

OTTAWA PARLIAMENT WEST BLOCK - ROCK STABILIZATION

PROPERTY: PWGSC - PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

GENERAL CONTRACTOR: PCL CONSTRUCTION CANADA

SUBCONTRACTOR: DUFRESNE PILING COMPANY

WORKS EXECUTED: ROCK BOLTS, DRAINAGE, MESH, SHOTCRETE

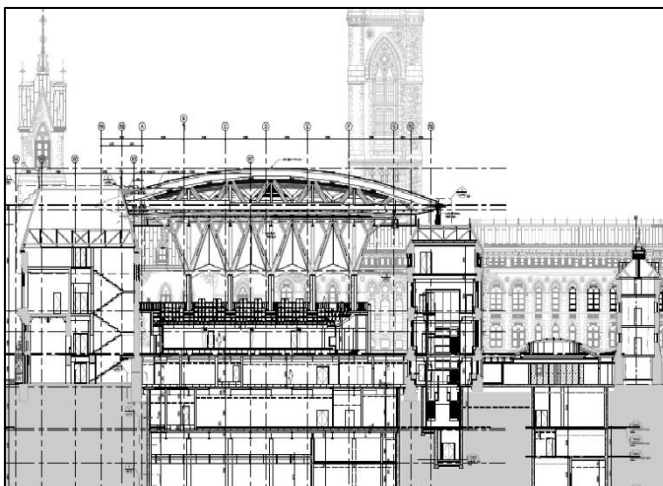
INTRODUCTION

The West Block is part of the monumental building of the Parliament hill.



Parliament hill. Panoramic view.

As part of an intensive program of sequential renovation of the complex, The West Block is designed to accommodate parliamentarians in 2017. The adaptation of the building to its new features includes the need for an integral rehabilitation and provision of new spaces, the project includes the excavation below the grade in the Inner and North courtyards about 15



Cross section.



Comacchio MC-600 drilling vertical dowels inside the building for foundation underpinning.

... meters, with the consequent underpinning of old foundations, construction of five tunnels under the existing building, erection of new structures, dome of steel and glass, internal redesign, facilities renovation, demolition, cleaning and recovery of sculptural motifs on all facades and decks repair.

WORKS DESCRIPTION

SITE CANADA works consisted of Rock reinforcement for excavation package, which included the support and underpinning of existing foundations.

The design included the installation of vertical bolts, called dowels next to existing foundations for underpinning prior to the excavation process, sub horizontal bolts in patterns of different density and length according to the rock degree of weathering and localized faults, as well as temporary fiberglass bolts for those rock fronts that due to the construction sequence will be excavated later as well as for nailing the tunnels crown's.

For waterproofing, Miradrain Panels type drain 600 were installed on the exposed rock, drainage layer with nodular sheet drain and high-density polyethylene with a geotextile filter layer towards the rock. Mechanically fixed.

The waterproofing is guaranteed with a wet mix shotcrete spray finishing, in this case was rather close to a spray mortar than concrete as per the space limitations and verticality of the walls, required the use of fines in the mixture and replacing or near elimination of the gravel., Accelerators and superplasticizer were also be required. For strengthening the shotcrete welded wire mesh in 6 mm 100x100 grid was used.

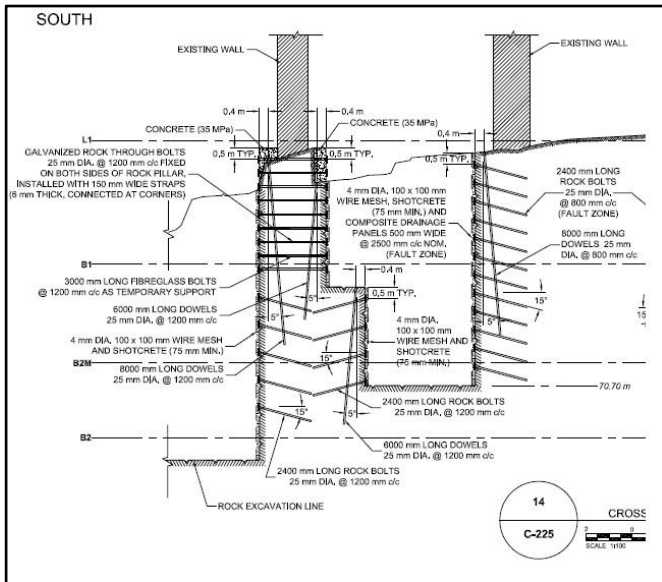
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SITE CANADA adapted well to the working environment of this construction site given the requirement for specialized equipment for such diverse areas. Using Ingersollrand pneumatic drill rigs for open spaces where they could maneuver easily and provide high levels of production. In the interiors of the building, with high limitation in dimensions and machinery fumes restrictions, small size pneumatic equipment were used in the bolting as well as hydraulic Comacchio MC-600, more versatile and TES-20 with width 780 mm, 800 kg weight and downhole hammer , very suitable machine to drill in different diameters at the most complicated accesses. Where it was not possible to introduce self-driving machinery, hand-held pneumatic and pneumatic boom tripods were used.

The foundation of limestone is presented horizontally layered gently sloping north south. Comprises a first layer of filled materials ranging from 0.3 m to 4.00 m, consisting of loose material, silt, sand, gravel and some boulders. The first meters of limestone is found cracked and / or broken. The competitiveness of the rock improves with its depth. Five faults cross the promontory, two of them lay out under the foundation of the West Block in North-South direction, requiring reinforcement or increase of the bolts mesh under the foundations.

The grout of bolts was performed with a grouting ratio of w:c = 0.5 with maximum pressure of 5 bars and an average admission of 30 kg of cement per meter.

The results of strength, quality and production have been within expectations and adjusted to the deadlines, schedules and other contracts.

MEASUREMENTS

Galvanized steel rock bolts. 25 mm installed with Gewi type bar Fast setting resin of 2 minutes. Including plate, nut and tensioning with calibrated torque wrench.	12.966.60 Meters
Galvanized steel rock bolts. 25 mm installed with Gewi type bar Grouted with w:c 0.5. Including plate, nut and tensioning with calibrated torque wrench.	2.035,00 Meters
Fiberglass bolts 25 mm installed with grout 0:5 Including plate, nut and tensioning with hydraulic jack	400 Meters
Units of heads for vertical dowels. Including plate and nut	304 Units
Proof test with hydraulic Jack in rock bolts. Including deformation and pressure readings and reports	560 Units
Shotcrete or mortar spray on vertical walls for excavation	80.55 Cubic meters
Welded Wire mesh 6mm 100x100	1075 Square meters
Drainage panels. Mira Drain 600 installed	1120.72 Square meters

RESULTS