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The Republic of the Philippines  
**DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS**



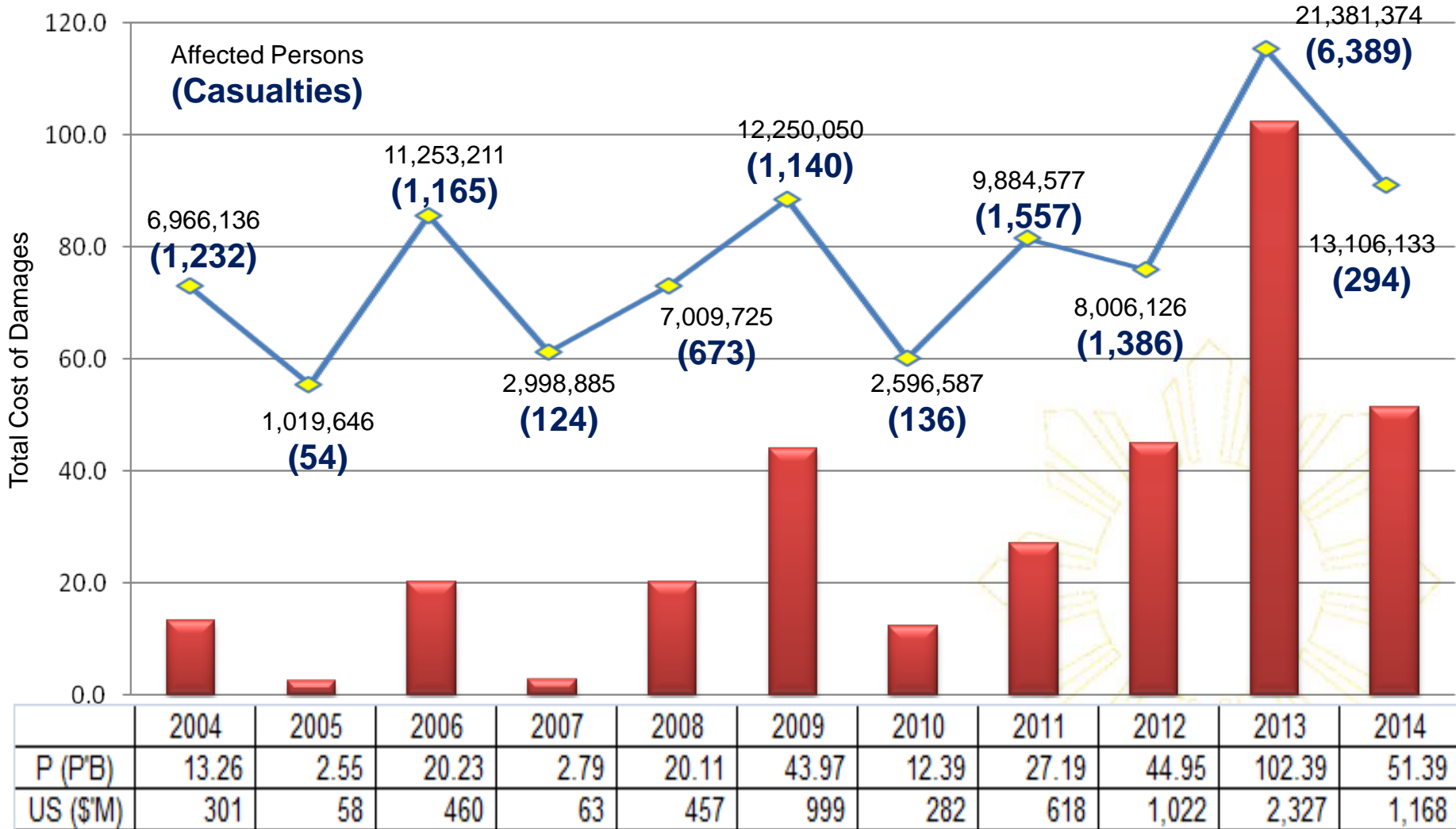
# **PLANNING AND DESIGNING FOR CLIMATE ADAPTIVE AND RESILIENT TRANSPORT: EXPERIENCE FROM PHILIPPINES**

**Engineer ERNESTO V. ALDAY, JR**  
**Project Preparation Division, Planning Service**

**Regional Seminar on Safe, Climate Adaptive and Disaster Resilient Transport for Sustainable  
Development  
Kathmandu, Nepal  
17 November 2015**

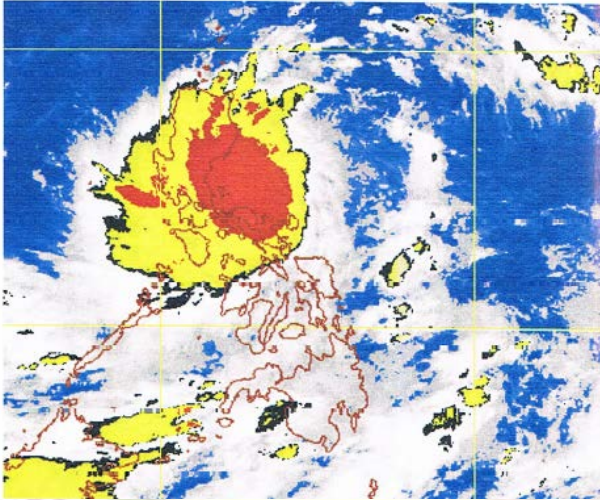
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# 10 Year Disaster Data:





# Effects of Typhoon Ketsana (Ondoy) – September 2009



## Total Cost of Damages: P11.0 B (\$ 250 M)

- Tropical Rainfall Measuring Mission (TRMM) / NASA – Multi Satellite Precipitation Analysis (MPA) showed Typhoon 'Ketsana' poured 575 mm of rainfall (6hr Rainfall)
- Monthly average (November) rainfall record in Manila was poured over in 1 day.

