Chapter 3. Recommendations Summary

CHAPTER 3. RECOMMENDATIONS SUMMARY

3.1 Overall Master Plan

3.1.1 Assumption

Based on the damage estimation by MMEIRS Study of the potential rupture of West Valley Fault, approximately 40% of the total number of residential buildings within Metropolitan Manila will collapse or be affected. This building collapse directly affects large number of people, since it is estimated to cause 34,000 deaths and 114,000 injuries. Moreover, additional 18,000 deaths are anticipated by the fire spreading after the earthquake event. This human loss, together with properties and economy losses of Metropolitan Manila will be a national crisis.

3.1.2 Vision

Such assumed circumstances must be avoided. "The earthquake impact reduction plan for Metropolitan Manila" prepared by the Metropolitan Manila Earthquake Impact Reduction Study anticipates the mitigation and reduction of the expected impact. The vision of this plan is to ultimately achieve "***A Safer Metropolitan Manila from Earthquake Impact***".

3.1.3 Goals, Objectives and Frameworks

To attain this *vision*, six goals have been addressed as follows:

1) To develop a national system resistant to earthquake impact
2) To improve Metropolitan Manila's urban structure resistant to earthquake
3) To enhance effective risk management system
4) To increase community resilience
5) To formulate reconstruction systems
6) To promote research and technology development for earthquake impact reduction measures.

These goals have ten objectives, and the objectives are broken down into thirty-four (34) frameworks. The frameworks represent main policies and strategies to achieve goals and objectives. This organization of the vision, goals, objectives, and frameworks is shown in Figure 3.1.1.

3.1.4 Frameworks and Action Plans

The frameworks contain 105 action plans. The action plans are prepared to put in practice the policies and strategies represented in the frameworks. The action plans by the framework are enumerated in Table 3.1.1.

For the detailed description, the *Frameworks* are described in Chapter 5, and the *Action Plans* in Chapter 6.

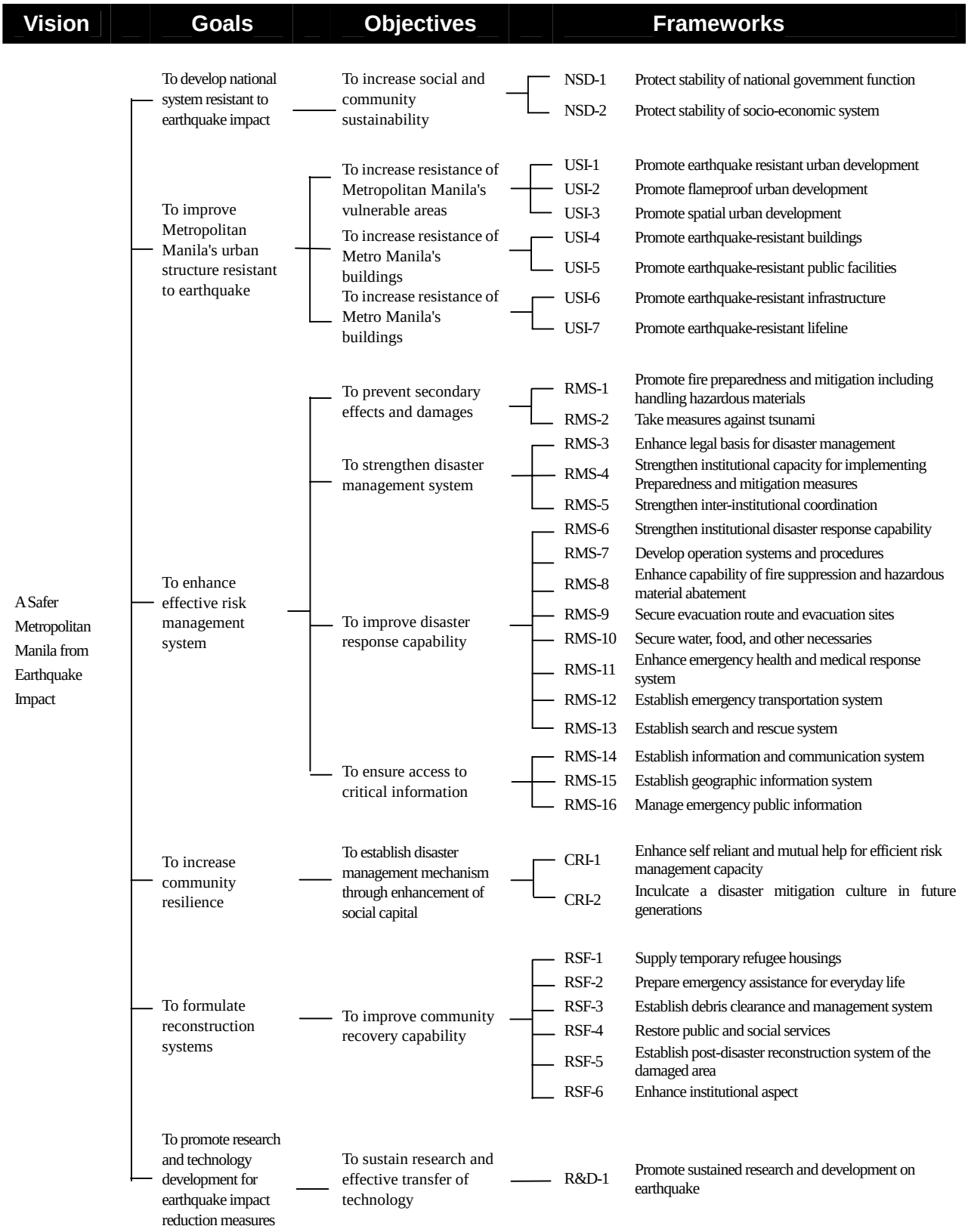

Figure 3.1.1 Structure of the Disaster Management Plan for Metropolitan Manila

Table 3.1.1. Frameworks and List of Action Plans (1)

Frameworks	Action Plans
NSD-1: Protect stability of national government function	1) Enhance security capability of national government function with the office of the President 2) Promote urban reform around the nationally important facilities
NSD-2: Protect stability of socio-economic system	1) Enhancing Emergency Measures of businesses 2) Enhance safety of on-line financial services 3) Create a safer business environment 4) Enhance emergency finance system
USI-1: Promote earthquake resistant urban development	1) Improve resistance of residential buildings 2) Promote subdivision development procedures 3) Enhance social housing policy for Illegal Settlement and Poverty Areas 4) Revise comprehensive land use plan
USI-2: Promote flameproof urban development	1) Tie down and stabilize propane cylinders against earthquake shaking 2) Enforce disaster mitigation measures for possible fire breakout facilities 3) Promote replacement to unbreakable (plastic-bottled) gasoline vending 4) Promote vulnerability reduction measures for urban industrial zones 5) Introduce urban fire proof development method
USI-3: Promote spatial urban development	1) Enforce further development of existing open spaces and parks 2) Promote disaster resistant urban development
USI-4: Promote earthquake-resistant buildings	1) Research and develop on strengthening buildings 2) Promote construction and improvement for earthquake resistant building 3) Develop building engineering related human resources/ Improve building construction permission system
USI-5: Promote earthquake-resistant public facilities	1) Strengthen public facilities 2) Research and develop for strengthening public buildings 3) Develop building engineering related human resources
USI-6: Promote earthquake-resistant infrastructure	1) Retrofit bridge structure 2) Secure safety of airport facility 3) Secure safety of harbor facility
USI-7: Promote earthquake-resistant lifeline	1) Prepare organizational system among lifeline companies 2) Assess Detail Risk of Each Lifeline 3) Strengthen emergency operation ability 4) Strengthen water distribution function 5) Strengthen electricity supply function 6) Strengthen telecommunications function
RMS-1: Promote fire preparedness and mitigation including handling hazardous materials	1) Revise the emergency plan and manuals of the relevant organizations 2) Enhance information and communication system 3) Enhance the emergency response operations of the public organization, LGUs, and the establishments of hazardous materials 4) Establish the support request system and conclude mutual aid agreements
RMS-2: Take measures against tsunami	1) Promote Research and development for Tsunami mechanism and damages 2) Promote tsunami damages preventive measures
RMS-3: Enhance legal basis for disaster management	1) Strengthen legal basis for disaster management at the national level by updating/replacing PD1566 2) Strengthen legal basis at the local level by adopting model city/municipal ordinance 3) Institutionalize local government framework and financing for disaster management 4) Promote policies that encourage implementation of disaster risk reduction measures

Table 3.1.1. Frameworks and List of Action Plans (2)

Frameworks	Action Plans
RMS-4: Strengthen institutional capacity for implementing preparedness and mitigation measures	1) Promote the reorganization and revitalization of city/municipal and barangay Disaster Coordinating Councils 2) Promote local government mitigation planning through implementation of the Earthquake Mitigation Handbook and the Earthquake Mitigation and Response Checklists -- Local Planning Guide 3) Conduct training needs assessment and develop capacity building programs for local and barangay Disaster Coordinating Council members and institutions 4) Strengthen barangay level preparedness for disaster response and relief
RMS-5: Strengthen inter-institutional coordination	1) Strengthen the MMDCC by updating its structure and organizing and implementing a MMDCC Work Plan 2) Strengthen and update national and Metropolitan Manila level disaster preparedness plans 3) Strengthen Incident Command System (ICS) and response decision-making systems 4) Encourage inter-local cooperation through zonation of LGUs and Master Mutual Aid Agreement
RMS-6: Strengthening of institutional disaster response capability	1) Encourage local emergency response planning through use of the Earthquake Mitigation and Response Checklists -- Local Planning Guide 2) Encourage adoption and utilization of emergency response pocket guide by agencies and LGUs 3) Encourage agencies and local governments to inventory response and relief resources and sources and identify needed disaster management tools and equipment 4) Enhance capacity for training emergency response personnel in response and relief functions
RMS-7: Develop operation systems and procedures	1) Develop and institutionalize Standard Operating Procedures (SOPs) for key response functions. 2) Develop MMDA Metro Base capabilities for Disaster Operations Center (DOC) operations 3) Establish functional Disaster Operations Centers (DOCs) at city/municipal and barangay levels.
RMS-8: Enhance capability of fire suppression and hazardous material abatement	1) Revise the emergency plan and manuals of the relevant organizations 2) Enhance information and communication system 3) Enhance the emergency response operations of the public organizations, LGUs, and the establishments of hazardous materials 4) Establish the support request system and conclude mutual aid agreements
RMS-9: Secure evacuation route and evacuation sites	1) Formulate evacuation site and plan for the LGUs 2) Enhance resources for evacuation
RMS-10: Secure Water, Food, and Other Necessaries	1) Secure the large scaled water source 2) Formulate emergency supply system of water, food, and other necessities 3) Formulate emergency aid agreement
RMS-11: Enhance emergency health and medical response system	1) Enhance organizational response capacities 2) Improve government hospital capacities 3) Enforce logistics 4) Expand training programs
RMS-12: Establish emergency transportation system	1) Establish emergency road network 2) Arrange machineries to DPWH for emergency road response 3) Secure road between Bagangas Port to Metropolitan Manila south region 4) Convert one portion of Manila port to earthquake resistant construction 5) Construct Laguna de bay northern shore unloading facility 6) Secure road between Subic port/ Clark field to Metropolitan Manila North region 7) Secure Ninoy Aquino airport functions
RMS-13: Establish search and rescue system	1) Develop capacity on search and rescue for refugees 2) Enhance community search and rescue system 3) Establish the system to accept international emergency aid

Table 3.1.1. Frameworks and List of Action Plans (3)

Frameworks	Action Plans
RMS-14: Establish information and communication system	1) Develop disaster information collection and dissemination system in MMDA, LGUs and Barangays 2) Establish a disaster management center
RMS-15: Establish geographic information system	1) Develop geographic database development for disaster management 2) Train LGU staffs on GIS database and information/ communication system
RMS-16: Manage emergency public information	1) Promote adoption and implementation by local governments and agencies of the Guide for Managing Information concerning disasters 2) Establish partnerships with the media for awareness raising and emergency public information
CRI-1: Enhance self-reliant and mutual help for effective risk management capacity	1) Knowledge development about earthquake hazards and vulnerabilities 2) Increase community resistance to earthquake 3) Enhance the community governance and linkage with LGUs 4) Enhance potential emergency management capacities (Fire/search & rescue, and information management) 5) Enhance the administrative system supporting community activities
CRI-2: Inculcate a disaster mitigation culture in future generations	1) Enhance school risk management capacity 2) Inculcate a disaster mitigation culture in future generations
RSF-1: Supply temporary refugee housings	1) Formulate temporary refugee housing plan
RSF-2: Prepare emergency assistance for everyday life	1) Formulate basic policy for emergency assistance for everyday life.
RSF-3: Establish debris clearance and management system	1) Formulate debris clearance plan for the LGUs
RSF-4: Restore public and social services	1) Formulation of basic policy for post-disaster peace and order keeping activities
RSF-5: Establish post-disaster reconstruction system	1) Formulate basic reconstruction policies for living, housing, employment and economic activities. 2) Formulate guidelines to urban reconstruction and make a scheme of finances and credits.
RSF-6: Enhance institutional aspect of recovery planning	1) Establish pre-disaster policies and institutional arrangements for post-disaster reconstruction and mitigation 2) Prepare pre-disaster recovery plans and procedures to ease post-disaster human and physical recovery and rehabilitation
R&D-1: Promote sustained research and development on earthquake	1) Evaluation activity of the Valley Fault System 2) Expansion of basic inventory on buildings and population for detail damage estimation purpose 3) Promotion detail study on comprehensive earthquake disaster estimation

3.2 High Priority Action Plans

3.2.1 Prioritization Needs and Process

Among the 105 identified priority action plans in the master plan, 40 of them are selected as high priority action plans. These selected high priority action plans are essential plans to be initiated as initial steps within 3-6 years, in accordance with the overall basic strategies to improve the existing situation.

For selecting the high priority action plans, five areas were focused to prioritize the action plans. The areas of focus are identified as in the following table together with the aim and reason

Table 3.2.1 Areas of Focus for Prioritization

Area	Aim/Reason
Area 1: Enhance legal framework and institutional capacity for disaster management	By consolidating the legal background for disaster management from national to barangay level, the disaster management system of Metropolitan Manila will be strengthened
Area 2: Build Basic Capacity for Relief and Recovery	Prepare for responding to the survival needs of the people
Area 3: Strengthen Community Preparedness for the Earthquake	To survive by the community's own capacity without relying on governmental institutions
Area 4: Reduce dangers of residential buildings	Reducing the amount of damages to residential buildings will minimize the estimated losses
Area 5: Enhance National System Resistant to Earthquake	Enhancing national systems resistant to earthquake damage and disruption

3.2.2 Selected High Priority Action Plans

The following table gives the brief description of selected 40 high priority action plans, including framework number, outline, and implementation agencies.

