

## CV4011 Project Planning and Management PYP AY2017-18 Sem 1

1. (a)

3 crucial aspects:

1. Fiduciary: trust, trustee of clients. PE shall maintain trust between client and him/her so the PE can discharge his duties with completely fidelity to the clients. This will lead the PE to give his best professional advices which reflects fully his own professional interest and judgement.
2. Confidential: keep key information from clients as confidential. PE shall not disclose any confidential information either to public or use for his personal profits.
3. Ethical: moral behaviour to be kept ethical. PE shall always uphold the dignity, standing and reputation of the profession and conduct their works in moral ethical way.

1(b)

(i) **Dangerous building:**

Any building that

- is in such a condition *or*
- is used to carry such loads

as to be or likely to be dangerous will be declared as a dangerous building by the CBC.

***Danger arising from the condition of the building***

The CBC may make an order requiring the owner to do all or any of the following:

- to carry out or cause to be carried out such inspection of the building as the CBC may specify
- to execute such building works as may be necessary to obviate the danger
- to demolish the building or part thereof and remove the rubbish resulting from the demolition.

***Danger arising from overloading of the building***

The CBC makes an order requiring the owner to restrict the use of the building until such time as the CBC withdraws the order. The withdrawal of such an order will be made possible if the building is made structurally adequate for the loading envisaged.

***Failure to comply with the CBC's order***

If the owner fails to comply with the CBC's order the CBC may

- execute the order as he thinks fit
- recover all reasonable expenses incurred by him

The owner unless he has a reasonable excuse shall be liable to a fine not exceeding \$50,000 or an imprisonment for a term not exceeding one year or both.

(ii) **An accredited checker's role**

An AC is a person who has been registered as such and authorized by the CBC, whether acting on his own behalf or on behalf of an accredited checking organization, to perform the following main tasks:

- Check that the design calculations and the plans of building works prepared by the QP for structural works conform to the design codes of building works.

- Evaluate, analyze and review the structural design in connection with a proposed building works with a view to determining the adequacy of the structural elements. (Note: AC has to prepare his original calculations to determine the adequacies of key structural elements contained in those plans of building works.)
- Verify that the key structural elements designed are consistent with the layout shown on the architectural and building plans.

If all above criteria is satisfied, issue a certificate to show that to the best of his knowledge and belief, the plans do not show any structural inadequacy in the structural plan.

An AC should perform the task in following manner:

1. A person of good character and must have at least 10 years of practical experiences.
  2. He must not have any professional and financial interest on the project he engaged.
- (iii) A PE who owns a unit in condominium is invited to carry out building inspection on the same condominium

This clearly not appropriate as the PE must not have any professional or financial interest on the project he taken. If he accepts the buildings inspection of his own condominium, there might be an issue of conflict of interest arise. Hence, it will violate the codes of Professional Conducts and Ethics.

(iv) **Revoke of permit to commence building operations**

Commissioner of Building Control (CBC) has the rights to revoke the permit to commence work if:

- i. Works after commencing has been suspended for more than 3 months without a valid reason.
- ii. The building works are not carried out in an appropriate manner such as there is risk of the building collapse, risk of the building to hurt people or passer-by, and damage to adjacent buildings or property.
- iii. Permit will lapse if any of the 3 key parties (owner, QP and builder) ceases to be in force.

