

Corrigendum -2 for Detailed Design Consultancy (DDC) Services Tender

NAME OF WORK –: Detailed Design Consultancy (DDC) Services for Elevated Viaduct of length 7.795 Km (-0.675km to Ch - 0.050km & Ch 11.230km to Ch 16.755km & Ch: 16.755km to Ch 18.400km) and RoR {Ch: (-) 0+100, 12+400, 16+612 to 16+709} including Double Decker Viaduct (Rail cum Road Flyover) from Ch. 14+562.903 to Ch. 15+680.447, Double Decker Station at Mathikere, Entry /Exit structure, Ramp for Road Flyover, Y-loop ramp, BSTP Viaduct ramp at Benniganahalli, Hebbal, YPR Cabin FOB's , Multi Model Integration works, and other related infrastructural works of Elevated section in between Benniganahalli to YPR Cabin of Corridor -2 and Part work up to substructure from Ch:16+900 to 18+055 (from P 192 / UP 192 to C1-P10) at Yeshwanthpur of Corridor-1, 4nos of Road over Bridge (RoB) and 1nos Road under Bridge (RuB) of Corridor-4, for Bengaluru Suburban Transport Project (BSTP)..

Tender Number: BiRIDE/BSTP/DDC/C2/P1/2026 DATE: 18.08.2026

TENDER ID: 2026_KRIDE_286419_1

Sl. No.	Clause Reference/ Page No.	Amendments
1.	Section-V Terms of the reference (ToR) Clause-10 CHECKING PROCEDURES	Replace The purpose of the checking shall be to ensure accuracy and consistency, as well as compliance with current requirements, standards, codes and the requirements of this and contract document. Proof-checking agency to be engaged by Bi-RIDE with each batch of documentation for acceptance at the final submission and subsequent submissions. With The purpose of the checking shall be to ensure accuracy and consistency, as well as compliance with current requirements, standards, codes and the requirements of this and contract document. Proof-checking agency to be engaged by Detailed Design Consultant (DDC) with each batch of documentation for acceptance at the final submission and subsequent submissions.
2.	PCC 2.7.3.2 (v), Effect of Cessation	Replace V) For the incomplete modules Bi-RIDE may obtain the services from other agencies at Implementation Partner's risk and cost, upon such terms and in such manner as it deems appropriate and the Contractor shall be liable to the Bi-RIDE for payment of any excess cost over and above what was agreed to in the contract for such similar services. With V) For the incomplete modules Bi-RIDE may obtain the services from other agencies at Implementation Partner's

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		risk and cost, upon such terms and in such manner as it deems appropriate and the Detailed Design Consultant (DDC) shall be liable to the Bi-RIDE for payment of any excess cost over and above what was agreed to in the contract for such similar services.
3.	PCC Additional Clause 13	Replace: Wherever the contract is terminated under Clause 15.2, the Performance Guarantee shall be encashed by the Employer: With Wherever the contract is terminated under Clause 2.7, the Performance Guarantee shall be encashed by the Employer:
4.	PCC Additional Clause 16	Replace: The Consultant shall provide to the Authority, within 30 days of the Commencement Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The professional liability cover shall be for a sum of not less than [6% (Six per cent)] of the Contract Price and shall be maintained until the end of the Defects Liability Period. With The Consultant shall provide to the Authority, within 30 days of the Commencement Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The professional liability cover shall be for a sum of not less than value equal to the Contract Price and shall be maintained until the end of the Defects Liability Period.
5.	Additional Clause 19	Added to the PCC: DDC shall not be considered liable for any loss or damage resulting from any occurrence unless a claim is formally made with him before the expiry of the relevant period stated in the Conditions of Contract, or such an earlier date as may be prescribed by law. The duration of Liability shall be up to 36 months reckoned from the date the Viaduct & Station building are brought into use for Commercial Train Operations.
6.	Section II, DATA SHEET	Replace: In this tender, a tender security/ EMD/ Bid Security of INR ₹ 6.5 lakhs./ (Rupees Six lakhs fifty thousand only) shall have to be

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	Information to Consultants Clause 1.11	paid. The instrument type for payment of tender security/ EMD shall be Demand Draft, Bank Guarantee, e-Bank Guarantee, RTGS & NEFT. No other mode of payment will be accepted. With: In this tender, a tender security/ EMD/ Bid Security of INR ₹ 6.5 lakhs./ (Rupees Six lakhs fifty thousand only) shall have to be paid. The instrument type for payment of tender security/ EMD shall be Demand Draft, Bank Guarantee, e-Bank Guarantee, RTGS, NEFT & Insurance Surety Bond. No other mode of payment will be accepted. In the case of Joint Venture (JV), the EMD/Tender Security shall be furnished in the name of the JV and in favour of Bi-RIDE. Such security shall be submitted by the Lead Member or any other member of the JV on behalf of the JV.
7.	Particular Conditions of the Contract Additional Clause-13 Performance Security: 3% of the Contract Value:	Replace: The Contractor shall obtain (at his cost) a Performance Security, for proper performance of the contract, for the amount, currencies and validity period for Performance Security. The Contractor shall deliver the Performance Security to the Employer after receiving the letter of Acceptance, and shall send a copy to the Engineer. The Performance Security/additional Performance Security shall be issued by a bank and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form as given in Section 6 or in another form specifically approved by the Client. The Performance Security/additional Performance Security shall be, at the Contractor's option, in any of the following forms: An unconditional Bank guarantee in the prescribed format A Pay Order / Demand Draft drawn on a Scheduled / Nationalized Bank in India in favour of “ Bengaluru Integrated Rail Infrastructure Development Enterprise Limited (Bi- RIDE)” payable at Bengaluru FDR in favour of “ Bengaluru Integrated Rail Infrastructure Development Enterprise Limited ” (free from any encumbrance). A deposit of cash or online bank transfer to BI-RIDE account. With: The Contractor shall obtain (at his cost) a Performance Security, for proper performance of the contract, for the amount, currencies and validity period for Performance Security. The Contractor shall deliver the Performance Security to the Employer after receiving the letter of Acceptance, and shall send a copy to the Engineer. The Performance Security/additional Performance Security shall be issued by a bank and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form as given in Section 6 or in another form

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		specifically approved by the Client. The Performance Security/additional Performance Security shall be, at the Contractor's option, in any of the following forms: An unconditional Bank guarantee in the prescribed format A Pay Order / Demand Draft drawn on a Scheduled / Nationalized Bank in India in favour of " Bengaluru Integrated Rail Infrastructure Development Enterprise Limited (Bi- RIDE)" payable at Bengaluru FDR in favour of " Bengaluru Integrated Rail Infrastructure Development Enterprise Limited " (free from any encumbrance). A deposit of cash or online bank transfer to BI-RIDE account. Insurance Surety Bond. The Insurance Surety Bond shall be issued by an Insurance Company authorized by the Insurance Regulatory and Development Authority of India (IRDAI) and shall be payable in India in favour of Bengaluru Integrated Rail Infrastructure Development Enterprise Limited (Bi-RIDE). It shall conform to the prescribed format provided in Attachment- A. In the case of Joint Venture (JV), the Performance Security and/or Additional Performance Security shall be furnished in the name of the JV and in favour of Bi-RIDE. Such security shall be submitted by the Lead Member or any other member of the JV on behalf of the JV.
8.	Section- V ToR, ANNEXURE-I BUILDING INFORMATION MODEL (BIM) REQUIREMENTS	Added the following BIM MANUAL as Attachment - B
9.	GAD's	Added the Mathikere station GAD as attachment
10.	Particular Conditions of the Contract Additional Clause-15	Replace: i) The Contract Agreement ii) The Letter of acceptance iii) Amendments to the tender documents issued by the Employer if any iv) Responses to the pre bid queries issued by the Employer if any v) Financial Bid

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		vi) Invitation for Bids vii) Instructions to the bidders viii) Scope of work ix) Particular Conditions of Contract x) The General Conditions of Contract xi) The consultant's proposal and xii) Any other document forming part of the contract With: 1) The Contract Agreement 2) The Letter of Acceptance. 3) Clarifications, addenda, and corrigenda issued to the RFP document. 4) Bid Price. 5) Terms of Reference (ToR) 6) Particular Conditions of the Contract 7) General Conditions of Contract. 8) Invitation for Bids 9) Instructions to Consultant 10) Consultant's Proposal/Submittal and 11) Any other document forming part of the Contract.
11.	Particular Conditions of the Contract Additional Clause-14	Replace: The Security Deposit shall be 5% of the contract value. Security Deposit may be deposited by the Contractor before release of first on account bill in cash or Term Deposit Receipt issued from Scheduled Bank in favour of BI-RIDE free from any

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		encumbrance, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Contractor, Bi-RIDE may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Security) may not exceed 10% of the total value of the contract. With: The Security Deposit shall be 5% of the contract value. Security Deposit may be deposited by the Contractor before release of first on account bill in cash or Term Deposit Receipt issued from Scheduled Bank in favour of BI-RIDE free from any encumbrance, or may be recovered at the rate of 6% of the bill amount till the full Security Deposit is recovered. Provided also that in case of defaulting Detailed Design Consultant (DDC), Bi-RIDE may retain any amount due for payment to the Contractor on the pending "on account bills" so that the amounts so retained (including amount guaranteed through Performance Security) may not exceed 5% of the total value of the contract.
12.	Section – 5 ANNEXURE-II GREEN BUILDING CERTIFICATION FACILITATION	Added the following: 4 Software Used 1 Ecotect (Preliminary design, site analysis, solar radiation, shading, and sun path analysis). 2 DOE 2.1 E (Visual DOE 4.1 Interface and manual editing for advanced options) 3 DOE 2.2 (eQUEST interface with manual editing for advanced options) 4 Energy Plus (Design Builder interface with manual editing as needed) 5 Radiance (For detailed daylighting design) 6 Ansys Fluent (CFD software for advanced HVAC and natural ventilation analysis) 7 Dialux and Calculux (for landscape and exterior lighting analysis) 8 Any other software that may be required to carry out day lighting simulation that is acceptable to the rating body.
13.	DATA SHEET Information to Consultants 5.3 A Technical Eligibility Criteria: Minimum Eligibility Criteria:	Replace: Bidder must have Successfully completed/Substantially completed the following during last five years ending last day of the month previous to the month of tender submission as given below: i. At least One "Similar Work" of value of INR 5 Crore or more.

