TAV Integrated Solutions

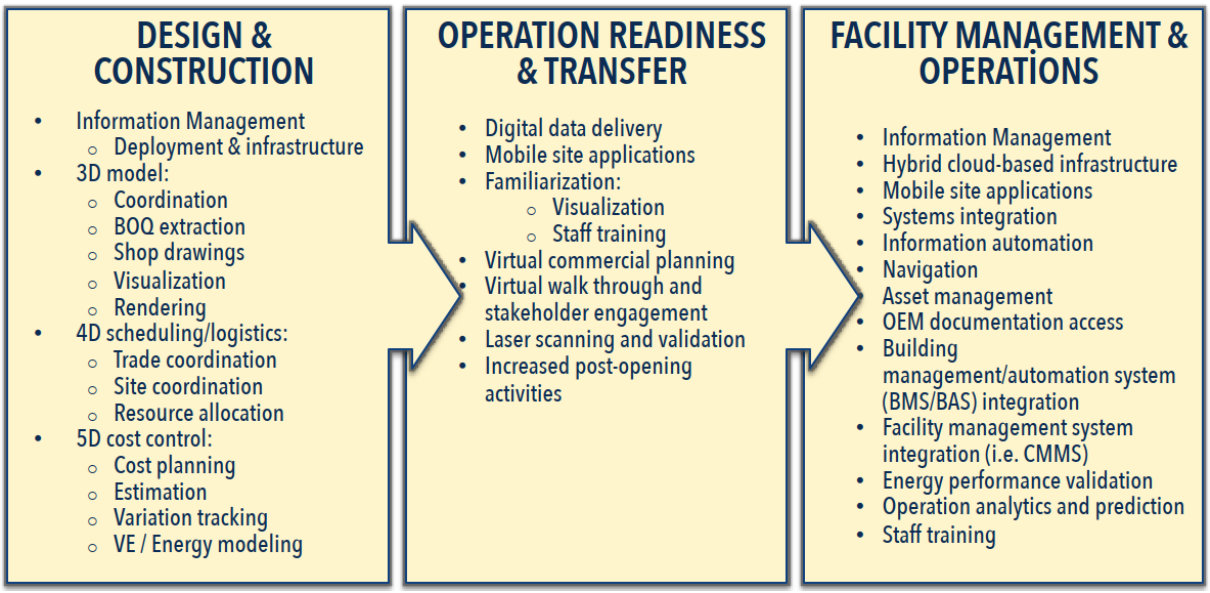
Overview and Scope of Services

TAV Integrated Solutions

Introduction

TAV Integrated Solutions (TAV-IS) was started under the TAV umbrella to formalize, utilize and commercialize the combined design, construction, and operation know-how of TAV Construction, TAV Airports and partners based on available tools and technologies created for the built environment industry. Building Information Modeling (BIM) combined with cloud base Construction Collaboration and Project Management Systems has been the main driver and platform for coalescing all project information from design, construction through facilities management objectives.

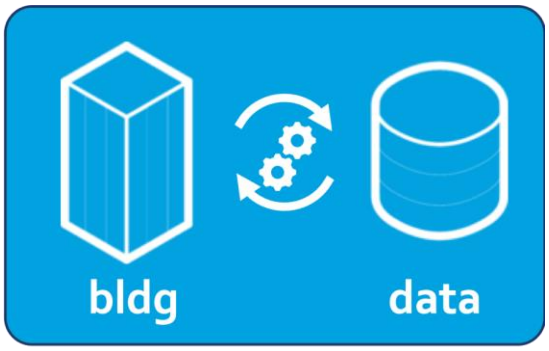
To date more than 6.5 million square meters of built space has been modeled at various levels of detail for a wide range of objectives on TAV and client projects. Our experience includes a wide range of use of various digital tools along with BIM for design conception through construction, as well as BIM-Facilities Management systems integration and site mobile applications. The following figure summarize the various BIM implementations delivered by TAV-IS on several large airport and high-rise projects.



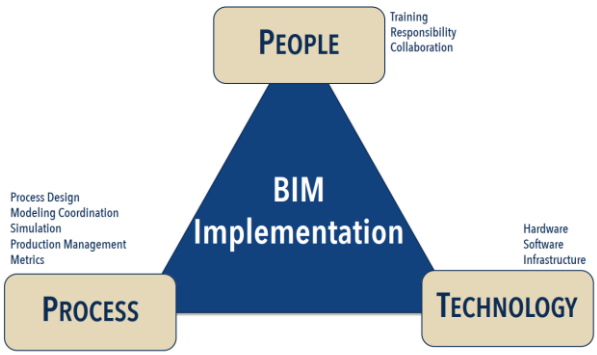
TAV Integrated Solutions

Overview

Despite the enormous potential and adoption in day-to-day use, the development of digital technologies has far outpaced their implementation in the construction industry. Yet clients are increasingly explicitly requiring the use of the most up-to-date technologies on their projects with specific use cases or lack thereof. Mirroring the challenges of a project - there are now the additional challenges brought on by introducing these new tools which brings on the need for new infrastructure along with new workflows or the necessity to adapt existing ones. Without proper organizational retooling these digital tools will only become additional burden to the project rather than bring any benefit or improved outcomes. Companies need to be pro-active rather than reactive to imposed digital requirements. Data has become an increasingly important deliverable and as an industry we have only began to really make use of the data we are generating.



