

Arch 464  
ECS  
Spring 2022

Name \_\_\_\_\_

Quiz #4

## "Inside Acoustics Outside!"

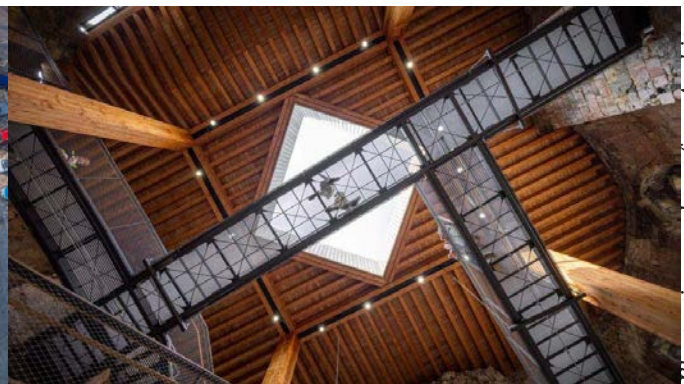
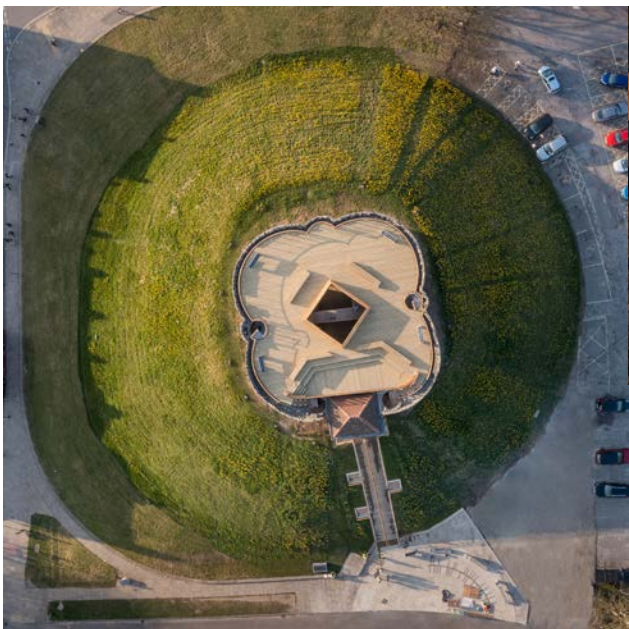
**Read and look at everything before you write!**

For this problem you are the acoustic consultant for an upstart musical troupe (TroupeX) that is planning a weekend festival at Clifford's Tower in York, UK.

"At Clifford's Tower, new architecture is transforming a centuries-old landmark, opening it up and unlocking its secrets. We're protecting Clifford's Tower for future generations and inspiring more people to discover its stories." says Kate Mavor, chief executive, English Heritage.



*The 55-step ascent to the tower.*



*The oculus from above and below.*

*Illustrations and text from Architect's Journal 6 APRIL 2022 Photography by Dirk Linder*

## 11th-century York tower updated with giant timber oculus

*The £5 million Clifford's Tower conservation project is a pioneering example of how to do a light-touch intervention on a historic monument.*

Only five minutes walk from York Town centre sits the medieval Clifford's Tower – the existing fabric of which has been conserved, and a new timber deck and suspended walkways added, by Hugh Broughton Architects in partnership with conservation specialists Martin Ashley Architects for English Heritage.

Strategically placed at the crotch of the river Ouse and the River Foss, the tower is perched stoically and defensively on top of a 15m-high conical mound, the beefy lobes of its rounded buttresses forged from heavy stone blocks. It's a structure with an eventful history, being the largest surviving element of the Castle of York established by William the Conqueror in 1068. Clifford's Tower has since been the site of many notorious events, the most tragic being the massacre of the city's Jewish population who took refuge in the tower from anti-Semitic riots which swept the country in 1190. After an explosion in 1684 left much of the building scarred and in disrepair, it remained in a relatively untouched ruinous state until some restorations in 1935. Given the chequered history embedded in its fabric, it made sense to pay homage with only the gentlest of touches in its conservation. As Ashbee says: 'We're not by any stretch pretending to renew Clifford's Tower into a royal palace.'

