Activity 3.1.3 Commercial Wall Systems

Answer Key

Introduction
Commercial walls must typically withstand greater loads and heavier abuse than residential walls and are therefore often built with different components. In this activity you will examine the different parts that make up various commercial wall systems. As you identify the components of these walls, notice the similarities and differences in materials and sizes of the structural components.

Equipment
- Engineering notebook
- Internet access
- Pencil
- Printer
- Keystone Library Renovation Preliminary (student version).rvt

Procedure
In order to enclose the second level of the Keystone Library, a new wall must be constructed at the second floor on Column Line 3. Assume that the new wall will be on the exterior side of the column line and will extend from the second floor level to the height of the adjacent walls on Column lines A and D. The new wall must also provide an exterior brick veneer to match the existing exterior brick. Note that, according to the design drawings, the renovation design calls for a total wall height of 38’-6”. This exceeds the maximum wall height per the Noblesville Code of Ordinance (which you discovered in a previous activity). However, the city has granted a variance to the county library system to allow the library to exceed the limit and has approved the building height as shown in the construction drawings.
1. Research each of the following wall systems for use as an exterior wall on the second floor at column line 3 in Keystone building.

2. Hand sketch a detail of each wall and label each component (including at least the exterior brick veneer, insulation, and interior finish).

3. Include the thickness of each component and the type of insulation on the sketch.

4. Give at least one advantage and one disadvantage of each wall system for use in this application.

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>SKETCH</th>
<th>Advantages and Disadvantages</th>
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</table>
| Concrete Masonry Unit (CMU)  | ![Concrete Masonry Unit CMU Sketch](image) | **Advantages:**  
  • Durable  
  • Fireproof  
  • Sound absorbing  
  • No additional interior finish required  
 **Disadvantages:**  
  • Requires skilled labor |
| **Cast-in-Place concrete** | **Advantages:**  
| | • Durable  
| | • Fireproof  
| | • Sound absorbing  
| | • Can cast concrete in insulating forms (ICF)  
| | **Disadvantages:**  
| | • Higher initial cost  
| | • Two construction trades involved  
| | • Longer construction time than CMU  
| | • Not desirable interior finish – requires another finish |

| **Tilt-up Concrete** | **Advantages:**  
| | • Durable  
| | • Fireproof  
| | • Sound absorbing  
| | • Thin bricks can be cast into wall  
| | • Less skilled labor required (less expensive)  
| | • Relatively fast construction time  
| | **Disadvantages:**  
| | • Contractor should have experience with tilt-up  
| | • Can be dangerous  
| | • Large set up costs due to special equipment needs  
| | • Undesirable interior surface |

| **Light Gauge Metal Framing** | **Advantages:**  
| | • Less expensive  
| | • Lighter weight  
| | **Disadvantages:**  
| | • More flexing can lead to cracks  
| | • Can corrode if in contact with water  
| | • Multiple construction trades involved  
| | • Interior surface (drywall) not as durable |
Curtain Wall

MULLION

GLAZING

Advantages:

- Day lighting
- Good views
- Aesthetics

Disadvantages

- Weaker than other walls
- Requires maintenance to maximize service life

NOTE: Other sketches, advantages, and disadvantages are possible.

5. Select a wall type for the Keystone Library application and justify your choice.

   Answers will vary

6. Include the new wall construction in the building 3D architectural model.

   Check 3D architectural model.

7. Create a section view (in the architectural software) through the new wall. Label all building components.

   Check drawing or 3D architectural software file.

Conclusion

1. Explain why the materials used in a residential wall system are different from a commercial system.

2. Why is concrete a popular commercial construction material?

3. What factors affect the selection of the exterior façade of a commercial structure?