Table 3.2.2 Description of High Priority Action Plans

Area 1： Enhance legal framework and institutional capacity for disaster management			
Strategy 1: Enhance legal basis for disaster management			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-3:	Strengthen legal basis for disaster management at the national level by updating/replacing PD1566	Request the President to certify that the bill "An Act Strengthening the Philippine Disaster Management Capability, appropriating funds therefore and other purposes" is urgent.	The President, acting on the request of stakeholders such as the NDCC and MMDCC
RMS-3:	Strengthen legal basis at the local level by adopting model city/municipal ordinance	The Metropolitan Manila Council, chaired by MMDA and comprised of the mayors of the cities and municipalities, is requested to endorse the model ordinance to each LGU for enactment.	MMDA, Metropolitan Manila Council, Mayors and Local Legislative Councils
Strategy 2: Strengthen institutional capacity for mitigation, preparedness and response			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-4:	Promote the reorganization and revitalization of city/municipal and barangay Disaster Coordinating Councils	MMDCC should (1) urge each city/municipal DCC to reorganize its membership and structure and launch a proactive program of disaster preparedness and mitigation, (2) request regular progress reports, (3) periodically consult with CDCCs/MDCCs together with their component BDCCs to create and sustain a proactive preparedness and mitigation strategy.	MMDCC, Mayors, City and Municipal DCCs
RMS-4:	Promote local government mitigation planning through implementation of the Earthquake Mitigation Handbook and the Earthquake Mitigation and Response Checklists -- Local Planning Guide	Print and distribute widely the Earthquake Mitigation Handbook and the Earthquake Mitigation and Response Checklists -- Local Planning Guide to local governments, agencies, schools, and others including NGOs as appropriate. Make guides available on the internet.	MMDCC to distribute the guides with endorsement and instructions; appropriate agencies to place guides on their websites.
RMS-4:	Conduct training needs assessment and develop capacity building programs for local and barangay DCCs	(1) Conduct training needs assessment of DCCs, (2) Develop a Metro Manila wide disaster management training and exercising plan, (3) Design specific training courses, exercises, and an implementation strategy including identifying resources, trainers, and specific audiences. Create a training cadre.	MMDCC, with assistance of DILG and OCD
RMS-6:	Encourage local emergency response planning through use of the Earthquake Mitigation and Response Checklists---Local Planning Guide	Print and distribute widely the Earthquake Mitigation and Response Checklists -- Local Planning Guide to local governments; MMDCC to endorse implementation of response planning by LGUs and others as appropriate. Make the guide available on the internet.	MMDCC to distribute the guide with endorsement and instructions; appropriate agencies to place on websites.
RMS-6 /RMS-16:	Encourage adoption and utilization of Emergency Response Pocket Guide and Guide for Managing Information by agencies and LGUs	Print and distribute widely the two draft guides to local governments; MMDCC to encourage LGUs to adapt the drafts to local needs and print them as city/municipal publications. MMDCC to recommend to cities, municipalities, and institutions that they adopt appropriate policies regarding release of information to the public regarding disaster risk and risk reduction measures they can take.	MMDCC, C/MDCCs MMDCC, MMDA, and LGUs

Strategy 3: Strengthen inter-institutional coordination			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-5:	Strengthen MMDCC by updating its structure and organizing and implementing a MMDCC Work Plan	MMDCC to form task group to recommend reorganization and develop an action agenda or work plan to implement MMDCC and LGU-related actions proposed in this study. Activate a core group to oversee progress.	MMDCC, MMDA
RMS-5:	Encourage inter-local cooperation through zonation of LGUs and Mutual Aid Agreements	Request MMDCC and Metropolitan Manila Council to endorse a zonation plan and encourage cities and municipalities to sign MoUs and Mutual Aid Agreements.	MMDCC, MMC, LGUs
Concept 2： Build Basic Capacity for Relief and Recovery			
Strategy 1: Enhance emergency health and medical response system			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-11:	Enhance organizational response capacities	1. Conclude an agreement among LGUs and/or Provincial Governments: available human and physical resources, procedures to request, financial compensation, etc. 2. Incident Command System, Communication Network among health facilities and personnel, SOP for emergency response. 3. Select and appoint core disaster hospitals in the zone, Structural reinforcement of hospitals, Expansion of temporarily receiving capacity and Strengthening ICU and ER.	1. Prime: LGU, Coordinator: MMDA and DOH 2. Prime: LGU, Coordinator: MMDA and DOH 3. Prime: DOH, some of LGUs and other governments' hospitals
RMS-11:	Improve government hospital capacities	Physical expansion and functional upgrading of existing provincial hospitals, Relocation/transfer of parts of major government hospitals in central MM areas.	Prime: DOH and Provincial Governments
RMS-11:	Enhance logistics and medical supplies	Make a list of essential medical supplies and consumables for disaster, Purchase and distribute them to medical institutions. Expansion of space to stock them in the institutions based on so-called "running-stock system".	Prime: LGU, DOH and other government's agency with hospitals
Strategy 2: Establish emergency transportation system			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-12:	Establish emergency road network	Emergency road network within the Metropolitan Manila will be established, to respond to the rescue, medical and fire fighting activities. Proposed network is based on the existing hierarchy road network proposed by MMDA, for environmental management purposes. Established emergency road network will be publicized for MMDCC members. At the same time, emergency road network operation will need to be arranged, for efficient response.	MMDA
RMS-12:	Secure road between Batangas Port to Metropolitan Manila south region	Since Metropolitan Manila has possibility to be separated into 4 zones, MM south region will need any access from the southern cities, such as Batangas. One road security from Batangas to MM south region is necessary.	DPWH

No.	Action Plan	Outline	Implementing Agency
RMS-12:	Convert one portion of Manila port to earthquake resistant construction	Manila port is vulnerable that the facility will be damaged and will be useless for landing goods in case of earthquake. Converting one portion of the port to earthquake resistant is important for making use in such condition, and will serve as the main transportation facility for MM west region.	PPA
RMS-12:	Secure road between Subic port/ Clark field to Metropolitan Manila North region	MM north region will be assisted from Subic port/ Clark field, in case of separation occurs. Road between those two areas needs to be secured.	DPWH
RMS-12:	Construct Laguna de bay northern shore unloading facility	MM east region will be separated from all other part of Metropolitan Manila by building collapses. Since this region does not have any transportation hub, it is important to construct new transportation which could act as the emergency transportation hub as well.	MMDA/PPA
RMS-12:	Secure Ninoy Aquino airport function	Transportation route from air is essential to be protected, together with sea transportation. This function is rather easy to preserve than other functions, if prepared properly.	DOTC
Strategy 3: Secure water			
No.	**Action Plan**	**Outline**	**Implementing Agency**
RMS-10:	Secure the large scaled water source for drinking	To secure the major water source which is very important to support and secure citizen's life in emergency situation. Alternate water source beside la mesa dam is needed.	MMDA, DSWD
RMS-10:	Formulate emergency supply system of water, (food, and other necessities)	According to the damage analysis by the JICA study, it is estimated that there will be more than 3 million refugees. In order to support such refugees' daily life, supply of water, food and other necessities is indispensable. Based on the damage analysis, basic strategy and methodology should be developed to cope with emergency supply for the refugees.	LGUs, MMDA, DSWD
Concept 3： Strengthen community preparedness for the earthquake			
Strategy 1: Enhance self reliant and mutual help for efficient risk management capacity			
No.	**Action Plan**	**Outline**	**Implementing Agency**
CRI-1:	Knowledge development about earthquake hazards and vulnerabilities	Enhancement of community's perception of their vulnerabilities with the help of experts such as earth scientists, structural engineers and urban planners. Participatory analysis of local capacities and vulnerabilities utilizing participatory tools.	PHIVOLCS, MMDA, LGUs
CRI-1:	Enhance the community governance and linkage with LGUs	Upgrading safer physical urban structure through participatory planning. Community governance system will be activated.	LGU, barangay (pilot)
CRI-1:	Enhance potential emergency management capacities	Legitimating local community unit and strengthening social cohesion, Familiarization of emergency tasks and capacity building for emergency response capacities.	MMDA, LGU, barangay

No.	Action Plan	Outline	Implementing Agency
CRI-1:	Enhance the administrative system supporting community activities	CBDM activities will be more effective if there is support from barangay and LGU levels in terms of technical assistance, information dissemination and sharing with other communities, etc.	Barangay, LGU
Strategy 2: Inculcate a disaster mitigation culture in future generations			
No.	**Action Plan**	**Outline**	**Implementing Agency**
CRI-2:	Enhance school risk management capacity	Conducting seminars and training of disaster management. Reviewing and updating disaster management plan	Dep Ed, LGU, schools
CRI-2:	Inculcate a disaster mitigation culture in future generations	Inclusion of disaster risk management education into school curriculum. Dissemination of earthquake damage estimation results. Conducting regular trainings and drills as a part of community activities.	Dep Ed, LGU, schools
Concept 4： Reduce dangers of residential buildings			
Strategy 1: Strengthen buildings against earthquake			
No.	**Action Plan**	**Outline**	**Implementing Agency**
USI-1:	Promote subdivision development procedures	1. Disseminate the idea of promoting subdivision development procedures for uniform improvement throughout Metro Manila to all relevant agencies and organizations. 2. Promote re-development of the high building collapse and flammable areas; illegal settlement areas, old manila city areas, old city areas in suburban areas by subdivision development procedure standards	HUDCC, MMDA, Private
USI-3:	Promote disaster resistant urban development/ re-development	To secure the safety of vulnerable urban areas, areas highlighted in comprehensive regional vulnerability will primarily be targeted for this type of urban development. Key directions for this area are to: 1) develop the area for earthquake resistance and fire proofing, and 2) develop open areas for less damage.	LGUs (Monitored by HLURB)
USI-3:	Enforce and develop laws and regulations related to urban planning and building code	Present urban planning and building code for Metropolitan Manila are either loosely enforced or regulated. Strengthening the structure and enforcement is mandatory for appropriate development.	HUDCC, DPWH
USI-4:	Research and development on strengthening buildings	1. Structural design code on masonry type building is revised for fitting to actual building situation in the Philippines. 2. Cheap and effective building strengthening technologies are developed. Building construction related technologies and engineering are developed and diffused. Especially cheap and effective building materials are developed.	DPWH, ASEP, PEIS and Researchers, Construction Industry

No.	Action Plan	Outline	Implementing Agency
USI-4:	Promote construction and improvement for earthquake resistant buildings	Building strengthening techniques are introduced to newly constructed buildings. Retrofitting techniques are introduced to existing buildings. In both cases, LGUs take initiative for promotion of the actions. System for tax exemption or subsidy for smooth introduction of these techniques is also introduced.	Residents, Housing developer, LGUs
Strategy 2: Avoid fire outbreaks from residential buildings			
No.	**Action Plan**	**Outline**	**Implementing Agency**
USI-2:	Tie down and stabilize propane cylinders against earthquake shaking	Teach community members on the importance to tie-down and stabilize propane cylinders against earthquake shaking. Distribute anti-slip and stabilize device by the LGU through barangays to the community.	LGU/ barangay
USI-2:	Promote replacement to unbreakable (plastic-bottled) gasoline vending	Promote use of pet-bottles instead of glass bottles, in order to reduce the risk of gasoline spreading and fire spreading by bottle breaking	BFP
Strategy 3: Propel research and technology development on earthquake impact reduction			
No.	**Action Plan**	**Outline**	**Implementing Agency**
R&D-1:	Evaluate activity of the valley fault system	To understand seismic activity information on the valley fault system, especially on recurrence interval and probability of occurrence.	PHIVOLCS
Concept 5： Enhance National System Resistant to Earthquake			
Strategy 1: Protect stability of national government function			
No.	**Action Plan**	**Outline**	**Implementing Agency**
NSD-1:	Enhance continuity of national government function with the President's office	1) The emergency management manual of national government will be reviewed based on the earthquake damage estimation by the JICA study to adjust and improve the procedures of disaster response by the Government of the Philippines. 2) Telecommunication and transportation system for emergency management by National Government and Malacanang will be developed. 3) Necessary staff preparation plan for emergency operation in Congress and Malacanang. 4) Emergency transportation network is to be designated to secure minimum transportation to link the important government facilities; and vulnerable buildings along the road network that would block the road when collapsed should be retrofitted beforehand.	LGUs, MMDA, Presidential Office
NSD-1:	Promote urban reform around the nationally important facilities	Malacanang is surrounded predominantly by the old wooden buildings, and with Pandacan oil depot base located on the other side of the Pasig River. The urban land use indicates the high possibility of fire spreading or explosions by oil stock. In order to protect the function of Malacanang, the existing land use should be changed in well-planned manner.	MMDA, Presidential Office

Strategy 2: Protect stability of socio-economic system			
No.	**Action Plan**	**Outline**	**Implementing Agency**
NSD-2:	Enhance emergency measures by businesses	The financial institutes like the central bank and the major private banks, whose shutdown has a tremendous negative impact on the nation's economic activities, should implement seismic assessment, and enhance the seismic resistance of the equipment such as computer system, communication system. The priority is put on those located in the more vulnerable areas due to the fault line locations, earthquake motion, building collapse risk, etc.	MMDA, Presidential Office, Chamber of Commerce
NSD-2:	Enhance safety of online financial services	It enhances the safety of the online financial services by the back-up of the system, in order to secure the system operation even in emergencies.	MMDA, Presidential Office, Chamber of Commerce
NSD-2:	Enhance disaster finance system	The international finance system for emergency situation should be studied in cooperation with International financial institutions.	Presidential Office, Chamber of Commerce, NEDA

Part II Master Plan and Action Plans for Safer Metropolitan Manila

Chapter 4. Vision and Goals

CHAPTER 4. VISION AND GOALS

4.1 The Vision -A Safer Metropolitan Manila from Earthquake Impact-

Since 1900, more than 30 earthquakes have caused some damage to Metropolitan Manila. Many faults have been identified around and within Metropolitan Manila, but the Valley Fault System that runs north to south along the west and east edges of the Marikina Valley is thought to pose the greatest threat to Metropolitan Manila due to its close proximity.

Of all the natural disasters that Metropolitan Manila has experienced throughout its history (such as tropical cyclones, droughts and floods, tsunamis, volcanic eruptions, and earthquakes), earthquakes pose the greatest threat to the life, property, and the economy. Since Metropolitan Manila is the leading city in the Philippines, and the center of governmental, financial, commercial, and social activities, the impact of a large earthquake in Metropolitan Manila will greatly affect the nation.

The damage estimation of a potential rupture of the West Valley Fault, is that 40% of the total number of residential buildings within Metropolitan Manila will be heavily or partly damaged, and the earthquake will cause approximately 34,000 deaths and 114,000 injuries. Moreover, fire spreading as a secondary effect of the earthquake will cause an additional 18,000 deaths.

The Metropolitan Manila area, together with neighboring provinces, is expected to grow continuously and reach 25 million inhabitants in the expanded urbanized area of 1,500 km^2 by 2015. This growing urbanization is creating unacceptable levels of an earthquake disaster in terms of both human and property losses. Therefore, the Metropolitan Manila Earthquake Impact Reduction Study was undertaken to develop a plan and strategies for ***"A Safer Metropolitan Manila from Earthquake Impact"***.

4.2 The Goals

To achieve this vision, the Earthquake Impact Reduction Study for Metropolitan Manila presents six basic goals:

1) Develop National System Resistant to Earthquake Impact

Metropolitan Manila is the only mega urban center in the Philippines that includes the national functional backbone consisting of economic, financial, and information activities. Metropolitan Manila generates about 35% of the total GDP of the Philippines. Also, it is the seat of the Philippine national government including administrative, legislative, and judiciary functions, and international activities. With the rupture of the West Valley Fault, national functions will be paralyzed, and in the worst case, the earthquake will lead to chaos and disruption of the national economy. Therefore, Metropolitan Manila needs to develop national systems resistant to

earthquake impact through improvement and updating of existing systems. Especially targeted are the following: items for updating of regulations for earthquake disaster prevention, promotion of research and development for disaster prevention technology, capacity building for disaster response staff from national to community level, installation of modern equipment for disaster management agencies. Improvement and enhancement of these existing systems are to be implemented based on detailed plans.

2) Improve Metropolitan Manila's Urban Structure Resistant to Earthquakes

Recent earthquake damage in the urbanized areas in the world illustrate the extreme vulnerability of urban structures including buildings and infrastructure (such as roads, railways, port facilities), and lifelines (including electricity, telecommunication and water supply). Based on the damage estimation by West Valley Fault system rupture, it is estimated that 40% of the total residential buildings in Metropolitan Manila will be affected. Since building collapse causes the greatest number of deaths and injuries, the reinforcement and strengthening of buildings are a priority measure to reduce loss of life. Research and technology development on building structures and materials should also be promoted including improvement of building codes, development of design standard for low cost housing and cost-effective construction. Furthermore, building collapse is the major cause of fire breakouts, so building collapse in the highly fire-prone areas needs to be reduced. Existing urban structures in the severe damage estimation area should be improved through re-development of land use. Buildings should be constructed with higher resistive structures and fireproof materials. Location of open spaces and road widening should be involved for urban re-development. The results of the damage estimation of infrastructure and lifelines also show the possible impact to society. For example, malfunction of the port caused by the liquefaction or the collapse of bridges over the Marikina and Pasig rivers will greatly affect the transportation of people, goods and services to and from and within the Metropolitan area. The urban structure of Metropolitan Manila including transportation infrastructures and lifelines needs to be made resistant to earthquakes in order to reduce loss of life and associated impacts.

