

3D Modeling and Clash Deduction of PBS-Television Center, Hawaii

N. Lavanya, Dr. DSV Prasad

Abstract—This experimental investigation carried out on the present mostly using software in construction Industries Revit which is software of Autodesk, Revit is building information modeling software for architects, structural engineers, MEP engineers, designers and contractors developed by Autodesk. It allows users to design a building and structure and its components in 3D, annotate the model with 2D drafting elements, and access building information from the building model's database. Revit is 4D BIM capable with tools to plan and track various stages in the building's lifecycle, from concept to construction and later demolition.

This Project carried on the 3D modeling of a building which includes the design of Structural, Architectural, and Plumbing modeling. After modeling of the design this modeling was Plug Inn into the Navis Work Manage. It is also Autodesk software where we can find the Clashes and check the Quantity and Quality of the materials use in the construction.

BY using this Software's in this project, we can give the detailed Information of the building structure and design before the construction in a detail. Where we can control the difficulties occurs during the working progress of the building, Wastage of the Materials can be deducted, The Clashes occurs at Walls, Beams, Footings, Columns, and we can see the Clashes between Structural and Architectural Plans and also between Structural and MEP (Mechanical, Electrical, Plumbing) plans and we can get the proper exact estimation of the Building materials and time of the project.

Index Terms—LOD 350, Non-graphic information, Model Element.

I. INTRODUCTION

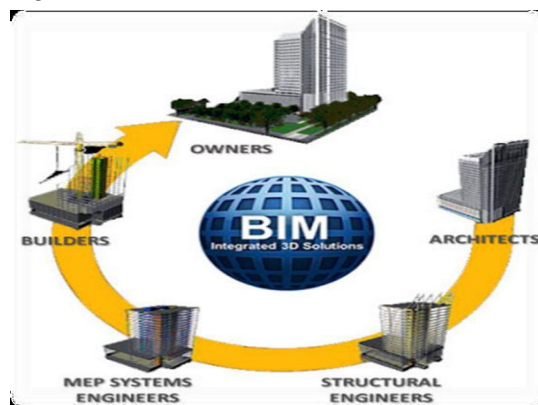
It is a most intelligent form of dynamic model. Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. It involves in a data collection, processing and functioning.

A. The Benefits of BIM

When we think of BIM, we often think of better design coordination and improved constructability. But the real value can come after handover, when the owner or facility manager receives a complete and accurate set of information. Even more than that, BIM provides a set of interrelated and cross-referenced information. For example, objects in the model are linked to related information including manuals, specifications, commissioning data, photos, and warranty details. This allows the owner or facility manager to efficiently and accurately manage the asset. Since 75% of the

cost of a facility is incurred after handover, it's clear that the benefits of BIM continue to accrue after design and construction have been completed.

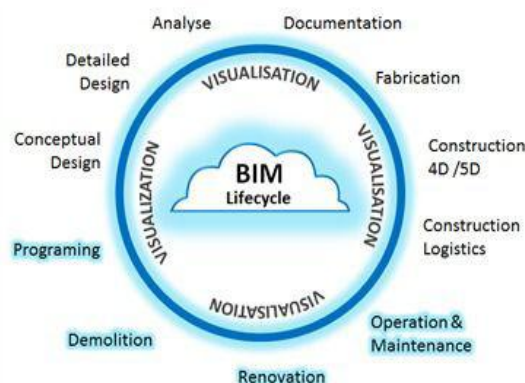
B. Stages in BIM



C. Life Cycle



D. BIM Workflows



E. BIM Applications

BIM applications are 2D, 3D, 4D, 5D, 6D, 7D.

