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EVALUATION OF MITIGATION STRATEGIES FOR DISASTER EVENTS

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This research applies policy analysis to the problem of designing a policy to mitigate the costs to residents of Los Angeles of any one of several prospective major earthquakes threatening the Los Angeles basin. A model is developed in the form of an accounting framework that processes data inputs from a variety of sources and generates policy rankings as outputs. Viewed as an attempt to start closing the gap between formal research in the earthquake field and applied policy testing, this model answers questions, for each of a number of suggested policies, such as: (1) Who will benefit? (2) Who will bear the cost? and (3) Is the policy cost effective? Annualized per capita costs and benefits of expected damage reduction are forecast for income groups as well as for geographic districts.

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BACKGROUND, OVERVIEW, LIMITS OF THE STUDY

This research applies policy analysis to the problem of designing a policy to mitigate the costs to residents of Los Angeles of any one of several prospective major earthquakes threatening the Los Angeles basin. We develop a model in the form of an accounting framework that processes data inputs from a variety of sources and generates policy rankings as outputs. We view this model as an attempt to start closing the gap between formal research in the earthquake field and applied policy testing.

The model answers questions like the following: for each of a number of suggested policies, are the costs saved worth the cost of saving them? if so, which policy is the most efficient, offering 'the biggest bang for the buck'? who enjoy the benefits and who bear the costs from such policies?

This policy analysis imposes four technical responsibilities:

1. to identify a set of prospective policies;
2. to determine the effects of each on the anticipated level of damages;
3. to assess the worth of these effects; and
4. to estimate the costs to the community of carrying out those policies.

Meeting these responsibilities would make it possible to rank various policies in terms of their relative efficiencies. Yet, governments do not always adopt the 'best' policy; efficiency is not the only (nor even necessarily the dominant) criterion. Indeed, the most efficient policy choice may have undesirable distributional consequences. Most simply, we tend to accept the notion that a new policy should not 'worsen' the distribution of income.

This adds another responsibility to the policy analyst:

5. to assess the losses and gains each policy promises to impose on different groups in society

The consequences of policy for individuals is the proper concern for political representatives whose constituencies are defined by the spatial of political district boundaries. A policy's political feasibility depends on the likelihood that it can garner enough legislative votes to be enacted. Thus, treatment of political feasibility in our policy analysis entails yet another responsibility:

6. To determine the geographical distribution of affected groups among the political relevant domains.

In short, the policy analysis of earthquake mitigation strategies confronts us with six tasks.

Legislators and public officials have interests in the prospective consequences that would flow from the implementation of policies. Some plans and policies can be developed on a trial and error basis, allowing a government to 'learn' by its mistakes and correct them 'in flight'. For others which have massive initial commitments of resources or lagged consequences that only become apparent after a number of years the learning mode is too costly. To substitute for the learning mode we have come to rely on <u>models of conditional prediction</u>. These models do not 'chose' a best policy; they simply present putative consequences flowing from different sets of assumptions to which valuational notions can be applied.

In this research we have developed a model of conditional prediction for policies proposed to mitigate the damages to be expected from the occurrence of any of the major seismic events predicted for Southern California. While we have no policy tools powerful enough to change the likelihood that one or more such events will occur, we can change the exposure of property and persons to damage or injury. Thus our modeling of the problem takes the estimated likelihoods of groundshaking at various intensities at specific points in the city as given. It then asks the question: how will the expected losses and the costs of policy implementation vary by each of four prospective policies?

To answer these questions, we forecast the annualized per capita costs and benefits of expected damage reduction for income groups as well as for geographic districts.

LITERATURE REVIEW

Current research on the relationship of development patterns to post-earthquake recovery -- and of land use and development controls to seismic risk -- is still in its infancy. Until very recently the bulk of research on earthquake hazard mitigation was devoted solely to building-scale vulnerability, focusing on structural design and life-line engineering. Recent interest in research related to urban-scale vulnerability is encouraging. Most effort to date has focused on three topics:

1. application of seismic and geological information and micro-zonation techniques in land use planning;
2. case studies of anticipatory or post-earthquake land use planning and reconstruction efforts;
2. organizational and institutional contexts of local decision-making in disaster mitigation.

The first category of research draws on existing scientific and technical information related to local seismic phenomena and geological characteristics. Studies for seismic zonation in the San Francisco Bay area (Borchert, 1975; Brabb, 1979) provided important ground-work for subsequent studies by Blair and Spangle (1979), Erley and Kockelman (1981) and Jaffe et al. (1981). The United States Geological Survey has played a leading role in generating technical and scientific information related to microzonation studies and in disseminating this information. At least in the San Francisco Bay area, the seismic microzonation information made available by USGS has had some impact on city and county land use planning (Kockelman, 1980). What is lack-ing is a ready methodology for microzonation analysis for specific sites and generalized performance characteristics of land use acceptable to sites of different risk levels.

Under the second topic, systematic inventory of post-earthquake losses and community impacts of recent earthquakes has begun. The Jones and Avgar (1977) protocol on the Rumania earthquake, the Lagorio and Mader (1981) and the Stratta et al. (1980) reports on the Campania-Basilicata earthquake, and the excellent paper on Managua by Kates et al. (1973) are noteworthy examples. Preliminary reports on the Coalinga quake are also available (French, et al., 1984).

While most of these studies focus on the community consequences of earthquake events and their implications for short-term and long-term planning, a monograph by Spangle et al. (1980) examines specifically the nature of reconstruction planning based on case studies of earthquake damaged cities (San Fernando, Anchorage, Valdez, Santa Rosa). It concludes that options for significant land use changes after an earthquake often are limited, which suggests that much greater emphasis should be placed on anticipatory, pre-earthquake policy measures for vulnerable areas.

Research on the organizational and institutional contexts of decision-making related to earthquake planning has barely begun. There have, however, been several efforts to develop land use planning techniques based on earthquake risk analysis. French and Isaacson (1984) describe a probabilistic approach to earthquake risk analysis which begins by estimating and mapping the expected level of ground motion and geological vulnerabilities of study areas. Damage estimates are then made based on existing land use patterns or future scenarios. In another such damage and loss estimation system developed under the auspices of FEMA (Moore et al., 1985) several types of loss estimates were offered:

1. the expected physical damage caused by groundshaking;
2. the expected percent loss of function or usability;
3. the expected percent of population killed and injured;
4. expected losses due to collateral earthquake hazards such as ground-failure, fire, inundation.

This work is similar, and presumably related, to a technically sophisticated approach to earthquake damage evaluation developed by Rojahn, Sharpe, Nutt (1984). In that study a fairly detailed inventory was developed to estimate direct physical damage, deaths, injuries, loss of function and relocation time. Thus the study attempts not only to measure direct physical losses but also collateral social and economic losses. The investigation combines empirical with judgmental data; the authors emphasize that many of the damage estimates are based on a combination of judgmental and empirical inputs.

It appears from the previous studies of human loss prediction that results relied heavily on judgmental extrapolations of limited empirical data. Some of these efforts have tried to introduce different factors or weightings to reflect technological developments in building construction since much of the information is dated. (Whitman et al., 1975).

We believe that our approach to the problem is more elaborate than any preceding it. Munroe and Blair (1975) and Hirschberg et al. (1978)

offer formal models which assess the costs and benefits of various earthquake mitigation measures. Rose offers an input-output model framework to estimate the role of utility lifelines in sustaining economic activity after an earthquake. Ellson, et al. (1984) also developed an accounting system to measure long-term economic effects of an earthquake in the Charleston metropolitan area. They concluded that the economy was quite resilient and could absorb the impact.

While our model can be distinguished from these in many ways, the key difference is its ability to compute costs and benefits by income group as well as by geographic district. Our approach contains a distributional dimension and is able to answer questions of <u>who</u> pays and <u>who</u> benefits, as well as of total costs and total benefits. This capability makes it possible to achieve a basic purpose of policy analysis -- that efficiency <u>and</u> distributional patterns for a variety of policies and assumptions can be compared.

Several observations can be made from a review of some of the current literature. First, judgmental data and expert opinion continue to be major inputs to most models of earthquake estimation and risk analysis. Second, no state of the art method for estimating secondary and collateral damages (loss of life, injury, etc.) exhibit much reliability or validity. Third, despite some sophisticated modeling efforts, impacts on economic activities remain difficult to pin down. Fourth, although some work has begun in estimating damages to lifeline infrastructure, little information exists on physical damage beyond building types. In fact, there has been no attempt to estimate the damage to the non-building stock in the larger urban context.

Finally, there has been little work on the distributional -- by income class or by geographical areas -- effects of the earthquake hazard risk.

POLICIES TO BE EVALUATED

A novel aspect of the research was the need to design a set of prospective 'new' earthquake mitigation policies to test. The candidate policies needed to be prospective in the sense that they fell within the powers normally available to local governments in California, 'new' in the sense that they were not currently in place with consequences already detectable.

We begin by reviewing the general policy instruments available to California local governments. They may utilize their police powers (P) to regulate the conduct of private parties to protect the health, safety, welfare and morals of the community. They may tax personal and real property (and other objects as state constitution and the legislature permit) (T) to provide revenue for the operation of government and the implementation of policies. Local governments may also purchase (or acquire by eminent domain), own, and convey land and structures for proper public purposes (L). They may enter into contracts and agreements with private parties or other public agencies to carry out proper public purposes (C). They may construct public works (infrastructure) appropriate to the production of public goods and services (I). Finally, they may do all things otherwise necessary and proper to administer the activities appropriate to such matters (X). While these six sources of authority do not exhaust the menu of powers available to local government, they are the most important from the standpoint of their potential for earthquake loss mitigation.

Another policy taxonomy is embedded in the nature of damages attributable to a major seismic disturbance. Structures collapse or are rendered uninhabitable or useless for their purposes as a result of severe ground-shaking, subsidence or slides. These primary damages occur in the first few moments of the quake's onset. In the private sector many residences, commercial buildings and industrial structures will suffer damages depending in large part on their construction (S1). The losses here include the costs of repair (or site clearance and structure replacement). In the public sector it is the basic infrastructure of the community which is damaged -- streets, water delivery and impoundment systems, bridges and overpasses, power and communications lines, natural gas pipelines, sewerage systems and treatment plants, airport runways and traffic control systems, as well as hospitals, schools, fire and police stations (I1). The losses from such damage may take the form of severe deprivation and hardship visited upon the community from the loss of services dependent upon such infrastructure. Furthermore, the ultimate costs of replacing such facilities is a major dimension of these losses.

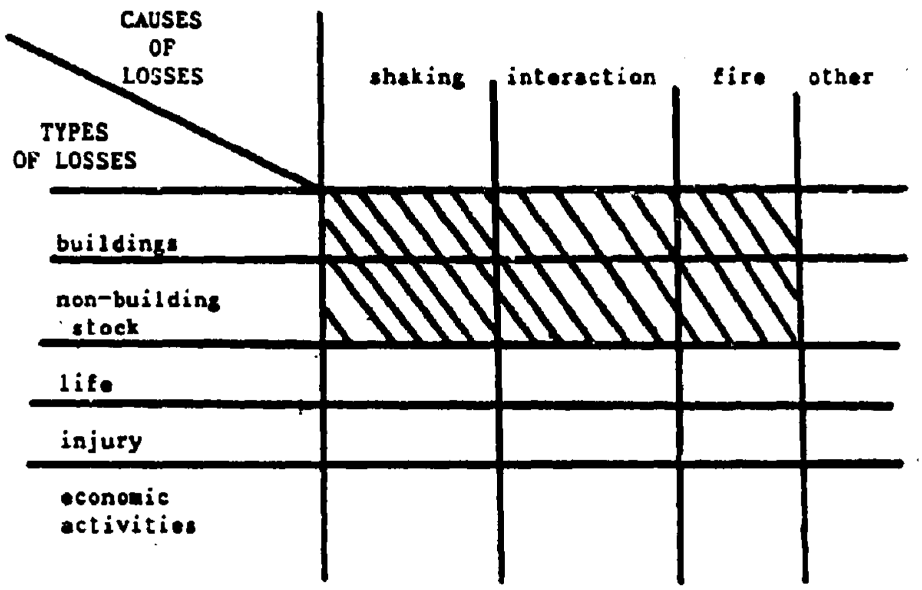
Collapsing structures can kill and injure large numbers of people (M1), depending on the moment the disaster strikes: early on a weekday afternon schools, stores and places of employment will be crowded while the pre-dawn hours will find most at home in bed. The morbidity and mortality consequences of such disasters -- the human costs -- are what really engage public concern. The value of lives lost is difficult if not impossible to calculate; it would be virtually impossible to achieve any consensus on such a figure. The losses occasioned by injury only begin with medical costs of recovery; they must also include incomes foregone and the more intangible losses from pain and suffering.

Also prominent among the losses would be those resulting from secondary damage to private property (S2), infrastructure (I2) and human beings (M2), caused by fire, looting, collapse of reservoirs, the exposure of structure contents to the elements -- all following the initial seismic shock.

Finally, large losses would result from the massive interruption of the local economy (E). Enormous stocks of capital are erased, the transportation of goods and services brought to a halt, the delivery of labor services impaired. The output of goods and services may be substantially reduced for weeks. An even more visible interruption in the economy may take the form of large numbers of homeless people who may become totally dependent on public support during the early stages of recovery.

It is beyond the scope of this project to address the full catalog of losses possible in a major earthquake in the Los Angeles area. Our attention was focused on direct and secondary impacts on the private building stock as well as on other elements of the built environment (elements of public 'infrastructure'). The shaded areas of figure I.1 denote the limits of the study.

FIGURE I.1: LIMITS OF THE STUDY



The systematic process of identifying policies for study began with the proposition that the mitigation of prospective loss from a major seismic event is an appropriate object of public policy for local governments in California, including the invocation of the police powers to protect the health, safety and welfare of the citizenry of Los Angeles. We were then led to examine each of these powers, raising the question each time: can this power support one or more activities which might have the effect of reducing the losses the community would suffer from a disaster event?

While the fundamental purpose of the power to tax is to raise revenue for the conduct of the affairs of government, its ability to create incentives to induce private individuals and firms to conduct themselves in manners consistent with public policy has often been exploited as a positive instrument of policy. With respect to the seismic threat, the induced behavior that would mitigate prospective losses might be manifested as private parties making structural improvements in structures they own to increase the ability to withstand seismic shaking. Accordingly, we designed a policy which would offer limited financial support to property owners to do things that are both in their interests and those of the general public:

1. offer a tax subsidy of up to 20% of current local property tax obligations to offset the costs to property owners of improving the ability of residential structures to withstand seismic shaking, subject to prior approval by the appropriate city agency (ta).

The regulatory authority available to local government under the implicit police powers of the state is the basis for negative incentives with respect to private behavior inconsistent with the health, safety, welfare and morals of the community. To mitigate the losses from seismic events that authority could support regulations governing matters ranging from construction standards and zoning to the provision for the safety of structure occupants. Our review of the mitigatory potential of public regulations led us to add the following measures to the project's policy menu:

2. require retrofitting and upgrading of all nonconforming private buildings to current structural standards within five years (pa);

3. require every large private establishment in the city limits to file with the City a 'private agency crisis plan' to minimize injurios and loss of life at such sites in the event of a major earthquake (pb);

4. prohibit the storage of materials of prospectively hazardous to life and property within the city limits of Los Angeles (pc);

5. rezone to low-density uses all areas within the city limits threatened by slides, liquifaction, subsidence, or inundation (pd);

6. restrict the current occupancy of places of public assembly to reduce the exposure of individuals to death and injury in the event of a major earthquake (pe).

The eminent domain powers of local government would make it possible both to take private structures for direct public use and to take property which presented unusual hazards to the public in the event of an earthquake. To the list of possible policies, we add measures that would:

7. set up within two years 500 fully equipped emergency shelters around the city to take care of those homeless and displaced after major earthquakes (ea);

8. acquire and demolish nonconforming structures posing unusual threats to life and property (eb);

9. acquire land and structures in hazardous areas subject to liquefaction and sliding to prevent further development of such areas (ec).

The authority to use public funds to do all things reasonable and proper to implement p--per public purposes provides the general powers that support much local public policy and is restrained only by the rule of reason. In the case of earthquake loss mitigation we would include in the list the following measures authorized by this local government power:

10. provide standby capacity or redundancy at vulnerable points in public infrastructure systems, such as roads, electric power distribution systems, sewerage, etc. (ia);

11. participate in joint powers agreements with other local jurisdictions in the metropolitan area to pool emergency powers, facilities, equipment and command responsibilities (ib):

12. conduct in schools, neighborhood centers and through the media public information programs with respect to the threats posed to life, limb and property by a major earthquake and to individual actions to minimize its effects on them, their families, employees and other charges (ic).

The power to enter into contracts allows the local government to solicit commitment from private (or public) agencies and groups to carry out provisions of public policy not easily achievable under other powers. For earthquake loss mitigation, we add the following measure to policy list:

13. offer public subsidies to firms and other private agencies to enter into emergency response training programs for employees, students and regular clients (ca).

Administrative powers offer a broad grant of authority to local governments. These powers can provide substantive support for programs in terms of planning, coordination and consultation. Several such internal measures are appropriate to our policy menu:

14. join with the California Department of Transportation and other local transportation agencies in the area to create a regional emergency transportation plan (xa);

15. establish a working interdepartmental coordinating committee to integrate plans for emergency public health and safety services (xb);

16. purchase insurance on local public buildings and structures against loss attributable to earthquakes (xc);

17. develop a standby emergency communications net among key administrators within the city and among local governments in Southern California (xd);

18. require all departments and agencies of the City to submit to the Mayor within six months emergency management plans assuming a major earthquake within ten years (xe);

19. establish a crisis command system within the City government with appropriate standby emergency powers to deal with the aftermath of a major earthquake (xf).

Our approach to generating a policy menu of nineteen elements was to take the policies generically rather than specifically, even though the expression of them was made specific to give panelists some sense of concreteness. Figure I.2 places these policies in a matrix which relates them to the policy taxonomies discussed at the outset.

FIGURE I.2: POLICIES BY SOURCE OF AUTHORITY AND FORM OF LOSS ADDRESSED

(see text for key to symbols)

FORM OF LOSS:	POWERS: p	t	e	i	c	x
(included)						
S1	a,d	a	b,c			
S2	,c		b			
I1	a			a		a,b,c
I2				a		a,b
(omitted)						
M1	b,c		a,b	c	a	b
M2	b,c		a,b	a,c	a	b
E				b		d,e,f

The first task for panelists engaged in the policy review exercise was to help us distinguish policies-in-effect from the list in order to identify candidate policies from which we would chose those to test in the policy model. The concept of 'policy-in-effect' is more elusive than at first appears. To begin, the term 'policy' has two common meanings:

1. a policy may be an authoritative statement about intentions to pursue a certain course of action;
2. a policy may also mean a public purpose toward achievement of which activities have been organized and resources made available.

Our approach was to invoke the judgments of a panel of experts on seismic risk in Southern California. We invited a number of officials of state and local government agencies and private firms who were responsible for rendering advice to their institutions on earthquake preparedness to serve on a Delphi panel to explore this and other relevant matters. Sixteen panelists served throughout this exercise.

To help us identify the City of Los Angeles' policies-in-effect to mitigate losses from earthquakes, we asked panelists to examine the policy menu to give us their understanding of the status of each using the key in Figure I.3.

FIGURE I.3: POLICY STATUS KEY

10. I know that this (or a very similar) policy has been adopted and is being aggressively implemented.

9. I know that this (or a very similar) policy has been adopted and is being routinely implemented.

8. I know that this (or a very similar) policy is on the books but is not being currently implemented.

7. While such a policy is currently in effect, I expect it to be rescinded or substantially modified within the next year or two.

6. While I do not know for sure, my impression is that such a policy is in effect.

5. I know that such a policy has been adopted.

4. I know that a policy very similar to this is currently being seriously considered and there is a strong likelihood that it will be adopted within the next year.

3. I know that such a policy has been seriously entertained by responsible authorities within the last two or three years and rejected.

2. To the best of my knowledge such a policy has not been seriously considered for adoption in recent years.

1. In my judgment such a policy is never likely to be a serious candidate for adoption.

0. I have insufficient information to make any judgment about the policy status of this item.

Answers to these questions generated a set of frequencies by categories which reflected:

1. the nature of the respondent's information;
2. his or her sense of certainty;
3. his or her conclusion about whether the policy was in effect.

Since these categories were not so structured as to permit any direct scaling of the answers, we employed a set of weights designed: [1] to distinguish judgments that a policy was in effect (+) from those for which that was not the case (-); and [2] to measure the conviction of the respondent about his or her answer. This exercise resulted in an interpretive scale of positive values $0<a<10$ and negative values $0>b>-10$. From this we defined a measure of the strength of conviction (S), which was simply the sum of the absolute values of the positive and negative scores:

$$0 < S = |a| + |b| < 10$$

Low values of S represented uncertainty and lack of conviction on the part of the panel as a whole. We then defined a measure (I) of the degree to which <u>positive</u> responses dominated the panel's collective opinion. That is, responses asserting that the policy element was, indeed, part of the City's earthquake damage mitigation policy were defined:

$$I = |a|/S.$$

This model suggests that if all of our policy elements were clearly described, if all of the experts were perfectly informed and if there was no ambiguity in the facts about policy elements, we would expect the following results:

$$I(j) = 1, \quad S(j) = 10, \text{ and}$$

$$I(k) = 0, \quad S(k) = 10$$

where, j designates a member of the set (m) of policies-in-effect;

k designates a member of the set (19-m) of policies-not-in-effect.

At the other extreme, the experts could be ignorant but honest, the facts difficult to ascertain and the statements of policy elements ambiguous. We would then expect to find:

$$I(j) = 0, \quad S(j) = 0, \text{ and}$$

$$I(k) = 0, \quad S(k) = 0.$$

What we actually discovered in the results is not the discontinuity between J and K that the ideal case would have us expect, nor the collapse of the distinction between J and K, but an irregular gradient between what appear to be 'j-cases' and 'k-cases'. J and K are taken to consist of six and eight policy elements respectively, while the remaining five cases fall between J and K. These five cases reveal the effects of ignorance on the part of the panel, ambiguity in the actual cases or a failure in our description of the policies. The results of this analysis are in column 1 of Table I.1.

TABLE I.1: ANALYSIS OF POLICY DELPHI*

Policy element	1 Is policy NOT in effect ? (i)	S1 0 to 1	rank	2 Is policy Feasible ? (f)	S2 0 to 10	rank	3 Is Adoption Urgent ? (u)	S3 0 to 10	rank	4 A POLICY OPTION? Reasons ?	5 Policy Object (See Key Below)
1 20% Tax Credit to Earthquake-proof Residences	Yes	.81	2.5	No	3.5	14.0	No	4.3	14.0	NO f,u	S
2 Emergency Transportation Plan for Region	?	.35	11.0	Yes	6.6	5.0	Yes	6.4	6.5	YES	E
# 3 Upgrade Nonconforming Structures	No	.19	14.0	No	1.6	16.5	Yes	6.4	6.5	NO e,f	S
# 4 Establish Interdepartmental Coordinating Committee	No	.00	18.0	Yes	6.2	7.0	Yes	6.4	6.5	NO e	L,E
5 Acquire Property in Hazardous Areas	Yes	1.00	1.0	No	1.6	16.5	No	2.3	19.0	NO f,u	S
# 6 Joint Powers Agreements among Local Govts.	No	.25	12.5	Yes	6.5	6.0	Yes	6.0	10.0	NO e	E
7 Acquire Insurance for Public Buildings	?	.58	7.5	?	4.7	11.0	No	3.6	16.0	NO e,f,u	E
8 Prohibit Storage of Hazardous Materials	Yes	.81	3.5	No	4.0	13.0	No	4.8	12.0	NO f,u	S,L
9 Restrict Occupancy of Public Places	?	.58	7.5	No	1.3	19.0	No	3.0	17.0	NO e,f,u	L
#10 Standby Capacity in Infrastructure	No	.25	12.5	?	4.4	12.0	Yes	6.4	6.5	NO e,f	E
11 Subsidize Emergency Response Training	Yes	.88	2.0	Yes	3.6	8.0	No	4.2	15.0	NO u	L
#12 Emergency Communications Net	No	.11	16.0	Yes	6.9	2.5	Yes	7.2	2.5	NO e	E
#13 Rezone Hazardous Areas to Low Density	Yes	.93	2.0	No	2.3	15.0	No	2.0	18.0	NO f,u	S
14 Condemn & Demolish Nonconforming Bldgs.	?	.56	9.0	No	1.3	18.0	No	5.2	11.0	NO e,f,u	S
#15 City Agencies to Draw Up Emergency Management Plans	No	.12	15.0	Yes	6.9	2.5	Yes	7.0	4.0	NO e	E
16 Require Crisis Response Plans of Private Firms	Yes	.72	6.0	?	4.9	9.0	Yes	6.2	9.0	YES	L
#17 Public Information and Instruction Program	No	.00	18.0	Yes	7.4	1.0	Yes	7.2	2.5	NO e	L
#18 Set Up a Crisis Command Center in City govt.	No	.00	18.0	?	4.8	10.0	Yes	7.9	1.0	NO e,f	E
19 System of Emergency Shelters	?	.52	10.0	?	4.8	10.0	No	4.5	13.0	NO e,f,u	L

Benchmark Policies

S1 = Score on Question 1
S2 = Score on Question 8.
S3 = Mean Score on Questions 4, 6, and 9.

S = Structures
L = Life and Limb
E = Recovery

*Readers should beware of the convention in the table that poses the interpretive question about policies-in-effect in the negative: policies-in-effect are identified by a NO answer to the question, 'Is policy NOT in effect?' By our rating system, perfect panel consensus on the judgment that a policy is in effect is reflected by a score of zero or a NO answer; similarly, perfect consensus that a policy is not in effect is represented by a score of 1.00 and a YES answer.

Policies on which the panel was unable to agree were defined as those with scores between 0.35 and 0.65, and identified with a question-mark. Of the nineteen policies on our menu, the panel concluded that eight were already in effect. These constituted our policy benchmark. Of the remainder, the panel concluded that six were not now in effect and that five more might not be, leaving a modified policy menu of eleven candidate policies.

Columns 3 and 4 of Table I.1 set out the panel's assessment of the feasibility and the urgency of the various policies. Some of the conclusions appear to be:

1. eight of the ten policies rated 'urgent' by the panel are benchmark policies and all of the benchmark policies were considered to be urgent;

2. only one of the six clear candidate policies was construed to be urgent by the panel; of the remaining five, four were considered infeasible;

3. only one of the five uncertain candidate policies was considered to be feasible;

Overall the panel's response seemed to tell us that the City of Los Angeles has done a good job of designing and adopting an overall earthquake mitigation policy. It would, by inference, recommend only two additional policies from our policy menu as being urgent and feasible:

2. an emergency transportation plan for the region;

16. a requirement that large private firms prepare crisis response plans to be filed with the City.

Our review of the panel's judgments leads us to the conclusion that it is conservative with respect to prospective mitigation policies. Of the six policies listed in Figure I.2 that required governmental intervention in the exercise of private property rights, five were found to be infeasible and deferable. The sixth, 'upgrading nonconforming buildings', was found to be urgent if infeasible (and probably already in effect).

It was clear that we could not limit ourselves to those policies which met the three-fold test:

1. is the policy already in effect?
2. is the policy feasible?
3. is the adoption of the policy urgent?

No policy meets that test beyond any doubt. Even stretching things would only have added #2 and #16. These are basically planning activities whose consequences for damage mitigation strategies would be difficult to specify.

Once we made the decision to confine this part of the research effort to policies which would have an effect on the prospective damage to structures, our attention was drawn to the five policies which dealt with structures and which were not in effect ('S' in column 5 of Table I.1). From these we selected three quite different policies to test:

1. 20% tax credit to earthquake-proof private residential structures;

8. prohibition storage of hazardous materials within city limits;

14. condemnation and demolition by the City of buildings nonconforming with respect to capacity to withstand seismic shaking.

In addition, we chose a policy which the panel took to be in effect:

10. adding standby capacity to key infrastructure systems.

We added this policy because we found that we had not conveyed effectively to the panel what the policy should include and because we wished to test our policy model on a more 'conventional' policy.

These four policies play a major role in the exercises discussed in the following chapters and, of course, in simulations by the policy model.

CHAPTER II: DATA INPUTS

A major contribution of our model is to be found in its accounting framework which can process diverse kinds of available information to develop outputs having a substantial policy interest. From the beginning we hypothesized that the data to implement such a model are available, even if from diverse and non-traditional sources. This prototype application of the model to the city of Los Angeles was an attempt to test that hypothesis. We can now report that enough information does exist and can be developed to implement the model. This chapter reviews the data sources as well as the data manipulations that implemented the model.

For the policy model to carry out its functions, its accounts require information on such matters as:

1. the likelihood that major seismic events will occur wihtin the regional fault structure within the near future;
2. the ground-shaking that any such event(s) will generate in all parts of the city;
3. the effects of ground-shaking on all significant classes of structures (privately owned and others) within the city;
4. valuation of various levels of damage to various classes of structures:
5. distributions of structure classes among various parts of the city;
6. the effects of alternative policies on the expectation of loss by the various classes of structures;

7. the costs to the taxpayers of carrying out such policies;

8. the income distribution of households in the various parts of the city;

9. the incidence of policy costs on the taxpaying public, by income class.

Such a data specification can only be satisfied by bringing into the model data from a multitude of sources. In some cases, the data were readily available in a form consistent with the model. The City's LUPAMS file, for example, presented us with information about the distribution of structures in the various planning districts. Other information had to be inferred from data from more general sources such as that about non-private structure values and the incidence of various taxes on income groups in the taxpayer population.

Some kinds of information, however, were not directly derivable from data sources we had searched out, nor could they be easily derived from conventional information available to us. Algermissen et al. had generated the well-known structure-type damage curves by MMI measures. To work within our model, these curves had to be adjusted to basic assumptions implied by the model and extended to account for damage to public facilities and infrastructure. We also required general information about the costs, status and usefulness of various policy options; these would have been laborious and expensive to estimate, item by item. The need for information having these characteristics was satisfied by employing judgmental inputs, disciplined by the methodology of the Delphi technique.

There is nothing arcane about the way in which individuals or organizations deal with uncertainty when they have no easy way to reduce that uncertainty: we ask those who are in a better position than we are -- the 'experts' -- to give us their best informed guess. We recognize that the experts probably disagree to some degree on the matters at hand. Given some such 'dissensus' among experts, most of us would like to think that judgments close to the center of the array of opinion are somehow more credible than those at the extremes, and thus we would like 'our' expert to be in the middle. But how do we know that until he or she has rendered judgment? We don't. So, to protect ourselves from ending out on a limb, we elect to consult either the whole universe of experts or a carefully selected panel thereof. We propose to consider that consensual values elicited therefrom are 'truer' than the judgment of any individual. We could, of course, assemble the panel in a hall and ask them to agree on the appropriate answers to the questions we put to them. These could be discussed, debated and put to the vote. If the vote in favor were unanimous, then the content of that resolution would represent the judgment of experts. But what if the vote were 56 to 44? The notion of majority rule has some relevance to social preferences but does very little to validate the 'truth' or establish fact, per se. In both of these cases polemic and personal force can count for as much as reasoned discourse.

The Delphi technique offers a means of minimizing these hazards. It permits us to interrogate each of the members of a 'panel' of experts in such a way that the judgments of each are treated confidentially but are disciplined by the knowledge that the other members of the panel will respond to the same questions. Typically, the analyst will aggregate the panel's individual responses into a two-dimensioned 'panel response', in terms of the central value of the panel's answers and a measure of dispersal (dissensus). In the conventional Delphi procedure such summary statistics are shared with each panelist, who is given an opportunity to review and amend his or her answer in light of this information. This modified information is analyzed and the new central value construed as the panel's answer, especially if smaller measures of dispersion suggest some degree of 'convergence' toward a concensual value by panelists.

Needless to say, the outcome of such a procedure depends heavily on the composition of the panel and on the breadth and complexity of the matter of the inquiry, factors which are not unrelated: the narrower the question the easier it is to specify the relevant domain of expertise. Not only that, but the more specialized the expertise appropriate to a collective best judgment and the greater the degree of consensus that one would expect to find. On the other hand, broad, messy questions often involve several kinds of specialized experience and make appropriate a more heterogeneous panel and a lower expectation of consensus. What becomes important with such questions is that the panel be larger than one dealing with narrow questions and be selected without obvious bias.

Our policy questions were broad and messy, so a small, professionally homogeneous panel would not have served us well. We wanted judgmental information about the current status of policies, about their costs and benefits and the incidences of same, about their feasibility, and about their urgencies. Engineers, planners, geologists, economists, and public officials, all have something to say on matters dealing with the mitigation of earthquake damages, and the authority of no one can be said to preempt the authority of the others.

Accordingly, we first compiled a master list of approximately sixty experts in public and private sectors in Southern California identified by inquiries to the relevant agencies of local governments in Southern California and by our own experience with the field. We then asked each member on the master list independently to nominate a slate of experts on local earthquake matters, and the master list was reorganized by the frequency with which individuals were identified in the nomination exercise. We invited the thirty top-ranked experts to serve on our policy Delphi panel; of these approximately twenty accepted, and sixteen of these participated throughout the policy inquiry. We could perceive nothing in this panel selection process that would 'stack the deck' with respect to answers to any of our inquiries. At the same time we have no reason to believe that the panel was an ideal sample of the universe of the sixty experts on the master list.*

The form of the policy questions posed to the panel provided devices by which panelists could disqualify themselves from answering specialized questions on which they themselves wished to deny any imputation of expertise (the 'O-option'). In assessing the private (nontaxpayer) costs panelists availed themselves of this option in approximately one-third (32.2%) of judgments sought, while in making judgments about

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*This procedure was modified somewhat with respect to the damage curve inquiries (below). The panel was enriched by adding several engineers and geologists from other parts of the state to the group.

public (taxpayer-borne) costs less than a fourth of the answers were 0. We accepted each panelist's implied judgment that he or she themselves as expert on any matter on which they submitted an answer > 1. We are not protected from the prospect that some experts may overestimate their expertise, or that some entering zero may underestimate themselves and so deprive us of the value of their judgment.

The Delphi technique produces judgments not 'facts', but where 'facts' cannot be established such judgments are the best informed guesses about the facts that expertise in a particular matter has to offer. Only history or the emergence of superior information can preempt them.

URBAN 'CONTEXTS'

Building damages usually attract much of the attention after major earthquakes. Yet the ravages of a major earthquake are not limited to buildings; they include significant damages to the rest of the physical city. While there are empirically based methods for predicting damages by different building types for different magnitudes of earthquake, no such methods exist for estimating the residual non-building damage. In this study we are interested in both the building damage and the residual non-building damage since the policy evaluation model is predicated on damage estimates for the entire physical city. We needed, then, to develop damage loss curves similar to those existing for building types for the rest of the urban physical stock -- underpasses, retaining walls, signs and billboards, transmission towers, streets, pavements, utilities, street furnitures, and the like.

Previous damage loss studies (Algermissen et al., 1978; Spangle and Degenkolb, 1984) have almost exclusively focused on building types, begging the question of estimating the residual damages to the physical city. Yet, there is ample evidence that non-building stock damages could be substantial.

During the 1971 San Fernando earthquake, for example, damage to one of the dams reduced its effective height by about 30 feet; displacement along the fault line sheared or damaged underground water, sewer and gas pipes; forty-two bridges or overpasses were damaged of which five collapsed. Although dollar costs are not known for many of these non-building stock damages, it is known that damage to the highway and road system alone amounted to over $36 million dollars.

We have found no damage ratios for the non-building stock. There are several reasons for this. It is possible that, given the miscellaneous nature of the residual damage, estimates are never quite complete or systematic. Many of these items fall in the public sector so that costs of repair or replacement are likely to be distributed among several agencies. Unlike individual buildings, these urban hardware items may not always be covered by insurance, and hence may not be subject to damage assessment. Furthermore, many of these elements are not as discrete as individual buildings, or are too numerous to be categorized under manageable headings. In other words, the absence of damage ratios for the non-building stock items can be attributed to both inadequate data and an absence of methodology.

In the absence of objectively derived damage curves for non-building stock losses, we adapted the Delphi methodology to generate damage curves for such losses from expert judgments. It was obvious at the outset that some form of abstraction was necessary to describe the variable features of the physical city. The critical assumption was that given some plausible global descriptions of urban settings, panelists would be able to estimate the overall residual environmental damage by such types of urban settings. What was needed, then, was an operational typology of urban settings similar to the widely used building typologies.

The development of such a conceptual model was considerably facilitated by the availability of a citywide data file (LUPAMS; Land Use and Planning Analysis and Management Systems) from the Los Angeles City Planning Department. The LUPAMS file is a master data file which compiles information from records of the Los Angeles County Assessor's file, the City Clerk's office, the City Planning Department and the Community Analysis Bureau. It includes land use, property values, zoning, jurisdictional and city services data for most of the over half-million parcels in the city of Los Angeles. As shown in Table II.1, LUPAMS offered enormous amounts of physical and wealth data, useful not only in estimating value at risk, but also in constructing physical descriptors of possible classes of urban areas.

In Figure II.1 we show our general approach to develop the typology of urban settings or contexts. The methods for classification were statistical, based on a set of relevant variables taken from the LUPAMS file. We chose census tracts rather than individual parcels as the appropriate unit of analysis since the state of parcel level data were enormous. This required creation of a new file of aggregated parcel data by census tracts for selected variables.

There was another justification for using census tract-level data. For all of its richness, the LUPAMS data file has one deficiency -- it does not include any assessment-related information on parcels under public ownership or other parcels with tax-exempt status. At the census tract level problems of missing data would be reduced.

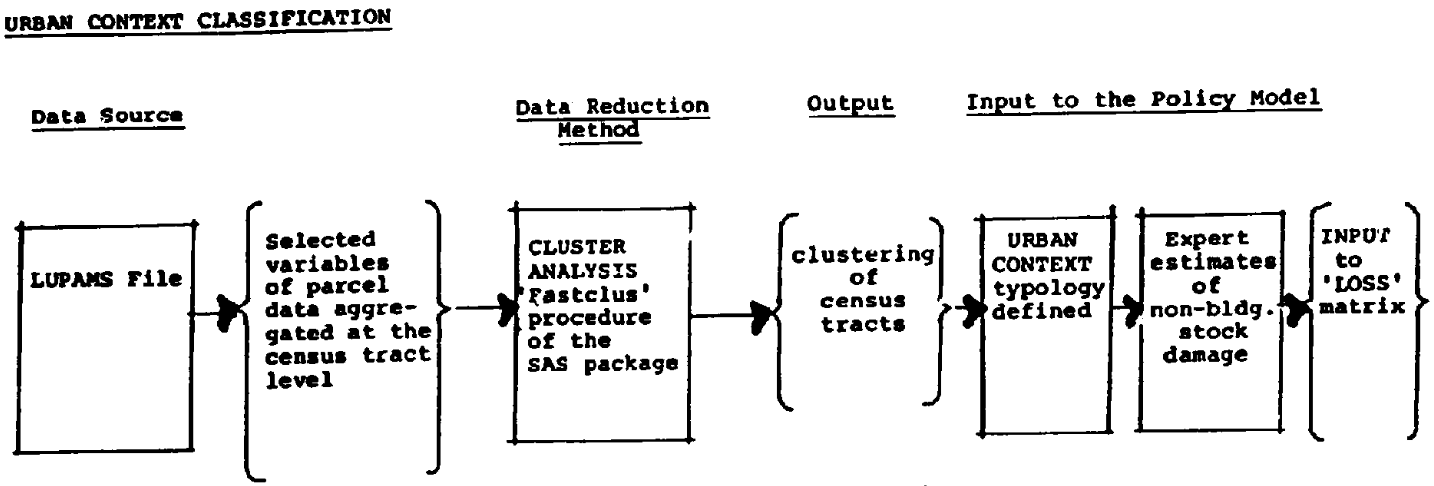


FIGURE II.1: PROCEDURE FOR DEVELOPING TYPOLOGY OF URBAN CONTEXTS

TABLE II.1: GENERAL ITEMS OF THE LUPAMS FILE

Los Angeles County Tax Assessor's Secured File

1. Agency classification numbder
2. Assessor' mapbook, page and parcel number
3. "Market" land value
4. "Market" imnprovement value
5. Personal property value and exemption
6. Inventory value and exemption
7. Fixture value and exemption
8. Other exemptions -- real estate and homeowner
9. Tax code area
10. Owners' name
11. Owners' mailing address
12. Parcel address (Situs)
13. Zoning
14. Assessor's property use classification
15. Building data line items (first five improvements)
    - (a) Design type
    - (b) Construction class and building shape
    - (c) Year built
    - (d) Number of units
    - (e) Number of bedrooms
    - (f) Number of bathrooms
    - (g) Gross floor area

City Clerk's Office

1. Parcel area
2. Census Tract
3. Census Block
4. Council District
5. Community Number
6. SCAG Land Use Code

Planning Department

1. Planned land use
2. Zoning corrections
3. Public owned land/land use
4. Home ownership code
5. Condominium indicators

Community Analysis Bureau

1. Police reporting district
2. Fire engine first-in-district
3. Corrected Dwelling Unit counts
4. Weed aoatement key

Table II.2 lists the variables which were selected from the LUPAMS file. The parcel-level data were aggregated to the census tract level for each of these variables. Furthermore, population and acreage data for census tracts were available from 1980 Census files and merged with the reduced LUPAMS file for the 734 census tracts which lie within the city boundaries. Several new variables using derived measures were also created; these are explained in the note accompanying Table II.2.

TABLE I? 2: LIST OF VARIABLES USED IN CLUSTER ANALYSIS

- Parcel Area (PCL-AREA)
- Building Improvement Area (BDGIMPRV) *
- Class "A" Structures (BCA)
- Class "B" Structures (BCB) *
- Class "C" Structures (BCC) *
- Class "D" Structures (BCD) *
- Class "S" Structures (BCS) *
- Building Quality 1 (BDC1)
- Building Quality 2 (BDC2)
- Building Quality 3 (BDC3)
- Building Quality 4 (BDC4)
- Building Quality 5 (BDC5)
- Building Quality 6 (BDC6)
- Building Quality 7 (BDC7)
- Building Quality 8 (BDC8)
- Residential Land Use (UC0) *
- Commercial Land Use I (UC1) *
- Commercial Land Use II (UC2) *
- Industrial Land Use (UC3) *
- Irrigated Farm Land Use (UC4)
- Dry Farm Land Use (UC5)
- Recreational Land Use (UC6)
- Institutional Land Use (UC7)
- Miscellaneous Land Use (UC8)
- Structures Built Before 1935 (YR1T34) *
- Structures Built Between 1934 and 1973 (YR35T73) *
- Structures Built After 1973 (YR74T85)
- Property Value (VALPAR) *
- Floor Area Ratio (FAR) *
- 1980 Census Gross Density (DEN80) *
- Year Built (BYEAR)

NOTE: (a) Property Value and Floor Area Ratio are derived measures. They were computed as follows: Property Value = (Market Land Value + Market Improvement Value)/Parcel Area. Floor Area Ratio = Building Improvement Area/Parcel Area.

(b) Asterisks indicate variables with R-squared values greater than .25 (See Table II.3, Results of the FASTCLUS procedure). These variables were used to name the six operational clusters (See Table II.4 and Figures II.3 and II.4)

Of the available statistical classification techniques (Figure II.1), cluster analysis is the most appropriate. It has emerged as a popular strategy for taxonomic analysis in such widely diverse fields as botany, education and clinical psychology. Recently it has been applied successfully in urban social area analysis (Kendig, 1976) using demographic data at the census tract level. We used the 'FASTCLUS' procedure of the SAS (Statistical Analysis System) package, which is best suited to large-scale files.

FASTCLUS requires a priori specification of the number of clusters desired. Our experiment with several different specifications indicated the categories at the level of six clusters were consistent with our operational point of view.

Results from the six-cluster FASTCLUS calculation are reported in Table II.3.

The table shows that the bulk of the census tracts were included in the two main clusters -- one and six -- with memberships of 470 and 210 tracts, respectively. The next largest cluster included 31 census tracts. The remaining clusters are much smaller; the fourth cluster only contains one census tract. It should also be noted that only about half of the variables played any significant role in differentiating cluster characteristics. Only these variables were used to name the clusters.

