

How the Port Authority of NY & NJ Accelerated Asset Data Turnover by Using AI-Powered Drawing Analysis

Transforming project drawings into digitally ready asset records.

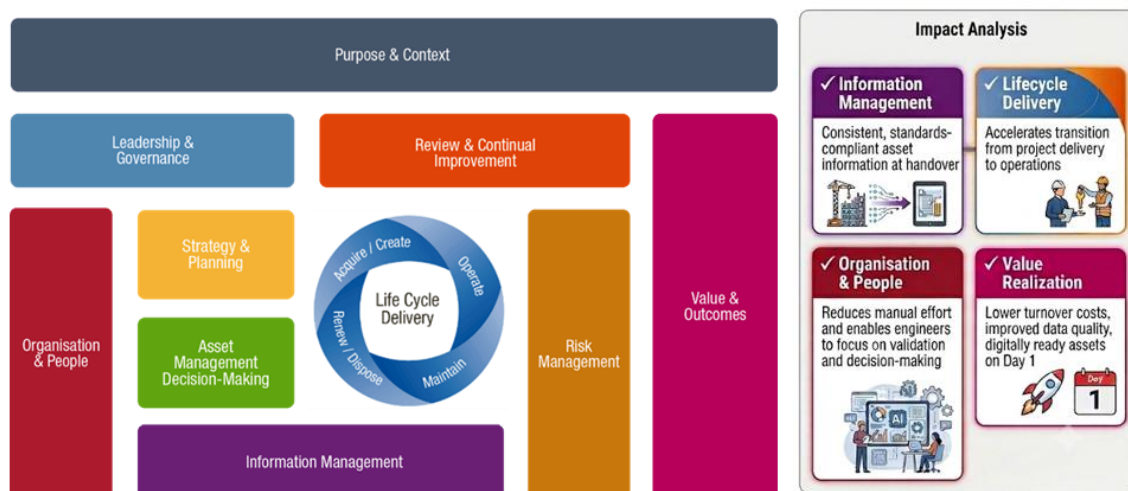
1. Executive Summary

The Port Authority of New York & New Jersey (PANYNJ) Enterprise Asset Management (EAM) Program is focused on ensuring that every asset is digitally ready for operations and maintenance immediately upon project turnover. However, asset data handover from capital projects has historically been a challenging, labor-intensive process. Coordinating submissions across numerous stakeholders with domain expertise outside of data preparation often resulted in inconsistent, incomplete, and invalid datasets.

To address this challenge, PANYNJ partnered with TwinKnowledge via the Transit Tech Lab to explore how artificial intelligence could identify equipment from design drawings and extract tabular asset data. By piloting TwinKnowledge's AI-powered drawing analysis capabilities, the Port Authority was able to dramatically reduce the manual effort required to identify individual assets resulting from project work, in addition to improving data quality and compliance with PANYNJ standards.

Preliminary testing from the pilot demonstrated that the TwinKnowledge solution identified asset records from drawings approximately 80-100 times faster than manual processes, demonstrating a scalable and cost-effective alternative to traditional asset data turnover.

Case Study Alignment with IAM Capability Model



2. Organization Overview

Industry:

Transportation & Infrastructure / Public Sector

Size:

One of North America's largest transportation infrastructure owners, managing a diverse portfolio of airports, bridges, tunnels, ports, rail transit, and a multi-billion dollar capital program serving hundreds of millions of customers each year.

Location:

New York & New Jersey Metropolitan Region

Context:

The Port Authority's Enterprise Asset Management (EAM) Program is responsible for enabling lifecycle management of critical infrastructure assets across a highly complex operating environment.

Story Angle:

PANYNJ recognized that traditional asset data handover methods were too dependent on manual processes, spreadsheet population, and interpretation of drawings by project stakeholders who were not EAM data experts. The organization sought a smarter, scalable approach that combined engineering expertise with AI-enabled automation.

Background on Transit Tech Lab and Twin Knowledge:

The Transit Tech Lab is a public-private initiative launched by the MTA and the Partnership Fund for New York City to help regional transit agencies test innovative, emerging technologies. As a program participant, TwinKnowledge is an AI platform designed to read and analyze design drawings, specifications, and construction plans, automating compliance checking and risk analysis for complex public infrastructure projects.

3. The Challenge

The asset data handover process from capital projects presented various operational challenges. Asset records needed to be identified, validated, and formatted for system upload according to the Authority's EAM Program standards. This process requires coordination among engineers, contractors, designers, and operational stakeholders.

Several critical pain points emerged:

- Identification and population of individual asset records was manual and time consuming.
- Project stakeholders possessed deep engineering expertise, but preparing structured, compliant asset data required specialized EAM knowledge.
- Issues with data accuracy, validity, and completeness often led to rework by internal staff.
- Budget constraints made comprehensive data collection difficult, particularly for smaller

scale projects.

- The risk of incomplete or inaccurate asset records threatened long-term asset lifecycle management.

Historically, much of the data preparation effort was spent manually analyzing drawing sets or physically cataloging assets in the field to then populate Excel templates with asset record data. Without improvement, the organization faced delayed asset readiness, higher turnover costs, and inconsistent data quality across projects.