F. Software involved in BIM

a. Introduction to Revit

N. Lavanya, PG Student, Civil Engineering Department, BVC Engineering College, Odalarevu, India

Dr. DSV Prasad, Professor &Principal, BVC Engineering College, Odalarevu,

The Revit platform for building information modeling is a design and documentation system that supports the design, drawings, and schedules required for a building project. Building information modeling (BIM) delivers information about project design, scope, quantities, and phases when you need it.

b. Element Behavior in a Parametric Modeler

In projects, Revit Architecture uses 3 types of elements:

- Model elements represent the actual 3D geometry of the building. They display in relevant views of the model. For example, walls, windows, doors, and roofs are model elements.
- Datum elements help to define project context. For example, grids, levels, and reference planes are datum elements.
- View-specific elements display only in the views in which they are placed. They help to describe or document the model. For example, dimensions, tags, and 2D detail components are view-specific elements.

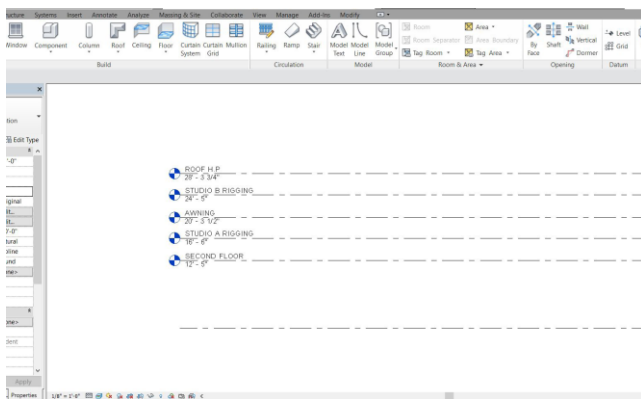
II. A NEW PROJECT

The recent files window can list up to 5 templates provide template provides a starting point for a new project, defining settings, styles, and basics information. Templates can simplify project setup, standardize project documentation, and ensure adherence to office standards.

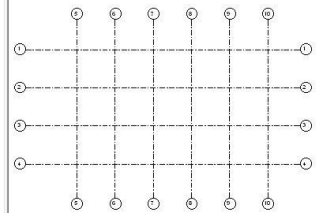
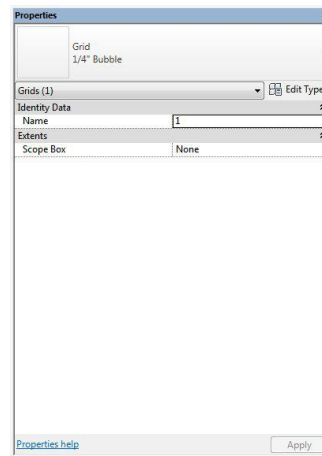
As installed, the software lists one or more default templates. However, you or your BIM manager may have changed or added more templates to the list

- To create project
- Open new file
- Create levels and grids
- Levels and Grids
- To establish context and guidelines for the project, create levels and grids

A. Adding Levels



B. Grids



III. ARCHITECTURAL MODELLING

Revit Architecture provides various familiar components for building design. No programming language or coding is required to create these components.

Topics involved in Architecture:

- WALLS
- DOORS
- WINDOWS
- COMPONENTS
- ARCHITECTURAL COLUMNS
- ROOFS
- CEALINGS
- FLOORS
- OPENINGS
- MODEL TEXT
- MODEL LINE
- STAIR BY COMPONENT
- RAMPS
- RAILINGS
- CURTAIN ELEMENTS
- STAIR BY SKETCH
- ROOMS
- BUILDING THE MODEL

IV. STRUCTURES

A. Introduction for structures

Structural system, in building construction, the particular method of assembling and constructing structural elements of a building so that they support and transmit applied loads safely to the ground without exceeding the allowable stresses in the members. Structural system, in building construction, the particular method of assembling and constructing structural elements of a building so that they support and transmit applied loads safely to the ground without exceeding the allowable stresses in the members. Basic types of systems include bearing wall, post-and-lintel, frame, membrane, and suspension. They fall into three major categories: low-rise, high-rise, and long-span. Systems for long-span buildings (column-free spaces of more than 100 feet, or 30 meters) include tension and compression systems

(subject to bending) and funicular systems, which are shaped to experience either pure tension or pure compression. Bending structures include the girder and two-way grids and slabs. Funicular structures include cable structures, membrane structures, and vaults and domes. See also shell structure.

