

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

# Building Science

## Adventures In Building Science

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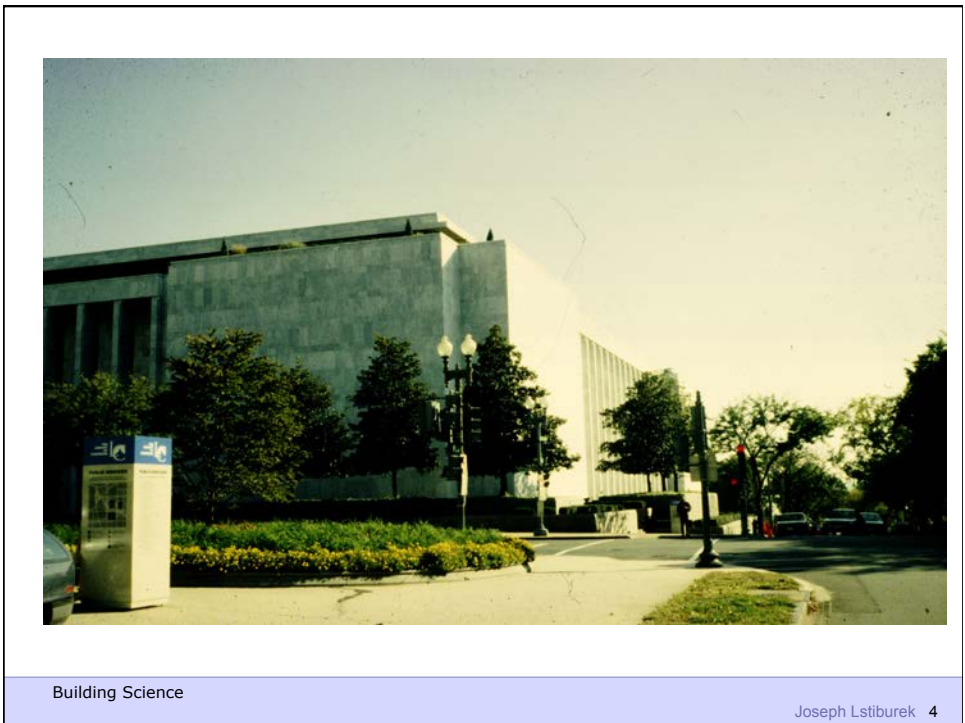
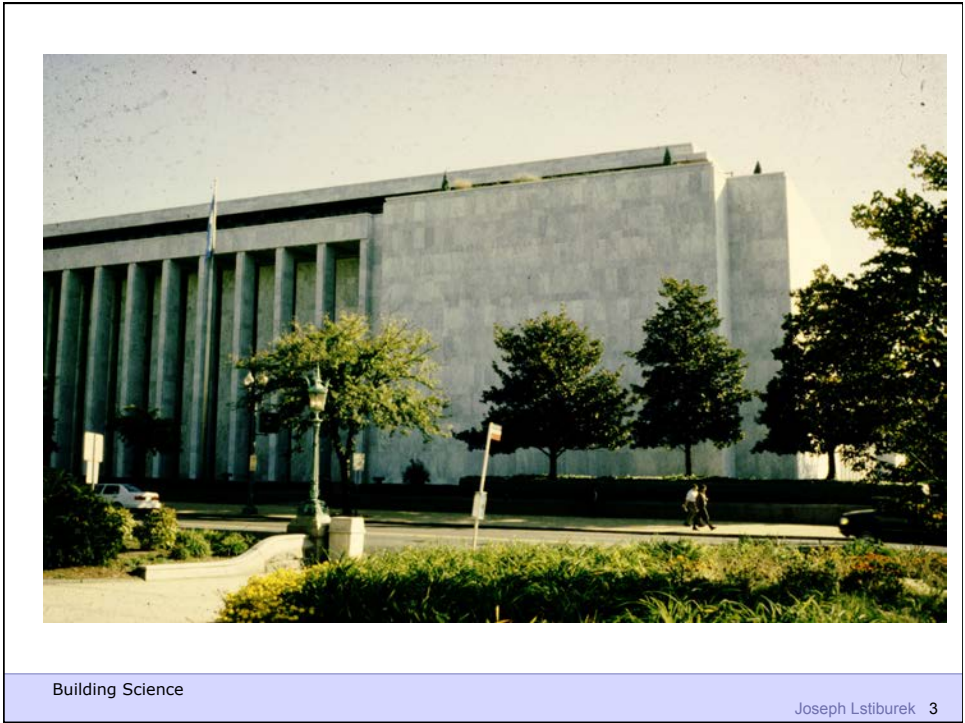
### Definition of a Problem

People

Pollutant (hot, wet, UV, ozone)

