FRIEDMAN FAMILY VISITING PROFESIONALS PROGRAM

Visit to Polytechnique Montreal: March 10, 2025

This report summarizes the visit of **Mr. Rafael Sabelli** from Walter P. Moore that took place at the Polytechnique Montreal on March 10, 2025.

ITINERARY OR AGENDA

March 9	
TIME:	**ACTIVITY:**
6:30 PM	Student Chapter President, Kamrul Islam met Mr. Rafael Sabelli and welcomed him to Montreal.
7:00 PM – 9:00 PM	Rafael Sabelli had dinner with the Chapter President, Kamrul Islam and Professor Robert Tremblay at a local Greek restaurant close to the hotel at downtown Montreal.
March 10	
9:30 AM – 10:00 AM	Professor Robert Tremblay met Rafael Sabelli at his hotel and accompanied him to the Polytechnique Montreal campus.
10:00 AM – 10:30 AM	Student chapter members met Rafael Sabelli in front of Pavilion Lasonde Entrance. Student Chapter SDC director Jad Albasha showed Rafael Sabelli the Poly campus and other chapter members accompanied them.
10:30 PM – 11:00 AM	Student chapter members gathered in the GRS conference room and briefly talked about their ongoing research projects.
11:00 AM – 11:30 AM	Professor Robert Tremblay gave Rafael Sabelli a tour to the Structural laboratory.
11:45 AM – 1:15 PM	Guest lecture by Rafael Sabelli –over 40 people attended the lecture (in-person 31 and virtually 10). The lecture was attended by graduate students, faculty members, Alumni, and industry professionals. Location of Lecture : B-411 (Main Pavillion-Lecture Room) Session Chair: Professor Robert Tremblay MC: Ms. Imane Sebai, Secretary of the Student Chapter
1:15 PM – 2:30 PM	Lunch with faculty members, student chapter members, and selected industry professionals.
2:30 PM – 3:00 PM	Rafael Sabelli and Chapter President, Kamrul Islam met student Chapter Faculty Advisor, Professor Samuel Yniesta after lunch. Professor Samuel Yniesta gave Rafael Sabelli a tour of the Geotechnical laboratory.
3:00 PM – 5:00 PM	Graduate students' presentation to Rafael Sabelli Participants: 4 presentations (from CEISCE member organizations) Presentation by SDC Team (Undergraduate Students)
6:30 PM – 8:30 PM	Dinner with Rafael Sabelli, Professor Robert Tremblay, and student chapter members. Location: Restaurant Napoleon Bonaparte (Old Port, Montreal)

STUDENT CHAPTER VISIT PLANNING COMMITTEE

LEAD ORGANIZER(S): Kamrul Islam, President, kamrul.islam@polymtl.ca

- Morane Chloe, Vice President, morane-chloe.mefande-wack@polymtl.ca
- Imane Sebai, Secretary, imane.sebai@polymtl.ca
- Oudom Chhoeng, Outreach Affairs Director, oudom.chhoeng@polymtl.ca
- Lea Zheng, Publicity Affairs Director, lea.zheng@polymtl.ca
- Jad AlBasha, SDC Director, jad.albasha@polymtl.ca
- Josephine Prudhomme, Treasurer, josephine.prudhomme@polymtl.ca
- Ehsan Rowzeh, Lucas Poitevin, Maxence Nicq, Huanru Zhu (Graduate students)
- Professor Samuel Yniesta (Chapter Advisor)
- Professor Najib Bouaanani (Chapter Co-Advisor)
- Professor Robert Tremblay

VISITING PROFESSIONAL LECTURE OVERVIEW

The 2025 Friedman Family Visiting Professional (FFVP) lecture took place in the Lecture Room of Main Pavillion at the Ecole Polytechnique of Montreal. The title of the presentation was "Divide and Conquer: How a Multi-Billion-Dollar Challenge was Met through Careful and Creative Division into Manageable Components. The lecture was attended by graduate students, faculty members, CEISCE members, CISC members, and industry professionals. Several engineers from CISC, CIMA+, Lainco, and Hatch joined the event. Graduate students from the University of Alberta and the University of Calgary joined virtually. The participants thoroughly enjoyed Rafael Sabelli's presentation and positive feedbacks were received from the students about the work Mr. Sabelli presented. After the presentation, the audience had the opportunity to ask questions related to the presentation. The following pictures were taken during and after the lecture.

Figure 1(a): A picture of the lecture by Rafael Sabelli at Polytechnique Montréal.

