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Users Handbook

Designing Resilient Structures

Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in Local Design Practices

DILG

Australian Aid

This report was prepared by Xiaoming Wang, Chi-Hsiang Wang, Yong Bing Khoo and Connie B. Morga, with technical advices from Mark G. Stewart. The project is co-funded by the Department of Foreign Affairs and Trade (DFAT), Government of Australia and the Commonwealth Scientific and Industrial Research Organization (CSIRO).

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Background

Build Back Better (BBB) principle was introduced by the Government of the Philippines (GOP) in the Reconstruction Assistance on Yolanda (RAY) to prevent the unending cycle of destruction and reconstruction.

For the RAY Infrastructure Cluster, BBB means the upgrading of minimum performance standards and specifications for the design and structural components, as well as materials, for public infrastructure such as schools, public markets, municipal/city and community halls, bridges, etc. (OPARR, 2014).

The Recovery Assistance on Yolanda-DILG (RAY-DILG) Fund has been used to support efforts for the rehabilitation and/or reconstruction of LGU-owned buildings and facilities essential to reinstate regular local government operations and services in the 171 cities and municipalities in 14 provinces in 6 regions identified as the most affected areas.

Under the RAY-DILG Fund, the LGUs will implement the subprojects under rehabilitation and repair of partially-damaged LGU-owned facilities and structures. Over the years, the DILG has supported the LGUs in constructing facilities and structures that are essential in local government operations, provision of social services to the public and socio-economic activities in their localities. This has occurred through its various projects namely Payapa at Masaganang Pamayanan (PAMANA), Bottom-up Budgeting (BuB) and Performance Challenge Fund (PCF).

The Comprehensive Land Use Plan is a vital tool that has been guiding LGUs in local development and public infrastructure planning. The latest Comprehensive Land Use Plan Guidebook (2014) includes the Supplemental Guidelines on Mainstreaming Climate Change and Disaster Risk. This guides the LGUs in analyzing the implications of hazards and climate change in the various development sectors and subsectors including public infrastructure. The information generated from the analyses becomes the basis, not only of the optimization of land allocation to various uses, but of sound information for spatial planning and more specifically in locating public facilities.

The challenge in rehabilitating and building new public infrastructure is also to give due consideration to Build Back Better by making them more resilient to disasters. In this regard, there is a further need to have even more details on how public facilities should be designed to address BBB.

Objectives

The handbook intends to:

1. Supplement the government's efforts in preparedness for extreme events and climate change, through the enhancement of the design of built assets capable of withstanding the increasing impacts of extreme hazards under changing climate.

2. Introduce risk-based knowledge in developing resilient structures to reduce disaster risks and enhance adaptive capacities of structures.

3. Support LGUs by taking into account disaster risk management and climate adaptation for the design of resilient structures (buildings and infrastructure), in addition to the minimal safety and service requirements of the National Structural Code of the Philippines (NSCP), as well as other standards and technical guidelines.

4. Advance the practices of resilient structure design in local governments that generate long-term benefits greater than the adaptation costs for local communities.

5. Provide an option of measurement on the aspect of enhancement in reconstruction performance for the Build Back Better (BBB) principle.

Message from the Secretary

As we face greater challenges in adapting to climate change, there is a pressing need to better support local government units (LGUs) in ensuring that key local government centers and facilities are intact to sustain the delivery of services even in the occurrence of extreme climatic events. This Users Handbook on *Designing Resilient Structures: Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in Local Design Practices* seeks to contribute to this endeavor.

Through this technical handbook, we expect a paradigm shift towards a scientific-based approach in designing local structures. This informative material aims to provide guidance and recommend resilient structural designs for LGU facilities to better withstand the debilitating impacts of natural hazards and to facilitate quick return to normalcy after their occurrence.

We therefore urge our local leaders and functionaries as well as our various stakeholders to take advantage of the practical strategies and crucial innovation being put forward in this handbook that can counter the never ending cycle of devastation and reconstruction.

Our sincerest thanks and congratulations to our partner agencies: the Australian Aid, Department of Foreign Affairs and Trade (DFAT) for their support; the Commonwealth Scientific and Industrial Research Organization (CSIRO) for their invaluable contribution; the Local Government Units (LGUs) that participated in the consultations and test cases; and, the Department of Public Works and Highways (DPWH) and other agencies that provided inputs for the completion of the handbook.

May this handbook truly serve its purpose of helping communities Build Back Better and build stronger structures that can weather any destructive calamity, as we continue to embark on our journey of fostering a culture of preparedness and safety.

MEL SENEN S. SARMIENTO

Message from the Undersecretary

The country has been visited by numerous typhoons resulting in flooding and landslides that had claimed lives, damaged properties and destroyed local infrastructures and facilities. An average of 22 typhoons per year in the Philippines is no mean feat. Because of these, we need to be resilient as a country and as a people.

Although, we have proven that time and again, we can manage to bounce and Build Back Better, there is no recourse but to adopt a more proactive stance against the adverse impacts of natural calamities which can be mitigated through more resilient design of structures, buildings and facilities.

This technical handbook on Designing Resilient Structures: *Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in Local Design Practices* recommends innovations intended to influence local design practices to pursue more resilient and greener designs suitable to our country's topography.

The handbook does not intend to replace existing standards as provided for in the National Structural Code of the Philippines (NSCP) but rather, seeks to increase awareness of engineers both in private and public practice as well as the local government units (LGUs) on resilience factors in local structure design as it builds on scientific data and climate change projections.

The Department, through this technical handbook, puts forward a reference material for our LGUs in designing local facilities to reduce vulnerabilities of infrastructures to climate-related risk and extreme events.

We encourage you to consider the guidance and applicable recommendations set forth in this handbook as we attempt to continuously introduce new approaches and perspectives to help improve systems and practices to protect communities.

AUSTERE A. PANADERO

Message from the OIC-Director, Bureau of Local Government Development

The development of the Technical Handbook on Infrastructure Resilience was an innovative evolution from the time it started in January 2015 until its finalization in July 2016. It was a document that originally stemmed from the need to have a reference guide for evaluating standard costs of proposed local infrastructure projects and facilities to be funded under the Performance Challenge Fund (PCF). It evolved as the Department proposal merged with the donor country's research priority and thematic focus on Disaster Risk Reduction and Climate Change Adaptation (DRR-CCA).

The end output was something quite innovative. The introduction of resilience factors derived from a statistical analysis of extreme natural hazards and likely climate change effects provided a basis for designing structures that meet the requirements for enhanced performance. With the uncertainties brought on by climate change, scenario-based planning and risk-based designing is indeed increasingly becoming more relevant.

We hope that this will be put to practical use by local engineers and LGUs in the design of their local building construction projects. Beyond project end, we hope that the worth and importance of risk-based designs gain broad-based acceptance and that this handbook could provide valuable inputs to the review of the National Building Code (NBC).

In behalf of the Bureau of Local Government Development (BLGD), we extend our deep appreciation to the Australian Aid, Department of Foreign Affairs and Trade (DFAT); the Commonwealth Scientific and International Research Organization (CSIRO); the Department of Public Works and Highways (DPWH); and, the Local Government Units (LGUs) and the National Government Agencies (NGAs) that participated in the development of the handbook. Without your support, this handbook could not have been completed.

ANNA LIZA F. BONAGUA, CSEE

Message from the Undersecretary for Technical Services

Congratulations to the men and women of the Department of the Interior and Local Government (DILG), Australian Aid, Department of Foreign Affairs and Trade (DFAT), the Commonwealth Scientific International Research Organization (CSIRO) team, and the Bureau of Design of Department of Public Works and Highways (DPWH) who ventured in the collaborative development of the handbook entitled *Designing Resilient Structures: Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in Local Design Practices*.

Recent unfortunate events have pushed us to become more socially aware on disaster preparedness.

It is acknowledged that with the increasing intensity and occurrence of extreme events, structural designs should indeed be fortified and strengthened.

The handbook focuses on risk-based design which is quite new to the Philippines as it recommends resilience factors that seek to increase integrity and performance levels of structures. The science-based derivation of resilience factors highlights the need take stock of the current assumptions of the National Structural Code of the Philippines (NSCP) in consideration of the new normal.

With Climate Change comes the advent of a new normal that ushered in a rethinking of adaptive designs to mitigate and reduce the crippling effects of extreme events on public infrastructure particularly for critical facilities and lifeline infrastructure that should be kept operational to maintain access to services, facilitate relief operations and early recovery.

The publication of such seminal work provides a useful reference for the ongoing review of the National Building Code of the Philippines (NBC).

We hope that this publication will challenge and inspire our Engineers' to rethink construction and standard design practice that has implications in ensuring safety of individuals housed inside these structures and in saving precious lives.

RAUL C. ASIS

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Acronyms

ARI	Average Recurrence Interval
BBB	Build Back Better
BuB	Bottom-Up Budgeting
CCA	Climate Change Adaptation
CLUP	Comprehensive Land Use Plan
DILG	Department of the Interior and Local Government
DRR	Disaster Risk Reduction
GOP	Government of the Philippines
LGU	Local Government Unit
NBC	National Building Code
NDRRM	National Disaster Risk Reduction and Management
NDRRMP	National Disaster Risk Reduction and Management Plan
NSCP	National Structural Code of the Philippines
PAMANA	Payapa at Masaganang Pamayanan
PCF	Performance Challenge Fund
PGA	Peak Ground Acceleration
RAY	Reconstruction/Recovery Assistance on Yolanda
RCP	Representative Concentration Pathway
SRTM	Shuttle Radar Topography Mission

1 Principles and Approaches for Resilient Structure Design via Risk Management

The handbook makes use of risk-based knowledge to develop structural design approaches for enhanced resilience performance of structures subjected to extreme events of winds, earthquakes and floods. The developed resilient structural design approaches constitute a supplement to the government's efforts for disaster risk reduction and climate change adaptation by way of risk management framework. This chapter briefly introduces the principles of risk management and the role of the developed resilience design in the framework. Chapter 2 presents the developed resilience design approaches for winds, earthquakes and floods, and Chapter 3 provides two illustrative examples to show how the resilience design could be applied in practice.

1.1 What is Risk?

Risk is generally expressed by the multiplication of the consequence of an event and the likelihood of the event occurrence[1], or simply described by

Risk* = *Likelihood* x *Consequence (1-1).

In more details related to natural disasters, the event is considered as a ***Natural Hazard***, such as a typhoon, earthquake and flooding. The consequence is considered as the result of the impacts of the hazards, often in monetary terms of damages or loss related to specific assets as well as non-monetary terms such as fatalities. In practice related to built assets, the '***Consequence***' is determined by both the likelihood of exposure of assets to natural hazards as well as their vulnerability to the hazards. In this regard, the risk can also be described by

Risk* = *Likelihood of Hazard* x *Likelihood of Exposure* x *Vulnerability of Assets (1-2).

Risk is the combined effect of hazards (H), exposures (E), and vulnerability (V) of the assets of interest, as shown in Figure 1-1.

Vulnerability is deemed here to be the susceptibility of the assets of interest and measured as a likely loss, to a given degree of a hazard. For physical assets, vulnerability can be described by the loss of functionality, serviceability or/and integrity of the assets. It is often represented by a monetary measure, although other measures may be used, for example, building structure damage in association with wind speed, flood depth, ground peak acceleration of earthquake. Vulnerability assessment is the key step to understanding how an asset functions given its exposure to hazards.

[1] AS/NZS ISO 31000:2009, Risk Management – Principles and Guidelines

The degree of vulnerability is closely related to the capacity of assets. The ***Capacity*** is considered to be an inherent system property, the ability to withstand or accommodate expected (future) adverse hazard impacts without loss of its functionality and integrity. For example, the ability of a structure to resist earthquake ground motions without collapse, and the ability of a roof to withstand wind velocity pressure without being up-lifted.

Measuring risk in (1-1) and (1-2) can be carried out by either qualitative or quantitative approaches. It can be measured in terms of potential loss against hazards considering various uncertainties. Quantitatively, it is often expressed as an average loss as a result of impacts of the hazards at scales ranging from very frequent to very rare events. The loss is normally related to economic loss, but it could also be described as broader socioeconomic and environmental loss, as shown in Figure 1-1.

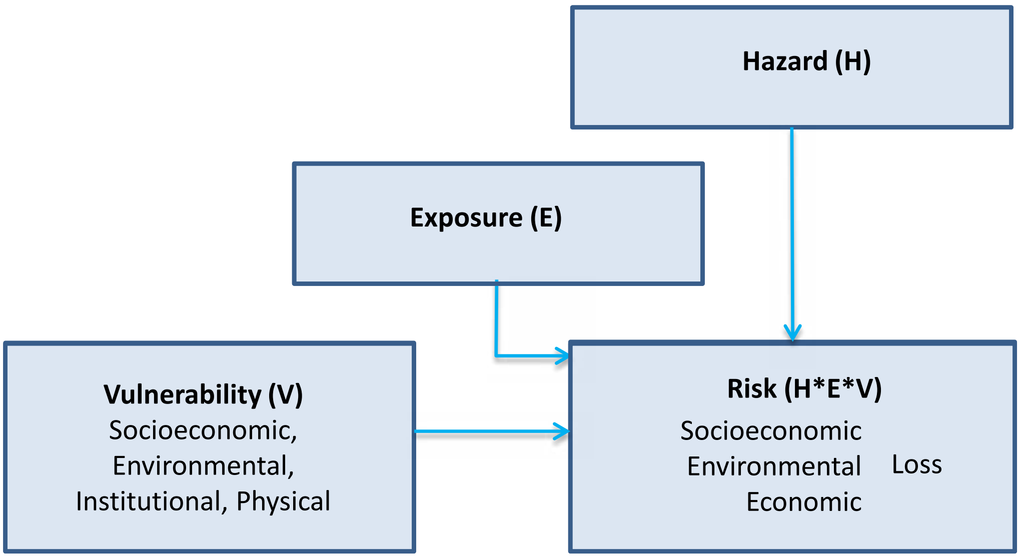

Figure 1-1 Risk assessment for climate change and natural disasters.

1.2 Risk Management Principles for Resilience

In general, climate adaptation and disaster risk reduction for resilience can be implemented through three risk-reduction-based principles:

1. Reduce the vulnerability of assets to hazards at relevant spatial and temporal scales;
2. Reduce the occurrence of and asset exposure to hazards, even though reducing the occurrence of hazards is often unachievable; and
3. Reduce the residual adverse consequences as a result of the impact of hazards.

More specifically, disaster risk reduction can be achieved through three risk management steps as shown in Figure 1-2, i.e. risk minimisation, risk sharing, and impact management.

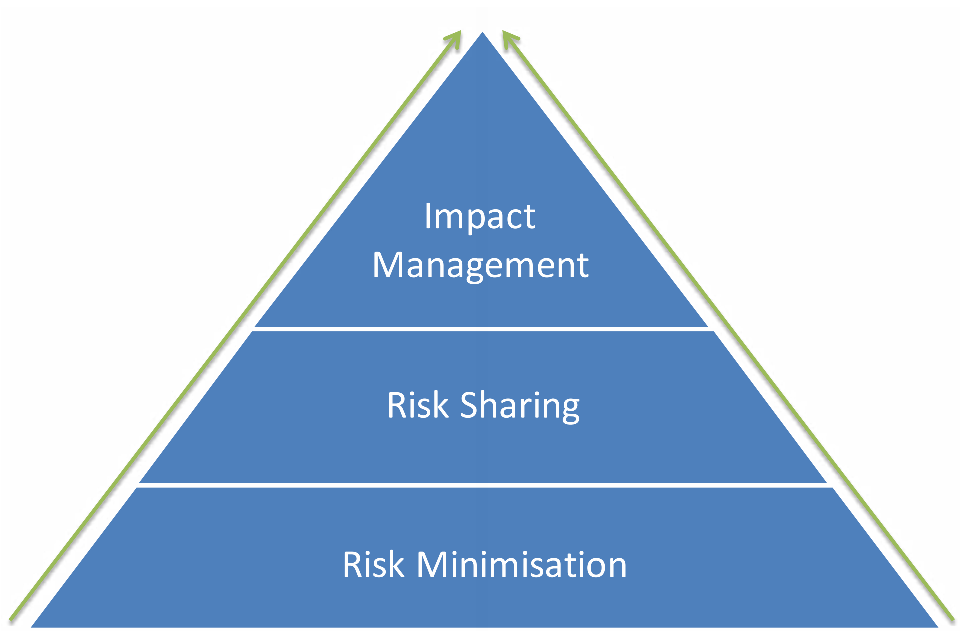

Figure 1-2 Three steps of risk management for climate adaptation and disaster risk reduction for enhanced resilience.

Risk minimisation can be attempted either by reducing the likelihood of hazard occurrence or reducing adverse consequences as a result of the hazard impact. For example, as shown in Figure 1-3, the strategies to minimise risks to climatic change and disasters can be summarised as follows:

- Reduce carbon emissions to minimise the likelihoods of climate change and associated climate extremes;
- Reduce the consequences of climate change directly by mitigating hazards due to climate change. Note that, although it is not always possible to reduce a climatic hazard, in some cases the hazard can be reduced, for example, reducing the effects of a heatwave hazard through green infrastructure development;
- Reduce the likelihood/extent of exposure to climatic hazards, such as by land use planning, to limit any building construction in low-lying areas, establish seawall protection, and retreat from high hazard areas;
- Reduce the consequence of hazard impacts by reducing the fragility or vulnerability of assets or increasing their capacity to withstand the impact of hazards, such as increasing the strength of construction materials; and
- Reduce the likelihood of indirect loss as a result of direct impact damage, such as through building community capacity, immunizing coastal infrastructure systems from cascading effects, developing emergency management, and better relief and recovery plan.

Figure 1-3 also illustrates the stages at which the current policies and regulations could be implemented to minimise risks, for example: the National Framework Strategy for Climate Change

(NFSCC) and the National Climate Change Action Plan (NCCAP); land use-related policies; the National Disaster Risk Reduction and Management Framework (NDRRMF) and the National Disaster Risk Reduction and Management Plan (NDRRMP); National Building Code (NBC) and the National Structural Code of the Philippines (NSCP); and the National Security Policy.

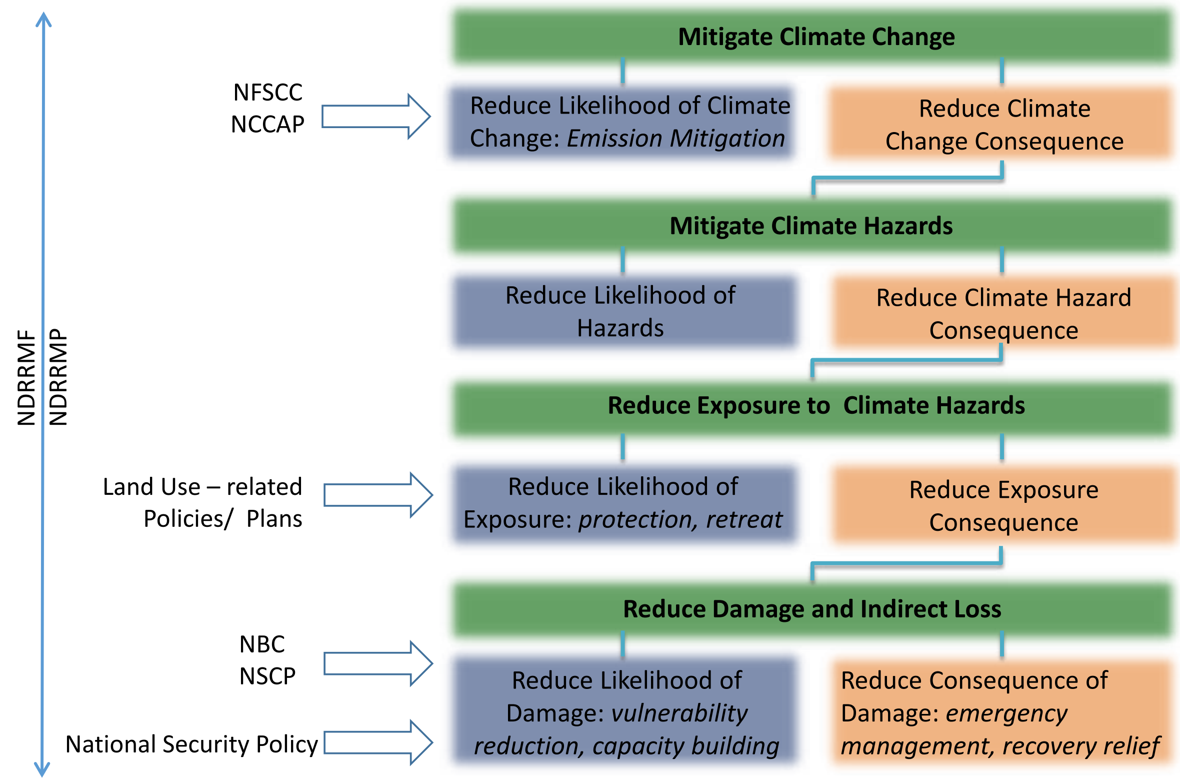

Figure 1-3 Approaches in risk minimisation and the focus of the current policies.

It should be emphasised that, while there are many approaches for disaster risk reduction, as indicated in Figure 1-3, 'Build Back Better' can be implemented to reduce current and future risks, as shown in Figure 1-4. It can be further advanced through various means (e.g. BBB Manual, NBC and NSCP, NDRRMP and NCCAP) that permeates and exerts influence on available information, enforced practices and governance systems, processes and structures ultimately contributing to reduced current and future risks as it relates to infrastructure performance.

This handbook not only aims to provide information and guidance but it also seeks to influence enforced practices and decision-making processes as it promotes risk-based infrastructure design for more resilient structures.

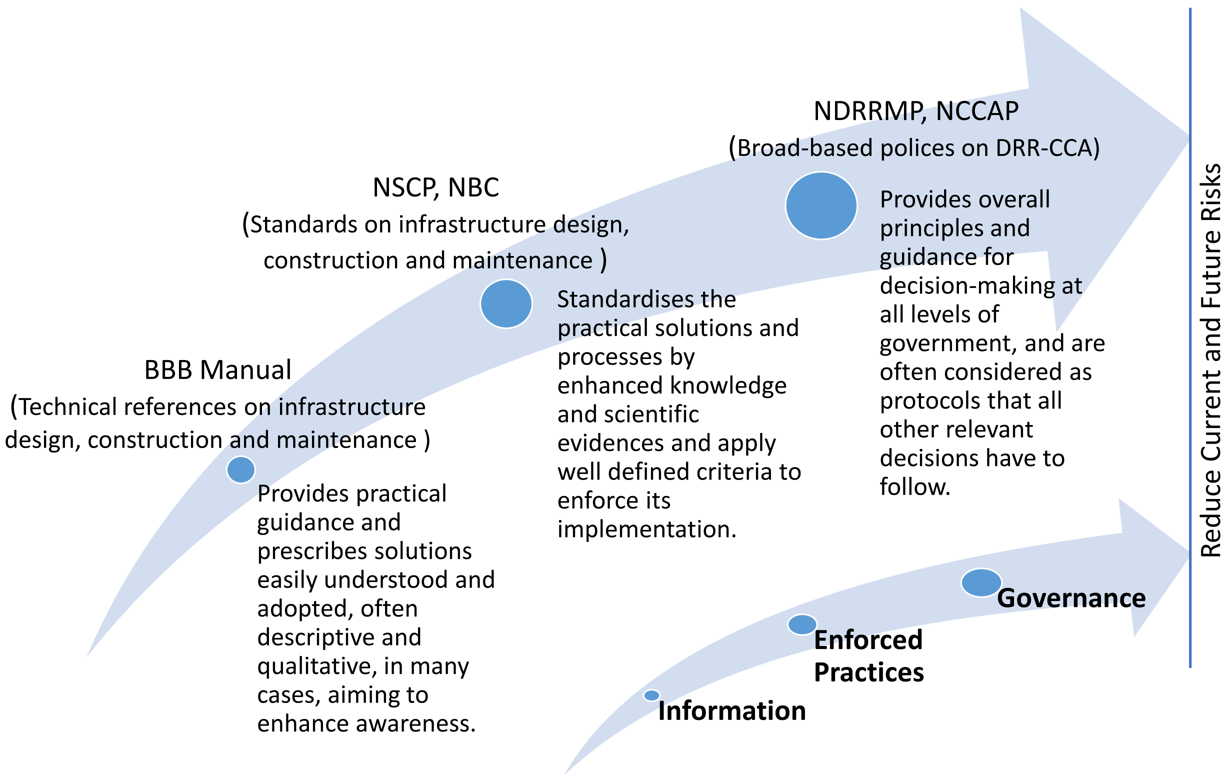

Figure 1-4 Means of promoting Build Back Better to reduce current and future risk.

1.3 Development of Resilient Structural Design

This resilient structural design handbook aims to mainstream disaster risk reduction and climate change adaptation into local building design practices for local government, to minimise current and future risks by reducing vulnerability and increasing capacity of local government built assets through enhanced design. It is one of the approaches for reducing damage and indirect loss in the risk minimisation described in Figure 1-3.

The resilience design in the handbook also aims to offer quantitative measurement for the implementation of 'Build Back Better' principle. It provides additional measures that align with the NSCP requirements, which could potentially support practices that enhance the resilience of the built assets of local government. It sits within the enforced practices level in climate adaptation and natural disaster risk reduction, indicated in Figure 1-4.

In general, to fulfill all performance requirements defined by the NSCP, a building structure must have sufficient reliability, which is in association with the failure probability or capacity exceedance probability. The lower the failure probability, the higher the reliability.

In the handbook, the performance requirements defined by the NSCP will be enhanced by demanding designed structures that meet a higher degree of reliability for resilience. This can be achieved by increasing the basic design load specified in the NSCP.

The ***basic design load*** is normally defined in terms of the minimum severity of a hazard that the designed structure should be able to withstand, for example, in terms of design wind speed and seismic peak ground acceleration.

The severity can be expressed by the ***Average Recurrence Interval*** (ARI) or ***Return Period***, which is the average time period for a specified severity of hazard to recur. The reciprocal of ARI, or 1/ARI, is known as the ***Exceedance Probability***, the probability of hazard events larger in severity than the event corresponding to the ARI. The relationship between hazard severity and ARI is called as ***Hazard Curve***, as shown in Figure 1-5. The hazard curve can be modelled on the basis of historical observations fitted by a probability distribution function. The hazard severity of very large ARI events is normally extrapolated from the models. It is important to select a distribution function that fits the collected data correctly and in accordance of the knowledge of the physical phenomena.

With the aid of hazard curve, a modified basic design load can be proposed with respect to the hazard severity of a larger ARI or lower exceedance probability for resilient structural design. This is fulfilled by the consideration of a ***Resilience Factor*** as a multiplier to the basic design load specified in the NSCP. It can be generically described by

Modified Basic Design Load = K_R X ***NSCP Basic Design Load*** (1-3)

where K_R is the resilience factor.

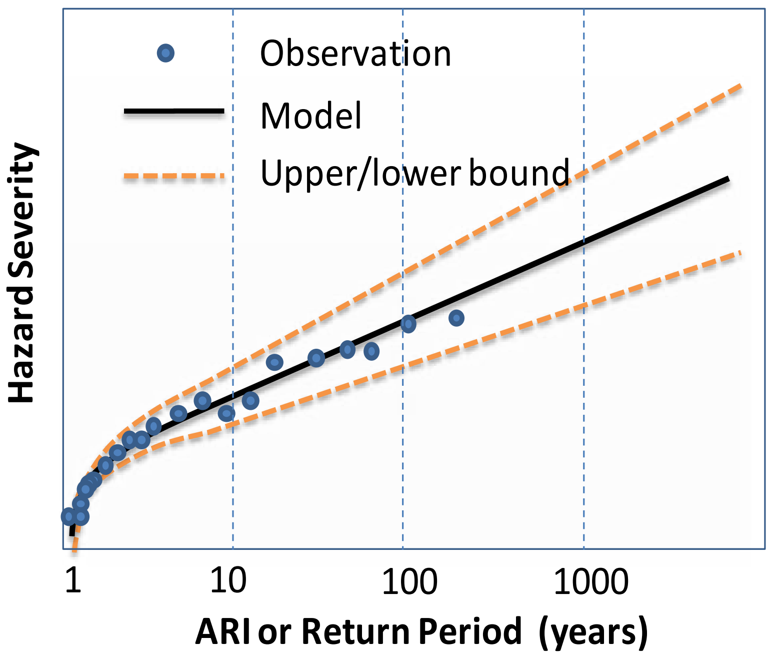

Figure 1-5 Description of a Hazard Curve.

The enhanced design for resilience is likely to incur an additional cost. Therefore, it is important to choose a reliability level that considers the ***cost-effectiveness*** - which means to build an asset for less cost, or for more benefit in the long term than the cost of an asset designed without consideration of enhanced resilience.

1.4 Cost-Effective Resilience Design

As shown in Figure 1-6, increased hazard, exposure and vulnerability lead to a higher risk (represented by a '+'). Meanwhile, resilience design can reduce the vulnerability (represented by a '-') leading to risk reduction; which is one of the interventions to reduce the risk of built assets to hazards, such as wind, flood and earthquake described in this handbook.

While a resilience design can generally improve the performance, it may also result in an increased cost in comparison with the standard design that complies with the NSCP. A proper resilience design should lead to the total increased cost, less than the total gained benefit. More strictly speaking, the probability of the total increased cost, less than the total gained benefit should be high.

While there have been many discussions on how to properly quantify the benefit and loss, they could be generally described as,

Benefit = Avoided Loss + (Additional Benefit)

Loss = Increased Cost by Risk Reduction Option + (Opportunity Loss + Additional Loss)

The avoided loss is considered to be the reduction in risks as a result of the structural performance improvement through resilience design. Additional benefits are more related to indirect benefits as a result of implementing the options, such as less population displacement and less productivity or business loss. Opportunity loss is associated with the loss of benefit that could have been achieved by investment in other areas rather than the resilience design. Additional loss could be considered as the adverse impact due to the implementation of the options, such as the construction of a wave barrier could lead to the impact on nearby environment. The additional benefit, additional loss and opportunity loss are not considered in this handbook.

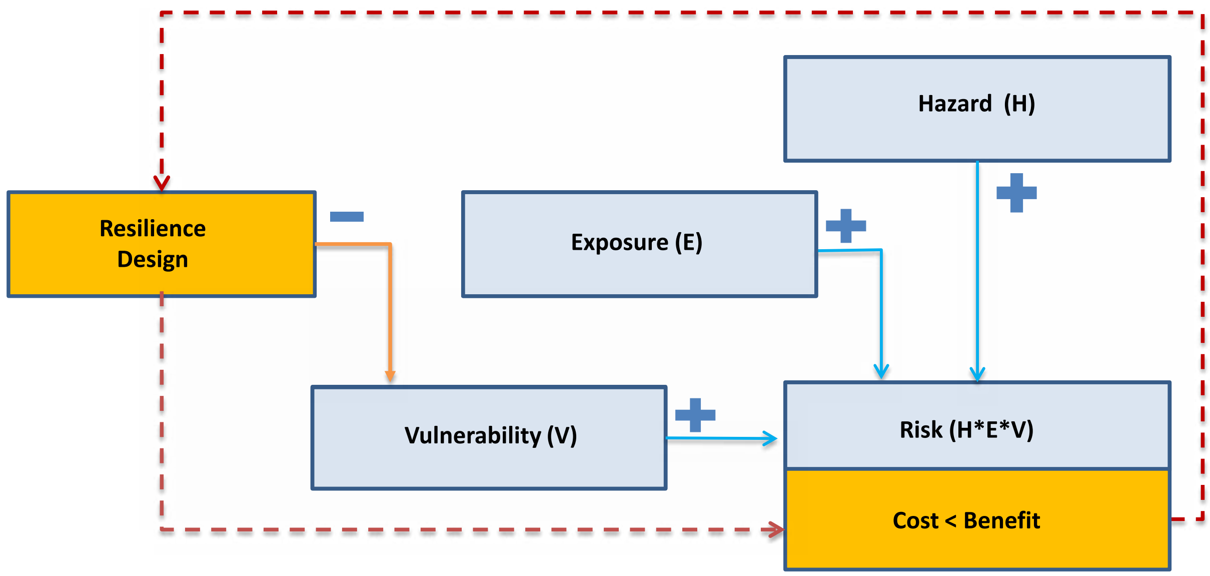

Figure 1-6 Identification of resilience design options.

