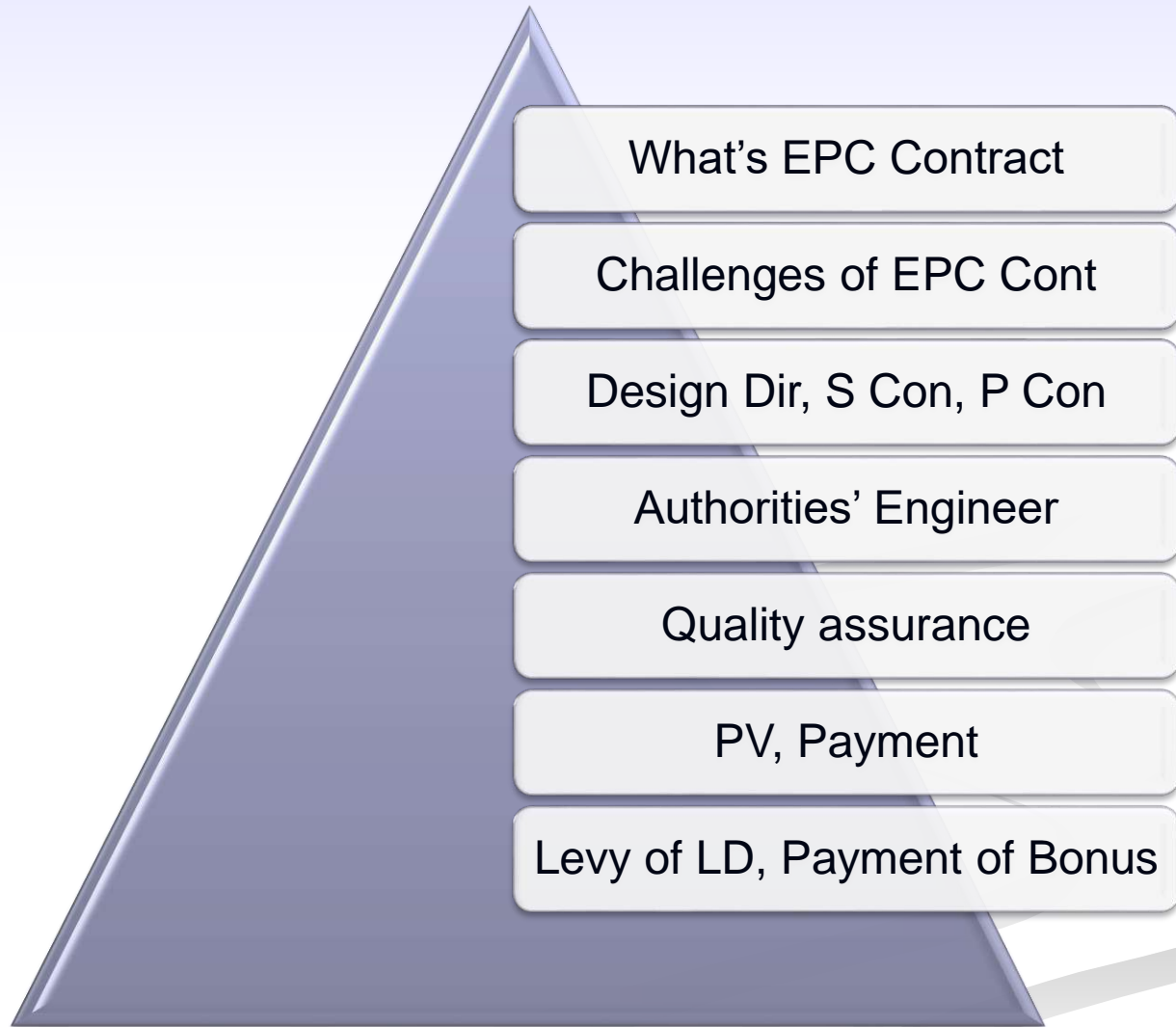


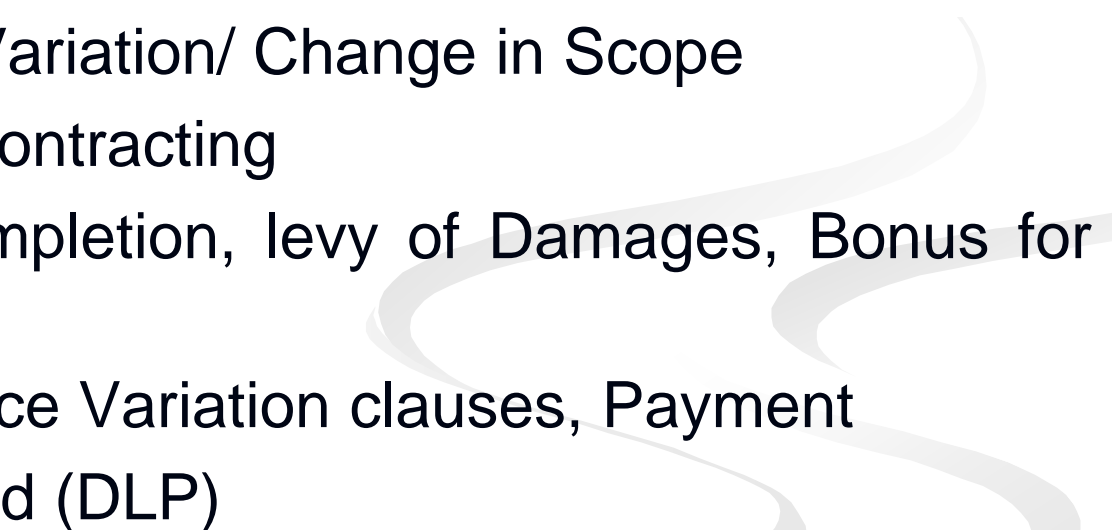
EPC (Engineering, Procurement and Construction) Contract

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Presentation plan



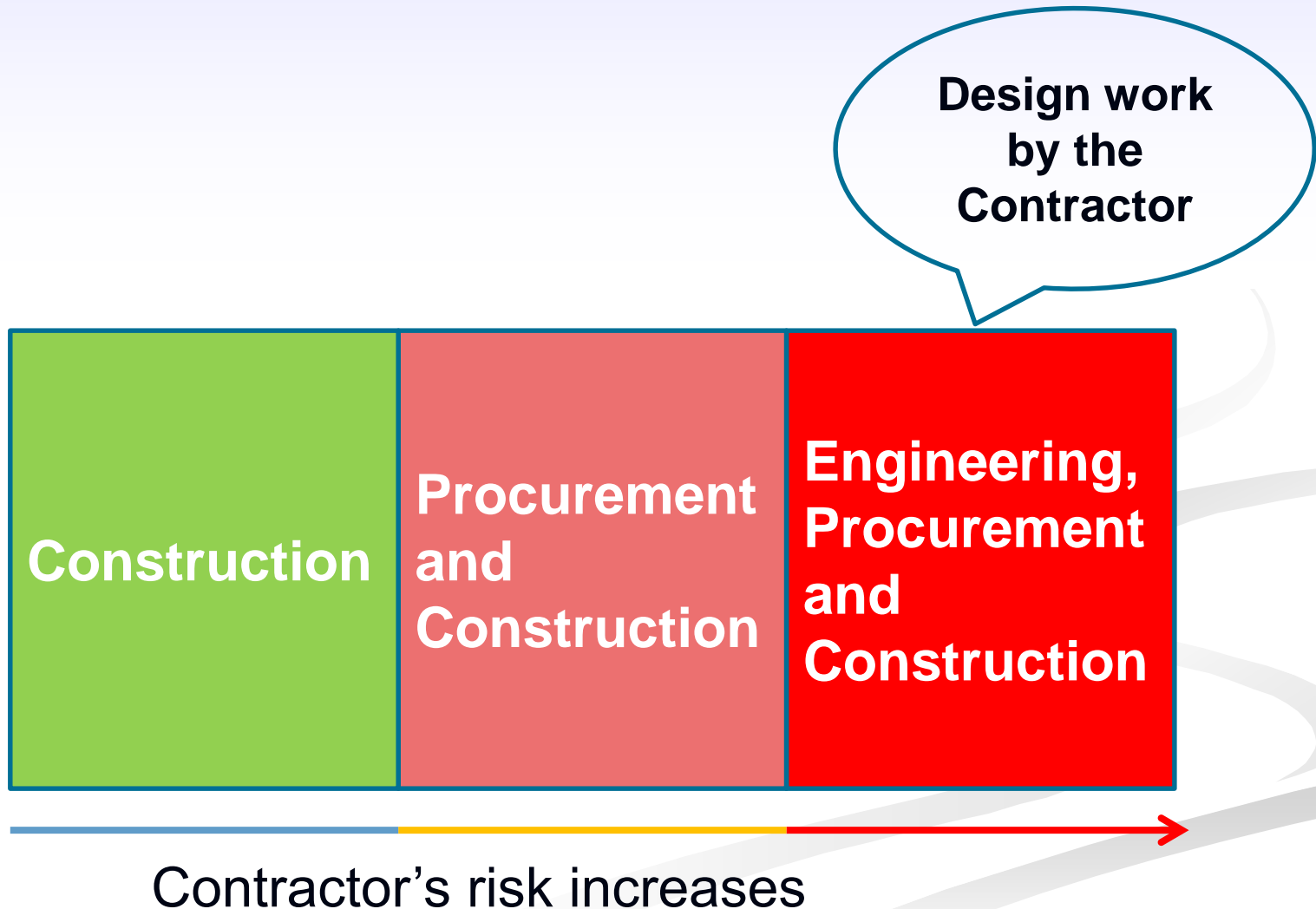
What all to expect today

- What is EPC contract, Issues and challenges
 - Scope of works, Technical Specs
 - Design Director, Safety Consultant, Proof Consultant
 - Authority's Engineer
 - Quality assurance, Variation/ Change in Scope
 - Assignment & Sub-contracting
 - Time for project completion, levy of Damages, Bonus for early completion
 - Insurance, Price, Price Variation clauses, Payment
 - Defect Liability Period (DLP)
- 

EPC contract

- **EPC** stands for **Engineering, Procurement and Construction**
- In EPC contract, the owner provides its requirements and the contractor prepares the detailed engineering design, procures all the materials and equipments and then construct to deliver a functioning facility or asset to the owner.
- **EPCC**- Engg. Proc, Construction and Commissioning
- **EPIC** - Engg, Proc, Installation and Commissioning

