BRAC Alexandria

Alexandria BIMStorm™
Federal Friendly Zones™ Exercise

buildingSMARTalliance Interest Group

Renaissance Club
Washington, DC
December 10, 2008

ONUMA

Michael Chipley – Alexandria BRAC Coordinator
Kimon Onuma – BIM Architect Extraordinaire

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How to make a BIMStorm (10 step plan)

1. Call Kimon
2. Call Deke
3. Make up a concept/exercise objective
4. Spend massive amount of time exchanging e-mails, phone calls, webinars
5. Explain to many, many folks what a BIMStorm is
6. Massage head from hitting table and walls
7. Encourage, cajole, plead, and other wise get the word out to participate
8. Dry run (Murphy's Law)
9. Ready, set, go!
10. Watch in amazement as the exercise unfolds and creative, talented people do what they do best…

Optional 11th Step – Check into the Betty Ford Center for Recovering BIMoholics to detox

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What is a Building Information Model?

National BIM Standard Definition of BIM

– A Building Information Model (BIM) is a digital representation of physical and functional characteristics of a facility. As such it serves as a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle from inception onward.

– *A basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM process to support and reflect the roles of that stakeholder. The BIM is a shared digital representation founded on open standards for interoperability.*

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International Alliance for Interoperability

Courtesy of Deke Smith, Executive Director

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Why Should I BIM?

BIM can deliver…

- A facility sooner
- A lower cost higher quality facility
- A facility with few or no change orders
- A significant reduction in RFI's
- A more energy efficient facility
- A more sustainable facility
- A more environmentally friendly facility

As of FY 08 GSA and DoD BRAC projects are to delivered in BIM

BIM is only the tool

- Build building electronically before you build it physically
- Collect information once by authoritative source
- Re-use information throughout the facility lifecycle
- Cut out non-value added effort (waste)

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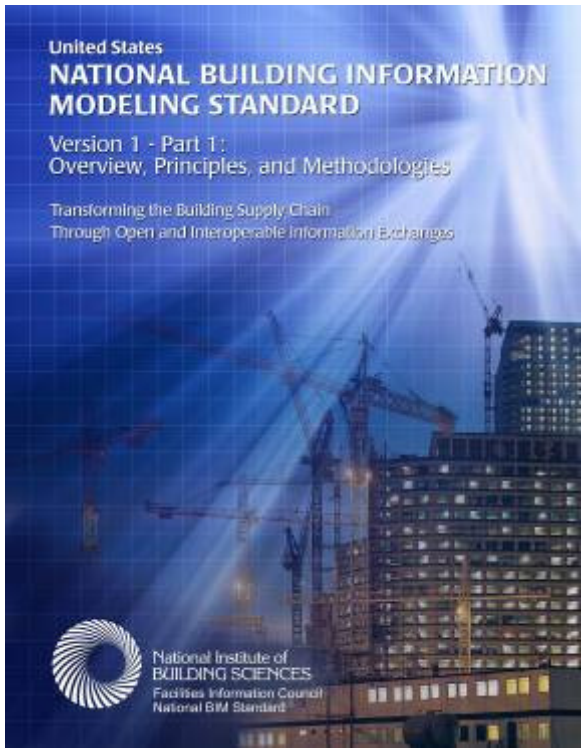
Standard: NBIMSV1 P1



- Delivered Dec 27, 2007
- International Core
- National Specific
  - OmniClass
- Information Exchange Concepts
- Standard Development Process
- Information Assurance
- Capability Maturity Model
- References and Appendices
- Over 30 contributors

200,000+ Downloads

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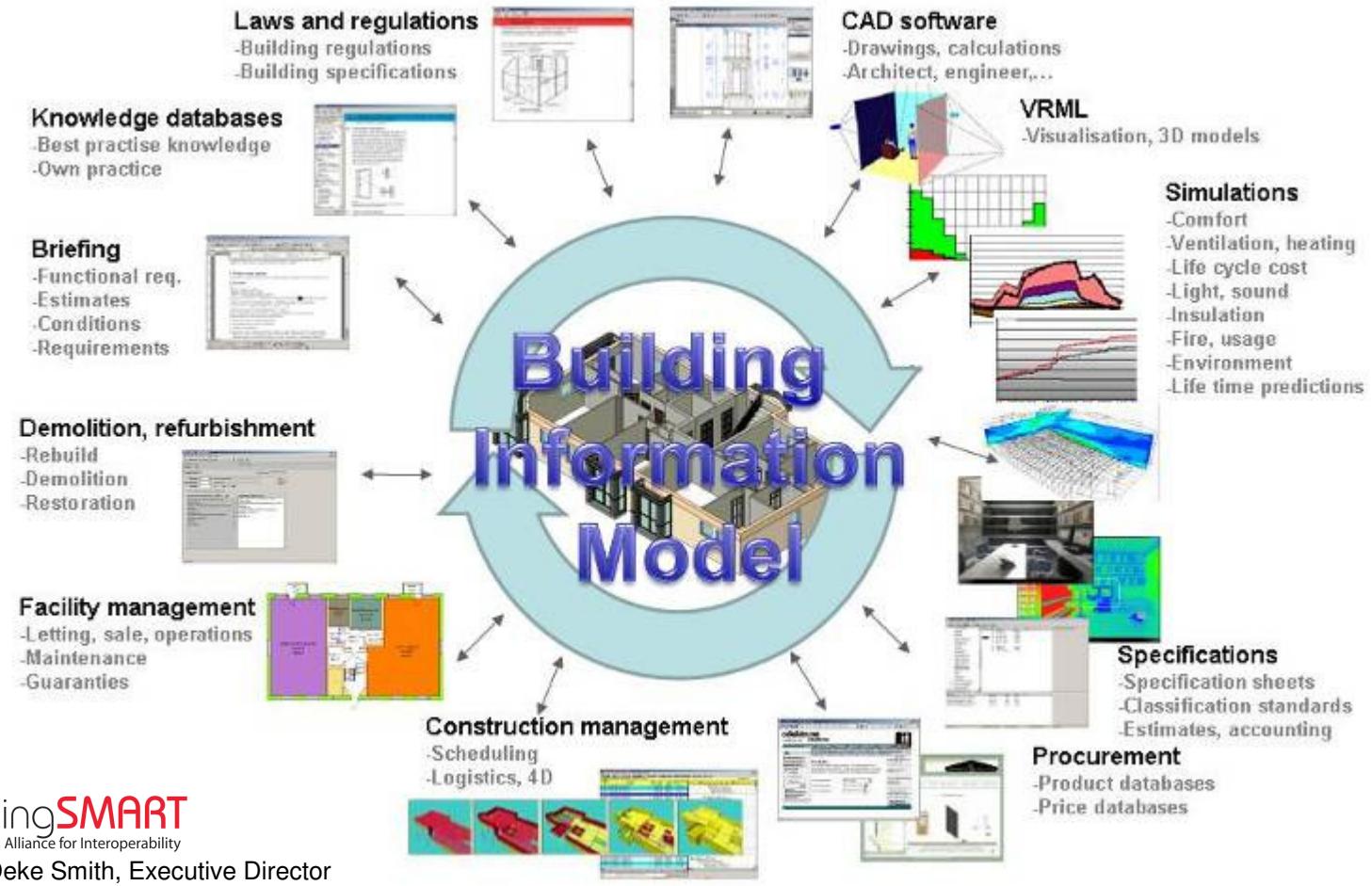
BIM Lifecycle View



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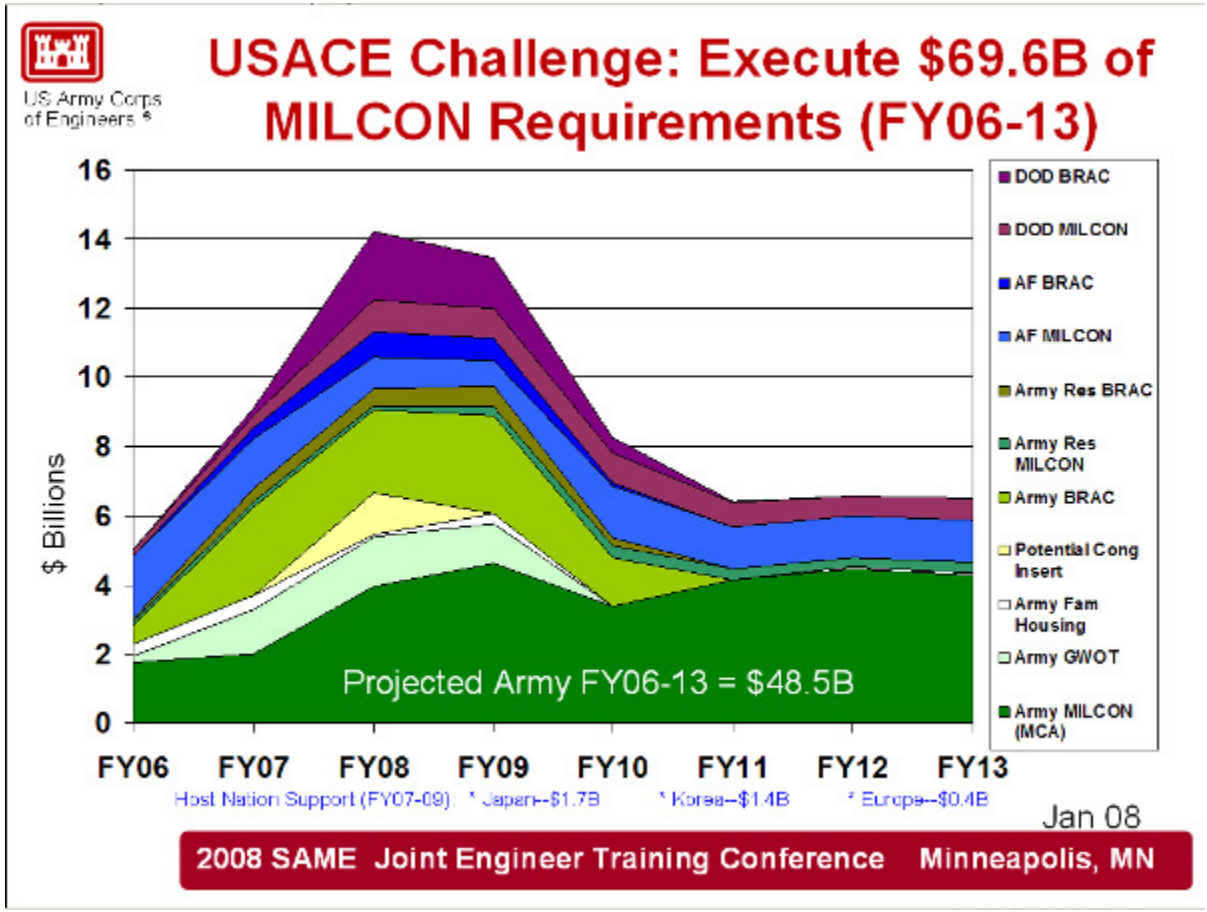
Army MILCON Transformation



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Army MILCON Transformation

US Army Corps of Engineers

Interoperability Demonstrations

- 23-25 July 2008, Washington DC
- US Army Corps of Engineers co-sponsoring event with buildingSMART Alliance
- Three demonstrations:
  - Spatial Compliance Information Exchange (SCIE)
  - Coordination View Information Exchange (CVIE)
  - Construction Operations Information Exchange (COBIE)

Information on this workshop can be obtained at http://buildingsmartalliance.org/ under the "News / Events" tab.