Generally, the benefit and loss are described in monetary terms. When both benefit and loss are measurable, an approach similar to cost-benefit assessment is effective for resilience design option appraisals. In such cases, an option is deemed preferable if one or more of the following criteria are met:

- higher positive net benefit , which is equal to the benefit subtracted by the loss;
- higher benefit-loss ratio that is larger than one; and
- higher likelihood that the benefit is larger than the loss.

However, when it is difficult to quantify the benefit in monetary terms, an approach similar to cost-effectiveness assessment can be more effective for the option appraisals. In such cases an option is preferable if the following criterion is met: with lower cost to achieve the same resilience design performance targets, or with the same level of cost but more likely to achieve the same resilience design performance targets.

2 Guidance for Resilience Design

This chapter provides a basic structure and principles for resilience design in the handbook. It gives new resilience performance design targets for LGU's building assets, considering hazards including wind, earthquake and flooding. The sea level rise in relation to climate change effects is also taken into account for designs to resist storm surge.

2.1 Performance-Based Design Hierarchy

National Structure Code of the Philippines (NSCP) requires that buildings, towers, and other vertical structures and all portions thereof shall be designed to resist the load combinations as specified in its Section 203, in particular, based on minimum design load. This approach is fundamentally performance-based, though NSCP does provide more design details for different types of structures to meet the performance requirement.

Internationally, to develop a performance-based building code, the Australian Building Codes Board consulted numerous models (including New Zealand, British, Swedish, and Dutch codes) and adopted a performance hierarchy for performance compliance, which will be adopted as a general format in the handbook. The performance hierarchy consists of four levels: objectives, functional statement, performance requirements, and design solutions, as shown in Figure 2-1. The performance levels are briefly described in the following subsections.

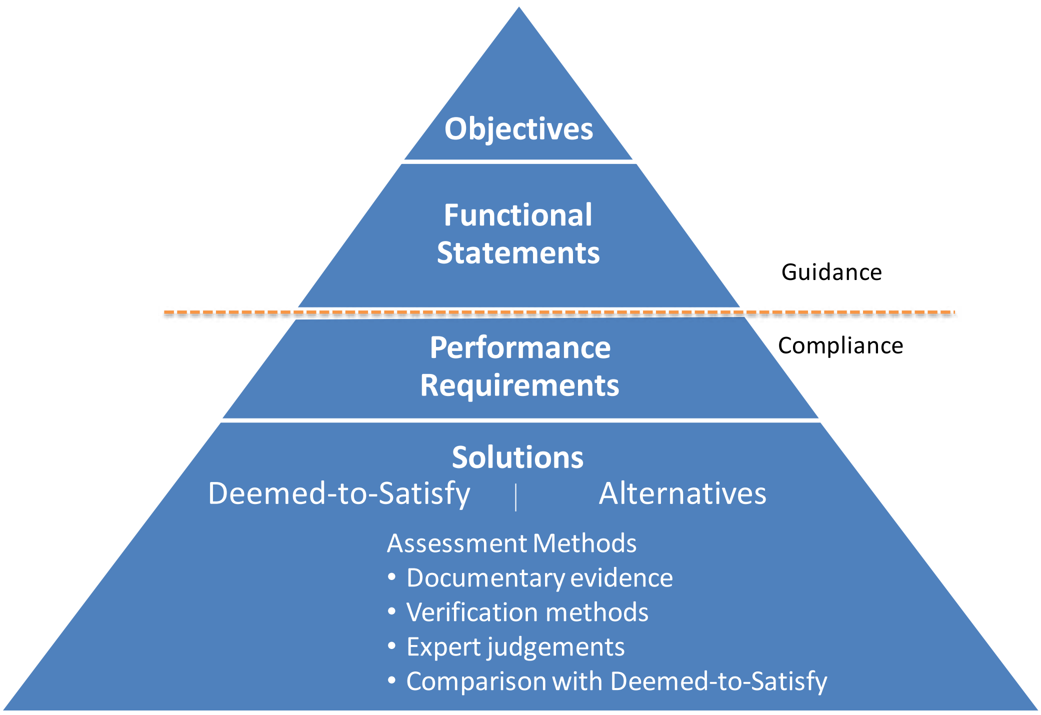

Figure 2-1 Performance hierarchy for structural design (adapted from Building Code of Australia).

2.1.1 Objectives

The objectives refer to the need to safeguard the occupants and protect adjoining buildings or other properties. For example, the objective of the construction is to safeguard the occupants from injury or loss of amenity caused by extensive structural damages.

2.1.2 Functional Statements

The functional statements specify how a construction is expected to satisfy the objectives. For example, the construction is to provide sufficient reliability and safety level for its intended use.

2.1.3 Performance Requirements

The performance requirements are the core of the performance hierarchy and are the only parts that require mandatory compliance. The performance requirements outline suitable levels of performance which must be met by construction materials, structural components, design factors, and construction method in order for a construction to meet the relevant functional statements and, in turn, the relevant objectives. For example, a performance requirement is that a construction may be allowed to sustain significant damages but not to the extent of causing life safety under earthquakes of a 500-year return period.

2.1.4 Solutions

The solutions could generally be divided into deemed-to-satisfy and alternative solutions. The deemed-to-satisfy provisions, provides predefined examples of materials, components, and construction methods which, if used, will result in compliance with the performance requirements defined by relevant standards. Since the objective, functional statements, and performance requirements, local environment, and construction site conditions are generally different at different local government units, the details of deemed-to-satisfy solutions could be quite different.

The alternative solutions set out the means of achieving compliance with the performance requirements. The key to the performance-based design is that there is no obligation to adopt any particular material, structural component, or construction method, as long as it is demonstrated through structural analysis and design, in accordance with the structural code that the design complies with the relevant performance requirements. The handbook will be developed based on the solutions only with performance requirements, intended to be aligning more with current NSCP.

2.1.5 Assessment Methods for Performance Requirements Compliance

Methods used to determine the solution compliance with the performance requirements include:

- ***Documentary evidence***: Evidence to support that the designs meet a performance requirement or a deemed-to-satisfy provision, including reports or certificates issued by relevant authorities or/and qualified engineers;

- ***Verification methods***: tests, inspections, calculation or other methods that determine whether the solution complies with the relevant performance requirements; and
- ***Expert judgements***: the judgement of experts who have the qualifications and experience to determine whether the solution complies with the performance requirements.

The performance-based design provides flexibility in developing resilient structural design. Rather than providing all details on how a structure is to be designed, it gives what the performance requirement the design should eventually meet regardless of how it was designed. The enhanced resilient structural design has to meet the following four requirements.

Requirement 1:

- A building or structure must have an appropriate degree of reliability to fulfil the following performance requirements:
  - function adequately under all expected actions during its designed lifecycle, as defined by the NSCP; and
  - withstand repeated/permanent actions, and provide safety and reliability during its lifecycle including construction and anticipated use, as defined by the NSCP.

Requirement 2:

- The structural resistance of materials must be determined based on characteristic material properties with appropriate allowance.

Requirement 3:

- A building or structure must have appropriate degrees of resilience through enhanced reliability to withstand extreme events, including typhoon, flooding and earthquake, and provide safety and serviceability during its lifecycle.

Requirement 4:

- Achieving the degree of reliability, with more benefit than the cost, through its service during the lifecycle. The cost is considered as the direct capital investment, and benefit is considered as the avoided direct loss or risk, given the direct capital investment.

In general, performance requirements are achieved via the specification of acceptable failure probability, which in turn depends largely on the direct and flow-on consequences of construction failure. For instance, a construction, the failure of which causes disruption in the economic activity of its surrounding region, should be designed with a higher reliability level than a construction that has a failure consequence limited to the particular local government.

A construction of lower failure probability provides higher resistance, hence higher resilience, to extreme events. The acceptable failure probability may be specified according to the implication of failure consequence; i.e. whether the impact of failure is local, regional, or national scale. Higher scale of consequence requires higher level of resilience (hence lower failure probability) to fulfil the intended objectives and functions.

Specification of performance requirements or targets related to Requirement 3 can be facilitated through a choice of acceptable failure probability targets versus three resilience improvement levels – *small*, *medium* and *significant*, as listed in Table 2-1. The degree of the ***resilience improvement*** are defined based on the specification of life quality index in ISO 2394:2015 — General Principles on

Reliability for Structures. To balance the cost and performance target (or resilience level), a relative lower performance target (or lower resilience) level should be when the cost to ensure the resilience is relatively high, and vice versa. More details can be referred to the standard.

In addition to considering the intended objectives and functions, construction cost plays an important part in the decision of construction design. Therefore, a typical construction is designed with a balanced consideration of the intended functions and construction cost so as to achieve a somewhat optimal cost effectiveness.

2.2 Resilient Construction of LGU Facilities

LGU facilities are constructed and managed by the local government, provide normal public services, and are expected to maintain safety and function without interruptions, even after the impact of extreme events, such as typhoon and earthquake. The LGU facilities may include municipal halls, schools, civic centres, day care centres etc.

Local government construction includes public facilities and provides secure environment for the public servants and the general public. Examples of local government construction include municipal halls, schools, civic centres, day care centres, and evacuation centres. To maintain the designated function and protect the occupants' safety, a public construction should be built to possess sufficient resilience and reliability when subjected to extreme events such as typhoons, earthquakes, and floods. Therefore, when the emphasis is on life safety and facility protection, the performance hierarchy may be defined as follows:

- Objectives — the construction is able to safeguard the occupants from life loss and the construction from collapse during and after extreme events;
- Functional statements — the construction is able to withstand the extreme events without collapse or loss of service functions during its design service life; and
- Performance requirements — the construction meets an acceptable reliability level (equivalent to meeting an acceptable failure probability) for prevention of collapse or loss of service functions.

To achieve the resilience performance by a design, a process has to be followed:

- Compliance with performance ***Requirement 1*** is verified in alignment with the National Structural Codes of the Philippines;
- Compliance with performance ***Requirement 2*** is verified in alignment with the National Structural Codes of the Philippines;
- Compliance with performance ***Requirement 3*** is verified when the calculated annual total risk of three classes (with the significance at individual, regional, national levels, respectively), for each extreme actions, is not greater than that listed in Table 2-1;
- Compliance with performance ***Requirement 4*** is verified when:
  - the expected (average) benefit is greater than the expected (average) cost, or
  - the ratio of the expected (average) benefit and the expected (average) cost is larger than 1, or
  - the likelihood of the benefit greater than the cost is more than 50%.

Table 2-1 Acceptable failure probabilities for different levels of intended resilience and construction classes.

Resilience Improvement	Failure Probability	
	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities III: Special Occupancy Structures
Small	0.1%	0.05%
Medium	0.01%	0.001%
Significant	0.001%	0.0005%

Structures of Class 2 is defined to include *standard occupancy structures*, and structures of Class 3 to include *essential facilities* and *special occupancy structures*, as defined in NSCP, shown in Table 2-2. The defined classes will be applied through the handbook.

The acceptable failure probabilities in Table 2-1 are based on the risk target value specified in ISO 2394:2015 – General Principles on Reliability for Structures, International Standard. In the standard, the risk target value was selected as a function of the costs of the risk reduction measure represented by three categories, i.e. large, medium and small relative to the initial construction cost of structures at hand, and the consequences in case of failure represented by Class 2 and Class 3 etc. Given a category of the risk reduction costs, it was considered that any further more stringent requirement away from the risk target value would lead to less cost effective. More details can be found in the standard.

In this handbook, it is assumed that the smaller resilience improvement is required when the larger costs would be involved in the design enhancement for risk reduction (see Table 2-1). More specific performance for wind, flood, and earthquake will be presented in sections 2.4.1, 2.4.2, and 2.4.3. Based on the requirement of a design to meet a risk threshold from high to low, the corresponding resilience improvement is also considered to be the levels from small, medium to significant.

For the design to meet the required performance, a performance target related to the resilience factor is introduced as a multiplication factor of the design load for winds and earthquake loads or water depth for flooding, as described in the following subsections The design loads are directly related to the hazard severity that the designed structure should be able to resist and are defined by hazard curves.

Table 2-2 Classes of structures in correspondence with NSCP occupancy categories.

CLASS	NSCP OCCUPANCY CATEGORY	OCCUPANCY OR FUNCTION OF STRUCTURE (NSCP SPECIFICATION, TABLE 103-1, NSCP)	MUNICIPAL STRUCTURES
3	I Essential Facilities	Occupancies having surgery and emergency treatment areas, fire and police stations, garages and shelters for emergency vehicles and emergency aircraft, structures and shelters in emergency preparedness centers, aviation control towers, structures and equipment in communication centers and other facilities required for emergency response, facilities for standby power-generating equipment for Category I structures, tanks or other structures containing housing or supporting water or other fire-suppression material or equipment required for the protection of Category I, II or III structures, public school buildings, hospitals and designated evacuation centers.	Public school buildings (except single-story buildings), hospital, designated evacuation centers (including gyms, covered courts, multi-purpose buildings if used as such)
3	III Special Occupancy Structures	Single-story school buildings, buildings with an assembly room with an occupant capacity of 1,000 or more, educational buildings such as museums libraries, auditorium with a capacity of 300 or more students, buildings used for college or adult education with a capacity of 500 or more students, institutional buildings with 50 or more incapacitated patients, but not included in Category I, mental hospitals, sanitariums, jails, prison and other buildings where personal liberties of inmates are similarly restrained, all structures with an occupancy of 5,000 or more persons, structures and equipment in power-generating stations, and other public utility facilities not included in Category I or Category II, and required for continued operation.	School buildings
2	IV Standard Occupancy Structures	All structures housing occupancies or having functions not listed in Category I, II, or III and Category V.	All municipal buildings, gyms, covered courts, multi-purpose buildings, housing, public market, not designated as evacuation centers

2.3 Hazard Zones and Hazard Curves

Structures are generally designed to be capable of resisting a certain degree of hazards in ARI to meet reliability or safety performance requirement. Hazard curves details the degree of hazards in relation to ARI, which are geographically dependent and standardised in association with hazard zones.

2.3.1 Wind Hazard

Buildings are a kind of vertical structures, exposed to wind hazards. Structures should be designed to be capable of resisting wind loads. The ***basic design wind speed***, or the three-second gust speed at 10m above the ground with annual probability of 0.02 being exceeded (50 year average recurrence interval[2]), is considered for wind loads in structural design, together with other factors including wind directionality factor, structural importance factor, exposure factor, topographic effects, and gust effect factor. More details are referred to the NSCP.

The land of the Philippines is divided into Wind Zones 1, 2 and 3, as shown in Figure 2-2, where the basic design wind speeds are 250kph, 200kph and 150kph, respectively. The wind speeds corresponding to a number of ARIs in the three wind zones are determined from the hazard curves (Figure 2-3) and listed in Table 2-3. For LGUs in each zone, the associated hazard curve should be applied for structural designs. A design requirement considering a greater ARI event implies structures capable of resisting a higher wind gust speed. The wind hazard zone related to each local government is listed in Appendix A.

It should be noted that the wind hazard curves are modelled only based on the basic wind speeds defined in the NSCP, and should be regularly evaluated and updated on the basis of the latest observations.

[2] Recent extreme typhoons, such as Haiyan or Yolanda, may have not been considered in developing the basic design wind speeds of the NSCP.

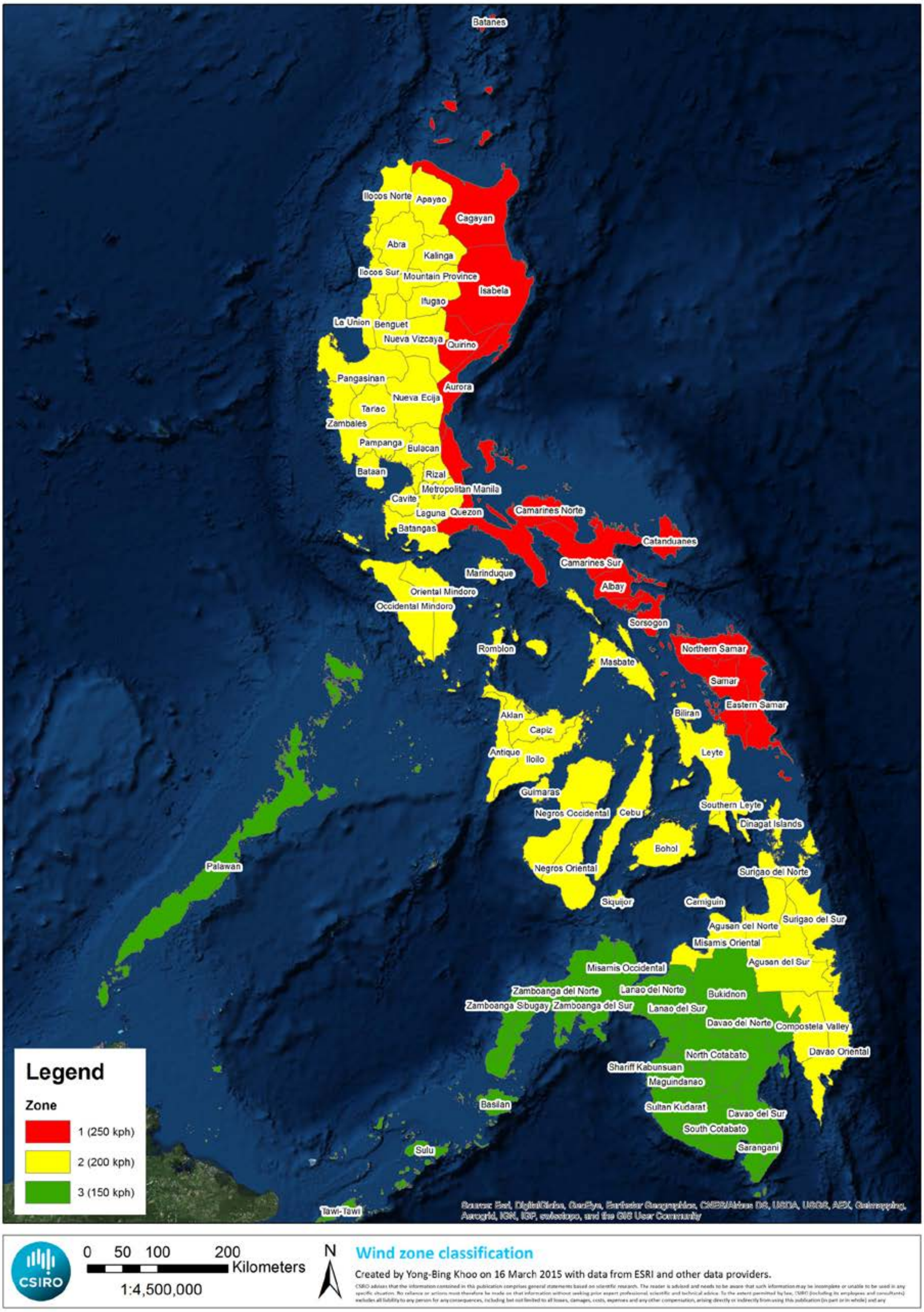

Figure 2-2 Wind zone map of the Philippines (source: NSCP 2010).

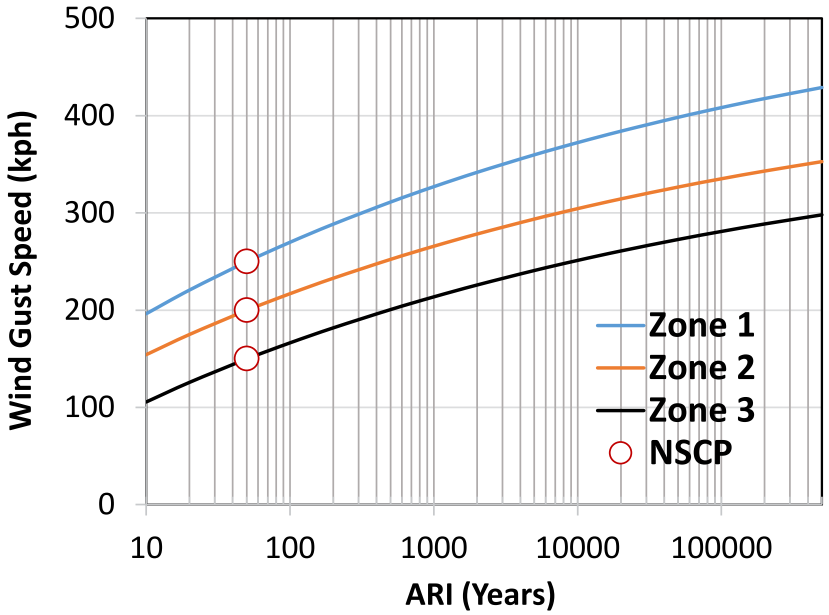

Figure 2-3 Wind gust speed versus average recurrence interval or return period.

Table 2-3 Wind speed given ARI for wind Zones 1, 2, and 3.

ARI (year)	Zone 1 (kph)	Zone 2 (kph)	Zone 3 (kph)
10	196	154	106
50	250	200	150
100	270	217	166
200	288	233	182
500	311	252	201
1000	327	266	214
2000	342	278	226
2500	346	282	230
5000	360	294	241
10000	372	304	251

2.3.2 Seismic Hazard

Ground motion caused by earthquake generates impacts on the structural safety. Structures should be designed to resist the seismic ground motion. In the structural design defined by NSCP, the peak ground acceleration (PGA) with a 10% probability of being exceeded in 50 years (or annual exceedance probability of 0.2%), is defined as the ***basic design PGA***.

In the NSCP, seismic hazard is characterised by the seismic zone, proximity of the site to active seismic sources, site soil profile characteristics, and the structure importance factor. The two seismic zones described by NSCP are shown in Figure 2-4. Zone 2 covers only the provinces of Palawan (except Busuanga), Sulu and Tawi-Tawi, and the rest of the country is under Zone 4. The seismic zone factor, Z, is specified as follows:

- Zone 2: $Z = 0.2$ and
- Zone 4: $Z = 0.4$.

This means that PGAs with a 10 % probability of being exceeded in 50 years are 0.4 g and 0.2 g for the Zones 4 and 2, respectively. More details can be found in NSCP. The seismic hazard zone related to each local government is listed in Appendix A.

The seismic hazard in the Manila region (located in Zone 4) has been investigated and the spectral accelerations for 50%, 10%, and 2% exceedance probabilities (or equivalent to average recurrence intervals of 72, 475 and 2475 years, respectively) have been estimated[3]. The spectral accelerations at fundamental period 0.01 second are taken as the PGAs for Zone 4 and fitted by Gumbel distribution.

Similarly, the PGA probability distribution in Zone 2 is assumed to follow a Gumbel distribution that has the same coefficient of variation as in Zone 4 and the PGA at 10% exceedance probability in 50 years to be 0.2 g. As a result, the seismic hazard curves in the two seismic zones are shown in Figure 2-5, and also listed in Table 2-4. For LGUs in each zone, the associated hazard curve should be applied for structural designs. A design requirement considering a greater ARI event implies structures capable of resisting higher PGA. As with the wind hazard, the seismic hazard curves should be regularly reviewed on the basis of latest information and knowledge.

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[3] Koo R, Mote T, Manlapig RV, Zamora C (2009) Probabilistic seismic hazard assessment for central Manila in Philippines. 2009 Australian Earthquake Engineering Society Conference.

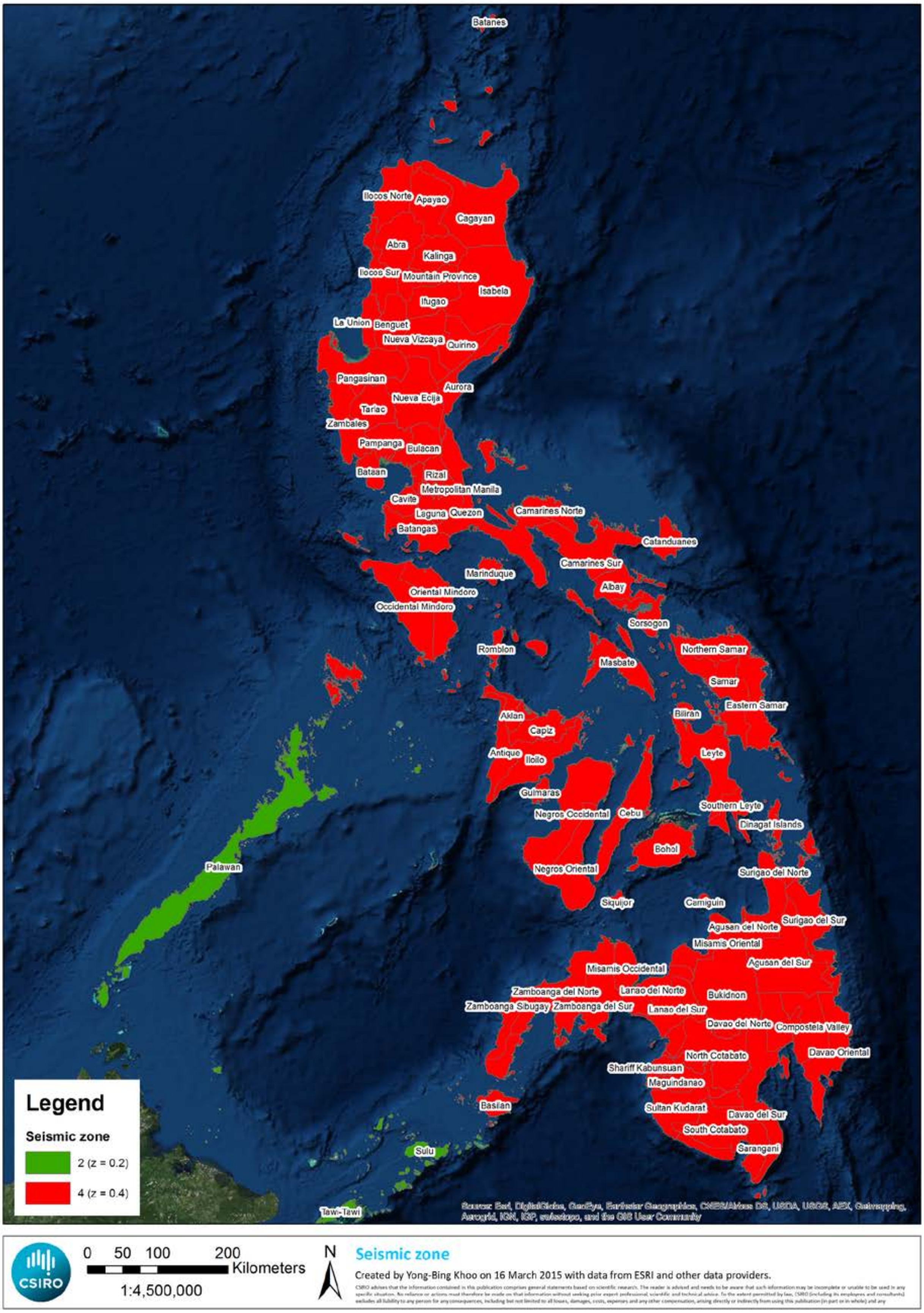


Figure 2-4 Seismic Zone Map of the Philippines (source: NSCP 2010).

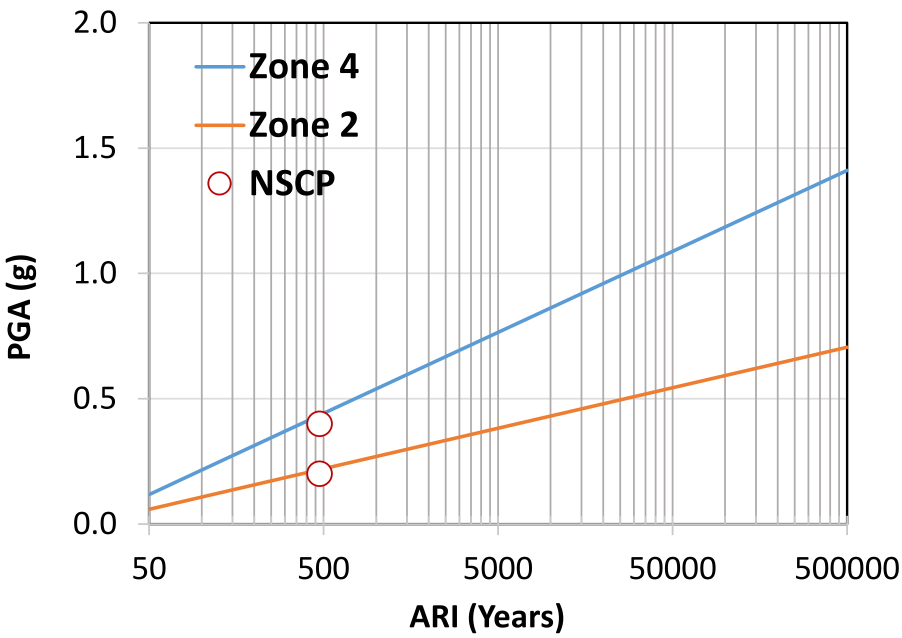


Figure 2-5 Peak ground acceleration hazard curves for Seismic Zones 4 and 2.

Table 2-4 PGA given ARI for seismic Zones 4 and 2.

ARI (year)	Zone 4 (g)	Zone 2 (g)
50	0.12	0.06
100	0.22	0.11
200	0.31	0.16
500	0.40	0.20
1000	0.54	0.27
2000	0.64	0.32
5000	0.77	0.38
10000	0.86	0.43
20000	0.96	0.48
50000	1.09	0.54
100000	1.19	0.59
200000	1.28	0.64

2.3.3 Flood Hazard

As the NSCP requires all new construction—including substantial improvement and restoration of substantial damage to buildings and structures—within flood hazard areas shall be constructed to resist the effects of flood hazards and flood loads. In this regard, the base floor elevation of buildings should be considered no less than the elevation of design flood, which is defined in NSCP as the greater of the flood of 100 years average recurrence interval or the depth of flood occurring in an area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated. In the handbook, only flood hazard curves will be applied, providing the flood elevation given average recurrence interval or return period.

It should be noted that the comments by engineering officials interviewed by the team revealed that the overwhelming majority of flood damages to buildings are on non-structural elements (e.g. partition walls, ceilings, doors), building contents, and indirect (e.g. disruption of economic activities) and intangible (e.g. displacement and/or inconvenience of occupants) losses. The very limited structural damages due to floods may be attributed to the fact that the design of structures is mostly dominated by the requirements for resistance of wind and earthquake loads.

There are no particular flood hazard zones specified for design purpose. In fact, the flood is more location specific as shown in Figure 2-6, and in Table 2-5, such as the flood hazard curve for the Manila City. It indicates that a design requirement considering a greater ARI event implies structures capable of resisting a higher flood event. The flood hazards described by the flood depth to the current mean sea level, at 5, 10, 25, 50, 100, and 200 years return periods at the location are extracted from Shuttle Radar Topography Mission (SRTM) data and PAGASA's depths rasters. The hazard is assumed to have a generalized extreme-value distribution. It is suggested that the flood hazard curves should be reassessed for any application beyond Manila region.