Figure 1(b): A picture of the lecture by Rafael Sabeli at Polytechnique Montréal.

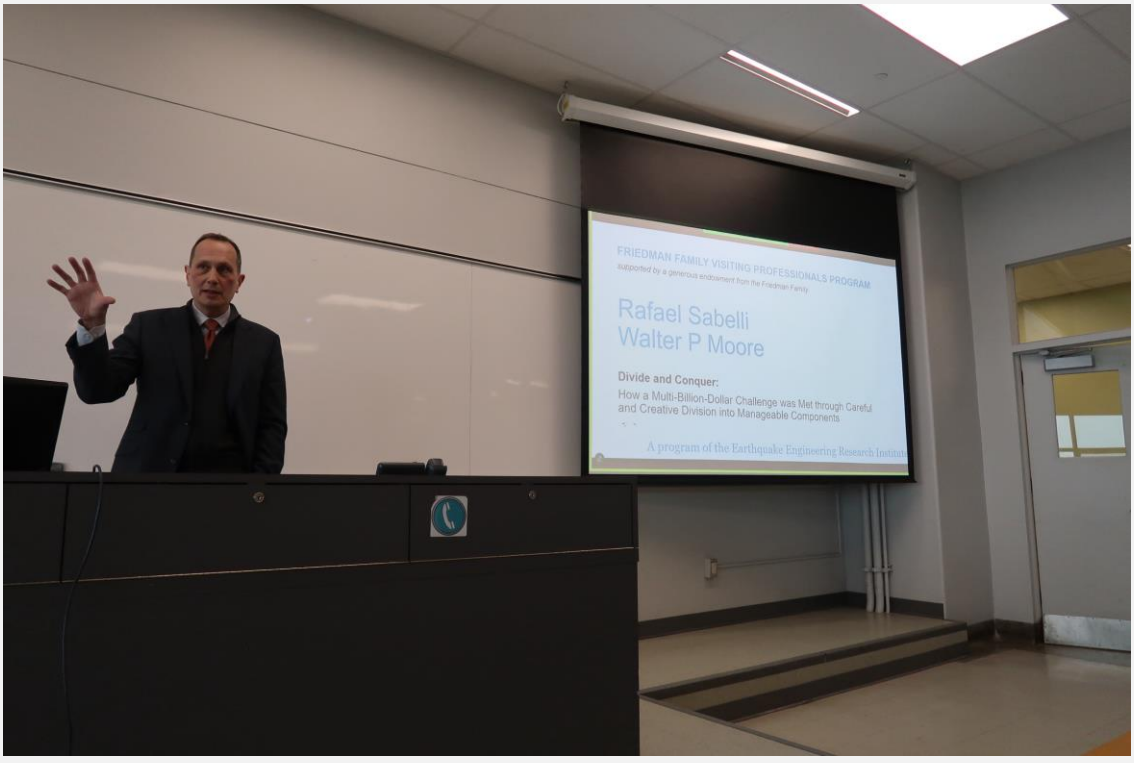

Figure 1(c): A picture of the lecture by Rafael Sabelli at Polytechnique Montréal.

Figure 2(a): A picture of guests during the lecture by Rafael Sabelli at Polytechnique Montréal.

Figure 2(b): A picture of guests during the Introduction session of Rafael Sabelli at Polytechnique Montréal.

Figure 3: A picture of the Q&A session between Mr. Rafael Sabelli and participants after his lecture at Polytechnique Montréal. Chapter Secretary, Imane Sebai moderated the Q&A session.

