2019 ANNUAL
CONFERENCE & EXHIBIT

NEWEA
WORKING FOR WATER QUALITY

ARCADIS
Design & Consultancy
for natural and
built assets

January 29, 2019

SESSION 18
SAFETY

BRINGING BETTER SECURITY PRACTICES TO THE WATER SECTOR FOR A NEW NORMAL

PRESENTER

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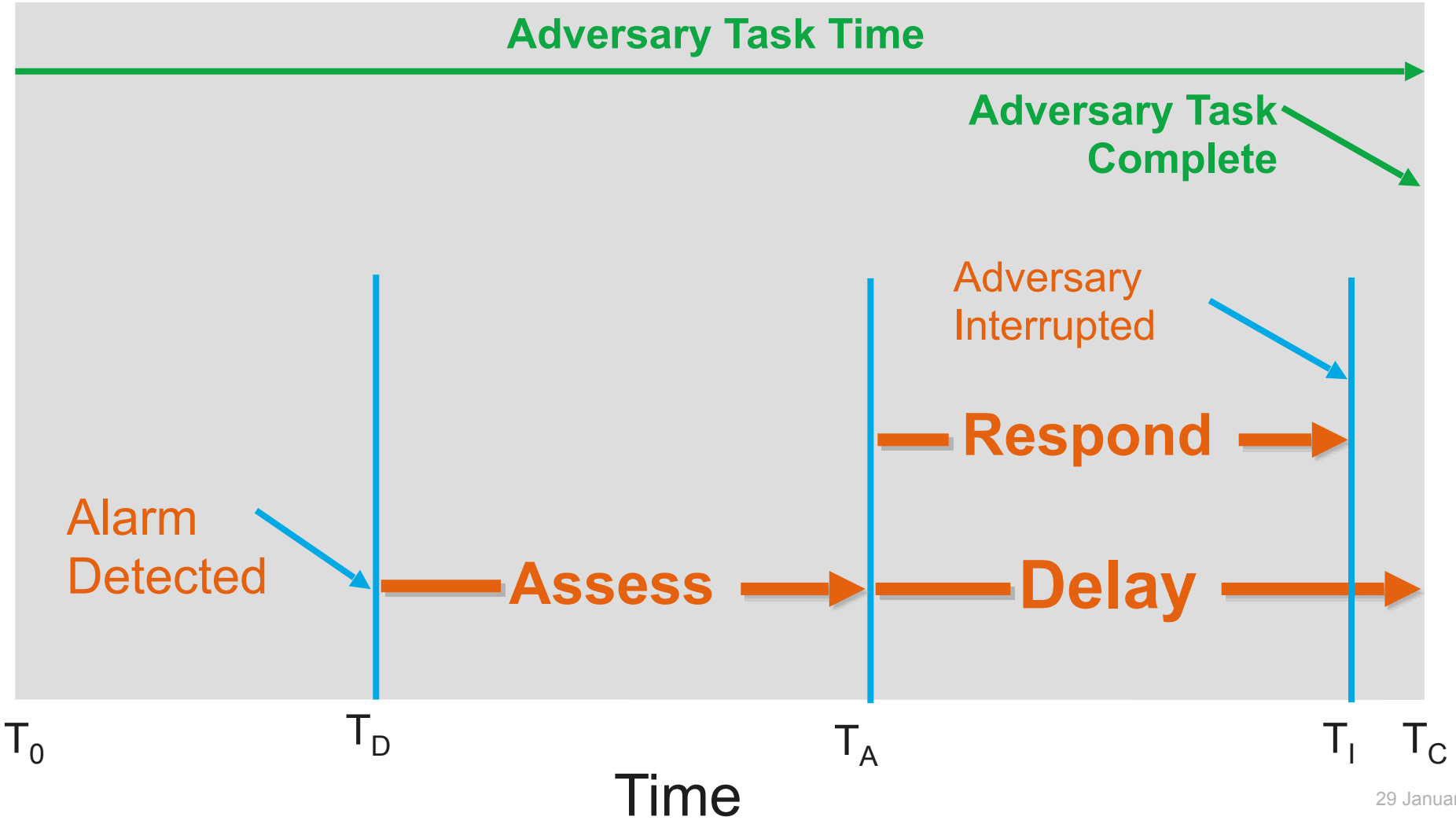
Arcadis

