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EIFS

Exterior Insulation and Finish Systems and the Building Code

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History of EIFS

- Developed in Europe after World War II
- Introduced in U.S.A. in 1969
  - First HUD Wood Frame Project in 1969 in New Bedford, MA
    - 1st EIFS Detail was expansion joint @ floor line in wood frame construction
- Equally significant, late 70's & 80's saw the growth of light gage metal framing.
- A major cladding in commercial construction. (25% in US) (40% in Germany & Switzerland - 80 % of those were retrofit applications)

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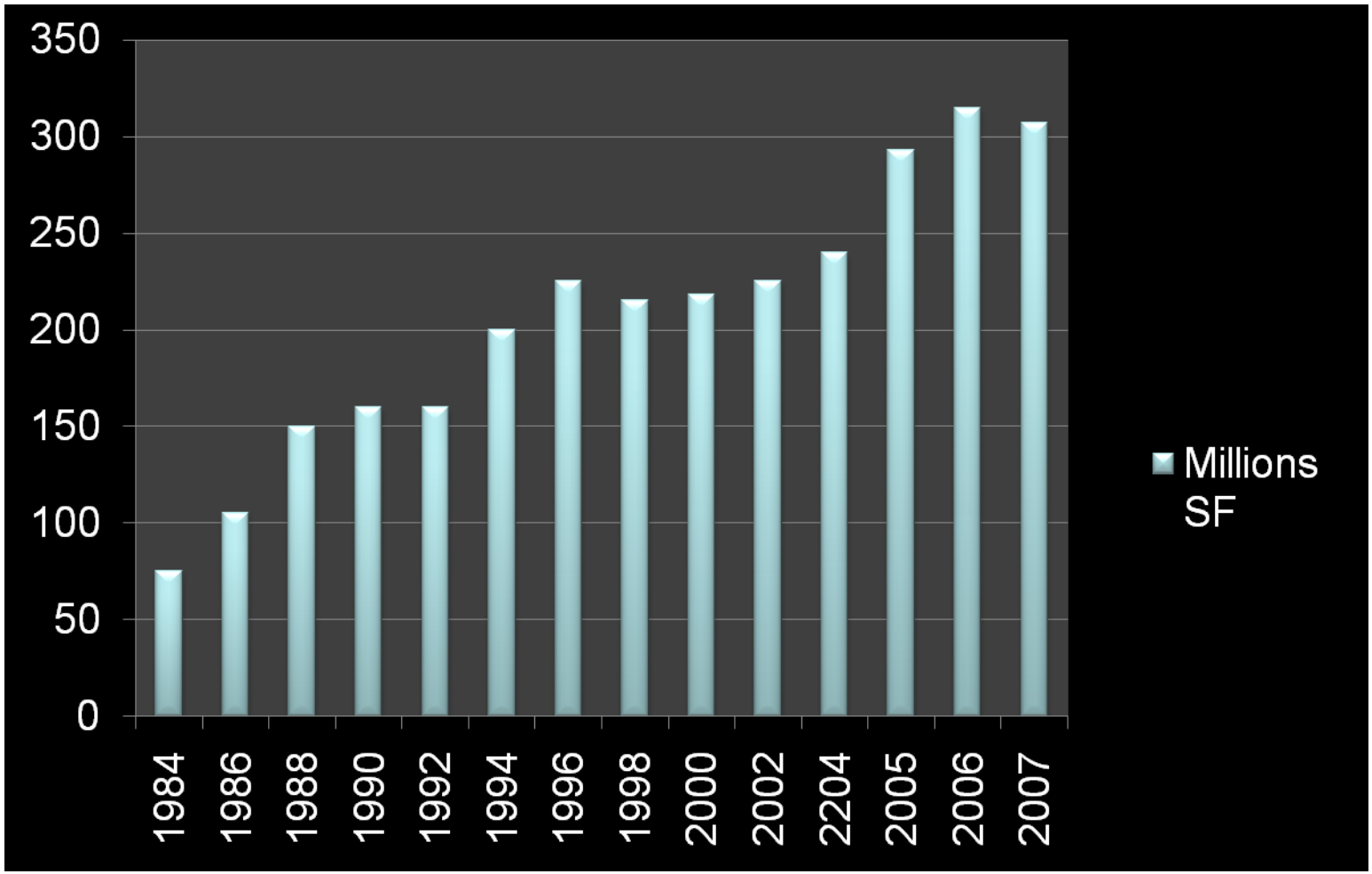
EIFS Growth



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What are EIFS?