3) Enhance Effective Risk Management System

A great number of casualties and injuries are anticipated in the scenario of the West Valley Fault System rupture, but the actual number of losses will vary depending on the level of preparedness and effectiveness of the risk management and emergency response systems. Therefore, to reduce overall losses, an effective risk management system is necessary. Necessary actions include preventing secondary effects and damages, strengthening disaster management practices and response capacity, and ensuring access to critical information. Robust legal and institutional arrangements, including systems for inter-institutional coordination and clearly defined and practiced roles of national, regional, city and municipal, and barangay level governmental and non-governmental entities, are essential to effective management of earthquake risk.

4) Enhance Community Disaster Management Capacity

In case of large disasters such as a major earthquake, most of the community members will not be reachable by public assistance immediately. Therefore, to protect community members from large earthquake impacts, it is important to maximize the preparedness and disaster response capacity of the community beforehand, through enhancement of social capital. Social capital in the Metropolitan Manila communities can be developed while recognizing community autonomy, local leadership, and community dynamics. This enhancement will be promoted through self-reliant and mutual-help risk management including disaster awareness through education and enlightenment.

5) Formulate Reconstruction Systems

To facilitate recovery and maximize the effectiveness of the reconstruction process of the damaged Metropolitan Manila, the preparation of recovery and reconstruction policies, strategies and procedures and their acceptance by the relevant agencies are indispensable. At present, the preparation of the risk management system is not fully developed for effective recovery and reconstruction. Nonexistence of a reconstruction structure and system will generate additional losses to the society and exacerbate inappropriate and vulnerable urban development. Both rehabilitation and reconstruction require careful planning and development to prevent further deterioration of urban structures and environmental degradation.

6) Promote Research and Technology Development on Earthquakes

For the promotion of earthquake impact reduction measures, analysis of present conditions and future projections related to earthquakes will play an important role. Especially, scientific research on large earthquake fault rupture mechanisms, return periods, and distribution of the active faults are important. The existing research and technology development system in the Philippines can be enhanced on earthquake science, earthquake engineering, geosciences under comprehensive those coordination. Especially mechanism of earthquake occurrence, estimation of earthquake motion, estimation of earthquake damages, comprehensive disaster condition estimation including secondary disaster are to be studied in depth.

4.3 The Plan

The Master Plan for Earthquake Impact Reduction sets forth basic policy and direction in pursuit of the vision of a safer Metropolitan Manila. The plan is a road map to achieve the vision. It contains 34 frameworks, each addressing specific goals and objectives. Each framework is not only a stand-alone avenue to pursue improved levels of risk reduction but also a cross street interconnected with the other frameworks. The goals, objectives, and frameworks address Metropolitan Manila's most imminent earthquake disaster management issues. Existing

earthquake disaster management systems in the Philippines is not enough to cope with expected earthquakes damages

The frameworks are presented in Chapter 5. Each framework describes the following:

- Understandings / Concerns
- Basic policy / Basic concept of framework
- List of action plans

The Basic policy / Basic concept of framework include several strategies that are encapsulated in various action plans designed to lead to accomplishment of the framework's goal and objectives. The high priority of these action plans, or "Priority Action Plans," are then presented in Chapter 6 in a format that includes the aim and outline of the project and the implementing agency responsible for undertaking the action.

Chapter 5. Master Plan for Earthquake Impact Reduction

CHAPTER 5. MASTER PLAN FOR EARTHQUAKE IMPACT REDUCTION

5.1 Introduction

The master plan for earthquake impact reduction for Metropolitan Manila is composed of 6 goals, and each goal has one or more objectives. In this chapter, each goal is described for several frameworks to achieve the vision, for a safer Metropolitan Manila from earthquake impact.

5.2 Development of National System Resistant to Earthquake Impact

Since Metropolitan Manila is the seat of the Philippine national government and the center of the social and economic activities of the country, major important functions are assembled including legislation, administration, jurisdiction, finance, economy, information, and international relations. Disruption of this system in the worst case may lead to the disruption of national economy and political stability. Therefore, development of a national system resistant to earthquake impact is an urgent matter. This goal will be achieved by increasing social and community sustainability, with two focuses, as described in the following frameworks:

1) Protect stability of socio-economic system
2) Protect stability of national government functions

Each framework states the problems that can arise, and several basic policies or concept of frameworks following. Strategies are described within the basic policies, and priority action plans for each framework are listed.

FRAMEWORK: NSD-1 PROTECT STABILITY OF NATIONAL GOVERNMENT FUNCTIONS

■ Understandings / Concerns:

A major earthquake would cause a huge damage to the life and assets of the people, hamper socio-economic activities from normal operation, so that most of the urban function and nationally central functions would be damaged. It is imperative to draw up countermeasures to maintain the capital functions of the nation in emergencies, and to respond to the disaster properly.

The Malacanang Palace stands on the riverside of the Pasig river, surrounded by highly congested residential areas. On the other side of the river lies the Pandakan Petroleum Complex, which has risk of building collapse and fire breakout and spreading. As for national parliament, the Upper Chamber is located on the reclaimed land on Manila Bay, and the Lower Chamber in Quezon City, near the West Valley Fault. Both of them are not safe since they stand in a rather vulnerable area, due to ground conditions and earthquake motion. Dysfunction of the three entities disables legislation and budgeting related to the emergency response to earthquake, and thus impedes the implementation of disaster mitigation measures.

Consequently, for the purpose of maintaining the central function of the nation in emergency situations, it is definitely needed to seismic examination and retrofitting of the related public buildings, and to ensure the temporary sites to accommodate the government functions, ensure the access to the emergency road network, etc. It is also necessary to devise at ordinary times the countermeasures to station parliamentary members, emergency services staff, facility administrators, and police officers near the temporary facilities, in order to maintain national functions in emergencies.

■ Basic Policy /Basic Concept of Framework:

1) Maintain the national function even in emergencies

The Malacanang Palace, both chambers of Congress, and governmental buildings should be examined on seismic-resistance and if necessary, retrofitting or relocating them or development of alternative facilities should be planned.

2) Ensure telecommunication functions and access to transportation network

In emergencies, the public facilities mentioned above must ensure communication means and access to transport network, so that the countermeasure to secure telecommunication system and access to major road network is developed.

3) Secure the emergency service staff

Houses and lodgings should be developed to accommodate the necessary staff of emergency services within walking distance even at ordinary times, so as to maintain the central function of the government even in emergency situations.

4) Ensure the safety of the Malacañang Palace

The area around the Malacañang Palace is a disaster vulnerable area. It is estimated that the fire of nearby wooden houses around the Malacañang Palace would cause smoke that would prevent helicopters from flying over although it depends on the wind conditions. On the other side of the Pasig

River across from the Malacañang Palace, there is the Pandakan Petroleum Complex, whose possibility of fire-breakout is a big concern. To protect the Malacañang Place, besides the enhancement of fire services, it is indispensable to reform the urbanized area into seismic-resistant and fire-resistant areas from the long-term perspective. Furthermore, the relocation of the Pandakan Petroleum Complex should be promoted. The vacant land after the relocation should be transformed into a park conducive to improvement of the safety of the surrounding areas.

■ Action Plans

- Enhance security capability of National Government functions with the Office of the Presidential
- Promote urban reform around important national facilities

FRAMEWORK: NSD-2	PROTECT STABILITY OF SOCIO-EOCONOMIC SYSTEM

■ Understandings / Concerns:

It is estimated that 47% of the houses in Metro Manila will be damaged or burnt, and about 3 million people will become refugees or homeless. The damage to infrastructure and lifelines will have a huge negative influence on stability of socio-economic situation and functions of the capital of a nation that will spread all through the country. Such damage in national socio-economic system should be minimized by effective countermeasures.

■ Basic Policy /Basic Concept of Framework:

1) Strengthen office buildings, etc

- Assess seismic resistance of buildings

  It is indispensable to assess seismic-resistance of buildings such as office buildings and retrofit them if necessary.
- Establish back-up system of utilities

  It is beneficial for offices to develop their own power generating system and water supply system to maintain office functions even in emergency.

2) Enhance seismic-resistance of office equipment like computers

It is necessary to enhance seismic-resistance of office equipment like computers. The office equipment is likely to get moved, fall off or tip off in case of strong earthquakes, which cause cutting of or disconnection of the power cables, thus stopping the computer operation and hampering the business operation considerably. Taking the financial sector as an example, such computer failure will cause breakdown of the online system. To avoid such a failure, it is required to take measures of development of backup systems and enhancement of redundancy of online connections, etc.

3) Decentralize business functions

Businesses with a central focus on finance should decentralize their operations and establish back-up systems. Allocation of employees and staff also is to be discussed to ensure their working at closer places in emergencies. Factories located in the urbanized areas are estimated to suffer from the long shutdown due to the damaged transportation and the stoppage of utilities like power and water. Relocating them to other places like suburban industrial parks, enhance the seismic-resistance to improve the security of operation should be pursued.

4) Strengthen governments' emergency services capability

Economic dysfunction of the Metropolitan Manila that would be caused by a major earthquake has a nationwide influence. The ministries responsible for the nation's economy and the other related agencies should discuss measures for maintenance of the financial system, foreign capital, exchange rate control, emergency loan system, disaster reconstruction fund, and so forth prior to a disaster.

■ Action Plans

- Enhance emergency measures of businesses
- Enhance safety of online financial services
- Create a safer business environment
- Enhance emergency finance system

5.3 Improvement of Metropolitan Manila's Urban Structure Resistant to Earthquake

Historical records of earthquake disaster show that the direct cause of casualties is building collapse. Such building collapse in Metropolitan Manila by strong earthquake will also cause a large number of casualties. Additionally, fire is expected to breakout and expands in the area with dense wooden buildings. Moreover, urban facilities are so vulnerable to the earthquakes, which those failures will further affect the society. To reduce the direct casualties and losses of social assets of the Metropolitan Manila, improvement of the vulnerable urban structures is the shortest path to mitigate the expected damages.

In order to achieve this goal, increasing resistance of urban structures is necessary. This will be promoted through improvement of vulnerable area, buildings, and infrastructure/ lifeline facilities. There are 7 ultimate issues to focus on, and they are organized in the framework as follows:

<u>To increase resistance of Metropolitan Manila's vulnerable areas</u>

1) Earthquake Resistant Urban Development
2) Flameproof Urban Development
3) Spatial Urban Development

<u>To increase resistance of Metropolitan Manila's Buildings</u>

4) Earthquake-Resistant Buildings
5) Earthquake-Resistant Public Facilities

<u>To increase resistance of Metropolitan Manila's lifelines and infrastructures</u>

6) Earthquake-Resistant Infrastructures
7) Earthquake-Resistant Lifelines

FRAMEWORK: USI-1	PROMOTE EARTHQUAKE RESISTANT URBAN DEVELOPMENT

■ Understandings / Concerns:

Metropolitan Manila's damage will mostly be affected by building collapse. Estimate of number of heavily damaged building is 175,000, and moderately damaged building is 348,000. 39.4% of total buildings will somehow be affected. High vulnerable areas by building collapse are as shown in Figure. Especially, Marikina city and Pasig city may become isolated from other portions of Metropolitan Manila by building collapse.

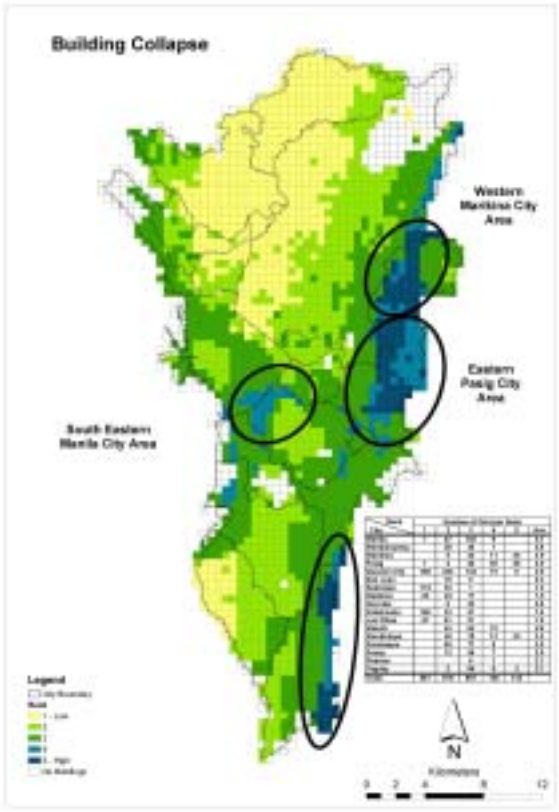

Figure: Building Collapse

■ Basic Policy /Basic Concept of Framework:

To develop Metropolitan Manila urban structure resistant to earthquake, individual residential building strengthening/ retrofitting is a first priority. Area re-development will be the next measure to be introduced.

1) Residential buildings strengthening/ retrofitting

➢ Strengthen/ retrofit individual residences to reduce the number of buildings from collapse

To reduce the number of building collapses that cause the most damage (i.e. human and economic loss), promote strengthening/ retrofitting of individual residences under the leadership of each LGU. Immediate action is needed for LGUs close to West Valley Fault; for Marikina, Pasig, and Muntinlula, and for LUGs from old Manila area: Manila, Pasay, Kalookan South,.

➢ Enlightenment Activity on Strengthening/ Retrofitting Residential Buildings

Residents need self-action programs to strengthen/ retrofit their own residences. To uplift incentives to strengthen personal residences, each LGU will enlighten the communities by utilizing the results of damage estimation and other relevant outputs from the MMEIRS study.

➢ Study of a financial system for retrofitting of residential buildings

Study of a financial system for retrofitting of residential buildings, by enhancing programs on earthquake resistant aspects such as Unified Home Lending Program (UHLP) prepared by National Home Mortgage Finance Corporation (NHMFC) affiliated with HUDCC.

2) Promotion of subdivision development procedures

HUDCC will promote subdivision development procedures throughout Metropolitan Manila in order to improve certain areas. Subdivision development has certain procedure standards for securing road width and open spaces, building standards following building codes, and construction of fire walls.

3) Enhancement of social housing policy for slums/ illegal settlements

Estimated numbers of building collapse are concentrated to the slums and illegal settlement areas. For these types of areas, improvement will be done through re-development procedures lead by NHA through social housing policy. This housing policy will utilize existing programs (i.e. community mortgage program, and relocation and resettlement Program), depending on the stage of the development of the targeted area. Buildings constructed through these programs will qualify for certain levels of earthquake resistance.

4) Promotion of land use incorporating seismic hazards information

In order to balance between seismic hazard and urban growth, promote land use based on earthquake damage estimation.

- Incorporate Seismic hazards data in General Plans

Update all CLUP with new information on damage estimation and urban vulnerability analysis. Ensure that all CLUP for 17 LGUs are updated within one year of the date that the damage estimation and urban vulnerability analysis are published. Ensure consistent enforcement of all requirements. HLURB will instruct, while MMDA will give advice to LGUs similar to present conditions.

- Limit Development near Existing Faults

To reduce possibility on large damage usually caused near faults, include limitation on development in the CLUP. HLURB and MMDA will direct and advise each LGU.

■ Action Plans

- Improve resistance of residential houses
- Apply subdivision development procedures
- Enhance social housing policy for illegal settlement and poverty areas
- Revise comprehensive land use plan
- Enforce and develop laws and regulations related to urban planning and building code

FRAMEWORK: USI-2 PROMOTE FLAMEPROOF URBAN DEVELOPMENT

■ Understandings/ Concerns:

Old Manila city area has the highest flammability possibility as shown in figure, and Northwestern portion of Metropolitan Manila has the highest fire extinguisher service shortage. The cause for fire outbreak is mainly the LPG and excessive power lines for electricity, commonly seen in the illegal settlement areas. The cause for fire spreading is mainly vulnerable urban structures, i.e. small open spaces and parks, and wooden building expansion conditions. Settlement of oil depot in central Manila, the Pandacan area, increases the possibility of larger impact to the Metropolitan Manila.

