

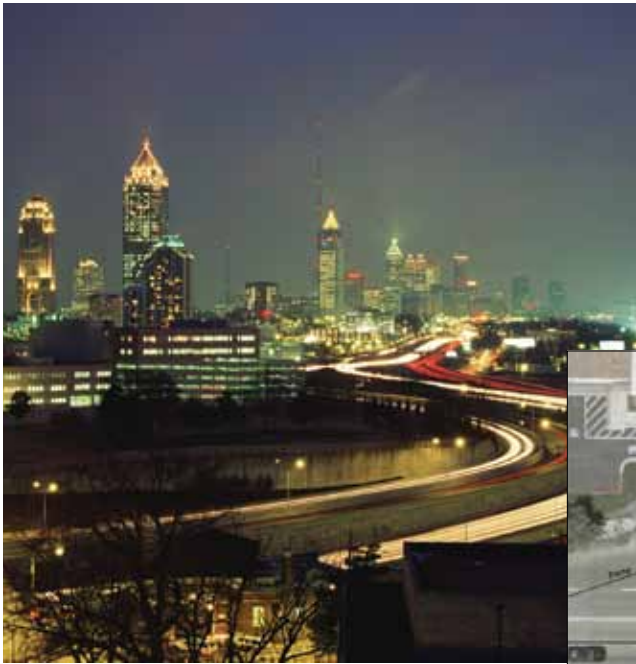


# GIS for Transportation Infrastructure Management



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Being able to visualize your assets and the surrounding environment when you build, upgrade, or repair transportation infrastructure helps you prioritize your work and make the right decisions. A geographic information system (GIS) software platform will allow you to do all this and much more. With Esri's GIS technology, you can build dynamic and rich mapping applications that will keep everyone—from the project team and government officials to field staff and the public—in the know.

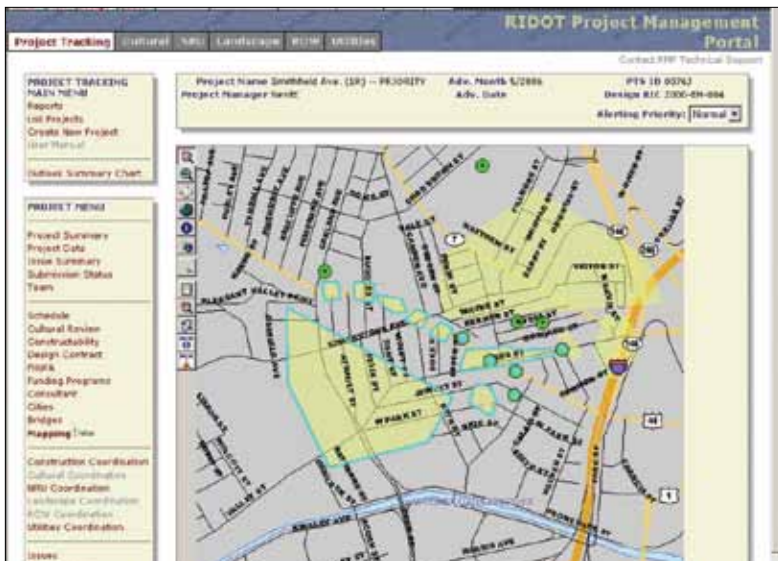


Maintain transportation infrastructure data from disparate systems and varying organizations with GIS.

## What Is GIS?

GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS technology allows you to view, query, and understand data in many ways. You'll see relationships, patterns, and trends in the form of GIS-based maps, reports, and charts.

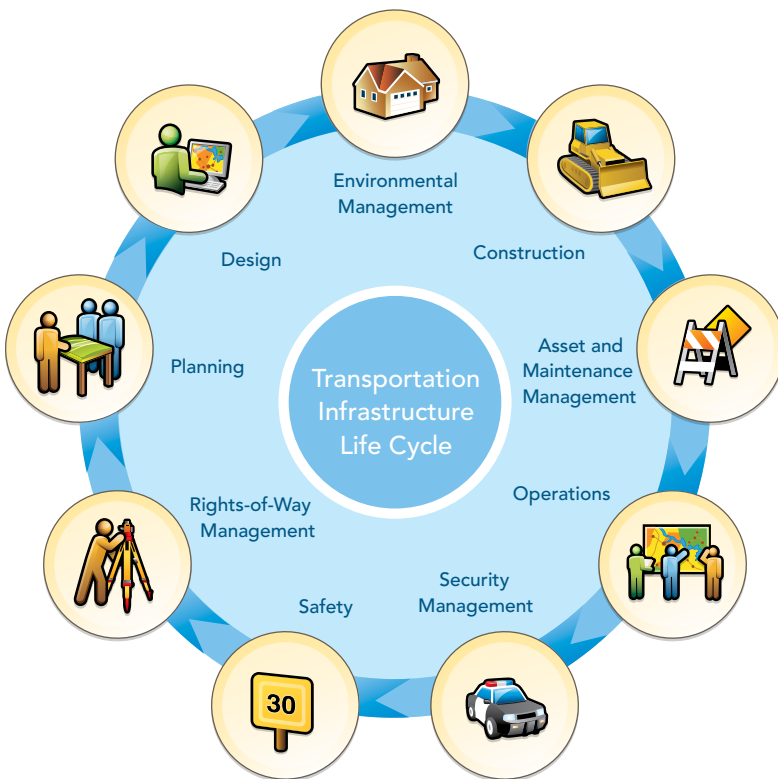
GIS helps you answer questions and solve problems. When viewed in the context of geography, your data is quickly understood and easily shared. GIS technology can be integrated into any enterprise information system framework.



