



ENTUITIVE

BUILDING ENCLOSURE COMMISSIONING PLAN
**DOCKSTEADER PRPS REPORTING
STATION**
ISSUED FOR REVIEW (90%)

EN024-01511

FOR: REGION OF PEEL | DATE: AUGUST 28, 2024



ENTUITIVE

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INTRODUCTION

1.1 PURPOSE

Entuitive was retained by CDML, on behalf of the Region of Peel, as the Building Enclosure Commissioning Agent (BECxA) for the building known as the Dockstader PRPS Reporting Station in Brampton, Ontario.

1.

As the BECxA, Entuitive has prepared a Building Enclosure Commissioning Plan (BECxP), which identifies the processes and procedures required to achieve the Construction Documents and to ensure building envelope performance is achieved to satisfy project requirements. As recommended for targeting Building Envelope related performance, this plan has been developed using principals of the following reference standards:

1.1.1.

1.1.2.

American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Guideline 0-2013 – The Commissioning Process,

National Institute of Building Sciences (NIBS) Guideline 3-2012 – Building Enclosure Commissioning Process BECx, and

CSA Standard Z320-11 – Building Commissioning Standard.

1.1.3.

The purpose of this Plan is to identify the project-specific building enclosure commissioning process, the commissioning team, major building enclosure systems and components, comprehensive checklists and issues log, and a general schedule of all tasks involved in the BECx process.

1.1.4.

The intent of this Plan is to act as a working document which will undergo updates as the design and project progresses.

1.2.1.

1.2

DEFINITIONS

Basis-of-Design (BOD)

1.2.2.

.1 The information necessary to accomplish the owner's project requirements, including system descriptions, indoor environmental quality criteria, design assumptions, and references to applicable codes, standards, regulations, and guidelines.

1.2.3.

Building Enclosure

.1 The physical separator between the interior and exterior environments of a building. Typical building enclosure components include the base floor systems, below-grade wall systems, above-grade wall systems (including windows and doors), and the roof systems.

Building Enclosure Commissioning (BECx)

.1 The process of inspecting and testing building components and assemblies to ensure the installed performance of the building enclosure meets or exceeds the minimum performance requirements set forth by the Contract Documents.

Building Enclosure Commissioning Plan (BECxP)

- 1.2.4. .1 Project-specific protocol developed by the BECxA, which outlines the BECx process for all related components and assemblies. This document will identify the Commissioning Team and include comprehensive checklists and general schedule of all tasks involved in the BECx, including design reviews, construction observations, mock-up construction and testing, whole building air leakage testing, and technical reports that will be produced over the course of the Project.

Building Enclosure Commissioning Report

- 1.2.5. .1 The final deliverable from the BECx process, this document includes a full summary report with appropriate documentation including the following information: a narrative describing the BECx items and issues found, a summary and list of enclosure systems and components included in the commissioning program, a description of non-compliant conditions noted during site observations with follow up documentation on the means and methods to resolve, and summary results of building performance testing.

Contract Documents

- 1.2.6. .1 Documents governing the responsibilities and relationships between Parties involved in the design and construction of this project, including (but not limited to): Agreements/Contracts, Drawings and Specifications, Addenda, Change Orders, BECx Plan, etc.

1.2.7. Construction Documents

- .1 Refers to the Contract Documents that dictate the details of construction.

1.3 KEY PERSONNEL

The key personnel involved in executing the project are listed below:

TABLE 1A - KEY PERSONNEL – DESIGN TEAM

ROLE	FIRM	CONTACT	EMAIL
OWNER	Region of Peel	Bob Ho Ajit Stephen Majadeh Hamidsaeidi	bob.ho@peelregion.ca ajit.stephen@peelregion.ca majadeh.hamidsaeidi@peelregion.ca
ARCHITECT OF RECORD	Diamond Schmitt Architects (DSA)	Eric Charron Tristan Crawford Laura Hutchinson Michael Leckman Arne Suraga	echarron@dsai.ca TCrawford@dsai.ca LHutchinson@dsai.ca mleckman@dsai.ca ASuraga@dsai.ca
STRUCTURAL ENGINEER	Read Jones Christoffersen (RJC)	Mario Lagana	MLagana@rjc.ca
MECHANICAL ENGINEER	Introba (INT)	Bhavin Degadwala	Bhavin.degadwala@introba.com
ELECTRICAL ENGINEER	Introba (INT)	Hiren Dalal Zorica Gombac	hiren.dalal@introba.com zorica.gombac@introba.com
CIVIL ENGINEER	Morrison Hershfield (MH)	Farooq Arshad Andrea Carroll Ken Luong Mathais Sawicki	farshad@morrisonhershfield.com ACarroll@morrisonhershfield.com KLuong@morrisonhershfield.com msawicki@morrisonhershfield.com
ENERGY MODELLING	Introba (INT)	Eric Campbell Jamie Dabner	eric.campbell@introba.com jamie.dabner@introba.com
SUSTAINABILITY	Introba (INT)	Eric Campbell Jamie Dabner	eric.campbell@introba.com jamie.dabner@introba.com
BUILDING ENVELOPE	Read Jones Christoffersen (RJC)	Matthew Lipiec	mlipiec@rjc.ca

TABLE 1B - KEY PERSONNEL – COMMISSIONING AUTHORITY

ROLE	FIRM	CONTACT	EMAIL
COMMISSIONING AUTHORITY (CxA)	CDML	Mark Boswell Jamie Carmichael	mboswell@cdml.ca jcarmichael@cdml.ca
BUILDING ENVELOPE COMMISSIONING AGENT (BECxA)	Entuitive	Fariz Dhalla Trent Williamson	fariz.dhalla@entuitive.com trenton.williamson@entuitive.com

TABLE 1C- KEY PERSONNEL – CONSTRUCTION TEAM

ROLE	FIRM	CONTACT	EMAIL
GENERAL CONTRACTOR	TBD	TBD	TBD
CLADDING SUB CONTRACTOR	TBC by GC at next available submission	TBC by GC	TBC by GC
GLAZING SUB CONTRACTOR	TBC by GC at next available submission	TBC by GC	TBC by GC
ROOFING SUB CONTRACTOR	TBC by GC at next available submission	TBC by GC	TBC by GC
OTHER	TBD	TBD	TBD

1.4 PERSONNEL RESPONSIBILITIES

Defining clear roles and responsibilities for those involved with the BECx process is necessary to establish an integrated approach to achieving building durability, as outlined below:

Owner

- 1.4.1. .1 The party responsible for outlining the functional requirements and expectations of the building's use and operation, as well as operating and maintaining completed building systems. The design and construction requirements are compiled in the Owner's Project Requirements (OPR). The Owner is responsible for updating the OPR for any material changes during design and construction such as: design changes, value engineering modifications, or updated operating conditions.

Architect

- 1.4.2. .1 The primary party responsible for all building systems, including those related to the building enclosure. This party defines the building enclosure systems, overall performance criteria, and is the primary point of contact between the design and construction team and the Owner.

Commissioning Authority (CxA)

- 1.4.3. .1 The Party responsible for coordinating and carrying out the entire scope of the commissioning process. The Commissioning Authority collaborates with the BECxA to accomplish the building enclosure commissioning.

1.4.4. Building Enclosure Commissioning Authority (BECxA)

- 1.4.5. .1 The Party retained by the Commissioning Authority which will manage the BECx process, develop and stipulate the BECx requirements, and validate that the components and assemblies are designed, constructed, and tested to meet requirements set forth in the Contract Documents.

Building Envelope/Building Enclosure (BE) Consultant

- 1.4.6. .1 This party may provide a more detailed review of the building enclosure system design during the design phase (as compared to the BECxA) regarding system performance and detailing and may review product literature and shop drawings in more detail as well as to provide more extensive field review services during the construction phase.

1.4.7. General Contractor

- .1 The party responsible for constructing the building in accordance with the contract documents. This party generally engages sub-contractors and suppliers in this effort and is responsible for administering a quality management program during construction.

Building Enclosure Commissioning Team

- .1 Owner and their consultants, General Contractor, Consultant, Commissioning Authority, Building Enclosure Commissioning Authority.

1.5 COMMISSIONING ACTIVITIES & RESPONSIBILITIES

The following table is intended as a summary and reference guide to the commissioning activities and responsible parties:

TABLE 2 | COMMISSIONING ACTIVITIES & RESPONSIBILITIES

Cx TASK	RESPONSIBLE PARTY	REQUIRED FOR:			
		Cx	ENHANCED Cx	MBCx	BECx
PREDESIGN					
Develop OPR	Owner	X	X	X	X
SCHEMATIC DESIGN					
Develop BOD, including envelope requirements	Design team	X	X	X	X
Include general monitoring, metering, and trending requirements	Design team			X	
DESIGN DOCUMENTS					
Engage CxA	Owner	X	X	X	X
Develop initial commissioning plan	CxA	X	X	X	X
Commissioning Plan: Include monitoring requirements, equipment	CxA			X	
Commissioning Plan: Include envelope requirements	CxA, BECxA				X
Commissioning Plan: Conduct OPR, BOD, and design document review	CxA, BECxA, design team, owner	X	X	X	X
Prepare systems manual outline	CxA, Owner		X	X	X
Systems Manual Outline: Include monitoring requirements, equipment	CxA, Owner			X	
Systems Manual Outline: Include envelope requirements	CxA, Owner, BECxA				X
Systems Manual Outline: Document training requirements	CxA, Owner		X	X	X
Systems Manual Outline: Conduct OPR, BOD, and design document review	CxA, BECxA, design team, owner	X	X	X	X
CONSTRUCTION DOCUMENTS					
Issue Cx specifications for inclusion in bid/permit documents	CxA	X	X	X	X

Cx TASK	RESPONSIBLE PARTY	REQUIRED FOR:			
		Cx	ENHANCED Cx	MBCx	BECx
Include enhanced Cx requirements	CxA		X	X	X
Include monitoring-based Cx requirements	CxA			X	
Include envelope based Cx requirements	CxA, BECxA				X
Update OPR and BOD as necessary	CxA, owner, BECxA, design team	X	X	X	X
Conduct design review	CxA, BECxA, design team	X	X	X	X
CONSTRUCTION					
Update OPR and BOD as necessary	CxA, owner, design team	X	X	X	X
Perform pre-functional inspections	CxA, BECxA	X	X	X	X
Complete submittal reviews concurrently with or before acceptance by design team	CxA, BECxA		X	X	X
Update OPR, BOD, Cx Plan and systems manual as necessary	CxA	X	X	X	X
Include Owner's training requirements	CxA to Contractor		X	X	X
Issue construction checklists	CxA, BECxA, Contractor	X	X	X	X
Issue functional performance test scripts for contractor review	CxA, BECxA, Contractor,	X	X	X	X
Issue/review verified TAB report	CxA, Contractor	X	X	X	X
Issue/review completed construction checklists	CxA, BECxA, Contractor	X	X	X	X
Execute functional performance tests	CxA, BECxA, Contractor	X	X	X	X
Document issues in issues log	CxA	X	X	X	X
Compile final systems manual	CxA		X	X	X
Complete final commissioning report	CxA, BECxA	X	X	X	X
Verify training plan has been implemented	CxA, contractor,		X	X	X

Cx TASK	RESPONSIBLE PARTY	REQUIRED FOR:			
		Cx	ENHANCED Cx	MBCx	BECx
	building operators				
POST CONSTRUCTION, OCCUPATION, AND OPERATION					
Complete Cx Report	CxA, BECxA	X	X	X	X
Compile operations and maintenance plan	CxA	X	X	X	X
Compile final systems manual	CxA		X	X	X
Perform seasonal testing	CxA, contractor, building operators		X	X	X
Perform 10-month review	CxA, contractor, building operators		X	X	X
Develop an ongoing Cx plan	CxA, building operators		X	X	X

BUILDING ENCLOSURE COMMISSIONING PLAN

The following sections provide a summary of the general project information, building enclosure components, BECx process, and functional performance test methodology.

2.1 DESCRIPTION OF FACILITY

2.

The Dockstader PRPS Reporting Station is to be located at the intersection of Dixie Rd and Dockstader Rd, in Brampton, Ontario. The building is three (3) storeys in height and approximately 5,322 square meters in total floor area.

The building will be designed to meet Canada Green Building Council (CaGBC) Zero Carbon Building (ZCB) under Version 3, while also meeting the requirements of the Region of Peel's mandate to reach Net Zero Emissions Standards. In addition, the project is to reach a Silver Sustainability Score per the City of Brampton Sustainability Assessment Tool.

2.2 OVERVIEW OF BUILDING ENCLOSURE COMPONENTS

The following components and assemblies make up the major building enclosure systems for the building. The assemblies identified below are based on the drawing set "Dockstader PRPS - Construction Documents - Issued for Tender", dated July 26, 2024, produced by Diamond Schmitt Architects, and the architectural specifications: "Dockstader PRPS - Construction Documents - Issued for Tender", dated July 26, 2024, produced by Diamond Schmitt Architects

2.2.1.

Roof Type R1 (Low Slope Conventional Roof Assembly, R45)

.1 The assembly consists of the following, from exterior to interior:

- .1 2-ply SBS modified bituminous roofing membrane, fully adhered
- .2 13mm mineral fiber insulation cover board
- .3 Polyisocyanurate roof insulation, tapered
- .4 Polyisocyanurate roof insulation, base
- .5 Self-adhering modified bitumen vapor control membrane
- .6 16mm Fiberglass-Mat Gypsum Sheathing Board
- .7 Support Substrate (Typically metal deck)

2.2.2.

.2 Design Service Life: TBD

Roof Type R2 (Low Slope Conventional Roof Assembly with Reduced Insulation)

.1 The assembly consists of the following, from exterior to interior:

- .1 2-ply SBS modified bituminous roofing membrane, fully adhered
- .2 13mm mineral fiber insulation cover board

- .3 Polyisocyanurate roof insulation, tapered
- .4 Polyisocyanurate roof insulation, base
- .5 16mm Fiberglass-Mat Gypsum Sheathing Board
- .6 Support Substrate (Typically metal deck)
- .2 Design Service Life: TBD

Exterior Wall Type EW1 (Metal Panel on Concealed Clip System)

- 2.2.3. .1 The assembly consists of the following, from exterior to interior:
 - .1 Prefinished metal cladding panels
 - .2 Engineered cladding rails with concealed clip system
 - .3 Semi rigid mineral wool insulation (R30)
 - .4 Fiberglass clip and galvanized girt cladding attachment
 - .5 Self-adhered air / vapour barrier
 - .6 Support substrate
- .2 Design Service Life: TBD

2.2.4.

Exterior Wall Type EW2 (Metal Panel on Concealed Clip System - Uninsulated)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Prefinished metal cladding panels
 - .2 Engineered cladding rails with concealed clip system
 - .3 Support substrate

2.2.5.

- .2 Design Service Life: TBD

Exterior Wall Type EW3 (Solar Wall)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Corrugated perforated rolled pre-painted steel wall cladding
 - .2 150mm solar wall Preheat cavity
 - .3 100mm Vertical galvanized Z -Girt on 50mm horizontal
 - .4 Corrugated rolled galvanized steel wall cladding

- .5 Semi-rigid mineral wool insulation (R30)
- .6 Fiberglass clip and galvanized girt cladding attachment
- .7 Self-adhered air / vapour barrier
- .8 Support substrate
- .2 Design Service Life: TBD

Exterior Wall Type EW4 (Aluminum Composite Panel Cladding System)

- 2.2.6. .1 The assembly consists of the following, from exterior to interior:
 - .1 Aluminum composite panel cladding system
 - .2 Engineered cladding rails
 - .3 Semi-rigid mineral wool insulation (R30)
 - .4 Fiberglass clip and galvanized girt cladding attachment
 - .5 Self-adhered air / vapour barrier
 - .6 Support substrate
- .2 Design Service Life: TBD

2.2.7.

