

THE EVOLUTION OF THE GREEK THEATER  
INTO THE ROMAN THEATER

A Senior Honors Thesis

By

MARC RYAN ZAK

Submitted to the Office of Honors Programs  
& Academic Scholarships  
Texas A&M University  
In partial fulfillment of the requirements of the

UNIVERSITY UNDERGRADUATE  
RESEARCH FELLOWS

April 2001

Group: Engineering

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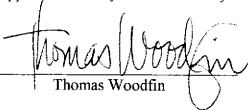
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Approved as to style and content by:

  
Thomas Woodfin

  
Edward A. Funkhouser

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## ABSTRACT

The Evolution of the Greek Theater  
Into the Roman Theater. (April 2001)

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This research is a study of the Roman theater and its evolution from the Greek theater. By defining the Roman theater through its three parts, the orchestra, stage, and auditorium, important design elements and criterion were developed. These design elements and criterion developed from influences and changes of the Greek theater. These design elements and criterion that were carried over from the Greek theater can now be used to create a contemporary theater with the quality of the Roman theater.

### ACKNOWLEDGMENTS

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## INTRODUCTION

The Romans have designed the most beautiful outdoor theaters ever constructed. The simplicity of the design and the detail put into these theaters makes them an extremely interesting and elegant piece of architecture. Outdoor theaters provide an atmosphere that is unlike any other performance space. Not only are the structures themselves beautiful, but the quality of the performance space of the Roman theaters can not get much better. The Romans have created a space that provides excellent sound qualities and an efficient layout of seating. However, the Romans did not conceive this type of space on their own. Through several outside influences, mainly from the earlier Greek theaters, the Romans were able to develop this magnificent performance space.

The first outdoor performance space for the entertainment of the Romans was the amphitheater or circus. These spaces were used for the popular gladiator fights, other athletic events, and races. At about 364 B.C., the influence from Etruscan dancers and musicians were being felt and performed in the Roman circuses and public spaces. They brought with them temporary wooden stands, similar to bleachers, that could be erected anywhere for the viewers' seating. This scaffolding is what influenced and developed into the Roman auditorium that was built up from level ground, in contrast to the Greek theaters built into hillsides (Bieber 1961, p.167)

Popular Italian comedies brought to Rome the Atellan or Oscan farce, which introduced the phlyakes stage to the Romans. Phlyakes stages are temporary wood

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stages used by the performers, which would be removed when other athletic performances or races were to take place. In 240 B.C., the first comedies and tragedies that were brought to Rome were translations and adaptations from the Greek. This type of performance took place on these phylakes stages. The phylakes stage was modified through time. Elegant Greek columns replaced the simple posts on the stage, and a simple wall was developed behind the stage, which was often painted in the Greek style. There was also a doorway that had steps leading up to the stage. This was the doorway the performers used to enter onto the stage. The doorway was often framed with columns and protected by a gable. This eventually developed into the richly framed doorways of the Roman stage. For good acoustic qualities, the phylakes stage was floored with wood, which also carried over to the Roman stage. These phylakes stages had an incredible influence in the development of the Roman *scaenae frons* (168).

The Greek theater was the biggest influence on the Roman theater, and there are several similarities and resemblances between the two. Five Roman theaters were studied in the Tuscan region of Italy, through onsite analysis and field measurements. These theaters are in Volterra, Fiesole, Pompeii, Ostia Antica and Spoleto (Figure 1).

With the similarities of the Greek and Roman theaters, there are also differences. These differences in design result from changes in use of certain elements of the theater, societal differences, and technological advances. By discovering the forces that influenced the redesign of the Greek theater to create the Roman theater, an understanding of the Roman theater and its conception will be understood. The

characteristics that create the quality of the Roman theater can then be used to design a modern theater that possesses the same qualities.

