

April 2, 2015

# Six month report to NC Arch+PE Licensing Boards For pilot on AE Seal use in BIM-IPD projects

For distribution to AE Board Pilot Program Board Representatives, plus Cathe Evans, and David Tuttle,  
Plus Tim L, Michael M, JNB, and Patrick G

Board Representatives,

In compliance with Part 5-Reporting, of the Pilot Program Proposal for use of Design Professional seals in BIM-IPD projects (3/12/2013, rev 4/5/2013), Carolina Healthcare Systems and Mecklenburg County Code Enforcement herein jointly submit this brief report on the current status of the Pilot Program. Part 5 of the Pilot Program Proposal specifically calls for updates on the following;

- The current status of the specific projects in the program.
- Observations made by CHS and Mecklenburg County staff on what “pilot program activity to date indicates regarding special BIM-IPD provisions which may be appropriate within the Board Rules”.

## **Item 1: project status**

1.1. CMC-Morrocroft ED Pavilion; a new one story emergency department pavilion of approximately 28,550 sq. ft., with a new parking deck bay above the emergency department. Occupancy is B for the emergency department and S-2 for the enclosed automobile parking garage. Construction type for the project is II-A and fully sprinkled with NFPA 13 system.

- Project status; construction completed and facility began receiving patients on May 12<sup>th</sup>.

1.2. CMC-Davidson Behavioral Health; new construction 79,471 sq. ft. facility, two story slab on grade on vacant land; with 66 beds, outpatient component and supporting food service. Occupancy is I-2; construction type is I-B; fully sprinkled (NFPA 13 system).

- Project status; construction completed and the facility began admitting patients on April 7.

1.3. CMC-Core Lab; a 28,400 sq. ft. lab upfit in shell building; construction cost \$7.3M.

- Project status; construction complete, with office occupancy taking place in January, 2015.

## **Item 2: observations to date**

- BIM-IPD should improve the HSW aspects of projects, as team dialogue identifies and solves compliance problems in the model, before the project is built.
- BIM-IPD significantly improves the incidence of correct construction the 1<sup>st</sup> time, reducing later error and construction tear out. For the CMC Core Lab project, there have been no change orders due to a lack of coordination or for errors and omissions.
- In occupied institutional environments, BIM-IPD reduces jeopardy to patient occupied environments, and also minimizes risk infection.
- BIM-IPD moves the RFI process into a “big room setting”, where cross discipline team dialogue has a greater chance of solving problems thoroughly from all angles, avoiding later errors in regulatory compliance or document-specification performance.
- How the AE seal pilot is applied to a given project requires extensive discussion between the owner’s team, especially the BIM model expert, and the local code official. As the owner’s performance

agreements with the construction team vary participant activity in the model, the local code official and AE agree on where part 4a of the Pilot Program criteria applies, vs. Part 4b-4e. It appears this agreement should be confirmed in the preconstruction meeting, before the umbrella project permit is issued (for projects using NC Administrative Code Section 106.2.3.1).

**Item 2.1: Virtual Inspections pilot**

Completed in November 2013, with findings reported the Mecklenburg County Building Development Commission on December 17, 2013. Refer to our 4/11/2014 report for a brief summary of conclusions.

**Item 2.2: Conclusions to date regarding Board Rules**

There is a need for the Board Rules to reflect this different approach to building construction project delivery and how design professional seal use can work most effectively, both in the interest of public safety, as well as the licensee and all project participants. We suggest the following points for consideration.

- Define BIM-IPD projects and provide a different set of seal use criteria, including the following.
- Digital seal/signature used on BIM-IPD documents confirming project development (phase completion information sets), affixed only to the work for which the licensee is responsible.
- Digital signature only used on other benchmark documents.
- Collaboration with other members of the project team (other licensed PE's, Architects, contractors, et al) encouraged.
- Professional review of other (non-PE) documents treated as shop drawings, reviewed for conformance with "sealed" information sets.
- Construction changes; licensee allowed to rely on others' information in the model.

