



Advancing Infrastructure

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Bentley Transportation Playbook

Playbook Introduction

Purpose

The purpose of Bentley's industry playbooks is to enable Bentley teams to go to market effectively via industries.

Objectives

This internal-only document will ensure teams:

- Are informed and educated about the industry.
- Are supported in establishing Bentley's position as an expert and thought leader.
- Understand how Bentley solutions fit existing user needs to solve their goals/problems.
- The playbook will not be a deep dive into all personas or products. Further supplemental materials will be available for this level of detail.

Audience

The primary teams that will leverage this playbook are:

- **Sales** team, to support prospecting and account management efforts.
- **Go-to-market** team, to build campaigns in support of sales goals.
- **Content activation** team, to create external content and collateral.

Frequency of update

Industry guides will serve as evergreen documents, revisited annually to ensure they enable sales, align with Bentley's brand, and stay current with evolving market dynamics.

Additional documents

In addition to these playbooks, we will issue annual, detailed GTM plays offering insights into proven strategies for winning and selling Bentley's energy solutions, as well as supplemental content kits to support external-facing activities.



Four dedicated industry playbooks will enable the Bentley teams to go-to-market

GTM by Industry Approach

Transportation

- Road & Highway
- Rail & Transit
- Bridge & Tunnel

Energy

- Energy production
- Electric Utilities
- Power Systems Analysis

Cities, Campuses and Airports

- Airports
- Cities/Municipalities/Regions
- Ports
- Industrial Campuses/Sites/Parks

Water

- Drinking Water
- Wastewater
- Water Resources

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Transportation Strategy

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Transportation Landscape

Transportation infrastructure is the backbone of society, providing networks that connect communities, support economic growth, and ensure access to essential services. Transportation professionals are dedicated to improving these systems, making them more efficient, accessible, equitable, and, most importantly, safe and resilient to meet both current and future demands.

As we face the reality that our infrastructure is rapidly aging and over 95% of the infrastructure required for 2030 is already in place, the need to expand, modernize, and retrofit existing networks has never been more urgent. The shortage of engineers further exacerbates this challenge.

That's where Bentley comes in. We offer AI-powered, purpose-built solutions across the entire project lifecycle, both above and below ground, enabling engineers, contractors, and owner-operators to collaborate better and do more with less.

The current Transportation industry market size is projected at around \$9 billion with Planning at \$0.7B, Design \$1.6B, Construction \$1.9B, Operations & Maintenance \$2.8B and Whole Lifecycle \$3B.

Sub-Industries



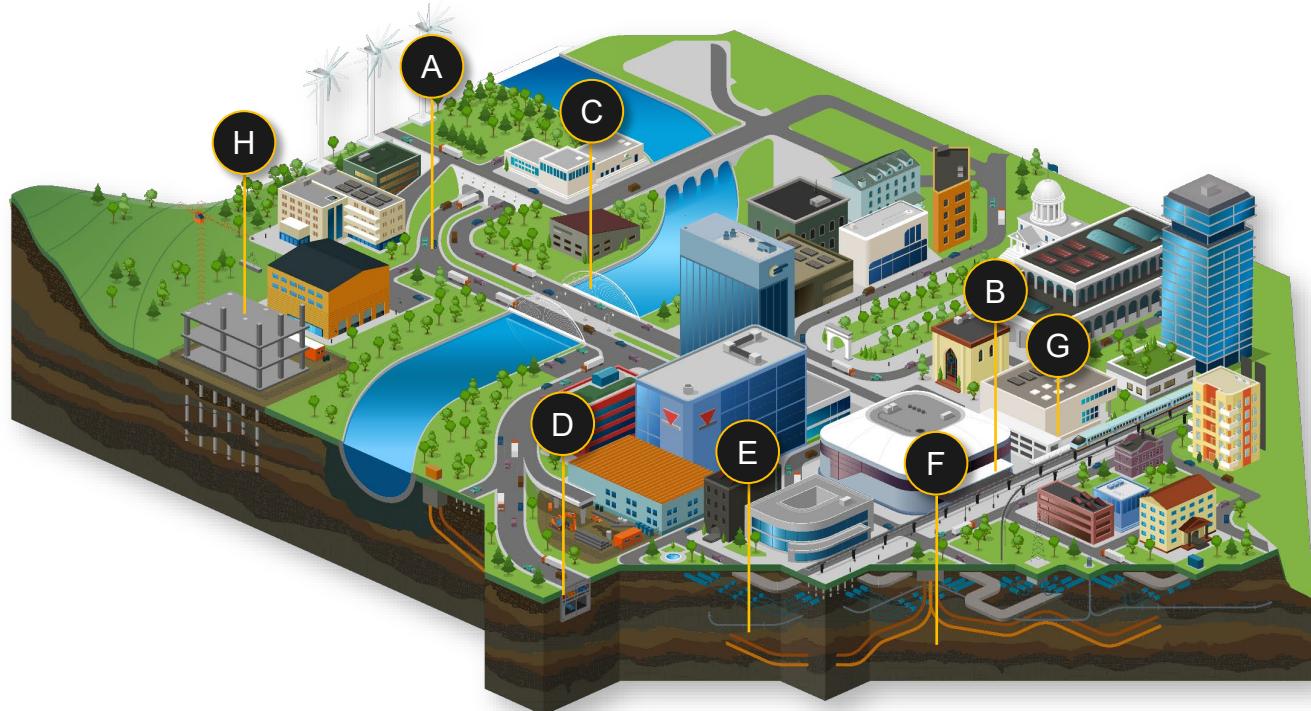
Road & Highway



Rail & Transit



Bridge & Tunnel



We support road, rail, bridge, and tunnel infrastructure as well as critical supporting elements such as drainage, geotech, signaling, and structures

A – Road
B – Rail
C – Bridges
D – Tunnels

E – Drainage
F – Geotech
G – Signaling
H – Structures

Transportation

Value Proposition

Bentley Purpose

To advance the world's infrastructure for **better quality of life**

Bentley Mission

We empower people to **design, build, and operate** better and more resilient **infrastructure**, through the adoption of our intelligent **digital twin solutions**.

2025 Bentley Objectives

1. Advance ProjectWise
2. Lead infrastructure AI
3. Enable 3D geospatial experiences
4. Transform internal systems and processes
5. Elevate the account experience

Transportation Value Proposition: The Leader in Transportation Infrastructure Delivery & Performance

Meet rising demands, seamlessly connect teams across the lifecycle, and embrace digital transformation. With decades of industry experience and deep understanding of engineering principles, we have developed our solutions from your perspective to optimize designs, accelerate project delivery, and enhance asset quality and safety. With Bentley Transportation, you're not just investing in software, you're investing in efficiency, innovation, and reliability.

Bentley Points of Difference

Leader in transportation engineering solutions both above and below ground.

Advancing digital delivery through seamless integration of construction planning solutions.

Incorporates AI for in-depth asset analysis, predictive maintenance, and efficient asset management.

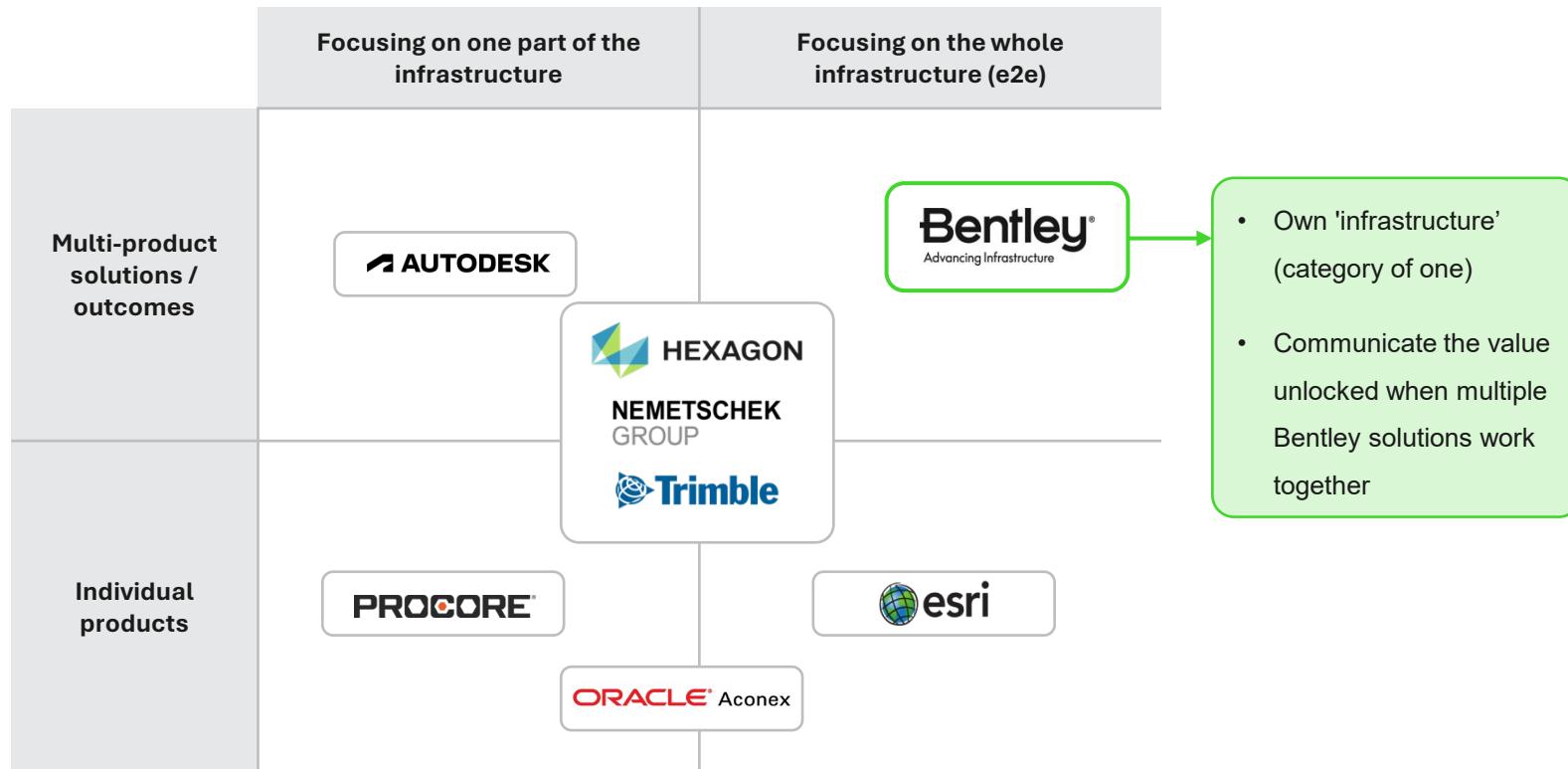
Transportation

Points of Difference

Bentley Point of difference	Bentley Solution	Aligned to Bentley Objectives	Impact
Leader in transportation engineering solutions both above and below ground	<p>Bentley is recognized for its comprehensive expertise in transportation infrastructure, delivering top-tier civil and geotechnical engineering solutions.</p> <p>Products: OpenBridge, OpenRail, OpenRoads, OpenTunnel+ Sequent + ProjectWise</p>	<ul style="list-style-type: none"> Cross sell open applications and Sequent products within existing transportation accounts (ARR growth). Drive adoption of portfolio across an organization's departments/locations (E365 consumption). Natural complement to adopt next-generation ProjectWise. 	<ul style="list-style-type: none"> Comprehensive and discipline focused, not generic, software for each type of transportation discipline: road, rail, bridge, tunnel, geotech. Accelerate design time by 20%+ Prioritizes interoperability and file format consistency, removing the need for cumbersome file format exchanges. Produces a dynamic rich dataset allowing for continuous enhancement and refinement throughout construction, operations, and maintenance.
Advancing digital delivery through seamless integration of construction planning solutions	<p>Bentley's construction planning solutions are at the forefront of digital delivery, transforming the way transportation projects are executed with precision and agility.</p> <p>Products: Bentley Infrastructure Cloud (SYNCHRO & ProjectWise)</p>	<ul style="list-style-type: none"> Natural complement to engineering solutions for Design Build accounts (ARR growth) Allows owners to meet digital delivery requirements and improve their O&M (ARR growth & E365 consumption) 	<ul style="list-style-type: none"> Utilize 3D design models to enable early-stage collaboration and design reviews, leading to improved constructability, minimized errors and rework, and efficient handover to construction team. Accelerate construction time by 20%+ Improve planning and bidding with 5D cost projection and automated quantity take-offs. Reduce 40% of time spent developing quantities. Create a unified digital twin to serve as a collaborative platform for design and construction, enhancing project delivery and equipping owners with superior data quality for effective asset management.
Incorporates AI for in-depth asset analysis, predictive maintenance, and efficient asset management	<p>Bentley harnesses the power of artificial intelligence and machine learning to redefine condition monitoring, proactive maintenance, and efficient asset management; ensuring transportation systems are smart, resilient, and future-ready.</p> <p>Products: iTwin IoT, iTwin Experience, iTwin Capture, Blynksy, Bentley Infrastructure Cloud (AssetWise)</p>	<ul style="list-style-type: none"> We take a leadership position with AI-based solutions for infrastructure engineering 	<ul style="list-style-type: none"> Develop a comprehensive understanding of existing infrastructure assets to drive strategic decisions that accelerate project delivery. AI technologies enhance and enable continuous remote health and condition monitoring for proactive maintenance and risk management. Reduce field time by 20%+ Automatically detect where and when your pavement needs maintenance, monitor your paint line condition over time and in real-time, fix faded road striping before it creates dangerous conditions. Leveraging digital delivery and the digital twin improves collaboration and information sharing. Reduce materials used during construction by 10%+

Transportation

Competitor Landscape



In addition to the overarching Bentley competitors, Bentley competes with **Oracle Aconex** in transportation.

"A construction management software that is part of Oracle's Construction and Engineering Cloud Platform."

SWOT Analysis for Bentley in the Transportation industry

Strengths

- Market leader in roadway, bridge, and tunnel design products, with high adoption rates, especially among US, UK, and ANZ DOTs and their consultants.
- Bentley Infrastructure Cloud (including ProjectWise) provides a robust repository for data-rich digital twins, offering a well-established solution for our users.
- Unmatched breadth in product portfolio that covers all aspects of the asset lifecycle including planning, design, construction and operations with consistent ARR growth.
- Industry-leading reality capture products, such as iTwin Capture and Blynscy, with the captured data increasingly being used for the rest of the asset lifecycle.

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Weaknesses

- Bentley's transportation operations phase offerings are currently limited, which owner/operators may view as a gap in our comprehensive lifecycle solutions.
- Interoperability challenges exist both within our own products and with other non-Bentley software tools used by our users.
- There is a geographic revenue concentration risk in the EMEA and APAC regions.
- We need to rebuild confidence in our rail design tools.

Opportunities

- Multi-year tailwinds in the infrastructure industry.
- Bentley's AI advancements in data acquisition, design, and operations & maintenance position us as a leader across the entire project lifecycle by leveraging our existing user base and industry knowledge.
- Cesium and Google's geospatial and visualization capabilities enhance our project lifecycle story. Partnering with their brands expands our reach to a larger audience of potential users.
- Blynscy's powerful capabilities in the maintenance phase, combined with further asset analytics development, will solidify leadership in O&M.
- Our leadership with many DOTs in design (OpenRoads), data management (ProjectWise), and asset management (AssetWise) drives product affinity with our geotechnical, construction, and digital delivery solutions.

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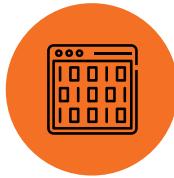
Threats

- Bentley faces competitive threats from Autodesk and ESRI, who are forming strategic partnerships and creating the perception that their tools are more "open" than Bentley's. Our strong user base within the governmental sector may increasingly favor open solutions.
- IFC (Industry Foundation Classes)
- Potential market competition from tech giants and startups. Disruptive technologies or new market entrants could challenge Bentley's current offerings.
- Rapid technological changes requiring continuous innovation.
- Economic factors affecting infrastructure spending. Infrastructure projects can be delayed or canceled in response to economic downturns, directly affecting Bentley's revenue.

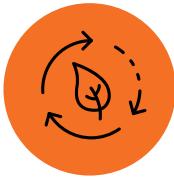
Transportation

Current & Emerging Trends

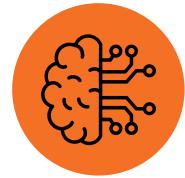
Current and emerging trends affecting Transportation infrastructure industry.



1. Digital Transformation



2. Sustainability & Race to Net Zero



3. Artificial Intelligence (AI)



4. Rapid Urbanization & Population Growth



5. Infrastructure Stimulus Government Initiatives

1. Digital Transformation

Organizations across the industry are in varying stages of adopting digital project delivery. This shift is causing owners, engineering firms, and contractors to evaluate their solutions to meet new project delivery requirements.

According to [RICS](#), obstacles to use digital technology in the sector:

1. Cost, effort, and changes needed
2. Shortage of skilled persons
3. No clear demand from clients

Opportunity

Driving demand for solutions that support digital delivery and the development of digital twins.



2. Sustainability and Resiliency

The global push for a sustainable future drives investments in building resilient infrastructure, promoting sustainable industrialization, and leveraging innovation to create safer, more efficient, and equitable communities.

