due Diligence:** There is no site warning signage installed on tower compound, or fence. Warning sign on building door and gate at base of tower are satisfactory.

3.2 TOWER STRUCTURE

- A. Tower Members:** Lower diagonal on face 3-4 had three loose bolts at the leg connection. These bolts were tightened by Tiller while on site. See Appendix A, Photo # 23.
- There was a loose bolt on face 3-4 at 25 feet. Bolt was tightened by Tiller while on site.

There was a loose kicker plate on level 5 and level 6 platforms. Bolts were tightened by Tiller while on site.

Chain-link brackets behind the radome access ladder were off. Reinstalled by Tiller while on site. See Appendix A, Photo #25.

B. Connections: The splice connections in the tower appear satisfactory.

The nuts on the foundation anchor bolts are not fully installed. See Appendix A, Photo #2.

C. Foundations: The four foundations were snow covered at time of inspections. See Appendix A, Photo #2.

3.3 STAIRS AND FALL ARREST SYSTEM

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

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 This tower is not equipped with an antenna building on the tower.

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. 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.

The PVC pipe entering the building at below the waveguide port is not sealed. See Appendix A, Photo # 4.

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 is not painted.

C. Lighting electrical:

The second level tower access light has a missing globe and bulb. See Appendix A, Photo #11.

Mounting hardware, control boxes and supports for electrical components exhibits moderate surface corrosion. See Appendix A, Photos #18, and #20.

3.8 GALVANIZING

A. General:

Sub-diagonals at 6 feet exhibits minor surface corrosion on all faces. See Appendix A, Photo #14.

The tops of the anchor bolts exhibits minor surface corrosion. See Appendix A, Photo #2.

The access gate at the base of the tower exhibits heavy surface corrosion. See Appendix A, Photos #9 and #16.

The bolts for the conduit protection plates exhibit moderate surface corrosion. See Appendix A, Photo #21.

The bolts and clips for the ground lead secured to leg one exhibits moderate surface corrosion. See Appendix A, Photo #17.

3.9 EQUIPMENT SHELTER

A. Condition:

The metal roofing exhibits minor surface corrosion. See Appendix A, Photo #26.

B. Electrical:

The exterior power outlets are not equipped with GFI plugs. See Appendix A, Photo #10.

3.10 ADDITIONAL COMMENTS

- The propane tank is un-protected from falling ice. See Appendix A, Photo # 12.
- The winch and winch mount exhibits moderate surface corrosion. See Appendix A, Photo #19.
- All connectors at base of control box were loose. Retightened by Tiller while on site. See Appendix A, Photo #22.
- Loose teck cable coming from control box. Re-secured by Tiller while on site. See Appendix A, Photo #13.
- Cotter pins in bolts for winch access exhibits moderate surface corrosion. See Appendix A, Photo #24.

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	Install engineered anti-climb at base of tower access stairs "use Marion Bridge anti-climb as a reference"	A
2	Relocate photocell to a more accessible location.	B
3	Install warning signs around perimeter of site, on buildings, and tower.	C
4	Wire brush and cold galvanize surface corrosion on bolts, steel, handrails, and steel throughout tower.	C
5	Replace tower access light globe and bulb at level two.	C
6	Install GFI approved plugs in all exterior outlets.	C
7	Re-lamp access lighting on tower and building.	C
8	Install protection over propane tanks.	C
9	Install grounding on all waveguide posts.	C
10	Install grounding on all corner fence posts.	C
11	Install grounding on every second fence post.	C
12	Install grounding from fence gates to fence posts.	C
13	Wire brush and repaint winch and winch supports.	C
14	Seal PVC at port entry.	C
15	Replace corroded bolts and clips on ground lead on leg one.	C
16	Replace corroded cotter pins.	C
17	Clean surface corrosion on roof of building.	C

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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 an 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: Radome and Photo-cell



