



ENGINEERING CONSULTING TRAINING

An ISO 21001:2018 Recognised Company

ADVANCED EXECUTIVE PROGRAM

High-Rise & Tall Structures

Revit Modeling, Tall Building Systems, Modal & Time History Analysis, PBSO and Wind Engineering as per IS Codes & ASCE 7-22

128

Contact Hours

15

Modules

5-6

Months

SOFTWARE COVERED

Revit

ETABS

SAFE

DIANA

PLAXIS

RWIND

IFC 4.3

AI + MCP



MSME
Registered Enterprise

4.8 ★★★★★
Google Rating

6+ Years in the
AEC Industry

PROGRAM OVERVIEW

About the Program

An advanced executive program for practising structural engineers who already design mid-rise buildings and want to move into high-rise and tall structures. It starts where standard PG courses stop, covering specialized Revit modeling, tall-building systems, modal and time history analysis, performance-based seismic design, dynamic wind engineering, critical element design and AI copilots with MCP servers, taught side by side under Indian Standards and ASCE 7-22.

Who it is for	Structural engineers with 2+ years of design experience, design consultants, project engineers and PG Structural Design graduates moving into tall-building work.
Prerequisites	RCC and steel design, IS 1893 fundamentals, working knowledge of ETABS. This is the advanced part only; basics are not repeated. Basic Revit familiarity is helpful but not required.
Course delivery	Online mode: live instructor-led classes, with recordings, assignments and a capstone project.
Class timing	7:00 PM or 8:00 PM IST, 3 days a week, between Monday and Friday.
Duration	128 contact hours, completed over about 5–6 months.
Content access	Lifetime access to course content on the StructureX e-learning portal and Drive.
Software	Revit, ETABS, SAFE, DIANA, PLAXIS and RWIND, with IFC 4.3 Open BIM workflows, AI copilots and MCP servers.
Codes & standards	IS 16700, IS 1893 (Part 1), IS 875 (Part 3), IS 13920, IS 456, IS 800, IS 11384, IS 2911; ASCE 7-22, ASCE 41-23, ASCE/SEI 49, ASCE Prestandard for PBWD; ISO 16739-1:2024 (IFC 4.3); references to LATBSDC, PEER TBI, ACI 318 and AISC 341.
Outcome	A complete tall-building design portfolio on one of the projects under consideration, with analysis models, PBSD evaluation and a Design Basis Report.

Program at a Glance

#	Module	Software	Hours
01	Specialized Modeling & Open BIM (Revit, IFC)	Revit · IFC 4.3	20
02	Tall Building Structural Systems	ETABS	8
03	Advanced Analysis & Modeling (ETABS)	ETABS	8
04	Modal Analysis	ETABS	6
05	Advanced Seismic Design (Response Spectrum)	ETABS	6
06	Time History Analysis (Linear & Nonlinear)	ETABS	10
07	Performance-Based Seismic Design (PBSD)	ETABS	8
08	Wind Engineering for Tall Buildings	ETABS · RWIND	10
09	Damping & Response Control Systems	ETABS	6
10	Advanced Component Design	ETABS · SAFE	12
11	Foundations for Tall Buildings	SAFE · DIANA · PLAXIS	8
12	IS vs. ASCE Comparative Design Workshop	ETABS	8
13	Serviceability, Documentation & Peer Review	ETABS · SAFE	6
14	AI Copilots & MCP Servers in Structural Engineering	AI copilots · MCP · ETABS API · Revit API	4
15	Capstone Project	Revit · ETABS · SAFE · DIANA · RWIND	8
Total			128

MODULE 01 · 20 HOURS

Specialized Modeling & Open BIM (Revit, IFC)

SOFTWARE Revit · IFC 4.3

BIM-first modeling of tall structures in Autodesk Revit: building the complete structural model of a tower, including complex systems such as diagrids, outriggers and transfer structures, and linking it to analysis and drawings.