Path

Pressure





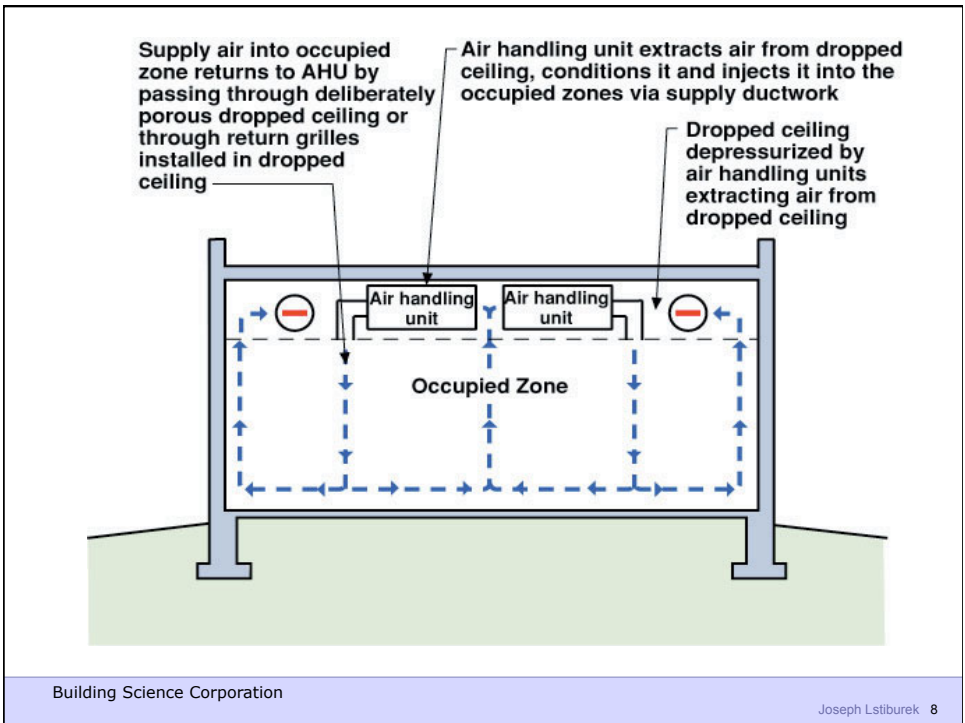
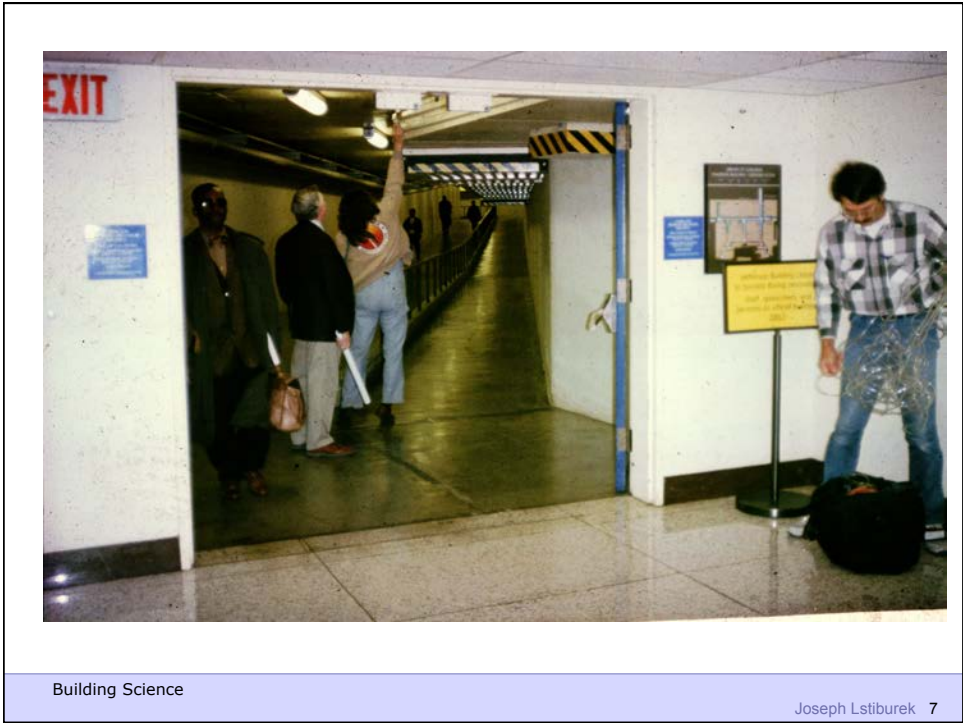
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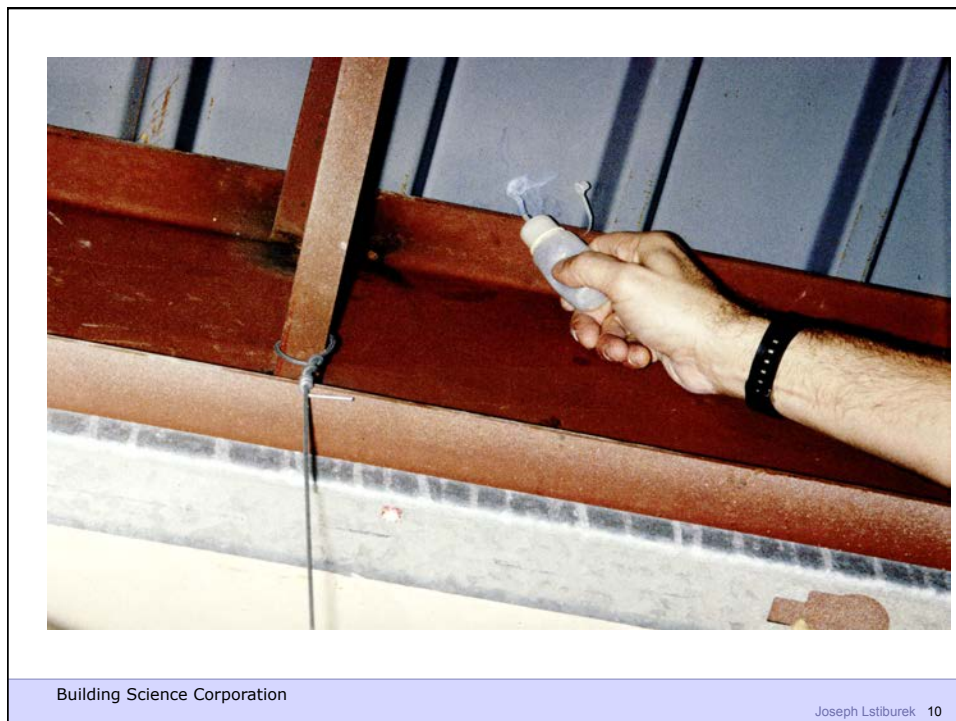
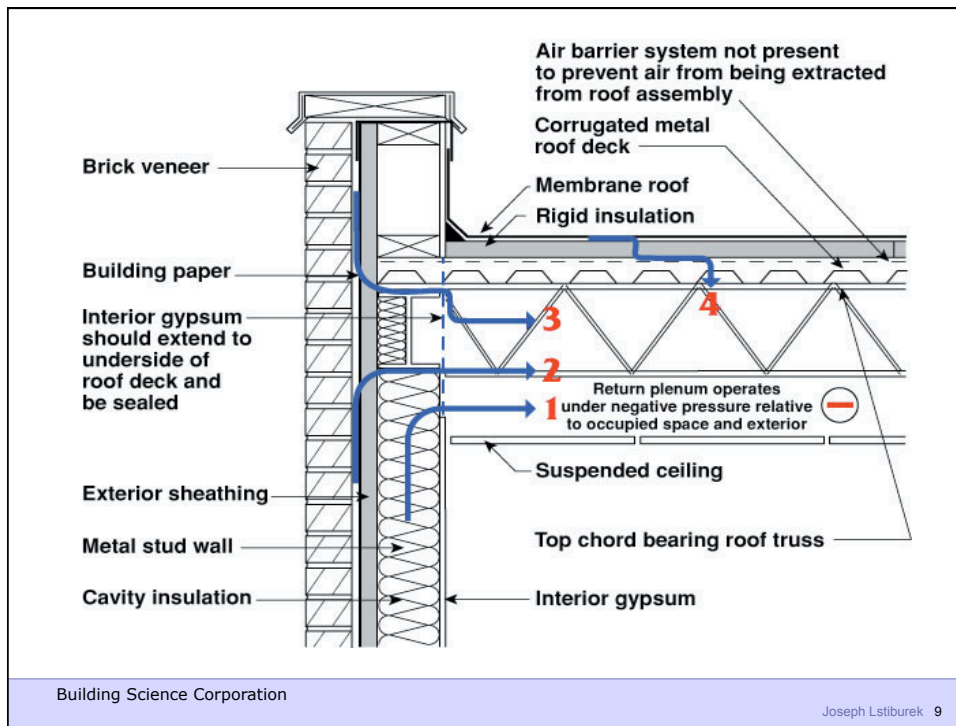
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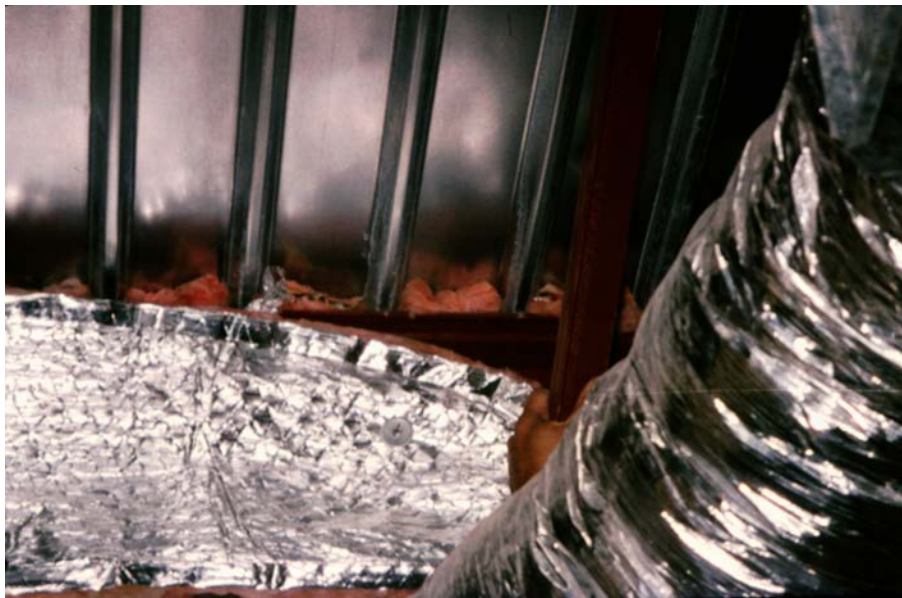
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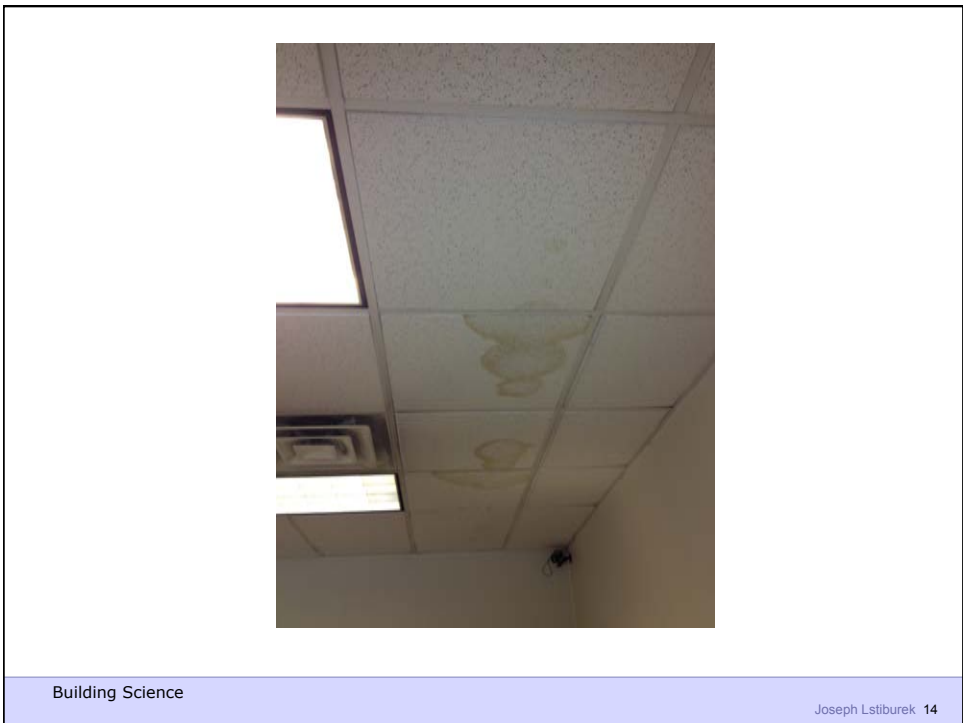
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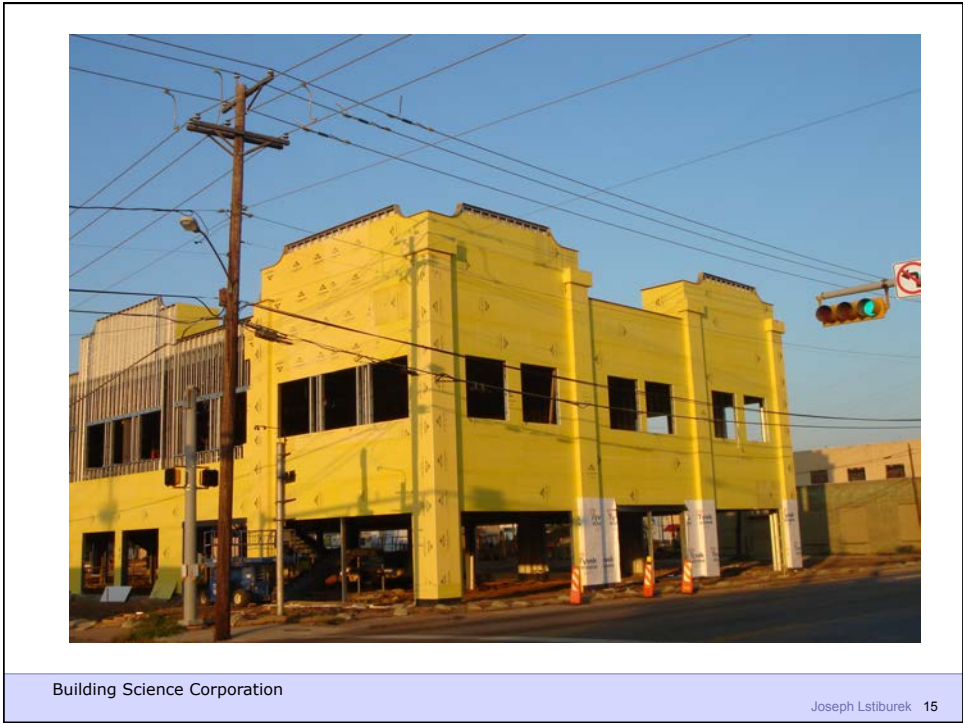
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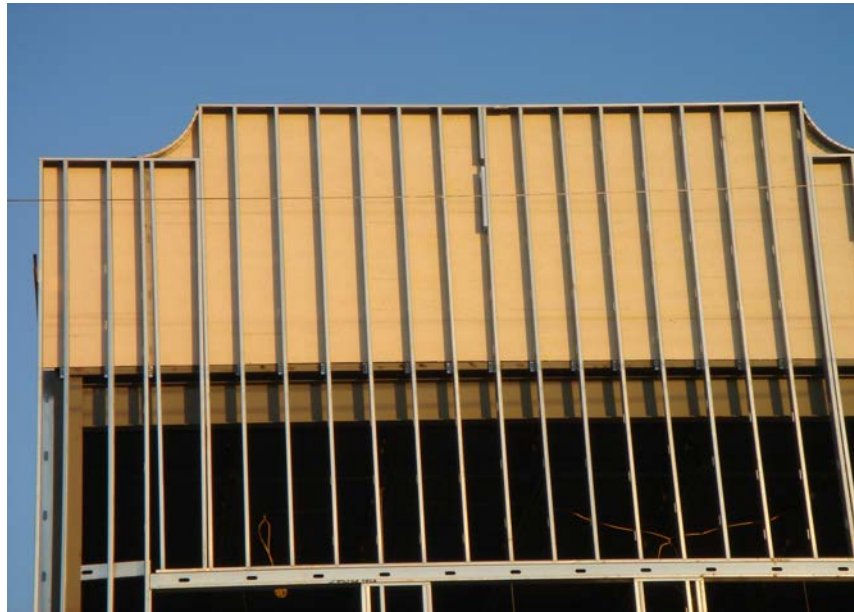
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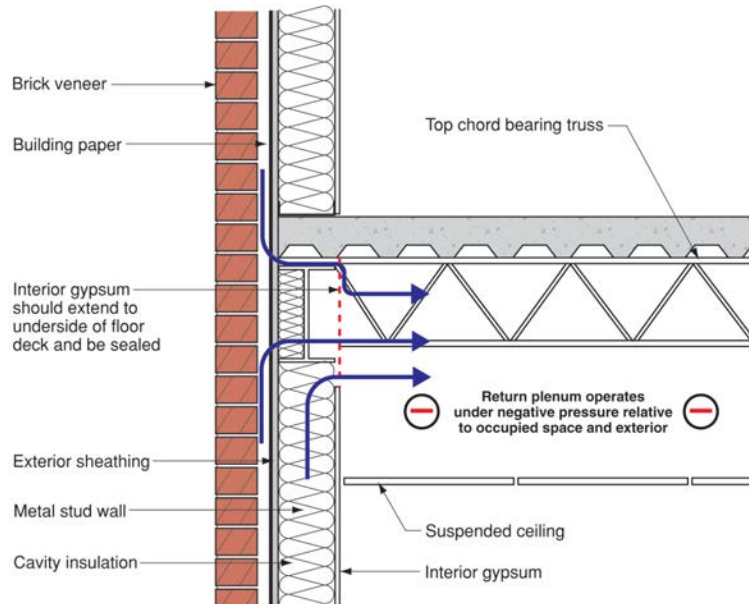