Exterior Wall Type EW5 (Aluminum Composite Panel - Uninsulated)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Composite metal panel on engineered clip system
 - .2 Engineered cladding rails
 - .3 Support substrate

2.2.8.

- .2 Design Service Life: TBD

Exterior Wall Type EW6 (Sintered stone panel cladding system)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Sintered stone panel on engineered clip system
 - .2 Cladding rails
 - .3 Semi-rigid mineral wool insulation (R30)
 - .4 Fiberglass clip cladding attachment

- .5 Self-adhered air / vapour barrier
- .6 Support substrate
- .2 Design Service Life: TBD

Exterior Wall Type EW8 (Corrugated Metal Cladding)

- 2.2.9. .1 The assembly consists of the following, from exterior to interior:
 - .1 Corrugated steel wall cladding
 - .2 Engineered cladding support channel
 - .3 Semi-rigid mineral wool insulation (R30)
 - .4 Fiberglass clip cladding attachment
 - .5 Self-adhered air / vapour barrier
 - .6 Support substrate
- .2 Design Service Life: TBD

2.2.10. Exterior Wall Type EW9 (Ribbed Pre-Cast Concrete Panel)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Pre-cast ribbed concrete panel
 - .2 Mid-coarse chipped surface pattern
 - .3 Cast-In-Place concrete
- 2.2.11. .2 Design Service Life: TBD

Exterior Wall Type EW10 (Glassed Faced Rainscreen Cladding Panel)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 Glass faced rainscreen panel
 - .2 Cladding Rail
 - .3 Semi-rigid mineral wool insulation (R30)
 - .4 Fiberglass clip and galvanized girt cladding attachment
 - .5 Self-adhered air/vapour barrier
 - .6 Support substrate

- .2 Design Service Life: TBD

Exterior Wall Type EW11 (Assembled Aluminum Fin Profile)

- 2.2.12. .1 The assembly consists of the following, from exterior to interior:
 - .1 Aluminum fin profile
 - .2 Extruded aluminum fin projections on plate aluminum cladding panel
 - .3 Engineered cladding attachment clip system
 - .4 Semi-rigid mineral wool insulation (R30)
 - .5 Self-adhered air/vapour barrier
 - .6 Support substrate
- .2 Design Service Life: TBD

Foundation Wall Type FW1 (Typical CIP Concrete Foundation Wall)

- 2.2.13. .1 The assembly consists of the following, from exterior to interior:
 - .1 100mm precast concrete wall base
 - .2 30mm air space
 - .3 Extruded polystyrene insulation (R30)
 - .4 Stainless steel anchors
 - .5 Filter fabric
 - .6 19mm drainage board
 - .7 Face applied waterproofing membrane
 - .8 Cast in place concrete
- 2.2.14. .2 Design Service Life: TBD

Foundation Wall Type FW2 (Typical CIP concrete Foundation Wall – 25mm air Space)

- .1 The assembly consists of the following, from exterior to interior:
 - .1 100 mm precast concrete wall base
 - .2 100mm air space
 - .3 Extruded polystyrene insulation (R30)

- .4 Stainless steel anchors
- .5 Filter fabric
- .6 19mm drainage board
- .7 Face applied waterproofing membrane
- .8 Concrete substrate
- .2 Design Service Life: TBD

Floor Assembly SOG1 (Slab on Grade)

- 2.2.15. .1 The assembly consists of the following, from interior to exterior:
 - .1 Floor finish
 - .2 Structural cast-in-place concrete
 - .3 Under slab vapour control membrane
 - .4 Extruded polystyrene insulation (R30)
 - .5 200mm gravel base
- .2 Design Service Life: TBD

2.2.16.

Floor Assembly SOG2 (Slab on grade w/ Concrete Topping)

- .1 The assembly consists of the following, from interior to exterior:
 - .1 Floor finish
 - .2 150mm concrete topping
 - .3 Hydronic piping set in topping
 - .4 Structural cast-in-place concrete slab
 - .5 Under slab vapour control membrane
 - .6 Extruded polystyrene insulation (R30)
- 2.2.17. .7 200mm gravel base
- .2 Design Service Life: TBD

Soffit Assembly S1 (Interlocking Metal Panel Soffit)

- .1 The assembly consists of the following, from interior to exterior:

- .1 92mm engineered metal stud
- .2 16mm gypsum sheathing board
- .3 Self-adhered air/vapour
- .4 Semi rigid mineral wool insulation (R30)
- .5 Fiberglass clip and SS girt cladding attachment
- .6 Interlocking prefinished galvanized metal panel
- .2 Design Service Life: TBD

Soffit Assembly S2 (Interlocking Metal Panel Soffit – Uninsulated)

- 2.2.18. .1 The assembly consists of the following, from interior to exterior:
 - .1 92mm Engineered metal stud
 - .2 16mm gypsum sheathing board
 - .3 25mm galvanized steel cladding attachment channel
 - .4 Interlocking prefinished galvanized metal panel
- .2 Design Service Life: TBD

Soffit Assembly S3 (Aluminum Composite Panel Soffit – Uninsulated)

- 2.2.19. .1 The assembly consists of the following, from interior to exterior:
 - .1 Composite metal panel
 - .2 Self-adhered air/vapour barrier
 - .3 92mm metal stud framing
- 2.2.20. .2 Design Service Life: TBD

Fenestration Systems

- .1 Thermally broken aluminum framed curtain wall system
 - .1 Triple glazed IGU, 90% Argon filled glazing cavity, single low-e coating
 - .2 Design Service Life: TBD
- .2 Tubular skylight system

- .1 Triple glazed IGU, 90% Argon filled glazing cavity, single low-e coating
- .2 Design Service Life: TBD

2.3 BUILDING ENCLOSURE SYSTEMS TO BE COMMISSIONED

The following systems and materials to be commissioned are outlined below as they make up the major building envelope for the building. Systems and materials apply only as appropriate to the materials, components and systems specified on the project.

2.3.1. TABLE 3 | BUILDING ENVELOPE SYSTEMS TO BE COMMISSIONED

ASSEMBLY/SYSTEM	FIELD CHECKLISTS REQUIRED	PERFORMANCE TESTING REQUIRED	REMARKS/NOTES
DIV 7- THERMAL AND MOISTURE PROTECTION			
Self-Adhered Sheet Waterproofing	Yes	Yes	Mock-up
Thermal Insulation	Yes	No	Mock-up
Foamed In Place Insulation	Yes	Yes	Mock-up
Under Slab Vapour Retarder	Yes	No	Mock-up
Self-Adhering Sheet Air Barriers and Vapour Retarders	Yes	Yes	Mock-up
Aluminum Composite Wall Panels	Yes	No	Mock-up
Solid Aluminum Plate Wall Panels	Yes	No	Mock-up
PER Cementitious Panel Systems	Yes	No	Mock-up
Glass Faced Rainscreen Cladding System	Yes	No	Mock-up
Steel Siding Panels and Soffits	Yes	No	Mock-up
Aluminum Interlocking Metal Systems	Yes	No	Mock-up
Modified Bituminous Membrane Roofing	Yes	Yes	Mock-up
Sheet Metal Flashing and Trim	Yes	No	Mock-up
Joint Sealants	Yes	Yes	Mock-up
DIV 8 - OPENINGS			
Steel Doors and Frames	Yes	No	Mock-up
High Speed Roll-Up Doors	Yes	No	Mock-up
Overhead Coiling Doors	Yes	No	Mock-up
Sectional Doors	Yes	No	Mock-up
Glazed Aluminum Curtain Walls	Yes	Yes	Mock-up
Tubular Skylights	Yes	Yes	Mock-up
Fixed Louvers	Yes	No	Mock-up

2.4 BUILDING ENCLOSURE COMMISSIONING PROCESS

OPR and BOD Review

The BECxA will complete a review of the documentation relating to the Basis of Design (BOD) and Owners Project Requirements (OPR) with a focus on performance requirements of building envelope related items.

2.4.1. Design Review

The BECxA will complete a review of the “Dockstader PRPS Reporting Station - Construction Documents - Issued for Tender”, dated July 26, 2024, and the architectural specifications:

2.4.2. “Dockstader PRPS Reporting Station - Construction Documents - Issued for Tender”, dated July 26, 2024. Our review has been distributed to the design and commissioning team for incorporation into the Construction Documents.

BECx Specification

2.4.3. The BECxA will provide a building enclosure commissioning specification for integration into the Contract Documents.

Preconstruction Kick-Off Meeting

2.4.4. The Building Enlosure Commissioning Team and General Contractor shall conduct a preconstruction kick-off meeting with all relevant parties, including electrical and mechanical sub-trades, to discuss the building enclosure performance, testing, and commissioning requirements.

2.4.5. Submittal Review

The General Contractor shall submit shop drawings, manufacturer’s information, and product data as outlined in the Contract Documents for review by the Building Enlosure Commissioning Team. If deviations exist between the submittal and Construction Documents, the submittal will be rejected. A summary of the relevant building envelope shop drawings and other submittals to be reviewed by Entuitive can be found in **Appendix E** of this report.

2.4.6.

Construction Checklists

The General Contractor shall produce construction checklists for each building envelope system and/or component. The checklists are intended to be completed by building envelope component installers (subtrades) daily to verify that the installation and Owner’s project requirements are being achieved. The General Contractor is responsible for ensuring that their subtrades are completing and collecting the construction checklists daily. The General Contractor is responsible for submitting the checklists for review by the Building Enlosure Commissioning Team. Sample checklists are included in **Appendix B** of this report.

Mock-Ups

2.4.7. The General Contractor shall coordinate construction of in situ mock-ups outlined in the Contract Documents for review by the Building Envelope Commissioning Team. Mock-Ups shall demonstrate how the pertinent components in the construction detail will interface to satisfactorily manage heat, air, and moisture to result in an assembly that conforms to the Contract Documents. The Contractor shall make necessary additions and modifications to mock-ups as requested by the BECx Team until final acceptance is obtained. Documentation of mock-ups by the Cx Authority will be accomplished via regular site review memos.

The building envelope systems noted in TABLE 3 | BUILDING ENVELOPE SYSTEMS TO BE COMMISSIONED in this report are to be mocked-up and approved prior to proceeding with the system installation, see Construction Documents for specific requirements.

Site Reviews and Reports

2.4.8. The BECxA and/or BE Consultant shall perform regular site reviews to inspect the installation of individual systems and components. Note that these site reviews are representative and do not constitute a comprehensive quality control program which is the ultimate responsibility of the General Contractor.

A Site Review Report will be issued to the project team following each review and will include documentation of any deficient or defective work which requires correction.

2.4.9. Functional Performance Testing

2.4.10. .1 Field testing (as determined by the Contract Documents) is to be performed at assemblies such as air/vapour barriers, curtain wall, windows, skylights and roofing to ensure building assemblies and components perform in accordance with design intent. A review of the project schedule ensures the inclusion of BECx activities. The timing of review and compliance testing is critical as some envelope elements are concealed before the building construction is complete. If verification or testing cannot be completed because of seasonal limitations, lack of occupancy, or other reasons, this occurrence is to be noted along with an indication of when review/testing will be rescheduled.

Recommended Functional Testing

- 2.4.10. .1 ASTM E1105: *Standard Test Method for Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference* shall be conducted as follows:
- .1 The number of tests and test locations shall be selected by the BECxA.
 - .2 Testing to be performed by the 'Testing Agency'.
 - .3 The spray rack and pressurization apparatus will be provided by the 'Testing Agency'.

- .4 Testing chambers required for building envelope pressurization shall be constructed by the Contractor at locations selected by the BECxA.
- .5 Construct test chambers in accordance with the most recent iteration of ASTM E1105.
- .6 The procedure used for water penetration testing shall be Procedure A— Test under uniform static air pressure difference. The test apparatus used shall be an interior-mounted depressurization chamber with exterior-mounted water spray system.
- .7 The level of pressurization required for localized water penetration testing shall be determined by the BECxA in accordance with the Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440/NAFS 2011 — North American Fenestration Standard Specification for Windows, Doors, and Skylights.
- .8 Additional levels of pressurization may be requested or specified by the BECx Team. If additional levels of pressurization are provided, testing shall be first performed at the lowest level of pressurization. The pressure shall be increased until completion of testing at all pressures, or failure.
- .9 Reporting for water penetration testing shall be done in the form of a regular site review report. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;
 - .5 Results of the testing ("Pass" or "Fail");
 - .6 Summary of potential reasons for "failure" (if appropriate);
 - .7 Recommendations for follow-up action.
- .10 Deficiencies or non-conformance identified in all tests will be identified and tracked in the Cx Log maintained by the Cx Authority, as described above.
- .2 ASTM E783: *Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors* shall be conducted as follows:
 - .1 The number of tests and test locations shall be coordinated with locations of ASTM E1105 testing.
 - .2 The pressurization apparatus will be provided by the 'Testing Agency'.

- .3 Testing chambers required for building envelope pressurization shall be constructed by the Contractor at locations selected by the BECxA.
- .4 Where quantitative testing of a fenestration assembly is performed, the test chamber shall be constructed in accordance with ASTM E783.
- .5 The level of pressurization required for localized air and water penetration testing shall be determined by ASTM standards E1186 and E783.
- .6 Additional levels of pressurization may be requested or specified by the BECx Team. If additional levels of pressurization are provided, testing shall be first performed at the lowest level of pressurization. The pressure shall be increased until completion or failure.
- .7 Reporting for air leakage testing shall be done in the form of a regular site review report, where practical. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;
 - .5 Results of the testing ("Pass" or "Fail");
 - .6 Summary of potential reasons for "failure" (if appropriate);
 - .7 Recommendations for follow-up action.
- .8 Deficiencies or non-conformance identified in all tests will be identified and tracked in the log maintained by the Cx Authority, as described above.
- .3 (ASTM E779 – Standard Test Method for Determining Air Leakage Rate by Fan Pressurization, ASTM E1186: *Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems*, and ASTM E3158 *Standard Test Method for Measuring Air Leakage Rate of a Large Multizone Building* shall be conducted as follows:
 - .1 The number of tests and test locations shall be selected by the BECxA.
 - .2 The pressurization apparatus and smoke tracer apparatus will be provided by the 'Testing Agency'.
 - .3 Testing chambers required for building envelope pressurization shall be constructed by the Contractor at locations selected by the BECxA.

