gbXML Geometry Benchmark Tests
Test Case #3 - Basic Second Level Space Boundary Test

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 #1 Instructions and Requirements

Space Name	Your file	
sp-2-Space	confirmed	☐
sp-3-Space	confirmed	☐
sp-4-Space	confirmed	☐
sp-5-Space	confirmed	☐
sp-6-Space	confirmed	☐

Table 1

This test (Test Case #3) is a double height space sharing an adjacent interior wall with single height spaces. In addition, this test ensures that interior floors/ceilings that overlap two zones are properly divided into separate surfaces to establish the correct neighboring relationships. The space names must adhere to the naming convention shown in column 1 of the table to the left (Table 1). These name strings should appear as the value of the Space element's id attribute. If you are rebuilding this test case to submit to gbXML, you can use the table's checkboxes as a form of quality control for your own internal processes. If the spaces are not named appropriately, then the test will not pass.
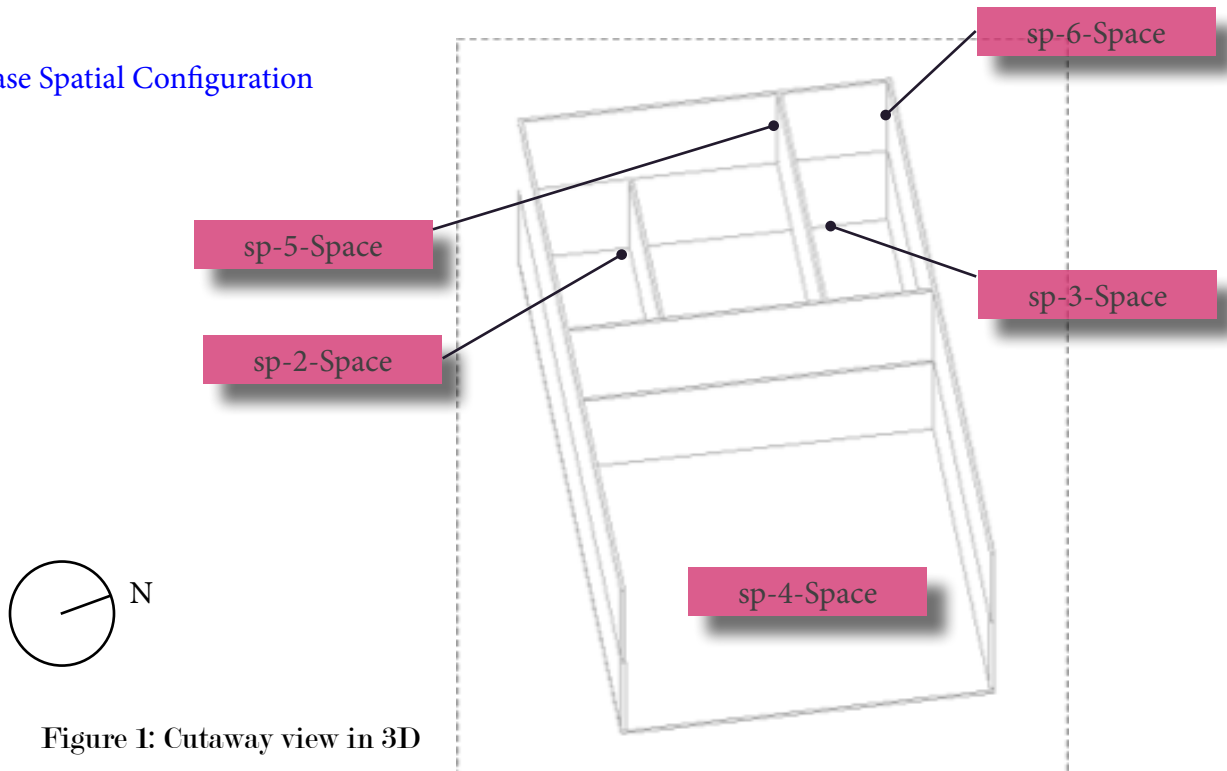
Test Case Spatial Configuration