	Volterra	Fiesole	Pompeii	Ostia Antica	Spoletto
Type	on hillside	on hillside	on level ground	on level ground	on hillside
Radius of orchestra	9.50m	10.0m		9.45m	9.50m
Seating type in orchestra	no seating	4 seating rows	4 seating rows	2 seating rows	no seating
*Dimensions of seating	-----	0.85mx0.25m		1.05mx0.20m	-----
Type of auditorium	2 galleries	1 gallery	1 gallery	2 galleries	2 galleries
Number of rows	19	18	18	22	20
*Dimensions of seating	0.80mx0.40m	0.80mx0.40m	0.80mx0.40m	0.80mx0.32m	0.70mx0.30m
Number of aisles	6 full 10 half	5 full	5 full	8 half	9 half
*Dimensions of aisles	0.40mx0.20m x0.90m	0.40mx0.20m x0.90m		0.40mx0.16m x0.90m	0.35mx0.15m x0.90m

Figure 1. Chart of characteristics and measurements of theaters.

## ORCHESTRA

The heart of the theater, “the best seats in the house,” is the orchestra. The orchestra in the Roman theater provides seating for the senators and other important city officials, and serves as a basis for the dimensions and orientation of the other parts of the theater. The orchestra, a half circle in shape, is located at the base of the auditorium and in front of the stage (Figure 2).

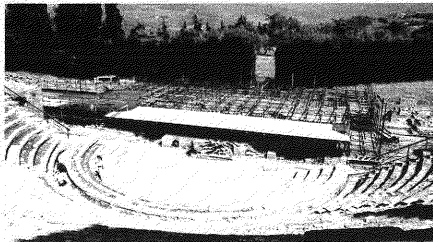


Figure 2. The orchestra at Fiesole.

The orchestra is the element of the Roman theater that links the auditorium with the stage as well as determines the dimensions of the stage. The depth and width of the stage is related to the radius and tangents of the orchestra. Since the shape of the orchestra is a half circle, if the perimeter of the orchestra is continued to create a full circle, the furthest point from the orchestra determines the depth of the stage (Figure 3). The front of the stage is typically set back from the orchestra by one to two meters. This creates an area of passage between the orchestra and stage, and provides a more

comfortable viewing angle for the audience members in the orchestra. The width of the stage is typically two diameter lengths of the orchestra.

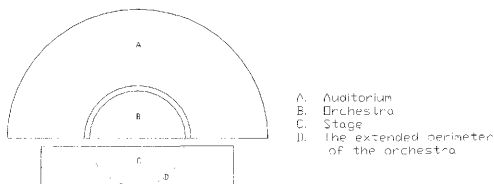


Figure 3. Diagram illustrating the relationship between the perimeter of the orchestra and the depth of the stage.

The aisles of the auditorium also relate to the orchestra in that they radiate from the center point of the orchestra. Although the aisle layout from theater to theater may vary, the layouts are regular in that they divide the auditorium into equal sections. The aisle layout is analyzed more fully in the auditorium section.

Characteristics of the orchestra itself are relatively consistent from theater to theater. The typical radius of the orchestra is 9-10 meters. This includes any seating tiers that may exist, but not the walkway that separates the orchestra and auditorium. This area provides enough space for seating the senators and elite members of society.

Orchestras of the Roman theaters either have or do not have seating tiers. Both methods utilize removable chairs that are placed in the orchestra for viewers to sit during the performance. In the theaters that have seating tiers there are typically four in total. The dimensions of these seating tiers are typically 0.85-1.05 meters deep with a 0.25

meters rise. The dimensions of the orchestra seating tiers are deeper and the rise is shorter than the typical dimensions of higher seating tiers, in the auditorium. This allows for more spacious seating, and the opportunity for the removable chairs to be placed in the seating tiers of the orchestra. In the orchestras without seating tiers, removable chairs would be placed on the orchestra floor in rows (Bieber 1961, 173). Removable chairs were needed in order to provide seating in the orchestra in both scenarios. In the case of the orchestras with seating tiers, the rise of the seating tiers, 0.25 meters, would not have provided comfortable seating because a person's knees would be elevated in an uncomfortable position (Figure 4). In the case of the orchestras without seating tiers, it would have been uncomfortable for any person to sit and watch a performance on the hard ground. Therefore, the use of removable chairs in the orchestra was imperative.



