CAC #7

Manitoba Hydro 2012/13 & 2013/14 General Rate Application

Supporting Materials

CAC Manitoba

December 19, 2012

Public Interest Law Centre
of Legal Aid Manitoba
3rd floor – 287 Broadway
Winnipeg, MB R3C 0R9

Manitoba Hydro

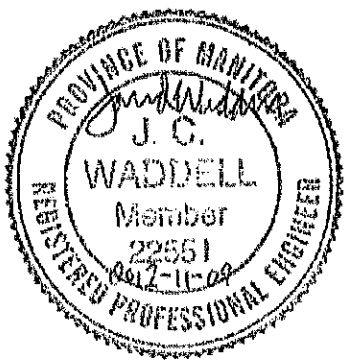
CUSTOMER SERVICE AND DISTRIBUTION

Customer Service Operations South Division

Distribution Asset Maintenance Department

REPORT ON

Distribution Asset Condition



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PREPARED BY: Distribution Asset Condition Team

DATE PREPARED: 2012 08 14

REVIEWED BY:

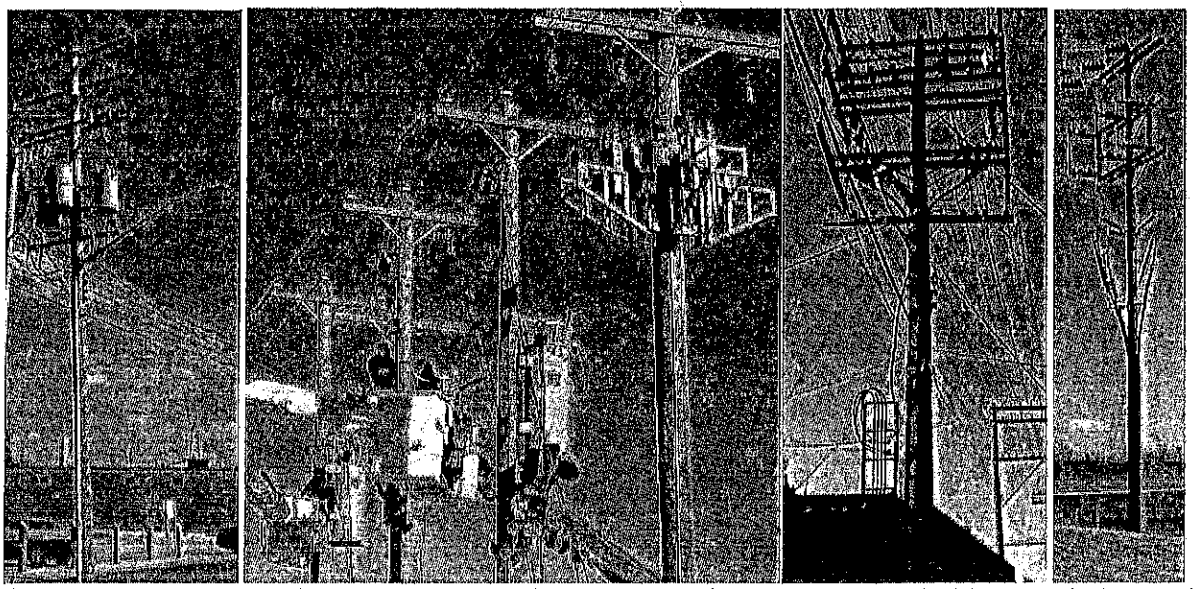
FILE NUMBER:

RECOMMENDED FOR IMPLEMENTATION

DEPARTMENT:

DIVISION:

DATE: 2012 11 09



Three-Phase Transformer Pole | Voltage Regulator and Capacitor Poles | Multi-Circuit 4 kV Pole | 66 kV Lateral Pole

Figure 31 Typical Wood Pole Structures

The majority of the distribution system was built in stages over the past 80 years making it difficult to accurately estimate an exact pole inventory. Previous Manitoba Hydro estimates indicate that approximately 700,000 poles exist in the system. A distribution pole inventory project (underway way for several years) has identified 90% of the poles in the province with bar-codes,as such the current pole population is expected to exceed 1 million units.

