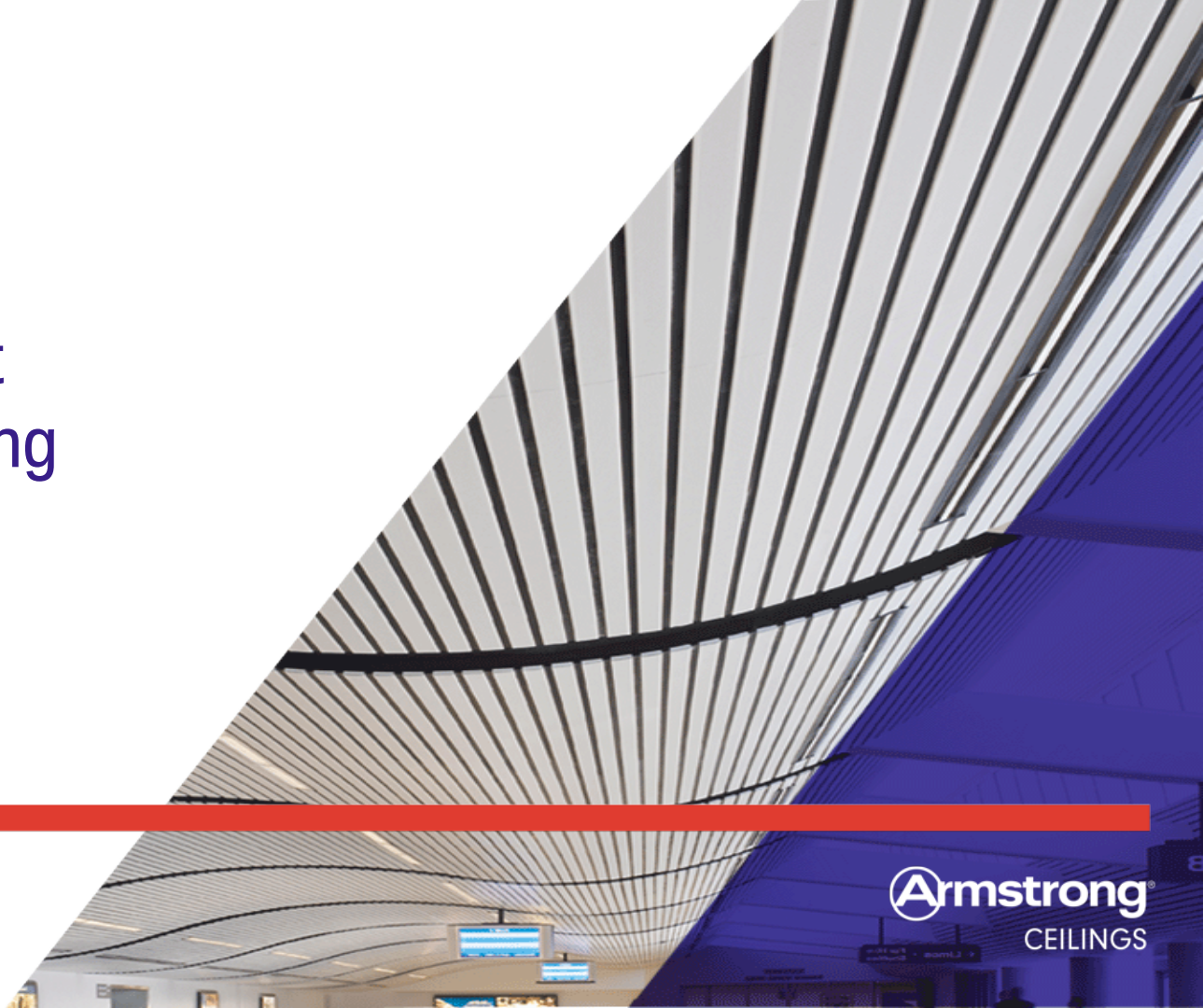
June 2016

Understanding Code-compliant Integrated Ceiling Solutions

Course Number EX205

1.00 AIA LU/HSU



Inspiring Great Spaces®

Armstrong® CEILINGS

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Questions related to specific products and services may be addressed at the conclusion of this presentation.

Course / Learning Objectives

After taking this course, you will be able to:

- Understand new installation systems available that navigate the challenges of designing ceilings from one end of a building to another.
- Explain the design and construction benefits of pre-engineered integrated ceiling systems versus traditional ceiling design and construction practices.
- Describe the environmental and occupant comfort benefits of pre-engineered systems versus traditional systems.
- Apply new construction practice knowledge to make informed product specification choices.
- Implement new construction methods to design ceilings that can be easily constructed.
- Understand the value of collaborating early with your ceiling partner to ensure best practices are followed to meet your project design intent.

Course Map

Pre-Engineered Ceiling Construction

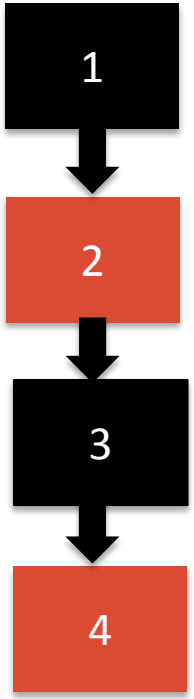
- Pre-engineered trims and transitions
- Integrated Shade Pockets
- Drywall Grid Soffits
- Interior Glazing Channel for Glass Partition Walls
- Monolithic Ceiling Design
- Lighting Integration
- Acoustics in Flexible Building Design

Ceiling Capabilities – Beyond the Square

Code Compliance

- Suspended acoustical and Drywall Ceilings
- Seismic Ceiling Design
- Acoustical Design

Embracing the Latest in Ceiling System Innovation; Meet Client Needs



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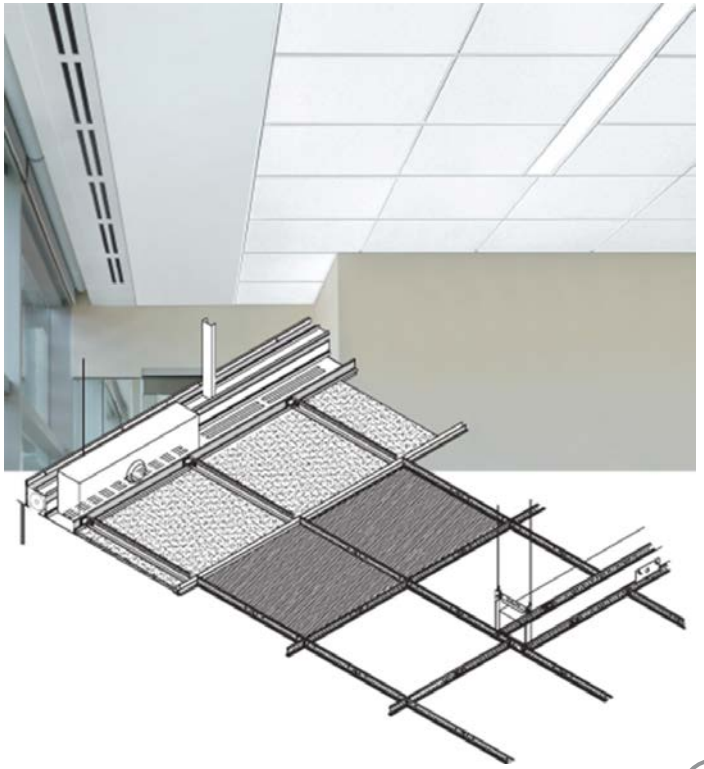
Pre-engineered Ceiling Construction

Benefits:

- Consistent quality – achieve design intent without compromise
- Reduce time to specify & detail
- 30 – 50% faster to build and install than traditional construction
- Code Compliant
- Tested and approved for use in seismic DEF areas



Pre-engineered Ceiling Construction

Case Study:

Bell Helicopter
Fort Worth TX

DESIGN NEED:

- Clean, consistent ceiling integration across the building
- Transitions from perimeter windows to interior suspended acoustical ceilings
- Coordination between Trades - MEP
  - Mechanicals
  - Electrical
  - Plumbing

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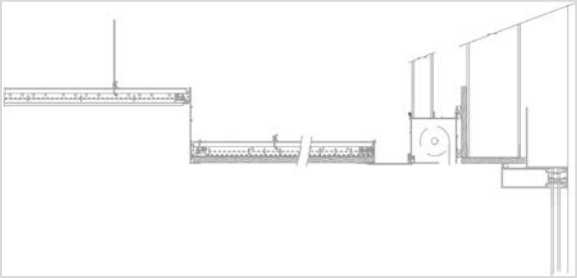
Pre-engineered Ceiling Construction

Case Study:

Bell Helicopter
Fort Worth TX

DESIGN SOLUTIONS:

- Extruded aluminum shade pockets with seamless integration into drywall grid and acoustical ceilings
- Drywall grid ceiling framing for soffits & hallways
- Steel acoustical to drywall transition moldings
- High CAC/NRC acoustic ceiling panels



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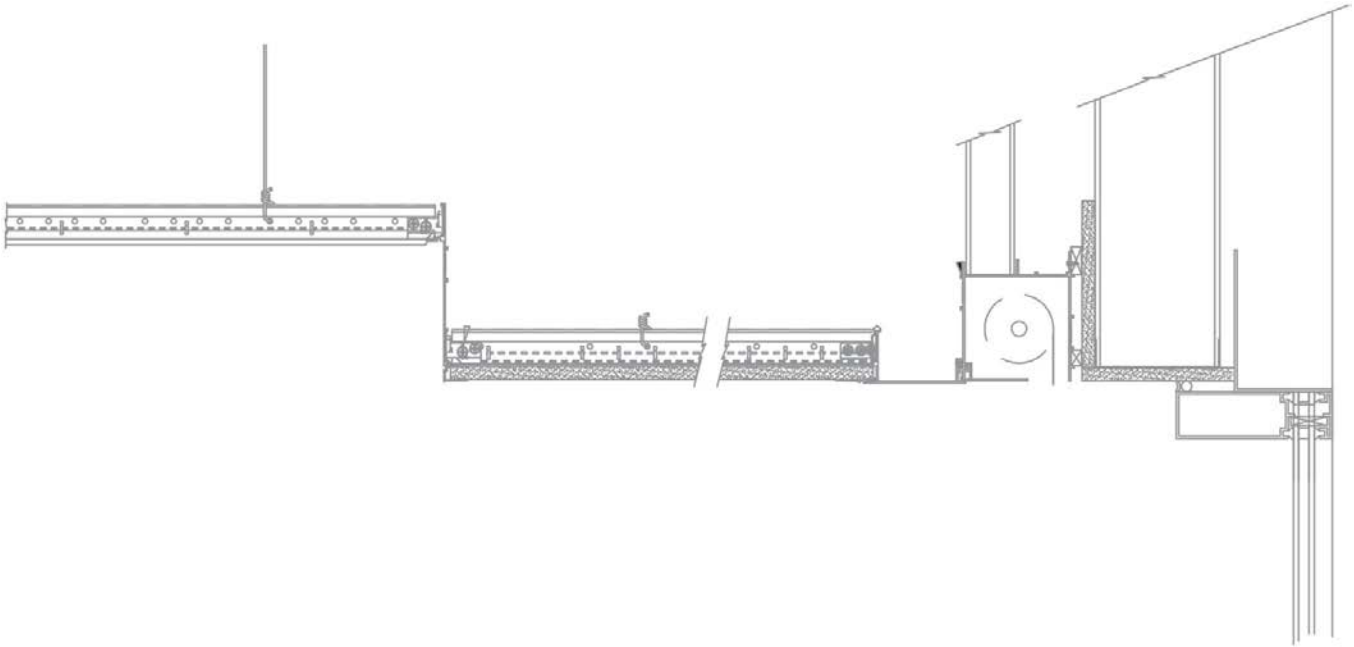
Case Study:

Bell Helicopter, Fort Worth TX

DESIGN DETAIL:



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Pre-engineered Ceiling Construction

Case Study:

Bell Helicopter
Fort Worth TX

RESULTS:

- Pre-engineered ceiling system made it possible to achieve:
- Design intent
- Reduction in construction time
- Budget requirements
- LEED® silver certification

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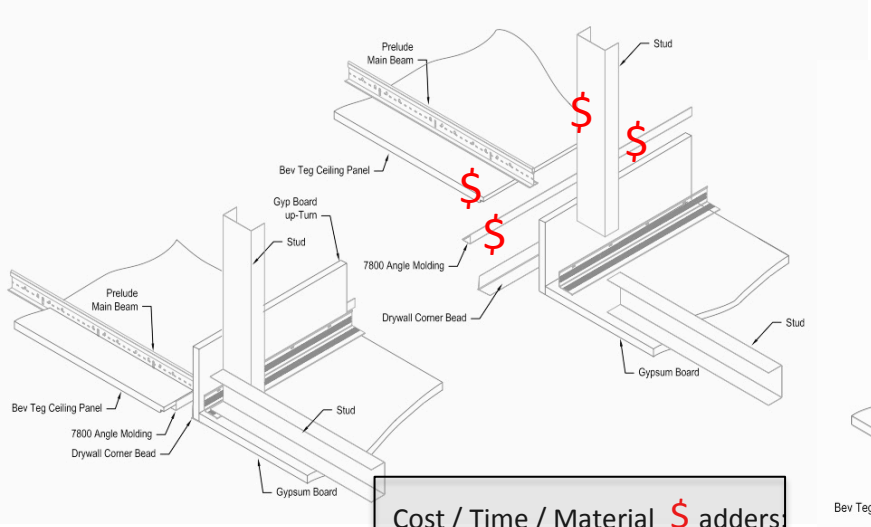
Pre-engineered Ceiling Construction

Pre-engineered Trims & Transitions

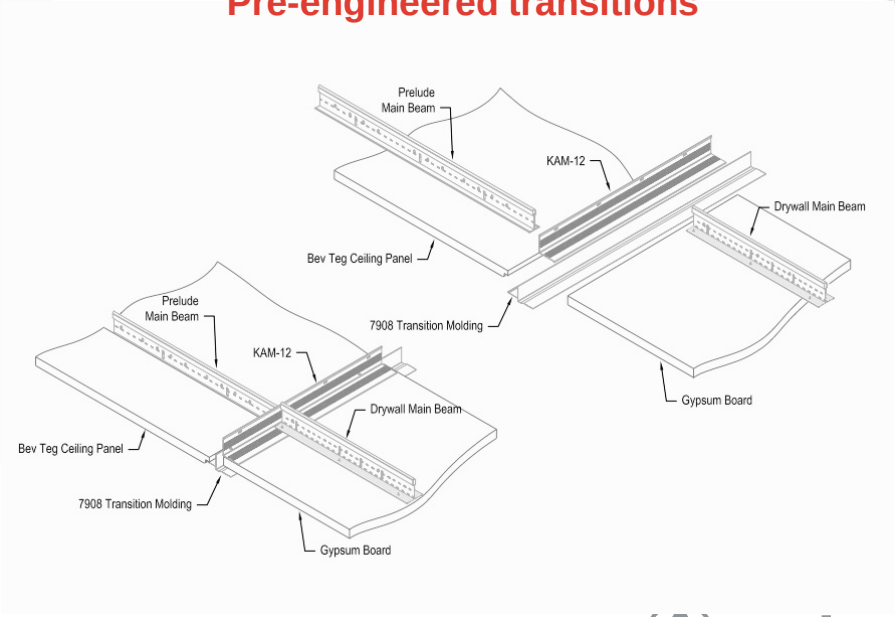
Issues with current transition construction:



Cost / Time / Material $ adders:

- Corner bead / mud / sand
- Acoustical wall angle
- Return drywall
- Return framing
- Trade coordination issues

Pre-engineered transitions



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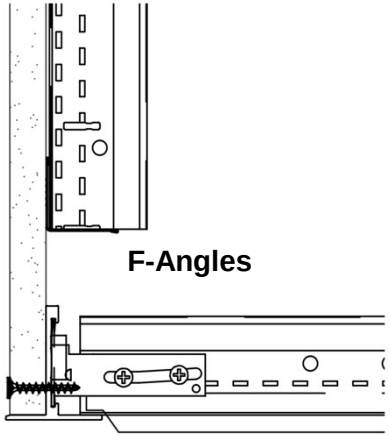
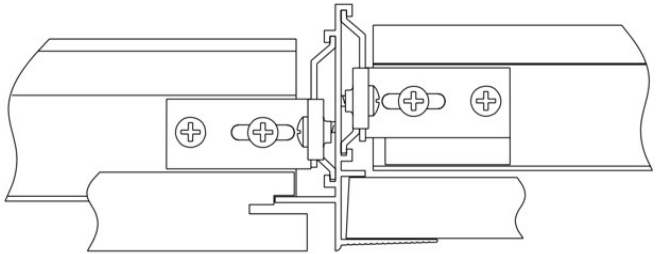
Pre-engineered Ceiling Construction

Pre-engineered Trims & Transitions

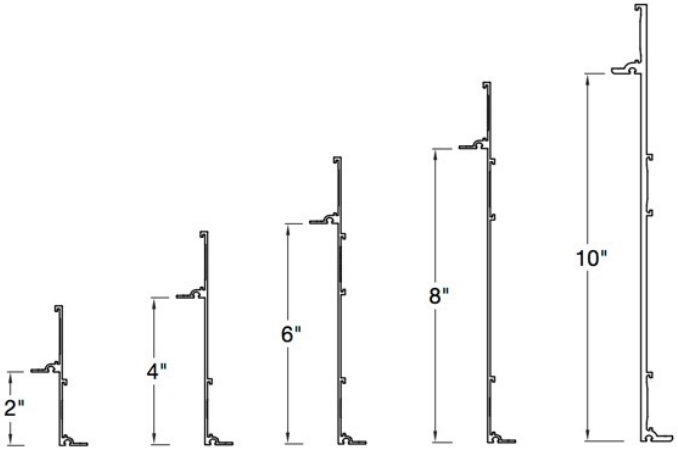
Solution: Aluminum & Steel Transition Trims



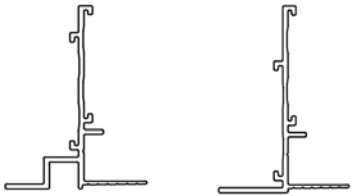
F-Angles

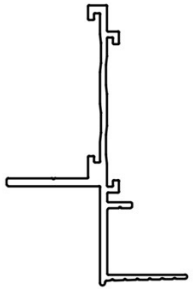


Flush Transitions



Height Transitions





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Pre-engineered Ceiling Construction

Pre-engineered Trims & Transitions

Case Study:

NOAA National Water Center, Tuscaloosa, AL

DESIGN NEED:

- Create “river effect” through center of ceiling
- Light cove “curved river bank” design
- Clean transition from drywall to acoustical ceiling

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Pre-engineered Ceiling Construction

Pre-engineered Trims & Transitions

Case Study:

NOAA National Water Center, Tuscaloosa, AL

DESIGN SOLUTIONS:

- Pre-engineered acoustical ceiling-to-drywall transition trim
  - Eliminates excess framing
  - Ensures consistent fit and finish
  - Curves and shapes easily duplicated
  - Code compliant
- Pre-engineered perimeter trim with integrated light coves
  - Cuts Installation time in half versus drywall

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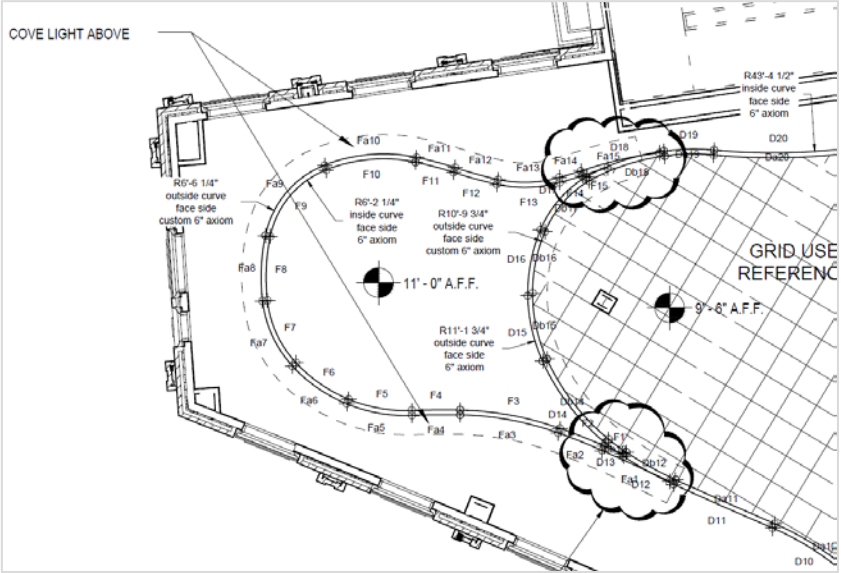
Pre-engineered Ceiling Construction

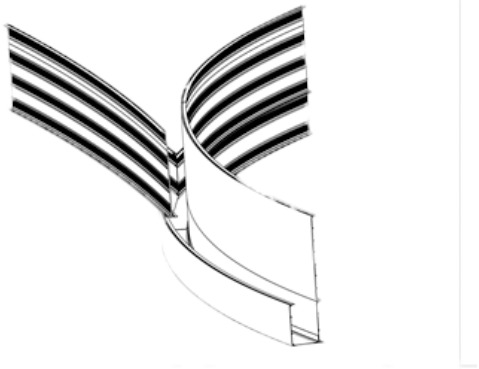
Pre-engineered Trims & Transitions

Case Study:

NOAA National Water Center, Tuscaloosa, AL

DESIGN DETAIL: A CLOSER LOOK





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Pre-engineered Ceiling Construction

Pre-engineered Trims & Transitions

Case Study:

NOAA National Water Center, Tuscaloosa, AL

RESULTS:

- Saved two months in construction schedule
- Three different size light coves installed
- No cracks or flat spots which are typical of curved drywall installation
- Pre-engineered curved aluminum trim achieved design intent - not possible with drywall

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Pre-engineered Ceiling Construction

Pre-engineered Extruded Aluminum Shade Pockets

Case Study:

EPCOR Tower, Edmonton, Alberta, Canada

DESIGN NEED:

- Integrated solution between acoustical ceiling and perimeter shade pockets
- Avoid:
  - Coordination between multiple trades
  - Higher cost
  - Unreliable finished visual using drywall pockets

Pre-engineered Ceiling Construction

Pre-engineered Extruded Aluminum Shade Pockets

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Pre-engineered Ceiling Construction

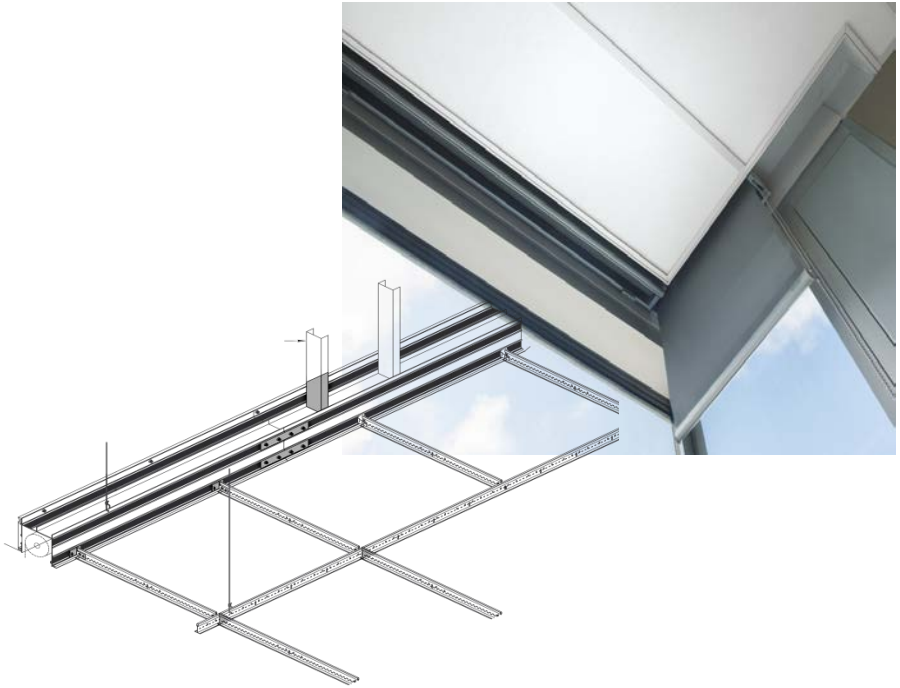
Pre-engineered Extruded Aluminum Shade Pockets

Case Study:

EPCOR Tower, Edmonton, Alberta, Canada

DESIGN SOLUTIONS:

- Pre-engineered aluminum shade pockets
  - Reduced time to specify and detail
  - Bridged transition from building interior perimeter and ceiling plane
  - Faster and easier installation
  - No additional trade coordination required
  - Customized to accommodate many popular shade options



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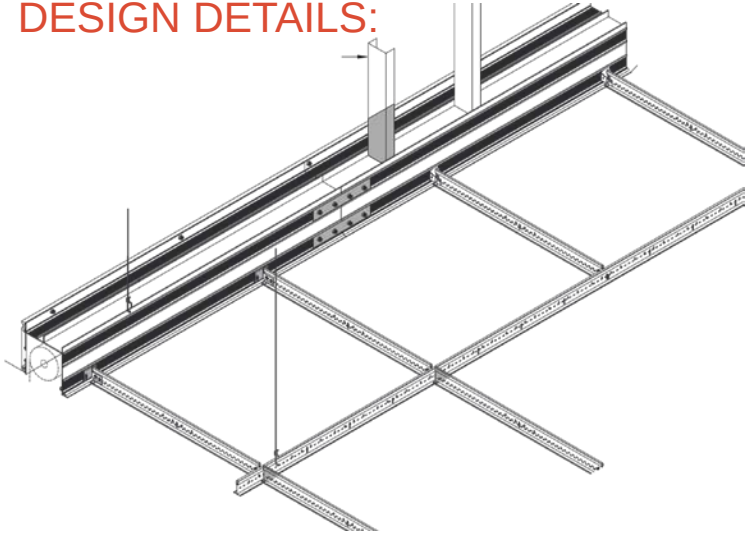
Pre-engineered Ceiling Construction

Pre-engineered Extruded Aluminum Shade Pockets

Case Study
EPCOR Tower, Edmonton
Alberta, Canada

DESIGN DETAILS:



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Pre-engineered Ceiling Construction

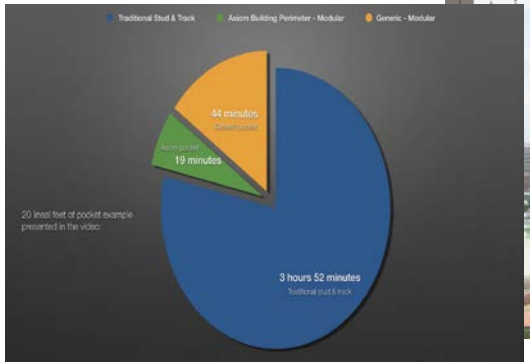
Pre-engineered Extruded Aluminum Shade Pockets

Case Study:

EPCORE Tower, Edmonton, Alberta, Canada

RESULTS:

- Seamless integration
- 50% reduced installation time
- Better coordination between trades
- Clean, consistent, quality visual achieved



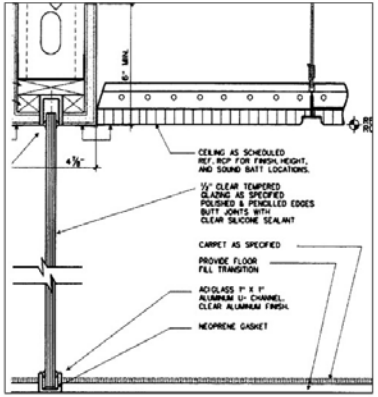
Interior glazing at the ceiling plane

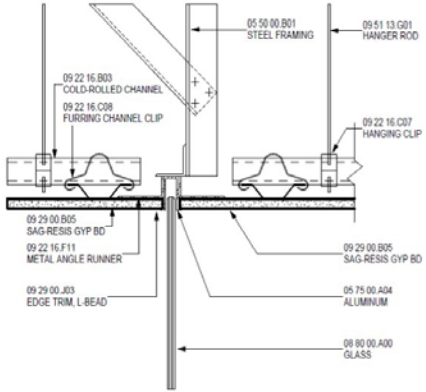
Making glass disappear into the ceiling plane

DESIGN NEED:

- Make interior glazing appear to disappear into the ceiling plane
- Remove visual ‘clutter’ of drywall bulkheads at glazing / ceiling junction

TYPICAL TOP GLAZING CHANNEL





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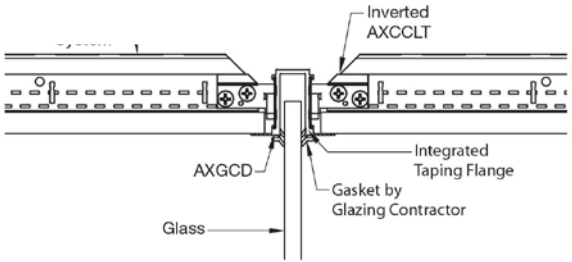
Pre-engineered Ceiling Construction

Interior glazing at the ceiling plane

Making glass disappear into the ceiling plane

DESIGN SOLUTION:

- Extruded aluminum glazing channel is a structural element of the ceiling that interior glazing disappears into.
- 5 profiles



Soffits, Bulkheads, Coves

Re-configure while maintaining

- Original design intent
- Structural performance

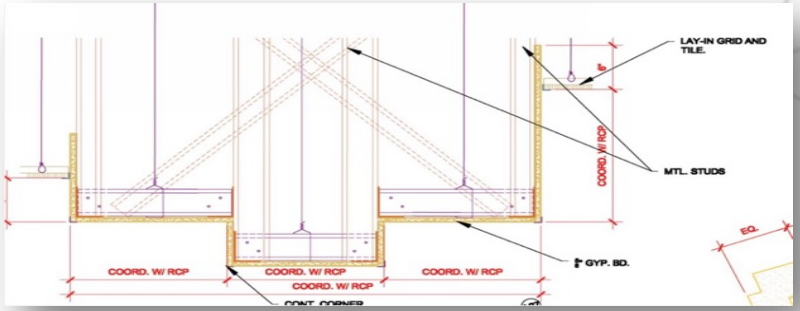
Build with less

- Time
- Material
- Labor

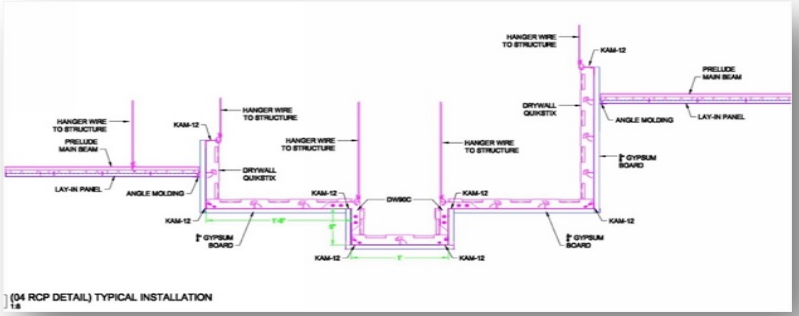
Increase

- Safety
- Dollar savings
- Coordination between MEP trades

Before



After



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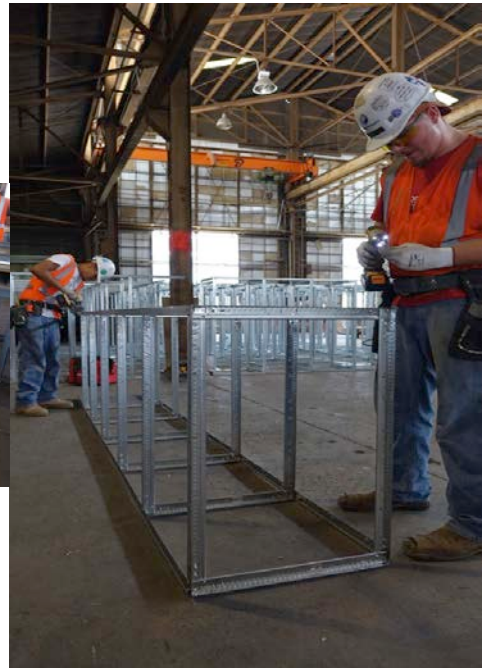
Offsite modularization

