Next Generation Buildings
Global Building Management Systems

John Huston - Teng Solutions
Steve Walter – City of Chicago DGS

The Teng Companies

- Teng & Associates, Inc. – 1959
  - Full Service A/E firm
  - Teng Solutions - 1993
    - Highly Specialized Business Unit
    - Technology Integration Engineering
    - Technology Partner
- Teng Construction L.L.C.
- Teng Development
  - Waterview Tower - Chicago

Technology Integration Services

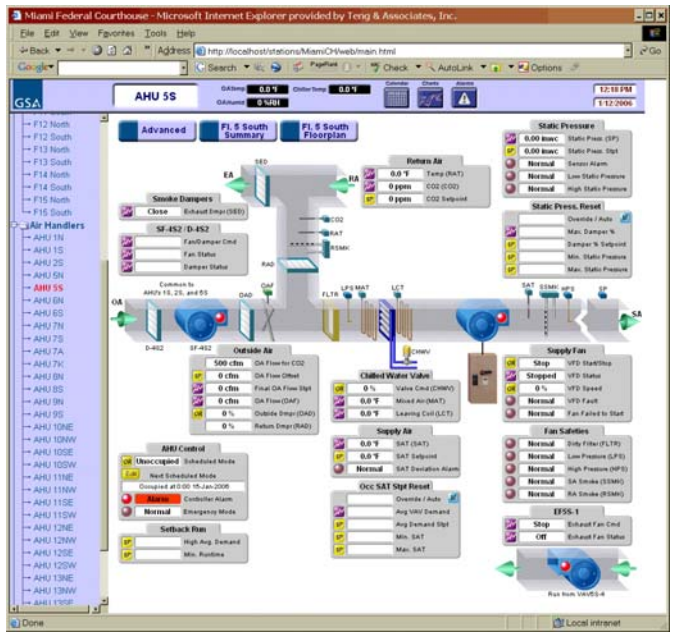
- Specification/Design High Tech Solutions
  - Open Protocols, Enterprise Based Connectivity
  - Building Automation Systems
  - Global Building Management System (Chicago)
  - Integrated Facility Management System (CDC)
- Implementation
  - Design/Build
  - Construction Administration
  - Commissioning, Retro-commissioning

What is a GBMS?