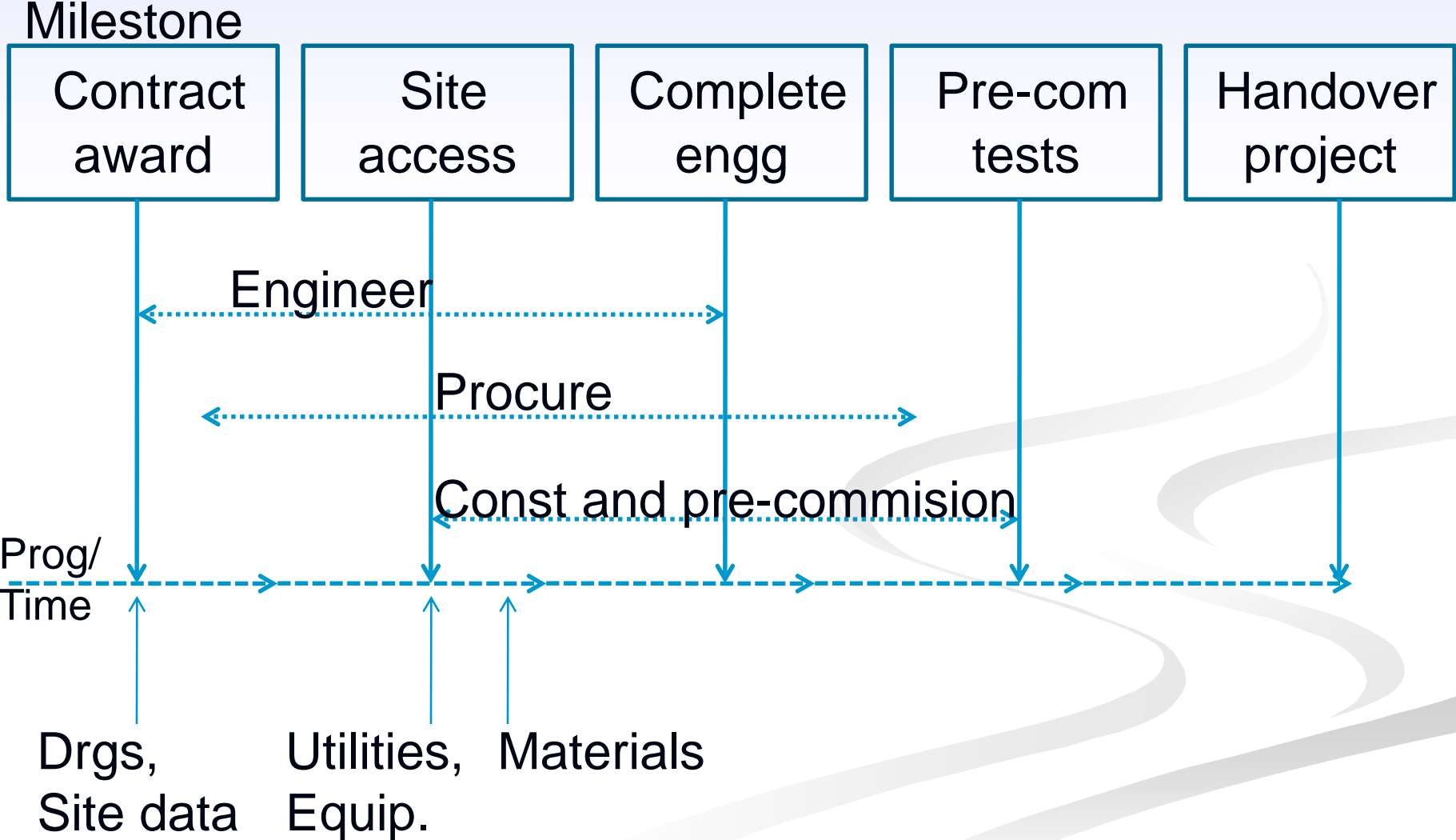
Degree of Risk allocation



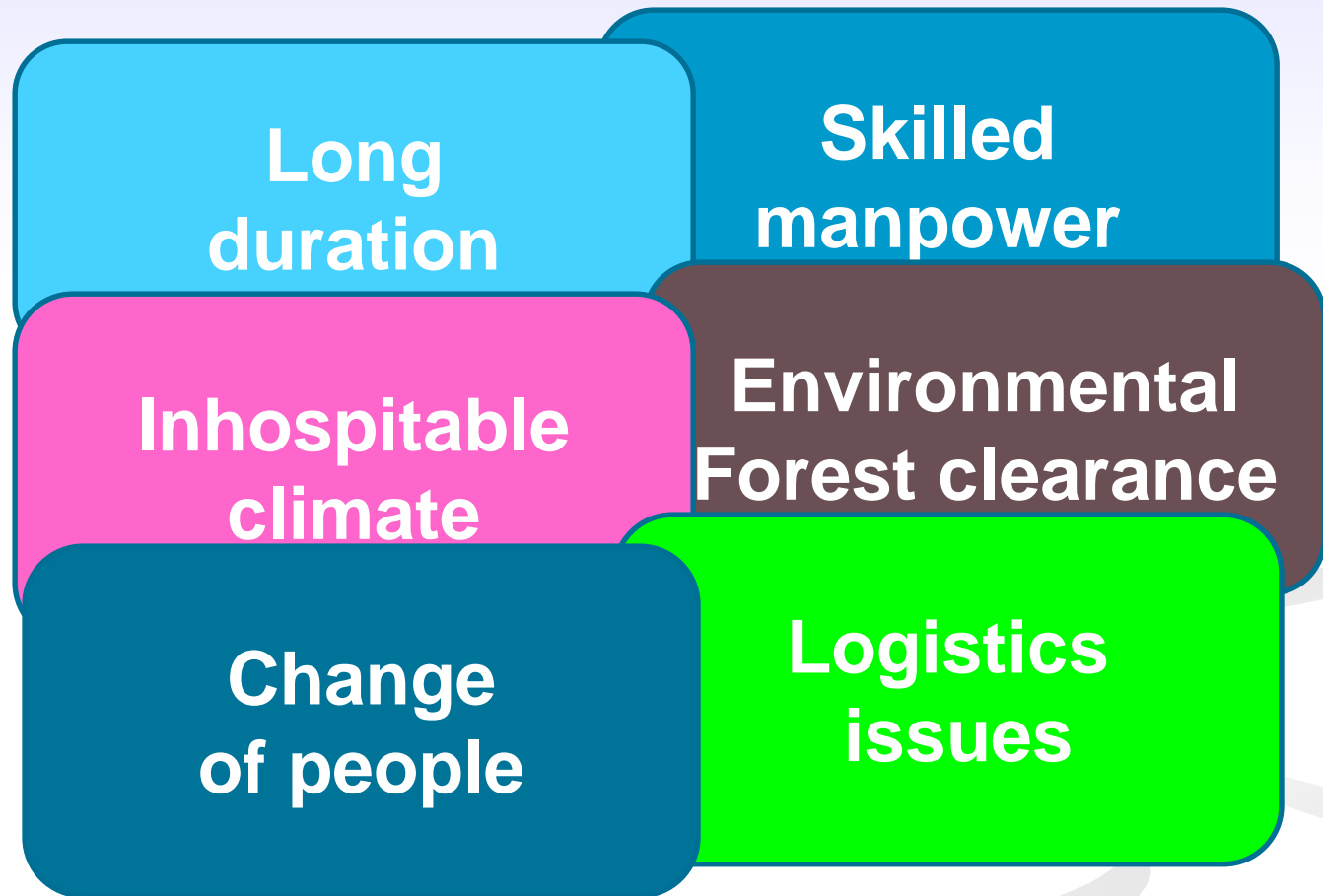
Scope of EPC contract- Niti Ayog

- The Contractor shall undertake the
- **survey,**
- **investigation,**
- **design,**
- **engineering,**
- **procurement,** and
- **construction** of the Project and observe, fulfil, comply with and perform all its obligations set out in the contract

Schedule diagram of EPC contract

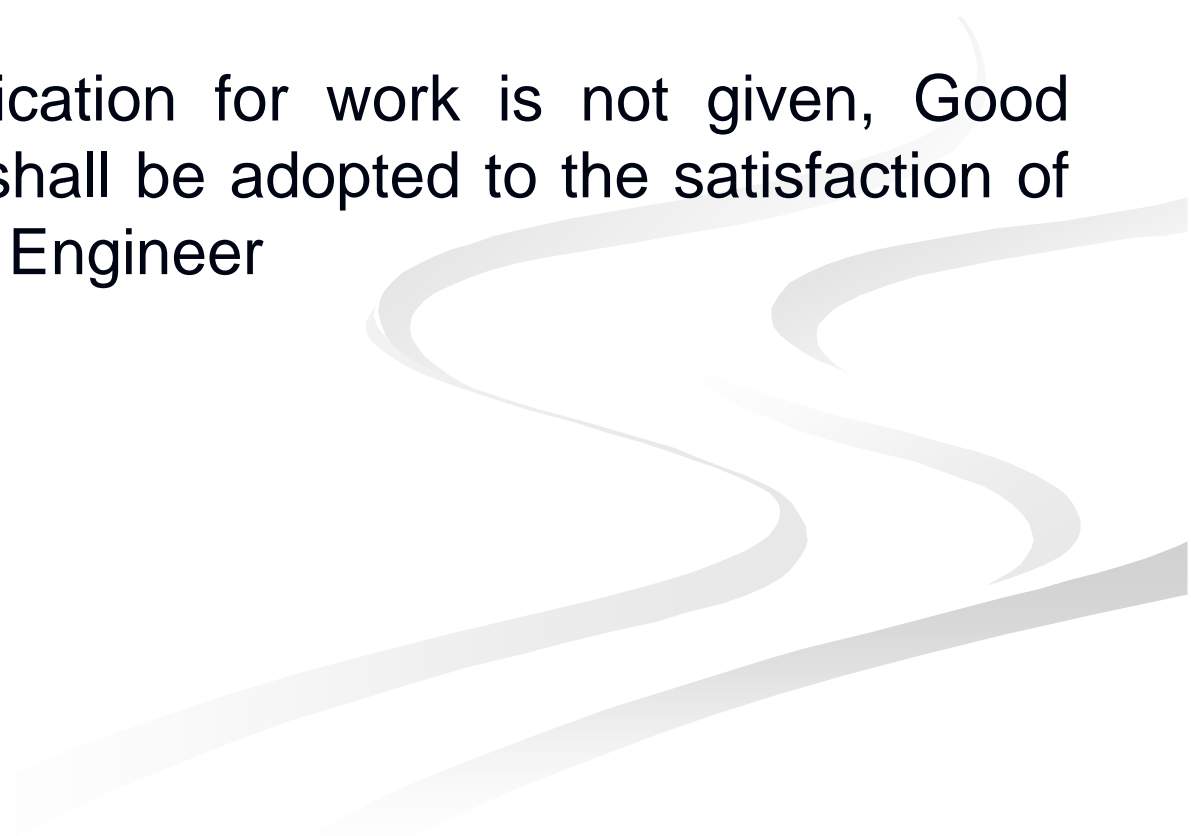


Issues and challenges of EPC contracts




- Add local problems- Jharkhand & Chhattisgarh, Stress, Personal issues, Covid etc and the problem increases...

