

# Highway Tunnel Case Study



## Introduction

Hrvatske Ceste Ltd. (a government owned company) owns and operates a network of highways in Croatia. The highway section from Zagreb to Split includes a number of tunnels. One of the largest is the Sveti Rok tunnel that goes through the Velebit Mountain near Zadar. The tunnel is 5,600 meters long and has two tubes. The first one was scheduled to be put in operation in July 2002 and the second finished 2 years later. There are four smaller tunnels near the Sveti Rok tunnel that were scheduled to be finished and to put in operation simultaneously with the main tunnel.



**Sveti Rok Tunnel Entrance**



**Sveti Rok Tunnel**

## **Problem**

The above mentioned tunnels needed to be equipped with a remote control system to enable central control and monitoring of road traffic, substation and lighting, ventilation, fire fighting, annunciation and CCTV systems. Two control centres (main and backup) are required and should be located at opposite ends of the Sveti Rok tunnel. The main control centre, located at the northern entrance, is responsible for the day-to-day operations of the system and is manned 24 hours a day, 365 days a year. The backup facility, located at the southern entrance, is manned 8 hours a day, but can be manned 24 hours a day in an emergency. Each computer in the Supervisory Control and Data Acquisition (SCADA) system needs to communicate with approximately 120 Programmable Logic Controllers (PLC) within the tunnels and substations.

## **Solution**

Willowglen Systems Inc. was selected to provide their very flexible and advanced SCADACOM® system to TEB Automatika d.o.o., who in turn, provide the end customer with all of the system integration services required for this project. The standard Modbus Transmission Control Protocol/Internet Protocol (TCP/IP) option was selected to interface the SCADACOM® host computers to the PLCs using high-speed Ethernet communication links. The main and backup computers were configured and supplied by Willowglen Systems Inc., each with identical configurations. The two master computers, in different locations, communicate using a fiber optic Local Area Network (LAN). Each master computer has a fully integrated commercial relational database for large historical data storage and retrieval. In addition, each master computer also has an operator interface.

Willowglen's unique fault tolerant design provides a high level of availability to ensure uninterrupted SCADA operations. The delivered system consists of a user-friendly operator interface so that the operators are quickly provided with the required information in a very intuitive and useful manner.