25%

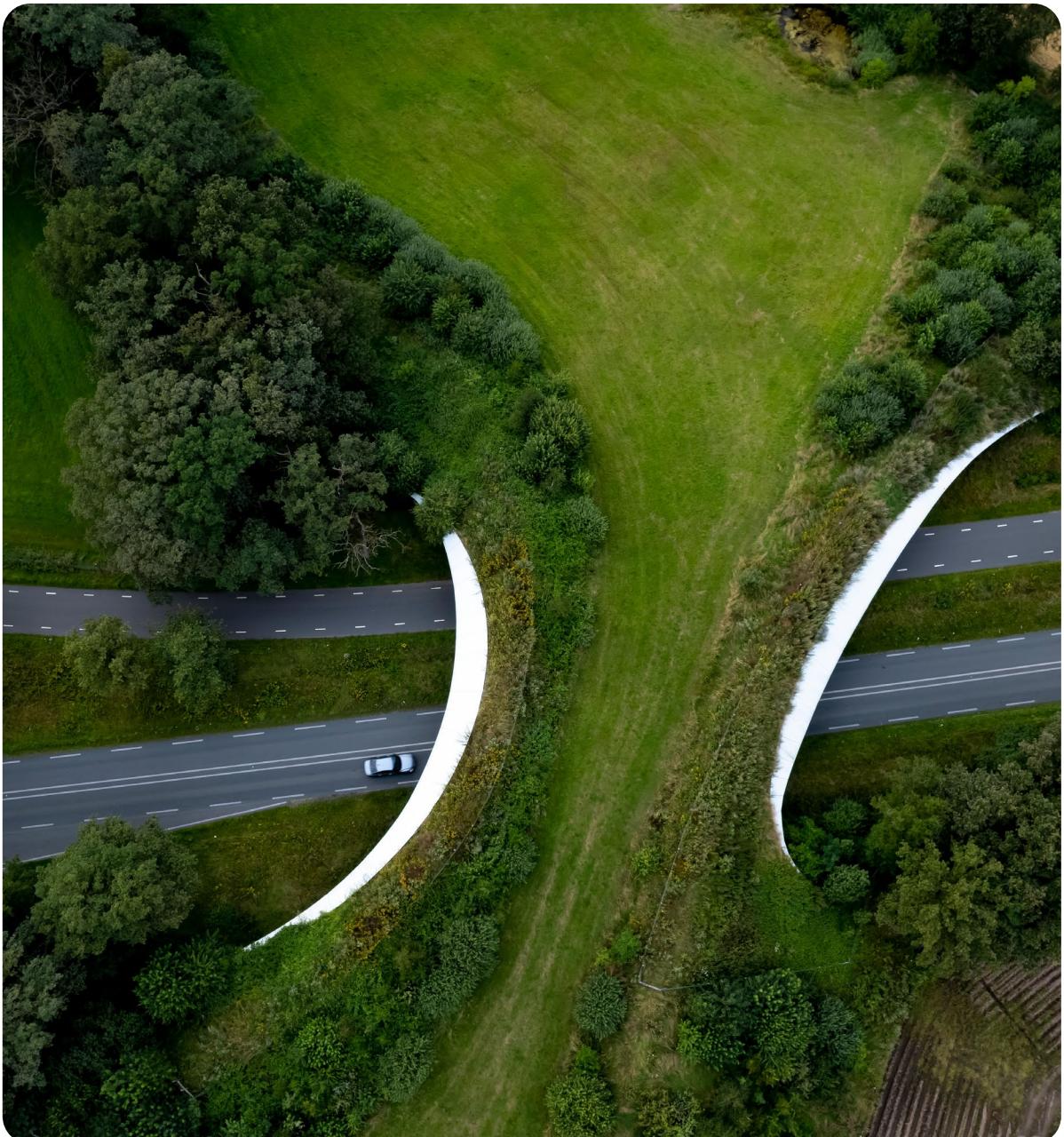
80%

[According to World Bank](#),
the transportation sector
accounts for 25% of global
CO2 emissions.

Trains emit between [70 to 80% less greenhouse emissions](#) than automobiles and airplanes.

Opportunity

Explore ways to reduce traffic congestion, improve public transit, and promote multimodal options. Incorporate technology that enhances collaboration among transportation sector stakeholders, reducing waste and time in the field.



3. Artificial Intelligence (AI)

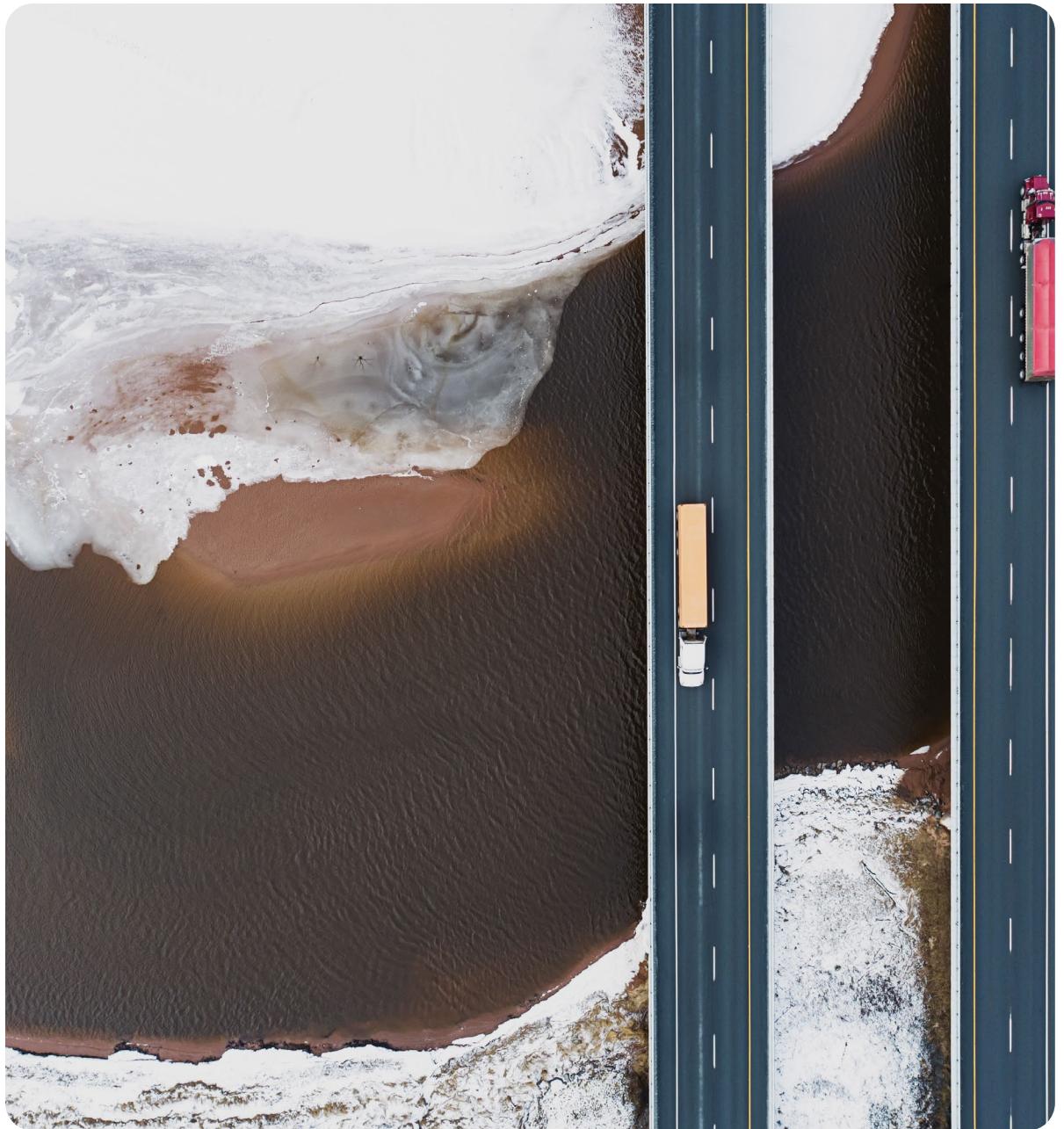
Engineers are turning to AI-driven solutions for automation to close their capacity and skills gap.

[McKinsey analysts](#) found engineering & construction frontrunners in artificial intelligence (AI) adoption could double their cash flow (economic benefit captured minus associated investment and transition costs) by 2030, with a **122% cumulative change**.

Whereas nonadopters [of artificial intelligence] “might experience around a **20% decline** in their cash flow from today’s levels,”

Opportunity

AI-powered solutions can accelerate project delivery by bridging the skills and capacity gap, while providing real-time monitoring and insights for proactive maintenance to enhance asset performance.



4. Rapid Urbanization and Population Growth

There is a need for expanded transportation networks to accommodate growing demand for mobility, accessibility, and public safety. Infrastructure stimulus is expediting this demand worldwide to ensure sustainable and inclusive growth.

55%

68%

[According to the UN](#), 55% of the world's population lives in urban areas.

This proportion is expected to increase to 68% by 2050.

Opportunity

Address current and future demand with transportation planning and mobility simulation software (OpenPaths). Increase project throughput with Bentley's road/rail engineering & construction planning solutions.



5. Government Stimulus

Government initiatives, regulations, and funding is expediting infrastructure development across the globe. Organizations are challenged to keep up with increasing demand and how to access/leverage stimulus offerings.

US\$550 B

IIJA is investing \$550 billion in new federal investments to upgrade US infrastructure until the end of 2026

€7B+

The European Commission has selected 134 transport projects to receive €7 billion+ in EU grants

AU\$20.8 B

ANZ announced a \$5B boost to transport funding for 2024-27, to \$20.8 billion.

US\$1.4T

Infrastructure sector investments for India worth US\$1.4 trillion are planned by 2025.

Opportunity

Bentley solutions, along with our Government Relations team, assist organizations in qualifying for stimulus opportunities and provide guidance on how to best leverage these funds for optimal ROI.



The Transportation infrastructure landscape faces 5 big challenges



Aging Infrastructure

More than **95%** of the infrastructure that will be in use by **2030** already exists today. Owner-operators need to expand, modernize, and retrofit existing networks to ensure they remain resilient, efficient, and capable of meeting future demands.

As roads, bridges, and public transit systems deteriorate, the risks of failures increase, leading to costly repairs, disruptions, and potential safety hazards. In the United States alone, [ARTBA](#) has found over **220,000 bridges** are in urgent need of major repair or replacement.

This challenge is further compounded by funding limitations, regulatory hurdles, and the need to integrate new technologies with legacy systems.



Unforeseen Ground Risk

According to [the National Academies](#), over the next five years, planned road and rail projects will be extensive enough to **circle the earth 2.5 times annually**. However, 50% of these projects could be affected by geotechnical issues, which significantly impact costs, claims, and delays.

[FHWA](#) has stated that a survey of 46 US DOTs revealed that these geotechnical problems cost each agency an average of **over \$10 million annually**.



Labour Skills Gap

In developed and developing economies, companies are finding it challenging to attract talent with the necessary technical expertise.

[BCG](#) has forecast every year; the US **will need about 400,000 new engineers**. The Japanese Ministry of Economy has predicted a **deficit of over 700,000 engineers** in Japan by 2030, and the German Economic Institute reported a **shortage of 320,000 STEM specialists** in Germany as of April 2022.

According to a report published in 2017 by the construction company Kier Group in the United Kingdom, construction, development, and related services are all having trouble attracting people to fields perceived as muddy, manual, male dominated, poorly paid, and non-academic.



Data Volume and Silos

Large transportation networks have millions of assets and billions of discrete components that are constantly changing with new projects. Reliance on historical paper-based documentation makes it difficult to find, share, and update information, compromising asset integrity.

Rapid advances in IT are generating exponentially more digital data, with [90% of global data](#) created in just the last two years, and this trend is set to continue. This makes gaining insights from the data far more challenging.

Additionally, siloed disciplines, distributed teams, and various file formats complicate sharing and collaboration.



Sustainability vs. Cost

The increasing frequency of severe weather events, such as hurricanes, floods, and wildfires, has heightened the need for resilient design.

Transportation infrastructure must adapt to evolving national and international standards. This transition often involves substantial upfront costs, posing a barrier for many projects. Integrating new technologies and more sustainable modes of travel (rail, multimodal) offers the potential for improved efficiency and reduced environmental impact.

The challenge lies in balancing immediate costs with long-term benefits to ensure transportation systems are both sustainable and economically viable.

We see five big opportunities to address those challenges



Asset Analytics for Predictive Maintenance

AI-powered asset analytics simplify the evaluation of infrastructure conditions, reducing manual effort and enabling real-time monitoring.

By continuously assessing operational states, this approach helps predict potential failures, allowing for proactive maintenance and timely interventions.

Real-time data analysis automates detection of issues, optimizing asset performance and improving operational workflows, ultimately enhancing reliability and efficiency in aging infrastructure.

Bentley Asset Analytics, IoT, iTwin Capture, iTwin Experience



Know the Sub-surface at Every Project Stage

Leverage earth-modeling, analysis, data management, and collaboration software to unlock a common understanding of ground conditions.

This enables geoprofessionals to collaborate seamlessly with transportation professionals across the infrastructure lifecycle, delivering projects faster, with greater certainty, to achieve better more sustainable outcomes.

Bentley Open Applications & Sequent

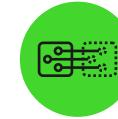


AI, Automation, Generative Design

AI, automation, and generative design are powerful tools that reduce tedious, manual, and repeatable work, enabling teams to achieve more with their existing staff. Not only do these technologies bridge the skills gap and address labor shortages, but they also significantly reduce errors.

[92% of leaders of global companies](#) rank attracting and retaining talent among their top three priorities

"Everywhere in the world right now [there] is the need for more talent, better talent," says Martin Fischer, professor of civil and environmental engineering at Stanford University. Fischer has observed an "expectation of the younger generation to not do stupid work that could be automated. They don't tolerate it. They just leave."



Open Data and Digital Twins

Open data breaks down data silos by providing a shared, accessible source of information across agencies, while digital twins help manage large volumes of data by creating virtual models of transportation infrastructure.

Digital twins continuously update, enabling real-time monitoring and analysis, helping professionals extract valuable insights to optimize operations and improve decision-making.

When paired with AI, digital twins become more powerful, helping to sift through large volumes of data to identify patterns, predict trends, and generate actionable insights.

Bentley Open Applications, Bentley Infrastructure Cloud, iTwin



Tech-Driven Sustainability

Leveraging technology, transportation professionals gain more time to evaluate and collaborate on design-build alternatives, optimizing resources, minimizing waste and emissions, and calculating carbon impact.

Digital twins capture this valuable data for reuse during operations and maintenance, enhancing long-term environmental performance while balancing cost and sustainability, and supporting more efficient, eco-friendly transportation systems.

Bentley Open Applications, Bentley Infrastructure Cloud, iTwin

Transportation

Target Organizations

	Owner Operators	Engineering Firms	Contractors
Overview	<p>Responsible for ensuring the safe, sustainable, and cost-effective movement of people and goods.</p> <p>Oversee transportation infrastructure projects from inception and funding through development, operations, and maintenance.</p> <p>Play a critical role in determining which software is used, either accelerating or hindering technology adoption by various teams—from designers to contractors to operators.</p>	<p>Provide comprehensive engineering and design services across all development phases.</p> <p>Increasingly responsible for the majority of projects as owners scale back their in-house design work.</p> <p>Face pressure to meet evolving requirements, standards, schedules, and budgets, while adhering to industry best practices.</p> <p>Being asked to do more with less, they need to be efficient as they are ultimately liable for the work.</p>	<p>Need to deliver on shorter deadlines and tighter budgets, while facing rising material costs and skilled labor shortages.</p> <p>Experiencing a growing backlog of projects for new transportation assets and major network upgrades</p> <p>Digital technology is a key solution. Contractors need to advance beyond traditional deliverables, including PDFs to 3D/4D model-based workflows that enhance collaboration between design and construction teams.</p>
Types	<p>Public Transportation Owners: Federal, state, regional, and local government + Rail, airport, port owners and operators</p> <p>Public-Private Partnerships (P3): Partnerships between government agencies and private companies + Toll roads/toll way authority</p> <p>Private Companies: Railway and public transit operators</p>	<p>Mid to large sized firms will have multiple business units that cover different disciplines and phases of a project lifecycle</p> <p>Small firms will specialize in a specific discipline or project task</p>	<p>Heavy Civil Contractors</p> <p>Mid to large-sized contractors specialize in managing complex, innovative, and diverse projects. Have resources, expertise, and experience to tackle large-scale developments efficiently and effectively</p> <p>Small sized contractors focus on more basic and specific types of projects; often serve as supplemental workforce for mid to large-sized contractors, contributing specialized skills and services to larger projects as needed</p>
Example accounts	<ul style="list-style-type: none"> • Network Rail • PT MRT Jakarta • MnDOT • City of Fort Worth, Texas • Port Authority of New York & New Jersey 	<ul style="list-style-type: none"> • Hatch • SMEC • VHB • Mott MacDonald • Summit Engineering 	<ul style="list-style-type: none"> • WIKA • ACCIONA

Chapter 2

Go-To-Market Strategy

Chapter 2 - Go-To-Market Strategy

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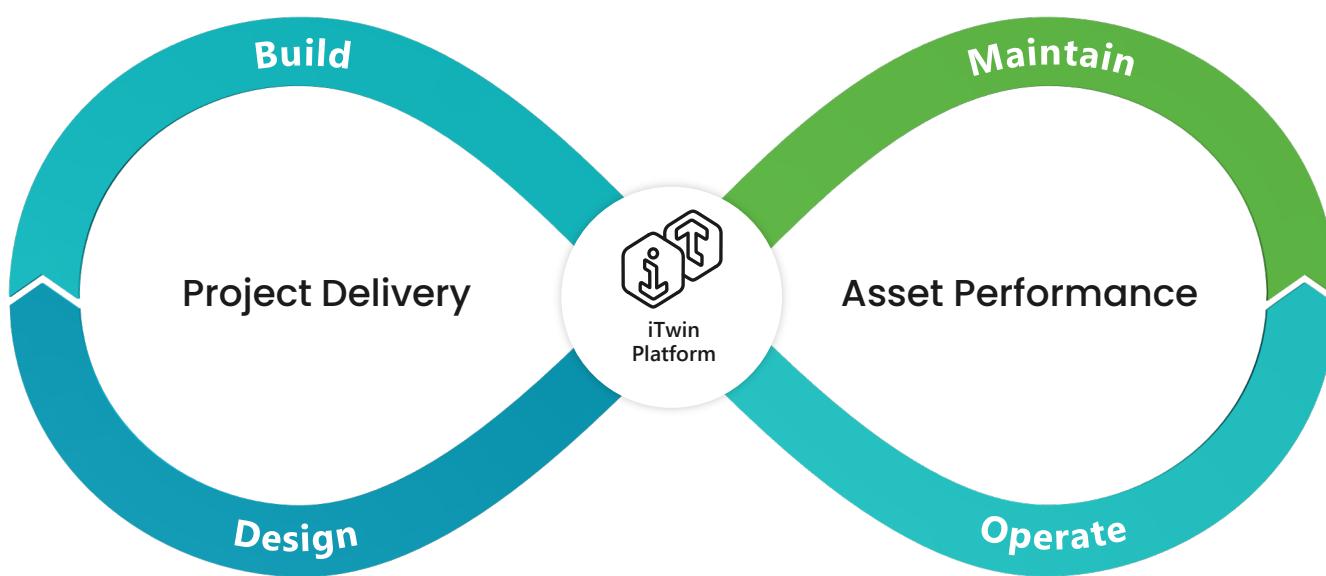
Click to jump to another chapter.



