

BIDDING DOCUMENTS  
FOR  
Procurement of Works



Dept of Air Transport  
Ministry of Information and  
Communications

Jan 2020

## INVITATION FOR BIDS

### ***Notes on the Invitation for Bids (IFB)***

*Its purpose is to supply information to enable potential Bidders to decide whether to participate in the procurement process. The Invitation for Bids shall specify any important Bid evaluation criteria (for example, the application of a margin of preference in Bid evaluation) and qualification requirements (for example, a requirement for a minimum level of experience in carrying out works of a similar type and size to those for which the IFB is issued).*

*The Invitation for Bids shall not be incorporated into the Bidding Documents. However, the information contained in the Invitation for Bids should conform to the Bidding Documents and in particular to the relevant information in the Bidding Data Sheet.*

# Procurement of Works

- Single-Stage: Two-Envelope Bidding Procedure -



## BIDDING DOCUMENT for Procurement of

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**Re-surfacing of runway 15-33, re-construction  
of taxiway A and other improvement works in  
Paro International Airport**

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**Issued on: 15th August 2019**

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**Invitation for Bids No.: DoAT/ADD/2019-20/856**

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**Employer: *DEPARTMENT OF AIR TRANSPORT, MINISTRY OF  
INFORMATION AND COMMUNICATION, PARO: BHUTAN***

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# Preface

This Bidding Document for the Procurement of Works has been prepared by DoAT in consultation with L&T IEL JV with United Consultancy and is based on the RGoB PRR Standard Bidding Document for the Procurement of Works (*Large Works*) issued by the Ministry of Finance and Standard Bidding Document for the Procurement of Works (*SBD Works*) issued by Asian Development Bank



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# Section 1: Instructions to Bidders

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## A. General

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| <b>1. Scope of Bid</b>         | <p>1.1 In connection with the Invitation for Bids (IFB) indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section 6 (Employer's Requirements). The name, identification, and number of contracts of the open competitive bidding (OCB) are provided in the BDS.</p> <p>1.2 Throughout this Bidding Document,</p> <ul style="list-style-type: none"> <li>(a) the term "in writing" means communicated in written form and delivered against receipt;</li> <li>(b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and</li> <li>(c) "day" means calendar day.</li> </ul>   |
| <b>2. Source of Funds</b>      | <p>2.1 The Employer as defined in section II, Bidding Data Sheet (BDS) has received a budget from RGoB towards the cost of the Project defined in the BDS and intends to apply a part of the funds to cover eligible payments under the contract for this works.</p>   |
| <b>3. Fraud and Corruption</b> | <p>3.1 It is RGoB's policy to require that Employers, Bidders, Suppliers, Contractors and their Subcontractors observe the highest standards of ethics during the procurement and execution of contracts. In pursuance of this policy, the RGoB:</p> <ul style="list-style-type: none"> <li>(a) defines, for the purposes of this provision, the terms set forth below as follows:             <ul style="list-style-type: none"> <li>(i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;</li> <li>(ii) "fraudulent practice" is any intentional act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;</li> <li>(iii) "collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;</li> <li>(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;</li> <li>(v) "obstructive practice" is (bb) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede any investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (cc) acts</li> </ul> </li> </ul> |

intended to materially impede the exercise of the inspection and audit rights of the Employer or any organization or person appointed by the Employer and/or any relevant RGoB agency provided for under ITB Sub-Clause 3.1 (d) below.

- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question.
  - (c) will sanction a firm or individual, including declaring them ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that they have, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing contract;
  - (d) will have the right to require that a provision be included in Bidding Documents and in contracts, requiring Bidders, Suppliers, Contractors and their Subcontractors to permit the Employer, any organization or person appointed by the Employer and/or any relevant RGoB agency to inspect their accounts and records and other documents relating to the Bid submission and contract performance and to have them audited by auditors appointed by the Employer;
  - (e) requires that Bidders, as a condition of admission to eligibility, execute and attach to their bids an Integrity Pact Statement in the form provided in Section IV, Bidding Forms. Failure to provide a duly executed Integrity Pact Statement shall result in disqualification of the Bid; and
  - (f) will report any case of corrupt, fraudulent, collusive, coercive or obstructive practice to the relevant RGoB agencies, including but not limited to the Anti-Corruption Commission (ACC) of Bhutan, for necessary action in accordance with the statutes and provisions of the relevant agency.
- 3.2. Furthermore, Bidders shall be aware of the provision stated in GCC Sub-Clause 60.1

#### 4. Eligible Bidders

- 4.1 A Bidder may be a private entity, government-owned entity, subject to ITB sub-clause 4.4, or any combination of such entities in the form of a joint venture (JV) under an existing agreement or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution. Unless specified **in the BDS**, there is no limit on the number of members in a JV.
- 4.2 A Bidder may have the nationality of any country, subject to the

restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or sub-consultants for any part of the Contract including related Services

- 4.3 A Bidder shall not have a conflict of interest. All Bidders found to have conflict of interest shall be disqualified. Bidders may be considered to have a conflict of interest with one or more parties in this bidding process, if:
- (a) they have at least one controlling partner in common; or
  - (b) they receive or have received any direct or indirect subsidy from either party; or
  - (c) they have the same authorized legal representative for purposes of this Bid; or they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or a Bidder participates in more than one Bid in this bidding process. Participation by a Bidder in more than one Bid shall result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the same subcontractor in more than one Bid; or
  - (d) a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Works that are the subject of the Bid or in any other way provided consulting services in any aspect of the preparatory stages leading up to the issue of these Bidding Documents; or
  - (e) a Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Project Manager for the Contract implementation; or
  - (f) a Bidder or any of its affiliates employs or otherwise engages a close relative of a civil servant who either is employed by the Employer or has an authority over the bidder or its affiliates or over the bid. For the purposes of this Sub-Clause a close relative is defined as immediate family which includes father, mother, brother, sister, spouse and own children.
- 4.4 A Bidder that is determined to be ineligible pursuant to any of the provisions of this Bidding Document shall not be eligible to be awarded a Contract.
- 4.5 Government-owned enterprises in Bhutan shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and (iii) are not a dependent agency of the Employer.
- 4.6 Bidders shall provide such evidence of their continued eligibility

satisfactory to the Employer as the Employer shall reasonably request.

4.7 A firm shall be excluded if:

- (a) as a matter of law or official regulation, Bhutan prohibits commercial relations with the country in which the firm is constituted, incorporated or registered; or
- (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Bhutan prohibits any import of goods or contracting of Works or services from that country in which the firm is constituted, incorporated or registered or any payments to persons or entities in that country.

4.8 A Bidder shall also be excluded if:

- (a) he is insolvent or is in receivership or is a bankrupt or is in the process of being wound up, or has entered into an arrangement with his creditors; or
- (b) his business affairs are being administered by a court, judicial officer or appointed liquidator; or
- (c) he has suspended business or is in any analogous situation arising from similar procedures under the laws and regulations of his country of establishment; or
- (d) he has been found guilty of professional misconduct by a recognized tribunal or professional body; or
- (e) he has not fulfilled his obligations with regard to the payment of taxes, social security or other payments due in accordance with the laws of the country in which he is established or of the Kingdom of Bhutan; or
- (f) he is or has been guilty of serious misrepresentation in supplying information required for any prior registration with the Employer or the Construction Development Board of Bhutan; or
- (g) he has been convicted of fraud and/or corruption by a competent authority; or
- (h) he has not fulfilled his contractual obligations with the Employer in the past; or
- (i) he has been debarred from participation in public procurement by any competent authority as per law.

**5. Eligible Materials, Equipment and Services**

- 5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as defined in ITB 4.2, and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment, and services.

- 5.2 For purposes of ITB 5.1 above, “origin” means the place where the materials and equipment are mined, grown, produced, or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

## B. Contents of Bidding Document

### 6. Sections of Bidding Document

- 6.1 The Bidding Document consist of Parts I, II, and III, which include all the sections indicated below, and should be read in conjunction with any addenda issued in accordance with ITB 8.

#### PART I Bidding Procedures

- Section 1 - Instructions to Bidders (ITB)
- Section 2 - Bid Data Sheet (BDS)
- Section 3 - Evaluation and Qualification Criteria (EQC)
- Section 4 - Bidding Forms (BDF)
- Section 5 - Eligible Countries (ELC)

#### PART II Requirements

- Section 6 - Employer's Requirements (ERQ)

#### PART III Conditions of Contract and Contract Forms

- Section 7 - General Conditions of Contract (GCC)
- Section 8 - Particular Conditions of Contract (PCC)
- Section 9 - Contract Forms (COF)

- 6.2 The IFB issued by the Employer is not part of the Bidding Document.
- 6.3 The Employer is not responsible for the completeness of the Bidding Document and their addenda, if they were not obtained directly from the source stated by the Employer in the IFB.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

### 7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

- 7.1 A prospective Bidder requiring any clarification on the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received no later than 10 days prior to the deadline for submission of bids. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 22.2.



- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested to submit any questions in writing, to reach the Employer not later than 1 week before the meeting.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
- 7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

#### **8. Amendment of Bidding Document**

- 8.1 At any time prior to the deadline for submission of Bids, the Employer may amend the Bidding Document by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2

### **C. Preparation of Bids**

#### **9. Cost of**

- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible

- Bidding** or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid** 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.
- 11. Documents Comprising the Bid** 11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price Bid containing the documents listed in ITB 11.3, both envelopes enclosed together in an outer single envelope.
- 11.2 The Technical Bid shall comprise the following:
- (a) Letter of Technical Bid;
  - (b) Bid Security or Bid-Securing Declaration, in accordance with ITB 19;
  - (c) alternative Bids, if permissible, in accordance with ITB 13;
  - (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
  - (e) documentary evidence in accordance with ITB 17, establishing the Bidder's qualifications to perform the contract;
  - (f) Technical Proposal in accordance with ITB 16; and
  - (g) any other document required in the BDS.
- 11.3 The Price Bid shall comprise the following:
- (a) Letter of Price Bid;
  - (b) completed Price Schedules, in accordance with ITB 12 and ITB 14;
  - (c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13; and
  - (d) any other document required in the BDS.
- 11.4 In addition to the requirements under ITB 11.2, Bids submitted by a Joint Venture shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement.
- 12. Letters of Bid and Schedules** 12.1 The Letters of Technical Bid and Price Bid, and the Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information

requested and as required in the BDS.

**13. Alternative Bids**

- 13.1 Unless otherwise indicated in the BDS, alternative Bids shall not be considered.
- 13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion.
- 13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.
- 13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section 6 (Employer's Requirements). The method for their evaluation will be stipulated in Section 3 (Evaluation and Qualification Criteria).

**14. Bid Prices and Discounts**

- 14.1 The prices and discounts quoted by the Bidder in the Letter of Price Bid and in the Bill of Quantities shall conform to the requirements specified below.
- 14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
- 14.3 The price to be quoted in the Letter of Price Bid, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the Bid.
- 14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Price Bid, in accordance with ITB 12.1.
- 14.5 The prices shall be either fixed or adjustable as specified in the BDS.
- (a) In the case of Fixed Price, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A Bid submitted with an adjustable price will be treated as nonresponsive and rejected.
- (b) In the case of Adjustable Price, prices quoted by the Bidder shall be subject to adjustment during performance of the contract to reflect changes in the cost elements such as labor, material, transport, and contractor's equipment in accordance with the provisions of the

Conditions of Contract. A Bid submitted with a fixed price will be treated as nonresponsive and be rejected. The Bidder shall furnish the indexes and weightings for the price adjustment formulas in the Tables of Adjustment Data included in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indexes and weightings. Any bid that omits indexes and weightings shall be subject to clarification with the Bidder.

14.6 If so indicated in ITB 1.1, bids are being invited for individual contracts or for any combination of contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the Bids for all contracts are submitted and opened at the same time.

14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.

**15. Currencies of Bid and Payment**

15.1 The unit rates and the prices shall be quoted by the Bidder entirely in the currency specified in the BDS.

15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in the currency of the Employer's country in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.3 Bidders expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country and wishing to be paid accordingly may indicate the other currencies in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.4 The rates of exchange to be used by the Bidder for currency conversion during bid preparation shall be the selling rates for similar transactions prevailing on the date 28 days prior to the deadline for submission of bids published by the source specified in the BDS. If exchange rates are not so published for certain currencies, the Bidder shall state the rates used and the source. Bidders should note that for the purpose of payments, the exchange rates confirmed by the source specified in the BDS as the selling rates prevailing 28 days prior to the deadline for submission of Bids shall apply for the duration of the Contract so that no currency exchange risk is borne by the Bidder.

15.5 Foreign currency requirements indicated by the Bidders in the Schedule of Payment Currencies shall include but not limited to the specific requirements for

(a) expatriate staff and labor employed directly on the Works;

(b) social, insurance, medical and other charges relating to such expatriate staff and labor, and foreign travel expenses;

- (c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for the Works;
- (d) depreciation and usage of imported Plant and Contractor's Equipment, including spare parts, required for the Works;
- (e) foreign insurance and freight charges for imported materials, Plant and Contractor's Equipment, including spare parts; and
- (f) overhead expenses, fees, profit, and financial charges arising outside the Employer's country in connection with the Works.

15.6 Bidders may be required by the Employer to clarify their foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Payment Currencies are reasonable and responsive to ITB 15.3 above, in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder.

15.7 Bidders should note that during the progress of the Works, the foreign currency requirements of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor in order to reflect any changes in foreign currency requirements for the Contract, in accordance with **Subclause 14.15 of the Conditions of Contract**. Any such adjustment shall be effected by comparing the percentages quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items.

**16. Documents  
Comprising  
the  
Technical  
Proposal**

16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule, and any other information as stipulated in Section 4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.

**17. Documents  
Establishing  
the  
Qualification  
s of the  
Bidder**

17.1 To establish its qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).

17.2 Domestic Bidders, individually or in Joint Ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 36.

**18. Period of  
Validity of  
Bids**

18.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.

18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended 28 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or

permitted to modify its Bid.

**19. Bid  
Security/Bid-Securing  
Declaration**

19.1 Unless otherwise specified in the BDS, the Bidder shall furnish as part of its Bid, in original form, either a Bid-Securing Declaration or a bid security as specified in the BDS. In the case of a bid security, the amount and currency shall be as specified in the BDS.

19.2 If a Bid-Securing Declaration is required pursuant to ITB 19.1, it shall use the form included in Section 4 (Bidding Forms). The Employer will declare a Bidder ineligible to be awarded a Contract for a specified period of time, as indicated in the BDS, if the Bid-Securing Declaration is executed.

19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be, at the Bidder's option, in any of the following forms:

- (a) an unconditional bank guarantee,
- (b) an irrevocable letter of credit,
- (c) a cashier's or certified check, or
- (d) SWIFT message in the form of MT760.

all from a reputable source from an eligible country as described in Section 5 (Eligible Countries). In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section 4 (Bidding Forms) or another form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for 28 days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.4 Unless otherwise specified in the BDS, any Bid not accompanied by a substantially compliant bid security or Bid-Securing Declaration, if one is required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned promptly upon the successful Bidder's furnishing of the performance security pursuant to ITB 45.

19.6 If a bid security is specified pursuant to ITB 19.1, the bid security of the successful Bidder shall be returned promptly once the successful Bidder has signed the Contract and furnished the required performance security.

19.7 The bid security may be forfeited or the Bid Securing Declaration executed, if

- (a) notwithstanding ITB 24.3, a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid, except as provided in ITB 18.2; or
- (b) the successful Bidder fails to
  - (i) sign the Contract in accordance with ITB 44;

- (ii) furnish a performance security in accordance with ITB 45;
- (iii) accept the arithmetical correction of its Bid in accordance with ITB 34; or
- (iv) furnish a domestic preference security, if so required.

19.8 If the bid security is required as per ITB 19.1, the bid security of a Joint Venture shall be in the name of the Joint Venture that submits the Bid. If the Joint Venture has not been legally constituted at the time of bidding, the bid security shall be in the name of any or all of the Joint Venture partners. If the Bid-Securing Declaration is required as per ITB 19.1, the Bid-Securing Declaration of a Joint Venture shall be in the name of the Joint Venture that submits the Bid. If the Joint Venture has not been legally constituted at the time of bidding, the Bid-Securing Declaration shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.

**20. Format and Signing of Bid**

20.1 The Bidder shall prepare one original set of the Technical Bid and one original set of the Price Bid comprising the Bid as described in ITB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID." Alternative Bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE." In addition, the Bidder shall submit copies of the Technical and Price Bids, in the number specified in the BDS, and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

20.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. If a Bidder submits a deficient authorization, the Bid shall not be rejected in the first instance. The Employer shall request the Bidder to submit an acceptable authorization within the number of days as specified in the BDS. Failure to provide an acceptable authorization within the period as stated in the Employer's request shall cause the rejection of the Bid. If either the Letter of Technical Bid or Letter of Price Bid or Bid-Securing Declaration (if applicable) is not signed, the Bid shall be rejected.

20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

## **D. Submission and Opening of Bids**

**21. Sealing and Marking of Bids**

21.1 Bidders may always submit their Bids by post or by hand. When so specified in the BDS, Bidders shall have the option of submitting their Bids electronically. Procedures for submission, sealing, and marking are as follows:

- (a) Bidders submitting Bids by post or by hand shall enclose the original of the Technical Bid, the original of the Price Bid, and each copy of the Technical Bid and each copy of the Price Bid, in separate sealed envelopes, duly marking the envelopes as

“ORIGINAL - TECHNICAL BID,” “ORIGINAL - PRICE BID,” and “COPY NO... - TECHNICAL BID” and “COPY NO.... - PRICE BID.” These envelopes, the first containing the originals and the others containing copies, shall then be enclosed in one single envelope per set. If permitted in accordance with ITB 13, alternative Bids shall be similarly sealed, marked and included in the sets. The rest of the procedure shall be in accordance with ITB 21.2 and ITB 21.5.

- (b) Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified in the BDS.

21.2 The inner and outer envelopes shall

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Employer in accordance with BDS 22.1; and
- (c) bear the specific identification of this bidding process indicated in the BDS 1.1.

21.3 The outer envelopes and the inner envelopes containing the Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid, in accordance with ITB 25.1.

21.4 The inner envelopes containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 25.7.

21.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

**22. Deadline for Submission of Bids**

22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

22.2 The Employer may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

**23. Late Bids**

23.1 The Employer shall not consider any Bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.

**24. Withdrawal, Substitution and Modification of Bids**

24.1 A Bidder may withdraw, substitute, or modify its Bid – Technical or Price – after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2 (except for withdrawal notices, which do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be

- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except for withdrawal notices, which do not require copies), and in addition, the respective envelopes shall be clearly marked



“WITHDRAWAL,” “SUBSTITUTION,” “MODIFICATION”; and

- (b) received by the Employer no later than the deadline prescribed for submission of Bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid or any extension thereof.

## **25. Bid Opening**

25.1 The Employer shall open the Technical Bids in public at the address, on the date and time specified in the BDS in the presence of Bidders' designated representatives and anyone who chooses to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 21.1, shall be as specified in the BDS. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the Technical Bid and the Price Bid are submitted together in one envelope, the Employer may reject the entire Bid. Alternatively, the Price Bid may be immediately resealed for later evaluation.

25.2 First, envelopes marked “WITHDRAWAL” shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening.

25.3 Second, outer envelopes marked “SUBSTITUTION” shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with ITB 25.1. No envelope shall be substituted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

25.4 Next, outer envelopes marked “MODIFICATION” shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding modification notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original as well as Modification, will remain unopened in accordance with ITB 25.1.

25.5 All other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the presence of a bid security or Bid-Securing Declaration, if

required; and

(d) any other details as the Employer may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Technical Bid are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the opening of Technical Bids except for late bids, in accordance with ITB 23.1.

25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum, the name of the Bidder and whether there is a withdrawal, substitution, or modification; alternative proposals; and the presence or absence of a bid security or Bid-Securing Declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice of the opening of Price Bids.

25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.

25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the Bid Prices, including any discounts and alternative offers; and
- (d) any other details as the Employer may consider appropriate.

Only Price Bids discounts, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Price Bid and Bill of Quantities are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be

rejected at the opening of Price Bids.

25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum, the name of the Bidder, the Bid Price (per lot if applicable), any discounts, and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

## **E. Evaluation and Comparison of Bids**

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| <b>26. Confidentiality</b>                         | <p>26.1 Information relating to the examination, evaluation, comparison, and post-qualification of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on the Contract award is communicated to all Bidders.</p> <p>26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions may result in the rejection of its Bid.</p> <p>26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.</p>  |
| <b>27. Clarification of Bids</b>                   | <p>27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Price Bids, in accordance with ITB 34.</p> <p>27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.</p> |
| <b>28. Deviations, Reservations, and Omissions</b> | <p>28.1 During the evaluation of Bids, the following definitions apply:</p> <ul style="list-style-type: none"> <li>(a) "Deviation" is a departure from the requirements specified in the Bidding Document;</li> <li>(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and</li> <li>(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.</li> </ul>   |
| <b>29. Examination of Technical</b>                | <p>29.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been provided, and to determine the completeness of each document</p>  |

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| <b>Bids</b> | submitted. |
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- 29.2 The Employer shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer shall be rejected.
- (a) Letter of Technical Bid;
  - (b) written confirmation of authorization to commit the Bidder;
  - (c) Bid Security or Bid-Securing Declaration, if applicable; and
  - (d) Technical Proposal in accordance with ITB 16.
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| <b>30. Responsiveness of Technical Bid</b> | <p>30.1 The Employer's determination of a Bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB11.</p> <p>30.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,</p> <ul style="list-style-type: none"> <li>(a) if accepted, would:             <ul style="list-style-type: none"> <li>(i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or</li> <li>(ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or</li> </ul> </li> <li>(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.</li> </ul> <p>30.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section 6 (Employer's Requirements) have been met without any material deviation, reservation, or omission.</p> <p>30.4 If a Bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.</p> |
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| <b>31. Nonmaterial Nonconformities</b> | <p>31.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid that do not constitute a material deviation, reservation, or omission.</p> <p>31.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the</p> |
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rejection of its Bid.

31.3 Provided that a Technical Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in Section 3 (Evaluation and Qualification Criteria).

**32. Qualification of the Bidder**

32.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).

32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1.

32.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.

**33. Subcontractors**

33.1 Unless otherwise stated in the BDS, the Employer does not intend for the contractor to execute any specific elements of the Works through nominated subcontractors.

33.2 If subcontractors are proposed for any of the key activities listed in Section 3 (Evaluation and Qualification) Criteria 2.4.2, they shall be considered as "Specialist Subcontractors" and shall meet qualification requirements for the relevant key activities.

**34. Correction of Arithmetical Errors**

34.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

- (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
- (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
- (c) If there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of Price Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Price Bid will be corrected.
- (d) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures

shall prevail subject to (a), (b) and (c) above.

34.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its Bid shall be disqualified and its bid security may be forfeited or its Bid-Securing Declaration executed.

**35. Conversion to Single Currency**

35.1 For evaluation and comparison purposes, the currency (ies) of the Bid shall be converted into a single currency as specified in the BDS.

**36. Domestic Preference**

36.1 Unless otherwise specified in the BDS, domestic preference shall not apply.

**37. Evaluation and Comparison of Price Bids**

37.1 The Employer shall use the criteria and methodologies listed in this Section 3, Evaluation and Qualification criteria. No other evaluation criteria or methodologies shall be permitted.

37.2 To evaluate the Price Bid, the Employer shall consider the following:

- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Daywork items, where priced competitively;
- (b) price adjustment for correction of arithmetic errors in accordance with ITB 34.1;
- (c) price adjustment due to discounts offered in accordance with ITB 14.4;
- (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 35;
- (e) adjustment for nonmaterial nonconformities in accordance with ITB 31.3;
- (f) assessment whether the bid is abnormally low in accordance with ITB 38; and
- (g) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria).

37.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

37.4 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts, the methodology to determine the lowest evaluated price of the contract combinations, including any discounts offered in the Letter of Price Bid, is specified in Section 3 (Evaluation and Qualification Criteria).

37.5 The Employer shall compare all substantially responsive Bids to determine the lowest evaluated Bid price, in accordance with ITB 37.2.

**38. Abnormally**

38.1 An abnormally low bid is one where the bid price, in combination with other

**Low bids**

elements of the bid, appears to be so low that it raises concerns as to the capability of the Bidder to perform the contract for the offered bid price.

38.2 When the offered bid price appears to be abnormally low, the Employer shall undertake a three-step review process as follows:

- (a) identify abnormally low costs and unit rates by comparing them with the engineer's estimates, other substantially responsive bids, or recently awarded similar contracts;
- (b) clarify and analyze the bidder's resource inputs and pricing, including overheads, contingencies and profit margins; and
- (c) decide whether to accept or reject the bid.

38.3 With regard to ITB 38.2 (b) above, the Employer will seek a written explanation from the bidder of the reasons for the offered bid price, including a detailed analysis of costs and unit prices, by reference to the scope, proposed methodology, schedule, and allocation of risks and responsibilities. This may also include information regarding the economy of the manufacturing process; the services to be provided, or the construction method to be used; the technical solutions to be adopted; and any exceptionally favorable conditions available to the bidder for the works, equipment or services proposed.

38.4 After examining the explanation given and the detailed price analyses presented by the bidder, the Employer may:

- (a) accept the bid, if the evidence provided satisfactorily accounts for the low bid price and costs, in which case the bid is not considered abnormally low;
- (b) accept the bid, but require that the amount of the performance security be increased at the expense of the bidder to a level sufficient to protect the Employer against financial loss. The amount of the performance security shall generally be not more than 30% of the contract price; or
- (c) reject the bid if the evidence provided does not satisfactorily account for the low bid price, and make a similar determination for the next ranked bid, if required.

**39. Unbalanced or Front-Loaded Bids**

39.1 If the Bid, which results in the lowest evaluated Bid Price, is seriously unbalanced or front-loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed, as well as the pricing and sources of materials, equipment and labor.

39.2 After the evaluation of the information and detailed price analyses presented by the Bidder, the Employer may as appropriate:

- (a) accept the Bid; or
- (b) accept the Bid, but require that the total amount of the Performance Security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract subject to ITB

45.2; or

(c) reject the Bid and make a similar determination for the next ranked bid.

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| <b>40. Employer's Right to Accept Any Bid, and to Reject Any or All Bids</b> | 40.1 The Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, bid securities, shall be promptly returned to the Bidders. |
| <b>41. Notice of Intention for Award of Contract</b>                         | 41.1 If Standstill provisions apply as specified in the BDS, the standstill period shall be defined in the BDS to specify the duration subsequent to notification of intention for award of contract (before making the actual contract award) within which any unsuccessful bidder can challenge the proposed award.                 |

## F. Award of Contract

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| <b>42. Award Criteria</b>        | 42.1 The Employer shall award the Contract to the Bidder whose offer has been determined in line with ITB 37 to ITB 39 above to be the lowest evaluated Bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.  |
| <b>43. Notification of Award</b> | <p>43.1 Prior to the expiration of the period of bid validity and upon expiry of the standstill period specified in ITB 41.1, or upon satisfactory resolution of a complaint filed within standstill period, if applicable, the Employer shall transmit the Notification of Award using the form included in Section 9 (Contract Forms) to the successful Bidder, in writing, that its Bid has been accepted.</p> <p>43.2 Unless standstill period applies, upon notification of award, unsuccessful Bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their Bids were not selected. The Employer shall promptly respond in writing and/or in a debriefing meeting to any unsuccessful Bidder who, after publication of contract award, requests a debriefing.</p> <p>43.3 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.</p> |
| <b>44. Signing of Contract</b>   | <p>44.1 Promptly after notification, the Employer shall send the successful Bidder the Contract Agreement.</p> <p>44.2 Within 7 days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.</p>  |
| <b>45. Performance Security</b>  | 45.1 Within 17 days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 38 and ITB 39, using for that purpose the Performance Security Form included in Section 9 (Contract Forms), or another form acceptable to the Employer. If the institution issuing the performance security is located   |



outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.

45.2 Failure of the successful Bidder to submit the abovementioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security or execution of the Bid-Securing Declaration. In that event, the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.

45.3 The above provision shall also apply to the furnishing of a domestic preference security if so required.

**46. Bidding-  
Related  
Complaints**

46.1 If the Bidder has or is likely to suffer, loss or injury due to breach of a duty imposed on the Employer by the provisions of this bidding document, the bidder shall submit the complaint in writing to the Employer within ten (10) days from the date of letter of intent to award the contract pursuant to ITB 41.1.

## Section 2: Bid Data Sheet

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 (Instructions to Bidders).

### A. General

<b>ITB 1.1</b>	The number of the Invitation for Bids (IFB) is: <b>DoAT/ADD/2019-20/856</b>
<b>ITB 1.1</b>	The Employer is: Director, Department of Air Transport, Ministry of Information and Communication, Paro, Bhutan
<b>ITB 2.1</b>	The name of the Project is: Resurfacing of Runway 15-33, Re-construction of taxiway A and other improvement works in Paro International Airport

### B. Contents of Bidding Documents

<b>ITB 7.1</b>	<p>For <b><u>clarification purposes</u></b> only, the Employer's address is:</p> <p>Chief Engineer, Department of Air Transport, Paro International Airport, Ministry of Information and Communications. Phone no: +975-8-271750 Email id: <a href="mailto:udorji@doat.gov.bt">udorji@doat.gov.bt</a>, <a href="mailto:jtdorji@doat.gov.bt">jtdorji@doat.gov.bt</a></p>
<b>ITB 7.4</b>	<p>A Pre-Bid meeting SHALL NOT take place.</p> <p>However, it is recommended that the prospecting bidders visit site before quoting and also with prior information to the DoAT.</p> <p>Contact no: +975-8-272168; +975-17140999</p>

## C. Preparation of Bids

<b>ITB 10.1</b>	The language of the Bid is: ENGLISH
<b>ITB 11.2 (g)</b>	<p>The Bidder shall submit with its Technical Bid the following additional documents:</p> <ol style="list-style-type: none"> <li>1. Valid Trade/Business License/similar documents issued by a competent authority of the Country in which the firm is registered.</li> <li>2. Valid CDB Certificate (for Local Firms), International Firms will require the CDB Certificate &amp; Temporary Contract License prior to the award if the International Firm/Joint Venture is the winning bidder.</li> <li>3. Valid Tax Clearance Certificate</li> <li>4. Joint Venture Agreement ( a letter of intent to form a JV along with a copy of proposed JV agreement). <ol style="list-style-type: none"> <li>a. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2.</li> <li>b. Authorization to represent the firm named above, in accordance with ITB 4.2.</li> <li>c. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.</li> </ol> </li> <li>5. Power of Attorney (if the signatory is not the sole proprietor).</li> <li>6. Audited Financial Statements <ol style="list-style-type: none"> <li>a. All such documents that reflect the financial situation of the Applicant or partner to a Joint Venture, and not sister or parent companies.</li> <li>b. Historic financial statements must be audited by a certified accountant.</li> <li>c. Historic financial statements must be complete, including all notes to the financial statements.</li> <li>d. Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted)</li> </ol> </li> </ol>
<b>ITB 11.3 (d)</b>	<p>The Bidder shall submit with its Price Bid the following additional documents:</p> <p>-Declaration from the firm that the Price Bid is non conditional.</p>

<b>ITB 12.1</b>	The units and rates in figures entered into the Bill of Quantities and Daywork Schedule should be typewritten, if written by hand, must be in print form. Bill of Quantities and Daywork Schedule not presented accordingly may be considered to be executed at contractor's own cost.
<b>ITB 13.1</b>	Alternative Bids SHALL NOT be permitted.
<b>ITB 13.2</b>	Alternative times for completion SHALL NOT be permitted.  If alternative times for completion are permitted, the evaluation method will be as specified in Section 3 (Evaluation and Qualification Criteria).
<b>ITB 13.4</b>	Alternative technical solutions shall be permitted for the following parts of the Works: NOT APPLICABLE  If alternative technical solutions are permitted, the evaluation method will be as specified in Section 3 (Evaluation and Qualification Criteria).
<b>ITB 14.5</b>	The prices quoted by the Bidder SHALL BE ADJUSTABLE for the followings:  1. Change in Bitumen content(JMF) as specified in Particular Specifications  2. Change in Bitumen price(the reference price to be adopted for this adjustment will be Nu. 41,500.00 per tonne at Phuentsholing)
<b>ITB 15.1</b>	The unit rates and the prices shall be quoted by the Bidder entirely in: NGULTRUMS
<b>ITB 15.4</b>	The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by: ROYAL MONETARY AUTHORITY, BHUTAN
<b>ITB 18.1</b>	The bid validity period shall be 90 days.
<b>ITB 19.1</b>	The Bidder shall furnish a bid security in the amount of Nu. 3,700,000.00(Ngultrums Three Millions and Seven Hundred Thousands.)
<b>ITB 19.2</b>	The ineligibility period will be NOT APPLICABLE

<b>ITB 19.4</b>	Any bid not accompanied by an irrevocable and callable bid security shall be rejected by the Employer as nonresponsive.
<b>ITB 20.1</b>	In addition to the original Bid, the number of copies is: ONE IDENTICAL COPY  <b>The technical and financial bids shall be submitted in separate envelopes.</b>
<b>ITB 20.2</b>	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: POWER OF ATTORNY
<b>ITB 20.2</b>	The Bidder shall submit an acceptable authorization within 7 days.

#### D. Submission and Opening of Bids

<b>ITB 21.1</b>	Bidders SHALL NOT have the option of submitting their Bids electronically.
<b>ITB 21.1 (b)</b>	If Bidders shall have the option of submitting their Bids electronically, the electronic bidding submission procedures shall be: NOT APPLICABLE
<b>ITB 22.1</b>	For <b><u>bid submission purposes</u></b> only, the Employer's address is: Director, Department of Air Transport, Arrival Terminal, Second Floor, Paro International Airport, <i>Paro</i>  <b>The deadline for bid submission is:</b> Date: 14 <sup>th</sup> February, 2020 Time: 1400 Hours(BST)
<b>ITB 25.1</b>	The opening of the Technical Bid shall take place at: Conference Hall Department of Air Transport, Arrival Terminal, Second Floor, Paro International Airport, Paro 1430 Hours(BST)
<b>ITB 25.1</b>	Electronic bid opening procedure shall be as follows: NOT APPLICABLE

<b>ITB 25.5</b>	The Letter of Technical Bid shall be initialed by ATLEAST 3(THREE) representatives of the Employer attending Bid opening.
<b>ITB 25.10</b>	The Letter of Price Bid and Bill of Quantities shall be initialed by ATLEAST 3(THREE) representatives of the Employer attending Bid opening.

## E. Evaluation and Comparison of Bids

<b>ITB 32.2</b>	The qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, Subcontractors SHALL NOT be permitted.
<b>ITB 33.1</b>	The Employer DOES NOT INTEND for the contractor to execute any specific elements of the Works through nominated subcontractors.
<b>ITB 35.1</b>	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: NOT APPLICABLE
<b>ITB 36.1</b>	Domestic preference SHALL NOT apply.
<b>ITB 41.1</b>	<p>Standstill provisions shall apply. The duration of standstill period will be 7(SEVEN) days from the date of notice of intention for award of contract.</p> <p>The Employer shall, at the start of the standstill period, notify in writing each Bidder that submitted a bid, of its intention to award a contract to the successful Bidder at the end of standstill period. The notification using the form included in Section 9 (Contract Forms) shall include the following information:</p> <ul style="list-style-type: none"> <li>(a) the name of each Bidder who submitted a Bid;</li> <li>(b) the bid prices as read out at bid opening;</li> <li>(c) the name and evaluated prices of each Bid that was evaluated;</li> <li>(d) the name of Bidders whose bids were rejected and the reasons for their rejection;</li> <li>(e) the name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded; and</li> <li>(f) a statement of the reason(s) the bid of the unsuccessful Bidder to whom the notification is addressed was unsuccessful, unless the price information under (e) of this paragraph already reveals the reason.</li> </ul>

**F. Award of Contracts**

<b>ITB 46.1</b>	<p>The Bidder should submit its complaints (if any) in writing and shall reach this office within 7(seven) days after issuance of notice of award, to:</p> <p>Director, Department of Air Transport, Paro International Airport, Ministry of Information and Communications. Phone no: +975-8-271403 Email id: kwangchuk@doat.gov.bt</p>
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## Section 3: Evaluation and Qualification Criteria

### - Without Prequalification -

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 32 and ITB 36, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

#### Table of Criteria

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2.4.2	Construction Experience in Key Activities .....	3-9



## 1. Evaluation

In addition to the criteria listed in ITB 37.2 (a)–(f), other relevant factors are as follows:

### 1.1 Adequacy of Technical Proposal

- Capacity to mobilize Key equipment as stipulated in section 6(Employer's requirements)
- Capacity to mobilize Key personnels as stipulated in section 6(Employer's requirements)
- Work methodology, scheduling and material sourcing

Note: Non Compliance with these requirements will be ground for rejection of bids

### 1.2 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:

NOT PERMITTED

### 1.3 Technical Alternatives

Technical alternatives, if permitted under ITB 13.4, will be evaluated as follows:

NOT PERMITTED

### 1.5 Quantifiable Nonconformities and Omissions

Subject to ITB 14.2 and ITB 37.2, the evaluated cost of quantifiable nonconformities including omissions, is determined as follows:

The Employer will make its own assessment of the cost of any nonmaterial nonconformities and omissions for the purpose of ensuring fair comparison of Bids.

### 1.6 Domestic Preference

NOT APPLICABLE

**1.7 Other Criteria**

**Add any other relevant criteria to consider in bid evaluation. Specify the evaluation methodologies:**

NOT APPLICABLE

**1.8 Multiple Contracts**

NOT APPLICABLE

## 2. Qualification

### 2.1 Eligibility

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	

#### 2.1.1 Nationality

Nationality in accordance with ITB 4.2.	Must meet requirement	Must meet requirement	Must meet requirement	Not applicable	Forms ELI - 1; ELI - 2 with attachments
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#### 2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB 4.3.	Must meet requirement	Must meet requirement	Must meet requirement	Not applicable	Letter of Technical Bid
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#### 2.1.4 Government-Owned Entity

Bidder required to meet conditions of ITB 4.5.	Must meet requirement	Must meet requirement	Must meet requirement	Not applicable	Forms ELI - 1; ELI - 2 with attachments
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## 2.2 Historical Contract Nonperformance

Declaration from the bidder that:

- the firm has not been debarred or blacklisted by any government agencies
- doesn't have any non-performing contracts and,

## 2.3 Financial Situation

### 2.3.1 Historical Financial Performance

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Submission of audited financial statements for the last year (2018-2019) to demonstrate the current soundness of the Bidder's financial position. As a minimum, the Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive.	Must meet requirement	Not applicable	Must meet requirement	Not applicable	Form FIN - 1 with attachments

### 2.3.2 Average Annual Construction Turnover

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Minimum average annual construction turnover of Nu: 277.00 million calculated as total certified payments received for contracts in progress or completed, within the last 3(three) years.	Must meet requirement	Must meet requirement	Must meet Atleast 25% of the requirement	Must meet Atleast 40% of the requirement	Form FIN - 2

### **2.3.3 Financial Resources**

**“The bidder should submit evidence of line of credit worth Nu. 185.00 Millions from any authorized financial institutions specifically for the Project, valid till the project completion date and shall be unconditional.”**

## 2.4 Construction Experience

### 2.4.1 Contracts of Similar Size and Nature

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Participation as a contractor, Joint Venture partner (Lead) in at least ONE contract of Nu. 148.00 millions that has been successfully completed within the last 3 (three) years  OR  2 works of total value Nu. 148.00 millions successfully completed in last 3 years.  The completed works shall be of similar nature to the proposed work.	Must meet requirement	Not applicable	Not applicable	Must meet requirement	Form EXP - 1

## 2.4.2 Construction Experience in Key Activities

May be complied with by the Bidder or by Specialist Subcontractor. If Specialist Subcontractors are proposed by the Bidder for key activities, each Specialist Subcontract must have experience in related key activity as a single entity.

If the key activity is to be undertaken by a Specialist Subcontractor, the Employer shall require evidence of the subcontracting agreement from the Bidder.

Criteria	Compliance Requirements		Documents
Requirement	Single Entity or Its Specialist Subcontractors	Joint Venture or Its Specialist Subcontractors	Submission Requirements
For the above or other contracts executed during the period stipulated in 2.4.1, a minimum construction experience is required in the following key activities:	Must meet requirement	Must meet requirement	Form EXP – 2
1 Airport flexible pavement works			
2 National highway (flexible pavement) works			

# Section 4: Bidding Forms

## - Without Prequalification -

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## Letter of Technical Bid

**Note**

*The Bidder must accomplish the Letter of Technical Bid on its letterhead clearly showing the Bidder's complete name and address.*

Date: .....

OCB No.: .....

Invitation for Bid No.: .....

To: *[insert complete name of the Employer]*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to execute in conformity with the Bidding Documents the following Works: *[insert narrative]*
- (c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of *[insert bid validity period as specified in ITB 18.1 of the BDS]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (d) Our firm, including any Subcontractors or Suppliers for any part of the Contract, have nationalities from eligible countries in accordance with ITB 4.2.
- (e) We, including any Subcontractors or Suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3.
- (f) We are not participating, as a Bidder, either individually or as partner in a Joint Venture, in more than one Bid in this bidding process in accordance with ITB 4.3(e), other than alternative offers submitted in accordance with ITB 13.
- (g) Our firm, Joint Venture partners, associates, parent company, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, are not subject to, or not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the Construction Development Board of Bhutan or similar boards/institutions in other countries
- (h) Our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the Contract, are not, or have never been, temporarily suspended, debarred, declared ineligible, or blacklisted by the Employer's country, any international organization, and other donor agency.

If so debarred, declared ineligible, temporarily suspended, or blacklisted, please state details (as applicable to each Joint Venture partner, associate, parent company, affiliate, subsidiaries, Subcontractors, and/or Suppliers):

(i) Name of Institution: .....

(ii) Period of debarment, ineligibility, or blacklisting *[start and end date]*: .....

(iii) Reason for the debarment, ineligibility, or blacklisting: .....

- (i) Our firm's, Joint Venture partners, associates, parent company's affiliates or subsidiaries, including any Subcontractors or Suppliers key officers and directors have not been [*charged or convicted*] of any criminal offense (including felonies and misdemeanors) or infractions/violations of ordinance which carry the penalty of imprisonment.

If so charged or convicted, please state details:

- (i) Nature of the offense/violation: \_\_\_\_\_
- (ii) Court and/or area of jurisdiction: \_\_\_\_\_
- (iii) Resolution [*i.e. dismissed; settled; convicted/duration of penalty*]: \_\_\_\_\_
- (iv) Other relevant details [*please specify*]: \_\_\_\_\_
- (j) We understand that it is our obligation to notify DoAT should our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers, be temporarily suspended, debarred or become ineligible to work with any other government agencies, international organizations, and other donor agencies, or any of our key officers and directors be charged or convicted of any criminal offense or infractions/violations of ordinance which carry the penalty of imprisonment.
- (k) Our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers, are not from a country which is prohibited to export goods to or receive any payments from the Employer's country by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations.
- (l) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].<sup>1</sup>
- (m) We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration in accordance with ITB 4.6.
- (n) We agree to permit DoAT or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by DoAT.
- (o) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 6 (Employer's Requirements) and our technical proposal, or as otherwise agreed with the Employer.
- (p) We understand that any misrepresentation that knowingly or recklessly misleads, or attempts to mislead may lead to the automatic rejection of the Bid or cancellation of the contract, if awarded; and may result in remedial actions, in accordance with Anti Corruption Act of Bhutan, 2011.

Name .....

In the capacity of .....

Signed .....

Duly authorized to sign the Bid for and on behalf of .....

Date .....

<sup>1</sup> Use one of the two options as appropriate.

## Letter of Price Bid

**Note-**

The Bidder must accomplish the Letter of Price Bid on its letterhead clearly showing the Bidder's complete name and address.

Date: .....

OCB No.: .....

Invitation for Bid No.: .....

To: *[insert complete name of the Employer]*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to execute in conformity with the Bidding Documents and the Technical Bid submitted for the following Works. *[insert narrative]*
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is:

*[amount of foreign currency in words], [amount in figures], and [amount of local currency in words], [amount in figures]*

*The total bid price from the Summary of Bill of Quantities should be entered by the bidder inside this box. Absence of the total bid price in the Letter of Price Bid may result in the rejection of the bid.*

- (d) The discounts offered and the methodology for their application are: *[insert discounts and methodology for their application if any]*
- (e) Our Bid shall be valid for a period of *[insert bid validity period as specified in ITB 18.1 of the BDS]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents.
- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract.<sup>2</sup>

Name of Recipient	Address	Reason	Amount
.....	.....	.....	.....
.....	.....	.....	.....

<sup>2</sup> If none has been paid or is to be paid, indicate "None".

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (j) We agree to permit DoAT or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by DoAT.

Name .....

In the capacity of .....

Signed .....

Duly authorized to sign the Bid for and on behalf of .....

Date .....

## Bid Security Bank Guarantee

[Bank's name, and address of issuing branch or office]<sup>3</sup>

**Beneficiary:** [Name and address of the Employer]

**Date:** .....

**Bid Security No.:** .....

We have been informed that [name of the Bidder] (hereinafter called "the Bidder") has submitted to you its bid dated [please specify] (hereinafter called "the Bid") for the execution of [name of contract] under Invitation for Bids No. [please specify] ("the IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we [name of bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [amount in words] [amount in figures] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder

- (a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Letters of Technical and Price Bid; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
- (c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the ITB, or (iii) fails or refuses to furnish a domestic preference security, if required.

This guarantee will expire (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder, or (ii) 28 days after the expiration of the Bidder's bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.<sup>4</sup>

[Authorized signature(s) and bank's seal (where appropriate)]

<sup>3</sup> All italicized text is for use in preparing this form and shall be deleted from the final document.

<sup>4</sup> Or 758 as applicable.

## Bid-Securing Declaration

Date: *[insert date (as day, month and year)]*

Bid No.: *[insert number of bidding process]*

Alternative No.: *[insert identification No if this is a bid for an alternative]*

To: *[insert complete name of the Employer]*

We, the undersigned, declare that:

We understand that, according to your conditions, Bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the Borrower for the period of time of *[insert number of years as indicated in ITB 19.2 of the BDS]*, starting on the date that we receive a notification from the Employer, if we are in breach of our obligation(s) under the bid conditions, because we

- (a) have withdrawn our Bid during the period of bid validity specified in the Letters of Technical and Price Bid; or
- (b) do not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
- (c) having been notified of the acceptance of our Bid by the Employer, during the period of bid validity, (i) fail or refuse to execute the Contract, if required; or (ii) fail or refuse to furnish the Performance Security, in accordance with the ITB; or (iii) fail or refuse to furnish the domestic preference security, if required.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of acceptance of the successful Bidder; or (ii) 28 days after the expiration of our Bid.

Signed: *[insert signature of person whose name and capacity are shown]*

In the capacity of *[insert legal capacity of person signing the Bid-Securing Declaration]*

Name: *[insert complete name of person signing the Bid-Securing Declaration]*

Duly authorized to sign the bid for and on behalf of *[insert complete name of the Bidder]*

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ *[insert date of signing]*

Corporate Seal *[where appropriate]*

## AFFILIATE COMPANY GUARANTEE

Name of Contract/Contract No.: \_\_\_\_\_

Name and address of Employer: \_\_\_\_\_

\_\_\_\_\_ [together with successors and assigns].

We have been informed that [name of Contractor] (hereinafter called the "Contractor") is submitting an offer for the above-referenced Contract in response to your invitation, and that the conditions of your invitation require its offer to be supported by an affiliate company guarantee.

In consideration of you, the Employer, awarding the Contract to the Contractor, we [name of affiliated company] irrevocably and unconditionally guarantee to you, as a primary obligation, that (i) throughout the duration of the Contract, we will make available to the Contractor our financial, technical capacity, expertise and resources required for the Contractor's satisfactory performance of the Contract; and (ii) we are fully committed, along with the Contractor, to ensuring a satisfactory performance of the Contract.

If the Contractor fails to so perform its obligations and liabilities and comply with the Contract, we will indemnify the Employer against and from all damages, losses and expenses (including legal fees and expenses) which arise from any such failure for which the Contractor is liable to the Employer under the Contract.

This guarantee shall come into full force and effect when the Contract comes into full force and effect. If the Contract does not come into full force and effect within a year of the date of this guarantee, or if you demonstrate that you do not intend to enter into the Contract with the Contractor, this guarantee shall be void and ineffective. This guarantee shall continue in full force and effect until all the Contractor's obligations and liabilities under the Contract have been discharged, when this guarantee shall expire and shall be returned to us, and our liability hereunder shall be discharged absolutely.

This guarantee shall apply and be supplemental to the Contract as amended or varied by the Employer and the Contractor from time to time. We hereby authorize them to agree on any such amendment or variation, the due performance of which and compliance with which by the Contractor are likewise guaranteed hereunder. Our obligations and liabilities under this guarantee shall not be discharged by any allowance of time or other indulgence whatsoever by the Employer to the Contractor, or by any variation or suspension of the works to be executed under the Contract, or by any amendments to the Contract or to the constitution of the Contractor or the Employer, or by any other matters, whether with or without our knowledge or consent.

This guarantee shall be governed by the law of the same country (or other jurisdiction) that governs the Contract and any dispute under this guarantee shall be finally settled under the [Rules or Arbitration provided in the Contract]. We confirm that the benefit of this guarantee may be assigned subject only to the provisions for assignment of the Contract.

Signed by: ..... <div style="text-align: right;">[signature]</div> ..... <div style="text-align: right;">[name]</div> ..... <div style="text-align: right;">[position in parent/subsidiary company]</div>	Signed by: ..... <div style="text-align: right;">[signature]</div> ..... <div style="text-align: right;">[name]</div> ..... <div style="text-align: right;">[position in parent/subsidiary company]</div>
--	--

Date: .....

### -- Note --

If permitted in accordance with ITB 32.2 of the BDS, the Bidder shall fill out the Affiliate Company Guarantee Form for each subsidiary, parent entity, affiliate, subcontractor, etc. that the Bidder submits for consideration of the Employer in determining its qualifications.

# **Technical Proposal**

**Personnel**

**Equipment**

**Site Organization**

**Method Statement**

**Mobilization Schedule**

**Construction Schedule**



## Personnel

### Form PER – 1: Proposed Personnel

Bidder should provide the details of the proposed personnel and their experience record in the relevant Information Forms below for each candidate:

1.	Title of position
	Name
2.	Title of position
	Name
3.	Title of position
	Name
4.	Title of position
	Name
5.	Title of position
	Name
6.	Title of position
	Name
etc.	Title of position
	Name

**-- Note --**

*All titles of positions will be as listed in Section 6 (Employer's Requirements).*

The Bidder shall provide all the information requested below. Use one form for each position.

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

[illegible]

## Equipment

### Form EQU: Equipment

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment requirements indicated in Section 6 (Employer's Requirements), using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

<b>Item of Equipment</b>		
<b>Equipment Information</b>	<b>Name of manufacturer</b>	<b>Model and power rating</b>
	<b>Capacity</b>	<b>Year of manufacture</b>
<b>Current Status</b>	<b>Current location</b>	
	<b>Details of current commitments</b>	
<b>Source</b>	Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

Omit the following information for equipment owned by the Bidder.

