Building The Future: The Role of As-Builts In Asset Management Evolution

Explore how updated as-built documentation can revolutionize asset management by providing more accurate data for better decision-making and resource allocation.

Effective asset management hinges critically on the accuracy of the data feeding the system, but to leverage the current deliverables post construction is often labor intensive to consume into most asset management systems. Traditionally, these documents have served as the final record, detailing the location and specifications of physical assets after construction. However, conventional methods of producing as-built documents often fall short of modern demands, leading to significant challenges in asset maintenance and lifecycle management. These traditional as-built documents often lack the dynamism and integrative capabilities required for today's digital and data-driven asset management environments.

The incorporation of Geographic Information Systems (GIS) into as-built documentation ushers in a transformative era in asset management. GIS enhances these documents with spatial data and advanced analytical tools, allowing for a more accurate and interactive representation of assets. This capability is crucial for the dynamic nature of asset management, which requires ongoing updates and accessibility across various platforms.

One significant area of improvement lies in the deliverables that designers, contractors, and construction managers provide to the client. Currently, these groups provide clientele a wide range of deliverables, including self-produced 2D and/or 3D CAD files, PDF and/or paper plans. The transition to digital as-builts integrated with GIS can profoundly enhance how these deliverables support long-term asset management systems. This shift not only promises to improve the accuracy of the data provided, but also its usability in maintenance and future planning.

The goal of this white paper is to outline a clear and actionable roadmap for developing GIS-based as-builts. This guide will bridge the gap between the physical construction and the digital documentation necessary for effective future work and maintenance of assets. We aim to:

1. Identify the Shortcomings of Current Documentation Practices: Analyze the limitations associated with traditional as-built documentation, emphasizing the challenges they pose in an increasingly digital workflow.

2. Illustrate the Role and Potential of GIS in Asset Management: Discuss how GIS can revolutionize asset

management by providing tools for better visualization, accuracy, and data integration.

3. Enhance End Deliverables: Propose methods for improving the quality of digital deliverables from construction stakeholders to end clients, ensuring these documents are primed for integration into sophisticated asset management systems.

4. Develop a Strategic Implementation Roadmap: Offer a phased approach to adopting GIS-based as-builts, tailored to meet the needs of various stakeholders involved in the asset lifecycle, from design through to operations.

Current State

Traditional as-built documentation, particularly when centered around Computer-Aided Design (CAD) systems, faces significant challenges that impact their utility in contemporary digital workflows. These challenges stem from the inherent limitations of CAD systems in capturing the dynamic and multifaceted data needed for effective asset management, inconsistencies due to varied skill levels among labor, and a general lack of alignment with the specific asset management needs of clients. This section delves into these specific issues, highlighting the need for a more integrated and sophisticated approach to documentation.

CHALLENGES WITH CAD-BASED DOCUMENTATION

CAD systems have been the cornerstone of engineering and architectural design for decades, offering robust tools for creating detailed designs and drawings. However, CAD as-built documents typically focus on design intent rather than representing what is actually built, and may not include all necessary data for asset management purposes. For instance:

- Difference Between Pay Items and Assets: CAD drawings often categorize components based on construction specifications and pay items rather than viewing them as assets with a lifecycle. This categorization is suitable for initial construction phases but falls short in providing the detailed data required for ongoing asset management, which needs a focus on the operational and maintenance aspects of each asset.

- Integration Issues: CAD systems are not inherently designed to interface smoothly with GIS or other asset management tools, which are essential for managing spatial data and assets over time. This lack of integration leads to significant gaps in data utility and accessibility.

INCONSISTENCY DUE TO VARIED SKILL LEVELS

The effectiveness of traditional as-built documentation is heavily dependent on the

skill level of the personnel involved in their creation and maintenance. Disparities in training and experience can lead to:

- Variability in Document Quality: Less experienced workers may not follow the same standards or attention to detail as their more experienced counterparts, leading to inconsistencies in the as-builts. Such variability can affect everything from the accuracy of the data, to its format and depth of detail, complicating maintenance, and asset management efforts.

- Errors and Omissions: Inaccurate or incomplete as-builts due to human error or misunderstanding can result in costly adjustments during the maintenance phase of asset management, where precise data is crucial for effective decision-making.

LACK OF EXPERIENCE WITH CLIENT-SPECIFIC ASSET MANAGEMENT NEEDS

Often, the teams responsible for producing as-built documentation have limited understanding of the client's asset management systems and requirements. This disconnect results in several issues:

- Misalignment with Client Needs: Documentation may not be tailored to integrate seamlessly with the client's existing asset management tools or may fail to include data critical for specific asset management tasks, such as condition monitoring or risk assessment.

- Training and Development Gaps: The workforce might not be adequately trained in the specificities of asset management-focused documentation, which requires not only technical skills, but also an understanding of asset lifecycle management and maintenance planning.