The Integrated Pole Maintenance Program (IPM) database which contains records of wood pole age, species, class, and pole treatment history, currently contains 525,465 pole records from 2003 to 2010 and is estimated to comprise 53% of the total 1,000,000 pole inventory. Using this data a projection of the anticipated age of Manitoba Hydro's pole assets is shown in Figure 32. The individual blue bars correspond to the estimated number of poles installed each year. The green line corresponds to the total cumulative percent these poles represent for the total pole inventory.

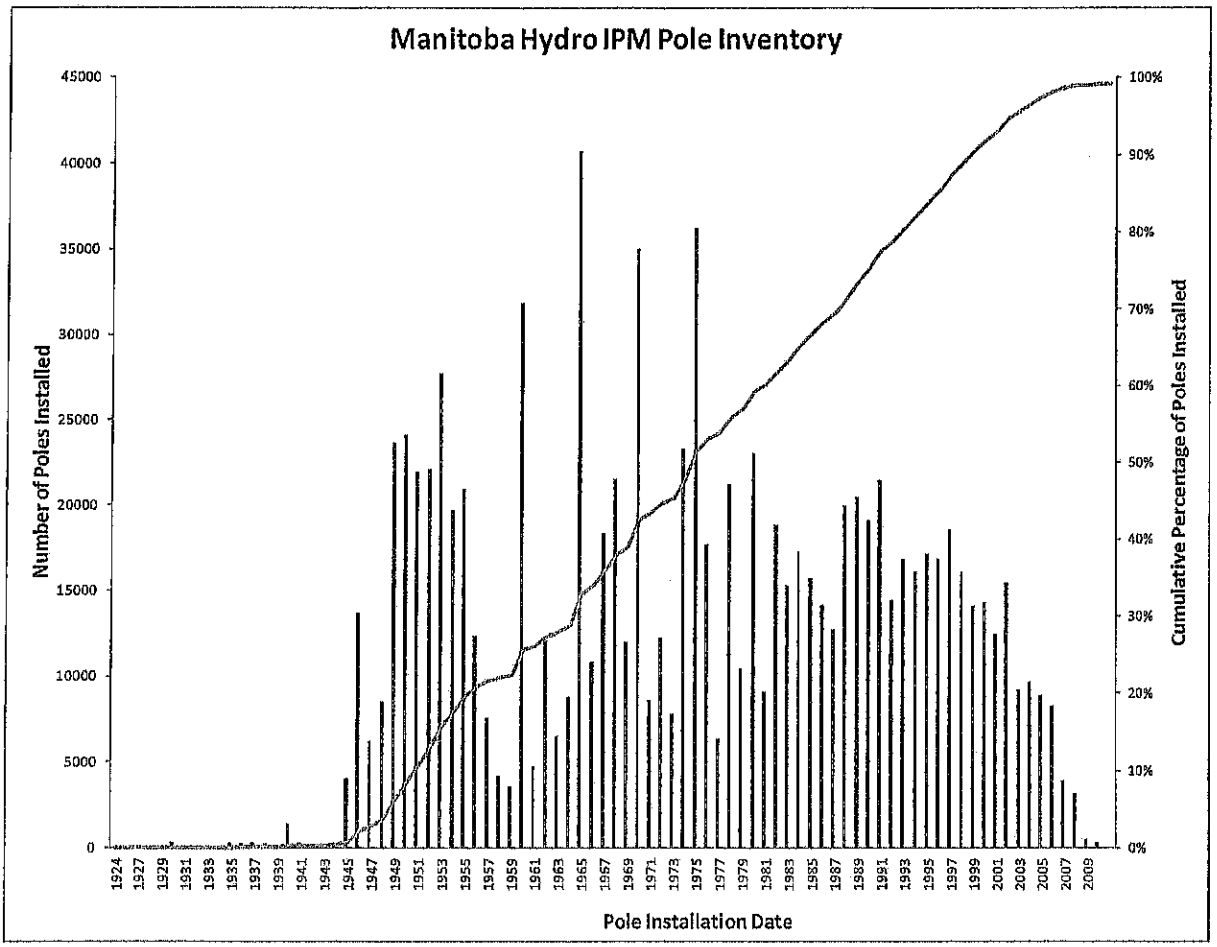


Figure 32 Manitoba Hydro Projected Pole Inventory

In Figure 32, it is notable that Manitoba Hydro's pole assets underwent a major expansion between 1945 and 1960. During that time approximately 250,000 poles were added to the distribution system. These poles are currently between 52 and 67 years of age and represent approximately 25% of the total pole population on the distribution system. Between 2020 and 2035, these poles will reach their anticipated lifespan of 75 