STRCS

STRUCTURAL CONSULTING SERVICES

COMPANY PROFILE
2024

STRCS
Structural Consulting Services inc.

Welcome to STRCS.

After more than 20 years of experience working with the largest international companies in the Middle East and Canada and carrying out structural design for large and distinctive projects from high-rise towers, airports, commercial, residential and industrial facilities, I achieved the biggest dream here in Canada, which is establishing STRCS Company in 2019. The main pillars of this company are:

1. Working with full responsibility.
2. Providing the best solutions.
3. Commitment to achieving the full benefit of our clients.
4. Providing structural design services with the highest quality and at competitive prices.
5. Working with transparency and always being the first choice for our clients in all their projects.
6. And gaining new clients.

Mohammad Amer Alrahwan P.Eng., ing.

ABOUT STRCS

STRCS-Structural Consulting Services Inc., is a company found in Montreal-Canada since 2019, specialize in providing innovative structural solutions for a wide range of projects. Our team of experienced engineers is dedicated to delivering high-quality work that meets the unique needs of our clients.

Our team has international experience working on projects in Canada and the Middle East, specifically Saudi Arabia and the United Arab Emirates. We have designed complex projects, high-rise towers, industrial structures, residential buildings, malls and commercial centers.
Our strategy in the company is based on the following main pillars:

- Working with full responsibility and providing the best solutions.
- Commitment to achieving the full benefit of our clients.
- Providing structural design services with the highest quality.
- Competitive prices.
- And working with transparency and always being the first choice for our clients in all their projects.
- gaining new clients.

OUR MISSION

Be the structural and engineering consultant of choice .

OUR PROCESS

Our process is designed to ensure that we deliver projects on time and within budget, while maintaining the highest standards of quality. We work closely with our clients to understand their needs and develop customized solutions that meet their specific requirements.

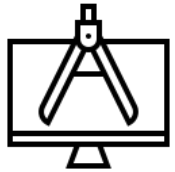
OUR TEAM

Our team is comprised of highly skilled and experienced engineers who are passionate about structural engineering. We are dedicated to providing exceptional service and delivering projects that are safe, efficient, and sustainable.

OUR VISION

Provide our clients with innovative, quality solutions.

OUR SERVICES



STRUCTURAL DESIGN

STRCS Provides quality conceptual design through to detailed structural design for all types of structure, Concrete, Steel, and Wood Structure.

Our professional team have local and international experiences in structural analysis and design of residential, commercials, and industrial structures.

in our design we formulate the structural design criteria and generate structural models in purpose of performing the structural analysis and design.

Our structural analysis is based on the structural theories, and the structural design is complying the design codes requirements.

Fulfilling our clients' needs and coordinating with the architectural, mechanical and electrical departments is the core of our work in order to provide our clients with a coordinated structural design.

The value engineering and controlling the quality of the structural design are our design methodology.

OUR SERVICES

STRUCTURAL DESIGN OF RENOVATED BUILDINGS

In STRCS provide the optimal structural solutions that help owners and architects make the required **renovation** for their projects.

Our professional structural engineers by using advanced structural software provide:
•The structural design for new transfer system to support the existing or new structure above.
•The optimal structural solution in order to Remove or replace existing bearing walls, columns, beams, bracing system, lintels, and roof frames.
•The proper structural reinforcement system for new openings in foundation walls , brick walls , floors, and roofs.
•Structural design for new columns and footings and foundation walls.
•Underpinning design.
•Design of temporary structures.
•Structural design for new mezzanine floors.
•Verifying the adequacy of the existing structural system and providing the proper structural reinforcement system if needed.

STRUCTURAL DESIGN FOR EXPANDED BUILDINGS

In STRCS we are designing and detailing your structure to accommodate future expansion, as well as helping the owner and architects that plan ahead for the intended use and functionality of the additional floors.
In vertical or horizontal expansion projects, we find the optimal structural relationship between the existing building and the expansion structure. We also study the effect of expansion on the existing structural system , such as the effect on existing of vertical elements , lateral resisting system and foundation system.

Registraire des entreprises Québec

Nom STRCS SERVICES DE CONSEIL STRUCTUREL INC.
Numéro d'entreprise du Québec (NEQ) 1175408260

COMPANY REGISTRATION
QUEBEC-CANADA

État de renseignements d'une personne morale au registre des entreprises

Renseignements en date du 2020-10-08 19:29:11

État des informations

Identification de l'entreprise

Numéro d'entreprise du Québec (NEQ)	1175408260
Nom	STRCS SERVICES DE CONSEIL STRUCTUREL INC.
Version du nom dans une autre langue	STRCS STRUCTURAL CONSULTING SERVICES INC.

Adresse du domicile

Adresse	1103-725 place Fortier Montréal (Québec) H4L5B9 Canada

Adresse du domicile élu

Nom de famille	ALRAHWAN
Prénom	MOHAMMAD AMER

Adresse	1103-725 place Fortier Montréal (Québec) H4L5B9 Canada

PORTFOLIO

Some projects

COMPANY PROFILE
2024

INTERNATIONAL PROJECTS

CARPLEX PROJECT.

JEDDAH,SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Value engineering .
3. Coordination with Architect.
4. Specification .
5. Bill of quantities.

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MAKKAH MALL

MAKKAH ,SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Value engineering .
3. Coordination with Architect.
4. Specification .
5. Bill of quantities.

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HAMPTON
JEDDAH ,SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Value engineering .
3. Coordination with Architect.
4. Specification .
5. Bill of quantities.

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AL-IMAN CENTER FOR CANCER TREATMENT

JEDDAH ,SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Design the deep foundation system on piles.
3. Coordination with Architect.
4. Specification .
5. Bill of quantities.

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FARAN PROJECT

FOR INSTITUTE OF CONSULTING

RESEARCH AND STUDIES ,

UM ALQURA UNIVERSITY

MEKKAH ,SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Design the steel structure.
3. Coordination with Architect.
4. Specification .
5. Bill of quantities.

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DEBA HOTEL
SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Coordination with Architect.
3. Specification .
4. Bill of quantities.

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THE DIAMOND TOWER

JEDDAH,SAUDI ARABIA

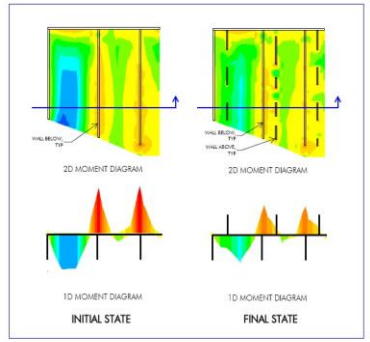
THE TOWER WAS DESIGNED DESIGNED BY SDEC.

The core engineering team:
Prof. Sohaib Alama
Eng. Mohammad Amer Alrahwan

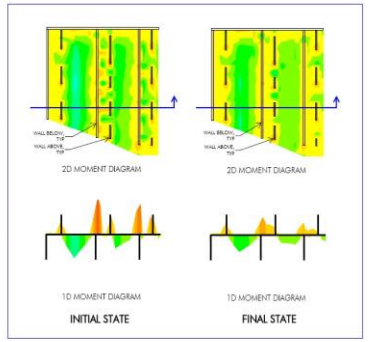
SCOPE OF WORK

1. Structural analysis and design for the tower.
2. Design the structural system for the podium.
3. Design the foundation system under the podium structure.
4. Apply the lateral loads resulting from the wind tunnel test and design the lateral system.
5. Control the lateral displacement to the allowable limits.
6. Meeting and responding to the comments of the peer reviewer

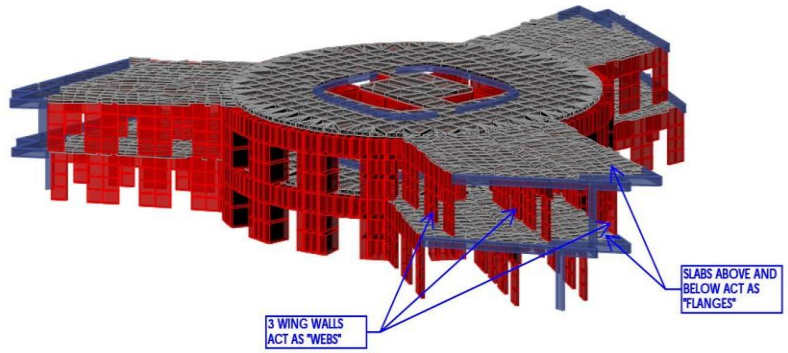
General information	
Status	Under construction[1]
Location	Jeddah, Saudi Arabia
Construction started	2011
Estimated completion	2018-19
Cost	$1Billion
Height	
Architectural	432 m (1,417 ft)[1]
Technical details	
Floor count	93
Design and construction	
Main contractor	Al-Masarat For Counstruction Co, Ltd