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	i) Work Experience:	OR ii. At least two “Similar Works” of value of INR 3.2 Crore each. OR iii. At least three “Similar Works” of value of INR 2.5 Crore each. In case of joint venture, full value of the work, if done by the same joint venture shall be considered. However, if the qualifying work(s) were done by them in JV having different constituents, then the value of work as per their percentage participation in such JV shall be considered. “Similar Works” for this Contract shall be defined as below: “Detailed Design Consultancy Services for elevated viaducts / elevated viaduct including elevated stations having sub-structure with pile/well/ open foundations and RCC piers and superstructure with prestressed concrete/Steel Composite and Double Decker station for Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway”. With: Bidder must have Successfully completed/Substantially completed the following during last Seven years ending last day of the month previous to the month of tender submission as given below: i. At least One “Similar Work” of value of INR 5 Crore or more. OR ii. At least two “Similar Works” of value of INR 3.2 Crore each. OR iii. At least three “Similar Works” of value of INR 2.5 Crore each. In case of joint venture, full value of the work, if done by the same joint venture shall be considered. However, if the qualifying

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		work(s) were done by them in JV having different constituents, then the value of work as per their percentage participation in such JV shall be considered. “Similar Works” for this Contract shall be defined as below: “Detailed Design Consultancy Services for elevated viaducts / elevated viaduct including elevated stations having sub-structure with pile/well/ open foundations and RCC piers and superstructure with prestressed concrete/Steel Composite for Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway”.													
14.	Section ii, Evaluation of technical Bid: Matrix for Breakup of Marks	Replace: TABLE-2: “Detailed Design Consultancy Experience” (Max 250 marks) (In the case of JV/Consortium, Detailed Design Consultancy Services fulfilled by any partner from a Single Contract shall be considered.) <table> <tr> <th>SI No</th><th>Criteria</th><th>Distribution of Marks</th></tr> <tr> <td rowspan="4">1</td><td rowspan="4">Detailed Design Consultancy Services of elevated viaduct from a single contract during the last 5 (Five) years ending as on the date of tender submission in i n Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 100 marks)</td><td>Design of Elevated Viaduct of minimum Length 5.00 Km: 50 marks</td></tr> <tr> <td>Design of Elevated Viaduct of Length >5.00 km to 7.50 km: 65 marks</td></tr> <tr> <td>Design of Elevated Viaduct of Length >7.50 km to 10.00 km: 80 marks</td></tr> <tr> <td>Design of Elevated Viaduct of Length > 10.00 km: 100 marks</td></tr> <tr> <td rowspan="2"></td><td rowspan="2">Detailed Design Consultancy Services of Double-Decker Viaduct (<i>one level elevated road with other level metro viaduct</i>) from a single contract during the last 5 (Five) years ending as on the date</td><td>Design of double-decker Viaduct of minimum Length 1.50 km: 50 Marks</td></tr> <tr> <td>Design of double-decker Viaduct of Length > 1.50 km to 3.50 km: 80 marks</td></tr> </table>	SI No	Criteria	Distribution of Marks	1	Detailed Design Consultancy Services of elevated viaduct from a single contract during the last 5 (Five) years ending as on the date of tender submission in i n Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 100 marks)	Design of Elevated Viaduct of minimum Length 5.00 Km: 50 marks	Design of Elevated Viaduct of Length >5.00 km to 7.50 km: 65 marks	Design of Elevated Viaduct of Length >7.50 km to 10.00 km: 80 marks	Design of Elevated Viaduct of Length > 10.00 km: 100 marks		Detailed Design Consultancy Services of Double-Decker Viaduct (<i>one level elevated road with other level metro viaduct</i>) from a single contract during the last 5 (Five) years ending as on the date	Design of double-decker Viaduct of minimum Length 1.50 km: 50 Marks	Design of double-decker Viaduct of Length > 1.50 km to 3.50 km: 80 marks
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		Design of Elevated Viaduct of Length >5.00 km to 7.50 km: 65 marks													
		Design of Elevated Viaduct of Length >7.50 km to 10.00 km: 80 marks													
		Design of Elevated Viaduct of Length > 10.00 km: 100 marks													
	Detailed Design Consultancy Services of Double-Decker Viaduct (<i>one level elevated road with other level metro viaduct</i>) from a single contract during the last 5 (Five) years ending as on the date	Design of double-decker Viaduct of minimum Length 1.50 km: 50 Marks													
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		2	of tender submission in Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 100 marks)	Design of double-decker Viaduct of Length > 3.50 km: 100 marks
		3	Detailed Design Consultancy Services of Double-Decker stations from a single contract during the last 5 (Five) years ending as on the date of tender submission in Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 50 marks)	Design of double-decker stations 1 no: 25 marks
				Design of double-decker stations of ≥ 2 No.: 50 marks
		With: TABLE-2: “Detailed Design Consultancy Experience” (Max 250 marks) (In the case of JV/Consortium, Detailed Design Consultancy Services fulfilled by any partner from a Single Contract shall be considered.)		
		Sl No	Criteria	Distribution of Marks
		1	Detailed Design Consultancy Services of elevated viaduct from a single contract during the last 7 (Seven) years ending as on the date of tender submission in in Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 100 marks)	Design of Elevated Viaduct of minimum Length 5.00 Km: 50 marks
				Design of Elevated Viaduct of Length >5.00 km to 7.50 km: 65 marks
				Design of Elevated Viaduct of Length >7.50 km to 10.00 km: 80 marks
				Design of Elevated Viaduct of Length > 10.00 km: 100 marks
			Detailed Design Consultancy Services of Double-Decker	Design of double- decker Viaduct of minimum Length 1.12 km : 50

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		2	Viaduct (<i>one level elevated road with other level metro viaduct</i>) from a single contract during the last 7 (Seven) years ending as on the date of tender submission in Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 100 marks)
			Marks
			Design of double-decker Viaduct of Length > 1.12 km to 2.50 km : 80 marks
		3	Design of double-decker Viaduct of Length > 2.50 km : 100 marks
			Detailed Design Consultancy Services of Double-Decker stations from a single contract during the last 7 (Seven) years ending as on the date of tender submission in Metro Railway/ Railway/ High Speed Railway /RRTS/ Light Railway (Max 50 marks)
	SECTION - 5 TERMS OF REFERENCE (TOR) Clause 10.7 Proof checking	Design of double-decker stations 1 no: 25 marks	
		Design of double-decker stations of ≥ 2 No.: 50 marks	
15.		Added the following to the Clause 10.7 Proof checking: c) Proof Checking Consultant (PC) should be an experienced practicing consultant (Individual/ organization) appointed independently and simultaneously with Detail Design Consultant (DDC). d) PC (Proof checking agency) should declare conflict of interest, if any, prior to accepting the assignment for proof checking. In case a conflict of interest arises during the assignment, it shall be declared by the PC immediately. e) PC shall also examine the geotechnical investigation report, hydrological study report, model study report (if any) and convey inadequacy w.r.t standard practices or inconsistency, if any, in writing. f) The Design Basis Note (DBN) containing Design Input Parameters (DIP) and specific clauses of relevant standards as submitted by DDC, should be scrutinized in detail by PC and should be approved by client before starting the Design. Revisions in DBN may be required during the process of Design and final version is approved with the approval of Design.	

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		g) The client will forward the results of analysis carried out by DDC along with proposed tentative sections. Design document and details of software input file shall not be shared by DDC/Client at this stage. h) Based on DBN & analysis given by DDC, the PC shall carry out independent analysis and convey their approval to client. If there is a difference in both the analyses between the DDC and the PC, then a meeting shall be arranged by the client to resolve the issues. PC shall submit all the independent calculations of analysis and design to the client for record. i) Any up-dation of DBN, if required during the above process shall be done and new version shall be issued. j) Based on the agreed results of analysis, Design drawing shall be prepared by DDC and submitted to PC through client. k) The PC shall see that the member sizes of bridge components and their connections designed by DDC are safe and have adequate margin/ utilization ratio for the long term durability and sustainability with respect to DBN approved. The margin/ utilizations ratio to be kept, shall be specified in DBN. l) PC shall scrutinize the method statement of execution given by DDC for ensuring compliance to specified/ standard specification / codes and requirements of quality control as specified in DBN. m) PC shall ensure that the design drawings developed by DDC have relevant notes and reference to specific method statements. The detailing of every connection and joint shall be specifically checked with respect to design document. The same shall be scrutinized by PC and before conveying their approval to the client. n) The PC shall also ensure the consistency of dimensions of various details in plans, elevation, cross sections etc. in different sheets/ drawings. The scrutiny shall be supported by the set of drawing, over which the marks are made by PC. o) PC shall see that the consultant certificate (in the format duly approved by the Client) has been submitted by DDC along with complete set of design document. PC shall also submit their Consultant's certificate (in the format duly approved by the Client) to the client. p) PC need to keep in mind the irregularities that might be prevalent in field. Adequate safeguards should be taken at the stage of design including the launching scheme, if applicable. Various Dos & Don'ts shall be specified in the drawing itself.