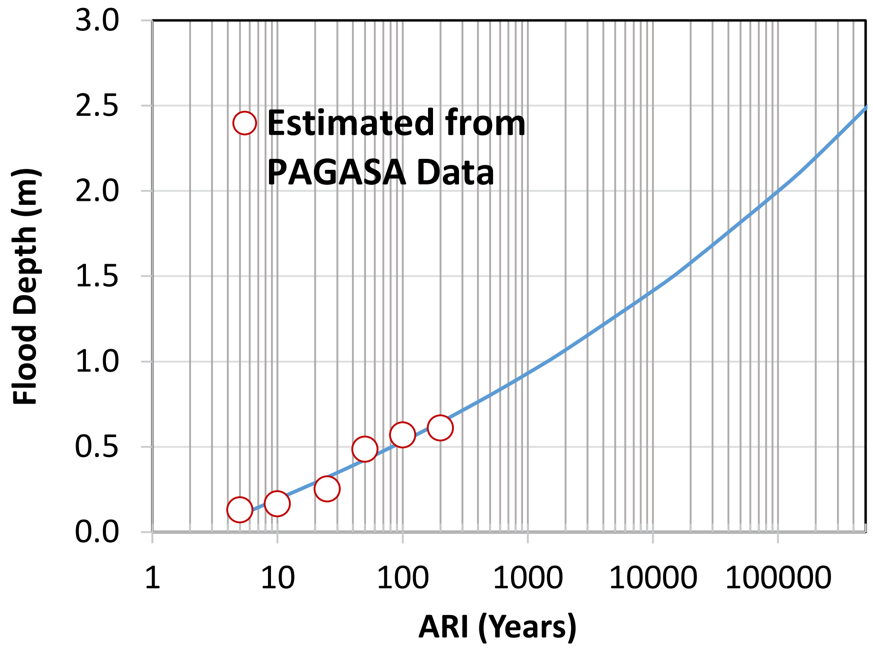


Figure 2-6 Flood hazard at Great Manila Metropolitan Area.

Table 2-5 Flood depth given ARI.

ARI (year)	Extractions from PAGASA data (m)	Model result (m)
5	0.12923	0.09860
10	0.16550	0.19335
25	0.25267	0.32170
50	0.48615	0.42358
100	0.56875	0.53069
200	0.60929	0.64367
500		0.80295
1000		0.93153
2000		1.06758
10000		1.41487
20000		1.57913
100000		1.99852
200000		2.19689
1000000		2.70339

2.4 Resilience Performance Under Wind Loads

2.4.1 Wind Resilience Factor

For an acceptable failure probability chosen from Table 2-1, the design wind gust speed and its corresponding wind pressure for a site location can be determined, as shown in Figure 2-7 and Figure 2-8 for buildings of class 2 and 3, respectively. The increase in design wind gust speed corresponds to the requirement for more resilience of structures to wind hazards. The resilience factor is defined as the ratio of design velocity pressure to the 50-year velocity pressure computed according to the National Structural Code of the Philippines (NSCP, 2010).

The wind pressure is proportional to the square of wind gust speed, which is based on the wind hazard curves developed herein for the three wind zones with the assumption that the curves match the 50-year wind speeds defined in the NSCP and have a shape parameter of –0.1 in the wind hazard modelled by the generalized extreme value distributions. The wind hazard curves should be reviewed when more observed wind speed data become available.

The resilience factors determined for Classes 2 and 3 structures are listed in Table 2-6 and Table 2-7, respectively, in which the three wind zones are specified in the NSCP and described by Figure 2-2, and the LGUs under each wind zone are given in Appendix A.

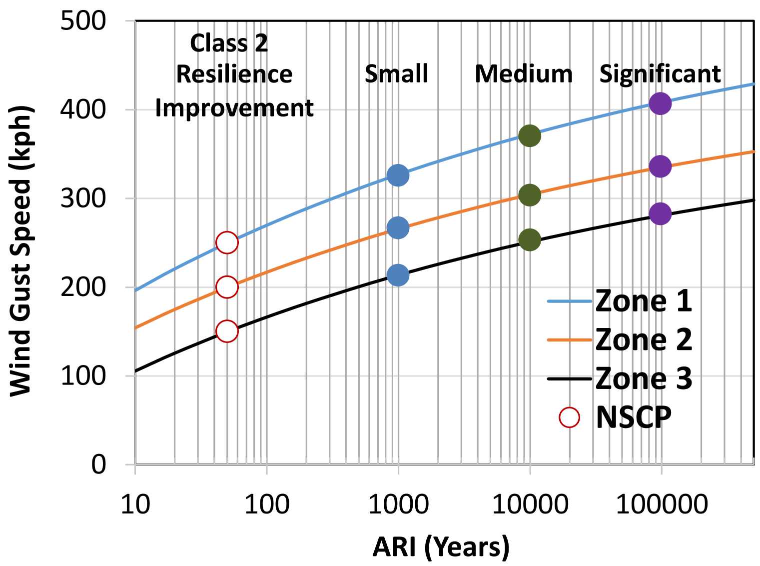


Figure 2-7 Enhanced design wind gust speed for a resilience design of class 2 buildings with small, medium and significant improvement.

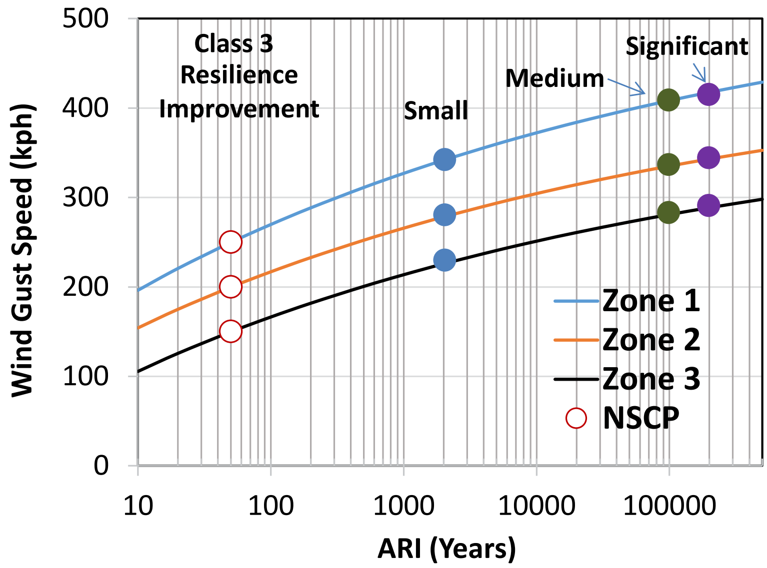


Figure 2-8 Enhanced design wind gust speed for a resilience design of class 3 buildings with small, medium and significant improvement.

The *resilience factor* is used as a multiplication factor of the design velocity pressure in Eq. (207-15), Section 207.5, NSCP (2010). Let K_R be the resilience factor, then the velocity pressure q_{zR} after multiplication of the resilience factor is

$$q_{zR} = K_R q_z = K_R \times 47.3 \times 10^{-6} K_z K_{zt} K_d V^2 I_w \quad (2\text{-}1)$$

where q_z is the velocity pressure specified in Eq. (207-1) of the NSCP, K_z, K_{zt}, and K_d are the exposure coefficient, topographic factor, and wind directionality factor defined in the NSPC, I_w is the importance factor and V is the basic wind speed.

After determination of q_{zR}, the subsequent design task follows the normal procedure specified in the NSCP.

It should be pointed out, the resilience factor, which varies from lower values for Zone 1 to higher values for Zone 3 as shown in Table 2-6 and Table 2-7, only implies the need to enhance the design more in Zone 2 and Zone 3 to meet the acceptable failure probability defined in Table 2-1.

Meanwhile, the likely future change in extreme wind speed due to climate change is not considered in the current resilience factor. Any increase in intensity in future would put more rationale to enhance relevant designs.

Table 2-6 Resilience factor, K_R, for design against velocity pressure for Class 2 buildings.

Resilience Improvement	Zone 1	Zone 2	Zone 3
Small	1.71	1.77	2.04
Medium	2.22	2.32	2.81
Significant	2.67	2.81	3.52

Table 2-7 Resilience factor, K_R, for design against velocity pressure for Class 3 buildings.

Resilience Improvement	Zone 1	Zone 2	Zone 3
Small	1.87	1.94	2.27
Medium	2.67	2.81	3.52
Significant	2.80	2.95	3.71

2.4.2 Minimum Wind Speed and Pressure Targets for Resilience Design

The resilience design for wind hazards are often referred to the designs of structures that can sustain the minimum wind speed design targets as shown in Table 2-8 and Table 2-9 for class 2 and 3 buildings, respectively, or minimum wind pressure design targets as shown in Table 2-10 and Table 2-11, in association with the desired resilience improvement from small to significant and wind hazard zones as defined by NSCP. Any design to meet above requirements is deemed to satisfy the performance targets as defined in the last chapter. For each municipality, its specific wind hazard zone is defined in Appendix A.

As mentioned early, the minimum wind speed design targets are based on the wind hazard curves developed for the three wind zones with the assumption that the curves match the 50-year wind speeds defined in the NSCP and have a shape parameter of –0.1 in the wind hazard modelled by the generalized extreme value distributions.

Table 2-8 Wind speed design target (m/s) of a resilient design for Class 2 Buildings.

Resilience Improvement	Zone 1		Zone 2		Zone 3	
	m/s	km/h	m/s	km/h	m/s	km/h
Small	90.8	327	73.8	266	59.4	214
Medium	103.4	372	84.5	304	69.8	251
Significant	113.4	408	93.1	335	78.1	281

Table 2-9 Wind speed design target (m/s) of a resilient design for Class 3 Buildings.

Resilience Improvement	Zone 1		Zone 2		Zone 3	
	m/s	km/h	m/s	km/h	m/s	km/h
Small	94.9	342	77.3	278	62.8	226
Medium	113.4	408	93.0	334	78.1	281
Significant	116.0	418	95.3	343	80.2	289

Table 2-10 Design targets of wind velocity pressure (kPa) to meet the requirement 3 for the three wind zones - Class 2 Buildings (IV: Standard Occupancy Structure).

Resilience Improvement	Zone 1	Zone 2	Zone 3
Small	4.27	2.82	1.82
Medium	5.53	3.70	2.52
Significant	6.65	4.48	3.15

Table 2-11 Design targets of wind velocity pressure (kPa) to meet the requirement 3 for the three wind zones - Class 3 Buildings (I: Essential Facilities, III: Special Occupancy Structures).

Resilience Improvement	Zone 1	Zone 2	Zone 3
Small	4.66	3.09	2.04
Medium	6.65	4.48	3.15
Significant	6.96	4.69	3.32

In general, a designed structure must have a minimum resistance greater than or equal to the most critical action effect resulting from different combinations of actions, as defined by the National Structural Code of the Philippines.

Fundamentally, the enhancement of the resilience design of structures to wind hazards is implemented by the improvement of structural capacity that resists the wind forces as shown in Figure 2-9. On the structural design aspect, in addition to the selection of strong materials, there are three key connection areas that should be considered in the enhanced resilience design:

- connection between roof metal sheets or shingles and battens;
- connection between battens and rafters; and
- connection from the bottom chords of roof trusses to wall plates.

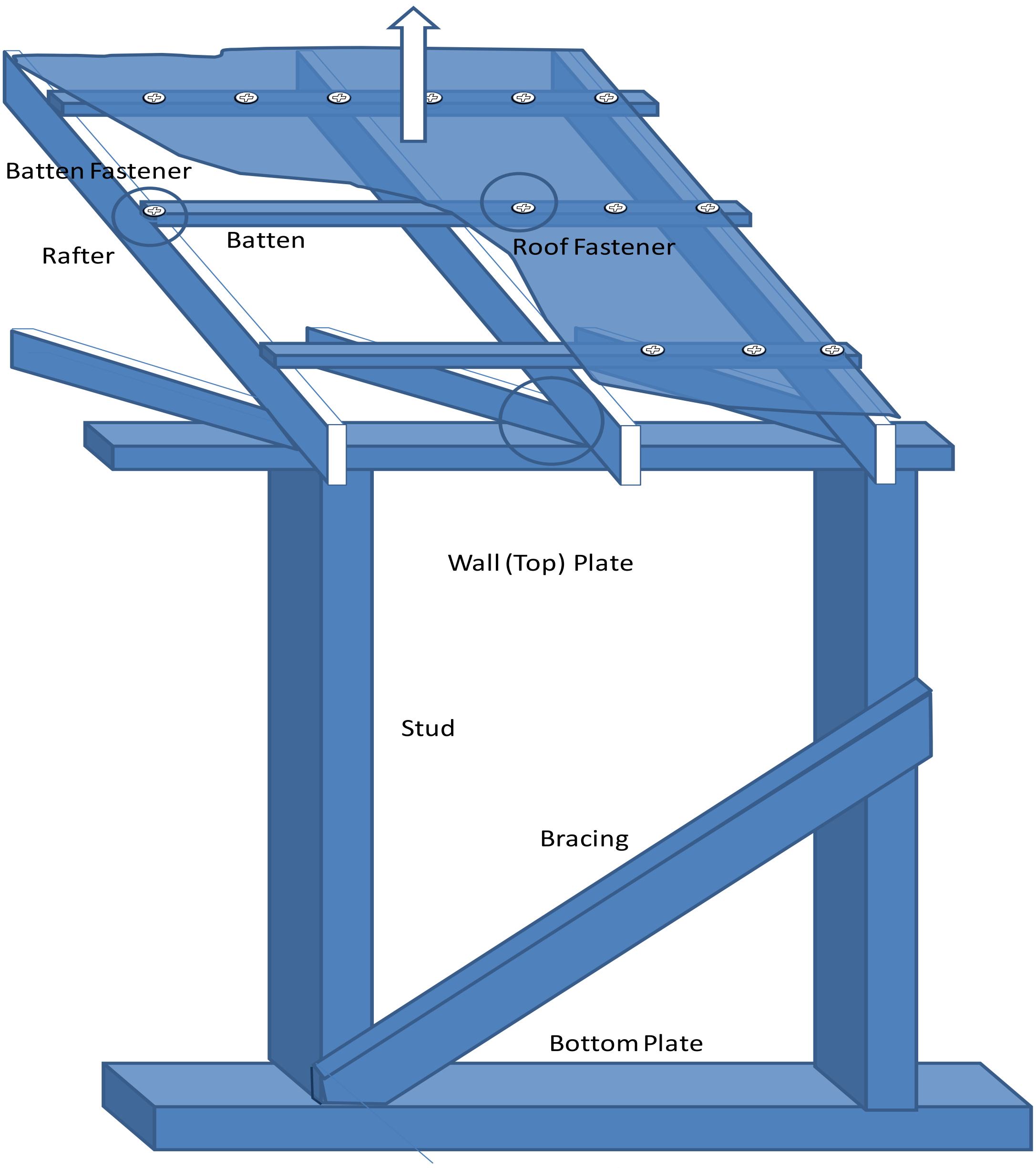


Figure 2-9 Critical connection areas in designing roof structures to resist wind loads.

2.5 Resilience Performance Under Earthquake

2.5.1 Seismic Resilience Factor

For an acceptable failure probability chosen from Table 2-1, the design PGA can be determined, as shown in Figure 2-10 and Figure 2-11 for class 2 and 3 buildings, respectively. The increase in design PGA corresponds to the requirement for more resilience of structures to seismic hazards. The resilience factor is defined as the ratio of design peak ground acceleration to the 500-year peak ground acceleration specified in the National Structural Code of the Philippines (NSCP, 2010).

The design peak ground acceleration in association with ARI is based on the earthquake hazard curves, which are developed to match the 500-year peak ground accelerations defined in the NSCP while assuming the peak ground accelerations following the Gumbel distributions.

The resilience factors determined for Classes 2 and 3 structures are listed in Table 2-12 and Table 2-13, respectively, in which the two seismic zones are specified in the NSCP and described by Figure 2-4, and the LGUs covered in each seismic zone are given in Appendix A.

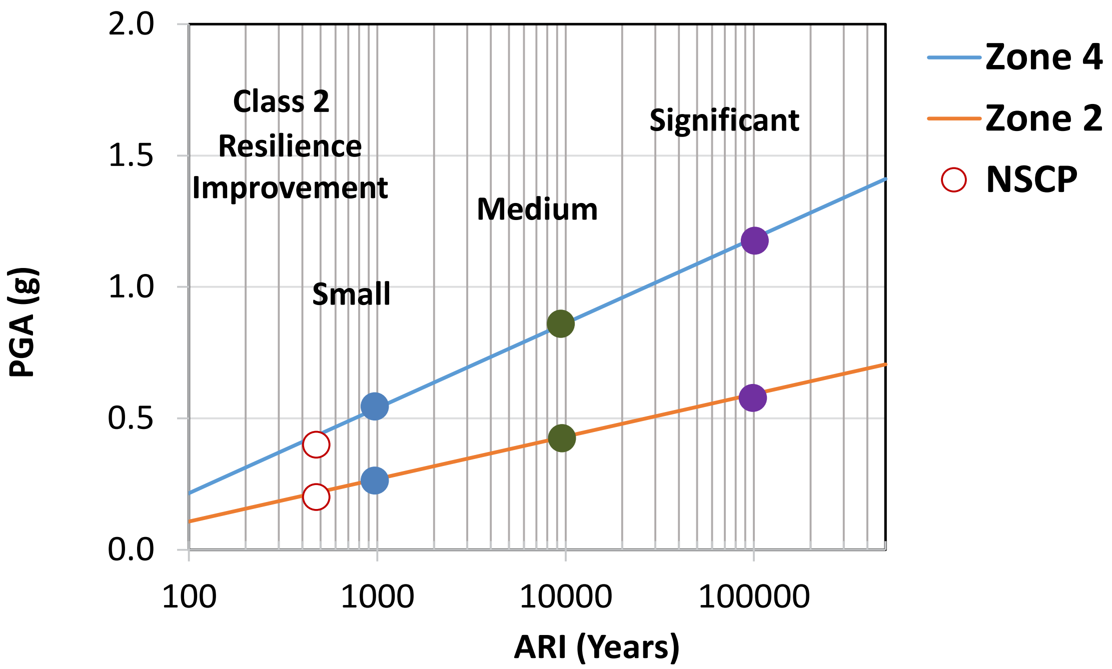


Figure 2-10 Enhanced design PGA for a resilience design of class 2 buildings with different improvement.

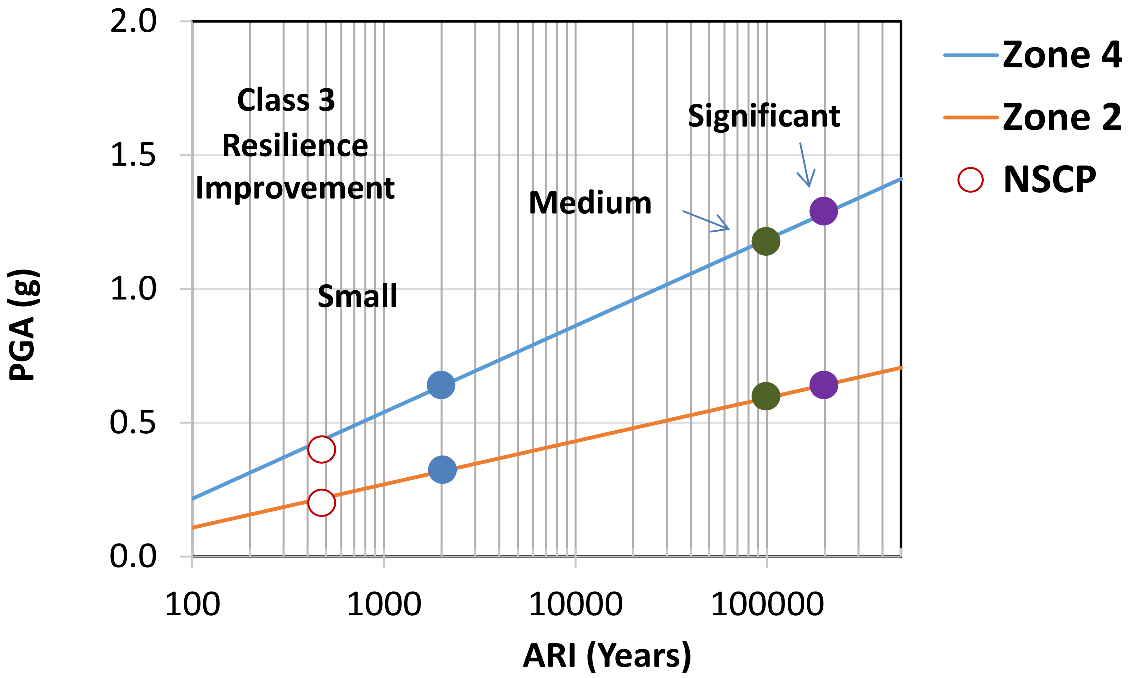


Figure 2-11 Enhanced design PGA for a resilience design of class 3 buildings with different improvement.

The resilience factor, K_R, is used as a multiplication factor of the seismic zone factor, Z, as specified in Table 208-3, National Structural Code of the Philippines (NSCP, 2010). The seismic zone factor Z_R after multiplication of the resilience factor is

$$Z_R = K_R Z \quad (2\text{-}2).$$

After determination of Z_R, the subsequent design task follows the normal procedure specified in the NSCP.

Table 2-12 Resilience factor, K_R, for design against earthquake peak ground acceleration — Class 2 construction.

Resilience Improvement	Zone 4	Zone 2
Small	1.35	1.35
Medium	2.16	2.16
Significant	2.96	2.96

Table 2-13 Resilience factor, K_R, for design against earthquake peak ground acceleration — Class 3 construction.

Resilience Improvement	Zone 4	Zone 2
Small	1.59	1.59
Medium	2.96	2.96
Significant	3.53	3.53

2.5.2 Minimum PGA Targets for Resilience Design

The resilience design for seismic hazards are often referred to as the designs of structures that can sustain the minimum PGA targets as shown in Table 2-14 and Table 2-15 for class 2 and 3 buildings, respectively, in association with the desired resilience improvement from small to significant and earthquake hazard zones as defined by NSCP. Any design to meet above requirements satisfies the performance targets as defined in Table 2-1. For each municipality, its specific earthquake hazard zone is defined in Appendix A.

Table 2-14 Peak ground acceleration targets (g) to meet the requirement 3 in two earthquake zones – Class 2 Buildings.

Resilience Improvement	Zone 4	Zone 2
Small	0.54	0.27
Medium	0.86	0.43
Significant	1.19	0.59

Table 2-15 Peak ground acceleration targets (g) to meet the requirement 3 in two earthquake zones – Class 3 Buildings.

Resilience Improvement	Zone 4	Zone 2
Small	0.64	0.32
Medium	1.19	0.59
Significant	1.41	0.71

In general, to maintain safety and functionality of buildings, structures must at least have the minimum resistance greater than the most critical action effect resulting from different combinations of actions, as defined by NSCP.

Fundamentally, the enhancement in resilience design of structures to earthquake is implemented by the improvement of structural capacity that resists the earthquake ground shaking as shown in Figure 2-12. Regarding structural design aspect, in addition to the selection of strong materials, there are three key structural elements that should be considered in the enhanced resilience design;

- footing (also related to soil types/properties);
- columns and beams to resist axial force, shear force, and bending moments; and
- shear walls to resist shear force and out-of-plane bending moment.

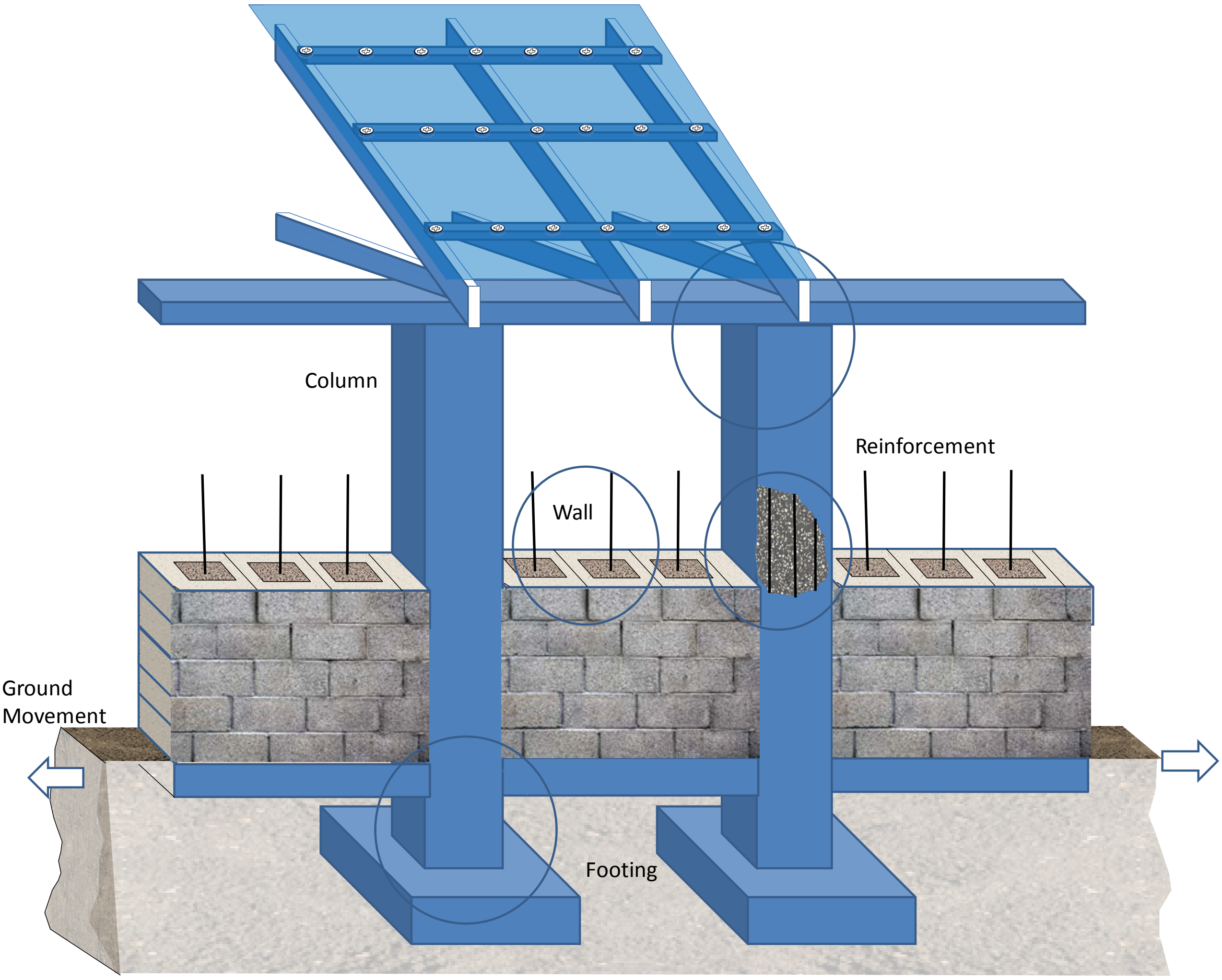


Figure 2-12 Critical connection areas in designing building structures to resist seismic loads.

2.6 Resilience Performance under Storm Tides

2.6.1 Storm Tide Resilience Factor

A storm-tide level consists of absolute mean water level reached by a storm surge combined with the astronomical tide level, as shown in Figure 2-13. Because many tide gauges along the Philippine coastlines have been in operation for only a short period of time, large epistemic uncertainty exists in many of the storm-tide datasets. At present, development of storm-tide hazard models with acceptable confidence remain untenable along the majority of the coastline.

For the construction design in areas at which there exists inundation maps or accurate probabilistic storm-tide hazard models, an acceptable inundation probability may be chosen for the design. This could be considered as a design that can sustain the impacts of flooding events with the average frequency as shown in Table 2-16, which is based on the risk thresholds defined in Table 2-1. The design floor height of construction should not be lower than the reach of the design storm-tide height. If the effect of wave setup (Figure 2-13) is considered, a height of 0.5 m should be added to the design storm-tide height.

The global mean sea level is projected to increase over time due to climate change. The mean sea level increase will result in an increase of occurrence frequency, or equivalently a decrease of return period, for a specific storm-tide height. To safeguard the construction from the effect of future increases in mean sea level, the projected mean sea level increase may be taken into account in the computation of design floor height.

Table 2-16 The average annual frequency of flood height considered for the design target.

Resilience Improvement	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Small	1/1000	1/2000
Medium	1/10000	1/100000
Significant	1/100000	1/200000

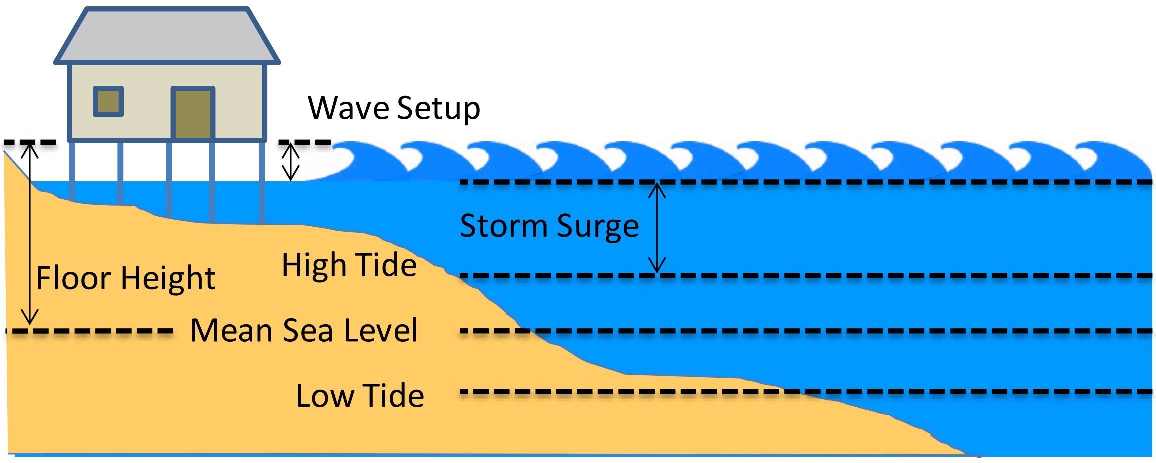


Figure 2-13 Schematic of storm tide and floor height applied in design against inundation.

The resilience design for flooding hazards are referred to the designs of structures that can sustain the minimum flooding depth design targets as shown in Table 2-17, in association with the desired resilience improvement from small, medium to significant, as shown in Figure 2-14 and Figure 2-15 for class 2 and 3 buildings, respectively. Any design to meet the above requirements is considered to satisfy the performance targets as defined in Table 2-1.

Table 2-17 Design flooding depth targets without consideration of sea level rise (unit: m) (no wave setup considered).

Resilience Improvement	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Small	0.93	1.1
Medium	1.4	2.0
Significant	2.0	2.2

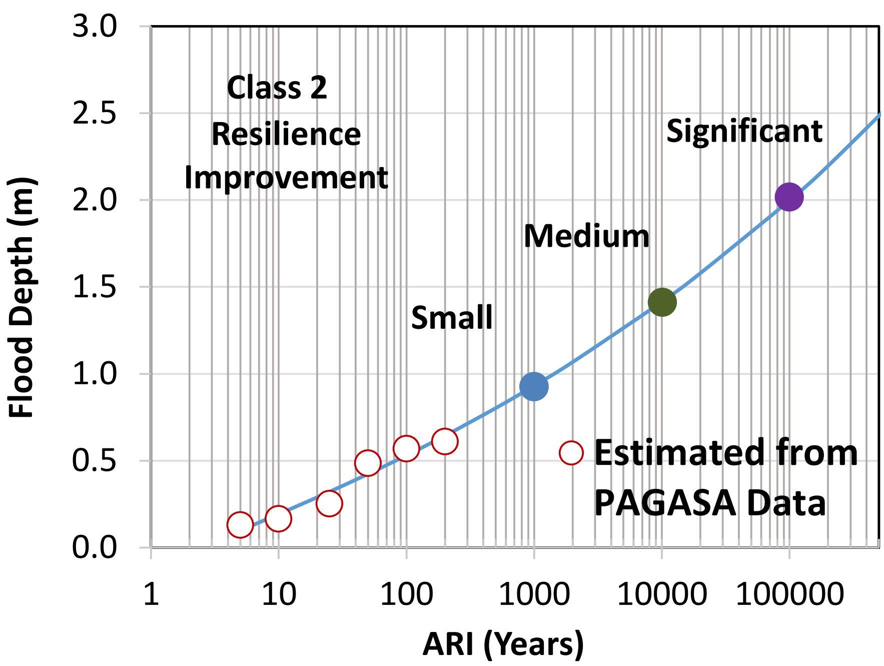


Figure 2-14 Enhanced design flood depth for resilience design of class 2 buildings with small, medium and significant improvement.