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BIM-COBIE

room functions
system functions

spatial layout
room numbers
room function
system info
product sizing

as-built layout,
product data,
serial number,
tag number,
warranty info,
spares/
suppliers,
job plans

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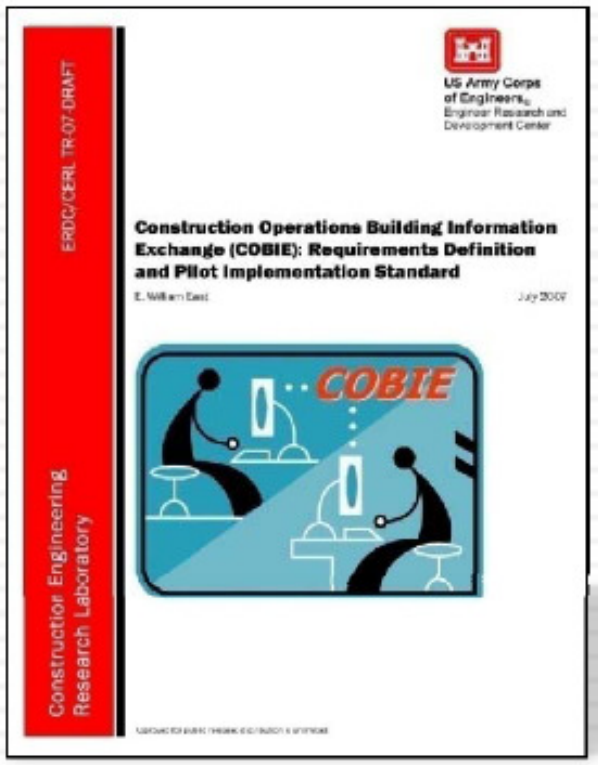
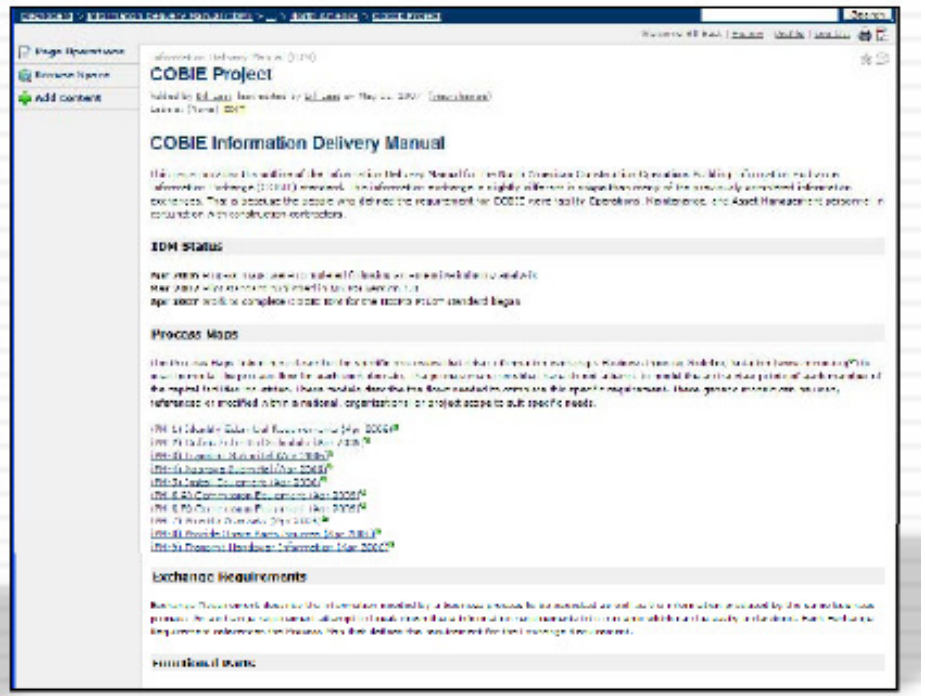
BIM-COBIE



wbdg.org



idm.buildingsmart.no

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H.R.3221
Renewable Energy and Energy Conservation Tax Act of 2007
(Engrossed as Agreed to or Passed by House)

(7) HIGH-PERFORMANCE GREEN BUILDING- The term `high-performance green building' means a building that, during its life-cycle, as compared with similar buildings (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency)--
(A) reduces energy, water, and material resource use;
(B) improves indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and improving lighting and acoustic environments that affect occupant health and productivity;
(C) reduces negative impacts on the environment throughout the life-cycle of the building, including air and water pollution and waste generation;
(D) increases the use of environmentally preferable products, including biobased, recycled content, and nontoxic products with lower life-cycle impacts;
(E) increases reuse and recycling opportunities;
(F) integrates systems in the building;
(G) reduces the environmental and energy impacts of transportation through building location and site design that support a full range of transportation choices for users of the building; and
(H) considers indoor and outdoor effects of the building on human health and the environment, including--

Objective is to reduce energy consumption and lead transformation of markets

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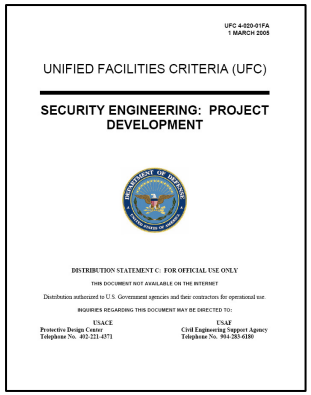
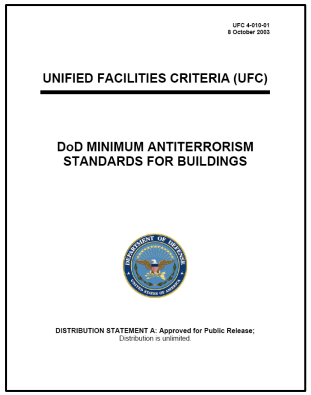
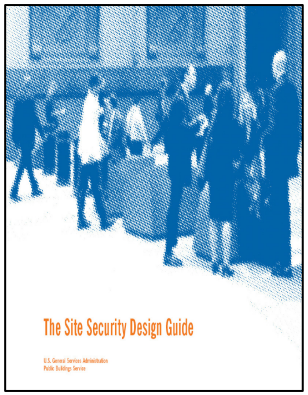
Federal Security Standards







GSA and DoD developed separate security standards and apply them differently, both standards have tremendous impacts on public space, transit, communities, and best use of land.

They may have significant conflict with other design objectives.

Blast is a significant design challenge

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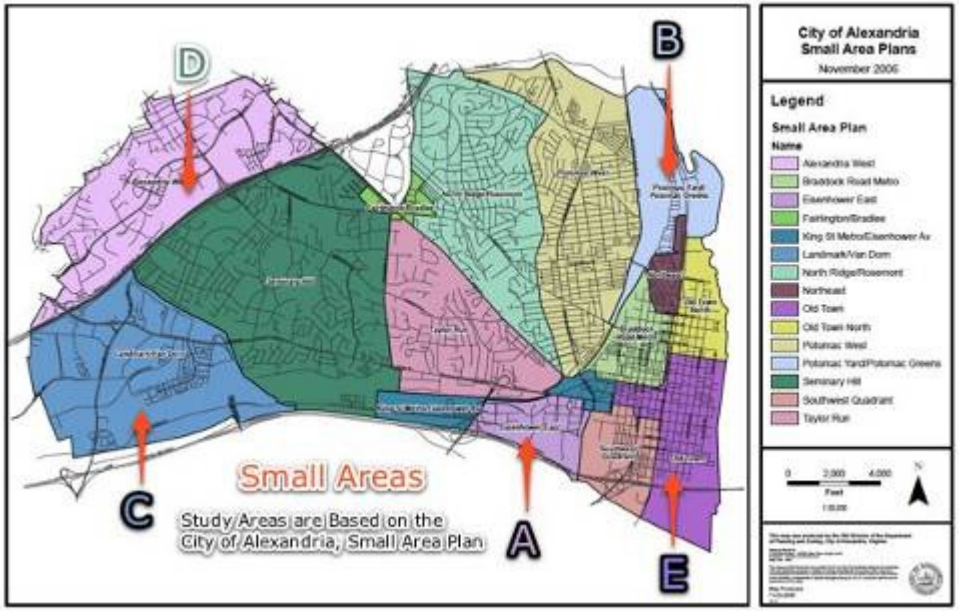
Alexandria - Why a BIMStorm?



- Long term economic growth based on eco-friendly and sustainable development
- Alexandria rebalancing commercial and residential tax base
- Direct Alexandria BRAC loss actions impacts approximately 7% of workforce and leases in Alexandria (7,200 jobs, 1.4 million square feet)
- Alexandria needs 5-10 million SF of office space designed to federal facility requirements to attract other federal agencies
- Building Information Modeling is rapidly changing the traditional process of design and analysis

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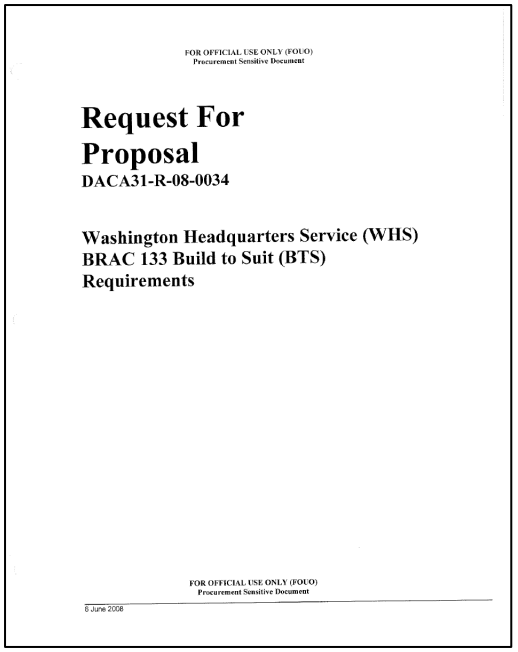
BIM in Practice - WHS BRAC 133

