



## Construction Management Breadth

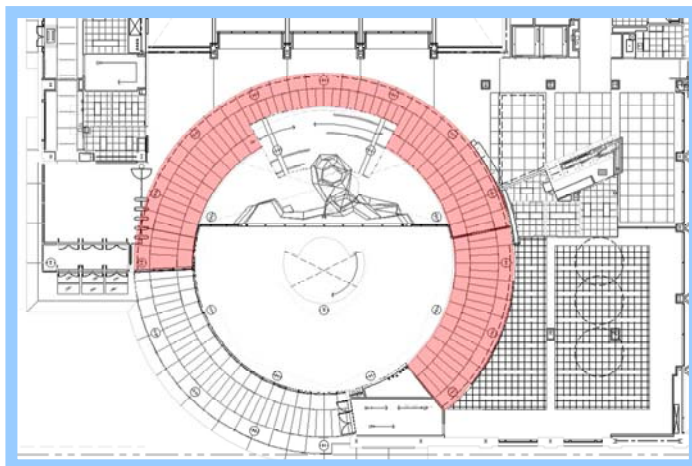
*Problem:* The existing ceiling in the concourse is radius metal ceiling panels. The installation was difficult and long because each piece is custom cut on a 40ft radius as well as, fitting each lighting fixture perfectly.

*Solution:* Change the radius metal panels to acoustic ceiling panels to decrease the schedule and the cost and improve the constructability.

*Resources and Tools:* Scott Mull – Barton Malow Company, Project Manager; CostWorks; Microsoft Excel

*Existing Conditions:* The area of the concourse to be changed from radius metal panels to acoustic ceiling panels is highlighted in the floor plan of the concourse (Figure 1). A picture of the existing metal panels and the acoustic ceiling panels to be used is depicted in Figure 2. The aluminum metal paneling is highly reflective, which could create unwanted glare issues. In order to keep the integrity of the circular design, the new lighting plan places the fixtures on the same 40ft radius circle to highlight the uniqueness of the rotunda. The space is generally all white with a few accent colors, so the acoustic ceiling panels will fit in well and won't be an eyesore, while keeping the same aesthetics. The total square footage being altered is 4,750. The current metal panel ceiling is 1'-3" below the surrounding drywall ceiling. Figure 3 depicts these existing conditions in a wall section.

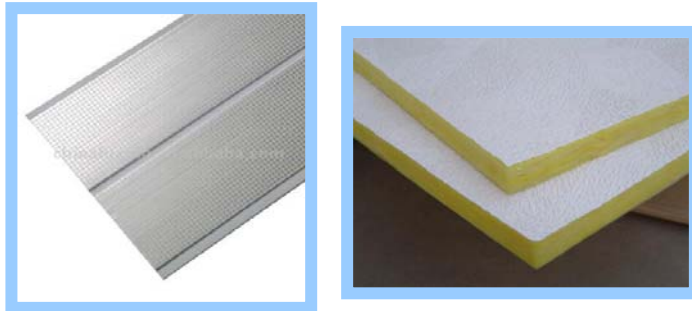
Figure 1



The inner radius of the metal ceiling (highlighted in red) is 40ft and the outer radius is 60ft. The bottom left corner of the circle (about 1/4 of the total square footage) is located on the exterior and is a slightly different material than the inside. This area will not be examined.

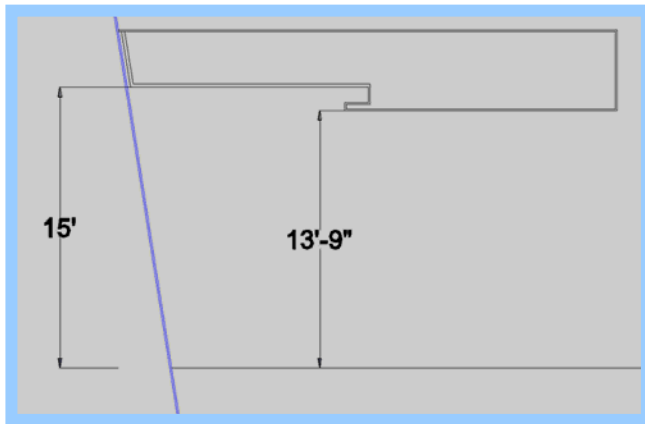


Figure 2



The first picture is of the highly reflective metal ceiling; the second acoustical ceiling tile.