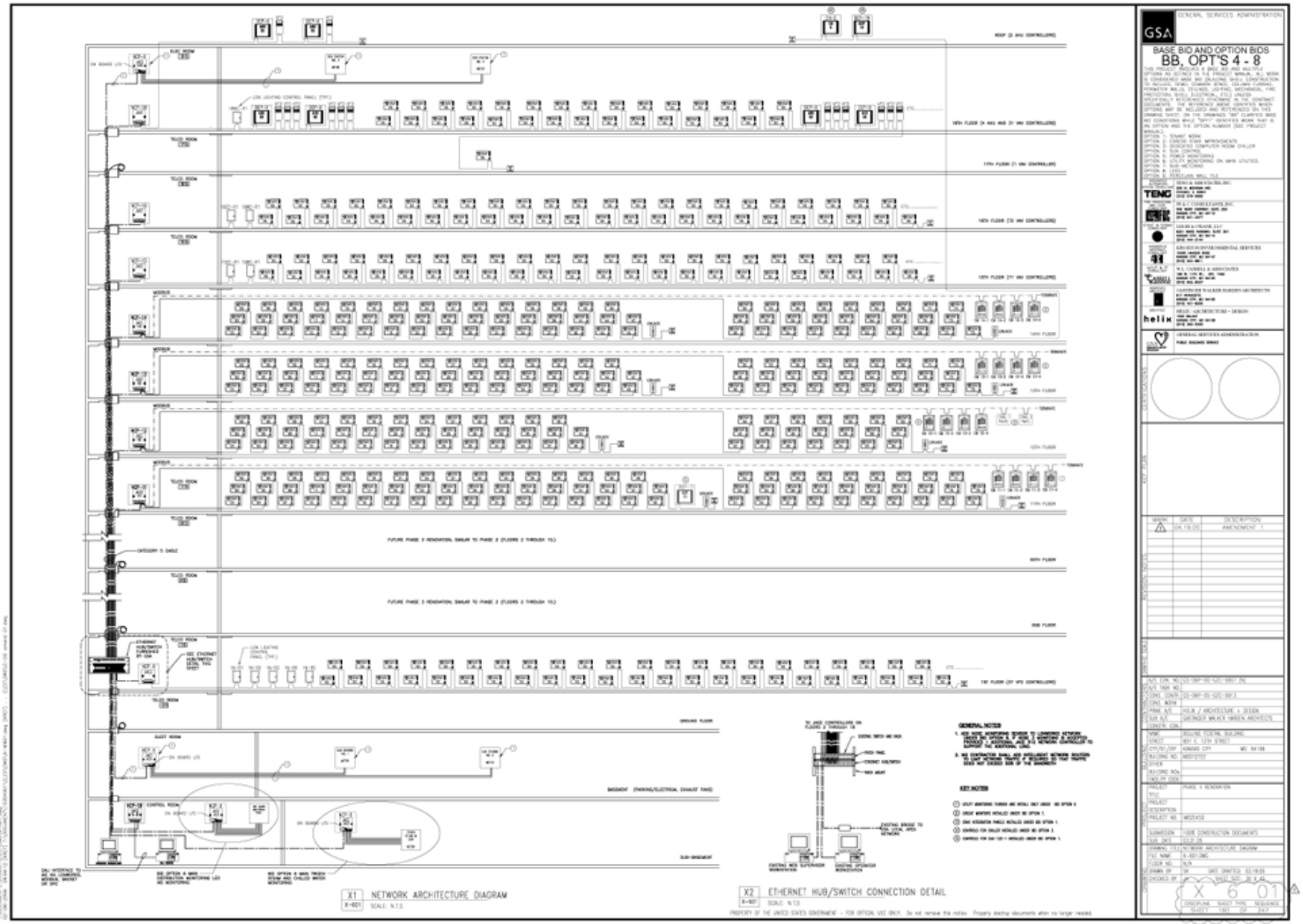
- Way to greatly improve efficiency and enhance security while reducing lifecycle costs
- Gets information into the hands of those that can use it, efficiently and reliably
- Takes advantage of enterprise connectivity, open protocols and latest advancements in technology
- Eliminates the expensive, proprietary lock created through custom, single source solutions
- Enables coordinated subsystem strategies

Subsystem Integration

- Enterprise Connectivity
  Browser Based
- HVAC
- Lighting
- Power Monitoring
- Security
- Fire/Life Safety
- Database Applications



