

THE IMPLEMENTATION OF BIM IN THE NEW ALAMEIN CITY-EGYPT

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Abstract

BIM (building information modeling), is now widespread around the globe, with many nations reporting that BIM is affecting their respective industries at various levels. The construction industry in the developed world is rushing to embrace BIM as a catalyst for gaining operational efficiencies, with BIM adoption increasing tremendously in the last three to five years. Annual surveys are being conducted to document the state of affairs, and national-level initiatives are in place to produce BIM standards and guidelines, and construction companies have reported a positive return on investment with more savings expected in the future [Ref.1].

In EGYPT, because of the importance of BIM in the national projects and its effects in the costs and time, we decided to implicate it in one of the important national project in EGYPT (The New Alamein City). This step helped us to solve a lot of problems, like, the collaboration between all stakeholders, the coordination between all disciplines in the drawings, enhancing the construction sequences with using 4D simulation and cost estimation using 5D, finally, documenting, organizing and administrating the project using BIM 360.

Keywords

BIM (building information modeling), national projects, The New Alamein City, collaboration, coordination, 4D and 5D simulation, BIM 360.

JEL Classification

L74, C63, E17.

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The New Alamein City

The New Alamein City is considered the first model of the new generation of the millennium cities, its initially estimated cost 6.000.000.000 EGP, the area of the project 50.000 acres, the works executed by the Arab Contractors Company.

- ✚ Infrastructure works for the First Phase (potable water network – wastewater networks – drainage – irrigation networks for the green areas – electricity network – transformers chambers – distribution plates-pumping stations) extends for 1466 acres within the scope of works of the First Phase.
- ✚ The First phase of the touristic sidewalks which is 7km length and will be 14km in the Second phase. It will include civil works, finishing works, the construction of the sand bridge and gates of the city. The construction of 2 bridges on the Strait above the lakes and the 2 pedestrian's bridges at the top of Strait 3 and 4 according to the strategic plan of the city.
- ✚ Shaping the sides of the lakes aspects in the coastal area.
- ✚ Construction of 3 towers in the coastal area with 34 floors (148 meters) built upon 39 thousand m² with a total floor area 150 thousand m².



Figure 1: Aerial view of The New Alamein City (www.moh.gov.eg).

The main problems

The New Alamein City consisting a lot of stakeholders, like, the owner, the contractors, and consultants, which make difficult for the collaboration with them, also the different projects like, the towers, the hotels, the presidential palace, the Prime Minister Building and infrastructures, which need to be coordinated.

In this project, we need to be on schedule and we have to reduce the errors in both, the designs and during the execution of the projects, so in our project, we faced a lot of problems, like:-

- ✚ The bad collaboration between all stakeholders in the project.
- ✚ Consuming a lot of times to make modifications in the drawings by sending letters and making meetings, that affect mainly on the time schedule and the costs of the project.
- ✚ The huge pressure from the ministry to finish the project on date.
- ✚ Lack of experience in using technology in Engineering fields.

BIM implementation in the project

As a result of this problems, we introduced BIM as a new technology the can solve a lot of problems, especially we don't have any time to make mistakes, our Steps in BIM Implementation are,

- ✚ Documenting all documents of The Project by Using BIM 360.
- ✚ Coordination between all drawings of the same discipline and make the model by using Revit.
- ✚ Integration between all models of all disciplines and making Multi-Disciplinary project using Revit.
- ✚ Clash detection between all disciplines by using Navisworks.
- ✚ Making Virtual Time Schedule and appearing method of statement using Navisworks.
- ✚ Making Cost Estimation by Primavera and Navisworks.
- ✚ Coordination Between all projects by using Infra works 360.

Documentation using BIM

There is no doubt that the project documentation is a vital part of a project management and it must lay the foundation for quality, traceability and the history for both the individual document and for the entire project documentation [Ref.2], it is also extremely important that the documentation is well arranged, easy to read, and adequate, for that reason, BIM interested in the documentation as a first step in the project and introduced the application BIM 360 DOC.

