Theater Engineering Conference

Physical Construction

The Drive-In Theater*

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Summary—**The problems involved in planning and building a drive-in theater are outlined. The following topics are treated: selection of the site, grading, drainage, and traffic control. Also considered are the proper elevation of ramps, lighting, and landscaping.**

ONCE AGAIN through the medium of invention, through its ability to reach more people, the influence and power of the motion picture industry is expanded.

With the advent of the Hollingshead Patent the drive-in motion picture came into being. It became possible for a whole group of people to attend the pictures, who previously could not, or preferred not, for one reason or another. In this class are invalids, their caretakers, parents with no one to mind their young children, and many others to whom the comforts of home mean more than seeing Betty Grable. Now the comforts of home can be taken right into a drive-in theater. Any drive-in manager has had the thrill of meeting crippled or otherwise handicapped people who, as a result of the drive-in are seeing their first motion picture in years, if not their first motion picture.

The drive-in theaters are so large that economical construction demands an engineering approach to many of the problems encountered. These are first a site problem; second, an earth-moving or grading problem; third, a drainage problem; fourth, a structural problem; and fifth, a traffic problem.

The site problem is often difficult to solve, particularly in mountainous or rolling country. The problem is, of course, to find a sufficiently large area within easy reach of a center of population. This cannot be just any land. The topography must be such that a theater can be constructed without too great cost.

The grading cost can be very critical. A drive-in theater of 660-car capacity covers approximately eight acres. Just one inch in height over an area of eight acres amounts to a thousand cubic yards.

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From this it is understandable that just any plot will not do. However, a variety of different topographies can be accommodated.

The ground can slope toward the screen but preferably at not a greater slope than four feet in 100. It may slope away from the screen but preferably at no greater slope than three feet in 100. It may slope from one side of the theater to the other but preferably at no greater slope than five feet in 100, and the side slope of the finished theater should not be greater than 4 per cent or discomfort will be experienced by those sitting on the slanted surface. Naturally the

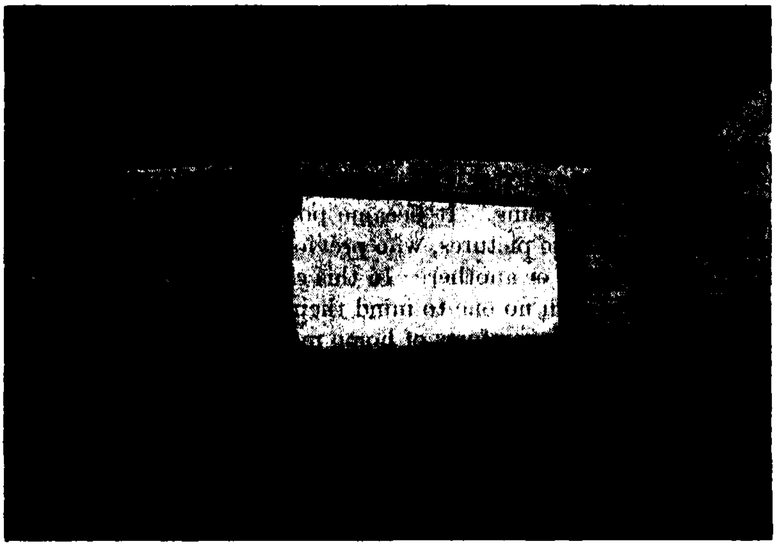

Fig. 1—Photograph taken through the windshield from the rear seat with the car parked in the second ramp.

car will slant sideways at the side pitch of the theater. We like to hold this pitch to $3^{1}/_{2}$ per cent or less. We have gone to 4 per cent in one or two cases.

This takes us into the grading problem. Each car must be positioned so that its occupants can see the screen. The people in each succeeding row must be able to see over those in the preceding row. (This art is taught by the Hollingshead patent.) Rear-seat vision must be obtained at least from the third ramp rearward. The first two ramps can be filled by cars having only front-seat occupants.

Adequate vision, particularly from the rear seat, requires that the car be tilted or aimed toward the center of the screen. This is very important since with the large screens used, practically the whole windshield is filled with the picture. Naturally if the car were not aimed at the picture, the top or bottom of the picture would be cut off. How critical this is, is shown by the fact that even in the second ramp of a large theater, at a point 173 feet from the screen, it is impossible to see the entire height of the picture through the windshield from a rear seat. Fig. 1 illustrates this. Fig. 2 shows that in the third ramp the screen becomes fully visible from the rear seat. The usual windshield height is 12 to 14 inches.

