BITAL

DATA PRESCIENCE FOR DISASTER PREVENTION



AI that finds slope failure risk from imagery alone

Start with a tablet, scale with drones, collaborate on one 3D

Smart Face Mapping | Construction | Maintenance

dpre disaster prevention

Ground hidden from view, data captured but never built up

Visual inspection | Drone capture | Manual rock survey



Visual inspection

Ground surface hidden by vegetation



Drone capture

Ends at file delivery; surveys hard to compare over time

Start with a tablet, scale with drones, collaborate on the same 3D

Contractor | Maintenance agency | Client



During construction

01 Smart Face Mapping
02 Construction

Rock survey of excavated faces, stage-by-stage stability checks on drone 3D



After completion

03 Maintenance

Change detection against the 3D baseline built during construction



If a failure occurs

Accumulated 3D data

Basis for cause review and repair & reinforcement design

3 site images: AI-generated for illustration

One 3D dataset **One view shared by contractor, maintenance agency and client**

Photos from many angles, turned into a 3D rock face

Capture | 3D reconstruction | Joint analysis | Face mapping · inspection map

01 Capture

Overlapping shots from multiple angles



AR true scale, GPS and compass recorded together (Android app)

02 3D reconstruction



AI 1 Multiple photos into 3D

AI-generated 3D model from multi-angle photos



Conventional method

Clinometer survey

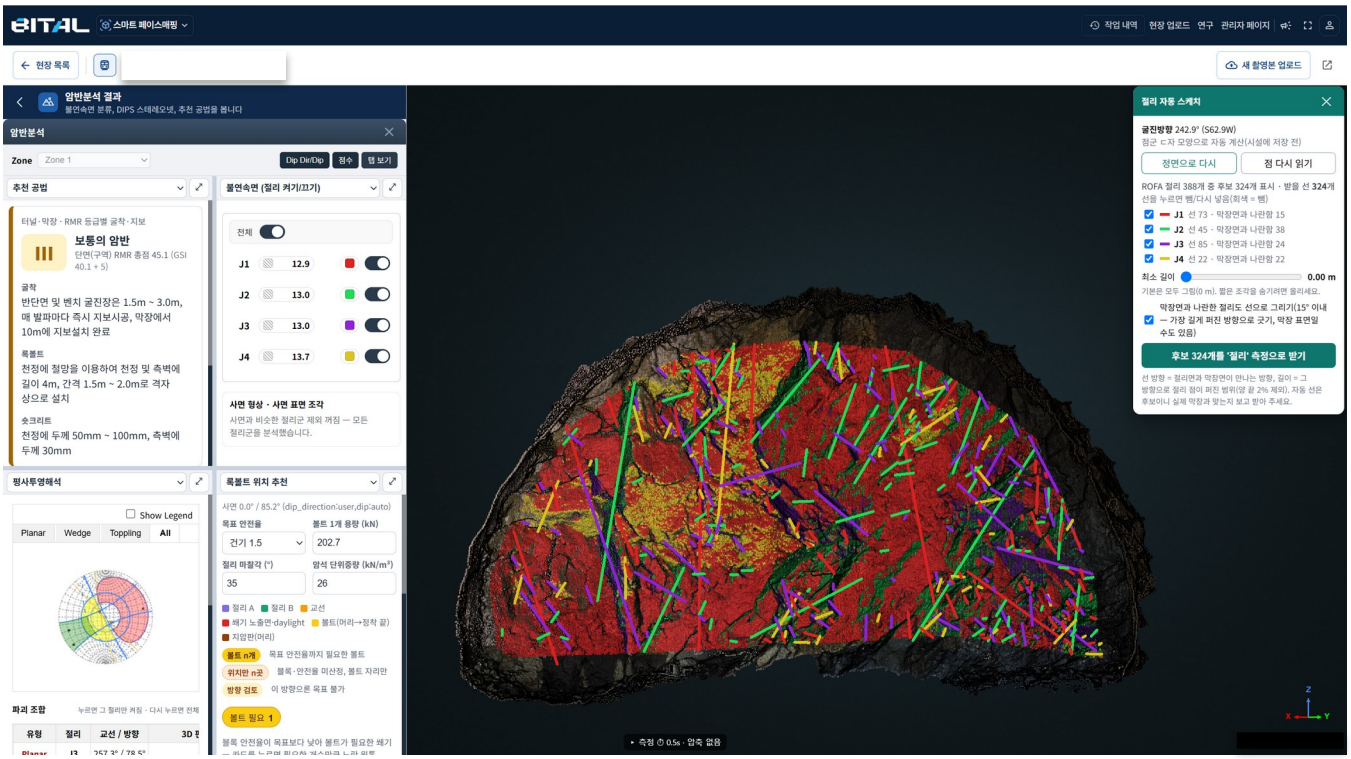
Face-by-face, up on the rock

From expert on-face survey to a junior engineer's photos

Conventional-method photo: AI-generated for illustration

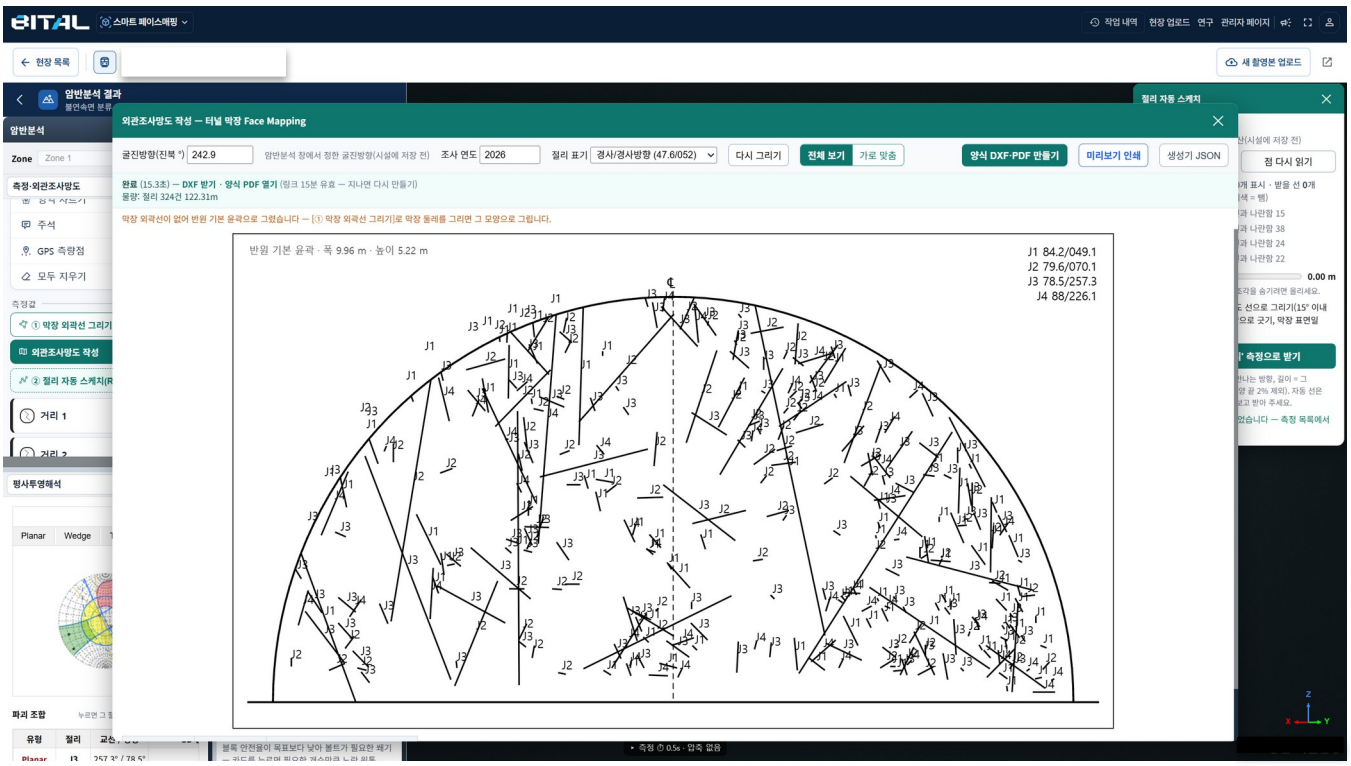
From joint analysis to face mapping and inspection maps

Capture | 3D reconstruction | Joint analysis | Face mapping · inspection map



AI 3 **Joint analysis for rock slopes and tunnel faces**

Automatic joint sets, orientation, stereonet, rock bolt layout suggestion (in development)



Face mapping and inspection maps from 3D data and CAD

Lines drawn on the 3D model become drawings: slope inspection maps, tunnel face maps ❋ **Custom formats need extra development**

Drone 3D for construction management, rock analysis right on top of it

Drone capture · 3D model | Rock analysis | Stability · rock mass rating | After completion

Today On-site construction management Already in practice



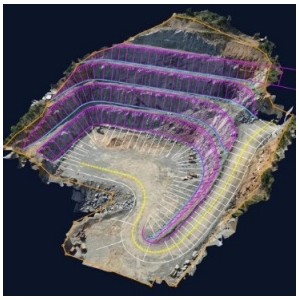
Unmanned drone station
Scheduled automatic flights



