Knowledge for Creating and Sustaining the Built Environment

The Predicator

Volume 47, Issue # 2 October/November 2007

Portland Chapter - The Construction Specifications Institute

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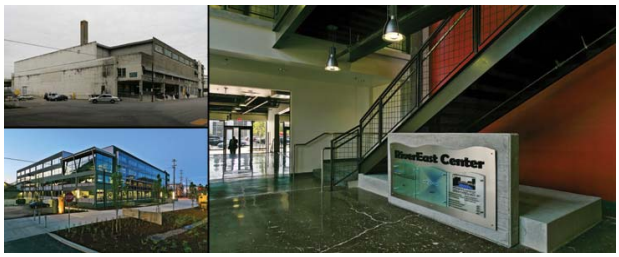
Thank you to our November sponsors:

Howard S Wright Construction

PARKER PAINT

LIGHTOLIER

RiverEast Center Tour and Discussion
November 13, 2007
Tour at 4:30 PM – RiverEast Center (1515 SE Water Ave Portland)
Dinner at 6:30 PM – NuMark Office Interiors (307 SE Hawthorne, Portland)



Join CSI colleagues and guests as we tour the RiverEast Center, located near OMSI and the Vera Katz Eastbank Esplanade. Built in 1951, the Holman Transfer Building (now the RiverEast Center) originally served as a product distribution hub for several large companies. Now the building is home to anchor tenants Group Mackenzie and Coaxis as well as other retail and non-profit organizations. This exceptional example of urban renewal combines visions of the central eastside community with the sustainable design goals of the design professionals responsible for the renovation. Jeff Reaves, President of Group Mackenzie will kick off the tour and welcome the group with an overview of the project.

On the tour, representatives from Group Mackenzie, Howard S. Wright Construction, and GreenWorks will take us through some of the challenges and achievements of the new RiverEast Center. Objectives of this warehouse transformation included retaining the industrial nature of the existing structure and integrating the design into the surrounding area. Designers also focused on maximizing energy efficiency, minimizing waste and increasing environmental quality. The RiverEast Center was awarded LEED Gold Certification.

Following the tour, enjoy dinner at the NuMark Office Interiors showroom. Tim Holmes, President of the Central Eastside Industrial Council, will discuss the history of the area, the Council's goals, achievements and challenges, and how the central eastside is changing.

Jay Haladay, Owner and CEO of Coaxis, Inc will be discussing the decision to relocate to the Central Eastside from an Owner's perspective. He will touch on the advantages of the location from an accessibility and recruitment standpoint as well as working with the PDC. Peter Alto, project architect for the RiverEast Center renovation, will finish the evening with a discussion about the intensive coordination necessary for this type of complex renovation project.

Cost:
$30.00 per person with pre-paid reservations by November 8, 2007
Pre-Registration Non-CSI Member Fee $40.00
Late reservations – and walk-ins (as available): $40.00 per person
Table for 8 is $230
Assure your spot for this special event! – Limit of 80 People

Register at: www.portlandcsi.org

Questions or problems contact Jane Phifer 503-805-2500 or jane@portlandcsi.org

By: Fred Herbold, CSI, CCS

Laminated Glass

This month we continue with the second article about glass. It is a review of information presented to the Share Group by Bill Coady, CSI CCPR, representative for Guardian Industries. Bill presented two seminars: "The Evolution of Glass & High Performance Coatings" and "Laminated Glass."

Laminated Glass Manufacturing

Laminated glass consists of two or more plies of glass bonded together with an interlayer material. For most architectural laminated glass there are two types of interlayer material. One is a solid sheet, the other is a liquid.

Polyvinyl Butyral or PVB is a plastic sheet that is sandwiched between sheets of glass. The glass is cut, washed and dried; the sheets are assembled and air is removed from between them; they are heated and compressed in an autoclave at 290 degrees F and 180 psi for 4 hours.

PVB sheet is available in thicknesses from 15 mils to 90 mils. 30 mils thickness is a good master specification because the resulting laminated glass complies with CPSC 16 CFR 1201 Category II, whereas laminated glass with 15 mils interlayer only meets Category I.

PVB is also available in many transparent colors and a variety of patterns and printed images. Different sheet of PVB can be combined to create different effects.

The second most common interlayer is cured resin. The resin is poured or pumped into the space between the glass. It is then cured by UV or heat. This process has the advantage of not requiring the expensive autoclave. It is also used for laminating curved glass and patterned glass.

