Executive Certificate in Structural Steel Detailing

Introduction to Structural Steel Detailing

Anchor Bolt: An anchor bolt is a type of fastener used to attach objects or structures to concrete. They are commonly used in structural steel detailing to secure steel columns, beams, and other elements to a concrete foundation. Anchor bolts are typically embedded in the concrete during construction and have a threaded end to secure nuts and washers.

Beam: A beam is a structural element that carries load primarily in bending. Beams are typically horizontal and are used to support loads over a span. They can be made of various materials, including steel, wood, and concrete. In structural steel detailing, beams are often designed and detailed to withstand specific loads and conditions.

Bolted Connection: A bolted connection is a type of connection used in structural steel detailing to join two or more steel members together. Bolts are inserted through pre-drilled holes in the steel members and secured with nuts to create a strong and rigid connection. Bolted connections are commonly used in steel construction due to their ease of installation and versatility.

Bracing: Bracing is a structural element used to provide stability and resistance to lateral forces in a building or structure. Bracing can be made of steel, concrete, or other materials and is designed to prevent sway, distortion, or collapse under wind, seismic, or other loads. In structural steel detailing, bracing is often specified to ensure the structural integrity and safety of a building.

Column: A column is a vertical structural element that supports loads primarily in compression. Columns are used to transmit loads from the beams or slabs above to the foundation below. In structural steel detailing, columns are often designed and detailed to withstand specific loads and conditions, such as gravity loads, wind loads, and seismic loads.

Connection: A connection is a joint or interface between two or more structural elements that allows for the transfer of loads. Connections can be classified as welded, bolted, or riveted, depending on the method used to join the elements. In structural steel detailing, connections play a critical role in the overall stability and performance of a structure.

Detailing: Detailing is the process of creating detailed drawings and specifications for the fabrication and erection of structural steel components. Steel detailers are responsible for translating the design drawings into shop drawings that provide all the necessary information for the fabrication and installation of steel elements. Detailing is a crucial step in the construction process to ensure the accuracy and integrity of the final structure.

Erection: Erection is the process of assembling and installing structural steel components on-site to form a complete building or structure. Erection involves lifting, positioning, and connecting steel members according to the detailed shop drawings and specifications. Proper erection practices are essential to ensure

the safety, quality, and integrity of the finished structure.

Fabrication: Fabrication is the process of manufacturing structural steel components in a fabrication shop according to detailed shop drawings and specifications. Fabricators use cutting, bending, welding, and other processes to shape raw steel into finished components that are ready for installation. Fabrication plays a critical role in the construction process to ensure the quality and accuracy of the final structure.

Footing: A footing is a structural element that transfers loads from a column or wall to the underlying soil or foundation. Footings are typically made of concrete and are designed to distribute the weight of the structure evenly to prevent settlement or movement. In structural steel detailing, footings are often detailed to ensure proper support and stability for the steel columns and walls.

Foundation: A foundation is the substructure of a building or structure that supports the loads from the superstructure above. Foundations can be shallow or deep, depending on the soil conditions and structural requirements. In structural steel detailing, foundations are critical to the overall stability and performance of the structure and are often detailed to meet specific design criteria.

Girder: A girder is a large horizontal beam that supports other beams or structural elements. Girders are commonly used in bridges and buildings to span long distances and carry heavy loads. In structural steel detailing, girders are often designed and detailed to withstand specific loads and conditions, such as live loads, dead loads, and wind loads.

Joist: A joist is a horizontal structural element that supports floor or ceiling loads over a span. Joists are typically made of wood, steel, or concrete and are designed to transfer loads to beams or walls. In structural steel detailing, joists are often specified to meet building code requirements and provide adequate support for the intended use of the space.

Lateral Load: A lateral load is a horizontal force that acts perpendicular to the vertical axis of a building or structure. Lateral loads can be caused by wind, seismic activity, or other external forces and can induce sway, deflection, or instability in the structure. In structural steel detailing, lateral loads are considered in the design and detailing of structural elements to ensure the safety and performance of the building.

Load: A load is a force acting on a structure or element that causes stress, deformation, or movement. Loads can be classified as dead loads (permanent), live loads (temporary), and environmental loads (wind, snow, seismic). In structural steel detailing, loads are considered in the design and detailing of steel components to ensure they can safely support the imposed loads.