Specification and standards for construction

- All materials, works and construction operations shall conform to the Standards and Specifications contained in(Manual / Annexure), eg Manual –IRC:SP:73-2007 for roads and MORTH specifications for Roads and Bridge works
 - Where the specification for work is not given, Good Industry Practice shall be adopted to the satisfaction of Project Authority's Engineer
- 

Responsibility of contractor

- The Contractor shall, in discharge of all its obligations, conform with and adhere to **Good Industry Practice** at all times
 - The Contractor shall comply with all applicable Laws and applicable Permits (including renewals as required) in the performance of its obligations under this contract.
- 
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Design work of the Project

Design Director


- Within 20 days of commencement of contract, the contractor shall appoint a “Design Director” who will head the Contractor’s design unit and shall be responsible for surveys, investigations, collection of data, and preparation of preliminary and detailed designs
- The Design Director shall be appointed after proposing to the Project Authority a panel of 3 names of qualified and experienced firms from which the Project Authority may choose one to be the Design Director

Safety aspect of the Project

Safety consultant

- The contractor shall appoint a Safety Consultant to carry out safety audit at the design stage of the Project in accordance with Applicable Laws and Good Industry Practice.
- The Safety Consultant shall be appointed after proposing to the Project Authority a panel of 3 names of qualified and experienced firms from which the Project Authority may choose 1 to be the Safety Consultant

Safety Consultant


- If any work(s) recommended by the Safety Consultant fall beyond the scope , the Contractor shall make a report thereon and seek the instructions of the Authority for Change in Scope.
 - The Safety Consultant to be engaged by the Contractor shall be independent of the design and implementation team of the Contractor.
- 
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Design & Drawings

Proof Consultant

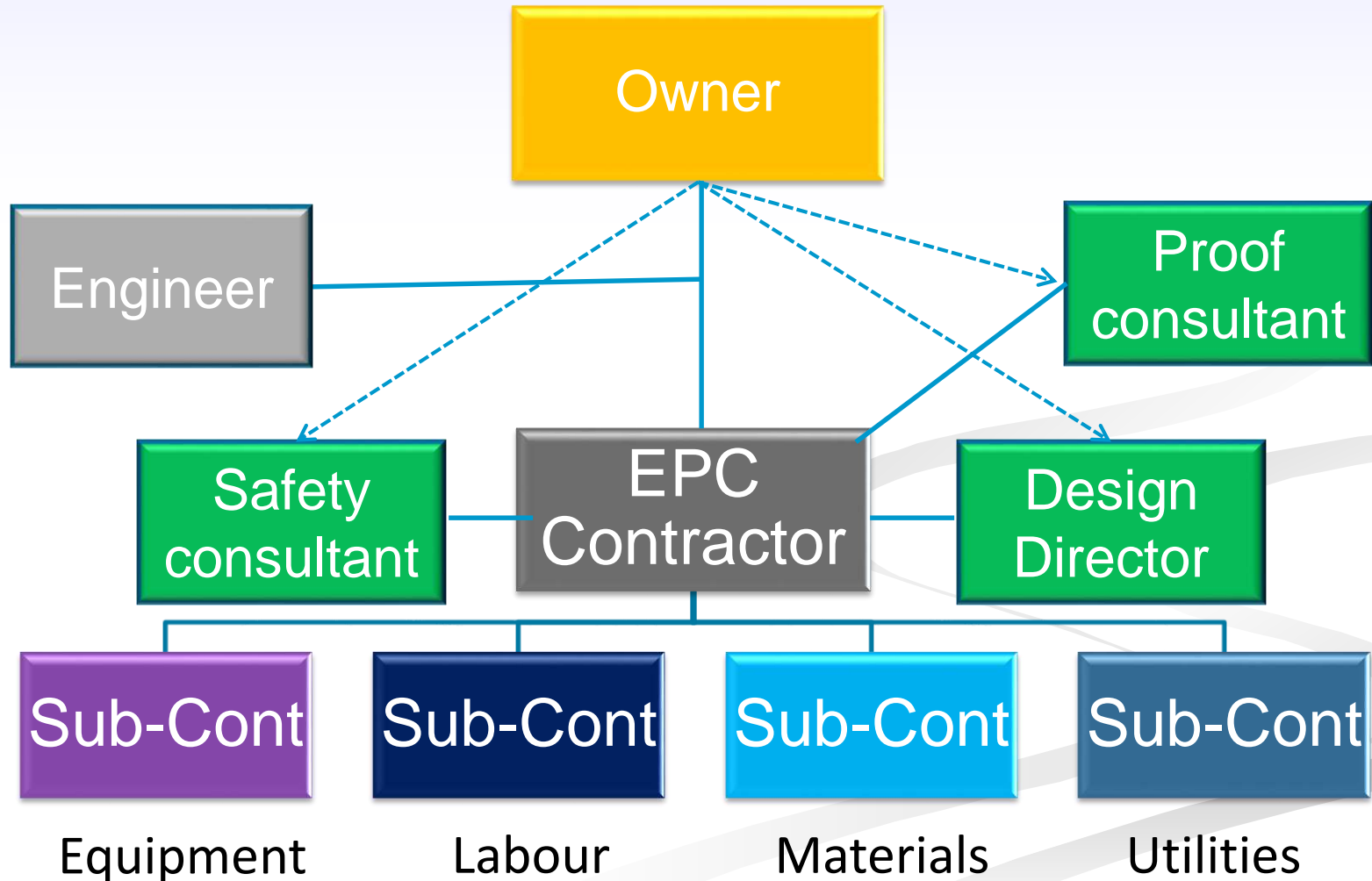
- The Contractor shall appoint a proof check consultant (the “Proof Consultant”) after proposing to the Authority a panel of 3 names of qualified and experienced firms from whom the Authority may choose 1 to be the Proof Consultant.
- The Proof Consultant shall (a) evolve a systems approach with the Design Director so as to minimise the time required for final designs and construction drawings and (b) proof check the detailed calculations, drawings and designs, which have been approved by the Design Director

Authority's Engineer

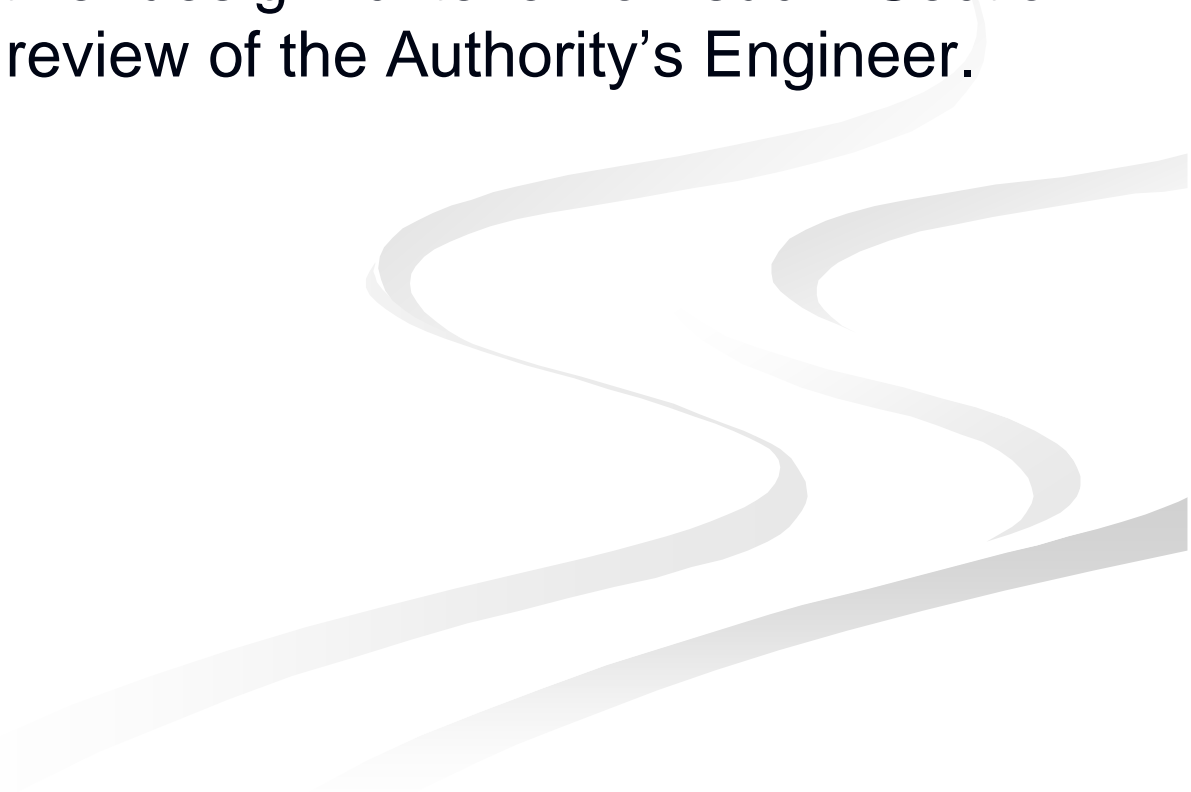
- The Project Authority shall, within 15 days of the date of the contract, appoint an engineer (the “Authority’s Engineer”) to discharge the functions and duties specified in this Agreement, and
 - This appointment will be communicated to the contractor
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EPC Contract

Simplified structure



Design & Drawings

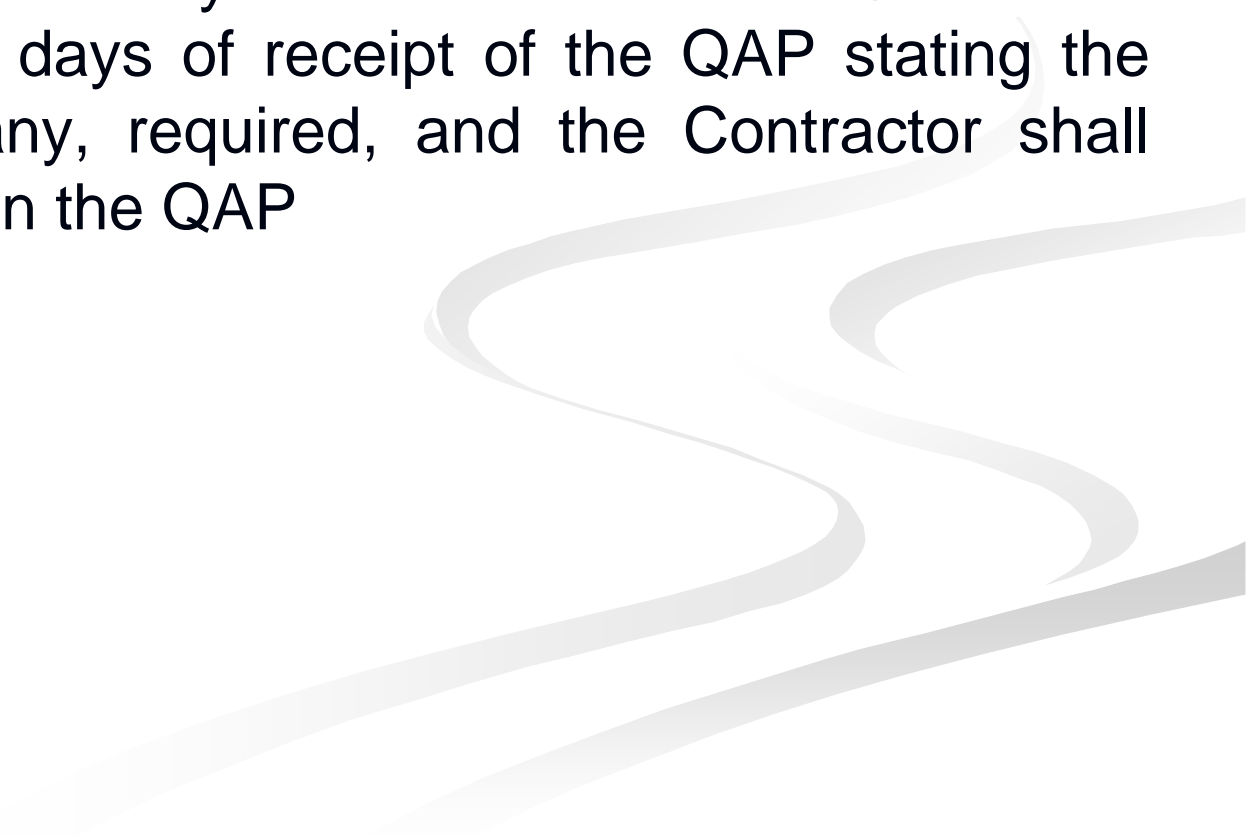
- Design and Drawings shall be developed in conformity with the Specifications and Standards set forth in the contract.
 - In the event, the Contractor requires any relaxation in design standards due to restricted Right of Way in any Section, the alternative design criteria for such Section shall be provided for review of the Authority's Engineer.
- 
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Quality of materials