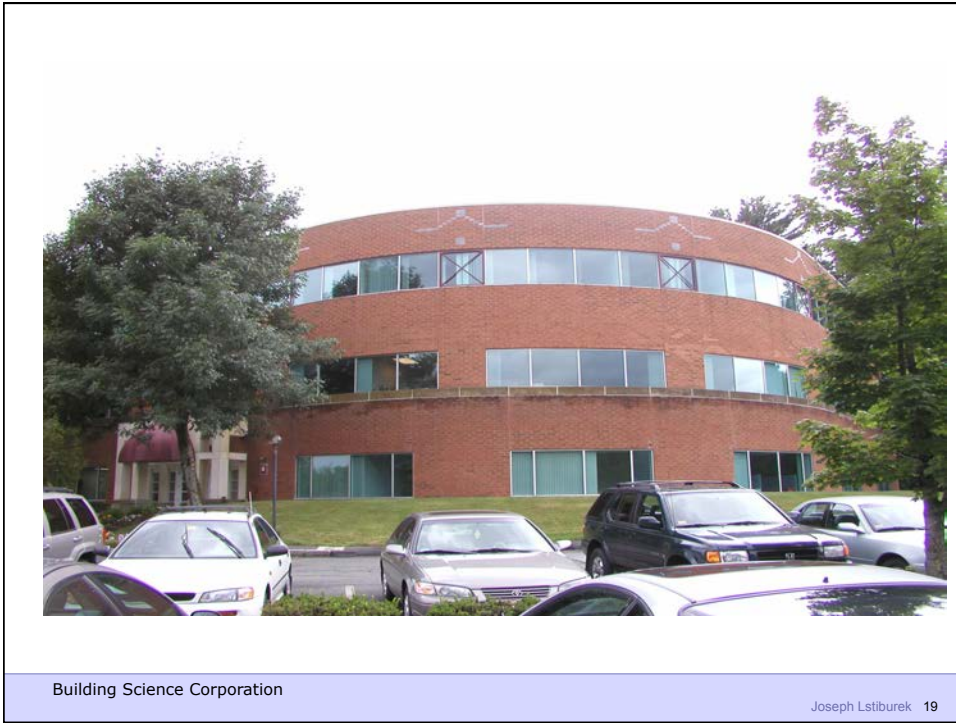
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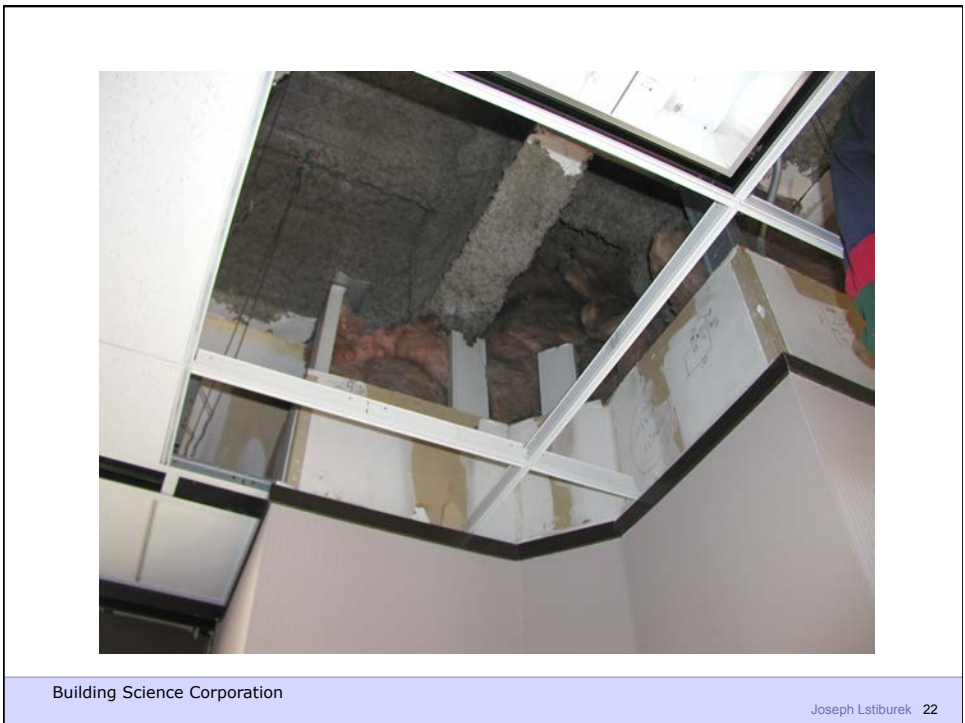
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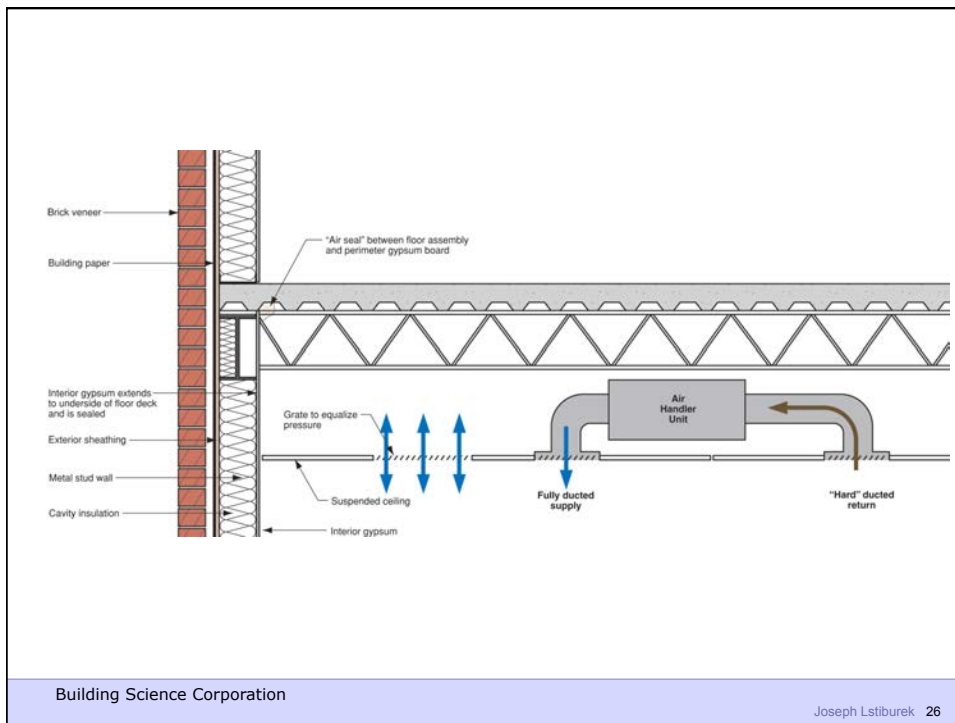
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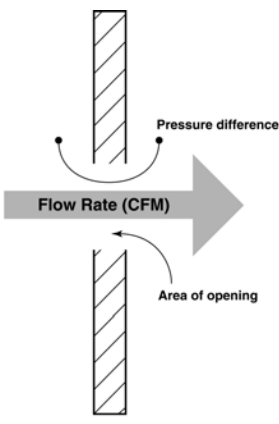
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The diagram shows two vertical rectangular openings, one above the other. A curved arrow between them indicates a pressure difference. A large grey arrow labeled 'Flow Rate (CFM)' points to the right, originating from the opening below. A smaller curved arrow labeled 'Area of opening' points to the bottom opening.

**Air Flow**

- Air flow depends on size of hole
- Air flow depends on pressure difference  
Flow = Area x  $\sqrt{\Delta P}$  x Coefficient
- Air flows from higher pressure to lower pressure

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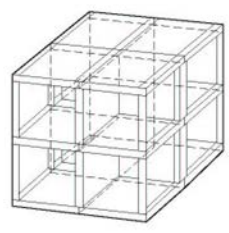