At each step of design, construction and operation useful information is either lost or constrained. This is due to inherit poor interoperability between these steps and the lack of data standards. The tools to collate entire project information and documentation into readily available resources are available through the use of BIM and information technologies during the design, construction, and operation of facilities. The challenges lie in developing the workflows that integrate the correct data within the correct format that make data mobile and interoperable among each stage of execution. Adopting technology on projects and operations involve more than just technology or software - in most part it involves introspection, involvement of people and development of processes.



As the built environment industry is increasingly adopting the use of BIM and information management technologies, its scope and meaning has become broader. Initially BIM has been used primarily as a design tool for engineers and architects. Supplemented with scheduling and cost information, BIM has extended into the purview of contractors as an invaluable tool. More recently the collective deposition of all design and construction information, asset information and integration with facility management tools have extended BIM into the realm of building owners and operators with an even greater impact.

Scope of Services

	Digital Construction & Operations	
	Scope	**Outcomes**
Vision	• Presentation to Executives and Technical Staff on current industry applications and trends • Workshop with technical staff to discuss and discover relevant tools and methods to be implemented • Discussion outline and summary development goals to be pursued	*Client management and technical staff will be introduced to current industry applications and trends, explore why digital implementations are critical, review areas ripe for change and together determine what fits company needs to enhance outcomes.*

Review	• Discovery workshop with Executives and Technical Staff
	• Existing governance and resources review
	• Gap analysis
	• Develop masterplan roadmap
	• Pilot implementation(s)
	  ○ Planning
	  ○ Requirements:
	  ▪ Technical infrastructure and solutions, i.e. hardware, software, services
	  ▪ Staffing and organization
	  ▪ Training
	  ○ Budgeting
		A clear tangible roadmap to what will be done: implement digital tools and methods, consistent with client needs will be detailed, to align all stakeholders for successful implementation.

Execution	• Corporate wide:
	  ○ Information Management Plan
	  ○ Corporate BIM Implementation Plan for Design and Construction
	  ○ Corporate BIM System Lifecycle Management Plan for Operations
	• Project Specific:
	  ○ Information Management Plan
	  ▪ Digital Content Structure and Naming Conventions
	  ▪ Mail and documents workflows both up and down stream
	  ▪ Mobile application deployment and training for site
	  ○ BIM
	  ▪ Execution Plan
	  • Requirements
	  • Budgeting
	  ▪ Model compliance reporting
	  ▪ Coordination review and clash detection reporting
	  ○ BIM-GIS-CMMS integration
	  ○ System deployment and training
		Corporate and project specific documentation of how digital tools and methods are to be executed will be developed, along with partial or full execution support to ensure utilization of technology advance client business and operations.

TAV Integrated Solutions Highlight Project

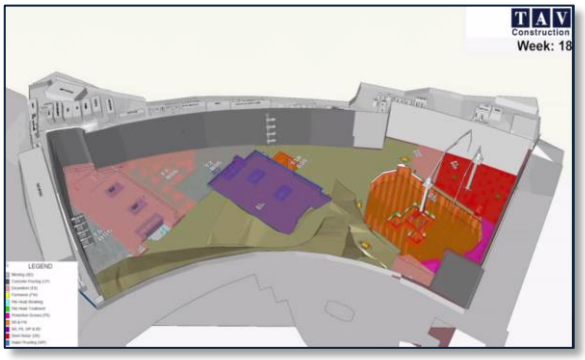
Dubai Emaar Towers – Dubai, UAE

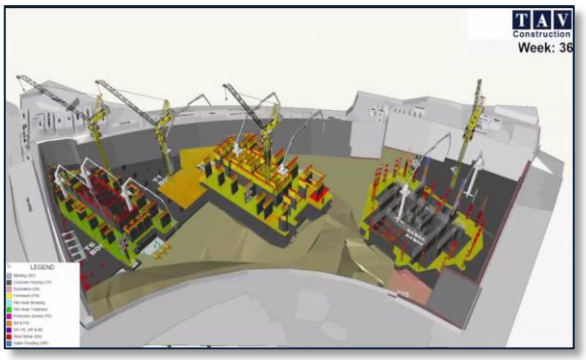
Client:	Emaar Properties
Main Contractor:	TAV Construction
Year:	2017 – on-going
Scope:	• Information Management • Mobile Field Applications • Coordination/Clash Detection • LOD 300, 400, 500 • Quantity Extraction • Site Logistics • 4D Progress Monitoring • Shop Drawing Extraction • Laser Scanning

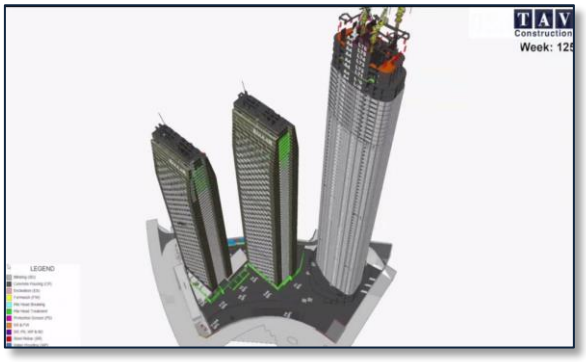
Dubai Emaar Towers Plot A is comprised of two separate projects, The Address Residences (Plots A2/A3/A1a) and Il Primo (Plots A4/A1b). Together these are a combination of three high end residential towers adjacent to the prestigious Opera House and the world's tallest building the Burj Khalifa in the heart of Downtown Dubai.

