
Fraser Grain Terminal Ltd.

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World-leading Earthquake early warning system to be implemented as part of the Seismic Risk protection plan at Fraser Grain Terminal Project and Fraser Surrey Docks

March 21, 2017

OVERVIEW

Fraser Grain Terminal (FGT) is working to submit a Development Permit (DP) application to The Vancouver Fraser Port Authority (VFPA), in accordance with VFPA's submission requirements, for the proposed development at Fraser Surrey Docks.

As part of the Development Permit application requirements, VFPA has specified that the FGT marine structures fall under 'Low Design Classification', meaning that the proposed facility needs to meet the provision of life safety protection in the Design Earthquake (DE). FGT, in order to go one step further from those requirements, intends to implement, together with Fraser Surrey Docks, an Earthquake Early Warning System (EEWS); a leading-edge technology developed by Ocean Networks Canada, in order to minimize loss of life in the occurrence of a catastrophic event in the Canadian West Coast. The proponent considers this to be a ground-breaking initiative not only in the Maritime Industry but also in any other industry or region worldwide.

This document intends to provide the VFPA with a clear intent and timeline to lay the foundation of the groundbreaking collaboration between Fraser Grain Terminal Ltd (and its partners, Parrish & Heimbecker Ltd and Paterson GlobalFoods Inc), with Fraser Surrey Docks (FSD) and Ocean Networks Canada (ONC). The outcome of this collaboration is to facilitate the transfer of technology from Ocean Networks Canada to its Industrial partners (FGT and FSD), and clarify the necessary steps to implement such a solution on the FSD leasehold property.

ABOUT OCEAN NETWORKS CANADA

Established in 2007 as a major initiative of the University of Victoria, Ocean Networks Canada (ONC) operates world-leading ocean observatories for the advancement of science and the benefit of Canada. The observatories collect data on physical, chemical, biological, and geological aspects of the ocean over long time periods, supporting research on complex Earth processes in ways not previously possible.

The observatories provide unique scientific and technical capabilities that permit researchers to operate instruments remotely and receive data at their home laboratories anywhere on the globe in real time. These facilities extend and complement other research platforms and programs, whether currently operating or planned for future deployment.

EARTHQUAKE EARLY WARNING SYSTEM

The west coast of North America is at risk of a major earthquake. An early warning alert of up to 90 seconds could save lives and protect infrastructure. In February 2016, ONC received funding from Emergency Management British Columbia (EMBC) to install and test the technology that will deliver a system for earthquake early warning for southern British Columbia by 2019.

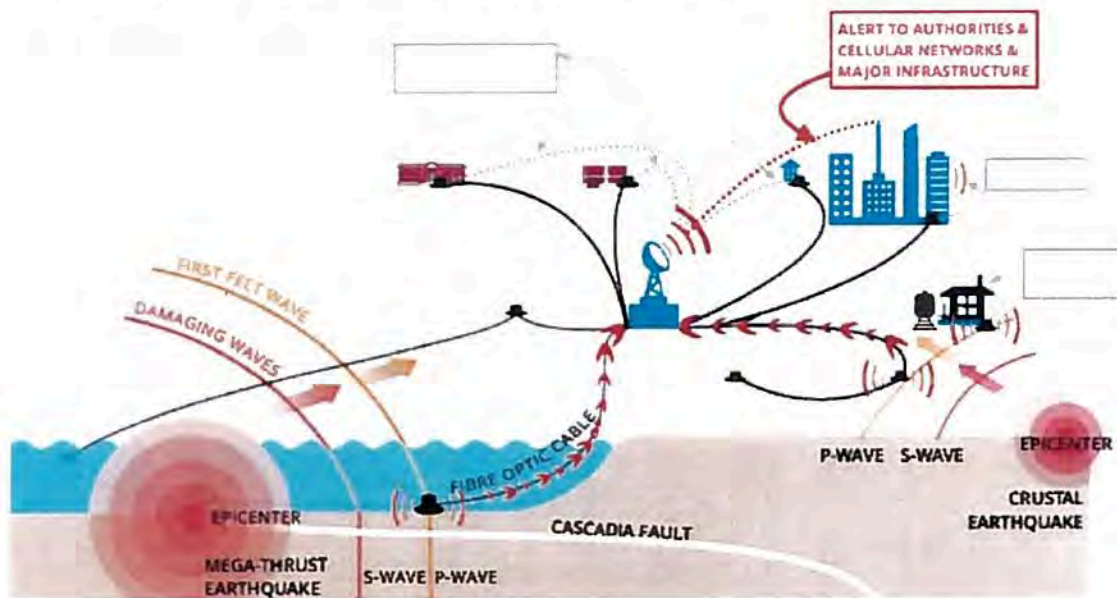
The Cascadia Subduction Zone is not the only area in BC that has the potential to cause a damaging earthquake but it does represent a large proportion of the risk, especially in southwestern BC. It is from this area that the so-called “Big One” will occur.



How does Earthquake Early Warning work?

- There is currently no known means to reliably predict earthquakes; however, seismic instruments can rapidly detect an earthquake as it begins to unfold.

