



NATIONAL TRANSPORT RESEARCH CENTRE
GOVERNMENT OF PAKISTAN
MINISTRY OF COMMUNICATIONS

REPORT ON
QUALITY CHECKING
CONTRACT - 10A (CRBC Bridges)
INDUS HIGHWAY PROJECT

NTRC-232

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MARCH, 2001

NATIONAL TRANSPORT RESEARCH CENTRE

624.2092

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**REPORT ON
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INDUS HIGHWAY PROJECT**

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C O N T E N T S

| | <u>Page No.</u> |
|--|-----------------|
| Executive Summary | (i-ii) |
| 1. Introduction | 1 |
| 2. Contract 10A of IHP | 3 |
| 3. Objective of the Work | 4 |
| 4. Scope of the Work | 4 |
| 5. Reconnaissance Survey | 4 |
| 6. Field Testing & Sampling | 6 |
| 7. Laboratory Testing | 9 |
| 8. Analysis of Results and Conclusions | 14 |
| 9. Recommendations | 16 |
| Photographs | |
| Annex-I | |
| Annex-II | |

EXECUTIVE SUMMARY

On a reference from Communications (Division) National Transport Research Centre (NTRC) has carried out the quality check of the Retra Junction - Malana Junction Section, Contract 10-A of Indus Highway. The project envisages construction of four bridges over Chashma Right Bank Canal (CRBC) flood channels. The launching/placing of all the pre-stressed girders has been completed while the casting of deck slabs is in progress.

2. Based on the reconnaissance survey, field observations & laboratory testing of samples of concrete, steel, aggregates the salient observations of NTRC are as follow. Copy of the report is enclosed.

The quality of concrete work was generally good.

- b) The compressive strength of the six concrete core samples was above the minimum required strength of 210 kg/sq.cms.
- c) The concrete slabs thickness were found as per design in all cases.
- d) The weight of the sample steel bars was more than the required value of 2.466 kg/meter.
- e) Yield strength of steel sample bars was higher than the required value of 60 ksi.
- f) The ultimate tensile strength of steel bar was also higher than the required value of 90 ksi.
- g) The surface finishing was generally of good quality. However in case of pre-stressed girders, the finishing of the bottom of the girders was much below the designed finish levels. Even the surface finishing obtained after repair was not of required standards.
- h) Also, the finishing quality of the parapet walls was not good and needs improvement.

3. Recommendations

The surface finishing of the parapet walls and the bottom of girders and chamfers should be brought to the desired class-I surface finish levels by rendering.

1 : Introduction

The Indus highway designated as the National Highway N-55 runs along the West Bank of the Indus river. It is approximately 1233 kilometer long route connecting the town of Kotri in the south to the city of Peshawar in the north. It is one of the very important links between the north and south regions of the country.

Observing the importance of the route, the improvement project of the Indus Highway (IHP) was approved by the Government of Pakistan (GOP) at a cost of Rs. 5,479.369 million in 1989. The objectives were that the project will provide alternate link from Karachi to Peshawar and would decrease the traffic burden on N-5. The improvement of the road would provide a fillip to development of backward areas of the country located on western bank of river Indus.

The work includes improvement of 968 kilometer of existing roads and construction of 241 kilometers of two new links from Sehwan to Nuriabad (148 kilometer) and Karrapa to Gambila (93 kilometer). After the completion of the project whole highway will achieve a uniform standard of 7.3-kilometer wide pavement with 3-meter wide shoulders and a design speed of 90 km/hour. For management purposes the National Highway Authority (NHA) divided the Indus Highway Project (IHP) in different contracts. The list of contracts along with their locations is placed at Figure-I.

INDUS HIGHWAY PROJECT

LOCATION MAP

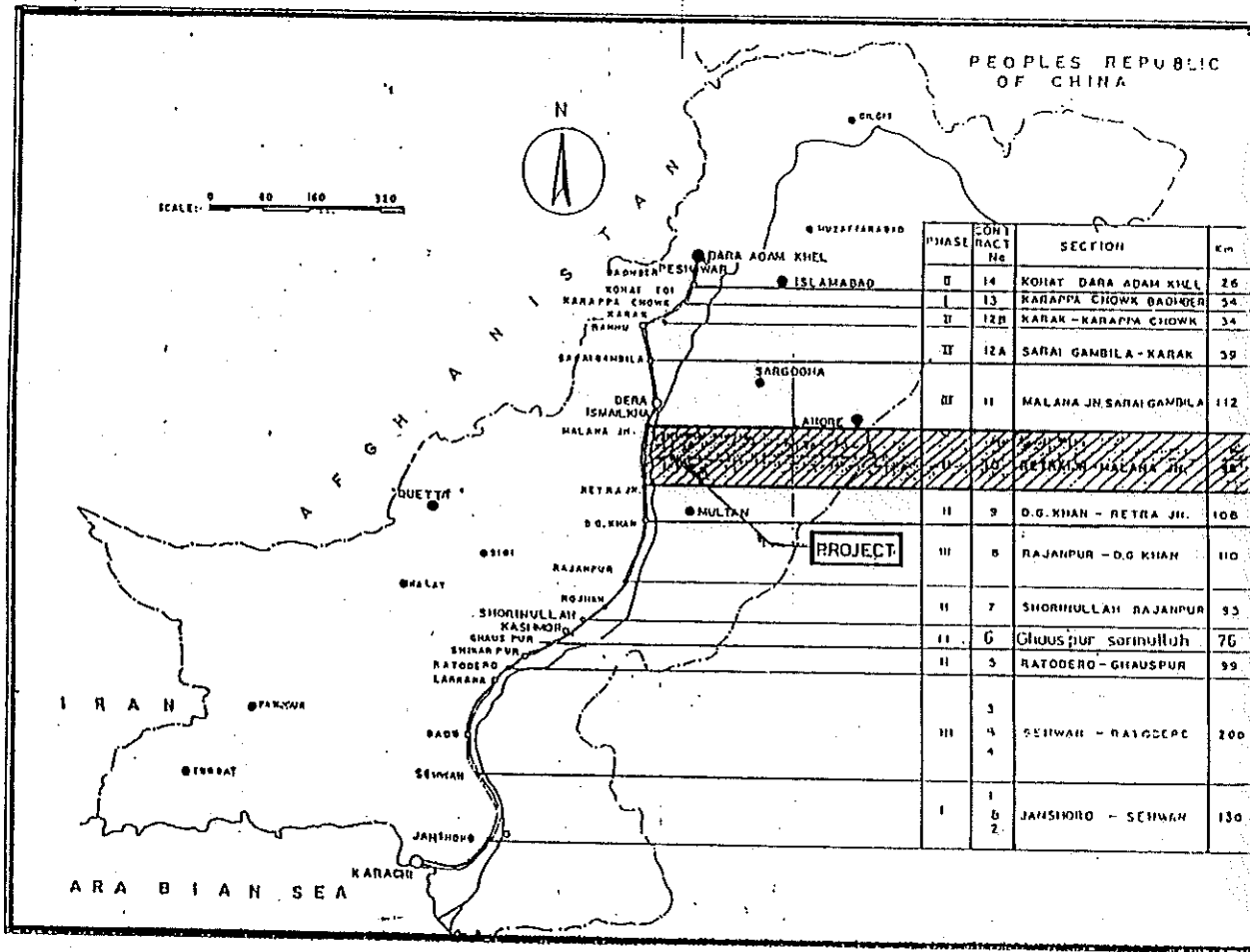


Figure -1

2 : Contract 10A of IHP

Contract 10A is the sub-contract of the contract-10 (Retra Junction - Malana Junction) of Indus Highway Project (IHP) carried out by National Highway Authority (NH). It consists of construction of four bridges over Chashma Right Bank Canal (CRBC) flood channels. A brief related to the contract 10-A is placed below: -

| | |
|---------------------|---|
| Name of the Project | Contract 10-A (4 CRBC Bridges) |
| Contract Amount | Rs.258, 750,000.00 |
| Client | National Highway Authority (NHA) |
| Funded by | O.E.C.F./J.B.I.C. |
| Ratio: | GOP 12% Agency Share 88% |
| Consultant | Pacific Consultants International & Engineering Associates |
| Contractor | M/s Hyundai Construction Co. Ltd. |
| Date of Award | 5-11-1999 |
| Date of Start | 27-2-2000 |
| Date of Completion | 30-05-2001 |
| Contract Duration | 15 Months (458 Days) |

The project is comprised of the construction of four bridges as per details in Table - 1.

Table - 1

| | BRIDGE NUMBER | | | |
|--------------------|----------------------|----------|----------|-----------------|
| | 1 | 2 | 3 | 4 |
| Name of the Bridge | Khad Warkai | Sherana | Ramak | J-Haibat Nullah |
| Chainage | 30 + 663 | 21 + 347 | 12 + 655 | 4 + 744 |
| No. of Spans | 5 | 4 | 3 | 3 |

Detail progress report of the project is placed at Annex-I.

3 : Objective of the Work

Ministry of Communications and Railways has asked National Transport Research Centre (NTRC) to carry out the quality checking of the construction work related to the contract 10-A of the IHP vide its letter No. 5(6)/87-Roads dated 2-12-2000 and requested a report in this regard. Letter is placed at Annex – I.

4 : Scope of the Work

The scope of the work consisted of the following activities: -

- a) Reconnaissance Survey
- b) Field observations, testing and materials sampling
- c) Laboratory testing and analysis of samples.
- d) Report writing

5 : Reconnaissance Survey

NTRC team carried out a reconnaissance survey of the project area on 5th January 2001. It includes a visual survey of the four under construction CBRC bridges the team inspected all parts of bridges in order to observe the general quality of work and workmanship. And also to assess the scale of the field sampling and testing to be carried out on the project. Photographs were obtained during survey to report the conditions at sites. Details of the reconnaissance survey are given in the following paras: -

5.1 **De-tours/Diversions:** At all the four locations of bridges, contractor has maintained good compacted diversions for traffic movement. Photograph-1 shows the condition of the diversion.

5.2 **Pre-Cast/Pre-Stressed Girders:** Nearly in all the four bridges, pre-stressed girders are already launched/placed at piers. A visual inspection of these girders reveals that in few girders, bottom were repaired using cement slurry and also few girders were chamfered using chisel at bottom. Photograph 2 - 6 presents the workmanship of the girders.

5.3 **Deck Slabs:** The team also inspected deck slabs. Generally the work was found appropriate however, at few locations, cleaning/removal of foam is needed. Photographs 7 - 9 shows the condition of deck slabs from bottom.

5.4. **Expansion Joints:** Expansion joints at nearly all locations were found disturbed and needs attention for repair and proper placing/straightening of steel. Photographs 10 - 13 show the prevailing condition of expansion joints.

5.5. **Piers/Abutments:** Other super structure elements of bridge such as piers and abutments were also inspected visually and generally found in good condition without any bulging or other defect. Photograph 14 - 18 shows the condition and workmanship of these elements.

5.6 **Barriers:** The construction of barrier is also started at two bridges. In place steel plates foamwork has been used to cast the barriers. Generally, the workmanship in this element is not at par and needs improvement. Photograph 19 shows the parapet walls at one bridge.

6 : Field Testing & Sampling

On the basis of reconnaissance survey, a detail plan was developed for the field testing and materials sampling.

6.1 **Drilled Cores:** In order to obtain the assessment about the quality of already poured concrete, two deck slabs from bridge No. 1 and 4 were randomly selected by the team. Three locations at each deck slab were marked for obtaining the concrete cores as per AASHTO method T-24-86. Location plan of the cores drilled is placed at **Figure-2** and **Figure-3**. Cylindrical core specimens were removed by drilling downward perpendicular to the horizontal surface. Six cores drilled were duly marked and secured for laboratory testing.

6.2 **Fresh Concrete Sampling:** In order to check the quality and the placement of fresh cement concrete, team inspected the mixing and pouring of concrete on 5-01-2001 and 8-1-2001 at Bridge-1 and Bridge-3. Samples in cylinders were obtained from these locations for 28 days compressive strength. Details of samples are given in following table: -

Table - 2

| S.No | Location | Concrete | Pouring Date | No. of Cylinders |
|------|--|----------|--------------|------------------|
| 1 | Bridge No. 1, Span No. 2 L/S Barriers | A-1 | 5-1-2001 | 06 |
| 2 | Bridge No. 3, Span No. 2 Dia Phram No.1&2 | A-1 | 8-1-2001 | 06 |

LOCATION PLAN OF CONCRETE CORE OF DECK SLAB No.3 AT BRIDGE No.1,

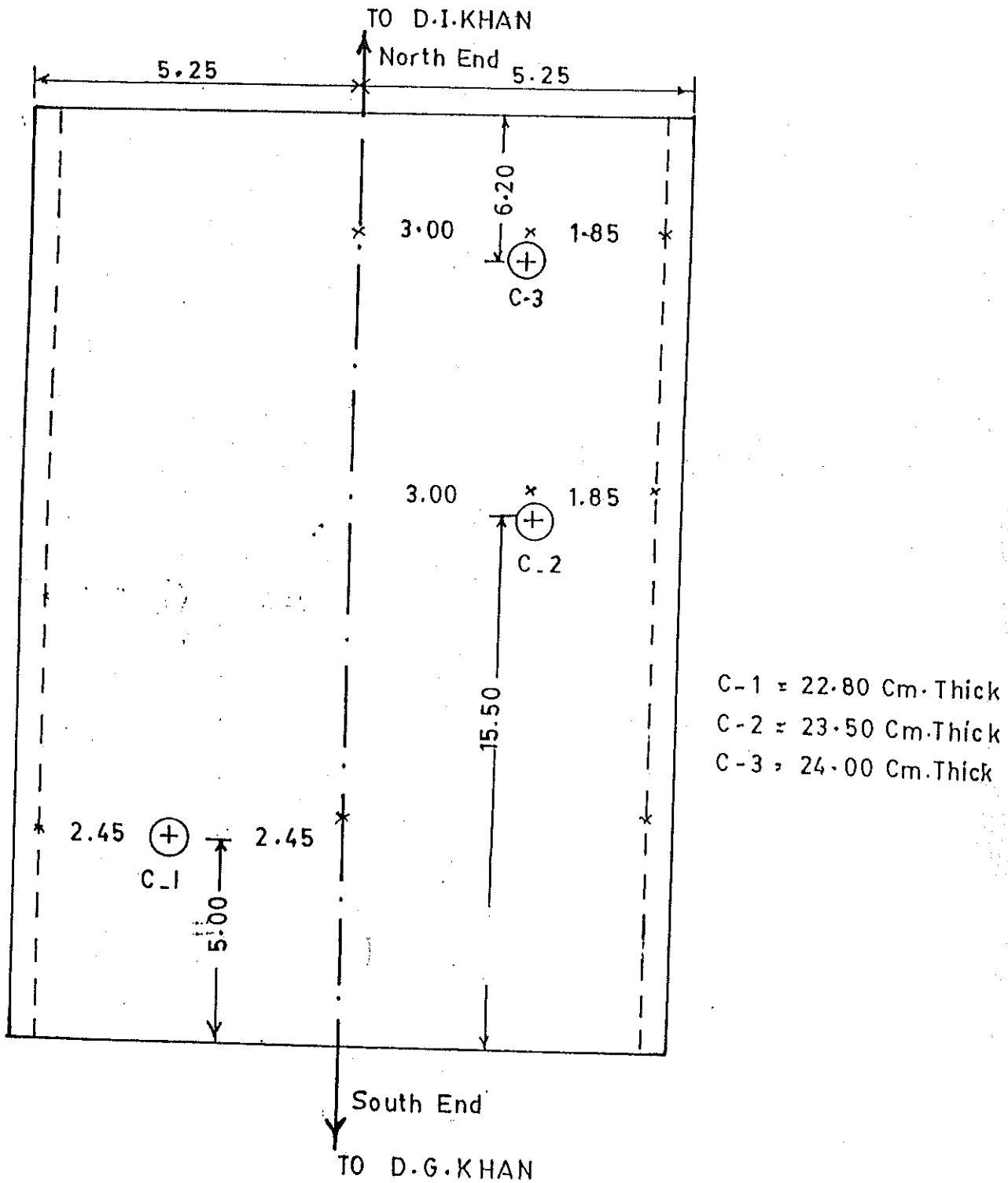
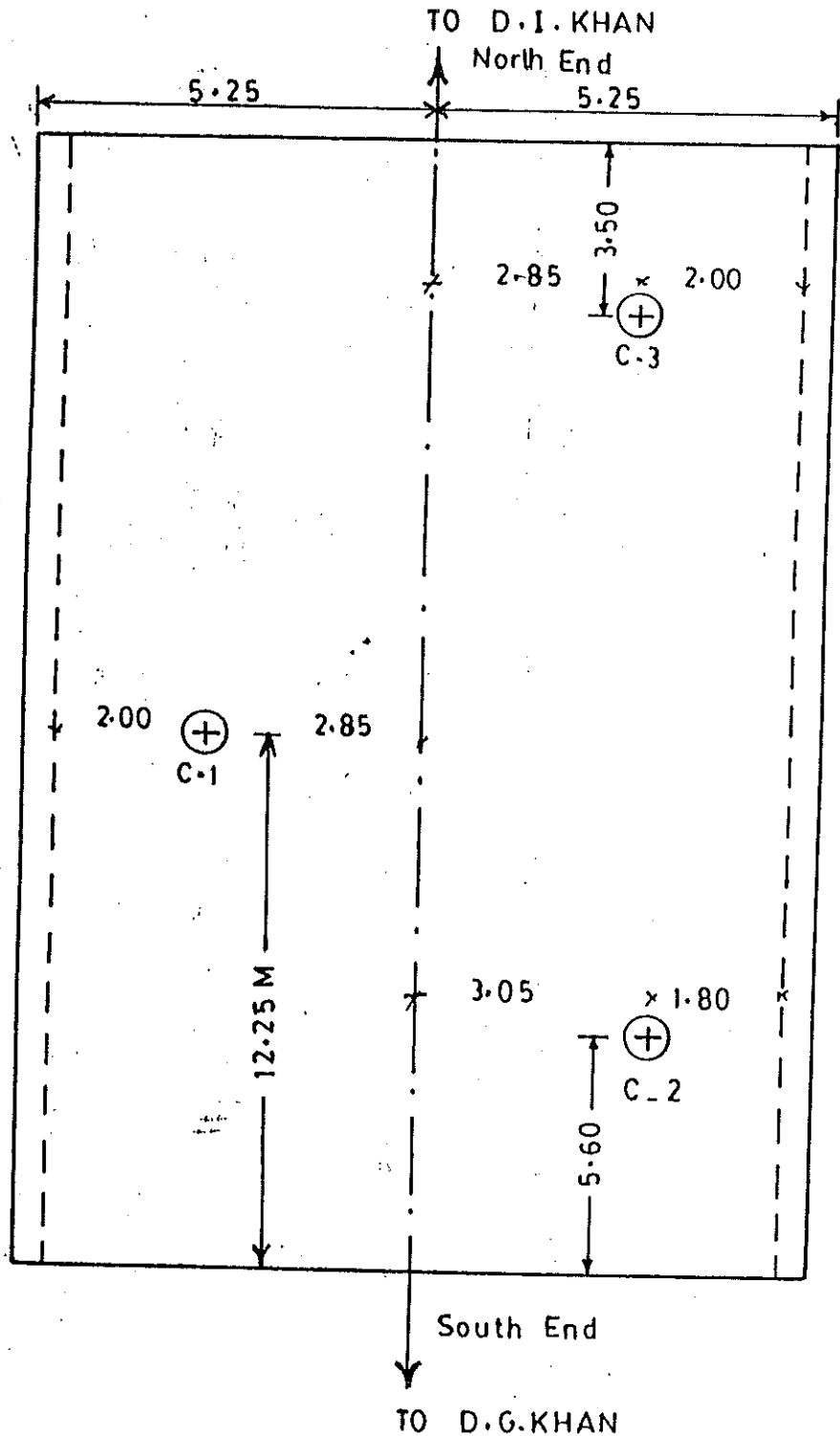


Figure - 2

LOCATION PLAN OF CONCRETE CORE OF DECK SLAB No.2 AT BRIDGE No: 4, km 4 + 744.45



- C-1 = 22.80 Cm Thick
- C-2 = 23.50 Cm Thick
- C-3 = 24.00 Cm Thick

Figure - 3

The concrete pouring slip of the contractor M/s Hyundai is placed at Annex-I for record. Also photographs 20 - 23 show the concrete pouring and sampling activities at the site.

6.3 **Steel Bars Sampling:** In order to sample the steel bars an expansion joint in Bridge No.1 was selected randomly. Sample was collected by cutting the 20mm diameter steel bar in the expansion joint using steel cutter. Photographs 24 - 25 show the steel sample procurement from expansion joint. Second steel bar sample was collected from the steel stock yard of the contractor M/s Hyundai. Photograph 26 - 27 show the steel stock yard.

6.4 **Aggregate Sampling:** Coarse and fine aggregates were sampled from the stock piles of the batching plant of contractor. Separate samples for 3/4 " down and 3/8" down aggregates alongwith sand were collected in plastic bags and safely placed under the team custody for onwards testing in NTRC laboratories.

7: **Laboratory Testing**

Standard tests on the concrete cores, sampled concrete, steel bars and aggregate samples were carried out in the following manner.

7.1 **Testing of Concrete Cores:** The concrete core specimens brought from the project were sawed into pieces of required size in NTRC laboratory. In order to keep a length/diameter (l/d) ratio between

the prescribed limits of 1.00 to 2.1 and to separate the steel embedded portion from the samples to be tested for compressive strength.

Diameter and length of each specimen were measured after the cutting in accordance with the provision of AASHTO T-148. Bulk specific gravity of each core was determined. Laboratory test results are placed at Annex - II. Table-3 provides the summary.

