

## Understanding Sightlines in a Raked Floor Facility

The most fundamental principal of “places of assembly”; theatres, concert halls, arenas etc., is that the audience must see and hear. Experts in acoustics will tell you that if you can’t see, you will think you can’t hear, so sightlines are a critical element to a successful venue. This article does not teach how to calculate sightlines, but it will provide a basic understanding of the principles of good sightlines.

There have been many articles touting theatres with universal access, meaning a 1:12 slope throughout the seating area, the slope which is compliant with ADA requirements for those with mobility difficulties. What’s actually universal about these facilities is the sightlines; they are universally bad, as the slope is so shallow no one can see well.

Here is a basic vocabulary used to talk about sightlines: One-row sightlines, two-row sightlines, stadium rake. Here is what they mean: One-row sightlines mean the rise between rows allows average adults to see over the heads of the row immediately (one row) in front of them. Two-row sightlines rely on staggered seating to allow a view between the heads in the row immediately ahead and on rise between rows to see over the heads two rows ahead. Stadium rake or stadium sightlines are so steep that there are often 3 steps between one row and the next and the head in front of each person is about level with his knee. Another important thing to know is that one- and two-row sightline facilities must get steeper with each row. As more heads accumulate in front of each row a steeper slope is necessary to see the stage well. It’s a parabolic rise. This must also be coordinated with the code restrictions on variable rise of steps, which is governed by UBC Chapter 1028, Steps in Aisles, not the code paragraphs related to stairways.

Yet another key concept is that of seat stagger. It is often assumed (and built) that good stagger is each seat offset one-half its width from the one behind. This is based on the mistaken assumption that everyone in the audience is looking straight ahead. In truth, most of the important action on any stage takes place at or near center stage, so almost everyone is looking at the stage at some degree off center, so a regular half-width offset is wildly inconsistent in providing a good view of the stage. In order to create good stagger, theatre chairs come in different widths, generally from 19" to 23", so that they can be arranged to provide the best possible view of the center of the stage while maintaining even row ends, since aisle widths are a critical part of complying with exiting requirements. The formulae that create good stagger are beyond the scope of this article; they require manipulating the multiple widths of seat available and the length of the row arc in relationship to the desired focus point and adjusting to achieve even row ends. Theatre consultants generally provide this service, so architects shouldn't have to learn to do it, but architects should understand the principles. As a side note, this author recommends not broadcasting that there are wider and narrower seats; this can prompt audience members to request wider seats and drive the box office staff crazy.

So, why doesn’t every facility have a very steep rake for good sightlines? There are several reasons. The steeper the rake, the greater the elevation change and the more difficult it is to provide access between the lobby, multiple required handicapped-accessible seating locations and the stage. A very steep rake provides a very different view of the performance from front to back. With today’s very large movie screens and their 10’ high faces, or for sports venues, this is not a problem, but when actual human-

sized humans are on stage, the extreme change of perspective can have a "Busby Berkeley" effect and leave the rear rows of the audience admiring actors' bald spots. A very steep rake also means that the rear wall of the facility is covered with absorptive soft bodies rather than hard reflective surfaces, which complicates achieving good acoustics in the room. In a multi-level facility, a steep rake forces the balcony or balconies to be higher, pushing the audience further from the performance and increasing the circulation spaces. Last, the very steep stadium rake dilutes audience cohesion, that delicate awareness of sharing the experience with other living, breathing persons that is so critical to the live event experience. (That awareness is rather sturdier in a 50,000 seat sports stadium.) So you can see that in general (Not always! None of this is absolute) a less-steep rake is advantageous, which then takes us back to good seat stagger. Understand also that "one-row" and "two-row" aren't absolute either. One and one-half row is a little better than two-row. One-row-but-a-little-steeper is even better than one-row as it helps accommodate persons of varying heights (Calculations are based on "average adult" eye level of +42" AFF.)

Why not raise the stage and use the shallower universal design? Because the more you raise the stage the more the front section of the seating looks at the face of the stage rather than the stage floor, and the more they look up the performer's nose rather than at her face. The sweet spot for the stage height is between 30"-36" with 36" as the most common elevation. I have been in a theatre where the audience could not see the stage floor, and thus, a dancer's feet, from the first 8 rows. That's a lot of bad seats that should be great seats for a dance performance...or "Anything Goes", or "Riverdance." You get the idea.

To roughly test a seating section, use AutoCAD's "ray" function and draw lines from the eye level of every row (+42" above row elevation) to a point one foot above the stage and one foot from the downstage edge. If the facility is planned to feature many dance performances, take the line right to the stage deck. How many heads does the line go through before it reaches the stage? One or two? With good stagger, probably ok. More? That may be a problem. Imagine Hamlet lying on his back contemplating the sky as he delivers the "To be or not to be" speech. Imagine Joel Grey (famous actor, father of Jennifer Grey, 5'-5" tall; look him up) is the star performer at the Gala Opening of new theatre you just designed. He sits on the very downstage edge of the stage. Can you see him? Can the dignitaries that donated major money to the building see him? You'd better hope so - or better, you know so, because now you understand sightlines enough to evaluate them thoughtfully. Of course, you really should hire a theatre consultant.