Dholera & Auric
Industrial Cities

*BIM for Infrastructure Projects*

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Agenda:

1. DMICDC NODES.
2. BIM MANDATE
3. IMPLEMENTATION CASE STUDIES.
   - DSIR REGION
   - AURIC REGION
4. ACHIEVEMENTS
8 Nodes being developed in DMIC Phase I

1. Dadri – Noida Ghaziabad IR, UP .......................... 200 sqkm
2. Manesar – Bawal IR, Haryana ............................ 402 sqkm
3. Neemrana – Kushkhera – Bhiwari IR, Rajasthan . 165 sqkm
4. Pitampura – Dhar – Mhow IR, MP ......................... 372 sqkm
5. Jodhpur Pali Marwar IR, Rajasthan ...................... 72 sqkm
6. Ahmedabad – Dholera IR, Gujarat ...................... 920 sqkm
7. Shendra – Bidkin Industrial Park, Maharashtra ... 84 sqkm
8. Dighi Port IA, Maharashtra ................................. 253 sqkm
3D Model Driven Approach Mandate for DMIC Nodes

- DMIC mandates the use of advanced computer based dynamic 3D-model driven approach for:
  - Detailed planning
  - Design, engineering
  - Construction, and operation of the DMIC nodes.

- To allow:
  - Simulation
  - Visualization and engineering analysis of all transportation, utility, building, civil works and geospatial infrastructures.

- The 3D Infrastructure Information Models are to be used throughout the design, construction and operational life-cycle of the asset, including:-
  - System collision detections
  - Materials quantification
  - Construction sequencing
  - Project reviews
  - Decision support
  - Design analysis, and
  - Quality assurance.

all phases of this program.
What is BIM?

**BIM** (Building Information Modeling) is an intelligent 3D Model-based process that gives Architecture, Engineering & Construction (AEC) professionals, the insight and tools to more efficiently Plan, Design, Construct, and Manage Buildings and Infrastructure.
To initiate the BIM process into the project, we require inputs at the different levels. Even before construction, the object is virtually created, models get updated progressively, and go into O&M.

- Scope / Program
- Finance / Budget
- Concept Development
- Design Development
- Detailed Design Development
- Construction Management
- Commissioning
- Handover / Closeout
- Operations & Management
2D Input to 3D Output Transformation

What is BIM
Input & Output Collaboration
• Better Expression of Design Intent and accelerated approvals.
• More integrated and optimized design
• Reduce Risk through design conflict resolution
• Visual Project Monitoring for time and cost.
• Enhanced Stakeholder inclusion.
• Virtual Model for Operations and Maintenance
• Better Multiparty Communication and understanding through 3D Model
• Integration of project data and minimum RFIs
• Better procurement management and reconciliation
• Cost of rework minimized through clash detection
• Design Review for Resource Optimization
• Actual project insights across all levels of management
Building Information Modelling – Case Studies.
DHOLERA
SPECIAL
INVESTMENT
REGION

DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

A “Platinum” Rated Green City

Geospatial World 2018
Dholera Industrial City – The pivot of Resurgence of the Country & investment potential

920 Sq.km

(TP1 to TP6)
422 Sq Km

Activation Area
22.54 Sq Km

Phase I (TP1 & TP2)
153 Sq Km

Value of Output
~90B

City Building
~$150B

DSIR
~ $18B

Phase I
~ $6B

Activation Area
~ $0.7B

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Why?

- Nationwide BIM Mandate
- Project BIM Mandate
- A differentiator to competition
- Demonstrate Leadership
- Standardize Project Delivery Process
- Improve profitability
What?

This chapter defines “what” – the BIM deliverables” to be produced by the respective project member(s) at different stages of a project to meet a set of BIM objectives. All the agreed deliverables are indicated in the “BIM Objective and Responsibility Matrix”.

BIM project deliverables should be agreed upon together with deliverable dates at the start of the project and after the main project members have been appointed so as to accommodate their participations. Some of the typical deliverables are shown below:

- Site model
- Massing model
- Architectural, structural, MEP models
  - For regulatory submissions
  - For coordination and/or clash detection analysis
  - For visualization
  - For cost estimation
- Schedule (material, time etc) and phasing program (in BIM or spreadsheet)
- Construction and fabrication models
- Shopdrawings
- As-built model (in native proprietary or open formats)
- Data for facility management
- Other additional value-added BIM services
How?

