مواقع أشغال

* chapter 1 [٤] → wind rose انقطوق

* chapter 2 [Waves]

Given H_0, T_0, ϕ_0, d

Required H, L, C, ϕ in different zones

[A] Deep Zone $\left\{\frac{d}{L_0} > 0.5\right\}$

$L \equiv L_0 = 1.56 T_0^2$

$C \equiv C_0 = 1.56 T_0$

$H \equiv H_0$

$\phi \equiv \phi_0$

[B] Transition Zone $\left\{0.04 < \frac{d}{L_0} < 0.5\right\}$

$\frac{d}{L_0} = ✓ \xrightarrow{table}$

- $\frac{d}{L} = ✓ \longrightarrow L = ✓$
- $\frac{C}{C_0} = \tanh \frac{2\pi d}{L} = ✓ \longrightarrow C = ✓$
- $K_s = ✓$

$\frac{L}{L_0} = \frac{\sin\phi}{\sin\phi_0} \Rightarrow \phi = ✓ \Rightarrow K_r = \sqrt{\frac{\cos\phi_0}{\cos\phi}}$

* $H = H_0 * K_s * K_r$

[C] Shallow Zone $\left\{\frac{d}{L_0} < 0.04\right\}$

$L = \sqrt{gd}\ T_0$

$C = \sqrt{gd}$

$\frac{L}{L_0} = \frac{\sin\phi}{\sin\phi_0} \Rightarrow \phi \Rightarrow K_r = \sqrt{\frac{\cos\phi_0}{\cos\phi}}$

$\frac{d}{L_0} = ✓ \xrightarrow{table} K_s = ✓$

$H = H_0 * K_r * K_s$

Chapter 3 Design of Harbor Elements

[A] Navigation Channel

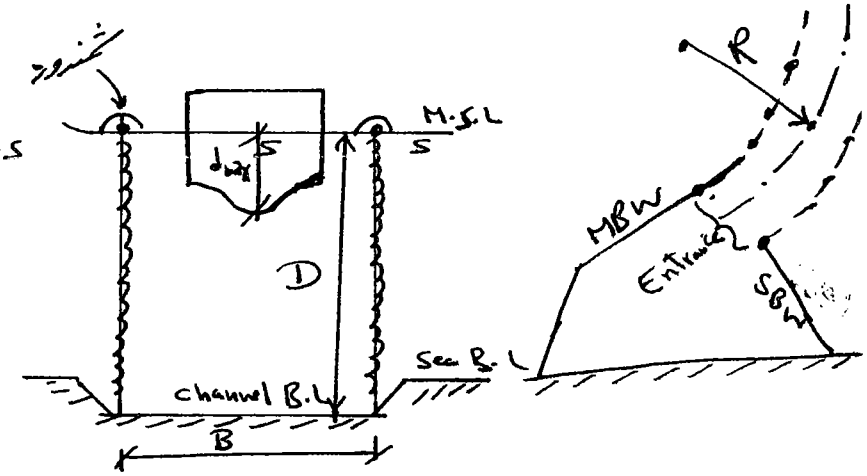
$$D \equiv d_{max} + \frac{H_o}{2} + \frac{T \cdot R}{2} + 1.5$$

or

$$D = d_{max} + 5^m$$

$$B = L_{max} + 10^m$$

$$R = 6 L_{max}$$



one way Navigation channel $B = (3 \rightarrow 5)\, b_{max} + L_{max} + 10^m$

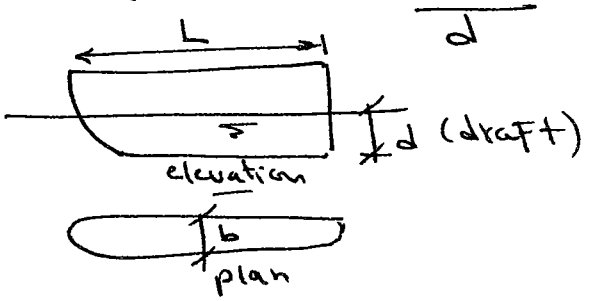
Two way Navigation channel $B = (6 \rightarrow 10)\, b_{max} + L_{max} + 10^m$

