

gbXML Geometry Benchmark Tests

Whole Building Test Case #2 - Large Office Building

Introduction

Geometry benchmark tests help to ensure that, as building geometry produced by building designers becomes more complex, the geometry produced for energy and heating and cooling loads analysis maintains the integrity of information that is required for a proper and detailed analysis.

gbXML.org maintains this battery of benchmark tests for vendors and other interested parties to ensure compliance with gbXML.org's standards for geometry accuracy and completeness. These tests are prescriptive and serve as marks of excellence that identify the ability of a technology to translate geometry properly from its native format to gbXML.

This test (Whole Building Test Case #2) is a replica of a DOE large office reference building. The reference buildings are used by the DOE as a way to estimate how average building types will perform over different climate zones.

This test is a Phase 2 test, and as such, does not have Space Name constraints. There is a separate basement level in this model, and then three typical zones with plenums. In total, there are 23 zones in this model.

The dimensions of the zones on Floor 1 are shown below. Subsequent floors above grade ($Z = 0$ meters) that are not plenum zones all have identical coordinates and dimensions, except for the z-height.

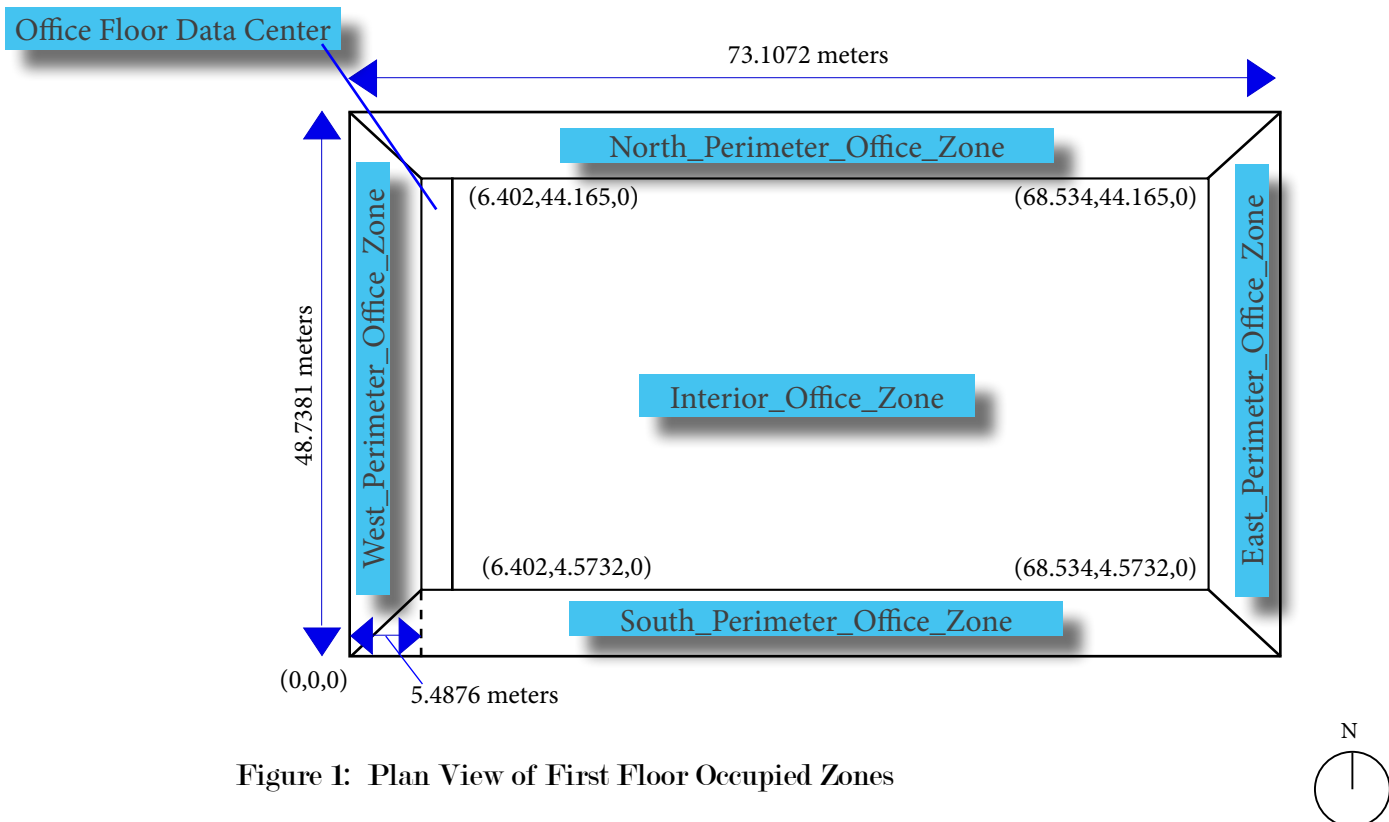


Figure 1: Plan View of First Floor Occupied Zones

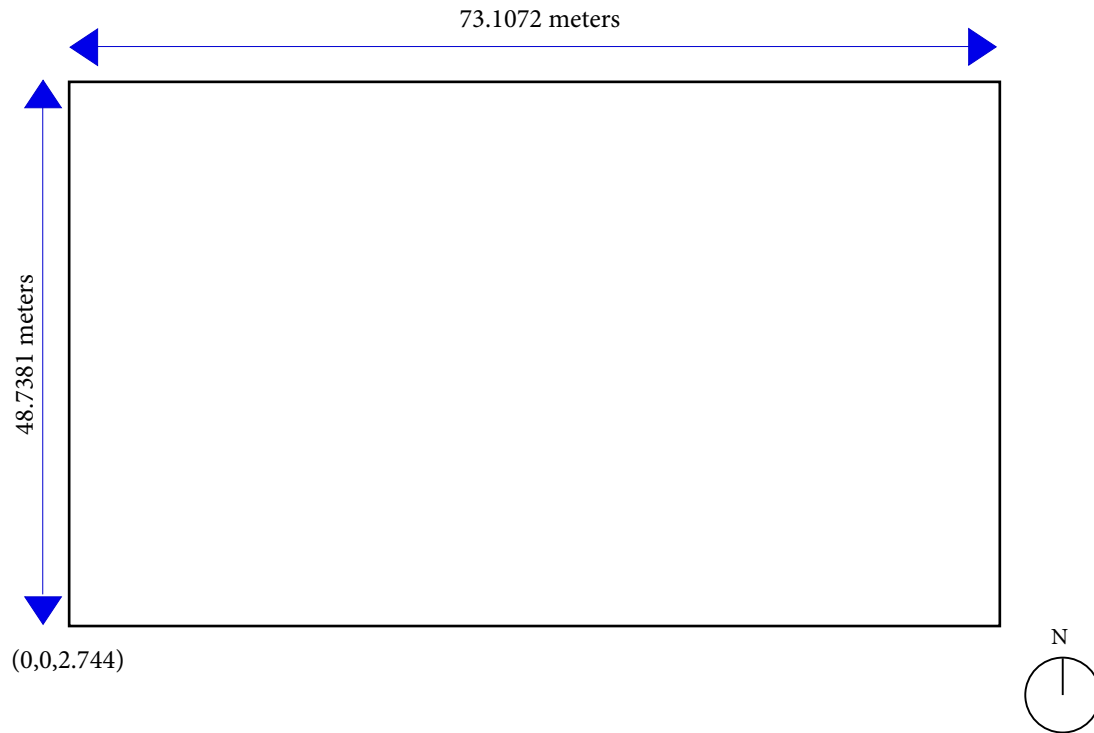


Figure 2: Plan View of a Typical Plenum Zone

The first floor plenum, shown in Figure 2 above, is stacked directly on top of the first floor zones shown in Figure 1. X,Y,Z coordinates of the lower left hand corner are shown. The basement floor plan is shown below in Figure 3. The stacking plan follows on the next page.

