



9191  
SURVEYING AND CONCRETE  
(12A)

40S/40E/40M

A Carpentry Course



# 9191 SURVEYING AND CONCRETE (12A) 40S/40E/40M

## Course Description

In this course, students will demonstrate knowledge of site layout tools, equipment, and processes. They will also demonstrate knowledge of concrete and concrete products, footings, slab-on-grade, grade beam forms, and wall forms. This course includes all of the objectives found in Unit A4: Site Layout 1, Unit C1: Concrete and Concrete Products, Unit C2: Footings, Slab-on-Grade and Grade Beam Forms, and Unit C3: Wall Forms from *Carpenter Level 1*, from Apprenticeship Manitoba.

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**Goal 1:** Describe and apply appropriate **health and safety** practices.

**GLO 1.1:** Describe and apply appropriate **health and safety** practices.

SLO 12A.1.1.1 Demonstrate an understanding of and adherence to health and safety practices.

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**GLO 1.2:** Demonstrate knowledge of the ***Trade Safety Awareness Manual***.

No applicable SLOs.

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**Goal 2:** Demonstrate the identification, installation, and management of **materials**.

**GLO 2.1:** Demonstrate the identification, installation, and management of **materials**.

SLO 12A.2.1.1 Demonstrate the identification, installation, and management of materials.

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**Goal 3:** Demonstrate the identification, use, and management of **tools, equipment, fasteners, and adhesives**.

**GLO 3.1:** Demonstrate the identification, use, and management of **tools and equipment**.

SLO 12A.3.1.1 Demonstrate the identification, use, and management of tools and equipment used in surveying and concrete.

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**GLO 3.2:** Demonstrate the identification, use, and management of **fasteners and adhesives**.

SLO 12A.3.2.1 Demonstrate the identification, use, and management of fasteners and adhesives.

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**Goal 4:** Demonstrate the basic **skills** of carpentry.

**GLO 4.1:** Demonstrate the skills related to **project drawings and specifications**.

SLO 12A.4.1.1 Interpret codes, regulations, and specifications pertaining to project drawings, specifications, and trade documentation. (B2.2) *(This objective is also taught in course #9189.)*

- federal
  - provincial/territorial
  - municipal
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**GLO 4.2:** Demonstrate the carpentry skills related to **layout, measurement, and assembly**.

SLO 12A.4.2.1 Calculate area/volume. (B1.3) *(This objective is also taught in course #9189.)*

- geometrical shapes
  - board-foot measure (BFM)
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**GLO 4.3:** Demonstrate the ability to determine **elevations** and lay out **building lines**.

SLO 12A.4.3.1 Define terminology associated with site layout and the layout of building lines. (A4.1)

SLO 12A.4.3.2 Identify hazards and describe safe work practices pertaining to site layout and the layout of building lines. (A4.2)

SLO 12A.4.3.3 Interpret codes, regulations, applicable covenants, and information found on drawings and specifications pertaining to site layout and the layout of building lines. (A4.3)

- SLO 12A.4.3.4 Identify tools and equipment used to perform site layout and the layout of building lines, and describe their applications and procedures for use. (A4.4)
- string lines
  - levels
    - builders’
    - laser
  - plumb bobs
  - tape measure
- SLO 12A.4.3.5 Explain surveying theory as it pertains to site layout. (A4.5)
- SLO 12A.4.3.6 Describe the procedures used to perform site layout. (A4.6)
- 3-4-5 method (Pythagorean theorem)
  - diagonal
  - establish offsets
  - determine locations of building and other structures
  - lay out building lines
- SLO 12A.4.3.7 Perform calculations pertaining to site layout and layout of building lines. (A4.7)
- SLO 12A.4.3.8 Use site layout equipment to determine elevations and lay out building lines. (A4.8)
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**GLO 4.4: Demonstrate the knowledge and skills associated with concrete foundations.**