Figure 4. Illustration comparing auditorium seating and orchestra seating.

The average maximum seating capacity of the orchestra is 150-200 people. This number is derived from the 0.50 meters per person needed for a seating space developed from a seating experiment performed in the auditorium at Fiesole. Therefore, it is

doubtful that the orchestra ever reached a 150-200 person capacity since it was intended to be a more spacious seating area for a selected few.

In the Roman theater a short wall, parapet, or aisle separates the orchestra from the auditorium (Figure 5). Therefore, entry into the orchestra is not via the aisles of the auditorium, but through two side entrances that connect the orchestra to the outside and to the stage house (Figure 6).



Figure 5. Remains of a parapet at Ostia Antica.

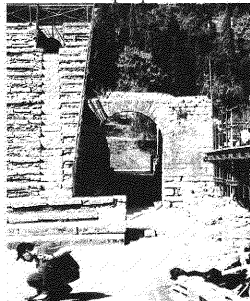


Figure 6. Side entrance into orchestra at Fiesole.

## STAGE

The stage is the area where the performance takes place, and it consists of the stage, the actual performance space, the stage wall, the wall that elevates the stage up and is visible from the orchestra and auditorium, and the stage house, which is the building that is behind the stage (Figure 7). The stage house is typically a two-story building that is behind and on two sides of the stage. The stage house's several functions are to provide an area for the performers' changing rooms and prop storage, to serve as a permanent backdrop, to create a barrier for external noises, and to serve as an echo scattering device.

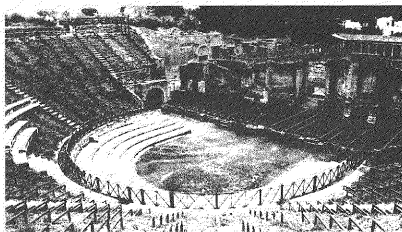


Figure 7. Remains of the stage and stage house at Pompeii.

The permanent backdrop is used in the Roman theater as a means to set the scene of the performance. The façade of the stage building, the *scaenae frons* or the backdrop, has characteristics of a streetscape, which was typically used as the setting for Roman performances. The *scaenae frons* was richly decorated with elaborate columns,

pediments, and friezes, and has three doorways or entries onto the stage. This gives a plastic texture to the *scaenae frons* helping in the reduction of any echoes heard in the theater (Figure 8).

Roman plays were standard structure with familiar character types appearing in every play. From this developed the use of certain entries onto the stage from the stage house by certain characters during the performance (227). For example, the center entrance, the “royal door” as it is referred to by Vitruvius, is used by the main character. Other characters use one of the other two entrances that are on either side of the “royal door.” There are also two large openings on either side of the stage. These entrances serve various functions: they give access to the stage for any additional props that may be needed for a performance, they reduce the lateral echo, and they serve as the “streets” into and out of town for the setting and use of the performances (Canac 1949, 413).



Figure 8. Ruins of *scaenae frons* at Volterra.



The stage wall is the wall elevating the stage above the orchestra, and it is visible from the auditorium and the orchestra. In the Roman theater, the stage wall is decorated not only for aesthetics but also to serve as a sound scattering device, like the highly decorated *scaenae frons*. The façade of the stage wall is typically decorated with niches that are either square or semi-circular (Figure 9). One or the other can be used in a regular pattern across the stage wall, or a combination of alternating types could be used. The niches on the face of the stage wall scatter the sound created on stage to reduce the amount of echo heard by the audience in the auditorium. Therefore, through the decoration of the *scaenae frons* and the stage wall, the echo factor is reduced thus improving the quality of sound in the theater (414).

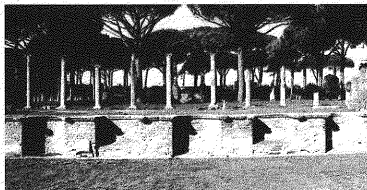


Figure 9. Semi-circular and square pattern of the façade of the stage wall at Ostia Antica.