Photo #4: Port Entry



Photo #5: Integral Stairs and Platforms



Photo #6: Waveguide Bridge



Photo #7: Waveguide Post Grounding Typical

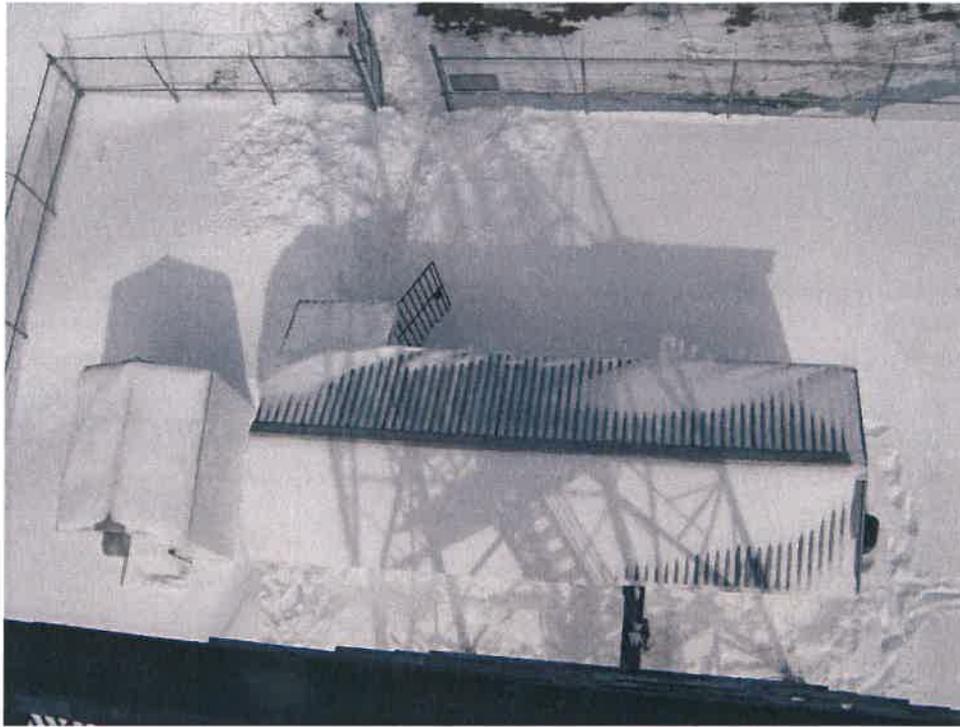


Photo #8: Site Buildings



Photo #9: Anti-Climb

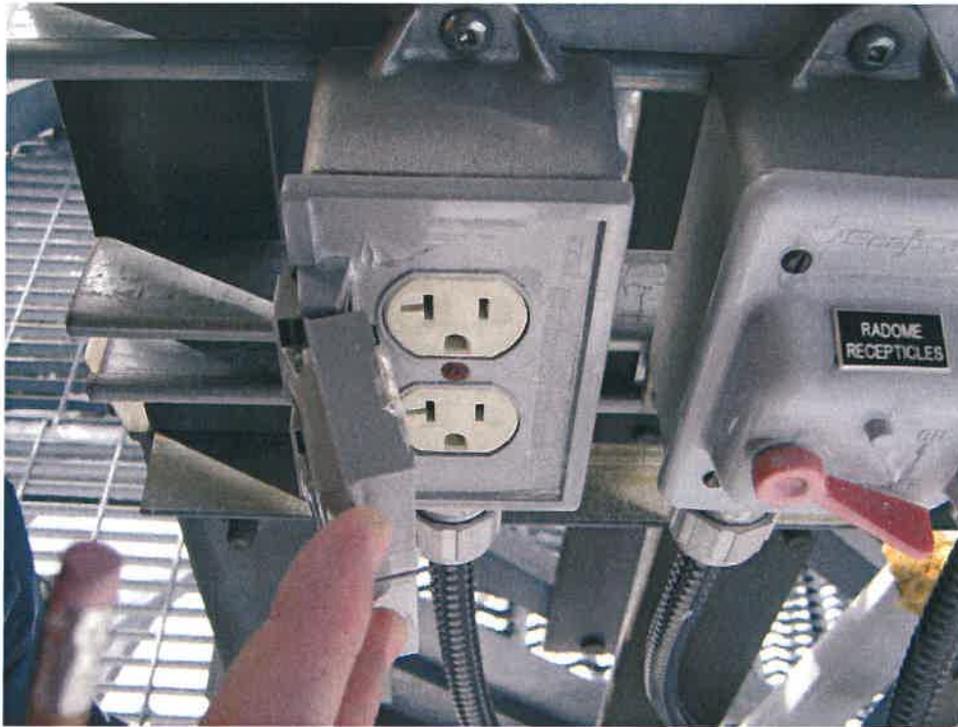


Photo #10: Outside Outlets



Photo #11: Damaged Access Lighting Level Two



Photo #12: Un-Protected Propane Tanks



Photo #13: Loose Teck Cable



Photo #14: Surface Corrosion Typical Lower Level

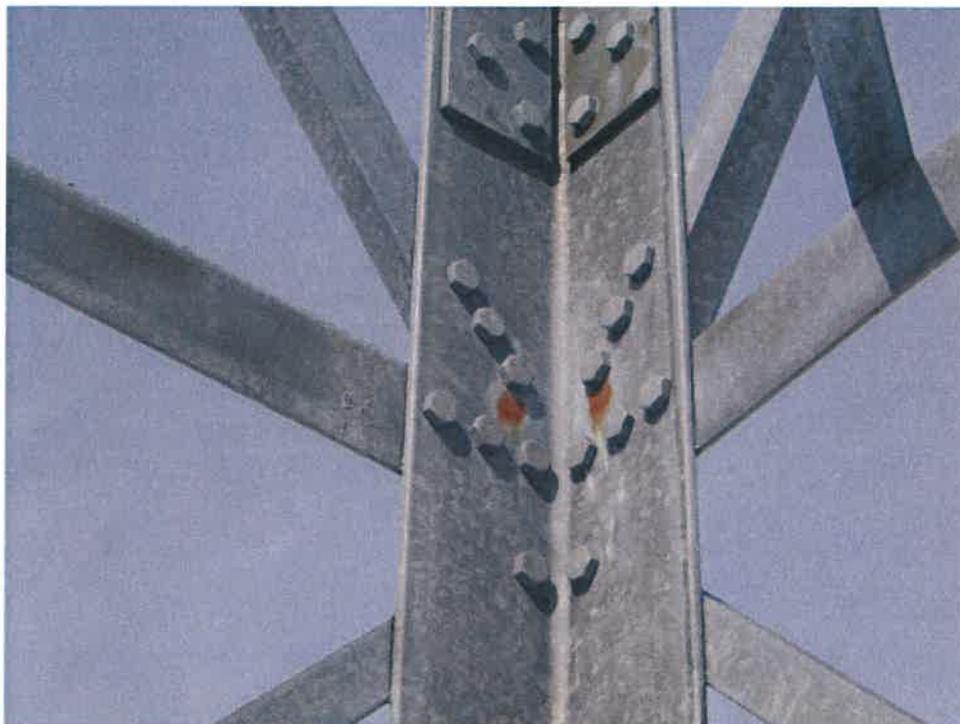


