

Bid Ref No: ED/SIE/2016-17/O&M/RD-01
_____ MARCH 2017



BIDDING DOCUMENTS

Repair and Maintenance of Roads and allied works at SIE Phase I

CONTACT PERSON

Mr. Kashif Tanveer, AM Tech BOM SIE
Cell: 0320 5400515, (042) 3529 7291~3

CONTANTS

SEC 1 INVITATION TO BID

SEC 2 INSTRUCTIONS TO BIDDERS

- A. GENERAL
- B. BIDDING DOCUMENTS
- C. PREPARATION OF BIDS
- D. SUBMISSION OF BID
- E. BID OPENING AND EVALUATION
- F. AWARD OF CONTRACT
- G. QUALIFICATION CRITERIA

SEC 3 BIDDING DATA

SEC 4 FORM OF BID

SEC 5 SCHEDULES TO BID

- SCHEDULE | A SUMMARY OF BID PRICES
- SCHEDULE | B SPECIFIC WORKS DATA
- SCHEDULE | C WORKS TO BE PERFORMED BY SUBCONTRACTORS
- SCHEDULE | D PROPOSED PROGRAM OF WORKS
- SCHEDULE | E METHOD OF PERFORMING WORKS
- SCHEDULE | F INTEGRITY PACT

SEC 6 CONDITIONS OF CONTRACT

- 1. GENERAL PROVISIONS
- 2. THE EMPLOYER
- 3. ENGINEER'S/EMPLOYER'S REPRESENTATIVES
- 4. THE CONTRACTOR
- 5. DESIGN BY CONTRACTOR
- 6. EMPLOYER'S LIABILITIES
- 7. TIME FOR COMPLETION
- 8. TAKING-OVER

9. REMEDYING DEFECTS
10. VARIATIONS AND CLAIMS
11. CONTRACT PRICE AND PAYMENT
12. DEFAULT
13. RISKS AND RESPONSIBILITIES
14. INSURANCE
15. RESOLUTION OF DISPUTES
16. INTEGRITY PACT

SEC 7 CONTRACT DATA

SEC 8 STANDARD FORMS

- | | |
|--------|------------------------------------|
| FORM A | BID SECURITY |
| FORM B | PERFORMANCE SECURITY |
| FORM C | CONTRACT AGREEMENT |
| FORM D | BANK GUARANTEE FOR ADVANCE PAYMENT |

SEC 9 TECHNICAL SPECIFICATIONS

- 1.0 GENERAL
- 2.0 SITE CLEARING, GRUBBING AND SETTING OUT OF WORKS
- 3.0 EXCAVATION, FILLING, BACKFILLING AND DISPOSAL
- 4.0 WATER
- 6.0 STEEL REINFORCEMENT
- 7.0 BRICK WORK
- 8.0 PLASTERING
9. CONCRETE PAVEMENTS
10. CONCRETE CURBS, GUTTERS AND CHANNELS

SEC 10 DRAWINGS



INVITATION TO BID

Bid Ref No: ED/ SIE/ 2016-17/ O&M/RD-01

Date: ___ March 2017

Sundar Industrial Estate (SIE) is a flagship project of Punjab Industrial Estate Development and Management Company (PIEDMC); a public sector company of Government of the Punjab (GOP). It is the first project developed on the concept of Public Private Partnership (PPP). SIE is run under the patronage of the Board of Management (BOM- SIE).

BOM-SIE invites sealed bids for *“Repair and Maintenance of Roads and allied works Phase I”* from eligible bidders, registered with income tax, sales tax & who are on active taxpayers list of the federal board of revenue and registered with PEC (In required category). Bidding shall be conducted through open competitive bidding (single stage one envelope) procedure specified in the public procurement rules 2014 with subsequent amendments.

A set of complete Bidding Documents, containing details of Work, specifications and terms and conditions etc. are available for purchase from the office of the Employer (Contact person; Assistant Manager Technical during 9 AM to 4PM 7/24) at the address given below. The interested eligible bidders on submission of a written application to BOM-SIE and upon payment of a non-refundable fee of Rupees 1500/- (One thousand and five hundred only) in the form of bank draft or pay order from any schedule bank of Pakistan in favour of BOM-SIE can purchase the set of Bid Documents. These documents can also be downloaded from the web site of BOM-SIE and PPRA respectively <http://sie.com.pk/>, [“http://www.ppra.org.pk”](http://www.ppra.org.pk)

The bids prepared (a) in accordance with the instructions in the bidding documents (b) complying Punjab Procurement Rules 2014 (c) supported with Bid Security mentioned in the Bidding Data sheet will be received by the contact person of BOM-SIE till **1100 hours, 13th of April 2017**. Bids will be opened by relevant committee at **1200 hours on the same day** in the presence of bidders or their authorised representatives. This advertisement is also available on the websites of PPRA and BOMSIE.

Chief Engineer



OFFICE

BOARD OF MANAGEMENT SUNDAR INDUSTRIAL ESTATE
Gate # 2, Sundar Industrial Estate, Sundar Raiwind Road, Lahore
Phone: +92 42 35297291-3, Fax: +92 42 35297080,
URL: www.sie.com.pk Email: info@sie.com.pk



SECTION 2
INSTRUCTIONS TO
BIDDERS

INSTRUCTIONS TO BIDDERS

A. GENERAL

IB.1 SCOPE OF BID

BOMSIE “**The Employer**” as defined in the **Bidding Data** invites the Bids for the Works summarized in the **Bidding Data** hereinafter referred to as “**the Works**”.

Bidders must quote for the complete scope of the works detailed in schedule of prices, drawings and specifications. Any Bid covering partial scope of work will be rejected as non-responsive.

Successful bidders will be expected to complete the works by the required completion date specified in the **Bidding Data**.

IB.2 SOURCE OF FUNDS

The Employer has arranged adequate funds from the PIEDMC and from its own source for the fiscal year 2016 / 2017 and intends to apply part of these proceeds to cover payments under the resulting contract for the works mentioned in the **Bidding Data**.

Payments will be made directly by the Employer subject to the terms and conditions of the resulting contract.

IB.3 ELIGIBLE BIDDERS

Bidding is open to all natural persons, companies, firms, and organizations or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a joint venture, consortium, or association. In the case of a joint venture, consortium, or association, all members shall be jointly and severally liable for the execution of the Contract in accordance with its terms and conditions. The joint venture, consortium, or association shall nominate a Lead Member who shall have the authority to conduct all business for and on behalf of joint venture, consortium, or association during the bidding process and performance of the contract.

The Lead Member shall at the time of contract award confirm the appointment by submission of a Power of Attorney to the Employer.

Any Bid from a joint venture, consortium or association shall indicate the part of proposed contract to be performed by each party and each party shall be evaluated or qualified according to its contribution only.

National bidders shall satisfy all relevant licensing and/or registration with the appropriate statutory bodies in Pakistan as under:

- ✓ Registration with Pakistan Engineering Council in appropriate Category for value of

- the Works. The PEC renewed registration certificate must accompany the bid.
- ✓ Registered with income tax and sales tax departments and be on the active tax payer list of the Federal Board of Revenue (FBR). Copy of registration with FBR must form part the bid
 - ✓ Registered with Securities and Exchange Commission (S&EC) or Registrar of Firms. Copy of Registration with S&EC or Registrar of Firms must form part the bid.
 - ✓ The bidder shall give an affidavit to the effect that he or his firm or company or organization is not declared ineligible in accordance with Punjab procurement rules 2014 by any government or autonomous body on the grounds:
 - The Bidder is declared bankrupt or, in case of company or firm, insolvent.
 - Payments in favour of the bidder are suspended in accordance with the judgment of any court of law.
 - Bidder is found to have conflict of interest as prescribed by Law of Pakistan.
 - Legal proceedings are instituted against bidder or he is convicted by a final judgment on any offence involving professional conduct.
 - The Bidder is debarred or blacklisted for participating in public procurement for corrupt, coercive, collusive, fraudulent or obstructive practices.

IB.4 ONE BID PER BIDDER

A Bidder shall submit only one Bid, in the same bidding process, either individually or as a partner in a joint venture.

No Bidder can be a subcontractor while bidding individually or as a partner of a joint venture in the same bidding process.

A Bidder, if acting in the capacity of subcontractor in any Bid, may participate in more than one Bid but only in the capacity of subcontractor.

The Employer at his own discretion may reject any or all bids or annul the entire bidding process if a bidder participates in more than one bid except as subcontractor.

IB.5 COST OF BIDDING

The bidders shall bear all costs associated with preparation and submission of their bids including attendance of pre bid meeting and site visits and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

IB.6 SITE VISIT

The bidders, at their own risk and cost, are encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the bid and entering into contract for performance of the Works.

The Employer may conduct for the bidders a site visit. The purpose of the site visit is to clarify issues and answer questions on that may be raised by the prospective bidders at that stage.

B. BIDDING DOCUMENTS

IB.7 CONTENTS OF BIDDING DOCUMENTS

The works required, bidding process and contract terms are prescribed in the bidding documents. In addition to Invitation of Bids, the Bidding Documents are those stated below, and should be read in conjunction with any Addendum issued.

- ✓ Instructions to Bidders
- ✓ Bidding Data
- ✓ Form of Bid
- ✓ Schedules to Bid comprising:
 - Schedule A: Schedule of Prices / Bills of Quantities
 - Schedule B: Specific Works Data
 - Schedule C: Works to be performed by the Subcontractors
 - Schedule D: Proposed Program of Works
 - Schedule E: Method of Performing Works
 - Schedule F: Integrity Pact
- ✓ General and Special Conditions of Contract
- ✓ Standard Forms:
 - Form A: Bid Security
 - Form B : Performance Security
 - Form C: Bank Guarantee for Advance Payment
 - Form D: Contract Agreement
- ✓ Specifications
- ✓ Drawings, if any

The number of copies to be completed and returned with the bid is specified in the **Bidding Data**.

The Invitation for bid issued by the Employer is not part of the bidding documents. In case of discrepancies between the Invitation for bid and the bidding documents listed above bidding documents will take precedence.

The Employer is not responsible for the completeness of the bidding documents and addenda where issued, if they were not obtained directly from the Employer.

The Bidder is expected to carefully examine all instructions, forms, terms and specifications in the bidding documents. Failure to furnish all information required by the bidding documents will be at the Bidder's risk and may result in the rejection of its bid.

IB.8 CLARIFICATION OF BIDDING DOCUMENTS

A prospective bidder requiring any **clarification(s)** in respect of the Bidding Documents may notify the Employer in writing at the address indicated in the **Bidding Data**.

The Employer will within three (3) working days after receiving the request for clarification **respond** in writing provided (a) such request is received not later than ten (10) days prior to the deadline for submission of bid in case of competitive Bidding and Five (5) days prior to the deadline in case of non-competitive methods.

Copies of the Engineer/Employer's **response** will be forwarded to all purchasers of the bid documents including a brief description of the enquiry but without identifying its source.

Should the Employer deem it necessary to **amend the bidding** documents as a result of such clarifications he shall do so following the procedure under given below.

IB.9 AMENDMENT OF BIDDING DOCUMENTS

Issue of addendum

At any time prior to the deadline for submission of Bids, the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by issuing addendum.

Acknowledgement

Any addendum thus issued shall be part of the Bidding Documents and shall be communicated in writing to all purchasers of the Bid Documents. Prospective bidders shall acknowledge receipt of each addendum in writing to the Employer.

Extension of Deadline

To afford prospective bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may at his discretion extend the deadline for submission of Bids.

C. PREPARATION OF BIDS

IB.10 LANGUAGE OF BID

The bid prepared by the bidder and all correspondence and documents relating to the Bid, exchanged by the bidder and the Employer shall be written in the English language.

Supporting documents and printed literature furnished by the bidder may be written in any other language so long as it is accompanied by an accurate translation of the relevant passages in English language, in which case, for the purposes of interpretation of the Bid, the English translation shall prevail.

IB.11 DOCUMENTS COMPRISING THE BID

The bid submitted by the bidder shall comprise the following:

- Covering Letter
- Form of Bid duly filled in, signed and sealed
- Schedules (A to F) to Bid; filled and initialled, in accordance with the instructions
- Bid Security.
- Power of Attorney
- Qualification information with documentary evidence
- Priced Bills of Quantities / schedule of prices

IB.12 DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS

The bidder shall furnish, as part of his bid; certificates, and documents establishing the bidder's eligibility to bid and his qualification to perform the Contract if his bid is accepted.

Bidder/ Manufacturer must meet *Qualification Criteria* given hereinafter and possess and provide evidence of its capability, experience and performance as stipulated in the Bidding Documents.

IB.13 DOCUMENTS ESTABLISHING WORKS' CONFORMITY TO BID

The documentary evidence of the Works' conformity to the Bidding Documents may be in the form of literature, drawings and data and the bidder shall furnish all such documentation as set out herein and in the **Bidding Data**.

The bidder shall note that standards for workmanship, material and equipment, and references to brand names or catalogue numbers, if any, designated by the Employer in the Technical Provisions are intended to be descriptive only and not restrictive.

IB.14 SUFFICIENCY OF BID

Each bidder shall satisfy himself before Bidding as to the correctness and sufficiency of his Bid and of the rates and prices entered in the Bills of Quantities. These rates and prices shall except in so far as it is otherwise expressly provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper completion of the Works and remedying defects therein.

The bidder is advised to obtain for himself at his own cost and responsibility all information that may be necessary for preparing the bid and entering into Contract for performance of the Works.

IB.15 BID PRICES

The Contract shall be for the whole Work based on the priced Bills of Quantities submitted by the Bidder.

The bidder shall fill in all rates and prices for all items of Work prescribed in the Bills of Quantities (Schedule A to Bid). Items for which no rate or price is entered will not be paid and shall be deemed to have been covered by other rates and prices as contained in the Preamble to Schedule of Prices.

Unless otherwise stipulated in the Conditions of Contract, prices quoted by the bidder shall remain fixed during performance of the Contract without variation on any account.

IB.16 CURRENCY OF BID AND PAYMENT

The unit rates and prices in the Schedule of Prices shall be quoted by the bidder in Pakistan Rupees as stipulated in Bidding Data.

In all cases, payments shall be computed using the rates quoted in the Bid.

IB.17 VALIDITY OF BIDS

Bids shall remain valid for a prescribed period after the date of bid opening as stipulated in the **Bidding Data**. A Bid valid for a shorter period than prescribed shall be rejected by the Employer as non responsive.

No alteration is to be made in the Form of Bid except filling in the blanks as directed. If any alteration is made or if these instructions are not fully complied with, the bid may be rejected.

IB.18 BID SECURITY

Each bidder shall furnish, as part of his bid, a **Bid Security** in the amount stipulated in **Bidding Data**. The Bidder may opt to submit his Bid Security in the form of Deposit at Call or a Bank Guarantee issued by any Scheduled Bank of Pakistan or an insurance company having at least AA rating from Pakistan Credit Rating Agency (PACRA) /JCR - VIS. The Deposit at Call or Bank Guarantee shall be in favour of the Employer and remain valid for twenty eight (28) days beyond the bid validity period.

Any bid not accompanied by an acceptable Bid Security shall be rejected by the Employer as non-responsive.

The bid securities of unsuccessful bidders will be returned upon award of contract to the successful bidder or twenty eight (28) days after the expiry of Bid validity period whichever is earlier.

The Bid Security of the successful bidder will be returned when the bidder has furnished the required **Performance Security**, and signed the Contract Agreement.

The Bid Security may be forfeited if:

- ✓ The bidder withdraws his bid during the period of bid validity; or
- ✓ The bidder does not accept the correction of his Bid Price, or
- ✓ The successful bidder:
 - Fails to Furnish Performance Security, or
 - Fails to Signs the Contract Agreement.

IB.19 PRE BID MEETING

The bidder's nominated representatives are invited to attend pre-bid meeting which, if convened, will take place at the venue date and time fixed in **the Bidding Data**.

The bidder is requested to submit his questions and seek clarifications in writing so that record of the communication reaches the Employer before the pre-bid meeting. It may not be practicable at the meeting to answer all questions, but questions and responses will be transmitted as described herein.

Minutes of the pre-bid meeting, including the text of the questions raised and the responses given together with any responses prepared after the pre-bid meeting will be transmitted **within five (5) days** to all purchasers of the Bid Documents. Any modification of the Bid Documents 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 and not through the minutes of the pre-bid meeting.

D. SUBMISSION OF BID

IB.20 SEALING AND MARKING OF BIDS

The Bidder shall seal the original and each copy of the Bid in separate envelopes, duly marked as "ORIGINAL" and "COPY." The envelopes shall then be put in an outer envelope securely sealed in such a manner that tempering cannot go unnoticed.

The inner and outer envelopes shall be addressed to the Employer, bear project name, bid reference number and a statement "DO NOT OPEN BEFORE DEADLINE" as specified in the **bidding data**.

In addition to the identification required, the inner envelopes shall also indicate the name and address of the Bidder to enable the Bid to be returned unopened in case it is declared late.

If the outer envelope is not sealed and marked as required the Employer shall assume no responsibility for misplacement or premature opening of the Bid.

IB.21 FORMAT, SIGNING AND SUBMISSION OF BID

All **Schedules to Bid** must be properly filled in, signed and stamped.

Each bidder shall prepare **Original and three copies** of the documents comprising the bid as specified in the **Bidding Data**. The documents so prepared shall be clearly marked as "ORIGINAL" and "COPY" as appropriate. In the event of discrepancy between the original and copies, the original shall prevail.

The original and all copies of the bid shall be typed or written in legible hand writing and indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the bidder (in the case of copies, Photostats are acceptable). This authorization shall consist of written confirmation 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. All pages of the bid shall be initialled and official seal affixed by the person or persons signing the bid.

Any interlineations, erasures, or overwriting shall be valid only if initialled by the person or persons signing the Bid.

The Bid shall be delivered in person or sent by registered mail at the Employer's address given in Bidding Data.

IB.22 DEADLINE FOR SUBMISSION AND LATE BIDS

Bids shall be received by the Contact person of the Employer at the address provided in **Bidding Data** not later than the **time and date** stipulated therein.

Bids submitted through telegraph, telex, fax or e-mail shall not be considered for evaluation and rejected.

Any bid received by the Employer **after the deadline** for submission shall not be considered for evaluation, rejected and returned unopened to the bidder.

IB.23 MODIFICATIONS, SUBSTITUTION & WITHDRAWAL OF BIDS

Any bidder may modify or substitute or withdraw his bid after submission provided that **written notice** of modification, substitution or withdrawal of the Bid is received by the Employer prior to the deadline for submission of bids.

Withdrawal of a bid during the interval between the deadline for submission of bids and the expiry of the bid validity period specified herein may result in forfeiture of the Bid Security.

The Bidder may offer **discounts** or otherwise modify the prices of its Bid by submitting Bid modifications in accordance with this Clause, or include in the original Bid submission.

E. BID OPENING AND EVALUATION

IB.24 BID OPENING

The Employer will **open all bids** including modification, substitution or withdrawal notices, in public, in the presence of bidders' representatives who choose to attend, at the time, date and venue stipulated in the Bidding Data.

Representatives of the bidders who choose to attend shall sign the attendance sheet as proof of their attendance.

Envelopes marked "WITHDRAWAL", "MODIFICATION" and "SUBSTITUTION" shall be opened first in that **order** and read out in appropriate details.

All other "ENVELOPES" shall be opened thereafter one at a time. The bidder's name, Bid Prices, total amount of Bid, any discount, the presence or absence of Bid Security, and such other details as the Employer at its discretion may consider appropriate, will be **announced** by the Employer at the bid opening.

Bids or modifications that are not opened and read out at Bid opening **shall not be considered** further for evaluation, irrespective of the circumstances. In particular, any Bid Price or discount which is not read out and recorded at bid opening will not be considered further for evaluation.

Bidders are advised to send a **representative who has knowledge** of the content of the Bid and verify the information read out from the submitted documents. Failure of the representative to point out any un-read information shall indemnify the Employer against any claim or failure to read out the correct information contained in the Bid.

No Bid will be **rejected** at bid opening except for late bids which will be returned unopened to the Bidder.

The Employer will record the **minutes** of the bid opening. Copy of the minutes shall be furnished to individual Bidders upon request.

IB.25 PROCESS TO BE CONFIDENTIAL

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall **not be disclosed** to Bidders until the award to the successful Bidders has been announced.

No bidder shall contact the Employer on any matter relating to its Bid from the time of Bid opening to the time of bid evaluation and announcement of result. The evaluation result shall be announced at least **ten (10) days** prior to the award of Contract. The announcement to all bidders will include schedule of prices, discounted prices, price adjustments made, final evaluated prices and recommendations against all the bids evaluated.

Any effort by a bidder to influence the Employer in the Bid evaluation, Bid comparison or Contract Award decisions may result in the rejection of his Bid. The bidder feeling aggrieved

may lodge a written complaint not later than fifteen (15) days after announcement of the bid evaluation result, however, mere fact of lodging a complaint shall not warrant suspension of procurement process.

IB.26 CLARIFICATION OF BID

To assist in the examination, evaluation and comparison of Bids and **qualification of Bidders** the Employer may, at its discretion, ask the bidder for clarification of his Bid including breakdown of prices and his antecedents. The request for clarification and the response shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted except confirmation of the correction of arithmetic errors.