**Affected Families**

**993,227**

**Total Displaced Families**

**15,798**

**Fatalities**

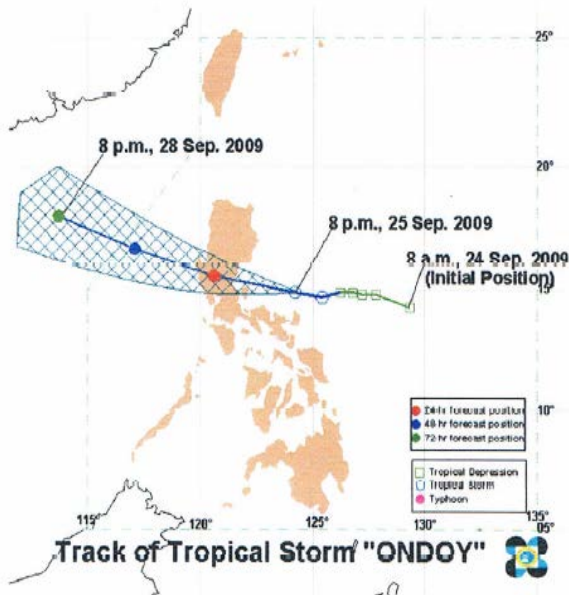
**464**

**Injured**

**529**

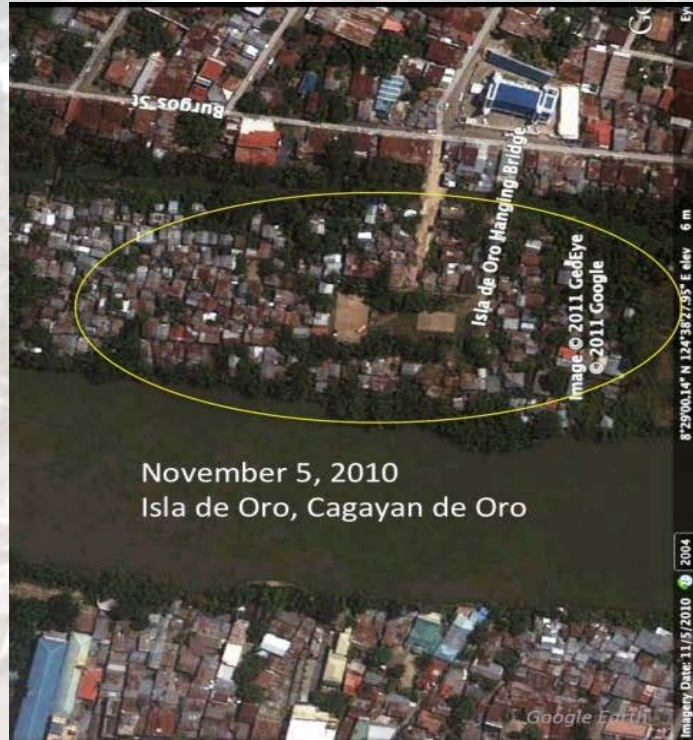
**Missing**

**37**





# Effects of Typhoon Washi (Sendong) – December 2011

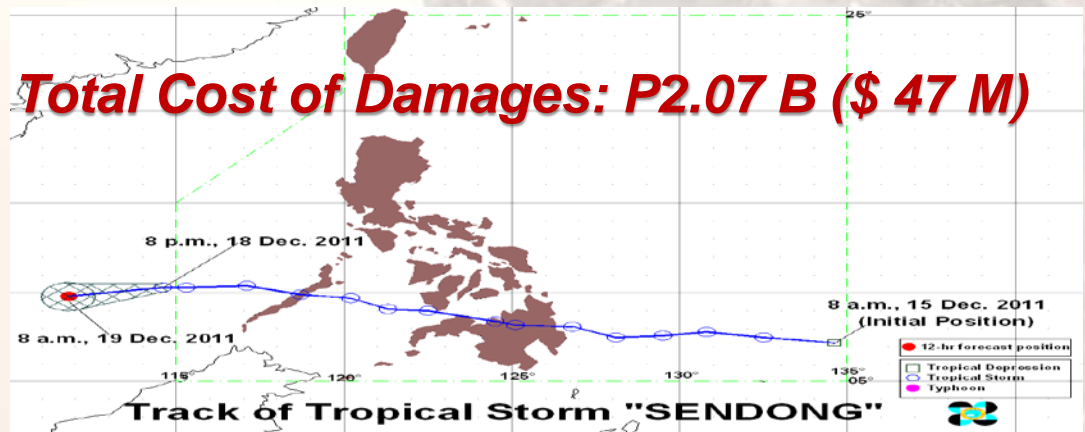


November 5, 2010  
 Isla de Oro, Cagayan de Oro



December 20, 2011  
 Isla de Oro, Cagayan de Oro

|                   |         |
|-------------------|---------|
| Affected Families | 131,618 |
| Fatalities        | 1,268   |
| Injured           | 6,071   |
| Missing           | 181     |





## Total Cost of Damages: P2.26 B\* (\$ 51 M)



|                          |         |
|--------------------------|---------|
| Affected Families        | 671,103 |
| Total Displaced Families | 72,521  |
| Fatalities               | 223     |
| Missing                  | 8       |
| Injured                  | 976     |



Source: NDRRMC Site Report No. 26, Nov. 6, 2013

\*Cost of damaged roads, bridges, flood control, school buildings, hospitals, and other public buildings.



