

Second International Symposium on Rockfill Dams

October 27 to 28, 2011

Windsor Barra da Tijuca Hotel - Rio de Janeiro - Brazil



XXVIII SNGB

National Seminar on Large Dams

October 25 to 28, 2011

Windsor Barra da Tijuca Hotel - Rio de Janeiro - Brazil



CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR CONSOLIDATION AND IMPERMEABILIZATION OF THE FOUNDATION ROCK.

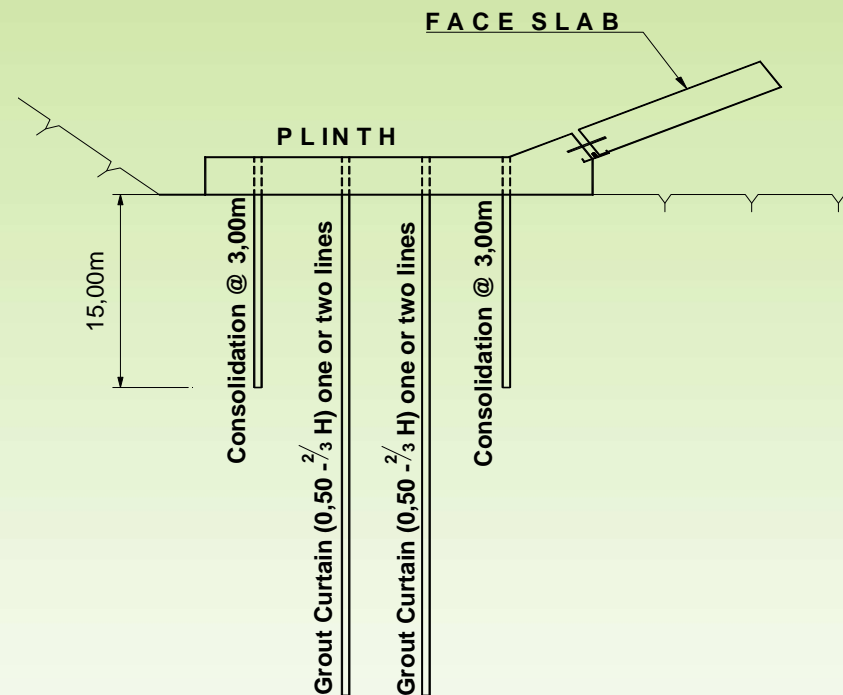
Dr. Eng. PhD.Hon. Giovanni Lombardi

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.