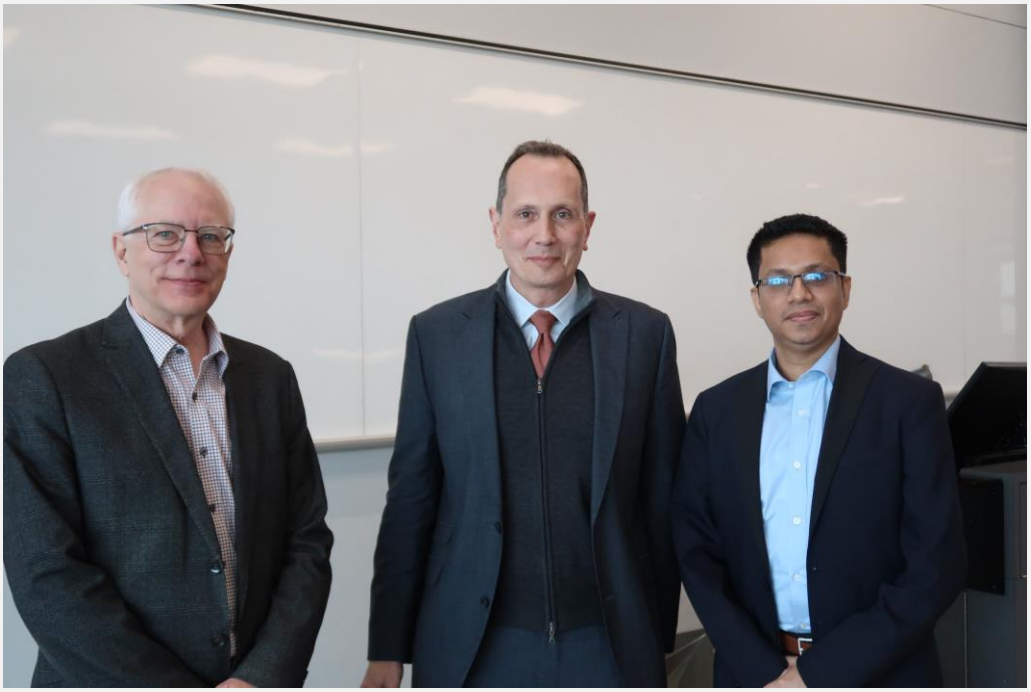

Figure 4: A picture with Mr. Rafael Sabelli after his EERI-FFVP presentation (From Left: Prof. Robert Tremblay, Rafael Sabelli, and Kamrul Islam)

Lecture Abstract

The state-of-the-art SoFi Stadium was showcased in Superbowl LVI in 2022, a fitting nod to several years of design and construction work. This project posed a tremendous structural and geotechnical challenge, including deep excavation, dramatic soil retention high seismicity, and long spans. To meet this challenge, the design team divided the project to create a small set of large, but manageable, component projects. The first carve-out was the 100-foot, 2.4M cubic yard open cut excavation and massive 265,000 square foot

mechanically stabilized earth retention system. This deep excavation was required in order to keep the overall building height below the clearance needed for aircraft approaching nearby Los Angeles International Airport. The independent retention system permitted structural design without retention forces. To further clarify the structural design, the roof structure was placed on columns separate from the stadium bowl structure. This project involved design and construction of multiple geotechnical and geostructural elements. In addition to the excavation and retention system, there were: approximately 700 continuous flight auger and cast-in-drilled-hole piles with diameters ranging from 24 in. to 72 in.; mat foundations, plinth columns, butterfly caps, and posttensioned grade strut and anchor blocks; and working platform stability for a 1,600 metric ton crane for roof erection. Complicating all design scenarios was a highly seismic environment, with the Newport-Inglewood Fault and Compton Blind-Thrust Fault nearby the stadium site. The underlying seismic complication to all geotechnical and structural designs was the need for the free-standing cable-net stadium roof to be completely isolated from the stadium structure and the MSE wall system, the base of which was founded nearly 120 ft below existing ground surface. This presentation will discuss in detail the specialty design and construction management of all of these systems, the difficulties in having four separate geotechnical consultants/designers on a project, the challenges of formulating an independent peer review panel and obtaining their review consensus on a complex series of designs, managing interaction between the City of Inglewood plan check process and the peer review panel, and constructing geotechnical and structural work separate from the rest of the stadium bowl, all on the critical path.

Professional Bio

Rafael Sabelli is a Senior Principal and Director of Seismic Design at Walter P Moore. Rafael has earned a Lifetime Achievement Award and a Special Achievement Award from AISC, as well as the T.R. Higgins Lectureship award. He is a member of the AISC Committee on Specifications, where he is vice-chair of the Technical Committee on the Seismic Provisions, and a member of the AISC Committee on Manuals, where he is chair of the Seismic Design Manual committee. He is a member of the ASCE 7 Main Committee and the Seismic Task Committee, and the NIST Building Seismic Safety Council's Provisions Update Committee. Rafael is co-author of Ductile Design of Steel Structures and has written extensively on the design and behavior of steel seismic systems. He has published technical papers on braced frames, connection design, and structural stability. He is the past President of the Structural Engineers Association of California. Rafael was Structural Engineer of Record of landmark projects including the award-winning San Francisco International Airport Air Traffic Control Tower and of the Los Angeles Rams Sofi Stadium.

SUPPLEMENTAL ACTIVITES

Polytechnique Montréal Campus Tour

The first activity on March 10th was the Polytechnique Montreal campus tour. Student Chapter SDC director, Jad Albasha led the tour. All the committee members were there during the campus tour. The following pictures were taken during the tour.