TABLE II.3: RESULTS FROM THE FASTCLUS CALCULATION

FASTCLUS PROCEDURE

CLUSTER SUMMARY

CLUSTER	MEMBERS	RMS ST DEV	MAX DISTANCE FROM SEED
1	470	531.7771	9088.906
2	3	1928.08	10891.92
3	31	1535.518	18141.65
4	1	.	0
5	17	968.003	13514.73
6	210	732.8804	12200.37

STATISTICS FOR VARIABLES

VARIABLE	TOTAL STD	WITHIN STD	R-SQUARED	VAR RATIO
PCL_AREA	418.68804	411.43814	0.04553	0.04771
BDGIMPRV	2840.78173	1523.18568	0.73356	2.75332
BCA	3.07859	3.03073	0.03560	0.03691
BCB	2.84425	2.88214	0.20037	0.25057
BCC	9.75802	6.68844	0.53349	1.14360
BCD	12.28822	8.13607	0.56511	1.29946
BCS	1.41612	1.21853	0.25345	0.35767
BDC3	3,85176	3.80627	0.02957	0.03048
BDC4	18.21787	17.88037	0.14816	0.17631
BDC5	21.98796	21.55642	0.03663	0.03792
BDC6	21.35517	20.88555	0.05004	0.05268
BDC7	18.13761	18.18953	0.10280	0.11458
BDC1	3.88728	3.88857	0.00618	0.00622
BDC2	0.57838	0.57967	0.00242	0.00243
BDC8	11.22650	11.10429	0.02835	0.02917
UCO	16.15382	12.06253	0.44621	0.80574
UC4V	7.15481	7.15444	0.00697	0.00702
UC1	5.18103	4.06904	0.38977	0.63872
UC2	4.80321	3.65743	0.42418	0.73664
UC3	8.81028	6.99905	0.38720	0.63186
UC4	0.02779	0.02774	0.01017	0.01027
UC5	0.18680	0.18685	0.00526	0.00528
UC6	0.62187	0.61727	0.02180	0.02228
UC7	0.75650	0.69648	0.15819	0.18792
UC8	2.36753	2.22122	0.12580	0.14391
YR1T34	32.31934	27.83834	0.26314	0.35711
YR35T73	30.81453	26.62340	0.26342	0.35762
YR74T88	10.31600	10.27568	0.01459	0.01480
VALPAR	1035.37033	510.94195	0.75814	3.13456
FAR	10.83754	6.59642	0.63206	1.71785
DEN80	7584.20281	3485.27161	0.79026	3.76790
BYEAR	13.07974	11.53639	0.22739	0.29431
OVER-ALL	1451.52365	682.40020	0.78049	3.55565

APPROXIMATE EXPECTED OVER-ALL R-SQUARED = 0.8730   CUBIC CLUSTERING CRITERION =-17.3854
WARNING: THESE VALUES ARE INVALID IF VARIABLES ARE CORRELATED.
SAS

FASTCLUS PROCEDURE

CLUSTER MEANS

CLUSTER	PCL_AREA	BDGIMPRV	BCA	BCB	BCC	BCD	BCS	BDC3	BDC4	BDC5	BDC6
1	357.48	2059.47	0.33	0.15	2.30	96.73	0.43	1.48	8.60	27.36	30.52
2	293.96	30422.36	8.32	5.77	29.27	53.31	2.69	1.48	16.76	15.88	29.80
3	264.30	6561.37	0.19	0.55	10.21	88.44	0.57	0.71	12.83	33.07	30.51
4	428.00	32898.60	3.45	24.14	5.17	65.52	1.72	0.00	24.14	34.48	6.90
5	598.03	9383.67	1.88	5.78	47.94	38.14	5.15	1.28	9.44	38.53	13.00
6	183.82	2700.94	0.19	0.13	2.53	96.69	0.41	2.88	25.24	35.98	21.28

CLUSTER	BDC7	BDC1	BDC2	BDC8	UCO	UC4V	UC1	UC2	UC3	UC4	UC5
1	18.75	1.12	0.11	8.69	80.86	5.47	2.81	1.81	2.45	0.01	0.03
2	4.82	0.30	0.00	1.10	26.30	2.15	38.65	27.27	3.12	0.00	0.00
3	7.15	0.47	0.03	5.20	77.87	4.06	10.73	6.53	2.78	0.00	0.00
4	1.72	0.00	0.00	0.00	41.18	1.18	18.82	30.59	2.35	0.00	0.00
5	5.41	0.61	0.18	5.45	26.48	3.80	9.83	17.40	38.80	0.01	0.00
6	7.13	0.47	0.15	2.52	86.16	4.41	6.80	3.82	1.38	0.00	0.00

CLUSTER	UC6	UC7	UC8	YR1T34	YR35T73	YR74T88	VALPAR	FAR	DEN80	BYEAR
1	0.10	0.43	1.41	22.15	68.78	8.06	425.06	8.29	6547.58	48.18
2	1.32	1.64	1.71	43.28	48.49	7.23	5153.45	112.13	14348.67	41.10
3	0.16	1.32	0.61	61.35	38.49	8.20	1183.18	38.71	34846.13	39.02
4	0.00	2.35	4.71	29.41	38.71	30.88	23087.88	76.82	1463.00	52.87
5	0.18	0.68	6.90	29.06	62.82	8.12	780.47	22.84	4636.35	47.16
6	0.21	0.98	0.85	58.38	35.41	6.21	633.82	14.88	16377.03	34.45

CLUSTER STANDARD DEVIATIONS

CLUSTER	PCL_AREA	BDGIMPRV	BCA	BCB	BCC	BCD	BCS	BDC3	BDC4	BDC5	BDC6
1	498.306	817.374	3.537	1.232	4.331	6.294	0.921	3.678	14.710	22.460	21.810
2	71.820	8393.021	6.013	2.213	20.628	25.891	2.371	2.577	17.259	7.866	32.658
3	288.818	3192.698	0.428	1.037	16.184	17.694	1.169	1.313	18.145	21.221	18.256
4	.	.	.	.	.	.	.	.	.	.	.
5	404.074	4380.554	4.747	15.652	27.547	30.000	5.898	3.073	10.670	22.485	11.327
6	118.484	1718.651	1.320	0.817	3.688	4.558	0.810	4.686	23.784	18.828	18.354

CLUSTER	BDC7	BDC1	BDC2	BDC8	UCO	UC4V	UC1	UC2	UC3	UC4	UC5
1	20.586	4.541	0.438	12.449	11.174	8.318	3.045	2.444	6.644	0.034	0.232
2	2.711	0.515	0.000	1.218	24.801	0.772	16.734	8.519	4.178	0.000	0.000
3	8.648	2.405	0.081	11.189	17.874	3.382	6.188	5.184	11.412	0.000	0.000
4	.	.	.	.	.	.	.	.	.	.	.
5	8.031	1.160	0.483	18.205	28.931	2.610	9.188	12.880	24.530	0.024	0.000
6	13.142	2.306	0.848	6.077	10.218	4.808	4.597	3.968	2.488	0.000	0.017

In Table II.4 we present the distinguishing characteristics of the six clusters in descriptive fashion using such terms as 'few' or 'many', 'small','moderate','large' to make it easier for the reader to follow the variable profiles of the six clusters. These descriptors simply highlight the major features or tendencies among the clusters, and represent the mean cluster values of the fifteen critical variables used in their identification.

It is evident from these cluster summaries and the map of Los Angeles shown in Figure II.2, that the first cluster which includes more than half of all census tracts in the city, essentially represents the almost ubiquitious low-density single family residential areas that typify much of Los Angeles' suburban 'sprawl'. In the areas characterized by this cluster more than two-thirds of the buildings are likely to have been built after the Long Beach earthquake. About a fifth of the buildings are likely to be of the pre-1934 era. Relatively few structures are likely to have been built since the San Fernando earthquake. Over ninety percent of these areas are in residential use. With a gross density of ten persons per acre, this cluster can be best described as <u>Low-Density Residential Neighborhood</u>.

The second cluster contains only three census tracts and represents <u>Medium-Density</u>, <u>Built-Up</u>, <u>Mixed-Use Districts</u>, typically found in the inner city areas. This setting is characterized by older buildings, about two-fifths of which were built before 1934. Most of the remaining building stock were built between 1934 and 1973. About a third of

TABLE II.4: SUMMARY OF SIX CLUSTERS

Variables	Cluster Number 1	2	3	4	5	6
Suggested name	Low density residential neighbor-hood	Medium density built-up mixed use district	Older high density trans-itional neighbor hood	High rise high value business district	Mixed industrial commercial district	Older medium density mixed neighborhood
Year Built	Late forties	Early forties	Late thirties	Early fifties	Late forties	Mid thirties
Value of improvements	small	large	moderate	large	moderate	small
Reinforced concrete fireproof structures	----	few	----	many	few	----
Masonry, concrete brick structures	----	some	some	----	many	----
Wood or wood & steel structures	mostly	some	many	some	some	many
Specialized other types of bldgs.	----	few	----	----	some	----
Residential use	mostly	small amt	mostly	some	few	mostly
Stores, offices, shopping centers, hotels, motels	----	many	some	some	some	few
Restaurants, banks wholesale, parking	----	many	few	many	many	few
Industrial, MFG, warehousing, etc.	----	few	few	----	many	----
Built before 1934	----	many 43%	mostly 51%	some	some	mostly 58%
Built between 1934-73	mostly 78%	many 50%	some	some	mostly 53%	some
Average property value (land and improvement)	low	moderate	moderate	very high	low	low
Floor area ratio	low	high	moderate	high	moderate	low
1980 Census gross density	10	22	54	2	7	23

FIGURE II.2 City of Los Angeles

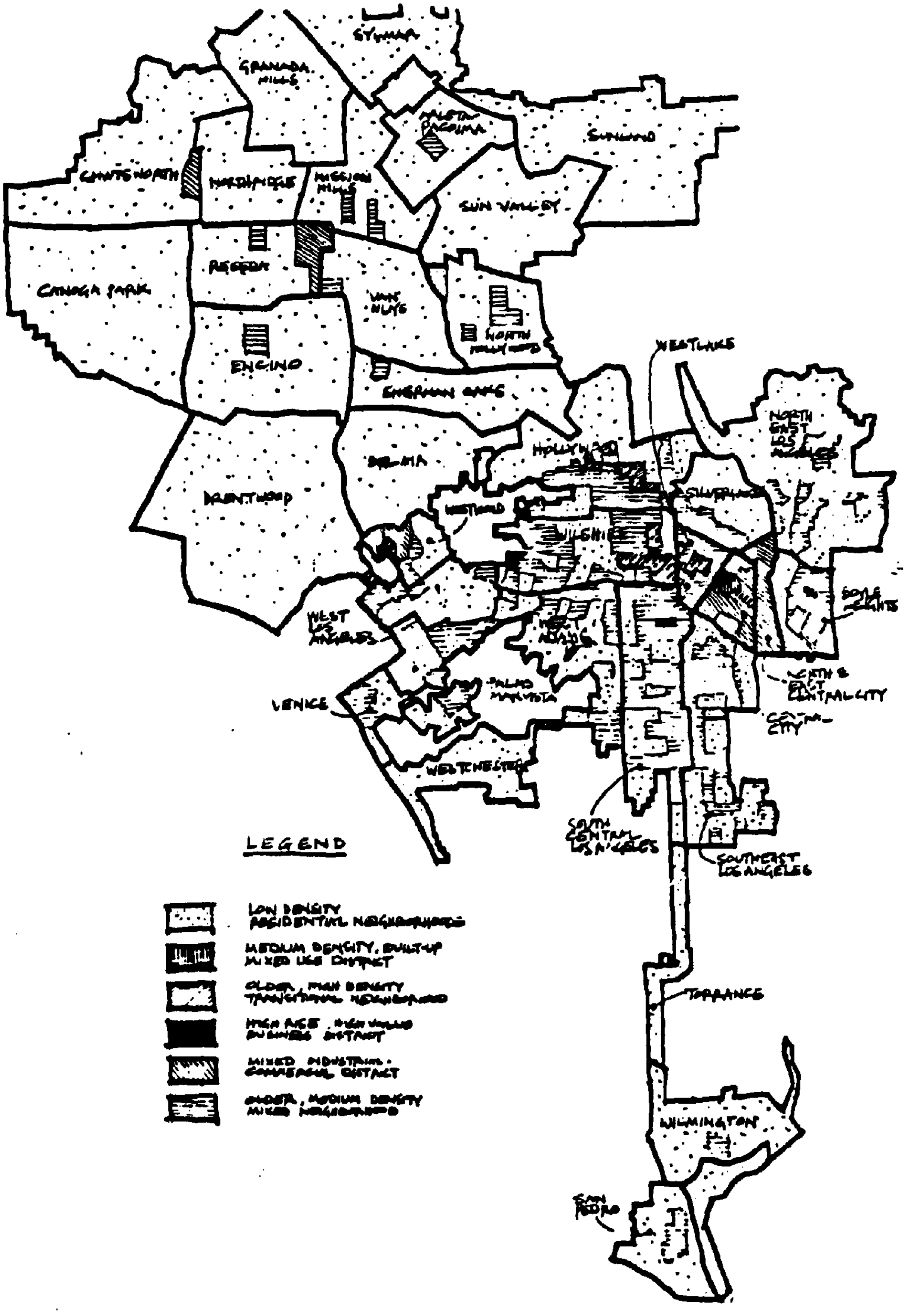


FIGURE II.2 (contd.) KEY TO MAP OF LOS ANGELES' PLANNING DISTRICTS
(order corresponds to matrices in Appendix E)

1. Arleta
2. Brentwood
3. Bel Air
4. Boyle Heights
5. Canoga Park
6. Central City
7. Chatsworth
8. Encino
9. Granada Hills
10. Hollywood
11. Mission Hills
12. N.E. Central City
13 North Hollywood
14. North-East L.A.
15. Northridge
16. Palms
17. Reseada
18. San Pedro
19. Sherman Oaks
20. Silver Lake
21. South-Central L.A.
22. South-East L.A.
23. Sunland
24. Sun Valley
25. Sylmar
26. Torrance Corridor
27. Van Nuys
28. Venice
29. West L.A.
30. West Adams
31. Westchester
32. Westlake
33. Westwood
34. Wilshire
35. Wilmington

all buildings are brick or concrete block masonry structures. More than half of all buildings, however, are wood, or wood and steel structures. Land use is mixed. About a fourth of the acreage is devoted to residential land use. Stores, offices, shopping centers, hotels, motels comprise about two-fifths of the acreage. Restaurants, banks, wholesale and manufacturing outlets, service stations, service shops, parking lots and garagess, automobile and equipment sales and service areas, constitute more than a fourth of all land use.

The third cluster is the third largest cluster with a membership of 31 census tracts. These settings can be best described as, Older, High-Density. Transitional Neighborhood. More than half of all buildings in these areas were built before 1934, and another two-fifths since 1934. Despite the large number of pre-1934 buildings, only about a tenth of all structures are brick or concrete masonry structures. Almost all of the rest are wood, or wood and steel structures. Residential use dominates, occupying over three-fourths of the land use acreage. But the fact that almost a quarter of total land use acerage is devoted to various types of commercial and industrial uses, suggests that the area is in transition. With a gross density of 54 persons per acre, this setting represents a high concentration of resident population.

The fourth cluster with membership of only one census tract represents the very heart of the downtown business district. It can be called High-Rise, High-Value, Business District. About two-fifths of the buildings were built between 1934 and 1973. Almost a quarter of all buildings are reinforced concrete fire-proof structures, representing the highest concentration of this type of building among all settings; most of the rest are wood or wood and steel-framed structures. Residential use represents only two-fifths of all land use acreage. Almost half of all land use is characterized by stores, offices, shopping centers, hotels, motels, restaurants, banks, wholesaling, parking, and the like. Both the value of real estate and the floor area ratio are the highest among all six settings.

With a membership of seventeen census tracts, the fifth cluster can be seen as Mixed Industrial-Commercial District. Three-fifths of the structures were built between 1934 and 1973. About a third were built before 1934. Almost half of all buildings are brick or concrete block masonry structures. Nearly two-fifths of the buildings, however, are wood or wood and steel structures. Industrial and warehousing uses dominate, accounting for about two-fifths of land use acreage. Commercial uses cover about a quarter of the area, while the residential uses occupy another quarter.

The sixth setting is the second largest cluster, with a membership of 210 census tracts. These areas can be best described as Older, Medium-Density, Mixed Neighborhoods. They have the largest concentration of older building stock with about three-fifths built before 1934. About a third of all their buildings were built between 1934 and 1973. Almost all of the structures are of wood or wood and steel construction. Residential uses dominate, with about nine-tenths of the land use acreage. The remainder consists of business and commercial establishments. With about 26 persons per acre gross density they are medium-density neighborhoods.

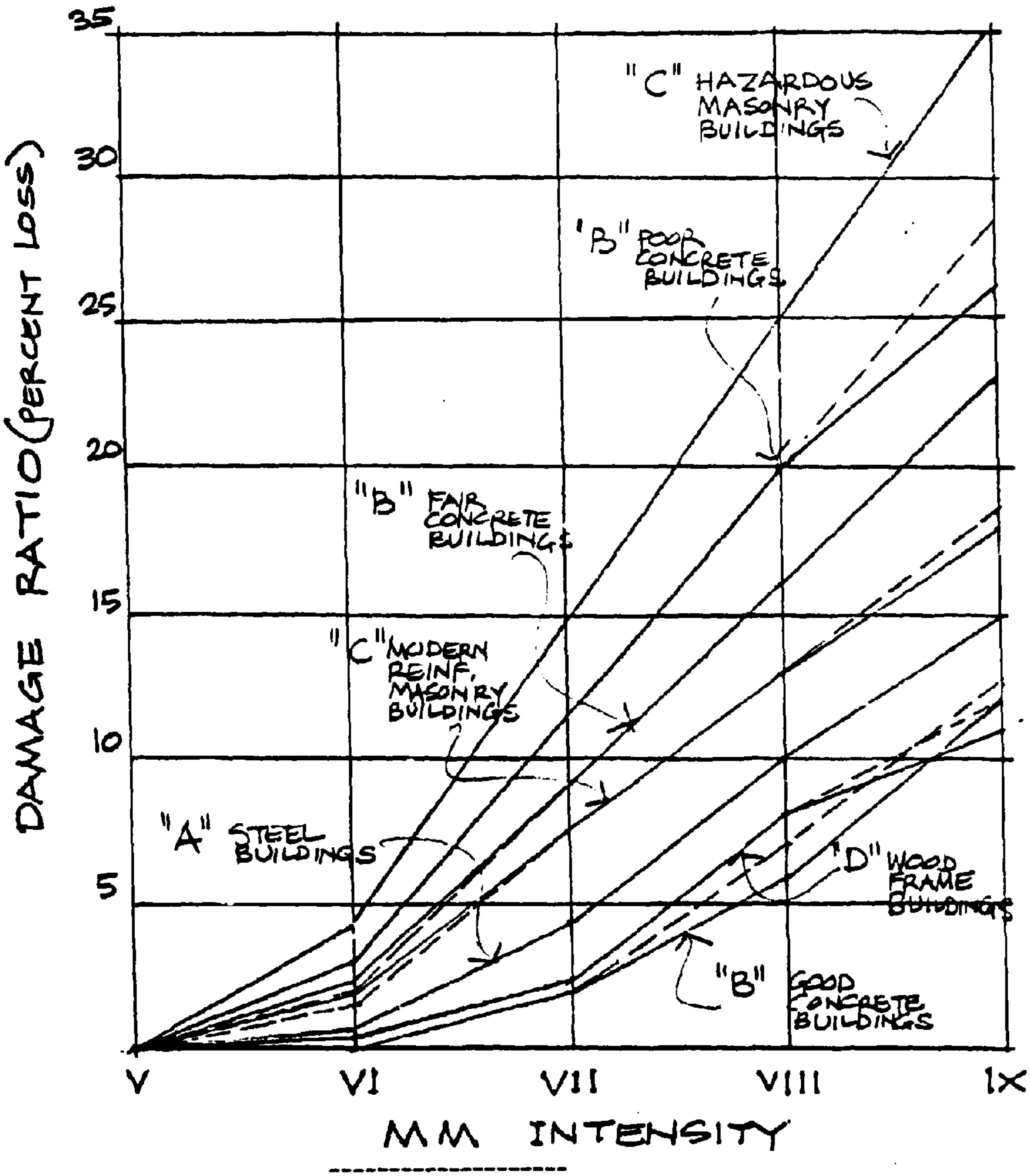
The summary characteristics of the six different setting types are included in materials in Appendix A3. These include cluster means for variables used naming the clusters and representative aerial photographs of each of the six settings.

DAMAGE-CURVE ESTIMATES

To describe the derivation of the damage estimate curves for different setting types requires a brief review of the purposes and results of our three-cycle Delphi exercise.

We began the Delphi exercises by presenting the panelists a set of damage curves by building types developed by William Spangle and Associates and H.J. Degenkolb Associates for the Los Angeles area -- the Degenkolb-Spangle curves in what follows. They are apparently a modified version of the well-known Algermissen and Steinbrugge (1978) damage curves, whose classifications could not be applied to the taxonomy of building types in the LUPAMS data file. We asked panelists to validate these curves in light of the information we had about policies-in-effect (Chapter I) in the City of Los Angeles (page 2, Questionnaire A, Appendix A1.) Figure II.3 summarizes the modified Degenkolb-Spangle curves based on the collective judgments of panelists who were asked whether these curves were accurate given the effects of current ('baseline') policies-in-effect in Los Angeles. The resulting curves should be only slightly different from the original D-S curves shown in Figure 1 on page 5 of the Questionnaire A, Appendix A2.

FIGURE II.3: MODIFIED D-S CURVES -- RESULTS FROM DELPHI CYCLE ONE*



*Dotted line segments are from the original D-S curves.

From these revised building damage curves and the known (from the cluster analysis) distribution of building types by the six urban settings (Table II.5) we were able to develop 'composite' building damage curves for each of the six settings (Table II.6).

In the second cycle of the Delphi exercise panelists were presented these composite curves and were asked to modify them to reflect additional damages resulting from the interaction effects between buildings in close proximity and possible fires resulting from primary ground shaking. Results of panel judgments are shown in Figure II.4.

In this second cycle panelists were asked also to estimate the damage to the non-building stock (infrastructure, etc.) for each of the six urban settings. These damage curves are shown in Figure II.5.

TABLE II.5: DISTRIBUTION OF BUILDING TYPES BY URBAN SETTINGS

	SETTING					
	1	2	3	4	5	6
BUILDING-TYPE:						
good concerete	0	0.28	0	7.24	0.15	0.17
wood frame	99.27	24.53	94.06	65.52	32.84	84.92
steel buildings	0	15.09	0	3.45	0	0
modern masonry	0.40	29.97	2.43	3.65	43.41	5.11
fair concrete	0	2.83	0	9.66	0.89	0.39
poor concrete	0	2.55	0	7.24	0.45	0.67
hazardous masonry	0.12	22.86	2.57	1.52	17.78	7.18
type-S	0.21	0	0.94	1.72	4.48	1.68

(columns should add up to 100%)

TABLE II.6: COMPOSITE BUILDING DAMAGE CURVES BY SIX URBAN SETTINGS

	SETTING					
	1	2	3	4	5	6
MM INTENSITY:						
VI	0.5	2.0	0.6	1.0	1.8	0.9
VII	2.5	7.5	3.0	4.0	6.7	3.6
VIII	8.0	13.8	8.5	9.8	12.7	9.4
IX	11.0	19.3	11.6	13.8	17.7	13.0

FIGURE II.4: BUILDING DAMAGE INCLUDING INTERACTION EFFECTS -- RESULTS FROM DELPHI CYCLE TWO

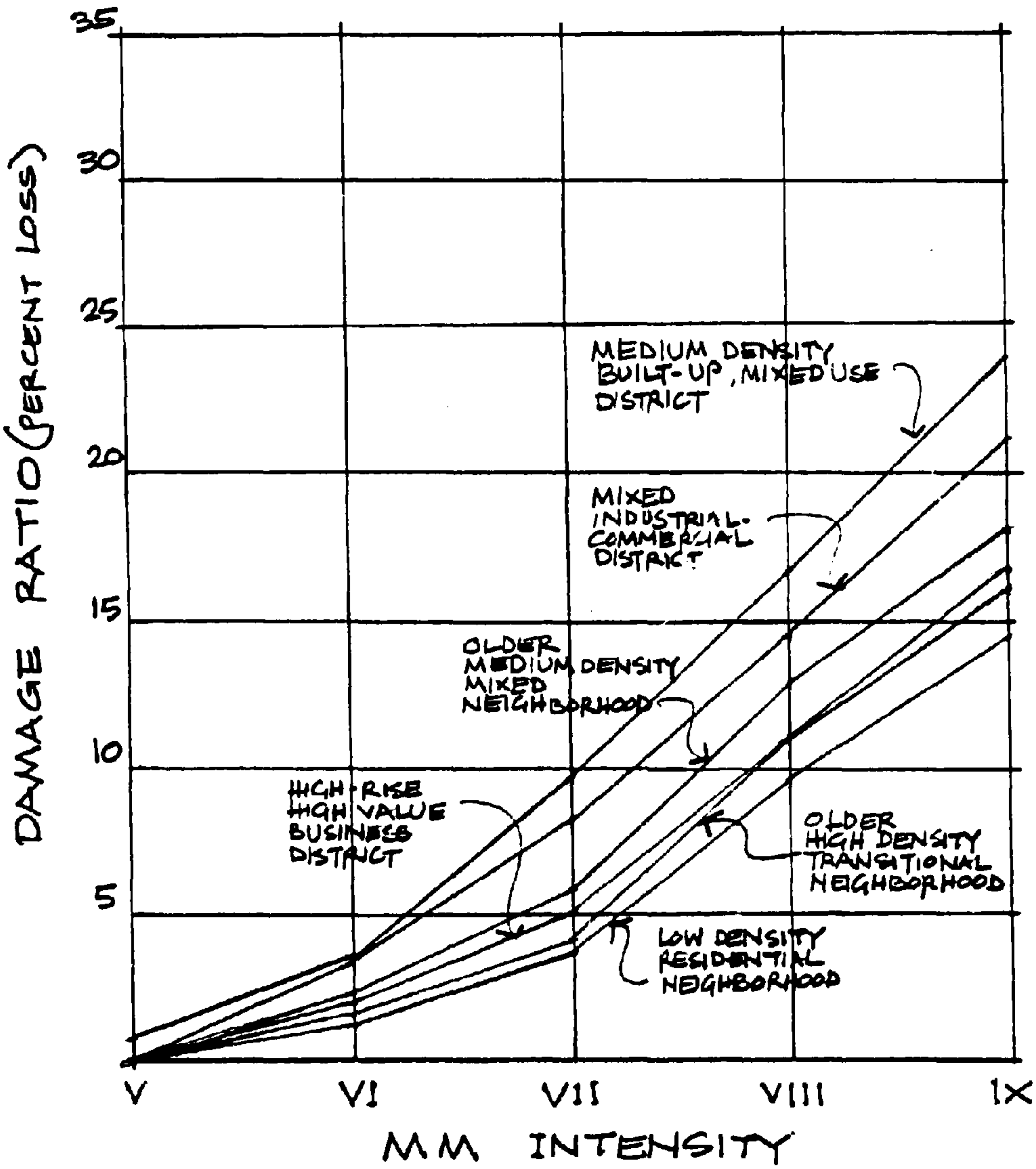
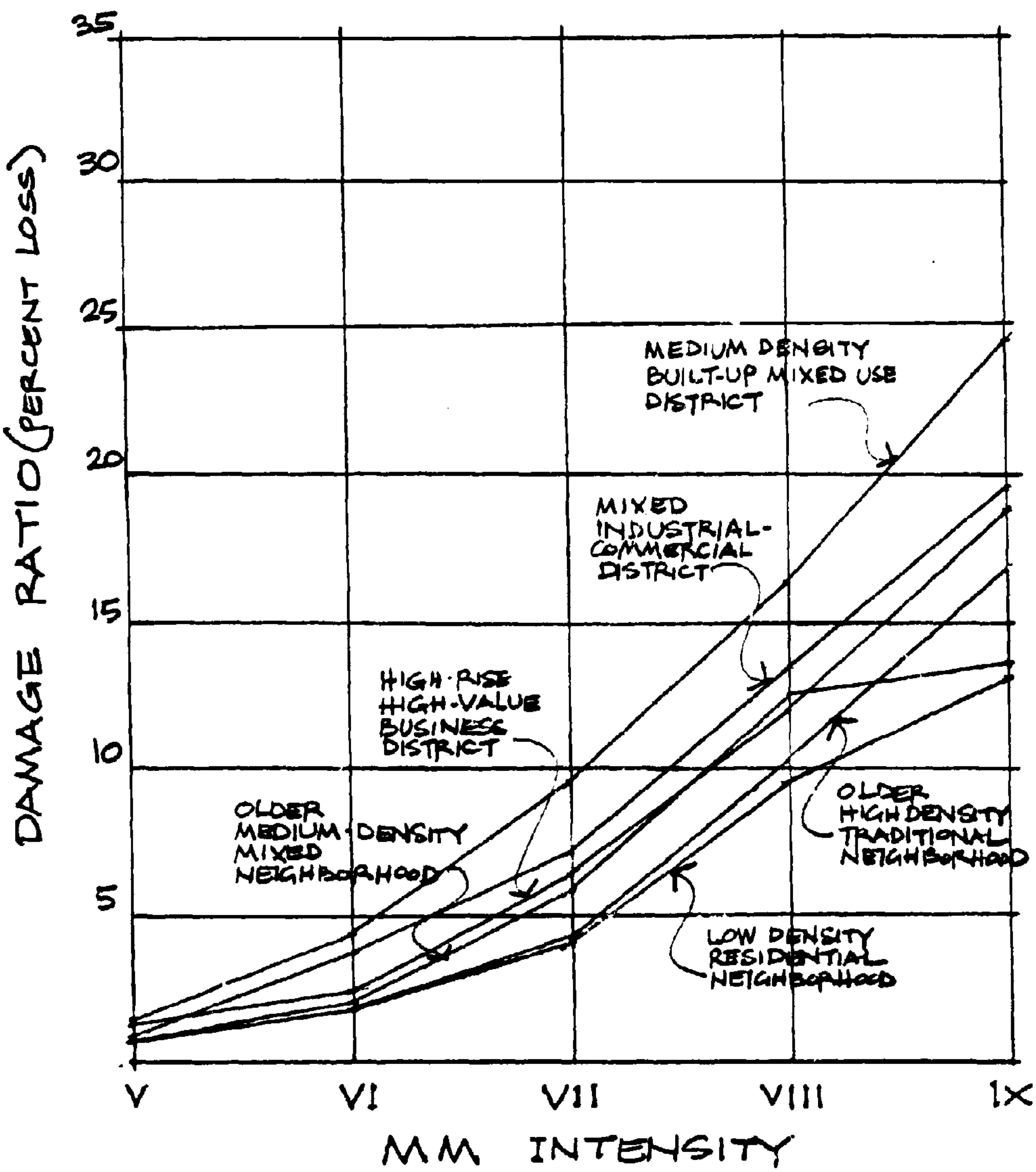


FIGURE II.5: DAMAGE TO NON-BUILDING STOCK -- RESULTS FROM DELPHI CYCLE TWO



Finally in the third cycle of the Delphi exercise, panelists were asked to consider the mitigating effects of the four suggested damage mitigation policies derived in our policy exercise (Chapter I). They were asked to adjust the building damage and the non-building stock damage curves accordingly. Results are summarized in Figures B.1 through B.12 of Appendix B. These graphs then serve as the baseline damage data and damage mitigation-by-policy data inputs to the policy model.

For the sake of the model, the damage estimates and policy-contingent mitigation estimates had also to be introduced via a matrix of thirty-five planning districts, each of which included various shares of the six urban settings. In Figure II.2, the previous map, we show Los Angeles as a mosaic of different urban settings superimposed on the thirty-five planning districts. These damage curves contain at least as much uncertainty as the more familiar curves which are specific to building types and which are silent on any policy context.

As superior methodologies are developed to generate more reliable curves, these can and should be entered into our evaluation model, replacing the ones developed here. An interim procedure might be to make levels of uncertainty explicit. This could be done if questionnaires similar to those developed in this research were elaborated so that panelists could posit levels of likelihood that might be associated with various curve shifts.*

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* Similar approaches have recently been implemented by Rojahn, et al., 1984.

TAX-INCIDENCE INFORMATION

The most up-to-date and exhaustive review of state and local tax incidence is by Phares (1980), who sought to determine who pays state and local taxes; he develops incidence information for as many as ninety-three types of state and local taxes for all of the fifty states. Needless to say, Phares' work requires him to make a number of economic assumptions, all of which we accept by utilizing his results.

Of the many taxes that we could have selected, we restricted ourselves to: 1) the state individual income tax; 2) the state general sales and gross receipts tax; 3) total real property taxes; and 4) the local general sales and gross receipts taxes. Together, according to Phares, these accounted for just over 68% of the total state and local tax liability of Californians. We simplified tax incidence calculations by dividing the amount that Californians paid of each of the four taxes by the sum of the four. This 'normalization' ruled out financing any of the earthquake mitigation policies via any but these four tax sources. We calculated that tax #1 accounted for approximately 17% of the total (four-tax) liability of all Californians; tax # 2 was 26%; taxes #3 and #4 accounted for 51% and 6%, respectively.

All of Phares' incidence results were for fourteen family-income groups. Population data for the thirty-five districts of our study area were for seven household-income groups. Luckily, we were able to collapse Phares' fourteen groups to our seven; there were no uncommon group cut-off points. Yet, we were forced to assume that the resulting seven groups had the same distribution by families as by house-holds.

The tax-incidence information which was finally used is shown in matrix TAX of Appendix E.

PROBABILITIES

The policy model relies on annual probability-of-risk data for each of the thirty-five analysis zones, with the likelihood of five levels of (MMI) ground-shaking itemized.

The calculations were developed by M.D. Trifunac and his associates. Their methods are documented in Anderson and Trifunac (1978a, 1978b). The seismicity model which Trifunac's group used is made up of 29 faults that span the Southern California region. Their program ('EQRISK') calculates seismic risk at the coordinates of the centroids of the 35 planning areas studied. The probabilities produced are shown in matrix PROB of Appendix F.

VALUE OF CAPITAL AT-RISK

Data on the value of privately owned improvements are from the LUPAMS file described in Chapter II. As suggested there, the large LUPAMS file was reduced to 731 observations, aggregating to create census tract-average values. The sum of dollar values for all tract averages for each of the six clusters was multiplied by the number of parcels believed to be in each cluster. That dollar value was annualized by multiplying by 10%.

Valuations arrived at by this procedure for the each of the six clusters are shown in matrix V of Appendix F. According to LUPAMS (and our processing), the sum of (unexempted) improvement values for the city (counting only the 'first' improvement on each parcel) was approximately $42 billion.

One of the innovations of our approach is the inclusion of infrastructure at-risk. Dollar valuations of these structures are not included in the LUPAMS file. Our approach was to use data from Musgrave (1980). These are data were assembled by the Bureau of Economic Analys s of the U.S. Department of Commerce. The various BEA reports offer time-series information for the value of government-owned fixed capital for the nation. We selected the series: net value of total (federal as well as state and local) structures in constant (1972) dollars. Though including more than simply the value of public infrastructure, this series picks up other government-owned buildings.

Since these were not included in the LUPAMS file, this is an advantage.

Musgrave's series went to 1979. We extrapolated the trend to 1982 and converted to current dollars. The results were converted to a per capita basis. Per capita values and 1980 population data were then used to assign these wealth data to the thirty-five planning districts.

The resulting values are shown in matrix W of Appendix E. The city's total value of government-owned structures is shown to amount to approximately $12 billion.

Flowcharts showing model computations (see Appendix C) reveal that damage mitigations to publicly owned and privately owned capital were treated differently since the former were available for the six settings while the latter were available for the thirty-five planning districts. More troubling is the fact that the two sources were quite distinct and conceivably not consistent. Problems with value-of-capital data make these the weakest link in the chain of information inputs that were assembled.

COSTS OF IMPLEMENTATION

A full accounting of the costs of carrying out local earthquake damage mitigation policies would distinguish among three classes of bearers:

1. direct costs borne by private firms and individuals in the local community;
2. outlays of state and local governments passed on to taxpayers through state and local fiscal structures;
3. subventions by the federal government in the form of emergency relief grants and loans to private parties and to local governments.

The federal responsibility is limited to post-event emergency assistance to expedite recovery and consequently is not relevant to our concerns, but the property-oriented mitigation policies we test in this model generate costs which:

a. are unambiguous charges against the general funds of the city or the state, such as implementation costs;
b. can only be borne by parties in the private sector, such as costs of compliance with building and zoning standards; or
c. can be borne either by individuals or be picked up by the local government, as in the case where poor tenants would be evicted from a nonconforming structure to permit it to be demolished who might thereafter be relocated or rehoused at public expense.

Under ideal circumstances we would carry out a careful analysis of each policy, tracing out its consequences and evaluating its impacts on both taxpayers and citizens at-large, account for costs falling under (a) and (b), and allow for a more detailed expression of policies to allow us to attribute each cost under (c) above either to (a) or (b). The terms of our proposal did not require such intensive policy study for the purpose of simply testing our aggregate model, nor would we have been justified in allocating any substantial share of the resources for the project to that end.

Instead, we turned to our Delphi panel and asked it to use its expertise to make some general estimates for us on these matters, assuming that each policy would be adopted in the near future and would be in effect over the succeeding twenty years. In each case, we provided the panelists with a general statement of each of nineteen prospective policies and a suggestive accounting structure to assist them in their estimation. Furthermore, we asked them to assume that:

1. any capital expenditures will be amortized over a twenty-year period;
2. future nominal interest rates will remain near 10%;
3. the relative contribution of revenue sources to gross revenues will not be influenced by the policy under consideration.

The panelists were provided with a key that allowed them to 'default' if they doubted their ability to render confident judgment, or if they were convinced that the answers depended on unspecified future developments. Otherwise, they were to choose from the answer key the value interval within which their estimates of aggregate costs would fall. The intervals were specified logarithmically rather than arithmetically as a result of a judgment that 'order of magnitude' estimates were sufficiently precise for our purposes, especially where there was a comparatively high degree of consensus.

Table II.7 summarizes how the sixteen panelists responded to our inquiry, policy-by-policy for public and private costs. Tables II.8 and II.9 summarize the actual estimates and their dispersion (ranked by decreasing consensus as measured by the standard deviation of the estimates for each). Table II.10 repeats public cost estimates for each of the four policies we tested.

TABLE II.7: COST RESPONSE SUMMARIES

	PRIVATE COST					PUBLIC COS.				
	(ordered by no. of estimates/32)									
Policy No.	Don't Know 0	Depends 1,2	<$100M 3,4	>$100M 5-10	Some est. 3-10	Don't Know 0	Depends 1,2	<$100M 3,4	>$100M 5-10	Some Est. 3-10
1	7	0	8	1	9	5	2	1	8	9
2	4	1	9	2	11	3	1	5	7	12
3	4	1	1	10	11	4	1	3	8	11
4	6	1	9	0	9	3	0	9	4	13
5	7	1	6	2	8	4	5	1	6	7
6	5	1	9	1	10	3	2	8	3	11
7	6	1	8	1	9	4	1	1	10	11
8	3	1	1	11	12	6	1	5	4	9
9	6	1	0	9	9	3	1	5	7	12
10	6	1	7	2	9	5	0	1	10	11
11	5	0	8	3	11	3	1	1	11	12
12	5	1	9	1	10	4	0	2	10	12
13	5	2	2	7	9	4	3	2	7	9
14	6	2	2	6	8	6	2	0	8	8
15	5	1	10	0	10	3	0	5	8	13
16	5	0	0	11	11	3	0	5	8	13
17	5	1	5	5	10	3	0	1	12	13
18	4	1	9	2	11	3	0	5	7	12
19	4	2	7	3	10	2	1	0	13	13
Sum	98	15	110	77	187	71	21	60	151	211
%	32.24	6.25	36.18	25.33	61.51	23.36	6.91	19.74	49.67	69.41

TABLE II.8: PRIVATE COSTS OF POLICIES

Full Policy Set (Policies listed by subquestion) — PRIVATE COSTS OF POLICIES — 6/10/85

Item No.	Short Description of Policy	N	N+	Code		Mean (log10)	Mean	StanDev (Log10)	Mean + 1 SD	Mean - 1 SD
3	nonconforming private buildings	11	11	$		9.273	1,873,817,423	.445	5,225,033,078	-671,994,164
8	hazardous substance storage	12	11	ps	!	6.000	1,000,000	.913	8,182,216	122,216
16	private firms crisis plans	11	11	l	!	6.636	4,328,761	1.068	50,617,845	370,189
9	occupancy of public places	10	9	l	!	6.100	1,258,925	1.170	18,622,704	85,105
4	interdepartment coordination	9	1	$		.444	3	1.185	43	0
15	emergency mangmnt plans	10	2	$		.800	6	1.431	170	0
7	public building insurance	9	1	$$		.556	4	1.481	109	0
6	joint powers agreements	10	2	o	!	.900	8	1.625	335	0
2	regional transportation plan	11	5	pi	!	2.000	100	1.651	4,4[illegible]	2
13	low density rezoning	9	8	ps	!	6.333	2,154,435	1.696	106,996,811	43,381
12	standby communications	10	3	$		1.400	25	1.862	1,829	0
17	public information/instruction	10	5	$		2.700	501	1.940	43,688	6
11	subsidized emergency training	11	4	l	!	1.818	66	1.966	6,077	0
14	demolish nonconforming bdgs	8	6	ps	!	5.500	316,228	2.046	35,183,431	2,842
1	20% tax credit	9	2	ps	!	1.222	17	2.137	2,286	0
18	crisis command system	11	3	$		1.545	35	2.249	6,224	0
10	infrastructure standby capacity	9	4	pi	!	2.556	359	2.440	98,907	0
5	acquire private property	8	2	ps	!	1.750	56	2.672	26,436	0
19	emergency shelter system	10	3	l	!	2.100	126	2.721	66,198	0

Key:

$$ = option not available
$ = benchmark policy
ps = object of policy -> mitigate physical damage
pi = " " " " damage to infrastructure
l = " " " " human casualties
o = organizational arrangements
N = number evaluating
N+ = number assigning values > 0.

TABLE II.9: PUBLIC COSTS OF POLICIES

Full Policy Set — PUBLIC COSTS OF POLICIES — 6/16/85

Pol. No.	Short Description of Policy	N	N+	Code	Mean Log(10)	Mean	S.D. Log(10)	Mean - S.D.	Mean + S.D.
12	Emergency communications	12	10	$	5.333	215,443	.707	42,229	1,097,590
2	Reg. Transportation Plan	12	7	pi	4.417	26,102	.795	4,185	162,786
17	Public info & instruction	13	12	$	5.654	450,657	.800	71,370	2,845,633
11	Emergency training subsidy	12	11	1	6.250	1,778,279	.924	211,733	14,935,211
13	Low density rezoning	9	7	ps	5.389	244,844	.944	27,826	2,154,435
15	Emer.management plans	13	8	$	4.808	64,223	1.105	5,046	817,365
6	Joint powers agreements	11	3	o	3.409	2,565	1.151	181	36,300
4	Interdpt. Coordination	13	4	$	3.577	3,775	1.222	227	62,899
16	Private firms crisis plans	13	8	1	4.615	41,246	1.238	2,385	713,419
19	Emergency shelter system	13	13	1	7.192	15,570,684	1.241	894,055	271,175,978
18	Crisis command system	12	7	$	5.192	155,707	1.306	7,697	3,149,938
8	Storing hazarous sustance	9	4	ps	3.889	7,743	1.392	314	191,032
9	Occupancy of public places	12	7	1	4.708	51,090	1.533	1,499	1,741,665
7	Public bdgs. Insurance	11	10	$$	6.227	1,687,612	1.538	48,886	58,258,159
14	Demolish nonconforming Bdgs	6	8	ps	7.375	23,713,737	1.763	408,939	1,375,124,429
10	System standby capacities	11	10	pi	7.591	38,986,037	1.890	507,172	3,026,674,494
3	Upgrade nonconf.bdgs.	11	8	$	5.500	316,228	2.105	2,482	40,289,177
1	20% tax credit	9	8	ps	7.222	16,681,005	3.370	7,111	39,129,433,470
5	Acquire private property	7	6	ps	8.357	227,584,593	4.968	2,448	))))))))))))))

$$ = option not available
$ = benchmark policy
ps = object of policy —) mitigate physical damage
pi = " " " " damage to infrastructure
1 = " " " " human casualtiese
o = organizational arrangements
N = number evaluating
N+ = number assigning values) 0.

TABLE II.10: PUBLIC COSTS OF FOUR POLICIES TESTED

POLICY DESCRIPTION	MEAN PANEL ESTIMATE OF PUBLIC COST
Storing Hazardous Substances	$7,700.
Demolish Nonconforming Buildings	23,713,700.
System Standby Capacity	38,986,000.
20% Tax Credit	16,681,000.

After a careful review of the cost results we decided to omit the private cost calculations from the model exercise on the basis of two considerations:

1. we deemed the basis we had provided the panelists inadequate for us to have confidence that all panelists were approaching each policy with the same 'model' of private costs;

2. estimating the incidence of private costs was not an exercise parallel to or consistent with our treatment of public costs by way of tax incidence, and we required further study if it were not to weaken our confidence in the policy outputs.

This decision in no way reflects any sense that such costs are unimportant in our analysis; it simply respects the complexity of the problem involved. In its final form, our model should treat fully the incidence of both costs and benefits. In its present form, our model operates with the <u>tax incidence</u>, not the <u>cost incidence</u> of the tested earthquake damage mitigation policies.

Finally, the reader should keep in mind that a city might adopt several of such separate policy elements in its efforts to reduce earthquake damage. If so, estimation of costs and benefits would not be simply additive. Both in terms of implementation and physical effects, many of these policy elements are complementary. To explore such combinations of policy elements would require us to treat each feasible combination as a separate policy. This might present some cognitive difficulty for the panelists.

An alternative to addressing this issue is to include an additional questionnaire for 'cross-impact analysis', a common follow-up task for Delphi-based studies. Panelists would be asked to indicate:

1. the probabilities that policy i will have an effect on policy j; and
2. the percentage by which effects of policy j would be enhanced or offset by policy i, if they were to interact.

The results are two contingency matrices, one showing probabilities and the other showing percentage changes in the effects. The information available from the two matrices can be used in various ways to reflect the effects of one policy or the cumulative effects of n policies on any other. Results could modify the mitigation effects of policies first first made by panelists.

Since one of the fundamental purposes of this exercise was to obtain the judgment of experts on cost figures which would be appropriate to the project's general cost-benefit framework, we now look at the actual aggregated estimates submitted by the panel. We use the rating key means to represent the aggregated judgment of the panel. We are comfortable with this definition where all members of the panel agree; our discomfort grows with dissensus (measured by the standard deviation of parelist responses). If two appraisers value a painting, one saying it is worthless, the other maintaining its worth at $100,000, it is hard to conclude the painting is worth $50,000 since both would probably object. We would require more information to determine which valuation is authoritative. In Tables II.7 and II.8 we identify three points: a mean value, which can be interpreted loosely as the least value that half of the respondents would accept, the mean minus one standard deviation -- the least value that roughly 5/6 of the respondents would accept and the mean minus one standard deviation --

the least value that roughly 1/6 of the respondents would accept. If the standard deviation of the answers to a particular question is relatively low (<1, say) we can take the mean to represent the group's estimate.

In other cases, we may be able to discern differences in assumption or perspective among panelists which account for the differences in their answers. We then find a position on one side or the other of the mean in accordance with our own points of view. Without such information, we are justified in adopting a conservative posture and finding a tentative figure on the high side of the mean.

In applying the valuation procedure we need to distinguish 'trivial' from 'significant' costs. If, as Table II.9 suggests, the public costs of achieving joint powers agreements among local jurisdictions reach $36,300 at most, they would warrant little attention from the City Council and have virtually no effect on any benefit-cost calculations. On the other hand, the decision to construct an emergency shelter system is bound to be significant in both fiscal and welfare terms. In Table II.9 we have extracted the details from Table II.8 of the nineteen policies whose means exceed $1,000,000, or whose means plus one standard deviation exceed $10,000,000. Such policies we construe as having fiscally significant costs attached to them. The public costs of all other policies can be taken to be near zero.

