

Survey, Investigation and Repairing on Concrete Wall of Waste Water Treatment Building

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Outline Presentation

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Introduction

- Waste Water Treatment Building (WWTB) of Multi National Company located in Cikande of Banten Province in Indonesia has experienced a poor function due to seepage and leakage on its reinforced concrete walls
- This building used the construction of reinforced concrete walls as high as 12 meters. After construction, there was seepage and leakage on its wall.
- The wall was encountered deterioration such as the presence of honeycomb/segregation of concrete and cracks.
- Based on the construction report, this deterioration was observed as a result of uncontrolled slumps so that the slump value was not complied and the level of compaction was not sufficient at the time of casting.

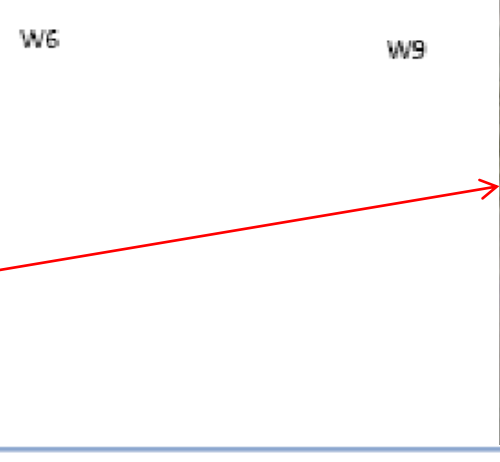
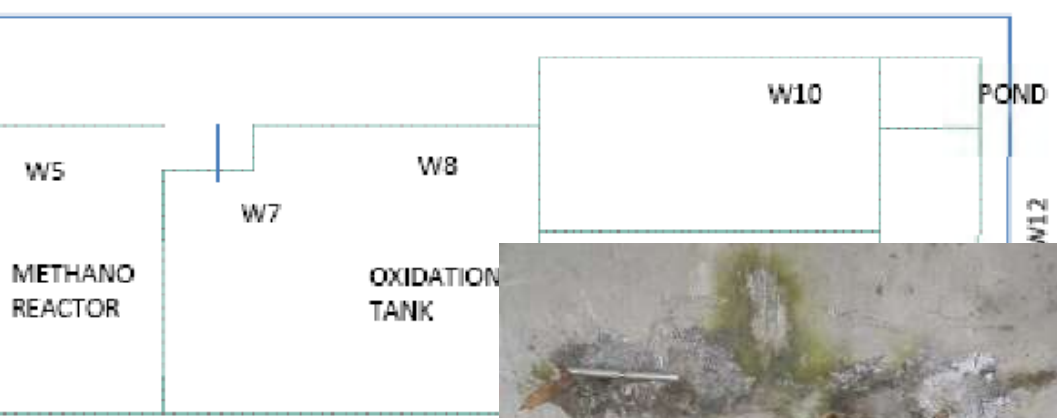
Waste Water Treatment Building (WWTB) of Multinational Company located in Cikande, Banten



