Special Topics

• Metal-Plate-Connected Wood Trusses
• Post-Frame Construction

Metal Plate Connected Wood Trusses

• Metal plate connected (MPC) trusses significantly impact construction industry
• MPC trusses use steel gusset plates to connect truss members at joints
• Truss members are primarily dimension lumber
Metal Plate Connected Wood Trusses

• Truss manufacturers can provide engineering design assistance (sometimes through the plate manufacturers)

• All those involved in the design process need to be familiar with truss design and installation

Design of Trusses

• The specification for design of MPC wood trusses is ANSI/TPI 1-1995
  • developed by Truss Plate Institute
  • TPI 1 establishes design procedures and provides technical information for design and construction
TPI 1 (and commentary)

- TPI 1 Contains:
  - responsibilities for the designer
  - quality criteria for MPC wood trusses
  - brief guidelines for truss installation and bracing
  - truss member design procedures
  - joint design procedures
  - deflection guidelines
  - bearing design

Design Responsibilities

- Wood Truss Council of America publishes WTCA 1-1995
  - Standard Responsibilities in the Design Process Involving Metal Plate Connected Wood Trusses
- Document outlines responsibilities of:
  - building owner
  - building designer
  - contractor
  - truss manufacturer
  - truss designer
Design Responsibilities

- Building Designer Responsibilities:
  - truss orientations and locations
  - info for determination of truss profiles
  - adequate support and connections for truss
  - permanent bracing design for structure
  - location, direction, magnitude of all loads and deflections
  - truss anchorage designs
  - review truss placement plan and truss design drawings

Design Responsibilities

- Truss Designer Responsibilities:
  - prepare truss drawings with:
    - slope, span, spacing
    - location of all joints
    - bearing widths
    - design loads and deflection limitations
    - adjustments to design values for conditions of use
Design Responsibilities

- Truss Designer Responsibilities (continued):
  - prepare truss drawings with:
    - reaction forces and direction
    - connector plate type, size, thickness, location
    - lumber size, species, grade for each member
    - connection requirements for truss
    - calculated maximum deflections for design loads
    - forces to enable the Building Designer to design anchorage of trusses
    - required permanent truss bracing locations

Truss Handling, Installation, and Bracing

- Frequent problems occur during handling, installation and bracing of trusses
- Two types of bracing are used:
  - temporary (to support trusses until all sheathing and other permanent bracing is installed)
  - permanent (to provide adequate lateral support for truss members under axial and bending loads)
- TPI DSB-89 Temporary Bracing of Metal Plate Connected Wood Trusses
- TPI HIB-91 Handling, Installing, and Bracing Metal Plate Connected Trusses
Proper use of spreader bars and nylon straps to prevent damage to wood members.
Proper use of longitudinal and diagonal bracing for trusses

Post-Frame Construction

- Post-frame construction has gained popularity in commercial and industrial buildings
- Began as pole buildings, but poles have been replaced by posts with rectangular cross sections
Post-Frame Construction

Purlins

Trusses

Girts

Posts (Columns)

Cladding

Cladding
Post-Frame Design

- Design of post-frame construction can be completed using traditional methods of wood design.
- ASAE has developed new Diaphragm Design Procedures
  - procedures account for additional stiffness and strength of roof diaphragms and end walls
  - using diaphragm design techniques results in savings in material required for Main Wind Force Resisting System