Toronto Metropolitan University

Civil Engineering

STRUCTURAL ENGINEERING

WHAT DO STRUCTURAL ENGINEERS DO?






Materials
Design
Analysis
Experiments






- Design, analyze & create:

Buildings
Bridges
Dams
Automobiles
Airplanes
Rockets
Satellites
Ships
Off-shore facilities
Mechanical structures
Sporting Goods

Civil Engineering



Dams and Power Stations

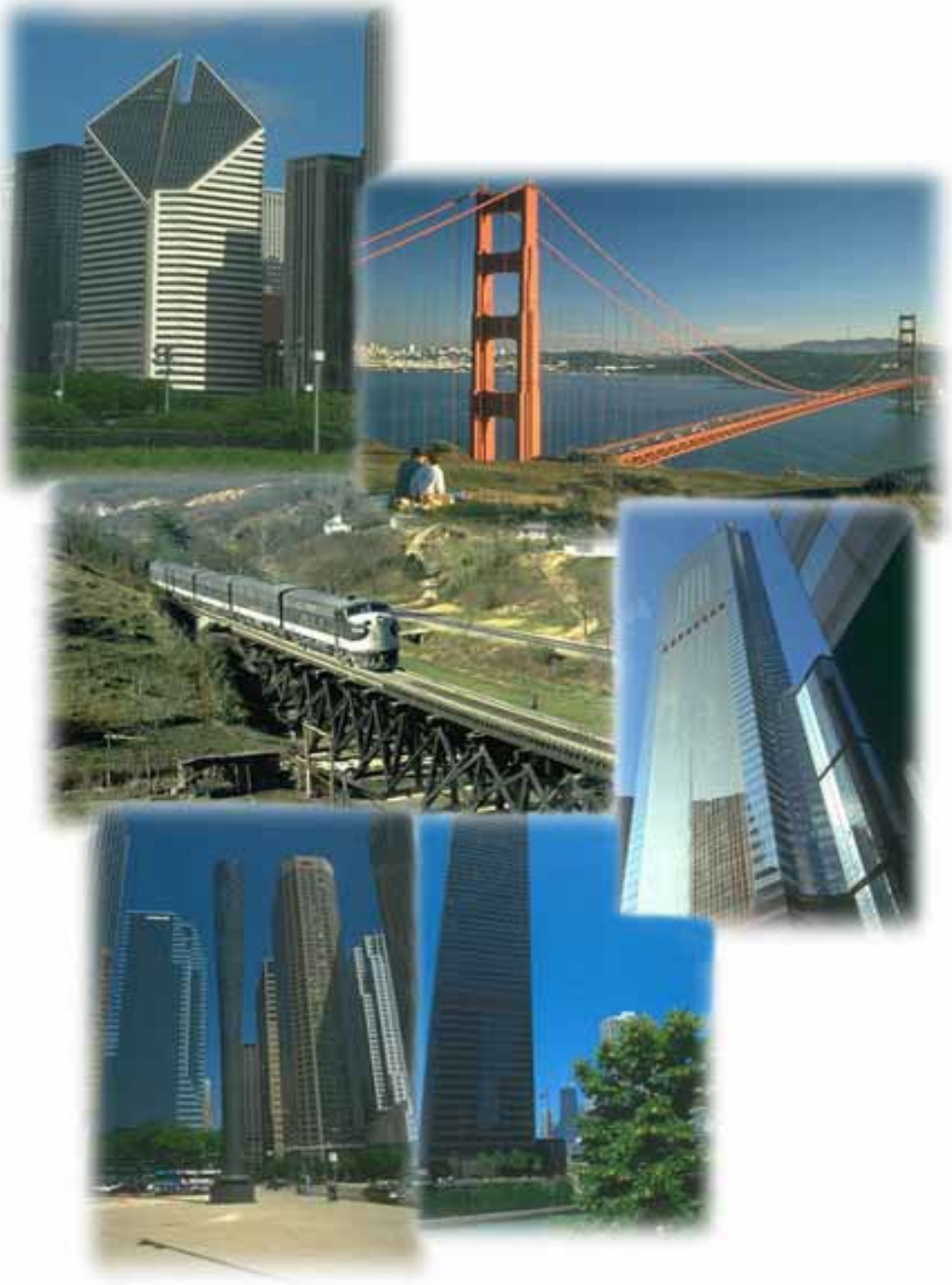
Civil Engineering



Water and Sewage Treatment Plants

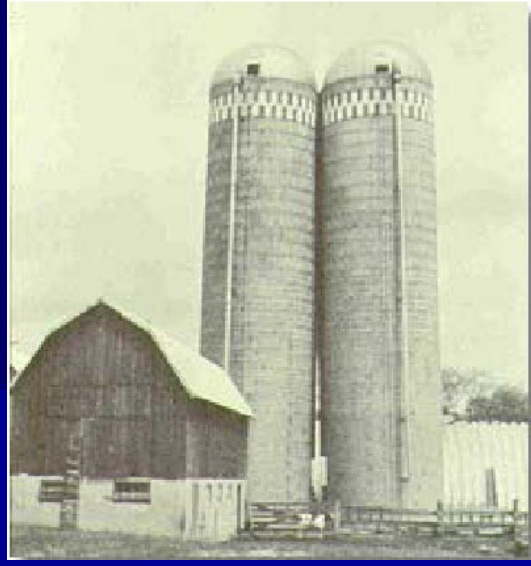
What do they design?

Structural Engineers design **steel, concrete, or timber** framed structures such as Tall Buildings, Bridges, Dams, Towers, Platforms, Retaining Walls, Foundations, and Stadiums.



