

Digital Twins

Advanced Spatial Intelligence to Support Facility Operations



120+
Offices



12,000+
Professionals

150
Forbes Largest
Private Companies

Founded in
1915

7,000 Active Projects
Worldwide

8th Largest
100% Employee-Owned
Company in the U.S.



Brian Melton

Technology Innovation
Leader



Robert Eckdahl

Virtual Design & Data
Solutions Leader | Water &
Integrated Facilities

Objectives

Why are we talking about this



Share a story of digital twins
with spatial intelligence



Awareness of use cases
and lessons learned



Spark innovation and
generation conversation

Agenda



Digital Twins



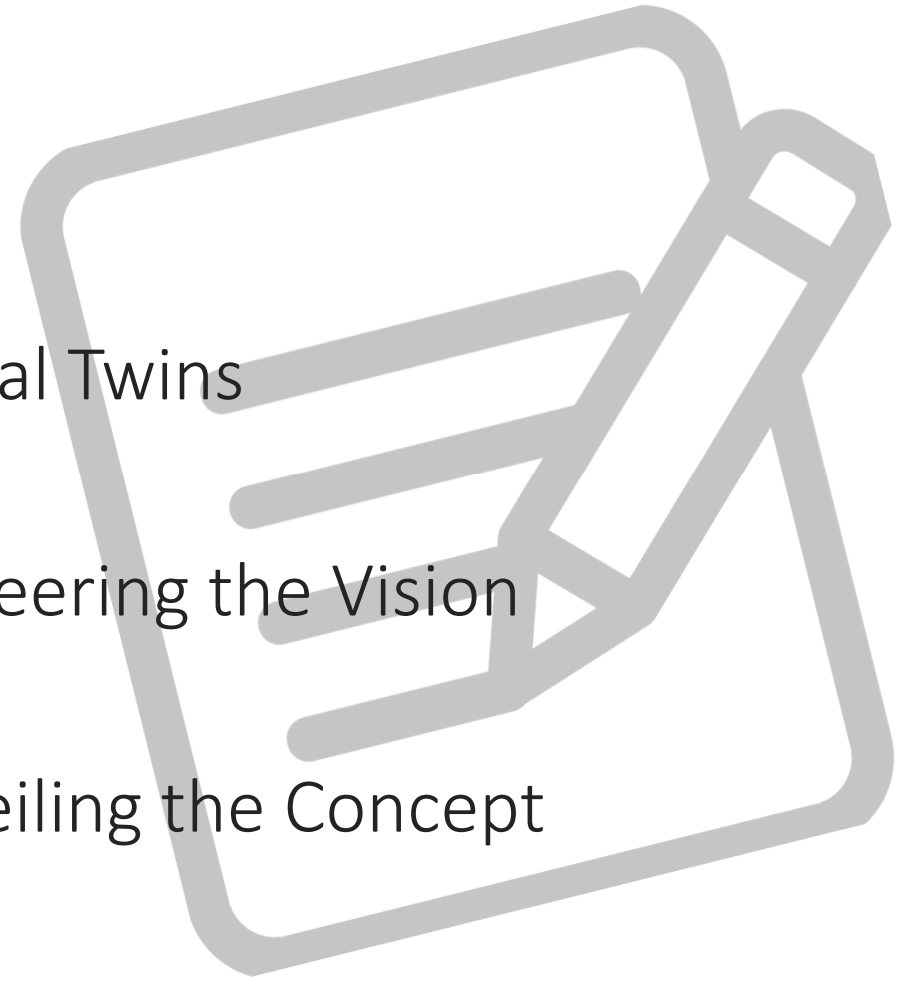
Pioneering the Vision



Unveiling the Concept



Essential Playbook Insights





Digital Twins

This is a **Phone**

This is also a **Phone**



Pretty sure it's got one of those sweet 3D models?

It's got to have GIS map data!

It's sensors and smart assets (IoT)?

It's only applicable during operations... I think?

I haven't seen one, it's probably Sci-fi!

Can I just view documents with it?

I think it's supposed to have artificial intelligence (AI)?

Probably has a cool dashboard with analytics, right?

What is a Digital Twin

A “Digital Twin” is a virtual representation that serves as a real-time digital counterpart of a physical asset, system or process.

Simple recipe includes:

a digital model (analytical, computational and/or spatial)

an evolving set of data/events

means of dynamic updates

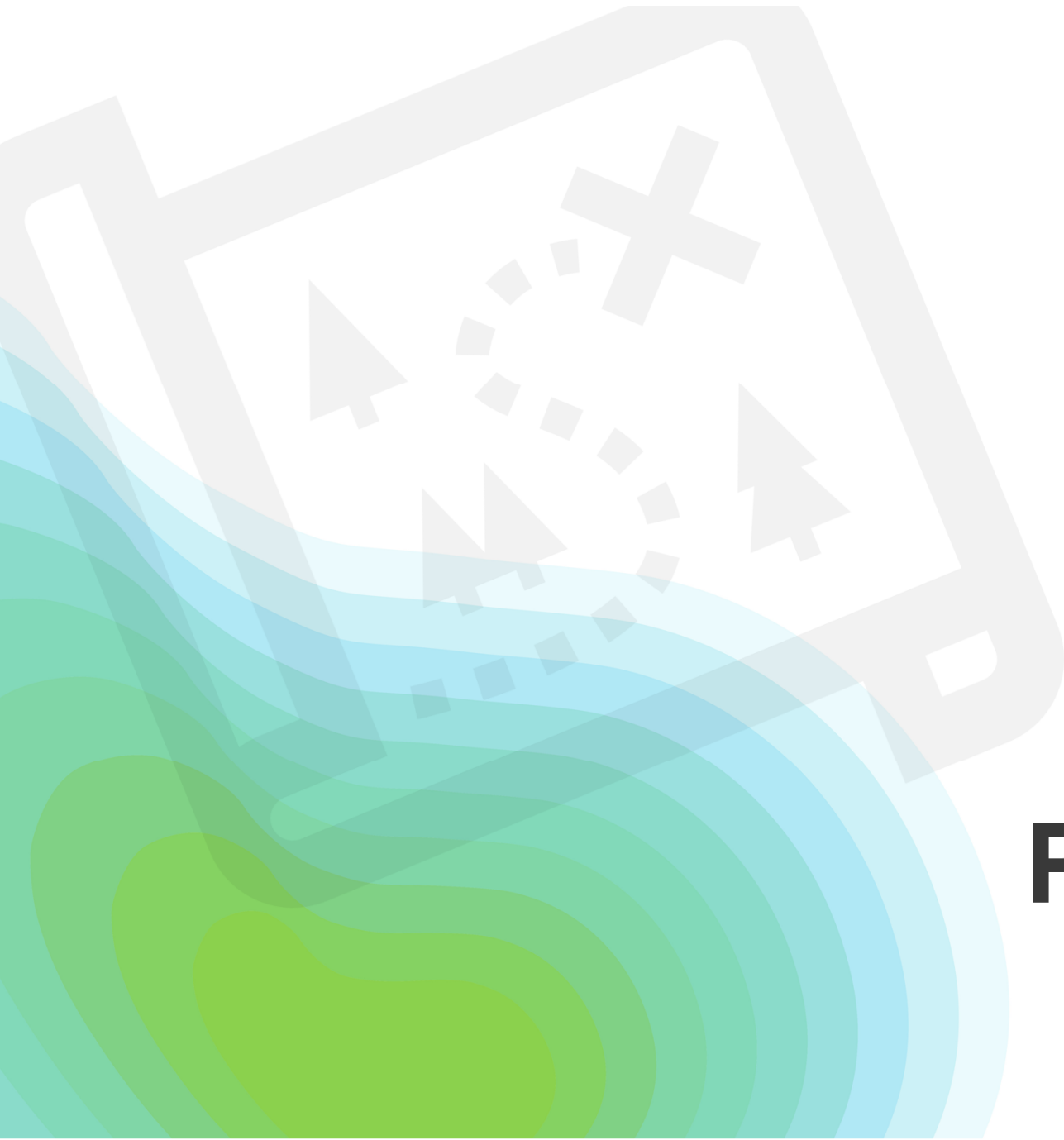
provides meaningful insights, recommendations and/or predictions