1(c)

**Areas of concern:**

**Planning Act**

The granting of planning approval is governed by the PLANNING ACT (Ref: Planning Act revised edition 1998) which is an Act to provide for the planning and improvement of Singapore. It deals with matters pertaining to:

- a. Master Plan
- b. Development of Land
- c. Development charge
- d. Planning permission
- e. Conservative Permission

f. Subdivision Permission

**Building Control Act**

The approval of building plan is governed by the Building Control Act (BC Act) which is an act that provides the law relating to buildings in Singapore and for matters connected therewith. The BC Act deals with a multiplicity of functions that include:

- Approval of building plans
- Granting permit to commence building works
- Appointment and control of Accredited Checkers
- Control over functions of Qualified Persons
- Control over functions of site supervisors
- Permit for Occupation of buildings
- Control and action over dangerous buildings
- Inspection of buildings

**Development of a new construction project**

**Planning Act**

Each application can be done by the use of Electronic Development Application (EDA) and will be assessed and evaluated against planning considerations as well as other Government policies and requirements that are relevant. Application for planning permission can be carried out in two stages:

- Outline Planning Application
- Application for Written Permission

***Outline Planning Application***

- This is a preliminary application for permission to develop land and is dealt with by the Development Control Division of the URA.
- At this stage, the CA will only consider broad issues of land use, intensity, type, form, and height of the development on an in-principle basis.
- In general, applicant only needs to submit prescribed forms and fees. At this stage, CA may ask the applicant to furnish the initial layout plans. Detailed architectural and structural drawings will not be necessary.
- If the proposal is found acceptable, then Outline In-principle Approval will be granted. This approval is given without prejudice to the rights of the Government technical departments to impose their own requirements. The purpose of this outline application is to give a quick indication as to whether the applicant is likely to succeed in obtaining planning approval. The applicant is able to obtain this indication without having to prepare detailed plans etc.

***Application for Written Permission***

- Consequent to obtaining outline in-principle approval, a formal application (with full details) for written permission must be made. Detailed planning and technical matters will be considered at this stage. The matter will be attended to by the Development Control Committee (DCC) in the Development Control Division of the URA.
- The development proposal will also be referred to the Government/statutory technical departments that are likely to be affected by this development. Before a submission is made, an applicant can contact and consult these relevant departments for detailed requirement. After the initial submission, the applicant is also required to liaise with these relevant departments to obtain their clearances and endorsements.
- A site inspection will be made by the interested parties, and a report to the Development Control Committee (DCC) will be prepared. The DCC will consider the report and make its recommendations to the CA for his decision.
- If the proposal is being viewed favourably, then a provisional permission can be granted with advice on alteration of Master Plan (if any) and early determination of Development Charge.

- At this stage, the applicant will resubmit plans after modifications taking into account the requirements of the technical departments. The development charge would be determined by the Chief Valuer. When the development charge is paid by the developer, the Master Plan will be altered by the Chief Planner (URA). Thereafter, the formal written permission will be issued.

### **Building Control Act**

After Obtaining Written/Provisional Permission, developer & his consultants can proceed to do the following:

- Architects prepare detailed Architectural floor plans
- Engineers do structural design and structural drawings including prepare structural layout plan and detailed calculation of each members.
- Accredited Checker (AC) to evaluate & analyse structural design and submit certificate of structural adequacy stated that to the best of his knowledge and belief, the structural plan do not show any inadequacy.
- Submit the above documents for the Building Plan approval (BP approval)-CORENET e-submission
- The above activities are Governed by Building Control Act (1999 Edn).

2(a) (i)

It is the application of the management principles and techniques to different phases of construction projects under the special situations and conditions prevailing in the Construction Industry (CI).

Primary Objectives:

- (a) Control of Time
- (b) Control of Cost
- (c) Control of Quality & Safety

The CI makes a major contribution to the national economy in any country. On the average, it amounts to about ten percent of the Gross National Product (GNP).

It provides a comparable employment market. Approximately about 10 -15 percent of the labour force is in CI. It also supports many manufacturing, development, real estate and other interests.

