

Joseph Lstiburek, Ph.D., P.Eng, ASHRAE Fellow

# Building Science

Adventures In Building Science

www.buildingscience.com

Buildings Get Wet From The Outside  
Buildings Get Wet From The Inside  
Buildings Start Out Wet  
Wet Happens

Building Science Corporation

Joseph Lstiburek 2

Buildings Must Be Designed To Dry

Building Science Corporation

Joseph Lstiburek 3

Buildings Can Dry To The Outside  
Buildings Can Dry To The Inside  
Buildings Can Dry To Both Sides

Building Science Corporation

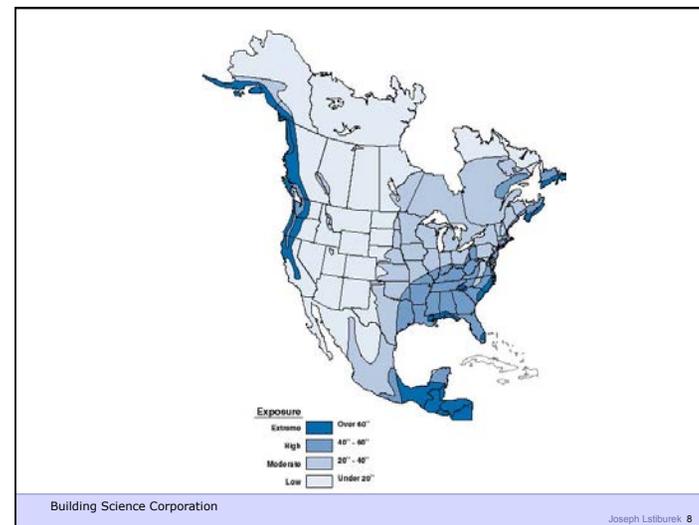
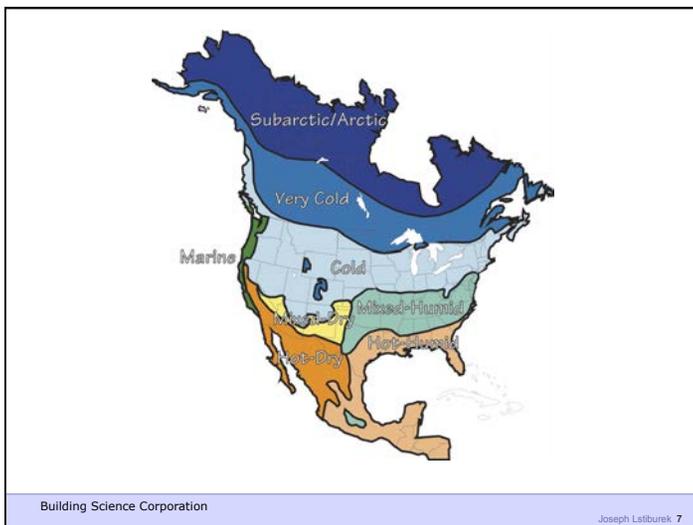
Joseph Lstiburek 4

2<sup>nd</sup> Law of Thermodynamics

Building Science Corporation Joseph Lstiburek 5

Heat Flow Is From Warm To Cold  
 Moisture Flow Is From Warm To Cold  
 Moisture Flow Is From More To Less  
 Air Flow Is From A Higher Pressure to a Lower Pressure  
 Gravity Acts Down

Building Science Corporation Joseph Lstiburek 6



Don't Do Stupid Things

Building Science Corporation

Joseph Lstiburek 9



Building Science Corporation

Joseph Lstiburek 10



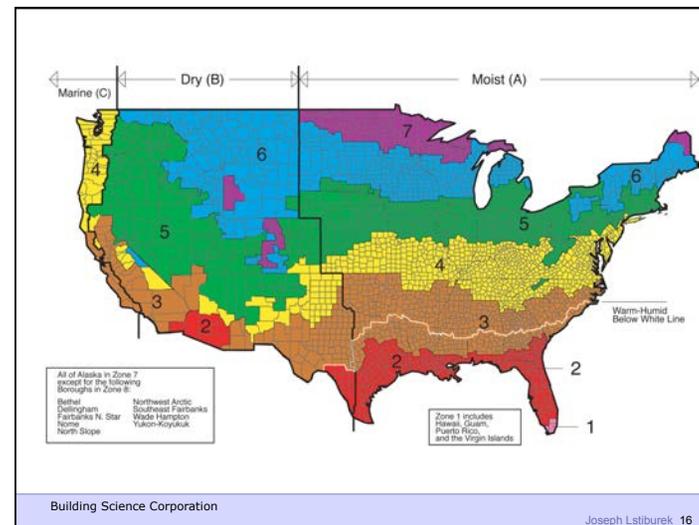
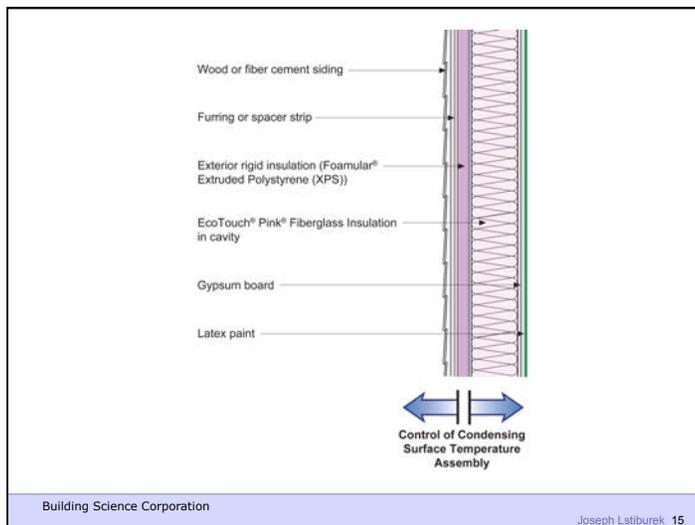
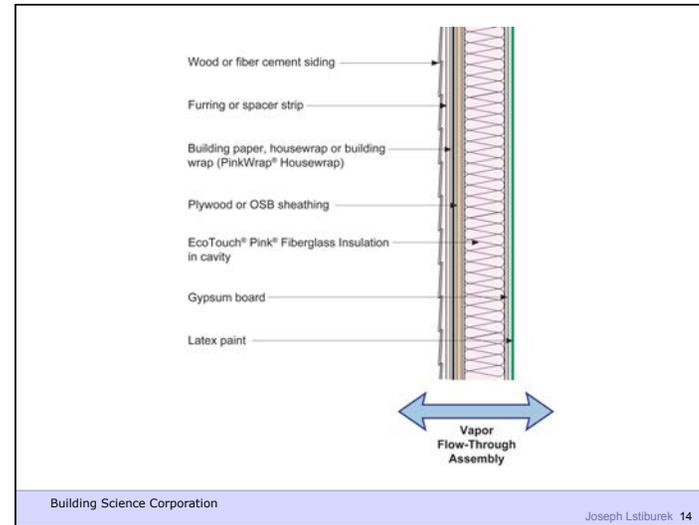
Building Science Corporation

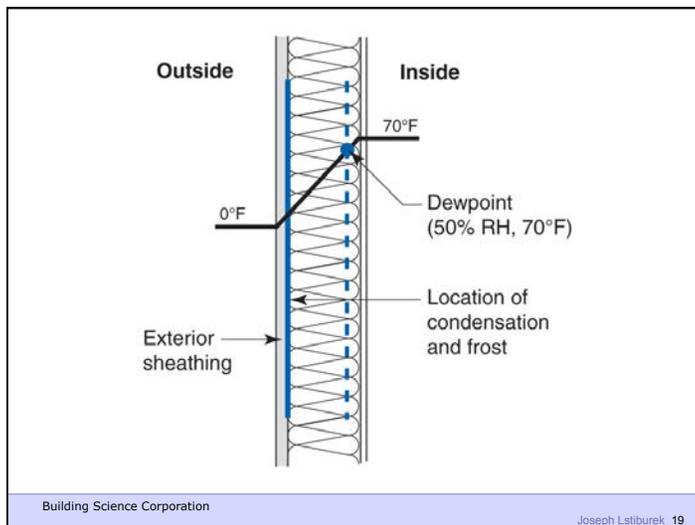
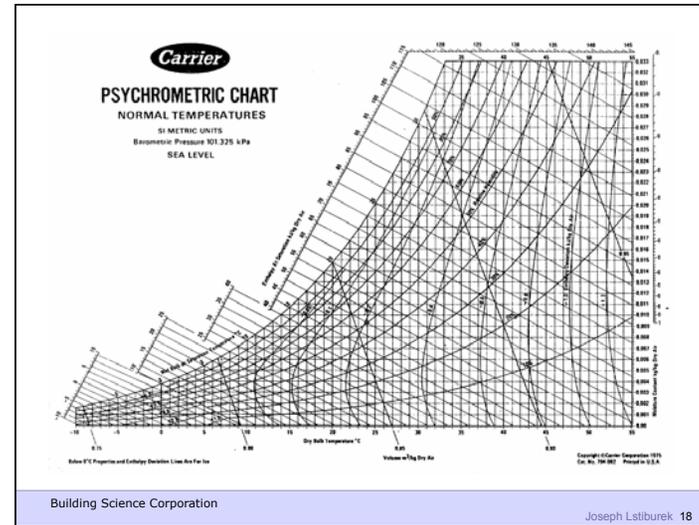
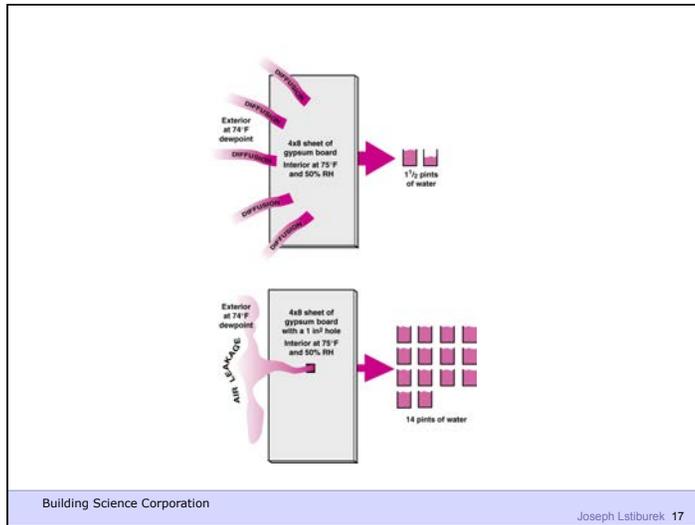
Joseph Lstiburek 11