4. The Turning Point

The Port Authority identified an opportunity after observing TwinKnowledge's ability to read PDF-based CAD drawings and detect changes between drawing versions. PANYNJ recognized that if TwinKnowledge could reliably identify equipment and understand engineering context in drawings, it could likely automate much of the repetitive work involved in preparing asset records for its asset management systems.

The goal was not to replace engineers or subject matter experts, but rather to augment their work.

Success required:

- Faster extraction of asset information from design drawings
- Improved compliance with EAM standards
- Better data consistency and accuracy
- A scalable approach for future capital projects

TwinKnowledge's AI-powered platform stood out for its ability to combine drawing intelligence with data extraction capabilities guided by documented requirements (i.e., asset data standards and specifications).

5. The Solution

Approach

Step 1 – Establish EAM Standards and Asset Logic

PANYNJ had already established comprehensive asset data standards and specifications, including asset definitions, hierarchy structures, asset type codes, and required attributes. These standards served as the reference framework for AI-based asset identification.

Step 2 – Engineer Interpretation Rules

PANYNJ and TwinKnowledge iteratively refined prompts and interpretation rules that taught the AI how to analyze engineering drawings in accordance with PANYNJ asset data standards. These rules guided the AI in selecting the appropriate drawings, distinguishing

new construction from existing conditions, interpreting engineering symbols and drawing context, and generating standardized, traceable asset records for downstream use.

Step 3 – Human Validation and Verification

Rather than manually identifying every asset, engineering subject matter experts could review and validate AI-generated asset records against the project drawings. Validation findings will be used to continuously refine the interpretation rules, improving the accuracy, completeness, and consistency of future asset extraction.

Key Actions

- AI-enabled analysis of design and as-built drawings
- Automated extraction of tabular asset record data
- Validation against Port Authority EAM standards
- Integration of human engineering review into the workflow
- Reduction of repetitive manual data entry activities

Technology & Tools Used

- TwinKnowledge AI drawing analysis platform
- Structured asset reference data for asset definitions, asset hierarchies, and asset codes.
- Structured asset data templates aligned to PANYNJ EAM standards

Key Decisions

- Developed and iteratively refined interpretation rules to improve extraction accuracy, including sheet selection, project scope identification, drawing context, symbol interpretation, and standardized output.

What Made It Different

- Pre-existing and high-quality reference data (asset definitions, hierarchies, codes) that could feed the TwinKnowledge platform at the click of a button.
- Strong AI engine that could consistently and accurately identify installed equipment.
- Iterative and innovative prompting.

6. Results

Qualitative Outcomes

- Improved confidence in asset data accuracy, validity, and completeness
- Reduced administrative burden on engineering and facility staff
- Faster preparation of digitally ready assets for operations and maintenance
- Demonstrable scalability for future capital projects

Quantitative Outcomes

- Preliminary testing showed TwinKnowledge identified asset records approximately 80-100 times faster than manual processes.
- Estimated overall asset data acquisition cost reduction: ~40%.

- Collection activities — traditionally among the most labor-intensive portions of asset turnover — were estimated to be reduced by approximately 90%.

7. Human Impact

If scaled and operationalized, engineering leads and project teams will no longer need to spend countless hours manually identifying assets and populating spreadsheets from drawing sets and field visits. Instead, they will be able to focus on validating AI-generated information and applying their technical expertise where it adds the greatest value.

Day-to-day improvements include:

- Reduced repetitive administrative work
- Faster review and validation cycles
- Less frustration coordinating asset turnover requirements
- Greater confidence that operational teams would receive usable asset information
- More time spent on engineering and quality assurance activities

By augmenting human expertise instead of replacing it, AI-powered drawing analysis could improve both productivity and engagement across project delivery teams.

8. Lessons Learned

Several important lessons emerged from this proof-of-concept that may be applicable to other organizations seeking to apply AI to asset information management:

- **Governed asset data standards are the foundation for successful AI.** High-quality reference data enabled the AI to consistently identify assets in accordance with PANYNJ requirements.
- **Domain expertise must be translated into interpretation rules.** The greatest improvements in accuracy and validity came from iteratively teaching the AI how to interpret drawings and subsequently structure the data output.
- **Human validation remains essential.** AI significantly reduced the effort required to identify and structure asset data, but engineering subject matter experts remained critical for validating results, refining interpretation rules, and continuously improving the workflow.
- **AI is more effective when integrated into a governed asset management process.** The combination of high-quality engineering drawings, enterprise data standards, meticulously crafted interpretation rules, and continuous validation produced a reliable and scalable approach to asset data turnover.

9. What's Next

The Port Authority plans to continue evaluating and refining AI-enabled asset data turnover as part of its broader Enterprise Asset Management strategy.

Future opportunities include:

- Expanding AI-based asset extraction across more of the capital portfolio, including projects with BIM deliverables.
- Increasing additional automation opportunities within existing EAM data preparation and validation processes.
- Identifying ways to continually decrease time in the field for data quality assurance, asset tagging, and asset photography.