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 bid he should do so in writing so as to provide record of the content of communication.

IB.27 CORRECTION OF ERRORS

Bids determined to be substantially responsive will be checked for any Arithmetic errors which shall be rectified on the following basis:

- ✓ If there is a discrepancy between the unit price and total price obtained by multiplying the unit price with quantity, the unit price shall prevail and the total price shall be corrected.
- ✓ If in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in that case total price as quoted shall govern and the unit price shall be corrected.
- ✓ If there is a discrepancy between the Total Bid price entered in Form of Bid and the Sub-total shown in the Summary of Schedule of Prices, then the amount stated in the Form of Bid will be corrected in accordance with the Corrected Schedule of Prices
- ✓ If there is a discrepancy between the words and figures, the amount in words shall prevail.
- ✓ If the bidder does not accept the corrected amount of Bid, his Bid will be rejected and Bid Security forfeited.

IB.28 EVALUATION METHODS

Following evaluation methods for price adjustments will be followed:

- ✓ *Price Adjustment for Technical Compliance*

The cost of making good any deficiency resulting from technical noncompliance will be added to the Corrected Total Bid Price for comparison purposes only. The adjustments will be applied taking the highest price quoted by other bidders in their original Bids for corresponding item. In case of non-availability of price from other bidders, the price will be estimated by the Employer.

✓ *Price Adjustment for Commercial Compliance*

As determined by the Engineer/Employer, the cost of making good any deficiency resulting from quantifiable variations and deviations from the Bid Schedules and Conditions of Contract, will be added to the Corrected Total Bid Price for comparison purpose only.

✓ *Price Adjustment for Deviation in Terms of Payments*

“Refer to Bidding Data”.

IB.29 BID EVALUATION AND COMPARISON

Prior to the detailed evaluation, the Employer will determine the substantial responsiveness of each bid to the Bidding Documents. For the purpose of these Clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the Bidding Documents without material deviations. It will include all requirements listed in **Bidding Data**.

A Bid determined as substantially non-responsive will be rejected and will not subsequently be made responsive by the bidder by correcting the inconformity.

Any minor informality or inconformity or irregularity in a Bid which does not constitute a material deviation may be waived off by the Employer, provided such waiver does not prejudice or affect the relative ranking of any other bidder.

The Employer will evaluate and compare only the bids previously determined to be substantially responsive and as per requirements given hereunder. Bids will be evaluated for complete scope of works. The prices will be compared on the basis of the Evaluated Bid described herein.

✓ *Technical Evaluation*

It will be examined in detail whether the Works offered by the bidder comply with the Technical Provisions of the Bidding Documents. For this purpose, the bidder's data submitted with the bid in **Schedule B** will be compared with technical features or criteria of the Works detailed in the Technical Provisions. Other technical information submitted with the bid regarding the Scope of Work will also be reviewed.

It will be examined in detail whether the bids comply with the commercial and contractual conditions of the Bidding Documents. It is expected that no material deviation or stipulation shall be taken by the bidders.

✓ *Evaluated Bid Price*

In evaluating the bids in order to reach the Evaluated Bid Price, the Employer will determine for each bid in addition to the Bid Price, the following factors (adjustments) in the manner and to the extent indicated below:

- Making any correction for arithmetic errors.
- Making an appropriate price adjustment for acceptable variation or deviation.

- Making an appropriate price adjustment for Deviations in terms of Payments (if any and acceptable to the Employer).
- Discount, if any, offered by the bidders as also read out and recorded at the time of bid opening.

F. AWARD OF CONTRACT

IB.30 QUALIFICATION

The Employer, at any stage of the bid evaluation, having credible reasons or *prima facie* evidence of any flaw in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence regardless of their pre-qualification; provided such qualification are objected after recording reasons in writing. The reasons so recorded shall form part of the records of **bid evaluation report**.

The determination will take into account the bidder's financial and technical capabilities. It will be based upon examination of the documentary evidence of the bidders' qualifications as well as such other information required in the Bidding Documents.

IB.31 AWARD CRITERIA & EMPLOYER'S RIGHT

The Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the Bidding Documents and who has offered the lowest evaluated Bid Price, provided such bidder has been determined to be (a) eligible in accordance with the provisions of IBs (b) qualified to perform the Contract satisfactorily in accordance with the provisions of the **contract**.

Notwithstanding **instructions contained in the Bidding Documents**, the Employer reserves the right to accept or reject any or all bids, or annul the entire bidding process at any time prior to the award of Contract without incurring any liability or obligations to the Bidder.

Notice of the rejection of all the bids shall be given promptly to all the bidders who have submitted bids.

The Employer shall upon written request communicate to any Bidder grounds for rejection of his bid, but is not required to justify those grounds.

IB.32 NOTIFICATION OF AWARD & SIGNING OF CONTRACT AGREEMENT

Prior to expiration of the period of bid validity prescribed in the Bidding Data, the Employer will notify the successful bidder in writing ("Letter of Acceptance") that his bid has been accepted.

Within **seven (7) days** from the date of submission of Performance Security by the successful bidder, the Employer will send the Form of Contract Agreement incorporating all Covenants between the parties as provided in the Bidding Documents.

IB.33 PERFORMANCE SECURITY

The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Conditions of Contract within a period of **fourteen (14) days** after the receipt of Letter of Acceptance.

Failure of the successful bidder to comply with the requirements of IBs shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

IB.34 INSTRUCTIONS TO BIDDERS NOT PART OF CONTRACT

These Instructions to Bidders (IB) along with Bidding Data Sheet will not be part of Contract and will cease to have effect once the Contract is signed.

IB.35 INTEGRITY PACT

The Bidder shall sign and stamp the Form of Integrity Pact provided at Schedule-F to Bid for all procurement contracts exceeding Rupees ten (10) million. Failure to provide such Integrity Pact shall make the bid non-responsive.

G. QUALIFICATION CRITERIA

An Individual Bidder or Individual Member of Joint Ventures must score an aggregate of 60 out of 100 weighted marks in order to qualify and perform the contract. The weighted score assigned to each criterion and information requested for each is given here under:

Weightage

Ser	Criterion	Weightage
1.	Eligibility and Qualification	15
2.	Work Experience and past performance[5 years]	30
3.	Major Equipment and Plants	15
4.	Technical Personnel and support staff	15
5.	Subcontracting	5
6.	Financial Soundness	10
7.	Litigation History	2
8.	Occupational Health and Safety Policy	3
9.	Joint Venture, Association Consortium	2
10.	Proposed Work Program	3
Total Marks		100

1. ELIGIBILITY AND QUALIFICATION

Constitution or legal status of Bidder: [attach copy]

Place of registration: [insert]

Principal place of business: [insert]

Registration/ Certificate of Incorporation [attach]

Current Business License [attach]

No conflict of interest [attach declaration]

Public entity – meet conditions [Attach legal status]

2. WORK EXPERIENCE AND PAST PERFORMANCE [5 YEARS]

Works of similar nature performed as prime Contractor and value of work over the last 5 years.

To comply with this requirement, works cited should at least be 70 per cent complete.

Experience as prime contractor, sub-contractor in at least 5 contracts for the past 3 years, each with a minimum value of Rs. 10 Million that have been successfully and substantially completed and that are similar to the proposed works.

Also list details of work under way or committed, including expected completion.

Ser.	Project Name	Name / address of Employer	Value of Work	Type of Work Executed	Year	Value of Contract
------	--------------	----------------------------	---------------	-----------------------	------	-------------------

- 1.
- 2.
- 3.
- n-1
- n

3. MAJOR EQUIPMENT AND PLANTS

Major items of Contractor's Equipment proposed for carrying out the works. List all information requested below

Ser	Description of equipment	Make, and age (years)	Condition and number available	Owned, Hired
-----	--------------------------	-----------------------	--------------------------------	--------------

- 1.
- 2.
- 3.
- n-1
- n

4. TECHNICAL PERSONNEL AND SUPPORT STAFF

Qualifications and experience of key personnel proposed for administration and execution of the Contract. (CVs of all key proposed shall be attached)

Ser.	Position	Name	Experience (Years)	Qualifications	CV of Key Personnel
------	----------	------	--------------------	----------------	---------------------

- 1.
- 2.
- 3.
- n-1
- n

5. SUBCONTRACTING

Proposed sub-contractor and firms involved

Ser	Sections of Works	Value of subcontract	Subcontractor Name and address)	Experience
-----	-------------------	----------------------	---------------------------------	------------

- 1.
- 2.
- 3.
- n-1
- n

6. FINANCIAL SOUNDNESS

Financial reports for the last three [3] years

Balance sheets

Profit and loss statements

Auditors’ reports

The submitted financial reports must demonstrate the current soundness of the Bidder’s financial position and indicate his prospective long-term profitability

7. LITIGATION HISTORY

Information on current litigation in which the Bidder is involved

Ser	Other party(s)	Causes of dispute	Amount involved
1.			
2.			
3.			

8. OCCUPATIONAL HEALTH AND SAFETY POLICY

Give in sufficient details Information regarding Occupation Health and Safety Policy and Safety Record of the Bidder.

9. JOINT VENTURE, ASSOCIATION CONSORTIUM

The information listed above shall be provided for each partner of the joint venture.

The information listed above shall be provided for the joint venture.

10. PROPOSED WORK PROGRAM

The Bidder should present Proposed Program to include “work method and schedule” descriptions, drawings, and charts necessarily required to comply with the requirements of the bidding documents.



SECTION 3
BIDDING DATA

BIDDING DATA

NOTE:

The following specific data for the works to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (IBs). Whenever there is a conflict, the provisions herein shall prevail over those in IBs.

BD REF IB REF AMENDMENTS OF AND SUPPLEMENTS TO CLAUSES IN THE IBs

A. GENERAL

1.	1	The Employer: The PIEDMC and Board of Management Sundar Industrial Estate along with its relevant Committees [Procurement & Contract Committee, Infrastructure Repair and Maintenance Committee] shall be the Employer for the purpose of this Contract.
2.	8	Address: Board of Management, Sundar Industrial Estate, Gate # 2 , Sundar Raiwind Road, Lahore Phone: +924235297291-3 Fax: +924235297080 URL: www.sie.com.pk Email: info@sie.com.pk
3.	1	The Works: Repair and maintenance of rigid pavement roads and allied works to include: <ul style="list-style-type: none"> ▪ Repair of Rigid Pavement Roads including Curb stones and Edge stones ▪ Rehabilitation of longitudinal and transverse Joints ▪ Construction of Roundabout and U-Turns ▪ Provision and Installation of Road Signs and Pavement Marking ▪ Construction and or Raising of Boundary Wall ▪ Repair of approach and exit at gate No.1
4.	1	Completion Time: The expected completion time of the works is one hundred and eighty [180] calendar days from the date of the first order to commence the work.
5.	2	Source of Funds: The funds for the works have been approved by The Board of Directors PIEDMC in the budget for the fiscal year 2016/2017 and allocated to BOM SIE to meet the cost of works.
6.	3	Eligible Bidders: The bidders shall satisfy all relevant licensing and/or registration with the appropriate statutory bodies in Pakistan as prescribed in IB.3 and listed below. The Bidder must be financially and technically sound - capable to perform the contract: <ol style="list-style-type: none"> (a) Licensed by PEC in the appropriate category for value of the Works. (b) Registered and be on active tax payer list of the (FBR). (c) Qualified and be on approved list of GOP and others for the said works. (d) Registered with (S&EC) or Registrar of Firms. (e) List of similar works completed by the Bidder during last five (5) years including similar works in hand with cost of each work. (f) Statement of account for the last three (3) years. (g) Annual construction turnover for the last three (3) years (h) An affidavit to the effect that the Bidder is not blacklisted or debarred.
7.	3	Joint Venture: Maximum number of members in the joint venture, consortium or

		association shall be Three (3). The lead member shall be named and authorized through Power of Attorney to conduct the business.
8.	6	Site Visit: Site visit if requested by the Bidders will be conducted once by Assistant Manager Technical AM (Tech) at 1200 hours on 28th of March 2017 .

B. BID DOCUMENTS

9	7.2	No of Copies: The number of copies to be completed and returned with the bid is: One (1) original and three (3) copies marked as such.
10	8.1	Contact Person: For purchase of Bid Documents, seeking clarification in the documents or visiting the work site, the Bidder may contact Mr. Kashif Tanveer AM Tech BOM SIE on Cell No. (0320) 540 0515 or on the address given below.

C. PREPARATION OF BID

11	10.1	Language of Bid: The Bid itself, all documents prepared and submitted by the Bidder with the bid including correspondence shall be in English Language.
12	11.1 12 13.1	Documents Accompanying the Bid: Apart from documents comprising the Bid, other information or materials required to be completed and submitted by Bidders are: Covering Letter Form of Bid duly filled in, signed and sealed Schedules (A to F) to the Bid Bid Security Power of Attorney Documents establishing bidder's Eligibility and Qualification information. Documents establishing conformity of work to the bidding documents
13	15.3	Fixed Cost: The prices quoted by the bidder shall remain fixed during performance of the Contract
14	16.1	Currency of Bid: The currency for quoting unit rates and prices shall be Pakistan Rupees . Similarly currency for payments shall also be Pakistan Rupees.
15	17.1	Bid validity: The Bid validity period shall be Ninety (90) days after the date of bid opening.
16	18.1	Bid Security: The amount of Bid Security shall be 4% of the bid price . The estimated value of Work for the purpose of this clause is Rs. 34.89 Million approximately. The bid security shall be in the shape of CDR from any schedule bank of Pakistan. The currency of the Bid Security shall be Pakistan Rupees. Bid Security shall remain valid Twenty eight (28) days after the Bid Validity Period.
17	19.1	Pre Bid Meeting: Pre-bid meeting if convened will take place in the conference room of BOM SIE at 1100 hours on 28th of March 2017 .

D. SUBMISSION OF BIDS

18.	21.2 a)	Bid Submission : Bids shall be submitted to the Employer’s contact person: Mr. Kashif Tanveer A.M. Tech. BOM SIE Department of Engineering Gate No. 2, Sunder Industrial Estate Sundar-Raiwind Road, Lahore. Cell No. (0320) 540 0515, mailto: akashtanveer@yahoo.com
19.	21.2 b)	Marking of Envelope : The envelopes of the bid shall bear: Project name: Bid Number: ED/ SIE/ 2016-17/ O&M/RD-01 Statement “DO NOT OPEN BEFORE DEADLINE”
20		Deadline for Submission : The last time for submission of Bids is 1100 hours, on 13th of April 2017

E. OPENING AND EVALUATION OF TENDERS

21.	22.1	Venue, time and Date of Bid Opening : Conference Room BOM SIE. 1200 Hours on 13th of April 2017
22	30.2	Evaluation : The currency that shall be used for bid evaluation and comparison purposes is Pakistan Rupees.
23.	38.1	Variations in Quantities : Percentage for quantities increase or decrease is 15%
24		Price Adjustment : If a bid deviates from the terms and conditions of payment as specified in Conditions of Contract and if such deviation is acceptable to the Employer, mark-up earned for any earlier payments as compared to those stipulated in the Conditions of Contract shall be calculated at the mark-up rate of 10% per annum and shall be added to the corrected total bid Price for comparison purposes only.
25		Responsiveness of the Bid : The bid shall be taken as responsive if: The bid is valid till prescribed validity period. The bid prices are firm during the performance of resultant contract. Completion period offered is within specified limits The bidder is eligible to bid and possesses the requisite experience, capacity and qualification. The bid does not deviate from the basic technical requirements. The bids are generally in order.

F. AWARD OF CONTRACT

26.	41.1	Performance Security : The amount of Performance Security shall be 10% of contract price .
27.	41.2	The Performance Security shall be in the form of bank guarantee from any schedule bank of Pakistan in favour of the Employer
28.	42.1	Advance Payment : The admissible advance against mobilization and stores brought at site respectively shall maximum be fifteen percent (15%) of the Contract Price and 70% of the value of store . The advance shall be against bank guarantee from any schedule bank of Pakistan in favour of the Employer.



SECTION 4
FORM OF BID

FORM OF BID

(LETTER OF OFFER)

Bid Reference No. _____

(Name of Works)

To:

Gentlemen,

1. Having examined the Bidding Documents including Instructions to Bidders, Bidding Data, Conditions of Contract, Contract Data, Specifications, Drawings, if any, Schedule of Prices and Addenda Nos. _____ for the execution of the above-named Works, we, the undersigned, being a company doing business under the name of and address _____ and being duly incorporated under the laws of Pakistan hereby offer to execute and complete such Works and remedy any defects therein in conformity with the said Documents including Addenda thereto for the Total Bid Price of Rs _____ (Rupees _____) or such other sum as may be ascertained in accordance with the said Documents.
2. We understand that all the Schedules attached hereto form part of this Bid.
3. As security for due performance of the undertakings and obligations of this Bid, we submit herewith a Bid Security in the amount of _____ drawn in your favour or made payable to you and valid for a period of twenty eight (28) days beyond the period of validity of Bid.
4. We undertake, if our Bid is accepted, to commence the Works and to deliver and complete the Works comprised in the Contract within the time(s) stated in Contract Data.
5. We agree to abide by this Bid for the period of _____ days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
6. Unless and until a formal Agreement is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

7. We undertake, if our Bid is accepted, to execute the Performance Security referred to in Conditions of Contract for the due performance of the Contract.
8. We understand that you are not bound to accept the lowest or any bid you may receive.
9. We do hereby declare that the Bid is made without any collusion, comparison of figures or arrangement with any other person or persons making a bid for the Works.

Dated this _____ day of _____, 20

Signature _____

in the capacity of _____ duly authorized to sign bid for and on behalf of

(Name of Bidder in Block Capitals)

(Seal)

Address _____

Witness:

(Signature): _____

Name: _____

Address: _____



SECTION 5
SCHEDULES TO BID

SCHEDULES TO BID

PREAMBLE TO SCHEDULE OF PRICES

1. GENERAL

The Schedule of Prices shall be read in conjunction with the Conditions of Contract, Contract Data together with the Specifications and Drawings, if any.

The Contract shall be for the whole of the Works as described in these Bidding Documents. Bids must be for the complete scope of works.

2. DESCRIPTION

The general directions and descriptions of works and materials are not necessarily repeated nor summarized in the Schedule of Prices. References to the relevant sections of the Bidding Documents shall be made before entering prices against each item in the Schedule of Prices.

3. UNITS & ABBREVIATIONS

Units of measurement, symbols and abbreviations expressed in the Bidding Documents shall comply with the System International d' Unites (SI Units).

4. RATES AND PRICES

Except as otherwise expressly provided under the Conditions of Contract, the rates and amounts entered in the Schedule of Prices shall be the rates at which the Contractor shall be paid and shall be the full inclusive value of the works set forth or implied in the Contract; except for the amounts reimbursable, if any to the Contractor under the Contract.

Unless otherwise stipulated in the Contract Data, the rates and prices entered by the bidder shall not be subject to adjustment during the performance of the Contract.

All duties, taxes and other levies payable by the Contractor shall be included in the rates and prices.

The whole cost of complying with the provisions of the Contract shall be included in the items provided in the Schedule of Prices, and where no items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related items of the Works and no separate payment will be made for those items.

The rates, prices and amounts shall be entered against each item in the Schedule of Prices. Any item 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 and prices for other items in the Schedule of Prices.

- ✓ The bidder shall be deemed to have obtained all information as to and all requirements related thereto which may affect the bid price.
- ✓ The Contractor shall be responsible to make complete arrangements for the

transportation of the Plant to the Site.

The Contractor shall provide for all parts of the Works to be completed in every respect. Notwithstanding that any details, accessories, etc. required for the complete installation and satisfactory operation of the Works, are not specifically mentioned in the Specifications, such details shall be considered as included in the Contract Price.

5. BID PRICES

Break-up of Bid Prices

- ✓ The various elements of Bid Prices shall be quoted as detailed by the Employer in the format of Schedule of Prices.
- ✓ The bidder shall recognize such elements of the costs which he expects to incur the performance of the Works and shall include all such costs in the rates and amounts entered in the Schedule of Prices.

Total Bid Price

- ✓ The total of bid prices in the Schedule of Prices shall be entered in the Summary of Bid Prices.

6. PROVISIONAL SUMS

Provisional Sums included and so designated in the Schedule of Prices if any, shall be expended in whole or in part at the direction and discretion of the Engineer/Employer. The Contractor will only receive payment in respect of Provisional Sums if he has been instructed by the Engineer/Employer to utilize such sums.

SCHEDULE OF PRICES – SUMMARY OF BID PRICES

NOTE: Bills of Quantities are attached

Bill No.	Description of Work	Amount (Rs)
1	Repair of Rigid Pavement Roads including Curb stones and Edge stones	
2	Rehabilitation of longitudinal and transverse Joints	
3	Construction of Roundabout and U-Turns	
4	Provision and Installation of Road Signs and Pavement Marking	
5	Construction and or Raising of Boundary Wall	
6	Repair of Approach & Exit at Gate # 01	
	Total Amount	

The total amount of Bid Price here is to be entered in Paragraph 1 of the Form of Bid both in figures as well as In words.