With little indication of any architectural intervention from the foot of the mound, internally this project takes the approach of employing contemporary industrial materials to contrast with and accentuate the surrounding history, offering a hybrid experience of the ancient and the contemporary. On entry, looking up, a vast square aperture punctures the new timber roof structure, opening up to the sky. Reminiscent of a James Turrell installation, the opening allows in light and a cascade of dramatic shadow-play throughout the double-height space. A comfortable contradistinction is created between the precise geometry of the timber elements and the irregularity of weathered masonry. The structural interventions essentially create a shelter over the existing structure to make the space functional while not encroaching on it too much.

Jagged turret window openings are left open to the elements, underlining to visitors this is a ruin that has stood for centuries. With this comes a duality of the here-and-now with the historical, as the sound of cars and passers-by are allowed to permeate the tower's defences. This could be offputting or detractive, but the combination of different architectures makes clear this is a celebration of a confluence of history and the present, an approach carried out throughout the building.

What's notable is that the structure is so forthcoming in its legibility. Visitors without construction knowledge are able to see clearly how the structure supports itself. This is not some high-tech intervention but rather a labour of care, craft and attention to detail. Hollow glulam columns sitting in each quarter of the space are the main supports of the loading of the roof structure while taking concealed rainwater downpipes to the floor. Advances in material technology allow for a thin slab of exposed concrete to form the floor and work together with columns to spread the load equally over the whole footprint of the space. As a result, this has minimised any need to bore into the mound so as not to compromise the original tower's structural integrity or disturb archaeological remains in the soil. 'What we've done structurally here at Clifford's Tower would have been impossible using 20th-century technology,' says practice director Hugh Broughton.

Historical references have also influenced the design process and final outcome, in particular taking cues from an early Lowry painting that depicts the steep entrance to Clifford's Tower. Broughton explains that they were keen to preserve the visual identity of the impressive 55-step entrance, so opted for providing a resting platform every 10 steps to allow breaks in the ascent as opposed to inserting any stair-free access.

Throughout the space leading up to the roof deck, there's a careful use of industrial materials. Wire-mesh fencing and metal grating minimise visual intrusion while lightweight steel stairs reduce the perceived bulk of the circulation. It makes it easy to focus attention on the physicality of the tower itself. Helping to animate the experience, the tower's roof deck now features a 360-degree viewing platform with integrated amphitheatre seating. New interactive elements such as soundscape installations and a performance space provide the

potential for multiple ways to interact with and interpret the architectural heritage, given that not everyone enjoys gawking geekily around historic monuments as you might do in a museum.

Overall, the architecture, with its light-touch intervention in the historic fabric, refreshingly leaves space both for interpretation and appropriation for future uses while staying true to its story.

