USACE BIM Contract Language

Presentation For:

Mid Continent MicroStation Community
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Presentation by:

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Development Team

In the Beginning…

- In Fall of 2006 I established a dialog with five BIM-aggressive AE firms in joining me in conducting discussions and workshops on mutually beneficial BIM issues.
- They are a mixture of TriForma, REVIT and ArchiCAD users.
- Collaboration on best practices, contract language, standards, etc. provides a tremendous opportunity to partner in strengthening federal and private sector BIM initiatives.
- Participation is strictly voluntary and all costs incurred to participate are the responsibility of the firms.
- We conduct monthly on-site workshops and weekly conference calls and also use a Groove workspace for ongoing discussions and data sharing.

Development Team

- Our first project was to establish BIM contract language that addressed the Corps' vision yet was application-neutral. This was driven by HFPA projects coming into SWF that contained customer-driven BIM requirements. Initial focus was on AE design requirements.
- About the same time there was an initiative in the BIM Sub-COP to develop USACE contract language in support of the CoS program and it just made sense for the team to contribute whatever was developed toward that effort.
- The BIM Sub-COP effort required language that covered both DB and DBB scenarios, so a search began for General Contractors that are experienced and aggressive in implementing BIM to join us.
- Along with five GC's we were also able to incorporate members of academia and of the AGC to include associates that work with legal matters.

Development Team

- Much discussion went into balancing the expectations in the USACE BIM Roadmap for building life-cycle BIM implementation against current design/construction experience for what is practical, fair and reasonable within the existing state of the technology and standards, while yet trying to push for innovation within a BIM application-neutral context.

- We began with the AE development to produce GC language for the DBB scenario and then would integrate where needed to produce DB language.

- As we got deeper into discussions from both AE/GC perspectives it became apparent that there are some very difficult issues that would need to be addressed.

Development Team

- Stepped back and focused on the DB context to produce RFP language and SOW language, then pushed it forward to the CoS Board and BIM Sub-COP for review.
- The contract language is very much a work in progress that will continue to be fine-tuned to reflect developments in the industry, and to incorporate lessons learned as projects are awarded and executed.
- In coordination with the BIM Sub-COP we will continue to develop language in support of other contract options such as DBB, CM@Risk, Integrated Project Delivery and as-needed, language that is application-specific.

Development Team

- The current USACE/AE/GC BIM Team Members are:
  - AE's:
    - CH2M Hill - Dave Fouche
    - CUH2A – Jeff Prashaw
    - HDR - Mark Butler
    - Jacobs – Shawn Foster
    - Mason & Hanger - Lee Ezell and Eric Baker

Development Team

- GC's:
  - Walsh Group - Dan Klancnik
  - Sundt - Dan Russell
  - Holder Construction - Mike LeFevre
  - Turner – Ben Ferrer

- AGC and Associates:
  - AGC - Brian Perlberg
  - Hurtado, S.C., Counselors at Law - Kim Hurtado
  - Duane Morris LPP Law Firm - Rick Lowe

Development Team

- Academia:
  - John Messner - Director of the Computer Integrated Construction Research Program at Penn State and he also leads a buildingSMART Alliance project focused on Project Execution Planning for BIM.
- Small Business:
  - Currently looking at potential team members

Contract Language

- Why it is important
  - Defines customer expectations.
    - Expectations vary wildly based on intended use of BIM input, processes and output.
  - Defines interoperability and collaboration requirements to maximize benefits of technology and processes.
  - Defines minimum AE and GC services and implementation requirements such as model content and usage.

Contract Language

- Defines compliance with standards and initiatives
  - National BIM Standard
  - COBIE
  - IFC

Contract Language

- Enhanced communication and coordination improves the overall experience, quality and risk for the owner, designer, builder and operator.
  - Owner/Operator gets improved product and financial risk mitigation.
  - Designer gets improved processes for design and performance sensitive decisions.
  - Builder get improved project quality and significant improvement in trade flow issues.

Contract Language Structure

Design/Build Scenario

- Establishes a collaborative effort between owner, designer and constructor.
- Input by General Contractor early on in process.
- Similar advantages in CM@Risk and Integrated Project Delivery

Design/Bid/Build Scenario

- No collaboration between designer and GC.
- GC to meet construction-intent BIM requirements based on design-intent model(s) created by others.
  - Some have concerns of liability for errors and omissions

DB Scenario

- Submittal Format
  - Design Development Drawings AND Asbuilt
    - All drawings will be developed using Building Information Modeling (BIM) software and CAD software.