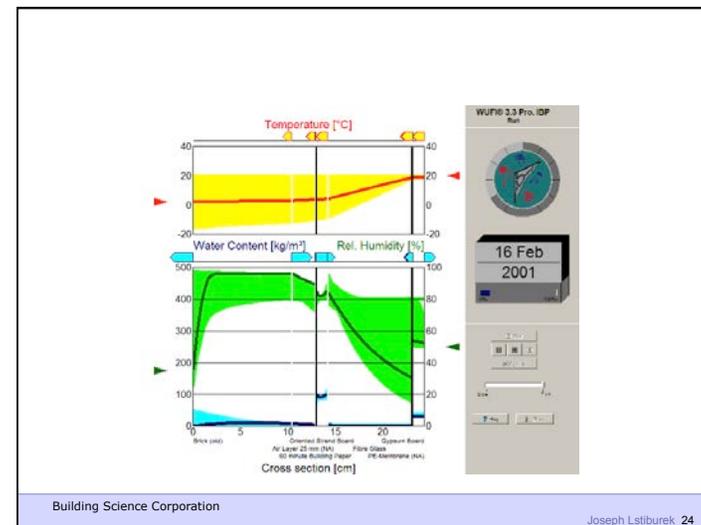
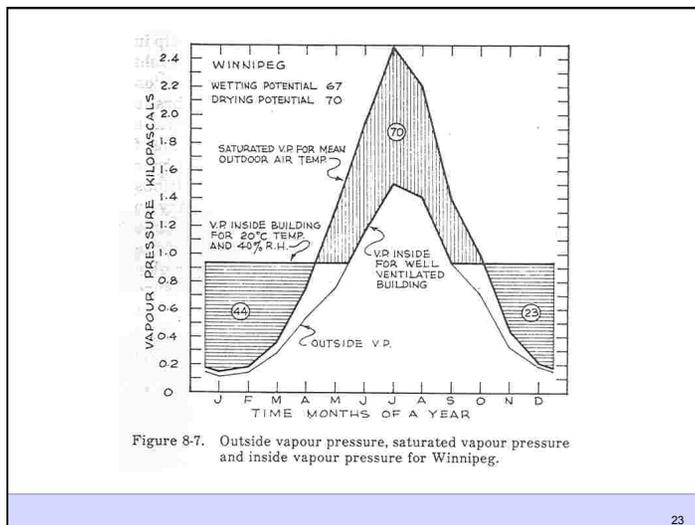
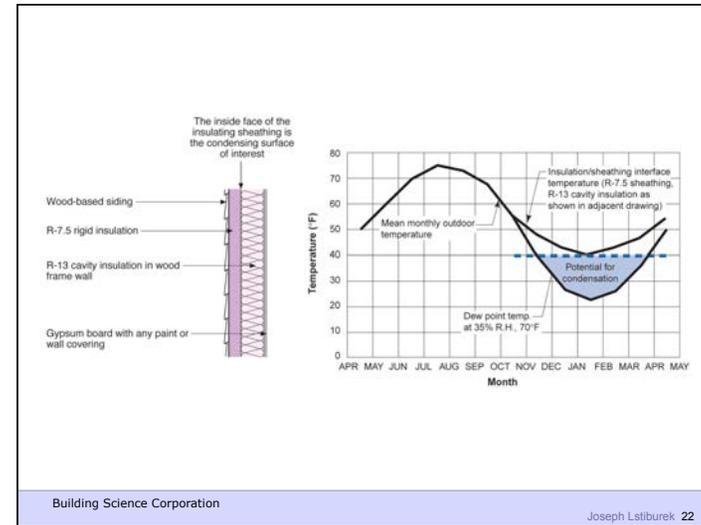
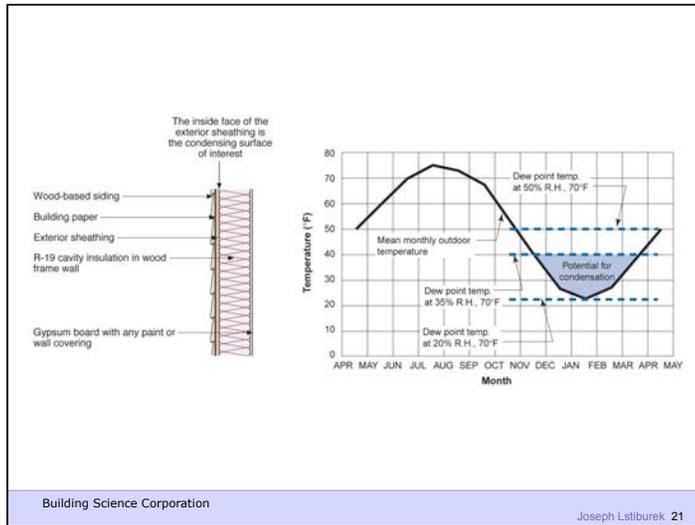


Building Science Corporation

Joseph Lstiburek 12

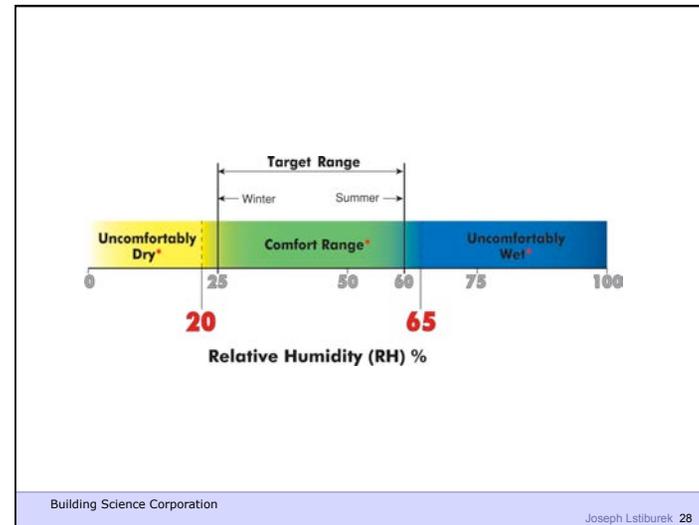
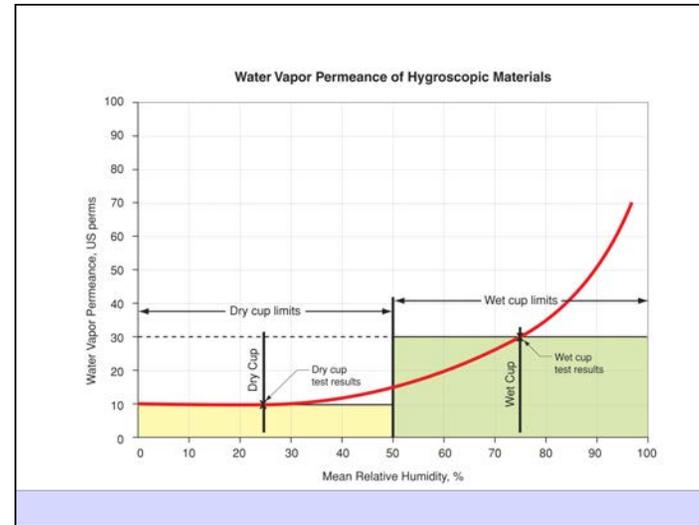


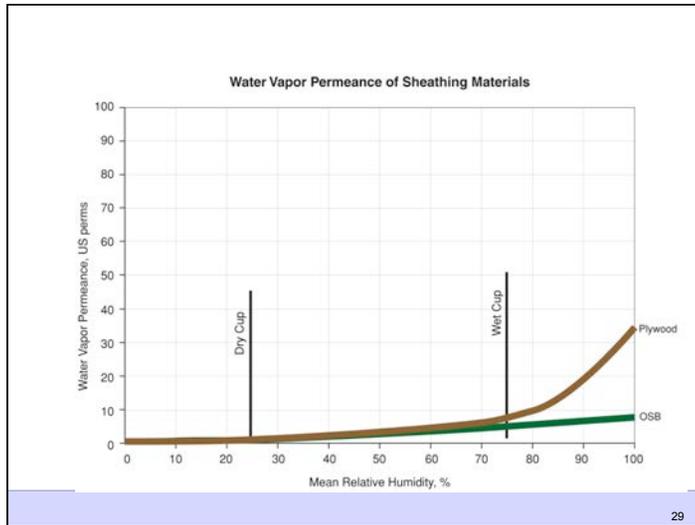




If You Need To Run A Hygrothermal Model  
To Figure Out If Your Wall Works You  
Have The Wrong Design