- .4 Where qualitative testing of a wall assembly is performed, the test chamber shall be constructed in accordance with ASTM E1186 procedure 4.2.7 - Chamber Pressurization or Depressurization in Conjunction with Leak Detection Liquid.
- .5 Where qualitative full-scale air leakage testing is performed, the testing shall be in accordance with ASTM E1186 procedure 4.2.2 - Smoke Tracer in Conjunction with Building Pressurization or Depressurization.
 - .1 Qualitative full-scale air leakage testing shall be conducted on the building after the building envelope and HVAC system has been completed.
- .6 Reporting for air leakage testing shall be done in the form of a regular site review report, where practical. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;
 - .5 Results of the testing ("Pass" or "Fail");
 - .6 Summary of potential reasons for "failure" (if appropriate);
 - .7 Recommendations for follow-up action.
- .7 Deficiencies or non-conformance identified in all tests will be identified and tracked in the log maintained by the Cx Authority, as described above.
- .4 ASTM D7877-14: *Electrofield Vector Mapping, Horizontal Waterproofing* shall be conducted as follows:
 - .1 The test shall be performed on the entirety of the waterproofing areas once the waterproofing is applied but before any overburden materials are installed.
 - .2 Testing to be performed by 'Testing Agency'.
 - .3 The Contractor is to provide the water supply and hose to the test locations.
 - .4 Reporting for waterproofing testing shall be done in the form of a regular site review report, where practical. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;

- .5 Results of the testing ("Pass" or "Fail");
 - .6 Summary of potential reasons for "failure" (if appropriate);
 - .7 Recommendations for follow-up action.
- .5 Deficiencies or non-conformance identified in all tests will be identified and tracked in the log maintained by the Cx Authority, as described above.
- .5 ASTM D4541-09 (if Metals) or ASTM D7234 (if concrete substrates): *Pull-Off Strength of Coatings* shall be conducted as follows:
 - .1 The number of tests and test locations shall be selected by the BECxA.
 - .2 Testing to be performed by 'Testing Agency'.
 - .3 Reporting for adhesion of coatings testing shall be done in the form of a regular site review report, where practical. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;
 - .5 Results of the testing ("Pass" or "Fail");
 - .6 Summary of potential reasons for "failure" (if appropriate);
 - .7 Recommendations for follow-up action.
 - .4 Deficiencies or non-conformance identified in all tests will be identified and tracked in the log maintained by the Cx Authority, as described above.
- .6 ASTM 1521-19: *Adhesion of Installed Weatherproofing Sealant* shall be conducted as follows:
 - .1 The number of tests and test locations shall be selected by the BECxA.
 - .2 Testing to be performed by 'Testing Agency'.
 - .3 Reporting for adhesion of coatings testing shall be done in the form of a regular site review report, where practical. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the testing;
 - .2 Locations and photos of the testing;
 - .3 Description of the test apparatus and methodology;
 - .4 Environmental conditions during testing;

- .5 Results of the testing ("Pass" or "Fail");
- .6 Summary of potential reasons for "failure" (if appropriate);
- .7 Recommendations for follow-up action.
- .4 Deficiencies or non-conformance identified in all tests will be identified and tracked in the log maintained by the Cx Authority, as described above.
- .7 Infrared Thermographic Scan shall be completed as follows:
 - .1 Infrared thermography shall be conducted on the building after the building envelope and HVAC system has been completed.
 - .2 Infrared thermography will be the primary method used to qualitatively identify air barrier and insulation issues and will also help to identify other problematic hygrothermal phenomena.
 - .3 All thermography shall be performed as outlined in the following standards:
 - .1 ASTM E1186 Standard Practice for Air Leakage Site Detection Building Envelopes and Air Retarder Systems
 - .2 ASTM C1060 Standard Practice for Thermographic Inspection Insulation Installations in Envelope Cavities of Frame Buildings.
 - .3 ASTM C1153: Standard Practice for Location of Wet Insulation Roofing Systems Using Infrared Imaging
 - .4 The thermographic camera will be provided by the BECxA.
 - .5 The initial thermographic scan shall be performed when the building is positively pressurized. The level of pressurization will be determined by the project team.
 - .6 A second thermographic scan shall be performed when the building is negatively pressurized. The level of pressurization will be determined by the project team.
 - .7 The Contractor is responsible for operating the HVAC systems as required to provide the necessary pressurization during thermographic scanning activities.
 - .8 Reporting for thermography will be included in separate report. The reporting shall identify pertinent items, such as:
 - .1 Time and date of the scan;
 - .2 Environmental conditions during testing (including levels of pressurization if available);
 - .3 Description of the test apparatus and methodology;

- .4 Photos and thermographs recorded during testing with associated commentary;
- .5 Identification of thermal anomalies that appear to be the result of air exfiltration or unintended discontinuities in the thermal barrier;
- .6 Recommendations for follow-up action such as exploratory investigation and/or repairs.
- .9 Deficiencies or non-conformance identified during thermography will be identified and tracked in the log maintained by the Cx Authority, as described above.

Occupancy and Operations

- 2.4.11. At the occupancy stage, the BECx agent will assemble the documentation related to the building envelope, (warranties, maintenance instruction by installer/supplier), relevant test reports, QA/QC checklists etc., as required for inclusion into the commissioning manuals prepared by CDML.

2.5 BUILDING ENCLOSURE COMMISSIONING BUDGET

- 2.5.1. Commissioning Budget
This budget is to be determined through the tender process via Contractor feedback on the BECx Specification Section 01 91 15.

CLOSURE

This Building Envelope Commissioning Plan comprises all elements required to achieve the Construction Documents and to ensure building envelope performance is achieved to satisfy project requirements.

- 3. Code-compliance reviews have not been included within the scope of work for this project. No comment within this document should be construed as indicating that a comprehensive code compliance assessment has been completed for any building system or installation.
- 3.1.1.
- 3.1.2. While some observations made may include comments on required maintenance, this document should not be considered a maintenance plan. We assume that the Building Owner has implemented and will follow a preventative maintenance program. The failure to adequately maintain building systems may result in building components reaching the end of their useful service lives prematurely, increasing risk of future hazards and maintenance costs. Decisions to repair or replace building components in future should not be made solely on the basis of this assessment. Any such actions taken based on this report are generally the responsibility of the Building Owner. As a general comment, we recommend the Building Owner consider more detailed reviews of each component and its condition prior to initiating its repair or replacement.
- 3.1.3.
- 3.1.4. This report has been prepared on behalf of Region of Peel and is for the exclusive internal use of Region of Peel. No other representations are made to any other parties and no other party may rely on this report without the express written permission of Entuitive. Any use a third party makes of this report, or any resulting reliance or decision made based on the information provided herein, is the responsibility of the third party. This report is the exclusive property of Entuitive and shall not be reproduced in whole or in part without the written consent of Entuitive.
- 3.1.5. This report must be read in its entirety. Failure to read this document in its entirety could unintentionally cause confusion or misunderstandings. Neither Entuitive nor its employees assume any responsibility for any interpretation of this report, or any extrapolation made from the report's contents.

We trust this is the information that you require at this time. We would be pleased to meet to further discuss our observations and recommendations. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

Sincerely,

3.1.6. Entuitive



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APPENDIX A
ISSUES LOG

Document Type	Sheet	Detail	Comments	Assigned To:	Status
Architectural Drawings, IFT, 2024/07/26	A041	R1, R2	ENT (BECx): Consider including a leak detection system for future water penetration testing (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A041	EW1, EW2, EW3, EW4, EW5, EW6, EW7, EW8, EW9, EW10, & EW11	ENT (BECx): For all rainscreen wall assemblies, recommend indicated minimum air gap for drainage at ventilation (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A041	R1	ENT (BECx): Indicate minimum depth of insulation.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A041	R2	ENT (BECx): Indicate minimum depth of insulation and target thermal performance of roof.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A041	AVBM-1, AVBM-2, AVBM-4, WPM-1, WPM-2, WPM-3	ENT (BECx): Recommend referencing spec section for all membrane types for better clarity (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A062	General Notes #2	ENT (BECx): Spec section 01 83 16 is not listed/included in the IFT specification manual. What is the target whole building air leakage requirement for the project. Architect to review and comment.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A109	3	ENT(BECx): Recommend providing section detail at roof hatch.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	7	ENT (BECx): Indicate parapet slope (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	7	ENT (BECx): Confirm method of sealing fasteners (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	7	ENT (BECx): Indicate membrane upturn height. Roofing flashing membrane to be 2-ply for better redundancy.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	6	ENT (BECx): It appears that membrane installed here will be bridging the open ends of the vertical mullions, recommend capping off vertical mullions (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	5	ENT (BECx): We assume there are weep holes for drainage and ventilation of the curtainwall system (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	4	ENT (BECx): Consider sloping to outside to promote positive drainage.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A451	4	ENT (BECx): Steel plate is forming a thermal bridge here, which could result in heat loss. Architect to review.	Architect	Open

Document Type	Sheet	Detail	Comments	Assigned To:	Status
Architectural Drawings, IFT, 2024/07/26	A452	7	ENT (BECx): We assume this is AVBM-2, heat resistant membrane below the metal coping. Architect to confirm (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A452	7	ENT (BECx): Indicate membrane upturn height. Roofing flashing membrane to be 2-ply for better redundancy.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A452	8	ENT (BECx): How is continuity of the AVB being achieved at fastener penetrations. Architect to review (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A453	2	ENT (BECx): It appears that membrane installed here will be bridging the open ends of the vertical mullions, recommend capping off vertical mullions to provide a sound substrate for the transition membrane (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A453	2	ENT (BECx): Architect to review if there is sufficient space for drainage and ventilation (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A453	3	ENT (BECx): We assume a dew point analysis was performed to verify that dew point condition occurs outboard of the roofing AVB membrane. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A453	3	ENT (BECx): Indicate flashing membrane overlaps onto field membrane (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A453	3	ENT(BECx): AVBM-3 is not indicated on DWG sheet A041.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A456	5	ENT (BECx): Recommend extending AVB as indicated	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A456	2	ENT (BECx): It appears that the membranes could be reverse lapped here. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A501	6	ENT (BECx): AVB membrane not shown on detail. We assume that this is a drafting error. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A501	3	ENT (BECx): It appears that AVBM-1 is lapping onto AVBM-4. Verify cross compatibility between interfacing membranes. Design team to review (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A501	15	ENT (BECx): How is continuity of the AVB being achieved at fastener penetrations? Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A551	1	ENT (BECx): There appears to be discontinuity if the AVB membrane here. We assume this is a drafting error. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A551	5	ENT (BECx): It appears that AVBM-1 laps onto AVBM-4. Verify cross compatibility between AVBM-1 and AVBM-4.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A551	7	ENT (BECx): How is continuity of the waterproofing membrane being achieved at penetrations. Architect to review.	Architect	Open

Document Type	Sheet	Detail	Comments	Assigned To:	Status
Architectural Drawings, IFT, 2024/07/26	A552	3	ENT (BECx): Verify if awning window is accessible here.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A552	4	ENT (BECx): AVB membrane appears discontinuous here. We assume this is a drafting error. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A552	6	ENT (BECx): There appears to be no slope in the roof here. There is a risk of pooling water and snow build-up here. Architect to review.	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A552	9	ENT: There is a risk of moisture collection within void. Consider filling void with a combination of grout and 50mm of pourable sealer. Consider flashing roof penetrations with liquid applied flashing (TYP.).	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A552	5	ENT (BECx): Consider capping top of HSS to prevent collection of moisture (TYP.)	Architect	Open
Architectural Drawings, IFT, 2024/07/26	A552	5	ENT (BECx): There is a risk of moisture collection below the roof membrane within the HSS. Consider filling HSS with a combination of grout and pourable sealer. Provide a weep hole above flashing membrane for drainage of incidental moisture within HSS.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	00 01 10	ENT(BECx): Recommend including spec section 01 91 15 - Building Envelope Commissioning.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	00 01 10	ENT (BECx): Spec section 07 00 05 not provided in IFT set. Section 08 63 00 also references this section.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	00 01 10	ENT (BECx): Recommend including a spec section for the air barrier system, which includes air barrier performance requirements, inspection and testing requirements, and parameters for whole building air tightness testing by a third party testing and inspection agency.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 13 26	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 13 26	ENT (BECx): We assume this warranty period meets requirements of the Region of Peel. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 13 26	ENT (BECx): Voltex DS is bentonite with a bonded polyethylene liner. This spec section is for modified bituminous sheet waterproofing membranes. Recommend changing this to Envirosheet waterproofing membrane by Cetco for consistency with the other specified products.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 13 26	ENT (BECx): Recommend including provisions for Pull Adhesion testing. Testing to be done to standard ASTM D4541-17 (if metals) or ASTM D7234-19 (if concrete) Testing requirements as per spec section 01 91 15 - Building Enclosure Commissioning.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 18 16	ENT (BECx): We assume this warranty period meets requirements of the Region of Peel. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): EPS? Or is this intended to be graphite polystyrene insulation? Indicate on drawings where EPS/GPS insulation is intended to be used on the project. Insulation types noted on DWG A041 do not list EPS/GPS insulation. Architect to review and comment.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): Indicate which insulation types are included here per insulation schedule on IFT Drawings A041 (TYP.)	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): Confirm that this insulation meets the strength requirements for this application.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): Recommend listing acceptable products or basis of insulation product for INS-2.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 00	ENT (BECx): Consider listing acceptable products for insulation adhesives and providing adhesion strength requirements/testing	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 19	ENT (BECx) Indicate on drawings where foamed in place insulation is intended to be used on the project. Insulation types noted on DWG A041 do not list foamed in place insulation. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 19	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 21 19	ENT (BECx): Should this be AVBM-1 as per spec section 07 27 14? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 26 16	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 26 16	ENT (BECx): VB-1 is not listed in the membrane schedule on A041. We assume this is intended to be VCM-2. Architect to coordinate with drawings.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	07 27 14	ENT (BECx): Should spec section 07 42 13 - Aluminum Composite Material Wall Panels, 07 42 19 - Solid Aluminum Plate Wall Panels, 07 44 36 - Glass Faced Rainscreen Wall, and 07 46 18 - Aluminum Interlocking Metal System be included as related sections? Architect to review.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 27 14	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 27 14	ENT (BECx): Recommend indicating frequency of qualitative/quantitative mock-up testing	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 27 14	ENT (BECx): Recommend indicating frequency of adhesion testing.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 27 14	ENT (BECx): Recommend including provisions for Pull Adhesion testing. Testing to be done to standard ASTM D4541-17 (if metals) or ASTM D7234-19 (if concrete) Testing requirements as per spec section 01 91 15 - Building Enclosure Commissioning.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 13	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 13	ENT (BECx): Is the intent to construct a performance mock-up of wall assembly EW-4/ EW-5? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 13	ENT (BECx): Recommend indicating frequency of water spray test.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 19	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	07 42 19	ENT (BECx): Is the intent to construct a performance mock-up of wall assembly EW-11? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 19	ENT (BECx): Recommend indicating frequency and extent of water spray test.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): Is the intent to construct a performance mock-up of wall assembly EW-6? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): Recommend indicating frequency and extent of water spray test.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): We assume this warranty period meets requirements of the Region of Peel. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT (BECx): Is the intent to construct a performance mock-up of wall assembly EW-10? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 42 46	ENT: This product is not specified on spec section 07 27 14. Architect to review and comment.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	07 46 13	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 46 13	ENT (BECx): We assume this warranty period meets requirements of the Region of Peel. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 46 13	ENT (BECx): Ensure that this is coordinated with 07 92 00	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 46 18	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 52 16	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 52 16	ENT (BECx): Consider including leak detection system for testing for water penetration and for pinpointing breaches. Consider Tru-Guard primer below roofing membrane, applied to insulation cover board. Architect to review.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 62 00	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 62 00	ENT (BECx): According to the membrane type schedule on DWG A041, high temperature resistant membrane is identified as AVBM-2. Architect to review.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	07 92 00	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	08 33 23.13	ENT (BECx): Recommend including air infiltration performance requirement for roll up doors to ensure successive results during whole building air leakage testing.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of quality assurance.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): We assume this warranty period meets requirements of the Region of Peel. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): What is the target thermal performance of operable windows and spandrel areas of the curtain wall? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): Is there a particular standard that should be used to determine condensation resistance? Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): INS-8 is not indicated on spec section 07 21 00 and is not listed under insulation types on DWG A041. Architect to review.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): Is there a minimum depth of insulation that is required to meet thermal performance requirements? Architect to review.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): We assume the operable component will be triple glazed	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): EG21 - Roof Monitors (Skylight?) appear to be operable windows as per detail 15/A052 of architectural drawings. Is the intent to use the same venting window frame specified herein on this section? If so, Architect to confirm if spec section 08 63 00 - Tubular Skylight is required for this project.	Architect	Open

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	08 44 13	ENT (BECx): Section not provided in IFT specification manual. Architect to review.	Architect	Open
		ENT (BECx): Recommend including provisions for field testing.		
		Testing to be done at 10%, 25%, 50%, and 75% of aluminum work installation completion.		
Architectural Specifications, IFT, 2024/07/26	08 44 13	Field calibrated nozzle testing done to AAMA 501.2-03 standard.	Architect	Open
		Chamber Air/Water penetration testing done to ASTM E783 and E1105 standards, respectively		
		Refer to spec section 01 91 15 - Building Enclosure Commissioning for additional requirements related to testing.		
Architectural Specifications, IFT, 2024/07/26	08 63 00	ENT (BECx): Architect to confirm if this spec section 08 63 00 is required. EG21 - Roof Monitors (Skylight?) appear to be operable windows as per detail 15/A052 of architectural drawings. which are specified on spec section 08 44 13 - Glazed Aluminum Curtain Walls. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 63 00	ENT (BECx): Recommend including provisions for Contractor to submit and utilize installation checklists as part of	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 63 00	ENT (BECx): Edit to indicate which warranty period applies	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 63 00	ENT (BECx): Spec section 07 00 05 not provided in IFT project specification manual. Architect to review.	Architect	Open
		ENT (BECx): Recommend including provisions for field testing.		
		Testing to be done at minimum one (1) skylight location.		
Architectural Specifications, IFT, 2024/07/26	08 63 00	Field calibrated nozzle testing done to AAMA 501.2-03 standard.	Architect	Open
		Chamber Air/Water penetration testing done to ASTM E783 and E1105 standards, respectively		
		Refer to spec section 01 91 15 - Building Enclosure Commissioning for additional requirements related to testing.		