Figure 2.11  
**Three Dimensional Multi-Layer Multi-Cell Analogue**

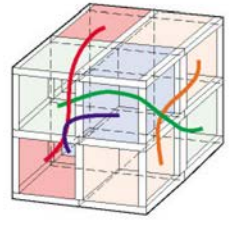
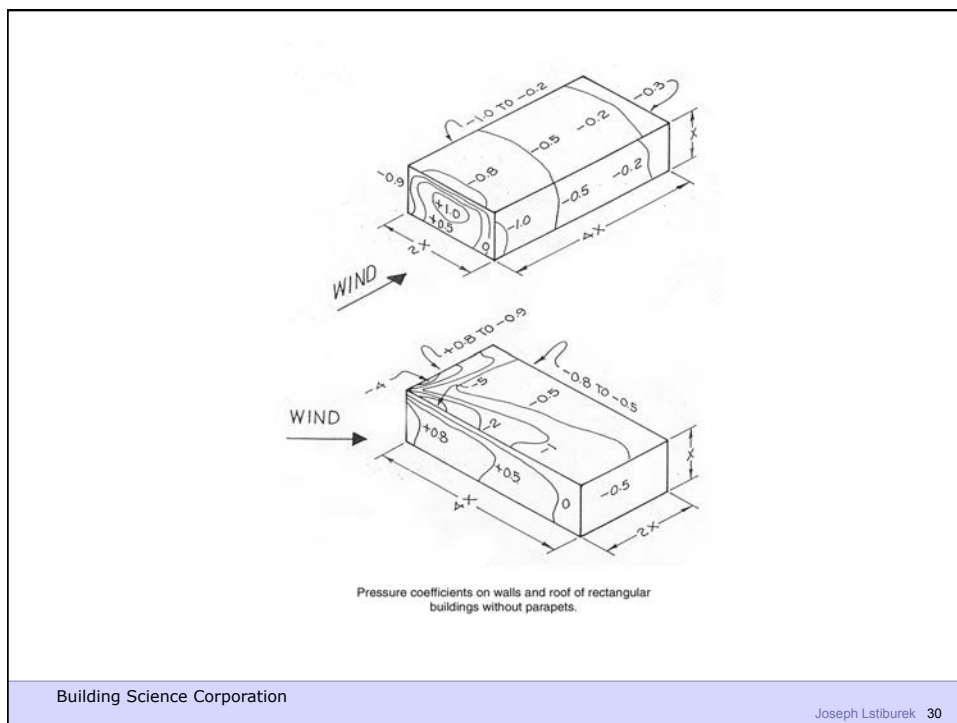
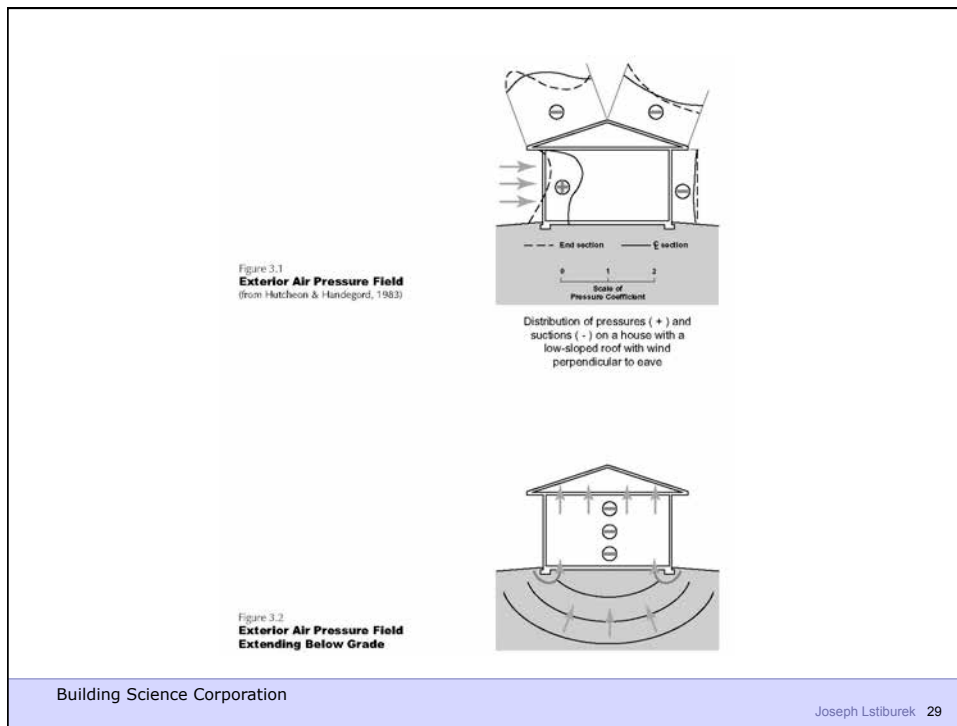
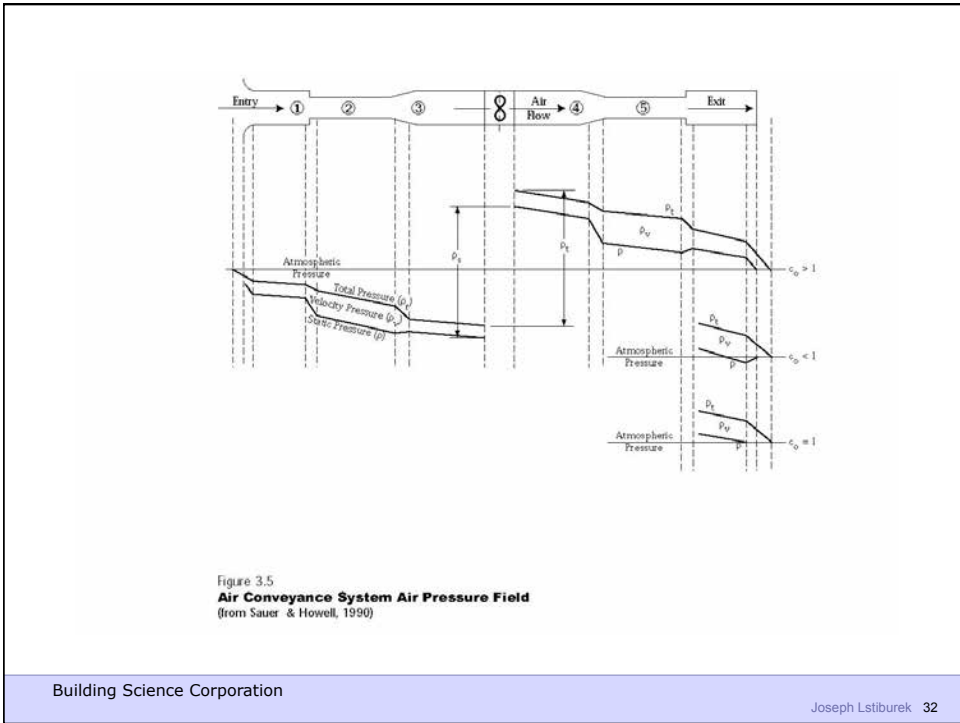
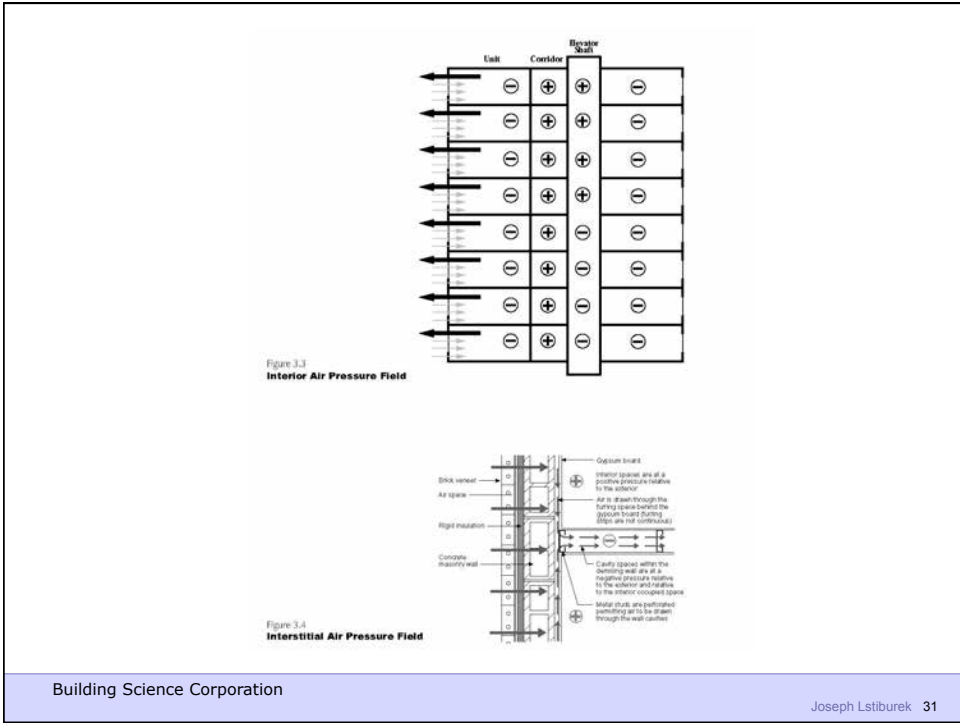


Figure 2.12  
**Three Dimensional Multi-Layer Multi-Cell Non-Contiguous Analogue**

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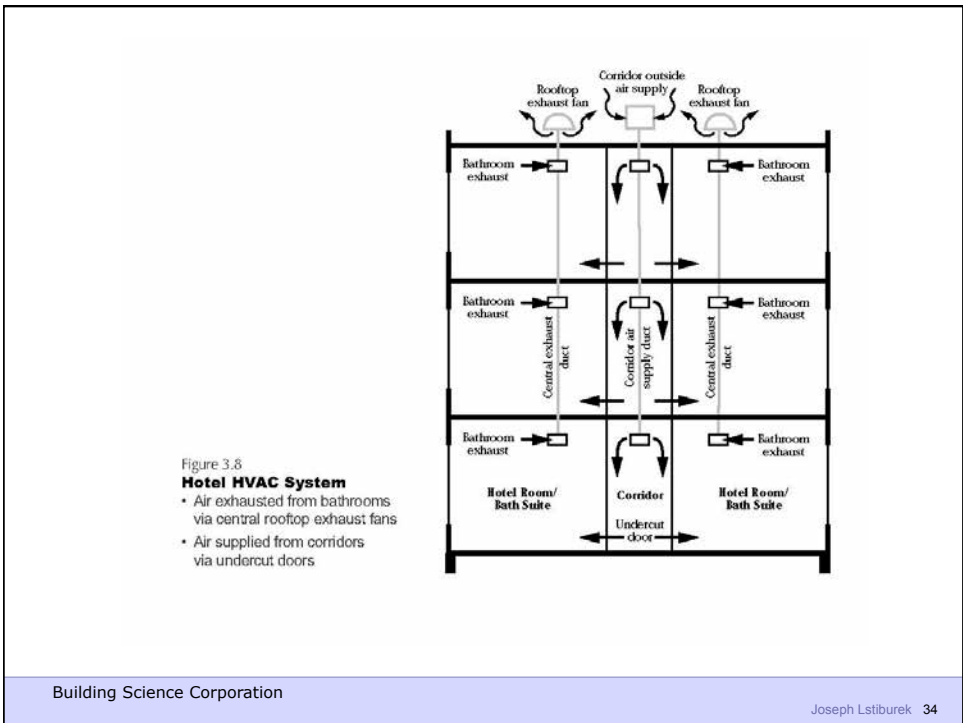