RFP released 6 June 2008, **Build to Suit Campus**

1. Meet the BRAC statutory deadline of Sep 15, 2011
2. 6,409 person at single site, minimum of 6,200 person
3. Satisfy UFC 4-020-02FA for threats and Level of Protection and use **CPTED**
4. Easy and clear authorized person access
5. **Establish a strong "campus-like" atmosphere by protecting and enhancing natural environment and common open spaces**
6. Incorporate sustainable design, **LEED Silver**
7. Flexible design for future changes
8. Will be done using **Building Information Modeling** (BIM)
9. Submissions due 30 July 2008

Mark Center selected as new WHS HQ site



FOR OFFICIAL USE ONLY (FOUO)
Procurement Sensitive Document

Request For Proposal
DACA31-R-08-0034

Washington Headquarters Service (WHS)
BRAC 133 Build to Suit (BTS)
Requirements

FOR OFFICIAL USE ONLY (FOUO)
Procurement Sensitive Document

6 June 2008

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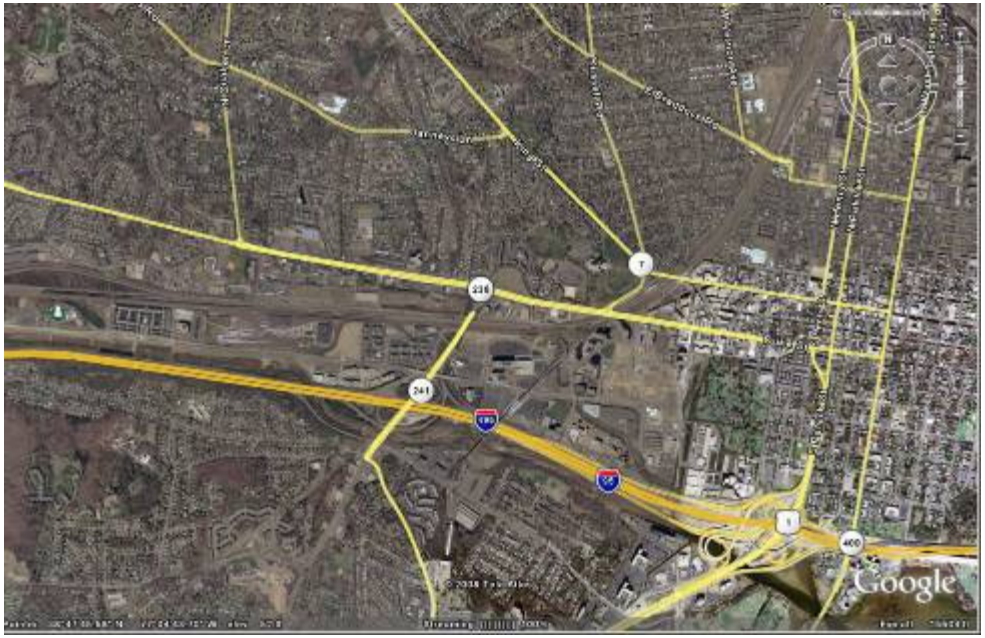
Alexandria Pre-BIMStorm



First BIMStorm to be in a hotel and team environment, city staff and SMEs in real time

- Alexandria real estate opportunities not well known within federal government
- Alexandria was a “Flat World” – no 3D buildings and no presence on the web
- Community recovery strategy not defined
- City staff and community experience with PTO demonstrated new paradigm and possibilities to integrate federal agencies into an urban environment
- Federal government desire for transit oriented development, energy efficient buildings

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Federal Friendly Zones™ (FFZ's)

Alexandria has many areas, neighborhoods and parcels that can meet these requirements, however, the process by which the federal government advertises, acquires and operates the commercial office lease space can conflict with many community objectives. The concept of the **Federal Friendly Zones** is to identify areas and sites that can support the federal requirements and become part of a larger integrated land use decision. Within each FFZ, there are three types of utilizations:

- Federal campus
- Single Federal Occupied Building
- Single building with federal agency as a tenant (dispersed)

Working with the local neighborhoods and federal agencies, a new approach can be developed to ensure the community grows and prospers to achieve mutually beneficial results (such as transit oriented development, Eco-City, enhanced water and air quality, etc.).

Another key objective of the **Federal Friendly Zones** is move from a **Protection** oriented process (using bollards, barriers, street closings, etc) that impact the streetscape and public space, **to a Resiliency, Redundancy, and Recovery model** that relies on enhanced police, fire, emergency management and community preparedness to respond to events (whether natural or man made).

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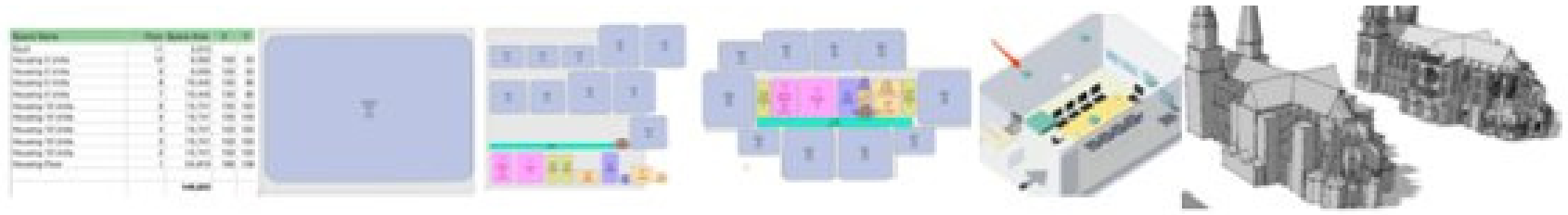
Alexandria BIMStorm FFZ Objectives



LOD-0 LOD-1 LOD-2 LOD-3 LOD-4 LOD-5 LOD-6

- Educate stakeholders on new requirements and capabilities
- Demonstrate virtual planning, design collaboration, speed to market
- First BIMStorm to use real sites, real requirements, intensive GIS
- Create a Virtual Alexandria and web presence
- Highlight Alexandria as a place to Live, Work, Shop, Play
- Develop and capture Lessons Learned to refine FFZ concept

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Alexandria BIMStorm FFZ Scenarios

Scenario	Study Area	Block	Project	Type	Notes
1	A	2	Campus DoD - Hoffman Block 2 - Class A 500,000 SF 10-15 story office building	New Construction	Office campus under development. This is for one of the blocks in the new campus.
1	A	2	Multi or Single Building GSA - Hoffman Block 2 - Class A 500,000 SF 10-15 story office building	New Construction	Office campus under development. This is for one of the blocks in the new campus.
1	B	1	Campus GSA - MRP Realty Landbay H Potomac Yard - Class A, 1 million SF campus with 2-4 buildings (Landbay H)	New Construction	Teams are to decide number and type of buildings.
1	C	1	Campus DoD - Jones Lang LaSalle Victory Center - Class A, 1 million SF campus with 2-4 buildings	New Construction	Teams are to decide number and type of buildings.
1	C	1	Campus GSA - Jones Lang LaSalle Victory Center - Class A, 1 million SF campus with 2-4 buildings (Victory Center)	New Construction	Teams are to decide number and type of buildings.
2	A	3	Multi or Single Building DoD - Hoffman Block 3 - Class A 500,000 SF 10-15 story office building	New Construction	Teams are to decide number and type of buildings.
2	D	1	Multi or Single Building Commercial - Duke Mark - Class A 1 million SF office building	New Construction	Teams are to decide number and type of buildings.
2	D	1	Multi or Single Building DoD - Duke Mark Center - Class A 1 million SF office building	New Construction	Teams are to decide number and type of buildings.

- DoD campus/buildings
- GSA campus/buildings
- Class A Speculative Office
- Historic Properties
- Cultural Resources
- Transit
- Environment

Scenarios were developed to highlight type, name, scale and challenge teams integration of multiple skills/disciplines

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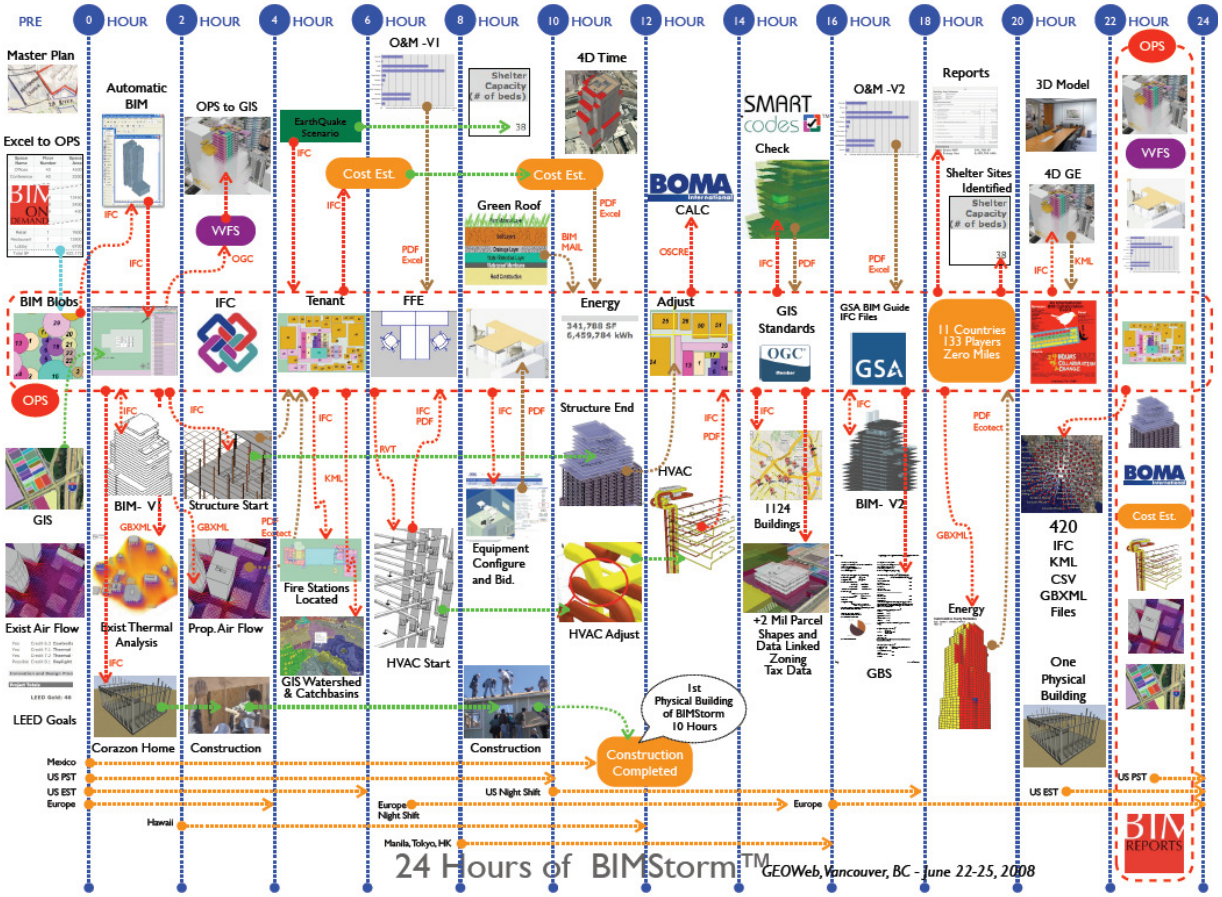
BIM 24 Hour Exercise Work Flow