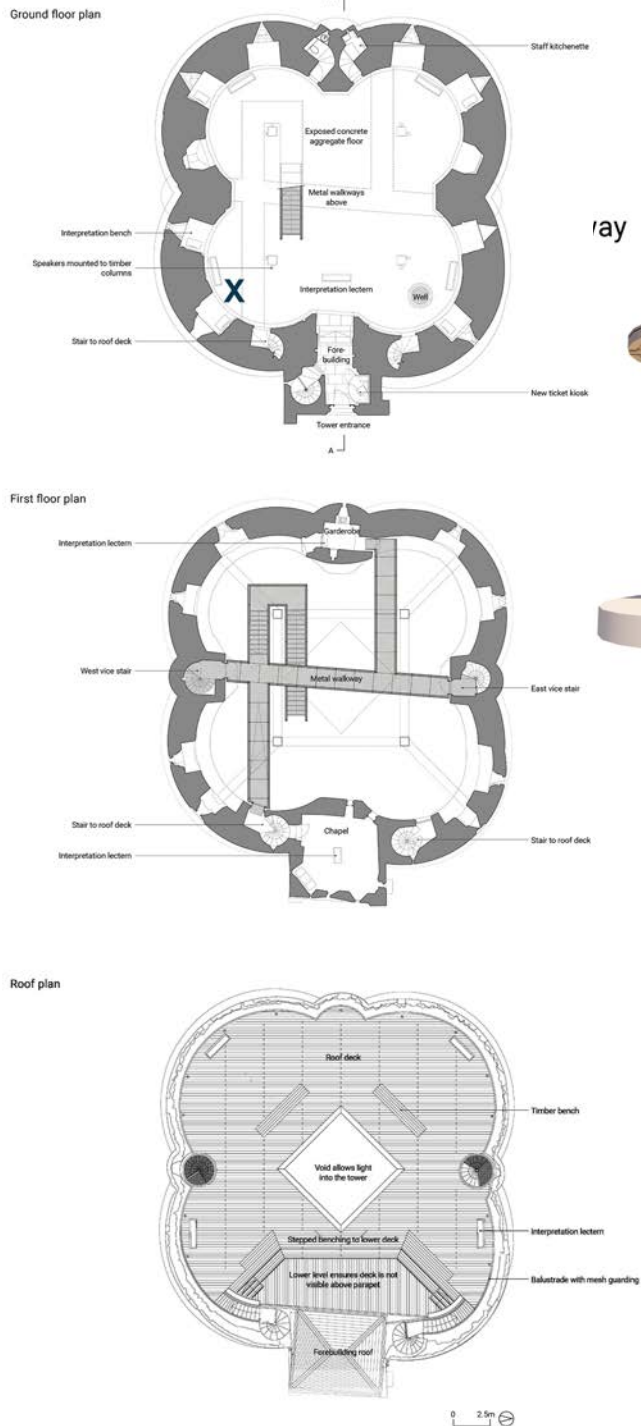
—Teshome Douglas-Campbell

**Architect's view**

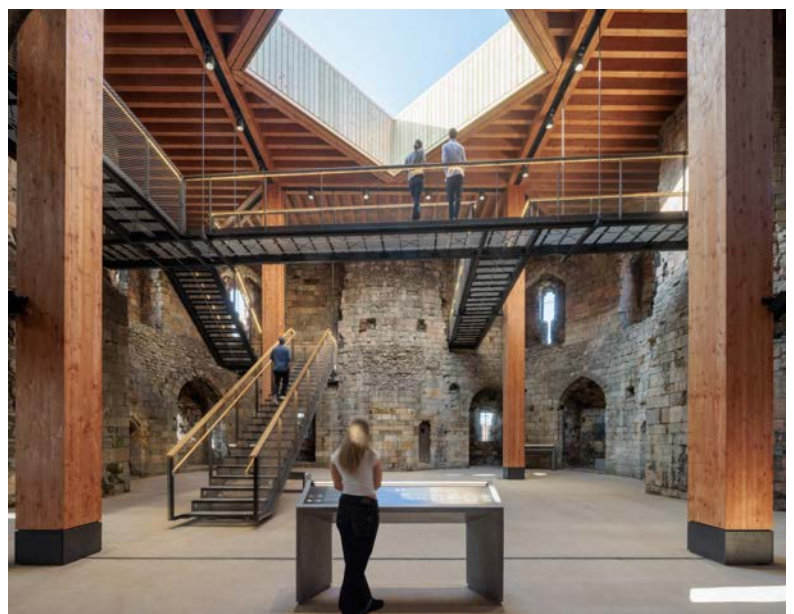
The existing fabric has been carefully conserved, and enhanced interpretation introduces visitors to the many stories associated with the tower and the wider castle precincts. The timber deck and suspended walkways improve access, introduce visitors to previously unseen historic fabric, allow more time for people to enjoy the spectacular views of York and complement the special character of Clifford's Tower.