B. Structures involved in sections

- Isolated footings
- Structural walls
- Structural floors
- Reinforcement
- Foundations
- Openings and structural elements
- Beam types
- Structural stiffness
- Joins and cutback on framing elements and columns
- Concrete modeling
- Beams
- Columns

C. Structural Input

- Architectural layout
- Floor thickness and TOC
- Foundation details
- Column type and Size
- Beam design informally (extracted from analysis software)

D. Steps Involved

- Initially beam sizes to be provided.
- Beam should be placed as per Architectural layout.
- Send again to design for final analysis for changes if any.

E. Structural Modeling

This section contains information about the various structural tools and elements within Revit Architecture.

Loading Structural Component Families When you load structural families, Revit Architecture provides a type catalog to assist you with the family selection process. You can sort through the data and load only the specific structural family type required for your project. This helps decrease project size and minimizes the length of the Type Selector list when selecting structural types. For example, if you load the entire C-Channel family, you have to scroll through a list of dozens of C-Channel types in order to make your selection. Simplify the choices by loading a single C-Channel type, such as a C15x40. After the family is loaded, it is saved with the project.

F. Loading Families Structural

Structural Columns Structural columns are used to model vertical load-bearing elements in a building. Although structural columns share many of the same properties as architectural columns, structural columns have additional properties defined by their configuration and industry standards. Structural columns differ from architectural columns in behavior as well. Structural elements such as beams, braces, and isolated foundations join to structural columns; they do not join to architectural columns. Typically, drawings or models received from an architect may contain a

grid and architectural columns. You create structural columns by manually placing each column or by using the Grids tool to add a column to selected grid intersections. Structural columns can be created in plan or 3D views.

V. TELEVISION CENTER (HAWAII) PROJECT



A. Scope of the project

The scope of work for the subject project includes, but is not limited to, the following:

a) Intent

Complete renovation of first floor and addition of new second floor level and roof.

b) Demolition

Demolition at first floor and selected exterior walls. All columns to remain.

c) Construction

1. New exterior walls, windows
2. New interior walls, ceilings, doors

d) New finishes

1. Flooring & base
2. Ceilings
3. Painting & tile
4. Carpentry & millwork

e) Electrical

1. New conduit and wiring
2. New lighting fixtures
3. New power/ data locations

f) Mechanical

1. HVAC work
2. Plumbing work
3. Fire protection work (sprinklers, fire ext.)

B. General Note for Architectural Plan

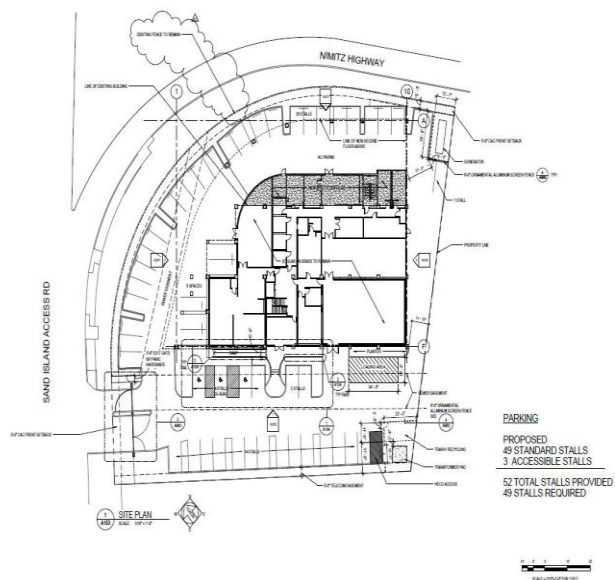
a) Architectural drawings

1. All details i.e. floor plans of all floors, Sections, Elevations, details of stair cases, toilets, canopy, Internal roads, Parking for vehicles, Architectural requirements should be mentioned along with type of floorings, wall claddings, wall tiles etc.
2. The details of firefighting riser, Lift well, Machine room.
3. All references / foot notes / Scale mentioned in all the drawings endorsed by the Architect.