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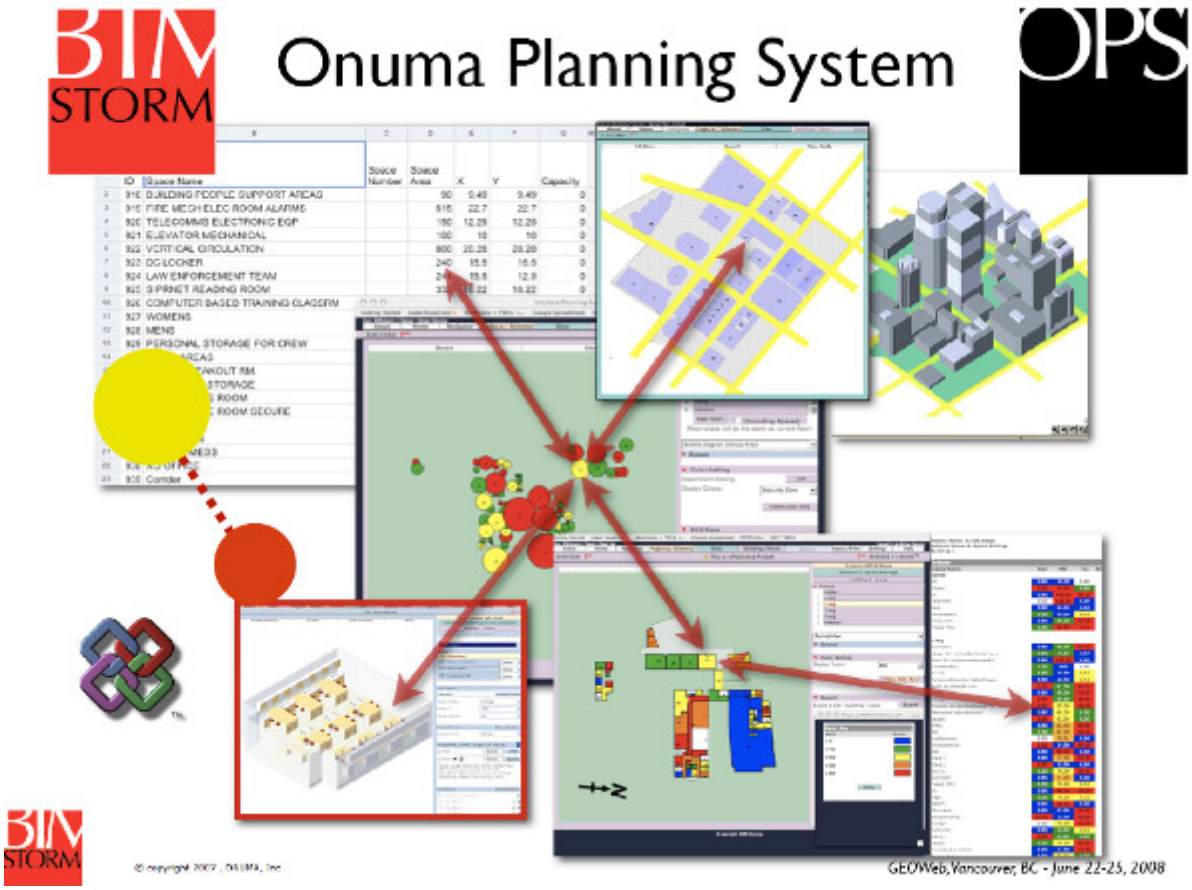
Onuma Planning System



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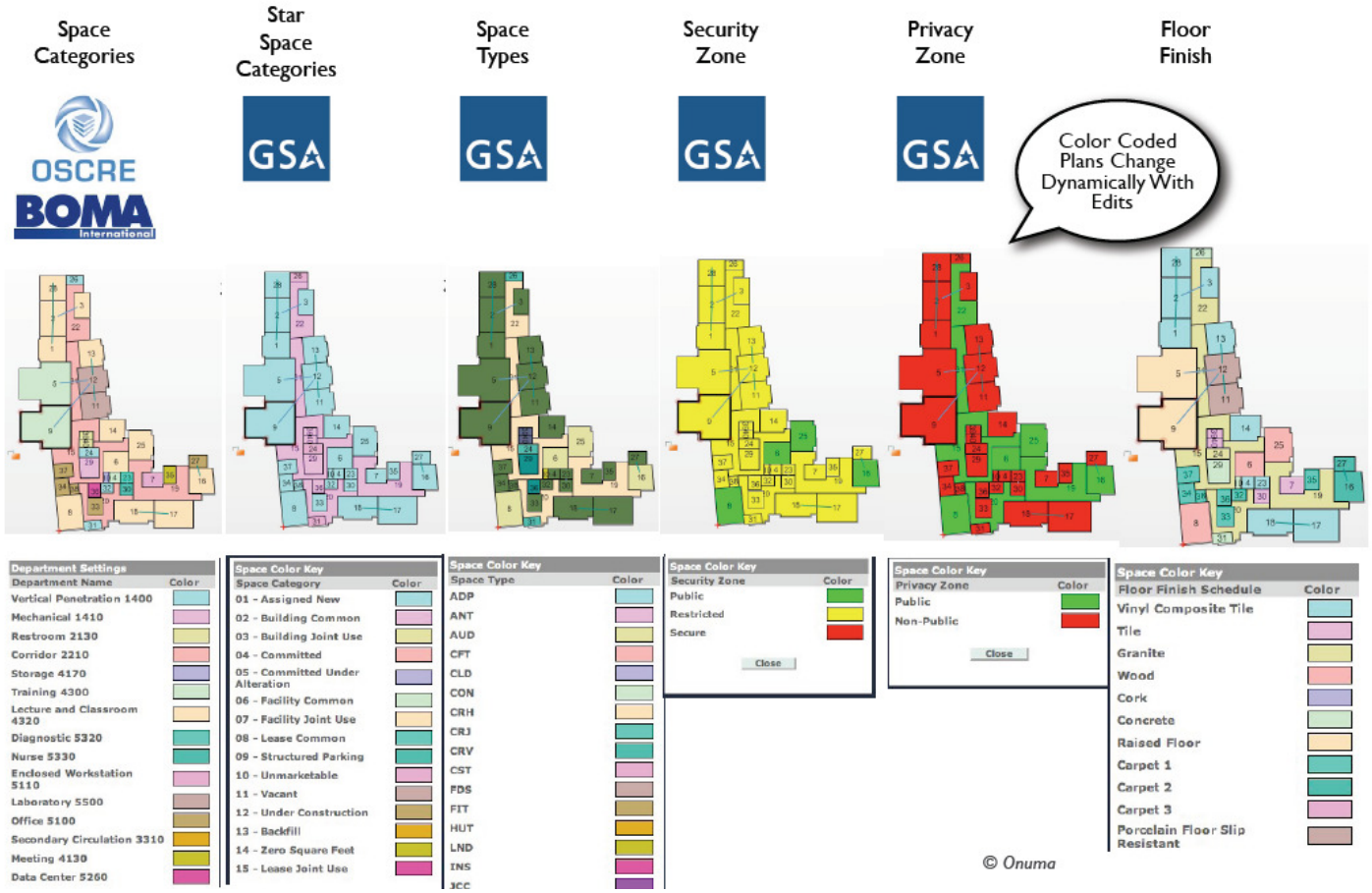
Define Space Attributes



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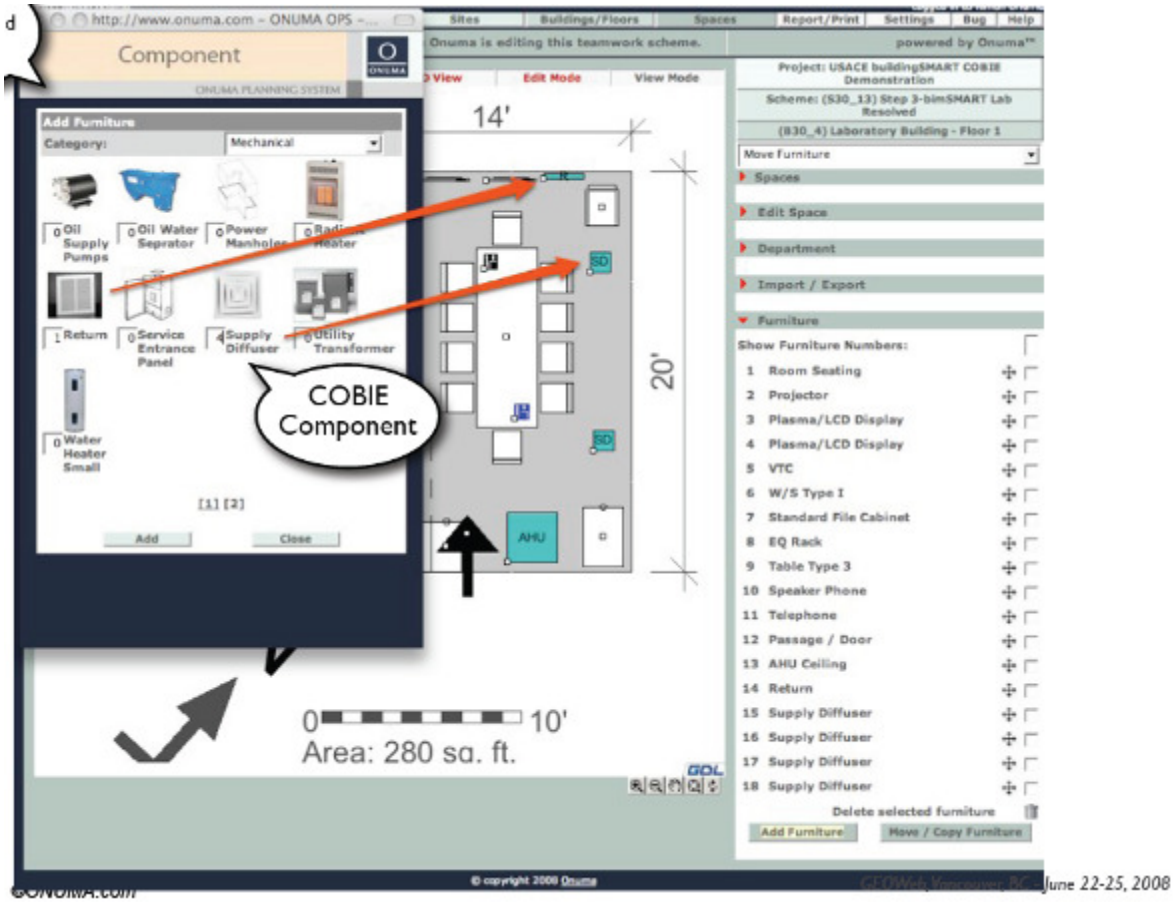
Add Furniture and Equipment