At Bentley, our goal is to begin with the end in mind, providing comprehensive and collaborative solutions that enable strategic planning and data reuse across all phases and teams to streamline project delivery and improve asset performance.

We see project phases as an **interconnecting continuous loop**, where one phase influences the next.

Viewing the lifecycle as a continuous loop, we can achieve sustainable and resilient systems that meet society's evolving needs.



1. Design

Effective planning sets the foundation for **successful design**

2. Build

Which in turn leads to **efficient construction**

3. Operate

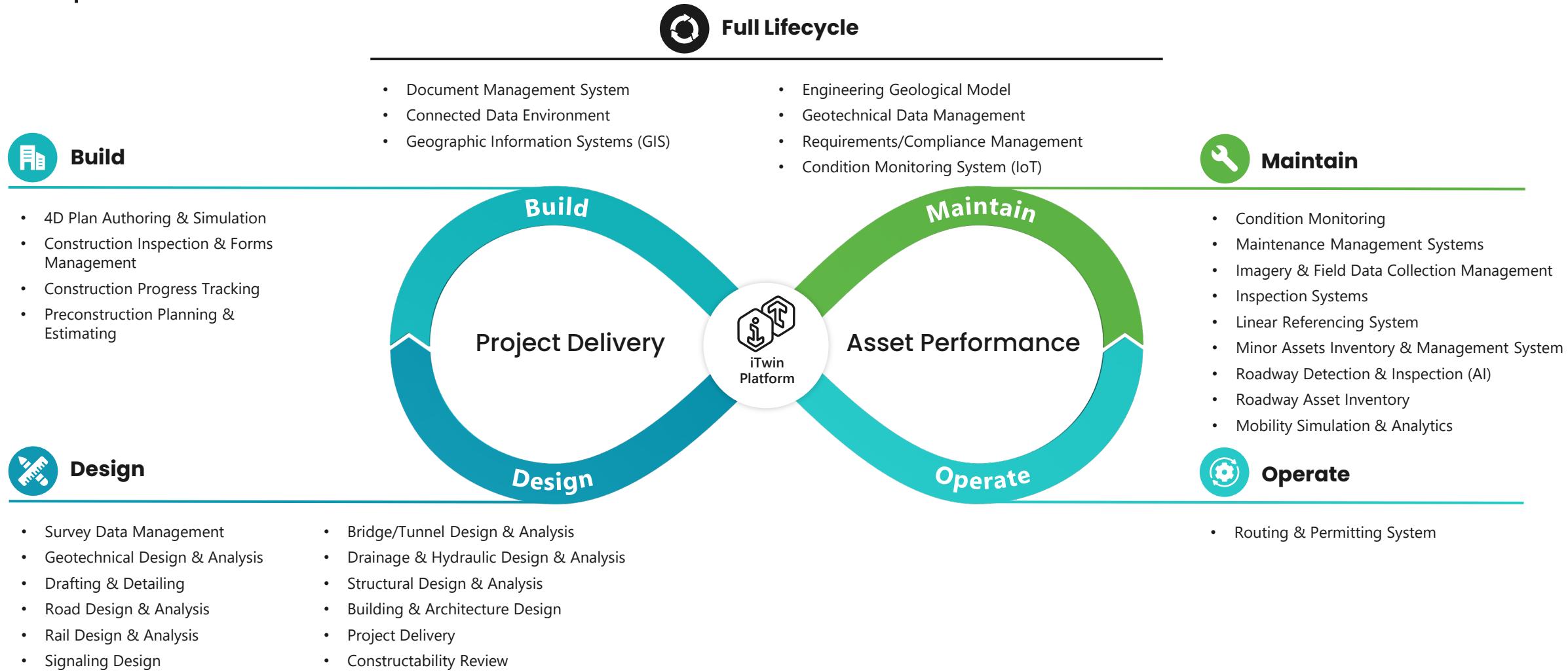
Well-built infrastructure facilitates **smooth operations**

4. Maintain

Ongoing maintenance ensures longevity and reliability

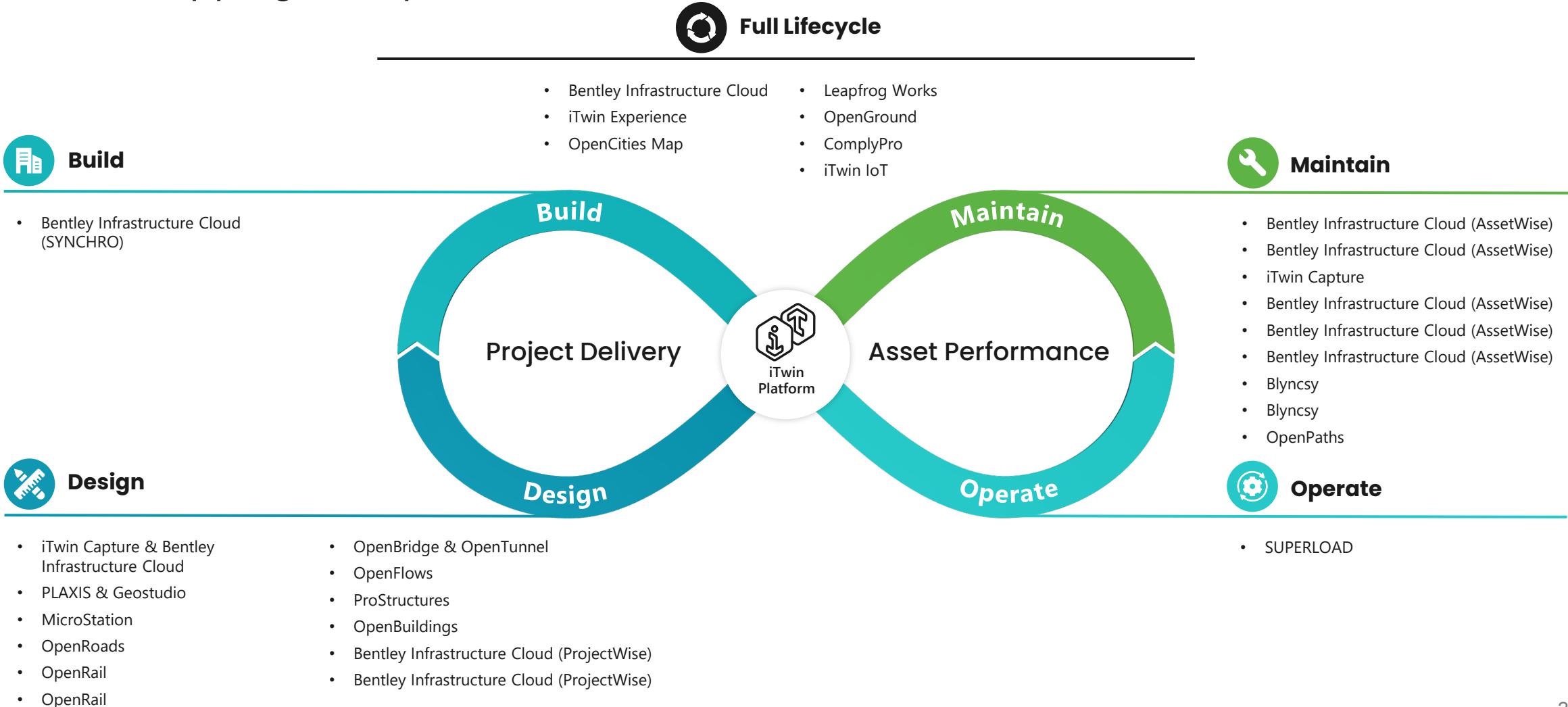
Transportation

Capabilities Overview



Transportation

Brand Mapping to Capabilities



Embracing digital delivery **paves the way for digital twins**, enhancing asset performance

To optimize transportation infrastructure for efficiency, quality, safety, and resiliency – embracing digital technology and workflows becomes essential. While some organizations may feel intimidated by digital transformation, using Bentley solutions **naturally advances them toward infrastructure digital twins**. Starting with the end in mind, data generated during design lays the foundation for digital delivery (reducing/replacing traditional paper-based deliverables) and serves as the steppingstone to develop digital twins.



Project Lifecycle Stage:
Design

Bentley's model-based design software takes a data-centric approach, generating robust engineering and geotechnical data as the foundation for digital delivery and the development of digital twins.

- Confidently work with **real-time, accurate data**. Ensures early conflict identification, minimizes rework, and enhances analysis.
- Produces a dynamic rich dataset**, allowing for continuous enhancement and refinement throughout construction, operations, and maintenance.
- Facilitates **early collaboration** and seamless handoff with **contractors** for optimum project delivery.



Project Lifecycle Stage:
Build

Bentley's construction solutions empower contractors by utilizing the 3D design model to create a dynamic 4D construction model, offering several key advantages:

- Increases collaboration with design, mitigates risk and rework typical in traditional 2D plans.
- Generate hyper-accurate estimates and reduce project costs.
- Simulate construction to understand impacts on environment, traffic flows, and local economy.
- Optimize project plans, schedules, and resources.
- Deliver detailed and reusable data to owners for improved asset information management and performance.



Project Lifecycle Stage:
Operate & Maintain

Bentley's O&M solutions can turn the data delivered from design and construction into valuable insights to improve monitoring, maintenance, and asset performance.

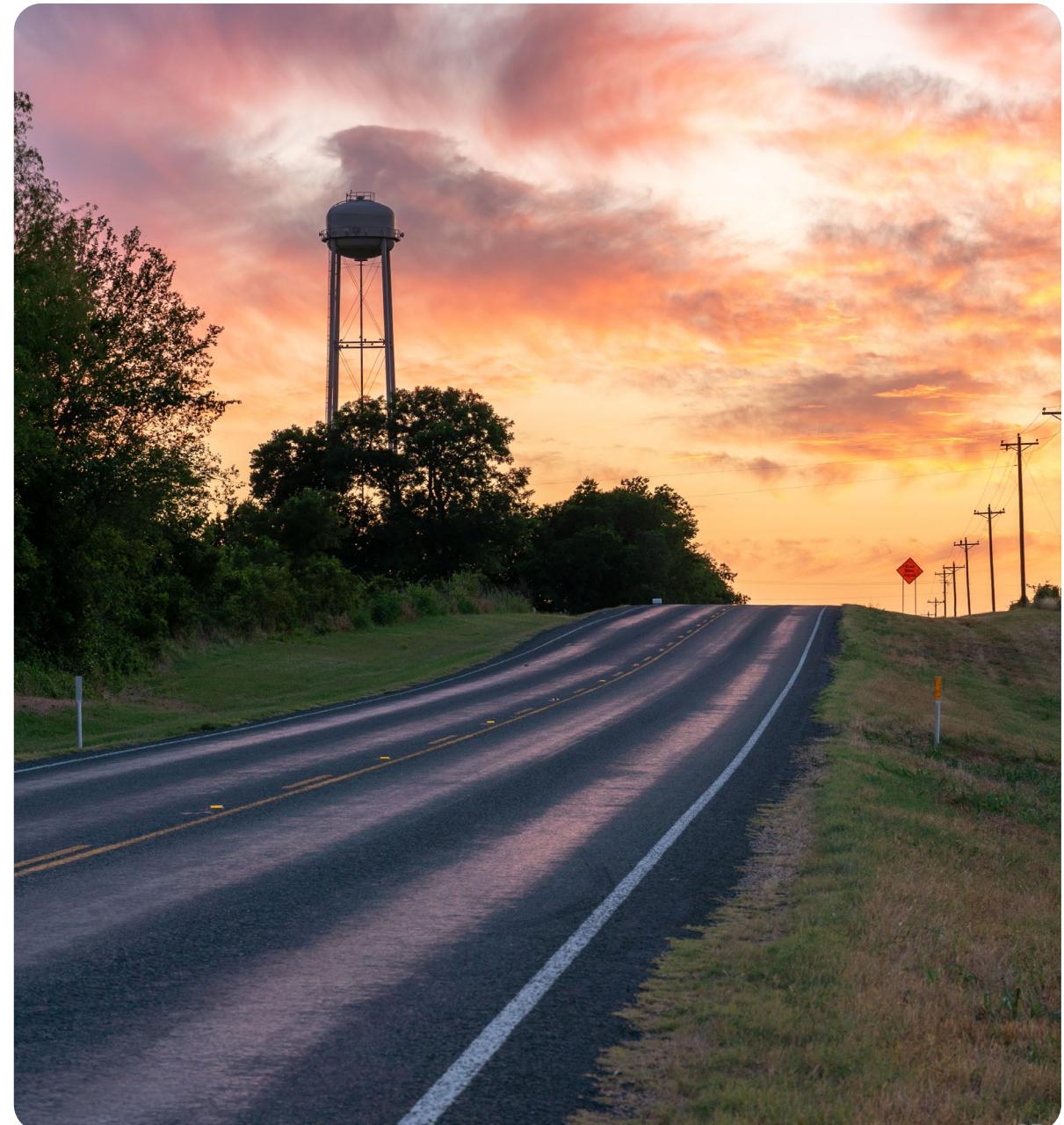
- Easily find, search, reuse, and augment data from design and construction, capabilities beyond traditional paper plans.
- Bentley's solutions integrate data from various sources, including design models, construction records, and real-time sensor data.
- By analyzing this integrated data, owners gain insights into asset performance, condition, and maintenance needs.
- These insights enable proactive decision-making and efficient resource allocation for maintenance tasks.

Road overview

Road networks serve a multifaceted role, catering to diverse needs. They provide vehicular access for drivers, establish dedicated lanes for cyclists, create corridors for public transportation, and ensure safe walkways for pedestrians. Road infrastructure includes highways, local roads, bridges, tunnels, traffic signals, signage, interchanges and roundabouts. Beyond the surface engineers must also consider proper drainage systems to prevent flooding and erosion, geotechnical factors for soil stability, and coordination with subsurface utilities such as water, gas, and electricity. Roads positively impact the economy facilitating trade, creating jobs, and promoting regional growth.

Challenges and Innovations:

- Aging infrastructure: networks are exceeding their intended lifespans
- Digitalization: Smart systems for better efficiency and safety
- Accessibility and equity: designing for all users and abilities



Road

Bentley's Value Proposition for Roads

Bentley understands the complexities of the modern transportation industry. Our approach focuses on digital solutions, innovation, and a commitment to open standards. This all translates to improved project outcomes, reduced risks, and greater operational efficiency throughout the entire lifecycle of your road network. We enable you to move beyond traditional road management to a data-driven, future-ready approach.

Adopt and Accelerate Digital Project Delivery for Resilient Transportation

Key messages and brands:

- Enhanced Digital Delivery: Bentley provides open format delivery and interoperability with third-party products. Our solutions allow for better data sharing and integration, helping to connect the different phases of a project and ensure seamless workflows. This also addresses the increasing expectations for digital workflows within the industry. (Bentley Infrastructure Cloud, OpenRoads, OpenBridge, OpenTunnel, OpenGround, MicroStation, ProjectWise, Asset Analytics, Google, Cesium, iTwin, iTwin Capture)
- Open Digital Twin Approach: Bentley's commitment to open standards, open data formats, and open APIs fosters interoperability and ensures that your data is accessible across different platforms offering an integrated view and single source of truth of your road network (Asset Analytics, Google, Cesium, iTwin)
- Addressing Workforce Challenges: Bentley's technology enhances efficiency and productivity, helping to mitigate the impact of the diminishing workforce. We also partner with educational institutions to ensure that future engineers are job-ready with the mindset of using open digital twins.
- Early Engagement in Detailed Planning: We provide solutions for the Detailed Planning phases including Mobility Simulation, Survey Reality Data, Subsurface Modeling, and Flood Modeling which helps establish Bentley as a strategic, end-to-end partner. (ProjectWise, Sequent, OpenRoads, OpenPaths, iTwin Capture, OpenFlows Flood)
- Comprehensive Asset Management: Our Asset Analytics portfolio helps agencies maintain and operate assets more effectively. Offering AI-based solutions for asset management and operations, including crack detection and disaster recovery.

Roads

Typical Persona Titles

Economic Buyers



Owner

(Government Agencies)

Common titles include:

- Secretary of Transportation
- Infrastructure/Transportation Minister
- CIO
- CTO
- VP/Director of Engineering
- VP/Director of Pre-construction
- VDC Director
- VP/Director of Digital Delivery
- VP/Director of Operations
- VP/Director of Technology
- VP/Director of Transportation
- City Manager



Consultants

(Engineering Firm)

Common titles include:

- Director of Engineering
- Director of Transportation
- Director of Digital Delivery
- Director of IT
- Director of Operations

Users / Influencers



Owner

(Government Agencies)

Common titles include:

- Project, District, Field Engineer
- Deputy, Chief, Principal, Lead Engineer
- Transportation Planner/Engineer
- Project, CAD, BIM, Digital Delivery, Engineering or Information Manager
- Planner/Scheduler
- Public Works Designer
- Maintenance, Inspection Manager
- Municipal Engineer



Consultants

(Engineering Firm)

Common titles include:

- Project, CAD, BIM, Digital Delivery, or Engineering Manager
- Maintenance Manager
- Operations Manager
- Construction / VDC Manager
- Senior Engineer
- Civil Engineer
- Road Engineer
- Asset Manager /Inspector
- Maintenance Manager

Key Persona: Economic Buyer

Government/Federal/Municipal Secretaries & Ministers, Engineering Firm C-Suite

Desired Outcomes

- On-time, on-budget delivery
- Engage the public and local stakeholders to ensure needs are met, impact is communicated, and support is received
- Maintain and build roads that support current and future traffic patterns and integrate with existing networks
- Deliver and maintain public transportation, enhancing safety, improving accessibility, mobility, quality and reliability.
- Maximized asset lifespan
- Efficient long-term operations & maintenance with uninterrupted service
- Customer retention/new business

Key Drivers

- Rapid urbanization & population growth with public demand for multi-modal transportation networks
- Safe, predictable and efficient movement of goods and people
- Investment in infrastructure projects drives economic growth and employment figures
- Increasing project volume, regulation, compliance and governance
- Data volumes increasing exponentially teams including international
- Ability to communicate and visualize design intent for stakeholder approval
- Public visibility and scrutiny of project costs and timeline with less tolerance for cost and time overruns due to unforeseen issues.
- Minimizing the total cost of ownership of a road asset, by optimizing the planning to operations lifecycle.
- Supporting innovation in the wider transport industry to overcome complex development challenges, like hard-to-develop land and increasing costs of labor and supply.