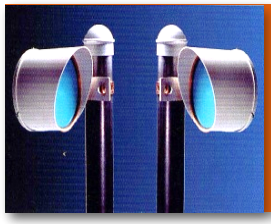
Agenda

- Security System Design & Components
- Recent Innovations
- Future of Security
- Case Study
- Lessons Learned and Take-Aways

Security System Design



Security System Components



Detection

- Sensors
- CCTV

Assessment

- CCTV
- People

Delay

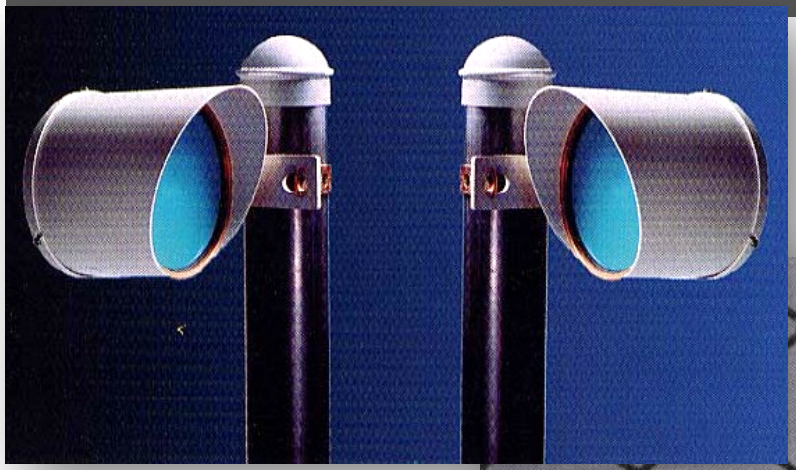
- Barriers
- Hardened Doors

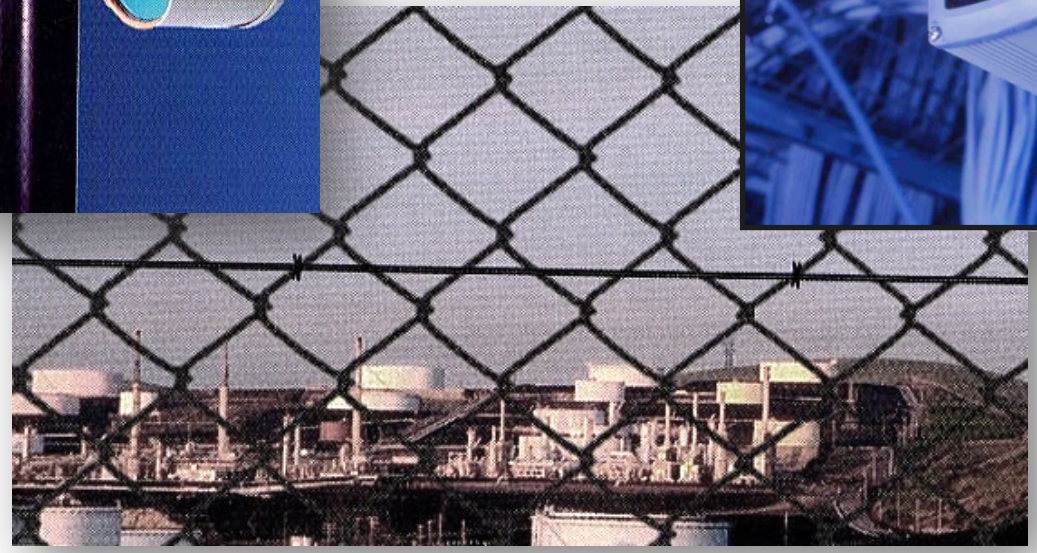