Figure 1: Cutaway view in 3D

6"

35'

sp-3-Space

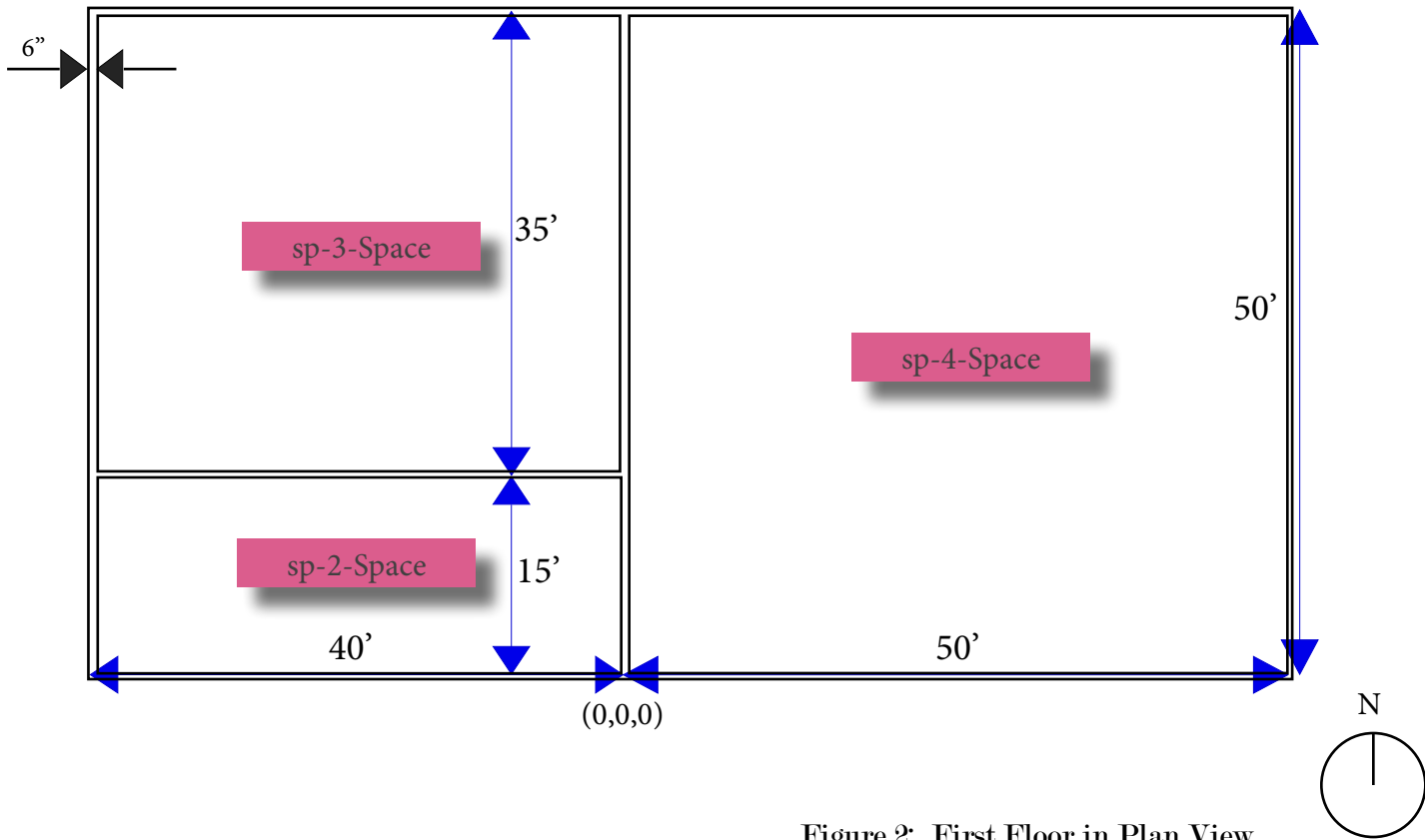50'

sp-4-Space

sp-2-Space

15'

40'

50'

(0,0,0)

N

Figure 2: First Floor in Plan View.