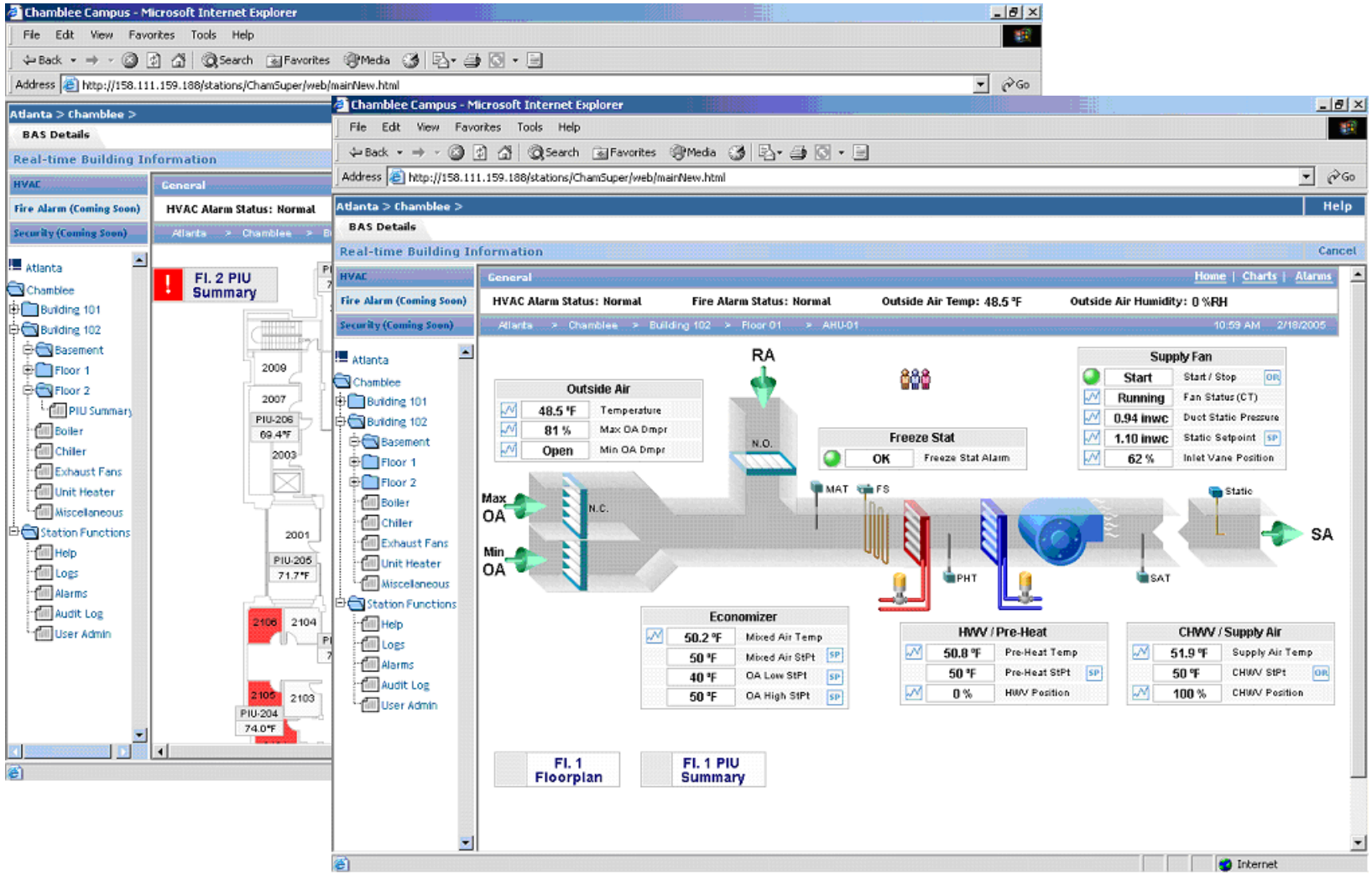
Design Drawings



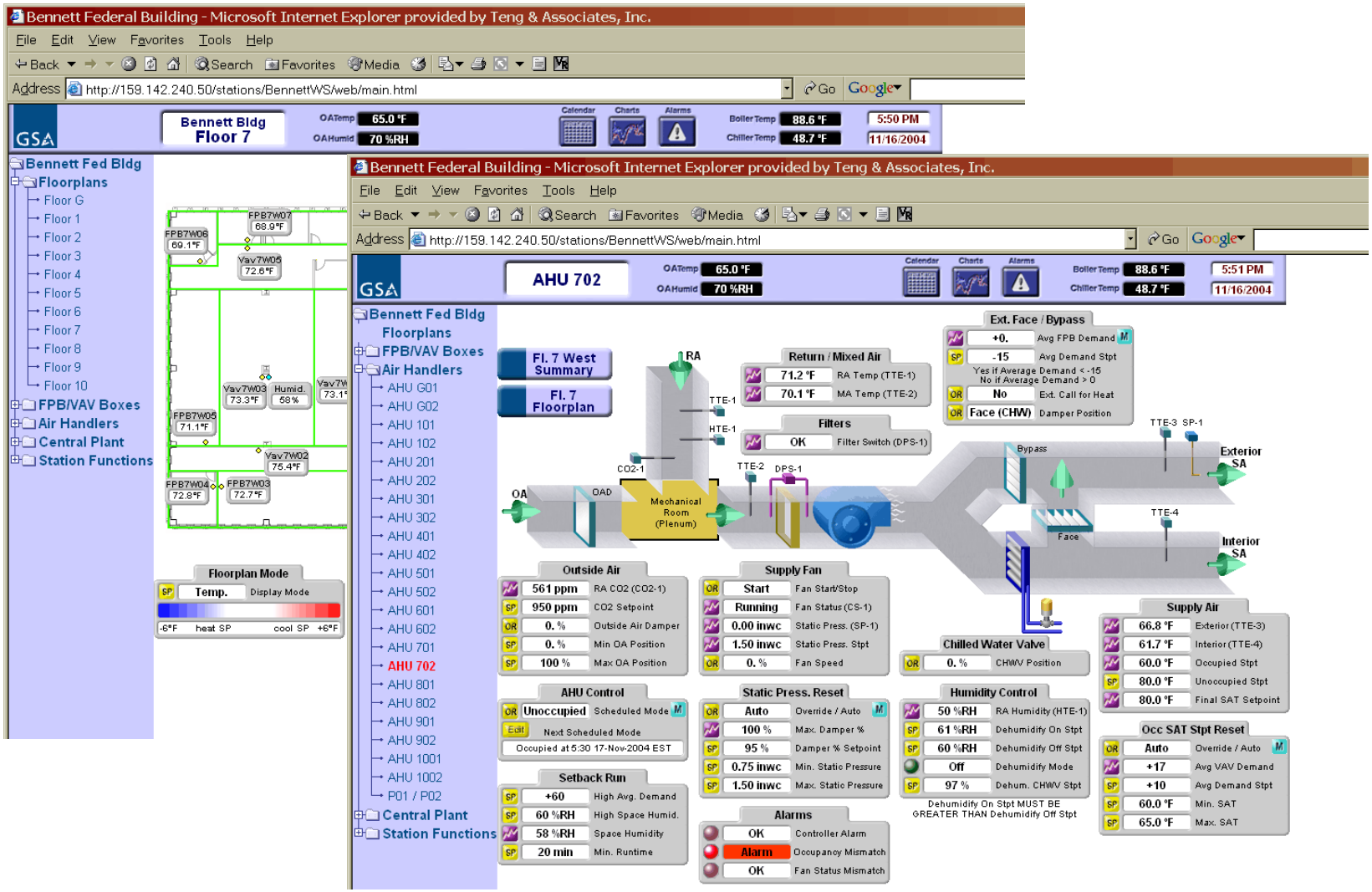
Who's Already Benefiting?

- City of Chicago DGS
- Centers for Disease Control and Prevention
- General Services Administration
- Army Corps of Engineers
- Colorado Springs Utilities
- Boeing Commercial Airplane Group
- EchoStar, US Cellular, SBC, AT&T, Broadwing
- SunTrust Banks
- Numerous Residential