One of the seven significant policies has already been identified as a 'benchmark' -- #3, upgrading structurally nonconforming buildings. Two others -- #11 emergency training and #19 the emergency shelter program -- are aimed at preserving life and limb.

Given our present concern about mitigating damage to physical structures, three of our significant policies are addressed to such objectives while the last is concerned with maintaining the local infrastructure so that it would be operational in time of disaster (those designated 'ps' and 'pi' in the 'code' column of Table II.9). These have very substantial costs associated with them at the level of the mean. They also enjoy very substantial standard deviations.

The next chapter which describes the model's workings shows where and how these cost data are utilized.

CHAPTER III: RESULTS

LAYOUT OF THE MODEL

A flow-chart which summarizes computations is shown in Appendix C. Without going into all of the detail, here are the important steps:

1. A 5x5x6 damage matrix was constructed (for private structures) using results from the damage-curve questionnaires; the dimensions were the six neighborhood types, five MMI levels and five policy states -- the four policy changes discussed in Chapter I as well as a 'baseline' of current mitigation policies-in-place in Los Angeles;

2. A 6x6 diagonal matrix of dollar values denoting the value of private structures at-risk in each of the neighborhood types was used to convert all damage data to dollar loss figures;

3. The results were converted to a thirty-five area format, using information on the distribution of the six generic neighborhoods through the city's thirty-five planning areas;

4. The (5x35) probability matrix converted all of the previous results to expected (annual) values;

5. All of the data were converted to expected annual dollar benefits by subtracting from the baseline-policy matrix; the five dimensions of policy (#1, above) were reduced to four dimensions by computing the difference that the four policy innovations would make;

6. All of these (expected annual dollar benefit) data for the thirty-five planning areas were converted to per capita information, using 1980 population data;

7. The known distribution of each planning area's population among seven income-groups was used to collapse the benefits information to a 4x7 matrix -- of expected annual dollar benefits per capita;

8. A 4x7 tax-incidence matrix, summarizing our use of Phares' data was combined with the four (annualized) policy costs;

9. Another four-dimensional (diagonal) matrix (labeled TP) included the proportion of Californians' (four-tax) liability due to each of the four individual taxes; these data (along with the results from #8) allowed us to compute a 4x7 matrix of annual dollar cost per capita -- for each of the four policies and seven income groups;

10. Annual costs per capita were subtracted from annual expected dollar benefits per capita (#7) to arrive at a (4x7) matrix of net benefits -- or, annual expected net dollar benefits per person -- for each of four policies, for each of the seven income groups;

11. A similar (though not identical) procedure generated net benefits data from reduced damage to infrastructure -- were the same four mitigation policies in place;

12. Results in #10 and #11 were combined to form a 'bottom-line' matrix of net annual expected dollar benefits per person;

13. Bottom-line information was distributed to the thirty-five planning areas -- using information on each income-groups' presence in each of the areas;

14. All of these steps were reproduced with 'conservative' benefits estimates; whereas panelists' mean judgments of damage curve shifts from each policy were used in the three-dimensional matrix (in #1, above), a completely separate calculation was carried out with one-standard-deviation-less-than-the-mean damage curve shifts (actually, the latter curves have a slightly higher displacement).

Great care must be taken in interpreting the models' outputs. It should be noted that none of the data on 'what is on the ground', e.g. the LUPAMS and the census data were updated or forecast into the future. That task awaits further work; our model has no real time dimension. The most appropriate interpretation of model results would, therefore, be along the following lines:

> The model provides estimates of net annual expected dollar benefits per person given the known distributions of structures and people, presuming that each of the prospective policies is fully in place and that its annualized (public) capital cost is borne by taxpayers according to funding assumptions we make explicit and given the associated tax-incidence, as described in Chapter II.

MODEL OUTPUTS

The policy model was structured in such a way that four sets of outputs are emphasized for each 'run' (each sensitivity test). These are: 1) LASTAV1 which is a 4x7 matrix showing net annual per capita expected dollar benefits of the four policies as they accrue to the seven income groups -- using panelists' average damage curve shift assessments (Table III.1); 2) LASTAV2 which is a 4x35 rearrangement of the same data -- the same four policies by thirty-five planning areas; 3) LASTCON1, also 4x7 but using 'conservative' benefits assessments (Table III.2); 4) LASTCON2, 4x35 also using 'conservative' assessments.

The most striking aspect of results in Table III.1 is that all of the elements are positive; all of the policies impact all of the income groups positively. Using standard benefit-cost criteria, the results say: 'do something', even 'do anything'. Using political criteria, they say almost the same thing since there appear to be no net loser groups.

Looking more closely, the results seem to make a great deal of sense. The poorest do best under all four policy regimes. The model 'knows' where the most vulnerable structures are; it also 'knows' the areas of the City where the poorest people live; it surmises that the most damage-prone buildings are likely to house the poorest people. The model also 'knows' that all of the four taxes are progressive at the lower end.

TABLE III.1: ANNUAL EXPECTED DOLLAR NET BENEFITS PER CAPITA FOR ANY OF FOUR POLICIES -- ACCRUING TO SEVEN INCOME GROUPS

(average benefits assessment of panelists)

	annual household income-group:						
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
POLICY:							
20% tax credit	7.14	6.03	4.47	4.40	4.34	4.09	4.58
hazard. mats. storage	8.82	7.91	6.57	6.68	6.72	6.58	7.01
demolish nonconf.struc.	11.02	9.68	7.80	7.57	7.46	7.11	7.86
standby infrastruct.	7.74	6.52	4.89	4.52	4.41	4.06	4.95

income groups:

(i)	less than $5,000
(ii)	$5,000 - $9,999
(iii)	$10,000 - $14,999
(iv)	$15,000 - $19,999
(v)	$20,000 - $24,999
(vi)	$25,000 - $34,999
(vii)	greater than $35,000

All of the income groups do best under policy #3, 'demolish non-conforming structures'. This also makes sense since it is well known (Sarin, 1982) that these structures pose an unusual threat in Los Angeles. The model does not 'know' who occupies the most hazardous structures; it simply contains data which denotes that those areas of the city with the oldest buildings are usually the areas populated by lower income groups. Hence, the poorest benefit from policy #3 the most.

Matrix LASTAV2 shows the distribution of these benefits to the thirty-five planning areas. A discussion of the plausibility of these results is beyond the scope of this report, requiring close acquaintance with the nature of each area. Nevertheless, we expect that these results are of interest to political leaders.

As suggested earlier, a more elaborate version of this model would process probabilistic information on any damage curve shifts in response the various policy initiatives. In the interim, we simply tested more conservative panel responses on damage curve shifts. These utilize smaller-than-average curve shifts; we tested shifts one standard deviation less than the mean.

The 4x7 matrix of 'conservative' results (Table III.2) is interesting since it does suggest political trade-offs. There are negative as well as positive elements suggesting gainers as well as losers. Again, the model presents us with plausible results: where there are gainers and losers, the greatest gains are to the lowest income groups; the greatest losses are to middle-income individuals, reflecting the distribution of tax burdens as well as the occupancy of the most perilous structures.

LASTCON2 shows which planning areas gain and which lose under the regime of 'conservative' benefits. Again, there are areas with expected gains as well as areas with expected losses.

TABLE III.2: ANNUAL EXPECTED DOLLAR NET BENEFITS PER CAPITA FOR ANY OF FOUR POLICIES -- ACCRUING TO SEVEN INCOME GROUPS

('conservative' benefits assessment of panelists)

	annual household income-group:						
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
POLICY:							
20% tax credit	0.35	0.19	0.01	-0.15	-0.15	-0.21	0.10
hazard. mats. stor.	0.16	0.15	0.12	0.13	0.14	0.15	0.17
demolish nonconf.struc.	1.40	1.07	0.67	0.37	0.28	0.13	0.49
standby infrastr. cap.	0.67	0.24	-0.27	-0.66	-0.74	-0.91	-0.30

income groups:

(i)	less than $5,000
(ii)	$5,000 - $9,999
(iii)	$10,000 - $14,999
(iv)	$15,000 - $19,999
(v)	$20,000 - $24,999
(vi)	$25,000 - $34,999
(vii)	greater than $35,000

SENSITIVITY TESTS

A large number of sensitivity tests are, of course, possible. That is the attractiveness of the model to policy analysts. The 'test' that has already been described had to do with alternate assumptions on (panelists' views of) policy potency. In this section, we add another test having to do with alternate funding proposals for the same four policies.

Table III.3 repeats outputs already discussed ('baseline' funding) and contrasts these with outputs from four runs of the model which assume that policies are funded wholly by each of the four taxes (state income, state sales, local sales, property), one at a time. Columns 'A' and 'C' repeat the distinction between the panel's average and conservative benefits judgments.

Results for each of the two sales taxes are practically identical; these taxes have almost the same incidence. Funding for the second policy appears not to matter since this is the least expensive of the four proposals. Also, the 'A' columns are only moderately sensitive to fundi g assumptions. In these cases, benefits so dominate costs that it appears to matter little how the policies are to be financed.

The 'C' columns do suggest some contrasts. The relative progressivity of the state income tax accounts for the greater variability of net benefits were all of the public costs to be financed by it. Financing via real propery taxes would distributs net benefits less progressively than for any of the other taxes.

We expect that policy makers would exploit the power of the model by testing a large number of assumptions on funding levels as well as tax source combinations.

TABLE III.3: SENSITIVITY TESTS --
ALTERNATE POLICY FUNDING ASSUMPTIONS

Sole Funding by:

Policies	baseline funding A	baseline funding C	state inc. tax A	state inc. tax C	state sales tax A	state sales tax C	local sales tax A	local sales tax C	real prop. tax A	real prop. tax C
	(seven rows: net annual expected dollar benefits; from lowest bracket in first row to highest bracket)									
20% tax credit	7.14	.35	7.46	.67	7.19	.40	7.19	.40	7.01	.21
	6.03	.19	6.45	.61	6.00	.16	6.00	.16	5.91	.06
	4.47	.01	4.81	.34	4.39	-.08	4.39	-.07	4.41	-.06
	4.40	-.14	4.38	-.16	4.33	-.21	4.32	-.22	4.44	-.10
	4.34	-.15	3.89	-.61	4.34	-.16	4.34	-.16	4.50	-.00
	4.09	-.21	3.40	-.90	4.12	-.17	4.13	-.17	4.29	-.00
	4.58	.10	4.34	-.14	4.67	.19	4.67	.19	4.60	.12
hazardous materials storage	8.82	.16	8.82	.16	8.82	.16	8.82	.16	8.82	.16
	7.91	.15	7.91	.15	7.91	.15	7.91	.15	7.91	.15
	6.57	.12	6.57	.12	6.57	.12	6.57	.12	6.57	.12
	6.68	.13	6.68	.13	6.68	.13	6.68	.13	6.68	.13
	6.72	.14	6.72	.14	6.72	.14	6.72	.14	6.72	.14
	6.58	.15	6.58	.15	6.58	.15	6.58	.15	6.58	.15
	7.01	.17	7.00	.17	7.01	.17	7.01	.17	7.00	.17
demolish nonconf. structures	11.02	1.40	11.47	1.85	11.09	1.47	11.09	1.47	10.82	1.20
	9.68	1.07	10.28	1.67	9.64	1.03	9.64	1.03	9.51	.90
	7.80	.67	8.28	1.15	7.68	.55	7.69	.55	7.71	.58
	7.57	.37	7.55	.35	7.47	.27	7.47	.27	7.64	.44
	7.46	.28	6.81	-.37	7.45	.27	7.45	.27	7.68	.50
	7.11	.13	6.12	-.85	7.16	.18	7.16	.18	7.40	.42
	7.86	.49	7.53	.16	8.00	.63	7.99	.63	7.89	.52
infrastr. standby capacity	7.74	.67	8.48	1.42	7.85	.79	7.85	.79	7.41	.35
	6.52	.24	7.50	1.22	6.45	.17	6.45	.17	6.23	-.05
	4.89	-.27	5.68	.52	4.69	-.46	4.70	-.45	4.74	-.42
	4.52	-.66	4.49	-.69	4.36	-.83	4.35	-.83	4.63	-.55
	4.41	-.74	3.34	-1.81	4.40	-.75	4.39	-.76	4.77	-.38
	4.06	-.91	2.45	-2.53	4.15	-.82	4.16	-.82	4.55	-.43
	4.95	-.30	4.40	-.86	5.18	-.08	5.17	-.08	5.00	-.25

note: Columns 'A' refer to mean values of damage as assessed by panelists; columns 'C' refer to conservative values, one standard deviation less assessed mitigation.

CHAPTER IV: CONCLUSIONS

We have tried to take a first step toward 'closing the gap' between formal earthquake research and applied policy analysis. The model we developed helped to illuminate the long chain of informational inputs required to move us to usable evaluational assessments. We can report that it is possible to gather and manipulate available information to provide outputs which are a basis for policy contrasts and rankings.

Exercises such as this have the added usefulness that they help investigators focus on weak links which deserve further attention. In fact, it can be argued that one of our model's main capabilities is to identify research priorities for policy analysis in the earthquake mitigation field.

Our own conclusions on immediate priorities were formed with the help of our panelists who met as an Advisory Group to review an early draft of this report (Appendix F). Of immediate concern are the following:

1. more elaborate damage curve estimating procedures should be developed; experts should be prompted to indicate subjective probabilities associated with synthetic curve shifts; model results should be qualified by the appropriate likelihoods;
2. more comprehensive implementation cost data should be gathered; private as well as public cost incidence should be specified as part of model outputs;
3. a larger conception of loss and damage should be considered; loss of life, injuries, and secondary economic losses must be handled by the model.

A number of other tasks will certainly emerge as these three are addressed. Yet, we are optimistic that useable results will be forthcoming and that planning for earthquake damage mitigation can take a large step forward. We hope that the ideas introduced in this research will form a basis for the next generation of policy models.

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A P P E N D I X   A 1

Policy Delphi (questionnaire and detailed results available on request)

A P P E N D I X   A 2

Damage curves -- cycle I

SAS

OBS	NAMES	SHIFT	CURVE1	CURVE2	CURVE3	CURVE4	CURVE5	CURVE6	CURVE7	CON1
1	ARNOLD	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
2	ASAKURA	1	-0.05	-0.16	-0.15	-0.05	-0.16	-0.10	0.00	1
3	BACHARAC	.	.	.	.	.	.	.	.	1
4	BLANCK	1	0.00	0.00	0.00	0.00	-0.05	0.00	0.00	1
5	BRAUNS	1	0.00	-0.10	0.00	0.00	0.00	0.00	0.00	1
6	DONOVAN	1	0.00	0.00	0.00	0.00	.	0.00	0.00	1
7	JOHNSON	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
8	JOHNSTON	1	-0.05	-0.05	-0.05	-0.02	-0.05	-0.05	-0.02	1
9	JONES	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
10	JULIAN	.	.	.	.	.	.	.	.	1
11	MCCKELMA	1	0.00	-0.10	-0.05	0.00	-0.16	0.00	0.00	0
12	MASRI	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
13	MATINGLY	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
14	MCCOY	1	0.00	-0.05	0.00	0.00	-0.10	0.00	0.00	1
15	MEUNIER	1	0.00	-0.05	-0.02	0.00	-0.08	0.00	0.00	1
16	FELAK	1	0.00	-0.05	-0.05	0.00	-0.05	0.00	0.00	1
17	SPICER	1	-0.05	-0.05	-0.05	0.00	-0.10	0.00	0.00	1
18	WHITMAN	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
CURVE1	16	-0.00937500	0.02015564	-0.05000000	0	0.00503891	-0.15000000	0.00040625	-214.998
CURVE2	16	-0.03812500	0.04819665	-0.16000000	0	0.01204916	-0.61000000	0.00232292	-126.417
CURVE3	16	-0.02312500	0.04028544	-0.15000000	0	0.01007136	-0.37000000	0.00162292	-174.207
CURVE4	16	-0.00437500	0.01314978	-0.05000000	0	0.00328744	-0.07000000	0.00017292	-300.566
CURVE5	15	-0.05000000	0.05830952	-0.16000000	0	0.01505545	-0.75000000	0.00340000	-116.619
CURVE6	16	-0.00937500	0.02719528	-0.10000000	0	0.00679882	-0.15000000	0.00073958	-290.083
CURVE7	16	-0.00125000	0.00500000	-0.02000000	0	0.00125000	-0.02000000	0.00002500	-400.000

3

SAS

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	COM2
1	ARNOLD	1	A	.	.	.	.	.	1
2	ARNOLD	1	B	.	.	.	.	.	1
3	ARNOLD	1	C	.	.	.	.	.	1
4	ARNOLD	2	A	.	.	.	.	.	1
5	ARNOLD	2	B	.	.	.	.	.	1
6	ARNOLD	2	C	.	.	.	.	.	1
7	ARNOLD	3	A	.	.	.	.	.	1
8	ARNOLD	3	B	.	.	.	.	.	1
9	ARNOLD	3	C	.	.	.	.	.	1
10	ARNOLD	4	A	.	.	.	.	.	1
11	ARNOLD	4	B	.	.	.	.	.	1
12	ARNOLD	4	C	.	.	.	.	.	1
13	ARNOLD	5	A	.	.	.	.	.	1
14	ARNOLD	5	B	.	.	.	.	.	1
15	ARNOLD	5	C	.	.	.	.	.	1
16	ARNOLD	6	A	.	.	.	.	.	1
17	ARNOLD	6	B	.	.	.	.	.	1
18	ARNOLD	6	C	.	.	.	.	.	1
19	ARNOLD	7	A	.	.	.	.	.	1
20	ARNOLD	7	B	.	.	.	.	.	1
21	ARNOLD	7	C	.	.	.	.	.	1
22	ASAKURA	1	A	0	0.010	0.040	0.100	0.150	0
23	ASAKURA	1	B	0	0.010	0.040	0.100	0.150	0
24	ASAKURA	1	C	0	0.010	0.040	0.100	0.150	0
25	ASAKURA	2	A	0	0.015	0.065	0.150	0.235	0
26	ASAKURA	2	B	0	0.035	0.115	0.200	0.285	0
27	ASAKURA	2	C	0	0.025	0.100	0.165	0.260	0
28	ASAKURA	3	A	0	0.020	0.090	0.160	0.230	0
29	ASAKURA	3	B	0	0.000	0.030	0.100	0.170	0
30	ASAKURA	3	C	0	0.000	0.000	0.060	0.125	0
31	ASAKURA	4	A	0	0.000	0.000	0.020	0.125	0
32	ASAKURA	4	B	0	0.000	0.020	0.070	0.125	0
33	ASAKURA	4	C	0	0.000	0.020	0.070	0.125	0
34	ASAKURA	5	A	0	0.020	0.050	0.070	0.150	1
35	ASAKURA	5	B	0	0.040	0.145	0.250	0.360	0
36	ASAKURA	5	C	0	0.020	0.050	0.070	0.150	0
37	ASAKURA	6	A	0	0.015	0.075	0.130	0.190	0
38	ASAKURA	6	B	0	0.015	0.075	0.130	0.190	0
39	ASAKURA	6	C	0	0.015	0.075	0.130	0.190	0
40	ASAKURA	7	A	0	0.005	0.025	0.080	0.115	0
41	ASAKURA	7	B	0	0.005	0.025	0.080	0.115	0
42	ASAKURA	7	C	0	0.005	0.025	0.080	0.115	0
43	BACHARAC	1	A	0	0.010	0.040	0.100	0.150	0
44	BACHARAC	1	B	0	0.000	0.000	0.040	0.095	0
45	BACHARAC	1	C	0	0.000	0.000	0.000	0.050	0
46	BACHARAC	2	A	0	0.030	0.120	0.200	0.275	0
47	BACHARAC	2	B	0	0.000	0.025	0.110	0.200	0
48	BACHARAC	2	C	0	0.000	0.000	0.075	0.160	0
49	BACHARAC	3	A	0	0.010	0.065	0.135	0.200	0
50	BACHARAC	3	B	0	0.020	0.090	0.160	0.230	0
51	BACHARAC	3	C	0	0.020	0.090	0.160	0.230	0
52	BACHARAC	4	A	0	0.000	0.020	0.070	0.125	0
53	BACHARAC	4	B	0	0.000	0.000	0.020	0.070	0
54	BACHARAC	4	C	0	0.000	0.000	0.000	0.020	0
55	BACHARAC	5	A	0	0.025	0.135	0.235	0.335	0
56	BACHRACH	5	B	0	0.000	0.050	0.155	0.260	0
57	BACHRACH	5	C	0	0.000	0.010	0.115	0.220	0

11

SAS

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
58	BACHRACH	6	A	0	0.015	0.075	0.130	0.190	0
59	BACHRACH	6	B	0	0.000	0.035	0.095	0.150	0
60	BACHRACH	6	C	0	0.030	0.000	0.055	0.110	0
61	BACHRACH	7	A	0	0.000	0.005	0.060	0.095	0
62	BACHRACH	7	B	0	0.000	0.000	0.010	0.050	0
63	BACHRACH	7	C	0	0.005	0.025	0.080	0.115	0
64	BLANCK	1	A	.	.	.	.	.	0
65	BLANCK	1	B	.	.	.	.	.	0
66	BLANCK	1	C	.	.	.	.	.	0
67	BLANCK	2	A	0	0.000	0.065	0.150	0.235	0
68	BLANCK	2	B	.	.	.	.	.	0
69	BLANCK	2	C	.	.	.	.	.	0
70	BLANCK	3	A	.	.	.	.	.	0
71	BLANCK	3	B	.	.	.	.	.	0
72	BLANCK	3	C	.	.	.	.	.	0
73	BLANCK	4	A	.	.	.	.	.	0
74	BLANCK	4	B	.	.	.	.	.	0
75	BLANCK	4	C	.	.	.	.	.	0
76	BLANCK	5	A	.	.	.	.	.	0
77	BLANCK	5	B	0	0.000	0.100	0.200	0.305	0
78	BLANCK	5	C	.	.	.	.	.	0
79	BLANCK	6	A	.	.	.	.	.	0
80	BLANCK	6	B	.	.	.	.	.	0
81	BLANCK	6	C	0	0.000	0.000	0.030	0.070	0
82	BLANCK	7	A	.	.	.	.	.	0
83	BLANCK	7	B	.	.	.	.	.	0
84	BLANCK	7	C	.	.	.	.	.	1
85	BRAUNS	1	A	.	.	.	.	.	1
86	BRAUNS	1	B	.	.	.	.	.	1
87	BRAUNS	1	C	.	.	.	.	.	1
88	BRAUNS	2	A	.	.	.	.	.	1
89	BRAUNS	2	B	.	.	.	.	.	1
90	BRAUNS	2	C	.	.	.	.	.	1
91	BRAUNS	3	A	.	.	.	.	.	1
92	BRAUNS	3	B	.	.	.	.	.	1
93	BRAUNS	3	C	.	.	.	.	.	1
94	BRAUNS	4	A	.	.	.	.	.	1
95	BRAUNS	4	B	.	.	.	.	.	1
96	BRAUNS	4	C	.	.	.	.	.	1
97	BRAUNS	5	A	.	.	.	.	.	1
98	BRAUNS	5	B	0	0.020	0.070	0.135	0.175	0
99	BRAUNS	5	C	0	0.015	0.075	0.130	0.190	1
100	BRAUNS	6	A	0	0.015	0.075	0.130	0.190	1
101	BRAUNS	6	B	0	0.015	0.075	0.130	0.190	1
102	BRAUNS	6	C	0	0.000	0.010	0.055	0.100	1
103	BRAUNS	7	A	.	.	.	.	.	1
104	BRAUNS	7	B	.	.	.	.	.	1
105	BRAUNS	7	C	.	.	.	.	.	0
106	DONOVAN	1	A	0	0.010	0.040	0.100	0.150	0
107	DONOVAN	1	B	0	0.010	0.040	0.100	0.150	0
108	DONOVAN	1	C	0	0.010	0.040	0.100	0.150	0
109	DONOVAN	2	A	0	0.030	0.120	0.200	0.275	0
110	DONOVAN	2	B	0	0.035	0.115	0.200	0.275	0
111	DONOVAN	2	C	0	0.035	0.225	0.200	0.275	1
112	DONOVAN	3	A	0	0.020	0.090	0.160	0.230	1
113	DONOVAN	3	B	0	0.020	0.090	0.160	0.230	1
114	DONOVAN	3	C	0	0.000	0.040	0.110	0.190	

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
115	DONOVAN	4	A	0	0.000	0.020	0.070	0.125	1
116	DONOVAN	4	B	0	0.000	0.020	0.070	0.125	1
117	DONOVAN	4	C	0	0.000	0.020	0.070	0.125	1
118	DONOVAN	5	A	0	0.040	0.145	0.250	0.360	1
119	DONOVAN	5	B	0	0.040	0.145	0.250	0.360	1
120	DONOVAN	5	C	0	0.000	0.095	0.200	0.310	1
121	DONOVAN	6	A	0	0.015	0.075	0.130	0.190	0
122	DONOVAN	6	B	0	0.015	0.075	0.130	0.190	0
123	DONOVAN	6	C	0	0.015	0.075	0.130	0.190	0
124	DONOVAN	7	A	0	0.005	0.025	0.080	0.115	0
125	DONOVAN	7	B	0	0.005	0.025	0.080	0.115	0
126	DONOVAN	7	C	0	0.005	0.025	0.080	0.115	0
127	JOHNSON	1	A	0	0.010	0.040	0.100	0.150	0
128	JOHNSON	1	B	0	0.010	0.040	0.100	0.150	0
129	JOHNSON	1	C	0	0.010	0.040	0.100	0.150	0
130	JOHNSON	2	A	0	0.005	0.085	0.170	0.255	0
131	JOHNSON	2	B	0	0.035	0.115	0.200	0.285	0
132	JOHNSON	2	C	0	0.000	0.065	0.150	0.235	0
133	JOHNSON	3	A	0	0.000	0.070	0.140	0.210	0
134	JOHNSON	3	B	0	0.020	0.090	0.160	0.230	0
135	JOHNSON	3	C	0	0.000	0.050	0.120	0.190	0
136	JOHNSON	4	A	0	0.000	0.010	0.060	0.115	0
137	JOHNSON	4	B	0	0.000	0.020	0.070	0.125	0
138	JOHNSON	4	C	0	0.000	0.000	0.050	0.095	0
139	JOHNSON	5	A	0	0.000	0.395	0.200	0.310	0
140	JOHNSON	5	B	0	0.040	0.145	0.250	0.360	0
141	JOHNSON	5	C	0	0.000	0.045	0.150	0.260	0
142	JOHNSON	6	A	0	0.015	0.075	0.130	0.190	0
143	JOHNSON	6	B	0	0.015	0.075	0.130	0.190	0
144	JOHNSON	6	C	0	0.000	0.050	0.115	0.175	0
145	JOHNSON	7	A	0	0.000	0.000	0.030	0.065	0
146	JOHNSON	7	B	0	0.005	0.075	0.080	0.175	0
147	JOHNSON	7	C	0	0.000	0.015	0.070	0.105	0
148	JOHNSTON	1	A	0	0.010	0.040	0.100	0.150	0
149	JOHNSTON	1	B	0	0.010	0.040	0.100	0.150	0
150	JOHNSTON	1	C	0	0.010	0.035	0.070	0.110	0
151	JOHNSTON	2	A	0	0.035	0.090	0.140	0.200	0
152	JOHNSTON	2	B	0	0.035	0.090	0.140	0.200	0
153	JOHNSTON	2	C	0	0.015	0.040	0.070	0.100	0
154	JOHNSTON	3	A	0	0.020	0.065	0.110	0.150	0
155	JOHNSTON	3	B	0	0.020	0.080	0.140	0.200	0
156	JOHNSTON	3	C	0	0.020	0.040	0.060	0.075	0
157	JOHNSTON	4	A	0	0.000	0.020	0.060	0.100	0
158	JOHNSTON	4	B	0	0.000	0.020	0.065	0.115	0
159	JOHNSTON	4	C	0	0.000	0.020	0.035	0.050	0
160	JOHNSTON	5	A	0	0.040	0.110	0.180	0.250	0
161	JOHNSTON	5	B	0	0.040	0.125	0.215	0.300	0
162	JOHNSTON	5	C	0	0.040	0.060	0.080	0.100	0
163	JOHNSTON	6	A	0	0.015	0.060	0.110	0.150	0
164	JOHNSTON	6	B	0	0.015	0.070	0.120	0.175	0
165	JOHNSTON	6	C	0	0.015	0.040	0.070	0.100	0
166	JOHNSTON	7	A	0	0.005	0.015	0.050	0.075	0
167	JOHNSTON	7	B	0	0.005	0.015	0.070	0.100	0
168	JOHNSTON	7	C	0	0.005	0.015	0.035	0.050	0
169	JONES	1	A	0	0.010	0.040	0.095	0.150	0
170	JONES	1	B	0	0.010	0.040	0.085	0.130	0
171	JONES	1	C	0	0.010	0.035	0.070	0.110	0

SAS

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	COM2
172	JONES	2	A	0	0.035	0.100	0.175	0.250	0.00
173	JONES	2	B	0	0.035	0.100	0.160	0.225	0.00
174	JONES	2	C	0	0.035	0.070	0.110	0.140	0.00
175	JONES	3	A	0	0.020	0.080	0.145	0.210	0.00
176	JONES	3	B	0	0.020	0.075	0.125	0.175	0.00
177	JONES	3	C	0	0.020	0.060	0.100	0.140	0.00
178	JONES	4	A	0	0.000	0.020	0.065	0.120	0.00
179	JONES	4	B	0	0.000	0.020	0.060	0.110	0.00
180	JONES	4	C	0	0.000	0.020	0.070	0.125	0.00
181	JONES	5	A	0	0.030	0.095	0.160	0.220	0.00
182	JONES	5	B	0	0.030	0.115	0.195	0.280	0.00
183	JONES	5	C	0	0.020	0.040	0.065	0.085	0.00
184	JONES	6	A	0	0.010	0.060	0.115	0.165	0.00
185	JONES	6	B	0	0.010	0.055	0.095	0.130	0.00
186	JONES	6	C	0	0.010	0.060	0.155	0.100	0.15
187	JONES	7	A	0	0.005	0.020	0.055	0.085	0.00
188	JONES	7	B	0	0.005	0.020	0.060	0.100	0.00
189	JONES	7	C	0	0.005	0.020	0.050	0.075	0.00
190	JULIAN	1	A	0	0.010	0.040	0.100	0.150	0.00
191	JULIAN	1	B	0	0.010	0.040	0.100	0.150	0.00
192	JULIAN	1	C	0	0.010	0.040	0.100	0.150	0.00
193	JULIAN	2	A	0	0.000	0.650	0.150	0.175	1.00
194	JULIAN	2	B	0	0.035	0.115	0.200	0.285	1.00
195	JULIAN	2	C	0	0.000	0.015	0.100	0.180	1.00
196	JULIAN	3	A	0	0.020	0.090	0.160	0.230	0.00
197	JULIAN	3	B	0	0.020	0.090	0.160	0.230	0.00
198	JULIAN	3	C	0	0.000	0.040	0.110	0.180	0.00
199	JULIAN	4	A	0	0.000	0.020	0.070	0.125	0.00
200	JULIAN	4	B	0	0.000	0.020	0.070	0.125	0.00
201	JULIAN	4	C	0	0.000	0.020	0.070	0.125	0.00
202	JULIAN	5	A	0	0.000	0.045	0.150	0.255	0.00
203	JULIAN	5	B	0	0.000	0.095	0.200	0.305	0.00
204	JULIAN	5	C	0	0.000	0.000	0.040	0.190	0.00
205	JULIAN	6	A	0	0.000	0.020	0.080	0.135	0.00
206	JULIAN	6	B	0	0.015	0.075	0.130	0.190	0.00
207	JULIAN	6	C	0	0.000	0.020	0.080	0.135	0.00
208	JULIAN	7	A	0	0.000	0.000	0.030	0.065	0.00
209	JULIAN	7	B	0	0.000	0.000	0.030	0.065	0.00
210	JULIAN	7	C	0	0.000	0.000	0.030	0.065	0.00
211	KOCKELM	5	B	0	0.000	0.095	0.200	0.305	0.00
212	KOCKELM	5	C	0	0.000	0.000	0.070	0.175	0.00
213	KOCKELM	6	A	0	0.000	0.000	0.050	0.110	0.00
214	KOCKELM	6	B	0	0.000	0.020	0.080	.	0.00
215	KOCKELM	6	C	0	0.000	0.000	0.000	0.060	0.00
216	KOCKELM	7	A	0	0.000	0.000	0.015	0.055	0.00
217	KOCKELM	7	B	0	0.000	0.000	0.010	.	0.00
218	KOCKELM	7	C	0	0.000	0.000	0.000	0.010	0.00
219	KOCKELMA	1	A	0	0.000	0.000	0.020	0.075	0.00
220	KOCKELMA	1	B	0	0.000	0.000	0.050	.	0.00
221	KOCKELMA	1	C	0	0.000	0.000	0.000	0.030	0.00
222	KOCKELMA	2	A	0	0.000	0.040	0.125	0.210	0.00
223	KOCKELMA	2	B	0	0.000	0.065	0.150	.	0.00
224	KOCKELMA	2	C	0	0.000	0.000	0.085	0.165	0.00
225	KOCKELMA	3	A	0	0.000	0.010	0.085	0.155	0.00
226	KOCKELMA	3	B	0	0.000	0.040	0.110	.	0.00
227	KOCKELMA	3	C	0	0.000	0.000	0.030	0.100	0.00
228	KOCKELMA	4	A	0	0.000	0.000	0.000	0.040	0.00

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OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
229	KOCKELMA	4	B	0	0.000	0.000	0.020	.	0
230	KOCKELMA	4	C	0	0.000	0.000	0.000	0.020	0
231	KOCKELMA	5	A	0	0.000	0.025	0.130	0.235	0
232	MASRI	1	A	0	0.000	0.035	0.090	0.145	0
233	MASRI	1	B	0	0.000	0.020	0.080	0.125	0
234	MASRI	1	C	0	0.003	0.000	0.030	0.080	0
235	MASRI	2	A	0	0.000	0.090	0.175	0.250	0
236	MASRI	2	B	0	0.030	0.110	0.190	0.270	0
237	MASRI	2	C	0	0.013	0.080	0.150	0.215	0
238	MASRI	3	A	0	0.003	0.065	0.135	0.200	0
239	MASRI	3	B	0	0.010	0.080	0.150	0.120	0
240	MASRI	3	C	0	0.000	0.000	0.050	0.120	0
241	MASRI	4	A	0	0.000	0.000	0.045	0.095	0
242	MASRI	4	B	0	0.000	0.000	0.055	0.115	0
243	MASRI	4	C	0	0.000	0.000	0.000	0.050	0
244	MASRI	5	A	0	0.000	0.075	0.175	0.275	0
245	MASRI	5	B	0	0.000	0.090	0.190	0.290	0
246	MASRI	5	C	0	0.000	0.000	0.190	0.220	0
247	MASRI	6	A	0	0.000	0.085	0.125	0.180	0
248	MASRI	6	B	0	0.000	0.060	0.120	0.175	0
249	MASRI	6	C	0	0.030	0.015	0.070	0.125	0
250	MASRI	7	A	0	0.005	0.025	0.080	0.115	0
251	MASRI	7	B	0	0.000	0.020	0.070	0.080	0
252	MASRI	7	C	0	0.000	0.000	0.045	0.085	0
253	MATINGLY	1	A	0	0.001	0.035	0.090	0.145	0
254	MATINGLY	1	B	0	0.010	0.040	0.100	0.150	0
255	MATINGLY	1	C	0	0.000	0.020	0.075	0.125	0
256	MATINGLY	2	A	0	0.025	0.100	0.180	0.260	0
257	MATINGLY	2	B	0	0.045	0.110	0.195	0.270	0
258	MATINGLY	2	C	0	0.000	0.050	0.125	0.210	0
259	MATINGLY	3	A	0	0.000	0.075	0.140	0.210	0
260	MATINGLY	3	B	0	0.000	0.060	0.130	0.140	0
261	MATINGLY	3	C	0	0.000	0.000	0.075	0.140	0
262	MATINGLY	4	A	0	0.000	0.005	0.050	0.110	0
263	MATINGLY	4	B	0	0.000	0.020	0.075	0.125	0
264	MATINGLY	4	C	0	0.000	0.000	0.035	0.075	0
265	MATINGLY	5	A	0	0.000	0.060	0.175	0.260	0
266	MATINGLY	5	B	0	0.025	0.125	0.225	0.325	0
267	MATINGLY	5	C	0	0.000	0.000	0.050	0.125	0
268	MATINGLY	6	A	0	0.003	0.065	0.125	0.175	0
269	MATINGLY	6	B	0	0.010	0.075	0.130	0.180	0
270	MATINGLY	6	C	0	0.000	0.000	0.045	0.095	0
271	MATINGLY	7	A	0	0.000	0.005	0.065	0.090	0
272	MATINGLY	7	B	0	0.000	0.000	0.045	0.075	0
273	MATINGLY	7	C	0	0.000	0.000	0.005	0.050	0
274	MCCOY	1	A	0	0.000	0.025	0.085	0.135	0
275	MCCOY	1	B	0	0.000	0.000	0.050	0.100	0
276	MCCOY	1	C	0	0.000	0.025	0.085	0.135	0
277	MCCOY	2	A	0	0.030	0.040	0.110	0.180	0
278	MCCOY	2	B	0	0.000	0.060	0.130	0.200	0
279	MCCOY	3	A	0	0.000	0.070	0.140	0.210	0
280	MCCOY	3	B	0	0.010	0.080	0.150	0.220	0
281	MCCOY	3	C	0	0.020	0.090	0.160	0.230	0
282	MCCOY	4	A	0	0.000	0.020	0.070	0.125	0
283	MCCOY	4	B	0	0.000	0.010	0.060	0.115	0
284	MCCOY	4	C	0	0.000	0.020	0.070	0.125	0
285	MCCOY	5	A	0	0.000	0.395	0.200	0.305	0

SAS

OBS	ID	BLDGTYPE	POLICY	HHV	HHVI	HHVII	HHVIII	HHIX	CON2
286	MCCOY	5	B	0	0.000	0.450	0.150	0.255	0
287	MCCOY	5	C	0	0.000	0.045	0.150	0.255	0
288	MCCOY	6	A	0	0.005	0.005	0.120	0.180	0
289	MCCOY	6	B	0	0.000	0.055	0.140	0.170	0
290	MCCOY	6	C	0	0.015	0.075	0.130	0.190	0
291	MCCOY	7	A	0	0.000	0.015	0.070	0.105	0
292	MCCOY	7	B	0	0.000	0.000	0.030	0.065	0
293	MCCOY	7	C	0	0.000	0.000	0.060	0.095	0
294	MEINER	5	B	0	0.035	0.140	0.240	0.335	0
295	MEINER	5	C	0	0.015	0.070	0.120	0.170	0
296	MEINER	6	A	0	0.010	0.060	0.115	0.170	0
297	MEINER	6	B	0	0.010	0.060	0.115	0.170	0
298	MEINER	6	C	0	0.005	0.050	0.095	0.140	0
299	MEINER	7	A	0	0.000	0.015	0.060	0.095	0
300	MEINER	7	B	0	0.000	0.020	0.075	0.110	0
301	MEINER	7	C	0	0.000	0.010	0.055	0.080	0
302	MEUNIER	1	A	0	0.000	0.035	0.085	0.135	0
303	MEUNIER	1	B	0	0.000	0.040	0.090	0.140	0
304	MEUNIER	1	C	0	0.000	0.025	0.065	0.100	0
305	MEUNIER	2	A	0	0.020	0.070	0.130	0.180	0
306	MEUNIER	2	B	0	0.030	0.110	0.180	0.265	0
307	MEUNIER	2	C	0	0.015	0.060	0.105	0.150	0
308	MEUNIER	3	A	0	0.010	0.070	0.130	0.180	0
309	MEUNIER	3	B	0	0.015	0.080	0.150	0.210	0
310	MEUNIER	3	C	0	0.005	0.045	0.090	0.125	0
311	MEUNIER	4	A	0	0.000	0.015	0.060	0.110	0
312	MEUNIER	4	B	0	0.000	0.015	0.060	0.110	0
313	MEUNIER	4	C	0	0.000	0.010	0.050	0.090	0
314	MEUNIER	5	A	0	0.075	0.100	0.170	0.230	0
315	PETAK	1	A	0	0.015	0.040	0.100	0.150	0
316	PETAK	1	B	0	0.000	0.025	0.085	0.135	0
317	PETAK	1	C	0	0.010	0.040	0.100	0.150	0
318	PETAK	2	A	0	0.000	0.065	0.150	0.230	0
319	PETAK	2	B	0	0.020	0.095	0.180	0.260	0
320	PETAK	2	C	0	0.000	0.020	0.100	0.175	0
321	PETAK	3	A	0	0.000	0.070	0.140	0.205	0
322	PETAK	3	B	0	0.000	0.070	0.140	0.205	0
323	PETAK	3	C	0	0.000	0.000	0.060	0.130	0
324	PETAK	4	A	0	0.000	0.020	0.070	0.125	0
325	PETAK	4	B	0	0.000	0.000	0.005	0.060	0
326	PETAK	4	C	0	0.000	0.020	0.070	0.125	0
327	PETAK	5	A	0	0.000	0.045	0.150	0.255	0
328	PETAK	5	B	0	0.000	0.000	0.110	0.200	0
329	PETAK	5	C	0	0.000	0.000	0.050	0.120	0
330	PETAK	6	A	0	0.015	0.075	0.130	0.190	0
331	PETAK	6	B	0	0.000	0.025	0.080	0.140	0
332	PETAK	6	C	0	0.015	0.075	0.130	0.190	0
333	PETAK	7	A	0	0.005	0.025	0.080	0.115	0
334	PETAK	7	B	0	0.005	0.025	0.080	0.115	0
335	PETAK	7	C	0	0.005	0.075	0.080	0.115	0
336	SPICER	1	A	.	.	.	.	.	1
337	SPICER	1	B	0	0.010	0.040	0.100	0.150	1
338	SPICER	1	C	0	0.010	0.340	0.100	0.150	1
339	SPICER	2	A	0	0.035	0.120	0.200	0.280	1
340	SPICER	2	B	0	0.035	0.120	0.200	0.280	1
341	SPICER	2	C	0	0.035	0.120	0.200	0.280	1
342	SPICER	3	A	0	0.020	0.090	0.160	0.230	1

SAS

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	COM2
343	SPICER	3	B	0	0.020	0.090	0.160	0.230	1
344	SPICER	3	C	0	0.000	0.000	0.050	0.125	1
345	SPICER	4	A	0	0.000	0.020	0.070	0.125	1
346	SPICER	4	B	0	0.000	0.020	0.070	0.125	1
347	SPICER	4	C	0	0.000	0.020	0.070	0.125	1
348	SPICER	5	A	0	0.030	0.135	0.225	0.345	1
349	SPICER	5	B	0	0.040	0.145	0.250	0.350	1
350	SPICER	5	C	0	0.000	0.000	0.090	0.175	1
351	SPICER	6	A	0	0.015	0.075	0.130	0.190	1
352	SPICER	6	B	0	0.015	0.075	0.130	0.190	1
353	SPICER	6	C	0	0.015	0.075	0.130	0.190	1
354	SPICER	7	A	0	0.000	0.020	0.075	0.120	0
355	SPICER	7	B	0	0.005	0.025	0.080	0.115	0
356	SPICER	7	C	0	0.000	0.010	0.060	0.100	0
357	WHITMAN	1	A	0	0.000	0.035	0.095	0.145	1
358	WHITMAN	1	B	0	0.010	0.040	0.100	0.150	1
359	WHITMAN	1	C	0	0.010	0.040	0.100	0.150	1
360	WHITMAN	2	A	0	0.030	0.110	0.195	0.280	1
361	WHITMAN	2	B	0	0.035	0.115	0.200	0.285	1
362	WHITMAN	2	C	0	0.015	0.085	0.155	0.225	1
363	WHITMAN	3	A	0	0.020	0.090	0.160	0.230	1
364	WHITMAN	3	B						1
365	WHITMAN	3	C	0	0.000	0.015	0.065	0.120	1
366	WHITMAN	4	A	0	0.000	0.020	0.070	0.125	1
367	WHITMAN	4	B	0	0.000	0.020	0.070	0.125	1
368	WHITMAN	4	C	0	0.035	0.140	0.245	0.355	1
369	WHITMAN	5	A	0	0.040	0.145	0.250	0.360	1
370	WHITMAN	5	B					0.100	1
371	WHITMAN	5	C	0	0.005	0.070	0.125	0.135	0
372	WHITMAN	6	A	0	0.015	0.075	0.130	0.190	0
373	WHITMAN	6	B	0	0.015	0.075	0.130	0.190	0
374	WHITMAN	6	C	0	0.000	0.020	0.075	0.110	0
375	WHITMAN	7	A	0	0.005	0.025	0.080	0.155	0
376	WHITMAN	7	B	0	0.005	0.025	0.080	0.150	0
377	WHITMAN	7	C						

DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	COM2
1	ARNOLD	1	A	0	0.010	0.040	0.100	0.150	1 0
2	ASAKURA	1	A	0	0.010	0.040	0.100	0.150	0
3	BACHARAC	1	A						0
4	BLANCK	1	A	.	.	.	.	.	1
5	BRAUNS	1	A	0	0.010	0.040	0.100	0.150	0
6	DONOVAN	1	A	0	0.010	0.040	0.100	0.150	0
7	JOHNSON	1	A	0	0.010	0.040	0.100	0.150	0
8	JOHNSTON	1	A	0	0.010	0.040	0.095	0.150	0
9	JONES	1	A	0	0.010	0.040	0.100	0.150	0
10	JULIAN	1	A	0	0.000	0.000	0.020	0.075	0
11	KOCKELMA	1	A	0	0.000	0.035	0.090	0.145	0
12	MASRI	1	A	0	0.001	0.035	0.090	0.145	0
13	MATINGLY	1	A	0	0.000	0.025	0.085	0.135	0
14	MCCOY	1	A	0	0.000	0.035	0.085	0.135	0
15	MEUNIER	1	A	0	0.010	0.040	0.100	0.150	0
16	PETAK	1	A						0
17	SPICER	1	A	0	0.000	0.035	0.095	0.145	1
18	WHITMAN	1	A						1
19	ARNOLD	1	B	0	0.010	0.040	0.100	0.150	0
20	ASAKURA	1	B	0	0.000	0.000	0.040	0.095	0
21	BACHARAC	1	B						0
22	BLANCK	1	B	.	.	.	.	.	1
23	BRAUNS	1	B	0	0.010	0.040	0.100	0.150	0
24	DONOVAN	1	B	0	0.010	0.040	0.100	0.150	0
25	JOHNSON	1	B	0	0.010	0.040	0.100	0.150	0
26	JOHNSTON	1	B	0	0.010	0.040	0.085	0.130	0
27	JONES	1	B	0	0.010	0.040	0.100	0.150	0
28	JULIAN	1	B	0	0.000	0.000	0.050	.	0
29	KOCKELMA	1	B	0	0.000	0.020	0.080	0.125	0
30	MASRI	1	B	0	0.010	0.040	0.100	0.150	0
31	MATINGLY	1	B	0	0.000	0.000	0.050	0.100	0
32	MCCOY	1	B	0	0.000	0.040	0.090	0.140	0
33	MEUNIER	1	B	0	0.000	0.025	0.085	0.135	0
34	PETAK	1	B	0	0.010	0.040	0.100	0.150	1
35	SPICER	1	B	0	0.010	0.040	0.100	0.150	1
36	WHITMAN	1	B						1
37	ARNOLD	1	C	0	0.010	0.040	0.100	0.150	0
38	ASAKURA	1	C	0	0.000	0.000	0.000	0.050	0
39	BACHARAC	1	C						0
40	BLANCK	1	C	.	.	.	.	.	1
41	BRAUNS	1	C	0	0.010	0.040	0.100	0.150	0
42	DONOVAN	1	C	0	0.010	0.040	0.100	0.150	0
43	JOHNSON	1	C	0	0.010	0.035	0.070	0.110	0
44	JOHNSTON	1	C	0	0.010	0.035	0.070	0.110	0
45	JONES	1	C	0	0.010	0.040	0.100	0.150	0
46	JULIAN	1	C	0	0.000	0.000	0.000	0.030	0
47	KOCKELMA	1	C	0	0.000	0.000	0.030	0.080	0
48	MASRI	1	C	0	0.000	0.020	0.075	0.125	0
49	MATINGLY	1	C	0	0.000	0.025	0.085	0.135	0
50	MCCOY	1	C	0	0.000	0.025	0.065	0.100	0
51	MEUNIER	1	C	0	0.010	0.040	0.100	0.150	0
52	PETAK	1	C	0	0.010	0.040	0.100	0.150	1
53	SPICER	1	C	0	0.010	0.040	0.100	0.150	1
54	WHITMAN	1	C						1
55	ARNOLD	2	A	0	0.015	0.065	0.150	0.235	0
56	ASAKURA	2	A	0	0.030	0.120	0.200	0.275	0
57	BACHARAC	2	A						

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DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
									0
58	BLANCK	2	A	.	.	.	.	.	1
59	BRAUNS	2	A	.	.	.	.	.	0
60	DONOVIN	2	A	0	0.030	0.120	0.200	0.275	0
61	JOHNSCN	2	A	0	0.005	0.085	0.170	0.255	0
62	JOHNSTON	2	A	0	0.035	0.090	0.140	0.200	0
63	JONES	2	A	0	0.035	0.100	0.175	0.250	1
64	JULIAN	2	A	0	0.000	0.650	0.150	0.175	0
65	KOCKELMA	2	A	0	0.000	0.040	0.125	0.210	0
66	MASRI	2	A	0	0.100	0.090	0.175	0.250	0
67	MATINGLY	2	A	0	0.025	0.100	0.180	0.260	0
68	MCCOY	2	A	0	0.000	0.040	0.110	0.180	0
69	MEUNIER	2	A	0	0.020	0.070	0.130	0.180	0
70	PETAK	2	A	0	0.000	0.065	0.150	0.230	1
71	SPICER	2	A	0	0.035	0.120	0.200	0.280	1
72	WHITMAN	2	A	0	0.030	0.110	0.195	0.280	1
73	ARNOLD	2	B	.	.	.	.	.	0
74	ASAKURA	2	B	0	0.035	0.115	0.200	0.285	0
75	BACHARAC	2	B	0	0.000	0.025	0.110	0.200	0
76	BLANCK	2	B	0	0.000	0.065	0.150	0.235	1
77	BRAUNS	2	B	.	.	.	.	.	0
78	DONOVAN	2	B	0	0.035	0.115	0.200	0.275	0
79	JOHNSCN	2	B	0	0.035	0.115	0.200	0.285	0
80	JOHNSTON	2	B	0	0.035	0.090	0.140	0.200	0
81	JONES	2	B	0	0.035	0.100	0.160	0.225	1
82	JULIAN	2	B	0	0.035	0.115	0.200	0.285	0
83	KOCKELMA	2	B	0	0.000	0.065	0.150	.	0
84	MASRI	2	B	0	0.030	0.110	0.190	0.270	0
85	MATINGLY	2	B	0	0.045	0.110	0.195	0.270	0
86	MCCOY	2	B	0	0.000	0.060	0.130	0.200	0
87	MEUNIER	2	B	0	0.030	0.110	0.180	0.265	0
88	PETAK	2	B	0	0.020	0.095	0.180	0.260	1
89	SPICER	2	B	0	0.035	0.120	0.200	0.280	1
90	WHITMAN	2	B	0	0.035	0.115	0.200	0.285	1
91	ARNOLD	2	C	.	.	.	.	.	0
92	ASAKURA	2	C	0	0.025	0.100	0.165	0.260	0
93	BACHARAC	2	C	0	0.000	0.000	0.075	0.160	0
94	BLANCK	2	C	.	.	.	.	.	1
95	BRAUNS	2	C	.	.	.	.	.	0
96	DONOVAN	2	C	0	0.035	0.225	0.200	0.275	0
97	JOHNSCN	2	C	0	0.000	0.065	0.150	0.235	0
98	JOHNSTON	2	C	0	0.015	0.040	0.070	0.100	0
99	JONES	2	C	0	0.035	0.070	0.110	0.140	1
100	JULIAN	2	C	0	0.000	0.015	0.100	0.180	0
101	KOCKELMA	2	C	0	0.000	0.000	0.085	0.165	0
102	MASRI	2	C	0	0.010	0.080	0.150	0.215	0
103	MATINGLY	2	C	0	0.000	0.050	0.125	0.210	0
104	MEUNIER	2	C	0	0.015	0.060	0.105	0.150	0
105	PETAK	2	C	0	0.000	0.020	0.100	0.175	1
106	SPICER	2	C	0	0.035	0.120	0.200	0.280	1
107	WHITMAN	2	C	.	.	.	.	.	1
108	ARNOLD	3	A	.	.	.	.	.	0
109	ASAKURA	3	A	0	0.020	0.090	0.160	0.230	0
110	BACHARAC	3	A	0	0.013	0.065	0.135	0.200	0
111	BLANCK	3	A	.	.	.	.	.	1
112	BRAUNS	3	A	.	.	.	.	.	1
113	DONOVAN	3	A	0	0.020	0.090	0.160	0.230	0
114	JOHNSCN	3	A	0	0.000	0.070	0.140	0.210	

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DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MHV	MHVI	MHVII	MHVIII	MHIX	CON2
115	JOHNSTON	3	A	0	0.020	0.065	0.110	0.150	0
116	JONES	3	A	0	0.020	0.080	0.145	0.210	0
117	JULIAN	3	A	0	0.020	0.090	0.160	0.230	0
118	KOCKELMA	3	A	0	0.000	0.010	0.085	0.155	0
119	MASRI	3	A	0	0.000	0.065	0.135	0.200	0
120	MATINGLY	3	A	0	0.000	0.075	0.140	0.210	0
121	MCCOY	3	A	0	0.000	0.070	0.140	0.210	0
122	MEUNIER	3	A	0	0.010	0.070	0.130	0.180	0
123	PETAK	3	A	0	0.005	0.070	0.140	0.205	1
124	SPICER	3	A	0	0.020	0.090	0.160	0.230	1
125	WHITMAN	3	A	0	0.015	0.085	0.155	0.225	1
126	ARNOLD	3	B	.	.	.	.	.	0
127	ASAKURA	3	B	0	0.000	0.030	0.100	0.170	0
128	BACHARAC	3	B	0	0.020	0.090	0.160	0.230	0
129	BLANCK	3	B	.	.	.	.	.	1
130	BRAUNS	3	B	.	.	.	.	.	1
131	DONOVAN	3	B	0	0.020	0.090	0.160	0.230	0
132	JOHNSON	3	B	0	0.020	0.090	0.160	0.230	0
133	JOHNSTON	3	B	0	0.020	0.080	0.140	0.200	0
134	JONES	3	B	0	0.020	0.075	0.125	0.175	0
135	JULIAN	3	B	0	0.020	0.090	0.160	0.230	0
136	KOCKELMA	3	B	0	0.000	0.040	0.110	.	0
137	MASRI	3	B	0	0.010	0.080	0.150	0.120	0
138	MATINGLY	3	B	0	0.000	0.060	0.130	0.140	0
139	MCCOY	3	B	0	0.010	0.080	0.150	0.220	0
140	MEUNIER	3	B	0	0.015	0.080	0.150	0.210	0
141	PETAK	3	B	0	0.000	0.070	0.140	0.205	1
142	SPICER	3	B	0	0.020	0.090	0.160	0.230	1
143	WHITMAN	3	B	0	0.020	0.090	0.160	0.230	1
144	ARNOLD	3	C	.	.	.	.	.	0
145	ASAKURA	3	C	0	0.000	0.000	0.060	0.125	0
146	BACHARAC	3	C	0	0.020	0.090	0.160	0.230	0
147	BLANCK	3	C	.	.	.	.	.	1
148	BRAUNS	3	C	.	.	.	.	.	1
149	DONOVAN	3	C	0	0.000	0.040	0.110	0.190	0
150	JOHNSON	3	C	0	0.000	0.050	0.120	0.190	0
151	JOHNSTON	3	C	0	0.020	0.040	0.060	0.075	0
152	JONES	3	C	0	0.020	0.060	0.100	0.140	0
153	JULIAN	3	C	0	0.000	0.040	0.110	0.180	0
154	KOCKELMA	3	C	0	0.000	0.000	0.030	0.100	0
155	MASRI	3	C	0	0.000	0.000	0.050	0.120	0
156	MATINGLY	3	C	0	0.000	0.000	0.075	0.140	0
157	MCCOY	3	C	0	0.020	0.090	0.160	0.230	0
158	MEUNIER	3	C	0	0.005	0.045	0.090	0.125	0
159	PETAK	3	C	0	0.000	0.000	0.060	0.130	1
160	SPICER	3	C	0	0.000	0.000	0.050	0.125	1
161	WHITMAN	3	C	.	.	.	.	.	1
162	ARNOLD	4	A	.	.	.	.	.	0
163	ASAKURA	4	A	0	0.000	0.000	0.020	0.125	0
164	BACHARAC	4	A	0	0.000	0.020	0.070	0.125	0
165	BLANCK	4	A	.	.	.	.	.	1
166	BRAUNS	4	A	.	.	.	.	.	1
167	DONOVAN	4	A	0	0.000	0.020	0.070	0.125	0
168	JOHNSON	4	A	0	0.000	0.010	0.060	0.115	0
169	JOHNSTON	4	A	0	0.000	0.020	0.060	0.100	0
170	JONES	4	A	0	0.000	0.020	0.065	0.120	0
171	JULIAN	4	A	0	0.000	0.020	0.070	0.125	0

DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
172	KOCKELMA	4	A	0	0.000	0.000	0.000	0.040	0
173	MASRI	4	A	0	0.000	0.000	0.045	0.095	0
174	MATINGLY	4	A	0	0.000	0.005	0.050	0.110	0
175	MCCOY	4	A	0	0.000	0.020	0.070	0.125	0
176	MEUNIER	4	A	0	0.000	0.015	0.060	0.110	0
177	PETAK	4	A	0	0.000	0.020	0.070	0.125	1
178	SPICER	4	A	0	0.000	0.020	0.070	0.125	1
179	WHITMAN	4	A	0	0.000	0.015	0.065	0.120	1
180	ARNOLD	4	B	.	.	.	.	.	0
181	ASAKURA	4	B	0	0.000	0.020	0.070	0.125	0
182	BACHARAC	4	B	0	0.000	0.000	0.020	0.070	0
183	BLANCK	4	B	.	.	.	.	.	1
184	BRAUNS	4	B	.	.	.	.	.	1
185	DONOVAN	4	B	0	0.000	0.020	0.070	0.125	0
186	JOHNSON	4	B	0	0.000	0.020	0.070	0.125	0
187	JOHNSTON	4	B	0	0.000	0.020	0.065	0.115	0
188	JONES	4	B	0	0.000	0.020	0.060	0.110	0
189	JULIAN	4	B	0	0.000	0.020	0.070	0.125	0
190	KOCKELMA	4	B	0	0.000	0.000	0.020	.	0
191	MASRI	4	B	0	0.000	0.000	0.055	0.115	0
192	MATINGLY	4	B	0	0.000	0.020	0.075	0.125	0
193	MCCOY	4	B	0	0.000	0.010	0.060	0.115	0
194	MEUNIER	4	B	0	0.000	0.015	0.060	0.110	0
195	PETAK	4	B	0	0.000	0.000	0.005	0.060	1
196	SPICER	4	B	0	0.000	0.020	0.070	0.125	1
197	WHITMAN	4	B	0	0.000	0.020	0.070	0.125	1
198	ARNOLD	4	C	.	.	.	.	.	0
199	ASAKURA	4	C	0	0.000	0.020	0.070	0.125	0
200	BACHARAC	4	C	0	0.000	0.000	0.000	0.020	0
201	BLANCK	4	C	.	.	.	.	.	1
202	BRAUNS	4	C	.	.	.	.	.	1
203	DONOVAN	4	C	0	0.000	0.020	0.070	0.125	0
204	JOHNSON	4	C	0	0.000	0.000	0.050	0.095	0
205	JOHNSTON	4	C	0	0.000	0.020	0.035	0.050	0
206	JONES	4	C	0	0.000	0.020	0.070	0.125	0
207	JULIAN	4	C	0	0.000	0.020	0.070	0.125	0
208	KOCKELMA	4	C	0	0.000	0.000	0.000	0.020	0
209	MASRI	4	C	0	0.000	0.000	0.000	0.050	0
210	MATINGLY	4	C	0	0.000	0.000	0.035	0.075	0
211	MCCOY	4	C	0	0.000	0.020	0.070	0.125	0
212	MEUNIER	4	C	0	0.000	0.010	0.050	0.090	0
213	PETAK	4	C	0	0.000	0.020	0.070	0.125	1
214	SPICER	4	C	0	0.000	0.020	0.070	0.125	1
215	WHITMAN	4	C	0	0.000	0.020	0.070	0.125	1
216	ARNOLD	5	A	.	.	.	.	.	1
217	ASAKURA	5	A	0	0.020	0.050	0.070	0.150	0
218	BACHARAC	5	A	0	0.025	0.135	0.235	0.335	0
219	BLANCK	5	A	.	.	.	.	.	1
220	BRAUNS	5	A	.	.	.	.	.	1
221	DONOVAN	5	A	0	0.040	0.145	0.250	0.360	0
222	JOHNSON	5	A	0	0.000	0.095	0.200	0.310	0
223	JOHNSTON	5	A	0	0.040	0.110	0.180	0.250	0
224	JONES	5	A	0	0.030	0.095	0.160	0.220	0
225	JULIAN	5	A	0	0.000	0.045	0.150	0.255	0
226	KOCKELMA	5	A	0	0.000	0.025	0.130	0.235	0
227	MASRI	5	A	0	0.000	0.075	0.175	0.275	0
228	MATINGLY	5	A	0	0.000	0.060	0.175	0.260	0

DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
229	MCCOY	5	A	0	0.000	0.095	0.200	0.305	0
230	MEONIER	5	A	0	0.075	0.100	0.170	0.230	0
231	PETAK	5	A	0	0.003	0.045	0.150	0.255	0
232	SPICER	5	A	0	0.030	0.135	0.225	0.345	1
233	WHITMAN	5	A	0	0.035	0.140	0.245	0.355	1
234	ARNOLD	5	B	.	.	.	.	.	0
235	ASAKURA	5	B	0	0.040	0.145	0.250	0.360	0
236	BACHRACH	5	B	0	0.000	0.050	0.155	0.260	0
237	BLANCK	5	B	.	.	.	.	.	1
238	BRAUNS	5	B	.	.	.	.	.	1
239	DONOVAN	5	B	0	0.040	0.145	0.250	0.360	0
240	JOHNSON	5	B	0	0.040	0.145	0.250	0.360	0
241	JOHNSTON	5	B	0	0.040	0.125	0.215	0.300	0
242	JONES	5	B	0	0.030	0.115	0.195	0.280	0
243	JULIAN	5	B	0	0.000	0.095	0.200	0.305	0
244	KOCKELM	5	B	0	0.000	0.095	0.200	0.305	0
245	MASRI	5	B	0	0.000	0.090	0.190	0.290	0
246	MATINGLY	5	B	0	0.025	0.125	0.225	0.325	0
247	MCCOY	5	B	0	0.000	0.450	0.150	0.255	0
248	MEINER	5	B	0	0.035	0.140	0.240	0.335	0
249	PETAK	5	B	0	0.000	0.000	0.110	0.200	1
250	SPICER	5	B	0	0.040	0.145	0.250	0.350	1
251	WHITMAN	5	B	0	0.040	0.145	0.250	0.360	1
252	ARNOLD	5	C	.	.	.	.	.	0
253	ASAKURA	5	C	0	0.020	0.050	0.070	0.150	0
254	BACHRACH	5	C	0	0.000	0.010	0.115	0.220	0
255	BLANCK	5	C	0	0.000	0.100	0.200	0.305	0
256	BRAUNS	5	C	0	0.020	0.070	0.135	0.175	1
257	DONOVAN	5	C	0	0.000	0.095	0.200	0.310	0
258	JOHNSON	5	C	0	0.000	0.045	0.150	0.260	0
259	JOHNSTON	5	C	0	0.040	0.060	0.080	0.100	0
260	JONES	5	C	0	0.020	0.040	0.065	0.085	0
261	JULIAN	5	C	0	0.000	0.000	0.040	0.190	0
262	KOCKELM	5	C	0	0.000	0.000	0.070	0.175	0
263	MASRI	5	C	0	0.000	0.000	0.190	0.220	0
264	MATINGLY	5	C	0	0.003	0.000	0.050	0.125	0
265	MCCOY	5	C	0	0.000	0.045	0.150	0.255	0
266	MEINER	5	C	0	0.015	0.070	0.120	0.170	0
267	PETAK	5	C	0	0.000	0.000	0.050	0.120	1
268	SPICER	5	C	0	0.000	0.000	0.090	0.175	1
269	WHITMAN	5	C	.	.	.	.	0.100	1
270	ARNOLD	6	A	.	.	.	.	.	0
271	ASAKURA	6	A	0	0.015	0.075	0.130	0.190	0
272	BACHRACH	6	A	0	0.015	0.075	0.130	0.190	0
273	BLANCK	6	A	.	.	.	.	.	1
274	BRAUNS	6	A	0	0.015	0.075	0.130	0.190	0
275	DONOVAN	6	A	0	0.015	0.075	0.130	0.190	0
276	JOHNSON	6	A	0	0.015	0.075	0.130	0.190	0
277	JOHNSTON	6	A	0	0.015	0.060	0.110	0.150	0
278	JONES	6	A	0	0.010	0.060	0.115	0.165	0
279	JULIAN	6	A	0	0.000	0.020	0.080	0.137	0
280	KOCKELM	6	A	0	0.000	0.000	0.050	0.110	0
281	MASRI	6	A	0	0.000	0.085	0.125	0.140	0
282	MATINGLY	6	A	0	0.003	0.065	0.125	0.175	0
283	MCCOY	6	A	0	0.005	0.005	0.120	0.180	0
284	MEINER	6	A	0	0.010	0.060	0.115	0.170	0
285	PETAK	6	A	0	0.015	0.075	0.130	0.190	0

DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	CON2
286	SPICER	6	A	0	0.015	0.075	0.130	0.190	1.00
287	WHITMAN	6	A	0	0.005	0.070	0.125	0.135	0.00
288	ARNOLD	6	B	.	.	.	.	.	1.00
289	ASAKURA	6	B	0	0.015	0.075	0.130	0.190	0.00
290	BACHRACH	6	B	0	0.000	0.035	0.095	0.150	0.00
291	BLANCK	6	B	.	.	.	.	.	0.00
292	BRAUNS	6	B	0	0.015	0.075	0.130	0.190	1.00
293	DONOVAN	6	B	0	0.015	0.075	0.130	0.190	0.00
294	JOHNSON	6	B	0	0.015	0.075	0.130	0.190	0.00
295	JOHNSTON	6	B	0	0.015	0.070	0.120	0.175	0.00
296	JONES	6	B	0	0.010	0.050	0.095	0.130	0.00
297	JULIAN	6	B	0	0.015	0.075	0.130	0.190	0.00
298	KOCKELM	6	B	0	0.000	0.020	0.080	.	0.00
299	MASRI	6	B	0	0.000	0.060	0.120	0.175	0.00
300	MATINGLY	6	B	0	0.010	0.075	0.130	0.180	0.00
301	MCCOY	6	B	0	0.000	0.055	0.140	0.170	0.00
302	MEINER	6	B	0	0.010	0.060	0.115	0.170	0.00
303	PETAK	6	B	0	0.000	0.025	0.080	0.140	0.00
304	SPICER	6	B	0	0.015	0.075	0.130	0.190	1.00
305	WHITMAN	6	B	0	0.015	0.075	0.130	0.190	0.00
306	ARNOLD	6	C	.	.	.	.	.	1.00
307	ASAKURA	6	C	0	0.015	0.075	0.130	0.190	0.00
308	BACHRACH	6	C	0	0.000	0.000	0.055	0.110	0.00
309	BLANCK	6	C	.	.	.	.	.	0.00
310	BRAUNS	6	C	0	0.015	0.075	0.130	0.190	1.00
311	DONOVAN	6	C	0	0.015	0.075	0.130	0.190	0.00
312	JOHNSON	6	C	0	0.000	0.050	0.115	0.175	0.00
313	JOHNSTON	6	C	0	0.015	0.040	0.070	0.100	0.00
314	JONES	6	C	0	0.010	0.060	0.155	0.100	0.15
315	JULIAN	6	C	0	0.000	0.020	0.080	0.135	0.00
316	KOCKELM	6	C	0	0.000	0.000	0.000	0.060	0.00
317	MASRI	6	C	0	0.000	0.015	0.070	0.125	0.00
318	MATINGLY	6	C	0	0.000	0.000	0.045	0.095	0.00
319	MCCOY	6	C	0	0.015	0.075	0.130	0.190	0.00
320	MEINER	6	C	0	0.005	0.050	0.095	0.140	0.00
321	PETAK	6	C	0	0.015	0.075	0.130	0.190	0.00
322	SPICER	6	C	0	0.015	0.075	0.130	0.190	1.00
323	WHITMAN	6	C	0	0.015	0.075	0.130	0.190	0.00
324	ARNOLD	7	A	.	.	.	.	.	1.00
325	ASAKURA	7	A	0	0.005	0.025	0.080	0.115	0.00
326	BACHRACH	7	A	0	0.000	0.005	0.060	0.095	0.00
327	BLANCK	7	A	0	0.000	0.000	0.030	0.070	0.00
328	BRAUNS	7	A	0	0.000	0.010	0.055	0.100	1.00
329	DONOVAN	7	A	0	0.005	0.025	0.080	0.115	0.00
330	JOHNSON	7	A	0	0.000	0.000	0.030	0.065	0.00
331	JOHNSTON	7	A	0	0.005	0.015	0.050	0.075	0.00
332	JONES	7	A	0	0.005	0.020	0.055	0.085	0.00
333	JULIAN	7	A	0	0.000	0.000	0.030	0.065	0.00
334	KOCKELM	7	A	0	0.000	0.000	0.015	0.055	0.00
335	MASRI	7	A	0	0.005	0.025	0.080	0.115	0.00
336	MATINGLY	7	A	0	0.000	0.005	0.065	0.090	0.00
337	MCCOY	7	A	0	0.000	0.015	0.070	0.105	0.00
338	MEINER	7	A	0	0.000	0.015	0.060	0.095	0.00
339	PETAK	7	A	0	0.005	0.025	0.080	0.115	0.00
340	SPICER	7	A	0	0.000	0.020	0.075	0.120	0.00
341	WHITMAN	7	A	0	0.000	0.020	0.075	0.110	0.00
342	ARNOLD	7	B	.	.	.	.	.	1.00

DATA FROM DELPHI BY BUILDING TYPE AND POLICY

OBS	ID	BLDGTYPE	POLICY	MMV	MMVI	MMVII	MMVIII	MMIX	COB2
343	ASAKURA	7	B	0	0.005	0.025	0.080	0.115	0
344	BACHRACH	7	B	0	0.000	0.000	0.010	0.050	0
345	BLANCK	7	B	.	.	.	.	.	0
346	BRAUNS	7	B	.	.	.	.	.	1
347	DONOVAN	7	B	0	0.005	0.025	0.080	0.115	0
348	JOHNSON	7	B	0	0.005	0.075	0.080	0.175	0
349	JOHNSTON	7	B	0	0.005	0.015	0.070	0.100	0
350	JONES	7	B	0	0.005	0.020	0.060	0.100	0
351	JULIAN	7	B	0	0.000	0.000	0.030	0.065	0
352	KOCKEIM	7	B	0	0.000	0.000	0.010	.	0
353	MASRI	7	B	0	0.000	0.020	0.070	0.080	0
354	MATINGLY	7	B	0	0.000	0.000	0.045	0.075	0
355	MCCOY	7	B	0	0.000	0.000	0.030	0.065	0
356	MEINER	7	B	0	0.000	0.020	0.075	0.110	0
357	PETAK	7	B	0	0.005	0.025	0.080	0.115	0
358	SPICER	7	B	0	0.005	0.025	0.080	0.115	0
359	WHITMAN	7	B	0	0.005	0.025	0.080	0.155	0
360	ARNOLD	7	C	.	.	.	.	.	1
361	ASAKURA	7	C	0	0.005	0.025	0.090	0.115	0
362	BACHRACH	7	C	0	0.005	0.025	0.080	0.115	0
363	BLANCK	7	C	.	.	.	.	.	0
364	BRAUNS	7	C	.	.	.	.	.	1
365	DONOVAN	7	C	0	0.005	0.025	0.080	0.115	0
366	JOHNSON	7	C	0	0.000	0.015	0.070	0.105	0
367	JOHNSTON	7	C	0	0.005	0.015	0.035	0.050	0
368	JONES	7	C	0	0.005	0.020	0.050	0.075	0
369	JULIAN	7	C	0	0.000	0.000	0.030	0.065	0
370	KOCKEIM	7	C	0	0.000	0.000	0.000	0.010	0
371	MASRI	7	C	0	0.000	0.000	0.045	0.085	0
372	MATINGLY	7	C	0	0.000	0.000	0.005	0.050	0
373	MCCOY	7	C	0	0.000	0.000	0.060	0.095	0
374	MEINER	7	C	0	0.000	0.010	0.055	0.080	0
375	PETAK	7	C	0	0.005	0.075	0.080	0.115	0
376	SPICER	7	C	0	0.000	0.010	0.060	0.100	0
377	WHITMAN	7	C	0	0.005	0.025	0.080	0.150	0

MEANS STD DEVIATION ETC FOR MM INTENSITY/BLDG TYPE/POLICY

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
BLDGTYPE=1 POLICY=A									
MMV	14	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	14	0.00578571	0.00505628	0.00000000	0.01000000	0.00135135	0.08100000	0.00002557	87.39
MMVII	14	0.03464286	0.01082452	0.00000000	0.04000000	0.00289298	0.48500000	0.00011717	31.24
MMVIII	14	0.09000000	0.02093947	0.02000000	0.10000000	0.00559631	1.26000000	0.00043846	23.26
MMIX	14	0.14142857	0.01984833	0.07500000	0.15000000	0.00530469	1.98000000	0.00039396	14.03
BLDGTYPE=1 POLICY=B									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00600000	0.00507093	0.00000000	0.01000000	0.00130931	0.09000000	0.00002571	84.51
MMVII	15	0.02966667	0.01652559	0.00000000	0.04000000	0.00426689	0.44500000	0.00027310	55.70
MMVIII	15	0.08533333	0.02125245	0.04000000	0.10000000	0.00548736	1.28000000	0.00045167	24.90
MMIX	14	0.13750000	0.01898886	0.09500000	0.15000000	0.00507499	1.92500000	0.00036058	13.81
BLDGTYPE=1 POLICY=C									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00600000	0.00507093	0.00000000	0.01000000	0.00130931	0.09000000	0.00002571	84.51
MMVII	15	0.02800000	0.01590148	0.00000000	0.04000000	0.00410575	0.42000000	0.00025286	56.79
MMVIII	15	0.07300000	0.03569714	0.00000000	0.10000000	0.00921696	1.09500000	0.00127429	48.90
MMIX	15	0.11933333	0.03940933	0.03000000	0.15000000	0.01017545	1.79000000	0.00155310	33.02
BLDGTYPE=2 POLICY=A									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.01733333	0.01498412	0.00000000	0.03500000	0.00386888	0.26000000	0.00022452	86.44
MMVII	15	0.12433333	0.14781584	0.04000000	0.65000000	0.03816589	1.86500000	0.02184952	118.88
MMVIII	15	0.16333333	0.02943920	0.11000000	0.20000000	0.00760117	2.45000000	0.00086667	18.02
MMIX	15	0.23566667	0.03802568	0.17500000	0.28000000	0.00981819	3.53500000	0.00144595	16.13
BLDGTYPE=2 POLICY=B									
MMV	16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	16	0.02531250	0.01586072	0.00000000	0.04500000	0.00396518	0.40500000	0.00025156	62.66
MMVII	16	0.09531250	0.02741464	0.02500000	0.12000000	0.00685366	1.52500000	0.00075156	28.76
MMVIII	16	0.17406250	0.02984509	0.11000000	0.20000000	0.00746127	2.78500000	0.00089073	17.14
MMIX	15	0.25466667	0.03335238	0.20000000	0.28500000	0.00861155	3.82000000	0.00111238	13.09
BLDGTYPE=2 POLICY=C									
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	0.01307692	0.01479562	0.00000000	0.03500000	0.00410357	0.17000000	0.00021891	113.14
MMVII	13	0.06500000	0.06051859	0.00000000	0.22500000	0.01678484	0.84500000	0.00366250	93.10
MMVIII	13	0.12576923	0.04386752	0.07000000	0.20000000	0.01216666	1.63500000	0.00192436	34.87
MMIX	13	0.19576923	0.05544690	0.10000000	0.28000000	0.01537820	2.54500000	0.00307436	28.32
BLDGTYPE=3 POLICY=A									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.01033333	0.00934778	0.00000000	0.02000000	0.00241359	0.15500000	0.00008738	90.46
MMVII	15	0.07233333	0.01989855	0.01000000	0.09000000	0.00513778	1.08500000	0.00039595	27.51
MMVIII	15	0.13966667	0.02056928	0.08500000	0.16000000	0.00531096	2.09500000	0.00042310	14.72
MMIX	15	0.20500000	0.02563480	0.15000000	0.23000000	0.00661888	3.07500000	0.00065714	12.50

MEANS STD DEVIATION ETC FOR MM INTENSITY/BLDG TYPE/POLICY

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
BLDGTYPE=3 POLICY=B									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.01300000	0.00882367	0.00000000	0.02000000	0.00227826	0.19500000	0.00007786	67.87
MMVII	15	0.07506667	0.01879083	0.03000000	0.09000000	0.00485177	1.13500000	0.00035310	25.03
MMVIII	15	0.14366667	0.01949969	0.10000000	0.16000000	0.00503480	2.15500000	0.00038024	13.57
MMIX	14	0.20142857	0.03660751	0.12000000	0.23000000	0.00978377	2.82000000	0.00134011	18.17
BLDGTYPE=3 POLICY=C									
MMV	14	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	14	0.00607143	0.00923592	0.00000000	0.02000000	0.00246840	0.08500000	0.00008530	152.12
MMVII	14	0.03250000	0.03320971	0.00000000	0.09000000	0.00887567	0.45500000	0.00110288	102.18
MMVIII	14	0.08821429	0.04045925	0.03000000	0.16000000	0.01081319	1.23500000	0.00163695	45.86
MMIX	14	0.15000000	0.04673987	0.07500000	0.23000000	0.01249176	2.10000000	0.00218462	31.16
BLDGTYPE=4 POLICY=A									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVII	15	0.01366667	0.00833809	0.00000000	0.02000000	0.00215289	0.20500000	0.00006952	61.01
MMVIII	15	0.05633333	0.02065591	0.00000000	0.07000000	0.00533333	0.84500000	0.00042667	36.66
MMIX	15	0.11233333	0.02226999	0.04000000	0.12500000	0.00575009	1.68500000	0.00049595	19.82
BLDGTYPE=4 POLICY=B									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVII	15	0.01366667	0.00895757	0.00000000	0.02000000	0.00231284	0.20500000	0.00008024	65.54
MMVIII	15	0.05600000	0.02213594	0.00500000	0.07500000	0.00571548	0.84000000	0.00049000	39.52
MMIX	14	0.11214286	0.02091322	0.06000000	0.12500000	0.00558929	1.57000000	0.00043736	18.64
BLDGTYPE=4 POLICY=C									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVII	15	0.01266667	0.00961150	0.00000000	0.02000000	0.00248168	0.19000000	0.00009238	75.88
MMVIII	15	0.04866667	0.02818730	0.00000000	0.07000000	0.00727793	0.73000000	0.00079452	57.91
MMIX	15	0.09333333	0.04042924	0.02000000	0.12500000	0.01043879	1.40000000	0.00163452	43.31
BLDGTYPE=5 POLICY=A									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.01966667	0.02247750	0.00000000	0.07500000	0.00580367	0.29500000	0.00050524	114.29
MMVII	15	0.09000000	0.03886791	0.02500000	0.14500000	0.01003565	1.35000000	0.00151071	43.18
MMVIII	15	0.18100000	0.04774187	0.07000000	0.25000000	0.01232690	2.71500000	0.00227929	26.37
MMIX	15	0.27600000	0.05865151	0.15000000	0.36000000	0.01514376	4.14000000	0.00344000	21.25
BLDGTYPE=5 POLICY=B									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.02200000	0.01906755	0.00000000	0.04000000	0.00492322	0.33000000	0.00036357	86.67
MMVII	15	0.13400000	0.09673602	0.00000000	0.45000000	0.02497713	2.01000000	0.00935786	72.19
MMVIII	15	0.20866667	0.04356713	0.11000000	0.25000000	0.01124899	3.13000000	0.00189810	20.87
MMIX	15	0.30966667	0.04745173	0.20000000	0.36000000	0.01225198	4.64500000	0.00225167	15.32

MEANS STD DEVIATION ETC FOR MM INTENSITY/BLDG TYPE/POLICY

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
BLDGTYPE=5 POLICY=C									
MMV	16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	16	0.00718750	0.01210630	0.00000000	0.04000000	0.00302658	0.11500000	0.00014656	168.435
MMVII	16	0.03656250	0.03585707	0.00000000	0.10000000	0.00896427	0.58500000	0.00128573	98.071
MMVIII	16	0.11093750	0.05487011	0.04000000	0.20000000	0.01371753	1.77500000	0.00301073	49.460
MMIX	17	0.18441176	0.06939206	0.08500000	0.31000000	0.01683005	3.13500000	0.00481526	37.625
BLDGTYPE=6 POLICY=A									
MMV	16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	16	0.00956250	0.00630311	0.00000000	0.01500000	0.00157578	0.15300000	0.00003973	65.915
MMVII	16	0.05937500	0.02651258	0.00000000	0.08500000	0.00662814	0.95000000	0.00070292	44.653
MMVIII	16	0.11718750	0.02205816	0.05000000	0.13000000	0.00551454	1.87500000	0.00048656	18.823
MMIX	16	0.17062500	0.02515784	0.11000000	0.19000000	0.00628946	2.73000000	0.00063292	14.744
BLDGTYPE=6 POLICY=B									
MMV	16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	16	0.00937500	0.00680074	0.00000000	0.01500000	0.00170018	0.15000000	0.00004625	72.541
MMVII	16	0.06093750	0.01908042	0.02000000	0.07500000	0.00477011	0.97500000	0.00036406	31.311
MMVIII	16	0.11781250	0.01931914	0.08000000	0.14000000	0.00482978	1.88500000	0.00037323	16.398
MMIX	15	0.17466667	0.01986262	0.13000000	0.19000000	0.00512851	2.62000000	0.00039452	11.372
BLDGTYPE=6 POLICY=C									
MMV	16	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	16	0.00843750	0.00723850	0.00000000	0.01500000	0.00180962	0.13500000	0.00005240	85.790
MMVII	16	0.04750000	0.03065942	0.00000000	0.07500000	0.00766485	0.76000000	0.00094000	64.546
MMVIII	16	0.09968750	0.04228746	0.00000000	0.15500000	0.01057186	1.59500000	0.00178823	42.420
MMIX	16	0.14812500	0.04505090	0.06000000	0.19000000	0.01126272	2.37000000	0.00202958	30.414
BLDGTYPE=7 POLICY=A									
MMV	17	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	17	0.00176471	0.00246296	0.00000000	0.00500000	0.00059736	0.03000000	0.00000607	139.568
MMVII	17	0.01323529	0.00983317	0.00000000	0.02500000	0.00238489	0.22500000	0.00009669	74.295
MMVIII	17	0.05823529	0.02091211	0.01500000	0.08000000	0.00507193	0.99000000	0.00043732	35.910
MMIX	17	0.09352941	0.02104791	0.05500000	0.12000000	0.00510487	1.59000000	0.00044301	22.504
BLDGTYPE=7 POLICY=B									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00266667	0.00258199	0.00000000	0.00500000	0.00066667	0.04000000	0.00000667	96.825
MMVII	15	0.01833333	0.01914854	0.00000000	0.07500000	0.00494413	0.27500000	0.00036667	104.467
MMVIII	15	0.05866667	0.02648899	0.01000000	0.08000000	0.00683943	0.88000000	0.00070167	45.152
MMIX	14	0.10250000	0.03457155	0.05000000	0.17500000	0.00923964	1.43500000	0.00119519	33.728
BLDGTYPE=7 POLICY=C									
MMV	15	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	15	0.00233333	0.00258199	0.00000000	0.00500000	0.00066667	0.03500000	0.00000667	110.657
MMVII	15	0.01633333	0.01922300	0.00000000	0.07500000	0.00496336	0.24500000	0.00036952	117.692
MMVIII	15	0.05400000	0.02680618	0.00000000	0.08000000	0.00692133	0.81000000	0.00071[illegible]	49.641
MMIX	15	0.08833333	0.03482952	0.01000000	0.15000000	0.00899294	1.32500000	0.0012[illegible]10	39.430

A P P E N D I X   A 3

Damage curves -- cycle II

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NOTE: THE PROCEDURE MEANS USED 0.14 SECONDS AND 232K AND PRINTED PAGE 42
NOTE: SAS USED 240K MEMORY.

