OPTIMUM SEISMIC PROTECTION FOR NEW BUILDING CONSTRUCTION IN EASTERN METROPOLITAN AREAS

NSF Grants GK-27955 and GI-29936

Internal Study Report No. 32

DATA FOR ANALYSIS OF DAMAGE TO HIGH RISE BUILDINGS IN LOS ANGELES

Robert V. Whitman

Sheu-Tien Hong

March 1973

Department of Civil Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. NSF-RA-E-73-580	2.	3. Recipient's Accession No. PB 80-104805
4. Title and Subtitle: Data for Analysis of Damage to High Rise Buildings in Los Angeles (Optimum Seismic Protection for New Building Construction in Eastern Metropolitan Areas, Internal Study Report 32)			5. Report Date: March 1973 6.
7. Author(s): R. V. Whitman, S. T. Hong			8. Performing Organization Rept. No.: No. 32
9. Performing Organization Name and Address: Massachusetts Institute of Technology Department of Civil Engineering Cambridge, Massachusetts 02139			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) GI29936 (G) GK27955
12. Sponsoring Organization Name and Address: Engineering and Applied Science (EAS) National Science Foundation 1800 G Street, N.W. Washington, D.C. 20550			13. Type of Report & Period Covered 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

Information was developed for input to a damage simulation study as part of the Hazards Reduction Research Assessment Study at the University of Colorado. The data, developed from the M.I.T. document of damage to buildings during the San Fernando Earthquake, includes four maps which give both replacement cost and assessed value for pre-1933 and post-1933 buildings having five stories or more. Three hundred and fifty buildings, for which there are good estimates of these values, are used to obtain average replacement cost and average assessed value for several different building height categories. These values are applied to a list of some 1500 total buildings in the area to obtain the information shown on the maps. Included are two plots of mean damage ratio vs. intensity for pre-1933 and post-1933 buildings.

17. Document Analysis a. Descriptors

Earthquakes
Buildings
Damage assessment
Dynamic structural analysis
Data processing
Maps
Cost analysis

b. Identifiers/Open-Ended Terms

High rise buildings
San Fernando Earthquake

c. COSATI Field/Group

18. Availability Statement: NTIS

19. Security Class (This Report)

20. Security Class (This Page)

21. No. of Pages: 10

22. Price: PC A02-A01

The following information was developed for input to a damage simulation study to be made by Dr. Friedman of Travelers Insurance as part of the Hazards Reduction Research Assessment Study at the University of Colorado. The data was developed from the M.I.T. documentation of damage to buildings during the San Fernando earthquake.

DEPARTMENT OF CIVIL ENGINEERING
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS 02139

30 March 1973

Mr. D.G. Friedman
Associate Director of Research
Corporate Research and Development Department
The Travelers Insurance Company
One Tower Square
Hartford, Connecticut 06115

Dear Don:

I am enclosing the information which you will need for your study of simulation of damage to high-rise buildings in the Los Angeles Basin. The grids on the four maps are just the grids used in the maps prepared by the Thomas Brothers Company. As the labels on these four maps indicate, they give both replacement cost and assessed value for pre-1933 and post-1933 buildings having five stories or more. To obtain these replacement costs and assessed values, we used the approximately 350 buildings for which we have really good estimates for these two values, and we obtained average replacement cost and average assessed value for several different building height categories. We then applied these average values to our list of some 1500 total buildings in the area to obtain the information shown on the maps.

Attached also are two plots of mean damage ratio vs. intensity for pre-1933 and post-1933 buildings. The portions of these curves based on our actual data are shown solid; the extrapolations are shown dashed.