#### Characteristics of CI:

The industry is large but diffuse. It is highly fragmented into a number of professional and skilled grades-such as

- (a) Architects, Planners
- (b) Consulting Engineers
- (c) Quantity Surveyors
- (d) Main Contractors
- (e) Sub Contractors
- (f) Skilled grades such as plumbers, plasterers etc

The products of CI are essentially

- (a) One-of-a-kind
- (b) Site produced
- (c) Labour intensive
- (d) highly dependent on local conditions
- (e) not subjected to much mass production or standardization

From the Contractor's point of view, the CI is inherently on uncertain industry. The uncertainty arises from the nature of the industry itself contributed by

- (a) the competitive tendering process

- (b) the Company's turnover
- (c) site production rates
- (d) weather
- (e) one-of-a-kind product
- (f) non-permanence of work force
- (g) variability in equipment or plant requirements

2(a) (ii)

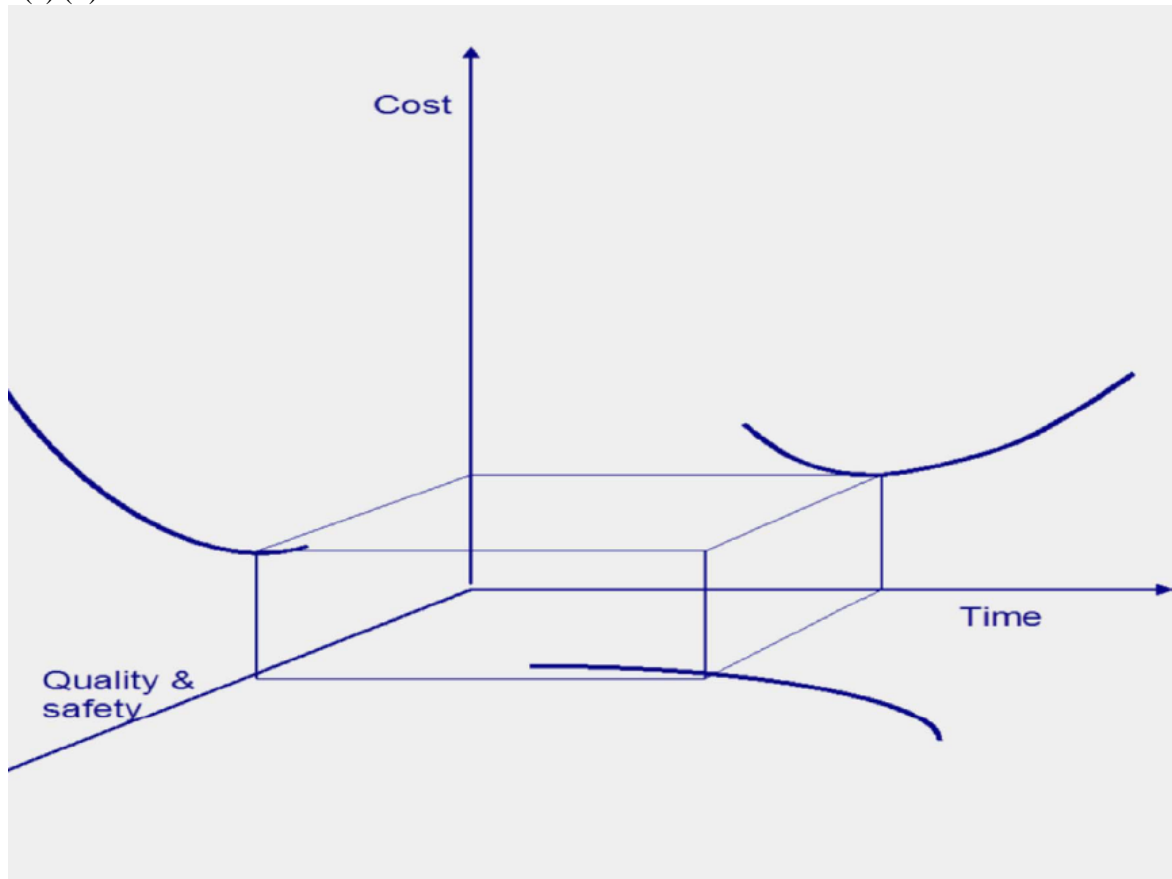
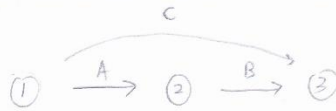