- EIFS are nonstructural, non-loadbearing, exterior wall cladding systems that consist of:
  - an insulation board attached either adhesively or mechanically, or both, to the substrate;
  - an integrally reinforced base coat;
  - a textured protective finish coat

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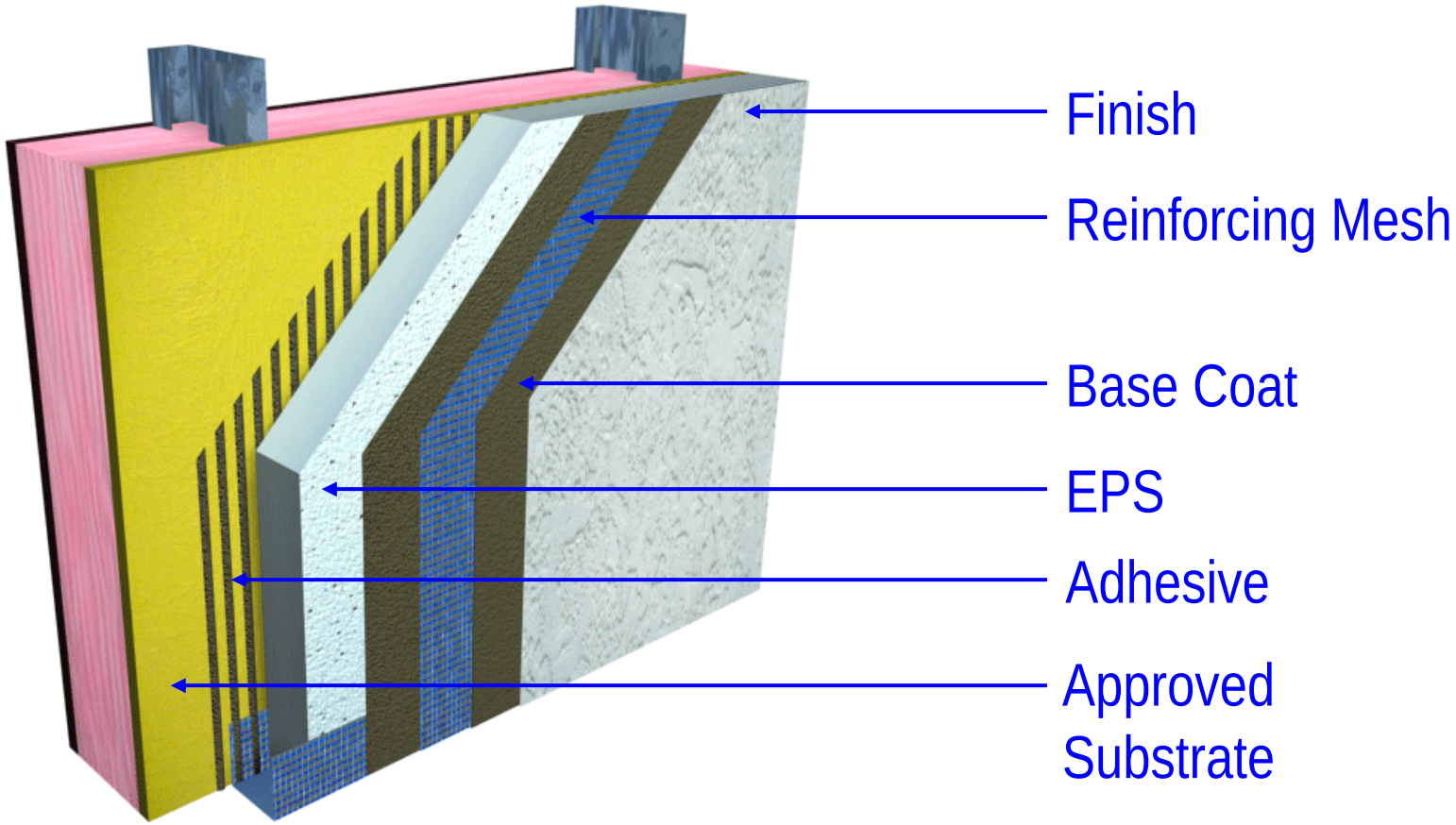
Conventional EIFS