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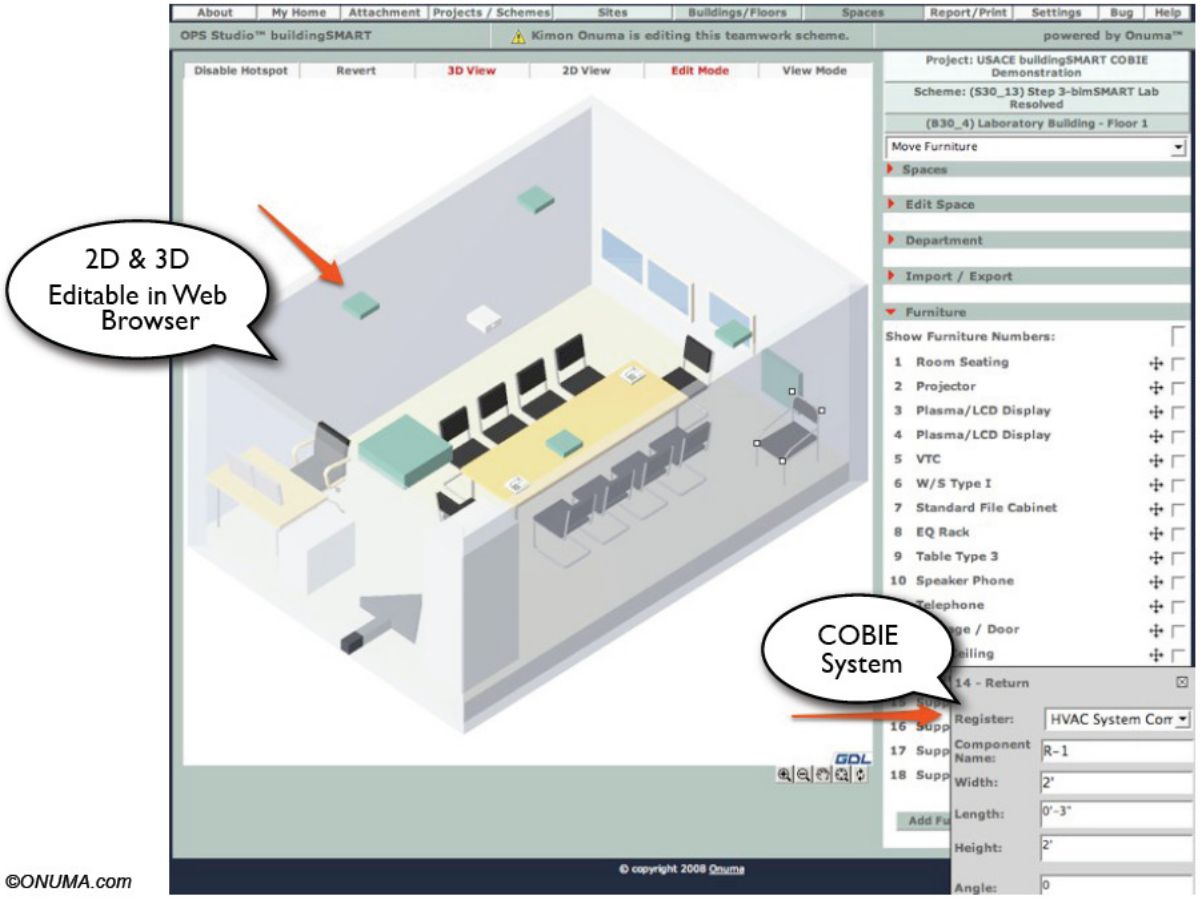
Move into Room, Register and Name



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Alexandria BIMStorm Scenario Start

Virtual Alexandria
Flat World v0

The tools and technology were used educate participants on federal requirements, to expand the presence of Alexandria internationally, and on the web

Many federal agency players and observers

Courtesy Onuma Inc.

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Alexandria BIMStorm Scenario Start

Virtual Alexandria 3D World v1

Alexandria has robust GIS data sets

This BIMStorm was the first to use GIS in support of site selection, design, and analysis

Courtesy Onuma Inc.

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Hoffman Block 2 & 3 DoD Campus

Courtesy TBD

Courtesy TBD

Courtesy Jacobs Engineering and Turner Construction

Three teams design solution for one site; trade off between stand off distance, height, density

Jacobs-Turner Team created BIM and Construction Model CPTED and LEED analysis performed in parallel, went to 4D time phased model (first time)

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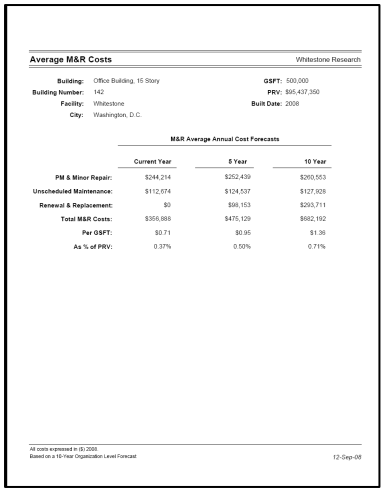
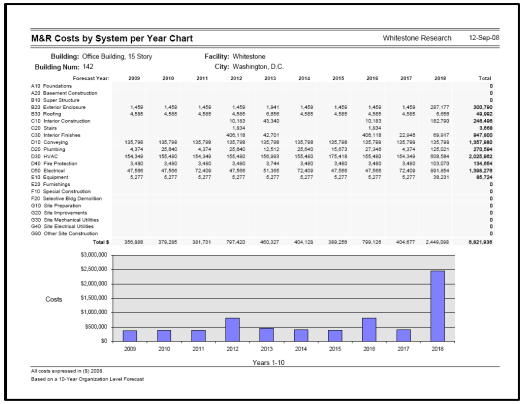
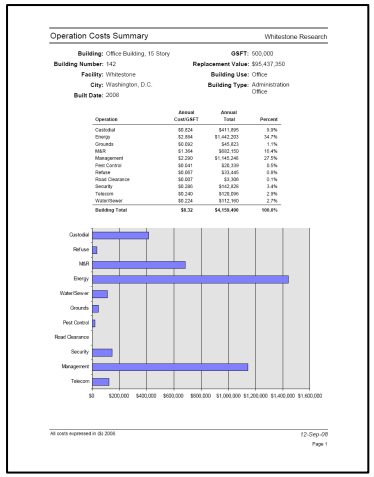
Hoffman Block 2 & 3 DoD Campus Cost







Building Cost Estimate

Courtesy Faithful and Gould

Average M&R Costs, Systems Costs by Year, Operations Cost Summary

Courtesy Whitestone Research

Initial design and costs quickly refined and preliminary life cycle costing completed; the real estate industry is now valuing buildings on LCA

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Mark Center GSA Campus

The buildings are not joined with the GIS data – terrain is actually very hilly and steep and when the GIS and BIM are integrated, the perimeter protection plan and spaces can be tightly coupled

Courtesy TBD

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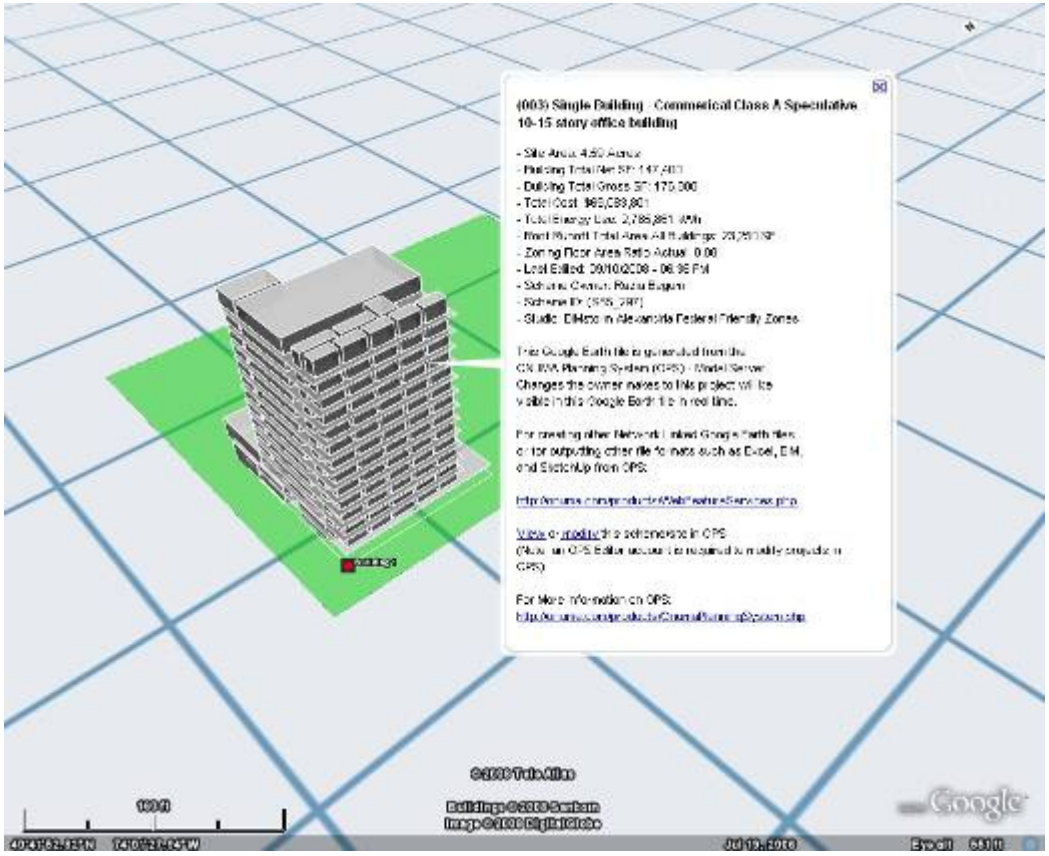
Class A Speculative Office



Courtesy Lessard Group

Model height, FAR, shape and statistics change at the mouse click, real time “what if”; model can be placed on any parcel

Note water, energy, Carbon Footprint, demographics are defined at space level and refined as design evolves – all automatic and completes the preliminary CPTED and LEED checklists