Automatic capture
Photogrammetry



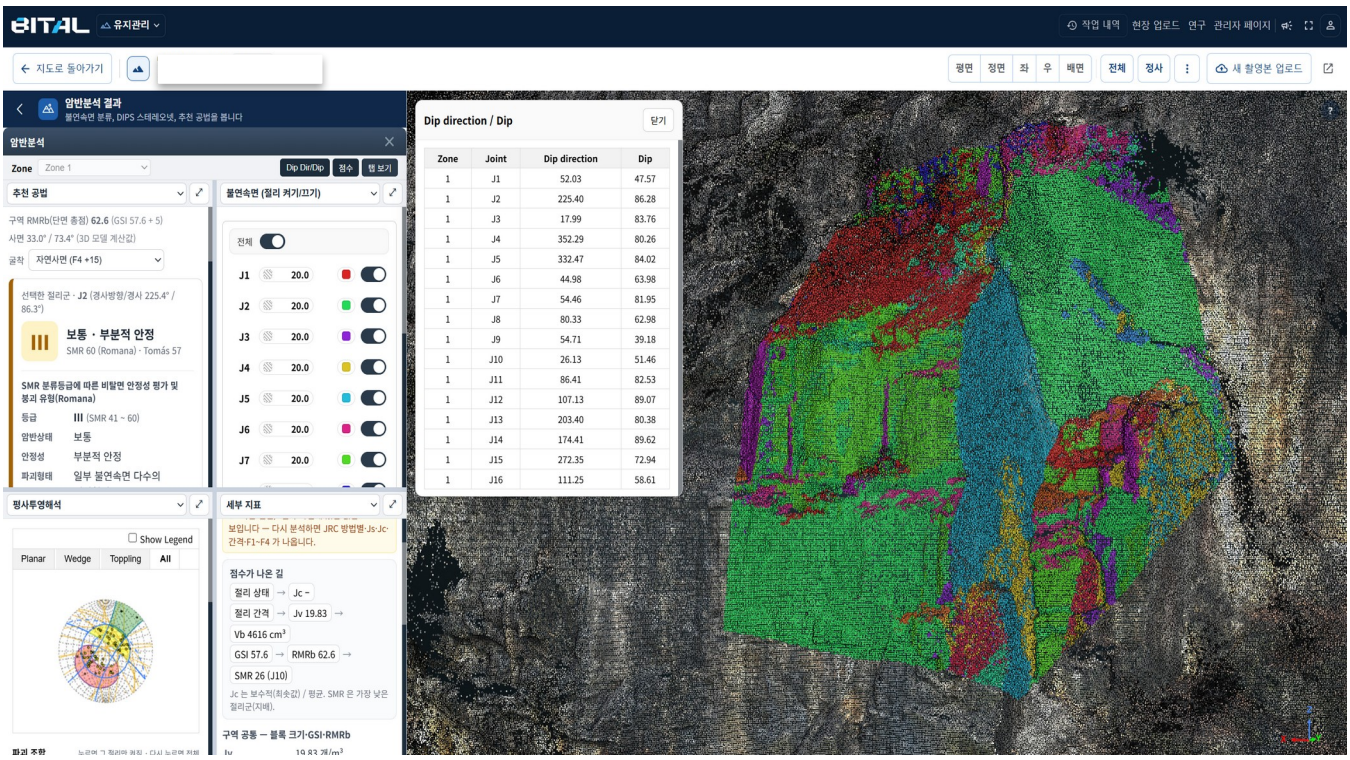
3D site model
Photo-based 3D



Design drawing overlay
As-built vs. design check

Concept images: AI-generated for illustration

Added Rock analysis Actual screen



AI 3 **Rock analysis on the same 3D model**

Discontinuities and failure modes (planar · wedge · toppling). No extra flights or equipment



