MCP SERVER | NO CODE | CLOUD HOSTED

Foundation Load Calculator MCP for AI Agents

Structural Analysis and Geotechnical Foundation Calculations

Foundation Load Calculator automatically calculates total structural loads for foundation beams and columns. This MCP determines the vertical forces—including permanent, variable, and self-weight components—acting on critical support structures in preliminary geotechnical analysis.

A+ Quality Score 100/100

structural-engineering | foundation-design | load-calculation | geotechnical | civil-engineering

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vinkius.com/mcp/foundation-load-calculator

SCAN TO VIEW

The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

> *The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.*
>
> — Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

```
https://edge.vinkius.com/{token}/mcp
```

Claude · Cursor · VS Code · Windsurf · Grok · Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1) Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

> Get started at **cloud.vinkius.com** — connect your AI agent in under 60 seconds.

Foundation Load Calculator MCP

3 tools available
Cloud-hosted on Vinkius

When starting a new construction project, you need to know exactly what load your foundations must bear. Manually calculating axial forces for every column or determining distributed loads along foundation beams is time-consuming and prone to math errors. This MCP takes that burden off your desk.

It provides specialized tools to analyze the vertical forces acting on your structure. You can determine the total force at a column base, calculate the linear load spread across foundation beams, and get a comprehensive summary of structural loads per unit area for the entire project profile. Instead of juggling multiple spreadsheets and referencing outdated codes, you feed the data into your AI client, and it handles the complex physics calculations instantly. By connecting this MCP through Vinkius, you give your agent immediate access to industry-specific engineering tools, letting you move from raw site data straight to actionable structural reports.

Core Capabilities

01 — Determine total axial force on a column base

Calculates the full vertical load for any specified column, factoring in permanent loads, variable forces, and the structure's own weight.

02 — Calculate distributed load along foundation beams

Finds the linear load acting on a beam by considering spacing and how many floors are above it.

03 — Generate aggregated structural load summary

Provides a high-level, unit area breakdown of all structural loads for your entire project profile.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/foundation-load-calculator** — connect your AI agent in three steps.

01 Specify the parameters needed for analysis: input permanent loads, variable loads, self-weight components, and dimensions (e.g., tributary area or beam spacing).

02 Your AI client invokes the necessary calculations—like determining column axial load or beam linear load—using this MCP's specialized functions.

03 The system returns a complete, aggregated structural load summary that pinpoints all forces per unit area for your project.

The bottom line is, you provide the physical parameters of the building, and we calculate the precise loads those foundations must support.

Built For

Civil and structural engineers who spend their days reviewing blueprints and calculating forces need this. If your job involves preliminary geotechnical analysis or sizing deep foundations, this MCP cuts down weeks of manual calculation into minutes.

Structural Engineer

Uses the MCP to calculate axial loads for columns and beams based on initial design parameters before starting a full structural model.

Civil Engineering Consultant

Runs load summaries across multiple project phases or different building sections to ensure compliance with local codes.

Construction Project Manager

Verifies preliminary structural calculations provided by junior engineers, quickly checking if the estimated loads match the site requirements.

What Changes When You Connect

01 Pinpoint critical forces instantly. Instead of guessing, you use calculate_column_axial_load to get the precise total vertical force on any column base.

02 Analyze beams faster than ever. Use calculate_beam_linear_load to quickly find the distributed load along foundation beams based on spacing and floor count.

03 See the big picture with one call. The get_structural_load_summary tool gives you an aggregated breakdown of all structural loads per unit area for your whole project profile.

04 Cut down calculation time drastically. Your agent handles complex load component breakdowns (permanent, variable, self-weight) that used to take hours in Excel.

05 Increase accuracy on site reports. By verifying preliminary geotechnical analysis with the Foundation Load Calculator, you reduce the risk of costly foundation failure.

Real-World Applications

Checking a new building's core supports

A structural engineer needs to know if the main utility column can handle the total load from 5 floors. They ask their agent, and it uses calculate_column_axial_load to return the exact force needed for preliminary reports.

Designing a long-span foundation beam

A consultant is designing a continuous beam across an open area. They use calculate_beam_linear_load, providing spacing and floor count, and get back the precise distributed load needed for material ordering.

Finalizing the initial site report

A project manager needs a single summary of all expected loads across a 4-story building. They prompt their agent to use get_structural_load_summary, which instantly generates a load breakdown per square meter.

Patterns to Avoid

Mixing up column and beam calculations

✗ AVOID

A user tries to calculate the distributed load on a beam using the axial load tool, or vice versa. This leads to inaccurate structural sizing and potential project delays.