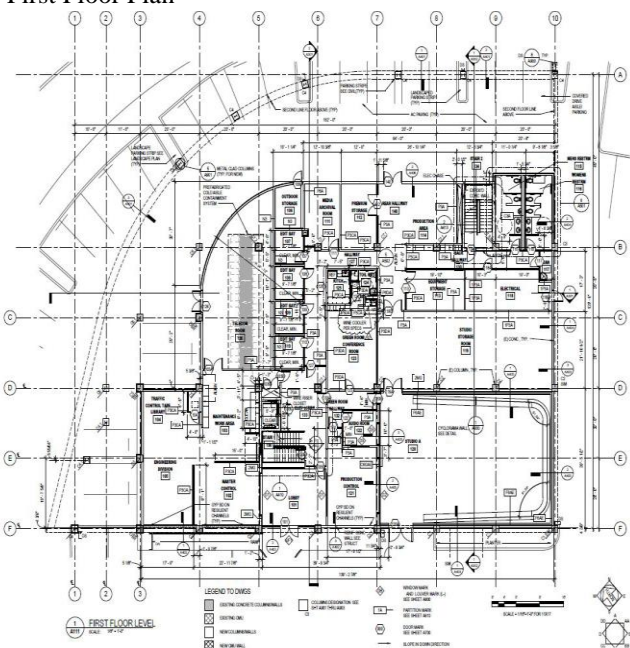
4. Whether the drawings are approved by the competent authority as well as by the local development authority or not.
5. Cross check all dimensions horizontally & vertically in all floors plans & any discrepancies are noted down to reach any conclusion.
6. All typical floor plan, sections, Elevations, any details & find out any discrepancy in drawings

All details i.e. wall thickness, floor height, Basement height, room dimensions, Important features of toilet, Bath, Kitchen Sunken/Raised floor along with +ve /-ve floor levels, details of external finishing and its offsets, details of doors/windows, grill, compound gates, Sentry hut, stair case railings Tread, Risers, Numbers of steps, landing details, Lift well/elevators details, Weather course, Drip course, canopy details, Fascia details.