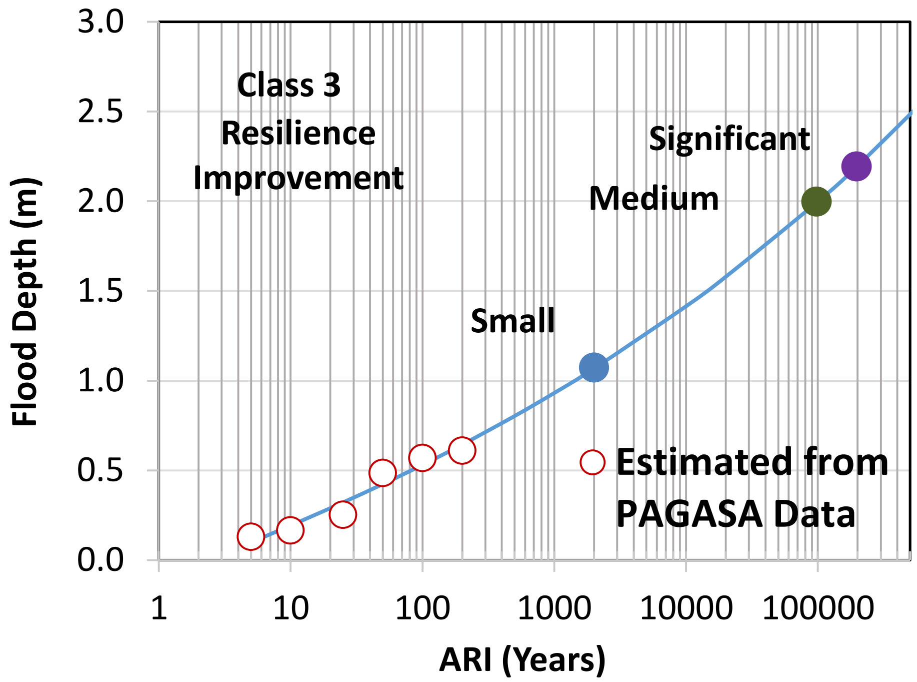


Figure 2-15 Enhanced design flood depth for resilience design of class 3 buildings with small, medium and significant improvement.

It should be noted that there are no specific provisions that include the flood loads in the current NSCP; although it did mention that all new construction within flood hazard areas shall be designed and constructed to resist the effects of flood loads. It indicated that structural systems of buildings or other structures shall be designed, constructed, connected, and anchored to resist flotation, collapse, and permanent lateral displacement due to action of flood loads associated with the design flood. There is a common view that the flood generally causes more non-structural damage including loss of functionality and building contents.

Nevertheless, the enhancement via resilience design of structures to flood hazard is still worth considering. Resilience against floods may be achieved by raising the floor height to avoid or reduce structural damage and non-structural loss.

As shown in Figure 2-16, in addition to raising the floor height, some further consideration may enhance flood resilience. In general, for non-structural aspects:

- adding a freeboard to the required floor height; and
- subfloor design that allow for water flowing through – flow-through design, in the case of flooding, which could be either open subfloor space, or a subfloor space that could be opened in the event of flooding.

For structural aspects:

- stump and wall design that consider wind, earthquake, and flood loads as well as potential impacts of debris; and
- use of concrete slab for floor.

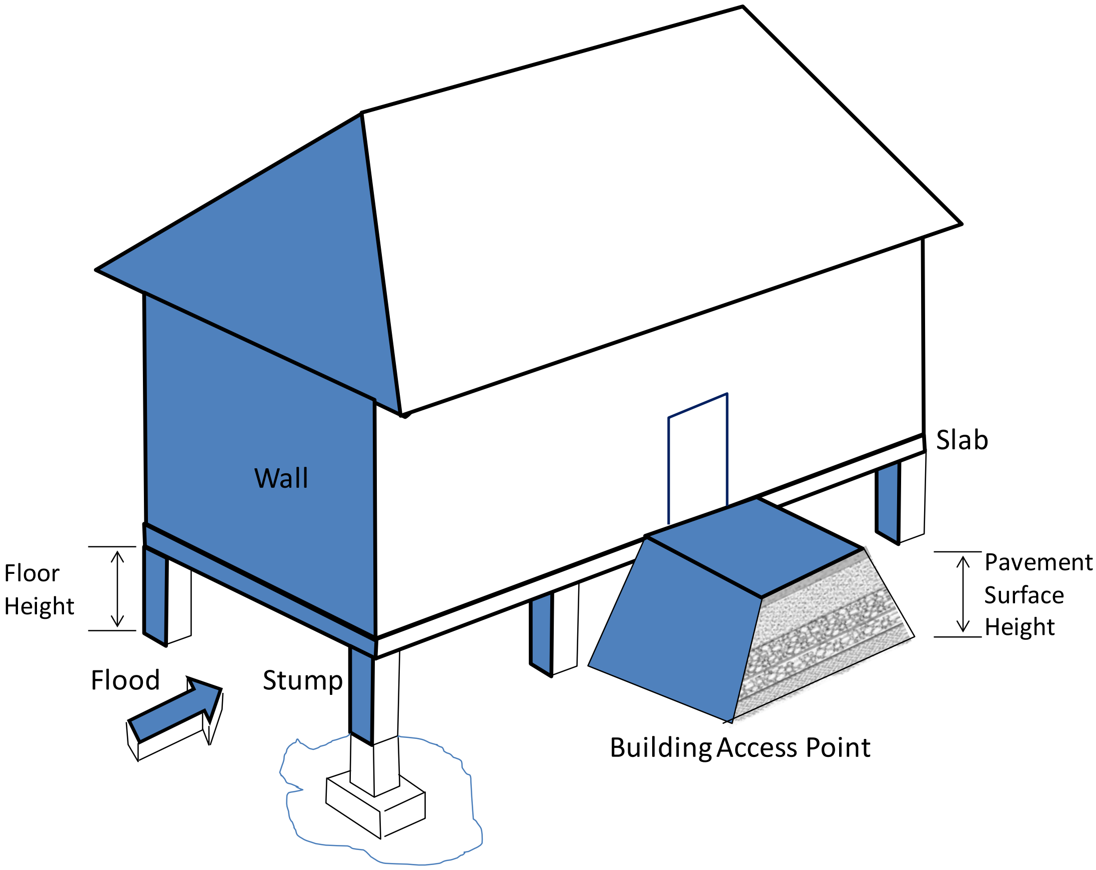


Figure 2-16 Enhanced resilient building structure design subject to flood.

A resilience design for flood, rather than focusing on safety, emphasises on the functionality of buildings. If the risk thresholds as described in Table 2-1 are considered, then the building design should ensure its functionality given the flooding events with an average frequency as described in Table 2-16. In another words, the floor height should be designed based on the flood height design target as defined in Table 2-17. The exact floor height depends on elevation of building locations.

2.6.2 Storm Tide Resilience Factor Considering Sea Level Rise

To consider the sea level rise of 10cm, 20cm and 50cm, then the design floor height should be given as described in Table 2-18, Table 2-19 and Table 2-20, respectively.

It should be noted that the currently limited availability of storm tide data has prevented accurate modelling of storm tide hazard. More updates should be undertaken to ensure the design targets meet the risk thresholds defined in Table 2-1.

More information about the global sea level rise in association with climate change scenarios described by the Representative Concentration Pathways (RCPs) are given in Table 2-21 for reference. RCP2.5, RCP6.0 and RCP8.5 represent the low, medium high and high carbon emission scenarios, respectively. While the regional sea level rise should be estimated by the global sea level rise and regional deviation or variation, Table 2-21 could be used as a general guide.

Table 2-18 Design flood height target considering sea level rise of 10cm (unit: m) (no wave setup considered).

Resilience Improvement	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Small	1.0	1.2
Medium	1.5	2.1
Significant	2.1	2.3

Table 2-19 Design flood height target considering sea level rise of 20cm (unit: m) (no wave setup considered).

Resilience Improvement	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Small	1.1	1.3
Medium	1.6	2.2
Significant	2.2	2.4

Table 2-20 Design flood height target considering sea level rise of 50cm (unit: m) (no wave setup considered).

Resilience Improvement	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Small	1.4	1.5
Medium	1.9	2.5
Significant	2.5	2.7

Seal level rises of 10cm and 20cm could happen around 2020 and 2045, respectively. A sea lever rise of 50cm could happen after 2100 for RCP2.5, after 2090 for RCP6.0, and after 2075 for RCP8.5.

Typhoon Haiyan (locally named Yolanda) is a very rare event. The measured maximum storm tide heights above the normal predicted tide level at surrounding locations range from 1.94 m to 7.88 m. The event can serve as the worst-case scenario for the region near the coast of San Pedro Bay.

To ensure the access to the buildings in the events of flooding, all roads that lead to the building access point, as shown in Figure 2-16, should be designed with the height of road pavement surface no less than the floor height.

Table 2-21 IPCC-AR5 projected sea level rise (2015–2100, in metres) relative to the sea level of 1986–2005. Low and High correspond to the 5th- and 95th-percentile values.

Year	RCP2.6			RCP6.0			RCP8.5		
	Low	Median	High	Low	Median	High	Low	Median	High
2015	0.06	0.08	0.10	0.05	0.06	0.08	0.05	0.06	0.07
2020	0.07	0.10	0.12	0.06	0.08	0.10	0.07	0.09	0.10
2025	0.09	0.12	0.15	0.08	0.10	0.13	0.08	0.11	0.13
2030	0.10	0.14	0.18	0.09	0.13	0.16	0.10	0.14	0.16
2035	0.12	0.16	0.20	0.11	0.15	0.18	0.12	0.16	0.20
2040	0.13	0.18	0.23	0.13	0.17	0.22	0.15	0.19	0.24
2045	0.14	0.20	0.26	0.14	0.20	0.25	0.17	0.23	0.28
2050	0.16	0.22	0.29	0.16	0.22	0.28	0.19	0.26	0.33
2055	0.17	0.24	0.32	0.18	0.25	0.32	0.22	0.30	0.38
2060	0.18	0.26	0.35	0.20	0.28	0.36	0.25	0.34	0.43
2065	0.20	0.28	0.38	0.22	0.31	0.40	0.28	0.38	0.49
2070	0.21	0.30	0.41	0.24	0.34	0.44	0.31	0.43	0.55
2075	0.22	0.33	0.44	0.26	0.37	0.48	0.34	0.47	0.61
2080	0.23	0.35	0.48	0.28	0.40	0.53	0.37	0.52	0.68
2085	0.24	0.37	0.51	0.31	0.44	0.58	0.41	0.57	0.75
2090	0.26	0.39	0.54	0.33	0.48	0.63	0.44	0.63	0.82
2095	0.27	0.42	0.58	0.36	0.51	0.68	0.48	0.68	0.90
2100	0.28	0.44	0.61	0.38	0.55	0.73	0.52	0.74	0.98

2.7 Cost and Benefit Assessment

The cost and benefit assessment is closely related to the definition of cost and benefit. In this handbook, the cost considered is the direct cost of the construction and the annualised direct losses over the construction service life due to extreme hazards. The benefit is the possible future direct loss avoided as a result of more resilient construction against extreme hazards. The following steps could be followed for the assessment:

(1) Establish a subassembly table for cost estimation and comparison with new design options (see Table 2-22);
(2) Estimate the cost of construction designed without consideration of resilience factor and the associated likelihood of failure;
(3) Estimate the cost of construction designed with consideration of resilience factor and the associated likelihood of failure;
(4) Estimate the annualized direct loss for each of the two structures designed in (2) and (3). The annualized direct loss is the construction cost multiplied by the likelihood of failure, in association with (2) and (3); and
(5) Estimate the annualized avoided direct loss as the annualized direct loss of construction without consideration of resilience factor subtracted by that with consideration of resilience factor.

Table 2-22 Construction costs of subassembly (or structural components) and cost difference between options.

Assembly	Option 1 (Peso)	Option 2 (Peso)	ΔCost
Site work			
Foundation			
Framing			
Exterior wall			
Roofing			
Others			
Labour			
Total Direct Construction Cost			

Note: The site work includes the preparation, such as excavation, pouring concrete slab and so on. Roof framing includes the construction of all roof structures and the associated such as sheathing, painting. Specialities include kitchen wall, cabinets etc. Mechanical is related to toilet, bathroom and water supply, sewage etc. The electrical subassembly is related to wiring, lighting fixing and so on. The adoption of resilience design would see a relative increase in the cost ratio for foundation, framing, roofing etc.

If the structures is assumed to fail when the external loads exceed the design loads, the annualised avoided direct losses are calculated as shown in Table 2-23 and Table 2-24 for wind and seismic hazard, respectively, where 2% corresponds to the exceedance probability considering the current design wind load based on the event of ARI=50, and 0.21% corresponds to the exceedance probability considering the current design seismic load based on the event of ARI=475; 0.1%, 0.01% and 0.001% are acceptable failure probabilities considering three levels of resilience improvement of Class 2 occupancy structures for wind speed and seismic hazards, while 0.05%, 0.001% and 0.0005% are acceptable failure probabilities considering three levels of resilience improvement of Class 3 occupancy structures. “C1” and “C2” are the construction costs of buildings without and with consideration of resilience design, respectively.

It should be noted that the annualised avoided direct loss does not include the indirect benefit.

Table 2-23 Annualised avoided direct loss for wind hazard.

Resilience	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Low	2%xC_1-0.1%x C_2	2%x C_1-0.05%x C_2
Medium	2%x C_1-0.01%x C_2	2%x C_1-0.001%x C_2
High	2%x C_1-0.001%x C_2	2%x C_1-0.0005%x C_2

Table 2-24 Annualised avoided direct loss for seismic hazard.

Resilience	Class 2 IV: Standard Occupancy Structures	Class 3 I: Essential Facilities) III: Special Occupancy Structures
Low	0.21%x C_1-0.1%x C_2	0.21%x C_1-0.05%x C_2
Medium	0.21%x C_1-0.01%x C_2	0.21%x C_1-0.001%x C_2
High	0.21%x C_1-0.001%x C_2	0.21%x C_1-0.0005%x C_2

(6) Choose an appropriate discount rate, *r*, defined by NEDA, which is 15% in its ‘ICC Project Evaluation Procedures and Guidelines’. It should be noted that the discount rate is fairly high. It is suggested also to consider 5% applied by the World Bank, and 10% in the range applied by developing countries.

(7) Estimate the net present value (NPV) of benefit gained due to consideration of resilience factor by

$$NPV \quad = \sum_{i=0}^{N} \frac{Avoided\ Annualized\ Loss}{(1+r)^i} - \Delta Cost \qquad (2\text{-}3)$$

where N is the design service life, r is the discount rate, and $\Delta Cost$ is the construction cost variation or difference between the construction without enhance resilience and the construction with enhanced resilience.

(8) If $NPV > 0$, then the design is acceptable because the construction with enhanced resilience provides positive benefit over its design service life, or the payback period (i.e. when NPV=0) is less than the design service life.

2.8 Recommended Design Steps

1) Develop facility/structure objective and function statement, and identify the class of structures
2) Determine the level of resilience that the structure is intended to achieve.
3) Identify the performance based on the class of structure and the level of resilience to achieve. The performance target is defined so that the risk thresholds, as shown in
4) Table 2-1, are not be exceeded. This chapter provides the performance targets of designs for wind, earthquake, and flooding hazards.
5) In the design for the enhanced resilience to wind and earthquake, select a resilience factor desired to be achieved in the design, and then identify the hazard zone for wind hazards from Table 2-6 or
6) Table 2-7, and for earthquake hazards from Table 2-12 and Table 2-13.
7) Apply the determined design loads for wind and earthquake to the combinations of loads as specified in the NSCP. Consideration of a load effect, e.g. wind load, based on the National Structural Codes of the Philippines (NSCP, a design load is generally in the form

$$Q = K_1 K_2 \cdots K_n q \qquad (2\text{-}4)$$

where Q is the design load, q is the basic design load, and K_i's are multiplication factors accounting for environmental conditions and structural configuration; e.g. topographical and directionality effects in the case of wind load.

Inclusion of resilience factor is in the form of resilience factor K_R

$$Q_R = K_R Q \qquad (2\text{-}5)$$

where Q_R is the design load accounting for the resilience factor. After determination of Q_R, the subsequent design task follows the normal procedure specified in NSCP. Eq. (2-5) is generic and applies in the same way for wind and earthquake loads.

6) Estimate the Net Present Value (NPV) of costs and benefits as described in the section 2.7. If NPV > 0, then the design is acceptable because the construction with enhanced resilience provides positive benefit over its design service life.

3 Illustrative Design Cases for Resilience

To make the inclusion of resilience factors as simple as possible, and be consistent with the application of NSCP (2010), resilience factors were developed to be incorporated at the computation of design loads. This chapter describes the details for incorporating the resilience factors in the design for wind and earthquake loads.

3.1 Wind loads

As presented in Chapter 2, for a specific return period (or failure probability) the required design velocity pressure in a resilient structural design can be computed by using either the required wind speed or the resilience factor.

As stated in Eq. (207-1), Section 207.5, NSCP (2010), the velocity pressure q_z is computed as follows:

$$q_z = 47.3\times 10^{-6} K_z K_{zt} K_d V^2 I_w \quad (3\text{-}1)$$

where K_z (Section 207.6.6, NSCP 2010), K_{zt} (Section 207.7.2, NSCP 2010), and K_d (Section 207.8, NSCP 2010) are the exposure coefficient, topographic factor, and wind directionality factor, respectively, defined in the NSPC, I_w (Section 207.9, NSCP 2010) is the importance factor, and V is the basic wind speed (Table 207-1, NSCP 2010).

Design for resilience (as developed in this handbook) can be accomplished by using the required basic wind speed or the resilience factor. If using required basic wind speed, the velocity pressure for resilient design q_{zR} may be computed as follows:

$$q_{zR} = 47.3\times 10^{-6} K_z K_{zt} K_d V_R^2 I_w \quad (3\text{-}2)$$

where V_R is the required basic wind speed for resilient design. That is, instead of using the basic wind speed specified in the NSCP (2010), the required basic wind speed for resilient design can be used in place of the code-specified basic wind speed.

An alternative for determining q_{zR} is to include the resilience factor, K_R, in the computation by either modifying the design wind speed V or the importance factor I_w. This may be accomplished by one of the three ways as follows:

a) Include K_R explicitly as an additional multiplier to Eq. (3-1); i.e.

$$q_{zR} = K_R q_z = K_R \times \left(47.3\times 10^{-6} K_z K_{zt} K_d V^2 I_w\right) \quad (3\text{-}3)$$

or

b) Multiply $\sqrt{K_R}$ and V to obtain V_R as in Eq. (3-2); i.e.

$$q_{zR} = 47.3\times 10^{-6} K_z K_{zt} K_d \left(\sqrt{K_R}V\right)^2 I_w \quad (3\text{-}4)$$

or

c) Multiply K_R and I_w and use $K_R I_w$ in place of I_w; i.e.

$$q_{zR} = 47.3\times10^{-6} K_z K_{zt} K_d V^2 \left(K_R I_w\right) \tag{3-5}$$

Using Eq. (3-2), (3-4), or (3-5) does not require explicitly introducing the resilience factor K_R, but needs to adjust the input value of V or I_w to obtain q_{zR}. On the other hand, using Eq. (3-3) allows computation of q_z as per usual procedure specified in the NSCP (2010), and then multiplied by K_R to obtain q_{zR}. Because the differences in ease of implementation and computational effort are minimal, the choice one of Eqs. (3-2) to (3-5) for resilient design depends on the preference of the design engineer.

3.2 Earthquake loads

For the majority of LGU structures, static lateral-force-resisting procedures may be used for structural analysis. The NSCP (2010) allows two alternative static procedures for determination of design base shear: simplified static procedure and static procedure. The computation and the inclusion of resilience factor in the required design base shear for resilient design are described in the following sub-sections.

3.2.1 Simplified static procedure

As specified in Section 208.4.8.1, NSCP (2010), simplified static lateral-force procedure may be applied to the analysis of following structures of Occupancy Category IV or V:

1. Buildings of any occupancy not more than three stories in height excluding basements that use light-frame construction; and
2. Other buildings not more than two stories in height excluding basements.

For the simplified static procedure, Sec. 208.5.2.3.1, NSCP (2010), specifies that the total design base shear in a given direction shall be determined from

$$V = \frac{3C_a}{R} W \tag{3-6}$$

where V is the design base shear, C_a is the seismic coefficient (Table 208-7, NSCP 2010), W is the seismic dead load as defined in the NSCP Sec. 208.5.1.1 and R is the coefficient representative of the inherent over-strength and global ductility capacity of lateral-force-resisting systems (Table 208-11, NSCP 2010, for building structures).

The resilience factor may be included in the computation of required design base shear, V_R, in one of the two ways as follows:

a) Include K_R explicitly as an additional multiplier to Eq. (3-6); i.e.

$$V_R = K_R V = K_R \times \left(\frac{3C_a}{R}\right) W \tag{3-7}$$

or

b) Multiply K_R and C_a, and use $\left(K_R C_a\right)$ in place of C_a; i.e.

$$V_R = \frac{3\left(K_R C_a\right)}{R} W \tag{3-8}$$

Using Eq. (3-7) allows computation of V as per usual procedure specified in the NSCP (2010), and then multiplied by K_R to obtain V_R. On the other hand, using Eq. (3-8) does not require explicitly introducing the resilience factor K_R, but needs to adjust the input value of C_a to obtain V_R.

3.2.2 Static Procedure

As specified in Section 208.4.8.2, NSCP (2010), static lateral-force procedure may be applied to the analysis of following structures:

1. All structures, regular or irregular in Occupancy Categories IV and V in Seismic Zone 2;
2. Regular structures under 75 m in height with lateral force resistance provided by systems listed in Table 208-11, NSCP (2010), except where dynamic lateral-force procedure applies;
3. Irregular structures not more than five stories or 20 m in height; and
4. Structures having a flexible upper portion supported on a rigid lower portion where both portions of the structure considered separately can be classified as being regular, the average story stiffness of the lower portion is at least 10 times the average story stiffness of the upper portion and the period of the entire structure is not greater than 1.1 times the period of the upper portion considered as a separate structure fixed at the base.

For the static procedure, Sec. 208.5.2, NSCP (2010), specifies that the total design base shear shall be determined from:

$$V = \frac{C_v I}{RT} W \tag{3-9}$$

but the total base shear need not exceed the following:

$$V = \frac{2.5 C_a I}{R} W \tag{3-10}$$

and shall not be less than the following:

$$V = 0.11 C_a I W \tag{3-11}$$

In addition, for Seismic Zone 4, the total base shear shall not be less than the following:

$$V = \frac{0.8 Z N_v I}{R} W \tag{3-12}$$

where C_a and C_v are the seismic coefficients (Table 208-7 and 208-8, NSCP 2010), Z is the seismic zone factor (Table 208-3, NSCP 2010), N_a and N_v are the near-source factors (Table 208-4 and 208-

5, NSCP 2010), I is the seismic importance factor (Table 208-1, NSCP 2010), W is the total seismic dead load, and T is the elastic fundamental period of the structure in the direction under consideration. T may be approximated by the following equation:

$$T = C_t h_n^{3/4} \tag{3-13}$$

where h_n (in m) is the building height above the base, and

$$C_t = \begin{cases} 0.0853, \text{for steel moment-resisting frames;} \\ 0.0731, \text{for reinforced concrete moment-resisting frames;} \\ 0.0488, \text{for all other buildings.} \end{cases} \tag{3-14}$$

The resilience factor may be included in the computation of required design base shear, V_R, in one of the two ways as follows:

a) Include K_R explicitly as an additional multiplier to Eq. (3-6); i.e.

$$V_R = K_R V \tag{3-15}$$

where V is computed from one of Eqs. (3-9) to (3-12); or

b) Multiply K_R and I, and use $(K_R I)$ in place of I in Eqs. (3-9) to (3-12); or

c) Multiply K_R and W, and use $(K_R W)$ in place of W in Eqs. (3-9) to (3-12).

Using Eq. (3-7) allows computation of V as per usual procedure specified in the NSCP (2010), and then multiplied by K_R to obtain V_R. On the other hand, using alternatives b) or c) does not require explicitly introducing the resilience factor K_R, but needs to adjust the input value of I or W, respectively, to obtain V_R.

3.3 Combination of Loads

The most critical load effect may occur when one or more types of loads act simultaneously. All applicable load combinations shall be considered. The symbols used in load combinations are defined below:

D = deal load

E =earthquake load resulting from the combination of the horizontal and vertical components

E_m = the estimated maximum earthquake load that can be developed in the structure

F = flood load

H = load due to lateral pressure of soil and water in soil

L = live load

L_r = roof live load

W = wind load

f_1 = 1.0 for floors in places of public assembly, for live loads in excess of 4.8 kPa, and for garage live load; = 0.5 for other live loads.

When strength design or load and resistance factor design method is used, the following combinations of factored loads shall be considered:

$$1.4(D+F) \quad (3\text{-}16)$$

$$1.2(D+F+T)+1.6(L+H)+0.5(L_r \text{ or } R) \quad (3\text{-}17)$$

$$1.2D+1.6(L_r \text{ or } R)+(f_1L \text{ or } 0.8W) \quad (3\text{-}18)$$

$$1.2D+1.6W+f_1L+0.5(L_r \text{ or } R) \quad (3\text{-}19)$$

$$1.2D+1.0E+f_1L \quad (3\text{-}20)$$

$$0.9D+1.6W+1.6H \quad (3\text{-}21)$$

$$0.9D+1.0E+1.6H \quad (3\text{-}22)$$

For strength design for concrete, and load and resistance factor design for steel, the following special load combinations for seismic design shall be considered:

$$1.2D+f_1L+1.0E_m \quad (3\text{-}23)$$

$$0.9D \pm 1.0E_m \quad (3\text{-}24).$$

3.4 Illustrative Structural Design Examples

This sub-section presents some structural design examples showing the use of resilience factor for resilient design. Structural analysis and design are complicated, time-consuming, and highly technical professional undertakings. With the advent of affordable computing power and sophisticated, user-friendly software technologies, many structural engineers of current time use specialized software packages that are capable of rapid computation and automatic requirement checking with relevant design code specifications. Nevertheless, some engineers remain to perform analysis and design either by manual computation or using general-purpose spreadsheet computer programs. However, the same basic structural-engineering principles guide the structural analysis and design, whether it be by way of specialized computer packages or manual computation.

Two design examples are shown in this section: (a) orphanage housing and (b) office for indigenous group. According to the NSCP (2010), the orphanage housing is classified as Occupancy Category I. Essential Facilities, whereas the office for indigenous group as Occupancy Category III. Special Occupancy Category. To provide an adequate understanding of the designed structures in addition to showing the use of resilience factor, some of the main analysis and design parameters were given as well, as shown in Table 3-1. The resilience factor for design against wind could be input according to one of the ways described in Section 3.1 and that for design against earthquakes in Section 3.2. Note that the return periods used in the design for earthquakes do not necessarily match that used in the design for wind. This is a kind of flexibility for which the designer or decision-maker can make judgments and decide which level of resilience fits best the purpose of the planned construction.

The structural stresses for design should be taken as the maximum of the combination of loads as listed in Section 3.3 or as defined in the NSCP (2010). The selection of the dimensions, constituent elements, and detailing of a structural member (e.g. a beam or a column) should be in accordance with the relevant NSCP specifications or other referenced codes (e.g. ACI 318 for reinforced concrete construction and AISC for steel construction). STAAD software was applied in the simulation for two design examples, but other assessment options could also be used to consider the resilience factors in designs.

Table 3-1 Input parameters and resilience factors for the design examples.

Design Parameters		LGU Structures	
		Bahay Sandigan (Orphanage housing)	Office for Indigenous Group
Construction Properties	Compressive strength of concrete	28 MPa	21 MPa
	Yield strength of steel	414 MPa	276 MPa
	Occupancy category	I. Essential facilities	III. Special occupancy structures
Wind Design Parameters	Wind zone	II (200 kph)	II (200 kph)
	Wind importance factor	1.15	1.15
	Surface exposure category	B	C
	Velocity pressure exposure coefficient (K_z)	0.575	1.16
	Topographic factor (K_{zt})	1.0	1.0
	Return period for re-design	1000 years	2000 years
	Wind speed for re-design	265 kph	278 kph
	Resilience factor for re-design	1.77	1.94
Earthquake Design Parameters	Seismic zone	4	4
	Seismic importance factor	1.5	1.0
	Seismic source type	C	A
	Value of Near Source Factor (N_a)	1.0	1.0
	Value of Near Source Factor (N_v)	1.0	1.0
	Soil profile type	S_E (soft soil)	S_C (Very dense soil and soft rock)

	Value of Seismic Coefficient (C_a)	0.44 N_a	0.40
	Value of Seismic Coefficient (C_v)	0.96 N_v	0.56
	Value of Over Strength and Global Ductility Capacity Coefficient (R)	8.5	8.5
	Value of Numerical Coefficient For Fundamental Period Computation (C_t)	0.0731	0.0731
	Building height (h_n)	6.95 m	8.10 m
	Return period for re-design	1000 years	2000 years
	PGA for re-design	0.50	0.58
	Resilience factor for re-design	1.24	1.46

3.4.1 Orphanage Housing

The orphanage housing is a two-story reinforced concrete building, and provided with pinned-connected supports. Its three-dimensional structural frame is shown in Figure 3-1. The plan view and elevation view of the structure are shown in Figure 3-2 and Figure 3-3, respectively.

As per result of the structural analysis, the frame shown in red in Figure 3-4 is the frame subjected to the highest stresses. To simplify the presentation only one beam (member no. 152) and one column (member no. 115) were chosen to show the differences between the original and the resilient re-design of structural members. The re-design of all other structural members follow a similar procedure.

Figure 3-5 and Figure 3-6 show the original and re-design of member no. 152 (a beam). The main difference in the member stress is the bending moment near the right support: the resilient re-design causes an increase from –136 kN-m to –164 kN-m. Even though the cross-sectional dimensions are the same in both cases (0.4 m × 0.3 m), the amount of reinforcement at the top increases from 4#20 (A_s = 1136 mm^2) to 2#32 (A_s = 1638 mm^2).

Figure 3-7 and Figure 3-8 show the original and re-design of member no. 115 (a column). Even though the re-design causes a decrease in axial force (from 238 kN to 193 kN), it induces an increase in bending moment (from 78 kN-m to 139 kN-m). In contrast to member no. 152, the resilient re-design cause both increases of the cross-section (from 0.3 m × 0.3 m to 0.4 m × 0.4 m) and the amount of reinforcement (from 2075 mm^2 to 2691 mm^2). Note that if the size #32 of reinforcing bars chosen in the re-design is deemed too large, it may be adjusted to use smaller-sized bars; for example, 8#22 (A_s = 3096 mm^2).

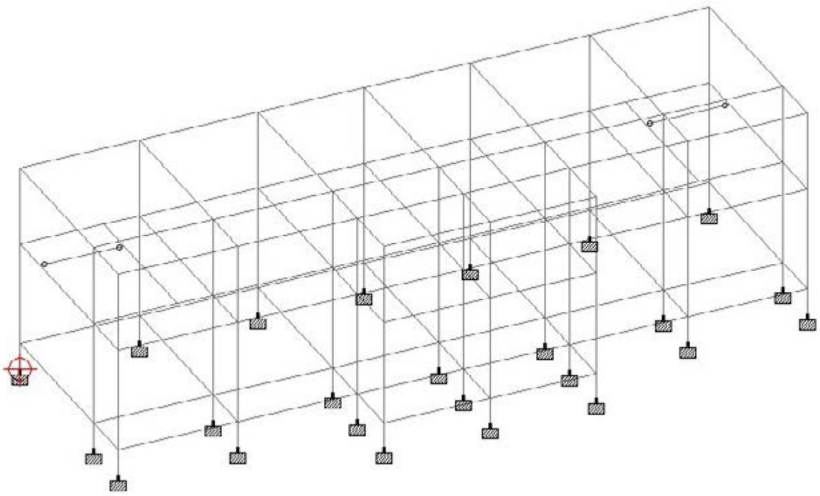


Figure 3-1 Three-dimensional structural frame of the orphanage housing.