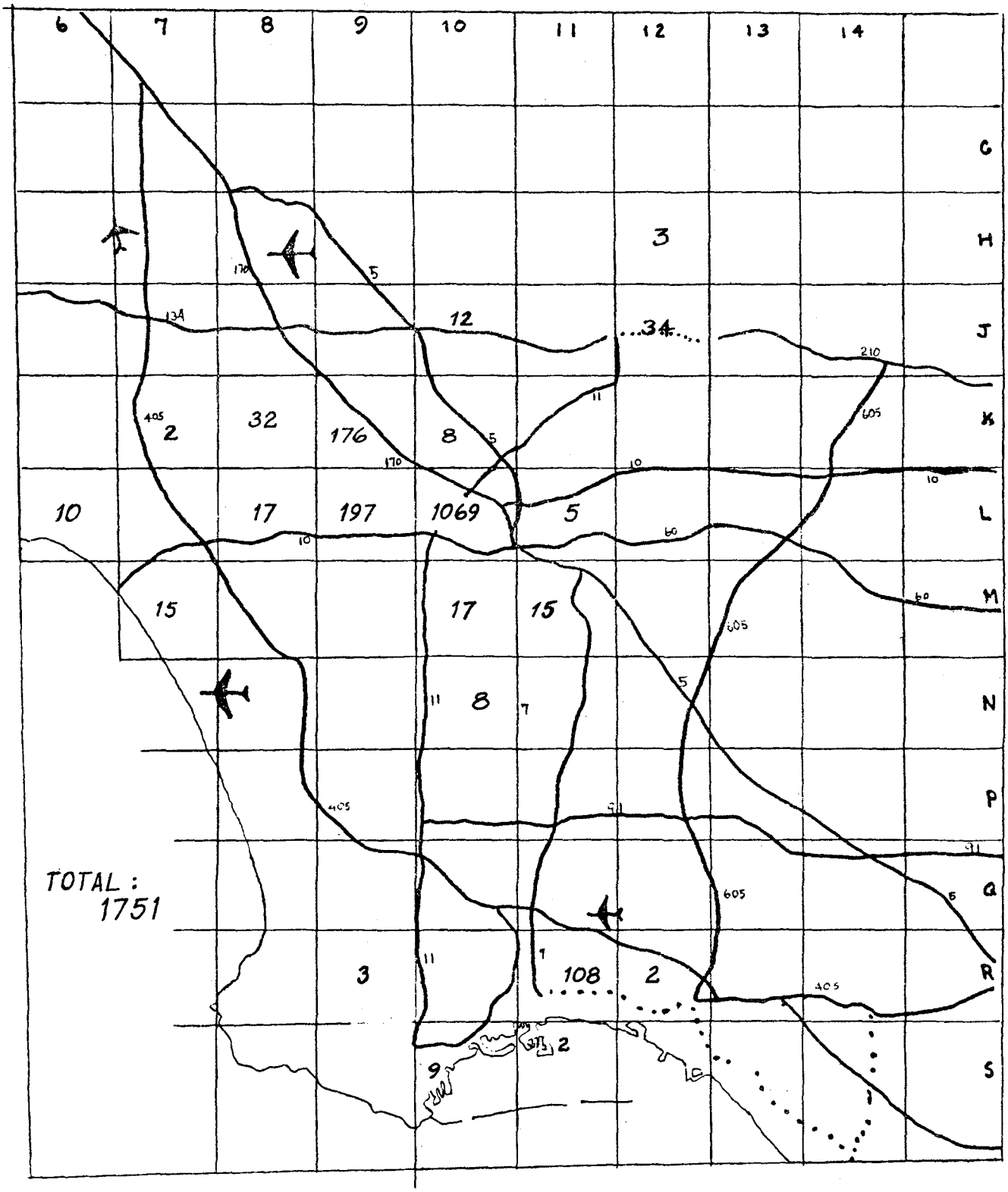
If you have any questions concerning this information, please give me a call. I look forward to seeing the results of your analyses.

