# *Absorbent roadway pilot* ***Concept***	Author : Renaud de Montaignac R&D Date : 26.09.2018

Project:

- **Concept of pavement for an absorbent roadway**

Objective :

- *Propose a design of typical cross-section of a reservoir street to prevent flooding*

Methods :

- *Predesign for structural performance*
- *Predesign validation with hydraulic performance*

Key results :

- *170 mm Concrete pavement with 2 base layers : 160 mm of ultrapervious concrete + 200 mm open graded drainage layer*
- Assumption to be validated

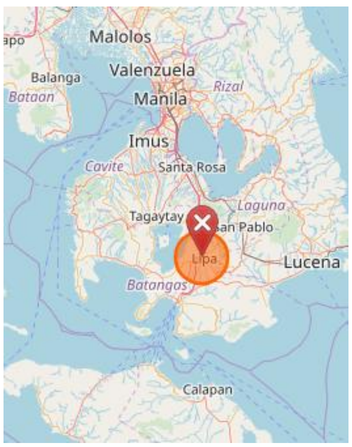
Conclusions and remarks:

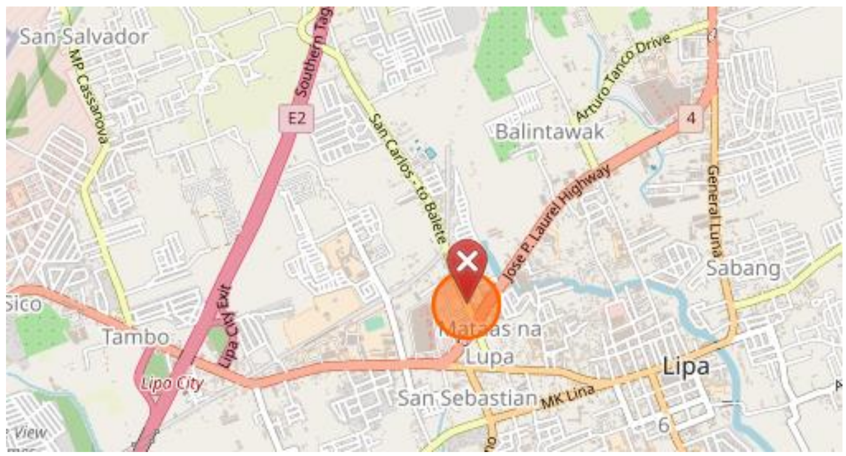
- Alternative RCC design are included in this report

1 Scope

A road section is regularly prone to flooding. This concept study aims to propose a typical cross section design to carry the water during heavy rainfall episode.

<u>Location :</u>

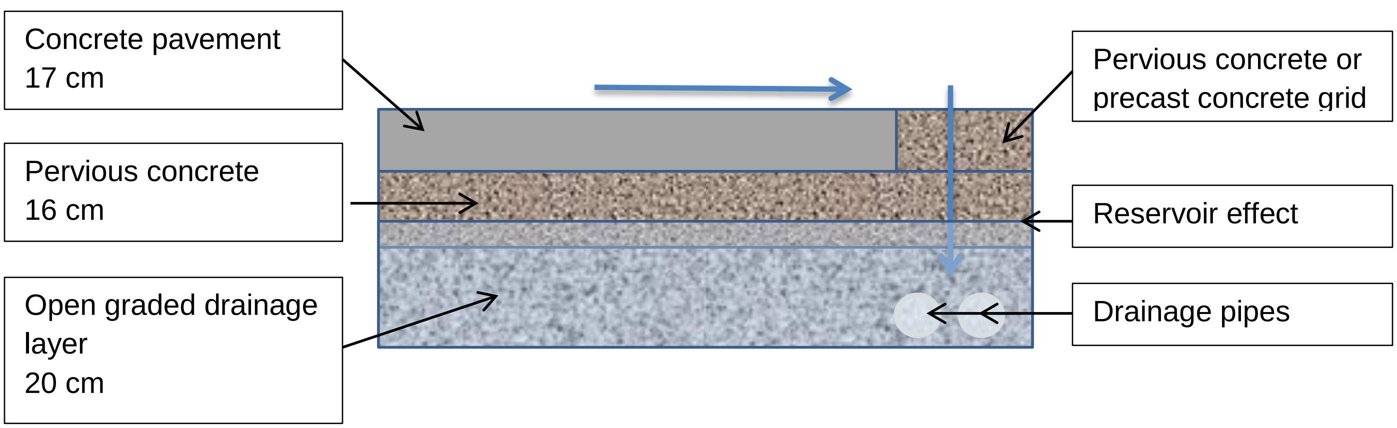




<u>Example of flooding :</u>

2 Proposition

The concept is based on having a concrete pavement based on 2 pervious layer that are acting as reservoir. The schematic view of the concept is as follow:



3 Structural Design

Predesign is performed with StreetPave12 following Aashto and assumptions described on section 4.