Document Type	Section	Comments	Assigned To:	Status
Architectural Specifications, IFT, 2024/07/26	08 81 23	ENT: The glass makeup for GL1B is similar to GL1A. Architect to confirm why the CoG U-value for GL1B is higher compared to GL1A.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 81 23	ENT (BECx): Verify if dew point analysis was performed to confirm that there is no condensation risk with having a low-e coating on surface no.5. Architect to review and comment.	Architect	Open
Architectural Specifications, IFT, 2024/07/26	08 81 23	ENT (BECx): GL4 not listed as indicated on glass schedule on DWG A052. Architect to review and comments.	Architect	Open

APPENDIX B

SAMPLE CONSTRUCTION CHECKLIST

Annex M: Construction Checklists

Commentary: This annex is intended to provide information about checklists about the building exterior enclosure that are available from various sources. A number of these checklists are protected by copyright, so we are not re-producing them here. For such checklists we provide citations for the reader to use to obtain the checklists from the organizations that have published them.

In addition, we are including in sub-annexes selected pre-functional checklists that have been developed by members of the GL 3-2006 development committee. When applying the content provided in these sub-annexes the reader is encouraged to apply the checklist formats provided in Guideline 0-2005, Annex M. There are related test sub-annexes in Annex U below.

There are 3 sub-annexes to this annex that contain example construction checklists:

- M.1 – This sub-annex consists of 10 Construction & Industry Checklists compiled over time by McCarthy Building Companies, Inc. and assembled and formatted for this document by Bill Nash of McCarthy. These include:
 - (1) Construction & Industry Checklist for *Waterproofing*, 07100, Division 7, Thermal and Moisture Protection, Jan. 1, 2002.
 - (2) Construction & Industry Checklist for *EIFS*, 07240, Division 7, Thermal and Moisture Protection, Jan. 1, 2002.
 - (3) Construction & Industry Checklist for *Commercial Low Slope Roofing Systems*, 07500, Division 7, Thermal and Moisture Protection, Jan. 1, 2002.
 - (4) Construction & Industry Checklist for *Flashing and Sheet Metal*, 07600, Division 7, Thermal and Moisture Protection, Jan. 1, 2002.
 - (5) Construction & Industry Checklist for *Joint Sealers*, 07900, Division 7, Thermal and Moisture Protection, Jan. 1, 2002.
 - (6) Construction & Industry Checklist for *Entrances and Storefronts*, 08400, Division 8, Doors and Windows, Jan. 1, 2002.
 - (7) Construction & Industry Checklist for *Windows*, 08500, Division 8, Doors and Windows, Jan. 1, 2002.
 - (8) Construction & Industry Checklist for *Skylights*, 08600, Division 8, Doors and Windows, Jan. 1, 2002.
 - (9) Construction & Industry Checklist for *Glazing*, 08800, Division 8, Doors and Windows, Jan. 1, 2002.
 - (10) Construction & Industry Checklist for *Glazed Curtain Walls*, 08900, Division 8, Doors and Windows, Jan. 1, 2002.
- M.2 – Pre-functional Checklist for Building Envelope (Exterior Enclosure) System.
- M.3 – Pre-functional Checklist for Windows and Doors.

Credits: The following persons and organizations have provided materials for this annex and its sub-annexes:

- o Sub-annex M.1 has been provided by Bill Nash of McCarthy Building Companies, Inc.
- o Sub-annexes M.2 and M.3 have been provided by H. Jay Enck of Commissioning and Green Building Services (CxGBS).

M-1 Citations of Available Construction Checklists

The following is a list of citations of available construction checklists from other sources, organized by type of element of the building exterior enclosure.

Good Painting Practice: SSPC Painting Manual. The Society for Protective Coatings. Vol. 1, 4th ed. P. 545-551.

Manual for Inspection and Maintenance of Build-Up and Modified Bitumen Roof Systems: A Guide for Building Owners. Asphalt Roofing Manufacturers Association and National Roofing Contractors Association. P. 16-22.

Masonry Inspection Checklist. TMS Construction Practices Committee. The Masonry Society, Boulder, CO. 2004.

Portland Cement Plaster Stucco: Resource Guide. Northwest Wall & Ceiling Bureau. P. 178-183.

Annex M.1: Ten Example Construction & Industry Checklists

Commentary: This sub-annex provides 10 examples of Construction & Industry Checklists compiled over time by McCarthy Building Companies, Inc. and assembled and formatted for this document by Bill Nash of McCarthy. The 10 example checklists are intended to provide generic resources that the user may adapt to fit the needs of specific projects. In developing checklists for specific projects the user is encouraged to use the formats recommended in ASHRAE Guideline 0-2005.

The 10 generic checklists provided in this sub-annex are:

1. Construction & Industry Checklist for *Waterproofing*, 07100, Division 7, Thermal and Moisture Protection.
2. Construction & Industry Checklist for *EIFS*, 07240, Division 7, Thermal and Moisture Protection.
3. Construction & Industry Checklist for *Commercial Low Slope Roofing Systems*, 07500, Division 7, Thermal and Moisture Protection.
4. Construction & Industry Checklist for *Flashing and Sheet Metal*, 07600, Division 7, Thermal and Moisture Protection.
5. Construction & Industry Checklist for *Joint Sealers*, 07900, Division 7, Thermal and Moisture Protection.
6. Construction & Industry Checklist for *Entrances and Storefronts*, 08400, Division 8, Doors and Windows.
7. Construction & Industry Checklist for *Windows*, 08500, Division 8, Doors and Windows.
8. Construction & Industry Checklist for *Skylights*, 08600, Division 8, Doors and Windows.
9. Construction & Industry Checklist for *Glazing*, 08800, Division 8, Doors and Windows.
10. Construction & Industry Checklist for *Glazed Curtain Walls*, 08900, Division 8, Doors and Windows.

Credits: Bill Nash of McCarthy Building Companies, Inc. had provided materials for this sub-annex including those adapted from the following sources:

7100 – Waterproofing – Western Waterproofing

7240 – Exterior Insulation Finish System (EIFS) - Robert Thomas

7500 – Roofing – National Roofing Contractors Association - NRCA

8400,8500,8800,8900 – American Architectural Manufacturers Association - AAMA

M.1-1 *Waterproofing Checklist, 07100*

(Construction & Industry Checklist for Waterproofing, 07100, Division 7, Thermal and Moisture Protection)

1. Verify product specified is appropriate to site conditions.
2. Verify subcontractor is authorized by manufacturer to apply product.
3. Verify exposed areas have been masked to protect adjacent work and property.
4. Verify that acceptable weather conditions are present for application (above 40 deg F, not damp or foggy, depending on material used).
5. Verify surfaces are primed, if required.
6. Provide applicator with substrates that are free of standing water, dirt and debris, loose material, voids and protrusions or deformations, which may inhibit application or performance of waterproofing.
7. If waterproofing application will be setup on bare ground, provide sub grades that are stable, smoothed and compacted to minimum 85 percent modified proctor density.
8. If waterproofing will be installed on earth retaining system, fill gaps and voids in earth retaining system to conform to waterproofing manufacturer's requirements; remove nails in wood lagging.
9. If waterproofing will be installed on concrete and/or masonry, provide substrates that are free of voids deeper than 3/8" and free of surface protrusions more than 1/4" above the surface.
10. If waterproofing will be installed on concrete footings, provide wood float or better finish to surfaces scheduled to receive the vapor-protective waterproofing.
11. If waterproofing will include bentonite water stop strips, provide concrete surfaces as required for that installation.
12. Verify laps between membrane sheets are consistent with approved details (flashings, changes of plane in membrane showing overlap, etcetera).
13. Verify joinery between each day's work is adequate.
14. Verify that interstitial moisture is not present.
15. Verify that stored materials are protected against moisture.
16. Verify proper fasteners and adhesives are used.
17. Verify that membrane is applied smooth without buckles or "fish mouths".
18. Rigidly install penetrations of vapor-protective waterproofing for detailing procedures.
19. Take appropriate protective measures to ensure that finished work is not penetrated or damaged by other trades.
20. Verify that proper ventilation is being maintained during application of waterproofing utilizing chemicals and solvents.
21. Verify that subcontractor has properly disposed of excess materials in compliance with EPA and OSHA requirements.

22. Ensure pipes, ducts, conduits, and other items penetrating membrane are watertight.
23. Verify proper coverage and quantities of materials such as mil thickness.
24. Verify protective covering is provided and installed as required and backfilling takes place immediately, and the covering remains in place during backfilling.
25. Perform field water testing of the completed installation wall penetrations prior to backfill operations

M.1-2 EIFS Checklist, 07240

(Construction & Industry Checklist for EIFS, 07240, Division 7, Thermal and Moisture Protection)

1. Verify flashing has been installed at windows- head, sills, jambs, doors, roof, louvers, and parapets.
- .
2. Mesh may not be stapled. It is to be embedded in the PB base coat.
3. Must tent and heat if under 40 degrees for 24 hours. Check the manufacturers recommendations from specific systems and their individual product components. Proper storage of materials is critical.
4. Must install the expansion joints out to edge, you do not want them built over.
5. Every 75 lineal feet needs a control joint.
6. Back wrapping is required for all EIFS.
7. EIFS must not be installed below grade.
8. Ganged penetrations are preferred in lieu of multiple close-together penetrations that will weaken the EIFS.
9. Warranty must be identified in bid documents.
10. Expansion joints are required at all floor lines.
 - Sealant joints must be made to the base coat, never to the finish topcoat.
 - Materials for a wall system must be sourced from an assembly of a system with specifically lab-tested materials. Materials must be a tested system.

The checklist below is for use while installing a Type PB EIFS. Its purpose is to alert you to key issues that need to be looked-into while the work is being done.

General:

11. Coverage rates for materials.
12. Safe access to wall (scaffold, swing stage).

13. Weather during entire application period.
14. Availability of water, electrical power.
15. Coordination with other trades (windows, sealants, masonry, metal panels, roofing.)
16. Warranty issues.
17. Construct a mock up of the EIFS wall assembly complete with flashings, penetrations, terminations and water test

Substrate:

18. Type
19. Flatness and "straightening" of surface.
20. Structural soundness and general condition.
21. Presence of surface coatings and removal thereof.
22. Removal of projections, existing windows, utilities, and so on.

EPS:

23. Density, bagged shipped.
24. Board size and thickness (2x4). Rasping required prior to base coat application.
25. Flatness and squareness.
26. Fusion of beads.
27. Approved EPS supplier
28. Third party listing and labels.
29. Patterns for making foam shapes.

Attachment Adhesive:

30. Type
31. Condition
32. Type and condition of Portland Cement. Premixed material is preferred; field mixing is not an acceptable method.

Preparing Attachment Adhesive:

33. Tools and mixing technique.
34. Proper cement/adhesive ratio.

Putting Adhesive on EPS:

35. Pattern
36. Quantity

Attaching EPS:

- 37. Planeness of outside surface.
- 38. Tightly abutted EPS joints are a requirement.
- 39. Adhesive or basecoat between board ends is not permitted.
- 40. "L"-shaped pieces at corners of openings, per EIMA.
- 41. Running bond pattern of EPS boards per EIMA.
- 42. Interlocking of EPS boards at corners per installation procedures per installation procedure/ EIMA.
- 43. Bonding of foam shapes to the substrate.

Curing of Attachment Adhesive:

- 44. Temperature, weather, and protection.

Adhesive:

- 45. Type and condition.
- 46. Mixing tools and technique.
- 47. Maintenance of adhesive/cement ratios.

Inspection of Surface of EPS:

- 48. Repair damage, if any.
- 49. Gaps between board ends are not permitted. Must be properly filled with EPs not base coat.
- 50. Plane-ness/sanding, rasping is a must prior to base coat installation of EPS surface.

Preparation of EPS for Base Coat:

- 51. Routing of aesthetic grooves.
- 52. Adding foam shapes to EPS.
- 53. Adding holes for penetrations.
- 54. Adding drip grooves and flashings.

Reinforcing Mesh:

- 55. Type, weight and coating per manufacturer and project specifications.
- 56. Cutting to size, proper minimum lap.per EIFS manufacturer

Applying Base Coat:

- 57. Temperature and weather conditions.

- 58. Thickness and full embedment of mesh. Mesh should not be visible either telegraphing thru or visually through the material.
- 59. Smoothness of outside surface of base coat.
- 60. Skim coating of outside of base coat.
- 61. Installing diagonal (45)° 'butterfly' meshes at all corners of openings is required.
- 62. Application of extra base coat layers only after first layer is cured per manufacturer's recommendations.

Curing of Base Coat:

- 63. Weather and protection.
- 64. Adequate time per manufacturer's recommendations.

Inspection of Base Coat:

- 65. Smoothness
- 66. Repair of damage (if any). Mesh must not be visible, neither color nor shape.

Preparing Finish Coat:

- 67. Proper color and type.
- 68. Mixing tools and technique.

Applying Finish Coat:

- 69. Adequate tools and manpower.
- 70. Weather and temperature conditions.
- 71. Matching to approved color/texture samples.
- 72. Tool and technique for getting finish onto wall.
- 73. Tool and technique for texturing the finish.
- 74. Details at terminations regarding sealant bonding. Sealants can only be installed on base coat, not on topcoat.

Drying of Finish Coat:

- 75. Temperature
- 76. Weather (rain, wind, relative humidity).
- 77. Temporary weather protection until building is closed-in. Protection from damage by other subcontractors.

Panels, General:

- 78. Coordination with other trades (built-in windows, and so on).
- 79. Tolerances of the building structural frame.

- 80. Floor space requirements for fabrication.
- 81. Availability of hoisting/ overhead crane for fabrication

Panels, Engineering:

- 82. PE stamped calculations, submittal, and approval/ shop drawings
- 83. Design of structural connections, including tolerances accommodation/ installation adjustability by PE.

