

# ENVIRONMENT CANADA MAINTENANCE INSPECTION

## 27m (88.6 ft) KNOCK-DOWN SELF-SUPPORT TOWER

XDR Dryden, Ontario

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Prepared by:



**Tiller Engineering Inc.**  
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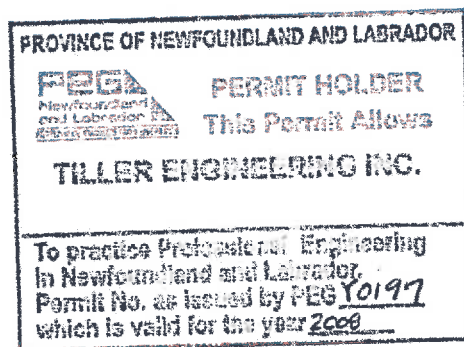
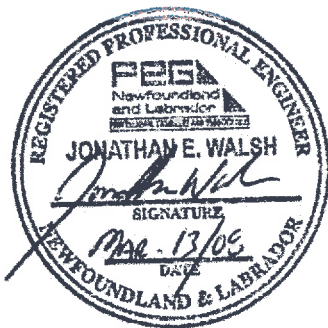
Prepared for:

**Environment Canada**  
**National Radar Network Support**  
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## TABLE OF CONTENTS

1.0	Site Information
2.0	Scope
3.0	Inspection Observations
3.1	General Site
3.2	Tower Structure
3.3	Stairs & Fall Arrest System
3.4	Antennas and Transmission Lines
3.5	Waveguide Bridge, Port and Cable Trays
3.6	Grounding
3.7	Obstruction Marking
3.8	Galvanizing
3.9	Equipment Shelter
3.10	Additional Comments
4.0	Alignment and Twist
5.0	Conclusions and Recommendations
Appendix A	Photographs
Appendix B	General Notes



## 1.0 SITE INFORMATION

**Site Name:** XDR Dryden

**Tower Owner:** Environment Canada

**Coordinates:** Latitude: N 49° 51' 29.5"  
Longitude: W 92° 47' 48.8"

**Tower Structure:** Height: 27 m (88.6 ft.)  
Construction Type: 4 Leg Self-support, Knock-down  
Panel Height: Varies  
Face Width: Varies  
Manufacturer: Trylon

**Site Access:** 2WD

**Inspected by:** Joe Parsons, Keith Martin, B. Tech.

**Personnel on site:** Mike Michon of Environment Canada

**Weather Conditions:** -15°C, 4 mph NW,

**Date of Inspection:** February 21, 2008

**Project Manager:** Leonard Szarko, P. Eng.

**Report Preparation:** Joe Parsons/Keith Martin

**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, Photo #7.
- B. Access:** The tower is located approximately 150 feet off the main road. Access lot was cleared of snow at time of inspection.
- C. Fencing:** The site fence appears satisfactory. See Appendix A, Photo #9.
- D. Security:** The compound fence has barbed wire installed and locked gates. There is a locked anti-climb at the base of the access stairs to the tower. The anti-climb was locked and appears satisfactory. See Appendix A, Photo #8.
- E. Due Diligence:** There is no warning signage installed on fence perimeter. Warning signs on building doors and anti-climb are satisfactory. See Appendix A, Photo #8.

#### 3.2 TOWER STRUCTURE

- A. Tower Members:** Tower members appear satisfactory.
- B. Connections:** Tower connections appear satisfactory.
- C. Foundations:** The four foundations were snow covered at time of inspection. Visible portions appear satisfactory.

### 3.3 STAIRS AND FALL ARREST SYSTEM

- A. Stairs:** The top platform grating requires additional support. See Appendix A, Photo #20.
- 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 5.5 meter radome appears satisfactory. See Appendix A, Photo #3.
- B. Transmission Line:** The existing hard line exhibits minor surface corrosion at 40 feet. See Appendix A, Photo #18.
- C. Antenna Building** This tower is not equipped with an antenna building.

