



# University of Alcalá – Madrid, Spain

## Lighting Control System and Energy Management for 35 Buildings Across Three University of Alcalá Campuses

The University of Alcalá (UoA) is a 16th century public university that offers a wide range of undergraduate and postgraduate degree programs covering fields such as humanities, engineering and social to biomedical science. Home of Miguel de Cervantes, one of the greatest writers of Spain, UoA is one of the six universities across the world designated a UNESCO World Heritage Site.

Preserving UoA's history and reputation is essential, but equally important is ensuring the university keeps current with the latest advances, including making the campus more energy efficient. The first step in this process was to upgrade the lighting to make it more energy efficient in 35 buildings across the three of the university's campuses. To help with this effort, the university granted Ferrovial Servicios a 10-year contract to create the engineering team to fulfill the following requirements:

- Make the lamps in every building LED.
- Install a lighting control system in the common areas (more than 980 lighting circuits distributed on the 35 buildings) that also serves as the base for implementing future control systems for lighting and climate in offices and classrooms.
- Install power analyzers to analyze the power network evolution of each building to find ways to improve the energy efficiency over a 10-year period.

### The Challenge:

UNESCO prohibits World Heritage Sites from changing most of the outside and inside of each building (except for minor details such as putting control panels beside electrical panels), UoA's historical campus has many old buildings. The rest of the campus (Technological and Guadalajara) did count with the infrastructure for the additional communication cabling. As a result, Ferrovial Servicios needed to figure out how to:

- Connect all 35 buildings to the Computer Service building, where it would be installed with a SCADA to manage the control system.
- Remove the need for each concierge to go around each electrical panel to turn ON/OFF each common area lighting circuit.

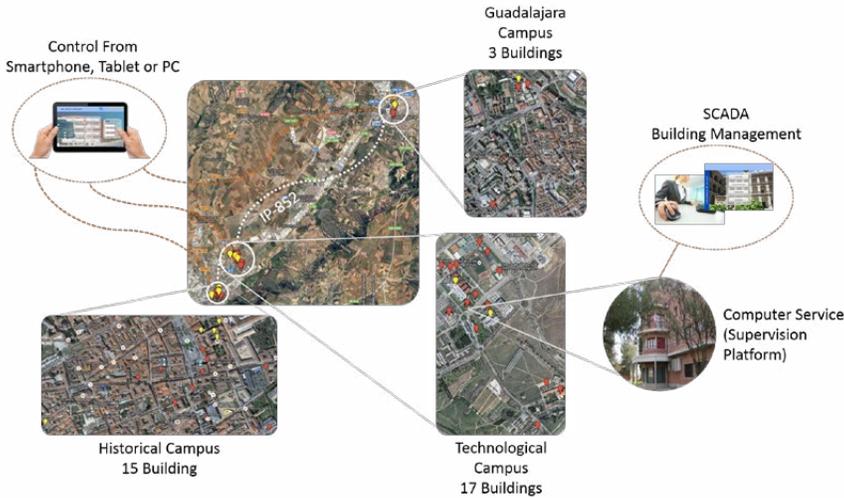


### The Solution:

Ferrovial Servicios required a standard-based solution that supports and work with different manufactures. The company hired ISDE as a LonWorks® technology manufacture company to help find this solution. With more than 20 years of service and experience, ISDE provide the following solution:

- Install a control panel besides each electrical panel. Inside the control panel was installed a control node and contactors to control each lighting circuit.
- Each control node includes a real time clock, which allows scheduling from each lighting circuit independently.
- For optimal control, it was installed an outside lighting sensor on each outside façade of the building (except on the historical campus, which were installed on buildings that didn't changed their facades). The sensors provide lighting control based on the outside lighting sensing.
- All the common areas lighting circuits are controlled from the control system, including scheduling, lighting threshold, manually control each lighting circuit. Inside the Main Electrical panel is monitored the main electrical parameters from the power analyzers also installed.
- All this data are managed by the SCADA which is accessed by Ferrovial Servicios, the concierges and the maintenance personal of the University. Also these data are stored inside a Microsoft SQL Database, where Ferrovial Servicios can use them to perform the data analysis from their Energy Management Software, helping them to know exactly what other actions can be made to provide energy efficiency or know if each building is energy efficient.

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Besides the SCADA, each building has a i.LON SmartServer that provides:

- Datalogger for each electrical parameter measured from the power analyzers.
- Work as an IP-852 router from the FTT-10 network to the IP network.
- Provide a Webpage so each concierge can accessed locally, avoiding the loss of the control in case of communication failure with the SCADA.

Ferrovial Servicios chose LonWorks® because:

- LonWorks® is a standard technology (ISO/IEC 14908) that is supported by myriad manufactures. It also works on different physical media, with more than 20 years and more than 1 million control nodes installed around the world. This facilitates maintenance and enhances the control system during the 10 years of service provided by Ferrovial Servicios to the university and beyond.
- Thanks to its flexibility, Ferrovial Servicios was able to solve the main problem associated with the historical campus buildings' infrastructure. It took advantage of the IP network infrastructure from each building, using the IP-852 (i.LON 600 and i.LON SmartServers) in some cases and the UTP 5 physical cable in others to work as the free topology FTT-10 networks. This reduced much of the impact of changing the façade inside the buildings.

"It was important to acknowledge that the solution adapted made possible the communication of the lighting installations from many buildings providing the enough flexibility to adapt us on each existing infrastructure," said Miguel Chaves Álvarez, Infrastructure Maintenance Division Manager from Ferrovial Servicios SA.

## The Result:

Since the project's completion on Nov. 1, 2016, a number of benefits have been noted:

- Each control system installed inside each building works as a backbone, making it possible to add more control systems like climate and lighting control inside each office and classroom, integrating them inside the main control system.
- Only one LNS database was used to communicate with the 35 building control systems, making it easy to maintain.
- Reliable real time communication of all data storage.
- Return on investment (ROI) already: Installation and cabling costs reduced by using the communication network inside each building.
- A 45 percent saving in the replacement of all the lamps and an additional 15 percent savings with the lighting control systems.
- Working hours saved for each concierge and maintenance personal by knowing the state of each lighting circuit from the SCADA or webpage.
- The control system easily adapts to the main requirements for each building.
- Easy management for each concierge and maintenance personal because they know the state of each lighting circuit. This easily configures the schedule and lighting threshold.

"I was really surprised how we solved all the communication network for each building infrastructure, mainly in the Historical Campus, in an easy and low cost way," said project manager Juan Jose Castillo Fernandez of ISDE.



2901 Patrick Henry Drive  
Santa Clara, CA 95054, USA  
Tel: +1 408-938-5266  
www.lonmark.org

## Contact:

### For more information contact:

ISDE  
C/Ciudad de Frias, 21- Nave 3 28021  
Madrid España  
Tel.: +34 91 643 70 75  
Móvil: +34 659 167 140  
o cinatenica01@isde-ing.com

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