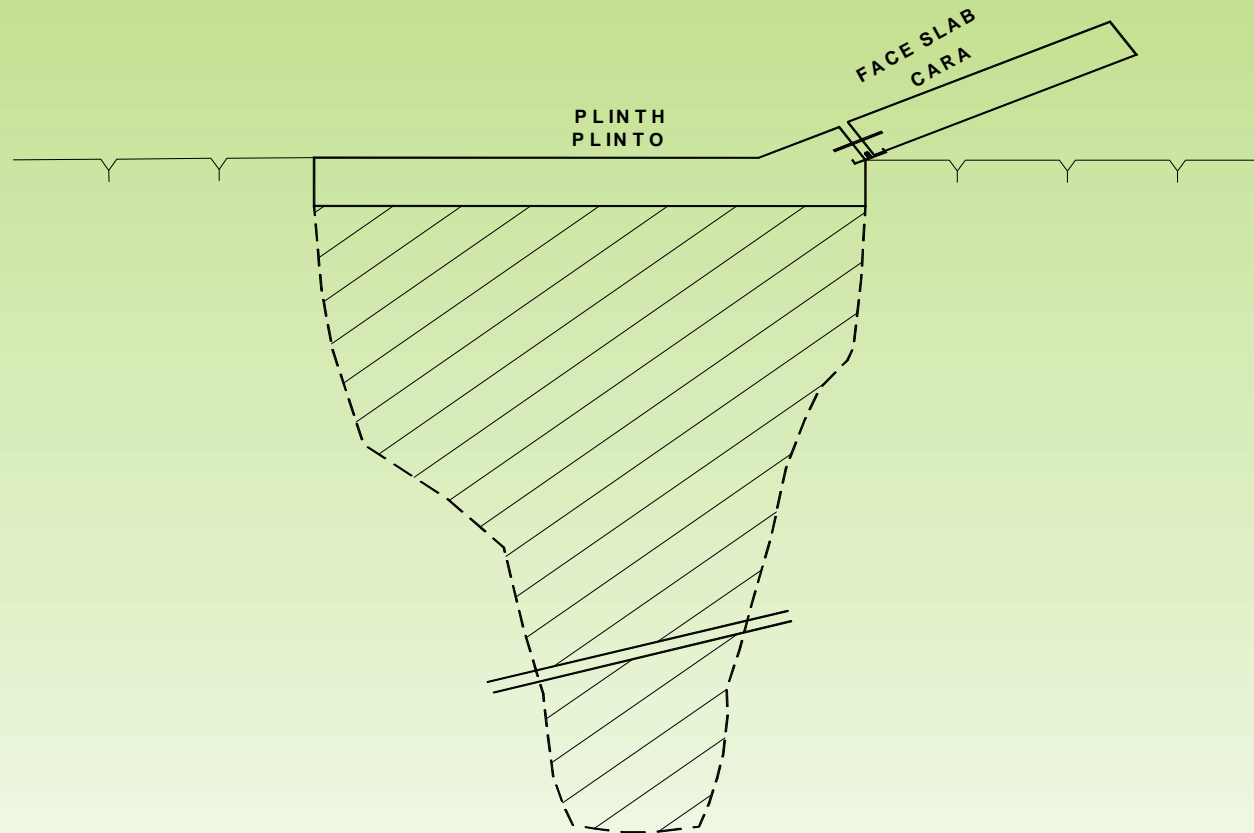
- **CONCRETE FACE ROCKFILL DAMS – CFRD's
HAVE THE HIGHEST HYDRAULIC GRADIENT.**
- **CONSEQUENTLY GROUTING OF THE
FOUNDATION IS EXTREMELY IMPORTANT.**
- **THIS PRESENTATION REFERS TO SOME HINTS
ABOUT THE GIN CRITERIA FOR FOUNDATION
GROUTING.**

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.

