

1(a). (1). Foundation

- The foundation supports the building and carries the live and dead loads of superstructure. Foundation takes various forms, it can be simple footing, driven pile, bored piles, raft etc.

(2) Building Envelope: The exterior walls and roof make up the building envelope that enclose the building. It basically consists of everything outside of the frame.

(3). Environmental control systems: Heating, lighting, A/c, ventilation & acoustics etc.

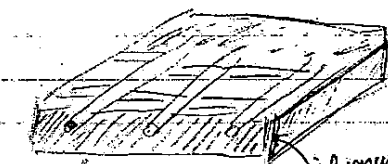
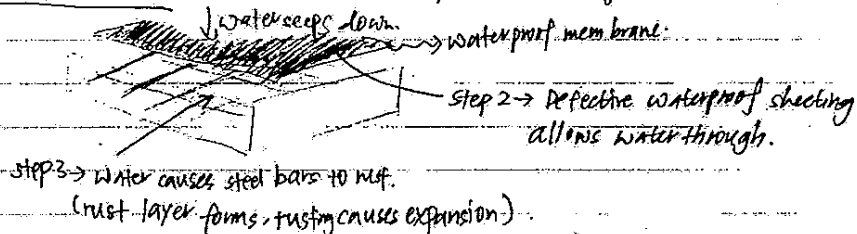
(4). Transportation systems: It includes vertical (e.g. elevators, escalators, stairs) and horizontal (eg. Travellators, shuttle trains in airport terminals).

(5). Fire suppression: fire sprinklers, smoke detectors systems, wet and dry riser etc.

or any others: utilities, framing, interior walls.

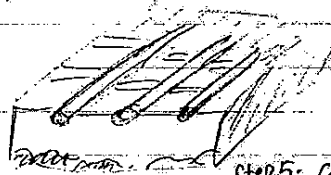
1(b). likely cause: water contact.

Stages of development: step 1 → water seeps down through cracks in bathroom tiles.



Step 4: Rusting causes expansion.

if concrete is not thick enough, moisture & chemicals can seep in & corrode the steel bars.

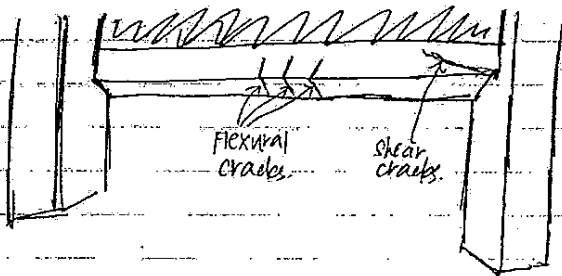


Step 5: concrete flakes off because of expansion (concrete starts spalling off).

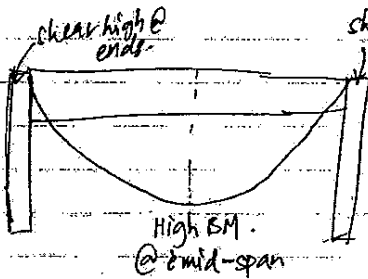
~ (16) continued ~ Common Types of Repair methods :

- crack injection
- Patch repairs
- Grout grouting
- Pressure grouting
- Jacking

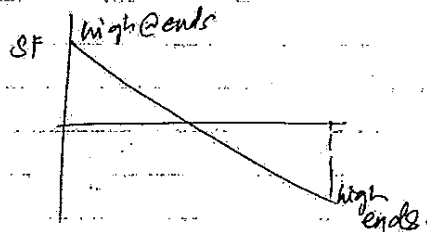
end part:



due to:



shear high @ ends.



Your gift changes lives

1(c) (i). Objectives of BDAS:

- To promote more buildable designs upstream and constructibility downstream to the industry through objective assessment.
- Noted that it is not the intention to promote BS at the expense of good architectural design.
- Also not to solely promote prefabrication.

Objectives of CAS:

- To bring about the wider use of labour-saving construction methods & technologies that can help to reduce the demand for manpower on site.

BDAS focuses on the use of buildable designs during upstream design process
CAS = Downstream. (Performance-Based)

1(c) (ii). 1. Standardisation.