Panels, Shop Drawings:

- 84. Ordering of materials (studs cut-to-length).
- 85. Dimensions taken from existing building instead of from drawings, actual field dimensions are required.
- 86. Submittal and approval of shop drawings.
- 87. Panel identification.
- 88. Erection sequence / plan
- 89. Panel-to-building connections- tolerances.
- 90. Panel lifting points and CG calculations.
- 91. Design of special rigging/ lifting fixtures.

Panels, Fabrication:

- 92. Use of welding fixtures.
- 93. MIG welding process.
- 94. Touching up of welds.
- 95. Use of bridging.
- 96. Checking dimensions.
- 97. Minimizing of movement of panels.
- 98. Access to panel surface for application of finish.
- 99. Curing of adhesives and finish.

Panels, Storage and Lifting:

- 100. Protection from weather and temperature.
- 101. Lifting process and special lifting fixtures.
- 102. Storage of panels at panel plant and on-site.

Panels, Transportation:

- 103. Stacking method - storage, transportation
- 104. Protection from weather, transportation to job site, tie-downs, delivery schedule

105. Off-loading sequence.

Panels, Erection:

106. Crane (type, crane "reach", capacity, availability, rigging), site access and layout.

107. Crew on grade and on building.

108. Alignment instruments, survey, story poles.

109. Protection until the building is closed-in.

110 Erection sequence/ schedule

Sealants

111. Verify all penetrations have been sealed.

111. Sealants can be flush or recessed.

112. Verify that type of sealant is what EIFS Manufacturer System approved.

113. How does sealant manufacturer evaluate, support and police its installers?

114. Does the EIFS manufacturer publish its own protocols for installing of sealant? Have you included them in your documentation?

115. Will the sealant manufacturer perform field tests (pull test) for elongation and adhesion for all substrates and interfacing materials?

116. Use certified skilled mechanics for installation of sealant system.

117. Follow sealant manufacturer's installation instructions.

118. Use fresh sealant materials that have arrived at the job site in their original unopened containers and are stored properly

119. Inspect joint for proper design in accordance with contract documents, manufacturer's recommendations, regarding: width, depth, location, substrate, and primers. Report discrepancies to architect and correct prior to installation of sealant system.

120. Make sure all joints are clean and free of foreign matter: moisture, dust, front, sealers, release agents and EIFS finish coat. Sealants are installed on base coat only.

121. Install sealant system only when climate conditions (temperature, humidity) are acceptable and meet sealant manufacturer's recommendations.

122. Protect adjacent materials from damage during installation. Be careful when using ladders, man lifts, and swing stages to install sealant to an EIFS system.

123. Allow all EIF products to cure fully prior to sealant application.

124. Apply coat of color coordinated EIFS recommended coating, or primer to wall of joint where only basecoat has been installed. DO NOT PUT FINISH COAT IN BOND LINE FOR SEALANT.

125. Install sealant primer, closed cell backer rod, or bond breaker tapes.

126. Remove any sealant primer over spill.

127. Mix sealant completely and according to instructions.

- 128. Use proper equipment, nozzles.
- 129. Tool the sealant properly. Soap tooling is not permitted.
- 130. Protect sealant from damage during curing.

Plan and Specification Review Prior to Bid/ Post Bid

- 1. Subcontractor site-specific safety plan to be submitted for approval – including hoisting, MSDS, aerial access operation by qualified personnel, stages, scaffolding, design by professional engineer (P.E.).
- 2. Dew Point Analysis conducted by A/E to determine if or where the dew point occurs in the wall system.
- 3. Require that the both the plans and contract specifications are in concert with the EIFS manufacturer specifications and with the detailed drawings for the wall system to be constructed.
- 4. Require that the shop drawings submitted be in accordance with EIFS manufacturer specifications and detailed system drawings.
- 5. Require that the shop drawings be detailed so that water penetration shall be prevented and so that damage will not occur to the composite wall assembly.
- 6. Proper substrate as recommended by EIFS manufacturer.
- 7. Proper flashing, trim, and accessories are specified and detailed in accordance with architect and EIFS manufacturer.
- 8. Minimum thickness is ¾" foam, maximum 4" foam.
- 9. Expansion joints properly located in accordance to EIFS manufacturer specifications and details. Shop drawings to include isometrics of the expansion joints, penetrations, terminations, flashings, end dams, fenestration openings – windows, doors, louvers, penetrations
- 10. Minimum width of expansion joint is specified and detailed in accordance with EIFS manufacturer and sealant manufacturer to allow for bond breaker/backer rod and the appropriate sealant contour.
- 11. Proper shop drawing detailing to prevent water penetration at dissimilar materials.
- 12. Proper shop drawing detailing of windows, including head and sill flashings, to prevent water penetration.
- 13. Drip details specified as required by EIFS manufacturer and contract documents.
- 14. EIFS should not be used as a parapet cap or windowsill.
- 15. Parapet is detailed to prevent water penetration and in accordance with EIFS manufacturer for flashing.
- 16. Proper transition from EIFS to roof base flashing to prevent water penetration in accordance with EIFS manufacturer.
- 17. Proper termination at concrete.
- 18. Proper termination above grade.
- 19. Proper detailing at foundation.

20. Contractor and supervision certification for system installation required.
21. Warranty called out.

Sheathing Substrate

1. Sheathing type.
2. Proper sheathing in accordance with project specifications, EIFS manufacturer and drawings.
3. Proper thickness.
4. Proper fastener type.
5. Proper fastener installation and spacing, including that the fasteners are installed per manufacturers recommendations for weather resistance
6. Butted tight and/or sealed per the sheathing manufacturer's recommendations.
7. Clean
8. Dry
9. Level/Plane.
10. Temporary protection provided when necessary.
11. Undamaged

Masonry Substrate

1. Porous
2. Free of efflorescence.
3. Unpainted
4. Free of release agents.
5. Clean surface.
6. Dry/Free of frost.
7. Plane to ¼" in 10'-0".
8. Undamaged

EIFS Material Inspection

9. Properly stored on jobsite.
10. Correct adhesive and manufacturer per contract.
11. Adhesive batch number recorded.
12. EPS in proper bags as delivered.
13. Insulation board certification attached.
14. Correct base coat material.
15. Base material batch number recorded.

16. Correct mesh, with type used recorded.
17. Correct finish coat material.
18. Finish batch number recorded.
19. Finish lot number recorded.

EPS/Adhesive Inspection

20. Substrate as specified. Manufacturer's technical representative or third party certified EIFS inspector should inspect completed substrate prior to EPS installation.
21. Proper mixing of adhesive. Premixed materials are preferred.
22. Proper adhesive pattern for specified substrate and type of adhesive.
23. Proper adhesive thickness for type used.
24. Full contact with substrate.
25. Proper temperature maintained during application and curing.
26. Insulation board minimum thickness of $\frac{3}{4}$ ".
27. Insulation boards butted tightly with no gaps.
28. Insulation boards installed flat and in correct pattern.
29. Gaps between insulation boards filled with slivers of insulation board. Adhesive and base coat not permitted to fill gaps.
30. Insulation joints staggered from sheathing joints.
31. Corners interlocked per detail.
32. Insulation board installed in running bond pattern.
33. Insulation board clean, dry, entire wall surface rasped flat and all rasping dust removed prior to base coat.
34. Minimum thickness of EPS board $\frac{3}{4}$ " maintained at bottom of aesthetic joints.
35. Yellowing of insulation board from extended exposure removed by adequate rasping.
36. All expansion and aesthetic joints installed.
37. EPS back wrapped at all terminations.
38. EPS back wrapped at all penetrations.
39. Proper space provided for the required width of sealant joints- review installation/ dimensions/ tolerances of adjacent materials.
40. Drip grooves where required.
41. Damaged insulation boards replaced.

Mesh/Base Coat Inspection

42. Proper mixing of base coat. Manufacturer's technical representative or third party certified EIFS inspector should inspect completed EPS prior to base coat application. Premixed materials are preferred.

43. High-impact mesh applied where required per contract documents.
44. High-impact mesh installed as first layer and butted tightly.
45. Diagonally reinforced with mesh at all window/door openings (butterfly).
46. Base coat mixture applied prior to embedding mesh.
47. Mesh lapped minimum 2 ½".
48. Reinforcing mesh fully embedded at all corners.
49. Mesh lapped minimum 8" at outside corners.
50. Reinforcing mesh fully embedded in aesthetic joints.
51. Base coat mixture applied to proper thickness.
52. Reinforcing mesh fully embedded with no mesh pattern showing.
53. Base coat mixture applied smoothly and free from trowel marks, etc.
54. All exposed edges of insulation board covered with reinforced mesh and base coat at all penetrations through system.
55. Proper temperature maintained during application and curing.

Finish Inspection

1. Lot numbers checked and recorded.
2. Reinforced base coat properly cured.
3. Reinforced base coat free of all irregularities.
4. Reinforced base coat clean, dry, and free from dust, dirt, efflorescence and other foreign materials.
5. Proper amount of clean potable water added consistently to all containers for mixing base coat.
6. Finish applied to proper thickness and per mock up.
7. Texture per approved sample and per mock up.
8. Sufficient manpower to finish distinct wall areas in deference to temperature conditions at the site
9. Wet edge maintained and cold joint prevented by proper planning.
10. Finish applied to all edges.
11. Finish is not applied where an expansion joint/sealant joint is installed.
12. Scaffolding installed at proper clear distance to permit EIFS installation to prevent scaffold damage to the EPS and finished EIFS.
13. Temperature monitored during installation and procedures implemented during application and curing to prevent cold joints, fully embed mesh, install laps, butterflies and other details.
14. Finish properly protected against rain after installation.
15. Flashing installed prior to completion of system application.

16. Sealant installed after wall system installed and cured to prevent water infiltration.

M.1-3 Commercial Low Slope Roofing Systems Checklist, 07500

(Construction & Industry Checklist for Commercial Low Slope Roofing Systems, 07500, Division 7, Thermal and Moisture.)

1. Verify the roofing subcontractor is installing the specified products and is installing the specified products in accordance with the manufacturer's written instructions.
2. Verify the roofing subcontractor is authorized by the manufacturer to install the products.
3. Verify the roofing materials are being stored in accordance with the manufacturer's recommendations.
4. Verify the roofing subcontractor is protecting its employees from fall hazards in accordance with applicable OSHA regulations.
5. Before roofing contractor is allowed to commence work verify that:
 - (a) Surfaces are free from foreign material.
 - (b) Excess mortar or concrete is removed; all holes, joints and cracks are pointed, and rough or high spots are ground smooth.
 - (c) Wood-nailers or other attachment conditions are adequate.
 - (d) Surfaces are dry to receive membrane heated asphalt, coal tar, and petroleum solvent asphalt mastics. Surfaces are tested for dampness if necessary.
 - (e) All materials to be used must be dry and dew free.
 - (f) Slope is as required. If roof surface does not have sufficient slope, contact architect.
 - (g) Pipes, conduits and other items penetrating the membrane are in place and ready to receive flashings.
 - (h) Open penetrations to have OSHA approved cover.
 - (i) All sheet metal and roof accessories are in place or on hand to be installed in conjunction with roofing as required.
6. Verify materials of types required are provided. Verify softening point of bitumen is as required. Verify materials are identifiable and comply with ASTM or FM standards. Verify roll roofing is stood on end and kept free of contact with earth or moisture. Verify protective coverings of stored roll roofing are vented so condensation will not occur.
7. Verify nails and fasteners are of length, shank, head, and coating as required.
8. Verify felts for use with asphalt are asphalt-saturated; felts for use with coal tar pitch are coal tar saturated.
9. Verify surface to receive roofing is primed or otherwise prepared if required.
10. Verify asphalt or pitch is not overheated. Check kettle thermometer. Verify methods to transport heated material are provided to avoid overcooling. Measure installation temperature, periodically. If asphalt is being used, heated requirement is EVT, plus or minus 25°F, at point of application (EVT – Equiviscous Temperature – is the temperature, at which asphalt will attain a viscosity of 125 centistokes which is the practical and optimum temperature for wetting and fusion at the point of application). This can be done visually

or with an infrared thermometer. In the event EVT information is not furnished by the manufacturer, the following maximum heating temperatures should be used as guidelines:

- (j) Dead Level Asphalt Type I 475°F maximum
 - (k) Flat Grade Asphalt Type II 500°F maximum
 - (l) Steep Grade Asphalt Type III 525°F maximum
 - (m) Special Steep Asphalt Type IV 525°F maximum
11. In no case should kettle or tanker be heated above flash point, if this occurs bitumen should be removed and not used. Final blowing temperature should not be exceeded for more than four hours.
 12. Roofing materials should not be applied unless correct bitumen application temperatures can be maintained. Ensure that the correct temperatures are maintained. Applications of BUR below 40 degrees require special guidelines; request these from the roofing materials manufacturer.
 13. Observe lap, mailing, and quantity of pitch or asphalt applied. In no case should felt touch felt; and there should be no bare spots.
 14. See that felts are laid so that each layer is free of air pockets, wrinkles, and buckles. Brooming may be required. Glass fiber felts should not be broomed. Do not allow "flopping" of roofing felts, except in the application of cap sheets. See that no felt touches felt. Verify mopping is full to ply lines.
 15. Phased application of a traditional BUR roof should be avoided. A four ply roof should have all four plies laid at once, not two and two. If a single or double ply is installed in an emergency to protect the insulation in a storm, it should be allowed to dry, and four plies applied over these.
 16. Verify all surfaces are kept moisture-free. Under no condition allow exposure of insulation or felts over night without a mopping. Verify stored material from moisture.
 17. When felt layer equipment is used, observe that jets are clear and an adequate and uniform layer of bitumen is deposited.
 18. Observe installation of roofing at cant strips, vertical surfaces, reglets, and penetration. Observe sealing of roofing membrane envelopes where use of envelope is required.
 19. Verify concrete walls to receive roofing are primed. Verify wall membranes are properly prepared and attached or fastened as specified.
 20. Observe aggregates for surfacing of type, color and size, specified, clean, and dry.
 21. Verify aggregates in quantity required are spread over flood coat while bitumen is hot.
 22. Verify roll roofing or cap sheet, if utilized, is of weight, selvage, finish, and color, as required. Verify cap sheet installed as required.
 23. Verify operations are performed in a manner to avoid plugging of drains, and weeps and do not damage or interfere with adjoining surfaces.
 24. Observe that roof drains are set to permit proper drainage.
 25. Verify roofing plies are mopped into clamping ring. Verify lead collar flashing is installed and stripped in, if required.

26. Verify roofing is protected from damage by other trades or by general contractor during installation and following completion. If subject to heavy traffic, movement of equipment, storage or materials, or used as a work surface, verify that runways, plywood sheets or other protection is provided.
27. Limit traffic on newly installed plies to minimize bitumen displacement. This can lead to blisters and leaks. This includes roofers until cooled.
28. While torching Atactic Polypropylene Modified bitumen (APP), do not torch directly to a flammable substrate (wood nailers, wood fiber cant, or flammable insulation).
29. When using a torch on an existing building, be aware the negative pressure can suck the flame through a crack and start a fire inside a wall or curb.
30. Observe and/or cut samples if required. Verify patching is properly performed where samples are cut. Samples are to be taken before finish surface (aggregate, cap sheet, emulsion) is applied.
31. Verify clean up is provided after installation, drains cleared and debris is removed from site.
32. Require submittal of shop drawings, MSDS sheets, technical data, site specific safety plan

Single Ply

1. Use sleepers and slip-sheets under all equipment.
2. Limit smoking, cutting, or hot work on roof, to avoid damage, and fires from flammable glues. Require hot work permits.
3. EPDM no moisture in seams of roof. "A clean seam is a good seam."
4. EPDM cold weather application is common, but not below or at freezing, due to newer glue formulations. Verify product specified is appropriate to site conditions.
5. Verify substrate temperature with an infrared thermometer at the start of each work shift.