Challenges

- Infrastructure leaders need to reduce the time it takes for them to identify, pilot and implement new technologies
- Increasing challenge to replace retiring experienced engineers against backdrop of ability to find new talent locally and globally
- Ability to access, manage and extract useful/informative data insights from trillions of data points
- Distributed teams often internationally adds further complexity to communication & feedback loops
- Project throughput can be constrained by siloed project stakeholders and a lack of collaboration
- Sub-surface unknowns and uncertainty significantly increases costs, claims and delays
- Reliance in field on paper-based documentation makes it difficult to find, share and update information upstream and downstream
- Being asked to more with less. Greater budgetary constraints despite evolving compliance requirements and complexities.

Opportunities

- Advancement of digital delivery through the multi-discipline integration. With a purpose-built portfolio for road, bridges and tunnels, to optimize working practices. Automation and deliverable focused for entire lifecycle improvements
- Digital Twins, crowd sourced data, ML and AI unlocks generative design, efficient asset management and helps with predictive maintenance, plus safe efficient inspection, triage & tracking change over time through data centric solutions.
- Deregulation and immigration policy changes globally will accelerate the need to adopt digital answers and backfill traditional labor requirements with technology.
- Leadership needs a comprehensive view that bridges geoscience, ground engineering, road design, and construction.
- Digital Twins can simulate carbon calculations, easy to model and simulate environmental impact changes and quantity/cost estimation

Key Persona: Economic Buyer

Government/Federal/Municipal Secretaries & Ministers, Engineering Firm C-Suite

Discovery Questions

- How do you see digital transformation helping to deliver against your organisation's strategic goals?
- What are your biggest challenges related to aging infrastructure and how are you addressing them?
- How does your organisation manage the lifecycle of infrastructure projects, from planning to operations and maintenance?
- How are you currently managing the transition from 2D workflows to model-based workflows, and what are the main challenges you face with this transition?
- What areas of the world are you targeting for expansion?
- How do you see AI and machine learning impacting your operations in the next 3-5 years?
- What new technology or strategic solutions are you considering to support the detailed planning and design phases of your projects?

Qualification Questions

1. What would be the impact of keeping the status quo with your current workflows and technology stack?
2. What is working and what is not working in your current processes and transition to digital project delivery?
3. What steps have you taken to resolve your challenges and what new solutions have you investigated?
4. What was the outcome of that discovery exercise and steps?
5. What benefits are you and the broader C-Suite/leadership looking to achieve?
6. Have you mapped out a defined timeline and milestones to review and pilot potential solutions and workflows?
7. Is there a desire for a change for instance using 4D models with your clients?
8. Are there any strategic programs or initiatives internally or externally that is a factor in making this change?
9. Do you have experience operating in the new countries you are targeting for expansion?

Objection Handling

Q: There's so much noise out there with AI and ML solutions, we don't even know where to start.

A: By being a trusted partner and Bentley's integrated approach, leveraging our cloud services, and exploring AI/ML capabilities, you can begin to address the challenge of adopting these solutions in a more manageable way.

Q: With so many projects in flight and many more in our backlog, we don't have the time or the capacity to bring in new solutions or software.

A: We can help you streamline your transportation projects with interoperable solutions. Bentley Infrastructure Cloud, ProjectWise and software like OpenRoads that integrates with other third-party systems across disciplines, organizations, and geographies, creating a single, unified source of truth that transcends project phases. By connecting design and construction workflows, you can simplify collaboration, ensure compliance.

Data, Insight, Question Example

- Have you considered accessing and running pilot projects through ADCMS grants with DOTs? We have some learning from others who are further along their digital transformation journey that might be insightful.
- Digital delivery is a guide path not a switch, with integrations with other industry partners such as Trimble and ESRI, together we can build a roadmap that can scale and adapt as necessary with your current technology stack.
- Here's how we've helped a similar organization compress the time it took for them to identify, pilot and implement new technologies. Does this look repeatable and scalable in your organization?

Key Persona: User

Road Designer, Civil Engineer, Public/Municipal Works Designer

Desired Outcomes

Automate Contract Deliverables: Utilize 3D models to generate a variety of deliverables including 2D drawings to meet requirements from one solution.

Share & Consume Large Datasets: Eliminate data silos to leverage large datasets across project stakeholders, no data translations required

Reduce Design Time by 20%: Automate repetitive manual changes with parametric road and bridge modeling, with little to no programming skills needed.

Enable Real Time Collaboration: Reduce risk by eliminating the need to re-input data from other disciplines. Real-time visibility identifies interdisciplinary clashes early in the design phase.

Extend to Other Asset Phases: Openness with file format consistency and digital workflows allows data to expand and accelerate projects from concept to asset.

Increase Infrastructure Resilience, Quality & Performance: Quality, accuracy, compliance with standards, and handoff to other phases.

Key Drivers

- Number of projects in flight or backlog:** The deterioration of existing road assets requiring immediate rehabilitation and new projects being spun up by urbanization and government investment.
- Reduce friction in stakeholder approval and interdisciplinary handover:** Most delays are caused by miscommunication, tracking of feedback& approvals and roundtripping/revisions between departments
- Public tolerance for cost and time overruns**
- Contractual requirements:** scrutiny of public budget, environmental impact and meeting evolving regulations and use of materials
- Struggle to balance workload & recruit new engineers:** Highly experienced and skilled engineers retiring are not being replaced with proportional amount of engineering graduates
- Personal pride and motivation:** Desire to deliver projects that will withstand climate events, allow greater mobility and serve communities

Challenges

- Volume of aging infrastructure AND requirement for new roads integrating multi-modal transport means
- Tedious, manual, repetitive tasks
- Reliance on 2D drawings and documentation, with little ability to give feedback upstream and downstream
- Increasingly complex projects with millions of assets and even more digital data points.
- Ability to derive insights from large amounts of data volume plus complex governance regulations
- Siloed disciplines, distributed teams, inconsistent terminology and taxonomies plus file formats complicate sharing and collaboration
- Unforeseen emergency rehabilitation, maintenance and ground risk

Opportunities

- Digital transformation, Digital Delivery, Digital Twins – can solve many of the challenges and deliver desired outcomes if adopted. There is an increasing volume of proven use cases to inspire confidence for those looking to make the transition.
- Automation and ML/AI - is available in an actionable and realistic delivery method that can solve many of today's headaches and bottlenecks
- 4D Model-based design with Digital Twins offers the ability to extract useful data and visualize projects before field work even begins
- Discipline focused design software not generic
- Strategic partnerships, openness, industry file formats and interchange supports integrated workflows
- Integrated subsurface solutions to reduce project risk

Road Engineering Solutions



Challenges & Objectives

- Inflection point of ever-increasing velocity of projects due to aging infrastructure, urbanization requiring new infrastructure versus a retiring highly qualified workforce and limited engineering workforce capacity.
- Increasing regulation with regards to compliance and governance.
- Linear, siloed, error-prone, potential for a lack of visibility and poor coordination.
- Understanding and mitigating for ground risk before construction boots are on the ground.
- Need to balance environmental impact and considerations whilst tracking against costs and budgets.
- Collaboration across disciplines and a lack of visibility leads to error, game of telephone feedback loops
- Disconnected data across lifecycles affecting the ability to make decisions leading to costly inefficiencies
- Variation in digital transformation between countries, municipalities and teams with no clear common framework of terminology and processes.



Deliverables & ROI / Business Outcomes

Deliverables

- Produce project deliverables from 2D drawings and reports to 3D models and compelling visualizations
- Design documentation, including plans, sections and elevations
- Project schedules and cost estimates
- Geotechnical reports and subsurface models
- Output files to other civil platforms
- Data-rich deliverables for clients and stakeholders with dynamic feedback and iteration
- Generate material, quantities, and cost estimate reports
- Generate road, bridge and tunnel-specific reports
- Generate BIM deliverables and share models with contractors to plan construction stages, project costs, and schedules

ROI / Business Outcomes

- Integrated and secure data as a single source of truth enabling collaboration across all project phases and stakeholders
- Increased throughput of projects without additional pressure on existing workforce, maintaining motivation and retention.
- Lowering bid amounts through geotechnical data accessibility allowing contractors to mitigate for ground risks
- Adoption of digital delivery across lifecycle to improve project performance and take advantage of data recycling/reuse for different stages.
- Time savings and project flexibility with the ability to model, document and access and view architectural, engineering, mapping, construction and operations design information.



Products & Capabilities

End-to-end Detailed Road Design - OpenRoads

- Leverage a fully detailed design application for surveying, drainage, subsurface utilities, and roadway design.

Digital Design Collaboration and Delivery – Bentley Infrastructure Cloud (ProjectWise)

- Link people, processes, and standards across the project. Manage, engineer, validate, and deliver data that spans all asset disciplines.

Earthworks Design – OpenRoads, OpenGround, PLAXIS, Leapfrog

- Bring in a complete picture of surface and subsurface conditions, from both proprietary and open data formats.

Interoperable with [Rail](#), [Bridge](#), [Tunnel](#), Engineering Solutions

Road Engineering Solutions

Summary of Competitor Learnings



Organization Summary

Autodesk provides Civil 3D and InfraWorks for road design. It required multiple software applications and time consuming file format exchanges to produce contract deliverables. It is not scalable to handle large data linear projects. Additionally, Autodesk does not offer fully BIM-integrated workflows for asset lifecycle management, limiting long-term digital twin capabilities.

Bentley's Competitive Differentiators – How We Win

Bentley provides a full engineering, modeling, and analysis solution that seamlessly integrates with construction and operations. Our solution provides automated and intuitive road and highway specific design tools eliminating the need for specialists, heavy customization, and multiple applications. The solutions' end-to-end integrated workflows improves collaboration across disciplines resulting in better bridge & tunnel design, quality, safety and performance.

Road Engineering

Solution Outcomes

1

Accelerated Design and Documentation

Leverage more efficient and cost-effective technologies to increase productivity and deliver more with your existing staff.

2

Improve Collaboration with Open Data

Work together in a unified model that incorporates data from multiple sources regardless of format, scale, or complexity.

3

Reuse Design Data Across the Asset Lifecycle

Simplify handover with the transfer of robust data-driven models to construction and asset managers, reducing errors and misinterpretations.

Challenges Addressed

This solution addresses the following challenges:



Road Engineering

User Outcomes



CDOT Alleviates Severe Bottlenecks Along Interstate, Connecting Major Mountain Resorts

- To date, digitization has reduced overall work hours by 50,000 and project costs by more than \$7 million USD.
- Bentley's integrated modelling solution saved 97% of effort developing and publishing digital twins for stakeholder review.



LARSEN & TOUBRO

Larsen & Toubro Helps Develop Dholera as India's First Smart Greenfield City

- Using Bentley open applications for Roadway and utility works accelerated the project schedule by 10% and saved INR 10 million in costs.
- Larsen & Toubro improved productivity by 25%, using OpenRoads' subsurface utility design analysis workflow automated previous manual modelling processes, reducing work hours from 4,000 to 3,000.



Beca

Beca Uses 3D Design and a Collaborative Environment on Takitimu North Link South of Auckland, N.Z.

- Streamlined digital workflows allowed teams to consider more options, which reduced tender costs and improved design efficiencies by 20%.
- Detailed geological insight in the design will help builders to reuse all excavated material, eliminating the need to use heavy equipment to remove material or import fill to the site.



“

The Bentley suite of products enables the presentation of AtkinsRéalis projects with reality modelling to convey design intent, project impacts, and community integration, which is critical to project success.

Samuel Worthy

National BIM Manager of Roads and Highways, AtkinsRéalis

[Find out more](#)

“

Bentley came with a solution of subsurface utility design and analysis workflow, where we have exported the design model into OpenRoads software along with all the design attributes carrying along with the BIM models.

Rajesh Kumar

Head of Digital, Larsen & Toubro

[Find out more](#)

“

The project's iTwin model enhanced efficiency, streamlining our work such as utilities, clash detection, and ease of planning at constrained corridor locations.

Ross Brown

Technical Director Civil, Beca

[Find out more](#)



Road Construction Planning



Challenges & Objectives

- Severe macro challenges including increasing cost of materials, an acute labor shortage, and the need to build more sustainably.
- Labor shortage reduces capacity to execute new projects and maintain/rehabilitate current crumbling infrastructure
- Inefficient project collaboration leads to problems handing off design and construction.
- Safety risks assessment
- Lack of transparency for Project Owners exists.
- Heavily paper based with lack of ability to communicate changes up and down stream without errors.
- Project data being siloed, out of context, not real-time and of low quality can hurt projects.



Deliverables & ROI / Business Outcomes

Deliverables

- 3D/4D model-based construction plans
- Optimized project schedules
- Web-based 4D sequences
- Construction cost estimates
- Automated Quantity Takeoffs
- Simulation reports

ROI / Business Outcomes

- Optimized plans, budgets, schedules and resources
- Understand what you are building before you build it
- Visualize and resolve conflicts before construction begins and ensure minimal disruption to existing road networks
- Regulatory compliance
- Access, use and manage project data securely
- Data sharing in real time instead of phased submittals
- Secure, single source of project truth
- Reduce the number of change orders
- Reduce bid amounts by increasing contractors' awareness of risks
- Reduce project and safety risks



Products & Capabilities

SYNCHRO

- 4D Construction modeling
- Resource management
- Web-based 4D sequences
- Cost and Quantity Takeoffs
- Clash detection

SYNCHRO 4D Pro

- 4D construction model of the entire project
- Consolidate models and external logistics information into a federated 4D model
- Conduct virtual planning ahead of construction
- Simulation of every step of construction

SYNCHRO Field

- Facilitates construction inspection and forms management
- Enables tracking of construction progress

Road Construction Planning Solutions

Summary of Competitor Learnings



Organization Summary

Autodesk Construction Cloud is a cloud-based construction management platform for collaboration on projects from design to completion. It provides tools for BIM data integration and other tech stacks. It also consists of a common data environment for centralized file management.	Trimble Construction One is a cloud-based construction management platform. It connects data and processes across the construction lifecycle, from design to completion. It includes a centralized data repository, project management, reporting and integrations with other software.	Procore is a cloud-based construction management platform for construction companies and other stakeholders to collaborate on projects. It allows users to share documents, data, and planning systems. Procore is primarily construction focused and does not offer design tools.	HCSS stands for Heavy Construction Systems Specialists, Inc., a company that develops software for timecards companies. HCSS's software is a tool to manage projects. Their functions include; bidding, estimating, safety management, fleet management, time cards and integration with accounting software.	Ineight is a construction project management platform that is stronger in industrial markets than in transportation. The platform includes functionality to support document and model management, cost and schedule controls, and construction operations.
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Bentley's Competitive Differentiators – How We Win

Autodesk does not have the history and adoption within transportation markets. Autodesk's design tools can present problems when applied to linear construction projects. Transportation designs using MicroStation, ORD and OBM will provide for a more seamless integration into Bentley's Construction Planning Solutions.	Trimble can require specialized training and is sometimes perceived as not user-friendly. Trimble's design tools are not as well established in the transportation market, meaning that Bentley's designs would require an additional integration step.	Bentley's abilities to share documents and projects with owners and external users is more streamlined than Procore. Procore also struggles with visualization of models limiting their ability for 4D modeling and simulation.	HCSS is stronger as an estimation tool but lacks in project management functionality. HCSS is also a dedicated construction software and does not have a design tool, which can make integration challenging when moving from design to construction.	Ineight is not as well known in the transportation market and lacks a strong design component making requiring an additional integration step. Scheduling functionality lacks integration with a BIM model.
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Road Construction Planning

Solution Outcomes

1

Enhanced Safety and Efficiency

Improved safety planning and streamlined design and construction review processes lead to a significant reduction in jobsite accidents and injuries.

2

Optimized Project Execution

Visualizing and resolving conflicts before construction begins, along with improving design quality and intent, reduces change orders and rework on projects.

3

Increased Stakeholder Confidence

Anticipating construction impacts on existing road networks and increasing transparency to inform the public and meet regulations.

Challenges Addressed

This solution addresses the following challenges



Road Construction Planning

User Outcomes



WSB Increases Access to Greater Minnesota with TH 169 Roadway Expansion Design

- WSB saved MnDOT USD 4.8 million in earthworks costs by using Bentley software to provide the CMGC real-time quantities on site to compare the costs of alternative designs.



NYSDOT US East 138th Street Bridge

- Simplified design review process for accessibility for over 180 staff across 15 agencies.
- Providing the digital twin as the contract document resulted in the winning bid 15% lower than anticipated.

“

The innovation and technical creativity of the design team, led by WSB, has raised the bar for the future of 3D modeling, visualization, and cross-discipline project coordination in Minnesota. The approach, along with our willingness to coordinate and collaborate with the CMGC, has saved the project significant time and money by providing better meeting presentations, reducing design iterations, and lowering the need for contingency in the 30% and 60% construction cost estimates.”

Jon Chiglo
COO, WSB

[Find out more](#)

”

With the sophisticated sequencing, overwhelming amount of underground utilities, and enormous group of project stakeholders, this project sets the new standard on what can be accomplished when a digital twin is used as the primary contract document.

Zachary Maybury,
Design Squad Manager, Highway Design, New York State
Department of Transportation

[Find out more](#)



Road Asset Analytic Solutions



Challenges & Objectives

Automate roadway maintenance and asset inventory activities, eliminating expensive manual inspections and allowing agencies to scale at a moment's notice.

- Identifying and addressing roadway hazards in a timely manner to prevent accidents and injuries.
- Limited funding for regular road maintenance and inspection can lead to deteriorating infrastructure.
- Managing and analyzing large volumes of data from various sources to make informed decisions.
- Adapting existing systems and processes to incorporate innovative AI technologies to combat operational and budgetary stresses and continue to provide critical services.