Repetition of grids, sizes of components & connection details, eg. repeated floor layout, column size.

2. Simplicity.

Uncomplicated building construction systems and metallation details.
eg. Flat plate / slab system with edge formwork construction.

3. Single integrated elements.

Combine related components together into a single element that may be prefabricated in factory, eg. prefabricated toilet.

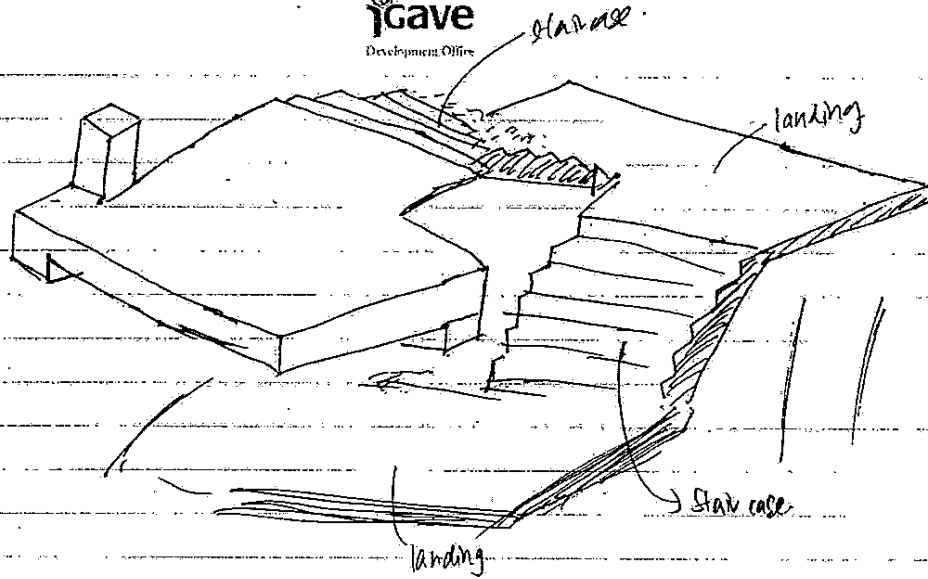
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2(b). special design considerations:

- ① Handling →
 - consider handling stresses in precast members (in many cases, components are handled 2nd or less after casting)
 - lifting devices built into components to be chosen with care: to consider shear or bursting stresses, also tensile stresses.
- ② standardisation →
 - precast components to be standardized in shape and size to reduce production cost.
 - standardisation will simplify handling, stacking, sorting and delivery.
- ③ Method of manufacture →
 - Pay particular attention to mould design:
 - ensure simple dismantling and re-assembly within acceptable tolerance limits
 - provide facilities for securing fixings
 - ensure stiffness of mould to control dimensional accuracy.
- ④ Transportation → Consider stacking procedure
 - either horizontally or vertically on vehicle
 - check height, width and load restrictions on public roads.
- ⑤ Erection → Consider stability of precast components during erection.
 - provide temporary adjustable propping or temporary adjustable fixing to main building, until permanent connections is complete.

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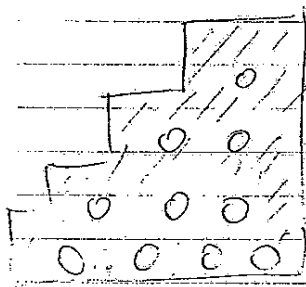
2(c).



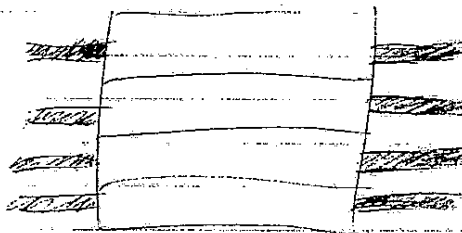
Basic concept of Prefab / Precasting:

- During installation, connections/topping are usually done with starter bars and wet concrete pour
- Structurally, building using pre-casting / prefabrication components manufactured off-site and installed on-site should be as strong as one done in cast-in-situ.
- As connections are frequently done with starter bars and concrete on-site, this will provide the required robustness needed for structural integrity and soundness -

side view of staircase



top view of staircase



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3.

