TunnelXperT™

FOCUS ON QUALITY

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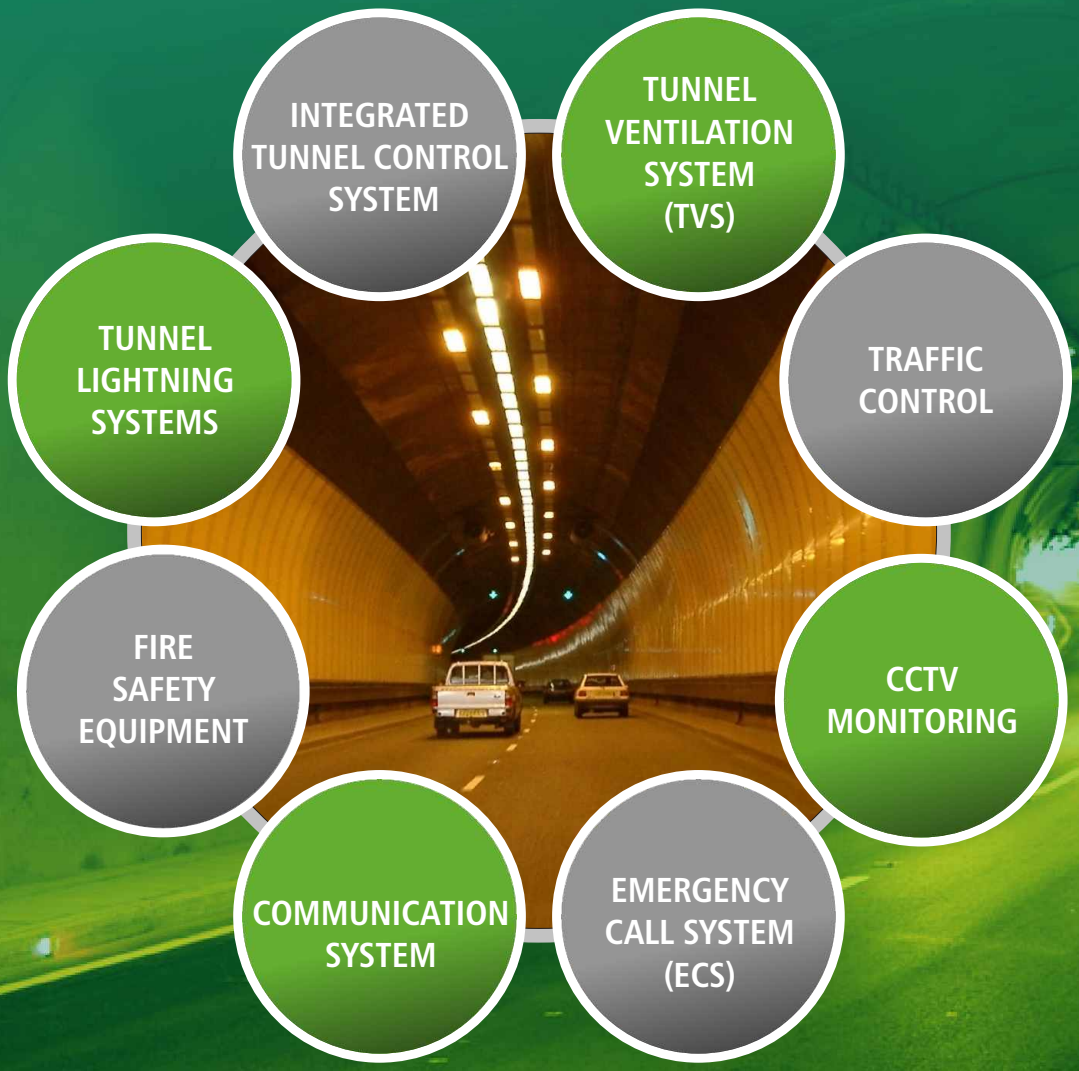
About QuaLiX

QuaLiX is a renowned name in traffic management solutions. It diligently uses hi-tech technologies and equipment to build and provide a well-connected TunnelXpert system. With the help of highly trained technicians, engineers and experts, we have adhered to applicable standards and installed requisite tunnel systems for both government as well as public organizations. We develop sophisticated solutions that match client's expectation and perfection. Our main objective is to impart security to the travelers,passing through the tunnels, via our solutions.

TunnelXpert system is segregated into following sub-systems that are developed according to client's needs, tunnel's structure and safety requirement of the travelers. Our sub-systems epitomize our expertise and experience in this field.



TUNNEL VENTILATION SYSTEM (TVS)

QuaLiX's highly secure Tunnel Ventilation system is a key element of electro-mechanical equipment and is crucial to the safety of tunnel operation.

