Prison Security Design
Security Inside Out

Monday, September 9
1:15 PM - 2:30 PM
Location: S503 B

Mark Bottomley CPP, PSP, P. Eng., PMP
Consultant, TSI Security

Marc-André Bergeron
Commercial Head, Genetec

Stewart Dewar
Product Manager, Senstar

GSX.org | #GSX19
SOLUTIONS MULTIPLIED.
Mark Bottomley
Security Consultant, TSI Security

- National specifications and requirements for electronic security systems.
- Projects involving all facets of electronic security at all security levels.
The prison was very important - as everywhere on earth. Everywhere the building of a prison is the first step in the organization of a civilized state.

B. Traven
<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Inmates</th>
<th>Annual Expenses</th>
<th>USD Per Inmate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canada</strong></td>
<td>37,000,000</td>
<td>39,000</td>
<td>$3,700,000,000,000</td>
<td>$94,900</td>
</tr>
<tr>
<td><strong>California</strong></td>
<td>39,000,000</td>
<td>212,000</td>
<td>$13,500,000,000,000</td>
<td>$63,700</td>
</tr>
<tr>
<td></td>
<td>Population</td>
<td>Inmates</td>
<td>Annual Expenses</td>
<td>USD Per Inmate</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>---------</td>
<td>-------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Canada</td>
<td>37,000,000</td>
<td>39,000</td>
<td>$3,700,000,000,000</td>
<td>$94,900</td>
</tr>
<tr>
<td>California</td>
<td>39,000,000</td>
<td>212,000</td>
<td>$13,500,000,000,000</td>
<td>$63,700</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>3,900,000</td>
<td>39,000</td>
<td>$1,000,000,000,000</td>
<td>$25,600</td>
</tr>
<tr>
<td></td>
<td>Population</td>
<td>Inmates</td>
<td>Annual Expenses</td>
<td>USD Per Inmate</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
<td>---------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Canada</td>
<td>37,000,000</td>
<td>39,000</td>
<td>$3,700,000,000</td>
<td>$94,900</td>
</tr>
<tr>
<td>California</td>
<td>39,000,000</td>
<td>212,000</td>
<td>$13,500,000,000</td>
<td>$63,700</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>3,900,000</td>
<td>39,000</td>
<td>$1,000,000,000</td>
<td>$25,600</td>
</tr>
<tr>
<td>Texas</td>
<td>28,700,000</td>
<td>245,000</td>
<td>$3,800,000,000</td>
<td>$15,500</td>
</tr>
</tbody>
</table>
US INMATES

HOUSTON

CITY LIMIT

POPULATION 2.303 MILLION

ELEVATION 80’
Deter, Detect, Delay, Respond
Deter,
Detect,
Delay,
Respond

Contain,
Control,
Isolate
History
Going inside...

Springhill Medium Security Institution
Nova Scotia
Challenge:
How do you interface with the outside?
Principle Entrance 1/4

Correctional Officers
Other Institutional Staff
Visiting Staff
Contractors
Sheriffs
Inmate Visitors
Principle Entrance 2/4

Contraband Detection:
  X-Ray
  Walk Through Metal Detector and Wand
  Ion Mobility Scanner
Principle Entrance 3/4

Access Control:
Closed Control Post
Barrier Control
Sally Port
Visitor Logs
Site Access Identification
Principle Entrance 4/4

Equipment Control:
- Key Safes
- OC Gas Safes
- Personal Portable Alarms
- Radios
Challenge:

How do you contain, control, and isolate the inmates?
Medium Security
Maximum Security
Living Unit 1/5

Inmate Control:
- Doors and Barriers
- Public Address
- Intercoms
- Televisions (?!?!)

GSX.org | #GSX19
Living Unit 2/5

Inmate Safety:
- Cell Call
- Security Patrols
- Observation Cells
Living Unit 3/5

Staff Safety:
- Dynamic Security Policy
- Radio
- Personal Portable Alarms
- OC Gas
Living Unit 4/5

Operation:
- Vandal/Tamper Resistant
- Hard-wired
- Air-gapped
- Redundant and Remote
- K.I.S.S. Operations
Living Unit 5/5

Doors and Barriers:
- Monitored Doors
- Controlled Fire Doors
- Swing and Slide
- Controlled Evacuation

Group Control
- Inmate Control
- Locked-out Doors
- Interlocked Doors
Main Communications and Control Post
Surrounding...

Springhill Medium Security Institution
Nova Scotia
Stewart Dewar
Product Manager, Senstar Corporation

- 30 years in perimeter security systems, embedded systems, and military systems.
- Product manager for Senstar perimeter systems including management and integration software
- Supporting projects around the world.
Operational Considerations

Threats

- Internal threat: escape
- External threat: contraband

Security Level

- Minimum (based on trust)
- Medium (controlled environment)
- High (secure and highly controlled)

Technologies

Multiple layers of technologies
A Suite of Systems

• Typically 2+ perimeter intrusion detection systems
• Lighting – always unobstructed and well-lit
• Complete perimeter surveillance
• Public address
• 24/7 armed patrol vehicles

• Extra precautions at gates/sally ports
• Wall sensors for buildings along perimeter
• Redundant systems for communications, fault, and sensing
• All-weather, all-season operation
• Indoor/outdoor personal duress
Perimeter Technologies

- Fence sensors
- Buried RF sensors
- Microwave sensors
- PA and lighting systems
Fence Sensors

Fence sensors are widely used for perimeter security applications because of their relative affordability and the fact they leverage and protect a key asset – the fence.