<b>Owner</b>	<b>Name of owner</b>	
	<b>Address of owner</b>	
	<b>Telephone</b>	<b>Contact name and title</b>
	<b>Fax</b>	<b>Telex</b>
<b>Agreements</b>	<b>Details of rental / lease / manufacture agreements specific to the project</b>	

## **Site Organization**

## **Method Statement**

## **Mobilization Schedule**

## **Construction Schedule**

## **Bidders Qualification**

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the following information requested in the corresponding Information Sheets.

**Form ELI - 1: Bidder's Information Sheet**

<b>Bidder's Information</b>	
<b>Bidder's legal name</b>	
<b>In case of a Joint Venture, legal name of each partner</b>	
<b>Bidder's country of constitution</b>	
<b>Bidder's year of constitution</b>	
<b>Bidder's legal address in country of constitution</b>	
<b>Bidder's authorized representative</b> (name, address, telephone number(s), fax number(s), e- mail address)	
<p><b>Attached are copies of the following documents:</b></p> <p><input type="checkbox"/> 1. In case of a single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2.</p> <p><input type="checkbox"/> 2. Authorization to represent the firm or Joint Venture named above, in accordance with ITB 20.2.</p> <p><input type="checkbox"/> 3. In case of a Joint Venture, a letter of intent to form a Joint Venture or Joint Venture agreement, in accordance with ITB 4.1.</p> <p><input type="checkbox"/> 4. In case of a government-owned enterprise, any additional documents not covered under 1 above required to comply with ITB 4.5.</p>	

**Form ELI - 2: Joint Venture Information Sheet**

Each member of the Joint Venture and Specialist Subcontractor must fill out this form separately.

<b>Joint Venture / Specialist Subcontractor Information</b>	
<b>Bidder's legal name</b>	
<b>Joint Venture Partner's or Specialist Subcontractor's legal name</b>	
<b>Joint Venture Partner's or Specialist Subcontractor's country of constitution</b>	
<b>Joint Venture Partner's or Specialist Subcontractor's year of constitution</b>	
<b>Joint Venture Partner's or Specialist Subcontractor's legal address in country of constitution</b>	
<b>Joint Venture Partner's or Specialist Subcontractor's authorized representative information</b> (name, address, telephone number(s), fax number(s), e-mail address)	
<b>Attached are copies of the following documents.</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2.</li> <li><input type="checkbox"/> 2. Authorization to represent the firm named above, in accordance with ITB 20.2.</li> <li><input type="checkbox"/> 3. In the case of a government-owned enterprise, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.</li> </ul>	

**Form FIN - 1: Historical Financial Performance**

Each Bidder must fill out this form.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name:

Joint Venture Partner: \_\_\_\_\_

Financial Data for Previous _____ Years [\$ Equivalent]		
Year 1:	Year 2:	Year ____:

**Information from Balance Sheet**

Total Assets (TA)			
Total Liabilities (TL)			
Net Worth = TA – TL			
Current Assets (CA)			
Current Liabilities (CL)			
Working Capital = CA - CL			

Most Recent Working Capital		To be obtained for most recent year and carried forward to FIN - 3 Line 1; in case of Joint Ventures, to the corresponding Joint Venture Partner's FIN – 3.
-----------------------------	--	---

**Information from Income Statement**

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

- ☐ Attached are copies of financial statements (balance sheets including all related notes and income statements) for the last \_\_\_\_\_ years, as indicated above, complying with the following conditions:
- Unless otherwise required by Section 3 of the Bidding Document, all such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries, or affiliates.
  - Historical financial statements must be audited by a certified accountant.
  - Historical financial statements must be complete, including all notes to the financial statements.
  - Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).



**Form FIN - 2: Average Annual Construction Turnover**

Each Bidder must fill out this form.

The information supplied should be the Annual Turnover of the Bidder or each member of a Joint Venture in terms of the amounts billed to clients for each year for work in progress or completed, converted to US dollars at the rate of exchange at the end of the period reported.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name:

Joint Venture Partner: \_\_\_\_\_

<b>Annual Turnover Data for the Last _____ Years (Construction only)</b>			
<b>Year</b>	<b>Amount Currency</b>	<b>Exchange Rate</b>	<b>\$ Equivalent</b>

<b>Average Annual Construction Turnover</b>	
---	--

**Form FIN – 3: Availability of Financial Resources**

Bidders must demonstrate sufficient financial resources, usually comprising of Working Capital supplemented by credit line statements or overdraft facilities and others to meet the Bidder's financial requirements for

- (a) its current contract commitments, and
- (b) the subject contract.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name:

Joint Venture Partner: \_\_\_\_\_

Financial Resources		
No.	Source of financing	Amount (\$ equivalent)
1	Working Capital (to be taken from FIN - 1)	
2	Credit Line <sup>a</sup>	
3	Other Financial Resources	
Total Available Financial Resources		

<sup>a</sup> To be substantiated by a letter from the bank issuing the line of credit.

**Form FIN- 4: Financial Requirements for Current Contract Commitments**

Bidders (or each Joint Venture partner) should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

In case of a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name:

Joint Venture Partner: \_\_\_\_\_

Current Contract Commitments						
No.	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Outstanding Contract Value (X) <sup>a</sup>	Remaining Contract Period in months (Y) <sup>b</sup>	Monthly Financial Resources Requirement (X / Y)
1						
2						
3						
4						
Total Monthly Financial Requirement for Current Contract Commitments						\$ .....

<sup>a</sup> Remaining outstanding contract values to be calculated from 28 days prior to the bid submission deadline (\$ equivalent based on the foreign exchange rate as of the same date).

<sup>b</sup> Remaining contract period to be calculated from 28 days prior to bid submission deadline.

**Form EXP – 1: Contracts of Similar Size and Nature**

Fill out one (1) form per contract.

The exchange rate to be used to calculate the value of the contract for conversion to a specific currency shall be the selling rate of the Borrower's national bank on the date of the contract.

<b>Contract of Similar Size and Nature</b>		
<b>Contract No . . . . . of . . . . .</b>	<b>Contract Identification</b>	
<b>Award Date</b>		<b>Completion Date</b>
<b>Total Contract Amount</b>	<b>\$</b>	
<b>If partner in a Joint Venture or Subcontractor, specify participation of total contract amount</b>	<b>Percent of Total</b>	<b>Amount</b>
<b>Employer's name Address Telephone number Fax number E-mail</b>		
<b>Description of the Similarity in Accordance with Criterion 2.4.1 of Section 3 (Evaluation and Qualification Criteria)</b>		

**Form EXP - 2: Construction Experience in Key Activities**

Fill out one (1) form per contract.

Each Bidder must fill out this form.

If complied by Specialist Subcontractor, each Specialist Subcontractor must fill out this form and provide the Specialist Subcontractor's name:

Specialist Subcontractor: \_\_\_\_\_

Contract with Similar Key Activities		
Contract No . . . . . of . . . . .	Contract Identification	
Award Date		Completion Date
Total Contract Amount	\$	
If partner in a Joint Venture or Subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's name Address Telephone number Fax number E-mail		
Description of the Key Activities in Accordance with Criterion 2.4.2 of Section 3 (Evaluation and Qualification Criteria)		

## Schedules

### Schedule of Payment Currencies

For .....insert name of Section of the Works .....

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. In such a case, the Employer should prepare separate tables for each Section of the Works.

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local Currency		1.00		
Foreign Currency #1				
Foreign Currency #2				
Foreign Currency #3				
Net Bid Price				100.00
Provisional Sums Expressed in Local Currency		1.00		
BID PRICE				

#### - Note -

The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by the source specified in BDS 15.

## Tables of Adjustment Data

To be entered by the Bidder

**Table A - Local Currency**

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Bidder's Proposed Weighting
	Nonadjustable	—	—	—	A: 0.15 _____ B: _____ C: _____ D: _____ E: _____
Total					1.00

**Table B - Foreign Currency**

Name of Currency: .....

[Insert name of currency. If the bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.]

To be entered by the Bidder

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
	Nonadjustable	—	—	—		A: 0.15 _____ B: _____ C: _____ D: _____ E: _____
Total						1.00

### - Notes -

As per GCC 1.1.3.1, "Base Date" means the date 28 days prior to the latest date for submission of the bid.

Tables of Adjustment Data shall only be included if prices are to be quoted as adjustable prices in accordance with ITB 14.5.

## Bill of Quantities

**Attached Separately**



## 2. INTEGRITY PACT

### 1. General:

Whereas (*Name of head of the procuring agency or his/her authorized representative, with power of attorney*) representing the (*Name of procuring agency*), Royal Government of Bhutan, hereinafter referred to as the “**Employer**” on one part, and (*Name of bidder or his/her authorized representative, with power of attorney*) representing M/s. (*Name of firm*), hereinafter referred to as the “**Bidder**” on the other part hereby execute this agreement as follows:

This agreement shall be a part of the standard bidding document, which shall be signed by both the parties at the time of purchase of bidding documents and submitted along with the tender document. This IP is applicable only to “**large**” scale works, goods and services, the threshold of which will be announced by the government from time to time. The signing of the IP shall not apply to framework contracting such as annual office supplies etc.

### 2. Objectives:

Whereas, the Employer and the Bidder agree to enter into this agreement, hereinafter referred to as IP, to avoid all forms of corruption or deceptive practice by following a system that is fair, transparent and free from any influence/unprejudiced dealings in the **bidding process**<sup>38</sup> and **contract administration**<sup>39</sup>, with a view to:

- 2.1. Enabling the Employer to obtain the desired contract at a reasonable and competitive price in conformity to the defined specifications of the works or goods or services; and
- 2.2. Enabling bidders to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices.

### 3. Scope:

The validity of this IP shall cover the bidding process and contract administration period.

### 4. Commitments of the Employer:

The Employer Commits itself to the following:-

- 4.1. The Employer hereby undertakes that no officials of the Employer, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favor or any material or immaterial benefit or any other advantage from the Bidder, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process and contract administration.
- 4.2. The Employer further confirms that its officials shall not favor any prospective bidder in any form that could afford an undue advantage to that particular bidder in the bidding process and contract administration and will treat all Bidders alike.

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**37** Bidding process, for the purpose of this IP, shall mean the procedures covering tendering process starting from bid preparation, bid submission, bid processing, and bid evaluation.

**38** Contract administration, for the purpose of this IP, shall mean contract award, contract implementation, un-authorized sub- contracting and contract handing/taking over.

- 4.3. Officials of the Employer, who may have observed or noticed or have reasonable suspicion shall report to the head of the employing agency or an appropriate government office any violation or attempted violation of clauses 4.1 and 4.2.
- 4.4. Following report on violation of clauses 4.1 and 4.2 by official (s), through any source, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings shall be initiated by the Employer and such a person shall be debarred from further dealings related to the bidding process and contract administration.

## **5. Commitments of Bidders**

The Bidder commits himself/herself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of the bidding process and contract administration in order to secure the contract or in furtherance to secure it and in particular commits himself/herself to the following :

- 5.1. The Bidder shall not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer, connected directly or indirectly with the bidding process and contract administration, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding process and contract administration.
- 5.2. The Bidder shall not collude with other parties interested in the contract to manipulate in whatsoever form or manner, the bidding process and contract administration.
- 5.3. If the bidder(s) have observed or noticed or have reasonable suspicion that the provisions of the IP have been violated by the procuring agency or other bidders, the bidder shall report such violations to the head of the procuring agency.

## **6. Sanctions for Violation:**

The breach of any of the aforesaid provisions shall result in administrative charges or penal actions as per the relevant rules and laws.

- 6.1. The breach of the IP or commission of any offence (forgery, providing false information, mis- representation, providing false/fake documents, bid rigging, bid steering or coercion) by the Bidder, or any one employed by him, or acting on his/her behalf (whether with or without the knowledge of the Bidder), shall be dealt with as per the terms and conditions of the contract and other provisions of the relevant laws, including De-barment Rules.
- 6.2. The breach of the IP or commission of any offence by the officials of the procuring agency shall be dealt with as per the rules and laws of the land in vogue.

## **7. Monitoring and Administration:**

- 7.1. The respective procuring agency shall be responsible for administration and monitoring of the IP as per the relevant laws.
- 7.2. The bidder shall have the right to appeal as per the arbitration mechanism contained in the relevant rules.

---

We, hereby declare that we have read and understood the clauses of this agreement and shall abide by it.

The parties hereby sign this Integrity Pact at *(place)* \_\_\_\_\_ on *(date)* \_\_\_\_\_

Affix Legal  
Stamp

Affix Legal  
Stamp

EMPLOYER

BIDDER/REPRESENTATIVE

CID : 

--	--	--	--	--	--	--	--	--	--	--	--

CID : 

--	--	--	--	--	--	--	--	--	--	--	--

Witness: \_\_\_\_\_

Witness: \_\_\_\_\_

Name:

Name:

CID : 

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CID : 

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# Section 5: Eligible Countries

## Eligibility for the Provision of Goods, Works and Services in RGoB-financed Procurement

1. The RGoB permits firms and individuals from all countries to offer goods, works and services for RGoB-financed projects. As an exception, firms of a Country, goods manufactured in a Country or services provided from or by a Country may be excluded if:
  - 1.1. As a matter of law or official regulation, the RGoB prohibits commercial relations with that Country, or
  - 1.2. By an Act of Compliance with a Decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the RGoB prohibits any import of goods from that Country or any payments to persons or entities in that Country.
2. For the information of Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding:
  - (a) (With reference to Paragraph 1.1 above:  
[Insert list of countries prohibited under the law or official regulations of Bhutan]
  - (b) With reference to Paragraph 1.2 above:  
[Insert list of countries which are barred under UN Security Council Chapter VII]

# Section 6: Employer’s Requirements

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## Particular Specifications

Item: Providing and laying of **Hot Mix Dense Asphaltic Concrete (DAC)** using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values of compaction, strength, surface accuracy complete (for tendering purpose VG bitumen of grade (VG-10) content shall be taken as 135 kg/m<sup>3</sup> of mix supplied in drum/bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler Material).

### 1 Materials

#### 1.1 Coarse Aggregates

This shall consist of a crushed or broken from hard stone obtained from approved quarry. These shall be clean, strong, durable of fairly cubical shape and free from disintegrated, soft, friable, thin elongated or laminated pieces. This shall also be free from dirt, organic, deleterious material and any other foreign matter and adherent coatings. The grading of coarse aggregates shall conform to IS:383.

##### 1.1.1 Physical Properties of Coarse Aggregate

The aggregate shall conform to the following Physical Properties:

<i>S. No.</i>	<i>Property</i>	<i>Tests</i>	<i>Test Method</i>	<i>Frequency</i>	<i>Acceptance Criteria</i>
1.	Cleanliness	Grain Size Analysis	IS:2386 (Part.I)	Before approval of the quarry and at every subsequent change in the source of Supply	Max.5% passing 0.075mm sieve

<b>S. No.</b>	<b>Property</b>	<b>Tests</b>	<b>Test Method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
2.	Strength*	Aggregate impact value	IS:2386 ( Part.IV )	Before approval of the quarry and at every subsequent change in the source of supply and one test for every 100m <sup>3</sup> of aggregates	Max.24%
		Los Angeles Abrasion value	IS:2386 (Part IV)	-do-	Max. 30%
3.	Durability	Soundness	IS:2386 (Part V)	-do-	Max. 12%
		Loss with Sodium Sulphate for 5 cycles  Loss with Magnesium Sulphate with 5 cycles			Max. 18%
4.	Particle Shape	Flakiness & Elongation Index (Combined)	IS:2386 (Part I)	-do-	Max. 30%
5.	Stripping	Coating and Stripping of Bitumen Aggregate	IS:6241	-do-	Minimum Retained Coating 95%
6.	Water absorption	Water absorption	IS:2386 Part III	-do-	Max. 2%
7.	#Water Sensitivity	**Retained Tensile strength	AASHTO 283	-do-	Minimum 80%

\* The aggregate may satisfy either of the two tests.



\*\* If the minimum retained tensile strength falls below 80%, use of anti-stripping agent is recommended to meet the minimum requirements

# The water sensitivity test is only required, if the minimum retained coating in stripping test is less than 95%. Where anyone or some of the above conditions cannot be satisfied, the Engineer-in-Charge may allow reasonable tolerances, with the approval of Competent Authority.

**1.1.2 Anti-stripping Agent:** Anti-stripping agent or additive if required shall be heat stable, shall not change the viscosity of the binder beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method and shall satisfy the requirements as stipulated in MORT&H Appendix-5. The cost of providing anti-stripping agent shall be borne by the contractor and nothing extra shall be paid on this account to the contractor.

## **1.2 Fine Aggregates**

Fine aggregate shall consist of crushed or naturally occurring mineral material or combination of two, passing 2.36mm sieve and retained on 0.075mm sieve. No natural sand will be allowed in the wearing course. The fine aggregate shall be clean, hard, durable, dry, and free from dust and soft organic and other deleterious substances. Fine aggregates shall have sand equivalent value not less than 50 when tested in accordance with the requirement of IS:2720 Part 37. The Plasticity Index of fraction of passing the 0.425mm sieve shall not exceed 4 when tested in accordance with IS:2720 Part 5.

## **1.3 Filler**

The filler shall consist of cement of quality conforming to relevant IS code as approved by the Engineer-in-charge.

### **1.3.1 Cost Adjustment for Filler**

For the purpose of tendering the contractor may base his rate assuming 2% cement as filler by weight of aggregates. If the actual quantity of cement required to be used, as per the design mix, is found to be different from the quantity of cement assumed above, necessary adjustment in cost of extra/short cement shall be made.

## **1.4 Bitumen**

The Viscosity Grade Bitumen shall conform to IS:73 and shall be supplied in drum/bulk by Govt. Refineries. The agencies shall submit copies of the purchase vouchers of the Bitumen to the Engineer-in-Charge. Selection of VG grade bitumen shall be based upon the climatic conditions of the area as per below table.

<b><i>Lowest Daily Mean Air Temperature</i></b>	<b><i>Highest Daily Mean Air Temperature</i></b>		
	<b><i>Less than 20°C</i></b>	<b><i>20° to 30°C</i></b>	<b><i>More than 30°C</i></b>
More than -10°C	VG-10	VG-20	VG-30
-10°C or Lower	VG-10	VG-10	VG-20

## 2 Combined Grading of Aggregates

In order to satisfy the design requirements for the Dense Asphaltic Concrete (DAC) as laid down in para 3.0, the mix shall contain coarse aggregates, fine aggregates and filler in suitable proportions. True and representative samples of the aggregates proposed to be used on specific job shall be tested in material testing lab (approved by Govt. institutions) and proper blend of individual aggregates normally available shall be worked out so that the gradation of the final composition shall satisfy the limits laid down in below Table:

<b><i>Nominal Maximum Aggregate Size*</i></b>	<b><i>13.2 mm</i></b>
<b><i>IS Sieve (mm)</i></b>	<b><i>Percentage by weight passing</i></b>
19	100
13.2	79-99
9.5	68-88
4.75	48-68
2.36	33-53
1.18	20-40
0.6	14-30
0.3	9-21
0.15	6-16
0.075	3-6

- Nominal maximum aggregate size is the largest specified sieve size upon which any of the aggregate material is retained.

### 3 Job Mix Formula (JMF)

Twenty days prior to the start of work at site, the job mix formula shall be got determined by the contractor in empanelled or Govt. Institute/laboratory, as directed by the Engineer-in-Charge, by Marshall Design Method. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site. The Contractor also shall intimate, in writing, to the Engineer-in-Charge the details of source and location of all materials, their sizes, grading and test results. Besides conforming to the requirements of grading and quality for individual ingredients, the mix shall meet the requirements enumerated as mentioned in the below Table.

S.No.	Criteria	Value
1	No. of compaction blows on each side of Marshall specimen	75
2	Marshall stability in kN at 60°C	Not less than 12
3	Marshall flow value in mm for VG Bitumen	2-4
4	Marshall Quotient for Viscosity Grade Paving Bitumen(Ratio of Stability/Flow)	2-5
5	Percentage Voids in Mix (VIM)	3-5
6	Percentage voids in mineral aggregates filled with bitumen (VFB)	65-75%
7	Bitumen(Viscosity Grade) content by weight of mix	As determined in the Lab.
8	Design laboratory density (Bulk density of the Marshall mold)	As determined in the Lab.
9	Retained Marshall Stability on Immersion Test	Not less than 75%
10	Tensile Strength Ratio	Not less than 80%

**Note:** Design of mix should also meet the following criteria:

- A test track** of minimum 7 m wide and 90m length and shall be of the same depth specified for the construction of the course which it represents, laid and tested by the contractor before commencement of actual work. The core cut from the test track on testing shall give a stability and density of not less than 98% of the respective design values.
- Texture depth** shall be measured by sand patch method and depth obtained by this test shall not be less than 1.0 mm.

- c) The texture depth shall be determined by the Sand Patch Test as described below. This test shall be performed at least once for each day's paving and wherever the Engineer-in-Charge consider it necessary at times after construction as under:

Five individual measurement of the texture depth shall be taken at least 2m apart anywhere along a diagonal line across a lane completed between points 50m apart along the pavement. No measurement shall be taken within 300mm of the longitudinal edges of a bituminous slab constructed in one pass.

d) Measurement of Texture Depth – **Sand Patch Method**

The following apparatus shall be used:

- i. A cylindrical container of 5 ml internal capacity.
- ii. A flat wooden disc 64mm diameter with a hard rubber disc, 1.5mm thick, stuck to one face, the reverse face being provided with a handle.
- iii. Dry natural sand with a rounded particle shape passing a 300micron IS sieve and retained on a 150 micron IS sieve.

Method: The surface to be measured shall be dried, any extraneous mortar and loose material removed and the surface swept clean using a wire brush both at right angles and parallel to the carriageway. The cylindrical container shall be filled with the sand, tapping the base 3 times to the surface to ensure compaction, and striking off the sand level with the top of cylinder. The sand shall be poured into a heap on the surface to be treated. The sand shall be spread over to surface, working the disc with its face kept flat in a circular motion so that the sand is spread into a circular patch with the surface depressions filled with sand to the level of peaks. The diameter of the patch shall be measured to the nearest 5mm. The texture depth of concrete surface shall be calculated from  $31000/(D \times D)$  mm where D is the diameter of patch in mm.

In case of any deficiency, necessary adjustment in Job Mix formula, plant operation, placing procedures and/or rolling procedure shall be made and the test section shall be re-laid & tested. No extra payment shall be made on this account of making test track or changes in grading or any other changes, if any. Full production shall not begin until acceptable test track has been constructed and accepted, in writing, by the Engineer-in-Charge.

### **3.1 Revision of Job Mix Formula**

The Job Mix Formula shall be revised if there is change in source of material and/or if it is noticed by the Engineer-in-Charge that grading of Individual aggregates has changed. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site with new source of material/grading. No extra payment shall be made to the contractor on this account.

### 3.2 Permissible Tolerances in the Job Mix Formula

<b>S.No.</b>	<b>Description</b>	<b>Permissible Variation</b>
1.	Aggregate passing 19mm sieve or larger	±7%
2.	Aggregate passing 13.2mm, 9.5mm	±6%
3.	Aggregate passing 4.75mm	±5%
4.	Aggregate passing 2.36mm, 1.18mm, 0.6mm	±4%
5.	Aggregate passing 0.3mm, 0.15 mm	±3%
6.	Aggregate passing 0.075mm	±1.5%
7.	Binder content	±0.3%

All the above tolerances are with respect to the Job Mix Formula as the datum.

## 4 Bitumen Content

The bitumen content of the mix shall be tested periodically and as directed by the Engineer-in-Charge using centrifugal extraction method or such method approved by the Engineer-in-Charge. The test shall generally be carried out in accordance with established practices and as directed by the Engineer-in-Charge. Whenever, there is a deviation in the resultant bitumen content from approved job-mix- formula values, it shall be reported to the Engineer-in-Charge immediately and necessary correction made at the job-mix plant as directed.

### 4.1 Cost adjustment for Bitumen

For the purpose of tendering, the Contractor may base his rate on the assumption that the bitumen content of the mixture shall be 135 Kg of bitumen per Cum. of total mix compacted to 100% density in Marshall mold. If the actual quantity of bitumen required to be used as a result of the laboratory test is found different from the quantity of bitumen that is assumed above, necessary adjustment in the cost of extra/short bitumen used shall be made from the rate specified at the time of tender and to the rate of purchase price of bitumen at the nearest IOC/HP/BP/Govt.Refinery. The procurement price of bitumen (Basic rate plus excise duty and sales tax & transportation charges) shall be ascertained by the Engineer-in- Charge on submission of documentary proof by the contractor. The rate of bitumen decided by the Engineer-in-Charge shall be final and binding. Except adjustment in cost due to variation in bitumen consumption as stated above, no other factor whatsoever shall be considered for adjustment in quoted rates.

In the event of change in materials available at site due to unforeseen exigencies, a fresh job mix formula shall be arrived at within the specified limits in the empanelled laboratory or Govt. Institute/laboratory as approved by the Engineer-in-Charge. Nothing extra is payable due to this.

Laboratory charges for the Job-mix formula design, costs of materials, its cartage and other incidental expenses shall be borne by the Contractor.

## **5 Mixing**

All plants used by the contractor for the preparation of Dense Asphaltic Concrete should be equipped with the following:

- a) Means for accurately weighing or measuring each batch of aggregates.
- b) Bitumen tanks with arrangement of heating the material under effective and positive control at all times.  
In addition there should be satisfactory devices for weighing, metering of volumetric measurement of the bitumen to be used.
- c) A mixer unit capable of producing uniform mixture.

The hot aggregate and binder shall be thoroughly and intimately mixed together in the correct proportion for at least 30 seconds or longer and until every particle of aggregates is completely coated and homogenous mixer is obtained. The total mixing time may be reduced but not less than 30 seconds in any case, if the Engineer-in-Charge is satisfied that thorough mixing can be achieved in less time. In such cases the contractor shall obtain prior written permission of the Engineer-in-charge.

## **6 Hot Mix Plant**

The Hot Mix Plant (HMP) employed by the contractor shall be a weigh batch plant having a minimum capacity of 100 TPH. Hot Mix Plant with electronic control of minimum capacity of 100 TPH and capable of producing a proper quality mix shall be used for preparing the mix. The plant may be a batch type having a coordinative set of essential units such as drier for heating the aggregate, devices for grading and batching/feeding by weight or volume the required quantities of aggregates. The plant shall also have a binder heating and control unit for metering out the correct quantities of heated binder together with the mechanical mixer for thorough mixing of the binder and the aggregates. It should preferably have a separate feeder for incorporating the correct quantity of filler by weight.

## 7 Temperature

**7.1** Following temperatures shall be adhered to at the different stages of work as mentioned in Table below:

<b><i>Bitumen Viscosity Grade</i></b>	<b><i>Bitumen Temperature °C</i></b>	<b><i>Aggregate Temperature °C</i></b>	<b><i>Mixed Material Temperature °C</i></b>	<b><i>Laying Temperature °C</i></b>	<b><i>*Rolling Temperature °C</i></b>
VG-40	160-170	160-175	160-170	150 Min.	100 Min.
VG-30	150-165	150-170	150-165	140 Min.	90 Min.
VG-20	145-165	145-170	145-165	135 Min.	85 Min.
VG-10	140-160	140-165	140-160	130 Min.	80 Min.

\* Rolling must be completed before the mat cools to these minimum temperatures. At no time, shall the difference in temperature between the aggregates and the binder exceed 14°C, at no time shall bitumen or aggregates be overheated.

## 8 Transportation of Hot Mix

The Hot Dense Asphaltic Concrete shall be transported from mixing plant to the site in clean vehicle. Every precaution shall be taken to avoid segregation of the hot mix and to ensure that they do not become contaminated with dust or foreign materials. In order to maintain satisfactory temperature of mix in transit, particularly in cold weather and to prevent undue loss of heat adequate precautions shall be taken by covering the material so that the materials are well protected during transportation. The temperature of the mix in every transporting vehicle shall be checked immediately prior to discharge of mix into the spreader and shall be ensured that the temperature is within the limits as specified in clause 7.0 above. If the temperature of mix in any transporting vehicle is not as per the limits specified in clause 7.0 above, the mix shall be rejected and shall be removed from site immediately.

## 9 Laying

Mix transported from the Hot Mix Plant to the site be spread by means of self-propelled electronic paver with electronic sensor & hydraulic control with suitable screeds capable of spreading, temping and finishing the mix true to the specified width and profile without calling segregation, dragging, bringing irregularities or other surface defects. The paver shall be capable of being operated at a speed consistent with a character of mix and the thickness of the course being laid so as to produce a surface of having uniform density and surface texture. The thickness of the single compacted layer shall not exceed 50mm. The temperature of the mix at the time of laying shall be as per clause 7.0 above.

## 10 Weather Limitation

The bituminous mixture shall not be placed:

- i) In presence of standing water on the surface
- ii) When the rain is imminent and during rains, fog or dust storm.
- iii) When the binder course is damp.
- iv) When the air temperature on the surface on which it is to be laid is below 10°C.

## 11 Rolling

After the mix being spread, rolling shall be carried in three consecutive stages as below:

- a) Break down rolling
- b) Intermediate rolling
- c) Finish rolling

**11.1** The initial or Break down rolling shall be done with 8-10 tonne dead weight smooth wheeled roller. The intermediate rolling will be done with smooth wheel pneumatic tyred roller of 12 to 15 tonne capacity having tyre pressure 7 kg/cm<sup>2</sup>. Finish rolling shall be done with 8 to 10 tonne steel wheel roller.

Alternatively all the compaction operations i.e. break down rolling, intermediate rolling and finished rolling can be accomplished by using vibratory roller of 8 to 10 tonnes static weight. During the initial or breakdown rolling and finished rolling, the vibratory system shall be switched off. The joints and edges shall be rolled with 8 to 10 tonnes three wheeled static roller.

**11.2** Rolling shall commence longitudinally at the sides and proceed towards center of the pavement, overlapping on successive trips by at least half the width of the rear wheels. Alternative trips of the roller shall be slightly of different lengths.

**11.3** Break-down rolling shall preferably commence as soon as practicable after the mix is spread. The maximum break down temperature at which rolling can commence shall be determined by field trials. The attempt should be to obtain the maximum possible density

**11.4** The principal function of finish rolling is to remove roller marks. The surface shall be carefully examined for residual marks which should be cleanly rolled out. A neat finished appearance shall be obtained. Finish rolling shall be accomplished with tandem roller.

### 11.5 Cold Rolling

The final compaction will be carried out with a pneumatic tyred roller of 12 to 15 tonne capacity having tyre pressure 7 kg/cm<sup>2</sup> after the entire paving operations are completed. This should be done on bright sunny days such that entire airfield is rolled minimum five times.



### **11.6 Speed of Rolling**

The speed of rolling shall not exceed 4 - 5 km/hr to prevent adhesion of the mixture to the roller. The wheels shall be kept moist but excess of water shall not be permitted. The line of rolling shall not suddenly be changed, thereby displacing the mix. Roller shall not be left standing on the new surfacing.

### **11.7 Rolling Temperature**

The range of temperature during rolling shall be as per clause 7.0 above.

## **12 Joints**

### **12.1 Longitudinal Joints**

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the centre line of runway. The longitudinal lane joints shall be truly vertical in straight lines which shall be continuous for the full length of the pavement, or in smooth curves around bends. The exposed vertical edges of the longitudinal lane joints shall be carefully cut back and trimmed to firm material in the compacted lane, or for a minimum of one and a half times the layer thickness, whichever is the greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned and painted with hot bitumen immediately before laying of the adjacent lane. Nothing extra shall be paid on this account.

### **12.2 Transverse Joints**

They shall be formed at right angles to the longitudinal joints, and shall be truly vertical. The exposed vertical edges of the transverse joints shall be cut back and trimmed to firm material or for a distance of not less than 1-1/2 times the thickness of layer whichever is greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned. The exposed joints shall then be cleaned and painted with hot bitumen immediately before the laying of the lane continues. Nothing extra shall be paid on this account.

## **13 Pavement Edges**

Pavement shall be laid to correct width and alignment. To achieve straight and vertical edge, Contractor shall either use adequate side shuttering or cut back the edges to correct width and alignment by removing extra mix spread. Nothing extra shall be paid on this account.

### **13.1 Temporary Ramps**

Temporary ramps at the end of each day work shall be made to allow smooth movement of air traffic and removal of ramp before start of next day work as per direction of Engineer-in-charge. Nothing extra shall be

paid on account of provision / dismantling of ramps and nothing shall be deducted in case ramps are not required to be provided.

#### 14 Determination of Field Density

The field density shall be determined by core cutting method using core cutting machine or by sand replacement method. Metallic tray of field density unit shall be kept on level spot of the finished pavement surface and a hole of 10cm dia. is cut in the entire thickness of the layer. All materials removed from the hole is carefully collected and weighed. A known weight of dry standard sand, passing 710 micron IS sieve and retained on 355 micron I.S. Sieve is taken in the sand pouring cylinder. The cylinder is kept directly over the hole and the shutter of the cylinder is released without any jerk and closed when the hole is filled with the sand. The quantity of the residual sand in the cylinder is weighed and the quantity filling the cone of the cylinder is determined.

The in-situ Field density of the layer is calculated as follows:

$$\text{Field Density} = \frac{A}{\{W - (W1 + W2)\}/d} \text{ gm/cm}^3$$

where,

A = Weight of the materials removed from the hole.

W = Initial weight of sand taken in the cylinder.

W1 = Weight of the sand filling the cone of the cylinder.

W2 = Weight of the sand remaining in the cylinder.

d = Bulk density, gm/cm<sup>3</sup> of sand.

#### 15 Quality Control Tests for Dense Asphaltic Concrete (DAC):

Apart from the quality control tests given in clause 1.1.1, following additional tests shall be carried out as mentioned in table below:

<b>S.No.</b>	<b>Test</b>	<b>Test method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
1.	Quality of binder	IS:73	Number of samples as per lot.	As per IS:73.
2.	Deleterious materials	IS:2386 (Part-III)	As required by the Engineer- in-charge.	As required by engineer-in-charge

<b>S.No.</b>	<b>Test</b>	<b>Test method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
3.	Mix grading	IS:2386 (Part-I)	One test for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
4.	Stability of mix, flow value, density and void content.	ASTMD1559	3 tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
5.	Binder content	As per clause 4.0	One test for each 400 tonnes of mix subject to minimum of two tests per day per plant.	As per clause 3.2
6.	Density of compacted layer	As per clause 14.0	One test per 500m <sup>2</sup> area.	As per clause 16.1

**Note:** One test shall consist of 3 samples.

## 16 Acceptance Criteria

### 16.1 Field Density

The work shall be accepted as of quality, measured and paid in full if the field density does not work out to be less than 98% of the Design Laboratory Density worked out in Job Mix Formula in Clause 3.0 above. When the field density achieved in the Field is between 95% and 98% of the Design Laboratory Density, the work shall be accepted as not up to the standard and paid at reduced rate on pro-rata basis of Design Laboratory Density with full rate for 98% density as base.

When the field density works out to be less than 95% of the Design Laboratory Density, the surface shall be further consolidated till the required field density is achieved. If this is not found possible, the work represented by the sample shall be dismantled and redone by the Contractor at his own cost.

### 16.2 Surface Accuracy

The finished surface of Dense Asphaltic Concrete shall be true to level, grade and camber as per the approved drawings and the directions of the Engineer-in-Charge. When a straight edge of 3 metres length is placed longitudinally or transversely, the maximum deviation shall not be more than 3 mm in longitudinal and transverse directions.

The surface accuracy shall be checked immediately after rolling. Surface irregularities which fall outside specified tolerance limits as stipulated in above para shall be rectified by removing to full depth the affected area which shall not be less than 10 Sqm and relaying with fresh materials. In no case shall depressions be filled up with screenings or binding material.

## **17 Measurements:**

- 17.1** Before commencement of laying of Dense Asphaltic concrete, levels shall be taken jointly by the Engineer-in-Charge or his representative and the Contractor at 3 m intervals both ways or closer as directed by the Engineer-in-Charge. These levels shall be recorded in the level book and plotted on the plan on tracing of polyester film/graph paper/plain computer sheet, as decided by the Engineer-in-Charge, by the Contractor at his own cost and the same shall be signed by the Contractor. Proposed formation levels of the finished Dense Asphaltic Concrete surface shall be marked at corresponding points. Tack coat shall then be applied and Dense Asphaltic Concrete shall then be laid and compacted to required levels (Tack coat shall be paid separately in the respective item of BOQ). Levels of the compacted bituminous surface shall be taken at grid points at which levels were recorded earlier in the level book and also plotted on the plan. Level books as well as the plan shall be signed by the Contractor as token of acceptance of the levels.
- 17.2** The volume of compacted mix shall be worked out in cubic meter correct to two places of a decimal as the product of the measured surface area and average thickness laid. Average thickness shall be worked out on the basis of actual levels. The length and breadth shall be measured correct to cm.
- 17.3** In case DAC is to be laid on SDAC newly laid under this contract, the finished levels of previous surface shall be taken as initial levels for this purpose.
- 17.4** Quantity for payment shall be the theoretical quantity (Based on Proposed formation levels) or the actual quantity (based on actual finished levels) whichever is less.

## **18 Rate**

The rate shall include the cost of all materials, plant machinery and labour required in all operations described above including all carriage and lifts involved. The rate also includes all cost of setting up the laboratory at site and carrying out the quality control measures/tests enumerated above by the Contractor at his own cost in the presence of Engineer-in-Charge or his authorized representative and submission of test results on completion of tests to the Engineer-in-Charge thereof (The item of Tack Coat shall be paid separately and is not included in this item).

Item: Providing and laying of Hot Mix **Semi Dense Asphaltic Concrete (SDAC)** using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values of compaction, strength, surface accuracy complete (for tendering purpose VG bitumen of grade (VG-10) content shall be taken as 114 kg/m<sup>3</sup> of mix supplied in drum/ bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler material).

## 1 Materials

### 1.1 Coarse Aggregates

This shall consist of a crushed or broken from hard stone obtained from approved quarry. These shall be clean, strong, durable of fairly cubical shape and free from disintegrated, soft, friable, thin elongated or laminated pieces. This shall also be free from dirt, organic, deleterious material and any other foreign matter and adherent coatings. The grading of coarse aggregates shall conform to IS:383.

#### 1.1.1 Physical Properties of Coarse Aggregate

The aggregate shall conform to the physical properties as mentioned in the table below:

S. No.	Property	Tests	Test Method	Frequency	Acceptance Criteria
1	Cleanliness	Grain Size Analysis	IS:2386 (Part.I)	Before approval of the quarry and at every subsequent change in the source of supply	Max. 5% passing 0.075mm sieve
2	Strength*	Aggregate impact value	IS:2386 (Part.IV)	Before approval of the quarry and at every subsequent change in the source of supply and one test for every 100m <sup>3</sup> of aggregates	Max.24%
		Los Angeles Abrasion value	IS:2386 (Part IV)	-do-	Max.30%

<b>S. No.</b>	<b>Property</b>	<b>Tests</b>	<b>Test Method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
3	Durability	Soundness Loss with Sodium Sulphate for 5 cycles  Loss with Magnesium Sulphate with 5 cycles	IS:2386 (Part V)	-do-	Max. 12%  Max. 18%
4	Particle Shape	Flakiness & Elongation Index (Combined)	IS:2386 (Part I)	-do-	Max. 30%
5	Stripping	Coating and Stripping of Bitumen Aggregate	IS:6241	-do-	Minimum Retained Coating
6	Water absorption	Water absorption	IS:2386 Part III	-do-	Max.2%
7	#Water Sensitivity	**Retained Tensile strength	AASHTO 283	-do-	Minimum 80%

\* The aggregate may satisfy either of the two tests.

\*\* If the minimum retained tensile strength falls below 80%, use of anti-stripping agent is recommended to meet the minimum requirements.

# The water sensitivity test is only required, if the minimum retained coating in stripping test is less than 95%. Where anyone or some of the above conditions cannot be satisfied, it is left to the Engineer-in-Charge to allow reasonable tolerances, with the approval of Competent Authority.

**1.1.2 Anti-stripping Agent:** Anti-stripping agent or additive if required shall be heat stable, shall not change the viscosity of the binder beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method and shall satisfy the requirements as stipulated in MORT&H Appendix-5. The cost of providing anti-stripping agent shall be borne by the contractor and nothing extra shall be paid on this account to the contractor.

## **1.2 Fine Aggregates**

Fine aggregate shall consist of crushed or naturally occurring mineral material or combination of two, passing 2.36mm sieve and retained on 0.075mm sieve. The fine aggregate will be clean, hard, durable, dry, and free from dust and soft organic and other deleterious substances. Fine aggregates shall have sand equivalent value not less than 50 when tested in accordance with the requirement of IS:2720 Part 37. The Plasticity

Index of fraction of passing the 0.425mm sieve shall not exceed 4 when tested in accordance with IS:2720 Part 5.

### 1.3 Filler

The filler shall consist of cement of quality conforming to relevant IS code as approved by the Engineer-in-charge.

#### 1.3.1 Cost Adjustment for Filler

For the purpose of tendering the contractor may base his rate assuming 2% cement as filler by weight of aggregates. If the actual quantity of cement required to be used, as per the design mix, is found to be different from the quantity of cement assumed above, necessary adjustment in cost of extra/short cement shall be made.

### 1.4 Bitumen

The bitumen shall be, Viscosity Grade Bitumen conforming to IS:73, supplied by Govt. refineries. The agencies shall submit copies of the purchase vouchers of the bitumen to the Engineer-in-Charge. Selection of VG grade bitumen shall be based upon the climatic conditions of the area as per below table:

<b><i>Lowest Daily Mean Air Temperature</i></b>	<b><i>Highest Daily Mean Air Temperature</i></b>		
	<b><i>Less than 20°C</i></b>	<b><i>20 to 30°C</i></b>	<b><i>More than 30°C</i></b>
More than -10°C	VG-10	VG-20	VG-30
-10°C or Lower	VG-10	VG-10	VG-20

## 2 Combined Grading of Aggregates

In order to satisfy the design requirements for the Semi Dense Asphaltic Concrete (SDAC) as laid down in para 3.0, the mix shall contain coarse aggregates, fine aggregates in suitable proportions. True and representative samples of the aggregates proposed to be used on specific job shall be tested in material testing lab (approved by Govt. institutions) and proper blend of individual aggregates normally available shall be worked out so that the gradation of the final composition shall satisfy the limits laid down in Table below:

<b>Nominal Maximum Aggregate Size*</b>	<b>19mm</b>
<b>IS Sieve (mm)</b>	<b>Percentage by weight passing</b>
26.5	100
19	90-100
13.2	59-79
9.5	52-72
4.75	35-55
2.36	28-44
1.18	20-34
0.6	15-27
0.3	10-20
0.15	5-13
0.075	2-8

### 3 Job Mix Formula (JMF)

Twenty days prior to the start of work at site, the job mix formula shall be got determined by the contractor in empanelled or Govt. Institute/laboratory as directed by the Engineer-in-Charge, by Marshall Design Method. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site. The Contractor also shall intimate, in writing, to the Engineer-in-Charge the details of source and location of all materials, their sizes, grading and test results. Besides conforming to the requirements of grading and quality for individual ingredients the mix shall meet the requirements enumerated below in Table below.

<b>S.No.</b>	<b>Criteria</b>	<b>Value</b>
1	No. of compaction blows on each side of Marshall specimen	75
2	Marshall stability in kN at 60°C	Not less than 9.0
3	Marshall flow value in mm for VG Bitumen	2-4



<b>S.No.</b>	<b>Criteria</b>	<b>Value</b>
4	Marshall Quotient for Viscosity grade Paving Bitumen(Ratio of Stability/Flow)	2-5
5	Percentage Voids in Mix (VIM)	3-5
6	Percentage voids in mineral aggregates filled with bitumen (VFB)	65-75%
7	Bitumen(Viscosity Grade) content by weight of mix	As determined in the Lab.
8	Design laboratory density (Bulk density of the Marshall mould)	As determined in the Lab.
9	Retained Marshall Stability on Immersion Test	Not less than 75%
10	Tensile Strength Ratio	Not less than 80%

**Note:** Design of mix should also meet the following criteria:

- a) A test track of minimum 7m wide and 90m length and shall be of the same depth specified for the construction of the course which it represents, laid and tested by the contractor before commencement of actual work. The core cut from the test track on testing shall give a stability and density of not less than 98% of the respective design values.

In case of any deficiency, necessary adjustment in Job Mix formula, Plant operation, placing procedures and rolling procedure shall be made and the test section shall be re-laid & tested. No extra payment shall be made on this account of making test track or changes in grading or any other changes, if any. Full production shall not begin until acceptable test track has been constructed and accepted, in writing, by the Engineer-in-Charge.

### 3.1 Revision of Job Mix Formula

The Job Mix Formula shall be revised if there is change in source of material and/or if it is noticed by the Engineer-in-Charge that grading of Individual aggregates has changed. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site with new source of material / grading. No extra payment shall be made to the contractor on this account.

### 3.2 Permissible Tolerances in the Job Mix Formula

<b>S.No.</b>	<b>Description</b>	<b>Permissible Variation</b>
1	Aggregate passing 19mm sieve or larger	±7%
2	Aggregate passing 13.2mm, 9.5mm	±6%
3	Aggregate passing 4.75mm	±5%
4	Aggregate passing 2.36mm, 1.18mm, 0.6mm	±4%
5	Aggregate passing 0.3mm, 0.15 mm	±3%
6	Aggregate passing 0.075mm	±1.5%
7	Binder content	±0.3%

## 4 Bitumen Content

The bitumen content of the mix shall be tested periodically and as directed by the Engineer-in-Charge using centrifugal extraction method or such method approved by the Engineer-in-Charge. The test shall generally be carried out in accordance with established practices and as directed by the Engineer-in-Charge. Whenever, there is a deviation in the resultant bitumen content from approved job-mix- formula values, it shall be reported to the Engineer-in-Charge immediately and necessary correction made at the job-mix plant as directed.

### 4.1 Cost adjustment for Bitumen

For the purpose of tendering, the Contractor may base his rate on the assumption that the bitumen content of the mixture shall be 114 Kg of bitumen per Cum. of total mix compacted to 100% density in Marshall mold. If the actual quantity of bitumen required to be used as a result of the laboratory test is found different from the quantity of bitumen that is assumed above, necessary adjustment in the cost of extra/short bitumen used shall be made from the rate specified at the time of tender and to the rate of purchase price of bitumen at the nearest IOC/HP/BP/Govt. Refinery. The procurement price of bitumen (Basic rate plus excise duty and sales tax & transportation charges) shall be ascertained by the Engineer-in-Charge on submission of documentary proof by the contractor. The rate of bitumen decided by the Engineer-

in-Charge shall be final and binding. Except adjustment in cost due to variation in bitumen consumption as stated above, no other factor whatsoever shall be considered for adjustment in quoted rates.

In the event of change in materials available at site due to unforeseen exigencies, a fresh job mix formula shall be arrived at within the specified limits in the empanelled laboratory as approved by the Engineer-in-Charge. Nothing extra is payable due to this.

Laboratory charges for the Job-mix formula design, costs of materials, its cartage and other incidental expenses shall be borne by the Contractor.

## **5 Mixing**

All plants used by the contractor for the preparation of Semi Dense Asphaltic Concrete should be equipped with the following:

- i) Means for accurately weighing or measuring each batch of aggregates.
- ii) Bitumen tanks with arrangement of heating the material under effective and positive control at all times. In addition there should be satisfactory devices for weighing, metering of volumetric measurement of the bitumen to be used.
- iii) A mixer unit capable of producing uniform mixture.

The hot aggregate and binder shall be thoroughly and intimately mixed together in the correct proportion for at least 30 seconds or longer and until every particle of aggregates is completely coated and homogenous mixture is obtained. The total mixing time may be reduced but not less than 30 seconds in any case, if the Engineer-in-Charge is satisfied that thorough mixing can be achieved in less time. In such cases the contractor shall obtain prior written permission of the Engineer-in-charge.

## **6 Hot Mix Plant**

The Hot Mix Plant (HMP) employed by the contractor shall be a weigh batch plant having a minimum capacity of 100 TPH. Hot Mix Plant with electronic control of minimum capacity of 100 TPH and capable of producing a proper quality mix shall be used for preparing the mix. The plant may be a batch type, having a coordinative set of essential units such as drier for heating the aggregate, devices for grading and batching/feeding by weight or volume the required quantities of aggregates. The plant shall also have a binder heating and control unit for metering out the correct quantities of heated binder together with the mechanical mixer for thorough mixing of the binder and the aggregates.

## 7 Temperature

**7.1** Following temperatures shall be adhered to for VG bitumen at the different stages of work as mentioned in below Table:

<b><i>Bitumen Viscosity Grade</i></b>	<b><i>Bitumen Temperature °C</i></b>	<b><i>Aggregate Temperature °C</i></b>	<b><i>Mixed Material Temperature °C</i></b>	<b><i>Laying Temperature °C</i></b>	<b><i>*Rolling Temperature °C</i></b>
VG-40	160-170	160-175	160-170	150 Min.	100 Min.
VG-30	150-165	150-170	150-165	140 Min.	90 Min.
VG-20	145-165	145-170	145-165	135 Min.	85 Min.
VG-10	140-160	140-165	140-160	130 Min.	80 Min.

\* Rolling must be completed before the mat cools to these minimum temperatures. At no time, shall the difference in temperature between the aggregates and the binder exceed 14°C, at no time shall bitumen or aggregates be overheated.

## 8 Transportation of Hot Mix

The Hot Semi Dense Asphaltic Concrete shall be transported from mixing plant to the site in clean vehicle. Every precaution shall be taken to avoid segregation of the hot mix and to ensure that they do not become contaminated with dust or foreign materials. In order to maintain satisfactory temperature of mix in transit, particularly in cold weather and to prevent undue loss of heat adequate precautions shall be taken by covering the material so that the materials are well protected during transportation. The temperature of the mix in every transporting vehicle shall be checked immediately prior to discharge of mix into the spreader and shall be ensured that the temperature is within the limits as specified in clause 7.0 above. If the temperature of mix in any transporting vehicle is not as per the limits specified in clause 7.0 above, the mix shall be rejected and shall be removed from site immediately.

## 9 Laying

Mix transported from the Hot Mix Plant to the site be spread by means of self-propelled electronic paver with electronic sensor & hydraulic control with suitable screeds capable of spreading, temping and finishing the mix true to the specified width and profile without calling segregation, dragging, bringing irregularities or other surface defects. The paver shall be capable of being operated at a speed consistent with a character of mix and the thickness of the course being laid so as to produce a surface of having uniform density and surface

texture. The thickness of the single compacted layer shall not exceed 75mm. The temperature of the mix at the time of laying shall be as per clause 7.0 above.

## 10 Weather Limitation

The bituminous mixture shall not be placed:

- i) In presence of standing water on the surface
- ii) When the rain is imminent and during rains, fog or dust storm.
- iii) When the binder course is damp.
- iv) When the air temperature on the surface on which it is to be laid is below 10°C.

## 11 Rolling

After the mix being spread, rolling shall be carried in three consecutive stages as below:

- a) Break down rolling
- b) Intermediate rolling
- c) Finish rolling

**11.1** The initial or Break down rolling shall be done with 8-10 tonne dead weight smooth wheeled roller. The intermediate rolling will be done with smooth wheel pneumatic tyred roller of 12 to 15 tonne capacity having tyre pressure 7 kg/cm<sup>2</sup>. Finish rolling shall be done with 8 to 10 tonne steel wheel roller.

