

# gbXML Geometry Benchmark Tests

## Test Case #8 - Sloping Slab on Grade

### 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

### Test #8 Instructions and Requirements

Space Name	Your file
sp-1-Occupied_Auditorium	confirmed <input type="checkbox"/>
sp-2-Unoccupied_Auditorium	confirmed <input type="checkbox"/>
sp-3-Roof_Void	confirmed <input type="checkbox"/>

Table 1

This test (Test Case #8) is a three-zone model mimicking a small auditorium, where the floor slopes to accommodate seating and basic acoustic needs. The space also includes a pitched roof.

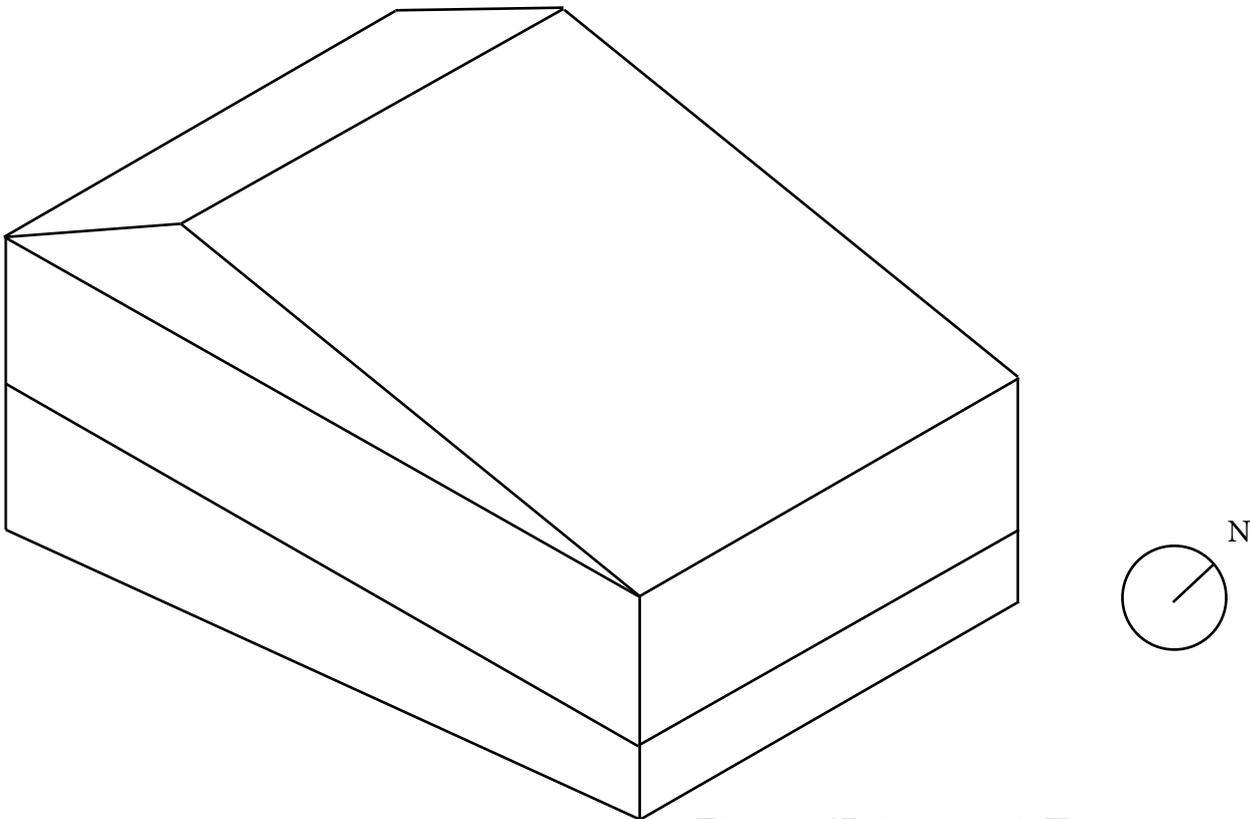


Figure 1: 3D Axonometric View

## Section Cut Drawing Instructions and Dimensions

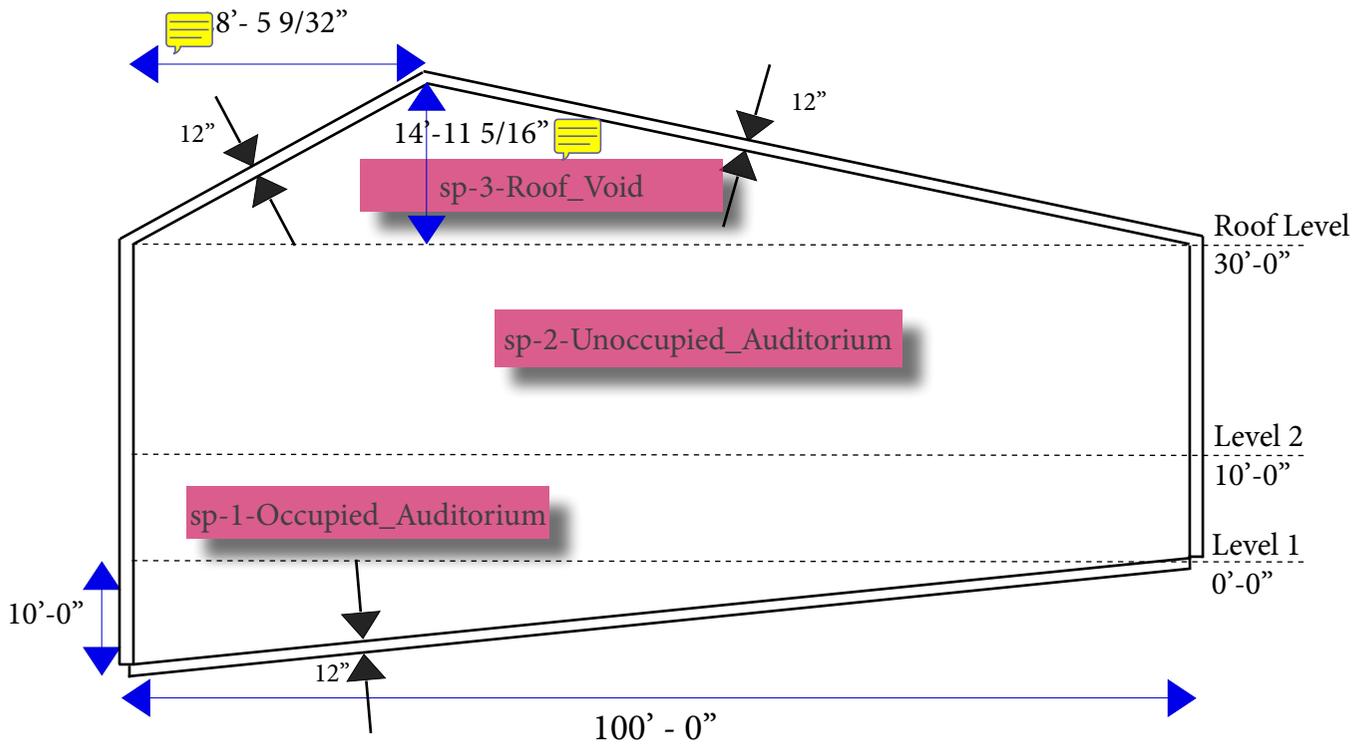


Figure 2: Test Case 8 in Section

A section cut looking north. Note that all of the surface thicknesses shown are 12". *sp-1-Occupied\_Auditorium* spans all of Level 1 and 2, but also dips to occupy the volume created by the sloping floor. *sp-2-Unoccupied\_Auditorium* fills the volume created by the boundaries of Level 2 and the Roof Level. *sp-3-Roof\_Void* represents the remainder of the volume, that which runs from the Roof Level to the roof elements that cap the auditorium.

Also note that the dimensions for the roof have been sketched, which should be sufficient to properly draw the roof object and associated walls. The slope of the slab on grade (1/10) can also be inferred by the dimensions 10'-0" and 100'-0".