NOTE: SAS INSTITUTE INC.
      SAS CIRCLE
      PO BOX 8000
      CARY, N.C.  27511-8000
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DATA FROM TASK ONE/SETTING ONE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	22.5	26.00	32.5	35.0	35.0	0
2	ARNOLD	0.0	0.50	2.5	8.0	11.8	0
3	ASAKURA	0.0	0.50	3.0	9.0	13.0	0
4	BACHRACH	0.0	1.00	3.0	9.3	13.0	0
5	BRAUN	0.0	1.50	5.0	16.0	21.5	0
6	GALLAGH	0.0	0.45	2.5	9.0	11.5	0
7	JOHNSONG	0.0	0.50	3.0	9.5	12.5	0
8	JOHNSONR	0.0	0.45	2.5	8.0	13.5	0
9	KOCKELMN	0.0	1.00	3.0	10.0	16.5	0
10	MASRI	0.0	5.00	10.0	15.0	20.0	0
11	MTTINGLY	0.0	2.50	6.5	11.5	15.0	0
12	SANDY	0.0	0.45	3.0	10.0	15.5	1
13	WALLACE	0.0	0.45	2.5	10.0	15.0	0
14	WHITMAN	0.0	0.00	1.0	3.0	6.0	1

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	13	13	100.000	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	1	1	7.692	7.692
0.45	4	5	30.769	38.462
0.5	3	8	23.077	61.538
1	2	10	15.385	76.923
1.5	1	11	7.692	84.615
2.5	1	12	7.692	92.308
5	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1	1	1	7.692	7.692
2.5	4	5	30.769	38.462
3	5	10	38.462	76.923
5	1	11	7.692	84.615
6.5	1	12	7.692	92.308
10	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
3	1	1	7.692	7.692
8	2	3	15.385	23.077
9	2	5	15.385	38.462
9.3	1	6	7.692	46.154
9.5	1	7	7.692	53.846
10	3	10	23.077	76.923
11.5	1	11	7.692	84.615
15	1	12	7.692	92.308
16	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
6	1	1	7.692	7.692
11.5	1	2	7.692	15.385
11.8	1	3	7.692	23.077
12.5	1	4	7.692	30.769
13	2	6	15.385	46.154
13.5	1	7	7.692	53.846
15	2	9	15.385	69.231
15.5	1	10	7.692	76.923
16.5	1	11	7.692	84.615
20	1	12	7.692	92.308
21.5	1	13	7.692	100.000

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VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C V
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.10000000	1.33322916	0.00000000	5.00000000	0.36977124	14.30000000	1.77750000	121.203
MMVII	13	3.65384615	2.32185823	1.00000000	10.00000000	0.64396761	47.50000000	5.39102564	63.546
MMVIII	13	9.86923077	3.19853733	3.00000000	16.00000000	0.88711464	128.30000000	10.23064103	32.409
MMIX	13	14.21538462	3.89162480	6.00000000	21.50000000	1.07934252	184.80000000	15.14474359	27.376

DATA FROM TASK ONE/SETTING TWO

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	12	16.0	21.0	25.5	30.5	0
2	ASAKURA	0	3.0	10.0	17.5	24.0	0
3	ARNOLD	0	2.0	7.5	14.0	20.0	0
4	BACHRACH	0	6.0	12.5	20.5	27.0	0
5	BRAUN	0	3.5	11.0	20.5	29.0	0
6	GALLAGH	0	2.3	7.5	14.0	20.5	0
7	JOHNSONG	1	3.0	10.0	17.0	25.0	0
8	JOHNSONR	0	2.3	7.5	13.5	22.3	0
9	KOCKELMN	0	3.5	9.5	15.5	22.0	0
10	MASRI	0	6.5	12.5	18.5	25.0	0
11	MTTINGLY	5	10.0	17.5	23.0	27.5	0
12	SANDY	0	2.3	8.0	16.2	23.0	1
13	WALLACE	0	2.3	10.0	20.0	30.0	0
14	WHITMAN	0	0.5	2.5	6.0	9.0	0

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	11	11	84.615	84.615
1	1	12	7.692	92.308
5	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0.5	1	1	7.692	7.692
2	1	2	7.692	15.385
2.3	4	6	30.769	46.154
3	2	8	15.385	61.538
3.5	2	10	15.385	76.923
6	1	11	7.692	84.615
6.5	1	12	7.692	92.308
10	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2.5	1	1	7.692	7.692
7.5	3	4	23.077	30.769
8	1	5	7.692	38.462
9.5	1	6	7.692	46.154
10	3	9	23.077	69.231
11	1	10	7.692	76.923
12.5	2	12	15.385	92.308
17.5	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
6	1	1	7.692	7.692
13.5	1	2	7.692	15.385
14	2	4	15.385	30.769
15.5	1	5	7.692	38.462
16.2	1	6	7.692	46.154
17	1	7	7.692	53.846
17.5	1	8	7.692	61.538
18.5	1	9	7.692	69.231
20	1	10	7.692	76.923
20.5	2	12	15.385	92.308
23	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
9	1	1	7.692	7.692
20	1	2	7.692	15.385
20.5	1	3	7.692	23.077
22	1	4	7.692	30.769
22.3	1	5	7.692	38.462
23	1	6	7.692	46.154
24	1	7	7.692	53.846
25	2	9	15.385	69.231
27	1	10	7.692	76.923
27.5	1	11	7.692	84.615
29	1	12	7.692	92.308
30	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C V
MMV	13	0.46153846	1.39136531	0.00000000	5.00000000	0.38589531	6.00000000	1 93589744	301.462
MMVI	13	3.63076923	2.49645903	0.50000000	10.00000000	0.69239316	47.20000000	6.23230769	68.758
MMVII	13	9.69230769	3.50914556	2.50000000	17.50000000	0 97326187	126.00000000	12 31410256	36.205
MMVIII	13	16.63076923	4.32403835	6.00000000	23 00000000	1 19927246	216 20000000	18 69730769	26 000
MMIX	13	23.40769231	5.32939358	9.00000000	30.00000000	1.47810783	304 30000000	28 40243590	22.768

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	14.5	17.00	22.5	25.5	28.0	0
2	ASAKURA	0.0	0.09	4.0	10.0	14.0	0
3	ARNOLD	0.0	0.80	3.0	9.0	13.4	1
4	BACHRACH	0.0	2.20	5.0	11.0	14.0	0
5	BRAUN	0.0	1.50	5.0	14.5	20.0	0
6	GALLAGH	0.0	1.00	3.5	9.5	12.0	0
7	JOHNSONG	0.0	2.00	7.0	15.0	23.0	0
8	JOHNSONR	0.0	0.80	3.0	8.5	14.2	0
9	KOCKELMN	0.0	1.50	6.0	12.0	16.0	0
10	MASRI	0.0	0.80	3.0	12.2	20.0	0
11	MTTINGLY	0.0	3.50	6.0	11.0	16.0	0
12	SANDY	0.0	1.00	4.5	12.0	16.5	1
13	WALLACE	0.0	0.80	5.0	15.0	20.0	0
14	WHITMAN	0.0	0.50	1.5	4.5	9.0	0

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MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	13	13	100.000	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0.09	1	1	7.692	7.692
0.5	1	2	7.692	15.385
0.8	4	6	30.769	46.154
1	2	8	15.385	61.538
1.5	2	10	15.385	76.923
2	1	11	7.692	84.615
2.2	1	12	7.692	92.308
3.5	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1.5	1	1	7.692	7.692
3	3	4	23.077	30.769
3.5	1	5	7.692	38.462
4	1	6	7.692	46.154
4.5	1	7	7.692	53.846
5	3	10	23.077	76.923
6	2	12	15.385	92.308
7	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
4.5	1	1	7.692	7.692
8.5	1	2	7.692	15.385
9	1	3	7.692	23.077
9.5	1	4	7.692	30.769
10	1	5	7.692	38.462
11	2	7	15.385	53.846
12	2	9	15.385	69.231
12.2	1	10	7.692	76.923
14.5	1	11	7.692	84.615
15	2	13	15.385	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
9	1	1	7.692	7.692
12	1	2	7.692	15.385
13.4	1	3	7.692	23.077
14	2	5	15.385	38.462
14.2	1	6	7.692	46.154
15	2	8	15.385	61.538
16.5	1	9	7.692	69.231
20	3	12	23.077	92.308
23	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C V
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.26846154	0.88934289	0.09000000	3.50000000	0.24665934	16.49000000	0.79093077	70.112
MMVII	13	4.34615385	1.53276188	1.50000000	7.00000000	0.42511166	56.50000000	2.34935897	35.267
MMVIII	13	11.09230769	2.93441122	4.50000000	15.00000000	0.81385924	144.20000000	8.61076923	26.454
MMIX	13	16.00769231	3.87566371	9.00000000	23.00000000	1.07491571	208.10000000	15.02076923	24.211

DATA FROM TASK ONE/SETTING FOUR

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	21	23.50	27.0	30.0	34.0	0
2	ASAKURA	0	1.75	5.0	12.0	17.0	0
3	ARNOLD	0	0.00	4.0	10.0	14.0	0
4	BACHRACH	0	2.00	5.5	11.5	16.0	0
5	BRAUN	0	2.00	5.0	12.5	19.0	0
6	GALLAGH	0	1.50	4.0	10.0	14.2	0
7	JOHNSONG	0	2.50	6.0	12.5	17.5	0
8	JOHNSONR	0	1.50	4.0	10.0	18.5	0
9	KOCKELMN	0	1.00	4.5	10.0	16.0	0
10	MASRI	0	2.00	6.0	12.0	16.0	0
11	MTTINGLY	0	3.50	6.0	10.5	14.0	0
12	SANDY	0	1.50	4.0	10.0	15.0	1
13	WALLACE	0	1.50	10.0	20.0	25.5	0
14	WHITMAN	0	0.50	1.5	3.5	9.0	0

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MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	13	13	100.000	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	1	1	7.692	7.692
0.5	1	2	7.692	15.385
1	1	3	7.692	23.077
1.5	4	7	30.769	53.846
1.75	1	8	7.692	61.538
2	3	11	23.077	84.615
2.5	1	12	7.692	92.308
3.5	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1.5	1	1	7.692	7.692
4	4	5	30.769	38.462
4.5	1	6	7.692	46.154
5	2	8	15.385	61.538
5.5	1	9	7.692	69.231
6	3	12	23.077	92.308
10	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
3.5	1	1	7.692	7.692
10	5	6	38.462	46.154
10.5	1	7	7.692	53.846
11.5	1	8	7.692	61.538
12	2	10	15.385	76.923
12.5	2	12	15.385	92.308
20	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
9	1	1	7.692	7.692
14	2	3	15.385	23.077
14.2	1	4	7.692	30.769
15	1	5	7.692	38.462
16	3	8	23.077	61.538
17	1	9	7.692	69.231
17.5	1	10	7.692	76.923
18.5	1	11	7.692	84.615
19	1	12	7.692	92.308
25.5	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.63461538	0.86971849	0.00000000	3.50000000	0.24121651	21.25000000	0.75641026	53.206
MMVII	13	5.03846154	1.93069006	1.50000000	10.00000000	0.53547708	65.50000000	3.72756410	38.319
MMVIII	13	11.11538462	3.52463855	3.50000000	20.00000000	0.97755885	144.50000000	12.42307692	31.710
MMIX	13	16.28461538	3.75207635	9.00000000	25.50000000	1.04063874	211.70000000	14.07807692	23.041

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	10	13.00	16.5	20.5	25.0	0
2	ARNOLD	0	2.30	7.0	12.8	18.0	0
3	ASAKURA	0	2.75	8.0	15.5	22.5	0
4	BACHRACH	0	3.25	8.5	15.0	20.0	0
5	BRAUN	0	3.50	10.0	18.0	35.0	0
6	GALLAGH	0	2.50	7.0	13.0	16.0	0
7	JOHNSONG	0	3.50	10.0	20.0	27.0	0
8	JOHNSONR	0	2.50	7.0	12.5	20.0	0
9	KOCKELMN	0	2.50	7.5	14.0	20.0	0
10	MASRI	0	6.00	11.5	17.0	22.0	0
11	MTTINGLY	0	5.00	9.0	14.5	20.0	0
12	SANDY	0	2.50	7.0	14.0	20.0	1
13	WALLACE	0	2.50	10.0	20.0	25.0	0
14	WHITMAN	0	0.50	2.5	4.5	7.0	0

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	13	13	100.000	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0.5	1	1	7.692	7.692
2.3	1	2	7.692	15.385
2.5	5	7	38.462	53.846
2.75	1	8	7.692	61.538
3.25	1	9	7.692	69.231
3.5	2	11	15.385	84.615
5	1	12	7.692	92.308
6	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2.5	1	1	7.692	7.692
7	4	5	30.769	38.462
7.5	1	6	7.692	46.154
8	1	7	7.692	53.846
8.5	1	8	7.692	61.538
9	1	9	7.692	69.231
10	3	12	23.077	92.308
11.5	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
4.5	1	1	7.692	7.692
12.5	1	2	7.692	15.385
12.8	1	3	7.692	23.077
13	1	4	7.692	30.769
14	2	6	15.385	46.154
14.5	1	7	7.692	53.846
15	1	8	7.692	61.538
15.5	1	9	7.692	69.231
17	1	10	7.692	76.923
18	1	11	7.692	84.615
20	2	13	15.385	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
7	1	1	7.692	7.692
18	2	3	15.385	23.077
20	5	8	38.462	61.538
22	1	9	7.692	69.231
22.5	1	10	7.692	76.923
25	1	11	7.692	84.615
27	1	12	7.692	92.308
35	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	3.02307692	1.34189160	0.50000000	6.00000000	0.37217377	39.30000000	1.80067308	44.388
MMVII	13	8.07692308	2.23463414	2.50000000	11.50000000	0.61977600	105.00000000	4.99358974	27.667
MMVIII	13	14.67692308	3.97369556	4.50000000	20.00000000	1.10210485	190.80000000	15.79025641	27.074
MMIX	13	21.11538462	6.25883990	7.00000000	35.00000000	1.73588986	274.50000000	39.17307692	29.641

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	26.5	28.0	32.0	35.0	35.0	0
2	ARNOLD	0.0	1.0	3.9	9.7	14.0	0
3	ASAKURA	0.0	1.0	4.5	10.5	15.0	0
4	BACHRACH	0.0	1.5	5.0	12.0	16.5	0
5	BRAUN	0.0	2.0	6.5	14.0	20.0	0
6	GALLAGH	0.0	1.0	4.0	10.0	13.0	0
7	JOHNSONG	0.0	2.5	10.0	20.0	25.0	0
8	JOHNSONR	0.0	1.0	4.0	9.5	17.5	0
9	KOCKELMN	0.0	1.0	4.0	10.0	15.0	0
10	MASRI	0.0	4.5	9.0	15.0	20.0	0
11	MTTINGLY	2.0	6.5	10.5	16.0	20.0	0
12	SANDY	0.0	1.0	4.5	12.0	20.0	1
13	WALLACE	0.0	1.0	7.5	15.0	20.0	0

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	11	11	91.667	91.667
2	1	12	8.333	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1	7	7	58.333	58.333
1.5	1	8	8.333	66.667
2	1	9	8.333	75.000
2.5	1	10	8.333	83.333
4.5	1	11	8.333	91.667
6.5	1	12	8.333	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
3.9	1	1	8.333	8.333
4	3	4	25.000	33.333
4.5	2	6	16.667	50.000
5	1	7	8.333	58.333
6.5	1	8	8.333	66.667
7.5	1	9	8.333	75.000
9	1	10	8.333	83.333
10	1	11	8.333	91.667
10.5	1	12	8.333	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
9.5	1	1	8.333	8.333
9.7	1	2	8.333	16.667
10	2	4	16.667	33.333
10.5	1	5	8.333	41.667
12	2	7	16.667	58.333
14	1	8	8.333	66.667
15	2	10	16.667	83.333
16	1	11	8.333	91.667
20	1	12	8.333	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
13	1	1	8.333	8.333
14	1	2	8.333	16.667
15	2	4	16.667	33.333
16.5	1	5	8.333	41.667
17.5	1	6	8.333	50.000
20	5	11	41.667	91.667
25	1	12	8.333	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	12	0.16666667	0.57735027	0.00000000	2.00000000	0.16666667	2.00000000	0.33333333	346.410
MMVI	12	2.00000000	1.75809815	1.00000000	6.50000000	0.50751922	24.00000000	3.09090909	87.905
MMVII	12	6.11666667	2.51353910	3.90000000	10.50000000	0.72559624	73.40000000	6.31787879	41.093
MMVIII	12	12.80833333	3.24666496	9.50000000	20.00000000	0.93723144	153.70000000	10.54083333	25.348
MMIX	12	18.00000000	3.44436298	13.00000000	25.00000000	0.99430195	216.00000000	11.86363636	19.135

DATA FROM TASK TWO/SETTING ONE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIx
1	ARNOLD	0.0	0.0	0.30	0.9	1.2
2	ASAKURA	0.0	1.2	5.00	15.0	21.0
3	BACHRACH	0.0	2.5	6.00	11.0	15.0
4	BLANCK	5.0	7.0	11.00	14.0	16.0
5	BRAUN	0.0	0.0	2.50	18.0	13.0
6	GALLAGH	.			.	
7	JOHNSONG	0.0	0.5	3.50	9.0	12.5
8	JOHNSONR	0.0	0.5	0.50	1.5	5.0
9	KOCKELMN	0.0	1.0	4.50	12.5	21.0
10	MASRI	0.0	3.0	6.50	10.0	15.0
11	MTTINGLY	2.5	6.0	9.50	14.0	17.5
12	SANDY	0.0	0.0	0.25	3.5	6.0
13	WALLACE	0.0	0.5	2.50	5.0	10.0
14	WHITMAN	0.0	0.5	2.50	9.0	13.5

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	11	11	84.615	84.615
2.5	1	12	7.692	92.308
5	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	3	3	23.077	23.077
0.5	4	7	30.769	53.846
1	1	8	7.692	61.538
1.2	1	9	7.692	69.231
2.5	1	10	7.692	76.923
3	1	11	7.692	84.615
6	1	12	7.692	92.308
7	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.25	1	1	7.692	7.692
0.3	1	2	7.692	15.385
0.5	1	3	7.692	23.077
2.5	3	6	23.077	46.154
3.5	1	7	7.692	53.846
4.5	1	8	7.692	61.538
5	1	9	7.692	69.231
6	1	10	7.692	76.923
6.5	1	11	7.692	84.615
9.5	1	12	7.692	92.308
11	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.9	1	1	7.692	7.692
1.5	1	2	7.692	15.385
3.5	1	3	7.692	23.077
5	1	4	7.692	30.769
9	2	6	15.385	46.154
10	1	7	7.692	53.846
11	1	8	7.692	61.538
12.5	1	9	7.692	69.231
14	2	11	15.385	84.615
15	1	12	7.692	92.308
18	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1.2	1	1	7.692	7.692
5	1	2	7.692	15.385
6	1	3	7.692	23.077
10	1	4	7.692	30.769
12.5	1	5	7.692	38.462
13	1	6	7.692	46.154
13.5	1	7	7.692	53.846
15	2	9	15.385	69.231
16	1	10	7.692	76.923
17.5	1	11	7.692	84.615
21	2	13	15.385	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V
MMV	13	0.57692308	1.49786172	0.00000000	5.00000000	0.41543210	7.50000000	2.24358974	259.629
MMVI	13	1.74615385	2.31034463	0.00000000	7.00000000	0.64077431	22.70000000	5.33769231	132.310
MMVII	13	4.19615385	3.38196575	0.25000000	11.00000000	0.93798853	54.55000000	11.43769231	80.597
MMVIII	13	9.49230769	5.39451288	0.90000000	18.00000000	1.49616868	123.40000000	29.10076923	56.830
MMIX	13	12.82307692	5.96226381	1.20000000	21.00000000	1.65363445	166.70000000	35.54858974	46.496

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.3	1.2	2.5
2	ASAKURA	0.0	6.0	15.0	27.5	40.0
3	BACHRACH	0.0	9.5	17.5	25.0	31.0
4	BLANCK	10.0	13.5	19.0	23.0	29.0
5	BRAUN	0.0	0.0	3.0	23.0	45.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.5	9.0	15.5	22.5
8	JOHNSONR	0.0	0.5	2.0	4.5	10.0
9	KOCKELMN	0.0	6.0	13.0	20.0	26.0
10	MASRI	0.0	4.5	10.0	16.0	22.0
11	MTTINGLY	7.5	13.0	17.5	23.5	29.0
12	SANDY	0.0	1.0	5.0	14.0	21.0
13	WALLACE	0.0	2.0	5.0	10.0	15.0
14	WHITMAN	0.0	2.0	8.5	16.0	26.0

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	11	11	84.615	84.615
7.5	1	12	7.692	92.308
10	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	2	2	15.385	15.385
0.5	1	3	7.692	23.077
1	1	4	7.692	30.769
2	2	6	15.385	46.154
2.5	1	7	7.692	53.846
4.5	1	8	7.692	61.538
6	2	10	15.385	76.923
9.5	1	11	7.692	84.615
13	1	12	7.692	92.308
13.5	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.3	1	1	7.692	7.692
2	1	2	7.692	15.385
3	1	3	7.692	23.077
5	2	5	15.385	38.462
8.5	1	6	7.692	46.154
9	1	7	7.692	53.846
10	1	8	7.692	61.538
13	1	9	7.692	69.231
15	1	10	7.692	76.923
17.5	2	12	15.385	92.308
19	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1.2	1	1	7.692	7.692
4.5	1	2	7.692	15.385
10	1	3	7.692	23.077
14	1	4	7.692	30.769
15.5	1	5	7.692	38.462
16	2	7	15.385	53.846
20	1	8	7.692	61.538
23	2	10	15.385	76.923
23.5	1	11	7.692	84.615
25	1	12	7.692	92.308
27.5	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
2.5	1	1	7.692	7.692
10	1	2	7.692	15.385
15	1	3	7.692	23.077
21	1	4	7.692	30.769
22	1	5	7.692	38.462
22.5	1	6	7.692	46.154
26	2	8	15.385	61.538
29	2	10	15.385	76.923
31	1	11	7.692	84.615
40	1	12	7.692	92.308
45	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C V
MMV	13	1.34615385	3.32531086	0.00000000	10.00000000	0.92227529	17.50000000	11.05769231	247.023
MMVI	13	4.65384615	4.72310198	0.00000000	13.50000000	1.30995280	60.50000000	22.30769231	101.488
MMVII	13	9.60000000	6.36238949	0.30000000	19.00000000	1.76460935	124.80000000	40.48000000	66.275
MMVIII	13	16.86153846	7.98639869	1.20000000	27.50000000	2.21502846	219.20000000	63.78256410	47.365
MMIX	13	24.53846154	11.38248204	2.50000000	45.00000000	3.15693251	319.00000000	129.56089744	46.386

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.5	1.0	2.0
2	ASAKURA	0.0	2.5	7.5	14.0	22.5
3	BACHRACH	1.0	3.5	8.0	13.5	17.0
4	BLANCK	6.5	8.0	11.0	15.5	19.0
5	BRAUN	0.0	0.0	3.0	19.0	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	1.5	5.5	9.0	21.5
8	JOHNSONR	0.0	0.5	1.0	2.5	8.0
9	KOCKELMN	0.0	3.5	9.0	15.0	21.0
10	MASRI	0.0	0.8	3.0	9.5	17.0
11	MTTINGLY	1.0	3.5	6.0	11.5	16.0
12	SANDY	0.0	0.0	0.0	2.0	4.5
13	WALLACE	0.0	0.5	3.0	8.0	11.0
14	WHITMAN	0.0	1.0	4.0	14.0	29.5

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	10	10	76.923	76.923
1	2	12	15.385	92.308
6.5	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	3	3	23.077	23.077
0.5	2	5	15.385	38.462
0.8	1	6	7.692	46.154
1	1	7	7.692	53.846
1.5	1	8	7.692	61.538
2.5	1	9	7.692	69.231
3.5	3	12	23.077	92.308
8	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	1	1	7.692	7.692
0.5	1	2	7.692	15.385
1	1	3	7.692	23.077
3	3	6	23.077	46.154
4	1	7	7.692	53.846
5.5	1	8	7.692	61.538
6	1	9	7.692	69.231
7.5	1	10	7.692	76.923
8	1	11	7.692	84.615
9	1	12	7.692	92.308
11	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1	1	1	7.692	7.692
2	1	2	7.692	15.385
2.5	1	3	7.692	23.077
8	1	4	7.692	30.769
9	1	5	7.692	38.462
9.5	1	6	7.692	46.154
11.5	1	7	7.692	53.846
13.5	1	8	7.692	61.538
14	2	10	15.385	76.923
15	1	11	7.692	84.615
15.5	1	12	7.692	92.308
19	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
2	1	1	7.692	7.692
4.5	1	2	7.692	15.385
8	1	3	7.692	23.077
11	1	4	7.692	30.769
16	1	5	7.692	38.462
17	2	7	15.385	53.846
19	1	8	7.692	61.538
21	1	9	7.692	69.231
21.5	1	10	7.692	76.923
22.5	1	11	7.692	84.615
29.5	1	12	7.692	92.308
35	1	13	7.692	100.000

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VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V
MMV	13	0.65384615	1.79565001	0.00000000	6.50000000	0.49802371	8.50000000	3.22435897	274.629
MMVI	13	1.94615385	2.27582051	0.00000000	8.00000000	0.63119904	25.30000000	5.17935897	116.939
MMVII	13	4.73076923	3.43763112	0.00000000	11.00000000	0.95342733	61.50000000	11.81730769	72.665
MMVIII	13	10.34615385	5.68398560	1.00000000	19.00000000	1.57645396	134.50000000	32.30769231	54.938
MMIX	13	17.23076923	9.35105917	2.00000000	35.00000000	2.59351718	224.00000000	87.44230769	54.270

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.5	1.0	2.0
2	ASAKURA	0.0	2.5	9.5	19.0	30.0
3	BACHRACH	0.0	3.5	9.0	14.5	20.0
4	BLANCK	16.0	19.5	23.0	26.0	30.0
5	BRAUN	0.0	0.0	2.5	13.0	40.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.0	4.5	10.0	15.0
8	JOHNSONR	0.0	0.5	1.0	3.5	10.0
9	KOCKELMN	0.0	2.5	6.5	12.5	19.0
10	MASRI	0.0	3.0	7.5	13.5	19.0
11	MTTINGLY	2.5	5.5	10.0	14.0	20.0
12	SANDY	0.0	1.0	1.5	5.0	6.0
13	WALLACE	0.0	1.5	5.0	15.0	20.0
14	WHITMAN	0.0	1.2	4.5	10.2	15.5

DATA FROM TASK TWO/SETTING FOUR

MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	11	11	84.615	84.615
2.5	1	12	7.692	92.308
16	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	2	2	15.385	15.385
0.5	1	3	7.692	23.077
1	1	4	7.692	30.769
1.2	1	5	7.692	38.462
1.5	1	6	7.692	46.154
2	1	7	7.692	53.846
2.5	2	9	15.385	69.231
3	1	10	7.692	76.923
3.5	1	11	7.692	84.615
5.5	1	12	7.692	92.308
19.5	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.5	1	1	7.692	7.692
1	1	2	7.692	15.385
1.5	1	3	7.692	23.077
2.5	1	4	7.692	30.769
4.5	2	6	15.385	46.154
5	1	7	7.692	53.846
6.5	1	8	7.692	61.538
7.5	1	9	7.692	69.231
9	1	10	7.692	76.923
9.5	1	11	7.692	84.615
10	1	12	7.692	92.308
23	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1	1	1	7.692	7.692
3.5	1	2	7.692	15.385
5	1	3	7.692	23.077
10	1	4	7.692	30.769
10.2	1	5	7.692	38.462
12.5	1	6	7.692	46.154
13	1	7	7.692	53.846
13.5	1	8	7.692	61.538
14	1	9	7.692	69.231
14.5	1	10	7.692	76.923
15	1	11	7.692	84.615
19	1	12	7.692	92.308
26	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
2	1	1	7.692	7.692
6	1	2	7.692	15.385
10	1	3	7.692	23.077
15	1	4	7.692	30.769
15.5	1	5	7.692	38.462
19	2	7	15.385	53.846
20	3	10	23.077	76.923
30	2	12	15.385	92.308
40	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C V
MMV	13	1.42307692	4.43398877	0.00000000	16.00000000	1.22976722	18.50000000	19.66025641	311.578
MMVI	13	3.28461538	5.10666985	0.00000000	19.50000000	1.41633538	42.70000000	26.07807692	155.472
MMVII	13	6.53846154	5.90360603	0.50000000	23.00000000	1.63736571	85.00000000	34.85256410	90.290
MMVIII	13	12.09230769	6.56460986	1.00000000	26.00000000	1.82069519	157.20000000	43.09410256	54.287
MMIX	13	18.96153846	10.21938831	2.00000000	40.00000000	2.83434835	246.50000000	104.43589744	53.895

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0	0.0	0.3	0.8	1.0
2	ASAKURA	0	4.0	14.0	24.0	34.0
3	BACHRACH	0	5.0	11.0	18.5	23.0
4	BLANCK	10	13.0	16.5	20.5	25.0
5	BRAUN	0	0.0	2.5	18.5	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0	3.0	9.0	17.0	25.0
8	JOHNSONR	0	0.5	1.5	5.0	12.5
9	KOCKELMN	0	4.5	9.0	16.0	23.5
10	MASRI	0	4.5	9.5	14.5	19.0
11	MTTINGLY	3	4.7	9.0	14.2	20.0
12	SANDY	0	0.5	2.0	4.5	6.0
13	WALLACE	0	2.5	5.0	10.0	15.0
14	WHITMAN	0	2.0	7.0	13.5	20.0

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MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.		
0	11	11	84.615	84.615
3	1	12	7.692	92.308
10	1	13	7.692	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1		.	.
0	2	2	15.385	15.385
0.5	2	4	15.385	30.769
2	1	5	7.692	38.462
2.5	1	6	7.692	46.154
3	1	7	7.692	53.846
4	1	8	7.692	61.538
4.5	2	10	15.385	76.923
4.7	1	11	7.692	84.615
5	1	12	7.692	92.308
13	1	13	7.692	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.3	1	1	7.692	7.692
1.5	1	2	7.692	15.385
2	1	3	7.692	23.077
2.5	1	4	7.692	30.769
5	1	5	7.692	38.462
7	1	6	7.692	46.154
9	3	9	23.077	69.231
9.5	1	10	7.692	76.923
11	1	11	7.692	84.615
14	1	12	7.692	92.308
16.5	1	13	7.692	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.8	1	1	7.692	7.692
4.5	1	2	7.692	15.385
5	1	3	7.692	23.077
10	1	4	7.692	30.769
13.5	1	5	7.692	38.462
14.2	1	6	7.692	46.154
14.5	1	7	7.692	53.846
16	1	8	7.692	61.538
17	1	9	7.692	69.231
18.5	2	11	15.385	84.615
20.5	1	12	7.692	92.308
24	1	13	7.692	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1	1	1	7.692	7.692
6	1	2	7.692	15.385
12.5	1	3	7.692	23.077
15	1	4	7.692	30.769
19	1	5	7.692	38.462
20	2	7	15.385	53.846
23	1	8	7.692	61.538
23.5	1	9	7.692	69.231
25	2	11	15.385	84.615
34	1	12	7.692	92.308
35	1	13	7.692	100.000

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V
MMV	13	1.00000000	2.82842712	0.00000000	10.00000000	0.78446454	13.00000000	8.00000000	282.843
MMVI	13	3.40000000	3.44068792	0.00000000	13.00000000	0.95427513	44.20000000	11.83833333	101.197
MMVII	13	7.40769231	4.96428268	0.30000000	16.50000000	1.37684429	96.30000000	24.64410256	67.015
MMVIII	13	13.61538462	6.80598342	0.80000000	24.00000000	1.88764017	177.00000000	46.32141026	49.987
MMIX	13	19.92307692	9.71005955	1.00000000	35.00000000	2.69308597	259.00000000	94.28525641	48.738

DATA FROM TASK TWO/SETTING SIX

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.00	0.5	1.0	1.5
2	ASAKURA	0.0	2.00	7.0	17.5	24.0
3	BACHRACH	0.0	2.00	6.5	17.5	25.0
4	BLANCK	5.0	10.00	15.0	19.0	23.0
5	BRAUN	0.0	0.00	2.5	19.0	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.00	9.0	17.5	22.5
8	JOHNSONR	0.0	0.25	0.5	3.5	10.0
9	MASRI	0.0	2.50	7.5	12.5	17.0
10	MTTINGLY	1.5	6.50	11.0	16.0	20.0
11	SANDY	0.0	0.00	3.0	5.0	6.0
12	WALLACE	0.0	1.00	5.0	10.0	15.0
13	WHITMAN	0.0	1.00	4.5	12.0	22.0

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MMV	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	10	10	83.333	83.333
1.5	1	11	8.333	91.667
5	1	12	8.333	100.000

MMVI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0	3	3	25.000	25.000
0.25	1	4	8.333	33.333
1	2	6	16.667	50.000
2	3	9	25.000	75.000
2.5	1	10	8.333	83.333
6.5	1	11	8.333	91.667
10	1	12	8.333	100.000

MMVII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
0.5	2	2	16.667	16.667
2.5	1	3	8.333	25.000
3	1	4	8.333	33.333
4.5	1	5	8.333	41.667
5	1	6	8.333	50.000
6.5	1	7	8.333	58.333
7	1	8	8.333	66.667
7.5	1	9	8.333	75.000
9	1	10	8.333	83.333
11	1	11	8.333	91.667
15	1	12	8.333	100.000

MMVIII	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	.
1	1	1	8.333	8.333
3.5	1	2	8.333	16.667
5	1	3	8.333	25.000
10	1	4	8.333	33.333
12	1	5	8.333	41.667
12.5	1	6	8.333	50.000
16	1	7	8.333	58.333
17.5	3	10	25.000	83.333
19	2	12	16.667	100.000

MMIX	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	1	.	.	
1.5	1	1	8.333	8.333
6	1	2	8.333	16.667
10	1	3	8.333	25.000
15	1	4	8.333	33.333
17	1	5	8.333	41.667
20	1	6	8.333	50.000
22	1	7	8.333	58.333
22.5	1	8	8.333	66.667
23	1	9	8.333	75.000
24	1	10	8.333	83.333
25	1	11	8.333	91.667
35	1	12	8.333	100.000

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VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V
MMV	12	0.54166667	1.46873993	0.00000000	5.00000000	0.42398870	6.50000000	2.15719697	271.152
MMVI	12	2.27083333	3.02538189	0.00000000	10.00000000	0.87335253	27.25000000	9.15293561	133.228
MMVII	12	6.00000000	4.30116263	0.50000000	15.00000000	1.24163870	72.00000000	18.50000000	71.686
MMVIII	12	12.54166667	6.37986297	1.00000000	19.00000000	1.84170780	150.50000000	40.70265152	50.869
MMIX	12	18.41666667	9.18208070	1.50000000	35.00000000	2.65063838	221.00000000	84.31060606	49.857

A P P E N D I X   A 4

Damage curves -- cycle III

DATA FROM TASK ONE/SETTING ONE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	22.5	26.00	22.5	35.0	35.0	0
2	ARNOLD	0.0	0.50	3.5	4.0	11.8	0
3	ASAKURA	0.0	0.50	9.0	8.0	13.0	0
4	BACHRACH	0.0	1.00	3.0	9.3	13.0	0
5	BRAUN	0.0	1.50	5.0	16.0	21.5	0
6	GALLAGH	0.0	0.45	2.5	9.0	11.5	0
7	JOHNSONG	0.0	0.60	3.0	9.5	12.5	0
8	JOHNSONR	0.0	0.45	2.5	8.0	13.5	0
9	KOCKELMN	0.0	1.00	3.0	10.0	16.5	0
10	MASRI	0.0	5.00	10.0	15.0	20.0	0
11	MTTINGLY	0.0	2.50	6.5	11.5	15.0	0
12	SANDY	0.0	0.45	3.0	10.0	15.5	1
13	WALLACE	0.0	0.45	2.5	10.0	15.0	0
14	WHITMAN	0.0	0.00	1.0	3.0	6.0	1

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.10000000	1.33322916	0.00000000	5.00000000	0.36977124	14.30000000	1.77750000	121.203
MMVII	13	3.65384615	2.32185823	1.00000000	10.00000000	0.64396761	47.50000000	5.39102564	63.546
MMVIII	13	9.86923077	3.19853733	3.00000000	16.00000000	0.88711464	128.30000000	10.23064103	32.409
MMIX	13	14.21538462	3.89162480	6.00000000	21.50000000	1.07934252	184.80000000	15.14474359	27.376

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DATA FROM TASK ONE/SETTING TWO

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	12	16.0	21.0	25.5	30.5	0
2	ASAKURA	0	3.0	10.0	17.5	24.0	0
3	ARNOLD	0	2.0	7.5	14.0	20.0	0
4	BACHRACH	0	6.0	12.5	20.5	27.0	0
5	BRAUN	0	3.5	11.0	20.5	28.0	0
6	GALLAGH	0	2.3	7.5	14.0	20.5	0
7	JOHNSONG	1	3.0	10.0	17.0	25.0	0
8	JOHNSONR	0	2.3	7.5	13.5	22.3	0
9	KOCKELMN	0	3.5	9.5	15.5	22.0	0
10	MASRI	0	6.5	12.5	18.5	25.0	0
11	MTTINGLY	5	10.0	17.5	23.0	27.5	0
12	SANDY	0	2.3	8.0	16.2	23.0	1
13	WALLACE	0	2.3	10.0	20.0	30.0	0
14	WHITMAN	0	0.5	2.5	6.0	8.0	0

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.46153846	1.38196581	0.00000000	5.00000000	0.[illegible]	6.00000000	1.[illegible]744	301.462
MMVI	13	3.63076923	2.49649903	0.80000000	10.00000000	0.[illegible]316	47.20000000	6.23230769	68.756
MMVII	13	9.69230769	3.50914556	2.50000000	17.50000000	0.97326187	126.00000000	12.31410256	36.205
MMVIII	13	16.63076923	4.32403835	6.00000000	23.00000000	1.19927246	216.20000000	18.69730769	26.000
MMIX	13	23.40769231	5.32939358	8.00000000	30 [illegible]0000000	1.47810783	304.30000000	28.40243590	22.768

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DATA FROM TASK ONE/SETTING THREE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	14.5	17.00	22.5	28.5	28.0	0
2	ASAKURA	0.0	0.00	4.0	10.0	14.0	0
3	ARNOLD	0.0	0.60	3.0	8.0	13.4	1
4	BACHRACH	0.0	2.20	5.0	11.0	14.0	0
5	BRAUN	0.0	1.50	5.0	14.5	20.0	0
6	GALLAGH	0.0	1.00	3.5	8.5	12.0	0
7	JOHNSONG	0.0	2.00	7.0	15.0	23.0	0
8	JOHNSONR	0.0	0.80	2.0	8.5	14.2	0
9	KOCKELMN	0.0	1.50	8.0	12.0	18.0	0
10	MASRI	0.0	0.60	3.0	12.2	20.0	0
11	MITTINGLY	0.0	3.50	6.0	11.0	16.0	0
12	SANDY	0.0	1.00	4.5	12.0	16.5	1
13	WALLACE	0.0	0.60	5.0	15.0	20.0	0
14	WHITMAN	0.0	0.50	1.5	4.5	8.0	0

DATA FROM TASK ONE/SETTING THREE

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.26846154	0.88934289	0.00000000	3.50000000	0.24665834	16.49000000	0.79093077	70.112
MMVII	13	4.34615385	1.53276188	1.50000000	7.00000000	0.42511166	56.50000000	2.34935897	35.267
MMVIII	13	11.09230769	2.93441122	4.50000000	15.00000000	0.81385924	144.20000000	8.61076923	26.454
MMIX	13	16.00769231	3.87566371	9.00000000	23.00000000	1.07491571	208.10000000	15.02076923	24.211

DATA FROM TASK ONE/SETTING FOUR

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	21	23.50	27.0	30.0	34.0	0
2	ASAKURA	0	1.75	8.0	12.0	17.0	0
3	ARNOLD	0	0.00	4.0	10.0	14.0	0
4	BACHRACH	0	2.00	5.5	11.5	16.0	0
5	BRAUN	0	2.00	5.0	12.5	19.0	0
6	GALLAGH	0	1.50	4.0	10.0	14.2	0
7	JOHNSONG	0	2.50	6.0	12.5	17.5	0
8	JOHNSONR	0	1.50	4.0	10.0	18.5	0
9	KOCKELMN	0	1.00	4.5	10.0	16.0	0
10	MASRI	0	2.00	6.0	12.0	16.0	0
11	MTTINGLY	0	3.50	6.0	10.5	14.0	0
12	SANDY	0	1.50	4.0	10.0	15.0	1
13	WALLACE	0	1.50	10.0	20.0	25.5	0
14	WHITMAN	0	0.50	1.5	3.5	9.0	0

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	1.63461538	0.86971848	0.00000000	3.50000000	0.24121851	21.25000000	0.75641026	53.206
MMVII	13	5.03846154	1.93069006	1.50000000	10.00000000	0.53547708	65.50000000	3.72756410	38.319
MMVIII	13	11.11538462	3.52463855	3.50000000	20.00000000	0.97755885	144.50000000	12.42307692	31.710
MMIX	13	16.28461538	3.75207635	9.00000000	25.50000000	1.04063874	211.70000000	14.07807692	23.041

DATA FROM TASK ONE/SETTING FIVE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	10	13.00	16.5	20.5	25.0	0
2	ARNOLD	0	2.50	7.0	12.5	18.0	0
3	ASAKURA	0	2.75	8.0	15.5	22.5	0
4	BACHRACH	0	3.25	8.5	15.0	20.0	0
5	BRAUN	0	3.50	10.0	18.0	35.0	0
6	GALLAGH	0	2.50	7.0	13.0	18.0	0
7	JOHNSONG	0	3.50	10.0	20.0	27.0	0
8	JOHNSONR	0	2.50	7.0	12.5	20.0	0
9	KOCKELMN	0	2.50	7.5	14.0	20.0	0
10	MASRI	0	6.00	11.5	17.0	22.0	0
11	MTTINGLY	0	5.00	9.0	14.5	20.0	0
12	SANDY	0	2.50	7.0	14.0	20.0	1
13	WALLACE	0	2.50	10.0	20.0	25.0	0
14	WHITMAN	0	0.50	2.5	4.5	7.0	0

DATA FROM TASK ONE/SETTING FIVE

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	.
MMVI	13	3.02307692	1.34189160	0.50000000	6.00000000	0.37217377	39.30000000	1.80067308	44.388
MMVII	13	8.07692308	2.23463414	2.50000000	11.50000000	0.61977600	105.00000000	4.99358974	27.667
MMVIII	13	14.67692308	3.97369556	4.50000000	20.00000000	1.10210465	190.80000000	15.79025641	27.074
MMIX	13	21.11538462	6.25883990	7.00000000	35.00000000	1.73588986	274.50000000	39.17307692	29.641

DATA FROM TASK ONE/SETTING SIX

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX	C
1	BLANCK	26.5	28.0	32.0	35.0	36.0	0
2	ARNOLD	0.0	1.0	3.9	9.7	14.0	0
3	ASAKURA	0.0	1.0	4.5	10.5	15.0	0
4	BACHRACH	0.0	1.5	5.0	12.0	16.5	0
5	BRAUN	0.0	2.0	6.5	14.0	20.0	0
6	GALLAGH	0.0	1.0	4.0	10.0	13.0	0
7	JOHNSONG	0.0	2.5	10.0	20.0	25.0	0
8	JOHNSONR	0.0	1.0	4.0	9.5	17.5	0
9	KOCKELMN	0.0	1.0	4.0	10.0	15.0	0
10	MASRI	0.0	4.5	9.0	15.0	20.0	0
11	MTTINGLY	2.0	6.5	10.5	16.0	20.0	0
12	SANDY	0.0	1.0	4.5	12.0	20.0	1
13	WALLACE	0.0	1.0	7.5	15.0	20.0	0

DATA FROM TASK ONE/SETTING SIX

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	12	0.16666667	0.57735027	0.00000000	2.00000000	0.16666667	2.00000000	0.33333333	346.410
MMVI	12	2.00000000	1.75809815	1.00000000	6.50000000	0.50751922	24.00000000	3.09090909	87.905
MMVII	12	6.11666667	2.51353910	3.90000000	10.50000000	0.72559624	73.40000000	6.31787879	41.093
MMVIII	12	12.80833333	3.24666496	8.50000000	20.00000000	0.93723144	153.70000000	10.54083333	25.348
MMIX	12	18.00000000	3.44436298	13.00000000	25.00000000	0.99430195	216.00000000	11.86363636	19.135

DATA FROM TASK TWO/SETTING ONE

OBS	ID	MMV	MMVI.	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.30	0.5	1.2
2	ASAKURA	0.0	1.2	5.00	15.0	21.0
3	BACHRACH	0.0	2.5	6.00	11.0	15.0
4	BLANCK	5.0	7.0	11.00	14.0	16.0
5	BRAUN	0.0	0.0	2.50	18.0	13.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	0.5	3.50	9.0	12.5
8	JOHNSONR	0.0	0.5	0.50	1.5	5.0
9	KOCKELMN	0.0	1.0	4.50	12.5	21.0
10	MASRI	0.0	3.0	6.50	10.0	15.0
11	MTTINGLY	2.5	6.0	9.50	14.0	17.5
12	SANDY	0.0	0.0	0.25	3.5	6.0
13	WALLACE	0.0	0.5	2.50	5.0	10.0
14	WHITMAN	0.0	0.5	2.50	9.0	13.5

DATA FROM TASK TWO/SETTING ONE

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.57692308	1.49786172	0.00000000	5.00000000	0.41543210	7.50000000	2.24358974	259.629
MMVI	13	1.74615385	2.31034463	0.00000000	7.00000000	0.64077431	22.70000000	5.33769231	132.310
MMVII	13	4.19615385	3.38196575	0.25000000	11.00000000	0.93798853	54.55000000	11.43769231	80.597
MMVIII	13	9.49230769	5.39451288	0.90000000	18.00000000	1.49616868	123.40000000	29.10076923	56.830
MMIX	13	12.82307692	5.96226381	1.20000000	21.00000000	1.65363445	166.70000000	35.54858974	46.496

DATA FROM TASK TWO/SETTING TWO

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.5	1.5	2.5
2	ASAKURA	0.0	6.0	15.0	27.5	40.0
3	BACHRACH	0.0	8.5	17.5	25.0	31.0
4	BLANCK	10.0	13.5	19.0	23.0	29.0
5	BRAUN	0.0	0.0	3.0	23.0	45.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.5	9.0	15.5	22.5
8	JOHNSONR	0.0	0.5	2.0	4.5	10.0
9	KOCKELMN	0.0	6.0	13.0	20.0	26.0
10	MASRI	0.0	4.5	10.0	16.0	22.0
11	MTTINGLY	7.5	13.0	17.5	23.5	29.0
12	SANDY	0.0	1.0	5.0	14.0	21.0
13	WALLACE	0.0	2.0	6.0	10.0	15.0
14	WHITMAN	0.0	2.0	8.5	16.0	26.0

DATA FROM TASK TWO/SETTING TWO

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V. %
MMV	13	1.34615385	3.32981066	0.00000000	10.00000000	0.92227529	17.50000000	11.08769231	247.023
MMVI	13	4.65384615	4.72310196	0.00000000	13.50000000	1.30995280	60.50000000	22.30769231	101.488
MMVII	13	9.60000000	6.36238949	0.30000000	19.00000000	1.76460935	124.80000000	40.48000000	66.275
MMVIII	13	16.86153846	7.98639869	1.20000000	27.50000000	2.21502846	219.20000000	63.78256410	47.365
MMIX	13	24.53846154	11.38248204	2.50000000	45.00000000	3.15693251	319.00000000	129.56089744	46.386

DATA FROM TASK TWO/SETTING THREE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.5	1.0	2.0
2	ASAKURA	0.0	2.5	7.5	14.0	22.5
3	BACHRACH	1.0	3.5	8.0	13.5	17.0
4	BLANCK	6.5	8.0	11.0	15.5	19.0
5	BRAUN	0.0	0.0	3.0	19.0	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	1.5	5.5	9.0	21.5
8	JOHNSONR	0.0	0.5	1.0	2.5	8.0
9	KOCKELMN	0.0	3.5	9.0	15.0	21.0
10	MASRI	0.0	0.5	3.0	9.5	17.0
11	MTTINGLY	1.0	3.5	6.0	11.5	16.0
12	SANDY	0.0	0.0	0.0	2.0	4.5
13	WALLACE	0.0	0.5	3.0	8.0	11.0
14	WHITMAN	0.0	1.0	4.0	14.0	29.5

DATA FROM TASK TWO/SETTING THREE

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	0.65384615	1.79565001	0.00000000	6.50000000	0.49802371	8.50000000	3.22435897	274.629
MMVI	13	1.94615385	2.27582051	0.00000000	8.00000000	0.63118904	25.30000000	5.17935897	116.939
MMVII	13	4.73076923	3.43763112	0.00000000	11.00000000	0.95342733	61.50000000	11.81730769	72.665
MMVIII	13	10.34615385	5.68398560	1.00000000	19.00000000	1.57645396	134.50000000	32.30769231	54.938
MMIX	13	17.23076923	9.35105917	2.00000000	35.00000000	2.59351718	224.00000000	87.44230769	54.270

DATA FROM TASK TWO/SETTING FOUR

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.0	0.5	1.0	3.0
2	ASAKURA	0.0	3.5	8.5	18.0	50.0
3	BACHRACH	0.0	3.5	9.0	14.5	20.0
4	BLANCK	16.0	19.5	23.0	26.0	30.0
5	BRAUN	0.0	0.0	2.5	13.0	40.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.0	4.5	10.0	15.0
8	JOHNSONR	0.0	0.5	1.0	3.5	10.0
9	KOCKELMN	0.0	2.5	6.5	12.5	19.0
10	MASRI	0.0	3.0	7.5	13.5	19.0
11	MTTINGLY	2.5	5.5	10.0	14.0	20.0
12	SANDY	0.0	1.0	1.5	5.0	6.0
13	WALLACE	0.0	1.5	5.0	15.0	20.0
14	WHITMAN	0.0	1.2	4.5	10.2	15.5

DATA FROM TASK TWO/SETTING FOUR

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	1.42307692	4.43398877	0.00000000	16.00000000	1.22976722	18.50000000	19.66025641	311.578
MMVI	13	3.28461538	5.10666985	0.00000000	19.50000000	1.41633538	42.70000000	26.07807692	155.472
MMVII	13	6.53846154	5.90360603	0.50000000	23.00000000	1.63736571	85.00000000	34.85256410	90.290
MMVIII	13	12.09230769	6.56460986	1.00000000	26.00000000	1.82069519	157.20000000	43.09410256	54.287
MMIX	13	18.96153846	10.21938831	2.00000000	40.00000000	2.83434835	246.50000000	104.43589744	53.895

DATA FROM TASK TWO/SETTING FIVE

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0	0.0	0.9	0.8	1.0
2	ASAKURA	0	4.0	14.0	24.0	34.0
3	BACHRACH	0	5.0	11.0	18.5	23.0
4	BLANCK	10	13.0	16.5	20.5	25.0
5	BRAUN	0	0.0	2.5	18.5	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0	3.0	9.0	17.0	25.0
8	JOHNSONR	0	0.5	1.5	5.0	12.5
9	KOCKELMN	0	4.5	8.0	16.0	23.5
10	NASRI	0	4.5	9.5	14.5	19.0
11	NITTINGLY	3	4.7	9.0	14.2	20.0
12	SANDY	0	0.5	2.0	4.5	6.0
13	WALLACE	0	2.5	5.0	10.0	15.0
14	WHITMAN	0	2.0	7.0	13.5	20.0

DATA FROM TASK TWO/SETTING FIVE

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	13	1.00000000	2.82842712	0.00000000	10.00000000	0.78446454	13.00000000	8.00000000	282.843
MMVI	13	3.40000000	3.44068792	0.00000000	13.00000000	0.95427513	44.20000000	11.83833333	101.197
MMVII	13	7.40769231	4.96428268	0.30000000	16.50000000	1.37684429	96.30000000	24.64410256	67.015
MMVIII	13	13.61538462	6.80598342	0.80000000	24.00000000	1.88764017	177.00000000	46.32141026	49.987
MMIX	13	19.92307692	9.71005955	1.00000000	35.00000000	2.69308597	259.00000000	94.28525641	48.738