* use table to present answer.

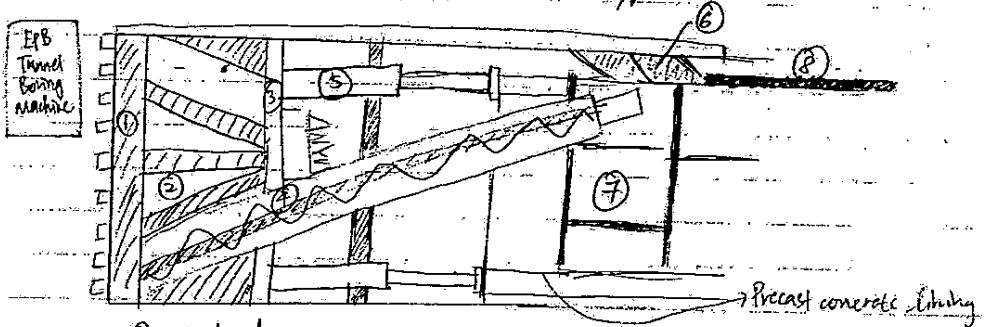
No.	Action Plan	Person responsible	Time line
1	Identify the trades or work activities that would require Permit-to-work system (i.e. lifting operations and working at height).	PM	1 week.
2	Develop the procedure and documentation for the permit-to-work system.	WHSO	2 weeks.
3	Identify the site staff that require statutory training.	WHSO	2 weeks.
4	Arrange for site staff to get statutory training & also develop the procedures & forms for these trainings.	WHSO	2 weeks.
5	Inform and train all subcontractors and suppliers on the permit-to-work system and the statutory training requirements.	PM/WHSO	4 weeks.
6	implement the permit-to-work system and also carry out regular site checks on the of compliance of the statutory training requirements.	WHSO	

Notes

PM - Project Manager.
WHSO - Workplace Health & Safety officer.

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A(a). TBM — Earth Pressure Balance type.



- | | | |
|-------------------|------------------|------------------|
| ① cutterhead | ④ screw conveyor | ⑦ segments |
| ② Working chamber | ⑤ Thrust Arm | ⑧ Stimulus Groat |
| ③ Pressure Wall | ⑥ Tail sealant | |

The excavated material & water mixture is in ②.

method of tunnel Advance:

- convert the excavated soil + water into high density slurry.
- stabilize the tunnel face by pressurising the excavated soil + water as the support medium for the tunnel face to counterbalance the earth and water pressures.
- Rotating cutter head cuts & thrusts into the tunnel face.
- Transport the excavated material by a screw conveyor.

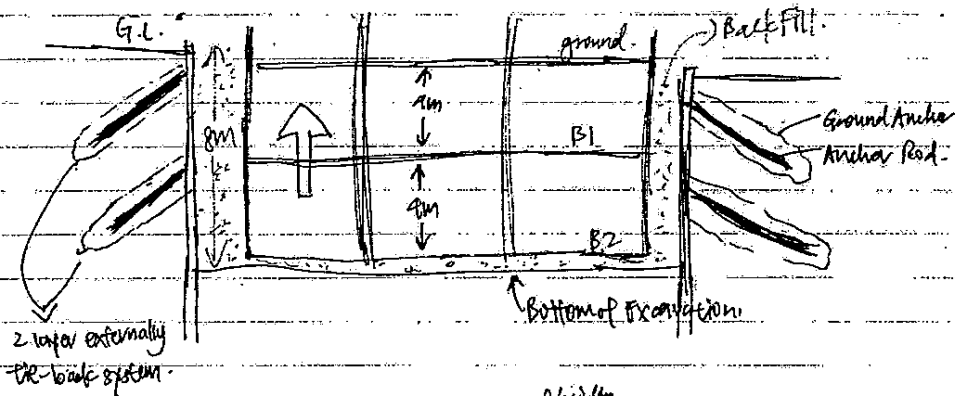
Advantage & Disadvantage of EPB:

- (+): high drive rates & requires less back-up plant
- (-): is limited in the types of ground in which it can operate, eg. boulders.