[B] Harbor Entrance

$$D_{ent} \equiv D_{N.ch}$$

$$B_{ent} \equiv B_{N.ch.}$$

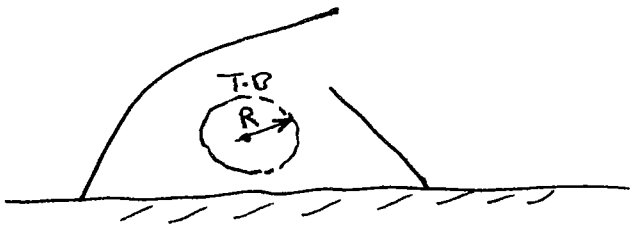
Ship dimensions $\frac{L * b}{d}$



[C] Turning Basin

$$R = 2 L_{max}$$

$$d \equiv d_{max} + 1.5^m$$



[D] Berths

$$\text{No. of berths} \equiv \frac{\text{Annual Amount (t/yr)}}{\text{Rate of loading} * \text{hours/shift} * \text{Shift/day} * \text{working days}}$$

(t/hr) (hr/shift) (shift/day) (day/yr)

= ⌣ berth ⟵ يقرب لاقرب رقم صحيح بالزيادة

أسئلة نظري

chapter 1

* **Beaufort wind Scale** :- The Force of winds is classified in accordance with a Scale established by Admiral Beaufort Known as Beaufort's Scale in which the range of intensity is given 13 numbers, 0 to 12 each number is representing an approximate velocity from Calm to Hurricane عاصفة دوامية

* **Tsunami** :- It's a wave generated by earth quakes

* **Wind Fetch** :- It's the distance the wind blows over the Sea in generating the wavers. Increase in fetch Causes larger waves

* **Tidal Range** :- It's the difference in water elevation between two consecutive ebb tides or Consecutive flood tides.

* **Tidal Currents** :- These are the Currents that rush to a beach or a limited water area such as bays and Parts of rivers

* **Coastal Currents** :- These are water Currents that rise near the shoreline, They are due to river discharges in the Sea, or due to wind effect or the impact of the wave on the beach.

* The main natural phenomena in Coastal Engineering :-

  * Wind (direction , Speed, duration , PWD) by wind ros
  * Currents (current velocity , - -)
  * Tide (Tidal ranges , Types of Tides)
  * Wave (wave characteristics, wave processes)

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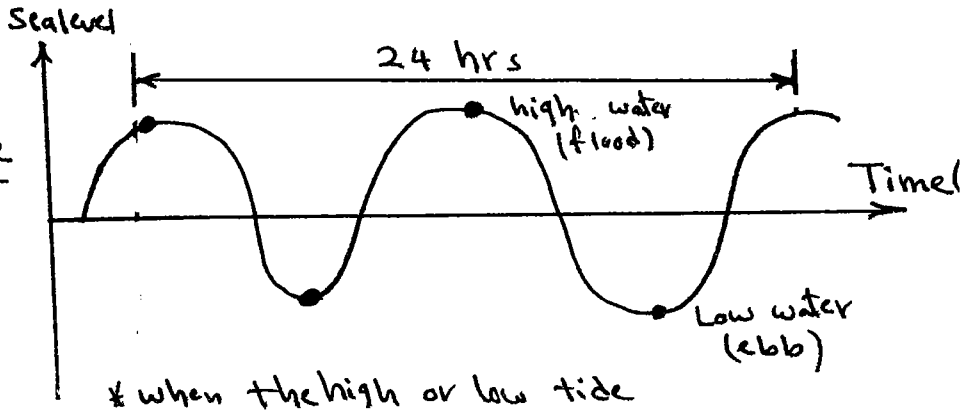
* Types of Tides :-