Other interlayer materials are polycarbonate and acrylic which are commonly used for bullet resistance or blast resistance. Laminated glass can also be reinforced by inserting a polyethylene terephthalate film between layers of interlayer material.

Advantages and Uses of Laminated Glass

Laminated glass should be considered as a part of the solution to glazing related issues:

- Life Safety,
- Solar Control,
- Acoustical Control,
- Aesthetics.

Safety Glazing for Hazardous Locations

Most hazardous locations for glass are defined in building codes. They include glass in doors, glass adjacent to doors, and glass in locations where a person might mistakenly walk into it.

There are two standards for safety glazing: ANSI Z97.1 and CPSC 16 CRF 1201. The second includes two categories; Category I and Category II. This specifier recommends specifications that require compliance with both ANSI and CPSC Category II standards. Category II will cover all sizes of openings. ANSI Z97.1 will require labeling, which the CPSC standard does not.

As stated above, laminated glass consisting of two plies of 3 mm (or 2.7 mm) glass and 30 mils of PVB will meet Category II requirements.

Safety glazing requirements are also satisfied by tempered glass (see last month's article).

Bullets, Blasts, Burglars and Missiles

Security glazing is resistant to the impact from specific sources. Small, speedy objects like bullets require a different analysis and solution than do burglars. The following is a summary of references and some examples.

Ballistic glazing or bullet-resistant laminated glass uses glass to flatten the bullet and the interlayer provides flexibility and absorbs energy. UL 752 is commonly used to specify the performance or ballistic glazing. UL 752 describes 4 Levels of resistance:

Level 1 – Medium power small arms
Level 2 – High power small arms
Level 3 – Super power small arms (Dirty Harry)
Level 4 – High power rifle.

Bullet-resistant laminated glass can be made from several different materials and in different configurations. The thickness can vary from Level 1 just over an inch thick to Level 4 over 2 inches thick. As with any security glazing solution, the glass is only one of several components that must be considered. We must consider the glazing method, frame and anchorage also.

Blast-Resistant glass is an import component of blast-resistant window and wall design. 75% of injuries in past bombings have been from flying glass. Laminated glass will most assuredly be incorporated in blast-resistant design because it holds glass together, preventing injury due to flying glass shards. In some designs, the inboard-most layer is required to be plastic to assure the integrity of the glazing.

GSA has a performance matrix that rates the hazard from window glass fragments. Performance Criteria are numbers 1, 2,

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What Do You Say
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3a, 3b, 4, and 5. Criteria 1 means Safe – No Breakage. Criteria 5 means Low Protection – High Hazard. GSA establishes the performance criteria for the design of its facilities.

Owners of buildings adjacent to potential bomb targets should evaluate the potential hazard to their occupants. At the Oklahoma City bombing of 1995 glass breakage occurred miles away from the target.

Forced-Entry resistance is measured in Performance Grades by ASTM F 588. Grade 10 is the lowest. Up through Grade 40 is recommended for attacks by unskilled or opportunistic burglars.

Resistance to forced entry can be adjusted by glass thickness, heat treating and laminating.

Laminated glass composed of 3 mm glass plies and 60 mils PVB provide significant improvement in resistance to attack from a variety of hand weapons. Laminated glass cannot be cut from one side with glass cutters. An important consideration is, as the interlayer thickness increases, impact resistance is increased.

Missile Impact resistance has become an issue as a result of hurricane design and testing. Test methods are ASTM E 1886 and E 1996. A schedule of resistance to missiles is used:

Level A – 2 gram steel ball at 130 feet per second
Level B – 2 pound lumber at 50 feet per second
Level C – 4.5 pound lumber at 40 feet per second
Level D – 9 pound lumber at 50 feet per second
Level E – 9 pound lumber at 80 feet per second.

As an example, laminated glass with 60 mils PVB interlayer will resist small missile impact. Plastic interlayer is needed because the test requires the glass to stay in place after impact and resist cyclical wind loading (as in an actual storm). Heat strengthened glass is required for commercial applications (Dade County, we assume). Two items to remember in storm resistant design: assure glass is designed for wind load; glazing method and design are important.

Seismic or earthquake-resistant design deserves some consideration at this point. During a seismic event glass may break or it may be dislodged. The use of laminated glass can assure that occupants adjacent to glazing will not be injured by flying glass. This can be a consideration in school design.

