MOTHER TERESA
INSTITUTE OF SCIENCE AND TECHNOLOGY
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ACCREDITED BY NAAC
B - GRADE

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR: 2018-19

A SUMMARY REPORT

Course Name: IRRIGATION AND HYDRAULIC STRUCTURES

Name of the Resource Person: Mr. Haroon Alikhan, Assistant Professor,

V. R. Siddaradha Engineering College,Vijayawada.

Gap Identified: Determination of uplift pressure.

No. of Students attended: 26 members

Summary: On the day of the session (i.e 22-09-2018) Mr. Haroon Alikhan, Assistant Professor, V. R. Siddaradha Engineering College, Vijayawada. Delivered a lecture on the basics of Introduction to the course of Uplift pressure, which is also known as hydrostatic uplift, is an upward pressure applied to a structure that has the potential to raise it relative to its surroundings. It is the condition of greater pore water pressure than the overburden pressure of the structure. The uplift pressure can be problematic if it is greater than the weight of the structure exerted downwards. ASCE 7-10, states that the upward pressure of water shall be taken as the full hydrostatic pressure applied over the entire area. The hydrostatic load shall be measured from the underside of construction. The structure must be designed properly to provide greater resistance against uplift forces in order to prevent risks due to water pressure. So, the uplift pressure must be taken into consideration during design stage since rehabilitation and maintenance of foundation cannot be carried out easily in the future. The possibility of occurrence of this upward force on foundation should be check when groundwater table is higher than the bottom of the foundation level. Due to the fact that hydraulic uplift pressure acts in upward direction. Therefore, it reduces the downward weight of the structure and consequently it acts against the stability of structure. Check for Uplift Pressure: The weight of the substructure should be greater than uplift pressure in order to meet the requirements of applicable codes, i.e. summation of downward load per given area should be larger than that of the vertical load per given area. The downward load should at least greater than 25% compared to the upward load due to hydrostatic load. The following expression can be used to check the occurrence of uplift force below the structure under considerations. The effective uplift pressure at a point is then calculated by multiplying the sum of the seepage and position potentials of the points by the unit weight of water. In most cases, the vertical and horizontal permeability of soil are not equal.

Uplift Pressures:

It is an upward vertical pressure created due to penetration of the water into the porous material at the dam basement. It is the condition of greater pore water pressure than the overburden pressure of the structure. The dam stores water in the upstream side of the river.

Due to this storage of water at certain height, a water head is developed equal to the height of water stored in the dam. Due to pressure, the water penetrates into foundation of dam through pores and fissures. The joints between foundation and dam are also penetrated by water at such great pressure. The water that enters into the dam material and foundation tends to come out of the downstream side of dam.

A hydraulic gradient is created due to this seeping water. This hydraulic gradient is set up between the upstream and downstream sides of dam. As a result, an upward vertical pressure is developed. This pressure is known as uplift pressure.

The consequences of generation of uplift are as below.

• It reduces the effective weight of the structure.

• It reduces the restoring forces on the structure.

Consider the below figure showing the water stored by dam on the upstream side.