- 3 Processes:
- ① excavation
 - ② stabilisation/protection by shield/lining
 - ③ transportation of excavated material out of tunnel working area.

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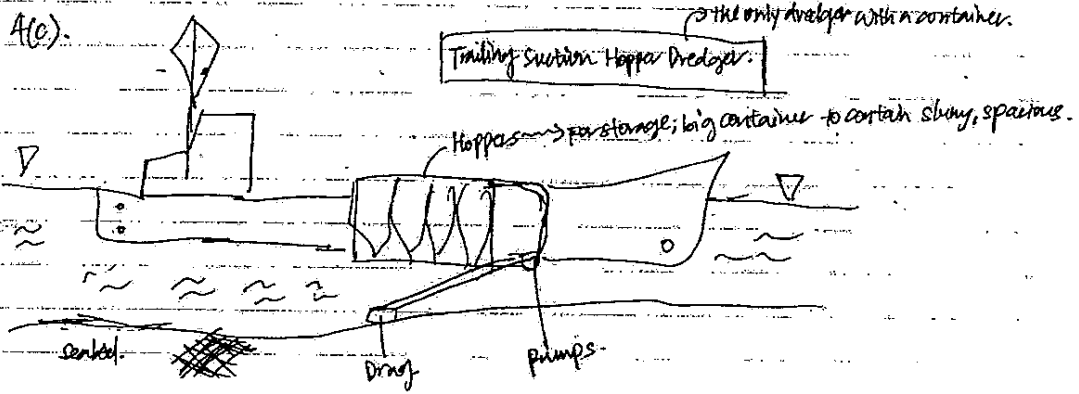
A(b) bottom-up method



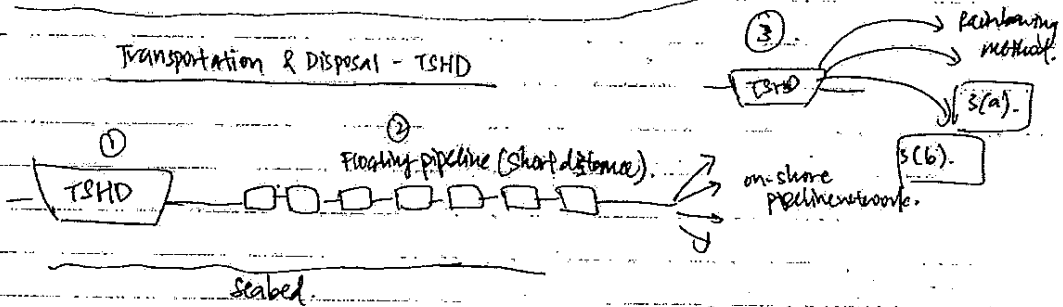
[It is imp^t to note that e rod will reach to e outside ^{of building} area, & thus, if e project site is limited, approval will be needed beforehand.]

- ① construct the retaining wall (2 layer ext. tie-back sys.)
- ② Do excavation
- ③ construct bottom up (start to construct Basement structure, start from BM-floor foundation).
- ④ Framework to cut from BM floors.
- ⑤ Backfill to close up e gap.

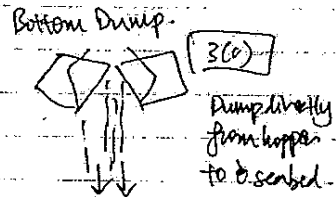
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characteristics: Ability to transport dredged material over long distances & high output production, but inability to dredge strong materials & to work in very restricted areas.
* can dump for long distance location (~100km).



Excavation → Transportation (TSHD, floating pipe) → Disposal (rainbowing, onshore pipeline network, bottom dump).



- Imp't Notes: Dredging cycle → (4 steps).
- ① Excavation (using equipment).
 - ② Raising material to water surface.
 - ③ Horiz. transportation of material to dumping ground.
 - ④ Disposal of mtl @ dumping ground.

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