## GIS—The Complete Platform

Esri's GIS technology integrates with project management software, financial and enterprise resource planning (ERP) systems, and leading-edge maintenance and work order management programs to enhance productivity and help solve complex problems for your organization.

The integration of project management software, project financials, and GIS provides a powerful way to manage the delivery of major infrastructure projects. GIS can provide a single point of entry for all transportation-related documents and files.



## GIS Supports the Transportation Infrastructure Life Cycle

Throughout the transportation infrastructure life cycle, Esri's GIS technology helps you create a seamless flow of information from one stage to the next. With GIS, information from your planning process can be brought into the design process and easily carried over into other areas such as as-built drawings, operations, and maintenance. Gains in both employee productivity and transportation system performance are made possible by the unique ability of GIS to integrate with a wide variety of technologies. Transportation organizations benefit by making use of the resultant information throughout their enterprise for better decision making.

# Transportation Infrastructure Life Cycle

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Paired with capital investment prioritization models, GIS can help transportation planners determine the best mix of new projects and maintenance activities to most cost-effectively meet future demands and maintain their infrastructure.

## Planning

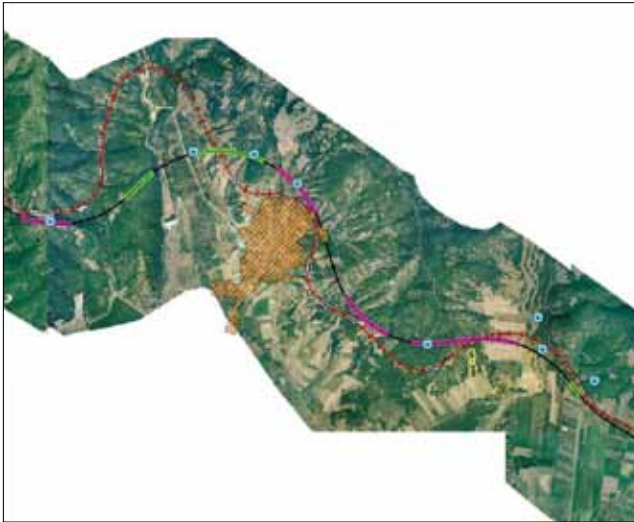
Transportation agencies face an enormous challenge in keeping their infrastructure operating smoothly and efficiently. The world's leading travel demand forecasting packages are integrated with GIS technology, helping transportation professionals conduct the complex analyses required to plan the transportation systems of the future. Increasingly, transportation planners are integrating land-use, environmental, and greenhouse gas considerations, along with energy consumption factors, into their planning processes. In doing so, they have discovered that GIS can bring all these factors together in the type of comprehensive planning models that will be required to help effectively plan the future.



GIS is the commonly accepted framework for georeferencing CAD data.

## Design

Transportation engineers are discovering the advantages of integrating GIS into their design processes. By bringing imagery, elevation, and environmental information into the CAD environment, engineers can continue working with familiar software while gaining access to important GIS data. Design files can be brought into a GIS and linked to financial software for better labor and materials and total project cost estimation. With these types of capabilities, GIS is an essential component of the engineering information systems of the future.



GIS can be used to develop complex, multicriteria models to help define an optimal transportation alignment, accounting for soils, slope, and other environmental constraints.

## Environmental Management

Transportation infrastructure management requires careful consideration of the environment. GIS is uniquely capable of assisting transportation professionals in understanding these issues and selecting the most environmentally sensitive solutions. With GIS, you can understand the impact of land-use decisions and evaluate smart-growth alternatives. GIS integrates environmental factors with land-use, housing, and employment density analysis to help communities address growth issues. The ability to visualize alternatives on a common platform allows parties that differ to reach a consensus when dealing with environmentally sensitive matters.