Building Science Corporation Joseph Lstiburek 25



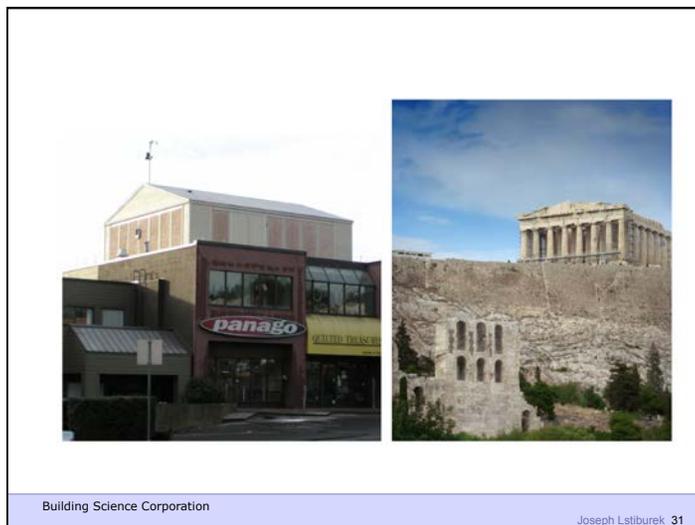


29



Building Science Corporation

Joseph Lstiburek 30



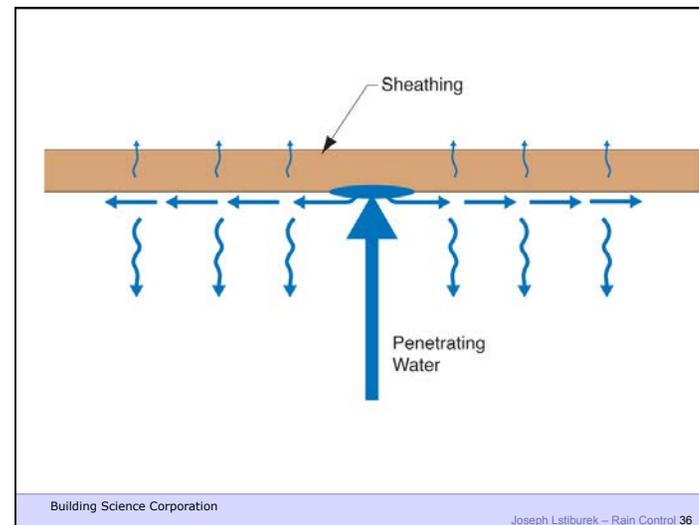
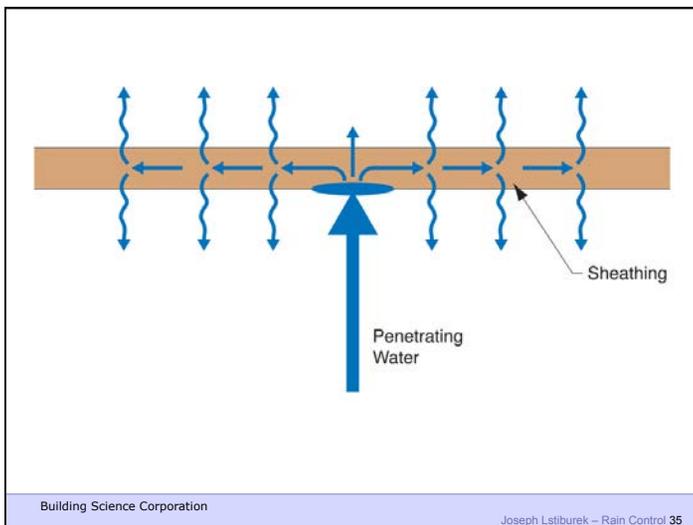
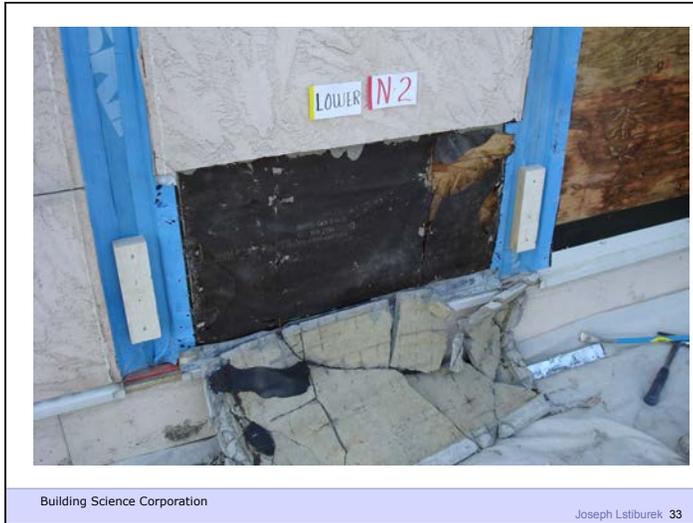
Building Science Corporation

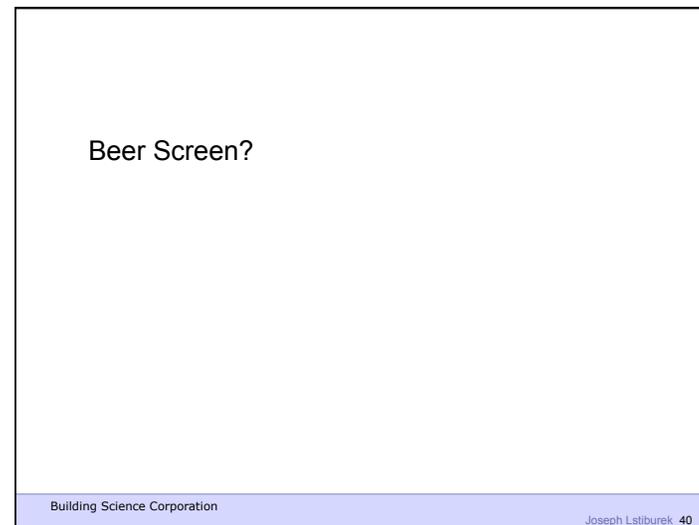
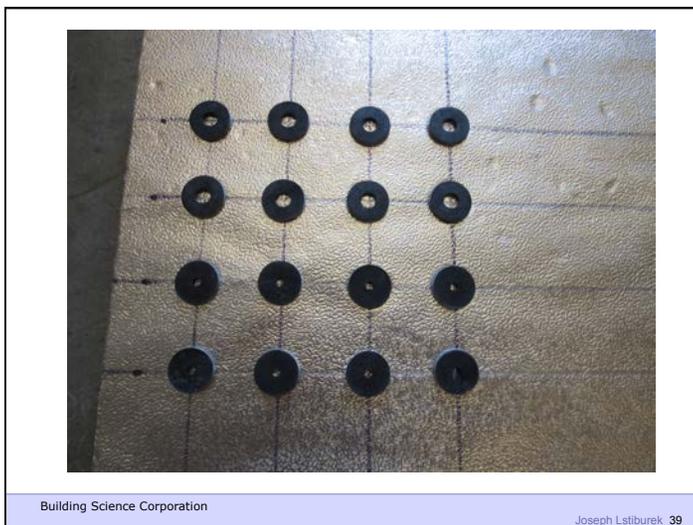
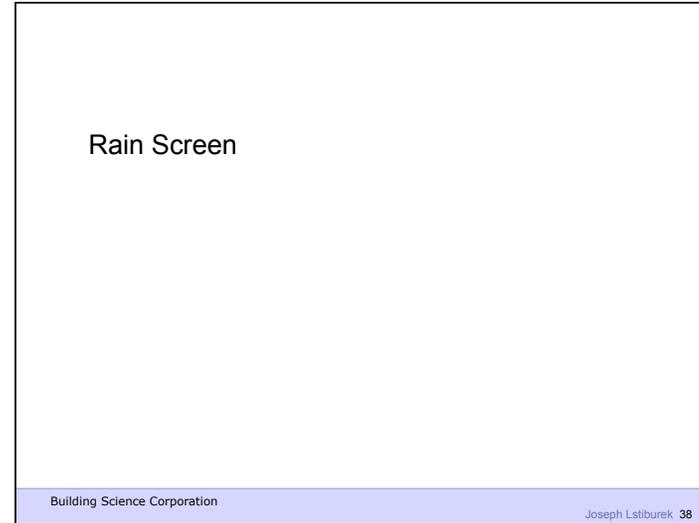
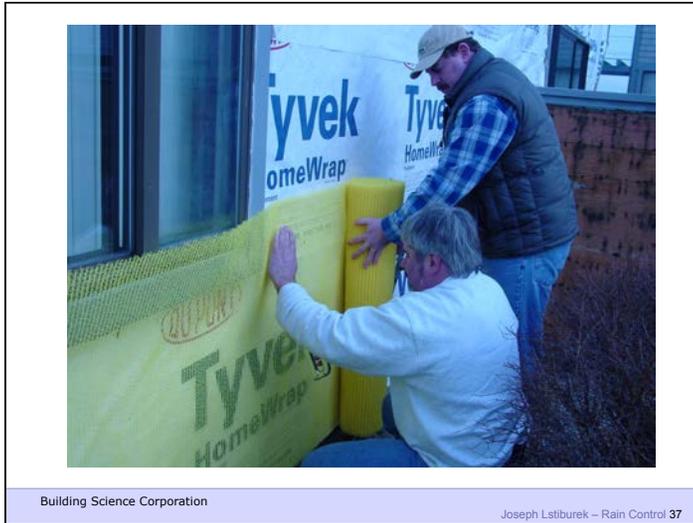
Joseph Lstiburek 31

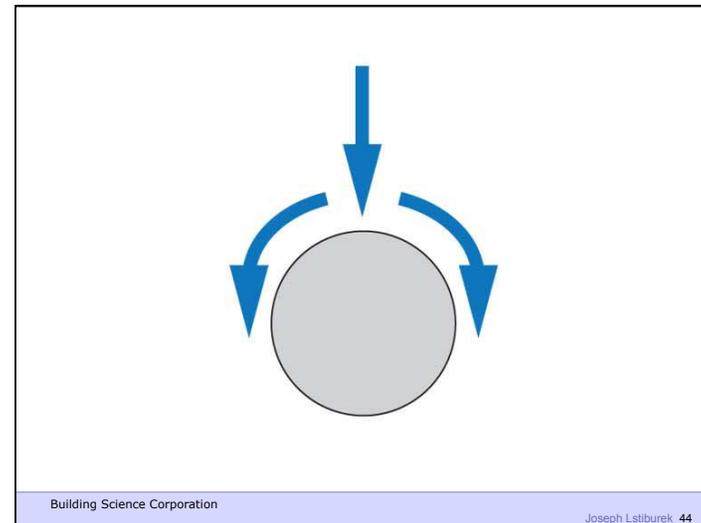
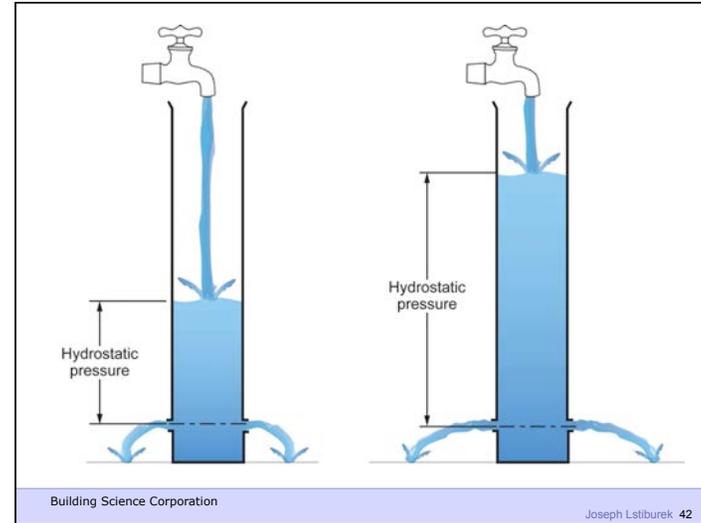
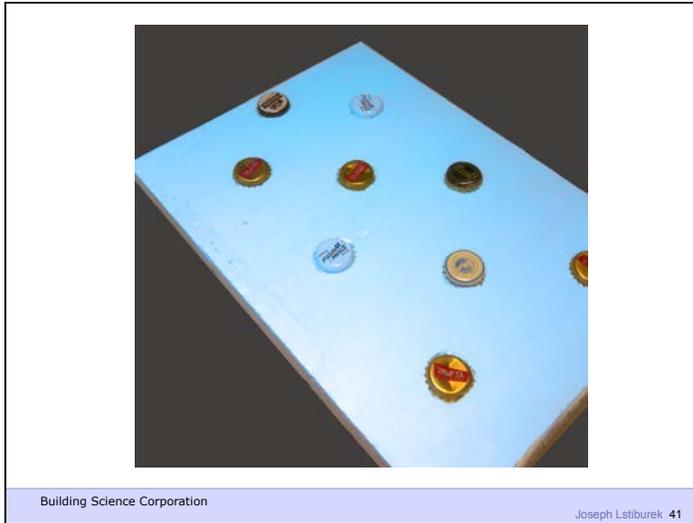


