MTO Central Region COMPASS Transportation Management Centre Technology Background

Presentation to ITS Canada
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Victoria, BC

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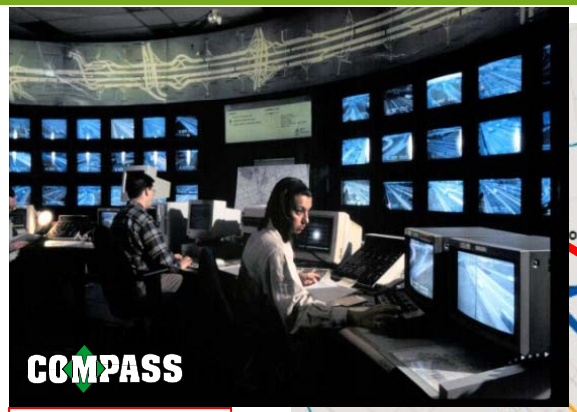
IBI Group

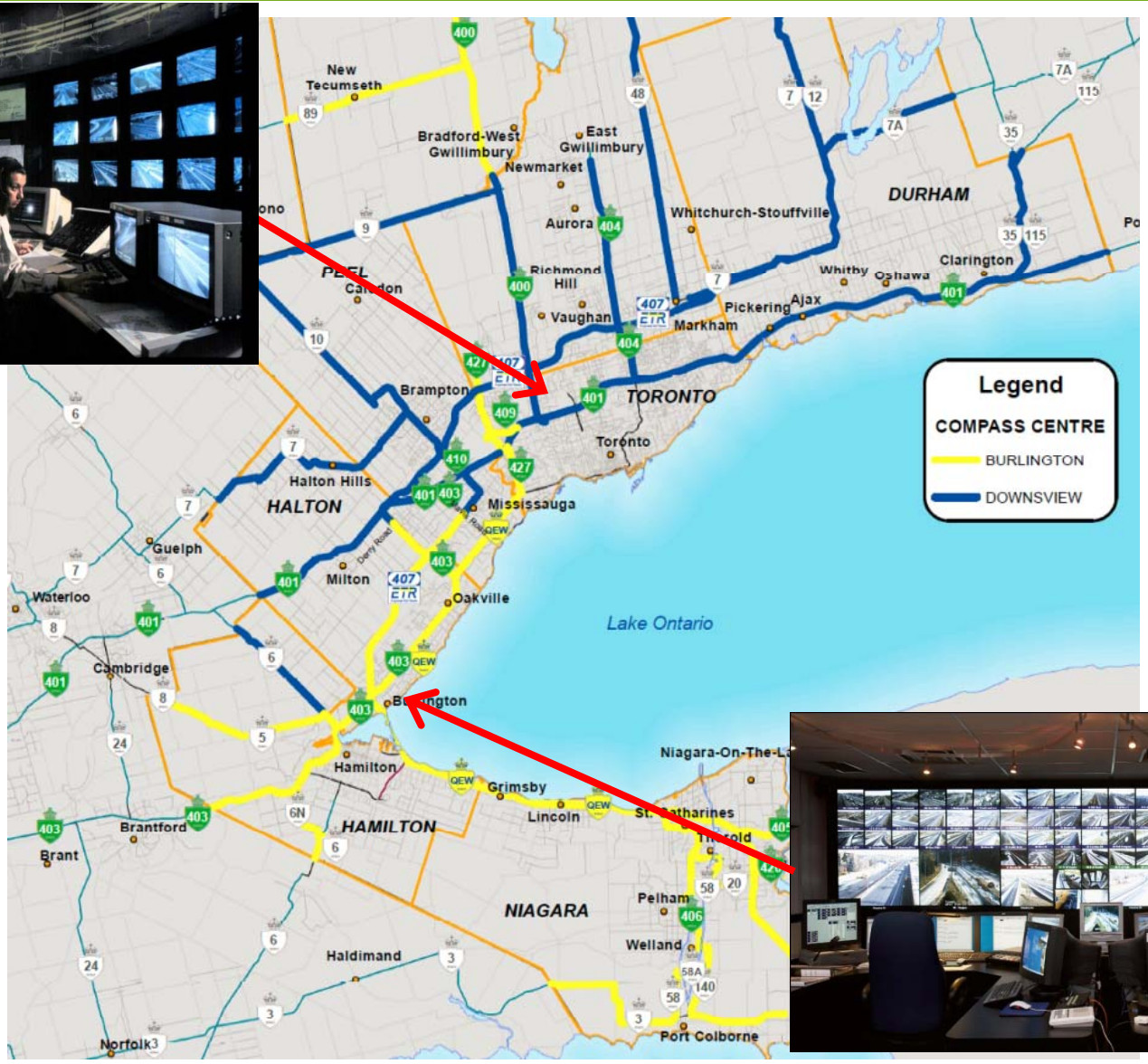
CRCTMC Discussion Items

- Background
- Work Packages
- Technology
- Construction Progress

Existing Greater Toronto Area TMCs

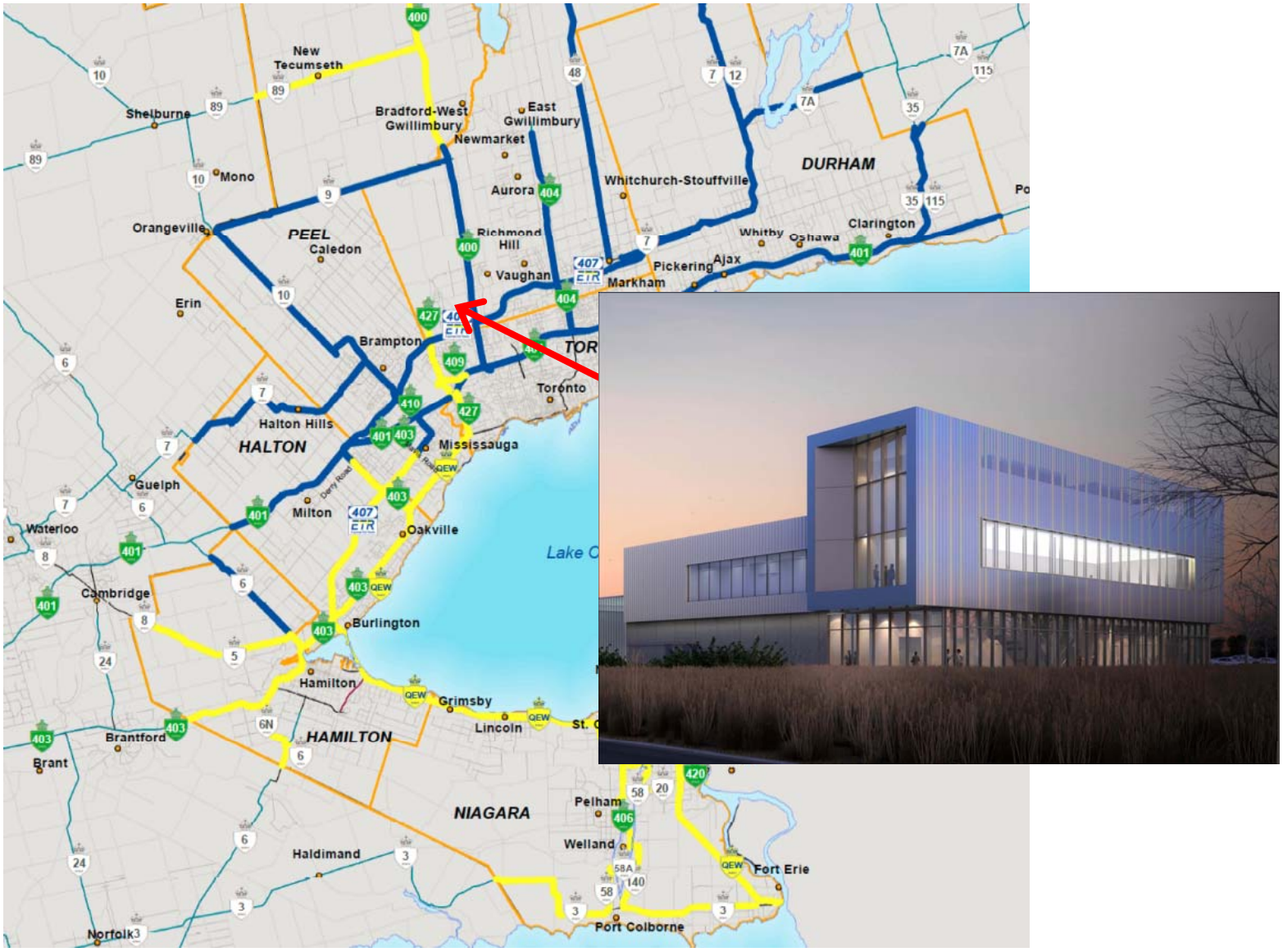


Toronto



Burlington

CRCTMC


New Tecumseth
Shelburne
Bradford-West Gwillimbury
East Gwillimbury
Newmarket
Mono
Aurora
Whitchurch-Stouffville
DURHAM
Orangeville
PEEL
Caledon
Richmond Hill
Vaughan
Markham
Pickering
Ajax
Whitby
Oshawa
Clarington
Erin
Brampton
Toronto
Halton Hills
HALTON
Mississauga
Guelph
Milton
Oakville
Waterloo
Cambridge
Burlington
Hamilton
Grimsby
Lincoln
Brantford
Brant
HAMILTON
NIAGARA
Pelham
Welland
Fort Erie
Haldimand
Norfolk
Port Colborne