DB Scenario

- Drawings
  - All CAD files used for the plan set will be delivered in [specify CADD format] and prepared in conformance with A/E/C CADD Standard Release 3.0.
  - CAUTION! A specified CAD format DOES NOT by default specify the BIM application to be used.

- Building Information Modeling (BIM).
  - BIM software will be utilized as a superset of CAD during the Design phase and the BIM model will be used to produce Construction Documents.
  - The BIM product(s) selected by the Design-Build Project Team must be certified in the IFC Coordination View (2x3 or better).

Highlights

- For projects with CoS facilities, Contractor may use BIM application of choice for design and construction activities, but must deliver Bentley BIM for all submittal stages.

Highlights

- The Design-Build BIM Implementation/Execution Plan
  - Leveraging BIM modeling, design and analysis technologies using a common data model from concept development through Drawings of Record as a design, production, coordination, construction, and documentation tool.
  - How BIM will be used to extract quantities and systems data to be used in cost analysis, value management, estimate validation, project scheduling, interference management and design-change tracking.
  - Plan will include BIM interoperability methodology and will be submitted to District BIM Manager for approval. Team will conduct a BIM Interoperability charrette to demonstrate the effective interaction of all parties for project processes and requirements.

Highlights

- The Design-Build BIM Implementation/Execution Plan
  - There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the Implementation Plan.

Highlights

- Modeling Granularity
  - Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a ¼-in to 1-ft, 0-in. scaled drawing.
  - Mechanical/Plumbing systems will include piping 1.5” diameter and larger.
  - ALL fire protection piping will be modeled.
- Estimating
  - The BIM model will provide a common estimating material take-off basis to provide validation for quantities, and support a single quantity basis for all parallel estimating activities.

Highlights

- BIM will be used to perform Design and Construction Reviews.
  - Visual Check to ensure design intent has been followed and that there are no unintended elements in the model.
  - Interference Management (Clash Detection) is used to locate problems in the model where two objects are occupying the same physical space.
    - Hard interferences and soft interferences (service access, fireproofing, insulation, etc.) will be reported.

Highlights

- Construction Operations Building Information Exchange (COBIE).
  - Currently optional.
  - Model(s) and project specific facility data are required to fulfill the COBIE requirements as applicable.
  - Follow requirements of NBIMS, Appendix B: www.nbims.org.
    - Provide information identified in the COBIE Pilot Implementation Standard worksheets.

Highlights

- Project Reviews
  - For visual review the 3D model will be delivered in NavisWorks, Adobe 3D PDF 7.0 (or later), SketchUp, Google Earth KMZ or equivalent format. Other formats may be requested as needed, i.e. IFC, Bentley Navigator.

Highlights

- BIM Model Minimum Requirements and Output
  - Design
    - Systems will be complete and accurate to reflect the design intent.
    - Final design-intent model(s) will be modeled as they would be built to get complete and accurate quantity takeoffs of relevant construction materials to satisfy COBIE requirements and to reflect as-built conditions.
  - Construction
    - Systems will be complete and accurate to reflect the as-built conditions.
    - COBIE requirements will be met.

Model Minimum Requirements

- Architectural system
  - Spaces
  - Walls and Curtain Walls
  - Doors, Windows and Louvers
  - Roof
  - Floors
  - Ceilings
  - Vertical Circulation
  - Architectural Specialties and Woodwork
  - Fixtures and Equipment
  - Schedules

Model Minimum Requirements

- Furniture system
  - Office and system furniture layouts
- Structural system
  - Foundations
  - Floor Slabs
  - Structural Steel
  - Cast-in-Place Concrete
  - Stairs
  - Elevators

Model Minimum Requirements

- Mechanical system
  - HVAC
  - Plumbing
  - Equipment clearances shall be modeled for use in interference management and maintenance access requirements.

Model Minimum Requirements

- Electrical/Telecommunications system
  - Interior Electrical / Power and Lighting
  - Communications
  - Conduit 1.5” dia. or larger than shall be modeled.
  - Exterior Building Lighting
  - Electrical Site
  - Equipment clearances shall be modeled for use in interference management and maintenance access requirements.