BIM 360 Doc, this application is used for publishing, reviewing and approving all drawings, documents and models. This application solved a lot of problems like:

- ✚ Organizing the drawings and the documents by reading automatically The codes.
- ✚ Resolving the collaboration between all stakeholders of the project.
- ✚ Resolving all the problems of the drawings without making meetings and sending letters that led to reduce the waste time
- ✚ The possibility to present the issues from anyone and the others can show it.
- ✚ Controlling the documents and the admin has the ability to control and determine the roles of the other stakeholders.
- ✚ The ability to check the model after making the integration of it.

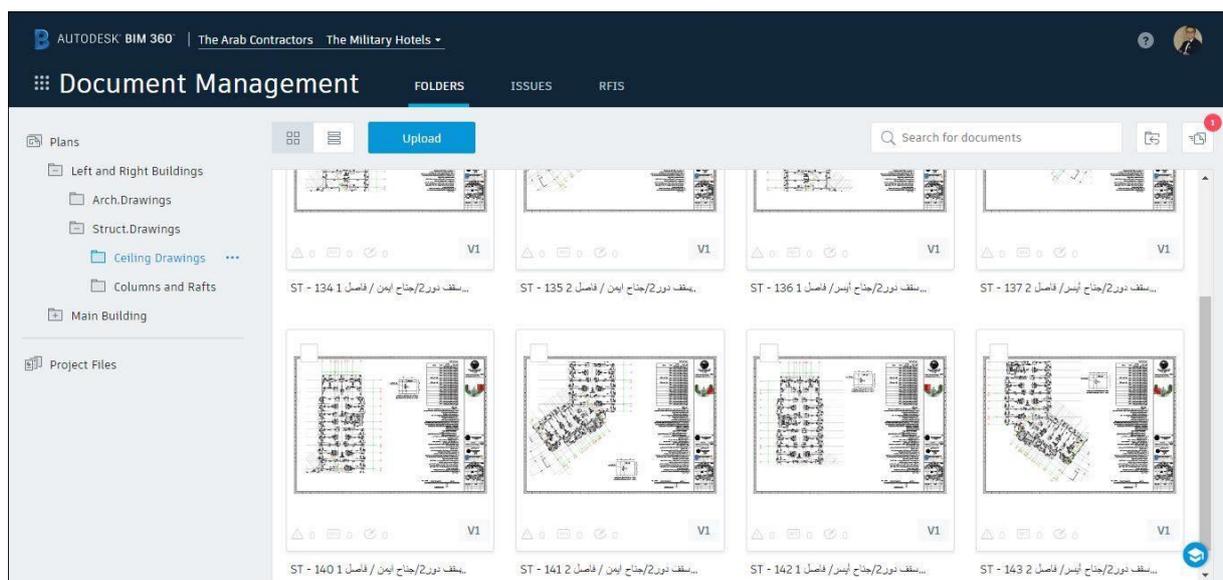


Figure 2: BIM 360 Doc (Drawings – The military Hotel/ALAMEIN).