Why New Central Region TMC?

- Both Central Region TMCs are aging and requiring reinvestment
  - Downsview TMC is 23 years old
  - Burlington TMC is 21 years old, modular building, lease has expired
- Opportunity to streamline operations by consolidating centres
- Opportunity to expand for future needs
- Coordinate and integrate emergency and special events transportation management
- Provide Unified Transportation Coordination Centre (UTCC) for PanAm Games

CRCTMC Work Packages

- Base Building
  - Under Infrastructure Ontario management
- Core and Field Network Upgrades
- Video Systems
- Operator Consoles
- System Integration
- Video Distribution

Base Building

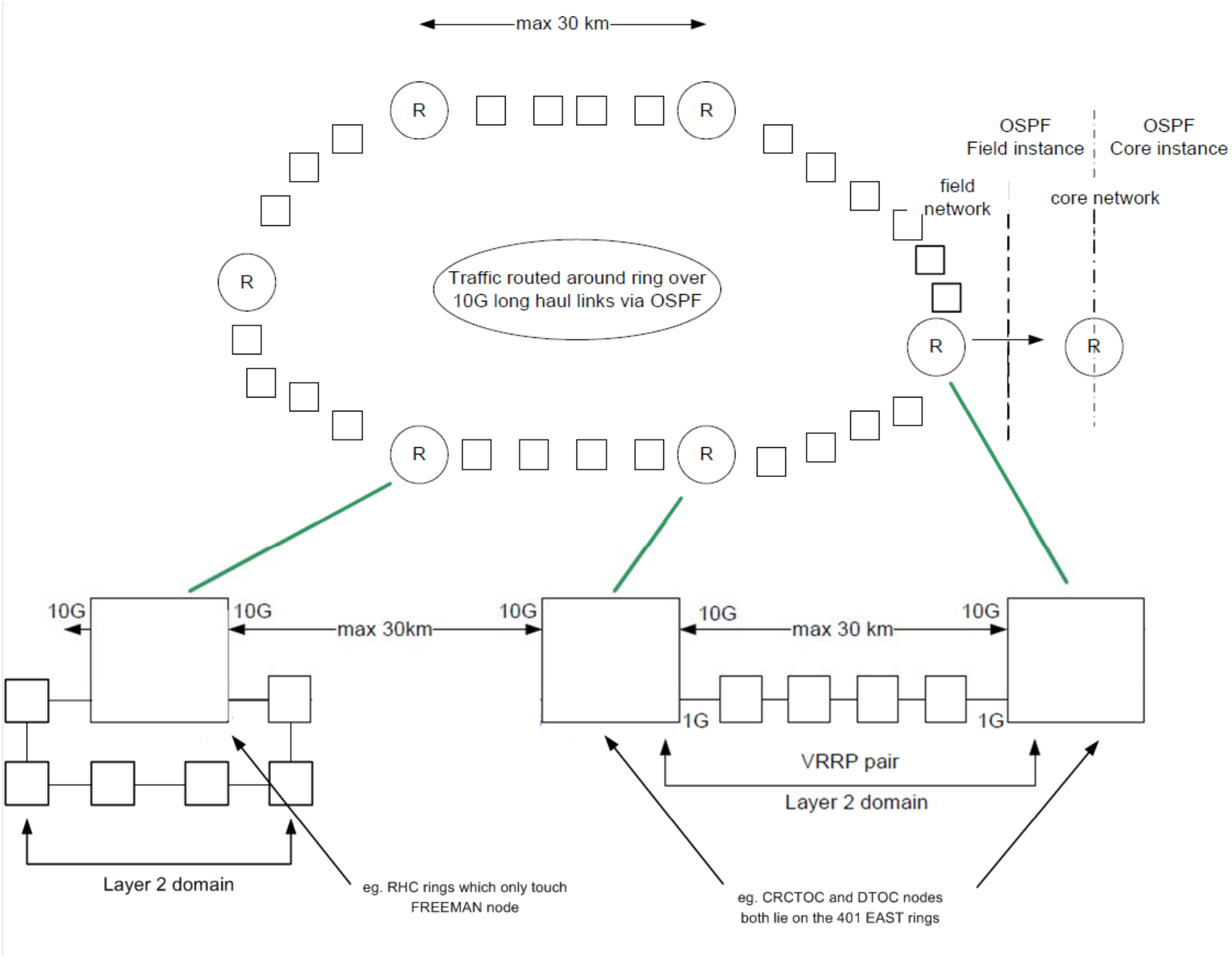
- Two storey building
- Dedicated for traffic management
- Dual access to MTO outside plant
- Diverse service provider access
- Oversized equipment racks
  - Lots of them!
- Eliminated equipment room raised access floor
  - Aids seismic performance