The depth and width of the stage are related to the radius of the orchestra as mentioned previously. The stages for the five theaters studied all had dimensions that are typically 7.5-8.0 meters deep and 36-40 meters wide. The height of the stage varied from theater to theater but as Vitruvius describes, it should not be any taller than 1.3

meters in order that the performances can be viewed comfortably from the orchestra level (Figure 10). With the stage as large as it is, the whole performance can take place on the stage and not in the orchestra, unlike the Roman theater's influential model; the Greek theater. More specific details about the stages of the individual theaters studied are not available from the fieldwork done due to the deterioration of the sites themselves.

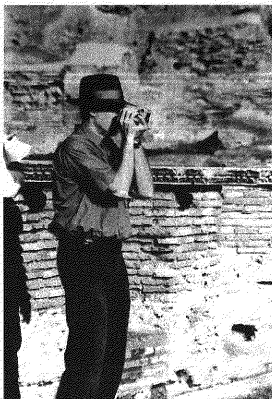


Figure 10. Stage wall at Ostia Antica.

## AUDITORIUM

The auditorium, the area from which the performance is viewed, is made up of a series of seating tiers or seating rows that outline the shape of the orchestra. Typically, the auditorium consists of 18-22 tiers. The dimensions of these tiers are typically a 0.40-meter rise by a 0.80-meter depth, a 1:2 height to depth ratio. This creates a comfortable seating height and provides plenty of space for legroom and foot traffic. At this angle, visibility of the people sitting in the auditorium is unimpeded by viewers in front of one another. The regularity of the auditorium's slope also increases the quality of sound to the tops of the auditorium as explained by Vitruvius in his *Ten Books of Architecture* (Morgan 1960, 139).

The layout of the auditorium and the aisles varies from theater to theater. The two layout types used in the design of the auditoriums are the single and double galleries. A double gallery is used to describe an auditorium that is separated into two even sections of tiers, usually by a passageway that is typically wider than a seating tier. In contrast, a single gallery is a continuous series of seating tiers that make up the auditorium (Figure 11).



Figure 11. Comparison between single and double gallery theaters.

In all the theaters, the orientation of the aisles radiates from the center point of the orchestra. However, the spacing and layout of the aisles is not consistent. Two types of aisles are used in the layout of the auditorium. One type of aisle used in the theaters extends from the top to the bottom of the auditorium, a full aisle. The other type of aisle used in the theaters starts from the top of the auditorium and extends only halfway down the auditorium, a half aisle ending at a gallery (Figure 12). This type of aisle typically serves only one gallery and is used between two full aisles to divide the upper gallery or section of the auditorium into smaller sections.

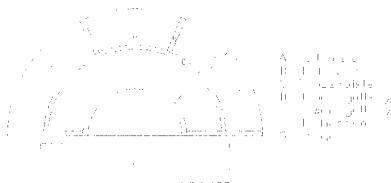


Figure 12. Illustration of full and half aisles.

Two examples of the single gallery auditorium are the theaters of Fiesole and Pompeii. Fiesole has 18 tiers and is divided into four equal seating sections by five aisles. On the bottom row of the auditorium in one seating section, 14-16 people can occupy the tier comfortably. Seating section is the term used to describe the seating tiers between two aisles (Figure 13). Therefore, 56-64 people can occupy the entire bottom tier. On the top tier in one seating section, 25-30 people can occupy the seating section,

giving the entire top tier occupancy of 100-120 people. This information was gathered by having my classmates sit on the bottom and top seating tiers of one section, to their comfort and counting the number of people in each seating tier (Figure 14). Based on these figures one person occupies 0.50 linear meters, and the auditorium of the theater at Fiesole can hold approximately 1608 people.



Figure 13. Seating section at Fiesole.

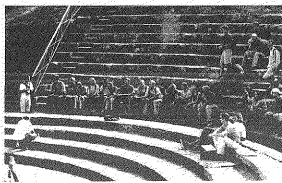


Figure 14. Seating experiment at Fiesole.

