Mold & Moisture Control in Federal Buildings

TEGA Update - ASHRAE Winter Meeting 2004

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- **Why the concern?**
- **Measures taken to address the concern**
- **Why *these* measures and not others**
- **Suggestions for implementation**

Why the concern about moisture & mold?

- **Outside GSA - Mold claims in commercial buildings between $3 and $12 billion in 2003**
- **Within GSA - Sometimes multimillion-dollar mold problems, often in courthouses**
- **GSA plans to build over 140 new courthouses in the near future**
- **Fact 1 - Buildings don't fall down very often… a good thing.**
- **Fact 2 - More often, buildings grow mold… a bad thing.**

Basic Strategy - Build robust buildings instead of fragile ones

- **1st principle: Design a dry building**
  - **Architect - a building which sheds water (rather than collecting it)**
  - **HVAC designer - a ventilation system which dries the building (rather than adding moisture)**
  - **Builder - keep it dry during construction**
- **2nd principle: When moisture gets in anyway… drain it out and dry it out, quickly.**
  - **Architect - Walls which drain water outwards (rather than trapping it).**
  - **HVAC designer- HVAC system which pushes dry air into walls (rather than sucking in humid air)**
  - **Building manager - Keeps the walls draining and HVAC system drying (rather than ignoring maintenance)**