Photo #15: Minor Surface Corrosion Leg 4 @ 20 Feet



Photo #16: Corroded Access Gate Base of Tower



Photo #17: Surface Corrosion on Ground Lead Clips



Photo #18: Surface Corrosion on Control Box



Photo #19: Surface Corrosion on Winch Support



Photo #20: Corroded Electrical Supports

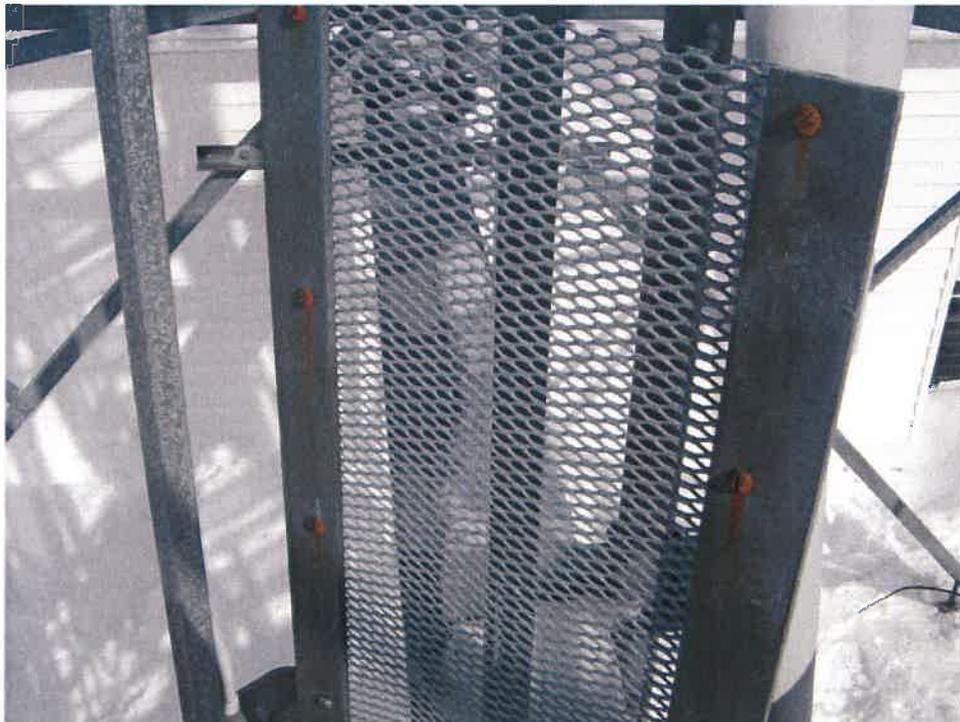


Photo #21: Corroded Bolts Typical

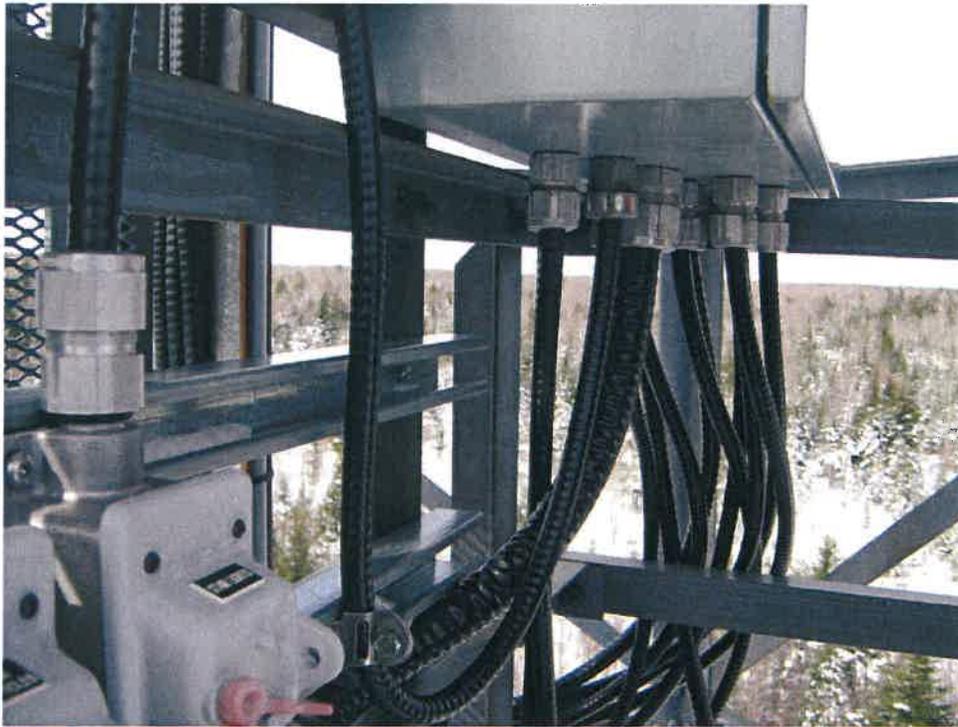


Photo #22: Loose Electrical Connections



Photo #23: Loose Diagonal Bolts



Photo #24: Corroded Cotter Pins



Photo #25: Chain-Link Brackets