Conventional method

Manual survey

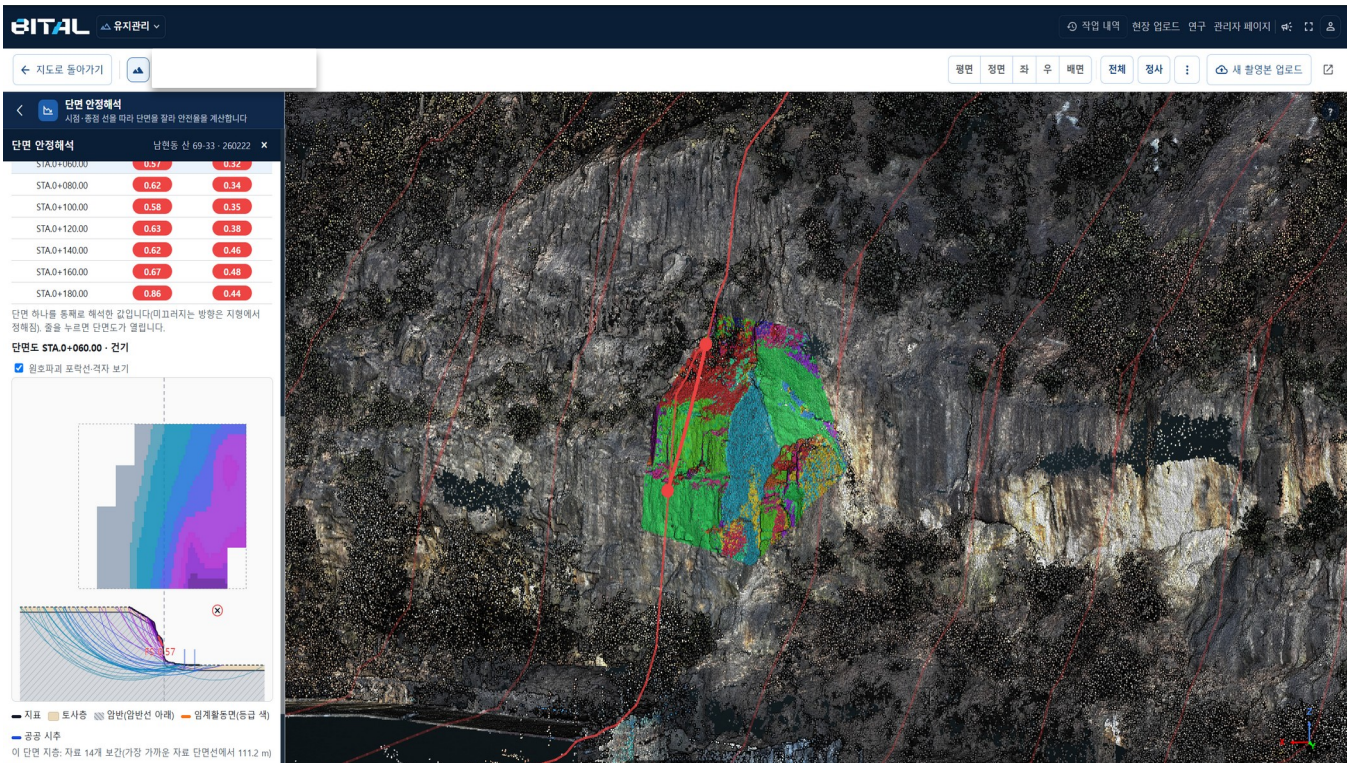
Face-by-face, up on the slope

From hands-on measurement to analysis on drone 3D

Conventional-method photo: AI-generated for illustration

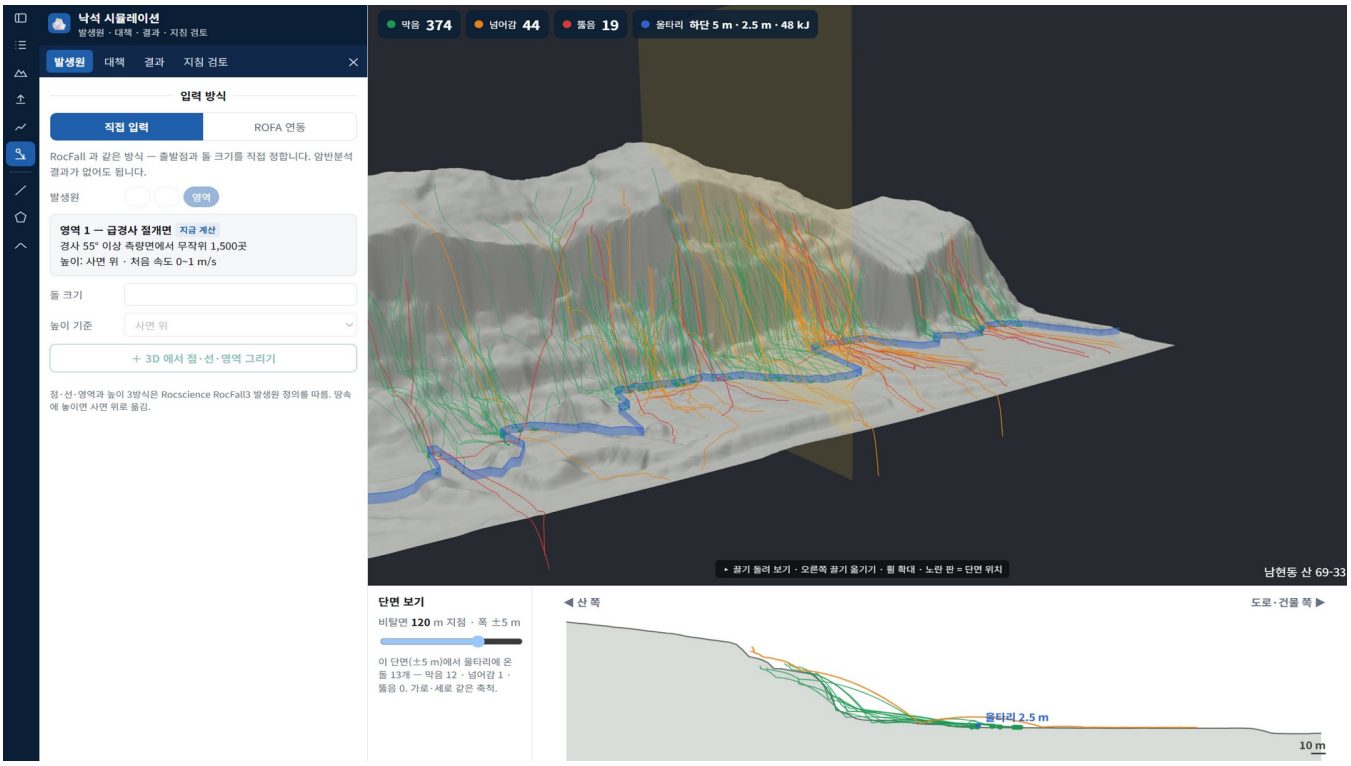
Stability analysis and rock mass rating, data still in use after completion