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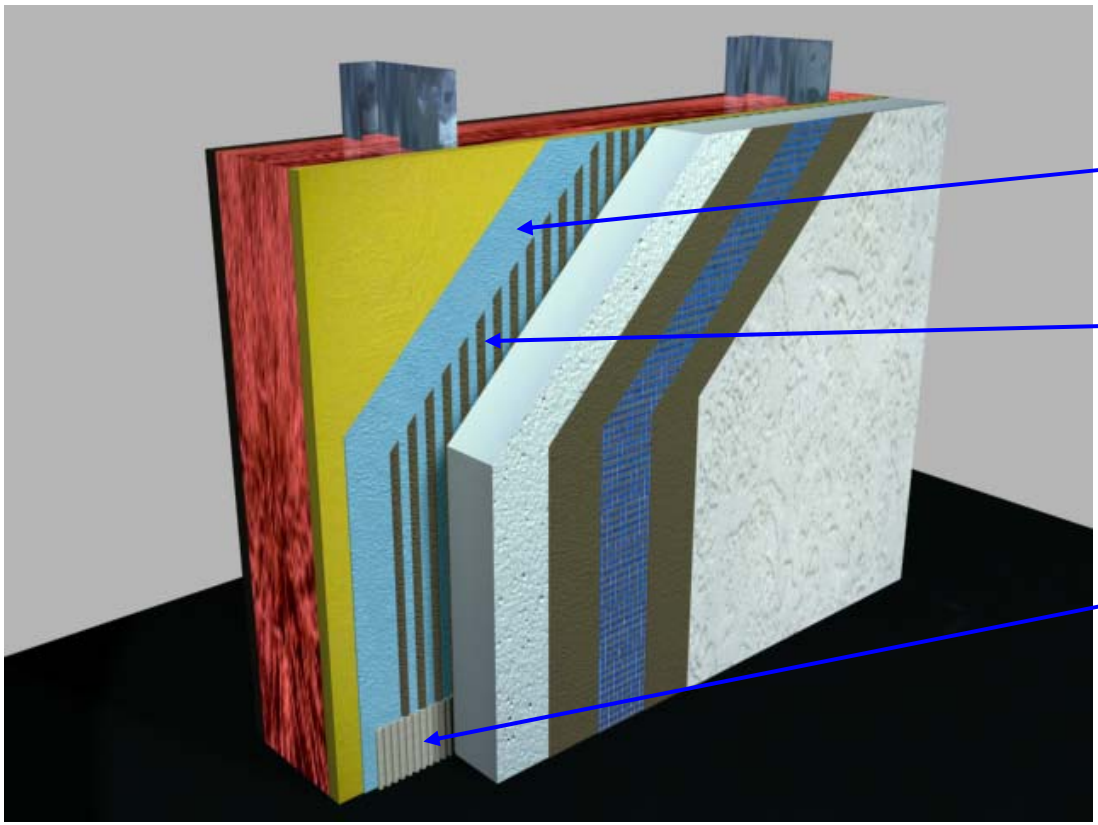
EIFS with Drainage

EIFS that incorporates a means of drainage applied over a water-resistive barrier



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EIFS Concept

- A cladding system that places INsulation on the OUTside - a thermal blanket for your building!

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EIMA
(EIFS Industry Members Association)

- Speak as one voice in order to achieve credibility in the market place
- Currently there are 4 Manufacturing members of the EIMA team
  - *BASF*
  - *Dryvit Systems, Inc.*
  - *Parex/TEIFS*
  - *Sto Corporation*
- We are a close knit group that get the job done for the betterment of the industry.

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Accomplishments

- Developed Industry consensus standards through ASTM to replace previously issued EIMA guidelines and industry test methods
  - ASTM E 2098 replaced EIMA Std. 105.01
  - ASTM E 2134 replaced EIMA Std. 101.03
  - ASTM E 2273 replaced EIMA Std. 200.02
  - ASTM E 2486 replaced EIMA Std. 101.86
  - ASTM E 2430 replaced EIMA Spec. for Insulation Board
  - ASTM E 2485 replaced EIMA Std. 101.01 and ICC-ES Procedure
  - ASTM E 2568 is the conversion of AC 219
  - ASTM E 2570 is the conversion of AC 212

