

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Backfill Strength Requirements MCP

Get precise geotechnical calculations for mine stability.

Backfill Strength Requirements MCP provides the engineering math needed to manage mine backfill. Your AI client uses this to determine required Uniaxial Compressive Strength (UCS), cement binder amounts, and curing schedules based on stope dimensions and overburden pressure.

mining

backfill

ucs

engineering

geotechnical



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.

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.

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.

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

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

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.

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.

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.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot 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.

FinOps

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

Firewall & DLP

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

Agent Activity

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

Tool Health

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

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.

Backfill Strength Requirements MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of backfill design. Instead of manually running formulas for every stope, you give your agent the dimensions and pressure data, and it handles the math. It calculates the target UCS needed to maintain structural integrity and tells you exactly how much binder you need to hit that strength. You can also predict curing windows so you know when a stope is safe to work around. It's a direct way to validate that your backfill design actually meets the safety requirements for the specific stope you're working on.

Core Capabilities

01 — Strength Calculation

Your agent calculates the necessary UCS based on overburden and stope geometry.

02 — Binder Estimation

The AI determines the cement content required for specific strength targets.

03 — Curing Predictions

Your client estimates the time needed for backfill to reach design strength.

04 — Stability Validation

The agent verifies if a backfill design meets the safety needs of a stope.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/backfill-strength-requirements — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Provide the stope dimensions and environmental data to your agent.
- 03 The agent calls the necessary tools to run the math.
- 04 Receive the calculated UCS, binder content, or curing time directly in your chat.

Connect your AI client to Vinkius to start running engineering calculations immediately.

Built For

This MCP is built for geotechnical and mining engineers who need to run repetitive strength and binder calculations.

Geotechnical Engineer

Hands off stope dimensions and pressure data to the agent for rapid UCS calculation.

Mining Engineer

Uses the tool to verify that backfill designs meet operational safety standards.

Mine Planner

Asks the agent for curing time estimates to schedule upcoming mining activities.

What Changes When You Connect

- 01 Reduces manual calculation errors in UCS and binder math.
- 02 Speeds up the stope design and validation process.
- 03 Provides predictable curing timelines for better scheduling.

Real-World Applications

Stope Design

Calculate the required UCS for a new stope based on its width, height, and overburden.

Material Planning

Determine the exact cement percentage needed for a specific binder type and strength goal.

Safety Verification

Confirm that a proposed backfill mix is strong enough for a specific stope's environment.

Operational Scheduling

Estimate how long a stope must sit before the backfill is strong enough for next steps.

Patterns to Avoid

Guessing binder amounts

❌ AVOID

You decide on a cement percentage based on gut feeling or old notes without checking the current stope geometry.

✓ INSTEAD

Input your specific dimensions and pressure data into ``determine_binder_requirements`` to get the exact amount needed.

Ignoring curing delays

❌ AVOID

You schedule heavy equipment to move into a stope immediately after pouring, assuming it's ready.

✓ INSTEAD

Use ``estimate_curing_duration`` to find out exactly how many days you need to wait before the backfill hits design strength.

Skipping stability checks

❌ AVOID

You assume a standard mix will work for every stope regardless of the overburden pressure.

✓ INSTEAD

Run ``validate_stope_stability`` to confirm your current plan actually meets the safety needs of that specific environment.

The Right Fit

Geotechnical and mining engineers should connect this MCP if they are tired of manual UCS and binder math. If your team relies solely on static, pre-calculated tables that don't account for changing stope geometry, you don't need this. The deciding factor is whether you need real-time validation for specific stope dimensions and pressure data.

Backfill Strength Requirements 4 Tools

These tools handle the math for UCS targets, binder amounts, curing times, and stope stability.

#	TOOL	DESCRIPTION
01	calculate_target_ucs	This tool finds the required Uniaxial Compressive Strength (UCS) based on the specific physical environment of the mine.
02	determine_binder_requirements	Use this to calculate the exact amount of cement needed to reach your target strength.
03	estimate_curing_duration	This tool predicts how many days of curing are necessary before the backfill hits its design strength.
04	validate_stope_stability	This tool checks if your current strength and binder plan is enough to keep a specific stope stable.

See It in Action

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

U What is the required UCS for a stope 10m wide, 20m high, with 500kPa overburden and a 1.5 safety factor?



The required Uniaxial Compressive Strength (UCS) is 1250 kPa.

U How much cement is needed for a target UCS of 2000 kPa using portland_cement with 15% water content?



The required cement content is 12.5% of the total dry mass.

U How many days will it take for portland_cement to reach 1500 kPa at 25 degrees Celsius?



It will take 7 days to reach the target strength.

Frequently Asked Questions

01 What can this MCP calculate for mine backfill?

It calculates required Uniaxial Compressive Strength (UCS), necessary cement binder content, and estimated curing durations.

02 How do I use this with Claude or Cursor?

You connect your client to Vinkius once, and the tools become available as functions your agent can call during your conversation.

03 Can I verify if my current design is safe?

Yes, you can use the `validate_stope_stability` tool to check if your strength and binder levels are sufficient for a specific stope.

04 Does it handle different types of cement?

The tools allow you to specify binder types, such as `portland_cement`, to get accurate binder and curing results.

05 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you, so it is ready to use as soon as you connect.

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 <code>"backfill-strength-requirements": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → 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

Backfill Strength Requirements 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

INDEPENDENT PLATFORM DISCLAIMER

Vinkius is an independent platform and is not affiliated with, endorsed by, sponsored by, verified by, or otherwise authorized by Backfill Strength Requirements. All third-party trademarks, logos, and brand names are the property of their respective owners. Their use in this document is strictly for informational purposes to identify service compatibility and interoperability.

DOCUMENT INFORMATION

Generated	September 2026
MCP Server	Backfill Strength Requirements MCP
Server ID	01a0823c-9192-71e1-8e0f-caab5ea50f38
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

LICENSE & USAGE

This document is generated automatically by the Vinkius PDF Engine. Content reflects the MCP server configuration at the time of generation and may change as updates are deployed. For the most current information, visit vinkius.com/en/ai-agent-connect/backfill-strength-requirements.