Signature of Bidder

BILL NO. 1: REPAIR OF RIGID PAVEMENT ROADS INCLUDING CURBS AND EDGE STONES

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1		Cft			
2		Kg			
3		Kg			
n-1		Cft			
n		Sft			
Total Bill No. 1					

BILL NO. 2: REHABILITATION OF LONGITUDINAL AND TRANSVERSE JOINTS

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1		Cft			
2		Kg			
3		Kg			
n-1		Cft			
n		Sft			
Total Bill No. 2					

BILL NO. 3: CONSTRUCTION OF ROUNDABOUT AND U-TURNS

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1		Cft			
2		Kg			
3		Kg			
n-1		Cft			
n		Sft			
Total Bill No. 3					

BILL NO. 4: PROVISION AND INSTALLATION OF ROAD SIGNS AND PAVEMENT MARKING

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
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REPAIR AND MAINTENANCE OF ROADS AND ALLIED WORKS AT SIE | FY 2017/17

1	Cft
2	Kg
3	Kg
n-1	Cft
n	Sft
Total Bill No. 4	

BILL NO. 5: CONSTRUCTION AND OR RAISING OF BOUNDARY WALL

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1		Cft			
2		Kg			
3		Kg			
n-1		Cft			
n		Sft			
Total Bill No. 5					

BILL NO. 6: REPAIR OF APPROACH & EXIT AT GATE # 01

Item. No.	Description of Items	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1		Cft			
2		Kg			
3		Kg			
n-1		Cft			
n		Sft			
Total Bill No. 6					

SPECIFIC WORKS DATA

BLANK

WORKS TO BE PERFORMED BY SUBCONTRACTORS

The bidder will do the works with his own workforce except the item of works listed below which he intends to sub-contract.

Items of Work To be Sub-Contracted	Name and Address of Sub-Contractor(s)	Statement of Similar Works Previously Executed by the Sub-Contractor *
Items of Work 1		
Items of Work 2		
Items of Work 3		
Items of Work 4		
Items of Work 5		
Items of Work 6		
And so on ...		
Total Number of Items of work		

*(attach evidence)

Note:

1. No change of Sub-Contractors shall be made by the bidder without prior approval of the Employer.
2. The truthfulness and accuracy of the statement as to the experience of Sub-Contractors is to be guaranteed by the bidder.
3. The Employer's judgment shall be final as to the evaluation of the experience of Sub-Contractors submitted by the bidder.
4. Statement of similar works completed by the Sub-Contractor shall include
 - a. Description, location and value of works
 - b. Year of completion of work
 - c. Name and address of the clients.

PROPOSED PROGRAM OF WORKS

The Bidder shall provide a work program in the form of a Bar chart, Gantt chart Critical path method etc. using software like Primavera or Microsoft Project. The works must be split into Work Breakdown Structure (WBS) prioritized ordered into sequence by which Constructor proposes to complete the Works of the entire Contract. Achievable milestone with timeline must be fixed to monitor and measure progress of work. Each work activity must be loaded with resource in terms of workforce, cash flow required, material flow etc. The program should indicate all the activities to be completed under the Contract like:

- a. Designing of the work where required
- b. Schedule of submittal of drawings
- c. Ordering and procurement of materials
- d. Manufacturing of parts where required
- e. Delivering at site of work Tools, Plants, and Materials etc.
- f. Construction of civil works
- g. Erection of works
- h. Testing and commissioning of Works

METHOD OF PERFORMING WORKS

The bidder is required to submit a narrative outlining the method of performing the Works. The narrative should indicate in detail and include but not be limited to:

- ✚ The sequence and methods in which he proposes to carry out the Works, including the number of shifts per day and hours per shift, he expects to work.
- ✚ A list of all major items of constructional and erection plant, tools and vehicles proposed to be used in delivering / carrying out the Works at Site
- ✚ The procedure for installation of equipment and transportation of equipment and materials to the site.
- ✚ Organization chart indicating head office & field office personnel involved in management, supervision and engineering of the Works to be done under the Contract.

INTEGRITY PACT

*DECLARATION OF FEE AND COMMISSION ETC. PAYABLE BY THE SUPPLIERS OF
WORKS, SERVICES & GOODS IN CONTRACTS WORTH
R S. 10.00 MILLION OR MORE*

Contract No. _____ Dated _____
 Contract Value: _____
 Contract Title: _____

..... [Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Punjab (GOP) or any administrative subdivision or agency thereof or any other entity owned or controlled by GOP through any corrupt business practice.

Without limiting the generality of the foregoing, [name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP, except that which has been expressly declared pursuant hereto.

[Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GOP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

[Name of Supplier] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GOP under any law, contract or other instrument, be voidable at the option of GOP.

Notwithstanding any rights and remedies exercised by GOP in this regard, [name of Supplier] agrees to indemnify GOP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GOP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder’s fee or kickback given by [name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GOP.

Name of Buyer:

Name of Seller/Supplier:

Signature:

Signature:

[Seal]

[Seal]



SECTION 6
CONDITIONS OF
CONTRACT

CONDITIONS OF CONTRACT

1. GENERAL PROVISIONS

1.1 Definitions

In the Contract as defined below, the words and expressions defined shall have the following meanings assigned to them, except where the context requires otherwise:

The Contract

1.1.1 “Contract” means the Contract Agreement and the other documents listed in the Contract Data.

1.1.2 “Specifications” means the document as listed in the Contract Data, including Employer’s requirements in respect of design to be carried out by the Contractor (if any), and any Variation to such document.

1.1.3 “Drawings” means the Employer’s drawings of the Works as listed in the Contract Data, and any Variation to such drawings.

The Persons

1.1.4 “Employer” means the person named in the Agreement and the legal successor in title to this person but not (except with the consent of the Employer) any assignee.

1.1.5 “Contractor” means the person named in the Agreement and the legal successor in title to this person but not (except with the consent of the Employer) any assignee.

1.1.6 “Party” means either the Employer or the Contractor.

Dates, Time and Period

1.1.7 “Commencement Date” means the date 14 days after the date the Agreement comes into effect or any other date agreed between the Parties.

1.1.8 “Day” means a calendar day

1.1.9 “Time for Completion” means the time for completing the Works as stated in the Appendix (or as extended under Sub-Clause 7.3) calculated from the commencement date.

Money and Payments

1.1.10 “Cost” means all expenditures properly incurred (or to be incurred) by the Contractor whether on or off the Site including overheads and similar charges but does not include profits.

Other Definitions

1.1.11 “Contractor’s Equipment” means all machinery, apparatus and other things required for the execution of the Works but does not include Materials or Plant intended to form part of the Works.

1.1.12 “Country” means the Islamic Republic of Pakistan.

1.1.13 “Employer’s Liabilities” means those matters listed in Sub-Clause 6.1.

1.1.14 “Force Majeure” means an event or circumstance which makes performance of a Party’s obligations illegal or impracticable and which is beyond that Party’s reasonable control.

1.1.15 “Materials” means things of all kinds (other than Plant) to be supplied and incorporated in the Works by the Contractor.

1.1.16 “Plant” means the machinery and apparatus intended to form or forming part of the Works.

1.1.17 “Site” means the places provided by the Employer where the Works are to be executed, and any other places specified in the Contract as forming part of the site.

1.1.18 “Variation” means a change which is instructed by the Engineer/Employer under Sub-Clause 10.1.

1.1.19 “Works” means all the Works and design (if any) to be performed by the Contractor including temporary works and any Variation.

1.2 Interpretation

Words importing persons or parties shall include firms and organizations. Words importing singular or one gender shall include plural or the other gender where the context requires.

1.3 Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. If an ambiguity or discrepancy is found in the documents, the priority of the documents shall be in accordance with the order as listed in the Contract Data.

1.4 Law

The law of the Contract is the relevant Law of Islamic Republic of Pakistan.

1.5 Communications

All Communications related to the Contract shall be in English language.

1.6 Statutory Obligations

The Contractor shall comply with the Laws of Islamic Republic of Pakistan and shall give all notices and pay all fees and other charges in respect of the Works.

2. THE EMPLOYER

2.1 Provision of Site

The Employer shall provide the Site and right of access thereto at the times stated in the Contract Data.

2.2 Permits etc.

The Employer shall, if requested by the Contractor, assist him in applying for permits, licenses or approvals which are required for the Works.

2.3 Engineer's/Employer's Instructions

The Contractor shall comply with all instructions given by the Employer or the Engineer, if notified by the Employer, in respect of the Works including the suspension of all or part of the Works.

2.4 Approvals

No approval or consent or absence of comment by the Engineer/Employer shall affect the Contractor's obligations.

3. ENGINEER'S/EMPLOYER'S REPRESENTATIVES

3.1 Authorized Person

One of the Engineer's personnel shall have authority to Act for him. This authorised person shall be as stated in the Appendix, or as otherwise notified by the Employer to the Contractor.

3.2 Engineer's/Employer's Representative

The Employer may also appoint a firm and individual to carry out certain duties. The appointee may be named in the Appendix, or notified by the Employer to the Contractor from time to time. The Employer shall notify to the Contractor of the delegated duties and authority of this Employer's representative.

4. THE CONTRACTOR

4.1 General Obligations

The contractor is obliged to submit his work schedule on a bar chart for approval of the Engineer before commencement the work.

4.2 Contractor's Representative

The Contractor shall appoint a representative at site on full time basis to supervise the execution of work and to receive instructions on behalf of the Contractor but only after obtaining the consent of the Employer for such appointment which consent shall not be unreasonably withheld by the Employer. Such authorized representative may be substituted / replaced by the Contractor at any time during the Contract Period but only after obtaining the consent of the Employer as aforesaid.

4.3 Subcontracting

The Contractor shall not subcontract the whole of the Works. The Contractor shall not subcontract any part of the Works without the consent of the Employer.

4.4 Duties of the Contractor

The contractor shall liable to prepare site area for construction, providing of all tools & machinery, labour, carriage, construction materials supply etc within due time. The contractor shall also liable to complete the whole works, complete in all respects.

4.5 Performance Security

If stated in the Appendix, the Contractor shall deliver to the Employer within 14 days of the Commencement Date a performance security in a form and from third party approved by the Employer.

5. DESIGN BY CONTRACTOR

5.1 Contractor's Design

The Contractor shall carry out design to the extent specified, as referred to in the Contract Data. The Contractor shall promptly submit to the Engineer/Employer all designs prepared by him. Within fourteen (14) days of receipt the Engineer/Employer shall notify any comments or, if the design submitted is not in accordance with the Contract, shall reject it stating the reasons. The Contractor shall not construct any element of the Works designed by him within fourteen (14) days after the design has been submitted to the Engineer/Employer or which has been rejected. Design that has been rejected shall be promptly amended and resubmitted. The Contractor shall resubmit all designs commented on taking these comments into account as necessary.

5.2 Responsibility for Design

The Contractor shall remain responsible for his bided design and the design under this Clause, both of which shall be fit for the intended purposes defined in the Contract and he shall also remain responsible for any infringement of any patent or copyright in respect of the same. The Engineer/Employer shall be responsible for the Specifications and Drawings.

6. EMPLOYER'S LIABILITIES

6.1 Employer's Liabilities:

The Employer's Liabilities are:-

- a. War, hostilities (whether war be declared or not), invasion, act of foreign enemies, within the Country;
- b. Rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country;
- c. Riot, commotion or disorder by persons other than the Contractor's personnel and other employees including the personnel and employees of Sub-Contractors, affecting the Site and/or the Works;
- d. ionizing radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such an assembly, except to the extent to which the Contractor/Sub-Contractors may be responsible for the use of any radio-active material;
- e. Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic

speeds;

- f. Use or occupation by the Employer of any part of the Works, except as may be specified in the Contract;
- g. late handing over of sites, anomalies in drawings, late delivery of designs and drawings of any part of the Works by the Employer's personnel or by others for whom the Employer is responsible;
- h. A suspension under Sub-Clause 2.3 unless it is attributable to the Contractor's failure; and
- i. Physical obstructions or physical conditions other than climatic conditions, encountered on the Site during the performance of the Works, for which the Contractor immediately notified to the Employer and accepted by the Employer.

7. TIME FOR COMPLETION

7.1 Execution of the Works

The contractor shall commence the Works on the Commencement Date and shall proceed expeditiously and without delay and shall complete the Works, subject to Sub-Clause 7.3 below, within the Time for Completion.

7.2 Program

Within the time stated in the Appendix, the Contractor shall submit to the Employer a program for the Works in the form stated in the [Appendix](#).

7.3 Extension of Time

The Contractor shall, within such time as may be reasonable under the circumstances, notify the Employer/Engineer of any event(s) falling within the scope of Sub-Clause 6.1 or 10.3 of these Conditions of Contract and request the Employer/Engineer for a reasonable extension in the time for the completion of Works. Subject to the aforesaid, the Employer/Engineer shall determine such reasonable extension in the time for the completion of Works as may be justified in the light of the details/particulars supplied by the Contractor in connection with the such determination by the Employer/Engineer within such period as may be prescribed by the Employer/Engineer for the same; and

The Employer shall extend the Time for Completion as determined.

7.4 Late Completion

If the Contractor fails to complete the Works within the Time for Completion, the Contractor's only liability to the Employer for such failure shall be to pay the amount stated in the Contract Data for each day for which he fails to complete the Works.

8. TAKING-OVER

8.1 Completion including Sectional Completion.

The Contractor may notify the Engineer/Employer when he considers that the Works are

complete. Partial or sectional completion shall also be acceptable and must be notified accordingly.

8.2 Taking-Over Notice

Within fourteen (14) days of the receipt of the said notice of completion from the Contractor the Employer shall either takeover the completed Works and issue a Certificate of Completion to that effect or shall notify the Contractor his reasons for not taking-over the Works. While issuing the Certificate of Completion as aforesaid, the Employer may identify any outstanding items of work which the Contractor shall undertake during the Maintenance Period.

9. REMEDYING DEFECTS

9.1 Remedying Defects

The Contractor shall for a period stated in the Contract Data from the date of issue of the Certificate of Completion carry out, at no cost to the Employer, repair and rectification work which is necessitated by the earlier execution of poor quality of work or use of below specifications material in the execution of Works and which is so identified by the Employer/Engineer in writing within the said period. Upon expiry of the said period, and subject to the Contractor's faithfully performing his aforesaid obligations, the Employer/Engineer shall issue a Maintenance Certificate whereupon all obligations of the Contractor under this Contract shall come to an end.

Failure to remedy any such defects or complete outstanding work within a reasonable time shall entitle the Employer to carry out all necessary works at the Contractor's cost. However, the cost of remedying defects not attributable to the Contractor shall be valued as a Variation.

9.2 Uncovering and Testing

The Engineer/Employer may give instruction as to the uncovering and/or testing of any work. Unless as a result of an uncovering and/or testing it is established that the Contractor's design, Materials, Plant or workmanship are not in accordance with the Contract, the Contractor shall be paid for such uncovering and/or testing as a Variation in accordance with Sub-Clause 10.2.

10. VARIATIONS AND CLAIMS

10.1 Right to Vary

The Employer/Engineer may issue Variation Order(s) in writing. Where for any reason it has not been possible for the Employer/Engineer to issue such Variations Order(s), the Contractor may confirm any verbal orders given by the Employer/Engineer in writing and if the same are not refuted/denied by the Employer/Engineer within seven (7) days of the receipt of such confirmation the same shall be deemed to be a Variation Orders for the purposes of this Sub-Clause.

10.2 Valuation of Variations:

Variations shall be valued as follows:

- a. At a lump sum price agreed between the Parties, or
- b. Where appropriate, at rates in the Contract, or
- c. In the absence of appropriate rates, the rates in the Contract shall be used as the basis for valuation, or failing which
- d. At appropriate new rates, as may be agreed or which the Engineer/Employer considers appropriate, or
- e. If the Engineer/Employer so instructs, at day work rates set out in the Contract Data for which the Contractor shall keep records of hours of labour and Contractor's Equipment, and of Materials, used.

10.3 Early Warning

The Contractor shall notify the Engineer/Employer in writing as soon as he is aware of any circumstance which may delay or disrupt the Works, or which may give rise to a claim for additional payment.

To the extent of the Contractor's failure to notify, which results to the Engineer/Employer being unable to keep all relevant records or not taking steps to minimize any delay, disruption, or Cost, or the value of any Variation, the Contractor's entitlement to extension of the Time for Completion or additional payment shall be reduced/rejected.

10.4. Valuation of Claims

If the Contractor incurs Cost as a result of any of the Employer's Risks, the Contractor shall be entitled to the amount of such Cost. If as a result of any Employer's Risk, it is necessary to change the Works, this shall be dealt with as a Variation subject to Contractor's notification for intention of claim to the Engineer/Employer within fourteen (14) days of the occurrence of cause.

10.5 Variation and Claim Procedure

The Contractor shall submit to the Engineer/Employer an itemized make-up of the value of variations and claims within twenty eight (28) days of the instruction or of the event giving rise to the claim. The Engineer/Employer shall check and if possible agree the value. In the absence of agreement, the Employer shall determine the value.

11. CONTRACT PRICE AND PAYMENT

11.1 Terms of Payments

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other terms of the Contract, shall be paid by the Employer to the Contractor within 30 days after such Interim Payment Certificate has been jointly verified by Employer and Contractor, or, in the case of the Final Certificate within 60 days after such Final Payment Certificate has been jointly verified by Employer

and Contractor; Provided that the Interim Payment shall be caused in 42 days and Final Payment in 60 days in case of foreign funded project. The contractor shall submit schedule of payment for supply and installation of the work.

Valuation of the Works

The Works shall be valued as provided for in the Contract Data, subject to Clause 10.

11.2 Monthly Statements

The Contractor shall be entitled to be paid at monthly intervals:

- a. The value of the Works executed; and
- b. The percentage of the value of Materials and Plant reasonably delivered to the Site, as stated in the Contract Data, subject to any additions or deductions which may be due.

The Contractor shall submit each month to the Engineer/Employer a statement showing the amounts to which he considers himself entitled.

11.3 Interim Payments

Payment will be carried out as per payment schedule signed by the Employer & Contractor. The minimum value of IPC shall be 20% of the value of work.

11.4 Retention

Retention money shall be paid by the Employer to the Contractor within fourteen (14) days after either the expiry of the period stated in the Contract Data, or the remedying of notified defects, or the completion of outstanding work, all as referred to in Sub-Clause 9.1, whichever is the later.

11.5 Final Payment

Within twenty one (21) days from the date of issuance of the Maintenance Certificate the Contractor shall submit a final account to the Engineer to verify and the Engineer shall verify the same within fourteen (28) days from the date of submission and forward the same to the Employer together with any documentation reasonably required to enable the Employer to ascertain the final contract value.

Within sixty (60) days from the date of receipt of the verified final account from the Engineer, the Employer shall pay to the Contractor any amount due to the Contractor. While making such payment the Employer may, for reasons to be given to the Contractor in writing, withhold any part or parts of the verified amount.

11.6 Currency

Payment shall be in the currency stated in the Contract Data.

12. DEFAULT

12.1 Default by Contractor

If the Contractor abandons the Works, refuses or fails to comply with a valid instruction of

the Engineer/Employer or fails to proceed expeditiously and without delay, or is, despite a written complaint, in breach of the Contract, the Employer may give notice referring to this Sub-Clause and stating the default.

If the Contractor has not taken all practicable steps to remedy the default within fourteen (14) days after receipt of the Employer's notice, the Employer may by a second notice given within a further twenty one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site leaving behind any Contractor's Equipment which the Employer instructs, in the second notice, to be used for the completion of the Works at the risk and cost of the Contractor.

12.2 Default by Employer

If the Employer fails to pay in accordance with the Contract, or is, despite a written complaint, in breach of the Contract, the Contractor may give notice referring to this Sub-Clause and stating the default. If the default is not remedied within fourteen (14) days after the Employer's receipt of this notice, the Contractor may suspend the execution of all or parts of the Works.

If the default is not remedied within twenty eight (28) days after the Employer's receipt of the Contractor's notice, the Contractor may by a second notice given within a further twenty one (21) days, terminate the Contract. The Contractor shall then demobilize from the Site.

12.3 Insolvency

If a Party is declared insolvent under any applicable law, the other Party may by notice terminate the Contract immediately. The Contractor shall then demobilize from the Site leaving behind, in the case of the Contractor's insolvency; any Contractor's Equipment which the Employer instructs in the notice is to be used for the completion of the Works.

12.4 Payment upon Termination

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

- a. Any sums to which the Contractor is entitled under Sub-Clause 10.4,
- b. Any sums to which the Employer is entitled,
- c. If the Employer has terminated under Sub-Clause 12.1 or 12.3, the Employer shall be entitled to a sum equivalent to twenty percent (20%) of the value of parts of the Works not executed at the date of the termination, and
- d. If the Contractor has terminated under Sub-Clause 12.2 or 12.3, the Contractor shall be entitled to the cost of his demobilization together with a sum equivalent to ten percent (10%) of the value of parts of the Works not executed at the date of termination.

The net balance due shall be paid or repaid within twenty eight (28) days of the notice of termination.

13. RISKS AND RESPONSIBILITIES

13.1 Contractor's Care of the Works

Subject to Sub-Clause 9.1, the Contractor shall take full responsibility for the care of the Works from the Commencement Date until the date of the Employer's/Engineer's issuance of Certificate of Completion under Sub-Clause 8.2. Responsibility shall then pass to the Employer. If any loss or damage happens to the Works during the above period, the Contractor shall rectify such loss or damage so that the Works conform to the Contract.