Response

- Communications
- Law Enforcement
- Utility Personnel

Security System Components

DETECT

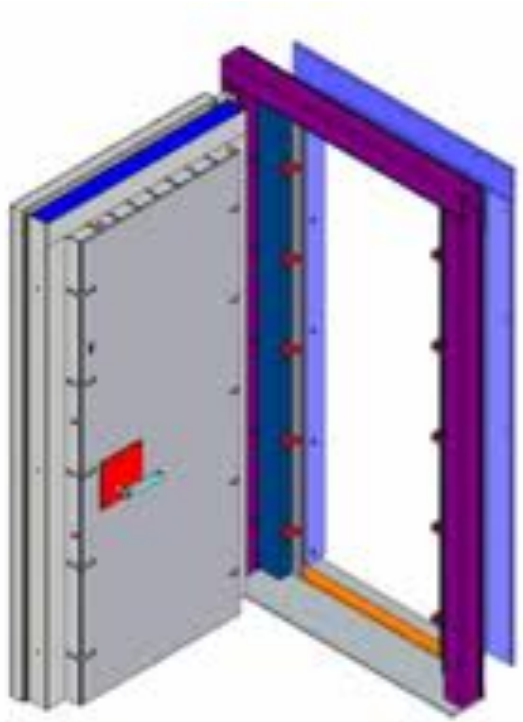




Security System Components

ASSESS

Security System Components

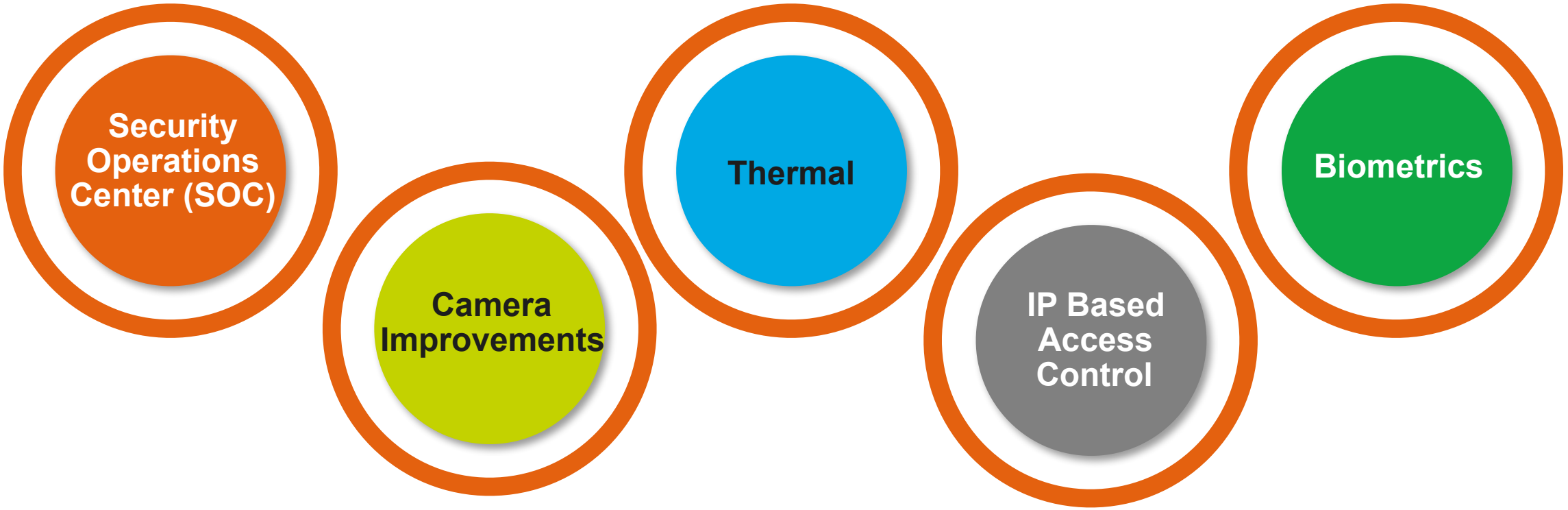


DELAY

Security System Components

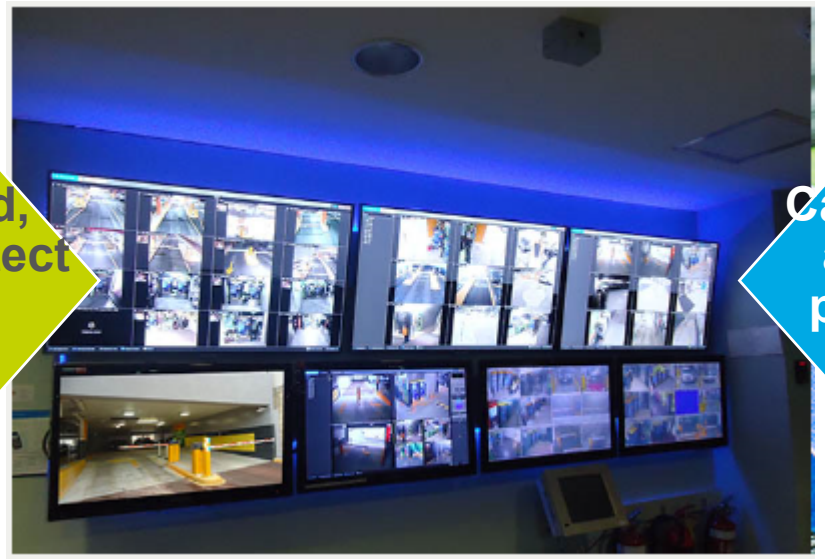
Respond

Recent Innovations