DATA FROM TASK TWO/SETTING SIX

OBS	ID	MMV	MMVI	MMVII	MMVIII	MMIX
1	ARNOLD	0.0	0.00	0.5	1.0	1.5
2	ASAKURA	0.0	2.00	7.0	17.5	24.0
3	BACHRACH	0.0	1.00	6.5	17.5	25.0
4	BLANCK	5.0	10.00	15.0	19)	23.0
5	BRAUN	0.0	0.00	2.5	19.0	35.0
6	GALLAGH	.	.	.	.	.
7	JOHNSONG	0.0	2.00	9.0	17.5	22.5
8	JOHNSONR	0.0	0.25	0.5	3.5	10.0
9	MASRI	0.0	2.50	7.5	12.5	17.0
10	MITTINGLY	1.5	6.50	11.0	16.0	20.0
11	SANDY	0.0	0.00	3.0	5.0	6.0
12	WALLACE	0.0	1.00	5.0	10.0	15.0
13	WHITMAN	0.0	1.00	4.5	12.0	22.0

VARIABLE	N	MEAN	STANDARD DEVIATION	MINIMUM VALUE	MAXIMUM VALUE	STD ERROR OF MEAN	SUM	VARIANCE	C.V.
MMV	12	0.54166667	1.46873992	0.00000000	5.00000000	0.42398870	6.50000000	2.15719697	271.152
MMVI	12	2.27083333	3.02538189	0.00000000	10.00000000	0.87335253	27.25000000	9.15293561	133.228
MMVII	12	6.00000000	4.30116263	0.50000000	15.00000000	1.24163870	72.00000000	18.50000000	71.686
MMVIII	12	12.54166667	6.37986297	1.00000000	19.00000000	1.84170780	150.50000000	40.70265152	50.869
MMIX	12	18.41666667	9.18206070	1.50000000	35.00000000	2.65063838	221.00000000	84.31060606	49.857

A P P E N D I X   B

Damage curve shifts to reflect policy mitigation effects

FIGURE B.1: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION
LOW-DENSITY RESIDENTIAL NEIGHBORHOOD

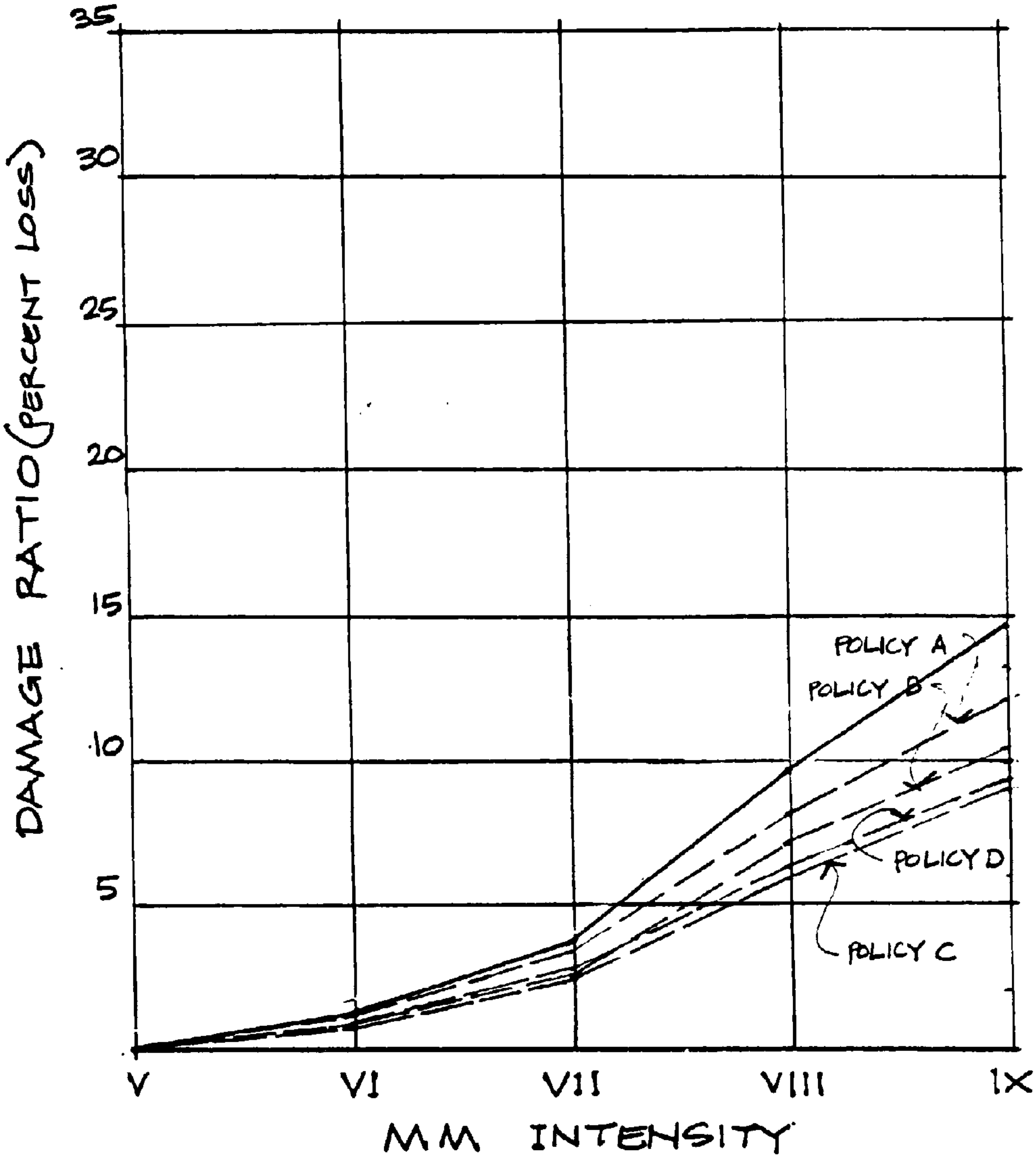


FIGURE B.2: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION MEDIUM-DENSITY, BUILT-UP MIXED-USE DISTRICT

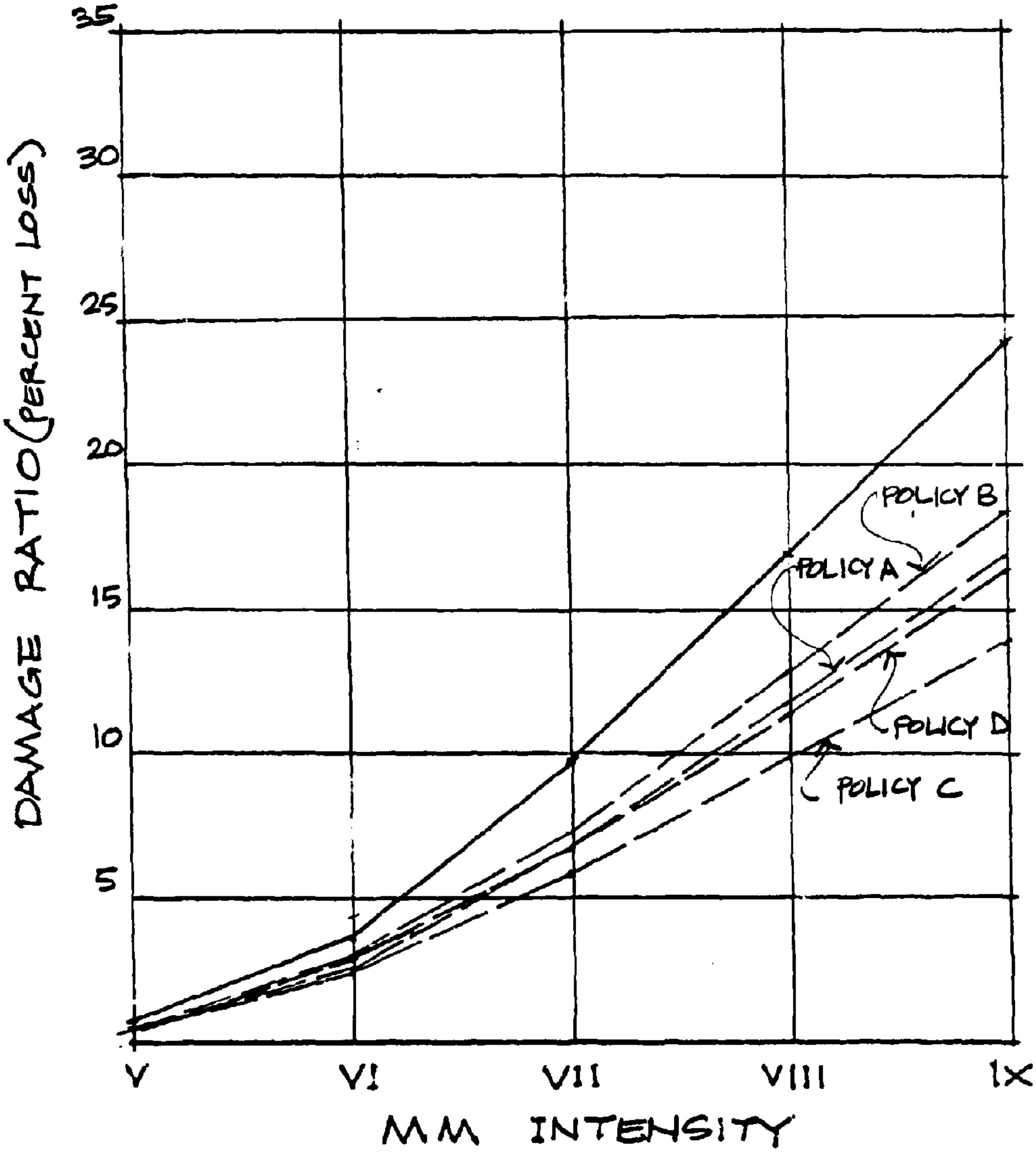


FIGURE B.3: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION
OLDER HIGH-DENSITY TRANSITIONAL NEIGHBORHOOD

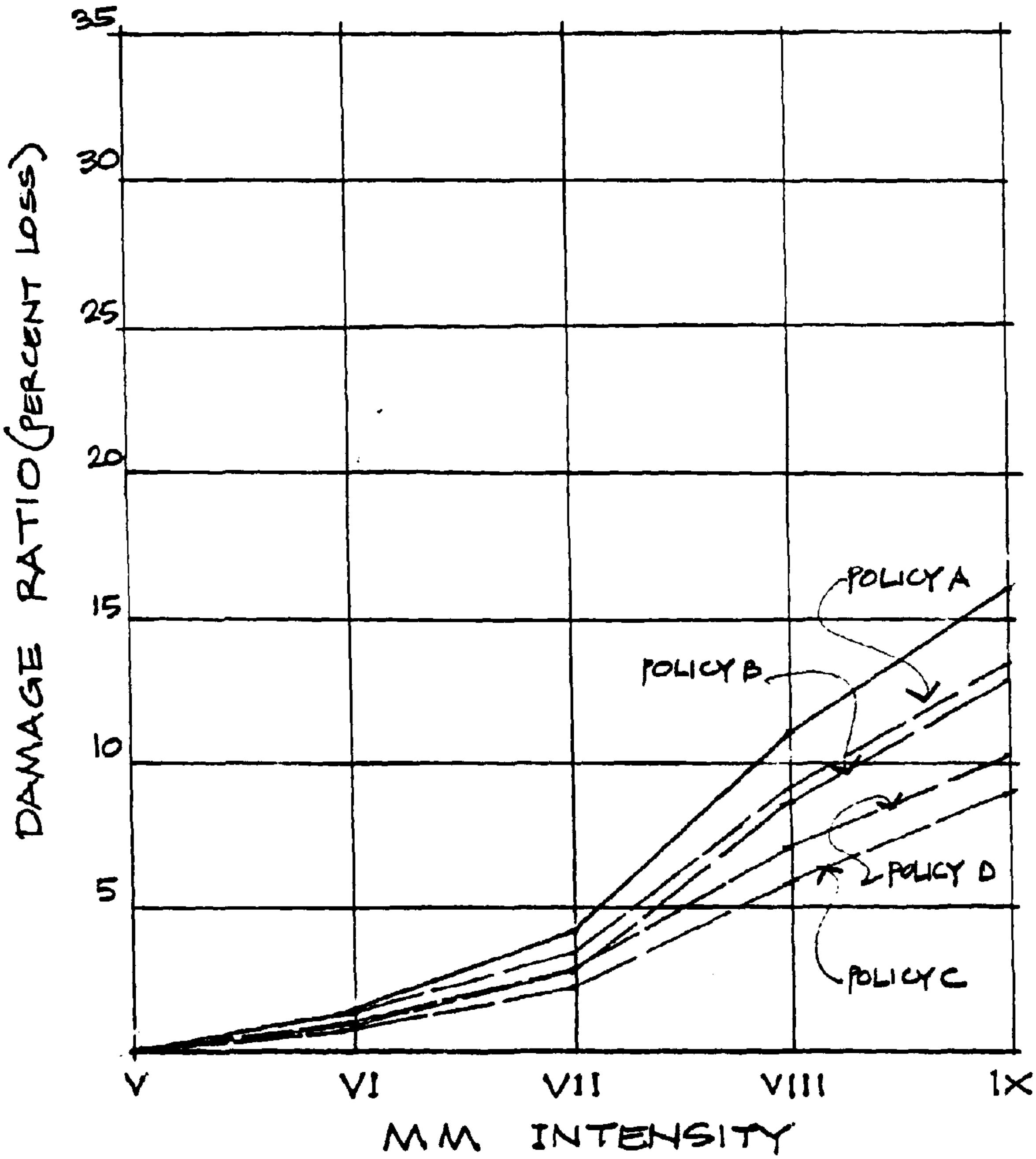


FIGURE B.4: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION
HIGH-RISE HIGH-VALUE BUSINESS DISTRICT

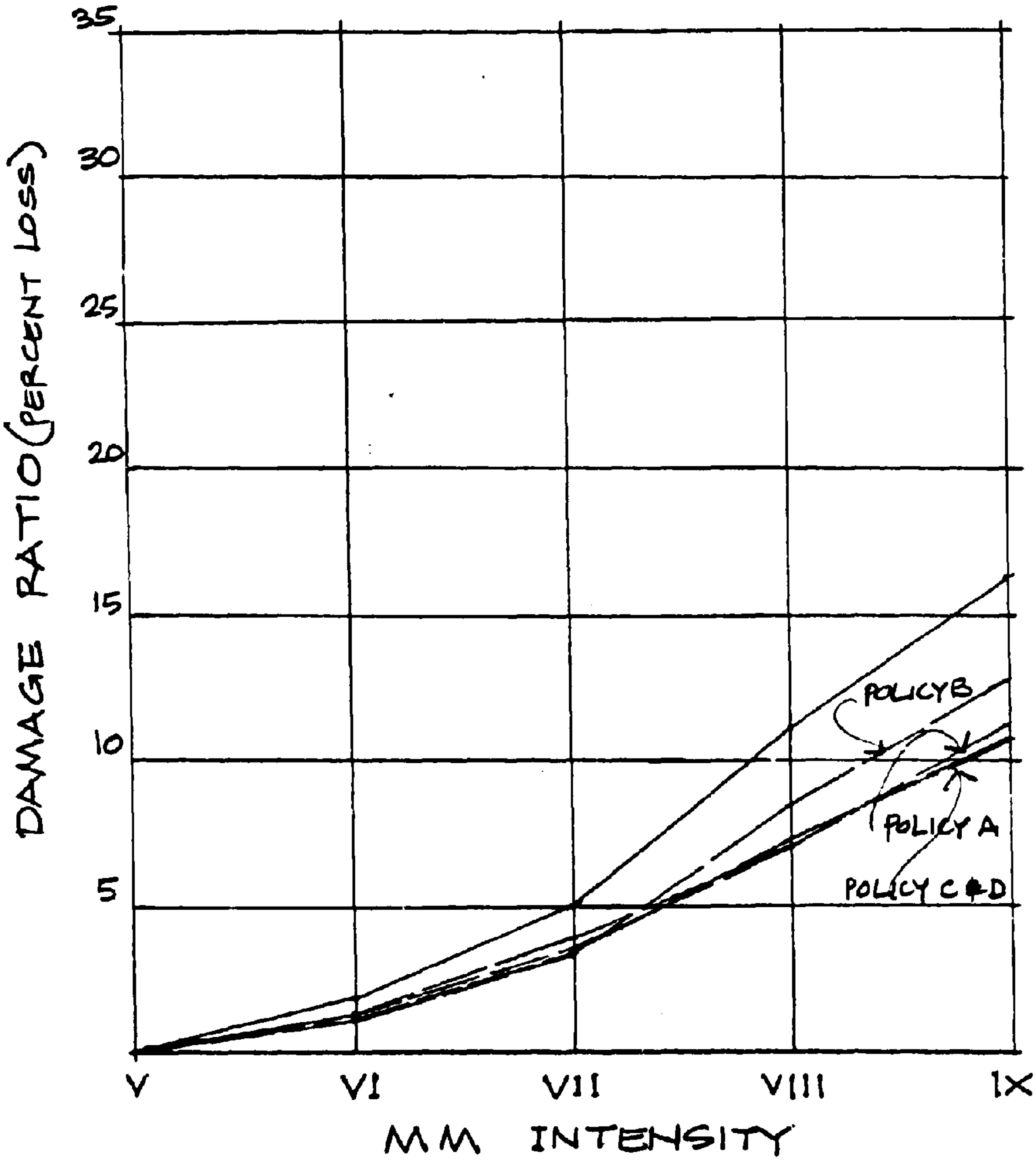


FIGURE B.5: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION
MIXED INDUSTRIAL-COMMERCIAL DISTRICT

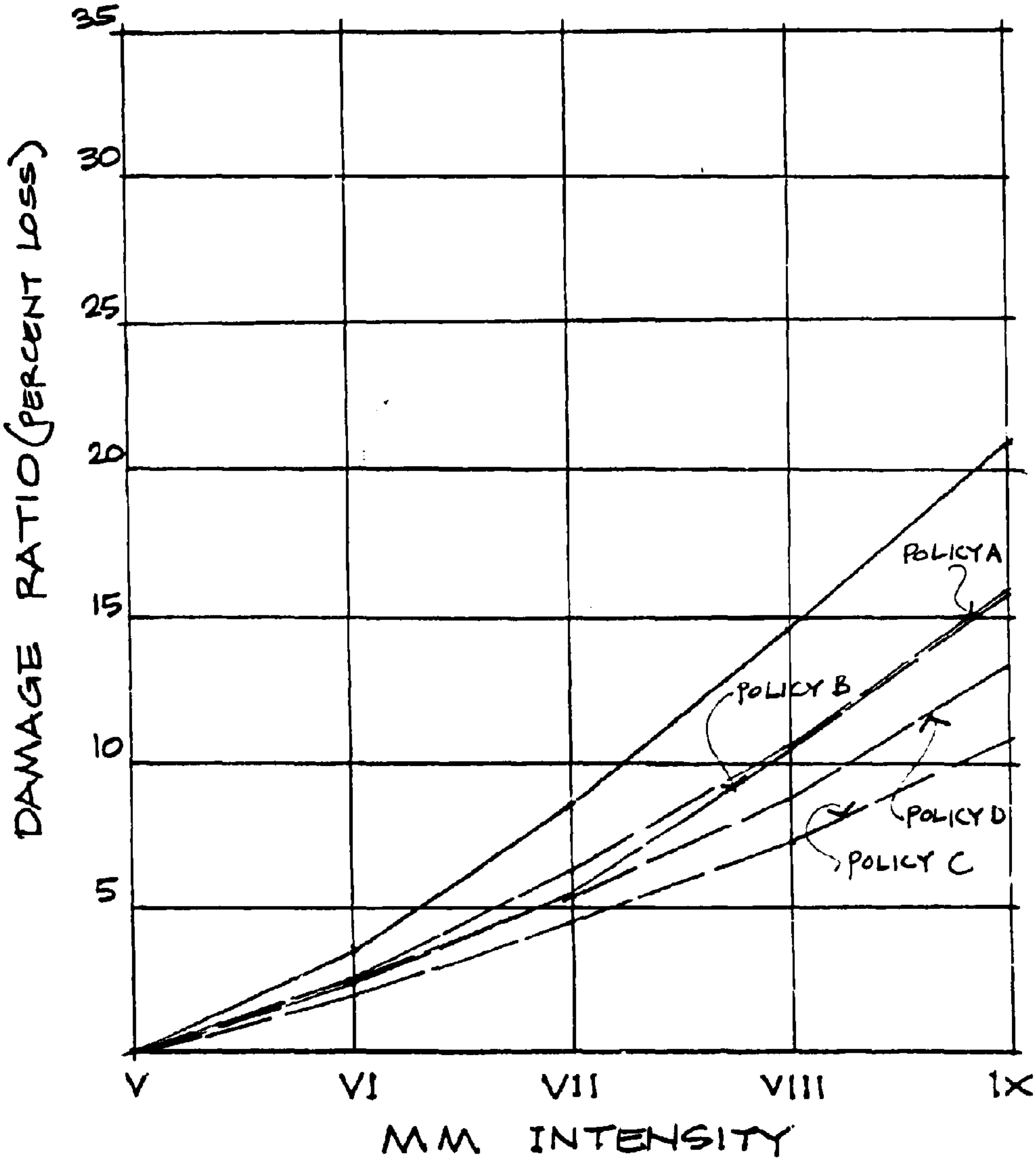


FIGURE B.6: POLICY EFFECTS ON BUILDING DAMAGE INCLUDING INTERACTION
OLDER MEDIUM-DENSITY MIXED NEIGHBORHOOD

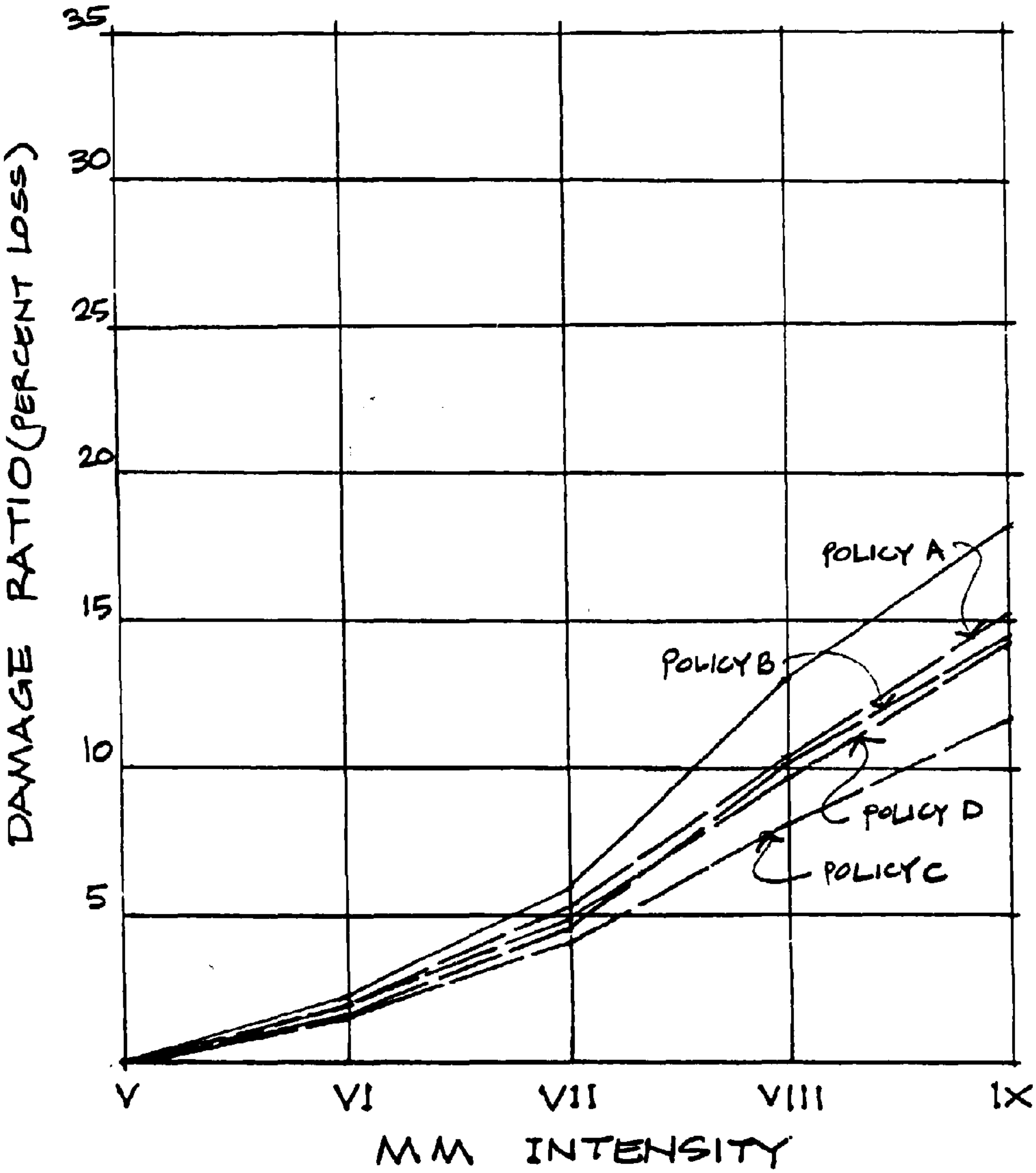


FIGURE B.7: POLICY EFFECTS ON NON-BUILDING STOCK DAMAGE
LOW-DENSITY RESIDENTIAL NEIGHBORHOOD

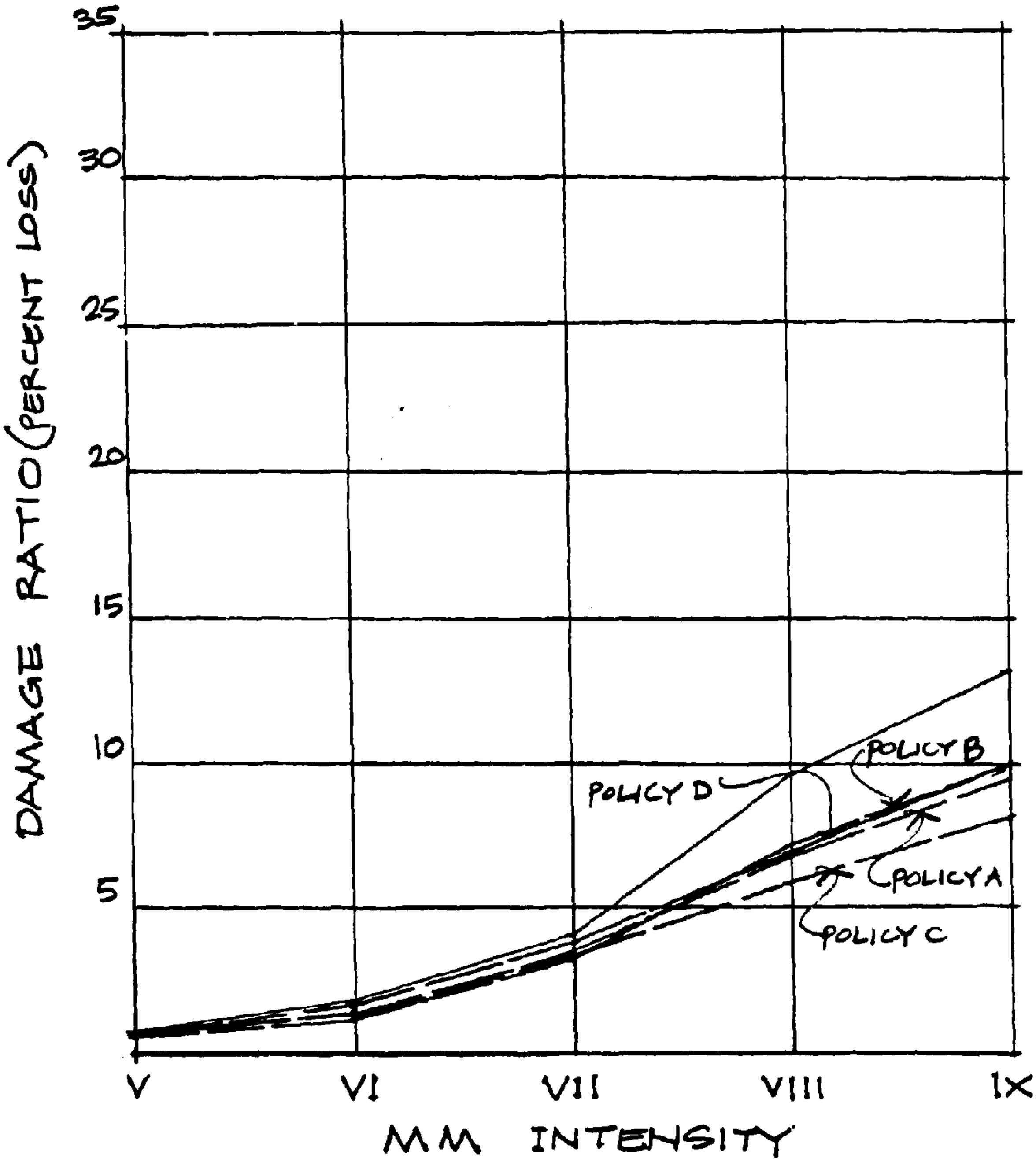


FIGURE B.8: POLICY EFFECTS ON NON-BUILDING STOCK DAMAGE
MEDIUM-DENSITY BUILT-UP MIXED-USE DISTRICT

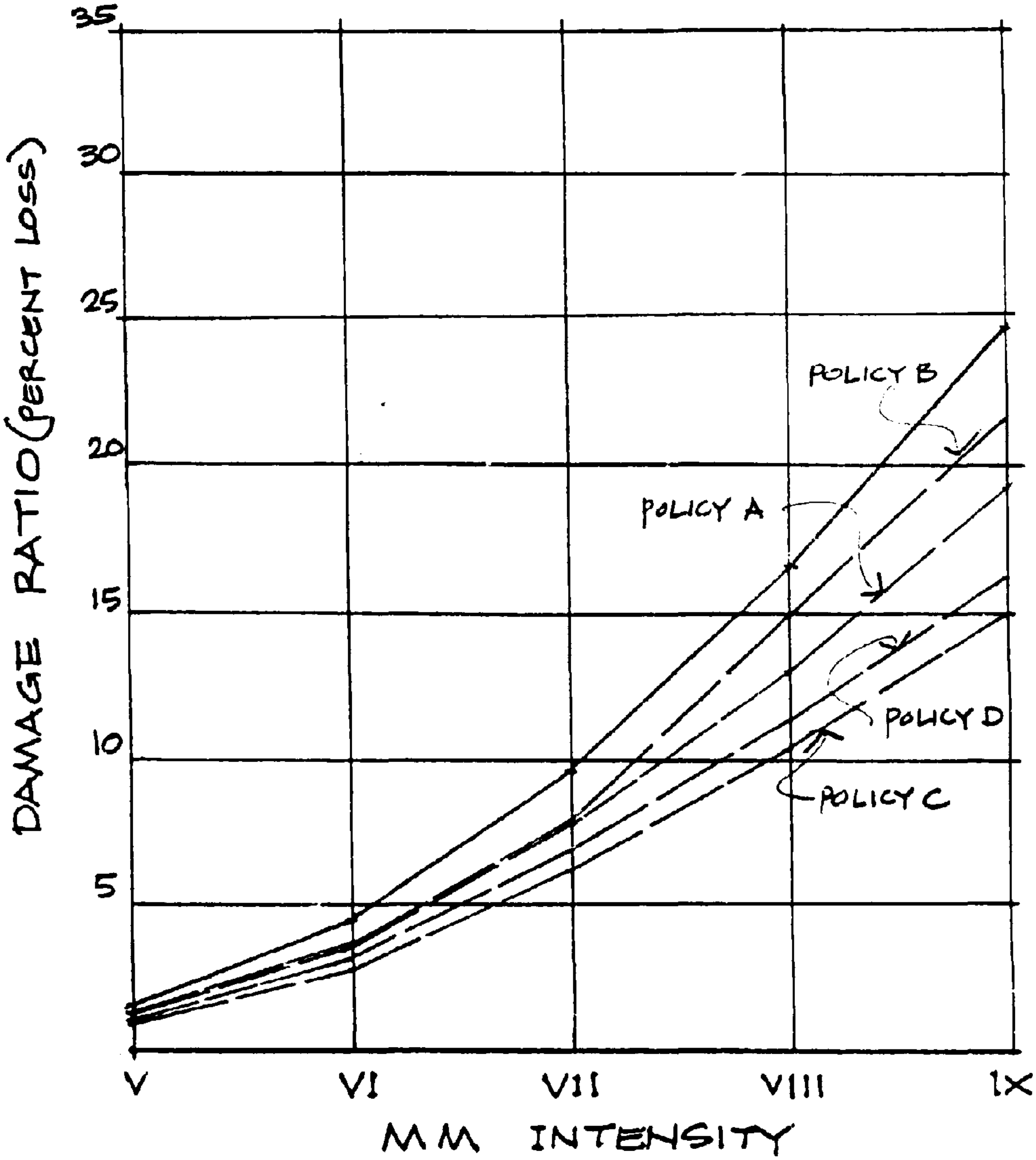


FIGURE B.9: POLICY EFFECTS ON NON-BUILDING STOCK DAMAGE
OLDER HIGH-DENSITY TRANSITIONAL NEIGHBORHOOD

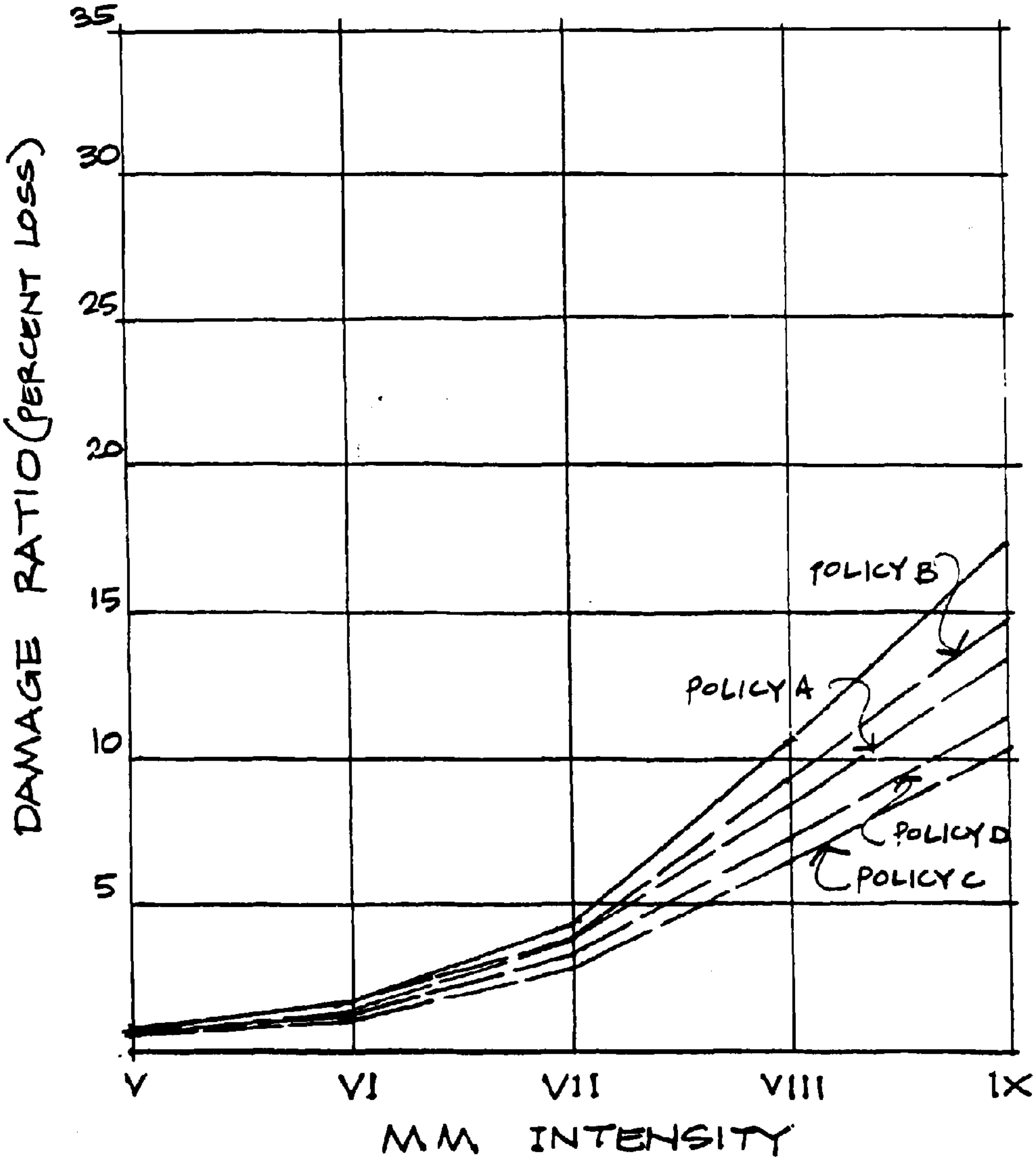


FIGURE B.10: POLICY EFFECTS ON NON-BUILDING STOCK DAMAGE
HIGH-RISE HIGH-VALUE BUSINESS DISTRICT

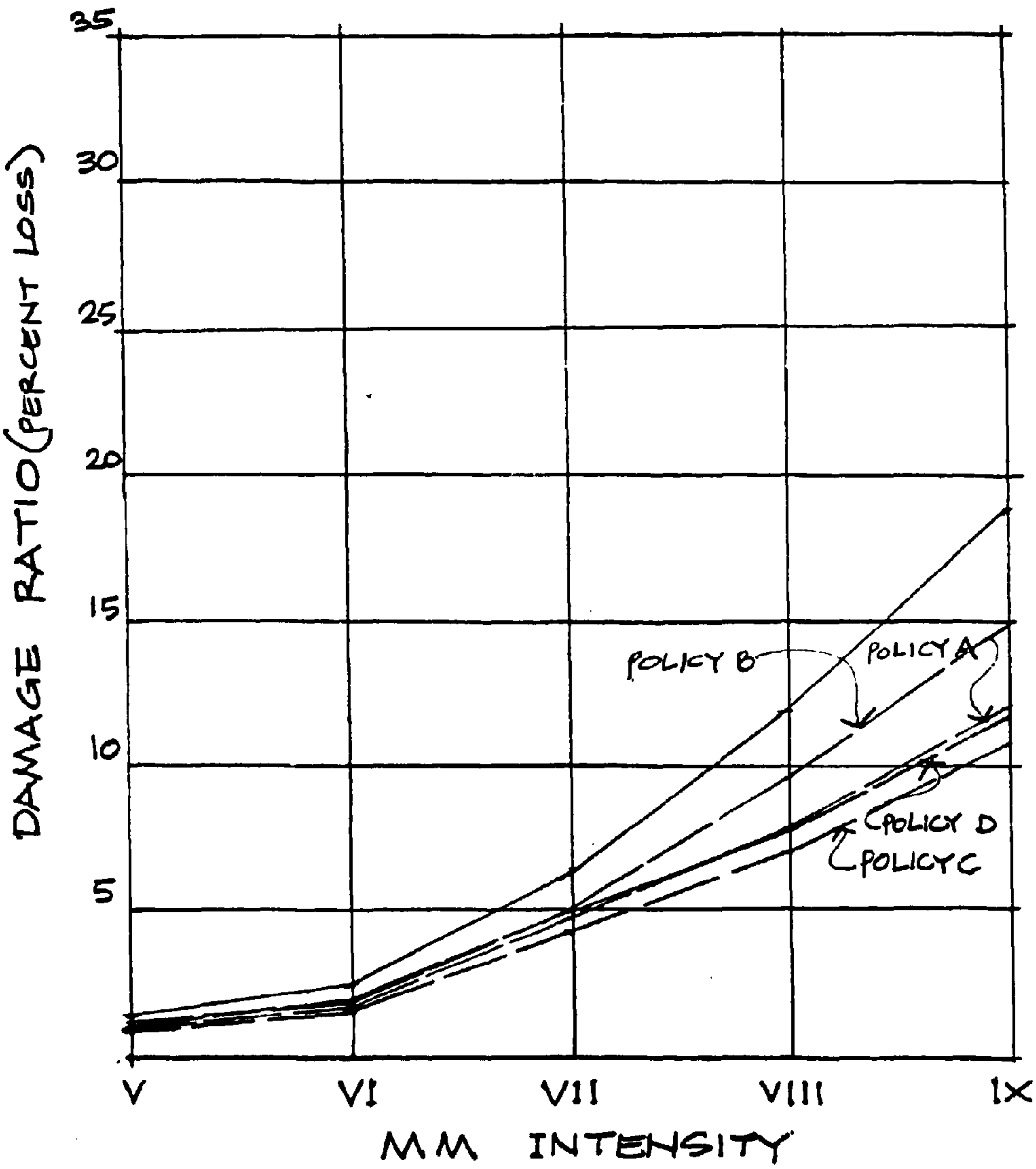


FIGURE B.11: POLICY EFFECTS ON NON-BUILDING STOCK DAMAGE
MIXED-USE INDUSTRIAL-COMMERCIAL DISTRICT

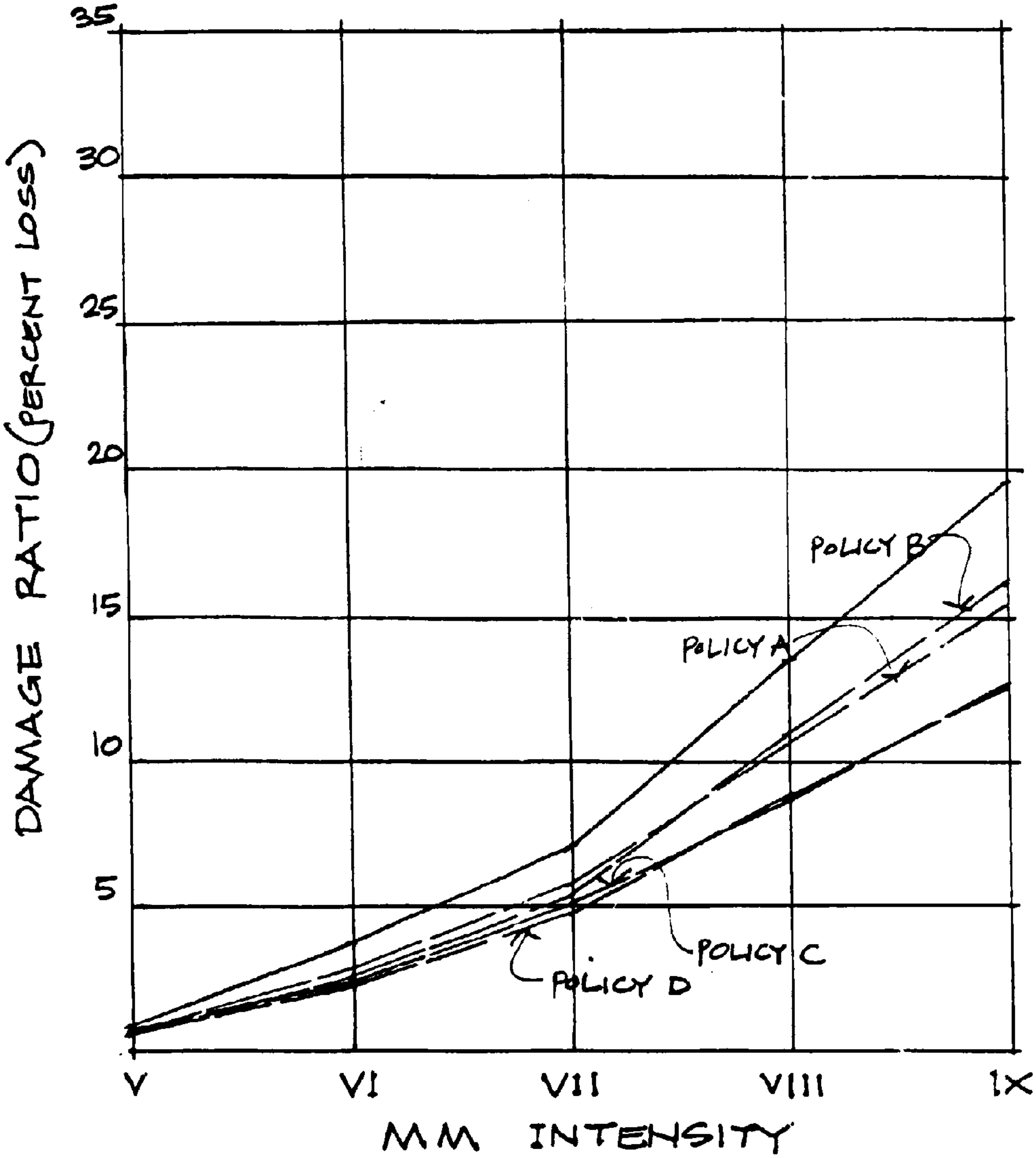
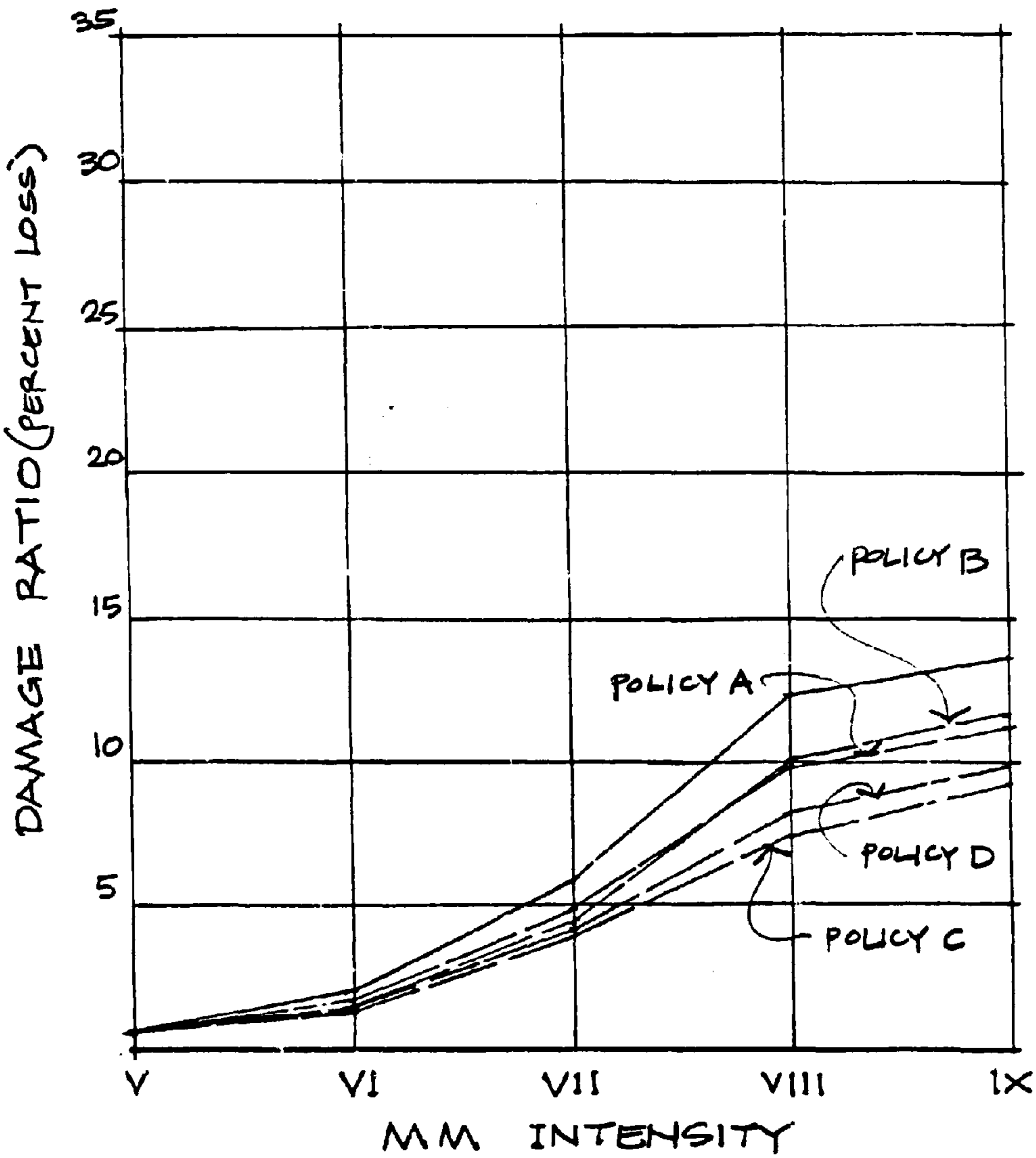