The foregoing is submitted by the following program representatives. Requests for clarification or further information may be directed to either or both;

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### **Item 3: Pilot Program Report Supplement for projects not related to Carolinas Healthcare System**

3.1. VA Charlotte Health Care Center; located at 3506 West Tyvola Rd, with a gross building area of 425,000 sq. ft., and 295,000 sq. ft. net usable. The project occupancy is 'B' - Ambulatory Health Care Facility, using construction type 1B.

- Project status;
  - a) Umbrella permit for Main Building issued 09/02/2014
  - b) 10- model updates have been performed to date
  - c) Footing/Foundations 100% complete
  - d) Super Structure 100% complete
  - e) All trade inspections complete in basement, 80 % complete on levels 1 and 2. Electrical temporary power to all main gears and main sub-panels on each floor set for beginning of May, 2015.
  - f) Plumbing contractor estimates a \$40,000 per floor savings due to coordination and working within the model, for a total savings on of labor of approximately \$200,000
  - g) Exterior pre-fab skin on Central Energy Plant 100 % complete, Main building 90% complete (Openings left for large equipment install)
  - h) Fire-proofing of all structural steel 90% complete.
  - i) Shaft liners complete on 7 of 15 shafts.

#### 3.1.1. Observations by the Hybrid Collaborative Delivery Team on the impact of the VA Charlotte Health Care Center project's collaborative approach to project delivery

- Coordination of trades due to working in the model, has greatly increased the speed and ease of installation. Trades have the ability to pre-fab off site and have items brought to the site only when needed for direct installation. Trades have the ability to proceed with work and know exactly when and where to stop; other trades step in and perform their install and thereafter trades can come back and finalize installation. This keeps all trades working within small areas and at the same time greatly increasing production per man hour.
- There have been an enormous number of changes (800-1,000 sheets per update) made by the owner and incorporated into the model by the design team on multiple occasions, without the HCDT IPD process the project would be months behind schedule. Due to the Code Official being the plans examiner and field inspector, this has greatly improved the efficiency of the model update process and has helped maintain the original time line of completion.
- All trades are now realizing time savings due to coordination using the model. This becomes very evident as speed of completion begins to ramp up and multiple trades are brought on site (sheet rock application, mud men, painters, etc.)
- Use of the model identified exit stair tower headroom issues which almost surely would have been missed on a typical 2D plan review; this allowed early correction before assembly.

3.2. Davidson College New Academic Building; aka renovation of and addition to Martin Science Building, this project is approximately 150,000 sq. ft. net usable (158,000 sq. ft. gross including mechanical/attic space), with a renovation net – 22,600 sq. ft. and new construction addition net 126,533 sq. ft. The project main occupancy is academic – B, with a mix of A-3, B, S-1 and S-2. Construction type is II-A, with the existing building being concrete frame.

- Project status;

- a) Temporary Egress from existing occupied building and Demo approved 09/10/2014, this is now in place on site and functioning.
- b) Umbrella permit issued 10/09/2014
- c) Model update for footing, foundation and structural approved 10/16/2014; all under slab work for all trades complete; all footings, foundations and basement wall pours complete.
- d) 1<sup>st</sup> floor slab pour has been approved and completed; sheer wall forms are now in place and ready for pour.
- e) Water proofing of basement walls complete; drainage complete; back fill of walls started.

3.2.1 Observations of the Hybrid Collaborative Delivery Team on the impact of Integrated Project Delivery

- The use of the model has helped clarify differences between designer and reviewer regarding numbers in occupancy counts and actual use of space.
- During a review of advancing design iterations, egress convergence (between lower level and 1<sup>st</sup> floor) became highly visible when “walking through the model”. Once identified, the problem impacting egress component (door) sizes, was quickly corrected before door orders were placed, saving correction of a built problem in the field.

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