TAVcloud is utilized as the project hybrid cloud file storage along with Oracle Aconex – the project cloud base Construction Collaboration and Project Management System has been set-up based on project stakeholder requirements determined though workshops and in-house best practices. Weekly automated reporting has been set-up utilizing the API provided by the cloud-based tools, significantly reducing the time and effort while increasing the accuracy of the reporting.

BIM is used as a key construction management and decision-making tool by multiple departments. BIM processes are utilized for shop drawing extraction, site logistics planning, and 4D progress monitoring among other uses. Some visuals of the successful implementation of 4D modelling integrating Primavera work schedule are illustrated below.







TAV Integrated Solutions Highlight Project

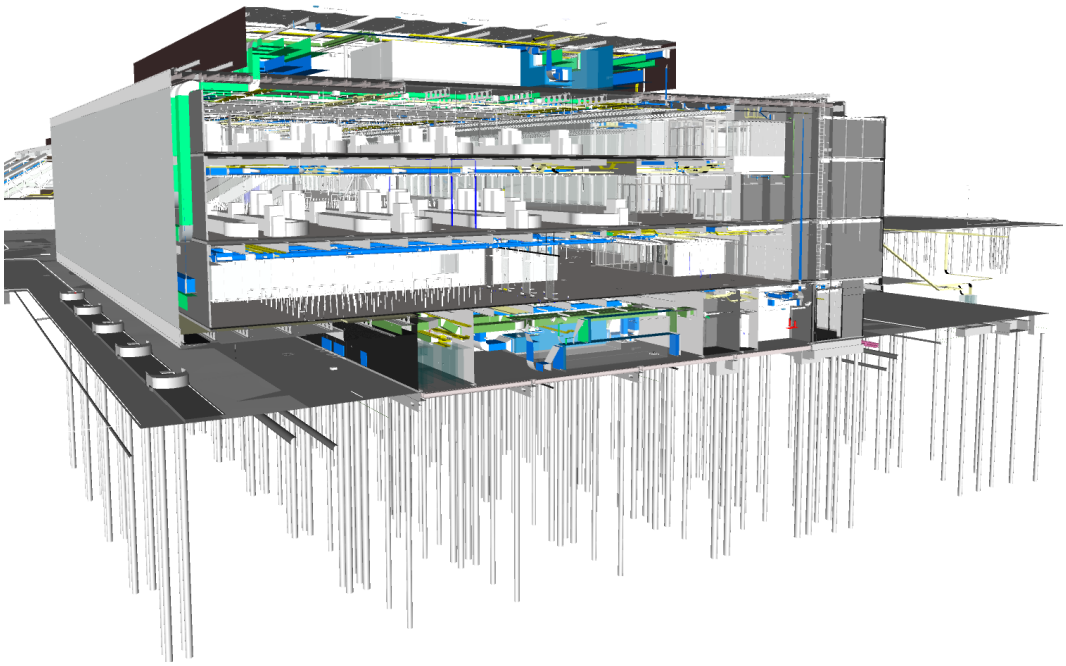
Schiphol Airport Pier A – Amsterdam, Netherlands

Client:	Schiphol Capital Projects
Main Contractor:	TAV Balast Nedam JV
Year:	2018 – on-going
Scope:	• Information Management • Mobile Field Applications • Coordination/Clash Detection • LOD 300, 400, 500 • Site Logistics • 4D Progress Monitoring • Shop Drawing Extraction • Laser Scanning

To better accommodate the growing number of passengers, Schiphol Airport Company has developed the Airfield Development Program, which outlines the progressive growth of the terminal in the coming years. As part of the Airfield Development Program, the addition of Pier A, taxiways, and a temporary corridor to the existing terminal structure aims to expand Schiphol International Airport.

TAVcloud infrastructure is utilized as the project hybrid cloud file storage along with Oracle Aconex – the project cloud base Construction Collaboration and Project Management System has been set-up based on project stakeholder requirements determined though workshops and in-house best practices. Weekly automated reporting has been set-up utilizing the API provided by the cloud-based tools, significantly reducing the time and effort while increasing the accuracy of the reporting

The BIM Scope for the Pier construction covers trade coordination and clash detection, shop drawing extraction, site logistics, laser scanning and FM integration. The below visual of the coordination model highlights BIM's role in the design coordination and drawing extraction stage of the project.