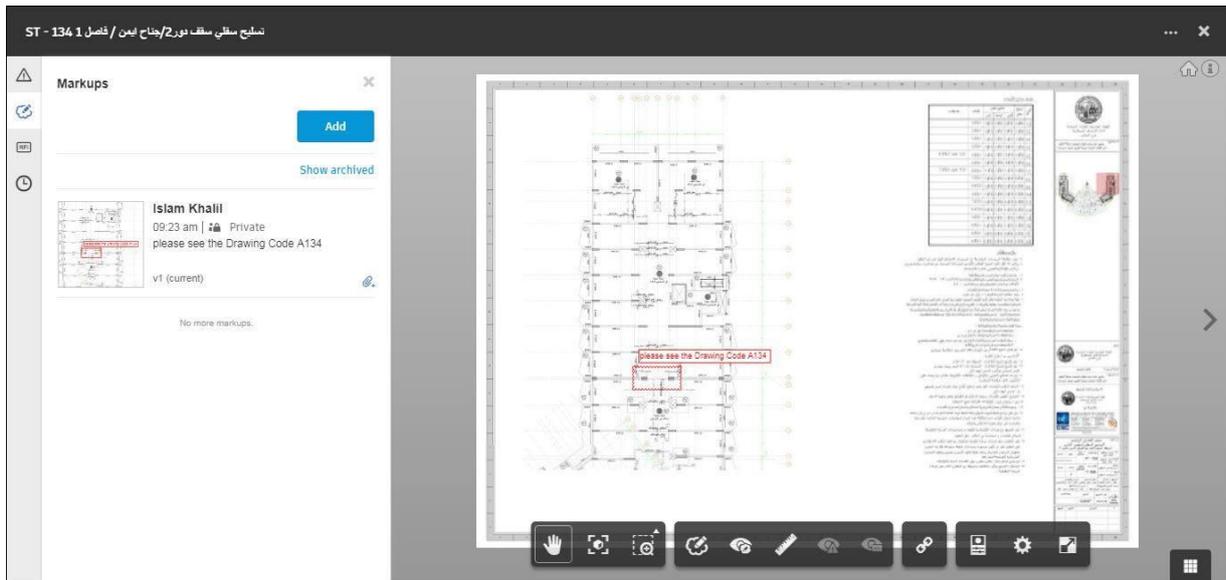


Figure 3: BIM 360 Doc (issues – The military Hotel/ALAMEIN).



Figure 4: BIM 360 Doc (3D Struc. Model View – The military Hotel/ALAMEIN).



Figure 5: BIM 360 Doc (3D Arch. Walk Through View – The military Hotel/ALAMEIN).

Construction sequencing (4D) and cost estimation (5D)

❖ The Towers

During the construction phase, the 4d model can assist in construction coordination and in reviewing constructability, it also allows understanding how the process will proceed in particular point of time, comparisons can also be made between the (as-build) and the (planned) schedules for the sake of improving the overall management, in our project - the Towers of The New Alamein City - the managers wanted to make a comparison between 2 method of statements (M.O.S) of execution the towers and present actual situation with cash in at 1/11/2018 and that was the result.

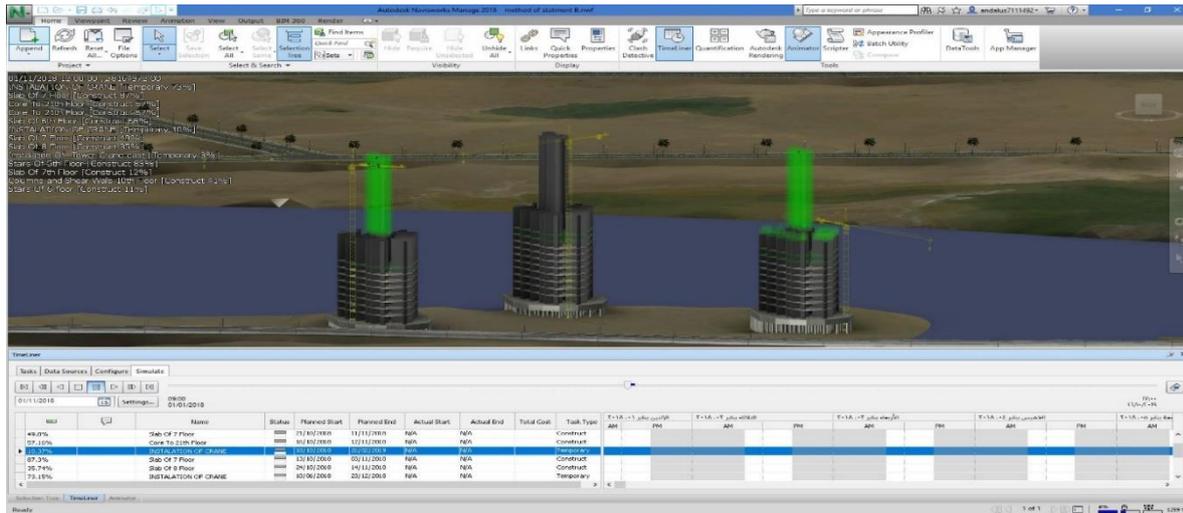


Figure 6: Navisworks (M.O.S 1 – The towers /ALAMEIN).