Drone capture · 3D model | Rock analysis | Stability · rockfall review | After completion



Slope stability analysis

Factor of safety by section, critical slip surface



3D rockfall simulation (under validation)

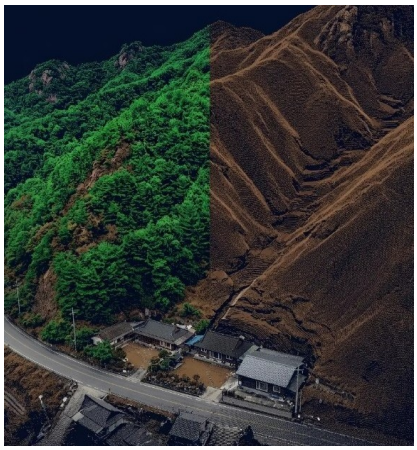
Rockfall simulation linked to rock analysis, including rockfall nets and fences

Down to the ground beneath the trees, with drone LiDAR

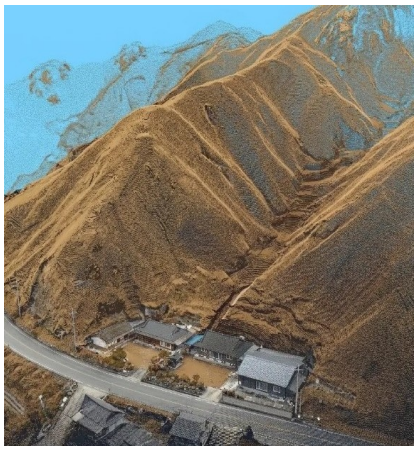
Drone LiDAR survey | Ground analysis | Displacement monitoring | Reports with public data



01 Drone LiDAR survey
Regular checks of slopes near homes



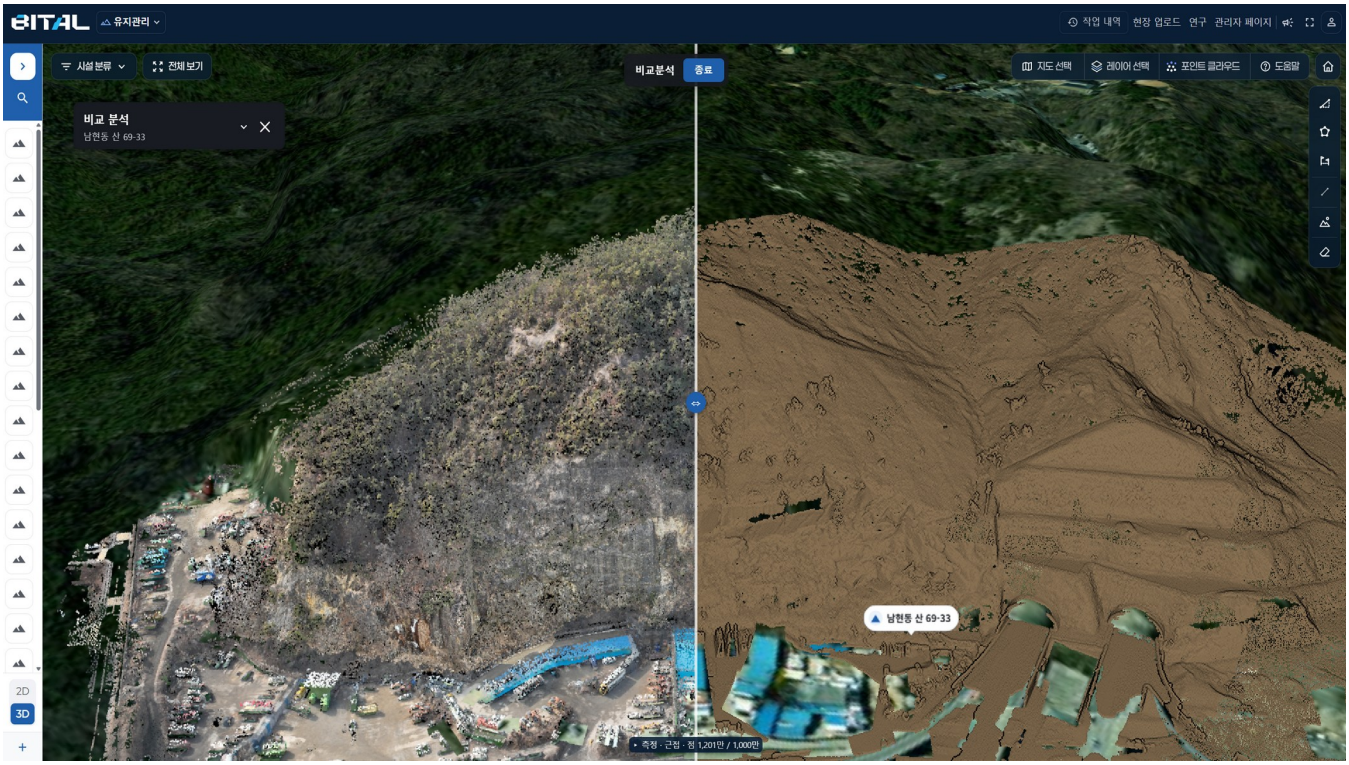
02 Vegetation–ground separation
Automatic point cloud classification