The ease of access and comfort of the seating tiers is an important element in the design of the theater. In Fiesole, the three middle aisles each provide access in and out of the theater for roughly 400 people, and the two aisles on the ends provide the same access for 200 people. With the layout of the aisles as they are in this example, a person on the top tier, the longest tier, would only have to step across 13-14 people at the most to get from the aisle to their seat or vice versa. The service ratio of the aisles to the seating sections is efficient in this example and in the other single gallery theater, Pompeii.

The double gallery theaters, Volterra, Ostia Antica, and Spoleto, employ the use of more aisles with the use of the half aisles, therefore creating a more efficient ratio between the service aisles and the seating sections. These theaters are three examples of Roman theaters that have an auditorium divided into two galleries. Despite this common characteristic among the three theaters, the layout of the aisles varies distinctively among the theaters. The theater at Volterra has 19 seating tiers, and an additional tier, which serves as a passageway. This passageway serves as a division between the upper and lower galleries. Six full aisles divide the lower gallery into five seating sections. In the upper gallery, five additional half aisles accompany the full aisles, dividing the upper gallery into ten seating sections.

Based on the spatial requirement needed for one person to sit comfortably, 0.50 meters, the bottom and top tiers of a seating section in the lower gallery at Volterra will occupy 11 and 20 people respectively. In the upper gallery, the bottom and top tiers of a seating section will occupy 10 and 13 people respectively. Therefore, the double gallery theater with its use of the half aisles to break up the upper gallery into smaller seating sections is more efficient than the single gallery in regards to the ratio of service aisles to the seating capacity of the seating sections. The aisle layout of Spoleto is similar to the aisle layout of Volterra.

Ostia Antica has a double gallery auditorium, but the layout of the aisles is uniquely different than that of Volterra's. Ostia Antica has 11 seating tiers in both the lower and upper galleries (22 seating tiers total). There is one additional tier that is slightly wider than the seating tiers, and this tier serves as a passage way and a division

between the two galleries. In the lower gallery there are four service aisles and a ground level entrance, in the center of the auditorium that divide the lower gallery into four seating sections. In the upper gallery, there are four aisles located halfway between the aisles of the lower gallery that divide the upper gallery into five seating sections (Figure 15). The bottom and top seating tiers of one seating section in the lower gallery have a capacity of approximately 20 and 34 people respectively. In the upper gallery the bottom and top seating tiers of one seating section occupy approximately 33 and 43 people respectively. Again, these numbers are derived from the 0.50 meters needed per person for seating. The aisle layout of Spoleto is done similarly to the aisle layout of Ostia Antica.

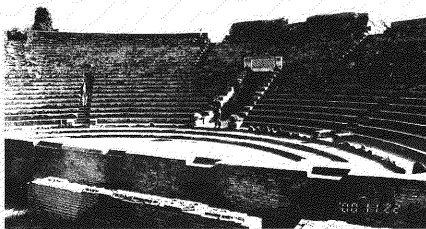


Figure 15. Layout of half aisles at Ostia Antica.

The service aisles of the Roman theaters studied average a little less than one meter wide, 0.90 meters. At this width, one person will be able to traverse the aisle

comfortably, but if two people are traversing the aisle in opposite directions, the climb or descent becomes awkward.

Entry into the Roman theater is from the top of the auditorium. A couple of different methods are used in the process of entry among these five theaters studied. Most commonly, there is one large main entrance that lead to the main corridor, typically a barrel vaulted passageway (Figures 16 and 17). This corridor connects to the main entrance and to the several smaller entrances that are in line with the aisles that service the auditorium. This method creates an efficient flow of traffic entering and exiting the theater. This method is seen in the theaters of Volterra, Fiesole, and Spoleto. This type of entry is most appropriate and logical for the access into these theaters because they were all built on a hillside.



Figure 16. Remains of entrance at Volterra.

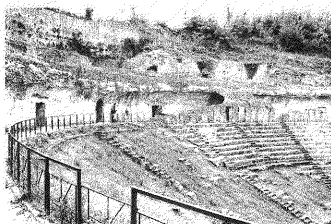


Figure 17. Remains of main corridor at Volterra.