—Hugh Broughton

**Floor plans**



ray



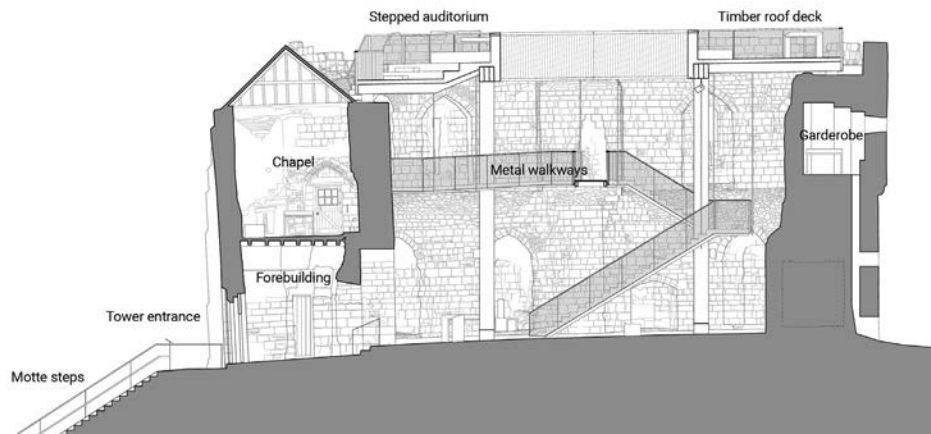
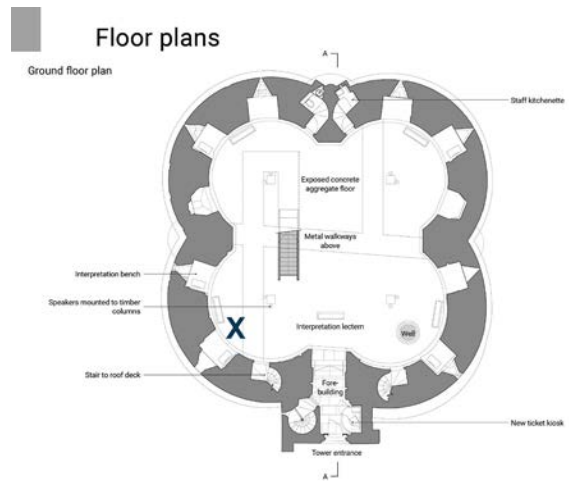
## Playing Inside

TroupeX intends to have small groups, such as woodwind quintets and oboe trios, playing acoustic instruments (un-amplified) perform on the ground floor of the tower.

6 points 1a. In one word what's the acoustic goal for this use of the space? Discuss the acoustic properties of the room's surfaces—floor, walls, ceiling—and how they contribute to the goal or don't.

1b. The photo on this page represents TroupeX's desired position (X in the plan) for the performers. Critique this idea in terms of acoustics. Is it a good idea? If not show your alternate placement on the plan and on the next page.