Challenges for Geotechnical Engineering





Shallow Foundation Design



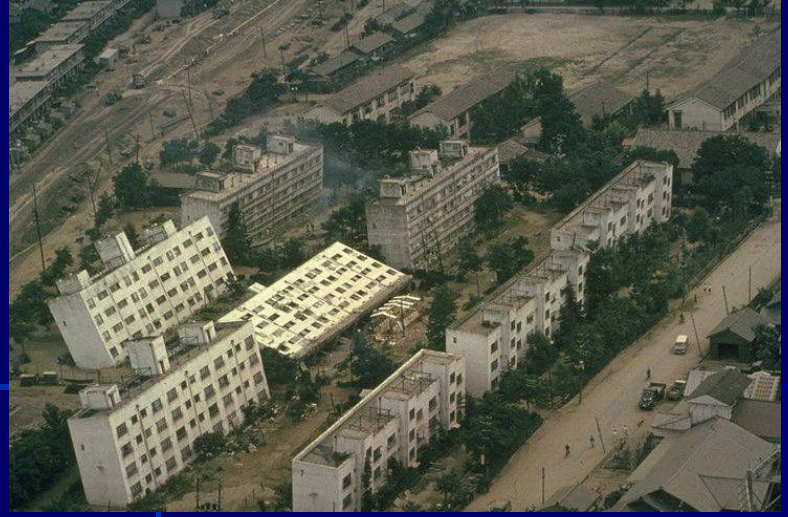
Challenges for Geotechnical Engineering





Deep Foundation Design







Challenges for Geotechnical Engineering







STRUCTURAL ENGINEERING OPTION
FALL 2026
(THIRD YEAR)

- CVL 313: Structural Analysis
- CVL 500: Introduction to Structural Design
- CVL 533: Concrete Materials
- CVL 600: Foundation Engineering
- MTH510: Numerical Analysis
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STRUCTURAL ENGINEERING OPTION (THIRD YEAR) WINTER 2027

- CVL 312: Computer Aided Structural Analysis
- CVL 410: Structural Concrete Design I
- CVL 411: Structural Steel Design
- CVL 609: Civil Engineering Systems
- CVL 742: Project Management
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STRUCTURAL ENGINEERING OPTION
FALL 2026 (FOURTH YEAR)

- CVL 70A: Structural Capstone Design Project
- CVL 904: Structural Concrete Design II
- CVL 905: Bridge Design and Construction
- CVL 908: Structural Building Systems
- Liberal Studies: One course required from the following: ENG503, GEO702, HST701, PHL709, POL507

STRUCTURAL ENGINEERING OPTION (FOURTH YEAR) WINTER 2027

- CVL 70B: Structural Capstone Design Project
- CEN 800: Law & Ethics in Engineering Practice
- CVL 300: Environmental Science & Impact Assessment
- CVL 906: Renovation/Repair of Existing Structures
- CVL 914: Pavement Materials and Design
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STRUCTURAL CAPSTONE PROJECTS

- The Capstone is a practical-oriented design project.
(Design options + cost analysis).
(Preliminary designs + final design).

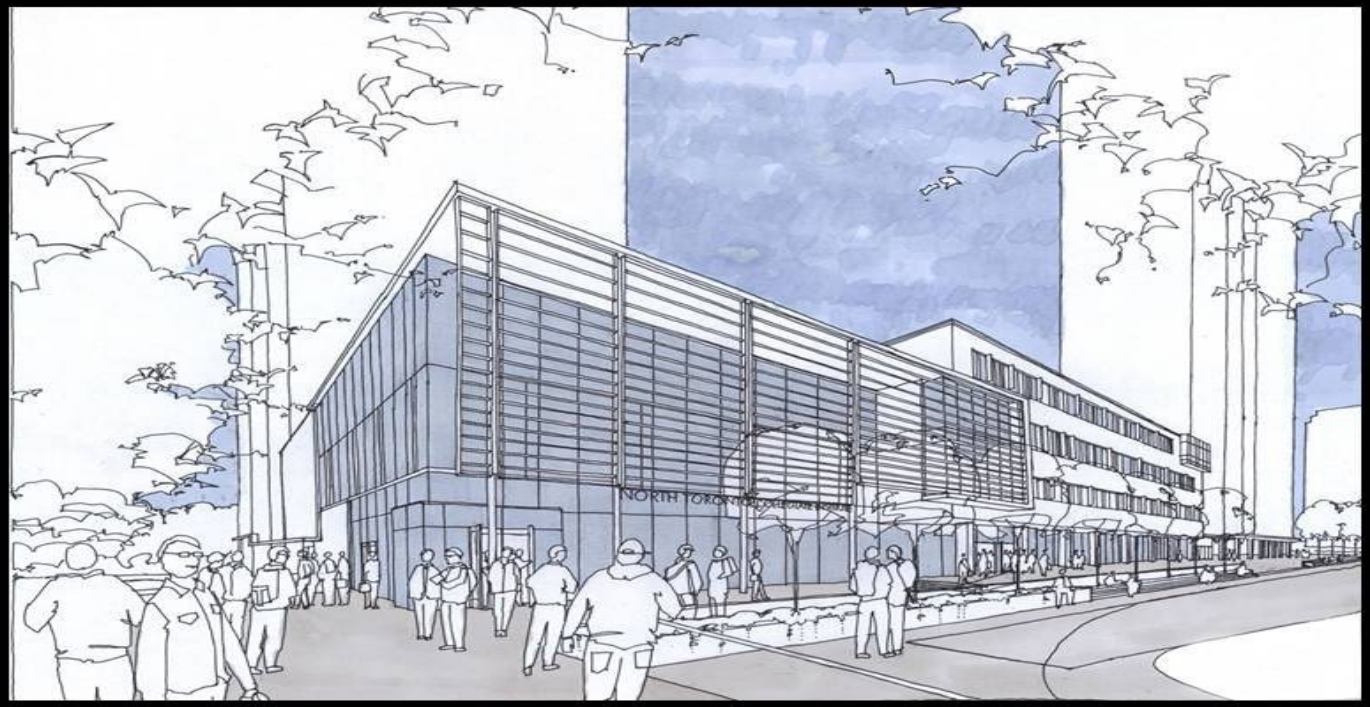
- The course involves outside professional engineers acting as clients and bringing in real life design problems to students.

