

Protection of the Dominion Observatory

18 April 2019



Dominion Observatory and Sun Dial, 1904 [Source: NA, PA12892]¹

Abstract

The Dominion Observatory is an important historical scientific entity. The building and environs have been designated as a “Classified Federal Heritage Building” by Parks Canada. However the artifacts and records of the Dominion Observatory are in imminent peril and are at risk of being destroyed and disposed of. An unknown number of artifacts and records have already been destroyed. The environs of the observatory are also at risk because of the development of the new Ottawa Hospital. The Canadian Heritage department together with Natural Resources Canada and other related departments need to establish a mandate to preserve the records and artifacts of the Dominion Observatory and related artifacts and records for earth science, geophysics, and environmental science. The development of the Ottawa Hospital needs to be done in such a way so that it preserves the environs of the Dominion Observatory and does not preclude the future establish of a Science and Technology museum in the Dominion Observatory building.

¹<http://www.agr.gc.ca/eng/about-us/offices-and-locations/central-experimental-farm/about-the-central-experimental-farm/central-experimental-farm-national-historic-site-management-plan-1-of-20/central-experimental-farm-national-historic-site-management-plan-9-of-20/?id=1170436212725>

Introduction

The Dominion Observatory was built in 1902 and designated in 1992 (together with its grounds and environs) as a “Classified Federal Heritage Building”². The “Dominion Observatory is a Classified Federal Heritage Building because of its historical associations, and its architectural and environmental values”.³ It was established “to aid and improve the survey work of western Canada through the investigation and application of positional astronomy, ... and developed a national profile as the source of Dominion Observatory Official Time.” The line from the transit circle wing of the observatory to the adjacent South Azimuth Building still forms the reference meridian for the Canadian Geodetic Reference System. The observatory operated as a center for scientific research until 1970.

Currently the custodian of the property is Natural Resources Canada, and the building is used as government office space. This is an appropriate interim use of the facility since it has ensured that the building is maintained. The 15-inch refractor telescope was removed in the 1970s to the Canada Science and Technology Museum and used to provide science education to the general public. A specialized observatory dome was built on the grounds of the Canada Science and Technology Museum, dedicated to Dr. Helen Sawyer Hogg⁴, a prominent Canadian astronomer. Recently the Canada Science and Technology Museum has been rebuilt, the specialized observatory dismantled and the telescope put into long-term storage.

There are currently a number of major changes in the vicinity of the Dominion Observatory, with Natural Resources Canada and with the Canada Science and Technology Museum that put the Dominion Observatory and the associated historical scientific artifacts under threat.

- 1) The construction of the new Ottawa Hospital on the grounds of the Central Experimental Farm adjacent to the Dominion Observatory threatens to destroy the protected “environs” by building a structure that will obstruct the view of the sky from the observatory. This would be especially true if the hospital builds a large parking lot immediately south of the observatory and creates a field of high intensity parking lot lights and/or increases the height and closeness of the hospital building. The initial design for the hospital calls for underground parking and a limit to the building height south east of the observatory, but there are already calls to extend the hospital, and it is unclear whether the proposal for underground parking will be accepted. Although the general light pollution of the city eliminates any possible future role for the observatory in professional astronomical research, the function of the observatory should be retained so that it can fulfill the role of providing science and technology education to the public.
- 2) The second major threat to the observatory is the reallocation of Natural Resources Canada from the Booth Street site and the consequential destruction of artifacts and records. Parts of Natural Resources Canada have already been moved out of some of the buildings on Booth Street. The Canada Lands development project is already inviting proposals for the future

² FHBRO Report Reference: 92-035; DFRP Number: 08625 00

³ https://www.pc.gc.ca/apps/dfhd/page_fhbros_eng.aspx?id=5695

⁴ <https://www.thecanadianencyclopedia.ca/en/article/helen-sawyer-hogg/>

development of parts of the Booth Street site⁵. Many of the artifacts relating to the history of earth science observation, including the records of research, and some of the physical artifacts of the Dominion Observatory have already been disposed of. There currently seems to be no mandate for preservation. These records and artifacts should be maintained. The records and artifacts of other aspects of earth and environmental science should also be maintained. The largest threat to the Dominion Observatory will come in the future when Natural Resources Canada eventually moves out of the site. This is not yet planned but it is expected to happen when a future site for Natural Resources Canada is established. At that time the Dominion Observatory would become an abandoned building. We need to plan a future appropriate role for the observatory. We also need to preserve the records and artifacts related to both the observatory and all of earth and environmental science.