TAV Integrated Solutions Highlight Project

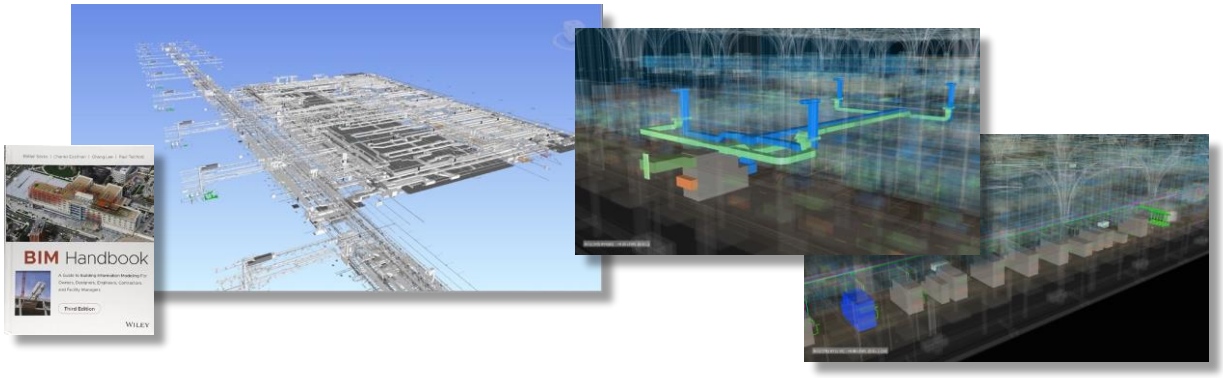
Medina Prince Mohammad Airport – Medina, KSA

Client: Tibah Airport Operation Company
Main Contractor: TAV Construction
Year: 2015 – on-going
Scope:

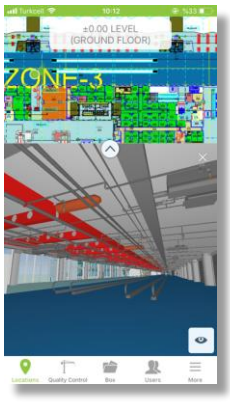
- Visualization for ORAT
- LOD 500
- BIM-FM Integration
- Mobile issue management app

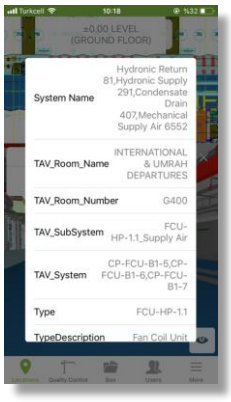
Medina Airport is Build-Transfer-Operate (BTO) project where TAV Airports financed, designed, constructed and now operates the airport. Utilizing construction and asset data has been critical for facilities asset management objectives. To this end TAV-IS has develop a federated as-built LOD 500 BIM models the terminal and ancillary buildings which including all discipline systems. The models and content are integrated with the airport Computerized Maintenance Management System (CMMS) to feed content and allow mobile entry of workorders on site for technical staff.

Aside from FM purposes the model has also been used as a powerful tool for spatial coordination and client communication tool via the BIM models and Virtual Reality tools. This allowed management and stakeholders to get an immersive experience into the airport facility to asses operational changes and expansions. The use of BIM at Medina airport has been highlighted as a case study in the 3rd Edition of the renowned BIM Handbook: *A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers*.



Integration of the models, asset documentation and CMMS allow unprecedented access of information and situational awareness on site via mobile applications as shown in the visuals below.





TAV Integrated Solutions Highlight Project

Emaar Square – Istanbul, Turkey

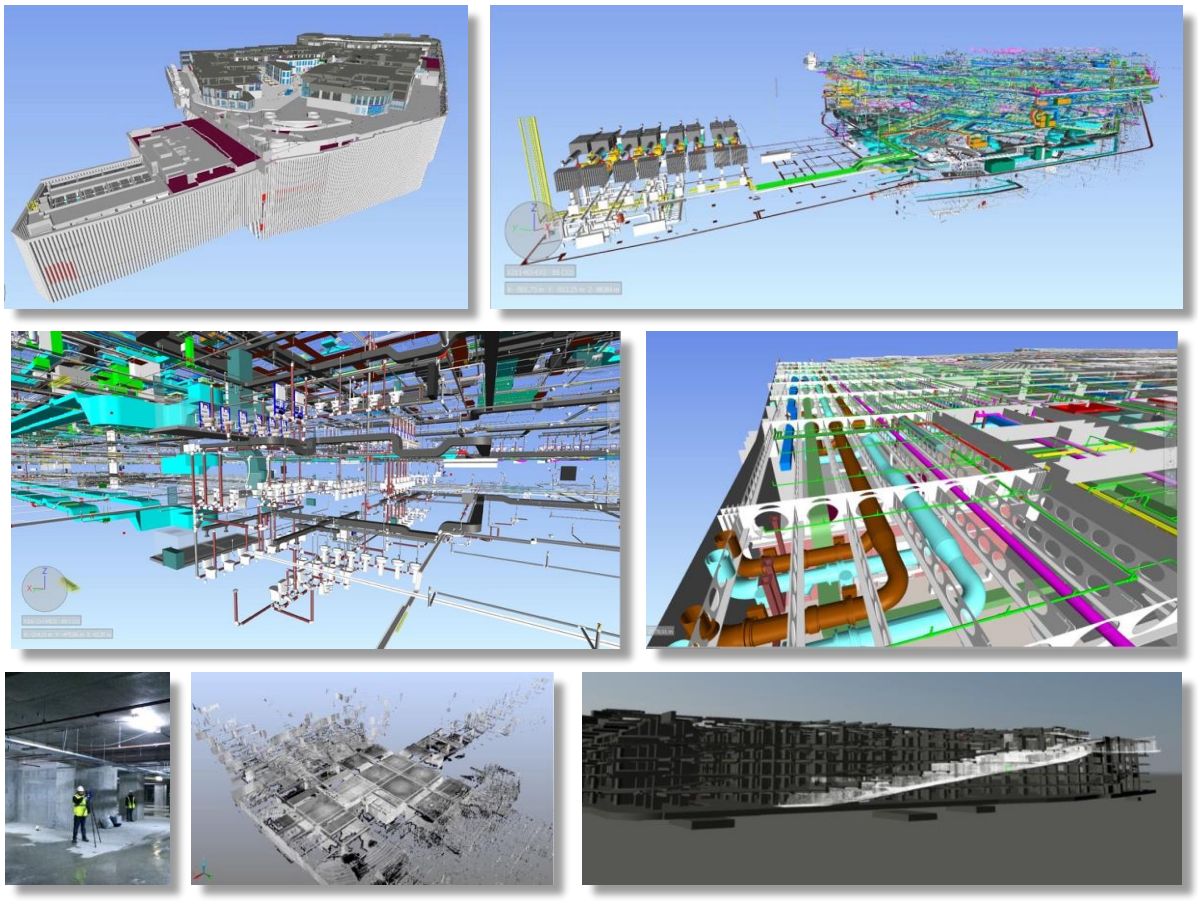
Client: Emaar Properties
Main Contractor: TAV Sera JV
Year: 2013 – 2017
Scope:

- Coordination/Clash Detection
- LOD 300, 400
- Commercial Studies
- Quantity Extraction
- Variation Monitoring
- Laser Scanning

Emaar Square is one of the largest mixed-used projects in Istanbul. The project is in the heart of city center and includes a shopping mall, high end residential units, and a hotel.

For this project BIM was used extensively for trade coordination, clash detection, and commercial studies. Drawing production was also support by BIM, reducing coordination errors on drawings. All disciplines have been modeled to solve extremely

Extensive use of laser scanning was utilized to check as-build accuracy of construction to ensure site conditions where accurately reflected for coordination.



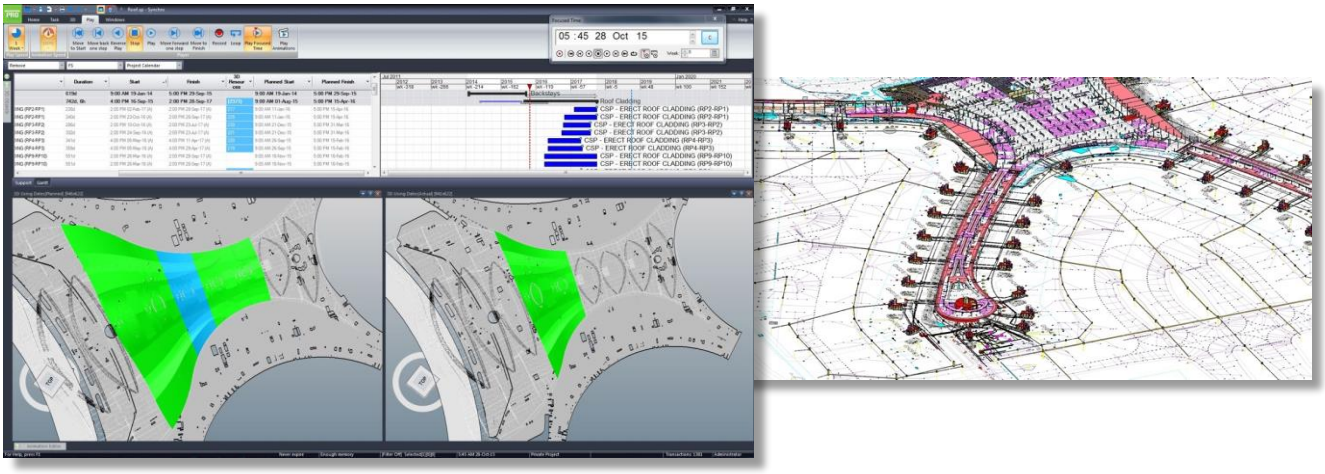
TAV Integrated Solutions Highlight Project