The entire test case file uses walls with 6" wall thickness throughout. North is indicated with the compass rose in Figure 2 above. Take note that the project origin is located at the SW corner of sp-4-Space not sp-2-Space. All dimensions shown are in US-IP feet. There are no fractional dimensions.

The double height space (sp-4-Space) is shown to the right in Figure 2 above. It has dimensions of 50' x 50'. sp-2-Space is shown to the lower ledt in Figure 2 above. It has dimensions of 40' x 15'. Lastly, sp-3-Space is shown above sp-2-Space, with the dimensions as shown. All of the dimensions are from centerline-to-centerline.
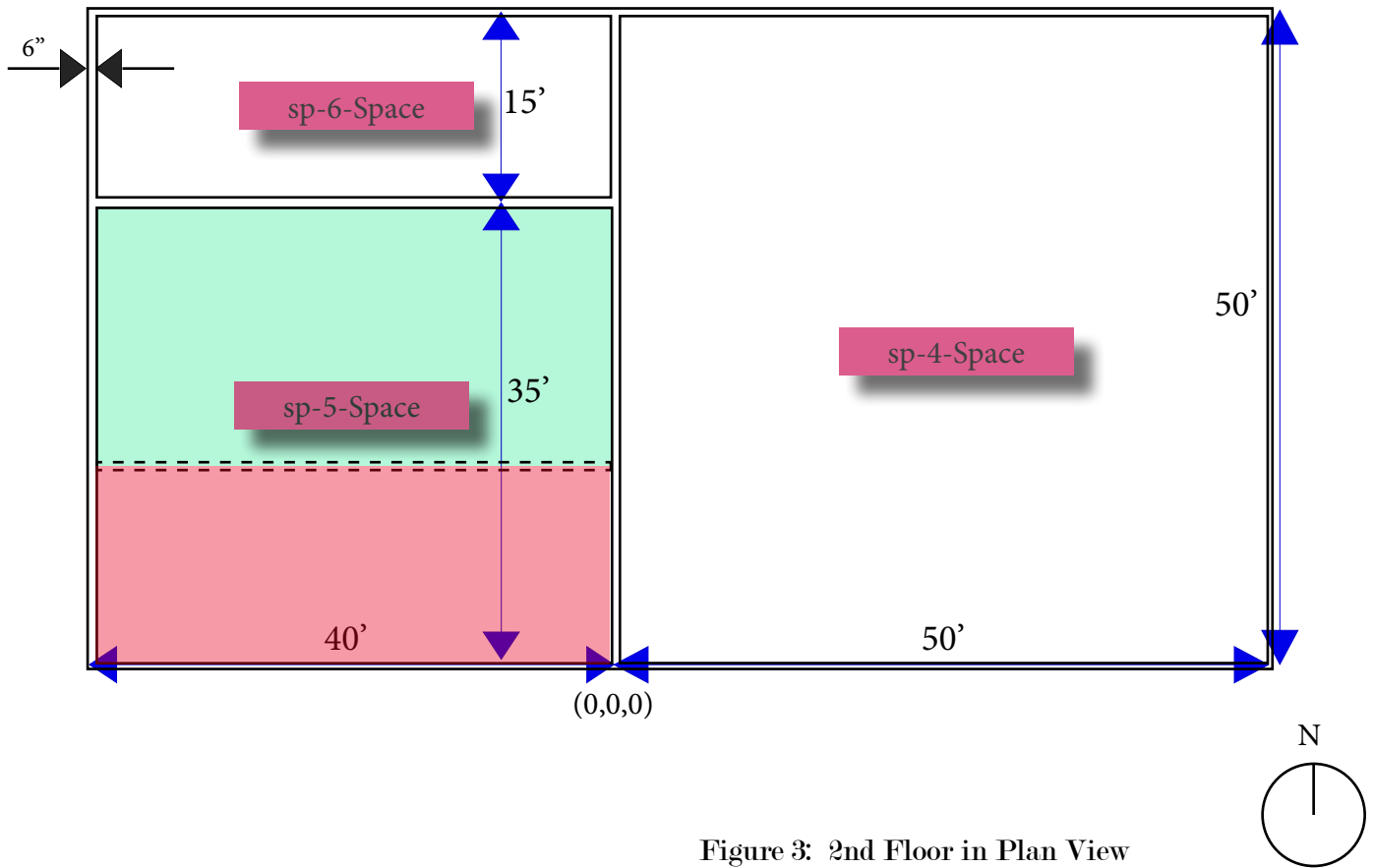
Figure 3: 2nd Floor in Plan View