Best regards,

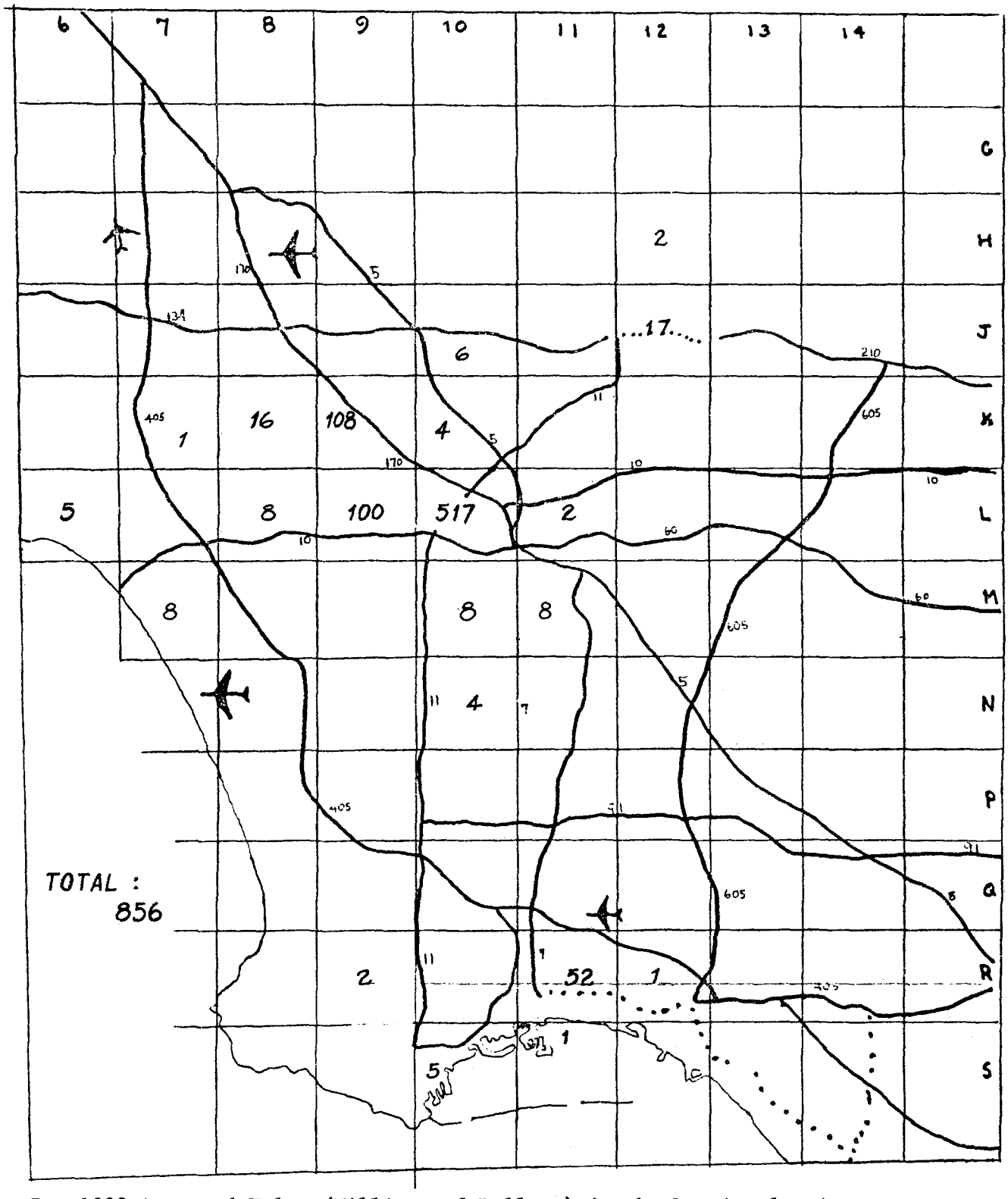
Robert V. Whitman

Robert V. Whitman
Professor of Civil Engineering
Head, Structural Engineering
Division

