

## Attachment A

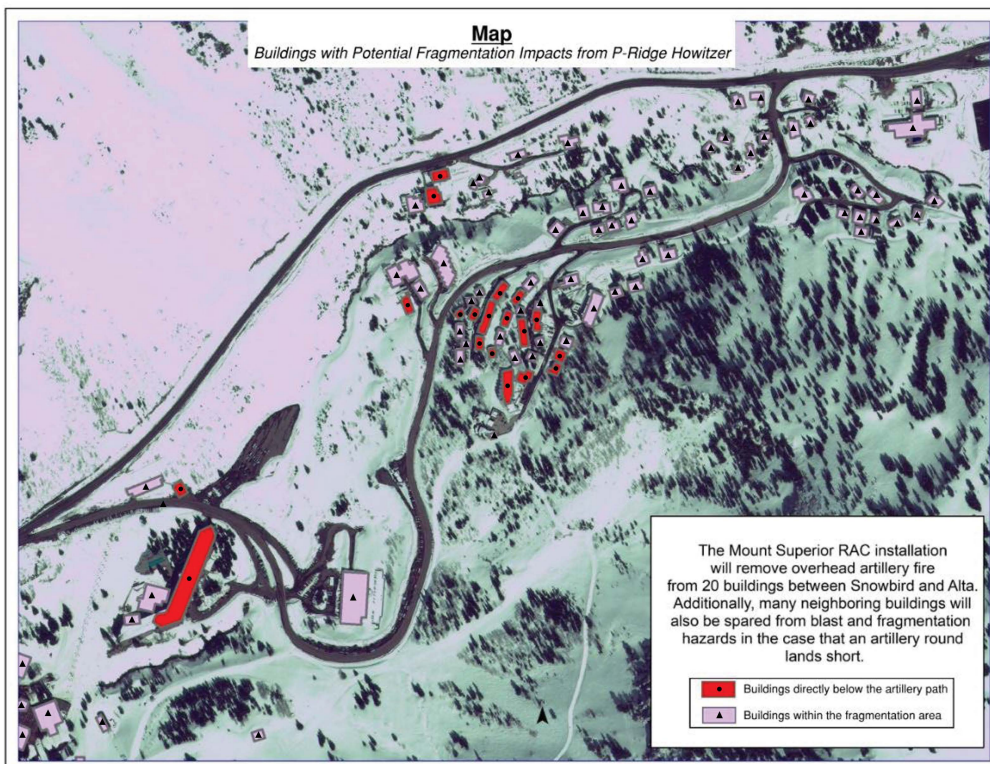
### **6. Describe the infrastructure project description and location, to the extent known.**

For this project, UDOT is planning to install 14 Remote Avalanche Control Systems (RACS) along Mount Superior (Elevation >11,000 ft) in Little Cottonwood Canyon, SR-210 (~ Milepost 10.7 to 11.2). These RACS reduce dependency on Military Artillery for avalanche mitigation and help eliminate the need to fire artillery over buildings and people.

#### **Safety Benefits**

In 2020, the US Army asked all members of the Avalanche Artillery Users of North America Committee (AAUNAC) to submit an exit plan for their use of military artillery. The plans included locations and timelines for reducing the use of artillery in each respective program. The one exception to this was programs and locations who performed avalanche mitigation in designated wilderness areas. These areas are protected from any type of infrastructure installations and currently do not allow the installation of RACS. For UDOT, this means that most locations where artillery is currently being used to perform avalanche mitigation, will be allowed to continue. The Mount Superior project area is not designated wilderness and UDOT has committed to ending the use of the P-Ridge Howitzer by 2025.

The completion of the Mount Superior RAC installation project is an important step in reducing UDOT's dependency on military artillery. Currently, live artillery ammunition is fired over inhabited buildings for the purposes of avalanche mitigation. This is the only location in North America where this occurs, and the US Army has strongly encouraged UDOT to work toward eliminating this hazard since the early 2000's. So far, previous UDOT RAC installations have contributed to the reduction of overhead fire in Little Cottonwood Canyon. Once the Mount Superior RAC installation project is completed, only two remaining buildings will have overhead fire in Little Cottonwood Canyon, a 97% reduction since 2009 (see map). The reduction of military artillery use will have additional worker safety benefits including limiting exposure to loud noises and breathing in potentially harmful smoke from the firing of military artillery.