Model Minimum Requirements

- Fire Protection system
  - Fire protection components
  - All fire protection piping shall be modeled
  - Fire alarm/mass notification devices and detection system
  - Design should be done in tandem with all other design disciplines to gain advantages in 3D design coordination
    - Some initial resistance to changing “the way it’s always been done – during construction”.

Model Minimum Requirements

- Civil ‘system’ - although not considered ‘traditional’ BIM, the intent is to integrate all geospatial data for better design coordination
  - Terrain (DTM)
  - Drainage
  - Utilities
  - Road and Parking

Model Implementation

- AE design services
  - Design-intent
    - Multi-discipline
    - IFC compliant model(s)
  - Schedules
  - Project review (visualization)
  - Validation of estimates
  - Value management
  - Interference management (Clash detection)
  - COBIE requirements
  - Contract documents

Model Implementation

- AE design services
  - Potential requirements
    - Acoustical analysis
    - Lighting analysis
    - Energy analysis
    - High definition scanning
    - LEED supported/documented in model

Model Implementation

- GC services
  - Project review (visualization)
  - Validation of estimates
  - Interference management (Clash detection)
  - Project scheduling
  - COBIE requirements
  - As-built models
    - Inclusion of sub-contractors

Contracting Issues

- Model ownership
  - USACE will own model(s)
  - Models in CoS program will be reused in adapt-build applications
- In DBB,
  - What is liability on GC for errors in AE design-intent model?
  - How is model-continuity-process addressed? Design-intent model versus construction-intent model.
- Contract Document precedence – the model or the hardcopy plans?

Contracting Issues

- Goal is to be application-neutral
  - Unless specified otherwise by customer, focus is on performance and output requirements versus specific means and methods.
  - CoS program will specify data and file format for continuity of standard designs and internal research initiatives.

- Design services payment schedule
  - AE's would prefer a larger distribution of funds at earlier stage to cover cost of modeling marathon.

Other Agency Partners

- Have adapted USACE BIM contract language for their own use or are considering
  - Health Facilities Planning Agency
  - Veterans Affairs
  - FAA
  - Air Force

USACE BIM Contract Language

- USACE Model RFP Wizard is an on-line tool for a standardized process for developing Requests for Proposals
  - Mandated for the Centers of Standardization (CoS) program
- BIM requirements implemented in Wizard in early January 08
- DB contracts with firm fixed price

USACE BIM Contract Language

- Covers three scenarios of BIM implementation
  - CoS Projects, Bentley BIM submittals
  - Non-CoS, BIM application-specific submittals
    - Bentley BIM, Revit, ArchiCAD
  - Non-CoS, BIM application-neutral submittals
    - Contractor submits in BIM platform of choice.

USACE BIM Contract Language

- CoS Projects
  - Standard Designs for common Army Installation facilities
    - i.e. Barracks, Company Operations, Dining Facility
  - Standard designs developed and maintained by designated CoS Districts in Bentley Systems BIM with USACE workspace.
    - only in place until we have another option via true interoperability
  - USACE in-house design teams and Contractors are provided baseline BIM facility designs for adapt-build projects.