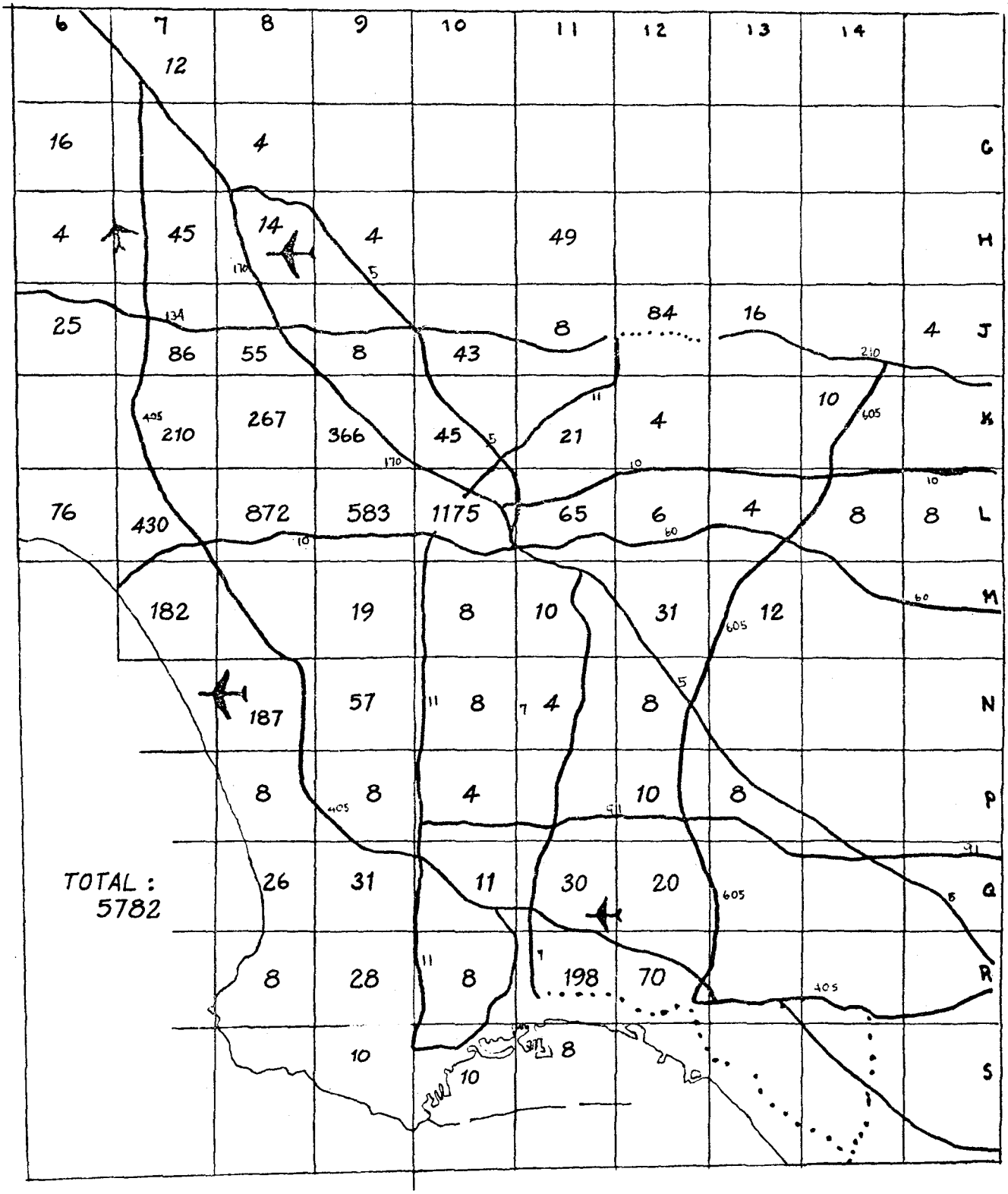
RVW/rt
Enclosure



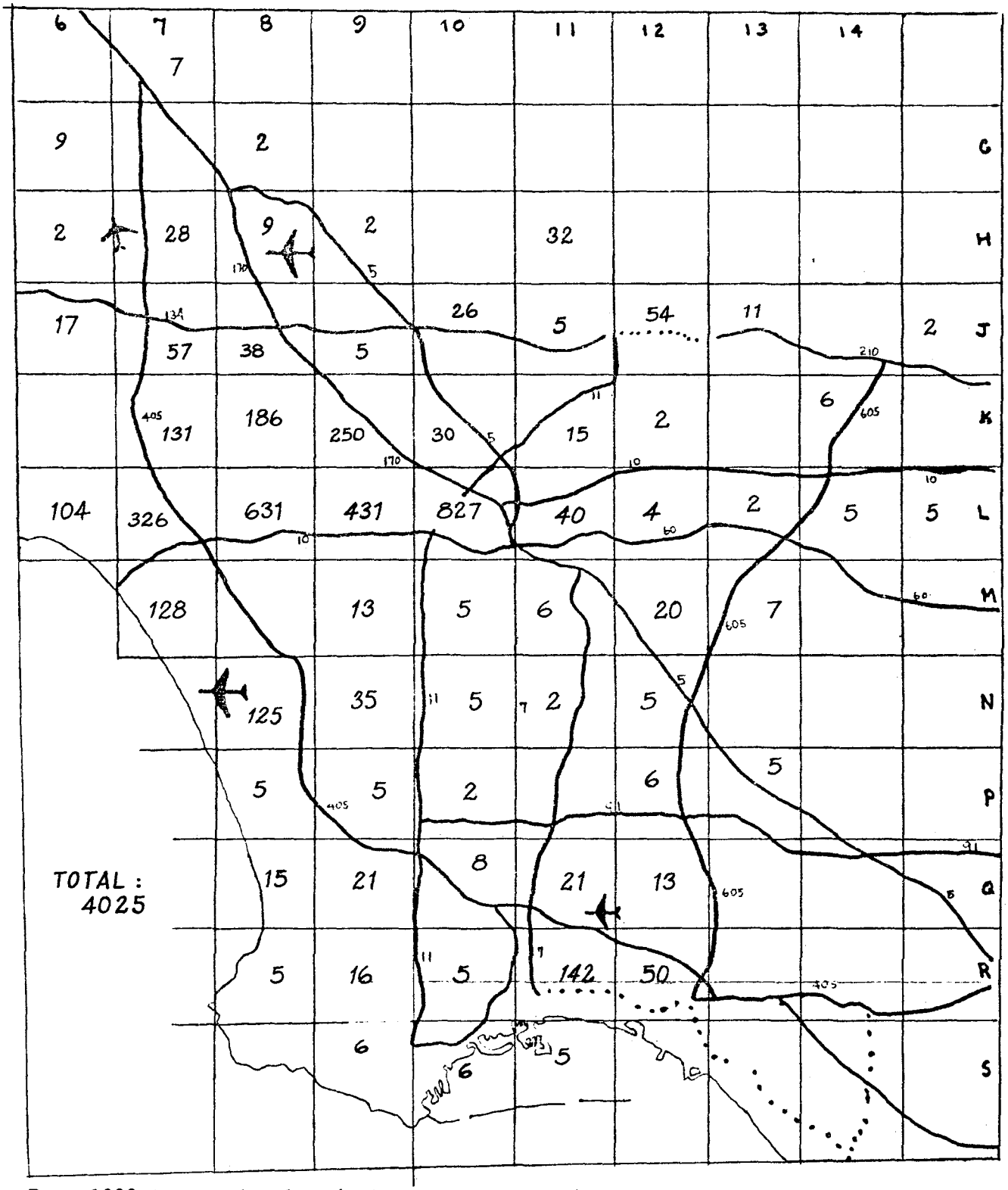
Pre-1933 Replacement Cost (Millions of Dollars) in the Los Angeles Area