ATTACHMENT -A
Surety Bond for Bid Security
(Refer Clauseof ITT)

S.B. No.

Dated:

1. In consideration of you, Bi-RIDE, having its office at Bengaluru-560 010, India (hereinafter referred to as the "Authority", which expression shall unless it be repugnant to the subject or context thereof include its, successors and assigns) having agreed to receive the Bid ofand having its registered office at (and acting on behalf of its Consortium) (hereinafter referred to as the "Bidder" which expression shall unless it be repugnant to the subject or context thereof include its/their executors, administrators, successors and assigns), for the... (hereinafter referred to as "the Project") pursuant to the Tender Document dated issued in respect of the Project and other related documents including without limitation the draft contract agreement (hereinafter collectively referred to as "Bidding Documents"), we (Name of the Surety Insurer) having our registered office at..... and one of its branches at..... (hereinafter referred to as the "Surety Insurer "), at the request of the Bidder, do hereby in terms of Clause 13 of ITT of Bid Document, irrevocably, unconditionally and without reservation guarantee the due and faithful fulfilment and compliance of the terms and conditions of the Bidding Documents by the said Bidder and unconditionally and irrevocably undertake to pay forthwith to the Authority an amount of Rs (hereinafter referred to as the "Surety Bond") as our primary obligation without any demur, reservation, recourse, contest or protest and without reference to the Bidder, if the Bidder shall fail to fulfil or comply with all or any of the terms and conditions contained in the said Bidding Documents.
2. Any such written demand made by the Authority stating that the Bidder is in default of the due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents shall be final, conclusive and binding on the Surety Insurer.
3. We, the Surety Insurer, do hereby unconditionally undertake to pay the amounts due and payable under this Surety Bond without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of the Authority is disputed by the Bidder or not, merely on the first demand from the Authority stating that the amount claimed is due to the Authority by reason of failure of the Bidder to fulfil and comply with the terms and conditions contained in the Bidding Documents including failure of the said Bidder to keep its Bid open during the Bid validity period as set forth in the said Bidding Documents for any reason whatsoever. Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Surety Insurer under this Surety Bond. However, our liability under this Surety Bond shall be restricted to an amount not exceeding Rs.....
4. This Surety Bond shall be irrevocable and remain in full force for a period of 240 days from the Bid Due Date inclusive of a claim period of 60 days or for such extended period as may be mutually agreed between the Authority and the Bidder, and agreed to by the Surety Insurer, and shall continue to be enforceable till all amounts under this Surety Bond have been paid.
5. We, the Surety Insurer, further agree that the Authority shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, Inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Bidding Documents, and the decision of the Authority that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority.
6. The Surety Bond shall not be affected by any change in the constitution or winding up of the Bidder or the Surety Insurer or any absorption, merger or amalgamation of the Bidder or the Surety Insurer with any other person.
7. To give full effect to this Surety Bond, the Authority shall be entitled to treat the Surety Insurer as

the principal debtor. The Authority shall have the fullest liberty without affecting in any way the liability of the Surety Insurer under this Surety Bond from time to time to vary any of the terms and conditions contained in the said Bidding Documents or to extend time for submission of the Bids or the Bid validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfilment and compliance with all or any of the terms and conditions contained in the said Bidding Documents by the said Bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said Bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said Bidding Documents or the securities available to the Authority, and the Surety Insurer shall not be released from its liability under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Bidder or by any change in the constitution of the Authority or its absorption, merger or amalgamation with any other person or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Surety Insurer from its such liability.

8. Any notice by way of request, demand or otherwise hereunder shall be sufficiently given in writing or made if addressed to the Surety Insurer and sent by courier or by registered post or by certified e-mail to the Surety Insurer at the address or e-mail set forth herein.
9. We undertake to make the payment on receipt of your notice of claim on us addressed to name of Surety Insurer along with branch address and delivered at our above branch who shall be deemed to have been duly authorized to receive the said notice of claim.
10. It shall not be necessary for the Authority to proceed against the said Bidder before proceeding against the Surety Insurer and the Surety Bond herein contained shall be enforceable against the Surety Insurer, notwithstanding any other security which the Authority may have obtained from the said Bidder or any other person and which shall, at the time when proceedings are taken against the Surety Insurer hereunder, be outstanding or unrealized.
11. We, the Surety Insurer, further undertake not to revoke this Surety Bond during its currency except with the previous express consent of the Authority in writing.
12. The Surety Insurer declares that it has power to issue this Surety Bond and discharge the obligations contemplated herein, the undersigned is duly authorised and has full power to execute this Surety Bond for and on behalf of the Surety Insurer.
13. For the avoidance of doubt, the Surety Insurer's liability under this Surety Bond shall be restricted to Rs The Surety Insurer shall be liable to pay the said amount or any part thereof only if the Authority serves a written claim on the Surety insurer in accordance with paragraph 9 hereof, on or before [*** (indicate date falling 240 days after the Bid Due Date)].
14. This Surety Bond shall also be operatable at our , branch at New Delhi, from whom, confirmation regarding the issue of this Surety Bond or extension/renewal thereof shall be made available on demand. In the contingency of this Surety Bond being invoked and payment hereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
15. The Insurance Surety Bond shall be verified from the specific portal created for this purpose.

Signed and delivered by Company

By the hand of Mr./Ms.....it's and authorized official

(Signature of the Authorized Signatory) (Official Seal)

ATTACHMENT A

FORM OF INSURANCE SURETY BOND FOR [to be filled as per Note-1]

(Refer Clause)

(To be stamped in accordance with the Stamp Act of the Country of Issuing Surety Insurer)

To,

.....

.....

WHEREAS [Name and Address of the Contractor] (hereinafter referred to as the “Contractor”) has undertaken for due performance of the Contract, in pursuance of LoA No. for [Description of the Contract work to be specified] (hereinafter referred to as “the Contract”).

The Contract was awarded by (hereinafter referred to as

the “Employer” or “ ”), which expression shall unless repugnant to the context or the meaning thereof, include its successors, administrators, executors and assignees.

AND WHEREAS it has been stipulated in the Contract that the Contractor shall furnish to the Employer with an unconditional and irrevocable Insurance Surety Bond for..... 2.1 (Performance Security / Mobilization Advance/ Plant & Machinery Advance/ Special Advance/ Retention Money) for the sum specified herein below as security for

2.2 (compliance of the obligations and performance of the Contractor/ such Advance Payment/ Retention Money).

In pursuance to this M/s (The Contractor) has requested for issuance of the Insurance Security Bond for the sum of [the amount of Guarantee to be specified in figure and words in the respective currency/ies in which the contract price is payable].

AND WHEREAS we [Name and full address of the Surety Insurer including Email address] having registered office at (hereinafter referred to as the “Surety Insurer ”), which expression shall unless repugnant to the context or the meaning thereof, include its successors, administrators, executors, assignees, hereby agrees to give the Employer on behalf of the Contractor such a Insurance Surety Bond drawn and payable at Bengaluru branch.

NOW, THEREFORE, the Surety Insurer hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Surety Insurer hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the (Construction Period/ Defects Liability Period and Maintenance Period under and in accordance with the Contract, and agrees and undertakes to pay to the Employer, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Surety Bond Amount as the Employer shall claim, without the Employer being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein
2. A letter from the Employer, under the hands of an officer not below the rank of General Manager,... , that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Contract shall be conclusive, final and binding on the Surety Insurer. The Surety Insurer further agrees that the Employer shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Contract and its decision that the Contractor is in default shall be final and binding on the Surety Insurer, notwithstanding any differences between the Employer and the Contractor, or any dispute

between them pending before any court, tribunal, arbitrators or any other Employer or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Surety Bond, the Employer shall be entitled to act as if the Surety Insurer were the principal debtor and any/Change in the constitution of the Contractor and/or the Surety Insurer, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Surety Insurer under this Surety Bond.
4. It shall not be necessary, and the Surety Insurer hereby waives any necessity, for the Employer to proceed against the Contractor before presenting to the Surety Insurer its demand under this Surety Bond.
5. The Employer shall have the liberty, without affecting in any manner the liability of the Surety Insurer under this Surety Bond, to vary at any time, the terms and conditions of the Contract or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Contractor to postpone for any time, and from time to time, any of the rights and powers exercisable by the Employer against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Contract and/or the securities available to the Employer, and the Surety Insurer shall not be released from its liability and obligation under these presents by any exercise by the Employer of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Employer or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Surety Insurer from its liability and obligation under this Surety Bond and the Surety Insurer hereby waives all of its rights under any such law.
6. This Surety Bond is in addition to and not in substitution of any other Surety Bond or security now or which may hereafter be held by the Employer in respect of or relating to the Contract or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.
7. Notwithstanding anything contained hereinbefore, the liability of the Surety Insurer under this Surety Bond is restricted to the Surety Bond Amount and this Surety Bond will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Employer on the Surety Insurer under this Surety Bond all rights of the Employer under this Surety Bond shall be forfeited and the Surety Insurer shall be relieved from its liabilities hereunder.
8. The Surety Bond ceases to be in force and effect on **** Unless a demand or claim under this Surety Bond is made in writing before expiry of the Surety Bond, the Surety Insurer shall be discharged from its liabilities hereunder.
9. The Surety Insurer undertakes not to revoke this Surety Bond during its currency, except with the previous express consent of the Employer in writing and declares and warrants that it has the power to issue this Surety Bond and the undersigned has full powers to do so on behalf of the Surety Insurer.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Surety Insurer at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer & the Employer that the envelope was so posted shall be conclusive.
11. This Surety Bond shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Employer pursuant to the provisions of the Contract.

