Toward Innovation and Resilience:

Transform Transportation Infrastructure with Digital Project Delivery

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Plan and Deliver More Transportation Projects with Advanced Digital Tools

Transportation networks are the backbone of society and central to keeping goods, economies, services, and people moving around the world.

Year over year, the transportation industry is the largest and fastest growing sector in the architecture, engineering, construction, and operations (AECO) industry.[1]

Roads, railroads, bridges, tunnels, and airports are being built at an unprecedented rate. Worldwide spending on transportation construction is forecast to reach USD 3.5 trillion in 2025.[2] A significant proportion of that investment is being directed by local, regional, and national governments, who are interested not only in stimulating the economy, but also in meeting their obligations to mitigate climate change.

The task of handling the major increase in transportation projects implicit in this expenditure will be challenging for today's transport organizations – but it also presents huge opportunities for successful growth across national and local economies.

This eBook will show how flexible and secure transportation engineering software solutions can help deliver efficient, innovative, resilient, and sustainable transportation infrastructure that can boost economic growth, foster innovation, and equip transportation businesses, workforces, and the industry as a whole with future-ready skills.

Government Investment Around the World

US

USD **626** billion

For federal, state, and local government transportation and water

Source: US Congressional Budget Office

AUS

AUD **17.1** billion
(USD 11.2 billion)

For new and existing road and rail infrastructure

Source: Australian Minister for Infrastructure, Transport, Regional Development, and Local Government

EU

EUR **300** billion

Annual transportation investment by EU governments

Source: European Commission

EU

EUR **7.0** billion

For cross-border rail, inland shipping, and maritime upgrade projects that deliver on the EU's climate objectives

Source: European Commission

IND

INR **2.8** trillion
(USD 33.7 billion)

For roads

Source: Indian Ministry of Road Transport and Highways

IND

INR **2.6** trillion
(USD 31.3 billion)

For rail

Source: Indian Ministry of Road Transport and Highways

*1 GlobalData

*2 The Business Research Company

Chapter 1

Ageing Infrastructure Calls for a New Approach

In the recent 2025 release by the American Society of Civil Engineers (ASCE), the industry-leading association laid out the current state of infrastructure in the United States: Ageing infrastructure systems face increasing risks from natural disasters and extreme weather, posing significant threats to public safety and the economy.[3]

Unreliable or unavailable data on key performance indicators continues to impact certain infrastructure sectors. Moreover, many infrastructure categories lack a basic inventory of assets and are therefore unable to implement asset management practices.

Remedying this situation calls for sustained government investment in all kinds of transportation infrastructure, from roads and railroads to airports, bridges, and tunnels – but that on its own won't be enough. What's needed is a willingness to apply new technologies and ways of working that take into account community expansion and usage trends, pave the way for economic growth, and make the most of new plans and project designs.

Climate Impact of Transportation CO_2:

Transportation is responsible for 17% of global greenhouse gas emissions

*3 ASCE – "Infrastructure Report Card"

Challenges for Today's Civil Engineering Firms

Data, Data, Data

Companies face huge growth in data quantities. That data is also fragmented across different software tools; **73% of project teams use 6 or more software tools on a daily basis.** According to an **FMI report**,[4] the largest infrastructure projects require an average of more than 100 million emails, 50 million documents, and 10 million workflows.

Many firms can't process this much information, and 95.5% of all data captured currently goes unused, leading to inefficiencies and rework. Unlocking the value of data with the right tools is an important step toward easier and more efficient collaboration as well as more successful transportation infrastructure projects.

Crumbling Infrastructure

There is a pressing need for new infrastructure around the world. Global transport infrastructure will require USD 50 trillion of investment by 2040.[5] In the US alone, 1 in every 5 miles of highways and major roads are in poor condition, as are 45,000 bridges.

Even after increased investment over the past year, the country received only a C rating overall on the ASCE Infrastructure Report Card. The imperative now is to seize the opportunity of using data to accelerate improvements across the board.

Governments everywhere recognize the need to invest in infrastructure to make their economies more sustainable and resilient to climate change. Around the world, in both mature and emerging markets, legislation now in place – think IIJA and IRA in the US, NIP in India, or RRF and TEN-T in the EU – is set to drive such investment.

For the world to meet the **UN's net zero target for 2050 will require trillions of dollars** in annual investment across sectors by the end of this decade,[6] so the opportunities to develop new transport infrastructure solutions incorporating electrical charging is huge.

*4 "Big Data: Big Questions for the E&C Industry"
*5 European Investment Bank – "Infrastructure Solutions: How to adapt transport to a sustainable future"
*6 International Energy Agency – "Net Zero by 2050"

1 | Infrastructure Challenge

Mandates and Open Standards

As global investment in resilient and sustainable transportation infrastructure accelerates, governments around the world are mandating the use of BIM. This is driving the removal of data silos through the adoption of standardized information management (ISO 19650) and open standards (IFC, BCF), making it possible to efficiently consume models across the asset lifecycle for maintenance and operations.

Transportation owners and stake-holders are increasingly turning to digital project delivery to help them comply with these mandates, implement the standards, and maximize the benefits of BIM for their projects.

Complex Projects

Transportation projects involve large budgets, complicated designs, and a need for collaboration, transparency, and ways to leverage the vast amounts of data that are already being collected.

On top of that, consideration must be given to the general public who use these systems daily and face inconvenience whenever such critical infrastructure gets built or updated.

Shortages of Skilled Labor

A skilled workforce is needed to deliver new transport infrastructure, but more than 20% of construction workers in Europe and North America are over 55.[7] Retirements are now outpacing new talent entering the field.

