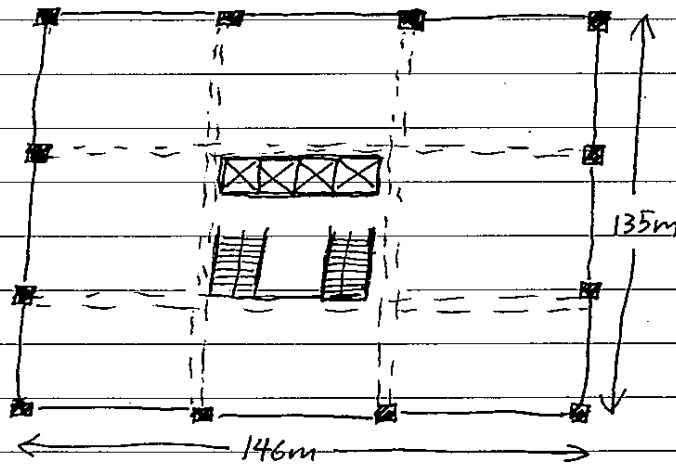


Apr/May 2013

- 1(a)
- Core walls are built two to three stories ahead of the external floors using the slipform/jumpform technique
 - Columns can be constructed using metal formwork
 - Beams & slabs can be constructed using table forms to improve the speed of construction
 - Internal floor (within the core walls) is concreted in one operation whereas the external floors are concreted in several operations with a suitable construction joint in between



- (b) One segmental construction method is the balanced cantilever method. Two advantages (leading to wide employment):

- Eliminate the use of support falsework at ground level & water surface, meant to support deck formwork which is both expensive & hazardous
- Water/traffic way can be kept free of obstruction
- Structurally appealing
- Construction can proceed from the bridge piers and bridge deck is self-supporting at all stages

Another segmental construction method is incremental launching. The advantages (leading to wide use):

- Construction takes place at fixed location at ground level, in repetitive cycles
- No transportation & lifting costs associated with precast units
- No application of epoxy resin for the joints of units

- Maximum use of formwork

(c) Main criteria in material selection:

- adequacy in ultimate strength
- adequacy in service performance
- adequacy in long-term durability

plastics / timber
 ↓
 suitability

Concrete is rarely chosen for strength purposes because common associated problems are cracking, spalling and excessive deflection under loads.

2(a) Lift core and staircase area construction should start first (usually at the centre of building). It affects how well the formwork of external floors can fit.

The external floor area can be built two to three stories behind time of the lift core & staircase area. This is because the lift core supports the external floor. (leave rebar behind)

The internal floor can be done last in one operation. However, so long as manpower is freed up, it can be done simultaneously.

A twin passenger lift, mounted at the edge of the building for vertical transportation of supervisors & workers, tools, light equipment.

One climbing tower crane mounted inside the lift shaft for lifting of heavy items.

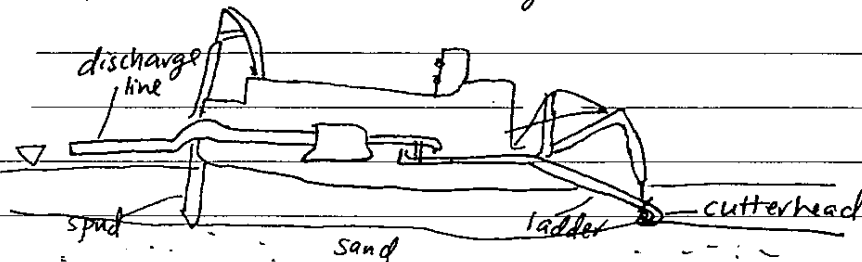
An additional static tower crane can be mounted at the edge of the building for back-up.

(b)(i) I agree with the speaker. A full precast structural system gives S_s of 1.0 (the highest), which helps attribute higher buildability score, acting as motivation for construction companies to use prefabrication.

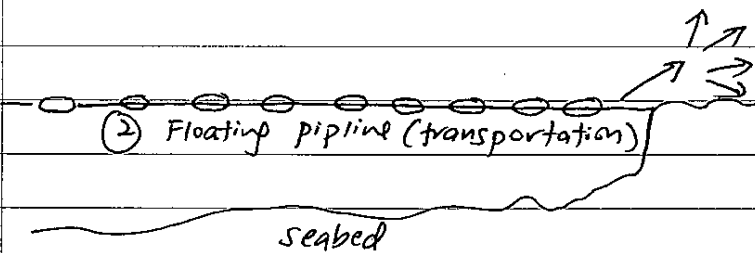
(ii) Maximum possible difference in score = $45(100\%) (1.0 - 0.5) = 22.5$

- 3(a) The cutter suction dredger is able to operate in shallow water (depth of water = 15m is considered shallow).
It is able to produce a uniform level bottom and has a high rate of production (2.0 km of land is long and productivity is desired).
As the water is calm, the cutter suction dredger, being sensitive to sea condition, does not pose any problem.
Hence, the cutter suction dredger is suitable for dredging in such condition.