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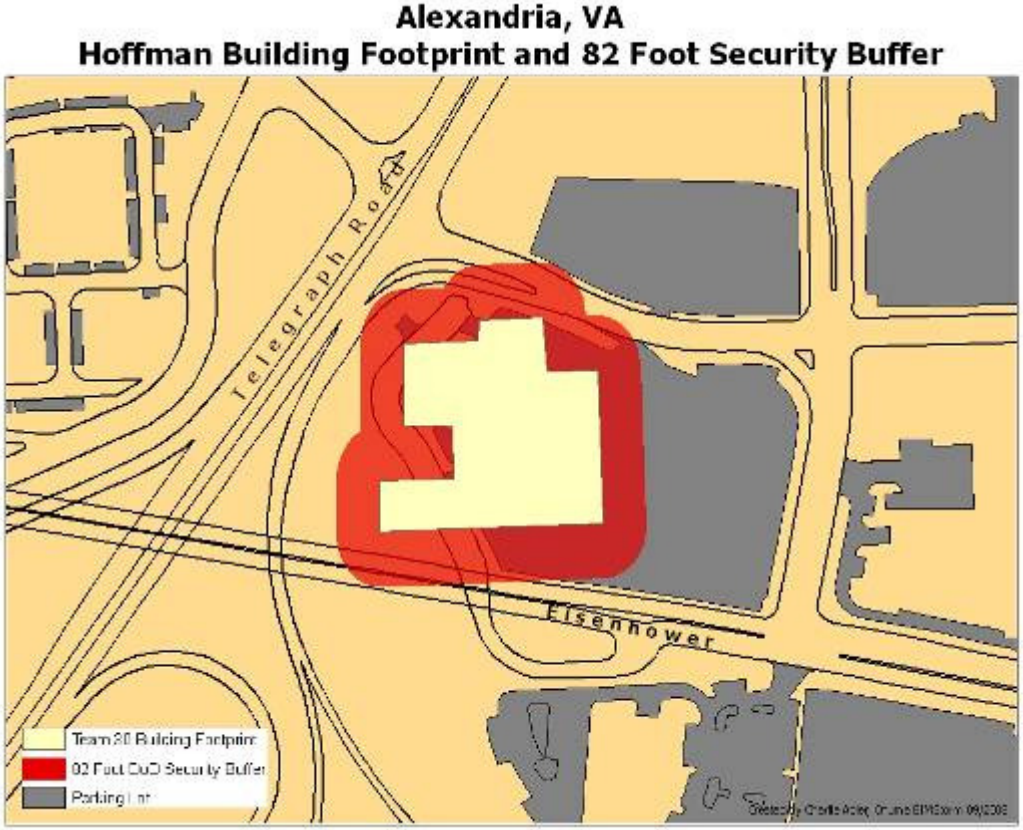
Blast Buffers Around Buildings



Courtesy Onuma Inc.

Blast buffer zones and GSA Protection Zones can quickly form site constraints and enable the design team to explore mitigation options (floor plan, spaces, selective envelope hardening, road realignment, evacuation rally points)

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Alexandria Historic Properties, Metro

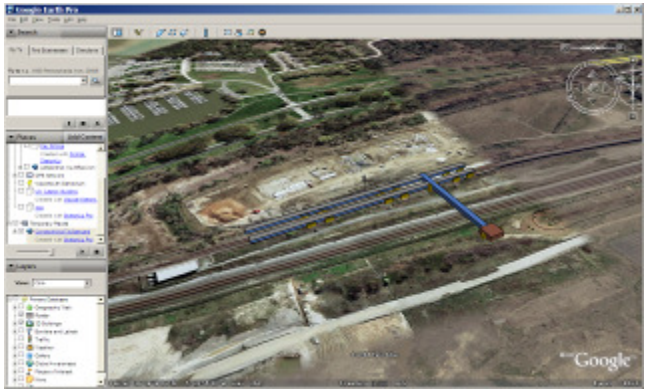
GMU
- Gadsby Tavern
- Torpedo Factory
- Washington Masonic Temple

Models to be posted

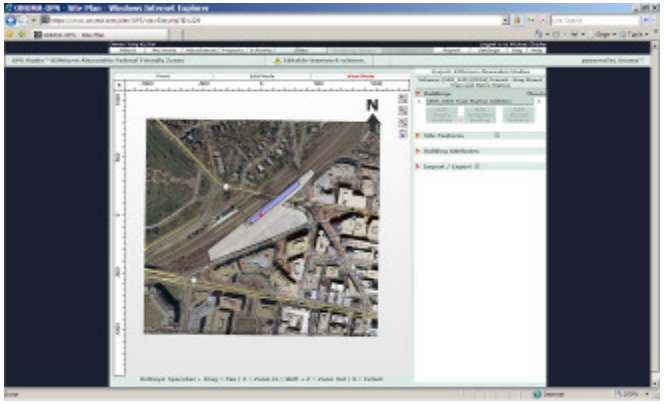
UC
- City Hall
- Contraband and Freedmen Cemetery

Preliminary analysis but no models, yet..

Potential for CPTED analysis to tie disconnected trails, parking, roads and sidewalks together, eliminate vandalism/theft



Courtesy Wendell



Courtesy Onuma Inc.

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Alexandria City Hall Greenfest Tent Event

Public space, art, and events can be integrated into a FFZ, down to the furniture level

Courtesy BIM Education Co Op

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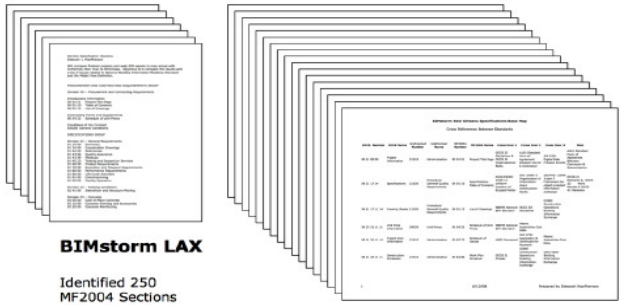
Code Mapping

Code Templates



BIMstorm LAX

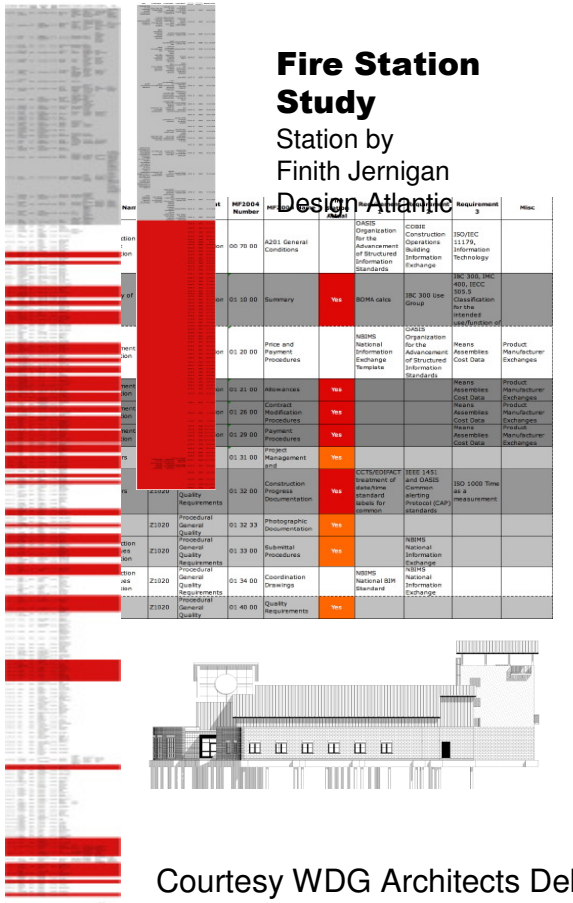
Identified 250
MF2004 Sections
For Any Building

BIMstorm New Orleans

Mapped Sections to OCCS and UniFormat
Began to define requirements

Name, Rank, Facility Number

OCCS Number	OCCS Name	UniFormat Number	UniFormat Name	MF2004 Number	MF2004 Name	bim SMART Lab	Standard 1	Standard 2	Standard 3
36 21 00 00	Project Information	Z1010	Administration	00 01 01	Project Title Page	01 Contact Data	AIA A295–2008 General Conditions of the Contract for Integrated Project Delivery	AIA G807–2001 Project Team Directory	A401 Standard Form of Agreement Between Contractor & Subcontractor
				00 01 10	Specifications Table of Contents	7 Zoning Floor Area	IECC 502 Building Elements	IBC 300 Use Group	AIA G808A–2001 Construction Classification Worksheet
36 21 17 14	Specifications	Z1020	Procedural General Quality Requirements	00 01 10	Specifications Table of Contents	ISO 1030 Part 21 Part 23	AS21/EJCDC 1910 16 Uniform Location of Subject Matter	ISO 12006-2 Organization of Information about Construction Works	ISO/PAS 12006-3 part 3 Framework for object oriented information exchange
36 21 17 11 14	Drawing Sheets			00 01 15	List of Drawings	ISO 1030 Part 21 Part 23	NBIMS National Information Exchange Template	IDM User Checklist COBie	MVD Implementers Checklist COBie
36 25 21 11 21	Unit Price Information	Z9020	Unit Prices	00 54 22	Schedule of Unit Prices		NBIMS National BIM Standard	Means Assemblies Cost Data	AIA D200–1995 Project Checklist
36 21 24 11 14	Project Cost Information	Z1010	Administration	00 62 73	Schedule of Values		USGBC LEED Scorecard	AIA G702 Application & Certificate for Payment	Means Assemblies Cost Data
36 21 24 11 11	Construction Schedules			00 62 86	Work Plan Schedule	02 Facility 03 Floors 04 Spaces 05 Systems 07 Components	COBIE Construction Operations Building Information	Need for: CPM Critical Path Management Software	Need for: OLAP Online Analytical Processing



Fire Station Study

Station by
Finith Jernigan
Design Atlantic

Courtesy WDG Architects Debra MacPherson

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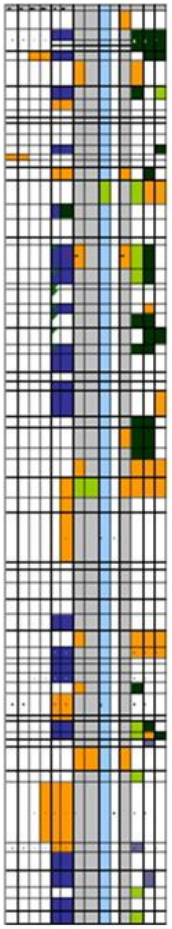
Code Mapping