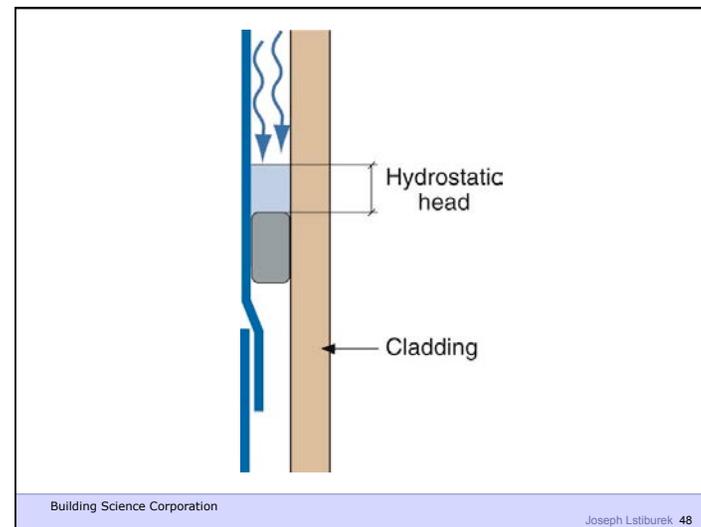
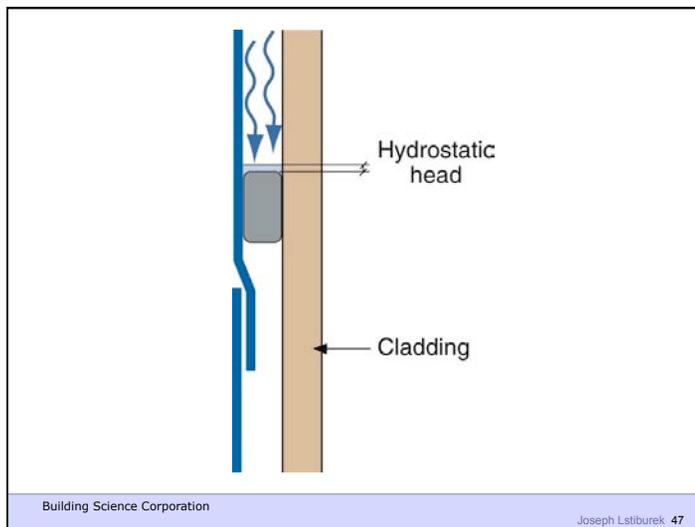
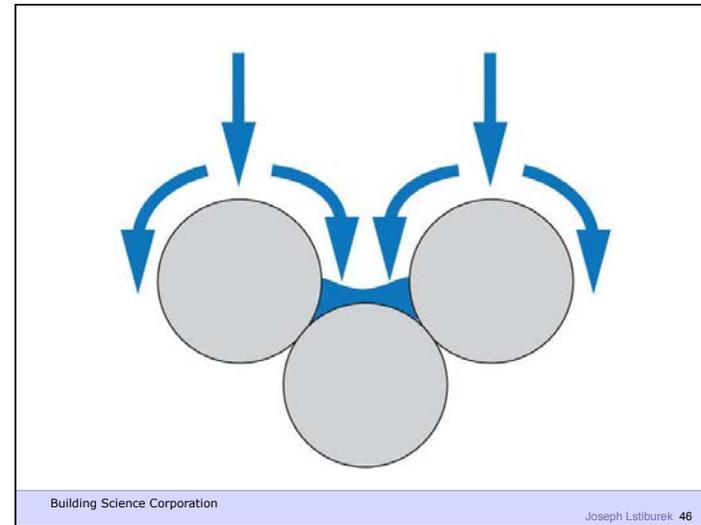
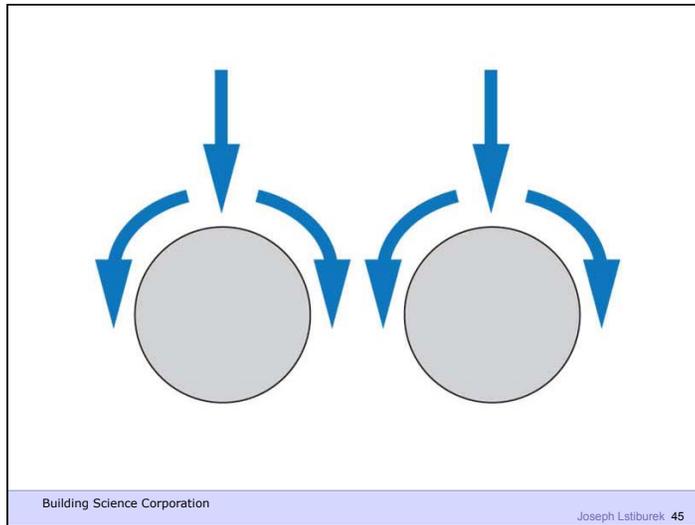
Building Science Corporation

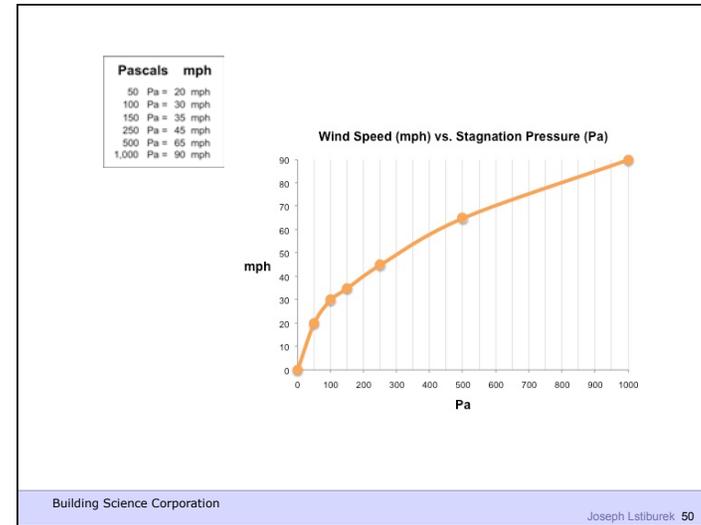
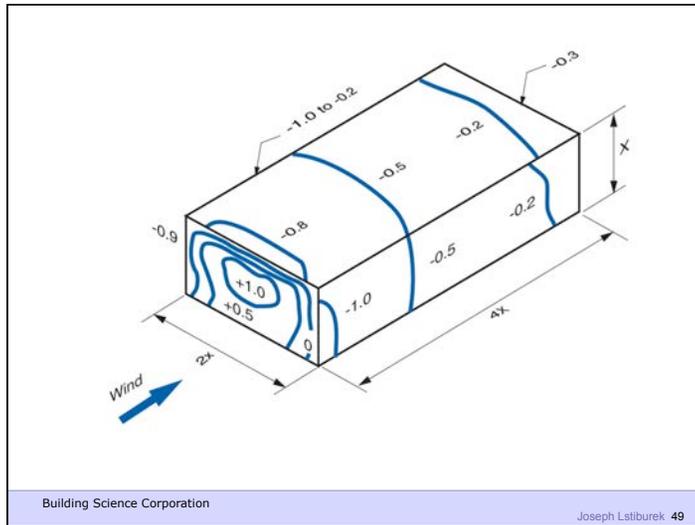
Joseph Lstiburek 32

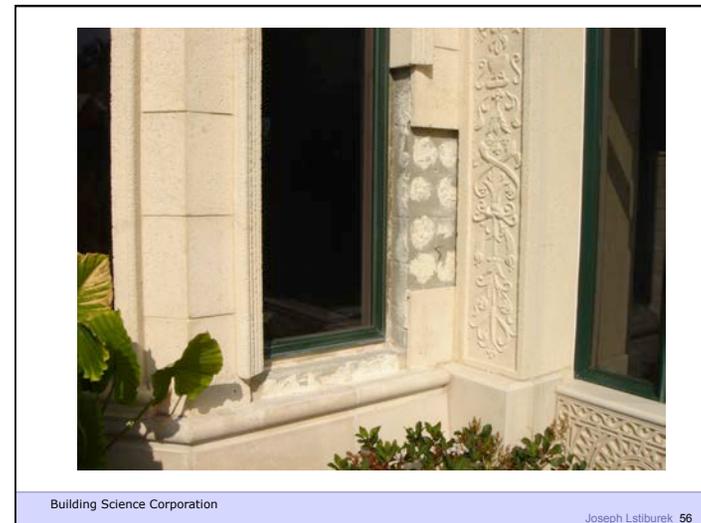
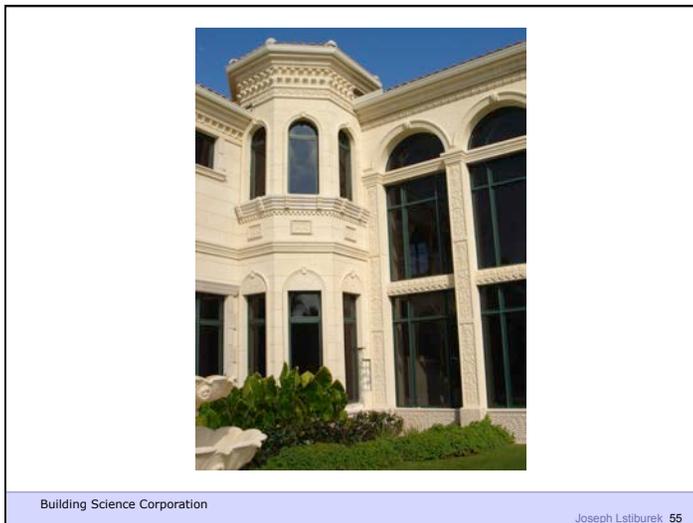


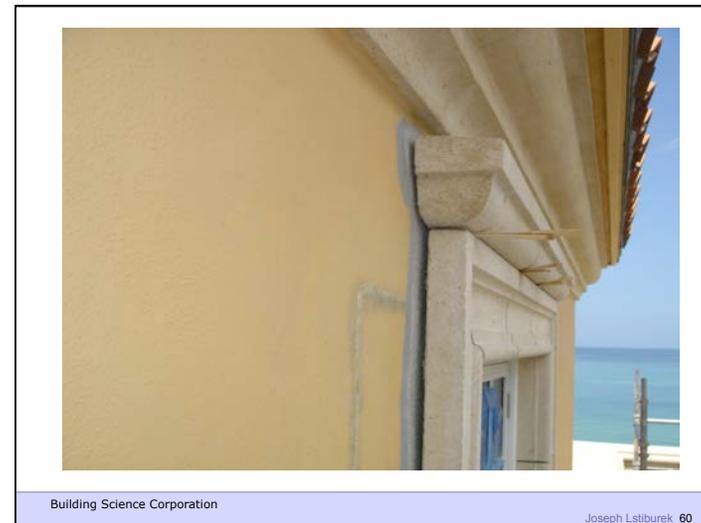
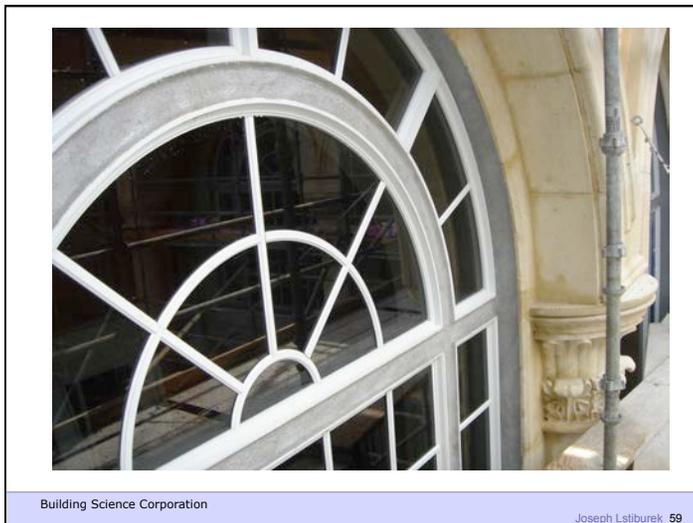