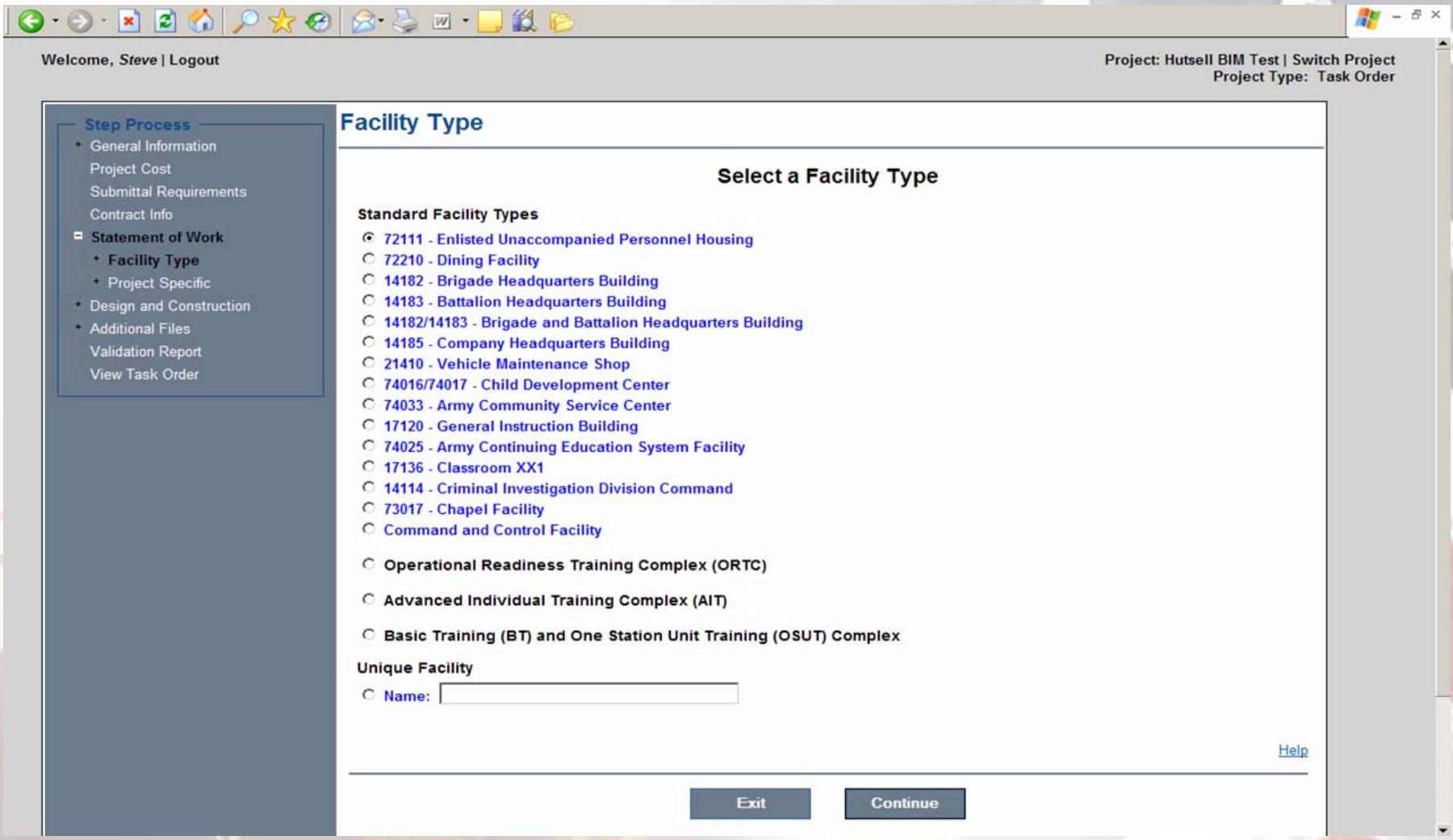
Section 01 33 16 – Design After Award

CoS Specific Language

3.7.1.6 CAD System and Building Information Modeling (BIM)

All CAD files shall be fully compatible with MicroStation v8 or higher. Save all design CAD files as MicroStation v8 or higher. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(d) See Attachment F for additional BIM requirements. BIM Model and associated Facility Data files shall be delivered in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F.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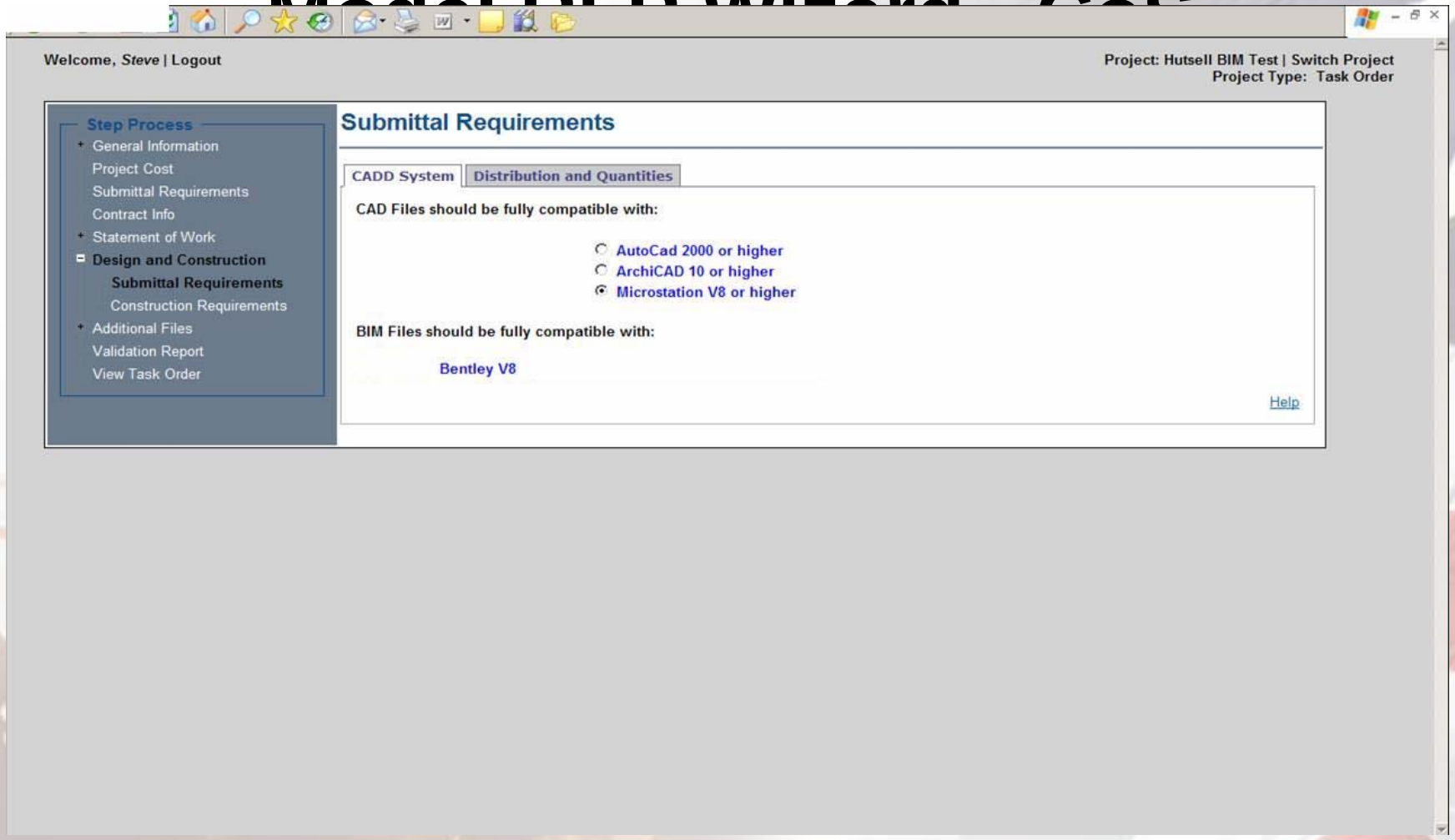
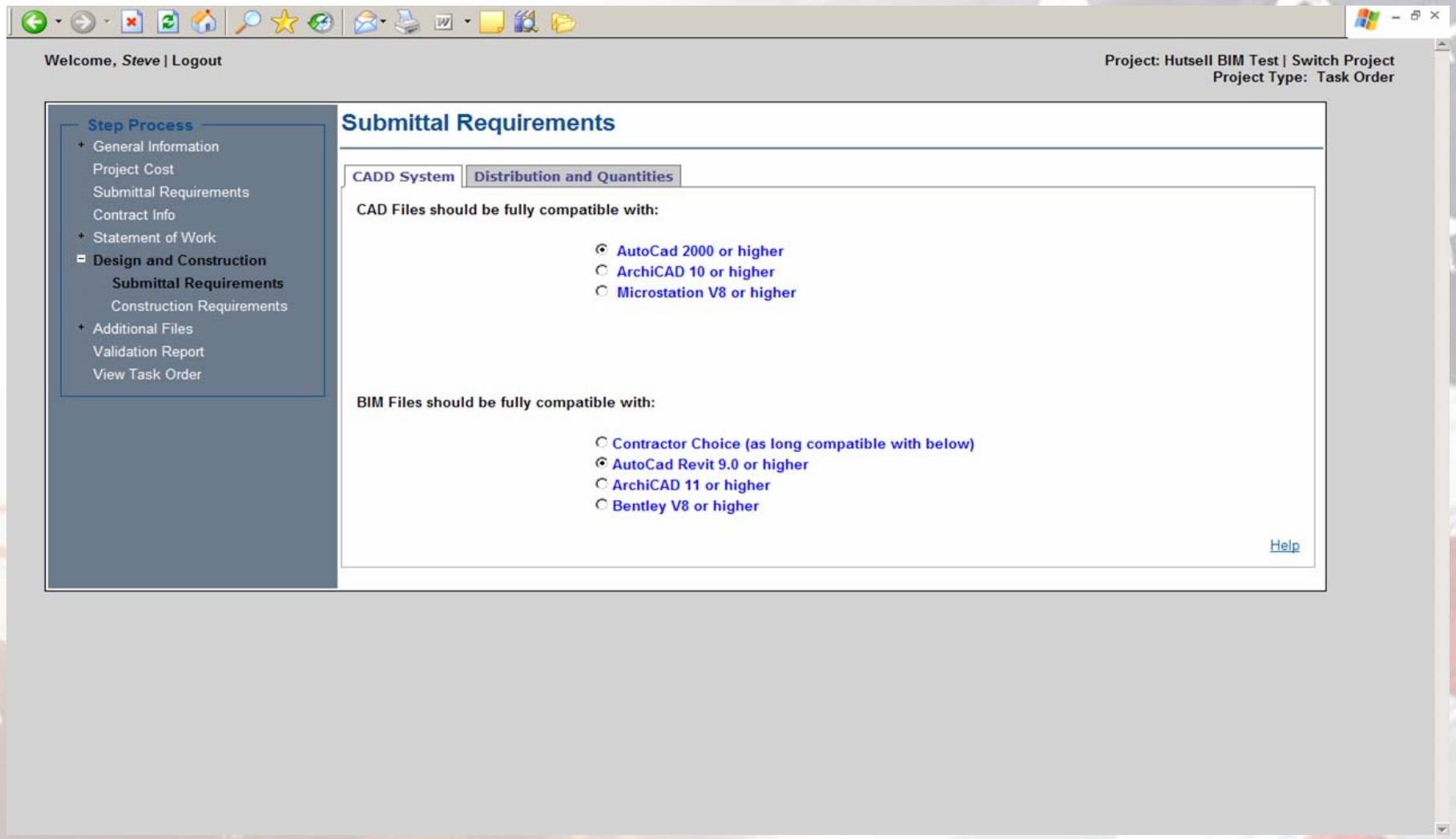
Project: Hutsell BIM Test | Switch Project
Project Type: Task Order
Step Process
General Information
Project Cost
Submittal Requirements
Contract Info
Statement of Work
Facility Type
Project Specific
Design and Construction