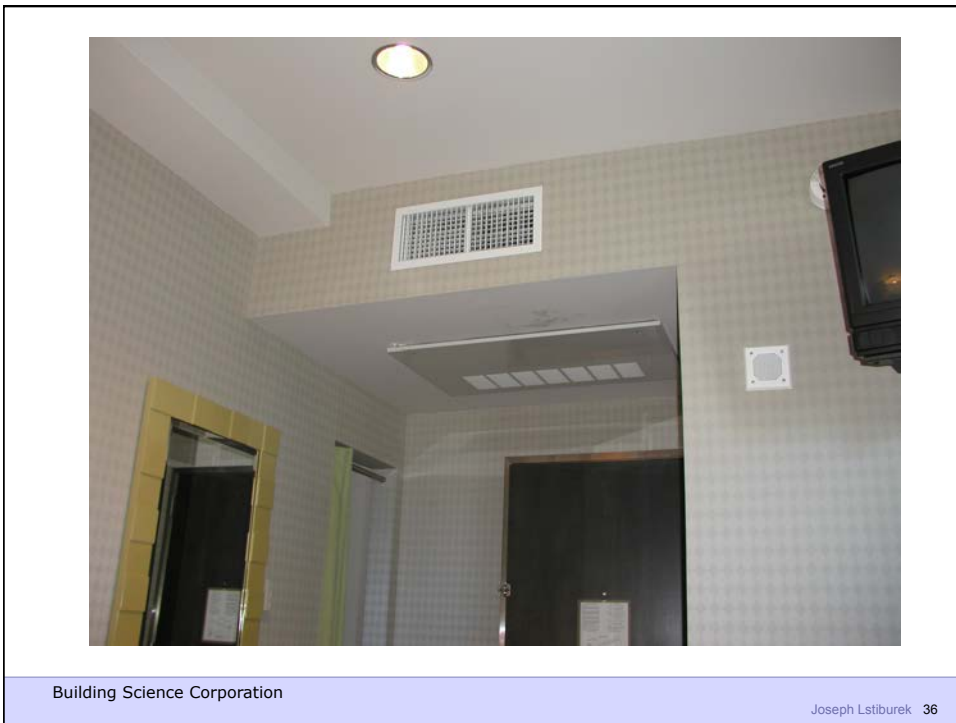
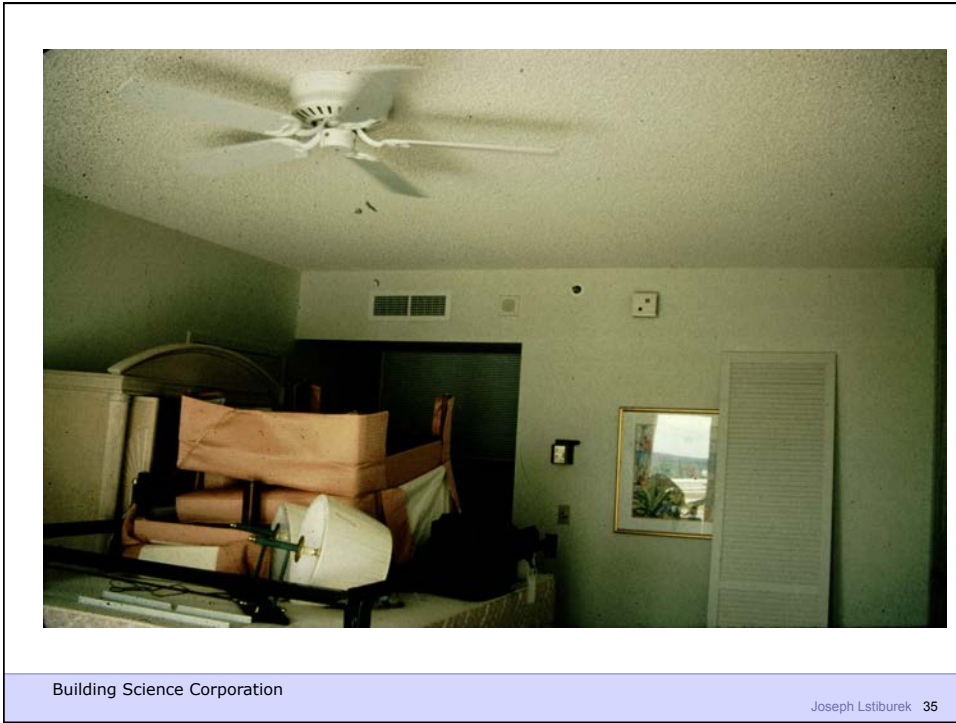
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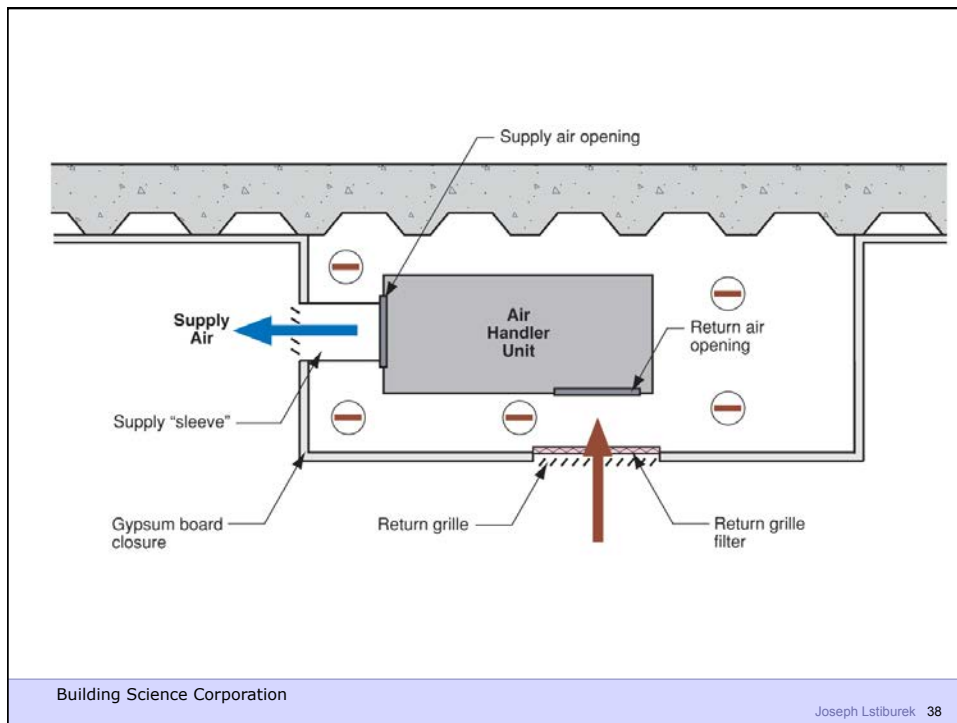
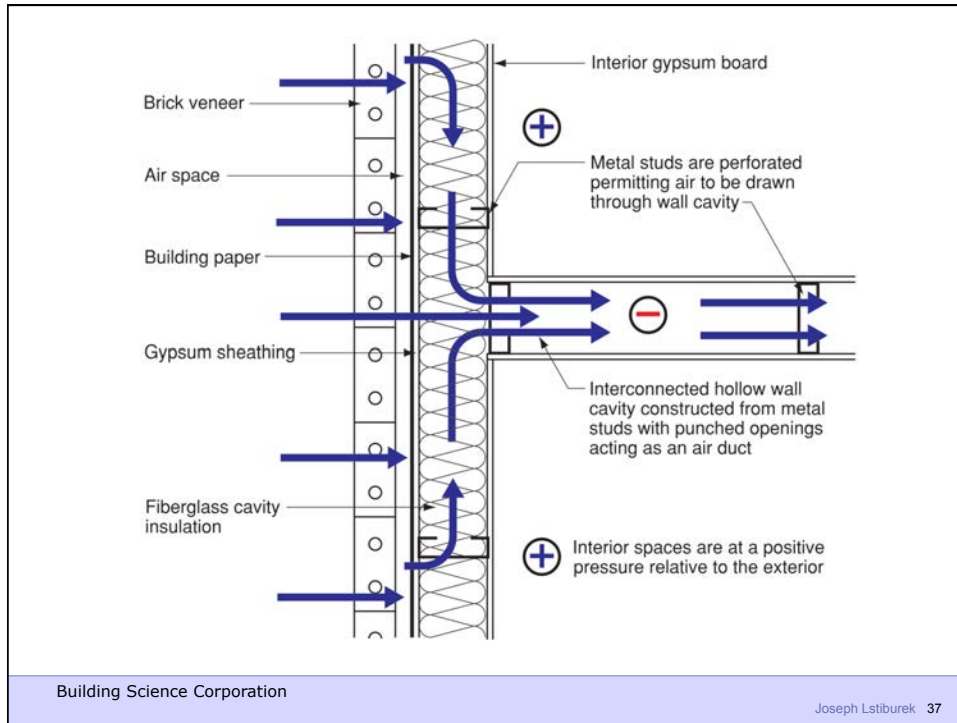
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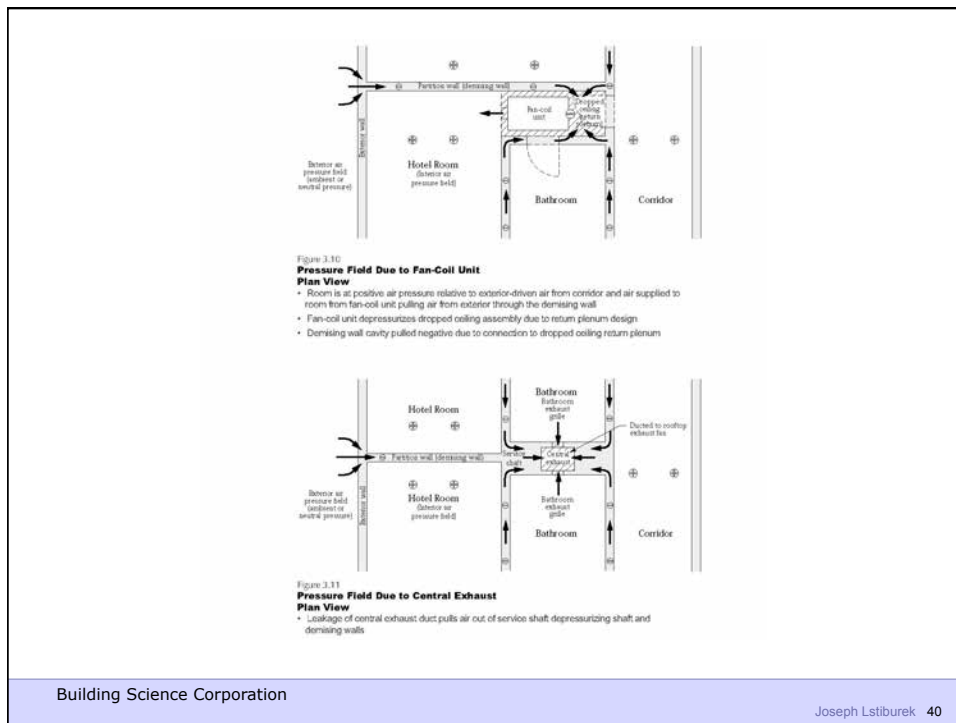
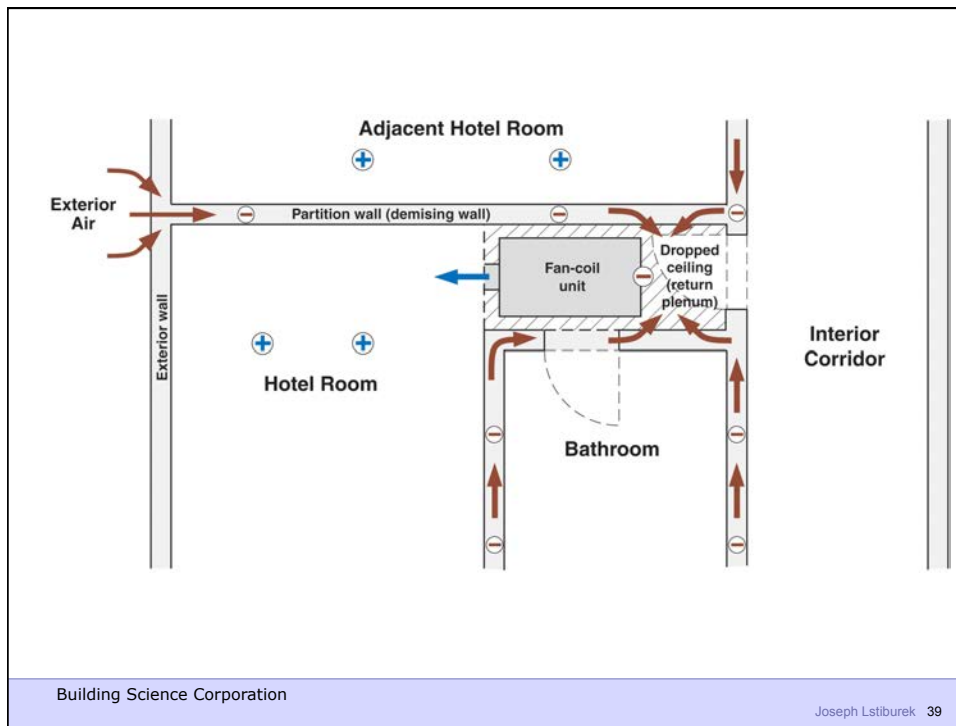