CONSTRUCTION SEQUENCE 1
1 LEVEL OF SHORING/ 3 LEVELS OF RE-SHORING



CONSTRUCTION SEQUENCE 2
2 LEVELS OF SHORING/ 2 LEVELS OF RE-SHORING



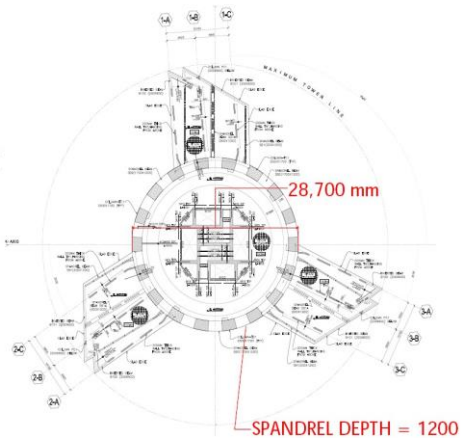
GENERAL BUILDING INFORMATION

BUILDING HEIGHT = 340m
CORE WIDTH = 28.7m
ASPECT RATIO = 12:1

50-YR WIND SPEED = 42.2 m/s (95mph)
SEISMIC DESIGN CATEGORY "C"

WALL THICKNESS AND CONCRETE GRADE

START LEVEL	END LEVEL	WALL THICKNESS	VERT REINF RHO	CONCRETE GRADE
		mm		Mpa
80	ROOF	600	0.85%	50
75	80	700	0.81%	50
70	75	800	0.77%	50
65	70	900	1.25%	50
60	65	1000	1.20%	50
55	60	1100	1.19%	60
50	55	1200	1.16%	60
40	50	1300	1.14%	60
35	40	1400	1.12%	60
30	35	1500	1.10%	60
25	30	1600	1.09%	70
15	25	1700	1.04%	80

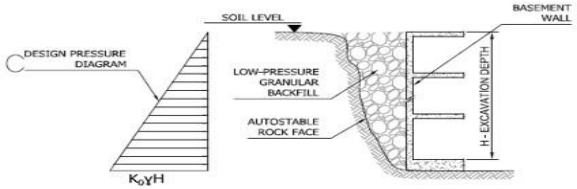


THE KAKIA TOWER

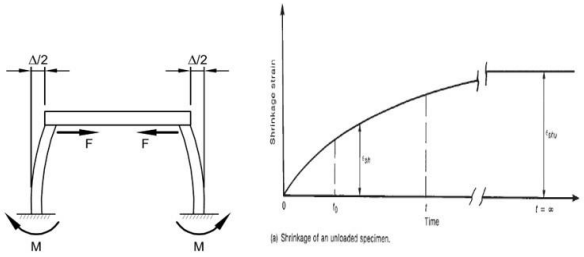
MAKKAH,SAUDI ARABIA

- FOR SECTIONS 6a, 7, 8, 11 AND 13, THE DESIGN OF THE BASEMENT RETAINING WALLS WAS DONE ACCORDING TO THE FOLLOWING BACKFILL MATERIAL PROPERTIES AND PRESSURE DIAGRAM:

DENSITY	γ=18 KN/m³
ANGLE OF INTERNAL FRICTION	Ø=30°
COHESION	C=0 T/m²



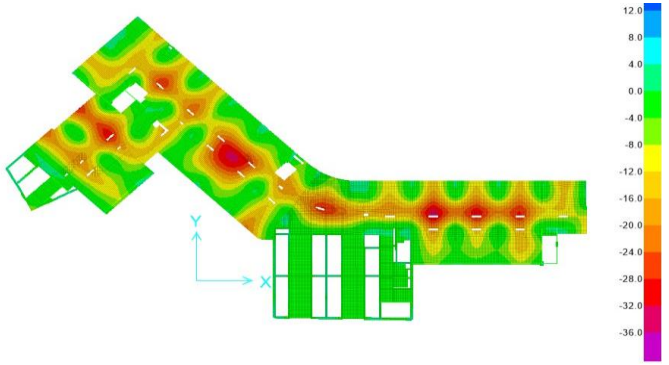
- FOR SECTIONS 1, 2, 3, 4, 5, 6, 9 AND 10, THE LATERAL EARTH PRESSURE CONSIDERED IN THE DESIGN WAS CALCULATED BASED ON A SILO EFFECT (NARROW BACKFILL) TAKING INTO ACCOUNT



CONSTRUCTION SEQUENCE ANALYSIS

CASE 1: LUMPED MODEL CONSTRUCTION

CASE 2: STAGED



SCOPE OF WORK

1. Structural analysis and design.
2. Structural design verification.
3. Meetings and coordination

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KHODARI RESIDANCE

DAMMAM, SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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MICRO FLAT

JEDDAH, SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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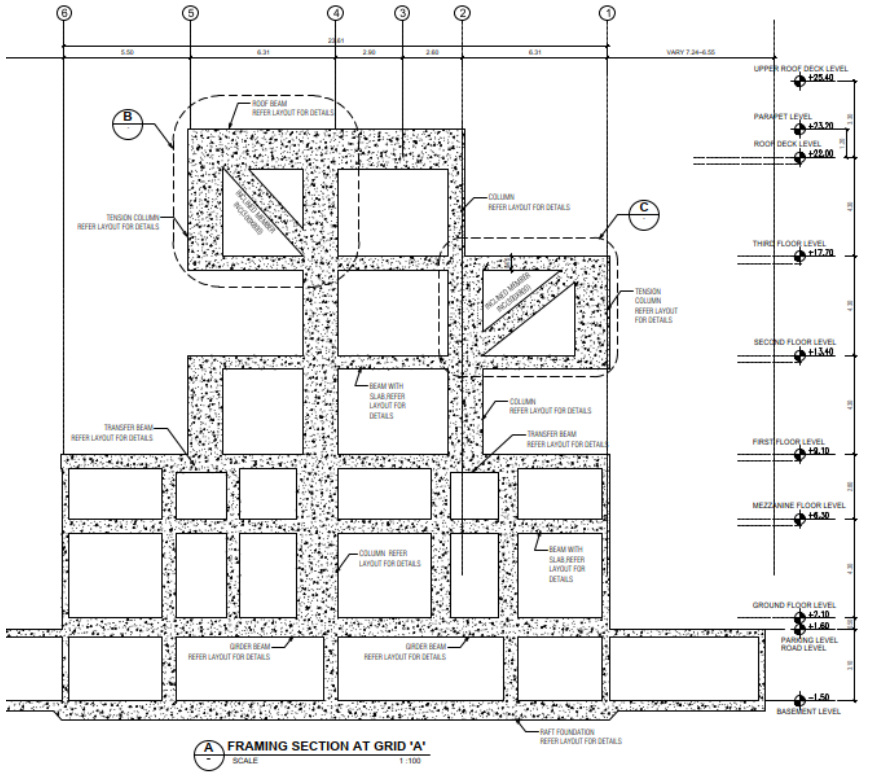
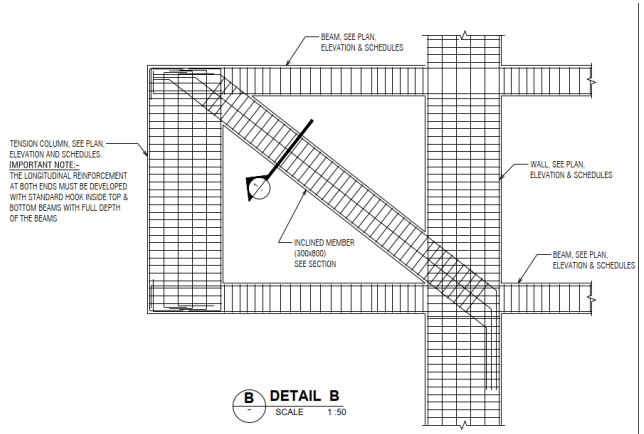
HIRAA PROJECT
JEDDAH, SAUDI ARABIA



A FRAMING SECTION AT GRID 'A'
SCALE 1:100



B DETAIL B
SCALE 1:50

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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SAUD ALSALEH COMPLEX

RIYADH, SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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ALTUWERGY COMMERCIAL BUILDING

SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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VERANDA PROJECT