The Future of Jobs Report 2025,[8] published by the World Economic Forum, also revealed that 39% of today's workforce skills will be obsolete by 2030, and that construction is one of the industries most at risk of disruption. Advanced digital tools can help manage these challenges and turn them into opportunities.

*7 "Future of Jobs report in AECO: digitalization and workforce realities"

*8 World Economic Forum – "Future of Jobs Report 2025"

Chapter 2

Digital Project Delivery as the Way Forward

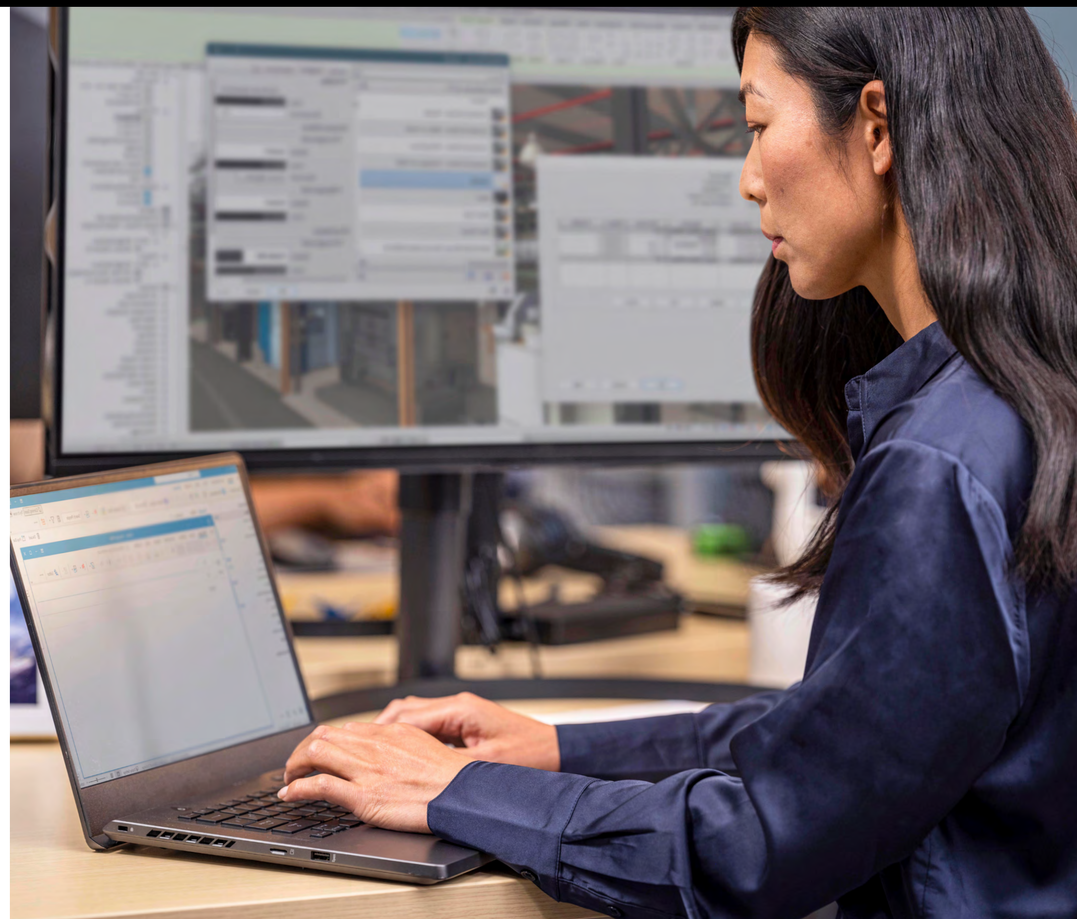
For architecture, engineering, and construction firms, the integration of digital tools is essential to maximize opportunities and deliver more sustainable and resilient transportation infrastructure.

Building roads, railroads, and related infrastructure is a complex business. Transportation infrastructure projects require diligent planning to ensure there is minimal interruption of existing transportation solutions, while having the flexibility to address problems and changes at all stages.

Rail projects, for example, require coordination of many disciplines to go from early feasibility studies to a fully operational asset.

Too often, collaborators work in silos throughout the project lifecycle. If files don't work with each other, one design can't inform the other. Clashes, rework, and lost data can quickly add up in the form of cost overruns and project delays.

> **Digital project delivery brings together communication, visualization, and safety. These are key components for our industry to innovate and go digital.**
>
> Kelly M. Barber, Division Chief, Engineering Automation and Services Division, Pennsylvania Department of Transportation



2 | Digital Project Delivery

Digital project delivery can help reduce these types of errors and improve business outcomes for transportation infrastructure projects of all types and sizes:

- **Enhanced communication and collaboration:**

  Interoperability transforms cross-discipline collaboration, decreasing time to delivery and improving team productivity and data exchange, while reducing field change requests.