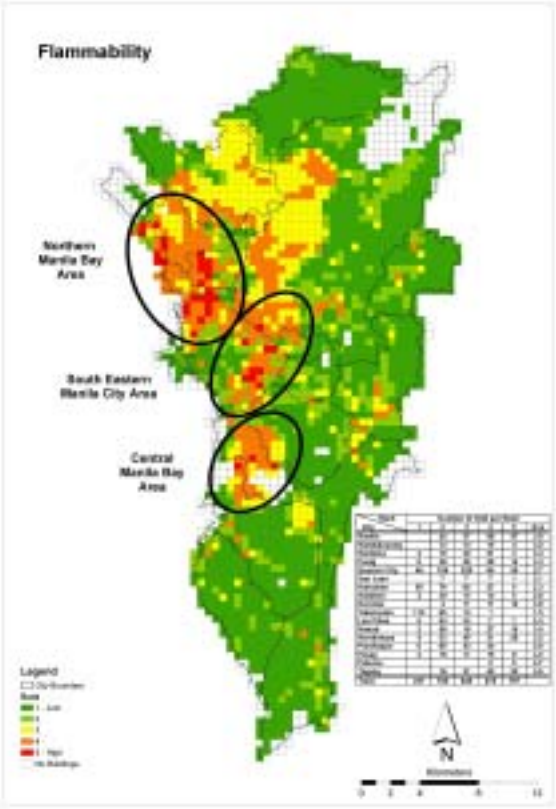

Figure: Flammability

■ Basic Policy /Basic Concept of Framework:

To avoid conflagration in Metropolitan Manila, it is important to be aware of preventing fire outbreak, extinguish initial fires, and avoid fire expansion.

1) Preventing fire outbreak

When fire breaks out, it is difficult to extinguish with small fire-prevention resources. Therefore, primary emphasis will be on the prevention of fire outbreaks.

➢ Reducing risk-components for fire outbreak in residences

To reduce risk-components from residences, each LGU will provide information on appropriate use of cooking equipment. Many residences use propane devices; however, the cylinder and cooking stove is not connected with any anti-slip device. There are possibilities to slip when vibration occurs; the propane gas may explode.

➢ Strengthening of possible fire outbreak at establishments

To reduce the risk of fire outbreak from facilities such as restaurants, hospitals, universities and research facilities, owners of those establishments will be responsible for retrofitting and strengthening the buildings, and using hazardous material treating facilities. They are also to be responsible for establishing emergency responding systems. BFP will develop enlightenment program to those establishments, and each LGU and regional BFP will enforce warning and safety inspections.

➢ Replacing gasoline container to splinter-less container

Glass bottled gasoline that can break and spill with the earthquake is commonly sold in Metropolitan Manila by gasoline stations and sari-sari stores. Such bottles are so highly inflammable that the

distributing method shall be changed. As for the substitute method, BFP will promote the use of pet-bottled gasoline distribution to reduce the risk.

2) Preventing fire spreading

- Promotion of vulnerability reduction measures for urban industrial zones

  There are several urban industrial zones treating hazardous materials. Secondary effects of explosions are extremely devastating. To reduce these risks, relocation will be promoted for the most effective measure. However, for the alternate less effective measures, facility retrofitting and development of buffer zones can be considered. After the relocation, vacant lots will be used for disaster management parks.

3) Promotion of fireproof district

- Introduction of Urban Fireproof Development Method

  Introduce the method of urban fireproof development to the highly flammable area: namely, Northeastern portion of Metropolitan Manila and old manila city area. This method is to develop many plots in urban areas introducing firebreak networks. Axis of firebreaks will be composed of Pasig-Marikina River, wide roads such as c-roads, railways (PNR), and parks; supporting firebreak will be fire resistant buildings, open spaces, and plants. HLURB will support MMDA from institutional aspects, such as enforcing regulations, and MMDA will be responsible for the plan and implementation.

- Promotion of subdivision development procedures

  Re-develop the high flammable areas (represented by illegal settlement area, old Manila city area, and old developed area of the sub-urban), by the subdivision development procedures. HLURB together with LGUs will monitor the development. Simultaneously, HUDCC and PEA will promote and regulate the subdivision development procedures.

■ Action Plans

- Tie down and stabilize propane cylinders against earthquake shaking
- Enforce disaster mitigation measures for possible fire breakout facilities
- Promote replacement to unbreakable (plastic-bottled) gasoline vending
- Promote vulnerability reduction measures for urban industrial zones
- Introduce urban fireproof development method
- Promote subdivision development procedures

FRAMEWORK: USI-3	PROMOTE SPATIAL URBAN DEVELOPMENT

■ Understandings/ Concerns:

Metropolitan Manila fringe areas will be the area of high evacuation difficulty as shown in the figure. Especially, areas along west valley fault system and Northern half portion of Manila coastal area has high evacuation area shortage. Extra attention has to be paid for Northern half portion of Manila coastal area; the area is also identified as high flammability and thus, emergency evacuation is indispensable.

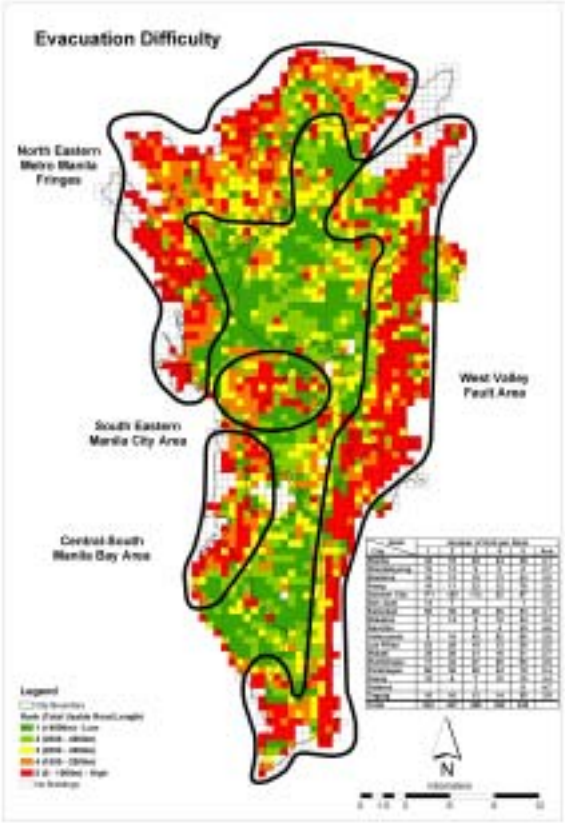

Figure: Evacuation Difficulty

■ Basic Policy /Basic Concept of Framework:

1) Preservation of open spaces and parks

Metropolitan Manila has only 10% open spaces and parks in total. Some LGUs with small open spaces have only 2% and less. However, many LGUs with small territories are planning to convert open spaces to build up area. This is increasing the risk to the metropolitan area.

➢ <u>Institutional enforcement of limiting further development of the existing open spaces and parks</u>

Enforce limitation of further development regarding open spaces and parks by LGU. This will be advised to LGUs by HLURB and MMDA. This limitation needs to be incorporated to CLUP by all LGUs.

2) Urban re-development

Areas lacking open spaces and having high evacuation difficulty need to introduce integrated area development by urban re-development procedures.

➢ <u>Promotion of Disaster Resistant Urban Development</u>

Areas lacking space (such as parks, open spaces, roads), need to spatially improve the areas by promoting disaster resistant urban development. Key directions for this area are to:

- develop parks for evacuation centers
- improve roads (widening), river catchments, and pedestrian paths for securing evacuation routes

Primarily targeted areas are the areas highlighted in figures of evacuation difficulty, and flammability. Implementing agency will be the LGU.

■ Action Plans

- Enforce further development of the existing open spaces and parks
- Promote disaster resistant urban development

FRAMEWORK: USI-4 PROMOTE EARTHQUAKE-RESISTANT BUILDINGS

■ Understandings/ Concerns:

Building damage estimation results in the worst case scenario indicates 13% of the building will collapsed or be heavily damaged, and 26% of the buildings will be partly damaged. The figures are higher than those of public buildings. Residential building damage is major reason of casualties.

■ Basic Policy /Basic Concept of Framework:

Quality of residential building greatly varies according to each owner compared to public buildings. Urban area is expanding rapidly and a huge number of buildings are continuously being newly constructed. It is an urgent issue for mitigation of damages that high-quality earthquake resistant buildings are introduced. Once a building is constructed, it is generally difficult to improve and strengthen the building because of limitation of available budget of owner for such works. Measures on simplification of administrative procedures and also provision of high quality buildings are to be considered.

1) Develop and expand seismic design regulations for masonry buildings

Masonry structure is cheap and comprehensively prevailing in Metropolitan Manila area. Regulations on masonry structure exist in the structural code; however, actual masonry building is not always consistent with the code. Therefore development of practical and applicable code is an urgent issue. Furthermore, introduction of construction manual for masonry structures, education and training of masons are important for expansion of high quality buildings.

2) Develop retrofitting techniques and expand retrofitting work

Simple, cheap and effective retrofitting techniques for residential buildings are to be developed. System for tax exemption or subsidy for smooth introduction of these techniques is also to be introduced.

3) Develop construction materials

Cheap, simple, lightweight and non-flammable construction materials are to be developed and standardized for public use.

4) Improve building permission system

Number of building permissions is too large and the number of actual buildings or engineering officers in each LGU is limited. This leads to insufficient checking of application documents and supervision of building construction. Introduction of registered building engineers for the designing, checking and supervising are to be considered.

5) Educate and train human resources on building construction

As the quality of constructed buildings relies on the skill of individual workers, supervisors of the construction site requires heavy responsibility. In order to improve the situation, some training system is necessary similar to driving school. Also researchers and administrative staff for building engineering are to be developed comprehensively.

■ Action Plans

- Implement retrofitting work of buildings
- Educate and train administrative staff on building engineering
- Educate and train building engineers, and establish training facility for construction workers
- Improve structural design code by DPWH, ASEP, PICE and researchers
- Develop and distribute building construction related technologies and engineering
- Develop and distribute construction materials in collaboration with industry firms
- Introduce tax exemption or subsidy for smooth introduction of retrofitting works
- Educate and train administrative staff on building engineering
- Educate and train building engineers, and establish training facilities for construction workers

FRAMEWORK: USI-5	PROMOTE EARTHQUAKE-RESISTANT PUBLIC FACILITIES

■ Understandings/ Concerns:

Building seismic diagnosis results for 80 public buildings identified that 45% of the building have basic or suspicious structural problems; on the other hand, 55% of the buildings were sound. Building damage estimation results against the worst case scenario for public facilities indicates 8% to 10% of the buildings would collapse or be heavily damaged; 20-25% of the buildings would be partly damaged.

■ Basic Policy /Basic Concept of Framework:

DPWH always supervise designing and construction of the public buildings. Building code is properly applied and quality of these building is generally better than for general residential buildings. Therefore estimated damage ratio is less than residential buildings. However seismic coefficient value, which is applied in the current structural code, is still not sufficient to cope with huge earthquake motion.

Public buildings serve as the center facilities during disaster and therefore special attention shall be paid to seismic resistance, and also their functions during emergency situation. Consequently, the framework for strengthening of the public buildings and retrofitting work is discussed under coordination of NDCC and MMDCC, not by each related department or agency. The framework includes contents, schedule, prioritization, preparation of budget, and others.

1) Diagnose seismic performance of public buildings

All of the public purpose buildings are to be diagnosed as basic inventory information; NDCC and MMDCC will manage these results. In case of some problems in building condition, secondary diagnosis is to be introduced.

2) Retrofit problem buildings

Buildings with poor seismic resistivity or constructed long ago are to be retrofitted or strengthened.

3) Improve public building function as a facility for emergency activity

The function as a facility for emergency activity is considered together with design of retrofitting. Especially storage, communication facilities, transportation access, temporary shelters are important.

4) Upgrade seismic design regulations

Current building code is improved. Design earthquake forces in the code may be small for the newly designing buildings to be able to withstand future possible near and medium distant earthquakes. Method of construction for masonry type buildings is also developed and introduced in the code.

5) Consider detail ground condition in designing structures

Ground properties directly affect seismic performance of the structures. Especially response properties and liquefaction potential are evaluated in detail, corresponding to importance of the structure.

6) Educate and train human resources on building construction

As the quality of the constructed buildings relies on the skill of individual workers, supervisors of the construction sites have a heavy responsibility. In order to improve the situation, some training system is necessary similar to a driving school. Also researchers and administrative staff of building engineering are to be comprehensively trained.

■ Action Plans

- Strengthen public facilities
- Research and development activity for strengthening public buildings
- Develop building engineering related human resources

FRAMEWORK: USI-6	PROMOTE EARTHQUAKE-RESISTANT INFRASTRUCTURE

■ Understandings/ Concerns:

Infrastructure consisting of roads, bridges, railway, LRT, MRT, airports, and harbors carries the most important role in case of severe earthquake. Maintaining such facilities will help to implement emergency activities smoothly. In Metropolitan Manila, retrofitting projects for major bridges have been implemented recently; however, other than retrofitting of bridges, appropriate action to strengthen other facilities has not yet been started. Therefore, action to make safer and stronger infrastructure against natural disaster will be necessary.

■ Basic Policy /Basic Concept of Framework:

1) Strengthening of bridge

Most serious dysfunction in the road network is caused by bridge collapse; therefore, strengthening of bridges is dispensable to maintain a safe road network. Fortunately, DPWH keeps implementing retrofitting project for major bridges. This effort should be continued in the future. However, DPWH is responsible for Bridges along National Roads; therefore, local bridges that are the responsibility of DILG, must receive the necessary remedial action.

- Retrofitting of Bridge Structure

  First of all, bridges, which were evaluated as “High Probability” and “Moderate Probability”, must be investigated in detail to evaluate vulnerability against earthquakes. Necessary retrofitting to these vulnerable bridges must be implemented. Other important bridges which are located on access to airports, harbors and along major road network must be investigated after retrofitting of above bridges.

2) Secure safety of airport facilities

Airports act as a transportation base alternative to land transportation, as well as a base for incoming personnel and goods from abroad. To secure the safety of airport facilities is necessary with coordination of DOTC, MIAA.

- Strengthening of Facilities

  Generally, the structure of Airport facilities such as Passenger Terminal, Control Tower, Runway, and Taxiway are appropriately designed and constructed using strict design standards. However, collapse or damage to control tower will cause transfer of air fleets to different airports. Generally, the gaps between runway and taxiway are constructed using different structures, and earthquakes will cause irregular displacement of the surface. These damages will cause several days of dysfunction of the airport. Improvement of airport safety is necessary.

- Preparation of Back Up System

  There are three (3) important control facilities in NAIA: namely, Control Center, Air Traffic Tower, and Approach Leader. Air Traffic Tower and Approach Leader have their own backup system; however, in the same building, the Control Center does not have backup system. Backup system should be located in a different building. To secure the safety of the most important system in airport facility, remote backup building should be constructed.

3) Secure safety of harbor facility

Liquefaction potential of port areas, where North Manila Port, Manila International Container Terminal, and Manila South Harbor are located, is very high and serious damage to port facility such as cranes and piers are expected. The role of Harbor facilities is also important to supplement land transportation, which will also be heavily damaged.

- Strengthening of Facility

  Strengthening of port facilities including cranes and piers is necessary; however, it is necessary to consider cost effectiveness. Prioritizing among piers is also necessary, because reinforcement of all of facilities at once cannot be realized.

■ Action Plans

- Retrofit bridge structures
- Secure safety of airport facilities
- Secure safety of harbor facilities

FRAMEWORK: USI-7 PROMOTE EARTHQUAKE-RESISTANT LIFELINES

■ Understandings/ Concerns:

Lifelines (consisting of water, sewage, gas, electricity, and telecommunication) are indispensable to modern life and have rapidly developed in recent decades. Stopping the supply of lifelines will expand scale of disaster. In the damage estimation, for water network the damage would reach 4,000 points in the worst case, and for electricity and telecommunication damaged length would reach 31 km and 97 km respectively. Lifeline companies must give effort to reduce estimated damage.