- The Contractor shall ensure that the construction, materials and workmanship are in accordance with the requirements specified in the contract, specifications and standards and Good Industry Practice
- The Contractor warrants that all materials shall be new, unused, not reconditioned and in conformity with specification and standards, applicable Laws and Good Industry Practice, and that the Contractor shall not use any materials which are generally recognised as being deleterious under Good Industry Practice

Quality assurance plan

Contractor to submit QAP

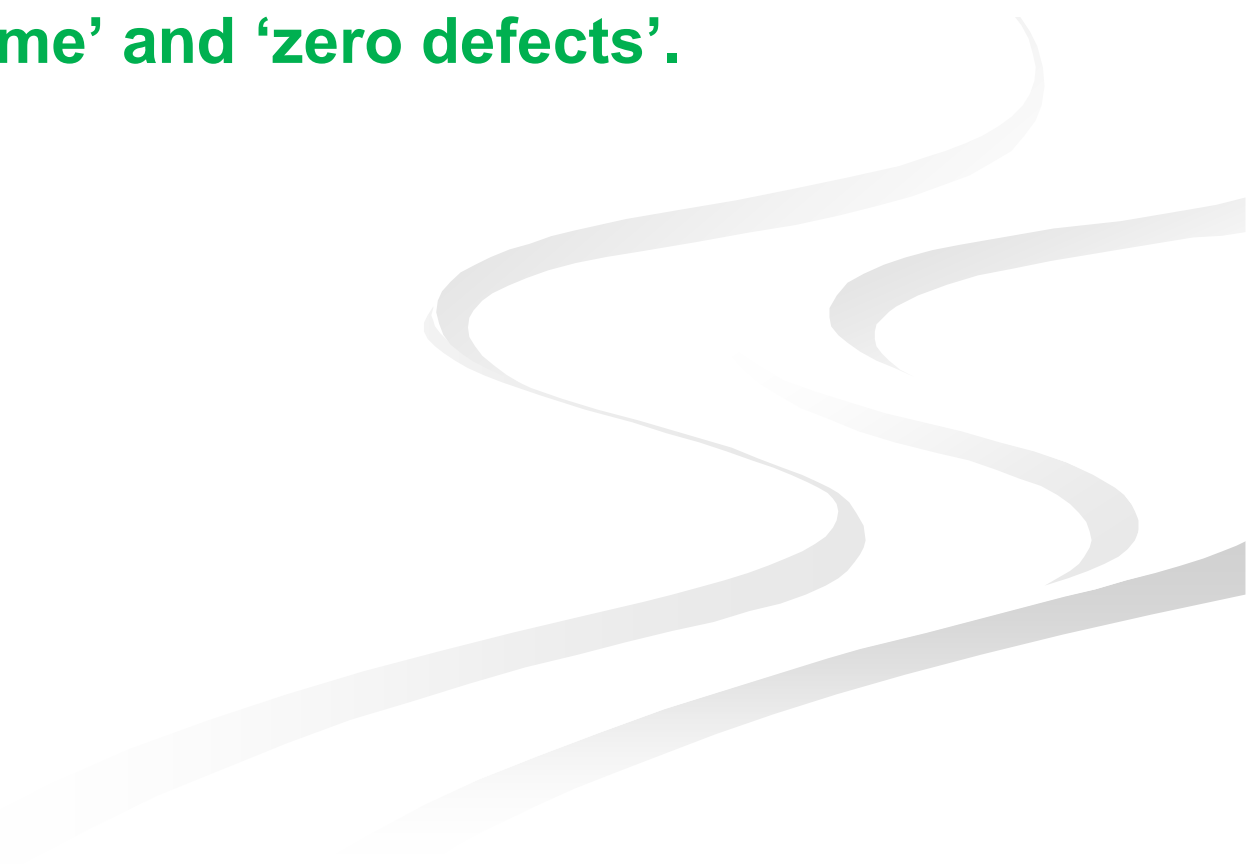
- The Contractor shall Prepare a comprehensive Quality Assurance Plan and submit it to the Project authority's engineer within 30 days
 - The engineer shall convey his comments to the Contractor within a period of days of receipt of the QAP stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP
- 

Advance payment

- The Project Authority shall make an advance payment equal to 10% (15% for large value and complex projects) of the contract price, for mobilisation expenses and for acquisition of equipment against bank guarantee of 110% of value of each installment.
- The Advance Payment shall carry simple interest at the rate of 8% (eight per cent) per annum and shall be made in two equal installments within 15 days of receipt of respective requests.

What is Quality?

Philip Crosby

- Quality is conformance with requirements that the company itself has established for its products, based directly on customer needs
 - **‘Do it right first time’ and ‘zero defects’.**
- 
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Quality Assurance


Inspection

- Inspection involves checking against what is required for any parameter:
 - For this, clear procedure for measuring the characteristics of a product or service is required. Only then a comparison with the 'requirement' can be made.
- **We cannot say:** since it was the first time, it didn't go well
- **Quality has to be sustained right from the word 'GO'.**
First product must be as good as last product
- Our QA system should be similar to 'Brands' which have good quality control systems

Inspection by Project Authority's engineer

- The Project Authority's Engineer and its authorised representative shall at all times:
 - (a) have full access to all parts of the site and to all places from which natural Materials are being obtained for use in the works; and
 - (b) during production, manufacture and construction at the site and at the place of production, be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of materials.

Inspection by PA's senior engineer & his team

- The Project Authority or any representative authorised by the Authority in this behalf may inspect and review the progress and quality of the construction of works and
 - Issue appropriate directions to the Authority's engineer and the contractor for taking remedial action in the event the works are not in accordance with the provisions of the contra.
- 

External technical audit by an expert & his team

- At any time during construction, Project Authority may appoint an external technical auditor to conduct an audit of the quality of the Works.
- The findings of the audit, to the extent accepted by the Project Authority, shall be notified to the Contractor and the Project Authority's Engineer for taking remedial action in accordance with the contract.
- The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit hereunder

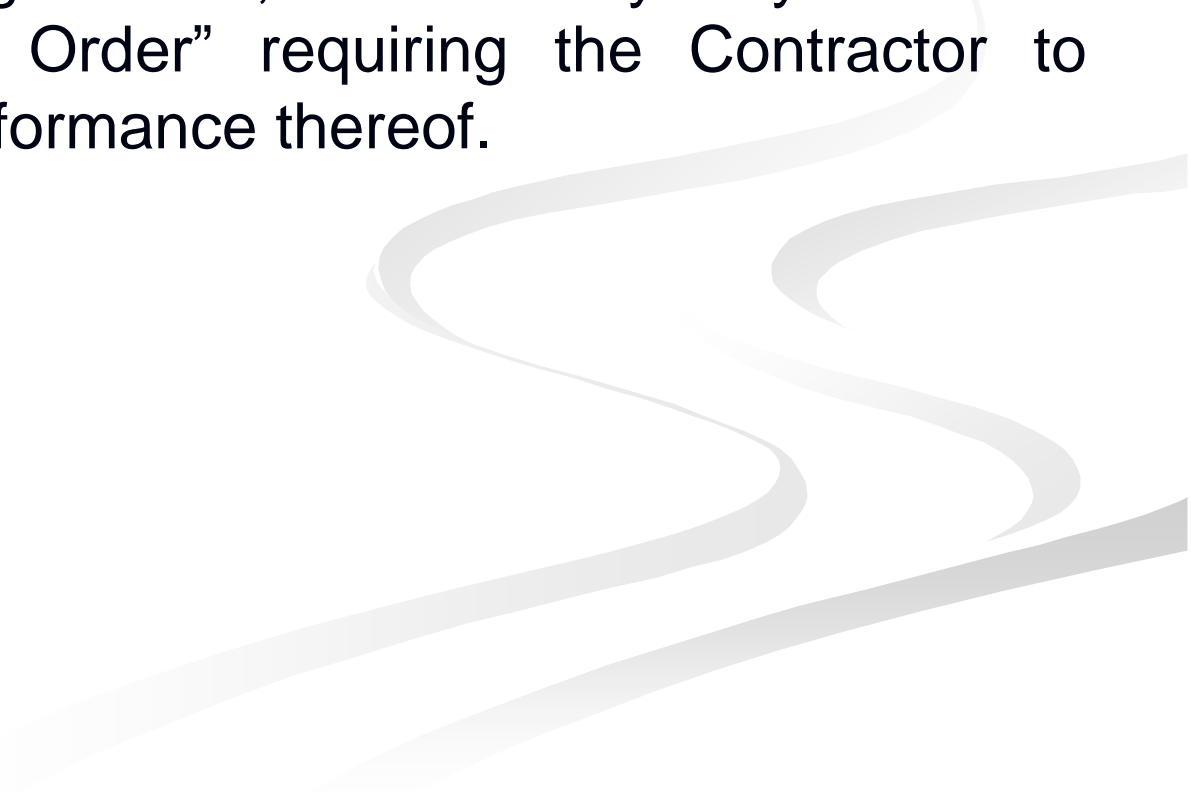
Change in Scope

On PA's request

- If the Project Authority determines that a Change of Scope is necessary, it may ask its Engineer to issue a notice to the Contractor specifying the details of the works and services contemplated thereunder (the “Change of Scope Notice”).
- Upon receipt of a Change of Scope Notice, the Contractor shall, with due diligence, provide to the Authority, the options for implementing the proposed Change in Scope and the effect each such option would have on the costs and time thereof


