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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

TRAFFIC NOISE STUDY
AT
HOLLYWOOD BOWL
COMPARISONS 1954-1959

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January 1960

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DEPARTMENT

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State of California
Department of Public Works
Division of Highways
Materials and Research Department

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Lab. Order 100-S-6212
File Reference
VII-LA-2-LA(3)
7QV2056-R

Mr. E. T. Telford
Assistant State Highway Engineer
District VII
Los Angeles, California

Dear Sir:

Submitted in reply to your letter of December 17, 1959, is:

TRAFFIC NOISE STUDY

AT

HOLLYWOOD BOWL

COMPARISONS 1954-1959

Survey made by . . . . . Structural Materials Section
Under general direction of . . . . . J. L. Beaton
Tests made by . . . . . L. Bourget and J. T. Kassel
Report prepared by . . . . . Louis Bourget

Very truly yours,

F. N. Hveem
Materials and Research Engineer

LB:mw
cc: JPMurphy
JWTrask
JALegarra
LLFunk
GLangsner
GMWebb
District VII (10)
Attn: REDeffebach

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I. INTRODUCTION

As requested by District VII at Los Angeles, an investigation of the noise problem at Hollywood Bowl has been accomplished for comparison with a similar study made in April 1954. Measurements were taken during the last week in December 1959. The purpose of this report is to provide technical sound level information to the District for consideration during the preparation of a report to the Highway Commission in accordance with their motion of November 19, 1959.

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II. SUMMARY AND RECOMMENDATIONS

The combined noise in the Bowl from all traffic sources traversing Cahuenga Pass has increased an average of 4 to 6 db above the values observed in 1954, depending upon the location chosen and the traffic pattern during the time of measurement. The present highest noise levels are, as in prior tests, produced by aircraft. The most persistent high level traffic noise is produced by trucks. Equally loud noise of shorter duration is occasionally produced by sport cars and motorcycles. All of the noisier vehicles could undoubtedly be quieted by more adequate muffling. Any correction in this respect can only come to pass when public opinion supports legislative action. Such action will require that enforcement be based on standardized technical measurements agreed upon by recognized acoustical authorities. Such standards do not presently exist.

The immediate problem of reducing noise in the Bowl can be accomplished by improving the partial shielding now offered by the incomplete earth fill along the east side of the Bowl and adding sound locks to the Promenade entrances. The exact height of the barrier could only be determined by a survey of the area.

The Knudsen-Loye Report of January 1959 recommends a barrier height of 30 feet with respect to the adjacent seating levels. An earlier report by Vern O. Knudsen, in 1945, recommended ----- " a wall or parapet, built up to a height of at least 10 feet above the promenade walk".

The present incomplete earth fill is probably no more than 12 to 15 feet high and is not very effective beyond seating Sections L and Q (Exhibits 1 and 2).

Obviously all parties concerned wish to preserve, as much as possible, the natural beauty of the Bowl environment. It is possible that this may be better accomplished by extending the present incomplete barrier so as to protect Sections F and V. Such construction may be supplemented by close planting of tall growing cypress along the barrier in the critical areas. Extension of the existing barrier could be an earthen dike, a masonry wall or a heavy double planked wall as suggested in the Knudsen-Loye report of January 1959. The present landscaping and contours are so random that the area should first be examined to determine the most feasible method of improving the effective barrier height without destroying the landscaped appearance of the Bowl.

It may be desirable to construct an inexpensive small-scale model of the Bowl so that a study can be made of different designs and contours. A small light source can be employed to explore the shielding effectiveness of various barriers and the best locations for the suggested tall growing plantings. The

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solid barrier should be a dense structure without leaks other than the required sound lock entrances. The dimensions should not assume such proportions that local plantings will be incapable of disguising the appearance of the barrier. It should not give the appearance of a gigantic billboard.

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III. HISTORY OF THE PROBLEM

Certain important points concerning external noise and acoustic problems of Hollywood Bowl deserve mention lest the impression be gained that no problems existed prior to the completion of the Hollywood Freeway. It is evident that the problems are now greater and that certain corrective measures are indicated. We would also like to point out that articulation tests made on this site prior to 1950 and cited in Reference 2, page 74, clearly show that acoustic deficiencies have long existed on the east side of the Bowl. The worst problem has always existed in the southeast upper corner. The entire east side of the Bowl has never had the quantity of natural protection against external noise and the internal acoustic enhancement of the hill boundary reflections which prevail on the western side. The corrective measures which are discussed in the Summary will serve two purposes:

1. The reduction of noise in the Bowl from all traffic sources in Cahuenga Pass, including the Freeway.

2. Improvement of interior acoustical conditions so that the east side, within the Bowl, more nearly resembles the west side.