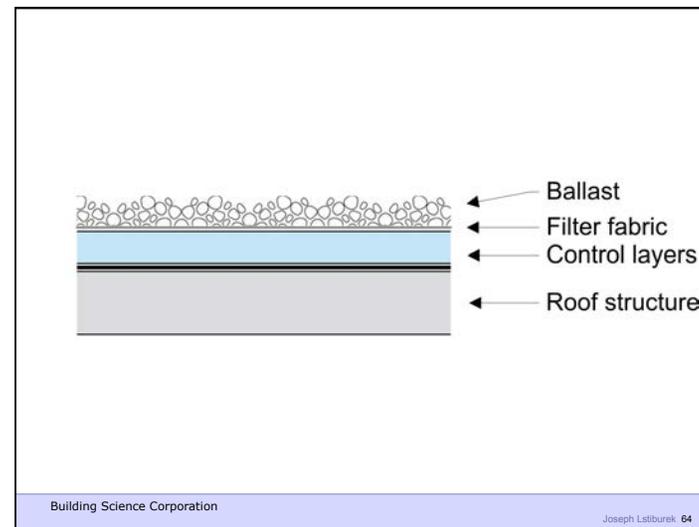
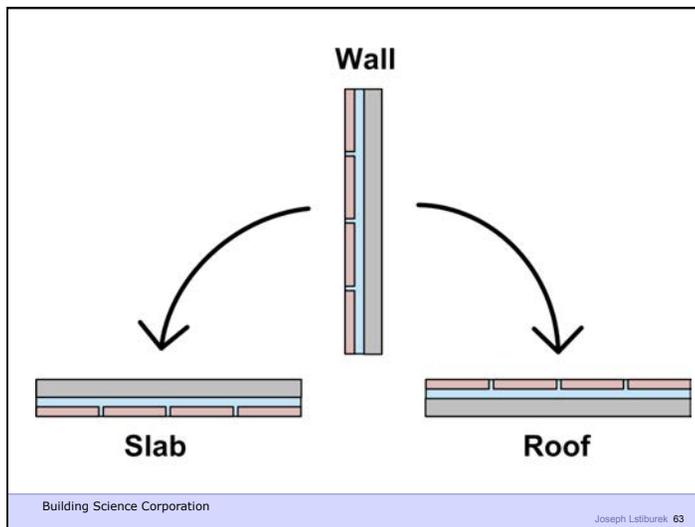
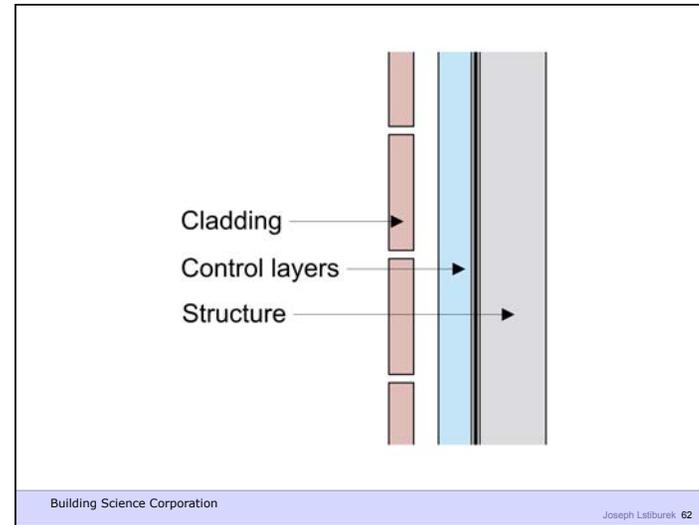


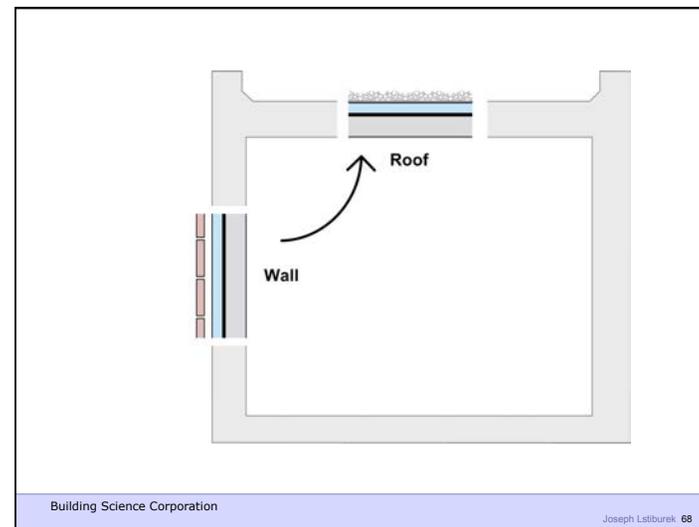
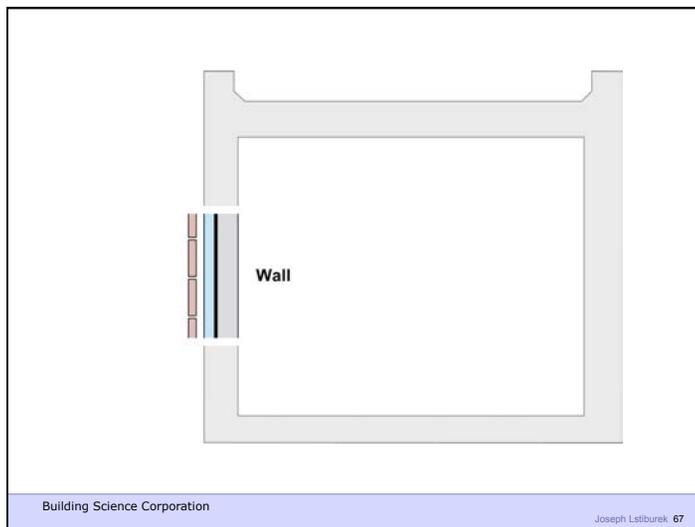
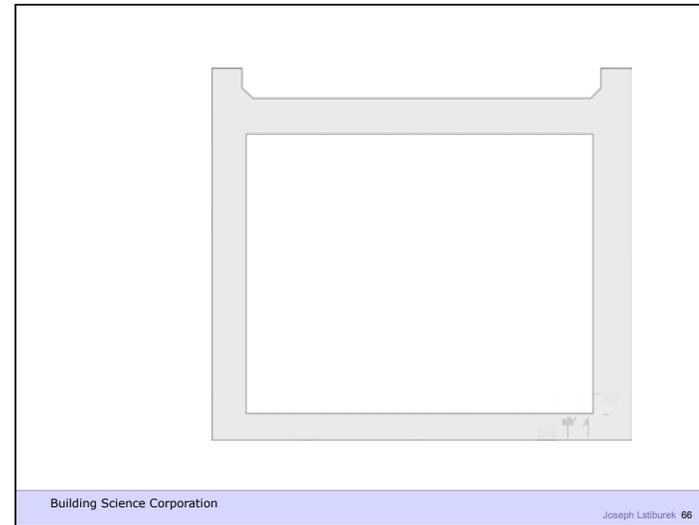
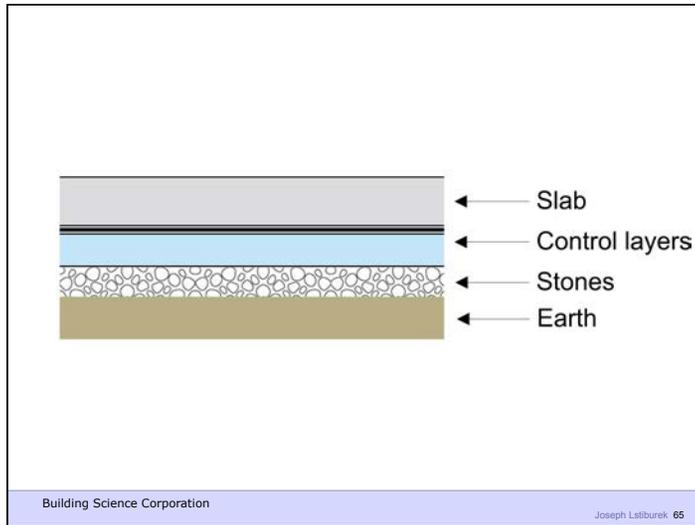