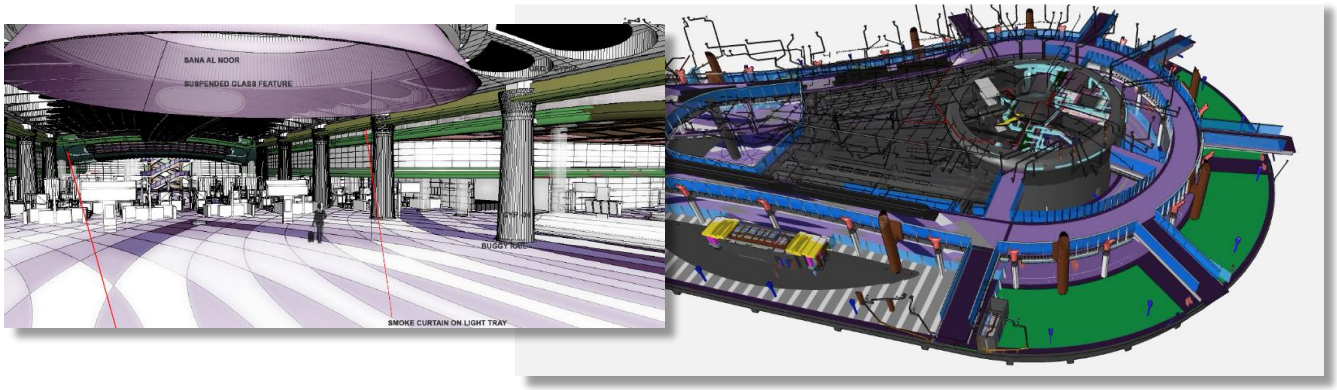
Abu Dhabi Airport Midfield Terminal – Abu Dhabi, UAE

Client: Abu Dhabi Airport Company (ADAC)
Main Contractor: TAV CCC Arabtec JV
Year: 2012 – on-going
Scope:

- Coordination/Clash Detection
- LOD 300, 400, 500
- 4D Progress Monitoring
- Shop Drawing Extraction
- Commercial Studies
- Quantity Extraction
- Variation Monitoring
- Laser Scanning
- Time Impact Analysis
- Facilities Management/Asset Management Integration

In Abu Dhabi, the TAV-CCC-Arabtec JV led by TAV Construction is managing one of the largest BIM scopes in the region. FOR the 2.9 billion USD, 700,000 square meter Midfield Terminal Project detailed BIM utilized as a powerful project management tool during construction. Cost and schedule updates are managed using in house object-based BIM capabilities. The project BIM team contributes and feeds in to several other project teams. Particularly BIM has been instrumental for project controls and coordination between trades, as well as object-based cost and schedule updates. The model is also being prepared for Facility Management and Asset Management use and integration with the airport CMMS and GIS infrastructure.





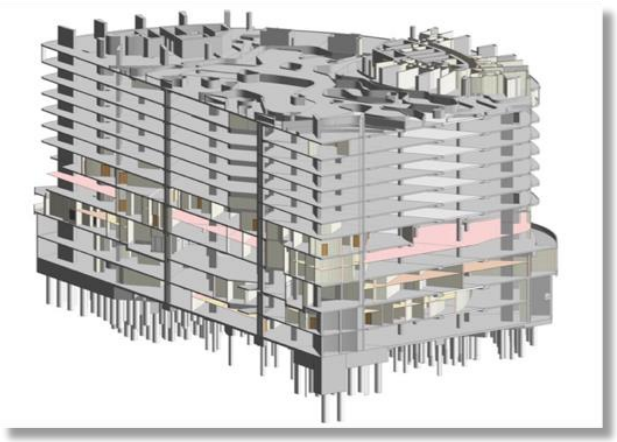
TAV Integrated Solutions Highlight Project

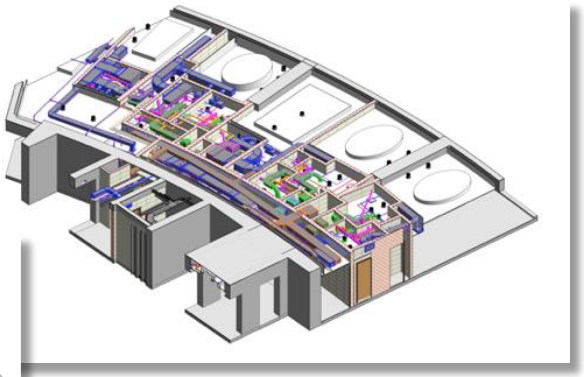
Damac Paramount Towers – Dubai, UAE

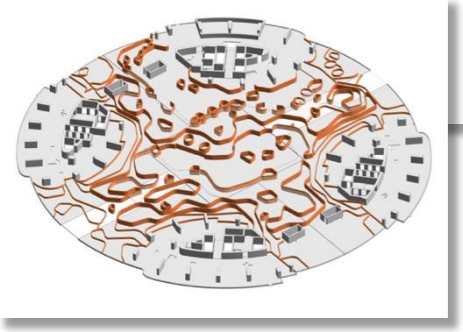
Client:	Damac Properties
Main Contractor:	TAV Construction
Year:	2013 – 2017
Scope:	• Coordination/Clash Detection • LOD 300, 400, • Quantity Extraction • Variation Monitoring

Located at the celebrated Burj Khalifa district, Damac Towers by Paramount is a hotel and residences focused mixed-use development project consisting of 4 towers and 54 floors reaching a height of 279 meters. Developed by DAMAC Properties, the region's leading luxury private developer, in collaboration with Paramount Hotel & Resorts, the project offers an ambience and reflection of the Hollywood glamour and California cool lifestyle, synonymous with Paramount Pictures over the past 101 years.