Unless the loss or damage happens as a result of any of the Employer's Risks, the Contractor shall indemnify the Employer, or his agents against all claims loss, damage and expense arising out of the Works.

13.2 Force Majeure

If Force Majeure occurs, the Contractor shall notify the Engineer/Employer immediately. If necessary, the Contractor may suspend the execution of the Works and, to the extent agreed with the Employer demobilize the Contractor's Equipment.

If the event continues for a period of eighty four (84) days, either Party may then give notice of termination which shall take effect twenty eight (28) days after the giving of the notice.

After termination, the Contractor shall be entitled to payment of the unpaid balance of the value of the Works executed and of the Materials and Plant reasonably delivered to the Site, adjusted by the following:

- a. Any sums to which the Contractor is entitled under Sub-Clause 10.4,
- b. The cost of his demobilization, and
- c. Less any sums to which the Employer is entitled.

The net balance due shall be paid or repaid within thirty five (35) days of the notice of termination.

14. INSURANCE

14.1 Arrangements

The Contractor shall, prior to commencing the Works, effect insurances of the types, in the amounts and naming as insured the persons stipulated in the Contract Data except for items (a) to (e) and (i) of the Employer's Risks under Sub-Clause 6.1. The policies shall be issued by insurers and in terms approved by the Employer. The Contractor shall provide the Engineer/Employer with evidence that any required policy is in force and that the premiums have been paid.

14.2 Default

If the Contractor fails to effect or keep in force any of the insurances referred to in the previous Sub-Clause, or fails to provide satisfactory evidence, policies or receipts, the Employer may, without prejudice to any other right or remedy, effect insurance for the

cover relevant to such as a default and pay the premiums due and recover the same plus a sum in percentage given in Contractor Data from any other amounts due to the Contractor.

15. RESOLUTION OF DISPUTES

15.1 Engineer's Decision

If a dispute of any kind whatsoever arises between the Employer and the Contractor in connection with the Works, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state that it is made pursuant to this Clause. No later than the twenty eight (28) days after the day on which he received such reference, the Engineer shall give notice of his decision to the Employer and the Contractor.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence, and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided in an arbitral award.

15.2 Notice of Dissatisfaction

If a Party is dissatisfied with the decision of the Engineer or if no decision is given within the time set out in Sub-Clause 15.1 here above, the Party may give notice of dissatisfaction referring to this Sub-Clause within fourteen (14) days of receipt of the decision or the expiry of the time for the decision. If no notice of dissatisfaction is given within the specified time, the decision shall be final and binding on the Parties. If notice of dissatisfaction is given within the specified time, the decision shall be binding on the Parties who shall give effect to it without delay unless and until the decision of the Engineer is revised by an arbitrator.

15.3 Arbitration

A dispute which has been the subject of a notice of dissatisfaction shall be finally settled as per provisions of Arbitration Act 1940 (Act No. X of 1940) and Rules made there under and any statutory modifications thereto. Any hearing shall be held at the place specified in the Contract Data and in the language referred to in Sub-Clause 1.5.

16 INTEGRITY PACT

16.1 Violation of Integrity Pact

If the Contractor, or Any of His Sub-Contractors, Agents or Servants is found to have violated or involved in violation of the Integrity Pact signed by the Contractor as Schedule-F to his Bid, then the Employer shall be entitled to:

- a. recover from the Contractor an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Contractor or any of his Sub-Contractors, agents or servants;

- b. Terminate the Contract; and
- c. Recover from the Contractor any loss or damage to the Employer as a result of such termination or of any other corrupt business practices of the Contractor or any of his Sub-Contractors, agents or servants.

On termination of the Contract under Sub-Para (b) of this Sub-Clause, the Contractor shall demobilize from the Site leaving behind Contractor's Equipment which the Employer instructs, in the termination notice, to be used for the completion of the Works at the risk and cost of the Contractor. Payment upon such termination shall be made under Sub-Clause 12.4, in accordance with Sub-Para (c) thereof, after having deducted the amounts due to the Employer under Sub-Para (a) and (c) of this Sub-Clause.



SECTION 7
CONTRACT DATA

CONTRACT DATA

NOTE:

The following Contract Data or Special Conditions of Contract (SCC) for the Works to be procured shall complement, supplement or amend the provisions the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract.

SCC REF	GCC REF	DESCRIPTION
A. GENERAL PROVISIONS		
1	1.1.4	<p>The Employer The PIEDMC and Board of Management Sundar Industrial Estate along with its relevant Committees [Procurement & Contract Committee, Infrastructure Repair and Maintenance Committee] shall be the Employer for the purpose of this Contract.</p> <p>Employer's Address: Board of Management, Sundar Industrial Estate, Gate # 2 , Sundar Raiwind Road, Lahore Phone: +924235297291-3 Fax: +924235297080 URL: www.sie.com.pk Email: info@sie.com.pk</p>
2	1.1.10	<p>The Cost: It is the total contract price including all taxes, levies and other lawful expenses incurred by the Contractor in performance of his Contract.</p>
3	3.1	<p>Employer's Representative: BOM SIE has appointed Chief Engineer SIE as the Authorised Person / Representative of the Employer and the Engineer for the Contract who shall direct and operate the Contract.</p>
4	3.2	<p>Engineer's Representatives: Mr. Kashif Tanveer [Assistant Manage Technical] and Mr. Zohaib Nawaz shall be the Representatives of the Engineer who will apart from their usual duties manage, control and supervise all works under the Contract.</p>
5	1.1.19	<p>The Works: Repair and maintenance of rigid pavement roads and allied works to include:</p> <ul style="list-style-type: none"> ▪ Repair of Rigid Pavement Roads including Curb stones and Edge stones ▪ Rehabilitation of longitudinal and transverse Joints ▪ Construction of Roundabout and U-Turns ▪ Provision and Installation of Road Signs and Pavement Marking ▪ Construction and or Raising of Boundary Wall ▪ Repair of approach and exit at gate No.1
6	1.1.1	<p>The Contract: The Contract Agreement and documents forming integral part of the Contract as listed herein in the order of priority shall form part of the Contract.</p> <ol style="list-style-type: none"> (a) The Contract Agreement (b) Letter of Acceptance (c) The completed Form of Bid (d) Contract Data (e) Conditions of Contract (f) The completed Schedules to Bid including Schedule of Prices (g) The Drawings, if any (h) The Specifications (i) Any other document
7	1.1.5	<p>The Contractor: Mean a person of a firm or an organization named in the Agreement.</p>

8	1.1.2	Specifications: For the purposes of this Contract, Following specification shall be followed by the contractor: a. Specifications of the Communication & Works Department of Government of the Punjab. b. Specifications of the National Highway Authority for Rigid Pavements. c. Technical Specifications included herein.
9	1.1.3	Drawings: Means the drawings included herein or the shop drawings provided by the Contractor from time to time and approved by the Engineer.
10	2.1, 1.1.17	Work Site: The site for all works is Sundar Industrial Estate. The Contractor is deemed to have taken over and possessed the site of Works on the seventh (7 th) day of the receipt of first written order to commence the Work.
11	1.1.6	Party: Means either the Employer or the Contractor; collectively called the Parties
12	2.2	Permits: The Employer shall assist if request by the Contractor under Sub-clause 2.2 of CONDITIONS OF CONTRACT.
13	8.1	Partial Completion: Sectional or partial completion by the Contractor shall be acceptable to the Employer / Engineer for the purposes of this Contract.
14	1.1.1	Contract No: Contract Agreement (CA) No. “ED/SIE/2016-17/O&M/W/Roads /001” has been allotted to the Work “Repair and Maintenance of Rigid Pavement Roads and Allied Works at SIE”.
15	15.3	The Arbitrator: The Issue Resolving Committee of BOM SIE or any other Committee appointed by the BOM shall act as an arbitrator for the Contract. Arbitration if required will take place in the conference room of BOM SIE. Decision of the Convener of the appointed Committee shall be final, conclusive and binding on both the parties in the Contract.
16	1.1.12	The Country: Means the Islamic Republic of Pakistan
17	1.4	The Law: The law that applies to the Contract is the Law of Islamic Republic of Pakistan.
18	1.5	Contract Language: The language of the Contract including all documents and correspondence shall be English Language.
19	-	Other Contractors: The Contractor is expected to cooperate and coordinate with all other Contractors working at Site. The Engineer’s Representatives shall give list of other contractors and share their Schedule, if any.
20	-	Site Investigation: The Employer shall provide to the Contractor the site investigation report for all new works to be designed by the Contractor. Where the design is provided by the Employer, site investigation report reports may not be necessary.
B. TIME CONTROL		
21	7.2	Program of Work: The Contractor shall Submit a Program for the Works within fourteen [14] days of delivery of the Letter of Acceptance.
22		Program Review: The program of Work shall be reviewed and periodically updated after a after every thirty [30] days starting from commencement date.
23	4.5	Validity of Performance Security: The Performance Security must remain valid 28 days after completion of the project.
24	1.1.7	Commencement Date: The Work shall commence on the seventh (7 th) day of the Engineer’s first written order to commence the work is issued to the Contractor.
25	1.1.9	Completion Date: The date of completion for the entire work shall be 180 calendar days after the commencement date or such other extended date approved by the Employer /Engineer.

26		Liquidated Damages: In case of delay in completion the Contractor shall pay Liquidated Damages within fifteen [15] days after the date of completion.
C. QUALITY CONTROL		
27	9.1	Defect Liability: The defect liability period shall commence on the date of first taking over of the completed part of work or the entire work as the case may be and shall continue for one hundred and eighty [180] calendar days thereafter.
28	-	Testing: The testing of input material or product shall be done jointly by the Employer and the Contractor from approved laboratory.
	-	Contractor not Absolved: Irrespective of the quality control measures adopted by the employer, the Contractor cannot be absolved of his obligations and shall remain bound to produce quality work closely conforming to the specifications and drawings.
D. COST CONTROL		
29	11.2 11.3	Interim Payment Certificate (IPC): Minimum Amount of Interim Payment Certificate will be twenty percent [20%] of contract price.
30	10.2	Price Adjustment: The contract “is not” subject to price adjustment except in accordance with Clause 10.1 of the General Conditions of Contract.
31	11.4	Retention Money: The amount of retention is five percent [5%] of value of approved works of Interim Payment Certificate’.
32	11.4	Limit of Retention: Limit of retention will not be more than ten percent [10%] of contract price.
33		Liquidated Damages: The amount of liquidated damages is point one two percent [0.12%] of the contract price per day subject to a maximum of ten [10%] of the contract price
34	4.5	Performance Security: The amount of the performance security is ten percent [10%] of the contract price as provided in Sub-Clause 4.5 of the GCC, and the Contractor shall submit to the Employer within fourteen [14] days of Commencement Date in the form of Pay Order in favour of the Employer.
35		Bonus: Should the Contractor complete the entire work before the stipulated completion herein he will be entitle to the bonus for early completion equal to an amount of five percent [5%] of the total value of approved work done.
36	-	Advances: The amount of advance payment on account of mobilization and stores brought at site of construction shall be ten percent [15%] of the contract sum and seventy per cent 70% of the value of store respectively. The advances shall be payable against bank guarantee. The advance can be drawn within thirty [30] days of commencement.
37	-	Recovery of Advance: Monthly Recovery of Advance Payment shall be twenty five percent [25%] of the amount of Interim Payment Certificate.
E FINISHING THE CONTRACT		
38	5.1	As built Drawings: As built drawings shall be supplied by the contractor within fifteen [15] days of handing over of the completed works.
39	-	Amount to be withheld: Project Manager may withhold an amount equal to: <ul style="list-style-type: none"> a. Five percent [5%] of the contract in the case the contractor does not submit as built drawings. b. Another five percent [5%] of the Interim Payment should the contractor not submit an updated program.

40	7.4	Late Completion: Number of days for which the maximum amount of liquidated damages can be paid is seventy five [75] days.
41	-	Additional Cost: The percentage to apply to the value of the work not completed, by the Contractor representing the Employer's additional cost for completing the Works, is 7.5%



SECTION 8
STANDARD FORMS

STANDARD FORMS

FORM A

BID SECURITY
(Bank Guarantee)

Guarantee No. _____
Executed on _____

(Letter by the Guarantor to the Employer)

Name of Guarantor (Scheduled Bank in Pakistan) with address:

Name of Principal (Bidder) with address:

Penal Sum of Security (express in words and figures):

Bid Reference No. _____ Date of Bid _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bid and at the request of the said Principal, we the Guarantor above-named are held and firmly bound unto the _____, (hereinafter called The "Employer") in the sum stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Bid numbered and dated as above for _____ (Particulars of Bid) to the said Employer; and

WHEREAS, the Employer has required as a condition for considering the said Bid that the Principal furnishes a Bid Security in the above said sum to the Employer, conditioned as under:

- (1) That the Bid Security shall remain valid for a period of twenty eight (28) days beyond the period of validity of the bid;
- (2) That in the event of;
 - (a) The Principal withdraws his Bid during the period of validity of Bid, or
 - (b) The Principal does not accept the correction of his Bid Price, pursuant to Sub-Clause 16.4 (b) of Instructions to Bidders, or
 - (c) Failure of the successful bidder to
 - (i) Furnish the required Performance Security, in accordance with Sub-Clause IB-21.1 of Instructions to Bidders, or

- (ii) Sign the proposed Contract Agreement, in accordance with Sub-Clauses IB-20.2 & 20.3 of Instructions to Bidders,
- (d) The entire sum shall be paid immediately to the said Employer for delayed completion and not as penalty for the successful bidder's failure to perform.

NOW THEREFORE, if the successful bidder shall, within the period specified therefore, on the prescribed form presented to him for signature enter into a formal Contract Agreement with the said Employer in accordance with his Bid as accepted and furnish within fourteen (14) days of receipt of Letter of Acceptance, a Performance Security with good and sufficient surety, as may be required, upon the form prescribed by the said Employer for the faithful performance and proper fulfilment of the said Contract or in the event of non-withdrawal of the said Bid within the time specified then this obligation shall be void and of no effect, but otherwise to remain in full force and effect.

PROVIDED THAT the Guarantor shall forthwith pay to the Employer said sum stated above upon first written demand of the Employer without cavil or argument and without requiring the Employer to prove or to show grounds or reasons for such demand, notice of which shall be sent by the Employer by registered post duly addressed to the Guarantor at its address given above.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal has duly performed his obligations to sign the Contract Agreement and to furnish the requisite Performance Security within the time stated above, or has defaulted in fulfilling said requirements and the Guarantor shall pay without objection the sum stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above bounded Guarantor has executed the instrument under its seal on the date indicated above, the name and seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

Guarantor (Bank of Punjab)

Witness:	1. Signature _____
1 _____	2. Name _____
_____	3. Title _____
Corporate Secretary (Seal)	
2 _____	

(Name, Title & Address)	Corporate Guarantor (Seal)

**PERFORMANCE SECURITY
(Bank Guarantee)**

Guarantee No. _____
Executed on _____

(Letter by the Guarantor to the Employer)

Name of Guarantor (Scheduled Bank in Pakistan) with address:

Name of Principal (Contractor) with address:

Penal Sum of Security (express in words and figures)

Letter of Acceptance No. _____ Dated _____

KNOW ALL MEN BY THESE PRESENTS, that in pursuance of the terms of the Bidding Documents and above said Letter of Acceptance (hereinafter called the Documents) and at the request of the said Principal we, the Guarantor above named, are held and firmly bound unto the _____ (hereinafter called the Employer) in the penal sum of the amount stated above, for the payment of which sum well and truly to be made to the said Employer, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has accepted the Employer's above said Letter of Acceptance for _____ (Name of Contract) for the _____ (Name of Project).

NOW THEREFORE, if the Principal (Contractor) shall well and truly perform and fulfil all the undertakings, covenants, terms and conditions of the said Documents during the original terms of the said Documents and any extensions thereof that may be granted by the Employer, with or without notice to the Guarantor, which notice is, hereby, waived and shall also well and truly perform and fulfil all the undertakings, covenants terms and conditions of the Contract and of any and all modifications of the said Documents that may hereafter be made, notice of which modifications to the Guarantor being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue till all requirements of Clause 9, Remedying Defects, of Conditions of Contract are fulfilled.

Our total liability under this Guarantee is limited to the sum stated above and it is a condition of

any liability attaching to us under this Guarantee that the claim for payment in writing shall be received by us within the validity period of this Guarantee, failing which we shall be discharged of our liability, if any, under this Guarantee.

We, _____ (the Guarantor), waiving all objections and defences under the Contract, do hereby irrevocably and independently guarantee to pay to the Employer without delay upon the Employer's first written demand without cavil or arguments and without requiring the Employer to prove or to show grounds or reasons for such demand any sum or sums up to the amount stated above, against the Employer's written declaration that the Principal has refused or failed to perform the obligations under the Contract, for which payment will be effected by the Guarantor to Employer's designated Bank & Account Number.

PROVIDED ALSO THAT the Employer shall be the sole and final judge for deciding whether the Principal (Contractor) has duly performed his obligations under the Contract or has defaulted in fulfilling said obligations and the Guarantor shall pay without objection any sum or sums up to the amount stated above upon first written demand from the Employer forthwith and without any reference to the Principal or any other person.

IN WITNESS WHEREOF, the above bounded Guarantor has executed this Instrument under its seal on the date indicated above, the name and corporate seal of the Guarantor being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

	_____ Guarantor (Bank)
Witness:	
1. _____	1. Signature _____
_____	2. Name _____
Corporate Secretary (Seal)	3. Title _____
2. _____	
_____	_____
(Name, Title & Address)	Corporate Guarantor (Seal)

CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT (hereinafter called the "Agreement") made on the ____ day of _____ 2010 ____ between _____ (hereinafter called the "Employer") of the one part and _____ (hereinafter called the "Contractor") of the other part.

WHEREAS the Employer is desirous that certain Works, viz _____ should be executed by the Contractor and has accepted a Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW this Agreement witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents after incorporating addenda, if any except those parts relating to Instructions to Bidders, shall be deemed to form and be read and construed as part of this Agreement, viz:
 - (a) The Letter of Acceptance;
 - (b) The completed Form of Bid along with Schedules to Bid;
 - (c) Conditions of Contract & Contract Data;
 - (d) The priced Schedule of Prices;
 - (e) The Specifications; and
 - (f) The Drawings
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy defects therein in conformity and in all respects within the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor, in consideration of the execution and completion of the Works as per provisions of the Contract, 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 Contract Agreement to be executed on the day, month and year first before written in accordance with their respective laws.

Signature of the Contactor

(Seal)

Signature of the Employer

(Seal)

Signed, Sealed and Delivered in the presence of:

Witness:

(Name, Title and Address)

Witness:

(Name, Title and Address)

BANK GUARANTEE FOR ADVANCE PAYMENT

Guarantee No. _____

Executed on _____

(Letter by the Guarantor to the Employer)

WHEREAS the (Board of Management Sundar Industrial Estate hereinafter called the Employer has entered into a Contract for "Repair and Maintenance of Roads and Allied Works at Sundar Industrial Estate", with (Name of the Contractor) hereinafter called the Contractor).

AND WHEREAS

1. The Employer has agreed to pay advance to the Contractor, at the Contractor's request, an amount of Rs. (_____ Figure _____) Rupees (_____ Words _____) which amount shall be advanced to the Contractor as per provisions of the Contract.
2. The Employer has asked the Contractor to furnish Guarantee to secure the advance payment for the performance of his obligations under the said Contract.
3. _____ (Scheduled Bank) (hereinafter called the Guarantor) at the request of the Contractor and in consideration of the Employer agreeing to make the above advance to the Contractor, has agreed to furnish the said Guarantee.

NOW THEREFORE

The Guarantor hereby guarantees that the Contractor shall use the advance for the purpose of above mentioned Contract and if he fails, and commits default in fulfilment of any of his obligations for which the advance payment is made, the Guarantor shall be liable to the Employer for payment not exceeding the aforementioned amount.

Notice in writing of any default, of which the Employer shall be the sole and final judge, as aforesaid, on the part of the Contractor, shall be given by the Employer to the Guarantor, and on such first written demand payment shall be made by the Guarantor of all sums then due under this Guarantee without any reference to the Contractor and without any objection.

This Guarantee shall come into force as soon as the advance payment has been credited to the account of the Contractor.

This Guarantee shall expire not later than _____

by which date we must have received any claims by registered letter, telegram, telex or facimile.

It is understood that you will return this Guarantee to us on expiry or after settlement of the total amount to be claimed hereunder.

