Apprenticeship and Industry Training

Steel Detailer

Competency Outline

204 (2023)

Alberta

Apprenticeship and Industry Training

ALBERTA SKILLED TRADES AND PROFESSIONS

Steel detailer: competency outline

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STEEL DETAILER

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Apprenticeship and Industry Training System

A person who has completed the competency requirements and met industry standards for the steel detailer training program, including 48 months and 7200 hours of level specific on-the-job training, can apply for a credential at any apprenticeship delivery services office of Alberta Skilled Trades and Professions, Apprenticeship and Industry Training. The candidate will have to successfully pass an industry examination administered by Alberta Skilled Trades and Professions before obtaining certification.

Special thanks are offered to the following industry members who contributed to the development of the standard:

Mr. J. Smyth .....Edmonton
Mr. G. Bratina.....Edmonton
Mr. A. Prier.....Red Deer
Mr. I. Pinnell.....Edmonton
Mr. M. Plooy .....Edmonton

Safety

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in industry training programs in Alberta. These responsibilities are shared and require the joint efforts of sponsors and employees. Controlling the variables and behaviors that may contribute to or cause an accident or injury can create safe learning experiences and environments. It is generally recognized that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy safe attitude towards prevention of accidents. Individuals in this trade may be exposed to more hazards than others in the work force and should be familiar and comply with the Occupational Health and Safety Act and Regulations respecting personal safety and the safety in the work place.

Additional information is available at www.alberta.ca/occupational-health-safety.aspx.

Legal and Administrative Aspects of Safety

Accident prevention and the provisions of safe working conditions are the responsibilities of a sponsor and employee.

Sponsor's/Employer's Responsibilities:

The sponsor is responsible for:

- providing and maintaining safety equipment, protective devices and clothing
- enforcement of safe working procedures
- safeguards for machinery, equipment and tools
- observance of all accident prevention regulations
- training of employees in safe use and operation of equipment

Employee's Responsibilities:

The employee is responsible for:

- working in accordance with the safety regulations pertaining to job environment
- working in such a way as not to endanger themselves or fellow employees
- safe use of all equipment and supplies provided by the sponsor/employer

Formal or Technical Training

Training may be available through sponsors, public or private providers, or the National Institute of Steel Detailing. The cost of training is the responsibility of the trainee or the sponsor or both. In order to obtain certification a candidate must demonstrate competency in each of the standards established by industry.