JEDDAH, SAUDI ARABIA

SCOPE OF WORK

1. Structural analysis and design.
2. Specification .
3. Bill of quantities.

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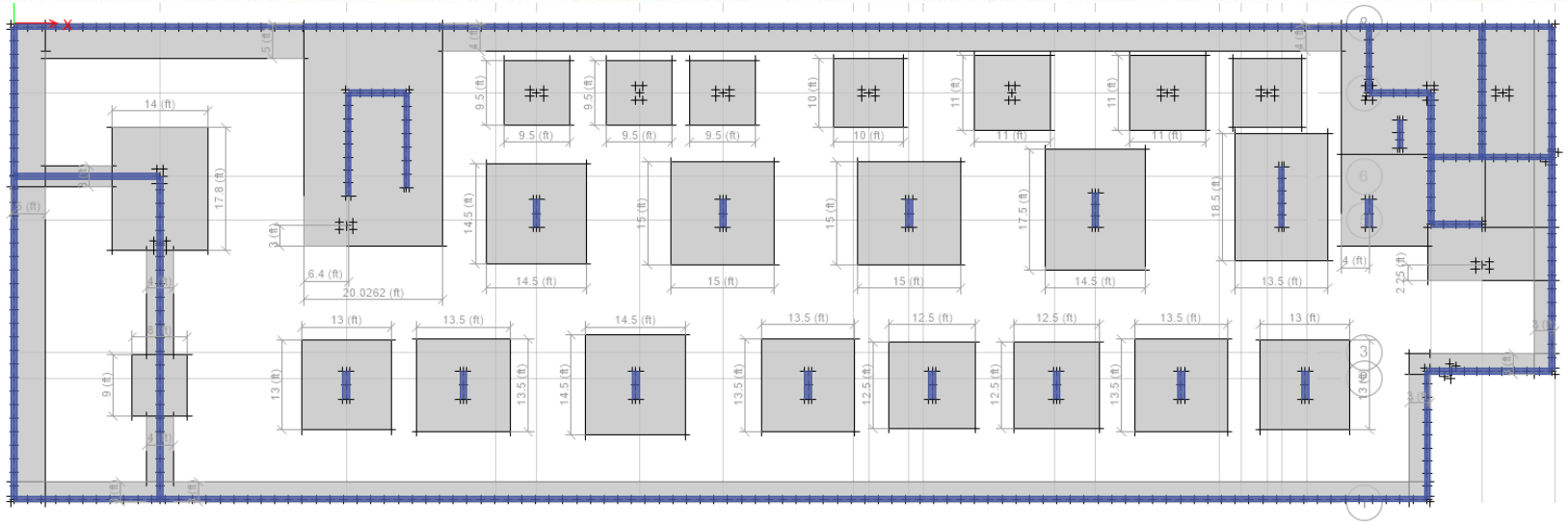
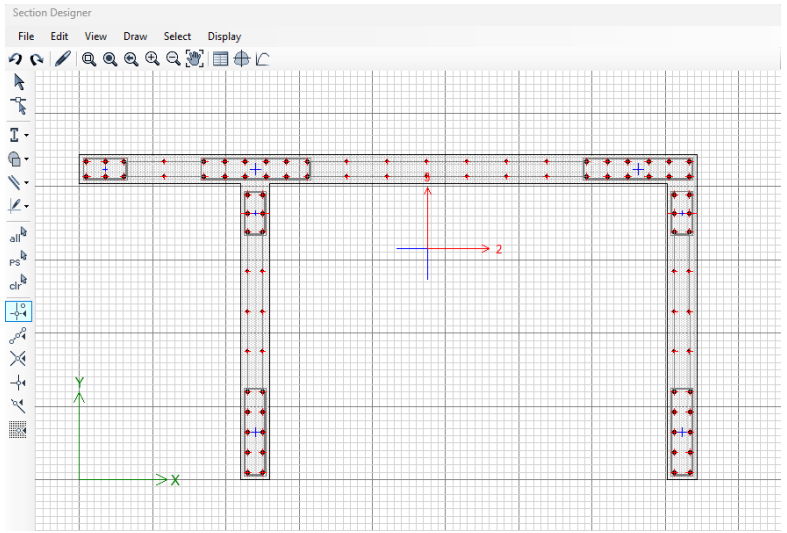
CANADIAN PROJECTS

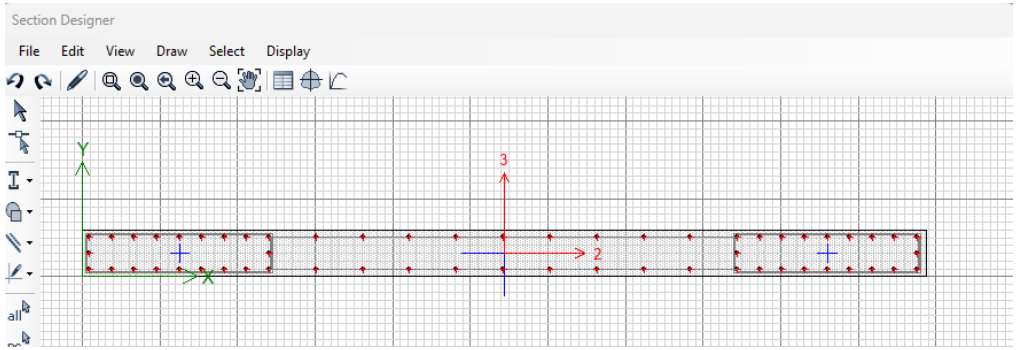
LAVAL PROJECT

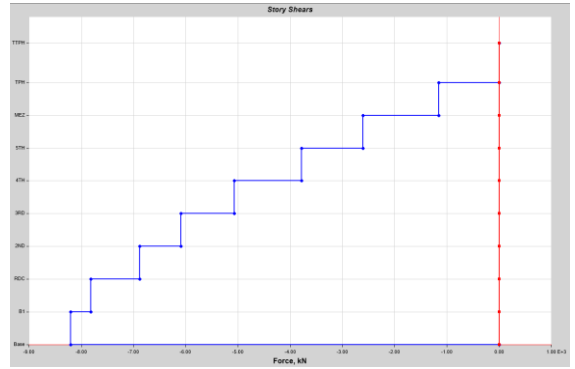
SCOPE OF WORK

1. Structural analysis and design.
2. Design the lateral resisting system against seismic and wind.
3. Reinforcement drawings for all slabs, columns details, shear walls and cores details.
4. Design and details the transfer beams.
5. Design the foundation system.
6. Bill of quantities.