Deliverables & ROI / Business Outcomes

Deliverables

- Rapid identification of safety issues
- Enhanced monitoring of road conditions
- Streamlined data collection and processing
- Comprehensive Network Inspection Information
- Actionable insights for proactive maintenance

ROI / Business Outcomes

- Improved public safety and trust in Infrastructure
- Cost-effective monitoring solutions
- Optimized resource allocation for repairs
- Enhanced funding justification through data-driven insights
- Improved decision-making and reporting capabilities
- Improved operational efficiency
- Enhanced public service delivery
- Scalability of AI solutions across multiple jurisdictions



Products & Capabilities

Blynpsy

- Roadway Detection and inspection (AI)
- Roadway Asset Inventory

iTwin Capture

- Reality Modeling and LiDAR Processing
- AI Assisted Feature Detection

iTwin IoT and 4D Analytics

- Sensor Data Viewed in Digital Twin
- Dashboarding and Reporting
- Customized Alerts

AssetWise Linear Network Management

- Network view of reality data, BIM Data and Real-time sensor data.
- Automated Vehicle Routing and Permitting Data
- Spatially Enable Asset Information

Road Asset Analytic Solutions

Summary of Competitor Learnings



Organization Summary

Vialytics specializes in roadway asset management through AI-driven inspections. Their technology focuses on identifying pavement conditions and infrastructure defects using advanced imaging and data analytics.

Note - Vialytics has been in operation for over five years, gaining significant traction and establishing itself in several U.S. markets with a strong revenue growth rate, indicating increasing demand for its services.

Cyclomedia specializes in capturing high-resolution street-level imagery for urban planning and infrastructure management. Their services include 360-degree imagery and advanced data analytics for visual insights

Note - Cyclomedia has been in business for over a decade and holds a significant market share in the street-level imagery space, providing a solid foundation of experience and expertise in the industry.

Vaisala is a global leader in environmental and industrial measurement, focusing on weather and road condition monitoring. Their solutions enhance road safety and asset management through environmental data.

Note - Vaisala has been in the industry for over 80 years and generates substantial annual revenue, making it a well-established player with a strong reputation in environmental monitoring.

Hayden AI specializes in leveraging AI and computer vision to enhance traffic management and enforcement. Their solutions focus on automated traffic monitoring and real-time analytics to improve roadway safety.

Note - Hayden AI has quickly gained recognition in the market, recently raising significant funding to expand its operations, indicating strong investor confidence and growth potential.

Bentley's Competitive Differentiators – How We Win

- Leverages crowdsourced data from dash cameras, enhancing data collection and reducing costs.
- Provides a wider array of AI capabilities beyond pavement assessments, including work zone monitoring and asset inventory.
- Focus is on user-friendly integration with existing systems offers greater flexibility for municipalities.

- Integrates diverse data sources (like crowdsourced imagery) beyond just street-level photos.
- AI tools offer real-time monitoring and insights, enhancing operational efficiency.
- Solutions are designed for broader transportation management applications, not just urban planning.

- Uses AI to provide actionable insights beyond environmental data, including asset monitoring and operational efficiencies.
- Crowdsourced approach enhances data collection at lower costs compared to Vaisala's proprietary systems.
- Focus on integrating with existing municipal systems offers greater operational flexibility.

- Provides a wider range of AI applications beyond traffic enforcement, including asset management and infrastructure insights.
- Unique crowdsourced data approach allows for broader data collection at lower costs.
- Emphasizes seamless integration with existing municipal platforms, enhancing operational efficiency.

Road Asset Analytic Solutions

Solution Outcomes

1

Maximize Productivity and Minimize Spending

Save up to 90% on manual inspection costs while maximizing the productivity of maintenance teams, allowing them to focus on repairs rather than inspections.

2

Reduce Safety Risks and Service Interruptions

Quickly identify and address roadway issues before they escalate into safety hazards, extending the lifespan of infrastructure and enhancing road safety.

3

Improve Insights and Decision Making

Access real-time data and detailed reports that empower agencies to make informed decisions, streamline operations, and improve service delivery for the communities they serve.

Challenges Addressed

This solution addresses the following challenges:



Road Asset Analytic Solutions

User Outcomes



Port Authority of New York and New Jersey explores significant cost savings with Blynchy

- 25% initial annual savings using Blynchy vs traditional methods.
- Estimated 48% savings over a five-year period.

The Port Authority of New York and New Jersey (PANYNJ) conducted a pilot project with Blynchy to inspect 100 centerline miles of roads. This automated, AI-powered inspection focused on pavement markings and a pavement condition assessment, sign assets (including MUTCD classification) and sign retroreflectivity.



How Plano Discovered Almost \$500,000 in Potential Savings Using Blynchy's Automated AI-powered Platform

- \$475,238 potential savings for the city identified in this pilot project, as the traditional manual inspection cost was measured at 23x the cost of Blynchy.
- In addition, Blynchy technology would result in a 90% reduction in the need for any manual surveys.

The City of Plano conducted an "apples to apples" comparison of their traditional manual method of surveying four centerline miles of roadway to Blynchy. The outcomes highlight the high level of detail and insight that Blynchy can deliver to cities, ensuring results equal to and at times better than those of manual surveys. Additionally, Blynchy costs 90% less than surveying the traditional way.

[Find out more](#)

[Find out more](#)



Hawaii DOT switched to Blynchy to automate roadway condition assessment and damage detection

- Hawaii DOT achieved a 95% reduction in the need for manual surveys using Blynchy.
- HIDOT estimated a 96% cost savings as well compared to manual or LiDAR inspections.
- An estimated 23,286 pounds of carbon emissions are saved annually for each maintenance vehicle removed from the road.

From debris and vegetation encroachment to guardrail damage detection, Blynchy is helping Hawaii Department of Transportation maintain a safe and pristine road network for its residents, tourists, and the most vulnerable road users.

[Find out more](#)



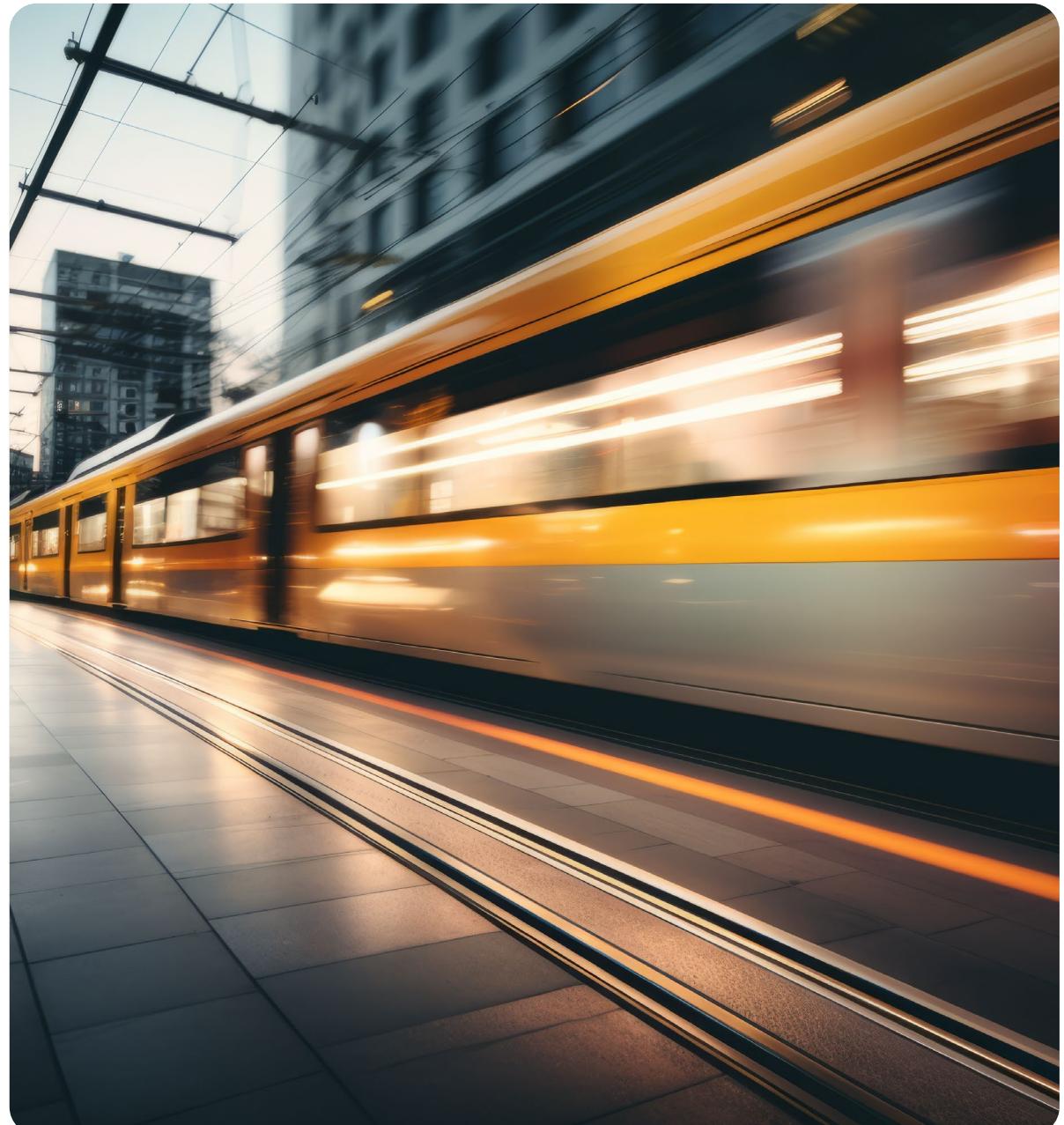
Roads

Rail & Transit Overview

Rail networks efficiently transport passengers between cities, towns, and suburbs, while also providing cost-effective freight services for goods over long distances. Rail infrastructure includes tracks, stations, bridges, tunnels, signals, overhead electrification, and maintenance facilities or rail yards. These networks have a positive impact on the economy by boosting trade, creating jobs, and promoting regional growth. Additionally, rail travel benefits the environment by producing fewer emissions compared to road transport.

Challenges and Innovations:

- High-Speed Rail: Faster connections between major cities
- Digitalization: Smart systems for better efficiency and safety
- Sustainability: Electrification, green materials, reduced environmental impact



Rail & Transit

Bentley's Value Proposition for Rail & Transit

Bentley's comprehensive rail solutions empower you to design, build, and maintain safe, reliable rail systems that improve operational efficiency and reduce risk.

KEY THEMES/MESSAGING:

- Transforming Transportation Engineering with AI Advancements
 - Understand your infrastructure assets and current operating conditions in full context to make better-informed decisions that improve planning and design.
Highlighted Brands: Asset Analytics, Google, Cesium, iTwin Capture, iTwin IoT, iTwin Experience
- Accelerating Project Delivery for Resilient Transportation
 - Accelerate design time with interoperable, rail focused engineering solutions, above and below ground.
Highlighted Brands: OpenRail
 - Support digital delivery to increase project throughput with 4D digital workflows that seamlessly connect design and construction teams.
Highlighted Brands: Bentley Infrastructure Cloud
 - Create digital twins, integrating data as a single source of truth enabling collaboration across all project phases and stakeholders.
Highlighted Brands: iTwin
- Engineering Excellence Starts Below the Surface
 - Engineering excellence starts below the surface, understanding ground risk is the core foundation of value engineering.
Highlighted Brands: OpenRail with OpenGround, PLAXIS, Leapfrog

Rail & Transit

Typical Persona Titles

Economic Buyers



Owner

(Government Agencies)

Common titles include:

- CIO
- CTO
- VP/Director Capital Projects
- VP/Director of Engineering
- VP/Director of Pre-construction
- VDC Director
- VP/Director of Digital Delivery
- VP/Director of Operations
- VP/Director of Technology



Consultants

(Engineering Firm)

Common titles include:

- Director of Engineering
- Director of IT
- Director of Operations
- Head of Digital Twins & Delivery,
- Head of Digital Delivery

Users / Influencers



Owner

(Government Agencies)

Common titles include:

- Project, District, Field Engineer
- Deputy, Chief, Principal Engineer
- Project, CAD, BIM, Digital Delivery, Engineering Asset or Information Manager
- Planner/Scheduler



Consultants

(Engineering Firm)

Common titles include:

- Project, CAD, BIM, Digital Delivery, or Engineering Manager
- Maintenance Manager
- Operations Manager
- Construction / VDC Manager
- Senior Engineer
- Civil Engineer
- Rail Engineer
- Asset Manager /Inspector
- Maintenance Manager

Key Persona: Economic Buyer

C-Suite / Department Heads



Desired Outcomes

- On-time, on-budget delivery
- Enhanced mobility, quality, reliability for the public
- Uninterrupted service
- Safe outcome despite increasing structural complexity
- Maximized asset lifespan
- Improved field workforce safety
- Efficient long-term operations & maintenance
- Optimized resources and maximized efficiency
- Customer retention/new business



Key Drivers

- Risk management and safety
- Evolving regulatory compliance
- Government funding and grants
- Client expectations and public satisfaction
- Increasing project throughput and cost efficiency
- Effective asset management
- Ensuring accessible, efficient, equitable mobility for current and future demand
- Profit & loss
- Long-term resilience of assets



Challenges

- Skilled and reliable workforce shortage
- Balancing stakeholder expectations
- Complex regulations and compliance
- Environmental impact and climate resilience
- Volume of assets and data to manage
- Deriving valuable insights from vast amounts of data
- Project scheduling and delays
- Paper deliverables
- Managing a geographically diverse workforce



Opportunities

- Data driven solutions/analytics (Digital transformation, Digital Delivery, Digital Twins)
- AI for monitoring, inspection, data insights

Key Persona: Economic Buyer

Role / Title

Discovery Questions

- Can you effectively deliver required construction documents such as cross sections, detail sheets and other plan sheets?
- Do you have enough time to try different configurations, create alternative designs for a project?
- Is unmanaged data opening your project up to unnecessary risk?
- How do you reduce constructability issues on-site?
- Do you use spreadsheets to perform engineering calculations?
- How do you maintain safety standards and ensure your teams have access to the latest project information?
- Do your clients require detailed reports or drawings for sections, elevations and framing plans?

Qualification Questions

- Is there a need to collaborate and work with federated models from multiple vendor data to achieve BIM workflows?
- Do you have the technology stack you need to complete rail projects on time and within budget?
- Can you find mentors when you need help on a specific workflow or project?
- How purpose driven are your solutions? Do they require heavy customization and scripting?
- Does your team have to translate data to complete a workflow?
- Do you struggle with resourcing projects and attaining full utilization?
- How do deliverables flow through complex rail supply chains?
- Are you employing 3D models as part of your workflow?

Objection Handling

Objection: We're satisfied with our current solutions and don't see a need for change.

Response: Can you tell me more about what you like most about your current workflow and any areas where you think there might be room for improvement?

Objection: We're not sure if the return on investment (ROI) justifies the cost.

Response: That's a valid concern. Can you tell me more about how you currently measure ROI for similar projects and what specific outcomes you're looking to achieve?

Data, Insight, Question Example

- Unforeseen ground conditions significantly impact costs, claims, and delays. How are you addressing ground risk for your projects?
- Rapid advances in IT are generating exponentially more digital data, with 90% of global data created in just the last two years. How is your company managing data and gaining insights for strategic decision making?
- Here's how we've helped a similar company reduce their design time by at least 20%. Could you see a similar ROI with your current workflows?

Key Persona: User

Rail, Civil Engineer / BIM, CAD Manager



Desired Outcomes

- On-time, on-budget project completion
- Compliance with contract deliverables and regulatory requirements
- Accelerated stakeholder reviews and approvals
- Enhanced coordination among all project stakeholders
- Ensured safety, reliability, sustainability, and resilience
- Minimized rework, change orders, and field safety incidents
- Optimized project coordination, resource allocation, schedules, and budgets
- Proactive and remote asset monitoring and maintenance



Key Drivers

- Client and project requirements
- Evolving regulatory compliance
- Responsibility for public safety and community impact
- Pride in and desire for quality, innovation, and excellence



Challenges

- Finding and maintaining resources
- Tedious, manual, repetitive tasks
- Reliance on 2D drawings and documentation
- Keeping up with technology
- Increasingly complex projects
- Data governance
- Change management
- Multiple stakeholders and siloed teams
- Software scalability / large dataset limitations
- Software interoperability / repetitive file format exchanges
- Unforeseen ground risk
- Sustainability standards



Opportunities

- Data driven solutions/analytics (Digital transformation, Digital Delivery, Digital Twins)
- Automation and AI
- Model-based design
- Discipline focused design software not generic
- Common data environment
- Integrated workflows
- Integrated subsurface solutions



Rail Engineering Solution



Challenges & Objectives

To deliver safe, resilient, and cost-effective rail infrastructure

- The primary challenges and objectives for rail and transit projects revolve around managing growing project complexity and costs.
- Labor shortages and the need for specialized personnel are significant hurdles.
- There's a critical need to improve data management by eliminating data silos and ensuring data accuracy, currency, and security.
- Projects must ensure regulatory compliance and sustainability.
- Organizations need to streamline workflows to optimize design and delivery, while enhancing stakeholder collaboration and communication.
- There's an increasing need to adopt digital transformation and technological innovation.
- Projects must be completed within shorter timeframes and tighter budgets.
- It is important to address the challenges of increased project volumes with limited resources.



Deliverables & ROI / Business Outcomes

Deliverables

- 2D drawings, 3D models, and Digital Twins of rail infrastructure
- Geotechnical reports and subsurface models
- Discipline-specific reports
- Project schedules and cost estimates
- Material quantities reports
- Construction models with staging and phasing plans
- BIM deliverables and federated models

ROI / Business Outcomes

- Reduced design time and costs
- Improved project quality and reduced risk
- Increased productivity through automation of industry-recognized and rail-specific workflows
- Simplified data handover with better-informed decisions
- Address skilled labor shortages and increased project demands



Products & Capabilities

Track and Overhead Line Design - OpenRail

- Leverage a fully detailed design application for survey, drainage, subsurface utilities, and railway design.

Digital Design Collaboration and Delivery – Bentley Infrastructure Cloud (ProjectWise)

- Link people, processes, and standards across the project. Manage, engineer, validate, and deliver data that spans all asset disciplines.

Station Design – OpenBuildings and LEGION

- Combines architectural, structural, mechanical, and electrical design along with pedestrian simulation to ensure all aspects of station design are coordinated and integrated to handle passenger flow and improve safety.

Interoperable with [Road](#), [Bridge](#), [Tunnel](#), Engineering Solutions

Rail Engineering

Summary of Competitor Learnings



Organization Summary

Autodesk's rail solutions, primarily relying on Civil 3D, InfraWorks, and Revit, present several limitations due to their generic nature and lack of specific rail focus.