*3D Visualization*

BEC Building

SPV Building
How?

Schedule Simulation/4D/Construction Planning

- Clash Detection & Coordination
- Program sequencing
- Improved quality
ABCD-1 SPV & BEC
Buildings-Virtual
Construction
Sequencing using 4D
Simulation Technique
ABCD-1 SPV & BEC
Buildings-Virtual Construction Sequencing using 4D Simulation Technique
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ABCD-1 SPV & BEC
Buildings-Virtual Construction
Sequencing using 4D Simulation Technique
How?

5D – Estimation
Quantity
Cost

5D ESTIMATING
- Real-time conceptual modeling and cost planning (EPonitor)
- Quantity takeoff to support detailed cost estimates
- Trade Verifications from fabrication
  - StructuralSteel
  - SheetMetal
  - Mechanical/Piping
  - Electrical
- Value Engineering
  - What if scenarios
  - Visual controls
- Cost Estimation
  - Estimation Solutions
  - Equipment rooms
  - MEP systems
- Multi Trade Prequalification
  - Unique architectural and structural elements

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DMICDC
A BIM Record Model up to 5D Level can be used for Operations & Maintenance after handing over the project and used for 6D & 7D Level BIM Process.
How?

LEED Tracking - Sustainability/Energy consumption control during operations
How?

BIM for Facilities and Asset Management
* 5D and 6D are being attempted to implement as EPC Contractor’s capabilities are limited.
Achievements - dholera

Contractor - L & T

Activation Area

LOD 200 Models have been done (graphical generic)

LOD 300 Level expected in the next Revision (graphical specific)
Achievements - dholera

Contractor- CCEL

All types of Models are completed

Quality check is going on with the Asset

Information Tagging for the Facility

Management Use.
Achievements - dholera

Developed the whole Designs in Revit BIM Platform on LOD 200 for Services and 300 for Architecture & Civil.
BUILDING INFORMATION MODELLING

IMPLEMENTATION ON
AURANGABAD INDUSTRIAL TOWNSHIP LIMITED

Case Study
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Various factors impacting design and construction accounted for.
• Aggregation/ intensity of interferences detected aided in determination of priority zones and element types such as residential sewerage line, cable trench etc.

• Later in the design process, and particularly for pre-construction planning stage, interference severity criteria was defined and interference rules configured that helped in supporting element level coordination.
CORRIDOR MODEL – SHENDRA INDUSTRIAL AREA

An aggregate dynamic 3D Building Information Model (BIM) created for AURIC SBIA city infrastructure systems with model for civil infrastructure system, roads and underground and above ground utilities systems.

- Aided in **better multi party communication and understanding** through 3D model.
- Benefitted integration of project data and achieve minimum RFIs
- Virtual model will aid in **operations and maintenance of the city infrastructure** through SCADA and AURIC Control Command Center.
• Clash Detection carried out to come up with coordinated model

• Coordinated model augmenting site execution process

• Cost of rework minimized through clash detection
AURIC CITY HALL 3D Model prepared through BIM Interface

Achievements - auric

In progress BIM Model – At ground floor level

- 4D simulation on NavisWorks – visualization and tracking of project activities; effective use of schedule and time saving
- Build sequencing of construction activities

Completed BIM Model for AURIC City Hall
AURIC CITY HALL 3D Model prepared through BIM Interface

Achievements - auric

Completed BIM Model for AURIC City Hall
Geospatial System Engineering Analysis, Modeling and Management

Collaboration System

Digital Imagery

Geospatial System

Engineering Analysis, Modeling and Management

Information & Communications technology (ICT)

Project Management Information System

BIM PLATFORM

Eco Vision

Land Use and Built Environment

Information & Communications technology (ICT)

Water, energy & infrastructure management

Health and Well Being

Sustainability Mobility

Smart Industrial City

Achievements – dmic region

AURIC CITY HALL 3D Model prepared through BIM Interface
THANK YOU