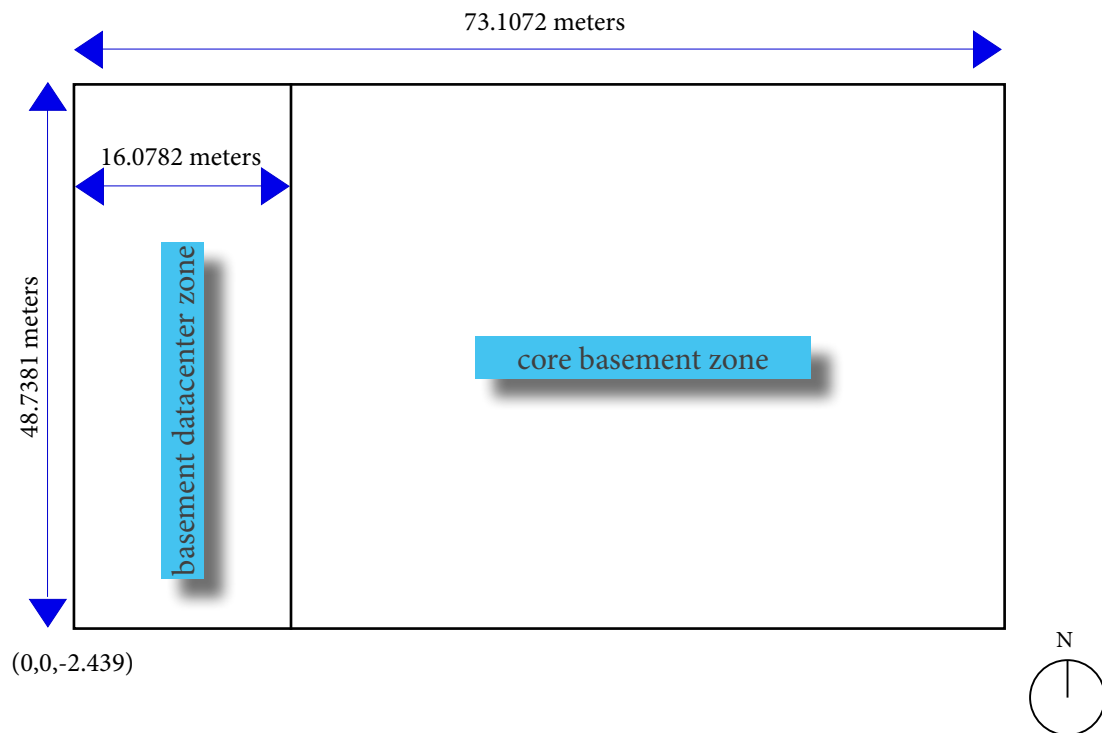


Figure 3: Basement Zones Layout

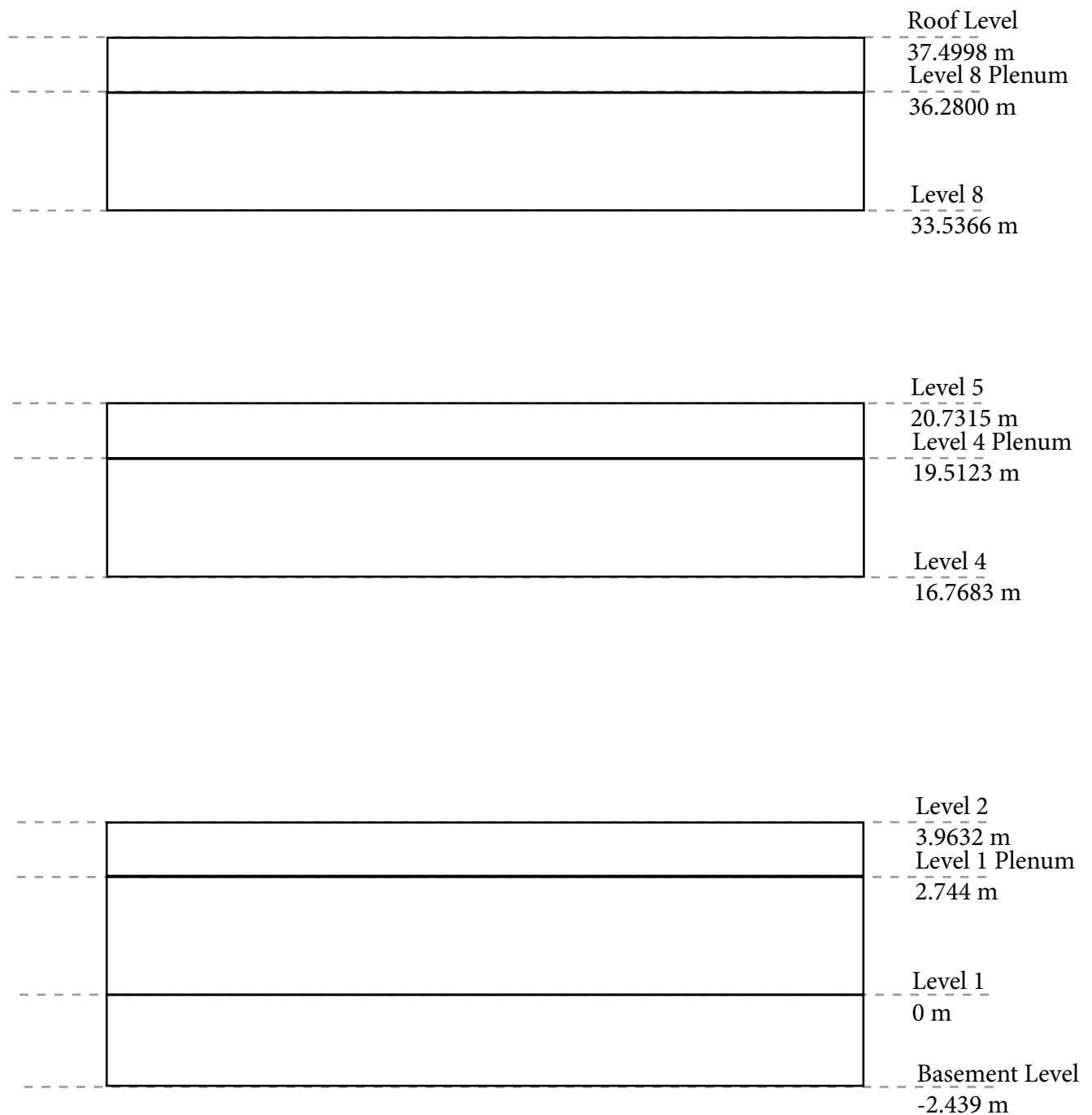


Figure 4: Large Office Stacking Diagram

The spaces left between certain floors are deliberate. This is because the reference building duplicates these floors using the multiplier command in simulation programs such as DOE-2 and EnergyPlus. Therefore, the surfaces at Level 2, Level 5 are not roofs (exterior surfaces) but instead floors (internal surfaces). Likewise, the surfaces at Level 4 and Level 8 are not exposed floors, but simply internal floors, considering they are not in reality exposed to the external environment because of the implied use of the multiplier command.

There are also windows in this model. These will not be tested for absolute placement, but the test will assure that the window to wall ratio does not exceed 40% for each facade orientation (North, South, East, and West). The wall area should include the wall area of the plenum when determining the 40% threshold.

In Figure 5 below, is a Sketchup representation of the Standard gbXML file, where the south (longer, dominant in the view) and east (shortened by perspective, secondary facade in the view) can be seen. The north and west facade are hidden. Note the different color of the ceiling (green) relative to the roof (blue). Sketchup OpenStudio recognizes these as ceilings and not a roof.