- 3) The third threat to the observatory artifacts is the rebuilding and reorganization of the Canadian Museum of Science and Technology. Although the museum now has a new 80,000 square foot building, it has not increased its space for the storage of records and artifacts. The museum's new storage and preservation building is already too small⁶. The museum and the government departments that send artifacts to the museum (such as Natural Resources Canada) are being forced to dispose of artifacts because of a shortage of space. The observatory artifacts are now dormant assets, since the Helen Hogg observatory has been dismantled. The 15-inch refractor telescope, which is the main instrument for the Dominion Observatory, is in storage and is at risk of being disposed of or lost. At the very least it is not serving a role in education the public about Science and Technology. It should be reinstalled in the observatory building.

Goal of this Proposal

This proposal endeavors to raise the issue of the preservation of the Dominion Observatory and to suggest a new role that will not only preserve the observatory and artifacts but also provide a venue for the teaching of science and technology to the public. In addition, if the experience of the Royal Greenwich Observatory⁷ in London UK can be followed, such an observatory can become a very popular tourist attraction.

- 1) The first goal of this proposal is to preserve the artifacts and records of the Dominion Observatory and the related artifacts and records related to earth and environmental science that are currently being disposed of. This includes the main telescope, but also other related instruments and especially the documents describing the research done at the observatory. A parallel goal is to preserve the same artifacts and documents from NRCan, DND, and DFO from the Booth Street site that relate to earth science that are being disposed of now. The Canadian developments in earth and environmental science are closely related to the original scientific aims of the Dominion Observatory.

⁵ <https://en.cbc.ca/property/522>

⁶ <https://ottawacitizen.com/news/local-news/science-and-tech-museums-new-storage-building-could-be-too-small-within-five-years>

⁷ <https://www.rmg.co.uk/royal-observatory>

- 2) The second goal is to endeavor to ensure that the development of the new Ottawa Hospital does not block the future conversion of the Dominion Observatory into a Science Museum by building a building that blocks the view of the observatory, or by introducing light pollution that eliminates the usefulness of the observing site.
- 3) The third goal is to propose that the Federal Government turn the Dominion Observatory into a science museum. This museum could be part of the group of museums associated with the Canada Science and Technology Museum (i.e., the Canada Science and Technology Museum, the Canada Aviation and Space Museum and the Canada Agriculture and Food Museum). Some of the artifacts such as the telescope are currently housed at the Canada Science and Technology Museum.
- 4) The fourth goal is to provide a venue for the teaching of science and technology. The Canada Science and Technology Museum already addresses part of this role. However, that museum does not have the resources or facilities to address the aspects of earth and environmental science including astronomy, seismology, mapping, weather, and the factors affecting the environment. As a museum the Dominion Observatory would be a good venue for explaining the principles of earth science ranging from astronomy and the measurement of time (and position) to geophysics and the factors affecting climate and environmental science. It will also be able to teach history because the observatory was established in part to survey and establish the borders of the western provinces. The history of the exploration of the west and the great explorers can be highlighted.
- 5) An indirect goal is to create a first-class tourist attraction promoting Canadian scientific achievement in the city of Ottawa. Other capital cities in the world have such attractions, such as the Carter observatory in Wellington New Zealand⁸, the Observatoire de Paris⁹, and especially the Royal Greenwich Observatory in London UK¹⁰ among many others. In Cape Town South Africa an observatory similar to the Dominion Observatory was established in 1828¹¹ with transit circles capable of determining precise longitude established in 1905. The main observatory is used for public outreach. Also Washington's U.S. Naval Observatory¹² has a special status being on the grounds of the residence of the Vice President of the United States of America. It seems that almost every major capital city hosts an observatory. The number of visitors to the Royal Greenwich Observatory in 2014 was 1,517,787 visitors¹³¹⁴. Greenwich has the Prime Meridian, but the story of the development of Standard Time and time zones by Sir Sandford Fleming, and the research into continental drift are also very compelling stories. The Dominion Observatory could be an important asset to Ottawa.