Table - 3

| Core No | Bridge No | Deck Slab | Pouring Date | Actual Length (cms) | Effective Length (cms) | Diameter (cms) | L/D | Area (Sq. cms) | Bulk Specific Gravity |
|---------|-----------|-----------|--------------|---------------------|------------------------|----------------|------|----------------|-----------------------|
| C-1 | 01 | 03 | 05-12-00 | 23.4 | 10.41 | 8.25 | 1.26 | 53.46 | 2.340 |
| C-2 | 01 | 03 | 05-12-00 | 22.4 | 13.34 | 8.23 | 1.62 | 53.20 | 2.337 |
| C-3 | 01 | 03 | 05-12-00 | 23.1 | 8.39 | 8.23 | 1.01 | 53.20 | 2.341 |
| C-1 | 04 | 02 | 23-11-00 | 22.8 | 16.26 | 8.29 | 1.96 | 53.97 | 2.347 |
| C-2 | 04 | 02 | 23-11-00 | 23.5 | 12.93 | 8.28 | 1.56 | 53.84 | 2.355 |
| C-3 | 04 | 02 | 23-11-00 | 24.0 | 9.17 | 8.25 | 1.11 | 53.45 | 2.355 |

The prepared specimens were cured for 48 hours in the laboratory at 25⁰ C using lime water, prior checking for compressive strength. Cores were duly capped in conformation with AASHTO T-231 specifications. After performing all necessary tests the cores were tested for compressive strength as per standard specifications. Laboratory test results are placed at Annex - II. Table-4 shows the summary of results.

Table - 4

| Core No | Bridge No | Deck Slab | Effective Length (cms) | Diameter (cms) | L/D | Area (Sq. cms) | Axial Load (KN) | Corrected Compressive Strength (kg/sq. cm) |
|---------|-----------|-----------|------------------------|----------------|------|----------------|-----------------|--|
| C-1 | 01 | 03 | 10.41 | 8.25 | 1.26 | 53.46 | 124 | 220 |
| C-2 | 01 | 03 | 13.34 | 8.23 | 1.62 | 53.20 | 128 | 237 |
| C-3 | 01 | 03 | 8.39 | 8.23 | 1.01 | 53.20 | 166 | 276 |
| C-1 | 04 | 02 | 16.26 | 8.29 | 1.96 | 53.97 | 162 | 309 |
| C-2 | 04 | 02 | 12.93 | 8.28 | 1.56 | 53.84 | 138 | 238 |
| C-3 | 04 | 02 | 9.17 | 8.25 | 1.11 | 53.45 | 146 | 242 |

7.2 Testing of Concrete Cylinders: Concrete sampled in standard six inches diameter cylindrical moulds from Bridge No.1 and Bridge No.3 on 05-01-2001 and 08-01-2001 respectively were checked for 28 days compressive strength on 12-02-2001. Samples were properly cured and capped. Laboratory test results are placed at Annex - II. Table - 5 presents the summary.

Table - 5

| Cylinder No | Bridge No | Location | Casting Date | Testing Date | Crushing Strength (kg/sq.cm) |
|-------------|-----------|-------------------------------|--------------|--------------|------------------------------|
| A | 01 | Barrier left side Span # 2 | 05-01-01 | 12-02-01 | 268 |
| B | 01 | - do - | 05-01-01 | 12-02-01 | 313 |
| C | 01 | - do - | 05-01-01 | 12-02-01 | 229 |
| D | 03 | Diaphragms # 1&2 Span # 2 | 08-01-01 | 12-02-01 | 268 |
| E | 03 | - do - | 08-01-01 | 12-02-01 | 324 |
| F | 03 | - do - | 08-01-01 | 12-02-01 | 296 |

7.3 Testing of Steel Bars: The billet deformed steel bars sampled from the project were checked in accordance with AASHTO M-31-89 and NHA's specifications. The bars were found free from rust, seams and surface irregularities. Laboratory test result is placed at Annex - II. Table - 6 shows the required standard size (diameter), measured size, and weight per running foot of sampled bars with yield and tensile strength of deformed bars.

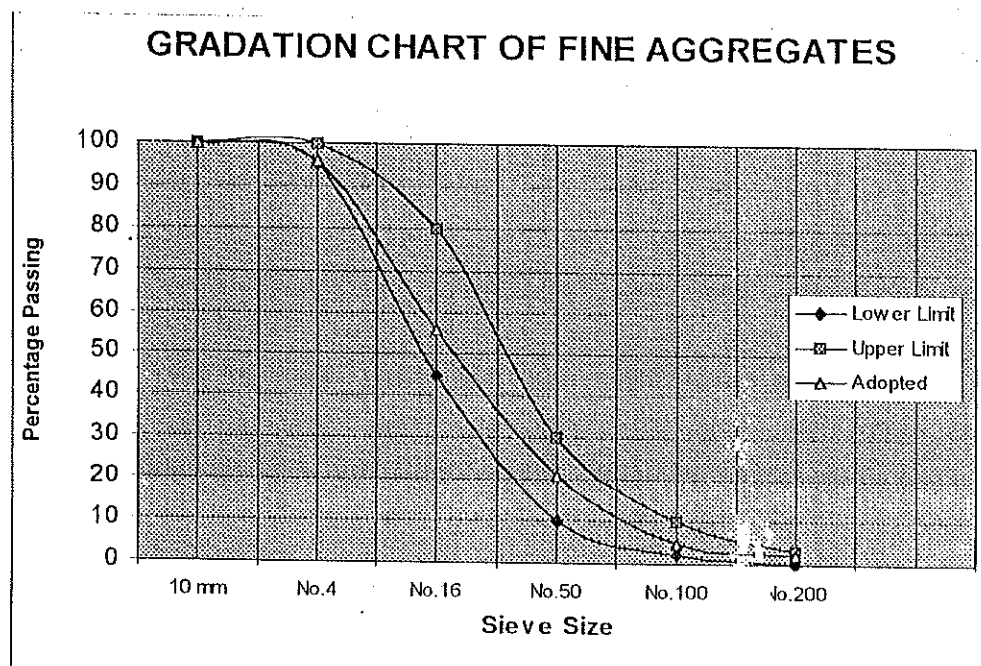
Table - 6

| Sr.No. | Diameter | | Weight (lb/ft) | Area (sq.inch) | Yield Strength (ksi) | Ultimate Tensile Strength (ksi) |
|--------|---------------|--------------|----------------|----------------|----------------------|---------------------------------|
| | Normal (inch) | Exact (inch) | | | | |
| 1 | 3/4 | 0.792 | 1.674 | 0.492 | 69.476 | 98.979 |
| 2 | 3/4 | 0.788 | 1.659 | 0.488 | 79.823 | 110.852 |

7.4 Testing of Aggregates Samples: The cement concrete mix used for construction of abutments, deck slabs, diaphragms and barriers in bridges was designated as concrete class A-1 by consultants. Mix was derived using ordinary Portland cement from D.G cement factory. While, aggregates from Chashma and sand from Pezu quarry were used. Two bins of aggregates used for the concrete are designated as coarse (3/4 inch down) and fine (3/8 inch down). Their proportion by weight used in the mix is 60:40.

Fine aggregates (3/8 inch down) were tested in accordance with AASHTO designation T-11 and T-27 for grading requirements. Result is shown graphically at figure - 4.

Figure - 4

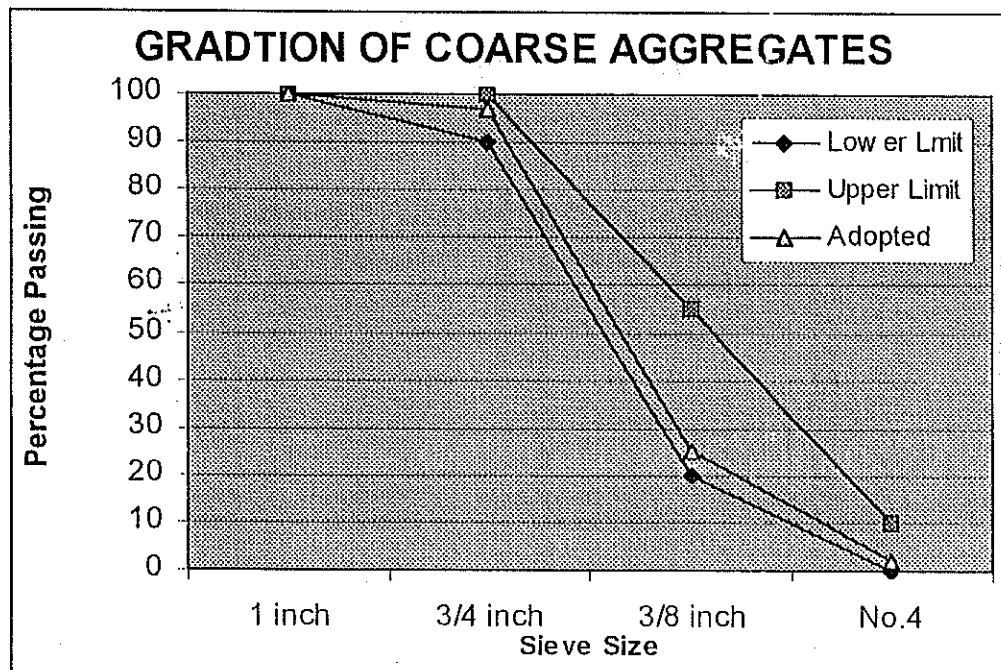


Coarse aggregates (3/4 inch down) were tested in accordance with AASHTO designation T-11 and T-27 for grading requirements. Result is placed at Table - 7 and shown graphically at figure - 4.

Table - 7

| Sieve Size | Percentage Passing | | |
|------------|--------------------|-------------|------|
| | Upper Limit | Lower Limit | Used |
| 1 inch | 100 | 100 | 100 |
| 3/4 inch | 90 | 100 | 97 |
| 1/2 inch | - | - | 37 |
| 3/8 inch | 20 | 55 | 23 |
| No.4 | 0 | 10 | 2 |

Figure - 5



8: Analysis of Results and Conclusions

8.1 **Surface Finishing:** The visual survey of bridge components by NTRC team, revealed that:

- i) The surface finishing of the bottom of the deck slabs and other elements of super structure such as piers and abutments were generally in good condition.
- ii) In few pre-cast/ pre-stressed girders the workmanship was not as per specifications. The surface finish obtained at the bottom of girders and chamfers was much below the desired smooth finishing levels. Even the surface finishing obtained after repair did not produce the required results. The reason for such fault is that the platform used for the casting of girders was not properly leveled.
- iii) The finishing surface obtained on barriers was not of required standards. The surface obtained was not of uniform texture and appearance. Also air bubbles on surface were excessively appeared.

8.2 **Drilled Cores from Deck Slabs:** The laboratory tests results (AASHTO designation T-148, T-85, T-24) of the concrete cores drilled from two deck slabs revealed that:

- i) The deck slabs thickness measured from drilled cores were found as per requirement.
- ii) 28 days compressive strength (Cylindrical) in all samples was found above the minimum required strength of 210 kg/sq.cms.

iii) Similarly, the densities of concrete in six sampled cores were found between 2.337 to 2.355 gms/cc against minimum requirement of 2.300 gms/cc.

8.3 Concrete and Aggregates Samples: Laboratory tests on the concrete and aggregates samples show:

i) The cylindrical samples of concrete (Type A-1) sampled from project were tested for 28-days compressive strength and found with more than 210 kg/sq.cms.

ii) The gradation tests (AASHTO designation T-11 & T-27) carried on fine and coarse aggregates were found within the NHA's specifications.

iii) The Los Angeles Abrasion Value for coarse aggregates was found as 27% against the requirement of not more than 40%.

8.4 Job Mix Design: The analysis of the cement concrete mix design adopted for type A-1 concrete on the project reveals that:

i) The mix fulfills the minimum requirement of cement content (300 kg/cubic meter), maximum Coarse Aggregate Size (20 mm), water-cement ratio (Maximum Permissible 0.58) and the minimum compressive strength (210 kg/sq.cms) as per NHA's specifications.

ii) However, the consistency requirement of the concrete (AASHTO designation T-119) was found out side the specifications. Against the slump requirement of 25-75 mm for vibrated concrete a value of 150 mm was found at site. The

matter was enquired from Chief Resident Engineer IHP, who informed that he had allowed slump of 150 mm after the addition of admixture.

8.5 **Steel Testing:** The billet deformed bars grade 60 for reinforcement sampled from the project were tested in laboratory (AASHTO M-31).

- i) Weight per running meter of 20 mm diameter bars were found to be 2.491 and 2.469 kg/m against the requirement of 2.466 kg/m.
- ii) The Yield Strength of two sampled steel bars was found as 69 and 79 ksi against the required value of 60 ksi. The Ultimate Tensile strength of sampled steel bars was found as 99 and 111 ksi against the requirement of 90 ksi.

9: Recommendations

The surface finishing of the barriers and the bottom of girders chamfer should be brought to the desired class one surface finish levels by rendering as per the requirement of NHA's specifications.