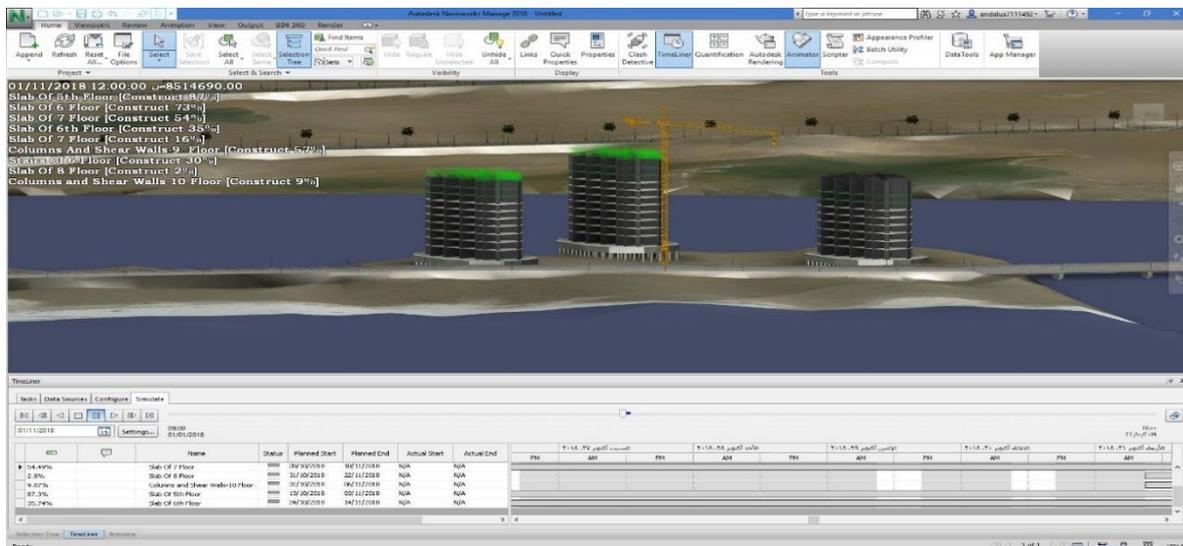


Figure 7: Navisworks (M.O.S 2 – The towers /ALAMEIN).

M.O.S 1 - (% of execution and cash in)



- Instalation of crane 70%
- Construction Of Slab(7) 65%- East tower
- Construction Of Slab(6) 35%- West tower
- Construction Of columns) 70%-middle tower
- cash-In 8,514,690 EGP
- As shown in figure 6

M.O.S 2 - (% of execution and cash in)



- Instalation of crane 73%
- Construction of core 90%- middle Tower
- Construction of core 57% - East Tower
- Construction of core 57% - West Tower
- Cash-in 8,164,917 EGP
- As shown in figure 7

Finally, we decided the M.O.S 1, because of the % of execution and cash in was higher than the other one.