Project setup for tall buildings

- Structural templates, levels and grids for 40+ storey towers
- Scope boxes, view templates and browser organisation
- Worksharing: central model, worksets and multi-user workflow

Modeling the tower

- Core walls with openings, coupling beams and wall sections changing by level
- Columns with varying sections, transfer girders and floating columns
- Flat slabs, PT slabs, podium and tower interface

Specialized systems

- Diagrid structures using slanted columns and adaptive components
- Outrigger and belt truss modeling with structural framing and truss families
- Mega-columns and parametric structural families

Analysis link, rebar & documentation

- Revit analytical model and its cleanup for analysis
- Revit-ETABS round-trip through CSIxRevit; IFC exchange
- 3D rebar in core wall boundary elements and coupling beams
- General arrangement drawings, sections, sheets and quantity schedules (BOQ)
- Interference (clash) checks with architecture and MEP models in Revit

Open BIM & IFC 4.3

- IFC 4.3 design and application: ISO 16739-1:2024 covers both buildings and infrastructure
- buildingSMART IFC 4.3.2.0 as the official release corresponding to ISO 16739-1:2024
- Interoperability limits: a tool may read an IFC file yet miss an entity or representation
- Acceptance testing on the exact software build and intended use before relying on an exchange
- AEC collaboration through Open BIM for structural design investigation
- Working across an integrated suite of BIM and CAD tools for the entire AEC lifecycle

Hands-on

- Model the G+47 Executive Tower with core and outrigger level, and the G+25 diagrid building, in Revit
- Build the diagrid with adaptive components and transfer the model to ETABS via CSIxRevit
- Produce a GA sheet set and quantity schedule
- Export to IFC 4.3 and run an acceptance check in the receiving software

Learning outcomes

- ✓ Model complex tall-building structural systems in Revit
- ✓ Move models reliably between Revit, ETABS and other tools through IFC 4.3
- ✓ Produce coordinated drawings and quantities from the BIM model

MODULE 02 · 8 HOURS

Tall Building Structural Systems

SOFTWARE ETABS

How height changes the governing design problem, and how to choose the lateral system that solves it efficiently. Each system is studied for load path, behaviour, efficiency and limitations, with case studies from the projects under consideration.

Tube systems

- Framed tube: closely spaced perimeter columns and deep spandrel beams
- Shear lag effect: why corner columns over-work and how it limits tube efficiency
- Tube-in-tube, braced tube and bundled tube systems

Diagrid systems

- Gravity and lateral load transfer through axial action of diagonals
- Optimal diagonal angle and module height for stiffness vs. material
- Node design, connection detailing and constructability

Outrigger & belt truss systems

- How outriggers engage perimeter columns to reduce core moment and drift
- Optimal location for single and multiple outrigger levels
- Belt trusses and virtual (indirect) outriggers
- Differential shortening between core and columns; delayed-connection strategies

Other systems & code basis

- Mega-frames and the buttressed core
- Transfer structures: transfer girders, transfer plates, floating columns
- IS 16700 requirements and system limits for tall buildings
- ASCE 7-22 seismic force-resisting systems, height limits and R , C_d , Ω_0 (Table 12.2-1)

Hands-on

- Model a framed tube, a diagrid and an outrigger tower of the same height in ETABS
- Compare drift, fundamental period and material quantity across the three systems

Learning outcomes

- ✓ Select an appropriate lateral system for a given height, use and architecture
- ✓ Explain shear lag, diagrid action and outrigger mechanics from first principles
- ✓ Justify system choice against IS 16700 and ASCE 7-22 limits

MODULE 03 · 8 HOURS

Advanced Analysis & Modeling (ETABS)

SOFTWARE ETABS

Modeling decisions that make or break a tall-building analysis, beyond default ETABS settings.

Topics

- Construction sequence (staged) analysis and its effect on gravity force distribution
- Column shortening: elastic, creep and shrinkage; differential axial shortening
- Cracked-section stiffness modifiers for walls, beams, slabs and columns
- Rigid vs. semi-rigid diaphragms; P-Delta effects
- Horizontal and vertical irregularities per IS 1893 and ASCE 7-22 (Tables 12.3-1, 12.3-2)
- Podium-tower interaction, expansion joints and modeling per ASCE 7-22 Section 12.7

Hands-on

- Construction sequence and column shortening study on the G+47 Executive Tower

Learning outcomes

- ✓ Build a defensible analysis model with documented assumptions
- ✓ Quantify differential shortening and its impact on slabs and outriggers

MODULE 04 · 6 HOURS

Modal Analysis

SOFTWARE ETABS

Understanding how a tall building vibrates: the foundation for response spectrum, time history and wind analysis.