- **Better design quality and more efficient design process:**

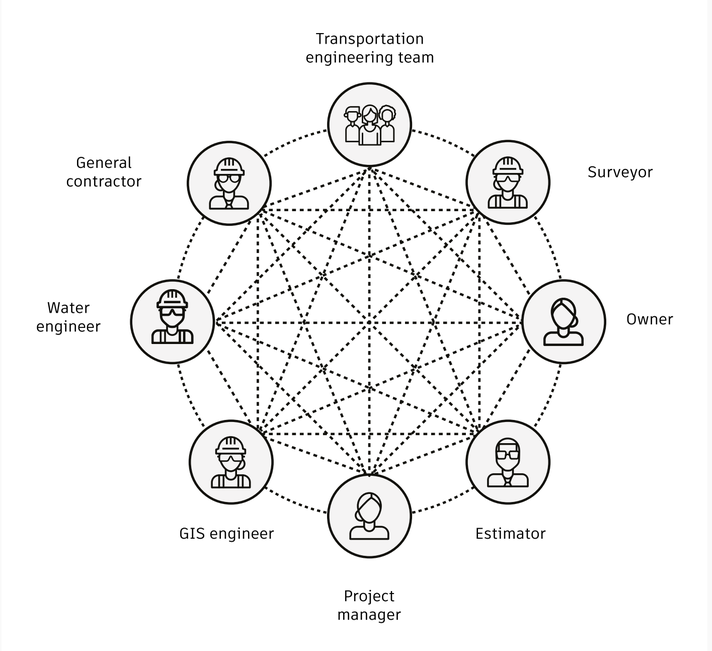
  By digitally transforming the business, the design process is more efficient throughout a project's lifecycle and delivers long-lasting transportation assets.

- **Staying competitive and winning more work:**

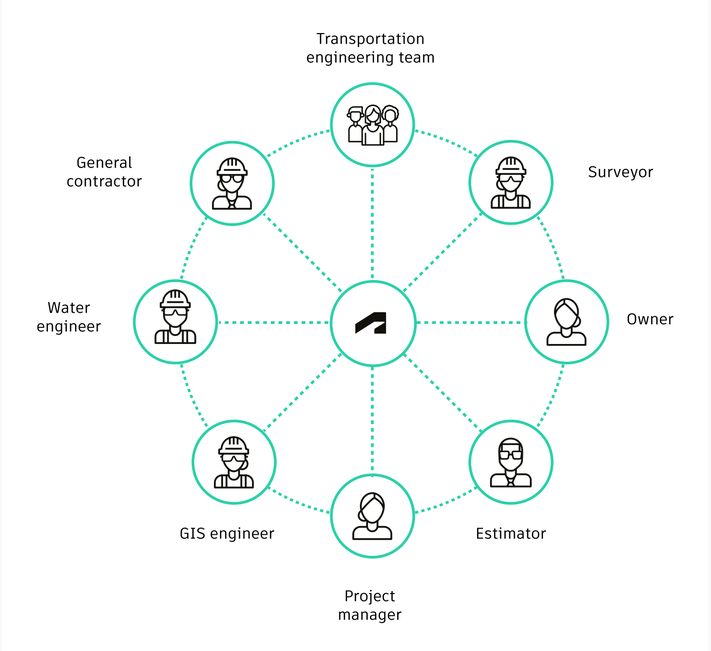
  Delivering projects more efficiently with enhanced design quality facilitates effective decision-making, keeps teams and stakeholders informed, and ultimately wins more business.

Visual Representation of the Value of a Common Data Enviroment

Traditional



Common Data Enviroment (CDE)



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Opportunities with Digital Project Delivery

By leveraging the tools for digital project delivery, businesses can win more work meeting BIM mandates and owner requirements, including lucrative government infrastructure projects. As the leader in BIM, Autodesk is the ideal technology partner for transportation companies looking to realize better ways of working and better outcomes.

Digital project delivery improves team collaboration to deliver operational efficiencies, optimize decisions and project results, and position organizations to be future-ready.

Business growth
Meet owner requirements to stay competitive and win lucrative government transportation infrastructure projects.

Enhanced quality
Produce better designs and reduce rework.

Better decision-making
Optimize decision-making by taking all stakeholders and all relevant data into account in real time.

Operational efficiency
Improve communication and collaboration through interoperability, across disciplines, to save time and money.

Better risk management
Manage design and project complexity with better communication and cloud collaboration on a single source of truth.

Future-ready workforce
Help build a confident talent pool ready to operate and maintain resilient transportation systems in a digital future.

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Chapter 3

The Importance of Standardized Processes in Digital Project Delivery

The sheer complexity and scale of transportation infrastructure projects require an effectively structured approach to managing the flood of information that today's road and rail construction projects generate by connecting tools, people, and processes as well as keeping all stakeholders up to date with a project's progress.