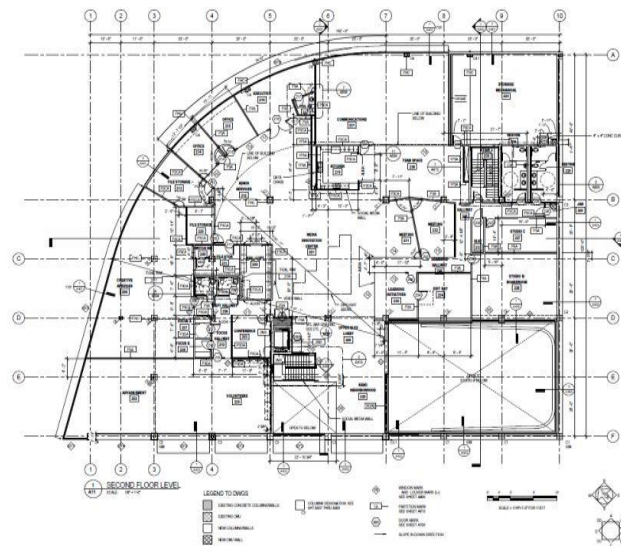
b) Site Plan



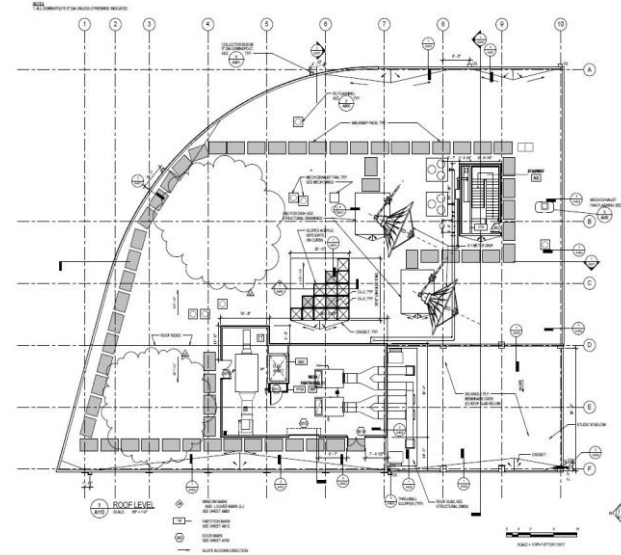
c) First Floor Plan



d) Second Floor Plan

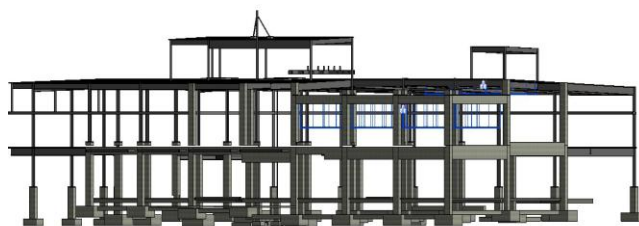


e) Roof Plan

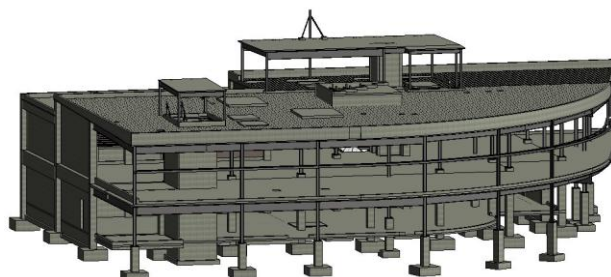


C. Structural Modeling

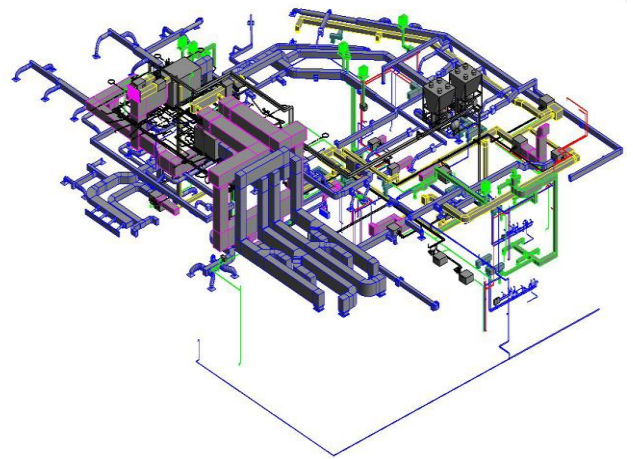
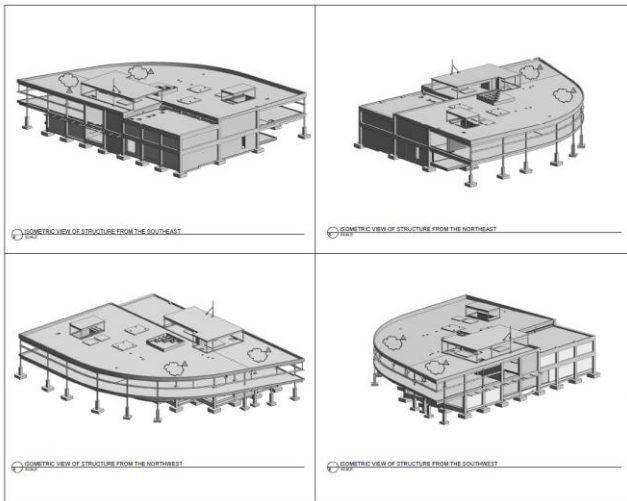
a) Foundation and Structural Framing