Security Operations Center

Security information is housed, monitored, and analyzed to protect data from physical and cybersecurity threats.



Camera feeds and access control alarms report back to security personnel who are on site at all times.

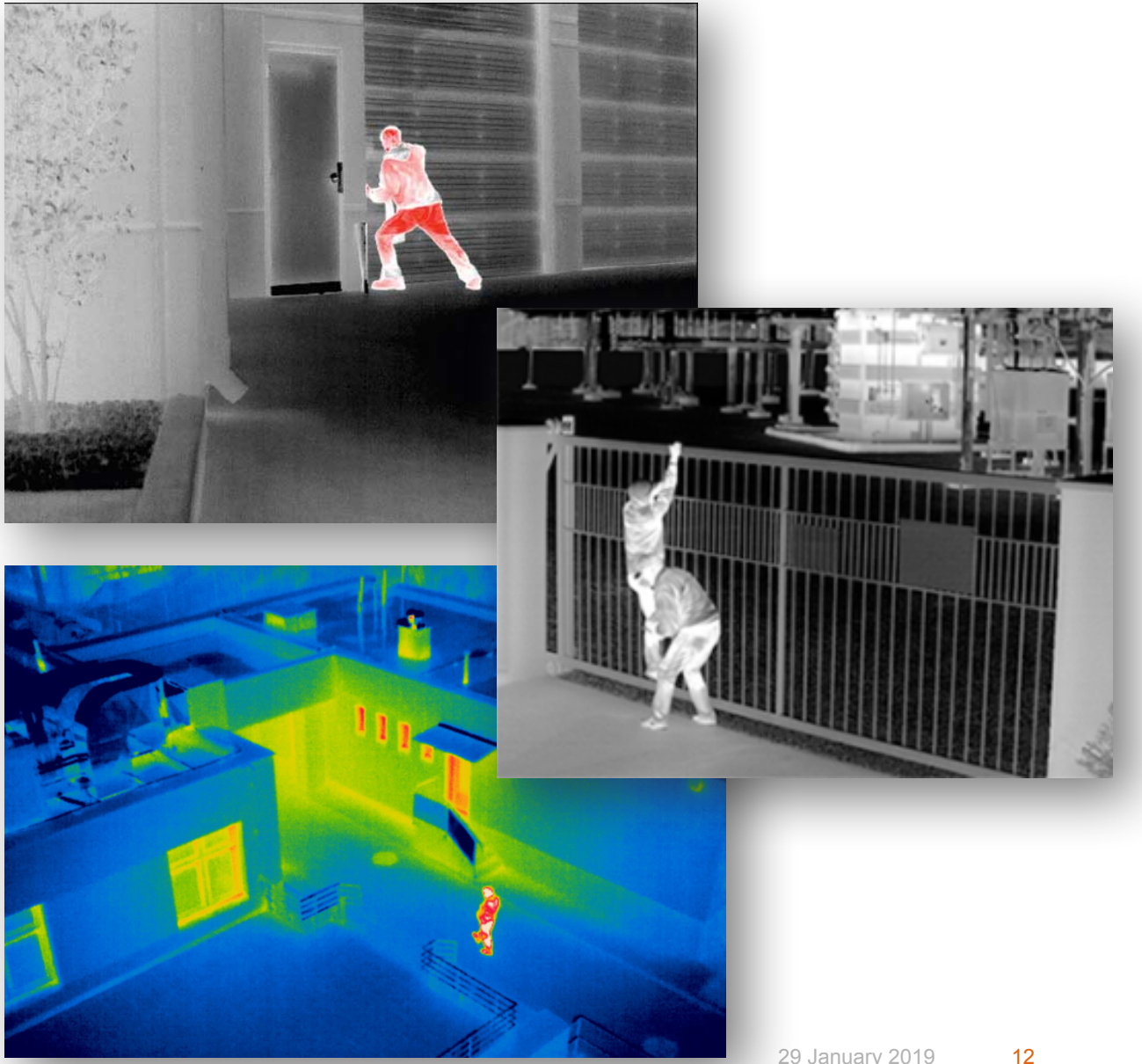
Camera Improvements

In the last two decades, CCTV cameras have vastly improved.
Some recent CCTV innovations are:

1. 360-degree fields of view
2. High Definition Video Feeds
3. Facial Recognition
4. Night Vision
5. Smartphone Integration
6. IP camera systems
7. Video Camera Analytics

Thermal Cameras

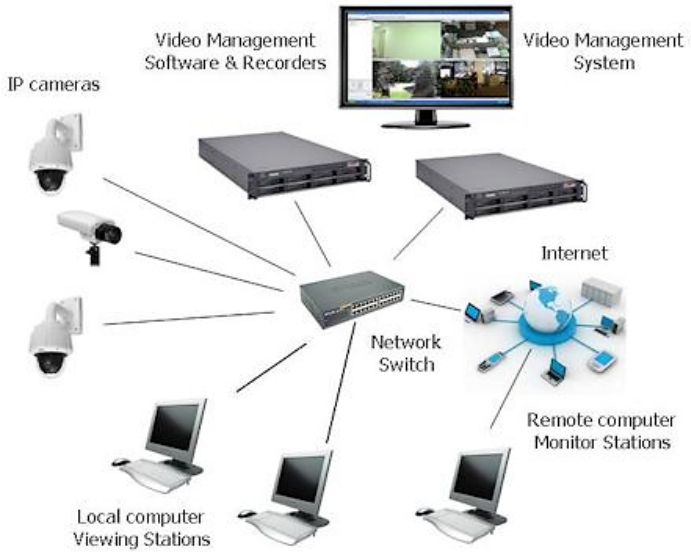
- Effective in low-light scenarios.
- Programmed to detect motion and begin recording and/or alert personnel.
- Capable of seeing through visual impediments such as fog, smoke, or dust.
- Thermal imaging is more effective when viewing natural landscape as the natural scene camouflage does conceal objects of interest.



Perimeter Detection

- Vibration Alarms
  - Continuous wire installed along fence
  - “Smart Programming” reduces false positives
  - Little maintenance required
- Invisible Barrier
  - Discriminates intrusions (walking, running, crawling) from environment effects
  - Electromagnetic detection field
  - Vegetation does not affect detection
- Anti-Climb Fencing
  - Small-weave discourages climbing
  - Difficult to cut with common hand and machine tools
  - Artcurial attractive designs

IP Controlled Cameras



- IP cameras have many advantages over traditional analog cameras.
- IP camera systems send their signal over a network, allowing for a greater amount of information to be transferred then an analog camera.

- Power over Ethernet (PoE)
- Capable of recording at higher resolution.
- In recent years, camera analytics have become very pro-active. Software is now capable of monitoring multiple camera feeds using pre-determined analytics to detect potential situations before they occur and trigger alarms that personnel can respond to.