Guarantor (Scheduled Bank)

Witness:

1. _____

Corporate Secretary (Seal)

2. _____

(Name, Title & Address)

1. Signature _____

2. Name _____

3. Title _____

Corporate Guarantor (Seal)



SECTION 9
SPECIFICATIONS

TECHNICAL SPECIFICATIONS

1.0 GENERAL

- 1.01 This General Specification is to be taken as applying to all the works in this Contract. Figured dimensions on the working drawings shall be followed in preference to the scale.
- 1.02 Until and unless specified otherwise, all goods and materials are to be Pakistan manufactured and to be of the best quality, and where not otherwise specified shall be according to latest engineering practice and conforming to Pakistan Standards (P.S) or British Standard Specifications (B.S.S) or Standard of American Society of Testing Materials (ASTM). The Engineer or the Consultants may also supplement such specifications during the progress of work.
- 1.03 All materials and goods used for such and other items shall be subjected to standard testing and if found below the specified standard such as PS or BSS or ASTM or their equivalent shall be removed from the site immediately at Contractor's own expense. All testing of materials finished and unfinished, shall be carried out by the Contractor at his cost, in the presence of Engineer or Engineer or his Representative for which the Contractor shall maintain a reasonably well equipped laboratory of his own, close to the site of work or make any other additional arrangement to the satisfaction and convenience of the Engineer. The Contractor shall include testing charges in his quotations and shall not be entitled to any reimbursement on this account for routine testing.
- 1.04 The Contractor must give early attention to the submission of samples of materials for approval of the Engineer, indicating the names of the manufacturing firms where applicable especially of cement, sand, aggregates, steel, water, tiles, hard-core and all fittings. Whenever practicable, samples shall be submitted at least three weeks before it is proposed to use the materials. Until and unless specified otherwise and whenever materials are ordered to be forwarded to a testing laboratory other than site laboratory for check/ testing, the Contractor will be reimbursed the cost of fees for such tests if proved satisfactory, by the Employer. The Contractor, however, will be required to bear the cost of the fees for tests, which proved unsatisfactory.
- 1.05 The Contractor must take all steps necessary to prevent damage or interference with all supply lines such as water, electric power, fuel, telephones, drains, buried cables and any construction designed for the use of the public, government or semi government authorities or the Employer. The Contractor shall be responsible for any damage caused to such services or constructions and settle all claims in respect of such damage.
- 1.06 The Contractor shall protect from injury by covering all work, internally and externally needing protection including new concrete, brickwork, surface renderings, floors, etc., to the satisfaction of the Engineer, including the work of his subcontractors at his own cost.
- 1.07 The whole work shall be carried out in the best manner in accordance with the instructions contained in these documents and those given by the Engineer from time to time during the progress of the work. The work shall be carried out in conformity with the best of the standard construction practices preferably the British Codes of Practices.

- 1.08 The Contractor shall submit to the Engineer for his approval before beginning the work, a complete plan of the proposed sequence and methods of operations for the execution of the works. Detailed drawings showing the location and construction of dumping and working platforms, cranes, building and all other structures in connection with the Contractor's plant and material storage sheds shall also be submitted to the Engineer for his approval before construction.
- 1.09 Orders and directions may be given orally by the Engineer or his Representative, and shall be received and promptly obeyed by the Contractor or his Representative or any superintendent or foreman or any supervisor of the Contractor whosoever may have charge of the particular part or section of work in relation to which the orders or directions are given, and a confirmation in writing of such order or directions will be given to the Contractor by the Engineer, if so requested. The Contractor shall provide and maintain at his own expense during the performance of the work an office in the vicinity of work. Orders or directions, written or oral, from the Engineer or his Representative delivered at such office shall be considered as delivered to the Contractor. The Contractor's office shall be fitted with a telephone connected to the local Telephone Exchange.
- 1.10 The Contractor shall not use the site for any other purpose than that of carrying out this Contract work. The operations of the Contractor shall be confined to the area immediately adjoining the buildings and the works included in this Contract but site clearance shall be kept to the satisfaction of the Engineer to permit carrying out of other works by other Contractors. The Contractor shall not affix advertisements; neither shall he permit advertisements to be displayed without the written consent of the Engineer.
- 1.11 The contract drawings are the working drawings to guide the Contractor generally about the shape and size of all the structures and fittings. Before proceeding to make preparations, fabrication, execution, erection of any such fittings and other details of any temporary works, scaffolds, railings, shuttering, details of doors, windows, partitions, iron mongers work, etc; the Contractor shall be under obligation to prepare and submit all detailed shop drawings to the satisfaction and the approval of the Engineer, before doing any or all of that described above or as directed. Approval of the contractor's drawings shall not relieve the Contractor for any part of his obligation to meet all the requirements of the specifications or correctness of his drawings.
- 1.12 No cement work shall be permitted during extreme cold weather when unless otherwise authorized by the engineer.
- 1.13 **PAYMENT**
Contractor shall not be entitled to any separate or additional payment on account of all these general requirements and any other arrangement or action Contractor has to undertake under the direction of the Engineer for a proper carrying out of the works and meeting all obligations of the Contract.

2.0 SITE CLEARING, GRUBBING AND SETTING OUT OF WORKS

2.01 SCOPE OF WORK

The work covered by this section of specifications consist of furnishing all labour, necessary equipment, services, miscellaneous and necessary items required to satisfactorily complete the clearing, grubbing and setting out of the works, as indicated on drawings, specified herein or both.

2.02 CLEARING

Clearing shall consist of cutting, or trimming of trees, if any, and the satisfactory disposal of tree and other vegetation designated for removal, together with the timber snags, bushes, and rubbish occurring within the area. Trees, other vegetation stumps, roots, and bushes in area to be cleared shall be cut off flush with or below the original ground surface except such individual trees, group of trees and vegetation as may be indicated on the drawing or designated by Engineer or his Representative to be left standing. Individual trees and other vegetation, to be left standing shall be thoroughly protected from damage during construction operation, by erection of barriers or by such other means as the circumstances require and as approved by the Engineer or his Representative. Clearing operation shall be conducted in a manner that existing structures and installations under construction, employees and others remain safe.

2.03 GRUBBING

Grubbing shall consist of the removal and disposal of all stumps, roots and matted roots in the designated grubbing areas. Stumps, roots, logs and timber and other debris, shall be excavated and removed to a depth not less than 2 feet below any subgrade level. In areas where the cut is over 3'-6" grubbing shall not be necessary.

2.04 DISPOSAL OF DEBRIS

Timber and other refuse to be disposed off by burning shall be burned at location, approved by the Engineer or his Representative, in a manner that will avoid all hazard such as damage to existing structures, construction in progress, trees and vegetation. The contractor shall be responsible for compliance with all pertinent laws and regulations pertaining to the burning of fire. Disposal by burning shall be kept under constant attendance, and residual, until materials will not be permitted to be pushed or placed on the adjacent areas without written approval of the owner/owners. The stones and concrete shall be broken and removed from the site for receiving the structure/flooring where required. All debris shall be disposed off by the Contractor as directed by the Engineer.

2.05 SETTING OUT OF WORKS

The Contractor shall set out the works and shall be responsible for true and perfect setting out of the same and for correctness of the direction, levels, dimension and alignment of all parts thereof.

If at any time any error in this respect shall appear during the progress of the works, the Contractor shall, at his own expense, rectify the error to the satisfaction of the Engineer. The Contractor shall construct accurate benchmarks so that the lines and levels can easily be checked by the Engineer.

2.06 **DRAINAGE DITCHES**

The Contractor shall construct and maintain such ditches, in addition to those shown on drawings or as may be ordered by the Engineer to adequately drain and areas under construction.

2.07 **PAYMENT**

Lump sum payment shall be made for the work covered in this section of the specification and all costs of site clearing and setting out shall be covered in the unit rates of the Contractor for this item.

3.0 EXCAVATION, FILLING, BACKFILLING AND DISPOSAL

3.01 SCOPE OF WORK

The work covered by this section of the Specifications consists of furnishing all Plant, Labour, Equipment, Appliances and materials and in performing all operations in connection with excavating, filling, backfilling and disposal for building construction, and other foundations complete in strict accordance with this section of the Specifications and the applicable drawings and subject to the terms and conditions of the Contract.

3.02 BORING LOG DATA

A preliminary report on Subsoil investigation and exploratory data of the site area is available for reference only in the office of the Engineer. The Employer or Engineer's predications, regarding character or extent of soil or other subsurface conditions to be encountered during the work are not bounding on the Contractor. The Contractor shall make his own deductions for subsurface conditions which may affect methods or cost of constructions of the work hereunder and he shall make no claim whatsoever for damages or compensation, should he find conditions during the progress of the work, different from those indicated by the soil investigation report of Engineer.

3.03 EXCAVATION

(a) **Classification**

Excavation shall include the removal of all materials of every category and nature. If rock is encountered it shall be removed carefully and without excessive noise and vibration. Blasting shall not be resorted to without specific permission in writing from the Engineer.

(b) The excavation shall conform to the dimensions and elevations as indicated on the Drawings. Foundations on made up ground shall be taken down to natural bottom soil as per direction and approval of the Engineer. Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms installation of services and for inspection but the same shall not be paid.

(c) In the event of any excavations being carried out wider or deeper than authorized, the same shall be filled in by the Contractor at his own cost to the required levels with lean concrete if below footing or with properly compacted, local river sand if beneath slabs or as directed by the Engineer.

(d) **Shoring and Bracing:**

The Contractor shall provide at his own cost, where required all shoring walls, supports etc. to the sides of the excavation to prevent sliding or any movement; where necessary, excavated sides shall be sloped as directed by the Engineer.

(e) **Dewatering and Drainage:**

The Contractor shall control the grading in the vicinity of site of work in order to prevent any water from running into the excavated areas. He shall at his own cost keep dry all pits and trenches during construction and all de- watering and pumping out whether due to ground water seepage or otherwise, shall be included in the rates as quoted by the Contractor. The method employed in all cases shall be approved and agreed by the Engineer or his Representative.

(f) **Protection of utility lines:**

When any existing utility lines whether to be retained or be removed are encountered within the area of operations, the Contractor shall notify the Engineer and his Representative, and shall not proceed until necessary measures are taken for protection or removal of the lines and instructions are obtained from the Engineer.

(g) **Excess and undesirable material:**

Excess and undesirable material from excavation not required for fill or backfill of the building site, shall be disposed off, removed and/or deposited as for filling and levelled anywhere on the work site as directed by the Engineer. Earth suitable and meant for backfill shall be stored at site in a manner not to interfere with the progress of construction works.

3.04 **FILL AND BACKFILL**

Where concrete slabs are to be placed on the ground, any loam, organic and other unsuitable material shall be removed. Fill where required to raise the subgrade for concrete slabs shall be clean, unadulterated local river sand or gravel and shall be free from wood, stones and other debris. Excavated material shall only be used for fill if approved by the Engineer in writing. All the backfill behind the subgrade walls shall be done with clean local river sand or approved excavated soil. Fill shall be compacted up to 95% modified AASHTO Density by a Power vibratory roller, mechanical rammer, or other approved equipment, in layers not more than 6 inch thick. Each layer shall be uniformly spread, watered to the extent of optimum moisture requirement for the required degree of compaction and then compacted. Contractor shall arrange at his own cost the testing of the filling where required by the Engineer or his Representative, after completion of foundation footings, walls, slabs and other construction below the elevation of the final grades and prior to backfilling. Backfill shall be placed in horizontal layers not more than 6 inches thick and shall have proper moisture content for the required degree of compaction of 95%. Each layer shall be compacted by mechanical tampers or by other suitable equipment approved by the Engineer. Backfill shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage thereof.

Backfill shall not be placed against foundation, walls etc., prior to the damp proofing treatment, if

specified and approved by the Engineer or his Representative. Backfill shall be brought up evenly on each side walls as far as practicable. Heavy equipment for spreading and compacting backfill shall not be operated closer to the wall than distance equal to the height of the backfill above the top of footing.

3.05 COMPACTION:

Fill and/or backfill within the building or structures and for a distance of 6 ft. outside structures shall be compacted to a density of not less than 95% maximum density at optimum moisture content.

3.06 ROUGH GRADING:

(a) Necessary rough grading shall be carried out by the Contractor to establish grade or construction requirements of the site. Grades not otherwise indicated shall be uniform levels or slopes between points on existing and finished grades. Abrupt changes in slopes shall be rounded. Additional fill required to complete rough grading shall be provided as directed by the Engineer or his Representative.

(b) Where paving or slabs are specified, all rough grading shall be done to the subgrade of the base course, removing all large stones and debris and shall be compacted uniform to the correct lines and levels ready to receive the paving or slab. Refilling, where required shall be executed with suitable selected materials in layers not exceeding 6 inch thick and thoroughly compacted to the required density. In place density tests shall be carried out by the Contractor for the approval of the compaction by the Engineer.

3.07 FOOTING BOTTOM LEVELS:

The levels as noted in the Drawings are only approximate and must be adjusted in the field with the approval of Engineer, depending on the soil conditions encountered. No concreting shall begin until the soil bearing capacity is substantiated by visual inspection by the Engineer or his Representative. The Contractor in planning his work shall make arrangement and provisions to construct the lowest level footings first.

3.08 FIELD LEVELS:

Prior to starting the work, the Contractor shall arrange to take the levels of the piece of land on which the building is located as directed by the Engineer. The same shall be simultaneously checked by the Engineer or his Representative and shall form the basis of payments for excavation and filling etc.

3.09 DISPOSAL OF SURPLUS EARTH AND RUBBISH:

All surplus earth and rubbish shall be disposed off at site as directed by the Engineer. Disposal of surplus earth and rubbish can only be carried out in timings allowed by the local authorities. The

term disposal shall include all operations of loading, unloading, stacking, spreading, re-handling, filling in depressions, including consolidating and ramming in layers not exceeding 6 inch thickness.

3.10 **MEASUREMENTS AND PAYMENTS:**

All excavation shall be measured net and perpendicular and no allowance shall be made for any increase in bulk of the excavated material after excavation or for sloping sides, or widened trenches to accommodate formwork, shoring and bracing etc. Similarly the measurements for filling/backfilling shall be thoroughly compacted and measured net and no allowance shall be made for any increase in bulk after excavation. Excavation, filling and Disposal shall include all leads and lifts as specified elsewhere in these specifications. Payment for all the items under this section shall be made at the rates entered in the BOQ appended to the contract and in accordance with the applicable conditions of the contract.

4.0 WATER

4.01 SCOPE:

The work covered by this section of the Specification consists of furnishing all labour, appliances and in performing all operations in connection with obtaining, conveying and storing water at site of work.

4.02 QUALITY OF WATER:

The water used for construction the contractor shall supply sufficient water for all purposes, including mixing the concrete, curing and cleaning plants and tools. Where doubt exists as to the suitability of the water, it shall be tested at the cost of the contractor in accordance with BS3148. Where water shall be shown to contain any organic impurities sugar or an excess of acid, alkali or salt or inorganic impurities in solution or suspension, the engineer shall refuse to permit its use. The suitability of water shall be subject to test when required by the engineer.

4.03 CHEMICAL REQUIREMENTS

As a guide, water may be used as mixing water if the chemical contents do not exceed the following limits, otherwise control test's to show the suitability have to be made.

<u>Kinds of Ingredient</u>	<u>Permissible Limits</u>
Dissolved Solids	2,000 ppm
Alkali Carbonate and Bicarbonate Chloride*	1,000 ppm
	500 ppm
	1,000 ppm
Sulphate (SO ₄)	3,000 ppm
Alkalies (Na ₂ O+0.658 K ₂ O)	600 ppm
PH – Value	4 (min)

* The maximum concentration of chloride in prestressed concrete should not be higher than 500 ppm.

In general, for reinforcement concrete in moist environment, or concrete containing imbedded aluminium structures with dissimilar metals, a maximum concentration of 1000 ppm is acceptable.

If the result of the acceptance tests are within 90% of the permissible limits, the quality control tests for above impurities shall be down each month, of not otherwise directed by the engineer.

If the amounts of each chemical ingredient are lower than specified in the section, and trial mixes show that no harmful effects appear due to the subject tested, the water can be used as mixing water.

4.04 TEMPORARY STORAGE TANK:

The Contractor shall provide onsite at his own cost temporary storage water tank with all necessary G.I. Pipes and fittings as per instructions of the Engineer. No separate payment will be made for tank, pipes and accessories, etc. These tanks shall be removed or dismantled or demolished and the area shall be cleaned and made good on completion of work as per direction of Engineer.

4.05 **PAYMENT:**

No separate payment will be made for the work covered under this section, and all costs in connection therewith shall be deemed to be included in the unit rates

6.0 STEEL REINFORCEMENT

6.01 SCOPE OF WORK:

The work covered by the section of the specification consists of furnishing all materials, tools, labour, equipment & appliances and in performing all operations in connection with the providing, straightening, cutting, bending, binding, fixing, elsewhere with necessary overlaps, wastage including binding wire, chairs, pins, spacer block complete in strict accordance with this section of the Specifications, the applicable drawings, approved bar bending schedule according to BS-4466 and the terms and conditions of the Contract. All steel reinforcement should be placed at locations, to lines and level as shown in the drawings and as the directed by the Engineer.

6.02 MATERIALS:

6.2.1 Reinforcing steel to be new billet stock of mild steel (plain bar), hard grade (deformed bar) and Ribbed Tor steel as specified on the drawings and shall conform to British Standard Specifications or equivalent ASTM or Pakistan Standard.

6.2.2 The Contractor shall furnish to the Engineer's Representative Manufacturers' mills certificate to guarantee that steel meets the standard, specifications requirements and minimum certified yield stresses as follows:-

- i) Mild Steel plain bars conforming to B.S.S. 4449 or PS-231
 - a) Tensile Strength: 438 to 517 N/Sq.mm (63.5 to 75 Kips/Sq. in).
 - b) Yield Strength : 250 N/Sq. mm (36 Kips/Sq. in)
 - c) Elongation : 16% to 24% (average 20%).
- ii) Hot rolled deformed bars conforming to ASTM A-615 Grade 60 or PS-605
 - a) Tensile Strength: 560 N/Sq. mm (81 Kips/Sq. in).
 - b) Yield Strength : 415 N/Sq. mm (60 Kips/Sq. in).
 - c) Elongation : 11%

6.2.3 All steel to be true to the Standard Specifications with regard to bend ability specially the hard grade deformed bars under 19 mm (3/4") dia. shall be capable of being bent cold through 90 degree round a bar of four times its own diameter without fractures or injury of any kind. In case of deformed bars over 19 mm (3/4") dia. and under 28 mm (1-1/8") dia. round a bar of 6 times its own diameter.

6.2.4 18 gauge galvanized wire shall be used for binding the steel reinforcement.

6.03 TESTING:

Reinforcement shall be obtained only from manufacturers approved by the Engineer or his Representative. All reinforcement shall be tested according to ASTM standard. If and when required samples shall be tested for above specification in an approved laboratory when required by the Engineer or his Representative and all costs of such tests shall be borne by the Contractor

as a minimum three (03) samples will be tasted per twenty (20) ton of steel.

6.04 STORAGE

Reinforcing bars shall be stored on platforms above surface of ground and be free from scales, oil, structural defects prior to placement in works. Rusted or dirty steel bars shall not be used in the works unless brushed and cleaned by proper steel wire brushes and after being approved for use by the Engineer or his Representative.

6.05 REINFORCEMENT CUTTING AND PLACING

6.5.1 All reinforcement steel shall be cut and bent cold in strict accordance with bar bending schedules approved and drawings supplied by Engineer. The Contractor shall prepare bar bending schedule from approved structural working drawings conform to ACI 318-02 section 12.5. The bending schedules shall be drawn on approved forms and submitted to the Engineer or his Representative for checking and approval. The steel reinforcement shall be cut and bent to sizes as per drawings and approved bending schedules. In case any bars, cut, bent or even fixed in position are found incorrect in dimensions size or shape according to the requirements of the drawings and instructions of Engineer, the Contractor shall replace such steel bars cut bent or fixed in position by correct sized bars at his own cost and no extra payment shall be made to the Contractor on such account. The system of holding bars in place shall ensure that all steel in top section will support weight of workmen without displacement or distortion. Suitable spacers and chairs as approved by the Engineer or his Representative shall be used for supporting and spacing purposes of bars. In case any bars are bent or displaced they shall be straightened or replaced prior to pouring. All reinforcement bars within the limit of a day's pour shall be in place and firmly tied with 18 gauge G.I. wires. Bars with kinks or bends not shown on drawings shall not be used.

6.5.2 Where indicated in the drawings, mesh shall be of the sizes as shown on drawings and conform to British Standard B.S.785. Mesh reinforcement when used in slabs shall be supported at proper elevations by standard accessories. In slabs on ground, pre cast concrete blocks may be substituted for chairs.

6.06 LAPS AND SPLICES

6.6.1 No splicing of bars shall be allowed at position other than shown on the drawings. All lap lengths shall be of the minimum sizes as indicated on the drawings or in conform to ACI-318-02 section 12.5 and in no case shall lap length be less than 40 times the diameter of the bigger lapping bars for nominal M.S. bars. Hard grade bars and tor steel shall have laps of 50 times the bigger diameter of lapping bars. Splices of adjacent bars shall be staggered unless approved otherwise by the Engineer or his Representative.

6.6.2 All reinforcing steel fixed in position shall be inspected by the Engineers Representative and no concrete shall be poured until steel placement has been approved by the

Engineers Representative. For inspection purposes the Contractor shall give to the Engineers Representative reasonable notice before the scheduled pouring time. Clear concrete cover to reinforcement steel shall be as indicated on the drawings/specified.

6.07 MANUFACTURE

Steel shall be manufactured from prime Pakistan Steel billets.

6.08 MEASUREMENT AND PAYMENT

6.8.1 The quantity to be paid for shall be the calculated in theoretical number of metric ton of reinforcement steel bars or mesh as determined from the approved bar bending diagrams and incorporated in the concrete and accepted, except when reinforcement is paid for under other items.