M.1-4 Flashing and Sheet Metal Checklist, 07600

(Construction & Industry Checklist for Flashing and Sheet Metal, 07600, Division 7, Thermal and Moisture Protection)

1. Verify delivered material is of approved type, shape, gauge, metal, fabrication, and priming, as required, and all accessories are provided.
2. Verify isolation provisions are made for dissimilar metals. Do not allow copper and aluminum flashings to be in contact with each other or with ferrous metal. Copper or aluminum flashings are to be fastened with non-ferrous nails or screws. Ferrous equipment bases are not to be set on copper flashings. Verify that flanges embedded in plastic cement or asphalt are asphalt primed.
3. Verify expansion joints are provided and installed as required or as specified. Note location of joints with respect to drains, downspouts, scuppers, corners, and other outlets.
4. Observe methods of installation – nailing and cleating types for spacing and location; also soldering, welding, bolting, and riveting.
5. Verify flashing does not interfere with structural requirements.
6. Generally see that edge metal is lapped a minimum of 4 inches with 12 inches staggered nailing or fastening through the back flange unless otherwise required.
7. Verify all edge metal laps are coated with sealant on horizontal flange and vertical rise. Verify that coating covers the entire lap and is sandwiched between.
8. Verify lengths are as long as practical or specified.
9. Verify installation is coordinated with roofing and/or siding installation.
10. Verify that a nailer or cant strip is provided for fastening flashing to roof deck is of proper material, well secured, and allows venting if required or specified.
11. Verify flashing is embedded and installed over roof membrane assembly with additional roofing membrane material.
12. Verify method of anchoring lower edge of fascia is as required. Observe alignment, and stiffness.
13. Verify gravel stops are flush with deck unless otherwise required.
14. Construct mock-ups and field water test.

Gutters

1. Verify gutters are adequately supported and allow for movement. Observe attachment size, type, location, and spacing of hangers and supports.
2. Verify gutters are pitched if required and provide for drainage to outlets.
3. Verify gutter joints are lapped in direction of flow.
4. Verify expansion joints, concealed or standing, are provided midway between outlets or downspouts and/or as required.

5. Verify scuppers are installed low enough not to retain dam water on roof. Verify overflow drains and scuppers if indicated or required by code are provided, located properly, i.e., low point of roof, are of size required and have correct inlet flow elevation.
6. Verify accessories are provided if required – basket strainer, bird screens, and covers.

Downspouts

1. Verify lengths are as long as practical and in accordance with specifications.
2. Verify slip joints in direction of flow or allowance for movement is provided.
3. Verify hangers or straps as required are provided. Verify spacing and location are as required or specified, and each section is supported. Connection of hangers does not damage finish wall material.
4. Verify contact is not made with wall surfaces except for supports.
5. Verify downspouts are installed plumb, without excessive lateral or angled joints, unless indicated or if required to conduct drainage.
6. Verify special items are furnished: heads, scuppers, and linings.
7. Verify downspouts that are indicated to terminate in drainage lines are nearly fitted and are cleaned and free of building debris or other materials.

Base and Cap Flashings

1. Verify flashing is provided to suit condition - cant, size, gauge, and fabrication.
2. Verify base flashing extends up sufficiently; flange is properly secured and embedded at least 4 inches in roofing membrane and is installed similarly to gravel stops. Verify mopped felt or suitable membrane covering flashings or cleats is provided. It is good practice to cover as much metal as practical to avoid movement from temperature variations.
3. Verify seams are lapped, locked, and soldered as required.
4. Verify secure anchorage is provided for size, spacing, and fixing of cleats or other equipment mountings.
5. Verify cap flashings are of shapes, sizes, and gauges required and are installed to provide secure anchorage, allow movement, and have sufficient laps and spacing.
6. Verify counter flashing is extended sufficiently into masonry walls or into reglets and is securely anchored and caulked, if necessary.
7. Field water test – flashings, laps, terminations, caps

Other Roof Flashing

1. Verify hip and ridge flashing and venting is provided as required. Check fabrication, size, gauge, anchorage, and lap. Observe caulking and painting procedures.
2. Verify valley flashing is provided as required: open or closed, width, gauge, anchorage, and lap.

3. Verify stepped flashing is provided as required: depth of insertion into wall, and length of material attached to deck and lap. Verify plastic cement or approved material is filled into joints between edges of shingles and flashings as required.
4. Verify reglets are provided at required areas: observe the setting in concrete or masonry to assure firm anchorage. Verify reglets are protected to prevent deformation or filling during installation.
5. Observe installation of sheet metal into reglets for tightness, weatherproof ness, caulking, and lap.

Wall and Through Wall Flashing

1. Verify locations for flashings fabrication and design with contractor.
2. Verify lap, turn up, location in wall, depth in masonry, length, are as required.
3. Verify sill flashing and pans extend full depth, are turned up, extend beyond horns or 4 inches, and are installed for proper drainage.

Miscellaneous

1. Verify louvers and vents have adequate flanges and connections for anchorage and flashings are watertight against driving rains after installation. Verify insect screen, bird screen, and shutters are provided as required.
2. Review drawings and specifications for sheet metal items.
3. Items such as skylight, roof, hatches, and fans may be suited for installation with or without flashing. Verify installation meets manufacturers' specifications when required.
4. Verify plastic flashing is of type required and is installed in accordance with requirements.
5. Verify sheet metal termite shields are provided as required.

M.1-5 Joint Sealers Checklist, 07900

(Construction & Industry Checklist for Joint Sealers, 07900, Division 7, Thermal and Moisture Protection)

1. Verify product specified is appropriate to site conditions.
2. Verify subcontractor is authorized by manufacturer to apply product.
3. Is product compatible with substrate?
4. Has surface been properly prepared?
5. Is primer being used when required?
6. Is the proper sealant installation technique being used including application, bond breakers, field-testing, storage, shelf life, etc.
7. Depth should never be larger than width of caulk joint.
8. General rule: acid cure sealants are generally compatible with clear glass, metals, plastics, and painted surfaces (primer may be needed). These types of sealants release ace-

tic acid during cure. Not compatible with concrete, limestone, marble, lead, zinc, or substrates attacked by acetic acid.

9. Open cell backer rod must be removed if rained on.
10. Verify exposed areas have been masked to protect adjacent work and product.

Surface factors and preparation for concrete:

1. Can have the most variable surface conditions.
2. Formulation of concrete, curing conditions, moisture, and form releases.
3. Improper formulations can cause weak surfaces.
4. Weak surfaces may need sandblasting, grinding, or wire brushing.
5. Contaminated surfaces must be completely removed.
6. Every day of rain means two days to dry.
7. Moisture in or on surface difficult to detect.
8. May look and feel dry to the touch, but moisture may be in the core.
9. Moisture can form to frost below 32° F; frost will affect adhesion.
10. Frost may be minimized with solvent wipe to surface.
11. Sealant must be applied immediately after solvent evaporates.

Stone

1. Typically good surfaces for sealant adhesion.
2. Should always be checked for compatibility.

Glass

1. Typically excellent surface for sealant adhesion.
2. Always test for compatibility on coatings or laminates.
3. Surface preparation required prior to sealant installation.

Metals, Mill Finish Aluminum

1. Contains mill contaminants such as oil, graphite or carbon.
2. Can be difficult to clean and oxides easily.
3. Not approved for structural glazing applications.
4. Primer required for dynamic joint conditions.

Metals

1. Anodized aluminum typically provides excellent adhesion; test before if possible.
2. Typically does not require a primer.

3. Oils and airborne contaminants easily deposited on new construction.
4. Lead, copper, stainless, and galvanized use neutral cure sealants.
5. Unpainted steel or unprimed steel will rust causing sealant failure.
6. Always test for sealant compatibility and adhesion.

EIFS

1. Sealant must be applied to base coat of EIFS to resist softening due to water saturation of the topcoat.
2. EIFS is a difficult substrate to adhere to.
3. Be aware of failures related to breakdown of acrylic emulsion-based finish coats.
4. Backer rods should be non-gassing closed cell foam.
5. Low modulus silicone minimizes bond line stress and delamination.
6. All EIFS must be primed.
7. Base coat must be allowed to dry prior to sealant installation.
8. Sealant surface must be sound and free of moisture.
9. Always monitor and verify adhesion throughout sealant application.

Proper Use of Primer

1. Be sure specified primer is being used. Primers are not all identical.
2. Never dip brush or rag in original primer container.
3. Primer should be poured into a clean small container.
4. Apply with a natural brush or clean lint free cloths.
5. Fully wet surface with primer, do not puddle on horizontal.
6. Allow primer time to dry until tack free (5-15 minutes).
7. Primers should never be applied to glass.
8. Do not prime more than can be sealed in one hour (field) two hours (shop).

Back-Up Materials

1. Install backer rod to the depth specified, make sure depth is uniform.
2. Ensure primer is dry prior to backer rod placement.
3. Do not twist rods, for this will create a poor sealant profile.
4. Use correct size specified; not doing so can affect adhesion performance.
5. Always center backer rod or bond breaker tape in center of joint.
6. Typically open cell polyurethane rods are acceptable (but not with EIFS).
7. Only use closed cell (non-gassing) type polyethylene rods.

Proper Sealant Installation

1. Apply sealant making sure sealant is filling joint slot.
2. Make good contact to the sides of the joint; avoid skips and air pockets.
3. Slowly fill the bead slightly ahead of the nozzle travel.
4. Tool the sealant into the joint and force against the joint for proper adhesion and contact to substrate.
5. Where possible concave face of sealant to "hour glass" profile.
6. Do not use soap or cleaning solutions to tool sealants.
7. Tool sealant before it starts to skin over.
8. Remove masking tape prior to sealant starting to skin over.
9. Do not disturb sealant once applied in joint.
10. Do not pull sealants.
11. Always use white lint free cloths for clean up.

Post Application Adhesion Tests and Storage of Sealant

1. Verify sealant adhesion to all substrates.
2. Most sealants have a 6-24 month shelf life if stored properly.
3. Never use out of shelf life sealant.

M.1-6 Entrances and Storefronts Checklist, 08400

(Construction & Industry Checklist for Entrances and Storefronts, 08400, Division 8, Doors and Windows)

1. Field measure prior to installation.
2. Cross-reference all related submittals, as well as specifications and plans.
3. Know where interior items intersect storefront glazing, and how it will be handled.
4. Copy all information to all subcontractors involved.
5. Be aware of surrounding materials and the connections to the doors and frames.
6. Follow all manufacturers instructions.
7. Secure approval for all mock-ups or irregular instances ahead of time by the Architect.
8. RFI any discrepancies immediately.
9. Provide dollars to cover the cost for the extra care and handling involved in this section.
10. Consider other trades when scheduling the installation.
11. Allow for proper protection of the glazing from other trades.
12. Verify components or pre-assembled panels are checked for shipping damage after uncrating; and size, shape, thickness of metal extrusions or parts match full size details

when available. Check that gauges, patterns, and colors are as approved and match samples.

13. Verify protective coating and/or lacquers are provided to proper thickness.
14. Verify shop-applied sealant is provided at shop-assembled joints as required.
15. Verify field-applied sealant is provided as required.
16. Verify color matches between panels and parts are within specified range.
17. Verify dissimilar metals and materials are isolated; for example, aluminum, in contact with other metals and cementitious surfaces, may require nylon, polystyrene or pressure tape, separators or stainless steel bolts.
18. Verify field-applied sealant is of proper type and color and applied where required. Verify sealant joint widths are correct.
19. Verify expansion joints are provided between units as required.
20. Verify weep holes and drainage systems are provided and are clean before and after erection.
21. Verify installation tolerances are maintained regarding horizontal and vertical alignment and plumbness.
22. Verify reveals are of consistent size and alignment.
23. Verify anchorage to structure is secure for transfer of wind load and is required and permanently tightened after alignment.
24. Verify hardware provisions have been coordinated.
25. Verify electric or pneumatic outlets and locations, if required, are provided.
26. Verify exterior is maintained reasonably clean after installation. Clear all cementitious materials from surfaces.
27. Verify final cleaning is performed as required.
28. Verify doors, openings and space at doors allow for accessibility requirements. (ADA)
29. Conduct water test (hose test) of the installed assembly.
30. Obtain manufacturer's touch-up painting procedures
31. Field water test thresholds, flashings, end dams.

M.1-7 Windows Checklist, 08500

(Construction & Industry Checklist for Windows, 08500, Division 8, Doors and Windows)

1. Verify delivered windows are of type, size, finish, and operation as approved.
2. Verify windows are properly stored and clipped shut until hardware is installed.
3. Verify hardware is of required type, metal, finish, and function.
4. Verify special items are furnished, such as window cleaner's bolts, pull-down hooks, poles, special mullions, and trim.

5. Verify required type of glazing beads or stops are provided, and are suitable to receive glass and glazing thicknesses. Verify method of fastening is as required.
6. Verify windows are set plumb, square, and level in alignment and at proper location and elevation.
7. Verify windows have provision for suitable anchorage, and it is provided during installation. Verify windows are adequately braced where "built in".
8. Verify windows are sealed as required for metal-to-metal surfaces and other surfaces. Observe that solid grouting, caulking and backup are provided if required.
9. Verify finish is protected and maintained during and after installation. Observe that protection against cement, plaster, acids, and other harmful materials is provided.
10. Verify windows are installed to be weather tight. Observe that weeps are provided, if required, and are maintained in a clean condition.
11. Ensure dissimilar metals are isolated.
12. Verify windows are properly adjusted for tolerance, clearance, and operation before glazing.
13. Observe glazing operation. Verify type of sealant is as required and applied in accordance with instructions.
14. Verify cleaning of metals and glass is properly performed.
15. Verify that screens of proper type, mesh, and size are provided, if required and suit installation.
16. Test operable windows for hardware and friction adjustment and ease of operation on completion of installation.
17. Obtain detailed installation instructions from manufacturer.
18. Verify compatibility of sealants.
19. Obtain cleaning recommendations from manufacturer.
20. Perform field water test/ hose testing of flashings, end dams, sub sills, prior to window installation.
21. Obtain warranties.

M.1-8 Skylights Checklist, 08600

(Construction & Industry Checklist for Skylights, 08600, Division 8, Doors and Windows)

Skylights - General

1. Verify Manufacturers/ Installers qualifications.
2. Verify Manufacturers/ Installers warranty.
3. Verify schedule for installation / weather factors.
4. Prior to installation, verify support and adjacent construction is properly prepared to receive the work.

5. Verify all materials are free from defects and/or damage prior to installation.
6. Verify system is plumb and true in relation to established lines and approved shop drawings.
7. In a pressure plate system, verify horizontal pressure plates are embedded in silicone; not just caulked around.
8. Verify all fasteners are compatible with the skylight support/framing system.
9. Verify protection of completed work from abuse and foreign matter.
10. Ensure owner has received a copy of the warranty and cleaning/maintenance instructions.

Framework

1. Confirm anchorage of skylight to structure is in accordance with approved shop drawings.
2. Verify retainer bars are attached with gasketed stainless steel fasteners spaced at a maximum of 9" on center.
3. Verify maximum variation from plane or location shown on approved shop drawings in 1/8" per 12'-0" or 1/2" in the total length.
4. Ensure deflection of any framing member shall not exceed 3/4" within any glass panel.