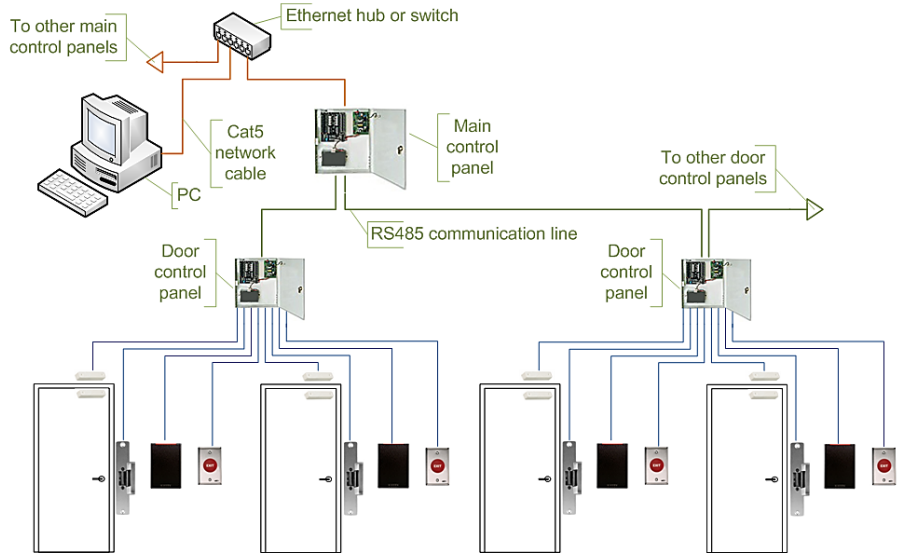
CCTV Analytics

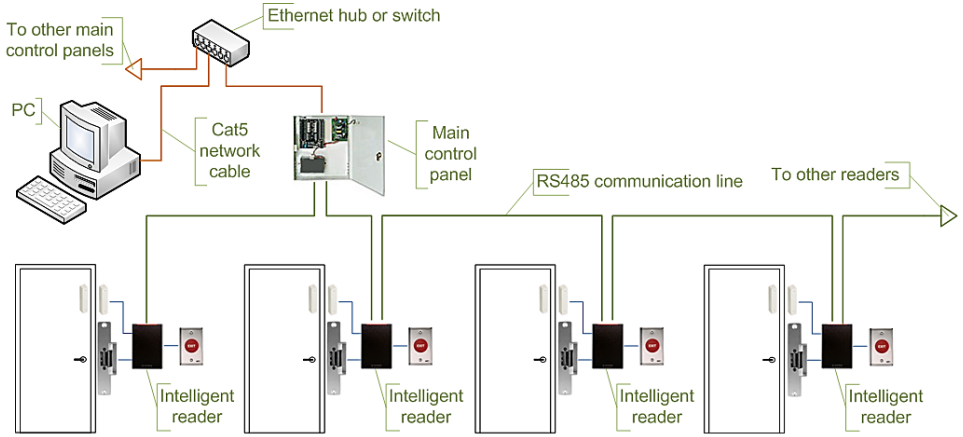
- **Integrated Video Management**
  Allows users to information from video and store it in a database for future use.
- **Real-Time or Recorded Video Analytics**
  Alerts personnel about an incident in progress. Software is capable of identifying perimeter breaches, abandoned objects, objects that are moved, people movement and/or vehicle activity.
- **Multiple Camera Types**
  Capable of analyzing video from different camera types such as fixed, PTZ, thermal, or camera in motion (i.e. body cameras)

- Motion Detection, Facial Recognition, and License Plate Reading.
- Capable of sending alarms to personnel based on pre-set parameters.

IP Based Access Control

- Involve electronic access controllers designed for controlling the entry/exit to and from restricted areas.
- Directly connected to the LAN/WAN connection and as a result, they can monitor all input and output data necessary.
- A traditional access control system is incapable of functioning properly without a terminal server. An IP based access control system has its own onboard network interface that assists in independent functioning.



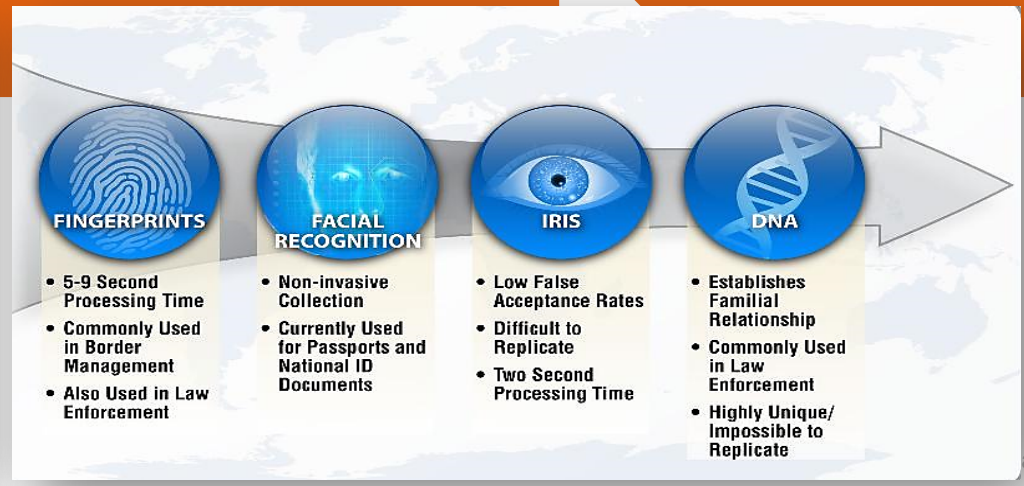


Biometrics

Measure unique characteristics of a person, such as voice pattern, iris or retina pattern, or fingerprint patterns.