Alternatively all the compaction operations i.e. break down rolling, intermediate rolling and finished rolling can be accomplished by using vibratory roller of 8 to 10 tonnes static weight. During the initial or breakdown rolling and finished rolling, the vibratory system shall be switched off. The joints and edges shall be rolled with 8 to 10 tonnes three wheeled static roller.

**11.2** Rolling shall commence longitudinally at the sides and proceed towards center of the pavement, overlapping on successive trips by at least half the width of the rear wheels. Alternative trips of the roller shall be slightly of different lengths.

**11.3** Break-down rolling shall preferably commence as soon as practicable after the mix is spread. The maximum breakdown temperature at which rolling can commence shall be determined by field trials. The attempt should be to obtain the maximum possible density.

**11.4** The principal function of finish rolling is to remove roller marks. The surface shall be carefully examined for residual marks which should be cleanly rolled out. A neat finished appearance shall be obtained. Finish rolling shall be accomplished with tandem roller.

**11.5** Rolling shall commence longitudinally at the sides and proceed towards center of the pavement, overlapping on successive trips by at least half the width of the rear wheels. Alternative trips of the roller shall be slightly of different lengths.

**11.6** Break-down rolling shall preferably commence as soon as practicable after the mix is spread. The maximum breakdown temperature at which rolling can commence shall be determined by field trials. The attempt should be to obtain the maximum possible density.

**11.7** The principal function of finish rolling is to remove roller marks. The surface shall be carefully examined for residual marks which should be cleanly rolled out. A neat finished appearance shall be obtained. Finish rolling shall be accomplished with tandem roller.

### **11.8 Speed of Rolling**

The speed of rolling shall not exceed 4 - 5 km/hr to prevent adhesion of the mixture to the roller. The wheels shall be kept moist but excess of water shall not be permitted. The line of rolling shall not suddenly be changed, thereby displacing the mix. Roller shall not be left standing on the new surfacing.

### **11.9 Rolling Temperature**

The range of temperature during rolling shall be as per clause 7.0 above. No rolling shall be allowed below 100°C in case of VG bitumen.

## **12 Joints**

### **12.1 Longitudinal Joints**

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the centre line of runway. The longitudinal lane joints shall be truly vertical in straight lines which shall be continuous for the full length of the pavement, or in smooth curves around bends. The exposed vertical edges of the longitudinal lane joints shall be carefully cut back and trimmed to firm material in the compacted lane, or for a minimum of one and a half times the layer thickness, whichever is the greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned and painted with hot bitumen immediately before laying of the adjacent lane. Nothing extra shall be paid on this account.

### **12.2 Transverse Joints**

They shall be formed at right angles to the longitudinal joints, and shall be truly vertical. The exposed vertical edges of the transverse joints shall be cut back and trimmed to firm material or for a distance of not less than 1-1/2 times the thickness of layer whichever is greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned. The exposed joints shall then be

cleaned and painted with hot bitumen immediately before the laying of the lane continues. Nothing extra shall be paid on this account.

### 13 Pavement Edges

Pavement shall be laid to correct width and alignment. To achieve straight and vertical edge, Contractor shall either use adequate side shuttering or cut back the edges to correct width and alignment by removing extra mix spread. Nothing extra shall be paid on this account.

#### 13.1 Temporary Ramps

Temporary ramps at the end of each day work shall be made to allow smooth movement of air traffic and removal of ramp before start of next day work as per direction of Engineer-in-charge. Nothing extra shall be paid on account of provision / dismantling of ramps and nothing shall be deducted in case ramps are not required to be provided.

### 14 Determination of Field Density

The field density shall be determined by core cutting method using core cutting machine or by sand replacement method. Metallic tray of field density unit shall be kept on level spot of the finished pavement surface and a hole of 10cm dia. is cut in the entire thickness of the layer. All materials removed from the hole is carefully collected and weighed. A known weight of dry standard sand, passing 710 micron IS sieve and retained on 355 micron I.S. Sieve is taken in the sand pouring cylinder. The cylinder is kept directly over the hole and the shutter of the cylinder is released without any jerk and closed when the hole is filled with the sand. The quantity of the residual sand in the cylinder is weighed and the quantity filling the cone of the cylinder is determined.

The in-situ Field density of the layer is calculated as follows:

$$\text{Field Density} = \frac{A}{\{W - (W1 + W2)\}/d} \text{ gm/cm}^3$$

where,

- A = Weight of the materials removed from the hole.
- W = Initial weight of sand taken in the cylinder.
- W1 = Weight of the sand filling the cone of the cylinder.
- W2 = Weight of the sand remaining in the cylinder.
- d = Bulk density, gm/cm<sup>3</sup> of sand.

### 15 Quality Control Tests for Semi Dense Asphaltic Concrete (SDAC):

Apart from the quality control tests given in clause 1.1.1, following additional tests shall be carried out as mentioned in the Table below:

<b>S.No.</b>	<b>Test</b>	<b>Test method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
1.	Quality of binder	IS:73	Number of samples as per lot.	As per IS:73.
2.	Deleterious materials	IS:2386 (Part-III)	As required by the Engineer- in- charge.	As required by engineer-in-charge
3.	Mix grading	IS:2386 (Part-I)	One test for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
4.	Stability of mix, flow value, density and void content.	ASTMD1559	3 tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
5.	Binder content	As per clause 4.0	One test for each 400 tonnes of mix subject to minimum of two tests per day per plant.	As per clause 3.2
6.	Density of compacted layer	As per clause 14.0	One test per 500 m <sup>2</sup> area.	As per clause 16.1

**Note:** One test shall consist of 3 samples.

## 16 Acceptance Criteria

### 16.1 Field Density

The work shall be accepted as of quality, measured and paid in full if the field density does not work out to be less than 98% of the Design Laboratory Density worked out in Job Mix Formula in Clause 3.0 above.

When the field density achieved in the Field is between 95% and 98% of the Design Laboratory Density, the work shall be accepted as not up to the standard and paid at reduced rate on pro-rata basis of Design Laboratory Density with full rate for 98% density as base. When the field density works out to be less than 95% of the Design Laboratory Density, the surface shall be further consolidated till the required field density



is achieved. If this is not found possible, the work represented by the sample shall be dismantled and redone by the Contractor at his own cost.

## **16.2 Surface Accuracy**

The finished surface of Semi Dense Asphaltic Concrete shall be true to level, grade and camber as per the approved drawings and the directions of the Engineer-in-Charge. When a straight edge of 3 m length is placed longitudinally or transversely, the maximum deviation shall not be more than 3 mm in longitudinal and transverse directions.

The surface accuracy shall be checked immediately after rolling. Surface irregularities which fall outside specified tolerance limits as stipulated in above para shall be rectified by removing to full depth the affected area which shall not be less than 10 sqm and relaying with fresh materials. In no case shall depressions be filled up with screenings or binding material.

## **17 Measurements:**

**17.1** Before commencement of laying of Semi Dense Asphaltic concrete, levels shall be taken jointly by the Engineer-in-Charge or his representative and the Contractor at 3 m intervals both ways or closer as directed by the Engineer-in-Charge. These levels shall be recorded in the level book and plotted on the plan on tracing of polyester film/graph paper/plain computer sheet, as decided by the Engineer-in-Charge, by the Contractor at his own cost and the same shall be signed by the Contractor. Proposed formation levels of the finished Dense Asphaltic Concrete surface shall be marked at corresponding points. Tack coat shall then be applied and Dense Asphaltic Concrete shall then be laid and compacted to required levels (Tack coat shall be paid separately in the respective item of BOQ). Levels of the compacted bituminous surface shall be taken at grid points at which levels were recorded earlier in the level book and also plotted on the plan. Level books as well as the plan shall be signed by the Contractor as token of acceptance of the levels.

**17.2** The volume of compacted mix shall be worked out in cubic meter correct to two places of a decimal as the product of the measured surface area and average thickness laid. Average thickness shall be worked out on the basis of actual levels. The length and breadth shall be measured correct to cm.

**17.3** In case SDAC is to be laid on Dense Bituminous macadam (DBM) newly laid under this contract, the finished levels of previous surface shall be taken as initial levels for this purpose.

**17.4** Quantity for payment shall be the theoretical quantity (Based on Proposed formation levels) or the actual quantity (based on actual finished levels) whichever is less.

## **18 Rate**

The rate shall include the cost of all materials, plant machinery and labour required in all operations described above including all carriage and lifts involved. The rate also includes all cost of setting up the laboratory at site and carrying out the quality control measures/tests enumerated above by the Contractor at his own cost in the presence of Engineer-in-Charge or his authorized representative and submission of test results on completion of tests to the Engineer-in-Charge thereof (The item of Tack Coat shall be paid separately and is not included in this item).

Item: Providing and laying of Hot Mix **Dense Bituminous Macadam(DBM)** using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values of compaction, strength, surface accuracy complete (for tendering purpose VG bitumen of grade (VG-10) shall be taken as 95 kg/m<sup>3</sup> of mix supplied in drum/bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler material).

## 1 Materials

### 1.1 Coarse Aggregates

This shall consist of a crushed or broken from hard stone obtained from approved quarry. These shall be clean, strong, durable of fairly cubical shape and free from disintegrated, soft, friable, thin elongated or laminated pieces. This shall also be free from dirt, organic, deleterious material and any other foreign matter and adherent coatings. The grading of coarse aggregates shall conform to IS:383.

#### 1.1.1 Physical Properties of Coarse Aggregate

The aggregate shall conform to the following physical properties as mentioned in the table below:

S. No.	Property	Tests	Test Method	Frequency	Acceptance Criteria
1.	Cleanliness	Grain Size Analysis	IS:2386 (Part.I)	Before approval of the quarry and at every subsequent change in the source of supply	Max. 5% passing 0.075mm sieve
2.	Strength*	Aggregate impact value	IS:2386 (Part.IV)	Before approval of the quarry and at every subsequent change in the source of supply and one test for every 100m <sup>3</sup> of aggregates	Max.27%
		Los Angeles Abrasion value	IS:2386 (Part IV)	-do-	Max.35%

<b>S. No.</b>	<b>Property</b>	<b>Tests</b>	<b>Test Method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
3.	Durability	Soundness Loss with Sodium Sulphate for 5 cycles  Loss with Magnesium Sulphate with 5 cycles	IS:2386 (Part V)	-do-	Max. 12%  Max. 18%
4.	Particle Shape	Flakiness & Elongation Index (Combined)	IS:2386 (Part I)	-do-	Max. 35%
5.	Stripping	Coating and Stripping of Bitumen Aggregate	IS:6241	-do-	Minimum Retained Coating
6.	Water absorption	Water absorption	IS:2386 Part III	-do-	Max.2%
7.	#Water Sensitivity	**Retained Tensile strength	AASHTO 283	-do-	Minimum 80%

\* The aggregate may satisfy either of the two tests.

\*\* If the minimum retained tensile strength falls below 80%, use of anti-stripping agent is recommended to meet the minimum requirements

# The water sensitivity test is only required, if the minimum retained coating in stripping test is less than 95%. Where anyone or some of the above conditions cannot be satisfied, it is left to the Engineer-in-Charge to allow reasonable tolerances, with the approval of Competent Authority.

**1.1.2 Anti-stripping Agent:** Anti-stripping agent or additive if required shall be heat stable, shall not change the viscosity of the binder beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method and shall satisfy the requirements as stipulated in MORT&H Appendix-5. The cost of providing anti-stripping agent shall be borne by the contractor and nothing extra shall be paid on this account to the contractor.

## **1.2 Fine Aggregates**

Fine aggregate shall consist of crushed or naturally occurring mineral material or combination of two, passing 2.36 mm sieve and retained on 0.075 mm sieve. The fine aggregate will be clean, hard, durable, dry, and free from dust and soft organic and other deleterious substances. Fine aggregates shall have sand equivalent value not less than 50 when tested in accordance with the requirement of IS:2720 Part 37. The

Plasticity Index of fraction of passing the 0.425 mm sieve shall not exceed 4 when tested in accordance with IS:2720 Part 5.

### 1.3 Filler

The filler shall consist of cement of quality conforming to relevant IS code as approved by the Engineer-in-charge.

#### 1.3.1 Cost Adjustment for Filler

For the purpose of tendering the contractor may base his rate assuming 2% cement as filler by weight of aggregates. If the actual quantity of cement required to be used, as per the design mix, is found to be different from the quantity of cement assumed above, necessary adjustment in cost of extra/short cement shall be made.

### 1.4 Bitumen

The bitumen shall be, Viscosity Grade Bitumen conforming to IS:73, supplied by Govt. refineries. The agencies shall submit copies of the purchase vouchers of the bitumen to the Engineer-in-Charge. Selection of VG grade bitumen shall be based upon the climatic conditions of the area as per table below.

<b><i>Lowest Daily Mean Air Temperature</i></b>	<b><i>Highest Daily Mean Air Temperature</i></b>		
	<b><i>Less than 20°C</i></b>	<b><i>20 to 30°C</i></b>	<b><i>More than 30°C</i></b>
More than -10°C	VG-10	VG-20	VG-30
-10°C or Lower	VG-10	VG-10	VG-20

## 2 Combined Grading of Aggregates

In order to satisfy the design requirements for the Dense Bituminous Macadam (DBM) as laid down in para 3.0, the mix shall contain coarse aggregates, fine aggregates in suitable proportions. True and representative samples of the aggregates proposed to be used on specific job shall be tested in material testing lab (approved by Govt. institutions) and proper blend of individual aggregates normally available shall be worked out so that the gradation of the final composition shall satisfy the limits laid down below:

<b>Grading</b>	<b>2</b>
<b>IS Sieve (mm)</b>	<b>Cum. Percentage by weight of % passing</b>
37.5	100
26.5	90-100
19	71-95
13.2	56-80
4.75	38-54
2.36	28-42
0.3	7-21
0.075	2-8

### 3 Job Mix Formula (JMF)

Twenty days prior to the start of work at site, the job mix formula shall be got determined by the contractor empanelled or Govt. Institute/Laboratory, as directed by the Engineer-in-Charge, by Marshall Design Method. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site. The Contractor also shall intimate, in writing, to the Engineer-in-Charge the details of source and location of all materials, their sizes, grading and test results. Besides conforming to the requirements of grading and quality for individual ingredients the mix shall meet the requirements enumerated below:

<b>S.No.</b>	<b>Criteria</b>	<b>Value</b>
1.	No. of compaction blows on each side of Marshall specimen	75
2.	Marshall stability in kN at 60°C	Not less than 9.0
3.	Marshall flow value in mm for VG Bitumen	2-4
4.	Marshall Quotient for Viscosity grade Paving Bitumen(Ratio of Stability/Flow)	2-5
5.	Percentage Voids in Mix (VIM)	3-5

<b>S.No.</b>	<b>Criteria</b>	<b>Value</b>
6.	Percentage voids in mineral aggregates filled with bitumen (VFB)	65-75%
7.	Bitumen(Viscosity Grade) content by weight of mix	As determined in the Lab.
8.	Design laboratory density (Bulk density of the Marshall mould)	As determined in the Lab.
9.	Retained Marshall Stability on Immersion Test	Not less than 75%

**Note:** Design of mix should also meet the following criteria:

- a) A test track of minimum 7m wide and 90m length and shall be of the same depth specified for the construction of the course which it represents, laid and tested by the contractor before commencement of actual work. The core cut from the test track on testing shall give a stability and density of not less than 98% of the respective design values.

In case of any deficiency, necessary adjustment in Job Mix formula, Plant operation, placing procedures and rolling procedure shall be made and the test section shall be re-laid & tested. No extra payment shall be made on this account of making test track or changes in grading or any other changes, if any. Full production shall not begin until acceptable test track has been constructed and accepted, in writing, by the Engineer-in-Charge.

### **3.1 Revision of Job Mix Formula**

The Job Mix Formula shall be revised if there is change in source of material and/or if it is noticed by the Engineer-in-Charge that grading of Individual aggregates has changed. The Job Mix Formula (JMF) so determined shall be submitted by the contractor, in writing, to the engineer-in-charge for his acceptance before the actual paving work starts at site with new source of material / grading. No extra payment shall be made to the contractor on this account.

### 3.2 Permissible Tolerances in the Job Mix Formula

<b>S.No.</b>	<b>Description</b>	<b>Permissible Variation</b>
1.	Aggregate passing 19mm sieve or larger	±8%
2.	Aggregate passing 13.2mm, 9.5mm	±7%
3.	Aggregate passing 4.75mm	±6%
4.	Aggregate passing 2.36mm, 1.18mm, 0.6mm	±5%
5.	Aggregate passing 0.3mm, 0.15 mm	±4%
6.	Aggregate passing 0.075mm	±2%
7.	Binder content	±0.3%

**Note:** All the above tolerances are with respect to the Job Mix Formula as the datum.

## 4 Bitumen Content

The bitumen content of the mix shall be tested periodically and as directed by the Engineer-in-Charge using centrifugal extraction method or such method approved by the Engineer-in-Charge. The test shall generally be carried out in accordance with established practices and as directed by the Engineer-in-Charge. Whenever, there is a deviation in the resultant bitumen content from approved job-mix- formula values, it shall be reported to the Engineer-in-Charge immediately and necessary correction made at the job-mix plant as directed.

### 4.1 Cost adjustment for Bitumen

For the purpose of tendering, the Contractor may base his rate on the assumption that the bitumen content of the mixture shall be 95 Kg of bitumen per Cum. of total mix compacted to 100% density in Marshall mold. If the actual quantity of bitumen required to be used as a result of the laboratory test is found different from the quantity of bitumen that is assumed above, necessary adjustment in the cost of extra/short bitumen used shall be made from the rate specified at the time of tender and to the rate of purchase price of bitumen at the nearest IOC/HP/BP/Govt. Refinery. The procurement price of bitumen (Basic rate plus excise duty and sales tax & transportation charges) shall be ascertained by the Engineer-in-Charge on submission of documentary proof by the contractor. The rate of bitumen decided by the Engineer-in-Charge shall be final and binding. Except adjustment in cost due to variation in bitumen consumption as stated above, no other factor whatsoever shall be considered for adjustment in quoted rates.



In the event of change in materials available at site due to unforeseen exigencies, a fresh job mix formula shall be arrived at within the specified limits in the empanelled laboratory as approved by the Engineer-in-Charge. Nothing extra is payable due to this. Laboratory charges for the Job-mix formula design, costs of materials, its cartage and other incidental expenses shall be borne by the Contractor.

## **5 Mixing**

All plants used by the contractor for the preparation of Semi Dense Asphaltic Concrete should be equipped with the following:

- a) Means for accurately weighing or measuring each batch of aggregates.
- b) Bitumen tanks with arrangement of heating the material under effective and positive control at all times. In addition there should be satisfactory devices for weighing, metering of volumetric measurement of the bitumen to be used.
- c) A mixer unit capable of producing uniform mixture.

The hot aggregate and binder shall be thoroughly and intimately mixed together in the correct proportion for at least 30 seconds or longer and until every particle of aggregates is completely coated and homogenous mixture is obtained. The total mixing time may be reduced but not less than 30 seconds in any case, if the Engineer-in-Charge is satisfied that thorough mixing can be achieved in less time. In such cases the contractor shall obtain prior written permission of the Engineer-in-charge.

## **6 Hot Mix Plant**

The Hot Mix Plant (HMP) employed by the contractor shall be a weigh batch plant having a minimum capacity of 100 TPH. Hot Mix Plant with electronic control of minimum capacity of 100 TPH and capable of producing a proper quality mix shall be used for preparing the mix. The plant may be a batch type, having a coordinative set of essential units such as drier for heating the aggregate, devices for grading and batching/feeding by weight or volume the required quantities of aggregates. The plant shall also have a binder heating and control unit for metering out the correct quantities of heated binder together with the mechanical mixer for thorough mixing of the binder and the aggregates.

## 7 Temperature

**7.1** Following temperatures shall be adhered to for VG bitumen at the different stages of work:

<b><i>Bitumen Viscosity Grade</i></b>	<b><i>Bitumen Temperature °C</i></b>	<b><i>Aggregate Temperature °C</i></b>	<b><i>Mixed Material Temperature °C</i></b>	<b><i>Laying Temperature °C</i></b>	<b><i>*Rolling Temperature °C</i></b>
VG-40	160-170	160-175	160-170	150 Min.	100 Min.
VG-30	150-165	150-170	150-165	140 Min.	90 Min.
VG-20	145-165	145-170	145-165	135 Min.	85 Min.
VG-10	140-160	140-165	140-160	130 Min.	80 Min.

\* Rolling must be completed before the mat cools to these minimum temperatures. At no time, shall the difference in temperature between the aggregates and the binder exceed 14°C, at no time shall bitumen or aggregates be overheated.

## 8 Transportation of Hot Mix

The Hot Dense Bituminous Macadam shall be transported from mixing plant to the site in clean vehicle. Every precaution shall be taken to avoid segregation of the hot mix and to ensure that they do not become contaminated with dust or foreign materials. In order to maintain satisfactory temperature of mix in transit, particularly in cold weather and to prevent undue loss of heat adequate precautions shall be taken by covering the material so that the materials are well protected during transportation. The temperature of the mix in every transporting vehicle shall be checked immediately prior to discharge of mix into the spreader and shall be ensured that the temperature is within the limits as specified in clause 7.0 above. If the temperature of mix in any transporting vehicle is not as per the limits specified in clause 7.0 above, the mix shall be rejected and shall be removed from site immediately.

## 9 Laying

Mix transported from the Hot Mix Plant to the site is spread by means of self-propelled electronic paver with electronic sensor & hydraulic control with suitable screeds capable of spreading, temping and finishing the mix true to the specified width and profile without causing segregation, dragging, bringing irregularities or other surface defects. The paver shall be capable of being operated at a speed consistent with a character of mix and the thickness of the course being laid so as to produce a surface of having uniform density and surface

texture. The thickness of the single compacted layer shall not exceed 75mm. The temperature of the mix at the time of laying shall be as per clause 7.0 above.

## 10 Weather Limitation

The bituminous mixture shall not be placed:

- i) In presence of standing water on the surface
- ii) When the rain is imminent and during rains, fog or dust storm.
- iii) When the binder course is damp.
- iv) When the air temperature on the surface on which it is to be laid is below 10°C.

## 11 Rolling

After the mix being spread, rolling shall be carried in three consecutive stages as below:

- a) Break down rolling
- b) Intermediate rolling
- c) Finish rolling

**11.1** The initial or Break down rolling shall be done with 8-10 tonne dead weight smooth wheeled roller. The intermediate rolling will be done with smooth wheel pneumatic tyred roller of 12 to 15 tonne capacity having tyre pressure 7 kg/cm<sup>2</sup>. Finish rolling shall be done with 8 to 10 tonne steel wheel roller. The finish rolling shall be accomplished before the temperature of mix fall below 100°C

Alternatively all the compaction operations i.e. break down rolling, intermediate rolling and finished rolling can be accomplished by using vibratory roller of 8 to 10 tonnes static weight. During the initial or breakdown rolling and finished rolling, the vibratory system shall be switched off. The joints and edges shall be rolled with 8 to 10 tonnes three wheeled static roller.

**11.2** Rolling shall commence longitudinally at the sides and proceed towards center of the pavement, overlapping on successive trips by at least half the width of the rear wheels. Alternative trips of the roller shall be slightly of different lengths.

**11.3** Break-down rolling shall preferably commence as soon as practicable after the mix is spread. The maximum break down temperature at which rolling can commence shall be determined by field trials. The attempt should be to obtain the maximum possible density

**11.4** The principal function of finish rolling is to remove roller marks. The surface shall be carefully examined for residual marks which should be cleanly rolled out. A neat finished appearance shall be obtained. Finish rolling shall be accomplished with tandem roller.

### **11.5 Speed of Rolling**

The speed of rolling shall not exceed 4 - 5 km/hr to prevent adhesion of the mixture to the roller. The wheels shall be kept moist but excess of water shall not be permitted. The line of rolling shall not suddenly be changed, thereby displacing the mix. Roller shall not be left standing on the new surfacing.

### **11.6 Rolling Temperature**

The range of temperature during rolling shall be as per clause 7.0 above. No rolling shall be allowed below 100°C in case of VG bitumen.

## **12 Joints**

### **12.1 Longitudinal Joints**

Longitudinal joints and edges shall be constructed true to the delineating line parallel to the center line of runway. The longitudinal lane joints shall be truly vertical in straight lines which shall be continuous for the full length of the pavement, or in smooth curves around bends. Joints in the successive asphaltic concrete layers above shall be staggered by 500mm from those the underlying layer. The exposed vertical edges of the longitudinal lane joints shall be carefully cut back and trimmed to firm material in the compacted lane, or for a minimum of one and a half times the layer thickness, whichever is the greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned and painted with hot bitumen immediately before the laying of the adjacent lane. Nothing extra shall be paid on this account.

### **12.2 Transverse Joints**

They shall be formed at right angles to the longitudinal joints, and shall be truly vertical. Transverse joints shall be staggered from each other and in the layers above at least 500mm. The exposed vertical edges of the transverse joints shall be cut back and trimmed to firm material or for a distance of not less than 1-1/2 times the thickness of layer whichever is greater. All debris/loose material arising from this operation shall be removed from the pavement and the underlying surface cleaned. The exposed joints shall then be cleaned and painted with hot bitumen immediately before the laying of the lane continues. Nothing extra shall be paid on this account.

## **13 Pavement Edges**

Pavement shall be laid to correct width and alignment. To achieve straight and vertical edge, Contractor shall either use adequate side shuttering or cut back the edges to correct width and alignment by removing extra mix spread. Nothing extra shall be paid on this account.

### 13.1 Temporary Ramps

Temporary ramps at the end of each day work shall be made to allow smooth movement of air traffic and removal of ramp before start of next day work as per direction of Engineer-in-charge. Nothing extra shall be paid on account of provision / dismantling of ramps and nothing shall be deducted in case ramps are not required to be provided.

## 14 Determination of Field Density

The field density shall be determined by core cutting method using core cutting machine or by sand replacement method. Metallic tray of field density unit shall be kept on level spot of the finished pavement surface and a hole of 10cm dia. is cut in the entire thickness of the layer. All materials removed from the hole is carefully collected and weighed. A known weight of dry standard sand, passing 710 micron IS sieve and retained on 355 micron I.S. Sieve is taken in the sand pouring cylinder. The cylinder is kept directly over the hole and the shutter of the cylinder is released without any jerk and closed when the hole is filled with the sand. The quantity of the residual sand in the cylinder is weighed and the quantity filling the cone of the cylinder is determined.

The in-situ Field density of the layer is calculated as follows:

$$\text{Field Density} = \frac{A}{\{W - (W1 + W2)\}/d} \text{ gm/cm}^3$$

where,

- A = Weight of the materials removed from the hole.
- W = Initial weight of sand taken in the cylinder.
- W1 = Weight of the sand filling the cone of the cylinder.
- W2 = Weight of the sand remaining in the cylinder.
- d = Bulk density, gm/cm<sup>3</sup> of sand.

## 15 Quality Control Tests for Dense Bituminous Concrete (DBM):

Apart from the quality control tests given in clause 1.1.1, following additional tests shall be carried out as mentioned in the table below:

S.No.	Test	Test method	Frequency	Acceptance Criteria
1	Quality of binder	IS:73	Number of samples as per lot.	As per IS:73.
2	Deleterious materials	IS:2386 (Part-III)	As required by the Engineer- in- charge.	As required by engineer-in-charge

<b>S.No.</b>	<b>Test</b>	<b>Test method</b>	<b>Frequency</b>	<b>Acceptance Criteria</b>
3	Mix grading	IS:2386 (Part-I)	One test for individual constituent and mixed aggregate from dryer for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
4	Stability of mix, flow value, density and void content.	ASTMD1559	3 tests for stability, flow value, density and void contents for each 400 tonnes of mix subject to minimum of two tests per day per plant.	
5	Binder content	As per clause 4.0	One test for each 400 tonnes of mix subject to minimum of two tests per day per plant.	As per clause 3.2
6	Density of compacted layer	As per clause 14.0	One test per 500m <sup>2</sup> area.	As per clause 16.1

**Note:** One test shall consist of 3 samples.

## 16 Acceptance Criteria

### 16.1 Field Density

The work shall be accepted as of quality, measured and paid in full if the field density does not work out to be less than 98% of the Design Laboratory Density worked out in Job Mix Formula in Clause 3.0 above. When the field density achieved in the Field is between 95% and 98% of the Design Laboratory Density, the work shall be accepted as not up to the standard and paid at reduced rate on pro-rata basis of Design Laboratory Density with full rate for 98% density as base. When the field density works out to be less than 95% of the Design Laboratory Density, the surface shall be further consolidated till the required field density is achieved. If this is not found possible, the work represented by the sample shall be dismantled and redone by the Contractor at his own cost.

### 16.2 Surface Accuracy

The finished surface of Dense Bituminous Macadam shall be true to level, grade and camber as per the approved drawings and the directions of the Engineer-in-Charge. When a straight edge of 3 m length is placed longitudinally or transversely, the maximum deviation shall not be more than 6 mm in longitudinal and transverse directions.

The surface accuracy shall be checked immediately after rolling. Surface irregularities which fall outside specified tolerance limits as stipulated in above para shall be rectified by removing to full depth the affected area which shall not be less than 10 sqm. and relaying with fresh materials. In no case shall depressions be filled up with screenings or binding material.

## **17 Measurements:**

- 17.1** Before commencement of laying of Dense Bituminous Macadam, levels shall be taken jointly by the Engineer-in-Charge or his representative and the Contractor at 3 m intervals both ways or closer as directed by the Engineer-in-Charge. These levels shall be recorded in the level book and plotted on the plan on tracing of polyester film/graph paper/plain computer sheet, as decided by the Engineer-in-Charge, by the Contractor at his own cost and the same shall be signed by the Contractor. Proposed formation levels of the finished Dense Asphaltic Concrete surface shall be marked at corresponding points. Tack coat shall then be applied and Dense Asphaltic Concrete shall then be laid and compacted to required levels (Tack coat shall be paid separately in the respective item of BOQ). Levels of the compacted bituminous surface shall be taken at grid points at which levels were recorded earlier in the level book and also plotted on the plan. Level books as well as the plan shall be signed by the Contractor as token of acceptance of the levels.
- 17.2** The volume of compacted mix shall be worked out in cubic meter correct to two places of a decimal as the product of the measured surface area and average thickness laid. Average thickness shall be worked out on the basis of actual levels. The length and breadth shall be measured correct to cm.
- 17.3** In case DBM is to be laid on WMM newly laid under this contract, the finished levels of previous surface shall be taken as initial levels for this purpose.
- 17.4** Quantity for payment shall be the theoretical quantity (Based on Proposed formation levels) or the actual quantity (based on actual finished levels) whichever is less.

## **18 Rate**

The rate shall include the cost of all materials, plant machinery and labour required in all operations described above including all carriage and lifts involved. The rate also includes all cost of setting up the laboratory at site and carrying out the quality control measures/tests enumerated above by the Contractor at his own cost in the presence of Engineer-in-Charge or his authorized representative and submission of test results on completion of tests to the Engineer-in-Charge thereof (The item of Tack Coat shall be paid separately and is not included in this item).

Item : Providing and applying **Tack Coat** using hot straight run bitumen of Viscosity grade VG-10 (80/100) including heating the bitumen, spraying the bitumen with mechanically operated spray unit fitted on bitumen boiler, cleaning and preparing the existing road surface as per specifications.

## **1 Tack Coat of Hot Straight Run Bitumen**

**1.1** The rate of application of binder which shall be as specified and shall be laid with viscosity grade bitumen VG-10 (80/100) as decided by the Engineer-in-charge

- i) 0.50 kg/ sqm on existing black topped surface, concrete surface.
- ii) 0.25 kg/sqm on new black topped surface

**1.2** Where the material to receive an overlay is a freshly laid bituminous layer that has not been subjected to traffic, or contaminated by dust, a tack coat is not mandatory where the overlay is completed within 2 days.

### **1.3 Materials**

Bitumen: This shall be straight run bitumen of specified Viscosity Grade conforming to IS 73 specifications.

### **1.4 Preparation of surface**

#### **1.4.1 Cleaning**

Prior to the application of bitumen, all vegetation, loose material shall be removed from the entire surface of the pavement and from existing dummy, construction and expansion joints(wherever existing),painting, rubber deposit by means of mechanical scrapper, mechanical sweepers and blowers, otherwise with steel wire brushes, small picks, brooms or other implements as approved by the engineer-in-charge. The material so removed shall be disposed of as directed by the engineer-in-charge.

#### **1.4.2 Weather and seasonal limitations**

The tack coat shall not be applied nor any bitumen work done during rainy weather or when the surface is damp or wet or when the atmospheric temperature in the shade is less than 10°C.

### **1.5 Application of Tack Coat:**

#### **1.5.1 Heating**

Bitumen shall be heated in the boiler to a temperature of 165°C to 175°C and maintained at that temperature. Temperature shall be checked at regular intervals with the help of a thermometer.



**1.5.2 Application of Bitumen**

Hot bitumen shall be applied evenly to the clean, dry surface by means of pressure sprayer at specified rate. Even and uniform distribution of bitumen shall be ensured. Bitumen shall be applied longitudinally along the length of the pavement and never across it. Excessive deposits of bitumen caused by stopping or starting of the sprayer or through leakage or any other reason shall be suitably rectified.

**1.6 Quality Control of work:**

For quality of the materials supplied and the works carried out, the relevant provisions of section 900 of MORT&H shall apply.

**1.7 Measurements**

Length and breadth shall be measured correct to a cm along the surface of pavement. Area shall be worked out in sqm correct to two places of decimal.

**1.8 Rate**

Rate shall include the cost of all materials (at an application rate as specified in clause 1.1 above) and labour involved in all the operations described above, with adjustment, plus or minus for the variation between this amount and actual amount approved by engineer-in-charge after field trials.

Item: Providing and laying in position **Polysulphide sealant** of approved make conforming to BS-5212-1990 or IS:11433-1995. in expansion/ construction/dummy joints including rounding off edges, applying 2 coats of approved primer compatible with the brand of Polysulphide and preparing the surface and applying masking tape along the edge of joint to prevent accidental spillage of sealant on top surface and to give neat finish to the sealant and removing the masking tape after application of sealant etc. complete as per direction of Engineer in- Charge & particular specifications.

[Note: For purpose of payment, quantity (Length x Width x Depth) of Polysulphide sealant only will be measured] unit cm<sup>3</sup>

- a) Expansion Joints of size 25 mm wide and 10 mm deep over 30 mm dia. closed-cell Polyethylene foam back-up rod, as per manufacturer's specifications and sketch at Appendix-'A'.
- b) Construction Joints of size 10 mm wide and 10 mm deep over 12 dia. closed-cell Polyethylene foam back-up rod, as per manufacturer's specifications and sketch at Appendix-'A'.
- c) Transfers Joints of size 10 mm wide and 10 mm deep over 12 mm dia. closed-cell Polyethylene foam back-up rod, as per manufacturer's specifications and sketch at Appendix-'A'.

**Procedure:**

- Preparation of Surface: All the joint surfaces to which the sealant is to be applied should be clean, dry and free from any loose material, dirt, dust, scale, protective lacquer, grease.
- Expansion joint filler material must be checked to ensure that it is tightly packed and no gaps or voids exist at the base of the joint slot.
- Sealant should be prepared as per manufacturer's specifications.
- Before sealant is applied, primer shall be applied to secure better adhesion between sealant and the concrete surface. The surface shall be allowed to dry for at least 30 minutes but no longer than 3 hours before the sealant is applied.
- To prevent accidental spillage of sealant on the top surface and to give a neat finish, masking tape should be applied along the edge of joint before the sealant material is filled.
- Immediately after filling the joints, the sealant should be tooled either with a stainless steel or wooden spatula of the size of the joint to give a smooth surface. While tooling, the spatula should be wetted with a wetting agent like soap water. Masking tape shall be removed immediately after the sealant has been tooled. By tooling, the sealant is compressed with the result that air bubbles if any, are broken up and the sealant becomes free of voids and there is a proper adhesion of the sealant to the sides of the joints.
- Sealant of approved make shall be filled only after complete curing. Sealant shall be applied slightly to a lower level than the slab with a tolerance of 3+1mm as shown in Appendix –'A'.
- Sealant of approved make shall be filled up for a depth as specified in item. The rate of application of sealant may be calculated on the basis of the following formula:

$$\text{Number of 1 Kilogram tins required} = 0.0015 \times L \times W \times D$$

- Manufacturer's certificate shall be produced for establishing that the sealant is not more than six months old or the shelf-life of the sealant. For storage, preparation of sealant, health and safety precautions etc., manufacturer's specifications shall be applicable.

Item: Providing and applying **Cement Slurry** at the rate of 2.6 kg/sqm on the existing concrete surface

- Cleaning : Prior to the application of cement slurry, all vegetation, loose material shall be removed from the entire surface of the pavement, painting, rubber deposit by means of mechanical scrapper, mechanical sweepers and blowers, otherwise with steel wire brushes, small picks, brooms or other implements as approved by the engineer-in-charge. The material so removed shall be disposed of as directed by the engineer-in-charge.
- After the final floating and finishing of the slab and before the application of the curing membrane, the surface of concrete slab shall be brush-textured in a direction at right angles to the longitudinal axis of the carriageway.
- The brushed surface texture shall be applied evenly across the slab in one direction by the use of a wire brush not less than 450 mm wide. The brush shall be made of 32 gauge tape wires grouped together in tufts spaced at 10 mm center. The tufts shall contain an average of 14 wires and initially be 100mm long. The brush shall have rows of tufts. The rows shall be 20mm apart and the tufts in one row shall be opposite the center of the gap between tufts in the other row. The brush shall be replaced when the shortest tuft wears down to 90mm length.
- The texture depth shall be determined by the Sand Patch Test as described below. This test shall be performed at least once for each day's work/paving and wherever the Engineer-in-Charge consider it necessary at times after construction as under:

Five individual measurement of the texture depth shall be taken at least 2m apart anywhere along a diagonal line across a lane completed between points 50m apart along the pavement. No measurement shall be taken within 300mm of the longitudinal edges of a concrete slab constructed in one pass.

- Measurement of Texture Depth – Sand Patch Method

The following apparatus shall be used:

- i. A cylindrical container of 5 ml internal capacity.
- ii. A flat wooden disc 64mm diameter with a hard rubber disc, 1.5mm thick, stuck to one face, the reverse face being provided with a handle.
- iii. Dry natural sand with a rounded particle shape passing a 300micron IS sieve and retained on a 150 micron IS sieve.

Method: The surface to be measured shall be dried, any extraneous mortar and loose material removed and the surface swept clean using a wire brush both at right angles and parallel to the carriageway. The cylindrical container shall be filled with the sand, tapping the base 3 times to the surface to ensure compaction, and striking off the sand level with the top of cylinder. The sand shall be poured into a heap on the surface to be treated. The sand shall be spread over to surface, working the disc with its face kept flat in a circular motion so that the sand is spread into a circular patch with the surface depressions filled with sand

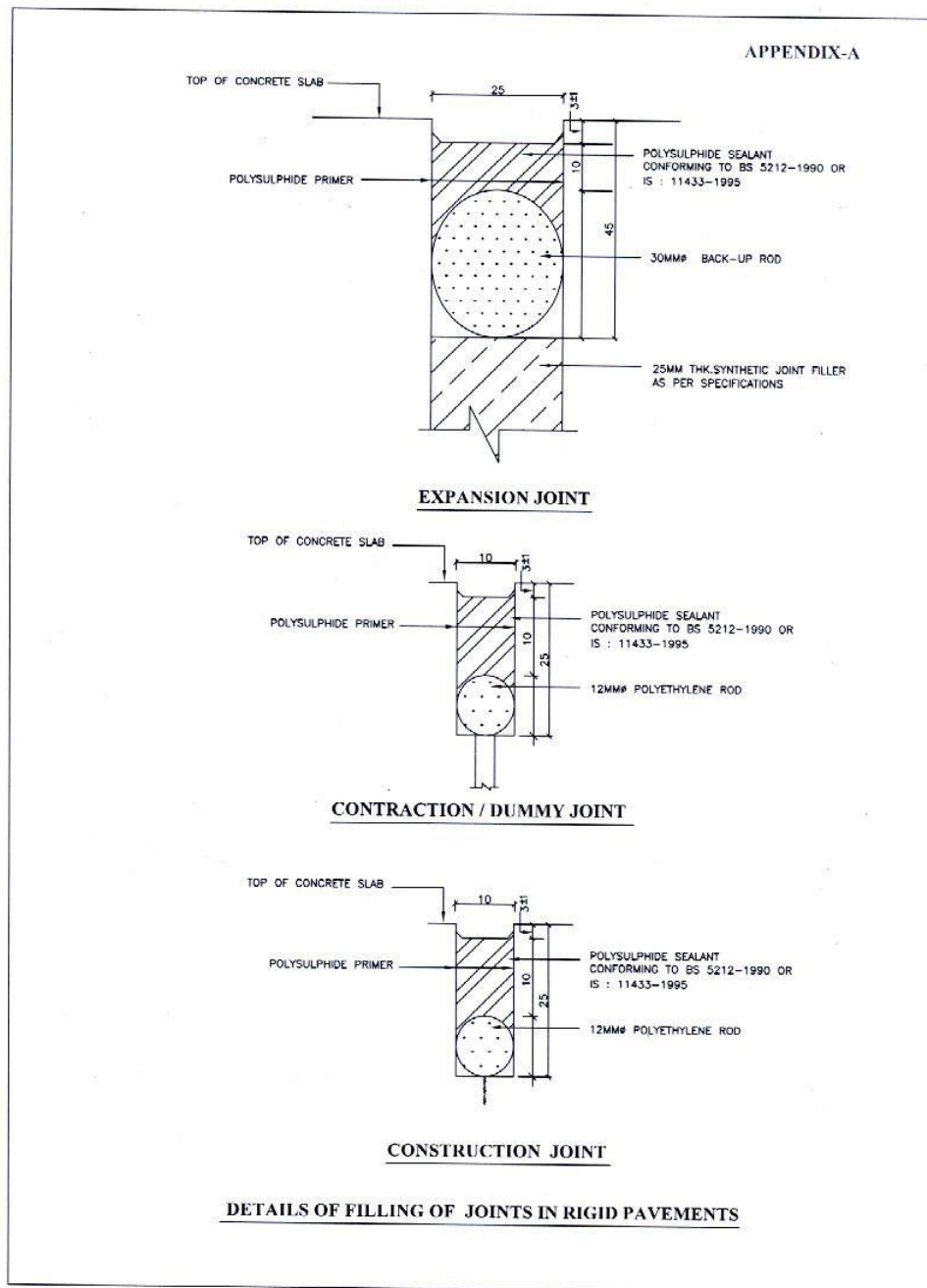
to the level of peaks. The diameter of the patch shall be measured to the nearest 5mm. The texture depth of concrete surface shall be calculated from  $31000/(D \times D)$  mm where D is the diameter of patch in mm.

- Texture depth shall not be less than a minimum required when measurement are taken as given in table nor greater than a maximum average of 1.00 mm.

<b>S.No</b>	<b>Time Test</b>	<b>Number of measurements</b>	<b>Required Texture Depth (mm)</b>	
			<b>Specified value</b>	<b>Tolerance</b>
1.	Between 24 hrs. and 7 days after the construction of the slab or until the slab is first used by vehicles.	An average of 5 Measurements	1.00	±0.25
2.	Not later than 6 weeks before the pavement is opened to public traffic.	An average of 5 Measurements	1.00	±0.25

- After the application of the brushed texture, the surface of the slab shall have a Uniform appearance.
- Where the texture depth requirements are found to be deficient, the Contractor shall make good the texture across the full lane width over length directed by the Engineer-in-Charge, by texturing the hardened concrete surface in all approved manner.
- Curing shall be done by manual method. However, nothing extra shall be paid for curing by application of curing compound.

## Appendix A



Item: Particular specification for **Granular Sub-base**

## 1 Scope

This work shall consist of laying and compacting well-graded material on prepared sub grade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

## 2 Materials

**2.1** The material to be used for the work shall be natural sand, moorum, gravel, crushed stone, crushed stone grit / dust or combination thereof depending upon the grading required. The material shall be free from organic or other deleterious constituents and conform to one of the grading given in Table below.

<b>IS Sieve</b>	<b>Per cent by weight passing the IS sieve</b>
26.5 mm	100
9.50 mm	65 – 95
4.75 mm	50 – 80
2.36 mm	40 – 65
0.425 mm	20 – 35
0.075 mm	3 - 10
CBR Value ( Minimum)	30

**Note:** The material passing 425 micron (0.425 mm) sieve when tested according to IS: 2720 (Part 5) shall have liquid limit and plasticity index not more than 25 and 6 per cent respectively.

### 2.2 Physical Requirements

The material shall have a 10 per cent fines value of 50 kN or more (for sample in soaked condition) when tested in compliance with BS:812 (Part 111). The water absorption value of the coarse aggregate shall be determined as per IS:2386 (Part 3); if this value is greater than 2 per cent, the soundness test shall be carried out on the material delivered to site as per IS : 383.

## 3 Strength of Sub-Base

It shall be ensured prior to actual execution that the material to be used in the sub-base satisfies the requirement of CBR and other physical requirements when compacted and finished. When directed by the

engineer, this shall be verified by performing CBR tests in the laboratory as required on specimens remolded at field dry density and moisture content and any other tests for the “quality” of materials, as may be necessary.

## **4 Construction Operations**

### **4.1 Preparation of subgrade:**

Immediately prior to the laying of sub-base, the subgrade already finished shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water if necessary and rolled with two passes of 80 –100 kN smooth wheeled roller.

### **4.2 Spreading and Compacting:**

The sub-base material of grading specified in the Contract shall be spread on the prepared sub grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation or other means as approved by the Engineer.

When the sub-base material consists of combination of materials mentioned in Clause 1.2.1, mixing shall be done mechanically by the mix-in-place method. Manual mixing shall be permitted only where the width of laying is not adequate for mechanical operations, as in small-sized jobs. The equipment used for mix-in-place construction shall be a rotavator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer, trial runs with the equipment shall be carried out to establish its suitability for the work.

Moisture content of the loose material shall be checked in accordance with IS:2770 (Part 2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and at controlled quantities to variable widths of surface or other means approved by the Engineer so that, at the time of compaction, it is from 1 per cent above to 2 per cent below the optimum moisture content corresponding to IS : 2720 (Part 8). While adding water, due allowance shall be made for evaporation losses. After water has been added, the material shall be processed by mechanical or other approved means like disc harrows, rotavator until the layer is uniformly wet.

Immediately thereafter, rolling shall start. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer up to 225 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN static weight with plain drum or pad foot drum or heavy pneumatic tyred roller of minimum 200 to 300 kN weight having a minimum tyre pressure of 0.7 MN/m<sup>2</sup> or equivalent capacity roller capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional crossfall and super-elevation and shall commence at the edges and progress towards the center for portions having crossfall on both sides.



Each pass of the roller shall uniformly overlap not less than one-third of the track made in the preceding pass. During rolling, the grade and crossfall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material determined as per IS:2770 (Part 8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re-compacted.

## **5 Surface Finish and Quality Control of Work**

### **5.1 Surface Evenness**

The surface finish of construction shall conform to the requirements of relevant clause(s) of MoRTH Specifications.

### **5.2 Quality Control**

Control on the quality of materials and works shall be exercised by the Engineer-in-charge in accordance with relevant clause(s) of MoRTH specifications.

## **6 Measurement of Payment**

Granular sub-base shall be measured as finished work in position in cubic metres, by the level computation method. The protection of edges of granular sub-base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

## **7 Rate**

The Contract unit rate for granular sub-base shall be payment in full for carrying out the required operations described in this particular specification.

## Drawings

ANNEXURE I – Runway Plan and Profile

ANNEXURE II – Runway Running Cross Sections

ANNEXURE III – Detail for Critical zone in Taxiway “A” and junction of Taxiway “S” and Turning Pad at  
Runway 33

Annexure IV – Taxiway A Layout

Annexure V – RESA at Runway 15 and 33

## **Supplementary Information Regarding Works to Be Procured**

- Re-surfacing of runway (Length 2270m, Width 30m, shoulder 5m on either side).
- Taxiway-A – To be reconstructed with flexible pavement.
- Apron (30% slabs to be re-surfaced with cement slurry, 7% joints to be cut and fill and remaining joints to be cleaned and replace with joint seal).
- Taxiway B - Joints to be repaired.
- Both Runway End turning pad joints to be repaired. Turning pad at RWY 33 shoulder to be reconstructed.
- Marking to be done for Runway, Taxiways and Apron.
- Runway and Taxiway strip to be leveled.
- RESA to be constructed at Both Runway Ends.
- Drains to be cleaned and repaired.

## Personnel Requirements

Using Form PER - 1 and PER - 2 in Section 4 (Bidding Forms), the Bidder must demonstrate that it has personnel who meet the following requirements:

<b>No.</b>	<b>Position</b>	<b>Qualification</b>	<b>Nos.</b>	<b><i>Experience In Similar Work [years]</i></b>
1.	Project Engineer	<u>B.E./ B.Tech Civil</u>	1	Minimum 10 yrs. in Bituminous work in Airport
2.	Civil Engineer	<u>B.E./B.Tech</u>	2	Minimum 5 yrs. Experience in Bituminous work in Airport/ National Highways
3.	Material Engineer	<u>Minimum Diploma</u>	1	Min. 5 yrs. experience in Bituminous Works in Airport/ National Highways
4.	Surveyor		1	Min. 5 yrs. experience in Total Station, Digital Leveling.

- Work Experience should be certified from competent authority must be submitted without which the proposed personal will not be considered for evaluation.
- Sufficient Supervisor, Operators, Lab Assistants, Survey Helpers and Labourers shall be provided for working in 2 shifts at site and plant.