Advantages

- Pre-determine level of pollution and thereby activates Tunnel Ventilation system
- Relinquish harmful gases and ensure travelers' safety within the tunnels

Modes of TVS

- Normal mode: It removes engine vehicle emissions and keeps the air quality and temperature in appropriate levels.
- Emergency mode: It provides safe escape route to trapped users and controls fire smoke.

Meteorological measuring stations

- Tunnel's physical Variable Measurement System (METROLOGY STATION) is installed inside the tunnel and are monitored as well as controlled through SCADA system. The whole Measurement system is connected to Tunnel UPS network.

TRAFFIC CONTROL

The main function of this sub-system is to control traffic passing through the Tunnel. The key areas that monitor traffic control are:

Traffic Lights

SCADA is responsible for monitoring the actual status of traffic lights installed at relevant points in and around the tunnel. These lights work on complex technologies like LED, Brightness adjustment panel and weather condition compatibility.

Overheight Vehicle Detection

QuaLix has designed this system to pre-reckon if any over-height vehicle is moving towards the tunnel. With the aid of intricate technologies like **Optical Height Gate subsystem, Infrared Barrier/Laser Distance Measurement devices, CCTV cameras, loop sensors, inbuilt software,** SCADA detect, monitor & control over-height vehicles before they pass through tunnel.

Traffic Logging Equipment

Traffic Logging Equipmententails data of vehicles moving at speed ranging between 20 to 200 Kmph through the tunnel with the help of hi-tech sensors, controllers and Ethernet-based IP cables. Sensors are installed at both portals and Lay-Bys to manage traffic whereas controller units are installed in tunnel niches to interpret electrical data received from these sensors and translate into logical data.

Variable Message signs(VMS)

Variable Message signs(VMS) are installed atentrance, exit and inside the tunnel. VMS purpose is to warn and support drivers about traffic control information like speed restrictions, road work in progress, accidents etc with help of central computer for continuous monitoring & management by SCADA.

Guidance system

Guidance system functions on LED technology and are installed on the borders of sidewalks. The purpose is to illuminate the road course and guide drivers passing through those roads. Effective placement of light modules is based on the area of entrance & interior lighting.

CCTV MONITORING

This enables the control centre to monitor tunnel operations and thereby take apt measures at right time in case of any unforeseen incidents in and around the tunnel. It encompasses recording function also which helps in later analysis and thus, prepare them to prevent for any future mishaps. It contains following components in its effective functioning:

Access Control Center

CCTV cameras:

These are automatic incident detection cameras, which are installed at relevant positions in the tunnel like on walls or poles, placed before & after the tunnels, emergency exits etc. It transmits images & data via transceivers & media converters to central computer. These advanced cameras are equipped with extraordinary features like PTZ, automatic switching, motorized zoom lenses, automatic recording, central storage system, time identification etc.

Incident Detection Function enables in automatically detecting any unforeseen incident in the tunnel like vehicle on hard shoulder, stopped vehicles, inverse moving objects like debris, persons etc that is potentially dangerous and thus, alerts the operators automatically within stimulated reaction times. It presents real time CCTV images to the operators to prepare for the response for it.

EMERGENCY CALL SYSTEM (ECS)

ALARM

COORDINATE

INFORM

It facilitates two-line communications between Emergency call columns(ECC) installed on portals as well as tunnel units and Central Monitoring unit installed at Traffic control rooms. Its main components are:

- ECB, open Road Unit which functions on hands-free communication devices i.e. microphone, speakers, single push buttons & pictograms. It enables the motorists to communicate with operator at control unit via ECB. We take special care in their housing, maintenances and smooth functioning.
- Emergency push buttons are located into all ECB and initiate free alarm contacts which are supervised on the basis of Quiescent Power principle. Flashing light appears on these devices in case of alarm and continuous light appears when connected with the operator.
- Central Monitoring & Control Unit: It acts as the main hub and administers entire ECS network. It comprises of apt communication gateways, operator workstations& telephone sets located at prescribed OMCs. Its main functions are: detecting the call box from where call/alarm originates, handling multiple calls, answering/queuing/holding of calls, notification of faults, message traffic as well as statistical information.