⁸ <https://www.museumswellington.org.nz/venue/space-place-carter-observatory/>

⁹ <https://www.obspm.fr/-histoire-du-site-de-paris-.html?lang=en>

¹⁰ <https://www.rmg.co.uk/royal-observatory>

¹¹ <https://www.sao.ac.za/about/history/>

¹² <https://www.usno.navy.mil/>

¹³ https://www.whatdotheyknow.com/request/visitors_statistics_6

¹⁴ <https://www.whatdotheyknow.com/request/267024/response/650631/attach/html/3/Copy%20of%20NMM%20Visitor%20Summary%20April%202014%202015%203.xlsx.html>

History:

The current Dominion Observatory is a “Classified Federal Heritage Building”¹⁵. However, that classification is because the building was designed by David Ewart the Chief Architect of the Department of Public Works from 1896 to 1914. The Observatory’s scientific history is not currently recognized as part of this designation. However, the Observatory’s place and contribution in the creation of the world system of Time Zones pioneered by Sir Sandford Fleming is not only significant, but also marks important Canadian contributions to the establishment of Standard Time.”

An important aspect of the early history of Canada is one of the discovery of this vast land by Europeans and their engagement with the indigenous peoples, and the connection of settlements by rail. In 1778 Captain James Cook visited the west coast of Canada and made contact with the peoples of Nootka Sound¹⁶ on the south-west coast of Vancouver Island. Captain Cook’s voyage benefited by the use of a chronometer used to establish longitude. The quest for establishing a method of measuring longitude¹⁷ was a one of the greatest scientific endeavors of the 18th century. The development of the chronometer by John Harrison and the development of the ephemeris tables of star positions by Sir John Flamsteed, the first Astronomer Royal allowed the British Navy to accurately create charts and explore the world. The seventh Astronomer Royal, Sir George Airy, established the first world geodetic reference system with the Prime Meridian at Greenwich near London, UK.

The establishment of the Prime Meridian was subject to a significant amount of scientific (and political) debate. The first International Geographical Congress was held in Belgium in 1871. The U.S. president Chester Arthur called for an International Meridian Conference to be held in Washington in 1884 to establish an international standard for zero degrees longitude. The Canadian Sir Sandford Fleming was a delegate to that conference. “The first proposal for a consistent treatment of time worldwide was a memoir entitled "Terrestrial Time" by Sandford Fleming, at the time the chief engineer of the Canadian Pacific Railway, presented to the Canadian Institute in 1876. ... In 1878/9, he produced modified proposals using the Greenwich meridian. Fleming's two papers were considered so important that in June 1879 the British Government forwarded copies to eighteen foreign countries and to various scientific bodies in England. At the same time the American Metrological Society produced a "Report on Standard Time" by Cleveland Abbe, chief of the United States Weather Service proposing essentially the same scheme. “¹⁸ The US adopted standard time in 1918.

The development of standard time was an important Canadian invention necessitated by the fact that Canada stretches from Cape Spear in Newfoundland at 52° 37’ West longitude to the west coast at 141° West longitude, covering what became six time zones. Note that some other large countries such as China simply use one national time zone and that the continental USA only spans 4 time zones.

¹⁵ https://www.pc.gc.ca/apps/dfhd/page_fhbros_eng.aspx?id=5695

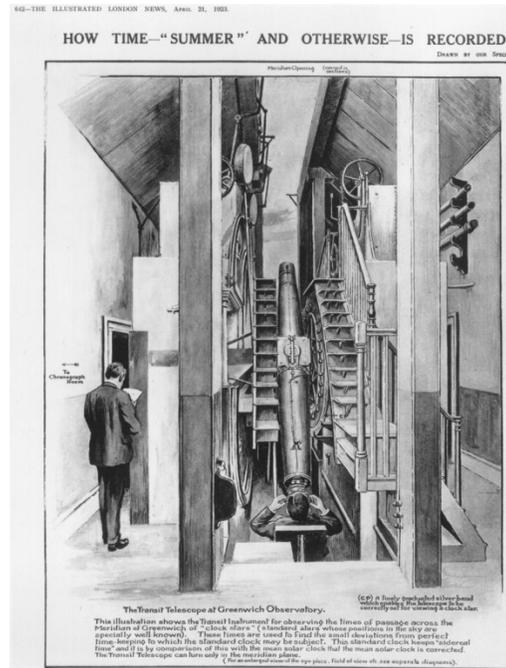
¹⁶ http://firstpeoplesofcanada.com/fp_furtrade/fp_contact_nootka.html

