November 7, 2022

CSA S900.2:21
Structural Design of Wastewater Treatment Plants

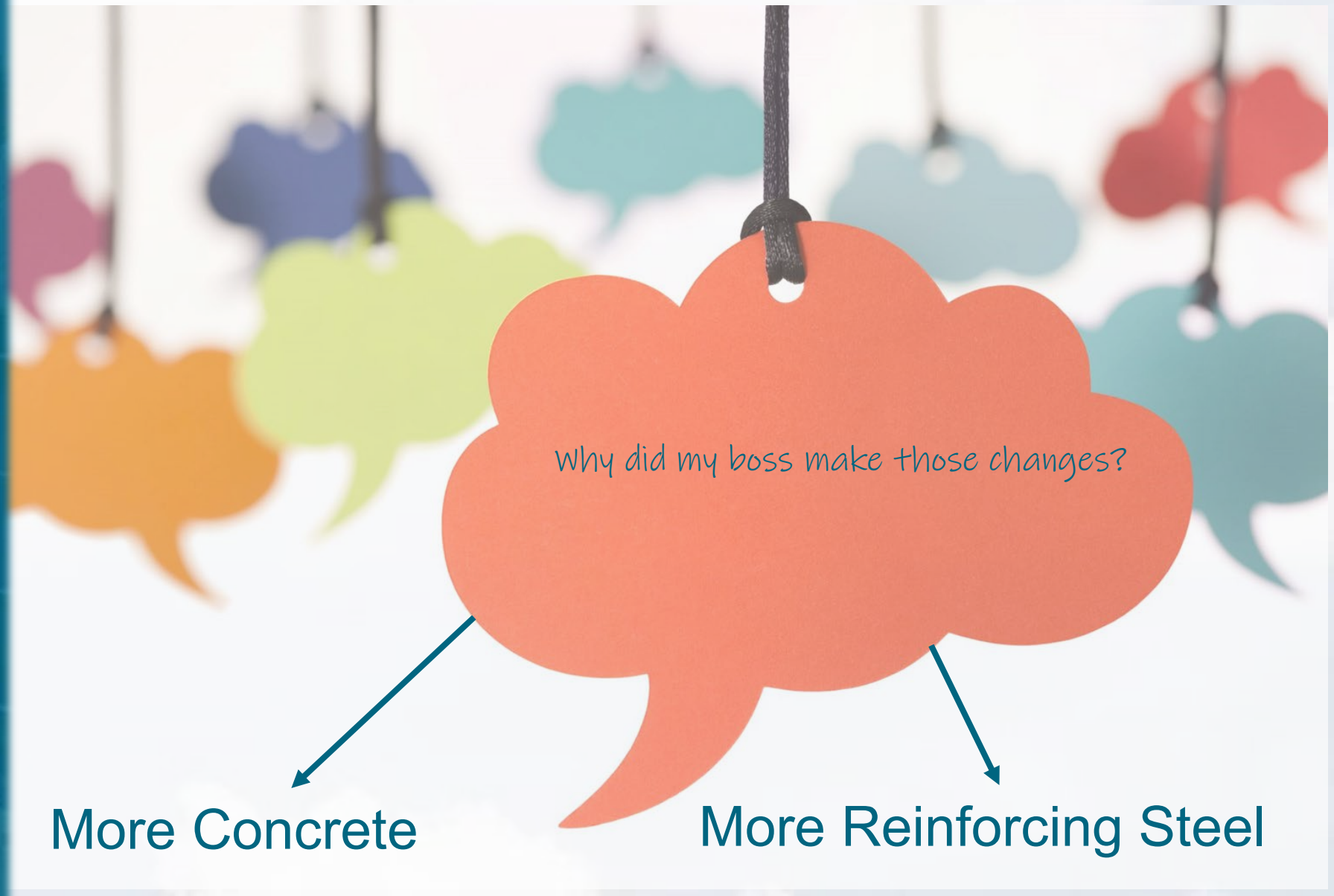
CANADA BEST MANAGED COMPANIES | Platinum member

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

We've been doing it WRONG…

1989 DESIGN

Wastewater Treatment Plant



Current Construction Priorities

Sustainability Driven

Supply Challenges

Financial Constraints

National Wastewater Treatment Numbers

38yrs

Average age of Wastewater Assets

3,400

Wastewater Treatment Systems in Canada

11%

Wastewater Assets in Poor to Very Poor Condition ($4.5B)

$37B

Replacement Value of Wastewater Treatment Plants (non-linear)

$18B

Capital Expenditures to Meet New Federal Regulations (linear & non)

Long Overdue for Canadian Design Standard

Replacement of Poor and Very Poor Bridge Vs. Wastewater

$2B < **$26B**

*excludes roads & sidewalks

*Approximately 50/50 between linear and non-linear

Conservative Designs

National Building Code of Canada

- Post-disaster structure
- Focus on life safety
- Excludes corrosive environments and large liquid containing structures

CSA A23.3 Design of Concrete Structures

- Limited guidance for watertightness

American Concrete Institute

- American standard
- US concrete industry and construction
- Front-line method of watertightness and durability

CSA S900.2

“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.”

CSA S900 History

CSA S900.1 Climate Change Adaptations for Wastewater Treatment Plants

Comprehensive Resource

- Design
- Operation
- Retrofit criteria to increase resilience

CSA S900.2 Structural Design of Wastewater Treatment Plants

Objective

- Combine relevant information
- Address overly conservative designs

Highlights of CSA S900.2

- Types of Materials
- Service Life of 80 Years
- Types of Possible Loads
- Post Disaster Equipment Design
- Seismic Performance

Recalibrated Design Factors

Reliability of Structures

↓

Reduced Loads

↓

Less Material

↓

Cost Savings

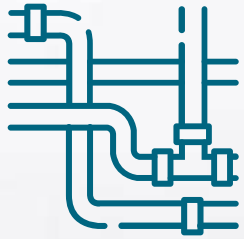
Dead Load Factor

Dead Load = 1,000 kN

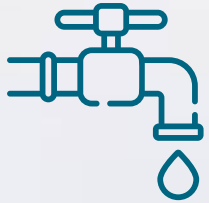
Example Comparison

CSA S900.2	ACI	NBCC
1.15 x 1,000 kN = 1,150 kN	1.4 x 1,000 kN = 1,400 kN	1.25 x 1,000 kN = 1,250 kN
	22%	9%

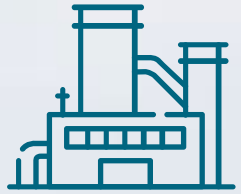
CSA S900.2
Limitations



Buried linear infrastructure



Water Treatment Plants



Other Water Retaining Structures

Push for Change

and get involved.