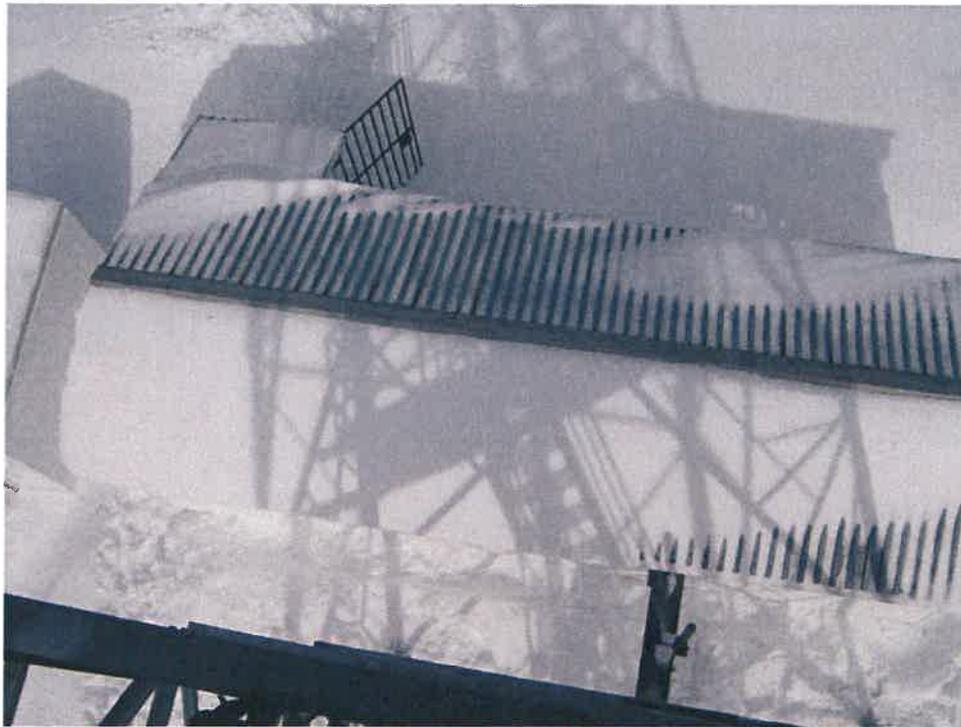


Photo #26: Surface Corrosion on Roof

**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

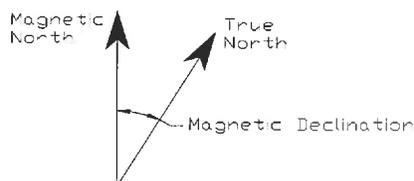
The tower inspection is limited to a random visual sampling of the steel tower members, bolts, connections, antennas, anchors, appurtenances and associated equipment. Sampling is defined as a set of observations and/or measurements on a subset of the whole that may be considered characteristic of the 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

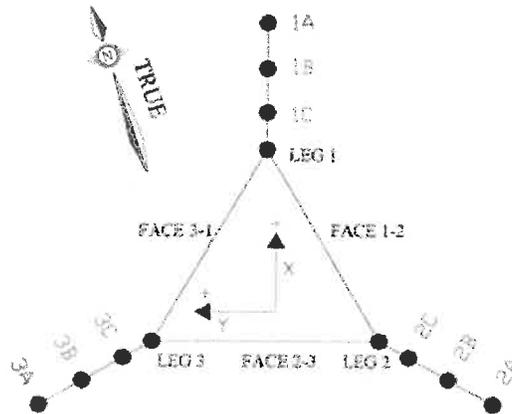
Magnetic North is the direction in which a compass points as determined by the Earth's magnetic field. This direction is constantly changing with time. True (or Geographic) North is the direction to the North Pole and is the basis for most maps because it is constant. The difference between True North and Magnetic North is called Magnetic Declination. According to Natural Resources Canada the Magnetic Declination Chipman, New Brunswick for the year 2008 is roughly 18° 30' 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).