¹⁷ D Sobel, Longitude, Walker Publishing, 1995, ISBN 978-0-8027-1529-6

¹⁸ https://en.wikipedia.org/wiki/International_Meridian_Conference

The establishment of the Prime Meridian at Greenwich near London was so that the meridian could pass through a major astronomical instrument. This was necessary so that the meridian could be measured precisely. The transit circle telescope and the chronograph pendulum clock were the primary scientific instruments at Greenwich and they are currently on display at the Greenwich observatory museum.

The Dominion Observatory was an active research center from 1902 until 1970. "The observatory grew out of the Department of the Interior's need for the precise coordinates and timekeeping that at that time could only come from an observatory.¹⁹" The original transit circles (similar to those in Greenwich) allowed the measurement of the motion of stars across a North South reference meridian to be accurately established.



Airy Transit Circle at Greenwich Observatory, [Source: *Illustrated London News* 21 April 1923]

The initial mandate for the Dominion Observatory was "to aid and improve the survey work of western Canada through the investigation and application of positional astronomy". A pair of transit telescopes was a central part of the observatory's instrumentation and the west wing of the building housed these telescopes. One of the other protected buildings in the Dominion Observatory environs, the "South Azimuth Building" served as an artificial horizon as a reference for measurements of star declination angles.]



Plaque on the south side of the Dominion Observatory building

The Dominion Observatory served as the reference for the accurate survey of western Canada and the establishment of the provincial boundaries for Alberta and Saskatchewan when they became provinces in 1905.

The other main historical role of the Dominion Observatory was the establishment of an accurate time reference. The familiar "Beginning of the long dash ... marks one o'clock.." that is currently broadcast on CBC radio derives from the National Research Council time signal. This is continuously broadcast from a radio station (near Barrhaven in Ottawa) based on an atomic clock maintained by the NRC. Originally this signal was the Dominion Observatory²⁰ time signal and it was generated by the Dominion

¹⁹ https://en.wikipedia.org/wiki/Dominion_Observatory

²⁰ Thomson, M, "The beginning of the long dash: A history of timekeeping in Canada", University of Toronto Press, Toronto, 1978

Observatory using accurate chronometers adjusted to an astronomical reference. The original vacuum pendulum clocks were artifacts maintained by the observatory until the 1970's. Hopefully they have been retained in either the Natural Resources Canada or the Canadian Museum of Science and Technology collections and their significance still understood. These artifacts should not be disposed of.

The Dominion Observatory was also an important research center in the verification of the theory of continental drift. A Zenith telescope building (now demolished) existed on the lawn in front of the Dominion Observatory which was used, together with similar instruments in the US and several places in Europe, to calculate polar motions. In the 1960's the zenith telescope was used in cooperation with others to establish the movement of the North American and European continents.

Other important research went on in seismology and gravity measurements. An adjacent building to the observatory, also designed by the Dominion architect David Ewart, was dedicated to seismology and earth science. Underground vaults housed seismographs that recorded earthquake activity. These vaults still exist. The measurement of gravity became very important and are now tools used in mineral exploration and other aspects of earth science.

Status

The Dominion Observatory buildings and the environs may be of protected historical status, but the context and purpose of the observatory is being lost. It is destined to become a curious old building with little connection to Canada's contributions to the establishment of standard time or the surveying of Canada.

The telescope and some other artifacts of the building are now in the Museum of Science and Technology and the building is currently being used as office space by Natural Resources Canada. There are major changes occurring with respect to Natural Resources Canada. Natural Resources Canada is in part being relocated as the Booth St. complex is redeveloped²¹. The current Canada Lands development is only for part of the site. Natural Resources Canada (and the Canadian Hydrographic Service) has been moved out of 615 Booth (the main building). DND Mapping and Charting Establishment remains for about two more years until the new facilities in Kanata (old Nortel site) is complete. At some point NRCan gets moved somewhere else in the city and the observatory becomes an anomaly.