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ICC-ES/EIMA Relationship

- EIMA was founded in 1981
  - First evaluation report was obtained by Dryvit Systems, Inc. in 1972 for SBCCI
- EIMA worked with ICBO-ES in the development of AC 24 which originated in January 1993
  - AC 24 was originally for conventional EIFS but morphed into the three current AC's (2003-2004)
    - Acceptance Criteria for Exterior Insulation and Finish Systems AC 219
    - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies AC 235
    - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing AC 212

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AC 219 (Acceptance Criteria for EIFS)

Weather Protection

- Requirements for conventional EIFS installed over framed walls are as follows:
  - Exterior wall envelope shall include flashing as described in Section 1405.3 of the IBC
  - System details must be tested to demonstrate that wind driven rain will not penetrate the exterior wall envelope.
    - Test is conducted at a pressure of 6.24 psf
    - Test duration is 2 hours
  - Special inspections are required on all EIFS applications over framed walls

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TESTING Per AC-219

TEST	TEST METHOD	CRITERIA
Abrasion Resistance	ASTM D 968	No deleterious effects after 500 liters (528 quarts)
Accelerated Weathering	ASTM G 155 Cycle 1	No deleterious effects after 2000 hours
	ASTM G 154 Cycle 1 (QUV)	
Freeze-Thaw	ASTM E 2485 (formerly EIMA 101.01)	No deleterious effects after 60 cycles
	ASTM C 67 modified	No deleterious effects after 60 cycles
	ASTM E 2485/ICC-ES Proc.; ICC ES (AC219)*/ASTM E 2568	No deleterious effects after 10 cycles
Mildew Resistance	ASTM D 3273	No growth during 28 day exposure period
Water Resistance	ASTM D 2247	No deleterious effects after 14 days exposure
Salt Spray Resistance	ASTM B 117	No deleterious effects after 300 hours exposure
Water Penetration	ASTM E 331 ICC ES (AC 219)*/ASTM E 2568	No water penetration beyond the inner-most plane of the wall after 2 hours at 299 Pa (6.24 psf)
Water Vapor Transmission	ASTM E 96 Procedure B	Vapor permeable

* AC 219 – Acceptance Criteria for EIFS

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FIRE PERFORMANCE - SYSTEM

TEST	TEST METHOD	CRITERIA
Fire Resistance	ASTM E 119	No effect on the fire resistance of a rated wall assembly
Ignitability	NFPA 268	No ignition at 12.5 kw/m^2 at 20 minutes
Intermediate Multi-Story Fire Test	NFPA 285 (UBC 26-9)	1. Resist flame propagation over the exterior surface 2. Resist vertical spread of flame within combustible core/component of panel from one story to the next 3. Resist vertical spread of flame over the interior surface from one story to the next 4. Resist lateral spread of flame from the compartment of fire origin to adjacent spaces

FIRE PERFORMANCE - COMPONENTS

TEST	TEST METHOD	CRITERIA
Surface Burning Characteristics	ASTM E 84	All components shall have a: Flame Spread $\leq$ 25 Smoke Developed $\leq$ 450

STRUCTURAL TESTING

TEST	TEST METHOD	CRITERIA
Tensile Bond	ASTM C 297/E 2134	Minimum 104 kPa (15 psi) – substrate or insulation failure
Transverse Wind Load	ASTM E 330	Withstand positive and negative wind loads as specified by the building code

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AC-235 Acceptance Criteria for EIFS with Drainage

Weather Protection

- Requirements for drainage systems installed over framed walls are as follows:
  - Water-resistive barrier or coating shall be used to protect the underlying substrate
  - A drainage plane shall exist
  - Exterior wall envelope shall include flashing as described in Section 1405.3 of the IBC
  - A minimum drainage efficiency of 90% shall be achieved
  - Special inspections are not required on the drainage system but are required on the installation of a liquid applied water-resistive barrier coating

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TESTING Per AC-235

TEST	TEST METHOD	CRITERIA
Abrasion Resistance	ASTM D 968	No deleterious effects after 500 liters (528 quarts)
Accelerated Weathering	ASTM G 155 Cycle 1	No deleterious effects after 2000 hours
	ASTM G 154 Cycle 1 (QUV)	
Freeze-Thaw	ASTM E 2485 (formerly EIMA 101.01)	No deleterious effects after 60 cycles
	ASTM C 67 modified	No deleterious effects after 60 cycles
	ASTM E 2485/ICC-ES Proc. ICC ES (AC235)*	No deleterious effects after 10 cycles
Mildew Resistance	ASTM D 3273	No growth during 28 day exposure period
Water Resistance	ASTM D 2247	No deleterious effects after 14 days exposure
Salt Spray Resistance	ASTM B 117	No deleterious effects after 300 hours exposure
Water Penetration	ASTM E 331 ICC ES (AC 235)*	No water penetration beyond the inner-most plane of the wall after 15 minutes at 137 Pa (2.86 psf)
Water Vapor Transmission	ASTM E 96 Procedure B	Vapor permeable
Drainage Efficiency	ASTM E 2273 ICC ES (AC 235)*	Minimum Drainage Efficiency of 90%