Member: A member is a structural element, such as a beam, column, brace, or truss, that forms part of a larger structure. Members are designed and detailed to carry specific loads and resist forces to ensure the stability and integrity of the structure. In structural steel detailing, members are specified based on their material, size, shape, and connection type.

Plate: A plate is a flat, rectangular structural element made of steel that is used in various applications, such as base plates, gusset plates, and stiffeners. Plates are often cut, drilled, and welded to other steel members to create connections or add strength to the structure. In structural steel detailing, plates are detailed with

dimensions and specifications for fabrication and installation.

Rivet: A rivet is a permanent mechanical fastener used to join two or more steel members together. Rivets are inserted into pre-drilled holes and secured by deforming the end of the rivet to create a strong and tight connection. Although riveting is less common in modern steel construction, it was widely used in historical structures and bridges.

Shop Drawing: A shop drawing is a detailed drawing or set of drawings produced by a steel detailer to guide the fabrication and installation of structural steel components. Shop drawings include dimensions, material specifications, connection details, and other information necessary for the fabricator and erector to accurately build the structure. Shop drawings are a crucial part of the construction process to ensure the accuracy and quality of the finished product.

Stiffener: A stiffener is a structural element used to reinforce or support a steel member subjected to bending, shear, or compression. Stiffeners are typically plates or angles welded to the flanges or web of a beam or column to increase its load-carrying capacity. In structural steel detailing, stiffeners are detailed with dimensions, locations, and welding requirements to ensure proper installation and performance.

Structural Steel: Structural steel is a type of steel used in construction to create load-bearing elements, such as beams, columns, and trusses. Structural steel has high strength, ductility, and versatility, making it suitable for a wide range of building applications. In structural steel detailing, the properties and characteristics of structural steel are considered in the design and detailing of steel components.

Truss: A truss is a structural framework of connected elements, such as beams, bars, and ties, designed to support loads over a span. Trusses are commonly used in roofs, bridges, and industrial buildings to create lightweight and efficient structural systems. In structural steel detailing, trusses are designed and detailed with specific configurations and connections to ensure they can safely carry the imposed loads.

Welded Connection: A welded connection is a type of connection used in structural steel detailing to join two or more steel members together by welding. Welding fuses the steel members at the joint to create a strong and continuous connection that resists forces and moments. Welded connections are commonly used in steel construction for their strength, durability, and efficiency.

Wind Load: Wind load is the force exerted by wind on a building or structure that can cause lateral movement, vibration, or overturning. Wind loads are influenced by factors such as building height, shape, location, and wind speed. In structural steel detailing, wind loads are considered in the design and detailing of structural elements to ensure the structural integrity and stability of the building.

This glossary provides a comprehensive overview of key terms and concepts related to structural steel detailing in the Executive Certificate in Structural Steel Detailing course. By understanding these terms, students will be better equipped to navigate the complexities of structural steel design, fabrication, and erection.

Introduction to Structural Steel Detailing Glossary

AISC (American Institute of Steel Construction)
- Related Terms: Steel construction, structural engineering
- Explanation: The American Institute of Steel Construction is a non-profit technical institute and trade association that develops design specifications and codes for structural steel construction in the United States.

Anchor Bolt
- Related Terms: Foundation, connection
- Explanation: An anchor bolt is a steel rod embedded in concrete or masonry to provide structural support and secure steel columns or other elements to the foundation.

Base Plate
- Related Terms: Column, foundation
- Explanation: A base plate is a steel plate that connects a steel column to a concrete foundation, providing stability and support for the structure.

Bearing Plate
- Related Terms: Beam, connection
- Explanation: A bearing plate is a steel plate used to distribute the load from a beam or column to the supporting structure, such as a column base or foundation.

Bolted Connection
- Related Terms: Fasteners, welding
- Explanation: A bolted connection is a connection method using bolts to secure steel members together, providing a way to disassemble and reassemble the structure if needed.

Camber
- Related Terms: Deflection, beam
- Explanation: Camber is a slight upward curvature intentionally built into a beam or truss to account for deflection under load, ensuring a level finished structure.

Column
- Related Terms: Beam, support
- Explanation: A column is a vertical structural member that supports the load of the structure above and transmits it to the foundation through connections such as base plates.