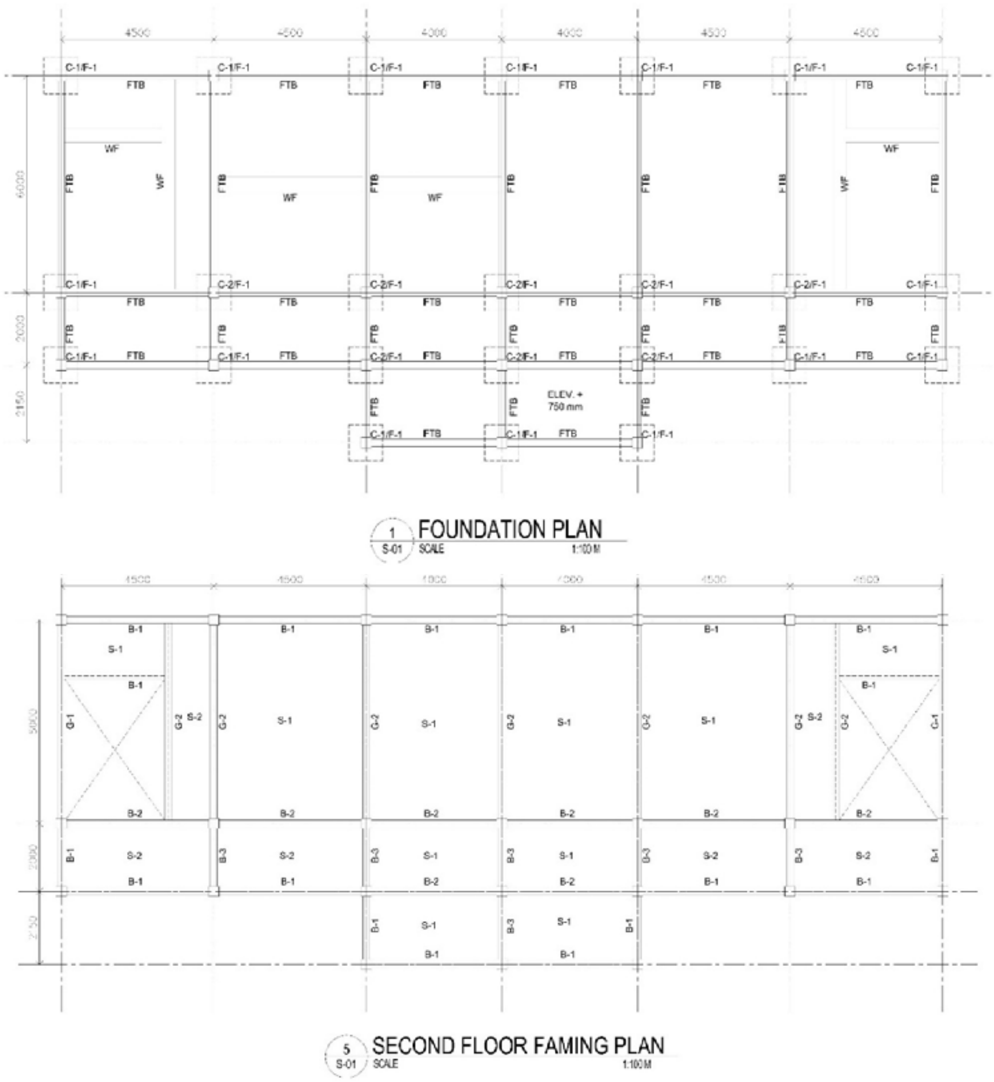


Figure 3-2 Foundation and second-floor plan view of the orphanage housing.

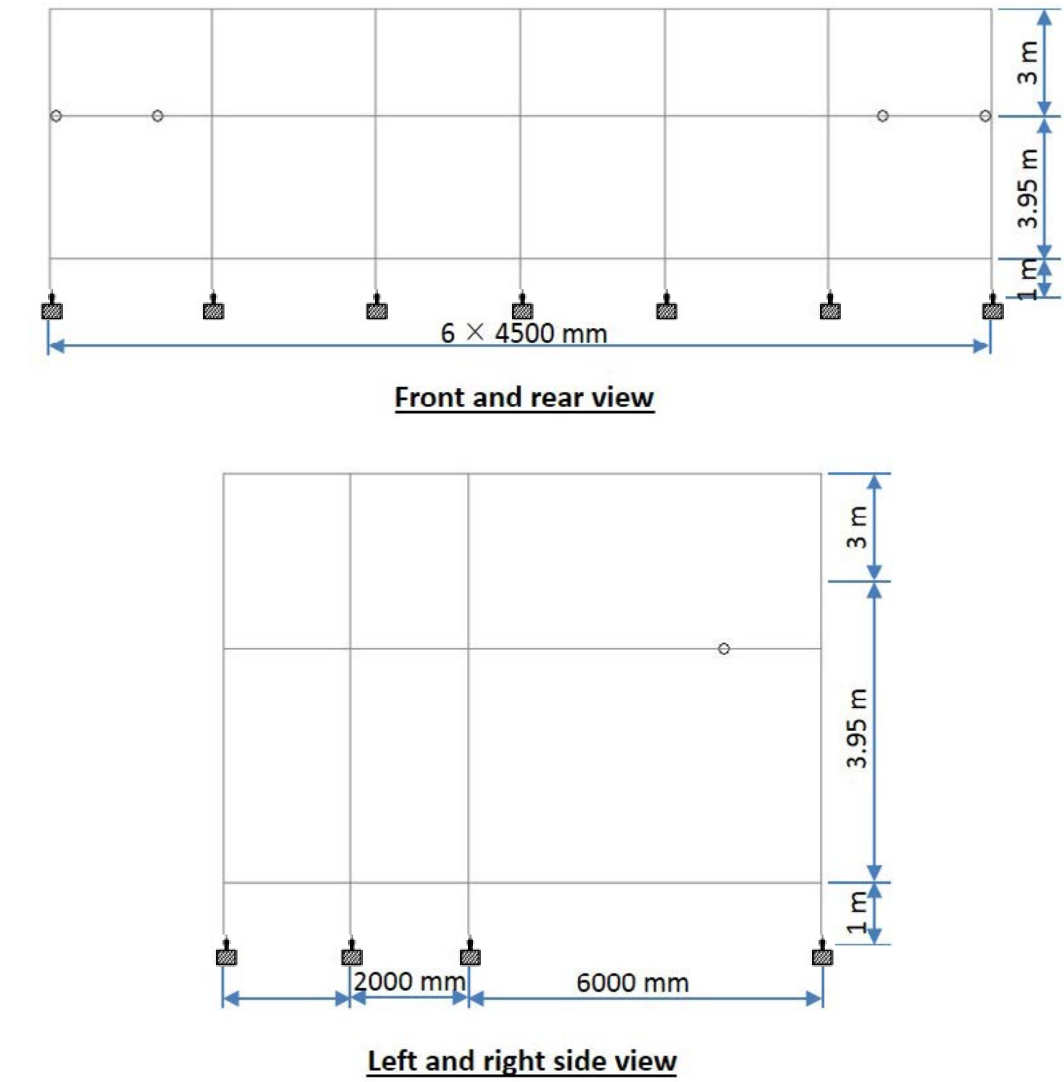


Figure 3-3 Elevation view of the orphanage housing.

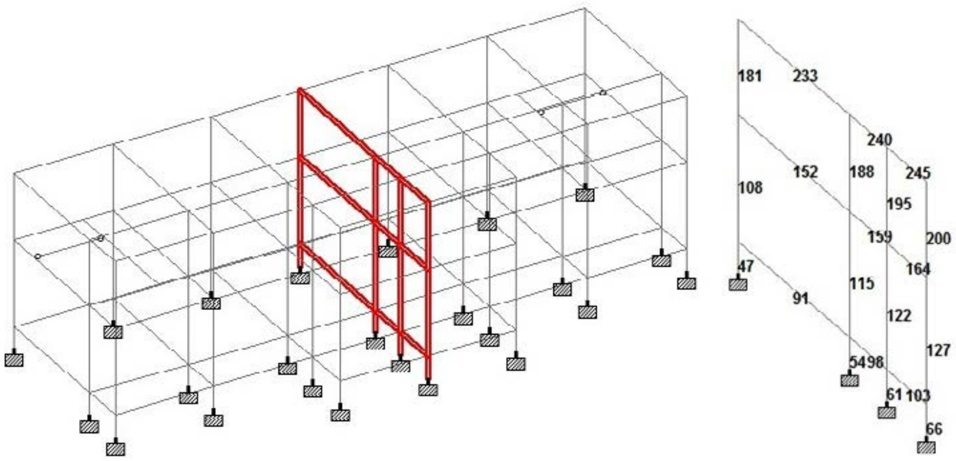


Figure 3-4 Critical frame (in red) and its structural element numbering.

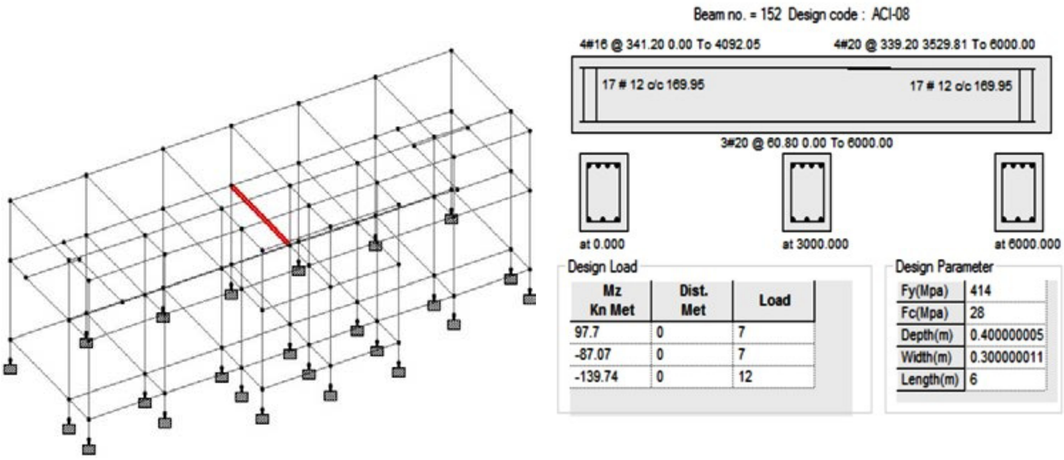


Figure 3-5 Original design of member no. 152 (in red).

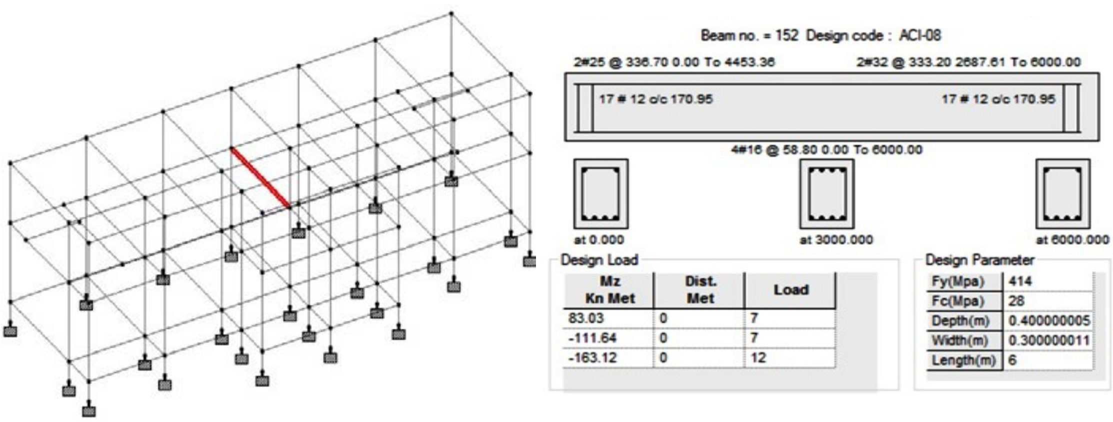


Figure 3-6 Resilient re-design of member no. 152 (in red).

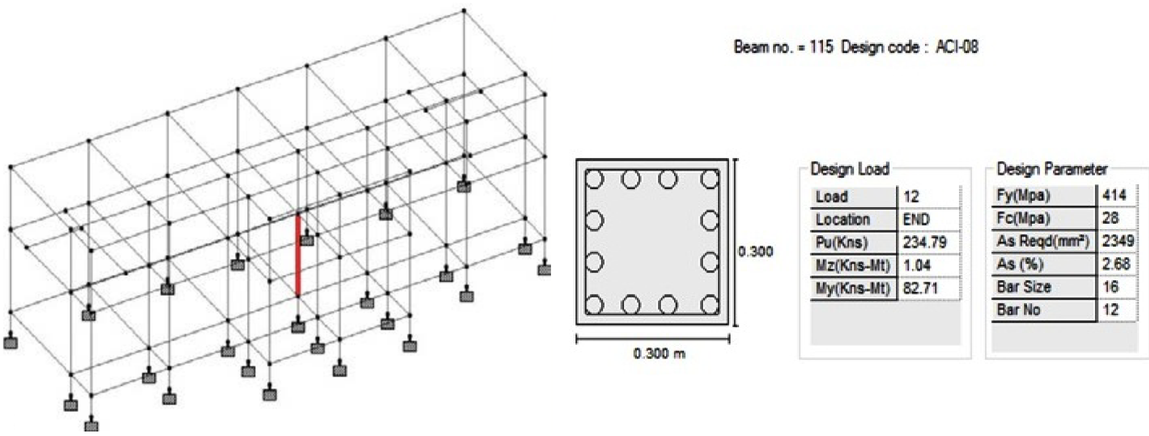


Figure 3-7 Original design of member no. 115 (in red).

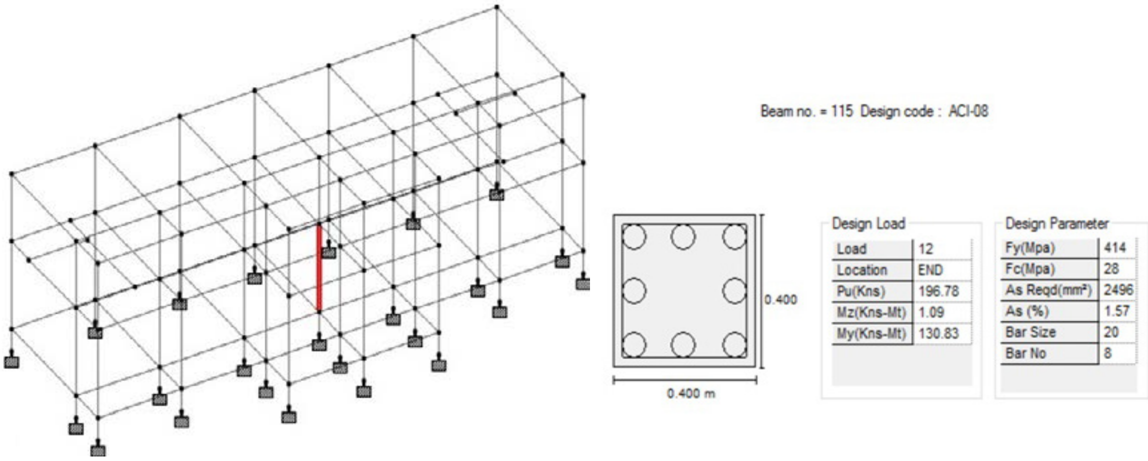


Figure 3-8 Resilient re-design of member no. 115 (in red).

The total direct construction cost and the cost (material and labour cost) in association with the components to be re-designed to meet resilience improvement are shown in Table 3-2.

Table 3-2 Direct total construction cost and cost difference of the re-designed components (examples only).

Re-Designed Components	Unit	Unit Price (PHP)	Existing Design	Resilience Design	Cost Difference (PHP)
Concrete	m^3	4,025.00	32.30	39.50	28,980.00
Steel Rebar	Kg	45.00	5,077.96	4,955.49	-5,511,14
Labour Cost	PHP		153,649.63	163,707.71	10,058.08
Total Direct Construction Cost	PHP		9,215,744.00	9,249,270.94	33,526.94

In the resilience design, we assumed:

- it follows the category for small resilience improvement of Class 3 buildings; and
- the total direct construction cost of the existing design is C_1 = PHP9,215,744.00, and then the cost of resilience design is C_2 = PHP9,249,270..94, or the sum of the existing construction cost and the additional cost for resilience design.

In this case, the structure was re-designed based on the event of ARI=1000, instead of 2000 required by the small resilience improvement for Class 3 buildings. It is interesting to find that the total amount of rebar mass was reduced in the resilience design as shown in Table 3-2. This could be caused by the new increased beam section in the resilience design which has a larger capacity more than that of the size in the original design and the software recognizes that there could be lesser mass of rebar requirement. As a result, the estimation of the avoided direct loss in Table 2-23 and Table 2-24 are modified when calculating the annualised avoided direct loss as shown in Table 3-3.

Table 3-3 Estimation of annualised avoided direct loss for the case of the orphanage housing

Annualised avoided direct loss for wind hazard	Annualised avoided direct loss for seismic hazard
2%x C_1-0.1%x C_2	0.21%x C_1-0.1%x C_2
PHP175,065.61	PHP10,103.79

The total is PHP185,169.40, which is large than PHP33,526.94, the additional construction cost for resilience design. It implies that the resilience design could bring in an immediate benefit, even without consideration of any indirect benefit.

3.4.2 Office of Indigenous Group

The office of indigenous group is a two-story reinforced concrete building with steel-trussed roof and fixed supports. Its three-dimensional roof trusses and structural frame are shown in Figure 3-9 and Figure 3-10, respectively. The two-dimensional view of a typical roof truss is shown in Figure 3-11. The plan view and elevation view of the structure are shown in Figure 3-12 and Figure 3-13, respectively.

The bending moments from structural analysis for the original design and for the resilient re-design are shown in Figure 3-14 and Figure 3-15, respectively. To simplify the presentation, only one beam (member no. 60), one column (member no. 39), and one truss member (member no. 379) were chosen to show the differences between the original and the resilient re-design of structural members. The re-design of all other structural members follow the same way.

Figure 3-16 and Figure 3-17 show the original and re-design of member no. 60 (a beam). It was noted that the re-design causes increases of the bending moments at every cross-section of the beam (i.e. 45%, 15%, and 10% increases at the left, middle, and right cross-sections, respectively). Such increases in bending moments is resisted with a larger cross-section (from 0.35 m × 0.30 m to 0.50 m × 0.40 m). Meanwhile, the amount of reinforcement is creased at the top of the left-half of the span (from 5#16 to 3#20) and at the bottom through the length of the beam (from 3#16 to 4#16).

Figure 3-18 and Figure 3-19 show the original and re-design of member no. 39 (a column). Even though the axial force in both cases are about the same, the re-design induces increases in bending moments with respect to the two principal axes of the cross section (from 4.7 kN-m to 10.9 kN-m with respect to Y-axis and from 61.4 kN-m to 65.3 kN-m with respect to Z-axis). In this example, the column dimensions for the re-design were increased from 0.3 m × 0.3 m to 0.35 m × 0.35 m, and this change in column size allowed the required amount of reinforcement to be reduced from 2412 mm^2 to 1869 mm^2. As a result, the original reinforcing bars of 12#16 was changed to 8#20.

Figure 3-20 and Figure 3-21 show the original and re-design of member no. 379 (a truss member). Note that the roof truss resists primarily the wind pressure. The re-design causes an 88% increase in critical load of this member, hence the double-L truss member was changed from L20203SD to L25253SD.

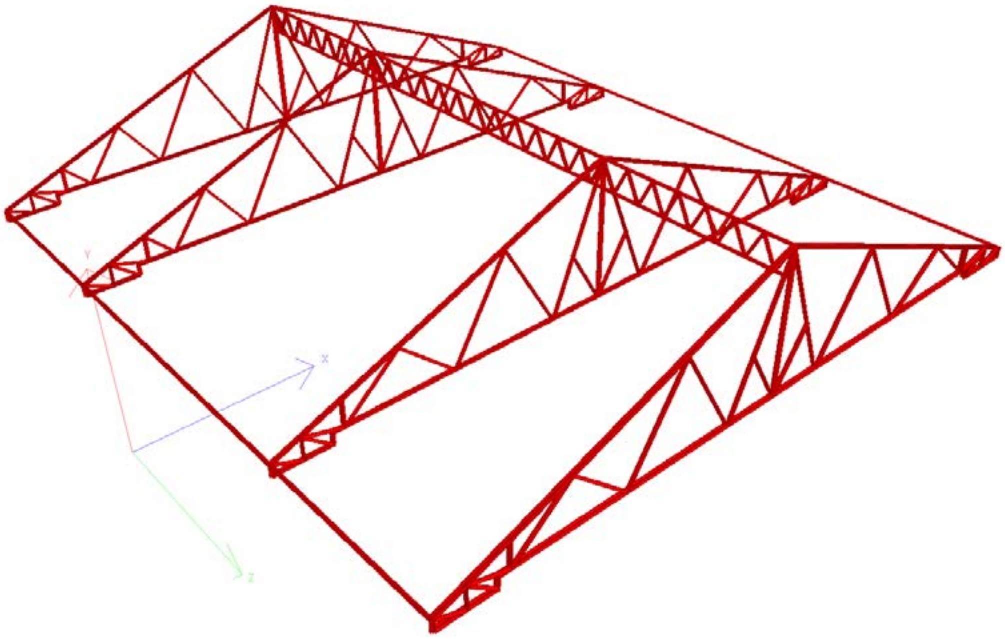


Figure 3-9 Three-dimensional view of the roof truss.

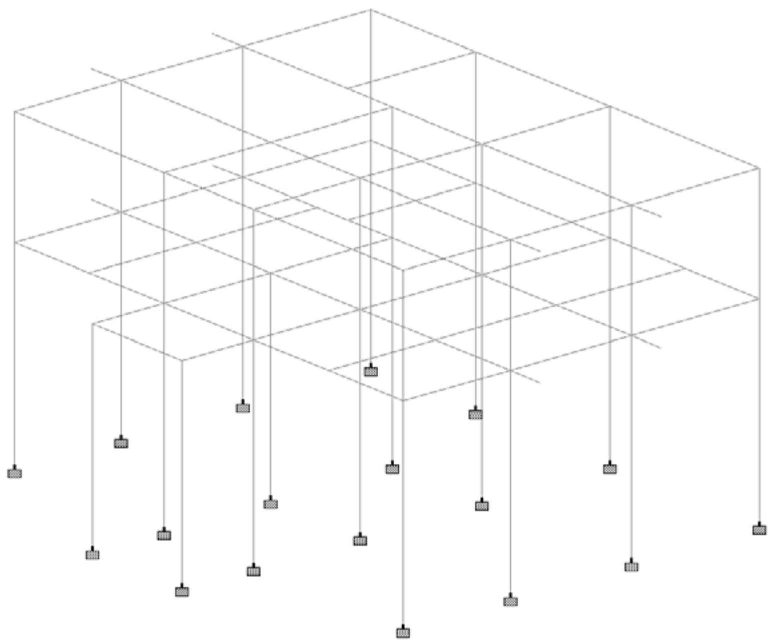


Figure 3-10 Three-dimensional structural frame of the building.

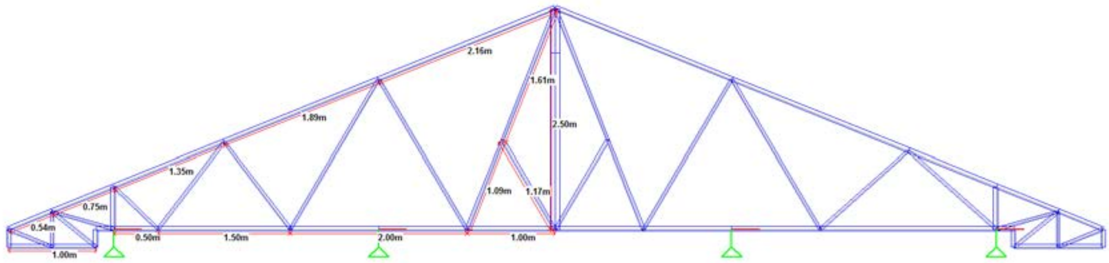


Figure 3-11 Two-dimensional view of a typical roof truss.

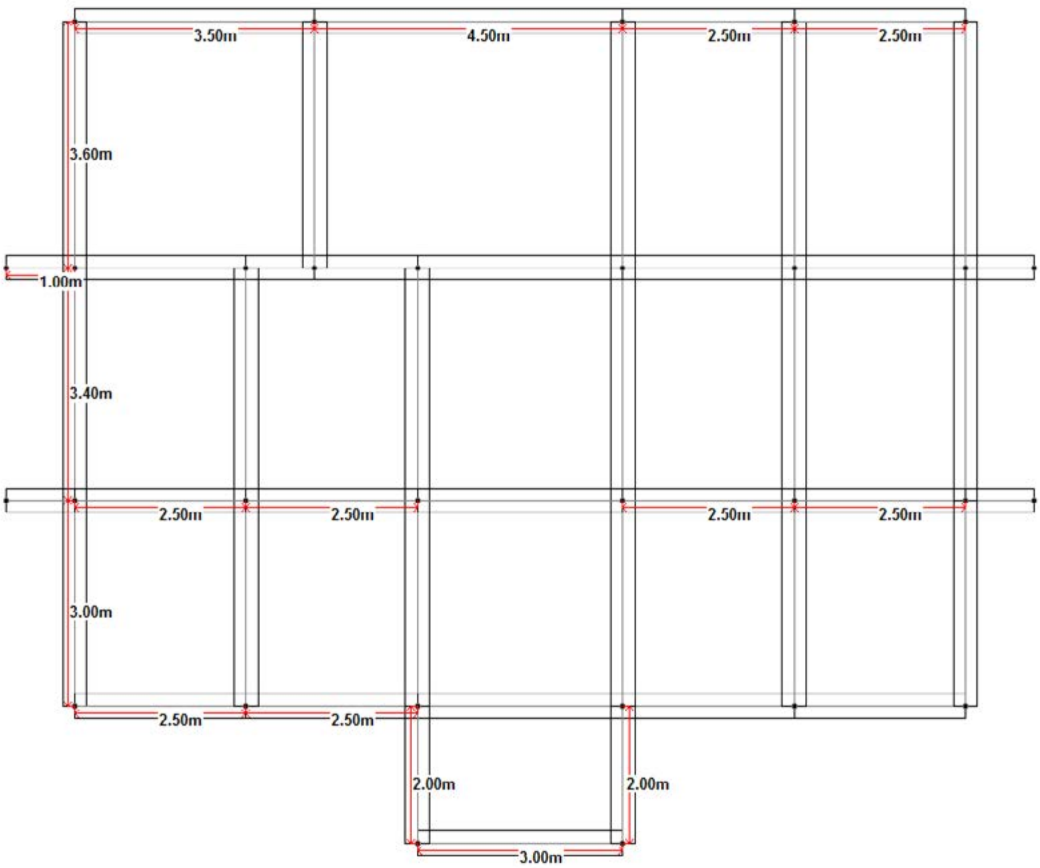
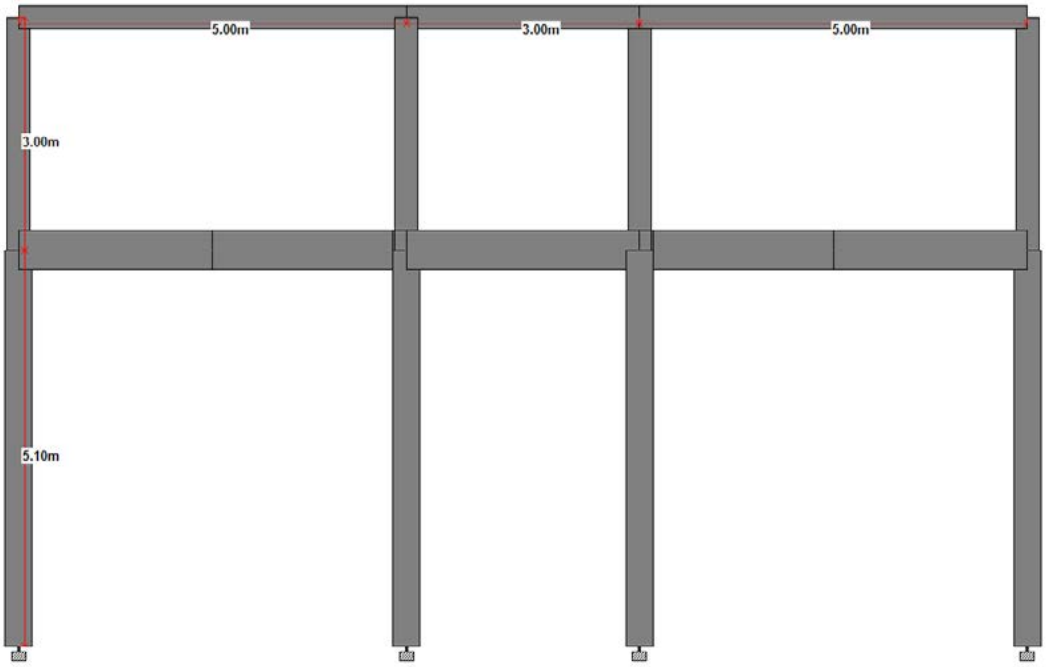
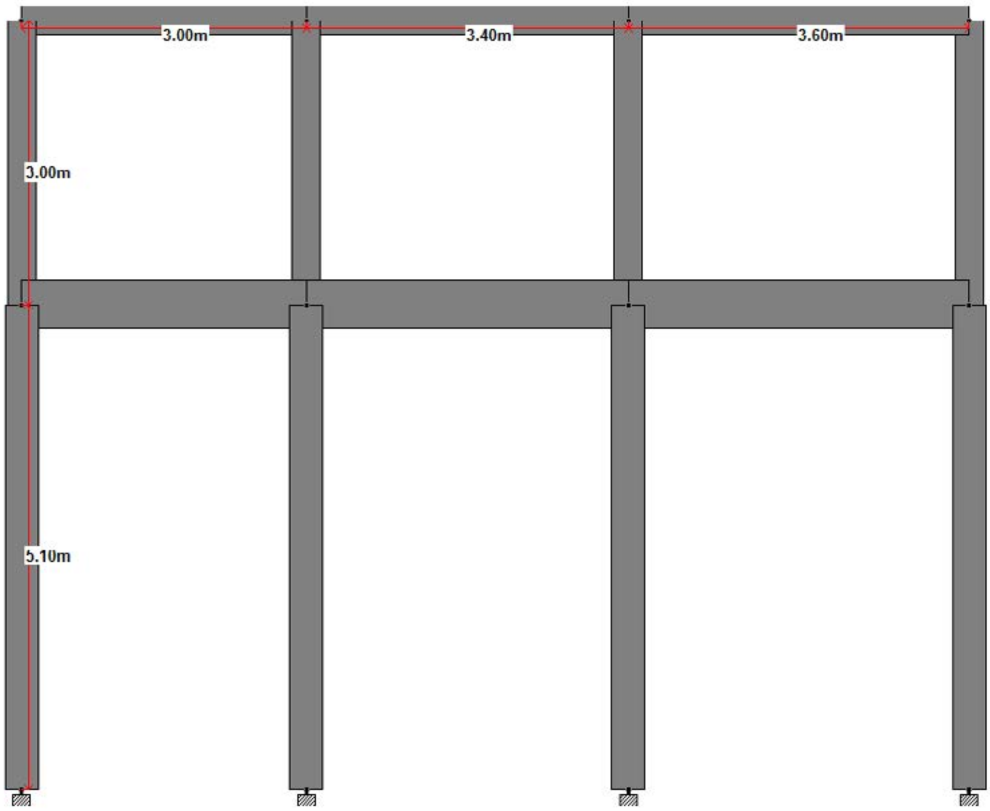


Figure 3-12 Plan view of the building.