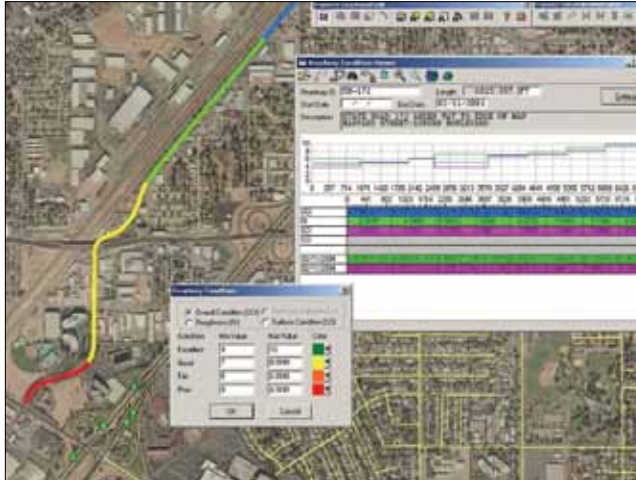
GIS makes crucial information easily available to project staff using a browser interface.

## Construction Management

When integrated with construction management and financial software, GIS can help track the performance of one or multiple infrastructure projects. GIS makes a wealth of information, such as schedules, estimates, and contracts, easily available from a spatial interface. For project tracking, GIS can help organize all relevant information, from survey data, soils, and geotechnical studies to planning, environmental studies, and engineering drawings. Having quick and easy access to data during construction can greatly increase efficiency and reduce time spent searching for needed information. This type of project transparency and reduced risk can lead to a greater return on investment.

# Transportation Infrastructure Life Cycle

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Aerial and digital photographs, surveys, and satellite imagery can be stored and combined with GIS to provide a comprehensive asset and maintenance management solution.

## Asset and Maintenance Management

GIS integrates asset mapping with project management and budgeting tools so that construction and maintenance expenses can be accounted for and centrally managed. A GIS-based maintenance management system promotes efficient scheduling of activities and tracking of work tasks, personnel, equipment, and material usage so managers can track and report maintenance activities. Simultaneously, field-workers can record information, perform inspections, and locate assets with GIS-equipped mobile devices. Deficiencies identified in the field during inspections can automatically prompt the GIS to generate new work orders for maintenance and repair.

## Operations

The demand for operational efficiency and increased safety in modern transportation systems requires access to detailed and real-time information. GIS provides management solutions that integrate data from all aspects of your operations. GIS can track and analyze assets over space and time and provide insight through visualization of information via maps and easy-to-understand reports. GIS gives you the ability to integrate disparate information sources into a common operational picture of all your facilities and transportation systems, with greater power to control your operations and positively impact your bottom line.

## Security Management

Comprehensive transportation facility protection requires the cooperation and close coordination of various agencies and the integration of different technologies and information sources. GIS integrates multiple sources of information, displays them on a map or satellite image, and delivers the resultant situational awareness on a secure network. You can combine real-time tracking of assets and vehicles with sources such as live closed-circuit television cameras to deliver a real-time security view of your transportation facilities. These capabilities make GIS an essential technology for managing a transportation security framework.



GIS enables a shared common operational picture of transportation hubs and facilities, which promotes interagency communication and coordination of action.

## Safety Management

Accurate records of accident locations frequently hold the key to improving safety for motorists, freight carriers, railways, and pedestrians. GIS maps can display crash records paired with spatial analysis of congestion, construction zones, and weather, making obvious what can easily be missed in simple tabular data. Spatial analysis, combined with statistical and business intelligence tools, can help pinpoint the root causes of accidents and determine effective countermeasures. Departments of transportation can identify trends, such as increases in oversized vehicle traffic, permit violations, and general commercial traffic route information, using GIS tools—all leading to significant improvements in transportation safety.



Combining digital maps with up-to-date data from accident and moving violation databases can speed up the recognition of troublesome hot spots.



GIS links imagery and data to utility, landscape, and maintenance schedules for complete rights-of-way management.

## Rights-of-Way Management

From property acquisition for new alignments to the disposal of unneeded properties, understanding the extent of your rights-of-way is a task enhanced by GIS. By linking parcel, survey, and assessor information, GIS can give rights-of-way managers a better understanding of their properties and a better way of analyzing which properties may no longer be required. GIS can capture the location of the various utilities within the rights-of-way, simplifying future construction and relocation activities and preventing unforeseen construction accidents.

Rights-of-way leases can be managed by a GIS linked to a database-driven lease management solution for more effective property management.

Read case studies, explore options, and connect with an expert at [esri.com/transportation](http://esri.com/transportation).



Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and NGOs trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.



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