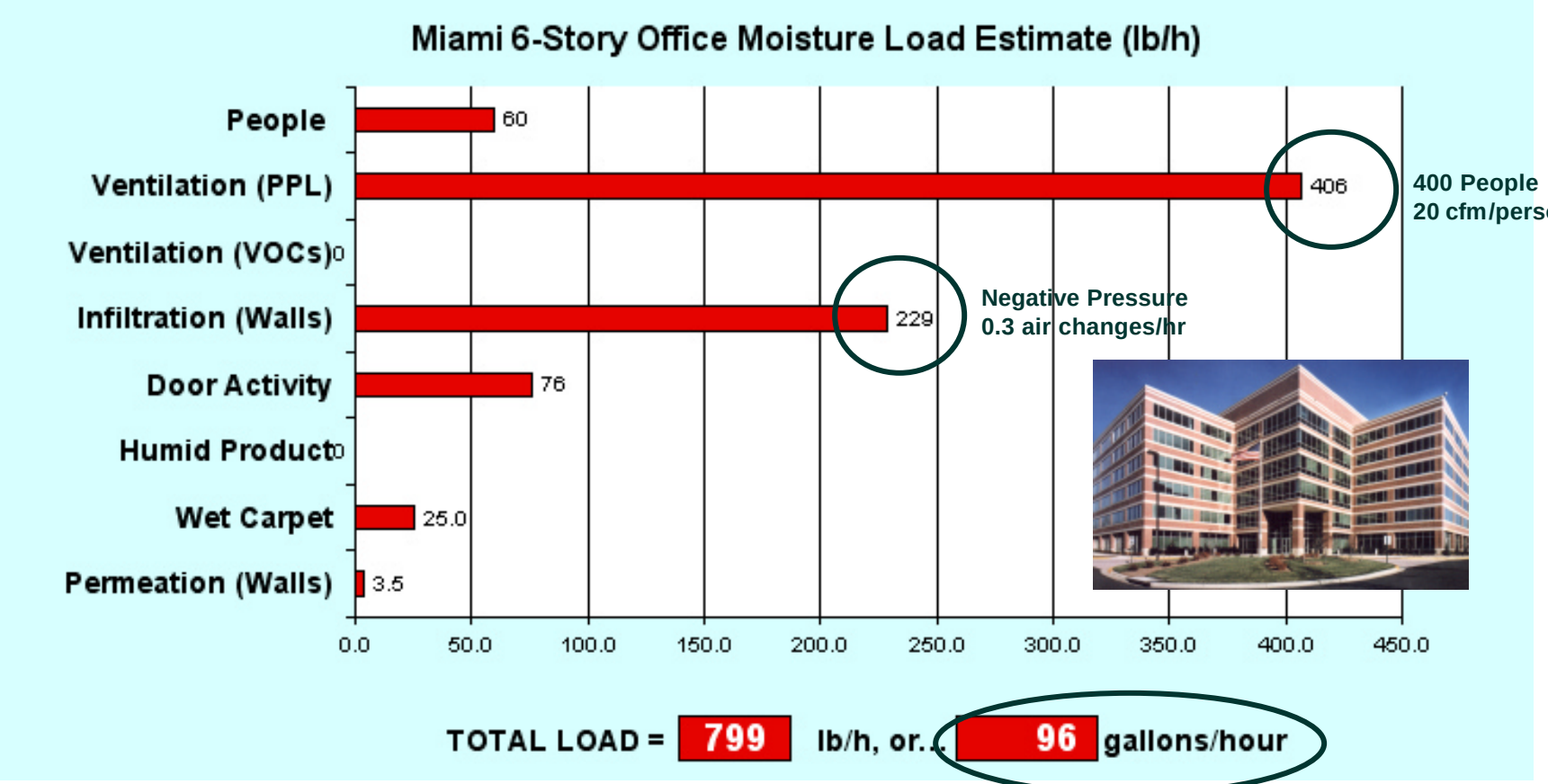
1st - Designing a dry building

- **Architect - Keep rain off the walls**
  - **Overhangs**
  - **Projections**
- **Architect - Keep rain away from the foundation**
  - **Slope the finish grading away from the building**
  - **Foundation drain and crushed stone under basement**
- **HVAC designer - Keep humid air out**
  - **Dedicated ventilation dehumidification system**
  - **Positive air pressure when it's humid outdoors**

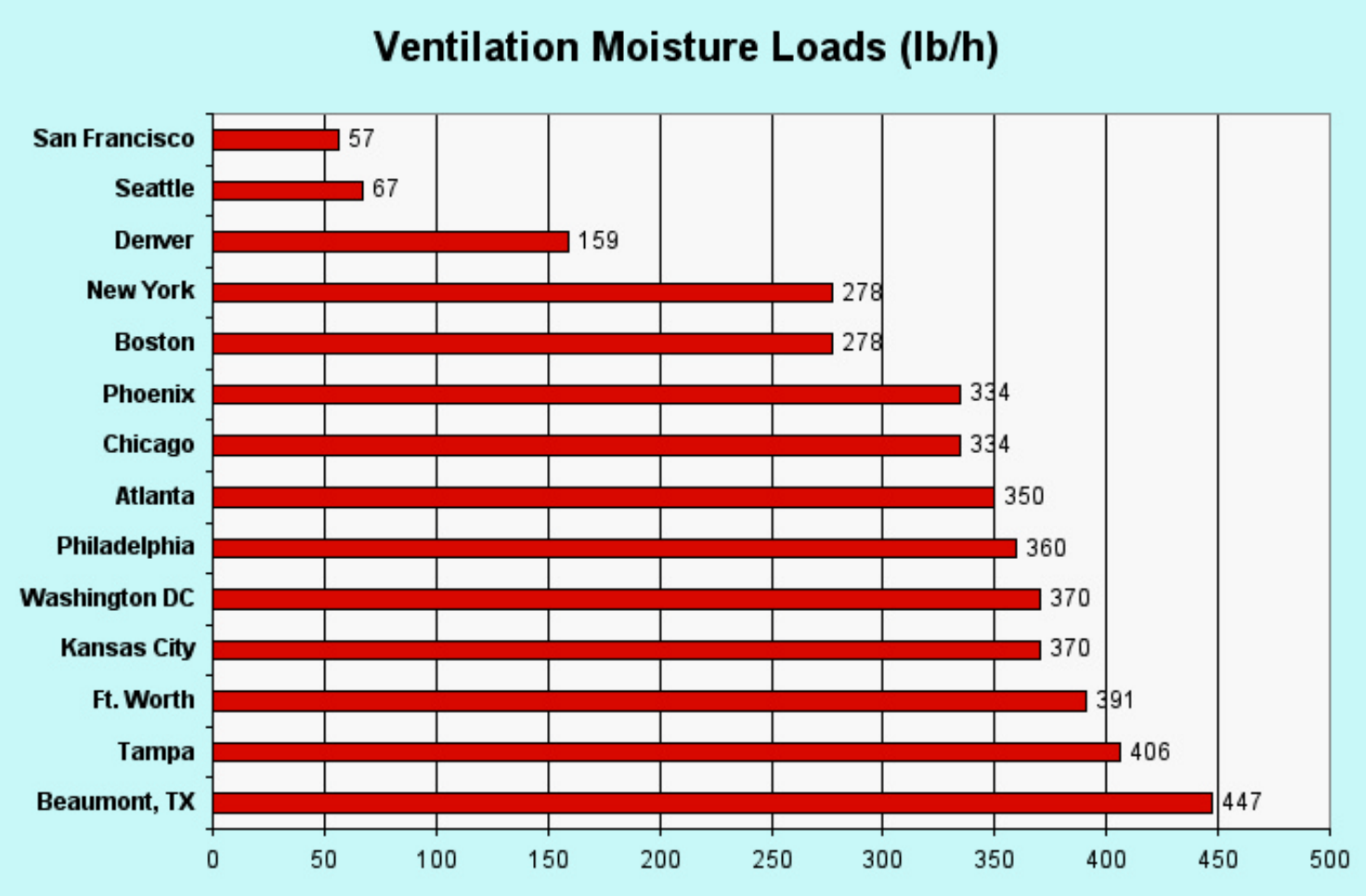
2nd - Draining and drying the building

- **Architect - Flashing details which drain any leaks outwards**
  - **Drawn in 3-d using layers, especially the corners**
  - **Mocked-up on-site for approval**
- **HVAC Designer - Gently push dry air outward through the walls**
  - **Positive internal pressure with dry air during humid weather**
  - **Neutral pressure during cold weather**