b) Structural Plan

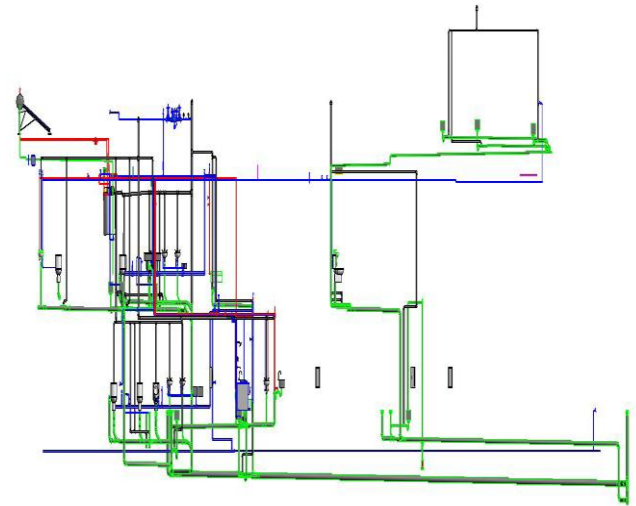
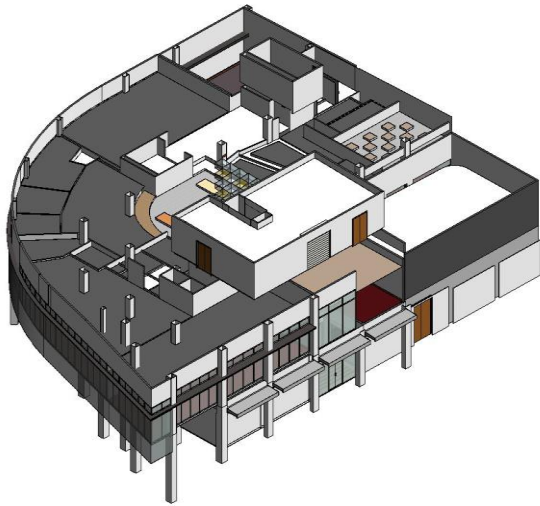