PHOTOGRAPHS

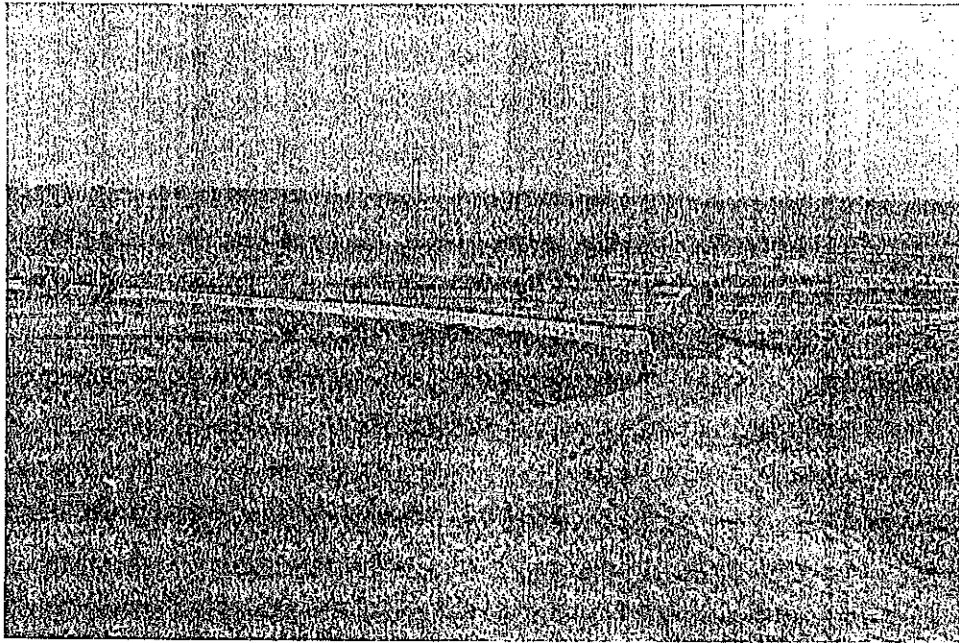


Photo - 1 View of good maintained diversion for traffic at Bridge # 2

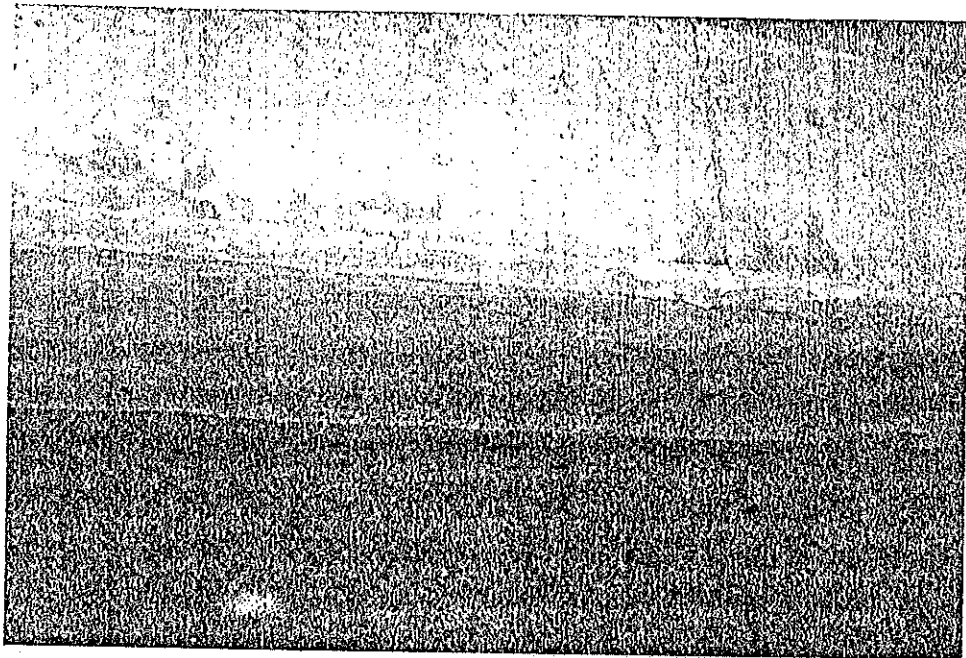


Photo - 2 Cement Slurry duly applied at bottom of pre-cast girder



Photo - 3 Another view of cement slurry treated girder



Photo - 4 View of girder chisled out at bottom

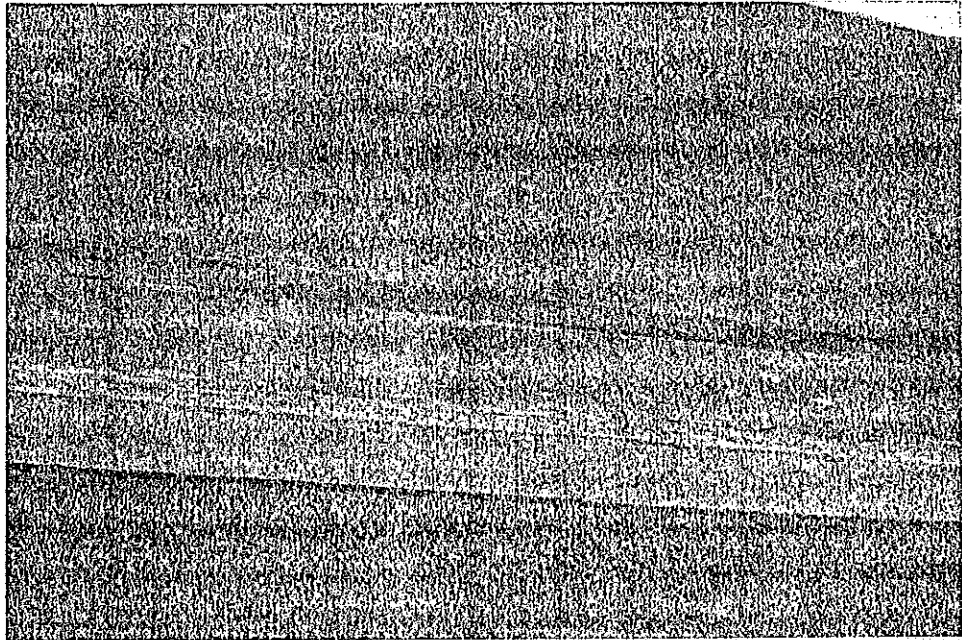


Photo - 5 Another view of pre-cast and pre-stressed girder

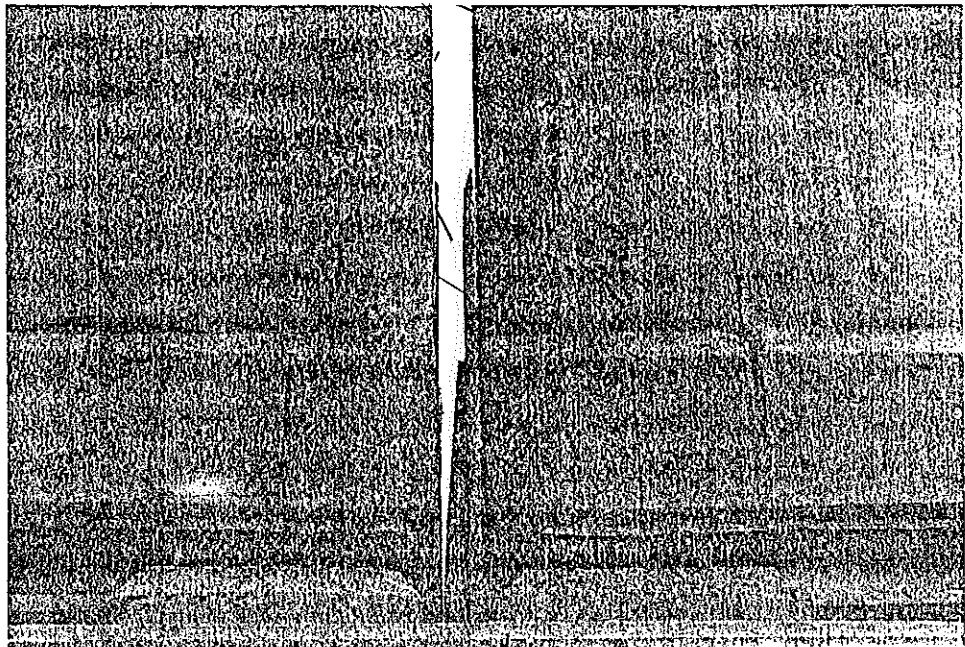


Photo - 6 Bearing pads placed at bottom of girders

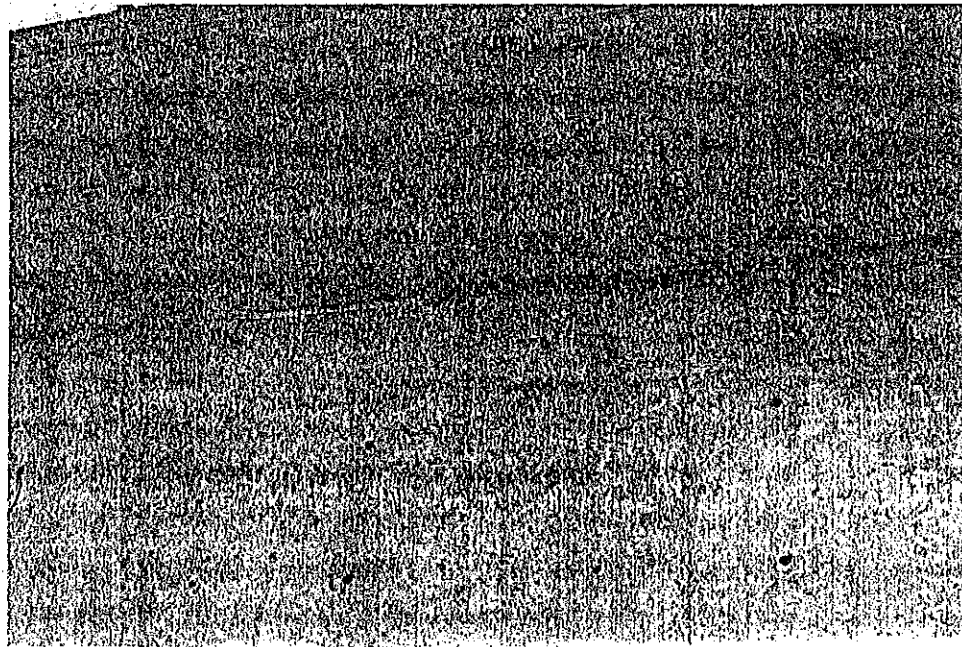


Photo - 7 View of deck slab from bottom it needs cleaning

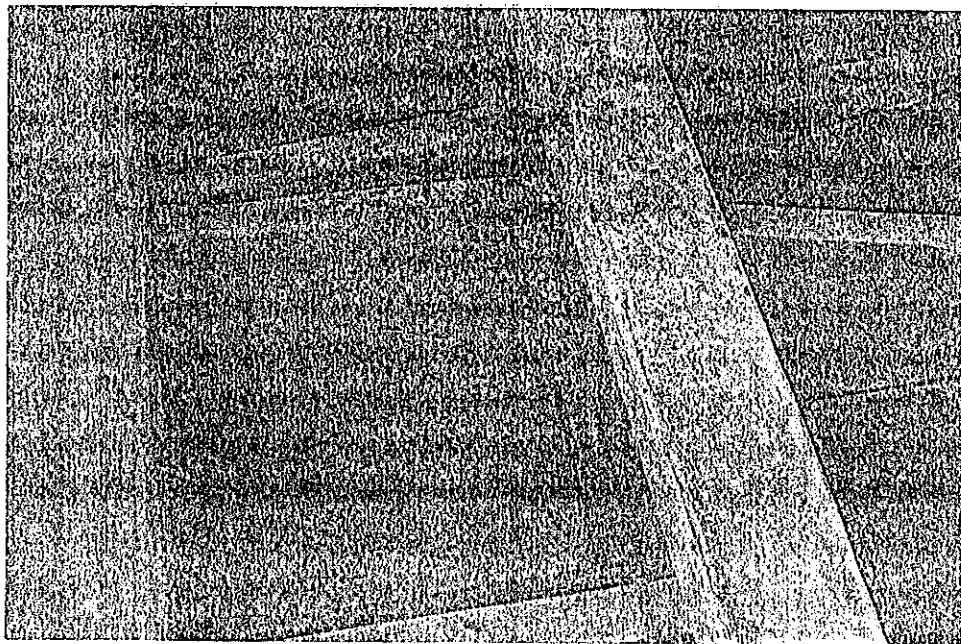


Photo - 8 Another view of deck slab

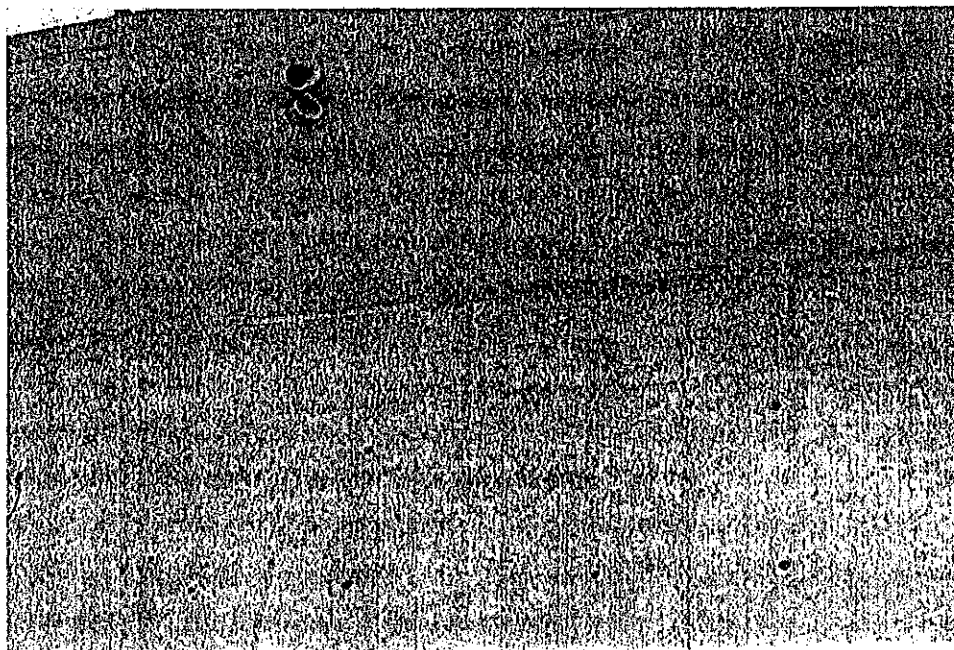


Photo - 7 View of deck slab from bottom it needs cleaning

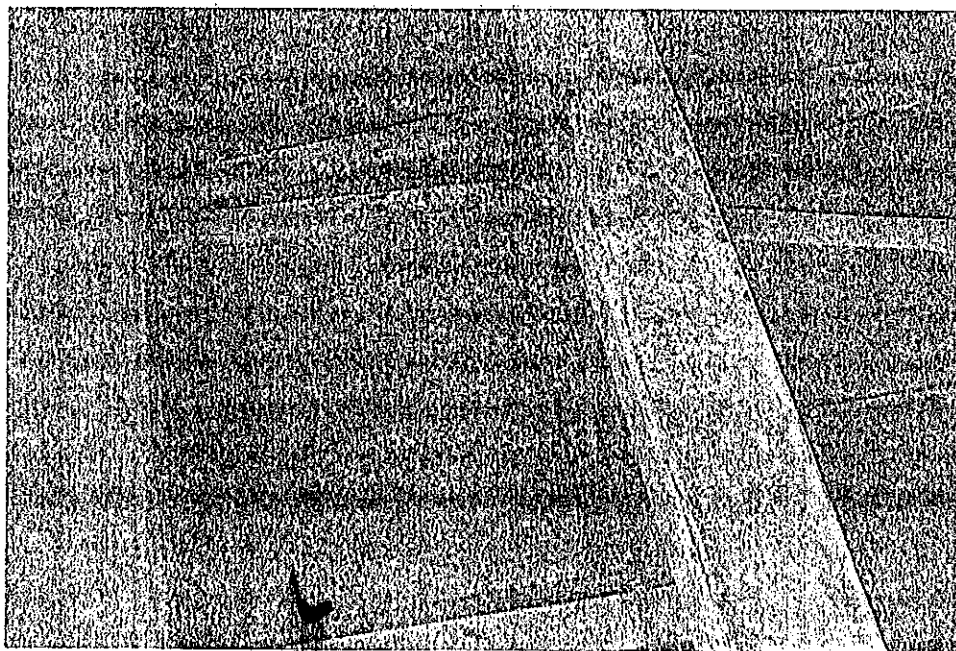


Photo - 8 Another view of deck slab

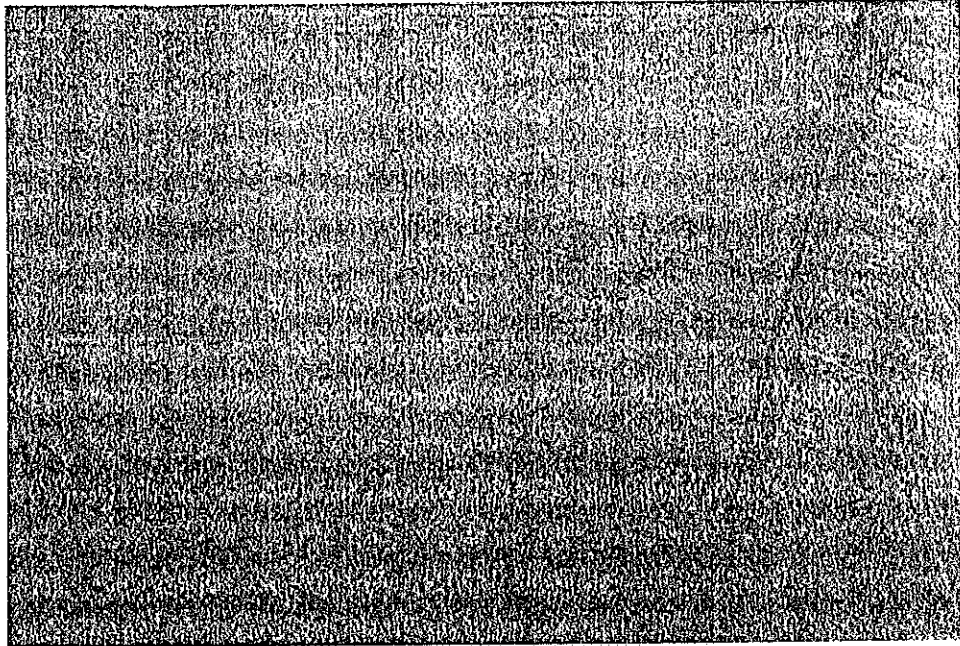


Photo - 9 Close view of deck slab from bottom

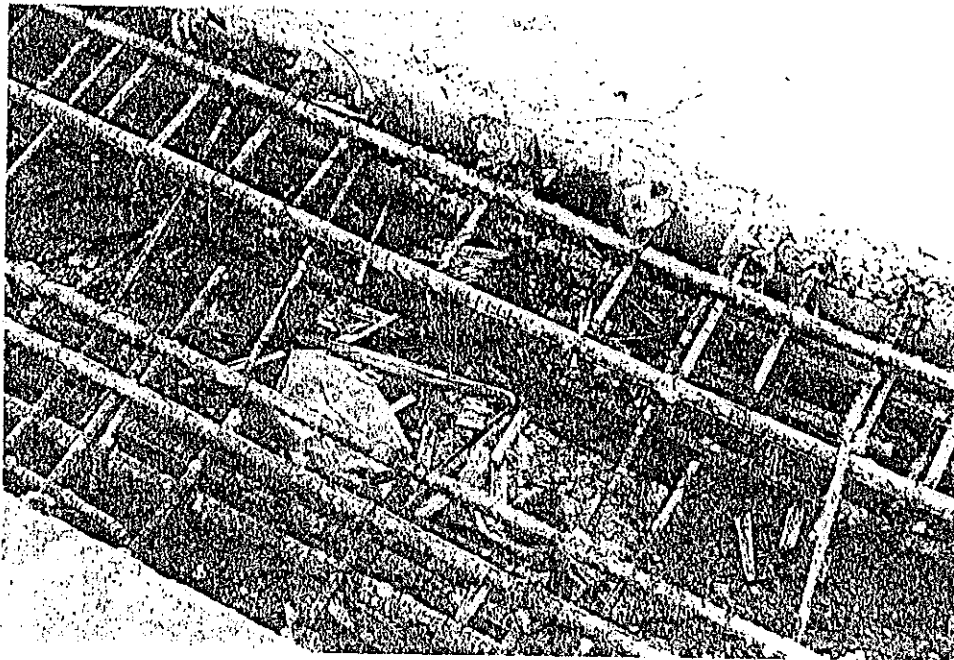


Photo - 10 View of expansion joint at Bridge # 1 needs cleaning and repairs

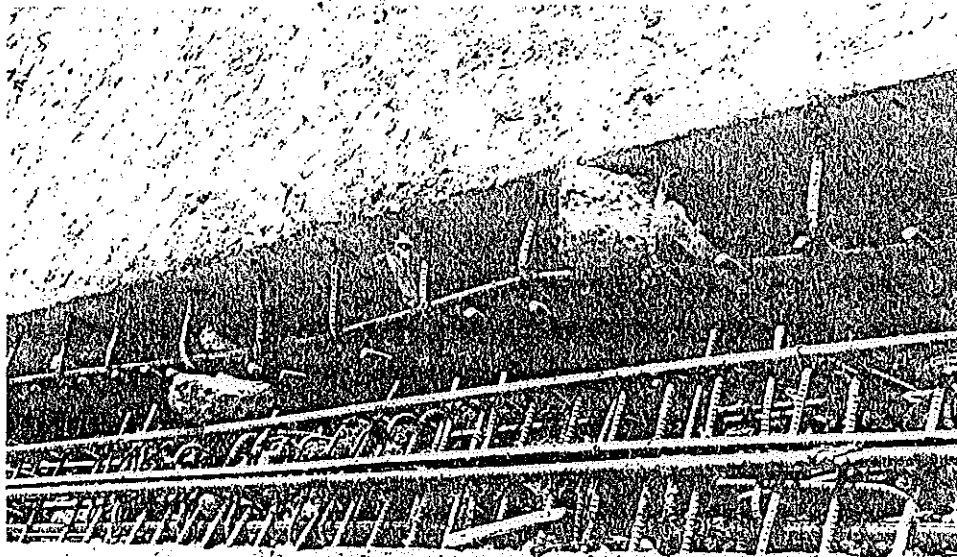


Photo - 11 Another view of expansion joint

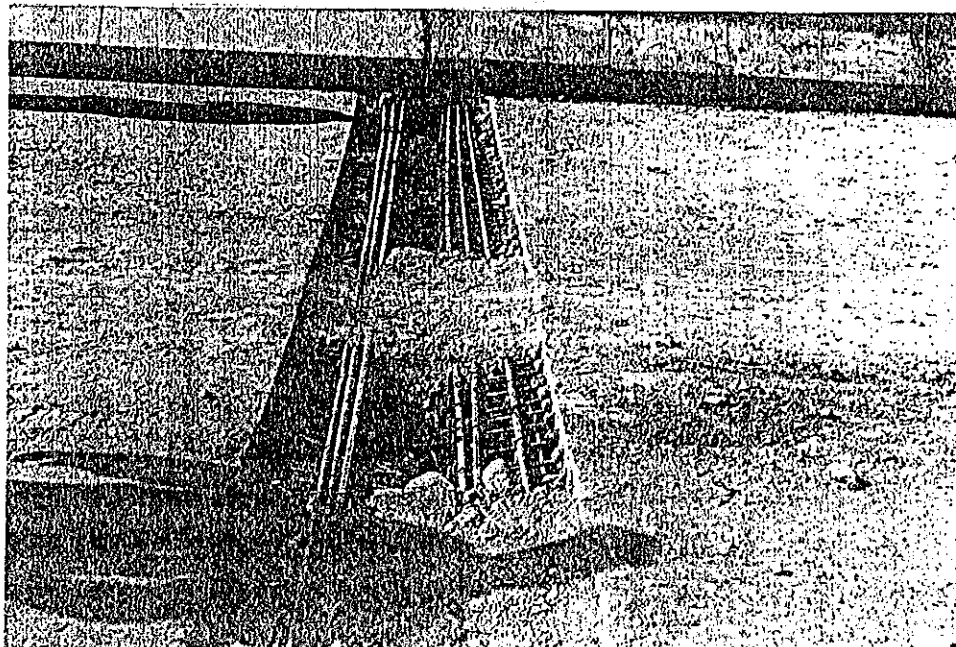


Photo - 12 View of expansion joint steel damaged due to movement of traffic

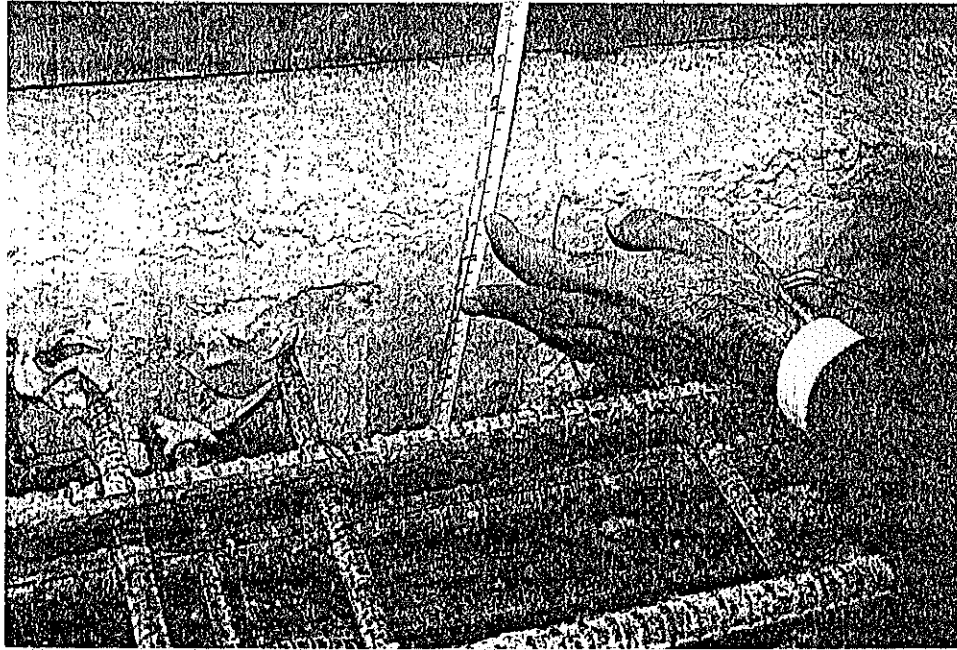


Photo - 13 Confirmation of thickness of deck slab from joint

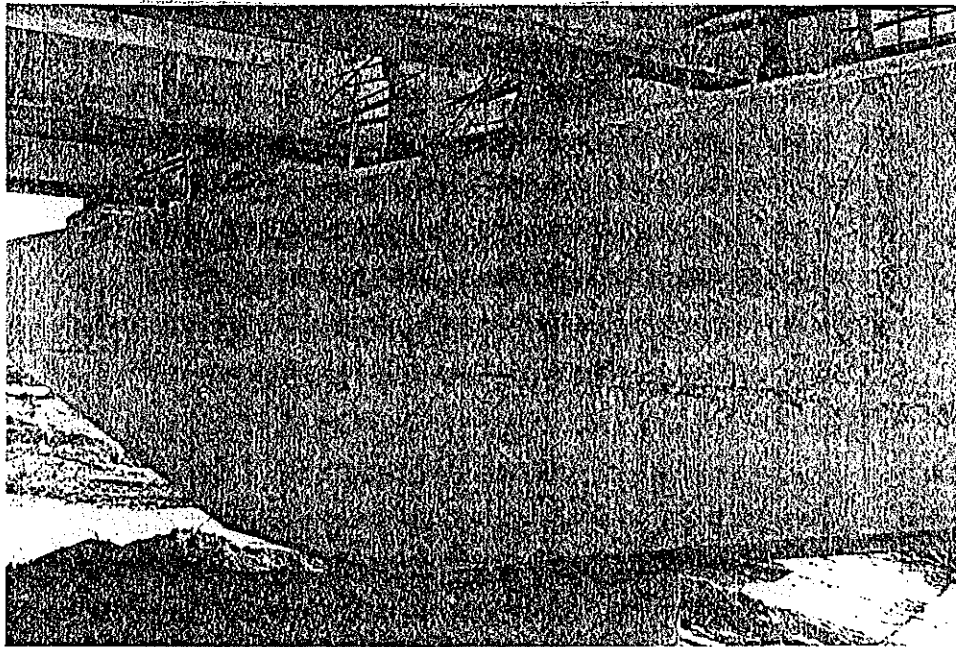


Photo - 14 View of pier cap in good form

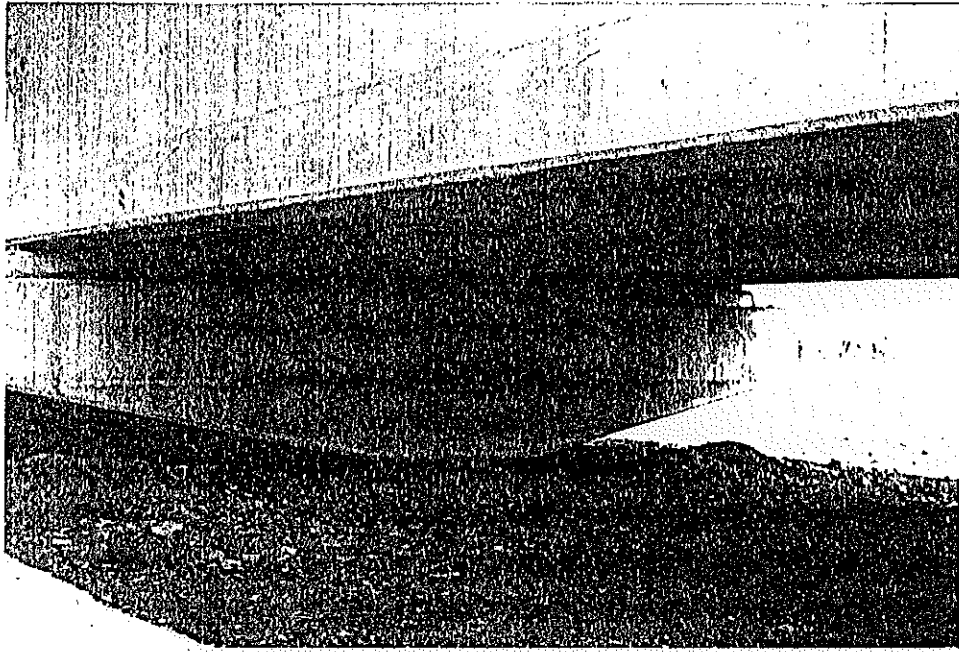