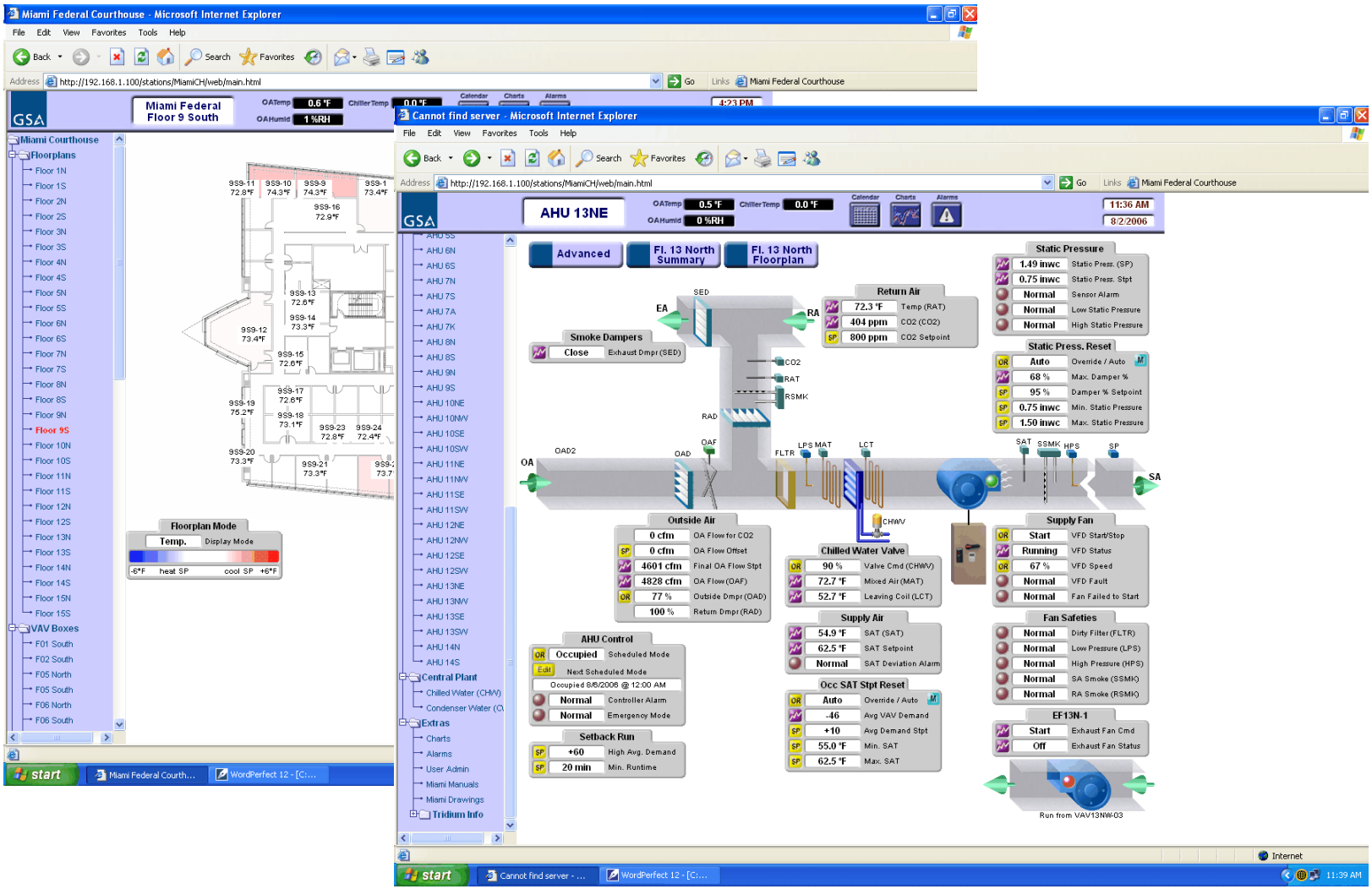
2006 Energy Centers for Disease Control



GSA - Jacksonville



GSA - Miami


Miami Federal Courthouse - Microsoft Internet Explorer
Miami Federal Floor 9 South
Floorplans
Floor 9S
VAV Boxes
Floorplan Mode
Temp.
Cannot find server - Microsoft Internet Explorer
AHU 13NE
Advanced
Fl. 13 North Summary
Fl. 13 North Floorplan
Smoke Dampers
Close
Exhaust Dmpr (SED)
Return Air
72.3 °F
Temp (RAT)
404 ppm
CO2 (CO2)
800 ppm
CO2 Setpoint
Static Pressure
1.49 inwc
Static Press. (SP)
0.75 inwc
Static Press. Stpt
Normal
Sensor Alarm
Low Static Pressure
High Static Pressure
Static Press. Reset
Auto
Override / Auto
68 %
Max. Damper %
95 %
Damper % Setpoint
0.75 inwc
Min. Static Pressure
1.50 inwc
Max. Static Pressure
Outside Air
0 cfm
OA Flow for CO2
0 cfm
OA Flow Offset
4601 cfm
Final OA Flow Stpt
4828 cfm
OA Flow (OAF)
77 %
Outside Dmpr (OAD)