Figure 5(a): Chapter members welcomed Mr. Rafael Sabelli upon his arrival at the entrance of the Pavillons Pierre-Lassonde at Polytechnique Montréal.

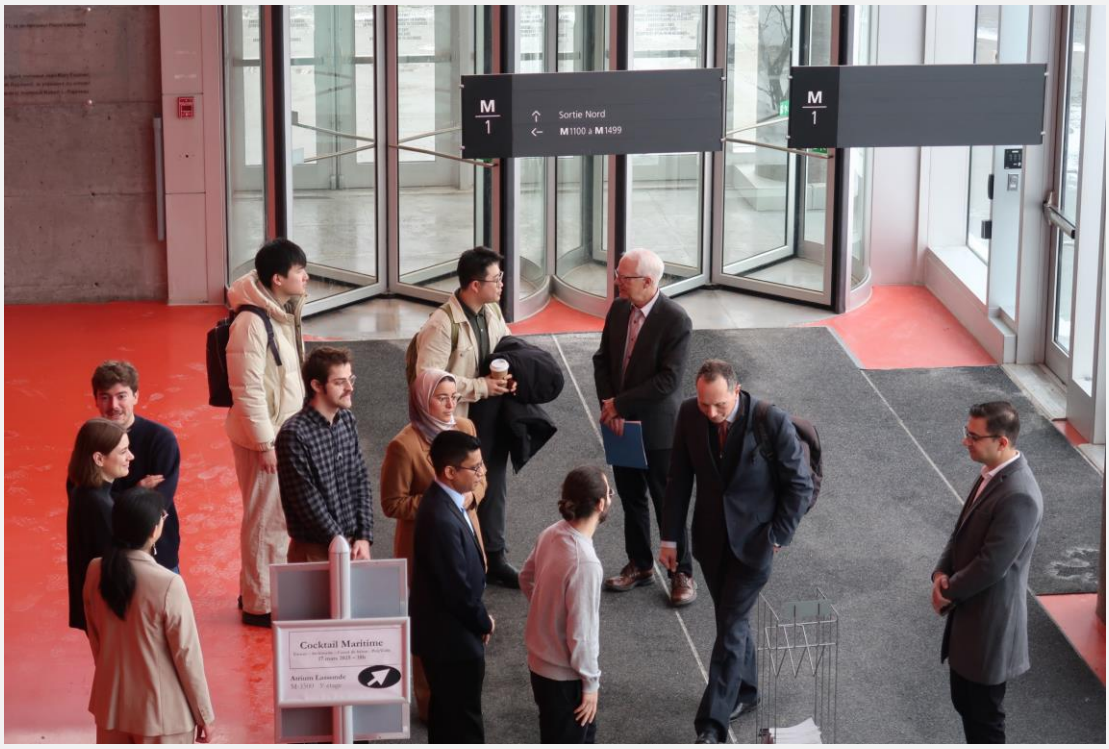

Figure 5(b): Chapter members welcomed Mr. Rafael Sabelli upon his arrival at the entrance of the Pavillons Pierre-Lassonde at Polytechnique Montréal.

Figure 6: Chapter President (Kamrul Islam) and SDC Director (Jad AlBasha) with Mr. Rafael Sabelli during the Polytechnique Montréal campus tour.

Figure 7: Chapter members with Mr. Rafael Sabelli during the Polytechnique Montréal campus tour.

Meeting with Student Chapter Adviser and Tour of the Geotechnical Lab

After the lunch, Mr. Rafael Sabelli and Student Chapter President, Kamrul Islam met the Chapter advisor, Professor Samuel Yniesta. Professor Yniesta took Mr. Rafael Sabelli for a quick tour of the Geotechnical lab. The following picture was taken during the Geotechnical lab tour.