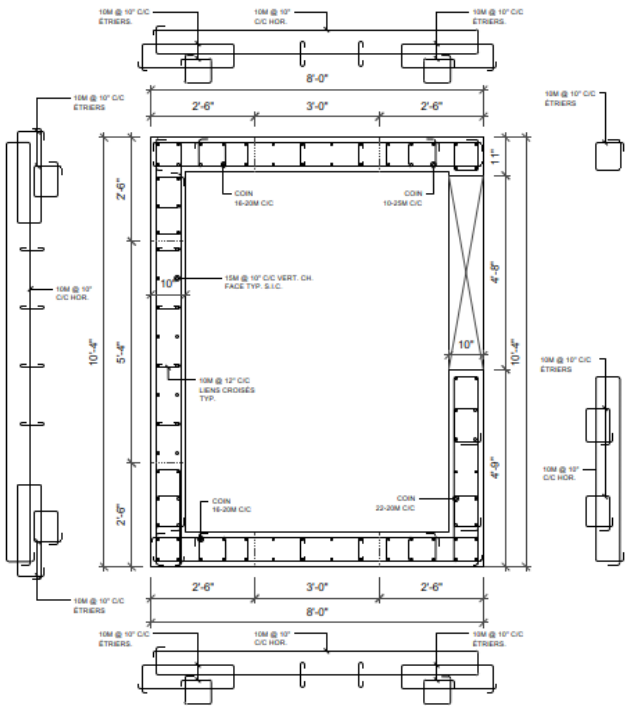


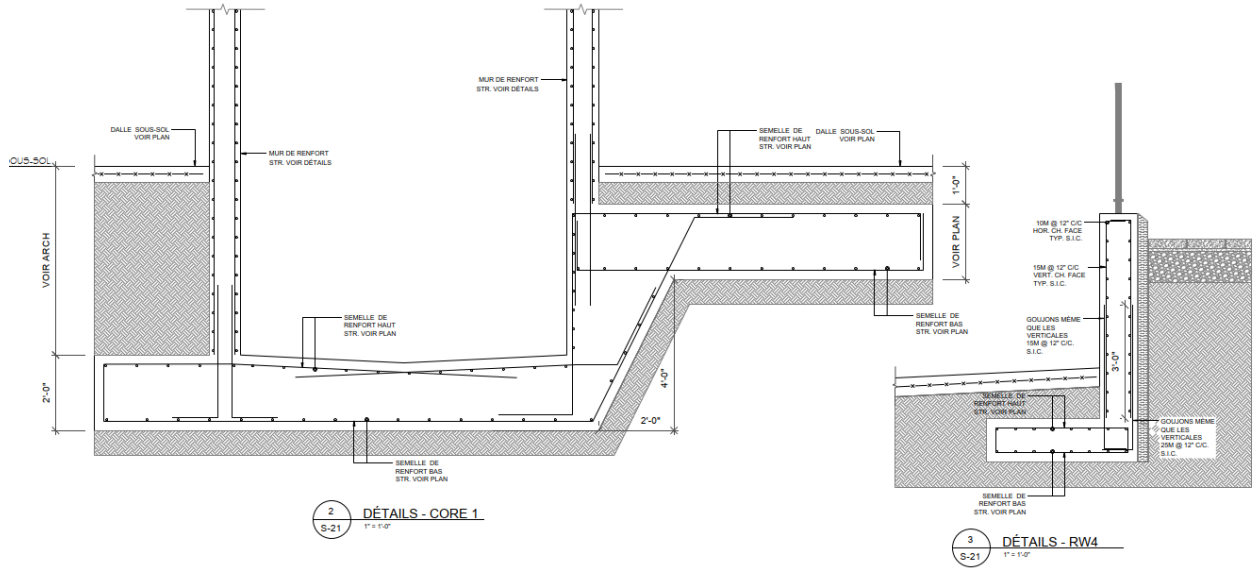


GOUIN PROJECT

SCOPE OF WORK

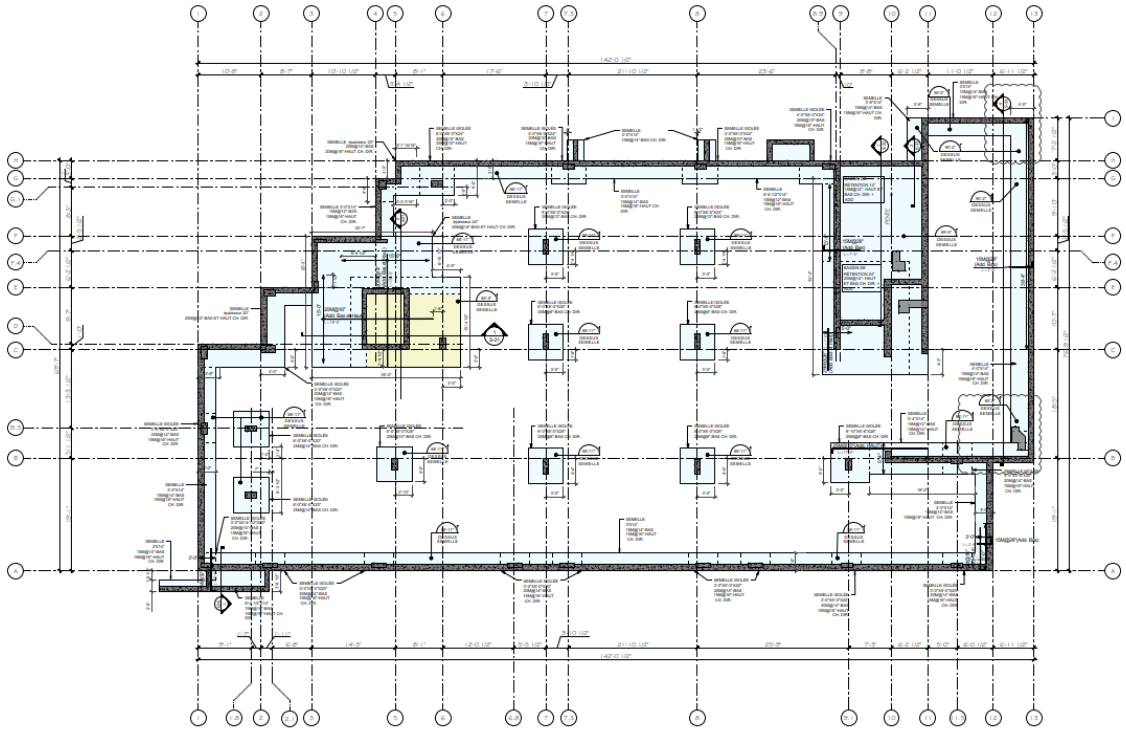
1. Structural analysis and design.
2. Design the lateral resisting system against seismic and wind.
3. Reinforcement drawings for all slabs, columns details, shear walls and cores details.
4. Design and details the transfer beams.
5. Design the foundation system.
6. Bill of quantities.





2 S-21 DÉTAILS - CORE 1 1" = 1'-0"

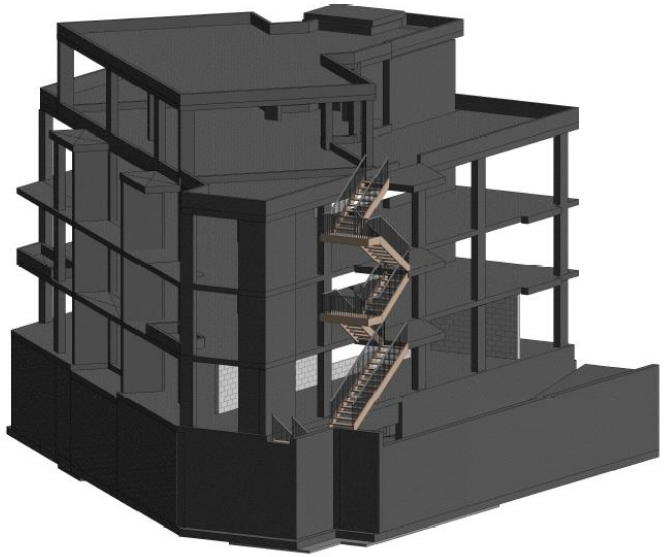
3 S-21 DÉTAILS - RW4 1" = 1'-0"

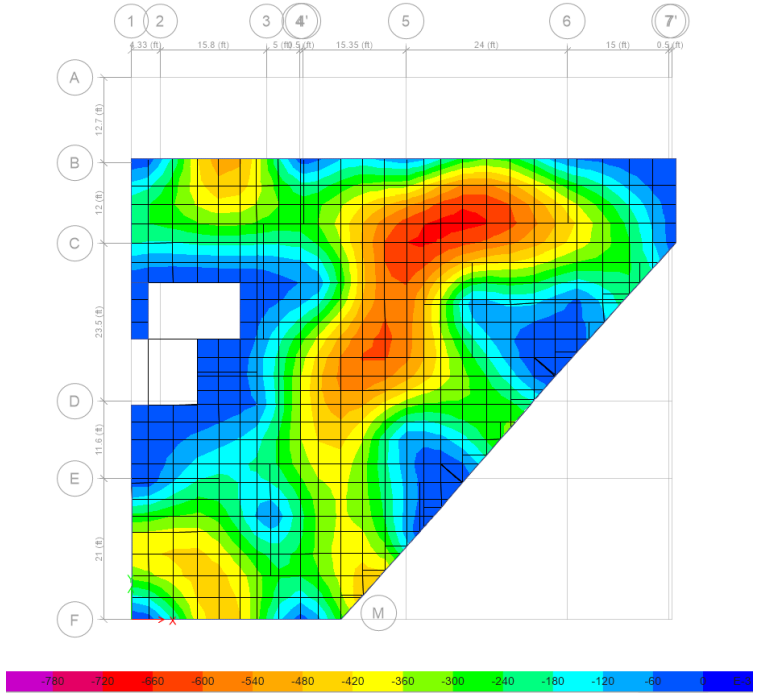


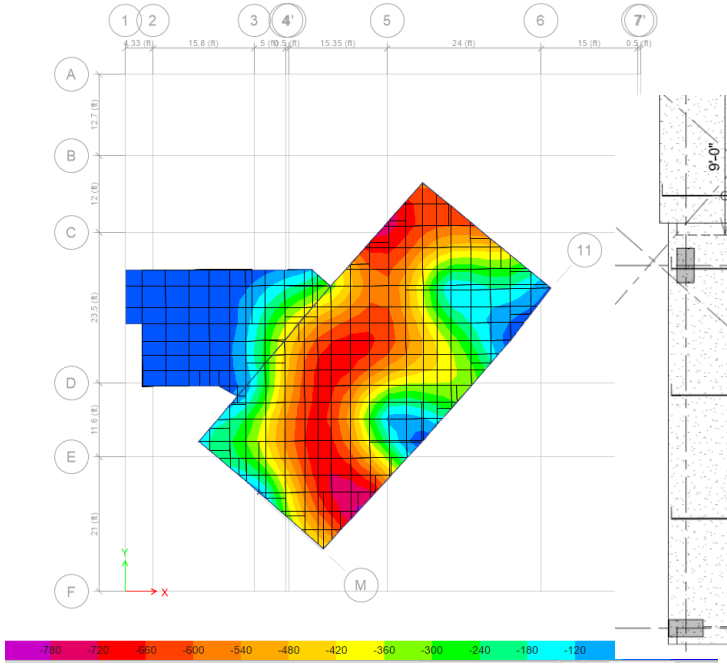
ST-JOSEPH, LACHINE PROJECT

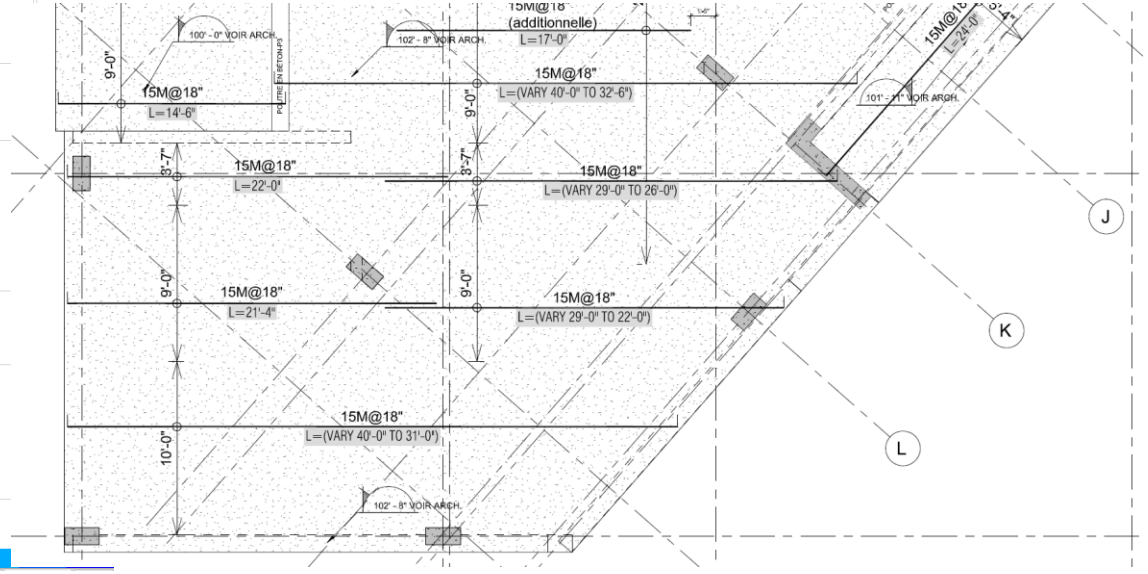
SCOPE OF WORK

1. Structural analysis and design.
2. Design the lateral resisting system against seismic and wind.
3. Reinforcement drawings for all slabs, columns details, shear walls and cores details.
4. Design and details the transfer beams.
5. Design the foundation system.