Photo - 15 Another view of pier cap

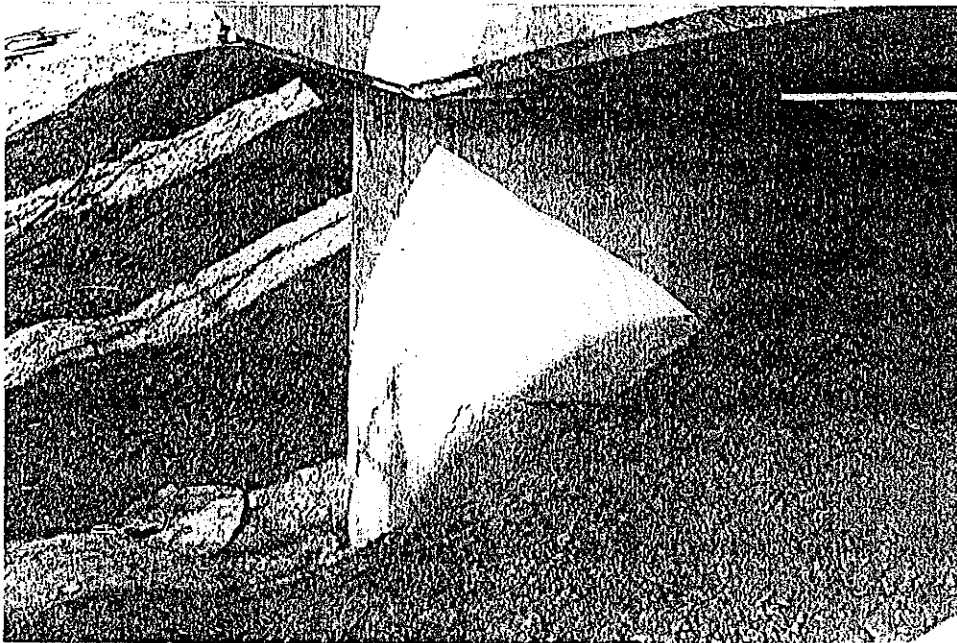


Photo - 16 View of pier length extended due to change in water board

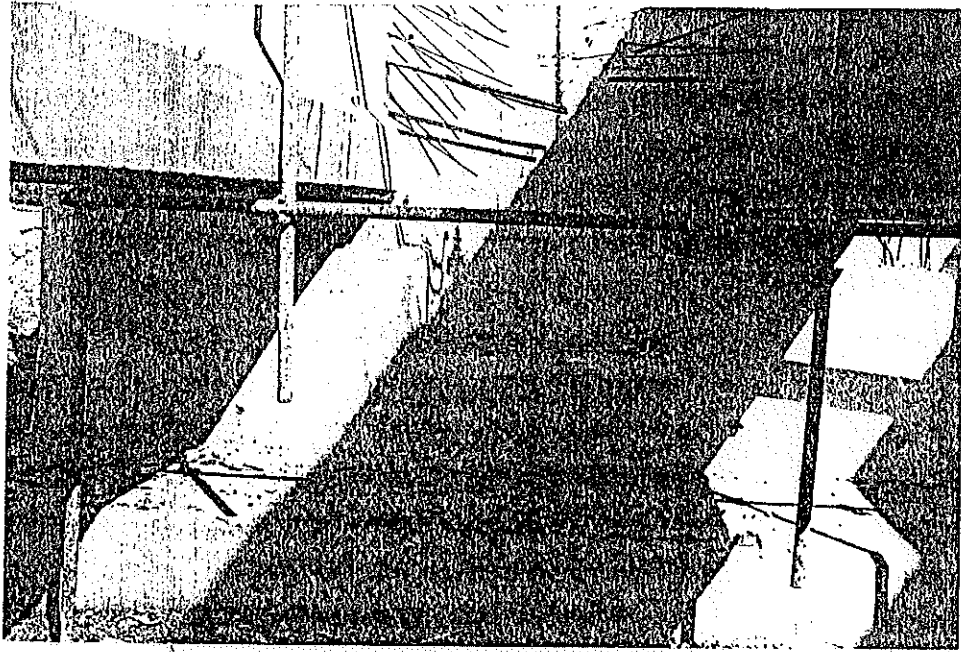


Photo - 17 View of Abutment in good form

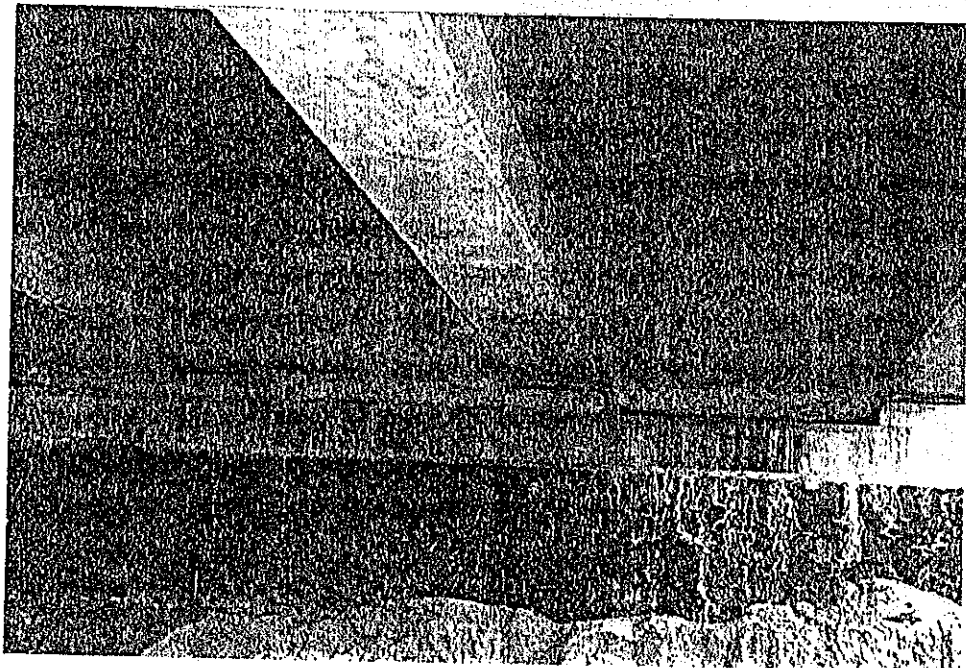


Photo - 18 Another view of bridge abutment in good form

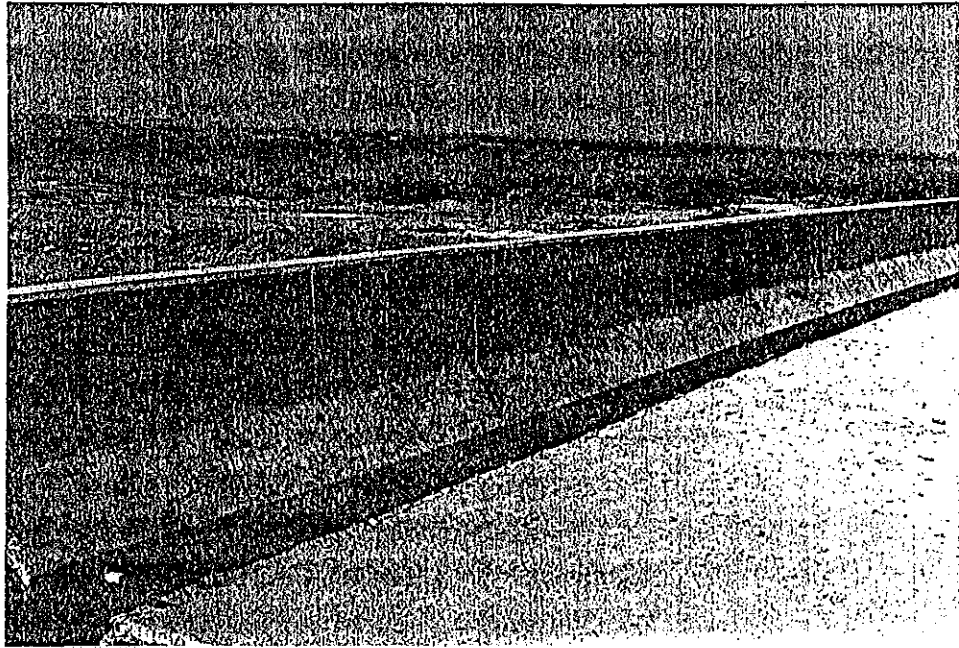


Photo - 19 View of bridge barrier needs improvement

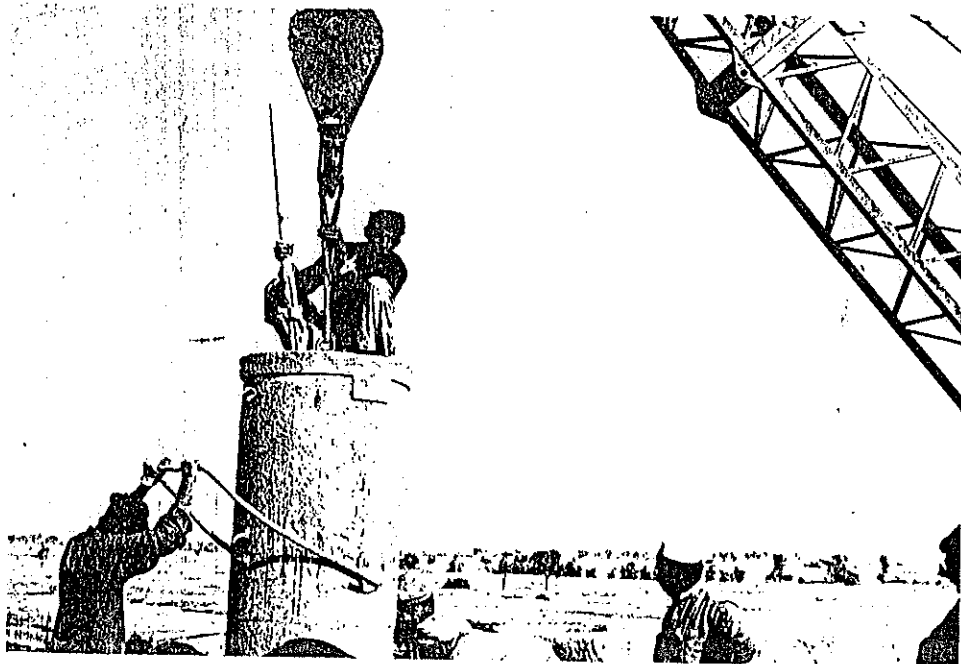


Photo - 20 Concrete poured using bucket and crane

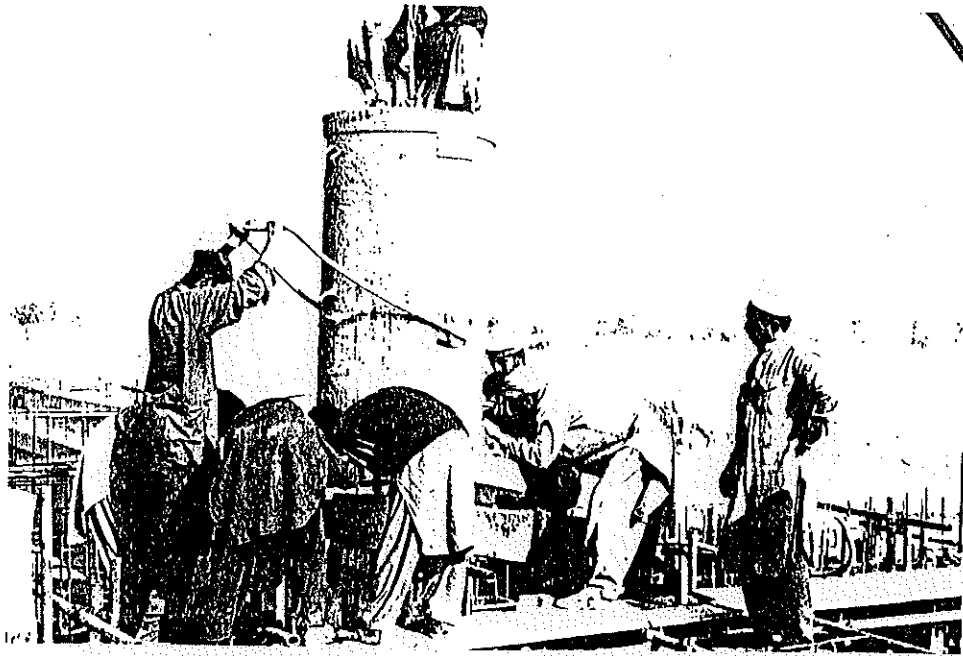


Photo - 21 Concrete is being poured in Diaphragms

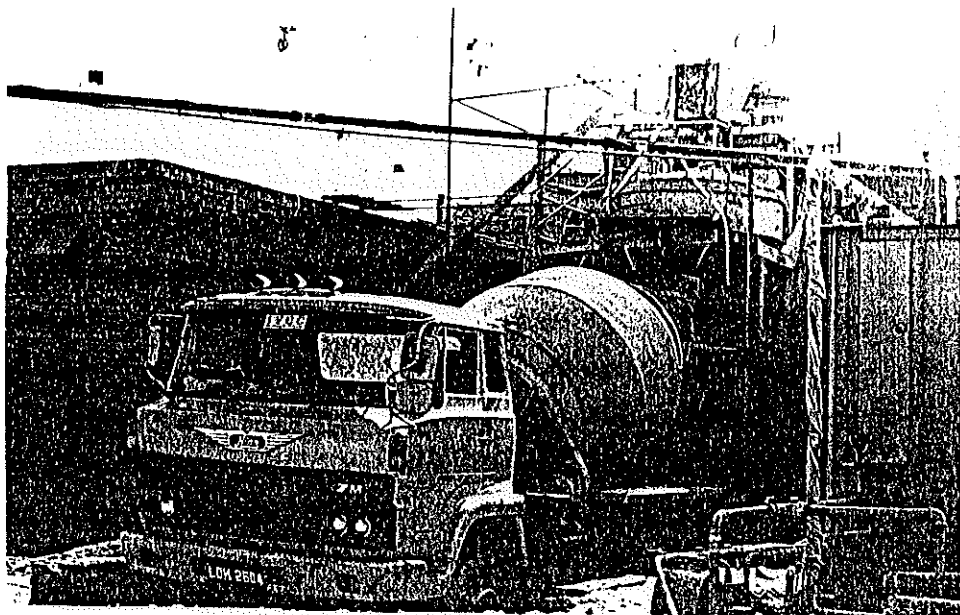


Photo - 22 Concrete mixing and batching plant at the Project



Photo - 23 Concrete being sampled from project by NTRC technicians

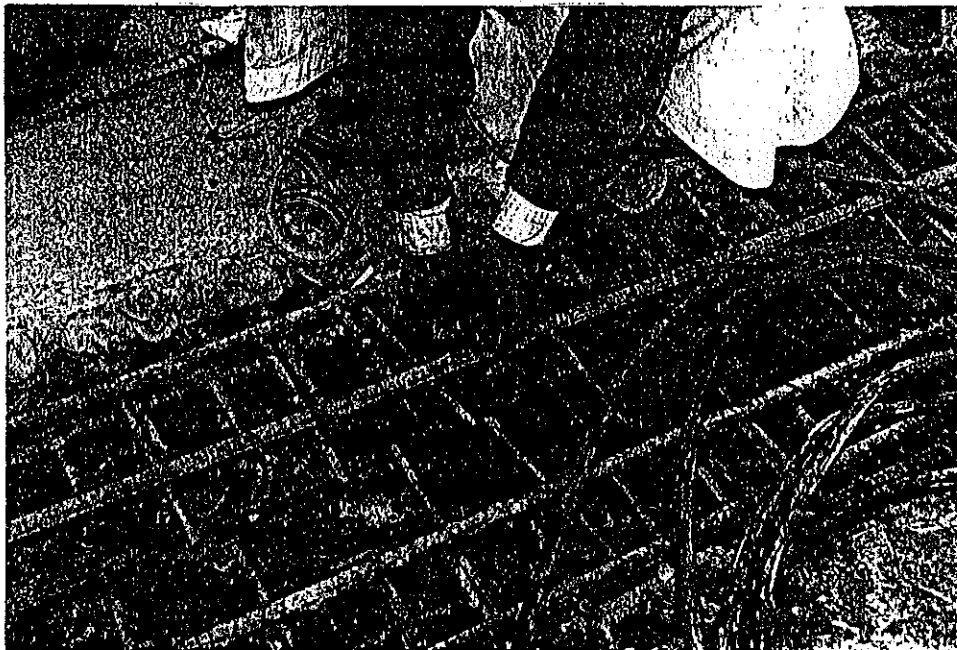


Photo - 24 Steel bar is being sampled from expansion joint



Photo - 25 Sampled steel bar is being cutting using cutter

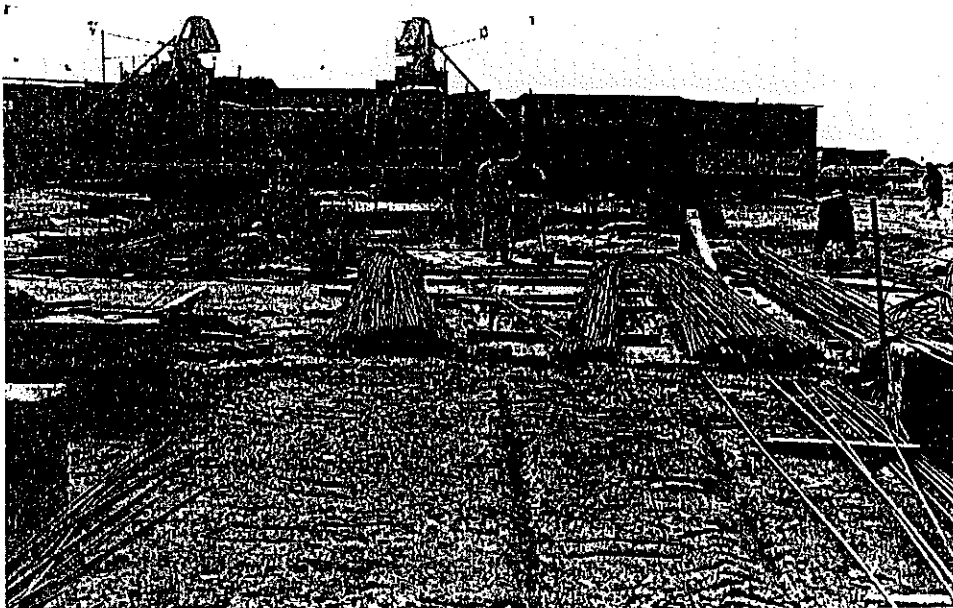


Photo - 26 Contractor's steel stock yard

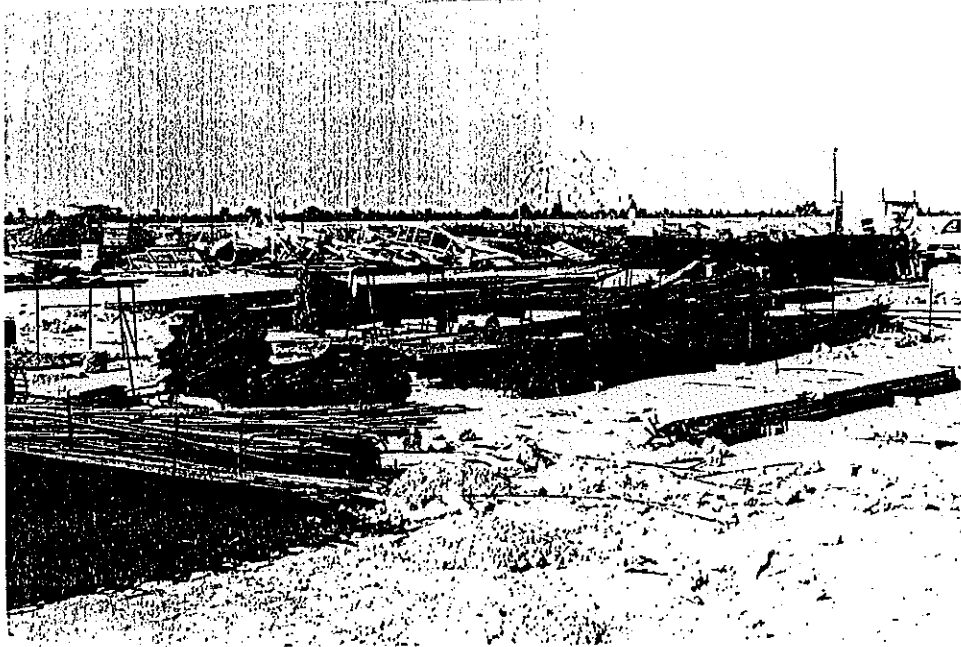


Photo - 27 Another view of steel stock yard

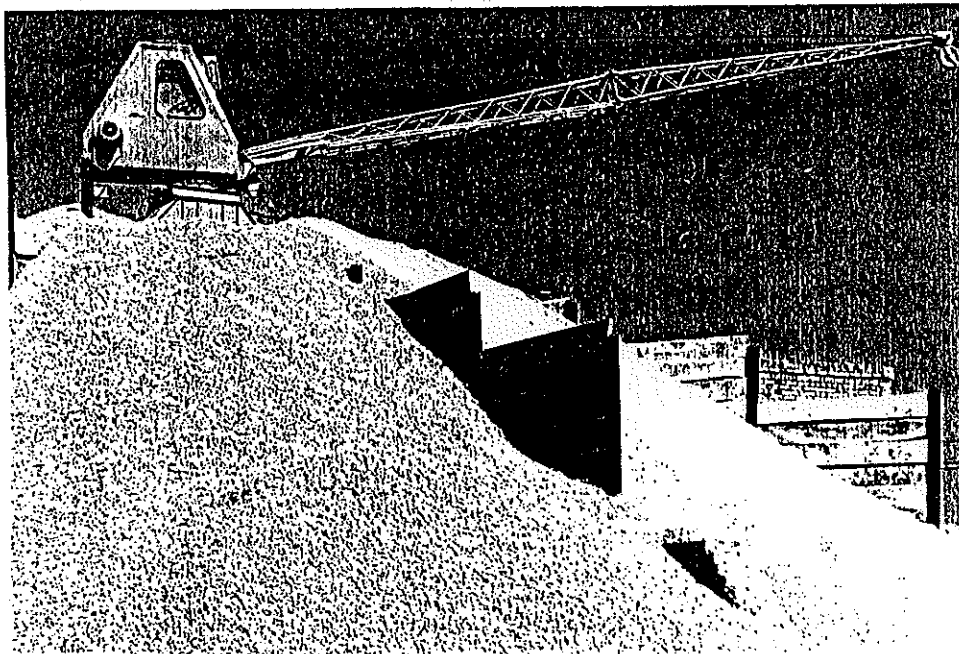


Photo - 28 Aggregates stock piles used for at batching plant

ANNEX - I



**NATIONAL HIGHWAY AUTHORITY
ISLAMABAD**

**INDUS HIGHWAY (N-55) PROJECT
CONTRACT-10/10A
(RETRA JUNCTION TO MALANA JUNCTION)**

PROJECT BRIEF



PACIFIC CONSULTANTS INTERNATIONAL
in Association with
ENGINEERING ASSOCIATES

CONTRACT – 10-A
4 CRBC BRIDGES
(M/S HYUNDAI)