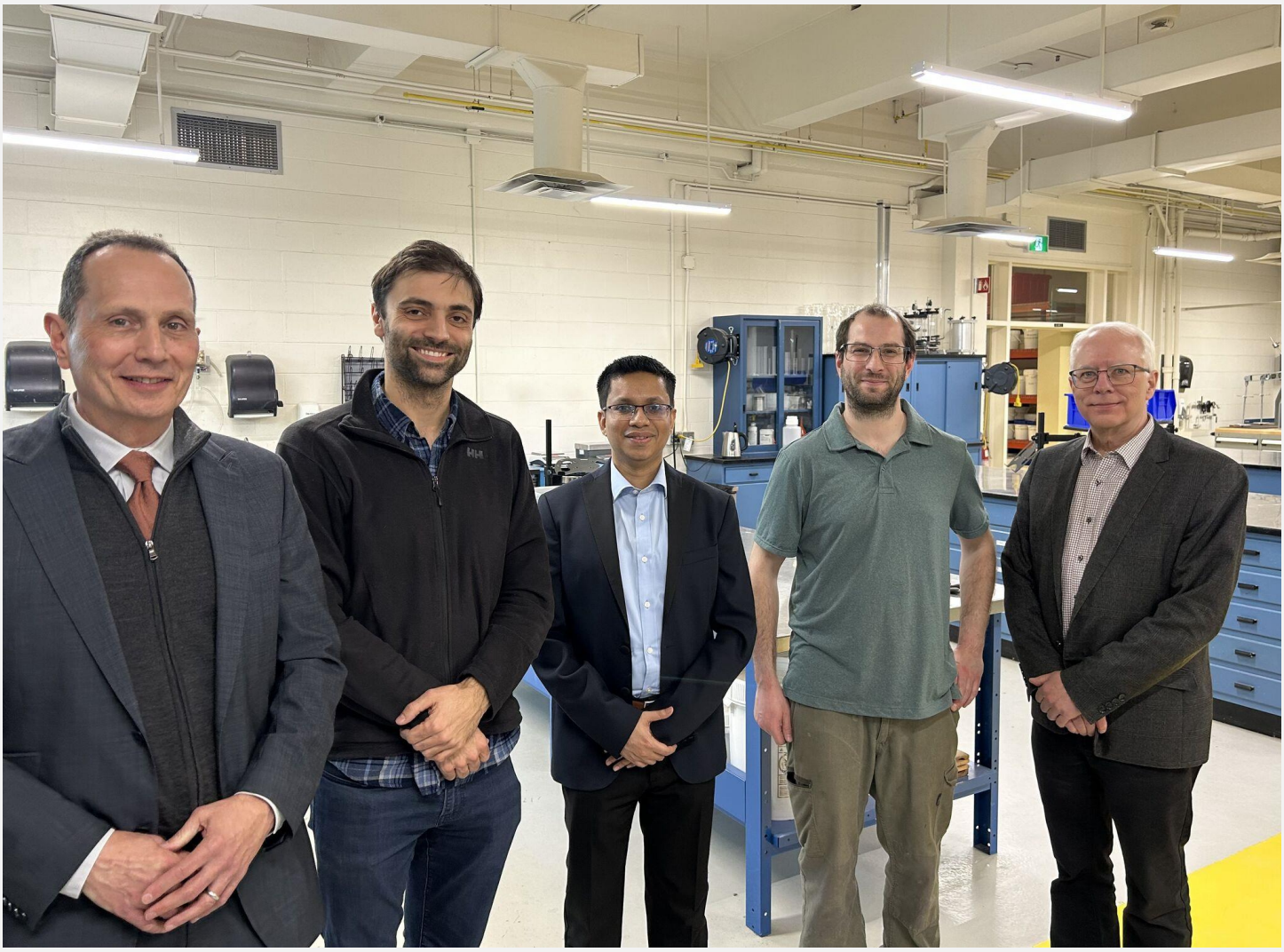

Figure 8: Picture taken at the end of the tour of the Geotechnical laboratory.
From left to right: Rafael Sabelli, Prof. Samuel Yniesta (Student Chapter Advisor), Kamrul Islam (Student Chapter President), Geotech Lab Manager, Prof. Robert Tremblay.

Welcome session for Mr. Rafael SAbelli at the GRS conference room of Polytechnique Montréal

After the Poltechnique Montreal campus tour, a welcome reception took place at the GRS conference room for Mr. Rafael Sabelli. Professor Robert Tremblay and Chapter members attended the welcome session. Light refreshments were served during the session. Each Chapter member briefly discussed their research projects with Mr. Rafael Sabelli.

Figure 9: Kamrul Islam (EERI Polytechnique Student Chapter President) discussing his PhD research project on Rocking Steel Columns to Mr. Rafael Sabelli .

Figure 10: Chapter members introducing CEISCE activities to Mr. Rafael Sabelli .

Tour of the Structural Testing Facilities at École Polytechnique Montréal

The Structural laboratory tour followed the reception session at GRS conference room. Polytechnique Montreal's Structural laboratory is one of the largest testing facilities in Eastern Canada. Professor Robert Tremblay led the lab tour. He showed Rafael Sabelli various testing devices, including Shake Table testing facility and MAST system. The following picture was taken during the lab tour.