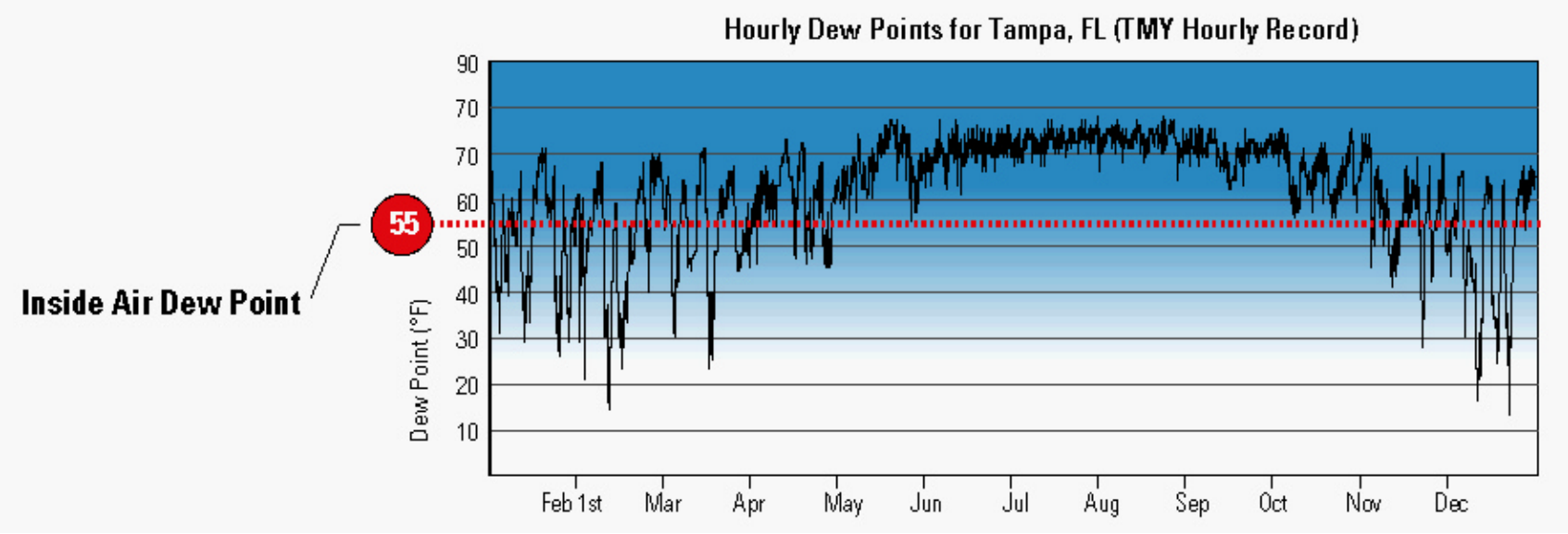
The importance of dedicated ventilation dehumidification



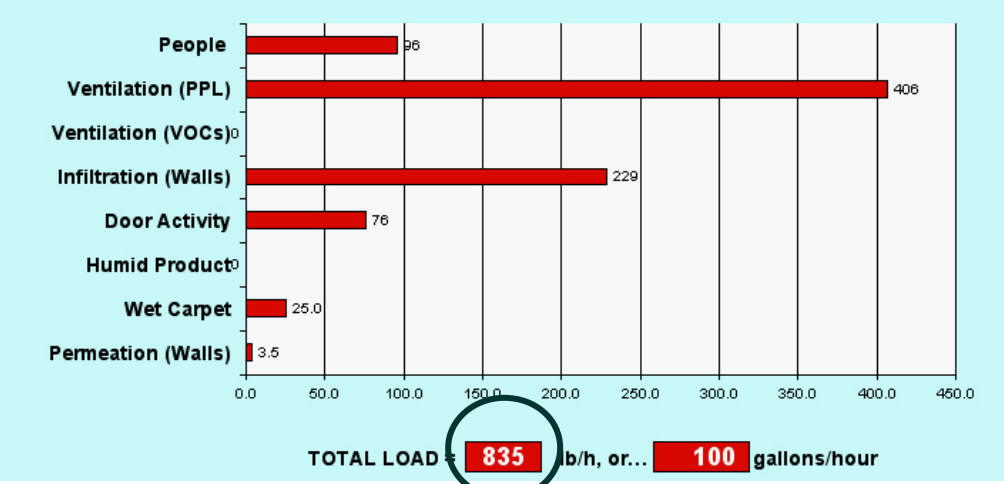
Representative peak hour ventilation moisture loads in U.S. locations