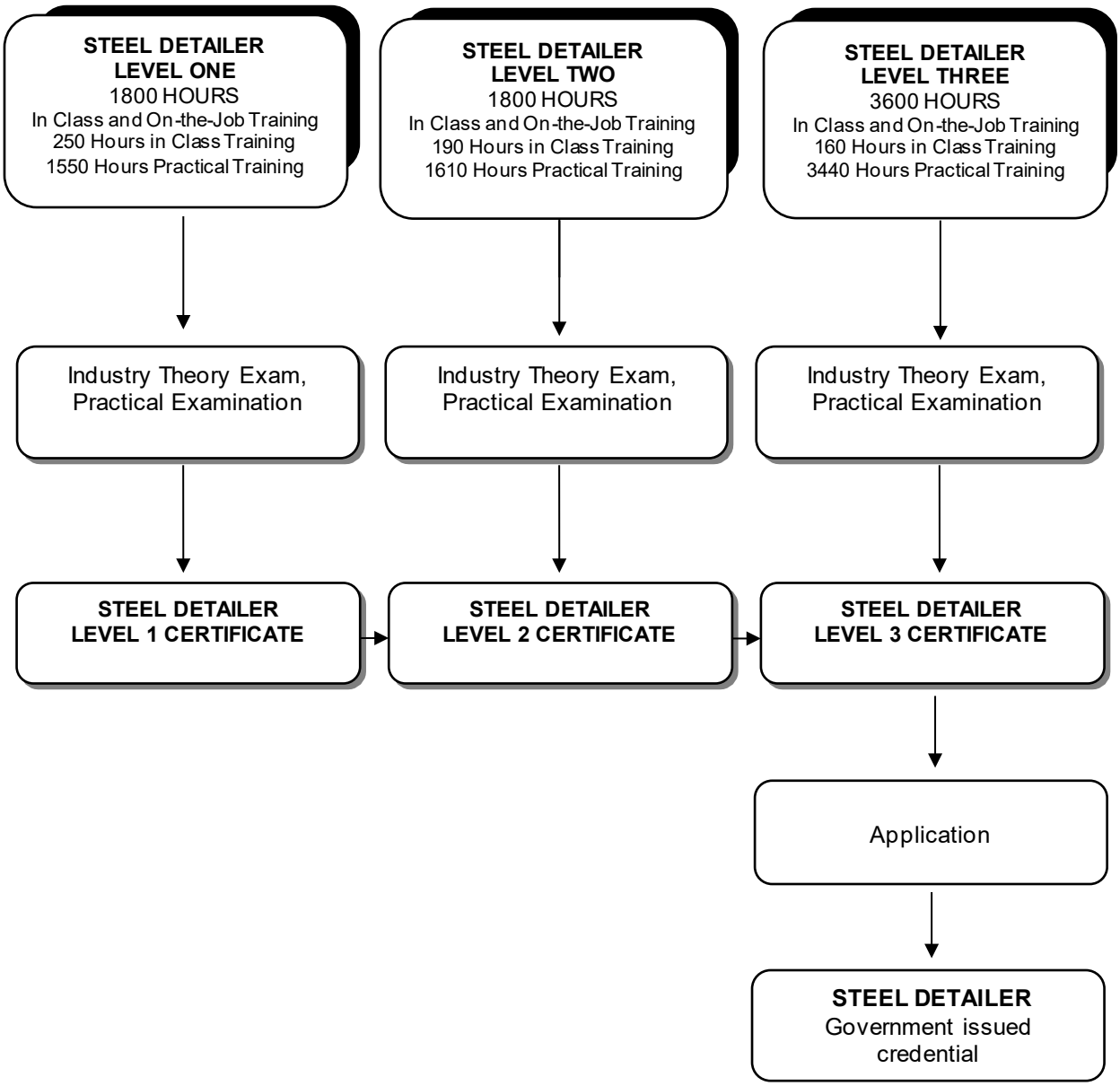
Procedures for Recommending Revisions to the Competency Outline

Valuable input is acknowledged from industry and the training providers. Any concerned citizen or group in the province of Alberta may make recommendations for change by writing to:

Registrar of Apprenticeship Programs
c/o Apprenticeship Delivery and Industry Support Services
Apprenticeship Delivery and Industry Support
19th floor, Commerce Place
10155 - 102 Street
Edmonton, AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used.

STEEL DETAILER – ROUTE TO CREDENTIAL



STEEL DETAILER
COMPETENCY TRAINING OUTLINE
LEVEL ONE (1800 Hours over 12 months)