## Equipment Requirements

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:

- **List of machineries** to be deployed by the contractor (For Qualifying Criteria)

No.	Equipment Type and Characteristics	Minimum Number Required	Remarks
1.	Computerized Bitumen Hot Weigh Batch mix plant	1 No. 100 Ton or 2 Nos. 60 Tonnes	Qualifying criteria as per section III. Clause 1.1
2.	Electronic Operated Sensor paver	2 Nos. adequate Width (extendable up to minimum 7.5m)	Qualifying criteria as per section III. Clause 1.1
3.	Mechanical Paver	1 No.	Qualifying criteria as per section III. Clause 1.1
4.	Vibratory Roller (8 – 10 T)	Minimum 2 Nos.	Qualifying criteria as per section III. Clause 1.1
5.	Pneumatic Roller (12-15T with tier Pressure of 0.56 MPa )	Minimum 2 Nos.	Qualifying criteria as per section III. Clause 1.1
6.	Tippers / Dumpers 16cu.m capacity	Minimum 10 Nos.	Qualifying criteria as per section III. Clause 1.1
7.	Truck mounted Mechanical Bitumen sprayer	2 Nos.	Qualifying criteria as per section III. Clause 1.1

<b>No.</b>	<b>Equipment Type and Characteristics</b>	<b>Minimum Number Required</b>	<b>Remarks</b>
8.	Front end Loader of bucket capacity of approx. 1 cum	2 Nos.	Qualifying criteria as per section III. Clause 1.1
9.	Concrete Joint cutting machine	2 Nos.	Qualifying criteria as per section III. Clause 1.1 (1 no)
10.	JCB	1 No.	Qualifying criteria as per section III. Clause 1.1
11.	Motor Grader	1 No.	Qualifying criteria as per section III. Clause 1.1
12.	Water tanker (10,000 Ltr. capacity)	1 No.	Qualifying criteria as per section III. Clause 1.1
13.	Road marking/Painting machine	1 No.	Qualifying criteria as per section III. Clause 1.1

• **Laboratory Equipment's** required (For Qualifying Criteria)

No.	Equipment Type and Characteristics	Minimum Number Required	Remarks
<b>A.</b>	<b>General</b>		
1.	Electric Oven, Electric hot plate, Kerosene or gas stove.	1 No. each	Qualifying criteria as per section III. Clause 1.1
<b>B.</b>	<b>Apparatus for testing of Bituminous Concrete</b>		
1.	Marshall testing equipment	1 No.	Qualifying criteria as per section III. Clause 1.1
2.	Water bath	1 No.	Qualifying criteria as per section III. Clause 1.1
3.	Binder Extraction equipment (Centrifugal extractor)	1 No.	Qualifying criteria as per section III. Clause 1.1
4.	Bitumen Core cutting equipment	1 No.	Qualifying criteria as per section III. Clause 1.1

- **List of Machineries** to be deployed by the contractor

No.	Equipment Type and Characteristics	Minimum Number Required
1.	Computerized Bitumen Hot Weigh Batch mix plant	1 No. 100 Ton or 2 Nos. 60 Tonnes
2.	Electronic Operated Sensor paver	2 Nos. adequate Width (extendable up to minimum 7.5m)
3.	Mechanical Paver	1 No.
4.	Vibratory Roller (8 – 10 T)	Minimum 2 Nos.
5.	Pneumatic Roller (12-15T with tier Pressure of 0.56 MPa )	Minimum 2 Nos.
6.	Tippers / Dumpers 16 cum capacity	Minimum 10 Nos.
7.	Truck mounted Mechanical Bitumen sprayer	2 Nos.
8.	Front end Loader of bucket capacity of approx. 1 cum	2 Nos.
9.	Concrete Joint cutting machine	2 Nos.
10.	JCB	1 No.
11.	Motor Grader	1 No.
12.	Water tanker (10,000 Ltr. capacity)	1 No.
13.	Road marking/Painting machine	1 No.
14.	Computerized concrete Weigh Batch mix plant	30 Ton / Hour
15.	Tractor mounted sweeper	2 Nos.
16.	Air-compressor	2 Nos.
17.	Concrete Breaker	1 No.
18.	Dozer	1.No.
19.	Milling Machine	1 No.



- **List of Laboratory** Equipment Required:

No.	Equipment Type and Characteristics	Minimum Number Required
<b>A.</b>	<b>General</b>	
1.	Electric Oven, electric hot plate, Kerosene or gas stove.	1 No. each
2.	Balance 20 kg capacity-self indicating type	1 No.
3.	Electronic Balance 5 Kg capacity 0.5 gm	2 Nos.
4.	Thermometers: Mercury-in glass thermometer range 0 to 250°C. Mercury-in steel thermometer with 30 cm stem, range up to 300°C.	2 Nos.
5.	Set of IS sieves with lid and pan with mechanical shaking arrangement; 450 mm diameter : 65mm, 40mm, 25mm, 12.5mm, 10mm and 4.75mm size and any other sieve required at site.	2 Sets.
6.	200 mm diameter: 2.36mm, 2.0mm, 1.18mm, 600 micron, 425 micron, 300 micron, 150 micron and 75 micron and any other sieve required at site.	2 Sets.
7.	Water Testing Kit	1 Set
8.	First Aid Box	1 Set
<b>B.</b>	<b>Apparatus for aggregates and soil</b>	
1.	Aggregate Impact Value Test apparatus	1 Set
2.	Flakiness and Elongation Test Gauges.	1 Set
3.	Standard measure of 30, 15 and 3 liters capacity along with standard tamping rod.	2 Set.
4.	Mold for cube test & Beam molds	12 Nos.
5.	Slump Cone	1 No.

<b>No.</b>	<b>Equipment Type and Characteristics</b>	<b>Minimum Number Required</b>
6.	Atterberg Limits (liquid and plastic limits) determination apparatus.	1 Set
7.	Compaction Test Equipment both 2.5 kg and 4.5kg rammers (Light and Heavy compactive effort).	1 Set
8.	Dry Bulk Density Test apparatus (sand pouring cylinder, tray, can etc.) complete.	1 Set
9.	Speedy Moisture Meter Complete with chemicals	1 Set
10.	Core cutter apparatus 10cm dia, 10/15 cm height, complete with dolly, rammer etc.	1 Set
<b>C.</b>	<b>Apparatus for testing of Bituminous Concrete</b>	
1.	Marshall testing equipment	1 No.
2.	Water bath	1 No.
3.	Binder Extraction equipment (Centrifugal Extractor)	1 No.
4.	Bitumen Core cutting equipment	1 No.
<b>D.</b>	<b>Surveying instruments</b>	
1.	Total stations Auto-leveling Instrument with staff	2 Sets
2.	Steel Tapes 30 meters, 15 meters and 5 meters	2 Nos. each

## Additional conditions for Operational Area

### 1 General

- i) Special conditions of Contract shall be read in conjunction with General Conditions of Contract, Technical Specifications, Drawings and any other documents forming part of this contract wherever the context so requires.
- ii) Notwithstanding the sub-division of the documents into these separate sections and volume every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the CONTRACT so far as it may be practicable to do so.
- iii) Where any portion of the General Condition of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears, the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy, or variations, prevail.

### 2 Completion schedule

- i) The works shall be executed strictly as per time schedule mentioned in NIT. Contractor shall have to plan his construction program and activities so as to complete the work in the stipulated period. The period of completion given includes the time required for mobilization as well as testing, rectifications, if any, re-testing and completion in all respects to the entire satisfaction of Engineer-in-Charge.
- ii) The contractor shall furnish within 7 days of letter of award, completion programme by showing the milestones for the work of *“Re-surfacing of runway 15-33, reconstruction of Taxiway A and other improvement works in Paro International Airport, Bhutan”*. This shall follow with detailed programme which shall commensurate with the above completion milestones, giving the procurement schedule, deployment of Manpower and Machinery, Resources shall be submitted for achieving the targeted progress. The programme shall be subject to the approval of Engineer-in-Charge who may order changes in the programme. The decision of Engineer-in-Charge shall be final and binding in this regard.
- iii) Contractor is expected to mobilize and employ sufficient resources as indicated in the agreed milestones program to achieve the progress within the broad frame work of accepted methods of

working and safety. In time and progress chart, deployment of machineries, equipment, apparatus and instruments are to be treated as one of the sections of the work.

- iv) No additional payment shall be made to the contractor for any multiple shift work or other incentive methods contemplated by him in his work schedule even though the time schedule is approved by the Engineer-in-Charge.
- v) During the currency of the work the contractor is expected to adhere to the time schedule on mile stone and total completion and this adherence will be a part of Contractor's performance under the contract.
- vi) The Engineers-in-Charge can hold the payment till such time; the contractor does not submit CPM/Milestone Chart/Construction Equipment Program etc. The Contractor will be fully responsible to submit Milestone Chart in consultation with Engineer-in-Charge to complete the work within stipulated time.

#### For Monitoring of Project

- The contractor shall submit the program Network based on Critical Path Method using precedence Diagram method to complete the work with in stipulated time schedule.
  - The contractor shall submit weekly details of manpower and machinery to be deployed in project along with material procurement schedule for completion of work with in stipulated period based on program Networking. The progress will be reviewed weekly with respect to the program/Net Work chart submitted by contractor. Two copies of proposed network chart showing activities completed and backlog if any, should be submitted to the Engineer-in-Charge on weekly basis. The revised BAR chart with additional manpower/machinery/ labour deployment scheduled should also be submitted in case regular backlog is observed and revised program is essential to complete the work with in stipulated period.
  - The approval to the revised schedule resulting in a completion date beyond the stipulated date of completion shall not automatically amount to grant of extension of time to the Contractor.
  - Contractor shall submit fortnightly progress reports (3 copies) highlighting status of various activities and physical completion of work.
- vii) The contractor shall execute the Taxiway A work at the critical zone. A separate methodology shall be submitted based on the resources and timeline.

- viii) Contractor shall give every day report on category wise labour and equipment deployed along with the progress of work done on previous day in the Pro forma prescribed by the Engineer-In-Charge.

### **3 Drawings and documents**

- i) The drawings accompanying the tender document are of indicative nature and issued for tendering purpose with the purpose to enable the tenderer to make an offer in line with the requirements.
- ii) However, no extra claim whatsoever, shall be entertained for variation in the "approved for construction" and "tender drawings" regarding any changes. the execution of work shall be as per approved drawings and detailed specifications.

### **4 Bill of quantities**

- i) The bill of quantities shall be read in conjunction with general conditions of contract, special conditions of contract, technical specifications, drawings and any other document forming a part of this tender. The quantities shown against the various items are only approximate and subject to variations as made in general conditions of the contract.

### **5 Temporary works**

- i) The tenderer should see the approaches and conditions of the same. if any approach from main road is required at site or existing approach is to be made and maintained for cartage of materials etc. by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost.
- ii) All temporary and ancillary works including enabling works connected with the work shall be responsibility of the contractor and the price quoted by them shall be deemed to have included the cost of such works which shall be removed by the contractor at his cost, immediately after completion of the work.
- iii) In case of transportation of mix by vehicles, Contractor has to use airport roads in Operational area, then any damage done / day-do-day cleaning of road to be made good as per direction of Engr.-in-charge by the contractor at his own cost.
- iv) All the salvageable materials received after demolitions are to be stacked properly and handed over to Engineer-in-Charge. These dismantled materials shall be the property of the DoAT.

- v) Site to the contractor shall be made available in phases and contractor shall be liable to dismantle / relocate any of the structures fouling with the proposed site as per instruction by the Engineer-in-Charge.

## **6 Payments**

- i) The intervals as provided on or before the date fixed by the engineer-in-charge for all the works executed since previous bill in accordance with provision. The contractor shall submit all the bills on the Performa prescribed by the Engineer-in-Charge, preferably through computerized billing in triplicate.
- ii) The payment due to the contractor shall be made within 30 days of the submission of the bill by the contractor and the measurements shall be verified by the Engineer-in-Charge or his representative within 10 days of submission of the bill.
- iii) The bill shall not be entertained if the gross amount of the work done including secured advance payable is less than Nu. 2.500 million Except final Bill.

## **7 Water**

- i) Contractor Shall Make His Own Arrangements for Water Supply For The Work And His Staff And Workmen.

## **8 Power Supply**

- i) Contractor shall make his own arrangements for power supply for the execution of the work.

## **9 Construction Equipment**

- i) The contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and time schedule deploy adequate equipment and tools and tackles and augment the same as decided by the engineer-in-charge depending on the exigencies of the work so as to suit the construction schedule.

### **Note:**

- Apart from the tools and plants quantity specified in the list of machinery, contractor is required to deploy additional machinery if required and directed by engineer – in – charge to ensure timely completion of work.

- In the interest of progress of work, if early deployment of any machinery / equipment is desired by engineer –in- charge then the contractor shall deploy the same as per the direction of engineer – in charge. For such early deployment no claim whatsoever shall be entertained.

**ii) Equipment's for night working:**

Due to restricted working hours in the day in view of operational reasons, the contractor shall execute the work between 1.00 PM to next day morning 5 AM. For proper execution, the work site shall be properly illuminated and the following arrangement shall be made by the contractor at his own expenses:-

- Two Nos. of DG sets of 25 KVA capacity of each with mobile arrangement to give illumination of 16 nos. of 1000 watt halogen lamps with suitable wiring shall be installed at the work site.
- Pumps with Gensets to bail out water/mud encountered during excavation of earth i.e. dewatering wherever required.

**iii) No Construction equipment shall be supplied by the DoAT**

## **10 Site Organization**

- i) Subject to the provisions in the tender document and without prejudice to contractors liabilities and responsibilities to provide adequate qualified and skilled personnel on the work. Contractor shall deploy site organization and augment the same as decided by the engineer-in-charge depending on the exigencies of work. No engineering personnel deployed at site shall be removed from the site without prior approval of the engineer-in-charge.

## **11 Field laboratory and list of Equipment:**

- i) The contractor at his own cost shall set up a fully furnished and adequately equipped field laboratory at site within 15 days from the date of issue of work order and maintain the same by providing adequate technical and upkeep staff. The laboratory should have office space for engineers to do testing and store for storage of samples. The remaining space shall be provided for the installation of equipment, laboratory tables and cupboards, working space for carrying out tests, besides a wash basin, toilet facility. The minimum equipment shall be provided in the laboratory are specified in equipment requirement:
- ii) In addition to tools, equipment's, apparatus and instruments as described above, if any, additional tool equipment apparatus and instrument is required for laboratory and execution of work as per

technical specification the same shall be provided by contractor. Nothing extra shall be payable to contractor on this account.

**Recoveries:**

As soon as possible after the contract is concluded the Engineer-In-Charge and the contractor shall agree upon a time and progress chart as above. In time and progress chart, deployment of machineries, equipment's, apparatus and instrument as listed above are to be treated as one of the sections of the work. In Case of delay in deployment of plants and machineries and equipments etc. beyond the period of stipulated in the approved time and progress chart submitted as mentioned above, penalty at the rates mentioned below shall be levied.

- In the event of not providing Hot Mix Plant as per work programme approved by Engineer-In-Charge, an amount of Nu.1,20,000/- per day per Equipment shall be debited to the contractors account.
  - In the event of not providing Sensor Paver of Adequate width as per work programme approved by Engineer-In-Charge, an amount of Nu.16,000/- per day per Equipment shall be debited to the contractors account.
  - In the event of not providing Vibratory/Pneumatic Roller as per work programme approved by Engineer-In-Charge, an amount of Nu. 8,000/- per day per Equipment shall be debited to the contractors account.
  - In the event of not providing Field Laboratory Equipment's Instruments an amount of Nu. 200/- per day per Equipment / Instrument shall be debited to the contractors account.
- iii) The Engineer-in-charge may at his discretion, check the test results obtained at contractor laboratory by independent test at an approved laboratory. The cost of such material, transport, cost of testing etc. shall be borne by the contractor.
- iv) In the event of failure to setup laboratory and provide equipment's/ apparatus mentioned above or substitute/ replaced the equipment/ apparatus on account of maintenance / breakdown Nu.200.00 per day per equipment / apparatus shall be debited to the contractors account.

**Note:-**

- To Maintain and record of the T&P received & the dates when it has been received at site also to keep track of the receipt of the material at site, work men / staff deployed works diary shall be maintained jointly by the Engineer-in- charge and the contractor to maintain a daily record of these activities to form basis of any analysis of this kind or in case any dispute occurs at a later date.
- The works diary shall be got printed by the contractor and also pages shall be machine numbered. The Performa for the same is given below. Additional sheets should also enclose with each page so as to furnish any additional information. Work diary shall be signed by the contractor/ Engineering Representative on daily basis by presenting himself in the site office of Engineer-in-charge. Failure to



do so render contractor liable to pay penalty @ Nu. 250/- per day for each day of such lapses. In case of failure to do so the details as filled up by DoAT representative shall be treated as final.

- An abstract of such information shall also be furnished by the contractor along with the progress report giving information of such deployment, date etc. Failure to submit the monthly progress report by contractor the firm is liable to pay a penalty @ Nu. 10,000/- for each occurrence.

## 12 Closing Day's Work

- i) Work shall be closed at 2 hrs. notice for VVIP movement and also other exigencies, if directed by the engineer-in-charge. No compensation shall be entertained on this account from the contractor.

## 13 Inspection of site and testing

- i) The Engineer-in-Charge or his authorized representative shall have full power to inspect any portion of the work, examine the materials and workmanship at the contractor's works or at any other place from where the material is obtained. Acceptance of any material shall in no way relieve the contractor of his responsibility for meeting the requirement of the specifications.
- ii) Routine type tests for the various items of material shall be performed at the contractor's works and test certificates furnished. The contractor shall permit the Engineer-in-Charge or his authorized representative to be present during any of or all the tests. After notification to the Engineer-in-Charge that the work has been completed, the contractor shall make under the direction and in the presence of Engineer-in-Charge such tests and inspections as have been specified or as the Engineer-in-Charge shall consider necessary to determine whether or not the full intent of requirements of the plans and specifications have been fulfilled. In case the work does not meet the full intent of the specifications it shall be rectified by the Contractor at no extra cost and the contractor shall bear all the expenses for any further tests considered necessary.
- iii) All tools, instruments, plants and labour/operating personnel for the test shall be provided by the contractor at his own cost. The contractor will establish a full-fledged laboratory at site at his own cost within 15 days from the date of issue of work order. The testing facilities should be sufficient to do various routine test of works and as approved by Engineer-in-Charge.
- iv) The Engineer-in-Charge may at his discretion, check the test results obtained at contractors laboratory by independent tests at an approved laboratory. The cost of such material, transport, cost of testing etc. shall be borne by the contractor.

## 14 Admission to Operational Area

- i) Work is to be executed inside the operational area of Paro Airport and entry is restricted by security. Passes as per the rules promulgated by Airport Security Authorities from time to time, the Contractor shall obtain necessary entry passes and shall bear all expenses connected to it including cost of photographs, entry permit fees if any etc. The following is the procedure currently in force for obtaining passes from the Airport Security Authorities.
- ii) All contractors/Agencies that got award of work pertaining to operational area are required to submit the application giving the details of name and award of work, duration of work with award letter. The list containing workers name, address also be enclosed along with application while submitting to the concerned department for recommendation. The application duly recommended by the concerned department will be forwarded to the office of the security, DoAT. The on receipt of application gate number will be allotted depending upon the area of work.
- iii) The contractor while applying for passes are required to submit 2 stamp size photographs for each worker along with the application. This requirement is for maintaining record and issuance of operational area access.
- iv) PIC (Photo Identity Card) will be issued for all engaged by contractor duly recommended by the concerned department.
- v) In the Case of Loaders and Drivers who are bringing construction materials into the operational area, the Airport Security officials at the respective gate shall allow passage of both the men and material including trucks having passes issued by DoAT.
- vi) The contractor or his agent shall also be fully be liable to security for any fraudulent/unauthorized use of the PIC by the workers whether with or without his knowledge and for any theft or loss of the same.
- vii) The contractor or his agent will not be liable for any unauthorized use of the pass after the loss or theft, provided that the loss or theft has to be reported to the Airport security in writing.
- viii) The Contractor or his agent shall not use for himself nor shall be permit any of his labourers use PIC disclosed as lost or stolen even in the instance of the recovery of the same at any latter date unless duly authorized by the airport security
- ix) Any other rules imposed by the regulatory authority from time to time due to security reason will be applicable to the contractor

- x) The contractor shall provide and maintain at his cost necessary fencing, watch and ward, lights etc. as directed by the Engineer-in-charge, considering the security and operational requirements of the airport wherever required in respect of his Labour camp and plants and machineries.
- xi) Carriage of materials are to be taken carefully to avoid any spillage and to keep the area clean
- xii) The contractor shall adjust his working hours and deployment of men and material to suit the restrictions in the operational area and nothing extra shall be paid on this account
- xiii) Necessary obstruction/cross markings and obstruction lighting etc. are required to be provided on the existing runway/taxiway as per the requirement of operations department for the safety of aircraft operations. Nothing extra shall be paid on this account.
- xiv) The Contractor shall be held fully responsible for any lapse on the part of their workers/staff working and safety of the Airport. As such before deploying Engineers/Supervisions, workers and labourers on work, the Contractor must ensure that they are genuine. An undertaking to this effect shall have to be given by the contractor each request for issue of entry passes.
- xv) There are restrictions on movements in operational area imposed by the Aerodrome Authorities and the contractor shall abide by all the rules and regulations in this regard and shall acquaint himself and all his staff thoroughly with the rules and regulations.
- xvi) The Contractors staff and labourers and every transport vehicle will carry the permit, issued by the Aerodrome authorities and produce the same whenever demanded otherwise the driver of the vehicle is liable for being charged for trespassing.
- xvii) The Contractor will have to construct the necessary kutchra road for carrying materials from the entry gate to the site of construction. Nothing extra will be paid for the same.
- xviii) Whenever the vehicle crosses the taxiways, contractor has to ensure no FOD on the taxiway. If dozer or poeline has to cross the taxiway precaution shall be taken by providing the rubber pads or belts to prevent damage to the surface.
- xix) If at any time during the execution of work and for any reasons whatsoever there is some difficulty in availability of site, the contractor shall adjust his labour accordingly and no claim shall be entertained on this account.
- xx) No labour huts shall be permitted to be constructed inside the operational area of Paro Airport.

xxi) The contractor must see the proposed site for the work and study the specifications and conditions carefully before tendering. No claims of any sort shall be entertained on account of site conditions or ignorance of specifications and conditions.

xxii) The contractor shall maintain in good conditions all works executed till the completion of the entire work allocated to the contractor and its handing over to the department.

## **15 Stores and materials**

i) No storage accommodation will be arranged by DoAT, contractor shall make all such arrangements at his own cost to the satisfaction of engineer-in-charge.

## **16 Stacking of materials, machines, installation of T & P and construction of temporary hutments at Site**

i) The contractor shall be allowed to install plants and machineries, store and stack the material within Airport premises. However, due to operational constraint or any other reason if DoAT could not allot the land for the said purpose then contractor has to make his own arrangements for land very close to Airport for installing plant. Installing crushing plant within DoAT area will not be permitted. The contractor shall not be permitted to enter on (other than for inspection purpose) or take possession of the site until instructed to do so by the Engineer-in-Charge in writing. The portion of the site to be occupied by the contractor shall be defined and/or marked on the site plan, failing which these shall be indicated by the Engineer-in-Charge at site and the contractor shall on no account be allowed to extend his operations beyond these areas.

- No license fee will be charged for the land allotted by DoAT.
- That such use or occupation shall not confer any right of tenancy of the land to the contractor.
- That the contractor shall be liable to vacate the land on demand by the Engineer-in-Charge.
- That the contractor shall have no right to any construction over this land without the written permission of the Engineer-in-Charge. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.

All clearance if any required for installing the plant shall be obtained from the local / Government authority / Pollution Control Board by the contractor at their own cost.

ii) The contractor shall co-operate with any other agency working on the same project, compare plans, specifications and the time schedule and so arrange his work that there will be no interference the contractor shall forward to the engineer-in-charge all correspondence and drawings so exchanged

failure to check plans for conditions will render the contractor responsible for bearing the cost of any subsequent change found necessary, contractor should co-ordinate in such a way that on no account there should be any disturbance to the work.

## **17 Standard of workmanship**

- i) To determine the acceptable standard of workmanship, the contractor shall execute portion of the item of work as sample for approval of the engineer-in-charge, before taking up the actual execution of the particular item of work.

## **18 Bye-laws**

- i) The contractor shall comply with all bye-laws and regulations of local and statutory authorities having jurisdiction over the works and shall be responsible for payment of all fees and other charges and for giving and receiving of all necessary notices and keeping the engineer-in-charge, informed of the said compliance with the bye-laws, payments made, notices issued and received.
- ii) The contractor shall indemnify the DOAT against all claims in respect of patent rights, design, trademarks of name or other protected rights in respect of any plant, machine, work or materials used for or in connection with the work or temporary works and from and against all claims, demands proceedings, cost, charges and expenses whatsoever in respect of or in relation thereto. The contractor shall defend all actions arising from such claims and shall himself pay all royalties license fees, damages, costs and charges of all and every sort that may be legally incurred in respect thereto.

## **19 Site precautions**

- i) When not in use, all equipment's and stockpiled materials must be so placed that after darkness the tops are below a fifty to one ratio from the ends of the basic strips of the runway and twenty to one from the sides of the usable aircraft traffic areas and must be marked with red flags by Day & Red lights by nights to indicate that they project above the general contour of the Aerodromes.
- ii) Any materials or T & P etc. found lying outside the sites approved by the Engineer-in-Charge, shall be removed by the Engineer-in-Charge at the risk and cost of the contractor.
- iii) When the contractor's equipment or personnel require to cross areas which are close to aircraft operations, the contractor shall provide competent flagmen at locations designated by the Engineer-in-Charge to relay signals from airport traffic control to personnel wishing to cross such areas.

- iv) Every transport vehicle shall carry a permit issued by the Chief Authority of Airport/Aerodrome concerned and shall be produced on demand by him or his authorized agent. All vehicles entering the Airport limits shall follow the routes prescribed by the Chief Authority of Airport for entering the areas and shall display red flags on top.
- v) No person shall drive any vehicles in the operational area of the airport or other areas as may be notified from time to time unless he has been specifically authorized by the Airport Director of the Airport after passing any test or examinations as may considered necessary. Provided, however that the APD of the Airport may also require such a person to possess the driving license under motor vehicle acts.
- vi) With regard to construction safety measures, the contractor shall adhere to various Indian Standard Codes of Practice, requirements of Provincial Government and local Municipal Authority wherever the provisions of the latter two agencies shall be more stringent than the provisions of the former. When these codes do not exist, the contractor shall adhere to such safety measures as directed by the Engineer-in-Charge.
- vii) The contractor shall, during construction, provide barricades at his own cost as per specifications prescribed by the Engineer-in-Charge to segregate the working area to ensure safety of all concerned.
- viii) The contractor shall be responsible for any damage, resulting from his operations, either to buildings, structures, airport fixtures such as underground cable, contact lights, hard surface areas, water mains, other operational installations, Airport roads etc. The contractor shall restore, replace or repair any such damage to the complete satisfaction of the Engineer-in-Charge and in default the Engineer-in-Charge may cause the same to be made good by any other means and deduct the expenses from any sums due to contractor.
- ix) The work shall be carried out in phases in such a way that there is least obstruction to the movement of Air Traffic at the Airport. The phasing shall be decided by the Engineer-in-Charge, who will be at liberty to change the phasing to suit the requirements. The contractor shall have to abide by these instructions and nothing extra shall be paid to him on this account.
- x) The contractor shall arrange his work schedule according to the flying operations. Unavoidable adjustments in the timings may however have to be made depending upon the emergency operational requirements which may result in lesser availability of working hours or re-scheduling of working hours Operational requirement may also not allow availability of site on certain days due to

unavoidable reasons when it will not be possible to execute any work at all on these days. Nothing extra shall be paid towards the ideal establishment labour & machinery etc on this account.

**20** The contractor shall take all precautions to avoid all accidents by exhibiting necessary day & night caution boards, speed limit boards, red flags, red lights and providing barriers He shall be responsible for all damages and accidents caused due to negligence on his part. No hindrances shall be caused to traffic during execution of work.

**21** No payment will be made to the contractor for damage caused by rains or other natural calamities during the execution of the works and no such claim on this account will be entertained.

**22** The contractor shall remove the labour huts, temporary barricades etc. on completion of work and leave the site in a neat and tidy state. The payment of final bill will be subject to the compliance of this condition by the contractor.

## **23 Materials at site**

- i) Materials brought to the site by the contractor shall be stored by the contractor in a safe/dry storage space. The contractor shall be responsible for safe custody of materials at site till such time; the installation is commissioned and handed over to the Engineer-in-Charge.
- ii) Cement bags shall be stored in separate godowns to be constructed by Contractor at his own cost with weather proof roofs and walls. Each godown shall be provided with a single door with two locks, the keys of one lock shall remain with DoAT Engineer-in-Charge of work and that of the other lock with the authorized agent of the contractor at the site of work so that the cement is removed from the godown according to the daily requirement with the knowledge of both the parties and the account maintained in the prescribed Performa.

## **24 Work in restricted area**

- i) The work is to be carried out in restricted area, whenever necessary; the work shall be carried out in the non-office period. The Contractor shall have to coordinate with the DoAT for locating T&P and stacking of materials etc. Nothing extra shall be paid to the Contractor for the entire above factor.

## 25 Arrangement to be made by the contractor at site

- i) Necessary registers and stationers required for entering data and test results shall be provided by the contractor at his own cost as directed by the engineer- in-charge.
- ii) The Contractor shall provide at his own cost one site office, location to be decided by Engineer-in-Charge for DoAT's staff. Site office, shall be provided with necessary electric lights, fans, Air condition, one drinking water cooler, toilet and other facilities which are generally required for a site office. Toilet should be provided with W.C. and a wash basin. The site office shall be a tubular structure with A/C sheet roofing with particle board false ceiling, C.C. flooring, Ekra wall fully glazed windows with M.S. frames, wooden flush doors with proper locking arrangement as per the directions of Engineer-in-Charge. The Contractor shall provide the followings furniture's at his own cost for site office as shown in table below:

<b>S.No</b>	<b>Item</b>	<b>Nos. Required</b>
1.	Table	3 Nos. ( Three )
2.	Chair	6 Nos. (six)
3.	Racks – 5 Tier 1800mm x 900mm x 375mm	4 Nos. (four)
4.	All rooms lighting	As per site requirement to achieve desired lux level

The Contractor shall maintain the office in good condition and provide facilities for having the office cleaned every day and keep the same in hygienic conditions till the completion of the project. The Contractor has to complete the construction of office within 15 days from the date of issue of work order and handover the same to the Engineer - in – charge.

In case the site office is not provided by the contractor latest by 15 days from the date of placing of work order, the contractor shall be liable to pay penalty @ Nu. 5000/- per day for each day of delay

- Partitions shall be provided in the office up to 1.50 m height and up to ceiling height for construction of Cabins as per the layout decided by the Engineer-in-charge.
- In addition to the tools and plants and equipment's/apparatus and instruments required for laboratory and execution of the work as per Technical Specifications, the following additional machineries/staff are to be arranged at site by the contractor at his own cost within 15 days of stipulated date of start of work. Facilities required at Site Office as mentioned in Table below:



<b>S.No.</b>	<b>Description of items</b>	<b>Total quantity</b>
	<b><i>For Paro Runway Re-surfacing office site</i></b>	
i)	Suitable Passenger vehicle for cylinder capacity of minimum 1400 CC (Tata Sumo / Scorpio/ equivalent) or 4W drive hard top jeep, either petrol or diesel driven including driver for taking the samples from work/plant site to laboratory and movement of the officials during progress of work for checking/controlling the quality of work. The Engineer-In-Charge of DoAT will be the controlling officer for movement of vehicles	1 No.
ii)	Office Boy	1 Nos.
iii)	Walkietalkie	3 Nos.

After completion of work and release of final bill, all the items like complete site office, fans, electrical fixtures, drinking water cooler and all furniture provided by the contractor shall be taken away by the contractor.

Diesel/Petrol/Fuel/Lubricants etc. for smooth running of all the equipment, vehicles and machineries deployed for the work shall be provided by the contractor at his own expenses. In the event of any break down of the plant, vehicles and machineries deployed for the work, the contractor shall take prompt remedial measure to put them back in working condition and nothing extra will be paid to minimize break down period, necessary spare parts shall be kept readily available at site by the contractor at his own expense.

In the event of fail to provide vehicle or being off the road for maintenance or on account of breakdown, the contractor will provide suitable substitute vehicle immediately. If contractor fails to provide vehicle or substitute vehicle as specified above an amount of Nu. 3000/- per day shall be debited from the contractor's account.

## **26 Safety devices for field engineers/technicians/workers at site**

The contractor is also required to provide specific uniform safety devices to the manpower deployed on site for the work in operational area as detailed below:-

- i) Trousers and reflective Jacket for male staff and Suitable dress with reflective jacket for female staff as approved by Engineer-in-charge.
- ii) An apron of reflective cloth is to be provided to each of the working labour on site.
- iii) Safety helmets and foot wears are to be provided for each of the workers

- iv) Safety belts, protective Goggles, Hand gloves etc. are to be provided as per requirement and nature of jobs.
- v) Helmets shall be provided for Contractor's and DOAT officials & Visiting / inspecting officials.

## **27 Employment of specialized supervisory manpower and safety devices to field engineers/ technicians/workers at site**

Contractor is required to provide the required manpower within 15 days from the date of award of work to assist the DOAT officers posted on site on full time. No staff should be shifted from site or allowed on leave without prior permission of the Engineer-In-Charge.

## **28 Use of ready mix concrete**

- i) The contractor is allowed to use Ready Mix concrete (RMC) from the batching plant as approved by the Engineer-in-charge. Also the contractor can use admixture to increase the workability of the concrete. However nothing shall be paid extra for using RMC, admixture, and lead etc. reason what so ever. The concrete shall be paid into the respective item as mentioned in the BOQ.
- ii) The contractor is allowed to use 53 grade OPC cement in case of non-availability of 43 grade OPC cement. However nothing shall be paid extra to contractor on this account.

## **29 Prices**

The rates quoted shall be in Ngultrum only and inclusive of all taxes and duties what so ever including excise duty, VAT/Sales tax, Octroi if any, work contract tax, applicable customs duty in case of imported items, labour, tools & plants, packing freight/transportation of items from factory up to the installation site & insurance up to the site, loading, unloading and hoisting arrangement for installation, fee(s) for testing, inspection documents including the fee(s) payable for obtaining statutory license / approval etc. from concerned department but excluding service taxes.

## **30 Source of material**

- i) Aggregate shall be procured from approved quarries subject to fulfillment of test criteria as specified in BOQ items and approval of Engineer-In-Charge.

### **31 Site conditions, requirements and sources of materials**

- i) The contractor shall be responsible for the true and proper setting out of the work and for the correctness of the positions levels and dimensions and alignments of all parts of the works and for the provisions of all necessary applications and labour in connections therewith.
- ii) If any time during the progress of the work any error may appear or arise in the position, levels, dimension or alignments of any part of the work the contractor on being required to do so by the Engineer-in-Charge shall at his own expense rectify such errors to the satisfaction of the Engineer-in-Charge.
- iii) The checking or any setting out of any line by the Engineer-in-Charge or his representative shall not relieve in any way the contractor of responsibility for the correctness thereof and shall carefully project and preserve all bench mark site rails, pegs and other things used in the set is out of work.
- iv) All duties concerning establishment of a set of bench marks permanent theodolite stations, Centre of pillars etc. for performing all the functions of us till the physical completion of all items of the in question shall be carried out by the contractor at his own cost.
- v) He shall also keep proper record of such permanent bench marks established denoting therein their correct levels.
- vi) The work establishing all such bench marks shall be carried out only by experience staff of the contractor with the help of precision instrument suitable for this type of work. The instruments shall be checked for their accuracy and for permanent adjustment before the commencement of the work and also frequent intervals during the progress of the work.
- vii) All such bench marks established by the contractor shall be subjected to check and approval of the Engineer-in-Charge or duly representative and valuations noticed in the work as a result of improper establishment of maintenance of such bench marks shall be at the contractor's risk and expense.
- viii) The contractor has to adjust his work and progress to work in coordination with other agencies working at site.
- ix) The materials such as Good Earth, Moorum, Coarse and Fine aggregates and other materials shall be brought to site only after approval of the quarry / source by the Engineer-in-Charge.

### **32 Nuisance:**

The Contractor shall not at any time do, cause or permit any nuisance on the Site or do anything which shall cause unnecessary disturbance or inconvenience to owners, tenants or occupiers of other properties near the Site and to the Public generally.

### **33 Watching and lighting**

The Contractor shall provide and maintain at his own expense all lights, guards, fencing and watching when and where necessary or required by the Engineer-in-Charge for the protection of the Works or for the safety and convenience of those employed on the Works.

#### **Duties and powers of Engineer-In-Charge's representative:**

- i) The duties of the representative of the Engineer-In-Charge, is to watch and supervise the Works and to test and examine any materials to be used or workmanship employed in connection with the Works. He shall have no authority to order any work involving any extra payment by DOAT nor to make any variation in the Works.
- ii) The Engineer-in-Charge may from time to time in writing delegate to his Representative any of the powers and authorities vested in the Engineer-in- Charge and shall furnish to the Contractor a copy of all such written delegation of powers and authorities. Any written instruction or written approval given by the Representative of the Engineer-in-Charge to the Contractor within the terms of such delegations shall bind the Contractor and DOAT as though it had been given by the Engineer-in-Charge.
- iii) Failure of the Representative of the Engineer-in-Charge to disapprove any work or materials shall not prejudice the power of the Engineer-in-Charge thereafter to disapprove such work or materials and to order the pulling down, removal or breaking up thereof.
- iv) If the Contractor shall be dissatisfied with any decision of the Representative of the Engineer-in-Charge he shall be entitled to refer the matter to the Engineer-in Charge who shall thereupon confirm, reverse or vary such decision.

### **34 Work during night or on Sundays and holidays:**

Subject to any provisions to the contrary contained in the Contract, permanent works shall be carried out during night or on Sundays or on authorized holidays with the permission of the Engineer-in-Charge.

### **35 Submission invoice/vouchers:**

Contractor must submit the vouchers of Bitumen, Cement and Paint etc.

- i) Contractor is sole responsible for the quantity & quality of Bitumen, Cement from delivery point to work site.
- ii) All Invoices of Bitumen, Cement & Paint are to be authenticated by supplier

## SECTION VII. GENERAL CONDITIONS OF CONTRACT (GCC)

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**General Conditions of Contract****A. General****1. Definitions****1.1. Boldface type is used to identify defined terms.**

- (a) The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC Clauses 25 and 26 hereunder.
- (b) **Bill of Quantities** summary of the units and unit prices of the items proposed under the contract.
- (c) **Compensation Events** are those defined in GCC Clause 45 hereunder.
- (d) The **Completion Date** is the date of completion of the Works as certified by the Employer, in accordance with GCC Sub-Clause 55.1.
- (e) The **Contract** is a formal agreement in writing entered into between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.
- (f) The **Contractor** is an individual or legal entity entering into a contract after its Bid to carry out the Works has been accepted by the Employer.
- (g) The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer.
- (h) The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.
- (i) **Days** are calendar days; months are calendar months.
- (j) **Day works** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant.
- (k) A **Defect** is any part of the Works not completed in accordance with the Contract.
- (l) The **Defects Liability Certificate** is the certificate issued by the Employer upon correction of defects by the Contractor.
- (m) The **Defects Liability Period** is the period named in SCC Sub-Clause 36.1 and calculated from the Completion Date.
- (n) **Drawings** include calculations and other information provided or approved by the Employer for the execution of the Contract.
- (o) The **Employer** is the Government Agency which enters into a Contract with a Contractor to carry out the Works, as specified in the SCC. The terms "Procuring Agency", "Purchaser", or "Employer" is synonymous.
- (p) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

- (q) The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.
- (r) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the SCC. The Intended Completion Date may be revised only by the Employer by issuing an extension of time or an acceleration order.
- (s) **In writing** is in any written form, including electronic mail.
- (t) **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- (u) **Plant** is any integral part of the Works that shall have a mechanical, electrical, chemical or biological function.
- (v) The **Project Manager** is the person named in the SCC (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Employer) who is responsible for supervising the execution of the Works and administering the Contract.
- (w) **SCC** is the Special Conditions of Contract.
- (x) **Secured Advance:** Secured advance can be given for non-perishable materials only. Materials such as cement/bamboo cannot be eligible for the secured advance. No secured advance shall be given on account of plants & machineries.
- (y) The **Site** is the area defined as such in the SCC.
- (z) **Site Investigation Reports** are those that were included in the Bidding Documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (aa) **Specifications** mean the Specifications of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (bb) The **Start Date** is given in the SCC. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (cc) A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
- (dd) **Temporary Works** are works designed, constructed, installed and removed by the Contractor that are needed for construction or installation of the Works.
- (ee) A **Variation** is an instruction given by the Project Manager which varies the Works.
- (ff) The **Works** are what the Contract requires the Contractor to construct, install and turn over to the Employer, as defined in the SCC.



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|---------------------------------------|--|
| <b>2. Interpretation</b>              | <p>2.1. In interpreting these GCC, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.</p> <p>2.2. If sectional completion is specified in the SCC, references in the GCC to the Works, the Completion Date and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).</p> <p>2.3. The documents forming the Contract shall be interpreted in the following order of priority:</p> <ul style="list-style-type: none"><li>(1) Contract,</li><li>(2) Letter of Acceptance,</li><li>(3) Contractor's Bid,</li><li>(4) Special Conditions of Contract,</li><li>(5) General Conditions of Contract,</li><li>(6) Specifications,</li><li>(7) Drawings,</li><li>(8) Bill of Quantities, and</li><li>(9) Any other document listed in the SCC as forming part of the Contract.</li></ul> |
| <b>3. Language and Law</b>            | <p>3.1. The language of the Contract and the law governing the Contract are stated in the SCC.</p>   |
| <b>4. Project Manager's Decisions</b> | <p>4.1. Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer..</p>   |
| <b>5. Delegation</b>                  | <p>5.1. The Project Manager may delegate any of his duties and responsibilities to other people except to the Adjudicator, after notifying the Contractor, and may cancel any delegation after notifying the Contractor.</p>   |
| <b>6. Communications</b>              | <p>6.1. Communications between parties that are referred to in the Conditions shall be effective only when in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission. A notice shall be effective only when it is delivered.</p>  |
| <b>7. Subcontracting</b>              | <p>7.1. The Contractor may subcontract with the approval of the Employer provided such provisions exist in contract document, but shall not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.</p>  |

**8. Setting Out**

8.1. The Contractor shall be responsible for setting out the Works and for ensuring the correctness of the positions, levels, dimensions and alignment of the Works. At any time during the execution of the Works, he shall correct any error at his own expense when required to do so by the Employer. Boreholes, exploratory excavations or soil testing may be done if instructed by the Employer. In case, cost of boreholes or exploratory excavations or soil testing is not included in the Contract Price, the cost shall be borne by the Employer. The contractor shall provide all facilities like labor and instruments, and shall co-operate with the Engineer-in-Charge to check all alignments, grades, levels and dimensions. Such checking shall not relieve the contractor of his own responsibility of maintaining the accuracy of the work.

**9. Other Contractors**

9.1. The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the SCC. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

**10. Personnel**

10.1. The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the SCC, to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule. If the Contractor fails to deploy the personnel as committed in the Bid document, the employer shall stop the work if the quality of work is going to suffer or otherwise deduct the salaries of such personnel at a rate stipulated in the Special Condition of Contract per month per personnel for every month of absence of such personnel from the site. Such deductions shall continue till such time that the Contractor deploys the key personnel acceptable to the employer. If the Contractor fails to deploy such key personnel within one to four months, the deductions shall be discontinued and the contractor's failure to deploy such personnel shall be treated as a fundamental breach of contract.

This shall also apply to the commitment of employment to Bhutanese. However in this case Contract may not be terminated but wage rates as mentioned in the SCC shall be deducted for the duration of the contract.

Similarly, if the committed equipments are not available at site, the hiring charges of such equipments shall be deducted at a rate stipulated in the SCC per month for every month of absence for a period of one to four months after which the deductions shall be discontinued and the contractor's failure to produce such equipments at site shall be treated as a fundamental breach of contract.

10.2. The Contractor shall pay rates of wages and observe conditions of labor which are not lower than the general level of wages and conditions in Bhutan. The Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's personnel. The Contractor shall comply with all relevant labor laws applicable to the Contractor's personnel, including their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights. The Contractor is required, to the extent practicable and reasonable, to employ national staff and labor with appropriate qualifications and experience.

10.3. The Contractor shall not engage child labor and shall conform to the labor laws/acts, rules and regulations of Bhutan in the execution of Contract work. A child who has not attained the age of 18 years shall not be employed in any work as a laborer. During the continuance of the Contract the Contractor and his Subcontractors shall abide at all times with the labor laws/acts, rules and regulations, including child labor, related enactment and rules made there under.

**11. Employer's and Contractor's Risks**

11.1. The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

**12. Employer's Risks**

12.1. From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials and Equipment), which are due to:
  - (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
  - (ii) Negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.
- (b) The risk of damage to the Works, Plant, Materials and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting Bhutan.

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<b>13. Contractor's Risks</b>	13.1. From the Start Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials and Equipment) which are not Employer's risks are Contractor's risks.
<b>14. Insurance</b>	<p>14.1. The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the SCC for the following events which are due to the Contractor's risks:</p> <p>(a) loss of or damage to the Works, Plant and Materials to be built into the works.</p> <p>14.2. Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred. Payments received from insurers shall be used for the rectification of loss or damage.</p> <p>14.3. If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due from the Contractor to the Employer.</p> <p>14.4. Alterations to the terms of insurance shall not be made without the approval of the Project Manager.</p> <p>14.5. Both parties shall comply with any conditions of the insurance policies.</p>
<b>15. Queries about the Special Conditions of Contract</b>	15.1. The Project Manager shall clarify queries on the SCC.
<b>16. Contractor to Construct the Works</b>	16.1. The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.
<b>17. The Works to Be Completed by the Intended Completion Date</b>	17.1. The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

**18. Approval by the Project Manager**

18.1. The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.

18.2. The Contractor shall be responsible for design of Temporary Works.

18.3. The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

18.4. The Contractor shall obtain approval of third parties to design the Temporary Works, where required.

18.5. All Drawings prepared by the Contractor for the execution of the temporary or permanent Works are subject to prior approval by the Project Manager before use.

**19. Safety**

19.1. The Contractor shall be responsible for the safety of all activities on the Site.

19.2. The Contractor shall assume full responsibility and comply with all applicable safety regulations for the adequacy and safety of site operations and methods of construction and he shall adopt measures to prevent injuries to persons or damage to properties or utilities. He shall hold the Employer harmless from any liability for loss or damage resulting from his failures to take the necessary precautions. He shall avoid undue interference with private business, public travel, or with the work of other contractors. He shall take steps to protect the environment and to minimize noise, pollution or other undesirable effects resulting from his method of operation.

**20. Discoveries**

20.1. Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Employer's instructions for dealing with them.

20.2. All materials obtained during excavation from the site and that have not been accounted for in the bid shall be the property of the Employer and the contractor shall take care of useful materials obtained during the execution of the Works and stack at place designated by the Employer. An arrangement shall be made between the Contractor and the Employer for the use and disposal of such materials according to the laws of the kingdom of Bhutan.

**21. Possession of the Site**

21.1. The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the SCC, the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.

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	21.2. Within 14 days of possession of site the contractor shall erect an information board as specified in SCC.
<b>22. Access to the Site</b>	22.1. The Contractor shall allow the Project Manager and any person authorized by the Employer access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.
<b>23. Instructions, Inspections and Audits</b>	<p>23.1. The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.</p> <p>23.2. The Contractor shall give notice to the Project Manager whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Project Manager shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that he does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Project Manager, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.</p> <p>23.3. The Contractor shall permit the Employer and/or persons appointed by the Employer to inspect the Site and/or the accounts and records of the Contractor and its Subcontractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the Employer if so required by the Employer. The Contractor's attention is drawn to GCC Sub-Clause 60.1 [Corrupt or Fraudulent Practices] which provides, inter alia, that acts intended materially to impede the exercise of the Employer's inspection and audit rights provided for under GCC Sub-Clause 23.3 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to ITB Sub-Clause 2.1 (c) of the Instructions to Bidders within the Bidding Documents that preceded the placement of the Contract of which these GCC form a part).</p>
<b>24. Disputes</b>	24.1. If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.
<b>25. Procedure for Disputes</b>	<p>25.1. The Adjudicator shall give a decision in writing within 30 days of receipt of a notification of a dispute.</p> <p>25.2. Unless otherwise agreed, the parties shall comply with the adjudication procedure published by appointing authority specified in SCC.</p>



25.3. The Adjudicator shall be paid by the hour at the rate specified in the BDS and the SCC, together with reimbursable expenses of the types specified in the SCC, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. If the rates are not specified in SCC, the parties shall comply with the rates fixed by appointing authority in schedule of fees. Either party may refer a decision of the Adjudicator to an Arbitrator within 30 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 30 days, the Adjudicator's decision shall be final and binding.

25.4. The arbitration shall be conducted in accordance with the arbitration procedure published by the institution named and in the place specified in the SCC.

## **26. Replacement of Adjudicator**

26.1. Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract; a new Adjudicator shall be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority designated in the SCC at the request of either party, within 14 days of receipt of such request.

### **B. Time Control**

## **27. Program**

27.1. Within the time stated in the SCC, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order and timing for all the activities in the Works.

27.2. The Contractor shall submit to the project manager for approval at intervals no longer than the period stated in the SCC a revised programme or if at any time:

- (a) actual progress is too slow to complete within the Time for Completion, and/or
- (b) progress has fallen behind or ahead the current programme under Sub-Clause 27.1 [Program],

Other than as a result of a cause listed in Sub-Clause 45 [Compensation Event], then the Project Manager may instruct the Contractor to submit, under Sub-Clause 27.2 [Program], a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

The contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of contractor's personnel and/or Goods, at the risk and cost of the Contractor.

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Additional costs of revised methods including acceleration measures, instructed by the Project Manager to reduce delays resulting from causes listed under Sub-Clause 45 [Extension of Time for Completion] shall be paid by the Employer.

27.3. The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Employer again at any time. A revised Program shall show the effect of Variations.

## **28. Progress Reports**

28.1. Unless otherwise stated in the SCC, monthly progress reports shall be prepared by the Contractor and submitted to the Project Manager. Reports shall be submitted monthly thereafter, each within 7 days after the last day of the period to which it relates. Reporting shall continue until the Contractor has completed all works. The report shall include:

- (a) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.
- (b) copies of quality assurance documents, test results and certificates of Materials;
- (c) charts and detailed descriptions of progress, including each stage of design (if any), delivery to Site, construction, erection and testing; and including the stages for work by subcontractor; and
- (d) any other details specified in SCC

## **29. Extension of the Intended Completion Date**

29.1. The Project Manager shall extend the Intended Completion Date if a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.

29.2. The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

## **30. Acceleration**

30.1. When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.



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- 30.2. If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.
- 31. Delays Ordered by the Project Manager**
- 31.1. The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
- 32. Management Meetings**
- 32.1. Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 32.2. The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.
- 33. Early Warning**
- 33.1. The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 33.2. The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.
- 33.3. If the Contractor considers himself to be entitled to any extension of Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Project Manager, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 30 days after the Contractor became aware, or should have become aware, of the event or circumstance.
- 33.4. If the Contractor fails to give notice of a claim within such period of 30 days, the Employer shall be discharged from all liability in connection with the claim.

### **C. Quality Control**

#### **34. Identifying Defects**

34.1. The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities to ensure the quality of works executed. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect. The Project Manager at the end of the Contract shall issue a Performance score on Quality out of a total of 70 points based on the guidelines issued by Construction Development Board (CDB).

#### **35. Tests**

35.1. If the Project Manager instructs the Contractor to carry out a test not specified in the Specifications to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

#### **36. Correction of Defects**

36.1. The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the SCC. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

36.2. Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

#### **37. Uncorrected Defects**

37.1. If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount to the Employer. At the option of the Employer, payment of such costs may be made in whole or in part by the Employer deducting and keeping for itself appropriate amounts from the Retention Money and/or claiming against any bank guarantee provided by the Contractor pursuant to GCC Sub-Clause 49.3.

### **D. Cost Control**

#### **38. Bill of Quantities<sup>42</sup>**

38.1. The Bill of Quantities shall contain items for the construction, installation, testing and commissioning work to be done by the Contractor.