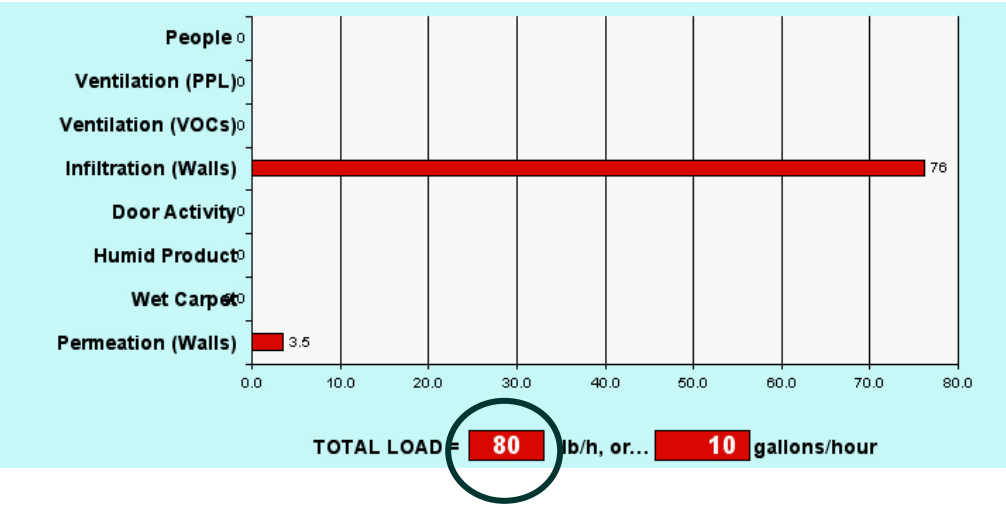


Also, outdoor moisture loads are high for MANY hours per year



…running the ventilation DH system eliminates infiltration moisture





- **Occupied 835 lb/hr**
  - **400 people @ 20 cfm and negative pressure infiltration @ 0.3 air changes/hr (835 lb/h total load)**

- **Unoccupied - Without positive pressure, 80 lbs/hr infiltration load remains**

Consequently…
Chapter 5 of the P-100 Facility Standard now requires:

- **1. Dedicated ventilation system which dries air to 50°F dew point, all the time**
- **2. Positive internal air pressure until outdoor temperature falls below 37°F**
- **3. 24-7 operation (at reduced air volume during unoccupied hours)**

Side benefits of required mold and moisture control system:

- **Simplifies and reduces cost of ventilation security**
- **Reduces cooling tonnage requirement in other systems**
- **Dedicated ductwork improves chances of ventilation air reaching the breathing zone**
- **Probably saves energy**
  - **No need to operate large, main systems to provide minimal comfort and assure IAQ for after-hour operations**
  - **Low dew point allows raising thermostat without sacrificing comfort**

Suggestions for implementation, based on recent experience…

- **1. Understand the logic and plan your system BEFORE competing for a Federal project**
  - **GSA is serious about this requirement**
  - **Your competitor will do so if you don't**
- **2. Take advantage of side-benefits**
  - **Reduce tonnage in other systems**
  - **Add air flow monitoring to OSA systems to document IAQ compliance and eliminate over-ventilation**
  - **Try raising thermostat after commissioning is complete**
- **3. Talk with your architects now, rather than later...**

The HVAC designer will have to tell the architect about this requirement at some point...

- **BEFORE design competition:**
  - **“Great! We’ll highlight this mold-avoidance feature during our short-list interview”**
- **AFTER the design award:**
  - **“Nice to have, but it won’t fit into OUR SUCCESSFUL design.”**
  - **“It costs too much”**
  - **“The floor plate is set and there’s no space”**

Summary:

Let your architects know that dedicated ventilation DH systems are:

- **Helpful to highlight during federal design competitions**
- **Excellent insurance against the effects of rain leaks or construction shortcomings**
- **A great way to reduce the risk of mold lawsuits and occupant concerns about IAQ and comfort**
- **The basis of the benchmark cost estimate... the money IS in the budget**
- **Required by P-100 Federal Facility Standards**