Change in Scope

Issue of change order/ amendment

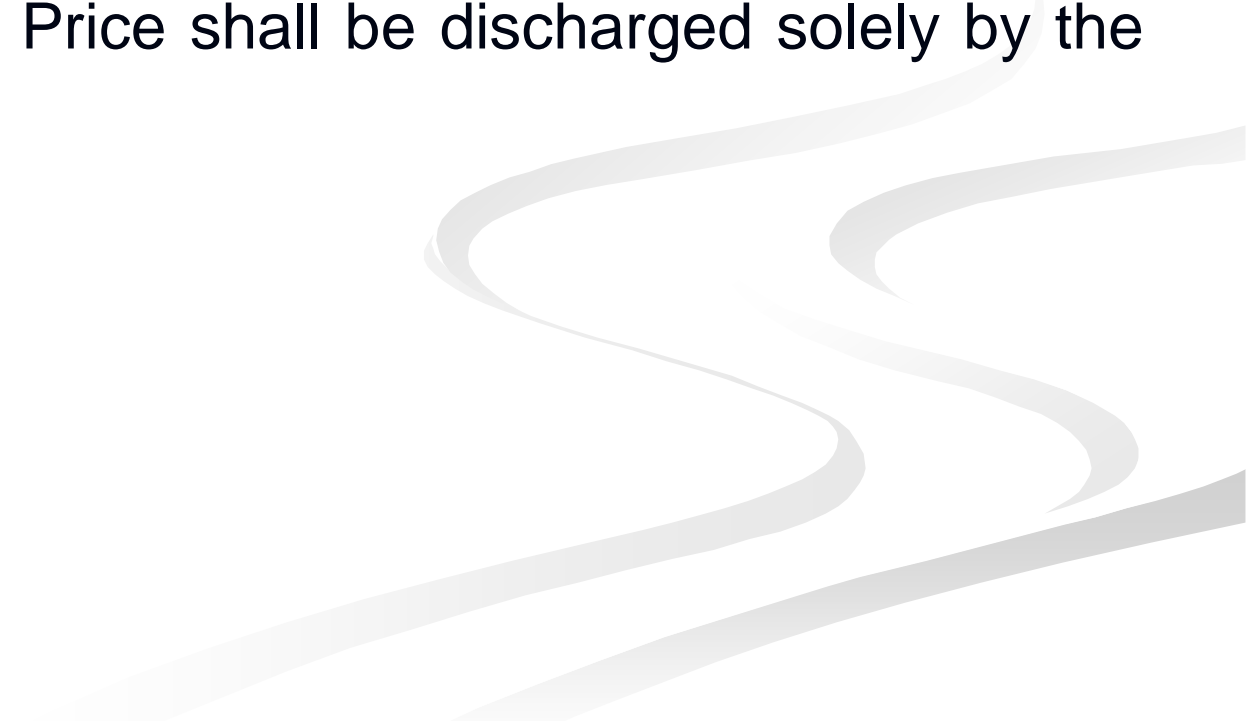
- The Project Authority may negotiate with the contractor to arrive at a reasonable cost and time line to carry out the change in scope
 - Upon reaching an agreement, the Authority may issue the “Change of Scope Order” requiring the Contractor to proceed with the performance thereof.
- 

Assignment

Project Authority can decline

- This Agreement/Job shall not be assigned by the Contractor to any person, save and except with the prior consent in writing of the Project Authority.
 - The Project Authority shall be entitled to decline the request for assignment without assigning any reason. The decision of Project authority shall be final and binding on the contractor.
- 

Sub-Contracting

- For the purposes of computing the value of sub-contracts , the Contract Price shall exclude any sub-contract for the procurement of goods and equipment such as [bitumen, cement, steel and equipment].
 - This obligation to carry out Works corresponding to at least 30% the Contract Price shall be discharged solely by the Lead Member.
- 

Sub- Contracting

(Sub-contractor performing > 5% but < 10%)

- In the event any sub-contract for Works, or the aggregate of such sub-contracts with any Sub-contractor, exceeds 5% of the Contract Price, the Contractor shall communicate the name and particulars, including the relevant experience of the sub-contractor, to the Project Authority prior to entering into any such sub-contract.

Sub- Contracting

(Sub-contractor performing > 5% but < 10%)

- The Project Authority shall examine the particulars of the sub-contractor from the National Security and Public Interest perspective and may require the Contractor, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, not to proceed with the sub-contract, and the Contractor shall comply therewith.


Sub- Contracting

(Qualifying the Sub-Contractor performing > 10%)

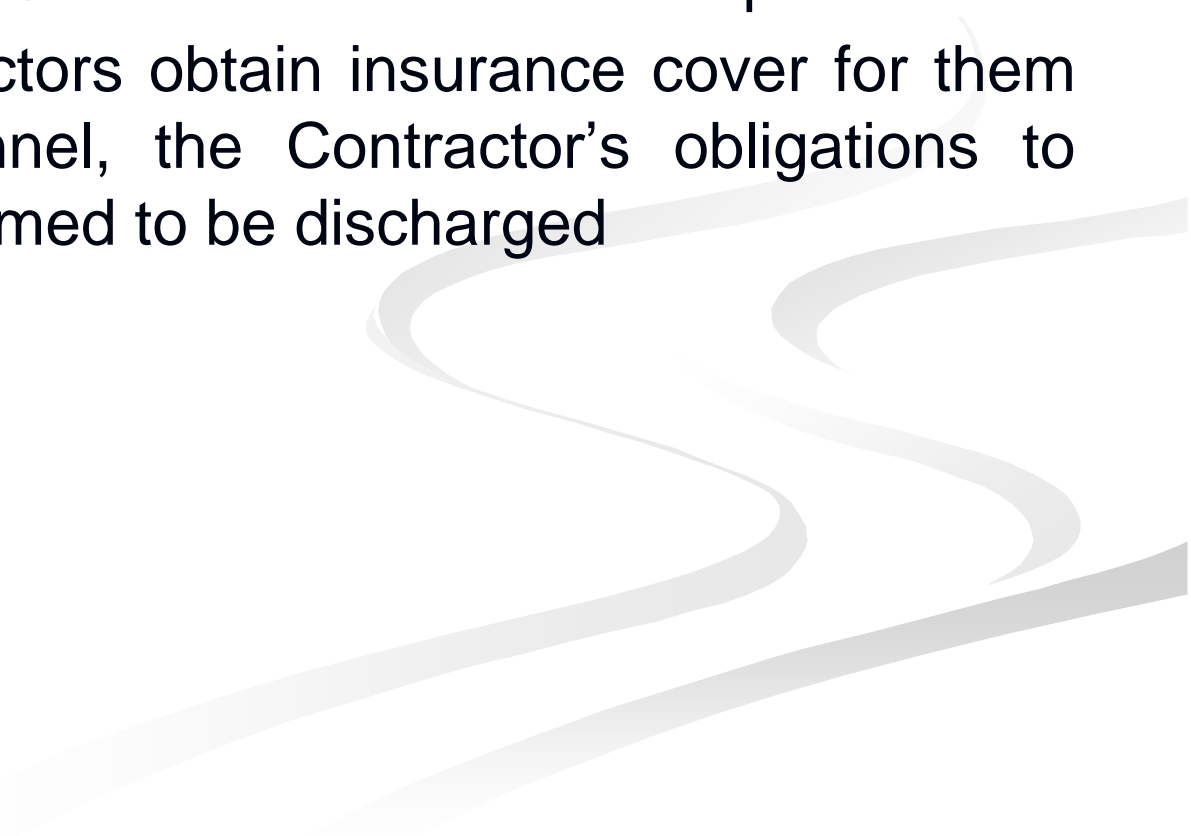
- If any sub-contract (total exceeding.. say 10 %) relates to a sub-contractor who has, over the preceding 3 years, **not** undertaken at least one work of a similar nature with a contract value exceeding 40% of the value of the sub-contract to be awarded hereunder and received payments in respect thereof for an amount equal to **at least 80%** of such contract, the Authority may, no later than 15 business days from the date of receiving the communication from the Contractor, require the Contractor not to proceed with such sub-contract, and the Contractor shall comply therewith

Sub- Contracting

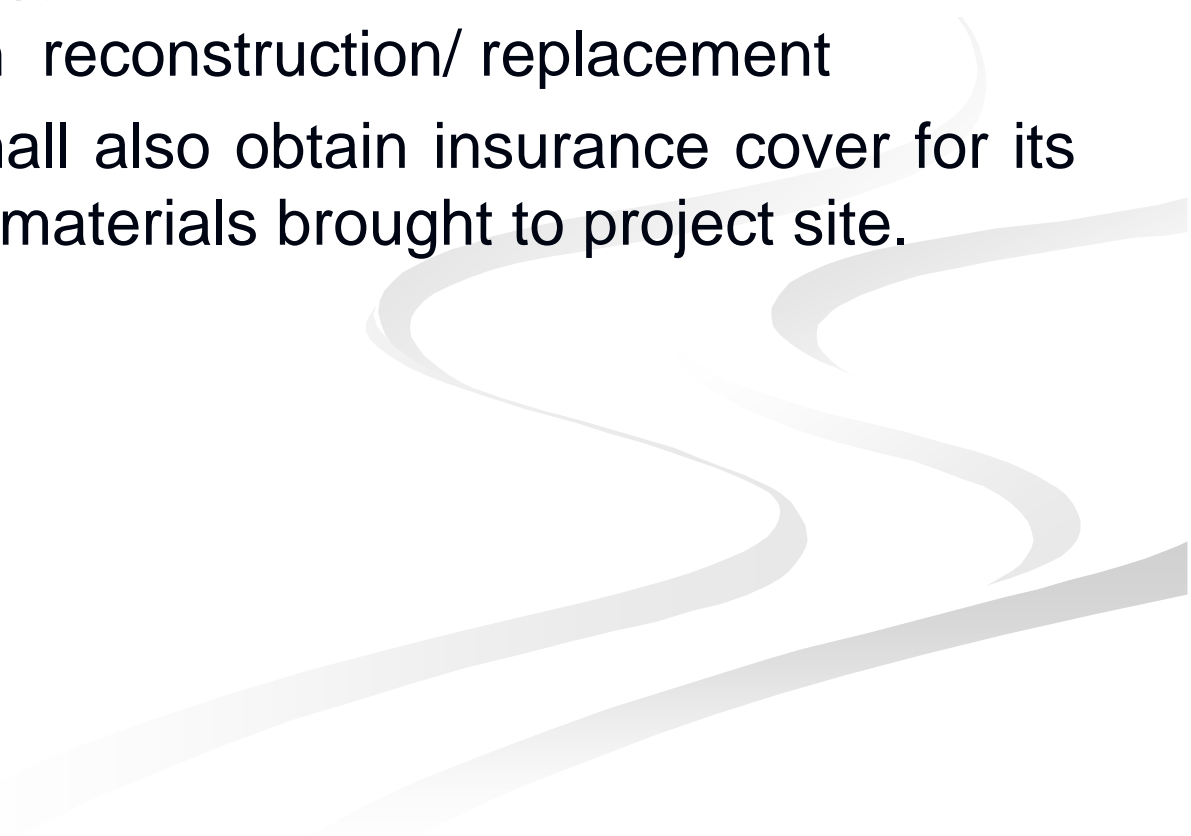
Liability rests with Contractor

- The contractor shall, at all times, be responsible and liable for all its obligations under this contract notwithstanding anything contained in the agreements with its Sub-contractors or any other agreement that may be entered into by the contractor, and no default under any such agreement shall excuse the contractor from its obligations or liability hereunder
- 

Insurance against accident to workmen

- The Contractor shall obtain insurance cover for its own personnel and any other persons employed by it on the project
 - This shall include Sub-contractors and their personnel
 - If the Sub-contractors obtain insurance cover for them and their personnel, the Contractor's obligations to insure will be deemed to be discharged
- 

Insurance for works, plant & machinery


- The contractor shall obtain insurance cover for works, Plant and Materials from the date of appointed date till the date of issue of completion certificate.
 - This shall be 15% in excess of the value to cover additional costs in reconstruction/ replacement
 - The contractor shall also obtain insurance cover for its own equipments, materials brought to project site.
- 

Accident or injury to workmen

Indemnity

- Notwithstanding anything contained in this agreement, it is hereby expressly agreed between the parties that the Project Authority shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or Sub-contractor, save and except as for death or injury resulting from any act, omission or default of the Project Authority, its agents or servants.