38.2. The Bill of Quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

**39. Changes in the Quantities**

- 39.1. If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than twenty percent (20%), provided the cost of variation beyond twenty percent (20%) limit exceeds one percent (1%) of the Initial Contract Value the Employer shall adjust the quoted rate up or down to allow for the change. Only when both conditions are met then the quoted rate shall be changed.
- (a) If the quantity of work executed exceeds the quantity of the item in BOQ beyond the higher specified limit the Employer shall fix the market rate (which may be lower or higher than the quoted rate) to be applied for the additional quantity of the work executed.
  - (b) If the quantity of work executed is less than the quantity of the item in BOQ lesser than the lower specified limit, the Employer shall fix the market rate based on the submission of the contractor (which may be lower/higher than the quoted rate) to be applied for whole of the quantity of the work so executed for that particular item.
- 39.2. The rates shall not be adjusted from changes in quantities if thereby the Initial Contract Price is exceeded by more than five percent (5%), except with the prior approval of the procuring agency in consultation with the Tender Committee.
- 39.3. For works upto Nu. 50 million, when quantity deviation exceeds twenty percent (20%) from the quantity in BOQ and the total cost of such deviations exceeds twenty percent (20%) of the initial contract price; prior approval shall be sought from the Competent Authority (Finance Committee constituted in respective agency).
- 39.4. For works above Nu. 50 million, when quantity deviation exceeds twenty percent (20%) from the quantity in BOQ and the total cost of such deviations exceeds twenty percent (20%) of the initial contract price; the procuring agency shall seek prior approval of the Competent Authority (Public Investment Board/Public Investment Coordination Committee).
- 39.5. If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

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**40. Variations**

- 40.1. The Project Manager shall order any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary. Each variation may include, but is not limited to, any of the following:
- (a) increase or decrease in the quantity of any work included in the Contract,
  - (b) omission of any item of work,
  - (c) change in the character or quality or kind of any such work,
  - (d) change in the levels, lines, position and dimensions of any part of the works,
  - (e) additional work of any kind (not exceeding twenty percent (20%) of the initial contract amount, or the maximum threshold value for the use of Limited Tender whichever is lower), or
  - (f) change in any specified sequence or timing of construction activities.
- 40.2. For works upto Nu. 50 Million, if the value of additional work exceeds twenty percent (20%) of the initial contract price, the procuring agency shall seek prior approval of the Competent Authority (Finance Committee constituted in respective agency).
- 40.3. For works above Nu. 50 Million, if the value of additional work exceeds twenty percent (20%) of the initial contract price, the procuring agency shall seek prior approval of the Competent Authority (Public Investment Board/Public Investment Coordination Committee).
- 40.4. The Project Manager shall make any such variation by issuing written instructions to the Contractor and ensure that such variations are duly noted in the Site Order Register. A variation made shall not, in any way, vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with GCC Clause 41.
- 40.5. The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Project Manager stating (with supporting particulars) that (i) the Contractor cannot readily obtain the Goods required for the Variation, or (ii) such Variation triggers a substantial change in the sequence of the progress of the Works. Upon receiving this notice, the Project Manager shall cancel, confirm or vary the instruction.
- 40.6. All Variations shall be included in updated Programs<sup>44</sup> produced by the Contractor.

**41. Payments for Variations**

41.1. The Contractor shall provide the Project Manager analysed rate for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the analysed rates, which shall be given within seven days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

41.2. If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of Project Manager, the quantity of work above the limit stated in GCC Sub-Clause 39.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

41.3. If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.

41.4. If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.

41.5. The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.

**42. Cash Flow Forecasts**

42.1. When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

**43. Payment Certificates**

43.1. The Contractor shall submit to the Project Manager monthly statements of the value of the work executed, based on the Contractor's records, less the cumulative amount certified previously.

43.2. The Project Manager shall check the Contractor's monthly statement (running account bills) and certify the amount to be paid to the Contractor latest by 30 working days from the date of receipt of contractor's monthly statement in correct and complete form.

43.3. The value of work executed shall be determined by the Project Manager.

43.4. The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed and measurement thereof shall be carried out jointly by the Project Manager, or his Representative, and the Contractor. The Project Manager, or his Representative, shall record the value of the work executed in a measurement book for the purposes of verifying the Contractor's monthly statements. The measurement book shall be signed by the Project Manager or his Representative, and countersigned by the Contractor.

43.5. The value of work executed shall include the valuation of Variations and Compensation Events.

43.6. The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

#### **44. Payments**

44.1. Payments shall be adjusted for deductions for advance payments, taxes, retention money and any other dues. The Employer shall pay the Contractor within 30 working days from the date of receipt of correct and verified bills/invoices in complete form by the Finance Section.

44.2. If the Employer makes a late payment, the Contractor shall be paid interest only on the late payment amount in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for overdraft facilities availed from respective financial institutes.

44.3. If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall not be paid interest upon the delayed payment as set out in this clause.

44.4. Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.

44.5. Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

**45. Compensation Events for allowing time extension**

45.1. The following shall be Compensation Events allowing for time extension:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 21.1.
- (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.
- (c) The Project Manager orders a delay or does not issue Drawings, Specifications or instructions required for execution of the Works on time.
- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.
- (e) The Project Manager unreasonably does not approve a subcontract to be let if provided in SCC.
- (f) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (g) Other contractors, public authorities, utilities or the Employer do not work within the dates and other constraints stated in the Contract, and they cause delay.
- (h) Other Compensation Events described in the SCC or determined by the Employer and force majeure. "Force Majeure" means an exceptional event or circumstance:
  - (i) which is beyond a Party's control,
  - (ii) which such Party could not reasonably have provided against before entering into the Contract,
  - (iii) which, having arisen, such Party could not reasonably have avoided or overcome, and
  - (iv) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (i) to (iv) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
- (iv) munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.



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However, force majeure shall not include the following;

- (i) rainfall
- (ii) snowfall
- (iii) strikes in other countries
- (iv) non-availability of laborer and materials such as timbers, boulders, sand, and other materials
- (v) difficulty and risky terrain and remoteness of site

45.2. If a Compensation Event would prevent the work being completed before the Intended Completion Date, the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Intended Completion Date shall be extended.

45.3. The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning.

#### 46. Tax

46.1. The prices bid by the contractor shall include all duties, taxes and levies that may be levied in accordance with the laws and regulations in being as of the date 30 days prior to the closing date for submission of bids.

#### 47. Currencies

47.1. Where payments are made in currencies other than Ngultrum (Nu), the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.

#### 48. Price Adjustment

48.1. If during the contract, there is an increase or decrease in the cost of materials as reflected by the Material Index Numbers published by the National Statistical Bureau (NSB), a corresponding increase or decrease in the payment to the contractor or recoverable from the Contractor shall be effected on the basis of the following formulae, such calculation being done for every successive period of 3 months after the 12th month of the Contract duration:  
Adjustment for variation of material prices:

$$V = W \times 0.80 \times 0.75 \times (M - M_0) / M_0$$

where:

V = amount of variation for materials payable to/recoverable from the contractor for the period under review;

W = value of the work done during the period under review minus (amount of secured advance recovered in the same period + value of works executed under variations for which the variations are paid in the new rate);

M<sub>0</sub> = Material Index for the month in which the tender was submitted;

M = the average value of the above Index Number for the 3 months period under review;



48.2. For the applications of the above formulae, the appropriate Index Numbers published by the National Statistical Bureau shall be adopted.

48.3. To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clauses in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

48.4. Price Adjustment shall apply only for work carried out within the stipulated time or extensions granted by the Procuring Agency and shall not apply to work carried out beyond the stipulated time for reasons attributable to the Contractor.

#### **49. Retention**

49.1. The Employer shall retain ten percent (10%) from each payment due to the Contractor in the proportion stated in the SCC until Completion of the whole of the Works as retention money.

49.2. On completion of the whole of the works, half the total amount retained shall be repaid to the Contractor and half when defects liability period has passed and the Engineer has certified that all defects notified by the Engineer to the Contractor before the end of this period have been corrected.

49.3. On completion of the whole of the works, the contractor may substitute the balance half of retention money by an unconditional bank guarantees. In the case of contracts beyond duration of 12 months, substitution of retention money by such a bank guarantee may be allowed on completion of 50% of the value of contract and duly certified by the Project Manager. The bank guarantee shall be valid until the issue of No Defects Liability Certificates by the Project Manager that all defects notified by the Project Manager to the Contractor have been rectified to his satisfaction before the end of this period. If the Contractor fails to remedy any reported defect within the Defect Liability Period, the Employer shall withhold the payment or realize claims from the bank guarantee of an amount which in the opinion of the Employer represents the cost of the defect to be remedied.

#### **50. Liquidated Damages**

50.1. The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the SCC for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the ten percent (10%) of the Initial Contract Price. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.

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**51. Advance Payment**

51.1. The Employer shall make advance payment to the Contractor of the amount stated in the SCC (mobilization) by the date stated in the SCC, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

51.2. The secured advances shall be paid to the contractor as specified in SCC on the following conditions:

- (a) The materials shall be in accordance with the specifications and shall not be in excess of the requirements;
- (b) The materials shall be delivered at the site of the works, properly stored and protected against loss, damage or deterioration;
- (c) A declaration shall be given by the contractor passing on the lien on the rights of the materials to the Procuring Agency.
- (d) The amount of the secured advance shall not be more than seventy five percent (75%) of the cost of materials delivered at the site of works which shall be supported by the original invoices/bills from the suppliers. All materials imported from other countries shall be supported by Bhutan Sales Tax Receipts or Customs Clearance. In case of fabrication works off site, secured advance may be paid to the Contractor after site inspection is carried out by the Procuring Agency at the cost of the contractor, submission of proof of payment (work order) and submission of supply order.

The secured advance shall be recovered from the interim progress payments in the months in which these materials are used in the works.

51.3. The Contractor is to use the advance payment only to pay for, Equipments, Plant, Materials and mobilization expenses required specifically for execution of the Contract. The contractor shall demonstrate that advance has been used in this way by supplying copies of invoices or other documents to the project manager. The manager shall encash the advance guarantee if the contractor is in breach of its obligation by using the advance payment for purpose other than the costs of mobilization in respect of the works.

51.4. The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. The Mobilization Advance shall be recovered when eighty percent (80%) of the contract is executed. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses or Liquidated Damages.

**52. Securities**

52.1. The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the SCC by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 30 days from the date of issue of the Certificate of Completion.

52.2. Following the successful completion of the Contract, the Employer shall return the Performance Security to the Contractor within 14 days of receipt of the Certificate of Completion.

52.3. The Employer shall encash the performance security to avoid it becoming invalid in case of failure by contractor to extend the validity.

52.4. The performance security (*including additional performance security obtained under abnormally low pursuant to ITB Clause 31 and seriously unbalanced and/or frontloaded bid pursuant to ITB Clause 32*) shall be payable to the employer as compensation for any loss resulting from the contractor's failure to complete its obligations under the contract.

**53. Day works**

53.1. If applicable, the Day works rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

53.2. All work to be paid for as Day works shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within 2 days of the work being done.

53.3. The Contractor shall be paid for Day works subject to obtaining signed Day works forms and at the rate quoted for Day works.

**54. Cost of Repairs**

54.1. Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

**E. Completion of the Contract****55. Completion**

55.1. The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the work is completed.

55.2. An on-time completion out of a total of thirty percent (30%) scoring shall be done by the Program Manager. The contractor shall be penalized under this component if he fails to deliver the project as per the initial time-lines committed in the Program.

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The site engineer shall penalize the contractor to an extent of thirty percent (30%). The quantum of penalty could vary as following:

- (i) Ten (10%) percent for a minor default  
(if the final completion of the project is delayed by 10 - 15% as compared to original project duration)
- (ii) Twenty percent (20%) for a medium default  
(if the final completion of the project is delayed by 15 - 25% as compared to original project duration)
- (iii) Thirty percent (30%) for a major default  
(if the final completion of the project is delayed by 25% or more as compared to original project duration)

55.3. At the time of taking over the work, the project Manager shall ensure that the contractor constructs a permanent information board as specified in SCC:

## **56. Taking Over**

56.1. The Employer shall take over the Site and the Works and shall issue the completion Certificate within 7 days of taking over. The completion certificate shall include the following mandatory information:

- (i) Name of Contract firm
- (ii) Name of Proprietor
- (iii) CDB Registration No.
- (iv) Trade License No.
- (v) Contract Amount
- (vi) Year of Completion
- (vii) Award order No. with Date.

## **57. Final Account**

57.1. The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 30 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

## **58. Operating and Maintenance Manuals**

58.1. If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the SCC.

58.2. If the Contractor does not supply the Drawings and/or manuals by the dates stated in the SCC, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the SCC from payments due to the Contractor.

**59. Termination**

59.1. The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2. Fundamental breaches of Contract shall include, but shall not be limited to, the following:

- (a) the Contractor stops work for 30 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;
- (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) The Contractor fails to employ the personnel and equipment proposed pursuant to GCC clause 10.1,
- (e) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
- (f) the Project Manager gives notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
- (g) the Contractor does not maintain a security, which is required;
- (h) the Contractor subcontracts any or whole of the Works without the approval of the Employer;
- (i) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the SCC; and
- (j) in case of joint venture any or all parties fail to fulfil the contractual obligations.
- (k) Fails to execute the contract in accordance with the contract, such failure being defined in SCC;
- (l) refuses or is unable to execute and complete the Works and Services in the manner specified in the program furnished under GC Clause 27 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain completion of the works and services by the Time for Completion as extended.

For fundamental breach of contract by contractor the employer shall give notice of a breach of contract for causes listed under GCC sub-clause 59.2 above and requiring the contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fifteen (15) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GC Sub-Clause 59.2.

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For fundamental breach of contract by employer the Contractor shall give a notice to the Employer thereof to remedy the breach within thirty (30) days of such notice and if the Employer is still unable to carry out any of its obligations under the Contract for any reason attributable to the Employer within thirty (30) days of the said notice, the Contractor may by a further notice to the Employer referring to this GC Sub-Clause 59.2, forthwith terminate the Contract.

59.3. When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 59.2 above, the Project Manager shall decide whether the breach is fundamental or not.

59.4. Notwithstanding the above, the Employer may terminate the Contract for convenience.

59.5. If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

**60. Corrupt or  
Fraudulent  
Practices**

60.1. If the Employer determines that the Contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for or in executing the Contract then the Employer may, after giving 14 days' notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of GCC Sub-Clause 60.4 to 60.8 shall apply.

60.2. Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with GCC Sub-Clause 10.2

60.3. For the purposes of this Sub-Clause:

- (a) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- (b) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;



- (c) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- (d) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- (e) “obstructive practice” is
  - ⓐ deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order materially to impede any investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
  - ⓑ acts intended materially to impede the exercise of the inspection and audit rights of the Employer and/or any other relevant RGoB agency provided for under GCC Clause 23.

60.4. will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

60.5. will sanction a firm or individual, including declaring them ineligible, either indefinitely or for a stated period of time, to be awarded an RGoB-financed contract if it at any time determines that they have, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, an RGoB-financed contract;

60.6. Will have the right to require that a provision be included in Bidding Documents and in contracts financed by the RGoB, requiring Bidders, Suppliers, Contractors and their Subcontractors to permit the Purchaser, any organization or person appointed by the Purchaser and/or any relevant RGoB agency to inspect their accounts and records and other documents relating to their Bid submission and contract performance and to have them audited by auditors appointed by the Purchaser;

60.7. Requires that Bidders, as a condition of admission to eligibility, execute and attach to their bids an Integrity Pact Statement in the form provided in the Bidding Documents which shall also be signed by procuring agencies; and

60.8. Will report any case of corrupt, fraudulent, collusive, coercive or obstructive practice to the relevant RGoB agencies, including but not limited to the Anti-Corruption Commission (ACC) of Bhutan, for necessary action in accordance with the statutes and provisions of the relevant agency.

**61. Payment upon Termination**

61.1. If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of work not completed, as indicated in the SCC. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable by the Contractor to the Employer.

61.2. If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

**62. Property**

62.1. All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Employer if the contract is terminated because of a Contractors default.

**63. Release from Performance**

63.1. If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.



## SECTION VIII. SPECIAL CONDITIONS OF CONTRACT

A. General	
<b>GCC 1.1 (o)</b>	The Employer is <i>Director, Department of Air Transport, Paro International Airport, Ministry of Information and Communications</i>
<b>GCC 1.1 (r)</b>	The Intended Completion Date for the whole of the Works shall be <i>3 months after the Contract start Date mentioned in the Work Order</i>
<b>GCC 1.1 (v)</b>	The Project Manager is <i>Mr. Ugyen Dorji, Chief Engineer Department of Air Transport, Paro International Airport, Ministry of Information and Communications Phone no: +975-8-271750</i>
<b>GCC 1.1 (y)</b>	The Site is located at <i>Paro International Airport.</i>
<b>GCC 1.1 (bb)</b>	The Start Date shall be <i>as mentioned in the work order</i>
<b>GCC 1.1 (ff)</b>	The Works consist of Resurfacing of Runway 15-33, Re-construction of taxiway A and other improvement works in Paro International Airport
<b>GCC 2.2</b>	Sectional Completions are: <b>NOT APPLICABLE</b>
<b>GCC 2.3 (9)</b>	The following documents also form part of the Contract:  - <i>Section 6: Employer's requirements</i>  - <i>Schedule of Key personnel(GCC 10)</i>  - <i>Schedule of equipments(GCC 10)</i>  - <i>The Contractor's proposal and any other documents forming part of The Contract.</i>
<b>GCC 3.1</b>	The language of the contract is <i>ENGLISH.</i>  The law that applies to the Contract is the law of the Kingdom of Bhutan.
<b>GCC 9.1</b>	Schedule of other contractors: <b>NOT APPLICABLE</b>

GCC 10.1

Key Personnel:

The amount to be deducted for the key personnel not employed by the contractor for each personnel is as follows:

1. Project Engineer- Nu. 17,000.00 per day
2. Civil Engineer- Nu. 5,000.00 per day
3. Material Engineer- Nu. 5,000.00 per day
4. Surveyor – Nu. 5,000.00 per day

The amount to be deducted for the equipment not available at site is as follows.

No.	Equipment Type and Characteristics	Penalty, Nu.
1.	Computerized Bitumen Hot Weigh Batch mix plant	1,20,000 per day
2.	Electronic Operated Sensor paver	16,000 per day
3.	Mechanical Paver	10,000 per day
4.	Vibratory Roller (8 – 10 T)	8,000 per day
5.	Pneumatic Roller (12-15T with tier Pressure of 0.56 MPa )	8,000 per day
6.	Tippers / Dumpers 16cu.m capacity	10,000 per day
7.	Truck mounted Mechanical Bitumen sprayer	8,000 per day
8.	Front end Loader of bucket capacity of approx. 1 cum	8,000 per day
9.	Concrete Joint cutting machine	10,000 per day
10.	JCB	10,000 per day
11.	Motor Grader / Dozer	15,000 per day
12.	Water tanker (10,000 Ltr. capacity)	8,000 per day
13.	Road marking/Painting machine	5,000 per day
14.	Computerized concrete Weigh Batch mix plant	5,000 per day
15.	Tractor mounted sweeper	2,000 per day
16.	Air-compressor	8,000 per day
17.	Concrete Breaker	2,000 per day
18.	Milling Machine	2,000 per day

	In the event of failure to provide laboratory equipment/Survey Instrument as mentioned in Section 6 Employer's Requirement, Nu.200 will be deducted per day for each equipment.
<b>GCC 14.1</b>	<p>The minimum insurance amounts and deductibles shall be:</p> <ul style="list-style-type: none"> <li>-Contractor's All Risk Insurance Policy</li> <li>(a) for loss or damage to the Works, Plant and Materials: Works on pro rata and Plants &amp; materials on actual costs;</li> <li>(b) for loss or damage to Equipment: as per the Labour Compensation Act in force, Royal Government of Bhutan;</li> <li>(c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract: as per the insurance policies and related laws in force of the Royal Government of Bhutan;</li> <li>(d) for personal injury or death: <ul style="list-style-type: none"> <li>(i) of the Contractor's employees: As per existing Labour Act of the Kingdom of Bhutan.</li> <li>(ii) of other people: three times the annual salary based on the minimum wage.</li> </ul> </li> </ul>
<b>GCC 15.1</b>	Queries. <i>If any on SCC , Contact the Project Manager</i>
<b>GCC 21.1</b>	The Site Possession Date(s) shall be: <i>[insert location(s) and date(s)]</i>
<b>GCC 21.2</b>	<p>The information board shall be 2mts x 1mts of <i>wood or MS sheets or aluminium</i> with following details:</p> <ul style="list-style-type: none"> <li>(i) Name of Work:</li> <li>(ii) Start and Completion Date:</li> <li>(iii) Value of Work:</li> <li>(iv) Name of Contractor:</li> <li>(v) Name of Employer:</li> </ul>
<b>GCC 25.2</b>	Fees and types of reimbursable expenses to be paid to the Adjudicator: <i>Nu 500 per hour</i>
<b>GCC 25.3</b>	<p>Institution whose arbitration procedures shall be used:</p> <p>Bhutan Alternative Dispute Resolution Centre (BADRC);</p> <p>GCC Sub-Clause 24.3—All disputes arising in connection with the present Contract shall be for finally resolved by arbitration in accordance with the rules and procedures of the Bhutan Alternative Dispute Resolution Centre (BADRC). The arbitration award shall be final on the parties who shall be deemed to have accepted to carry out the resulting award without delay and to have waived their right to any form of appeal insofar as such waiver can validly be made.</p> <p>The place of arbitration shall be: <i>Thimphu; Bhutan</i></p>
<b>GCC 26.1</b>	Appointing Authority for the Adjudicator: <i>Bhutan Alternative Dispute Resolution Centre.</i>
<b>B. Time Control</b>	

<b>GCC 27.1</b>	<p>The Contractor shall submit for approval a Program for the Works within <i>10(ten)</i> days from the date of the Letter of Acceptance.</p> <p>However a suggestive works and material schedule is attached in Annexure VI.</p> <p>The Program shall include, but not be limited to, the following elements under the conditions stipulated:</p> <p>(a) Quality Assurance Plan (QAP)</p> <p>The Quality Assurance Plan shall specify the work methodology, quality control tests and intervals for such tests in accordance with the work specifications for each item of the Works. If in the opinion of the Project Manager the QAP submitted by the Contractor does not fully represent the spirit of the General Conditions of Contract or the Specifications he may seek further clarification from the Contractor before his approval. The Contractor shall strictly follow the QAP in the execution of the Works. If the Contractor does not comply with the QAP, he shall not be allowed to proceed further with the Works. Details of all procedures and compliance documents shall be submitted to the Project Manager for information before each execution stage is commenced. Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the contract.</p>
<b>GCC 27.3</b>	The period between Program updates is <i>7(seven)</i> days. Weekly review meeting will be conducted to review progress. If any shortfall found Contractor shall increase resources accordingly.

### C. Quality Control

<b>GCC 36.1</b>	The Defects Liability Period is: <i>365(three sixty five)</i> days.
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### D. Cost Control

<b>GCC 45.1 (h)</b>	Other Compensation Events are: NONE
<b>GCC 46.1</b>	In case of certain Tax exemptions, such as in foreign assistance projects, this specific exemption(s) should be clearly specified in this clause. None
<b>GCC 48.1</b>	<p>The Contract "<i>is not</i>" subject to price adjustment in accordance with GCC Clause 48 except for the followings:</p> <ol style="list-style-type: none"> <li>1. Change in Bitumen Content(JMF) as specified in particular specifications</li> <li>2. Change in Bitumen price(the reference in price to be adopted for this adjustment will be Nu. 41,500.00 per tonne at Phuentsholing base)</li> </ol>
<b>GCC 49.1</b>	The proportion of payments retained is: <i>10%(TEN PERCENT)</i>
<b>GCC 50.1</b>	The liquidated damages for the whole of the Works are <i>.1%</i> per day. The maximum amount of liquidated damages for the whole of the Works is <i>10%</i> of the initial Contract Price.
<b>GCC 51.1</b>	The Mobilization Advance Payment shall be ten percent (10%) of the Contract Price and shall be paid to the Contractor no later than 30 days after receipt by the Employer of an acceptable Advance Payment Guarantee.
<b>GCC 51.2</b>	The secured advance is <i>75%(SEVENTY FIVE PERCENT)</i>
<b>GCC 52.1</b>	The Performance Security amount is <i>shall be ten percent (10%) of the Contract Price.</i>

<b>D. Finishing the Contract</b>	
<b>GCC 58.1</b>	<p>The date by which operating and maintenance manuals are required is <i>NOT APPLICABLE</i></p> <p>The date by which “as built” drawings are required is <i>NOT APPLICABLE</i></p>
<b>GCC 58.2</b>	The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals by the date required in GCC Sub-Clause 58.1, or failing to obtain the Project Manager’s approval of them by the said date, is <i>NOT APPLICABLE</i> .
<b>GCC 59.2 (i)</b>	The maximum number of days is: <i>100</i>
<b>GCC 59.2 (k)</b>	Failure to execute contract in accordance with <b>agreed work plan</b> .
<b>GCC 61.1</b>	<p>The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is</p> <p><i>20% of balance works up to a maximum of 10% of the initial contract price]</i></p>

## Section IX: Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

### Table of Forms

<b>Notice of Intention for Award of Contract .....</b>	<b>9-2</b>
<b>Notification of Award .....</b>	<b>9-3</b>
<b>Contract Agreement .....</b>	<b>9-4</b>
<b>Performance Security .....</b>	<b>9-6</b>
<b>Advance Payment Security.....</b>	<b>9-7</b>

# Notice of Intention for Award of Contract

[on letterhead paper of the Employer]

[date of notification]

To: [name of the Bidder]  
 Attention: [insert name of the Bidder's authorized representative]  
 Address: [insert address of the Bidder's authorized representative]  
 Telephone/Fax numbers: [insert telephone/fax numbers of the Bidder's authorized representative]  
 E-mail Address: [insert e-mail address of the Bidder's authorized representative]

This is to notify you of our intention to award the contract [insert name of the contract and identification number, as given in the Bid Data Sheet]. You have [insert number of days as specified in ITB 41.1 of the BDS] days from the date of this notification to (i) request for a debriefing in relation to the evaluation of your Bid; and/or (ii) submit a bidding-related complaint in relation to the intention for award of contract, in accordance with the procedures specified in ITB 46.1.

The summary of the evaluation are as follows:

## 1. List of Bidders

Name of Bidder	Bid Price as Read Out at Opening	Evaluated Bid Price

## 2. Reason/s Why Your Bid Was Unsuccessful

.....  
 .....  
 .....

## 3. The Successful Bidder

Name of Bidder:	
Address:	
Contract Price:	
Duration of Contract:	
Scope of the Contract Awarded:	
Amount Performance Security Required:	

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Agency: .....

# Notification of Award

*[on letterhead paper of the Employer]*

## Letter of Acceptance

*[date]*

To: *[Name and address of the contractor]*

Subject: *[Notification of Award Contract No.]*

This is to notify you that your Bid dated *[date]* for execution of the *[name of the contract and identification number, as given in the Bid Data Sheet]* for the Accepted Contract Amount in the equivalent of *[amount in words and figures and name of currency]*, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract and any additional security required as a result of the evaluation of your bid, using for that purpose the Performance Security Form included in Section 9 (Contract Forms) of the Bidding Document.

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Agency: .....

Attachment: Contract Agreement



## Contract Agreement

THIS AGREEMENT made the [date] day of [month], [year], between [name of the Employer] (hereinafter "the Employer"), of the one part, and [name of the contractor] (hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as [name of the contract] should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein.

The Employer and the Contractor agree as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
  - (a) Contract Agreement,
  - (b) Letter of Acceptance,
  - (c) Letter of Technical Bid,
  - (d) Letter of Price Bid,
  - (e) Addenda Nos. [insert addenda numbers if any]
  - (f) the Particular Conditions of Contract – Part A,
  - (g) Particular Conditions of Contract – Part B,
  - (h) List of Eligible Countries that was specified in Section 5 of the Bidding Document
  - (i) General Conditions of Contract,
  - (j) Specifications,
  - (k) Drawings,
  - (l) completed Schedules including Bill of Quantities, and
  - (m) any other documents shall be added here.<sup>1</sup>
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of [name of the borrowing country] on the day, month and year indicated above.

<sup>1</sup> Tables of Adjustment Data may be added if the contract provides for price adjustment (see GCC 13.8).

Signed by .....

Signed by .....

for and on behalf of the Employer  
in the presence of

for and on behalf the Contractor  
in the presence of

Witness, Name, Signature, Address, Date

Witness, Name, Signature, Address, Date

## Performance Security

[Bank's name, and address of issuing branch or office]

**Beneficiary:** [Name and address of the Employer]

**Date:** .....

**Performance Guarantee No.:** .....

We have been informed that [name of the contractor] (hereinafter called "the Contractor") has entered into Contract No. [reference number of the contract] dated [date] with you, for the execution of [name of contract and brief description of works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we [name of the bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [name of the currency and amount in words]<sup>1</sup> [amount in figures] such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the [date] day of [month], [year],<sup>2</sup> and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 [or ICC Publication No. 758 as applicable], except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.<sup>3</sup>

.....  
[Signature(s) and seal of bank (where appropriate)]

### Note to Bidder

If the institution issuing the performance security is located outside the country of the Employer, it shall have a correspondent financial institution located in the country of the Employer to make it enforceable.

- <sup>1</sup> The guarantor shall insert an amount representing the percentage of the contract price specified in the contract and denominated either in the currency(ies) of the contract or a freely convertible currency acceptable to the Employer.
- <sup>2</sup> Insert the date 28 days after the expected completion date. The Employer should note that in the event of an extension of the time for completion of the contract, the Employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months] [1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."
- <sup>3</sup> Or the same or similar to this clause specified in the Uniform Rules for Demand Guarantees, ICC Publication No. 758 where applicable.

# Advance Payment Security

[Bank's name, and address of issuing branch or office]

**Beneficiary:** [Name and address of the Employer]

**Date:** .....

**Advance Payment Guarantee No.:** .....

We have been informed that [name of the contractor] (hereinafter called "the Contractor") has entered into Contract No. [reference number of the contract] dated [date] with you, for the execution of [name of contract and brief description of works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum [name of the currency and amount in words]<sup>1</sup> [amount in figures] is to be made against an advance payment guarantee.

At the request of the Contractor, we [name of the bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of [name of the currency and amount in words]<sup>2</sup> [amount in figures] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor:

- (a) used the advance payment for purposes other than the costs of mobilization and cash flow support in respect of the Works; or
- (b) has failed to repay the advance payment when it has become due and payable in accordance with the conditions of the Contract, specifying the amount payable by the Contractor.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number [Contractor's account number] at [name and address of the bank].

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety percent (90%) of the Contract Price has been certified for payment, or on the [date] day of [month], [year],<sup>3</sup> whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 [or ICC Publication No. 758 as applicable].

.....  
[Signature(s) and seal of bank (where appropriate)]

## Note to Bidder

If the institution issuing the advance payment security is located outside the country of the Employer, it shall have a correspondent financial institution located in the country of the Employer to make it enforceable.

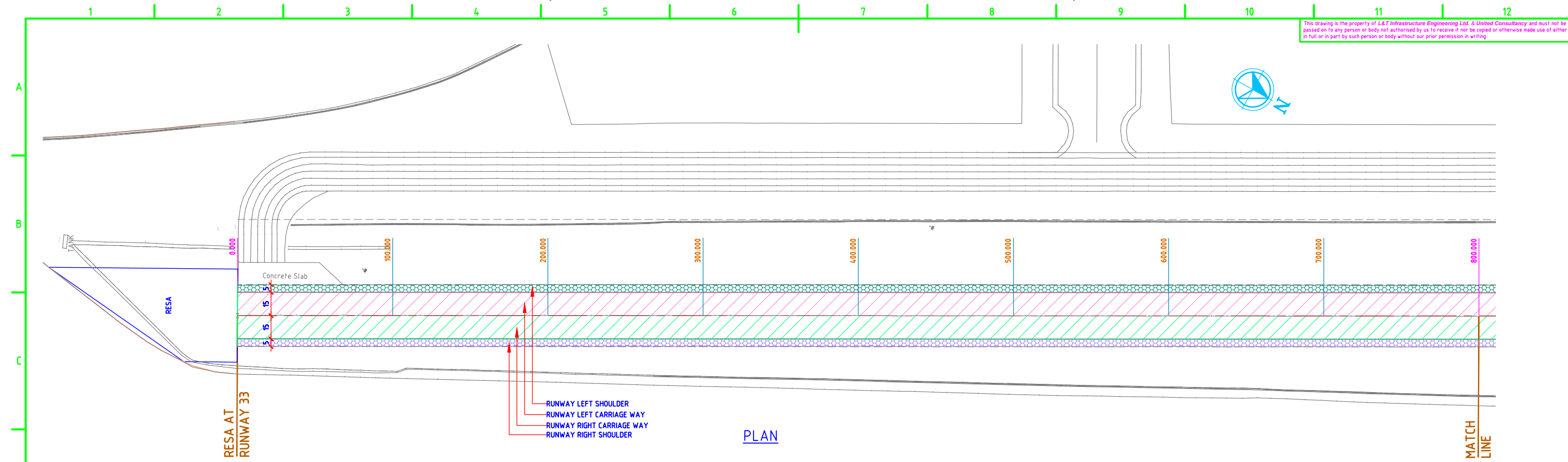
<sup>1</sup> The guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.

<sup>2</sup> Footnote 1.

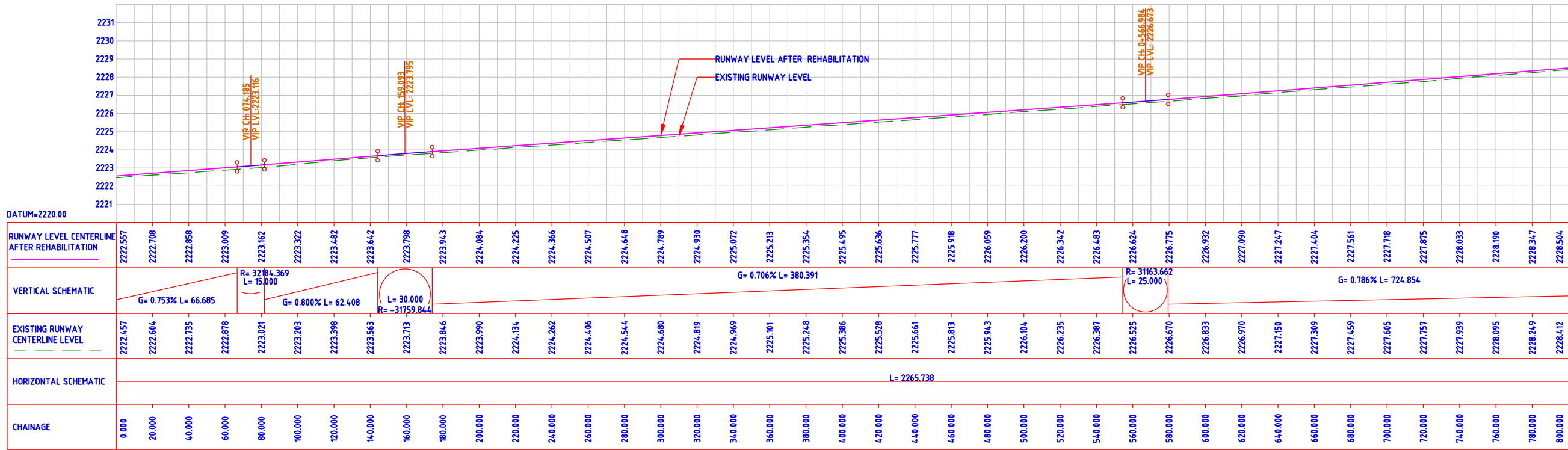
<sup>3</sup> Insert the expected expiration date of the time for completion. The Employer should note that in the event of an extension of the time for completion of the contract, the Employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months] [1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

## Annexures

# ***ANNEXURE I***



PLAN



LONGITUDINAL PROFILE

NOTES:

- 1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- L = LENGTH
- R = RADIUS OF VERTICAL CURVE
- G = VERTICAL GRADIENT

REV.		DATE		STATUS		DESCRIPTION		DES.	DRN.	INIT.	SIGN.	INIT.	SIGN.
0	200118	1		FIRST SUBMISSION				HSN	CPS	NCB		RMS	
REV.		DATE		STATUS		DESCRIPTION		DES.	DRN.	INIT.	SIGN.	INIT.	SIGN.
DRG NO.		TITLE		REVISIONS		STATUS CODES		1: PRELIMINARY		2: FOR APPROVAL		3: GOOD FOR CONSTRUCTION	
DRG NO.		TITLE		REVISIONS		STATUS CODES		1: PRELIMINARY		2: FOR APPROVAL		3: GOOD FOR CONSTRUCTION	

CLIENT:

ROYAL GOVERNMENT OF BHUTAN

Department of Air Transport | Ministry of Information and Communications

DESIGN CONSULTANT:

L&T Infra Engineering

L&T INFRASTRUCTURE ENGINEERING LTD

TC 2 BUILDING, 3rd FLOOR,

MOUNT POONAMALLEE ROAD,

MANAPAKKAM, P.B.NO.979, CHENNAI - 600 089

E-mail: roads@lntiel.com, Website: www.lntiel.com

IN JV With

UNITED CONSULTANCY

61, JANGSAM LAM, CHANGANGKHA,

THIMPHU, BHUTAN

PH: (+975)- 2-326776 FAX NO:-323884

E-mail: ucsonam@gmail.com

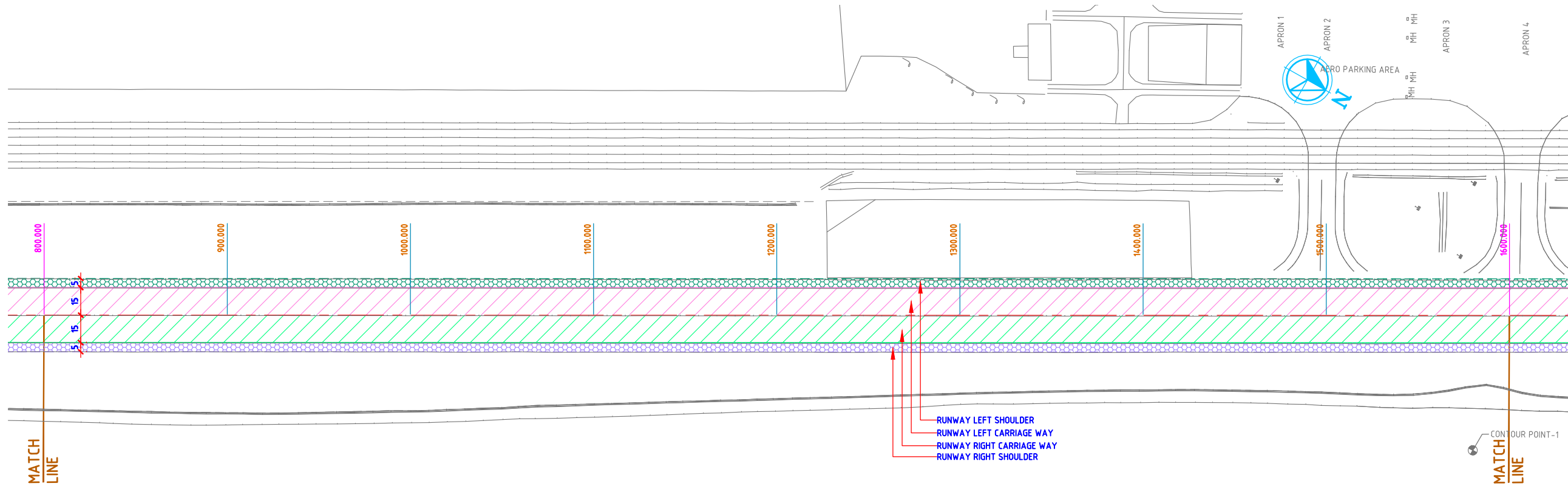
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TITLE: RUNWAY – PLAN &PROFILE FROM CH:0.000 TO CH:800.000											
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C	1	1	9	2	7	0	5	A3	HOR:1:2500 VER:1:250	DDP001	0

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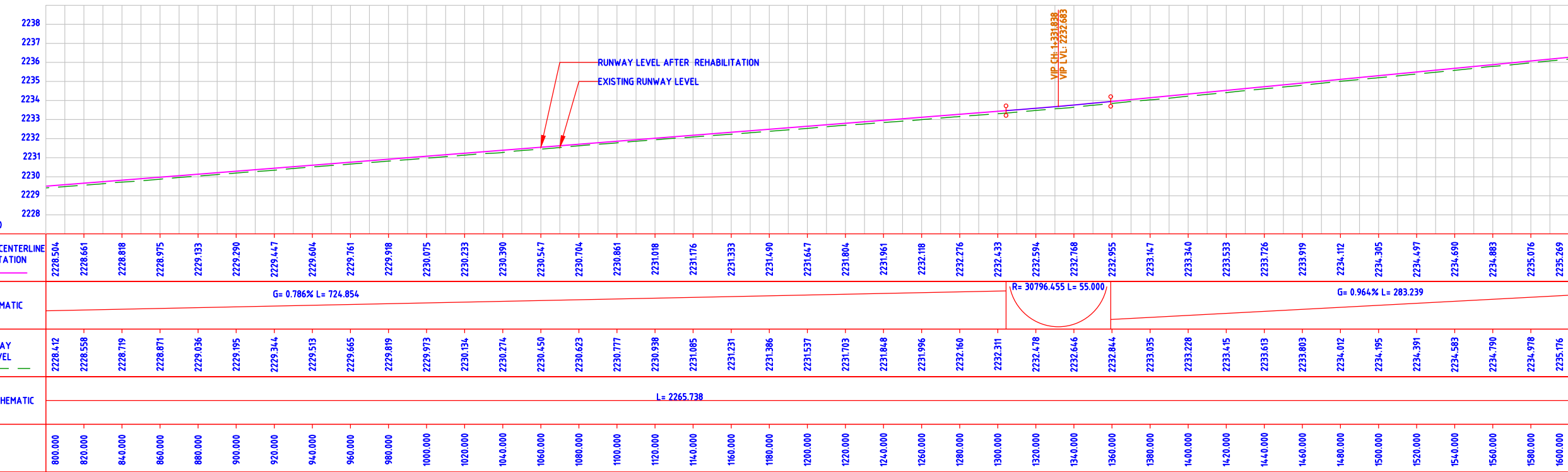
This drawing is the property of L&T Infrastructure Engineering Ltd. & United Consultancy and must not be passed on to any person or body not authorised by us to receive it nor be copied or otherwise made use of either in full or in part by such person or body without our prior permission in writing.

plot scale 50mm

This drawing is the property of L&T Infrastructure Engineering Ltd. & United Consultancy and must not be passed on to any person or body not authorised by us to receive it nor be copied or otherwise made use of either in full or in part by such person or body without our prior permission in writing.



PLAN



LONGITUDINAL PROFILE

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

L = LENGTH  
R = RADIUS OF VERTICAL CURVE  
G = VERTICAL GRADIENT

REV.	DATE	STATUS	DESCRIPTION	DES.	DRN.	INIT.	SIGN.	INIT.	SIGN.
0	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
1	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
2	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
3	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
4	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
5	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
6	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
7	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
8	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
9	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
10	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
11	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		
12	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		

CLIENT: ROYAL GOVERNMENT OF BHUTAN

Department of Air Transport | Ministry of Information and Communications

DESIGN CONSULTANT: L&T Infra Engineering

L&T INFRASTRUCTURE ENGINEERING LTD  
TC 2 BUILDING, 3rd FLOOR,  
MOUNT POONAMALLEE ROAD,  
MANAPAKKAM, P.B.NO.979, CHENNAI - 600 089  
E-mail: roads@lntiel.com, Website: www.lntiel.com

In JV With

UNITED CONSULTANCY  
61, JANGSAM LAM, CHANGANGKHA,  
THIMPHU, BHUTAN  
PH: (+975)- 2-326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

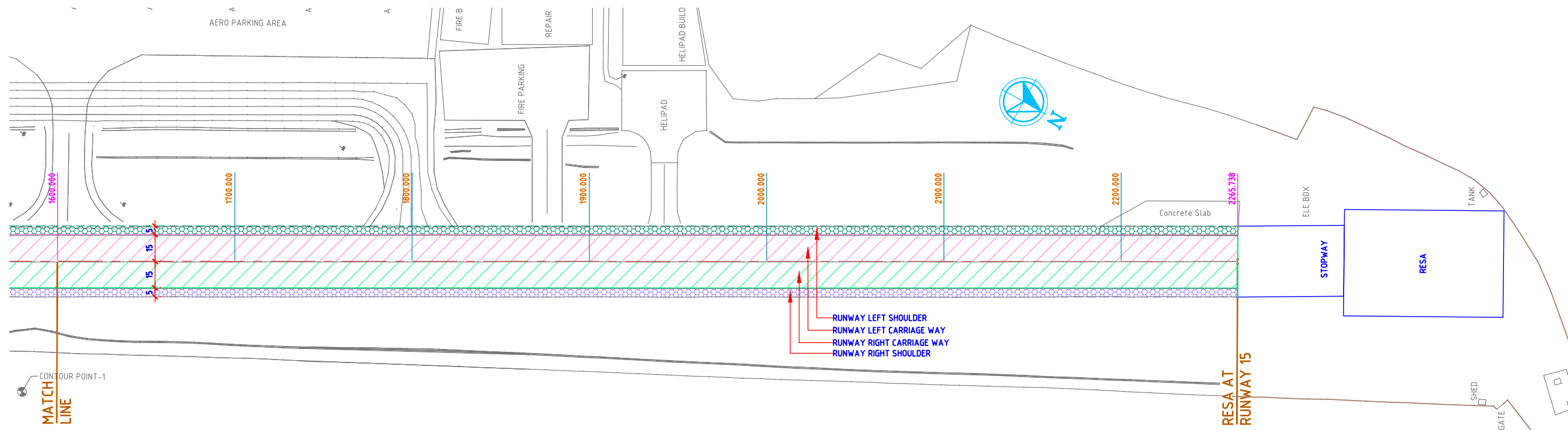
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TITLE: RUNWAY- PLAN & PROFILE FROM CH:800.000 TO CH:1600.000

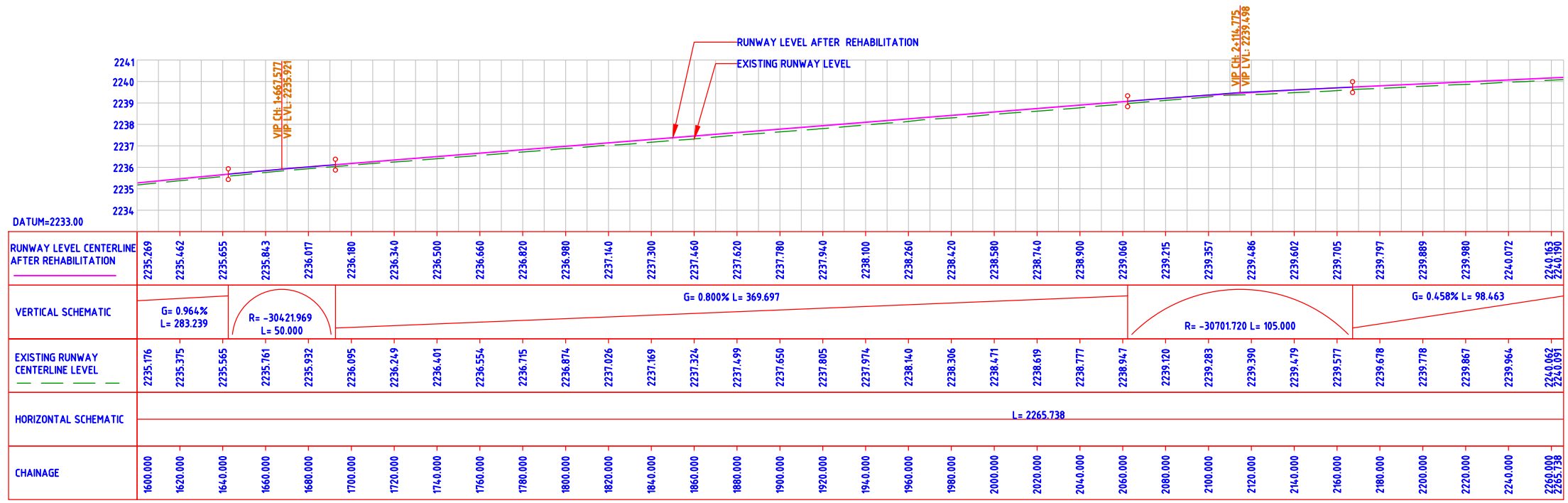
PROJECT NUMBER	SIZE	SCALE	DRAWING NUMBER	REV.
C 1 1 9 2 7 0 5	A3	HOR:1:2500 VER:1:250	DDP002	0

plot scale 50mm





PLAN



LONGITUDINAL PROFILE

**NOTES:**

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

L = LENGTH  
R = RADIUS OF VERTICAL CURVE  
G = VERTICAL GRADIENT

REV.	DATE	STATUS	DESCRIPTION	DES.	DRN.	INIT.	SIGN.	INIT.	SIGN.
0	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS		

DRG NO. TITLE

REFERENCE DRAWINGS

STATUS CODES 1: PRELIMINARY 2: FOR APPROVAL 3: GOOD FOR CONSTRUCTION 4: .....

