



## Major Midwestern Airport - Shoring and Track Monitoring

### How intelligent wireless monitoring technology was used to enable safer rail work at a major midwest U.S. airport

#### Challenge

Ongoing construction to the rail lines around a major Midwestern airport posed an interesting challenge for engineers. Because the potential to disturb or damage existing tracks during this construction was considered significant, constant monitoring was required to maintain stability and integrity of both the railway and the temporary soil retention system.

Failed soil retention systems can lead to soil, rock, and vegetation sliding from underneath the tracks, potentially leaving track crossties and rails unsupported. Furthermore, sliding debris may cause damage to assets below, such as houses, roads, or even other tracks. An effective monitoring regime is therefore often viewed as the best way of avoiding the disruption and costs of such a failure.

For this project, Senceive was called on to employ intelligent wireless monitoring technology capable of delivering constant updates on ground and structural movement.

During construction, while Senceive's system was deployed, an old drainage system was uncovered. This posed significant challenges to the construction team and complicated the already complex ground engineering works.



Map of sensors in the area surrounding the excavated drainage system

## Solution

A common solution to this problem would have been to use a total stations, or AMTS, to survey in points with a laser and track any changes in their position.

While this can provide good data, it does come with a host of drawbacks that Senceive's wireless approach avoids.

For one, the constant requirement to maintain line of sight between the unit and the targets can cause complications in poor weather, something the Midwest is infamous for.

Furthermore, sampling rates on prisms are relatively slow. While surveying a single prism doesn't take long, with the large arrays of prisms required by a project such as this, the survey unit can take hours to finish measuring every prism before it's able to restart the cycle. This can mean significant gaps in data.

Senceive tilt sensors were deployed along the support of excavation (SoE) system for the duration of the groundwork program.

A total of 1336 NanoMacro tilt sensors were set out to perform this monitoring and were attached to either rail ties or bracing of the SoE in question. From here, they provide live data about either the position of the SoE structure, or more advanced metrics such as crosslevel, cant, and twist about the rails.



SoE system being installed adjacent to railway



Senceive NanoMacros Triaxial Tilt Sensors deployed along a section of rail SoE

## Outcome

With the wireless system in place, engineers could be confident of get immediate detection of potentially damaging ground movement at locations identified as being at-risk.

This should enable early intervention to fix the problem and reduce disruption to passengers.

The unexpected discovery of an underground drainage system could have caused major disruption to the project. Reliance on traditional monitoring methods would not have delivered sufficiently frequent data updates to check ground stability.

However, because Senceive's NanoMacro tilt sensors don't use conventional optical means of measurement, it was possible to accelerate reporting rate to five-minute intervals. This was sufficient to enable the project to continue with confidence.

### Client Testimonial

**“If we were using traditional surveying, we'd never have been able to monitor this number of points at a high frequency. But with Senceive products, we were able to monitor about fifty sensors simultaneously every five minutes”.**