The second floor looks very similar to the first, except in this case sp-5-Space is 40' x 35' and sp-6-Space to the north is 40' x 15'. Comparing Figure 3 to the floor plan in Figure 2, it can be seen that sp-5-Space spans both sp-2-Space and sp-3-Space.

Figure 3 above shows the internal wall that separates sp-2-Space and sp-3-Space on the first floor. This wall is represented with a dotted line. Second level space boundary rules require that the floor of sp-5-Space be broken along the centerline of this wall to correctly define the neighboring relations between sp-5-Space and sp-2-Space and sp-3-Space below. If the floor is not properly broken up into two separate surfaces along the wall boundary, this test will fail.

Hypothetical floor surfaces that are properly broken up for sp-5-Space are shown above where the orange floor surface corresponds to sp-2-Space and the green surface corresponds to sp-3-Space.
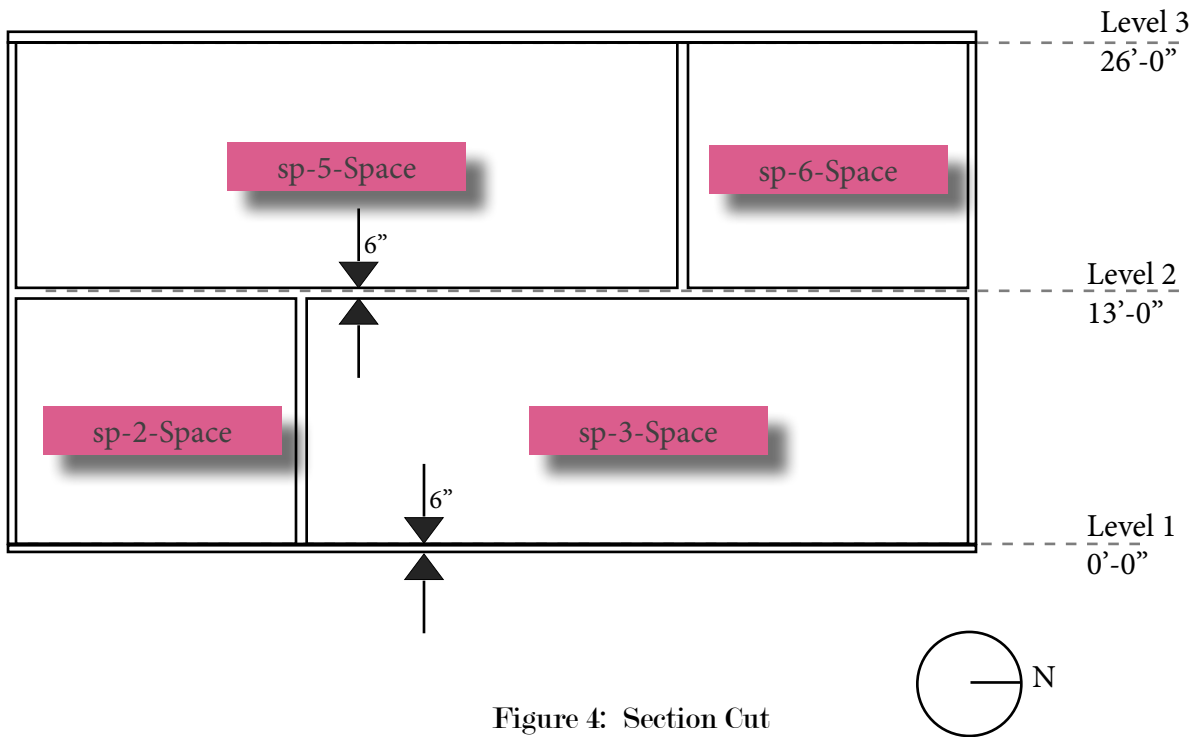
Figure 4: Section Cut

