

# UPPER WAWA DAM PUMPING STATION PROJECT STEEL FIBER-REINFORCED SHOT

## CITY OF ANTIPOLLO AND MUNICIPALITIES OF SAN MATEO AND RODRIGUEZ, REGION IV-A, PHILIPPINES

### Primary Lining

#### Problem

The Upper Wawa Dam Pumping Station Project aims to address the increasing water demand and flood concerns in Metro Manila. The project was designed to convey water from the reservoirs through a conveyance pipeline with a tunneled portion up to the designated delivery point near the Calawis Water Treatment Plant (CWTP).

Hydraulic aspects of the project include the design of a diversion tunnel and headworks for the transmission pipeline. With the section of the project being underground and prone to the moderate impact of earthquake-induced slope instability considering the terrain and slope of the project area, the first technical concern was evaluating the geological conditions and planning excavation methodologies using conventional drill and blast technology with shotcrete, rockbolts, and steel sets for temporary support.

#### Solution

Maccaferri Philippines (MPI) together with Bekaert provided design and technical assistance and worked with the contractor, Prime Metro BMD Corporation, a joint venture between Prime Infra and the BMD Group.

Dramix Steel Fiber-Reinforced Shotcrete (SFRS) has been proposed for slope stabilization and underground lining of the conveyance pipeline. An easy-to-use alternative for traditional steel mesh and bar reinforcement providing significant technical performance in terms of energy absorption capacity and residual flexural strength. Fiber reinforcements are used in underground shotcrete with the primary objective of providing post-crack reinforcement and increasing the ductility of the shotcrete support layer.

Steel fibers impart to the shotcrete lining the ability to redistribute cracking by providing miniature hinges, and thus redistribute the moments and stresses resulting in increased load capacity. In achieving the required energy absorption capacity performance of 700 Joules of the shotcrete mix design for the Upper Wawa Dam Pumping Station Project, a dosage of 25kg/m<sup>3</sup> Dramix 3D 65/60 BG steel fibers is recommended.

Besides its constructability and being a cheap alternative compared to conventional reinforcement, another distinct advantage of using Steel Fiber-Reinforced Shotcrete is its ability to reduce shotcrete consumption and

**Client:** Prime Metro BMD Corporation

**Designer / Consultant:** Lombardi Engineering Ltd. / AFRY

**Contractor:** Prime Metro BMD Corporation

**Products used (Qty.)**

- Ties and Spirals

Dramix 3D 65/35  
BG 205 metric

**Date of construction:** 07/2022 - 12/2025



Unloading of Fresh Steel Fiber-Reinforced Shotcrete mix on to a shotcrete machine



Tunneling Works using Steel-Fiber Reinforced Shotcrete



Steel Fiber-Reinforced Shotcrete 1



Steel Fiber-Reinforced Shotcrete 2



Steel Fiber-Reinforced Shotcrete 2



Steel Fiber-Reinforced Shotcrete Slope Stabilization Surface

Maccaferri (Philippines), Inc.  
11/F, Asian Star Building Alabang, 1781 Muntinlupa City - Philippines  
Tel: +63-2 8889-0623  
E-mail: [info.ph@maccaferri.com](mailto:info.ph@maccaferri.com)