4 CRBC BRIDGES PROJECT
CONTRACT INFORMATION SYSTEM
ON-GOING CONTRACTS DATA

DECEMBER, 2000

| | |
|----------------------|--------------------------------|
| Name of the Project: | Contract 10-A |
| Type of the Project: | Construction of 4 CRBC Bridges |
| Contract Amount: | Rs. 258,750,000.00 |
| Funded by: | O.E.C.F. / J.B.I.C |
| Ratio: | GOP. 12 % Agency Share: 88% |
| Project Director: | Mr. Muhammad Shuaib Khattak |
| Consultant: | P.C.I. (E.A) |
| Contractor: | M/s Hyundai |
| Date of Award: | 05-11-1999 |
| Date of Start: | 27-02-2000 |
| Date of completion: | 30-05-2001 |
| Contract Duration: | 15 Months (458 Days) |

SCHEDULE STATUS

| | |
|------------------------------------|-------------------------------------|
| Planned Progress to date | Programme Awaited |
| Actual Progress to date | 56.15% |
| Amount Paid to Contractor to-date. | (Detail not provided by Contractor) |

PHYSICAL PROGRESS M/S HYUNDAI

Month: **December, 2000** Date of Start: **27/02/2000**
 Project Name: **4 CRBC Bridges Project** Date of Completion: **30/05/2001**
 Cost of Contract: **258,750,000.00**

| S.No. | Description | Unit | This Month | | Upto Date | | Rate | Amount | |
|-------|-----------------------------------|----------------|------------|--------------|--------------|--------------|---------------|----------------|-----------|
| | | | Last Month | This Month | Last Month | This Month | | This Month | Upto Date |
| 1 | Exc. Unsuitable Material | cu.m | 9,472 | 9,028.00 | 18,500.00 | 132.00 | 1,191,696 | 2,442,000.00 | |
| 2 | Test Piles 750mm dia | LM | 83 | - | 83.00 | 9,677.00 | - | 803,191.00 | |
| 3 | Test Pile 1100mm dia | LM | 32 | - | 32.00 | 13,202.00 | - | 422,464.00 | |
| 4 | Pile Load Test to design load | LM | 4 | - | 4.00 | 1,356,829.00 | - | 5,427,316.00 | |
| 5 | NGC | M2 | 4,500 | - | 4,500.00 | 7.00 | - | 31,500.00 | |
| 6 | Structure Excavation | M3 | 11,700 | 275.00 | 11,975.00 | 209.00 | 57,475 | 2,502,775.00 | |
| 7 | Cast in place Piles 750mm dia | LM | - | - | 2,925.00 | 9,677.00 | - | 28,305,225.00 | |
| 8 | Cast in place Piles 1100mm dia | LM | 512 | - | 512.00 | 13,202.00 | - | 6,759,424.00 | |
| 9 | Lean Concrete | M3 | 70 | 79.00 | 149.00 | 5,031.00 | 397,449 | 749,619.00 | |
| 10 | Concrete Class A | M3 | 1,207 | 805.00 | 2,012.00 | 10,177.00 | 8,192,485 | 20,476,124.00 | |
| 11 | Steel Reinforcement | Ton | 488 | 40.00 | 528.00 | 37,706.00 | 1,508,240 | 19,908,768.00 | |
| 12 | Girder 25m long | Each | 20 | - | 20.00 | 494,223.00 | - | 9,884,450.00 | |
| 13 | Girder 30m long | " | 40 | - | 40.00 | 585,444.00 | - | 23,417,760.00 | |
| 14 | Embankment | M ² | 66,000 | 10,000.00 | 76,000.00 | 189.00 | 1,890,000 | 14,364,000.00 | |
| 15 | Granular Sub Base | M ³ | - | 3,000.00 | 3,000.00 | 808.00 | 2,424,000 | 2,424,000.00 | |
| 16 | Aggregate Base Coarse | M ³ | - | 1,000.00 | 1,000.00 | 1,320.00 | 1,320,000 | 1,320,000.00 | |
| 17 | Concrete Class C | M ³ | - | 375.00 | 375.00 | 8,552.00 | 3,207,000 | 3,207,000.00 | |
| 18 | Difference of cost for SR Cement. | M ³ | - | 1,273.00 | 1,273.00 | 311.00 | 395,903 | 395,903.00 | |
| 19 | Bearing Pads. | cu.m | - | 1,360,000.00 | 1,360,000.00 | 1.80 | 2,448,000 | 2,448,000.00 | |
| | Total | | | | | | 23,032,248.00 | 145,539,639.00 | |

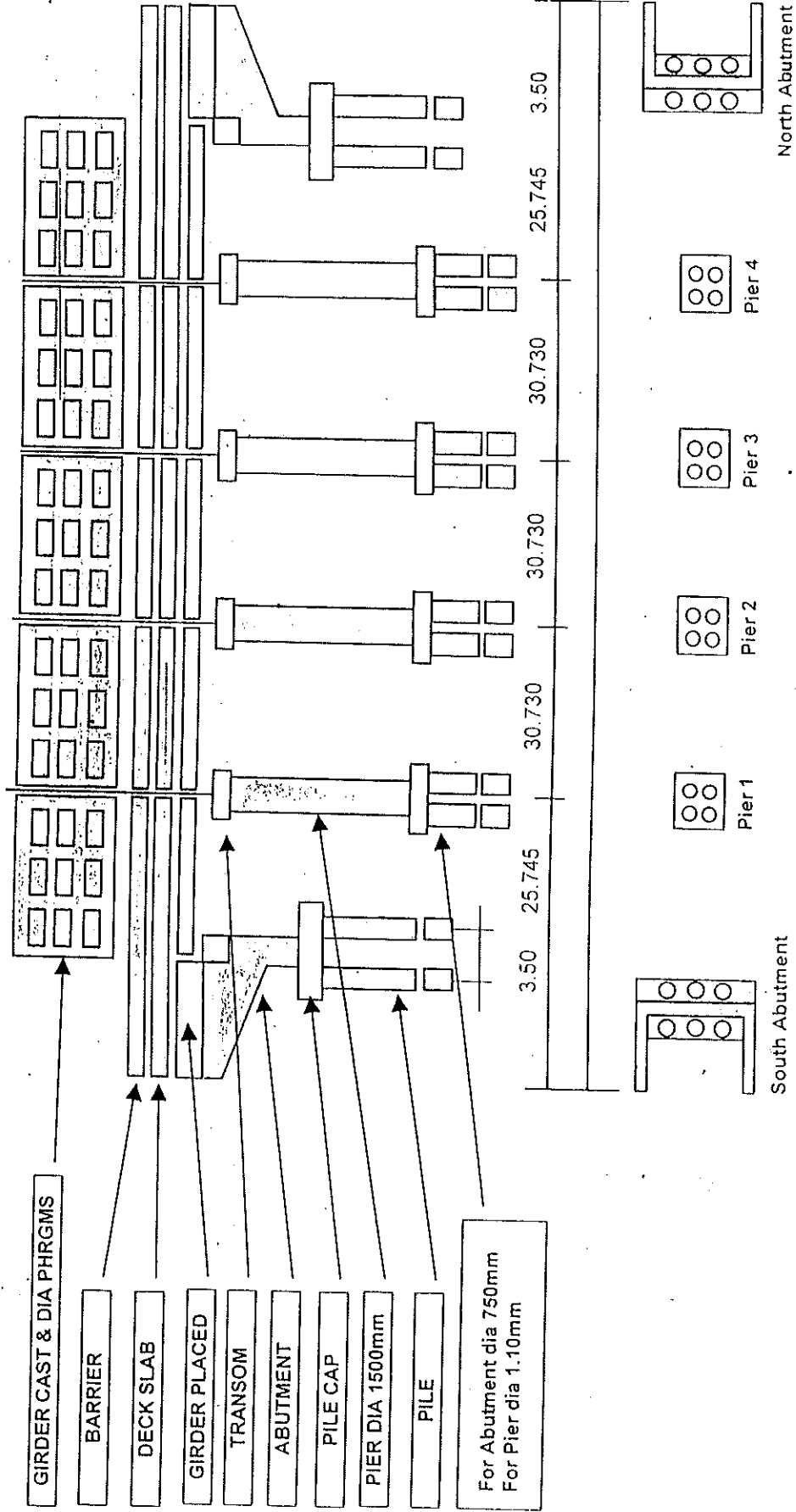
Total Amount of work done = **146,289,529**
 Percentage of Progress Achieved = **66.16 %**
 Percentage of Progress for this month. = **8.90 %**

BRIDGE PROGRESS

BRIDGE DATA

Name = KHAD WARKAI (1)
 Chainage = 30+663
 No. of Spans = 5
 Length of Span = 2x25, 3x30
 Total Length = 150.68 upto end of wing walls.
 Depth of Girder = 2.05
 No. of Girder Precast =
 Date =

| | |
|----------------------------|--|
| Previous Work Done | |
| Work done during the month | |

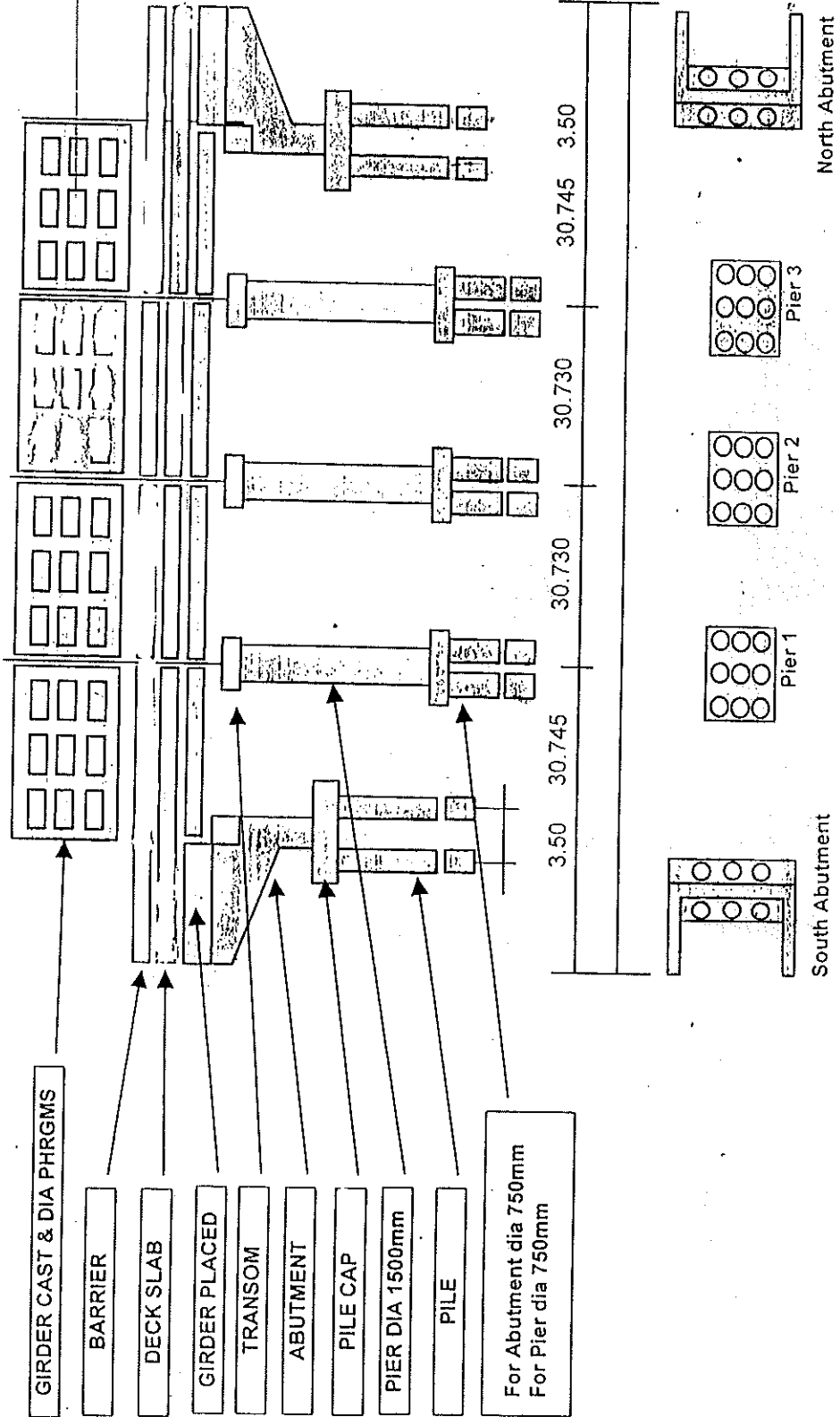


BRIDGE PROGRESS

BRIDGE DATA

Name = SHERANA (2)
 Chainage = 21+347
 No. of Spans = 4
 Length of Span = 30M
 Total Length = 129.95 upto end of wing walls.
 Depth of Girder = 2.20
 No. of Girder Precasted =
 Date =

| | |
|----------------------------|--|
| Previous Work Done | |
| Work done during the month | |

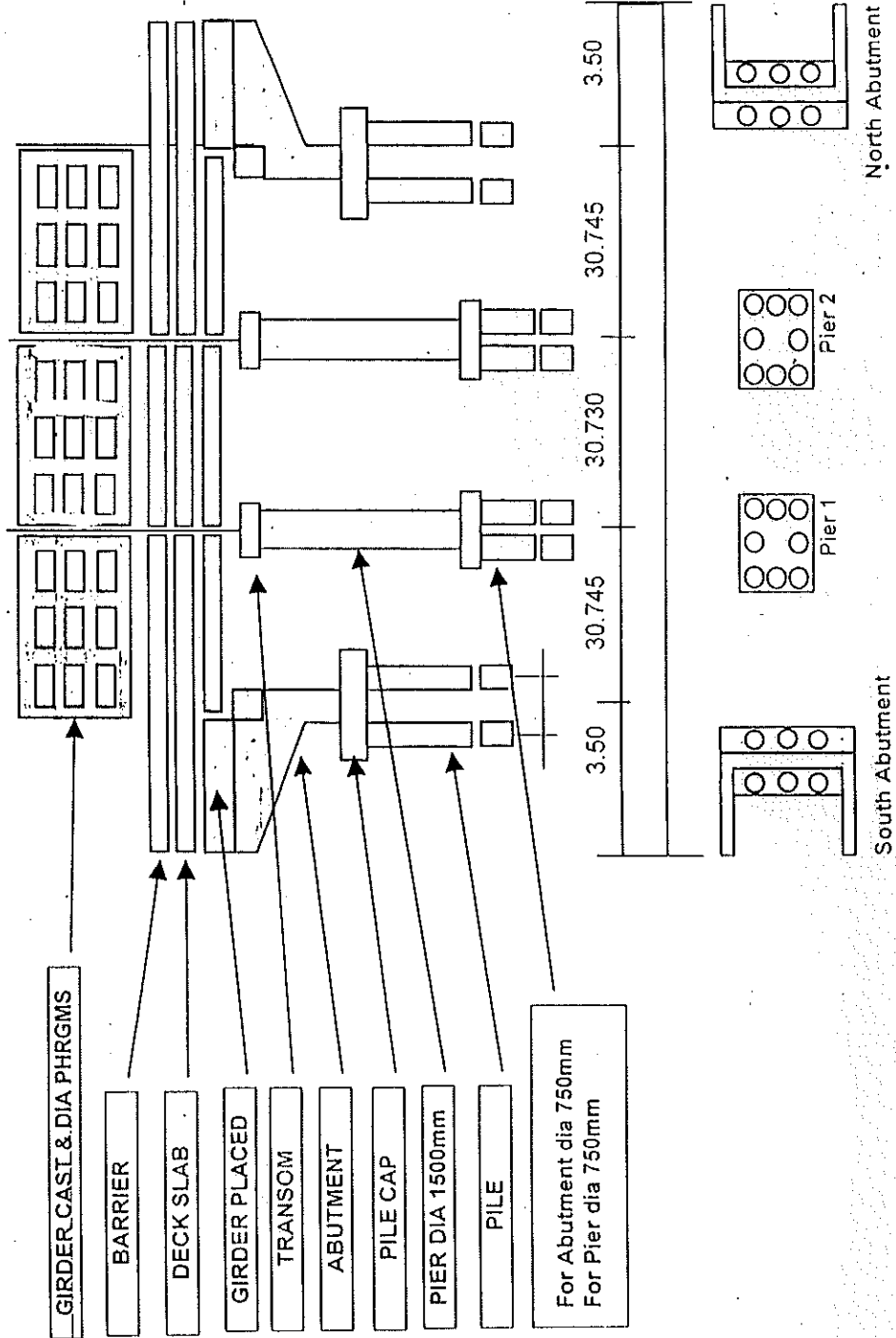


BRIDGE PROGRESS

BRIDGE DATA

Name = RAMAK (3)
 Chainage = 12+655
 No. of Spans = 3
 Length of Span = 30M
 Total Length = 99.22 upto end of wing walls.
 Depth of Girder = 2;20
 No. of Girder Precasted =
 Date =

| | |
|----------------------------|--|
| Previous Work Done | |
| Work done during the month | |

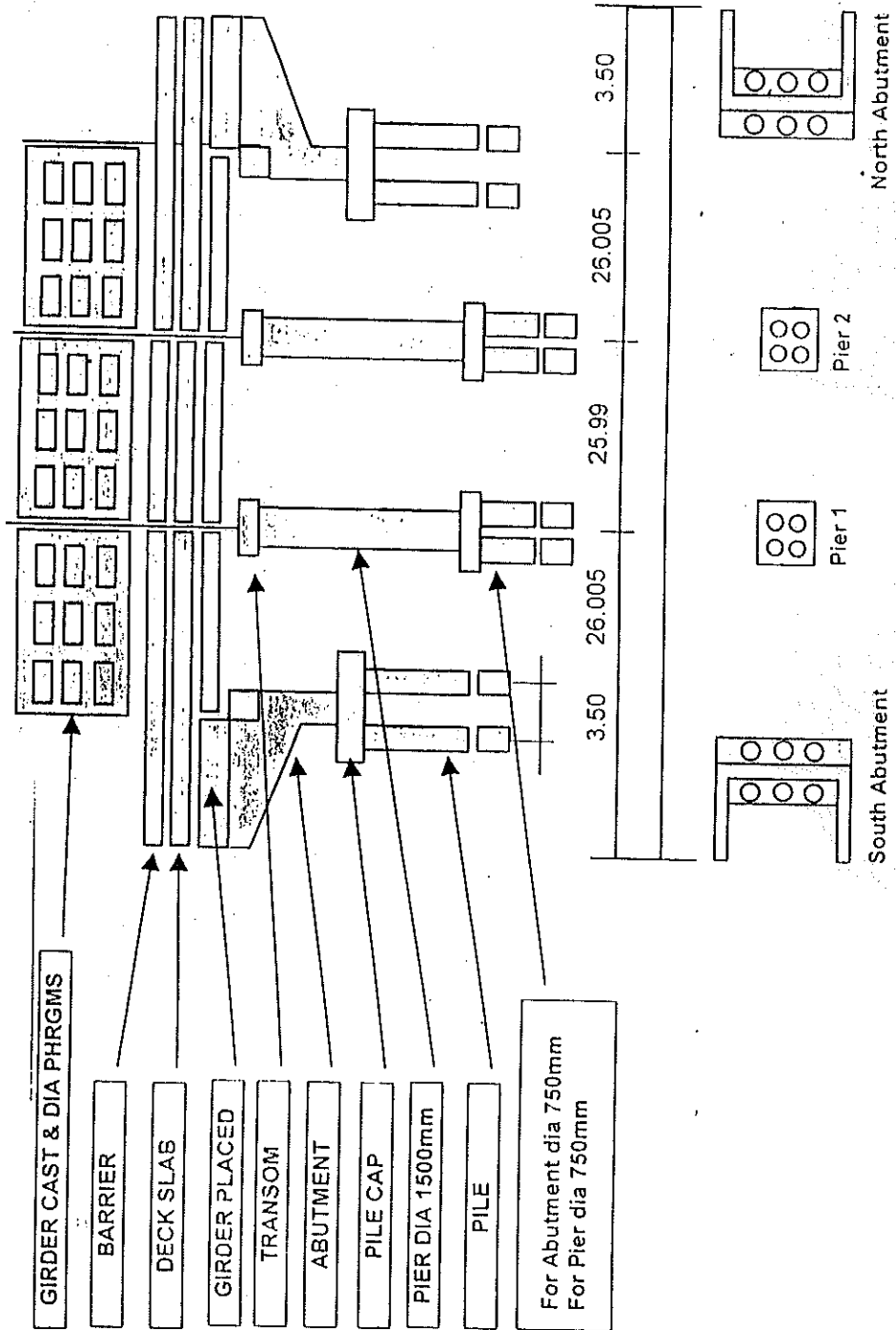


BRIDGE PROGRESS

RIDGE DATA

Name = J - HAIBAT NULLAH (4)
 Mainage = 4+744
 No. of Spans = 3
 Length of Span = 26M
 Total Length = 85M upto end of wing walls.
 Depth of Girder = 2.050
 No. of Girder Precast =
 Site =

| | |
|----------------------------|--|
| Previous Work Done | |
| Work done during the month | |



GOVERNMENT OF PAKISTAN
MINISTRY OF COMMUNICATIONS

No. 5(6)/87-Roads

Islamabad, 2nd December 2000

OFFICE MEMORANDUM

2862
6/12/2000

Subject: Quality Checking of IHP Sections 9, 10 and 10A

The undersigned is directed to refer to the subject and to state that complaints have been received by the MOC regarding quality/specification of material used in contract 10 of IHP (Retra Junction to Malana Junction).