03 3D ground model
Baseline for later reviews

3 step images: AI-generated for illustration

Actual screen



AI 2 Separating vegetation and ground
Full vs. ground point cloud side by side; ground separation accurate even on vertical cliffs

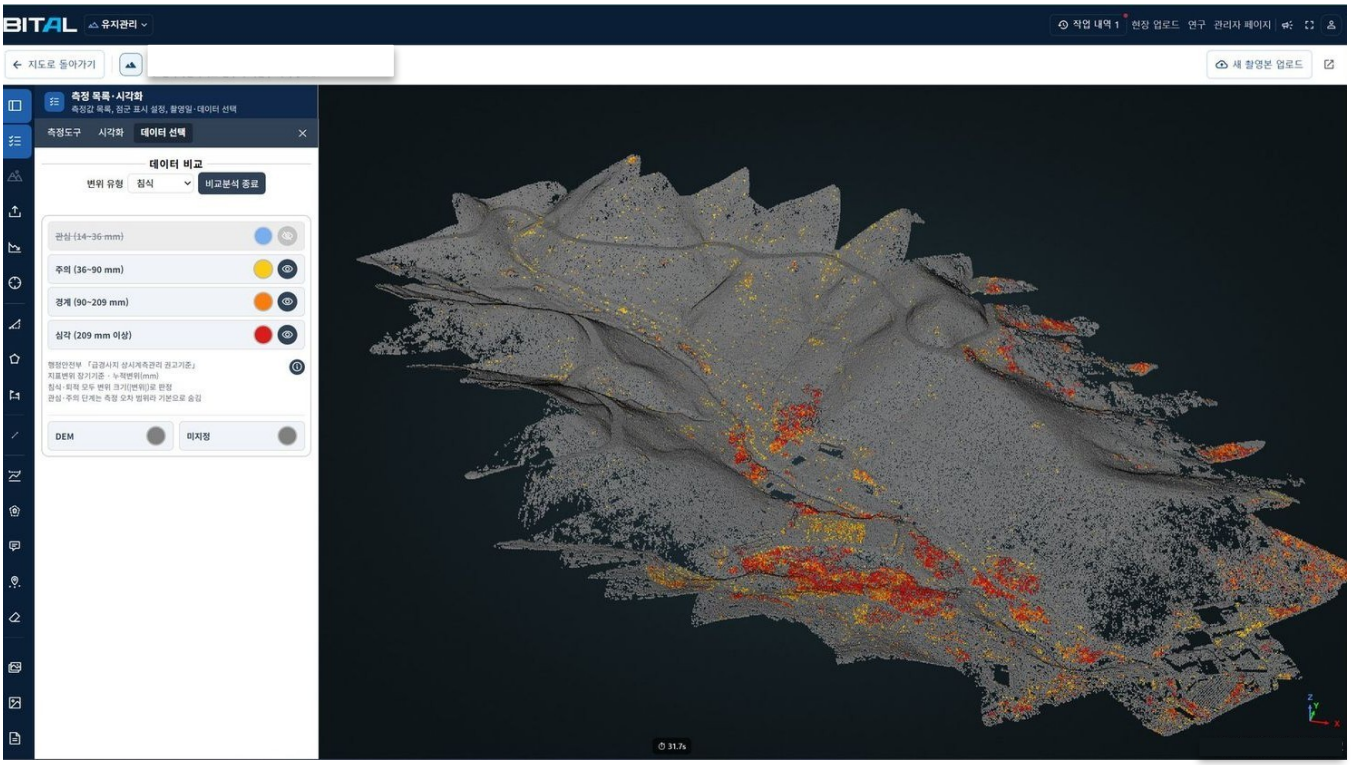
Statutory **At least twice a year** safety inspection; 3D added each time — Steep Slope Disasters Act (Korea), Art. 5

Canopy Ground coverage (dense forest, leaf-off): photogrammetry **80.7%** · LiDAR **~100%** — Eur. J. Remote Sens. 2023