Enhanced Deliverables with GIS

GIS represents a transformative leap forward in the field of asset management, providing a platform not only for improved visualization, but also for enhanced accuracy and comprehensive data integration. As asset management evolves to accommodate more complex infrastructures and more dynamic operational demands, GIS technology emerges as a critical tool in revolutionizing the field.

ENHANCED VISUALIZATION CAPABILITIES

GIS allows for the spatial visualization of assets in a way that is not possible with traditional documentation systems. Managers can see not just the position of assets, but also their relationships to each other and the broader environment. This spatial awareness is crucial for planning maintenance activities, assessing risks, and optimizing operations across widespread geographic locations.

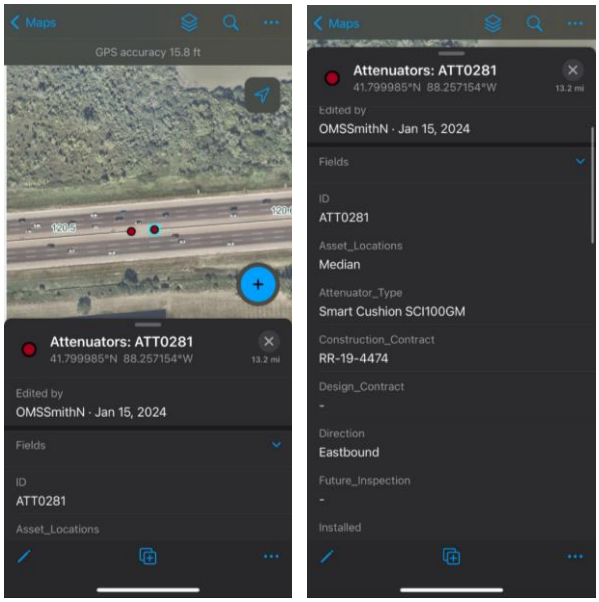

Figure 1 – arcgis field maps mobile data collection

IMPROVED ACCURACY

The precision of GIS data stems from its capability to integrate and analyze various data types and sources. This integration ensures that asset information is not only more accurate, but also more reflective of real-time conditions. GIS supports various data inputs, including real-time sensor data, which can be used to monitor the condition of assets and predict failures before they occur, thereby reducing downtime and maintenance costs.

COMPREHENSIVE DATA INTEGRATION

One of the most significant advantages of GIS in asset management is its ability to consolidate disparate data into a single, coherent system. GIS can incorporate historical data, maintenance records, operational metrics, and more, all within the same framework. This holistic view enables asset managers to make more informed decisions, supported by a complete understanding of each asset's history and current status.

ENHANCING END DELIVERABLES

The transition to GIS-based as-built documentation offers a substantial improvement in the quality of digital deliverables from construction stakeholders to end clients. Here are several methods to ensure these deliverables are optimally primed for integration into sophisticated asset management systems:

CONTINUOUS FEEDBACK AND UPDATES

Establishing a feedback loop between end users and document creators allows for continuous improvement of the GIS-based as-built documentation. As asset managers use these systems, their insights and suggestions can help refine and optimize the documentation process, making it more attuned to operational needs.

Strategic Roadmap

To successfully adopt GIS-based as-built documentation within an asset management framework, organizations must follow a strategic, phased approach that accounts for the diverse needs and roles of all stakeholders involved—from the initial design phase through construction, to long-term operations and maintenance. This roadmap outlines a structured path to integration, ensuring each phase builds upon the previous one, ultimately leading to a robust and effective implementation.

PHASE 1: PLANNING AND PREPARATION

1.1 STAKEHOLDER ENGAGEMENT

Initiate the process by engaging all relevant stakeholders, including designers, contractors, construction managers, asset managers, and IT specialists.

Understanding their needs, expectations, and current workflow challenges is crucial for tailoring the GIS implementation to meet organizational objectives.

1.2 NEEDS ASSESSMENT AND FEASIBILITY STUDY

Conduct a thorough assessment of current as-built documentation processes and asset management needs. This assessment should identify the gaps in current practices and the potential benefits of GIS integration. A feasibility study will help determine the technical and financial requirements for the project.

1.3 ESTABLISH STANDARDS AND PROTOCOLS

Develop standardized protocols for data collection, entry, and management to ensure consistency across the project. Decide on the GIS software and hardware requirements, ensuring compatibility with existing systems and scalability for future needs.