## **10 Listing of Materials, Technical Specifications, and Quantity:**

(14) Wyssen Tower Remote Avalanche Control Systems comprised of the following:

- The Wyssen Deployment Box and Tower is an equipment system designed to be paired together to be used for avalanche mitigation. The Wyssen system is a type of Remote Avalanche Control System (RACS) that utilizes a remotely deployed explosive charge that hangs above the slope to provide an air blast used to trigger avalanches in a controlled environment.

(14) Deployment Box LS12-5 \$1,620,458.00 Switzerland PSC: 5445 NAICS: 33399

- The Deployment Box is a device that holds 12 explosive charges used to trigger avalanches. Inside of each unit is a 12 shot carousel, redundant cell and radio communications equipment, solar panel, and associated safety features.

(14) Tower 10m, reinforced LS12-5 \$280,616.00 Switzerland PSC: 5445 NAICS: 332312

- The Tower serves as a landing location for the Deployment Box. It is specifically designed to accept the Deployment Box on the top of the tower by landing the box onto the “thumb”. The Tower is also designed to handle the forces from snow creep and avalanche impacts. The Tower is fixed to the ground with 5 micro pile anchors and rests on a small concrete footing.

(14) Anchor Kit vertical ND32(LS12/LS6) \$3,290.00 Switzerland PSC: 5445 NAICS: 33299

- The anchor kit included the associated hardware to join the tower to the 4 vertical micropile anchors.

(14) Anchor Kit shear relief ND40(LS12/LS6) \$2,506.00 Switzerland PSC: 5445 NAICS: 33299

- The shear relief anchor kit is used to join the upslope, shear relief anchor to the tower using a specifically designed bracket.

(14) Template plate for ND 32 \$6,398.00 Switzerland PSC: 5445 NAICS: 33299

- The Template is designed to align the micro pile anchors to the tower base. Additionally, it forms the top of the concrete pad that the tower rests on top of, protecting the concrete from damage.

### **10.1 Technical specification description of items to be waived, if applicable.**

#### **Wyssen Avalanche Control**

The Wyssen Tower Remote Avalanche Control System provides a unique combination of features that make it suitable for the Mount Superior RAC installation project. The Wyssen avalanche tower is designed to trigger avalanches proactively with remote-controlled blasting. To trigger an avalanche, a coded command is sent from the control center WAC.3® to the control system of the deployment box to initiate blasting. Communication with the systems is redundant in that they can operate on both cellular and radio modems and adjacent towers will function as repeaters to relay a signal in the case that one tower loses connection. The deployment box contains up to 12 explosive charges, which can be individually deployed by remote control. When the explosive charge is dropped two igniters are pulled, and the explosion is set off after a time delay. The charge hangs from a cord about 2-3 meters (7-10 ft) above the snow cover, and the cord is dropped after blasting. To reload explosive charges the deployment box is lifted from the tower by helicopter and brought to a workshop or warehouse.

The Wyssen Tower system is designed to be a rugged, self-contained RAC system. The solar panels, antenna and flashing lamp are mounted on the outside of the deployment box. The dropping mechanism,

the electronics, and 12 prepared explosive charges are on the inside of the box, protected from the elements. The tower has a very small footprint and is ideal for construction in the rugged terrain within the Mount Superior Project Area.

UDOT and The Transportation Avalanche Research Pool (TARP) funded a RACS effectiveness analysis project in 2021. The project was completed by Rob Larsen and Brandt Seitz from Montana State University. The study compared different combinations of RACS in both operational and simulated flat ground scenarios. In short, the Pentolite Wyssen explosive was found to have the largest effective blast area. This study and UDOT's operational experience with different RAC systems informed UDOT's decision to install Wyssen Towers in the Mount Superior Area.