12. This Surety Bond is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.
13. This Surety Bond shall also be operatable at our, branch at Bangalore, from whom, confirmation regarding the issue of this Surety Bond or extension/renewal thereof shall be made available on demand. In the contingency of this Surety Bond being invoked and payment here under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
14. The Insurance Surety Bond shall be verified from the specific portal created for this purpose.
- Signed and sealed this.....Day of.....,26.....at.....

SIGNED, SEALED AND DELIVERED For and on
behalf of the Surety Insurer by:
(Signature)
(Name) (Designation)
(Code Number)
(Address)

Notes:

1. Any one of the following types of 'Insurance Surety Bond is to be inserted in the heading after the word '**FORM OF INSURANCE SURETY BOND FOR**' according to the purpose:
 - a) "**PERFORMANCE SECURITY**"
2. In Para-2, insert from the bracket the appropriate option according to the type^{2.1} and purpose^{2.2} of the Insurance Surety Bond to fill in the blanks.
3. The stamp paper of appropriate value shall be purchased in the name of the Surety Insurer, who issues the "Insurance Surety Bond".
4. The Insurance Surety Bond to be submitted shall be got issued from an IRDA approved Surety Insurer

Attachment- B

BIM MANUAL

INDEX

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GENERAL

1 Purpose

- 1.1.1 This Building Information Modelling - Standards, Methods and Procedures (SMPs) describes the use of Building Information Modelling (BIM) for the work under the Contract.
- 1.1.2 This SMP's shall be used as a reference for the Contractor to develop specific Work Package SMPs that shall detail the specific CAD/GIS/BIM software and Electronic Content Management System (ECM) software used within the Work Package to control the specific BIM and CAD process. The outputs from this ECM system will be drawings as PDF's that will be input to the Contractors EDMS system for distribution.
- 1.1.3 SMPs establish the methodology for managing the production, distribution and quality of the design information generated by CAD, GIS and BIM systems, using a disciplined process for collaboration and a specified file and model naming policy.

2 Scope

- 1.2.1 This BIM SMP outlines the roles and responsibilities that are necessary for a successful collaborative Building Information Modelling approach.
- 1.2.2 The Common Data Environment (CDE) is mandated for the structure and the controlled sharing of the building information with known provenance and status in a multi-disciplinary environment.
- 1.2.3 The Contractor's SMPs are required to control the production and coordination of the design information within each Works Package.

3 Introduction

- 1.1.1 BSRP Projects are implementing BIM for the delivery of the projects to return significant time, cost and quality improvement in the way that the program will be delivered, constructed and ultimately operated.
- 1.1.2 The gradual development of BIM, with the support of new digital technologies, aim to improve the quality of planning, construction and operation of BSRP Rail system. BIM can be successfully implemented if effective forms of collaboration are also adopted.
- 1.1.3 Collaborative project execution is a central factor for success. Openness, transparency and a goal and solution-oriented approach must become the core value of all activities in the infrastructure area.
- 1.1.4 The BIM Manual should be implemented for all the project phases.

4 Standards, Norms and Guidelines

This manual makes use of the following technical standards

- ISO/DIS 19650-1.2 Organization of information about construction works -- Information management using building information modelling -- Part 1: Concepts and principles.
- ISO/DIS 19650-2.2 Organization of information about construction works -- Information management using building information modelling -- Part 2: Delivery phase of the assets.
- PAS 1192-2:2013 Specification for information management for the capital/delivery phase of construction projects using building information modelling.
- PAS 1192-3:2014 Specification for information management for the operational phase of assets using building information modelling.
- PAS 1192-4:2014 Collaborative production of information.
- PAS 1192-5:2015 Specification for security-minded building information modelling, digital built

environments and smart asset management.

5 Terminology

Terms	Description
2D	Two-dimensional representation of an object, typically plans, sections, elevation and details.
3D	A model with objects having three-dimensional properties. Model may have varying levels of detail and development depending on the project phase.
Asset Information Model	File based federated BIM Model, set of BIM extraction (drawings, data drops) and project related documentation (reports and forms) developed during the Operation and maintenance stages.
Attribute	Data field populated with pieces of information attached to each BIM object to provide different type of information like physical/geometrical characteristics, classification codes, locations, relationships or data related to the BIM use cases. It may be called as Parameters.
Authoring Tools	BIM Software developed by different providers that enable the creation and modification of BIM Models.
Aggregated Model	A compilation of multiple models into a single manageable model. For example, an Aggregate Model may include a building model plus a site model, or several Mono-Discipline Models aggregated into a single Multi-Discipline Model. Aggregation - as a term - applies to both Integrated Models and Federated Models
BIM Execution Plan	BIM Execution Plan developed by the contractor to address the Employer's Information Requirement (EIR).
BIM Model	3D Model containing information and attribute data
Clash Rendition	Rendition of the native format model file to be used specifically for spatial coordination processes to achieve clash avoidance or to be used for clash detection.
Common Data Environment	Single source of information for any given project used to collect and manage all relevant approved project documents for multi-disciplinary teams in a managed process
Data Exchange	BIM Deliverables
Data Drop	Extraction of the data information store in the BIM Models. This data is extracted to Spreadsheets or databases.
Federated Model	A BIM Model which links (not merge) several individual discipline Models together. It does not merge the properties of individual models into single database.
Gate review	Design review carried out by Engineers to confirm the design outputs
Information Exchange	Structure collection of information at one stage of a project in a defined format
IFC	Data model neutral and open specification that is used by BIM programs and that contains a model of a building or facility including spatial elements, materials, shapes and information.
Level of Definition	It includes Level of Geometry and Level of Information
Master Information Delivery Plan	Post-contract award deliverable which includes a plan listing all the information deliverables of a project including models, drawings, specification and other kind of deliverables. It identifies when project information is to be prepared, by whom and define the Level of definitions and the procedure. It will be created by collating Task Information Delivery Plan (TIDP) of all discipline of a project

Terms	Description
Milestone	Scheduled event marking the due date of accomplishment of a specified task of objective.
Project Implementation Plan	Post-contract award deliverables which assess the capability, competence and experience of the potential contractor bidding for the project along with quality documentation.
Project Information Model	File based federated BIM (model), set of BIM extraction (Drawings, data drop) and project related documentation (report and forms) developed during the design and construction stages.
Task Information Delivery Plan	Post-Contract award deliverable, which includes a plan listing all the information deliverable of a specific discipline of a project including model, drawings, specification, and other kind of deliverables.
Virtual Design Review	Team review the digital engineering design model
Work Breakdown Structure	Multilevel framework that organizes and graphically displays elements representing work to be accomplished in logical relationships. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services. It is the structure and code that integrates and relates all project work (technical, schedule, and cost) and is used throughout the life cycle of a project to identify and track specific work scopes.
Zone	Set of spaces (locations) sharing a specific Attributes, such as activity, access, management or condition

6

Abbreviation

Abbreviation	Meaning
AIM	Asset information Model
AIR	Asset information Requirement
BEP	BIM Execution Plan
BIM	Building Information Modelling
BOQ	Bill of Quantities
CDE	Common Data Environment
COBie	Construction Operation Building Information exchange
EIR	Employer Information Requirement
GIS	Geographical Information System
IFC	Industry Foundation Class
LOD	Level of Definition
LoG	Level of Geometry
LoI	Level of Information
MEP	Mechanical Electrical Plumbing
MIDP	Master Information Delivery Plan
PIM	Project Information Model
PIP	Project Implementation Plan
QAQC	Quality Assurance & Quality Control
QC	Quality Control

Abbreviation	Meaning
TIDP	Task information Delivery Plan
VDR	Virtual Design Review
WBS	Work Break-down Structure