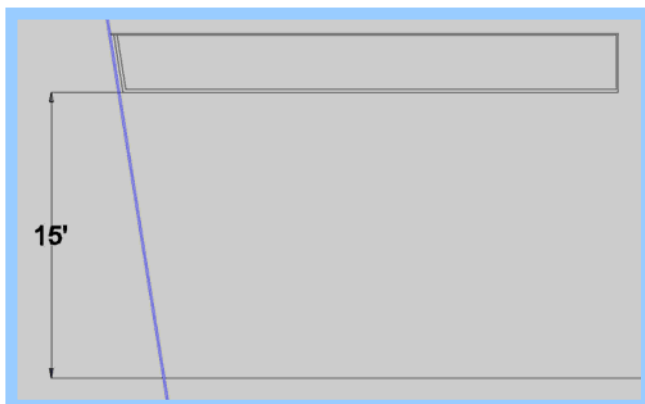
Figure 3



To the left is a section of the existing ceiling. The drop ceiling is on the right side of the picture.

*Proposed Change:* The highlighted ceiling in Figure 1 will be changed to acoustic ceiling panels and raised 1'-3" to meet the existing height of the surrounding drywall ceiling.

Figure 4



The redesigned wall section can be seen to the left.



*Schedule Impact:* The installation of acoustic ceiling panels has reduced the complexity of the ceiling installation. The centralized location of the concourse area makes it difficult to work on it all at one time. Therefore the concourse was completed a quarter at a time so that traffic patterns could be maintained and the construction of the other side of the building was not interrupted.

Acoustical ceiling tile was chosen instead of gypsum board to aid in the constructability and coordination. The acoustical ceiling tile permits the ceilings and partitions contractor to install the grid system and then put the tiles in place. This provides the contractor with an easier way to manage cuts that are not typical. Although gypsum board is easier to work with than the metal panels it is still a lengthy process. To install the gypsum board you must frame, board, tape and paint. The easy removal of the acoustical ceiling panel aids with coordination issues and maintenance. Once metal panels and gypsum board are installed it is impossible to access the plenum without ripping the ceiling out.

Changing from metal panels to acoustical ceiling panels has reduced the schedule nine days. Table 1 depicts the details of the time savings. This schedule savings reduces the entire project schedule because the metal panel installation is on the critical path. It was important that the project remained on schedule because the arena needed to be ready for a home opener. The construction manager, Barton Malow, would have received liquidated damages for every day the project was late. The nine day schedule savings gives the overall project schedule float. This will help the construction manager deal with any unforeseen conditions.

*Table 1: Schedule Comparison*

Material Type	Activity Duration	Hours Worked per Day	Activity Duration
Metal Panel	180	8	23
Acoustic Ceiling Panel	110	8	14
<b>Schedule Savings (days):</b>			<b>9</b>

*Cost Impact:* The material cost of the designed metal panels is \$40 per square foot compared to the proposed material cost of \$5.05 per square foot (Table 2).

*Table 2: Material Cost*

Material Type	Cost (\$) per Square Foot	Total Square Feet	Total Material
Metal Panel	\$40.00	5000	\$200,000.00
Acoustic Ceiling Panel	\$5.50	5000	\$27,500.00

There is a significant savings in material cost and due to the schedule savings there is also a significant savings in labor cost (Table 3).



Table 3: Labor Cost Analysis

Position Title	Number of Workers per Crew	Number of Crews	Cost (\$) per hour	Duration of Installation		Total Labor Cost (\$)	
				Metal Panels	Acoustic Ceiling Panel	Metal Panels	Acoustic Ceiling Panel
Carpenter Foreman	1	1	\$77.00	180	110	\$13,860.00	\$8,470.00
Carpenter Journeyman	3	1	\$72.00	180	110	\$38,880.00	\$23,760.00
Labor Foreman	1	1	\$60.00	180	110	\$10,800.00	\$6,600.00
Labor Journeyman	1	1	\$44.00	180	110	\$7,920.00	\$4,840.00
Total Labor Cost (\$):						\$71,460.00	\$43,670.00

The total savings for changing the metal panels to acoustic ceiling panels is \$200,290.00 as shown in Table 4.

Table 4: Total Cost Comparison

Material Type	Total Material	Total Labor Cost	Total Cost (\$)
Metal Panel	\$200,000.00	\$71,460.00	\$271,460.00
Acoustic Ceiling Panel	\$27,500.00	\$43,670.00	\$71,170.00
Savings (\$):			\$200,290.00

Recommendation:

Due to the \$200,290.00 savings and nine day schedule savings it is recommended that the Boston University change concourse ceiling from radius metal panels to acoustical ceiling tiles. The original design intent was to bring out the curved architecture throughout the space. In order to preserve this concept, the new lighting design followed the same curved radius as the old ceiling. The white acoustical ceiling tiles will brighten up the space while opening up the space with the raised ceiling.

*\*Pricing information taken from actual project costs, provided by Scott Mull, PM with Barton Malow Company.*