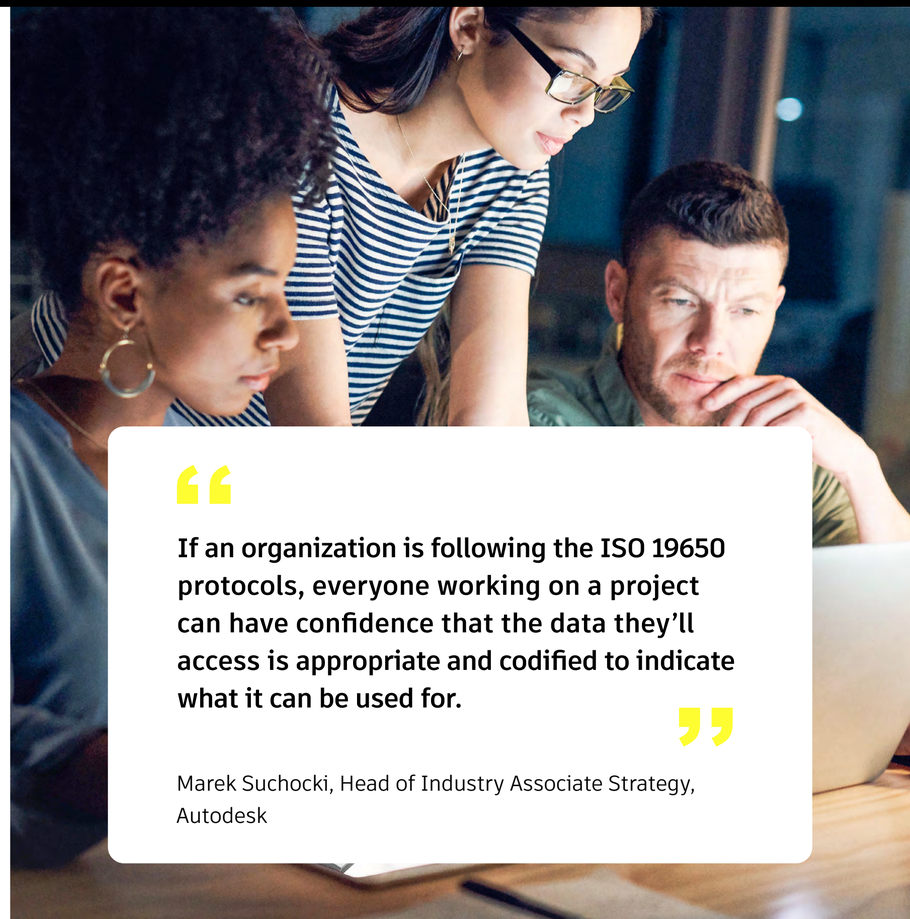
ISO 19650 is a milestone in the evolution of BIM standards, and it provides a standardized framework for mapping the complex, interlinking data flows that are a feature of digital project delivery. The goal is to ensure that every person understands their responsibilities and the timing of their tasks, thereby reducing risks and enhancing project success.

ISO 19650 is gradually being adopted by transportation engineers and owners globally, especially in Europe and North America.

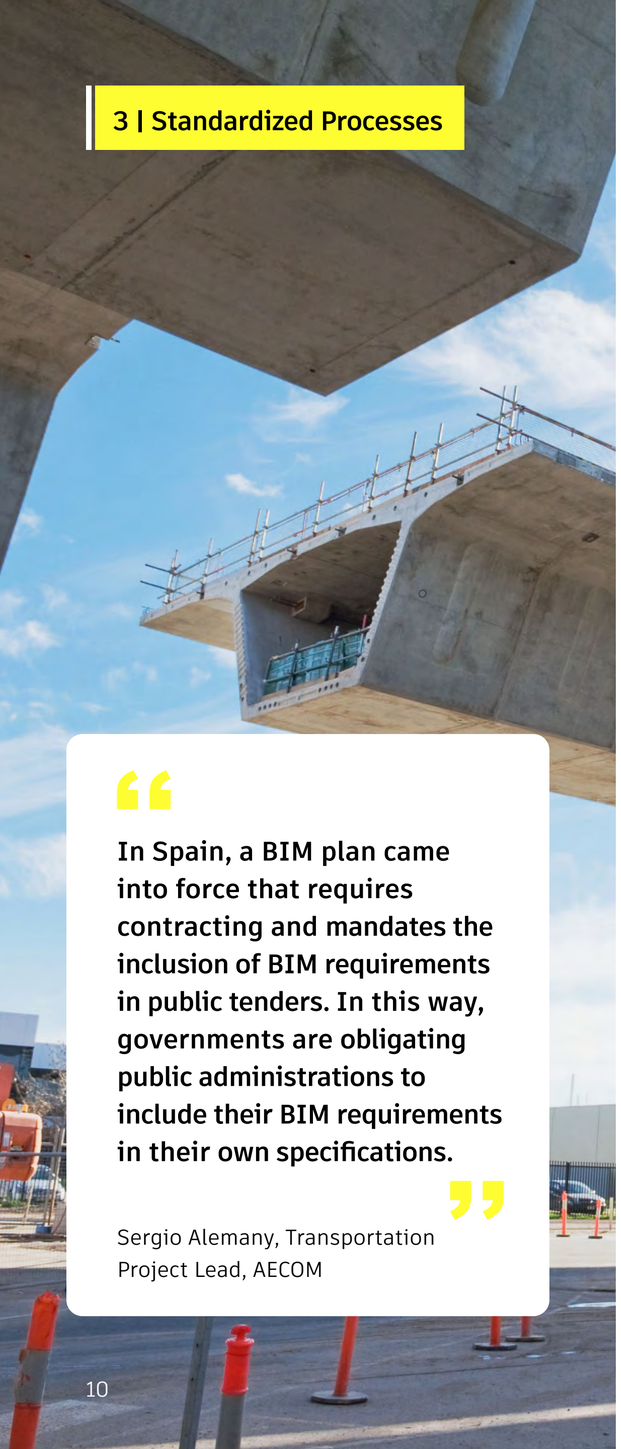
Benefits of standards such as ISO 19650 include:

- **Improved project outcomes:**
  Data is codified and checked for quality, leading to more reliable information throughout the project lifecycle.
- **Enhanced confidence and security:**
  Each team member knows their roles and responsibilities.
- **Efficient information management:**
  Information is stored centrally, streamlining access and usage of data.
- **Consistency and clarity:**
  Files are clearly identified and appropriately used.

With a growing number of governments requiring standardized processes, more and more transportation businesses are also promoting them.



> **If an organization is following the ISO 19650 protocols, everyone working on a project can have confidence that the data they'll access is appropriate and codified to indicate what it can be used for.**
>
> Marek Suchocki, Head of Industry Associate Strategy, Autodesk



> **In Spain, a BIM plan came into force that requires contracting and mandates the inclusion of BIM requirements in public tenders. In this way, governments are obligating public administrations to include their BIM requirements in their own specifications.**
>
> Sergio Alemany, Transportation Project Lead, AECOM

Setting and Meeting Standards with Cloud-Based Collaboration

BIM mandates mark an inflection point in the digitalization of transportation infrastructure projects. For decades, Autodesk has been developing more open ways of working through BIM, primarily by embracing open standards for better software interoperability and project team collaboration. When there are hundreds of people working on one project, across a variety of teams and industry solutions, success calls for improved collaboration, interoperability, and security.