simplifies access to data/information

Convergence of Twins | Classification Framework

- COMPUTATIONAL DATA**
Usually paired with a process simulation to assist with operational decisions or recommended actions
- ANALYTICAL DATA**
Usually in the form of business intelligence dashboards - aggregate and analyze diverse datasets
- SPATIAL DATA**
Visually rich interactive experience that enhances data with spatial context and spatial insights





Pioneering the Vision

Johnson County Wastewater



580,000 Residents, 17 Cities



6 WW Treatment Facilities



32 Pump Stations



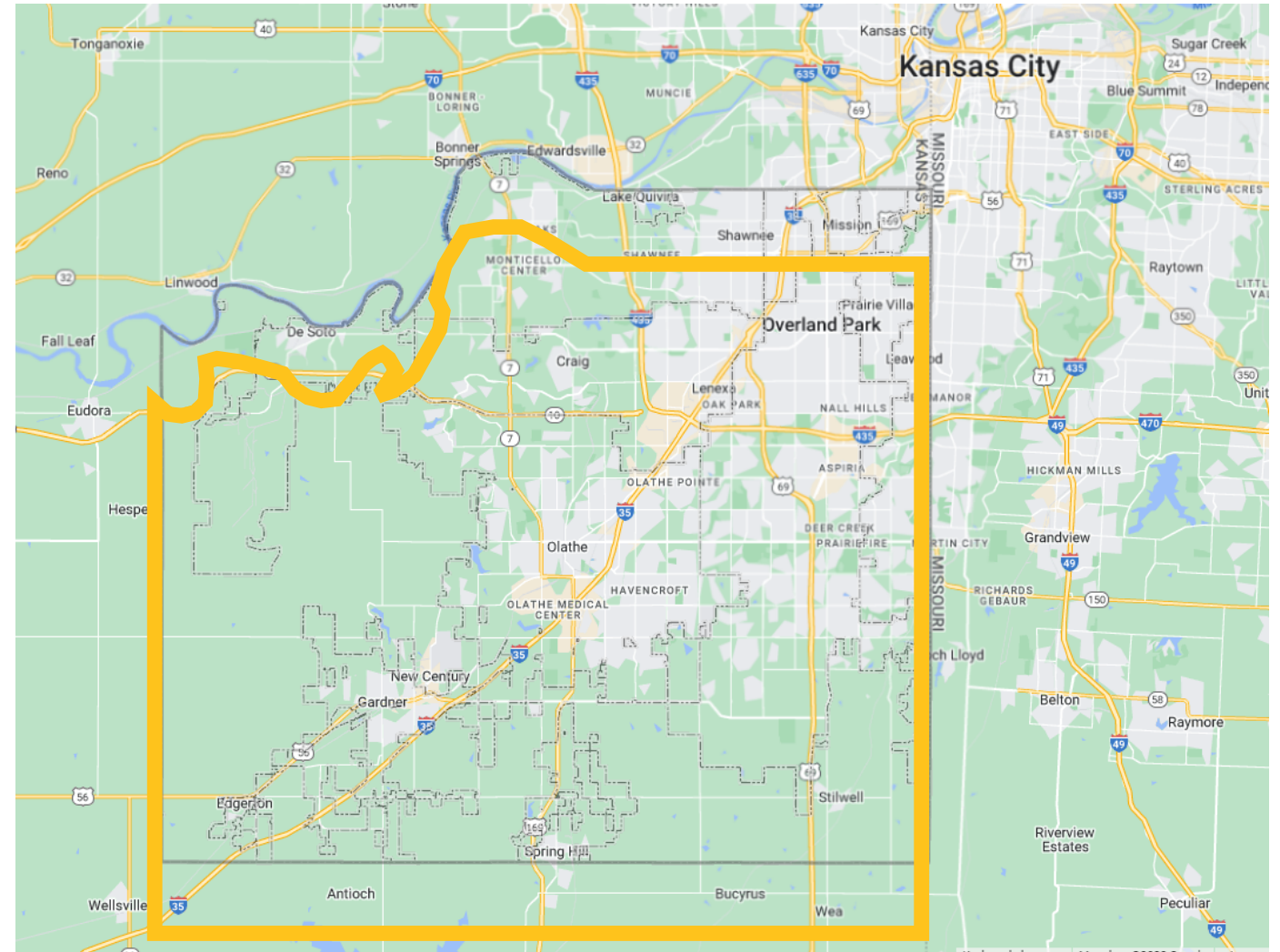
3 Billion in Assets



2,300 miles of linear assets



238 Employees (165 Ops & Maint.)



Tomahawk Creek Wastewater Treatment Facility

Original Construction 1955

Reconstructed in 2018

Communities Served:

- Leawood, Prairie Village, Overland Park, Olathe

Flowrates:

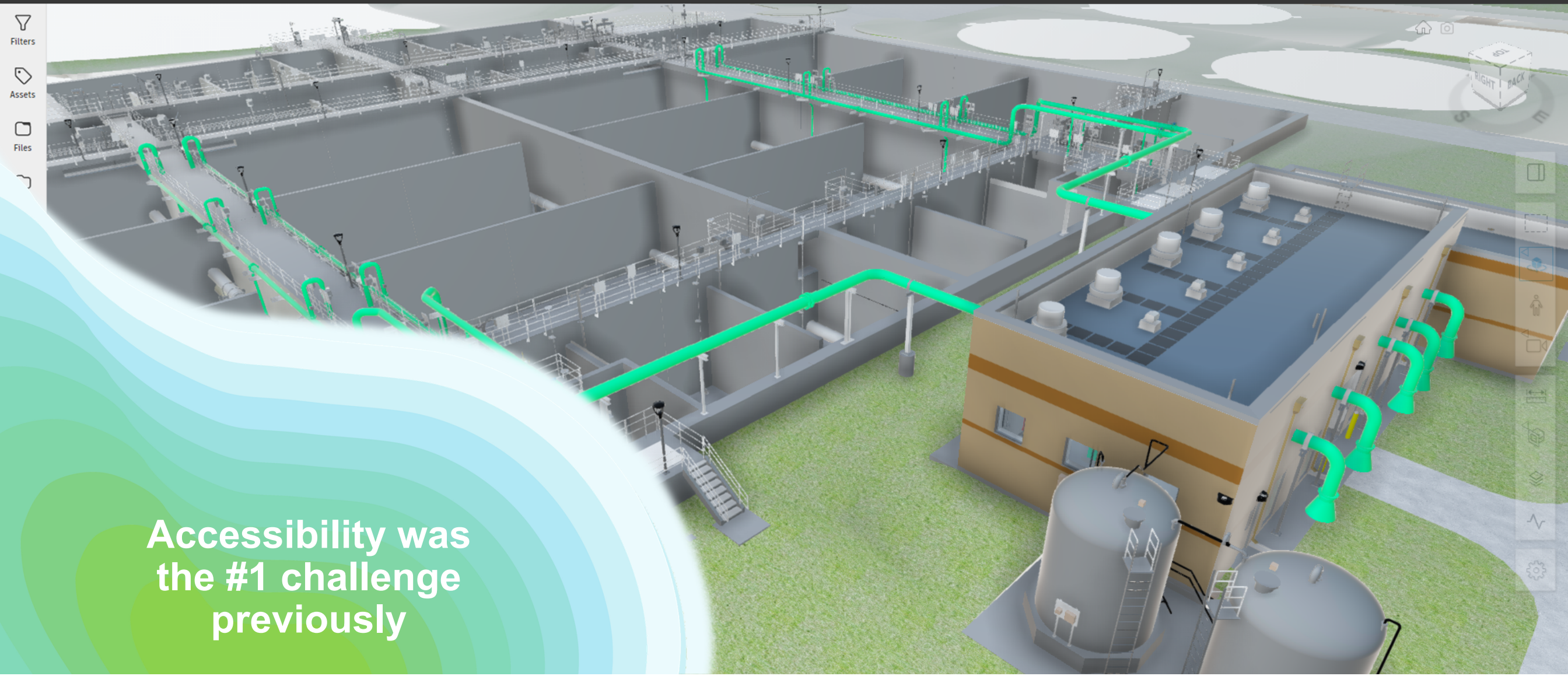
- 19 MGD/Day, 172 MGD Peak (Avg. 14 MGD/Day)

Approx. 3,000 Assets

Newer, Less Experienced Staff



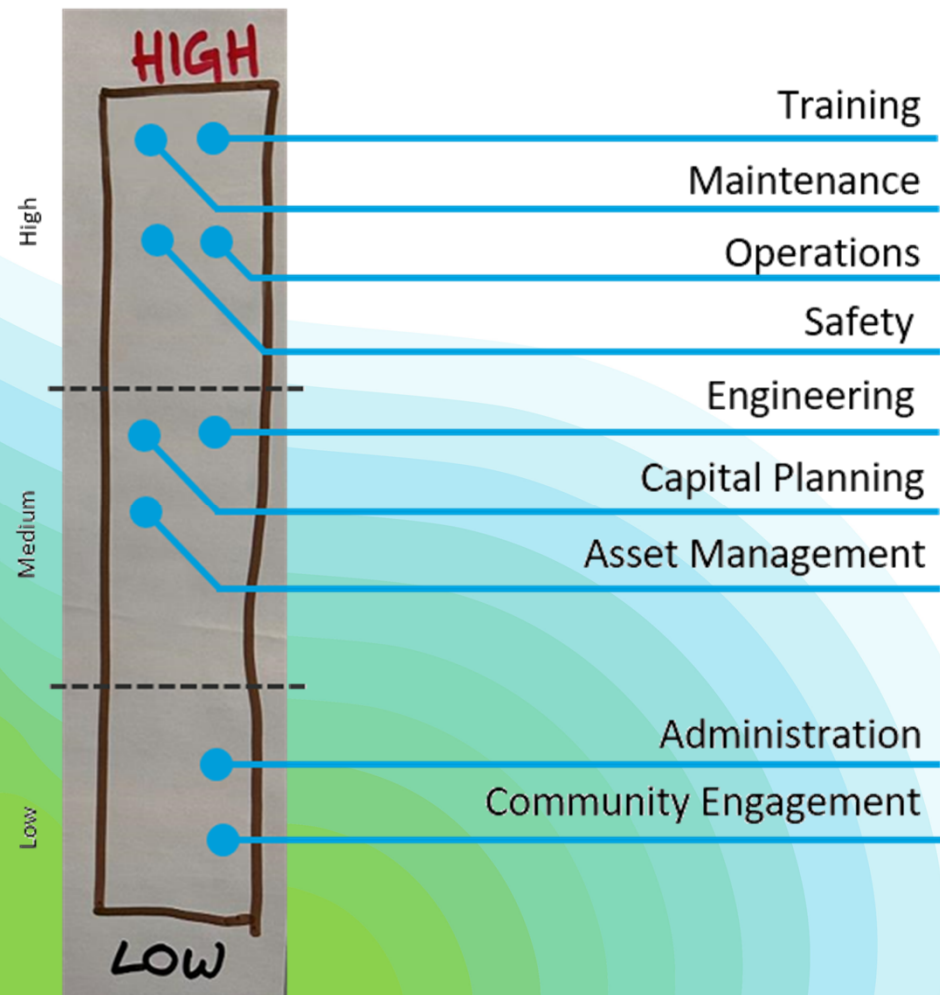
Great, You've Got a Model... Now What?



Accessibility was the #1 challenge previously

Where to focus?

