TERM OF REFERENCE

FOR CONSULTANCY SERVICES

DEVELOPMENT OF FLOOD RISK ASSESSMENT (FRA) AND FLOOD VULNERABILITY INDEX (FVI) FOR CRITICAL INFRASTRUCTURE (CI) IN MALAYSIA

FOR

CONSTRUCTION RESEARCH INSTITUTE OF MALAYSIA (CREAM)
Subsidiary of the CIDB Malaysia

TERM OF REFERENCE: CONSULTANCY SERVICES

1.0 Project Title

Development of Flood Risk Assessment (FRA) and Flood Vulnerability Index (FVI) for Critical Infrastructure (CI) in Malaysia.

2.0 Background

2.1 Latest catastrophic events that occurred in Malaysia have witnessed numbers of massive devastation, economic change and loss of human life. The country has experienced unprecedented events, including the worst flood event in 50 years and strong earthquake in 39 years since 1976. Even though Malaysia geographically considered less vulnerable, the exposure to a range of climate-related disasters has intensified in part, due to climatic and topographical conditions.

2.2 New risks and vulnerabilities have emerged as the features of climate change in term of the scale, frequency, severity and unpredictability of extreme weather. Human activities including immense population growth, sprawling development and megacities is another factor that cause threats to the environment thus lead to disasters. In time of uncertainties, the risk and vulnerabilities exposed by natural hazards and disasters rise at accelerating pace add sense of urgency to the challenge of being resilience.

2.3 Moving forward, resilience features need to be enhanced in multi-disciplinary actions. Enhanced resilience enables better anticipation of disaster and planning to minimise the impact and losses. The critical question is, how resilience is we, and are we ready to face various challenges and uncertainties in the future?

2.4 Conceptually, resilience needs to have the ability to maintain acceptable levels of functionality during and after disruptive events with recover full functionality within a specific period. The strategy in developing resilience involve short and long-term planning, investments of time and resources prior to an event. Resilience is a process that needs to take into account the economic, social, psychological, physical and environment factors that will ensure continuity to survive (Dodman, Ayers, & Huq, 2010).

2.5 The Sendai Framework for Disaster Risk Reduction 2015 to 2030 (SFDRR) adopted in 2015 echoes global commitment to address Disaster Risk Reduction (DRR) and the building of resilience to disasters with renewed sense of urgency (United Nations, 2015). Align with the global agenda, Malaysia government under the Eleventh Malaysia Plan (11th MP) aims to strengthening resilience against climate change and natural disaster. Building the culture and practice of disaster resilience will require focused action within and across multi sectors.

3.0 Purposes

The purpose of this study is to improve the resilience of the built environment through:

i. Understanding risk of natural hazards to buildings and infrastructure,
ii. Understanding issues and countermeasures against the buildings and infrastructure regarding to DRR,
iii. Mainstream DRR into planning, design, construction and maintenance of building and infrastructure, and
iv. Adopting good practices and lessons on building resilience for building and infrastructure from other countries.

4.0 Objectives

The aim of this study is to develop flood risk assessment and vulnerability index for critical infrastructure in Sungai Pinang (Pulau Pinang) which are to be achieved through the following specific objectives:

4.1 To identify indicators that will be selected to construct an index for critical infrastructure in respected area.

4.2 To develop a multi-criteria assessment of the critical infrastructure

4.3 To identify the parameters for developing flood vulnerability index (FVI) of critical infrastructure and assigning score for each parameter.

4.4 To assist construction industry and local authority in making decision to manage and strengthen the security and resilient of the critical infrastructure.

5.0 Work Scope

The proposed scope of work are as follows:

5.1 To identify indicators/ parameters for FRA and FVI for critical infrastructures.

5.2 To prepare and verify methodology to develop flood risk map.

5.3 To prepare and verify methodology to develop FVI for critical infrastructures.

5.4 To develop flood risk map of the study area.

5.5 Based on the developed risk map further identify the critical infrastructure.

5.6 To collect, collate, and analyse data (primary and secondary) to support the development of FVI for critical infrastructures in the selected areas.