- SLO 12A.4.4.1 Define terminology associated with **concrete and concrete products**. (C1.1)
- SLO 12A.4.4.2 Identify hazards and describe safe work practices pertaining to concrete and concrete products. (C1.2)
- SLO 12A.4.4.3 Interpret codes, regulations, and information found on drawings and specifications pertaining to concrete and concrete products. (C1.3)
- SLO 12A.4.4.4 Identify tools and equipment used to test, consolidate, and finish concrete, and describe their applications and procedures for use. (C1.4)
- SLO 12A.4.4.5 Identify concrete products, structures, and components, and describe their characteristics and applications. (C1.5)
- cast-in-place
  - pre-cast

- SLO 12A.4.4.6 Identify types of concrete reinforcement and describe their applications. (C1.6)
- rebar and accessories
  - stirrups
  - collars
  - fibre
  - mesh
  - dowels
- SLO 12A.4.4.7 Identify types of embedded materials and describe their applications. (C1.7)
- anchor bolts
  - inserts
  - weld plates
  - angle iron
  - temperature bars
  - water stop
  - form voids
  - sleeves
  - stud welding fasteners
  - conduit
  - isolation joint
- SLO 12A.4.4.8 Describe the effects of water/cement ratio on concrete. (C1.8)
- SLO 12A.4.4.9 Describe the effects of aggregate size on concrete. (C1.9)
- SLO 12A.4.4.10 Identify additives/admixtures used in concrete and describe their purpose and applications. (C1.10)
- SLO 12A.4.4.11 Identify types of concrete tests and describe their associated procedures. (C1.11)
- slump
  - air entrainment
  - compression
  - temperature

- SLO 12A.4.4.12 Identify types of joints and describe their applications. (C1.12)
- isolation
  - expansion
  - control
  - construction
- SLO 12A.4.4.13 Describe the procedures used to place, consolidate, and finish concrete and to facilitate the curing of concrete. (C1.13)
- SLO 12A.4.4.14 Demonstrate the procedures to mix, place, consolidate, and finish concrete and to facilitate the curing of concrete. (C1.14)
- SLO 12A.4.4.15 Perform the slump/compression test. (C1.15)
- SLO 12A.4.4.16 Define terminology associated with **footings, slab-on-grade, and grade beam forms**. (C2.1)
- SLO 12A.4.4.17 Identify hazards and describe safe work practices pertaining to footings, slab-on-grade, and grade beam forms. (C2.2)
- SLO 12A.4.4.18 Interpret codes, regulations, and information found on drawings and specifications pertaining to the construction of footings, slab-on-grade, and grade beam forms. (C2.3)
- SLO 12A.4.4.19 Identify tools and equipment used to construct footings, slab-on-grade, and grade beam forms, and describe their applications and procedures for use. (C2.4)
- SLO 12A.4.4.20 Identify types of footings, slab-on-grade, grade beam forms, form materials, and accessories, and describe their characteristics and applications. (C2.5)
- SLO 12A.4.4.21 Identify the steps involved and factors to consider in the preparation of a site for construction of footings, slab-on-grade, and grade beam forms. (C2.6)
- SLO 12A.4.4.22 Identify types of piles and piers, and describe their characteristics and applications. (C2.7)
- SLO 12A.4.4.23 Describe the procedures used to construct, dismantle, and recondition footings, slab-on-grade, and grade beam forms. (C2.8)
- SLO 12A.4.4.24 Identify types of embedded materials used in footings, slab-on-grade, and grade beam forms, and describe their characteristics and applications. (C2.9)
- rebar
  - anchor bolts
  - mesh