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SECTION ONE	**DRAFTING**	Drafting Language	Drawing Standards	Dimensioning
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SECTION TWO	**VIEW DEVELOPMENT AND GEOMETRIC MATHAMATICS**	Geometry	Primary Auxiliary Views	Secondary Auxiliary Views
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SECTION THREE	**DRAWINGS AND SPECIFICATIONS**	Interpret Customer Drawings	Notes and Specifications	Schedules and Tables
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SECTION FOUR	**FABRICATION DRAWINGS**	Bolting	Welding Joints	Welding Symbol Identification
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SECTION FIVE	**COMPUTER AIDED DRAFTING (CAD)**	System Overview	Menus, Hierarchy and Standard Commands	Drawing Set-Up
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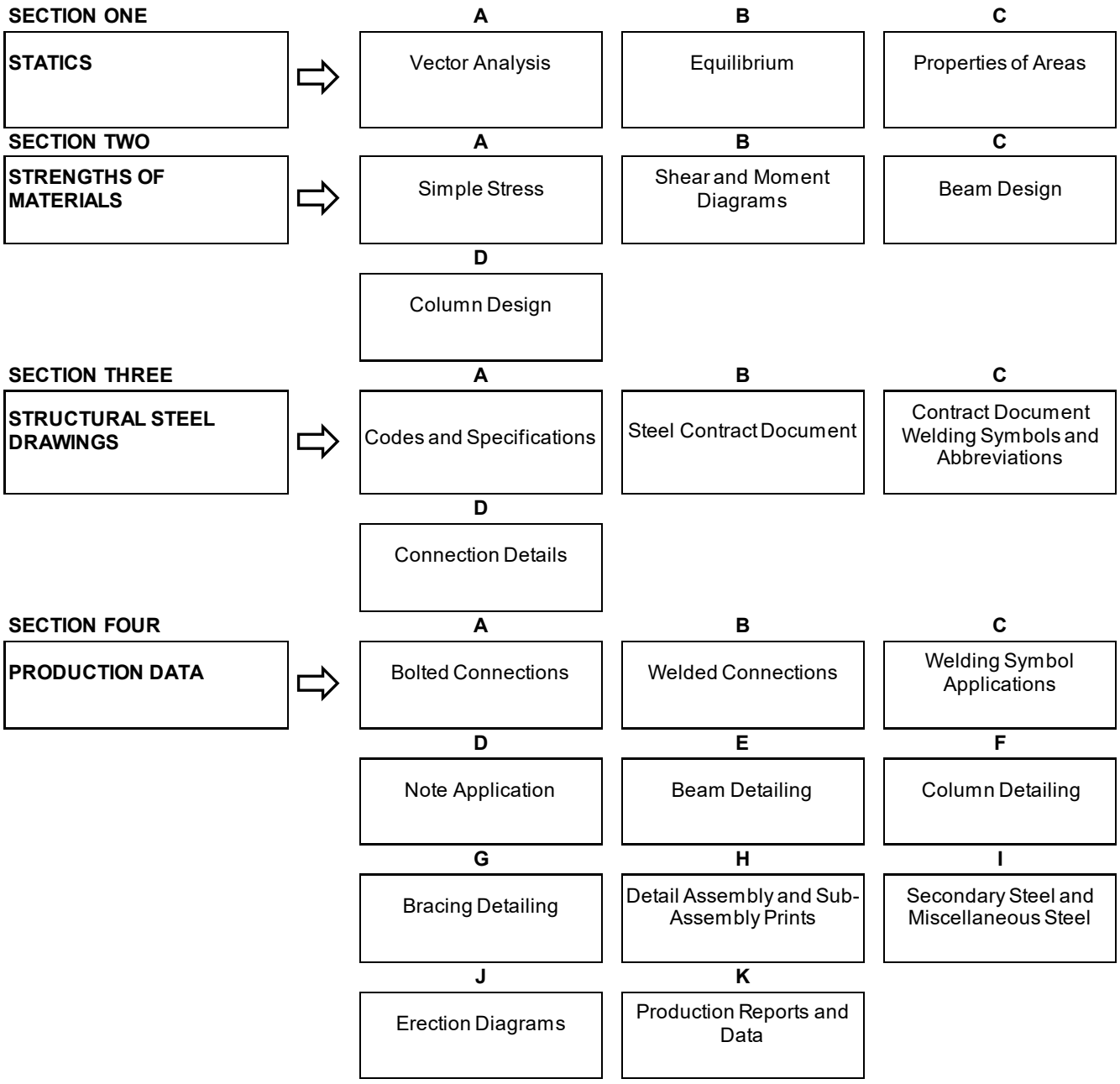
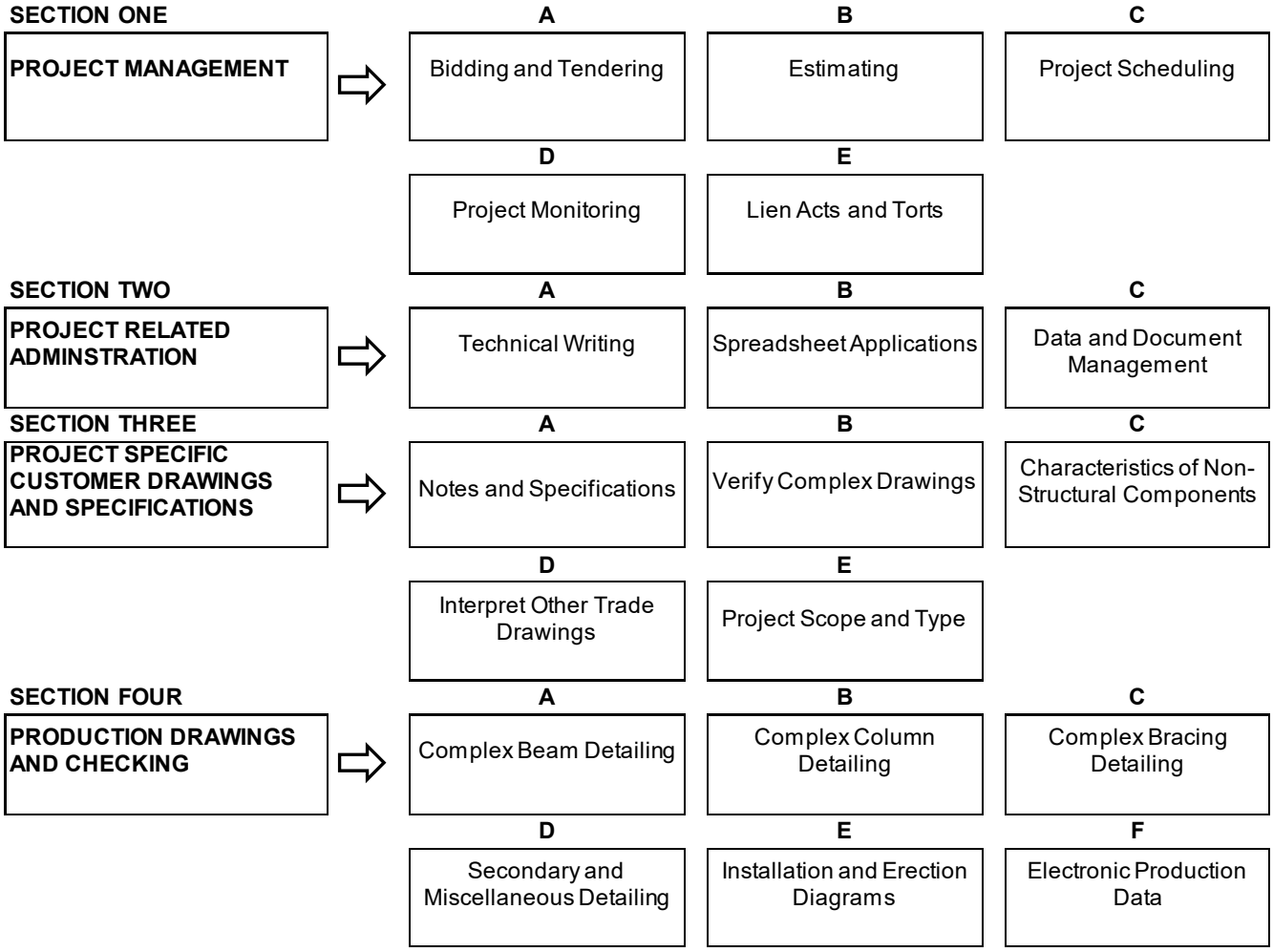
STEEL DETAILER
COMPETENCY TRAINING OUTLINE
LEVEL TWO (1800 Hours over 12 months)