# Effects of Super Typhoon Haiyan (Yolanda) – November 2013



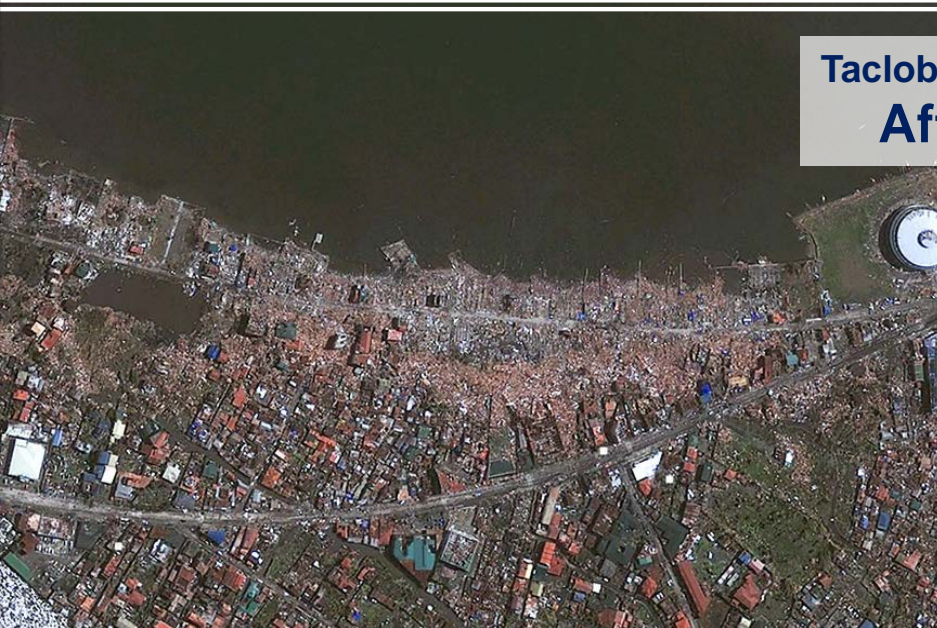
# Effects of Super Typhoon Haiyan (Yolanda) – November 2013



Tacloban City  
Before



Tacloban City  
After





## Pre-Disaster Demographics of the Six (6) Affected Regions (Haiyan)



**29.5 million** in 2012  
(combined population)



Data in 2012 show that the **average household income** in the severely affected provinces was only **75%** of the national average.



**17.4 %** of the country's  
GDP in 2012



**Enrolment rate** was generally high, with most near or above the national enrolment rate of 91.2 %.

The affected regions account for 26.8% of the total agricultural output, 16.7% of industry, and 15.8% of services in 2012



**Malnutrition rate** was high

Source: RAY, 16 December 2013

# Comprehensive Rehabilitation and Recovery Plan (CRRP)

**CRRP Total Funding Requirement: P 167.86 Billion (\$ 3.82 B)\***

**Infrastructure**  
**P 35.15 Billion**  
(\$ 0.80 B)

- ❖ Rebuild/repair damaged roads, bridges, airports, ports, school buildings, municipal halls, public markets, health facilities, water supply, sanitation, power utilities and other public facilities with affordable disaster-resilient standards.

**Resettlement**  
**P 75.68 Billion**  
(\$ 1.72 B)

- ❖ Construction of 205,128 disaster-resilient housing units including provision for sustainable livelihood opportunities in new settlement sites

**Livelihood**  
**P 30.63 Billion**  
(\$ 0.70 B)

- ❖ Emergency Employment & Livelihood Assistance; Clearing of farmlands; Provision of inputs (seeds, fertilizers, fishing gears); assets (work animals, fishing boats); Transition to labor market programs; skills development

**Social Services**  
**P 26.41 Billion**  
(\$ 0.60 B)

- ❖ Cash for work; financial/shelter/food assistance; college scholarship grants; supplemental feeding to students including learning kits; Health services and medicines; insurance subsidy to farmers; construction material assistance



# Lessons Learned:

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## I. Build Back Better Policy

- Need for Structural Measures (More Resilient & Better Designed Structures)
- Lack of Non-Structural Measures (Early Warning, Policy Changes, Community Awareness)
- Need for capacity building of NGAs & LGUs
- Inadequate resilient public infrastructure facilities for emergency situations and disaster mitigation

## II. Strategic Policies

- Creation of Office of the Presidential Assistant for Rehabilitation and Recovery
- Created cabinet level Climate Change Commission
- Adoption of Integrated Water Resource Management (IWRM) principles
- Implement River Basin Approach to Flood Management and Water Optimization

# Estero de paco



- DEVELOPMENT:**
- Market renovation
  - Dredging
  - Riprap
  - slope protection and phytoremediation
  - Walkway and riprap
  - SAIR