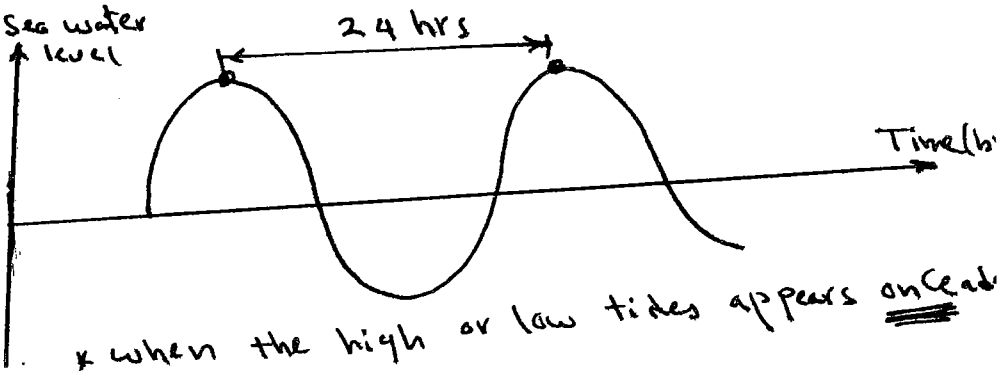
a) Semi Diurnal Tide

2 times / day



* when the high or low tide appears twice a day

b) Diurnal Tide



* when the high or low tides appears once a

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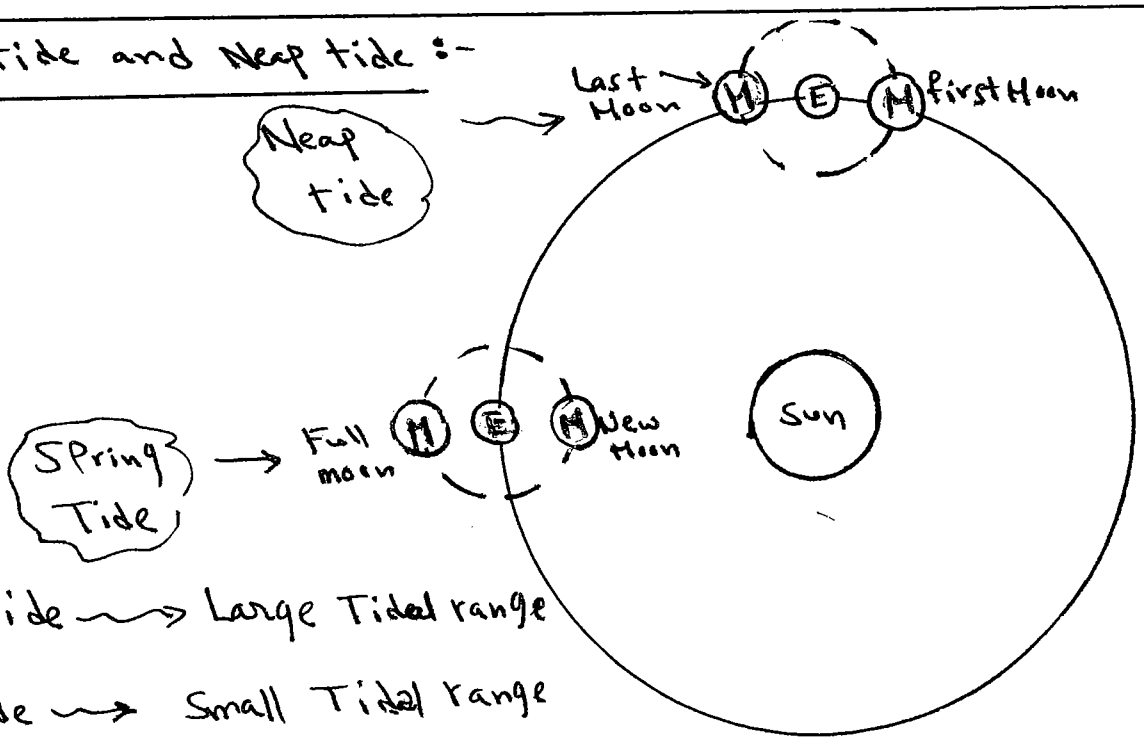
* Spring Tide and Neap tide :-