## Level 1 Floor Plan and Dimensions

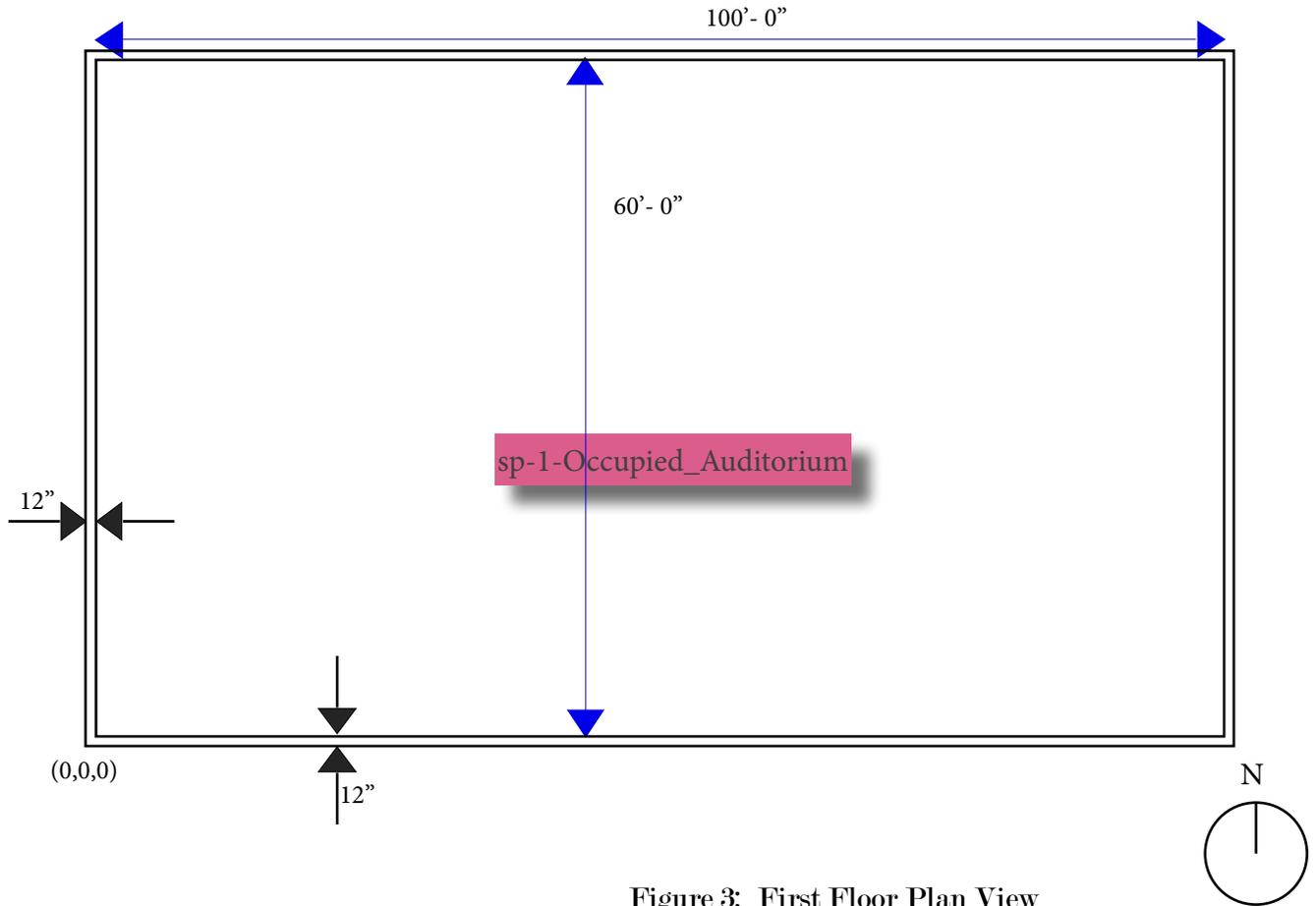


Figure 3: First Floor Plan View

*The floor footprint of Level 1. The same footprint remains the same for all Z-heights.*

## Test #8 Common Outcomes and Test Results

The test is fairly simple. Failures usually result from improperly drawing the volume, or due to an incorrect interpretation of the volume calculation. Where wall thicknesses are present, the wall centerlines are typically used to determine the boundary of the volume, and the inner wetted surface of the floor and ceiling is used to define the upper and lower boundary, even when the surfaces are sloped. This is clearly explained in the gbXML implementation agreement.

Typical validator output when wrong surfaces are taken for the volume calculation:

- 1. The Space Volumes tests will fail. The Space Areas tests may also fail.*

Another common failure may be that the first floor walls that dip below grade to meet the sloping slab...are not broken into below-grade and above-grade walls as is required. In this case, one of two possible scenarios would occur, where errors will pop up in the Exterior Wall Surface Count Tests, the Underground Wall Count Tests, and in the detailed Surface tests.

Typical validator output when wrong surfaces are taken for the volume calculation:

- 1. In this scenario, your file uploaded did not break down the exterior wall into an underground wall and an exterior wall. In this case, there will be 2 underground walls in the Standard File Count Test, and 0 underground walls in your file. There should be the same number of Exterior Wall Surface Counts in both models. This is a mistake and should be corrected.*
- 2. In the second scenario, the first floor exterior walls on the north and south are broken twice, first from the remainder of the wall that is above the 10'-0" z-height. Second, the remaining section is broken again into an exterior wall from z-height 0'-0" to 10'-0', and a below-grade portion may be created below z-height 0'-0". In this case, there will be two extra counts in the Exterior Wall Surface Count in your model. Also, the detailed surface tests for the two walls will fail. While technically this is not an error, the phase 1 validator cannot tell the difference and you may consider correcting.*

Various permutations of the two cases above may occur, depending upon how the CAD/BIM file translates the geometry to gbXML.