Fig. Relationships of 3 main objectives

As can be seen from the fig above, it can conclude that:

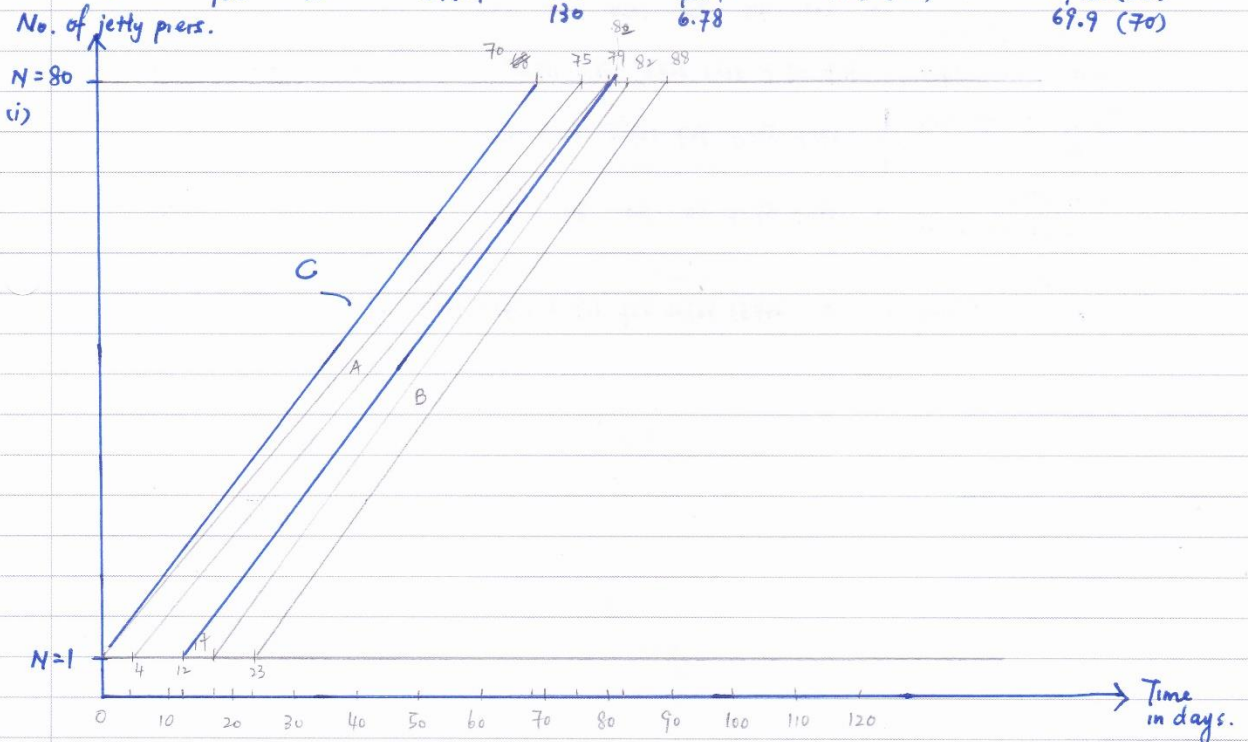
- a. As the construction industry requires high quality or safety to be achieved on site, it requires longer duration or time to meet the standards.
- b. Hence, the higher the quality and safety of that projects to be met, the higher costs required for that project due to more skill-worker needed, more resources such as equipment and materials needed to achieve the high quality and safety requirements.
- c. For the cost-time relationship curve, it shown that when the duration of the project is long, it will costly and expensive. However, there is an optimum time in which the cost is the lowest for the project to be achieve. When the time to complete the project is shorter than the optimum point, the time will be compact which will cause more overtime and more resources needed on time, Hence, the cost of the project definitely will increase.