Antenna Schedule:			
Ant #	Antenna Type and Model	TX Line	Azimuth
1	Model EEC, s/n: 81-4	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 legs are grounded in four

locations grounding appears  
satisfactory.

**B. Waveguide Post:**

Only one of the three waveguide post  
are grounded.

**C. Equipment Shelter:**

The equipment shelters appeared  
satisfactory. See Appendix A, Photo  
#19.

### 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	27(88.5)	N/A	Unknown
<b>Comments:</b> Photo cell is located on radome.					
2	Tower access lights				
<b>Comments:</b> All were working at time of inspection.					

**B. Paint:**

This tower was not painted.

**C. Lighting electrical:**

The bolts in the tower access lighting  
fixtures exhibits minor surface  
corrosion.

The teck cables are secured with light  
duty Ty-wraps.

### 3.8 GALVANIZING

**A. General:**

Various bolts in the stairs frame  
exhibits minor surface corrosion. See  
Appendix A, Photos #11 and #12.

Bolts in the conduit protector on the  
stair rail exhibits minor surface  
corrosion. See Appendix A. Photo #17.

### 3.9 EQUIPMENT SHELTER

- A. Condition:** The buildings on site appear satisfactory. See Appendix A. Photo #19.
- B. Electrical:** The buildings electrical components appear satisfactory.

### 3.10 ADDITIONAL COMMENTS

- The propane tank has no protection from vehicles or snow clearing equipment. See Appendix A. Photo #16.

### 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 site warning signage indicating falling ice and RF hazard on fence perimeter.	A
2	Install additional support for platform grating at top platform.	A
3	Install protection in front of propane tanks.	A
4	Install grounding to remaining two (2) waveguide posts.	B
5	Install additional heavy duty Ty-wraps on teck cable.	B
6	Clean corrosion on existing hard line at 40 feet.	C
7	Replace corroded bolts in tower access lighting fixtures.	C
8	Replace the two (2) corroded bolts in stair frame.	C
9	Replace corroded bolts in conduit protector on hand rail.	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: Snow Covered Foundations**



