

## Railway Bridge – Switzerland – Montreux-Naye Line

Key project facts:

|                             |                            |
|-----------------------------|----------------------------|
| <b>Structure Type:</b>      | <b>Railway bridge</b>      |
| <b>System Installation:</b> | 2023                       |
| <b>Camera locations:</b>    | 2                          |
| <b>Sensor number:</b>       | 20+                        |
| <b>Configuration:</b>       | 2D displacement monitoring |
| <b>Static / Dynamic:</b>    | Static                     |

What is measured:

- Thermal induced motion of a railroad truss bridge
- Masonry movement on both sides of the bridge, before and after masonry repair
- Crack initiation in the abutment masonry
- Automatic SMS and email alerts sent based on thresholds set by the structural engineer.



*Left: View of the historical railway bridge with the solar power supply and one of the AIMsight autonomous optical monitoring systems. Right: View of the abutment wall monitored by the AIMsight system*

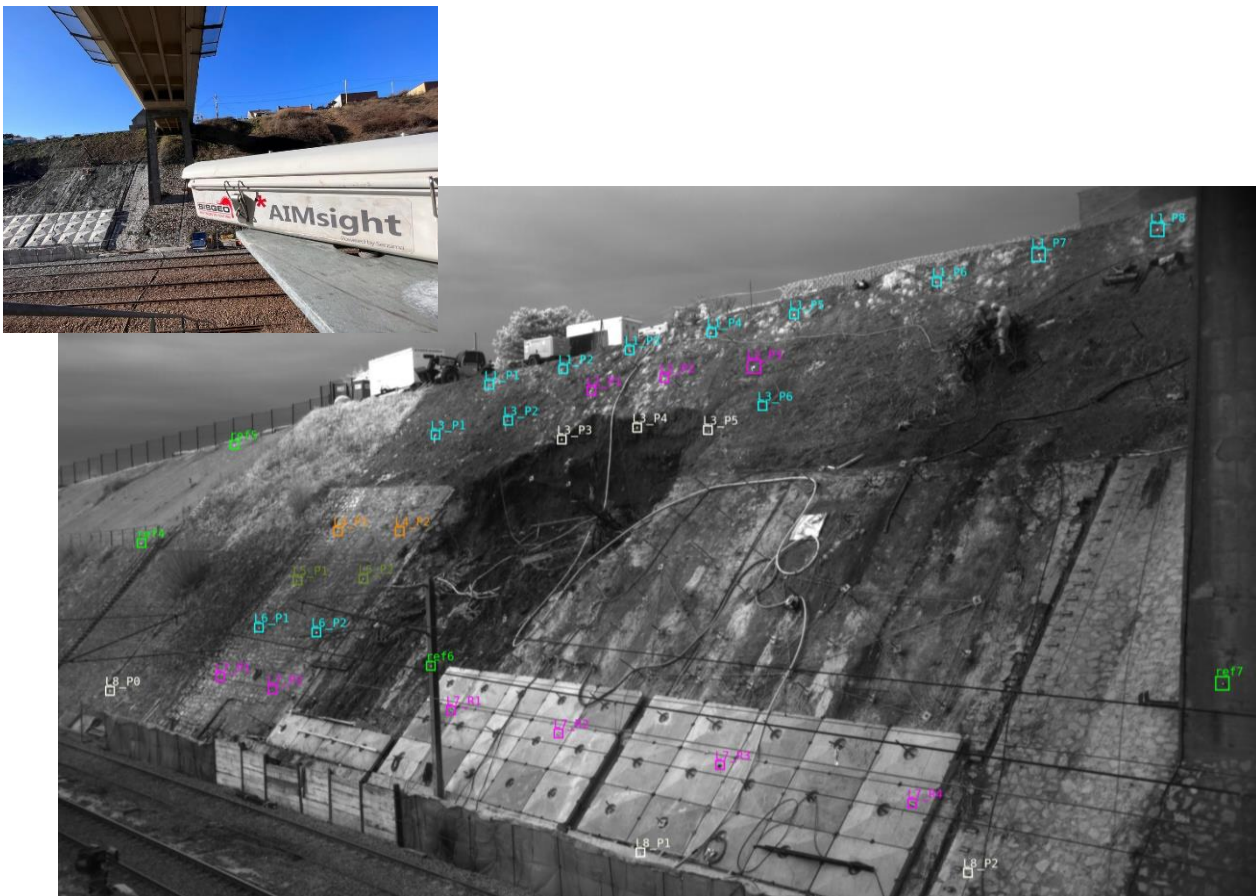
## Railway Embankment – France – SNCF

Key project facts:

|                             |  |
|-----------------------------|--|
| <b>Structure Type:</b>      | <b>Railway embankment</b>              |
| <b>System Installation:</b> | 2023                                   |
| <b>Camera locations:</b>    | 1                                      |
| <b>Sensor number:</b>       | 40+                                    |
| <b>Configuration:</b>       | Long-range 2D displacement measurement |
| <b>Static / Dynamic:</b>    | Static monitoring                      |