2. Secretary (Communications) has desired that NTRC should test the following sections of IHP and give their report on priority basis. The report will facilitate NHA to get the deficiencies, if any, rectified through the contractors during their contractual maintenance period

- i) D.G.Khan Bypass in Section-9 (D.G.Khan to Retra Junction)
- ii) 13 km (restored) in section 10 (Retra Junction to Malana Junction)
- iii) 4 Chashma Right Bank Canal Bridges as Section-10A (As above)

R. Riaz Khattak
(Mohammed Riaz Khattak)
Deputy Director (Roads)
Tel: 051-9216279

✓ Senior Chief
National Transport Research Centre
Islamabad

Copy to:

to *6/12/2000*
le
6/12/2000
Chairman, NHA

DC(Mat)



HYUNDAI

Engineering & Construction Co., Ltd.

ORIGINAL
DUPLICATE

Serial No. 01

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|----------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | | |
| date | 08-01-2001 | Plant No. | 01 |
| Bridge No. | 03 | Qty this trip | 3.2 |
| Structure | Diaphragm # 62 SP# 2 | Running Qty | 3.2 |
| Vehicle No. | Lok 2607 | Temperature (at BP) | 13°C |
| Time Starting (Mixing) | 12:50 | Temperature (at Site) | 16°C |
| Time departure (From BP) | 12:15 | Slump (at Site) | 102 mm |
| Time Arrival (Site) | 12:40 | Slump (at BP) | 150 mm |

[Signature]
115

[Signature]

PCI REPRESENTATIVE

HYUNDAI REPRESENTATIVE

ANNEX - II

GOVERNMENT OF PAKISTAN
NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core Sample No. 01, Bridge # 01, Deck Slab # 03
Location Indus Highway Project (N-55), Contract 10-A

Mean

Length: 10.50, 10.55, 10.30, 10.30 = 10.41 cm
(cm)

Diameter: 8.23, 8.24, 8.30, 8.21 = 8.25 cm.
(cm)

Volume: $\frac{\pi d^2 l}{4} = \frac{3.14(8.25)^2}{4} \times 10.41 = 556.20 \text{ cu. cm.}$

Density: $M(A)/V = \frac{12.80}{556.20} = 2.301 \text{ gm/cu. cm.}$

Specific Gravity:

Weight in Air (A): 1280 gms.

Weight in Water (C): 740 gms.

Weight in SSD (B): 1287 gms.

Specific Gravity = $A/B-C$

= 1280/1287-740 = 2.340

[Signature]
Lab. Tech.

Checked
[Signature]

RESEARCH OFFICE
Research Officer (NTRC)
Ministry of Communications
Government of Pakistan
Islamabad

GOVERNMENT OF PAKISTAN
NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core Sample No. 02, Bridge No. 01, Deck Slab No. 03
Location Indus Highway Project (N-55), Contract 10-A

Length: 13.34, 13.50, 13.33, 13.31 = 13.37 cm.
(Cm) Mean

Diameter: 8.22, 8.23, 8.24, 8.22 = 8.23 cm.
(Cm)

$$\text{Volume: } \frac{\pi d^2 l}{4} = \frac{3.14 (8.23)^2}{4} \times 13.37 = 710.89 \text{ cu. cm.}$$

$$\text{Density: } M(A)/V = \frac{1650}{710.89} = 2.321 \text{ gm/cu. cm.}$$

Specific Gravity:

Weight in Air (A): 1650 gms.

Weight in Water (C): 950 gms.

Weight in SSD (B): 1656 gms.

$$\text{Specific Gravity} = \frac{A}{B-C} \\ = \frac{1650}{1656-950} = 2.337$$

[Signature]

Lab. Tech.

Checked

[Signature]

Director
National Transport Research Centre
Government of Pakistan
Islamabad

GOVERNMENT OF PAKISTAN
NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core Sample No. 03, Bridge No. 01, Deck Slab No. 03
Location Indus Highway Project (N-55), Contract 10-A

Length: 8.40, 8.32, 8.34, 8.50 = 8.39 cm.
(cm) Mean

Diameter: 8.21, 8.20, 8.21, 8.30 = 8.23 cm.
(cm)

Volume: $\frac{\pi d^2 l}{4} = \frac{3.14 (8.23)^2}{4} \times 8.39 = 446.10 \text{ cu. cm.}$

Density: $M(A)/V = \frac{1044}{446.10} = 2.340 \text{ gm / cu. cm.}$

Specific Gravity:

Weight in Air (A): 1044 gms.
Weight in Water (C): 601 gms.
Weight in SSD (B): 1047 gms.

Specific Gravity = $A/B-C$
 $= 1044 / (1047 - 601) = 2.341$

[Signature]
Lab. Tech.

Checked.
[Signature]
NATIONAL TRANSPORT RESEARCH CENTRE
Ministry of Communications
Government of Pakistan
(Islamabad)

GOVERNMENT OF PAKISTAN
NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core Sample No. 01, Bridge No. 04, Deck Slab No. 02
Location Indus Highway project (N-55), Contract 10-A

Length: 16.30, 16.20, 16.30, 16.25 = ^{Mean} 16.26 cm.
(Cm)

Diameter: 8.30, 8.24, 8.30, 8.30 = 8.29 cm.
(Cm)

$$\text{Volume: } \frac{\pi d^2 l}{4} = \frac{3.14 (8.29)^2}{4} \times 16.26 = 877.20 \text{ cu. cm.}$$

$$\text{Density: } M(A)/V = \frac{2056}{877.20} = 2.344 \text{ gm/cu. cm.}$$

Specific Gravity:

Weight in Air (A): 2056 gms.

Weight in Water (C): 1188 gms.

Weight in SSD (B): 2064 gms.

$$\text{Specific Gravity} = A/B-C$$

$$= 2056/2064-1188 = 2.347$$

[Signature]
Lab. Tech.

Checked
[Signature]

RECEIVED AT
NATIONAL TRANSPORT RESEARCH CENTRE
GOVERNMENT OF PAKISTAN
ISLAMABAD

GOVERNMENT OF PAKISTAN
NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core, Sample No. 02, Bridge No. 04, Deck Slab No. 02
Location Indus Highway project (N-55), Contract 10-A

Length: 12.91, 12.90, 12.91, 13.00 = 12.93 Mean
(cm)

Diameter: 8.25, 8.30, 8.30, 8.25 = 8.28 Mean
(cm)

Volume: $\frac{\pi d^2 l}{4} = \frac{3.14 (8.28)^2}{4} \times 12.93 = 695.87$ cu. cm.

Density: $M(A)/V = \frac{1625}{695.87} = 2.335$ gm/cu. cm.

Specific Gravity:

Weight in Air (A): 1625 gms.

Weight in Water (C): 941 gms.

Weight in SSD (B): 1631 gms.

Specific Gravity = A/B-C

$$= \frac{1625}{1631-941} = \frac{1625}{690} = 2.355$$

Lab. Tech.

Imdad

Checked

Imdad

HASHEED AHMED
Research Officer (NTRC)
Ministry of Communications
Government of Pakistan
Islamabad

GOVERNMENT OF PAKISTAN
 NATIONAL TRANSPORT RESEARCH CENTRE

DENSITY & SPECIFIC GRAVITY TEST

Core Sample No. 03, Bridge No. 4, Deck slab No. 02

Location IHP, Contract 10-A

Length: 9.33, 9.11, 9.05, 9.20 = 9.17 cm.
 (cm) Mean

Diameter: 8.25, 8.25, 8.25, 8.25 = 8.25 cm.
 (cm)

Volume: $\frac{\pi d^2 l}{4} = \frac{3.14 (8.25)^2}{4} \times 9.17 = 489.94 \text{ cu. cm.}$

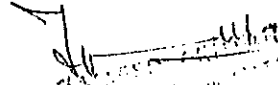
Density: $M(A)/V = \frac{1140}{489.94} = 2.327 \text{ gm/cu. cm.}$

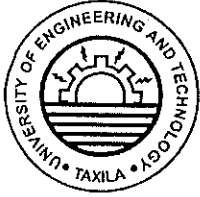
Specific Gravity:

Weight in Air (A): 1140 gms.
 Weight in Water (C): 660 gms.
 Weight in SSD (B): 1144 gms.

Specific Gravity = $A/B-C$
 $= 1140/1144-660 = 2.355$

Amjad
 Lab. Tech.

Checked

 Director, National Transport Research Centre
 Ministry of Transport
 Government of Pakistan
 Islamabad



DEPARTMENT OF CIVIL ENGINEERING
CONSULTING & TESTING SERVICES
UNIVERSITY OF ENGINEERING & TECHNOLOGY, TAXILA
PHONE: 0596-534936 FAX: 0596-537504 9314226

9314235

REF: CEP/CT/2001-8

DATED: 20-2-2001

To,

Mr. Muhammad Naeem
Assistant Chief,
Ministry of Communications,
National Transport Research Centre,
Section H-8/2,
Islamabad.

553
20/2/2001

Subject: COMPRESSIVE STRENGTH RESULTS OF CONCRETE CORE SAMPLES.

Refer to your letter No.NTRC-15(26).93 dated 17/02/2001.

Please find hereunder the result of the provided samples regarding the subject matter

The following table shows the result, Bridge No.4 Deck No.2.

| Br.No. | Core No. | Core Length (in.) | Core Dia D(Inch) | Axial Load (KN) | Corrected Comp. Strength (Psi) |
|--------|----------|-------------------|------------------|-----------------|--------------------------------|
| 1. | C1 | 6.47 | 3.248 | 162 | 4398.65 |
| 2. | C2 | 5.098 | 3.248 | 138 | 3395.13 |
| 3. | C3 | 3.248 | 3.248 | 146 | 3118.87 |

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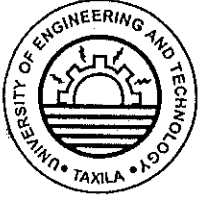
CHAIRMAN
(CHAIRMAN)
Department of Civil Engg.
UET Taxila.

CONSULTANCY SERVICES

Project Planning & Design, Feasibility Studies, Structural Designs, Soil & Foundation Designs,
Highway & Airport Designs, Hydraulic & Sedimentation Studies, Municipal Designs, Irrigation studies

FIELD & LABORATORY SERVICES

Material Testing, Water & Sewage Sample Testing



DEPARTMENT OF CIVIL ENGINEERING

CONSULTING & TESTING SERVICES

UNIVERSITY OF ENGINEERING & TECHNOLOGY, TAXILA

PHONE: 0596-534938 FAX: 0596-537504 9314226

9314235

REF: CFD/CT/2001-9

DATED: 20-2-2001

To,

Mr. Muhammad Naeem
Assistant Chief,
Ministry of Communications,
National Transport Research Centre,
Section H-8/2,
Islamabad.

554
20/2/2001

Subject: COMPRESSIVE STRENGTH RESULTS OF CONCRETE CORE SAMPLES.

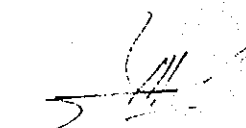
Refer to your letter No.NTRC-15(26)/93 dated 17-02-2001

Please find hereunder the result of the provided core samples regarding the subject matter.

The following table shows the result, Bridge No.1 Deck No.3.

| Sr.No. | Core No. | Core Length (in.) | Core Dia D(Inch) | Axial Load (KN) | Corrected Comp Strength (Psi) |
|--------|----------|-------------------|------------------|-----------------|-------------------------------|
| 1. | C1 | 4.114 | 3.248 | 124 | 3131.19 |
| 2. | C2 | 5.285 | 3.248 | 128 | 3371.21 |
| 3 | C3 | 3.307 | 3.248 | 166 | 3921.31 |

K


CHAIRMAN
(CHAIRMAN)
Department of Civil Engg.
UET, Taxila.

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Highway & Airport Designs, Hydraulic & Sedimentation Studies, Municipal Designs, Irrigation studies

FIELD & LABORATORY SERVICES

Material Testing, Water & Sewage Sample Testing

CIVIL ENGINEERING DEPARTMENT
CONSULTING & TESTING SERVICES

UNIVERSITY OF ENGINEERING & TECHNOLOGY, TAXILA
 PHONE: 0596-4381 FAX: 0596-2821
 93142-35

OUR REF: CEJ/67/2001

MINISTRY of

YOUR REF: NIL

DATED: 12/2/2001

Communication
 National Transport

DATED: 12/2/2001

Research Center Sector H-8/2

The required results of the concrete cubes provided are as under.

557
 20/2/20

cylinders

| S. No. | Mark | Weight in Lbs. | Size of Specimen | Date | | Age (days) | Mix (ratio) | Crushing Strength PSI | Remarks |
|--------|------|----------------|------------------|---------|---------|------------|-------------|-----------------------|---------|
| | | | | Casting | Testing | | | | |
| 1 | A | | 6 Φ 12 | | 12/2 | 28 | | 3816 | |
| 2 | B | | N | | N | N | | 4451 | |
| 3 | C | | N | | N | N | | 3259 | |
| 4 | D | | N | | N | N | | 3815 | |
| 5 | E | | N | | N | N | | 4610 | |
| 6 | F | | N | | N | N | | 4213 | |

LAB INCHARGE

[Signature]
 (CHAIRMAN)
 CHAIRMAN
 Department of Civil Engg.
 UET, Taxila.



DEPARTMENT OF CIVIL ENGINEERING
 CONSULTING & TESTING SERVICES
UNIVERSITY OF ENGINEERING & TECHNOLOGY, TAXILA
 PHONE: 0596- 534938 FAX : 0596- 537504

269

OUR REF: CE/ST/2K1-79

NTRE Islamabad. YOUR REF: NTRE-15026/93

DATED: 17-02-2021

DATED: 17-02-2021

The required results of the steel specimens provided are as under: Deformed steel

| Sr. No. | Diameter | | Weight LS/ft | Area in ² | Yield Strength psi | Ultimate Strength psi | Elongation (%) | Bend Test |
|-----------|----------|-------|-----------------|-------------------------|-----------------------|--------------------------|-------------------|-----------|
| | Normal | Exact | | | | | | |
| 1 | 3/4 | .792 | 1.674 | .492 | 69476 | 98979 | 15.62 | / |
| 2 | 4 | .788 | 1.659 | .488 | 79823 | 110852 | 15-62 | |
| 557 | | | | | | | | |
| 20/2/2021 | | | | | | | | |

[Signature]
 SUPERVISOR

LAB INCHARGE

[Signature]
 DEAN / CHAIRMAN
 Department of Civil Engg.
 UET, Taxila.

SIEVE ANALYSIS

Sample P/U Date: 08-01-2001 Sample No. 01

Location: Indus Highway project (N-55), 10^A Loc. No: Batch Plant

Description of Material: DI. Khan. crushed "3/4" down.

Processing Time: _____ Study: _____

Total wt. of Sample = 4230 gms.

| COARSE SIEVE | | | | | FINE SIEVE | | | | | |
|---------------|--------------|------------|-----------|---------------|--------------|--------------|------------|-------------------|---|--------------|
| SIEVE NO/mm | RETAINED CUM | RETAINED % | PASSING % | SPEC. From/To | SIEVE NO/mm | RETAINED CUM | RETAINED % | PASSING PART ADJ. | | SPEC From/To |
| / | / | / | / | / | 4 4.75 | 4156 | 98.25 | 1.75 | 2 | / |
| 3 75 | / | / | / | / | 8 2.36 | / | / | / | / | / |
| 2 1/2 63 | / | / | / | / | 10 2.00 | 4217 | 99.69 | 0.31 | 0 | / |
| 2 50.0 | / | / | / | / | 16 1.18 | / | / | / | / | / |
| 1 1/2 37.5 | / | / | / | / | 30 0.600 | / | / | / | / | / |
| 1 25.0 | - | - | 100 | / | 40 0.425 | 4219 | 99.74 | 0.26 | 0 | / |
| 3/4 19.00 | 106 | 2.51 | 97.49 | / | 50 0.300 | / | / | / | / | / |
| 1/2 12.5 | 2663 | 62.96 | 37.04 | / | 100 0.150 | / | / | / | / | / |
| 3/8 9.50 | 3245 | 76.71 | 23.29 | / | 200 0.075 | 4222 | 99.81 | 0.19 | 0 | / |
| - 3/8 | | | | | PAN | | | | | |

Technician: *[Signature]*
Lab Tech.

Date Tested: *[Signature]*
2/1/2001

LABORATORY
PUNJAB ENGINEERING COLLEGE
SINGHPUR
GOVERNMENT OF PUNJAB
INDIA

GOVERNMENT OF PAKISTAN
PLANNING COMMISSION
NATIONAL TRANSPORT RESEARCH CENTRE
: : : : :

LOS ANGELES ABRASION TEST:

Sample P/U date: 08-01-2001 Sample No. _____

Location Indus Highway Project (N-55), D.T. Khan. Sec. CRBC Bridges

Processing Time/Date 23-02-2001.

Study: _____

Rotations of Drum: 30 to 33 rpm No. of Revolutions: 500

Type of Agg. (Crushed, Natural etc.): crushed "3/4" down

Quality of Agg. (Surfacing, Base, Sub-base): _____

Grading (A,B,C,D,E,F): "B"

No. of Steel Balls Used: 11 Wt. of abrasive charges: 4584 ± 25

CALCULATIONS:

1. Original Wt. of Sample : $W_1 = 5000 \text{ gms.}$

2. Wt. of material retained on Sieve No.12 after revolutions $W_2 = 3657 \text{ gms.}$

3. Los Angeles Abrasion Value = $\frac{W_1 - W_2}{W_1} \times 100$

$$= \frac{5000 - 3657}{5000} \times 100 = 26.86\%$$

CONCLUSIONS:

Say 27%

Performed by: Mazhar Hussain

Checked by : [Signature]
8/1/2001

RESEARCH OFFICE
National Transport Research Centre
Government of Pakistan
Islamabad

NATIONAL TRANSPORT RESEARCH CENTRE

SIEVE ANALYSIS

Sample P/U Date: 08-01-01 Sample No. 01

Location: IVCC Plant Loc. No: _____

Description of Material: 70% Sand + 30% agg. 3/8 Down.

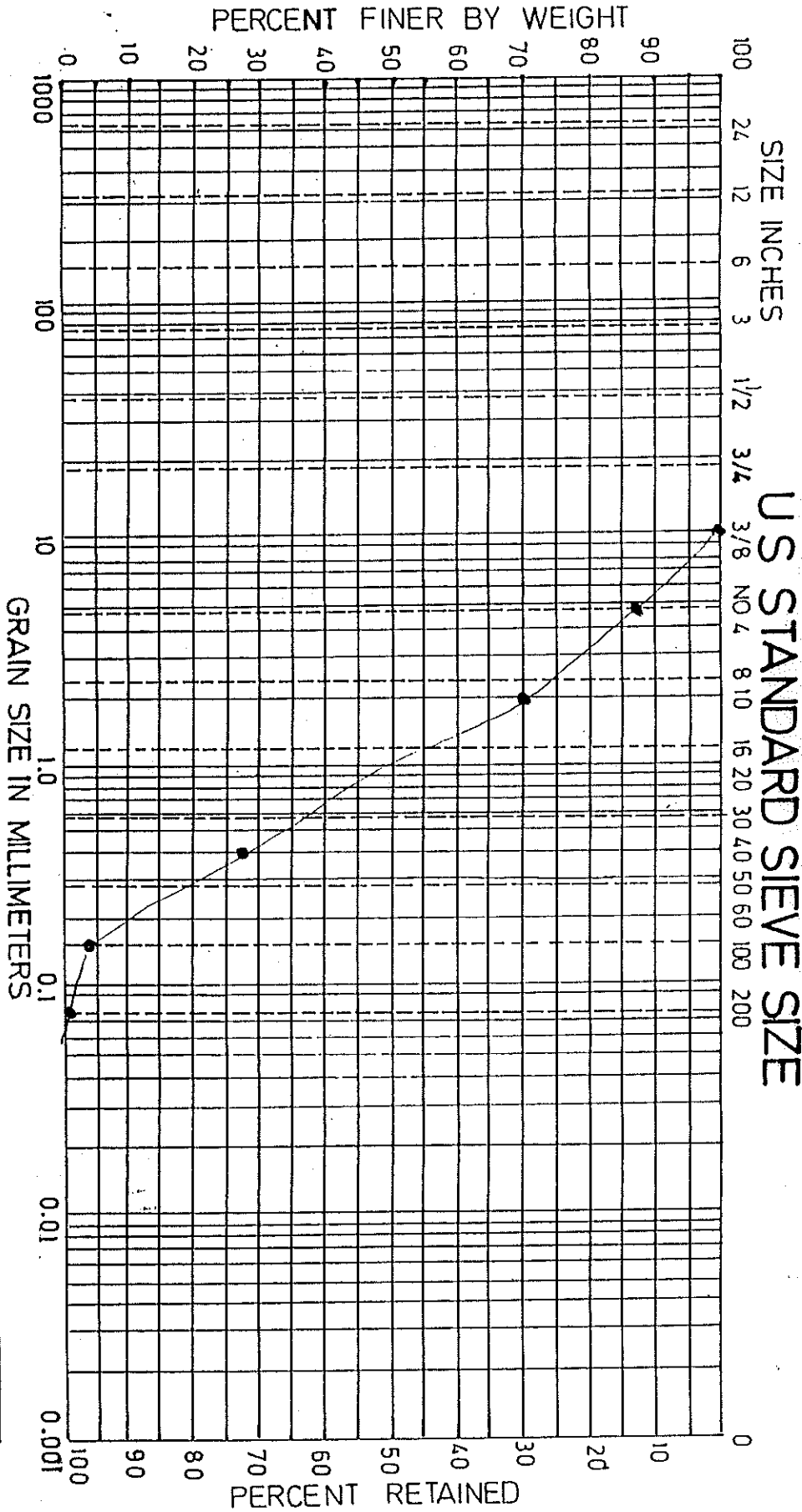
Processing Time: _____ Study: I.H.P Contract 10-A

| COARSE SIEVE | | | | | FINE SIEVE | | | | | |
|--------------|----------|----------|---------|---------|------------|----------|----------|---------|------|---------|
| SIEVE | RETAINED | RETAINED | PASSING | SPEC. | SIEVE | RETAINED | RETAINED | PASSING | | SPEC. |
| NO/mm | CUM | % | % | From/To | NO/mm | CUM | % | PART | ADJ. | From/To |
| 3 | | | | | 4 | 305 | 13.2 | 86.80 | 87 | |
| 75 | | | | | 4.75 | | | | | |
| 2 1/2" | | | | | 8 | | | | | |
| 63 | | | | | 2.36 | | | | | |
| 2 | | | | | 10 | 700 | 30.30 | 69.70 | 70 | |
| 50.0 | | | | | 2.00 | | | | | |
| 1/2" | | | | | 16 | | | | | |
| 37.5 | | | | | 1.18 | | | | | |
| 1 | | | | | 30 | | | | | |
| 25.0 | | | | | 0.600 | | | | | |
| 3/4" | | | | | 40 | 1683 | 72.86 | 27.14 | 27 | |
| 19.00 | | | | | 0.425 | | | | | |
| 1/2" | | | | | 50 | | | | | |
| 12.5 | | | | | 0.300 | | | | | |
| 3/8" | | | 100 | | 100 | 2208 | 95.58 | 4.42 | 4 | |
| 9.50 | | | | | 0.150 | | | | | |
| - 3/8" | | | | | 200 | 2294 | 99.31 | 0.69 | 1 | |
| | | | | | 0.075 | | | | | |
| | | | | | PAN | | | | | |