On the other hand, the theater in Ostia Antica was built up from level ground, and as a result, entry into the theater is addressed differently. On the outside perimeter of the auditorium there are four staircases that lead to the top of the auditorium and connect with each of the four aisles of the upper gallery (Figure 18). Therefore, in order to get to a seat in the lower gallery, one enters via one of the four entrances, traverses down the aisle to the cross-aisle, walks along it to the next aisle and proceeds downward to their proper seating tier. This method is more efficient because there are four entrances connected to the outside of the theater, whereas, in the previously mentioned method, there is only one entrance that is connected to the outside of the theater.



Figure 18. One of the entrances into the theater at Ostia Antica.

In addition to the four entrances on the perimeter at the theater in Ostia Antica, there is also an entry that is in the center of the auditorium. This entry is a ground level passageway that is barrel vaulted as it passes under the upper gallery and becomes exposed as it passes through the lower gallery. This passageway gives access to the orchestra from outside the theater (Figure 19). This type of connection to the orchestra from the outside the theater is unique to the theater of Ostia Antica.

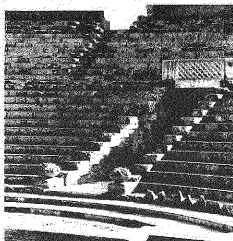


Figure 19. Entrance into the orchestra at Ostia Antica.

## DIFFERENCES BETWEEN THE ROMAN AND GREEK THEATERS

The Roman theater is an evolutionary development of the Greek theater through improvements of design based on differences in design needs. Changes in the way the theater is used, technological advancements and a change in social interest affect and influence the design criteria, thus resulting in an evolution in design methods.

Several changes have been made to the Greek theater model to create the typical Roman theater. First, the orchestra changes in shape and function. In the Greek theater, the orchestra is a full circle and serves as the location for the performance to take place. In a sense the orchestra serves as the stage and not the stage itself. In the Roman theater, the orchestra is a half circle and is the location for the senators and city elite to sit and view the performance. The only seating in the orchestra of the Greek theater is on the perimeter of the orchestra, and there are only a few seats, which are used by the priest, whereas, in the Roman theater, more seating is provided, and the seating is within the orchestra and not restricted to the perimeter edge of the orchestra (Cheney 1918, 23). The seating in this area is provided by the placement of removable chairs in the orchestra either on the tiers, if the theater has tiers in the orchestra, or on level ground (Bieber 1961, 173).

A couple of design elements are affected by this change in the function of the orchestra. Now that the orchestra is a place for viewing the performance the performance itself has to be moved onto the stage. Since the stage in the Greek theater is not used for the performance, it is not necessary for the stage to be very large. However, in the Roman theater, the performance now takes place on the stage and as a

result it has to be enlarged and lowered. The Roman stage becomes two to three times larger than the Greek stage, and the height of the stage is lowered from three to four meters high to a height of no more than 1.3 meters tall (Boethius 1970, 167). The larger Roman stage gives space enough for the entire performance to take place on the stage, and the lowered height allows the viewers in the orchestra to view the performance comfortably without neck strains (Figure 20).



Figure 20. View from orchestra to the stage at Ostia Antica.

Now that the Romans have moved the performance to the stage, the opportunity arises for elaborate backdrops to be created. In the Greek theater, the orchestra, the site of the performance, typically did not have any highly decorated backdrops just the surrounding scenery. The openness of the Greek theater is what makes its performances unique (Cheney 1918, 13). At times, the use of painted backdrops would be employed but nothing permanent. With the development of the stage house, the Romans utilized the opportunity to create a permanent backdrop out of the façade of the stage house, the *scaenae frons*. Typically, the *scaenae frons* is two stores tall and surrounds three sides

of the stage. In order for the entire audience in the auditorium to view the stage and *scaenae frons*, the auditorium changes shape to become a half circle as opposed to an auditorium that encircles up to two-thirds of the perimeter of the orchestra as in the Greek auditorium (Lawrence 1973, 284). The stage and *scaenae frons* become a more important design element in the Roman theater. The elaborate design of the *scaenae frons* is also a tactic that was used to attract people from the gladiator games, which were extremely popular at the time, to the theaters to view a different form of entertainment (Bieber 1961, 168).