Current - Focus on the Front End

MF2004 Div 00 and 01, OCCS 36, UF Z

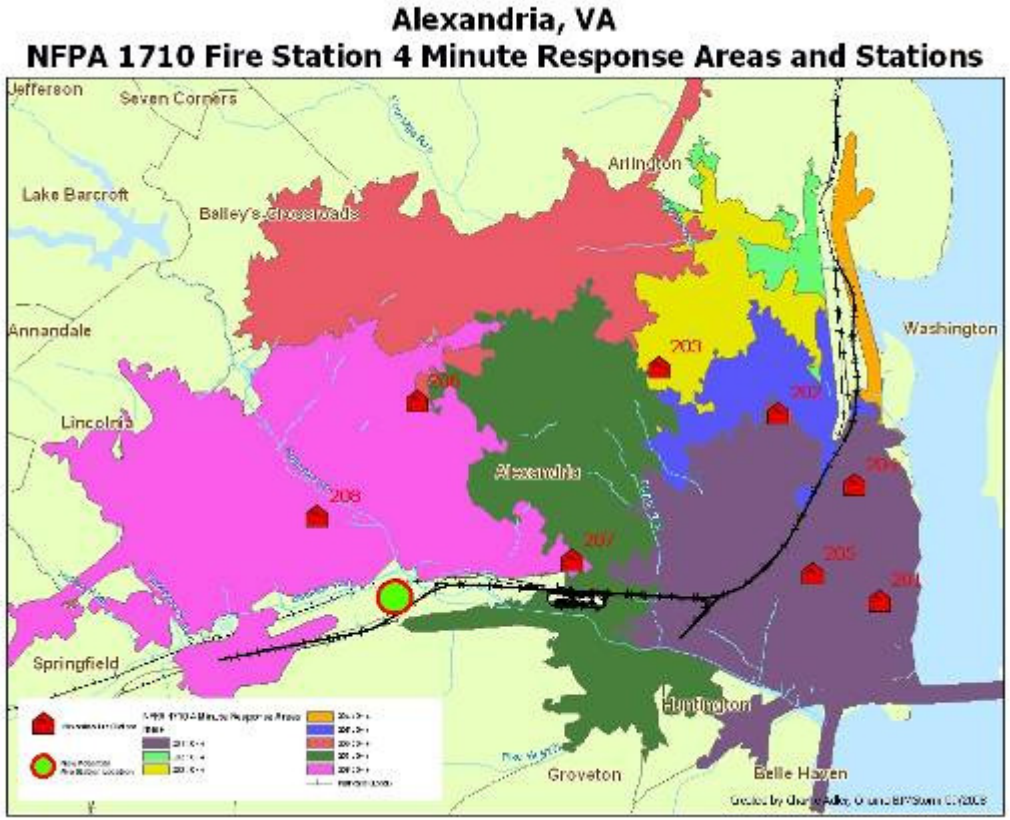
OCCS Number	OCCS Name	UniFormat Number	UniFormat Name	MF2004 Number	MF2004 Name	Alexandria	Huntington Beach California	buildingSMART Project	IDC 2008	Tshwane South Africa	Standard 1	Standard 2	Standard 3
OCCS 21 Elements & OCCS 22 Work Results & OCCS 41 Materials	OCCS 33 Disciplines & OCCS 34 Organization Roles	Z9910	Definition	00 10 00	Solicitation	Alexandria SPD Process	Typically begin w/ meeting between 4 to 5 people: A Design Developer, assessment team members, and developers VI, the Owner, and	2008-BDP-02 BIM - Execution Planning		Repeat process and elsewhere	Kgobisa Tshwane (DPW), (DPSA) (CTMM)		
36 21 00 00	Project Information	Z1910	Administration	00 01 01	Project Title Page						AIA A295-2008 General Conditions of the Contract for Integrated Project Delivery	AIA G857-2001 Project Team Directory	AHEI Standard Form of Agreement between Contractor & Subcontractor
				00 01 05	Certifications Page			2008-BPR-05 Risk and Legal					
				00 01 07	Seals Page								
		Z9930	Available Information	00 01 10	Specifications Table of Contents				IDC 200 Use Group		ISCC 102 Building Elements	AIA E201 Digital Data Protocol Exhibit	AIA G808A-2001 Construction Classification Worksheet
		Z9920	Instructions for Procurement	00 20 00	Instructions for Procurement	Eliminate the cost to the Government of developing its own standards and decrease the cost of goods procured and the burden of complying with agency regulations.		2008-BPR-01 AIA Contracts are being revised to support BIM technology				ISO 12006-2 Organization of Information about Construction Works	ISO/PAS 12006-3 part 3 Framework for object oriented information exchange
36 21 17 11 14	Drawing Sheets	Z1920	Procedural General Quality Requirements	00 01 15	List of Drawings	Submission Documentation Required for Plan Review		2008-GTP-08 Model View Definition (MVD)			AS21/IDCDC 1858-16 Uniform Location of Subject Matter	NEMS National Information Exchange Template	COBIE Data Checklist COBIE Web Implementation Checklist COBIE

WDG Typical
Undefined
COBIE
Building Codes
buildingSMART Project
AIA documents

Courtesy WDG Architects Debra MacPherson

BRAC Alexandria

Alexandria GIS Fire Station Analysis

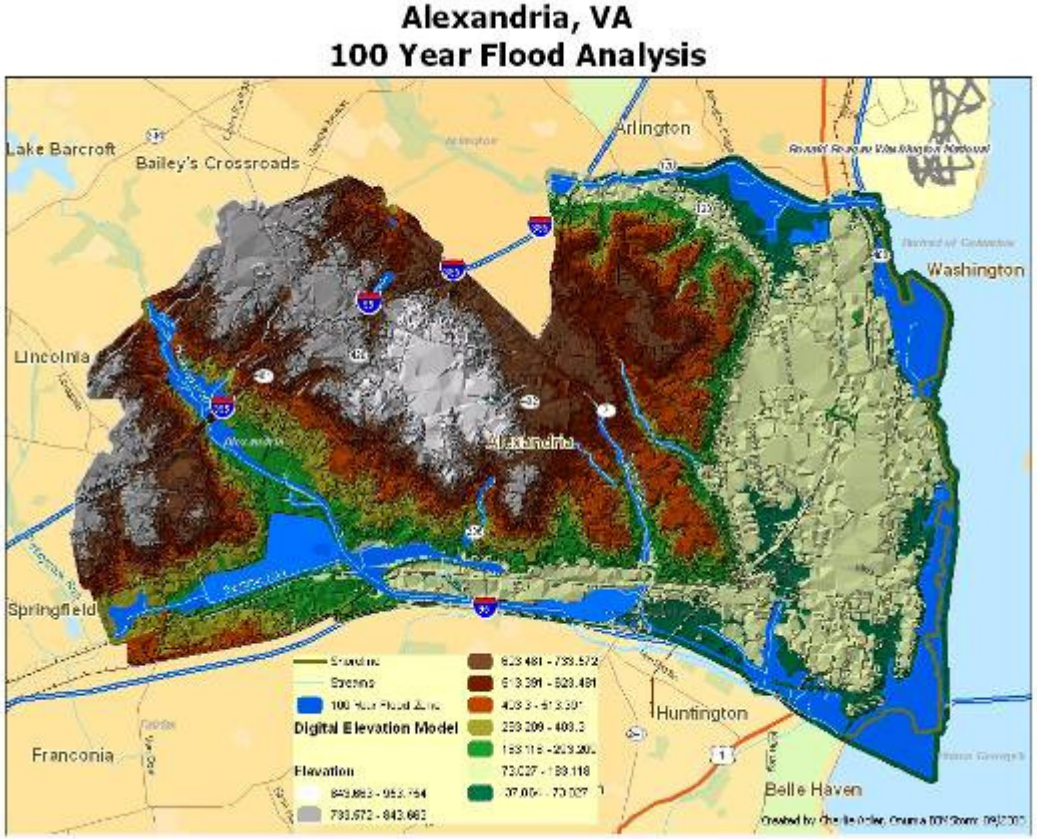


Demonstrated response times and potential sites for new stations, road radius, ingress/egress points, type of size of equipment (ladder trucks, etc) generated as building is set on the parcel

Courtesy Vista Technologies

BRAC Alexandria

Alexandria GIS Flood Analysis



Courtesy ESRI and Onuma Inc

Used the FEMA HAZUS flood analysis over layed with city GIS and digital elevation model data to create a topographical model, identify areas for redundant utilities, recovery staging areas

Building water and waste water, use of Green Roofs rain can be used as inputs to water shed model

BRAC Alexandria

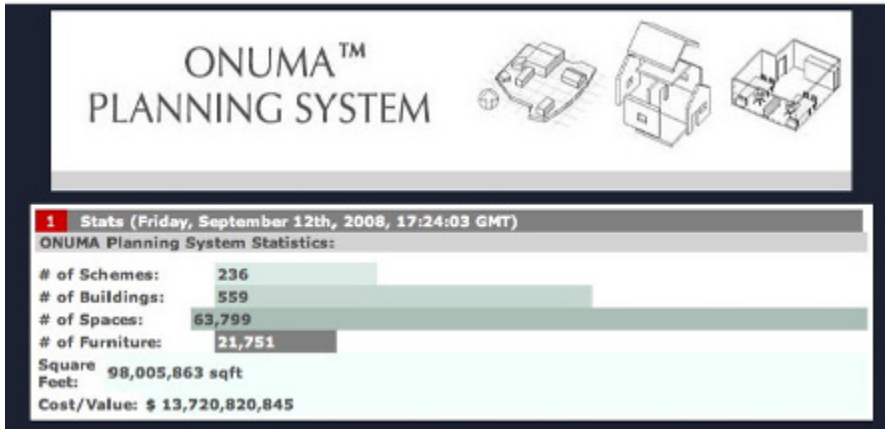
Teams and SMEs, Lessons Learned

Over 200 players/observers
- Design Teams
- City Staff
- SME's

Lessons Learned
- Industry challenges
- Government challenges
- Organizations and Associations challenges
- IT challenges

BIM tools are revolutionizing virtual collaboration, parallel design, speed to market, waste reduction, total cost

Major cultural shift, challenging to implement, older versus younger adoption of technology, major changes in business processes required



BRAC Alexandria

BRAC133 WHS Next Steps

- City, Duke and Army in final negotiations, design intent
- Property becomes and Annex of Ft Belvoir
- Approximately 1.8M sq ft campus
- Common base building with 2 towers, approx 17 stories
- 2 employee parking structures
- 1 Transit Center
- 1 Remote Receiving Facility
- Upgrades to roads, transit service – possible DAR project
- Community public meeting hosted by Duke and Army