■ Basic Policy /Basic Concept of Framework:

1) Organizational preparedness among lifeline companies

Each lifeline relates to others, for instance, without electricity supply, none of the lifelines can be functional. Therefore, cooperation and information sharing among lifeline companies are also necessary to maintain their safety.

- Establishment of Lifeline Sub-Committee in MMDCC

  To share the information and to establish inter-company cooperation at the time of disaster, periodic meetings among lifeline companies are necessary. Appropriate personnel shall be assigned from each lifeline company and in the event of disaster, people shall gather at MMDCC at once. There will be a person to collect information from each company and report information to other lifelines necessary to implement smooth recovery activities.

2) Detail risk assessment of each lifeline

Occurrence of earthquake will demolish valuable facilities of lifelines, and cause supply of their services to stop. To avoid such eventuality, each lifeline company has to recognize weakness of their facilities. Therefore, it is necessary to promote implementation of a research project in risk assessment of each facility.

- Implementation of Detail Risk Assessment of each Lifeline

  In detail risk assessment, both nodes (such as buildings) and networks (such as pipelines and cables) must be evaluated against earthquake risks in detail. In order to evaluate vulnerability, database of each facility and network must be updated.

3) Strengthening of emergency operation ability

Each lifeline company must prepare for emergency response after earthquake occurrence; therefore, to increase emergency operation ability is the first step to avoid spreading of damage caused by earthquake.

- Preparation of Emergency Operation Manual

  In case of emergency after earthquake, to implement emergency recovery activities promptly and effectively, emergency operation manual must be prepared in advance. This manual shall be widely read by all the relevant staff and periodic drills shall be executed.

- Strengthening of Emergency Operation Team

  In relation to the preparation of emergency operation manuals, relevant number of personal, vehicles, and equipments shall be increased to cope with the estimated damage. In addition, inventory data regarding resources such as number of equipment, available stocks of pipes, joints, and cables shall be clearly defined to avoid any confusion in an emergency.

4) Water distribution

Lack of water will create serious harm to life, so supply of potable water is at least necessary for 3 liters per person per day. Also, sanitation and cooking, as well as, laundry need a large volume of water. It is necessary to secure a volume supply of water.

- Strengthening of Water Distribution Facilities

  To avoid serious shortage of water supply in the emergency phase, strengthening of facilities related to water distribution such as dams, water intake facilities, purification plants, reservoirs, and its pipeline network, must be implemented. Most critical points are the pipelines from Angat Dam which is the only pipeline to supply water into Metropolitan Manila; however, the transmission pipe crosses the fault. In addition, approximately 1,000 km of water pipe is made of Cast Iron which is vulnerable especially at pipe joints which are 26% of total pipe network in Metropolitan Manila. Cast Iron pipes should be gradually replaced with RC pipes, Ductile Iron pipes, or pipes using flexible joints.

5) Electricity supply

Electricity failure affects human life very much and also affects the supply of other lifelines to subscribers. In addition, short-circuits often cause fires which can expand the scale of damage.

- Strengthening of Electric Supply Facilities

  To avoid unnecessary expansion of damage called secondary disaster, strengthening measures should be undertaken by Meralco. Especially, at sub stations, porcelain bars are often damaged in past earthquakes. In addition, aerial lines are critical against earthquakes but some amount of damage cannot be avoided. Therefore, strengthening of centrally controlled system, which can regulate supply of electricity in blocks, will support reduction of potential damage area and minimize the possibility of fires.

- Regulation of illegal connection of electricity in squatter area

  Illegal connection of electricity in the squatter area has high risk of fire caused by short-circuit. In such area where cables are connected illegally, severing of cable may occurs. To avoid unnecessary expansion of damage, regulations against illegal electric supply must be strictly enforced.

6) Telecommunications

Role of telecommunications in disaster is to route prompt and appropriate commands to reduce damage in organizations related to disaster management. In addition, many people will try to use telephone lines and also from outside so calls to Metropolitan Manila will drastically increase.

➢ Strengthening of Telecommunications Service Facilities

To avoid dysfunction of telecommunication, restriction of private telephone connection must be regulated, with the necessity to prioritize public use for disaster management. Reinforcement of facilities such as exchange stations should be securely engaged. Also for disaster management organizations, special dedicated lines should be installed together with consideration of using satellite mobile phones which will not be affected by damage on the ground.

■ Action Plans

- Prepare organizational system among lifeline companies
- Assess detail risk of each lifeline
- Strengthen emergency operation ability
- Strengthen water distribution functions
- Strengthen electricity supply functions
- Strengthen telecommunications functions

5.4 Enhancement of Effective Risk Management System

Number of losses will greatly vary based on the level of preparedness and effectiveness of the risk management and emergency response systems. In order to reduce the overall losses of Metropolitan Manila, four objectives are provided as follows:

To prevent secondary effects and damages:

Largest secondary effects and damages are anticipated to be caused from fire outbreak and spreading, and tsunami in the Manila coastal areas. To reduce the casualties and social losses from fire, reduction on fire outbreaks and initial fire extinction are the important actions to take. Tsunami damage is anticipated only from the rupture of Manila trench; however, if that occurs, 2 to 4 meter waves will sweep over low lands in Manila coastal side in an hour. Tsunami increases the casualties without appropriate information beforehand and timely dissemination to the public. To reduce the affect of the tsunami, appropriate evacuation plans need to be prepared.

To strengthen disaster management system:

Existing disaster management systems for national, regional and local governments do not include occurrence and impact of large earthquake. Through understanding identified estimated damage, enhancement of legal system, institutional capacity, and inter-institutional coordination are to be the focus for improvement.

To improve disaster response capacity:

Efficient response to the emergency situations will reduce the number of needless casualties. Estimated damage of Metropolitan Manila is overwhelming to the present capacity in terms of human resources, budgets, and equipment. Deficiencies in those responding capacities are seen throughout national, regional, and local levels. This disaster response capacity should be enhanced.

To ensure access to critical information:

Effective disaster response very much relies on the accurate critical information. For adequate emergency responses, collection of the essential damage information as well as a dissemination and communication system is needed. Information such as distribution of the hazardous material treating facilities, disaster management resources, buildings, public facilities, roads and bridges, population etc., and database construction of collected information by the LGUs using the detailed map are essential as a basic information to support disaster management planning to be utilized in emergency operations. For emergency management, information communication system and management system of emergency public information should be developed to ensure access to critical information in the Metropolitan Manila.

All of these objectives are supported by frameworks as follows:

To prevent secondary effects and damages

1) Fire preparedness and mitigation including handling of hazardous materials
2) Measures against tsunami

To strengthen disaster management system

3) Enhance legal basis for disaster management
4) Strengthen institutional capacity for implementing preparedness and mitigation measures
5) Strengthen inter-institutional coordination

To improve disaster response capability

6) Strengthening of institutional disaster response capability
7) Development of operation systems
8) Fire suppression and hazardous material abatement
9) Evacuation (Evacuation route and evacuation sites (Refugee sites))
10) Security of water, food, and other necessaries
11) Emergency Health and Medical Response System
12) Emergency transportation system
13) Search and rescue

To ensure access to critical information

14) Information and communication system
15) GIS
16) Management of emergency public information

FRAMEWORK: RMS-1	PROMOTE FIRE PREPAREDNESS AND MITIGATION INCLUDING HANDLING OF HAZARDOUS MATERIALS

■ Understandings / Concerns:

Metropolitan Manila will suffer from fire that would burn down buildings on about 1,700 hectares of land and kill 19,300 people in the event of the earthquake because there are so many wooden buildings and hazardous facilities. In Metro Manila, there are highly congested wooden residential areas such as squatter areas. Such areas have not been developed according to a plan, but spontaneously in a disorderly way. Dilapidated, small wooden houses are crowded with very limited opens space like green areas, parks, and roads. The physical conditions of these areas contribute much to the high fire risk.

Besides the spatial structure of the Metro Manila urban area, there exist hazardous facilities and materials in places. Such hazardous materials include: kerosene, gasoline, petroleum, LPG, chemical substances, and so forth.

In addition, fire service capacity is far too short to handle the estimated secondary damage, so that it is required to promote fire preparedness and mitigation including handling of hazardous materials in Metro Manila.

■ Basic Policy /Basic Concept of Framework:

To mitigate the damage to Metro Manila from fire and prepare fire, it is required to enhance not only fire fighting capability, but preparedness and mitigation measures. A flameproof city is the ultimate picture of Metro Manila from fire prevention perspective, although it is a long way off. To reach that level, Metro Manila has to take many preparedness and mitigation measures against fire.

1) Strengthen fire services capability

- Enhance personnel and fire equipment

  The capacity of fire service of BPF is not sufficient, lacking 3,035 fire personnel and 231 fire trucks to the international standards. The resource should be increased to improve the capacity. In addition, various water sources for fire extinguish also shall be secured.

- Strengthen and development of fire stations

  Fire stations are important facilities for post-quake activities like rescue and fire extinguishing activities. The stations shall be built strong enough against earthquakes.

2) Improvement of auxiliary fire fighting operations

Only BPF cannot handle fire when an earthquake occurs because of their resource shortage. Based on the Fire Code of the Philippines, every business establishment and barangay should provide an organization to deal with fires and related emergency when they occur. Also, the community disaster response is recognized as a very important resource in emergencies from the disaster experience across the world. However, only 141 out of 1,694 barangays have necessary equipment and tools. Therefore such response resources shall be enhanced.

- Strengthen the capability of the barangays and private companies

  BFP and LGUs will have the barangay captains and company heads establish voluntary fire fighting corps based on the evaluation of the potential estimated damage and their capability of handling them. The volunteer fire fighting corps will serve as a core for the community-based disaster management and promote the security of fire fighting water source, fire fighting training, fire drills, etc.

- Strengthen community capability

  Besides the tools, the LGUs will also promote capacity building through barangay activities for communities on initial fire fighting activities. The detailed activities include: 1) reservation of levee protection and water facilities, 2) organization of civil corps, 3) fire extinction drills by the community members, and 4) prepare necessary equipment such as small fire pumps and hoses. The northwestern part of Metropolitan Manila will have the priority, since fire extinction service shortage is prominent

3) Ensure safety of hazardous materials

- Enhance the safety measures of hazardous materials

  In Metro Manila, there are many hazardous facilities and buildings (including sari-sari stores that might cause fire in case of earthquakes) with LPG, gasoline, petroleum, other flammable materials and chemicals. These materials should be properly controlled and the related regulations should be enforced adequately, which may lead to modification of regulations or safety standards.

- Promote the relocation of hazardous facilities

  Some hazardous facilities like Pandakan Petroleum Complex are located in the congested urban area and have a high potential to affect the surrounding areas in the event of major earthquakes.

4) Strengthen inter-organizational coordination and cooperation

For collective and collaborative efforts against fire fighting, inter-organizational relations shall be developed with mutual aid agreement of specific roles and functions among the organizations, including international organizations.

■ Action Plans

- Enhance fire-proofing of buildings
- Construct new fire stations where the stations are underprovided
- Strengthen fire service resources
- Improve water sources for fire fighting
- Reinforce auxiliary fire fighting operations such as the barangays, communities, and business establishment voluntary fire fighting corps
- Improve management system of hazardous materials, including relocation of hazardous facilities
- Promote inter-organization coordination and cooperation

FRAMEWORK: RMS-2	TAKE MEASURES AGAINST TSUNAMI

■ Understandings/ Concerns:

Preliminary estimated tsunami condition at Manila Bay seashore in case for Manila Trench earthquake are: 1) maximum height is 4 m, 2) average height is 2 m, 3) arrival time is about one hour after the earthquake occurrence. Lowland area, of which elevation is less than 4 m, prevails widely around the old manila area and these areas are severely affected. Tsunami also run up into Pasig River and possibly affect Maracanang palace and Pandacan deposit area.

■ Basic Policy /Basic Concept of Framework:

Even in case of less seismic related damage, there is high possibility of tsunami damage. Once appropriate information is disseminated, people have enough time for evacuation and damage amount is reduced.

1) Support ongoing research on tsunami phenomena and damages

PHIVOLCS has already initiated study of tsunami phenomena and damage all over the country. Especially case for Metropolitan Manila area, the study is being accelerated. The result will be the basis for any consideration of preventive measure of tsunami damages.

2) Establish information dissemination system on tsunami phenomena

Quick response to the tsunami phenomena reduces casualties; therefore quick information dissemination system to public is to be constructed. All existing measures such as television and radio media are to be integrated in the system.

3) Promote public awareness on tsunami effect

Evacuation routes and sites are to be defined in detail. LGUs will take initiative on the issue.

■ Action Plans

- Promote Research and development for Tsunami mechanism and damages
- Promote tsunami damage preventive measures

FRAMEWORK: RMS-3	ENHANCE LEGAL BASIS FOR DISASTER MANAGEMENT

■ Understandings/ Concerns:

The basic law establishing the framework for disaster management in Metro Manila was established in 1988 and has not been significantly updated to coincide with subsequent legislation affecting the authorities of local governments and the structure of governmental agencies. Moreover, it does not adequately reflect the current holistic approach to disaster management and its relation with urban planning and development. At the local level, a city/municipal ordinance is needed to strengthen the legal framework and institutionalize disaster mitigation programs.

■ Basic Policy /Basic Concept of Framework:

1) Strengthen legal basis at national level by updating/replacing PD1566

The basic law and policy framework for disaster management in the Philippines is established by Presidential Decree 1566, signed by the President in 1978. This Presidential Decree is still the operative law that provides guidelines for the organizations and functions of all Disaster Coordinating Councils from the national, regional, provincial, city and municipal levels including the barangays. With the law 25 years old, it should be re-conceptualized in light of current concepts and best practices, e.g. a proactive, holistic risk management approach taking decentralization and community-based concepts into account.

- Pending National Legislation

  A number of proposed measures have been introduced in Congress. Some of these propose restructuring, and others aim to strengthen community awareness and/or the capabilities of government and other agencies to prepare, respond, and reduce the impacts of disasters.

  It may be surmised that generally speaking, Congress does not consider these bills as high priorities. All these bills will remain on First Reading stage unless the concerned agencies and other interested parties lobby for immediate congressional action. A certification by the President that a bill is urgent will trigger action by both chambers of Congress.

- Support of NDCC Proposed Legislation

  The National Disaster Coordinating Council (NDCC) and its operational arm the Office of Civil Defense have developed an integrated, comprehensive disaster management act that would strengthen the Philippine disaster management capability at all levels of government and society. This consensus-based proposal (An Act Strengthening the Philippine Disaster Management Capability, appropriating funds therefore and other purposes) would restructure and strengthen disaster management institutional structures, incorporating community-based, local, regional, and national entities. It would integrate disaster management in physical, social, economic, and environmental planning and development and tie disaster management to poverty alleviation and environmental protection. It would create local disaster management offices, a funding mechanism, and a system for accrediting community disaster volunteers.

2) Strengthen local government framework for disaster management

- Institutionalize Disaster Management Offices and Budgets

Some local disaster management offices/organizations exist on the basis of executive orders, so they don't have regular department status or receive a regular budget. They need a stronger legal basis and standing that can be provided through mitigation policies stated in a local disaster management ordinance.

- Improve Financial Viability of Disaster Coordinating Councils

Most of the Disaster Coordinating Councils in Metro Manila are primarily operating on a shoestring budget augmented by appropriations from the Office of the Mayor whenever a disaster occurs. DCCs can get funds from the local budget but only after a State of Calamity has been declared. They have practically no funds for expenditures during a pre-disaster period. Therefore, they need financial augmentation from all possible sources to allow the councils to be more ready anytime for disaster or emergency.

Innovative strategies may have to be formulated to improve their financial viability, such as:

- ✧ Create a trust fund and solicit and manage donations from the private sector. Usually donations from the private sector for such purposes are tax deductible.
- ✧ Outsource domestic and foreign grants intended to improve the overall capability of disaster councils.
- ✧ Encourage government agencies, which are members of the councils, to appropriate either in funds or in kind to be used to upgrade the internal administrative or operational requirements of disaster councils, such as for the purchase of computers, communications equipment and response vehicles.