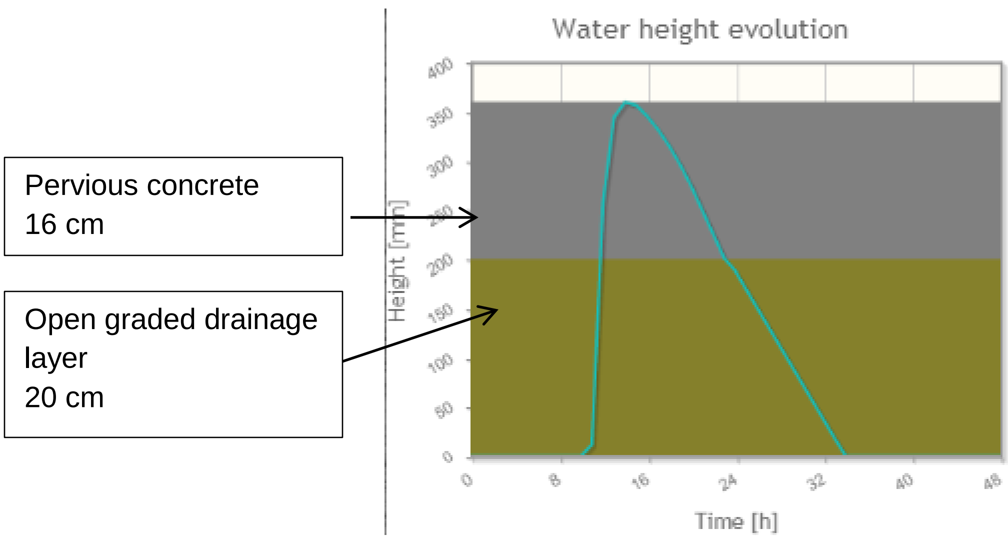
CONCRETE PAVEMENT DESIGN

Rigid ESALs =		9,554,914	
Composite Modulus of Subgrade Reaction (Static k-Value) =		225.1	MPa/m
Top Layer =	Lean Concrete Subbase (LCB, Econocrete)	160	mm
Layer 2 =	Unstabilized Subbase	200	mm

	Min. Required Thickness mm	Design Thickness mm	Max Joint Spacing m.	Failure Controlled By
*Doweled	151.38	155.00	3.26	Cracking
Undoweled	166.37	170.00	3.57	Faulting

4 Hydraulic design

Considering a maximum daily rainfall of 220 mm over the design life, water level in the reservoir has been studied over a 48 hour period. Considering some drainage pipe positioned in the OGDL that will perform to evacuate 10L/s.



Calculation performed showed that the water level is constantly under the surface of pervious. The reservoir effect is sufficient for this typical project without overflow of water.

5 Inputs and hypothesis

The Key assumptions in this study for pavement design are:

- Design period

  30 years

- Traffic (ESAL)

ESAL = 9 500 000

For ESAL calculation, a 2% annual traffic growth rate is assumed for one 80 kN axle.

- Concrete Properties

  Assumed to be conventional with flexural strength of 4.5 MPa and a modulus of elasticity of 30 500 MPa.

- Pervious concrete

  Modulus >13000 MPa
  Porosity = 20%

- Open graded drainage layer

  Modulus > 200 MPa
  Porosity = 40%

- Subgrade strength (CBR or k-value)

  A CBR of 7 is assumed in this calculation.

- Pavement Performance (serviceability index)

  Initial serviceability is 4.25 for RCC pavement. The terminal serviceability is assumed to be 2.25

- Reliability

  Reliability is set to 80%.

6 Calculation

Attached file:

- A1_StructuralPredesign_20180926.pdf
- A2_HydraulicPredesign_20180926.pdf