Distributed-processor cable-based system

Centralized-processor fiber optic system

Point-sensing accelerometer (wired or wireless)
Common Fence Sensor Configurations

• Sensor typically deployed on fence fabric at mid-height
• Detects cuts, climbs and lifting of fabric
• Sensor cable can be deployed on the fence topper (concertina/razor wire/barbed wire)
• Interior and exterior fences may use same or different sensors (cable, fiber, or accelerometer)
• Accurately determines point of intrusion, enabling software zoning
Buried RF Sensor (“Guided Radar”)

- The volumetric detection and covert nature of buried RF cable sensors provides a highly secure layer of detection
- Largely unaffected by weather, vegetation, or small animals
- Provides down-cable location accurate to within 3 feet (1 meter)
Buried RF Sensor Deployment Considerations

• For medium/high-risk facilities, best used between fences
• 20’ (6 m) recommended clearance between fences
• Both Rx and Tx cable can be installed in same trench
• Goes easily around corners and through grade changes
• Can be used independent of a fence in areas with minimal large animal activity
Microwave sensor

Provides cost-effective detection either as a second or even third layer of detection around the perimeter or as a solution for gate/sally port areas.
Microwave Deployment Considerations

- Forms a volumetric cigar-shaped detection field between a transmitter and receiver
- Generates a wider detection field than IR-based solutions
- Best used with Tx-Rx separation of up to 328 ft/100 m
- Area must be kept clear of vehicles, snow, and other objects
- Multiple units can provide overlapping coverage
Gate/Sally Port Protection

• Swinging gates can use cable-based sensors without problem
• Sliding gates require either a cable-management system, a wireless device, or adjacent detection sensor (microwave, PIR, etc)
• High-traffic gates pose operational challenges (i.e. maintain security while handling vehicles, deliveries, foot traffic, etc), leading to sally port concept
Building Facades

- Buildings, especially those on the perimeter, pose potential security risks
- Can be protected with anti-climb, wall-based sensors (along with physical barriers and deterrents)

![Touch-sensitive cable](image1)

![Freestanding or wall-mounted electrostatic sensor](image2)
Perimeter Lighting

- Perimeter lighting is critical to corrections security
- Required to obtain high-quality, full-color video at night (required for assessment, identification and investigatory purposes)
- Lighting now LED-based, more focused, allowing lower light pollution
Perimeter Patrol

• In addition to sensing and surveillance measures, a response force is critical in the event of an incident
• Typically one vehicle is patrolling with a 2\textsuperscript{nd} on stand-by
• Perimeter patrol roads must enable patrol response within time delay provided by perimeter fence/wall, \(\sim 45\) seconds
• Multiple road turn-arounds required to facilitate mobility
Personal Duress System

- A personal duress system helps keep security officers safe in high-threat environments.
- Button-press emits an electronic call for help, positioned on map.
- Highly challenging environment for locating systems due to building construction (concrete and steel attenuate RF).
- Technologies:
  - Ultrasonic
  - RF ID-based – personnel tagged in/out at entrances
  - RF multi-sensor, received signal strength correlation
  - Time-of-flight triangulation
- Need ultra-reliable, no-hassle solution.
Integration and Maintenance Considerations

- Network access to perimeter sensors is highly valued
  - physical trips to perimeter are particularly time-consuming in correctional environments
- Network access enables diagnostic access and configuration changes to be made centrally
- The central Sensor Gateway software provides SDK connection to leading VMS/SMS/PSIM systems
Summary

• Modern correctional facilities use a range of systems and technologies
• Require reliable 24/7 operation
• Perimeter security tightly integrated with operations and processes
Watching...

Springhill Medium Security Institution
Nova Scotia
Marc-André Bergeron
Commercial Head – Public Sector at Genetec Inc.

- Focused on complex security integration system designs in the Government, Correctional, Healthcare, Law and Protection verticals.
- Performed work in all Corrections Canada Facilities.
Closed Circuit Video Equipment
Focus on Design Principles

• Standardization on Genetec Omnicast as the platform for all institutions.
• View, Manage, Distribute and Record video feeds for 10,000+ Cameras.
• Integration to PSIM platform in place to exchange alarms and events.
• Monitor and Control of all cameras on a permission based model.
CCVE Systems – Main Purpose

• The main purposes of CCVE systems are:
  • To gather evidence.
  • To assist in the coordination of incident responses and improve safety.
  • To deter specific behaviours, such as violence, contraband smuggling, self-injury, and escape attempts, as well as to facilitate the observation of such behaviours.
  • As a means of identification for remote access control.
CCVE Systems – Deployment Strategy

• Perimeter Intrusion Detection Systems (PIDS)
  • Fixed cameras deployed around the perimeter of each institution.