Lock and capture mechanism to control access to specific data.

Use of unique characteristics or traits which are matched to a database in the system.



Future of Security

The emerging model of the **Internet of Things (IoT)** is rapidly changing the way organizations think about security.

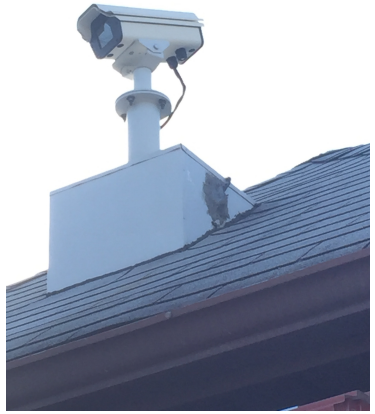
Critical infrastructure will become more interconnected as **IoT** continues to advance and preventing data breaches and cyber attacks will be of utmost importance.

Future security will be based ***not*** on the hope of interoperable, cross-platform security features – but ***around*** unified computing architectures that focus on controlling data access based on corporate policies.

- Such as personal smartphones, computers, laptops, tablets

Case Study Background

- Confidential Client
- Regional Water Utility in North East
  - Treatment and Bulk Supply
  - Existing Analog Cameras and Standard Card Readers
  - $3.3M Design-Build by Integrator Construction Contract
  - Funded by SRF
  - 21 Sites

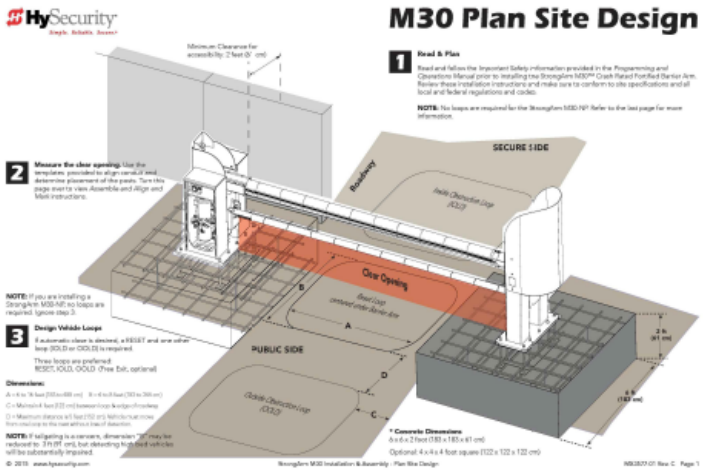


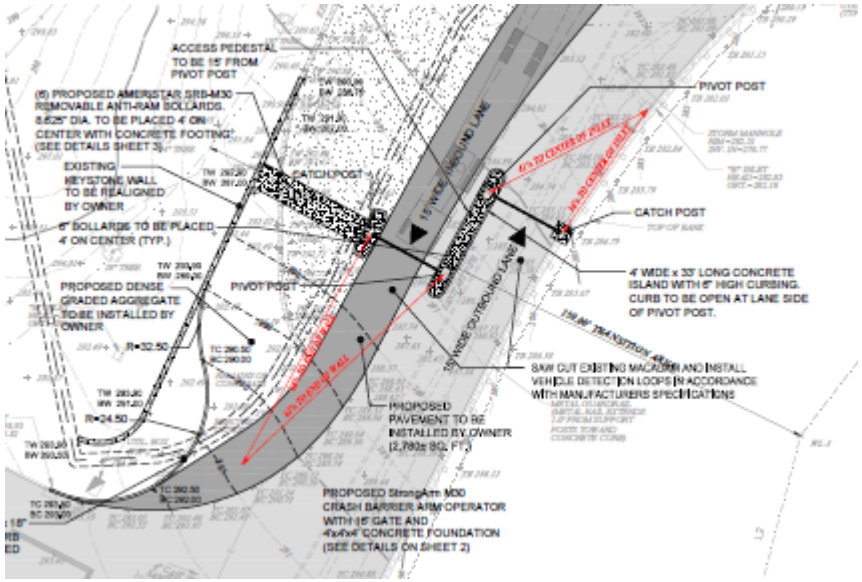
Security Enhancements Project

- Design-Build by the Integrator
  - 200+ IP based cameras
    - 17 Models
    - Mix of Fixed and PTZ
    - Thermal and IR
    - 360° Multisensor