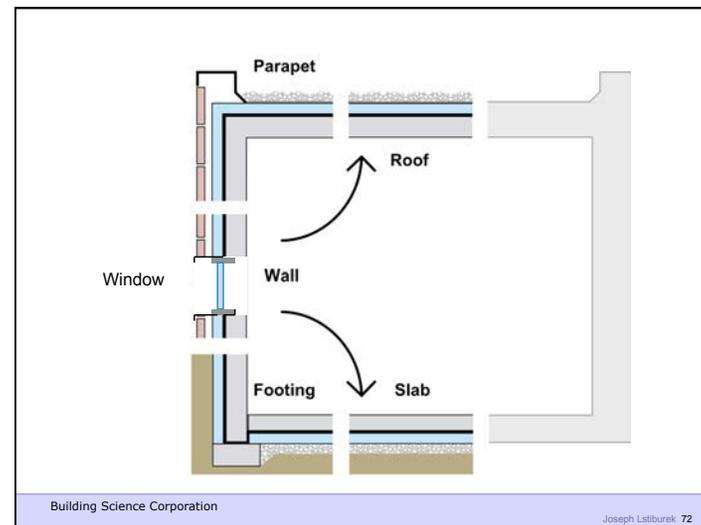
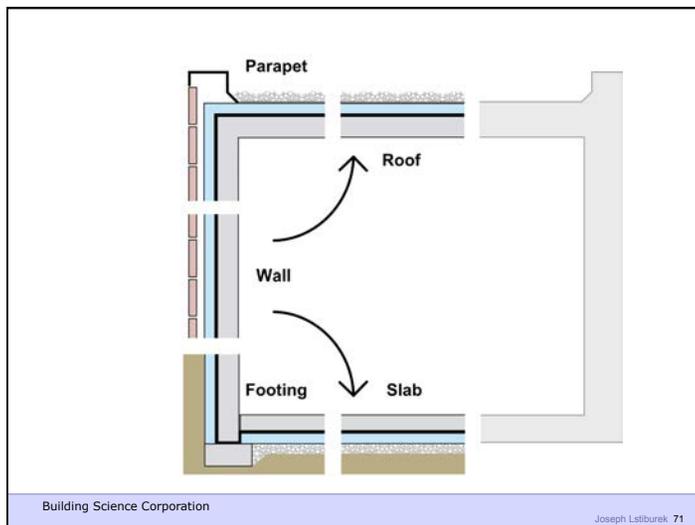
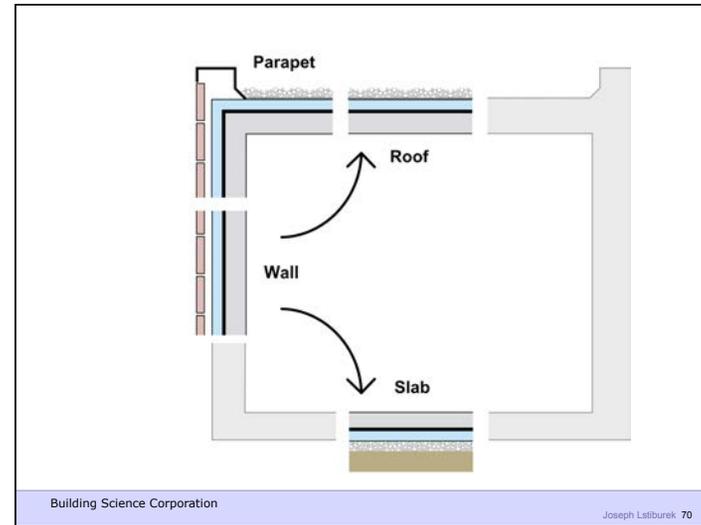
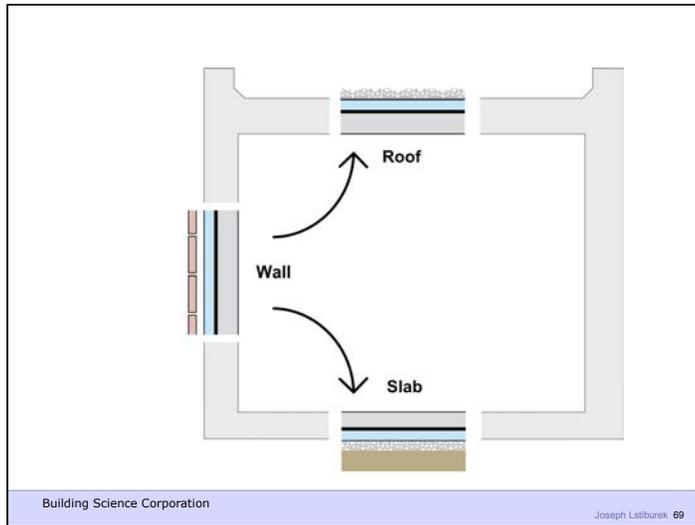


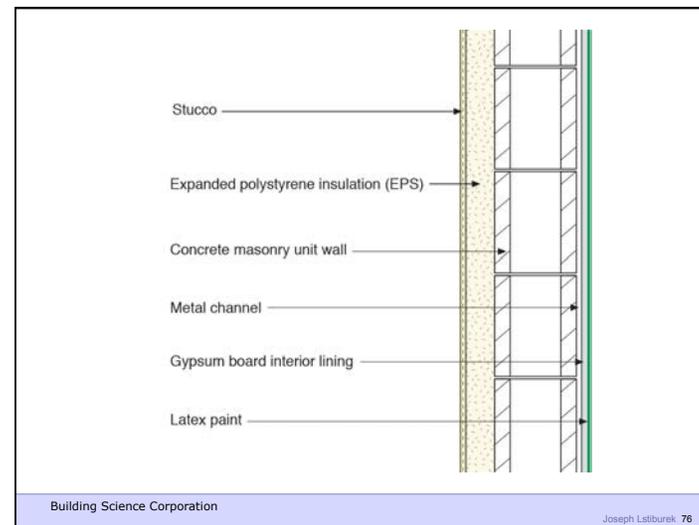
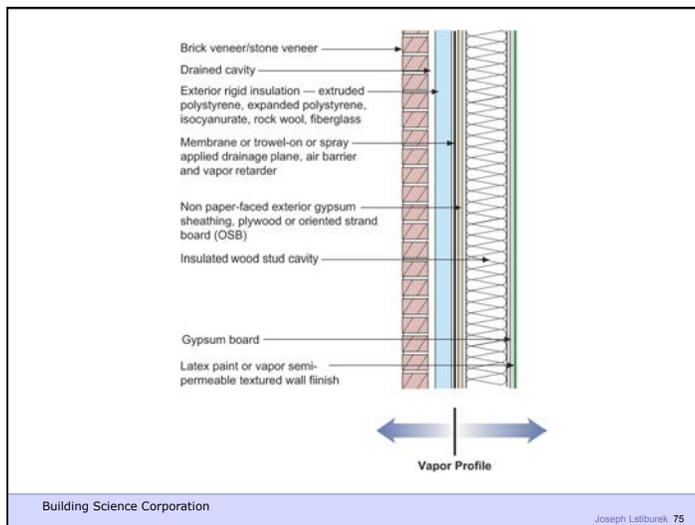
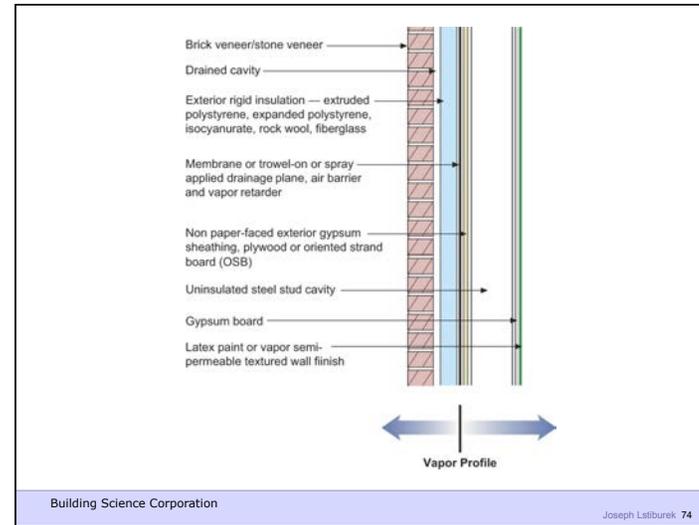
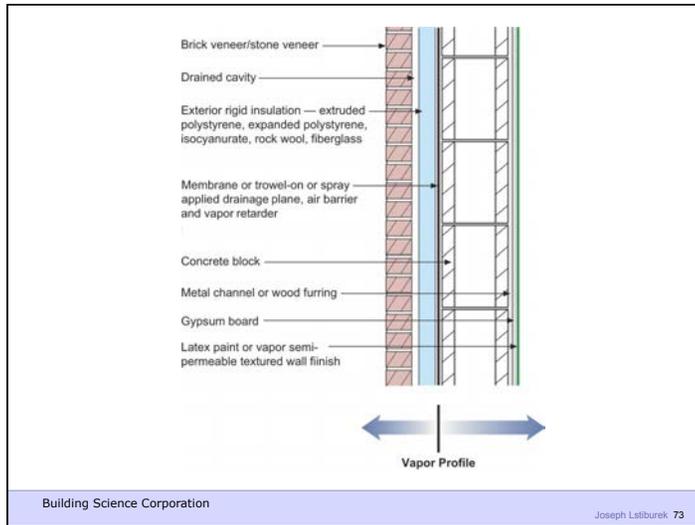
Water Control Layer  
 Air Control Layer  
 Vapor Control Layer  
 Thermal Control Layer

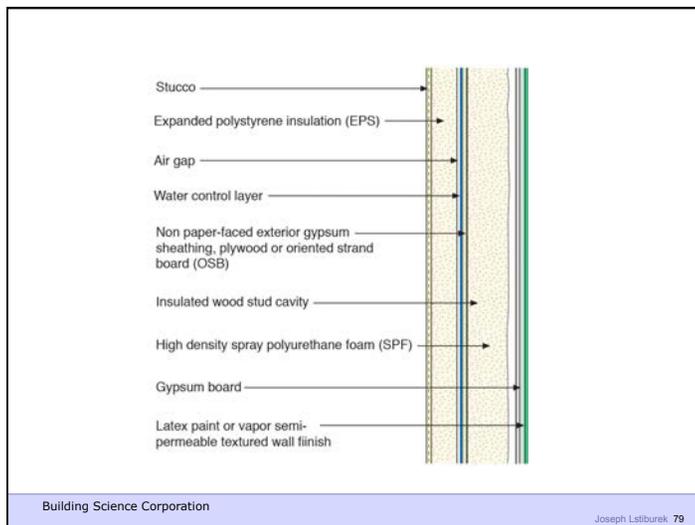
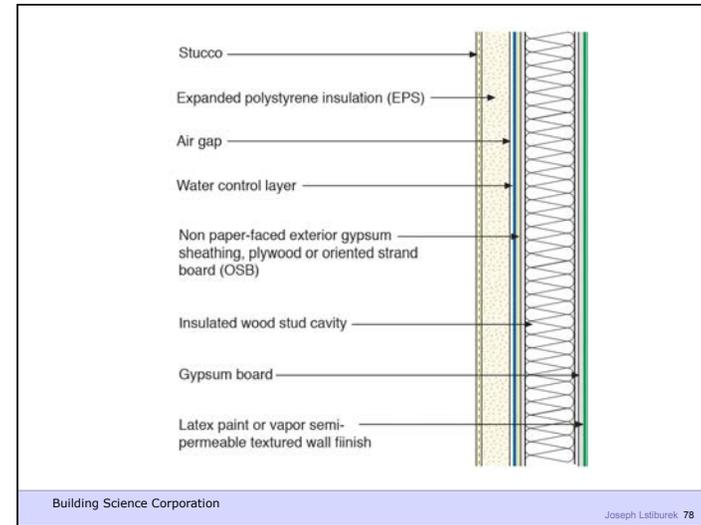
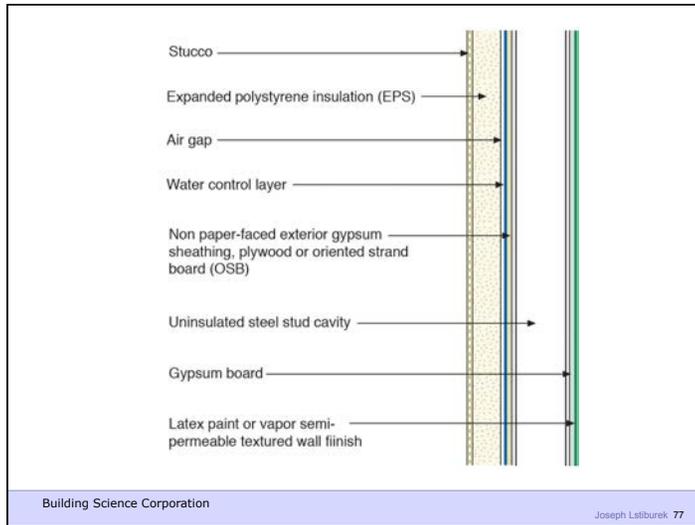
Building Science Corporation Joseph Lstiburek 61