# Estero de paco

Apacible to UN Ave. Segment

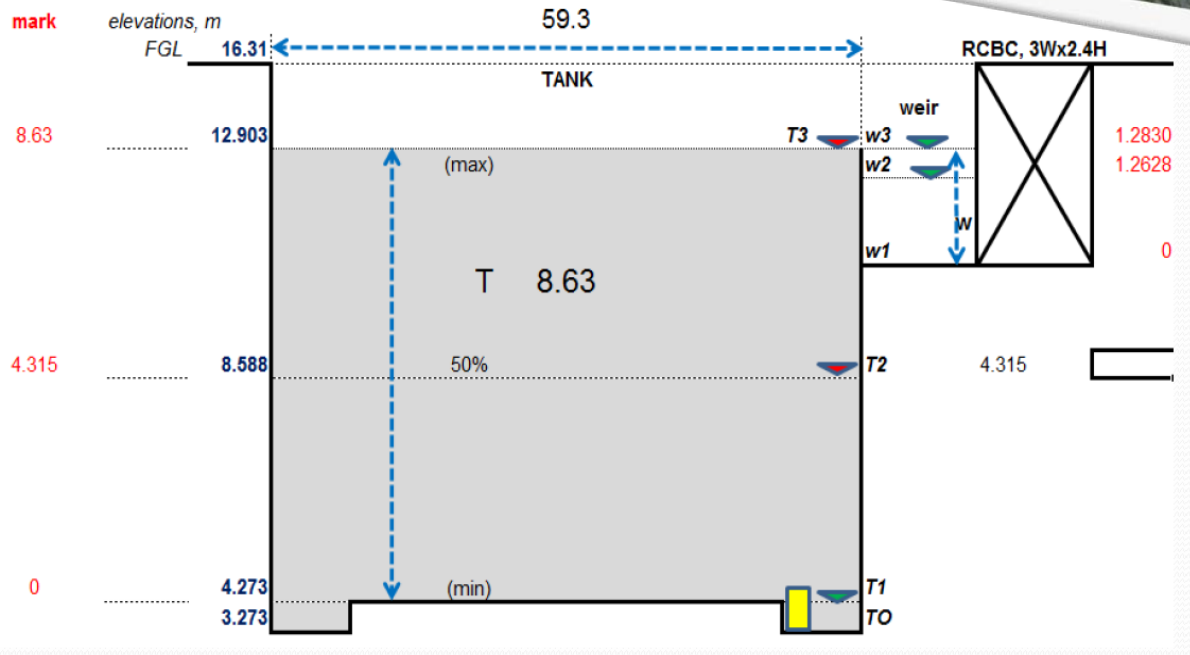


### DEVELOPMENT:

- dredging
- riprap
- slope protection and phytoremediation
- Facelifting of Residential Houses
- Walkway/Linear Park



# USE OF RETARDING BASIN IN URBAN CENTERS BURGOS CIRCLE, FORT BONIFACIO GLOBAL CITY



## The Detention Tank

- is meant to temporarily detain storm water from direct discharge to waterways.



### Spending within Means

- Enough **Resources** to contribute to growth
- Efficiently collecting more **revenues** and carefully managing the country's debt
- Implementing the **Two-Tier Budgeting Approach**, which sets a sufficient budget for on-going programs and focuses the remaining funds only on priority programs



### Spending on the Right Priorities

- Focusing on the 5 priority programs (**Pursuing Good Governance; Making Growth Inclusive; Sustaining the Growth Momentum; Climate Change Adaptation and Disaster Risk Reduction and Management and Just and Lasting Peace**)
- Addressing the needs of the **44 poorest and most vulnerable provinces**