Autodesk's commitment to industry standards and an open platform, Autodesk Construction Cloud (ACC), combines with its long-standing promotion of key industry strategic alliances and partnerships to support standardized processes, create connected workflows, and maximize the benefits of digital project delivery.

ACC supports the adoption of ISO 19650 by providing a centralized platform for data and documentation management. It offers several advantages:

- **Simplified configuration:**
  The open platform makes it easier to configure projects following ISO 19650 standards, reducing the complexity for users in deploying digital project delivery processes.
- **Quality workflows:**
  Project participants can quickly understand their roles; information is planned and managed effectively.
- **Centralized data access:**
  Stakeholders can have access to necessary information, enhancing collaboration and reducing the risk of errors.
- **Automated checks and approvals:**
  Data is correctly named, uploaded, and authorized for use.

> **The adoption of ISO 19650 and implementation of Autodesk Construction Cloud (ACC) as our common data environment (CDE) allowed us to collaborate across different design centers and resources. It actually improved our productivity by 40%.**
>
> Imad Sabonji, Senior Manager for Delivery, Kathib & Alami

Transportation infrastructure projects that adopt the latest digital project delivery standards and ensure that different disciplines collaborate in the cloud will be leaner, more effective, and more productive, bringing transparency to the complexities inherent in major road and rail construction and operations.

Success Story

Tunneling Rail Success in the Alps with Digital Project Delivery

The 270 km Mont Cenis base tunnel lies at the heart of a landmark project connecting France and Italy.

Its complex geology demands advanced construction techniques. With Autodesk Construction Cloud and advanced BIM tools, project teams achieve seamless data integration and digital collaboration.

These cutting-edge solutions enable virtual construction and proactive problem-solving before physical work begins, ensuring accuracy in construction and efficiency in long-term maintenance.

Read full story

> **BIM means building virtually beforehand. Any problems we may encounter on-site are anticipated during the virtual phase.**
>
> Michele Positano,
> BIM Manager at Consortium CO 6–7

Chapter 4

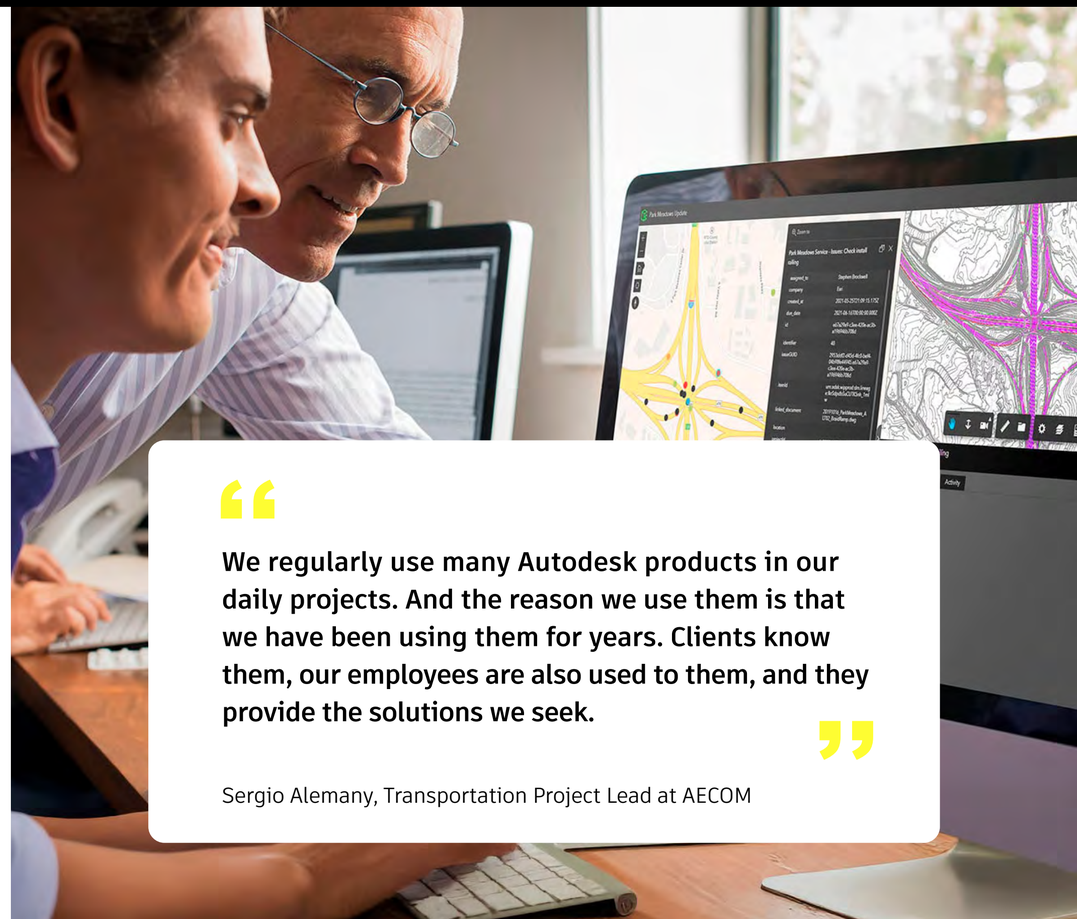
Rely on Trusted Tools and Leverage Partnerships

Transportation projects are extremely complex and project teams require a variety of solutions. Autodesk already combines many of them in a broad portfolio, while also investing in interoperability and alliances with industry partners to provide a complete toolset for transportation infrastructure projects.