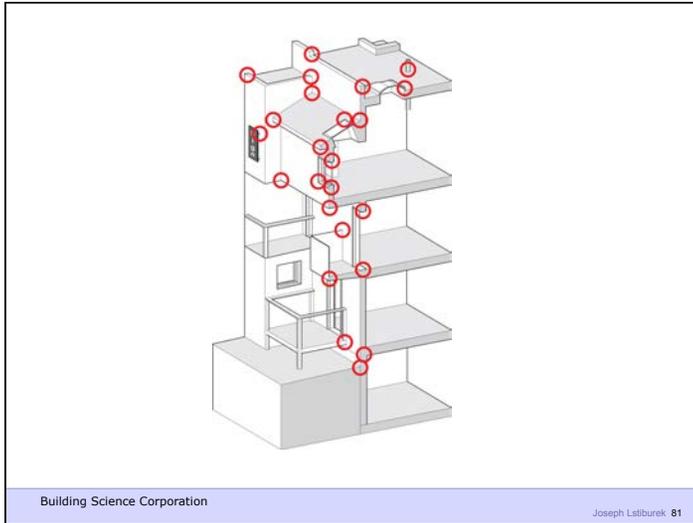


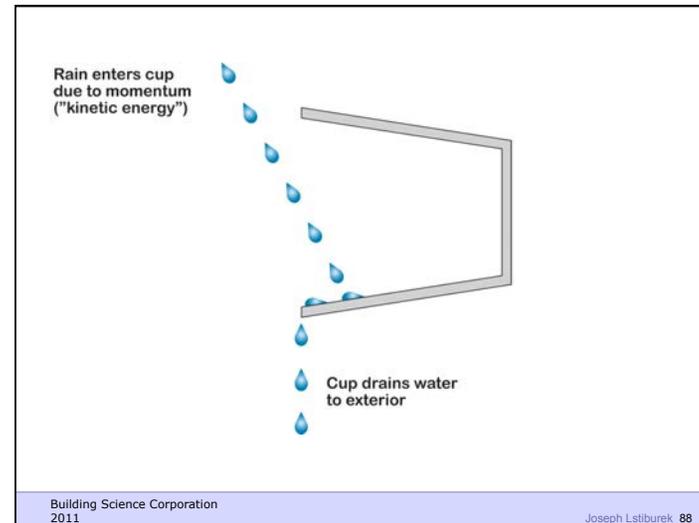
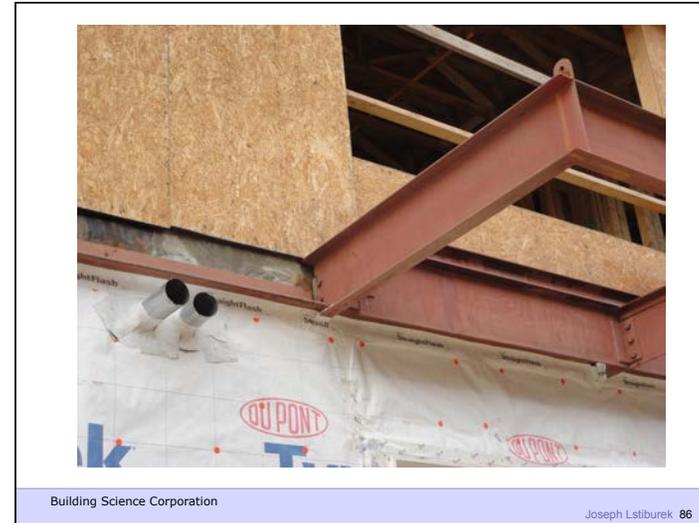
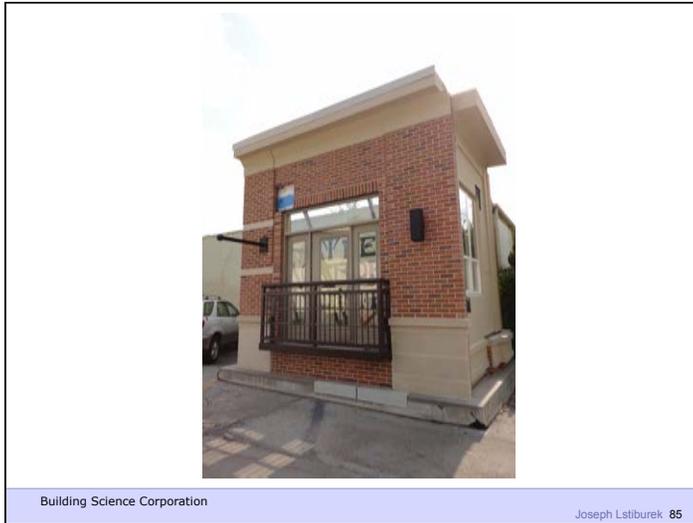
### Commercial Enclosure: Simple Layers

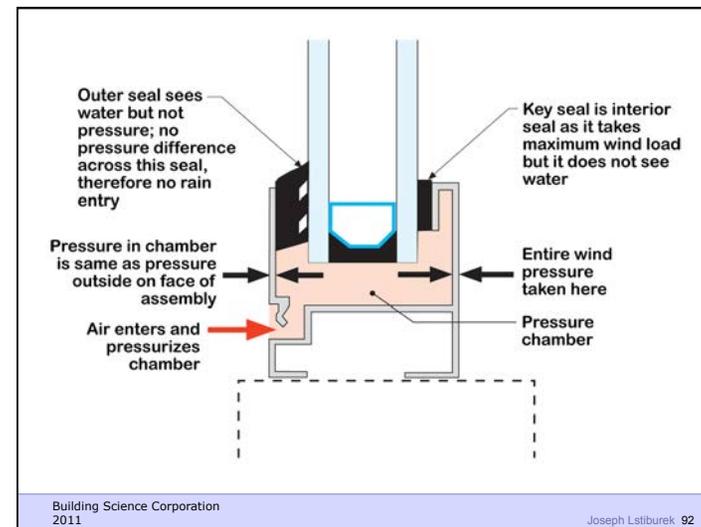
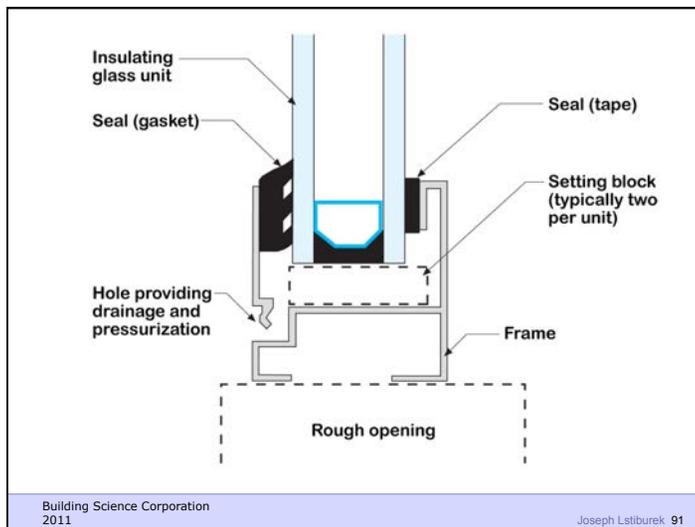
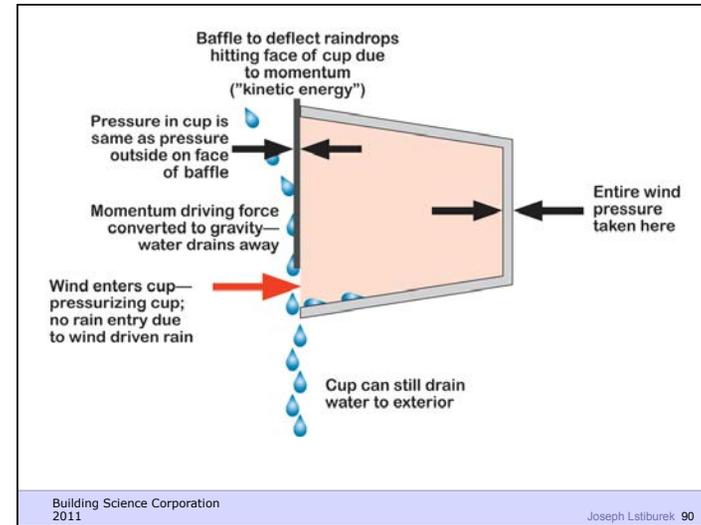
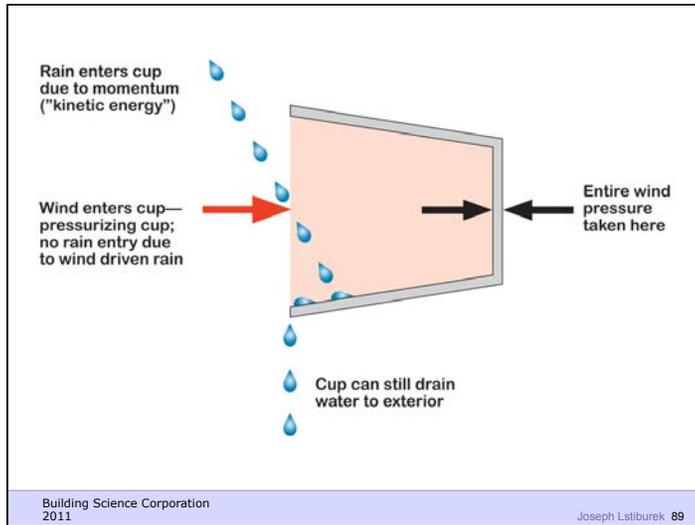
- Structure
- Rain/Air/Vapor
- Insulation
- Finish