FIGURE B.12: POLICY EFFECTS OF NON-BUILDING STOCK DAMAGE
OLDER MEDIUM-DENSITY MIXED NEIGHBORHOOD



A P P E N D I X   C

Flow-chart of the model

pink boxes -- inputs

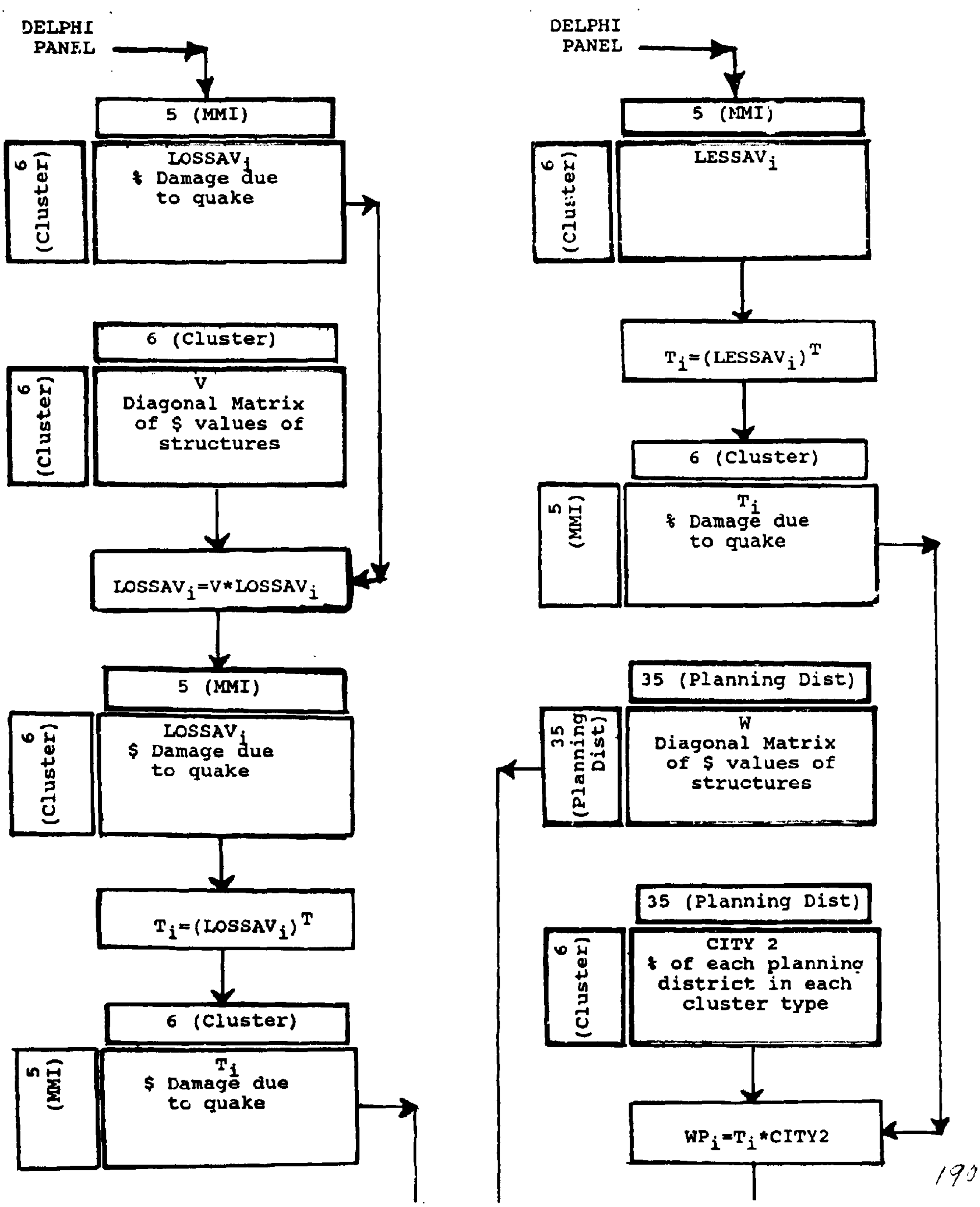
small blue boxes -- computation

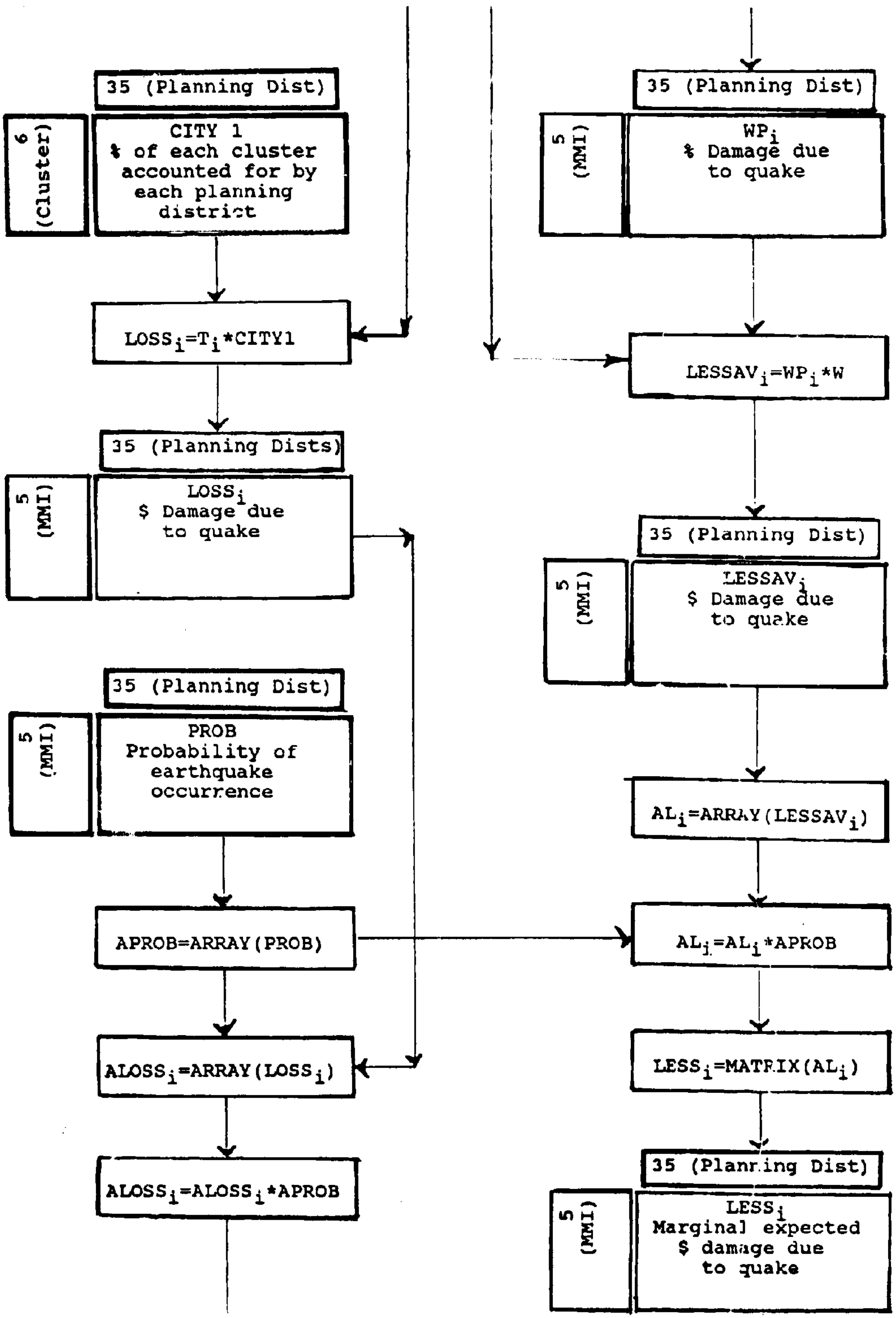
large blue boxes -- outputs

white boxes -- panel inputs

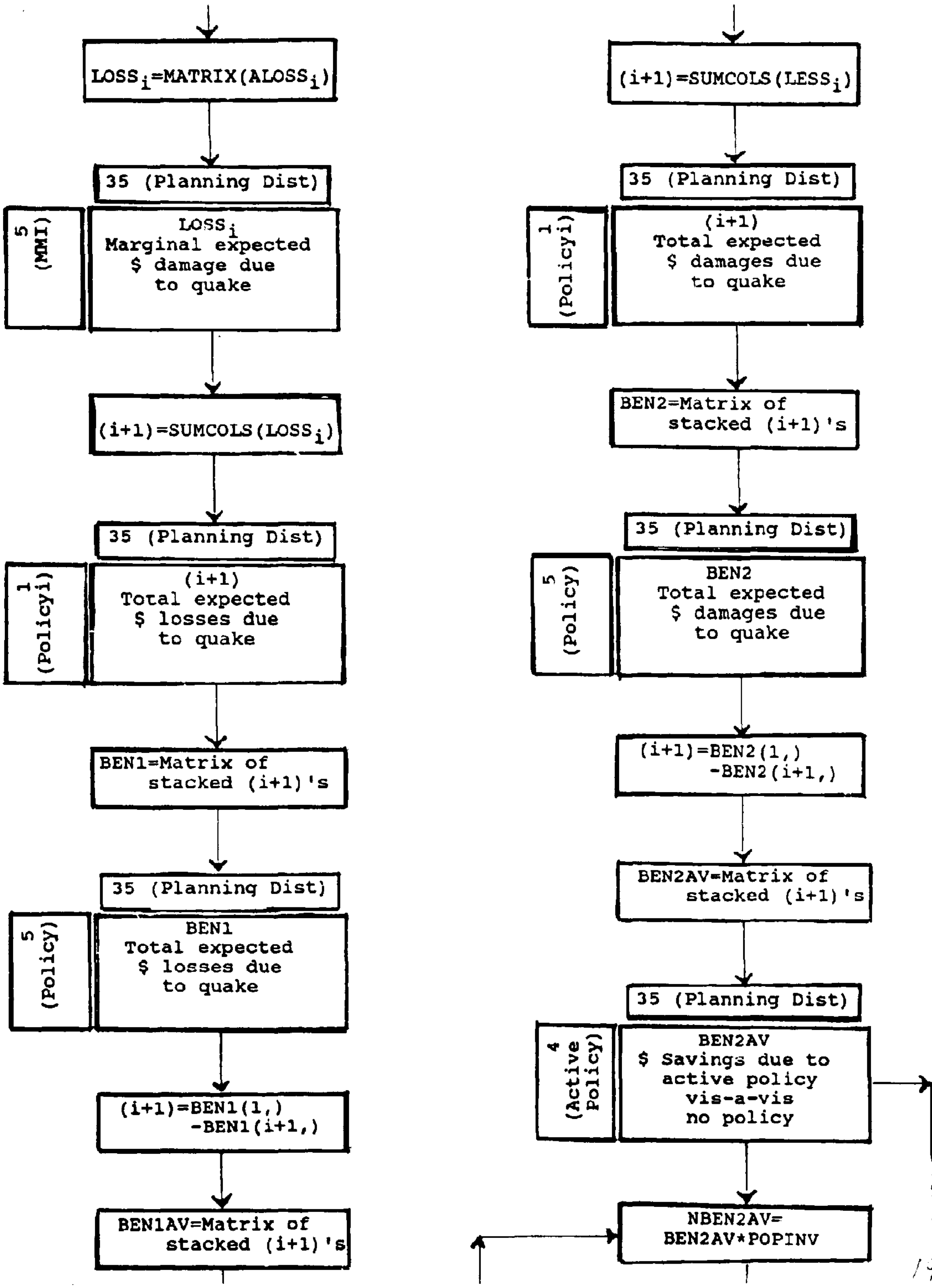
(i = 0,A,B,C,D)

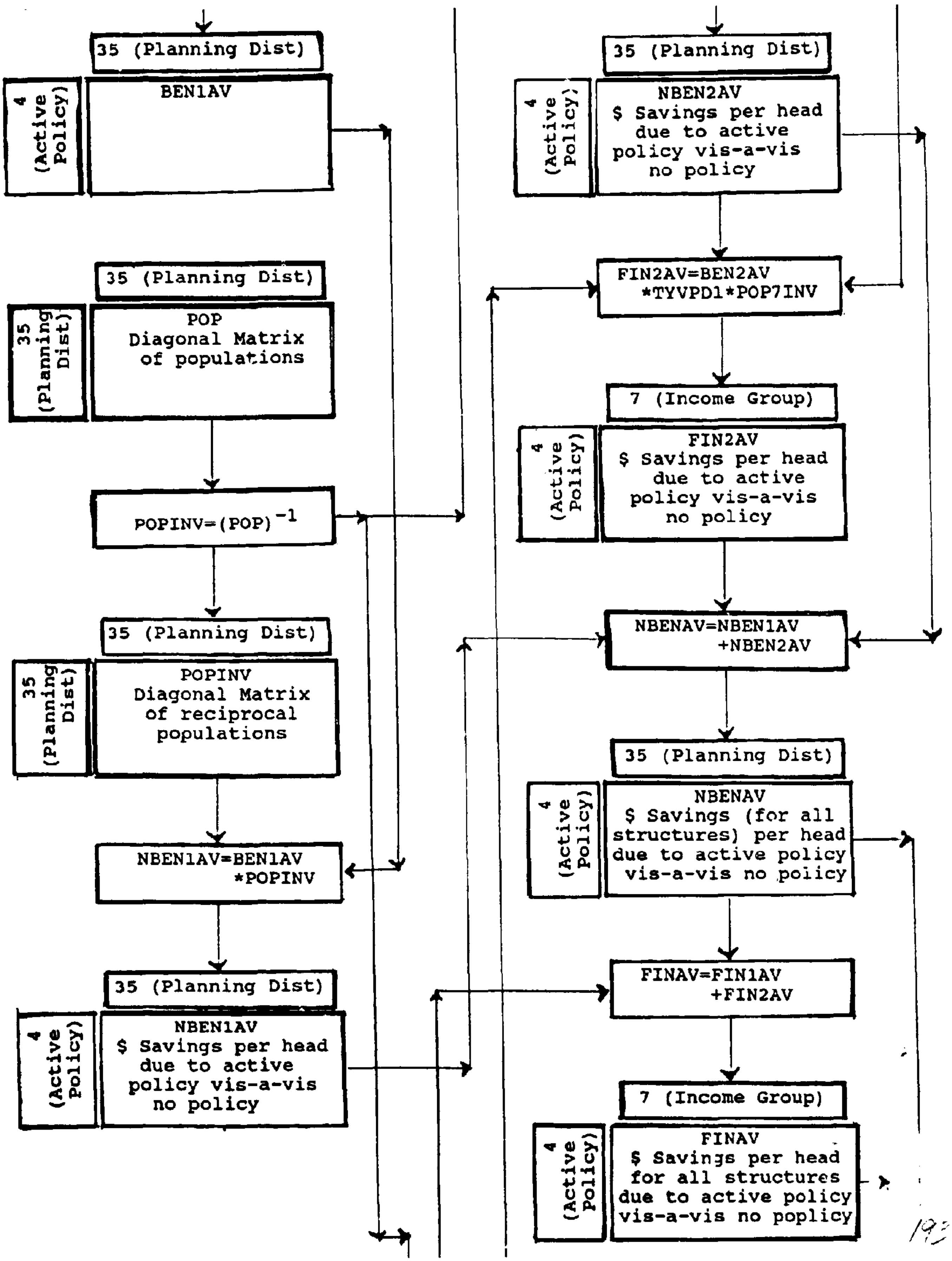
PRIVATE STRUCTURES | NON-PRIVATE STRUCTURES

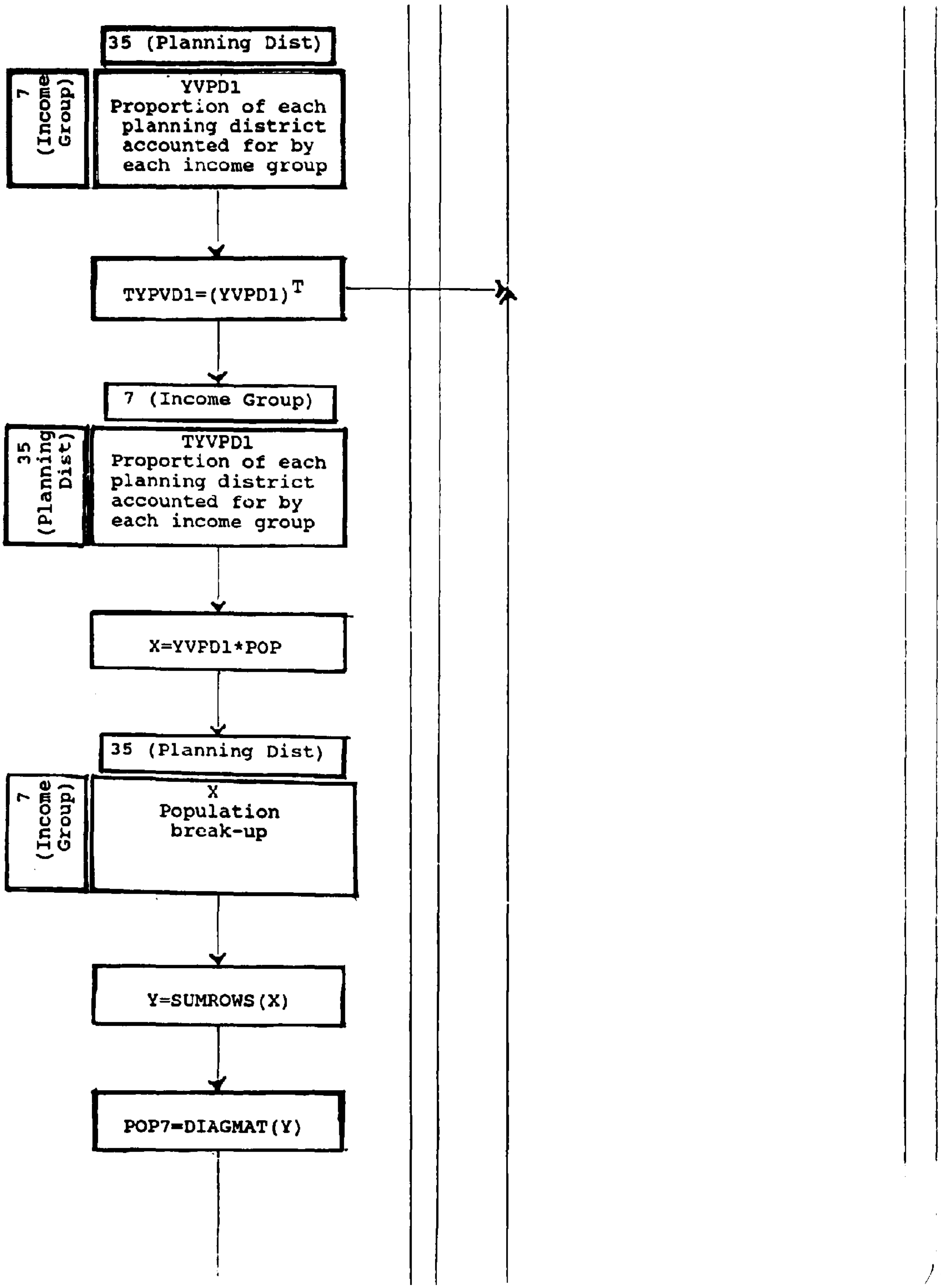


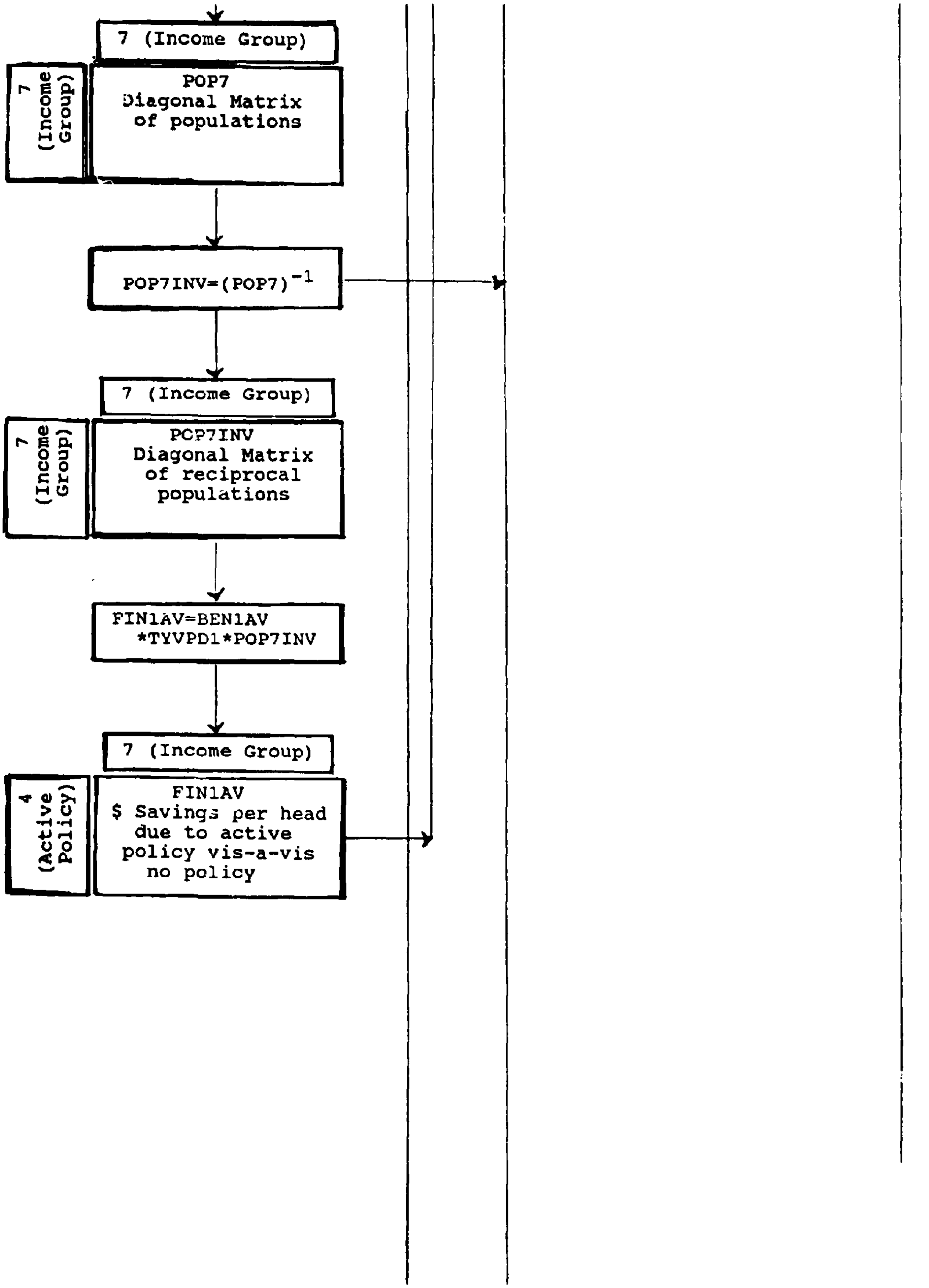


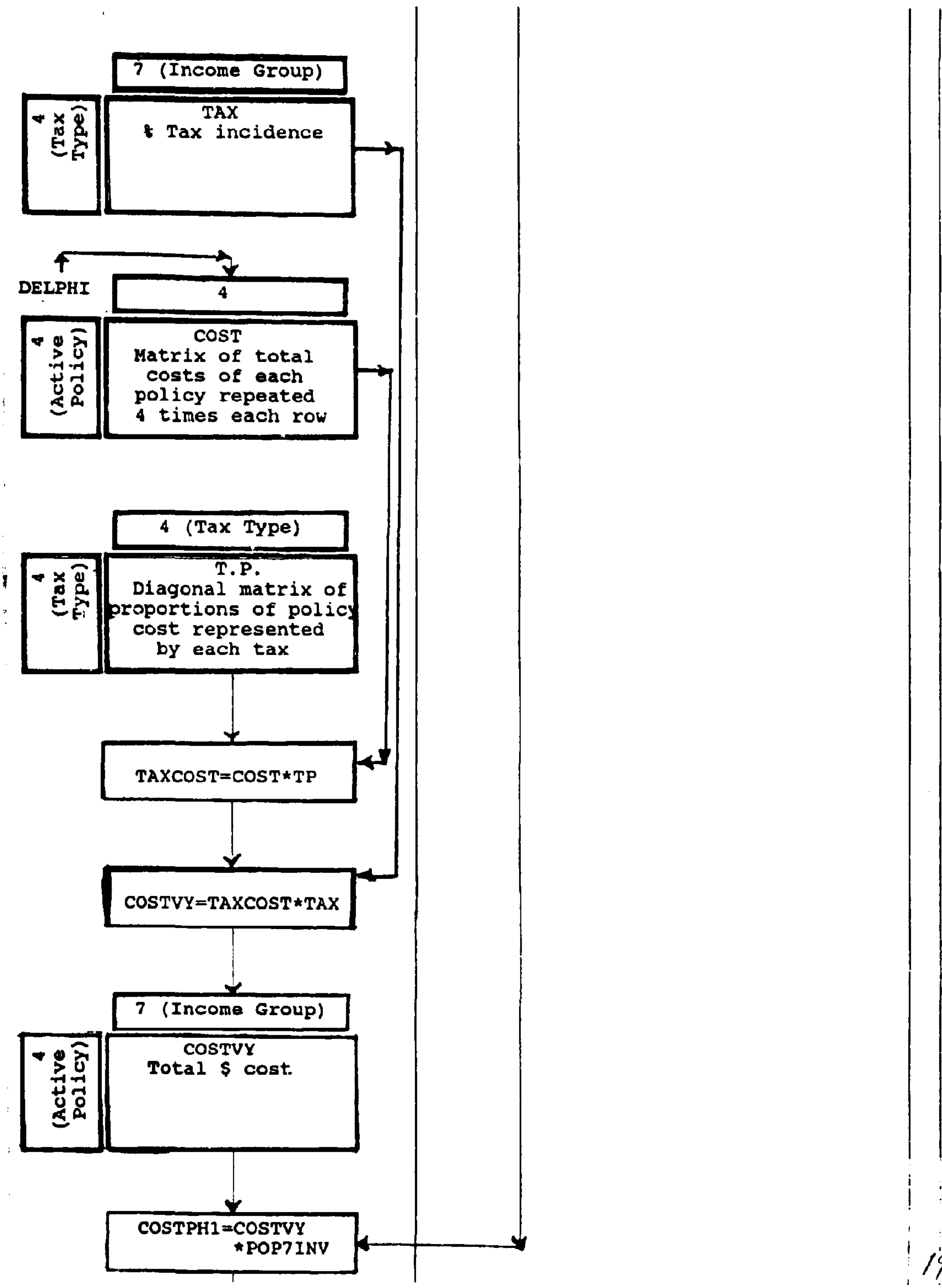
35 (Planning Dist)
6 (Cluster)
CITY 1
% of each cluster accounted for by each planning district
LOSS$_i$=T$_i$*CITY1
35 (Planning Dists)
5 (MMI)
LOSS$_i$
$ Damage due to quake
35 (Planning Dist)
5 (MMI)
PROB
Probability of earthquake occurrence
APROB=ARRAY(PROB)
ALOSS$_i$=ARRAY(LOSS$_i$)
ALOSS$_i$=ALOSS$_i$*APROB
35 (Planning Dist)
5 (MMI)
WP$_i$
% Damage due to quake
LESSAV$_i$=WP$_i$*W
35 (Planning Dist)
5 (MMI)
LESSAV$_i$
$ Damage due to quake
AL$_i$=ARRAY(LESSAV$_i$)
AL$_i$=AL$_i$*APROB
LESS$_i$=MATRIX(AL$_i$)
35 (Planning Dist)
5 (MMI)
LESS$_i$
Marginal expected $ damage due to quake

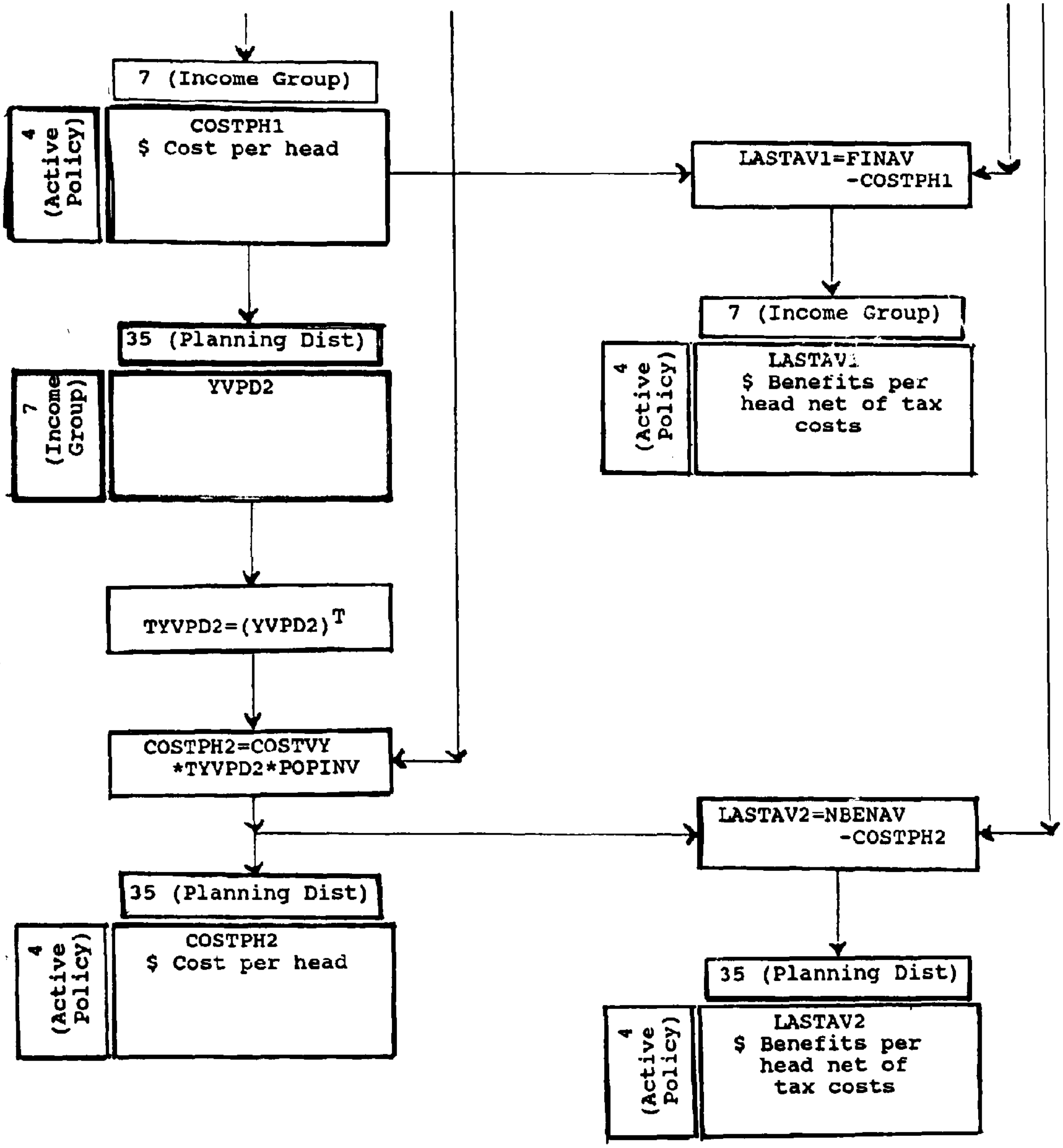

LOSSi=MATRIX(ALOSSi)
35 (Planning Dist)
5 (MMI)
LOSSi Marginal expected $ damage due to quake
(i+1)=SUMCOLS(LOSSi)
35 (Planning Dist)
1 (Policyi)
(i+1) Total expected $ losses due to quake
BEN1=Matrix of stacked (i+1)'s
35 (Planning Dist)
5 (Policy)
BEN1 Total expected $ losses due to quake
(i+1)=BEN1(1,) -BEN1(i+1,)
BEN1AV=Matrix of stacked (i+1)'s
(i+1)=SUMCOLS(LESSi)
35 (Planning Dist)
1 (Policyi)
(i+1) Total expected $ damages due to quake
BEN2=Matrix of stacked (i+1)'s
35 (Planning Dist)
5 (Policy)
BEN2 Total expected $ damages due to quake
(i+1)=BEN2(1,) -BEN2(i+1,)
BEN2AV=Matrix of stacked (i+1)'s
35 (Planning Dist)
4 (Active Policy)
BEN2AV $ Savings due to active policy vis-a-vis no policy
NBEN2AV= BEN2AV*POPINV


35 (Planning Dist)
4 (Active Policy)
BEN1AV
35 (Planning Dist)
35 (Planning Dist)
POP
Diagonal Matrix
of populations
POPINV=(POP) -1
35 (Planning Dist)
35 (Planning Dist)
POPINV
Diagonal Matrix
of reciprocal
populations
NBEN1AV=BEN1AV
*POPINV
35 (Planning Dist)
4 (Active Policy)
NBEN1AV
$ Savings per head
due to active
policy vis-a-vis
no policy
35 (Planning Dist)
4 (Active Policy)
NBEN2AV
$ Savings per head
due to active
policy vis-a-vis
no policy
FIN2AV=BEN2AV
*TYVPD1*POP7INV
7 (Income Group)
4 (Active Policy)
FIN2AV
$ Savings per head
due to active
policy vis-a-vis
no policy
NBENAV=NBEN1AV
+NBEN2AV
35 (Planning Dist)
4 (Active Policy)
NBENAV
$ Savings (for all
structures) per head
due to active policy
vis-a-vis no policy
FINAV=FIN1AV
+FIN2AV
7 (Income Group)
4 (Active Policy)
FINAV
$ Savings per head
for all structures
due to active policy
vis-a-vis no poplicy


35 (Planning Dist)
7 (Income Group)
YVPD1
Proportion of each planning district accounted for by each income group
TYPVD1=(YVPD1)T
7 (Income Group)
35 (Planning Dist)
TYVPD1
Proportion of each planning district accounted for by each income group
X=YVPD1*POP
35 (Planning Dist)
7 (Income Group)
X
Population break-up
Y=SUMROWS(X)
POP7=DIAGMAT(Y)


7 (Income Group)
7 (Income Group)
POP7
Diagonal Matrix
of populations
POP7INV=(POP7)$^{-1}$
7 (Income Group)
7 (Income Group)
POP7INV
Diagonal Matrix
of reciprocal
populations
FIN1AV=BEN1AV
*TYVPD1*POP7INV
7 (Income Group)
4 (Active Policy)
FIN1AV
$ Savings per head
due to active
policy vis-a-vis
no policy


7 (Income Group)
4 (Tax Type)
TAX
% Tax incidence
DELPHI
4
4 (Active Policy)
COST
Matrix of total costs of each policy repeated 4 times each row
4 (Tax Type)
4 (Tax Type)
T.P.
Diagonal matrix of proportions of policy cost represented by each tax
TAXCOST=COST*TP
COSTVY=TAXCOST*TAX
7 (Income Group)
4 (Active Policy)
COSTVY
Total $ cost
COSTPH1=COSTVY
*POP7INV



7 (Income Group)
4 (Active Policy)
COSTPH1
$ Cost per head
LASTAV1=FINAV
-COSTPH1
35 (Planning Dist)
7 (Income Group)
YVPD2
7 (Income Group)
4 (Active Policy)
LASTAV1
$ Benefits per head net of tax costs
TYVPD2=(YVPD2)T
COSTPH2=COSTVY
*TYVPD2*POPINV
LASTAV2=NBENAV
-COSTPH2
35 (Planning Dist)
4 (Active Policy)
COSTPH2
$ Cost per head
35 (Planning Dist)
4 (Active Policy)
LASTAV2
$ Benefits per head net of tax costs

A P P E N D I X D

Computer program (SPEAKEZ)

```
:_edit project2
EDIT COMMAND MODE
:%1
EDITING PROJECT2
PROGRAM
JOURNAL(ON)
LOSSAVO=KEPT(LOSSAVO);LOSSAVA=KEPT(LOSSAVA);LOSSAVB=KEPT(LOSSAVB)
LOSSAVC=KEPT(LOSSAVC);LOSSAVD=KEPT(LOSSAVD)
LOSSAVO;LOSSAVA;LOSSAVB;LOSSAVC;LOSSAVD
LOSSCONO=KEPT(LOSSCONO);LOSSCONA=KEPT(LOSSCONA);LOSSCONB=KEPT(LOSSCONB)
LOSSCONC=KEPT(LOSSCONC);LOSSCOND=KEPT(LOSSCOND)
LOSSCONO;LOSSCONA;LOSSCONB;LOSSCONC;LOSSCOND
V=KEPT(V)
V
LOSSAVO=V*LOSSAVO;LOSSAVA=V*LOSSAVA;LOSSAVB=V*LOSSAVB
LOSSAVC=V*LOSSAVC;LOSSAVD=V*LOSSAVD
TO=TRANSPOSE(LOSSAVO);TA=TRANSPOSE(LOSSAVA);TB=TRANSPOSE(LOSSAVB)
TC=TRANSPOSE(LOSSAVC);TD=TRANSPOSE(LOSSAVD)
CITY1=KEPT(CITY1)
CITY1
LOSSO=TO*CITY1;LOSSA=TA*CITY1;LOSSB=TB*CITY1;LOSSC=TC*CITY1;LOSSD=TD*CITY1
PROB=KEPT(PROB)
PROB
APROB=ARRAY(175:PROB)
ALOSSO=ARRAY(175:LOSSO);ALOSSA=ARRAY(175:LOSSA);ALOSSB=ARRAY(175:LOSSB)
ALOSSC=ARRAY(175:LOSSC);ALOSSD=ARRAY(175:LOSSD)
ALOSSO=ALOSSO*APROB;ALOSSA=ALOSSA*APROB;ALOSSB=ALOSSB*APROB
ALOSSC=ALOSSC*APROB;ALOSSD=ALOSSD*APROB
LOSSO=MAT(5,35:ALOSSO);LOSSA=MAT(5,35:ALOSSA);LOSSB=MAT(5,35:ALOSSB)
LOSSC=MAT(5,35:ALOSSC);LOSSD=MAT(5,35:ALOSSD)
A=SUMCOLS(LOSSO);B=SUMCOLS(LOSSA);C=SUMCOLS(LOSSB);D=SUMCOLS(LOSSC)
E=SUMCOLS(LOSSD)
BEN1=MAT(5,35:A B C D E)
A=BEN1(1,)-BEN1(2,);B=BEN1(1,)-BEN1(3,);C=BEN1(1,)-BEN1(4,)
D=BEN1(1,)-BEN1(5,)
BEN1AV=MAT(4,35:A B C D)
POP=KEPT(POP)
POP
POPINV=INVERSE(POP)
NBEN1AV=BEN1AV*POPINV
NBEN1AV
YVPD1=KEPT(YVPD1)
YVPD1
TYVPD1=TRANSPOSE(YVPD1)
X=YVPD1*POP
Y=SUMROWS(X)
POP7=DIAGMAT(Y)
POP7
POP7INV=INVERSE(POP7)
FIN1AV=BEN1AV*TYVPD1*POP7INV
FIN1AV
LESSAVO=KEPT(LESSAVO);LESSAVA=KEPT(LESSAVA);LESSAVB=KEPT(LESSAVB)
LESSAVC=KEPT(LESSAVC);LESSAVD=KEPT(LESSAVD)
LESSAVO;LESSAVA;LESSAVB;LESSAVC;LESSAVD
LESSCONO=KEPT(LESSCONO);LESSCONA=KEPT(LESSCONA);LESSCONB=KEPT(LESSCONB)
LESSCONC=KEPT(LESSCONC);LESSCOND=KEPT(LESSCOND)
LESSCONO;LESSCONA;LESSCONB;LESSCONC;LESSCOND
TO=TRANSPOSE(LESSAVO);TA=TRANSPOSE(LESSAVA);TB=TRANSPOSE(LESSAVB)
TC=TRANSPOSE(LESSAVC);TD=TRANSPOSE(LESSAVD)
W=KEPT(W)
```

```
W
CITY2=KEPT(CITY2)
CITY2
WPO=TO*CITY2;WPA=TA*CITY2;WPB=TB*CITY2;WPC=TC*CITY2;WPD=TD*CITY2
LESSAVO=WPO*W;LESSAVA=WPA*W;LESSAVB=WPB*W;LESSAVC=WPC*W;LESSAVD=WPD*W
ALO=ARRAY(175:LESSAVO);ALA=ARRAY(175:LESSAVA);ALB=ARRAY(175:LESSAVB)
ALC=ARRAY(175:LESSAVC);ALD=ARRAY(175:LESSAVD)
ALO=ALO*APROB;ALA=ALA*APROB;ALB=ALB*APROB;ALC=ALC*APROB;ALD=ALD*APROB
LESSO=MAT(5,35:ALO);LESSA=MAT(5,35:ALA);LESSB=MAT(5,35:ALB)
LESSC=MAT(5,35:ALC);LESSD=MAT(5,35:ALD)
A=SUMCOLS(LESSO);B=SUMCOLS(LESSA);C=SUMCOLS(LESSB);D=SUMCOLS(LESSC)
E=SUMCOLS(LESSD)
BEN2=MAT(5,35:A B C D E)
A=BEN2(1,)-BEN2(2,);B=BEN2(1,)-BEN2(3,);C=BEN2(1,)-BEN2(4,);
D=BEN2(1,)-BEN2(5,)
BEN2AV=MAT(4,35:A B C D)
NBEN2AV=BEN2AV*POPINV
NBEN2AV
FIN2AV=BEN2AV*TYVPD1*POP7INV
FIN2AV
NBENAV=NBEN1AV+NBEN2AV
NBENAV
FINAV=FIN1AV+FIN2AV
FINAV
LOSSCONO=V*LOSSCONO;LOSSCONA=V*LOSSCONA;LOSSCONB=V*LOSSCONB
LOSSCONC=V*LOSSCONC;LOSSCOND=V*LOSSCOND
TO=TRANSPOSE(LOSSCONO);TA=TRANSPOSE(LOSSCONA);TB=TRANSPOSE(LOSSCONB)
TC=TRANSPOSE(LOSSCONC);TD=TRANSPOSE(LOSSCOND)
LOSSO=TO*CITY1;LOSSA=TA*CITY1;LOSSB=TB*CITY1;LOSSC=TC*CITY1;LOSSD=TD*CITY1
ALOSSO=ARRAY(175:LOSSO);ALOSSA=ARRAY(175:LOSSA);ALOSSB=ARRAY(175:LOSSB)
ALOSSC=ARRAY(175:LOSSC);ALOSSD=ARRAY(175:LOSSD)
ALOSSO=ALOSSO*APROB;ALOSSA=ALOSSA*APROB;ALOSSB=ALOSSB*APROB
ALOSSC=ALOSSC*APROB;ALOSSD=ALOSSD*APROB
LOSSO=MAT(5,35:ALOSSO);LOSSA=MAT(5,35:ALOSSA);LOSSB=MAT(5,35:ALOSSB)
LOSSC=MAT(5,35:ALOSSC);LOSSD=MAT(5,35:ALOSSD)
A=SUMCOLS(LOSSO);B=SUMCOLS(LOSSA);C=SUMCOLS(LOSSB);D=SUMCOLS(LOSSC)
E=SUMCOLS(LOSSD)
BEN1=MAT(5,35:A B C D E)
A=BEN1(1,)-BEN1(2,);B=BEN1(1,)-BEN1(3,);C=BEN1(1,)-BEN1(4,)
D=BEN1(1,)-BEN1(5,)
BEN1CON=MAT(4,35:A B C D)
NBEN1CON=BEN1CON*POPINV
NBEN1CON
FIN1CON=BEN1CON*TYVPD1*POP7INV
FIN1CON
TO=TRANSPOSE(LESSCONO);TA=TRANSPOSE(LESSCONA);TB=TRANSPOSE(LESSCONB)
TC=TRANSPOSE(LESSCONC);TD=TRANSPOSE(LESSCOND)
WPO=TO*CITY2;WPA=TA*CITY2;WPB=TB*CITY2;WPC=TC*CITY2;WPD=TD*CITY2
LESSCONO=WPO*W;LESSCONA=WPA*W;LESSCONB=WPB*W;LESSCONC=WPC*W;LESSCOND=WPD*W
ALO=ARRAY(175:LESSCONO);ALA=ARRAY(175:LESSCONA);ALB=ARRAY(175:LESSCONB)
ALC=ARRAY(175:LESSCONC);ALD=ARRAY(175:LESSCOND)
ALO=ALO*APROB;ALA=ALA*APROB;ALB=ALB*APROB;ALC=ALC*APROB;ALD=ALD*APROB
LESSO=MAT(5,35:ALO);LESSA=MAT(5,35:ALA);LESSB=MAT(5,35:ALB)
LESSC=MAT(5,35:ALC);LESSD=MAT(5,35:ALD)
A=SUMCOLS(LESSO);B=SUMCOLS(LESSA);C=SUMCOLS(LESSB);D=SUMCOLS(LESSC)
E=SUMCOLS(LESSD)
BEN2=MAT(5,35:A B C D E)
A=BEN2(1,)-BEN2(2,);B=BEN2(1,)-BEN2(3,);C=BEN2(1,)-BEN2(4,);
D=BEN2(1,)-BEN2(5,)
BEN2CON=MAT(4,35:A B C D)
NBEN2CON=BEN2CON*POPINV
```

```
NBEN2CON
FIN2CON=BEN2CON*TYVPD1*POP7INV
FIN2CON
NBENCON=NBEN1CON+NBEN2CON
NBENCON
FINCON=FIN1CON+FIN2CON
FINCON
TAX=KEPT(TAX)
TAX
COST=KEPT(COST)
COST
TP=KEPT(TP)
TP
TAXCOST=COST*TP
COSTVY=TAXCOST*TAX
COSTPH1=COSTVY*POP7INV
COSTPH1
YVPD2=KEPT(YVPD2)
YVPD2
TYVPD2=TRANSPOSE(YVPD2)
COSTPH2=COSTVY*TYVPD2*POPINV
COSTPH2
LASTAV1=FINAV-COSTPH1
LASTAV1
LASTAV2=NBENAV-COSTPH2
LASTAV2
LASTCON1=FINCON-COSTPH1
LASTCON1
LASTCON2=NBENCON-COSTPH2
LASTCON2
*JOURNAL(OFF)
:%end
MANUAL MODE
:_journal(off)
```