Additional Files
Validation Report
View Task Order
Facility Type
Select a Facility Type
Standard Facility Types
72111 - Enlisted Unaccompanied Personnel Housing
72210 - Dining Facility
14182 - Brigade Headquarters Building
14183 - Battalion Headquarters Building
14182/14183 - Brigade and Battalion Headquarters Building
14185 - Company Headquarters Building
21410 - Vehicle Maintenance Shop
74016/74017 - Child Development Center
74033 - Army Community Service Center
17120 - General Instruction Building
74025 - Army Continuing Education System Facility
17136 - Classroom XX1
14114 - Criminal Investigation Division Command
73017 - Chapel Facility
Command and Control Facility
Operational Readiness Training Complex (ORTC)
Advanced Individual Training Complex (AIT)
Basic Training (BT) and One Station Unit Training (OSUT) Complex
Unique Facility
Name:
Help
Exit
Continue

Model BER Wizard – CoS

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Design and Construction
Submittal Requirements
Construction Requirements
Additional Files
Validation Report
View Task Order
Submittal Requirements
CADD System
Distribution and Quantities
CAD Files should be fully compatible with:
AutoCad 2000 or higher
ArchiCAD 10 or higher
Microstation V8 or higher
BIM Files should be fully compatible with:
Contractor Choice (as long compatible with below)
AutoCad Revit 9.0 or higher
ArchiCAD 11 or higher
Bentley V8 or higher
Help

Extra Credit

- Additional credit during source selection for including one or more of the following in contract proposal
  - COBIE compliance
  - Project Scheduling using the Model
  - Use of BIM in support of Cost Estimating requirements

Contact Info

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