Accident or injury to workmen

- The contractor shall **indemnify and keep indemnified** the Project Authority from and against all such claims, (previous slide) proceedings, damages, costs, charges, and expenses whatsoever in respect of the above save and except for those acts, omissions or defaults for which the Project Authority shall be liable.
- 

Time for completion of Project

L/D @ 0.05% per day

- The Contractor shall construct the project in accordance with the Project Completion Schedule set forth in ...
- If the Contractor fails to achieve any Project Milestone or any Scheduled Completion Date within a period of 30 days from the date set forth therein, it shall pay damages to the Project Authority
- The damages will be calculated @ 0.05% of Contract Price for delay of each day (subject to a ceiling of...)
- **Delay attributable to FM and Project Authority shall be excluded**

Time for completion of Project

L/D to be refunded if project completed on time

- If the Works are completed within or before the Scheduled Completion Date including any Time Extension, the damages paid shall be refunded by the Authority to the Contractor, but without any interest thereon.
- It is agreed that recovery of damages under this Clause shall be without prejudice to the rights of the Authority under this contract including the right of Termination thereof.

Contract Price and weightages

- The Contract Price is Rs.....say,150 crs
- Proportions of contract price for different stages of construction of the Project shall be as under

Item	% Weig-tage	Stage of Payment	% Weig-tage
Road works including culverts, Minor bridges, underpasses, overpasses	*****	1)Earth work	*****
		2)Granular work	*****
		3)Bituminous wrk	*****
		4) Culverts	*****
		5) Minor bridges	*****

Weightage in percentage to the contract price

Determination of value of work done for stage payment

- Contract Price - Rs 150 crsP
- Total length of road is 100 KMs.....L
- 10 Kms of bituminous work done by contractor...I
- Weightage for road work (wr).....say 0.8
- Weightage for bituminous work (wb)..... say 0.05
- Value = {P x wr x wb } x (I/L)
- Value = {150 x 0.8 x 0.05} x (10/100)= Rs 60,00,000

Note- This determination will vary from case to case

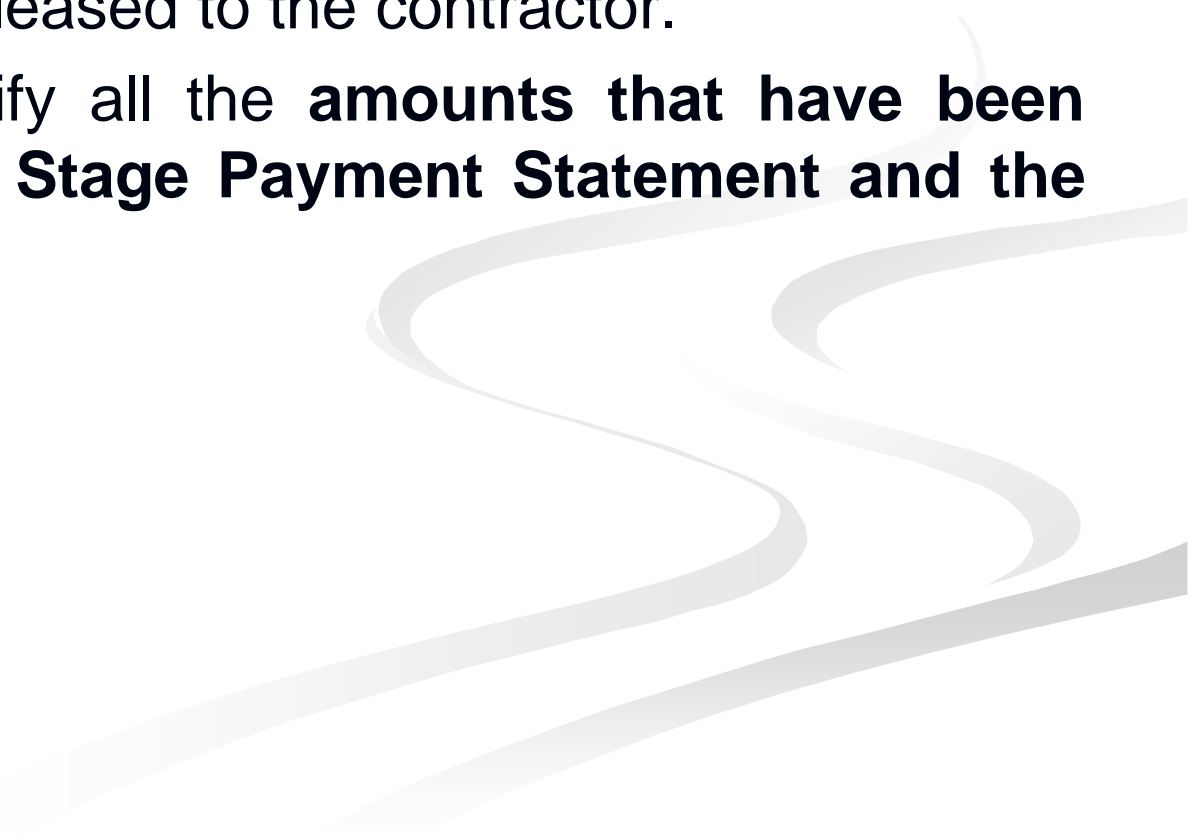
Stage payment statement (Bill)

- The contractor shall submit a statement (Stage Payment Statement), by the 7th day of a month to the Authority's Engineer in the required form with supporting documents, showing the amount due to him for the completed stage(s) of works.
- The contractor shall not submit any claim for payment of incomplete stages of work. If there is no claim for a month, the contractor shall submit a 'Nil' claim to the Authority's Engineer

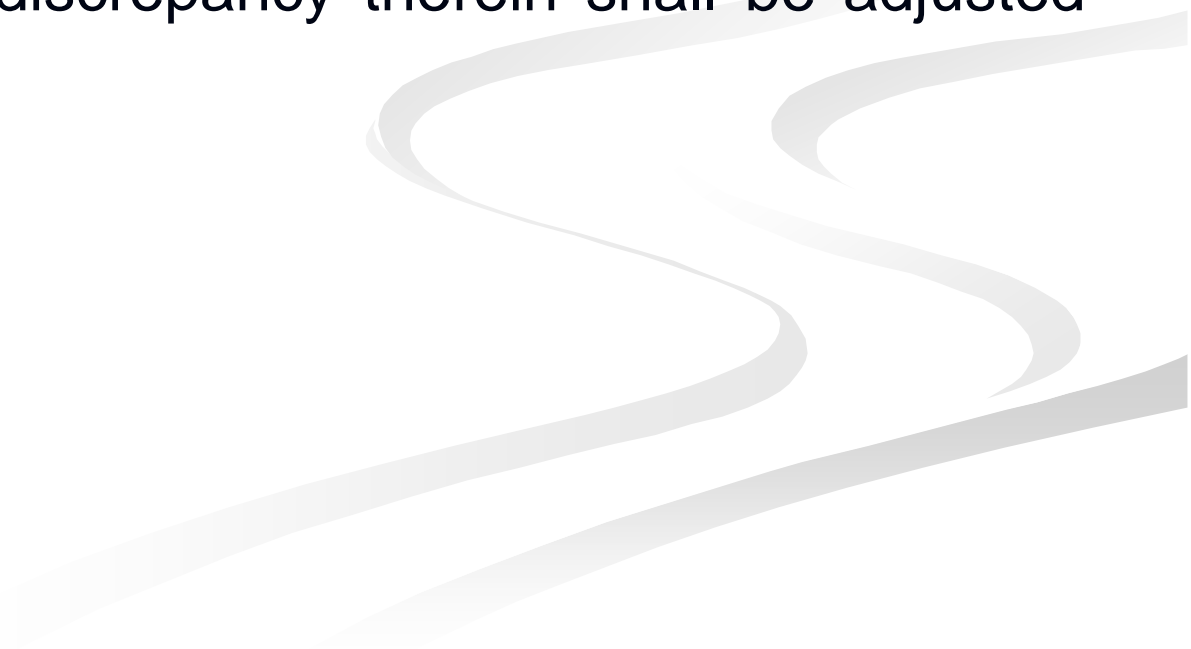
Stage payment

- Within 10 days of receipt of Stage Payment Statement , Project Authority's Engineer shall **broadly** determine the amount due to the Contractor and recommend the release of 90% of the amount so determined as part payment against the Stage Payment Statement, pending issue of the Interim Payment Certificate by Project Authority's Engineer.
- Within 10 days of the receipt of recommendation of the Authority's Engineer, the Authority shall make an electronic payment thereof directly to the Contractor's bank account.