These tools necessitate heavy customization and scripting, requiring firms to invest significant effort and potentially leading to delays. The workflow is fragmented, as Autodesk requires multiple platforms to integrate bridge and tunnel analysis, using plugins for structural and geotechnical aspects, creating data silos and hindering seamless data flow. This lack of integration means that Autodesk cannot natively connect to geological and geotechnical design solutions, which are critical for rail projects.

The absence of fully integrated BIM workflows limits long-term digital twin capabilities and requires third-party tools. They struggle with large datasets common in multi-disciplinary rail projects and require constant data translations due to a lack of file format consistency, causing rework and inefficiencies.

Autodesk doesn't offer design-time visualization without exporting or rendering and lacks parametric road and rail integration making it difficult to create adaptable bridge models. This results in a need for multiple software design, analysis, and modeling tools, and workarounds that hinder a streamlined workflow.

Bentley's Competitive Differentiators – How We Win

We provide a unified, purpose-built approach that directly addresses the limitations of generic software. Bentley offers discipline-specific, model-based software tailored for rail, overhead line equipment (OLE), bridge, tunnel, and station design, eliminating the need for extensive customization, scripting, and the reliance on specialists.

The solution accelerates project delivery by automating industry-recognized, rail-specific workflows such as regression analysis, horizontal and vertical alignment, cant/superelevation design, and turnout placement, while simplifying complex calculations and reducing manual changes through parametric modeling.

Key differentiators include:

- Intelligent, rail-object, and schema-driven automatic updating for design changes resulting in ready visualizable 3D models
- Specific capabilities to complete complex rail design and maintenance tasks, such as yard/station design, corridor modeling, and overhead line electrification
- Production of OLE layouts in relation to the track model in one solution
- Parametric tunnel design linked to track geometry and subsurface conditions
- Configurable rail workspaces
- The ability to design and review designs in both 2D and 3D in one process

Rail Engineering Solution

Solution Outcomes

1

Accelerate Design and Documentation

Accelerate multidiscipline design and the production of project deliverables from 2D drawings and reports to 3D models through model-based design.

2

Ensure Compliance with Industry Standards

User-defined design rules ensure projects follow the local requirements leaving engineers free to focus on the design process.

3

Reuse Design Data Across the Asset Lifecycle

Simplify handover with the transfer of robust data-driven models to construction and asset managers, to reduce errors and misinterpretations.

Challenges Addressed

This solution addresses the following challenges



Rail Engineering Solution

User Outcomes



Arcadis Hurontario Light Rail Project Design: "Global Resources - Local Mobility"

- Decrease of 75% in time taken to update design.
- Supported collaboration across teams in 6 time zones.

“

Our track design team had to re-align the track to accommodate late-breaking adjustments from the systems design team. Not only do these changes impact the track alignment, but they also affect the roadway, landscape and other design disciplines. Despite this, we successfully delivered these re-alignments through close design integration and the use of a common data environment.

Fernando Romero

Senior Track Engineer, Arcadis

[Find out more](#)



Digital Twins Prove a Game-changer in Helping Sweco Nederland Deliver Bergen's Light Rail Extension

- Streamlined digital workflows allowed teams to consider more options, which reduced tender costs and improved design efficiencies by 20%.
- Sweco estimates to save EUR 1.5 million annually on projects of similar size and is embracing digital twins for future engineering initiatives.

“

Bentley's solution has enabled Sweco NL to engineer the extension of Bergen's Light Rail system 'right first time,' and, as a result, make significant time and cost savings on this complex project. In short, Bentley's software made our work easier and more effective, enabling the team to optimize the design and complete work within a tight schedule.

Christiaan Post

Consultant BIM Manager, Sweco Nederland B.V

[Find out more](#)



Banedanmark Creates a Digital Twin of Denmark's Railway System to Modernize Signalling and Reducing Delays

- The digital workflow reduces the design time by up to 30% by viewing data within the digital twin, rather than accessing PDFs.
- When the systems are complete, signal-related delays are expected to decline between 50% to 80%, depending on the line.

“

Put simply, without Bentley applications it was impossible to successfully work on this project.

Farzad Aknooni

BIM Specialist, Banedanmark

[Find out more](#)



Rail



Rail Construction Planning Solutions



Challenges & Objectives

To deliver safe, resilient, and cost-effective rail projects while minimizing disruption to existing services and the public

- Common challenges include shorter deadlines, tighter budgets, rising material costs, and skilled labor shortages
- There's a critical need to improve data management by eliminating data silos
- Projects must ensure regulatory compliance and sustainability
- Organizations need to enhance collaboration between design and construction teams
- There's an increasing need to move beyond traditional 2D deliverables, such as PDFs, to 3D/4D model-based workflows
- 4D construction modeling, visualization, and simulation capabilities allow for better planning and execution
- Shareable web-based 4D sequences improve communication and understanding among all stakeholders
- Cost projects and automated quantity takeoffs lead to better budget management and risk reduction
- Reduced disruption to existing rail services and members of the public improves project outcomes
- Seamless transition from design-focused to construction-focused project management



Deliverables & ROI / Business Outcomes

Deliverables

- 3D/4D model-based construction plans
- Optimized project schedules
- Web-based 4D sequences
- Construction cost estimates
- Automated Quantity Takeoffs
- Simulation reports

ROI / Business Outcomes

- Reduced project costs through optimized planning and resources
- Accelerated project delivery through digital workflows and enhanced collaboration
- Minimized disruption to rail services
- Improved jobsite safety
- Optimized material usage through material planning, leading to less waste and reduced carbon footprint
- Reduced staging time



Products & Capabilities

SYNCHRO

- 4D Construction modeling
- Resource management
- Web-based 4D sequences
- Cost and Quantity Takeoffs
- Clash detection

SYNCHRO 4D Pro

- 4D construction model of the entire project
- Consolidate models and external logistics information into a federated 4D model
- Conduct virtual planning ahead of construction
- Simulation of every step of construction

SYNCHRO Field

- Facilitates construction inspection and forms management
- Enables tracking of construction progress

Rail Construction Planning Solution

Summary of Competitor Learnings



Organization Summary

Autodesk offers a comprehensive suite of tools for construction management, including BIM 360 and PlanGrid. While it provides robust features for general construction, its rail-specific capabilities are less pronounced. The platform emphasizes cloud-based collaboration and real-time data access but requires additional customization for rail infrastructure projects, such as third-party tools for advanced simulation, quantity takeoffs, and cost estimation, making workflows fragmented.	Trimble's Quantm system specializes in route optimization for rail and road projects, offering alignment planning and cost estimation. Novapoint provides BIM solutions for infrastructure design, including railways. However, Trimble's offerings are more focused on the planning and design phases, with less emphasis on integrated 4D construction modeling and simulation.	Procore is a widely used construction management platform that offers project management, quality and safety tools, and financial management. It excels in providing a centralized platform for construction projects but lacks specialized features for rail construction planning, such as 4D modeling and rail-specific design integrations.	HCSS provides software solutions for heavy civil construction, including estimating, project management, and fleet management. While it offers robust tools for general construction management, it does not cater specifically to the unique requirements of rail construction projects, such as rail alignment design and 4D construction simulation.	InEight delivers project management tools focusing on project controls, estimating, and field execution management. It offers comprehensive solutions for construction projects but lacks specialized features for rail construction, such as integrated BIM workflows and 4D modeling capabilities.
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Bentley's Competitive Differentiators – How We Win

Integrated rail-specific workflows - Bentley's solution offers end-to-end workflows tailored for rail projects, encompassing design, construction planning, and operations, reducing the need for multiple disparate tools.	Unlike competitors, Bentley provides sophisticated 4D modeling capabilities, allowing for detailed construction sequencing, visualization, and simulation, which are crucial for complex rail projects.	Bentley's tools enable automated extraction of quantities and accurate cost projections directly from the model, enhancing budgeting accuracy and efficiency.	Our rail construction planning solution supports the entire asset lifecycle, from design through construction to maintenance, ensuring data continuity and facilitating informed decision-making throughout the project's life.	We facilitate real-time collaboration among stakeholders, ensuring that all parties have access to the most current project information, thereby reducing errors and rework.
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Rail Construction Planning Solution

Solution Outcomes

1

Enhanced Safety and Efficiency

Improved safety planning and streamlined design and construction review processes lead to a significant reduction in jobsite accidents and injuries.

2

Optimized Project Execution

Visualizing and resolving conflicts before construction begins, along with improving design quality and intent, reduces change orders and rework on projects.

3

Increased Stakeholder Confidence

Anticipating construction impacts on existing rail services/timetables and increasing transparency to inform the public and meet regulations.

Challenges Addressed

This solution addresses the following challenges



Rail Construction Planning Solution

User Outcomes



Rail

Victoria's Level Crossing Removal

- Working in a connected data environment saved approximately 300 resource hours.
- Integrated digital approach optimized data management and streamlined workflows, reducing modeling time by 60%.
- Optimized material usage and reduced carbon footprint by 30%.

“

Utilizing Bentley's software solutions—such as OpenBridge Modeler®, OpenRail, and ProjectWise—proved to be a game-changer for our multidiscipline rail project.

Matt Gillard

Design Area Manager for Parkdale Level Crossing, WSP Australia Pty. Ltd.

[Find out more](#)



Rail Asset Performance Solutions



Challenges & Objectives

To maintain and sustain transport networks for safe, reliable use

- Understand asset inventory and their criticality to service delivery
- Assess asset condition and suitability for purpose
- Predict impacts on asset condition and safe operating life
- Evaluate the consequences of asset failure
- Identify asset interactions in service delivery
- Anticipate changes in system requirements and necessary adjustments
- Assess impacts of maintenance and renewal options
- Account for budget, resource, and engineering constraints in asset management
- Plan for future maintenance and renewal needs, ensuring adequate resources or understanding risks of deferred actions
- Stay informed on statutory and regulatory requirements and potential changes
- Establish response protocols for incidents and accidents
- Monitor system usage trends and potential changes
- Evaluate public perception and its effect on usage



Deliverables & ROI / Business Outcomes

Assets

- Track
- Electrification system
- Signaling system
- Stations
- Tunnels
- Bridges

ROI / Business Outcomes

- Reduction in maintenance costs
- Reduce risk to engineers and end users
- Increased system availability
- Increase efficiency, which reduces operational costs.
- Avoid risk of catastrophic failures
- Ensure resilience in the face of changing environment, requirements and components
- Compliance with regulations



Products & Capabilities

iTwin Experience

- Visualize design, construction, operational and maintenance data in a unified view

AssetWise ALIM

- Manage relationships and track changes between assets, standards, requirements

AssetWise Linear Analytics

- Optimize decision support combining track measurement with designs, work history and system usage

iTwin IoT

- Manage live feeds from sensors over the rail system

iTwin Capture

- Process and manage drone and LIDAR data to create models of current state of assets & systems

OpenRail Designer

- Generate maintenance instructions to correct track alignment

OpenPaths

- Detect travel patterns to improve decision-making through access to comprehensive mobility data and powerful analytics.

Rail Asset Performance Solutions

Solution Outcomes

1

Increase Availability

Supporting proactive maintenance to fix issues before they disrupt service.

2

Reduce Costs

Support root cause analysis to ensure the right work is done first time around. Ensure engineers have access to all available data to support informed decision making. Help understand the impact of changes to minimize associated costs.

3

Increase Safety

Minimize site visit requirements by utilizing digital inspections from sensors on assets and rail vehicles. Maximize work efficiency per site visit and ensure the right tasks are completed to prevent the need for repeat visits.

Challenges Addressed

This solution addresses the following challenges



Rail Asset Performance Solutions

User Outcomes



PT MRT Jakarta (Perseroda)

- Using Bentley's digital twin applications saved 10% in working time and reduced hard copy submissions by 90%.
- The digital solution helped maintain the review of and approval for contractor submissions within a contractual obligation of 30 days.

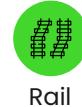
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The adoption of [Bentley's] digital technologies improves project performance and seamless collaboration among project stakeholders while maintaining the quality of deliverables.

Imam Detriana

Head of Project Management Office Division, PT MRT Jakarta

[Find out more](#)



SMRT Trains Improves Rail Reliability Across 282 Kilometers of Track

- As of August 2019, SMRT achieved 1 million MKBF across all rail lines.
- With prioritization implementation, SMRT managed to cut down hundreds of manual planning hours and save about 20 maintenance train deployments annually.

//

By providing a holistic assessment of the whole network's asset condition, [the] PDSS helps engineers manage long-term maintenance planning to both anticipate and justify the need for asset renewal.

Jessie Nguyen

Senior Engineer SMRT Trains Ltd

[Find out more](#)



Transport for London Delivers the Elizabeth Line, London's Largest Addition to Public Transport in over 50 Years

- An additional 1.5 million people are now within 45 minutes of Central London, and congestion on the rail network is reduced.
- Delivered 200 million passenger forecast, within 10% of actuals, setting benchmarks for appraisal speed and accuracy.
- Forecasted 10 million fewer car journeys per year to transfer to the Elizabeth Line, a net reduction of 24.6 million fewer grams of carbon emissions per day.

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Without the efficiency and stability of the OpenPaths EMME software, developing a model as large and as sophisticated as Railplan simply wouldn't have been possible.

David Warner

Principal Transport Modeler, Transport for London

[Find out more](#)



Rail

Bridges overview

Bridges serve as critical links in transportation networks, enabling the seamless passage of vehicles, pedestrians, and cyclists over obstacles such as rivers, valleys, roads, or rail lines. Bridge types include arch, beam, truss, suspension, cable-stayed, and cantilever. Bridges not only facilitate connectivity and mobility but also have the potential to become iconic landmarks symbolizing engineering prowess and aesthetic appeal. They contribute to economic vitality by reducing travel times and costs, thereby enhancing trade efficiency and accessibility to different regions. Additionally, bridges support tourism by providing access to previously isolated areas.

Challenges and Innovations:

- Structural health monitoring: Early detection of issues ensure safety and maintenance efficiency.
- Aerodynamics: Design improvements enhance stability, especially in high winds. Considerations are crucial for long-span bridges.
- Materials: Developing stronger, more durable materials extends bridge lifespans. Sustainable materials contribute to reduced environmental impact.

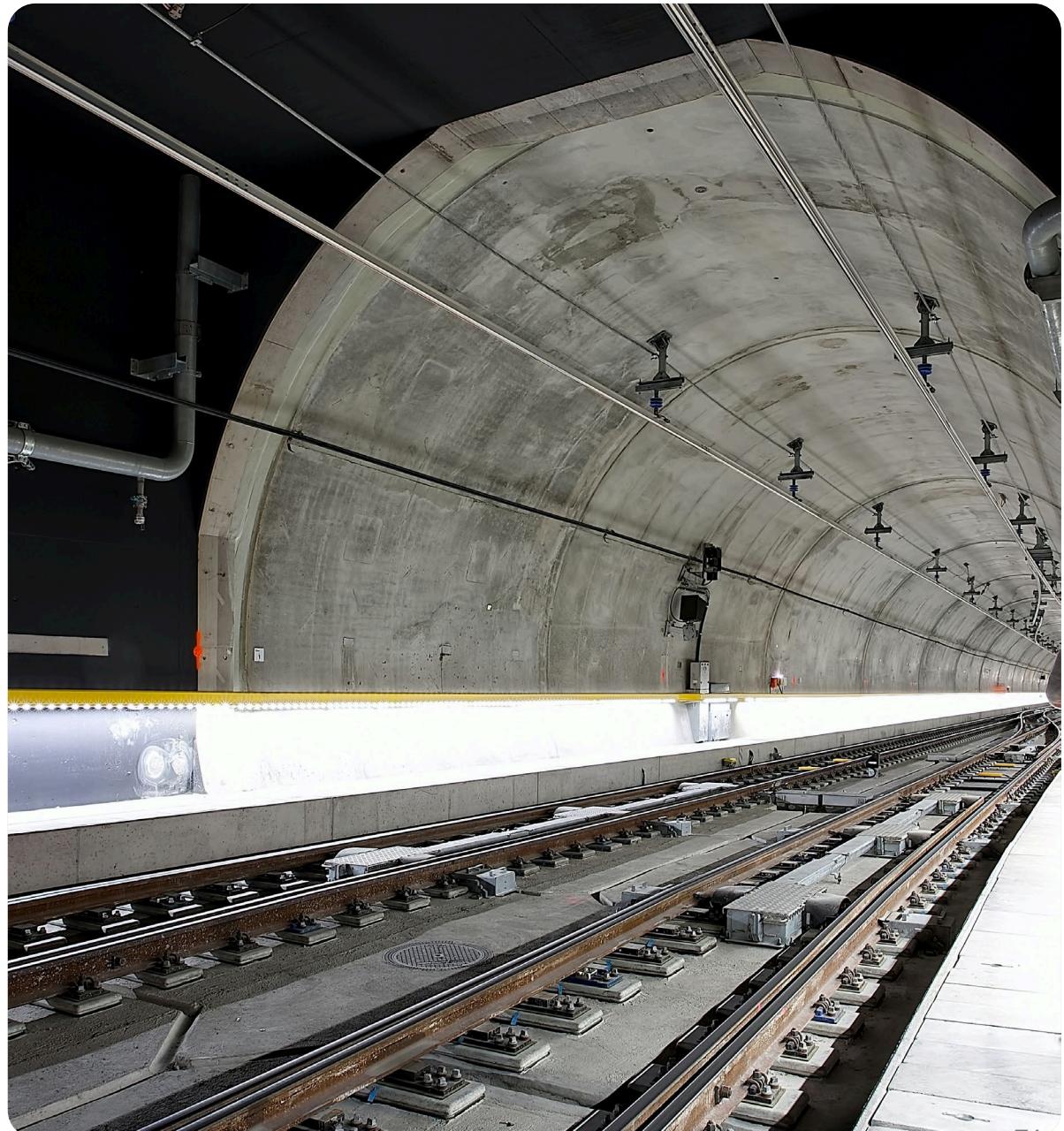


Tunnels overview

Tunnels serve as essential conduits for road vehicles, buses, trains, trams, and even canals. They efficiently connect regions by providing routes through mountains, under rivers, or within urban areas. These horizontal passages are created through methods like excavation, explosives, or specialized machinery. Notable tunnel types include cut-and-cover, bored tunnels, and immersed tube tunnels. Geotechnical analysis and soil stability are critical factors in tunnel construction. Understanding subsurface conditions ensures safe and stable tunnel foundations. Proper soil stabilization techniques enhance load-bearing capacity, reduce settlement, and contribute to the longevity of these vital infrastructure projects.