- Earthquakes release energy that travels through the Earth as seismic waves. The primary or 'P' waves that cause no damage travel up to 90 seconds ahead of the secondary or 'S' waves that cause severe and damaging ground shaking.
- It is the ability to detect these first seismic 'P' waves that enables earthquake early warning systems to deliver alerts before the ground shaking begins.
- Installing many sensors on land and in the sea to detect earthquakes can provide rapid estimates of the location and magnitude of the quake. This helps determine the arrival time and intensity of ground-shaking across a region.
- Monitoring for earthquakes and providing alerts are critical to public safety.



What is the timeline?

- In February 2016, the Government of British Columbia announced an investment of \$5 million to ONC for the development of an earthquake early warning system for British Columbia. [BC Government News Release](#)
- In June 2016, ONC successfully deployed and connected the first of several offshore earthquake early warning sensors at the Cascadia subduction zone.
- ONC's funding from Emergency Management BC (EMBC), will:
 - install more subsea seismic instruments, as well as land-based seismic and GPS sensors, which will help estimate the magnitude for large earthquake events;
 - integrate the new network of land and sea sensors with existing networks and data;
 - further develop earthquake alerting software; and
 - test the system with EMBC.

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- By 2019, ONC will deliver an earthquake early warning system to EMBC, who are responsible for providing alerts and updates to the general public. Once approved by EMBC, these alerts can be embedded into major infrastructure operators' systems.

SYSTEM BENEFITS

Rapid alerts that signal incoming earthquake ground shaking can reduce deaths, injuries and property losses. Even a few seconds of warning provide enough time to take protective action and preventative measures, such as:

- triggering trains to slow down;
- stopping traffic, especially near tunnels and bridges;
- shutting off gas lines, electrical supply, etc;
- opening bay doors at fire and ambulance halls;
- allowing personnel to stop dangerous procedures;
- allowing surgeons to pause during surgery; and
- warning people to drop, cover and hold on before the shaking starts.

KEY CRITICAL FSD SITE CONSIDERATIONS

In order for the system to be successful in minimizing loss of life and property losses, FSD will need to take into consideration the following aspects:

- An Emergency Response Plan (EMS) that fully integrates the EEWS and includes such items as:
 - Determination of Personnel No-liquefaction Area(s) within reach of site personnel and operations,
 - actions required by each personnel to take cover,
 - actions required to safeguard personnel and infrastructure
 - provide safe and unimpeded access for First Responders
- Ensure potentially impactful areas and components of the facility are understood and considered within the EEWS and EMS
- Ensure connectivity to the EEWS is secure, properly maintained and monitored
- Train all personnel as required

FSD (AND FGT) SITE IMPLEMENTATION TIMELINE

Although in its preliminary stages, all participating organizations are committed to develop and implement this system to enhance current and future seismic mitigation measures in place at the FSD site.


Fraser Grain Terminal has already had initial discussions with Fraser Surrey Docks to implement this technical solution not only in the FGT site, but the complete FSD area. The goal will be to integrate the earthquake early warning system into the emergency siren system already in place at the FSD site.

Ocean Networks Canada is currently developing the necessary steps to have an operational system in place by early 2019. It is estimated that, pending Development Permit approval from VFPA, the Fraser Grain Terminal project will be completed no later than 2020. It is assumed that the earthquake early warning system will be operational before the FGT project is complete, therefore allowing the ownership to integrate it within other seismic safety risk mitigation measures already in place.


PARTICIPATING ORGANIZATIONS



Casey McCawley
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(on behalf of FGT Ltd)



Jeff Scott
CEO
Fraser Surrey Docks LP



Kate Moran
President & CEO
Ocean Networks Canada

ABOUT FRASER GRAIN TERMINAL

Fraser Grain Terminal Ltd. is a joint venture of Parrish and Heimbecker, Limited (P&H) and Paterson GlobalFoods Inc. (PGF) to construct a grain handling facility along the Fraser River in Surrey, British Columbia. P&H and PGF are Canadian family-owned and operated grain companies with more than 100 years of experience in agribusiness and locations across Canada, including the Alliance Grain Terminal, located on the south shore of the Burrard Inlet. Serving more than 10,000 Canadian farmers and producers, they market grain to over 40 countries.

Read more at <http://www.frasergrainterminal.ca/>

ABOUT PARRISH & HEIMBECKER LTD

Parrish and Heimbecker, Limited (P&H) is a Canadian family-owned firm with over 100 years of experience in agribusiness, with locations stretching across Canada from Vancouver to Halifax. P&H has grown into a diversified, vertically integrated company that is committed to agribusiness and the entire agri-food industry.

Read more at <http://www.parrishandheimbecker.com/home>

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Read more at <http://www.oceannetworks.ca/>

ABOUT FRASER SURREY DOCKS

Fraser Surrey Docks LP, is the largest modern, multi-purpose marine terminal on the West Coast of North America. Fitted with seven deep sea berths, the approximate 200 acre terminal maintains uncongested rail connections to four different rail carriers. FSD has been serving the needs of Container, Break Bulk, Project Cargo, Forest Products and Dry Bulk customers in the Port Metro Vancouver and around the world since 1962. The facility is located in the greater Vancouver area of Surrey, British Columbia along the banks of the mighty Fraser River.

Read more at <http://www.fsd.bc.ca/>