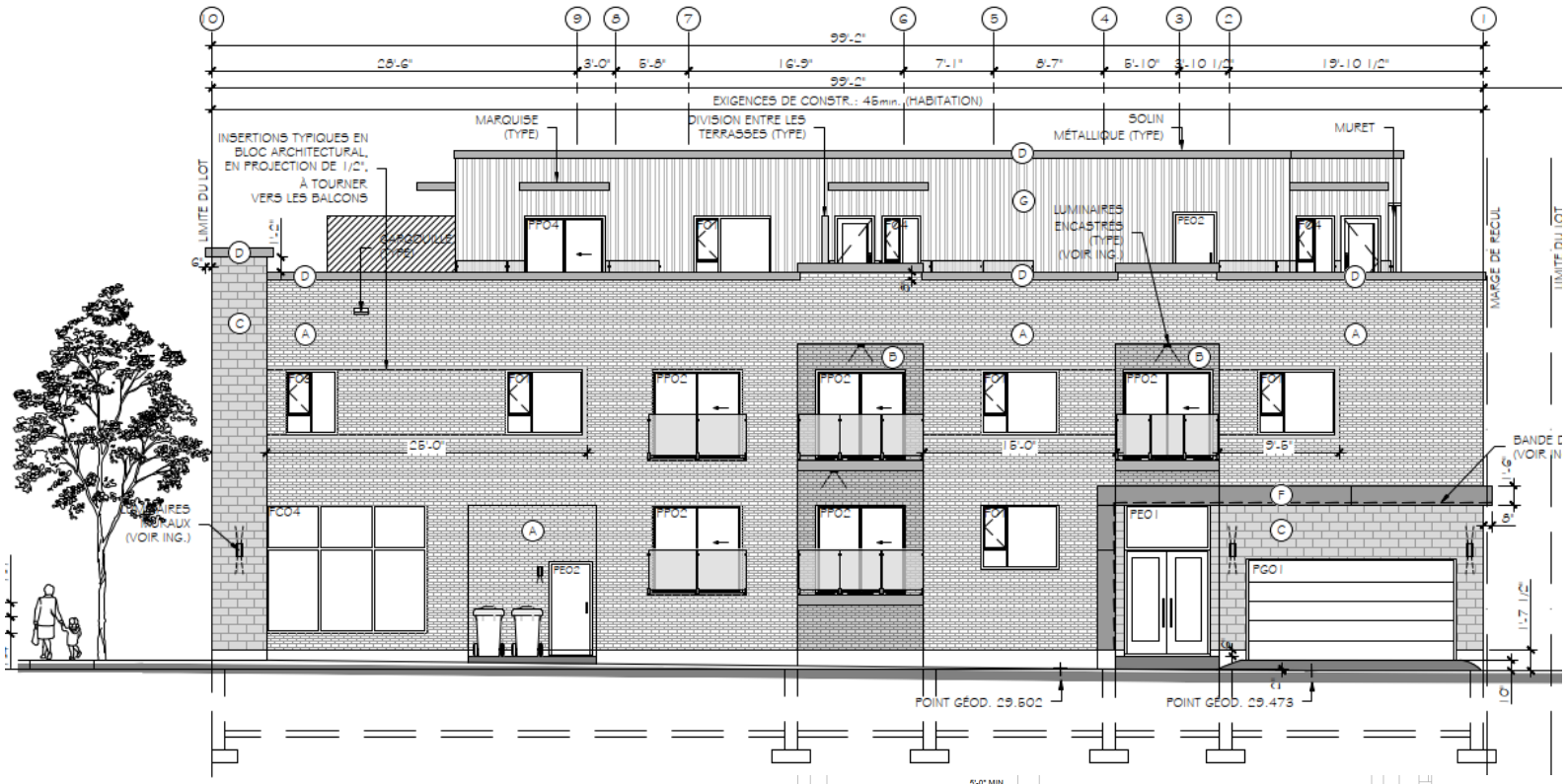


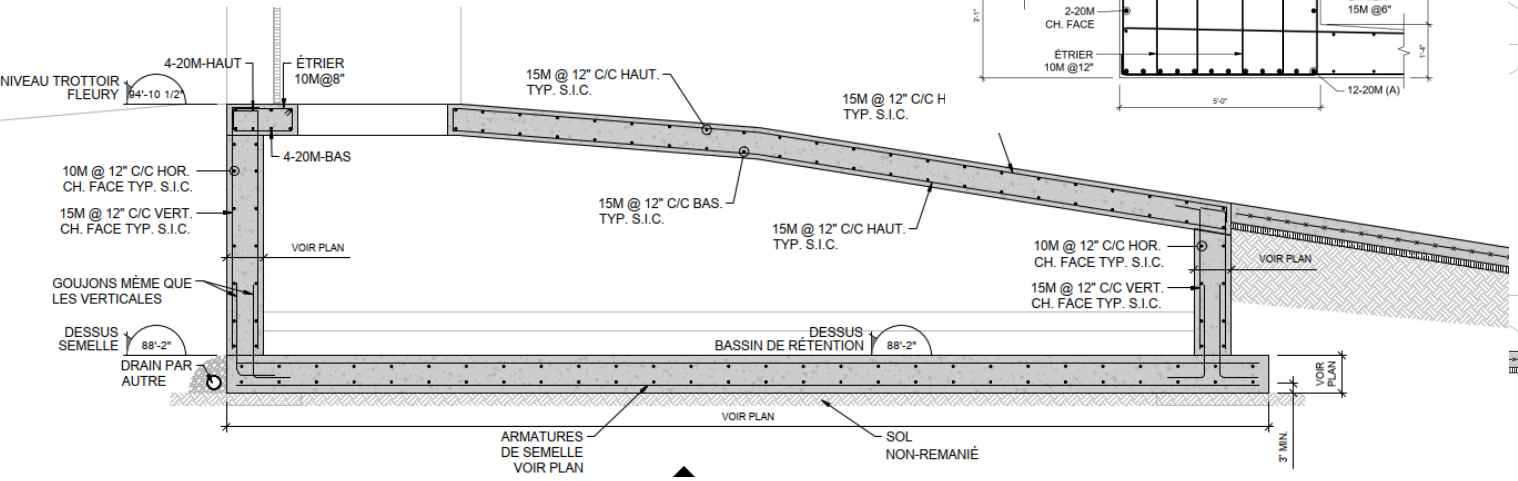


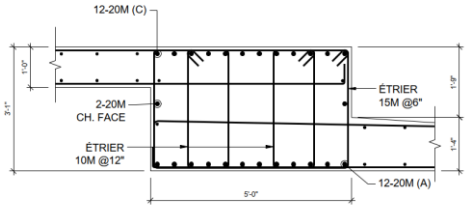
FLEURY PROJECT

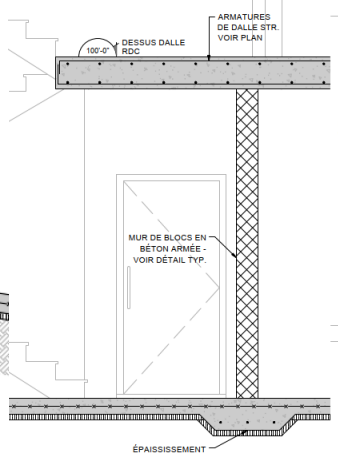
SCOPE OF WORK

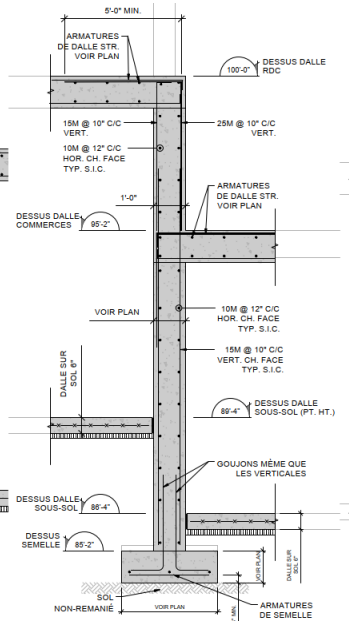
1. Structural analysis and design.
2. Design and detail the transfer concrete slab at ground floor.
3. Reinforcement drawings , columns details, shear walls and cores details.
4. Design the foundation system.
5. Bill of quantities.