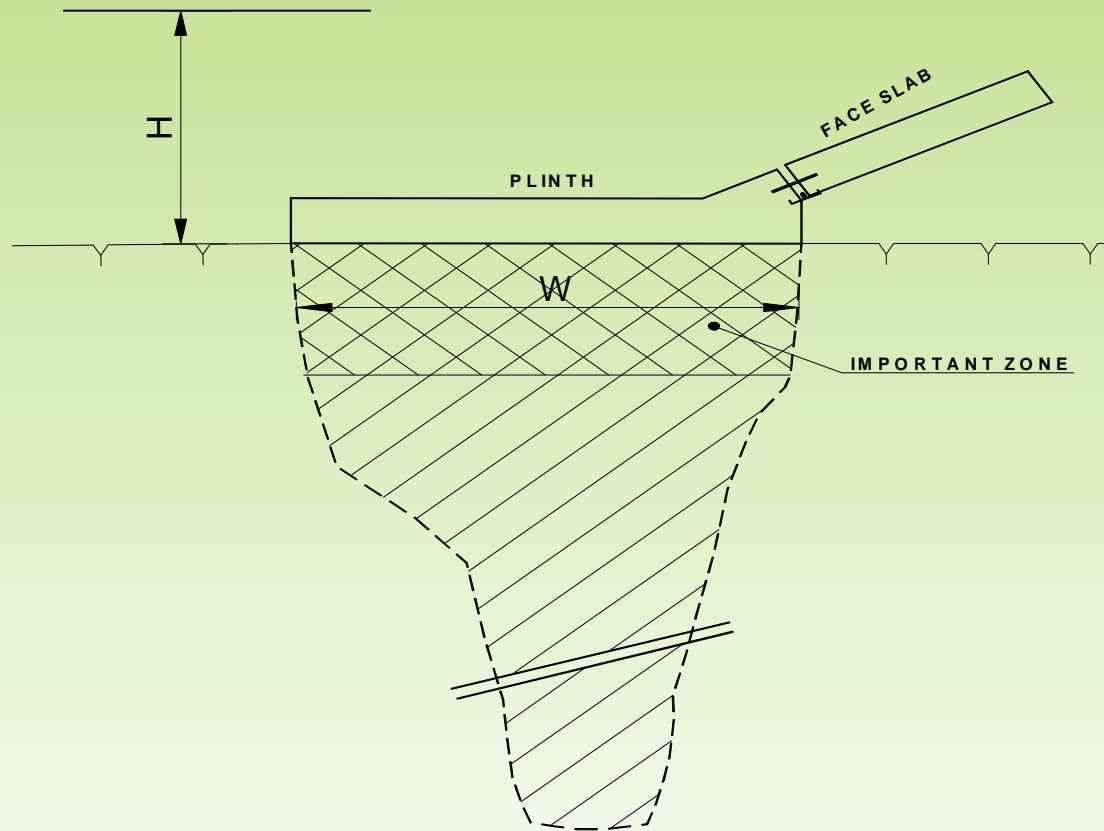
CLASSICAL GROUTING



CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



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CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.

IT IS IMPORTANT TO:

- **TREAT THE UPPER ZONE BETTER THAN OTHER LOWER ZONES.**
- **PRESSURE HAS TO BE RELATED WITH THE RESERVOIR HEAD TO AVOID HYDROJACKING IN NOT GROUTED ZONES.**
- **THE MIX HAS TO BE STABLE WITH GOOD QUALITY.**
- **MODERATE OPENING OF FISSURES IS ACCEPTABLE.**
- **HOWEVER, AVOID TO OPEN FISSURES IN EXCESS .**

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.

MIX

SELECT ONLY ONE MIX AS FOLLOWS:

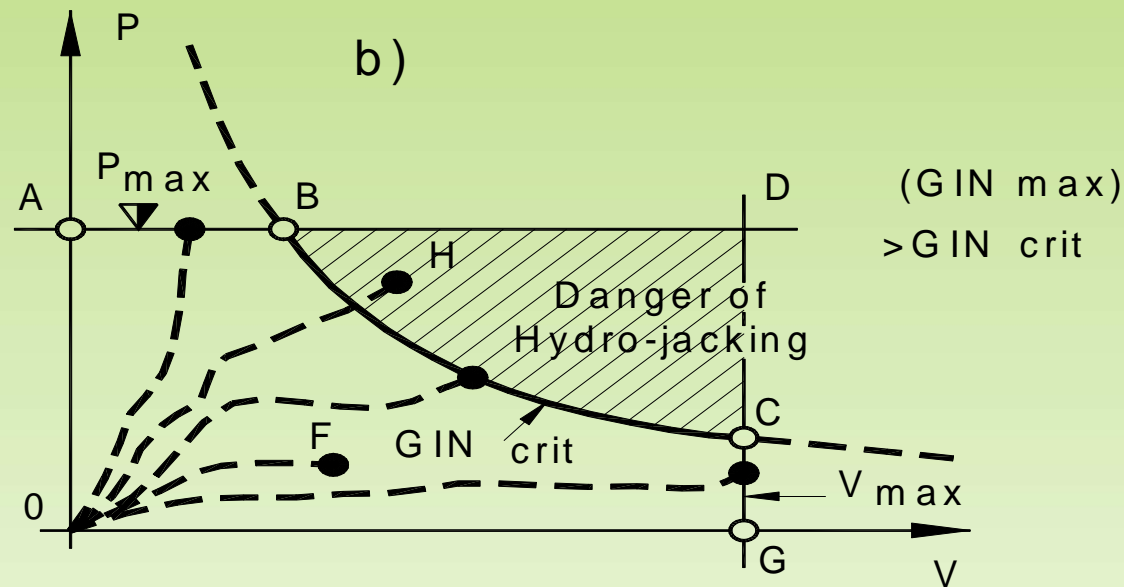
- **MINIMUM SETTING RETRACTION.**
- **PENETRATION OF GROUT IS RELATED TO THE CEMENT DIAMETER.**
- **FINE CEMENT IS BETTER.**
- **REDUCE COHESION AND VISCOSITY BY ADDING A SUPER PLASTICISER.**

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.