Autodesk solutions enable the digital project delivery process through a secure common data environment (CDE), giving stakeholders access to the right insight with the most up-to-date information they need, and taking projects into the fast lane with new horizontal and vertical design capabilities.

> **We have projects sometimes spanning hundreds of team members, so we need something that allows everyone to have access to the one source of truth, and to be able to properly collaborate in almost real time...**
>
> **We don't want to depend on servers and IT and connectivity issues, and not be able to find the right files at the right moment.**

Imad Sabonji, Senior Manager for Delivery, Kathib & Alami



> **We regularly use many Autodesk products in our daily projects. And the reason we use them is that we have been using them for years. Clients know them, our employees are also used to them, and they provide the solutions we seek.**

Sergio Alemany, Transportation Project Lead at AECOM

Chapter 5

On the Digital Track with Industry Partnerships

Just as transportation infrastructure projects are increasingly complex, so are the solutions required to cover all aspects of the design, build, and operation processes.

With Autodesk's open platform and industry partnerships, engineering firms can plan and design in the context of society, nature, and the environment.

Connected and interoperable: BIM & GIS

The strategic **alliance between Autodesk and Esri** is the first of its kind: It lets planners, engineering firms, contractors, and owners **connect teams, workflows, and data across the project lifecycle,** bringing together the natural and built environment.

Interoperable platforms help teams imagine, design, make, and manage new infrastructure and existing assets – delivering better decisions, smarter workflows, and a more resilient future.

Efficiency booster: Subsurface data analysis

The partnership with Fugro has seen the launch of the GeoDin® Ground plugin for Autodesk Civil 3D software.

GeoDin® is a comprehensive geo-technical data management software that consolidates various types of subsurface data collected during construction processes. This integration represents the next big step in bringing the most useful data to customers and enhancing the accuracy and efficiency of asset development.

Climate care: Road designs with carbon assessments

In a partnership with ORIS, carbon assessment and emissions modeling capabilities have been embedded into Civil 3D.

ORIS's certified calculator streamlines processes, provides comprehensive impact assessments, and quantifies embodied carbon emissions for road designs.

Chapter 6

Investment in the Future with Sustainability and AI

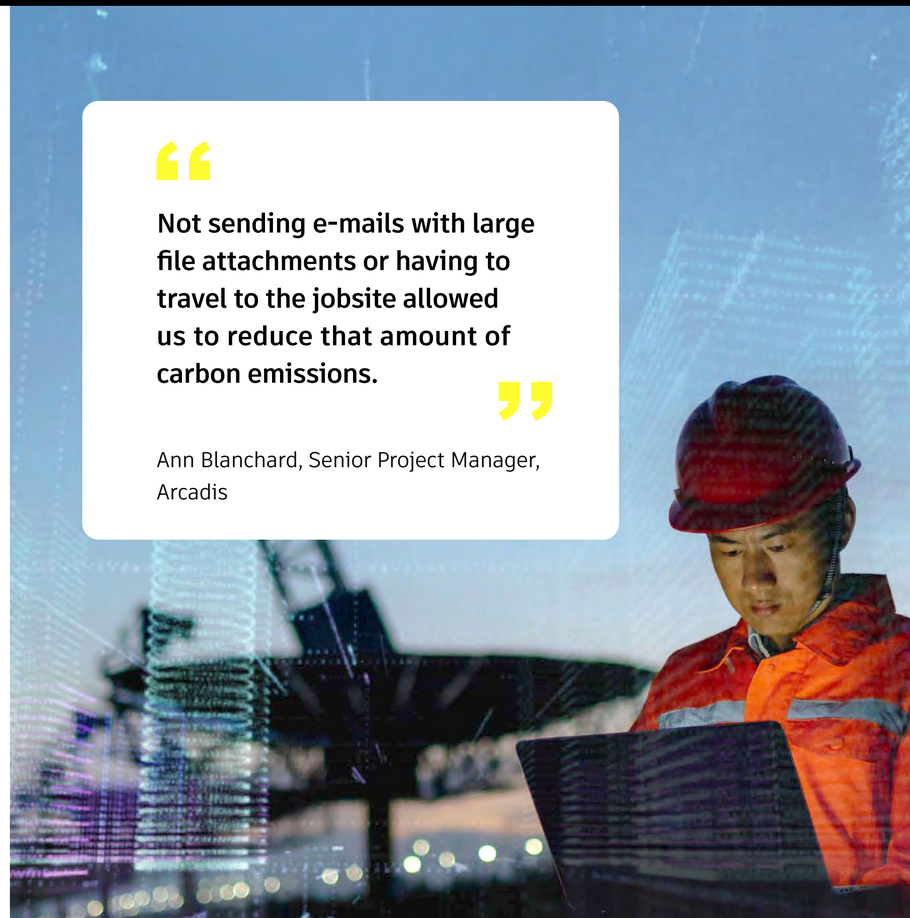
Autodesk's 2025 State of Design & Make report finds that digital transformation efforts are having an overwhelmingly positive impact, with sustainability transitioning from pressure to profitability.

Among digitally mature civil engineering firms, 73% are well prepared to handle unforeseen changes and 35% are using internal data to gain a competitive edge. The comparable figures for less digitally mature firms are 52% and 27%.

