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**Mosul Dam
- an extraordinary
year of
rehabilitation**

Introduction by Richard Guthrie, Editor

Winter 2018

Early into 2018, Mt. Mayon erupted in the Philippines and, almost at the same time, Kusatsu-Shirane erupted at a ski resort in Japan. The former caused the evacuation of almost 60,000, the latter physically injured several and killed one. Significant earthquakes hit Indonesia, Alaska (a 7.9 no less!), Japan, Taiwan, Peru, Mexico, South Africa, Chile and Honduras. California was inundated by debris flows, following on the heels of (and exacerbated by) the intense fires of December 2017.

Geohazards, as we continue to be reminded, take on increasingly important stature in modern societies. As professionals we are sought out for advice, explanation, understanding, and mitigation. How do we take care of our professional staff and colleagues when they are assessing hazards? What about during mitigation?

While we don't have all the answers, a relatively new group of like-minded professionals is trying to work out how to be safe while working on steep slopes.

The Association of Geohazards Professionals (AGHP) was formed in 2013 to establish standards and best practices around design and implementation of geohazard technologies such as rock fall fencing, debris flow nets, post-support systems, and monitoring systems. They are formally supported by the Canadian Geotechnical Society.

In this issue, John Duffy, Mark Fish and Colby Barrett, all from AGHP, discuss working safely on steep slopes that require rope systems to operate.

I hope you find it thought provoking.

Call for project descriptions

Geohazards is interested in featuring projects that you've been researching, investigating, or implementing, around the world in 2017/2018. Specifically, we are looking to feature the breadth and depth of Canadian geotechnical expertise and input to Geohazard challenges elsewhere in the world. Please submit a good quality photograph and a project description to Richard.guthrie@stantec.com by June 21, 2018.

7th Canadian Geohazards Conference – Geohazards 7: Engineering Resiliency in a Changing Climate <http://www.geohazards7.ca/>

The Canadian Geotechnical Society (CGS) is pleased to announce the 7th Canadian Geohazards Conference – Geohazards 7 – to be held June 3-6, 2018 at the Coast Canmore Hotel & Conference Centre in Canmore, Alberta. The CGS's Geohazards conferences are the premiere forums in Canada for the sharing and dissemination of scientific and engineering knowledge related to geohazard assessment and risk management.

Canmore is ideally situated for hosting Geohazards 7. It is located within easy travel distance from the Calgary International Airport, and is less than a 30-minute drive from Banff National Park. Heavy rainfall in June 2013 resulted in the worst floods in Alberta's history. Landslides, debris floods and debris flows cut off highway and rail access to Banff and Canmore, and many homes constructed on alluvial fans were destroyed.

Municipal governments, the Province and the engineering and geoscience community have since carried out aggressive programs to quantify geohazard risk, increase public awareness of hazards, and are constructing mitigation measures to reduce future risk. Canmore is a terrific venue to showcase the results of some of these initiatives, which will feature in the conference program and fieldtrip.

This conference will be of interest to engineering and geoscience students and consultants, industry, and government agency representatives who are involved in planning, approval, construction and operation of infrastructure and residential development in areas prone to geohazards. The conference will touch on the full gamut of hazards and risks associated with floods, debris flows, landslides, snow avalanche, earthquakes, volcanic eruptions, degrading permafrost and more. Arming participants with greater awareness of methods for quantifying geohazard magnitude and frequency for risk assessment and mitigation design, quantifying uncertainty in a changing climate, and communicating with the public about geohazard issues, are key objectives of the conference.

Closing Notes

Thank you for your letters! If you have a paper or project related to Geohazards that you think would be interesting to GN readers, please send me note at Richard.guthrie@stantec.com.

Until next time,

Rick

Safe work on dangerous slopes

John Duffy, Marc Fish, and Colby Barrett

Prologue

In 2013 a group of engineering, geologic and geotechnical consultants, contractors, manufacturers and stakeholders came together to form the Association of Geohazard Professionals (AGHP). The concept was a diverse body that could promote material and application standards, best practices, safety practices, and knowledge transfer in North America. The association has grown steadily since, with much of its activity focused around committees dealing with various aspects of the industry such as debris flow mitigation, geohazard monitoring, anchor design and testing, material testing and dangerous slope access and safety.

The Rope Access Committee is one of the first committees to have formed. John Duffy (Yeh and Assoc., formerly California Department of Transportation) and Marc Fish (Washington State Department of Transportation) are the committee co-chairs, having a combined total of 50 years working on and around dangerous slopes. The committee consists of representatives from government, academics, consultants, contractors and geohazard system manufacturers.

(www.geohazardassociation.org/committees/rope-access-committee/).

Introduction

The mitigation of many geohazards involves the movement of people and machinery on or within the affected areas of steep, unstable slopes (Figure



Figure 1: Scaling operations along Highway SR 410 in Washington.

1). The very nature of the work means that lives are being put at risk at every stage of mitigation, whether it is in the course of preliminary site investigations, during construction, or carrying out inspection or maintenance of mitigation measures. Such activities are by no means a new phenomenon, but as the geohazard industry has progressed over the years, there has never been a widespread adoption of rope access protocols specific to the unique requirements of the industry. Instead, geohazard professionals have been left to draw on safety procedures and training originally developed for other applications such as recreational climbing, search and rescue, arborists, security, avalanche control, and man-made structures. Other than the fact that all these activities share the use of rope systems for mobility, they differ

greatly in practice. The skills, techniques and equipment that make one activity safe cannot simply be transferred to another with an expectation of the same results. The Rope Access Committee is trying to establish rope access protocols and cultures that will fill make the industry safer, while at the same time allow professionals to work efficiently.

