ADVANCED DETAILING TECHNIQUES FOR WOOD-FRAME BUILDING ENCLOSURES

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QUESTIONS RELATED TO SPECIFIC MATERIALS, METHODS, AND SERVICES WILL BE ADDRESSED AT THE CONCLUSION OF THIS PRESENTATION.



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EXPERTISE: STRUCTURAL ANALYSIS, BUILDING CODES, DESIGN AND PERFORMANCE OF BUILDING SYSTEMS, ROOFING MATERIALS AND CONSTRUCTION.

Course Description

THIS PRESENTATION WILL PROVIDE AN IN-DEPTH LOOK AT A VARIETY OF WOOD-FRAME BUILDING ENCLOSURE ASSEMBLIES AND DETAILS. BEGINNING WITH A REVIEW OF BUILDING ENCLOSURE DESIGN FUNDAMENTALS AND CONSIDERATIONS, IT WILL THEN FOCUS ON BEST PRACTICES WITH REFERENCES FROM TECHNICAL GUIDELINES AND CASE STUDIES. FINALLY, THE CRITICAL DETAIL INTERFACES BETWEEN DIFFERENT ENCLOSURE ASSEMBLIES (I.E., WALLS, ROOFS, BALCONIES, WINDOWS) WILL BE REVIEWED WITH A FOCUS ON CONTINUITY OF CRITICAL BARRIERS. DETAILS AND CASE STUDIES WILL BE PRESENTED FOR EACH.

Learning Objectives

- 1. REVIEW BUILDING ENCLOSURE DESIGN BEST PRACTICES FOR LIGHT WOOD-FRAME BUILDINGS.
- 2. DEMONSTRATE EFFECTIVE METHODS OF CONTROLLING HEAT, AIR, AND MOISTURE MOVEMENT THROUGH WOOD-FRAME ASSEMBLIES.
- 3. DISCUSS COMMON DETAILS USED FOR LIGHT WOOD-FRAME WALL, ROOF ENCLOSURE ASSEMBLIES, AND BALCONIES.
- 4. USING CASE STUDIES AND DETAILS FROM SUCCESSFUL PROJECTS, DEMONSTRATE UNIQUE CONSIDERATIONS AND BEST PRACTICES ASSOCIATED WITH THE INTERFACES BETWEEN ADJACENT ENCLOSURE ASSEMBLIES.

LET'S REVIEW!

- THE ENCLOSURE CONTROLS....
- WATER (INCLUDING VAPOR)
- AIR
- HEAT
- IN THAT ORDER!

THE ENCLOSURE MATERIALS MUST ALSO, TRANSFER LOADS, BE DURABLE, BE ECONOMICAL, AND LOOK GOOD!



WOODS ENEMY IS... WATER AND VAPOR!!

- WOOD IS HYGROSCOPIC
- ITS MOISTURE CONTENT WILL FLUCTUATE
 BASED ON THE RELATIVE HUMIDITY OF THE
 SURROUNDING AIR
- SO AN INCREASE IN HUMIDITY INCREASES THE MOISTURE CONTENT AND THE WOOD SWELLS, AND A DECREASE IN HUMIDITY THE CAUSES WOOD TO SHRINK.

THAT'S SOME WRINKLY STUCCO!!!



WOOD MC VS RELATIVE HUMIDITY



Wood shrinkage is 0.20% to 0.25% in dimension per 1% change in MC

THINGS THAT ARE MOVEMENT SENSITIVE

SEALANTS

YOU CAN OVERCOME THIS BY ADJUSTING THE THICKNESS BY FLOOR

THIN METAL FLASHINGS

UTILIZE COUNTER FLASHINGS OR SLIP FLASHINGS



MORE REVIEW

THE CONTROL LAYERS ARE...

1. WEATHER RESISTIVE LAYERS

2. VAPOR RETARDERS

3. AIR RETARDERS

4. INSULATION

5. THERMAL BREAKS



Extruded polystyrene (XPS)

SO WHAT DOES THAT LOOK LIKE?



JUST REMEMBER, "IT'S ALL CONNECTED"



DESIGN GUIDES

- 1. BUILDING ENCLOSURE DESIGN GUIDE WOOD FRAME MULTI-UNIT RESIDENTIAL BUILDINGS, 2ND EDITION
- 2. GUIDE FOR DESIGNING ENERGY-EFFICIENT BUILDING ENCLOSURES
- 3. CROSS LAMINATED TIMBER HANDBOOK



WHERE IS WATER LIKELY TO COME THROUGH A WALL?



WINDOWS AND DOORS



CONTROLLING AIR

WE KNOW ABOUT WATER CONTROLS, BUT WHAT ABOUT AIR MOVEMENT...

FIBERGLASS, BLOWN AND SPRAYED CELLULOSE ARE AIR PERMEABLE MATERIALS USED IN THE STUD SPACE OF THE WALL ALLOWING POSSIBLE AIR PATHS BETWEEN THE INTERIOR AND EXTERIOR AS WELL AS CONVECTIVE LOOPING IN THE INSULATION.

DENSE PACK CELLULOSE HAS LESS AIR PERMEANCE BUT DOES NOT CONTROL AIR LEAKAGE. INSULATING SHEATHING (EPS, XPS AND FOIL-FACED POLYISOCYANURATE BOARD FOAM) PRODUCTS ARE AIR IMPERMEABLE.



JUST REMEMBER... WOULD YOU EAT A SWEATER?



SOME FIELD EXAMPLES... DON'T FORGET THE ROOF!



INSULATING A ROOF? GOOD IDEA!



CANTILEVER BALCONIES MOST COMMON



WHY SUCH A BIG PROBLEM?

- THEY ARE FORGOTTEN!!!!
- TYPICALLY HAVE DIFFICULT FLASHING AND WATERPROOFING CONDITIONS
- NUMEROUS TRADES WORKING WITH MINIMAL GUIDANCE
- EXPOSED TO THE ELEMENTS MORE READILY THAN INTERIOR FRAMING

SPOT THE PROBLEM



THE END RESULT



SOLVING THE TOUGH EDGES



FROM A DIFFERENT VIEW



WHAT THIS LOOKS LIKE IN THE FIELD



WHAT ABOUT AIR CONTROL? USE FOAM!



TO SUMMARIZE

BUILDING ENCLOSURES ARE MEANT TO CONTROL MOISTURE, AIR, AND HEAT, IN THAT ORDER!!!

KEEP THE CONTROL LAYERS OUTSIDE OF THE BUILDING

KEEP THE CONTROL LAYERS CONTINUOUS

WALLS, ROOFS, AND BALCONIES



QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

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