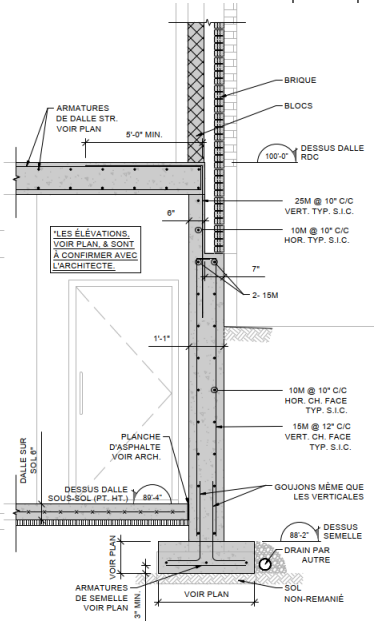




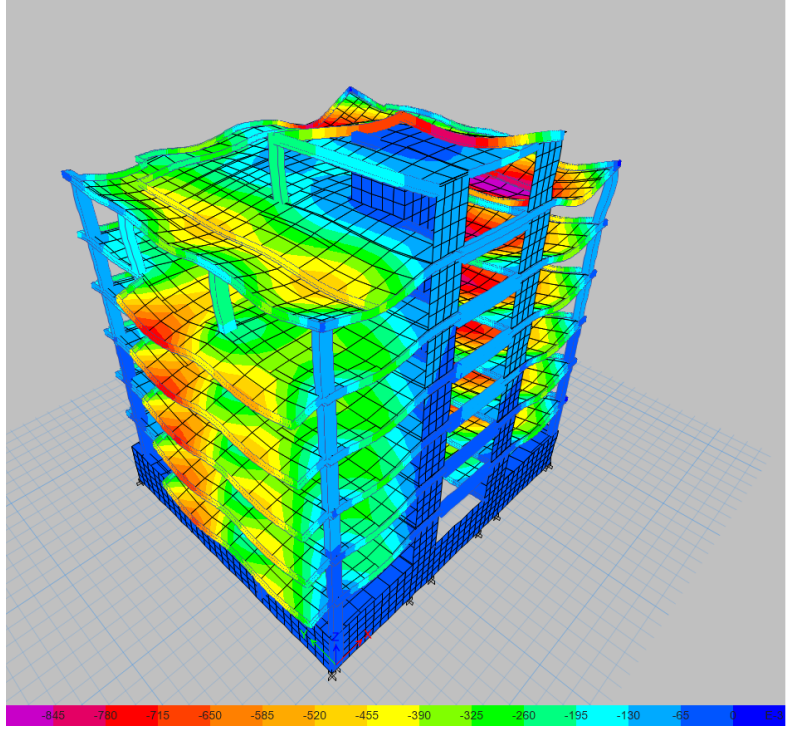


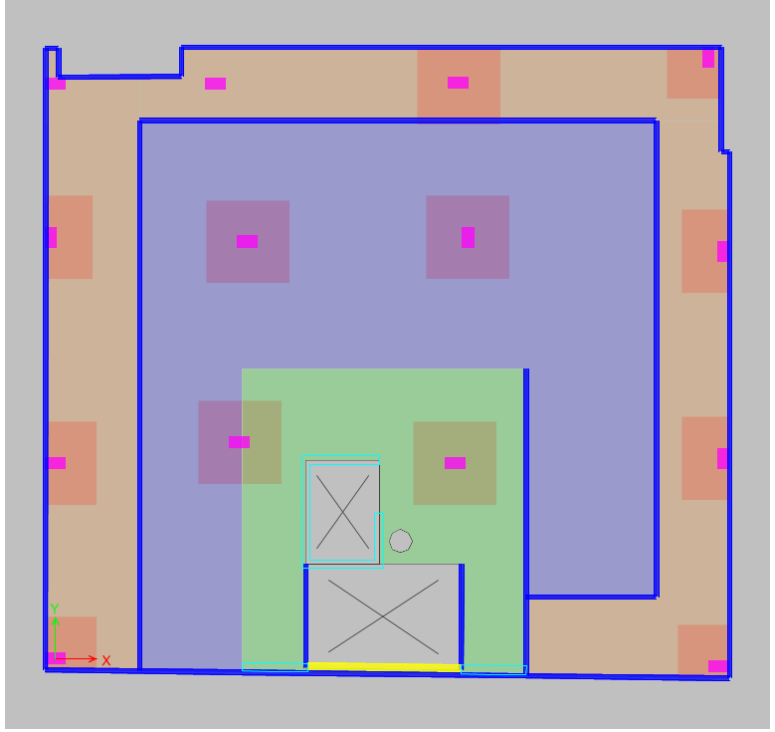






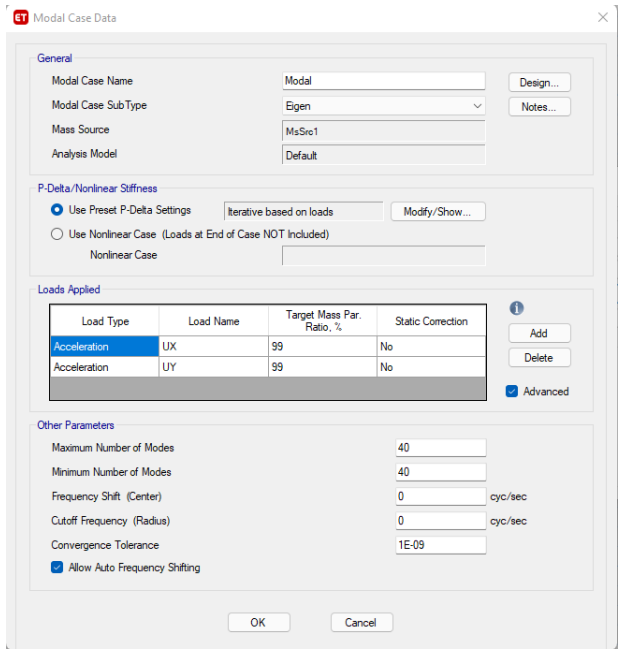
DECARI PROJECT
MONTREAL

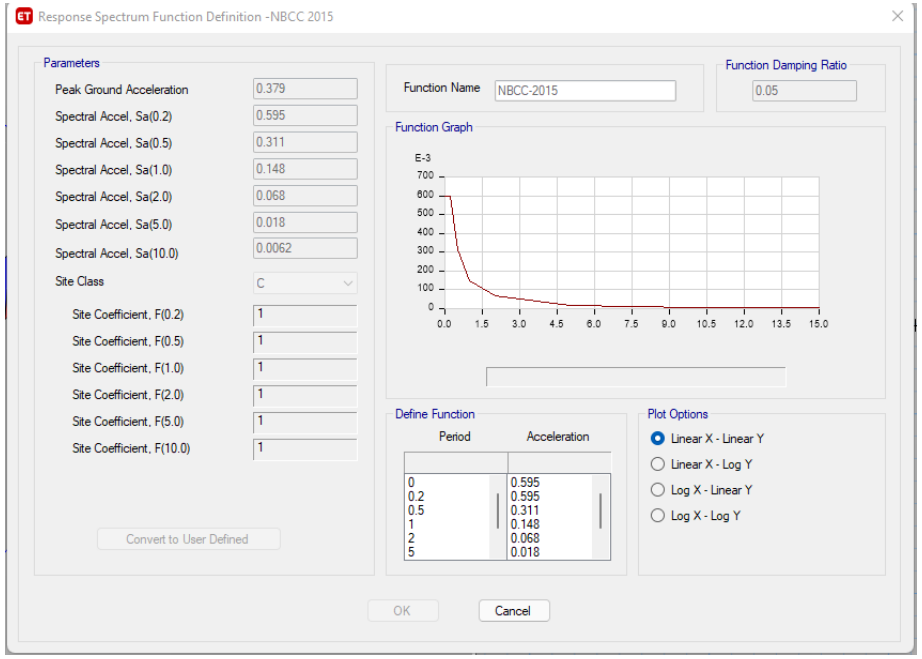




SCOPE OF WORK

1. Structural analysis and design.
2. Design the lateral resisting system against seismic and wind.
3. Reinforcement drawings for all slabs, columns details, shear walls and cores details.
4. Design and details the transfer beams.
5. Design the foundation system.
6. Bill of quantities.