Reduce

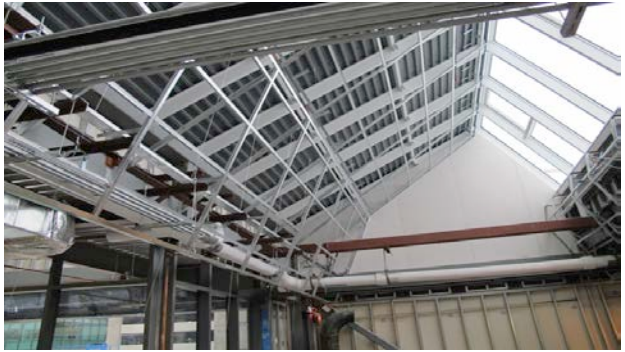
- Time spent on the job by up to 50%
- Traditional soffit studs to structure
- Installation time – Soffits / Light coves
- Installers needed on site
- Material (steel) used

Increase

- Safety
- Coordination between M.E.P. trades with less plenum congestion



Reduced steel framing



Reduced steel framing

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Reduced steel framing

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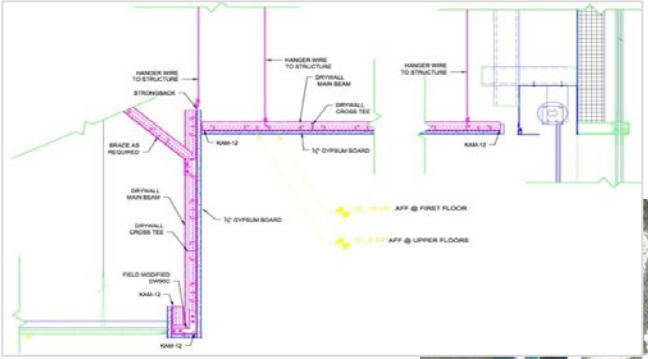

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Pre-engineered Ceiling Construction

Monolithic Ceiling Design

Case Study:

Greenway Group
Atlanta GA

DESIGN NEED:

- Contemporary look and feel
- Remove visual ‘clutter’ in ceiling plane
- Design a Functional Working Space
- Eliminate tall fixture housing and requirements
- Eliminate light fixture plenum interference

Pre-engineered Ceiling Construction

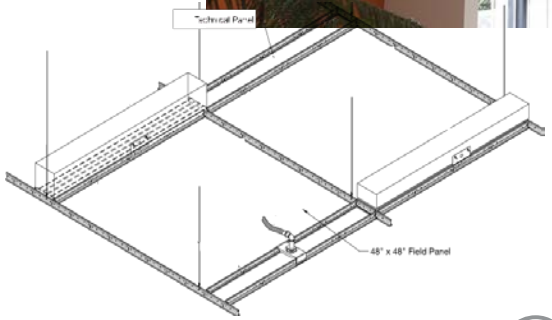
Monolithic Ceiling Design

Case Study:

Greenway Group
Atlanta GA

DESIGN SOLUTIONS:

- Ceiling systems with integrated lighting solution and suspension systems offer:
  - Organized narrow light fixtures, air diffuses and sprinklers into compact linear zones
  - Symmetrical on-center continuous or non-continuous layout options
  - Factory-finished or made-to-order panels
  - Range of compatible fixtures from partner companies that are prequalified for fit and finish



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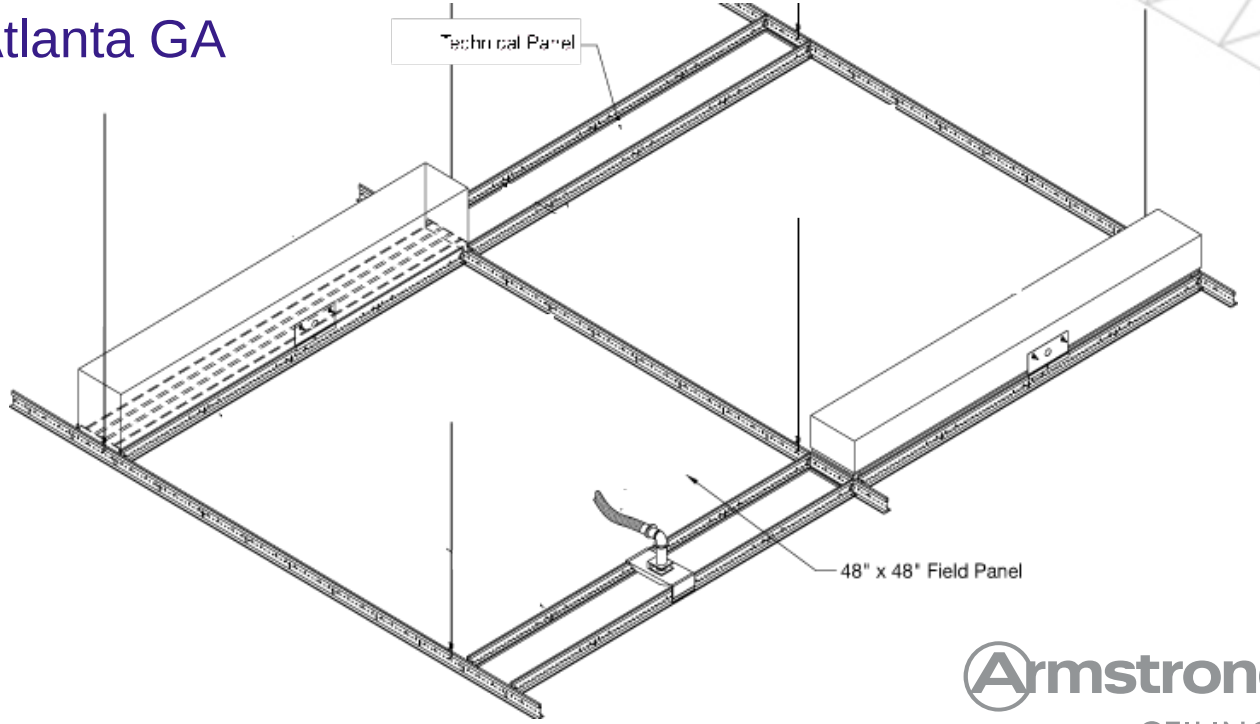
Pre-engineered Ceiling Construction

Monolithic Ceiling Design

Case Study
Greenway Group, Atlanta GA

DESIGN DETAILS:



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Pre-engineered Ceiling Construction

Monolithic Ceiling Design

Case Study:

Greenway Group
Atlanta GA

RESULT:

- Integrated ceiling system achieved a clean, custom look using standard components
- Eliminated:
  - Ceiling clutter and penetrations for fixtures in ceiling panels

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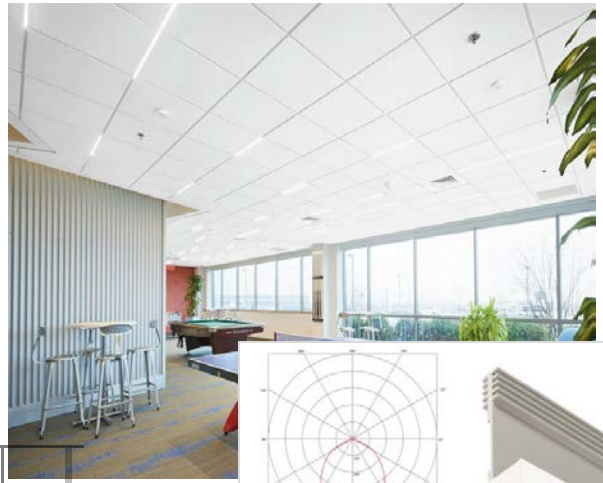
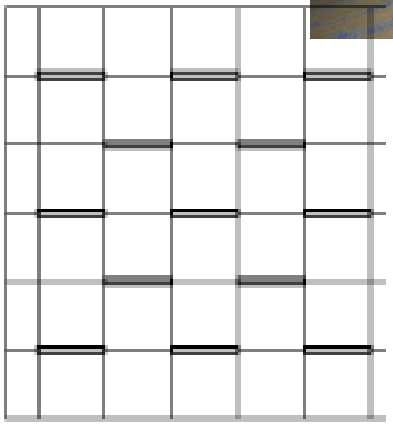
Pre-engineered Ceiling Construction

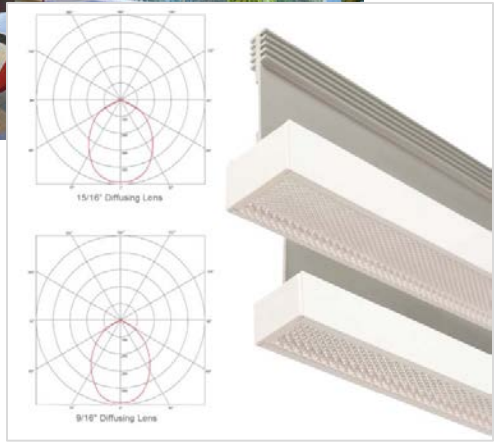
Lighting Integration – T-Bar LED

DESIGN NEEDS:

- Zero plenum lighting fixture with cross tee clips installs like a standard cross tee, for increased ceiling heights
- Seismic D, E, F compliant and pre-engineered to install with all 15/16" and 9/16" suspension systems







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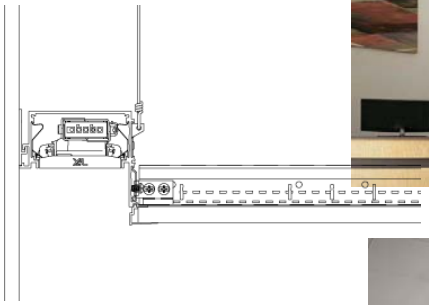
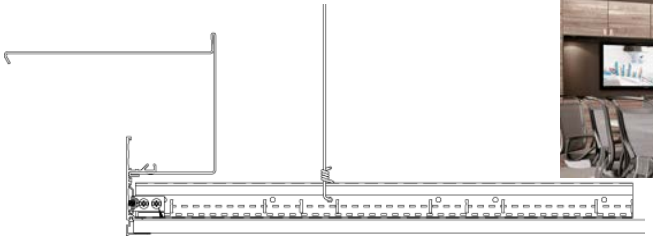
Pre-engineered Ceiling Construction

Lighting Integration – Direct & Indirect Light Coves

DESIGN NEEDS:

- Pre-engineered, extruded aluminum light cove profiles with integrated light fixture
- Fully concealed integrated design installs with standard suspension systems
- Reduces time, material, and labor over conventional solutions





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Lighting Integration – Direct & Indirect Light Coves

DESIGN SOLUTIONS:

- Pre-engineered, extruded aluminum light cove profiles with integrated light fixture
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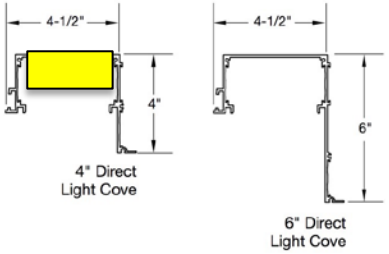
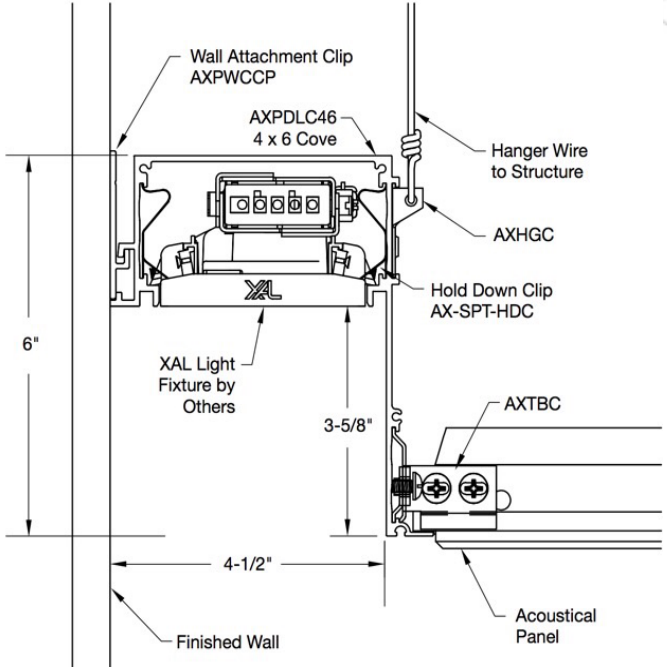


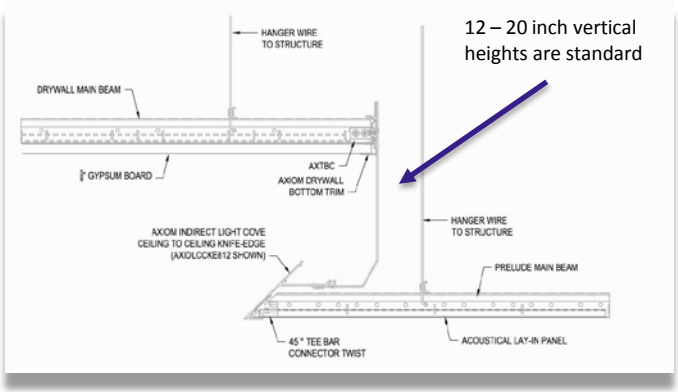


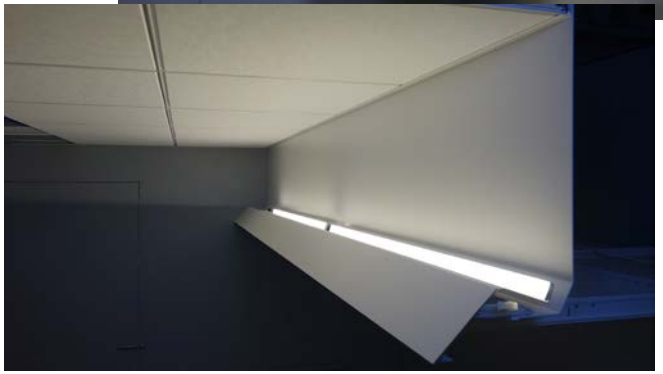
Pre-engineered Ceiling Construction

Lighting Integration – Indirect Light Coves

DESIGN SOLUTIONS:

- Ceiling to wall cove – 8 & 10'' standard heights
- Ceiling to ceiling cove – 12, 14, 16, 18 & 20'' standard heights
- Custom heights available
- Pre-engineered LED lighting





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Pre-engineered Ceiling Construction

Lighting Integration – Direct & Indirect Light Coves

- Coves are pre-hung with 4' on center cables, then acoustical ceilings tie into the upper and lower sections with T-bar connector hardware.
- Seismic areas? 4' on center vertical & lateral bracing is all that's required

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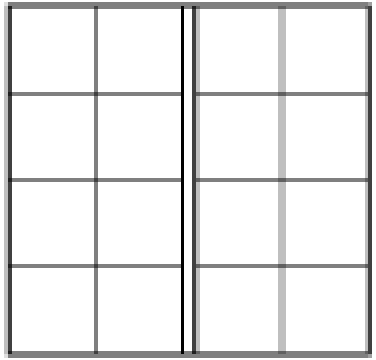
Pre-engineered Ceiling Construction

Lighting Integration – Acoustical Clouds

DESIGN SOLUTIONS

- Dramatic floating visual due to recessed aircraft cables
- Acoustical clouds provide greater sound absorption than a continuous ceiling of the same area
- LED light fixture is pre-engineered to easily install without independent suspension
- Seismic D, E, F compliant



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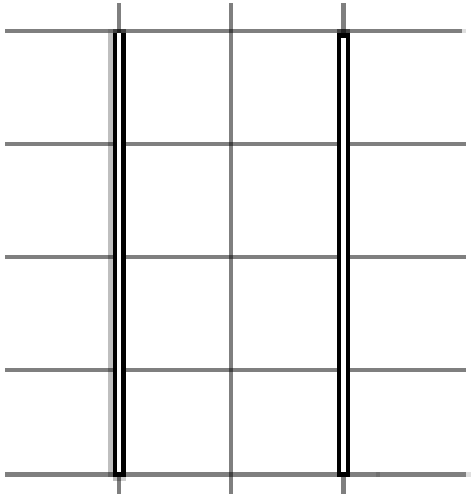
Lighting Integration

DESIGN SOLUTIONS

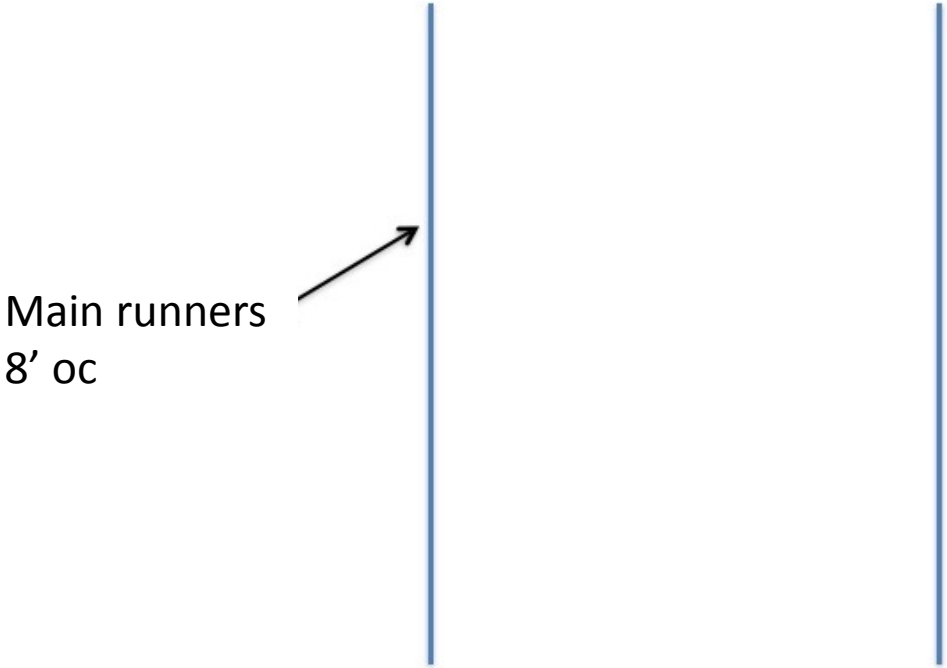
- On-center linear lighting provides the symmetry to complement and brighten interior spaces
- On-center linear lights visually replace main runners while they line up with mullions, columns etc.



Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL

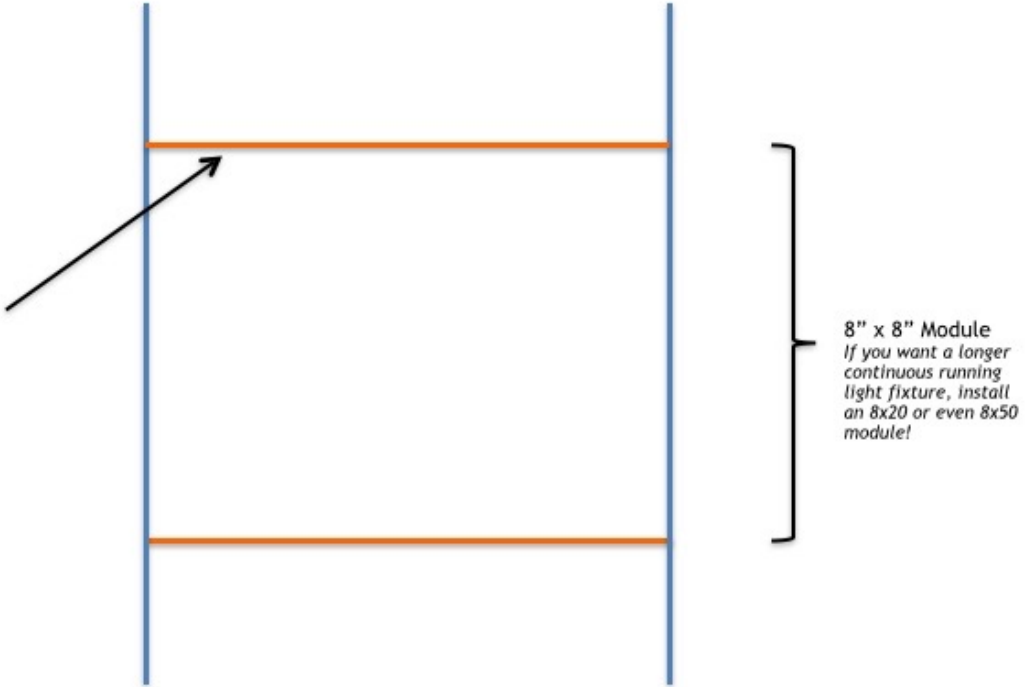


Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL

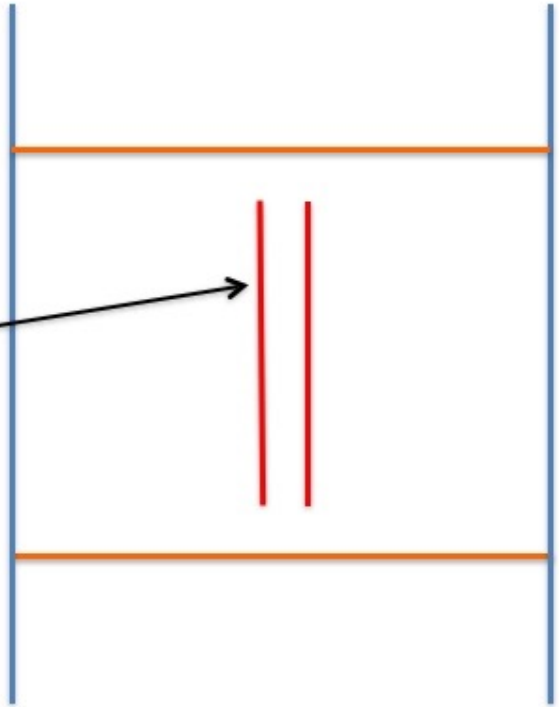
8’ cross tees at the end of your continuous light fixture runs, which could be as little as 4’ or as long as 40’+



Lighting Integration

DESIGN DETAIL

Combination of main runners to span the distance of your linear lighting.
If it's only 4 - 8' – just use
4, 6 or 8' cross tees.

