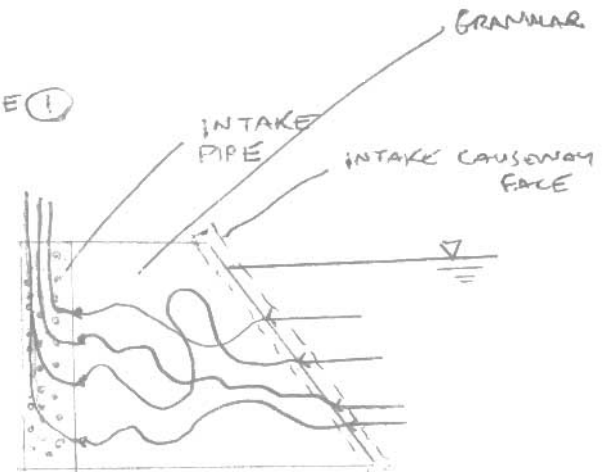
JERICHO
FRESHWATER CAUSEWAY

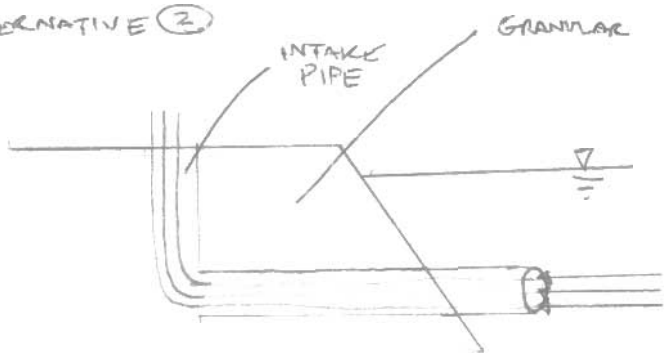
JOE MURDOCK
JULY 27TH, 2005

ALTERNATIVE (1)



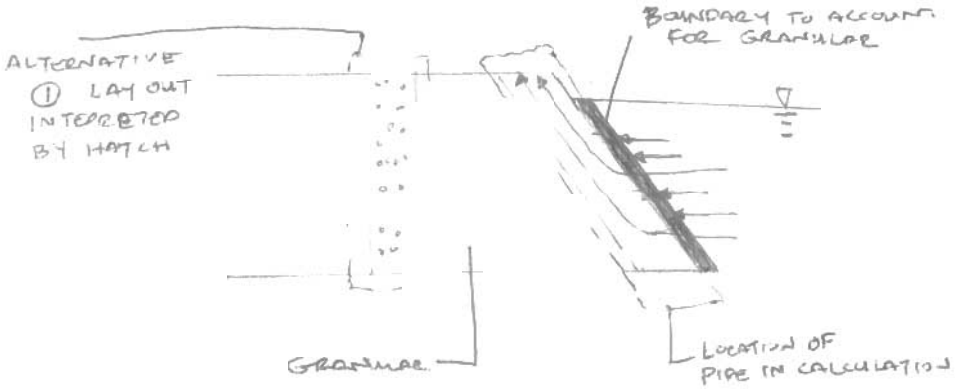
IN ALTERNATIVE (1) EACH WATER PARTICLE IS BROUGHT INTO THE FRESHWATER INTAKE THROUGH SUCTION FROM THE PUMP. DUE TO THE NATURE OF THE GRANULAR STRUCTURE THE WATER PARTICLE WILL FOLLOW A TORTUOUS PATH THROUGH SPACINGS BETWEEN THE INTAKE GRANULAR PARTICLES. AS THE WATER PARTICLE MOVES FROM THE INTAKE CAUSEWAY FACE. TOWARDS THE INTAKE PIPE LOCATED WITHIN THE CAUSEWAY STRUCTURE, ENERGY LOSS WILL OCCUR (THE WATER PARTICLE WILL HIT THE INTAKE GRANULAR PARTICLES AND THE TORTUOUS PATH WILL BE LONGER THAN A SIMPLE STRAIGHT LINE FROM INTAKE CAUSEWAY FACE. THUS IT CAN BE UNDERSTOOD THAT A HIGHER MECHANICAL PUMPING RATE WOULD BE REQUIRED TO EXTRACT A GIVEN VOLUME OF WATER IF THE PARTICLE DID NOT HAVE HAVE TO TRAVEL A PATH WITH GRANULAR OBSTRUCTING

ALTERNATIVE (2)



ALTERNATIVE (2) IS THE OPTION THAT SHOULD BE EXAMINED. AS SHOWN THERE IS A CONDUIT DIRECTLY INTO THE FRESH WATER NO ANALYSIS OF THIS HAS TAKEN PLACE IN RESPECT TO VELOCITY @ INTAKE

HATCH'S CALCULATION AND INTERPRETATION OF ALTERNATIVE (1)



IN HATCH'S CALCULATION OF ALTERNATIVE (1) THEY ASSUMED THAT SURFACE AREA OF PIPE EXPOSED WAS SIMPLY 0.3 (LENGTH OF INTAKE CAUSEWAY FACE) WITH THE 0.3 REPRESENTING THE POROSITY OF THE GRANULAR. THIS SCHEMATIC REPRESENTS THIS BY MEANS OF A BOUNDARY THAT ALLOWS 1/3 WATER THROUGH

NOTE — TAHARA AND HATCH WERE TO CALCULATE WITH RESPECT TO ALTERNATIVE (2) NOT ALTERNATIVE (1)