* Spring Tide ⟶ Large Tidal range
* Neap Tide ⟶ Small Tidal range

* Types of Currents :-

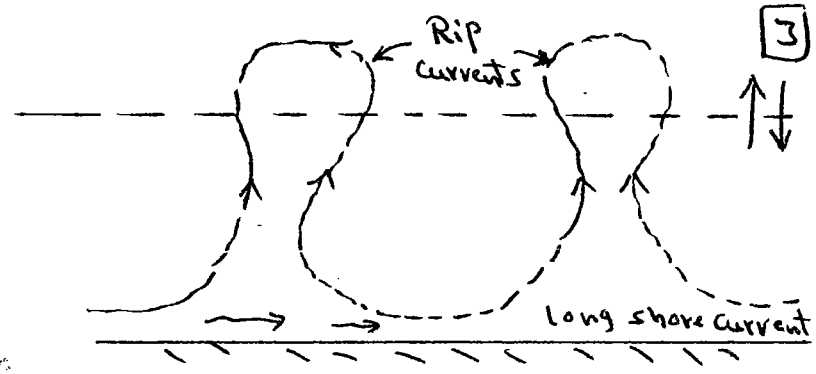
1) off-Shore Currents

2) Near Shore Currents

I- Long Shore Currents

II- Cross Shore Currents

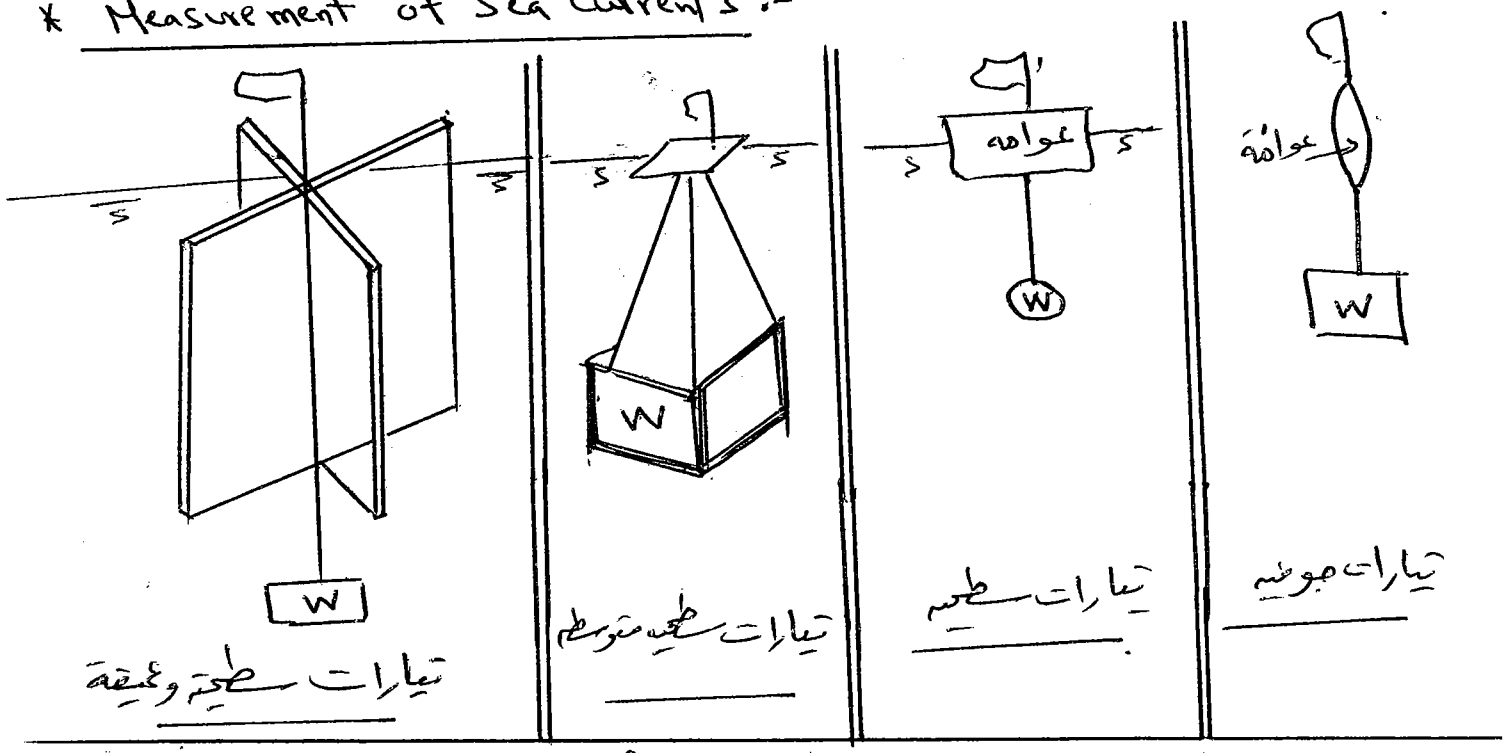
III- Rip currents



* Factors affecting the Near Shore Currents

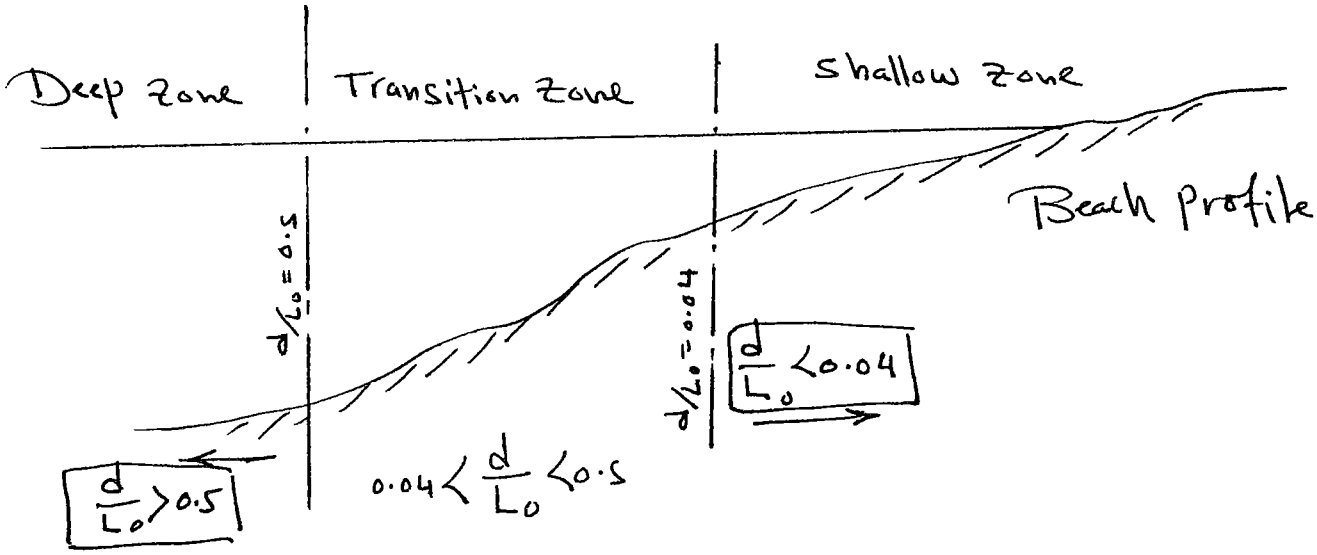
1) Salinity 2) Temperature 3) wind 4) waves 5) Tides

* Measurement of Sea Currents :-



Zones of the beach Profile :-

chapter 2



Important Wave processes in the near shore zone:-

1) wave Reflection 2) wave Breaking 3) wave Diffraction

4) wave Reflection 5) wave Runup and Rush-down 6) wave Shoaling

* **Wave Reasons**

1) wind 2) Tide 3) Earth quakes 4) ship movement

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chapter 3

* **The data required For planning the Harbor :-**

[1] **Natural Phenomena :-**

i) wind : direction, duration, speed

ii) waves: height, direction, Force

iii) Tides: Tidal range

iv) Currents: direction, speed

[2] **Bathemetric survey :-**

* The Topography of the site (wave refraction, Type of berth, Bw

[3] **Economic Study:-**

* Amount of trade, Design Period, Construction material, Types of Ca

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* Why the following parameters are important factors in planning the port elements (-Soil Properties, Types of accomodated ships and Cargos - wave Properties):-