Topics

- Eigen vectors vs. Ritz vectors, and when to use each
- Mass source definition per IS 1893 and ASCE 7-22 (effective seismic weight)
- Mass participation: 90% per IS 1893 vs. 100% (with residual mode) per ASCE 7-22
- Reading mode shapes: translational, torsional and coupled modes
- Torsional period ratio check per IS 16700
- Higher-mode effects in tall buildings
- Modal combination: SRSS vs. CQC; directional combination
- Empirical vs. analytical period, and base shear scaling (IS 1893 and ASCE 7-22 Section 12.9)

Hands-on

- Modal study of a 40-storey tower: interpret mode shapes and fix a torsion-dominated layout

Learning outcomes

- ✓ Interpret modal results and identify torsional sensitivity
- ✓ Apply correct mass source, mode count and scaling under both codes

MODULE 05 · 6 HOURS

Advanced Seismic Design (Response Spectrum)

SOFTWARE ETABS

Code-based seismic design of tall buildings under IS 1893 and ASCE 7-22, side by side.

Topics

- IS 1893 (Part 1) vs. ASCE 7-22 Chapters 11 and 12: design spectrum, site classes, Seismic Design Categories
- Modal response spectrum analysis and scaling (ASCE 7-22 Section 12.9)
- Site-specific response spectrum (ASCE 7-22 Chapter 21)
- Soil-structure interaction (ASCE 7-22 Chapter 19)
- Accidental torsion and torsional amplification
- Diaphragms, chords and collectors (ASCE 7-22 Section 12.10)

Hands-on

- Response spectrum analysis of the same tower under IS 1893 and ASCE 7-22

Learning outcomes

- ✓ Perform and scale response spectrum analysis under both codes
- ✓ Design diaphragms and collectors for tall-building force transfer

MODULE 06 · 10 HOURS

Time History Analysis (Linear & Nonlinear)

SOFTWARE ETABS

From linear time history to full nonlinear response history analysis: the core analytical skill for tall and important buildings.

Linear time history

- Modal time history vs. direct integration
- When linear time history adds value over response spectrum

Nonlinear time history (NLTHA)

- Fast Nonlinear Analysis (FNA) vs. direct integration (Newmark, HHT methods)
- Ground motion selection from the PEER NGA database
- Number of record pairs, period range, amplitude scaling vs. spectral matching (ASCE 7-22 Chapter 16)
- Damping for tall buildings: Rayleigh vs. modal damping
- Plastic hinges, fiber sections and nonlinear shear wall modeling

Interpreting results

- Storey drift, floor accelerations and residual drift
- Hysteresis loops and energy balance checks
- Acceptance criteria per ASCE 41-23, LATBSDC and PEER TBI

Hands-on

- Nonlinear time history analysis of a 40-storey core-wall tower in ETABS

Learning outcomes

- ✓ Select, scale and apply ground motions correctly
- ✓ Run and debug a nonlinear time history model
- ✓ Evaluate results against recognised acceptance criteria

MODULE 07 · 8 HOURS

Performance-Based Seismic Design (PBSD)

SOFTWARE ETABS

Designing to explicit performance targets rather than prescriptive limits, as practised on tall buildings worldwide.

Topics

- Performance objectives: Immediate Occupancy, Life Safety, Collapse Prevention
- Service-level and MCE-level evaluation
- ASCE 41-23 nonlinear modeling parameters and acceptance criteria
- Nonlinear response history procedure per ASCE 7-22 Chapter 16
- Pushover analysis and its limits for tall buildings
- LATBSDC and PEER TBI guidelines; deformation- vs. force-controlled actions

Hands-on

- Pushover and nonlinear PBSD evaluation of the capstone tower in ETABS

Learning outcomes

- ✓ Define performance objectives and acceptance criteria for a project
- ✓ Distinguish deformation- and force-controlled actions and design for each

MODULE 08 · 10 HOURS

Wind Engineering for Tall Buildings

SOFTWARE ETABS · RWIND

Above a certain height wind, not earthquake, governs. This module covers dynamic wind response and comfort.