Security Enhancements Project

- Design-Build by the Integrator
  - 40+ Enhanced encryption card readers
  - New Entrance configuration
    - Visitor Badging
    - Crash Rated Barrier Arms





Lessons Learned and Take-Aways

Secure Procurement

Testing

Integration with other systems

- Fire Alarm
- SCADA

Networking & Cybersecurity

Lightning Protection

Secure Procurement

- Closed Bid
- Pre-approved Bidders
- Sole Source Integrators

Secure Procurement Approach – Bid Documents

Standard Bid Documents	Secure Procurement
Complete Site Layout	**Bare minimum of information given necessary to bid**
Conduit Routing Details	**Routing details withheld. Bid price provided via additional pay items**
Security System Software/ Hardware Fully Specified	**Utility to self purchase with configuration by third party**
Complete Security Command Center Details	**Construction details provided, but with no location reference**

Testing

- Location
  - Field of View
- Functionality
  - PTZ Functions
  - Day/Night
  - Door Alarms
  - Detection Functions

Door Type	Type	Lock	Mounting	Unlock on Card	Unlock on Rex	Unlock on Exit Button	Re-Lock	Relock time	Door Open	Door Closed	Door Held	Door Forced
Single	Access Control	Maglock										
Double	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Double	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Sliding	Access Control	Maglock										
Sliding	Access Control	Maglock										
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Access Control	EL Strike										
Roll-up	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Double	Door Monitor			N/A	N/A	N/A	N/A	N/A				N/A
Roll-up	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Roll-up	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A
Double	Access Control	Maglock										
Single	Door monitor			N/A	N/A	N/A	N/A	N/A				N/A

View	Location	Camera	Installed Location	Mounting	Field Of View	Focus	Picture	PTZ Control	Programmed Name	Playback	Streaming
Variable pan-tilt-zoom	NE Corner Building	Q6055-E									
Raodway, Parking, Gate, grounds	NE Corner Building	Q6000-E MKII									
Dam view	W side building	Q1765-LE									
parking	SE corner bldg	P1435-LE									
access road	Front of bldg	P1435-LE									
front entry door	wall	P3225-LV MKII									
Variable pan-tilt-zoom	NE corner lower roof	Q6055-E									
Roadway, entry door, gen door,parking	NE corner lower roof	Q6000-E MKII									
fixed-exterior	NW corner upper roof	P1435-LE									
LLPS Trailers	SW corner upper roof	P1435-LE									
LLPS Transformers	SE corner upper roof	P1435-LE									
LLPS Entry Door-CR	adjacent to door	P3225-LVE MKII									
Pump Control	wall across from cntrl pnl	P3225-LV MKII									
Variable pan-tilt-zoom	exisitng tower	P5635-E MKII									
generator	generator room wall	P3225-LV MKII									
Variable pan-tilt-zoom	NW corner roof	Q6055-E									
Roadway, parking entry door, grounds	NW corner roof	Q6000-E MKII									
Entry Door	side of door	P3225-LVE MKII									
Dam View	W center roof	Q1765-LE									
Greenhouse	SE side roof	P1435-LE									
Rear of LLPS	SE corner roof	Q1765-LE									
Interior Overview	West interior wall	P3225-LV MKII									

Integration with other Systems

- Fire Alarm
  - Requirement or functionality
    - Magnetic Locks
- SCADA
  - Dual Use of Video
  - Dual Alarms

Networking & Cybersecurity

- Standards
- Common Networking Concerns
  - Standard equipment
  - Separate Network or on others
  - Permissions
  - Bandwidth
- Cybersecurity
  - Permissions
  - Wireless or cellular connections
  - Vendor access

Lighting Protection

- Thermal Cameras installed on old unused towers
- Grounding was not checked
- Unusually high amount of lightning storms this spring and summer
- Replaced multiple thermal cameras
- Result
  - Grounding insufficient – upgraded
  - Removed unused top tiers of towers
  - Grounded cameras on both ends
    - At camera
    - At switch

Contact Information

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