STEEL DETAILER
COMPETENCY TRAINING OUTLINE
LEVEL THREE (3600 Hours over 24 months)



COMPETENCY OUTLINE
STEEL DETAILER TRADE
LEVEL ONE

SECTION ONE: ..... DRAFTING .....

A. Drafting Language

Competency: Interpret drafting language.

1. Interpret graphic language such as symbols, line types, line weights, clouds and section markers.
2. Interpret acronyms, abbreviations, and language specific to steel detailing.

B. Drawing Standards

Competency: Compare drawing sizes as per industry standard.

1. Describe drawing sizes as per industry standard.
2. Explain the general layout of a drawing.
3. Describe correct folding care and storage of drawings.
4. Compare drawing sizes as per industry standard.

C. Dimensioning

Competency: Describe dimensioning.

1. Describe dimensioning units, types, and scale.
2. Describe lines used for dimensioning, dimensional and extension line placement, arrowheads, leaders, direction of dimensional arcs, and angles.
3. Explain the role of dimension tolerances in shop fabrication and project layout.

D. Sketching and Shape Description

Competency: Create freehand sketches.

1. Create freehand sketches of simple parts.
2. Create freehand sketches of 3D objects.

SECTION TWO: ..... VIEW DEVELOPMENT AND GEOMETRIC MATHEMATICS .....

A. Geometry

Competency: Apply principles of geometry to drawings.

1. Explain planes of projection.
2. Explain the layout of geometric constructions.
3. Describe geometric shapes, points on lines, visibility of lines and planes and parallelism of lines.
4. Apply principles of geometric construction to drawings.

B. Primary Auxiliary Views

Competency: Draw three-dimensional objects in two dimensions.

1. Explain orthographic projection of a 3D object.
2. Describe true length of analytic geometry.

3. Identify intersection of planes and sloping lines.
4. Draw a 3D object in 2D.

C. Secondary Auxiliary Views and View Development

Competency: Apply geometric mathematics to a drawing.

1. Identify any secondary auxiliary views.
2. Describe the true length in an oblique plane.
3. Apply geometric mathematics to a drawing.

D. Trigonometry

Competency: Calculate angles and slopes based on rise and run.

1. Describe acute angles and isosceles triangles.
2. Describe right angle solutions and the Pythagorean Theory.
3. Perform calculations using sin, cos, tan.
4. Calculate angles and slopes based on rise and run.

SECTION THREE:.....DRAWINGS AND SPECIFICATIONS.....

A. Interpret Customer Drawings

Competency: Interpret engineering and architectural drawings.

1. Explain the relationship between architecture drawings and the engineer's structural drawings.
2. Describe standard drawing symbols, construction methods, architectural details, referencing, sections and elevations.
3. Interpret engineering and architectural drawings.

B. Notes and Specifications

Competency: Select project requirements from notes and specifications.

1. Identify grades of steel required from a drawing.
2. Identify the relevant notes on drawings.
3. Identify paint preparations, required bolt types and grades, connection requirements and loads.
4. Identify required reference drawings.
5. Select project requirements from notes and specifications.

C. Schedules and Tables

Competency: Use schedules and tables.

1. Identify schedules as provided on customer documents.
2. Identify tables as provided on customer documents.
3. Use schedules and tables that are provided on the customer documents.

D. Structural Shapes and Sections

Competency: Describe structural steel type and properties.

1. Identify steel shapes.

2. Explain the properties, mill tolerances and terminology of steel shapes.

E. Frames and Shop Assemblies

Competency: Select steel members for shop assemblies.

1. Identify steel members required for shop assembly.
2. Select steel members required for shop assembly.

F. Simple Connection Details

Competency: Incorporate connection requirements.

1. Identify customer standards for connection details.
2. Determine connection requirements.
3. Incorporate engineering design and details found on customer drawings, specifications and notes.
4. Incorporate connection design details provided by connection design engineers.

SECTION FOUR: .....FABRICATION DRAWINGS .....

A. Bolting

Competency: Describe types of structural bolting systems.

1. Describe the properties of structural bolts, bolt connections, holes and slots.
2. Describe the properties of anchor bolts for structural steel.
3. Describe the properties of concrete and masonry fastening systems for structural steel.
4. Describe the properties of fastening systems for grating and checker plate.
5. Explain methods of installation for structural bolting systems.

B. Welding Joints

Competency: Identify types of welding joints.

1. Identify the types of weld joints.

C. Welding Symbol Identification

Competency: Apply welding symbols to fabrication drawings.

1. Identify welding symbols.
2. Describe welds and weld strengths.
3. Select welding symbols.
4. Apply welding symbols and welding notes to fabrication drawings.

D. Note Description

Competency: Enter notes on fabrication drawings.

1. Identify required notes and ensure they are shown on fabrication drawings.
2. Select proper terminology for use in notes.
3. Enter notes on fabrication drawings.

E. Bill of Material

Competency: Create Bill of Material used for fabrication.

1. Enter the material requirements for fabricating steel.
2. Enter the correct length, weight, and grade of steel.
3. Calculate material weights on Bill of Material.
4. Create a Bill of Material for fabrication.

F. Fabrication Drawings

Competency: Create a fabrication drawing.