years. Manitoba Hydro's current pole replacement rate of approximately 5,000 poles per year is not sufficient to replace this first "hump" of poles when they reach their anticipated lifespan.

It is notable that although the projected pole age profile is the most accurate data available, it is also likely very conservative. Manitoba Hydro archives indicate that substantial expansion of the transmission system (33 kV and 66 kV at the time) had occurred prior to 1939. At the time the

system provided electricity to 139 communities. A schematic of the system is provided in Figure 33. Although relatively few farms were supplied off this system, many of the wood poles were used to supply both distribution town customers and the supplying transmission lines. It is probable that many of these poles still remain in service.

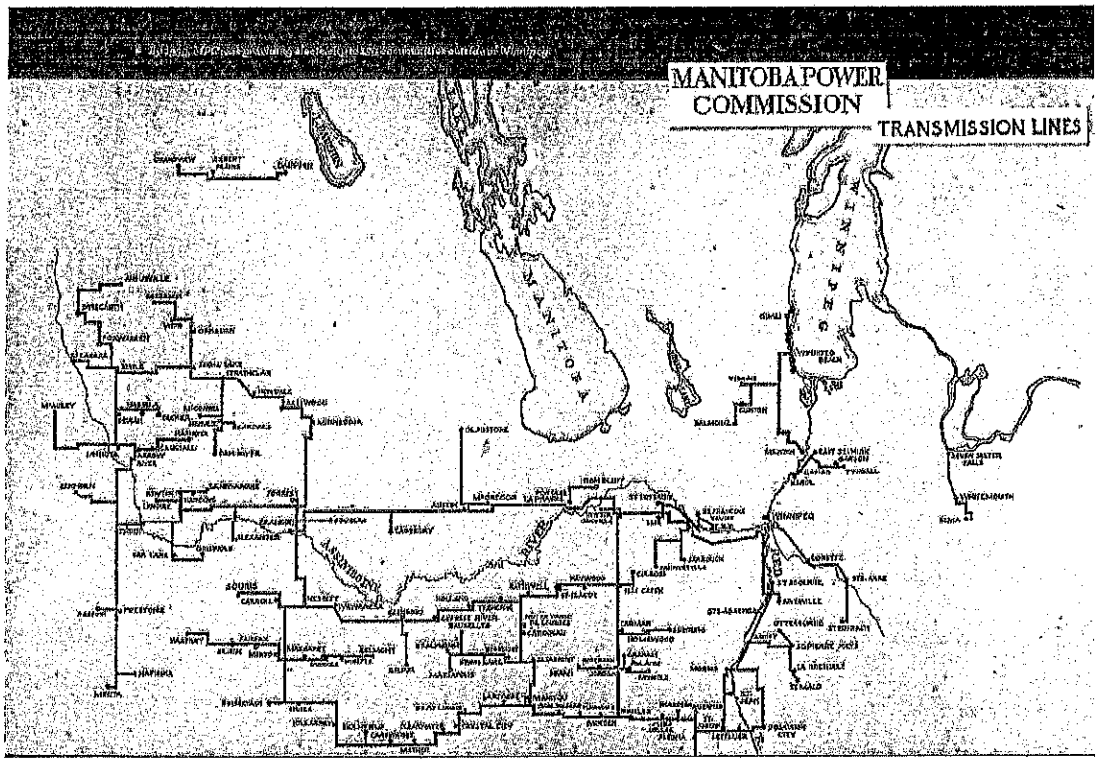


Figure 33 Manitoba Power Commission Transmission Lines in 1939

Tables 25 and 26 detail Manitoba Hydro's estimated wood pole inventory along with the material requirements to replace these assets with standard stock items.