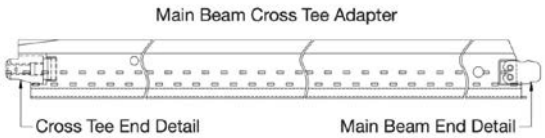


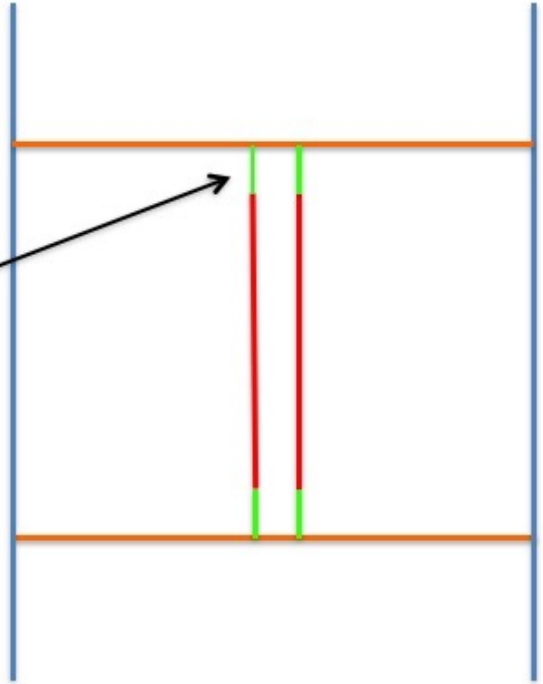
Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL

12’’ grid adapters convert your span of main runners back into a cross tee end, so it can stab into the 8’ cross tee at the end of your linear run.





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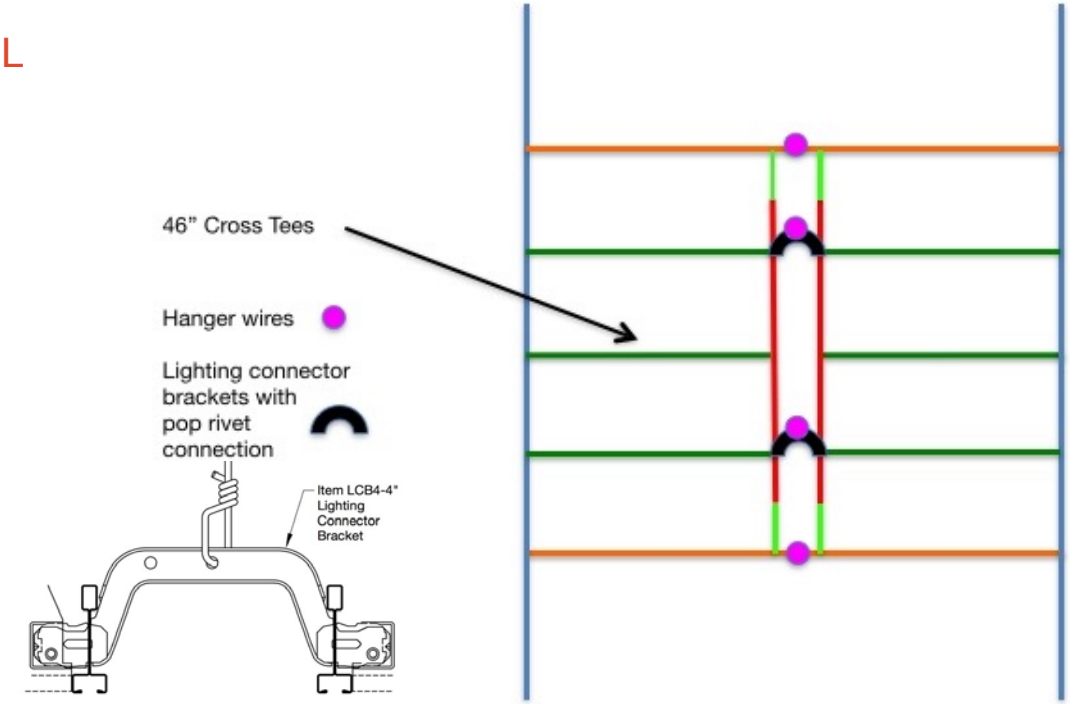
Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL



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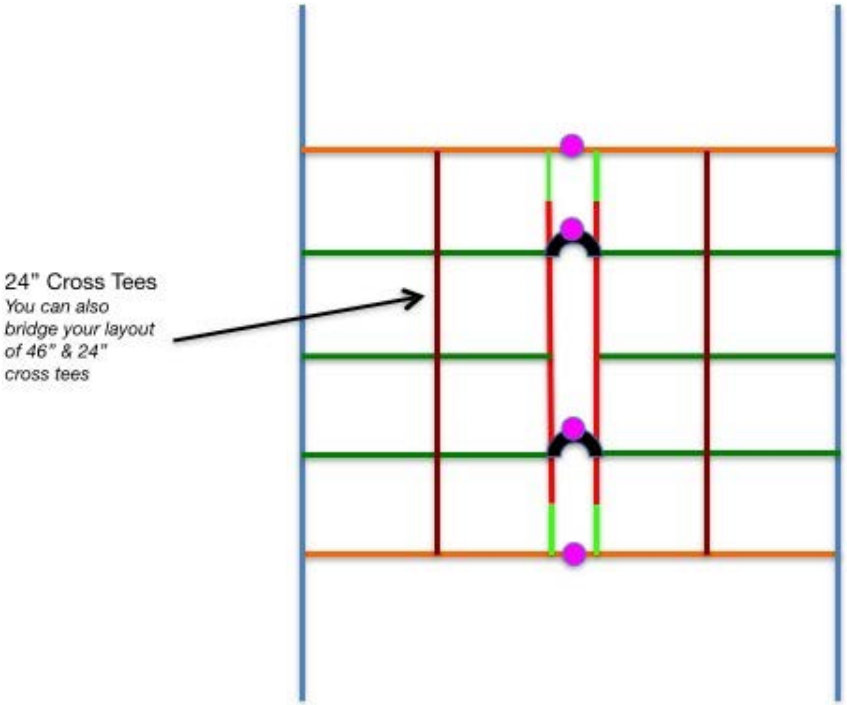
Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL



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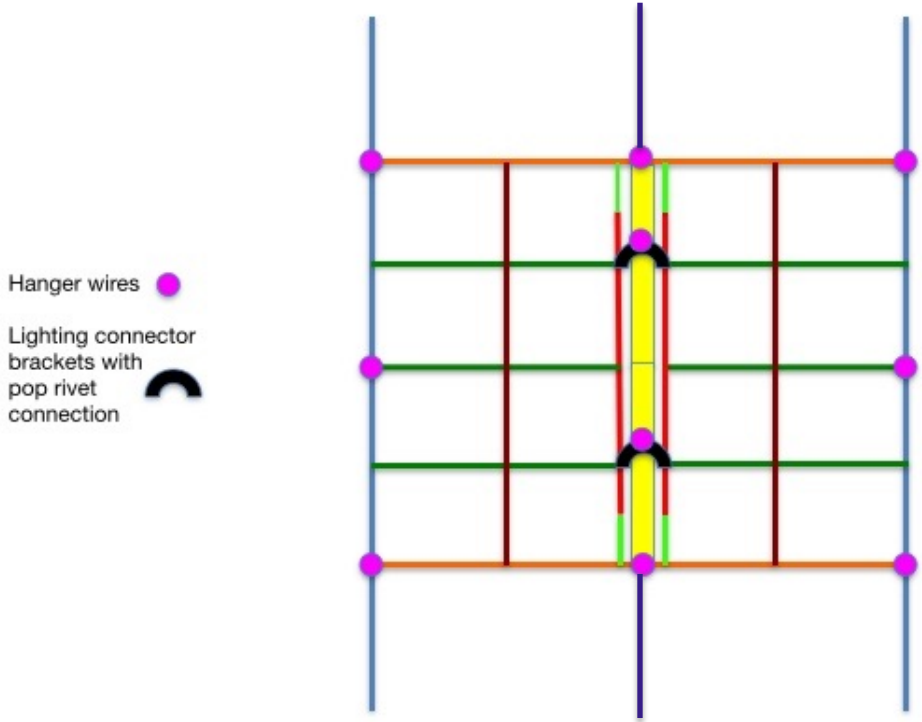
Pre-engineered Ceiling Construction

Lighting Integration

DESIGN DETAIL



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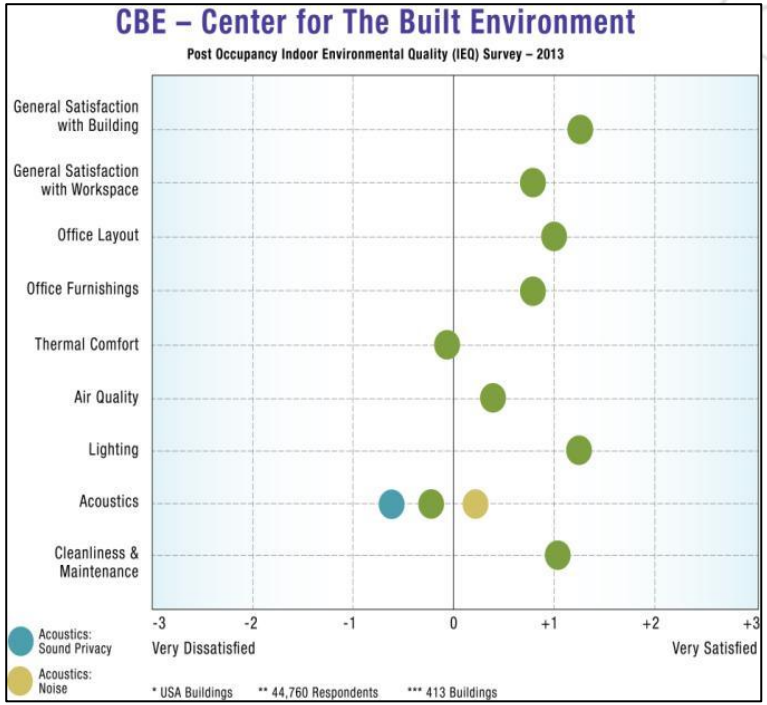
Conclusions