1. Describe the piece marks on a fabrication drawing.
2. Describe assembly fabrication drawings.
3. Describe sub-assembly fabrication drawings.
4. Describe the proper views on a fabrication drawing.
5. Describe dimensioning on a fabrication drawing.
6. Create a fabrication drawing.

SECTION FIVE: ..... COMPUTER AIDED DRAFTING (CAD) .....

A. System Overview

Competency: Locate CAD commands, menus and files.

1. Create a file in CAD software.
2. Explain file management; opening, naming and saving files.
3. Describe how to access the help system.
4. Locate CAD commands, pull down menus, toolbars and files.

B. Menus, Hierarchy and Standard Commands

Competency: Operate CAD commands.

1. Operate pull down menus, toolbars, command line, keyboard commands, function keys and data input.

C. Drawing Set-up

Competency: Set up new CAD drawing.

1. Explain planning and layout using CAD software.
2. Explain how to use snaps, layers and line types.
3. Set up a new CAD drawing.

D. Drafting

Competency: Use CAD for drafting operations.

1. Operate the cursor and auto snap.
2. Navigate within your drawing.

3. Operate layers, filters and display tools.
4. Select appropriate tool to draw or model simple shapes or objects.

E. Editing

Competency: Modify elements of a CAD drawing.

1. Describe the use of editing and attribute tools.
2. Modify elements of a CAD drawing.

F. Dimensioning

Competency: Create dimensions on a CAD drawing.

1. Describe dimensioning styles and types.
2. List the variables for geometry, format and annotation.
3. Create dimensions on drawings.

G. Title Blocks and Plotting

Competency: Prepare a CAD drawing for printing.

1. Select appropriate drawing format.
2. Select print or plot configurations.
3. Prepare a CAD drawing for printing.

H. 3D Modeling

Competency: Use 3D software to generate drawings, reports and CNC data.

1. Describe program commands for modeling software.
2. Establish three dimensional grids on a drawing.
3. Describe modeling of simple members.
4. Describe modeling of simple connections.
5. Use 3D software to generate drawings, reports and CNC data.

SECTION SIX: .....SURVEYING.....

A. Measurement

Competency: Use survey measurement methods.

1. Describe the methods and types of linear measurement.
2. Describe the equipment and accessories used in surveying.
3. Use practical and field notes to create a 3D model.

B. Surveying

Competency: Describe surveying principles and principles.

1. Explain the importance of surveying principles and practices.
2. Describe the definitions, types and classes of surveying.
3. Describe the methods used for surveying.

4. Explain survey references, units of measurement, accuracy and precision, field notes and management.
5. Identify situations requiring site dimensions or surveys.

C. Levelling

Competency: Describe levelling techniques.

1. Explain levelling theory.
2. Describe levelling procedures.
3. Explain levelling operations and definitions.

COMPETENCY OUTLINE
STEEL DETAILER TRADE
LEVEL TWO

SECTION ONE: .....STATICS .....

A. Vector Analysis

Competency: Perform vector analysis.

1. Define vector and scalar.
2. Describe the types of vector systems such as coplanar and concurrent.
3. Explain vector couples and moments.
4. Perform vector analysis.

B. Equilibrium

Competency: Apply concepts of equilibrium to the design of steel components.

1. List the equations of equilibrium.
2. Describe determinate and indeterminate structural types.
3. Describe supports and loads.
4. Describe simple structures: graphical and mathematical solutions.
5. Describe frames.
6. Create free body diagrams.
7. Apply concepts of equilibrium to the design of steel components.

C. Properties of Areas

Competency: Determine moment of inertia.

1. Describe steel shapes.
2. Describe custom shapes.
3. Describe eccentricity.
4. Determine centroids.
5. Determine moment of inertia.

SECTION TWO: ..... STRENGTHS OF MATERIALS .....

A. Simple Stress

Competency: Illustrate effects of stress on connections.

1. Describe tension, compression and shear connections.
2. Describe properties of materials.
3. Illustrate design examples with effects of stress on connections.

B. Shear and Moment Diagrams

Competency: Create shear and moment diagrams.

1. Describe shear and moment diagrams.
2. Create simple shear and moment diagrams.

C. Beam Design

Competency: Describe fundamentals of beam design.

1. Describe flexural stress.
2. Describe shear stress.
3. Describe deflection.
4. Describe torsion.
5. Describe moments and moment reversals.