7

1.1.1

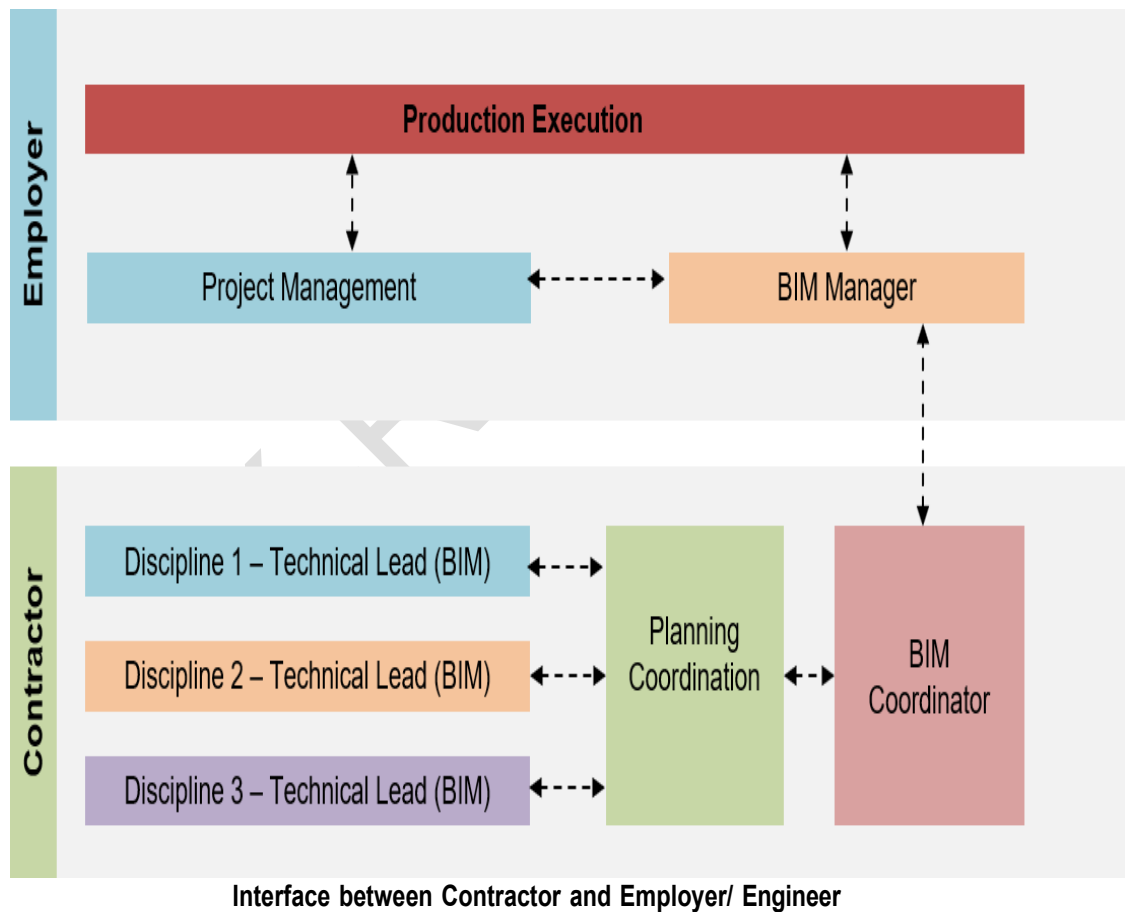
BIM Management

Employer / Engineer Team

The Employer BIM Management team has the following roles to monitor / review the BIM process for the whole project till handover. This may either be directly with the Employer or through the Engineer.

BIM Manager – Primary contact for the various BIM Coordinators within a project

BIM Coordinator– Secondary contact for the various BIM related query (on-site)



Role	Description	Tasks / responsibilities
BIM Manager	The BIM Manager leads the implementation of BIM throughout the project in compliance with Employer and leads the project as BIM Integrated team. The BIM Manager is the primary point of contact for any BIM related issues within the BIM project	Define the BIM strategy and requirements for the project, identifying and maintaining the BIM goals and priorities Review and approve the BIM Execution plan and the MIDP Lead the BIM teams, tracking and monitoring their performance Report to Employer management on any issues surrounding BIM Implementation. Ensure the project proves the tools, process and support to engage the information in a Structured, coordinated and accurate way. Hosting the BIM team Meeting. Coordinate efforts within the BIM Teams in accordance to project needs. Facilitate the adoption of collaborative ways of working
BIM Coordinator	Equivalent role to the BIM Manager but focused on local delivery aspects	Similar task of the BIM Manager but in close discussion with local implementation bodies.
Technical lead - BIM	Key person for all BIM Technical related issues within the BIM Project (for each discipline)	Ensure that Design/ Construction / Operation uses BIM. Ensure the quality and the BIM standards within the discipline. Performs a BIM Model quality verification. Participate in the BIM related meetings with local contractor / specialists. Organizes and leads the BIM kick-off meeting with the BIM Coordinator for his/ her discipline. Ensure that the 3D models are clash free Support the contractor in BIM related issues.

1.1.2 Contractor's Team

Role	Description	Tasks / responsibilities
BIM Manager	The BIM Manager leads the implementation of BIM throughout the project from the Contractor side	Leads the BIM Implementation during the project from contractor side. Produce and updates the BIM Execution Plan in collaboration with the BIM Coordinator. Produces MIDP by collating the TIDP at the start of the project. (BIM perspective). Assure the BIM deliverable. Act as a contact for any BIM related issues. Leads the Virtual Design / Construction review
BIM Coordinator	Equivalent role to the BIM Manager but focused on local delivery aspects	Similar task of the BIM Manager but in close discussion with local implementation bodies.
Technical lead – BIM (Discipline)	Technical lead – BIM (Discipline) is responsible for the interdisciplinary coordination of the BIM Model per package	Reports to the BIM Coordinator. Produce the BIM Execution plan in coordination with the BIM Coordinator / BIM Manager. Ensure that the BIM process and procedures per discipline are compliant with the project goals. Ensure that discipline models can be used to properly deliver the requested BIM uses. Support and advises on the adoption of BIM processes within the discipline. Define and updates best practice and procedure per discipline. Configure and develop Clash Detection analysis on a regular basis. Leads regular coordination meeting and track the process. Responsible for the integration and the geolocation of the models per package. Support interface Coordinator and Design Coordinators. Support the BIM Coordinator on discipline specific issues (i.e. Clash detection analysis or the Gate Review meeting). Define the TIDP (per discipline) at the start of the project (deliverable)
BIM Engineer	BIM Engineer reports to Technical Lead – BIM (BIM perspective) and to the BIM Coordinator	Develop the BIM Models and constituent parts. Developing the content for the 3D model. Generate the 2D drawings from the 3D model. Following the standards and incorporating in the 3D/2D . Owns their model information. Generate the project output, such as drawings, the quantity (if necessary) the data drops, the visualization work and any other BIM output. Internal quality check (Self check) related to the design

8**BIM User Cases**

BIM information (both graphical and non-graphical data) is initially created during the Design phases of the project. This information will be consumed later by functions based on the data that can be input into their work process. The use cases are summarized in the list below against each function. All the BIM use cases to be applied in each project shall be defined in the BIM Execution Plan.

The following table shows the mandatory (M) and optional (O) use cases.

Mandatory (M)	Design Authoring (Collaboration)	Engineering Analysis	2D Drawing	Interference Management (Clash Checks)	Interactive Design Review	Structural detailing	Quality Control	As-Built documentation	Operation & Maintenance Information (Attributes)
Optional (O)									
Concept Design	M	O	M	O	M	O	O	-	-
Preliminary Design	M	M	M	M	M	M	M	-	-
Detailed Design	M	M	M	M	M	M	M	-	O
Design for Approvals	M	M	M	M	-	M	O	-	-
Construction	M	O	M	M	M	M	M	-	-
As-Built	M	-	M	-	-	M	M	M	O

- **Design Authoring (Collaboration)**

A BIM model of the principal elements of Civil works including Track work inside the Depots covering Architectural, Structural and MEP works shall be created in accordance with the Master Information Development Plan using discipline-based software which each designer's controls and where the required information from other teams is referenced from the Contractor CDE and the Employer CDE using Open BIM formats.

The contractor shall deploy their own CDE where their WIP (Work In Progress) design will be carried out. A Contractor CDE with a "Client Shared" area is necessary to make possible Gate Reviews for the Employer's Approval.

- **Engineering Analysis**

The BIM Model produced from the core BIM authoring tools may be linked to / exported to analysis software for Structural, Mechanical, Electrical and other design analysis.

- **2D Drawings**

2D General Arrangement drawings, coordination drawings, location drawings and schedule of elements objects components and materials for all works that is modelled shall be generated from the 3D BIM Model as sheet sets (data drop) that are contained in the BIM Project model for that discipline. Typical details, assembly and component details and shop drawings may be created separately from the BIM Model depending on the Level of Definition of a stage.

- **Interference Management (Clash Detection)**

Design Collaboration between disciplines shall be supported by running clash detection in both the authoring and reviewing software to identify spatial interference between modelled elements. A Clash register will be maintained for review and action during design review (the Clash Detection Report is a deliverable). Lead Engineers shall not be permitted to approve an element unless it is confirmed as being clash free against all related model for that work.

- **BIM Quality Control and Assurance**

Quality Control and Assurance of the BIM Data (3D and information) will be done through the process of design, collaboration, checking review and audit. These processes measure how well the BIM objects fulfil their purposes and follow the processes defined to achieve those purpose

- Coordination of the BIM Data through Design / Construction Review, Clash check etc.,
- Checking the deliverable created from the BIM Model prior to Employer's approval'
- Specific Checks of the BIM Model content by any Subcontractor prior to approval (Shop Drawings generation for instance),
- Audits by the Contractor BIM Management Team

- **As-Built documentation**

The BIM Model shall be revised as work packages are completed to record the As-Built status of the works and if necessary, to adapt the positioning / shape / type of the objects to the built condition

The Contractor during the Design Stage shall develop a model that can be used / updated as a base for the As-Built models. The As-Built model documentation will also be stored and used during the Operation Stage that takes place after BIM commission (Hand-over). LOD shall be as defined in Clause 4.9.