Detailing
- Related Terms: Drafting, fabrication
- Explanation: Detailing is the process of creating detailed drawings and plans for the fabrication and construction of steel structures, including connections, dimensions, and material specifications.

Engineering Drawing
- Related Terms: Blueprint, CAD
- Explanation: An engineering drawing is a detailed, technical drawing that communicates the design and dimensions of a steel structure, including plans, elevations, and sections.

Fabrication
- Related Terms: Welding, shop drawings
- Explanation: Fabrication is the process of cutting, bending, and assembling steel components according to the engineering drawings to create the individual parts of a structure.

Girder
- Related Terms: Beam, bridge
- Explanation: A girder is a horizontal structural member that supports the load of beams and joists in a building or bridge, transferring the load to the columns or piers.

HSS (Hollow Structural Section)
- Related Terms: Tube, pipe
- Explanation: A hollow structural section is a type of steel tube with a hollow cross-section, used in structural applications such as columns, beams, and trusses.

I-Beam
- Related Terms: Flange, web
- Explanation: An I-beam is a type of steel beam with an I-shaped cross-section, featuring a central web connecting top and bottom flanges to resist bending and shear forces.

Joist
- Related Terms: Beam, floor
- Explanation: A joist is a horizontal structural member that supports the load of a floor or ceiling, transferring it to the beams or girders in the structure.

Knee Brace
- Related Terms: Bracing, truss
- Explanation: A knee brace is a diagonal structural member used to provide additional stability and prevent lateral movement in a structure, especially in trusses and portal frames.

Ladder Frame
- Related Terms: Scaffolding, access
- Explanation: A ladder frame is a temporary steel structure used for access and support during construction, typically consisting of vertical members connected by rungs or steps.

Moment Connection
- Related Terms: Beam, column
- Explanation: A moment connection is a type of steel connection that resists both vertical and horizontal forces, allowing beams to transfer bending moments to columns efficiently.

Node
- Related Terms: Joint, connection
- Explanation: A node is a point where two or more structural members meet and are connected, often requiring careful detailing to ensure proper load transfer and stability.

Orthographic Projection
- Related Terms: Multiview drawing, projection
- Explanation: Orthographic projection is a method of creating two-dimensional engineering drawings that represent an object in three dimensions using multiple views from different angles.

Portal Frame
- Related Terms: Frame, bracing
- Explanation: A portal frame is a structural frame consisting of columns and beams connected by rigid joints, providing strength and stability against lateral forces such as wind loads.

Quality Control
- Related Terms: Inspection, standards
- Explanation: Quality control is the process of ensuring that steel components meet the required specifications and standards through inspections, tests, and documentation.

Rivet
- Related Terms: Fastener, connection
- Explanation: A rivet is a metal pin with a head used to fasten steel plates or components together by deforming the end of the pin, creating a strong and permanent connection.

Shop Drawing
- Related Terms: Fabrication, detailing
- Explanation: A shop drawing is a detailed drawing produced by the fabricator or contractor that specifies the dimensions, materials, and assembly of steel components for fabrication.

Truss
- Related Terms: Roof, bridge
- Explanation: A truss is a structural framework of connected members forming triangles to support roof loads, bridge spans, or other structures requiring a lightweight and efficient design.

Universal Column
- Related Terms: Beam, section
- Explanation: A universal column is a type of steel column with a universal beam shape, offering versatility in structural applications such as columns, beams, and lintels.

Virtual Design and Construction (VDC)
- Related Terms: BIM, coordination
- Explanation: Virtual design and construction is a process that uses digital models and simulations to plan, design, and construct steel structures more efficiently and collaboratively.

Welding Symbol
- Related Terms: Weld joint, welder
- Explanation: A welding symbol is a graphic representation on engineering drawings that communicates the type, location, and size of welds required for joining steel components.

X-Bracing
- Related Terms: Bracing, diagonal
- Explanation: X-bracing is a type of diagonal bracing used in steel structures to provide lateral stability and resist horizontal forces such as wind loads or seismic activity.

Yield Strength
- Related Terms: Tensile strength, deformation
- Explanation: Yield strength is the maximum stress a material can withstand before it begins to deform permanently, indicating its ability to support loads without failure.

Zinc Coating
- Related Terms: Galvanizing, corrosion
- Explanation: Zinc coating is a protective layer of zinc applied to steel components through galvanizing to prevent corrosion and extend the lifespan of the structure.