5.7 To develop FVI for critical infrastructure.

5.8 To propose flood and development zoning with respect to FVI.

6.0 Output

6.1 New Flood Risk Map.

6.2 FVI for Critical Infrastructures.

6.3 Flood and development zoning.

6.4 Presentation materials (must be handed to CREAM).

6.5 A training session (for CREAM personnel and others).

7.0 Duration

The duration of the consultancy services is 9 months effective upon official date letter of appointment from CREAM.

8.0 Referral Document for Appointed Consultant

8.1 The appointed consultants may obtain relevant documents, data of the study area in GIS format (.shp) from CREAM and other sources that relate to the scope of the above-'scope of work'.

8.2 CREAM will distribute any questionnaire that will be developed by the consultant.

8.3 The ranking of Critical Infrastructures (CI) will be provided by CREAM. The CI are as follows:

i) Insititutional/Public Facilities

ii) Residential

iii) Central Business District

iv) Industry/Commercial

9.0 Deliverables Submission Format

9.1 All reports must be in English. The schedule of submission and number of copies are specified in **Section 10**.

9.2 Digital submission for maps shall be in GIS format (shapefile).

10.0 Schedule of Payment

The Consultant is required to submit a Progress Payment for the completed services for each work submission.

10.1 CREAM reserves the right to change the payment scheme and payment schedule as follows:

Deliverable	Date of Submission	No of Copies	% Payment
Deliverable 1: Inception Report	1 month after appointment	5 Hard Copy with PDF	20
Deliverable 2: Interim Report	4 month after appointment	5 Hard Copy with PDF	20

Deliverable 3: Draft Final	7 month after appointment	5 Hard Copy with PDF	20
Final Report	9 month after appointment	15 Hard Copy with PDF	40

11.0 Intellectual Property Rights

11.1 Deliverables and sub-deliverables prepared and submitted by the consultants under the terms of reference (TOR) are the intellectual property of CREAM. No part or parts need to be reproduced in any form without prior permissions by CREAM. CREAM reserves the right to alter, modify, or change any information if it deems so.

11.2 The consultant and CREAM is responsible to take all reasonable steps to protect confidential information (if any) specified by one of the parties.

12.0 Agreement of Consulting Services

12.1 A consultant will be given a copy of the agreement stating the terms and conditions of the consultant's services shortly after the consultant agrees to the appointment to the reception of the consultant's appointment.

12.1 The consultant is required to provide the minutes of the meeting and distribute it to the relevant parties.

13.0 Termination of Consulting Services

CREAM has the right to terminate the consulting services if:

13.1 The consultants fails to produce results with the agreed time without a valid reason.

13.2 The consultant fails to perform task for the identified scope with a high level of commitment.

13.3 The consultant fails to attend meeting or workshop that were agreed upon in advance.

14.0 Estimated cost

A total of **RM 200,000.00** is allocated for this consultancy service using the provision of MAMPAN- CREAM-CIDB. Documentation printing cost (refer **Section 10**) shall be proposed by the appointed consultant within the estimated cost.

15.0 Reimbursement

Appointed consultant eligible to make claim as follows:

15.1 Official traveling mileage is RM 0.80/km according to CREAM's financial regulations

15.2 Standard class hotel according to CREAM's financial regulations

15.3 Official travelling including return economy flight ticket according to CREAM's financial regulations.

TEMPLATE FOR PROPOSAL

Note: Kindly prepare proposal according to template given.

1.0 Title of project

2.0 Introduction

3.0 Background of project

4.0 Propose Methodology

5.0 Deliverable

6.0 Milestone

7.0 Consultancy cost

8.0 Research team (should include)

- 8.1 Project Manager
- 8.2 Hydrologist
- 8.3 Socio-economic
- 8.4 River/Hydraulics Modeler
- 8.5 GIS Expert/ Database Developer

9.0 CV for each individual involve