BECx Design Phase Specification Review Workshop

Building Enclosure Commissioning: Train the Trainer
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Design Phase

Pre-Design Design Construction Occupancy & Operation Phase

Building Enclosure Coordination Process

Building Enclosure Coordination Process (BECP):
The process by which the design and constructed performance of building enclosure materials, components, assemblies and systems are verified to meet defined objectives and requirements of the project as established by the Owner.

Construction Risk Management

- Risk Assessment
- Unfavorable consequence
- Unwanted outcome
- Variability
- Ambiguity
- Perception
- Lack of certainty
- Weather
- Inexperienced workmen
- Sequence of Installation
- Hazards
- Market
- Schedule
- QC Testing
- QA audits
- Damage by other trades

Building Enclosure Risk Management

Components of a Building Enclosure Coordination Program
- BE Assessment during estimating of contract documents
- BE Shop drawings / submittal review
- BE Mock Ups / Performance Testing
- BE Subcontractor Coordination of Shop drawings for interfacing materials
- BE Field Performance Verification Testing
- BE Non Conformance Process
- BE warranty walk thru at 10 months
Causations of Non Performing Building Enclosures

• Project Specifications should clearly delineate process requirements for the CM/GC for site specific execution planning, safety, mock ups, submittals, non conformances, self audits, field performance testing and scheduling for the co-ordination of the building enclosure.

Causations of Non Performing Building Enclosures

• Owners and Design Professionals make assumptions in reference to CM/GC field processes which are absent as requirements within the project specifications to verify the daily performance of the Construction Manager/General Contractor/ Subcontractors specific to the co-ordination, installation, and first level performance verification and documentation of the building enclosure performance.

Construction Discussion

What are the risks posed by ‘Construction’ to building enclosures?

Value Engineering / getting to budget
Preconstruction Meeting – scheduling, attendees, agenda
Installation of air barrier prior to roof installation
Installation of enclosure without continuity to the waterproofing, windows, doors, storefront, curtainwall, parapets, roofing, roof curbs
Substrates (exterior sheathing, concrete masonry units, concrete) not prepared for waterproofing, air barrier, window installation
Schedule driven decisions to not perform an enclosure mock up or first work
Construction Managers / General Contractors with no experience with building enclosure coordination programs
Non experienced building enclosure installation subcontractors
Damage to the installed building enclosure by other trades

How do you deliver the performance defined in your project documents- plans and specifications?

Primary BE Coordination Program Principles

1) Determine Owner Expectations and Project Performance Requirements

2) Assemble the generic Building Enclosure Coordination Process

3) Generate a Site Specific Building Enclosure Coordination Plan - Assemble the plan for the specific project, per the plans and specifications inclusive of Mock up, Inspection, Testing, and Non Conformance Process,
Keys to BE project success

- Prequalification
  Construction Manager / General Contractor
- MEP Coordination Program
- Building Enclosure Coordination Program (BE Coordination Program)

Keys to a Building Enclosure that performs:

- Commitment of the construction team to deliver a building enclosure that performs per the contract documents.
- Clearly identify the Responsibility and Accountability of the Construction Team in a Responsibility Matrix
- Training for the recognition of building enclosure interfacing materials issues for the project field personnel and management as well as the self perform workforce and subcontractor.

Questions For The Construction Team

- Are project design and construction teams proactive with the verification and assurance of the building performance for the six sides of the box for the building enclosure?

Zelda Says

- The building enclosure poses multiple risks to the management of a building project. While there are proactive construction management and construction firms that have implemented internal programs and processes to co-ordinate the building enclosure inclusive of peer review, mock-ups, and field performance testing there remain those projects that construct ‘buildings with issues’. These projects provide headline news of non-performance and litigation.

Questions For The Construction Team

- What are the enclosure process components found in the tool boxes of successfully proactive Owner, A/E, CM, GC, and Subcontractors?

BECP Team Coordination Goals

Design:
- Eliminate Detailia Absentia
- Eliminate Detailia Dementia

Construction:
- Require subcontractor first level QC
- Coordination of interfacing material trades
- Minimize delay impacts of defective work

Operation and Maintenance:
- Provide a roadmap for operational budgets, periodic inspections, and documentation of the building enclosure performance
Title 2 - Ten (10) Items that Architects, Engineers, Construction Managers, General Contractors, and Design Builders should implement within their projects to minimize building enclosure risks and assure that their projects are proactive for the delivery of enclosure performance.

1. Require the CM/GC to provide the implementation of a Building Enclosure Co-ordination Process (BECP)

Require the CM/GC to provide a BECP and a specific individual responsible for the coordination of the building enclosure interfaces with subcontractors and manufacturers.

2. Integrated Specifications

Cross link the individual specifications across all specification divisions.

2. Integrated Specifications Continued...

Division 1 – provide sections for Mock Up, Performance Testing, Site Specific Performance Plan, Construction & Temporary Protection, Scheduling with tasks included for the building enclosure:

- Submittals, shop drawings, building enclosure trade installation activities, mock ups, lab testing, field performance testing
- Temporary protection of the installed enclosure materials
- Shop Drawings integrated to demonstrate the continuity of the air, water and thermal barriers
- Compatibility of materials regarding waterproofing, air barrier, roofing sealants, and fenestration

3. Responsibility Matrix

Utilize to perform a ‘Gap Analysis’ of the specifications and provide a roadmap for the building enclosure first level QC, performance testing, documentation.

3. Performance Verification Specifications- 14000

Provide specific listings of Responsibilities for each member of the Construction Team.
4. Performance Specifications

Owners, A/E, CM, GC, CxA, BEC, Subcontractors for the substrates –concrete, concrete masonry units, light gauge metal framing, exterior sheathing, waterproofing, air barrier, windows, doors, storefront, curtain wall, parapets, roofing, equipment curbs, wall and roof penetrations, manufacturers, and Independent Testing Agency

5. Coordinated Shop Drawings

Require the submittal of coordinated shop drawings specific to the project. The coordination between trades is similar to above ceiling coordination for Mechanical, Plumbing, Electrical, Fire Protection, and Communications

6. CM/GC Responsible for 1st level Performance Control Verification

Require the CM/GC to create and implement a non-conformance process to inspect, document, track and require formal submittals for approval prior to field repairs and requiring mock ups of field repair work.

7. Pre-Construction Meetings

Require Pre-construction meetings to be scheduled after the shop drawings are approved and a minimum of 4 weeks prior to the start of construction activity

8. Require Site Constructed Mock Ups That Are Field Performance Tested

Utilize a separate Mock Up specification placed in Division 1

9. Field Performance Testing and Documentation by the CM/GC

The project specifications provide requirements for field testing, locations, frequency, scheduling and the acceptance metrics.
10. A 10 Month Warranty Walk Through for the Building Enclosure

Utilize the enclosure issues log and punch lists to discuss the current enclosure observed performance with a walk through attended by the Owner, Facility Maintenance Personnel, Construction Manager, General Contractor, subcontractors, and Manufacturer’s technical representatives.