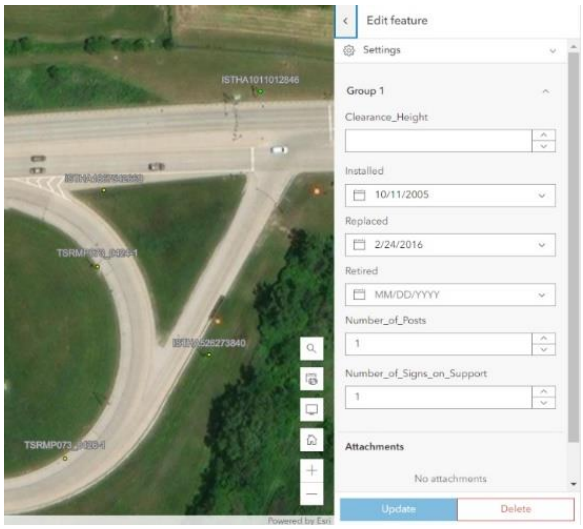

Figure 2 – webmap to check the data collected

PHASE 2: SYSTEM DESIGN AND DEVELOPMENT

2.1 GIS SYSTEM DESIGN

Design the GIS system architecture with the help of IT specialists and GIS experts. This design should incorporate the data standards and protocols established in Phase 1, and ensure that the system supports real-time data integration and mobile access, if needed.

2.2 PILOT PROJECT

Before full-scale implementation, conduct a pilot project on a small-scale to test the GIS system. This project should represent a typical segment of the organization's assets and involve all key stakeholders. The pilot will help identify potential issues and allow for adjustments before wider deployment.

2.3 TRAINING AND SUPPORT

Develop comprehensive training programs to educate all users on how to use the new

GIS system effectively. Include training on data entry, system navigation, data analysis, and troubleshooting. Ongoing support should also be planned to assist users after deployment.

PHASE 3: FULL-SCALE IMPLEMENTATION

3.1 GRADUAL ROLLOUT

Implement the GIS system gradually across the organization. Begin with departments or projects that showed the most significant potential for improvement during the needs assessment. A gradual rollout helps manage the change more effectively and allows time to make necessary adjustments.

3.2 INTEGRATION WITH OTHER SYSTEMS

Ensure that the GIS system is fully integrated with other existing management systems, such as Enterprise Asset Management (EAM) systems, to maximize data utility and workflow efficiency. Seamless integration is crucial for real-time data sharing and decision-making.

3.3 CONTINUOUS MONITORING AND FEEDBACK

Establish mechanisms for continuous monitoring of the system's performance and gather regular feedback from users. Use this feedback to refine processes and address any issues that arise. Continuous improvement will help maintain the relevance and effectiveness of the GIS system.

PHASE 4: REVIEW AND OPTIMIZATION

4.1 PERFORMANCE EVALUATION

Regularly evaluate the performance of the GIS system against the objectives set during the planning phase. Assess improvements in asset management efficiency, data accuracy, and stakeholder satisfaction.

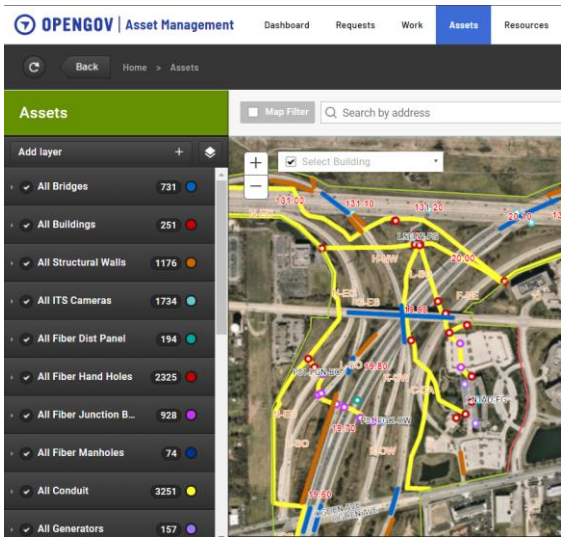

Figure 3 – as-built data is imported into asset management system

4.2 SYSTEM UPGRADES AND EXPANSION

Based on the performance evaluations and technological advancements, plan for necessary upgrades or expansions to the GIS system. Keep the system aligned with the latest GIS technologies and industry best practices to ensure ongoing benefits.

4.3 LONG-TERM STRATEGY DEVELOPMENT

Develop a long-term strategy for maintaining and expanding the use of GIS-

based as-builts within the organization. This strategy should include plans for adapting to changes in technology, market conditions, and organizational goals.

Conclusion:

The transition from traditional as-built documentation to GIS-based digital as-builts represents a fundamental shift in the way asset management is approached and implemented. Traditional methods, while foundational, often fall short in meeting the demands of modern asset management, plagued by issues of accuracy, timely updates, and poor integration with advanced management systems. These limitations significantly hinder the effectiveness of asset management practices, impacting maintenance scheduling, operational efficiency, and long-term asset planning. By embracing GIS-based as-builts, organizations equip themselves with the tools to manage their assets more effectively, ensuring that they are well-prepared to meet the demands of both today and tomorrow.

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