100 %
Return Dmpr (RAD)
Chilled Water Valve
90 %
Valve Cmd (CHWV)
72.7 °F
Mixed Air (MAT)
52.7 °F
Leaving Coil (LCT)
Supply Air
54.9 °F
SAT (SAT)
62.5 °F
SAT Setpoint
Normal
SAT Deviation Alarm
Occ SAT Stpt Reset
Auto
Override / Auto
-46
Avg VAV Demand
+10
Avg Demand Stpt
55.0 °F
Min. SAT
62.5 °F
Max. SAT
Supply Fan
Start
VFD Start/Stop
Running
VFD Status
67 %
VFD Speed
Normal
VFD Fault
Normal
Fan Failed to Start
Fan Safeties
Normal
Dirty Filter (FLTR)
Normal
Low Pressure (LPS)
Normal
High Pressure (HPS)
Normal
SA Smoke (SSMK)
Normal
RA Smoke (RSMK)
EF13N-1
Start
Exhaust Fan Cmd
Off
Exhaust Fan Status
AHU Control
Occupied
Scheduled Mode
Next Scheduled Mode
Occupied 8/6/2006 @ 12:00 AM
Normal
Controller Alarm
Normal
Emergency Mode
Setback Run
+60
High Avg. Demand
20 min
Min. Runtime
Central Plant
Extras
Tridium Info
Run from VAV13NW-03
11:36 AM
8/2/2006