Assemble a team, define a framework



Where is the value | Identify opportunities

Visualize location of safety devices

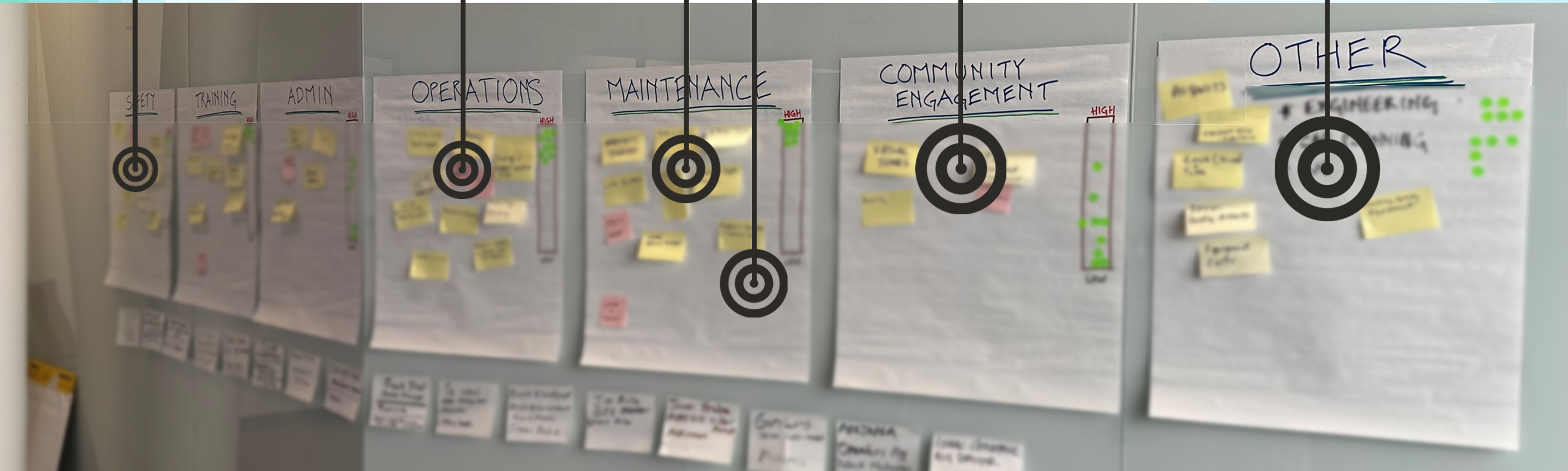
Visualize processes & systems

Visualize warranty end date

Find assets

Attract new talent

Better handover product



Define Use Cases

Be specific – keep it simple



Focus on the end user



Define expected outcomes



Capture approach considerations



Capture risk considerations



Estimate feasibility & effort

ONE PAGE Digital Twin Use Case

Locate and Access O&M Manuals

ONE PAGE Digital Twin Use Case

Search for Physical Asset Location



Goal

BIM can be used by maintenance staff to locate assets easier by providing a digital representation of the facility and its assets. The Digital Twin solution selected should provide an easy way for users to search for specific properties such as, tag number or asset type, the system will return desired results and visually indicate location of assets.



Approach

- BIM model to include desired assets
- Assets to include minimum desired attributes to support search criteria (tag number, type, description, etc.)
- Digital twin solution established will allow for simplified searching and isolating features.

Expected Outcomes:

- 01 Simplify ability to spatially locate an asset within the facility
- 02 Decrease downtime of maintenance staff from looking for information
- 03 Decrease burden on Asset Management team spending time locating assets for staff
- 04 Supports onboarding and training of new employees



Users/Roles Impacted

- Maintenance Staff
- Asset Management Staff



Risk/Considerations

- Only applies to facilities where BIM data exists
- BIM data needs maintenance to remain relevant and synchronized with physical facility
- Minimal training for staff to become familiar with capabilities



Effort & Impact



Status: Preliminary for Consideration



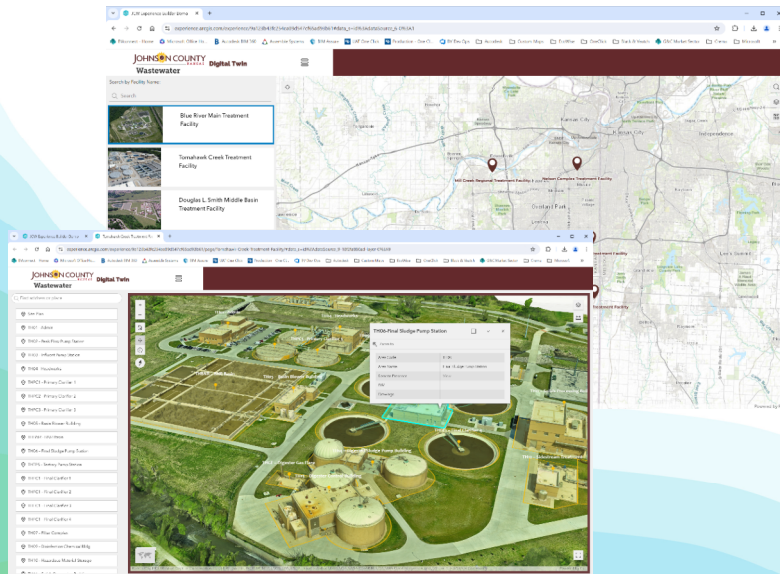
~4000 Initial Assets



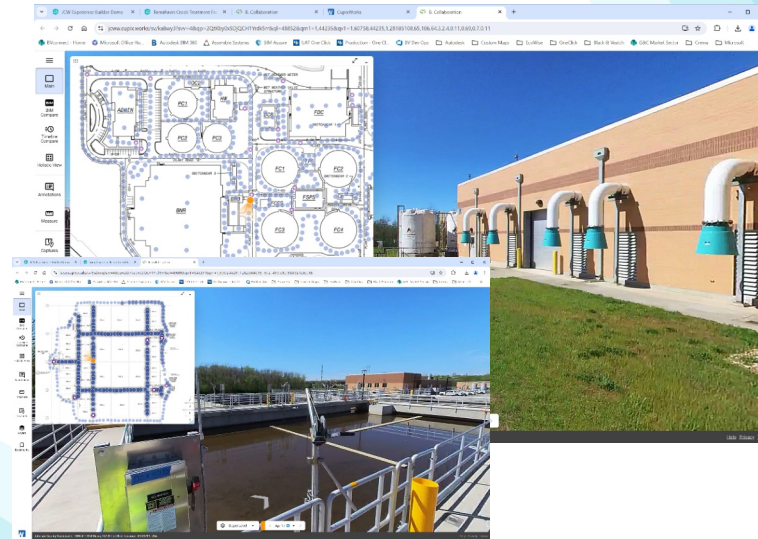
Unveiling the Concept

Enabling Components

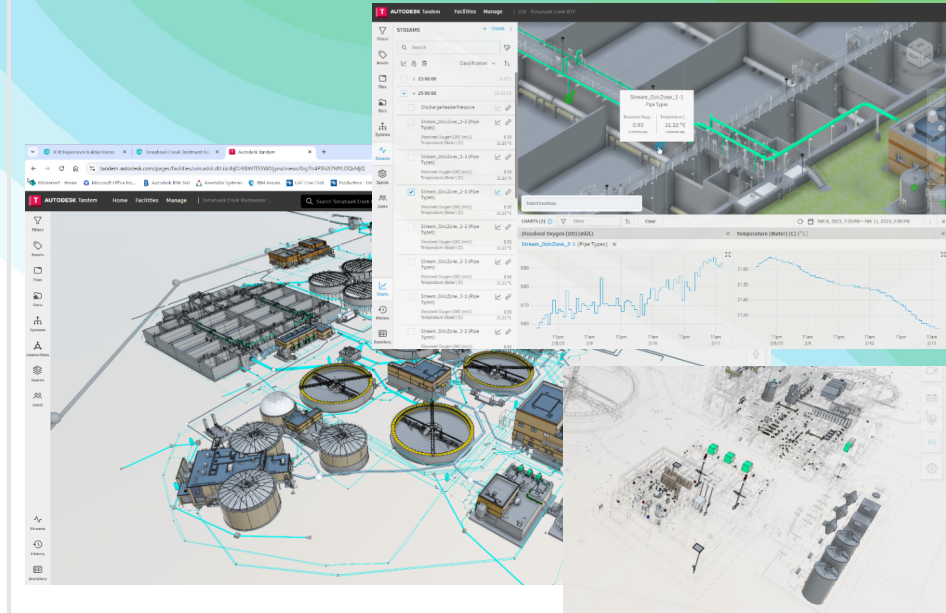
Advanced Spatial Intelligence for Facility Management