For the Damac Paramount Towers Project BIM was used for clash detection, trade coordination, and mainly for commercial studies. Variations were managed using quantities extracted from BIM through a close collaboration between BIM and commercial teams.







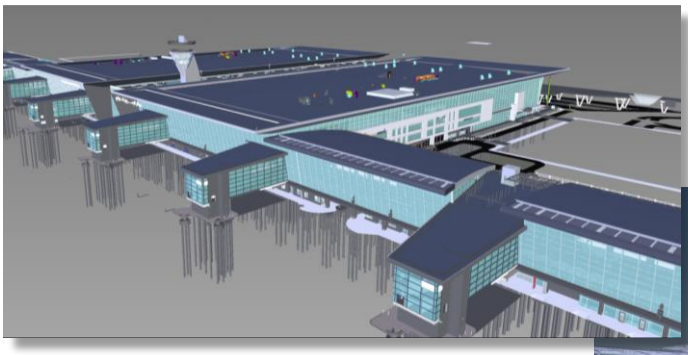
TAV Integrated Solutions Highlight Project

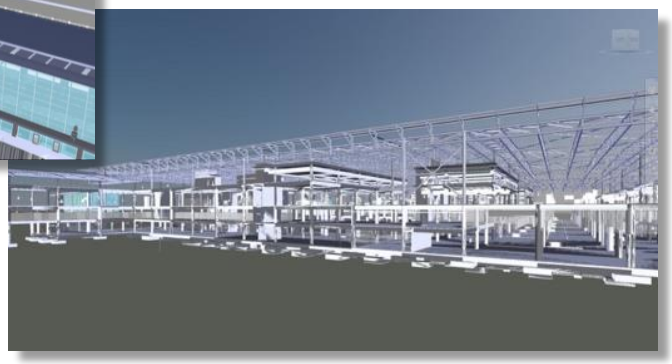
Bahrain Airport New Terminal – Manama, Bahrain

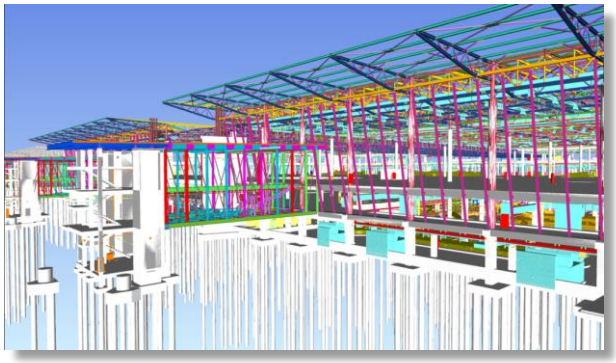
Client:	Bahrain Ministry of Transportation
Main Contractor:	Arabtec TAV JV
Year:	2016 – 2020
Scope:	• Coordination/Clash Detection • LOD 300, 400, 500 • Commercial Studies • Quantity Extraction • Shop Drawing Extraction

Bahrain International Airport's 1,1 billion USD contract, the largest project won ever by a Turkish contractor in Bahrain, covers the construction of a state-of-the-art new terminal building, airside apron works, a Central Utility Complex and a 3,500-vehicle capacity multi-story car park. Boasting a built-up area of 222,000 square meters, the terminal design is centered upon efficiency of operations, simplicity and ease of passenger circulation and targets LEED® Gold certification with environment-friendly measures throughout the design-construction-operations life-cycle.

TAV-IS prepared project BIM Execution Plan, organization, infrastructure requirements and budget as well as executed the modeling, coordination and shop drawing extraction of all structural works. As Arabtec-TAV JV, clash detection between all disciplines, quantities studies for commercial teams, and shop drawing extraction was done through data extracted from BIM.







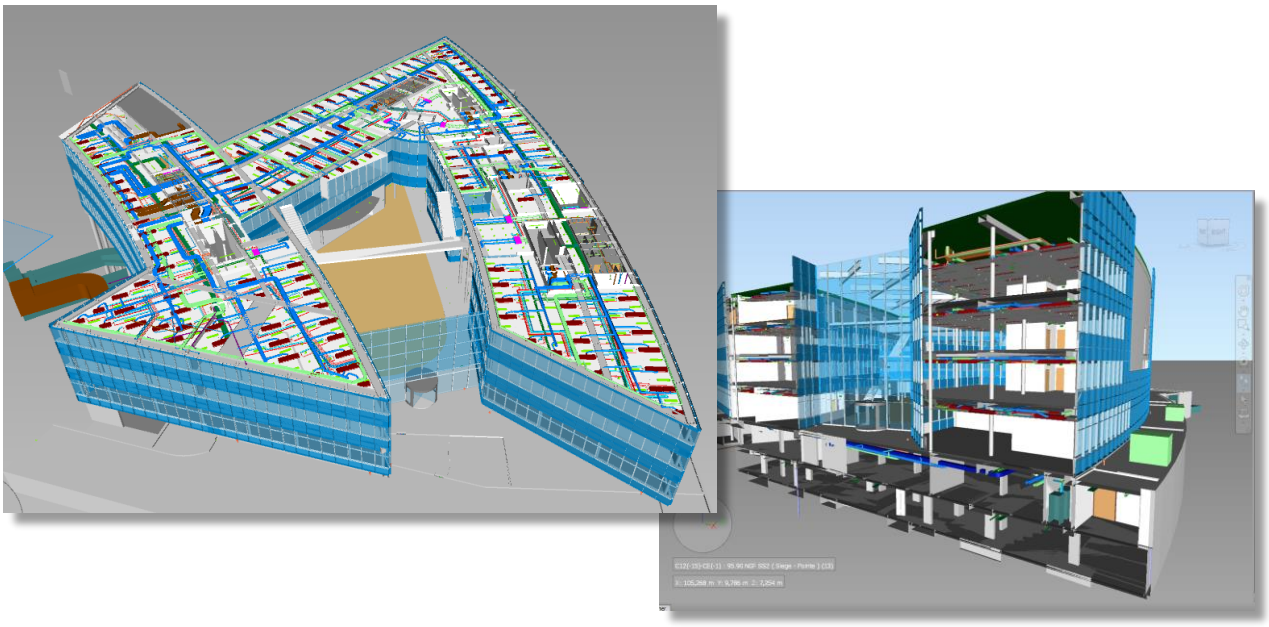
TAV Integrated Solutions Highlight Project