Core and Field Network Upgrades

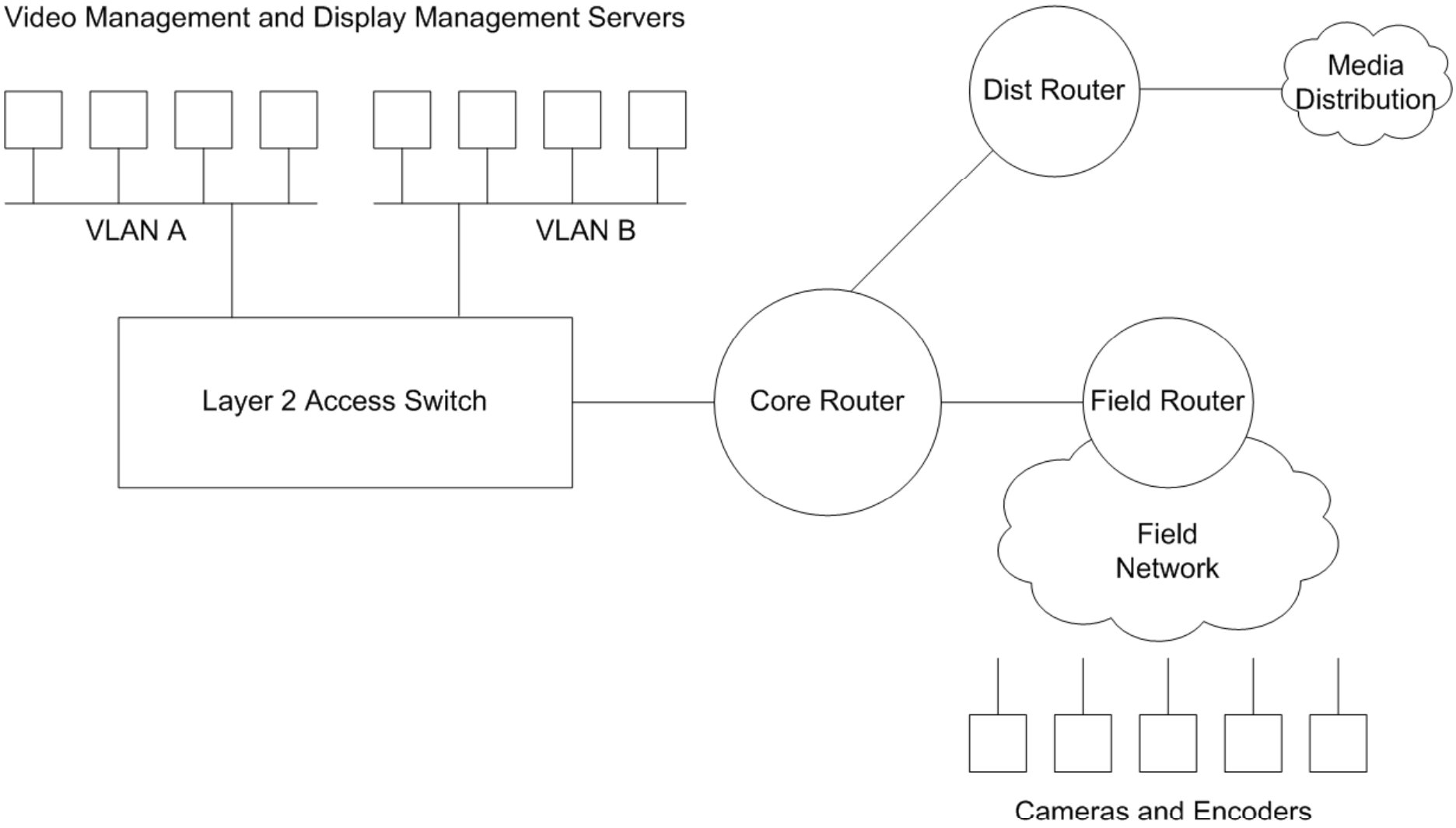
- 10G Ethernet backbone communications system
- New design reflects current industry trends
  - Layer 3 Core, Layer 2 Access
- Modern architecture to increase network availability, built-in switch redundancy
- Efficient connections for external interfaces/services

Core and Field Network Upgrades

- Backbone Communications
  - Legacy communications network deployments
    - Point to Point
    - OTN OC-3
    - Gigabit Ethernet
  - Hybrid deployment of networks
  - Fibre optic cable infrastructure
  - Future-proofing technology


max 30 km
R
R
R
R
R
R
OSPF
Field instance
OSPF
Core instance
field
network
core network
Traffic routed around ring over
10G long haul links via OSPF
10G
10G
max 30km
10G
10G
max 30 km
10G
1G
1G
VRRP pair
Layer 2 domain
Layer 2 domain
eg. RHC rings which only touch
FREEMAN node
eg. CRCTOC and DTOC nodes
both lie on the 401 EAST rings