Technician: [Signature]

Date Tested: 02-03-01

| | | | | | | |
|--------|---------|--------|------|--------|--------|--------------|
| BOLDER | COBBLES | GRAVEL | | SAND | | SILT OR CLAY |
| | | Coarse | Fine | Coarse | Medium | |



Description = 70% Sand + 30% aggregate 3/8 down
 Location = Ivec Plant, I.H.P. Contract, 10-A.
NTRC

Dated: 07/10/2008

3/15

TRIAL # 10 & 11

REVISED CONCRETE MIX DESIGN CLASS A₁

(Using D.G Ordinary Portland cement and Chashma /Pezu Aggregate)

ABSOLUTE VOLUMES

W/C RATIO = 0.51

| | | |
|------------------------------------|---|-----------------------|
| Cement - 400 Kg | = | 0.1270 m ³ |
| Water - 187 (liters) (203.5) | = | 0.1870 m ³ |
| Air Entrance 1.5% | = | 0.0150 m ³ |
| Volume of Paste | = | 0.3290 m ³ |
| Volume of Aggregate | = | 0.6710 m ³ |
| Ratio of Coarse and Fine Aggregate | = | 60:40 |
| Weight of Aggregate (C.A+F.A) | = | 1814 Kg |
| Weight of Coarse aggregate | = | 1088 Kg |
| Weight of Fine Aggregate | = | 726 Kg |

| Material | %age | Weight (Kg) | SPG (S.S.D) | ABS% |
|-----------|------|-------------|-------------|-------|
| 3/4" Agg. | 60 | 1088 | 2.697 | 0.667 |
| 3/8" Agg. | 12 | 218 | 2.796 | 0.876 |
| Sand | 28 | 508 | 2.676 | 1.444 |

Average Combined Specific Gravity = 2.703

ABSORPTION IN AGGREGATES

| | | | | |
|-------------------------------------|---|------------------|---|----------|
| 3/4" Agg. | = | 1088 x 0.667/100 | = | 7.3 " |
| 3/8" Agg. | = | 218 x 0.876/100 | = | 1.9 " |
| Sand | = | 508 x 1.444/100 | = | 7.3 " |
| Total Absorption water in aggregate | = | | = | 16.5 (L) |

Batch Weight For

| | <u>1 M³</u> | <u>0.4 M³</u> | <u>For One Bag</u> |
|-----------------------------|------------------------|--------------------------|--------------------|
| 1. Cement (D.G, OPC) | 400 Kg | 160 Kg | 50 Kg |
| 2. 3/4" Agg. (Chashma) | 1088 Kg | 435 Kg | 136 Kg |
| 3. 3/8" Agg. (Pezu) | 218 Kg | 87 Kg | 27 Kg |
| 4. Sand (Pezu) | 508 Kg | 203 Kg | 64 Kg |
| 5. Water 187+16.5 | 203.5 L | 81.4 L | 25.1 L |
| 6. Admixture (Plastiment-R) | 2 L | 800 ml | 250 ml |

SLUMP = 180 mm

Temp. = 30 °C

28 days Compressive Strength = 309 Kg/cm²
(Test Report # 1022 attached)

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY PROJECT CONTRACT - 10 - A
CHASHMA RIGHT BANK CANAL BRIDGES
PACIFIC CONSULTANTS INTERNATIONAL**

COMPRESSIVE STRENGTH TEST

| | |
|----------------------------------|--------------------------------------|
| Sample No. : 1022 | Section : 19 |
| Date Sampled : 7/10/2000 | Location : Paroa Lab. |
| Type of Sample : Class A1 | Structure Component: Mix Design # 11 |
| Cement Brand : D.G Cement Type I | Contractor : Hyundai |
| Sampled by : Zaldi / A. Rasheed | Tested by : Asif Zia / Zaidi |

DESIGN MIX DATA

| | | | |
|----------------------------|---------|-----------------------|--------------|
| Time Sampled | 9:30 am | Wt/Vol. of 09 mm Agg. | 218 Kg/cc |
| Slump | 180 mm | Wt/Vol. of 25 mm Agg. | - Kg/cc |
| Tem. of Mix | 31°C | Wt/Vol. of 19 mm Agg. | 1088 Kg/cc |
| Ambient Temp | 30°C | Wt/Vol. of Sand | 508 Kg/cc |
| Water Cement Ratio | 0.51 | Wt/Vol. of Cement | 400 Kg/cc |
| Admixture - Plastiment - R | 0.5% | Wt/Vol. of Water | 203.5 Liters |

TEST DATA

| Sample No. | Date Sampled | Date Tested | Age (Days) | Sample Size Cm | Cross Sectional Area Cm ² | Breaking Load Kg | Corrected Breaking Load Kg | Strength Kg/Cm ² | Unit Wt. Kg/cm ³ | Design Strength Kg/Cm ² |
|----------------|--------------|-------------|------------|----------------|--------------------------------------|----------------------------------|----------------------------|-----------------------------|-----------------------------|------------------------------------|
| 1022-A | 7/10/2000 | 14/10/00 | 7 days | 15.22φ x 30.5 | 182.0 | 48,000 | 47673 | 262 | | |
| B | " | " | " | 15.21φ x 30.3 | 181.7 | 47,000 | 46686 | 257 | | |
| C | " | " | " | 15.22φ x 30.2 | 182.0 | 49,000 | 48659 | 267 | | |
| Average | | | | | | | | 262 | | |
| 1022-D | 7/10/00 | 4/11/00 | 28 days | 15.23φ x 30.6 | 182.2 | 55,000 | 54006 | 300 | | |
| E | " | " | " | 15.22φ x 30.5 | 181.9 | 57,000 | 56580 | 311 | | |
| F | " | " | " | 15.20φ x 30.4 | 181.5 | 58,000 | 57582 | 317 | | |
| Average | | | | | | | | 309 | | |
| Remarks | | | | | | | | | | |
| Contractor ME | | | | | | Consultant ME <i>(Signature)</i> | | | | |

Attach : 2

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY PROJECT CONTRACT-10-A
PACIFIC CONSULTANTS INTERNATIONAL**

HYUNDAI ENGINEERING & CONSTRUCTION COMPANY LTD.

SIEVE ANALYSIS

Sample No. 1218

Section CRBC Bridges (East)

Date Sampled 17-11-2000

Location J.V.C.C Camp conc plant

Sampled By A. Sif / Farman

Source Chashma

Prepared By [Signature]
21/11/2000

Contractor HYUNDAI

Sample wt. (dry) = 3024 gms 3/4" down Agg

| Sieve Size | Wt. Retained | % Retained | Cumulative % Ret. | Cumulative % Passing | Specs. | Remarks |
|------------|--------------|------------|-------------------|----------------------|--------|---------|
| 3" | | | | | | |
| 2" | | | | | | |
| 1 1/2" | | | | | | |
| 1" | | | | | | |
| 3/4" | 192 | 6.3 | 6.3 | 93.7 | | |
| 1/2" | 1850 | 61.2 | 67.5 | 32.5 | | |
| 3/8" | 1400 | 13.2 | 80.7 | 19.3 | | |
| # 4 | 514 | 17.0 | 97.7 | 2.3 | | |
| Pan | | | | | | |
| Total | | | | | | |

Sample wt. before washing = _____ gms

| | | | | | | |
|-------|----|-----|------|-----|--|--|
| # 8 | 51 | 1.7 | 99.4 | 0.6 | | |
| # 10 | | | | | | |
| # 16 | 7 | 0.2 | 99.6 | 0.4 | | |
| # 30 | 2 | 0.1 | 99.7 | 0.3 | | |
| # 40 | | | | | | |
| # 50 | | | | | | |
| # 100 | | | | | | |
| # 200 | | | | | | |
| Pan | | | | | | |
| Total | | | | | | |

Contractor M.E. [Signature]

[Signature]
Consultant M.E. _____

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY PROJECT CONTRACT-10-A
PACIFIC CONSULTANTS INTERNATIONAL**

HYUNDAI ENGINEERING & CONSTRUCTION COMPANY LTD.

BLENDING OF AGGREGATES

Sample No. 1219 To 1220

Date Sampled 17-11-2000

Sampled By Asif Juman

Prepared By [Signature]

Section C.R.B.C Bridges

Location near Camp Gora Blvd East Side

Material Source Mount Curran / Pigeon

Contractor HYUNDAI

| S. No. | Size of Aggregate mm | SIEVE ANALYSIS | | | | | | | | | | | |
|--------|----------------------|----------------|----|------|------|------|------|------|------|------|------|------|------|
| | | 1 1/2" | 1" | 3/4" | 1/2" | 3/8" | #4 | #8 | #16 | #30 | #50 | #100 | #200 |
| 1 | 3/8" Down Agg | | | | | 100 | 88.8 | 10.2 | 1.3 | 0.3 | | | |
| 2 | Sand | | | | | | 98.6 | 87.2 | 79.0 | 62.0 | 29.4 | 7.9 | 3.0 |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |

| Combined Gradation | | | | | | | | | | | | | | | |
|--------------------|---------------|------|---|--|--|-----|------|------|------|------|------|------|------|-----|-----|
| 1 | 3/8" Down Agg | 30.7 | % | | | | | 30 | 26.6 | 3.1 | 0.4 | 0.1 | | | |
| 2 | Sand | 70 | % | | | | | 70 | 69.0 | 61.0 | 55.3 | 43.4 | 20.6 | 5.5 | 2.1 |
| 3 | | | % | | | | | | | | | | | | |
| 4 | | | % | | | | | | | | | | | | |
| Specifications | 100% | | | | | 100 | 95.6 | 64.1 | 55.7 | 43.5 | 20.6 | 5.5 | 2.1 | | |
| | Mid Point | | | | | | | | | | | | | | |
| | Max Limit | | | | | | 100 | - | 85 | - | 30 | 10 | 3 | | |
| | Min. Limit | | | | | | 95 | - | 45 | - | 10 | 2 | 0 | | |

Remarks _____

Contractor M.E. [Signature]

Consultant M.E. [Signature]

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY PROJECT CONTRACT-10-A
PACIFIC CONSULTANTS INTERNATIONAL**

HYUNDAI ENGINEERING & CONSTRUCTION COMPANY LTD.

SIEVE ANALYSIS

Sample No. 1219

Section C.R.B.C. Bridges

Date Sampled 17-11-2000

Location I.V.C.C. Camp Camp Plant. (east side)

Sampled By Asif / Jinnat

Source Asphalt Crusher

Prepared By [Signature]

Contractor HYUNDAI

Sample wt. (dry) = 839.0 gms 3/8" Down Pass

| Sieve Size | Wt. Retained | % Retained | Cumulative % Ret. | Cumulative % Passing | Specs. | Remarks |
|------------|--------------|------------|-------------------|----------------------|--------|---------|
| 3" | | | | | | |
| 2" | | | | | | |
| 1 1/2" | | | | | | |
| 1" | | | | | | |
| 3/4" | | | | | | |
| 1/2" | | | | | | |
| 3/8" | NIL | NIL | NIL | 100 | | |
| # 4 | 94.0 | 11.2 | 11.2 | 88.8 | | |
| Pan | | | | | | |
| Total | | | | | | |

Sample wt. before washing = _____ gms

| | | | | | | |
|-------|-------|------|------|------|--|--|
| # 8 | 659.5 | 78.6 | 89.8 | 10.2 | | |
| # 10 | | | | | | |
| # 16 | 74.7 | 8.9 | 98.7 | 1.3 | | |
| # 30 | 8.4 | 1.0 | 99.7 | 0.3 | | |
| # 40 | | | | | | |
| # 50 | | | | | | |
| # 100 | | | | | | |
| # 200 | | | | | | |
| Pan | | | | | | |
| Total | | | | | | |

Contractor M.E. [Signature]

Consultant M.E. [Signature]

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY PROJECT CONTRACT-10-A
PACIFIC CONSULTANTS INTERNATIONAL**

HYUNDAI ENGINEERING & CONSTRUCTION COMPANY LTD.

SIEVE ANALYSIS

Sample No. 1220

Section C.R.B.C Bridges

Date Sampled 17-11-2000

Location U.C. Camp near Plot East Side

Sampled By Asif Jammal

Sand

Source Amal Canteen Pesh

Prepared By [Signature]

Contractor HYUNDAI

Sample wt. (dry) = 259.9 gms

| Sieve Size | Wt. Retained | % Retained | Cumulative % Ret. | Cumulative % Passing | Specs. | Remarks |
|--|--------------|------------|-------------------|----------------------|--------|---------|
| 3" | | | | | | |
| 2" | | | | | | |
| 1 1/2" | | | | | | |
| 1" | | | | | | |
| 3/4" | | | | | | |
| 1/2" | | | | | | |
| 3/8" | | | | | | |
| # 4 | 3.6 | 1.4 | 1.4 | 98.6 | 95-100 | |
| Pan | | | | | | |
| Total | | | | | | |
| Sample wt. before washing = gms | | | | | | |
| # 8 | 29.6 | 11.4 | 12.8 | 87.2 | | |
| # 10 | | | | | | |
| # 16 | 21.3 | 8.2 | 21.0 | 79.0 | 45-85 | |
| # 30 | 44.0 | 17.0 | 38.0 | 62.0 | | |
| # 40 | | | | | | |
| # 50 | 84.7 | 32.6 | 70.6 | 29.4 | 10-30 | |
| # 100 | 55.9 | 21.5 | 92.1 | 7.9 | 2-10 | |
| # 200 | 12.7 | 4.9 | 97.0 | 3.0 | 0-3 | |
| Pan | | | | | | |
| Total | | | | | | |

Contractor M.E. [Signature]

Consultant M.E. [Signature]

NATIONAL HIGHWAY AUTHORITY
ISLAMABAD

AA6176
T-93

Consultant: E. A. Contractor: HYUNDAI
 Project: Indus Highway Project C-10A Sample No: 1218 To 1219
 Description: 3/4" To 3/8" down Agg Date Sampled: 17-11-2001
conc plant East side

Abrasion of Coarse Aggregate
by use of Los Angeles Machine

Type of grading of test:

| Sieve Size (Square Opening) | | Weight and Grains of Test Pieces | | | |
|-----------------------------|-------------|----------------------------------|------|------|---|
| Passing | Retained on | A | B | C | D |
| 1 1/2" | 1" | 1250 | | | |
| 1" | 3/4" | 1250 | | | |
| 3/4" | 1/2" | 1250 | 2500 | | |
| 1/2" | 3/8" | 1250 | 2500 | | |
| 3/8" | No. 3 | | | 2500 | |
| No. 3 | No. 4 | | | 2500 | |
| No. 4 | NO. 8 | | | | |
| TOTAL | | 5000 | 5000 | 5000 | |

A) Weight of Sample before Test = 5000 gm.
 B) Weight of Sample after Test = (Retained on No. 12 Sieve) = 3878 gm
 C) Percentage of wear = $\frac{A-D}{A} \times 100 = 22.4\%$

Remarks:

Tested: [Signature]
 Sign: [Signature]
 Contractor: E.E.

Checked: [Signature]
 Sign: [Signature]
 Date: 25/11/2001

NATIONAL HIGHWAY AUTHORITY
ISLAMABAD

AASHTO
T-104

Consultant: E.A. Contractor: HYUNDAI
 Project: Indus Highway Project C-10A Sample No: 1218, 1219 E/side
 Description: 3/4" to 3/8" down Agg for concrete Date Sampled: 17-11-2000
 Sign: _____

Soundness of Aggregate by Use of Sodium Sulphate

| Sieve Size | Passing | Retained on | (A) | (B) | (C) | (D) | (E) | (F) |
|------------------|------------|-------------|-------------------------------------|-----------------------------------|----------------------------------|------------------------|--------------------------|------------------------------|
| | | | Grading Original Sample, % Retained | Wt. Test Fraction Before Test (g) | Wt. Test Fraction After Test (g) | Loss in wt. After Test | Actual Loss After Test % | Corrected Ave. Weight Loss % |
| Fine Aggregate | No. 100 | | | | | | | |
| | No. 50 | No. 400 | | | | | | |
| | No. 30 | No. 50 | | 100 | | | | |
| | No. 10 | No. 30 | | 100 | | | | |
| | No. 8 | No. 16 | 8.5 | 100 | 97.2 | 2.8 | 2.8 | 0.24 |
| | No. 4 | No. 8 | 59.0 | 100 | 94.7 | 5.3 | 5.3 | 3.1 |
| | No. 3/4 in | No. 4 | | 100 | | | | |
| | TOTALS | | | | | | | |
| Coarse Aggregate | 3/8 in | No. 4 | 17.0 | 300 | 289.0 | 11.0 | 3.7 | 0.62 |
| | 3/4 in | 3/8 in | 74.4 | 1000 | 985.5 | 14.5 | 1.5 | 1.08 |
| | 1 1/2 in | 3/4 in | 6.3 | 1500 | 1488.2 | 11.8 | 0.8 | 0.05 |
| | 2 1/2 in | 1 1/2 in | | 3000 | | | | |
| | | | | | | | | Total |

Note:
 D = B.C
 E = D/B x 100
 F = A x E/100

3/8 to 3/4 in. Consist of 33% 3/8 to 1/2 in. material & 67% 1/2 to 3/4 in. material
 3/4 to 1 1/2 in. Consist of 33% 3/4 to 1 in. material & 67% 1 to 1 1/2 in. material
 1 1/2 to 2 1/2 in. Consist of 50% 3/8 to 1 1/2 in. material & 50% 1 to 2 1/2 in. material

Remarks:

Tested: _____
 Sign: _____
 Contractor M.E.

Checked: _____
 Sign: _____
 Consultant M.E.