EXAMPLES OF THE CAPSTONE PROJECTS

Redevelopment of North Toronto School



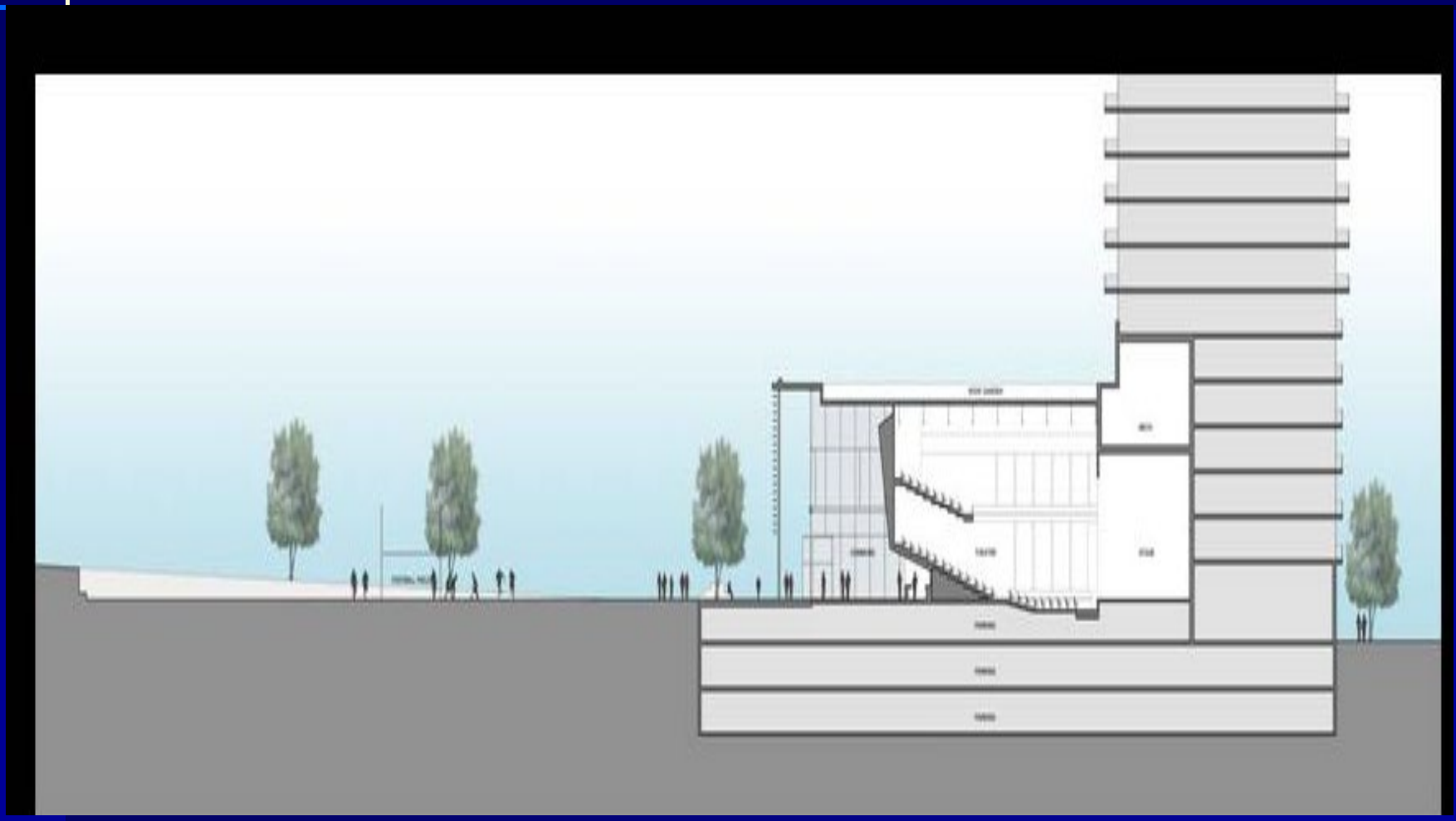
EXAMPLES OF THE CAPSTONE PROJECTS



View from Broadway Avenue of School Entry and 'Porch'