D. Column Design

Competency: Use formulas to create column design.

1. Describe slenderness ratio.
2. Describe column design.
3. Describe column classification.
4. Use formulas to create column design.

SECTION THREE: .....STRUCTURAL STEEL DRAWINGS.....

A. Codes and Specifications

Competency: Apply codes and specifications to project.

1. Select required reference drawings.
2. Decipher applicable notes.
3. Determine required grade of steel.
4. Determine required bolt types and grades, connection requirements, and loads.
5. Identify CSA G40.21 and the American equivalent.
6. Use the Alberta Building Code and S16.1 in relation to Notes and Project Specifications.
7. Apply codes and specifications to project.

B. Steel Contract Documents

Competency: Determine steel scope using contract documents.

1. Identify structural steel components required.
2. Identify miscellaneous steel components required.
3. Identify construction materials affecting steel.
4. Determine steel scope using contract documents.

C. Contract Document Welding Symbols and Abbreviations

Competency: Interpret weld design on contract documents.

1. Identify weld type and weld sizes on contract documents.
2. Recognize symbols for field welds and shop welds.
3. Explain what welding symbols represent.
4. Recognize ANSI/AWS A2.4-98 or ANSI/AWS A3.0-94 standards from contract documents.
5. Interpret weld design on contract documents.

D. Connection Details

Competency: Determine connection standards from drawings and notes.

1. Read connection details and notes on customer drawings.
2. Determine customer standards and shop standards for connection details.
3. Locate applicable information in CISC handbook and W59-89.
4. Determine connection standards from drawings and notes.

SECTION FOUR: .....PRODUCTION DATA .....

A. Bolted Connections

Competency: Detail bolted joints on fabrication drawings.

1. Define complex bolted connections.
2. Detail bolted joints on fabrication drawings.

B. Welded Connections

Competency: Detail weld joints on fabrication drawings.

1. Define complex welded connections.
2. Detail weld joints on fabrication drawings.

C. Weld Symbol Application

Competency: Detail weld symbols on fabrication drawings.

1. Determine welds for drawings.
2. Detail welding notes on fabrication drawings.
3. Detail weld symbols on fabrication drawings.

D. Note Application

Competency: Create notes on fabrication drawings.

1. Determine notes for fabrication drawings.
2. Use industry terminology in notes on fabrication drawings.
3. Create notes on fabrication drawings.

E. Beam Detailing

Competency: Perform beam detailing.

1. Describe beam detailing.
2. Perform beam detailing.

F. Column Detailing

Competency: Perform column detailing.

1. Describe column detailing.
2. Perform column detailing.

G. Bracing Detailing

Competency: Perform bracing detailing.

1. Describe detailing of horizontal and vertical bracing.
2. Describe bracing components.
3. Perform bracing detailing.

H. Detail Assembly and Sub-assembly Prints

Competency: Perform assembly and sub-assembly detailing.

1. Describe detailing of proper views, piece marks, dimensions, sections and welds.
2. Perform assembly and sub-assembly detailing.

I. Secondary Steel and Miscellaneous Steel

Competency: Create secondary steel and miscellaneous steel detailing.

1. Describe detailing of miscellaneous steel.
2. Describe detailing of secondary steel.
3. Perform secondary steel and miscellaneous steel detailing.

J. Erection Diagrams

Competency: Create erection diagrams.

1. Describe an erection diagram.
2. Create detailed layouts incorporating sections, details, schedules, references and revisions.
3. Create field work details if required for modifications and installation.
4. Create erection diagrams.

K. Production Reports And Data

Competency: Produce material reports for a project.

1. Determine required reports.
2. Create CNC files as required.
3. Produce required material reports for a project.

COMPETENCY OUTLINE
STEEL DETAILER TRADE
LEVEL THREE

SECTION ONE: ..... PROJECT MANAGEMENT .....

A. Bidding and Tendering

Competency: Describe types of contracts for steel industry.

1. Describe types of contracts for steel industry.

B. Estimating

Competency: Describe cost and profit categories.

1. Describe quantity surveying and pricing.
2. Describe direct and indirect costs.
3. Describe overhead.
4. Describe profit.
5. Describe work time schedules.