Stage payment- IPC

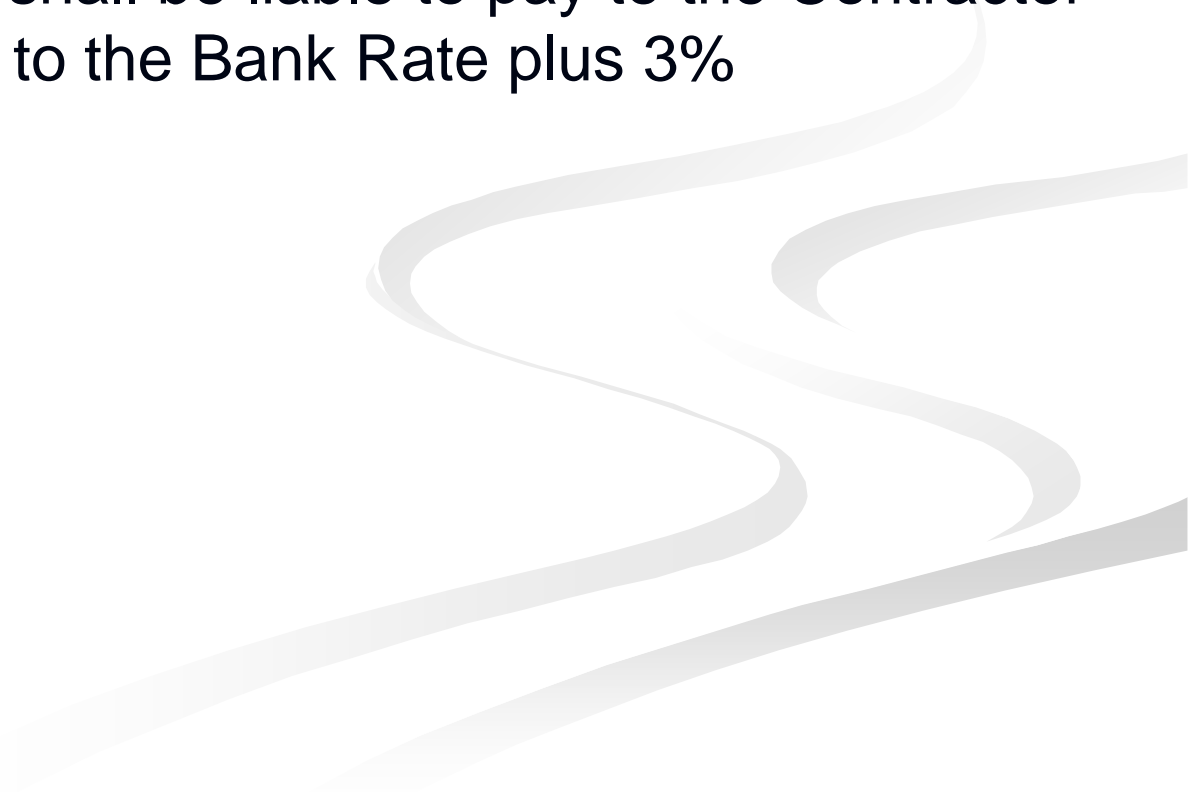
- Within 15 days of the receipt of the Stage Payment Statement, the Authority's Engineer shall deliver to the Authority and the contractor, an IPC certifying the amount due and payable to the contractor, after adjusting the payments already released to the contractor.
 - The IPC shall specify all the **amounts that have been deducted from the Stage Payment Statement and the reasons therefor.**
- 

Stage payment (Time 30 days)

- Payment shall be made within 30 days from the date of submission of the Stage Payment Statement by the contractor to the Authority's Engineer for certification.
 - If Interim Payment Certificate (IPC) is not issued by the Authority's Engineer within 30 days, the Authority shall pay the amount shown in the Contractor's Stage Payment Statement and any discrepancy therein shall be adjusted in the next IPC.
- 

Stage payment

(Interest due to delay)

- In case of failure of the Project Authority to make payment to the contractor within 30 days from the date of submission of Stage Payment Statement by the contractor, the Project Authority shall be liable to pay to the Contractor interest at rate equal to the Bank Rate plus 3%
- 

Price adjustment/ variation

Road Works(RW)

- Price adjustment/variation for Road works and other works shall be paid in accordance with the following formula:
- $$VRW = 0.85 RW \times [PL \times (LI - LO) / LO + PA \times (AI - AO) / AO + PF \times (FI - FO) / FO + PB \times (BI - BO) / BO + PM \times (MI - MO) / MO + PC \times (CI - CO) / CO + PS \times (SI - SO) / SO]$$
- RW- Value of work done for completion of a stage
- VRW- Variation payable

Price adjustment/ variation

Bridges(BR)

- Price adjustment/variation for major Bridges and Structures shall be paid in accordance with the following formula:
- $$VBR = 0.85 BR \times [PL \times (LI - LO)/LO + PA \times (AI - AO)/AO + PF \times (FI - FO)/FO + PM \times (MI - MO)/MO + PC \times (CI - CO)/CO + PS \times (SI - SO)/SO]$$
- BR- Value of work done for completion of a stage
- VBR- Variation payable

Percentages contributions for variation

Component	Earth work and other works %	Bituminous Work %	Cement Concrete pavement	Culvert Minor Brigde	Major Bridges/ Structures
Labour (PL)	20	20	20	15	15
Cement (PC)	5	Nil	20	15	15
Steel (PS)	Nil	Nil	Nil	15	20
Bitumen (PB)	Nil	15	Nil	Nil	Nil
Fuel and Lubricants (PF)	10	10	10	10	10
Other materials (PM)	50	40	35	30	25
Plant, machinery and spares (PA)	15	15	15	15	15

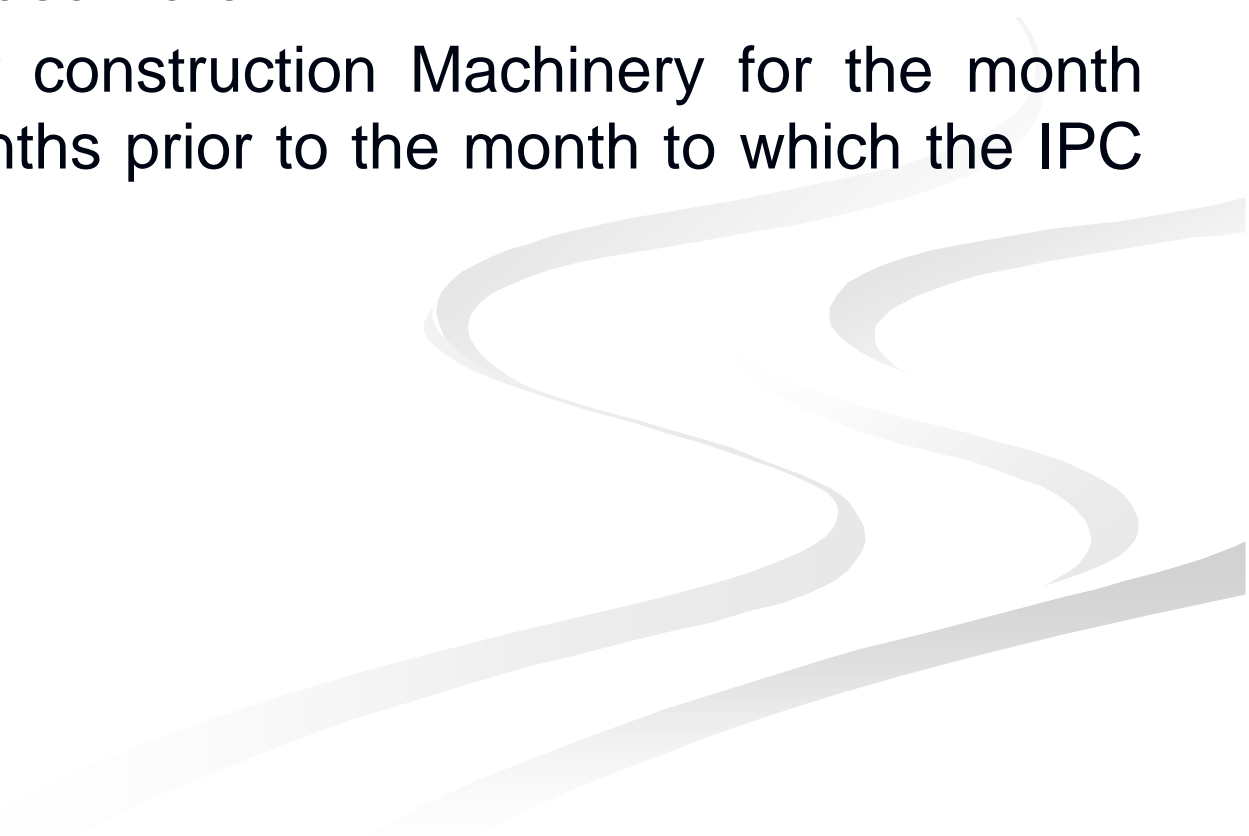
Price adjustment/ variation

(Factors)

- PB, PC, PL, PM, and PS are the percentages of Bitumen, Cement, Labour, other Materials, and Steel/components (including strands and cables) respectively for the relevant items
- PA is the percentage of Plant, Machinery and spares component for the relevant items.
- PF is the percentage of Fuel and lubricants for the relevant items.

Price Index

(Machinery)

- AO= The wholesale price index as published by the Ministry of Commerce & Industry, Government of India (hereinafter called “WPI”) for construction Machinery for the month of the Base Date
 - AI = The WPI for construction Machinery for the month which is three months prior to the month to which the IPC relates
- 

Price Index

(Bitumen, Cement)

- BO = The official retail price of bitumen at the nearest refinery at [say Panipat] on the Base Date
- BI = The official retail price of bitumen at nearest refinery at [say Panipat], on the first day of the month which is three months prior to the month to which the IPC relates
- CO = The WPI for cement for the month of the Base Date
- CI = The WPI for cement for the month which is three months prior to the month to which the IPC relates

Price Index

(Fuel, Lubricant)

- FO=The official retail price of high speed diesel (HSD) oil at the existing consumer pumps of Indian Oil Corporation (“IOC”) in the State of [say in Delhi] on the Base Date
- FI =The official retail price of HSD at the existing consumer pumps of IOC in the State of [say in Delhi] on the first day of the month which is three months prior to the month to which the IPC relates

Price Index (Labour)

- LO = The consumer price index for industrial workers for the [circle **** in the State of Haryana], published by Labour Bureau, Ministry of Labour, Government of India, (hereinafter called “CPI”) for the month of the Base Date
- LI =The CPI for the month which is three months prior to the month to which the IPC relates

Price Index

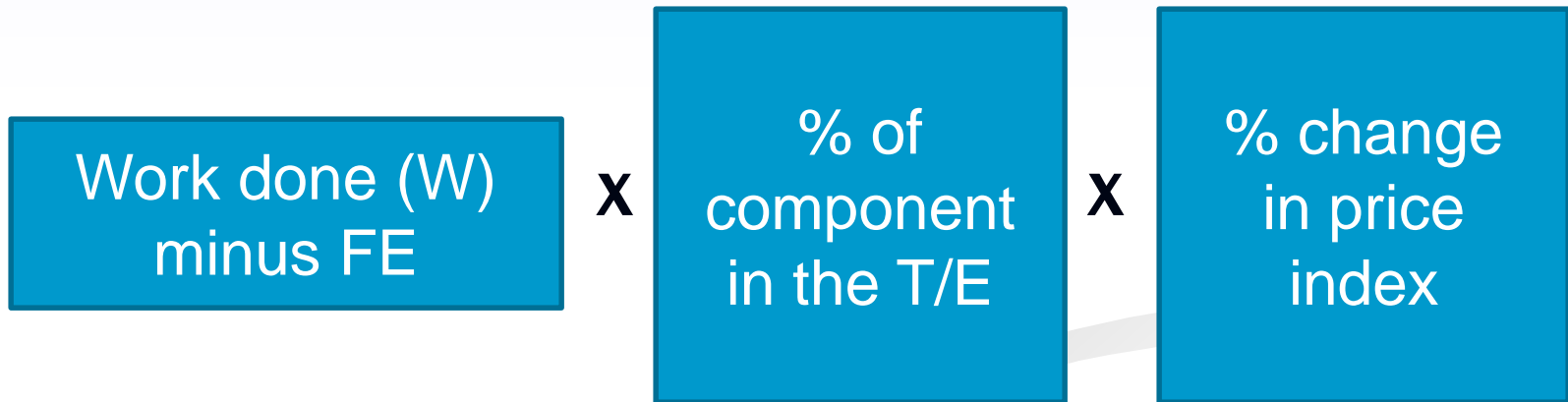
(Steel, Other Materials)

- SO = The WPI for steel (rods) for the month of the Base Date
- SI = The WPI for steel (rods) for the month which is three months prior to the month to which the IPC relates
- MO = The WPI for all commodities for the month of the Base Date
- MI = The WPI for all commodities for the month which is three months prior to the month to which the IPC relates

Price Variation

General Formula

- Price variation Steel, Cement, Labour, Fuel etc



Major Bridge

How to calculate price variation for steel

- Work done $W = 1,00,000$
- Material component (Steel) = 20% weightage for Bridge
- Base price index = 100
- Price index for the quarter in which work done = 110

$$\begin{aligned} \text{Price variation} &= 0.85 \times 1,00,000 \times \frac{20}{100} \times \frac{110 - 100}{100} \\ &= 1700 \end{aligned}$$

Major Bridge

How to calculate price variation for Labour

- Work done $W = 1,00,000$
- Labour component = 15% weightage for Bridge
- Base Labour index = 100
- Labour index for the quarter in which work done = 110

$$\begin{aligned}\text{Price variation} &= 0.85 \times 1,00,000 \times \frac{15}{100} \times \frac{110 - 100}{100} \\ &= 1275\end{aligned}$$

Class exercise: What will the total amount of variation if there is uniform increase of 10% in price of all inputs in a quarter?