Glass

1. Verify glass lites comply with the specifications.
2. Check glass labels for proper setting of lite and glass type.
3. If glass used is heat strengthened or tempered on the interior side, verify a screen has been installed within 100 mm. or 4" of the glass.
4. Ensure glass is resting evenly on setting blocks to avoid shear action.

Flashing

1. Sheet metal flashing should be shop formed in a minimum of 10'-0" or 3.04 m lengths.
2. Verify sheet metal flashing ends overlap a minimum of 6" – 8" and set in full bed of sealant.
3. Ensure flashing details should meet the standards of the National Roofing Contractors Association and/or SMACNA.
4. Field water test – flashings and end dams prior to installation of the skylight

Glazing Strips

1. Verify no visual cracks or breaks in glazing strips.
2. Interior glazing gaskets must maintain a 3/16" minimum separation between glass and frame.
3. Interior glazing gaskets must maintain a 1/2" minimum bite of glass.

Sealants

1. When backer rod is used, verify uniformity in the depth of the joint.
2. Verify all dirt, dust, moisture, and other foreign matter is removed from surfaces to receive sealant.
3. High performance silicone sealant is utilized at structural joints.
4. Verify allowable ambient temperatures for installation of sealants with an infrared thermometer.
5. Verify that the sealant is compatible and functional with the substrates.

Skylights with Integral Drainage Systems

1. If integral gutter system is utilized, verify positive drainage.
2. Verify weep/gutter is clear of caulking and/or debris.

Testing

1. Verify no water penetration when tested in accordance with the specifications. Water penetration is defined as the appearance of uncontrolled water other than condensation on the interior surface of any part of the skylight.
2. Air infiltration shall be limited to the specified allowance. ASTM E283-84 allows an infiltration rate of 0.23 cfm/m or 0.50 cfm/ft. under 11kPa or 1.57 psi of pressure.
3. Ensure adhesion tests have been submitted to verify adequate adhesion of sealant to samples of metal and glass to be used on the project.
4. Obtain aluminum extrusion test reports that verify the material meets industry standards for strength and chemical composition.

M.1-9 Glazing Checklist, 08800

(Construction & Industry Checklist for Glazing, 08800, Division 8, Doors and Windows)

Glazing - General

1. Verify types, thickness, quality, pattern, and finish of glass are as required and glass is labeled or otherwise identified.
2. Verify type, materials, and methods of glazing. Verify putty, glazing compound, tape, gasketing, glazier points, screws, shims, separators, beads, and special sections are as required.
3. Verify surfaces to receive glass are dry, clean, and properly prepared.
4. Verify wood and steel rabbets and beads are primed before glazing; lacquer and grease are removed from metals; and weathering steel is primed or otherwise prepared.
5. Verify required clearance between glass and frames is provided (extremely important for plastic panes).

6. Verify heat-absorbent glass has clean-cut edges. If altered at site, see that this condition is met.
7. Verify no alteration or attempt to alter size or edge of heat-strengthened, tempered, or insulating glass is made on job.
8. Verify glazing blocks and shims are provided for proper positioning and setting as required.
9. Verify embedding requirements, such as puttying and back puttying, use of points, and use of putty or compound are as required. Observe that corrosion-resistant fasteners are used. Verify glazing compound or sealant is applied in accordance with manufacturer's requirement, including proper rod stock material.
10. Verify plastic panes are protected with covering. Verify covering is removed after installation where exposed to sunlight. Verify plastic panes are protected from paint, tar, plaster, and solvents, and cleaning is performed in strict accordance with manufacturer's recommendations. Look for bubbles or scratches.
11. Verify patterned glass is set in exterior opening with smooth side to exterior. Verify pattern of adjacent panes is consistent.
12. Verify gasketing in metal sash is not painted.
13. Verify stop beads are securely fastened and non-removable types are used if required.
14. Verify interior glass is installed using required soundproofing methods and is otherwise vibration free.
15. Verify mirrors are installed using soundproofing methods required and is otherwise vibration free.
16. Verify requirements are met for maintaining labels and protective identification on glass until final cleaning.
17. Verify cleaning of glass is performed properly per the manufacturer's recommendations without scratches, and all surfaces are free of labels, putty, compounds, and paint.

M.1-10 Glazed Curtain Walls Checklist, 08900

(Construction & Industry Checklist for Glazed Curtain Walls, 08900, Division 8, Doors and Windows)

General

1. Verify components or pre-assembled panels are checked for shipping damage after uncrating. Verify size, shape, and thickness of metal extrusions or parts match full size details when available. Check that gauges, patterns, and colors are as approved and match samples.
2. Verify protective coating and/or lacquers are provided to proper thickness.
3. Verify joint sealer is provided at shop-assembled joints as required.
4. Verify shop-applied sealant is provided as and where required, including per the Laboratory tested mock up.
5. Verify sound deadening material and/or insulation is provided as required.

6. Verify color matches between panels and parts are within specified range.
7. Ensure dissimilar metals and materials are isolated; for example, aluminum, in contact with other metals and cementitious surfaces, may require nylon, polystyrene, or pressure tape, separators or stainless steel bolts.
8. Verify field-applied sealant is of proper type and color and applied where required.
9. Verify expansion joints are provided between units as required.
10. Verify weep holes and drainage systems are provided and are clean before and after erection.
11. Verify erection tolerances are maintained regarding horizontal and vertical alignment and plumbness.
12. Verify reveals and align are of consistent size.
13. Verify anchorage to structure is secure for transfer of wind load and is required and permanently tightened after alignment.
14. Verify debris, such as spray fireproofing, is removed from within curtain wall sections after erection.
15. Verify exterior is maintained reasonably clean after installation, especially free from cementitious materials.
16. Verify final cleaning is performed as required.
17. Obtain manufacturer's installation instructions.
18. Obtain manufacturer's cleaning instructions and touch up painting instructions.
19. Obtain warranty.
20. Perform field water testing (of the flashings, end dams, sub sills prior to installation) per the project specifications.

Construction Checklist

BUILDING ENVELOP SYSTEM

Components included: ___ unit masonry, ___ limestone veneer, ___ cast stone, ___ sheet metal flashing & trim, ___ roof, ___ joint sealants, ___ wood windows/doors

1. Submittal / Approvals

Submittal: The above components and systems integral to them are complete and ready for testing. The checklist items are complete and have been checked off only by parties having direct knowledge of the event, as marked below, respective to each responsible contractor. This construction checklist is submitted for approval, subject to an attached list of outstanding items yet to be completed. A Statement of Correction will be submitted upon completion of any outstanding areas. None of the outstanding items preclude safe and reliable functional tests being performed. ___ List attached.

Sealant Contractor	Date	Glazing Contractor	Date
Ext. Limestone Veneer Contractor	Date	Sheet Metal Contractor	Date
Masonry/Cast Stone Contractor	Date	Steel Fabricator	Date
General Contractor	Date	Roof Contractor	Date

Construction checklist items are to be completed as part of installation & initial checkout, preparatory to functional testing.

- This checklist does not take the place of the manufacturer's recommended checkout and installation procedures or reporting requirements.
- Items that do not apply shall be noted with the reasons on this form (N/A = not applicable, BO = by others).
- Contractors' assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.
- "Contr." column or abbreviations in brackets to the right of an item refer to the contractor responsible to verify completion of this item. A/E = architect/engineer, All = all contractors, CxA = commissioning agent, GC = general contractor, LVC = limestone veneer/sheet metal contractor, SC = sealant contractor, GLC = glazing contractor, UMC = masonry/cast stone/sheet metal contractor, RC = roof contractor, SMC = sheet metal contractor

Approvals: This filled-out checklist has been reviewed. Its completion is approved with the exceptions noted below.

Commissioning Agent	Date	Owner's Representative	Date
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2. Requested documentation submitted (filled out by CxA)

Building Envelope Component-> Check	Masonry	Limestone Veneer/ Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Manufacturer's cut sheets								
Installation details								
Manufacturer's requirements								
Shop drawings showing attachment and details grills & louver								
Architect of record has reviewed installation to see that placement is consistent with original design.								
Building envelop structural engineer of record has reviewed concentric connections between limestone and embeds and issued a letter of acceptance.								

- Documentation complete per contract documents for given trade..... YES NO

3. Installation Checks (filled out by contractor)

Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____

Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
General Installation								
Building envelope component completed and cleaned per contract documents								GC
Dampproofing								
CMU are dry, free of dirt and excess mortar, sand and other construction debris before application of primer								UMC
Outside temperature is above 40 F during application of dampproofing								UMC
Dampproofing is 6-10 mils and pin hole free								UMC



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Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Rigid Insulation								
CMU is plumb, level, true to line, and is free of obstructions that would inhibit good adhesion of insulation in dampproofing cement								UMC
Dampproofing is cured and ready for Insulation installation								UMC
Rigid insulation is securely bonded to CMU prior to exterior finish installation								UMC
Rigid insulation joints are tightly butted to minimize moisture collection between joints								UMC
Roof								
Substrates and conditions under which ice & water shield are to be installed are dry, free of debris and satisfactory								RC
Ice & water shield lapped over flashing per contract documents								RC
Modified bitumen membrane laps per contract documents								RC
Cant strip installed at horizontal/vertical intersections per contract documents								RC
Metal flashing surfaces are dry, clean, free of grease, oil, dirt, and corrosion, and without sharp edges or offsets at joints.								RC
Lap joints are sealed in accordance with contract documents								RC
Flashing is installed in accordance with contract documents								RC
Limestone veneer								
Limestone is not discolored by contaminates								LVC
Anchors, dowels, fastenings, and hoisting fittings are properly installed Units are in good condition: not warped, distorted cracked, stained or otherwise damaged								LVC
Rigid insulation is securely bonded to CMU								LVC
Rigid insulation joints are tightly butted to minimize moisture collection between joints								LVC
Flashing is installed in accordance with contract documents								LVC
Grouted joints are 3/8" ± 1/16" or less in width								LVC



Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Limestone is within specified tolerances 1/2" total height								LVC
Limestone corners are within specified tolerances 3/8" total height								LVC
Limestone within 1/4" of plumb in 10 ft								LVC
Limestone is within 1/4" of level in 20 ft, 1/2" in total run								LVC
Limestone is within 1/4" of position or cross sectional dimension								LVC
Corner alignment of adjacent panels are within ± 1/32"								LVC
Steel anchors and attachments are in good condition								LVC
Limestone attachments are in line with structure attachment								LVC
Sufficient clearance between non grouted components to allow for proper backing rod and sealant installation								LVC
Cavity weep tubes are installed at sills, relieving angles, door and window heads, and embed joints								LVC
Horizontal weeps are at 5' centers or less, vertical cavity weeps at 20' or less								LVC
Weep holes are open and free of debris								LVC
Cast Stone								
Cast Stone is not discolored by contaminates								UMC
Anchors, dowels, fastenings, and hoisting fittings are properly installed. Units are in good condition: not warped, distorted, cracked, stained or otherwise damaged								UMC
Rigid insulation is securely bonded to CMU prior to placement of stone								UMC
Rigid insulation joints are tightly butted to minimize moisture collection between joints								UMC
Flashing is installed in accordance with contract documents								UMC
Horizontal substrate is clean and free of debris prior to placement of drainage mat & waterproofing								UMC
Drainage mat and water proofing are installed according to contract documents								UMC



Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Vertical joints are 1/4" unless otherwise indicated in contract documents								UMC
Cast Stone is within specified tolerances $\pm 1/8$ " total height or width or length up to 2 ft								UMC
Cast Stone is within specified tolerances $+1/16$ ", $-1/8$ " total length 2 ft to 5 ft								UMC
Cast Stone is within specified tolerances $+1/8$ ", $-3/16$ " total length 5 ft to 10 ft								UMC
Cast Stone is within specified edge out of line tolerance of $\pm 1/8$ " per 10 ft, 1/4" maximum								UMC
Cast Stone corners are within specified tolerances 3/8" total height								UMC
Opening size $\pm 1/2$ "								UMC
Opening location $\pm 1/2$ "								UMC
Steel anchors and attachments are in good condition								UMC
Cast Stone attachments are in line with structure attachment								UMC
Ends of lugged sills and similar units are embed in mortar								UMC
Joints are raked to 3/4" from face for pointing								UMC
Sufficient clearance between non grouted components to allow for proper backing rod and sealant installation								UMC
Excess mortar has been sponged off face								UMC
Rake joints have been allowed to set before application of pointing mortar								UMC
Cavity weep tubes are installed per contract documents								UMC
Weep holes are open and free of debris								UMC
Sheet metal flashing and trim								
Substrates and conditions under which sheet metal flashing and trim are to be installed are satisfactory								UMC LVC
Sheet metal complies with at least minimum specified thickness, weight, and grade.								UMC LVC



Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Exposed sheet metal is without excessive oil canning, buckling, and tool marks and is true to line and levels indicated, with exposed edges folded back to form hems.								UMC LVC
Surfaces were cleaned with no oils or foreign matter prior to sealing or joining together								UMC LVC
Lap joints are sealed in accordance with contract documents.								UMC LVC
Flashing between CMU & exterior finish is embedded in dampproofing and securely fastened								UMC LVC
Joints have been filled with sealant and metal formed to conceal sealant.								UMC LVC
Nonmoving seams in sheet metal and aluminum are fabricated with flat-lock seams								UMC LVC
Brick								
Brick color and texture matches mock-up								UMC
Anchors are properly installed								UMC
Rigid insulation is securely bonded to CMU								UMC
Rigid insulation joints are tightly butted to minimize moisture collection between joints								UMC
Flashing is installed in accordance with contract documents								UMC
Mortar color matches mock-up								UMC
Anchors and attachments are in good condition and correctly spaced								UMC
Brick is within ¼" of plumb in 10' and within 3/8" per floor, and within ½" from base to roof line								UMC
Control joints are 25' or less apart								UMC
Sufficient clearance between non grouted components to allow for proper backing rod and sealant installation								UMC
Cavity weep tubes are installed at sills, relieving angles, door and window heads, and imbed joints								UMC
Horizontal weeps are at 2' centers or less, vertical cavity weeps at 20' or less								UMC
Weep holes are open and free of debris								UMC



Check Building Envelope Components ->	Masonry	Limestone Veneer/Cast Stone	Sheet metal	Sealants	Glazing	Steel	Roof	Contr.
Joint sealants								
Joints are sufficiently spaced to allow proper application of backing and sealant								SC
Backing material has been installed in accordance with sealant manufacturer's requirements.								SC
Materials delivered in original containers or bundles with labels showing manufacturer, product name or designation, color, shelf life, and installation instructions.								SC
Joints are completely filled.								SC
Full contact is made with bond surfaces and there is a minimum 3/8" width adhesion area.								SC
Surfaces are clean and dry prior to application of sealant								SC
Non-sag sealants have been tooled to smooth surface								SC
Surfaces adjacent to joints are clean								SC
Sealant has cured according to manufacturer's recommendations and is ready for testing.								SC
Grills & Louvers								
Rough or masonry opening is correct and sill plate is level.								SMC
Grills/louvers are plumb, level, and true to line								SMC
Sill members and other members have been set in a bed of sealant or with joint fillers or gaskets to provide weather tight construction.								SMC
Final								
Report completed with this checklist attached								GC
Finished surfaces are clean and not discolored.								GC
Exterior wall has been cleaned in accordance with contract documents within 48 hours of substantial completion date								GC

- **The checklist items of Part 3 are all successfully completed for given trade.** ___ YES ___ NO



4. Operational Checks (These augment mfr's list. This is not functional performance testing.)

Check Building Envelope Components->	Masonry	Limestone Veneer	Sheet metal	Sealants	Windows	Glazing	Contr.
All seals and joints are tight.							GC
System is waterproof as specified.							GC
Brick, limestone, cast stone are clean.							GC
Cavity drains remove moisture effectively preventing water build-up in the cavity.							GC

- **The checklist items of Part 4 are all successfully completed for given trade.** ☐ **YES** ☐ **NO**

END OF CHECKLIST



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Annex M.2: Example Construction Checklist for Building Envelope System

Commentary: This sub-annex provides an example of a construction checklist for the building envelope (exterior enclosure) system.