Core and Field Network Upgrades

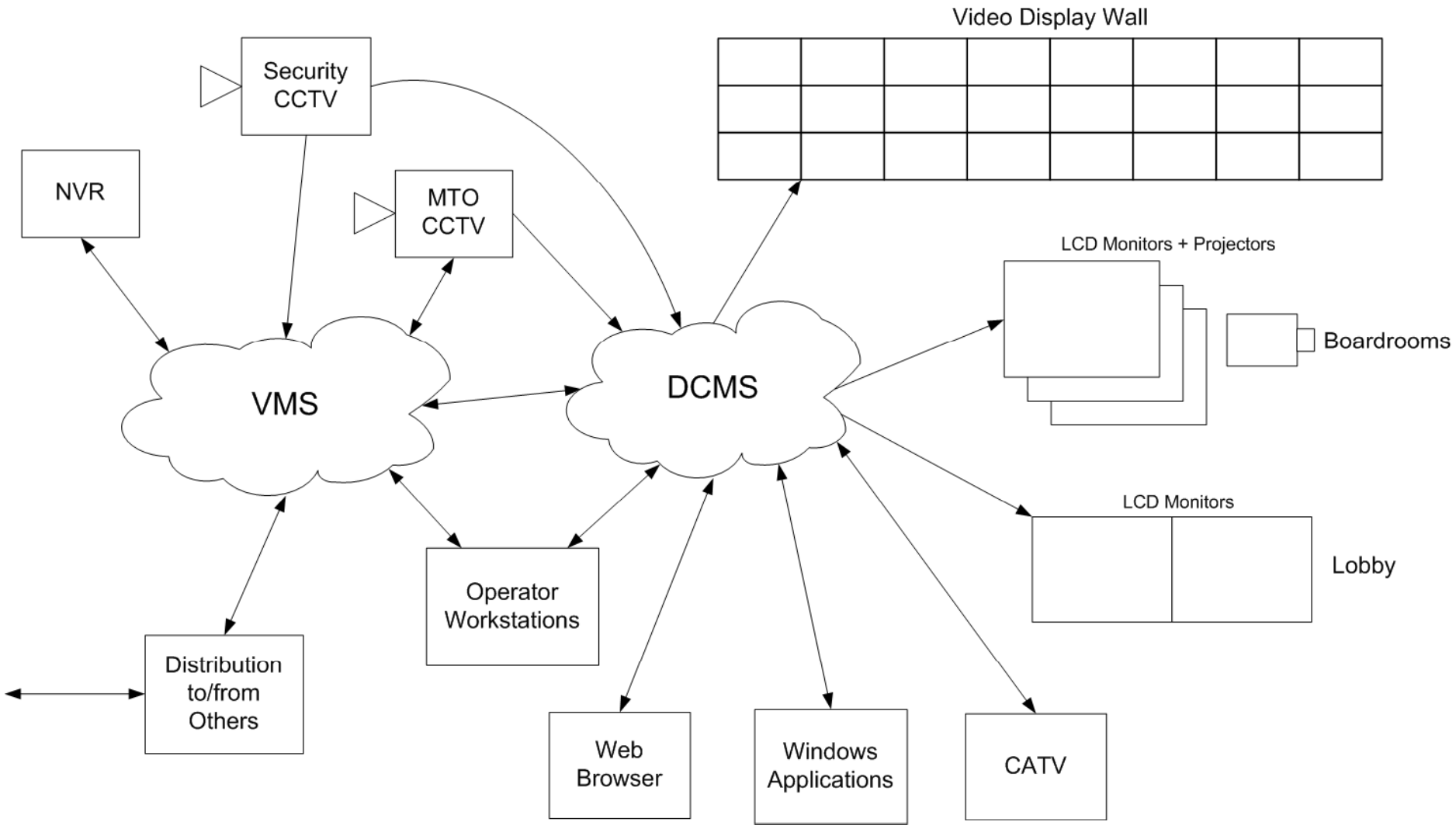


Video Systems

- **Complete Digital Solution**

- Digital Video Management System
  - Pan, Tilt, Zoom
  - Video archiving all cameras
    - Full fps and resolution
    - 30 days
- Display Content Collaboration
  - Ability to display any content to any display connected on the TMC network

Video Systems

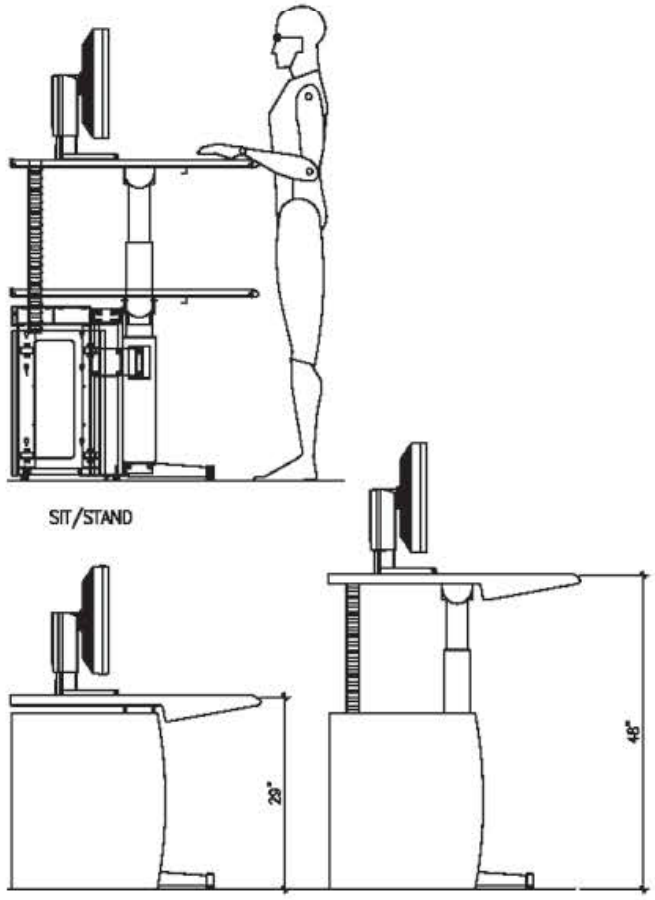


Video Systems

- Operations Room Video Display Wall
  - 4 high x 8 wide 70” rear-projection cubes
- Boardroom A/V Equipment
  - Portable monitors

Operator Consoles

- Sit/Stand Design
- Monitor Arms
  - Flexible
  - Articulated
- CPU and Cable Management
  - Non-obstructing
  - Flexible
  - Accessible
- Task Lighting
- Extra Storage
  - Binders
  - Files



System Integration

- Contractor to integrate all systems
  - Network configuration
  - IP addressing
  - Multicasting for video (or dual stream)
  - Migrate network

Video Distribution

- Centralized CCTV Video distribution
- Contractor to deliver and integrate application for distribution of video to various third parties
  - Other transportation agencies
  - Police, EMS
  - Media
  - Academics
  - Public
- Three year service agreement

Video Distribution

Video Distribution

- Integration Challenges
  - Legacy infrastructure
    - Network switch limitations
    - Communication systems plant
  - Digital video standards
  - Bandwidth
    - Unicast vs. Multicast
  - Distribution requirements
    - Re-streaming vs. Transcoding

Video Distribution

- Integration Considerations
  - Host vs. Service Provider
  - Cloud-based options
  - Subscriber account options
  - Security
  - Privacy protection
- User Levels
  - Interagency
  - Media
  - Public