Challenges and Innovations:

- Advanced Surveying and Geotechnical Analysis: LiDAR and UAVs provide precise topographical data and high-resolution imagery to help identify geological risks early during site surveys.
- Building Information Modeling (BIM): Integrating all aspects of tunnel design, construction, and management into a single digital platform ensures collaboration and up-to-date information for stakeholders.
- Digital Twins: Creating virtual replicas of physical tunnels allows real-time monitoring, predictive maintenance, and optimization. This proactive approach enhances longevity and reliability.



Bridge & Tunnel

Bentley's Value Proposition for Bridge & Tunnel

Comprehensive bridge and tunnel solutions that optimize the entire project lifecycle, driving efficiency, reducing risks, and ensuring long-term success from design through maintenance.

KEY THEMES/MESSAGING:

- Transforming Transportation Engineering with AI Advancements
 - Understand your infrastructure assets and current operating conditions in full context to make better-informed decisions that improve planning and design.
Highlighted Brands: Asset Analytics, Google, Cesium, iTwin Capture, iTwin IoT, iTwin Experience
- Accelerating Project Delivery for Resilient Transportation
 - Accelerate design time with interoperable, bridge and tunnel focused engineering solutions, above and below ground.
Highlighted Brands: OpenBridge, OpenTunnel, OpenGround
 - Support digital delivery to increase project throughput with 4D digital workflows that seamlessly connect design and construction teams.
Highlighted Brands: Bentley Infrastructure Cloud
 - Create digital twins, integrating data as a single source of truth enabling collaboration across all project phases and stakeholders.
Highlighted Brands: iTwin
- Engineering Excellence Starts Below the Surface
 - Engineering excellence starts below the surface, understanding ground risk is the core foundation of value engineering.
Highlighted Brands: OpenBridge, OpenTunnel with OpenGround, PLAXIS, Leapfrog

Bridge & Tunnel

Typical Persona Titles

Economic Buyers



Owner

(Government Agencies)

Common titles include:

- Secretary of Transportation
- Infrastructure/Transportation Minister
- Chief Information Officer (CIO)
- Chief Technology Officer (CTO)
- Director of Engineering
- Director of Pre-construction
- Director of Digital Delivery
- Director of Operations
- Director of Technology
- VDC Director



Consultants

(Engineering Firm)

Common titles include:

- Director of Engineering
- Director of Information Technology (IT)
- Director of Operations
- Principal Engineer
- Director of Digital Delivery

Users / Influencers



Owner

(Government Agencies)

Common titles include:

- Project Engineer
- District Engineer
- Field Engineer
- Chief Engineer
- Principal Engineer
- Project Manager
- CAD Manager
- BIM Manager
- Digital Delivery Manager
- Engineering Manager
- Maintenance Manager
- Operations Manager
- Construction Manager / VDC Manager
- Senior Civil Engineer
- Senior Bridge Engineer
- Senior Tunnel Engineer
- Senior Structural Engineer
- Asset Manager
- Inspector
- Geotechnical Engineer



Consultants

(Engineering Firm)

Common titles include:

- Project Manager
- CAD Manager
- BIM Manager
- Digital Delivery Manager
- Engineering Manager
- Maintenance Manager
- Operations Manager
- Construction Manager / VDC Manager
- Senior Civil Engineer
- Senior Bridge Engineer
- Senior Tunnel Engineer
- Senior Structural Engineer
- Asset Manager
- Inspector
- Geotechnical Engineer

Key Persona: Economic Buyer

Government/Federal/Municipal Secretaries & Ministers, Engineering Firm C-Suite



Desired Outcomes

- On-time, on-budget delivery
- Enhanced mobility, quality, and reliability for the public
- Uninterrupted service
- Safe outcome despite increasing structural complexity
- Maximized asset lifespan
- Improved field workforce safety
- Efficient long-term operations & maintenance
- Optimized resources and maximized efficiency
- Customer retention/new business



Key Drivers

- Risk management and safety
- Evolving regulatory compliance
- Government funding and grants
- Client expectations and public satisfaction
- Increasing project throughput and cost efficiency
- Effective asset management
- Ensuring accessible, efficient, and equitable mobility for current and future demand
- Profit & loss
- Long-term resilience of assets



Challenges

- Skilled and reliable workforce shortage
- Balancing stakeholder expectations
- Complex regulations and compliance
- Environmental impact and climate resilience
- Volume of assets and data to manage
- Deriving valuable insights from vast amounts of data
- Project scheduling and delays
- Paper deliverables
- Managing a geographically diverse workforce



Opportunities

- Data driven solutions/analytics (Digital transformation, Digital Delivery, Digital Twins)
- AI for monitoring, inspection, data insights
- Doing more with existing staff

Key Persona: Economic Buyer

Government/Federal/Municipal Secretaries & Ministers, Engineering Firm C-Suite

Discovery Questions

- What is your most significant challenge in delivering projects on time and within budget?
- How do you currently manage collaboration and communication across your project teams and stakeholders?
- What are your top priorities for improving the efficiency of your current design, build, and/or operations and maintenance processes?
- What level of ground risk do you typically encounter in your projects, and how do you address it?
- What are your main concerns regarding the long-term performance and maintenance of your bridge and tunnel assets?
- How do you currently leverage data and technology to support decision making in your project lifecycle?
- How are you approaching the challenges related to the increasing complexity, cost, and risk involved in infrastructure projects?

Qualification Questions

- What criteria are most important to you when evaluating potential solutions for your projects?
- How do you see our solution integrating with your existing systems and workflows to address your specific design challenges?
- Who in your organization is responsible for making decisions about software improvements?
- Do you have a strategic initiative or goal to improve project delivery or asset performance?
- What is your current budget allocation for digital transformation initiatives?
- Are you looking for a comprehensive solution that covers the entire infrastructure lifecycle?
- How much do you value openness considering the various vendors and file formats in the market?
- How is your organization leveraging AI?

Objection Handling

Objection: We're satisfied with our current solutions and don't see a need for change.

Response: Can you tell me more about what you like most about your current workflow and any areas where you think there might be room for improvement?

Objection: We're not sure if the return on investment (ROI) justifies the cost.

Response: That's a valid concern. Can you tell me more about how you currently measure ROI for similar projects and what specific outcomes you're looking to achieve?

Data, Insight, Question Example

- There is an urgent need for rehabilitation projects, with over 220,000 bridges in the US alone in need of major repair or replacement. Can Bentley help you prioritize and manage this?
- Unforeseen ground conditions significantly impact costs, claims, and delays. How are you addressing ground risk for your projects?
- The industry is facing a significant skills gap, making it difficult to attract and retain talent. How are you addressing your team's technical expertise needs?
- Here's how we've helped a similar company reduce their design time by at least 20%. Could you see a similar ROI with your current workflows?

Key Persona: User

Bridge, Civil, Structural, Geotechnical, Tunnel Engineer / BIM, CAD Manager



Desired Outcomes

- On-time, on-budget project completion
- Compliance with contract deliverables and regulatory requirements
- Accelerated stakeholder reviews and approvals
- Enhanced coordination among all project stakeholders
- Ensured structural integrity, safety, reliability, and resilience
- Minimized rework, change orders, and field safety incidents
- Optimized project coordination, resource allocation, schedules, and budgets
- Proactive and remote asset monitoring and maintenance



Key Drivers

- Client and project requirements
- Evolving regulatory compliance
- Responsibility for public safety and community impact
- Pride in and desire for quality, innovation, and excellence



Challenges

- Finding and maintaining resources
- Tedious, manual, repetitive tasks
- Reliance on 2D drawings and documentation
- Keeping up with technology
- Increasingly complex projects
- Data governance
- Change management
- Multiple stakeholders and siloed teams
- Software scalability / large dataset limitations
- Software interoperability / repetitive file format exchanges
- Unforeseen ground risk



Opportunities

- Data driven solutions/analytics (Digital transformation, Digital Delivery, Digital Twins)
- Automation and AI
- Model-based design
- Discipline focused design software not generic
- Common data environment
- Integrated workflows
- Integrated subsurface solutions

Bridge & Tunnel Engineering Solutions



Challenges & Objectives

To deliver safe, resilient, and cost-effective bridge & tunnel infrastructure

- The primary challenges and objectives for bridge and tunnel projects revolve around managing growing project complexity and costs. This includes addressing the impact of aging infrastructure and ground risk.
- Labor shortages and the need for specialized personnel are significant hurdles.
- There's a critical need to improve data management by eliminating data silos and ensuring data accuracy, currency, and security.
- Projects must ensure regulatory compliance and sustainability, while also promoting public and worker safety.
- Organizations need to streamline workflows to optimize design and delivery, while enhancing stakeholder collaboration and communication.
- There's an increasing need to adopt digital transformation and innovation.



Deliverables & ROI / Business Outcomes

Deliverables

- 3D models of bridges and tunnels
- Geotechnical reports and subsurface models
- Structural analysis and simulation results
- Design documentation, including plans, sections, and elevations
- Project schedules and cost estimates
- Construction models with staging and phasing plans
- Data-rich deliverables for clients and stakeholders

ROI / Business Outcomes

- Reduction in design time
- Improved project quality
- Reduced project costs
- Minimized risk of project overruns and onsite change orders
- Enhanced safety on project sites
- Greater client satisfaction
- Compliance with regulatory requirements
- Improved asset performance and longevity



Products & Capabilities

Bridge Design and Analysis - OpenBridge

- Design concrete and steel bridges and ensure that they are fit for purpose by using advanced analytics.

Tunnel Design and Analysis - OpenTunnel

- Track geometry and subsurface conditions by linking parametric tunnel design.

Geotechnical Modeling, Design, Analysis, and Data Management

- GeoStudio, Leapfrog, PLAXIS, OpenGround

Bridge & Tunnel Engineering Solutions

Summary of Competitor Learnings



Organization Summary

Autodesk provides Civil 3D, InfraWorks, and Revit for bridge and tunnel modeling, but relies on plugins for structural analysis, load rating, and geotechnical modeling. It lacks open data and large dataset support, requiring multiple applications to produce deliverables. Additionally, Autodesk does not offer fully BIM-integrated workflows for asset lifecycle management, limiting long-term digital twin capabilities.	Lacks parametric road and rail integration making it difficult to create fully adaptable bridge models. Users require Civil 3D for alignments and external software for analysis, leading to inefficiencies. While strong in steel detailing and fabrication, it lacks robust capabilities for reinforced concrete bridge workflows.	Allplan integrated structural analysis tools but requires exports to SCIA or external software for advanced analysis. The geotechnical and tunnel modeling capabilities are limited, making it less suitable for complex underground infrastructure projects. Allplan's parametric modeling is not as dynamic, requiring more manual adjustments compared to fully integrated solutions.	CSI Bridge is focused on structural analysis but lacks comprehensive BIM integration and parametric modeling capabilities. Users must export models from Revit or Civil 3D before performing analysis, creating inefficiencies. Its lack of automated clash detection and alignment integration makes it less effective for large-scale bridge projects.	MIDAS provides strong structural and geotechnical analysis tools but lacks comprehensive BIM integration and lifecycle asset management capabilities. It requires third-party tools for design collaboration, making workflows more fragmented. Additionally, MIDAS does not offer fully connected digital twin solutions, limiting long-term infrastructure monitoring and maintenance capabilities.
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Bentley's Competitive Differentiators – How We Win

Bentley provides a full engineering, modeling, and analysis solution that seamlessly integrates with construction and operations. Our solution provides automated and intuitive bridge and tunnel specific design tools eliminating the need for specialists, heavy customization, and multiple applications. The solutions' end-to-end integrated workflows improves collaboration across disciplines resulting in better bridge & tunnel design, quality, safety and performance.	Unlike the competition, our bridge solution provides parametric modeling with native structural analysis for alignment, cross-sections supporting changes automatically updating the entire model, reducing rework and decreasing design time by at least 20%.	We provide a fully integrated BIM and structural analysis workflow, eliminating the need for external software. Unlike Allplan, our solution includes advanced geotechnical and tunnel-specific analysis within the same environment, improving accuracy and efficiency.	Bentley enables a seamless workflow, from design, to modeling and analysis, integrating parametric modeling, structural analysis, and BIM in one platform. Unlike the competition, it eliminates the need for external CAD modeling tools such as Civil 3D or Revit, reducing design iteration time.	Our solutions offer comprehensive BIM integration and lifecycle asset management, enabling real-time collaboration across teams, enhancing design coordination and long-term asset performance.
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Bridge & Tunnel Engineering Solutions

Solution Outcomes

1

Accelerated Design and Documentation

Leverage more efficient and cost-effective technologies to increase productivity and deliver more with your existing staff.

2

Improve Collaboration with Open Data

Work together in a unified model that incorporates data from multiple sources regardless of format, scale, or complexity.

3

Reuse Design Data Across the Asset Lifecycle

Simplify handover with the transfer of robust data-driven models to construction and asset managers, reducing errors and misinterpretations.

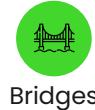
Challenges Addressed

This solution addresses the following challenges:



Bridge & Tunnel Engineering Solutions

Bridge User Outcomes



Ferrovial and Alamo NEX Create a 3D Digital Twin to Build a Viaduct Road in a Tight Urban Area

- Combining clash detection software and LiDAR information for existing elements eliminated approximately 3,500 clashes, preventing costly rework.
- Digital design helped them determine how to reduce the use of expensive elements like steel spans while keeping the design strong.

“

By having the entire project modelled in 3D and having the digital twin, we have increased the efficiency of the communication and approval process by leaps and bounds. Construction segment directors no longer must wait for a finalized 2D plan and then sit down for days and try to understand it.

Carlos Gonzalez

Vice President, Engineering Services, Design Operations Lead North America, Ferrovial Construction

[Find out more](#)



Arcadis Leverages Digital Modelling and Analysis to Deliver Iconic Lifting Footbridge in London

- Using Bentley's solutions as a single source of truth improved productivity by 20%.
- Producing an accurate digital representation of the site's subsurface reduced the ground investigation scope by around 30%, saving more than GBP 70,000.
- Digital connectivity increased data efficiencies for design cost savings of about 12%, or about 1,000 hours.

“

Going digital has improved collaboration between clients, architects, and design disciplines, making it easier to obtain planning permissions, consents, and funding for this exciting South Dock Bridge project.

Andrea Gillarduzzi

Senior Director and Global Lead, Subsurface Modelling, Arcadis

[Find out more](#)



Bridges

Qk4 Revolutionizes Bridge Survey Program, Saving Kentucky USD 300 Million

- By implementing Bentley applications, Qk4 reduced survey processing time by 50% and overall program costs by USD 380 million.
- The team saved USD 3.5 million in survey costs alone, eliminating approximately 20,000 land survey hours.
- Survey costs per bridge reduced from USD 24,440 to USD 14,220.

“

A picture is worth a thousand words, and a model is worth a book.

Royce Meredith, PE

Program Manager for Bridging Kentucky, Kentucky Transportation Cabinet

[Find out more](#)



Bridges

Bridge & Tunnel Engineering Solutions

Tunnel User Outcomes



Tecne Systra-SWS Advanced Tunneling Srl – Digital Implementation in Tunnel Assessment and Rehabilitation

- Leveraging Bentley's advanced modeling tools reduced design time by 21.5%, significantly cutting costs.
- By streamlining workflows, Bentley's solution improved data interpretation efficiency by 35%, enabling faster and more accurate project execution.
- Digital workflows optimized structural interventions, extended infrastructure life, and reduced waste, contributing to more sustainable engineering practices.

“

Bentley workflow provided tools to develop assessment models for a better survey data integration and interpretation to support intervention solution making and develop project and construction information tunnel models that can became a basis for digital twin.

Ana Emiliano dos Reis

BIM Manager, Tecne Systra-SWS Advanced Tunneling Srl



Setec Terrasol – High value-added geotechnical engineering

“

OpenTunnel is a powerful tool for designing tunnels and all associated structures. The automatic implementation of the reinforcement is also an indispensable tool that we use very regularly, which allows us to save a lot of time and to test several solutions.

Jean-Pierre Janin

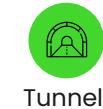
Former Manager of the Underground Structures Unit, Setec Terrasol

“

With OpenTunnel, the design can be made directly by the drafter, and the engineer can concentrate on the calculations in PLAXIS and the design of the work. It is a way to save time and optimize everyone's work.

Christine Remonay

Design Drafter, Setec Terrasol



ETS Ingegneria – Engineering meets infrastructure technology

“

We applied Bentley's digital information technology and management concept to the design, construction, manufacturing, installation, and construction management cycle of the Liaozi Grand Bridge to provide a technological route and implementation plan for digital bridge construction.

Federico Foria

Manager, Geotechnics, Geology and Hydraulics Department, ETS

[Find out more](#)

[Find out more](#)

[Find out more](#)



Construction Planning Solution

See [Road](#) and/or [Rail](#) Construction Planning Solution

Bridge Monitoring Solution



Challenges & Objectives

To deliver safe, resilient, and cost-effective bridge monitoring and inspection

- Address the challenges of aging infrastructure requiring innovative solutions
- Overcome labor shortages and the need to do more with less in bridge inspection, maintenance, and repair
- Improve inefficient, manual, and error-prone inspection processes
- Reduce risks of accidents, injuries, and bridge failures
- Address siloed data systems, poor communication, and collaboration between disciplines
- Improve data management by ensuring data accuracy, currency, and security
- Enable predictive decision support on assets
- Streamline workflows to reduce time spent on site and minimize traffic disruptions
- Provide a way to organize and access bridge images and associated annotations
- Enable remote visualization to bridge assets
- Augment and accelerate inspections using technology



Deliverables & ROI / Business Outcomes

Deliverables

- 3D digital twin of bridges created using iTwin Capture, iTwin IoT and iTwin Experience
- Real-time data and insights on bridge structures
- Single-view repository for comprehensive and historical bridge inspection data
- Visualization of bridge condition, including reported issues
- AI and ML defect detection to identify and classify defects

ROI / Business Outcomes

- Reduction in bridge rehabilitation project costs by 20%
- Enhanced safety for inspectors by reducing field time and risk of accidents
- Increase in amount and quality of contextual data
- Addition of real-time data and insights to provide more comprehensive view of bridge performance
- Reduction in manual defect identification through AI
- Improved consistency and accuracy of defect identification through AI
- Reduction of roadway closures and traffic disruptions



Products & Capabilities

iTwin Capture

- Create highly detailed 3D reality mesh of bridges from simple photographs or point clouds
- Enable bridge inspectors to remotely view and accurately document the condition of bridge structures

iTwin IoT

- Connect IoT field sensors to the digital twin to gather real-time insights and data
- Generate email and text alerts based on user-defined thresholds
- Measure and visualize critical performance metrics like environmental changes, structural movement, and deterioration
- Create dashboards to view condition assessment, maintenance scheduling, and prompt preventative maintenance

iTwin Experience

- Enable visualization, querying, and analysis of infrastructure digital twins
- Visualize data in the context of a digital twin across assets and geographies
- Annotate condition notes directly in the 3D environment and remotely review
- Utilize AI to assist with defect detection
- Create custom inspection forms

Bridge Monitoring Solution

Summary of Competitor Learnings



GNEXT processes and inspects in the same software and is not a bridge specific inspection tool. It does include change detection and AI defect detection and report generation. It does not include IoT integration capabilities.