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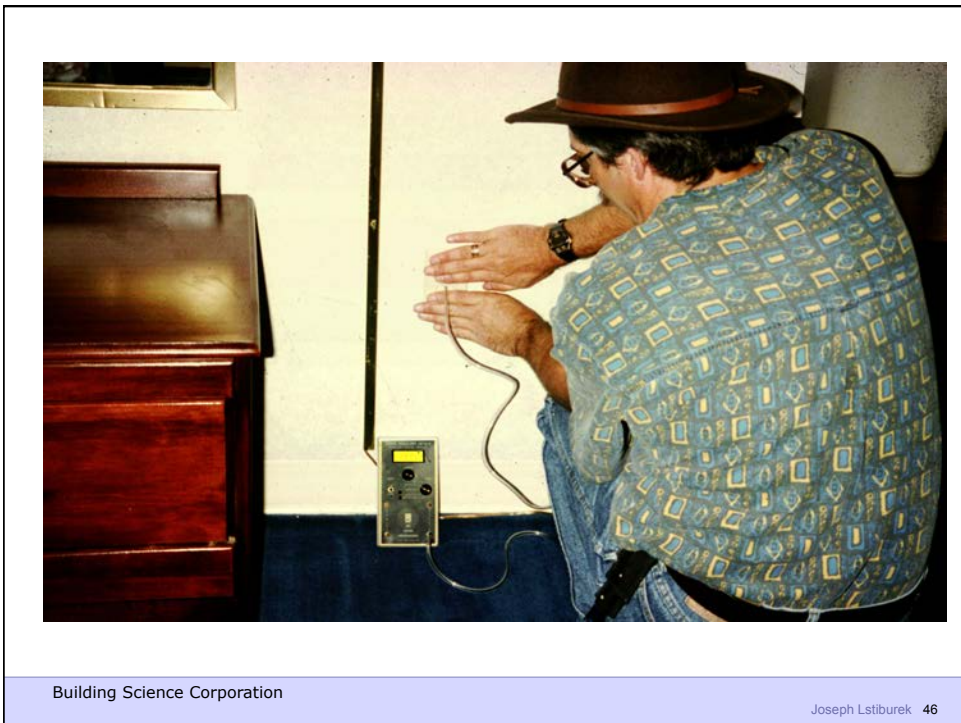
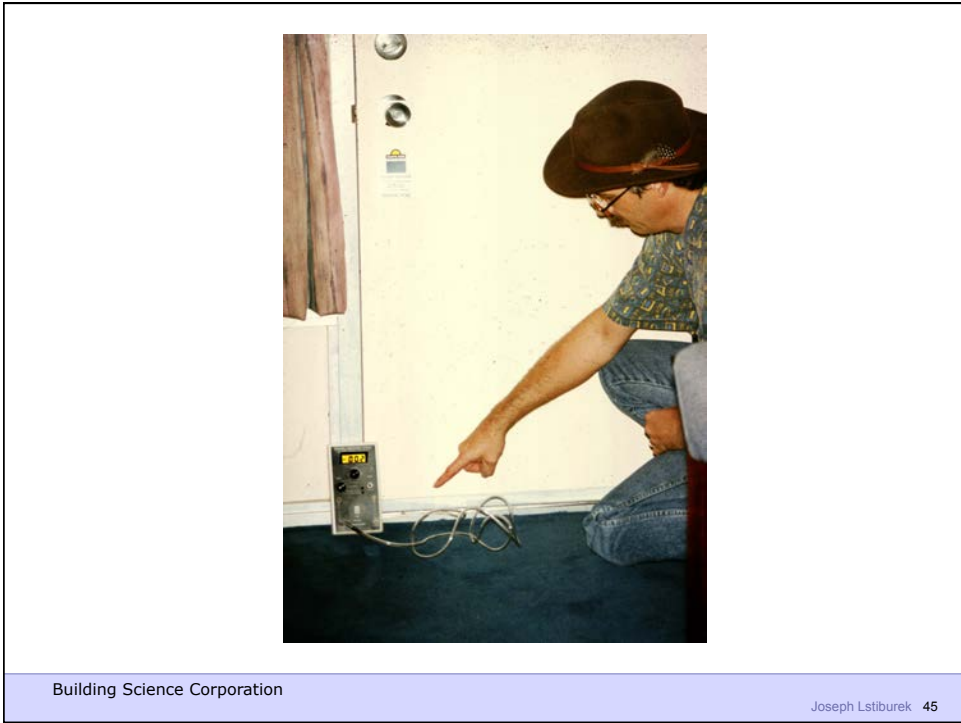
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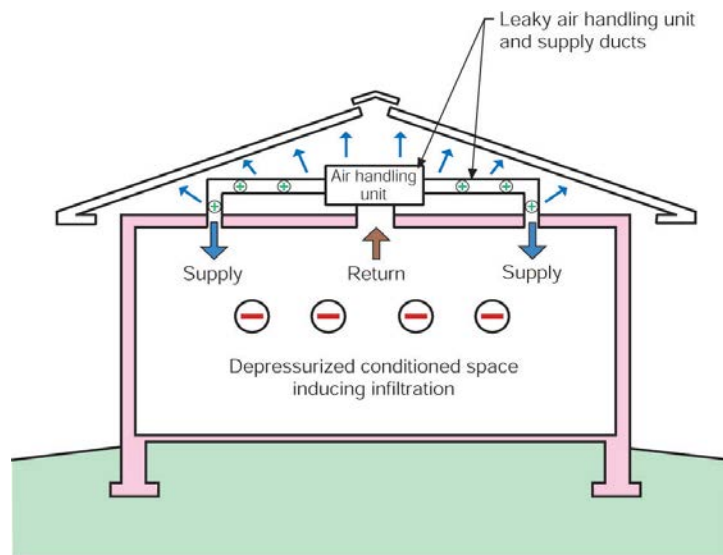






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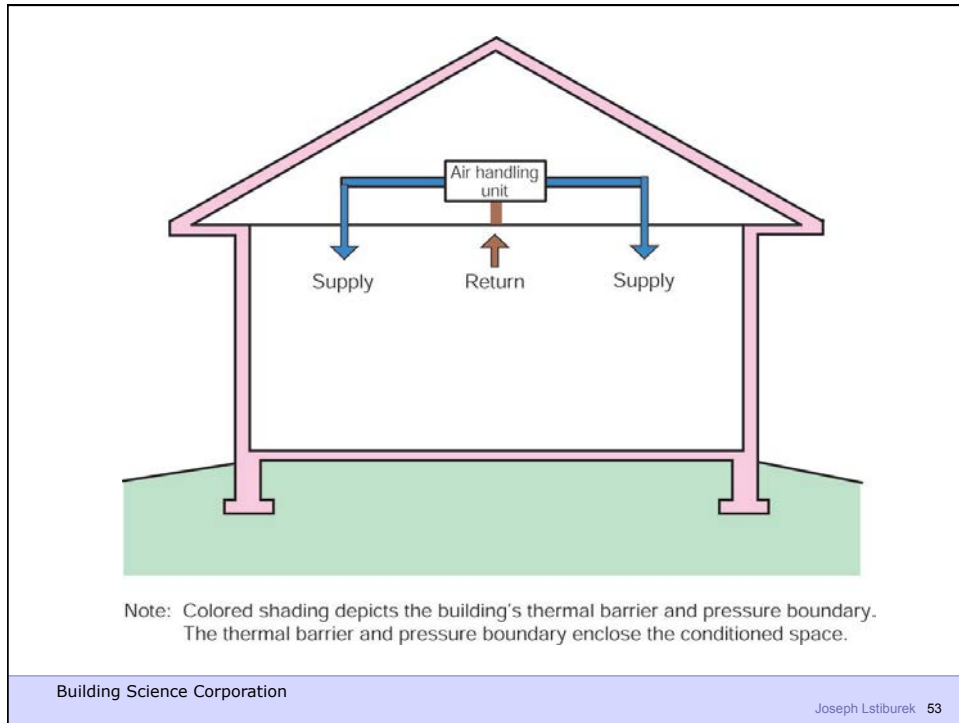
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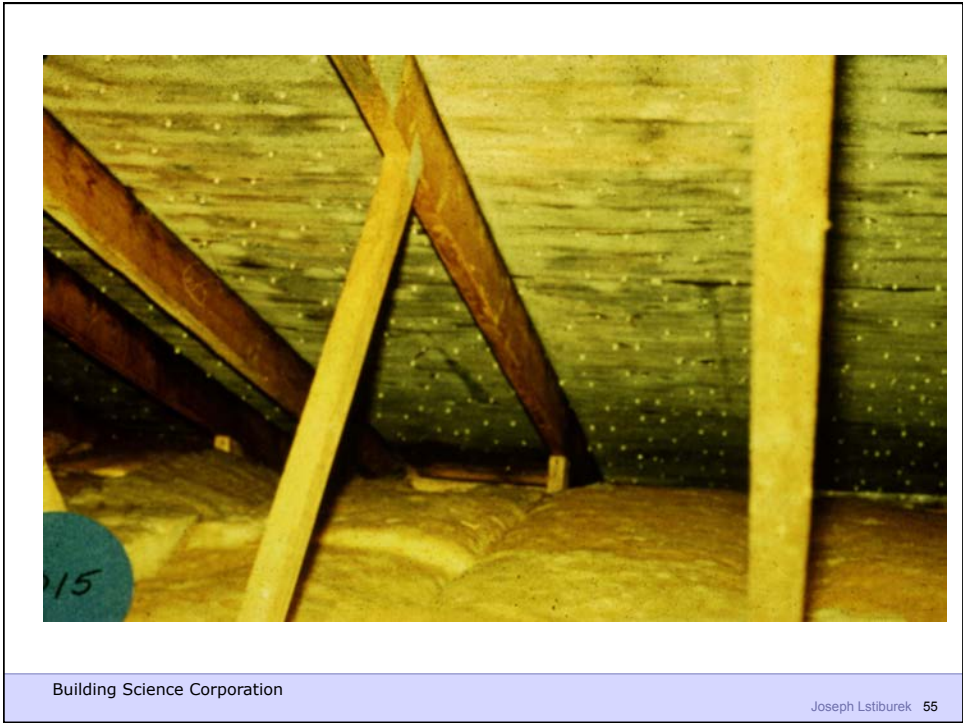


Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

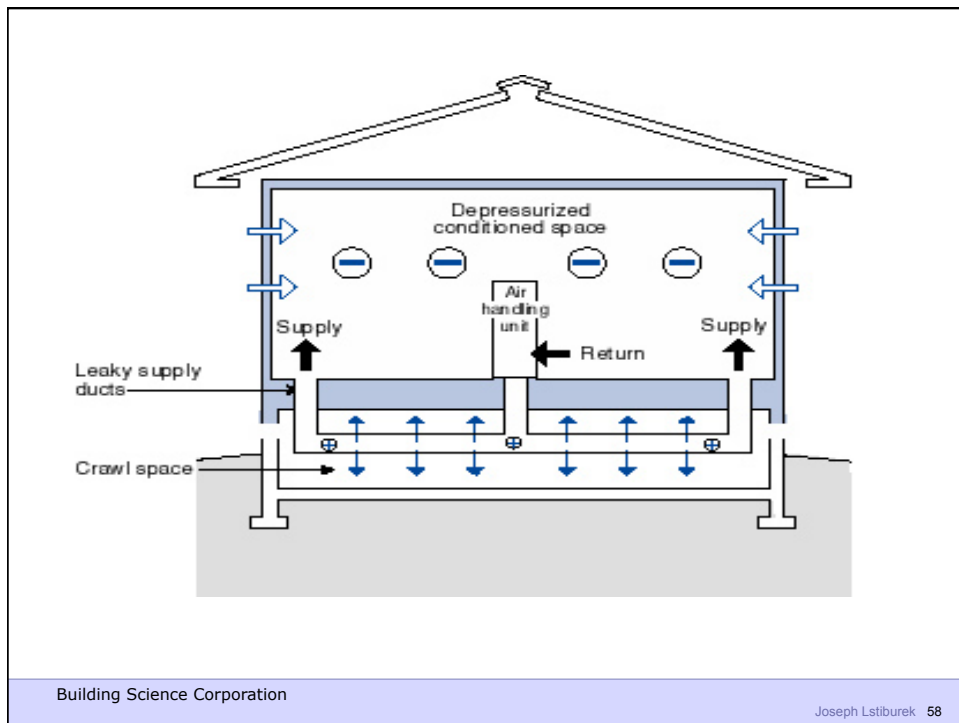
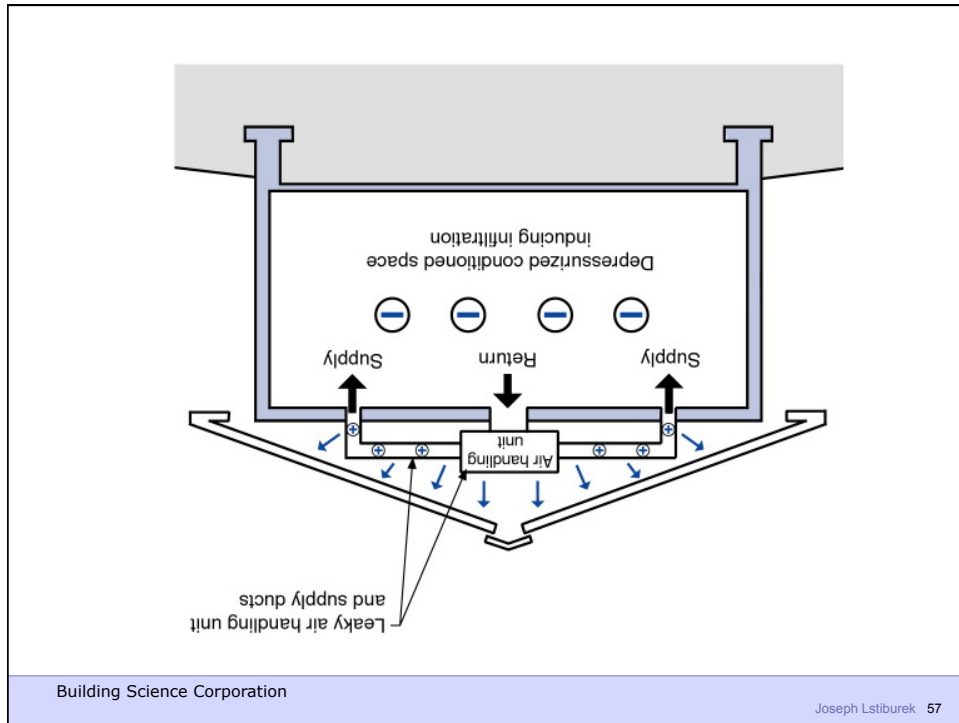
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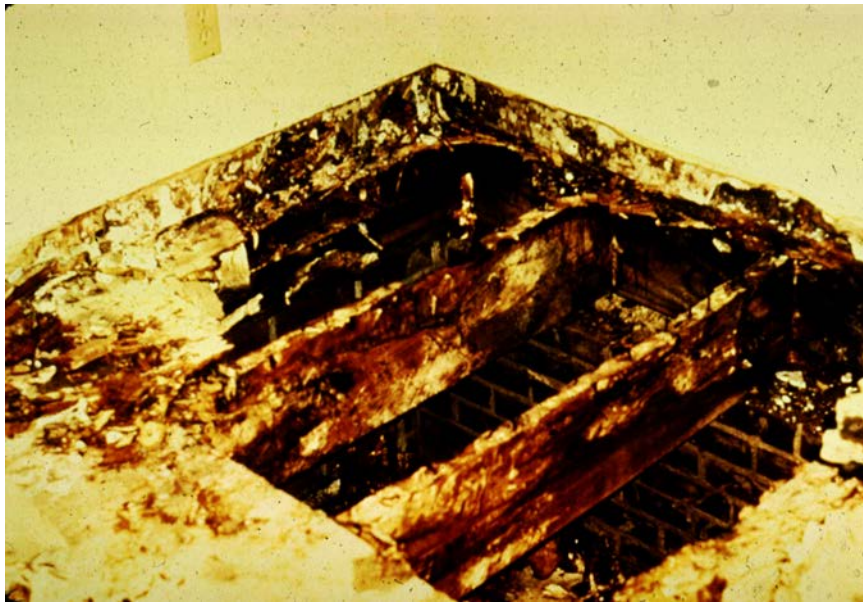
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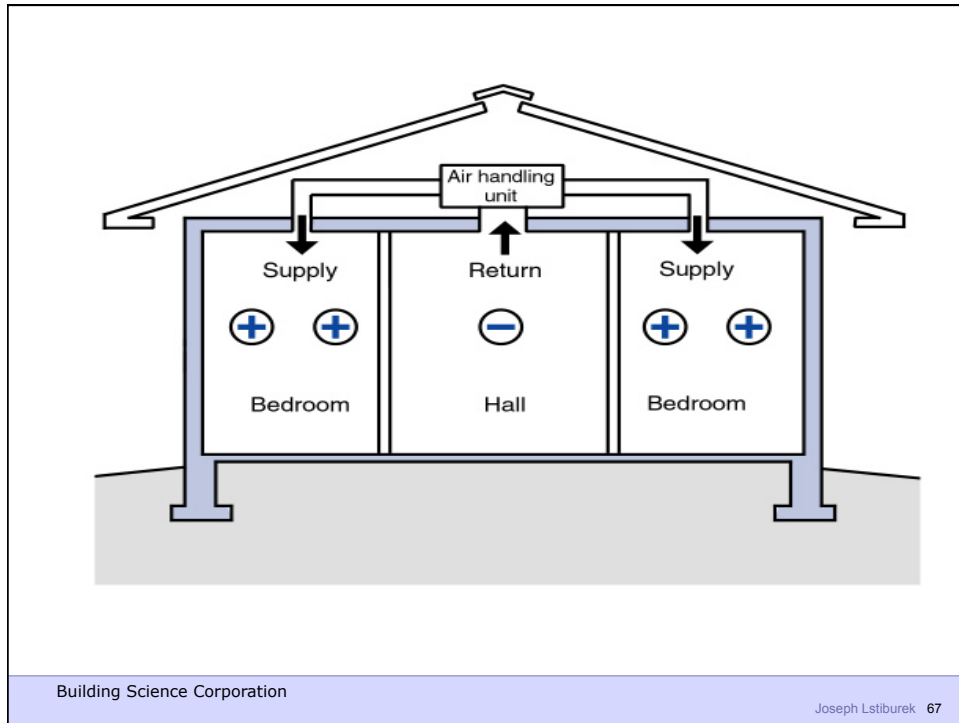
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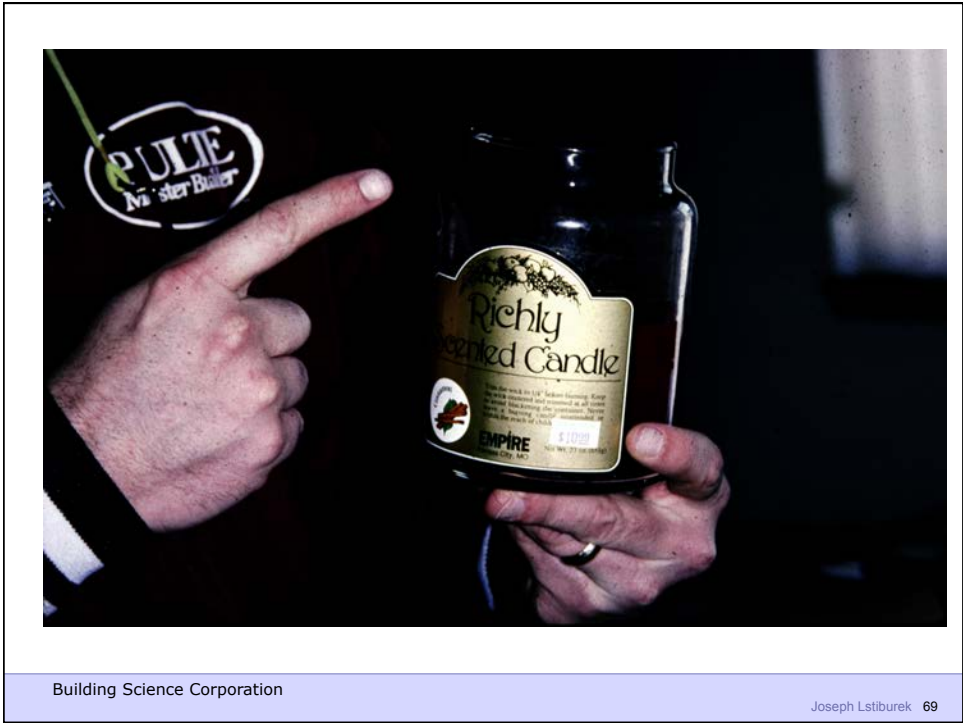