Figure 11: Picture taken at the end of the tour of the Structural Testing Facilities.

Lunch Session

After the lecture, Mr. Rafael Sabelli and the EERI-Polytechnique Montreal Student Chapter members went for lunch. Professor Robert Tremblay, Professor Samuel Yniesta, and Professor Sanda Koboevic also joined for lunch. Selected CEISCE student committee members attended the lunch. Due to space limitations, only 25 people were invited for lunch. The participants got an opportunity to talk to Mr. Sabelli during lunch session.

Figure 12: A picture taken during lunch.

Graduate Students presentations

After lunch, selected graduate students presented their works to Mr. Rafael Sabelli. Student presentations covered a wide range of topics, including Mass timber rocking system, Timber-steel hybrid braced frames, steel fuse system, and effect of main shock-after shock seismic events on steel MRF systems. Each presenter gave a 18-minute talk, including Q&A. The following pictures show Mr. Huanru Zhu and Mr. Sayeed Amiri, presenting their research works to Mr. Rafael Sabelli.

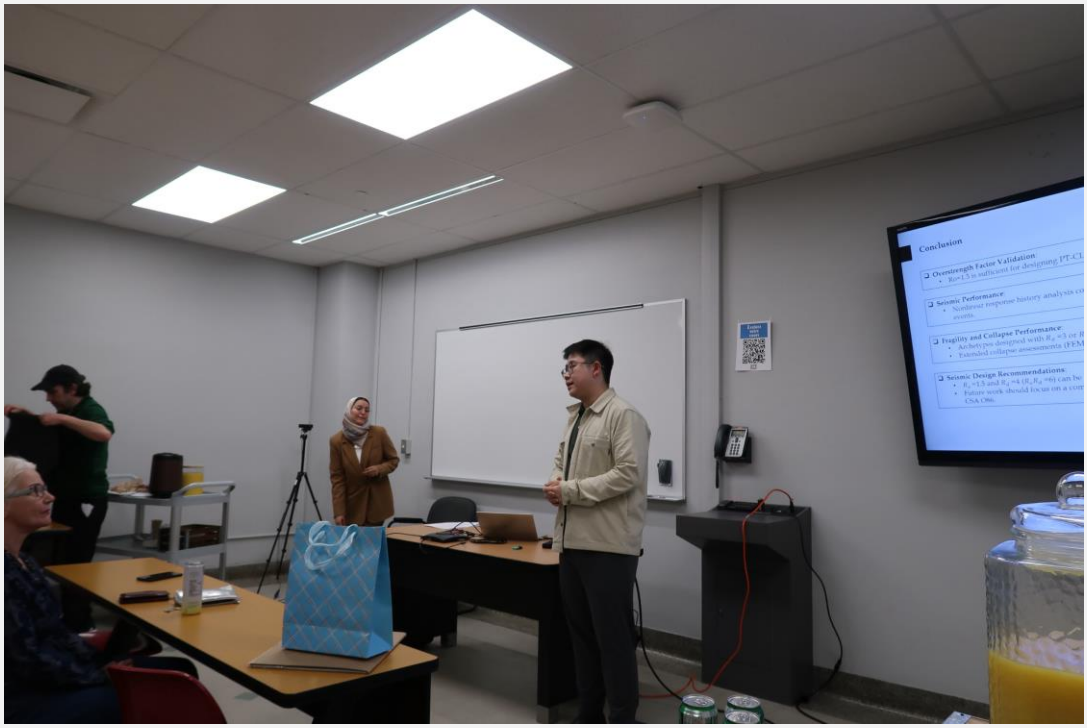

Figure 13(a): Graduate student Huanru Zhu presenting his research to Mr. Rafael Sabelli

Figure 13(b): Graduate student Huanru Zhu presenting his research to Mr. Rafael Sabelli