EXAMPLES OF THE CAPSTONE PROJECTS

Theatre



Theatre



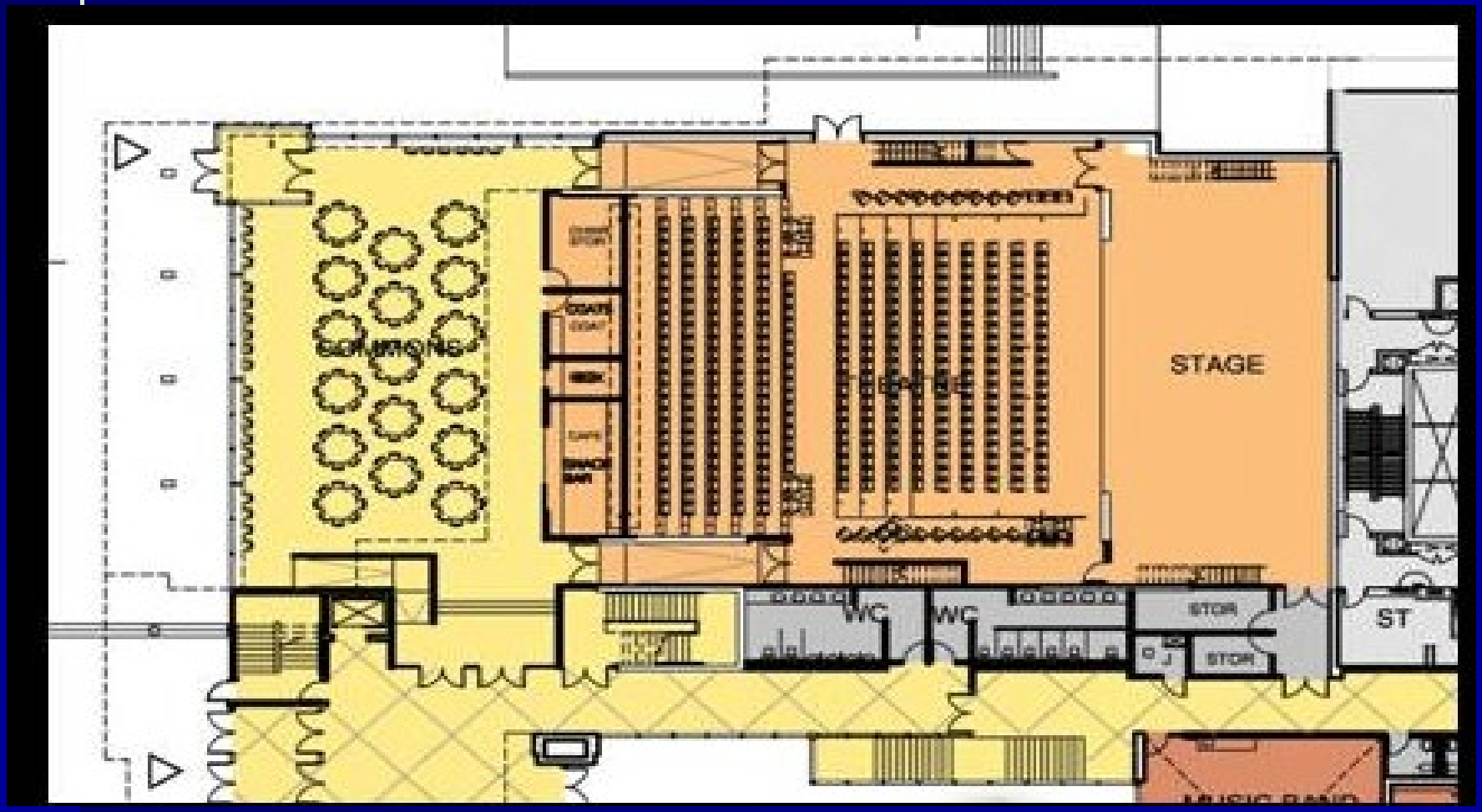




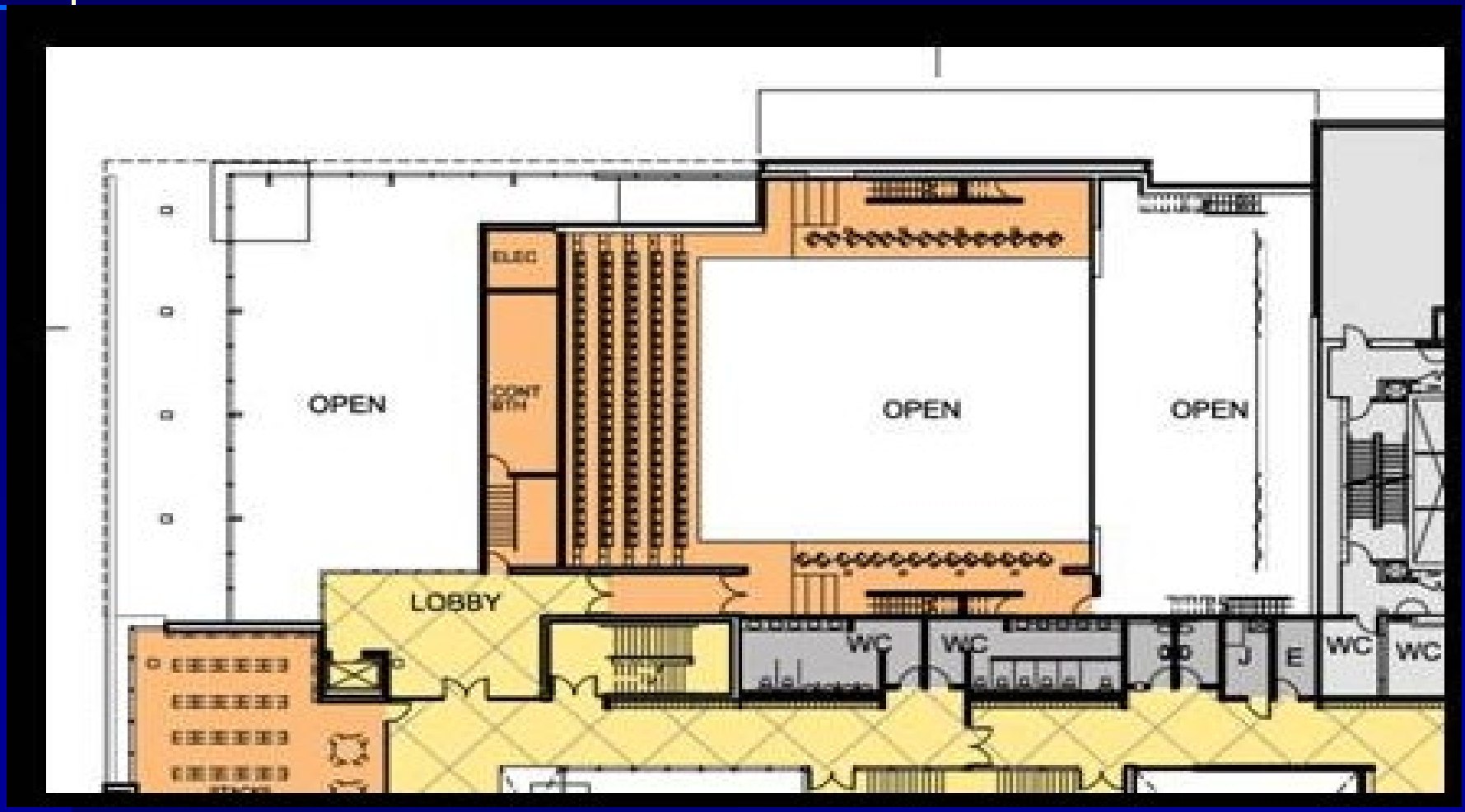


Secondary School Theatres

Theatre



Theatre



