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PROFESSIONAL ENGINEERS & GEOSCIENTISTS NEWFOUNDLAND & LABRADOR  
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## *Practice Guideline for the Design of Formwork and Falsework by Professional Members*

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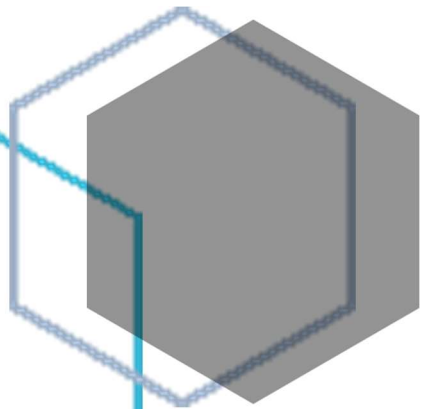


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## 1. Introduction

### 1.1 PEGNL

**Professional Engineers and Geoscientists Newfoundland & Labrador (PEGNL)** is mandated to regulate the practices of engineering and geoscience in the public interest. PEGNL exists so that there will be competent and ethical practice of engineering and geoscience in Newfoundland and Labrador, and to instill public confidence in the professions. To practice Engineering or Geoscience in Newfoundland and Labrador one must be registered, and in good standing, with PEGNL.

The Newfoundland and Labrador ***Engineers and Geoscientists Act, 2008*** and the associated ***Engineers and Geoscientists Regulations, 2011*** under that Act govern the practices of engineering and geoscience in the Province. PEGNL is the authority that licenses practitioners under the Act, administers all aspects of that legislation and strives to ensure the ethical conduct of professional members.

Under Section 36 of the Regulations, PEGNL has the power to produce publications for the purpose of promoting high standards of professional services and the maintenance and improvement of the competence of members. PEGNL produces these documents to inform and educate its professional members, permit holders and the public, in matters of professional practice and to:

- make PEGNL professional members aware of their duties in performing specific components of their professional roles in accordance with the current *Act, Regulations and By-Laws*; and
- help the public, especially clients, contractors and suppliers, understand the role of PEGNL professional members and the responsibilities they have when performing professional services.

Professional members adhering to this Guideline are following best practices in conforming to the legislation and ethical practices applicable to this guideline.

This Guideline seeks to advise what is normally expected of a reasonable and prudent Professional member. However, it is not a comprehensive list of what constitutes substantive engineering practice. This is an area of responsibility which will remain fully that of the Professional members.

The intention is not to supersede or replace contractual arrangements designed to satisfy specific situations where good engineering practice might, in certain circumstances, dictate departure from this Guideline.

Questions or concerns relating to this document should be addressed to the Professional Standards Director at PEGNL.

## 1.2 Formwork and Falsework Guideline Purpose

Formwork and falsework carry a significant risk to the safety of construction workers and the general public. It is important that the constructability of a structure be considered in the design stage, to identify any temporary works that are required to be designed by a professional member during the construction stage.

The purpose of this guideline is to identify conditions under which formwork and falsework should be designed by professional members and the factors that need to be considered in those designs.

## 1.3 Definitions

### Act

The Newfoundland and Labrador *Engineers and Geoscientists Act, 2008*

### Bracing

Is a system of secondary members that provide stability against lateral movement.

### Structural Engineer of Record (Structural EOR)

The professional member who produces and is responsible for the structural design documents which are issued for construction of the Primary Structural System, which include the primary structural elements that support the building's self-weight and the applicable live load based on occupancy, use of the spaces and environmental loads, such as wind, snow and vibration forces.

### Falsework

Consists of a temporary structure used in construction to support a permanent structure, usually concrete, until its construction is sufficiently advanced to support itself. It can also consist of temporary members that are used during construction and/or transportation that will be removed when they no longer are integral in supporting loads.

### Formwork

Formwork encompasses the total system of support for freshly placed concrete, including the mold or sheathing that contacts the concrete and all supporting members, hardware, and necessary bracing.

### Formwork/Falsework Engineer

The engineer responsible for the design of the formwork/falsework structure, typically on behalf of a construction contractor.

### PEGNL

Professional Engineers and Geoscientists Newfoundland and Labrador

### Permit Holder

A corporation or association of persons that holds a permit to practice under the *Act*. A permit holder has a *permit number* issued by PEGNL to engage in the practice of engineering or geoscience.