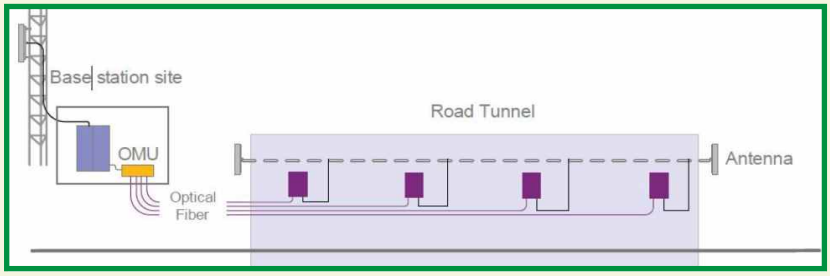
COMMUNICATION SYSTEM

This system comprises of following sub-systems:

- Tunnel Radio System: It aids open road communications via radio equipment installed at OMC server rooms & in tunnel niches and radio towers near the respective OMC buildings. It is powerful enough to cover the whole tunnel project and an extra 5 km distances from both portals. It comprehensively facilitates the services of:

Cell Phone	Public Radio
Emergency Service Radio	Maintenance Radio

- Internal Telephone system: It works on VoIP Technology to impart effective communications for staff working at all locations. Each tunnel control centre is inter-connected with each other & control centre via this channel all the time. Moreover, it gives access to public switched telephone network to connect with emergency services & other main numbers.
- Sound System: with our advanced speaker & sound system installed at all the relevant areas in & around tunnel like driving area, tunnel portals, we can make announcements, transmit signals or address staff individually or in groups.



FIRE SAFETY EQUIPMENT

We have taken special head in developing fire detection system for the tunnels to ensure safety of staff, operators and travelers. Following systems are well connected to fire alarm centre which detect fire, send alarm & location details:

- Linear Heat detection (Main& Egress Tunnel)
- Manual Call Point Fire Alarm

Our fire safety equipment comprise of following main components:

- Inbuilt fire alarm system in buildings
- Automatic fire detection system in Tunnel
- Emergency telephone niches having fire Alarm Push Buttons as well as fire extinguisher at close proximity
- Well-equipped Hydrants with fire-fighting water at Hydrant Niches in tunnel
- Portable Fire extinguishers at each emergency niches in tunnel




TUNNEL LIGHTING SYSTEMS

We have laid strategic emphasis on placement of tunnel lights according to the system's requirements and safety of people

- Entrance Lighting
- Interior Lighting
- Lay-bys Lighting
- Egress tunnel Lighting
- Street Lighting
- Luminance Measurement
- Escape Direction Lamps
- Evacuation Route Lamps
- Evacuation Route Signs

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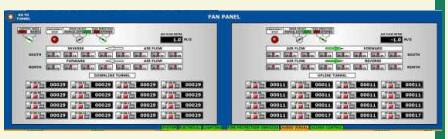
INTEGRATED TUNNEL CONTROL SYSTEM

Integrated Tunnel Control System is directly handled by Supervisory Control & Data Acquisition (SCADA) for better monitoring & interaction. Its main areas of focus are Monitoring systems and IT Equipments.

SCADA aids operators in tunnel monitoring so that in case of following complicated situations, they can take right decisions to resolve them safely & aptly

- Accidents or other incidents on the carriageway
- Recurrent or non-recurrent congestion
- Broken down vehicles on the hard shoulder
- Adverse weather or visibility conditions
- Debris, animals or other unusual objects on the road
- Damage to road infrastructure
- Other unusual or unexpected event
- It has Man-Machine Interface(MMI) equipment installed at control centers where technologically equipped operator stations work concurrently to perform their monitoring and control functions.
- External Systems include ITS-Subsystems, M&E Subsystems, Police & Fire Brigade, ITS/M&E operator, Vehicle drivers and Emergency called system



DOORS AND GATES

In Tunnel Management system, special attention is given to installation of automatic doors and gates at all the prescribed points in the tunnel: control centres, emergency call niches, hydrant niches, power supply niches, egress tunnel, cross passages etc. Opening of any door activates an alarm to SCADA and can be operated by a key switch or by the appointed OMC operator.

WHY QuaLiX?

QuaLiX has carved its niche in building intelligent traffic management systems. It has gained substantial experience in this field and understands the significance of well-planned traffic control systems especially tunnel management.

- We focus mainly on ensuring maximum safety of tunnel as well as people like staff, drivers, operators etc.
- We are equipped with hi-tech control equipments& technologies which help us in developing Tunnel expert system', which is reliable, sophisticated and well planned.
- We ensure the maintenance of ambient atmosphere for the operation of our tunnel management solutions.
- Client's satisfaction is our top priority and we dedicate our resources in meeting their expectations.

Our experts put in great efforts in building a state-of-art tunnel management system for our esteemed clients. They take all necessary actions to surpass their expectations and meeting international standards applicable in their design and development

QuaLiX®

Focus on Quality

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