2(b)



2(b) Given:  $N = 80$ ,  $R = 7$  pers/week,  $h = 8$  hours/day,  $d = 6$  days/week, min buffer = 3 days.

Operation	M	Q	$G = \frac{RM}{dh}$	g	$u = \frac{g}{G}R$	$T = \frac{M}{uW}$ (days)	$S = \frac{(N-1)}{u}d$ (days)
A	150	5	21.875	20	6.4	3.75 (4)	74.06 (75)
B	420	10	61.25	64	7.314	5.25 (6)	64.81 (65)
C	920	10	134.17	<del>125</del> 130	<del>7.04</del> 6.78	11.5 (12)	<del>67.33</del> (68) 69.9 (70)



(ii) The expected project completion time is 88 days.

(iii) If the operation C can only supply 11 teams, the completion of project duration <sup>may</sup> be affect.

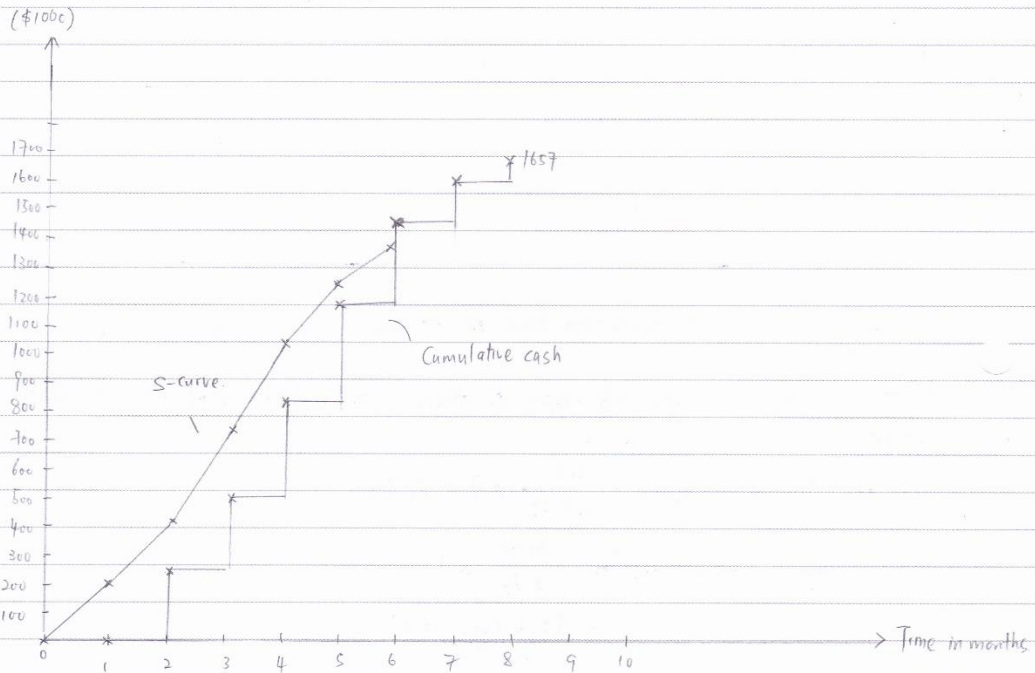
$$\text{For operation C: } u_{\text{new}} = \frac{110}{134.17} \times 7 = 5.74$$

$$\begin{aligned} \text{Thus, time interval} &= \frac{80-1}{5.74} \times 6 \\ &= 82.6 \text{ days} \approx 83 \text{ days.} \end{aligned}$$

Hence, the project duration will delay by  $(95-88) = 7$  days.  
 → New project completion day = 95 days.