The Bowl authorities are to be complimented for the installation of electronic amplification and high quality loudspeaker systems. One recognized acoustical authority has observed that the size of Hollywood Bowl may well exceed the natural (desirable) limits for an outdoor theater[4]. Electronic amplification provides a considerable improvement. It may be found that even more speaker systems than the three now in use may further the development of a more uniform sound pattern in the seating areas -- and thereby help to correct the long-standing deficiency in this regard[2].

Other improvements made within the Bowl since 1954 involve the replacement of most earth surfaces with concrete, a requirement we understand that was necessary for safety reasons. Sharp heels often led to sprained ankles or falls, or both. This improvement in safety has not been achieved without certain acoustical penalties. The more absorbent earth surfaces, that once existed throughout the seating area, have been surfaced with concrete that reflects sound in excellent fashion. Therefore, any extraneous sound which gets into the Bowl bounces around a good deal more than would have been the case formerly. The new lighting towers also contribute to the reflectance of sound. Pictures in the Knudsen-Loye 1959 report clearly show a transition from the original rustic interior to the more modern one of concrete. Undoubtedly sound absorption will be most effective when all seats are filled. The report just mentioned makes further suggestions which we believe are directed to the Hollywood Bowl officials.

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IV. TEST RESULTS AND DISCUSSION

Test results are shown in the Appendix. The following is a discussion of their significance:

The December 1959 measurements of traffic noise in the Bowl average from 4 to 6 db higher than the measurements taken in April 1954.

Noise from aircraft is still the most intense and disturbing noise source, as it was in 1954.

Noise which may be attributed to traffic sources through Cahuenga Pass include:

1. The Hollywood Freeway
2. Highland Avenue
3. Cahuenga Boulevard
4. Other less significant frontage roads

The greatest amount of traffic noise emanates from vehicles on Hollywood Freeway, although the contribution by vehicles on the other mentioned roads is a significant factor during occasional intervals; for example, when a truck on Highland Avenue accelerates from the stop light at Odin Street. This is particularly true if it occurs during a time when there is no loud noise from trucks traversing the exposed freeway as viewed from Location 12A on Exhibit 1. If the freeway did not exist, the traffic on Highland and Cahuenga would be greater and constitute a noise problem about the same as measured in 1954. We expect the present Cahuenga Pass situation to improve after completion of the Golden State Freeway about two years from now, but the total long-term effects are difficult to forecast with accuracy. There will always be a significant amount of truck traffic through Cahuenga Pass and a reduction in noise could only come from palliative measures as discussed in the Summary.

A sound barrier will not protect against aeroplane noise from overhead, and during the daylight hours this is a persistent intrusion which is prevalent for better than a third of the time.

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REFERENCES

1. Knudsen-Loye Acoustical Survey of Hollywood Bowl, January 26, 1959.

2. V. O. Knudsen and C. M. Harris, book, page 74, Acoustical Designing in Architecture, John Wiley & Sons, Inc., N. Y.

3. Division of Highways 1954 Tests, Intra-Division Correspondence, File Reference VII-LA-2-LA.

4. Per V. Bruel, book, Sound Insulation and Room Acoustics, pages 216-217, Chapman & Hall, Ltd., London (Anglobooks, New York and Milwaukee)

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APPENDIX

1954 versus 1959 Noise Levels

Based on C Scale Sound Pressure Level Readings

Location		April 1954 Tests	December 1959 Tests	Change	Comments
7	Trucks Cars	64 - 69 60 - 64	67 - 72 63 - 67	+3 to +6	Aircraft consistently developed noise levels from 77 to 90 db at all locations. In 1954 the truck noise was occasional with lower passenger car levels predominating. In 1959 the truck noise frequently predominated with intervening lulls when passenger car levels were measurable.
9		60 - 66 58 - 62	62 - 70 58 - 62	0 to +4	
8		59 - 62 56 - 59	66 - 70 58 - 63	+4 to +8	
6		60 - 64 56 - 60	64 - 70 60 - 64	+4 to +6	
5		59 - 64 52 - 59	62 - 66 59 - 62	+2 to +7	
4		58 - 60 54 - 58	63 - 68 59 - 63	+5 to +8	
1		60 - 64 56 - 60	62 - 67 58 - 62	+2 to +3	
3		59 - 66 56 - 59	62 - 65 59 - 62	0 to +3	
2		58 - 62 54 - 58	60 - 64 56 - 60	+2	
10		56 - 59 52 - 56	60 - 64 56 - 60	+4	
12 A outside Bowl facing traffic		Not available from 1954 test	73 - 78 70 - 73		Shows that shielding provided by a solid obstruction can reduce noise effectively. In this case an 8 db noise reduction results.
12B screened from 12A by earth mound			65 - 70 61 - 65		

Note: Aircraft noise, during daylight hours exceeded traffic noise about 35% of the time by an actual clocked test.