* AC 235 – Acceptance Criteria for EIFS Clad Drainage Wall Assemblies

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AC 212 - Water-Resistive Coatings over Sheathing Substrates

- Qualifies trowel, spray, or roller applied coatings being offered by EIFS manufacturers
- Special inspections are required on the installation of the liquid applied water-resistive barrier coating

TEST	TEST METHOD	CRITERIA
Tensile Bond	ASTM C 297/E 2134 ICC ES (AC 212)*/ASTM E 2570	Minimum 104 kPa (15 psi)
Freeze-thaw	ASTM E 2485/ICC-ES Proc. ICC ES (AC 212)*/ASTM E 2570	No deleterious effects after 10 cycles
Water Resistance	ASTM D 2247 ICC ES (AC 212)*/ASTM E 2570	No deleterious effects after 14 days exposure
Water Vapor Transmission	ASTM E 96 Proc. B ICC ES (AC 212)*/ASTM E 2570	Vapor Permeable
Air Leakage	ASTM E 283	No Criteria
Structural Performance	ASTM E 1233 Proc. A ICC ES (AC 212)*/ASTM E 2570	Minimum 10 positive cycles at 1/240 deflection; No cracking in field, at joints or interface with flashing
Racking	ASTM E 72 ICC ES (AC 212)*/ASTM E 2570	No cracking in field, at joints or interface with flashing at net deflection of 3.2 mm (1/8 inch)
Restrained Environmental	ICC-ES Procedure ICC ES (AC 212)*/ASTM E 2570	5 cycles; No cracking in field, at joints or interface with flashing
Water Penetration	ASTM E331 ICC ES (AC 212)*/ASTM E 2570	No water penetration beyond the inner-most plane of the wall after 15 minutes at 137 Pa (2.86 psf)
Weathering **UV Exposure** **Acceleratred Aging** **Hydrostatic Pressure Test**	 ICC ES Proc. ICC ES (AC212)*/ASTM E 2570 AATCC 127 ICC ES (AC212)*/ASTM E 2570	 UV - 210 hours of exposure Aging - 25 cycles of drying and soaking 21.6" water column for 5 hours
Surface Burning Characteristics	ASTM E 84	Flame Spread < 25 Smoke Developed < 450

* AC 212– Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing

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IBC FIRE SAFETY FS 175 07/08

- IBC Fire Safety Code Committee voted 11-1 for inclusion of EIFS into IBC.
- IRC Building and Energy Code Committee voted 10-0 for inclusion of EIFS into IRC.
- No comments received during the Comment Period so Code Change FS 175 is included in consent agenda.
- Anticipate Final Action Approval at this meeting.

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Summary - IBC

- Adds definition for EIFS
- Adds definition for EIFS with Drainage.
- EIFS shall comply with ASTM E 2568 (Standard Specification for PB Exterior Insulation and Finish System)
- EIFS with Drainage required on Type V, Group R1 thru R4.
- Structural frame and Substrate shall meet the requirements of Chapter 16
- Comply with Section 1403 (weather resistance).
- Comply with section 1704.1 & 1704.12 Special Inspections.

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Summary - IRC

- Adds definition for EIFS
- Adds definition for EIFS with Drainage.
- EIFS shall comply with ASTM E 2568 & ASTM E 2273 (drainage efficiency)
- Water-Resistive Barrier shall comply with ASTM E 2570
- Special Inspections are required on WRB installations
- EIFS with Drainage required on Type V, Group R1 thru R4.

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Code Change

- All requirements of current Acceptance Criteria have been included in ASTM E 2568 and E 2570
- ICC-ES has been a critically important participant in the development of the EIFS Industry.
- ICC Mission: Providing the highest quality codes, standards, products, and services for all concerned with the safety and performance of the built environment.

Thank You

Questions?