What is measured:

- Stability of an embankment above a railroad line
- Emergency measurements during stabilization work
- Stability of concrete plates after the stabilization work has been completed.



*View of the embankment with the points monitored during the emergency phase.*

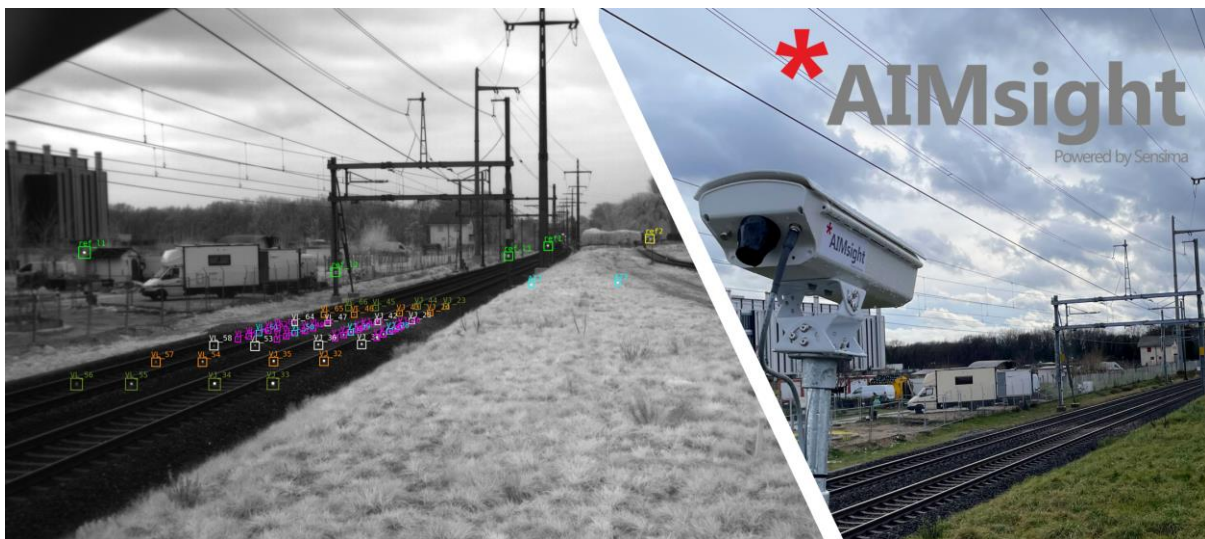
## Railway Tracks – Switzerland – SBB / CFF Geneva-Lausanne Train Line

Key project facts:

|                             |   |
|-----------------------------|---|
| <b>Structure Type:</b>      | <b>Railway tracks</b>                     |
| <b>System Installation:</b> | 2023                                      |
| <b>Camera locations:</b>    | 1   |
| <b>Sensor number:</b>       | 69  |
| <b>Configuration:</b>       | Settlement and rail position measurements |
| <b>Static / Dynamic:</b>    | Static monitoring                         |

What is measured:

- Measuring rail movement during tunneling under one of Switzerland's most important rail lines
- Monitoring ground settlement around railroad tracks



*Left: View of the tracks and of the points under surveillance. Right: Autonomous battery powered AIMsight optical monitoring system on-site.*

## Railway Tracks – Switzerland – MOB GoldenPass Line

Key project facts:

|                             |   |
|-----------------------------|---|
| <b>Structure Type:</b>      | <b>Railway tracks close to</b>          |
| <b>System Installation:</b> | 2022                                    |
| <b>Camera locations:</b>    | 2                                       |
| <b>Sensor number:</b>       | 10 per site                             |
| <b>Configuration:</b>       | 2D displacement measurement             |
| <b>Static / Dynamic:</b>    | Static and dynamic (video acquisitions) |

What is measured:

- Impact of ballast tamping on the track position
- Ageing of the ballast in the vicinity of bridges and expansion joints



