Detailing Considerations for Light Wood Framing of Multi-family Structures

Where Structure Intersects with Finish, Acoustics, and Fire Protection

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Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.
Outline

1. Typical Detailing
2. Coordinating Structural and Architectural Requirements
3. Shrinkage Detailing
4. Acoustic Detailing
5. Fire Protection Detailing
6. Mechanical/Electrical/Plumbing Detailing
7. Structural Observations and Inspections
Light-frame Multi-Family Construction

Multi-Family Development is forecasted by Urban Land Institute to be in the top 3 projects types in the US for 2021.

Light-wood framing is a very competitive building material with expansion of sustainable forest and additional production facilities.

Light-wood framing remains an essential sustainable building material due to its renewable sourcing, energy efficiencies and is projected to significantly contribute to a $574 billion sustainable materials market by 2027.
Proper & Economical Connection Design & Detailing

1. Begins with clear & concise set of plans that are up to date and coordinated with other consultants - Architects, MEP Engineers, Elevators, Landscape, Waterproofing, etc. Review wall sections and enlarged details - focus on these fundamental details.

2. Load bearing walls, non-load bearing walls, shear walls clearly shown on plans.
3. Typical details sufficiently indicated on each level. Unique details also indicated on each level. Plan notes indicated.

4. Meet & coordinate early & often with Architect and other consultants, Contractor

5. Follow through on submittals to ensure design intent is met

6. Execution in the field
1. Light wood framing is sensitive to deviations in as-built conditions from the designed and detailed conditions. Ensure the load path on the drawings is maintained at all conditions through coordinated plans and fundamentally sound detailing.

2. Avoid misaligned load bearing walls-accumulate loads throughout wall stacks

3. Evenly distribute shear wall locations throughout the building diaphragms in orthogonal directions

4. Maintain diaphragm continuity in plane and reinforce around openings

5. Detail collectors, and other load accumulating members
1. Not only is light-framing sensitive to load path through framing members, it is also sensitive to load path through connections. Keep connections as simple and straightforward as possible.

2. Simple to detail = simple to construct (and affordable)

3. Study the details in depth

KEEP DETAILS SIMPLE!
Coordinating Architectural & Structural Requirements

Typical Fundamental Structural Details-Most Projects

1. Base of Exterior Wall-Brick Ledge or No?
2. Exterior Wall-Typical Floor
3. Interior Walls-Load Bearing vs Non-Load Bearing
4. Exterior Wall at - Hallways, Breezeways, or Balconies
5. Exterior Wall-Roof
6. Interior Walls-Roof
Floor-Wall Intersections - Foundations

Structural Grade Beam w/Brick Ledge

Architectural Grade Beam w/Brick Ledge

REF PLAN

TO LEDGE
REF ARCH

REF ARCH

VARIES

2@5 CONT

3@#8 TOP

3'0

#3 @ 12" OC

SLAB ON GRADE PER PLAN AND DETAILS

TO CONC EL
REF PLAN

2 1/2"
Floor-Wall Intersections - Exterior Walls

Structural Detail

Architectural Detail
Floor-Wall Intersections – Interior Walls

Structural Detail

Architectural Detail
Floor-Wall Intersections – Corridors, Breezways, or Balconies

Structural Detail

Architectural Detail
1. Gypsum board on interior walls-shrinkage
2. Floor members-ceiling gypsum board
3. Exterior walls-stucco, brick, metal panel
4. Canopy through brick coordination
1. Wood’s natural characteristics contribute to shrinkage and while it is unavoidable, shrinkage effects can be mitigated.

2. Shrinkage may cause distress in architectural finishes, MEP systems, and waterproofing systems.

3. Typical shrinkage on the order of magnitude of 3/8” per floor.

4. Reduce Shrinkage using proper detailing, protecting wood, delaying caulk application-expect maintenance

5. Reduced Shrinkage to order of magnitude of 1/8” – ¼” per floor

6. Fundamental details at typ exterior & interior walls, sill, jamb, and head of windows

7. Wood arrives wet and dries – Brick arrives dry and absorbs moisture, swells
1. Also refer to: Accommodating Shrinkage in Multi-Story Wood-Frame Structures available from WoodWorks

2. Detailing for Wood Shrinkage, August 12, 2015
Acoustics


2. Wall Assembly between units-Gyp layers, resilient channels-no short circuits, studs

3. Floor-Ceiling Assembly-Gyp layers, resilient channels, floor underlayment at hard floors

4. Verify Testing for products/assemblies!

5. Elevators & Stairs, Parking garages (adjacent to units-separation joint)

6. Mechanical Units-AHU, pool pumps, trash chutes/rooms

7. Engage an Acoustical Consultant-Details review & special conditions

Acoustic Details

Interior Section

Exterior Plan View

Interior Plan View – Offset Penetrations
Fire Protection


2. Coordinate closely with Architect for UL assemblies-ensure structure and architecture do not clash and violate UL requirements

3. Check with local building code departments-some jurisdictions are more detailed and stringent with their requirements

4. Shaft Wall requirements unique-reference IBC and WoodWorks.org for more detailed treatment

5. Also refer to: The Evolution of Fire Life Safety in Building Codes – WoodWorks
Fire Protection Details

Boxes

Pipe Penetrations

Floor-to-Wall
Balcony/Terrace Conditions

1. Typically require step in top of finished floor and corresponding step at supporting structure

2. Avoid discontinuity of structure-ESPECIALLY AT CANTILEVERED CONDITIONS

3. Simple pass through of framing

4. Handrail blocking

5. Any special loading requirements? – Higher live loading, tieback loading, topping, landscape loads
Mechanical Coordination

1. Duct routing - Trusses planned openings or between web members
2. Heavy equipment hangers
3. Floor supported equipment - additional blocking
4. Roof top equipment
5. Elevators – also ref: Shaft Wall Solutions for Wood-Frame Structures - WoodWorks
1. Every tradesman is a potential demolition contractor

2. Vertical plumbing - Sill & header plates, thermal expansion of piping vs. wood shrinkage

3. Horizontal plumbing - floors: joists vs truss, holes in studs properly placed, sized, and pipes protected

4. Sprinklers

5. Horizontal electrical conduit
1. Contractor’s Obligations

2. Structural Observations by EOR

3. Structural Inspections-IBC & Independent Testing Laboratory

4. Architectural Observations

5. Architectural Inspections-Firestops, firewalls, life safety systems
Common Issues

1. Poor dimensional control in the field—misaligned walls
2. Lack of preconstruction planning from trades—too many field modifications to structure
3. Quality labor shortages
4. Field Quality Control
5. Too few structural & architectural field observations
This concludes The American Institute of Architects Continuing Education Systems Course

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