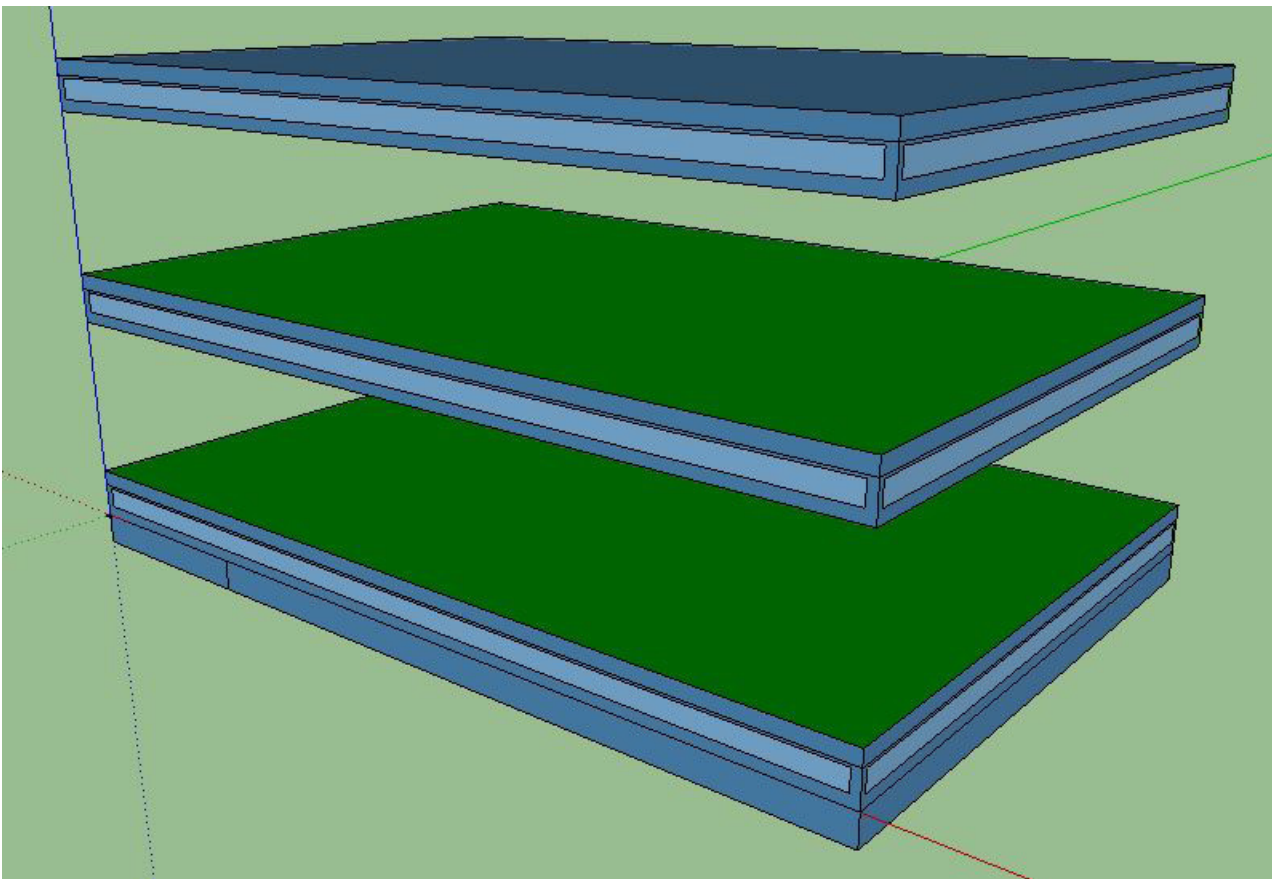


Figure 5: Axonometric View of the Finished Model

Whole Building Test #2 Common Outcomes and Test Results

This test has not been run often in the community and therefore common mishaps are not known at this time.

Resulting common issues will be related to interested parties as different CAD/BIM vendors complete this test.