The next wave of transformation is about adopting AI into day-to-day workflows, so transportation engineers have more capacity to solve today's challenges. According to the report, **75% of leaders at digitally mature civil engineering firms say they will increase investment in AI, compared to 65% at their less digitally mature peers**. In other words, the recent hype around AI is fast becoming reality.

These figures make it clear that firms need to have their people working smarter together, with confidence in every decision, since adopting more digital workflows can open new opportunities in the market.

For example, the global design, engineering, and consultancy firm Arcadis used Autodesk's construction management software in its recent project to modernize 20 toll plazas for the Ohio Turnpike and Infrastructure Commission. **Arcadis used Autodesk Construction Cloud and Autodesk Build to centralize its communications and collaboration**, helping the firm cut the project's carbon footprint by 50 tons.



> **Not sending e-mails with large file attachments or having to travel to the jobsite allowed us to reduce that amount of carbon emissions.**
>
> Ann Blanchard, Senior Project Manager, Arcadis

Sustainable Future with AI

The WEF Future of Jobs Report 2025 highlights AI, cloud computing, and big data as the most transformative trends across all industries. Four key digital trends are reshaping the AECO sector:

1. **AI-powered project management**
2. **Digital twins and real-time analytics**
3. **Automation and robotics on job sites**
4. **IoT-enabled smart jobsites**

Autodesk has been investing in AI research and development since the early 2000's to help transportation decision-makers make the most of these opportunities, deliver on sustainability requirements, and improve project accuracy, delivery, and cost-effectiveness.

How AI Can Help Transportation Businesses

The transportation industry will become more future-ready and resilient by leveraging data and connected workflows to fuel business opportunities and insights. Implementing standardized processes lets you get the most out of data, so you can deliver a digital twin, augment and automate processes with AI, and analyze data for insights that improve margins and win rates.

- **Augment and automate your processes** using AI to reduce repetitive workflows, drive exponential productivity, and get more out of your talent.
- **Run predictive analytics** to see around corners and adapt your business to market needs and fluctuations.
- **Analyze your data** to bring deeper insights that help you fully understand business health, so you can increase margins, win more business, and innovate new offerings.
- **Connect with the cloud** and connected construction platforms to enable streamlined workflows, improved sustainability, and advanced risk assessment in infrastructure.

> **We already have all our information in the cloud. It's good to get more insights into the historical data, to see the patterns, to see how we can improve in our new projects, say, from the issues or things that happened in previous projects.**

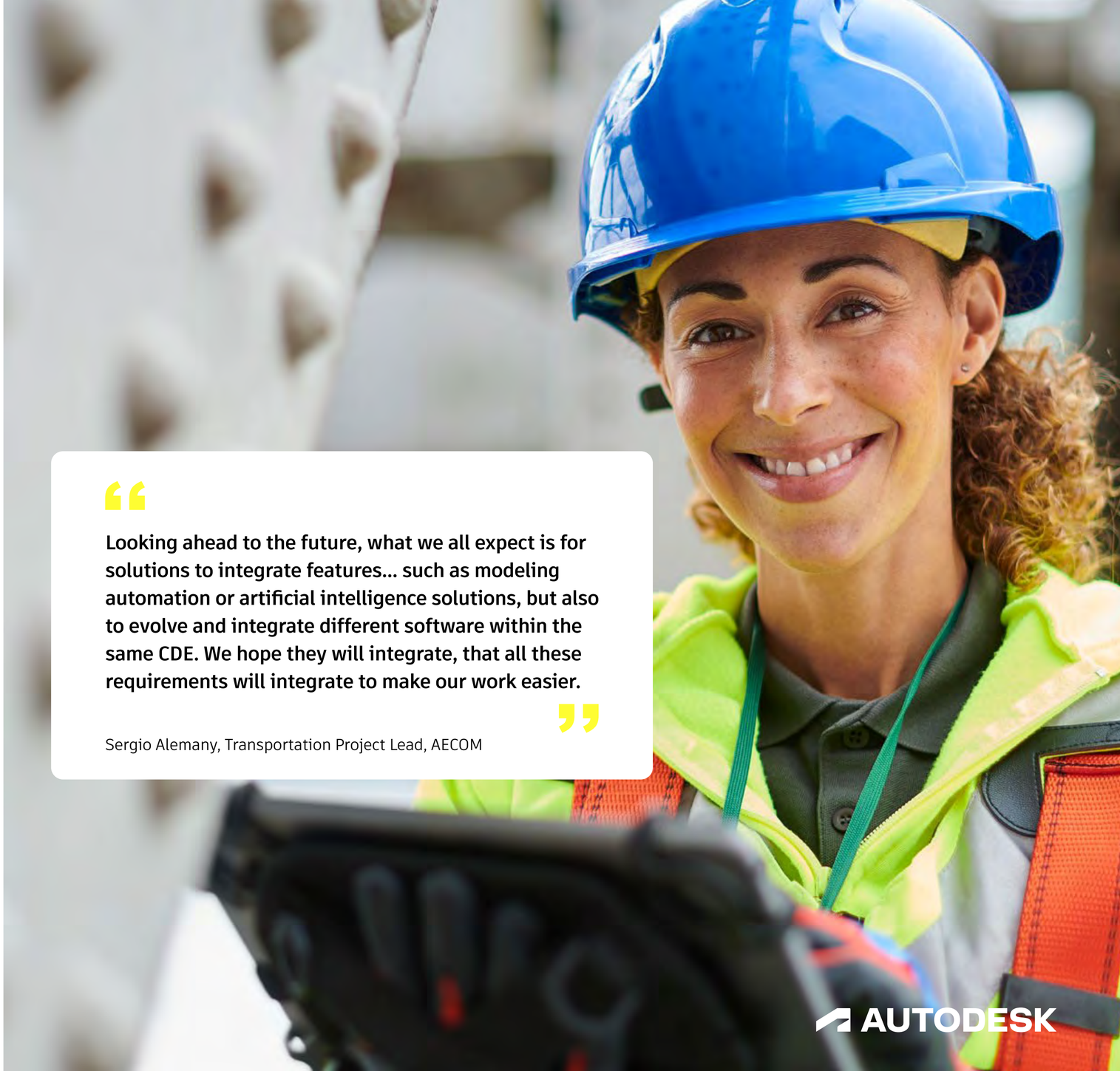
Imad Sabonji, Senior Manager for Delivery, Kathib & Alami