A connection also develops between the stage building and the orchestra as the stage house becomes more developed. This brings the stage house and orchestra into an architectural whole (Cheney 1918, 20). Covered vaulted passageways on both sides of the stage give access to the stage house from the orchestra. This allows the viewers that would sit in the orchestra, the senators and city elite, to have access to the stage house, the area that is used by the performers before, during and after the performances.

In the Greek theater, only the priest had reserved seats in the auditorium. City officials, the wealthy and common people of the community sat amongst each other in the auditorium without any social division. In the Roman theater however, social division becomes common practice within the community and is reflected in the design of the theater. This gives support to the reason why the orchestra is now used as the location for the senators and city elite to view the performances (Boethius 1970, 167).

Site location is an important design criterion for any building location. The Greeks traditionally built theaters in sanctuaries so the auditorium of the theater is built

along a hillside (Bieber 1961, 189). Vitruvius gives some guidelines to the selection of a healthy site for the Roman theater, which were less restrictive than the site selection for the Greek theater. Wind patterns are important so that foul smells are not brought onto the site from nearby marshy areas. It is also important that the auditorium does not have a southern exposure because the air can become trapped and unable to circulate in the bowl of the auditorium, thus becoming heated and uncomfortable for the viewer. Southern and western exposure is also undesirable in the site selection, like in the site selection of a city, because of the summer heat (Morgan 1960, 18). An east/west orientation is avoided as well in order to prevent the sun from shining directly into the viewers' or performers' eyes at any time during the performance.

The Greeks, due to less-advanced stone construction technology, were limited to using the natural topography of a hillside to construct and support the auditorium. Through the development and a further understanding of the strength of arches and arcades as support structures, the Romans were able to move the theater away from the hillside and build the theater on level ground. This also gives the theater a rich façade and a colonnaded gallery that sometimes has shrines on top of it (Bieber 1961, 189).

Various reasons support the difference in entry to the Roman theater compared to entry into the Greek theater. In the Greek theater, the audience entered the theater through two side entrances that connect to the orchestra. The audience then traverses up the aisles into the auditorium to their proper seating tier. In the Roman theater, viewers entered through numerous vaulted corridors and passageways at the top of the auditorium to gain downward access into the theater. In the case of Ostia Antica, there

are multiple entries that lead to the top of the auditorium to gain access into the theater. Once at the top of the auditorium, the viewers then traverse down the aisles into the auditorium to their proper seating tier. In the Roman theater, there is typically a different set of entrances into the auditorium from those used to enter the orchestra. Since the senators and city elite are seated separately from the other viewers, this gives support to the need to address the entry into the theater differently than the Greeks did. Also, since the theaters are being built up from level ground, the entry can be addressed in a different manner than the Greeks.

## CONCLUSION

Five Roman theaters were studied to gather the information needed to develop a model of the Roman theater. Measurements, field studies, and analysis of the materials were used to develop the characteristics of the typical Roman theater. The orchestra functions as the location for the senators and city elite to sit. The orchestra is also one of the most important elements of the theater for dimensional layout. Once the radius of the orchestra is determined, the sizes of the other parts are proportionally determined, such as the stage. Rays from the center point of the orchestra orient the layout of the aisles, which, in some cases like in Ostia Antica and Spoleto, include the entrances into the auditorium.

The layout of the orchestra itself was relatively consistent among the theaters. They were all roughly the same size. The only major variation between them was the use of seating tiers. Theaters that did employ the seating tiers had similar the dimensions. However, in both styles of the orchestras, the ones with seating tiers and without, the use of removable chairs and the function of the orchestra are common to all.