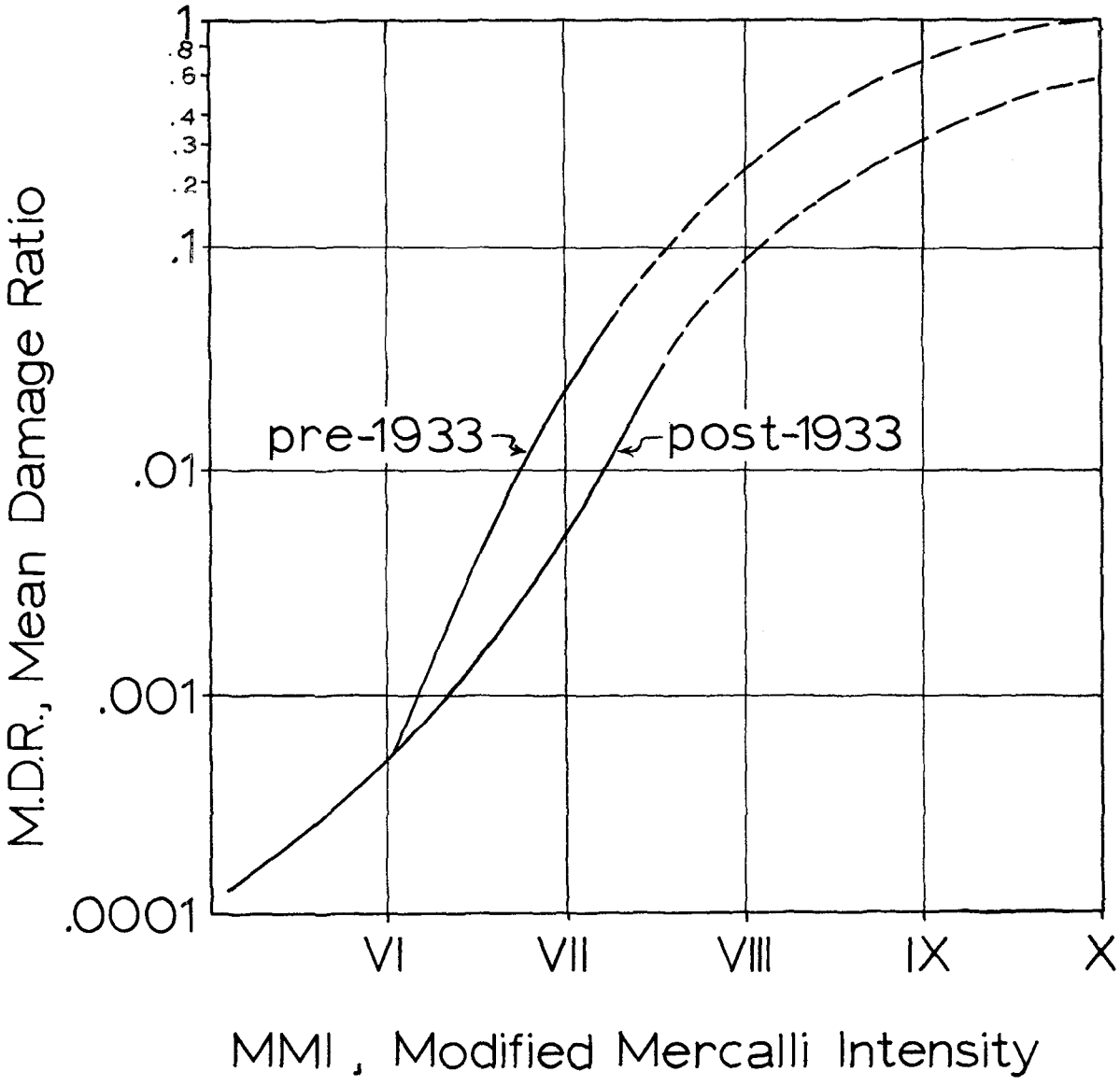
Pre-1933 Assessed Value (Millions of Dollars) in the Los Angeles Area