3(a)

		Project time in months.									
3(a).	Cost Information.	0	1	2	3	4	5	6	7	8	9
	Monthly D. Cost (\$1000)	193	193	287	287	195	95				
	" Ind. Cost (\$1000)	16	16	16	16	16	16				
	" Total Cost (\$1000)	209	209	303	303	211	111				
	Cumulative Total Cost (\$1000)	0	209	418	721	1024	1235	1346			
	Monthly value (\$1000)	271.7	271.7	363.6	363.6	253.2	133.2				
	Cumulative monthly value (\$1000)	0	271.7	543.4	907	1270.6	1523.8	1657			
	Cumulative retention (\$1000)	0	27.17	54.34	80	80	80	80			
	Cumulative payment (\$1000)	0	0	244.53	489.06	827	1190.6	1443.8	1577	1657	



Time in months.	0	1	2	3	4	5	6	7	8
Working capital ( <del>at</del> before payment) ( $\$1000$ ).	0	209	418	476.47	534.94	408	155.4		

$$\begin{aligned} \text{Interest payable} &= [209(1.015)^8 - 209] + [418(1.015)^7 - 418] + [476.47(1.015)^6 - 476.47] + \\ & [534.94(1.015)^5 - 534.94] + [408(1.015)^4 - 408] + [155.4(1.015)^3 - 155.4] \\ &= \$190.352k \end{aligned}$$

$$\begin{aligned} \text{So, the expected profit} &= \$1657000 - \$190352 - \$150,000 \\ &= \$1316647.91 \text{ \#} \end{aligned}$$



3(b)

(i)

The project duration is said to be All-Normal if all the activities of the project are carried out at their own individual All-Normal rates. If any other method of working reduces the activity duration, the activity is said to be Crashed or Compressed. Activity durations faster than all-normal duration must cost more because of added expenses of:

- (i) Overtime
- (ii) Shift work
- (iii) Use of more equipment / plant

3(b) (ii)

Limitation of the compression of activities on critical path is the project cannot afford any further delay of activities. As the project has been compressed, the total float time available in the project will be reduced or become zero subsequently. Hence, if there are any critical activities along the critical path, the project will be delayed eventually. Therefore, the date of project completion will be achieved at a later date.

3b (iii)

Cost-Time Planning is the search for this optimum solution knowing the all-normal and crash solutions for each activity.

This is achieved through Project or Network Compression.

#### **Principles behind Project (Network) Compression**

1. Project duration may be shortened by crashing activities along critical path.
2. If an activity is crashed by 1 unit of time, then,  
**Increase in project direct cost = cost slope of that activity**
3. If project duration is shortened, then there is a saving in indirect cost of the project.
4. **Net saving in total cost** if the project duration is shortened by one unit of time = (Indirect Cost/Unit of time) – Cost Slope
5. To reduce total cost, only those activities which have cost slope less than Indirect cost / unit-time should be selected for crashing.
6. Crashing of non-critical activities will not change project duration
7. Compression should be done in stages taking into account the float available in non-critical chains. If two or more parallel chains are critical, then they should all be compressed together by the same amount.

4(a)

(i) Nature of LOI:

- Often occur in a situation of negotiation.
- In practice, it is common to find work on construction project started before a formal contract is drawn up and signed.
- Architect on behalf of employer may write a LOI to the contractor indicating a firm intention to award the contract.
- Letter of intent does not usually give rise to any contractual rights or obligations.
- This is because there will or may be a contract in future, hence is an indication that there is no such contract at present.
- A contractor who carries out work under the basis of Letter of Intent may be entitled to pay the reasonable values of the work carried out but there are no further legal consequences.
- The court may well take the view that the letter, by stating that there will or may be a contract in the future, is an indication that there is no such contract at present. The absence of a clear, comprehensive and concluded Contract often leads to disputes over the scope of work and claims for future payment and/or time.