CA and Commissioning

- Design Drawing, Specifications Review
- Controls Submittal Review
- Point-Point Verification (AI, AO, DI, DO)
- Sequence of Operations Testing
- GUI Testing and Graphics Review
- O&M Manual, As-Built Drawing Review
- Insure the Design Intent is Realized

City of Chicago DGS

- Variety of Building Control Systems
- Over 500 DGS Facilities
- Proprietary standalone systems
  - Difficult to operate
  - Expensive to maintain
  - Various states of efficiency and comfort levels
  - Typical of BCS market for last 25 years
- Building Engineers maintain multiple sites
  - Each facility is unique relative to BCS
  - Access via remote communication limited
  - Requires travel to each site to maintain operation

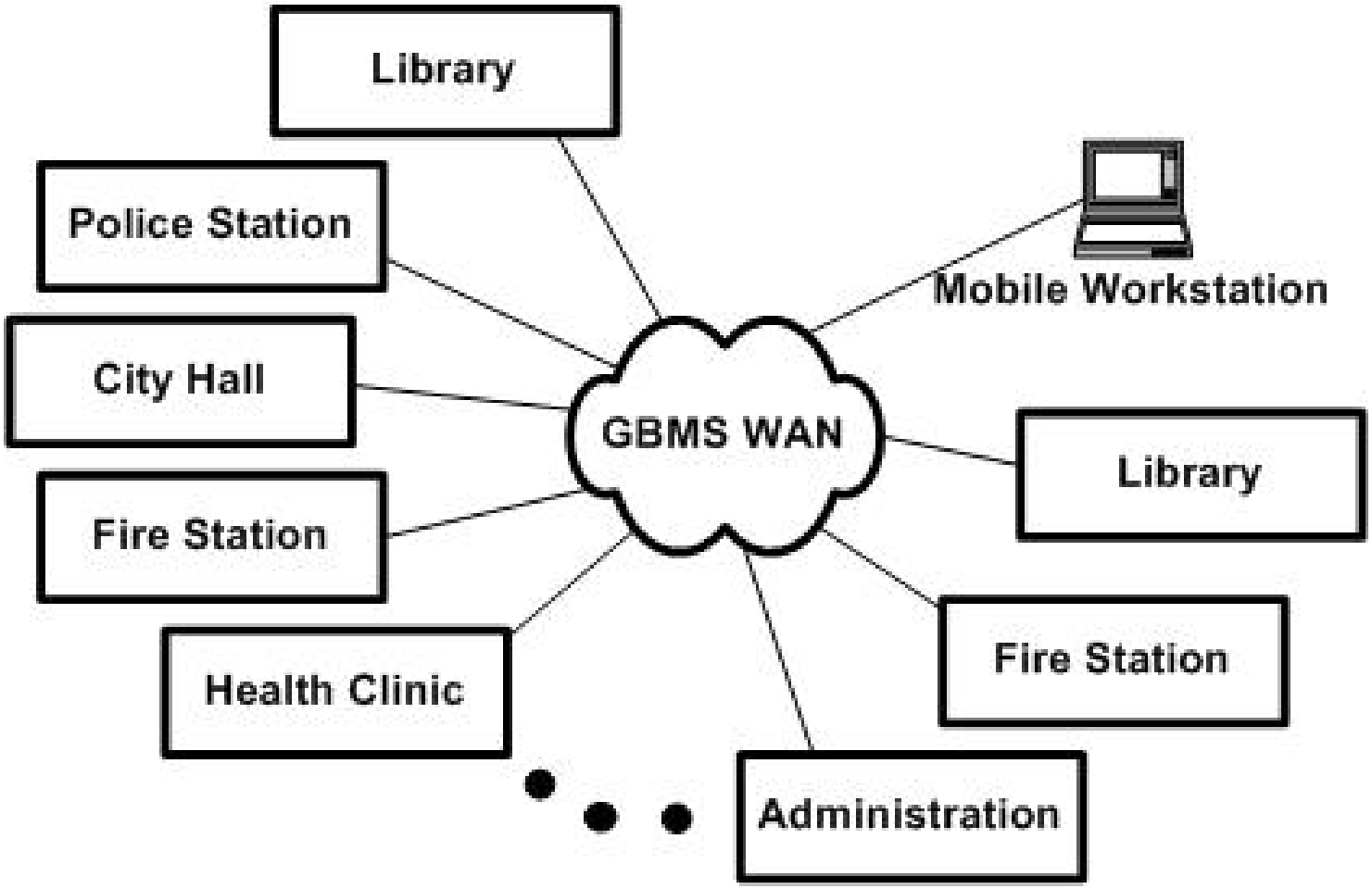
Department of General Services

- Identified Opportunities for Life Cycle Cost Savings
- Apply Latest Building Control Systems Technology
  - Standardize on open protocols – interchangeability, competition
  - Utilize browser based access - uniform training, IT convergence
  - Integrate HVAC, lighting, security, power monitoring, fire/life safety
    - Easy to operate via common interface – web browser
    - Cost effective to maintain – multiple sources throughout lifecycle
    - Maximize efficiency while improving comfort level
    - Address each facility's unique features through common technology
  - Provide the tools for Building Engineers to effectively maintain multiple sites throughout the city – Enterprise connectivity
  - Migrate all facilities over 10-15 years

GBMS

- Global Building Management System
  - $150M, 10-15 year Migration
    - HVAC, Security, Power, Fire, Life Safety
  - 3 year Development
    - Concept, RFP, Selection
  - Award expected 2006 – City Council
  - CA/Commissioning - Intent is Realized
  - Initial Implementations:
    - OEMC (911), City Hall, HWL, Police, Fire….