Video Distribution

Functional Requirement	User		
	Interagency	Media	Public
Image Quality	High	High	Variable
Frames per Second	Full	Full	Variable
Camera Control	No	No	No
Camera Blocking	Custom	Yes	Yes
Camera Details	Yes	Yes	Yes
Concurrent Sessions	One to multiple	One	Unlimited
Cameras per Session	Several	1 to 12	1

Video Distribution

Functional Requirement	User		
	Interagency	Media	Public
Viewing Period	Unlimited	Unlimited	2 minutes
Live Stream Delay	No	No	Up to 5 minutes
Rebroadcast	No	TV only	No
User Interface	Web / Direct	Web / Direct	Web
User Authentication	Yes	Yes	No
Initial Deployment	2	3	0
Scalable	Yes	Yes	Yes
Ultimate Deployment	10	10	1,000

Video Distribution

Service Type	Pros	Cons
Agency Hosted, Owned, and Operated	• Capital - Up-front capital costs for hardware, software licensing, space • Lowest perceived agency risk for data and video – control of system and data remain with agency • Lowest Monthly Recurring Cost estimate	• Agency responsible for building the system • Agency responsible for managing the system • Agency responsible for internet connection

Video Distribution

Service Type	Pros	Cons
Agency Hosted and Owned Contractor Operated	• Capital - Up-front capital costs for hardware, software licensing, space • Service guarantee through contractor SLA and penalty enforcement • High degree of customization and integration, depending on the contractor	• Requires contractor physical access onsite • Agency space used, HVAC and electricity costs additional

Video Distribution

Service Type	Pros	Cons
Agency Hosted Contractor Owned and Operated	• Detailed customization and development for an integrated solution may be achieved • Full integration completed by the contractor • Service guarantee through contractor SLA and penalty enforcement	• Requires contractor physical access onsite • Agency space used, HVAC and electricity costs additional • Higher Monthly recurring cost estimate

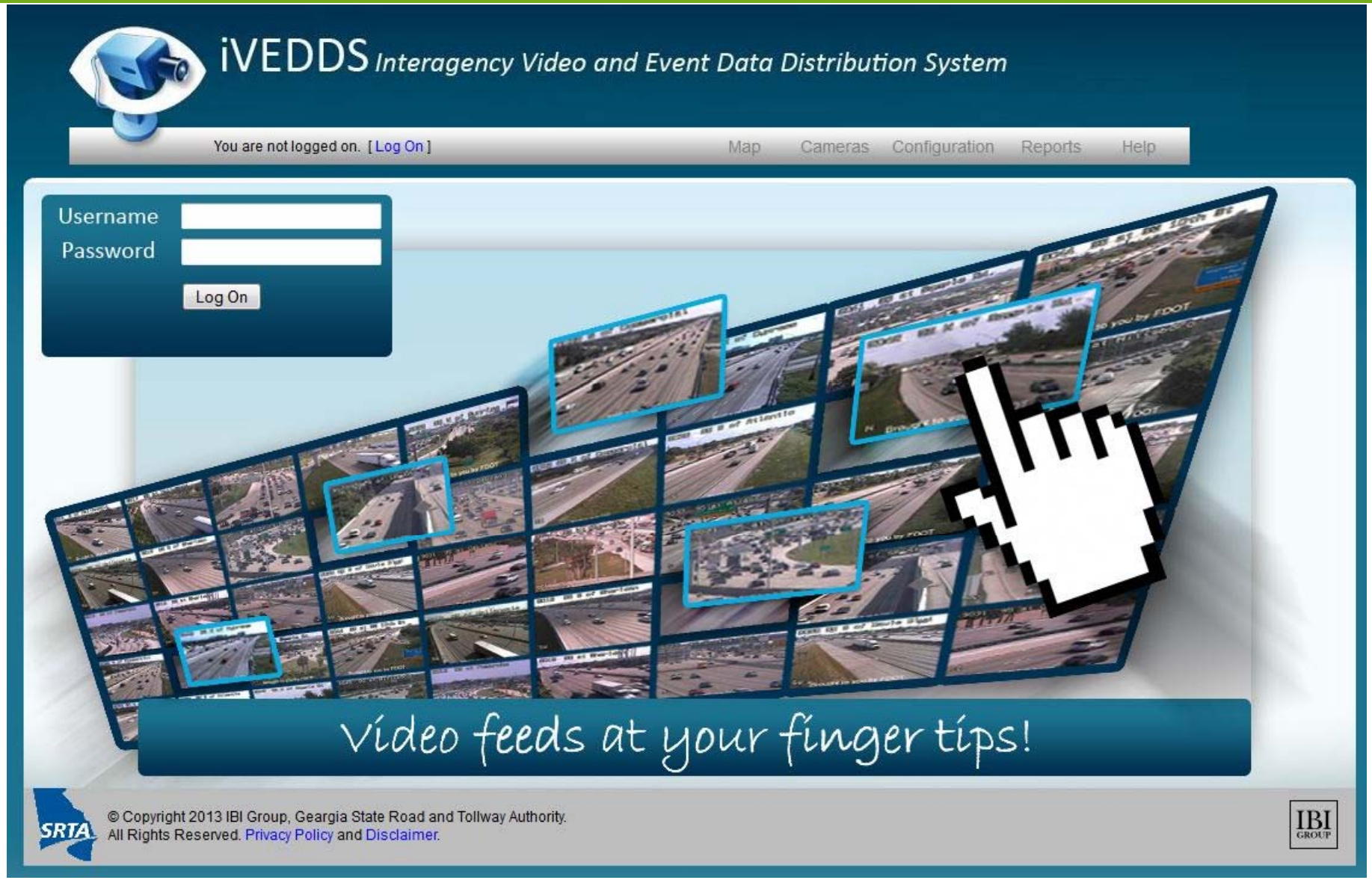
Video Distribution

Service Type	Pros	Cons
Contractor Hosted, Owned, and Operated	• Agency is not responsible for any hardware/software/ connectivity that makes up the system • Environment and electricity costs are not agency responsibility • Variety of custom reports generated for agency • Service guarantee through contractor SLA and penalty enforcement	• System sharing may create security risks as Service Provider controls the system • Highest monthly cost estimate • Provider may resell video • Typically vendors will offer limited customization to achieve and maintain economies of scale