Front view



Left and right side view

Figure 3-13 Elevation view of the building.

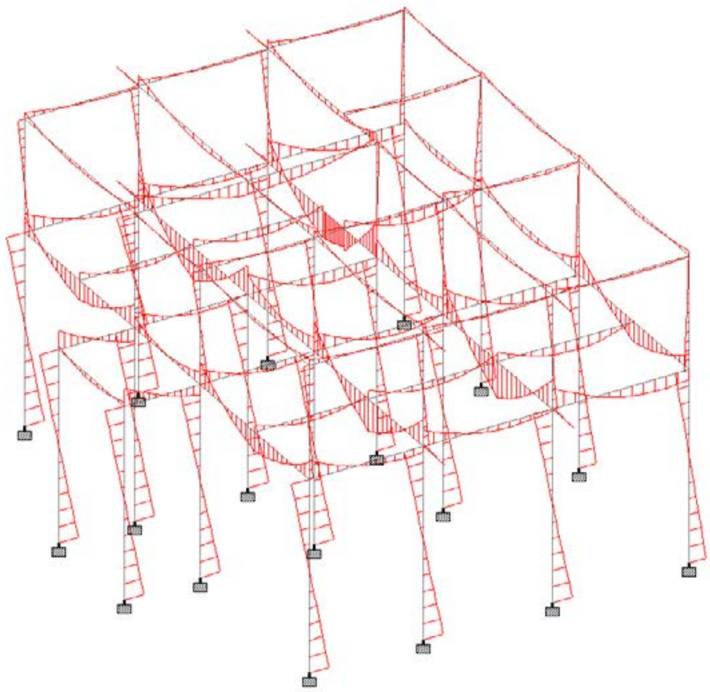


Figure 3-14 Three-dimensional bending moments of the original design.

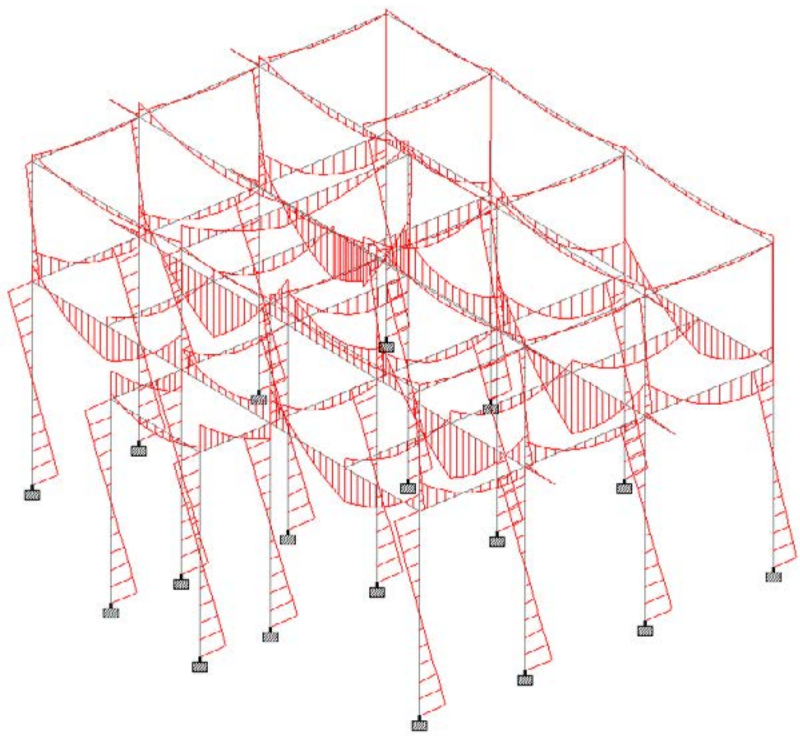
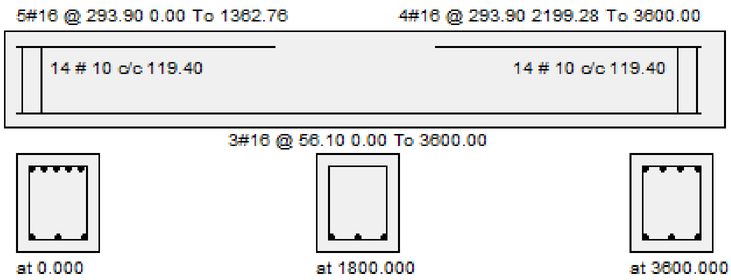


Figure 3-15 Three-dimensional bending moments of the resilient re-design.

Beam no. = 60 Design code : ACI-08



Design Load

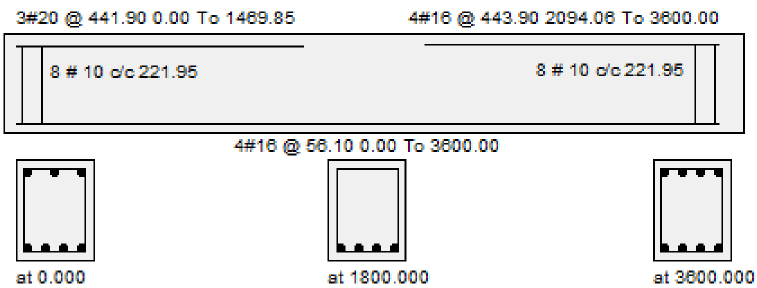
Mz Kn Met	Dist. Met	Load
35.27	0	11
-66.07	0	11
-52.76	0	10

Design Parameter

Fy(Mpa)	276
Fc(Mpa)	21
Depth(m)	0.349999994
Width(m)	0.300000011
Length(m)	3.599999904

Figure 3-16 Original design of member no. 60.

Beam no. = 60 Design code : ACI-08



Design Load

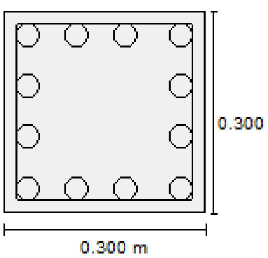
Mz Kn Met	Dist. Met	Load
51.29	0	11
-75.76	0	11
-58.21	0	10

Design Parameter

Fy(Mpa)	276
Fc(Mpa)	21
Depth(m)	0.5
Width(m)	0.400000005
Length(m)	3.599999904

Figure 3-17 Resilient re-design of member no. 60.

Beam no. = 39 Design code : ACI-08



Design Load

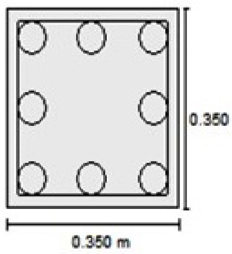
Load	12
Location	END
Pu(Kns)	229.72
Mz(Kns-Mt)	4.68
My(Kns-Mt)	61.39

Design Parameter

Fy(Mpa)	276
Fc(Mpa)	21
As Reqd(mm²)	2412
As (%)	2.68
Bar Size	16
Bar No	12

Figure 3-18 Original design of member no. 39.

Beam no. = 39 Design code : ACI-08



Design Load

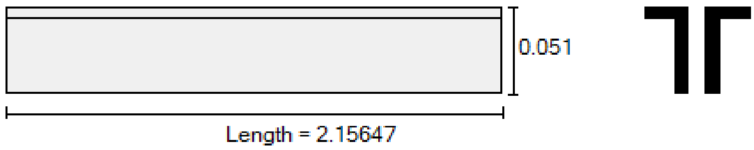
Load	12
Location	STA
Pu(Kns)	226.56
Mz(Kns-Mt)	10.87
My(Kns-Mt)	65.34

Design Parameter

Fy(Mpa)	276
Fc(Mpa)	21
As Reqd(mm²)	1825
As (%)	2.05
Bar Size	20
Bar No	8

Figure 3-19 Resilient re-design of member no. 39.

Beam no. = 379. Section: L20203SD



DESIGN STRESSES (NEW, MMS)

YLD	248.21	FC	55.77
FCZ	0	FTZ	0
FCY	0	FTY	0
FT	148.93	FV	0

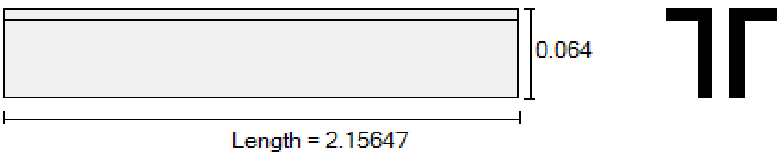
Critical load (KN ,METE)

Load	7
Locatio	0
FX	47.293880 C
MY	0
MZ	0

Code	Result	Ratio	Critical	KLR
AISC-89	PASS	0.9166179	AISC- H1-1	137.5794

Figure 3-20 Original design of member no. 379 (roof truss member).

Beam no. = 379. Section: L25253SD



DESIGN STRESSES (NEW, MMS)

YLD	248.21	FC	81.97
FCZ	0	FTZ	0
FCY	0	FTY	0
FT	148.93	FV	0

Critical load (KN ,METE)

Load	7
Locatio	0
FX	88.811882 C
MY	0
MZ	0

Code	Result	Ratio	Critical	KLR
AISC-89	PASS	0.9278687	AISC- H1-1	109.1205

Figure 3-21 Resilient re-design of member no. 379 (roof truss member).

The total direct construction cost and the cost (material and labour cost) in association with the components to be re-designed to meet resilience improvement are shown in Table 3-4.

Table 3-4 Direct total construction cost and cost difference of the re-designed components (examples only).

Re-Designed Components	Unit	Unit Price (PHP)	Existing Design	Resilience Design	Cost Difference (PHP)
Concrete	m^3	41,40.00	32.30	43.40	45,954.00
Steel Rebar	Kg	45.00	4,601.00	5,077.00	21,420.00
Labour Cost	PHP		146,043.00	174,917.57	28,874.57
Total Direct Construction Cost	PHP		3,500,000.00	3,596,248.57	96,248.57

In the resilience design, we assumed:

- it follows the category for small resilience improvement of Class 3 buildings; and
- the total direct construction cost of the existing design is C_1 = PHP3,500,000.00, and then the cost of resilience design is C_2 = PHP3,596,248.57, or the sum of the existing construction cost and the additional cost for resilience design.

By applying Table 2-23 and Table 2-24, the annualised avoided direct losses for wind and seismic hazards, are PHP68,213 and PHP5,552, respectively. The total is PHP73,754. Considering equation (2-3) at 15% discount rate, the total annualised avoided direct loss is shown in Table 3-5. As a result of the additional construction cost for resilience design to be PHP96,248.57, the resilience design could be paid back in the second year, even without consideration of any indirect benefit.

Table 3-5 Estimation of the total avoided direct loss for the office of indigenous group (discount rate: 15%)

Year	Annualised avoided direct loss for wind hazard	Annualised avoided direct loss for seismic hazard	Total annualised avoided direct loss
	2%x C_1-0.05%x C_2	0.21%x C_1-0.05%x C_2	
0	PHP68,202	PHP5,552	PHP73,754
1	PHP127,508	PHP10,380	PHP137,887

4 Applicability and Limitations

With limited climate and hazard information as well as geographical/geological data available for hazard modelling and assessment, there are some limitations in the applicability of the developed resilience design. These are listed as follows:

- The wind hazard curves developed herein for the three wind zones were based on matching the 50-year wind speeds defined in the NSCP and the assumption that a shape parameter of –0.1 in the wind hazard modelled by the generalized extreme value distributions. The wind hazard curves should therefore be reviewed when more observed wind speed data become available. Correspondingly, all performance targets for the resilience design should be updated. Considering the uncertainties in the future trend of extreme wind due to climate change, the likely change in wind speed is not considered;
- Similar to the case of wind, the earthquake hazard curves were developed based on matching the 500-year peak ground accelerations defined in the NSCP and the assumption that the peak ground accelerations follow the Gumbel distributions. If more detailed local geological and tectonic conditions are known, then they should be used for determination of the design peak ground accelerations;
- The majority of the storm-tide gauge records along the coastlines covered only a limited time and therefore were too short to be used for hazard modelling; hence the storm tide resilience design presented in this handbook is preliminary and may only be applicable around the Manila region. The storm-tide hazard models should be developed when sufficient lengths of data or knowledge about storm tides become available. Correspondingly, the design targets defined in the handbook should be updated. Meanwhile, the impact related to the speed of storm surge induced coastal flooding was not considered in the design, cautions should be taken when the effect becomes significant; and
- If local climatic and geographical conditions related to wind or flooding are sufficiently known, and the hazards are shown to be higher than specified in the handbook, they may be used for resilience design against wind or flooding.

Meanwhile, the selection of the resilience improvement level (i.e. small, medium and significant) for a structural design should be carefully considered as an over-design using a high resilience improvement level could lead to a significant increase in construction cost without achieving return or cost-effectiveness.

In regard to the estimation of the avoided loss in the cost/benefit assessment of a resilience design option, the approximate approach applied in the handbook is based on the assumption that the structure fails when the external load exceeds the basic design load. It should be pointed out that it is not always the case in practice because of both uncertainties and over-design. In this regard, the annualised avoided direct loss could be over-estimated. More accurate estimation requires consideration of the vulnerability of structures.

Finally, while the handbook aims to provide resilience designs for building assets of LGUs, it could be applied for residential buildings classified as Class 2 or standard occupancy structures as defined by NSCP. Moreover, it can also provide a guidance on what the performance should be achieved for the retrofit of existing buildings.

Appendix A Wind and Earthquake Zones of Municipalities

Municipality City Name	Province Name	Region Name	Wind Zone	Seismic Zone
AKBAR	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
AL-BARKA	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
CITY OF LAMITAN	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
HADJI MOHAMMAD AJUL	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
HADJI MUHTAMAD	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
LANTAWAN	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MALUSO	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SUMISIP	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TABUAN-LASA	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TIPO-TIPO	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TUBURAN	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
UNGKAYA PUKAN	BASILAN (Excluding City of Isabela)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BACOLOD-KALAWI (BACOLOD GRANDE)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BALABAGAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BALINDONG (WATU)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BAYANG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BINIDAYAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BUADIPOSO-BUNTONG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BUBONG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BUMBARAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BUTIG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
CALANOGAS	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DITSAAN-RAMAIN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4

GANASSI	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
KAPAI	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
KAPATAGAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
LUMBA-BAYABAO (MAGUING)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
LUMBACA UNAYAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
LUMBATAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
LUMBAYANAGUE	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MADALUM	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MADAMBA	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MAGUING	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MALABANG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MARANTAO	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MARAWI CITY	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MAROGONG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MASIU	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MULONDO	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PAGAYAWAN (TATARIKAN)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PIAGAPO	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PICONG (SULTAN GUMANDER)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
POONA BAYABAO (GATA)	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PUALAS	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SAGUIARAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SULTAN DUMALONDONG	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TAGOLOAN II	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TAMPARAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TARAKA	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TUBARAN	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4

TUGAYA	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
WAO	LANAO DEL SUR	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
AMPATUAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BARIRA	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BULDON	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
BULUAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU ABDULLAH SANGKI	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU ANGGAL MIDTIMBANG	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU BLAH T. SINSUAT	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU ODIN SINSUAT (DINAIG)	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU PAGLAS	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU PIANG	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU SALIBO	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU SAUDI-AMPATUAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
DATU UNSAY	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
GEN. S. K. PENDATUN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
GUINDULUNGAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
KABUNTALAN (TUMBAO)	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MAMASAPANO	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MANGUDADATU	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
MATANOG	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
NORTHERN KABUNTALAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PAGAGAWAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PAGALUNGAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PAGLAT	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PANDAG	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
PARANG	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4

RAJAH BUAYAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SHARIFF AGUAK (MAGANOY) (Capital) (25)	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SOUTH UPI	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SULTAN KUDARAT (NULING)	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SULTAN MASTURA	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
SULTAN SA BARONGIS (LAMBAYONG)	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TALAYAN	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
TALITAY	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
UPI	MAGUINDANAO (Excluding Cotabato City)	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	4
HADJI PANGLIMA TAHIL (MARUNGGAS)	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
INDANAN	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
JOLO (Capital)	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
KALINGALAN CALUANG	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
LUGUS	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
LUUK	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
MAIMBUNG	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
OLD PANAMAO	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
OMAR	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PANDAMI	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PANGLIMA ESTINO (NEW PANAMAO)	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PANGUTARAN	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PARANG	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PATA	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PATIKUL	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SIASI	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
TALIPAO	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
TAPUL	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2

TONGKIL	SULU	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
BONGAO	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
LANGUYAN	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
MAPUN (CAGAYAN DE TAWI-TAWI)	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
PANGLIMA SUGALA (BALIMBING) (Capital)	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SAPA-SAPA	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SIBUTU	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SIMUNUL	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SITANGKAI	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
SOUTH UBIAN	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
TANDUBAS	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
TURTLE ISLANDS	TAWI-TAWI	AUTONOMOUS REGION IN MUSLIM MINDANAO	3	2
BANGUED (Capital)	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
BOLINEY	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
BUCAY	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
BUCLOC	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
DAGUIOMAN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
DANGLAS	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
DOLORES	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LA PAZ	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LACUB	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LAGANGILANG	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LAGAYAN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LANGIDEN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LICUAN-BAAY (LICUAN)	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
LUBA	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
MALIBCONG	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4

MANABO	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
PEÑARRUBIA	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
PIDIGAN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
PILAR	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
SALLAPADAN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
SAN ISIDRO	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
SAN JUAN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
SAN QUINTIN	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
TAYUM	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
TINEG	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
TUBO	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
VILLAVICIOSA	ABRA	CORDILLERA ADMINISTRATIVE REGION	2	4
CALANASAN (BAYAG)	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
CONNER	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
FLORA	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
KABUGAO (Capital)	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
LUNA	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
PUDTOL	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
SANTA MARCELA	APAYAO	CORDILLERA ADMINISTRATIVE REGION	2	4
ATOK	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
BAGUIO CITY	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
BAKUN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
BOKOD	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
BUGUIAS	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
ITOGON	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
KABAYAN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
KAPANGAN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4

KIBUNGAN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
LA TRINIDAD (Capital)	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
MANKAYAN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
SABLAN	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
TUBA	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
TUBLAY	BENGUET	CORDILLERA ADMINISTRATIVE REGION	2	4
AGUINALDO	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
ALFONSO LISTA (POTIA)	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
ASIPULO	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
BANAUE	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
HINGYON	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
HUNGDUAN	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
KIANGAN	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
LAGAWE (Capital)	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
LAMUT	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
MAYOYAO	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
TINOC	IFUGAO	CORDILLERA ADMINISTRATIVE REGION	2	4
BALBALAN	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
CITY OF TABUK(Capital)	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
LUBUAGAN	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
PASIL	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
PINUKPUK	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
RIZAL (LIWAN)	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
TANUDAN	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
TINGLAYAN	KALINGA	CORDILLERA ADMINISTRATIVE REGION	2	4
BARLIG	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
BAUKO	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4

BESAO	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
BONTOC (Capital)	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
NATONIN	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
PARACELIS	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
SABANGAN	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
SADANGA	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
SAGADA	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
TADIAN	MOUNTAIN PROVINCE	CORDILLERA ADMINISTRATIVE REGION	2	4
BINONDO	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
ERMITA	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
INTRAMUROS	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
MALATE	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
PACO	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
PANDACAN	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
PORT AREA	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
QUIAPO	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SAMPALOC	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SAN ANDRES	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SAN MIGUEL	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SAN NICOLAS	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SANTA ANA	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SANTA CRUZ	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
SANTA MESA	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
TONDO	NCR - MANILA FIRST DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF LAS PIÑAS	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF MAKATI	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF MUNTINLUPA	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF PARAÑAQUE	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
PASAY CITY	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4

PATEROS	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
TAGUIG CITY	NCR FOURTH DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF MANDALUYONG	NCR SECOND DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF MARIKINA	NCR SECOND DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF PASIG	NCR SECOND DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF SAN JUAN	NCR SECOND DISTRICT	NATIONAL CAPITAL REGION	2	4
QUEZON CITY	NCR SECOND DISTRICT	NATIONAL CAPITAL REGION	2	4
CALOOCAN CITY	NCR THIRD DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF MALABON	NCR THIRD DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF NAVOTAS	NCR THIRD DISTRICT	NATIONAL CAPITAL REGION	2	4
CITY OF VALENZUELA	NCR THIRD DISTRICT	NATIONAL CAPITAL REGION	2	4
ADAMS	ILOCOS NORTE	REGION I - ILOCOS	2	4
BACARRA	ILOCOS NORTE	REGION I - ILOCOS	2	4
BADOC	ILOCOS NORTE	REGION I - ILOCOS	2	4
BANGUI	ILOCOS NORTE	REGION I - ILOCOS	2	4
BANNA (ESPIRITU)	ILOCOS NORTE	REGION I - ILOCOS	2	4
BURGOS	ILOCOS NORTE	REGION I - ILOCOS	2	4
CARASI	ILOCOS NORTE	REGION I - ILOCOS	2	4
CITY OF BATAC	ILOCOS NORTE	REGION I - ILOCOS	2	4
CURRIMAO	ILOCOS NORTE	REGION I - ILOCOS	2	4
DINGRAS	ILOCOS NORTE	REGION I - ILOCOS	2	4
DUMALNEG	ILOCOS NORTE	REGION I - ILOCOS	2	4
LAOAG CITY (Capital)	ILOCOS NORTE	REGION I - ILOCOS	2	4
MARCOS	ILOCOS NORTE	REGION I - ILOCOS	2	4
NUEVA ERA	ILOCOS NORTE	REGION I - ILOCOS	2	4
PAGUDPUD	ILOCOS NORTE	REGION I - ILOCOS	2	4
PAOAY	ILOCOS NORTE	REGION I - ILOCOS	2	4
PASUQUIN	ILOCOS NORTE	REGION I - ILOCOS	2	4
PIDDIG	ILOCOS NORTE	REGION I - ILOCOS	2	4
PINILI	ILOCOS NORTE	REGION I - ILOCOS	2	4
SAN NICOLAS	ILOCOS NORTE	REGION I - ILOCOS	2	4
SARRAT	ILOCOS NORTE	REGION I - ILOCOS	2	4
SOLSONA	ILOCOS NORTE	REGION I - ILOCOS	2	4
VINTAR	ILOCOS NORTE	REGION I - ILOCOS	2	4
ALILEM	ILOCOS SUR	REGION I - ILOCOS	2	4
BANAYOYO	ILOCOS SUR	REGION I - ILOCOS	2	4
BANTAY	ILOCOS SUR	REGION I - ILOCOS	2	4
BURGOS	ILOCOS SUR	REGION I - ILOCOS	2	4
CABUGAO	ILOCOS SUR	REGION I - ILOCOS	2	4
CAOAYAN	ILOCOS SUR	REGION I - ILOCOS	2	4
CERVANTES	ILOCOS SUR	REGION I - ILOCOS	2	4
CITY OF CANDON	ILOCOS SUR	REGION I - ILOCOS	2	4

CITY OF VIGAN (Capital)	ILOCOS SUR	REGION I - ILOCOS	2	4
GALIMUYOD	ILOCOS SUR	REGION I - ILOCOS	2	4
GREGORIO DEL PILAR (CONCEPCION)	ILOCOS SUR	REGION I - ILOCOS	2	4
LIDLIDDA	ILOCOS SUR	REGION I - ILOCOS	2	4
MAGSINGAL	ILOCOS SUR	REGION I - ILOCOS	2	4
NAGBUKEL	ILOCOS SUR	REGION I - ILOCOS	2	4
NARVACAN	ILOCOS SUR	REGION I - ILOCOS	2	4
QUIRINO (ANGKAKI)	ILOCOS SUR	REGION I - ILOCOS	2	4
SALCEDO (BAUGEN)	ILOCOS SUR	REGION I - ILOCOS	2	4
SAN EMILIO	ILOCOS SUR	REGION I - ILOCOS	2	4
SAN ESTEBAN	ILOCOS SUR	REGION I - ILOCOS	2	4
SAN ILDEFONSO	ILOCOS SUR	REGION I - ILOCOS	2	4
SAN JUAN (LAPOG)	ILOCOS SUR	REGION I - ILOCOS	2	4
SAN VICENTE	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTA	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTA CATALINA	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTA CRUZ	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTA LUCIA	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTA MARIA	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTIAGO	ILOCOS SUR	REGION I - ILOCOS	2	4
SANTO DOMINGO	ILOCOS SUR	REGION I - ILOCOS	2	4
SIGAY	ILOCOS SUR	REGION I - ILOCOS	2	4
SINAIT	ILOCOS SUR	REGION I - ILOCOS	2	4
SUGPON	ILOCOS SUR	REGION I - ILOCOS	2	4
SUYO	ILOCOS SUR	REGION I - ILOCOS	2	4
TAGUDIN	ILOCOS SUR	REGION I - ILOCOS	2	4
AGOO	LA UNION	REGION I - ILOCOS	2	4
ARINGAY	LA UNION	REGION I - ILOCOS	2	4
BACNOTAN	LA UNION	REGION I - ILOCOS	2	4
BAGULIN	LA UNION	REGION I - ILOCOS	2	4
BALAOAN	LA UNION	REGION I - ILOCOS	2	4
BANGAR	LA UNION	REGION I - ILOCOS	2	4
BAUANG	LA UNION	REGION I - ILOCOS	2	4
BURGOS	LA UNION	REGION I - ILOCOS	2	4
CABA	LA UNION	REGION I - ILOCOS	2	4
CITY OF SAN FERNANDO (Capital)	LA UNION	REGION I - ILOCOS	2	4
LUNA	LA UNION	REGION I - ILOCOS	2	4
NAGUILIAN	LA UNION	REGION I - ILOCOS	2	4
PUGO	LA UNION	REGION I - ILOCOS	2	4
ROSARIO	LA UNION	REGION I - ILOCOS	2	4
SAN GABRIEL	LA UNION	REGION I - ILOCOS	2	4
SAN JUAN	LA UNION	REGION I - ILOCOS	2	4

SANTO TOMAS	LA UNION	REGION I - ILOCOS	2	4
SANTOL	LA UNION	REGION I - ILOCOS	2	4
SUDIPEN	LA UNION	REGION I - ILOCOS	2	4
TUBAO	LA UNION	REGION I - ILOCOS	2	4
AGNO	PANGASINAN	REGION I - ILOCOS	2	4
AGUILAR	PANGASINAN	REGION I - ILOCOS	2	4
ALCALA	PANGASINAN	REGION I - ILOCOS	2	4
ANDA	PANGASINAN	REGION I - ILOCOS	2	4
ASINGAN	PANGASINAN	REGION I - ILOCOS	2	4
BALUNGAO	PANGASINAN	REGION I - ILOCOS	2	4
BANI	PANGASINAN	REGION I - ILOCOS	2	4
BASISTA	PANGASINAN	REGION I - ILOCOS	2	4
BAUTISTA	PANGASINAN	REGION I - ILOCOS	2	4
BAYAMBANG	PANGASINAN	REGION I - ILOCOS	2	4
BINALONAN	PANGASINAN	REGION I - ILOCOS	2	4
BINMALEY	PANGASINAN	REGION I - ILOCOS	2	4
BOLINAO	PANGASINAN	REGION I - ILOCOS	2	4
BUGALLON	PANGASINAN	REGION I - ILOCOS	2	4
BURGOS	PANGASINAN	REGION I - ILOCOS	2	4
CALASIAO	PANGASINAN	REGION I - ILOCOS	2	4
CITY OF ALAMINOS	PANGASINAN	REGION I - ILOCOS	2	4
CITY OF URDANETA	PANGASINAN	REGION I - ILOCOS	2	4
DAGUPAN CITY	PANGASINAN	REGION I - ILOCOS	2	4
DASOL	PANGASINAN	REGION I - ILOCOS	2	4
INFANTA	PANGASINAN	REGION I - ILOCOS	2	4
LABRADOR	PANGASINAN	REGION I - ILOCOS	2	4
LAOAC	PANGASINAN	REGION I - ILOCOS	2	4
LINGAYEN (Capital)	PANGASINAN	REGION I - ILOCOS	2	4
MABINI	PANGASINAN	REGION I - ILOCOS	2	4
MALASIQUI	PANGASINAN	REGION I - ILOCOS	2	4
MANAOAG	PANGASINAN	REGION I - ILOCOS	2	4
MANGALDAN	PANGASINAN	REGION I - ILOCOS	2	4
MANGATAREM	PANGASINAN	REGION I - ILOCOS	2	4
MAPANDAN	PANGASINAN	REGION I - ILOCOS	2	4
NATIVIDAD	PANGASINAN	REGION I - ILOCOS	2	4
POZORRUBIO	PANGASINAN	REGION I - ILOCOS	2	4
ROSALES	PANGASINAN	REGION I - ILOCOS	2	4
SAN CARLOS CITY	PANGASINAN	REGION I - ILOCOS	2	4
SAN FABIAN	PANGASINAN	REGION I - ILOCOS	2	4
SAN JACINTO	PANGASINAN	REGION I - ILOCOS	2	4
SAN MANUEL	PANGASINAN	REGION I - ILOCOS	2	4
SAN NICOLAS	PANGASINAN	REGION I - ILOCOS	2	4

SAN QUINTIN	PANGASINAN	REGION I - ILOCOS	2	4
SANTA BARBARA	PANGASINAN	REGION I - ILOCOS	2	4
SANTA MARIA	PANGASINAN	REGION I - ILOCOS	2	4
SANTO TOMAS	PANGASINAN	REGION I - ILOCOS	2	4
SISON	PANGASINAN	REGION I - ILOCOS	2	4
SUAL	PANGASINAN	REGION I - ILOCOS	2	4
TAYUG	PANGASINAN	REGION I - ILOCOS	2	4
UMINGAN	PANGASINAN	REGION I - ILOCOS	2	4
URBIZTONDO	PANGASINAN	REGION I - ILOCOS	2	4
VILLASIS	PANGASINAN	REGION I - ILOCOS	2	4
BASCO (Capital)	BATANES	REGION II - CAGAYAN VALLEY	1	4
ITBAYAT	BATANES	REGION II - CAGAYAN VALLEY	1	4
IVANA	BATANES	REGION II - CAGAYAN VALLEY	1	4
MAHATAO	BATANES	REGION II - CAGAYAN VALLEY	1	4
SABTANG	BATANES	REGION II - CAGAYAN VALLEY	1	4
UYUGAN	BATANES	REGION II - CAGAYAN VALLEY	1	4
ABULUG	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
ALCALA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
ALLACAPAN	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
AMULUNG	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
APARRI	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
BAGGAO	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
BALLESTEROS	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
BUGUEY	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
CALAYAN	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
CAMALANIUGAN	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
CLAVERIA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
ENRILE	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
GATTARAN	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
GONZAGA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
IGUIG	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
LAL-LO	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
LASAM	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
PAMPLONA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
PEÑABLANCA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
PIAT	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
RIZAL	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
SANCHEZ-MIRA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
SANTA ANA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
SANTA PRAXEDES	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
SANTA TERESITA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
SANTO NIÑO (FAIRE)	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4