### **11.1.1 A description of the due diligence performed by the applicant, including names and contact information of the manufacturers, distributors, or suppliers contacted for quotes (minimum 3), and the responses provided.**

#### **Suppliers:**

UDOT contacted three primary suppliers of RACS to the United States of America. UDOT is part of the Transportation Avalanche Research Pool(TARP) and these are the systems identified and in use in the United States based on their findings. Each system has unique properties and not all systems will work perfectly in all situations. Many operations will have a mixture of RAC systems to address differences in terrain configuration, proximity to structures, effective blast radius and other considerations. The main supplier for gas-delivered explosions (GazEx®, GazFlex®, OBellX®, and Daisy-Bell®) is MND (formerly TAS). Inauen-Schatti (Avalanche Guard® and Avalanche Pipe) is the main supplier of propelled explosive charges. Wyssen Avalanche Control (Wyssen Tower and Mini-Wyssen) is the main supplier of suspended explosive charges. Inauen-Schatti does make RACS that are suspended from towers (Avalanche Master), but to date, none have been installed in the United States.

#### **Supplier Contact 1 - Wyssen Avalanche Control**

Eddie Schoen, from Wyssen Avalanche Control was contacted and provided a quote for 14 Wyssen avalanche control towers and deployment boxes.

Eddie Schoen - Project Manager  
[eddie@wyssen.com](mailto:eddie@wyssen.com), 720-826-8527

- Products: Wyssen Tower (LS12-5, LS24-5), Mini-Wyssen Tower
- Headquarters: Feld 1, 3713 Reichenbach im Kandertal, Switzerland  
Wyssen USA - 3550 Frontier Ave, Suite A2, Boulder, CO 80301
- Materials source and manufacture: Switzerland (Magazines and hardware), Poland and USA (towers)
- Systems installed in the US as of NOV 2023: 53
- Materials/Parts sourced/produced in the USA: Towers, foundation concrete, rebar, and rock anchors sourced in USA
- Installations: Performed by US contractors with one Swiss Supervisor from Wyssen
- Explosive rounds: Casings manufactured in Switzerland, Explosives and fuses made in USA

#### **Supplier Contact 2 - MND- Gazex and Obell-X**

The UDOT Avalanche Safety program currently operates a network of 21 Gazex Exploders and 2 Obellx Exploders in Little Cottonwood Canyon. These systems use gas mixtures (Oxygen, Propane, or Hydrogen) to initiate a blast wave to trigger avalanches. Gazex systems use common shelters to store gas and mechanical operation equipment. Gas lines from the shelters run along the group surface to nearby

exploders. Obellx are self contained units that are stocked with gas and delivered to a remote tower location via helicopter.

The topography within the project area consists mostly of steep, rocky terrain. In our experience, MND equipment is susceptible to damage and has reliability issues in this type of terrain. **Because of this, a quote from MND was not obtained for this waiver because the MND equipment was deemed not suitable for this project by the UDOT Avalanche Safety Program.**

Brandon Dodge MND, Safety Sales Manager -North America, Project Manager  
[brandon.dodge@mnd.com](mailto:brandon.dodge@mnd.com), (801) 803-3993

- Products: GazEx®, GazFlex®, OBellX®, Daisy-Bell®
- Headquarters: Parc d'Activités ALPESPACE 74 Voie Magellan, Sainte-Helene-Du-Lac, 73800, FRANCE +33 (0)4 79 65 08 90
- Materials source and manufacture: France
- Systems installed in the US as of NOV 2023: 205
- Materials/Parts sourced/produced in the USA: Platforms for gas shacks, Valve Assemblies (Yesco)
- Installations: Installations, foundations (concrete and rebar), and drilling done with US-based contractors.

### **Supplier Contact 3 – Inauen-Schatti**

Currently, UDOT does not have any equipment from Inauen-Schatti. The unique requirements from an Avalanche Guard® make operation and maintenance a challenge for many programs. Additionally, the current service to US operations from Inauen-Schatti does not meet the mission critical requirements from UDOT. **As such, a quote from Inauen-Schatti was not obtained.**

Oswald Graber, Outdoor Engineers  
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- Products: Avalanche Guard®, Avalanche Pipe, Avalanche Master, LM 32
- Headquarters: Tschachen 1, CH-8762 Schwanden
- Materials source and manufacture: Switzerland
- Systems installed in the USA as of NOV 2023: 20 Avalanche Guard® Boxes, ~5 Avalanche Pipes
- Materials/Parts sourced/produced in the USA: None
- Installations: Performed by US and Canadian Contractors