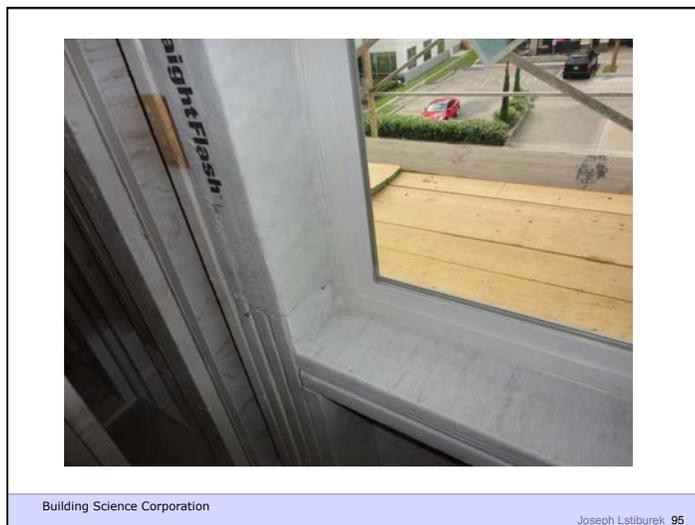
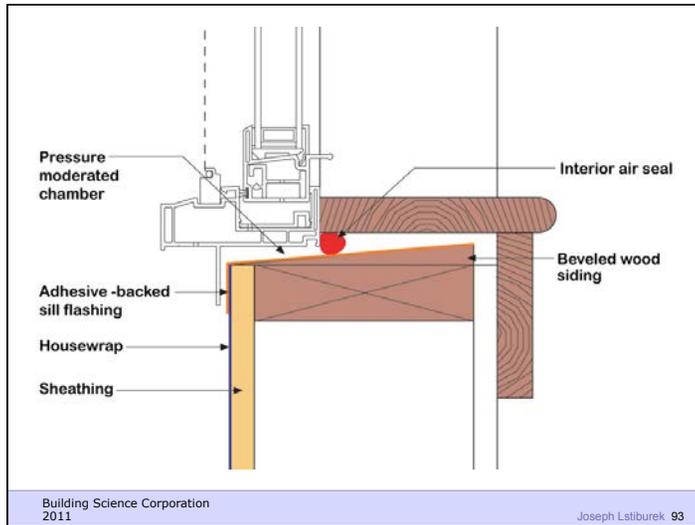
Building Science Corporation

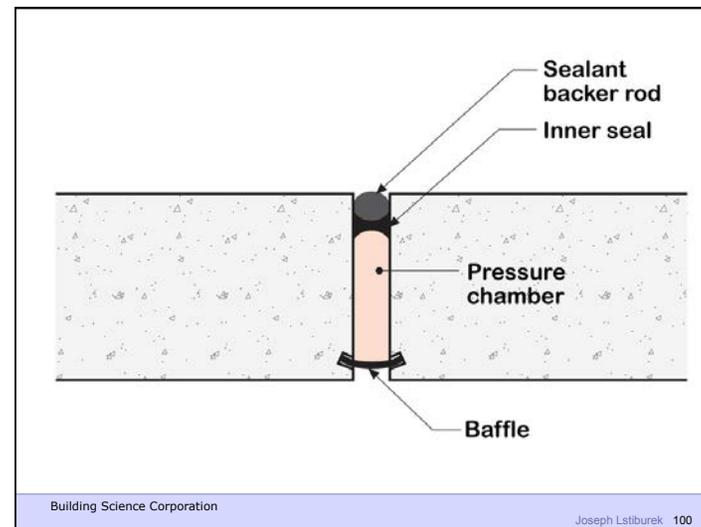
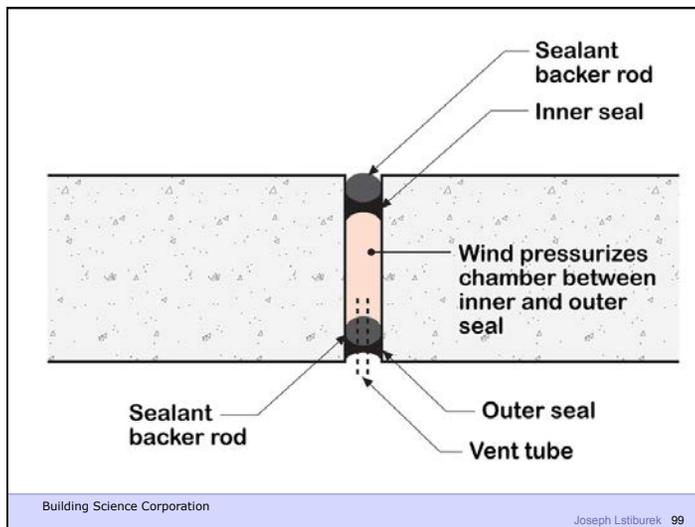
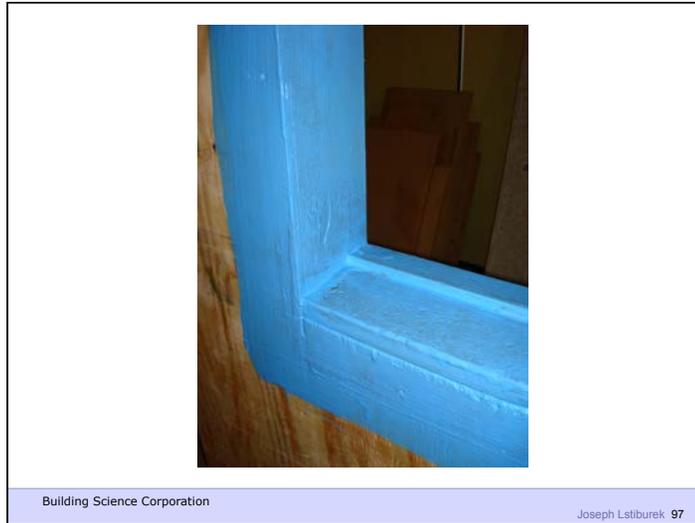
Joseph Lstiburek 80

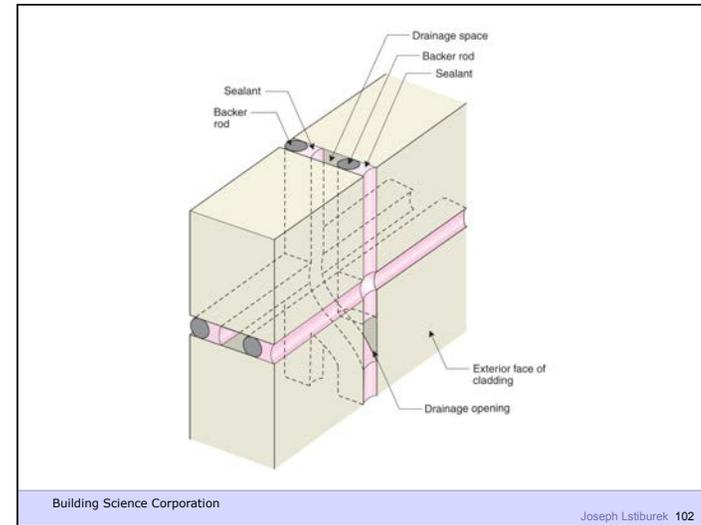
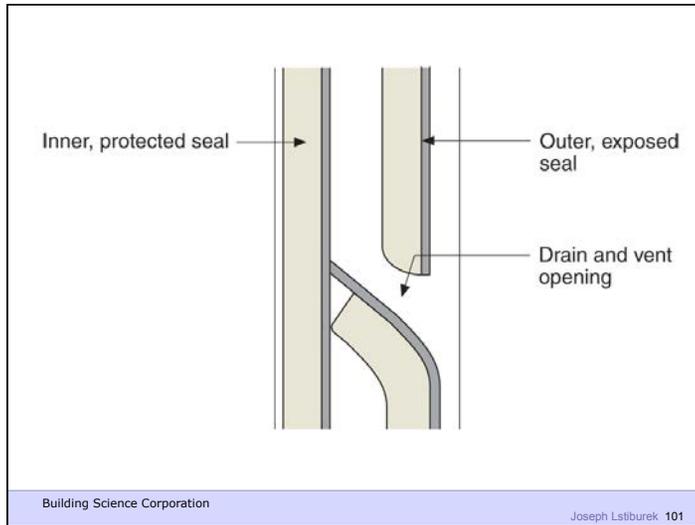


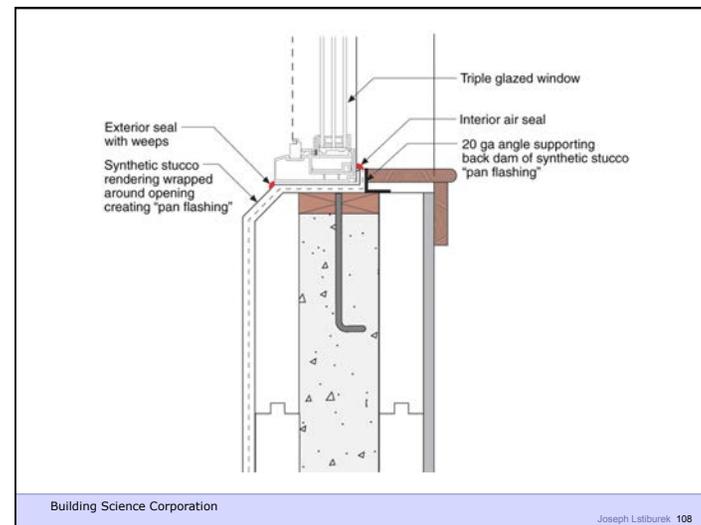


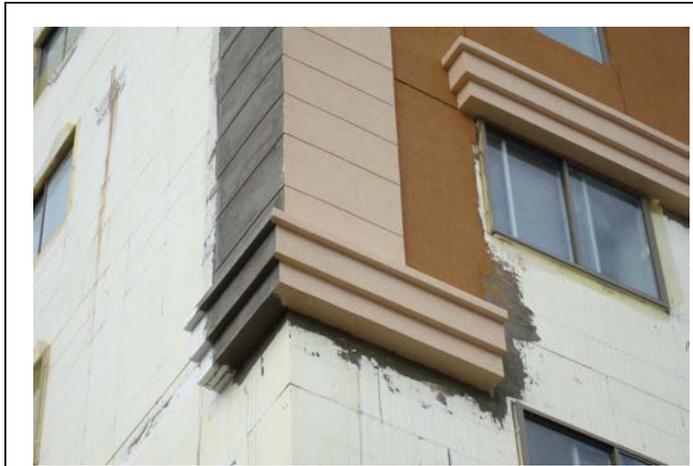












Building Science Corporation

Joseph Lstiburek 109



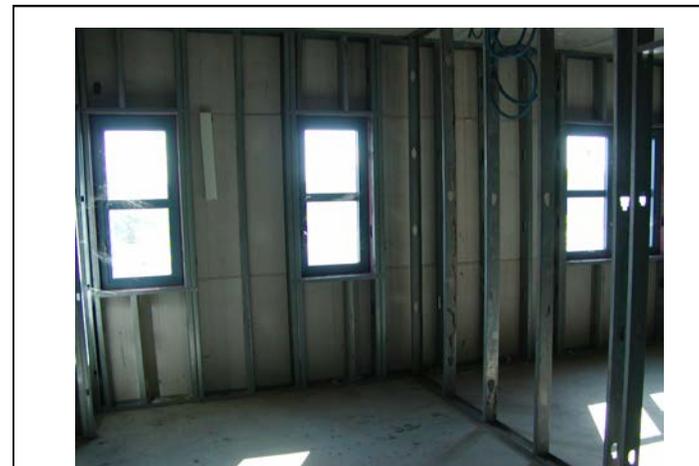
Building Science Corporation

Joseph Lstiburek 110



Building Science Corporation

Joseph Lstiburek 111



Building Science Corporation

Joseph Lstiburek 112