REVISIONS

CLIENT: ROYAL GOVERNMENT OF BHUTAN

DESIGN CONSULTANT: L&T Infra Engineering

UNITED CONSULTANCY

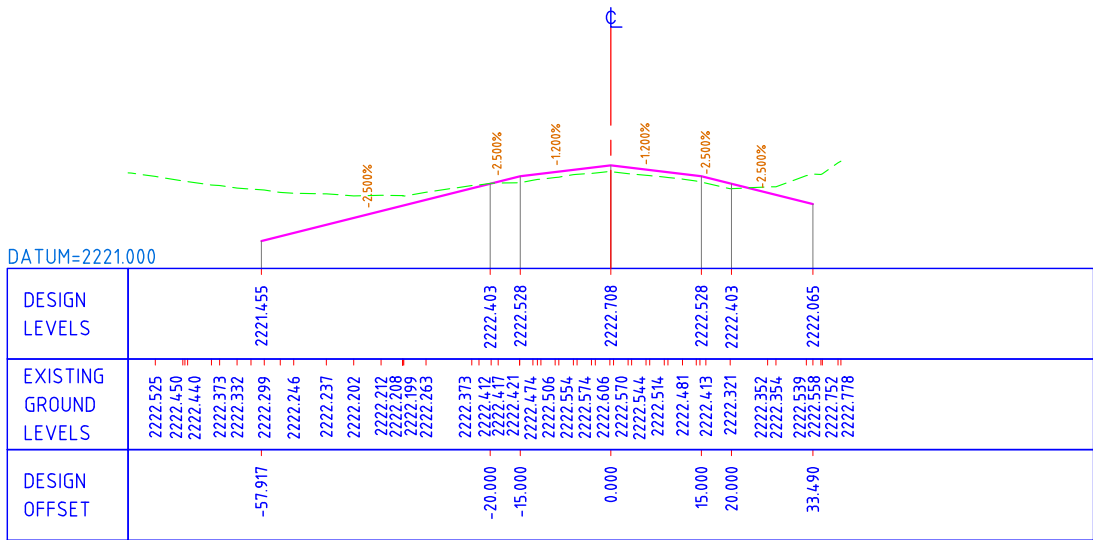
PROJECT: PAVEMENT EVALUATION AND REHABILITATION AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNWAY- PLAN & PROFILE FROM CH:1600.000 TO CH:2265.738

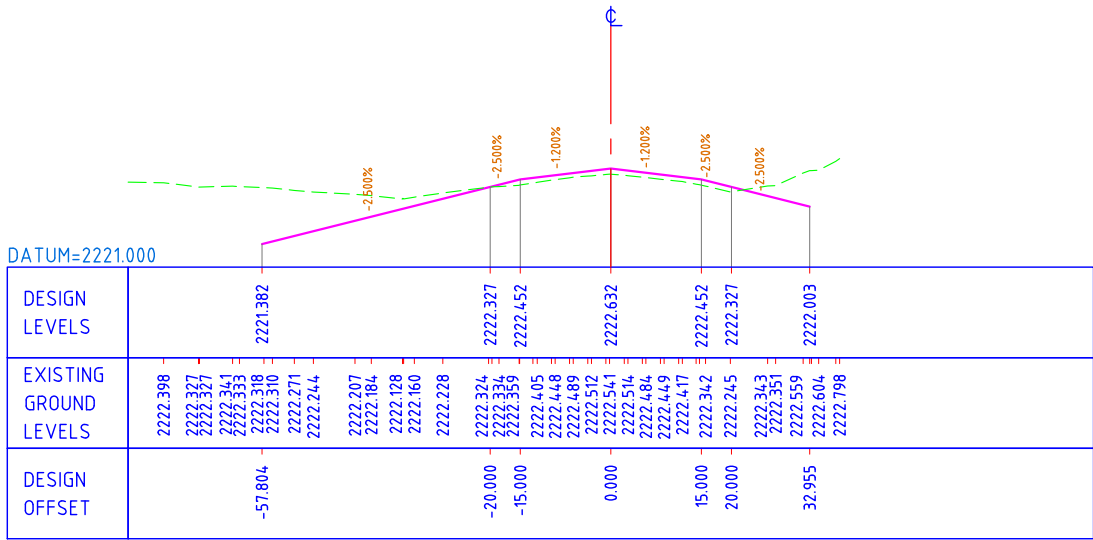
PROJECT NUMBER	SIZE	SCALE	DRAWING NUMBER	REV.
C 1 1 9 2 7 0 5	A3	HOR:1:2500 VER:1:250	DDP003	0

AUTO PATH: L:\ROADS\2019\1192705 - PARO AIRPORT\BHUTAN\WORKING DRAWINGS\RUNWAY PLAN & PROFILE\DDP001 TO 003-RO-CPS-RUNWAY PLAN & PROFILE CH-00 TO 2265.738.DWG

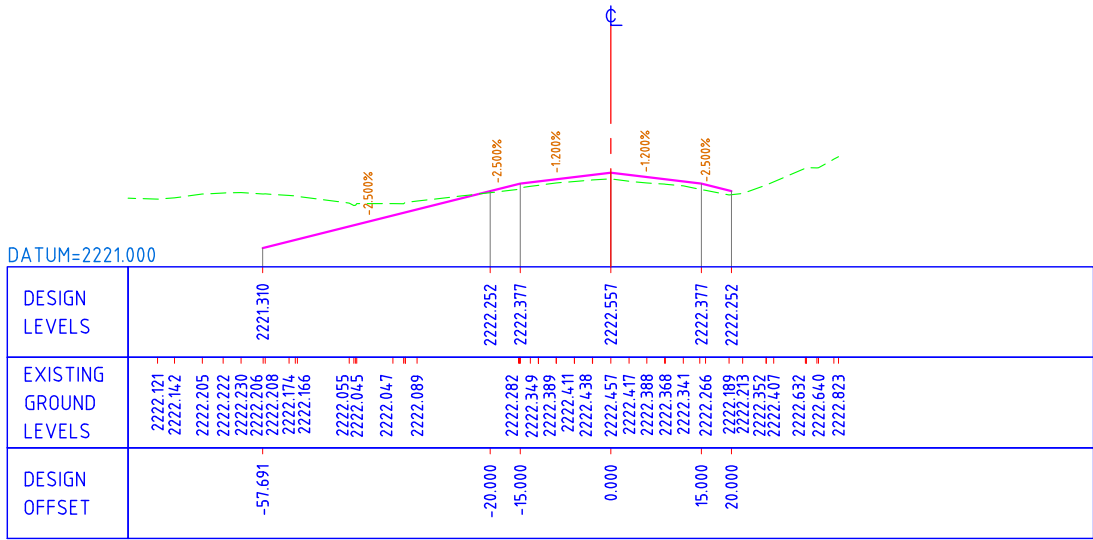
## ***ANNEXURE II***



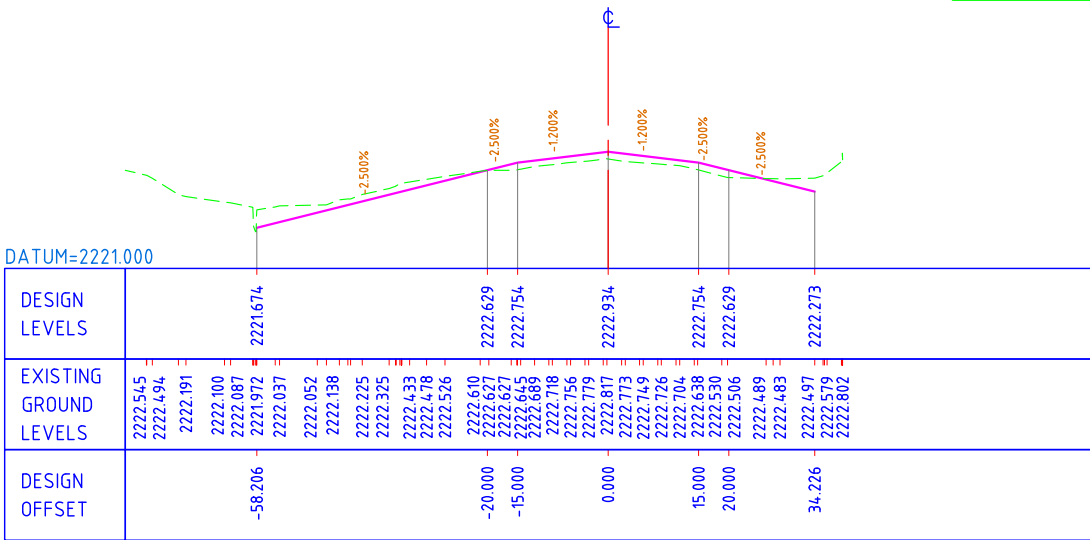
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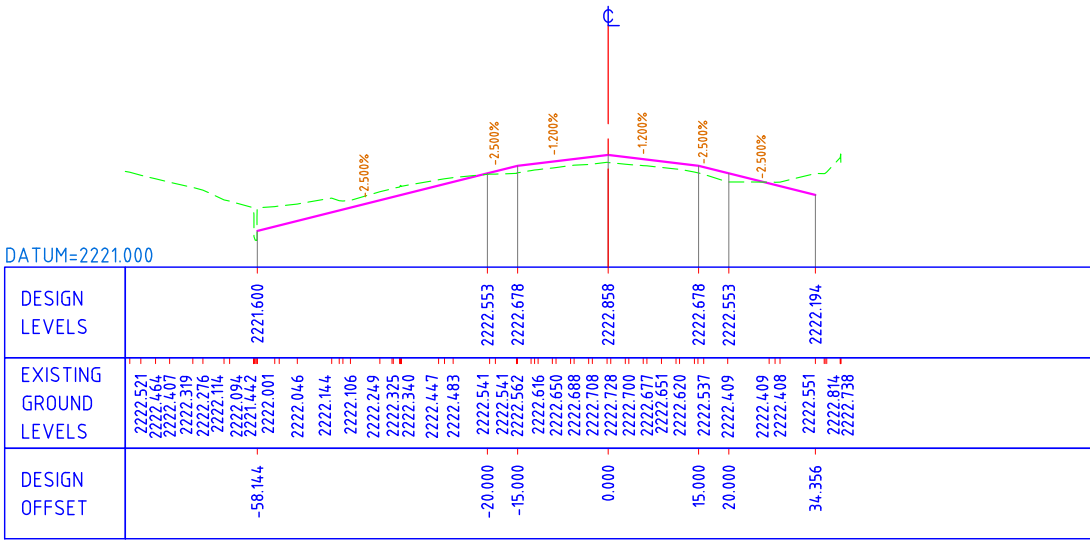
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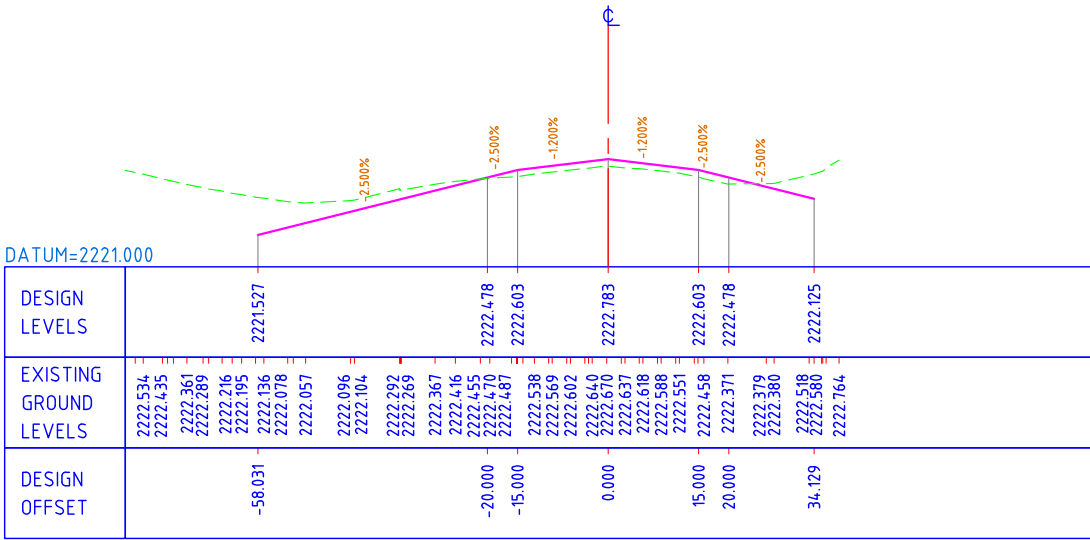
CHAINAGE =0.000



CHAINAGE =50.000



CHAINAGE =40.000



CHAINAGE =30.000

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

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CLIENT:

ROYAL GOVERNMENT OF BHUTAN



DESIGN CONSULTANT:

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L&T INFRASTRUCTURE ENGINEERING LTD  
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With



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THIMPHU, BHUTAN  
PH: (+975)- 2-3326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

PROJECT:

PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE:

RUNNING CROSS SECTION  
(FROM CH: 0.000 TO 50.000)

PROJECT NUMBER

C 1 1 9 2 7 0 5

SIZE

A3

SCALE:

1:1250

DRAWING NUMBER

DDX101

REV:

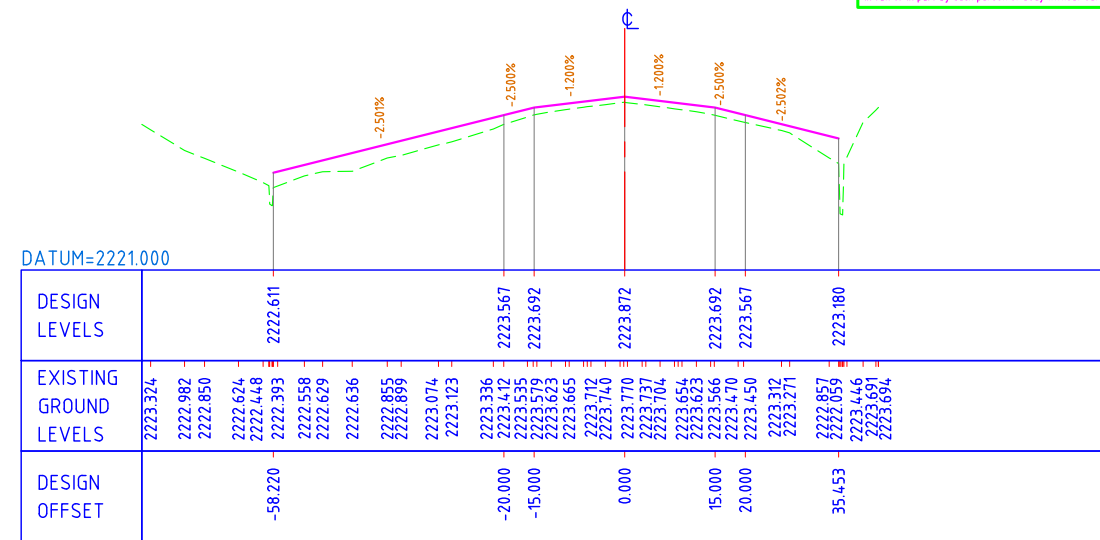
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plot scale

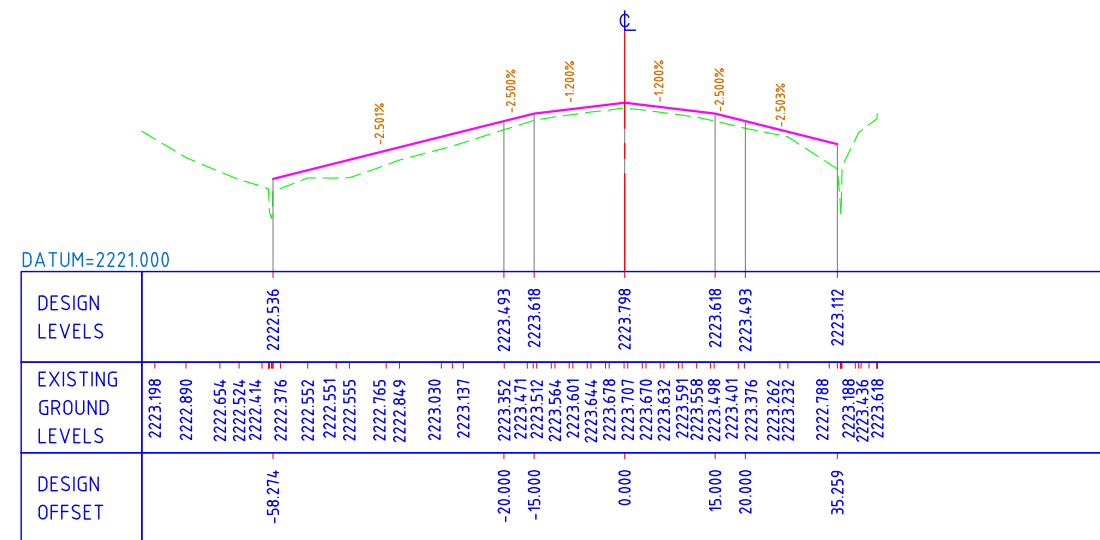
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12

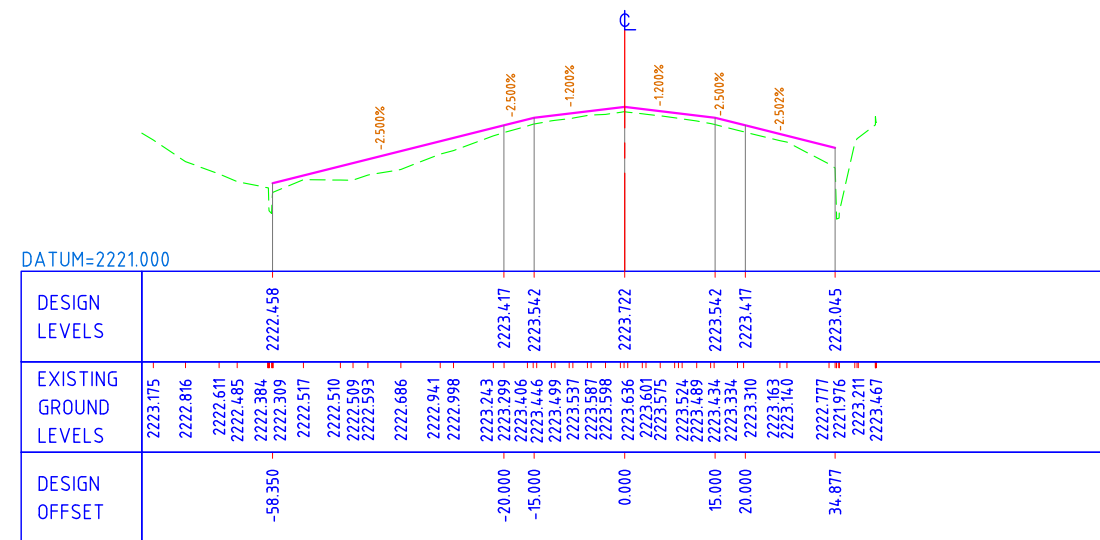




CHAINAGE =170.000



CHAINAGE =160.000



CHAINAGE =150.000

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

ROYAL GOVERNMENT OF BHUTAN



TITLE: RUNNING CROSS SECTION  
(FROM CH: 120.000 TO 170.000)

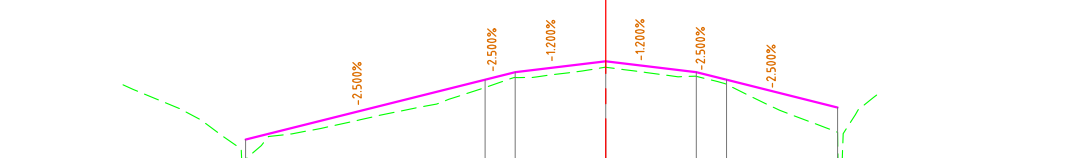
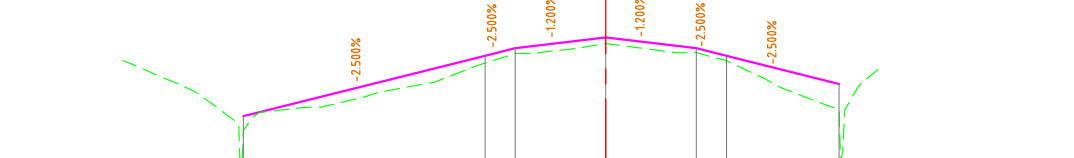
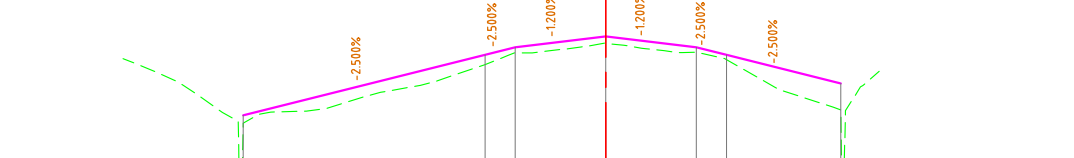
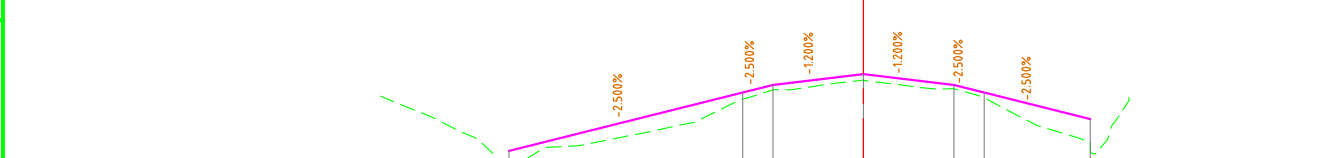
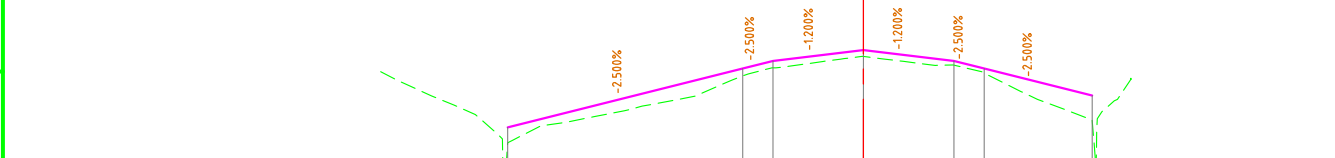
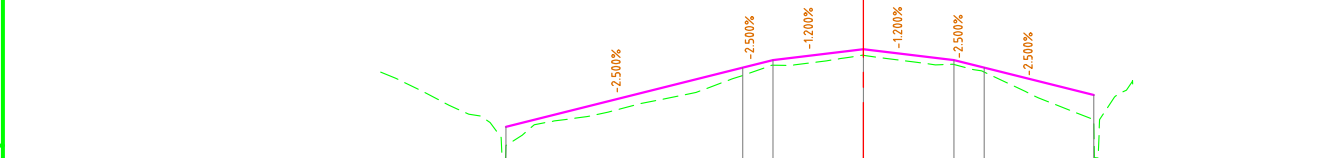
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plot scale 


 50mm







	V	ZVVH6	T	FIRST SUBMISSION	RSN	CPS	NCD	SIGN	RFS	SIGN
	REV.	YYMMDD DATE	STATUS	DESCRIPTION	DES.	DRN	INIT. CHECKED	SIGN. APPROVED	INIT.	SIGN
DRG NO.	TITLE			REVISIONS						
REFERENCE DRAWINGS				STATUS CODES    1 : PRELIMINARY    2 : FOR APPROVAL    3 : GOOD FOR CONSTRUCTION    4 : .....						


 ལྷ་མོ་ བཀའ་ཁྲིའི་སྐུ་ལ་འཛིན་པའཕེལ་བཅའ་བུ།  
 ལྷ་མོ་ བཀ་དོན་དང་དབུལ་སྤྱི་ལྷན་ཁུ། དཔལ་ལྷན་འབྲུག་པུ་རྒྱ།
 

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om

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TITLE: RUNNING CROSS SECTION  
(FROM CH: 240.000 TO 290.000)

PROJECT NUMBER								SIZE A3	SCALE: 1:1250	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5			DDX105	0

plot scale						50mm
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 “ॐ” त्रयं ब्रह्म ॥ त्रयं ब्रह्म ॥ त्रयं ब्रह्म ॥

Department of Air Transport | Ministry of Information and Communications

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UNITED CONSULTANCY  
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PH: (+975- 2-)326776 FAX NO:-32388  
E-mail: ucsonam@gmail.com

TITLE: RUNNING CROSS SECTION  
(FROM CH: 360.000 TO 410.000)







1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

## REFERENCE DRAWINGS

ROYAL GOVERNMENT OF BHUTAN



In JV  
With

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THIMPHU, BHUTAN  
PH: (+975- 2-)326776 FAX NO:-32388  
E-mail: ucsonam@gmail.com

PROJECT NUMBER								SIZE A3	SCALE: 1:1250	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5			DDX110	0

plot scale 


 50mm



1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

[illegible]

ROYAL GOVERNMENT OF BHUTAN



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THIMPHU, BHUTAN  
PH: (+975- 2-)326776 FAX NO:-32388  
E-mail: ucsonam@gmail.com

PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNNING CROSS SECTION  
(FROM CH: 600.000 TO 650.000)

PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REVISION
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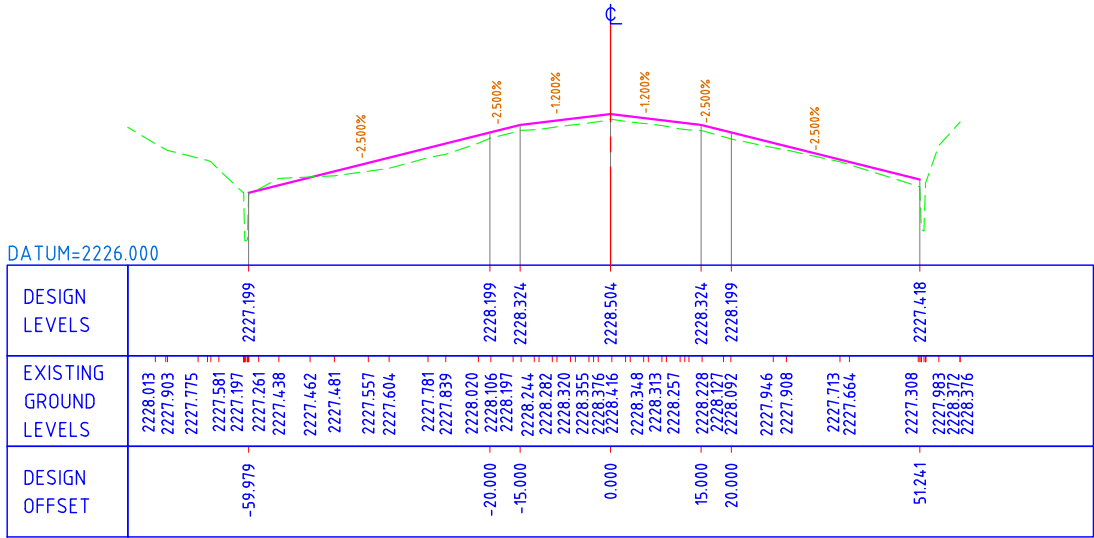
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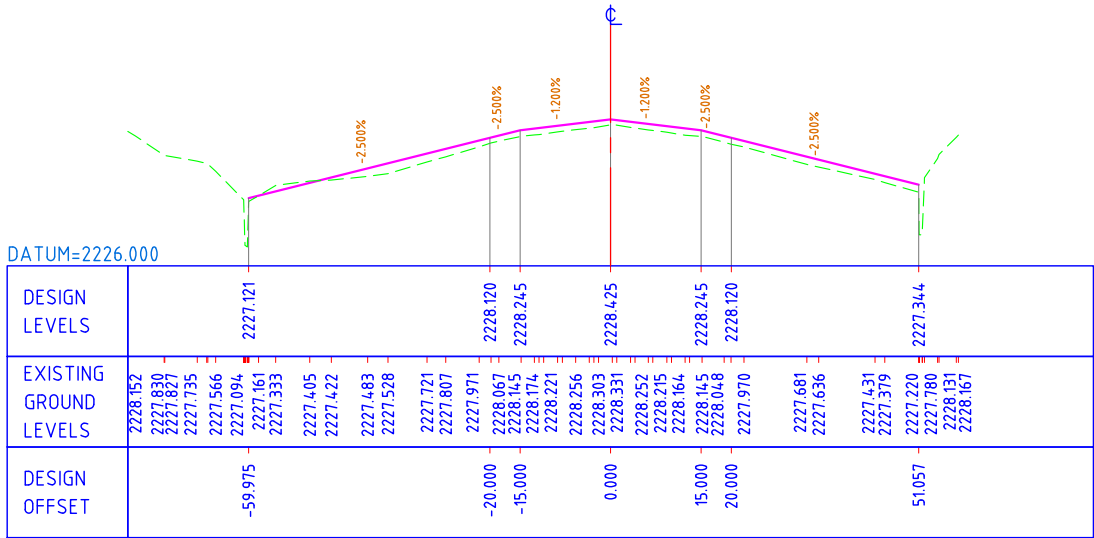




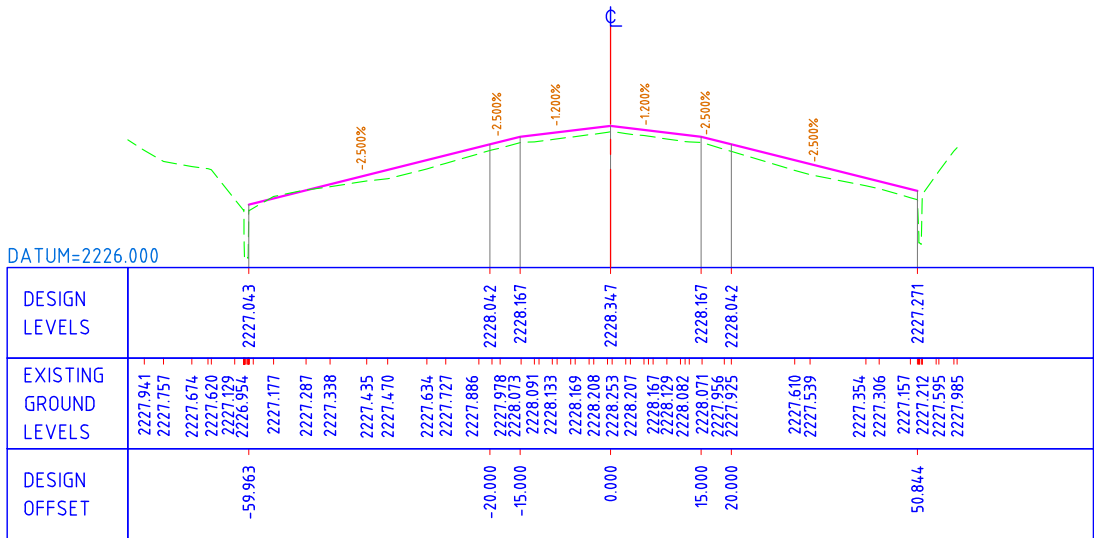




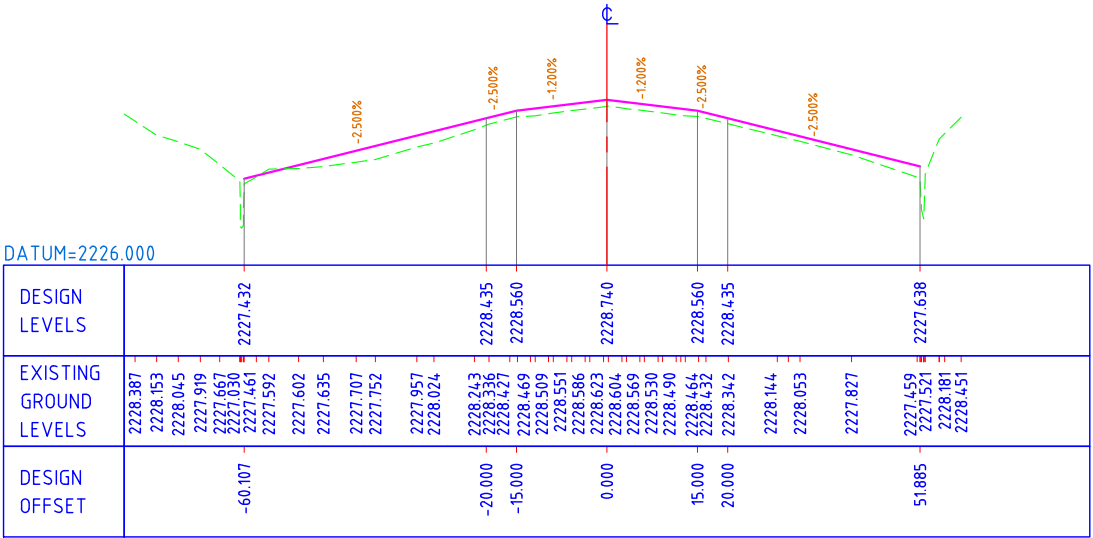
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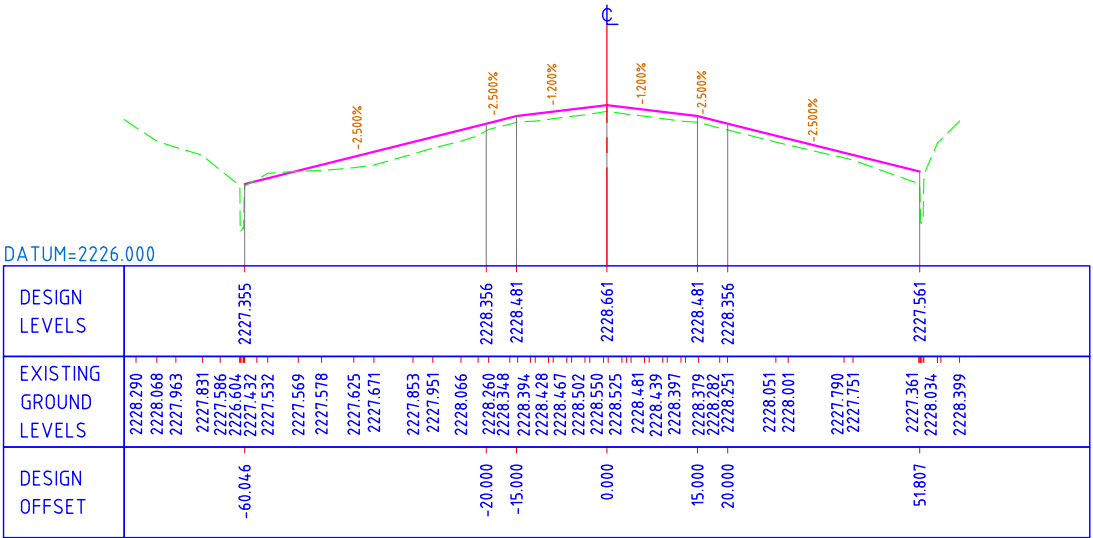
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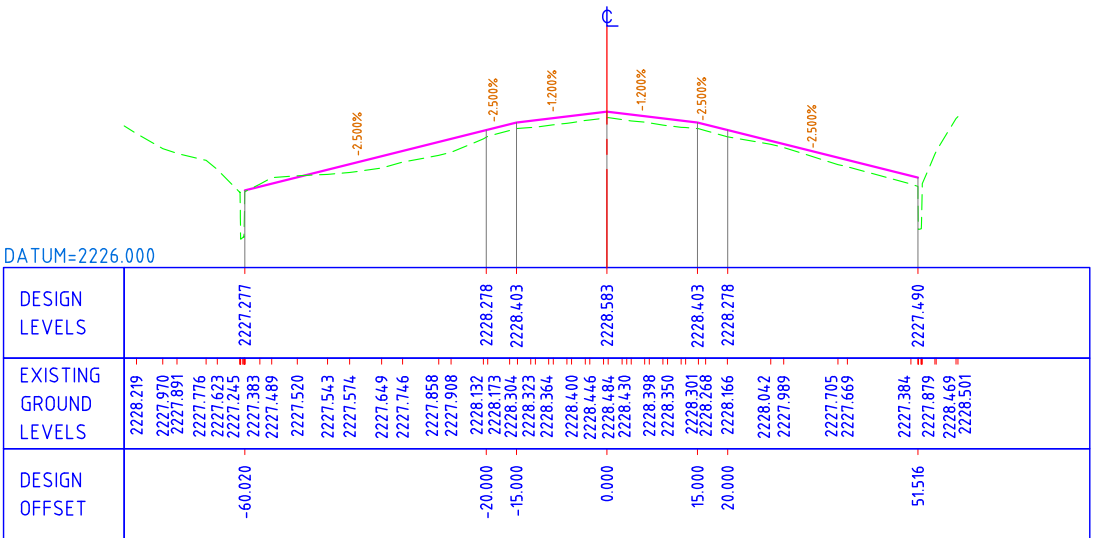
CHAINAGE =780.000



CHAINAGE =830.000



CHAINAGE =820.000



CHAINAGE =810.000

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

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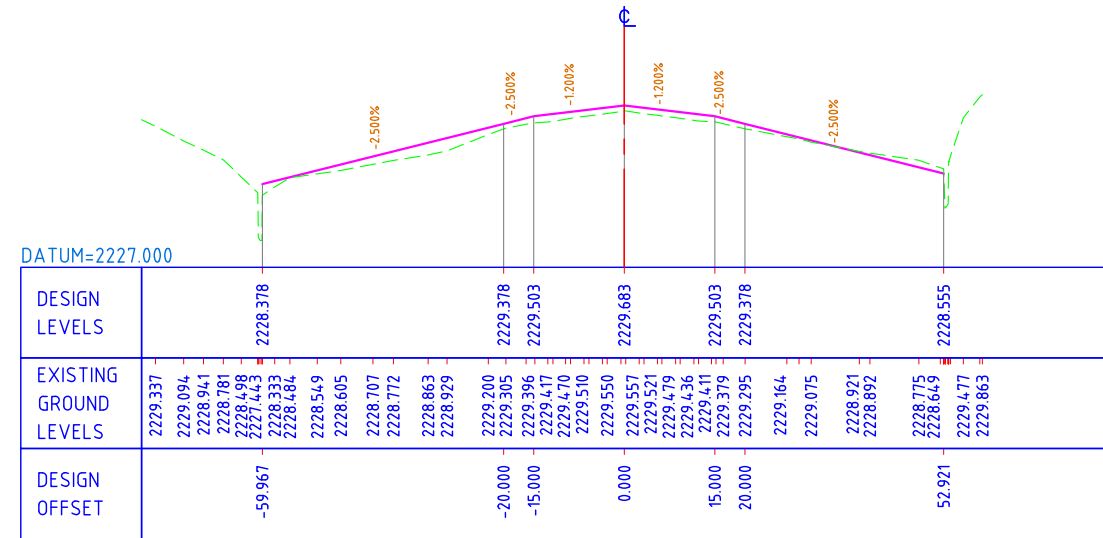
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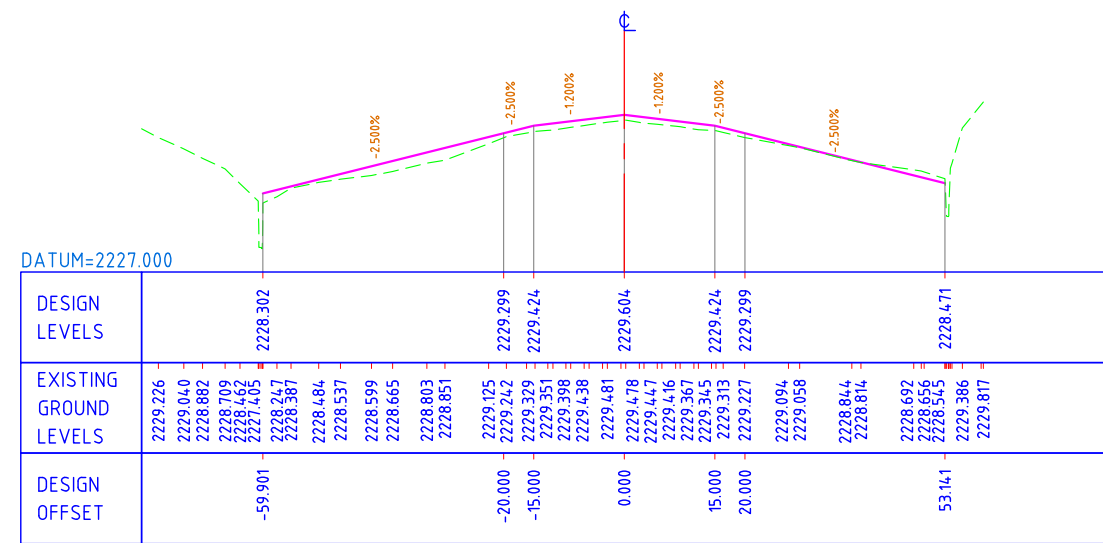
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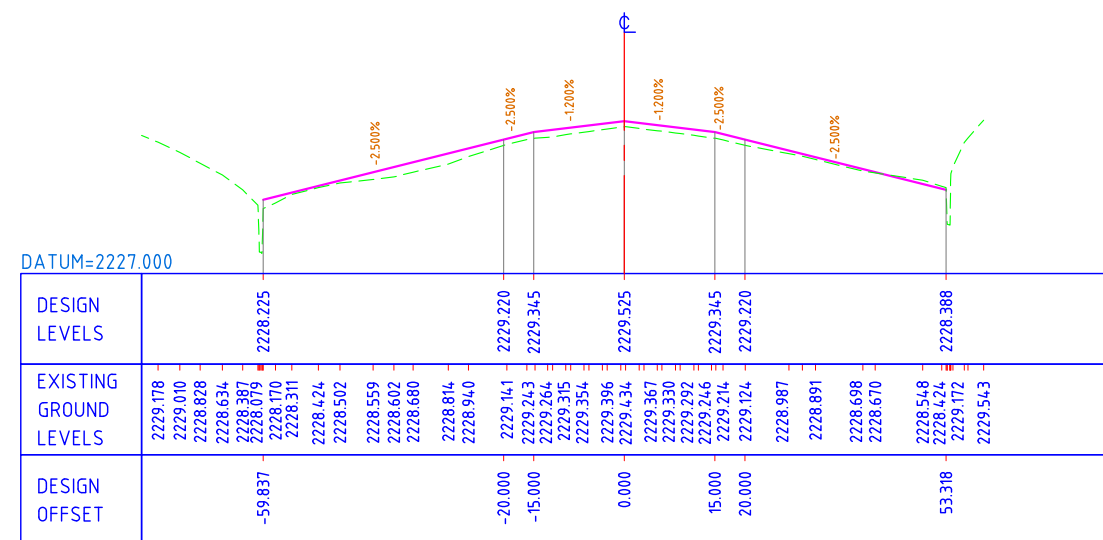




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CHAINAGE =940.000



CHAINAGE =930.000

**PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN**



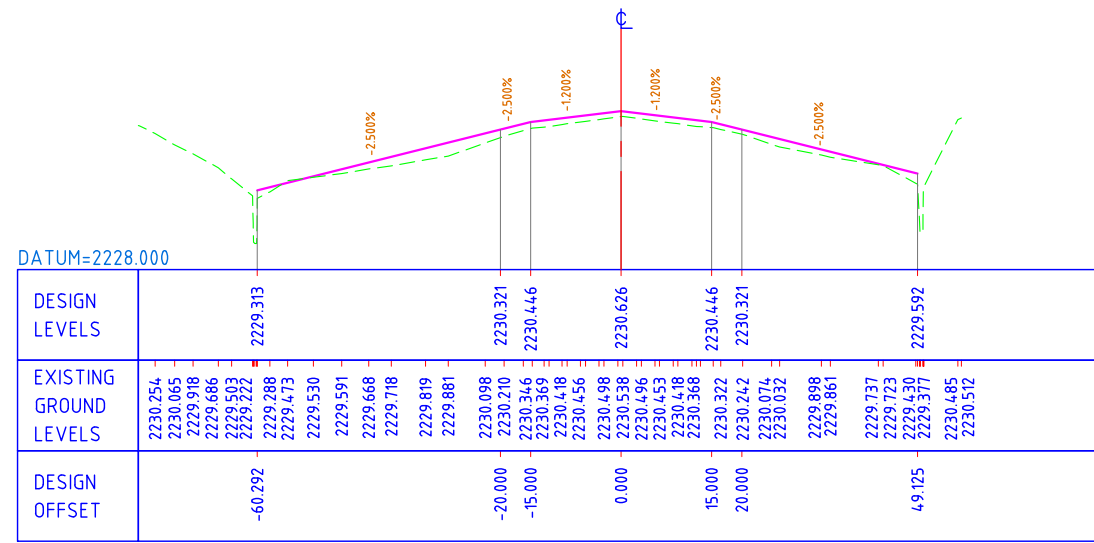
In JV  
With

TITLE: RUNNING CROSS SECTION  
(FROM CH: 900.000 TO 950.000)

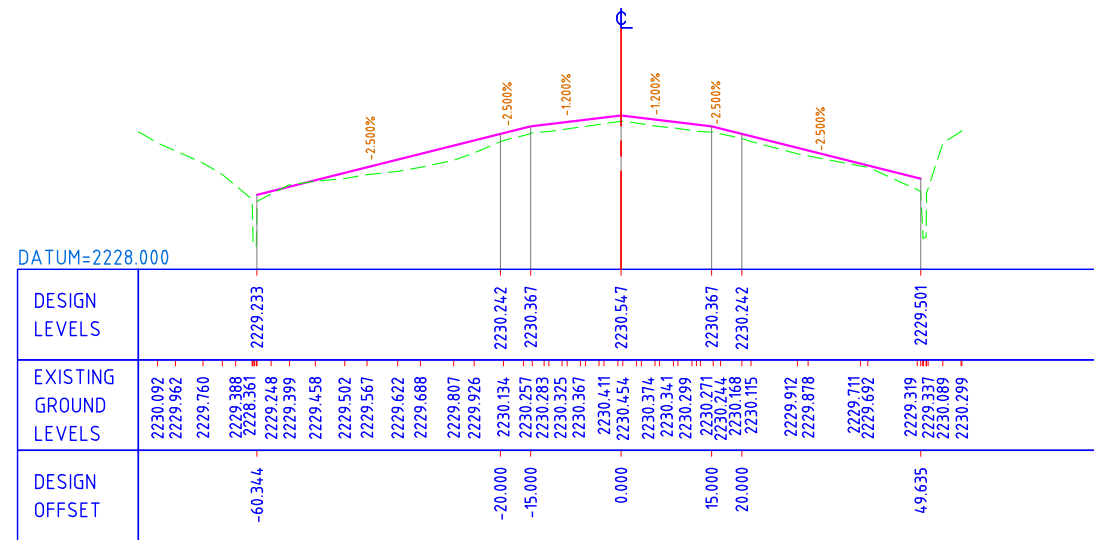
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12

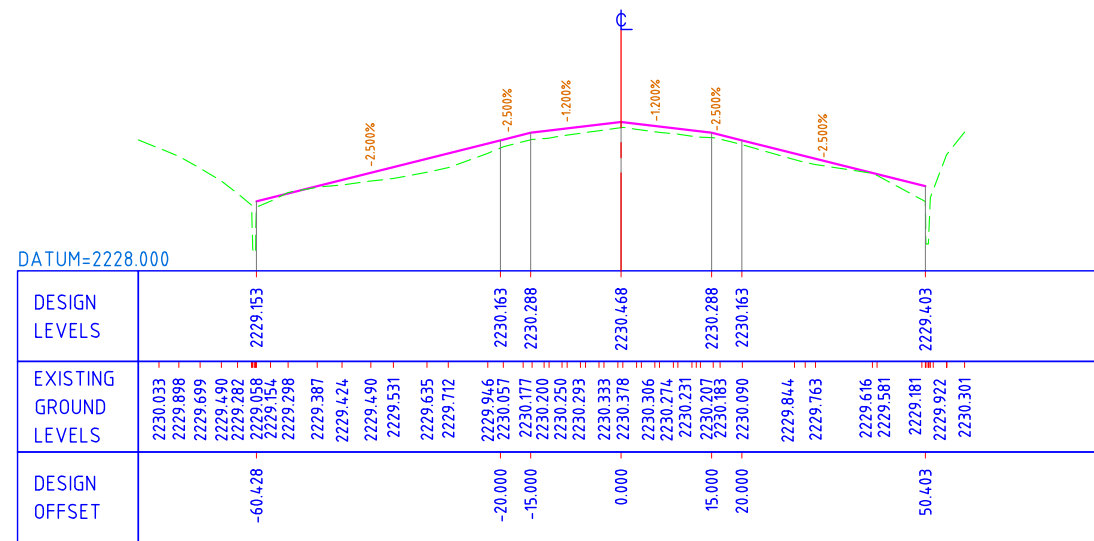




CHAINAGE =1070.000



CHAINAGE =1060.000



CHAINAGE =1050.000

**CLIENT:**

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**DESIGN CONSULTANT:**



PROJECT NUMBER	SIZE
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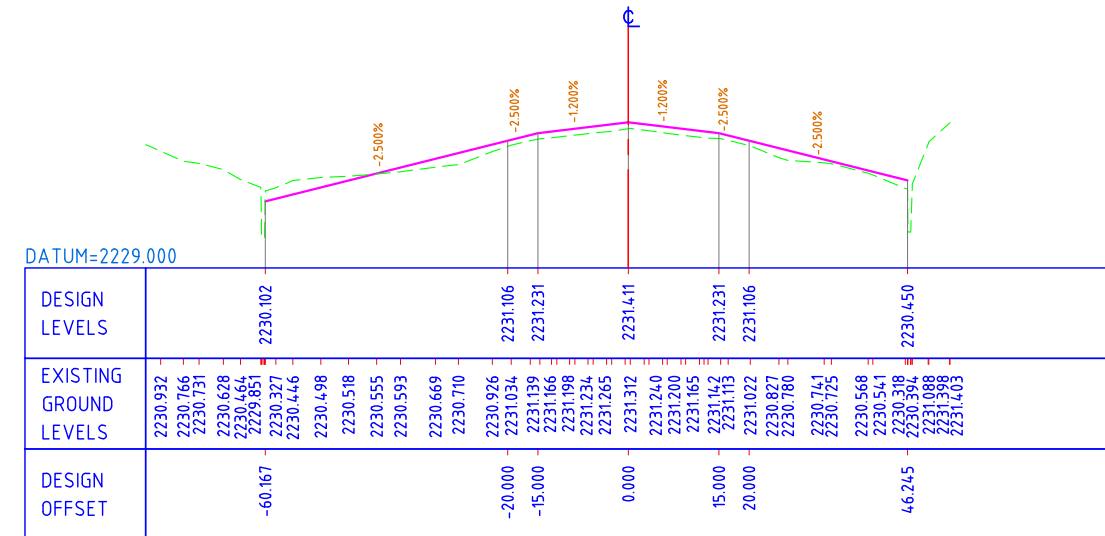
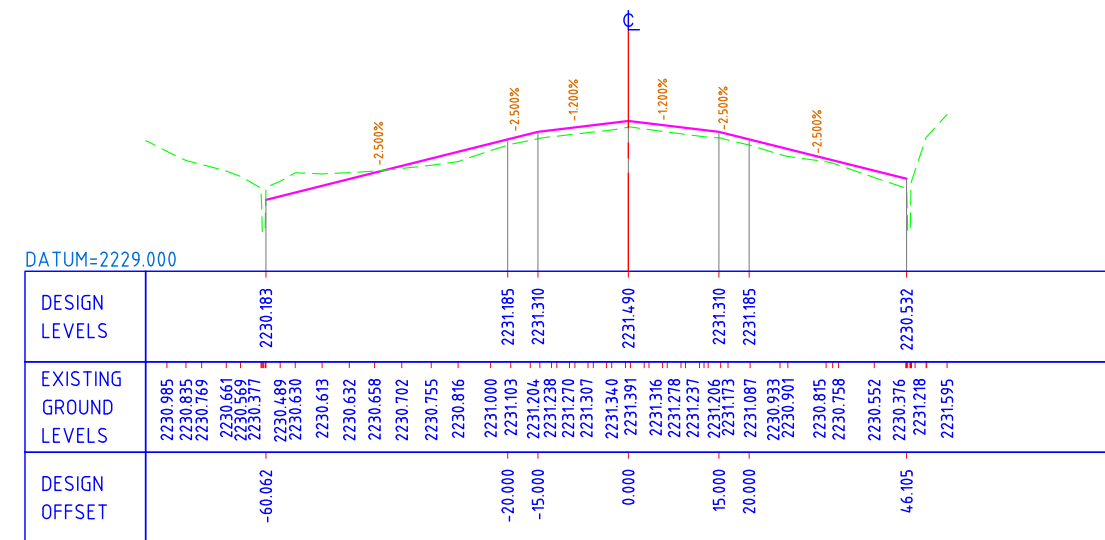
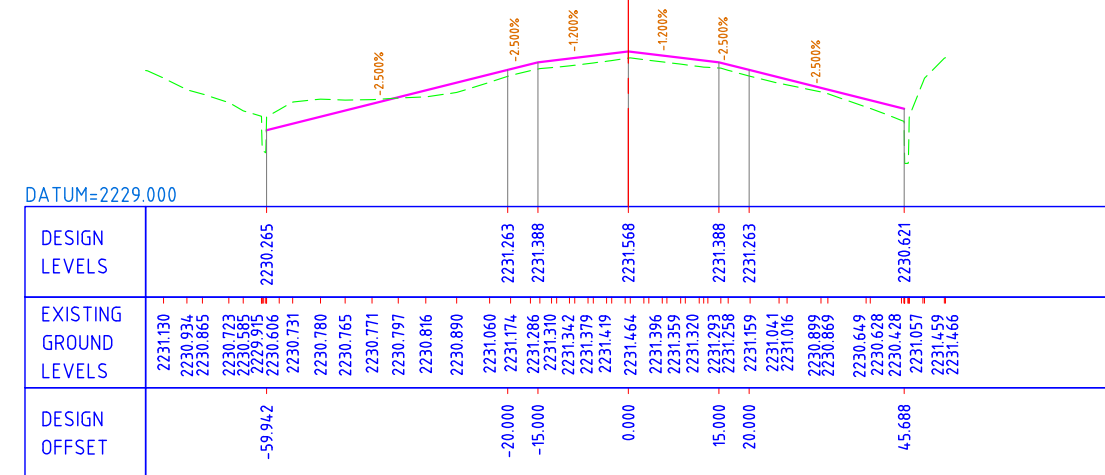
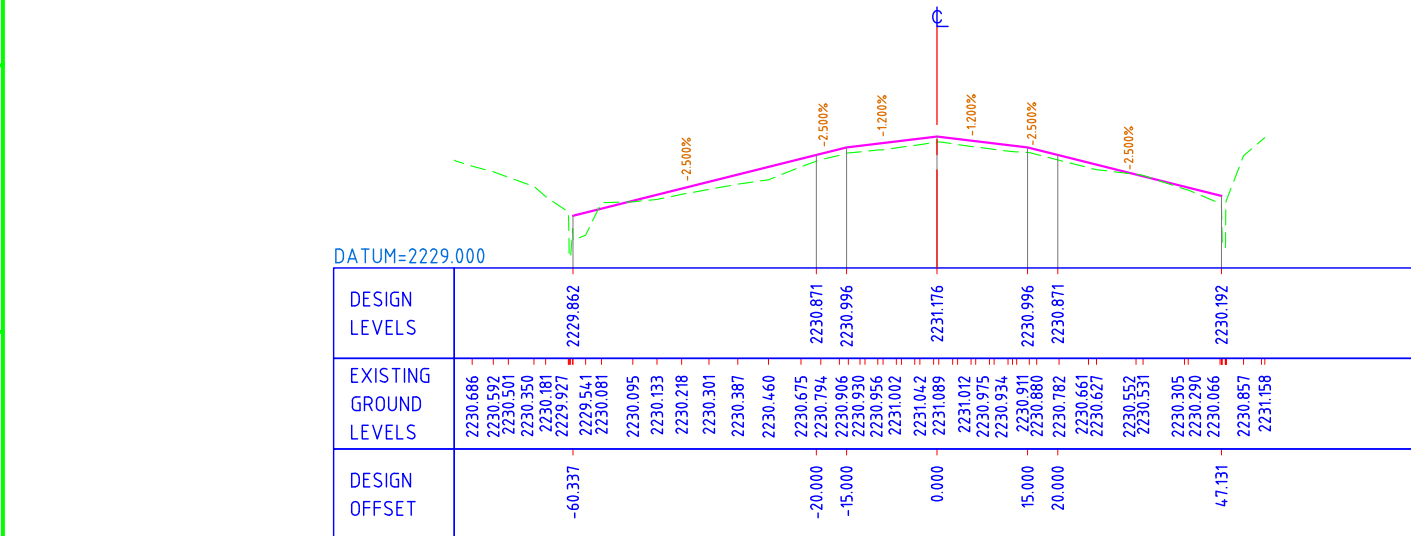
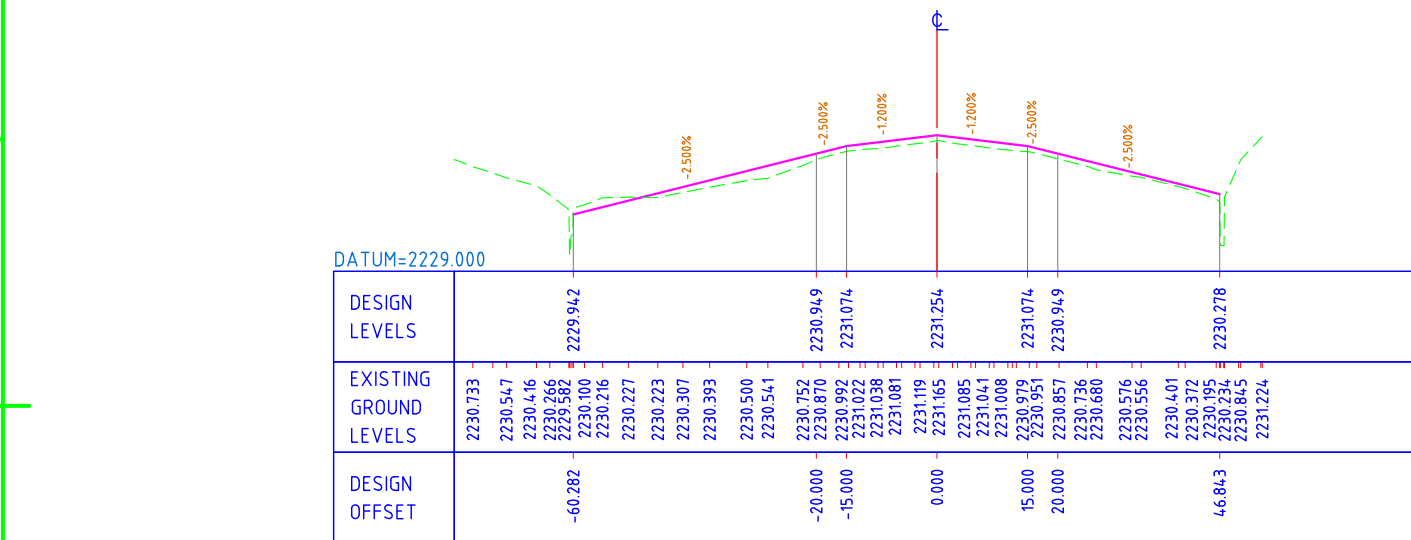
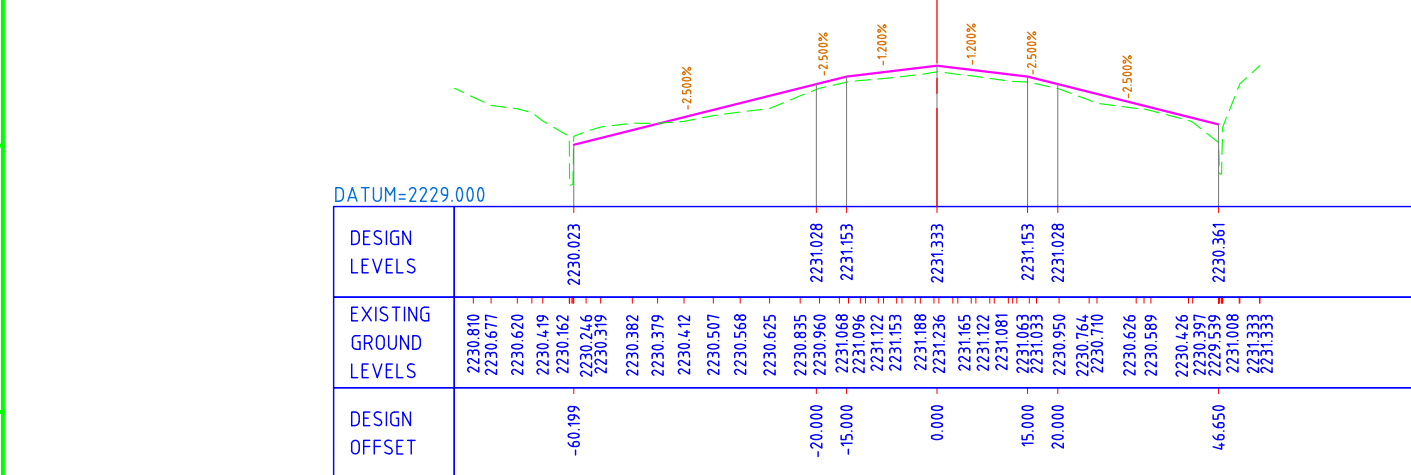
SCALE:	DRAWING NUMBER	REV:
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14250	DDY119	0
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REV.