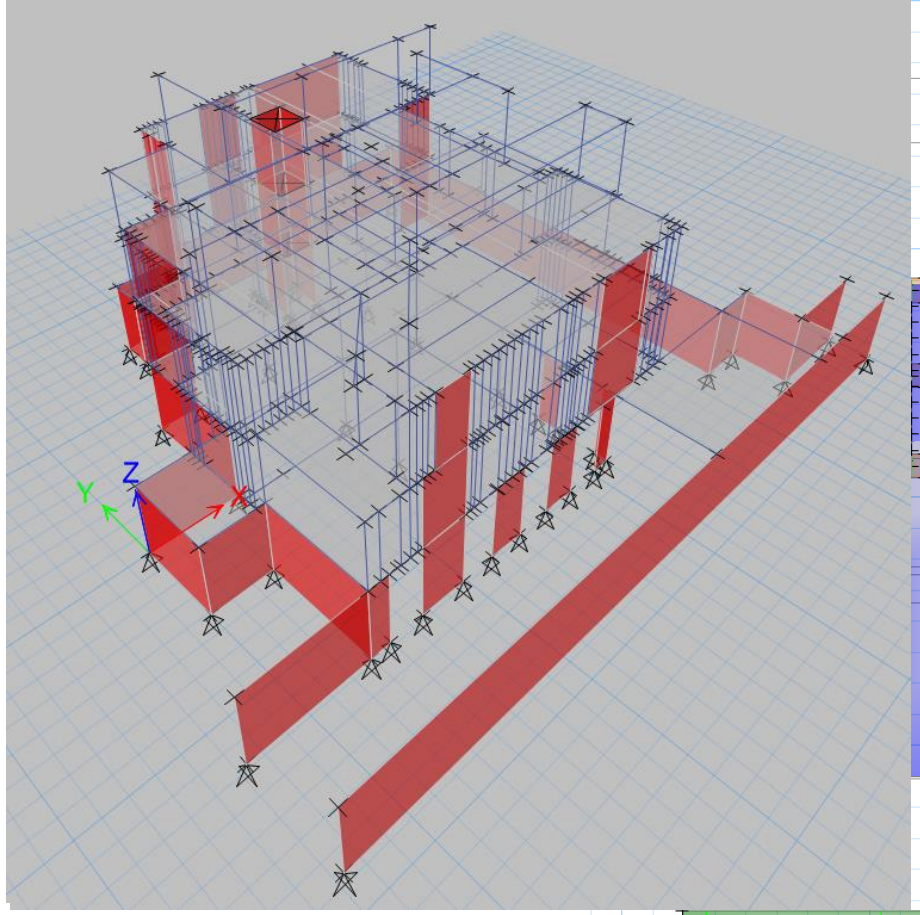


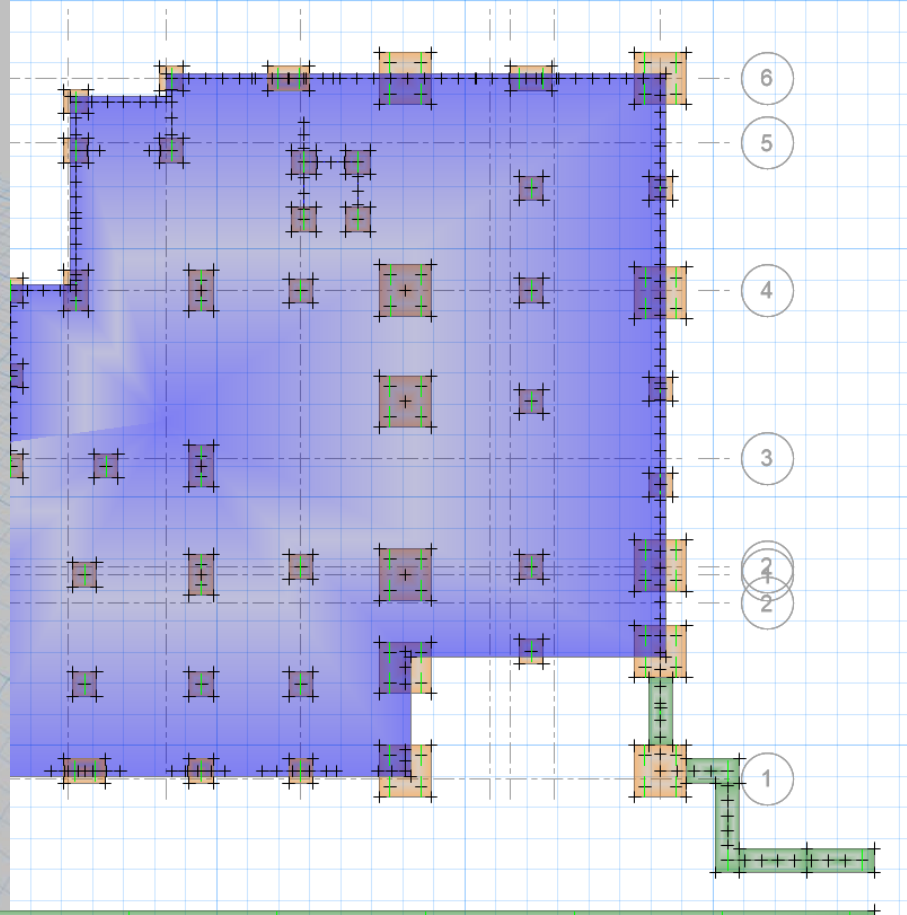


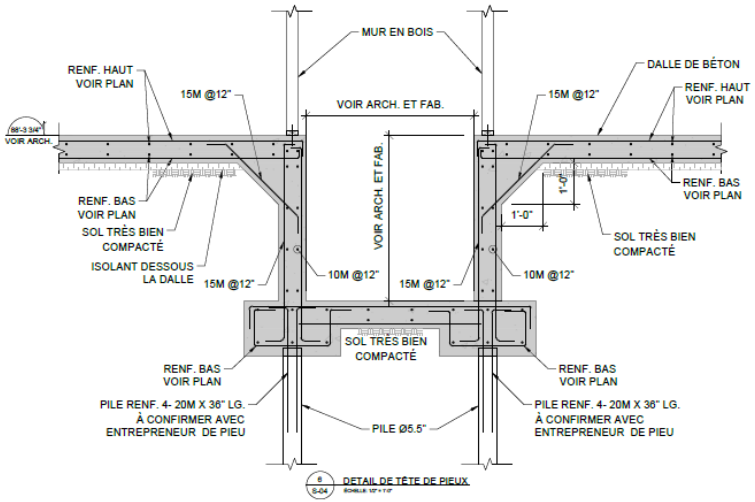
QUEEN MARY PROJECT

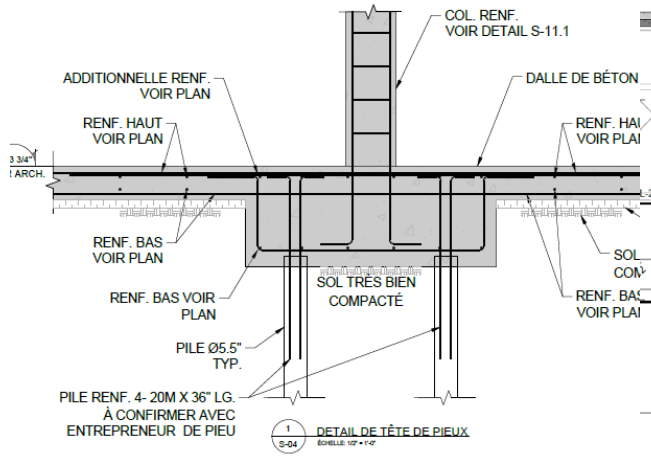
SCOPE OF WORK

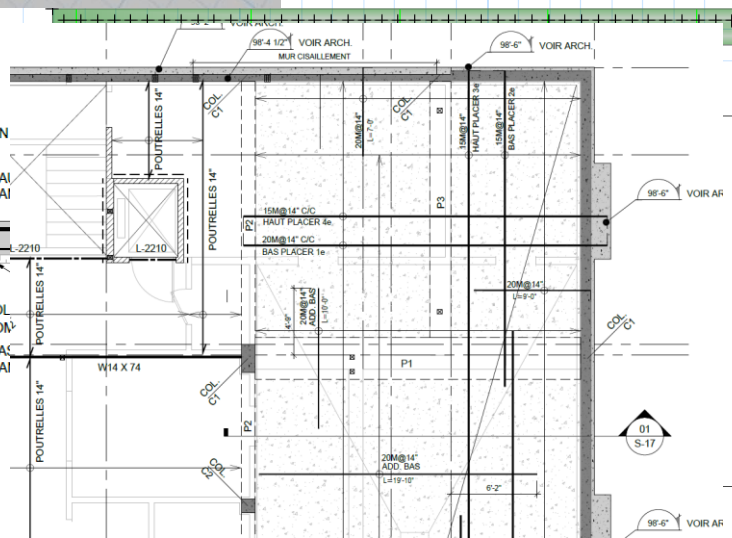
1. Structural analysis and design.
2. Design the steel , concrete and wood structures.
3. Design and details the transfer beams.
4. Design the foundation system.
5. Bill of quantities.