12 m



surface area seepage on the wall W1



spot seepage on the wall W2

Lay out of WWTB

12m

U

LEVEL 3



THE INDICATION OF THE
SEGREGATION IN CONCRETE

ALKALINE REACTION HAPPENED



Cement based waterproofing was not working

8m

S

SOME CRACKS

VERTICAL CRACK



A

DETAIL - A
VERTICAL CRACKS

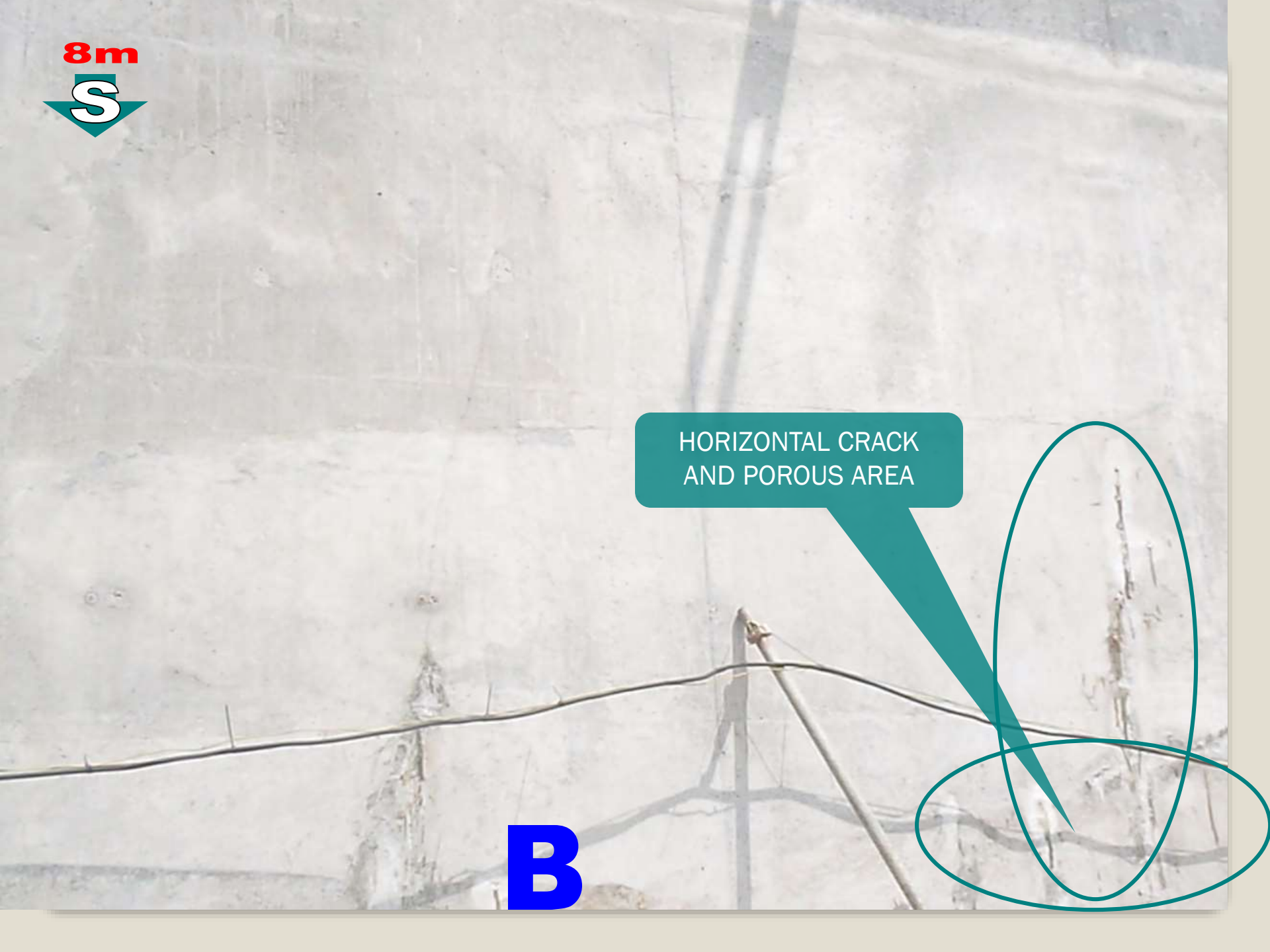


8m


8m
S

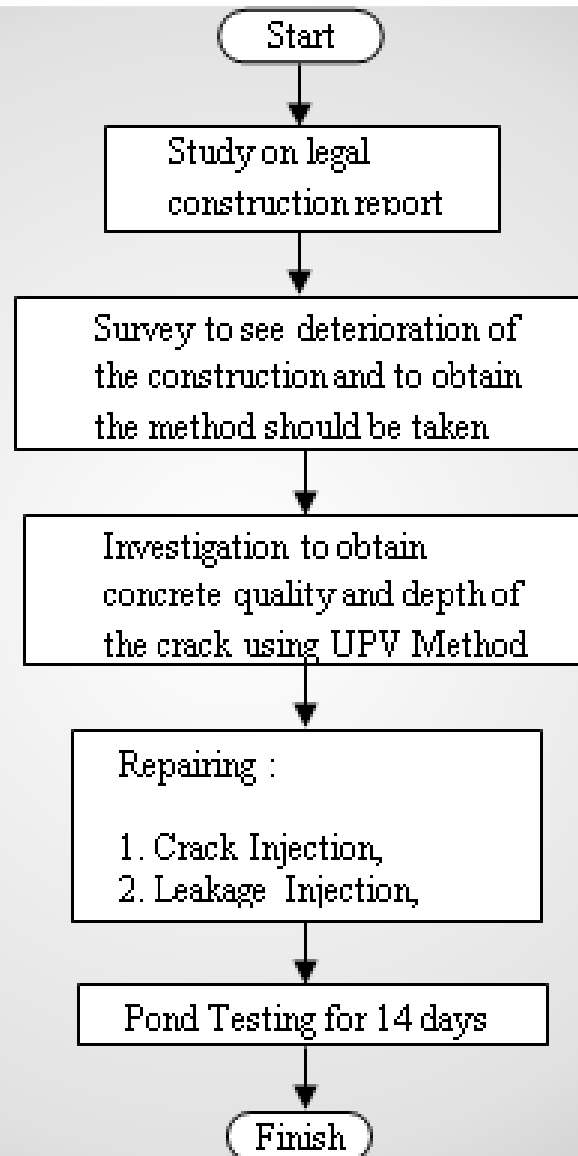
HORIZONTAL CRACK
AND POROUS AREA

B





Methods



Methods...(cont'd)

- **Investigation**

The investigation tests were: (1) Homogeneity test and (2) concrete crack depth measurement using UPV (Ultrasonic Pulse Velocity) method with Ultrasonic Testing Apparatus Proceq model Pundit Plus

Methods...(cont'd)

- **Repairing**

Methods of repairing conducted were: (1) injection of cracks with Epoxy, (2) injection of leaks with cement modified polymer material, and (3) waterproofing coating with a cement based material

Methods...(cont'd)

- **Testing on the repairing structure by pond testing**

The WWTB construction was tested by pond testing for 14 days. During the ponding process, a thorough observation of the concrete wall was conducted to see whether the seepage or leakage still occur or not

Result and Discussion

◦ Survey and Investigation



No	Location/Wall	V	uniformity of concrete quality
		(km/sec)	
1	Vertical/wall W12	3,24	pretty good
2	Horizontal/wall W12	2,34	enough
3	Horizontal/wall W1	3,05	pretty good
4	Vertical/wall W1	3,32	pretty good
5	Vertical/wall W3	2,99	enough

From the results of crack depth testing of wall W1, the average crack depth of **102.5 mm** was obtained