In March 2003, the Department of Budget and Management and the Department of the Interior and Local Government released Joint Memorandum Circular No. 2003 – 1 regarding the use of Local Calamity Fund Appropriations for Man-Made Disaster Relief and Mitigation. This Memorandum Circular authorizes pre-disaster disbursements from the 5% calamity fund of cities and municipalities, which may assist LGUs in funding disaster preparedness training and other pre-disaster activities.

- Promote Adoption of Model City/Municipal Ordinance

City/municipal authorities can strengthen their Disaster Coordinating Council's effectiveness by the local legislative councils enacting a comprehensive ordinance on disaster management. Such an ordinance has been drafted and circulated among various stakeholders.

3) Promote policies that encourage implementation of disaster risk reduction measures

The National Government should adopt disaster risk reduction policies and ensure that disaster mitigation measures are included in national, regional, and local development and land use plans. Local governments should reiterate or redefine local policies that contribute to earthquake or other disaster mitigation, in order to re-emphasize these policies and create awareness on the part of the community as well as local officials.

■ Action Plans

- Strengthen legal basis for disaster management at the national level by updating/replacing PD1566
- Strengthen legal basis at the local level by adopting model city/municipal ordinances
- Institutionalize local government framework and financing for disaster management
- Promote policies that encourage implementation of disaster risk reduction measures

FRAMEWORK: RMS-4	STRENGTHEN INSTITUTIONAL CAPACITY FOR IMPLEMENTING PREPAREDNESS AND MITIGATION MEASURES

■ Understandings/ Concerns:

The institutional arrangements for disaster management and structures of the local disaster councils were initiated over 20 years ago and no substantive changes have been made since then, despite legal changes affecting local government authorities and responsibilities and changes in the Government's organizational structure. Also, planning guidance and emergency plans need to be updated, and a training needs assessment needs to be undertaken in order to identify and develop training opportunities for DCC members.

■ Basic Policy /Basic Concept of Framework:

1) Strengthen local government disaster management through reorganization and revitalization of disaster coordinating councils

The existing council structures at the regional, provincial, city, municipal and barangay levels are still based on the legal framework provided by PD 1566 promulgated in 1978. It would appear that most of the disaster councils are largely inactive or reactive and lack comprehensive disaster management and response plans that spell out their holistic mandate. Plans are generally based on the Calamities and Disaster Preparedness Plan of 1988. Both the DCC structures and plans should be re-conceptualized in light of current concepts and best practices, e.g. a proactive, holistic risk management approach taking decentralization and community-based concepts into account.

Also, while the functions and responsibilities of the member agencies of the City/Municipal Disaster Coordinating Councils are defined on paper, there are few if any examples of detailed manuals or Standard Operating Procedures (SOPs) to guide staff in effectively carrying out specific disaster-related responsibilities.

- Strengthen City/Municipal Disaster Coordinating Councils

  Because DCC functions and structures are based on an obsolete decree not responsive to the needs and requirements of present day disaster management and planning, there is a need to review the organization of the councils in order to identify ways to improve their predictive or proactive capabilities.

  New legislation may also be needed to revitalize as well as professionalize the local disaster coordinating councils thereby allow them to formulate their respective disaster management plans and programs which are holistic, current and proactive in character.

  The membership of the local disaster coordinating councils as defined in Presidential Decree 1566 should be reconsidered. Analysis of government agencies represented in the councils does not predict the full development of competent staff in disaster management and planning for the simple reason that most members in the councils consider their Disaster Coordinating Councils responsibilities an additional burden to their core work in their respective offices.

  Also, there is little or no regular communication between disaster coordinating councils and the legislative councils of cities and municipalities. Some local disaster management offices/organizations exist on the basis of executive orders, so they don't have regular department status or receive a regular budget. They need a stronger legal basis and standing.

- Strengthen Barangay Disaster Coordinating Councils

  A typical Barangay Disaster Coordinating Council organization has the Barangay Captain as head of the Disaster Council. The members consist of the Barangay Councilmen, organized tasks forces and community volunteers. In many cities in the National Capital Region, homeowners associations are organized into task forces of the Barangay Disaster Coordinating Councils. However, it is likely that many of the BDCC are organizations that exist on paper only in symbolic compliance with the requirements of the National Calamities and Disaster Preparedness Plan. Many BDCCs are not fully functional and at times are reactivated only in case of emergency or crisis such as a conflagration or flood.

- Update Barangay emergency planning guidance and plans

  The Barangay Disaster Manual (1988) covers the organization and responsibilities of the barangay DCC, a preparedness checklist, preparation of a barangay disaster preparedness plan, and basic disaster countermeasures. In essence, the manual can serve as a "model plan" for preparing for and managing a disaster situation in the barangay. However, it is long overdue for revision and updating, along with any barangay level disaster plans based on the Manual.

2) Promote the development of a disaster management center

The proposed Center would serve the specific needs of agencies and Local Government Units in the National Capital Region (Metropolitan Manila).

3) Encourage local mitigation planning through use of "Earthquake mitigation handbook" and "Earthquake mitigation and response checklists – local planning guide"

An Earthquake Mitigation Handbook has been completed by the Study Team as a tool to guide local governments in the design and implementation of earthquake disaster mitigation programs. Also, in concert with the City of Makati, a model process and guide for local mitigation and preparedness/response planning utilizing checklists have been developed.

4) Conduct training needs assessment and develop capacity building programs

The need to upgrade the overall capabilities of the DCCs is a continuing priority.

■ Action Plans

- Promote the reorganization and revitalization of city/municipal and barangay Disaster Coordinating Councils.
- Promote the development of a Disaster Management Center to serve Metro Manila.
- Promote local government mitigation planning through implementation of the Earthquake Mitigation Handbook and the Earthquake Mitigation and Response Checklists -- Local Planning Guide.
- Conduct training needs assessment and develop capacity building programs for local and barangay Disaster Coordinating Council members and institutions.
- Strengthen barangay level preparedness for disaster response and relief.

FRAMEWORK: RMS-5	STRENGTHEN INTER-INSTITUTIONAL COORDINATION

■ Understandings/ Concerns:

Mechanisms for inter-institutional coordination currently exist in the form of Disaster Coordinating Councils, but the functionality of these councils is less than optimal. Most have no regular meetings or agenda for overseeing any pre-disaster preparedness and mitigation programs, which restricts their capacity for effective collaboration during response, relief, and recovery operations. There is need to revitalize the councils, update their plans, strengthen decision-making processes, and encourage lateral communications and mutual aid.

■ Basic Policy /Basic Concept of Framework:

1) Strengthen metropolitan manila disaster coordinating council

The Metropolitan Manila Disaster Coordinating Council (MMDCC), like the city and municipal Disaster Coordinating Councils (DCCs) in Metro Manila, has no regular schedule of meetings and meets very irregularly. It has no specific action agenda to improve its capabilities to counter disasters effectively. Also, the functionality of MMDCC needs to be reviewed in regard to its vertical relationships with the city and municipal DCCs.

- Update MMDCC Structure

  The membership roster needs to be reviewed and updated. Also, the responsibilities of the members need to be redefined in order to determine accountability as to who will do what and under what circumstances in a disaster situation. Present membership should be reduced to a minimum and should include only agencies that are priority and highly critical in disaster mitigation. The other current member agencies can form as a core auxiliary group.

  MMDCC should organize an Executive Committee of three to five members, which shall be responsible for the day-to-day activities of the regional council in coordination with the appropriate office of MMDA.

- Organize and implement a MMDCC Work Plan

  Committees and councils that are active year-round, instead of only when disaster threatens or arrives, function better when faced with crises. MMDCC could play a more active role in developing and promoting mitigation and preparedness activities among agencies and LGUs, as well as providing guidelines to cities. It also could act as mechanism for exchange of information between cities and setting up mutual aid agreements. MMDCC should be a policy formulating body for disaster management and at the same time a metro wide coordinating council in the provision of services to cities and municipalities during disaster in the NCR.

2) Enhance lateral and vertical inter-agency and inter-governmental communication and coordination

The external communications of City/Municipal Disaster Coordinating Councils with their lateral counterparts in neighboring or nearby cities and municipalities are seldom practiced. The only functional communications in many instances are vertical, i.e. upwards to MMDCC or downwards to the Barangay Disaster Coordinating Councils. Lateral consultations generally only occur during or immediately after an emergency situation. Mechanisms for communication and coordination must be

in place and practiced during non-disaster times in order to function effectively when a major disaster occurs.

3) Strengthen Incident Command System (ICS) and response decision-making systems

The Incident Command System (ICS) is internationally recognized as providing a standard and effective system for managing emergencies through a common organizational framework within which various agencies can work collectively at the scene of an emergency.

There are five primary ICS functions: command/management, operations, planning/intelligence, logistics and finance/administration. Since with ICS there is common terminology for functions, positions, and resources, it provides a consistent and standard framework for managing activities of diverse agencies under a mutual aid situation.

4) Update the National Calamities and Disaster Preparedness Plan and Metro Manila Level Plans

The National Plan was first approved in 1984 as an Annex to the Implementing Rules and Regulations to PD 1566. The current version of the plan was approved in 1988. The NDCC also has issued The Valley Faultline Contingency Plan, which plan is undated but appears to have been approved by virtue of NDCC Memorandum Order No. 38, Series of 1991. At the Metro Manila level, there are the Metro Manila Calamities and Disaster Preparedness Plan (or Emergency Preparedness Plan, and The Metro Manila Earthquake Disaster Preparedness and Response Plan (aka Earthquake Preparedness Plan). This latter plan was dated for approval in October 1999 by MMDCC.

5) Encourage inter-local cooperation through zonation of LGUs and Master Mutual Aid Agreement

" Mutual aid" which is a voluntary assistance provided by other agencies or local governments when an incident requires responses that exceed the resource capabilities of the affected response agencies and jurisdictions. It involves the provision of services and facilities such as fire, law enforcement, medical and health, urban search and rescue, coroner, public works, communications, transportation, and utilities. Mutual aid is intended to provide adequate resources, facilities, and other support to jurisdictions whenever their own resources prove to be inadequate to cope with a given situation.

Local governments should be encouraged to enter into formal agreements between and among local governments that they will help one another in case of emergencies such as fires or earthquakes. The conceptual–sociological framework of such a formal agreement (inter-local Mutual Aid Agreement) is the traditional "bayanihan" spirit or community assistance.

The cities in one zone could agree on executing a long term inter-city Memorandum of Understanding authorizing inter-city cooperation in such common actions as inter-city earthquake preparedness planning, other disaster mitigation strategies, and response assistance. The cities would then prepare the implementing operational procedures to be institutionalized at the city level as well as internalized by all staff concerned.

■ Action Plans

- Strengthen MMDCC by updating its structure and organizing and implementing a MMDCC Work Plan
- Update national and Metropolitan Manila level disaster preparedness plans
- Strengthen Incident Command System (ICS) and response decision-making systems

- Encourage inter-local cooperation through zonation of LGUs and Master Mutual Aid Agreements

FRAMEWORK: RMS-6	STRENGTHEN INSTITUTIONAL DISASTER RESPONSE CAPABILITY

■ Understandings/ Concerns:

The need for training and other resources to upgrade the capacities and capabilities of agencies, institutions, and Disaster Coordinating Councils at each level of government is broadly recognized in Metro Manila. There has been little up-to-date guidance or assistance available to institutions and LGUs to aid them with emergency planning, training, procedures, and identification and procurement of needed resources.

■ Basic Policy /Basic Concept of Framework:

1) Encourage local emergency response planning through use of "Earthquake mitigation and response checklists -- local planning guide"

The disaster plans of Metro Manila's cities and municipalities are generally overdue to be updated. The roles and responsibilities of each agency and official must be clearly defined and should be included in checklists of duties of key personnel. Operational priorities should be established as well as the incident command structure (who is in charge). Checklists of actions and responsibilities can greatly facilitate the immediate actions to be taken when a disaster occurs.

A Planning Guide has been produced through the Study through cooperation with the City of Makati to facilitate mitigation and preparedness planning by LGUs and their Disaster Coordinating Councils.

2) Encourage adoption and utilization of an "Emergency response pocket guide" by agencies and LGUs

In addition to the Planning Guide noted above, a model Emergency Response Pocket Guide has been developed with the City of Makati, and it can easily be adapted for use by any agency or LGU by inserting agency- or locality-specific information.

3) Encourage agencies and local governments to inventory response and relief resources and sources and identify needed disaster management tools and equipment

Response and relief resources include financial, institutional, material and technical resources which a local government can avail of during and immediately following emergencies. Local governments should inventory the resources available for use in their area and compile information on how to access them. Resources in general can be either internal within the local government or external which can be provided by outside sources.

- <u>Identify Needed Disaster Management Tools and Equipment</u>

  In order to build capacity for cities and municipalities to respond effectively to disasters, the following should be identified:

  - ✧ Inventory of necessary equipment essential to disaster mitigation which will upgrade city and municipal disaster coordinating council capabilities.

✧ Identification of available local resources and how they may be mobilized in the event of crisis or disaster.

These considerations should be identified based on the Study's earthquake scenario, which identifies a major earthquake's destructive implications to the community.

The C/MDCCc should establish or recommend a standard package of equipment and tools for disaster mitigation for the BDCCs. Thereafter, they should undertake an inventory and determine which BDCCs are up to the established standard package of equipment and tools. Effort should then be exerted to help BDCCs with substandard equipment.

4) Enhance capacity for training emergency response personnel in response and relief functions

To meet the constant need for building local capacity for effectively carrying out response and relief functions, the constitution of a permanent training and exercising coordination cadre is proposed.

■ Action Plans

- Encourage local emergency response planning through use of the Earthquake Mitigation and Response Checklists -- Local Planning Guide
- Encourage adoption and utilization of emergency response pocket guide by agencies and LGUs
- Encourage agencies and local governments to inventory response and relief resources and sources and identify needed disaster management tools and equipment
- Enhance capacity for training emergency response personnel in response and relief functions

FRAMEWORK: RMS-7	DEVELOP OPERATIONS SYSTEMS AND PROCEDURES

■ Understandings/ Concerns:

A large disaster requires a high level of communication and coordination among responding jurisdictions and agencies to effectively save lives and protect property. Most city/municipality DCCs as well as barangay DCCs do not have Standard Operating Procedures to guide them in carrying out critical response and relief functions, nor do they have fully functional Disaster Operations Centers to coordinate inter-agency operations and serve as the focal point for information gathering, analysis, and dissemination.

■ Basic Policy /Basic Concept of Framework:

1) Develop and institutionalize Standard Operating Procedures (SOPs) for key response functions

In a major earthquake or other disaster, it is imperative to have systems in place to facilitate effective response in regard to critical functions such as immediate situation and needs assessment (in order to evaluate needs for services and determine priorities), and organizing resources, staff, and volunteers for search and rescue operations. Standard Operating Procedures must be developed and institutionalized through training and testing in multi-organizational exercises.

2) Develop MMDA Metro Base capabilities for Disaster Operations Center (DOC) operations

MMDA/MMDCC will play an important role in coordinating and managing response to major disasters. During disaster operations, MMDA will receive and disseminate emergency alerts and warnings and coordinate emergency information flow and response activities among agencies, cities and municipalities, keeping OCD informed of situation and resource updates. It also will coordinate and act on mutual aid requests that go beyond the boundaries of any mutual aid zone.

For MMDCC to effectively coordinate disaster situation and response operations information, it must be equipped and its staff prepared to act as a Disaster Operations Center with back-up communications capabilities vis-à-vis the LGUs, NCR agencies, and NDCC/OCD.

3) Establish functional Disaster Operations Centers (DOCs) at city/municipal and barangay levels

DOCs should serve as the focal point for coordination of preparedness, response, and relief activities during a disaster as well as receipt, compilation, and dissemination through the Public Information Officer of information to the public. Standard Operating Procedures need to be developed to guide DOC operations; equipment needs to be procured, and staff need to be trained.

An effective local government Disaster Operations Center is vital in order to ensure disaster response is timely and relevant in terms of control of local disaster management operations, coordination of local resources, and provision of a communication center for coordination with all other relevant agencies.