- **Operations & Maintenance Information**

The BIM model will be used to both visualize and report the status of construction testing and the collaboration of work packages ready for Hand-over to the Client for Operation and Maintenance

9 **BIM Execution Plan (BEP)**

A "**BIM Execution Plan**" (**BEP**) is a plan prepared by the Contractor to explain how the information modelling aspects of a project will be carried out. The plan is prepared as a direct response to the Employer's Information Requirements and Technical Specifications and shall detail the project deliverables stipulated by the contract and the information exchange requirements detailed in the BIM Manual.

This plan is prepared at the beginning of the project but must be updated later for each project stage. The Contractor shall provide the BIM Execution Plan in order to explain in detail how they intend to carry along all the BIM Objectives in this project.

The BIM Execution Plan includes Specific Annexes for the different disciplines and authoring tools describing how all the procedures shall be implemented.

The contents of the BEP shall consist of everything requested in the EIR and also the following information:

- **Management:**
 - Roles, responsibilities and authorities
 - Master Information Delivery Plan (MIDP)
- **Planning and documentation:**
 - Capability of the Contractor / Sub-contractor
 - BIM Use Cases
 - Agreed project processes for collaboration and information modelling
 - Agreed matrix of responsibilities across the Supply Chain
 - Task Information Delivery Plan (TIDP to be collated in the MIDP)

- **The standard method and procedure:**
 - File Naming Convention to be followed as per the BIM Manual Naming Convention, any change will need to be approved by the Employer.
 - Geo-location & Coordinates system.
 - Levels of definition (LOD).
 - Specific Annexes from the different disciplines and authoring tools (one per authoring tool), describing:
 - Modelling standards (including model's size and length recommendations)
 - Workflows
 - Agreed construction tolerances for all disciplines
 - Drawing sheet templates
 - Contractor CAD manual (Adaptation of the CAD Standard to its authoring tool)
- **The IT solutions**
 - Software versions
 - Exchange formats
 - Security & Extranet Access

The BEP shall include the MIDP.

The BIM Execution Plan is comprised of the main document (describing the overall information of the BEP) and a list of annexes including the TIDP, the MIDP and the different BIM Authoring tools – specific procedures and workflows.

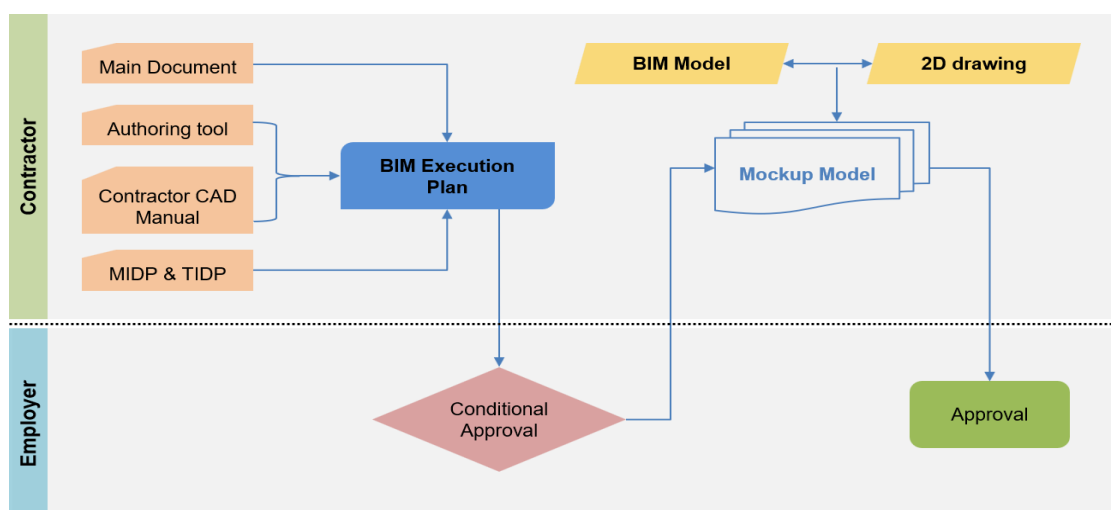
The Contractor shall provide 4 Nos. of Authoring tool licenses for the Engineer to review the deliverables throughout the entire project phases.

- **BIM Authoring tool**

The Contractor shall provide at least one annex by BIM Authoring tool and there could be more if the contractor considers it necessary; for instance, due to the existence of various disciplines developing the project with the same BIM Authoring tool.

This annex should include a small mock up model geo-located correctly. It shall be an aggregate model containing at least two BIM models from various disciplines and shall be submitted in the delivery format defined in BEP (Preferably IFC). The content of the model should have a simple 3D model to identify the proper project geo-location (Northing, Easting & Elevation).

The Engineer will review the model by linking the model to the other discipline and to export IFC with minimal loss of information.



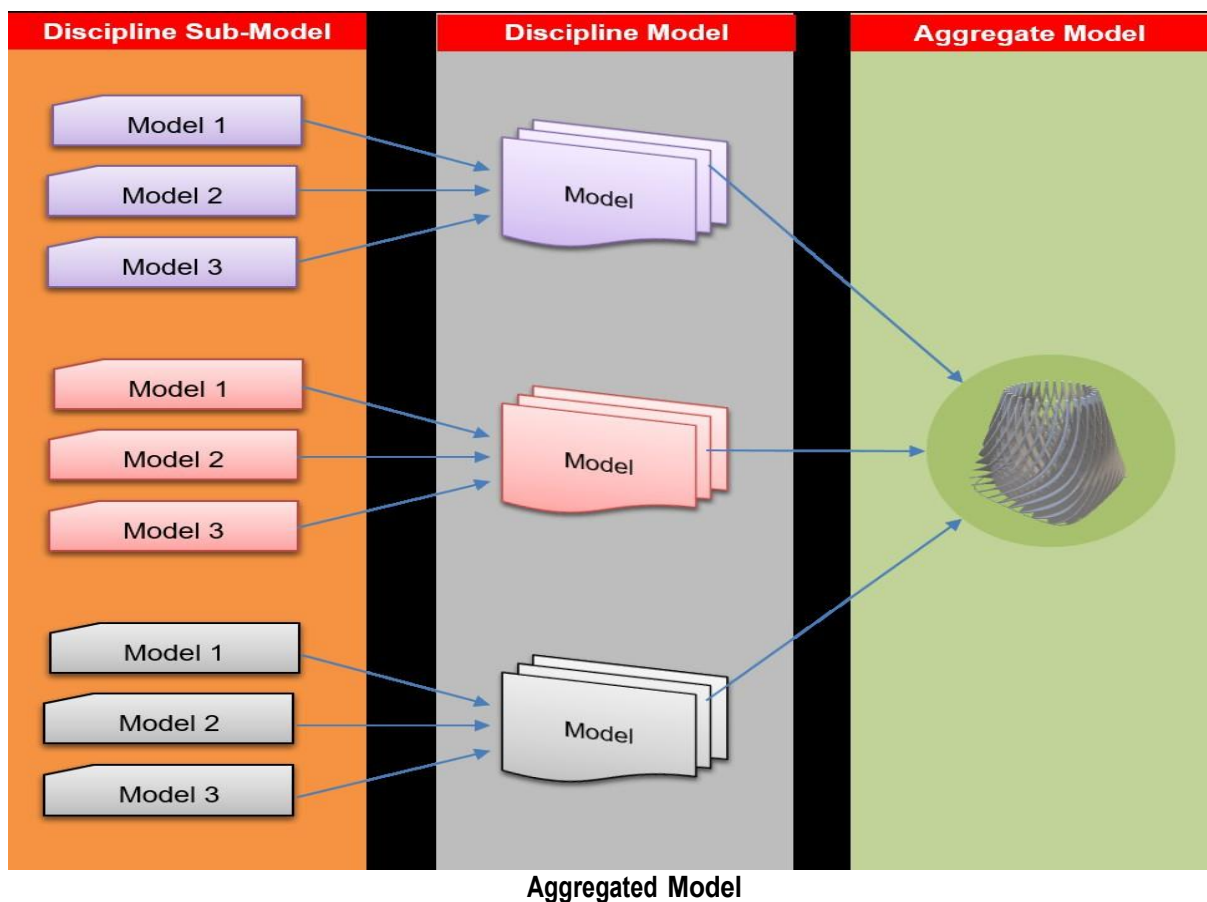
Workflow for Mock Up Model to be fixed

10 Main Deliverables

The BIM strategy is a file-based information delivery, where the featuring files can be consumed independently but also used, viewed and referenced together, by means of the federation of the files according to the Work Breakdown Structure (WBS) and the way the Contractor structures the delivery.

The Federation of models attempts, as much as possible and depending on the CDE environments deployed by the Employer and the Contractor, to build one model but using multiple source files (federated model for instance) controlled by the Employer's CDE.

If the files are federated models, this single model is called Aggregated Model. An Aggregated model can also be generated by adding several Aggregated models.