JERICHO
FRESHWATER CAUSEWAY

JOE MURDOCK
JULY 21TH, 2005

FOR ALTERNATIVE (1)

MODEL SIMILARLY TO EARTH DAM @ EVALUATION OF SEEPAGE THROUGH INTAKE CAUSEWAY

DISCHARGE VELOCITY = $v = ki$

- i = hydraulic gradient → FUNCTION OF PUMPING RATE. $= \frac{\Delta h}{L}$
- k = coefficient of permeability (m/s)

K IS A FUNCTION OF PORE SIZES

- FXN → DISTRIBUTION OF PARTICLE SIZES
- FXN → PARTICLE SHAPE (HOW SOIL MATRIX "INTERLOCKS")

∴ IN GENERAL SMALLER PORE SIZE (DUE TO WELL GRADED GRANULAR) EQUALS LOWER K. → IN THIS CASE CAUSEWAY IS POORLY GRADED COARSE GRANULAR

IN ESSENCE COEFFICIENT OF PERMEABILITY IS FXN OF VOID RATIO WHICH IS IN TURN A FXN OF POROSITY

n = POROSITY $= \frac{V_V}{V_T}$ $\qquad$ V = VOID RATIO $= \frac{V_V}{V_S}$

WHERE V_V = VOLUME OF VOIDS
V_T = VOLUME TOTAL
V_S = VOLUME OF SOLIDS

COEFFICIENT OF PERMEABILITY ALSO VARIES W TEMPERATURE

K IS MEASURED @ 20°C

$0.77 K_{20}$ IS MEASURED @ 10°C

$0.56 K_{20}$ IS MEASURED @ 0°C

→ $k = \frac{\gamma_w K}{\eta}$

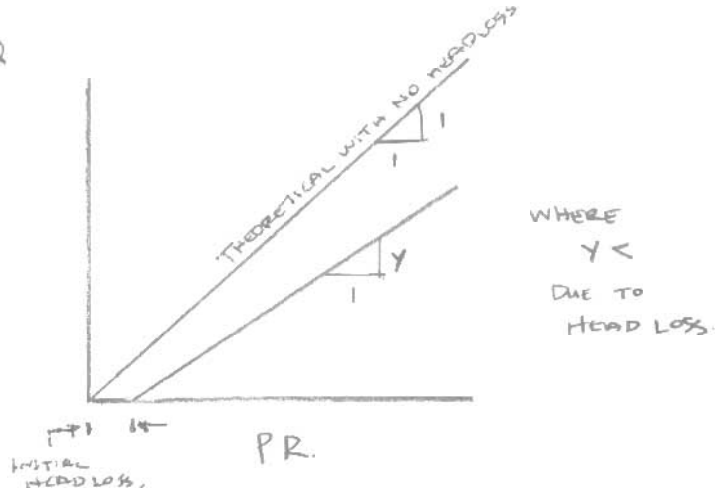
- γ_w = UNIT WEIGHT OF WATER
- K = ABSOLUTE COEFFICIENT → DEPENDS ON CHARACTERISTICS OF SOIL SKELETON
- η = VISCOUSITY OF WATER

→ DESIGN CALCULATIONS FOR ALTERNATIVE (1) BY HATCH ARE NOT REPRESENTATIVE OF ACTUALITY

JERICHO
FRESHWATER
(ANSEWAY)

JOE MURDOCK
JULY 27TH
2005

IN LIEU OF APPROPRIATE DESIGN THEORETICS AND CALCULATION AN IN SITU-CALIBRATION SHOULD BE USED TO UNDERSTAND THE PUMPING RATE AND ACTUAL VOLUME OF WATER EXTRACTED FROM THE WATERSOURCE



WHERE
Y < DUE TO HEAD LOSS.

WHERE
PR = PUMPING RATE OF THE MECHANICAL SYSTEM.
Q = INTAKE FLOW RATE

THIS TEST WILL PROVIDE A BASIS TO BETTER UNDERSTAND THE INTAKE SYSTEM AND CAN ACT AS A BOOK KEEPER INDETERMINE TOTAL AMOUNT OF WATER EXTRACTED.

ALSO WITH RESPECT TO DFO MANDATE AN INSPECTOR CAN EVALUATE THE ACTUAL MECHANICAL PUMPING RATE AND JUDGE IF TAHERA IS OUT IF COMPLIENCE

IT WOULD BE OF INTEREST TO BETTER T.S.S INTAKE DUE TO VARYING PUMPING RATES BUT THIS MAY NOT BE FEASABLE.

(1) NEED TO UNDERSTAND BENCHMARK TSS ALREADY PRESENT IN SUSPENSION BEFORE INTAKE.

(2) THE SYSTEM WOULD NEED TO BE CLEANED IF EACH TEST

THIS WOULD BE DIFFICULT AND THEREFORE A MISUNDERSTANDING OF OBTAINED RESULTS WILL MORE THAN LIKELY RESULT

THE EVALUATION OF THE ACTUAL INTAKE FLOW WRT PUMPING RATES WILL PROVIDE DFO INFORMATION TO EVALUATE FISH SCREEN REQUIREMENTS AND WILL PROVIDE DIAND INFORMATION TO PROBE FURTHER INTO LOCATION OF INTAKE PIPE WITH RESPECT TO LAKE BOTTOM AND SEDIMENT ACCUMULATION.