Solar Control and Aesthetics

A more lengthy discussion of solar control will be in next month's article on IGUs. Since we are concentrating on laminated glass, it is important to note that the PVB interlayer blocks 99% of UV radiation. Even the most selective coatings for vision glass allow some UV transmission. Where UV protection is critical in vision glass, laminated glass should be considered.

Color of the interlayer and printed pattern on the interlayer can play an import role in controlling solar radiation and daylight. The range of colors for PVB are far greater than those of tinted glass; and the colors can vary in intensity.

Acoustical Control

An often forgotten fact: the interlayer of laminated glass is effective at reducing sound transmission through glass. In addition a special acoustical PVB interlayer is available; it improves sound control even more. A typical sound transmission coefficient for 1/4-inch thick laminated glass with acoustical PVB interlayer is STC 35. A typical STC for 1-inch IGU with one lite of laminated glass is STC 39.

Specification Standards

Laminated glass is made with Flat Glass, ASTM C 1036.

It may be made with Heat Treated Flat Glass, ASTM C 1048, Kind HS or even Kind FT. (see last month's article)

Standards for laminated glass are established in **ASTM C 1172**, Specification for Laminated Architectural Flat Glass. It should be specified as a requirement for laminated glass.

Method for Selecting Glass (Reprinted for your use)

- Determine Life Safety Requirements:
  Safety glazing for hazardous location,
  Fire rating,
  Blast resistance,
  Bullet resistance (ballistic).
- Determine Energy Requirements (Gain vs. Loss):
  Insulating value or U-value,
  Solar heat gain.
- Address Load Conditions:
  Wind,
  Thermal,
  Impact

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OCTOBER MEETING RECAP

BIM IN THE REAL WORLD"

The Moderator is David R (Skip) Brown III, CSI, AIA, CCS, NCARB. Skip has over 25 years experience as an Architect. He received a Bachelor of Architecture from the University of Oregon. He is a registered Architect in Oregon and Nevada, and NCARB Certified. His skillset includes computer-aided design (CAD), construction document development, specifications writing and review, coordination of contract documents and contract administration. Skip has experience in multiple institutional, industrial, residential, educational, and commercial projects. He has worked with most every major Architectural firm in the Portland area. If you ask him what his most memorable project was, he will quickly say "living and working in Israel for 18 months on a microelectronics design/build project."

Skip began with a little history. At a Specifiers' Share group presentation two months ago, there was a discussion of the difficulties and possible astronomical costs that might be inflicted on the design professional due to a steel subcontractors authorized use of the project electronic "BIM" model for development of shop drawings. I sent a rather "warm" email expressing my concern to our Specifiers' Share Group members in response to that presentation. A few weeks after that email, Kaye got Fred, Dennet, and me together to discuss the possibilities for a "BIM" Chapter program … naturally when I protested too much I was "nominated" (by Kaye) to moderate this event.

In 1985, I and one other person were assigned the task of developing electronic construction documents for interior tenant spaces of the US Forest Service and Corps of Engineers in the Mark O Hatfield building which is a 10 story full block building at Second and Oak Streets. The design/construction documents for the envelope of the building were of traditional paper design and output. We were working with AutoCAD release 8 on a 286 (I think) DOS machine, developing the tenant drawings. When we pressed "regen" we went for a cup of coffee.

Eight years ago the electronic documentation process allowed me to produce door schedules from a one way extraction of intelligent object information (door numbers) in drawings. And just last month that same capability in AutoCAD ADT, at my present firm, became a "baligon" mess when I reviewed Construction Documents to be issued for bid. (In Hebrew baligon essentially means a "traffic jam"!) The CAD operator had decided to label each of the 300+ doors by type rather than by room number.

My experiences in the electronic production of contract documents have instilled in me a greater respect for the person operating the software … than I have for the software! So, my expectations, my views of BIM are not quite as confident or in complete concert with others in terms of practical application.

We have very experienced people here tonight, and after having lively discussions in preparation for tonight's event … we are here to share with you what we believe is the state of "BIM in the Real World."

Skip introduced Gordon Price, BIM Manager SERA Architects, and Revit User Group chair:

Gordon has 12 years of experience in the Architecture field, as a Job Captain, a CAD Manager and now a BIM Manager. He has worked in a variety of firms, including Arthur Dyson and Associates, David Baker & Associates, Thomas Hacker and Associates, and now SERA Architects, who is the first 100% Revit firm in the Portland area. He is a past presenter at Autodesk University.