Credits: The example checklist contained on the following pages has been provided by H. Jay Enck of Commissioning and Green Building Services (CxGBS).

Annex M.2: Example Construction Checklist for Building Envelope System

Commentary: This sub-annex provides an example of a construction checklist for the building envelope (exterior enclosure) system.

Credits: The example checklist contained on the following pages has been provided by H. Jay Enck of Commissioning and Green Building Services (CxGBS).

Construction Checklist

WINDOWS & DOORS

Components included: ___unit masonry, ___sheet metal flashing & trim, ___joint sealants, ___wood windows/doors, ___glazing, ___limestone veneer, ___brick/cast stone

1. Submittal / Approvals

Submittal: The above components and systems integral to them are complete and ready for functional testing. The checklist items are complete and have been checked off only by parties having direct knowledge of the event, as marked below, respective to each responsible contractor. This prefunctional checklist is submitted for approval, subject to an attached list of outstanding items yet to be completed. A Statement of Correction will be submitted upon completion of any outstanding areas. None of the outstanding items preclude safe and reliable functional tests being performed. ___ List attached.

_____	_____	_____	_____
Masonry Contractor	Date	Glazing Contractor	Date
_____	_____	_____	_____
Interior Contractor	Date	Limestone Contractor	Date
_____	_____	_____	_____
Security Contractor	Date	Sealant Contractor	Date
_____	_____		
General Contractor	Date		

Construction checklist items are to be completed as part of installation & initial checkout, preparatory to functional testing.

- This checklist does not take the place of the manufacturer's recommended checkout and installation procedures or reporting requirements.
- Items that do not apply shall be noted with the reasons on this form (N/A = not applicable, BO = by others).
- Contractors' assigned responsibility for sections of the checklist shall be responsible to see that checklist items by their subcontractors are completed and checked off.
- "Contr." column or abbreviations in brackets to the right of an item refer to the contractor responsible to verify completion of this item. A/E = architect/engineer, All = all contractors, GC = general contractor, LVC = limestone veneer/sheet metal contractor, UMC = masonry /sheet metal contractor, SC = sealant contractor, GLC = glazing contractor, contractor CxA = commissioning agent, SCC = Security contractor

Approvals. This filled-out checklist has been reviewed. Its completion is approved with the exceptions noted below.

_____	_____	_____	_____
Commissioning Agent	Date	Owner's Representative	Date



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2. Requested documentation submitted (filled out by CxA)

Windows & Doors Component-> Check	Hardware	Sheet metal	Sealants	Windows & Doors	Framing	Jam & Threshold	Contr.
Manufacturer's cut sheets				Y			GC
Installation details		Y	Y	Y	Y		GC
AAMA 101 -97 test report by an independent laboratory for each window model and door configuration				Y			GC
ASTM E 330 test report by an independent laboratory for each window model				Y			GC
Shop drawings showing attachment and details							GC

- Documentation complete as per contract documents for given trade..... ☐ YES ☐ NO

3. Installation Checks (filled out by contractor)

Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____
 Location: _____ Elevation _____ Floor; _____ From grid line _____ to grid line _____

Check Windows & Doors Components ->	Hardware	Sheet metal	Sealants	Glazing	Framing	Jams & Thresholds	Contr.
General Installation							
Exterior windows & door components completed and cleaned per contract documents							GC
Sheet metal flashing							
Substrates and conditions under which sheet metal flashing and trim are to be installed are satisfactory							UMC LVC GLC
Sheet metal complies with at least minimum specified thickness, weight, and grade.							UMC LVC GLC
Lap joints are sealed in accordance with contract documents.							UMC LVC GLC
Surfaces were cleaned with no oils or foreign matter prior to sealing or joining together							UMC LVC GLC
Joints have been filled with sealant per contract documents.							UMC LVC GLC
Windows							
Color, quality and finish are with acceptable color range							GLC



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Check Windows & Doors Components ->	Hardware	Sheet metal	Sealants	Glazing	Framing	Jams & Thresholds	Contr.
Window units are plumb, level, and true to line, without warp or rack of frames or sash. Proper support is provided and units are anchored securely in place.							GLC
Masonry surfaces are dry and free of excess mortar, sand and other construction debris.							GLC
Rough or masonry opening is correct with required clearance for proper installation of window							GLC
Metal surfaces are dry, clean, free of grease, oil, dirt, and corrosion, and without sharp edges or offsets at joints.							GLC
Sill members and other members have been set in a bed of sealant or with joint fillers or gaskets to provide weather tight construction.							GLC SC
Weeps are installed per construction documents							GLC SC
Weep holes are open and free of debris or blockages							UMC LVC GLC
Opening mechanism is installed							GLC
Security contacts are installed and function correctly							SCC
Joint sealants							
Windows are placed so that backer rod and sealant have sufficient bearing surface for proper adhesion and sealant reinforcement.							SC
Backing material has been installed in accordance with sealant manufacturer's requirements.							SC
Materials delivered in original containers or bundles with labels showing manufacturer, product name or designation, color, shelf life, and installation instructions.							GC SC
Surfaces are clean and dry prior to application of sealant							SC
Joints are completely filled.							SC
Nonsag sealants have been tooled to smooth surface							SC
Surfaces adjacent to joints are clean							SC
Sealant has cured according to manufacturer's recommendations and is ready for testing.							SC
Window Glazing							
Each unit is permanently labeled on spacer or on one pane.							GLC



Check Windows & Doors Components ->	Hardware	Sheet metal	Sealants	Glazing	Framing	Jams & Thresholds	Contr.
Visual characteristics, such as pattern, bow, and roll wave distortion are uniform.							GLC
Temporary labels have been removed. No tape or labels have been applied to glazing.							GLC
Installed glazing is clean.							GLC
Wood Doors							
Color, quality and finish are with acceptable color range							GLC
Doors units are square, plumb, level, and true to line, without warp or rack of frames or sash. Proper support is provided and units are anchored securely in place.							GLC
Masonry surfaces are dry and free of excess mortar, sand and other construction debris.							GLC
Rough or masonry opening is correct with required clearance for proper installation of exterior doors							UMC LVC GLC
Metal surfaces are dry, clean, free of grease, oil, dirt, rust and corrosion, and welding slag, without sharp edges or offsets at joints.							GLC
Doors are plumb, level, and true to line, without warp or rack of frames or sash. Proper support is provided and units are anchored securely in place.							GLC
Jam members and thresholds members have been set in a bed of sealant or with joint fillers or gaskets to provide weather tight construction.							GLC SC
Interior drains adjacent to ADA thresholds are plumbed to drainage plane per contract documents Weep holes are open and free of debris or blockages							LVC GLC
Door Glazing							
Each unit is permanently labeled on spacer or on one pane.							GLC
Visual characteristics, such as pattern, bow, and roll wave distortion are uniform.							GLC
Temporary labels have been removed. No tape or labels have been applied to glazing.							GLC
Installed glazing is clean.							GLC



Check Windows & Doors Components ->	Hardware	Sheet metal	Sealants	Glazing	Framing	Jams & Thresholds	Contr.
Final							
Report completed with this checklist attached							GC
Finished surfaces are clean and not discolored.							GC

- **The checklist items of Part 3 are all successfully completed for given trade.** ___ YES ___ NO

4. Operational Checks (These augment mfr's list. This is not the functional performance testing.)

Check Windows & Doors Components->	Masonry	Limestone Veneer	Sheet metal	Sealants	Windows	Glazing	Contr.
All seals and joints are tight.							GC
System is waterproof as specified.							GC
Windows/doors and wood surfaces are clean. Hardware and other moving parts are lubricated.							GC
Windows/doors and hardware have been adjusted to operate smoothly and close tightly.							GC

- **The checklist items of Part 4 are all successfully completed for given trade.** ___ YES ___ NO

END OF CHECKLIST



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APPENDIX C
OWNERS TRAINING MANUAL

APPENDIX D
BECX SITE REVIEW REPORTS

APPENDIX E

LIST OF BECX REVIEWED SHOP DRAWINGS/SUBMITTALS

Section	Number	Revision	Title	Date Returned
07 00 05			Exterior Enclosure Performance Requirements - product data	
07 00 05			Exterior Enclosure Performance Requirements - shop drawings	
07 00 05			Exterior Enclosure Performance Requirements - samples	
07 00 05			Exterior Enclosure Performance Requirements - QA/QC submittals	
07 00 05			Exterior Enclosure Performance Requirements - reports/ certificates	
07 13 26			Self-Adhering Sheet Waterproofing - product data	
07 13 26			Self-Adhering Sheet Waterproofing - shop drawings	
07 13 26			Self-Adhering Sheet Waterproofing - samples	
07 13 26			Self-Adhering Sheet Waterproofing - certificates	
07 13 26			Self-Adhering Sheet Waterproofing - warranties	
07 13 26			Self-Adhering Sheet Waterproofing - quality control submittals	
07 21 00			Thermal Insulation - product data	
07 21 00			Thermal Insulation - certificates	
07 21 19			Foamed in Place Insulation - product data	
07 21 19			Foamed in Place Insulation - shop drawings	
07 21 19			Foamed in Place Insulation - samples	
07 21 19			Foamed in Place Insulation - certificates	
07 21 19			Foamed in Place Insulation - quality control submittals	
07 26 16			Under Slab Vapour Barriers - product data	
07 26 16			Under Slab Vapour Barriers - samples	
07 26 16			Under Slab Vapour Barriers - quality control submittals	
07 27 14			Self-Adhering Sheet Air Barriers and Vapour Retarders - product data	
07 27 14			Self-Adhering Sheet Air Barriers and Vapour Retarders - samples	
07 27 14			Self-Adhering Sheet Air Barriers and Vapour Retarders - quality control submittals	
07 42 13			Aluminum Composite Material Wall Panels - product data	
07 42 13			Aluminum Composite Material Wall Panels - shop drawings	
07 42 13			Aluminum Composite Material Wall Panels - samples	
07 42 13			Aluminum Composite Material Wall Panels - reports	
07 42 13			Aluminum Composite Material Wall Panels - closeout submittals	
07 42 13			Aluminum Composite Material Wall Panels - warranty	
07 42 13			Aluminum Composite Material Wall Panels - quality control submittals	
07 42 19			Aluminum Plate Wall Panels - product data	
07 42 19			Aluminum Plate Wall Panels - shop drawings	
07 42 19			Aluminum Plate Wall Panels - samples	
07 42 19			Aluminum Plate Wall Panels - reports	
07 42 19			Aluminum Plate Wall Panels - closeout submittals	
07 42 19			Aluminum Plate Wall Panels - warranty	
07 42 19			Aluminum Plate Wall Panels - quality control submittals	
07 42 46			PER Cementious Panel Systems -product data	
07 42 46			PER Cementious Panel Systems - shop drawings	
07 42 46			PER Cementious Panel Systems - samples	
07 42 46			PER Cementious Panel Systems - closeout submittals	
07 42 46			PER Cementious Panel Systems - warranty	
07 42 46			PER Cementious Panel Systems- quality control submittals	
07 44 36			Glass Faced Rainscreen Cladding Systems - product data	
07 44 36			Glass Faced Rainscreen Cladding Systems - shop drawings	
07 44 36			Glass Faced Rainscreen Cladding Systems - samples	
07 44 36			Glass Faced Rainscreen Cladding Systems - closeout submittals	
07 44 36			Glass Faced Rainscreen Cladding Systems - warranty	
07 46 13			Steel Siding Panels and Soffits - product data	
07 46 13			Steel Siding Panels and Soffits - shop drawing	
07 46 13			Steel Siding Panels and Soffits - samples	
07 46 13			Steel Siding Panels and Soffits - closeout submittals	
07 46 13			Steel Siding Panels and Soffits - warranty	
07 46 18			Aluminum Interlocking Metal Systems - product data	
07 46 18			Aluminum Interlocking Metal Systems - shop drawings	
07 46 18			Aluminum Interlocking Metal Systems - samples	

07 46 18	Aluminum Interlocking Metal Systems - closeout submittal
07 46 18	Aluminum Interlocking Metal Systems - warranty
07 52 00	Modified Bituminous Roofing - product data
07 52 00	Modified Bituminous Roofing - shop drawings
07 52 00	Modified Bituminous Roofing - samples
07 52 00	Modified Bituminous Roofing - reports and certificates
07 52 00	Modified Bituminous Roofing - closeout submittals
07 52 00	Modified Bituminous Roofing - warranty
07 52 00	Modified Bituminous Roofing - quality control submittals
07 62 00	Sheet Metal Flashing and Trim - shop drawings
07 62 00	Sheet Metal Flashing and Trim - samples
07 92 00	Sealants - product data
07 92 00	Sealants - samples
08 11 13	Steel Doors and Frames - product data
08 11 13	Steel Doors and Frames - shop drawings
08 11 13	Steel Doors and Frames - quality control submittals
08 33 23.13	High Speed Rollup Doors - product data
08 33 23.13	High Speed Rollup Doors - shop drawings
08 33 23.13	High Speed Rollup Doors - closeout submittals
08 33 23.13	High Speed Rollup Doors - warranty
08 33 23.13	High Speed Rollup Doors - quality control submittals
08 33 24	Overhead Coiling Doors - product data
08 33 24	Overhead Coiling Doors - shop drawings
08 33 24	Overhead Coiling Doors - closeout submittals
08 33 24	Overhead Coiling Doors - warranty
08 33 24	Overhead Coiling Doors - quality control submittals
08 44 13	Aluminum Work - shop drawings
08 44 13	Aluminum Work - samples
08 44 13	Aluminum Work - certificates
08 44 13	Aluminum Work - reports
08 44 13	Aluminum Work - closeout submittals
08 44 13	Aluminum Work - warranty
08 44 13	Aluminum Work - quality control submittals
08 44 13	Tubular Skylights - product data
08 44 13	Tubular Skylights - shop drawings
08 44 13	Tubular Skylights - certificates
08 44 13	Tubular Skylights - reports
08 44 13	Tubular Skylights - closeout submittals
08 44 13	Tubular Skylights - warranty
08 44 13	Tubular Skylights - quality control submittals
08 80 05	General Requirements for Glass and Glazing - product data
08 80 05	General Requirements for Glass and Glazing - samples
08 80 05	General Requirements for Glass and Glazing - certificates
08 80 05	General Requirements for Glass and Glazing - warranty
08 80 05	General Requirements for Glass and Glazing - quality control submittals
08 81 23	Exterior Glazing - product data
08 81 23	Exterior Glazing - samples
08 81 23	Exterior Glazing - certificates
08 81 23	Exterior Glazing - warranty
08 81 23	Exterior Glazing - quality control submittals
08 91 19	Fixed Louvres - product data
08 91 19	Fixed Louvres - shop drawings
08 91 19	Fixed Louvres - certificates
08 91 19	Fixed Louvres - quality control submittals

Note: At this time, this summary contains all relevant submittals from Architectural Project Specifications.

The final submittal list for BECx will only include relevant documents that have been requested to be reviewed by Entuitive.

APPENDIX F

SUMMARY OF MOCK-UP REVIEWS