Beyond what instruments can see: satellite · drone · instrument monitoring

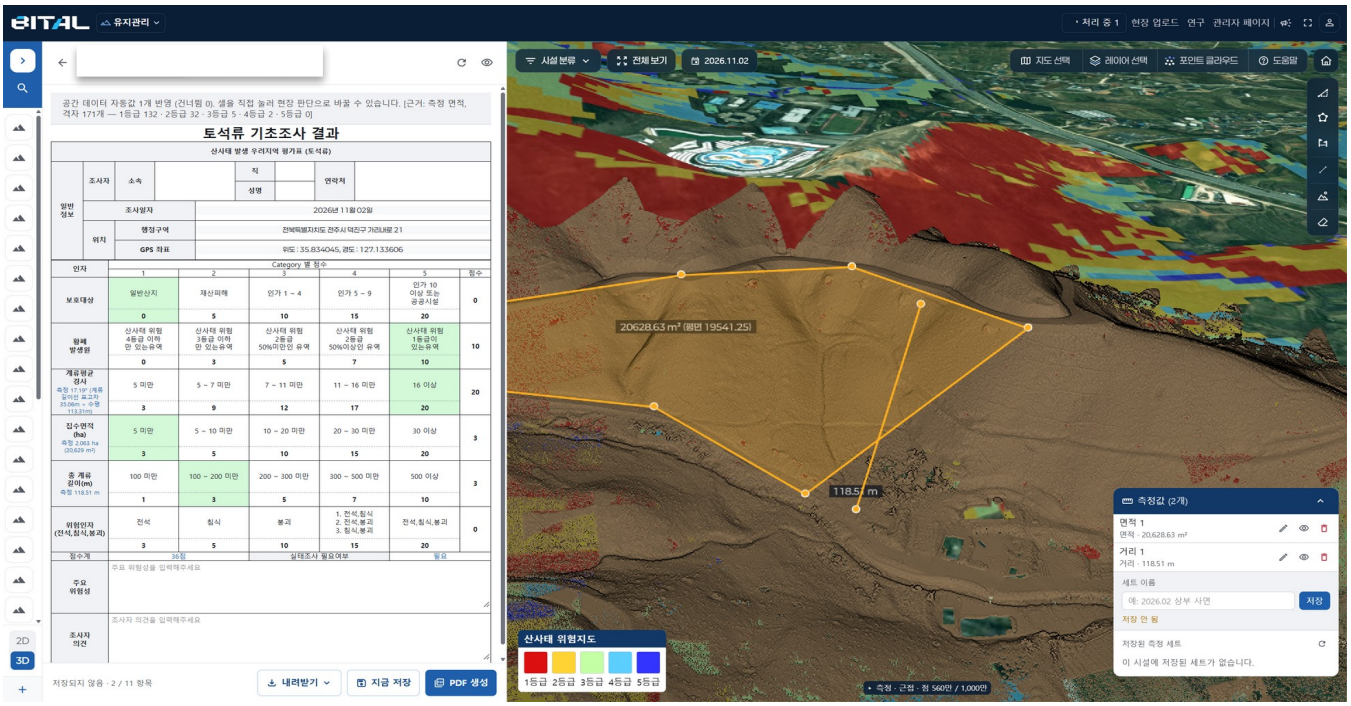
Attention 14 mm | Caution 36 mm | Alert 90 mm | Severe 209 mm

MOIS (Korea) evacuation criteria (cumulative displacement, soil slopes)



Whole-slope monitoring system with drone LiDAR

SAR for wide areas · drone LiDAR for the whole slope (5 cm class, quality-dependent) · instruments for Attention · Caution stages



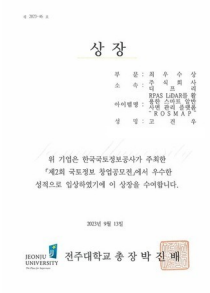
Slope reports generated from linked public data

Korean public and spatial data filled into statutory report forms automatically

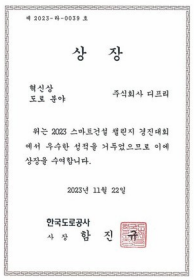
Reports Facilities · steep slopes · landslides · debris flows **Data** Boreholes · hazard maps · forest maps

5 field pilots, awards and a regulatory exemption

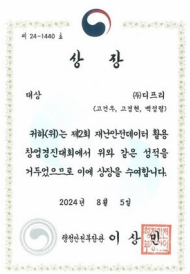
5 pilots & contracts | **5 awards** | **Smart City Regulatory Sandbox exemption**



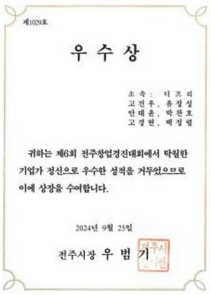
Top Excellence
2nd Land Information Startup Contest · LX
Sep 2023