Action Plans

- Develop and institutionalize Standard Operating Procedures (SOPs) for key response functions.
- Develop MMDA Metro Base capabilities for Disaster Operations Center (DOC) operations
- Establish functional Disaster Operations Centers (DOCs) at city/municipal and barangay levels.

FRAMEWORK: RMS-8	ENHANCE CAPABILITY OF FIRE SUPPRESSION AND HAZARDOUS MATERIAL ABATEMENT

■ Understandings / Concerns:

Metropolitan Manila is estimated would suffer from huge fire-breakout and spreading in the event of earthquake, because of its distribution of wooden buildings and hazardous facilities. About 1,700 hectares of land is estimated would be burned down, leaving 19,300 people killed. On the other hand, fire service capacity is far too short to handle the estimated secondary damage, so that it is required to improve the total capacity of fire suppression and abatement of hazardous materials scattered in Metro Manila.

■ Basic Policy /Basic Concept of Framework:

Effective response to the disaster impact is critical to limit casualties, restore essential life support and community systems, mitigate further damage and loss, and provide the foundation for subsequent recovery. Metro Manila has to respond to the secondary disaster caused by the scenario earthquake, including those caused by hazardous materials such as petroleum, gas, LPG, gasoline, the other chemicals, and so forth. For effective response operation, apart from resources, the following are to be attained.

1) Revise response plan and manual of the relevant organizations

All the related organizations shall review their emergency response plan based on the scenario earthquake. The plans describe: liaison conference of the relevant organizations, establishment of the emergency headquarters, commanding system, emergency summons, emergency deployment, mutual aid etc. A manual of the emergency response operations such as the initial data collection, communication with the relevant organizations, activation of response operations, request of support, collaborative operation with the voluntary fire service teams, etc. also should be established or revised.

2) Enhance information and communication system

Speedy collection and communication of accurate information about the damages are fundamental to respond to the disaster promptly in a proper way. At this moment, Metro Manila does not have an advanced information and communication system that allows effective emergency response. It is indispensable to establish or enhance the information and communication system that link all the relevant organizations and the LGUs.

3) Establish system to request and accept support from outside

In case that the damage within a certain jurisdiction surpasses the existing capability, the related organization will call for fire service and rescue support from outside their jurisdiction. Therefore, the system to request the support from outside is to be established. Such system may be operational with the mutual aid agreement with the relevant organizations and the LGUs.

4) Enhance emergency response operations to abate hazardous material

- Fire services and other public organizations

  Fire related organizations have to enhance their response operations that are described in the emergency plans and manuals of the organizations. To that end, training, disaster drills, morale

raise, and so forth are to be conducted. Fire services also strengthen their capability to treat with fire caused by hazardous materials and chemicals.

- Business establishments

  Business establishments of hazardous materials should review their emergency response plan based on the scenario earthquake.

Action Plans

- Revise the emergency plan and manuals of the relevant organizations
- Enhance of the information and communication systems
- Establish the support request system and conclude mutual aid agreements
- Enhance the emergency response operations of the public organizations and the establishment of hazard materials handling

FRAMEWORK: RMS-9	SECURE EVACUATION ROUTE AND EVACUATION SITES

■ Understandings / Concerns:

Based on the damage estimation, at worst 3.15 million people will become refugees because their loss of the houses due to building collapses and fires as secondary disaster. To accommodate such a large number of refugees, it is a necessity to formulate a plan to secure temporary evacuation routes and sites.

The results of estimated number of building collapses and analysis of fire-spreading show that Manila City will have some 580,000 refugees, followed by Quezon City (524,000)., MarikinaCity (175,000), Pasig City (285,000) , Muntinlupa City (175,000), Taguig City (161,000), which total 1.9 million refugees, 60% of the total refugees estimated. The number of refugees varies among LGUs. The LGUs along the West Valley Fault, Marikina, Pasig, Muntinlupa, and Taguig account for 797,000, the LGUs on the Manila Bay, Manila, Kalookan, Malabon, Navotas, Las Pinas, Paranaque, and Pasay 1,458,000. Also Quezon has 524,000, and Makati 156,000. Despite the number of refugees, there is no evacuation plan for Metro Manila. Therefore, the evacuation plan to guide and accommodate them in the temporary evacuation sites safely, should be formulated in advance.

■ Basic Policy /Basic Concept of Framework:

1) Formulate the land use plan including evacuation sites

Possible evacuation sites of LGUs are illustrated in **the table below**. Taking into account the number of refugees estimated and the existing land use, each LGU should formulate the land use plan including the evacuation routes and sites for the accommodation of refugees in emergency situation. In particular, LGUs with limited open space such as old city areas of Manila city, Pasay city, and Makati city, and the inside Metro Manila area like Pateros, and San Juan, have to formulate an evacuation plan taking the adjacent LGUs into consideration.

2) Ensure evacuation route network

The evacuation route should be planned based on fire-spreading, distribution of hazardous facilities, degree of safety of bridges, accessibility to evacuation sites, etc. The West Valley Fault, running north-south, crosses many of the roads running east-west, and is estimated would destroy and make such roads impassable. The impassability of such roads would isolate Marikina City, because land along the West Valley Fault is obvious escarpment or steep slope. This means a severe limitation on the organized rescue and fire fighting activities from surrounding areas; thereby, it is required to consider countermeasures against it.

3) Disseminate the plan to the pubic

Each LGUs should propagate the evacuation routes and evacuation site to the public and set up the signs of emergency evacuation routes and sites. MMDA will review all the evacuation plans made by LGUs and make a necessary coordination to make them consistent, and formulate the MMDA comprehensive evacuation plan for Metro Manila.

■ Action Plans

- Formulate evacuation sites and plans for the LGUs
- Enhance resources for evacuation

Table Estimated number of Refugees

City/ Municipality	Heavily Damaged Building Number (×1,000)	Partly Damaged Building Number (×1,000)	Partly Damaged Building Number (×1,000) ×1/2	Maximum Possible Burnt out Building (×1,000) (8m/sec)	Total number of unlivable buildings (×1,000)	Total Number of Refugees (×1,000)
	(1)		(2)	(3)	(4)=(1)+(2)+(3)	(5)=(4)×7people
Manila	26.2	51.4	25.7	31.0	82.8	579.9
Mandaluyong	4.4	9.8	4.9	4.0	13.3	93.4
Marikina	15.3	18.8	9.4	0.4	25.1	175.6
Pasig	23.0	25.5	12.8	5.0	40.7	285.1
Quezon	26.9	71.4	35.7	12.3	74.9	524.1
San Juan	1.2	3.2	1.6	1.3	4.1	28.5
Valenzuela	2.4	7.9	3.9	0.7	7.0	48.8
Kalookan	7.2	25.2	12.6	8.2	28.0	196.2
Malabon	4.7	12.3	6.2	7.3	18.2	127.4
Navotas	5.7	11.3	5.6	8.6	19.9	139.6
Las Pinas	6.4	17.3	8.7	1.7	16.8	117.8
Makati	9.2	16.5	8.3	4.9	22.3	156.4
Muntinlupa	13.5	19.0	9.5	2.0	24.9	174.6
Paranaque	9.2	21.1	10.5	3.5	23.2	162.6
Pasay	7.0	13.0	6.5	5.8	19.3	135.0
Pateros	1.7	2.9	1.5	0.5	3.6	25.4
Taguig	11.6	21.3	10.7	0.8	23.1	161.7
Total	175.6	348.0	174.0	97.8	447.5	3132.2

Source: JICA Study

Table Open space area and ratio to the total area of LGUs

City/ Municipality	Total Land Area (GIS, Ha)	Open Area (Parks, Open Spaces)	
		Area (Ha)	Ratio (%)
Manila	4,128	247	6.0
Mandaluyong	1,107	125	11.3
Marikina	2,265	177	7.8
Pasig	3,188	403	12.6
Quezon	16,533	666	4.0
San Juan	588	11	1.8
Valenzuela	4,452	696	15.6
Kalookan	5,312	116	2.2
Malabon	1,596	2	0.2
Navotas	1,095	1,008	92.1
Las Pinas	3,227	667	20.7
Makati	3,196	189	5.9
Muntinlupa	3,813	926	24.3
Paranaque	4,561	593	13.0
Pasay	1,778	353	19.9
Pateros	195	4	1.8
Taguig	2,752	158	5.8
Total	59,786	6,341	10.6

Source: JICA Study

FRAMEWORK: RMS-10	SECURE WATER, FOOD AND OTHER NECESSITIES

■ Understandings / Concerns:

Earthquake disasters destroy the normal life of many people. To maintain their basic life, there must be an emergency service delivery plan for water, food, clothes, drugs and so forth. LGUs before a disaster must estimate the needs of such daily necessities for the emergency situation and stockpile them as much as possible. Many LGUs have no stockpiles at all in preparation for emergency. However, even for some LGUs with stockpiles like Marikina city, which are kept in preparation for flood at present, the amount is small and not enough in case of earthquakes.

Mutual aid agreements between Metropolitan Manila and LGUs outside Metropolitan Manila also need to be concluded. The govenment should be alert to watch and keep commodity prices from being hijacked.

■ Basic Policy /Basic Concept of Framework:

1) Ensure water supply system

It is estimated that water supply pipes of a large part of Metro Manila will be destroyed by earthquake motion, and thereby water supply will become impossible. It is also estimated that the conduit tube from Angat dam would be damaged and water supply to the La Mesa reservoir will be stopped; consequently, Metro Manila will not be supplied with water for a long time. It is imperative to consider emergency water resource security, water treatment system and supply capacity, water supply system, etc. In case of emergency, for the quick recovery of the damaged water supply pipes, it is necessary to set up detailed measures including the stock of pipe materials.

2) Stockpile food

A certain amount of food should be stockpiled based on the estimate number of disaster victims and the estimated requirement per person/day. Food transportation and delivery system should be established including disaster agreements with major distribution companies within and outside Metropolitan Manila in order to ensure smooth food supply. Surveillance system to maintain commodity prices is also required. Special food like milk for babies, food as medicine for disease should be taken into account with emergency medical services.

3) Supply clothes

As for clothes, the LGUs should make an emergency delivery plan of clothes in cooperation with large apparel businesses and the like under an emergency supply aid agreement.

4) Stockpile drugs

A certain amount of drugs should be stocked based on the estimated amount for both ordinary and emergency times. It is also essential review the procurement system of drugs including those from abroad.

■ Action Plans

- Secure the large scale water source
- Formulate emergency supply system of water, food, and other necessities
- Formulate emergency aid agreement

FRAMEWORK: RMS-11	ENHANCE EMERGENCY HEALTH AND MEDICAL RESPONSE SYSTEM

■ Understandings/ Concerns:

Metropolitan Manila is equipped with scant resources and fragmented systems of emergency medical responses to potential consequences after an earthquake. It is urgently necessary to formulate networks for LGUs to help each other and to make a practical multi-layered response structure from local communities to the national level and up to the international level.

■ Basic Policy /Basic Concept of Framework:

1) Increase LGUs' self-contained capability by strengthening mutually supporting networks

LGUs in Metropolitan Manila and adjacent regions will form zones to promote mutual assistance in health sector in order to increase self-help and self-contained capability with the technical support from DOH and MMDA. This will be particularly essential among LGUs in northern, eastern and southern Metropolitan Manila, which have less resources and poorer capabilities. Figure-1 illustrates one of the possible combinations of LGUs and adjacent Provinces.

➢ Internal mutual cooperation among LGUs in Metropolitan Manila

Possible consequences in the aftermath of a disaster, such as total blockage of main roads and disruption of day-to-day EMS, will justify forming zones with a certain level of self-help capability composing several LGUs, in order to accommodate health resources mutually and make preparations together.

➢ Wider area cooperation between LGUs in Metropolitan Manila and surrounding Provinces

New tiers will be set up by coupling the zones in peripheral part of Metropolitan Manila with provinces next to Metropolitan Manila such as Bulacan, Rizal, Cavite and Laguna Provinces, since it is natural to evacuate victims from heavily affected LGUs in Metropolitan Manila to less or non affected areas in provinces. Hence, it is vital to strengthen the hospitals in these provinces in order to increase their capacity to receive victims.

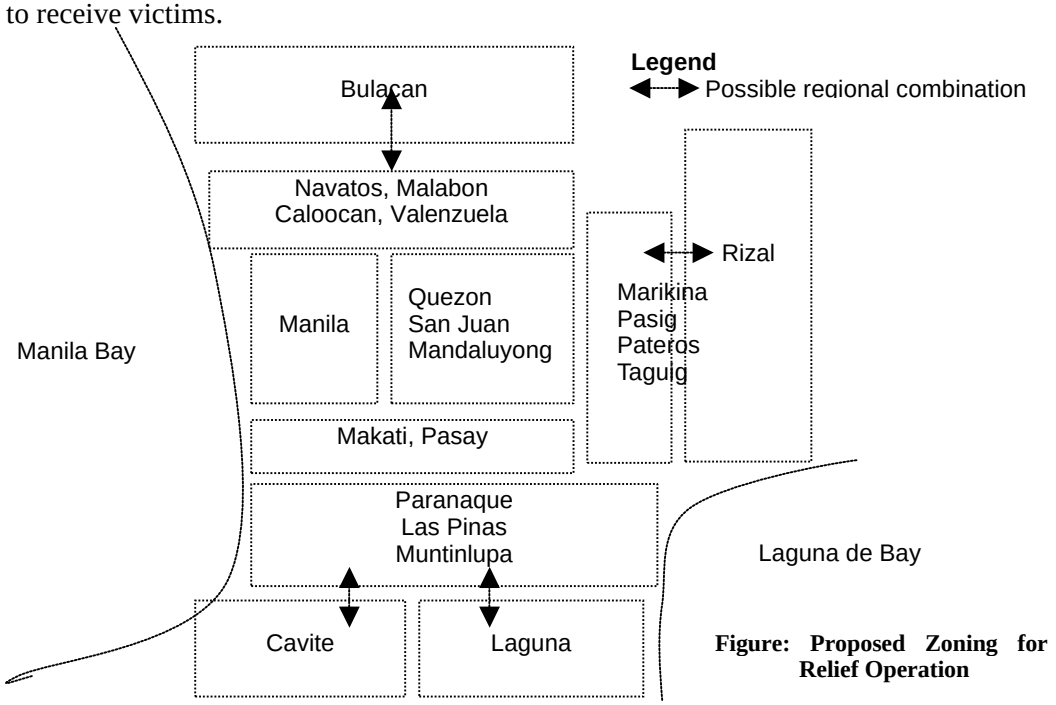

Figure: Proposed Zoning for Relief Operation

2) Organize the Standardized Treatment Procedures based on planned multi-layered structure

In order to manage mass casualties effectively with limited resources, LGUs and DOH will organize multi-layered response system. Essential layers of the system include, community (barangay) level for triage and first aid, city or zone level for in-patient treatment, and Metropolitan Manila and national level (at tertiary hospitals in less or non affected area) for intensive care/surgery.

➢ Establishment of Standardized Treatment Procedures

In order to operate relief activities promptly and effectively, CHO will develop standardized procedures at LGU level with technical support from DOH at Metropolitan Manila level. Plan of response procedures will be formulated by MMDA and include following essential components. Procedures are illustrated in Figure.