- More than 50% of cubicle occupants think poor acoustics interfere with their ability to get their job done
- 30% of those in private offices say poor acoustics interfere with their ability to work
- In indoor environmental quality, poor acoustics causes the most dissatisfaction



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Pre-engineered Ceiling Construction

Acoustics in Flexible Buildings

Case Study:

Sempra Energy
San Diego CA

DESIGN NEEDS:

- Create acoustical design appropriate for collaboration and focus in open spaces
- Prevent sound from private offices and conference rooms to be heard in adjacent spaces

Armstrong CEILINGS

Acoustics in Flexible Buildings

Case Study:

Sempra Energy,
San Diego CA

DESIGN SOLUTION

- Fine-textured mineral fiber ceiling panels that feature total acoustics performance; high sound absorption (NRC) and sound blocking (CAC)
  - Sound absorption reduces noise while sound blocking keeps it from traveling into adjacent spaces
  - Total noise control and design flexibility for concentration, collaboration, and confidential spaces
  - Space can easily adapt to new uses over time

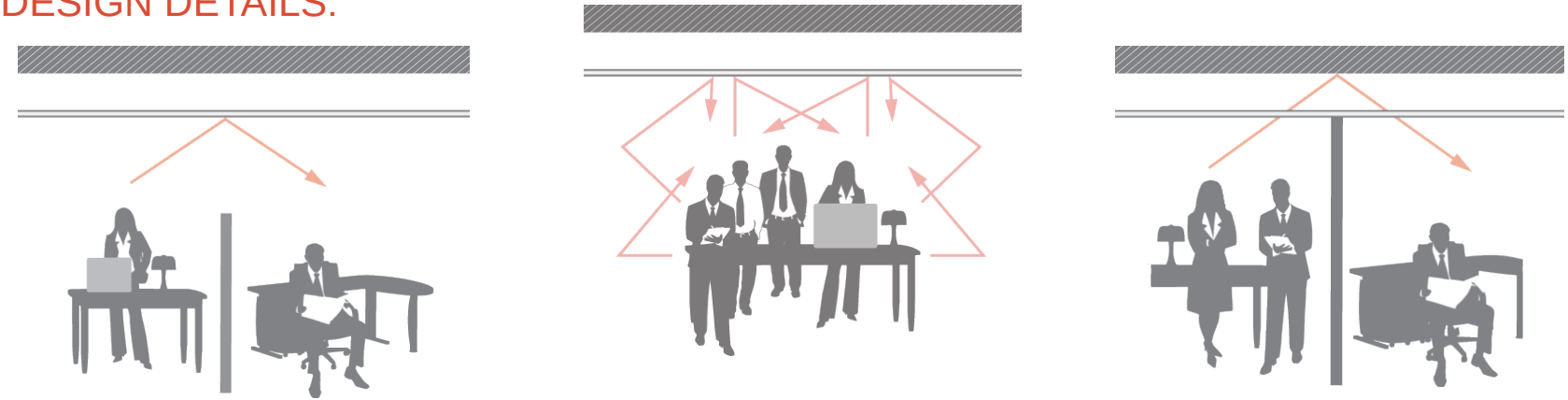
Armstrong CEILINGS

Pre-engineered Ceiling Construction

Acoustics in Flexible Buildings

Case Study:
Sempra Energy
San Diego CA

DESIGN DETAILS:



Need – one ceiling to control sound in all of these spaces – High NRC / High CAC

Armstrong CEILINGS

Acoustics in Flexible Buildings

Case Study:

Sempra Energy
San Diego CA

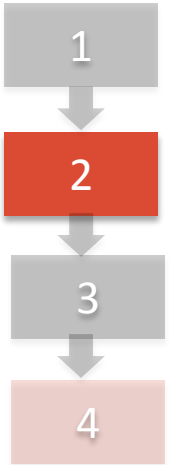
RESULTS:

- Total flexible design capability without changing ceiling panels
- Completely flexible design with high performance acoustics using a single ceiling panel
- Increased acoustic comfort
- Excellent speech intelligibility and privacy in both open and closed plan portions of the office
- Reduced noise and distractions in the open plan office area

Ceiling Capabilities — Beyond the Square

Benefits:

- Thousands of options for achieving custom looks with standard items
  - Metal, wood, mineral fiber, fiberglass, translucent materials
  - Ceiling to wall transitions
  - Sloped ceilings
  - Faceted installations
  - Canopies, clouds, baffles
- Unlimited options for one-of-a-kind custom ceiling designs



Case Study:

Harrah's Cherokee Casino, Cherokee NC

DESIGN NEEDS:

- Draw attention to focus area with a custom ceiling design
- Design team intent: create a "wow" factor
- Create a "woodland" setting with a modern interpretation

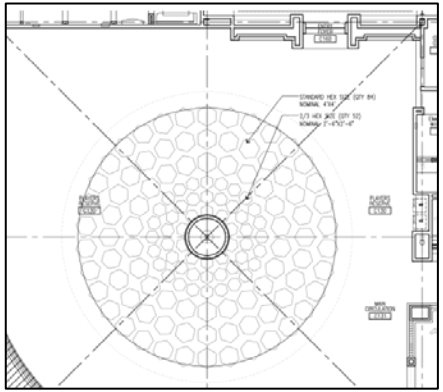
Ceiling Capabilities — Beyond the Square

Case Study:

Harrah's Cherokee Casino, Cherokee NC

DESIGN SOLUTIONS:

- Mixed design of standard and custom acoustical clouds
  - Standard 4' x 4' hexagon panels used to build 'tree branches' in bright standard colors
  - Custom size and shapes panels for trunk and transition to the canopy in custom colors



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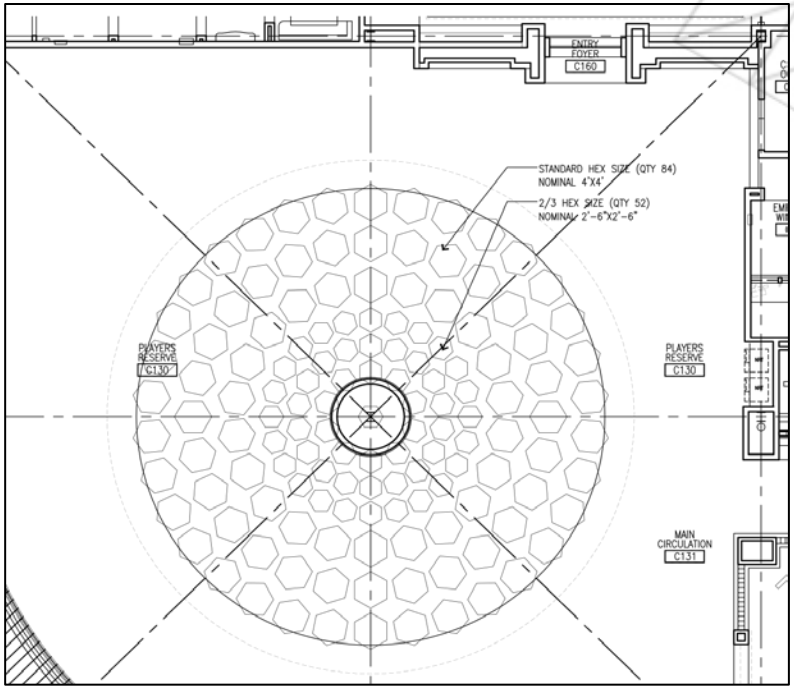
Ceiling Capabilities — Beyond the Square

Case Study:

Harrah's Cherokee Casino, Cherokee NC

DESIGN DETAILS:

- Many manufacturers offer design/ shop drawing services and will design your reflected layouts and section cuts for you.



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Case Study:

Harrah's Cherokee Casino, Cherokee NC

RESULT:

- Design intent achieved
- Custom look utilizing a combination of custom and standard cloud shapes and colors
- Enhanced acoustics performance within the space

Case Study:

Westfield Santa Anita Mall, Arcadia CA

DESIGN NEEDS:

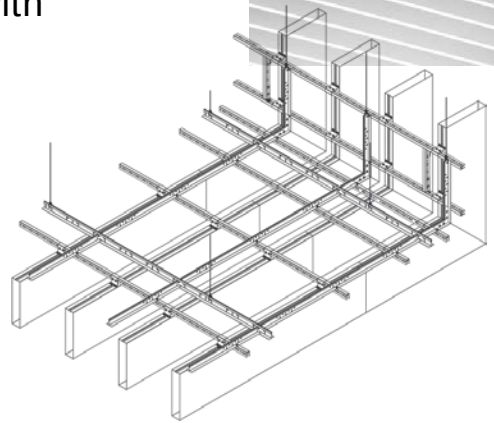
- Renovation of Center Court – hub of structure
- Design intent: New living room environment to draw visitors
- Architectural elements need to:
  - Reduce visual scale of exposed 80-foot ceiling
  - Allow light to enter through ceiling clerestory windows
  - Meet requirements for seismic area

Case Study:

Westfield Santa Anita Mall
Arcadia CA

DESIGN SOLUTIONS:

- Custom metal baffle ceiling system installed in two runs on each side of Center Court – resembles open trellis
- Drywall suspension system compatible with load-carrying and seismic requirements

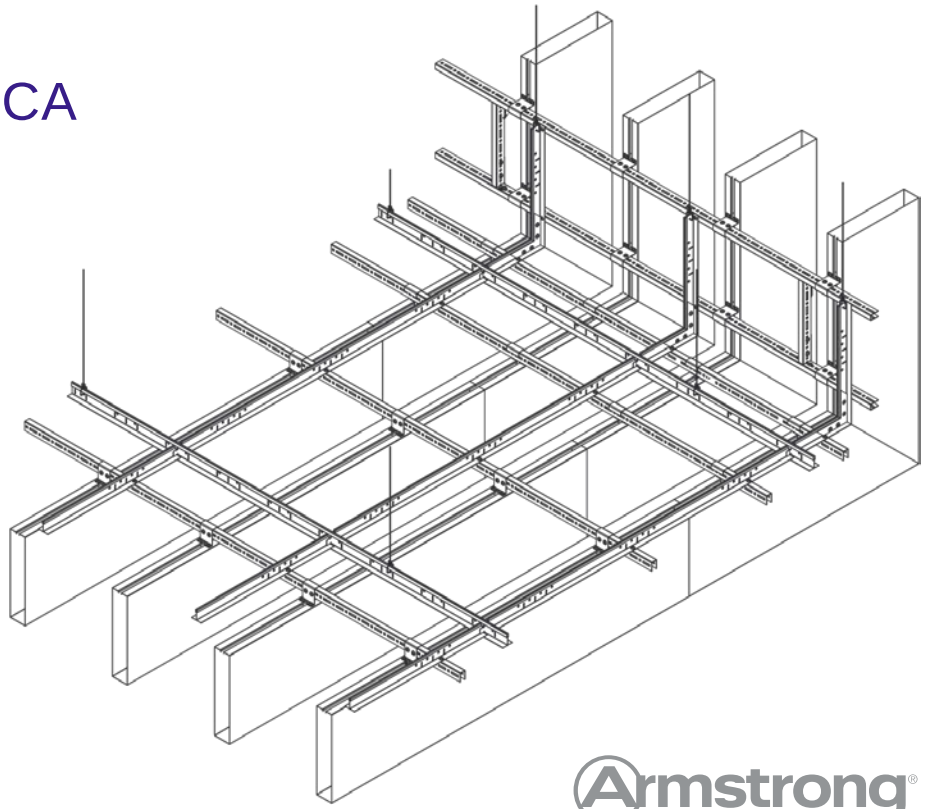


Armstrong CEILINGS

Case Study:

Westfield Santa Anita Mall, Arcadia CA

DESIGN DETAILS:



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Ceiling Capabilities — Beyond the Square

Case Study:

Westfield Santa Anita Mall, Arcadia CA

RESULT:

- Design intent achieved
  - Break down overall volume of Center Court
  - Allows illumination from overhead windows
  - Provides aesthetic contrast to dark painted open plenum ceiling
  - Makes space feel more intimate
- Tested and Approved for use in Seismic area

Armstrong CEILINGS

Case Study:

Westfield Santa Anita Mall, Arcadia CA

RESULT:

Armstrong CEILINGS

Ceiling Capabilities — Beyond the Square

Case Study:

Armstrong Student Ctr, Miami Univ. Oxford OH

DESIGN NEEDS:

- Create visual interest in student center Commons Area and Galleria corridor adjacent to dining area
- Acoustic performance to reduce noise in open space
- Allow light reflectance from exterior windows

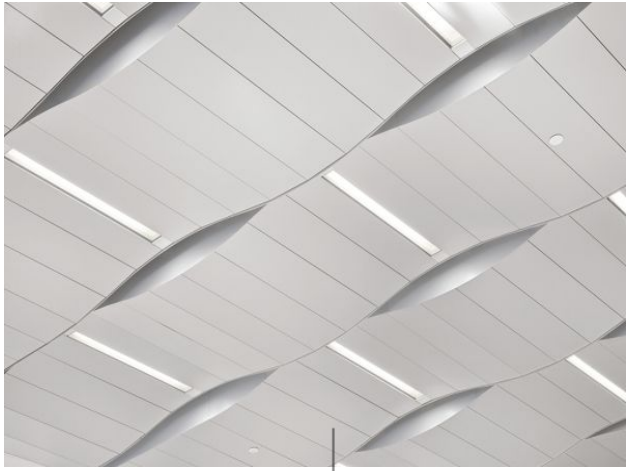
Armstrong CEILINGS

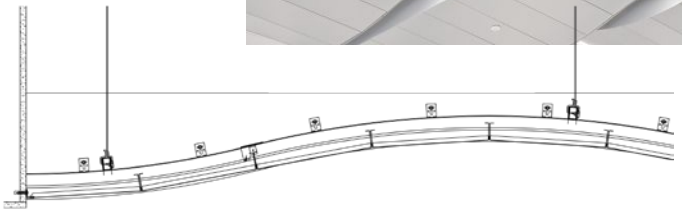
Case Study:

Armstrong Student Ctr, Miami Univ. Oxford OH

DESIGN SOLUTIONS:

- Two custom metal perforated ceiling systems were created for these spaces backed with acoustical fleece
  - Commons Area: Wave-shaped cloud design made of white metal panels on a curved suspension system with field-cut white metal trim
  - Galleria Area: Barrel vault created by suspended white metal ceiling panels on a curved suspension system

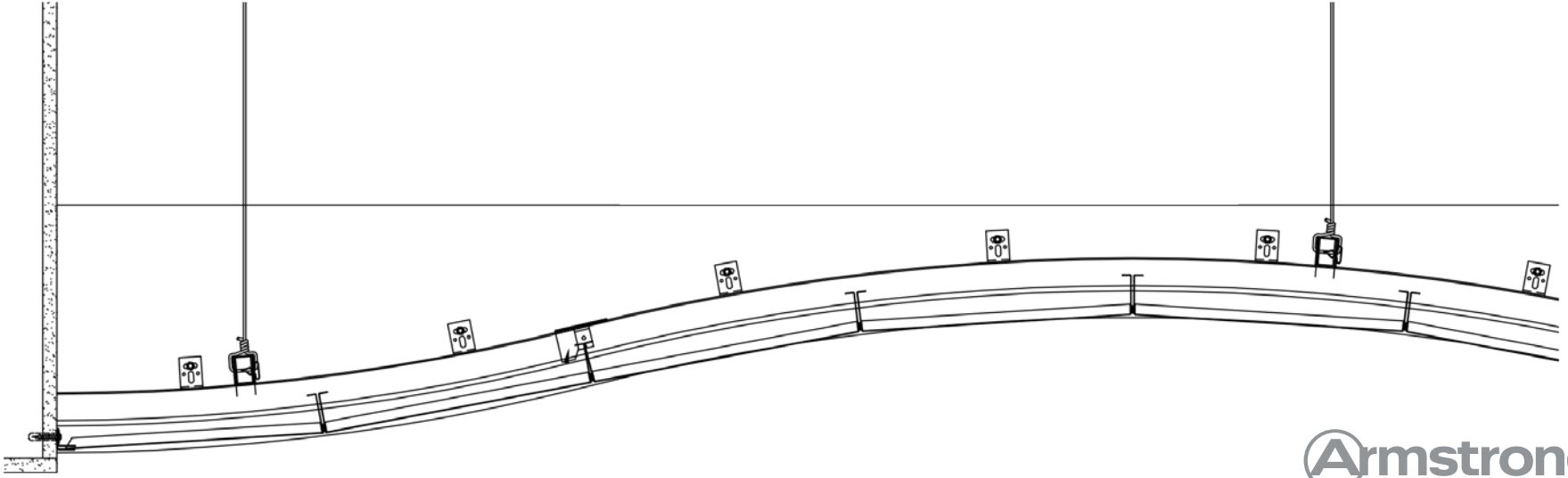




Case Study:

Armstrong Student Ctr, Miami Univ.
Oxford OH

DESIGN DETAILS:



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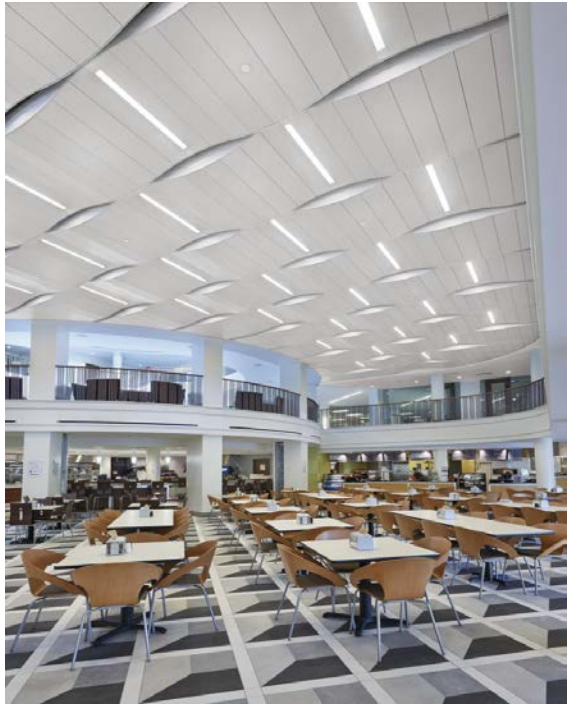
Ceiling Capabilities — Beyond the Square

Case Study:

Armstrong Student Ctr, Miami Univ. Oxford OH

DESIGN RESULT:

- Curved shape and reflective finish bounce natural light from window back into space
- Enhanced acoustical performance helps to control noisy corridors and open spaces



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CASE STUDY:

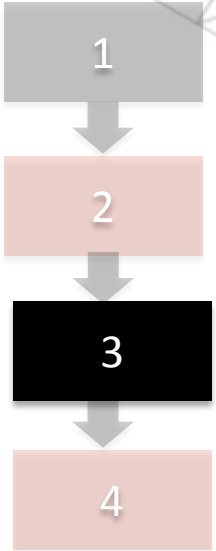
Armstrong Student Ctr, Miami Univ. Oxford OH

DESIGN RESULT:

Code Compliance

Suspended Acoustical & Drywall Ceilings

- Ceilings not planned, drawn, created, and built precisely to specifications can jeopardize the integrity of an entire system
- Ceiling installation requirements follow International Code Council® International Building Code, or IBC
- Suspended Ceilings system performance is based on:
  - Specific combination of components
  - Methods of installation
- Purpose behind installation requirements:
  - Guarantee suspension systems are strong enough to resist lateral forces without failing
  - Prevent border panels from falling from the ceiling plane
  - Codes/requirements not discussed and planned for up front can delay construction schedules and could lead to structure failure



Armstrong® CEILINGS

Code Compliance

Seismic Ceiling Design

- Installations that do not meet code requirements require evaluation report:
  - Manufacturer must submit product information and testing to independent evaluation agencies, like ICC Evaluation Service (ICC-ES) or International Association of Plumbing and Mechanical Officials Uniform Evaluation Service (IAPMO ES)
  - Evaluation services appraise building products based on acceptance criteria
  - Products that meet acceptance criteria receive an evaluation report
  - Report states product either complies with, or is alternate to the code
- Ask for and obtain reports from the manufacturers' representatives in the submittal process to ensure code compliance

Compliance

Acoustical Performance

- To achieve comprehensive acoustic quality:
  - an ideal combination of sound blocking and absorption
  - acoustical ceiling products should perform at a high levels of CAC and NRC
- Ceiling panels with high CAC and NRC ratings help block and absorb unwanted sound in open and closed office spaces used for both collaboration and focus work
- Dissatisfaction with final built environment will result if you:
  - Don’t plan appropriately for sound in the design
  - Control for only one acoustic variable

Armstrong CEILINGS

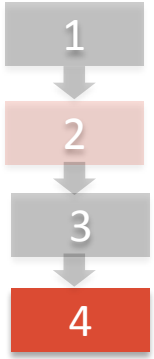
Meet Client Needs

Benefit for Architects & Specifers:

- Design choices for every application
- Assurance that design aesthetics and acoustics are constructible
- Ensure enhanced installation quality and consistency
- Ensure budgeting transparency

Benefit for the Contractor:

- Reduced labor and jobsite risk
- Faster, more accurate installations



Embracing the Latest Ceiling System Innovation

Meet Client Needs

Pre-engineered ceiling design allows architects to win the challenge of designing spaces that use modern, best construction practices,

that meet design intent, code requirements, and accelerate deadlines

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