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CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION CISCA ● 405 Illinois Avenue, Unit 2B, St. Charles, IL ● 60174 630-584-1919 phone ● 630-584-2003 fax ● www.cisca.org

Revised 9/08
Suspended Ceilings vs. Open Plenum:

Background

Design and product selection considerations for today’s buildings include aesthetics, performance, sustainability and cost – not only for initial purchases but also for ongoing maintenance throughout the life cycle of buildings.

In the case of ceilings, the recent trend toward the aesthetic decision to have an open plenum environment has created questions about trade-offs, especially performance and cost.

CISCA completed a Life Cycle Study comparing cost and performance considerations for continuous ceilings and open plenum environments. A description of that study and the results follow.

The CISCA Life Cycle Study is modeled on two different building types (office and retail) in five different markets, reflecting differences in energy costs, construction/installation costs and climate zones. Markets included Chicago, Charlotte, Oklahoma City, Orlando and Phoenix.

The costs implications included in this study are:

- Initial construction costs (Source: R.S. Means)
- Annual operating costs (Source: BOMA)
  - HVAC
  - Lighting
  - Maintenance

Assumptions

- Suspended ceilings installations included flexible ducts, cable trays and recessed lighting.
- Open plenum environments included return fans, return air ductwork, conduit and pendant lighting.

The key life cycle study outcomes are:

- Initial construction costs are higher for suspended ceilings:
  - First time construction costs were 15 to 22% higher for suspended ceilings vs. open plenums in offices.
  - First time construction costs were 4 to 11% higher in retail spaces.

- Suspended ceiling spaces use less energy than open plenum spaces due to:
  - Use of a return air plenum with low static pressures and fan horsepower vs. ducted air returns with higher static pressures and fan horsepower.
  - Return air plenums are more efficient at removing heat from lights, reducing the air conditioning load in the space.
  - Higher light reflectance with a ceiling vs. open plenum (assumed 70% vs. 50%).

- Maintenance costs are lower for suspended ceilings vs. open plenum:
  - Periodic duct, pipes and raceway cleaning necessary.
  - Open plenum assumed to be painted and periodically repainted.

- Energy savings are significant for suspended ceilings:
  - Total energy savings ranged from 9% to 10.3% for the office design and 12.7% to 17% for the retail design.
  - Can contribute to LEED EA credit #1; 10.5% reduction in energy to earn 1 point, 14% reduction for 2 points.
  - Considering both first-time and operating costs, suspended ceilings are extremely cost effective.

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<table>
<thead>
<tr>
<th>RETAIL SPECS</th>
<th>OFFICE SPECS</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Story Masonry; Metal Deck &amp; Concrete Floor</td>
<td>Low Rise/Mid Rise; Open Plan</td>
</tr>
<tr>
<td>10,000 Square Feet Total</td>
<td>120,000 Square Feet Total</td>
</tr>
<tr>
<td>10’ Ceiling Height</td>
<td>15,000 Square Feet Per Floor</td>
</tr>
<tr>
<td>Pendant Mounted HIDs</td>
<td>9’ Ceiling Height</td>
</tr>
<tr>
<td>&lt;10% Percent Glass</td>
<td>Recessed 2’x2’ U-Tube Fluorescents</td>
</tr>
<tr>
<td>2’x4’ Panels on 15/16” Grid</td>
<td>40-50% Percent Glass</td>
</tr>
<tr>
<td>2’x2’ Tegular on 9/16” Grid</td>
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<th>LIFE CYCLE PAYBACK</th>
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</thead>
<tbody>
<tr>
<td>Charlotte</td>
<td>Chicago</td>
<td>Oklahoma City</td>
</tr>
<tr>
<td>17.0%</td>
<td>13.7%</td>
<td>12.7%</td>
</tr>
<tr>
<td>0.6 YRS</td>
<td>1.1 YRS</td>
<td>0.7 YRS</td>
</tr>
<tr>
<td>1.0 YRS</td>
<td>1.1 YRS</td>
<td>1.2 YRS</td>
</tr>
<tr>
<td>5.0 YRS</td>
<td>&gt;10 YRS</td>
<td>7.2 YRS</td>
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</thead>
<tbody>
<tr>
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<td>Chicago</td>
<td>Oklahoma City</td>
</tr>
<tr>
<td>9.0%</td>
<td>10.0%</td>
<td>9.7%</td>
</tr>
<tr>
<td>3.4 YRS</td>
<td>7.0 YRS</td>
<td>5.0 YRS</td>
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