Topics

- IS 875 (Part 3) vs. ASCE 7-22 Chapters 26–30: wind speeds, exposure, gust effect factor for flexible buildings
- Along-wind, across-wind and torsional responses; vortex shedding
- Wind tunnel procedure (ASCE 7-22 Chapter 31) and ASCE/SEI 49 testing standard
- Reading wind tunnel reports: HFFB and pressure studies
- ASCE Prestandard for Performance-Based Wind Design
- Occupant comfort: acceleration criteria and serviceability drift under wind

Digital wind tunnel (RWIND)

- CFD wind simulation of a tall building in RWIND: domain, mesh and wind profile setup
- Wind pressure coefficients and surface pressures on the facade
- Interference effects from surrounding buildings
- Exporting wind loads from RWIND to the structural model
- Comparing CFD results with IS 875 and ASCE 7-22 code values

Hands-on

- Dynamic wind analysis of a slender tower; across-wind and comfort checks
- Run a CFD wind simulation of the capstone tower in RWIND and apply the loads

Learning outcomes

- ✓ Compute dynamic wind effects under IS 875 and ASCE 7-22
- ✓ Interpret wind tunnel and CFD (RWIND) results and apply them to design

MODULE 09 · 6 HOURS

Damping & Response Control Systems

SOFTWARE ETABS

Supplemental devices that control motion where stiffness alone becomes uneconomical.

Topics

- Tuned mass dampers (TMD) and tuned liquid dampers
- Viscous, viscoelastic and friction dampers
- Damped structures per ASCE 7-22 Chapter 18
- Seismically isolated structures per ASCE 7-22 Chapter 17
- Effect of supplemental damping on drift, acceleration and member forces

Hands-on

- Add viscous dampers to a tower and compare response with and without them

Learning outcomes

- ✓ Select a response control strategy for a given problem
- ✓ Model dampers and quantify their benefit

MODULE 10 · 12 HOURS

Advanced Component Design

SOFTWARE ETABS · SAFE

Design and detailing of the critical elements that hold a tall building together.

Topics

- Shear walls with boundary elements (IS 13920) and ductile wall detailing
- Diagonally reinforced coupling beams
- Composite mega-columns and steel-concrete composite design (IS 11384)
- Composite shear wall design: steel-plate and steel-encased (SRC) walls, with AISC 341 provisions
- Outrigger connections and transfer girders designed for amplified forces using Ω_0 (ASCE 7-22 Section 12.3.3)
- Transfer plates and strut-and-tie basics
- Post-tensioned slabs and flat slab punching shear

Hands-on

- Design of a core wall, a coupling beam and an outrigger connection
- Design check of a composite shear wall

Learning outcomes

- ✓ Design and detail critical tall-building elements to code
- ✓ Apply overstrength and capacity design principles

MODULE 11 · 8 HOURS

Foundations for Tall Buildings

SOFTWARE SAFE · DIANA · PLAXIS

Foundation systems that carry very large loads with controlled settlement.

Topics

- Piled-raft foundations and design philosophy
- Pile design per IS 2911; settlement and differential settlement
- Foundation requirements per ASCE 7-22 Section 12.13
- Raft design in SAFE; introduction to PLAXIS interaction analysis
- 3D finite element analysis of pile and piled-raft foundations in DIANA
- Superstructure-foundation interaction

Hands-on

- Piled-raft design for the capstone tower in SAFE
- 3D FE model of the pile foundation in DIANA

Learning outcomes

- ✓ Select and design a foundation system for a tall building
- ✓ Estimate and control settlement

MODULE 12 · 8 HOURS

IS vs. ASCE Comparative Design Workshop

SOFTWARE ETABS

One tower, two codes. Participants see exactly where Indian and US practice differ, and why it matters.

Topics

- Same tower designed under IS 1893 / IS 875 and ASCE 7-22
- Comparison of base shear, drift limits, wind loads and load combinations
- When Indian projects use ASCE: international clients, peer reviews, Middle East projects
- Companion codes in US practice: ACI 318 and AISC 341 (overview)

Hands-on

- Side-by-side comparison report for the workshop tower

Learning outcomes

- ✓ Work confidently under both IS and ASCE frameworks
- ✓ Explain code differences to clients and reviewers

MODULE 13 · 6 HOURS

Serviceability, Documentation & Peer Review

SOFTWARE ETABS · SAFE

How tall-building designs are documented, reviewed and approved in practice.