- (ii) One advantage of LOI:
  - It is popular because client and contractor can agree on spot and contractor can start work on a very quick time as there is no waiting time for the submission and preparing of letter of award.
- (iii) One disadvantage of LOI:
  - As we know that, LOI is not a legally binding contract and there is no intention to create legal relationship. Hence, there is no obligations on both parties (clients and contractors). Contractor who carries out work on the basis of such a letter may be entitled, under a legal doctrine called restitution, to be paid a reasonable value of the work carried out, other than that, there are no further legal consequences. This is the biggest disadvantage of LOI.

4(b) both question's answer combined as below

- (i) Method of contractor to submit claims for variations:
  - A Variation results in a change to the Works or the conditions in which the Works are to be completed
    - Such instructions create an opportunity for the Contractor to recover the cost of this change work or change in the manner by which the work must be completed
    - Variations are generally required because:
      - a. Employer changes makes a design change during the construction phase of the work
      - b. If a mistake or omission is discovered in the Contract Documents
      - c. Overcome unforeseen problems

**Procedures:**

- When there are any variation changes:
  - All instructions must be in writing (**cl. 3.12.1**)
    - Verbal instructions must be confirmed in writing within 7 days, or
    - Contractor's written acceptance of a verbal instruction becomes a CA's instruction if a CA's instruction is not issued within 7 days of the Contractor's acceptance
- Contractor must give written notification/send notice on his claim within time limit.
- Supporting contemporary documents need to submit by contractor for the explanation of causes.
  - Progress report
  - Labour allocation sheet
  - Plant utilization sheets
- Contractor must keep an update of fully extensive records on site to substantiate any claim.
- CA must make determination of the claim.
  - Determination of validity
  - Determination of quantum
    - Usually ascertain by QS on behalf of CA.
- Owner pay to contractor according to the issue of payment certificate.

4(c)

- (i) Principles and application of LD:
  - To enable the parties to be able to agree beforehand the damage recoverable for a breach of contract.

- A mutually benefiting clause to both the employer and the contractor as it will be to their advantage that they should know with reasonable degree of certainty the extent of their liabilities and risks which they run as a result of entering into the Contract.
- It will enable the employer to know the extent to which he is protected in the event that the contractor fails to perform his obligations.
- To limit the contractor's exposure to claims by the employer.
- A pre-estimate of loss of client and will include in the tender price.

(ii) Method to claim for EOT:

- If there is any delaying event
- Contractor must give written notification /send notice on his claim
- Supporting contemporary documents need to submit by contractor for the explanation of causes.
  - Progress report and photographs
- Contractor must keep an update of fully extensive records on site to substantiate any claim.
- Architect/Superintending Officer/Engineer must make determination
- Architect/Superintending Officer/Engineer need to notify contractor in writing as to whether the contractor is entitled to EOT (Principle of Intimation)
- The intention of in-principle intimation is to force the Architect/Superintending Officer/Engineer to take a stand so that the contractor may in turn decide which course of actions to be take.
  - Accelerate the works
  - Proceed as normal in the expectations of EOT will be granted.
- Architect/Superintending Officer/Engineer issue EOT certificate to contractor.

4(d)

(i) Nature of damage claims:

Claims for delay and/or disruption can be made by:

- the employer against the contractor by way of liquidated damages;
- the contractor against the employer.

•The contractor's claims for delay and/or disruption are commonly brought under these heads:

- Increased preliminaries
- Overheads and loss of profits
- Loss of productivity or uneconomic working
- Increased cost from inflation
- Interest and financing charges

(ii) Method to claim for Loss and Expenses:

**Procedures:**

- Contractor must give written notification/send notice on his claim within time limit.
- Supporting contemporary documents need to submit by contractor for the explanation of causes.
  - Progress report
  - Labour allocation sheet
  - Plant utilization sheets
- Contractor must keep an update of fully extensive records on site to substantiate any claim.
- CA must make determination of the claim.

- Determination of validity
- Determination of quantum
  - Usually ascertain by QS on behalf of CA.

Owner pay to contractor according to the issue of payment certificate

Prepared by: PEH HOONG PING