### Spending with Measurable Results

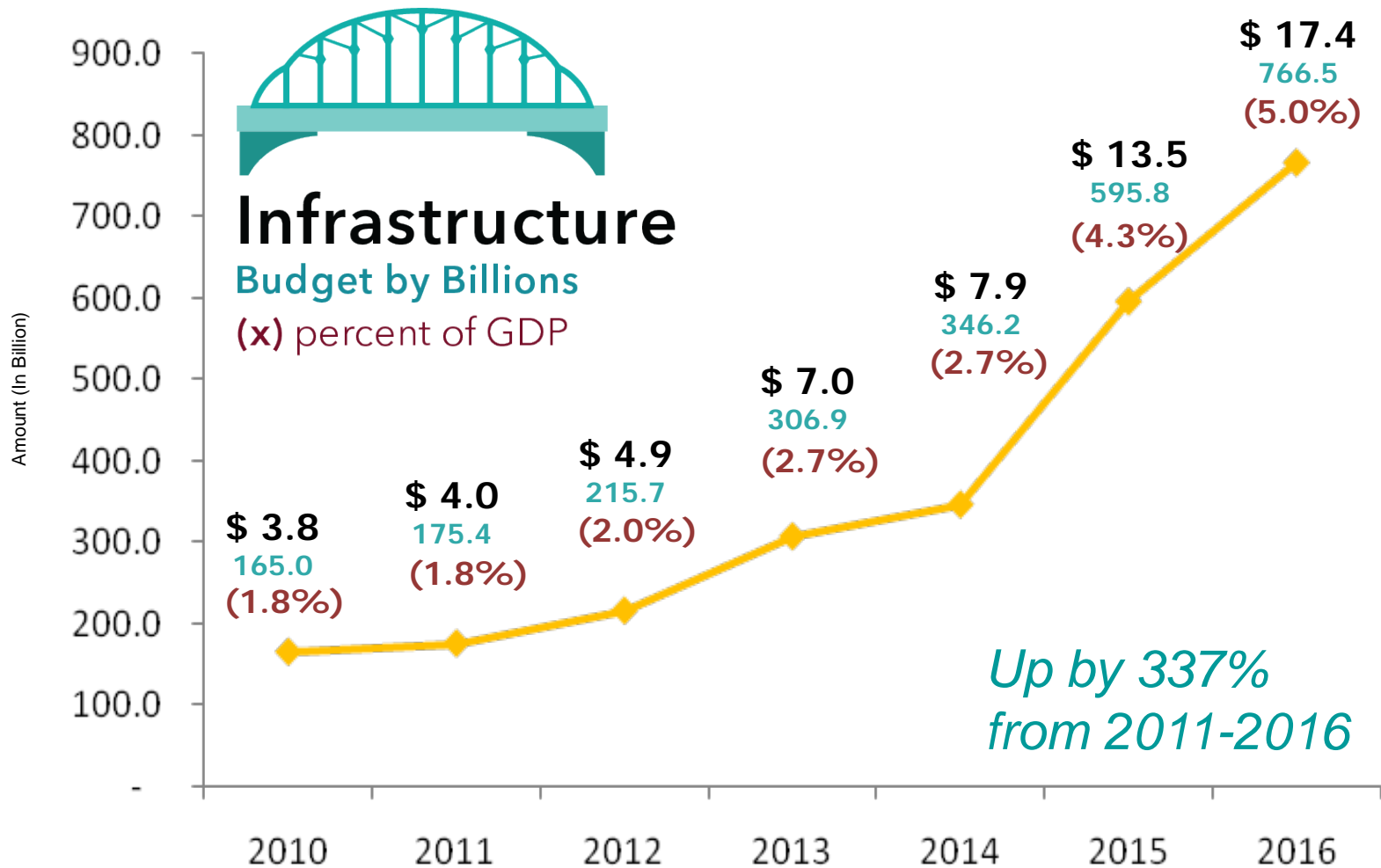
- Cutting the number of steps required to release funds, **procuring important projects in advance**, and paying contractors via **bank to bank transactions**
- Improving the **capacity of agencies to procure**, spend their budgets on time and **monitor their progress**
- Establishing collaborations with capable local government units and the **private sector to implements projects**
- Linking budget allocations to performance targets through **Performance-Informed Budgeting**



### Citizen Empowerment

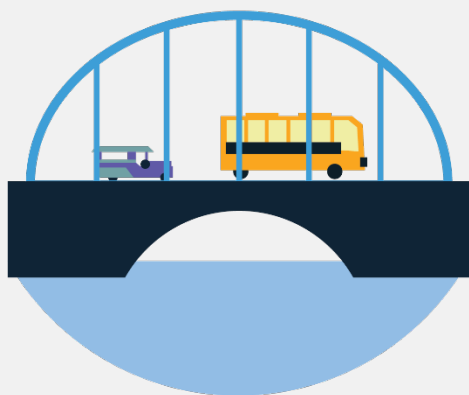
- Providing a wider space for citizens to shape government priorities through **Bottom-Up Budgeting, Budget Partnership Agreements** and direct release of funds to local governments
- Requiring agencies to provide more information on their **websites**