❖ **The Military Hotel**

Using 4D-simulation, helped us to understand the construction sequences, we presented to the engineering authority of the armed forces, the visual time simulation, which was the first time to present time schedule like this, the benefits of 4D simulation are

- ✚ Making visual simulation of the time schedule
- ✚ Making comparison between which was planned and actual
- ✚ Determine the parts for every sub-contractor to making follow up
- ✚ Determining the cash in or out at the selected time

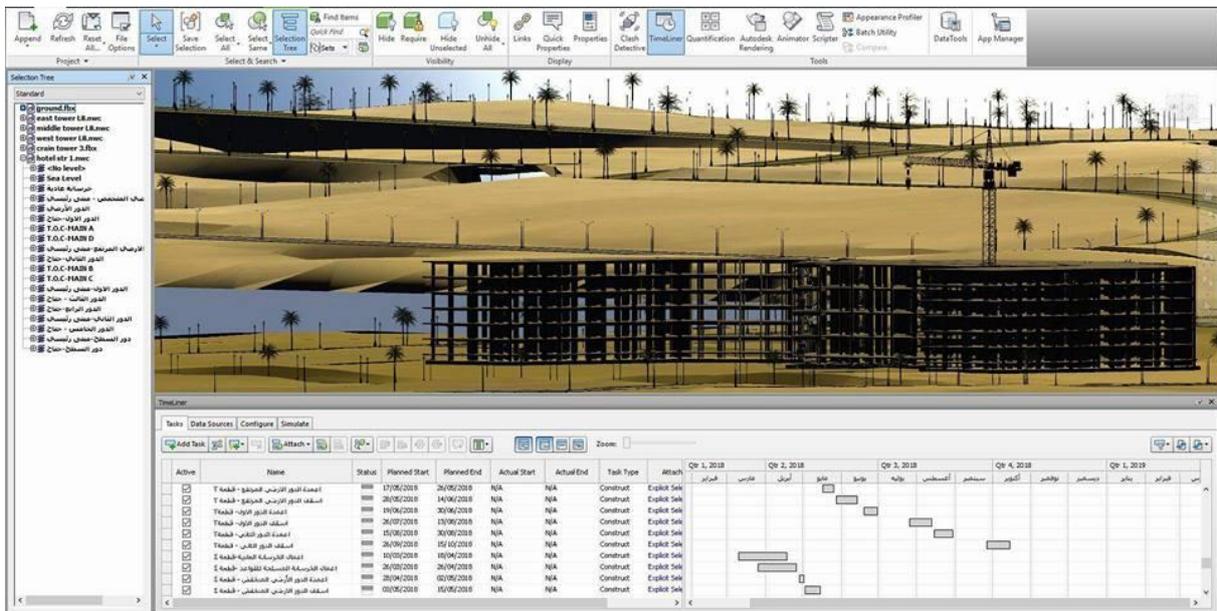


Figure 8: Navisworks (4D simulation – The military hotel /ALAMEIN).

BIM in infrastructure

Our projects consist of Infrastructure project like

- ✚ Networks (Sewer – Storm – Water and irrigation networks)
- ✚ Transformers and Distributers
- ✚ Pump stations

For that reason, we used the application INFRA WORKS 360, this application is used for

- ✚ Coordination between the projects in virtual environment.
- ✚ Drawing the networks (Sewer – Storm – Water and irrigation networks) by the invert level in drawings and checkup the errors.
- ✚ Drawing The roads and determine the quantitates of drilling and landfill

