

COMPANY

**Atkins & Skanska Balfour Beatty
Joint Venture**

LOCATION

M25 motorway, England

SOFTWARE

**Autodesk® AutoCAD® Civil 3D®
Autodesk® AutoCAD® Navisworks® Manage
Autodesk® AutoCAD® Navisworks® Freedom
Autodesk® AutoCAD®**

Autodesk BIM solutions give us a more accurate engineering representation of the highway and a deeper understanding of the project during construction.

—**David Owens**
Engineer
Skanska Balfour Beatty Joint Venture

BIM Paves the Way

Atkins & Skanska Balfour Beatty widen London's M25 motorway



M25 motorway construction model (at Junction 19). Image courtesy of Atkins & Skanska Balfour Beatty Joint Venture..

Project summary

The M25 motorway that circles London is already one of Europe's busiest highways, with some sections handling almost 200,000 vehicles a day. When London host the 2012 Summer Olympic Games, organizers expect the influx of an additional million visitors. Although the M25 is not part of the official Olympic Route Network, it is likely to be used by many people traveling to the games.

To relieve the motorway's day-to-day congestion levels, improve journey times and safety, and increase traffic capacity, England's Highways Agency awarded a £6.2 billion design, build, finance, and operate (DBFO) contract to the Connect Plus consortium in 2009 for future development, operation, and maintenance of the M25. Part of this contract includes widening over 23 miles of the motorway's northwestern quadrant and 17 miles in the northeast from three lanes to four.

The Highways Agency is responsible for operating, maintaining, and improving the strategic road network in England. The Connect Plus consortium comprises Atkins, Skanska, Balfour Beatty, and

Egis Road Operation UK. Atkins is the U.K.'s largest engineering and design consultancy and the world's 11th largest design firm. Skanska is one of the world's largest project development and construction groups, with expertise in construction, development of commercial and residential projects, and public-private partnerships. Balfour Beatty is a world-class infrastructure services business operating across the infrastructure lifecycle.

The challenge

"Roadway construction began in the spring of 2009 and must be completed by the summer of 2012," says David Owens, an engineer with the Skanska Balfour Beatty Joint Venture. "This means we have to finish construction in approximately half the time it typically takes for a project of this scope."

This effort is also constrained by the boundaries of the current road. "In addition to adding two lanes, the design incorporates a new central reserve barrier, additional gantries, and new roadside lighting," says Hugh Woods, a senior group engineer at Atkins. "Therefore, all of these features must fit into the existing boundaries of the M25,

Resolve interdisciplinary design clashes before construction

which requires precise design and construction coordination." Furthermore, three lanes of traffic in each direction must be allowed to proceed at all times during construction of the new roadway, necessitating careful construction planning.

The solution

Atkins designers use Autodesk® Navisworks® Manage software to aggregate their multidiscipline design information, which is developed with third-party and Autodesk® AutoCAD® software. The Skanska Balfour Beatty Joint Venture team then uses AutoCAD and Autodesk® AutoCAD® Civil 3D® software to adapt the Navisworks model for construction purposes, adding greater realism and context to the design components. "It's not about creating pretty pictures," says Owens. "Autodesk BIM for infrastructure solutions give us a more accurate engineering representation of the highway and a deeper understanding of the project during construction."

Increase coordination

To help meet their aggressive schedule, the project team relies on a more coordinated, accurate design model. Created in Navisworks, the integrated design model helps the team visualize and coordinate the whole project, including all above-ground and underground components as well as

nonphysical aspects of the design, such as safety and access zones. "Navisworks helps us identify and resolve interdisciplinary clashes, many of which would be very difficult to detect using 2D documentation," says Woods.

Inform decision making

When the design is issued for construction, the project team adapts the Navisworks design model, using Civil 3D to enhance the design intent and create a virtual construction model that incorporates more realistic versions of some of the design elements, such as fences, crash barriers, and retaining walls. The team also adds elements such as point clouds from laser scans, and temporary works. "This construction model makes the project easier to understand for all the on-site staff," says Woods. "It informs their decisions for construction planning and helps them better understand their options when site conditions necessitate changes."

Stay on schedule

The whole project team, including on-site construction personnel, views the construction model using Autodesk® Navisworks® Freedom software. "Everyone can use the same up-to-date project information when assessing how best to perform construction tasks," says Owens. "Navisworks lets us virtually plan our production, helping us meet the project's fast-track schedule and still maintain ongoing operations on this heavily traveled section of the highway."

The result

To the relief of the M25 commuters, the project is on schedule for completion before the summer of 2012. "By resolving design conflicts prior to construction, we are reducing costly, time-consuming errors," says Woods. "Autodesk BIM solutions are helping us optimize our design and build the project safely, on time, and on budget." The Atkins & Skanska Balfour Beatty Joint Venture received an Autodesk BIM Experience Award for their use of BIM on the M25 project.

To learn more about BIM for Civil Infrastructure, visit, www.autodesk.com/industry/civil-infrastructure/transportation-infrastructure or www.autodesk.com/civil3d

Autodesk BIM solutions are helping us optimize our design and build the project safely, on time, and on budget.

—Hugh Woods
Senior Group Engineer
Atkins



Photograph of widened M25 motorway at Junction 19. Image courtesy of Atkins & Skanska Balfour Beatty Joint Venture.



M25 motorway design intent model (at the Chandler's Lane overpass). Image courtesy of Atkins & Skanska Balfour Beatty Joint Venture.