6.8.2 The weight of plain or deformed bars will be computed from the theoretical weight of plain round bars of the same nominal size as shown in the following tabulation:

Size Inch	Weight in		Size Inch	Weight in	
	Lbs / ft.	Kg. / ft.		Lbs / ft.	Kg / ft.
¼	0.167	0.076	¾	1.502	0.681
3/8	0.376	0.170	7/8	2.044	0.927
½	0.668	0.303	1	2.672	1.212
5/8`	1.043	0.473	1-1/18	3.382	1.534

6.8.3 Clips, ties, separators, and other material used for positioning and fastening the reinforcement in place, and structural steel, shall not be included in the weight calculated for payment under this item. If bars are substituted upon the Contractor's request and as a result more steel is used than specified only the amount specified shall be included.

6.8.4 When laps are made for splices, other than those shown on the drawings or required by the Engineer and for the convenience of the Contractor, the extra steel shall not be measured nor paid for.

6.8.5 When continuous bars are shown on the drawings, without the splices being shown, the necessary steel in the splices will be paid for on the basis of the individual bars not being shorter than 40 ft (12 m).

6.8.6 The accepted quantity measured as provided above shall be paid for at the contract unit price for the items listed in the Bill of Quantities, which price and payment shall be full compensation for furnishing materials, labour, equipment and incidentals necessary to complete the item.

7.0 BRICK WORK

7.01 SCOPE

The work under this section includes First Class brick work in walls, both internal and external of any thickness and of the heights shown on the drawings. The brick work shall be carried out in cement sand mortar of proportion specified in the Bill of Quantities.

7.02 CONFORMITY TO W.P. SPECIFICATIONS VOL. PART I AND II

Except as otherwise specified, all brickwork shall be erected in conformity with West Pakistan Schedule of Rates Volume I Part II Section 21.1 "Brick Work General" as applicable to the work shown on the drawings and as specified.

7.03 Materials

7.3.1 Brick shall be first class, strong and sound of well burnt clay, uniform in shape, colour and shall measure 220x105x67 mm with dimensional tolerance of 1.6mm so that every four courses laid shall measure 305mm in height. Bricks should produce a ringing sound when struck. The brick shall be free from flaws, cracks, chip stones, nodules of lime or kankar or other blemishes. The brick shall not absorb more than 1/6th its weight when soaked in water for an hour. Minimum compressive strength shall not be less than 140kg/sq.cm. Bricks of only one size shall be used throughout the work and bricks from different kilns not having the same size shall not be allowed. All the bricks shall, conform to W.P. Specifications Vol. I, Part II 4.1 for First Class Burnt Clay Bricks.

7.3.2 Mortar for Brick Work

- a. Mortar shall be mixed in proportion as specified in Bill of Quantities and shall be done by volume except directed otherwise by the Engineer.
- b. Cement and sand shall be thoroughly mixed in a dry state on a hard platform or in a trough & appropriate quantity of water shall be added to make the mortar of workable consistency. The mortar in any single batch shall be of quantity which could be used within 30 minutes of mixing water. Such mortar which has not been used within 30 minutes of addition of water shall be discarded. The mixing platform or, trough shall be thoroughly, washed and cleaned at the close of the day's work.
- c. Portland cement shall conform to BS: 12.1958.
- d. Sand shall be as specified under section "Concrete Work".
- e. Water shall be clean, free from any organic impurities, acids, alkaline, greasy or oily substances, either in solution or in suspension as specified under section "Concrete Work".

7.3.3 Wall Ties

Mild steel bars, wall ties, lugs, anchors etc. shall be provided as per drawing and instructions of the Engineer.

7.04 SAMPLES

The samples of 'all the material used for brick work shall be approved by the Employer after necessary testing. The Contractor shall incorporate in the work only approved materials during the work in progress. If the Engineer, desires to get the material tested, this will be got done by the Contractor from a Laboratory approved by the Engineer at the Contractor's expenses.

7.05 WORKMANSHIP FOR BRICK WORK

7.5.1 Brick Laying:

Brick laying shall conform to the applicable requirements of W.P. Specifications Vol. 1, Part II.

All brick work shall be 'done with approved bricks and shall be strictly in accordance with the drawings. The bricks shall be laid in mortar specified in the Bill of Quantities. Before the bricks are used they shall be soaked in water tanks (to be constructed by the Contractor at his own cost) for at least four hours. They shall be placed in the water tanks in a manner that they do not get damaged.

7.5.2 Bricks shall always be laid in English bond (unless otherwise directed by the Consultants) with frogs upwards. Bricks shall be laid with bed and vertical Joints pattered with specified mortar. Brick work must be truly plumb and must be checked by plumb bob and straight edge frequently. Brick work should present a perfect straight and vertical surface and no chipping or rubbing shall be allowed. Brick work where necessitated by the design have curved or chamfer surface shall be cut and chiselled finely such as when placed in position they do not present an ugly look or require levelling up with extra mortar. Where work has to be left incomplete, it shall be left in slope and in no case the difference of height between different walls shall be more than 1.5 Here at any section of the building.

7.5.3 All brick work shall be bonded where it abuts other brick work, concrete walls and concrete columns. Where brick walls and partitions intersect or abut, it is absolutely necessary to interlock the masonry of the two walls in a way as not to leave a straight vertical joint between the two walls. In such cases the bond shall be obtained by placing the closer 115mm from the face in every alternate course of the wall or masonry ties shall be provided. Where brick work abuts concrete, wall ties engaging in dovetail, slots shall be provided at every fourth course. 76mm long brick course height shall be considered sufficient under these specifications, unless the Contractor considers continuous length of slots convenient for his working. Where 14.S.bar wall ties are shown on drawings; these shall supercede dovetail wall ties specified herein.

- 7.5.4 Brick work shall be wedged to the underside of floor and roof slabs and the top most horizontal joints shall be, filled with mortar well compacted. Putlog holes shall always be along headers and not more than one brick in length and shall be neatly bricked in on removal of scaffolding.

All the built-in items such as anchor bolts, inserts, pipe supports, hangers, pipe sleeves, dowels, ties and all items shown on the drawings or specified are required to be built into the masonry as the work progresses.

Frames and other built-in work shall be maintained in their proper position and bracing shall not be removed until they are securely held in position by the masonry. The spaces around all built in items shall be filled with masonry. Where required for later building in, opening in masonry for heating and plumbing pipes, electric conduits etc. shall be left, and after piping or conduits have been installed, filled around with brick work and mortar.

- 7.5.5 All cutting and patching of masonry required for installation of built in work or work supported by masonry shall be kept properly cured, for at least 10 days where cement mortar is used. Where according to plans and sections the masonry work requires cut bricks to be used, the same shall be done by 'the Contractor free of cost, to obtain correct thickness according to drawings.

7.5.6 Jointing

Vertical joints in alternate course must be directly one over the other, horizontal joints shall be truly level. The thickness of joints shall be between 8mm to 13mm or as shown otherwise on the drawings. The thickness of joints must be kept uniform throughout the progress of work and varying sizes of joints shall not be allowed. The joints of the masonry must be raked out uniformly at the close of each day's work and any extra mortar sticking on the face of the work must be scrubbed out and cleaned daily.

7.06 MEASUREMENT AND PAYMENT

- 7.6.1 Brick work in wall having 230 mm thickness shall be measured in square metre i.e. multiplying the length or breadth of wall with height of the wall. 115 and 76 mm thick walls shall also be measured in square metre. All the openings left in masonry wall will be deducted. All mild steel reinforcement shall be measured as specified in section "Concrete Work". The rate for items of work in this section shall include:

- 7.6.2 The cost of material, labour, curing, scaffolding and appliances at site and all operations in connection with the installation of brick work in accordance with the drawings, finish schedules and as specified above, and cutting and patching work required for installation built in work.

8.0 PLASTERING

8.01 Scope of Work:

The work covered by this section of the Specifications consists of furnishing all plant, labour, appliances, and materials and in performing all operations in connection with the installation of plastering complete in strict accordance with this section of the Contract.

8.02 General

Except as may be otherwise shown on the drawings or specified elsewhere; the plaster surfaces shall include walls, partitions jambs, returns, reveals, backs of recesses and jambs and heads of windows and doors and all the soffits, alcoves etc.

8.03 Materials:

- a) "WATER" as specified in respective section.
- b) "CEMENT" shall be ordinarily Portland cement and shall conform to B.S.S.12.
- c) "SAND" shall be from approved source and free from dust and salt as specified in Section on concrete.
- d) "METAL LATH" shall be expanded metal not less than 9" wide strips, and weighing at least 2.5 lbs, per square yard or as directed by the Engineer.
- e) "CORNER LATH" shall be strips 6" wide bent to form two 3-inches wings.

9. CONCRETE PAVEMENTS

9.1 DESCRIPTION

This work shall consist of a pavement composed of Portland cement concrete with or without reinforcement as specified constructed on a prepared subgrade or base course in accordance with these specifications and in conformity with the lines, grades, thickness and typical Cross-sections shown on the plans. Both plain and reinforced concrete shall include deformed bars for contraction joints and dowel bars for expansion joints or as shown on the Drawings.

9.2 MATERIAL REQUIREMENTS

9.2.1 Concrete

Concrete materials shall conform to the requirements indicated in item 401 and as specified hereinafter. In addition to it the contractor shall advise the Engineer immediately after the award of the contract of the source of all materials to be used in proportioning concrete for the work. If the contractor later proposes to obtain materials from a different source, he shall notify the Engineer at least thirty (30) days before such materials are to be used.

9.2.2 Reinforcing Steel

Concrete reinforcement shall conform to item 404 or as indicated on the Drawings. If required, steel fabric for reinforcement of concrete shall conform to AASHTO M 55-73. It must be supplied in sheets.

9.2.3 Polythene Sheeting

Polythene sheeting for placing immediately below concrete slabs shall be 0.065mm thick or having a minimum weight of fifty (50; grams per square meter (whichever is greater) made from polythene or other approved hydrocarbon thermoplastic resin (produced by the polymerization of ethylene under high pressure and density) and given an antistatic treatment to reduce dust attraction and reduce friction. The sheeting shall have the minimum mechanical properties shown in table as under:

PROPERTIES OF POLYTHENE SHEETING

Properties	Direction	
	Machine	Transverse
Tensile Strength Method ASTM D882-73 Kgf/SM	140	105
Elongation at Break %	150	500
Tear Strength Elmendorf Method ASTM D689-62 (1974)-Kg/cm ²	390	310

9.2.4 Joint Filler

Joint filler shall be of approved quality and consist of cane or other suitable long fibres of a cellular nature uniformly impregnated with asphalt. The asphalt content of the joint material shall be between thirty and fifty per cent. The joint material will not deteriorate under any weather conditions and is to be of such a character as not to be permanently deformed or broken by moderate twisting, bending or other ordinary handling. Strips of the joint filler which do not conform to the specified dimensions within the tolerance + two (2) mm for thickness and + twelve (12) mm for depth are to be rejected. All damaged strips are to be rejected too.

9.2.5 Joint Sealing Compound

Joint sealing compound is to be as BS 2499(1973) type A1 or A2, or as approved by the Engineer.

The compound is to be impermeable, is to withstand all weather conditions and is to be capable of adhering to the concrete without cracking, spalling or disintegrating and will not require an impracticable condition of dryness or cleanliness of the concrete slabs.

Where recommended by the manufacturer of the sealing compound, a primer supplied by him is to be used to improve adhesion.

9.2.6 Dowel Bars

Dowel bars shall be cut from mild steel bars and will be approved by the Engineer. The Contractor's attention is directed to the requirement that one end of each dowel bar in all joints, except bonded construction joints, shall be sawn and not sheared so that no irregularities likely to interfere with its sliding action in the concrete shall occur. The minimum length of the dowel bars spaced at one meter centre to centre or as shown on the drawings, shall be thirty five (35) times the diameter of the bar used unless otherwise specified or as directed by the Engineer.

9.2.7 Expansion Caps

Expansion caps for dowel bars in expansion joints shall consist of pressed metal sleeves plugged at one end by punching the specified joint filler board of a wad of cotton waste of similar compressibility and sealed at the end against entry of mortar. The tube shall have an internal diameter permitting sliding on the dowel bar but close enough to prevent entry of mortar.

9.2.8 Darkening Agent

Darkening agent for the top course of concrete pavements if ordered and specified shall be carbon black; either as an aqueous dispersion containing at least 25% of solids, to be added to the mixing water, or as a self dispensing powder to be added to aggregate and cement. It shall be approved by the Engineer as nondeleterious giving grey colour and shall be added at the rate of 0.1 % by weight of the mixed concrete or as specified by the manufacturer if it is aqueous dispersion. The minimum quantity of self dispersing powder shall be 0.025% by weight of the concrete aggregate.

The darkening agent shall be free from sulphur trioxide and from any other matter deleterious to concrete.

Crack inducing battens shall be of wood or of any other suitable material proposed by the Contractor at the time of tendering and approved of at the award of the Contract or approved by the Engineer at his discretion after the award of the Contract. Battens of highly absorbent wood or other material shall be of cross-sectional dimensions shown on the Drawings, and treated to prevent adhesion between them and the concrete.

9.2.10 Sampling and Testing

All materials shall be approved by the Engineer prior to use in the work. Additional samples will be taken and tested by the Employer during the progress of the work to check on the quality of the materials being supplied and/or placed by the Contractor. The results of these tests will be available for the Contractor's use, however they are not intended for construction control purpose. The contractor should set up his own test facilities or arrange the same from a private laboratory, to assure that his materials and workmanship comply with the specification.

9.3 CONSTRUCTION REQUIREMENTS

9.3.1 Pavement Base

The base upon which the concrete pavement is laid shall be levelled compacted and true to the grades and cross-sections shown on the plans and shall be so maintained, as provided under such other items throughout the period of placing concrete pavement.

To ensure the proper depth and section, a scratch template true to depth and section and resting on accurately set side forms shall be moved over the surface immediately before placing concrete, and any irregularities shall be immediately corrected. High spots shall be planned down and the Contractor shall have the option of either filling low spots to the proper elevation with approved material, which shall be watered compacted and struck off to the required grade or of placing additional concrete. No measurement or payment will be made for such additional concrete.

Until the subgrade has been checked and approved, no material shall be deposited thereon . Storing or stock piling of materials on the subgrade and placing of surfacing material or laying of pavement on muddy or frozen subgrade will not be permitted.

9.3.2 Forms

Side forms shall be made of metal of an approved section and construction provided with adequate devices for secure setting so that when in place, they shall withstand the impact and vibration of the compacting and finishing equipment with settlement not exceeding 1.5 mm in three (3) meters form a true plane surface on the top of the form and inside face shall not vary more than six (6) millimetres from a plane surface. The width of the bases of steel forms shall be not less than their height except that the forms having a base not less than two third (2/3) of their

height and meeting all other requirements herein may be used for manual laying of non rectangular bays.

The depth shall be equal to the thickness of the pavement at the edge or as shown on the plans. The forms sections shall be tightly joined by each joint free from play in any direction. These forms shall be stacked with steel stakes and shall be of a length approved by the Engineer. Each section of forms shall have stake pocket* at each end and at intervals of not more than one and one-half (1:5) meters between ends.

Each section of forms shall be straight and free from bends and warps at all times.

Side forms for machine placing shall have rolled section steel rails which shall be of adequate stiffness to carry the laying, compaction and finishing machines.

These machines shall not run on folded sheet metal form tops. The top faces of the forms are to be carefully cleaned and maintained. The forms shall be without horizontal joints and with flange braces extending outward on the base not less than two thirds (2/3) the height of the forms. Each stack pocket shall be equipped with a positive non detachable wedge. These forms shall be placed by using at least three steel pins of the size and length approved by the Engineer or as shown on the plans. They shall be equipped with positive locking devices which will permit neat tight joints and do not, deform under impact vibration by trust. Pins for stacking forms in place shall be made of steel at least two (2) centimetres in diameter as directed by the Engineer in case of impractical use,

Wooden forms may be used for curves having a radius of less than fifty (50) meters. They shall be made of two and half (2.5) centimetres well seasoned surfaced planks fastened together and shall be attached securely to a wooden base in width. All wooden forms shall be braced at least every sixty (60) centimetres with steel pins of the size and length here in specified. Straight forms shall be set out as chords to convex edges and as tangents to concave edges, but payment will not be made for concrete outside the curved edges shown on the Drawings.

Before placing forms the underlying material shall be excavated to the required grade, and shall be firm and compact. The forms shall have full bearings upon the foundation throughout their length and shall be placed with exactness to the required grade and alignment of the edge of the finished pavement.

Forms shall be set to the required lines and grades well in advance of placing concrete, preferably not less than two hundred (200) meters, Forms shall not be removed for at least twelve (12) hours after the concrete has been placed. Forms shall be carefully removed in a manner to avoid damage to the pavement. Under no circumstances will the use of pry bars between the forms and the pavement be permitted. Pavement which in the opinion of the Engineer is damaged due to the careless removal of forms shall be repaved by the Contractor as directed by the Engineer at the Contractor's own expense.

Forms shall be thoroughly cleaned and oiled each time they are used.

Special forms or other supporting devices meeting the approval of the Engineer shall be used to support the joint filler at transverse control joints when concrete is to be placed on only one side of the filler. When pavement is placed adjoining existing concrete pavement upon which the finishing machine will travel, any irregularities in the old pavement shall be ground down to a true uniform surface of sufficient width to accommodate the wheels of the finishing equipment if necessary to obtain proper smoothness of the pavement.

9.3.3 Composition and Compressive Strength of Concrete

9.3.3.1. Strength Requirement

- (a) All concrete shall be proportioned by weighing and conform to the following strength and mix requirements
- | | | |
|------|--|---------------|
| I. | Minimum cylindrical compressive strength at 28 days: | 280 kg/sq.cm. |
| II. | Cement content, 50 Kg sacks: | 7-5 bags |
| III. | Maximum water cement ratio: | 0.45 |
| IV. | Slump range: | 25-75 mm |
| V. | Entrained air in percent: | 3+0.6 % |
| VI. | Nominal size of aggregate: | 1/2" Max. |
- (b) At least 35 days prior to the start of paving operations and after approval of all materials to be used in the concrete, the contractor shall submit for approval, the mix design he intends to use based on proportioned weights of cement, air entrainment agent, saturated surface dry aggregates and water. This mix design will be tested by the Engineer and approval will not be granted unless the average twenty eight (28) days compressive strength exceeds the minimum strength requirement by at least 15%. However the Engineer may allow paving operation on the basis of seven (7) days strength if he is satisfied with the results of seven (7) days strength.
- (c) The cement content given in the foregoing table is the minimum. If it is not sufficient to produce concrete of the compressive strength specified it shall be increased as necessary without additional compensation under the contract.
- (d) The compressive strength of the concrete will be determined by testing standard cylinders made from concrete taken from the mixer. The making, curing and testing of the specimens will be in accordance with AASHTO T23-73..
- (e) During the course of construction, when the source of any material for the concrete is to be changed, or if there is any variation in the quality of the materials furnished, additional tests and necessary adjustments in the mix shall be made as required to obtain the specified strengths.

9.3.3.2 Composition

The required consistency of the concrete mixture shall be such that the mixture will be cohesive, uniform and plastic, permitting proper handling and finish. When deposited it shall not flow, but shall remain in a conical pile. There shall be minimum segregation and surplus water during the process of handling and finishing. The slump shall be determined by AASHTO T1 19-74 except that during the course of construction control of concrete may be accomplished by the ball penetration

as outlined in AASHTO T183-72. Two and a half (2.5) centimetre ball penetration is considered equivalent to a slump of five (5) centimetres.

The cement content shall be determined by means of a yield test in accordance With AASHTO T 121-74.

9.3.4 Placing Concrete

9.3.4.1 General

The mixer shall be operated outside of the forms at all times except at locations where the Engineer deems it not feasible to do so.

When ordered by the Engineer, the subgrade shall be moistened as directed, prior to the placement of the subgrade paper such as polythene sheeting.

Concrete mixed in central plant shall be transported without delay from the mixing plant to the position for laying and any concrete which in the opinion of Engineer has been mixed too long before reaching, the work will be rejected and shall be removed from the site. The concrete shall be deposited on the subgrade in successive batches for the full width between forms and in a manner which will require as little rehandling as possible. Spreading shall be done by an approved mechanical spreader in *a manner that will prevent segregation and separation of the materials. Necessary hand spreading shall be done with shovels, not rakes. Workmen shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances. the amount of material deposited shall be sufficiently in excess of that required to form the pavement to the required cross-section after consolidation in order to provide a roll of concrete ahead of the front screed of the finishing machine for the full length of the screed.

Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all expansion joint assemblies by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the grade or a side form. In no case shall the vibrator be operated longer than fifteen (15) seconds. Concrete shall be deposited as near to expansion and contraction joints as possible without disturbing them) but shall not be dumped from the discharge bucket or hopper on to a joint assembly. The hopper is well centered on the joint assembly. Damage to joint assemblies caused by dumped concrete shall be repaired immediately as directed by the Engineer at Contractor's expense. Trucks delivering concrete shall not run on polythene sheeting nor shall they run on, completed slabs until at least fourteen (14) days after placing the concrete.

Should any concrete materials fall on or be worked into the surface of completed slab, they shall be removed immediately by methods approved by the Engineer.

Placement of concrete ahead of the initial spreader strike off shall not be more than fifteen (15) minutes ahead of final spreader strike off. If concrete is placed in one (1) layer only, the placement of concrete shall not be more than twenty (20) minutes ahead of the spreader strike off.