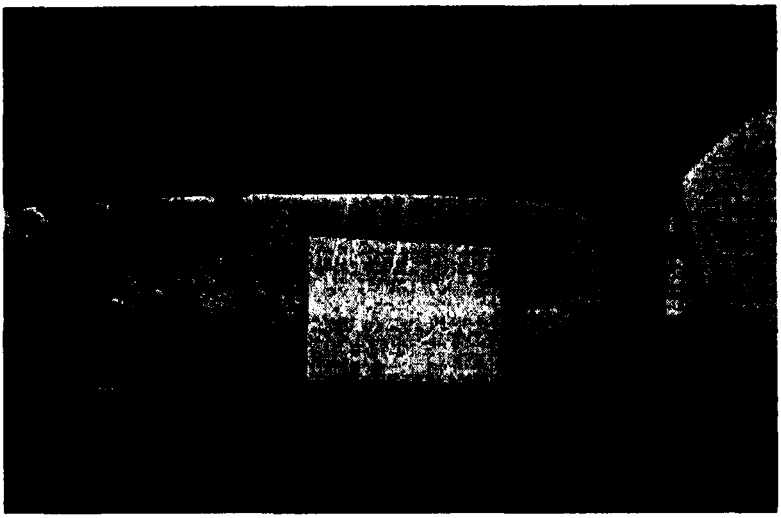

Fig. 2—Same view, with car parked in third ramp.

The front of the car is elevated for the aiming operation by use of a ramp and the operator can control the angle of the car by the distance he drives up the ramp. It is not enough, however, just to throw up a series of ramps and allow the driver to choose his pitch by the distance he drives. The occupants of each row must be able to see the bottom of the picture over the preceding row. This involves the correct relationship between the elevations of the ramps. We must go as high with each succeeding ramp as needed to accomplish this purpose, but no higher than necessary or we increase grading costs and complicate the drainage problem.

The calculation of the elevations of such a system of ramps is relatively simple, but just one system will not do. We must have a large number of systems to fit the various topographies selected, and so avoid excessive earthwork cost. The different systems are obtained by varying the height of the screen. The higher the screen the lower the ramp system related to it. A one-foot jump in the height of the screen will lower the necessary elevation of the rear ramp three feet or more, depending on the number of ramps.

We can then select the system of ramps which best fits our site, and adjust its height to balance cuts and fills. This produces the

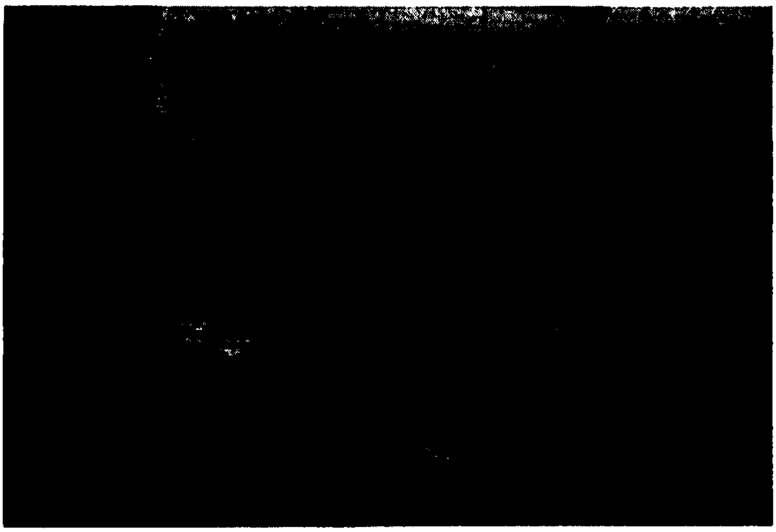

Fig. 3—All-steel screen in North Jersey theater. Note man standing at the bottom.

least amount of earthwork and allows the grading to be done by a short-haul "put-and-take" method. This is the type of grading that can be done very cheaply by bulldozers or carryalls.

Side pitch of the theater must be set at not less than 0.4 per cent and not more than the 4 per cent previously referred to. We may drain from the center to both sides or across the theater from one side to the other, depending upon the topography of the site and the drainage conditions.

Balancing earthwork means that we must cut into the existing ground surface at least a couple of feet at the low point. If drainage cannot be had from this elevation, it may be necessary to grade the theater by bringing in fill from outside. This fill method is expensive, however, and increases the earthwork, in the case of an entire fill job, approximately fourfold. This is why sites that require fill, either from a drainage or a stable-soil standpoint, are expensive to convert into drive-in theaters.

If the ground does not slope away from the theater sufficiently, drainage often can be obtained by ditching or piping to roadside ditches or near-by streams. It is very important that the topography show these drainage possibilities.

Fig. 4—General view of same theater.

Our structural problem mainly is in the screen. These run from a minimum of 35 by 45 feet to a maximum of 53 by 72 feet. The distance of the bottom of the screen from the ground is usually 18 to 22 feet. So in the case of the large screen, the top is approximately 75 feet off the ground; this is a structural problem of the first magnitude.