The section cut above ahows another view of the layout, along with the floor-to-floor heights. The thicknesses of the floors are also shown. Because the roof is entirely above the height of the second floor walls, the thickness of the roof does not affect the gbXML file PolyLoop geometry.
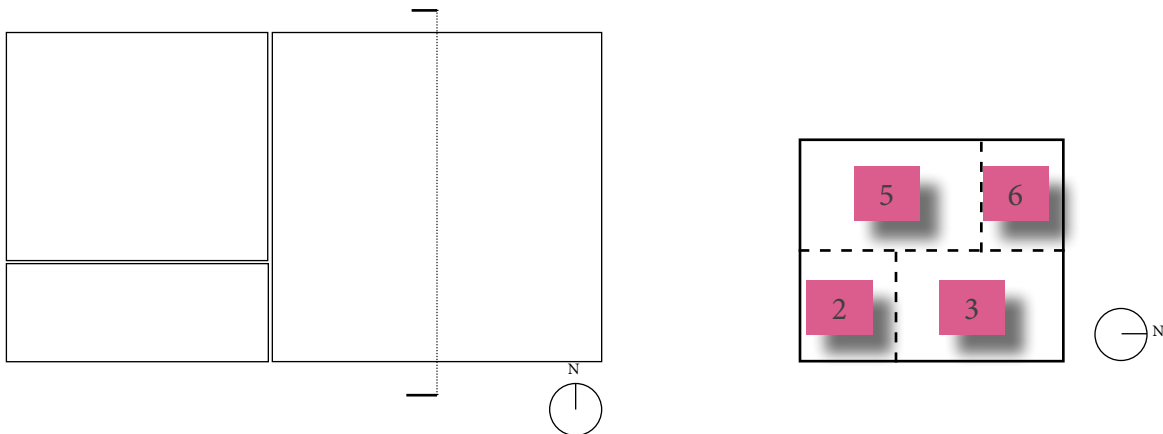

Figure 5: Direction of Section Cut, and Diagram of Internal Wall Breakdown and Assignment

The section cut also reveals how the single interior wall that sp-4-Space shares with sp-2, sp-3, sp-5, and sp-6 would be broken down and allocated according to second level space boundary requirements.

Test #3 Common Outcomes and Test Results

This is generally an easy test and is simply ensuring that the requirements for second level space boundaries are satisfied. All geometry is reasonably simple, and so the only common failure will be if the second level space boundaries are not properly created.

Typical validator output in this case:

1. *The number of surfaces will be different. Therefore, the Surface Count Test Result will likely fail. This test counts the total number of surfaces. Since the Surface Count Test counts the total number of surfaces in your file, if the floor is not broken down properly, then the number of surfaces will not match the standard file.*

2. *Whereas the Surface Count Test counts all surfaces The Interior Wall Surface Count Test counts only surfaces defined as Interior Walls. This test may be another location that fails. Remember that sp-4-Space has an interior wall that shares a neighboring relationship with sp-2-Space, sp-3-Space, sp-5-Space, and sp-6-Space. Therefore its interior wall, will be broken into 4 separate walls. In total, there should be six interior walls in your gbXML file.*

3. *The Interior Floor Surface Count Test might also fail. This would occur if the floor of sp-5-Space and sp-6-Space are not properly broken down according to second level space boundary requirements. Slab on Grade is counted as an Interior Floor Surface, so in total your file should have 6 interior floor surfaces. Remember that floor and ceiling are interchangeable terms in gbXML. All of these surfaces are defined as floors in the test cases.*