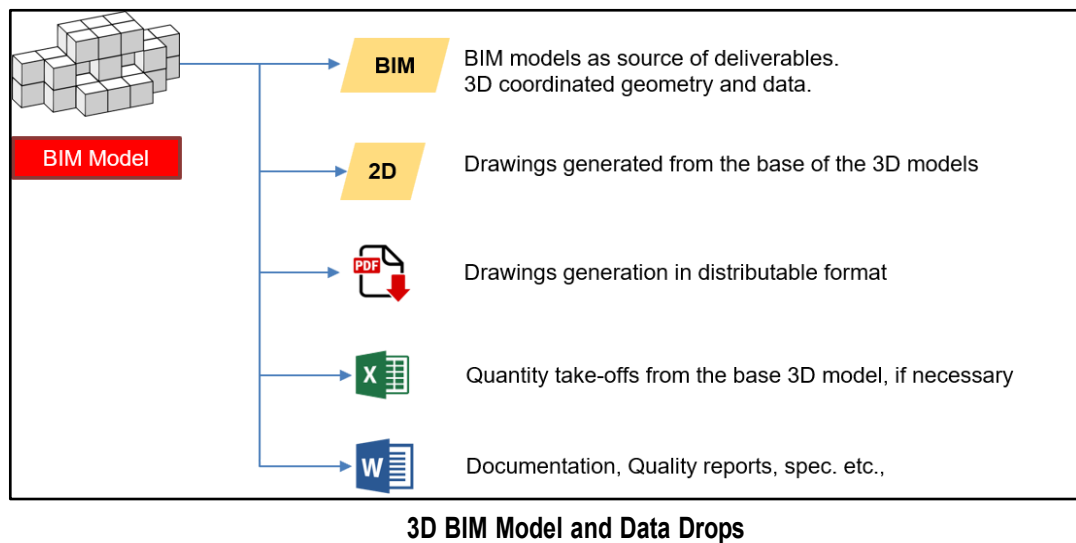


a. 3D BIM Models

The 3D BIM Models are the core deliverables in the Project Information Model Phase (Design and Construction Stages). These models become the source any information provided in the different stages, up to the point of taking precedence in the event of discrepancies and inconsistencies between models and drawings

The Master Information Delivery Plan (MIDP) shall include the estimated list of BIM models. It will not be necessary to develop in depth the breakdown of models for each discipline/ package, but the list must include at least one model per present discipline per package/ segment and submission.

The Level of Definition, LoG (Geometry) + Lol (Information), shall be shown for each deliverable.



b. **2D Drawings**

2D Drawings are the preferred source of information for the transmission of information among the different stakeholders.

The MIDP will include the forecast of drawings needed for every submittal. 2D drawings shall be generated from the base of the 3D models.

c. **BIM Data drops and extraction**

The BIM Data drops are the Quantity Take-off Spreadsheet (if necessary) and the information from the BIM Model (at later stage)

d. **Master information Delivery Plan (MIDP)**

The Master Information Delivery Plan (MIDP) is a main Post-Contract award deliverable, which includes a plan listing all the information deliverables of a project including models, drawings, specifications, equipment and other kind of BIM deliverables.

It shall identify when project information is to be prepared, by whom, and defines the Levels of Definition and the procedures.

The MIDP incorporates all relevant Task Team Information Delivery Plans (TIDP), which list all the information deliverables of a discipline of a project, and an updated / detailed Responsibility Matrix. The MIDP is an independent deliverable, while the TIDPs commonly are included within the BEP. The TIDP could be also included within the MIDP documentation.

11

Level of Definition

Level of Definition is used to determine both the level of geometry detail (LOD), and level of associated information (LOI) for any given model element at project work stage. Defining LOD and LOI informs the Contractor of the degree of information reliability when using the model (LOD = LoG + Lol).

a. **Level of Geometric detail (LoG)**

The Level of Geometric detail (LoG) is the description of the quality of the graphical content of a container at a particular point during project delivery. It relates to how much detail is included within the model space, system of element.

Level of Geometric detail (LoG)	Definitions
LoG 200	The Model Element is graphically represented within the Model as a generic system, space, object, or assembly with approximate quantities, size, shape, location, and orientation. The Model must be accurate enough to ensure that the design complies with the defined restrictions (clearances for administrative, legal, environmental, adjacent roads, railways, space for utilities/ electro-mechanical systems verification or transversal discipline coordination) prior to detailing. As such, the LoG 200 is defined to reach the requirements of the Master Design, by focusing on the outer geometry and allowance of the objects. The elements may be recognizable as the components they represent or as volumes for space allocation and reservation. This LoG can be used to verify regulatory requirements if those are allowance-related (clearances).
LoG 300	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Objects modelled can be measured directly from the model and those non-modelled can be calculated considering measures extracted from related objects This LoG can be used to verify any regulatory requirements unless those are related to specific brand/model/materials etc.,
LoG 400	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. This LoG incorporates coordinated specialist sub-contract design models and reaches the highest level of definition geometrically speaking. It is important to mention that when LoG 400 is a requirement of the Design Phase, brand/model may not be stated; therefore, during the Construction Phase that Design LoG 400 would need to implement the finally chosen brand/model to the Construction LoG 400.
LoG 500	As per LoG 300 but with sufficient verification as to demonstrate the accuracy of the model as a constructed at Hand-over. It is focused on the graphical information needed to support the model and the Lol for the Operation & Maintenance stage. It is important to mention that this LoG does not necessarily need to reach the highest detail of the LoG 400.

b. Level of Information (Lol)

The Level of Geometric detail (Lol) is the description of the quality of the non-graphical content of a container at any point during project delivery. It relates to the information that is included within the Models elements and that is contained in the elements Attributes.

Concept Plan	Preliminary Design	Detailed Engineering Design	Construction Drawings	As Built	Operation
					(Future)
Stage Definition (PAS 1192:2)	Stage 2 Concept / Stage 3 Definition	Stage 3 - Definition / Stage 4 – Design	Stage 4 – Design / Stage 5 – Building and commission	Stage 6 Handover	Stage 6 – Handover / Stage 7 – Operation
Level of Definition	LOD 200	LOD 300	LOD 400	LOD 500	LOD 500

12

Common Data Environment (CDE)

A Common Data Environment (CDE) is a single source of information for any given project or asset, used to collect, manage and disseminate all relevant approved project documents and data for multi-disciplinary teams in a managed process.

The CDE is core to Building Information Modelling [BIM] and information management processes and shall act as a means of providing a collaborative environment for sharing work in a consistent, managed and lean way for all project stakeholders.

The CDE shall support container-based collaboration where information management processes are applied to all information content (model files, drawings, documents and objects etc.).

The project's CDE shall have the functionality to deliver secure, managed access to information based on a stakeholder's role in the project and the status of the information being accessed.

No information exchanges shall be permitted out of the Employer CDE environment including e-mails. This promotes a collaborative environment where all stakeholders can integrate and share appropriate content.

- **Naming Conventions within CDE**

The Project CDE shall be based on at least the following naming codification:

- Project Name / Location
- Line
- Originator Name
- Volume System / Zone
- File Type
- Discipline Code
- Floor Level
- Number
- Revision No.

- **Project Name / Location**

This will consist of a distinct common project identifier to Detailed Technical Design (three characters)

- **Line**

Line name according to the Detailed Technical Design

- **Originator Name**

Each Contractor shall be allocated a unique code.

- **Discipline Code**

Each Discipline shall have the following code

Code	Description
ARC	Architecture
CTV	Closed Circuit Television
COM	Communications
CIV	Civil
ETP	Electrical Traction Power
ELV	Extra Low Voltage
ELE	Electrical Emergency Voltage
FRD	Fire Detection
FRS	Fire Suppression
MHV	Mechanical HVAC
MLF	Mechanical Lifts
MES	Mechanical Escalators
MTR	Mechanical Travellators
PUA	Public Address
PUH	Public Health
SNG	Signage
STR	Structural
SIG	Signals
TRK	Track
UTL	Utilities
GEO	Geotechnical
TUN	Tunnelling

- File Type**

The File type shall be used from the below table:

Code	Description
DRG	2D Drawing
MD2	2D Model
MD3	3D Model
MDR	Model Rendition File, e.g. PDF, Navisworks, i-model
AMF	Animation file (of a model)
VSF	Visualization File (of a model)
RPT	Report
SKE	Sketch
DAT	Data Sheet
STA	Standard

- **Floor Type**

The Floor type code shall be used from the below table:

Code	Level	Description
ZZ	Multiple level	Where the file applies to multiple levels, for example a cross sectional drawing
XX	No level	For files that are not relevant to the levels, for example specifications or meeting minutes
GF	Ground floor	
0	Base level	For linear assets (for example roads) or where GF isn't applicable
1	Level one	The first level primary level above ground level
M1	Mezzanine one	Mezzanine level above level one
M2	Mezzanine two	Mezzanine level above level two
B1	Basement one	The first level below ground level
B2	Basement two	The second level below ground level