- Break ground Jan 09
- WHS move by Sep 2011

BRAC Alexandria

BRAC133 Campus

BRAC Alexandria

BRAC133 Campus

BRAC Alexandria

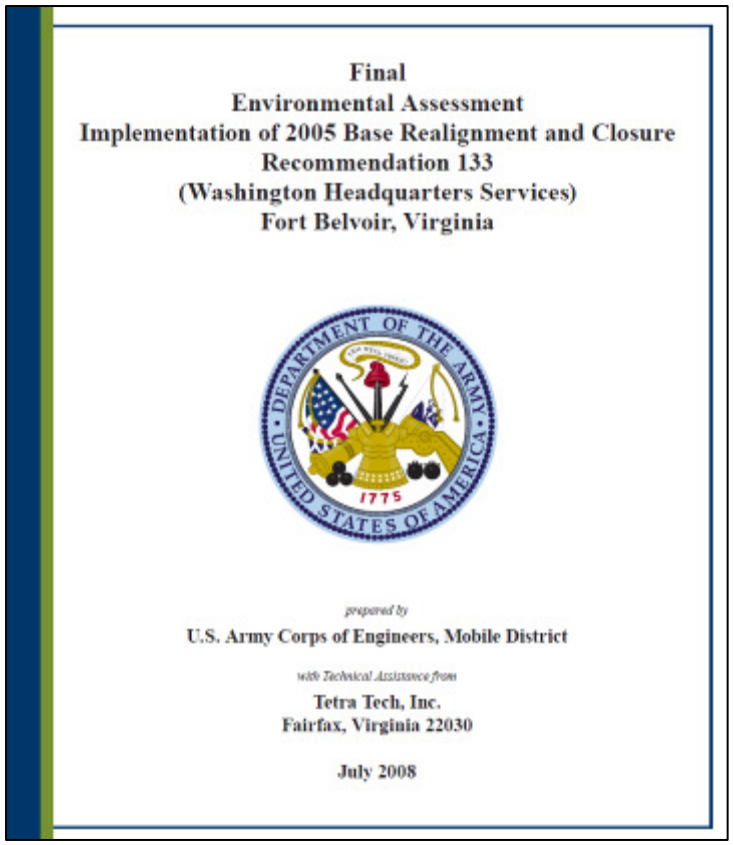
BRAC133 WHS Site Plan

BRAC Alexandria

BRAC133 WHS Transit Center

BRAC Alexandria

BRAC133 WHS EA



Final
Environmental Assessment
Implementation of 2005 Base Realignment and Closure
Recommendation 133
(Washington Headquarters Services)
Fort Belvoir, Virginia

prepared by

U.S. Army Corps of Engineers, Mobile District

with Technical Assistance from

Tetra Tech, Inc.
Fairfax, Virginia 22030

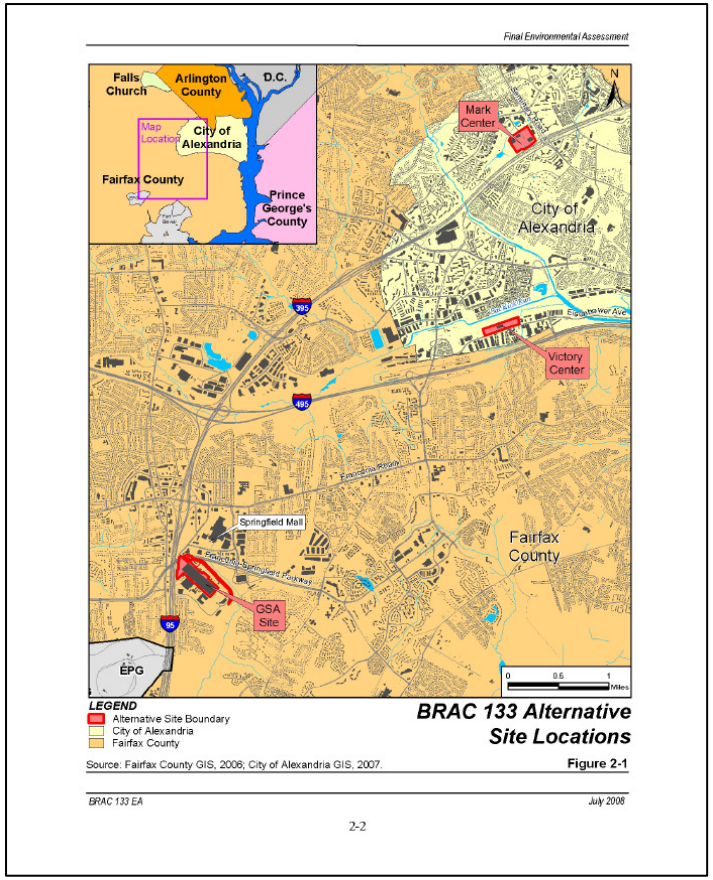
July 2008

Table ES-1
Summary of potential environmental and socioeconomic consequences

	Environmental and Socioeconomic Consequences			
Resource Area	**GSA Site**	**Victory Center**	**Mark Center**	**No Action Alternative**
Land Use	Long-term negligible to minor adverse and beneficial; not significant	No effects	No effects	No effects
Transportation	Long-term minor adverse; not significant	Long-term minor adverse; not significant	Long-term minor adverse; not significant	No effects
Air Quality	Short- and long-term minor adverse; not significant	Short- and long-term minor adverse; not significant	Short- and long-term minor adverse; not significant	No effects
Noise	Short-term minor adverse and long-term negligible adverse; not significant	Short-term minor adverse and long-term negligible adverse; not significant	Short-term minor adverse and long-term negligible adverse; not significant	No effects
Geology and Soils				
Geology/Topography	No effects	No effects	No effects	No effects
Soils	Short-term minor adverse	Short-term minor adverse	Short- and long-term minor adverse; not significant	No effects
Prime Farmland	No effects	No effects	No effects	No effects
Water Resources				
Surface Water and Groundwater	Short-term minor adverse and long-term minor beneficial	Short-term minor adverse and long-term minor beneficial	Short- and long-term minor adverse; not significant	No effects
Floodplains, Coastal Zone	Short-term minor adverse and long-term minor beneficial	Short-term minor adverse and long-term minor beneficial	Short- and long-term minor adverse; not significant	No effects
Biological Resources				
Vegetation	No effects	No effects	Long-term minor adverse; not significant	No effects
Wildlife	Short- and long-term negligible adverse; not significant	Short- and long-term negligible adverse; not significant	Short- and long-term negligible to minor adverse; not significant	No effects
Threatened and Endangered Species	No effects	No effects	No effects	No effects
Wetlands	No effects	No effects	No effects	No effects
Cultural Resources	No effects	No effects	No effects	No effects
Socioeconomics				
Economic Development	Short- and long-term minor beneficial	Short- and long-term minor beneficial	Short- and long-term minor beneficial	No effects
Housing	Short-term minor adverse	Short-term minor adverse	Short-term minor adverse	No effects
Law Enforcement, Fire Protection, and Medical Services	Short-term minor adverse	Short-term minor adverse	Short-term minor adverse	No effects
Schools	Short- and long-term minor adverse; not significant	Short- and long-term minor adverse; not significant	Short- and long-term minor adverse; not significant	No effects

BRAC Alexandria

BRAC133 WHS Mark Center Site



BRAC Alexandria

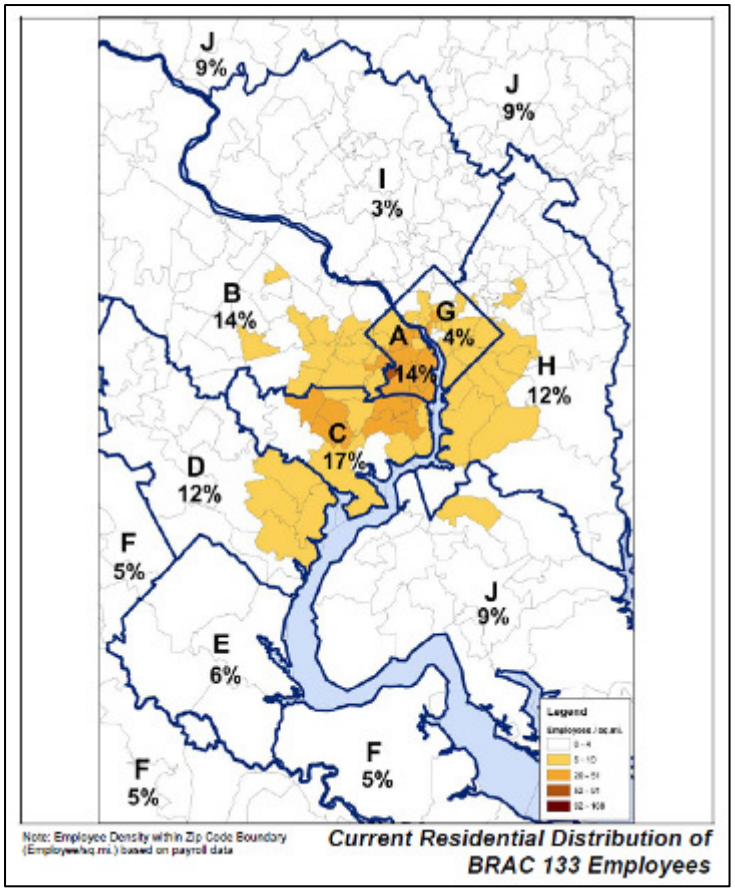
BRAC133 WHS Transit

Table 3.2-1
BRAC 133 peak hour trip generation with Transportation Management Program

AM peak hour trips	Percent assumed	GSA site	Victory Center	Mark Center
BRAC 133 relocated employees		6,409	6,409	6,409
Approved development		150	4,300	5,050
Net increase in employees at site		6,259	2,109	1,359
Daily reporting employees (assuming 10 percent absent)	90%	5,633	1,898	1,223
Daily visitors		500	500	500
Total persons		6,133	2,398	1,723
Peak hour person trips (assuming percent of total)	30%	1,840	719	517
LOV[a] person trips	58%	1,067	417	300
HOV[a] person trips (carpools)	16%	294	115	83
HOV[a] person trips (slugging)	5%	92	36	26
Shuttle bus/walk to Metro	20%	368	144	103
Other	1%	18	7	5
Vehicle trips[b]		1,104	432	310
Bus trips (40 passengers per vehicle)		10	4	3

Note: PM Peak Hour trip estimation would be approximately the same or slightly lower as some employees may leave early, stay late, etc.
[a] LOV = low occupancy vehicle; HOV = high occupancy vehicle; slugging = picking up passengers at designated points to meet HOV requirements.
[b] Vehicle Trips were calculated by adding LOV, HOV carpool, and HOV slugging person trips, assuming a LOV vehicle occupancy of 1.1 persons per vehicle; HOV carpool vehicle occupancy of 3.2; and HOV slugging vehicle occupancy of 2.2.

New road alignments, interchanges, bus routes, shuttles, possible HOT Lanes and BRT stop



Note: Employee Density within Zip Code Boundary (Employee/sq.mi.) based on payroll data

Current Residential Distribution of BRAC 133 Employees

BRAC Alexandria

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