c) Isometric Views

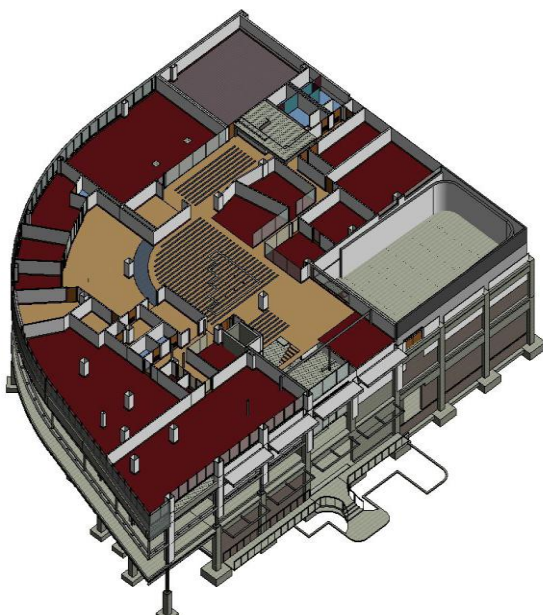


b) Plumbing and Fire Fighting

D. Architectural Model

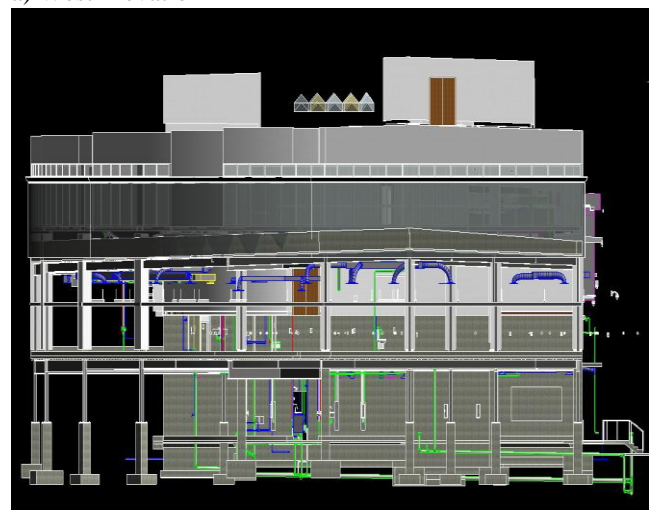


E. Interior Model



G. Electrical Model

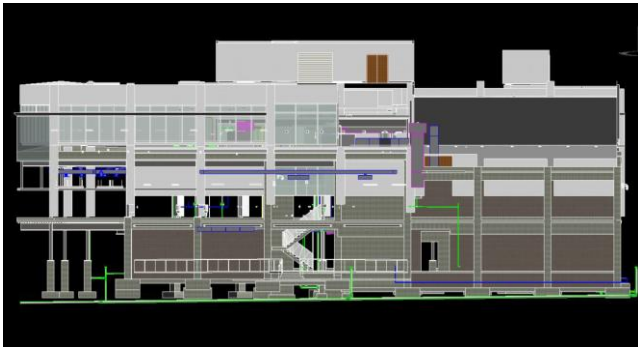
a) West Elevation



F. Mechanical Model

a) HVAC

b) South Elevation



N. Lavanya completed B. Tech (civil) in BVC Engineering College, Odalarevu, E.G.Dt., AP and presently perusing M. Tech in Structural Engineering in the same institution.



Dr. D. S. V. Prasad working as Principal BVC Engineering College, Odalarevu, AP, has more than 20 years of experience in teaching. Published more than 80 technical papers in National & International Journals & Conferences in the research area of Soil Mechanics & Foundation, Structural Engineering. He got a prestigious Crop's of Engineers Award constituted by IET Journal and Meritorious Teachers Award in 2009 by JNT University, Kakinada. Life memberships in ISTE, IEI and Indian Geotechnical Society.

VI. PROJECT CONCLUSION

In traditional processes, i.e. 2d planning cost procedure establish has lot of problems then 3d modeling In BIM Revit is a software includes 3d modeling has accurate information, center life information, and project management is wellplanned. Any complications can be detected easily.

REFERENCES

- [1] Crotty, Ray (2012). The Impact of Building Information Modelling: Transforming Construction. London: SPON/Routledge. p. 72. ISBN9781136860560. -64.
- [2] W.-K. Bergin, Michael S. "A Brief History of BIM". Archived from the original on 2 March 2014. Retrieved 15 December 2012.
- [3] "What does full bi-directional associativity mean.
- [4] "Patent: Graphical object generation and regeneration". Archived from the original on 18 February 2013. Retrieved 15 December 2012.
- [5] "The History of Revit - The Future of Design". Retrieved 15 December 2012.
- [6] "Patent: Software usage/procurement management". Retrieved 15 December 2012.
- [7] Autodesk to Acquire Revit Technology Corporation, 2002 Autodesk Press Release.
- [8] Arkin, Gregory K. "The History of Revit - The Future of Design". Revit3d.com. Retrieved 2 September 2012.
- [9] Smith, Brett. "Autodesk Announces Autodesk Revit LT". Autodesk, Inc. Archived from the original on 10 October 2012. Retrieved 16 December 2012.
- [10] "Autodesk Revit LT". Autodesk, Inc. Retrieved 6 September 2012.
- [11] "Compare Autodesk Revit LT and Autodesk Revit". Autodesk Inc. Archived from the original on 27 September 2012. Retrieved 6 September 2012.
- [12] Martin, Richard. "Building information modeling Market to Reach \$6.5 Billion Worldwide by 2020". Pike Research. Archived from the original on 15 November 2012. Retrieved 28 September 2012.
- [13] "Autodesk Revit LT-Version".
- [14] "Autodesk Rental Plans". Autodesk. Retrieved 3 December 2013.
- [15] "Software included in the Standard, Premium, and Ultimate editions". Autodesk. Retrieved 8 October 2012.
- [16] "Revit Architecture content". Autodesk Seek. Retrieved 16 June 2012.
- [17] "Revit MEP content". Autodesk Seek. Retrieved 16 June 2012.
- [18] "Revit Spaghetti". Inside the Factory - Designing the Revit Experience. Retrieved 16 June 2012.
- [19] Keough, Ian. "Dynamo for Revit". Grasshopper - Generative Modeling for Rhino. Retrieved 16 June 2012.