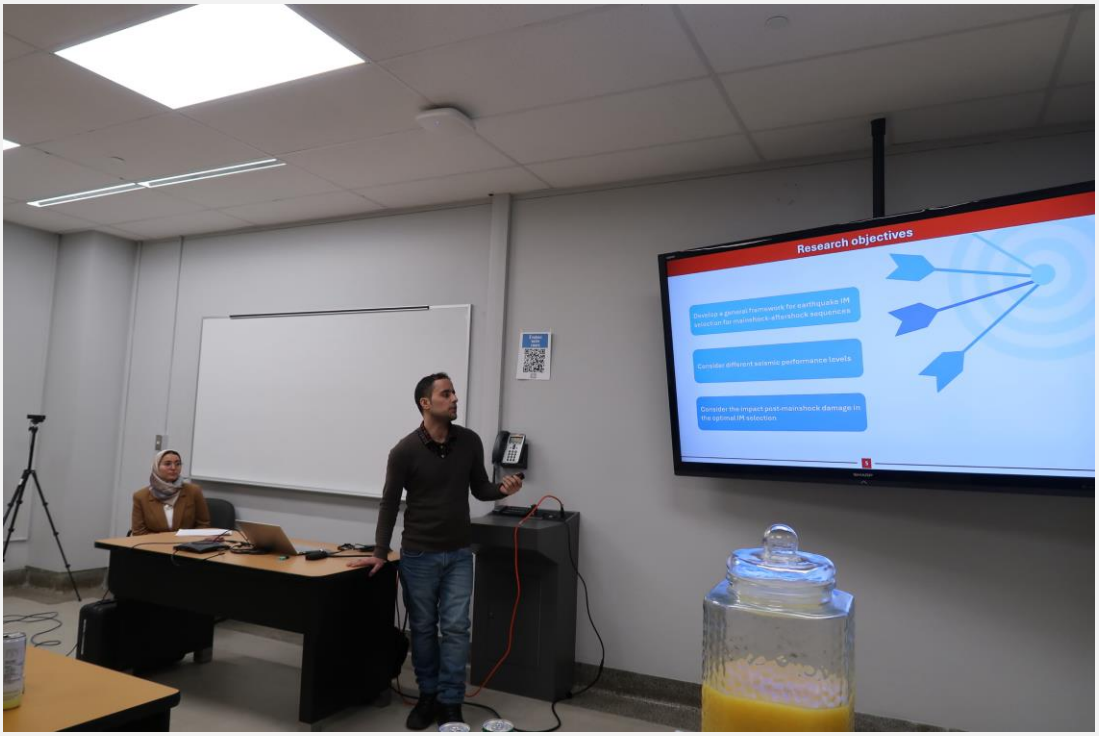

Figure 13 (c): Graduate student S. Amiri presenting his research to Mr. Rafael Sabelli

Figure 13(d): Group photos taken after the gradtuate students presentation with Mr. Rafael Sabelli

Formal Dinner Session

The day ends with a dinner at a French restaurant, 'Napoleon Bonaparte'. Professor Robert Tremblay and the executive committee members of EERI- Polytechnique Montreal student chapter joined the dinner. Committee members interacted with Rafael Sabelli during dinner. Professor Robert Tremblay talked about his ongoing research projects on seismic stability and future test plan.

Figure 14: Formal dinner involving Mr. Rafael Sabelli, Prof. Robert Tremblay, and available EERI-Polytechnique Montreal chapter executive committee members in a local French restaurant.

RESULTS, FEEDBACK AND LESSONS LEARNED

The lecture by Mr. Rafael Sabelli attracted a large audience from different universities within Quebec province, members of the Quebec Strategic Research Cluster (CEISCE), leading steel industry professionals, and members from the Canadian Institute of Steel Construction (CISC). Rafael Sabelli's lecture provided a great opportunity for the graduate students to learn more about the EERI's goal and mission. It will help attract more graduate students to join EERI and engage in student chapter's yearly activities. Selected graduate students presented their research projects to Mr. Rafael Sabelli and got feedback from him.

The visit took place during the undergraduate mid-term exam week. Next time, we will arrange the visit at the beginning of the Winter Semester (preferably either February or in the end of March) to increase the undergraduate student participation rate. This year, we had to plan the visit with other two student chapters which made the planning and coordination quite challenging. We had to organize the event with a short notice and we didn't get enough time to advertise the event. Next year, we will organize the FFVP program separately like we did in 2024 to plan properly and to attract a larger audience, especially undergraduate students.

ACKNOWLEDGEMENTS

The EERI Polytechnique Montreal Student Chapter gratefully acknowledges the support of the Friedman Family for sponsoring the travel of Mr. Rafael Sabelli through their Friedman Family Visiting Professional Program endowment. The Student Chapter is also grateful to the Department of Civil, Geological and Mining Engineering for the financial support to organize the event. Special thanks to Department Chair, Prof. Richard Simon and Claudia Tocco (Deputy Director of Administration, CGM) for their kind support throughout the process.