EXAMPLES OF THE CAPSTONE PROJECTS

Design of Residential Building



Design of Residential Building



EXAMPLES OF THE CAPSTONE PROJECTS

Toronto District School Board

Chester Le JS Childcare & Community Centre Addition

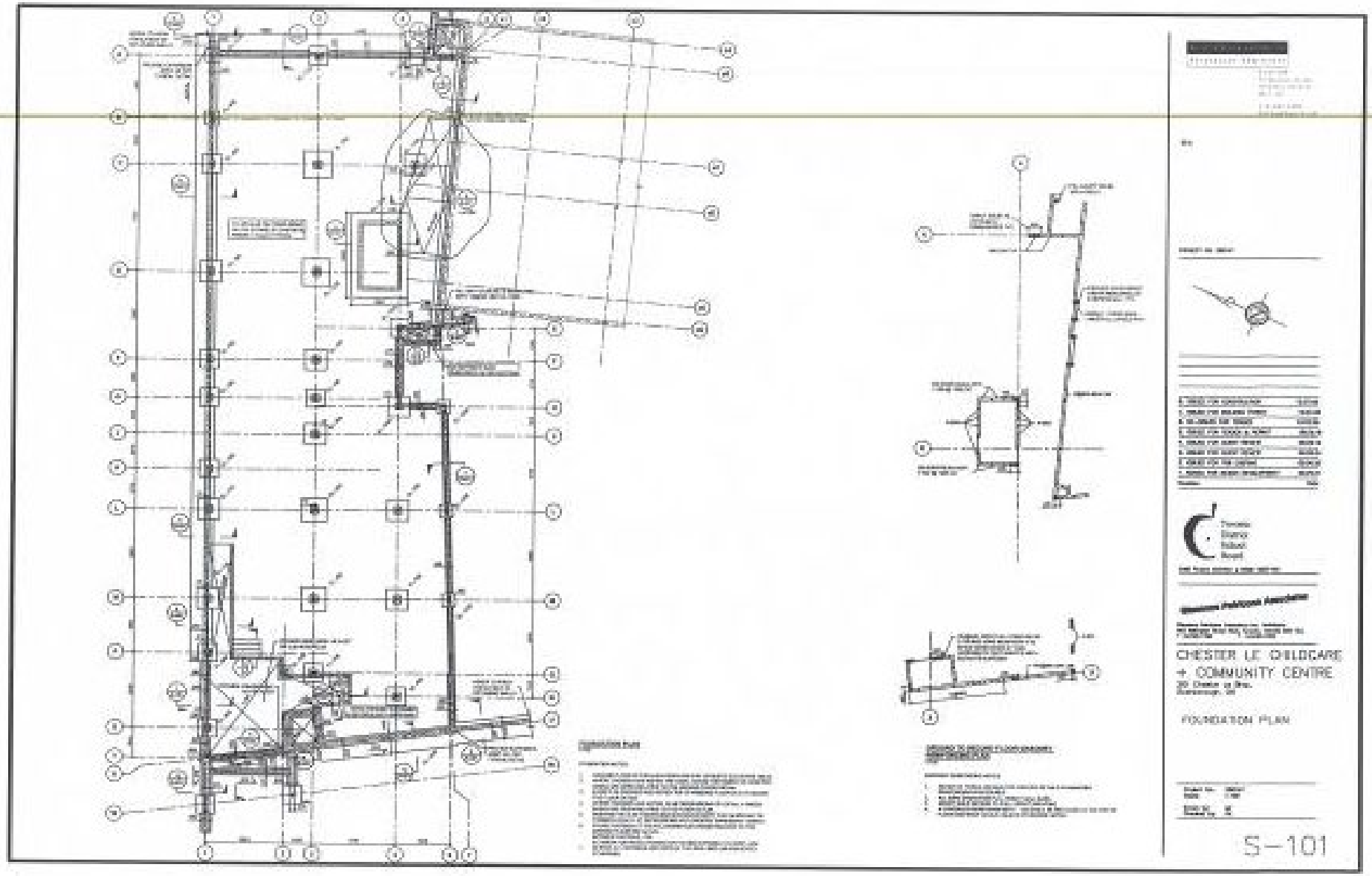


Toronto District School Board

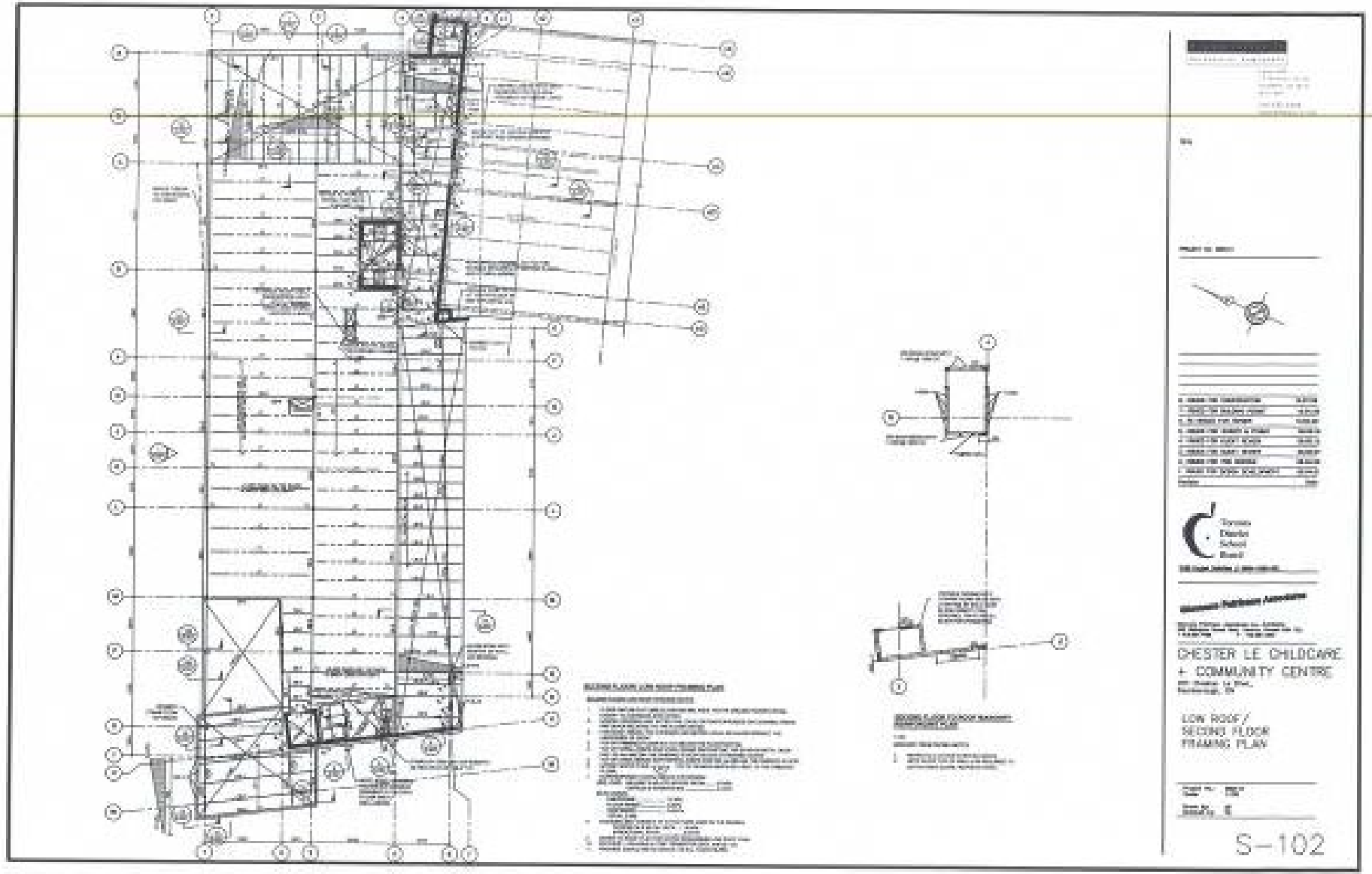
Chester Le JS Childcare & Community Centre Addition