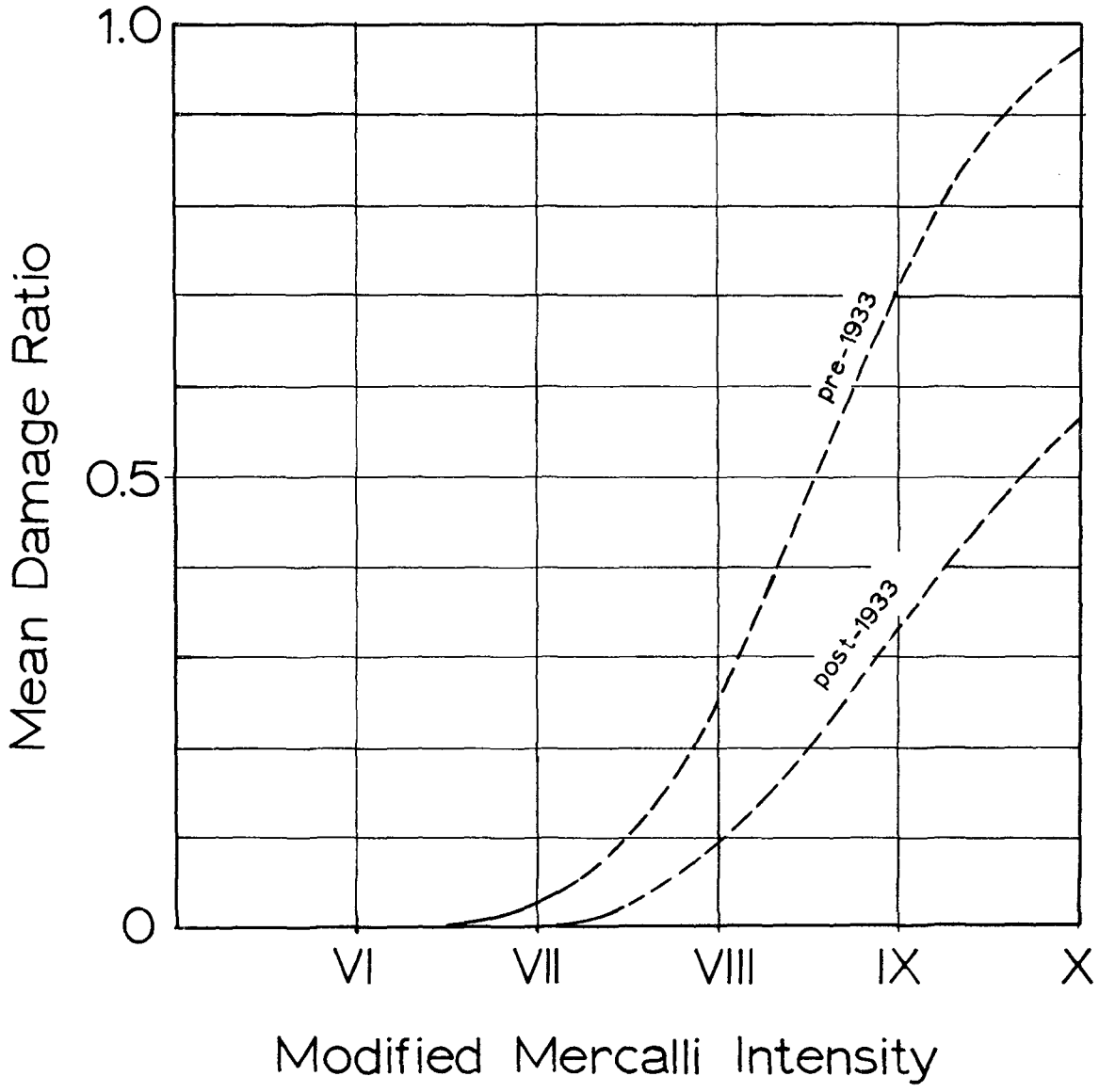


Post-1933 Replacement Cost (Millions of Dollars) in the Los Angeles Area



Post-1933 Assessed Value (Millions of Dollars) in the Los Angeles Area


M.D.R., Mean Damage Ratio
1
.8
.6
.4
.3
.2
.1
.01
.001
.0001
pre-1933
post-1933
VI
VII
VIII
IX
X
MMI , Modified Mercalli Intensity


1.0
0.5
0
Mean Damage Ratio
pre-1933
post-1933
VI
VII
VIII
IX
X
Modified Mercalli Intensity