MIX BEST PARAMETERS

- **TYPE OF CEMENT (HIGH BLAINE).**
- **WATER CEMENT RATIO – $W/C = 0.7$**
- **TYPE OF SUPER PLASTICISER.**
- **OPTIMIZE DOSING OF PLASTICISER.**
- **HIGH DENSITY.**
- **LOW COHESION AND VISCOSITY.**
- **HIGH STRENGTH .**
- **AVOID USE OF BENTONITE.**

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



$P = \text{bar}$

$V = \text{l/m or Kg/m}$

$$GIN = P.V =$$

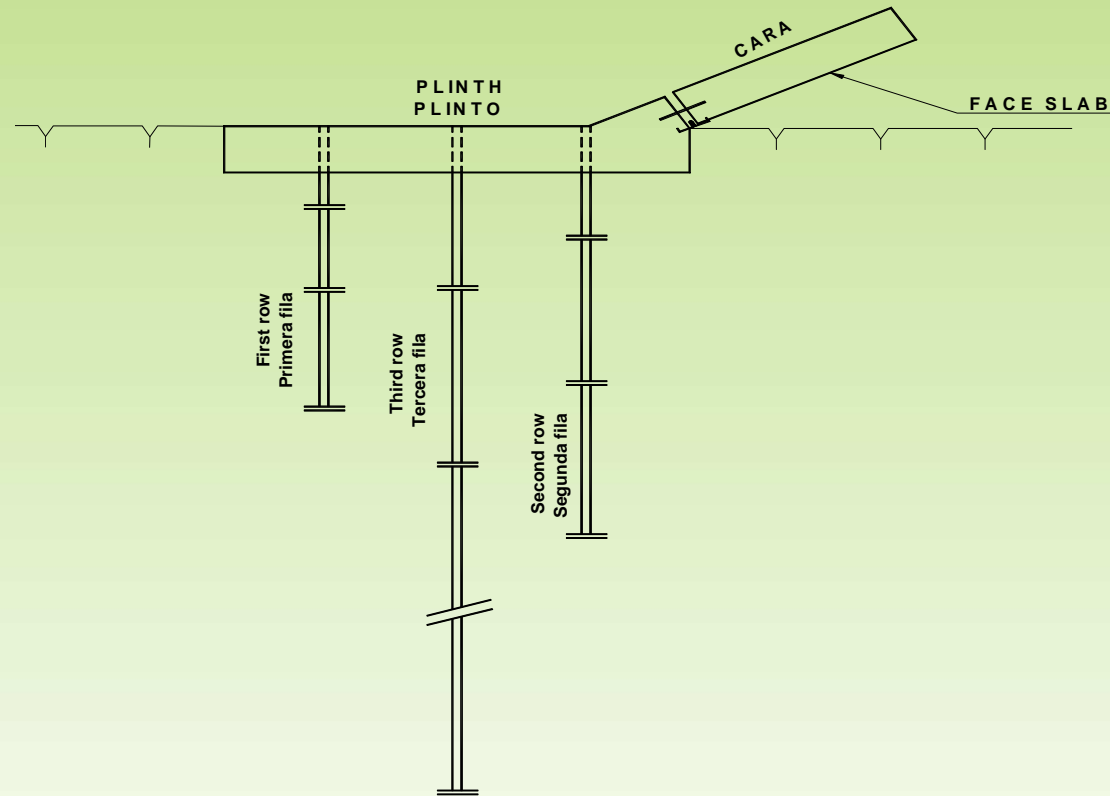
$$\text{Distance between holes : } \sqrt[3]{GIN}$$