# FY 2016 Infrastructure Outlays (in Billion pesos)



**P766B**

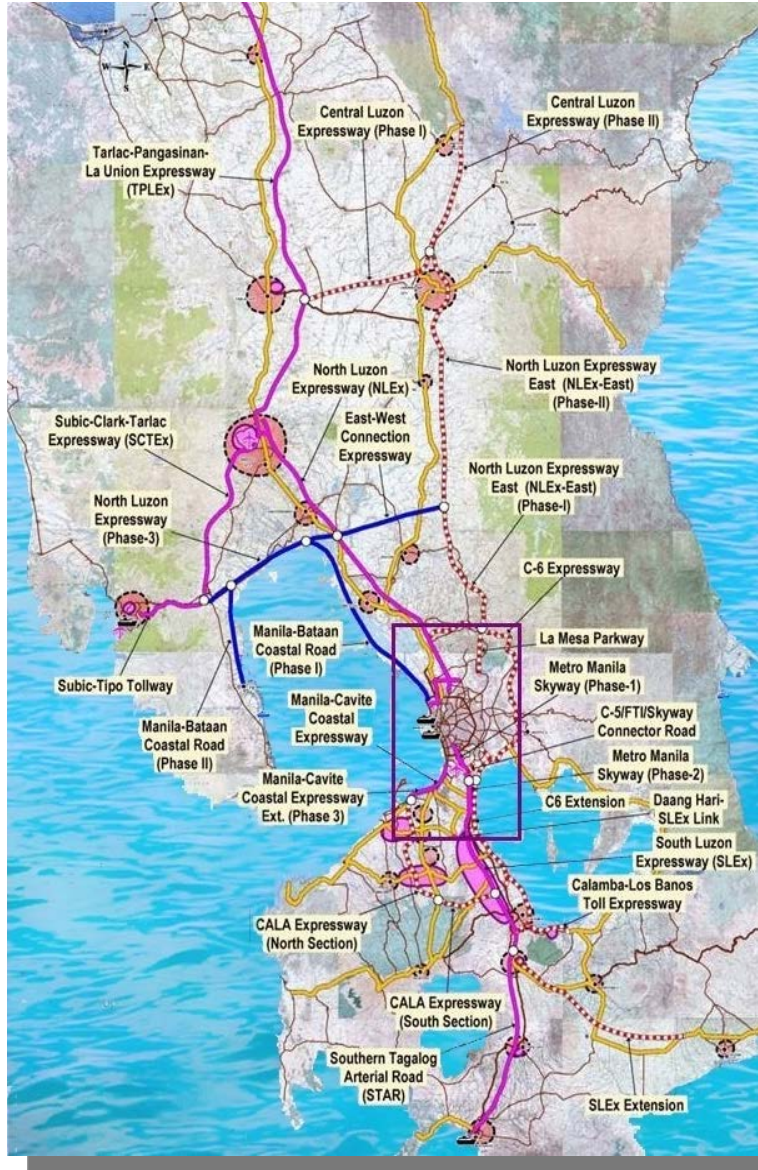
**(\$17B)**

**28.6% Growth**

**5% of GDP**

| Particulars  | P'B        | \$'B         |
|--|------------|--------------|
| Roads and Bridges  | 277        | 6.30         |
| Basic Educational Facilities                                   | 89         | 2.02         |
| Flood Control Structures/Facilities/ Drainage/Protection Works | 63         | 1.44         |
| Housing  | 33         | 0.74         |
| National Irrigation  | 26         | 0.58         |
| Military, Police and Security Equipment                        | 25         | 0.57         |
| Health Facilities  | 20         | 0.44         |
| Multi-Purpose Facilities                                       | 19         | 0.43         |
| Government Buildings   | 15         | 0.34         |
| Farm-to-Market Roads   | 14         | 0.32         |
| Railways   | 11         | 0.24         |
| Forestry and Fisheries Infrastructure                          | 9          | 0.21         |
| Airports/Air Navigational Facilities                           | 9          | 0.21         |
| Water Supply   | 7          | 0.17         |
| Information and Communication Technology                       | 7          | 0.16         |
| Electrification  | 4          | 0.08         |
| Ports, Light Houses and Harbors                                | 2          | 0.05         |
| Land Transportation/ Traffic Decongestion                      | 2          | 0.05         |
| Internal Revenue Allotment-Development Fund                    | 86         | 1.95         |
| National Disaster Risk Reduction and Management Program        | 16         | 0.37         |
| Others   | 33         | 0.76         |
| <b>TOTAL</b>   | <b>766</b> | <b>17.41</b> |

# High Standard Highway (HSH) Network in Metro Manila and its 200km Sphere:



## COMPLETED : 43.21 km, P9.20B (US \$ 209.09 M)

| Name of Project                                     | Km    | P'B  | \$'M | Start | Completion |
|---|-------|------|------|-------|------------|
| Muntinlupa-Cavite Expressway (Daang Hari-SLEx Link) | 4.00  | 2.01 | 45.7 | 2012  | 2015       |
| STAR, Lipa – Batangas , Phase II                    | 19.74 | 2.32 | 52.7 | 2013  | 2015       |
| NLEX Harbor Link, Segment 9*                        | 2.42  | 1.15 | 26.1 | 2013  | 2015       |
| Plaridel By-Pass Road, Phase I                      | 17.05 | 3.72 | 84.5 | 2009  | 2012       |

## ON-GOING : 201.04 km, P137.38B (US \$ 3,122.27 M)

| Name of Project                 | Km    | P'B   | \$'M  | Start | Completion |
|---------------------------------|-------|-------|-------|-------|------------|
| NAIA Expressway                 | 7.15  | 15.86 | 360.5 | 2014  | 2016       |
| Tarlac-Pangasinan-La Union Exp. | 88.85 | 21.38 | 485.9 | 2010  | 2016       |
| NLEX Harbor Link, Segment 10*   | 5.65  | 9.00  | 204.5 | 2014  | 2017       |
| Metro Manila Skyway Stage 3*    | 14.80 | 37.43 | 850.7 | 2015  | 2018       |
| Plaridel By-Pass Road, Phase II | 9.96  | 3.34  | 75.9  | 2014  | 2018       |
| CLLEx – P I (Tarlac-Cabanatuan) | 30.00 | 14.94 | 339.5 | 2015  | 2019       |
| CALA Expressway                 | 44.63 | 35.43 | 805.2 | 2016  | 2020       |

## APPROVED FOR IMPLEMENTATION: 113.00 km, P159.1B (US \$ 3,616.1 M)

| Name of Project              | Km    | P'B    | \$'M    | Start | Completion |
|------------------------------|-------|--------|---------|-------|------------|
| NLEX-SLEX Connector Road     | 8.00  | 23.20  | 527.3   | 2016  | 2020       |
| SLEX TR4, Sto. Tomas-Lucena* | 58.00 | 13.1   | 297.7   | 2016  | 2020       |
| Laguna Lakeshore Expressway  | 47.00 | 122.81 | 2,791.1 | 2016  | 2023       |

## ADDITIONAL PROPOSED: 77.20 km, P52.02B (US \$1,182.3 M)

| Name of Project                      | Km    | P'B   | \$'M  |
|--------------------------------------|-------|-------|-------|
| NLEX Harbor Link, Segment 8.2*       | 7.50  | 6.50  | 147.7 |
| C6-P I, Southeast Metro Manila Exp.* | 34.00 | 31.32 | 711.8 |
| CLLEx - P II (Cabanatuan-San Jose)   | 35.70 | 14.20 | 322.7 |