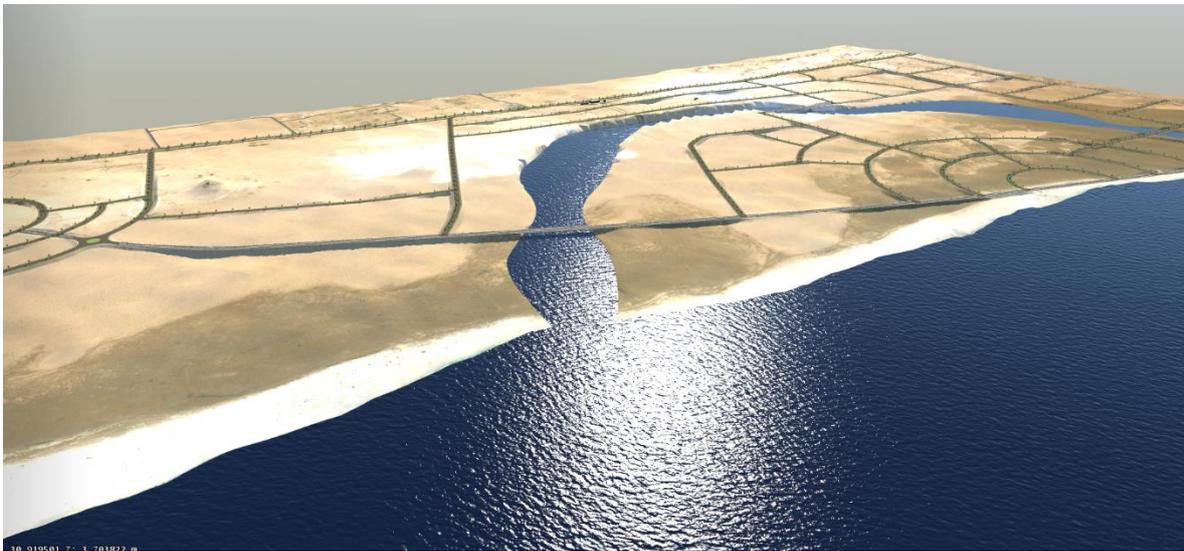


Figure 10: INFRA WORKS 360 (Roads – ALAMEIN).

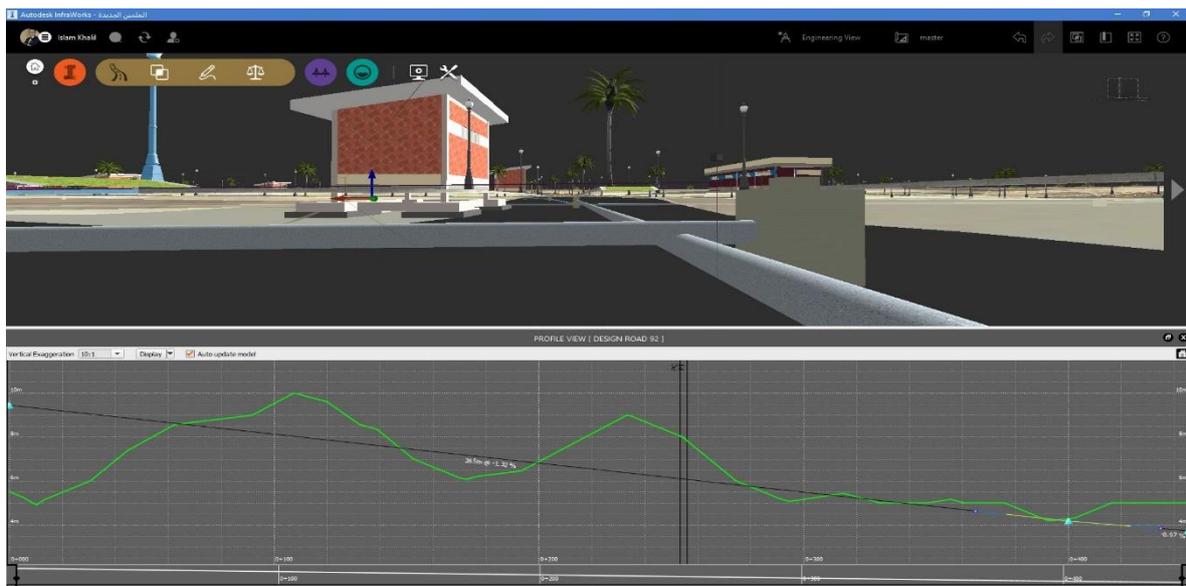


Figure 11: INFRA WORKS 360 (Networks – ALAMEIN).

Results of using BIM in The New Alamein City

-  Enhancing the collaboration between the stakeholders of the project
-  Enhancing the coordination and integration between the drawings
-  Reducing the time and costs
-  Following up the time schedule virtually and making easily explaining the method of statement of execution the project

References

- [1] Royal institute of chartered surveyors (RICS)-BIM implementation
- [2] www.pmp-practitioners.com