- ✧ Community relief activity for search, rescue and first aid
- ✧ Establishing Advance Medical Posts (AMPs) for triage and field care
- ✧ Transportation of the injured
- ✧ Hospital care in the affected area
- ✧ Hospital care in less or non affected area for severe cases
- ✧ Coordination of National/International support organizations
- ✧ Logistics: supply of health and medical necessities

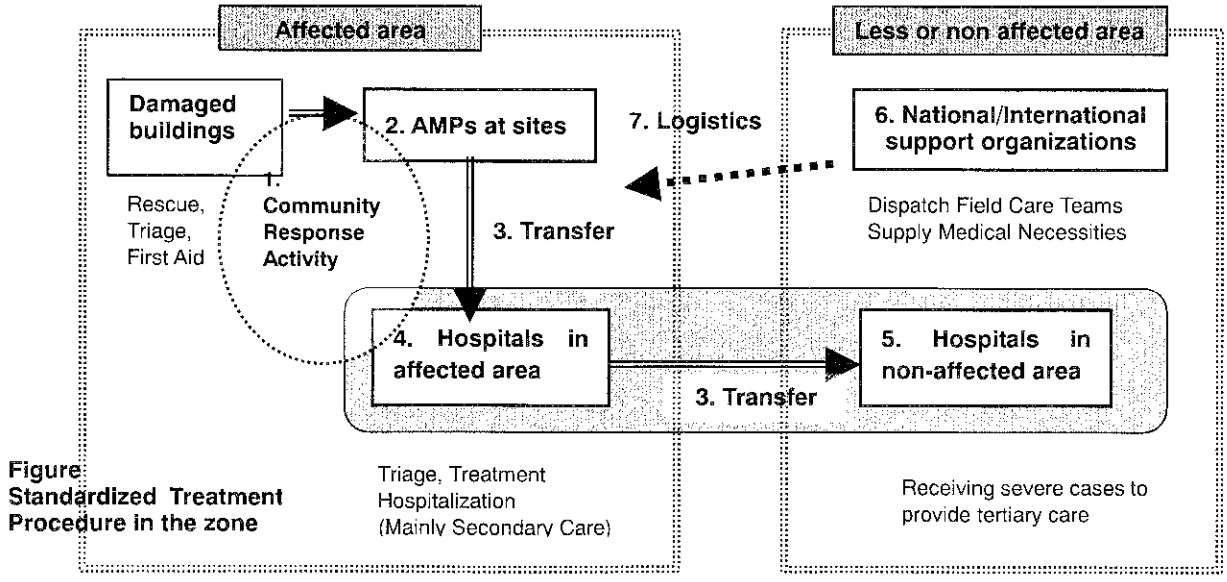

Figure Standardized Treatment Procedure in the zone

■ Action Plans

- Enhance organizational response capacities
- Improve government hospital capacities
- Enforce logistics
- Expand training programs

FRAMEWORK: RMS-12	ESTABLISH EMERGENCY TRANSPORTATION NETWORK

■ Understandings/ Concerns:

Metro Manila has no recognized emergency transportation network among the government agencies. It is indispensable to designate the primary and secondary network of emergency roads in order to do rescue and relief activities, and transport goods, people, etc.

■ Basic Policy /Basic Concept of Framework:

1) Establish Emergency Road Network within Metropolitan Manila

Emergency road network will be propagated by MMDA to MMDCC members and organizations responsible for primary emergency responses (rescue, medical, and fire fighting), in order to respond effectively to the emergency situation in case of earthquake.

➢ Establishment of Emergency Road network

In order to respond to the emergency situations, emergency road networks within the Metropolitan Manila region will be established, and be recognized by the NDCC, MMDCC, and organizations responsible for primary emergency responses (rescue, medical, and fire fighting). Proposed Emergency road network is as shown in Figure.

➢ Use of emergency road network

In order to use the emergency road efficiently, DPWH will be responsible for removing the debris and primary response to the damaged infrastructure on the emergency road network. To investigate the area affected, 17 LGUs are responsible to investigate, and report to DPWH at once.

2) Establish Metro Manila Accessible Network (Land, sea, air and river transportation)

In order to respond to the accommodation of people and commodities, given domestically and internationally, four regions which are likely to be separated, should have any means of transportation network to be accessed, acknowledged, and operated by NDCC.

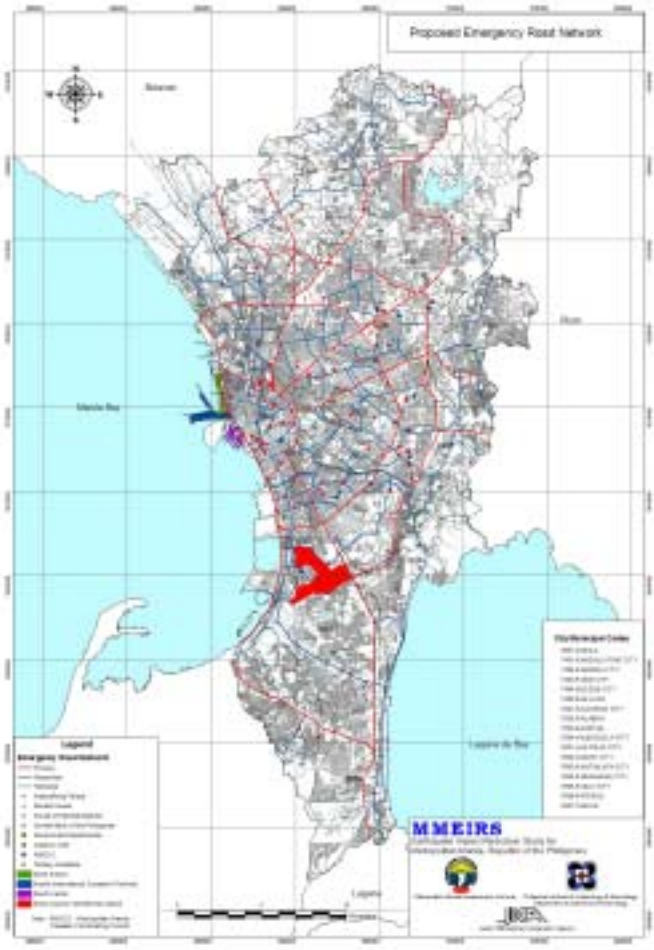

Figure: Proposed Emergency Road Network

- Establishment of Emergency Transportation Network

  Proposed Emergency transportation Network will be informed to all related agencies of NDCC by OCD in order to respond effectively in the emergency situation.

- Operation of Emergency Transportation Network

  To respond appropriately and effectively in the emergency situation, all NDCC agencies will be assigned for certain responsibility. However, this is not decided, and thus, it has to be considered. This will be organized by OCD.

Action Plans

- Establish emergency road network
- Arrange machineries to DPWH for emergency road response
- Secure road between Batangas port to Metropolitan Manila south region
- Convert one portion of Manila port to earthquake resistant construction
- Secure road between Subic port/ Clark field to Metropolitan Manila north region
- Construct Laguna de Bay northern shore uploading facility
- Secure Ninoy Aquino airport functions

FRAMEWORK: RMS-13 ESTABLISH SEARCH AND RESCUE SYSTEM

■ Understandings / Concerns:

Search and rescue after disaster is a major determining factor to reduce the number of casualties. Accordingly, it is very vital to enhance community capability for search and rescue in the early stage. It is also indispensable to increase the organized search and rescue capability such as fire services, and to procure the necessary equipment, develop the search and rescue system including maintenance of order and morale by regular trainings and drills. Moreover, because it is essential to accept aid from abroad in case of major disaster, training to work with international aid agencies is also mandatory. However, national, regional and city/municipal governments neither have well-organized search and rescue structure, nor recognize its necessity.

■ Basic Policy /Basic Concept of Framework:

1) Enhance the community capability of search and rescue

Search and rescue after the disaster will firstly be carried out by community near the damaged buildings. People will search and rescue their families and neighbors, confirming whether they are alive. However, the search and rescue at community level is limited. In particular, the search and rescue that requires heavy machines to remove the heavy building debris, or cutters for iron bars, thereby waits for an organized rescue team like fire service teams or others who are equipped with such search and rescue tools and equipment. For instance, in case of the 1995 Kobe earthquake, most of the people who survived, escaped by themselves, or were rescued by community people, while only around 10% of the total rescued were by the organized rescue teams. This demonstrates that the community is very necessary and effective in search and rescue operation. Thus, it is favorable to equip communities with a set of rescue tools of chain saw, concrete cutter, crowbars, wire rope, shouldering sticks, clippers, jack hammers, pincers, handsaws and abaca rope, and conduct regular training prior to a disaster.

2) Enhance the organized system of training and procurement of equipment

The organization responsible for organized rescue operation such as fire services should establish staff training and procure state-of-the-art equipment for rescue under the difficult conditions, and maintain order and morale of staff.

3) Establish community-based search and rescue structure

Community people have contributed considerably to search and rescue activities in many earthquake disasters. They sometimes perform better than the uniformed rescue squads. From this point, for better search and rescue activities, it is better to form a community-based search and rescue structure, which has a barangay hall as operation center.

■ Action Plans

- Develop capacity of search and rescue system
- Enhance community search and rescue system
- Establish the system to accept international emergency aid

FRAMEWORK: RMS-14	ESTABLISH INFORMATION AND COMMUNICATION SYSTEM

■ Understandings / Concerns:

A large amount of emergency communication traffic is generated temporarily in case of major earthquake disasters. It is estimated that this causes overflow of capacity and communication will become impossible. Damaged communication facilities or electric power failure will hamper the emergency communication and lead to a chaotic situation. Therefore, it is imperative to set up a disaster information and communication system that can collect the necessary damage information and deliver emergency response commands and other information. Particularly, establishment of the communication network to link the relevant ministries, city/municipalities, and barangays is required.

Such an information and communication system will allow adequate emergency rescue operation to reduce the number of fatal human casualties, give prompt medical treatment, and to support effective rescue operation. And the emergency disaster public information system of TV and radio broadcasting stations should be reviewed and measures should be drawn up. The confirmation system should inform about the safety of the disaster-hit people.

Presently, OCD, which is the central organization of NDCC, is deploying an information communication system to link with its 16 regional centers. Its headquarters is located in Quezon City. OCD is also establishing GIS and constantly connecting an internet system with the regional centers. However, because OCD has put priority on hurricane and flood disasters, and NCR (Metro Manila) has paid less attention to the establishment of this disaster management information system. Among the members, LGUs of NCR do not have a unified information system and they use radio system when communication is necessary.

■ Basic Policy /Basic Concept of Framework:

1) Ensure quick collection and delivery of damage information

It is indispensable to establish an information system to collect the damage information quickly and deliver it to the relevant organizations quickly. Accurate damage information on what, where and how is the minimum required for the command center to make decisions on response and countermeasures. Accurate information allows effective resource allocation in the emergency situation. To that end, all the levels of community, barangay, and LGUs, collection and delivery system of information should be established. Training also is pivotal to have the system to function well in an emergency.

2) Establish emergency information and communication network system among LGUs, fire services, police, MMDA, and national organizations

It is critical to establish a stand-alone emergency information and communication network system to link NDCC as the national emergency decision making organization, MMDCC as the Metro Manila emergency decision making organization, the LGUs, the fire services and police as emergency response organizations, in order to collect the necessary information from the LGUs and transmit it to the related organizations.

3) Establish Disaster management center and enhance the existing function

The emergency information and communication systems need to function effectively with the disaster management centers of the LGUs and the national disaster-management-related organizations. The

staff of the centers should be well skilled and be prepared to collect and deliver the information even during ordinary times. It is particularly required to establish a comprehensive disaster management system including a disaster management center function with the information and communication system that enables the 24-hour operation between MMDA and the LGUs. Although OCD has a disaster management center in operation, its information system is, because of its very limited capacity, incapable of functioning in case of large disasters. Therefore, it is mandatory to enhance the function of the existing system and to integrate the MMDA disaster management center and the OCD system into a network including information and communication system for effective disaster management of Metro Manila.

4) Establish the aerial information collection system

At the same time as the establishment of the disaster management center, the information collecting system should be set up. When it comes to information collection from the areas inaccessible due to the fires or the hazardous materials, aerial information collection system using helicopters or airplanes is required. Information collection system by video cameras or the like should be equipped in helicopters and airplanes. The aerial system is required to be available for 24 hours if necessary.

5) Establish information system on public relations and individual safety confirmation

Information on the safety of disaster victims and wide-area information should be sequentially delivered through televisions, radios, and newspapers. Delivery of accurate information to the public is considerably important for the restraint of social disorder and groundless rumors, and the maintenance of orderly daily life of the people. Thus, the related organizations are to discuss how to deliver the information and make public announcement in case of major earthquakes and draw up measures to take. At the same time, delivery method of the information of the safety of the disaster victims should be discussed.

■ Action Plans

- Develop disaster information and communication system connecting MMDA, LGUs and barangays
- Establish a disaster management center

FRAMEWORK: RMS-15	ESTABLISH GEOGRAPHIC INFORMATION SYSTEM (GIS)

■ Understandings / Concerns:

GIS database of the existing various information of Metro Manila is very useful to formulate the disaster management plan and countermeasures at ordinary times, and response and command in case of emergency. The database may include transportation network, distributions of buildings, hazardous facilities, public facilities, schools, and hospitals, water supply system network, population, geographic information, topographic conditions, public administrative boundaries, and so on.

The JICA's MMEIRS developed the GIS database covering the whole Metro Manila. Based on the JICA database, each LGU must update the information necessary for the disaster management. It is necessary to establish disaster information network system for effective disaster information collection and disaster management measures by data sharing among the fire services and MMDA.

■ Basic Policy /Basic Concept of Framework:

1) Establish LGU-unit disaster information database

This database serves as the base of information to draw up disaster management measures for Metro Manila. JICA's MMEIRS has developed 1:5,000 base maps and orthophotos. The GIS database includes basic urban information on topography, geology, land use, buildings, hazardous facilities, infrastructure, lifelines, population, administrative jurisdictions, etc. Each LGU is required to update MMEIRS-based database with its own precise disaster relate data and establish its own disaster information database.

2) Standardize database

Disaster information systems for the LGUs should be established and integrated into a unified Metro Manila system, based on standardized map scale and data formats. MMDA should coordinate on the necessary matters for that purpose. Especially, it is essential to include barangay and other administrative boundaries and have them consistent with NSO data. Furthermore, it is vital to prepare a manual about data items of the database in coordination with the LGUs.

3) Share the database

The developed database should be networked and shared not only with the LGUs and MMDA, but also with the other relevant organizations such as fire services, police, OCD, and PHIVOLCS.

4) Maintain and update the disaster information database

The established database should be updated promptly to reflect changes to METROPOLITAN MANILA, particularly important are the changes in distribution of population, land use, distribution of buildings, structure of buildings, and building usage.

5) Develop the data analysis system

To use the database for various purposes, it is necessary to develop applications to analyze regional characteristics. Applications should be developed to analyze spatial characteristics from the point of

view of urban planning and urban disaster management and to store the analysis results in map and spreadsheet formats.

Action Plans

- Develop geographic information database for disaster management
- Train LGU staff on GIS database and information & communication systems

FRAMEWORK: RMS-16	MANAGE EMERGENCY PUBLIC INFORMATION

■ Understandings/ Concerns:

It is the responsibility of government to provide complete and accurate information to the public regarding disasters, and to do this, it must establish appropriate policies and protocols for cooperation with the media and create an atmosphere conducive to media participation in all phases of disaster management. Without these actions, life-saving information may not be communicated to potential disaster victims and rumors and false information may spread.

■ Basic Policy /Basic Concept of Framework:

1) Promote adoption and implementation by local governments and agencies of the Guide for Managing Information concerning Disasters

During the Study, the need for a guide to assist local governments in managing information concerning disasters was identified as a high priority. Therefore, a model guide has been developed to provide guidance to local governments and institutions on appropriate policies and actions they should take to ensure the public receives accurate and timely information concerning how they can protect themselves from earthquake and other disaster impacts.

2) Establish partnerships with the media for awareness raising and emergency public information

There are two major aspects of a disaster-related public information program, and the media play a pivotal role in both:

- Public Information for Prevention and Mitigation

  There is need for a continuous campaign of public information dissemination through the various media including television, radio, and print media. This may include television and radio spot commercial and disaster-oriented dramas or games, pamphlets and brochures, newspaper inserts, etc.

- Public Information for Response in case of Emergency

  Emergency public information corresponds to agreements, procedures, and protocols designed to evoke an appropriate public response in the face of a disaster or the threat of disaster. In a disaster, the media will perform an essential role in providing emergency instructions and up-to-date information to the public. However, due to loss of power, communications capabilities, or broadcasting or transmitting facilities, some media may be off the air for hours or even days after the earthquake.

■ Action Plans

- Promote adoption and implementation by local governments and agencies of the Guide for Managing Information concerning Disasters
- Establish partnerships with the media for awareness raising and emergency public information