Gordon advised that BIM has a different definition depending on who is using it. With BIM on an Architecture Project you can make a 'rough' model early and develop it into working drawings. With BIM programs, an architect can cut a section thru the model at will. Schedules are dynamic. There is a lot of sharing of information among the various subconsultants during the design effort. Using BIM, you can do more work, but you need to be sure you are doing the right work.

Skip then introduced James E. Brady, PE, Apollo Construction Services, Oregon Division Manager:

Jim is a registered mechanical engineer in the states of Oregon and California. Jim began his career in Navy propulsion system design and operation over 20 years ago. He has spent the last 17 years as a mechanical contractor, working on a variety of industrial, commercial and institutional projects. Projects experiences range from semiconductor fabrication facilities, central plants, food-processing and chemical plants.

Having been through the industry's transition from hand drawing coordination and fabrication drawings to drawing with CAD software, Jim views 3D coordination and BIM opportunities as revolutionary. Jim's current firm has been actively utilizing 3D coordination and providing Lead CAD Management services for 7 years now. Jim enjoys projects that encourage strong architect/engineer/contractor design and preconstruction involvement and believes that it is the most influential key to a successful outcome.

Jim advised that BIM has a lot of different definitions but literally stands for Building Information Model. As a Mechanical Contractor he uses BIM as a tool for land use planning etc. Everyone is not on the same page yet, with BIM being a weak link. An architectural firm needs to go through the process of using BIM to understand how BIM should work. Those who understand the process will then lead the top management through the process. Because BIM can create three dimensional models the Architect is

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What Do You Say

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- Exterior Aesthetics and Maintenance:
  Color,
  Reflectance vs. transparency,
  Maintenance and repair.
- Interior Environment Concerns:
  Day lighting and glare,
  UV protection,
  Reflectance,
  View,
  Sound transmittance.
- Determine Cost and Time Constraints.

Next Month

We will continue with Insulating Glass Units - IGUs.

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better able to coordinate the construction and to resolve conflicts. BIM draws model to scale so the building (model) looks like what it will look like after it is built.

Finally Skip introduced Greg Smith, Skanska USA Building, Inc., CAD/Modeling Manager:

Greg brings 20 years experience developed at an Executive level leadership position providing engineering technical services to the Architectural, Engineering, and Construction industry while managing and developing sales and marketing strategies to facilitate the success of the services. Greg also served as an educator and adjunct Professor in developing architectural and engineering drafting/design curriculum, instruction in various software applications including AutoCAD, Microsoft Office, Windows, and DOS in support of Fort Vancouver High School, Mount Hood Community College, and Washington State University. Greg has a B.S. Degree from Portland State University, with a Major in General Management. Greg also has a State of Washington vocational education certification.

Greg explained that Skanska was recently named the #1 green builder in the US. They are developers and do both "Design Build" and "Classic Construction" (design, bid and construct) – Developer in Europe, Design/Build on East Coast, Classic on the West Coast. They Work with BIM " in total " - viewing the process like an iceberg – the 3D model is just the tip, the 20% above the water. We look at the entire process including the 80% below the water you can't see – 4D scheduling, 5D cost, logistics, sequencing, energy analysis.

There are three aspects of learning: first, if you: tell me (I will forget), second: show me and I will remember and third: Involve me, I understand. Getting everyone involved in the project – up front – is key to BIM success. Just a few of the ways Skanska uses BIM: 1) constructability analysis – like clash detection, 2) Estimating – allowing for faster and more accurate quantity take-offs allowing for more time to spend estimating and looking at "what if:" scenarios, 3) Productivity gains – scheduling and sequencing work to optimize the schedule, 4) Innovation – "chunking" or manufacturing offsite rather than constructing onsite (like a headwall of a hospital room), or attaching RFID (radio frequency identification) tags to components like precast concrete panels (model can be updated quickly and shows, with color, what has been installed, what needs to be installed.

OCTOBER MTG RECAP

(CONTINUED)

Question and Answer period followed:

First question was: - *who is responsible for what?* BIM is risk avoidance versus management (of risk) problem. BIM is a tool - a relationship to complexity of project. BIM lends well to projects which are collaborative in nature, but it can be used in several different ways. Models can be used to estimate quantities but you need to have confidence in the model. When projects are done in tandem – like estimates for the cost of structural steel, it was found that when a traditional quantity take-off was compared with a BIM estimate, they were found to be within 1% of each other. We do a lot of checking of results to be sure they make sense and are accurate. BIM staff works by system (not individual item) BIM will do well at making better professionals – as people are forced to make decisions up front. Need better answers for contractor.