The interior of the Dominion Observatory building has been significantly changed by its use as an office building. The Transit Circle wing of the building has been converted to an open space office with cubicles.

The development of the Ottawa Hospital is a major threat to the observatory. Hospitals tend to grow over time and the Ottawa Hospital will eventually necessarily press to take over the observatory environs and leave the building as a curious old piece of architecture. The future role of the observatory needs to be established now. This will help the Ottawa Hospital because it will be clear where its boundaries are and the conditions that need to be maintained at those boundaries.

²¹ This is described in the Canada Lands Booth St development < <https://en.clc.ca/property/522> >

There is political opposition to the Ottawa Hospital expanding in the future into more of the Central Experimental Farm; however, this is a necessary eventuality and needs to be planned for. The observatory and its environs should be preserved. They will complement the hospital by providing parkland and greenspace.

Vision:

The primary goal of this proposal is the preservation of artifacts, records, and the legacy of Canadian scientific contributions. The Dominion Observatory is a tangible reminder of the work, data, and vision of Astronomers and Earth Sciences researchers' to systems of measurement and timekeeping which are foundational to modern society.

The necessary expansion of the Ottawa Hospital does not need to conflict with this goal, and by creating a clear plan and policy around the artifacts and grounds of the Observatory, disruptions to the Hospital's planned expansion can be minimized while preserving this historical site.

The minimum that needs to be done now is the preservation of artifacts and records relating to the Dominion Observatory and preservation of the Dominion Observatory buildings including the environs so that the construction of the Ottawa Hospital does not block the sky and create a sea of parking lot lights. However, much more can be done at very little cost.

The vision is for a Science Museum that specializes in astronomy, earth and environmental science as part of or affiliated with the Canadian Museum of Science and Technology. This museum could tell the story of Sir Sandford Fleming and the establishment of universal time. It could also tell the story of the exploration of Canada's natural resources and the protection of the environment. This could include survey and mapping and the Canadian explorers that mapped this country, the study of geophysics, including seismology and gravity, and more recently aerial photography and satellite remote sensing. It could also highlight the current challenges to our environment.

The Dominion Observatory could become a center for the teaching of science and technology to the general public, especially those aspects of science related to the earth as a planet. In the 1960's and before, the Dominion Observatory held weekly Saturday night observations where the public could view the moon and planets through its telescope. It also mounted several smaller portable telescopes on its flat roof for viewing. A similar viewing arrangement could be established again, although some national observatories that do something similar are open for viewing every clear night. At one time the Dominion Observatory had a Spectroheliograph attached to the rear of the building. This was demolished in the 1970's to increase parking, but a similar instrument could be used to show an image of the sun and sunspots so the observatory could be active all day.

This will be a relatively low cost museum because the buildings already exist and most of the artifacts and records still exist, and it is a natural fit for the current Canadian Museum of Science and Technology to manage.

Actions

The first action is for the appropriate bodies in the federal government to pass a **preservation mandate** that stops the disposal of relevant historical artifacts and records from the Dominion Observatory, Natural Resources Canada, the Department of Fisheries and Oceans, and Environment Canada. This should relate to all of earth science, not just astronomical records.

The second action is for the federal government to insist that the development of the **Ottawa Hospital** complex not preclude the potential future establishment of the Dominion Observatory as a Science Museum by **not obscuring the view of the sky** from the Observatory or by creating parking expanses or other lighting that **flood the surrounding areas with light**. The current proposal for the Ottawa Hospital seems sensitive to these concerns, but the plans for the Ottawa Hospital are not finalized and aspects such as preservation of the environs are likely to suffer in the future.

The third action is to work with the Canadian Museum of Science and Technology to **create the Dominion Observatory as a museum**. Hopefully this will assist the Museum of Science and Technology by reducing its artifact storage requirements and provide a new venue for the teaching of Science and Technology to the general public.

In addition, the City of Ottawa, and the **Ottawa Tourism Board** should be engaged to make such a museum a tourist attraction. The school boards should also be involved to integrate such a facility, astronomy, geophysics, earth and environmental **science** into their **teaching resources**.