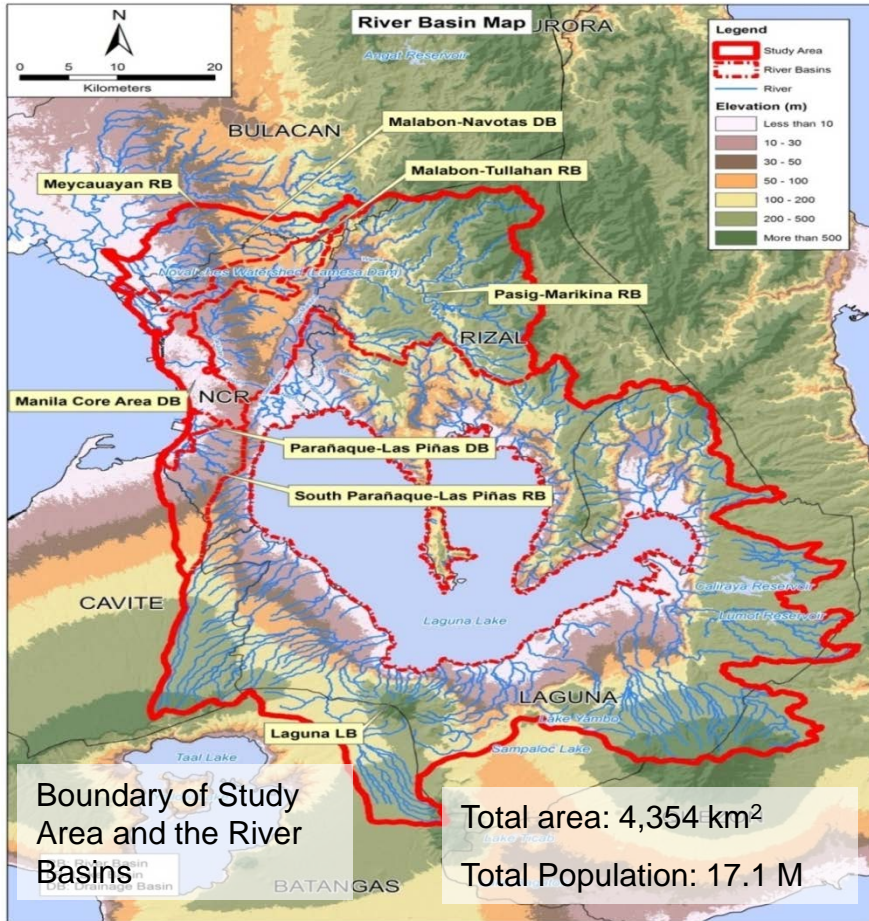
## PIPELINE: 200.5 km, P404.92B (US \$9,202.7 M)

| Name of Project   | Km    | P'B   | \$'M    |
|---|-------|-------|---------|
| Manila Bay Integrated Flood Control, Coastal Defense and Expressway Project | 50.00 | 338.8 | 7,700.0 |
| R7 Expressway   | 16.10 | 7.77  | 176.6   |
| North Luzon Expressway East (NLEE) Phase I and II                           | 92.10 | 15.77 | 358.4   |
| Pasig Marikina Expressway   | 15.70 | 34.65 | 787.5   |
| East-West Connection Expressway   | 26.60 | 7.93  | 180.2   |

# Master Plan for Flood Management in Metro Manila and Surrounding Areas:



Based on river basins:  
Pasig-Marikina River Basin and Laguna Lake Basin.



| Name of Project  | Est. Cost                           |
|--|-------------------------------------|
| Pasig-Marikina River Improvement and Dam Construction      | 198.435 B                           |
| Meycauayan River Improvement                               | 14.040 B                            |
| Malabon-Tullahan River Improvement                         | 21.635 B                            |
| South Parañaque-Las Piñas River Improvement                | 17.335 B                            |
| East Mangahan Floodway (Cainta & Taytay River Improvement) | 25.901 B                            |
| West Laguna Lakeshore Land Raising                         | 25.185 B                            |
| Land Raising for Small Cities around Laguna Lakeshore      | 7.158 B                             |
| Improvement of the Inflow Rivers to Laguna Lake            | 0.637 B                             |
| Manila Core Area Drainage Improvement                      | 27.257 B                            |
| West Mangahan Area Drainage Improvement                    | 5.522 B                             |
| Valenzuela-Obando-Meycauayan (VOM) Improvement             | 8.613 B                             |
| <b>Total:</b>  | <b>P 351.718 B<br/>(\$ 7.994 B)</b> |

# Laguna Lakeshore Expressway Dike

## PROJECT DESCRIPTION:

- 47-km, four-lane expressway dike
- Taguig-Muntinlupa Reclamation, 700 hectare (7 islands, about 450-500m wide and 15.6 km long)

## PROJECT OBJECTIVE:

- Will connect Bicutan to Los Baños
- Will reduce average travel time between Bicutan and Los Baños from 90 minutes to 35 minutes
- P8.1 billion average annual flood damage will be avoided
- An average of 800,000 people will no longer be affected by flood