PRINTOUT PROCESSED AT 11:48:41 ON WEDNESDAY JANUARY 08, 1986

DATA SET PRINTED IS	QKUA050.PROGRAM
NUMBER OF COPIES TO BE PRINTED	1
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NUMBER OF INPUT RECORDS READ	155
NUMBER OF COPIES SUCCESSFULLY PRINTED	1
NUMBER OF LINES PRINTED PER COPY	155
TOTAL NUMBER OF LINES PRINTED	155

NORMAL END OF PROCESSING

202

A P P E N D I X   E

Complete model outputs

LOSSAVO (A 6 BY 5 MATRIX)

0	.017	.038	.096	.141
.01	.037	.045	.167	.136
0	.017	.043	.113	.162
0	.02	.05	.11	.163
0	.035	.033	.146	.21
0	.023	.06	.13	.18

LOSSAVA (A 6 BY 5 MATRIX)

0	.0122	.0342	.0812	.1215
.0053	.0265	.0685	.1168	.1679
0	.0136	.0355	.0915	.1145
0	.0135	.0357	.0693	.1128
3E-4	.0265	.0629	.1063	.1605
0	.0191	.0528	.1052	.162

LOSSAVB (A 6 BY 5 MATRIX)

0	.0098	.0269	.0702	.1038
.0054	.0303	.0718	.1291	.1844
0	.0134	.0295	.0861	.1286
0	.0131	.0335	.0856	.1277
0	.0231	.0643	.1091	.1598
0	.016	.0447	.1025	.1453

LOSSAVC (A 6 BY 5 MATRIX)

0	.0088	.0246	.0587	.0902
.0084	.0247	.0586	.0985	.1377
0	.0085	.0222	.0578	.09
0	.014	.0354	.0733	.108
0	.0196	.0455	.0725	.1096
0	.0146	.0417	.0817	.1166

LOSSAVD (A 6 BY 5 MATRIX)

0	.0105	.0275	.0635	.0932
.0088	.0285	.0688	.1148	.163
0	.0108	.0288	.0702	.1027
0	.0143	.0392	.0724	.11
0	.0235	.0541	.0879	.1333
0	.0179	.0482	.0987	.142

LOSSCONO (A 6 BY 5 MATRIX)

0	.017	.038	.096	.141
.01	.037	.045	.167	.136
0	.017	.043	.113	.162
0	.02	.05	.11	.163
0	.035	.033	.146	.21
0	.023	.06	.13	.18

LOSSCONA (A 6 BY 5 MATRIX)

0	.0147	.038	.0933	.1407
.0084	.037	.045	.1656	.136
0	.0165	.0428	.1017	.1552
0	.02	.06	.1008	.1579
0	.035	.033	.146	.21
0	.022	.06	.1235	.1795

LOSSCONB (A 6 BY 5 MATRIX)

0	.0164	.038	.098	.141
.0086	.037	.045	.167	.136

0	.017	.043	.113	.162
0	.02	.05	.11	.163
0	.035	.033	.146	.21
0	.023	.06	.13	.18

LOSSCONC (A 6 BY 5 MATRIX)

0	.0137	.038	.096	.141
.0097	.0348	.045	.1405	.136
0	.0135	.0336	.0863	.1343
0	.02	.0496	.1031	.1555
0	.0317	.033	.1178	.1788
0	.0201	.056	.1128	.1642

LOSSCOND (A 6 BY 5 MATRIX)

0	.0143	.038	.096	.141
.0095	.037	.045	.1638	.136
0	.0163	.0421	.1033	.1528
0	.0194	.0487	.0963	.145
0	.0331	.033	.1242	.1904
0	.0229	.0584	.1255	.1765

V (A 6 BY 6 MATRIX)

1.8871E9	0	0	0	0	0
0	2.0098E8	0	0	0	0
0	0	3.3019E8	0	0	0
0	0	0	5.6396E8	0	0
0	0	0	0	2.3599E8	0
0	0	0	0	0	9.7561E8

CITY1 (A 6 BY 35 MATRIX)

ROW 1	.0239	.0736	.0255	.013	.0811	.0057	.043	.0794	.0457	.0392
	.028	0	.023	.054	.027	.012	.0256	.014	.029	.008
	.015	.0289	.055	.0517	.018	.011	.0356	.0056	.0148	.022
	.0273	.0025	.0077	.0198	.0155					
ROW 2	0	0	0	0	0	.5754	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	.4246	0					
ROW 3	0	.0171	0	.0183	0	.0272	0	0	0	.1978
	0	0	0	0	0	0	0	0	0	0
	.1994	0	0	0	0	0	0	0	0	.0577
	0	.169	.0253	.28	0					
ROW 4	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0					
ROW 5	0	0	0	.1366	0	.1694	.0745	0	0	0
	0	.1885	0	0	0	0	.1265	0	0	0
	0	.0667	0	0	0	0	0	0	0	0
	.0629	0	.1639	0	0					
ROW 6	.0044	.003	0	.0373	0	0	0	.0031	0	.0817
	.0225	.004	.0184	.0461	0	.1438	.0038	.0102	0	.0279
	.1563	.113	0	0	0	0	.006	.0164	.0287	.067
	0	.0585	.005b	.1361	.0046					

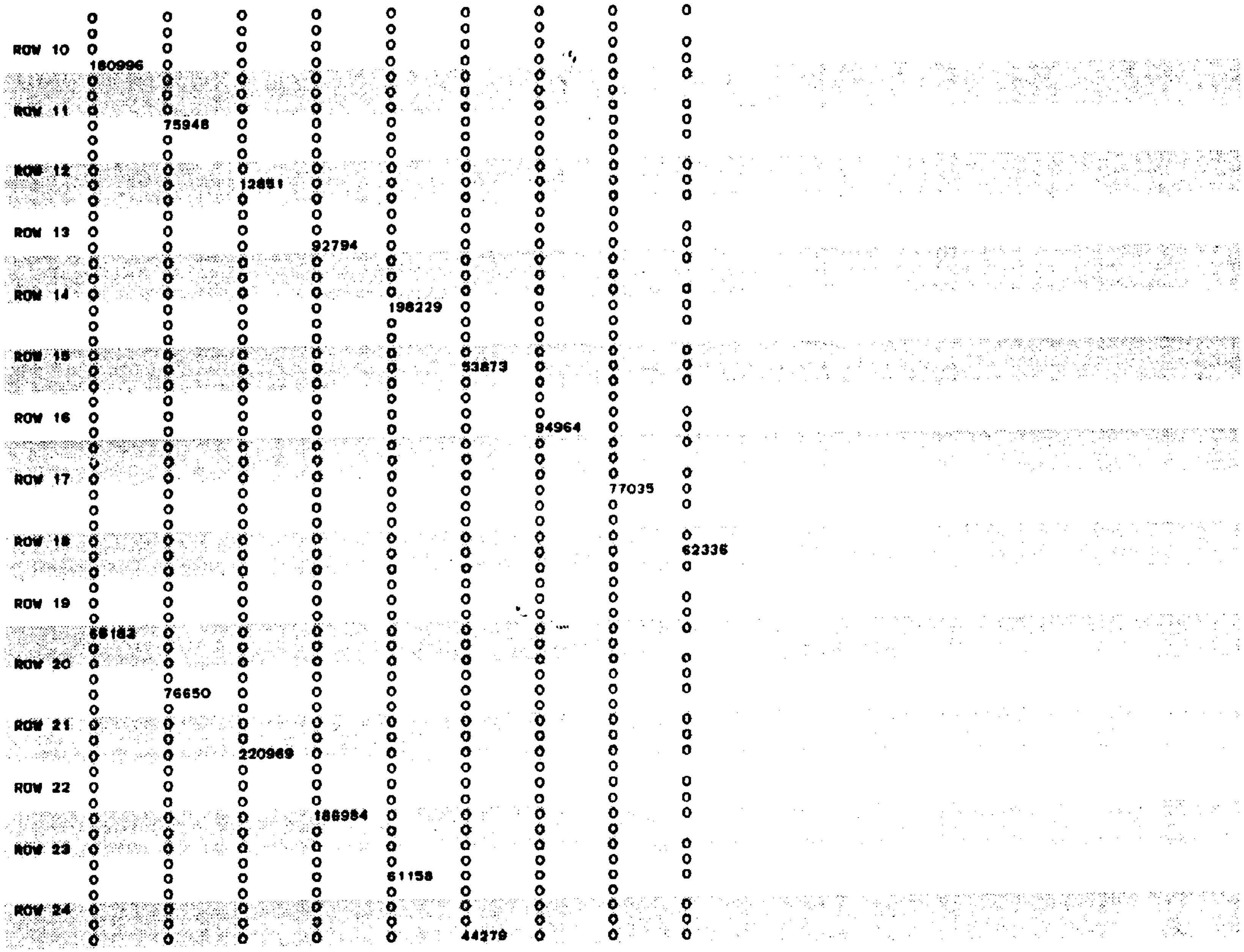
PROB (A 5 BY 35 MATRIX)

ROW 1	.4506	.4242	.4373	.4465	.4296	.4443
	.4428	.4384	.4495	.4469	.4499	.443
	.449	.4503	.4465	.4207	.4416	.3848
	.4427	.4481	.4472	.4328	.4509	.4483
	.4504	.4112	.4466	.4134	.4263	.4332

	.4145	.443	.4291	.4414	.398	
ROW 2	.2606	.19387	.21251	.2328	.2015	.22689
	.22447	.21479	.247	.2342	.2476	.22359
	.242	.2514	.2337	.18931	.22141	.15527
	.22316	.2382	.23539	.20615	.2559	.2777
	.2625	.17844	.2342	.18134	.19618	.20559
	.18223	.22384	.1999	.22005	.16604	
ROW 3	.08863	.06011	.06736	.07606	.06358	.0735
	.07321	.06854	.08257	.076076	.08251	.07208
	.0801	.08488	.07685	.05807	.07148	.04549
	.07167	.07866	.07732	.06436	.08659	.09785
	.0885	.08406	.07635	.05505	.08074	.06451
	.06534	.07219	.06216	.07052	.04942	
ROW 4	.024845	.015787	.017929	.020589	.017224	.019763
	.02043	.018528	.023208	.020912	.022961	.019279
	.022012	.023465	.021362	.014929	.019596	.011122
	.019325	.021451	.021079	.016795	.024202	.028106
	.025397	.013522	.020668	.014018	.015772	.016888
	.01415	.01936	.016242	.01884	.012028	
ROW 5	.006449	.003524	.0041319	.004901	.0040517	.0046389
	.005058	.0043873	.005949	.005039	.005795	.0044219
	.005414	.00604	.00533	.0031872	.0047545	.0020282
	.004566	.0052143	.0051178	.0036384	.00615	.007497
	.006644	.00271	.005099	.002923	.0034275	.003703
	.0028766	4.8038E-4	.0035804	.0043209	.0023194	

POP (A 35 BY 35 MATRIX)

ROW 1	69077	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 2	0	53596	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 3	0	0	20201	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 4	0	0	0	81279	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 5	0	0	0	0	134495	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 6	0	0	0	0	0	22829	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 7	0	0	0	0	0	0	67899	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 8	0	0	0	0	0	0	0	66852	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	
ROW 9	0	0	0	0	0	0	0	0	55886
	0	0	0	0	0	0	0	0	0


ROW 10
160996
ROW 11
75948
ROW 12
12851
ROW 13
92794
ROW 14
198229
ROW 15
53873
ROW 16
94964
ROW 17
77035
ROW 18
62336
ROW 19
66183
ROW 20
76650
ROW 21
220969
ROW 22
188984
ROW 23
61158
ROW 24
44279

207

	0	0	0	0	0	0	0	0	
ROW 25	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	42375	0	0
	0	0	0	0	0	0	0	0	
ROW 26	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	30238	0
	0	0	0	0	0	0	0	0	
ROW 27	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	109511
	0	0	0	0	0	0	0	0	
ROW 28	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	36553	0	0	0	0	0	0	0	
ROW 29	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	62747	0	0	0	0	0	0	
ROW 30	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	151526	0	0	0	0	0	
ROW 31	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	43743	0	0	0	0	
ROW 32	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	92414	0	0	0	
ROW 33	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	34534	0	0	
ROW 34	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	225406	0	
ROW 35	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	60438	

NBENIAV (A 4 BY 35 MATRIX)

ROW 1	1.5111	4.0416	3.8636	1.8795	1.7555	108.63	2.287	3.7874	3.0228
	2.3837	2.0223	2.7802	1.3165	1.9567	1.7344	2.724	1.4184	.67772
	1.421	1.1384	2.3196	1.5488	3.4544	4.9958	1.6878	.90267	1.2127
	1.0596	1.4095	1.4046	1.7514	2.2942	1.8859	3.5203	1.0633	
ROW 2	2.6966	7.1124	6.8939	3.5972	3.1311	101.45	4.3063	6.7539	5.4242
	3.6148	3.546	5.5224	2.3089	2.7295	3.107	4.639	2.8901	1.1861
	2.5391	1.8602	5.7122	2.7414	6.2058	9.0133	3.0347	1.6026	2.1695
	1.8278	2.4408	2.3364	3.3468	3.5371	4.1478	4.2562	1.8773	
ROW 3	3.3265	8.824	8.3942	5.4763	3.8149	122.2	5.7684	8.246	6.6351
	5.5282	4.4467	17.389	2.8918	3.4277	3.7961	6.0101	4.2798	1.4648
	3.095	2.5091	5.3564	3.6464	7.5925	11.058	3.7167	1.9425	2.6513
	2.3226	3.0859	2.1698	4.5654	5.4774	7.2876	7.0646	2.287	
ROW 4	2.6532	7.1041	6.8338	3.5616	3.1074	98.975	4.421	6.6817	5.4182
	3.9633	3.3521	5.987	2.1799	2.5755	3.0874	3.8987	3.033	1.1044

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2.5215	1.7238	3.6141	2.4477	6.1996	9.0456	3.0373	1.5765	2.1223
1.6098	2.1973	2.2139	3.4517	3.7365	4.6911	4.7002	1.8126	

YVPD1 (A 7 BY 35 MATRIX)

ROW 1	.0686	.0632	.031	.1894	.0483	.4796	.0618	.0718	.0573	.1844
	.0822	.3248	.0983	.141	.0736	.0688	.1002	.1423	.0956	.165
	.2608	.338	.1158	.0872	.089	.1112	.1103	.1286	.1002	.1852
	.0652	.2771	.1261	.1877	.1312					
ROW 2	.1714	.0745	.0369	.2685	.072	.3372	.0726	.0991	.0734	.2102
	.1193	.2984	.1817	.1819	.0945	.2309	.1416	.1819	.1148	.1962
	.2376	.2893	.1816	.1187	.094	.1377	.1853	.1667	.1451	.1919
	.0832	.287	.1098	.2058	.1477					
ROW 3	.1364	.0871	.0326	.2	.0884	.0333	.0855	.0826	.0962	.1733
	.1402	.1473	.1805	.1844	.1046	.2597	.1324	.1486	.1352	.1875
	.1717	.1675	.1572	.1222	.122	.1722	.1702	.1693	.1586	.1794
	.1089	.1851	.1168	.1756	.1677					
ROW 4	.1636	.0966	.0419	.1569	.0993	.0478	.1025	.1143	.0993	.1193
	.1365	.0789	.1453	.1461	.096	.1116	.1271	.1278	.1309	.1341
	.1231	.0887	.1707	.1068	.1274	.1128	.1455	.131	.1319	.1498
	.1182	.1143	.0993	.1256	.1266					
ROW 5	.1514	.0856	.1727	.0947	.1115	.0399	.0997	.0911	.1174	.0872
	.1282	.0507	.1356	.1172	.1028	.0862	.1401	.1117	.1144	.0998
	.0861	.0863	.1886	.1288	.1424	.1306	.1189	.0838	.1114	.1015
	.1301	.0614	.0878	.0848	.1263					
ROW 6	.164	.1416	.0841	.0755	.2121	.0262	.1884	.156	.234	.084
	.2094	.0695	.1294	.1322	.1758	.1135	.1977	.1495	.1373	.1136
	.0858	.0452	.1539	.2045	.2254	.1875	.1477	.1161	.1387	.1121
	.211	.0472	.1362	.0892	.1842					
ROW 7	.1265	.4814	.5812	.0351	.3684	.0356	.3585	.3729	.3224	.1316
	.1742	.0303	.1282	.0872	.3527	.1193	.1609	.1382	.2718	.1038
	.0446	.0238	.0813	.2206	.1998	.1477	.1551	.1947	.2141	.0801
	.2734	.0279	.3242	.1112	.1163					

POP7 (A 7 BY 7 MATRIX)

454266	0	0	0	0	0	0
0	523807	0	0	0	0	0
0	0	464184	0	0	0	0
0	0	0	367376	0	0	0
0	0	0	0	308747	0	0
0	0	0	0	0	387505	0
0	0	0	0	0	0	460965

FINIAV (A 4 BY 7 MATRIX)

4.6195	3.6174	2.2149	2.3521	2.3738	2.2258	2.423
5.7478	4.8399	3.5545	3.7076	3.7838	3.6938	4.0479
7.6077	6.4709	4.8588	4.9889	5.0309	4.8792	5.2793
5.6689	4.767	3.5018	3.666J	3.7434	3.6603	4.0313

LESSAVO (A 6 BY 5 MATRIX)

.01	.02	.04	.095	.13
.017	.043	.096	.168	.24
.01	.02	.043	.107	.17
.014	.025	.068	.12	.189
.01	.048	.072	.138	.194
.008	.02	.06	.126	.139

LESSAVA (A 6 BY 5 MATRIX)

.0061	.0143	.0354	.0669	.0949
.0121	.0858	.0278	.1308	.1816
.0082	.0148	.0368	.0834	.1338
.0102	.0182	.0478	.0782	.1209

.007	.0294	.0567	.1062	.1554
.0058	.018	.0485	.0981	.112

LESSAVB (A 6 BY 5 MATRIX)

.0058	.0135	.0327	.0717	.1005
.0122	.0368	.0796	.1498	.2161
.007	.016	.0379	.0835	.1464
.0116	.0184	.0505	.0955	.1486
.0062	.0263	.053	.1107	.1613
.006	.0165	.0443	.1005	.1157

LESSAVC (A 6 BY 5 MATRIX)

.0058	.0142	.0329	.0588	.0816
.0096	.0285	.0614	.1041	.15
.0057	.0115	.0287	.0651	.1033
.0068	.0163	.0426	.0701	.1074
.0061	.0227	.0477	.0874	.1286
.0063	.0141	.0393	.074	.0817

LESSAVD (A 6 BY 5 MATRIX)

.0072	.0169	.0385	.0698	.1001
.0111	.0316	.0687	.1144	.1627
.0058	.0127	.0324	.0716	.1149
.0117	.0185	.0499	.0788	.1173
.0056	.0247	.0609	.0875	.127
.0059	.0147	.0424	.0816	.0993

LESSCONO (A 6 BY 5 MATRIX)

.01	.02	.04	.095	.13
.017	.043	.096	.168	.24
.01	.02	.043	.107	.17
.014	.025	.066	.12	.189
.01	.048	.072	.135	.194
.008	.02	.06	.126	.139

LESSCONA (A 6 BY 5 MATRIX)

.01	.02	.04	.095	.13
.017	.043	.096	.168	.24
.01	.02	.043	.107	.17
.014	.025	.066	.12	.189
.01	.0405	.072	.135	.194
.008	.02	.06	.126	.139

LESSCONB (A 6 BY 5 MATRIX)

.01	.02	.04	.095	.13
.0163	.043	.096	.1647	.24
.01	.02	.043	.107	.17
.014	.025	.066	.12	.189
.0098	.0363	.072	.135	.194
.008	.02	.06	.126	.139

LESSCONC (A 6 BY 5 MATRIX)

.01	.02	.04	.089	.13
.0153	.0418	.0909	.1584	.2331
.0097	.0172	.0427	.0999	.1629
.014	.025	.066	.1158	.181
.0092	.0346	.0703	.1317	.193
.008	.02	.06	.1236	.139

LESSCOND (A 6 BY 5 MATRIX)

.01	.02	.04	.0873	.1221

.0164	.0409	.0673	.1483	.2153
.0097	.0165	.0409	.0927	.1526
.014	.025	.066	.1019	.1553
.0094	.0344	.067	.1164	.1715
.008	.0188	.0553	.1118	.1272

W (A 35 BY 35 MATRIX)

ROW 1	40521171	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 2	0	31439882	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 3	0	0	11850063	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 4	0	0	0	47676871	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 5	0	0	0	0	78895942	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 6	0	0	0	0	0	15038888	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 7	0	0	0	0	0	0	39826627
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 8	0	0	0	0	0	0	0
	39215967	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 9	0	0	0	0	0	0	0
	0	32783216	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 10	0	0	0	0	0	0	0
	0	0	5.0617E8	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 11	0	0	0	0	0	0	0
	0	0	0	44254936	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0

	0	0	0	0	0	0	0
ROW 12	0	0	0	0	0	0	0
	0	0	0	0	7538509	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 13	0	0	0	0	0	0	0
	0	0	0	0	0	54433771	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 14	0	0	0	0	0	0	0
	0	0	0	0	0	0	1.1628E8
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 15	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	31602372	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 16	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	55708712	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 17	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	48189404	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 18	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	36566855	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 19	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	38823525	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 20	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	44963559	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 21	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	1.2962E8
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 22	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	1.0804E8	0	0	0	0	0	0
	0	0	0	0	0	0	0
ROW 23	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	35875817	0	0	0	0	0
	0	0	0	0	0	0	0

ROW 24	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	25974461	0	0	0	0
	0	0	0	0	0	0	0
ROW 25	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	24857545	0	0	0
	0	0	0	0	0	0	0
ROW 26	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	17737875	0	0
	0	0	0	0	0	0	0
ROW 27	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	64200109	0
	0	0	0	0	0	0	0
ROW 28	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	21442309
	0	0	0	0	0	0	0
ROW 29	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	36807938	0	0	0	0	0	0
ROW 30	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	88887647	0	0	0	0	0
ROW 31	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	25657679	0	0	0	0
ROW 32	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	54210859	0	0	0
ROW 33	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	20253946	0	0
ROW 34	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	1.3223E8	0
ROW 35	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	35453425

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CITY2 (A 6 BY 35 MATRIX)

ROW 1	.96	.979	1	.459	1	.2788	.919	.9902	1	.5656
	.8319	0	.8341	.8232	1	.4211	.767	.8526	1	.5587
	.2348	.4715	1	1	1	1	.966	.5743	.672	.5349
	.8902	.0897	.4011	.2828	.9566					
ROW 2	0	0	0	0	0	.137	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	.032	0					
ROW 3	0	.011	0	.0277	0	.059	0	0	0	.1377
	0	0	0	0	0	0	0	0	0	0
	.1469	0	0	0	0	0	0	0	0	.0659
	0	.3138	.084	.1986	0					
ROW 4	0	0	0	0	0	.1159	0	0	0	0
	0	0	0	0	0	0	C	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0					
ROW 5	0	0	0	.2247	0	.4084	.081	0	0	0
	0	.914	0	0	0	0	.2044	0	0	0
	0	.064	0	0	0	0	0	0	0	0
	.1098	0	.4623	0	0					
ROW 6	.04	.01	0	.2887	0	0	0	.0098	0	.2967
	.1881	.086	.1659	.1768	0	.5788	.0285	.1474	0	.4413
	.6102	.4645	0	0	0	0	.034	.4257	.328	.3992
	0	.582	.0728	.4865	.0434					

NBEN2AV (A 4 BY 35 MATRIX)

ROW 1	2.6555	2.1069	2.2734	2.6785	2.1955	3.8906	2.5522	2.2952	2.5821
	10.714	2.4421	3.99	2.4101	2.4856	2.4721	1.6951	2.7177	1.6633
	2.3649	2.1863	2.0372	1.9711	2.6464	2.8361	2.7051	1.9619	2.435
	1.7268	1.9131	1.9409	2.1589	1.8766	2.8568	2.038	1.8193	
ROW 2	2.8858	2.2799	2.467	3.0343	2.3793	4.0629	2.7991	2.4904	2.7966
	11.324	2.679	4.7382	2.6447	2.7294	2.6783	1.9187	3.038	1.8234
	2.5657	2.4525	2.1962	2.2346	2.8682	3.0704	2.9295	2.1326	2.6467
	1.9296	2.1238	2.1187	2.3853	1.9059	3.2479	2.1057	1.9834	
ROW 3	3.0738	2.3761	2.5534	3.7725	2.4844	5.5727	3.0113	2.5923	2.9271
	14.431	2.9863	6.0534	2.9385	3.0564	2.784	2.4588	3.421	1.9602
	2.6625	3.0263	3.2027	2.7892	3.0043	3.2407	3.0771	2.1853	2.7907
	2.3227	2.4731	2.6527	2.555	3.0211	3.9946	3.0869	2.0373	
ROW 4	1.8249	1.4208	1.5015	2.9703	1.4537	4.5602	1.9383	1.5314	1.7075
	10.371	1.8929	5.5263	1.8614	1.9438	1.6353	1.8298	2.4558	1.2442
	1.5618	2.1491	2.5648	2.0892	1.7478	1.8745	1.7879	1.2949	1.6614
	1.6388	1.6822	1.9141	1.5972	2.5446	3.324	2.4436	1.2465	

FIN2AV (A 4 BY 7 MATRIX)

2.8426	2.8344	2.7803	2.7438	2.7054	2.6593	2.7288
3.0736	3.0871	3.012	2.9729	2.934	2.8869	2.9575
3.8651	3.8125	3.6839	3.5804	3.476	3.3635	3.397
2.8137	2.7422	2.6042	2.4941	2.3845	2.2721	2.2833

NBENAV (A 4 BY 35 MATRIX)

ROW 1	4.1667	6.1485	6.137	4.558	3.951	112.52	4.8193	6.0827	5.6049
	13.098	4.4644	6.7702	3.7267	4.0424	4.2066	4.4181	4.1331	2.341
	3.7859	3.3247	4.3568	3.5199	6.1004	7.8318	4.3928	2.8646	3.6477
	2.7864	3.3225	3.3455	3.9103	4.1708	4.7427	5.5563	2.5826	
ROW 2	5.5824	8.3923	9.361	6.6315	5.5105	105.52	7.1054	9.2444	8.2208
	15.159	6.225	13.261	4.9536	5.4589	5.7852	6.5576	5.9281	3.0094
	5.1047	4.4027	5.9084	4.976	9.0742	12.084	5.9643	3.7352	4.8062
	3.7572	4.5644	4.4581	5.7721	5.4429	7.3857	6.3618	3.8607	
ROW 3	6.4003	11.2	10.846	9.2487	6.2793	127.77	8.7797	10.838	9.5827
	19.959	7.433	23.443	5.8303	6.4841	6.5801	8.4689	7.7008	3.4281

	5.7575	5.5354	8.5591	6.4357	10.597	14.299	6.7938	4.1279	5.4421
	4.6451	5.559	5.8225	7.1504	8.4985	11.282	10.151	4.3443	
RCW 4	4.4781	8.5249	8.3353	6.5619	4.5611	103.54	6.3594	8.2132	7.1257
	14.335	5.245	15.513	4.0409	4.5191	4.7327	5.7285	5.4886	2.3486
	4.0832	3.8729	6.1789	4.5369	7.9474	10.82	4.8281	2.8714	3.7837
	3.2486	3.6794	4.128	5.1489	6.281	8.0151	7.1438	3.0591	

FINAV (A 4 BY 7 MATRIX)

7.4621	6.4518	4.9852	5.0959	5.0792	4.8851	5.1518
8.8215	7.907	6.5664	6.6805	6.7179	6.5807	7.0054
11.473	10.283	8.5427	8.5893	8.5068	8.2426	8.6762
8.4828	7.5081	6.106	6.1604	6.128	5.9324	6.2845

NBEN1CON (A 4 BY 35 MATRIX)

ROW 1	.46284	1.3191	1.2826	.37477	.58167	6.9748	.68474
	1.2376	.97611	.55883	.55608	.10662	.36392	.42308
	.56443	.53905	.37033	.20063	.46867	.25465	.46453
	.33756	1.1129	1.5795	.54053	.30737	.38254	.25168
	.35431	.32252	.53964	.46424	.34058	.56606	.34869
ROW 2	.10209	.30144	.30373	.042159	.13757	.96446	.16096
	.28885	.22869	.057431	.10336	0	.067916	.077542
	.13262	.027086	.06331	.039484	.11071	.028149	.0.:092
	.035801	.28087	.36713	.12625	.073498	.086204	.031458
	.052393	.033797	.12877	.0068562	.050468	.088733	.079321
ROW 3	.86323	1.8052	1.6705	1.6227	.75666	14.568	1.2698
	1.6467	1.2578	1.7472	1.0113	5.6152	.66065	.78162
	.72939	1.7547	1.0812	.35357	.60892	.67138	1.7732
	1.0136	1.4331	2.0192	.69439	.40424	.53746	.62473
	.79497	.84051	1.0606	2.0288	2.2838	2.1882	.50469
ROW 4	.47819	1.407	1.3668	.72794	.61908	18.059	.87573
	1.3102	1.0291	.94572	.54614	3.4693	.35792	.41421
	.59677	.40284	.75119	.2009	.4982	.22058	.40823
	.35816	1.1726	1.6521	.56813	.33074	.39938	.22013
	.32491	.29422	.82077	.42075	1.25::	.53044	.36867

FINICON (A 4 BY 7 MATRIX)

.62633	.57383	.50158	.53078	.55612	.56605	.64423
.088091	.083366	.078441	.08936	.10042	.10801	.13143
1.6765	1.5199	1.2884	1.2558	1.2238	1.1712	1.2183
.94608	.78242	.55677	.60621	.63714	.64152	.73682

NBEN2CON (A 4 BY 35 MATRIX)

ROW 1	0	0	0	.23014	0	.45894
	.079986	0	0	0	0	.8991
	0	0	0	0	.19911	0
	0	0	0	.056897	0	0
	0	0	0	0	0	0
	.068022	0	.4065	0	0	
ROW 2	0	0	0	.38256	0	.79783
	.13319	0	0	0	0	1.4976
	0	0	0	0	.33179	0
	0	0	0	.095161	0	0
	0	0	0	0	0	0
	.14798	0	.68068	.0069871	0	
ROW 3	.0013991	.0055472	0	.50936	0	1.1616
	.1691	2.5563E-4	0	.42554	.0053978	1.9009
	.0051412	.0058407	0	.012167	.42178	.002308
	0	.013:27	.10585	.13151	0	0
	0	0	9.9827E-4	.0084014	.0072832	.043168
	.18787	.18562	.89699	.18148	7.3474E-4	
ROW 4	.15932	.08745	.10013	.78463	.096575	1.4308

215

.30485	.10728	.1324	1.585	.19664	2.2509
.18891	.20665	.12119	.2442	.59005	.09177
.10845	.28895	.46387	.36656	.13782	.16169
.14551	.073636	.1304	.18972	.18322	.26135
.28333	.50779	1.1063	.4433	.075311	

FIN2CON (A 4 BY 7 MATRIX)

.043874	.036918	.026245	.025526	.025244	.025163	.025295
.074607	.062646	.044411	.043207	.042687	.042443	.042695
.17294	.15188	.1197	.11075	.10166	.093165	.091538
.47429	.44426	.39553	.36791	.34029	.3129	.30046

NBENCON (A 4 BY 35 MATRIX)

ROW 1	.46284	1.3191	1.2826	.60491	.58167	7.4338	.76472
	1.2376	.97611	.55883	.55608	1.0057	.36392	.42308
	.56443	.53905	.56944	.20083	.46867	.25465	.46453
	.39448	1.1129	1.5786	.54093	.30737	.38254	.25168
	.36431	.32252	.62766	.46424	.74708	.56605	.34869
ROW 2	.10209	.30144	.30373	.42472	.13757	1.7623	.29415
	.28885	.22869	.057431	.10336	1.4576	.067916	.077542
	.13262	.027086	.4151	.039484	.11071	.028149	.018092
	.13106	.26057	.35713	.12625	.073498	.086204	.031456
	.052393	.033797	.27876	.0088562	.73114	.0957	.078321
ROW 3	.66453	1.9109	1.8709	2.132	.75666	15.726	1.4388
	1.647	1.2578	2.1727	1.0167	7.5161	.66579	.78746
	.72939	1.7669	1.503	.35588	.60892	.6847	1.879
	1.1451	1.4331	2.0192	.69439	.40424	.53846	.63313
	.80225	.98368	1.2684	2.2144	3.1807	2.3397	.50542
ROW 4	.83751	1.5044	1.4669	1.5126	.71566	18.49	1.2808
	1.4175	1.1615	2.1307	.74279	5.7202	.54683	.62086
	.71798	.64705	1.3412	.29267	.60665	.50953	.8721
	.72472	1.3104	1.8138	.71364	.40438	.52978	.40985
	.50813	.55557	1.1041	.92855	2.3595	.97374	.44398

FINCON (A 4 BY 7 MATRIX)

.67021	.61075	.52783	.55631	.58136	.59121	.66853
.1627	.14601	.12285	.13317	.14311	.15045	.17412
1.8494	1.6718	1.4081	1.3665	1.3255	1.2643	1.3099
1.4204	1.2267	.9523	.97412	.97743	.95442	1.0373

TAX (A 4 BY 7 MATRIX)

0	.001	.051	.1572	.221	.3481	.2237
.0736	.1424	.1685	.1698	.137	.1787	.132
.1245	.1715	.163	.1439	.1072	.1372	.1527
.0735	.1425	.1674	.1703	.1373	.1765	.1325

COST (A 4 BY 4 MATRIX)

1667247	1667247	1667247	1667247
774.46	774.46	774.46	774.46
2371374	2371374	2371374	2371374
3899420	3899420	3899420	3899420

TP (A 4 BY 4 MATRIX)

.1727	0	0	0
0	.28739	0	0
0	0	.51356	0
0	0	0	.056356

COSTPHI (A 4 BY 7 MATRIX)

.3184	.42311	.52197	.70049	.7356	.7988	.57326
1.4836E-4	1.9854E-4	2.4246E-4	3.2539E-4	3.417E-4	3.7106E-4	2.6629E-4

.45429	.60181	.74241	.99633	1.0463	1.1362	.61536
.74702	.98959	1.2206	1.6383	1.7204	1.8683	1.3408

YVPD2 (A 35 BY 7 MATRIX)

.0067	.0146	.0132	.0206	.0229	.0228	.013
.0062	.0062	.0106	.0154	.0165	.022	.0563
.0016	.0016	.0016	.0026	.0131	.0066	.0299
.0234	.0284	.0237	.0209	.0175	.0113	.0043
.0075	.0094	.0131	.019	.0258	.0395	.057
.0215	.013	.0014	.0027	.0027	.0014	.0016
.0111	.0085	.0125	.0173	.0203	.031	.0489
.0104	.0123	.0129	.0204	.0198	.0276	.0541
.006	.0066	.0087	.0129	.0183	.0295	.034
.0694	.0871	.0807	.0716	.0632	.055	.0638
.0135	.015	.0197	.0248	.0281	.0371	.0256
.0033	.0026	.0014	.001	8E-4	9E-4	3E-4
.0219	.0343	.0382	.0397	.0447	.0344	.0283
.0501	.0553	.0629	.0644	.0622	.0567	.0346
.0078	.0083	.0103	.0122	.0158	.0218	.0363
.0215	.0617	.0779	.0432	.0449	.0427	.0372
.017	.0218	.022	.0271	.036	.041	.0265
.0194	.0212	.0194	.0216	.0227	.0244	.0188
.0186	.0181	.0292	.0315	.0332	.0321	.0528
.0244	.0246	.0266	.0246	.022	.0203	.0154
.1776	.1439	.1167	.108	.081	.0732	.0316
.0853	.058	.0404	.0308	.0212	.0137	.006
.0065	.0096	.0111	.0156	.0187	.0199	.0137
.0076	.0079	.0091	.0103	.0151	.0192	.0172
.0084	.0087	.0084	.0113	.0152	.0194	.0143
.0058	.0061	.0066	.0072	.0101	.0117	.0077
.0302	.0363	.0447	.0493	.0474	.0468	.0425
.0146	.0161	.0184	.0184	.0159	.0159	.0221
.0174	.0215	.0264	.0284	.0289	.0291	.0372
.0647	.0573	.0602	.0649	.053	.0473	.0282
.0067	.0082	.0107	.015	.02	.0261	.0281
.0676	.061	.0369	.0284	.0181	.0118	.0058
.0107	.006	.0096	.0104	.0112	.0139	.0275
.1104	.1035	.0891	.0915	.0834	.0703	.0654
.0134	.0129	.0165	.0151	.0193	.0227	.012

COSIPH2 (A 4 BY 35 MATRIX)

ROW 1	.41008	.6633	.70864	.36195	.33	.37251
	.56117	.59754	.54174	.65466	.54075	.1705
	.63075	.46491	.52914	.84274	.61624	.56867
	.79435	.48482	.74854	.28658	.39393	.48842
	.48073	.46565	.66702	.80028	.73941	.57748
	.66957	.4944	.64983	.64106	.45543	
ROW 2	1.9049E-4	3.0811E-4	3.2917E-4	1.6813E-4	1.5329E-4	1.7304E-4
	2.6067E-4	2.7756E-4	2.5164E-4	3.041E-4	2.5119E-4	7.9201E-5
	2.9299E-4	2.1596E-4	2.4579E-4	3.9147E-4	2.8625E-4	2.6415E-4
	3.6899E-4	2.2521E-4	3.4771E-4	1.3312E-4	1.8299E-4	2.2688E-4
	2.2331E-4	2.163E-4	3.0984E-4	3.7174E-4	3.4347E-4	2.6825E-4
	3.1102E-4	2.2966E-4	3.0185E-4	2.9776E-4	2.1155E-4	
ROW 3	.58326	.94342	1.0079	.51481	.46937	.52983
	.79817	.84989	.77053	.93114	.76913	.24251
	.89713	.66125	.7526	1.1987	.8765	.80883
	1.1298	.68958	1.0647	.40761	.5603	.69469
	.68376	.6623	.94872	1.1383	1.0517	.82136
	.95234	.7032	.92427	.9118	.64777	
ROW 4	.9591	1.5513	1.6574	.84653	.77182	.87124
	1.3126	1.3975	1.267	1.5311	1.2647	.39878

..4752	1.0873	1.2376	1.971	1.4413	1.33
1.8579	1.1339	1.7507	.67027	.92134	1.1423
1.1244	1.0891	1.56	1.8717	1.7294	1.3506
1.566	1.1563	1.5198	1.4993	1.0652	

LASTAV1 (A 4 BY 7 MATRIX)

7.1427	8.0286	4.4732	4.3854	4.3436	4.0883	4.5785
8.8213	7.9068	6.5662	6.6802	6.7175	6.5803	7.0051
11.019	9.6816	7.8003	7.573	7.4607	7.1065	7.8609
7.7356	6.5195	4.8852	4.5221	4.4075	4.0642	4.9538

LASTAV2 (A 4 BY 35 MATRIX)

ROW 1	3.7566	5.4852	9.4284	4.1861	3.521	112.15	4.2861	5.4851	8.0832
	12.443	3.9237	6.5997	3.0959	3.5775	3.6775	3.5764	3.5169	1.7724
	2.9916	2.8399	3.6083	3.2333	5.7069	7.3435	3.9121	2.399	2.9807
	1.9861	2.5831	2.768	3.2407	3.8764	4.0929	4.9152	2.4272	
ROW 2	5.5822	9.392	9.3607	6.6313	5.5103	105.52	7.1061	9.2441	8.2205
	15.158	6.2248	13.261	4.9533	5.4587	5.785	6.5574	5.9278	3.0092
	5.1044	4.4025	5.8081	4.9759	9.074	12.084	5.964	3.735	4.8059
	3.7568	4.564	4.4549	5.7717	5.4427	7.3954	6.3616	3.8605	
ROW 3	5.817	10.257	9.9397	8.7339	5.8099	127.24	7.9815	9.9883	8.7917
	19.028	6.6639	23.2	4.9331	5.8228	5.8375	7.2702	6.8243	2.6163
	4.6277	4.8458	7.4944	8.028	10.037	13.604	8.11	3.4656	4.4933
	3.8068	4.5073	5.0011	6.1981	7.7953	10.358	9.2397	3.6966	
ROW 4	3.819	6.9736	6.6779	5.7154	3.7893	102.66	5.0469	6.8156	5.8587
	12.804	3.9803	15.115	2.5657	3.4317	3.4951	3.7575	4.0473	1.0186
	2.2253	2.739	4.4282	3.8666	7.026	9.7777	3.7007	1.7823	2.2236
	1.3769	2.1501	2.7774	3.5829	5.1247	6.4952	5.6445	1.9939	

LASTCON1 (A 4 BY 7 MATRIX)

.35081	.18764	.0058636	-.14418	-.15424	-.20759	.088267
.16255	.14582	.12261	.13284	.14277	.15008	.17385
1.3951	1.07	.66568	.37021	.2792	.12818	.4945
.67335	.2371	-.26849	-.66422	-.74301	-.91386	-.30348

LASTCON2 (A 4 BY 35 MATRIX)

ROW 1	.052764	.65578	.57394	.24296	.25167	-.0612	.20385
	.64004	.43438	-.095835	.015327	.83522	-.26683	-.041833
	.03529	-.30369	-.046808	-.36784	-.32568	-.23018	-.28401
	.10787	.71895	1.0911	.059798	-.15828	-.28448	-.5486
	-.38511	-.25496	-.041808	-.030167	.097255	-.075006	-.10674
ROW 2	.1019	.30113	.3034	.42455	.13742	1.7621	.28389
	.28857	.22844	.057127	.10311	1.4875	.067623	.077326
	.13237	.026694	.41481	.03922	.11034	.027924	.017745
	.13093	.26039	.3669	.12603	.073282	.085894	.031084
	.052049	.033529	.27645	.0066266	.73084	.095402	.07911
ROW 3	.081363	.96736	.66262	1.6172	.28728	15.196	.64067
	.79707	.4873	1.2416	.2476	7.2736	-.23134	.12621
	-.023214	.56822	.62646	-.45296	-.52092	-.0048758	.81436
	.73746	.87284	1.3245	.010625	-.25806	-.41026	-.50513
	-.24944	.16231	.3161	1.5112	2.2565	1.4279	-.14234
ROW 4	-.32159	-.046928	-.19045	.66604	-.056165	18.618	-.031908
	.019946	-.10851	.89958	-.52194	6.3214	-.82839	-.46648
	-.5196	-1.324	-.10006	-1.0374	-1.2512	-.62439	-.87862
	.064449	.38905	.67143	-.41072	-.68469	-1.0303	-1.4619
	-1.2212	-.79506	-.46191	-.22778	.83967	-.52559	-.62119

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APPENDIX F

Workshop of January 24, 1986, Participants and Panelists

A number of the panelists met as an Advisory Committee at USC in order to help us evaluate an early draft of this report. Attending were:

Allen Asakura
Chief, Earthquake Safety Division
Department of Building and Safety
City of Los Angeles

Henry Bachrach
Risk Manager, Chief Administrators' Office
County of Los Angeles

Lou Blanck
Engineering Geologist, Building and Safety Department
County of Riverside

David Brauns
Senior Civil Engineer, Bureau of Engineering
City of Los Angeles

Paul Flores
Director, Governor's Office of Emergency Services
Southern California Earthquake Preparedness Project

Lawrence Gallagher
Risk Manager, Metropolitan Water District of Southern California

Jeri Hartman
Disaster Preparedness Operations Officer, Department of Disaster Preparedness
County of Riverside

Marvin Hopewell
Senior Civil Engineer, Department of Planning and Building
City of Long Beach

Glenn Johnson
Principal City Planner, City Planning Department
City of Los Angeles

Margarita McCoy
Professor, Department Urban and Regional Planning
School of Environmental Design
California State Polytechnic University

Kathleen Tierney
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The following panelists did not attend the workshop yet participated in various cycles of the Delphi surveys:

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