Foundations Plan



Second Floor Framing Plan



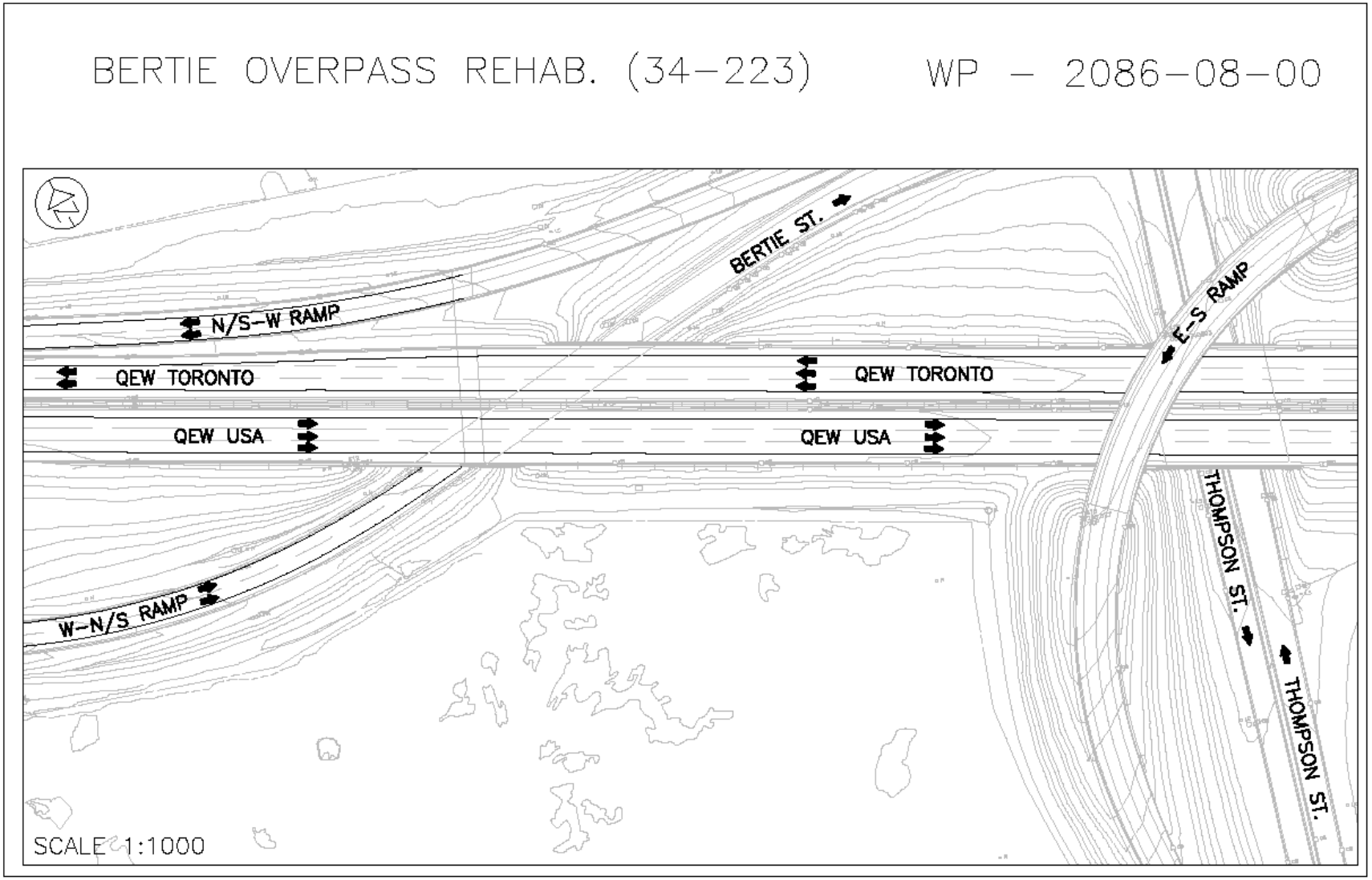
EXAMPLES OF THE CAPSTONE PROJECTS

DESIGN OF 7 STOREY OFFICE BUILDING



EXAMPLES OF THE CAPSTONE PROJECTS

Bertie Overpass Bridge Rehabilitation

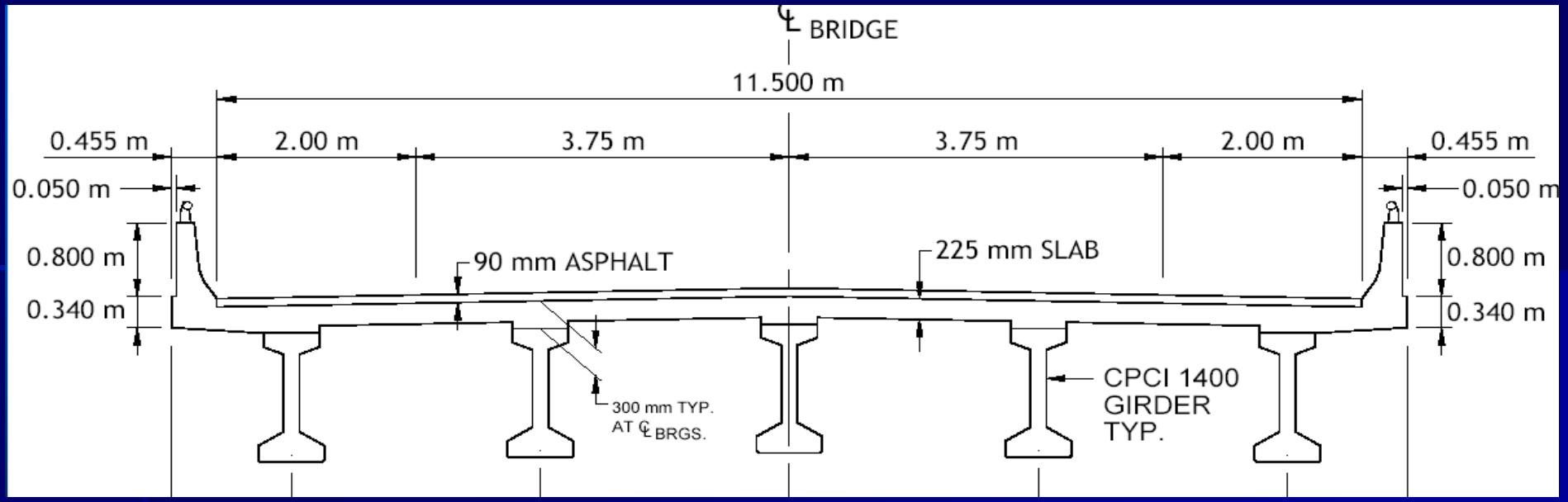




Steel bridges







Concrete bridges

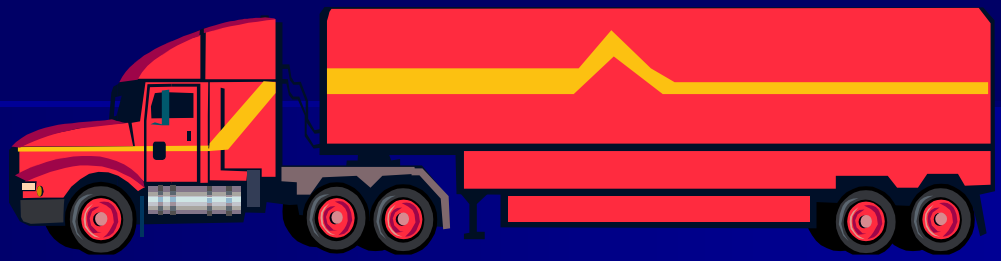


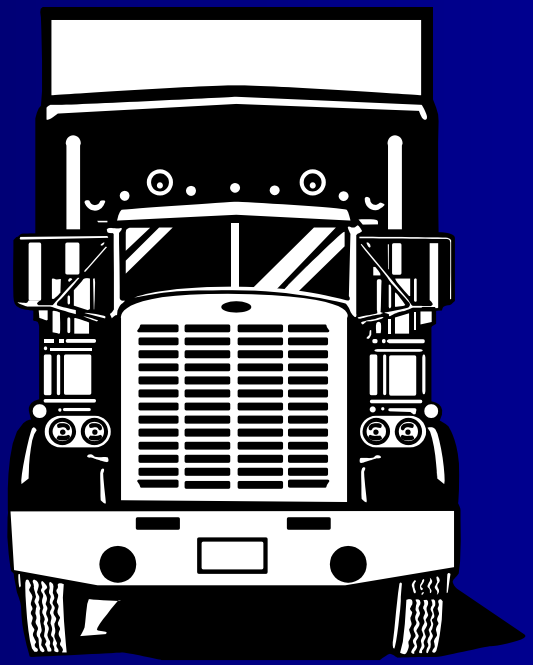


Timber bridges



Canadian Truck Loads:









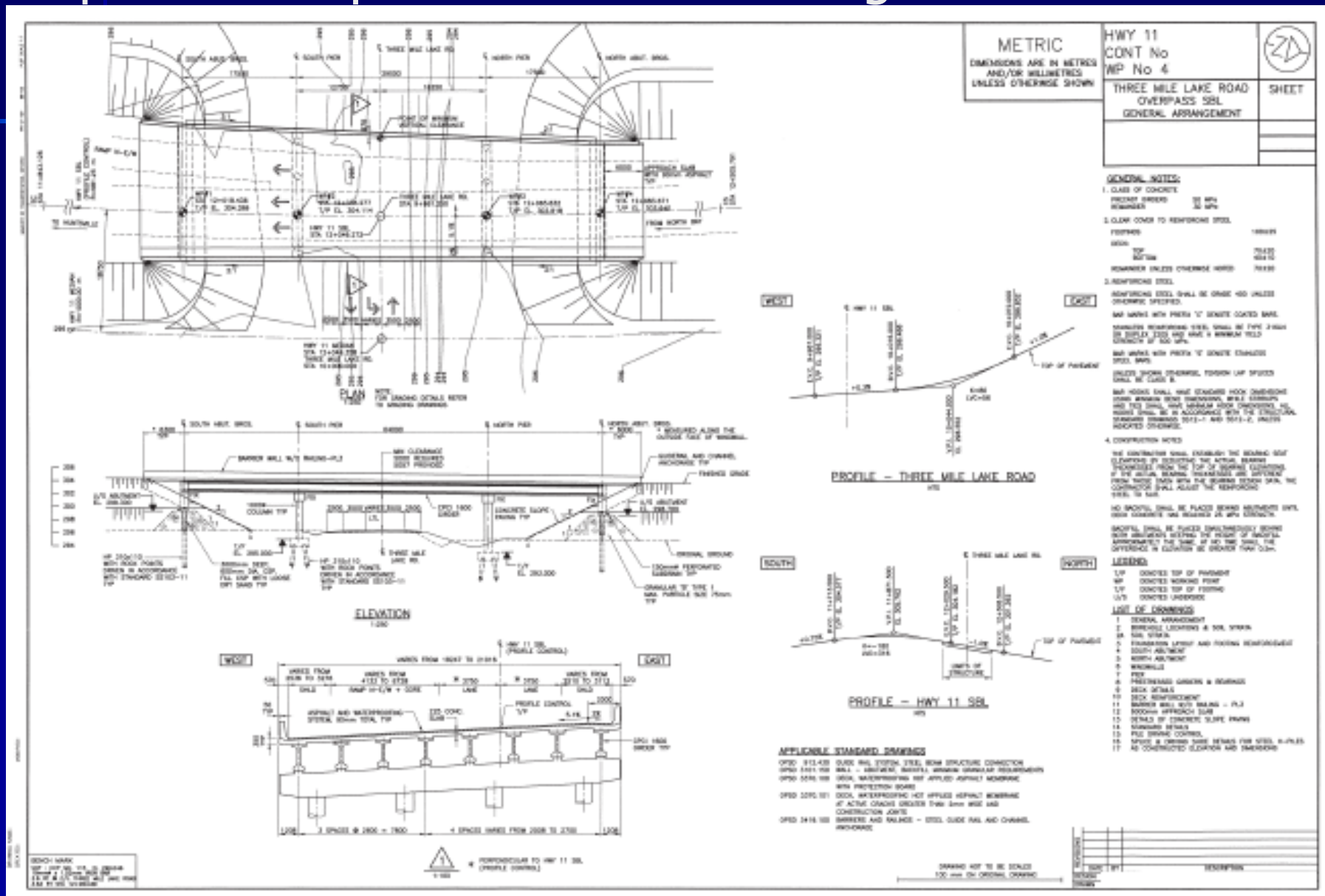
Deterioration of the Structure





EXAMPLE OF THE CAPSTONE PROJECTS

Expansion of precast concrete bridge



FOR CAPSTONE STRUCTURAL PROJECTS

For building design:

- National Building Code of Canada
- Solved design examples of multi-storey buildings
- Design of Composite Floor System, with solved examples.
- Design of floors for vibration, with examples.
- Design of tall buildings.
- Seismic Design of building.

FOR CAPSTONE STRUCTURAL PROJECTS

For bridge design:

- Canadian Highway Bridge Design Code
- Solved examples of the design of a variety of bridge configurations.
- Solved examples on the design of integral abutment bridges.
- AREMA CODE: Design of railway bridges.

Civil Engineering

CAREER OPPORUNITIES

- Construction Companies
- Consulting Companies
- Material Suppliers
- Municipal, Provincial and Federal Government
- Utility Corporations
- Other Government Agencies.