General Formula for variation

Cost of materials method

- Price variation Steel, Cement, bricks, Fuel etc

$$\text{Weight of steel} \times \text{Difference in rate}$$

- Steel used 1000 kg during this period
- Difference between (i) the price prevailing during this period and (ii) initial price of steel is Rs 5 per kg
- Variation Rs 5 X 1000 = Rs 5000

Bonus for early completion


(Bonus upto 3%)

- If the Project is completed early, the contractor shall be entitled to receive a bonus equivalent to 0.03% of the contract price for each day by which the Project completion date precedes the Scheduled completion date
- This will be subject to a ceiling of 3% of Contract Price.
- For determining the bonus, the Contract Price shall be the amount specified initially in the contract and shall exclude any revision thereof
- Payment of bonus will be made only after the issue of the Completion Certificate

Monthly Inspection report

- The Project Authority's Engineer shall submit a monthly inspection report to the Project Authority and the contractor bringing out the results of inspections and the remedial action taken by the contractor in respect of Defects or deficiencies.
- Such inspection or submission of Inspection Report by the Project Authority's Engineer shall not relieve or absolve the contractor of its obligations and liabilities under this contract in any manner whatsoever.

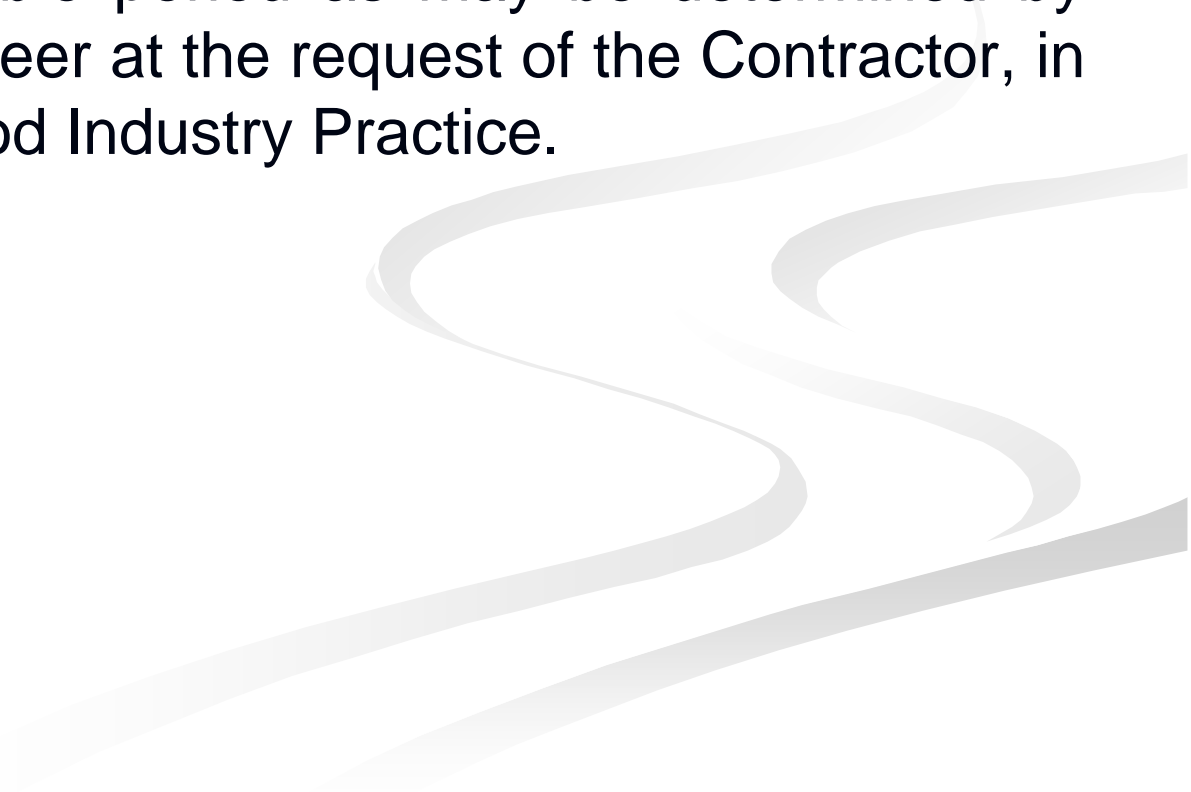
Monthly progress report

- During the Construction Period, the Contractor shall, no later than 10 days after the close of each month, furnish to the Project Authority and the Project Authority's Engineer a monthly report on the progress of Works and shall promptly give such other relevant information as may be required by the Project Authority's Engineer.
- 
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Defect liability period

- The Contractor shall be responsible for all the defects and deficiencies, except usual wear and tear in the Project or any Section thereof, till the expiry of a period of 2 years from the date of Provisional Certificate or expiry of a period of 18 months from the date of Completion Certificate, whichever is later
- The Defects Liability Period for a Structure or Major Bridge having an estimated construction cost exceeding Rs.50 crore each, shall be extended by a further period of 3 years after the expiry of the above Defects Liability Period.

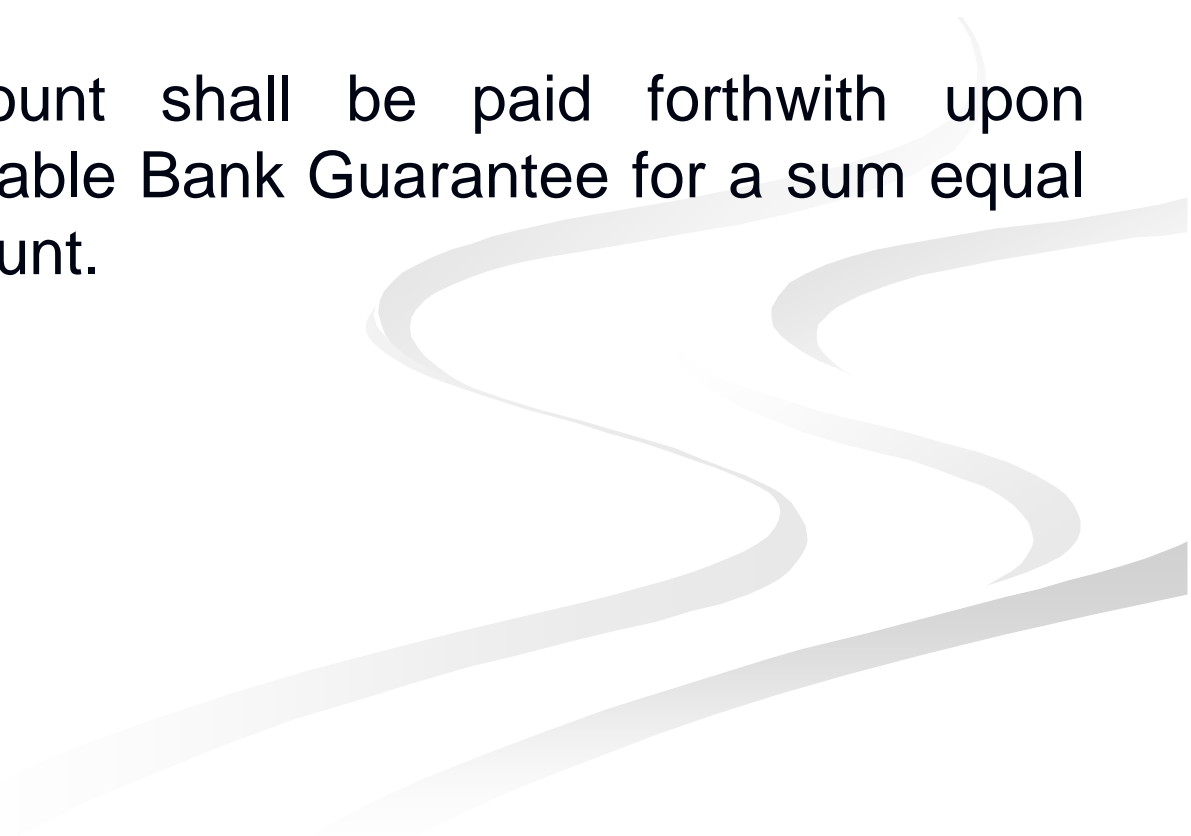
Rectification of defects & deficiencies

- The Contractor shall repair or rectify all defects and deficiencies observed by the Authority's Engineer during the Defects Liability Period within a period of 15 days from the date of notice issued by the Authority's Engineer or within such reasonable period as may be determined by the Authority's Engineer at the request of the Contractor, in accordance with Good Industry Practice.
- 
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Contractor's failure to rectify the defects

- If the contractor fails to repair or rectify the defect or deficiency within the specified period, the Authority shall be entitled to get the same repaired, rectified or remedied at the Contractor's cost .
- All costs consequent thereon shall, after due consultation with the Authority and the Contractor, be determined by the Authority's Engineer. The cost so determined, and an amount equal to 20% (twenty percent) of such cost as Damages, shall be recoverable from any monies due to the contractor

Dispute Resolution

- In the event the party against whom the Award has been granted challenges the Award in a Court of law, it shall make an interim payment to the other party for an amount equal to 75% of the Award, pending final settlement of the Dispute.
 - The aforesaid amount shall be paid forthwith upon furnishing an irrevocable Bank Guarantee for a sum equal to the aforesaid amount.
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Dispute Resolution

- Upon final settlement of the Dispute, the aforesaid interim payment shall be adjusted and any balance amount due to be returned, shall be returned with interest calculated @ 10% from the date of interim payment to the date of final settlement of such balance.
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- The bottom right portion of the slide features several thick, light gray wavy lines that curve and flow across the page, serving as a decorative graphic element.

**Thank you so much
for
active participation**

The background features several thick, light gray wavy lines that flow from the bottom right towards the center, creating a sense of movement and depth.