Enable Intuitive Navigation Across Sites



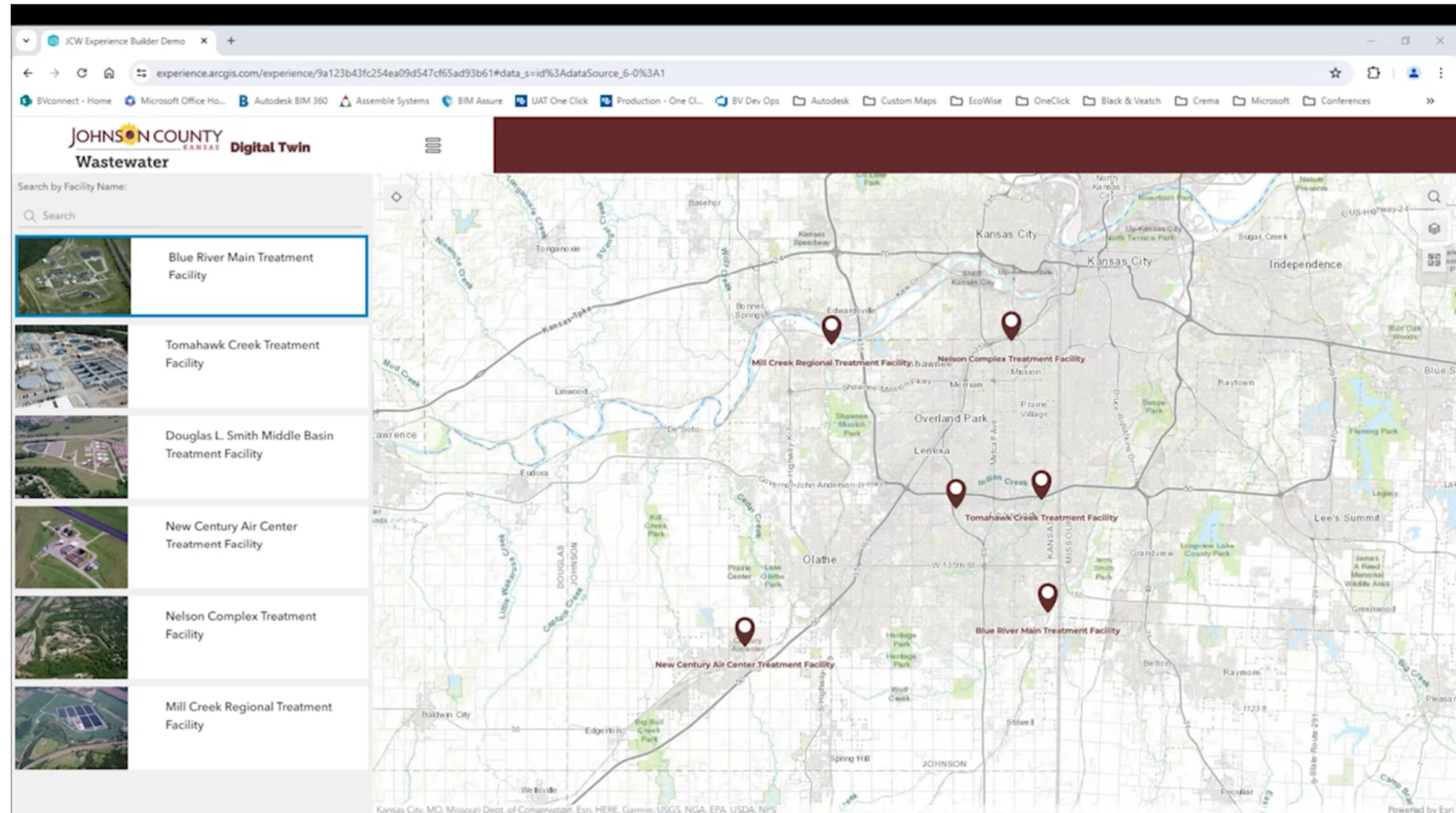
Incorporate Real Photos of Assets



BIM-Enabled Business Intelligence

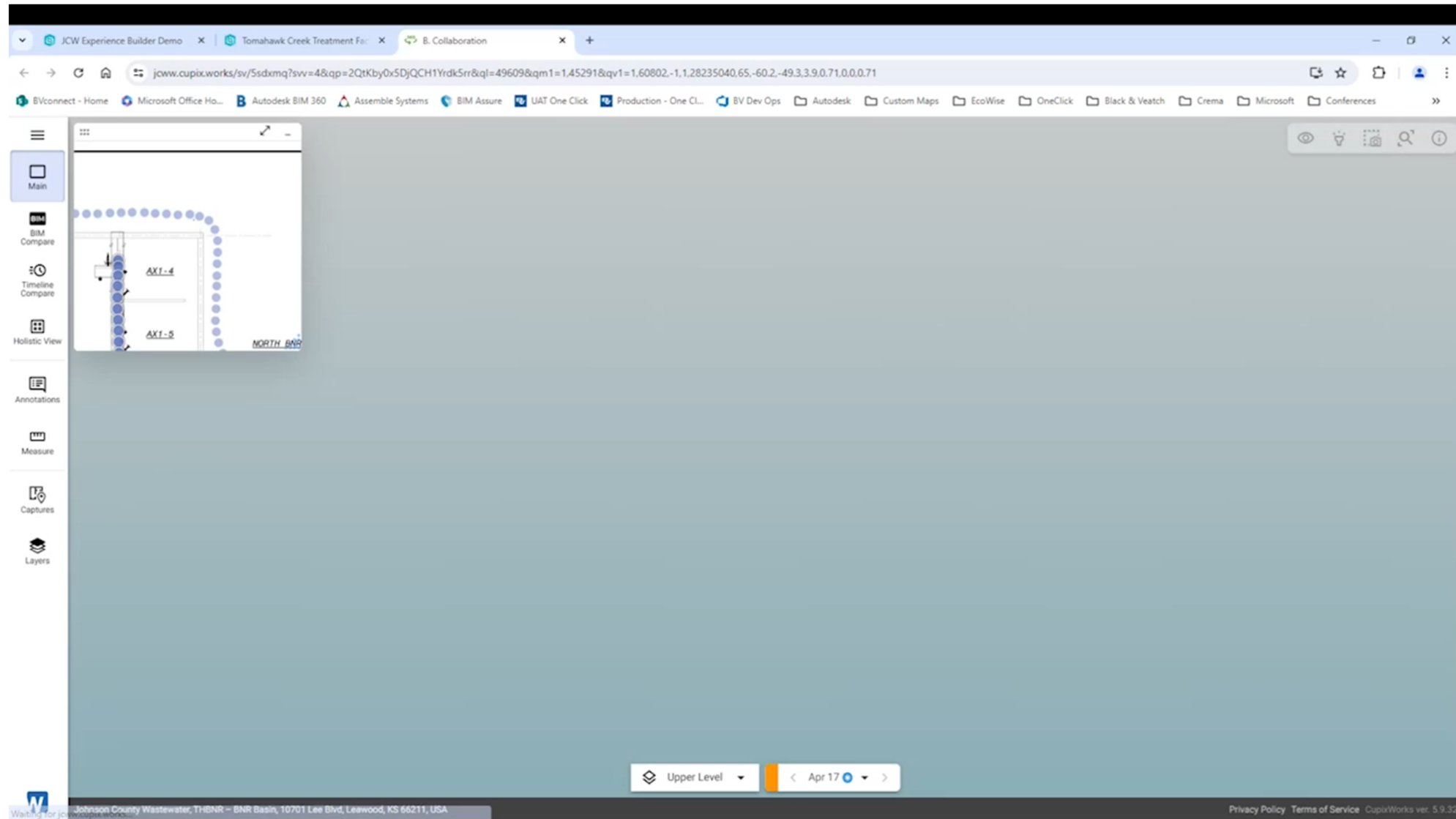
Simplify Access Across Multiple Sites

- Provide consistent data access across all sites from day one
- Map navigation for simple and intuitive users experience
- Easily scalable
- Act as switchboard for to other capabilities



Visualize **Real-World** Assets and Conditions

- Personalized “google street-view like” experience for your facilities