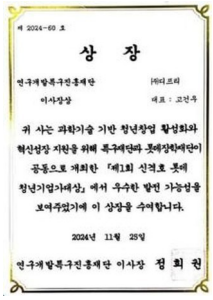
Innovation Award
Smart Constr. Challenge
Korea Expressway Corp.
Nov 2023



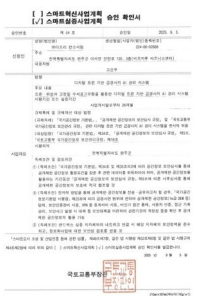
Grand Prize
Disaster & Safety Data Startup Competition
MOIS Minister, Aug 2024



Excellence Award
Jeonju Startup Contest
Mayor of Jeonju
Sep 2024



Chairman's Award
Shin Kyuk-ho LOTTE Young Entrepreneur
INNOPOLIS Foundation
Nov 2024



Sandbox Approval
Smart demonstration plan approval
MOLIT Minister
Sep 2025



Seoul steep-slope safety inspection pilot site
2025



Wanju County slope pilot site
2024

2022
Company founded
Drone operator registered

2023
Corporate R&D center
Two national awards

2024
GS E&C Open Innovation
Pilot at 12 sites, Wanju

2025
Seoul pilot project
Regulatory sandbox pilot

2026
TIPS selected
BITAL launch

Pilots & contracts

2024	GS E&C Open Innovation Tunnel rock assessment automation
2024	Wanju County: pilot at 12 slopes
2025	Wanju: drone digital-twin survey of life-risk areas
2025	Smart City Regulatory Sandbox pilot
2025	Seoul: drone steep-slope safety inspection pilot

Awards

2023	Top Excellence, Land Info Startup Contest LX
2023	Innovation, Smart Constr. Challenge K. Expressway
2024	Grand Prize, Disaster & Safety Data Startup MOIS
2024	Excellence, Jeonju Startup Contest 6th, Mayor
2024	Chairman's Award, LOTTE Young Entrepreneur INNOPOLIS

Three AI technology highlights, patents · certifications · selections

TIPS 2026 | 9 patents | Engineering firm | Venture company | Tech Market certified

AI 1
Ultra-fast image-based 3D model generation

Transformer model estimating 3D point clouds directly from multiple photos

In use

AI 2
Ground classification

Ground split from trees & structures
In-house engine (learning-based)

In use

Moving to a transformer model

AI 3
Rock analysis

Joint sets by density clustering (ML)
Stochastic 3D JRC matching

In use for joint classification

Moving to a transformer model



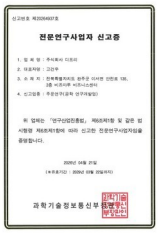
R&D Center Certificate
KOITA
Oct 2023



Tech Market Certificate
LX
Dec 2024



Data Business Registration
MSIT
Dec 2024



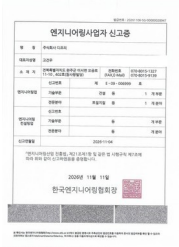
Research Firm Registration
Engineering R&D
Mar 2026



Startup Cert. (youth-founded)
MSS
Apr 2026



Venture Cert.
Venture-invested
Aug 2026



Engineering Registration
KENCA
Nov 2026

Intellectual property

9 patents **1** PCT filing **1** copyright

2017	Underground space management system Tech transfer
2021	SAR big-data disaster classification method Tech transfer
2023	Early prediction of soil slope failure CEO-held
2024	Reservoir embankment failure prediction CEO-held
2024	Rock structure management system
2025	Rock structure management system & method
2025	Slope history management system & method
2025	Rock structure assessment method & system
2026	Digital-twin slope monitoring & management with drone remote-sensing data

Certifications & registrations

2022	Incorporation · business registration Oct 2022
2022	Drone operator registration
2023	Corporate R&D center certified KOITA
2024	SME Tech Market certified LX
2024	Data business registered Data analysis
2025	Smart City Association member
2026	Research business registered Engineering R&D
2026	Startup confirmed Youth-founded
2026	Venture company confirmed Venture-invested
2026	Engineering firm registered Soil & geology
2026	Safety inspection agency Tunnels & bridges

Selections & MOUs

2025	Kibo-Star Valley
2026	TIPS selected
	MOU: Korea Steep Slope Safety Association
	MOU: Jeonbuk Nat'l Univ. Civil Engineering

BITAL

DATA PRESCIENCE FOR DISASTER PREVENTION

From slope construction to maintenance, on a single dataset

Head office	#402, 11-10 Ogong-ro, Wanju-gun, Jeonbuk State, Republic of Korea
Seoul office	#902-1, Bldg. B, 168 Gasan digital 1-ro, Geumcheon-gu, Seoul
AI R&D Center	5F 5-13, 42 Changeop-ro, Sujeong-gu, Seongnam-si, Gyeonggi-do (Spatial Info Startup Center)
Tel	+82-70-8015-1327 | Fax +82-70-8015-9139
Email	dpreofficial@naver.com
Website	dpre.co.kr | Platform dpre.kr

dpre disaster prevention