We are separating this problem from others by keeping all other buildings as separate structures. We believe this to be the most economical approach. This makes the screen a sort of special and glorified signboard. We believe in keeping it as simple as possible and merging it with the ground by proper landscaping. A number of interesting shapes are coming out of this conception. One of them is illustrated in Fig. 3. A general view of the same theater is shown in Fig. 4. The open space at the bottom of the screen will be closed by a planting of shrubs and small trees.

The special structural problems of the projection and concession booths is to construct so as to occupy as little total height as possible. Too high a structure ruins parking in too many ramps at the rear of the theater. This dictates thin roofs placed at exactly the correct elevation. The roof should slant from front to back a proper amount to take advantage of all the height possible. In our designs, we fix these roof slants to give vision in the second row back of the booth.

A drive-in theater will need, of course, rest rooms and a ticket booth or booths. The rest rooms usually are placed in the projection building because it is somewhere near the theater center. The placing of the ticket booth brings us to our traffic problems.

The ticket booth should be placed in a wide driveway at least several hundred feet from the highway. In this way the driveway area on the street side is available for storage. Failure to provide this storage will result in a back-up of traffic on the highway and a resultant irritation of local and state traffic authorities. The amount of storage needed depends on the size and business of the theater.

The back-up occurs when the theater is originally loading and also when it is full and patrons are waiting for the show to change. At one North Jersey theater, the number of these waiting patrons resulted in a two-mile back-up on the highway. The solution was simple; a parking lot with a capacity of four to five hundred cars properly located so that vehicles could easily get into it from the entrance drive and easily out of it to the ticket booth. These parking lots are being incorporated into several large theaters under construction in this area, and are being added to some already built.

No mention has been made of the electrical problem. The in-car speakers require electric cable. This is usually sunk in the ground 10 to 12 inches and the speaker stands connected to it. These stands are 18 feet apart to allow for the parking of two cars between them.

The entrance and exit driveways should be lighted as well as the parking lot, if one exists. It is customary to mark the ramps at the sides and center of the theater with concrete posts on which are painted and illuminated the numbers of the ramps. The illumination is accomplished with a simple fixture which throws the light downward on the number. The numbers are placed on both sides of the post. They are needed to guide patrons back to their cars after visiting rest rooms and concession booths. As the rear ramp in many theaters is 600 feet from the screen it is evident people need something to assist them to find their cars if they have left them.

A novel feature at a North Jersey theater is a hundred-foot pole at the rear of the theater, on the top of which are erected floodlights to bathe the theater in soft moonlight. On moonlight nights the artificial product is not used.

Landscaping is an important part of all drive-in theaters. The actual selection of materials to be used is left to the local owner. It is

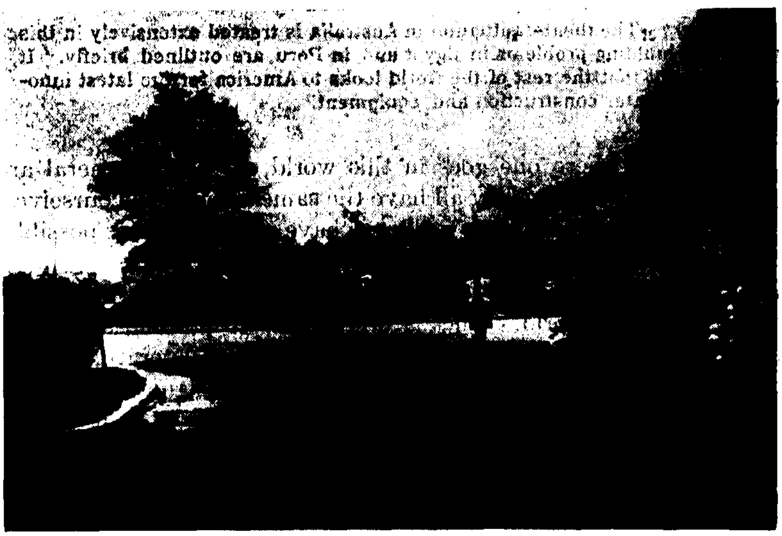

Fig. 5—A parking lot for a New Jersey theater.

presumed that he will use those materials best suited to his particular locality. (See Fig. 5.)

When Hollingshead conceived the idea of the drive-in theater, during the depression years, he said that he thought in terms of the things that the majority of people would give up last. He decided the two top items were automobiles and motion pictures He put them together through his ingenious invention, and we have the drive-in theater. How good his judgment was is attested by the large number of theaters already in use. The experimental stage of the drive-in is past. It is here to stay as an ever-growing factor in the industry.