6 | Sustainability and AI

Trust and Transparency in an AI Era

Autodesk is collaborating with policymakers to shape and advocate for AI policies. As a member of the AI Safety Institute Consortium (AISIC) in the US, run by the National Institute of Standards and Technology (NIST), Autodesk is part of a powerful coalition dedicated to establishing AI safety standards and guidelines across multiple industries. Autodesk was also part of the first cohort of companies to sign the EU's AI Pact, taking proactive and voluntary steps to comply with AI regulations in the European Union.

For transportation decision-makers, Autodesk's investment in AI and sustainability is a crucial next step in addressing the challenges of modern infrastructure development. By leveraging AI and sustainable practices, Autodesk provides the tools and technologies you need to build resilient, efficient, and environmentally responsible infrastructure.



> **"Looking ahead to the future, what we all expect is for solutions to integrate features... such as modeling automation or artificial intelligence solutions, but also to evolve and integrate different software within the same CDE. We hope they will integrate, that all these requirements will integrate to make our work easier."**
>
> Sergio Alemany, Transportation Project Lead, AECOM

Chapter 7

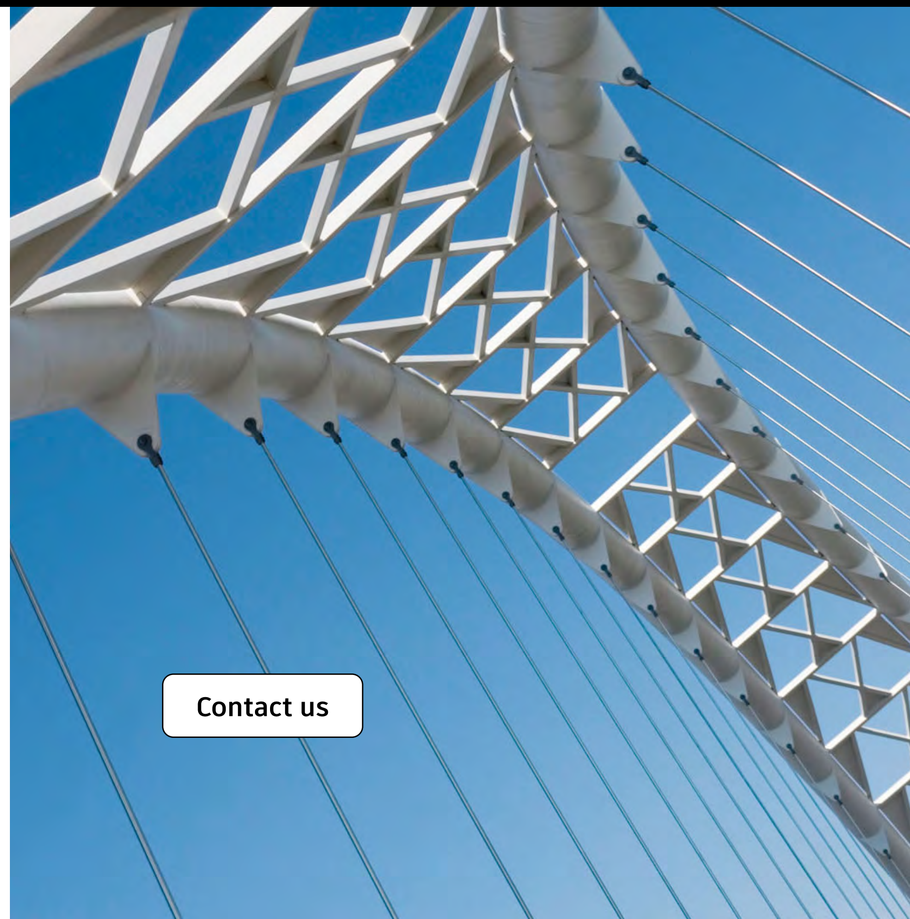
Take the Next Step in Your Digital Journey

As the architecture, engineering, construction, and operations sector continues to grow, driven by increasing demand for new infrastructure, better sustainability outcomes, and more structured and standardized processes, the industry has to embrace the digital future and strive to get the most out of the data.

Autodesk understands what's needed in today's – and tomorrow's – transportation infrastructure projects, and it offers a one-stop shop for success. The combination of an industry-leading platform, open standards capabilities, and key partnerships can help you ensure that your organization is ready to take advantage of all the exciting opportunities the transportation sector presents in the years ahead.

> **I think we're all on a digital journey. You can't do it all at once. But everybody has to move, and is moving. If not, you'll really get left behind. So get your focus right, get your priorities right. And make sure it's part of your strategy.**
>
> Bas Bollinger, Global Director for Rail and Transit, Arcadis

If you're ready to take your organization into a technology-driven future, book a meeting with your Autodesk partner and discover transportation engineering tools that will get you there.



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Make Anything

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