Topics

- Drift limits per IS 1893 and ASCE 7-22 (Table 12.12-1)
- Floor vibration and long-term deflection
- Writing a Design Basis Report (DBR)
- Third-party and peer review process
- IS 16700 and ASCE 7-22 compliance checklists

Hands-on

- Prepare a DBR for the capstone tower

Learning outcomes

- ✓ Produce a complete, reviewer-ready Design Basis Report
- ✓ Run a structured compliance check

MODULE 14 · 4 HOURS

AI Copilots & MCP Servers in Structural Engineering

SOFTWARE AI copilots · MCP · ETABS API · Revit API

How AI assistants are entering structural design practice, and how the Model Context Protocol (MCP) lets them work directly with analysis and BIM software, under the engineer's control.

AI copilots in structural practice

- Where AI copilots help: model setup, load combinations, result extraction, code lookup and report drafting
- Limits and risks: hallucinated values, outdated code clauses and data confidentiality
- The engineer of record stays responsible: checking and signing off every AI output

Model Context Protocol (MCP)

- What MCP is: an open standard that connects AI assistants to external tools and data
- MCP clients, servers, tools and resources explained
- MCP servers built on the ETABS / SAP2000 API, OpenSTAAD and the Revit API
- Python scripting basics for structural software APIs

Automating tall-building workflows

- Generating grids, storeys and members from prompts
- Automated extraction of modal, drift and base shear results
- Verification discipline: independent hand checks and an audit trail of AI actions

Hands-on

- Connect an AI assistant to ETABS through an MCP server
- Generate a tower model, extract modal and drift results and verify them by hand checks

Learning outcomes

- ✓ Explain how MCP connects AI assistants to engineering software
- ✓ Use AI copilots to automate repetitive modeling and checking tasks
- ✓ Apply a verification process before relying on any AI-generated result

MODULE 15 · 8 HOURS

Capstone Project

SOFTWARE Revit · ETABS · SAFE · DIANA · RWIND

End-to-end design of one of the projects under consideration (G+25 to G+84), carried through every stage of the program and checked under both IS and ASCE. Delivered as a professional design portfolio.

Project stages

- Stage 1: Architectural brief, structural system selection and justification
- Stage 2: Revit BIM model, ETABS analysis model, construction sequence and column shortening study
- Stage 3: Modal and response spectrum analysis under IS 1893 and ASCE 7-22
- Stage 4: Dynamic wind analysis and occupant comfort checks
- Stage 5: Nonlinear time history and performance-based evaluation
- Stage 6: Design of core walls, coupling beams, outriggers and transfer elements
- Stage 7: Piled-raft foundation design
- Stage 8: Design Basis Report and final presentation to a review panel

Deliverables

- Revit BIM model with GA drawings and quantities
- ETABS, SAFE, DIANA and RWIND models
- Design calculations and drawings for key elements
- Design Basis Report
- IS vs. ASCE comparison summary
- Final presentation

LIVE PROJECTS

Projects Under Consideration

The program is taught on real-scale tall-building projects. Every step of the course is carried out on one of these projects, and once all steps are complete, every project is discussed with its complete analysis and design.

#	Project	Type	Focus in the course
01	G+43 Residential Tower	Residential	Core-wall and frame system; complete analysis and design workflow
02	G+47 Executive Tower	Commercial	Outrigger and belt truss system (case study)
03	G+35 Commercial & Residential	Mixed use	Podium-tower interaction and transfer structures
04	G+52 Multi-Tower	Residential	Multiple towers on a common podium; expansion joints and interaction
05	G+84 Worli Tower	Super tall	Case study: tall-building behaviour, wind and higher-mode effects
06	G+25 Diagrid Building	Commercial	Diagrid structural system
07	Tube Structure	Case study	Framed and bundled tube behaviour, shear lag

How the projects are used

- During the course, every step, from Revit modeling and ETABS analysis to wind, PBSD, element design and foundations, is followed on one of the projects above.
- Each participant takes one project through the complete workflow as their capstone.
- After all steps are done, every project is discussed in class with its complete analysis and design steps, so participants learn from all of them.
- Project names and data are used for training only.