Rope access best-practice

Social acceptance of exposing employees to hazardous conditions on a worksite has reduced dramatically over the last century and employers are increasingly focused on protecting the worker from harm while carrying out their tasks. Safety standards are frequently set by State/Provincial or Federal public agencies, however, these policies can be absent, vague,

or inappropriate for the industry's specific needs.

Some of the largest stakeholders of hazardous slopes are Departments/Ministries of Transportation found throughout North America. In general, their contract specifications require no specific rope access safety protocols or rely on safety procedures and training requirements from other disciplines.

A few agencies have identified the importance of safety protocols for working on hazardous slopes and



Figure 2: CalTrans staff participating in rope access training program (Photo credit Bill Gates).

established their own extensive training and certification programs (Figure 2). The California Department of Transportation (Caltrans), for example, created a training course used to train hundreds of employees since 1990 and developed the Caltrans Bank Scaling and Rock Climbing Manual (Caltrans 2014). Another available guideline is available from U.S. Bureau of Reclamation Guidelines for Rope Access (2004).

Geohazard specialty companies have further developed their own internal safety protocols and implemented comprehensive and on-going training programs. They often have workers certified by third party organizations such as SPRAT (Society of Professional Rope Access Technicians), IRATA (Industrial Rope Access Trade Association) or PCIA (Professional

Climbing Instructors Association Slope Access Technician (SAT) program).

One common controversy is the selection of the appropriate climbing protocol and strategy for the task at hand. Each system has advantages, depending on site conditions and the characteristics of the work to be carried out. Important is that a choice be made by a competent and trained individual, based on careful consideration of decisive factors, such as available anchorage, geologic slope conditions, unstable rock blocks, entry and exit routes, need for mobility and other potential features that may affect the work.

In sum, while a safety and training program is vital for any geohazard professional engaging in work on dangerous slopes, there is currently no harmonized approach. Safety training and certification either done in-house or through third-party agencies will only help reduce risk to workers and demonstrate due diligence by their employer.

The Rope Access Committee is currently developing an AGHP safety best-practice guideline specific to

the geohazards industry. Committee member Steve Wilcox, who previously authored a guideline for communication tower workers in the USA, is heading this effort. Steve is currently visiting multiple construction sites involving steep slopes in order to gather information and will work with the committee to prepare draft guidelines later this year.

Slope access and safety evaluation

While there are many jobsite safety programs, few are available for working on steep slopes. One of the key components missing is the recognition and evaluation of the slope characteristics as they relate to accessing the slope with ropes. Slope geometry, site access, geologic characteristics and potential hazards need to be identified. The process of identifying such features is part of the slope access and safety evaluation (SASE), which provides a critical first step to slope access safety.

The Rope Access Committee drafted a form for the purpose of standardizing the collection of information used for decision making regarding the proper slope access equipment and systems



Figure 3: Drilling operations on a steep slope.

required, site safety, work procedures, worker experience requirements and emergency response procedures. The form is available on the AGHP website.

A working group is currently designing a corollary guidance document on how the form should be used, whom should fill it out, and options for adjustment and modification. By implementing the use of SASEs as a best-practice, together with a job site assessment (JSA) a comprehensive job safety evaluation is possible when accessing steep slopes is required (Figure 3).

Safety culture and recognition

Best-practice guidelines and the SASE process are important tools, but are only of illusory benefit without a strong safety culture among industry participants. Increasingly, industrial firms have understood that working safe need not come at the expense of production. Workers that know that they are protected – by their firm’s process, procedures, training, approaches, and equipment selection and maintenance – are able to achieve high levels of sustainable production (Figure 4). And as more owner agencies become aware of these best practices, they will inevitably require that anyone working on their slopes (including their own employees) do so with the highest safety standards and most appropriate certifications. This process takes time, but the trend in the North American geohazards mitigation industry is clear.

To help grow such a culture, the Rope Access Committee has initiated the AGHP Safety Recognition Program. The hope is that by recognizing industry members that are diligent in keeping their rope access workers safe, we will encourage others to follow. The public recognition will also help owners have confidence in those who carry out their work.

The Safety Recognition Program is an annual review of a company’s safety

program and performance metrics. The first identifies a commitment to management involvement and commitment to a firm’s safety program, including specific questions about whether the firm has a written rope access safety procedure and adheres to other industry best practices. The latter identifies geohazards mitigation organizations that execute their work safer than industry averages based on Total Incident Rates and Lost Time/Modified Duty Rates statistics.

More information about this program can be found on the committee’s webpage.

Summary

The AGHP’s Rope Access Committee is a group of volunteer individuals from the geohazards industry with a passion about making a safe work environment for those who literally put their lives on the line while making the world a safer place for others. This diverse group of experts is working towards establishing best-practice guidelines, standardizing safety procedures and instilling an industry wide culture of safety. If the saying “it takes a village to raise a child” is true, then it takes an association of volunteers to keep that child safe! Please share the culture.



Figure 4: Scalers working off of a two-rope system.

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