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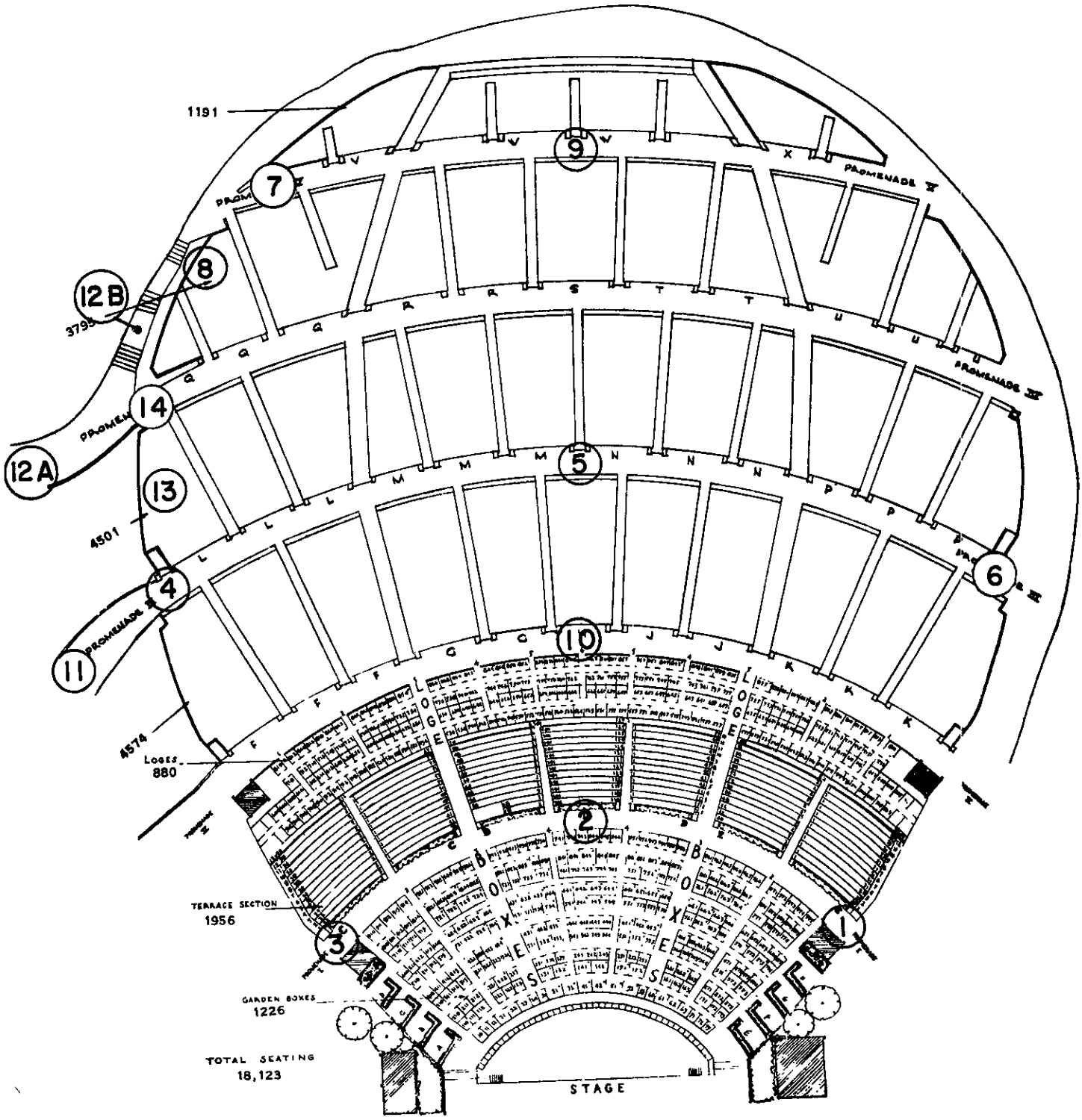
SEATING ARRANGEMENT
HOLLYWOOD BOWL



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View looking toward Location 4.

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