## ESTIMATED COST:

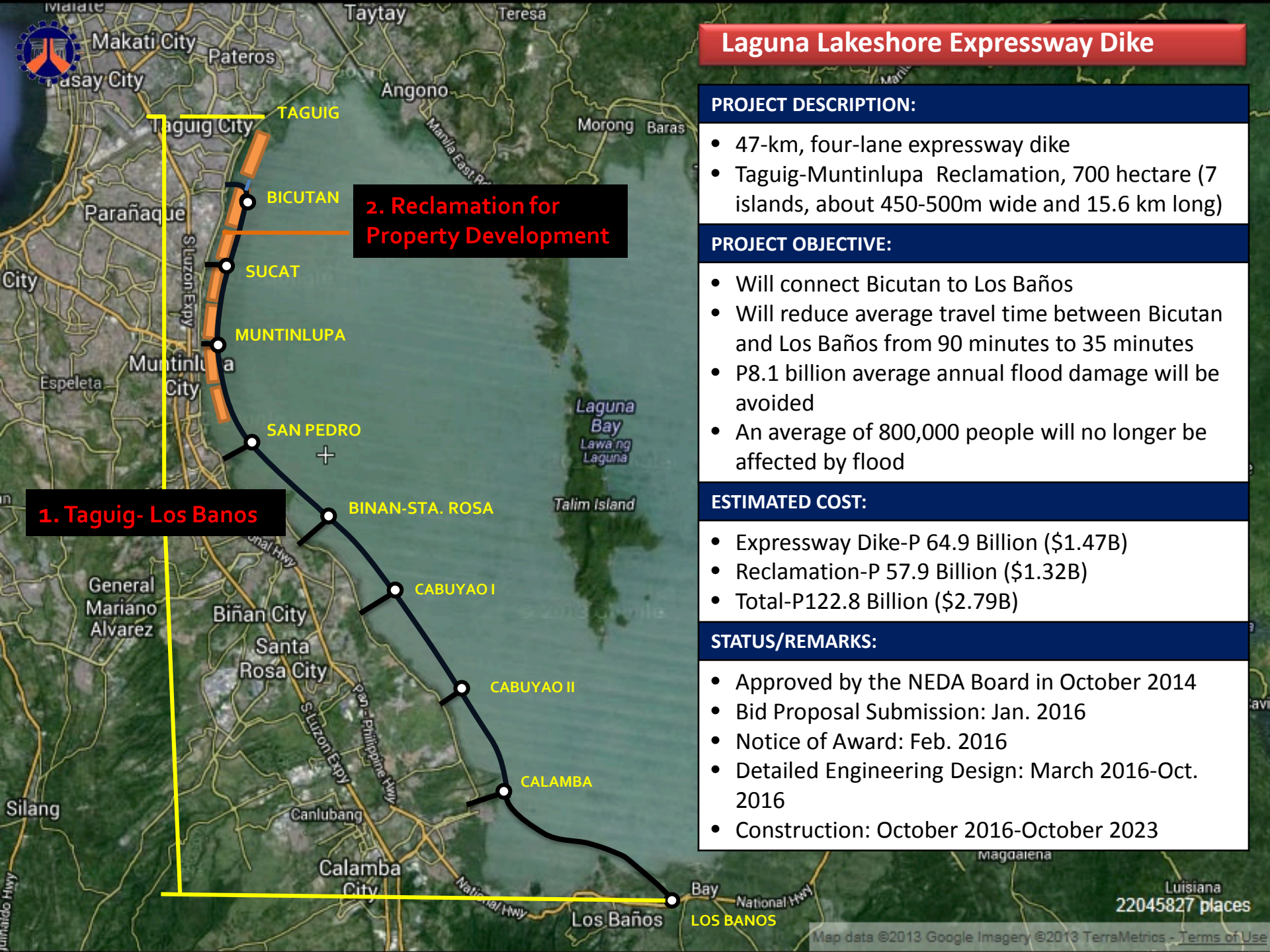
- Expressway Dike-P 64.9 Billion (\$1.47B)
- Reclamation-P 57.9 Billion (\$1.32B)
- Total-P122.8 Billion (\$2.79B)

## STATUS/REMARKS:

- Approved by the NEDA Board in October 2014
- Bid Proposal Submission: Jan. 2016
- Notice of Award: Feb. 2016
- Detailed Engineering Design: March 2016-Oct. 2016
- Construction: October 2016-October 2023

**2. Reclamation for Property Development**

**1. Taguig- Los Banos**





# Laguna Lakeshore Expressway Dike

## 1. Expressway-Dike: 47 kms



## 2. Reclamation: 700 hectares



# Moving Forward:

*Continuing investments in infrastructure for more jobs and sustained growth.*



- ***Institutionalize Good Governance and Anti-Corruption Reforms***
  - ***Right project , right cost , right quality, right on time and right people***
  
- ***Infrastructure Investment for GOP to grow from 1.8% of GDP in 2011 to 5.0% of GDP in 2016.***
  
- ***DPWH will continue investments in:***
  1. ***Upgrading Quality and Safety of Roads and Bridges with stronger private sector participation***
    - ***Long Term Road Maintenance Contracts***
    - ***Design and Build Bridge Program***
  
  2. ***Better access to Tourism Destinations, Airports, Seaports, RORO Ports and Food Production Areas***
  
  3. ***Flood Risk Reduction Program***
    - ***Flood management convergence program with other stakeholders***
  
  4. ***Mindanao Logistics Network Program***
  
  5. ***Disaster Risk Reduction and Resiliency Program***



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**THANK YOU !!!**

