



معوذ - اده ش.م.م.
MOUAWAD-EDDE S.A.R.L.

Beirut March 7th 2014

Ref: AC/14/384

BAUER Lebanon Foundation Specialists S.a.r.l.

Beirut - Lebanon

Subject: Chabrouh Dam - Republic of Lebanon

Dear Madams / Sirs,

The Chabrouh Dam, a project of the Ministry of Energy and Water of the Lebanese Republic, was successfully completed and put into operation in 2007.

Herewith, we, Ste. Mouawad-Edde, being the Main Contractor for the Dam Execution would like to express our appreciation for BAUER Lebanon Foundation Specialist S.a.r.l.'s performance on the project.

Chabrouh Dam, constructed for potable water supply, irrigation purposes and for the general development of Kesrouan region is located on Wadi Chabrouh, approximately 40 km North-East of Beirut. The rockfill dam, with a maximum height of 65 m and crest length of 470 m, creates a reservoir dimensioned for approx. 9 million cubic meters.

The geological conditions of the project area are of significant heterogeneity, additionally affected by tectonic disturbance. On the both flanks of the Main Dam moderately to highly fractured Limestone is prevailing with locally high degree of disturbance, including Karstic features. The major faults in the Main Dam area consisted additionally of Tuff of volcanic origin.



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The grouting works performed by Bauer in several stages in the years 2003 – 2007 included some 60.000 m of grouting holes, with depths of down to 90 m, executed under partially very complicated underground conditions, to reduce the seepage losses underneath the dam and at its flanks, beside the improvement of dam foundations by consolidation. Bauer's scope included further investigation drillings, drainage bores and rock stabilization with rock anchors and shotcrete. A substantial portion of the works had to be executed in the tunnels and galleries, consisting of 410 m long diversion tunnel, 240 m long concrete access tunnel, 750 m long 2 concrete drainage tunnels and 300 m long 2 grouting tunnels, under conditions of considerable space limitations.

Bauer reacted flexibly regarding design changes and contributed in a professional way to further mix design and execution technique improvements based on their extensive experience acquired in similar projects. Their team was always proactive in seeking solutions for unforeseen problems.

In conclusion, Bauer's professional approach towards the project was to our fullest satisfaction with respect to the excellent quality, the construction schedule and the cooperation with the involved Parties.

Yours sincerely,

Charles Edde