**Photo #3: Radome**

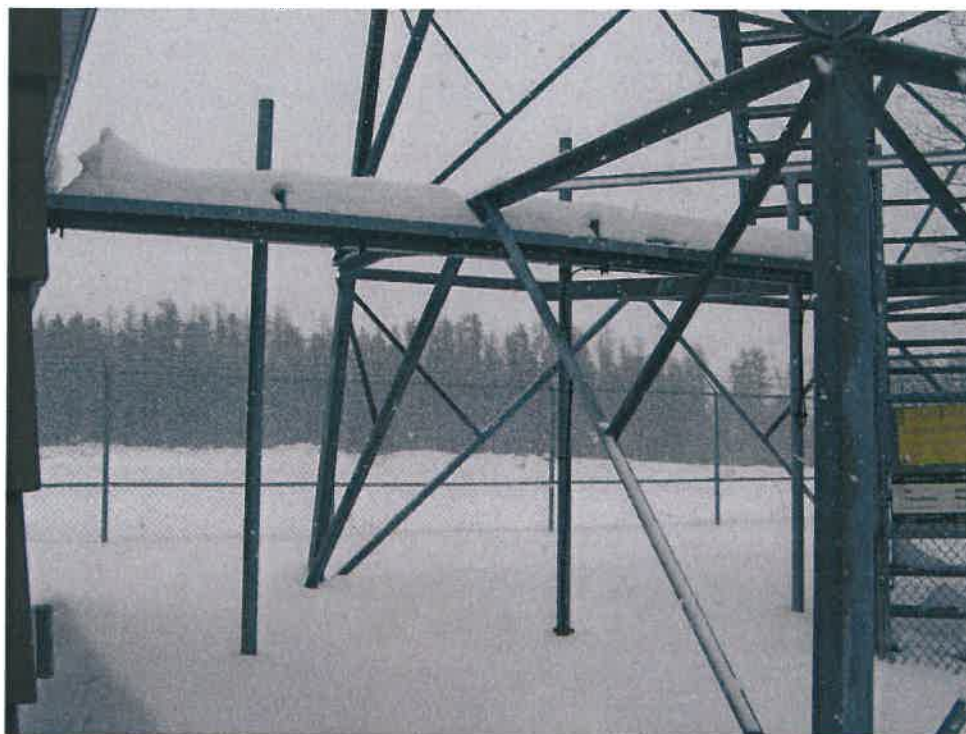




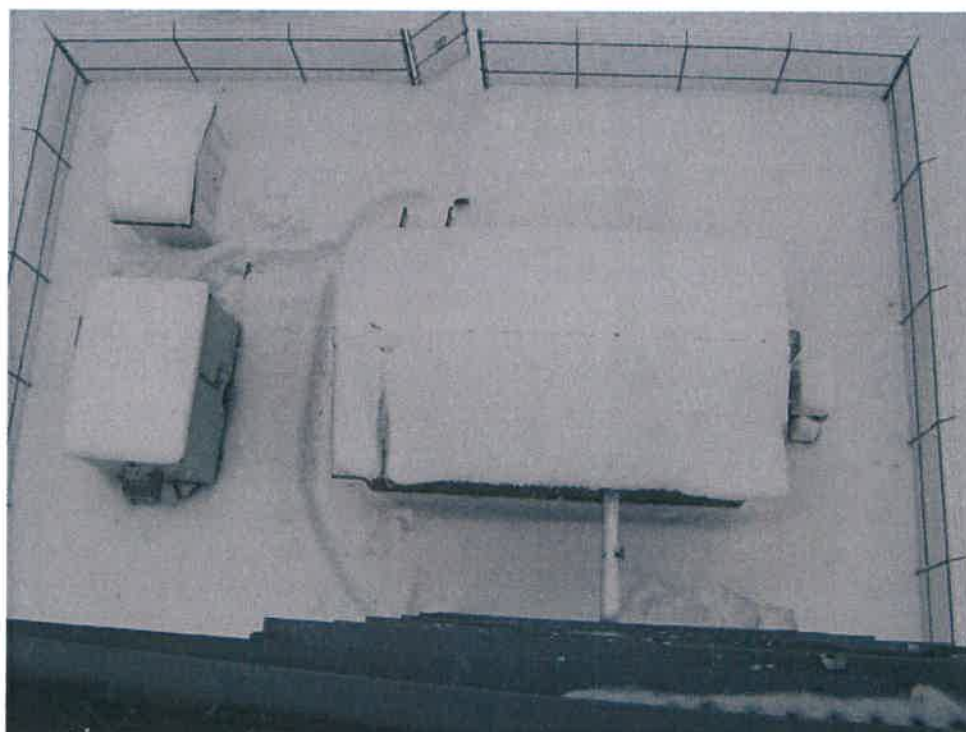
**Photo #4: Port Entry**



**Photo #5: Integral Stairs and Platforms**



**Photo #6: Waveguide Bridge**



**Photo #7: Site Building**

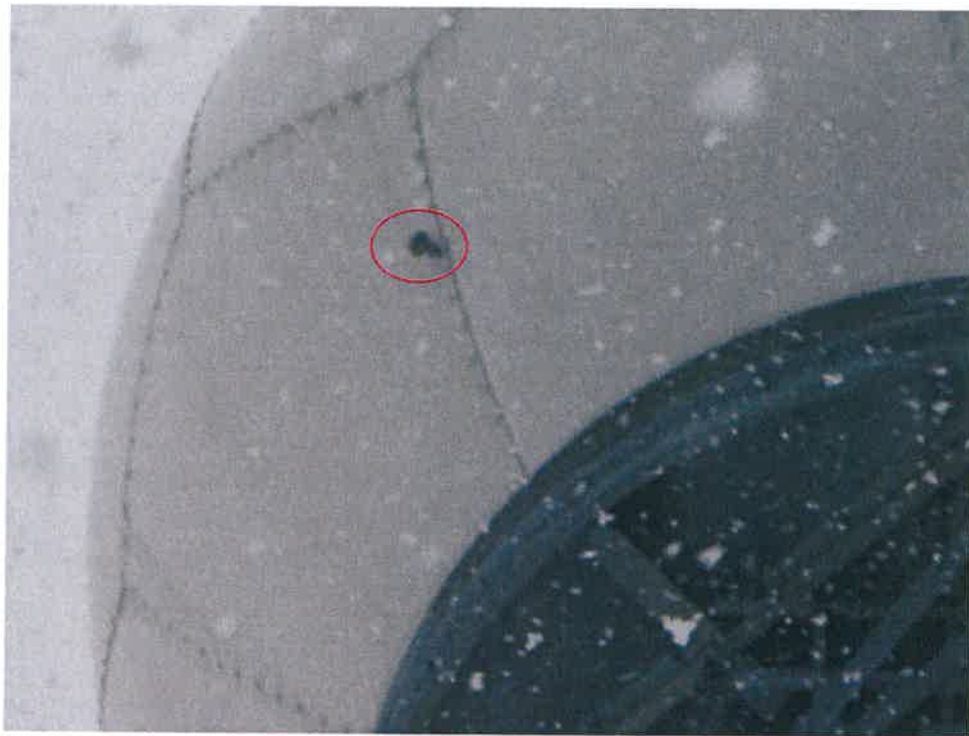




**Photo #8: Anti-Climb**



**Photo #9: Fencing**



**Photo #10: Photocell**



**Photo #11: Corroded Nut**





**Photo #12: Corroded Bolt In Stairs**



**Photo #13: Exterior Outlets**



**Photo #14: Damaged Step**



**Photo #15: Corroded Fixture Bolts**



**Photo #16: Unprotected Propane Tanks**



**Photo #17: Corroded Bolts**





**Photo #18: Corroded Hard Line**



**Photo #19: Equipment Shelter**



**Photo #20: Grating**

## **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

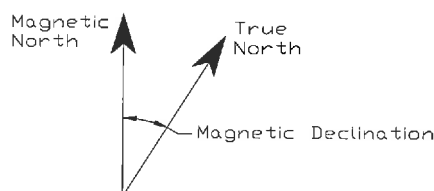
The tower inspection is limited to a random visual sampling of the steel tower members, bolts, connections, antennas, anchors, appurtenances and associated equipment. Sampling is defined as a set of observations and/or measurements on a subset of the whole that may be considered characteristic of the 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 in Dryden, Ontario for the year 2008 is roughly  $0^{\circ} 11'$  West.

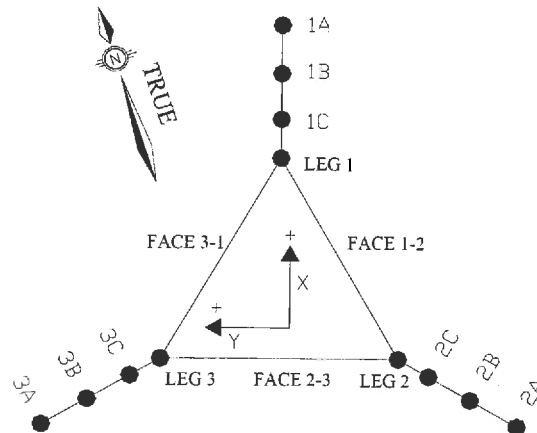
In all reports and calculations created by Tiller Engineering Inc. True North is used unless otherwise specified.



## 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).