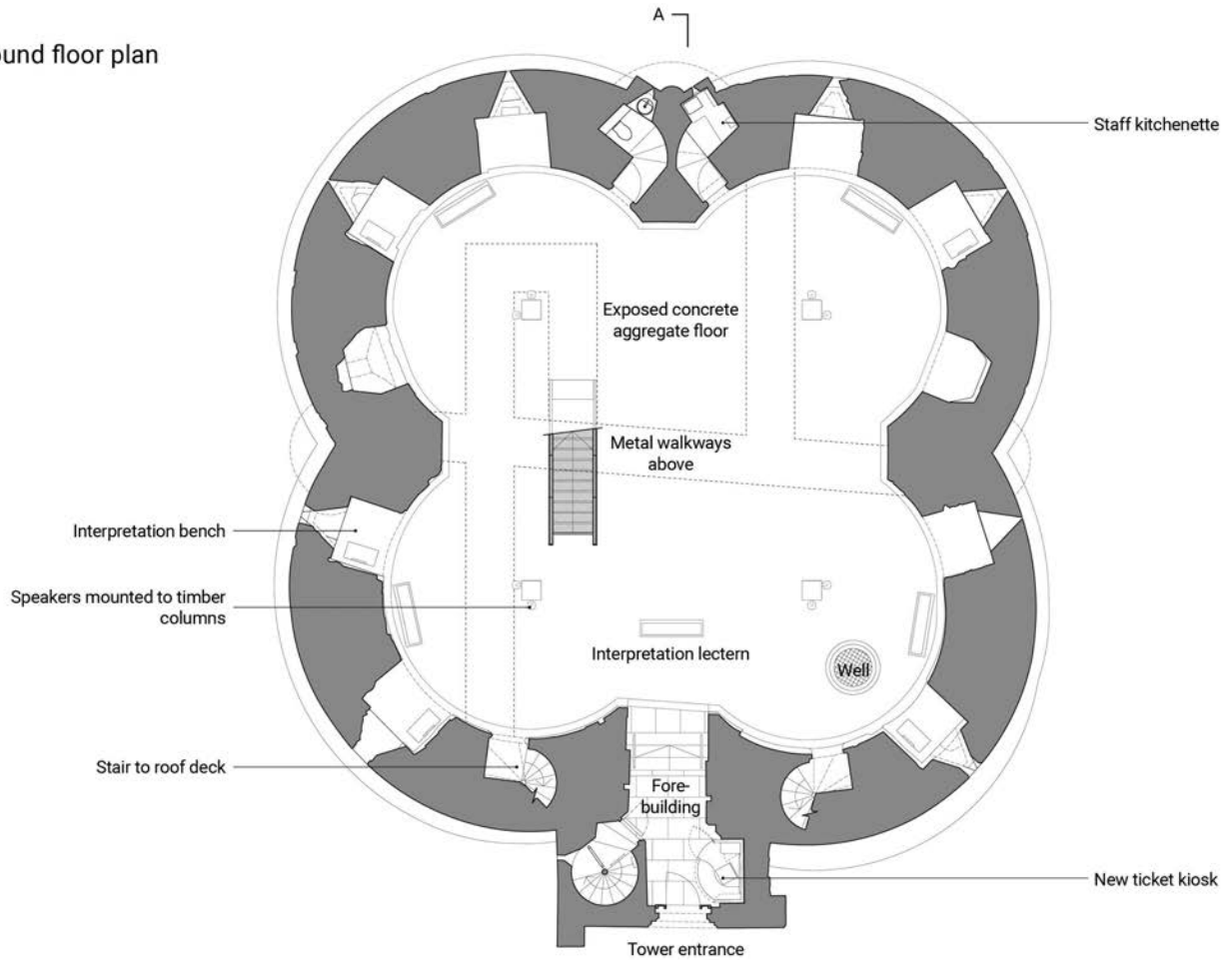
1c. Add a few simple, needed acoustic interventions (like acoustic clouds for example). Describe how they will enhance the sound in the space.



2. Use the plan below to show your placement of the performers and your acoustic interventions. Do a ray tracing analysis of space configuration you have specified. What conclusion can you draw from the diagram?

6 points

Ground floor plan



4. **Explain** the effect of the speakers (shown in the photo on page 4) that are placed on the hollow wooden columns.

2 points

## Playing Outside

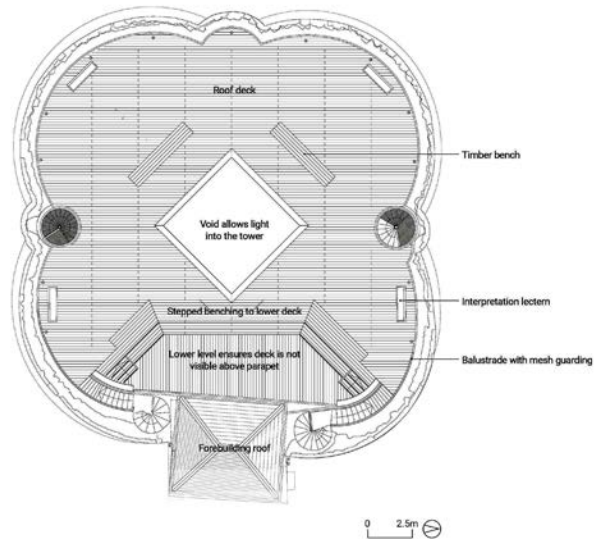
5. There is a small auditorium on the roof deck, but TroupeX wants to entertain larger audiences on the rooftop. They envision placing the performers in one of the curved corners of the deck.

6 points Give three sound (pun!) pieces of advice and/or warnings based on the characteristics of sound for outdoor performance.

1



2



3