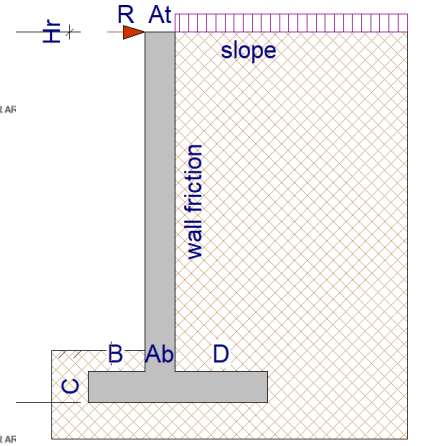




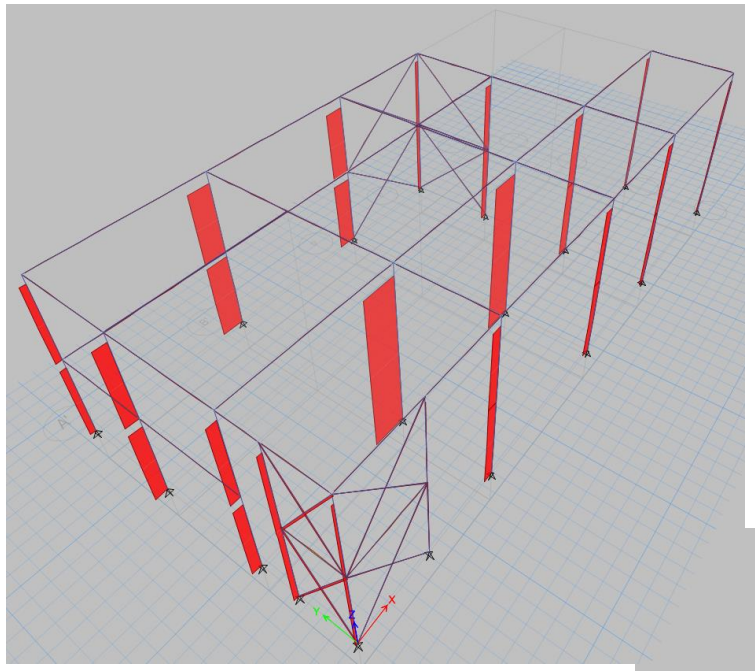


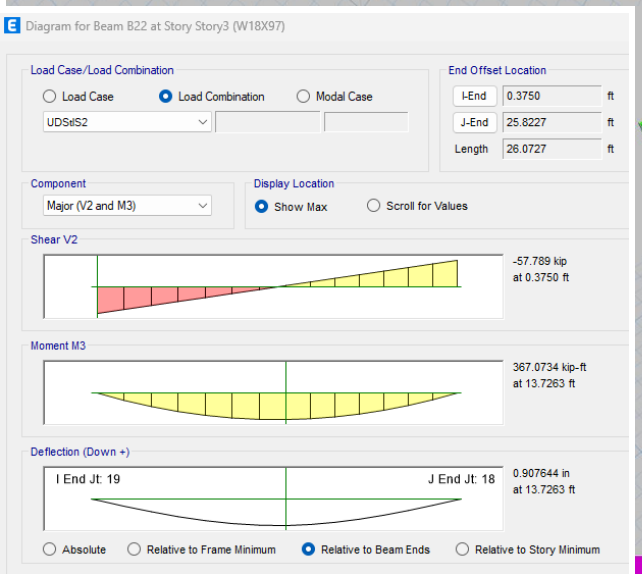


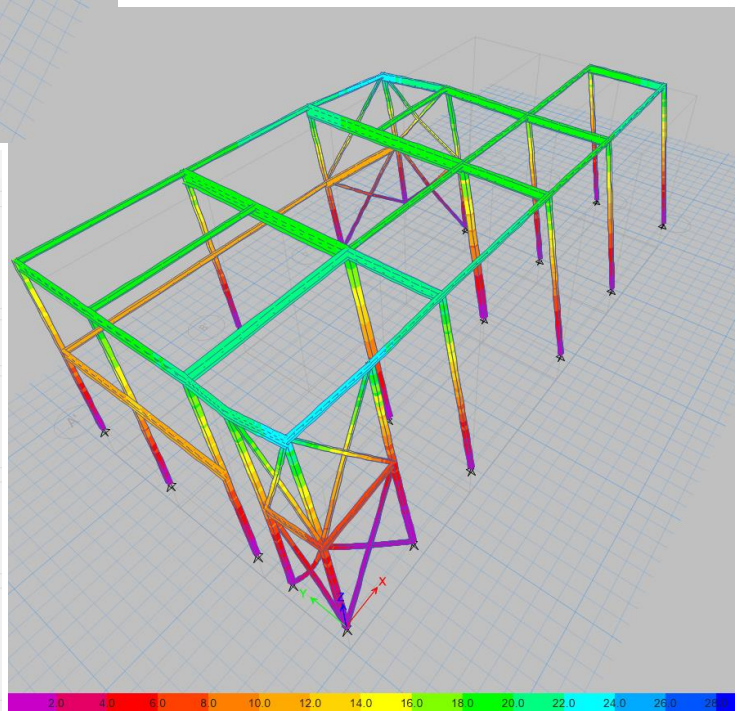




PORT ROYAL PROJECT







Material Properties

E (lb/in²)	f_y (lb/in²)	R_y	α
29000000	36000	1.551	NA

Demand/Capacity (D/C) Ratio (13.8.2-2)

D/C Ratio	Axial Ratio	Flexural Ratio Major	Flexural Ratio Minor
0.653	0 +	0.644 +	0.009

Stress Check Forces and Moments (Combo UDStlS3)

Location (in)	P (kip)	M 33 (kip-ft)	M 22 (kip-ft)	V 2 (kip)	V 3 (kip)
164.7152	-0.82	367.083	-1.2771	2.903	-0.106

Basic Factors

Buckling Mode	K Factor	L Factor	L Length (in)	KL/r
Major (3-3)	1	0.976	305.3719	38.97
Minor (2-2)	1	0.512	160.2152	60.329
Major (K=1)	1	0.976	305.3719	38.97
Minor (K=1)	1	0.512	160.2152	60.329
LTB	1	0.512	160.2152	60.329

Design Factors

β (13.8.2)	$U_{1,maj}$ (13.8.4)	$U_{1,min}$ (13.8.4)	$\Omega_{1,maj}$ (13.8.5)	$\Omega_{1,min}$ (13.8.5)	Ω_2 (13.6(a))
0.85	1	1	1	1	1.034

Axial Force & Biaxial Moment Design Factors (13.8.2-2)

	β	$U_{1,maj}$	$U_{1,min}$	$U_{2,maj}$	$U_{2,min}$	$\Omega_{1,maj}$	$\Omega_{1,min}$	Ω_2
Section Capacity	0.6	1	1	1	1	1	1	1.034
Overall Capacity	0.85	1	1	1	1	1	1	1.034
LTB Capacity	0.85	1	1	1	1	1	1	1.034

Axial Force and Capacities

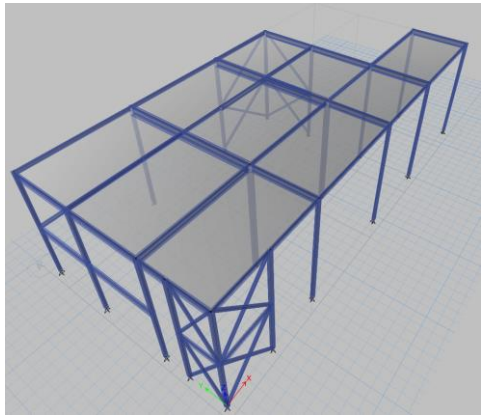
P_r Force (kip)	C_r Resistance (kip)	C_r (K = 1) (kip)	C_r (λ = 0) (kip)	T_r Resistance (kip)
0.82	737.717	854.903	923.4	923.4

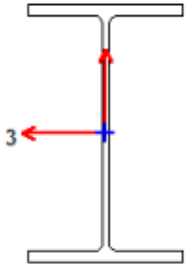
Axial Capacities for Different Conditions

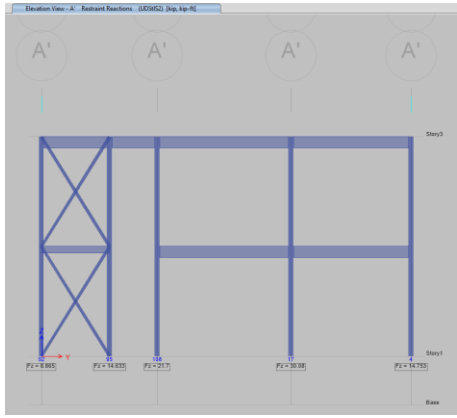
	n	K Factor	L Length (in)	KL/r	F_e (kip)	λ	F_{cr} / F_y	C_r (kip)
Major (3-3)	1.34	1	305.3719	38.97	188.466	0.437	0.926	854903.287
Minor (2-2)	1.34	1	160.2152	60.329	78.64	0.677	0.799	737717.309
Major (K=1)	1.34	1	305.3719	38.97	188.466	0.437	0.926	854903.287
Minor (K=1)	1.34	1	160.2152	60.329	78.64	0.677	0.799	737717.309
Torsional TF	1.34	1	160.2152	60.329	122.613	0.542	0.876	809178.775

ETABS Steel Frame Design

CSA S16-14 Steel Section Check (Strength Summary)







Element Details (Part 1 of 2)

Level	Element	Unique Name	Location (in)	Combo	Element Type	L (in)
Story3	B22	62	164.7152	UDStlS3	Type LD Concentrically Braced Frame (Tension-Only)	312.8719

Element Details (Part 2 of 2)

Section	Classification
W18X97	Class 1

Seismic Parameters (Part 1 of 2)

System R_d	System R_o	System Ie*Fa*Sa(0.2)	Slenderness Procedure	Ignore Seismic Code?
3	1.3	0.595	No	No

Seismic Parameters (Part 2 of 2)

Ignore Special Seismic Load?	Doubler Plate Plug Welded?
No	Yes

Design Code Parameters

ϕ_b	ϕ_c	ϕ_t	ϕ_v
0.9	0.9	0.9	0.9

Section Properties

A (in²)	I_{33} (in⁴)	r_{33} (in)	S_{33} (in³)	A_{v2} (in²)	Z_{33} (in³)
28.5	1750	7.836	188.17	19.31	211

J (in⁴)	I_{22} (in⁴)	r_{22} (in)	S_{22} (in³)	A_{v3} (in²)	Z_{22} (in³)	C_w (in⁶)
5.86	201	2.6557	36.22	9.95	55.3	15584.56