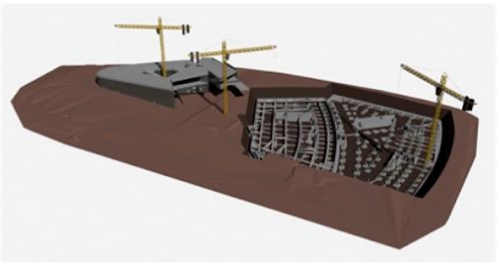
ADP Headquarters – Paris, France

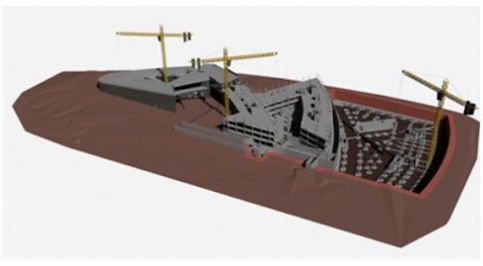
Client:	Aéroports de Paris (ADP)
Main Contractor:	TAV Herve JV
Year:	2015 – 2017
Scope:	• Coordination/Clash Detection • LOD 300, 400, 500 • Quantity Extraction • Facilities Management/Asset Management Integration

The TAV Construction and Hervé SA Joint Venture carried out the design and build contract of the new Aéroports de Paris Headquarters located in the district of Roissypole East, in the heart of Paris-Charles de Gaulle Airport. The Headquarters is a showcase of the expertise of Aéroports de Paris and has a special importance as being the first project of TAV Construction in a European Union country. The project consists of the design and construction of 3 office buildings which will be connected with an accessible roof terrace with French gardens and aim to get a dual environmental certification; BREAAM Very Good and HQE Excellent.

The TAV-IS BIM Scope included the design coordination between all disciplines using BIM at LOD 300 and 400 for clash detection and on-site coordination as well as preparation of an LOD 500 as-built model for Facilities and Asset Management purposes upon handover.







TAV Integrated Solutions Services

Design Together Competition – Istanbul Technical University

Client: Istanbul Technical University
Year: 2017 – on-going
Scope: Training for BIM modeling, coordination and Execution Plan authoring to student participants

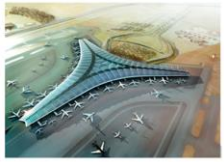
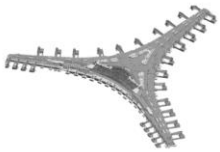

Arturo Merino Benitez Int Airport – Santiago, Chile

Client: Nuevo Pudahuel JV (ADP Vinci Astaldi)
Year: 2015
Scope: BIM System and Implementation Planning Consultancy

Kuwait International Airport – Kuwait

Client: TAV CCC Ghaffari JV
Year: 2014
Scope:

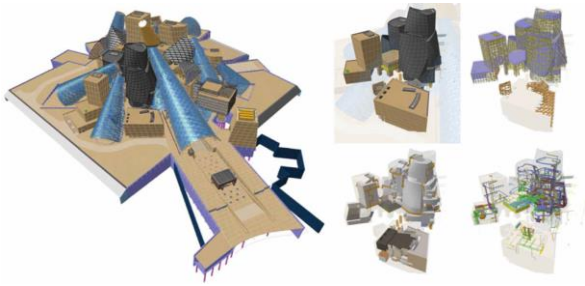
- Pre-Tender BIM Execution Plan
- LOD 300 Architectural, Structural and MEP BIM modeling
- Full Quantity Extraction from BIM


Guggenheim Museum – Abu Dhabi, UAE

Client: Arabtec TAV JV
Year: 2014
Scope:

- Pre-tender BIM Execution Plan
- LOD 300 MEP BIM modeling
- Quantity Extraction from BIM



Information Management – TAV Construction

Client: TAV Construction
Year: On-going
Scope:

- Report automation
- KPI tracking
- Service integration
- Custom application development
- Dashboard development
- Deployment & training