• Supplementary Intrusion Detection Systems (SIDS)
  • Fixed and pan/tilt/zoom (PTZ) cameras to enable enhanced video assessment of incidents adjacent to the perimeter areas of the institution.

• General CCTV Systems
  • Fixed and PTZ cameras installed to provide CCTV coverage in areas that are not provided with coverage under the PIDS or SIDS. These areas may include living units, ranges, dining halls, kitchen areas, visits and correspondence areas, recreation areas, walkways, corridors, and the principal entrance.
CCVE Camera Installation Guidelines

• Deployment defined per institution level

<table>
<thead>
<tr>
<th>Location</th>
<th>SHU</th>
<th>Maximum</th>
<th>Multi-Level</th>
<th>Medium</th>
<th>Minimum</th>
<th>CCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIDS CCTV</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>SIDS CCTV</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Principal Entrance</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Controlled Entrance/ Exit Doors</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Required</td>
</tr>
<tr>
<td>Living Unit Ranges</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Living Unit Common Areas</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>N/A</td>
</tr>
<tr>
<td>Segregation Ranges</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Observation Cells</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Segregation Recreation</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Health Care</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Kitchen Dining Rooms</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Kitchen Cook/ Prep Areas</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Visiting Areas</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Visiting Areas – Exterior</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Leisure and Recreation Areas</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
<tr>
<td>Gymnasium</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Permitted</td>
<td>N/A</td>
</tr>
<tr>
<td>Walkways/Corridors</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
<td>Permitted</td>
</tr>
</tbody>
</table>

Source: Correctional Service Canada
CCVE Camera Viewing Guidelines

• Access to cameras are defined per function
• The viewing of live CCVE feeds is controlled and guided by what is reasonable and necessary.
• Access to CCVE cameras for observation cells will normally be limited to the immediate control post.
• Observation cell cameras will only be utilized for live viewing under specific circumstances.
CCVE Storage and Retrieval Guidelines

• All CCVE video recordings are recorded on a centralized video archiving system

• Centralized Head end
  • Failover on Software and Archiving
  • Direct Attach Storage
  • Network Attached Storage / Hyperconverged environment
  • Redundant Cold Storage
CCVE – Perimeter / Exterior

• PIDS Cameras
  • Installed on poles and towers located around the perimeter.
  • 2x cameras aligned with PIDS zones
  • Automated callup on alarm + Tours
  • Redundant Recording

• Exterior Bullet Camera in Environmental housings / No IR (Controlled Lighting conditions)

• Live Response and Evidentiary Purposes
CCVE – Exterior Grounds

• SIDS Cameras
  • Fixed cameras pointed at key locations
  • PTZ cameras to be used for situational awareness

• Exterior rated PTZ Cameras / Exterior rated Dome Cameras (Vandal Resistant)

• Live Response and Evidentiary Purposes
CCVE – Main Entrance

• Full Coverage of the interior using a panoramic type camera supplemented with dome cameras to cover important areas such as:
  • Metal Detector
  • X-Ray Scanner

• Vandal Resistant dome cameras with threaded conduit entry.

• Evidentiary Purposes only
CCVE – General Areas

• Partial Coverage with a focus on key areas.

• Vandal Resistant dome cameras with threaded conduit entry.

• Privacy concerns – No Staff being recorded

• Evidentiary Purposes only, except where used for inmate transfers
CCVE – Living Units/Segregation

• Full coverage of Unit ranges and Common areas with cameras being deployed in a cross configuration facing each other – No dead spot.

• Vandal Resistant dome cameras with threaded conduit entry or bullet cameras in a special vandal proof / anti-ligature housing.

• Evidentiary Purposes only
CCVE – Observation Cells

- Full coverage of the cell using a vandal proof corner mount camera with IR.
- Vandal proof / anti-ligature
- No apparent conduit in cell

- Camera recording and viewing controlled by designated personnel / Indication in cell.

- Evidentiary Purposes only / Observation
CCVE – Kitchen / Dining Hall

• Partial coverage of the kitchen area and dining hall.

• PTZ cameras in Kitchen area to allow the Kitchen Supervisor to monitor staff.

• Exterior rated (Kitchen) / Vandal Resistant dome cameras with threaded conduit entry.

• Evidentiary Purposes only / Observation
CCVE – Visitations

• Full coverage of Visitations Area

• PTZ cameras and Fixed cameras

• Plans to integrate microphone / cameras

• Monitored from Local Control Post

• Evidentiary Purposes / Observation
"If you want total security, go to prison. There you’re fed, clothed, given medical care and so on. The only thing lacking... is freedom."

-Dwight D. Eisenhower
Prison Security Design
Security Inside Out

Monday, September 9
1:15 PM - 2:30 PM
Location: S503 B

Mark Bottomley CPP, PSP, P. Eng., PMP
Consultant, TSI Security

Marc-André Bergeron
Commercial Head, Genetec

Stewart Dewar
Product Manager, Senstar