- Visit the site while remote
- Easily and securely share access with others
- Take measurements remotely
- Update photos regularly to monitor asset and space changes over time



Advanced Spatial Intelligence for Assets

As a maintenance professional, I need to...

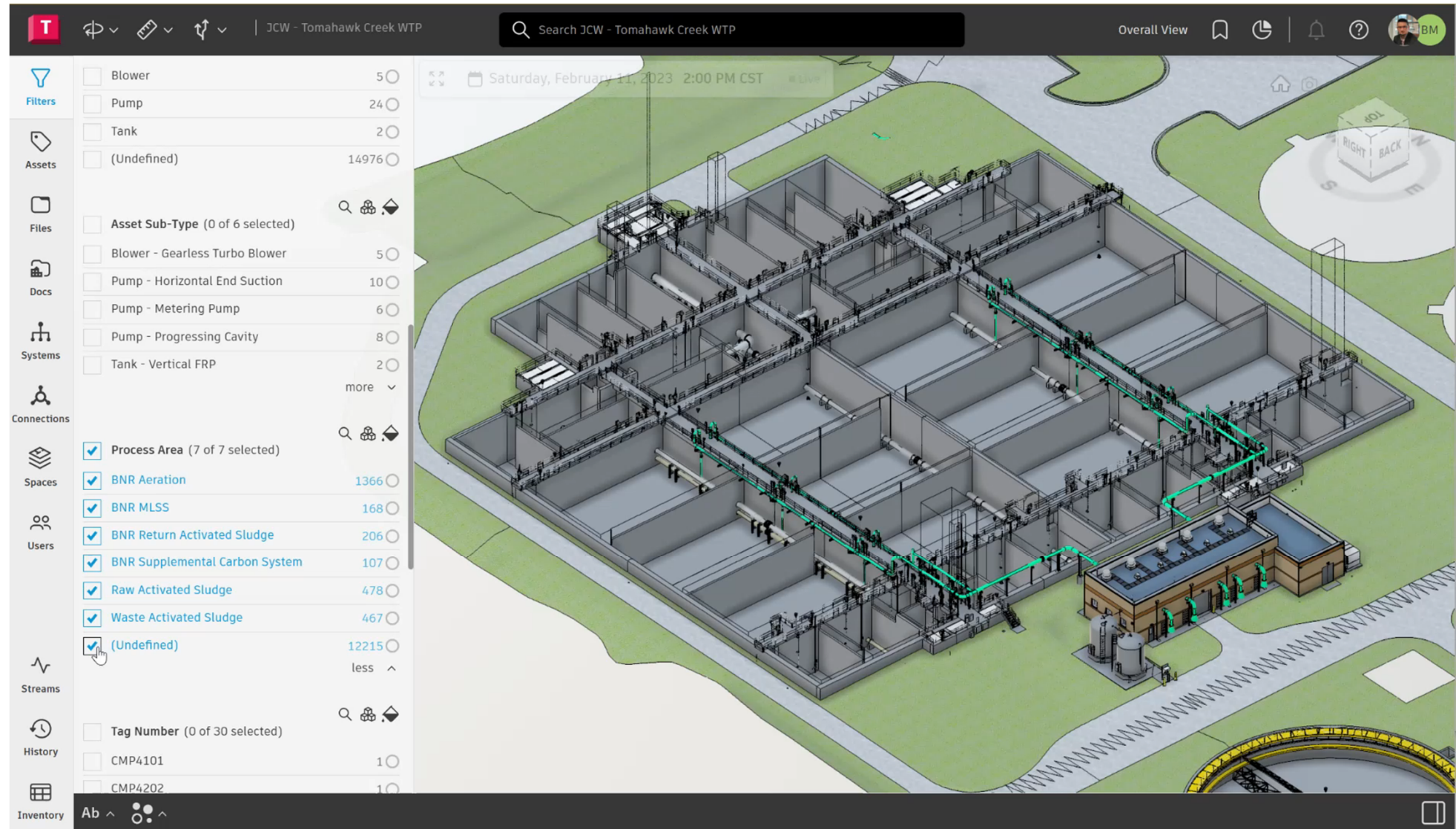
...complete this **work order** for **RSP5301**, but I don't know where it is!



Advanced Spatial Intelligence for Assets

As a maintenance professional, I need to...

