

## Polyester Rope Suspended Footbridge – Five Years in Service

### **Ryan M. WOODWARD**

Bridge Engineer  
HNTB Corporation

New York, NY, USA  
[Woodward.R.M@gmail.com](mailto:Woodward.R.M@gmail.com)

B.S.E. University of Pennsylvania (2000). M.S.E. Princeton University (2002). Structural engineer in the design of complex bridges.

### **Margaret M. COWIE**

Project Engineer  
Robert Silman Associates

New York, NY, USA  
[cowie@silman.com](mailto:cowie@silman.com)

B.S. Columbia University (2014). M.S. Columbia University (2015). Structural engineer involved in preservation and new construction.

### **Tamar J. CAPLAN**

Structural Engineer  
Robert Silman Associates

New York, NY, USA  
[caplan@silman.com](mailto:caplan@silman.com)

B.S. Columbia University (2014). M.S. Columbia University (2015). Structural engineer involved in preservation and new construction.

### **Jennifer A. MAHAN**

Senior Engineer  
Thornton Tomasetti  
New York, NY, USA  
[jmahan@thorntontomasetti.com](mailto:jmahan@thorntontomasetti.com)

B.S. Columbia University (2015).  
M.S. University of California, Berkeley (2016).

### **Devin McMANUS**

Structural Engineer  
S/L/A/M Collaborative  
Glastonbury, CT, USA  
[dmcmamus@slamcoll.com](mailto:dmcmamus@slamcoll.com)

B.S. Columbia University (2015).  
M.S. Columbia University (2016).

**Contact:** [Woodward.R.M@gmail.com](mailto:Woodward.R.M@gmail.com)

## **1 Abstract**

A footbridge was built in 2013 in rural Morocco using lightweight polyester rope, spanning 64 meters (210 feet) across a deep ravine. The area is prone to perennial flash flooding, cutting off access to schools, the local clinic, and the market for weeks at a time. After five years of service, the design team returned to inspect the structural condition, and replace one of the main ropes. The decommissioned rope was subjected to load testing and dissection, and was found to be in excellent condition.

The novel use of synthetic rope offered some advantages over steel wire rope typically used for this type of project, and the team developed strategies to work efficiently with this unusual material. Particularly, its light weight makes it substantially less costly and simpler to transport to the construction site (the rope was procured in the U.S. and shipped to Morocco in backpacks). As it is less sensitive to the effects of twisting, the rope does not require the level of care typical of wire rope.

The paper will discuss unique aspects of construction, and challenges related to ongoing maintenance of this type of infrastructure in a developing country.

**Keywords:** Sustainability; synthetic rope; innovative construction methods; structural concepts; planning; new materials