*Left: Tamping operations monitored by the AIMsight system. Right: Detail of the optical tracking patterns on the rails.*

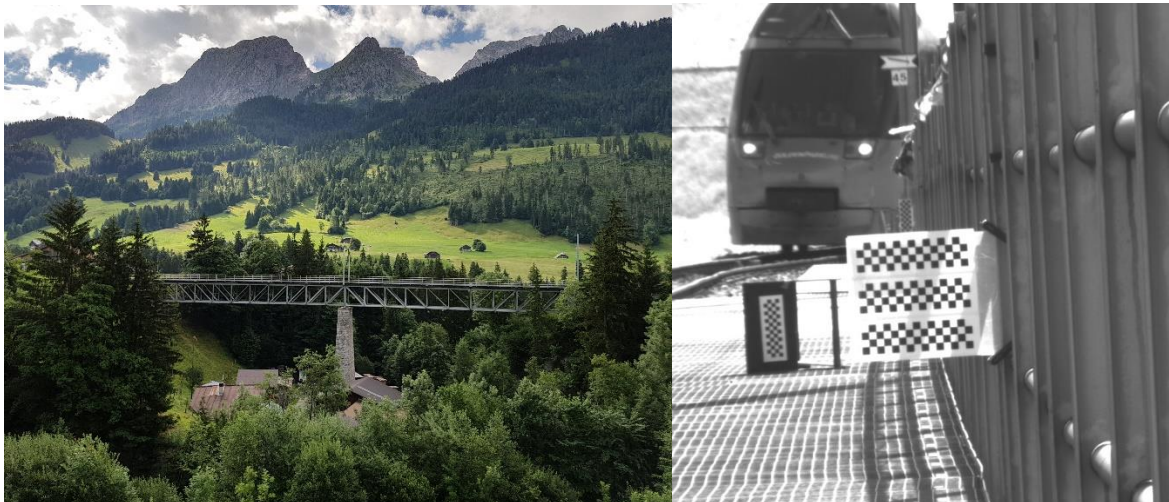
## Railway bridge – Switzerland – Flendruz Viaduct

### Key project facts

|                             |                                    |
|-----------------------------|------------------------------------|
| <b>Structure Type:</b>      | <b>Railway truss bridge (1904)</b> |
| <b>System Installation:</b> | 2018                               |
| <b>Camera locations:</b>    | 1                                  |
| <b>Sensor number:</b>       | 1                                  |
| <b>Configuration:</b>       | Beam axial view                    |
| <b>Static / Dynamic:</b>    | Dynamic (video acquisitions)       |

### What is measured:

- Mid-span bridge deflections under load



*Left: View of the historical railway truss bridge. Right: Optical trackers installed to measure the mid span deflections*

## Railway bridge – Switzerland – Gstaad Viaduct

Key project facts:

|                             |   |
|-----------------------------|---|
| <b>Structure Type:</b>      | <b>Railway truss bridge (1903)</b>      |
| <b>System Installation:</b> | 2017                                    |
| <b>Camera locations:</b>    | 8                                       |
| <b>Sensor number:</b>       | 10                                      |
| <b>Configuration:</b>       | Close-range 2D displacement measurement |
| <b>Static / Dynamic:</b>    | Static and dynamic (video acquisitions) |

What is measured:

- Monitoring of bridge displacements due emergency braking in the frame of bridge re-certification
- Bridge thermal expansion
- 2D rail tie motion tracking
- Optional video correlation between railway traffic and deflection



*Left: View of the historical railway truss bridge. Right: Detail of the optical tracking pattern on the bridge and rail.*

## Railway bridge – Switzerland – Flendruz Viaduct

Key project facts:

|                             |   |
|-----------------------------|---|
| <b>Structure Type:</b>      | <b>Railway truss bridge (1904)</b>      |
| <b>System Installation:</b> | 2017                                    |
| <b>Camera locations:</b>    | 8                                       |
| <b>Sensor number:</b>       | 10                                      |
| <b>Configuration:</b>       | Close-range 2D side measurement         |
| <b>Static / Dynamic:</b>    | Static and dynamic (video acquisitions) |

What is measured:

- Monitoring of bridge displacements due emergency braking in the frame of bridge re-certification
- Bridge thermal expansion
- 2D rail tie motion tracking
- Optional video correlation between rail traffic and deflection



*Views of the optical tracking cameras on one abutment of the railway bridge. The same system is replicated on the other side of the bridge.*