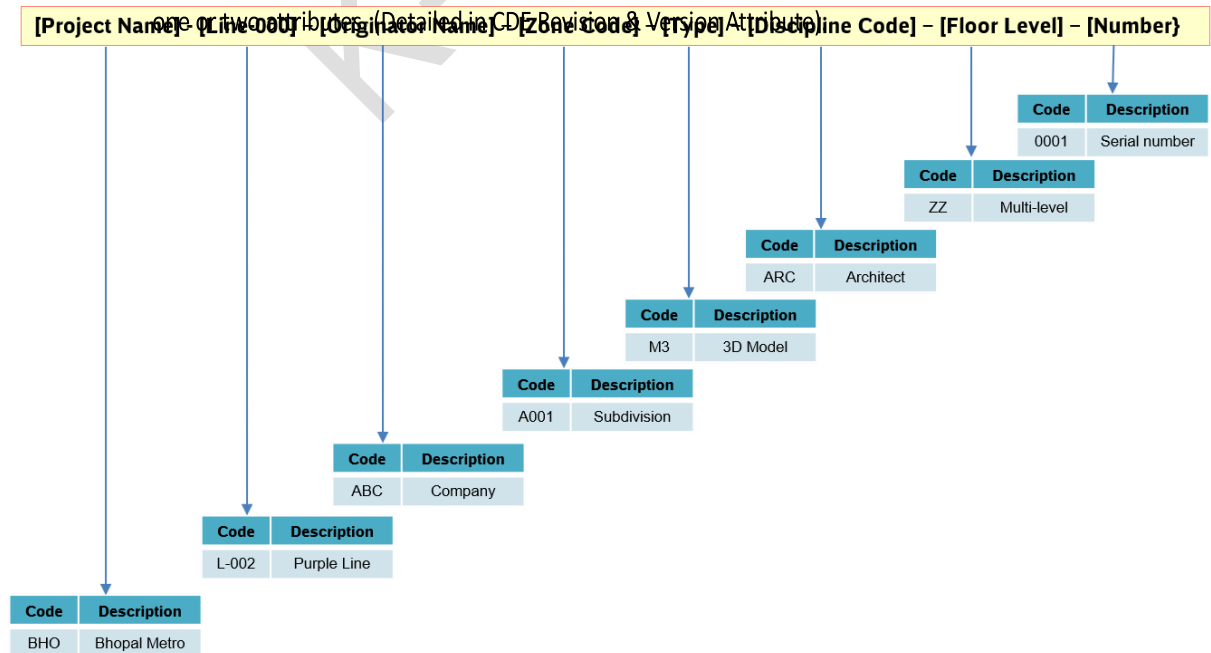
- **Number**

This will consist of four numeric digits used sequentially to when a container is one of a series not distinguished by other of the fields.

- **Revision No.**

The Revision number of the document (three characters) only within the CDE

The Contractor CDE Shall follow the Revision-Version concept and depending on the CDE used it could be



1.12.1 Common Data Environment (CDE) Container Attributes

Containers within the Employer CDE shall have the following attributes defined:

- Suitability / Issue Purpose
- Revision
- Classification

1.12.2 Common Data Environment (CDE) Revision & Version Attributes

Each container within the Employer Common Data environment shall have an attribute indicating the container Revision on the other hand container within the Contractor shall have an additional Version number, added to the Revision on for their internal approval / validation tracking. This contractor "Revision" will be the Revision-Version number.

Contractor CDE shall define the attribute for the Revision-Version

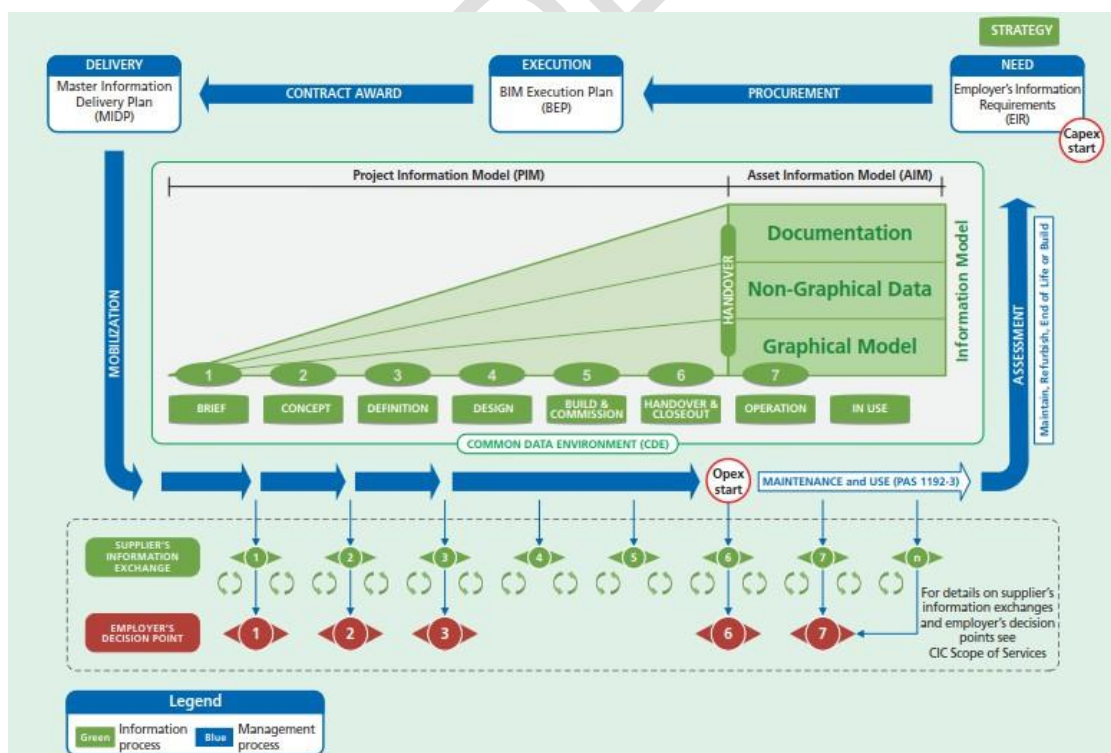
[Revision]. [Version] = 0001.03

Employer CDE shall define the attribute for the Revision-Version

[Revision] = 0001

Revision-Version numbers shall be used only in the Contractor CDE, and within the Employer CDE only Revision numbers shall remain. (Version number shall be removed when submitting to the Employer CDE.

1.12.3 Common Data Environment (CDE) and the Information Life Cycle



Extracted from PAS 1192-2-2013 – Figure 2

1.12.4 Process and the Common Data Environments

Work-in-Progress (WIP):

Used to hold unapproved information. [Contractor CDE]

Shared:

Used to hold information which has been approved for sharing with other organizations/ teams to use as a reference in design/construction development.

[Contractor CDE] Client Shared:**Shared:**

Used to hold completed information, placed for Client (Employer) authorization by means of Gate Reviews. [Contractor CDE] (Employer will need to be granted with Read privileges in the Client Shared area within the Contractor CDE).

GC Shared:

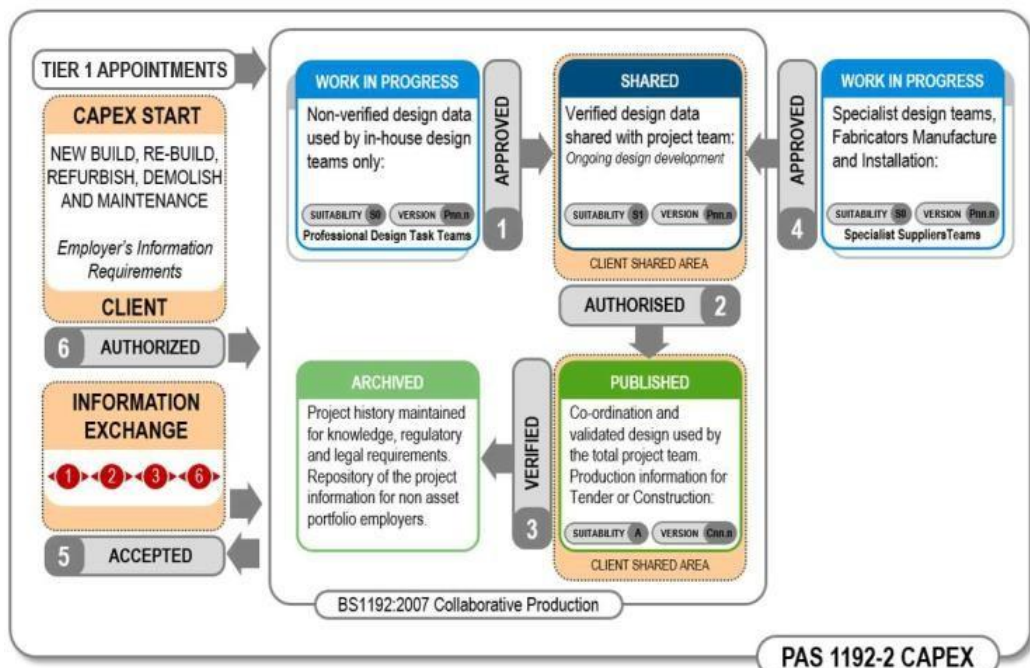
Used to release the information from the Contractor CDE to the Employer CDE, for sharing with Engineers or the local implementing bodies. [Client CDE]

Published:

Used to hold published (Approved by the Employer for a final stage) information for use by the entire project team. (both design/construction team and project team).

Archived:

Used to store all progress as each project milestone is met. In practice, the Archive area holds a record of all versions of the Published data, providing a tracking and trail in the dispute event. [Employer CDE].



CDE Model Principal phases according to the PAS 1192-2