✓ INSTEAD

For total vertical force at the base, use calculate_column_axial_load. For spread-out loads along a foundation element, always use calculate_beam_linear_load.

Ignoring load components

✗ AVOID

A novice engineer only calculates permanent loads and forgets to include variable or self-weight forces, leading to an unsafe undersized foundation.

✓ INSTEAD

Use the full capability of calculate_column_axial_load; it requires you to factor in all necessary components (permanent, variable, self-weight) automatically.

Using calculations piecemeal

✗ AVOID

Running three separate reports for a single project—one for columns, one for beams, and one summary. This is inefficient and hard to reconcile.

✓ INSTEAD

Start by getting the overview using get_structural_load_summary. This provides an immediate, aggregated picture of all loads across the site.

The Right Fit

Use this MCP if your primary need is preliminary geotechnical analysis or confirming structural feasibility based on calculated forces. You need to know the precise axial force at a column base (use calculate_column_axial_load) or the distributed load along a beam (use calculate_beam_linear_load). If you are designing for dynamic, time-varying loads—like seismic event simulations—or complex material stresses beyond basic compression and tension, this MCP might not be enough. In those cases, look into specialized Finite Element Analysis (FEA) software or advanced structural modeling tools instead.

Foundation Load Calculator for Preliminary Geotechnical Analysis

Before drawing the first line on a blueprint, engineers spend days and nights in front of spreadsheets. They manually input site dimensions, permanent loads, and variable forces, then calculate column axial forces and beam linear loads to see if the structure is feasible. It's painstaking work that requires constant cross-referencing against building codes.

With this MCP, you simply tell your agent what kind of load you have—permanent, variable, or self-weight—and for which element (column or beam). The tool handles all the complex calculations in seconds. You get immediate feedback on structural viability, letting you move straight into detailed design work.

Foundation Load Calculator for Comprehensive Structural Reporting

Traditionally, compiling a full load report meant running several separate calculations: one for the column summary, another for beam spacing, and then manually compiling an 'Overall Load' section. This process was messy, required multiple file saves, and often contained discrepancies.

Now, you ask your agent to get_structural_load_summary. It instantly aggregates all data points into a single, clear report showing the total load per unit area for the entire project profile. The final output is one clean summary ready for client review.

3 Tools for Foundation Load Calculation and Geotechnical Engineering

Use these specific tools to analyze column axial loads, beam linear loads, and generate comprehensive structural summaries for your projects.

#	TOOL	DESCRIPTION
01	`calculate_beam_linear_load`	Calculates the total distributed load acting along a foundation beam.
02	`calculate_column_axial_load`	Determines the complete vertical force applied to a column's base, including all components of weight and usage.
03	`get_structural_load_summary`	Provides an overview summary of structural loads across the entire project area.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U What's the combined structural load on the main corner column?

Structural Load Report: Column C-1

COMPONENT	CALCULATED FORCE (KN)
Permanent Load	35.0
Variable Load	18.0
Self-Weight	7.0
Total Axial Load	**60.0 kN**

The column can support a total vertical force of 60.0 kN at the base.

U Calculate the load for the main foundation beam running through the center.

Foundation Beam Analysis

- **Beam Identifier:** B-main-01
- **Spacing/Floors:** 2m spacing, 5 floors.
- **Distributed Linear Load: 32.5 kN/m**

The foundation beam requires a distributed load capacity of 32.5 kilonewtons per meter.

U Give me the overall structural summary for this four-story building design.

Project Load Summary (Per Unit Area)

- **Total Permanent Load:** 6.0 kN/m²
- **Total Variable Load:** 3.0 kN/m²
- **Total Self-Weight:** 6.0 kN/m²

Maximum Calculated Stress: The summary is complete.*

Frequently Asked Questions

01 **How is the column axial load calculated?**

The `calculate_column_axial_load` tool sums the permanent load, variable load, and the accumulated self-weight (self-weight per floor multiplied by the number of floors), all scaled by the provided tributary area.

02 **What does the beam linear load represent?**

The `calculate_beam_linear_load` tool calculates the distributed weight (kN/m) acting along a foundation beam by combining permanent and variable loads from the slab area with the beam's own self-weight, multiplied by the number of floors.

03 **Can I get a summary of all load types?**

Yes, use the `get_structural_load_summary` tool to receive an aggregated breakdown of total permanent, variable, and self-weight loads per unit area for your entire building footprint.

Go Live in 60 Seconds

Get your connection token from **cloud.vinkius.com**, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add `"foundation-load-calculator": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → Add endpoint URL
ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

- Ask ChatGPT
- Ask Claude
- Ask Perplexity
- Ask Gemini
- Ask Grok

READY TO CONNECT

Foundation Load Calculator is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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