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CSA S900.2:21
National Standard of Canada

Structural design of wastewater treatment plants

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Preface

This is the first edition of CSA S900.2, *Structural design of wastewater treatment plants.*

This Standard was prepared by the Subcommittee on Structural Design of Wastewater Treatment Plants, under the jurisdiction of the Technical Committee on Wastewater Treatment Plants and the Strategic Steering Committee on Construction and Civil Infrastructure, and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Notes:

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
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   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

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Structural design of wastewater treatment plants

0 Introduction

0.1 General

There are currently gaps in guidance for structural engineering, construction, commissioning, and maintenance of wastewater treatment facilities. The present structural engineering methodology requires interpretation of non-Canadian standards in a Canadian setting, which might lead to unsafe assumptions in compatibility of design and analysis factors.

The objective of the CSA Wastewater Treatment Plant Program is to develop consistency in engineering and construction methodology. This would achieve benefits enabling more cost-effective design and construction, minimizing jurisdiction-specific regulation development, and reducing overall risk to owners.

0.2 General requirements for the design of wastewater treatment plant structures

Wastewater treatment plant structures are used for conveying, storing, and treating liquid and associated solid waste and need to be designed and constructed to be reasonably liquid tight or gas tight, with minimal leakage under normal operating conditions, and a minimum design service life of 80 years for durability. The key process stages of a wastewater treatment plant are described in Annex A.

Below-grade structures such as storage tanks, pump stations, and pipe galleries, which are part of wastewater treatment plants and could be exposed to groundwater pressures, are generally designed as liquid-tight, environmental concrete structures. Above-grade storage tanks are also generally designed as liquid tight or gas tight concrete or steel structures. Above-grade building structures for wastewater treatment plants are generally constructed of concrete, steel, or masonry, and are designed in accordance with provincial building codes based on the *National Building Code of Canada* (NBCC) and specific CSA standards.

0.3 Differences between wastewater treatment structures and ordinary structures

Wastewater treatment plant structures are subjected to more complicated loads, more severe exposure conditions, and more restrictive serviceability requirements than ordinary building structures. Under the NBCC, sewage treatment plants are also classified as post-disaster facilities and are required to remain in operation immediately following an earthquake.

The quality of materials and construction for wastewater treatment plants are normally higher than the requirements for ordinary building structures to satisfy durability and serviceability concerns. Leakage from wastewater treatment plants needs to be controlled to minimize contamination of ground water or the environment. Wastewater treatment plants need to be designed and detailed with considerable attention to detail because of their watertight requirements.

Loadings for wastewater treatment plant structures include dead and live loads, temperature or self-straining loads, wind loads, earthquake loads (including hydrodynamic forces), and loads from vibrating