SOLANA	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
TUAO	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
TUGUEGARAO CITY (Capital)	CAGAYAN	REGION II - CAGAYAN VALLEY	1	4
ALICIA	ISABELA	REGION II - CAGAYAN VALLEY	1	4
ANGADANAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
AURORA	ISABELA	REGION II - CAGAYAN VALLEY	1	4
BENITO SOLIVEN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
BURGOS	ISABELA	REGION II - CAGAYAN VALLEY	1	4
CABAGAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
CABATUAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
CITY OF CAUAYAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
CITY OF SANTIAGO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
CORDON	ISABELA	REGION II - CAGAYAN VALLEY	1	4
DELFIN ALBANO (MAGSAYSAY)	ISABELA	REGION II - CAGAYAN VALLEY	1	4
DINAPIGUE	ISABELA	REGION II - CAGAYAN VALLEY	1	4
DIVILACAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
ECHAGUE	ISABELA	REGION II - CAGAYAN VALLEY	1	4
GAMU	ISABELA	REGION II - CAGAYAN VALLEY	1	4
ILAGAN (Capital)	ISABELA	REGION II - CAGAYAN VALLEY	1	4
JONES	ISABELA	REGION II - CAGAYAN VALLEY	1	4
LUNA	ISABELA	REGION II - CAGAYAN VALLEY	1	4
MACONACON	ISABELA	REGION II - CAGAYAN VALLEY	1	4
MALLIG	ISABELA	REGION II - CAGAYAN VALLEY	1	4
NAGUILIAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
PALANAN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
QUEZON	ISABELA	REGION II - CAGAYAN VALLEY	1	4
QUIRINO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
RAMON	ISABELA	REGION II - CAGAYAN VALLEY	1	4
REINA MERCEDES	ISABELA	REGION II - CAGAYAN VALLEY	1	4
ROXAS	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN AGUSTIN	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN GUILLERMO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN ISIDRO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN MANUEL	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN MARIANO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN MATEO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SAN PABLO	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SANTA MARIA	ISABELA	REGION II - CAGAYAN VALLEY	1	4
SANTO TOMAS	ISABELA	REGION II - CAGAYAN VALLEY	1	4
TUMAUINI	ISABELA	REGION II - CAGAYAN VALLEY	1	4
ALFONSO CASTANEDA	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
AMBAGUIO	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4

ARITAO	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
BAGABAG	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
BAMBANG	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
BAYOMBONG (Capital)	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
DIADI	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
DUPAX DEL NORTE	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
DUPAX DEL SUR	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
KASIBU	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
KAYAPA	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
QUEZON	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
SANTA FE	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
SOLANO	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
VILLAVERDE	NUEVA VIZCAYA	REGION II - CAGAYAN VALLEY	2	4
AGLIPAY	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
CABARROGUIS (Capital)	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
DIFFUN	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
MADDELA	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
NAGTIPUNAN	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
SAGUDAY	QUIRINO	REGION II - CAGAYAN VALLEY	1	4
BALER	AURORA	REGION III - CENTRAL LUZON	1	4
CASIGURAN	AURORA	REGION III - CENTRAL LUZON	1	4
DILASAG	AURORA	REGION III - CENTRAL LUZON	1	4
DINALUNGAN	AURORA	REGION III - CENTRAL LUZON	1	4
DINGALAN	AURORA	REGION III - CENTRAL LUZON	1	4
DIPACULAO	AURORA	REGION III - CENTRAL LUZON	1	4
MARIA AURORA	AURORA	REGION III - CENTRAL LUZON	1	4
SAN LUIS	AURORA	REGION III - CENTRAL LUZON	1	4
ABUCAY	BATAAN	REGION III - CENTRAL LUZON	2	4
BAGAC	BATAAN	REGION III - CENTRAL LUZON	2	4
CITY OF BALANGA (Capital)	BATAAN	REGION III - CENTRAL LUZON	2	4
DINALUPIHAN	BATAAN	REGION III - CENTRAL LUZON	2	4
HERMOSA	BATAAN	REGION III - CENTRAL LUZON	2	4
LIMAY	BATAAN	REGION III - CENTRAL LUZON	2	4
MARIVELES	BATAAN	REGION III - CENTRAL LUZON	2	4
MORONG	BATAAN	REGION III - CENTRAL LUZON	2	4
ORANI	BATAAN	REGION III - CENTRAL LUZON	2	4
ORION	BATAAN	REGION III - CENTRAL LUZON	2	4
PILAR	BATAAN	REGION III - CENTRAL LUZON	2	4
SAMAL	BATAAN	REGION III - CENTRAL LUZON	2	4
ANGAT	BULACAN	REGION III - CENTRAL LUZON	2	4
BALAGTAS (BIGAA)	BULACAN	REGION III - CENTRAL LUZON	2	4
BALIUAG	BULACAN	REGION III - CENTRAL LUZON	2	4

BOCAUE	BULACAN	REGION III - CENTRAL LUZON	2	4
BULACAN	BULACAN	REGION III - CENTRAL LUZON	2	4
BUSTOS	BULACAN	REGION III - CENTRAL LUZON	2	4
CALUMPIT	BULACAN	REGION III - CENTRAL LUZON	2	4
CITY OF MALOLOS (Capital)	BULACAN	REGION III - CENTRAL LUZON	2	4
CITY OF MEYCAUAYAN	BULACAN	REGION III - CENTRAL LUZON	2	4
CITY OF SAN JOSE DEL MONTE	BULACAN	REGION III - CENTRAL LUZON	2	4
DOÑA REMEDIOS TRINIDAD	BULACAN	REGION III - CENTRAL LUZON	2	4
GUIGUINTO	BULACAN	REGION III - CENTRAL LUZON	2	4
HAGONOY	BULACAN	REGION III - CENTRAL LUZON	2	4
MARILAO	BULACAN	REGION III - CENTRAL LUZON	2	4
NORZAGARAY	BULACAN	REGION III - CENTRAL LUZON	2	4
OBANDO	BULACAN	REGION III - CENTRAL LUZON	2	4
PANDI	BULACAN	REGION III - CENTRAL LUZON	2	4
PAOMBONG	BULACAN	REGION III - CENTRAL LUZON	2	4
PLARIDEL	BULACAN	REGION III - CENTRAL LUZON	2	4
PULILAN	BULACAN	REGION III - CENTRAL LUZON	2	4
SAN ILDEFONSO	BULACAN	REGION III - CENTRAL LUZON	2	4
SAN MIGUEL	BULACAN	REGION III - CENTRAL LUZON	2	4
SAN RAFAEL	BULACAN	REGION III - CENTRAL LUZON	2	4
SANTA MARIA	BULACAN	REGION III - CENTRAL LUZON	2	4
ALIAGA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
BONGABON	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
CABANATUAN CITY	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
CABIAO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
CARRANGLAN	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
CITY OF GAPAN	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
CUYAPO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
GABALDON (BITULOK & SABANI)	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
GENERAL MAMERTO NATIVIDAD	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
GENERAL TINIO (PAPAYA)	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
GUIMBA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
JAEN	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
LAUR	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
LICAB	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
LLANERA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
LUPAO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
NAMPICUAN	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
PALAYAN CITY (Capital)	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
PANTABANGAN	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
PEÑARANDA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
QUEZON	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4

RIZAL	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SAN ANTONIO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SAN ISIDRO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SAN JOSE CITY	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SAN LEONARDO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SANTA ROSA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SANTO DOMINGO	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
SCIENCE CITY OF MUÑOZ	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
TALAVERA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
TALUGTUG	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
ZARAGOZA	NUEVA ECIJA	REGION III - CENTRAL LUZON	2	4
ANGELES CITY	PAMPANGA	REGION III - CENTRAL LUZON	2	4
APALIT	PAMPANGA	REGION III - CENTRAL LUZON	2	4
ARAYAT	PAMPANGA	REGION III - CENTRAL LUZON	2	4
BACOLOR	PAMPANGA	REGION III - CENTRAL LUZON	2	4
CANDABA	PAMPANGA	REGION III - CENTRAL LUZON	2	4
CITY OF SAN FERNANDO (Capital)	PAMPANGA	REGION III - CENTRAL LUZON	2	4
FLORIDABLANCA	PAMPANGA	REGION III - CENTRAL LUZON	2	4
GUAGUA	PAMPANGA	REGION III - CENTRAL LUZON	2	4
LUBAO	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MABALACAT	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MACABEBE	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MAGALANG	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MASANTOL	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MEXICO	PAMPANGA	REGION III - CENTRAL LUZON	2	4
MINALIN	PAMPANGA	REGION III - CENTRAL LUZON	2	4
PORAC	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SAN LUIS	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SAN SIMON	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SANTA ANA	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SANTA RITA	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SANTO TOMAS	PAMPANGA	REGION III - CENTRAL LUZON	2	4
SASMUAN (Sexmoan)	PAMPANGA	REGION III - CENTRAL LUZON	2	4
ANAO	TARLAC	REGION III - CENTRAL LUZON	2	4
BAMBAN	TARLAC	REGION III - CENTRAL LUZON	2	4
CAMILING	TARLAC	REGION III - CENTRAL LUZON	2	4
CAPAS	TARLAC	REGION III - CENTRAL LUZON	2	4
CITY OF TARLAC (Capital)	TARLAC	REGION III - CENTRAL LUZON	2	4
CONCEPCION	TARLAC	REGION III - CENTRAL LUZON	2	4
GERONA	TARLAC	REGION III - CENTRAL LUZON	2	4
LA PAZ	TARLAC	REGION III - CENTRAL LUZON	2	4
MAYANTOC	TARLAC	REGION III - CENTRAL LUZON	2	4

MONCADA	TARLAC	REGION III - CENTRAL LUZON	2	4
PANIQUI	TARLAC	REGION III - CENTRAL LUZON	2	4
PURA	TARLAC	REGION III - CENTRAL LUZON	2	4
RAMOS	TARLAC	REGION III - CENTRAL LUZON	2	4
SAN CLEMENTE	TARLAC	REGION III - CENTRAL LUZON	2	4
SAN JOSE	TARLAC	REGION III - CENTRAL LUZON	2	4
SAN MANUEL	TARLAC	REGION III - CENTRAL LUZON	2	4
SANTA IGNACIA	TARLAC	REGION III - CENTRAL LUZON	2	4
VICTORIA	TARLAC	REGION III - CENTRAL LUZON	2	4
BOTOLAN	ZAMBALES	REGION III - CENTRAL LUZON	2	4
CABANGAN	ZAMBALES	REGION III - CENTRAL LUZON	2	4
CANDELARIA	ZAMBALES	REGION III - CENTRAL LUZON	2	4
CASTILLEJOS	ZAMBALES	REGION III - CENTRAL LUZON	2	4
IBA (Capital)	ZAMBALES	REGION III - CENTRAL LUZON	2	4
MASINLOC	ZAMBALES	REGION III - CENTRAL LUZON	2	4
OLONGAPO CITY	ZAMBALES	REGION III - CENTRAL LUZON	2	4
PALAUIG	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SAN ANTONIO	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SAN FELIPE	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SAN MARCELINO	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SAN NARCISO	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SANTA CRUZ	ZAMBALES	REGION III - CENTRAL LUZON	2	4
SUBIC	ZAMBALES	REGION III - CENTRAL LUZON	2	4
AGONCILLO	BATANGAS	REGION IVA - CALABARZON	2	4
ALITAGTAG	BATANGAS	REGION IVA - CALABARZON	2	4
BALAYAN	BATANGAS	REGION IVA - CALABARZON	2	4
BALETE	BATANGAS	REGION IVA - CALABARZON	2	4
BATANGAS CITY (Capital)	BATANGAS	REGION IVA - CALABARZON	2	4
BAUAN	BATANGAS	REGION IVA - CALABARZON	2	4
CALACA	BATANGAS	REGION IVA - CALABARZON	2	4
CALATAGAN	BATANGAS	REGION IVA - CALABARZON	2	4
CITY OF TANAUAN	BATANGAS	REGION IVA - CALABARZON	2	4
CUENCA	BATANGAS	REGION IVA - CALABARZON	2	4
IBAAN	BATANGAS	REGION IVA - CALABARZON	2	4
LAUREL	BATANGAS	REGION IVA - CALABARZON	2	4
LEMERY	BATANGAS	REGION IVA - CALABARZON	2	4
LIAN	BATANGAS	REGION IVA - CALABARZON	2	4
LIPA CITY	BATANGAS	REGION IVA - CALABARZON	2	4
LOBO	BATANGAS	REGION IVA - CALABARZON	2	4
MABINI	BATANGAS	REGION IVA - CALABARZON	2	4
MALVAR	BATANGAS	REGION IVA - CALABARZON	2	4
MATAASNAKAHOY	BATANGAS	REGION IVA - CALABARZON	2	4

NASUGBU	BATANGAS	REGION IVA - CALABARZON	2	4
PADRE GARCIA	BATANGAS	REGION IVA - CALABARZON	2	4
ROSARIO	BATANGAS	REGION IVA - CALABARZON	2	4
SAN JOSE	BATANGAS	REGION IVA - CALABARZON	2	4
SAN JUAN	BATANGAS	REGION IVA - CALABARZON	2	4
SAN LUIS	BATANGAS	REGION IVA - CALABARZON	2	4
SAN NICOLAS	BATANGAS	REGION IVA - CALABARZON	2	4
SAN PASCUAL	BATANGAS	REGION IVA - CALABARZON	2	4
SANTA TERESITA	BATANGAS	REGION IVA - CALABARZON	2	4
SANTO TOMAS	BATANGAS	REGION IVA - CALABARZON	2	4
TAAL	BATANGAS	REGION IVA - CALABARZON	2	4
TALISAY	BATANGAS	REGION IVA - CALABARZON	2	4
TAYSAN	BATANGAS	REGION IVA - CALABARZON	2	4
TINGLOY	BATANGAS	REGION IVA - CALABARZON	2	4
TUY	BATANGAS	REGION IVA - CALABARZON	2	4
ALFONSO	CAVITE	REGION IVA - CALABARZON	2	4
AMADEO	CAVITE	REGION IVA - CALABARZON	2	4
BACOOR	CAVITE	REGION IVA - CALABARZON	2	4
CARMONA	CAVITE	REGION IVA - CALABARZON	2	4
CAVITE CITY	CAVITE	REGION IVA - CALABARZON	2	4
CITY OF DASMARIÑAS	CAVITE	REGION IVA - CALABARZON	2	4
GEN. MARIANO ALVAREZ	CAVITE	REGION IVA - CALABARZON	2	4
GENERAL EMILIO AGUINALDO	CAVITE	REGION IVA - CALABARZON	2	4
GENERAL TRIAS	CAVITE	REGION IVA - CALABARZON	2	4
IMUS CITY	CAVITE	REGION IVA - CALABARZON	2	4
INDANG	CAVITE	REGION IVA - CALABARZON	2	4
KAWIT	CAVITE	REGION IVA - CALABARZON	2	4
MAGALLANES	CAVITE	REGION IVA - CALABARZON	2	4
MARAGONDON	CAVITE	REGION IVA - CALABARZON	2	4
MENDEZ (MENDEZ-NUÑEZ)	CAVITE	REGION IVA - CALABARZON	2	4
NAIC	CAVITE	REGION IVA - CALABARZON	2	4
NOVELETA	CAVITE	REGION IVA - CALABARZON	2	4
ROSARIO	CAVITE	REGION IVA - CALABARZON	2	4
SILANG	CAVITE	REGION IVA - CALABARZON	2	4
TAGAYTAY CITY	CAVITE	REGION IVA - CALABARZON	2	4
TANZA	CAVITE	REGION IVA - CALABARZON	2	4
TERNATE	CAVITE	REGION IVA - CALABARZON	2	4
TRECE MARTIRES CITY (Capital)	CAVITE	REGION IVA - CALABARZON	2	4
ALAMINOS	LAGUNA	REGION IVA - CALABARZON	2	4
BAY	LAGUNA	REGION IVA - CALABARZON	2	4
CABUYAO	LAGUNA	REGION IVA - CALABARZON	2	4
CALAUAN	LAGUNA	REGION IVA - CALABARZON	2	4

CAVINTI	LAGUNA	REGION IVA - CALABARZON	2	4
CITY OF BIÑAN	LAGUNA	REGION IVA - CALABARZON	2	4
CITY OF CALAMBA	LAGUNA	REGION IVA - CALABARZON	2	4
CITY OF SANTA ROSA	LAGUNA	REGION IVA - CALABARZON	2	4
FAMY	LAGUNA	REGION IVA - CALABARZON	2	4
KALAYAAN	LAGUNA	REGION IVA - CALABARZON	2	4
LILIW	LAGUNA	REGION IVA - CALABARZON	2	4
LOS BAÑOS	LAGUNA	REGION IVA - CALABARZON	2	4
LUISIANA	LAGUNA	REGION IVA - CALABARZON	2	4
LUMBAN	LAGUNA	REGION IVA - CALABARZON	2	4
MABITAC	LAGUNA	REGION IVA - CALABARZON	2	4
MAGDALENA	LAGUNA	REGION IVA - CALABARZON	2	4
MAJAYJAY	LAGUNA	REGION IVA - CALABARZON	2	4
NAGCARLAN	LAGUNA	REGION IVA - CALABARZON	2	4
PAETE	LAGUNA	REGION IVA - CALABARZON	2	4
PAGSANJAN	LAGUNA	REGION IVA - CALABARZON	2	4
PAKIL	LAGUNA	REGION IVA - CALABARZON	2	4
PANGIL	LAGUNA	REGION IVA - CALABARZON	2	4
PILA	LAGUNA	REGION IVA - CALABARZON	2	4
RIZAL	LAGUNA	REGION IVA - CALABARZON	2	4
SAN PABLO CITY	LAGUNA	REGION IVA - CALABARZON	2	4
SAN PEDRO	LAGUNA	REGION IVA - CALABARZON	2	4
SANTA CRUZ (Capital)	LAGUNA	REGION IVA - CALABARZON	2	4
SANTA MARIA	LAGUNA	REGION IVA - CALABARZON	2	4
SINILOAN	LAGUNA	REGION IVA - CALABARZON	2	4
VICTORIA	LAGUNA	REGION IVA - CALABARZON	2	4
AGDANGAN	QUEZON	REGION IVA - CALABARZON	1	4
ALABAT	QUEZON	REGION IVA - CALABARZON	1	4
ATIMONAN	QUEZON	REGION IVA - CALABARZON	1	4
BUENAVISTA	QUEZON	REGION IVA - CALABARZON	1	4
BURDEOS	QUEZON	REGION IVA - CALABARZON	1	4
CALAUAG	QUEZON	REGION IVA - CALABARZON	1	4
CANDELARIA	QUEZON	REGION IVA - CALABARZON	1	4
CATANAUAN	QUEZON	REGION IVA - CALABARZON	1	4
CITY OF TAYABAS	QUEZON	REGION IVA - CALABARZON	1	4
DOLORES	QUEZON	REGION IVA - CALABARZON	1	4
GENERAL LUNA	QUEZON	REGION IVA - CALABARZON	1	4
GENERAL NAKAR	QUEZON	REGION IVA - CALABARZON	1	4
GUINAYANGAN	QUEZON	REGION IVA - CALABARZON	1	4
GUMACA	QUEZON	REGION IVA - CALABARZON	1	4
INFANTA	QUEZON	REGION IVA - CALABARZON	1	4
JOMALIG	QUEZON	REGION IVA - CALABARZON	1	4

LOPEZ	QUEZON	REGION IVA - CALABARZON	1	4
LUCBAN	QUEZON	REGION IVA - CALABARZON	1	4
LUCENA CITY (Capital)	QUEZON	REGION IVA - CALABARZON	1	4
MACALELON	QUEZON	REGION IVA - CALABARZON	1	4
MAUBAN	QUEZON	REGION IVA - CALABARZON	1	4
MULANAY	QUEZON	REGION IVA - CALABARZON	1	4
PADRE BURGOS	QUEZON	REGION IVA - CALABARZON	1	4
PAGBILAO	QUEZON	REGION IVA - CALABARZON	1	4
PANUKULAN	QUEZON	REGION IVA - CALABARZON	1	4
PATNANUNGAN	QUEZON	REGION IVA - CALABARZON	1	4
PEREZ	QUEZON	REGION IVA - CALABARZON	1	4
PITOGO	QUEZON	REGION IVA - CALABARZON	1	4
PLARIDEL	QUEZON	REGION IVA - CALABARZON	1	4
POLILLO	QUEZON	REGION IVA - CALABARZON	1	4
QUEZON	QUEZON	REGION IVA - CALABARZON	1	4
REAL	QUEZON	REGION IVA - CALABARZON	1	4
SAMPALOC	QUEZON	REGION IVA - CALABARZON	1	4
SAN ANDRES	QUEZON	REGION IVA - CALABARZON	1	4
SAN ANTONIO	QUEZON	REGION IVA - CALABARZON	1	4
SAN FRANCISCO (AURORA)	QUEZON	REGION IVA - CALABARZON	1	4
SAN NARCISO	QUEZON	REGION IVA - CALABARZON	1	4
SARIAYA	QUEZON	REGION IVA - CALABARZON	1	4
TAGKAWAYAN	QUEZON	REGION IVA - CALABARZON	1	4
TIAONG	QUEZON	REGION IVA - CALABARZON	1	4
UNISAN	QUEZON	REGION IVA - CALABARZON	1	4
ANGONO	RIZAL	REGION IVA - CALABARZON	2	4
BARAS	RIZAL	REGION IVA - CALABARZON	2	4
BINANGONAN	RIZAL	REGION IVA - CALABARZON	2	4
CAINTA	RIZAL	REGION IVA - CALABARZON	2	4
CARDONA	RIZAL	REGION IVA - CALABARZON	2	4
CITY OF ANTIPOLO	RIZAL	REGION IVA - CALABARZON	2	4
JALA-JALA	RIZAL	REGION IVA - CALABARZON	2	4
MORONG	RIZAL	REGION IVA - CALABARZON	2	4
PILILLA	RIZAL	REGION IVA - CALABARZON	2	4
RODRIGUEZ (MONTALBAN)	RIZAL	REGION IVA - CALABARZON	2	4
SAN MATEO	RIZAL	REGION IVA - CALABARZON	2	4
TANAY	RIZAL	REGION IVA - CALABARZON	2	4
TAYTAY	RIZAL	REGION IVA - CALABARZON	2	4
TERESA	RIZAL	REGION IVA - CALABARZON	2	4
BOAC (Capital)	MARINDUQUE	REGION IVB - MIMAROPA	2	4
BUENAVISTA	MARINDUQUE	REGION IVB - MIMAROPA	2	4
GASAN	MARINDUQUE	REGION IVB - MIMAROPA	2	4

MOGPOG	MARINDUQUE	REGION IVB - MIMAROPA	2	4
SANTA CRUZ	MARINDUQUE	REGION IVB - MIMAROPA	2	4
TORRIJOS	MARINDUQUE	REGION IVB - MIMAROPA	2	4
ABRA DE ILOG	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
CALINTAAN	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
LOOC	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
LUBANG	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
MAGSAYSAY	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
MAMBURAO (Capital)	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
PALUAN	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
RIZAL	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
SABLAYAN	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
SAN JOSE	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
SANTA CRUZ	OCCIDENTAL MINDORO	REGION IVB - MIMAROPA	2	4
BACO	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
BANSUD	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
BONGABONG	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
BULALACAO (SAN PEDRO)	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
CITY OF CALAPAN (Capital)	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
GLORIA	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
MANSALAY	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
NAUJAN	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
PINAMALAYAN	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
POLA	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
PUERTO GALERA	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
ROXAS	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
SAN TEODORO	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
SOCORRO	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
VICTORIA	ORIENTAL MINDORO	REGION IVB - MIMAROPA	2	4
ABORLAN	PALAWAN	REGION IVB - MIMAROPA	3	2
AGUTAYA	PALAWAN	REGION IVB - MIMAROPA	3	2
ARACELI	PALAWAN	REGION IVB - MIMAROPA	3	2
BALABAC	PALAWAN	REGION IVB - MIMAROPA	3	2
BATARAZA	PALAWAN	REGION IVB - MIMAROPA	3	2
BROOKE`S POINT	PALAWAN	REGION IVB - MIMAROPA	3	2
BUSUANGA	PALAWAN	REGION IVB - MIMAROPA	3	4
CAGAYANCILLO	PALAWAN	REGION IVB - MIMAROPA	3	2
CORON	PALAWAN	REGION IVB - MIMAROPA	3	4
CULION	PALAWAN	REGION IVB - MIMAROPA	3	4
CUYO	PALAWAN	REGION IVB - MIMAROPA	3	2
DUMARAN	PALAWAN	REGION IVB - MIMAROPA	3	2
EL NIDO (BACUIT)	PALAWAN	REGION IVB - MIMAROPA	3	2

KALAYAAN	PALAWAN	REGION IVB - MIMAROPA	3	2
LINAPACAN	PALAWAN	REGION IVB - MIMAROPA	3	2
MAGSAYSAY	PALAWAN	REGION IVB - MIMAROPA	3	2
NARRA	PALAWAN	REGION IVB - MIMAROPA	3	2
PUERTO PRINCESA CITY (Capital)	PALAWAN	REGION IVB - MIMAROPA	3	2
QUEZON	PALAWAN	REGION IVB - MIMAROPA	3	2
RIZAL (MARCOS)	PALAWAN	REGION IVB - MIMAROPA	3	2
ROXAS	PALAWAN	REGION IVB - MIMAROPA	3	2
SAN VICENTE	PALAWAN	REGION IVB - MIMAROPA	3	2
SOFRONIO ESPAÑOLA	PALAWAN	REGION IVB - MIMAROPA	3	2
TAYTAY	PALAWAN	REGION IVB - MIMAROPA	3	2
ALCANTARA	ROMBLON	REGION IVB - MIMAROPA	2	4
BANTON	ROMBLON	REGION IVB - MIMAROPA	2	4
CAJIDIOCAN	ROMBLON	REGION IVB - MIMAROPA	2	4
CALATRAVA	ROMBLON	REGION IVB - MIMAROPA	2	4
CONCEPCION	ROMBLON	REGION IVB - MIMAROPA	2	4
CORCUERA	ROMBLON	REGION IVB - MIMAROPA	2	4
FERROL	ROMBLON	REGION IVB - MIMAROPA	2	4
LOOC	ROMBLON	REGION IVB - MIMAROPA	2	4
MAGDIWANG	ROMBLON	REGION IVB - MIMAROPA	2	4
ODIONGAN	ROMBLON	REGION IVB - MIMAROPA	2	4
ROMBLON (CAPITAL)	ROMBLON	REGION IVB - MIMAROPA	2	4
SAN AGUSTIN	ROMBLON	REGION IVB - MIMAROPA	2	4
SAN ANDRES	ROMBLON	REGION IVB - MIMAROPA	2	4
SAN FERNANDO	ROMBLON	REGION IVB - MIMAROPA	2	4
SAN JOSE	ROMBLON	REGION IVB - MIMAROPA	2	4
SANTA FE	ROMBLON	REGION IVB - MIMAROPA	2	4
SANTA MARIA (IMELDA)	ROMBLON	REGION IVB - MIMAROPA	2	4
CITY OF ISABELA (Capital)	CITY OF ISABELA (Capital)	REGION IX - ZAMBOANGA PENINSULA	3	4
BACUNGAN (Leon T. Postigo)	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
BALIGUIAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
DAPITAN CITY	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
DIPOLOG CITY (Capital)	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
GODOD	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
GUTALAC	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
JOSE DALMAN (PONOT)	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
KALAWIT	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4

KATIPUNAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
LA LIBERTAD	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
LABASON	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
LILOY	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
MANUKAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
MUTIA	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
PIÑAN (NEW PIÑAN)	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
POLANCO	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
PRES. MANUEL A. ROXAS	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
RIZAL	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SALUG	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SERGIO OSMEÑA SR.	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SIAYAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SIBUCO	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SIBUTAD	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SINDANGAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SIOCON	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
SIRAWAI	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
TAMPILISAN	ZAMBOANGA DEL NORTE	REGION IX - ZAMBOANGA PENINSULA	3	4
AURORA	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
BAYOG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
DIMATALING	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
DINAS	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
DUMALINAO	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
DUMINGAG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
GUIPOS	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
JOSEFINA	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4

KUMALARANG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
LABANGAN	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
LAKEWOOD	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
LAPUYAN	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
MAHAYAG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
MARGOSATUBIG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
MIDSALIP	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
MOLAVE	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
PAGADIAN CITY (Capital)	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
PITOGO	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
RAMON MAGSAYSAY (LIARGO)	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
SAN MIGUEL	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
SAN PABLO	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
SOMINOT (DON MARIANO MARCOS)	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
TABINA	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
TAMBULIG	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
TIGBAO	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
TUKURAN	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
VINCENZO A. SAGUN	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
ZAMBOANGA CITY	ZAMBOANGA DEL SUR	REGION IX - ZAMBOANGA PENINSULA	3	4
ALICIA	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
BUUG	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
DIPLAHAN	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
IMELDA	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
IPIL	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
KABASALAN	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
MABUHAY	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4

MALANGAS	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
NAGA	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
OLUTANGA	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
PAYAO	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
ROSELLER LIM	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
SIAY	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
TALUSAN	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
TITAY	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
TUNGAWAN	ZAMBOANGA SIBUGAY	REGION IX - ZAMBOANGA PENINSULA	3	4
BACACAY	ALBAY	REGION V - BICOL	1	4
CAMALIG	ALBAY	REGION V - BICOL	1	4
CITY OF LIGAO	ALBAY	REGION V - BICOL	1	4
CITY OF TABACO	ALBAY	REGION V - BICOL	1	4
DARAGA (LOCSIN)	ALBAY	REGION V - BICOL	1	4
GUINOBATAN	ALBAY	REGION V - BICOL	1	4
JOVELLAR	ALBAY	REGION V - BICOL	1	4
LEGAZPI CITY (Capital)	ALBAY	REGION V - BICOL	1	4
LIBON	ALBAY	REGION V - BICOL	1	4
MALILIPOT	ALBAY	REGION V - BICOL	1	4
MALINAO	ALBAY	REGION V - BICOL	1	4
MANITO	ALBAY	REGION V - BICOL	1	4
OAS	ALBAY	REGION V - BICOL	1	4
PIO DURAN	ALBAY	REGION V - BICOL	1	4
POLANGUI	ALBAY	REGION V - BICOL	1	4
RAPU-RAPU	ALBAY	REGION V - BICOL	1	4
SANTO DOMINGO (LIBOG)	ALBAY	REGION V - BICOL	1	4
TIWI	ALBAY	REGION V - BICOL	1	4
BASUD	CAMARINES NORTE	REGION V - BICOL	1	4
CAPALONGA	CAMARINES NORTE	REGION V - BICOL	1	4
DAET (Capital)	CAMARINES NORTE	REGION V - BICOL	1	4
JOSE PANGANIBAN	CAMARINES NORTE	REGION V - BICOL	1	4
LABO	CAMARINES NORTE	REGION V - BICOL	1	4
MERCEDES	CAMARINES NORTE	REGION V - BICOL	1	4
PARACALE	CAMARINES NORTE	REGION V - BICOL	1	4
SAN LORENZO RUIZ (IMELDA)	CAMARINES NORTE	REGION V - BICOL	1	4
SAN VICENTE	CAMARINES NORTE	REGION V - BICOL	1	4
SANTA ELENA	CAMARINES NORTE	REGION V - BICOL	1	4