**Person**

An individual, as well as a corporation, company, association, firm, partnership, society or other organization.

**Professional document**

A document in any medium (e.g., paper, electronic or other) that contains or presents engineering or geoscience work as defined under the Act.

**Professional Member**

A professional engineer, professional geoscientist, limited licensee (engineering), or limited licensee (geoscience) entitled to engage in the practice of engineering or geoscience under the Act.

**Regulations**

The *Engineers and Geoscientists Regulations, 2011*

**1.4 Reference Standards**

- CSA S269.1 Falsework and Formwork
- CSA O86 Engineering Design in Wood
- CSA S157 – Strength Design in Aluminum
- CSA S16 – Design of Steel Structures

**1.5 Responsibilities of Professional Members and Permit Holders**

Professional members and permit holders are responsible for practicing in accordance with the Act, Regulations and By-laws (which include the PEGNL Code of Ethics).

A permit holder is corporately responsible for the integrity of its projects. A permit holder is responsible to put in place a quality management system enabling engineering or geoscience practice to be carried out competently and ethically by professionals with appropriate training and experience, which includes facilitating their compliance with this guideline.

Not following this guideline without providing documented, sound professional reasoning may contravene the requirements of the Act, Regulations and By-Laws and could lead to discipline proceedings.

**2. Professional Member Requirement and Responsibilities****2.1 Requirements for a Professional Member**

Structural EOR shall be responsible for determining and specifying which formwork/falsework shall require stamped drawings. Stamped drawing requirements include, but are not necessarily be limited to:

- a) Suspended floor slabs;
- b) All formwork over 2.4m high;
- c) Tunnel forms and arch culverts;
- d) Slipforms;
- e) Non-standard or non-conventional formwork; and
- f) Shop drawings for pre-engineered formwork and false work systems.

## 2.2 Allocation of Professional Responsibility and the Associated Competencies

The professional members responsible for (i) determining if engineering is required in the falsework / formwork installations and (ii) the design of the formwork and falsework, may be part of the project design team or may be part of the project construction team. If either of these responsibilities is to be allocated to the construction team, the project design team must ensure that the allocation is noted in the construction contract documents, and that the contractor understands its responsibility to engage a professional member with the required competency for that purpose.

The professional member required for either activity noted in the previous paragraph must have the competencies required, including structural competencies.

## 3. Design Criteria

### 3.1 General

In terms of design parameters, codes regulating formwork and falsework may not be as specific as codes for permanent works. Rather than prescribe specific design criteria, these codes may specify acceptable factors of safety and allowable stresses. Professional engineers responsible for designing formwork and falsework will find it necessary to assess particular design problems in detail, to determine the design criteria and unique loading cases and conditions that apply to works. Formwork and falsework designers should be familiar with all relevant standards, codes, factors of safety, and supplier-specific systems. It is also important to be familiar with the construction methods being applied by the specific contractor as factors such as the rate of pour and the pouring method can have a significant effect on the loads being applied to the formwork or falsework.

### 3.2 Loads

Applied loads for concrete are highly dependent on the rate of pour, concrete mix design, temperature and weight of the concrete, depth of concrete, buoyancy, and the method of placement. The general method to control the pressure is to regulate the rate of pour so the head of liquid concrete is limited to a specific height which corresponds to the design capacity of the formwork. Rates of pour must be specified on formwork drawings. Refer to the *CSA Standard S269.1 Falsework and Formwork* for calculation of pour rates. Ensure vertical and lateral loads are considered and include all dead, live and wind loads.

### 3.3 Formwork and Falsework Material

Materials which cannot be identified with a specific standard or are in poor condition shall not be used.

Much formwork that is normally used is all or part of a manufactured formwork system. It is the responsibility of the formwork engineer to be familiar with any systems being used and their load capabilities including but not limited to, wall panels, accessories, braces, connections, shoring, beams.

### 3.4 Inspections

Pre-pour inspections shall be conducted and signed-off by the formwork engineer or their representative. Refer to CSA S269.1 for inspection guidelines prior to and during pouring operations.

### 3.5 Specialized Formwork

Formwork for tunnels, shafts and arch culverts shall be designed as a combination of both formwork and falsework and to resist any other loads that may be applied including vibration and pumping.