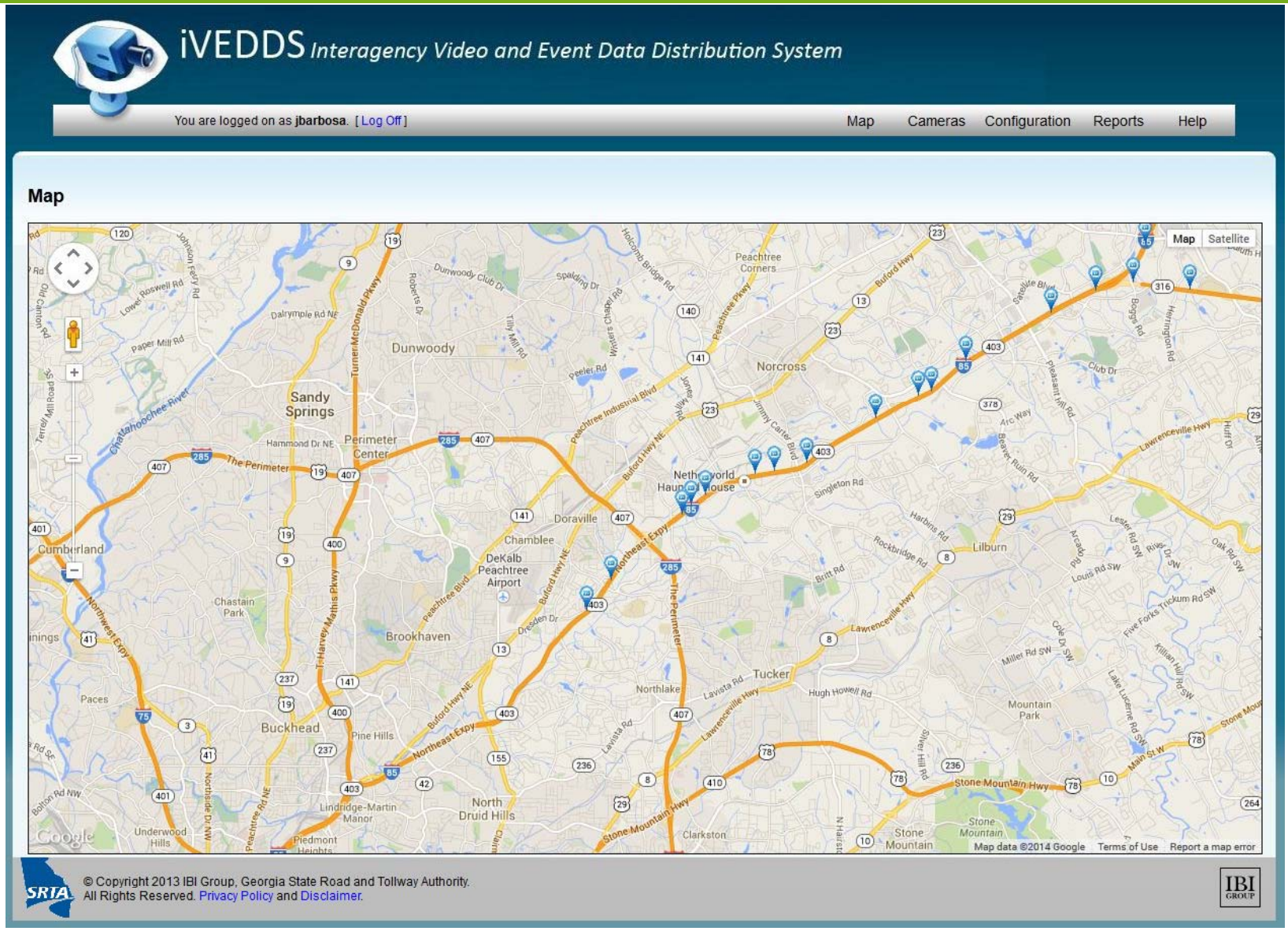
Video Distribution

- MTO decided on….
- Agency owned and hosted, contractor operated
  - Agency better controls capital cost
  - Obtain quality SLA