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[illegible]



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UNITED CONSULTANCY  
61, JANGSAM LAM, CHANGANGKHA

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1140.000 TO 1190.000)

PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REVISION
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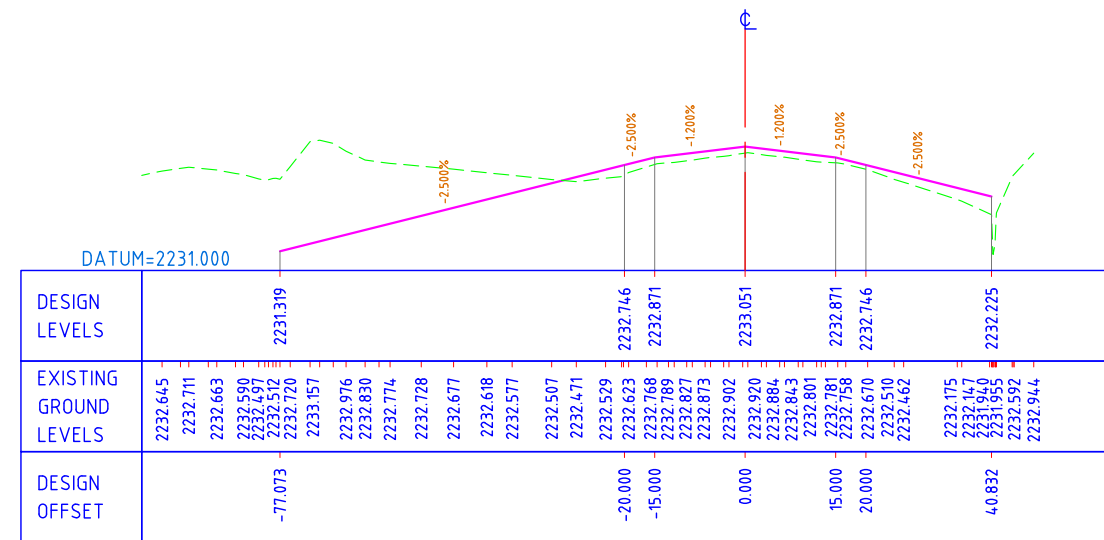
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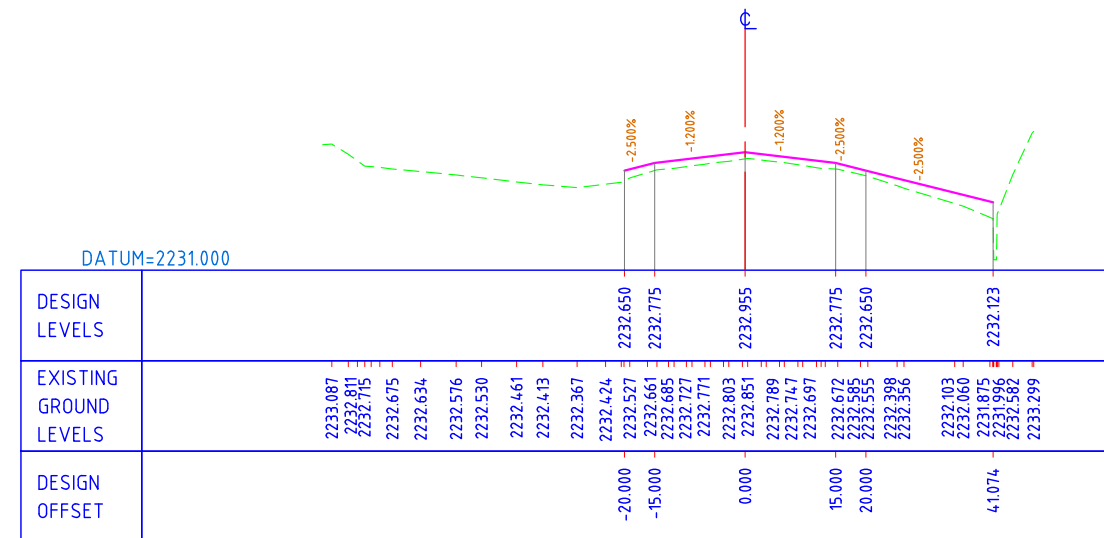




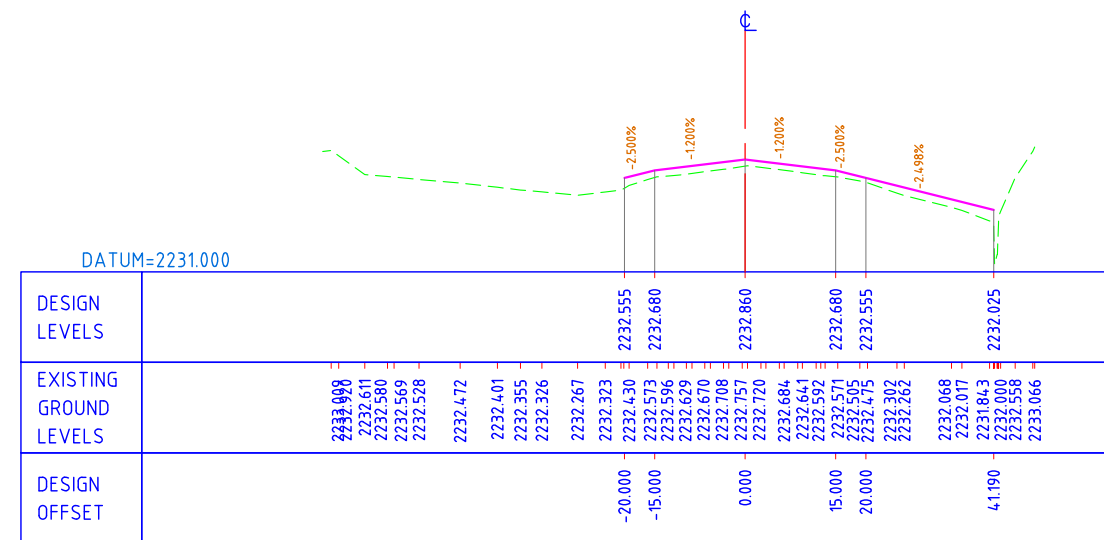




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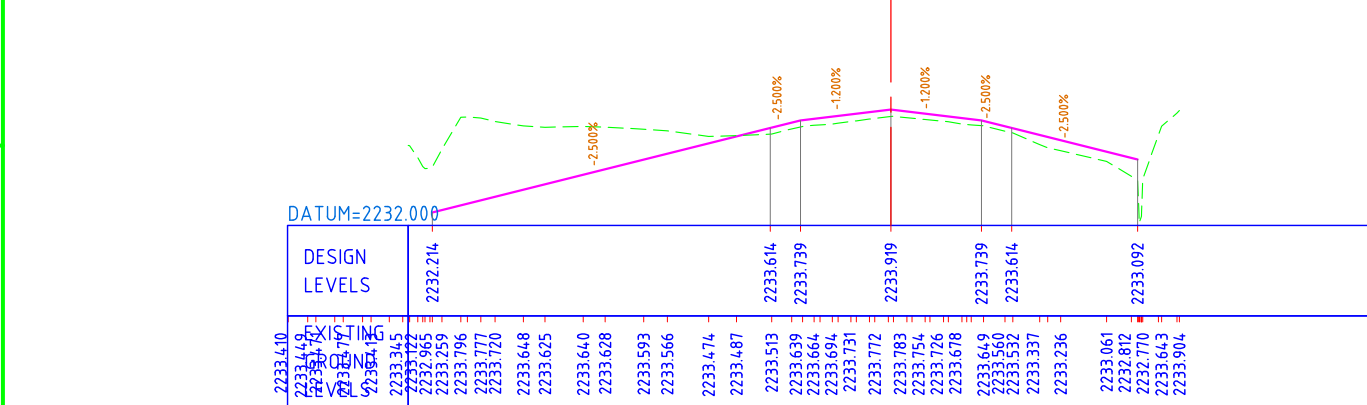


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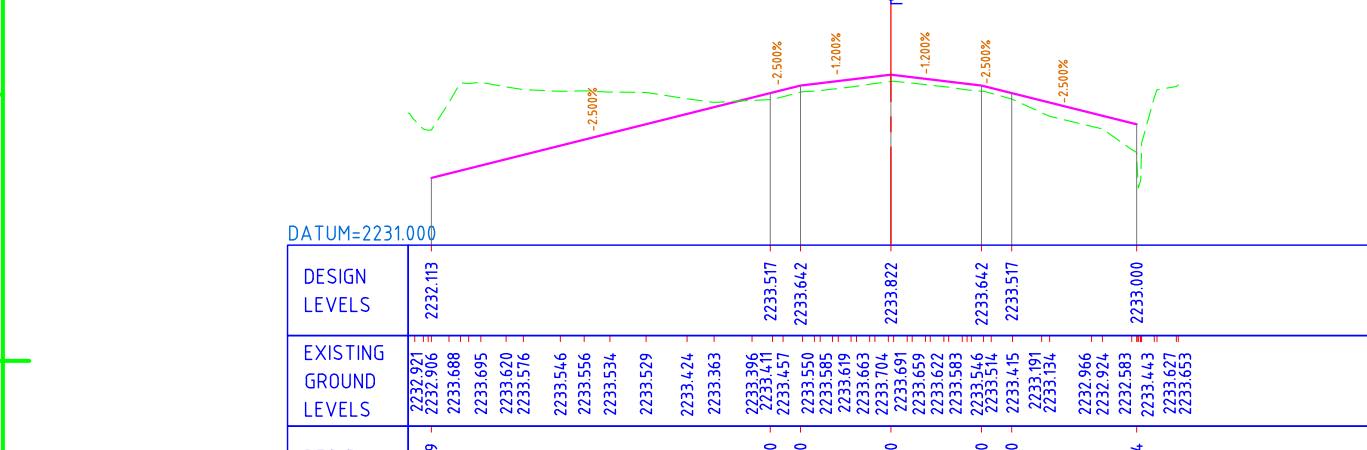
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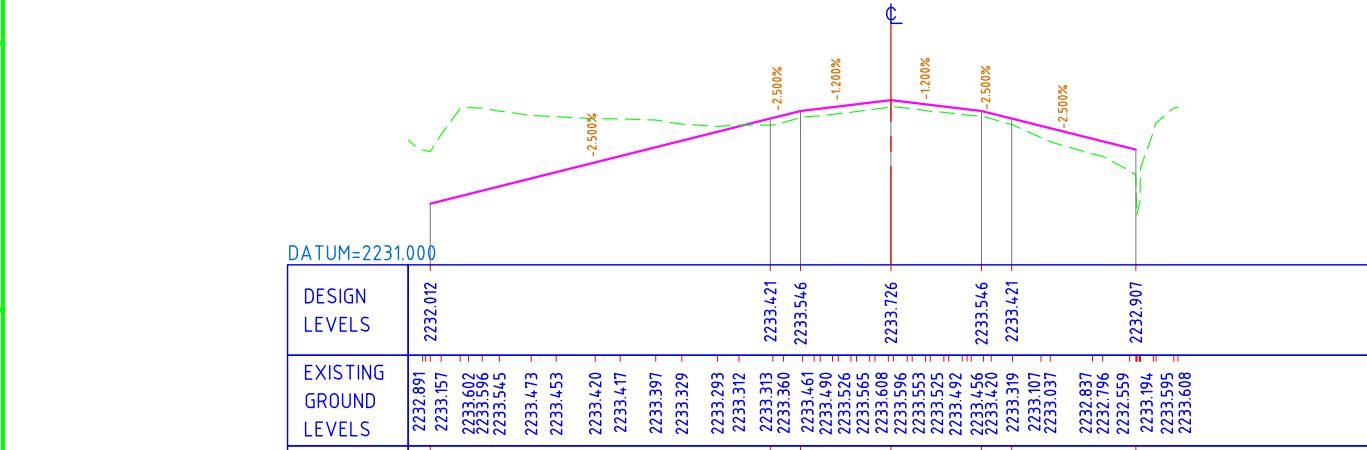




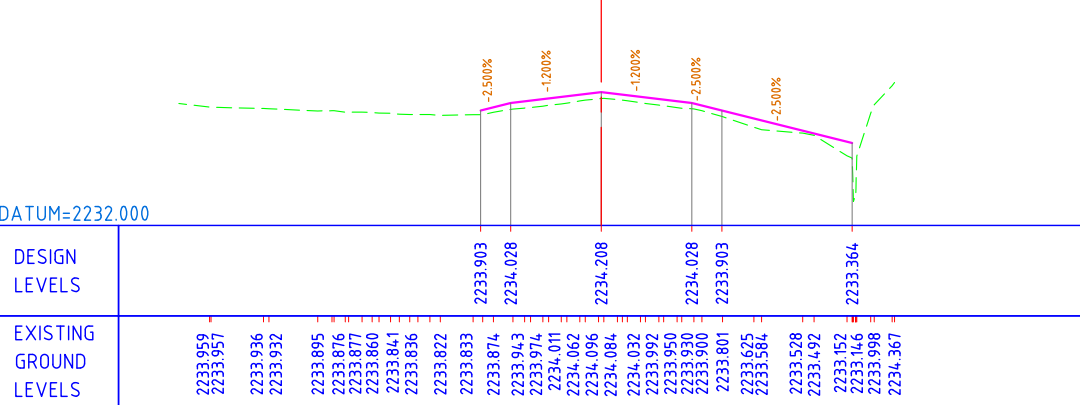
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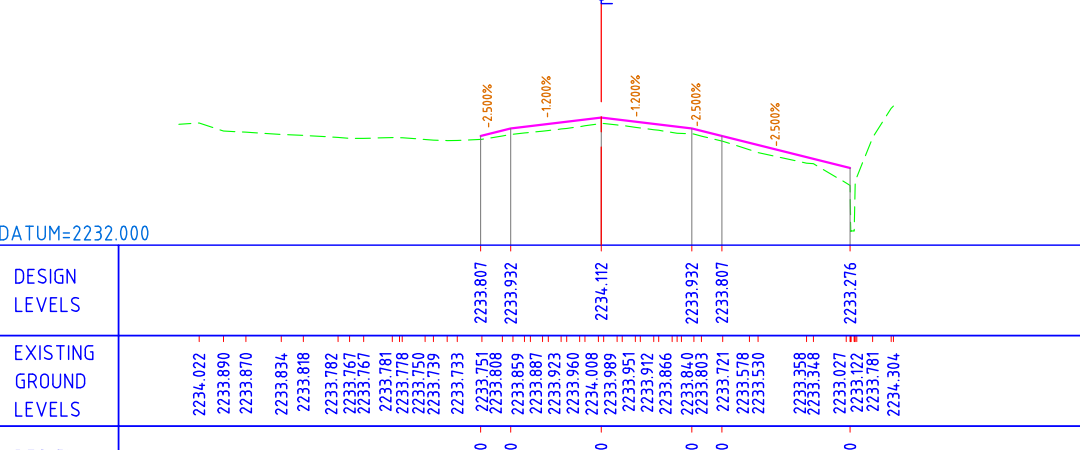
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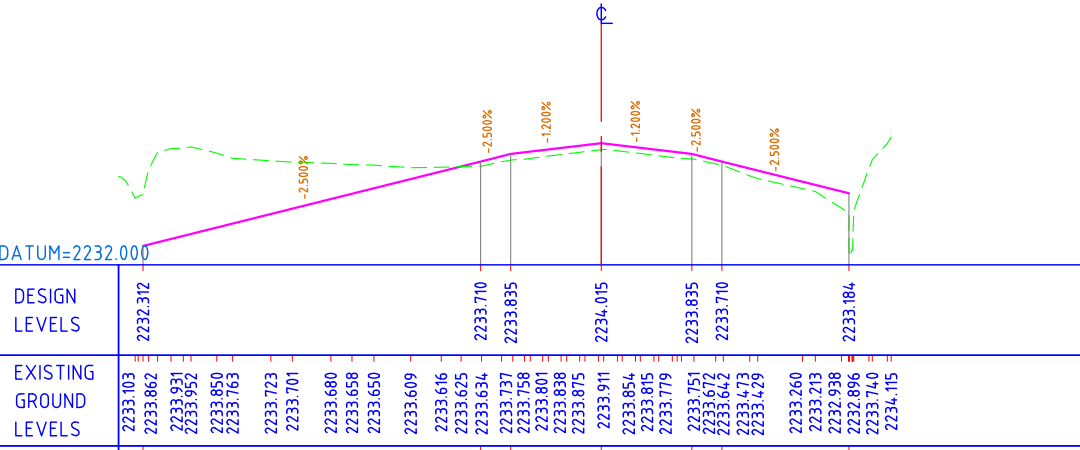
CHAINAGE =1440.000



CHAINAGE =1490.000



CHAINAGE =1480.000



CHAINAGE =1470.000

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THIMPHU, BHUTAN  
PH: (+975- 2-)326776 FAX NO:-32388  
E-mail: ucsonam@gmail.com

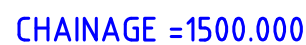
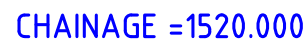
PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1440.000 TO 1490.000)

PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5	A3	1:1250	DDX125	0

plot scale 


 50mm



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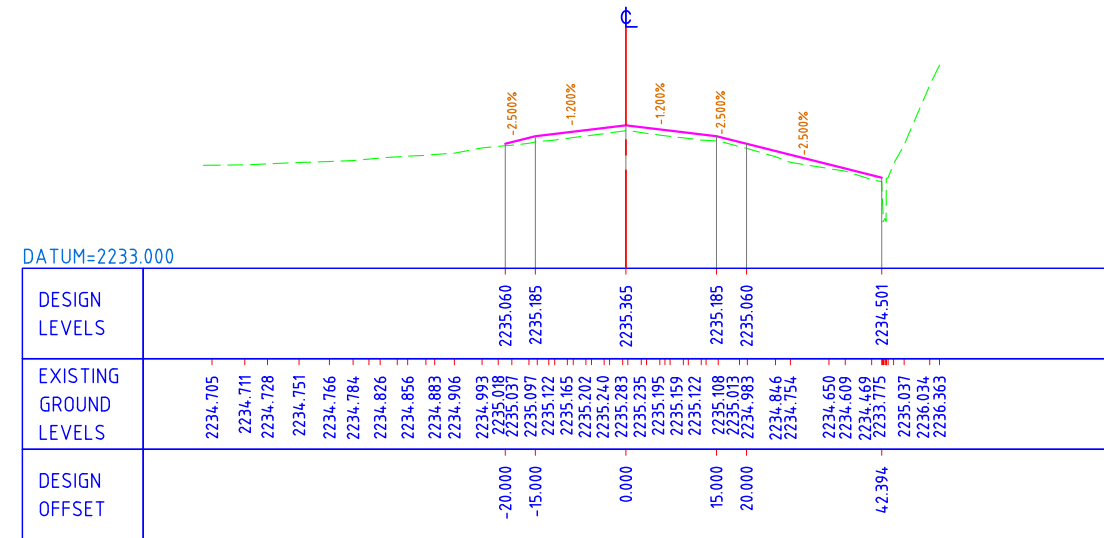
PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1500.000 TO 1550.000)

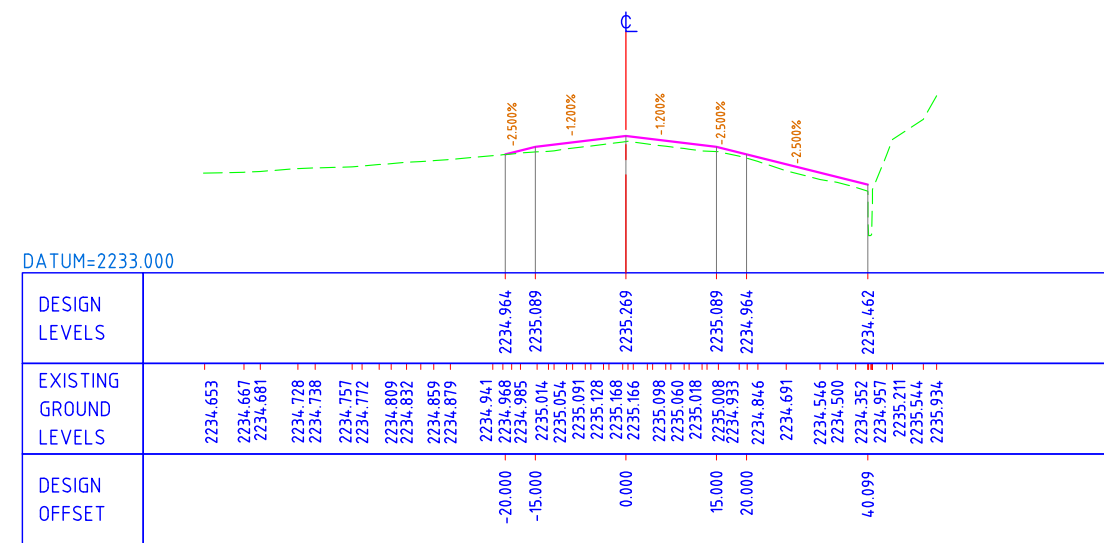
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plot scale 

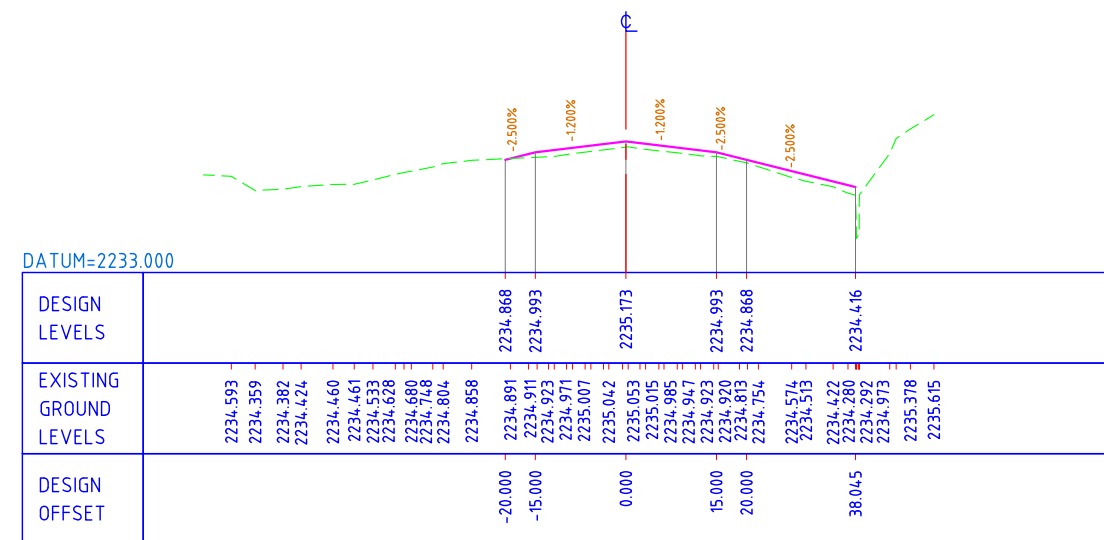

 50mm



CHAINAGE =1610.000



CHAINAGE =1600.000



CHAINAGE =1590.000

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**PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN**

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1560.000 TO 1610.000 )

PROJECT NUMBER								SIZE A3	SCALE: 1:1250	DRAWING NUMBER	REV:
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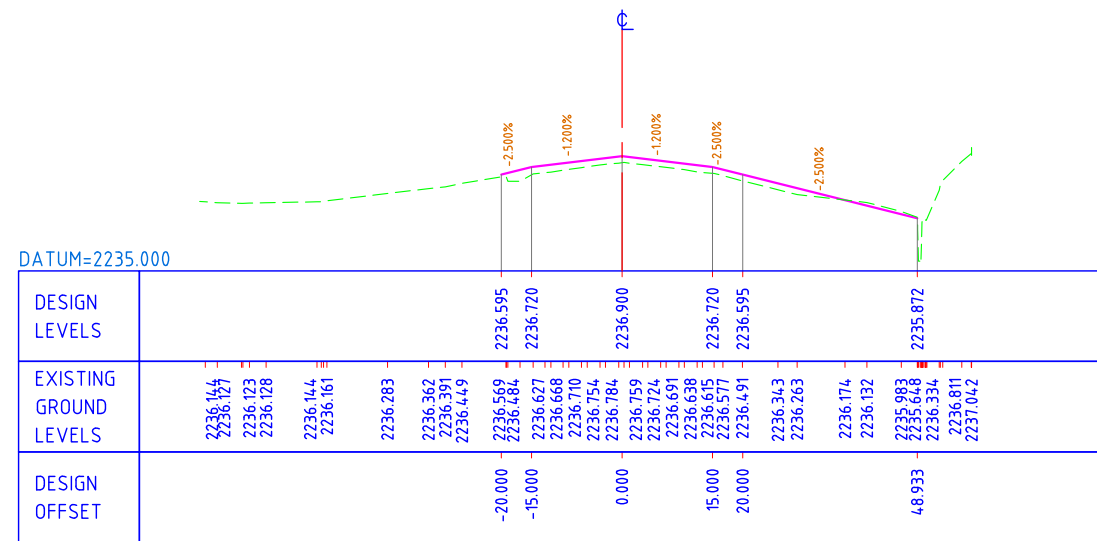
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 50mm

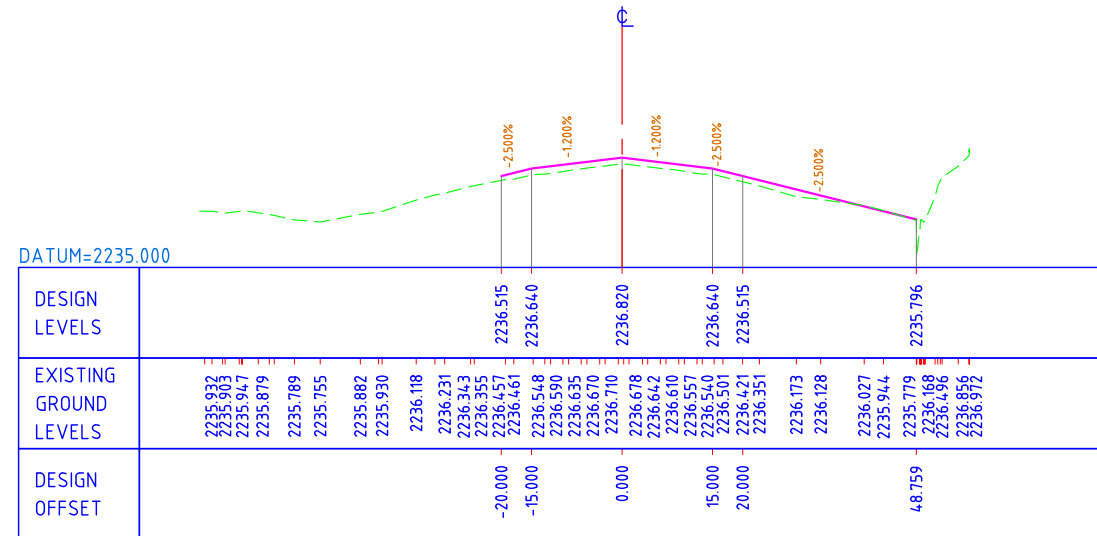




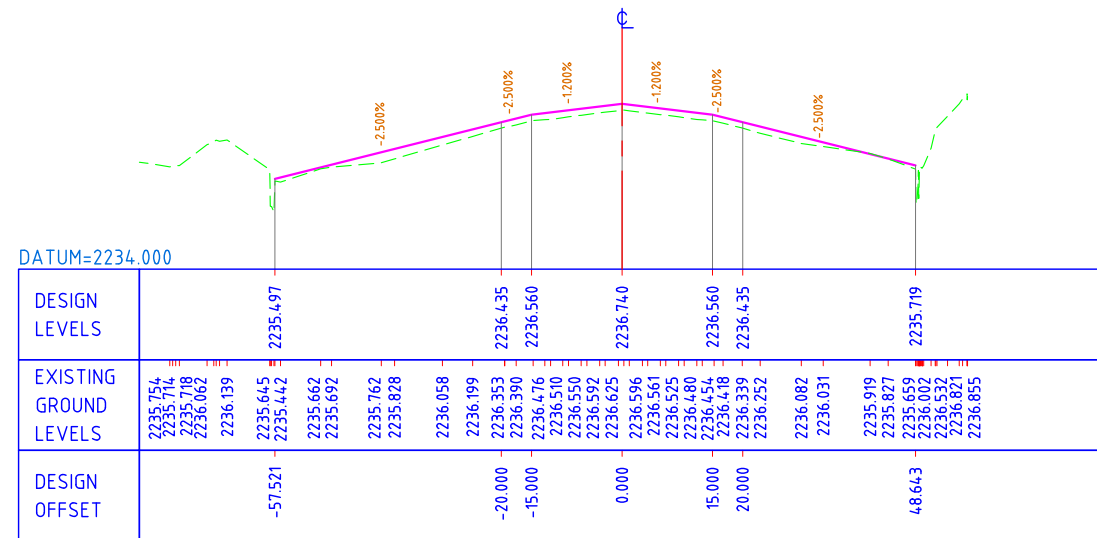




CHAINAGE =1790.000



CHAINAGE =1780.000



CHAINAGE =1770.000

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1740.000 TO 1790.000 )

plot scale 

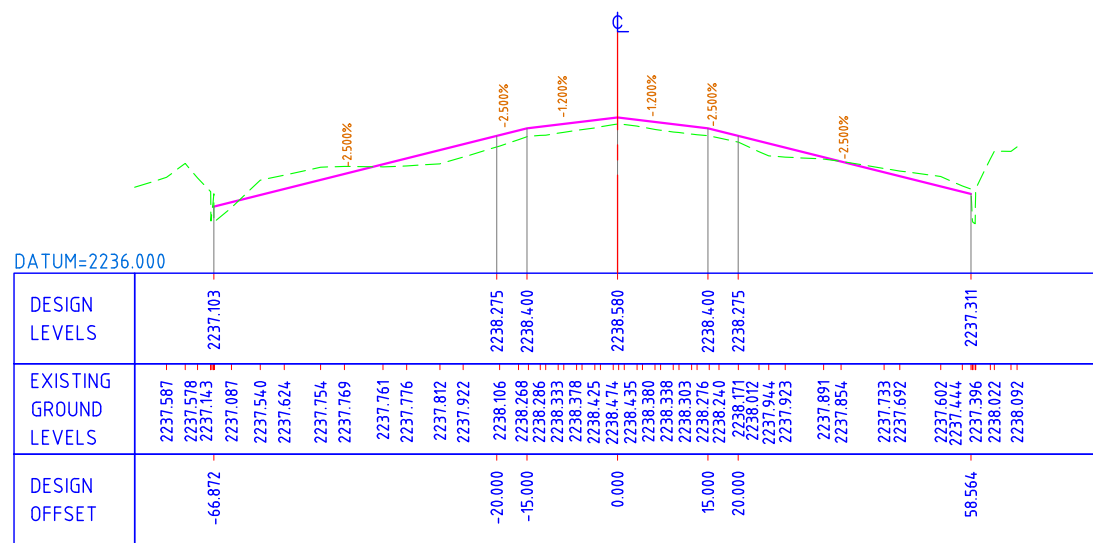

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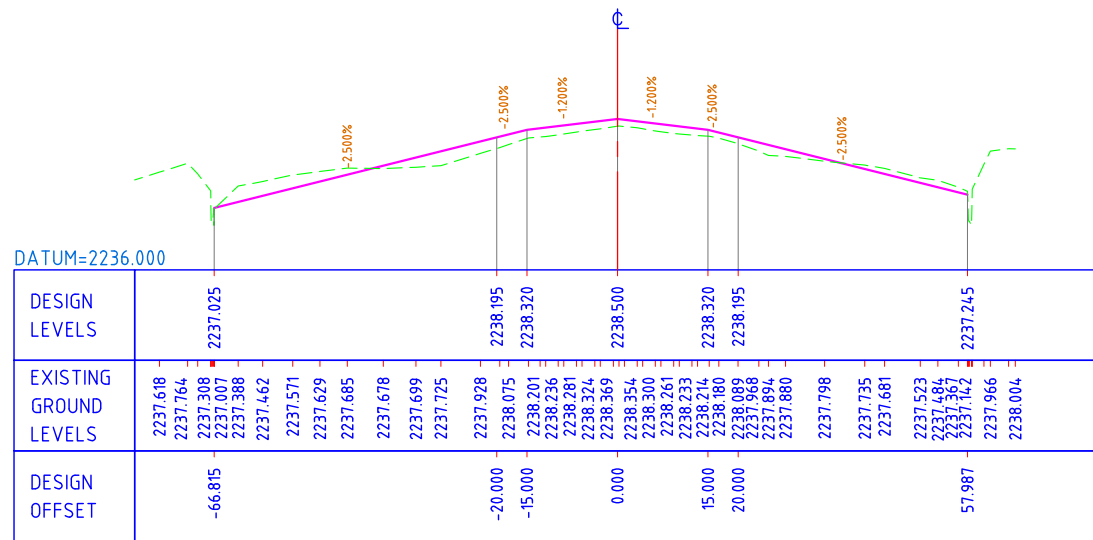




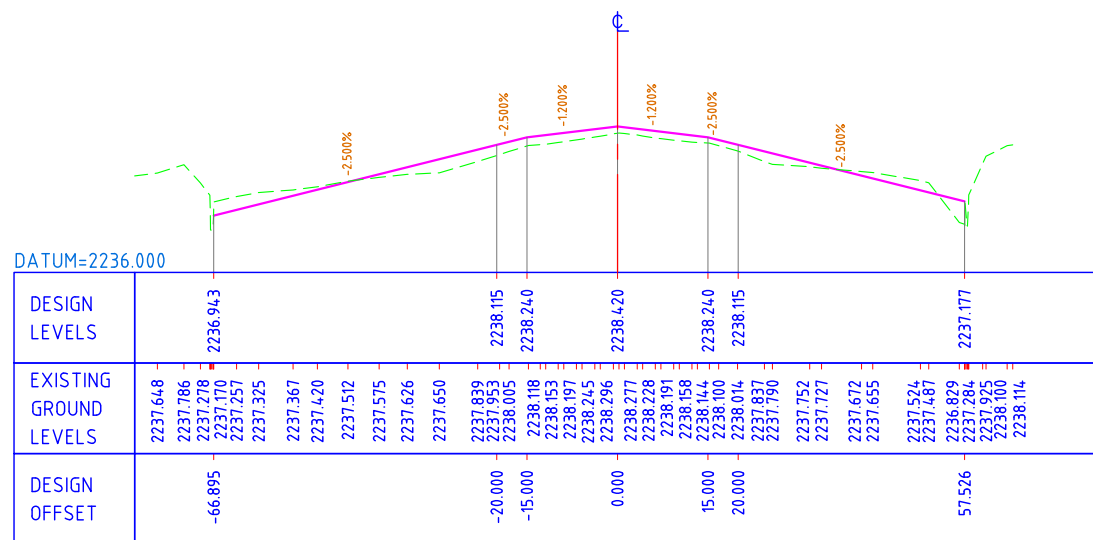




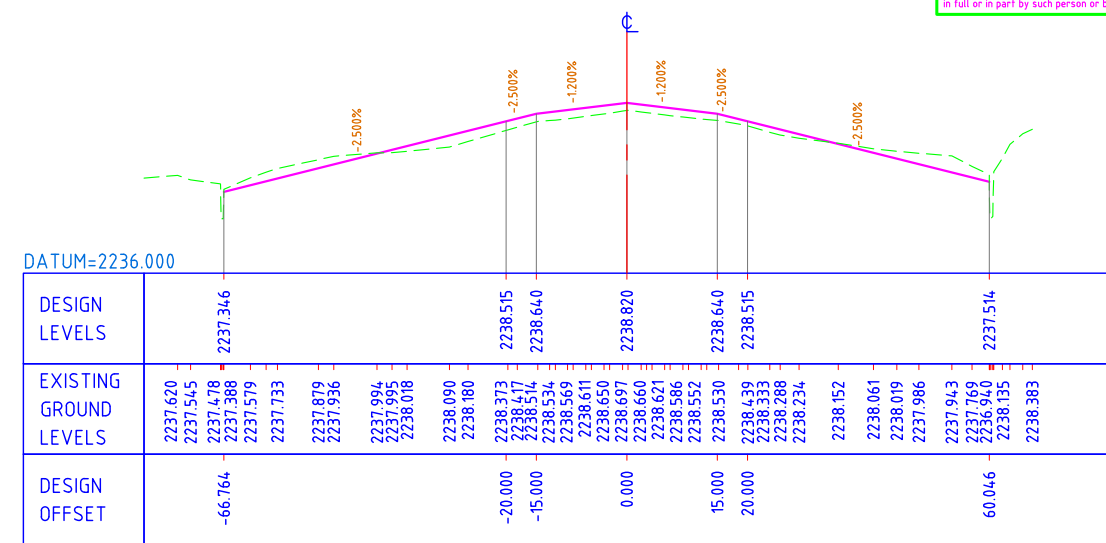
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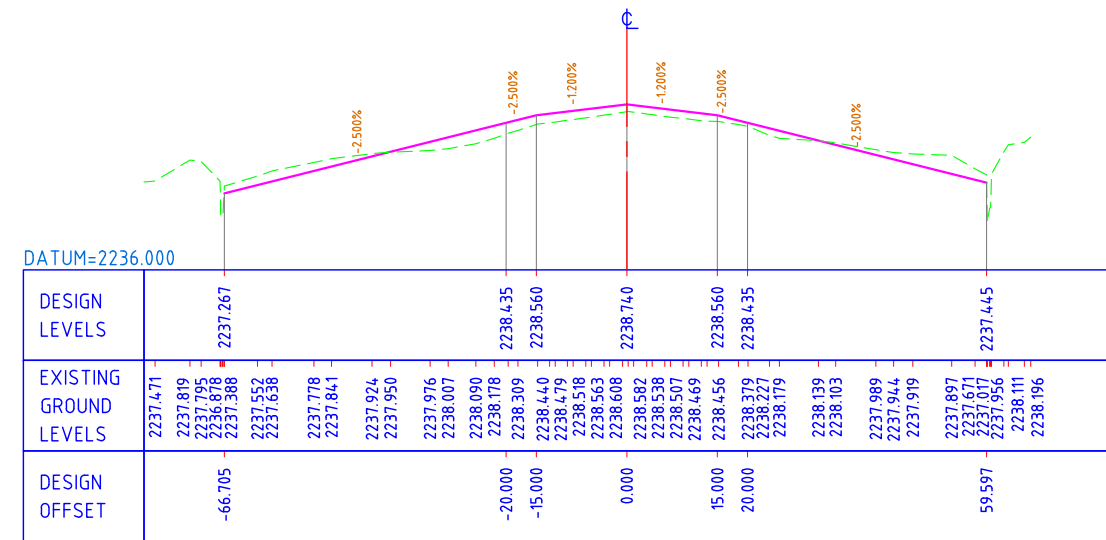
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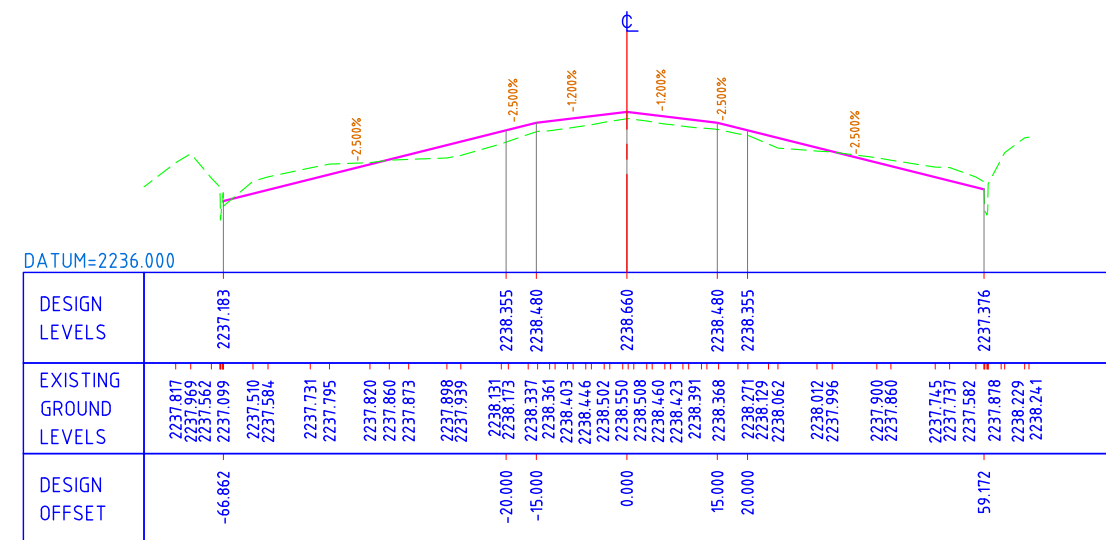
CHAINAGE =1980.000