LIST OF ATTACHMENTS

A list of the attachments is included below:

- Item 1 (flier for event)

Centre d'études interuniversitaire des structures sous charges extrêmes

CEI SCE

POLYTECHNIQUE MONTRÉAL TECHNOLOGICAL UNIVERSITY

UNIVERSITÉ DE SHERBROOKE

McGill

Concordia UNIVERSITY

ÉTS

UNIVERSITÉ LAVAL

A strategic research cluster dedicated to the safety of civil engineering structures subjected to extreme effects induced by natural hazards, climate change and human activities

Earthquake Engineering Research Institute

EERI Friedman Family Visiting Professional Program

Divide and Conquer: How a Multi-Billion-Dollar Challenge was Met through Careful and Creative Division into Manageable Components

Speaker | Conférencier

Rafael Sabelli, S.E.

Senior Principal &

Director of Seismic Design

Walter P Moore

San Francisco, California

Date, Time | Heure

10 March, 2025, 11:45- 13:15

Room | Salle

B-411 (Pav. Main, Polytechnique Montréal)

Link | Lien

https://polymtl-ca.zoom.us/j/83247899462

EERI Friedman Family Visiting Professionals Program

Divide and Conquer: How a Multi-Billion-Dollar Challenge was Met through Careful and Creative Division into Manageable Components

Rafael Sabelli, S.E.
Senior Principal and Director of Seismic Design, Walter P Moore
San Francisco, California

Date: Monday, March 10, 2025
Time: 11:45- 13:15 (EST)
Room: B-411 (Main Pavillion, Polytechnique Montréal)
Zoom Link: https://polymtl-ca.zoom.us/j/83283646829
Moderator: Dr. Robert Tremblay

ABSTRACT

The state-of-the-art SoFi Stadium was showcased in Superbowl LVI in 2022, a fitting nod to several years of design and construction work. This project posed a tremendous structural and geotechnical challenge, including deep excavation, dramatic soil retention, high seismicity, and long spans. To meet this challenge, the design team divided the project to create a small set of large but manageable, component projects. The first carve-out was the 100-foot, 2.4M cubic yard open-cut excavation and massive 265,000 square foot mechanically stabilized earth retention system. This deep excavation was required in order to keep the overall building height below the clearance needed for aircraft approaching nearby Los Angeles International Airport. The independent retention system permitted structural design without retention forces. To further clarify the structural design, the roof structure was placed on columns separate from the stadium bowl structure. This project involved design and construction of multiple geotechnical and structural elements. In addition to the excavation and retention system, there were: approximately 700 continuous flight auger and cast-in-drilled-hole piles with diameters ranging from 24 in. to 72 in.; mat foundations, plinth columns, butterfly caps, and posttensioned grade strut and anchor blocks; and working platform stability for a 1,600 metric ton crane for roof erection. Complicating all design scenarios was a highly seismic environment, with the Newport-Inglewood Fault and Compton Blind-Thrust Fault nearby the stadium site. The underlying seismic complication to all geotechnical and structural designs was the need for the free-standing cable-net stadium roof to be completely isolated from the stadium structure and the MSE wall system, the base of which was found nearly 120 ft below the existing ground surface. This presentation will discuss in detail the specialty design and construction management of all of these systems, the difficulties in having four separate geotechnical consultants/designers on a project, the challenges of formulating an independent peer review panel and obtaining their review consensus on a complex series of designs, managing interaction between the City of Inglewood plan check process and the peer review panel, and constructing geotechnical and structural work separate from the rest of the stadium bowl, all on the critical path.

Sponsored by Earthquake Engineering Research Institute (EERI) and Department of Civil, Geological and Mining Engineering (CGM), Polytechnique Montréal

BIOGRAPHY

Rafael Sabelli is a Senior Principal and Director of Seismic Design at Walter P Moore. Rafael has earned a Lifetime Achievement Award and a Special Achievement Award from AISC, as well as the T.R. Higgins Lectureship Award. He is a member of the AISC Committee on Specifications, where he is vice-chair of the Technical Committee on the Seismic Provisions, and a member of the AISC Committee on Manuals, where he is chair of the Seismic Design Manual committee. He is a member of the ASCE 7 Main Committee and the Seismic Task Committee, and the NIST Building Seismic Safety Council's Provisions Update Committee. Rafael is co-author of Ductile Design of Steel Structures and has written extensively on the design and behavior of steel seismic systems. He has published technical papers on braced frames, connection design, and structural stability. He is the past President of the Structural Engineers Association of California. Rafael was Structural Engineer of Record of landmark projects, including the award-winning San Francisco International Airport Air Traffic Control Tower and of the Los Angeles Rams Sofi Stadium.