There are several programs and projects outside the IPM program in which wood poles have been identified for replacement. The line refurbishment program and capacity/clearance upgrade projects replace poles throughout the province as required. Although these projects retire aging assets, they do not replace them at the volume required to address future aging infrastructure concerns.

1.5 Health

Projections based on IPM inspection data, predict 18,000 poles would be expected to be in non-serviceable condition today. Of these 18,000 poles, approximately 4,000 could be stubbed and the remaining 14,000 require replacement. This projection is the first indication Manitoba Hydro's current pole replacement rate is falling behind requirements.

Although, this is a relatively low value compared to the overall pole population, approximately 260,000 poles were installed between 1945 and 1960 during rural electrification. These poles approach the end of their serviceable lives between 2020 and 2035. At that time it is anticipated pole replacement requirements could average 17,000 per year.

The projected age profile of the pole currently requiring replacement is shown in Figure 35.

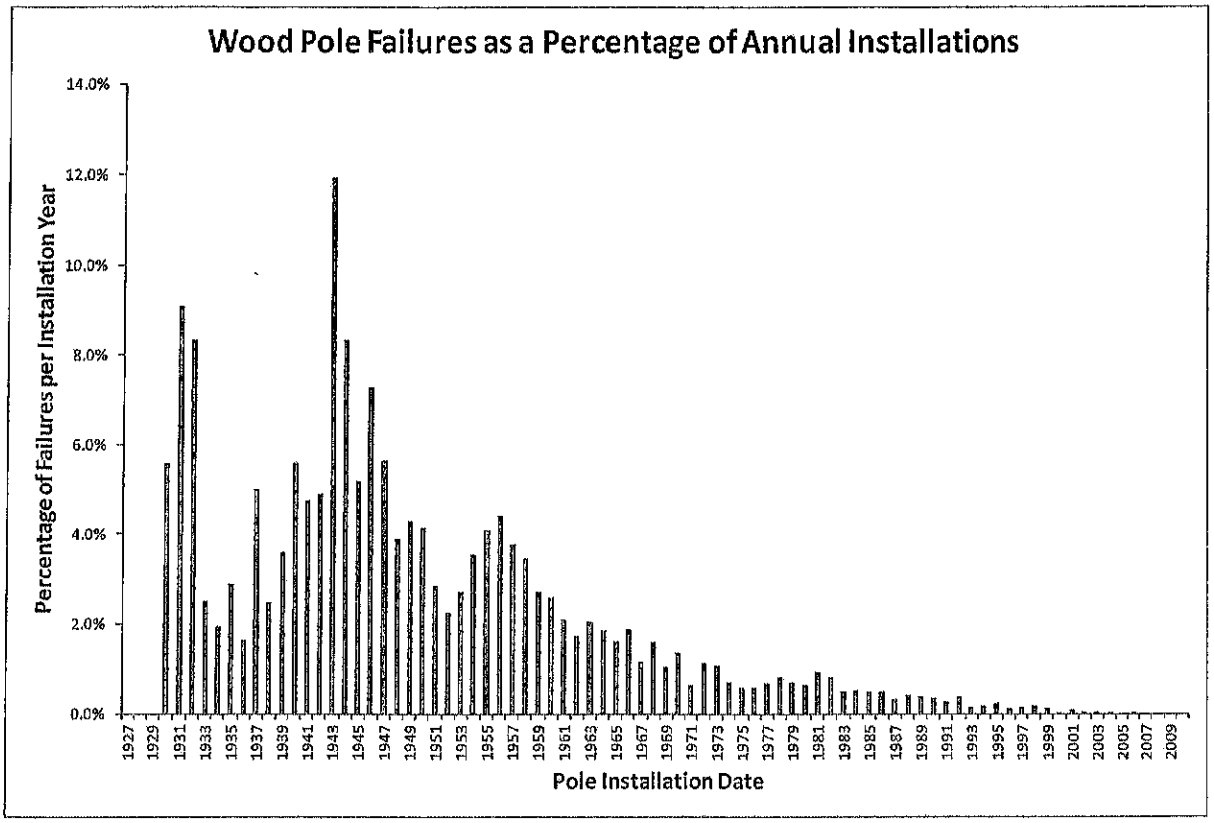


Figure 36 Percent of Poles Requiring Replacement

Figure 36 details the percentage of service pole inspection failures by installation date. Failures range from less than 1% for pole installations since 1971 to 12% for poles installed in 1943. The typical upper range of pole failures ranges from 5% to 12% for poles installed prior to 1960. This data supports the conservative assumption that a 75 year lifespan for a pole is reasonable with typically less than 12% of assets that age failing in service. While relatively little data is available for poles older than 75 years, it is notable that the IPM data for the three 85 year old poles indicated a 66% failure rate. While only three poles that age were available for those data points, it is reasonable to assume in service failures would be more likely to occur with increasing pole age.

The health profile of Manitoba Hydro's wood pole assets is presented in the "soccer field" graphs on Figure 37. In these graphs, poles are classified based on the following conditions.

- Poles 75 years of age or greater or rejected poles are rated critical.
- Poles 51 – 74 years or greater are rated fair/poor.

1. OVERHEAD DISTRIBUTION CONDUCTORS