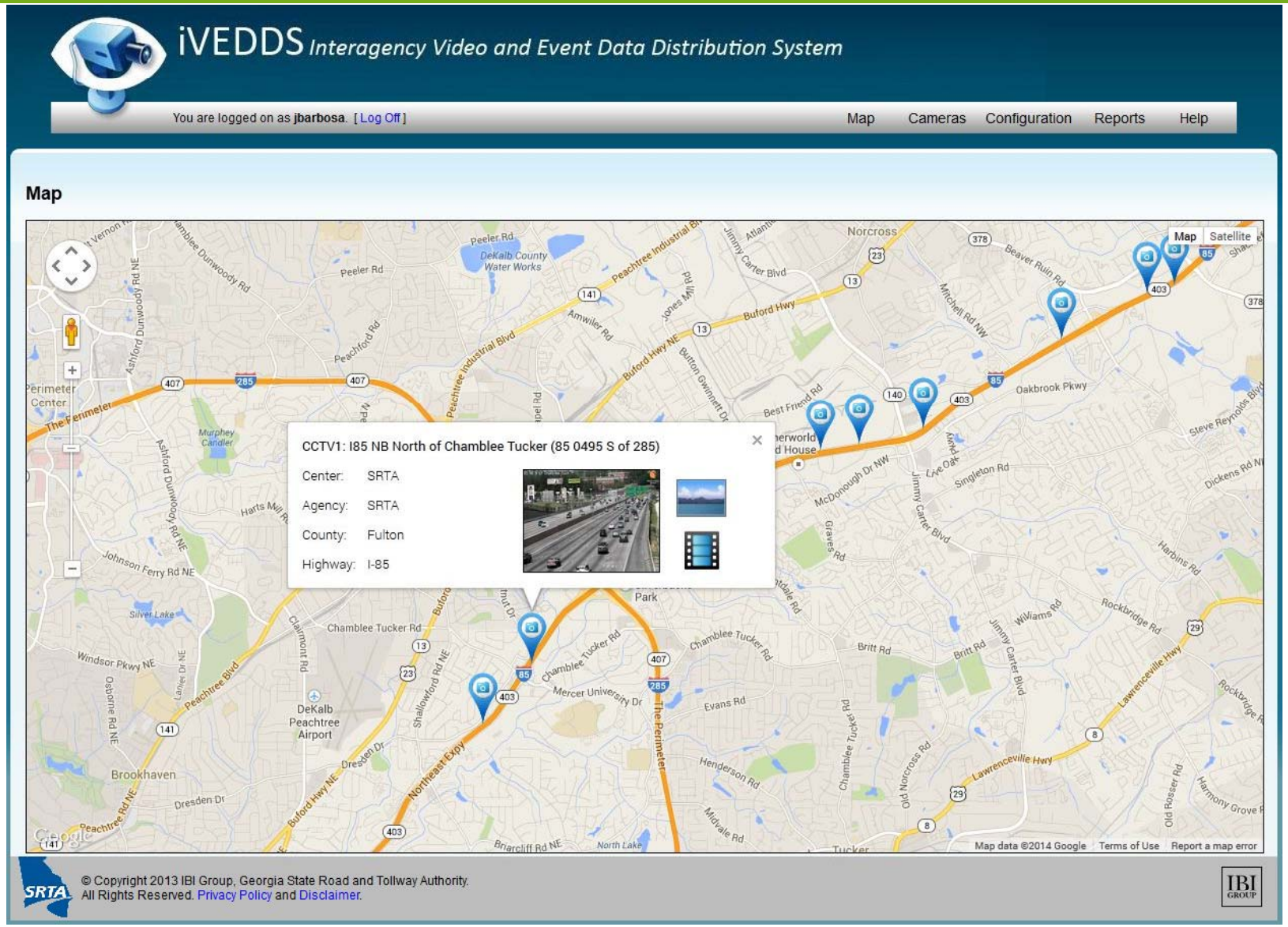
Video Distribution



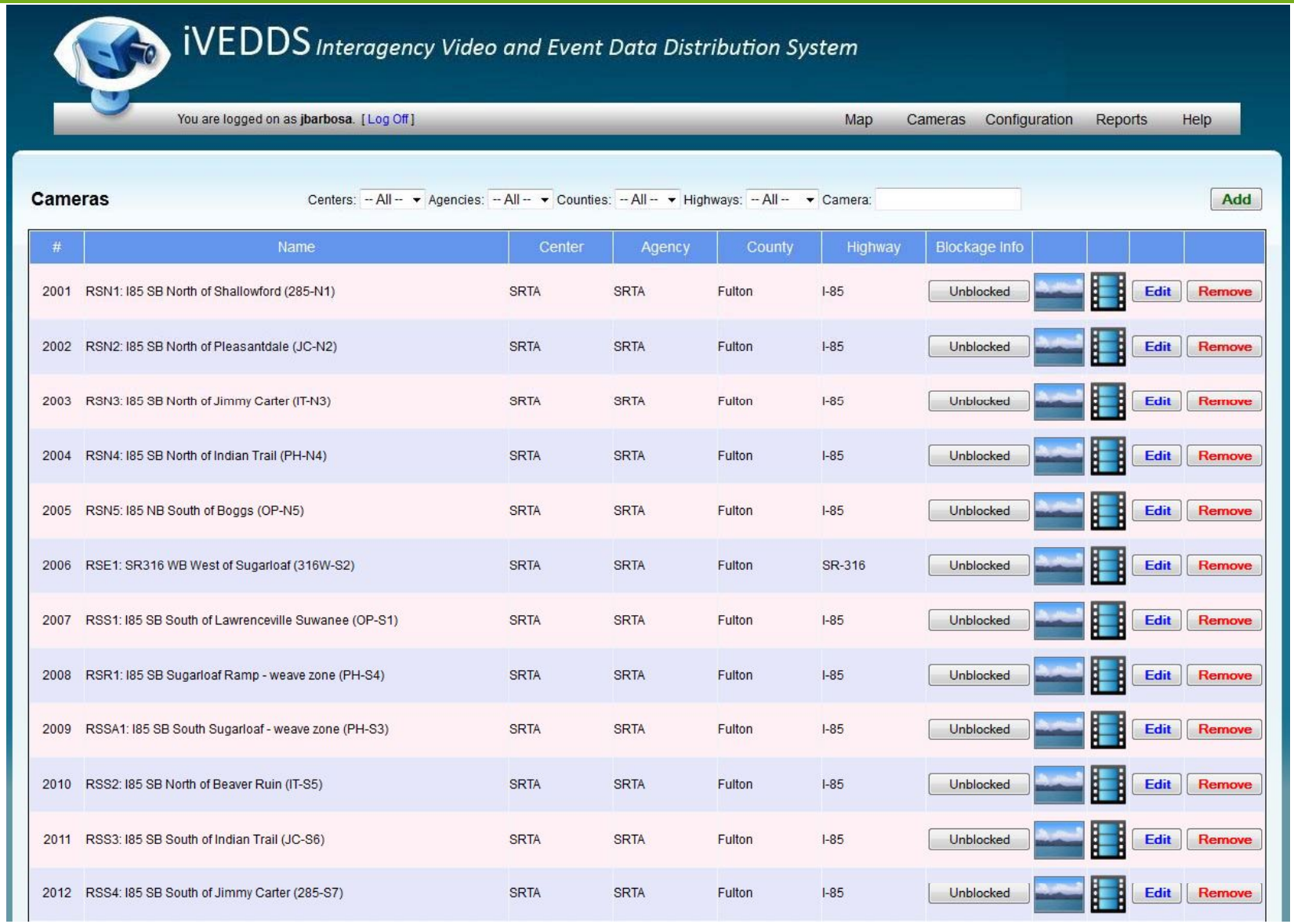
Video Distribution



Video Distribution



Video Distribution



CRCTMC Contractors

Work Package	Contractor	Equipment
Video Systems	Applied Electronics	• Barco Video Wall and CMS • Genetec Omnicast
Network	Black and McDonald	• Juniper Core Switches • RuggedCom Layer 3 Field Switches
Operator Consoles	NovaLink	• Custom consoles
System Integrator and Video Distribution	IBI Group	• iVEDDS