500+ Facilities



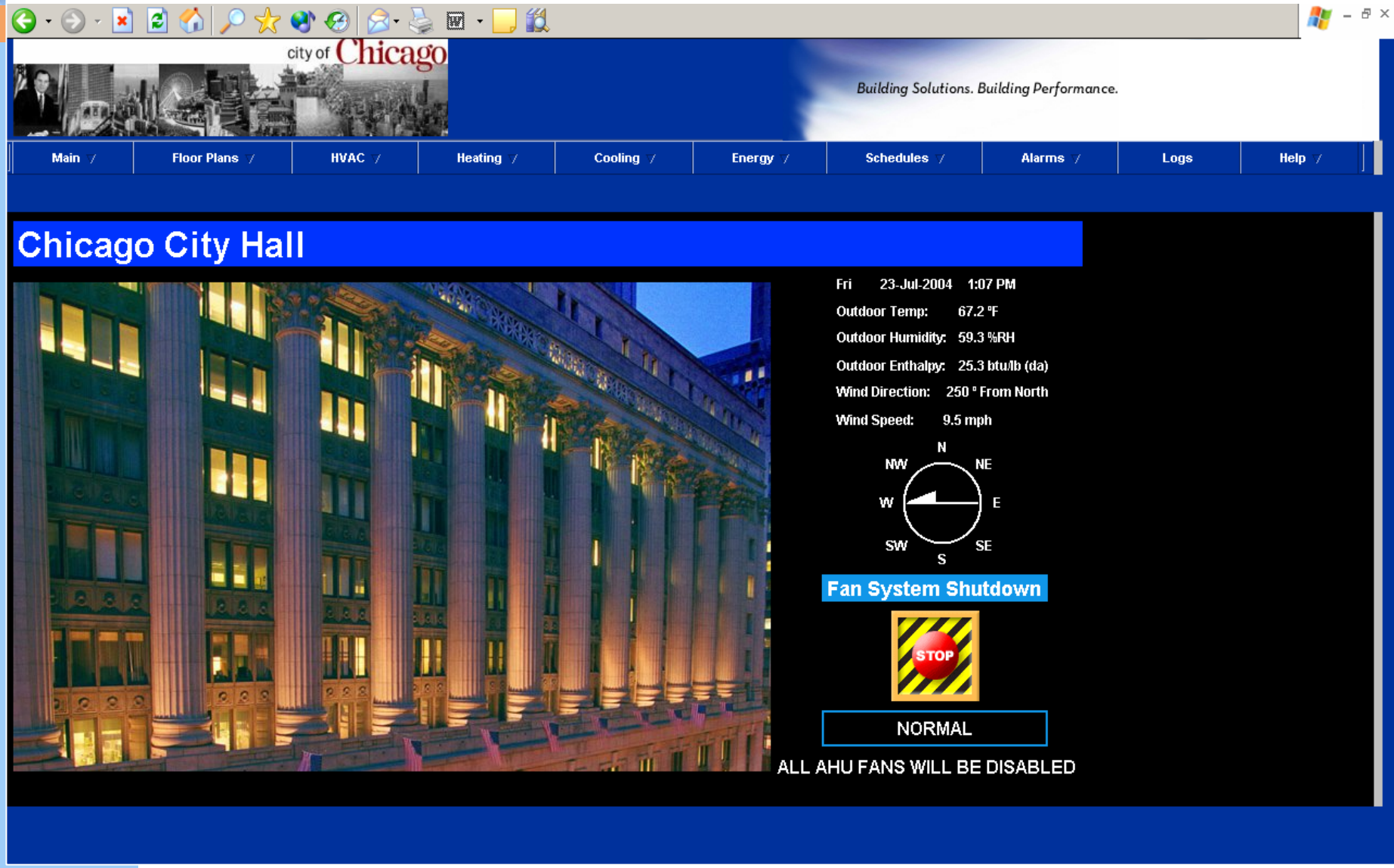
Enhances Security

- Remote Access to CCTV and DVRs Reduces the Required Number of Security Guards
  - Monitor City Hall cameras at OEMC
- Integration with Operation Virtual Shield
  - Internal view – GBMS
  - External view – OVS
  - CBR – GBMS
  - HVAC – GBMS – Automatic or Manual Response
  - Future expansion – Both
  - Remote Access through PDAs

Features and Benefits

- Positions the City to Maximize Efficiency and Lower Life Cycle Costs
  - LEED – Control and Innovation points
  - Energy Savings – City Hall significant savings
  - Improved Comfort - Libraries
  - Continuous Commissioning capability
  - Operations – Workforce
    - Reduced Labor and Overtime Costs
  - Service
  - Maintenance – Preventative Maintenance Software Integration
  - Upgrades – Cost Effective

City Hall


city of Chicago
Building Solutions. Building Performance.
Main
Floor Plans
HVAC
Heating
Cooling
Energy
Schedules
Alarms
Logs
Help
Chicago City Hall
Fri 23-Jul-2004 1:07 PM
Outdoor Temp: 67.2 °F
Outdoor Humidity: 59.3 %RH
Outdoor Enthalpy: 25.3 btu/lb (da)
Wind Direction: 250 ° From North
Wind Speed: 9.5 mph
N
NW
NE
W
E
SW
SE
S
Fan System Shutdown
STOP
NORMAL
ALL AHU FANS WILL BE DISABLED

Application Integration

- Geographical Information System
- Energy Management
- Maintenance Management
- Inventory Control
- Computer Aided Facility Management
- Asset Tracking
- Facial/License Plate Recognition
- Biometrics, CBR Detection
- Coordinated Response

Methods of Financing

- Master Lease/Purchase
- Vendor Financing
- Municipal Financing
- City Bonds
- Grants

- **A “revenue stream” will be derived from the resulting savings in energy, workforce and overall efficiencies**

Getting Started

- Develop a Master Plan
  - Analyze Existing Infrastructure
    - Existing BAS, Security, Power
    - Network communications
  - Identify Processes and Procedures
    - Interview Key Personnel
  - Look for Integration Opportunities
  - Present the Options and Associated Costs
    - Matrix Format to Compare Features and Benefits
  - Design a Pilot Project - Verify
  - Develop an Implementation Plan

Thank You

Questions?