CHAINAGE =2030.000



CHAINAGE =2020.000



CHAINAGE =2010.000

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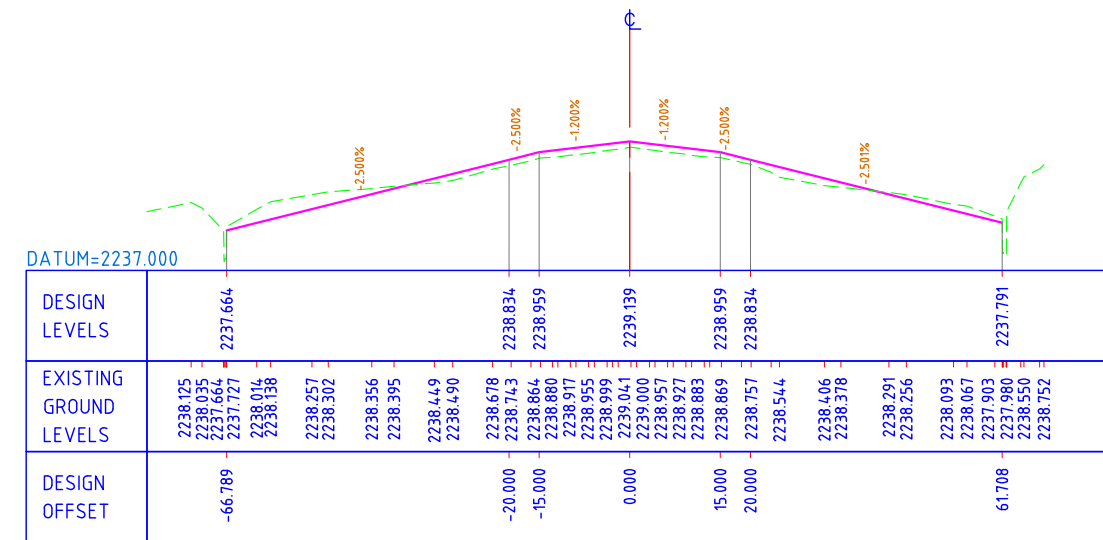
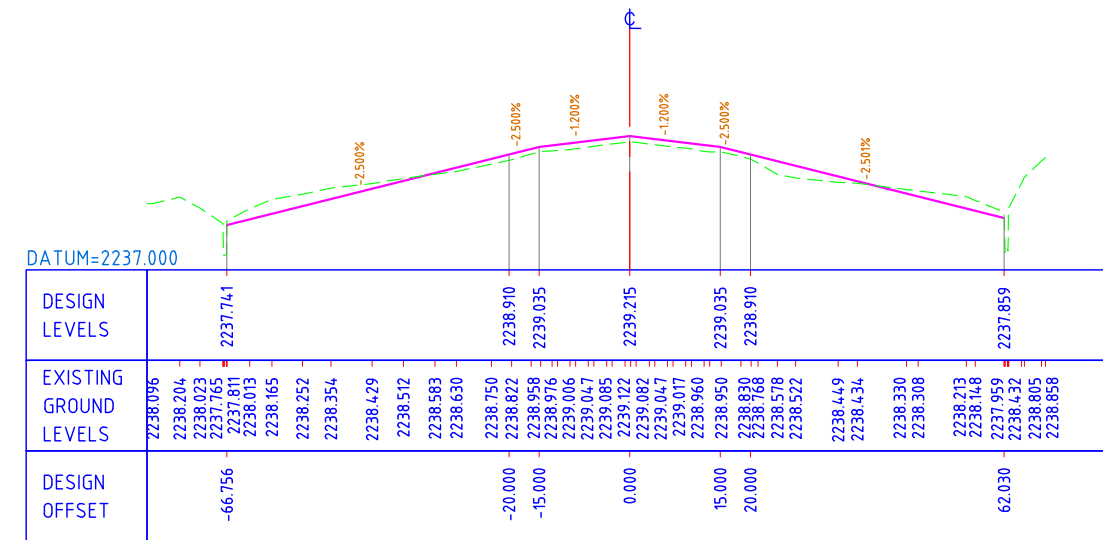
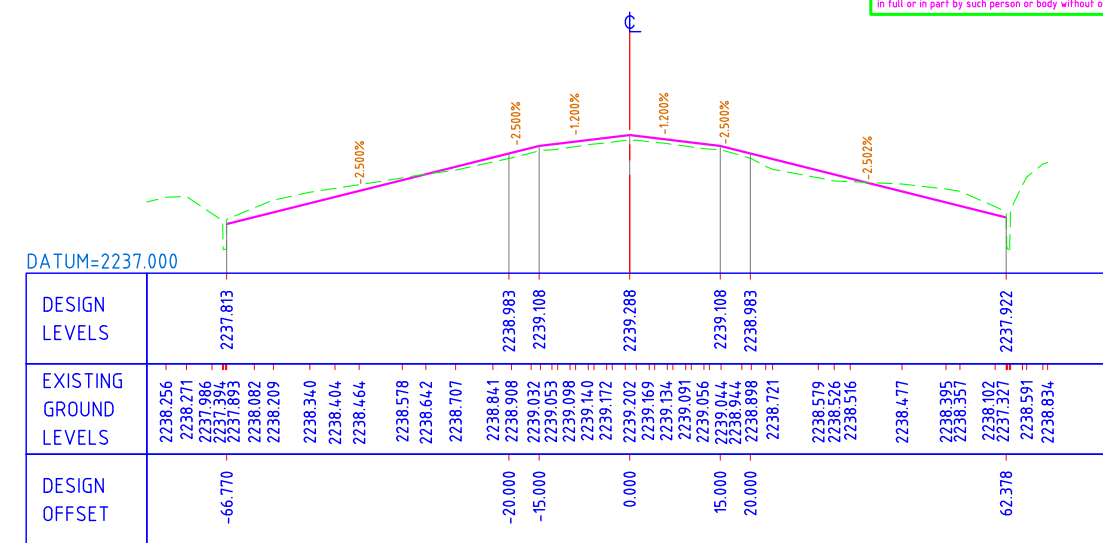
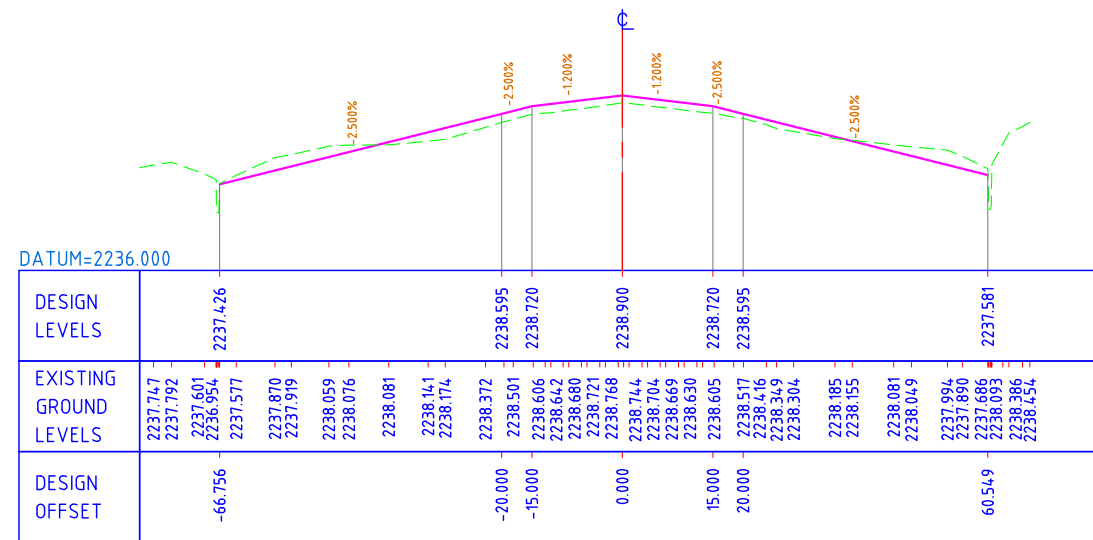
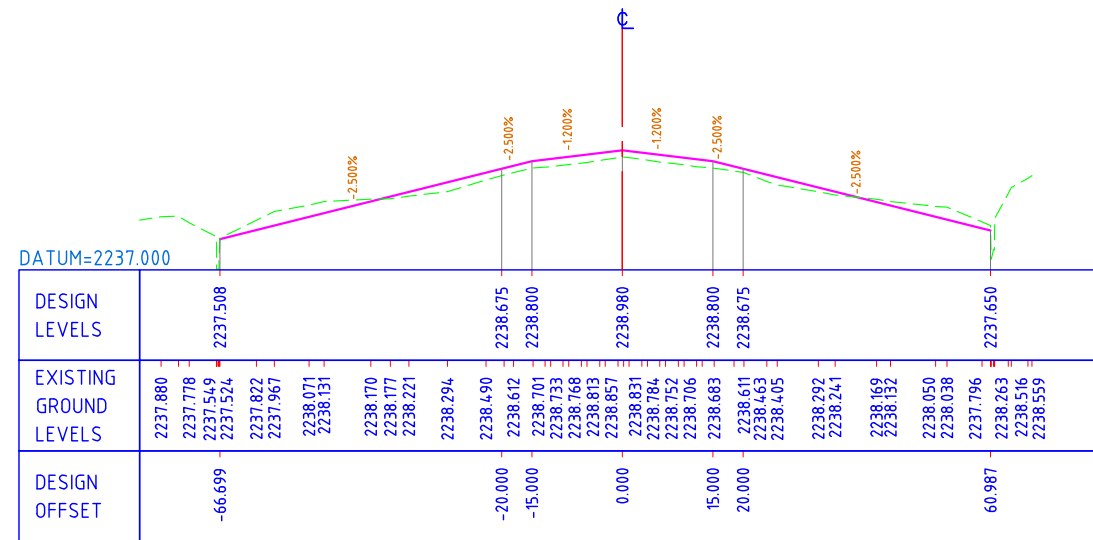
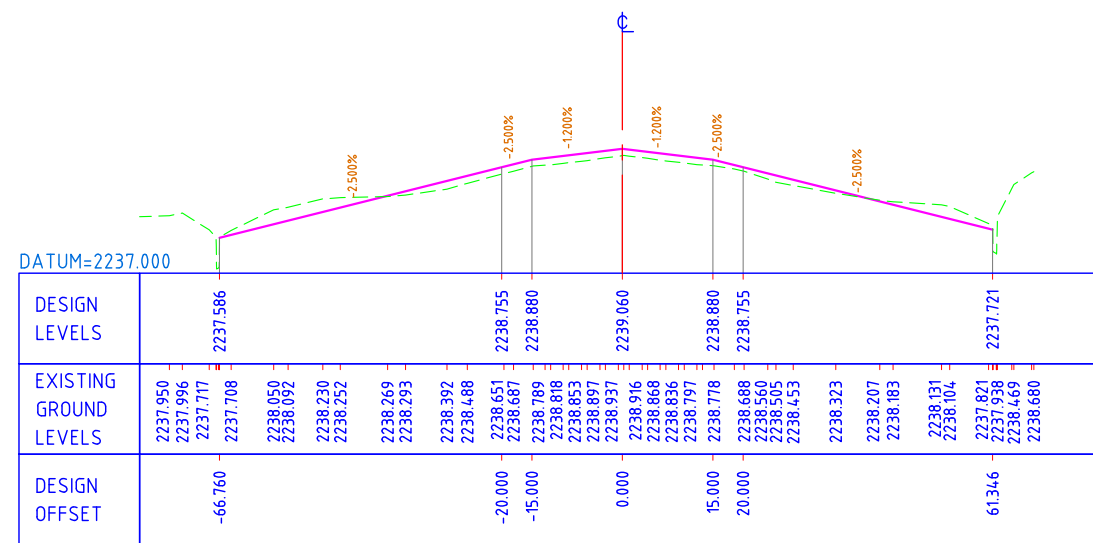
PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNNING CROSS SECTION  
(FROM CH: 1980.000 TO 2030.000 )

PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5	A3	1:1250	DDX134	0

plot scale 


 50mm



NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED

[illegible]

CLIENT:

ROYAL GOVERNMENT OF BHUTAN



DESIGN CONSULTANT:



L&T INFRASTRUCTURE ENGINEERING LTD  
TC 2 BUILDING, 3rd FLOOR,  
MOUNT POONAMALLEE ROAD,  
MANAPAKKAM, P.B.NO.979, CHENNAI – 600 089  
E-mail: roads@lntiel.com. Website: www.lntiel.com

In JV  
With



UNITED CONSULTANCY  
61, JANGSAM LAM, CHANGANGKHA,  
THIMPHU, BHUTAN  
PH: (+975- 2-)326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

PROJECT: PAVEMENT EVALUATION AND REHABILITATION  
AT PARO INTERNATIONAL AIRPORT, BHUTAN

TITLE: RUNNING CROSS SECTION  
(FROM CH: 2040.000 TO 2090.000 )

PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5	A3	1:1250	DDX135	0

plot scale 


 50mm





DATUM=2238.000

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EXISTING GROUND LEVELS	2238.777 2238.738 2238.897 2238.889 2238.984 2239.034 2239.025 2239.122 2239.285 2239.366 2239.137 2239.516 2239.516 2239.577 2239.613 2239.655 2239.680 2239.655 2239.626 2239.582 2239.558 2239.548 2239.465 2239.368 2239.371 2239.403 2239.356 2239.259 2239.183 2239.072 2238.954 2238.726 2238.309 2239.313 2239.409
DESIGN OFFSET	-20.000 -15.000 0.000 15.000 20.000 65.573

CHAINAGE =2180.000

DATUM=2237.000

DESIGN LEVELS	2238.346 2239.446 2239.571 2239.751 2239.571 2239.446 2238.316
EXISTING GROUND LEVELS	2238.905 2238.903 2238.889 2238.621 2238.724 2238.470 2238.678 2238.639 2238.898 2238.960 2239.002 2239.046 2239.042 2239.177 2239.261 2239.299 2239.375 2239.446 2239.505 2239.535 2239.568 2239.605 2239.638 2239.612 2239.587 2239.544 2239.506 2239.496 2239.467 2239.403 2239.360 2239.310 2239.306 2239.318 2239.175 2239.115 2239.036 2238.866 2238.678 2238.520 2239.273 2239.395
DESIGN OFFSET	-64.021 -20.000 -15.000 0.000 15.000 20.000 65.189

CHAINAGE =2170.000

DATUM=2237.000

DESIGN LEVELS	2238.261 2239.400 2239.525 2239.705 2239.525 2239.400 2238.278
EXISTING GROUND LEVELS	2238.744 2238.743 2238.505 2238.381 2238.687 2238.828 2238.921 2238.951 2239.011 2239.034 2239.118 2239.189 2239.285 2239.356 2239.429 2239.476 2239.477 2239.508 2239.545 2239.578 2239.548 2239.522 2239.484 2239.439 2239.432 2239.399 2239.399 2239.305 2239.299 2239.297 2239.259 2239.183 2239.008 2238.901 2238.704 2238.604 2238.160 2239.245 2239.482
DESIGN OFFSET	-65.545 -20.000 -15.000 0.000 15.000 20.000 64.846

CHAINAGE =2160.000

DATUM=2238.000

DESIGN LEVELS	2239.629 2239.754 2239.934 2239.754 2239.629 2238.461
EXISTING GROUND LEVELS	2238.867 2238.889 2238.978 2239.077 2239.046 2239.034 2239.178 2239.286 2239.401 2239.433 2239.533 2239.597 2239.695 2239.695 2239.724 2239.754 2239.786 2239.817 2239.798 2239.781 2239.745 2239.717 2239.699 2239.578 2239.627 2239.659 2239.477 2239.415 2239.377 2239.392 2239.140 2239.013 2238.852 2238.302 2239.534 2239.614
DESIGN OFFSET	-20.000 -15.000 0.000 15.000 20.000 66.739

CHAINAGE =2210.000

DATUM=2238.000

DESIGN LEVELS	2239.584 2239.709 2239.889 2239.709 2239.584 2238.424
EXISTING GROUND LEVELS	2239.039 2238.922 2238.909 2238.970 2238.960 2238.945 2239.075 2239.169 2239.249 2239.308 2239.417 2239.463 2239.536 2239.616 2239.640 2239.679 2239.714 2239.750 2239.779 2239.751 2239.732 2239.694 2239.662 2239.640 2239.548 2239.570 2239.599 2239.472 2239.374 2239.336 2239.346 2239.074 2238.933 2238.748 2239.163 2239.586 2239.532
DESIGN OFFSET	-20.000 -15.000 0.000 15.000 20.000 66.375

CHAINAGE =2200.000

DATUM=2238.000

DESIGN LEVELS	2239.538 2239.663 2239.843 2239.663 2239.538 2238.387
EXISTING GROUND LEVELS	2239.029 2238.895 2238.888 2238.869 2238.862 2238.991 2239.063 2239.255 2239.299 2239.429 2239.480 2239.560 2239.588 2239.625 2239.660 2239.696 2239.726 2239.694 2239.669 2239.632 2239.604 2239.589 2239.509 2239.523 2239.528 2239.452 2239.376 2239.272 2239.249 2239.084 2238.933 2238.376 2238.112 2239.444 2239.525
DESIGN OFFSET	-20.000 -15.000 0.000 15.000 20.000 66.023

CHAINAGE =2190.000

NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

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CLIENT: ROYAL GOVERNMENT OF BHUTAN



DESIGN CONSULTANT: L&T Infra Engineering

In JV With

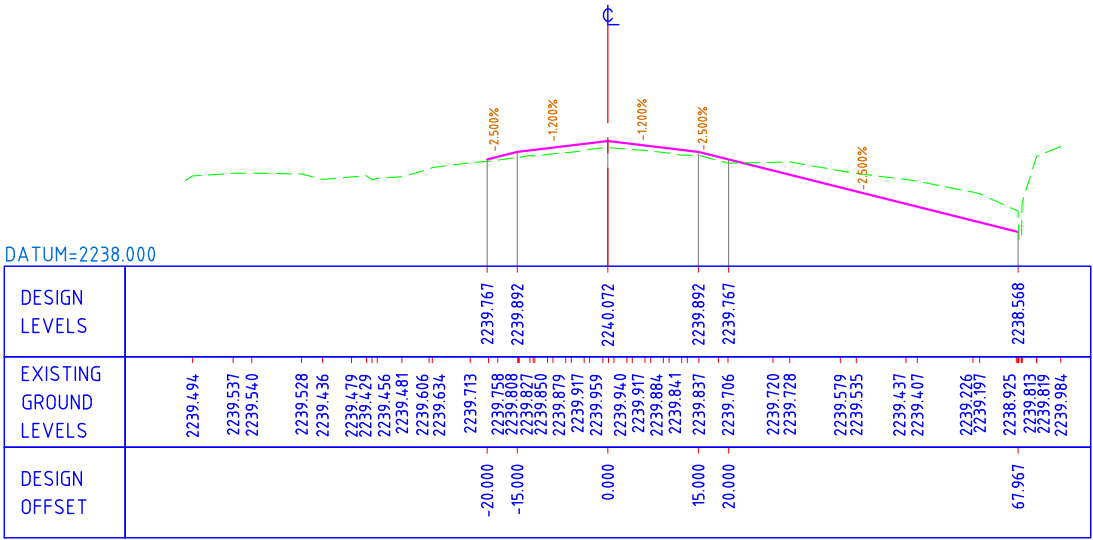


L&T INFRASTRUCTURE ENGINEERING LTD  
TC 2 BUILDING, 3rd FLOOR,  
MOUNT POONAMALLEE ROAD,  
MANAPAKKAM, P.B.NO.979, CHENNAI - 600 089  
E-mail: roads@lntiel.com, Website: www.lntiel.com

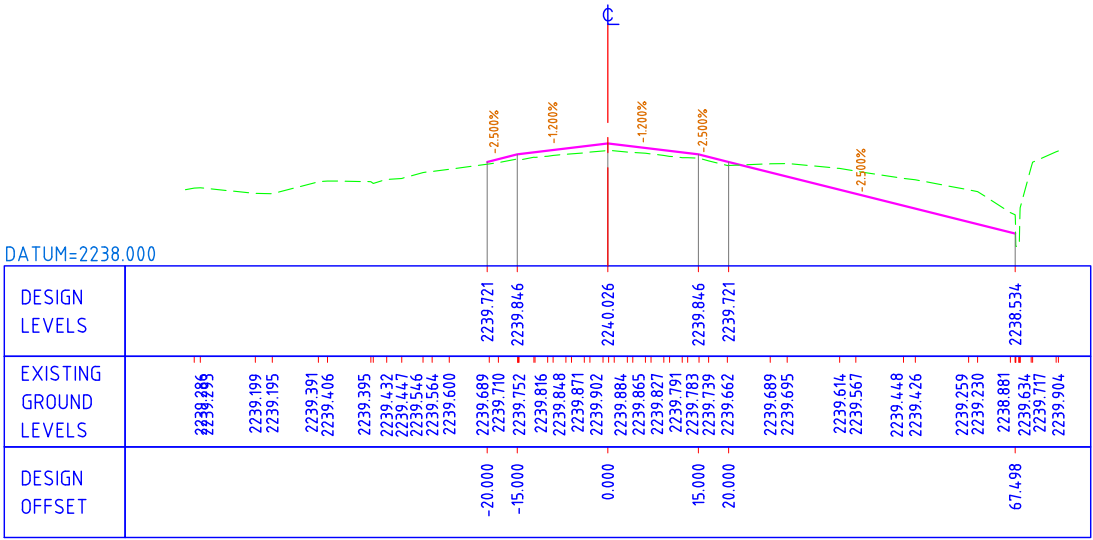
UNITED CONSULTANCY  
61, JANGSAM LAM, CHANGANGKHA,  
THIMPHU, BHUTAN  
PH: (+975)- 2-3326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

PROJECT: PAVEMENT EVALUATION AND REHABILITATION AT PARO INTERNATIONAL AIRPORT, BHUTAN											
TITLE: RUNNING CROSS SECTION (FROM CH: 2160.000 TO 2210.000 )											
PROJECT NUMBER								SIZE	SCALE:	DRAWING NUMBER	REV:
C	1	1	9	2	7	0	5	A3	1:1250	DDX137	0

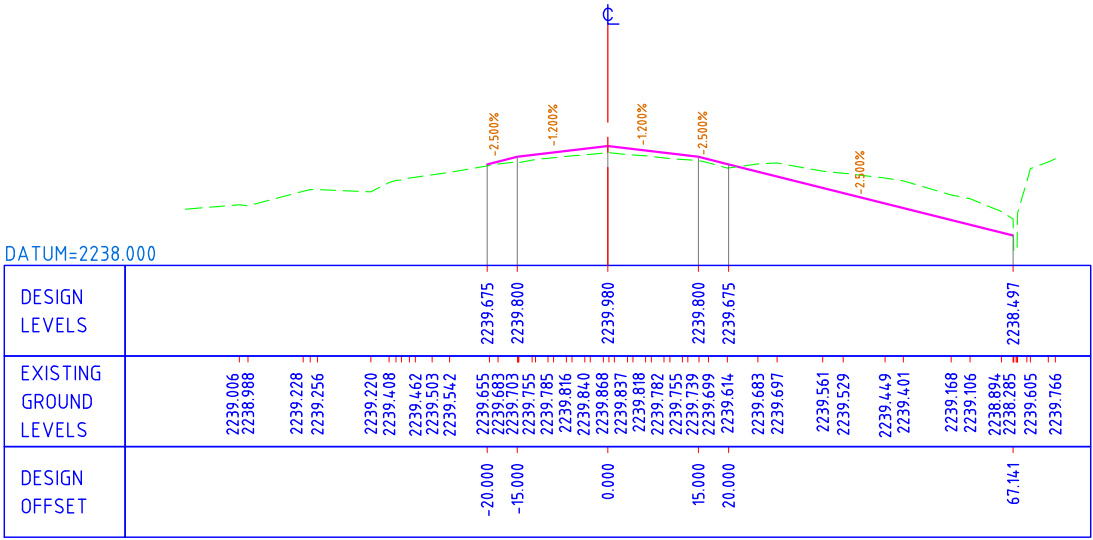
plot scale 50mm



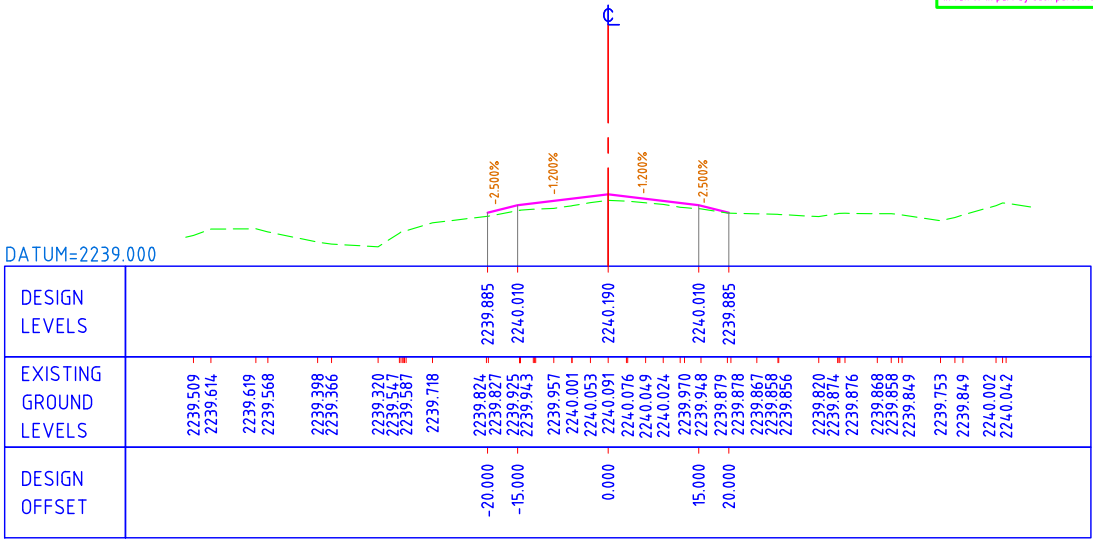
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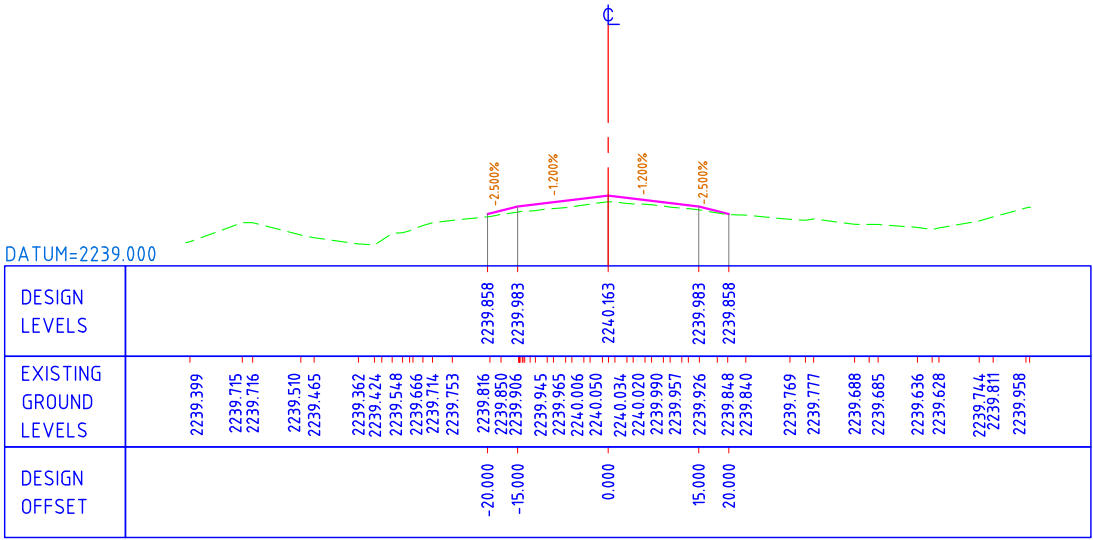
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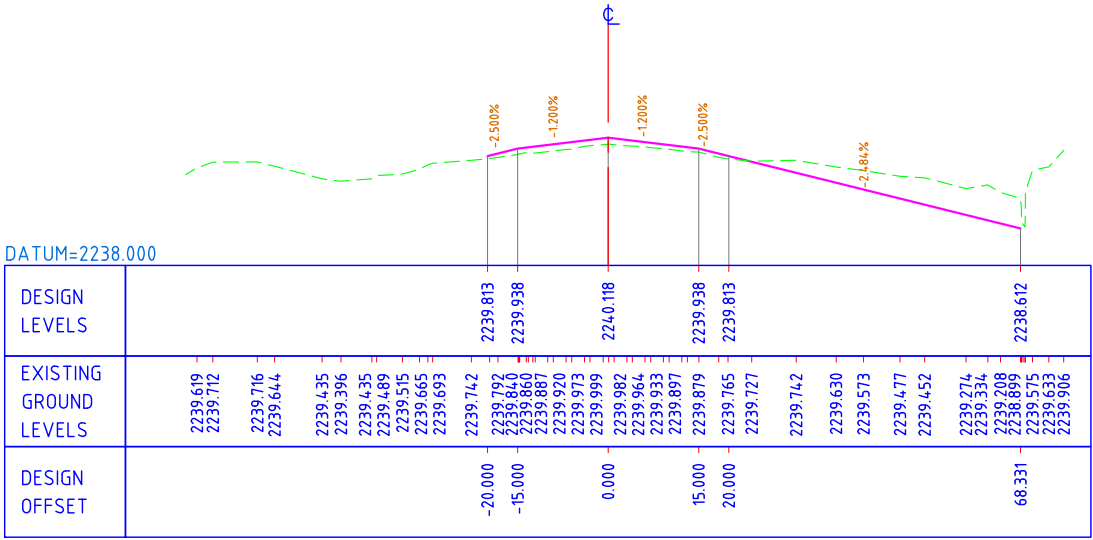
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CHAINAGE =2265.738



CHAINAGE =2260.000



CHAINAGE =2250.000

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

0	200118	1	FIRST SUBMISSION	HSN	CPS	NCB	RMS
REV.	YYMMDD	DATE	STATUS	DES.	DRN.	INIT.	SIGN.
REVISIONS				CHECKED	INIT.	SIGN.	APPROVED
STATUS CODES				1: PRELIMINARY 2: FOR APPROVAL 3: GOOD FOR CONSTRUCTION 4: .....			
REFERENCE DRAWINGS							

CLIENT:  
ROYAL GOVERNMENT OF BHUTAN  
  
Department of Air Transport | Ministry of Information and Communications

DESIGN CONSULTANT:  
  
L&T INFRASTRUCTURE ENGINEERING LTD  
TC 2 BUILDING, 3rd FLOOR,  
MOUNT POONAMALLEE ROAD,  
MANAPAKKAM, P.B.NO.979, CHENNAI - 600 089  
E-mail: roads@lntiel.com, Website: www.lntiel.com

In JV  
With  
  
UNITED CONSULTANCY  
61, JANGSAM LAM, CHANGANGKHA,  
THIMPHU, BHUTAN  
PH: (+975)- 2-3326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

PROJECT: PAVEMENT EVALUATION AND REHABILITATION AT PARO INTERNATIONAL AIRPORT, BHUTAN			
TITLE: RUNNING CROSS SECTION (FROM CH: 2220.000 TO 2265.738 )			
PROJECT NUMBER		SIZE	SCALE:
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DRAWING NUMBER		REV.	
DDX138		0	

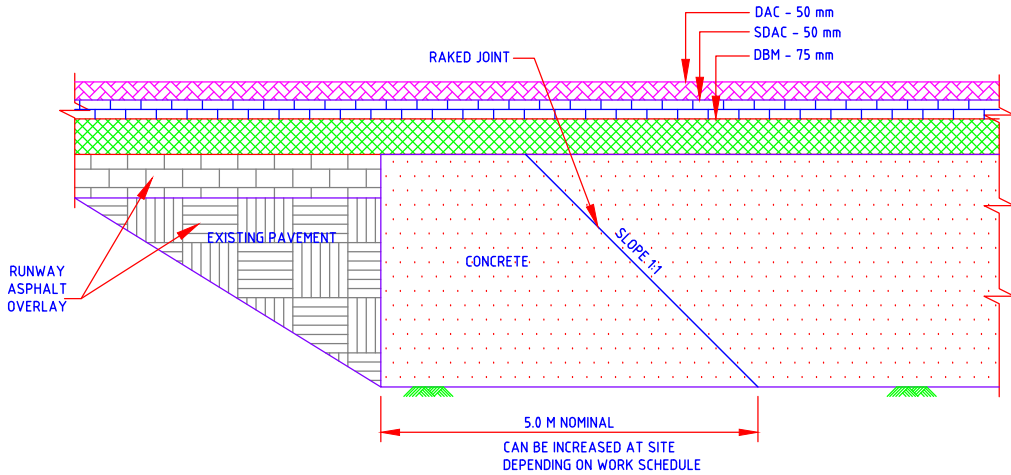
plot scale 50mm



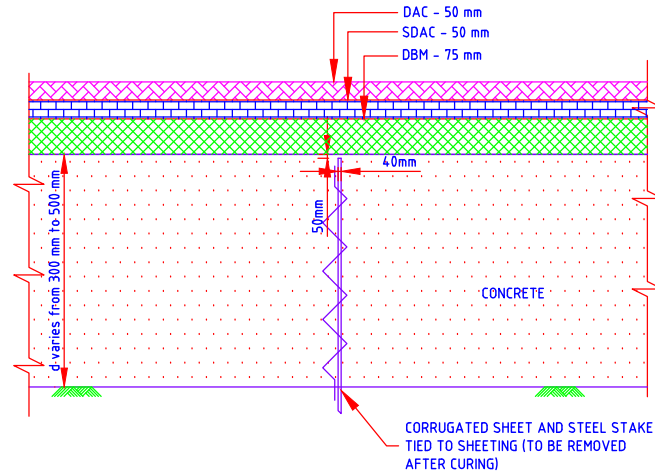
## ***ANNEXURE III***

DETAIL FOR CRITICAL ZONES IN TAXIWAY "A" AND TAXIWAY "S" JUNCTION WITH TURNING PAD AT RUNWAY 33.

CONCRETE CONSTRUCTION JOINT



TRANSVERSE CONCRETE CONSTRUCTION JOINT



LONGITUDINAL CONCRETE CONSTRUCTION JOINT

THIS DETAIL WAS APPLICABLE FOR ALL NEW CONCRETE JOINTS BEING CONSTRUCTED

NOTES:  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

DRG NO.		TITLE		REVISIONS		STATUS CODES		1: PRELIMINARY		2: FOR APPROVAL		3: GOOD FOR CONSTRUCTION		4: .....	
REV.		YYMMDD DATE		STATUS		DESCRIPTION		DES.		DRN.		INIT.		SIGN.	
0		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
1		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
2		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
3		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
4		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
5		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
6		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
7		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
8		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
9		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
10		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
11		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	
12		200117		1		FIRST SUBMISSION		HSN		CPS		NCB		RMS	

CLIENT: ROYAL GOVERNMENT OF BHUTAN

DESIGN CONSULTANT: L&T Infra Engineering

UNITED CONSULTANCY

PROJECT: PAVEMENT EVALUATION AND REHABILITATION AT PARO INTERNATIONAL AIRPORT, BHUTAN										SIZE		SCALE:		DRAWING NUMBER		REV:	
TITLE: DETAIL FOR CRITICAL ZONES IN TAXIWAY "A" AND TAXIWAY "S" JUNCTION WITH TURNING PAD AT RUNWAY 33.										PROJECT NUMBER		1:100		DDM001		0	
C 1 1 9 2 7 0 5										A3		1:100		DDM001		0	

## ***ANNEXURE IV***

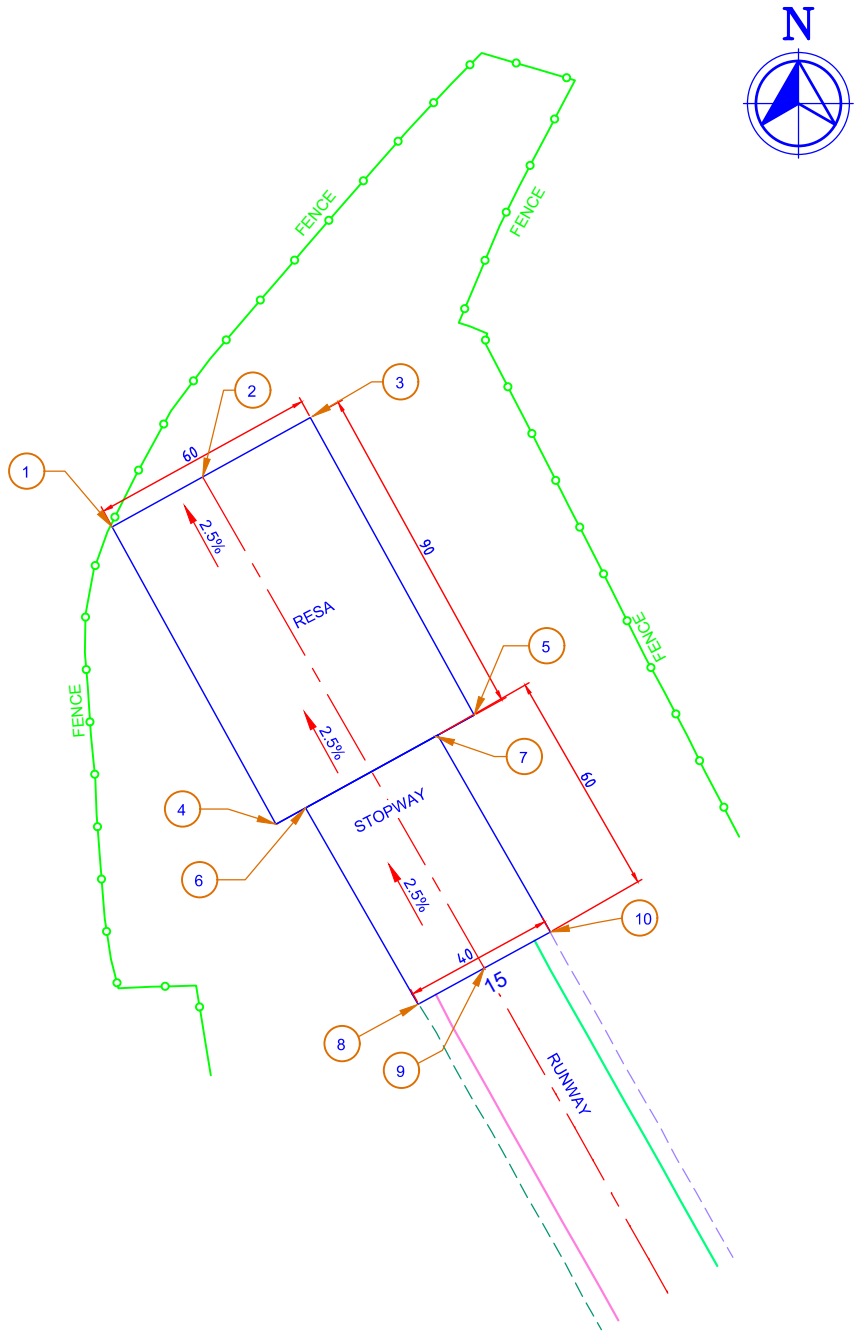
# RUNWAY

[illegible]

# ***ANNEXURE V***

SECTION	AREA (Sq.m)
RESA	5400
STOPWAY	2400

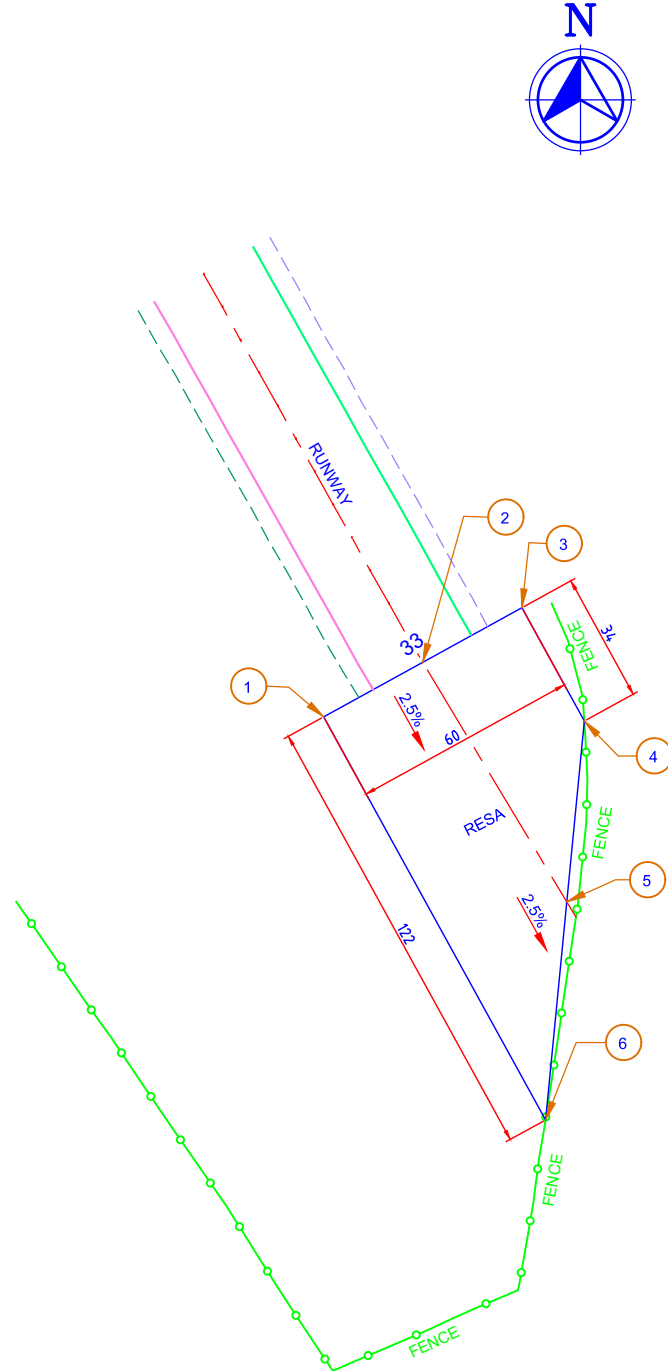
NOS	COORDINATE	
	EASTING	NORTHING
1	192449.167	3033551.677
2	192473.171	3033564.895
3	192501.726	3033580.618
4	192492.579	3033472.839
5	192545.138	3033501.781
6	192500.427	3033477.16
7	192535.471	3033496.458
8	192530.257	3033425.14
9	192547.816	3033434.726
10	192565.374	3033444.312



RESA AT RUNWAY 15

SECTION	AREA (Sq.m)
RESA	4875

NOS	COORDINATE	
	EASTING	NORTHING
1	193632.868	3031445.851
2	193659.147	3031460.322
3	193685.426	3031474.793
4	193701.971	3031444.748
5	193697.311	3031396.841
6	193691.69	3031339.043



RESA AT RUNWAY 33

**NOTES:**  
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

REV.	YYMMDD	DATE	STATUS	DESCRIPTION	DES.	DRN.	INIT.	SIGN.	INIT.	SIGN.
0	200118	1	FIRST SUBMISSION		HSN	CPS	NCB	RMS		
REVISIONS										
STATUS CODES 1: PRELIMINARY 2: FOR APPROVAL 3: GOOD FOR CONSTRUCTION 4: .....										
REFERENCE DRAWINGS										

**CLIENT:** ROYAL GOVERNMENT OF BHUTAN

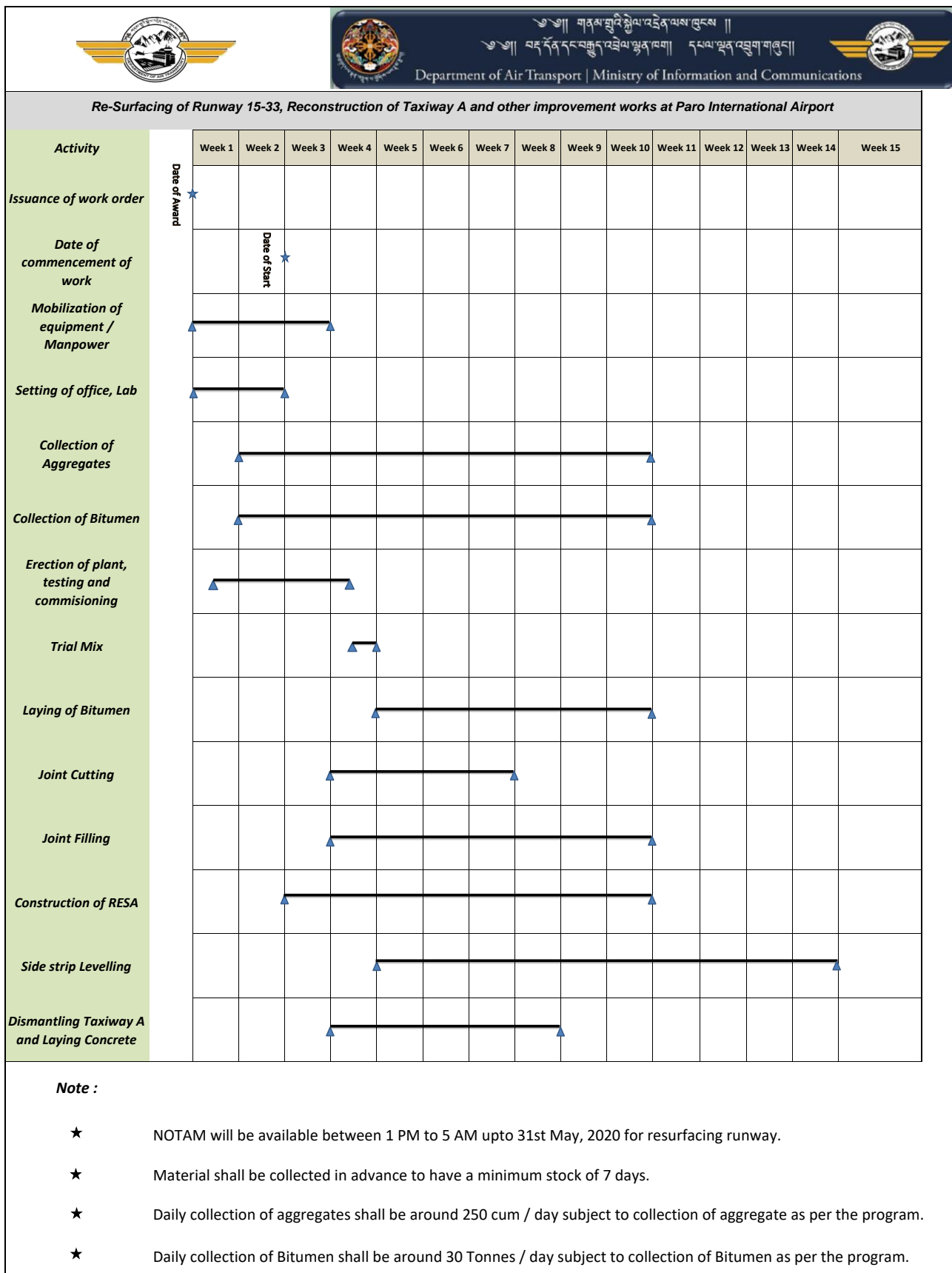
**DESIGN CONSULTANT:** L&T Infra Engineering  
L&T INFRASTRUCTURE ENGINEERING LTD  
TC 2 BUILDING, 3rd FLOOR,  
MOUNT POONAMALLEE ROAD,  
MANAPAKKAM, P.B.NO.979, CHENNAI - 600 089  
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**UNITED CONSULTANCY**  
61, JANGSAM LAM, CHANGANGKHA,  
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PH: (+975) - 2-3326776 FAX NO:-323884  
E-mail: ucsonam@gmail.com

PROJECT: PAVEMENT EVALUATION AND REHABILITATION AT PARO INTERNATIONAL AIRPORT, BHUTAN										
TITLE: RUNWAY END SAFETY AREA										
PROJECT NUMBER							SIZE	SCALE:	DRAWING NUMBER	
C	1	1	9	2	7	0	5	A3	1:2000	DDP101
										REV: 0

plot scale 50mm

## ***ANNEXURE VI***





## ***Schedule of Quantities***

Schedule							
Project:	Name of work: Resurfacing of runway 15-33 and reconstruction of Taxiway A and other improvement works at Paro International Airport, Bhutan. (Civil Works)						
Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
1	Demolishing cement concrete 1:3:6 & richer, including disposal of Materials within 50m lead (By mechanical Breaker)	cum	564				
2	Earth work in surface excavation, depth <300mm, width >1.5m, area >10 Sq.m in plan, including disposal of excavated earth within 50m lead & 1.5m lift and disposed soil to be neatly dressed - Ordinary soil	cum	18,200				
3	Earth work in excavation over areas by Dozer/Excavator/motar grader including levelling and dressing - All kinds of soils	cum	8,099				
4	Banking excavated earth for road, flood banks, guide banks & depressions, in layers <200mm depth, including watering,rolling & dressing up within 50m lead & 1.5m lift - All kinds of Soil, Output taken fromMX	cum	14,255				
5	Constructing random rubble masonry open surface drain in cement mortar 1:6 Considering 10% of the entire length of the drain to be reconstructed	cum	164				
6	Applying cement slurry on Pavement Quality Concrete Slab(Apron) using 2.75 kg per sq.m including roughening, cleaning & dampen the surface	sqm	4,898				

Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
7	P&L in position machine batched, machine mixed and machine vibrated M-20 design mix cement concrete including admixtures in recommended proportions (as per IS 9103) to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per the direction of the engineer. - All work upto plinth level	cum	1,474				
8	P&L 20mm cement plaster - C.M 1:4,	sqm	469				
9	Extra for compaction of earth in embankments under suitable moisture conditions to give at least 95% of the proctor density Output taken fromMX	cum	14,255				
10	Providing and laying Granular sub-base course (GSB) to required degree of compaction with proper formation of cross fall using motor grader for laying and compacted to required density as per material gradation and aggregate quality specified	cum	3,803				
11	Providing and applying tack coat using hot straight run bitumen of grade VG - 10, including heating the bitumen, spraying the bitumen with mechanically operated spray unit fitted on bitumen boiler,cleaning and preparing the existing surface as per specifications :On bituminous surface @ 0.50 Kg / sqm	sqm	93,054				
12	Providing and applying tack coat using hot straight run bitumen of grade VG - 10, including heating the bitumen, spraying the bitumen with mechanically operated spray unit fitted on bitumen boiler,cleaning and preparing the existing road surface as per specifications :On bituminous surface @ 0.25 Kg / sqm	sqm	9,507				

Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
13	Providing and laying of Hot Mix Dense Asphaltic Concrete (DAC) using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen (supplied in bulk) in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values of compaction, strength, surface accuracy complete [for tendering purpose VG bitumen of grade VG-10 content shall be taken as 135 kg/m3 of mix supplied in bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler material].	cum	4,653				
14	Providing and laying of Hot Mix Semi Dense Asphaltic Concrete (SDAC) using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen (supplied in bulk) in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values compaction, strength, surface accuracy complete [for tendering purpose VG bitumen of grade VG-10 content shall be taken as 114 kg/m3 of mix supplied in bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler material].	cum	4,653				

Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
15	Providing and laying of Hot Mix Dense Bituminous Macadam(DBM) using crushed stone aggregate of quality, size and grading as specified and 2% cement by weight of aggregates as filler of quality as specified and Viscosity Grade Bitumen (supplied in bulk) in proportions as per job mix formula and laid to specified levels, grade and camber as per specification, drawings and as directed by the Engineer-in-Charge including compacting with 8-10 tonne, preferably vibratory road roller of adequate capacity to achieve the specified values of compaction, strength, surface accuracy complete [for tendering purpose VG bitumen of grade VG-10 shall be taken as 95 kg/m3 of mix supplied in bulk produced by Govt. Refineries and 2% cement by weight of aggregates as filler material].	cum	596				
16	Painting runway / Taxi Track / Apron marking with adequate no. of coats to give uniform finish with road marking paint of superior make as approved by the Engineer-in-Charge including cleaning the surface of all dirt, scales, oil grease and other foreign material etc., and lining out complete. New work (Two or more coats)	sqm	11,001				
17	Painting runway / Taxi Track / Apron marking with adequate no. of coats to give uniform finish with road marking paint of superior make as approved by the Engineer-in-Charge including cleaning the surface of all dirt, scales, oil grease and other foreign material etc., and lining out complete. One or more coats	sqm	8,181				

Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
18	Providing, laying and fixing of self adhesive glass fibre reinforcement grid of High Modulus Fibre Glass of mesh size not exceeding 12.5mm x 12.5mm. The self adhesive glass fibre reinforcement after laying over the Runway Pavement shall be pressed down fully with a rubber tired roller and glued to pavement surface. The grid being self adhesive does not require tack coat. The longitudinal overlap should not be less than 250mm and transverse overlap i.e. at the end of the roll should not be less than 150mm. The items should be completed in all respect, to the satisfaction of Engineer-in-charge	sqm	162				
19	Providing and laying in position Polysulphide sealant(pouring grade) of approved make conforming to BS-5212-1990 or IS: 11433-1995. in expansion/ construction/dummy joints including rounding off edges, applying 2 coats of approved primer compatible with the brand of Polysulphide and preparing the surface and applying masking tape along the edge of joint to prevent accidental spillage of sealant on top surface and to give neat finish to the sealant and removing the masking tape after application of sealant etc. complete as per direction of Engineer in-Charge & particular specifications. [Note: For purpose of payment, quantity (Length x Width x Depth) of Polysulphide sealant only will be measured.] unit cm3	cu.cm	1,029,375				
20	Cutting construction joints 10 mm wide x 25 mm deep in cement concrete pavement complete as per direction of Engineer-in-charge.	Rm	500				
21	Cutting dummy joints of size 3mm wide x 1/3rd thickness of slab which is subsequently widened to 10mm for the top 25mm depth complete as per direction of Engineer-in-charge	Rm	60				

Item No.	Description	Unit	Qty	Rate		Amount	
				In Figures	In words	In Figures	In words
22	Providing and laying polythene sheet of 200 microns on the concrete surface with overlaps of not less than 75mm longitudinally and 75 mm transversely as per drawings provided and as directed by Engineer-in-charge.	sqm	2,866				
23	Sand Filling in RESA area complete as per Drawing	cum	1,541				
				Total			

Amount in Words :

Signature Contract