① To determine the type of Breakwaters and Quay walls

② To determine the location of Harbor (accretion zones)

③ To design the transit sheds For accomodated ships

④ To determine the riumber of berths For each Cargo

* Types of Harbors :-

I) according to Use (Function) :-

1) Commercial Harbors 2) Fishing Ports

3) Military Ports 4) Passenger Ports

II) According to location

1) Inland Harbor (internal)

2) In Sea Harbor (External)

3) on channel Harbor

4) on Island Harbor

* Commercial Port :- It's the Port used by ships for Commercial Purpose of loading and uploading and to take the passengers.

The following characteristics are required :-

- Must be protected from storms and wave to ensure no movement.
- The tidal range should not be significant in the ports location.
- Berths are constructed with sufficient depth and sheds are constructed for storage of cargos
- Berths are equipped with machines and Cranes for loading and uploading in short time.
- Floating Cranes are recommended to be available for loading and uploading heavy Cargo.
- Ports are established with dry docks, Slipways and workshops to repair ships.
- Port should be Provided with good lighting systems.

* Components of Port :-

[1] Water Area (Harbor)

- Navigation channel
- Entrance
- Turning Basin
- Berths (Piers, basins, wharf, Jetty)
- Break water (Main Bw, Secondary Bw)
- Repairing Structures (Dry Dock, Slipway)

[2] Land Area

- Transit sheds, Silos, Tanks
- Port adminstration, Police Station, Customs
- Railway, Roads
- workshops
- Light House

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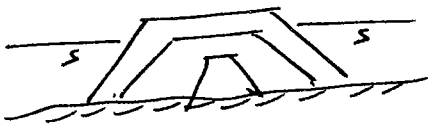
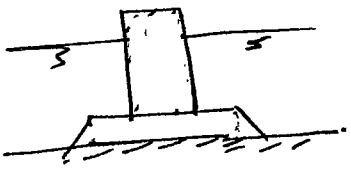
* Types of Break waters :-

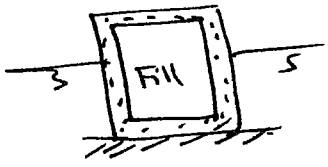
- Rubble mound



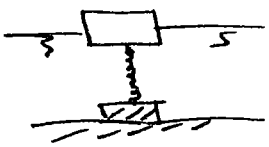
- Vertical R.C



- Caissons



- Floating Breakwater



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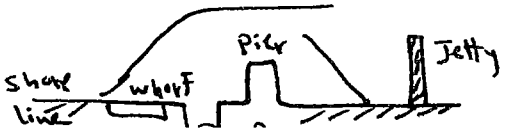
* Types of Berths :-

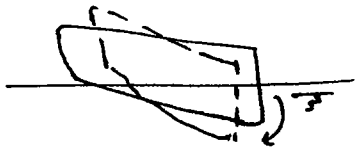
* Basin (inside land)
* Pier (Mall) inside water
* Wharf (Parallel to shoreline)
* Jetty



* Factors affecting Selection of Break water Type :-

1) Wave Conditions (Height, Direction, Speed)
2) Soil Condition
3) water depth.
4) Available Construction materials
5) Types of Port and its importance
6) Available construction equipments.
7) Construction and maintainance Cost

* Factors affecting the Navigation channel :-

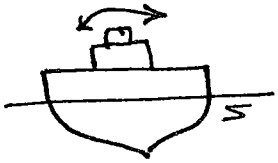


1) Squat of ship (at the start of motion)

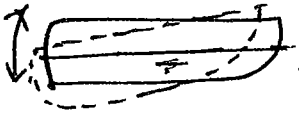
2) Trim of ship

3) ship motion due to waves

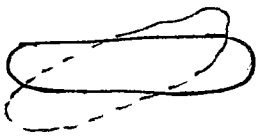
Heaving



Rolling



Pitching



Yawing

4) Tidal Variation
5) Bed level Fluctuation
6) overdepth due to Sedimentation