Once the owner gets BIM - it will make turning over the facilities to a manager easier. *How is BIM useful to owner?* Whether BIM is useful to owner depends on architect and owner. On remodels the BIM helps because there is no question of what happened (during construction – BIM updates documents to show how the project was built) and helps manage the building later. A lot of different software packages are available and it depends on what the contractor owner wants - working drawings or manufacturing drawings or fabricating drawings – or getting vendor information which fits in BIM. The person operating the software has to be smarter than usual. In BIM you can get more information about a specific problem.

There was a question about authorship of the model - the problem is there are several models – everyone needs to know who is going to do what. A BIM can also be an evolution of "as built" drawing during the construction phase - Ideally you would hire someone to track BIM, a LCM (Lead CAD Manager). If it can prove there is money to be made for everyone then there will be more cooperation – with most examples have been involved with finding out the best way to build buildings better.

BIM not really going to work until there is more cooperation - then insurance contracts will demand it. *The question is how do we start working together?* Design Construction documents show intent of the project – construct according to shop drawings and don't accept less change the design – only confirm the design with methods of construction.

We all need to have a common language that will help move us forward in BIM. People talk back and forth and solve problems - definitions are not private information which are not shared.

A great program - plan on attending next time.

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Puget Sound, Seattle, WA *(Second Tuesday)*
Andrew Estep, CSI.....206-382-3393

Mt. Rainier, Tacoma, WA *(First Thursday)*
Bob Kenworthy, FCSI, CCS, CCCA..253-931-4904
Dennis Kabba, CSI, CDT …….. 253-627-5599

Spokane, WA *(Second Thursday)*
Thoms Gerard, PE, CSI, LEED-AP. 509– 328-2771

Portland, OR *(Second Tuesday)*
Jane Phifer, CSI.....503-805-2500

Capital, Salem, OR *(Third Thursday)*
Chris Veit, CSI, CCS.....503-390-0291

Willamette Valley, Eugene, OR *(Last Thursday)*
Melanie Wittkop-Fort, CSI 541-485-0922

Idaho, Boise, ID *(First Tuesday)*
Karen Morris, CSI …….....208-343-3620

Big Sky, MT
Jan O'Brien, CSI……406-245-6363

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11/6 CSI Board Meeting, *Noon, SERA Architects*
11/8 CSI Specifiers Share Group Meeting, *Noon, ZGF*
11/13 CSI Chapter Meeting - *Central Eastside Industrial Council*
11/19 CSI Membership, noon Macadam's Bar & Grill
11/22 HAPPY THANKSGIVING
11/27 Program Meeting, *7:30 am, Nancy's Kitchen—16th & Glisan*
11/29 CSI Specifiers Share Group Meeting, *Noon, ZGF*

December 2007

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12/4 CSI Board Meeting, *Noon,*
1211 CSI Chapter Meeting - *Ten thousand villages*
12/13 CSI Specifiers Share Group Meeting, *Noon, ZGF*
12/17 CSI Membership, noon Macadam's Bar & Grill
12/18 CSI Program Meeting, *7:30 am, Nancy's Kitchen—16th & Glisan*
12/25 MERRY CHIRSTMAS
12/27 CSI Specifiers Share Group Meeting, *Noon, ZGF*

January 2008

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1/8 CSI Board Meeting, *Noon,*
1/8 CSI Chapter Meeting -
1/10 CSI Specifiers Share Group Meeting, *Noon, ZGF*
1/21 CSI Membership, noon Macadam's Bar & Grill
1/24 CSI Specifiers Share Group Meeting, *Noon, ZGF*
1/29 Program Meeting, *7:30 am, Nancy's Kitchen—16th & Glisan*

PERKY'S NOTE ABOUT THE SEPTEMBER TOUR: Portland Chapter CSI had a very nutrious and interesting meeting in September. I didn't feel like taking the tour. Somebody who took the tour should be able to write a story about the tour for The Predicator. I will buy the dinner of the person who writes an article (story) about the tour afterd the article appears in the next issue of The Predicator. Thank you. Perky