Developed by the American Association of State Highway and Transportation Officials, this software focuses on bridge inventory and inspection management. It offers tools for data collection and condition assessment but may lack advanced real-time monitoring and predictive analytics capabilities. Lacks real-time health monitoring and advanced predictive analytics, limiting proactive maintenance capabilities.

A web and tablet-based platform designed for efficient inspection, inventory, and maintenance of transportation infrastructure. While it provides offline capabilities and GIS integration, it may not offer comprehensive digital twin functionalities or extensive IoT sensor integrations. Does not fully integrate IoT sensor data for real-time monitoring, potentially missing immediate structural health insights.

A Swiss digital twin platform specialized in managing civil infrastructures, mainly bridges. It emphasizes creating digital replicas for monitoring purposes but might have limited integration with various data sources compared to more comprehensive solutions. May have limited integration with diverse data sources and lacks comprehensive tools for predictive maintenance planning.

Australian based company that promotes asset intelligence and serves multiple markets beyond bridge and transportation. They recently added AI detection which integrates with the manual labelling of defects.

Bentley's Competitive Differentiators – How We Win

Bentley has an advantage by offering seamless integration with iTwin Capture and iTwin IoT. Additionally, GNEXT is a standalone software. Users that are familiar with Bentley products can add the bridge monitoring solution and connect directly with ProjectWise and eliminate duplicate storage of large reality data files. Gnext processes the models so it removes a level of control from the user. This is different than iTwin Capture where Bentley users control the processing.

Bentley's solution offers real-time health monitoring through IoT integrations and advanced predictive analytics, enabling proactive maintenance strategies beyond standard inspection routines.

Our bridge monitoring solution provides comprehensive digital twin capabilities, integrating various data sources, including IoT sensor data, for a holistic view of bridge health and performance.

Bentley enhances digital twin functionalities with robust data integration from multiple sources and advanced analytics, supporting more effective predictive maintenance and decision-making processes.

Bentley has an advantage by offering seamless integration with iTwin Capture and iTwin IoT. Additionally, Trendspek is a standalone software. Trendspek processes the models, so it removes a level of control from the user. This is different than iTwin Capture where Bentley users control the processing.

Bridge Monitoring Solution

Solution Outcomes

1

Improve Collaboration & Productivity

Conduct more detailed inspections, increase stakeholder engagement and reduce outage of assets and impact to public. Minimize manual tasks by leveraging AI.

2

Promote Safety

Mitigate risk for inspectors by reducing time on-site. Reduce project risk by bringing all relevant data together in context.

3

Increase Transparency & Efficiency

Improve the inspection process and streamline maintenance while providing a total view of the asset's condition for future repair, rehabilitation design, and construction efforts directly within the design and construction tools.

Challenges Addressed

This solution addresses the following challenges:



Bridge Monitoring Solution

User Outcomes



Collins Engineers Uses Digital Inspection to Restore Iconic Pedestrian Bridge in Minneapolis

- Digital twin applications saved 20% in field inspection time and limited bridge closure to just four days.
- The digital twin solution will reduce construction risks that are expected to save MnDOT 10% to 15% in costs.

//

The digital model of the Stone Arch Bridge has allowed the team to improve workflows by recording real time inspection notes right onto the model, develop plan sheets from the model, and more accurately pinpoint repair areas.

Barritt Lovelace

Director of Unmanned Aircraft Systems (USA), Artificial Intelligence and Reality Modeling, Collins Engineers, Inc.

[Find out more](#)



Bridges



Stantec

Stantec Uses a Digital Twin and IoT Sensors to Monitor City of Denver Pedestrian Bridge

- The digital twin solution with integrated IoT sensors comprehensively captured the dynamic movement of the structure.
- Having real-time data allowed the City and County of Denver to improve their decision-making and address issues before they become costly repairs.

//

We now know the bridge moves a little more than it was designed to, which could lead to some maintenance issues faster than we were anticipating....We can now monitor the bridge and use that information to determine when to do rehabilitation projects...If the vibration gets above a certain level, we can notify the city immediately.

John Barone

Infrastructure Technology Lead, Stantec

[Find out more](#)



Bridges



Collins Engineers

Collins Engineers Sets New Bridge Inspection Standard with Iconic Robert Street Bridge

- Artificial intelligence compensated for fewer workers in the field by cutting down on the overall time and labor required on site, yielding over USD 90,000 in savings.
- Information sharing via the digital twin will result in up to USD 15 million in savings for MnDOT and a 10% reduction in materials used during the construction process.

//

Using traditional inspection data collection methods would be very tedious and expensive, so our team had to find innovative ways to not only be more efficient but also to provide a higher quality deliverable for MnDOT.

Barritt Lovelace

Director of Unmanned Aircraft Systems (USA), Artificial Intelligence and Reality Modeling, Collins Engineers, Inc.

[Find out more](#)



Bridges

Chapter 3

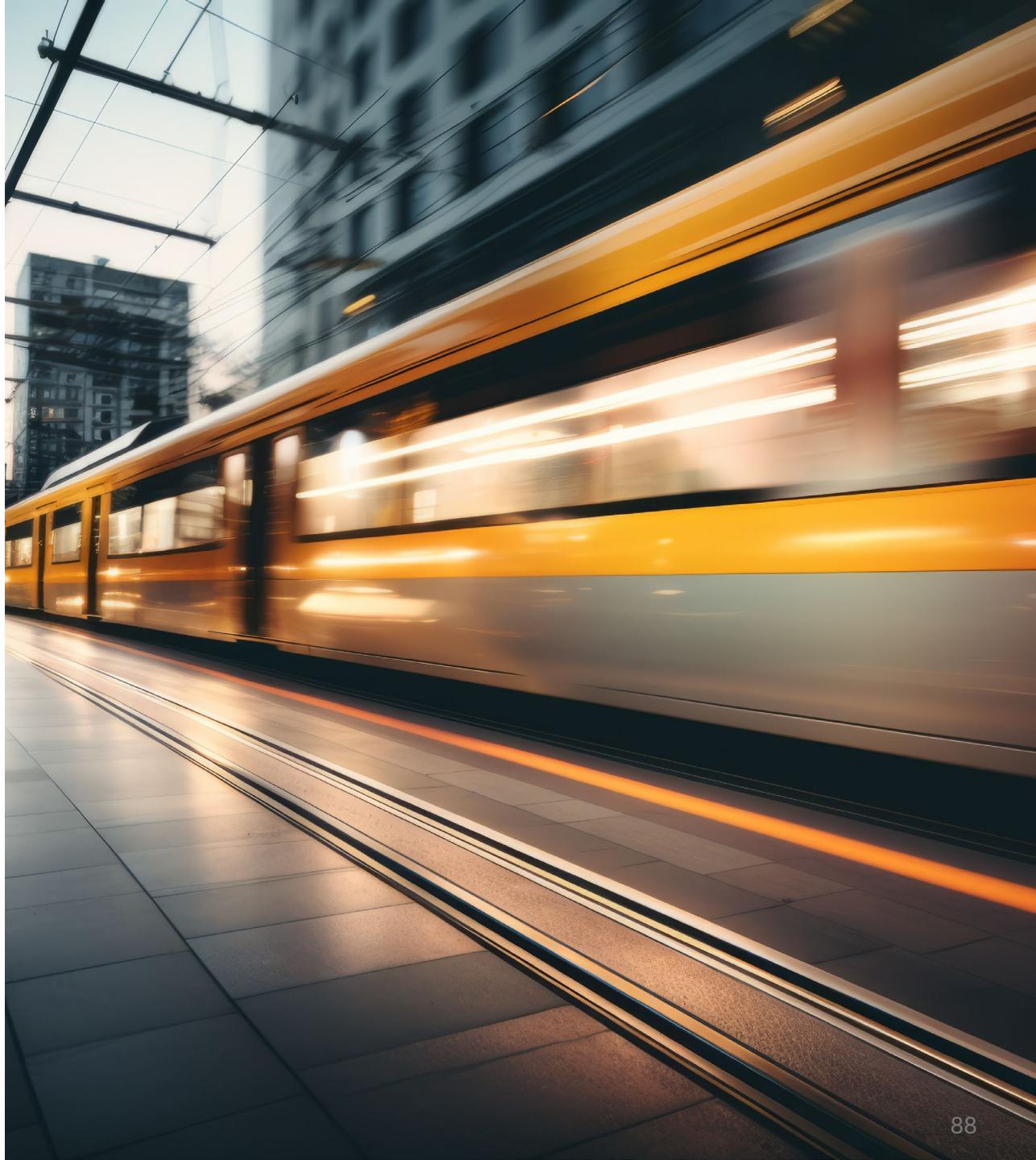
Further Information

Chapter 3 – Further information

01 Capabilities Mapped to Product Description

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- 3

Click to jump to another chapter.





Design

Capabilities Mapped to Products

	Capabilities	Bentley products	Description
Design phase	Survey Data Management	iTwin Capture	Capture, manage, analyze, and share reality data in a connected reality data environment to serve as a single source of truth to advance infrastructure workflows.
	Geotechnical Design & Analysis	PLAXIS	Model diverse geotechnical problems from a single, integrated application. Analyze the deformation and stability of projects ranging from excavations, embankments, and foundations to tunneling, mining, and geomechanics.
	Drafting & Detailing	GeoStudio	Integrated software suite for modelling slope stability, ground deformation, and heat and mass transfer in soil and rock.
	Road Design & Analysis	MicroStation	Model, document, access, and view architectural, engineering, mapping, construction, and operations design information with the power and flexibility you need for any size project.
		OpenRoads ConceptStation	Create conceptual road designs in hours to quickly evaluate design alternatives with associated costs in the planning and pre-bid stage of your project.
		OpenRoads Designer	Detailed road design, analysis, and documentation for roads, highways, interchanges, roundabouts, and overpasses.
		OpenRoads SignCAD	Automate the design of standards driven traffic signage and seamlessly progresses through the workflow to manufacturing.
		OpenRail ConceptStation	Create conceptual rail designs in hours to quickly evaluate design alternatives with associated costs in the planning and pre-bid stage of your project.
	Rail Design & Analysis	OpenRail Designer	Detailed track design, analysis, and documentation for metro, light rail, commuter rail, freight and high-speed rail projects.
		OpenRail Overhead Line Designer	Purpose built for rail electrification design software, combining all the detailed track design, analysis and documentation capabilities included in OpenRail Designer with Siemen's Sicat Master for advanced overhead line analysis.
	Bridge/Tunnel Design & Analysis	OpenBridge Designer	Create physical and analytical models throughout the lifecycle of steel and concrete bridges, combining capabilities for modeling, analysis, and design.
		OpenTunnel Designer	Model, simulate, detail, and document tunnel projects fully interoperable with analysis and design.
	Drainage & Hydraulic Design & Analysis	OpenFlows	Model, analyze, and simulate water distribution, wastewater collection, stormwater management, and hydraulic networks.

Capabilities Mapped to Products



	Capabilities	Bentley products	Description
Design phase	Signaling Design	OpenRail Designer & OpenRail Overhead Line Designer	Design low voltage assets located in the railway corridor for a variety of project types including new signaling design, re-signaling, upgrade of signaling systems as well as supporting low voltage electrical systems and cable trenches.
	Structural Design & Analysis	ProStructures	Create accurate 3D models for structural steel, metal work, and reinforced concrete structures.
	Building & Architecture Design	OpenBuildings Designer	Design, analyze, document, and visualize buildings with software made for architects and engineers.
	Project Delivery	ProjectWise within Bentley Infrastructure Cloud	Securely share, manage, and distribute project documents, models, and data, ensuring efficient project delivery and enhancing communication among stakeholders.
	Constructability Review	ProjectWise within Bentley Infrastructure Cloud	Facilitate interdisciplinary design reviews to validate constructability before construction begins.
Full lifecycle	Document Management System	Bentley Infrastructure Cloud (ProjectWise, SYNCHRO, AssetWise)	Securely share, manage, and distribute project documents, models, and data, ensuring efficient project delivery and enhancing communication among stakeholders.
	Connected Data Environment	iTwin Experience, ProjectWise, & AssetWise	Provides a unified platform for Owner-Operators and their Supply Chain to visualize, analyze, manage, and share infrastructure digital twins from a single interface.
	Geographic Information Systems (GIS)	OpenCities Map	Efficiently document and model assets in a 2D or 3D geospatial environment. Integrate, process, and stream reality modeling data such as large-scale reality meshes, point clouds, scalable terrain models, and raster data for use in a federated environment to improve collaboration and make better-informed decisions.
	Engineering Geological Model	Leapfrog Works	Fast, dynamic 3D geological modelling that easily combines disparate subsurface datasets with intuitive interpretation, even for complex geology encountered in tunnelling.
	Geotechnical Data Management	OpenGround	Complete cloud-based geotechnical data management and reporting solution enabling connected workflows and improved collaboration across all stages of the ground investigation lifecycle.
	Requirements/Compliance Management	ComplyPro	Simplify the delivery of progressive assurance on complex rail projects, reducing the cost and time typically associated with poor design visibility and lack of compliance during the build phase.
	Condition Monitoring System (IoT)	iTwin IoT	A scalable, cloud-based platform that remotely monitors, analyzes, and manages sensor data within digital twins, providing secure, unified visibility into the performance of both natural and built environments.



Build

Capabilities Mapped to Products

	Capabilities	Bentley products	Description
Build phase	Preconstruction	SYNCHRO within Bentley Infrastructure	
	Planning	Cloud	Plan, optimize, and track projects in a single visual to better optimize resources, reduce costs, and avoid errors.
	Construction Inspection & Forms Management	SYNCHRO within Bentley Infrastructure Cloud	Manage site inspections, RFIs, issues, safety observations, and more, all in one place, to drive better collaboration and speed up informed decision-making.
	Construction Progress Tracking	SYNCHRO within Bentley Infrastructure Cloud	Maintain visibility into the 4D schedule and project progress, so projects stay in control and continue to meet plans and specifications.
	4D Plan Authoring & Simulation	SYNCHRO within Bentley Infrastructure Cloud	By validating plans in a virtual environment, teams can optimize the path of construction, reducing costly rework, lost time, and unoptimized resources in the field.
	Model-based QTO	SYNCHRO within Bentley Infrastructure Cloud	Split 3D models into manageable, constructible components to ensure faster project estimates, like labor and materials, and reduced errors and omissions.
	Geotechnical Analysis & Design	PLAXIS and GeoStudio	Design temporary works for excavations, embankments, and engineered slopes.
Full lifecycle	Document Management System	Bentley Infrastructure Cloud	Securely share, manage, and distribute project documents, models, and data, ensuring efficient project delivery and enhancing communication among stakeholders.
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Build

Capabilities Mapped to Products

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Operate & Maintain

Capabilities Mapped to Products

	Capabilities	Bentley products	Description
Operate & Maintain phase	Routing & Permitting System	SUPERLOAD	Reduce time, optimize routes, and increase efficiency with real-time route validation to ensure accurate and safe travel for oversize/overweight (OS/OW) vehicles.
	Linear Condition Monitoring	Bentley Infrastructure Cloud (AssetWise Linear Analytics) Blynksy	Leverage advanced and highly configurable analytical and decision support tools that help optimize maintenance strategies. Turn data into actionable information, driving greater efficiency through better decisions while working to meet regulatory compliance and maintain a safe and reliable network. From potholes to paint line visibility, guardrail damage to MUTCD sign inventory, Blynksy's AI-powered platform helps cities and state Departments of Transportation manage their road network more effectively and efficiently.
	Maintenance Management Systems	Bentley Infrastructure Cloud (AssetWise Linear Network Management)	Define inspections, activity types and schedules with related tasks, managing defects and reinstatement regimes by visually creating your workflows.
	Imagery & Field Data Collection Management	iTwin Capture	Capture, manage, analyze, and share reality data in a connected reality data environment to serve as a single source of truth to advance infrastructure workflows.
	Inspection Systems	Bentley Infrastructure Cloud (AssetWise)	Enables rapid capture, analysis, and management of data in the field or from the office, empowering organizations to improve the decisions they make while meeting regulatory reporting requirements and ensuring safe and reliable infrastructure assets.
	Linear Referencing System	Bentley Infrastructure Cloud (AssetWise Linear Network Management)	Leverage linear referencing services and decision support capabilities to help manage complex transportation networks. Gain insight to asset information across your network enabling you to make better decisions, improve safety, reduce maintenance costs, and ensure regulatory compliance.
	Minor Assets Inventory & Management System	Bentley Infrastructure Cloud (AssetWise Linear Network Management)	Manage any type of asset with any number of properties, provide map-based network editing, locate them linearly and automatically translate their locations to any Linear Referencing System.
	Mobility Simulation	OpenPaths AGENT OpenPaths EMME OpenPaths CUBE OpenPaths DYNAMEQ OpenPaths CityPhi	Travel demand modeling software used to forecast mobility decisions at any level of detail, from zones to individual people. A complete transportation forecasting application for planning the urban, regional, and national movement of people. Create digital transport models for travel demand forecasting, traffic planning, transit service planning, and related needs to provide an evidence base for transport strategy and policy decision-making. Multimodal transport planning software used to develop and apply predictive multimodal transportation models to simulate how changes in infrastructure, operations, technology, and demographics will impact movement and accessibility of a given area. A traffic simulation and dynamic traffic assignment (DTA) software for transport planning and traffic management studies of virtually any size. Provides an API to produce captivating data visualizations, interactive animations, and insightful analytics about mobility and location by turning data about the movement of people and things, their location, and their changing social, economic, and physical characteristics into dynamic scenes.