In order to secure adequate compaction, the concrete is to be spread with a surcharge above the finished level of the layer. Spreading, compacting and finishing operations are to be completed without delay.

The total time taken from the addition of the water to the mix until the completion of the surface finishing operations shall not exceed thirty (30) minutes when the shade or mix temperature exceeds twenty seven (27) degree C or forty (40) minutes when less than twenty seven (27) degree C. The mixing and placing of the concrete shall progress only at such a rate as to permit proper finishing, protecting and curing of the pavement.

The additives shall be added to the concrete mix so as to ensure more setting time. The top of the forms shall be kept free from accumulation of concrete or foreign material. The Contractor shall not permit the accumulation of laitance along the edge of a slab poured adjacent to one previously placed. Any accumulation of laitance shall be removed and replaced with fresh concrete. As soon as the side forms are removed, the edges of the slab shall first be inspected by the Engineer and any minor honey combed areas shall then be filled in With mortar composed of one part of cement to two parts of fine aggregate under the supervision of the Engineer.

9.3.4.2 Weather Conditions

For concreting during hot/cold weather, requirements 401.3.6 (1) of these specifications will be followed.

9.3.6 Placing Reinforcement

All pavement reinforcement shall be placed as shown on the plans. All marginal bars, dowel bars, and tie bars required by the plans shall be held in proper position by sufficient, number of metal bar supports or pins as approved by the Engineer. If the centre joint is to be sawed in lieu of placing the metal centre strip, the tie bars may be installed mechanically by means of equipment and methods approved by the Engineer. The satisfactory placement of the tie bars shall depend upon the ability of the mechanical device to place the tie bars in their true position- The Engineer may require, when satisfactory placement is not obtained by mechanical" means, that the tie bars be installed ahead of placing the concrete and that they be securely staked and tied if necessary to hold them in their exact position. The use of removable devices, supporting the bars from the forms, will not be permitted.

Following the placing of the concrete, it shall be struck off to conform to the cross section shown on the plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement will be at the elevation shown on the plans. When reinforced concrete pavement is placed in two (2) layers, the entire width of the bottom layer shall be struck off to such length and depth that the sheet of fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete after which the top layer of the concrete shall be placed, struck off and screed. Any position of the bottom layer of the concrete which has been placed more than thirty (30) minutes without being covered with the top layer shall be removed and replaced with freshly mixed concrete at the contractor's expense. Plain concrete and bar reinforced bridge

approach pavement may be placed in one (1) layer.

Where two (2) layers of wire mesh reinforcement are required, such as bridge approaches, the bottom layer shall be supported in the required position with bar chairs. Separators shall be used for the top layer if the strike off cannot be properly used for the operation. Laps in adjustment sheets or mats of reinforcement shall be as shown on the plans. Laps parallel to the centerline of the pavement will not be permitted except for unusual widths of pavement lanes or for irregular areas. If the plans do not show dimensions for laps, the minimum lap either perpendicular or parallel of the centerline of the pavement shall be fifteen (15) centimetres. The adjacent sheets shall be fastened or tied together to hold all parts of the sheets in the same plane.

Reinforcing steel shall be free from detrimental amounts of dirt, oil, paint, grease, loose mill scale, and loose or thick rust which could impair bond of the steel with the concrete.

9.3.7 Joints

Joints shall be constructed exactly in accordance with the details shown on the plans and specifications and with the best of workmanship. Failure to construct the joints as called for and in the best possible manner, as determined by the Engineer, will be cause for suspension of work until the cause of the defective work is remedied.

If removal of existing pavement of any type is required to connect with the new pavement, and the termination of the removal is not at an existing joint, the new joint shall be made- by sawing the existing pavement not less than five (5) centimetres deep before removal.

9.3.7.1 Expansion Joints

The subgrade at Expansion joints shall be accurately trimmed to the required cross section and to the proper depth of the pavement.

A string line shall be stretched between the pavement forms along the centerline of the joint. One half of the length of each dowel bar shall be painted in accordance with the directions shown on the plans and then thoroughly coated with hard grease, or lubricant as approved by the Engineer, to prevent the concrete from bonding to that portion of the dowel.

The entire joint assembly shall be of a type designated on the plans and shall be installed in such a position that the centerline of the joint assembly is perpendicular to the centerline of the pavement slab and the dowels lie parallel to the centerline of the slab. Finished joints shall not deviate more than six (6) millimetres in the horizontal alignment from a straight line. No plugs of concrete shall be permitted anywhere within the expansion space.

A slip sleeve of the dimensions shown on the plans shall be placed on the greased end of each dowel. The greased ends shall be free to slide in the dowel holder and shall extend in the direction as indicated on the plans. Any excess grease on the dowel holder shall be removed.

The joint shall be securely staked or fastened in place prior to placing the concrete and in a manner to ensure the joint and the dowel bars will remain in their proper position after the concreting and finishing operations are completed.

Joints for pavement designed for two (2) or less lanes of traffic shall be assembled and installed in one (1) continuous piece or the connections between sections shall be made rigid and tight to prevent offsets in sections of the joints. The length of individual pieces of the expansion joint filter shall be not less than the width of one (1) traffic lane of the pavement.

The finishing machine shall be operated in a manner that O11 prevent displacement of the joint. If for any reason it is necessary to straighten a joint, any depression caused by this operation shall immediately be filled with fresh concrete, reshaped and brought to the original crown in advance of the longitudinal finishers. Any fluid laitance or mortar caused by this operation shall be removed and replaced with fresh concrete.

As the finishing machine approaches the joint on the first trip, the excess concrete shall be shovelled ahead and the tamper and each screed, in turn, shall be lifted over the joint. On the second trip of the finishing machine, the screed may be operated over the joint.

9.3.7.2 Contraction Joints

Contraction joints shall be of the type and dimensions and at the spacing shown on the plans. Sawed contraction joints shall be cut by means of an approved concrete saw. The joints shall not be sawed until the concrete has hardened to the extent that tearing and relling is precluded. All joints shall be sawed during the initial curing period and the sawing shall begin before the pavement starts shrinking and uncontrolled cracking takes place. Any procedure which results in premature and uncontrolled cracking shall be revised immediately by adjusting the sequence of cutting the joints or the time interval involved between the placing of the concrete or removal of the curing media and the cutting of the joints. In no case shall the pavement be left overnight without having the joints sawed.

The joints shall be sawed at the depth, spacing, and lines shown on the plans. Guidelines or devices approved by the Engineer shall be provided to ensure cutting the joint in a straight line and perpendicular to the centerline of the pavement. The dust resulting from sawing shall be completely removed from the joint and adjacent areas by means of an air jet or a combination of air and water applied under pressure immediately after the joint has been cut, and before filling with joint compound.

When the plan so specifies that the dowels be installed through contraction joints; the subgrade at the contraction joints shall be accurately trimmed to the required cross section and to the proper depth of the pavement. A string line shall be stretched between the pavement forms along the centre line of the joint. Each dowel shall be painted and thoroughly coated with hard grease or lubricant, in accordance with the direction shown on the plans or as approved by the Engineer, to prevent the concrete from bonding to that portion of the dowel. The entire joint assembly shall be of the type designated on the plans and shall be installed in such a position that the centerline of the joint assembly is perpendicular to the centreline of the slab and the dowels lie parallel to the

slab surface as well as to the centerline of the slab. The greased ends of the dowels shall be placed in the direction as indicated on the plans and shall be free to slide in the dowel holder. Any excess hard grease on the dowel holder shall be removed.

9.3.7.3 Longitudinal Joints

Longitudinal joints shall be constructed in conformance with the details shown on the plans. When the fabricated steel strip is specified, it shall be held rigidly in place with an adequate number of pins driven into the subgrade to ensure that it will remain true to line and grade during concreting and finishing operations. On multiple lane pavements, where longitudinal joints are constructed at the form line, an approved recessed form and tie bars will be required. The full depth fabricated steel strip designated for other longitudinal joints will not be permitted. When sawed joints are specified or used, suitable guidelines or devices shall be furnished to ensure cutting the longitudinal joint on the true lines as shown on the plans. The sawing of longitudinal joints shall be performed at a time that will preclude erratic or uncontrolled cracking. Sawed joints shall be filled with the type of joint compound indicated on the plans. The dust resulting from sawing shall be completely removed from the joint and adjacent areas by means of air jet or a combination of air and water applied under pressure immediately after the joint has been cut and before filling with joint compound.

9.3.7.4 Construction Joints

A butt construction joint shall be made perpendicular to the centerline of the pavement at the close of each day's work and also when the process of depositing concrete is stopped for a length of time such that, in the opinion of the Engineer, the concrete will have taken its initial set. This joint shall be formed by using a clean plank header having a nominal thickness of five (5) centimetres, a width of not less than the thickness of the pavement and a length of not less than the width of the pavement. The header shall be cut true to the crown of the finished pavement and shall be accurately set and held in place in a plane at right angles to centerline and perpendicular to the surface of the pavement.

The top surface of the header shall be protected with steel as approved by the Engineer. On the face along with the centre of the header there shall be fastened a trapezoidal piece of metal or wood the full length of the header, five (5) centimetres wide and at least twenty five (25) millimetres in depth to form a grooved joint. The header shall have drilled holes to accommodate the dowel or tie bars hereinafter specified. Upon resumption of Work any surplus concrete remaining upon the subgrade shall be removed. The header shall then be carefully removed and fresh concrete deposited against the old in such a manner as to avoid injury to the edge of the old concrete. The fresh concrete shall be vibrated into the groove in a manner to ensure an interlocking joint.

Dowel bars or load transfer devices shall be used in all construction joints in accordance with the details shown on the plans. If no such details are shown on the plans, tie bars as provided for the longitudinal joint, and spaced at forty-five (45) centimetre centres, shall be placed across the joint in a plane parallel to the surface of the pavement approximately midway between the top and bottom surfaces of the pavement. The edges of the joint shall be grooved, edged, and sealed with

the material used for sealing expansion and contraction joints.

No construction joint shall be placed within three (3) meters of an expansion, contraction, or other construction joint.

9.3.7.4 Sealing Joints

- a) **Materials:** Joints shall be sealed with material of the approved type designated on the plans.
- b) **Hot Poured Joints:** The joints shall be sawed as provided in sub item 310.33(b) and covered as provided in sub item 310.3.7(c). After the fourteen (14) or seventeen (17) day curing period for the pavement has elapsed, the jute or other protective covering shall be removed from the joint and the joint thoroughly cleaned of all loose scale, saw dust, dirt, laitance or other matter. Cleaning may be accomplished with a compressed air jet, water under pressure, wire brushes or in extreme cases the joint shall, when directed by the Engineer, be re-sawn to ensure a completely clean joint. The joint surfaces and adjacent areas of the slab shall be thoroughly clean.

The hot poured joint material shall be heated in a heating unit approved by the Engineer to the temperature within the range required as shown by tests. The joint shall be filled from the bottom of the saw cut to the surface of the pavement. Any joint with a depth greater than twenty five (25) millimetres shall be filled with a minimum of two (2) layers, each layer being approximately equal in depth.

- c) **Cold Poured Joints:** The joints shall be sawed as provided in sub~ item 310.3.7(b) & 310.3.7(c) and cleaned of all loose saw dust, laitance, dirt, other foreign matter and free water.

The joints shall be filled immediately after cleaning. The nozzle used must be so designed that the joint is filled completely from bottom to top. The joint shall be filled so it is rounded on top about six (6) millimetres above the pavement surface. Immediately after the joints have been filled, they shall be covered with strip of non absorptive paper at least four (4) centimetres wide. Eleven (11) kilogram glass line or heavy craft is suitable. The paper shall remain on the joint until it weathers or wears off.

d) Permanent Header Board

Immediately after the forms are removed from the ends of concrete pavement that will be exposed to other than permanent type surfacing and temporary and permanent traffic, a header board having dimensions of not less than eight (8) centimetres (nominal) by twenty (20) centimetres shall be bolted securely to the end of the pavement in a manner to protect the edge of the pavement from damage. The header board shall extend the full roadway width, but may be in two (2) sections. At the time of placing the concrete, six (6) (three for each lane), thirteen (13) millimetres by twenty (20) centimetres bolts shall be embedded in the end of the pavement in a manner that will hold the header board securely. The header board shall be shaped to conform to the crown of the pavement and shall be installed flush with the concrete pavement surface. The finishing and installing of the header board shall be considered subsidiary Work pertaining to the other items in the Bill of Quantities and will not be paid for directly.

The header will not be required on concrete base course Work.

9.3.8 Consolidating and Finishing

After being spread and struck off as provided in sub item 310.3.5 "Placing Concrete," the concrete shall be further struck off and consolidated with an approved finishing machine to such an elevation that when finishing operations are completed, the surface will conform to the required grade and crown. The finishing machine shall operate over the entire surface at least twice, the first time with the finishing machine tamper and both screeds in operation. A uniform roll of concrete approximately fifteen (15) centimetres above the pavement grade shall be maintained ahead of the front screed for its entire length during the first trip over with the finishing machine. Excessive tamping or finishing resulting in bringing an excess of mortar to the surface will not be permitted.

After the last pass of the finishing machine, a mechanical longitudinal finisher shall be operated over the concrete surface. The forward motion of the longitudinal finisher shall be so adjusted that the screed will pass over each portion of the surface at least twice. The longitudinal finisher shall be operated in a manner that will prevent excessive slumping of the concrete at the form lines or the metal centre strip or the loss of the crown of the pavement. If necessary or when ordered by the Engineer, the finisher shall be operated in one direction only or shall be operated from only the form to the centerline in order to ensure that the proper cross section of the pavement is obtained. The leading edge of the screed shall clear the forms upon completion of each transverse pass in order to clear the pavement surface of any laitance or thin mortar.

In general, the addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted. If the application of water to the surface is permitted by the Engineer, it shall be applied as a fog spray by means of approved spray equipment.

As an alternative to the longitudinal finisher, the contractor may use a machine composed of a cutting and smoothing float, or floats, suspended from and guided by a rigid frame. The frame shall be carried by four (4) or more visible wheels riding on, and constantly in contact with, the side forms.

When directed by the Engineer, following one of the preceding methods of longitudinal finishing, long handled floats having blades not less than one and one half (1.5) meters in length and fifteen (15) centimetres in width shall be used to smooth and fill in open textured areas in the pavement, Long handled floats shall not be used to float the entire surface of the pavement in lieu of, or supplementing, one of the preceding methods of longitudinal finishing.

When the longitudinal finishing has been completed, the entire surface shall be tested with straightedges not less than three (3) meters in length. The straightedges shall be operated parallel to the pavement centerline starting at the centre and progressing toward the forms. Advance along the pavement shall be in successive stages of not more than one half (1/2) the length of the straightedges. All laitance, surplus water, and inert material shall be removed from the surface. All

high places shall be worked down and all low places filled by combined operations of floats and straight edges until no irregularities exist. The proper crown of the pavement shall be maintained throughout the operations.

After floating and straightening has been completed, the concrete shall be finished by using a belt made of canvas, rubber, or other approved belting not less than fifteen (15) centimetres in width, nor less than sixty (60) centimetres longer than the width of the pavement. This belt shall be worked with a longitudinal and crosswise motion. Care shall be exercised in the use of the belt to ensure that the edges of the belt do not dig into the surface of the concrete or work the crown out of the pavement. Either machine belting or hand belting will be permitted.

As soon as all excess moisture has disappeared, and while the concrete is still plastic enough to make a granular surface possible, a drag shall be used which shall consist of a seamless strip of damp burlap or cotton fabric, which shall produce a uniform surface of gritty texture after dragging it longitudinally along the full width of pavement. For pavement (5) meters or more in width, the drag shall be such that a strip or burlap or fabric at least one and one half (1.5) meters wide is in contact with the full width of pavement surface while the drag is used. The drag shall be maintained in such condition that the resulting surface is of uniform appearance and reasonably, free from grooves over two (2) millimetres in depth, as determined by the Engineer. Drags shall be maintained clean and free from encrusted mortar. Drags that cannot be cleaned shall be discarded and new drags substituted.

After dragging the surface with burlap, the concrete over the expansion joint filler shall be completely removed and the joint finished. The edges of the concrete at expansion joints shall be finished with an edger to the radius shown on the plans. The exposed edge of the pavement shall be finished with an edger to a radius of six (6) millimetres. Any tool marks appearing on the slab adjacent to the joints or edge of slab shall be eliminated by dragging the surface. In doing this, the rounding of the corner of the slab shall not be disturbed.

9.3.8.1 Hand Finishing

Unless otherwise specified, hand finishing methods will not be permitted except under the following conditions:

- a. In the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade when the breakdown occurs, and no additional concrete shall be placed until such equipment is repaired to the satisfaction of the Engineer.
- b. Narrow widths Or areas of irregular dimensions where operation of mechanical equipment is impractical as determined by the Engineer, may be finished by approved hand methods.
- c. Short lengths of pavement, such as bridge approach pavement, where the operation of mechanical equipment is impractical may be finished by approved hand methods.

Concrete, as soon as placed, shall be struck off and screeded. An approved portable screed shall be used. A second screed shall be provided for striking off the bottom layer of concrete if reinforcement

is used.

The screed for the surface shall be at least one (1) meter longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and be constructed either of metal or other suitable material shod with metal.

Consolidation shall be attained by the use of a suitable vibrator or other approved equipment.

In operation the screed shall be moved forward on the forms with a combined longitudinal and transverse shearing motion, moving always in the direction in which the work is progressing and so manipulated that neither end is raised from the side forms during the striking off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

After the concrete has been struck off, it shall be further smoothed, trued, and consolidated by means of a longitudinal float. The hand operated longitudinal float shall be not less than three and one-half (3.5) meters in length and fifteen (15) centimetres in width, properly stiffened to prevent flexing and warping. The longitudinal float, operated from foot bridges resting on the side forms and spanning but not touching the concrete, shall be worked with a sawing motion, while held in a floating position parallel to the road centerline, and passing gradually from one side of the pavement to the other. Movement ahead along the centerline of the pavement shall be in successive advances of not more than one half (1/2) the length of the float. Any excess water or soupy material shall be wasted over the side forms on each pass.

At the option of the Engineer, the long handled floats having blades not less than one and one half (1.5) meters in length and fifteen (15) centimetres in width may be substituted for the hand operated longitudinal float.

All other operations after this substitution for the mechanical equipment shall be performed in the manner previously described.

Concreting operation shall be performed only in daylight, under no circumstances shall concrete pavement placed or finished at night.

9.3.9 Removing Forms

Unless otherwise provided, forms shall not be removed from freshly placed concrete until it has set for at least twelve (12) hours, except auxiliary forms used temporarily in widened areas. Forms shall be removed carefully so as to avoid damage to the pavement. After the forms have been removed, the sides of the slab shall be cured as specified for the surface. Major honeycombed areas will be considered as defective work and shall be removed and replaced at the Contractor's expense, as directed by the Engineer. Any area or section so removed shall neither be less than three (3) meters in length nor the full width of lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less

than three (3) meters in length, shall also be removed and replaced.

9.3.10 Protecting and Curing of Concrete Pavement

a. Initial Curing

As the surface of the newly laid pavement is progressively finished, the initial curing and protection operations shall be started.

Upon completion the finishing operation and while the surface of concrete is still moist, but no free water remains, a liquid curing membrane approved by the Engineer shall be applied to the exposed surface of the pavement at the rate not less than one (1) litre per three and two thirds (3-2/3) square meters of surface area when mechanical pressure distributors are used. The curing membrane, except on irregular areas, shall be applied by means of approved self-propelled mechanical pressure distributors or approved hand sprays. Satisfactory means shall be provided for thoroughly mixing the curing membrane compound before and during its use. The mechanical spraying equipment may be either a full width spray bar equipped with multiple nozzles or a traversing spray which travels from one edge of the pavement to the other. In either case the path of adjacent nozzles or passes of the traversing spray shall overlap a minimum of one-half (1/2) the width of the spray pattern so that all portions of the surface shall receive double applications from adjacent nozzles or passes. The pumping, pressure and distribution arrangement shall be correlated with the forward speed to provide adequate and uniform coverage of the pavement at not less than the minimum rate required. Irregular areas to which the mechanical distributor cannot be adapted may be covered with hand sprays.

When hand sprays are used, the curing membrane shall be applied in two (2) applications, each at a rate of not less than one (1) litre per five (5) square meters of surface area so as to provide a total rate of application of one (1) litre per two and one half (2-1/2) square meters of surface area. The path of the spray on the second application shall be at right angles to the path of the spray on the first application. When hand operated sprays are permitted, the equipment supplying the pressure to them. Spray nozzle shall be capable of supplying a constant and uniform pressure to provide uniform and adequate distribution of the curing membrane compound at the rate required. If from any cause, such as rainfall soon after its application, the curing membrane is damaged, the Contractor shall immediately apply another application of curing membrane to the surface of the pavement. The rate of application for the replacement membrane shall be the same as for the original membrane.

Unless otherwise directed by the Engineer, immediately following the application of curing membrane, an approved shade canvas shall be placed approximately thirty (30) centimetres above the pavement surface. The shade canvas shall be constructed of materials and in a manner approved by the Engineer. In no case shall any portion of the shade canvas come in contact with the pavement. The initial curing shall be continued for a period of twenty four (24) hours from the time the curing membrane is applied.