C. Project Scheduling

Competency: Create project schedule.

1. Identify available resources.
2. Compare available resources with master schedule.
3. Coordinate project production with customer.
4. Create a critical path and milestone schedule.
5. Create project schedule.

D. Project Monitoring

Competency: Monitor project progress.

1. Explain cost accounting.
2. Explain procurement of material.
3. Modify schedule when necessary.
4. Advise on the status of the production schedule.
5. Advise on the status of the field schedule.

E. Lien Acts and Torts

Competency: Describe the legal aspects of contracting.

1. Describe liens and torts.
2. Describe holdbacks.

SECTION TWO:.....PROJECT RELATED ADMINISTRATION .....

A. Technical Writing

Competency: Create technical documents and notes.

1. Create transmittals and Request for Information (RFI) for the client.
2. Create Advanced Bills of Materials (ABMs) for procurement.
3. Create point to point bolt lists for the field.
4. Perform revisions and create revision tracking documents.
5. Respond to technical questions in written format.
6. Write Change Orders when necessary.
7. Create job summaries.

B. Spreadsheet Applications

Competency: Design spreadsheets.

1. Design spreadsheets.

C. Data and Document Management

Competency: Manage project documentation and production data.

1. Manage project documentation and production data.

SECTION THREE: PROJECT SPECIFIC CUSTOMER DRAWINGS AND SPECIFICATIONS .....

A. Notes and Specifications

Competency: Interpret notes and specifications in complex project documents.

1. Identify notes and specifications relevant to the fabricator.
2. Interpret notes and specifications in complex project documents.

B. Verify Complex Drawings

Competency: Verify steel components of complex drawings.

1. Identify steel components on customer drawings.
2. Visualize complex 3D structures from 2D drawings.
3. Find any conflicts, errors, etc. in consultant drawings.
4. Prepare RFI on errors and conflicts from project documents.

C. Characteristics of Non-Structural Components

Competency: Describe the characteristics of non-structural steel structures and building components.

1. Describe the characteristics of non-structural steel structures and building components.

D. Interpret Other Disciplines Drawings

Competency: Interpret drawings for building components provided by other disciplines.

1. Examine mechanical drawings for conflicts with structural components.
2. Examine electrical drawings for conflicts with structural components.
3. Examine information from grating supplier, deck/cladding supplier, joist supplier, and precast for conflicts with structural components.
4. Coordinate information with grating supplier, deck/cladding supplier, joist supplier, and precast for conflicts with structural components.
5. Resolve conflicts and errors with consultants.
6. Interpret drawings for building components provided by other disciplines.

E. Project Scope and Type

Competency: Describe project type and scope of work to be completed.

1. Describe differences of types of projects.
2. Describe how scope of work changes between project types.

SECTION FOUR: ..... PRODUCTION DRAWINGS AND CHECKING .....

A. Complex Beam Detailing

Competency: Create final complex detail drawings for beams.

1. Describe all types of beams.
2. Check that detailed items comply with contract documents.
3. Create final complex detail drawings for beams.

B. Complex Column Detailing

Competency: Create final complex detail drawings for columns.

1. Describe all types of columns.
2. Check detailed items comply with contract documents.
3. Create final complex detail drawings for columns.

C. Complex Bracing Detailing

Competency: Create final complex detail drawings for bracing.

1. Describe all types of horizontal and vertical bracing.
2. Check detailed items comply with contract documents.
3. Create final complex detail drawings for bracing.

D. Secondary and Miscellaneous Detailing

Competency: Create final complex detail drawings for secondary and miscellaneous steel.

1. Describe all types of secondary and miscellaneous steel.
2. Check detailed items comply with contract documents.
3. Create final complex detail drawings for secondary and miscellaneous steel.

E. Installation and Erection Diagrams

Competency: Create final complex erection diagrams.

1. Describe layout requirements for complex erection diagrams.
2. Create field work details required for modifications and installation.
3. Check detailed items comply with contract documents.
4. Create final complex erection diagrams.

F. Electronic Production Data

Competency: Create files used in steel production.

1. Create fabrication drawing files.
2. Organize fabrication drawing files.
3. Create and administer CNC data.
4. Create production files.
5. Control production files.

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