GIN is selected according to geology and adjusted during tests

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING. USUAL ERRORS

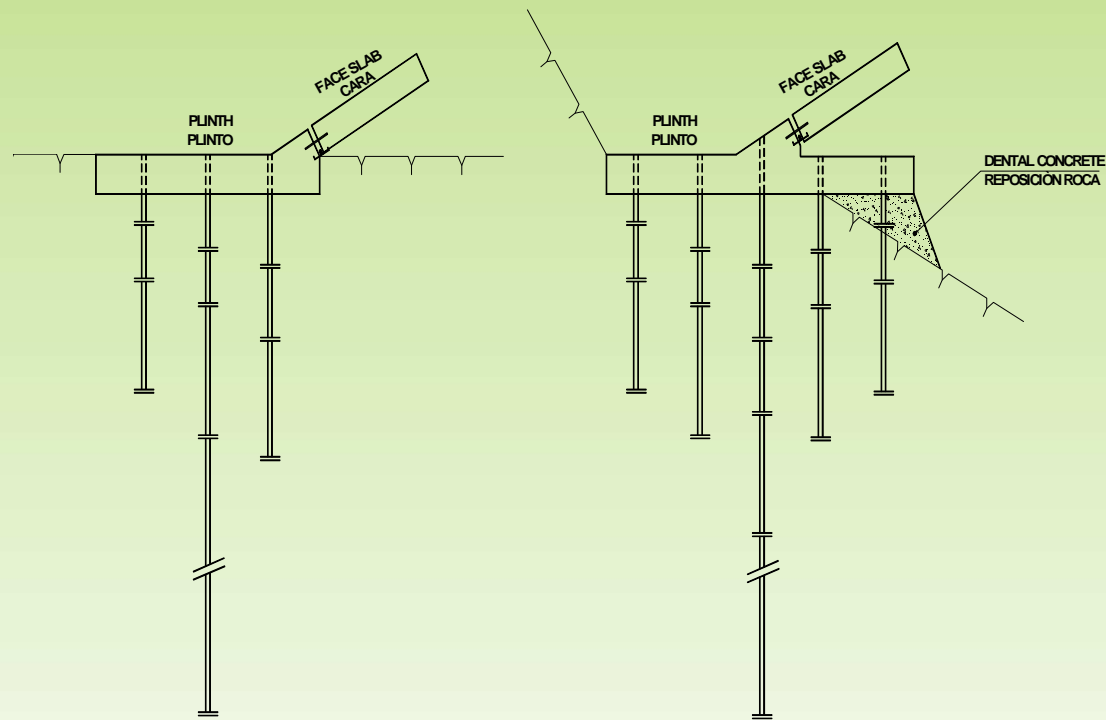
- **MAXIMUM PRESSURE RELATED TO DEPTH OF GROUTING.**
- **WATER PRESSURE TESTS (LUGEON) ON GROUTED AREAS.**
- **CONTINUOUS MIX CHANGES.**
- **LACK OF ROCK SATURATION.**
- **NOT WASHING DRILL HOLES.**