TALISAY	CAMARINES NORTE	REGION V - BICOL	1	4
VINZONS	CAMARINES NORTE	REGION V - BICOL	1	4
BAAO	CAMARINES SUR	REGION V - BICOL	1	4
BALATAN	CAMARINES SUR	REGION V - BICOL	1	4
BATO	CAMARINES SUR	REGION V - BICOL	1	4
BOMBON	CAMARINES SUR	REGION V - BICOL	1	4
BUHI	CAMARINES SUR	REGION V - BICOL	1	4
BULA	CAMARINES SUR	REGION V - BICOL	1	4
CABUSAO	CAMARINES SUR	REGION V - BICOL	1	4
CALABANGA	CAMARINES SUR	REGION V - BICOL	1	4
CAMALIGAN	CAMARINES SUR	REGION V - BICOL	1	4
CANAMAN	CAMARINES SUR	REGION V - BICOL	1	4
CARAMOAN	CAMARINES SUR	REGION V - BICOL	1	4
DEL GALLEGO	CAMARINES SUR	REGION V - BICOL	1	4
GAINZA	CAMARINES SUR	REGION V - BICOL	1	4
GARCHITORENA	CAMARINES SUR	REGION V - BICOL	1	4
GOA	CAMARINES SUR	REGION V - BICOL	1	4
IRIGA CITY	CAMARINES SUR	REGION V - BICOL	1	4
LAGONOY	CAMARINES SUR	REGION V - BICOL	1	4
LIBMANAN	CAMARINES SUR	REGION V - BICOL	1	4
LUPI	CAMARINES SUR	REGION V - BICOL	1	4
MAGARAO	CAMARINES SUR	REGION V - BICOL	1	4
MILAOR	CAMARINES SUR	REGION V - BICOL	1	4
MINALABAC	CAMARINES SUR	REGION V - BICOL	1	4
NABUA	CAMARINES SUR	REGION V - BICOL	1	4
NAGA CITY	CAMARINES SUR	REGION V - BICOL	1	4
OCAMPO	CAMARINES SUR	REGION V - BICOL	1	4
PAMPLONA	CAMARINES SUR	REGION V - BICOL	1	4
PASACAO	CAMARINES SUR	REGION V - BICOL	1	4
PILI (Capital)	CAMARINES SUR	REGION V - BICOL	1	4
PRESENTACION (PARUBCAN)	CAMARINES SUR	REGION V - BICOL	1	4
RAGAY	CAMARINES SUR	REGION V - BICOL	1	4
SAGNAY	CAMARINES SUR	REGION V - BICOL	1	4
SAN FERNANDO	CAMARINES SUR	REGION V - BICOL	1	4
SAN JOSE	CAMARINES SUR	REGION V - BICOL	1	4
SIPOCOT	CAMARINES SUR	REGION V - BICOL	1	4
SIRUMA	CAMARINES SUR	REGION V - BICOL	1	4
TIGAON	CAMARINES SUR	REGION V - BICOL	1	4
TINAMBAC	CAMARINES SUR	REGION V - BICOL	1	4
BAGAMANOC	CATANDUANES	REGION V - BICOL	1	4
BARAS	CATANDUANES	REGION V - BICOL	1	4
BATO	CATANDUANES	REGION V - BICOL	1	4

CARAMORAN	CATANDUANES	REGION V - BICOL	1	4
GIGMOTO	CATANDUANES	REGION V - BICOL	1	4
PANDAN	CATANDUANES	REGION V - BICOL	1	4
PANGANIBAN (PAYO)	CATANDUANES	REGION V - BICOL	1	4
SAN ANDRES (CALOLBON)	CATANDUANES	REGION V - BICOL	1	4
SAN MIGUEL	CATANDUANES	REGION V - BICOL	1	4
VIGA	CATANDUANES	REGION V - BICOL	1	4
VIRAC (Capital)	CATANDUANES	REGION V - BICOL	1	4
AROROY	MASBATE	REGION V - BICOL	2	4
BALENO	MASBATE	REGION V - BICOL	2	4
BALUD	MASBATE	REGION V - BICOL	2	4
BATUAN	MASBATE	REGION V - BICOL	2	4
CATAINGAN	MASBATE	REGION V - BICOL	2	4
CAWAYAN	MASBATE	REGION V - BICOL	2	4
CITY OF MASBATE (Capital)	MASBATE	REGION V - BICOL	2	4
CLAVERIA	MASBATE	REGION V - BICOL	2	4
DIMASALANG	MASBATE	REGION V - BICOL	2	4
ESPERANZA	MASBATE	REGION V - BICOL	2	4
MANDAON	MASBATE	REGION V - BICOL	2	4
MILAGROS	MASBATE	REGION V - BICOL	2	4
MOBO	MASBATE	REGION V - BICOL	2	4
MONREAL	MASBATE	REGION V - BICOL	2	4
PALANAS	MASBATE	REGION V - BICOL	2	4
PIO V. CORPUZ (LIMBUHAN)	MASBATE	REGION V - BICOL	2	4
PLACER	MASBATE	REGION V - BICOL	2	4
SAN FERNANDO	MASBATE	REGION V - BICOL	2	4
SAN JACINTO	MASBATE	REGION V - BICOL	2	4
SAN PASCUAL	MASBATE	REGION V - BICOL	2	4
USON	MASBATE	REGION V - BICOL	2	4
BACON	SORSOGON	REGION V - BICOL	1	4
BARCELONA	SORSOGON	REGION V - BICOL	1	4
BULAN	SORSOGON	REGION V - BICOL	1	4
BULUSAN	SORSOGON	REGION V - BICOL	1	4
CASIGURAN	SORSOGON	REGION V - BICOL	1	4
CASTILLA	SORSOGON	REGION V - BICOL	1	4
CITY OF SORSOGON (Capital)	SORSOGON	REGION V - BICOL	1	4
DONSOL	SORSOGON	REGION V - BICOL	1	4
GUBAT	SORSOGON	REGION V - BICOL	1	4
IROSIN	SORSOGON	REGION V - BICOL	1	4
JUBAN	SORSOGON	REGION V - BICOL	1	4
MAGALLANES	SORSOGON	REGION V - BICOL	1	4
MATNOG	SORSOGON	REGION V - BICOL	1	4

PILAR	SORSOGON	REGION V - BICOL	1	4
PRIETO DIAZ	SORSOGON	REGION V - BICOL	1	4
SANTA MAGDALENA	SORSOGON	REGION V - BICOL	1	4
ALTAVAS	AKLAN	REGION VI - WESTERN VISAYAS	2	4
BALETE	AKLAN	REGION VI - WESTERN VISAYAS	2	4
BANGA	AKLAN	REGION VI - WESTERN VISAYAS	2	4
BATAN	AKLAN	REGION VI - WESTERN VISAYAS	2	4
BURUANGA	AKLAN	REGION VI - WESTERN VISAYAS	2	4
IBAJAY	AKLAN	REGION VI - WESTERN VISAYAS	2	4
KALIBO (Capital)	AKLAN	REGION VI - WESTERN VISAYAS	2	4
LEZO	AKLAN	REGION VI - WESTERN VISAYAS	2	4
LIBACAO	AKLAN	REGION VI - WESTERN VISAYAS	2	4
MADALAG	AKLAN	REGION VI - WESTERN VISAYAS	2	4
MAKATO	AKLAN	REGION VI - WESTERN VISAYAS	2	4
MALAY	AKLAN	REGION VI - WESTERN VISAYAS	2	4
MALINAO	AKLAN	REGION VI - WESTERN VISAYAS	2	4
NABAS	AKLAN	REGION VI - WESTERN VISAYAS	2	4
NEW WASHINGTON	AKLAN	REGION VI - WESTERN VISAYAS	2	4
NUMANCIA	AKLAN	REGION VI - WESTERN VISAYAS	2	4
TANGALAN	AKLAN	REGION VI - WESTERN VISAYAS	2	4
ANINI-Y	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
BARBAZA	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
BELISON	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
BUGASONG	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
CALUYA	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
CULASI	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
HAMTIC	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
LAUA-AN	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4

LIBERTAD	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
PANDAN	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
PATNONGON	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
SAN JOSE (Capital)	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
SAN REMIGIO	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
SEBASTE	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
SIBALOM	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
TIBIAO	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
TOBIAS FORNIER (DAO)	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
VALDERRAMA	ANTIQUE	REGION VI - WESTERN VISAYAS	2	4
CUARTERO	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
DAO	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
DUMALAG	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
DUMARAO	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
IVISAN	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
JAMINDAN	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
MA-AYON	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
MAMBUSAO	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
PANAY	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
PANITAN	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
PILAR	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
PONTEVEDRA	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
PRESIDENT ROXAS	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
ROXAS CITY (Capital)	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
SAPI-AN	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
SIGMA	CAPIZ	REGION VI - WESTERN VISAYAS	2	4
TAPAZ	CAPIZ	REGION VI - WESTERN VISAYAS	2	4

BUENAVISTA	GUIMARAS	REGION VI - WESTERN VISAYAS	2	4
JORDAN (CAPITAL)	GUIMARAS	REGION VI - WESTERN VISAYAS	2	4
NUEVA VALENCIA	GUIMARAS	REGION VI - WESTERN VISAYAS	2	4
SAN LORENZO	GUIMARAS	REGION VI - WESTERN VISAYAS	2	4
SIBUNAG	GUIMARAS	REGION VI - WESTERN VISAYAS	2	4
AJUY	ILOILO	REGION VI - WESTERN VISAYAS	2	4
ALIMODIAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
ANILAO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BADIANGAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BALASAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BANATE	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BAROTAC NUEVO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BAROTAC VIEJO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BATAD	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BINGAWAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
CABATUAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
CALINOG	ILOILO	REGION VI - WESTERN VISAYAS	2	4
CARLES	ILOILO	REGION VI - WESTERN VISAYAS	2	4
CITY OF PASSI	ILOILO	REGION VI - WESTERN VISAYAS	2	4
CONCEPCION	ILOILO	REGION VI - WESTERN VISAYAS	2	4
DINGLE	ILOILO	REGION VI - WESTERN VISAYAS	2	4
DUEÑAS	ILOILO	REGION VI - WESTERN VISAYAS	2	4
DUMANGAS	ILOILO	REGION VI - WESTERN VISAYAS	2	4
ESTANCIA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
GUIMBAL	ILOILO	REGION VI - WESTERN VISAYAS	2	4
IGBARAS	ILOILO	REGION VI - WESTERN VISAYAS	2	4
ILOILO CITY (Capital)	ILOILO	REGION VI - WESTERN VISAYAS	2	4

JANIUAY	ILOILO	REGION VI - WESTERN VISAYAS	2	4
LAMBUNAO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
LEGANES	ILOILO	REGION VI - WESTERN VISAYAS	2	4
LEMERY	ILOILO	REGION VI - WESTERN VISAYAS	2	4
LEON	ILOILO	REGION VI - WESTERN VISAYAS	2	4
MAASIN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
MIAGAO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
MINA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
NEW LUCENA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
OTON	ILOILO	REGION VI - WESTERN VISAYAS	2	4
PAVIA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
POTOTAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SAN DIONISIO	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SAN ENRIQUE	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SAN JOAQUIN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SAN MIGUEL	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SAN RAFAEL	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SANTA BARBARA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
SARA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
TIGBAUAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
TUBUNGAN	ILOILO	REGION VI - WESTERN VISAYAS	2	4
ZARRAGA	ILOILO	REGION VI - WESTERN VISAYAS	2	4
BACOLOD CITY (Capital)	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
BAGO CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
BINALBAGAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CADIZ CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CALATRAVA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4

CANDONI	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CAUAYAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF ESCALANTE	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF HIMAMAYLAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF KABANKALAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF SIPALAY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF TALISAY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
CITY OF VICTORIAS	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
ENRIQUE B. MAGALONA (SARAVIA)	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
HINIGARAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
HINOBA-AN (ASIA)	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
ILOG	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
ISABELA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
LA CARLOTA CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
LA CASTELLANA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
MANAPLA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
MOISES PADILLA (MAGALLON)	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
MURCIA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
PONTEVEDRA	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
PULUPANDAN	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
SAGAY CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
SALVADOR BENEDICTO	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
SAN CARLOS CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
SAN ENRIQUE	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
SILAY CITY	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
TOBOSO	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4
VALLADOLID	NEGROS OCCIDENTAL	REGION VI - WESTERN VISAYAS	2	4

ALBURQUERQUE	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
ALICIA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
ANDA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
ANTEQUERA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BACLAYON	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BALILIHAN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BATUAN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BIEN UNIDO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BILAR	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
BUENAVISTA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CALAPE	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CANDIJAY	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CARMEN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CATIGBIAN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CLARIN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CORELLA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
CORTES	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
DAGOHOY	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
DANAO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
DAUIS	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
DIMIAO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
DUERO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
GARCIA HERNANDEZ	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
GETAFE	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
GUINDULMAN	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
INABANGA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
JAGNA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4

LILA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
LOAY	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
LOBOC	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
LOON	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
MABINI	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
MARIBOJOC	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
PANGLAO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
PILAR	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
PRES. CARLOS P. GARCIA (PITOGO)	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SAGBAYAN (BORJA)	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SAN ISIDRO	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SAN MIGUEL	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SEVILLA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SIERRA BULLONES	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
SIKATUNA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
TAGBILARAN CITY (Capital)	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
TALIBON	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
TRINIDAD	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
TUBIGON	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
UBAY	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
VALENCIA	BOHOL	REGION VII - CENTRAL VISAYAS	2	4
ALCANTARA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
ALCOY	CEBU	REGION VII - CENTRAL VISAYAS	2	4
ALEGRIA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
ALOGUINSAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
ARGAO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
ASTURIAS	CEBU	REGION VII - CENTRAL VISAYAS	2	4

BADIAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
BALAMBAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
BANTAYAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
BARILI	CEBU	REGION VII - CENTRAL VISAYAS	2	4
BOLJOON	CEBU	REGION VII - CENTRAL VISAYAS	2	4
BORBON	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CARMEN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CATMON	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CEBU CITY (Capital)	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CITY OF BOGO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CITY OF CARCAR	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CITY OF NAGA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CITY OF TALISAY	CEBU	REGION VII - CENTRAL VISAYAS	2	4
COMPOSTELA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CONSOLACION	CEBU	REGION VII - CENTRAL VISAYAS	2	4
CORDOBA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
DAANBANTAYAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
DALAGUETE	CEBU	REGION VII - CENTRAL VISAYAS	2	4
DANAO CITY	CEBU	REGION VII - CENTRAL VISAYAS	2	4
DUMANJUG	CEBU	REGION VII - CENTRAL VISAYAS	2	4
GINATILAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
LAPU-LAPU CITY (OPON)	CEBU	REGION VII - CENTRAL VISAYAS	2	4
LILOAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
MADRIDEJOS	CEBU	REGION VII - CENTRAL VISAYAS	2	4
MALABUYOC	CEBU	REGION VII - CENTRAL VISAYAS	2	4
MANDAUE CITY	CEBU	REGION VII - CENTRAL VISAYAS	2	4
MEDELLIN	CEBU	REGION VII - CENTRAL VISAYAS	2	4

MINGLANILLA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
MOALBOAL	CEBU	REGION VII - CENTRAL VISAYAS	2	4
OSLOB	CEBU	REGION VII - CENTRAL VISAYAS	2	4
PILAR	CEBU	REGION VII - CENTRAL VISAYAS	2	4
PINAMUNGAHAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
PORO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
RONDA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SAMBOAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SAN FERNANDO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SAN FRANCISCO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SAN REMIGIO	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SANTA FE	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SANTANDER	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SIBONGA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
SOGOD	CEBU	REGION VII - CENTRAL VISAYAS	2	4
TABOGON	CEBU	REGION VII - CENTRAL VISAYAS	2	4
TABUELAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
TOLEDO CITY	CEBU	REGION VII - CENTRAL VISAYAS	2	4
TUBURAN	CEBU	REGION VII - CENTRAL VISAYAS	2	4
TUDELA	CEBU	REGION VII - CENTRAL VISAYAS	2	4
AMLAN (AYUQUITAN)	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
AYUNGON	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
BACONG	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
BAIS CITY	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
BASAY	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
BINDOY (PAYABON)	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
CANLAON CITY	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4

CITY OF BAYAWAN (TULONG)	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
CITY OF GUIHULNGAN	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
CITY OF TANJAY	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
DAUIN	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
DUMAGUETE CITY (Capital)	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
JIMALALUD	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
LA LIBERTAD	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
MABINAY	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
MANJUYOD	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
PAMPLONA	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
SAN JOSE	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
SANTA CATALINA	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
SIATON	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
SIBULAN	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
TAYASAN	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
VALENCIA (LUZURRIAGA)	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
VALLEHERMOSO	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
ZAMBOANGUITA	NEGROS ORIENTAL	REGION VII - CENTRAL VISAYAS	2	4
ENRIQUE VILLANUEVA	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
LARENA	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
LAZI	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
MARIA	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
SAN JUAN	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
SIQUIJOR (Capital)	SIQUIJOR	REGION VII - CENTRAL VISAYAS	2	4
ALMERIA	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
BILIRAN	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
CABUCGAYAN	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4

CAIBIRAN	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
CULABA	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
KAWAYAN	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
MARIPIPI	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
NAVAL (Capital)	BILIRAN	REGION VIII - EASTERN VISAYAS	2	4
ARTECHE	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
BALANGIGA	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
BALANGKAYAN	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
CAN-AVID	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
CITY OF BORONGAN (Capital)	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
DOLORES	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
GENERAL MACARTHUR	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
GIPORLOS	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
GUIUAN	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
HERNANI	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
JIPAPAD	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LAWAAN	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LLORENTE	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
MASLOG	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
MAYDOLONG	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
MERCEDES	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
ORAS	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
QUINAPONDAN	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SALCEDO	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN JULIAN	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN POLICARPO	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SULAT	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4

TAFT	EASTERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
ABUYOG	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
ALANGALANG	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
ALBUERA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BABATNGON	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BARUGO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BATO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BURAUEN	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
CALUBIAN	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
CAPOOCAN	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
CARIGARA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
CITY OF BAYBAY	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
DAGAMI	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
DULAG	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
HILONGOS	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
HINDANG	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
INOPACAN	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
ISABEL	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
JARO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
JAVIER (BUGHO)	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
JULITA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
KANANGA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
LA PAZ	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
LEYTE	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MACARTHUR	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MAHAPLAG	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MATAG-OB	LEYTE	REGION VIII - EASTERN VISAYAS	2	4

MATALOM	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MAYORGA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MERIDA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
ORMOC CITY	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
PALO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
PALOMPON	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
PASTRANA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SAN ISIDRO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SAN MIGUEL	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SANTA FE	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TABANGO	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TABONTABON	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TACLOBAN CITY (Capital)	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TANAUAN	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TOLOSA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TUNGA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
VILLABA	LEYTE	REGION VIII - EASTERN VISAYAS	2	4
ALLEN	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
BIRI	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
BOBON	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
CAPUL	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
CATARMAN (Capital)	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
CATUBIG	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
GAMAY	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LAOANG	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LAPINIG	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LAS NAVAS	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4

LAVEZARES	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
LOPE DE VEGA	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
MAPANAS	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
MONDRAGON	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
PALAPAG	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
PAMBUJAN	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
ROSARIO	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN ANTONIO	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN ISIDRO	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN JOSE	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN ROQUE	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SAN VICENTE	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
SILVINO LOBOS	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
VICTORIA	NORTHERN SAMAR	REGION VIII - EASTERN VISAYAS	1	4
ALMAGRO	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
BASEY	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
CALBAYOG CITY	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
CALBIGA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
CITY OF CATBALOGAN (Capital)	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
DARAM	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
GANDARA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
HINABANGAN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
JIABONG	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
MARABUT	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
MATUGUINAO	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
MOTIONG	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
PAGSANGHAN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4

PARANAS (WRIGHT)	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
PINABACDAO	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SAN JORGE	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SAN JOSE DE BUAN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SAN SEBASTIAN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SANTA MARGARITA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SANTA RITA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
SANTO NIÑO	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
TAGAPUL-AN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
TALALORA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
TARANGNAN	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
VILLAREAL	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
ZUMARRAGA	SAMAR (WESTERN SAMAR)	REGION VIII - EASTERN VISAYAS	1	4
ANAHAWAN	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BONTOC	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
CITY OF MAASIN (Capital)	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
HINUNANGAN	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
HINUNDAYAN	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
LIBAGON	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
LILOAN	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
LIMASAWA	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MACROHON	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
MALITBOG	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
PADRE BURGOS	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
PINTUYAN	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SAINT BERNARD	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SAN FRANCISCO	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4

SAN JUAN (CABALIAN)	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SAN RICARDO	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SILAGO	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
SOGOD	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
TOMAS OPPUS	SOUTHERN LEYTE	REGION VIII - EASTERN VISAYAS	2	4
BAUNGON	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
CABANGLASAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
CITY OF MALAYBALAY (Capital)	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
CITY OF VALENCIA	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
DAMULOG	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
DANGCAGAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
DON CARLOS	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
IMPASUG-ONG	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
KADINGILAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
KALILANGAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
KIBAWE	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
KITAOTAO	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
LANTAPAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
LIBONA	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
MALITBOG	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
MANOLO FORTICH	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
MARAMAG	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
PANGANTUCAN	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
QUEZON	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
SAN FERNANDO	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
SUMILAO	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4
TALAKAG	BUKIDNON	REGION X - NORTHERN MINDANAO	3	4

CATARMAN	CAMIGUIN	REGION X - NORTHERN MINDANAO	2	4
GUINSILIBAN	CAMIGUIN	REGION X - NORTHERN MINDANAO	2	4
MAHINOG	CAMIGUIN	REGION X - NORTHERN MINDANAO	2	4
MAMBAJAO (Capital)	CAMIGUIN	REGION X - NORTHERN MINDANAO	2	4
SAGAY	CAMIGUIN	REGION X - NORTHERN MINDANAO	2	4
BACOLOD	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
BALOI	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
BAROY	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
ILIGAN CITY	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
KAPATAGAN	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
KAUSWAGAN	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
KOLAMBUGAN	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
LALA	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
LINAMON	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
MAGSAYSAY	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
MAIGO	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
MATUNGAO	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
MUNAI	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
NUNUNGAN	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
PANTAO RAGAT	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
PANTAR	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
POONA PIAGAPO	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
SALVADOR	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
SAPAD	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
SULTAN NAGA DIMAPORO (KAROMATAN)	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
TAGOLOAN	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
TANGCAL	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4

TUBOD (Capital)	LANAO DEL NORTE	REGION X - NORTHERN MINDANAO	3	4
ALORAN	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
BALIANGAO	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
BONIFACIO	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
CALAMBA	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
CLARIN	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
CONCEPCION	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
DON VICTORIANO CHIONGBIAN (DON MARIANO MARCOS)	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
JIMENEZ	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
LOPEZ JAENA	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
OROQUIETA CITY (Capital)	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
OZAMIS CITY	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
PANAON	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
PLARIDEL	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
SAPANG DALAGA	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
SINACABAN	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
TANGUB CITY	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
TUDELA	MISAMIS OCCIDENTAL	REGION X - NORTHERN MINDANAO	3	4
ALUBIJID	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
BALINGASAG	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
BALINGOAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
BINUANGAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
CAGAYAN DE ORO CITY (Capital)	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
CITY OF EL SALVADOR	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
CLAVERIA	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
GINGOOG CITY	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
GITAGUM	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4

INITAO	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
JASAAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
KINOGUITAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
LAGONGLONG	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
LAGUINDINGAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
LIBERTAD	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
LUGAIT	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
MAGSAYSAY (LINUGOS)	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
MANTICAO	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
MEDINA	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
NAAWAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
OPOL	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
SALAY	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
SUGBONGCOGON	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
TAGOLOAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
TALISAYAN	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
VILLANUEVA	MISAMIS ORIENTAL	REGION X - NORTHERN MINDANAO	2	4
COMPOSTELA	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
LAAK (SAN VICENTE)	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MABINI (DOÑA ALICIA)	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MACO	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MARAGUSAN (SAN MARIANO)	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MAWAB	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MONKAYO	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
MONTEVISTA	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
NABUNTURAN (Capital)	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
NEW BATAAN	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
PANTUKAN	COMPOSTELA VALLEY	REGION XI - DAVAO	2	4
ASUNCION (SAUG)	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
BRAULIO E. DUJALI	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
CARMEN	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
CITY OF PANABO	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
CITY OF TAGUM (Capital)	DAVAO DEL NORTE	REGION XI - DAVAO	3	4

ISLAND GARDEN CITY OF SAMAL	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
KAPALONG	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
NEW CORELLA	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
SAN ISIDRO	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
SANTO TOMAS	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
TALAINGOD	DAVAO DEL NORTE	REGION XI - DAVAO	3	4
BANSALAN	DAVAO DEL SUR	REGION XI - DAVAO	3	4
CITY OF DIGOS (Capital)	DAVAO DEL SUR	REGION XI - DAVAO	3	4
DAVAO CITY	DAVAO DEL SUR	REGION XI - DAVAO	3	4
DON MARCELINO	DAVAO DEL SUR	REGION XI - DAVAO	3	4
HAGONOY	DAVAO DEL SUR	REGION XI - DAVAO	3	4
JOSE ABAD SANTOS (TRINIDAD)	DAVAO DEL SUR	REGION XI - DAVAO	3	4
KIBLAWAN	DAVAO DEL SUR	REGION XI - DAVAO	3	4
MAGSAYSAY	DAVAO DEL SUR	REGION XI - DAVAO	3	4
MALALAG	DAVAO DEL SUR	REGION XI - DAVAO	3	4
MALITA	DAVAO DEL SUR	REGION XI - DAVAO	3	4
MATANAO	DAVAO DEL SUR	REGION XI - DAVAO	3	4
PADADA	DAVAO DEL SUR	REGION XI - DAVAO	3	4
SANTA CRUZ	DAVAO DEL SUR	REGION XI - DAVAO	3	4
SANTA MARIA	DAVAO DEL SUR	REGION XI - DAVAO	3	4
SARANGANI	DAVAO DEL SUR	REGION XI - DAVAO	3	4
SULOP	DAVAO DEL SUR	REGION XI - DAVAO	3	4
BAGANGA	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
BANAYBANAY	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
BOSTON	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
CARAGA	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
CATEEL	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
CITY OF MATI (Capital)	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
GOVERNOR GENEROSO	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
LUPON	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
MANAY	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
SAN ISIDRO	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
TARRAGONA	DAVAO ORIENTAL	REGION XI - DAVAO	2	4
ALAMADA	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
ALEOSAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
ANTIPAS	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
ARAKAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
BANISILAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
CARMEN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4

CITY OF KIDAPAWAN (Capital)	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
KABACAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
LIBUNGAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
M`LANG	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
MAGPET	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
MAKILALA	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
MATALAM	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
MIDSAYAP	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
PIGKAWAYAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
PIKIT	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
PRESIDENT ROXAS	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
TULUNAN	COTABATO (NORTH COTABATO)	REGION XII - SOCCSKSARGEN	3	4
COTABATO CITY	COTABATO CITY	REGION XII - SOCCSKSARGEN	3	4
ALABEL (Capital)	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
GLAN	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
KIAMBA	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
MAASIM	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
MAITUM	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
MALAPATAN	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
MALUNGON	SARANGANI	REGION XII - SOCCSKSARGEN	3	4
BANGA	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
CITY OF KORONADAL (Capital)	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
GENERAL SANTOS CITY (DADIANGAS)	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
LAKE SEBU	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
NORALA	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
POLOMOLOK	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
SANTO NIÑO	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
SURALLAH	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
T`BOLI	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
TAMPAKAN	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
TANTANGAN	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
TUPI	SOUTH COTABATO	REGION XII - SOCCSKSARGEN	3	4
BAGUMBAYAN	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
CITY OF TACURONG	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
COLUMBIO	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4

ESPERANZA	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
ISULAN (Capital)	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
KALAMANSIG	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
LAMBAYONG (MARIANO MARCOS)	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
LEBAK	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
LUTAYAN	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
PALIMBANG	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
PRESIDENT QUIRINO	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
SEN. NINOY AQUINO	SULTAN KUDARAT	REGION XII - SOCCSKSARGEN	3	4
BUENAVISTA	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
BUTUAN CITY (Capital)	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
CARMEN	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
CITY OF CABADBARAN	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
JABONGA	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
KITCHARAO	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
LAS NIEVES	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
MAGALLANES	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
NASIPIT	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
REMEDIOS T. ROMUALDEZ	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
SANTIAGO	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
TUBAY	AGUSAN DEL NORTE	REGION XIII - CARAGA	2	4
BUNAWAN	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
CITY OF BAYUGAN	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
ESPERANZA	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
LA PAZ	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
LORETO	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
PROSPERIDAD (Capital)	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
ROSARIO	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
SAN FRANCISCO	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
SAN LUIS	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
SANTA JOSEFA	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
SIBAGAT	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
TALACOGON	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
TRENTO	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
VERUELA	AGUSAN DEL SUR	REGION XIII - CARAGA	2	4
BASILISA (RIZAL)	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
CAGDIANAO	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
DINAGAT	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
LIBJO (ALBOR)	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
LORETO	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
SAN JOSE (CAPITAL)	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4
TUBAJON	DINAGAT ISLANDS	REGION XIII - CARAGA	2	4

ALEGRIA	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
BACUAG	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
BURGOS	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
CLAVER	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
DAPA	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
DEL CARMEN	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
GENERAL LUNA	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
GIGAQUIT	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
MAINIT	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
MALIMONO	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
PILAR	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
PLACER	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SAN BENITO	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SAN FRANCISCO (ANAO-AON)	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SAN ISIDRO	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SANTA MONICA (SAPAO)	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SISON	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SOCORRO	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
SURIGAO CITY (Capital)	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
TAGANA-AN	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
TUBOD	SURIGAO DEL NORTE	REGION XIII - CARAGA	2	4
BAROBO	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
BAYABAS	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CAGWAIT	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CANTILAN	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CARMEN	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CARRASCAL	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CITY OF BISLIG	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CITY OF TANDAG (Capital)	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
CORTES	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
HINATUAN	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
LANUZA	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
LIANGA	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
LINGIG	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
MADRID	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
MARIHATAG	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
SAN AGUSTIN	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
SAN MIGUEL	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
TAGBINA	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4
TAGO	SURIGAO DEL SUR	REGION XIII - CARAGA	2	4

Appendix B Glossary

ARI: Average Recurrence Interval.

Average Recurrence Interval: the average time period for a specified severity of hazard to recur.

Avoided Loss: the benefit due to the implementation of resilience design that leads to reduced risks.

Basic Design Load: the minimum load that the designed structure should be able to withstand, for example, the design wind velocity pressure and the design base shear to withstand seismic ground movement.

Basic Design PGA: the peak ground acceleration (PGA) with a 10% probability of being exceeded in 50 years (or annual exceedance probability of 0.2%).

Basic Design Wind Speed: the three-second gust speed at 10m above the ground with annual probability of 0.02 being exceeded (50 year ARI), is considered for wind loads in structural design, together with other factors including wind directionality factor, structural importance factor, exposure factor, topographic effects, and gust effect factor (More details are refereed to NSCP).

Capacity: an inherent system property, the ability to withstand or accommodate expected adverse hazard impacts without loss of its functionality and integrity. For example, the ability of a structure to resist earthquake ground motions without collapse, and the ability of a roof to withstand wind velocity pressure without being up-lifted.

Consequence: the adverse effects by the impact of natural hazards, and determined by both the likelihood of exposure of assets to natural hazards as well as their vulnerability to the hazards.

Cost-Effectiveness: the effectiveness of an investment to achieve a goal on an economical term, indicating that a solution among available NDRR or CCA options has a less cost to meet a same goal as others.

Exceedance Probability: the probability of hazard events larger in severity than the event corresponding to a given ARI. It can be expressed as the reciprocal of ARI, or 1/ARI.

Natural Hazard: natural event that could cause adverse impacts on both built and natural environment as well as society, such as typhoon, earthquake and flood;

Hazard Curve: the relationship between hazard severity and ARI. It is a plot of a hazard model that may be developed on the basis of historical observations fitted by a probability distribution function.

Hazard Zones: geographical areas classified by NSCP for the selection of basic design loads of wind and earthquake in structural design.

RCP: see Representative Concentration Pathways.

Representative Concentration Pathways: representative greenhouse emission pathways, expressed by total radiative forcing in relation to years. They are associated with carbon concentration, and chosen by Intergovernmental panel on climate change (IPCC) to represent a broad range of climate outcomes in its Fifth Assessment Report (AR5).

Resilience: the ability of built assets to resist, absorb and recover from the adverse impact of hazards, with a focus in the handbook on the resistance enhancement by designs.

Resilience Factor: a multiplier to the basic design load specified in the NSCP as a means to increase the resilience of the designed structure. It may be described in the formulation, Modified Basic Design Load = Resilience Factor X NSCP Basic Design Load.

Return Period: see Average Recurrence Interval.

Risk: the multiplication of the consequence caused by an event and the likelihood of the event occurrence. It can be simply described by Risk = Likelihood x Consequence.

Vulnerability: susceptibility or loss of the assets, measured as the expected loss, given a hazard level. For a physical asset, vulnerability can be described by the loss of functionality, serviceability or integrity of the asset, and is often expressed in a monetary measure.

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