The stage of the Roman theater became the location of the performance unlike in the Greek theater, which had the performance in the orchestra. This resulted in a Roman stage that is larger than the Greek stage. Among the theaters the stages were consist in their dimensional relation to the orchestra. There were variations in the placement of the entrances onto the stage where it was possible to determine their locations. However, the use of the stage wall, the highly decorated *scaenae frons*, the side stage entrances, and the use of wood planks for the materials of the stage as a method to improve sound



quality seem to be consistent among the theaters. According to Vitruvius, the stage wall should have a height restriction of 1.3 meters, and this height was found among all the theaters where we could determine the height of the stage.

In the auditorium is where the most variations occurred. However, the basic design methods of the auditorium were common in all five theaters. The dimensions and proportions of the seating tiers and aisles were either the same or very close to each other. The auditorium is also divided into equal seating sections, and in the theaters that have two galleries, the galleries are equal in size as well. The major variation among the auditoriums of these five theaters is the specific layout of the aisles. Although done similarly in a couple of theaters, there are not two theaters that have the exact same layout of aisles. Therefore the number and size of seating sections varies as well.

The creation of the Roman theater design is from various influences; Etruscan, phlyakes stages, and, most influential, the Greek theater design. The Greek theater is a starting point for the conception of the Roman theater. Through other influences such as the Etruscans and the phlyakes stage, the ability to revamp the Greek design and changes in design criterion developed. Changes in the function of the orchestra have had an enormous impact on the rest of the design. Since the performance is no longer done in the orchestra, the stage becomes the performance space. Now the orchestra can serve another purpose such as the location for the senators and city elite to sit. This is also a reflection of the importance Romans put on the separation of the political elite and ordinary citizens.

Site selection is also an important aspect of design. The Romans were not as restrictive to the site location of the theater as the Greeks were. The Greek theater is located in sanctuaries and on hillsides. With the improved masonry technology and the influence of the scaffolding for the Etruscan entertainment, arches were used to build the Roman theaters on level ground. This was something that was only done by the Romans and as a result, new standards for site location were developed.

This evolution of the Greek theater into the Roman theater illustrates how over time the design criterion of a building or, in this case the theater, can change. The design of the theater, as a result, changes in order to satisfy the new design criterion. However, there are still some similarities that remain between the two designs as a result of the influence that the Greek design had on the Roman design. As a result of these similarities, the quality of the theater is carried over from the Greek to the Roman theater, but with the changes improvements also came, like the use of the stage front as a means to improve the quality of sound. With this shown, the Roman design of an outdoor theater can be used as a starting point to create contemporary outdoor theaters that may have a different set of design criterions and reflect the influence of newer building technology.

## REFERENCES

- Amott, Peter D. 1971. *The Ancient Greek and Roman Theatre*. New York: Random House.
- Beacham, Richard C. 1992. *The Roman Theatre and Its Audience*. Cambridge: Harvard University Press.
- Bieber, Margarete. 1961. *The History of the Greek and Roman Theater*. New Jersey: Princeton University Press.
- Boethius, Axel. 1970. *Etruscan and Roman Architecture*. Baltimore: Penguin Books.
- Canac, F. 1949. "On the Acoustics of Grecian and Roman Theaters: Investigations of the Theaters at Orange and Vaison and Practical Conclusions." *R.I.B.A. Journal*.
- Cheney, Sheldon. 1918. *The Open-Air Theatre*. New York: Mitchell Kennerley.
- Lawrence, A.W. 1973. *Greek Architecture*. Baltimore: Penguin Books.
- Martin, Roland. 1980. *Greek Architecture*. New York: Electa S.p.A.
- Morgan, Morris Hicky. 1960. *Vitruvius: The Ten Books on Architecture*. New York: Dover Publications, Inc.
- Sear, Frank. 1982. *Roman Architecture*. New York: Cornell University Press.
- Settis, Salvatore. 1985. *The Land of the Etruscans*. Milano, Italy: Scala.
- Tomlinson, R.A. 1995. *Greek and Roman Architecture*. London: British Museum Press.
- Waugh, Frank A. 1917. *Outdoor Theaters*. Boston: Richard G. Badger.