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



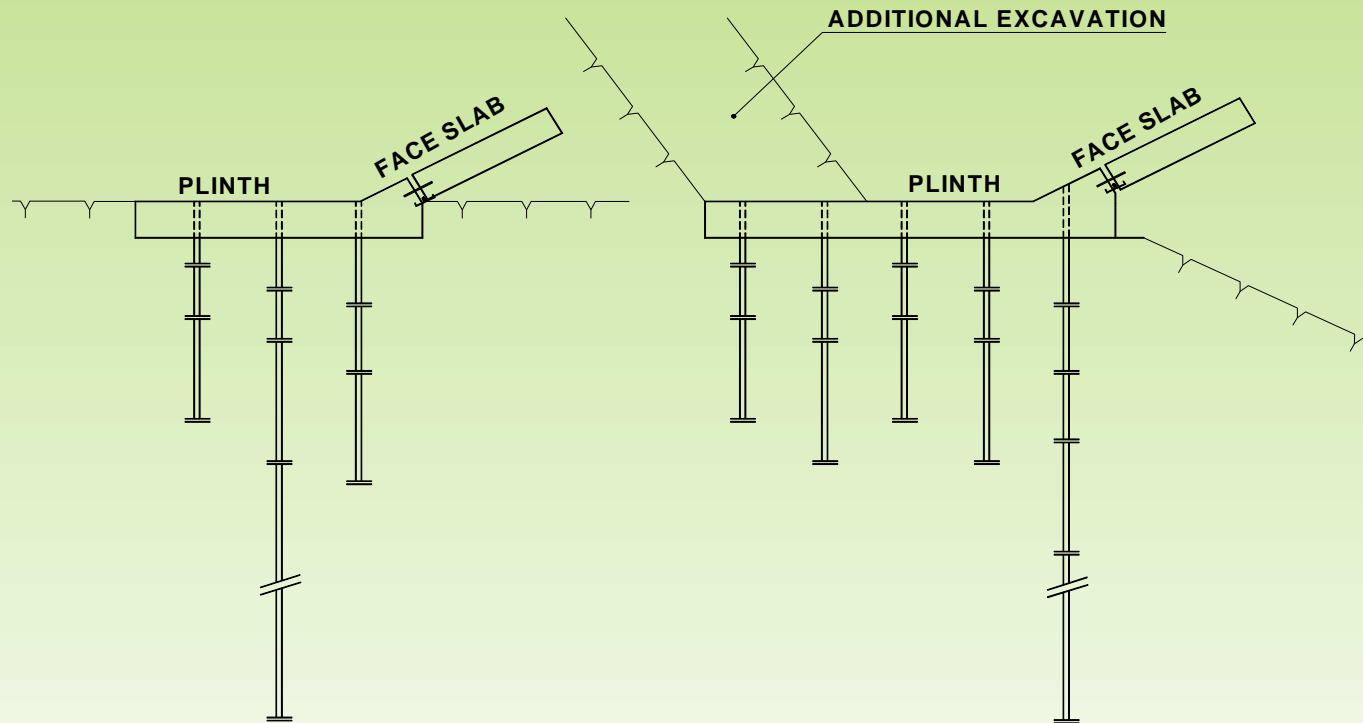
GROUT DESIGN OPTIMIZATION

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



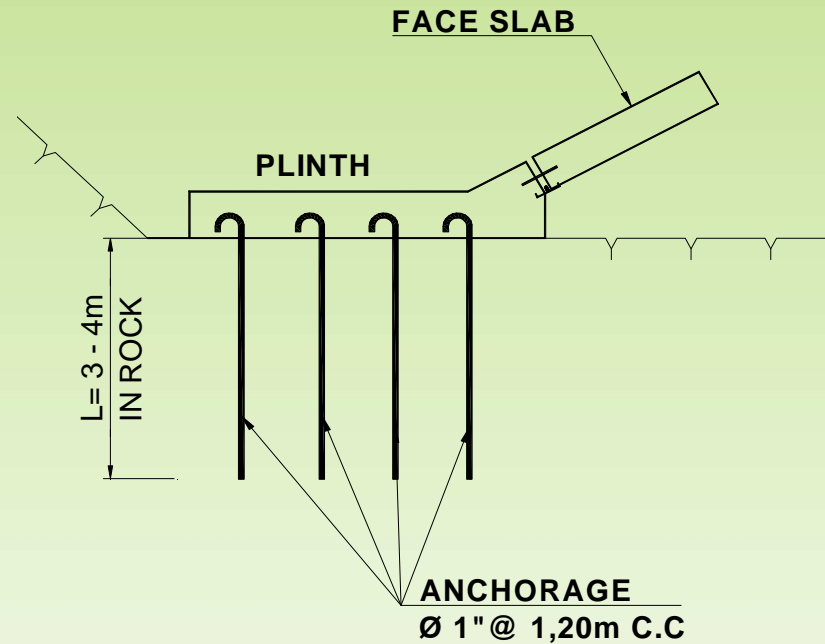
TYPES OF PLINTH

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



TYPES OF PLINTH

CONCRETE FACE ROCKFILL DAMS USE OF GIN CRITERIA FOR GROUTING.



**CONCRETE FACE ROCKFILL DAMS
USE OF GIN CRITERIA FOR GROUTING.**

THANKS