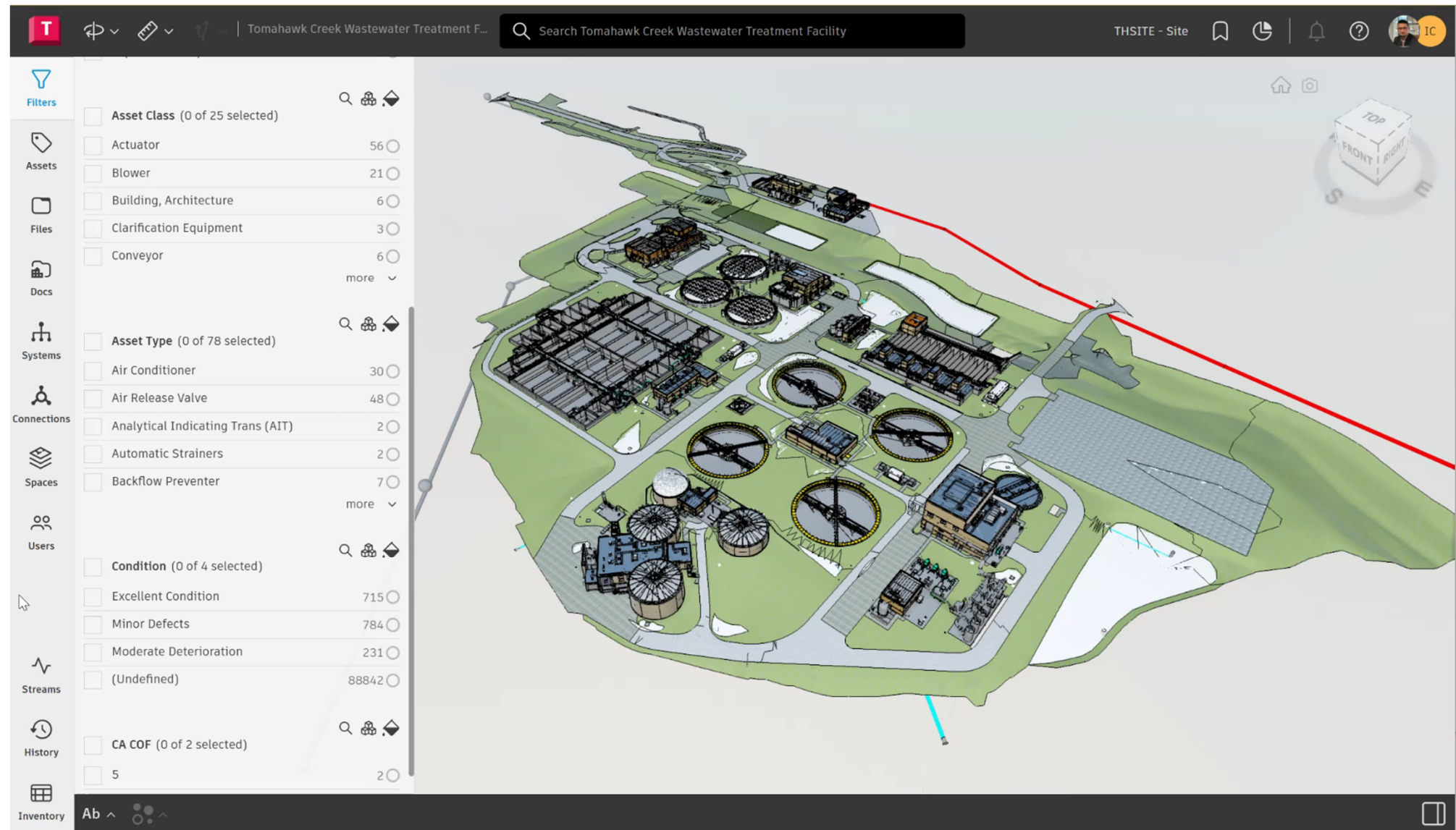
...see, **what is included in the Aeration System?**



Advanced Spatial Intelligence for Assets

As an asset management leader, I need to...

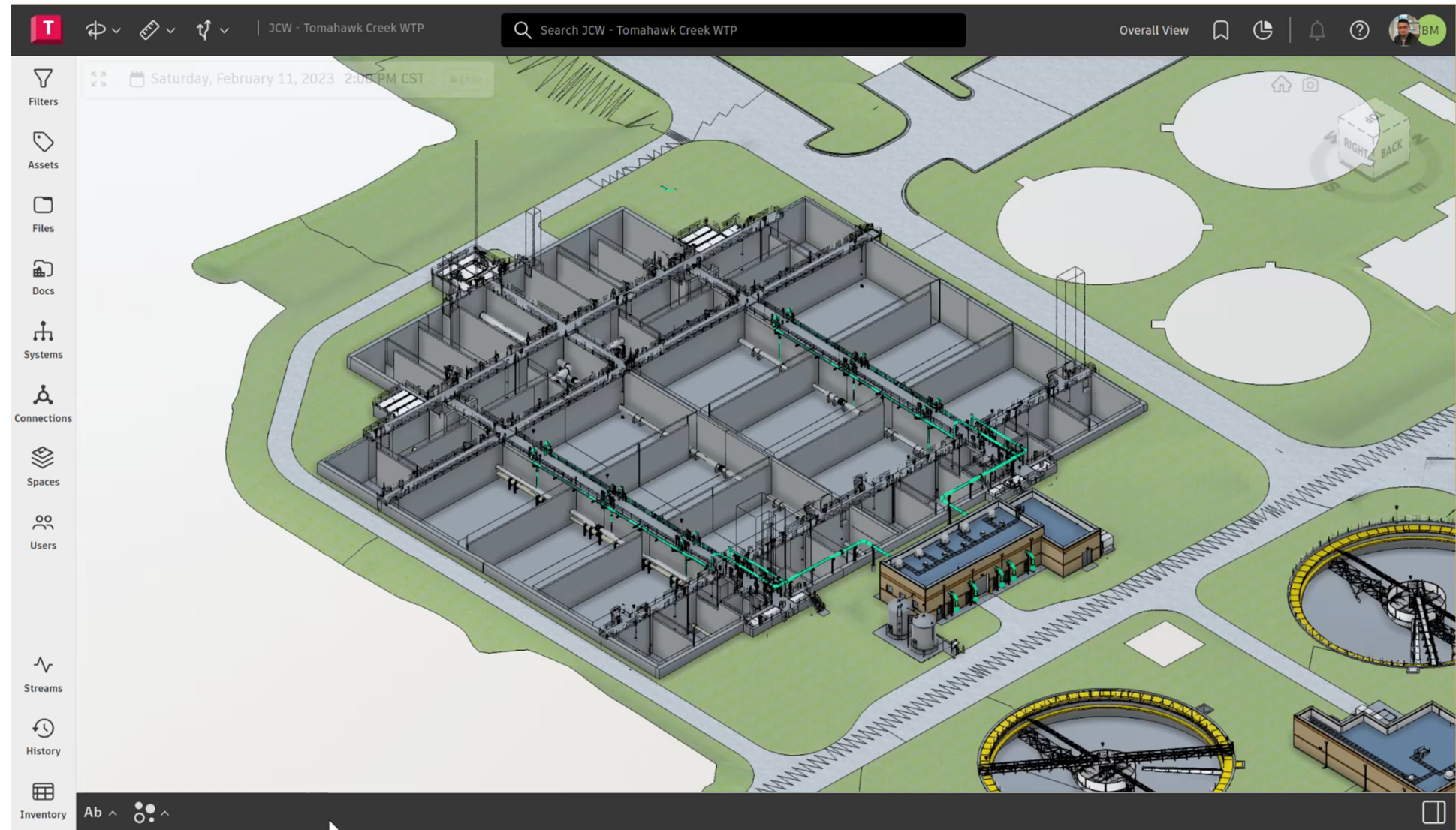
...**communicate asset health conditions** for upcoming planning meeting.



Advanced Spatial Intelligence for Assets

As an operations professional, I need to...