- SLO 12A.4.4.25 Describe the procedures used to place embedded materials in footings, slab-on-grade, and grade beam forms. (C2.10)
- SLO 12A.4.4.26 Calculate materials needed to construct footings, slab-on-grade, and grade beam forms, and calculate the volume of concrete required. (C2.11)
- SLO 12A.4.4.27 Lay out and construct footings, slab-on-grade, and grade beam forms. (C2.12)
- SLO 12A.4.4.28 Define terminology associated with **wall forms**. (C3.1)
- SLO 12A.4.4.29 Identify hazards and describe safe work practices pertaining to wall forms. (C3.2)
- SLO 12A.4.4.30 Interpret codes, regulations, and information found on drawings and specifications pertaining to wall forms. (C3.3)
- SLO 12A.4.4.31 Identify tools and equipment used with wall forms, and describe their applications and procedures for use. (C3.4)
- SLO 12A.4.4.32 Identify types of wall form systems, and describe their characteristics and applications. (C3.5)
- loose forming/panel forming
  - proprietary forming
  - insulated concrete forms (ICF)
- SLO 12A.4.4.33 Identify types of wall form system components, accessories, and materials, and describe their purpose and applications. (C3.6)
- SLO 12A.4.4.34 Describe the procedures used to construct, dismantle, and recondition wall forms. (C3.7)
- SLO 12A.4.4.35 Identify types of embedded materials used in wall forms, and describe their characteristics and applications. (C3.8)
- SLO 12A.4.4.36 Describe the procedures used to place embedded materials in wall forms. (C3.9)
- SLO 12A.4.4.37 Calculate materials needed to construct wall forms, and calculate the volume of concrete required. (C3.10)
- SLO 12A.4.4.38 Demonstrate the procedures to lay out and construct a wall form. (C3.11)

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**Goal 5:** Follow the **ethical and legal standards** that pertain to carpentry.

**GLO 5.1:** Demonstrate an awareness of the **ethical and legal expectations** of carpenters.

- SLO 12A.5.1.1 Demonstrate an awareness of the existence of building codes and other local regulations related to concrete.
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**Goal 6:** Demonstrate **employability skills**.

**GLO 6.1:** Demonstrate **employability skills**.

- SLO 12A.6.1.1 Demonstrate regular attendance and punctuality.
  - SLO 12A.6.1.2 Demonstrate accountability by taking responsibility for own actions.
  - SLO 12A.6.1.3 Demonstrate adaptability and effort.
  - SLO 12A.6.1.4 Demonstrate the ability to accept and follow direction and feedback.
  - SLO 12A.6.1.5 Demonstrate teamwork skills.
  - SLO 12A.6.1.6 Demonstrate the ability to stay on task and use time effectively.
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**GLO 6.2:** Demonstrate **critical thinking** skills.

- SLO 12A.6.2.1 Demonstrate problem-solving skills.
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**GLO 6.3:** Demonstrate respectful interactions with individuals of different **cultures**.

- SLO 12A.6.3.1 Demonstrate an awareness of cultural differences in the workplace.
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**Goal 7:** Demonstrate an awareness of **sustainability** as it pertains to carpentry.

**GLO 7.1:** Describe the impact of the construction industry on **human sustainability** and the health and well-being of carpenters.

- SLO 12A.7.1.1 Demonstrate an awareness of the sustainability of the carpenter's working conditions, including working hours and out-of town travels, shift work, and so on.
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**GLO 7.2:** Describe the construction industry's **sustainability practices** and impact on the environment.

- SLO 12A.7.2.1 Demonstrate the ability to reuse materials.
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**Goal 8:** Demonstrate an understanding of the **structure and scope** of carpentry.

**GLO 8.1:** Describe the **scope of** carpentry.

- SLO 12A.8.1.1 Demonstrate an awareness of the scope of surveying and concrete.
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**GLO 8.2:** Describe **apprenticeship, post-secondary education, and employment opportunities.**

SLO 12A.8.2.1 Describe employment opportunities in surveying and concrete.

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**Goal 9:** Demonstrate an understanding of the **evolution** of carpentry, including its **technological progression and emerging trends.**

**GLO 9.1:** Demonstrate an understanding of the **evolution** of carpentry, including its **technological progression and emerging trends.**

SLO 12A.9.1.1 Demonstrate an awareness of the evolution of surveying and concrete, including its technological progression and emerging trends.

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