Distribution conductors are utilized to deliver electrical energy from the distribution system to customers supplying customer loads. The majority (94%) of conductors utilized on the distribution system are overhead with the remainder comprised of underground cable. This section focuses on the characteristics of the overhead conductors installed on Manitoba Hydro's distribution system.

Manitoba Hydro has selected aluminum as its standard material for overhead distribution conductors. Aluminum is utilized for all new construction projects due to its high strength, low impedance, and high ampacity ratings. Aluminum comprises approximately 70% of the wire used on the distribution system.

Non-standard conductors such as steel and copper comprise the remaining 30% of wire utilized on Manitoba Hydro's distribution system. While non-standard, these conductors are maintained and operated until there is a need to replace them to increase system capacity, rebuild a line section due to pole condition or road realignment, or replacement due to poor condition.

1.1 Demographics

Manitoba Hydro has installed overhead distribution conductors throughout the province. Manufactured dates are not readily available for specific conductor sections; however it is reasonable to assume the conductors utilized on Manitoba Hydro's distribution system have a similar age profile to the wood poles. Typical conductors found on the distribution system are provided in Figure 40. The conductors (left to right) are 3/13" Steel, 2/0 AASC and 477 kcmil ACSR.

Figure 43 indicates that the risks associated with overhead conductor failures are moderate. In the worst case scenario a conductor failure would impact a major 66 kV or 24 kV circuit and result in an outage impacting several thousand customers for several hours. These types of failures are readily repairable by operational staff.

1.7 Distribution Asset Evaluation

Overhead conductor replacement costs are primarily based on the installed conductor size. Figure 44 provides an overview of the conductor asset value, current replacement rates, and anticipated lifespan.

Asset	Quantity	Life Expectancy	Current Replacement Rate[11]
ACSR Conductor	77,747 km	100 Years	200 Years
AASC Conductor	4,481 km	100 Years	200 Years
ASC Conductor	562 km	100 Years	200 Years
3/13" Steel	22,021 km	100 Years	200 Years
9 Alloy	2,730 km	70 Years	200 Years
Other Non-Standard Conductors	7,336 km	100 Years	200 Years
Replacement Cost	$2,000 - $8,000+/km		
Replacement Value	$700 Million		

Figure 44 Overhead Conductor Economic Evaluation

[11] Assumed replacement rate corresponds to wood pole replacement during line rebuilding projects. Existing replacement rate of 3/13" steel is 50 km/year, which will be ramped up during wood pole replacement projects.