...know when there is an **anomaly detected with the temperature and dissolved oxygen (DO) levels** in the BNR basin



Enable Dynamic Data Flow



Spatial Digital Twin

Simplified web access to advanced spatial intelligence improving insights and decision-making

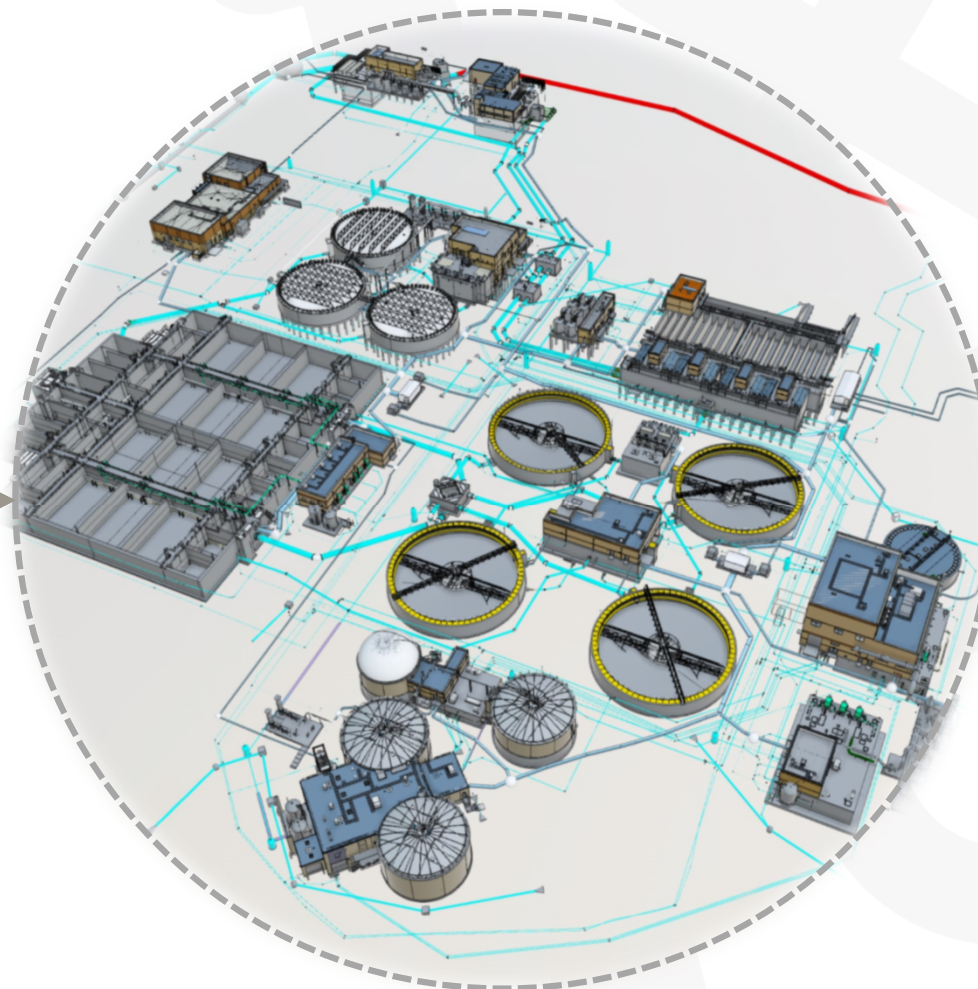
CMMS
Work orders, work order history, condition and inspection data



SCADA
Performance, Alarms



Documentation
Training, O&Ms, Vendor Info



Search for physical asset location



Access O&M's



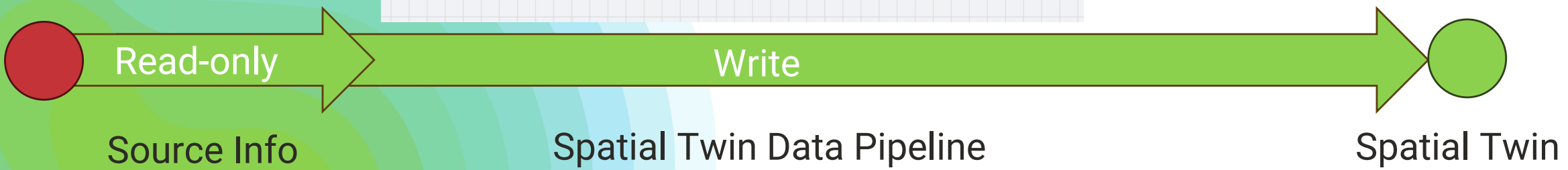
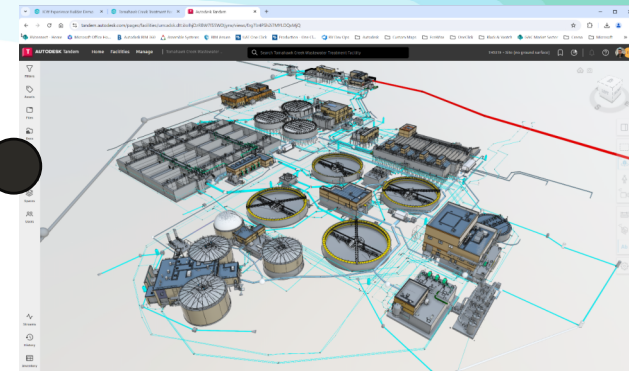
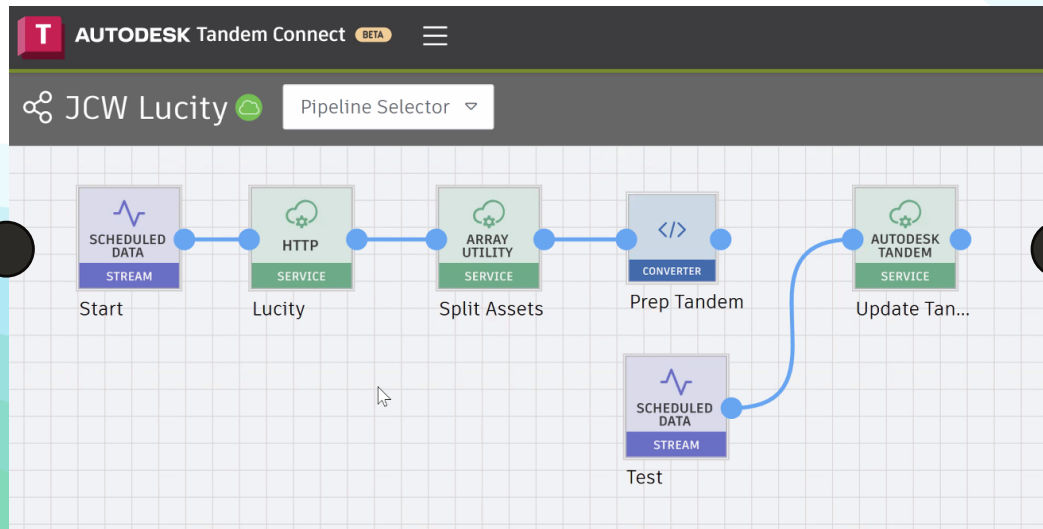
Visualize key asset management and condition data




Visualize key asset performance data and alerts

Enable Continuous Data Flow

- Connect to Azure via dedicated API
- Read-only mode of transfer
- Visualize Azure data via Tandem





Essential Playbook Insights

Playbook Insights



As the **Consultant**, I am learning:

✓ Start to consider the
“**handover product of the future**”

- Design BIM lacks detail to support new facility use cases
- Evolve record modeling processes for higher accuracy



As the **Owner**, I am learning:

✓ Think about creating a strategy for data management and governance

- Identify which assets to track in BIM and determine relevant data
- Revise your as-built specification

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Thank You