Result and Discussion...

- **Repairing**

- **Crack Injection**

The steps of Crack injection were (1) cleaning the crack surface from dust and other dirt, (2) cutting the crack, (3) setting an injection nipple, (4) injecting the epoxy, and (5) cleaning the surface with a grinder



Result and Discussion...

- **Repairing**

- **Leakage Injection**

The steps of leakage injection were (1) cleaning the crack surface from dust and other dirt, (2) cutting the crack, (3) setting injection nipple, (4) injecting the cement modified polymer material , and (5) cleaning the surface with a grinder



Result and Discussion...

- **Repairing**
 - **Waterproof Coating**

The steps of waterproof coating were (1) cleaning the crack surface from dust and other dirt, (2) applying waterproof coating for 1 layer, and (3) applying waterproof coating for 2 layers perpendicularly



Result and Discussion...

- **Pond Testing**

The pond testing was conducted for 14 days. Based on the test results, there was no leakage and seepage during the pond testing. WWTB was ready to use



Conclusion

- The leakage and seepage of WWTB were caused by the inadequate quality of concrete work
- Investigation conducted using UPV Testing showed that the quality of concrete was enough and pretty good quality and the crack depth of 102.5 mm
- The repairing methods using crack injection, leak injection and waterproof coatings were performed successfully
- This was proved by no leakage and seepage during the pond testing for 14 days

**THANK YOU
FOR YOUR ATTENTION**