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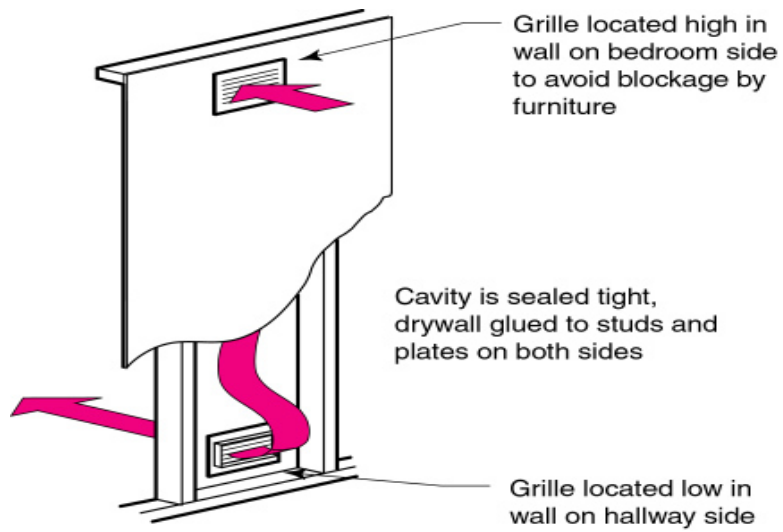
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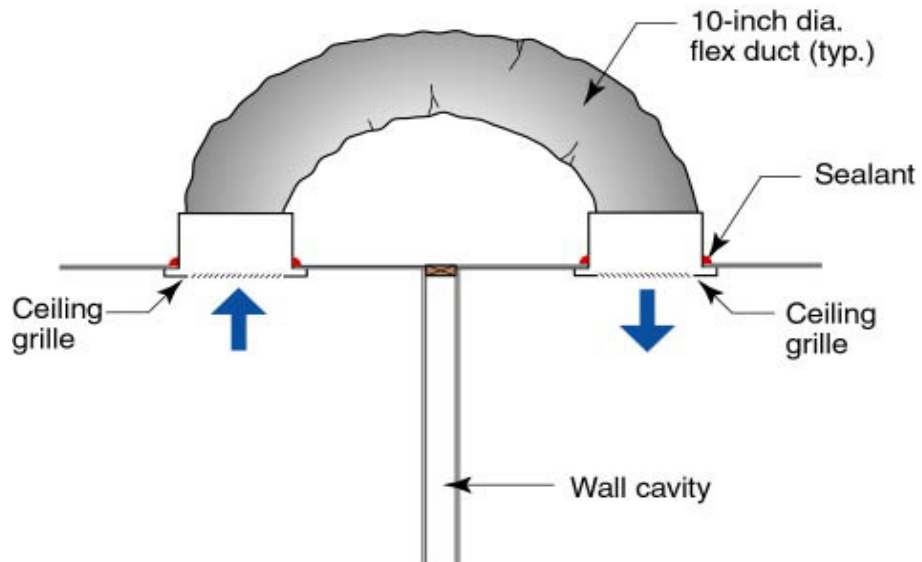
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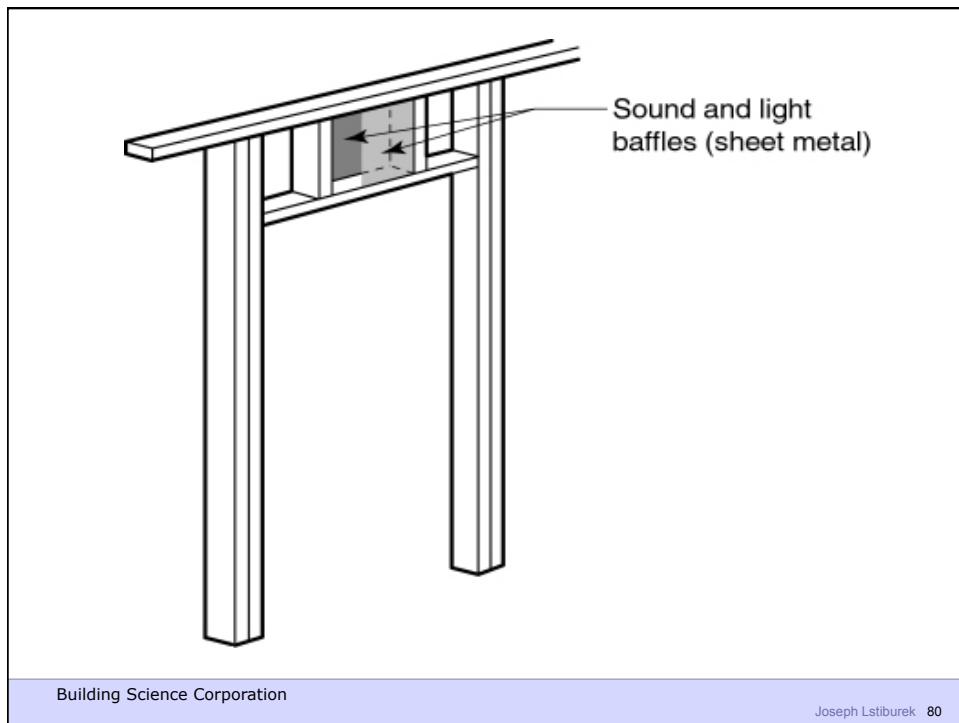
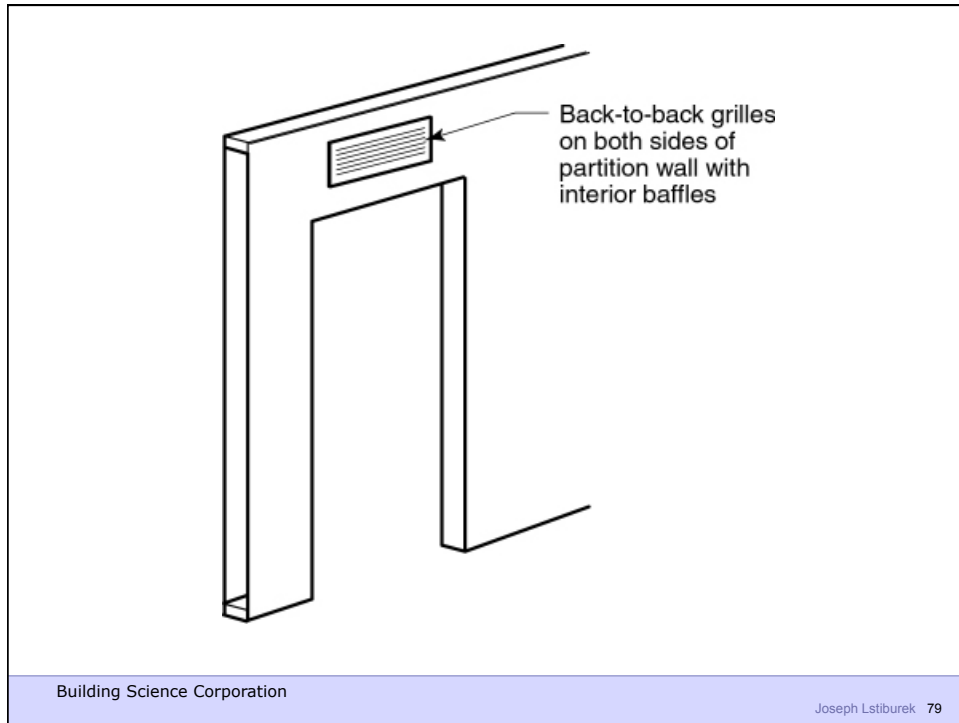
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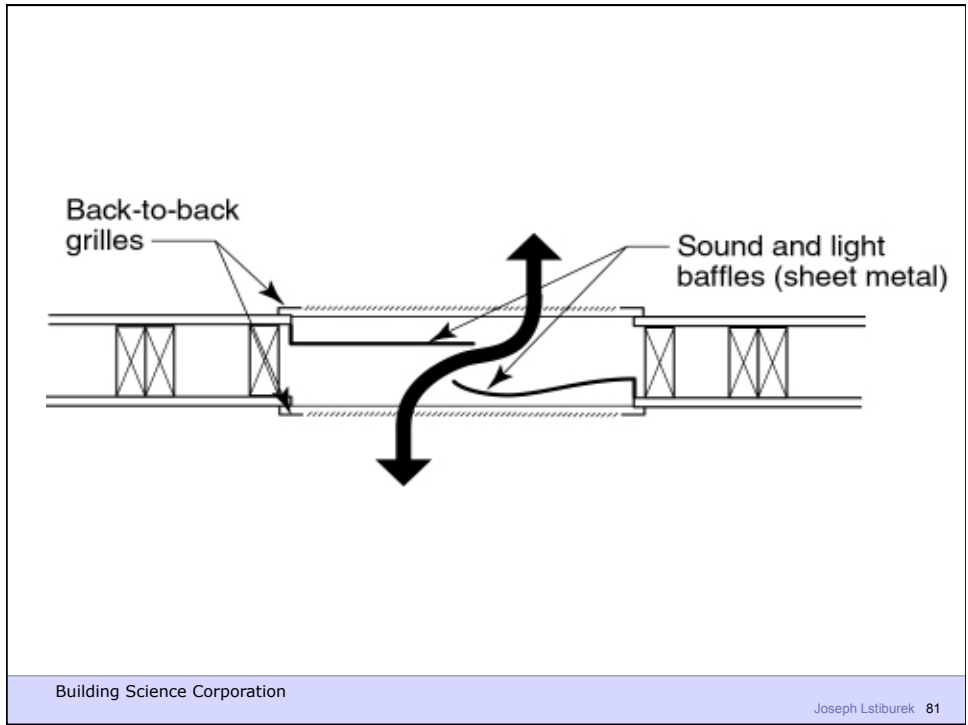
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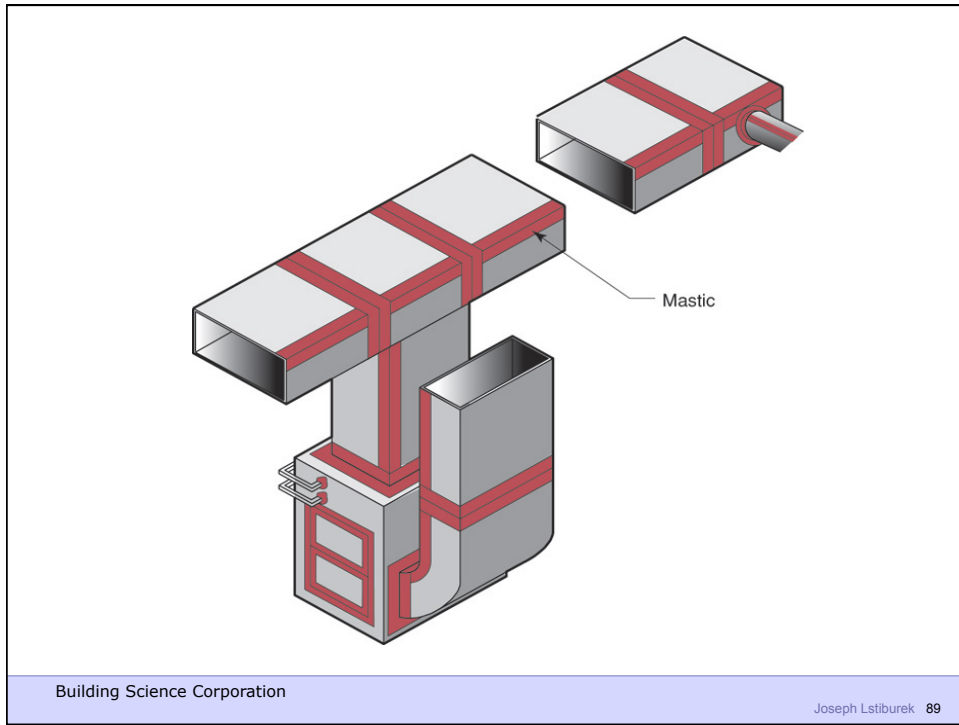
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