Schedule

Work Completion

Building – July 31 and October 1, 2014

Network – October 2014

Video Systems – August to October 2014

Consoles – August 2014

IT – December 2014

Integration – October to December 2014

Trial Operations – February 2015

Initiation of Operations – March 2015

PanAm Games – July to August 2015

CRCTMC Perspective – NE View

CRCTMC Progress

CRCTMC Progress

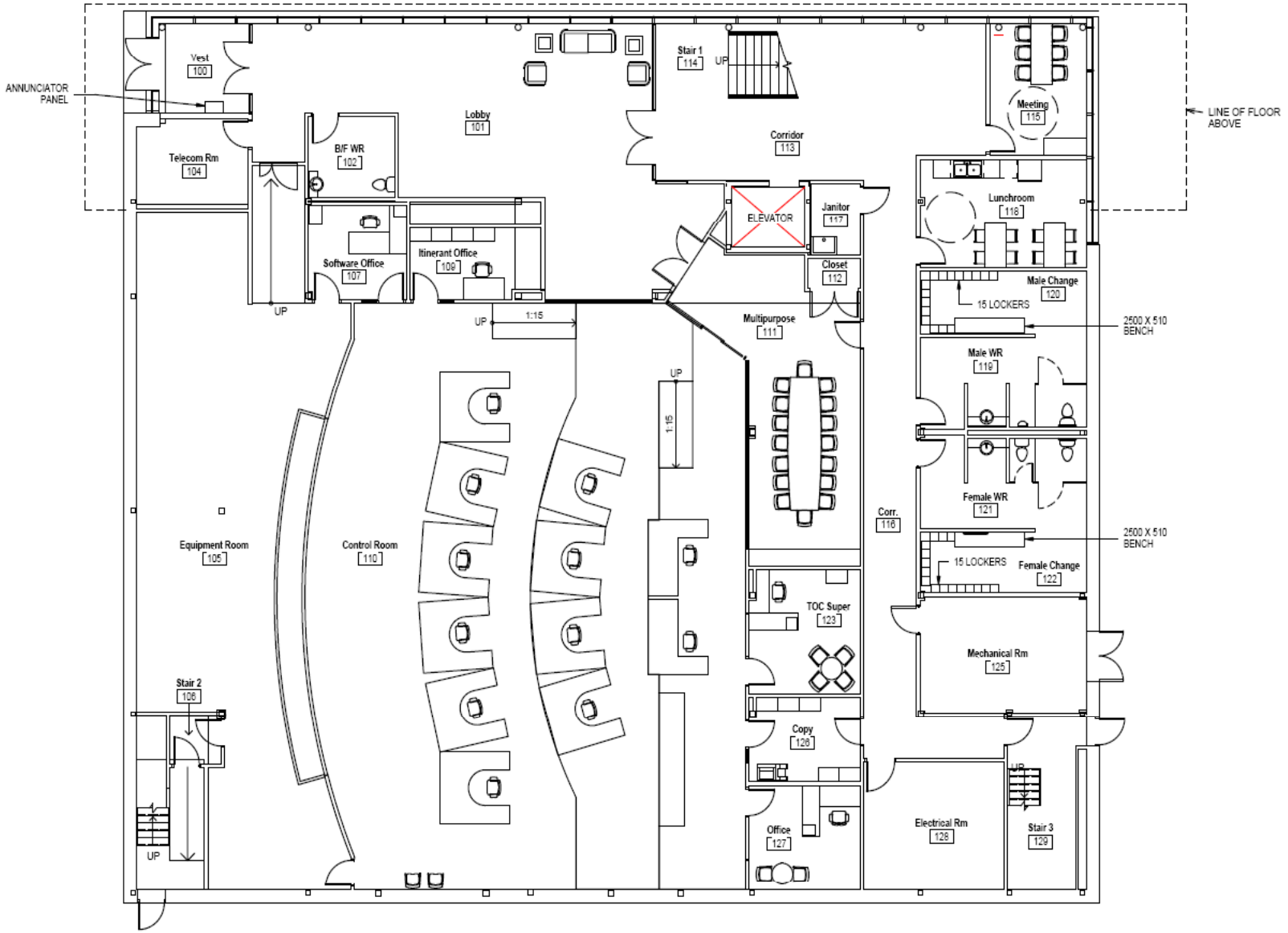
CRCTMC Progress

CRCTMC Progress

CRCTMC Progress

CRCTMC Progress

CRCTMC Floor Plans – Ground Floor



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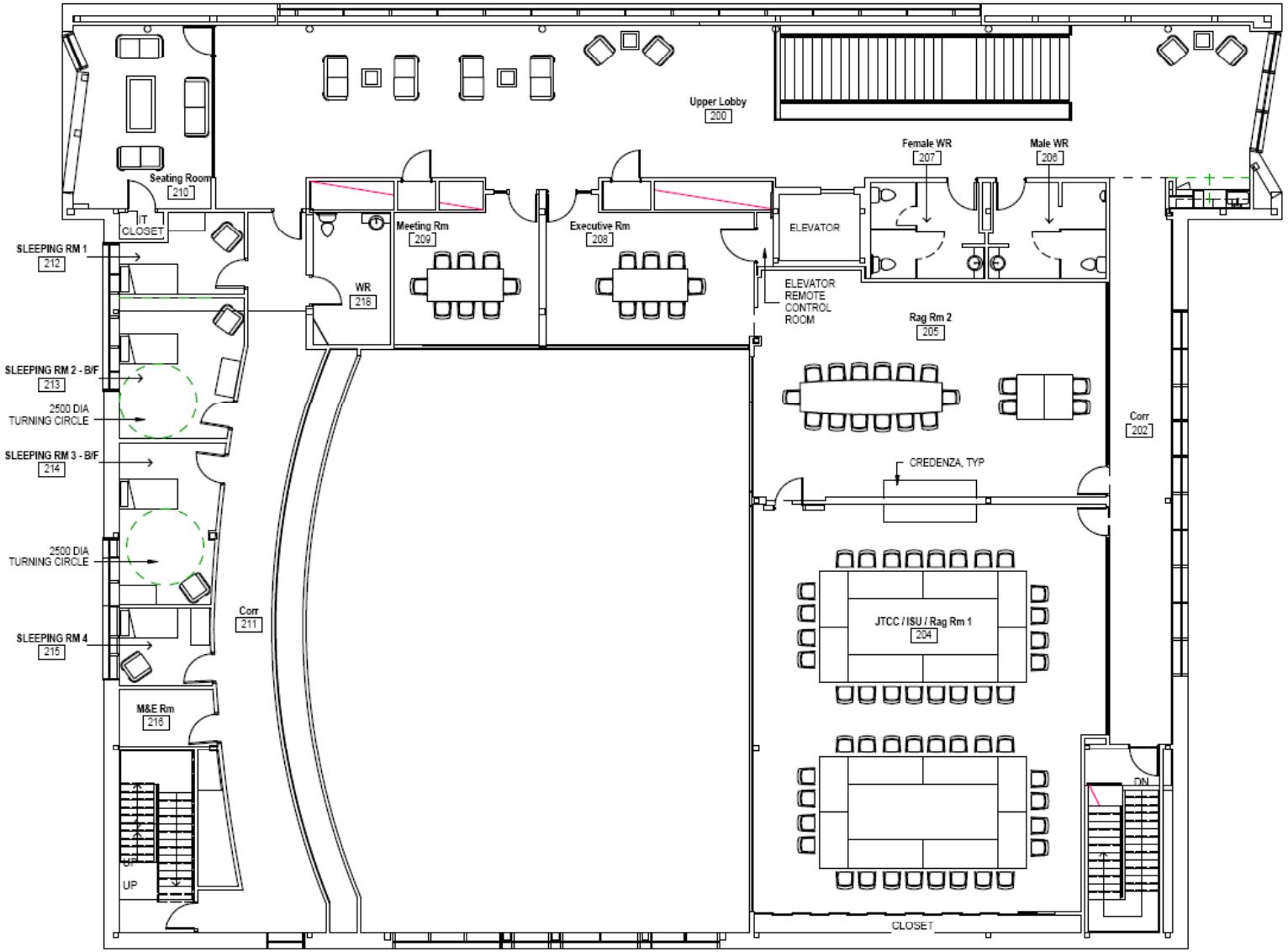
CRCTMC Floor Plans – Second Floor



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Thank You

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