(b)



① Excavation

③ Disposal
(on shore pipeline network)

② Floating pipeline (transportation)

(c) A backhoe dredger can still perform the job.

However, it is impractical to use a backhoe as the dredging distance is long for a backhoe with low production rate.

Backhoe is required to handle difficult materials (stiff clays, boulders).

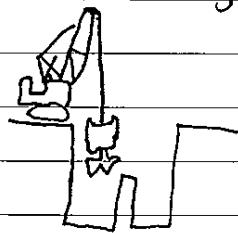
Loose sand has no need for the employment of backhoe.

4(a)

①

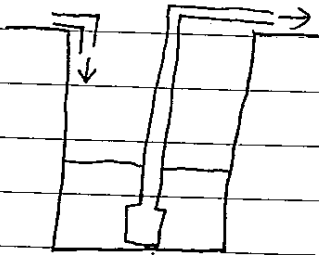
excavate a gap in the ground

②

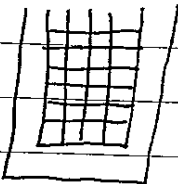


trim into perpendicular dimensions

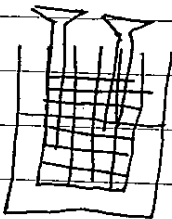
③ through a pipe, add bentonite slurry and remove loose soil particles



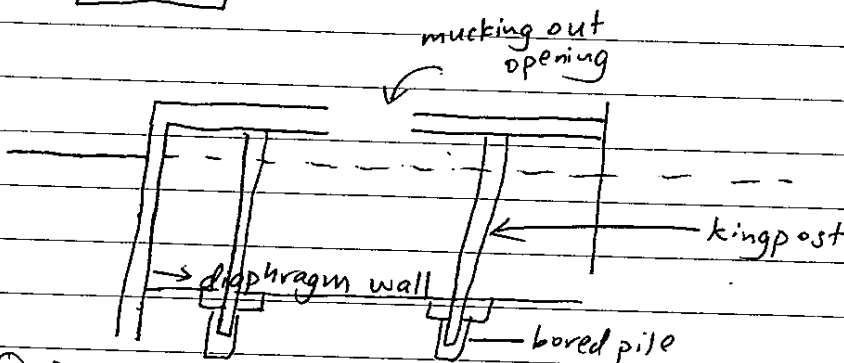
④ Add in reinforced steel



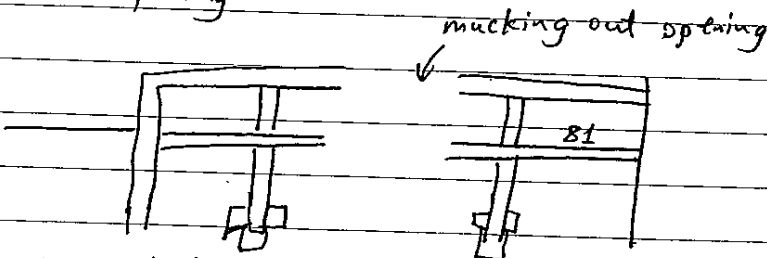
⑤ Use tremie pipes to add cement



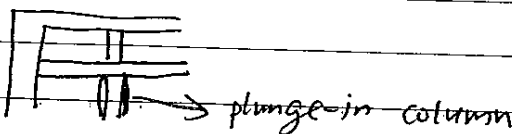
(b)



- ① Preliminary excavation to approx. 1m, install diaphragm walls, concrete bored piles and kingposts.
- ② Construct 1st storey slab with conventional formwork & leaving mucking out opening



- ③ Excavate to B1
- ④ Construct basement 1 slab, Repeat for basement 2.
- ⑤ Construct the pile cap
- ⑥ Construct column & wall for B1 & B2



6) Close mucking out opening on slab of B2 followed by B1.

5(a) Possible channels of communication:

- Morning assembly
- Toolbox meeting
- Posters, notice boards
- Internal memos
- Company orientation briefing
- Company newsletter
- Management meetings

(b) No.	Action Plan	Person Responsible	Timeline
1	Identify the different niche activities that would require Permit-to-Work system	PM	1 week
2	Develop the procedures and documentation for the Permit-to-Work system	WSHO	2 weeks
3	Inform & train all subcontractors/workers on the Permit-to-Work System & safety procedures	WSHO	2 weeks
4	Implement the system	WSHO	
5	Conduct occupational health & safety campaigns for all site staff & workers (talks & games)	WSHO/PM	Twice yearly (first to be held within 4 months)