Codes & Standards Reference

IS 16700	Criteria for structural safety of tall concrete buildings
IS 1893 (Part 1)	Criteria for earthquake resistant design of structures
IS 875 (Part 3)	Design loads: wind loads on buildings and structures
IS 13920	Ductile design and detailing of reinforced concrete structures
IS 456 / IS 800	Plain and reinforced concrete / general construction in steel
IS 11384	Composite construction in structural steel and concrete
IS 2911	Design and construction of pile foundations
ASCE 7-22	Minimum design loads and associated criteria for buildings and other structures
ASCE 41-23	Seismic evaluation and retrofit of existing buildings (nonlinear modeling and acceptance criteria)
ASCE/SEI 49	Wind tunnel testing for buildings and other structures
ASCE PBWD Prestandard	Prestandard for Performance-Based Wind Design
ISO 16739-1:2024	Industry Foundation Classes (IFC 4.3) for data sharing in construction: buildings and infrastructure
LATBSDC / PEER TBI	Alternative procedures and guidelines for performance-based seismic design of tall buildings

CERTIFICATION

Your Certificate

On completing the program, every participant receives a StructureX certificate that recognises advanced, industry-level capability in high-rise and tall structure design.



Sample certificate for illustration. Each certificate carries a unique ID, verifiable at [structurex.live/verify](https://www.structurex.live/verify/).

Certificate criteria

- Attendance in live sessions or completion of recorded sessions
- Submission of module assignments
- Completion and review of the capstone design project

Why it matters

- Issued by an ISO 21001:2018 recognised, MSME registered training company
- Demonstrates hands-on skill in Revit, ETABS, SAFE and DIANA on a real tall-building project
- Shareable on LinkedIn and with employers alongside your capstone portfolio

ADMISSIONS

Admission Process & Fee Structure

A simple six-step admission process. Seats are limited per batch to keep live sessions interactive.

- 01** **Free counselling**
Speak with a program advisor by phone or WhatsApp to discuss your background, goals and fit for the program.
- 02** **Eligibility check**
Share your profile or resume. The program suits civil and structural engineers with design experience.
- 03** **Application**
Complete the enrollment form to reserve your seat in the upcoming batch.
- 04** **Fee payment**
Pay securely online by UPI, card or net banking. A GST invoice is issued on payment.
- 05** **Onboarding**
Receive LMS access on academy.structurex.live, software setup guidance and the batch schedule.
- 06** **Batch starts**
Join live evening classes (7 or 8 PM IST, 3 days a week, Mon–Fri) with recordings and mentor support from day one.

Fee Structure

Component	Amount
Program fee (excluding GST)	₹55,085
GST @ 18%	₹9,915
Total program fee (inclusive of 18% GST)	₹65,000/-

GST component calculated on the inclusive fee of ₹65,000 and rounded to the nearest rupee.

What the fee includes

- 128 hours of live instructor-led sessions with full recordings
- Lifetime access to course content on the e-learning portal and Drive
- Study material, code references and model files for every module
- Assignments, capstone project review and mentor doubt support
- Course completion certificate from StructureX (ISO 21001:2018 recognised, MSME registered)

For batch dates and instalment options, please contact the admissions team.

ABOUT STRUCTUREX

India's Academy for AEC Professionals

StructureX trains civil, structural and infrastructure engineers on the tools, codes and workflows used on real projects, through live e-classroom programs taught by practising engineers.

1000+

Professionals trained

4.8

Google rating

6+

Years in the AEC industry

40%

Multinational learners

Recognition

- ISO 21001:2018 recognised company
- MSME registered enterprise

Other PG programs at StructureX

RCC & Steel Design	High Rise & Tall Structure · RCC Structure & BIM Technology · Steel Structure & BIM Technology
Road & Bridge Design	Bridge Design & BrIM Technology · Highway & Infrastructure · Highway Engineering & BIM Management
BIM & Management	Project Management & BIM Civil · BIM Management · BIM Civil Advance · BIM MEPF Advance

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Ready to design tall buildings?

Book a free counselling call and reserve your seat in the next batch.