When forms are removed, whether during the initial or the final curing period, the edges of the pavement shall receive curing membrane at the rate of coverage specified for the pavement

surface.

The curing membrane may be applied to the vertical edges of the pavement by means of hand sprays or by nozzles attached to the mechanical distributor, but the edges of the pavement shall be covered with curing membrane at the rate specified within thirty (30) minutes after removal of the forms.

When cold poured joint compound is used, all joints shall be sawed during the initial curing period. The shade canvas may be moved at joint locations for short periods of time to permit the sawing. Before being sealed, the joints shall be thoroughly cleaned of all loose saw dust, laitance, dirt, other foreign matter, and free of water. As the method of final curing is different from that of the initial curing, the cleaning and sealing of joints shall be performed immediately following the removal of the shade canvas at the end of the initial curing period and prior to the application of the polyethylene sheeting.

When hot poured joint compound is used, the joints shall be sawed, cleaned, and filled with jute or other acceptable protective material in the same time sequence as for cold poured joints.

In no case shall any portion of the concrete pavement be exposed to the direct rays of the sun for more than one (1) hour.

Following jointing operations, curing membrane shall be applied to the joint area at the rate specified for the pavement surface.

b. Final Curing

Upon completion of the initial curing period and after the shade canvas has been removed and jointing operation has been completed, the pavement shall be completely covered with White Opaque Polyethylene Film as specified in AASHTO M 171. Adjoining sheets shall be lapped a minimum of forty five (45) centimetres. The sheeting shall be held in place in a manner approved by the Engineer.

Final curing shall be continued until the concrete reaches an age of fourteen (14) days. During this period, the curing membrane and polyethylene film shall be protected from damage from any cause. Any damage from one cause shall be immediately repaired by the Contractor at his expense. No traffic, including workmen and pedestrians, shall be allowed on the surface of the pavement until the expiration of the fourteen (14) day curing period.

When concrete is being placed during the time that the air temperature may be expected to drop below fifteen (15) degrees C, a sufficient supply of burlap, straw, hay, or other suitable blanketing material shall be provided along the work to protect the concrete and maintain a minimum temperature of fifteen (15) degrees C in the concrete as measured on the surface of the pavement. An approved moisture barrier such as wet burlap or plastic sheeting shall be placed on the concrete prior to placing the blanketing material. This type of cure shall be maintained for a period of seventy two (72) hours as the initial cure. After the initial cure as specified above, a final

cure as specified above may be used. The final cure shall be maintained for a period of fourteen (14) days, thus making a seventeen (17) day curing period for cold weather concreting.

9.3.11 Surface Tolerance

As soon as the concrete has hardened sufficiently, the pavement surface shall be tested with a three (3) meter straightedge or other specified devices. Areas showing high spots of more than three (3) mm, but not exceeding twelve (12) mm in three (3) meters between any two contact points, shall be marked and immediately grinded down with an approved grinding tool to a tolerance of less than three (3) mm as described above.

Where the departure from correct cross section exceeds twelve (12) mm, the pavement shall be removed and replaced by the Contractor at his expense. Any area or section so removed shall neither be less than three (3) meters in length nor the full width of the lane involved. When it is necessary to remove and replace a section of pavement, any remaining portion of the slab adjacent to the joints that is less than three (3) meters in length, shall also be removed and replaced.

9.3.12 Tests for Thickness of Pavement and Degree of Compaction

a. Thickness of Pavement

The Employer will not be liable for payment of any excess in thickness or depth of pavement. During the progress of the work, the thickness or depth of pavement will be determined by the Engineer from cores cut from the concrete pavement by the Contractor. The cost of cutting and recovering all the cores described in this clause and the following paragraph shall be deemed to be included in the rates and prices for Portland Cement Concrete Pavement entered by the Contractor in the Bill of Quantities.

Unsatisfactory work shall be repaired, replaced, or will be paid for at an adjusted price, as follows:

- 1) One 15cm diameter core will be removed by the Contractor from each lane, at such locations as the Engineer may direct, and shall represent not more than 1000 SM of pavement area. A lane shall be considered the pavement surface between longitudinal joints, or a longitudinal joint and pavement edge.
- 2) If any core measurement is deficient more than 6.5 mm from the required thickness a core measurement shall be taken at each 30m interval in both directions longitudinal from the first deficient core in the same lane, as defined herein, until the thickness of the pavement is found to be not more than 6.5 mm deficient from the required thickness. Each deficient core shall be considered as representing the condition in the same lane or longitudinal section, as above defined, for a distance of 15m, in each direction longitudinally from the core.
- 3) Sections of pavement which are deficient in thickness, as determined by cores, by an amount more than 1.3 cm shall be removed and replaced with pavement of the specified thickness at the expense of the Contractor. The removal and replacement shall start at the determined point of deficiency and proceed longitudinally as hereinafter specified, until the pavement is to

be not more than 6.5 mm deficient from the required thickness. The old reinforcing steel shall be left extended a sufficient distance so as to allow the new reinforcement steel to be lapped with the old, the required distance to be welded to the satisfaction of the Engineer.

- 4) The removal and replacements of pavements shall extend transversely the full width each lane in which such deficiency is found.
- 5) All pavements within two (2) meters of the deficiency spot shall be removed, except that when any joint is more than two (2) meters, all pavements shall then be removed to the next joint.
- 6) Sections of pavement which are deficient in thickness, as determined by measurement of cores in accordance with AASHTO T148-49, by an amount more than 6.5 mm, but not more than 1.3 cm, will be paid for at an adjusted price as specified in Table Below:

DEFICIENCY IN THICKNESS AS DETERMINED FROM CORES

<u>Thickness Deficient</u>	<u>Proportional Part of Contract of Contract Price to be allowed</u>
3.00 mm to 6.5 mm	95%
6.5 mm to 13 mm	75%

b. Degree of Compaction

The cores that have been cut from the concrete pavement according to the requirements of (i) above shall be examined by the Engineer's Representative to check the degree of compaction achieved through the slab and to check the effectiveness of the bond between the top and bottom course concrete.

Should any core reveal that any part of the slab has not been adequately compacted by revealing honeycombed or segregated concrete and should the bond between the top and bottom layers of concrete be such that a plane of weakness is present, then additional cores shall be taken to check the areas of defective concrete pavement according to the procedure laid down in (i) above for determining the areas of concrete pavement deficient in compaction.

Any areas of defective pavement concrete so found shall be replaced with new concrete in accordance with this section at contractor's own expense.

The Engineer reserves the right to carry out crushing tests on any or all of the concrete cores taken in accordance with this clause, and should these tests show that any area of pavement concrete has failed to meet the strength requirements of the specification, then such areas of concrete shall be removed and replaced with new concrete, mixed, laid, compacted and finished to the requirements of this section at contractor's own expense.

c. Refilling, of Holes

Holes in the pavement created by the cutting of cores shall be thoroughly coated on the inside with a neat cement grout and shall then be filled with concrete of the same mix as shown in the pavement. The filling shall be in two equal layers and each shall be vibrated to its full depth. The surface shall be finished flush and brushed, The surface shall be kept thoroughly wet for 72 hours thereafter.

9.3.13 Replacement of Defective Concrete

Any concrete not complying with the specification shall be cut out and replaced in accordance With the specification over the full width of the slab between longitudinal construction joints and over a length extending between two transverse joints each of a type other than a warping joint.

9.3.14 Concrete Lug Anchors

"Concrete Lug Anchors" shall be constructed in accordance with the dimensions and notes and at the locations shown on the plans. Unless otherwise indicated on the plans, the class, composition, consistency, proportioning, batching, mixing and curing of the concrete used in concrete lug anchors shall conform to the same requirements as the concrete pavement. Reinforcing steel, concrete and excavation for lug anchors shall be subsidiary to the Bill of Quantities item.0Concrete Lug Anchors."

9.4 MEASUREMENT AND PAYMENT

9.4.1 Measurement

The unit of measurement for payment shall be the cubic meters of the completed and accepted Portland Cement Concrete Pavement, as measured in place. The number of cubic meters of the completed Portland Cement Concrete Pavement shall be determined by the length measured along the centre line and upon the surface of the road, times the width as shown on the Drawings plus the areas of any widening on curves, turnouts and intersection, authorized and measured separately. Measurement of pavement thickness will be ensured by erecting shutters for spreading concrete at required level.

The unit of measurement for bridge Approach Slabs shall be the square meters of the area actually constructed in accordance with the Drawings or as directed in writing by the Engineer.

Concrete Lug Anchors shall be measured by the linear meters in place, the measuring being made along the centerline of the concrete lug anchor transverse to the pavement centerline. No measurement will be made of unauthorized areas or for extra thickness.

9.4.2 Payment

The number of cubic meters of Portland Cement Concrete Pavement, measured as specified in sub item 310.4.1 above , will be paid for , at the price tendered per cubic meter in the Bill of Quantities, adjusted as specified for deficiency in thickness, which price shall include the cost of constructing, finishing, curing, protecting and cleaning the pavement as above described; the preparation of subgrade to receive the pavement; the construction of all joints of whatever type; cutting of cores and filling of holes, all materials, including joint filler and other material, equipment, labour and all else necessary therefore, and all other work in connection therewith and incidental there to in accordance with the specification and Drawings. Reinforcing steel shall be measured separately under relative items of work.

The number of cubic meters of Bridge Approach Slabs, will be paid for at the price tendered per cubic meter in the Bill of Quantities, which price shall include the cost of constructing, finishing, curing, protecting and cleaning the slab as above described; the surface preparation of the subbase to receive the slab: the construction of all joints of whatever type; all materials, including joint filler and other joint material, equipment, labour and all else necessary therefore, and all other work in connection therewith and incidental thereto in accordance with the Specification and Drawings.

<u>Item Number</u>	<u>Description</u>	<u>Unit of Measurement</u>
9 a	Plain Concrete Pavement	CM
9 b	Reinforced Concrete Pavement	CM
9 c	Concrete Lug Anchors	Metres

10. CONCRETE CURBS, GUTTERS AND CHANNELS

10.1 DESCRIPTION

This work shall consist of Curb, gutter, channel, or combination of Curb and gutter or channel; constructed of the following materials and in accordance with the specifications at the location and of the form, dimensions and designs shown on the Drawings or as directed by the Engineer. The Curb, gutter, channel or in combination may be constructed by one of the following methods.

1. Cast in place concrete Curbing.
2. Precast concrete Curbing.
3. Extruded concrete Curbing.

10.2 MATERIAL REQUIREMENTS

The concrete cast-in-place for concrete Curbs, gutters and channels shall be either Class W or class 'C' or as indicated on the Drawings or as approved by the Engineer and shall conform to the requirements of that particular class prescribed under item 401.1.1 "Classes of concrete". An air entraining agent, if required, shall be added during mixing an amount to produce five (5) to eight (8) percent air by volume in the mixed concrete.

Precast concrete Curbing units shall consist of class 'C' concrete conforming to the requirement of item 401 and to lengths, shape and other details shown on the Drawings. Curbing which shows surface irregularities of more than five (5) mm when checked with three meter straight edge or surface pits more than fifteen (15) mm in diameter will be rejected.

Forms to hold the concrete shall be built and set in place as described under item 403-Formwork.

Forms for at least sixty meters of Curb or combination of Curb and gutter or channels shall be in place and checked for alignment and grade before concrete is placed. Curved sections shall have forms of either wood or metal and shall be accurately shaped to radius of curvature shown on the Drawings. Steel Reinforcement if required shall conform to item 404 "Steel Reinforcement".

Expansion joint filler shall be either the performed type conforming to requirement of AASHTO-M 153 or shall be precast fibre board packing.

Joint filler shall consist of one part cement and two parts of approved sand with sufficient quantity of water necessary to obtain the required consistency. The mortar shall be used within thirty (30) minutes after preparation.

The Bonding compound when used shall conform to AASHTO M-200.

10.3 CONSTRUCTION REQUIREMENTS

10.3.1 Cast in Place

a. Excavation and Bedding

Excavation shall be made to the required depth and the base upon which the Curb or combination of Curb and gutter is to be set shall be compacted to a minimum density of ninety (90) percent of the maximum dry density as determined by AASHTO T-191 Method. All soft and unsuitable material shall be removed and replaced with suitable material acceptable to the Engineer.

Where directed by the Engineer, a layer of cinders or clean sand and gravel, or other approved porous material having a minimum compacted thickness, of fifteen (15) cm shall be placed to form a bed for the Curb or combination of Curb and gutter.

b. Placing Concrete

Concrete may be placed in the gutter to the full depth required. The top of the Curb or combination of Curb and gutter shall be floated smooth and the edges rounded to the radii shown on the Drawings. Before finishing, the surface of the gutter shall be tested with a three (3) meter straight edge and any irregularities of more than five (5) mm in three (3) meters shall be eliminated. In finishing concrete only mortar normally present in the concrete shall be permitted for finishing. The use of a separate mortar finishing coat or the practice of working dry cement into the surface of the concrete will not be permitted.

c. Joints

The Curb and gutter shall be constructed in uniform sections of not more than twenty five (25) meters in length except where shorter sections are required to coincide with the location of weakened planes or contraction joints of the concrete pavement or for closures but no section shall be less than two (2) meters long.

The sections shall be separated by sheet templates set perpendicular to the face and top of the Curb and gutter. The templates shall be approximately five (5) mm in thickness, of the same width as that of the Curb or gutter and not less than five (5) cm greater than the depth of the Curb or gutter. Templates shall be set carefully and held firmly during the placing of concrete and shall be allowed to remain in place until the concrete has set sufficiently to hold its shape, but shall be removed while the forms are still in place.

When pre-cut fibre board packing is used in the expansion joints it may be used in place of the sheet template referred to above, on the approval of the Engineer. In this case the fibre board shall be pre-cut to the shape of Curb so that its outer edge is flushed with the abutting Curb.

Expansion joints shall be formed in the Curb and gutter at intervals of six (6) to ten (10) meters in order to coincide with the expansion joints of cement concrete pavement or as shown on the Drawing.

d. Dowels at Expansion Joints in Channels

At expansion joints in channels and in the channel portion of Curbs and channel built

monolithically, painted dowel bars with slip sleeve shall be provided as a load transfer medium at locations shown on the Drawings.

The size and spacing of the dowel bars shall be as indicated on the Drawings. Each dowel shall be set accurately parallel to the top surface of the gutter and accurately at right angles to the expansion joint.

e. Contraction Joints

Transverse contraction joints shall be provided opposite to all contraction joints in abutting concrete pavement and other locations shown on the Drawing spaced to a maximum of four (4) meters.

The contraction joints shall be provided by forming grooves in the face and surface of structure at right angle to the Curb alignment and Curb surface. The grooves shall be rectangular in cross-section, five (5) cm deep by five (5) cm wide. The grooves shall be formed in the top of all Curbs and in the exposed roadway face of Curb and in the channel surface of monolithic type Curb and channels and in the surface of channels. The edges of the joints shall be tooled and the joints shall be left clean, neat and of specified width and depth.

f. Removal of Forms and Finishing

The forms shall be removed within twenty four (24) hours after concrete has placed except that the, form used against the face of the Curb in a combination of Curb and gutter shall be removed as soon as the concrete has set sufficiently to hold its shape. Minor defects shall be repaired with mortar containing one part of Portland cement and two parts of the fine aggregate. Plastering shall not be permitted on the face of a Curb or Curb and gutter and all rejected Curb or gutter shall be removed and replaced without additional compensation. All surfaces which will be exposed in the finished construction of the Curb and gutter shall be finished, while the concrete is still "green" by wetting a wood block of float and rubbing the surface until they are smooth.

g. Curing

During seventy two (72) hours following placing of concrete, the Curbs, channels and gutters shall be protected against premature drying by covering with suitable cotton or Hessian mats and by frequent sprinkling with water, with liquid forming compounds or with waterproof paper or by any other method as mentioned in section 401.3.8-Curing, Concrete and approved by the Engineer.

h. Backfilling

After forms has been removed and concrete has been cured as specified, the excavation of Curbs, gutters or channels shall be backfilled with suitable earth or granular material tamped into place in layers of not more than fifteen (15) cm each until firm and solid.

10.3.2 Precast

a. Excavation and Bedding

Excavation shall be made to the required depth as shown on the Drawings. All soft and unsuitable material shall be removed and replaced with a suitable material acceptable to the Engineer.

Bedding shall consist of Class B Concrete conforming to the requirements of Item 401 and shall be to the section and dimension shown on the Drawings.

b. Placing

The precast concrete Curbs shall be set in 1:3 of cement sand mortar to the line, level and grade as shown on the Drawings or as directed by the Engineer.

c. Joints

Joints between consecutive Curbs shall be three (3) to five (5) mm wide and filled with cement mortar to the full section of the Curb.

d. Backfilling

Backfilling shall meet the requirements of Item 601.3.1 (h).

10.3.3 Extruded Concrete Curbing and Channels

a. Excavation and Bedding

Excavation and bedding shall conform to the requirements as described under item 601.3.1 (a).

b. Placing

Concrete shall be fed to the machine at a uniform rate. The concrete shall be of such consistency that after extrusion it will maintain the shape of the Curb section without support and shall contain the maximum amount of water that will permit this result. The machine shall be operated under sufficient uniform restraint to forward motion to produce a well compacted mass of concrete which requires no further finishing other than light brushing with a brush filled with water only. The forming tube portion of the extrusion machine shall be readily adjustable vertically during the forward motion of the machine. A grade line gauge or pointer shall be attached to the machine so that a continual comparison can be made between the Curb being placed and the established Curb grade as indicated by an offset guideline.

The top end face of the finished Curb shall be true and straight and the top surface of the Curb shall be of uniform width, free from bumps or surface pits larger than fifteen (15) mm in diameter. When a straightedge three (3) meters long is laid on the top or face of the Curb or surface of the

gutter, the surface shall not be more than five (5) mm from the edge of the straightedge except at grade changes or curves.

Where adhesive is used to bond the Curb to an ~existing pavement, the surface shall be first thoroughly cleaned of all dust, loose material and oil, the cost of which shall be included in other items of work.

c. Joints

Expansion joints shall be constructed by sawing through the Curb section to its full depth. The width of the cut shall be such as to admit the joint filter with a tight fit. Preformed joint filler shall conform to the provisions of Item 601.2 and shall be inserted and mortared in place.

If sawing is performed before the concrete has hardened, the adjacent portion of the Curb shall be supported firmly with close fitting shields and the operations of sawing and inserting the joint filler shall be completed before curing the concrete.

Alternatively pre-cut joint fillers shall be permitted to be placed at the location of the expansion joints prior to placing of the extruded Curb with the approval of the Engineer. The joint fillers shall be set firmly in place in a vertical position to the line and grade of the Curb profile.

d. Curing and Backfilling

Curing and backfilling shall be as described in item 601.3.1(g) and Item 601.3.1 (h).

10.4 MEASUREMENT AND PAYMENT

10.4.1 Measurement

The unit of measurement for concrete Curb, gutter, or combination of Curb and gutter, channel, or extruded Curbs and channels shall be measured by the linear meter along the front face of the section at the finished grade elevation. Deduction in length will be made for drainage structure installed in the Curbing such as catch basins and drop inlets etc. Measurement will not include any area in excess of those shown on the Drawings except for any area authorised by the Engineer in writing.

10.4.2 Payment

Measured and accepted quantities shall be paid for at the contract unit price per linear meter for each of the particular pay item listed below and shown in the Bill of Quantities which prices and payment shall constitute full compensation for furnishing and placing all materials for concrete, for reinforcing steel if required on the Drawings for expansion Joints, material, form for drainage opening, excavation, backfilling and dumping and disposal of surplus material and for all labour, equipment, tool and incidentals necessary to complete the item.

Payment for expansion joint filler material used in transverse expansion and contraction joints in Curbs and channel shall be understood to be included in the price tendered per linear meter for the Curbs and channels and shall not be paid for separately.

Concrete and mortar required for bedding of precast concrete Curbs as shown on the Drawings shall not be paid for as separated item, but the cost shall be included in the contract unit price for precast concrete Curb.

<u>Item Number</u>	<u>Description</u>	<u>Unit of Measurement</u>
10 a	Concrete Curb, in place, Type _____	Metres
10 b	Combination of Curb and Gutter in Place, Type _____	Metres
10 c	Combination of Curb and Channel in Place, Type _____	Metres
10 d	Precast Curb in Place, Type _____	Metres
10 e	Concrete Channel, Type _____	Metres
10 f	Extruded Curb and Channel, Type _____	Metres

D – SOURCES OF CONSTRUCTION MATERIALS

<u>Ser</u>	<u>Material</u>	<u>Source of Supply</u>
1	Granular Sub Base.	Sargodha.
2	Bitumen.	Attock Refinery OR National Refinery.
3	Pre-stressed, Precast boundary wall RCC I-Section beam and columns.	Banu Mukhtar / Izhar (Pvt.) Ltd. / Ittefaq Concrete.
4	Concrete Pavers.	Bin Creet / Izhar (Pvt.) Ltd. OR Equivalent.
5	Crush for PCC / RCC	Sargodha.
6	Sand for Concrete 3000 PSI & Above.	Lawrencepur.
7	Sand for other type of Concrete.	Local / River Sand
8	Steel.	Mughal / Model / AFCO.
9	HDPE Pipes.	DADEX / ILL / BBJ
10	Gutka.	Lahore / Pattoki.

DRAWINGS