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY (N-55) PROJECT, CONTRACT NO. 10-A
CHASHMA RIGHT BANK CANAL BRIDGES
PACIFIC CONSULTANTS INTERNATIONAL**

COMPRESSIVE STRENGTH TEST

Sample No.: 1309 Section: C.R.B.C Bridge
 Date of Sampled: 05-12-2000 Location: Bridge # 1
 Type of Sample: A-1 Structure Component: Span # 3
 Cement Brand: D.G cement Contractor: HYUNDAI
 Sampled by: Ms Farooq / Ms Ahsan Khan Tested by: [Signature]

DESIGN MIX DATA

| | | | | |
|------------------------|-----------|-----------------------|--------|-------------------|
| Time Sampled | 1159 1000 | Wt/Vol. of 19 mm Agg. | 87 | Kg/c ³ |
| Slump | 115 mm | Wt/Vol. of 25 mm Agg. | — | Kg/c ³ |
| Tem. of Mix | 19 oC | Wt/Vol. of 19 mm Agg. | 435 | Kg/c ³ |
| Ambient Temp | 29 oC | Wt/Vol. of Sand | 203 | Kg/c ³ |
| Water Cement Ratio | 0.51 | Wt/Vol. of Cement | 160 | Kg/c ³ |
| Admixture Plastiment R | 0.801 | Wt/Vol. of Water | 81.40% | Kg/c ³ |

TEST DATA

| Sample No. | Date Sampled | Date Tested | Age (Days) | Sample Size (Cm) | Cross Sectional Area (Cm ²) | Breaking Load (Kg) | Corrected Breaking Load (Kg) | Strength Kg/Cm ² | Design Strength Kg/Cm ² |
|------------|--------------|-------------|------------|------------------|---|--------------------|------------------------------|-----------------------------|------------------------------------|
| 1309 A | 05-12-2000 | 12-12-2000 | 7 days | 15.25/31.1 | 182.7 | 37,000 | 3650 | 201 | 2.426 |
| B | " | " | " | 15.25/31.0 | " | 36,000 | 35601 | 195 | 2.421 |
| C | " | " | " | 15.25/30.9 | " | 32,000 | 31500 | 172 | 2.432 |
| | | | | | | Average | | 189 | |
| 1309 D | 05-12-2000 | 02-01-2001 | 28 days | 15.26/31.1 | 183.0 | 48,000 | 47673 | 261 ✓ | 2.418 |
| E | " | " | " | 15.25/31.0 | 182.7 | 45,000 | 44711 | 245 ✓ | 2.428 |
| F | " | " | " | 15.26/30.9 | 183.0 | 42,000 | 41747 | 228 ✓ | 2.436 |
| | | | | | | Average | | 245 | |

Remarks:

Contractor M.E. [Signature]

Consultants M.E. [Signature]

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY (N-55) PROJECT, CONTRACT NO. 10-A
CHASHMA RIGHT BANK CANAL BRIDGES
PACIFIC CONSULTANTS INTERNATIONAL**

COMPRESSIVE STRENGTH TEST

Sample No.: 1193 Section: C.R.B.C Bridges
 Date of Sampled: 11/11/00 Location: Bridge # 4
 Type of Sample: class A-1 Structure Component: Deck slab span #
 Cement Brand: D. G. cement Contractor: HYUNDAI CP
 Sampled by: ASIF/Zahed Tested by: _____

DESIGN MIX DATA

| | | | | |
|-----------------------|-----------------|-----------------------|--------------|-------|
| Time Sampled | <u>15.00.00</u> | Wt/Vol. of 19 mm Agg. | <u>218</u> | Kg/ee |
| Slump | <u>160 mm</u> | Wt/Vol. of 25 mm Agg. | <u>—</u> | Kg/ee |
| Tem. of Mix | <u>25 oC</u> | Wt/Vol. of 19 mm Agg. | <u>1088</u> | Kg/ee |
| Ambient Temp | <u>32 oC</u> | Wt/Vol. of Sand | <u>508</u> | Kg/ee |
| Water Cement Ratio | <u>0.51</u> | Wt/Vol. of Cement | <u>400</u> | Kg/ee |
| Admixture placement-R | <u>2.0 l</u> | Wt/Vol. of Water | <u>203.7</u> | Kg/ee |

TEST DATA

| Sample No. | Date Sampled | Date Tested | Age (Days) | Sample Size (Cm) | Cross Sectional Area (Cm ²) | Breaking Load (Kg) | Corrected Breaking Load (Kg) | Strength Kg/Cm ² | Design Strength Kg/Cm ² |
|---------------|-----------------|-----------------|----------------|-------------------|---|--------------------|------------------------------|-----------------------------|------------------------------------|
| <u>1193 A</u> | <u>11/11/00</u> | <u>18/11/00</u> | <u>7-Days</u> | <u>15.24/31.1</u> | <u>182.4</u> | <u>44000</u> | <u>43724</u> | <u>240</u> | <u>2.436</u> |
| <u>1193 B</u> | <u>"</u> | <u>"</u> | <u>"</u> | <u>15.26/31.2</u> | <u>183.0</u> | <u>41000</u> | <u>40759</u> | <u>223</u> | <u>2.440</u> |
| <u>1193 C</u> | <u>"</u> | <u>"</u> | <u>"</u> | <u>15.25/31.0</u> | <u>182.7</u> | <u>43000</u> | <u>42736</u> | <u>234</u> | <u>2.446</u> |
| | | | | | | Average | | <u>232</u> | |
| <u>1193 D</u> | <u>11/11/00</u> | <u>9/12/00</u> | <u>28-Days</u> | <u>15.24/30.1</u> | <u>182.4</u> | <u>52,000</u> | <u>51630</u> | <u>283</u> | <u>2.459</u> |
| <u>1193 E</u> | <u>"</u> | <u>"</u> | <u>"</u> | <u>15.23/30.2</u> | <u>182.2</u> | <u>50,000</u> | <u>49646</u> | <u>272</u> | <u>2.446</u> |
| <u>1193 F</u> | <u>"</u> | <u>"</u> | <u>"</u> | <u>15.24/30.5</u> | <u>182.4</u> | <u>49,000</u> | <u>48659</u> | <u>267</u> | <u>2.429</u> |
| | | | | | | Average | | <u>274</u> | |

Remarks:

Contractor M.E. Asif

Consultants M.E. Zahed

**NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY (N-55) PROJECT, CONTRACT NO. 10-A
CHASHMA RIGHT BANK CANAL BRIDGES
PACIFIC CONSULTANTS INTERNATIONAL**

COMPRESSIVE STRENGTH TEST

Sample No.: 1254

Section: CRBC Bridges

Date of Sampled: 23-11-2000

Location: Bridge #4

Type of Sample: A-1

Structure Component: Deck Slab Span #2

Cement Brand: D.G cement

Contractor: HYUNDAI Grid #2

Sampled by: Mr. Forooq

Tested by: [Signature]

DESIGN MIX DATA

| | | | | |
|--------------------------|---------|-----------------------|----------|-------|
| Time Sampled | 1000 | Wt/Vol. of 19 mm Agg. | 87 | Kg/cc |
| Slump | 75 mm | Wt/Vol. of 25 mm Agg. | - | Kg/cc |
| Tem. of Mix | 18 oC | Wt/Vol. of 19 mm Agg. | 435 | Kg/cc |
| Ambient Temp | 23 oC | Wt/Vol. of Sand | 203 | Kg/cc |
| Water Cement Ratio | 0.50 | Wt/Vol. of Cement | 160 | Kg/cc |
| Mixture Proportion R_s | 0.8 lit | Wt/Vol. of Water | 81.4 lts | Kg/cc |

TEST DATA

| Sample No. | Date Sampled | Date Tested | Age (Days) | Sample Size (Cm) | Cross Sectional Area (Cm ²) | Breaking Load (Kg) | Corrected Breaking Load (Kg) | Strength Kg/Cm ² | Design Strength Kg/Cm ² |
|------------|--------------|-------------|------------|------------------|---|--------------------|------------------------------|-----------------------------|------------------------------------|
| 1254 A | 23-11-2000 | 30-11-2000 | 7 days | 15.24/31.1 | 182.4 | 30000 | 29457 | 161 | 2.429 |
| B | 4 | 4 | 4 | 15.25/31.0 | 182.7 | 36000 | 35601 | 195 | 2.418 |
| C | 4 | 4 | 4 | 15.26/31.1 | 183.0 | 38000 | 37688 | 206 | 2.436 |
| Average | | | | | | | | 187 | |
| 1254 D | 23-11-2000 | 21-12-2000 | 28 days | 15.23/30.1 | 182.2 | 45000 | 44711 | 245 | 2.435 |
| F | 4 | 4 | 4 | 15.23/30.2 | 182.2 | 43000 | 42736 | 235 | 2.415 |
| F | 4 | 4 | 4 | 15.23/30.1 | 182.2 | 47000 | 46686 | 256 | 2.430 |
| Average | | | | | | | | 245 | |

Remarks:

Contractor M.E. [Signature]

Consultants M.E. [Signature]

NATIONAL HIGHWAY AUTHORITY
INDUS HIGHWAY (N-55) PROJECT, CONTRACT NO. 10-A
CHASHMA RIGHT-BANK CANAL BRIDGES
PACIFIC CONSULTANTS INTERNATIONAL

COMPRESSIVE STRENGTH TEST

Sample No.: 1293

Section: C.R.B.C Bridges

Date of Sampled: 01-12-2000

Location: Bridge # 4

Type of Sample: A-1

Structure Component: Deck Slab Span #3

Cement Brand: D.G cement

Contractor: HYUNDAI

Sampled by: M. Farooq / Asad Khan

Tested by: [Signature]

DESIGN MIX DATA

| | | | | |
|-------------------------------|--------------|-----------------------|---------------|-------------------|
| Time Sampled | 1005-1000 | Wt/Vol. of 19 mm Agg. | 87 | Kg/c ³ |
| Slump | 145 mm | Wt/Vol. of 25 mm Agg. | - | Kg/c ³ |
| Tem. of Mix | 17 °C | Wt/Vol. of 19 mm Agg. | 435 | Kg/c ³ |
| Ambient Temp | 29 °C | Wt/Vol. of Sand | 203 | Kg/c ³ |
| Water Cement Ratio | | Wt/Vol. of Cement | 160 | Kg/c ³ |
| Admixture <u>Plastiment R</u> | <u>0.80%</u> | Wt/Vol. of Water | <u>81.40%</u> | Kg/c ³ |

TEST DATA

| Sample No. | Date Sampled | Date Tested | Age (Days) | Sample Size (Cm) | Cross Sectional Area (Cm ²) | Breaking Load (Kg) | Corrected Breaking Load (Kg) | Strength Kg/Cm ² | Design Strength Kg/Cm ² |
|------------|--------------|-------------|------------|------------------|---|--------------------|------------------------------|-----------------------------|------------------------------------|
| 1293 A | 01-12-2000 | 08-12-2000 | 7 days | 15.24/30.9 | 182.4 | 35000 | 34582 | 190 | 2.426 |
| B | " | " | " | 15.25/31.0 | 182.7 | 34,000 | 33552 | 184 | 2.418 |
| C | " | " | " | 15.26/31.1 | 183.0 | 35,000 | 34582 | 189 | 2.436 |
| Average | | | | | | | | 188 | |
| 1293 D | 01-12-2000 | 1-1-2001 | 88 days | 15.25/31.0 | 182.7 | 43000 | 42736 | 234 | 2.425 |
| E | " | " | " | 15.24/30.9 | 182.4 | 46000 | 45699 | 251 | 2.428 |
| F | " | " | " | 15.26/31.1 | 183.0 | 46000 | 45699 | 250 | 2.436 |
| Average | | | | | | | | 245 | |

Remarks:

Contractor M.E. [Signature] Consultants M.E. [Signature]



ORIGINAL

Serial No. 1

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 5.2 |
| Structure | Deck slab sp#03 | Temperature (at BP) | 12C |
| Vehicle No. | LOK 2601 | Temperature (at Site) | 16C |
| Time Starting (Mixing) | 0830 | Slump (at Site) | 180 MM |
| Time departure (From BP) | 0845 | Slump (at BP) | 130 MM |
| Time Arrival (Site) | 0903 | | |

D. Usal

PCI REPRESENTATIVE

r7. Yachya

HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 2

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 01 | Running Qty | 10.4 M ³ |
| Structure | Deck slab Span#03 | Temperature (at BP) | 12C |
| Vehicle No. | C 1263 | Temperature (at Site) | 16C |
| Time Starting (Mixing) | 0848 | Slump (at Site) | 150 MM |
| Time departure (From BP) | 0903 | Slump (at BP) | 170 MM |
| Time Arrival (Site) | 0925 | | |

D. Usal

PCI REPRESENTATIVE

r7. Yachya

HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 3

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 4 M ³ |
| Bridge No. | 01 | Running Qty | 14.4 M ³ |
| Structure | Deck slab sp#03 | Temperature (at BP) | 13C |
| Vehicle No. | LOK 2604 | Temperature (at Site) | 16C |
| Time Starting (Mixing) | 0905 | Slump (at Site) | 140 MM |
| Time departure (From BP) | 0917 | Slump (at BP) | 175 MM |
| Time Arrival (Site) | 0934 | | |

D. Usal

PCI REPRESENTATIVE

r7. Yachya

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-19-2000 | Qty this trip | 5.2 |
| Bridge No. | 1 | Running Qty | 19.8 |
| Structure | Deck Slab Span #3 | Temperature (at BP) | 14 C |
| Vehicle No. | LOK 2801 | Temperature (at Site) | 17 C |
| Time Starting (Mixing) | 0950 | Slump (at Site) | 135 MM |
| Time departure (From BP) | 1005 | Slump (at BP) | 150 MM |
| Time Arrival (Site) | 1022 | | |

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CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 24.8 |
| Structure | Deck Slab Span #3 | Temperature (at BP) | 14 C |
| Vehicle No. | LOK 2805 | Temperature (at Site) | 17 C |
| Time Starting (Mixing) | 1005 | Slump (at Site) | 180 MM |
| Time departure (From BP) | 1020 | Slump (at BP) | 140 MM |
| Time Arrival (Site) | 1041 | | |

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CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 30.0 |
| Structure | Deck Slab Span #3 | Temperature (at BP) | 15 C |
| Vehicle No. | E-1283 | Temperature (at Site) | 17 C |
| Time Starting (Mixing) | 1025 | Slump (at Site) | 180 MM |
| Time departure (From BP) | 1040 | Slump (at BP) | 150 MM |
| Time Arrival (Site) | 1057 | | |

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HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 7

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 4.0 |
| Bridge No. | 01 | Running Qty | 34.0 |
| Structure | Deck slab of #03 | Temperature (at BP) | 15°C |
| Vehicle No. | Lok 2604 | Temperature (at Site) | 18°C |
| Time Starting (Mixing) | 10:40 | Slump (at Site) | 125 MM |
| Time departure (From BP) | 10:58 | Slump (at BP) | 140 MM |
| Time Arrival (Site) | 11:14 | | |

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ORIGINAL

Serial No. 8

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 39.2 |
| Structure | Deck slab of #03 | Temperature (at BP) | 17°C |
| Vehicle No. | Lok 2601 | Temperature (at Site) | 19°C |
| Time Starting (Mixing) | 11:18 | Slump (at Site) | 115 MM |
| Time departure (From BP) | 11:32 | Slump (at BP) | 150 MM |
| Time Arrival (Site) | 11:50 | | |

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PCI REPRESENTATIVE

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HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 9

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 44.4 |
| Structure | Deck slab of #03 | Temperature (at BP) | 18°C |
| Vehicle No. | 01263 | Temperature (at Site) | 19°C |
| Time Starting (Mixing) | 11:50 | Slump (at Site) | 130 MM |
| Time departure (From BP) | 12:05 | Slump (at BP) | 160 MM |
| Time Arrival (Site) | 12:18 | | |

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HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 10

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|---------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 49.6 |
| Structure | Deck slab SF#03 | Temperature (at BP) | 18.00 |
| Vehicle No. | LOK 2605 | Temperature (at Site) | 20.0 |
| Time Starting (Mixing) | 1205 | Slump (at Site) | 120 MM. |
| Time departure (From BP) | 1220 | Slump (at BP) | 150 MM |
| Time Arrival (Site) | 1234 | | |

Bullseye
PCI REPRESENTATIVE

M. Yehya
HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 11

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 4.0 |
| Bridge No. | 01 | Running Qty | 53.6 |
| Structure | Deck slab SF#03 | Temperature (at BP) | 18.00 |
| Vehicle No. | LOK 2604 | Temperature (at Site) | 21.0 |
| Time Starting (Mixing) | 1220 | Slump (at Site) | 135 mm |
| Time departure (From BP) | 1230 | Slump (at BP) | 160 mm |
| Time Arrival (Site) | 1246 | | |

Bullseye
PCI REPRESENTATIVE

M. Yehya
HYUNDAI REPRESENTATIVE



ORIGINAL

Serial No. 12

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 05-12-2000 | Qty this trip | 5.2 |
| Bridge No. | 01 | Running Qty | 58.8 |
| Structure | Deck slab SF#03 | Temperature (at BP) | 19.00 |
| Vehicle No. | LOK 2601 | Temperature (at Site) | 21.0 |
| Time Starting (Mixing) | 1305 | Slump (at Site) | 135 mm |
| Time departure (From BP) | 1320 | Slump (at BP) | 155 mm |
| Time Arrival (Site) | 1335 | | |

Bullseye

M. Yehya

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | | |
| date | 05-12-2000 | Plant No. | 1 |
| Bridge No. | 01 | Qty this trip | 5.2 |
| Structure | Deck slab sp#03 | Running Qty | 64.0 |
| Vehicle No. | C-1263 | Temperature (at BP) | 19°C |
| Time Starting (Mixing) | 1325 | Temperature (at Site) | 21°C |
| Time departure (From BP) | 1340 | Slump (at Site) | 140 |
| Time Arrival (Site) | 1359 | Slump (at BP) | 165 mm |

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CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | | |
| date | 05-12-2000 | Plant No. | 1 |
| Bridge No. | 01 | Qty this trip | 5.2 |
| Structure | Deck slab sp#03 | Running Qty | 69.2 |
| Vehicle No. | LoK 2605 | Temperature (at BP) | 20°C |
| Time Starting (Mixing) | 1410 | Temperature (at Site) | 21°C |
| Time departure (From BP) | 1425 | Slump (at Site) | 140mm |
| Time Arrival (Site) | 1442 | Slump (at BP) | 160 mm |

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CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-----------------|-----------------------|--------|
| CLASS OF CONCRETE | A-1 | | |
| date | 05-12-2000 | Plant No. | 1 |
| Bridge No. | 01 | Qty this trip | 5.6 |
| Structure | Deck slab sp#03 | Running Qty | 74.8 |
| Vehicle No. | LoK 2601 | Temperature (at BP) | 20°C |
| Time Starting (Mixing) | 1440 | Temperature (at Site) | 22°C |
| Time departure (From BP) | 1455 | Slump (at Site) | 145 mm |
| Time Arrival (Site) | 1513 | Slump (at BP) | 165 mm |

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HYUNDAI
Engineering & Construction Co. Ltd.

ORIGINAL

Serial No. 1

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 4 | Running Qty | 5.2 M ³ |
| Structure | Deck Slab Span# 2 | Temperature (at BP) | 15°C |
| Vehicle No. | Lok 8601 | Temperature (at Site) | 18°C |
| Time Starting (Mixing) | 0831 | Slump (at Site) | 160mm |
| Time departure (From BR) | 0847 | Slump (at BP) | 175mm |
| Time Arrival (Site) | 0915 | | |

James
PCI REPRESENTATIVE

James Kim
HYUNDAI REPRESENTATIVE



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Serial No. 2

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 4 | Running Qty | 10.4 M ³ |
| Structure | Deck Slab Span# 2 | Temperature (at BP) | 16°C |
| Vehicle No. | Lok 8605 | Temperature (at Site) | 18°C |
| Time Starting (Mixing) | 0854 | Slump (at Site) | 155mm |
| Time departure (From BP) | 0912 | Slump (at BP) | 165mm |
| Time Arrival (Site) | 0950 | | |

James
PCI REPRESENTATIVE

James Kim
HYUNDAI REPRESENTATIVE



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ORIGINAL

Serial No. 3

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 4 | Running Qty | 15.6 M ³ |
| Structure | Deck Slab Span# 2 | Temperature (at BP) | 16°C |
| Vehicle No. | C-1863 | Temperature (at Site) | 19°C |
| Time Starting (Mixing) | 0917 | Slump (at Site) | 160mm |
| Time departure (From BP) | 0932 | Slump (at BP) | 170mm |
| Time Arrival (Site) | 1005 | | |



HYUNDAI
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ORIGINAL

Serial No. 4

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 52M ³ |
| Bridge No. | 4 | Running Qty | 20.8M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 16°C |
| Vehicle No. | LOK 2601 | Temperature (at Site) | 18°C |
| Time Starting (Mixing) | 1000 | Slump (at Site) | 180mm |
| Time departure (From BP) | 1018 | Slump (at BP) | 175mm |
| Time Arrival (Site) | 1050 | | |

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PCI REPRESENTATIVE

[Signature]

HYUNDAI REPRESENTATIVE



HYUNDAI
Engineering & Construction Co., Ltd.

ORIGINAL

Serial No. 5

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|--------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 52M ³ |
| Bridge No. | 4 | Running Qty | 26.0M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 16°C |
| Vehicle No. | LOK 2605 | Temperature (at Site) | 19°C |
| Time Starting (Mixing) | 0959 1030 | Slump (at Site) | 148mm |
| Time departure (From BP) | 1045 | Slump (at BP) | 155mm |
| Time Arrival (Site) | 1115 | | |

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PCI REPRESENTATIVE

[Signature]

HYUNDAI REPRESENTATIVE



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Engineering & Construction Co., Ltd.

ORIGINAL

Serial No. 6

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | 1 |
| date | 23-11-2000 | Qty this trip | 52M ³ |
| Bridge No. | #4 | Running Qty | 31.2 M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 16°C |
| Vehicle No. | C 1263 | Temperature (at Site) | 20°C |
| Time Starting (Mixing) | 1048 | Slump (at Site) | 160mm |
| Time departure (From BP) | 1104 | Slump (at BP) | 175 |
| Time Arrival (Site) | 1135 | | |

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PCI REPRESENTATIVE

[Signature]

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ORIGINAL
Serial No. 7

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | | H-1 | |
| date | 23-11-2000 | Plant No. | 18 |
| Bridge No. | 4 | Qty this trip | 5.2 M ³ |
| Structure | Deck Slab Span#2 | Running Qty | 36.4 M ³ |
| Vehicle No. | LoK 2601 | Temperature (at BP) | 17°C |
| Time Starting (Mixing) | 11:31 | Temperature (at Site) | 20°C |
| Time departure (From BP) | 11:48 | Slump (at Site) | 135mm |
| Time Arrival (Site) | 12:30 | Slump (at BP) | 145mm |

[Signature]
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Engineering & Construction Co., Ltd.

ORIGINAL

Serial No. 8

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | | H-1 | |
| date | 23-11-2000 | Plant No. | 18 |
| Bridge No. | 4 | Qty this trip | 5.2 M ³ |
| Structure | Deck Slab Span#2 | Running Qty | 41.6 M ³ |
| Vehicle No. | LoK 2605 | Temperature (at BP) | 17°C |
| Time Starting (Mixing) | 12:13 | Temperature (at Site) | 19°C |
| Time departure (From BP) | 12:29 | Slump (at Site) | 155mm |
| Time Arrival (Site) | 13:00 | Slump (at BP) | 175mm |

[Signature]
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[Signature]
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Engineering & Construction Co., Ltd.

ORIGINAL

Serial No. 9

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | | H-1 | |
| date | 23-11-2000 | Plant No. | 18 |
| Bridge No. | 4 | Qty this trip | 5.2 M ³ |
| Structure | Deck Slab Span#2 | Running Qty | 46.8 M ³ |
| Vehicle No. | C 1263 | Temperature (at BP) | 18°C |
| Time Starting (Mixing) | 12:39 | Temperature (at Site) | 20°C |
| Time departure (From BP) | 12:55 | Slump (at Site) | 150mm |
| Time Arrival (Site) | 13:28 | Slump (at BP) | 165mm |

[Signature]
PCI REPRESENTATIVE

[Signature]
HYUNDAI REPRESENTATIVE



HYUNDAI
Engineering & Construction Co.Ltd.

ORIGINAL

Serial No. 10

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | |
| date | 23-11-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 4 | Running Qty. | 52.0 M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 18°C |
| Vehicle No. | LOK 2601 | Temperature (at Site) | 19°C |
| Time Starting (Mixing) | 12:59 | Slump (at Site) | 145mm |
| Time departure (From BP) | 13:15 | Slump (at BP) | 160mm |
| Time Arrival (Site) | 13:50 | | |

Graver

PCI REPRESENTATIVE

[Signature]

HYUNDAI REPRESENTATIVE



HYUNDAI
Engineering & Construction Co.Ltd.

ORIGINAL

Serial No. 11

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | |
| date | 23-11-2000 | Qty this trip | 5.2 M ³ |
| Bridge No. | 4 | Running Qty. | 57.8 M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 19°C |
| Vehicle No. | LOK 2605 | Temperature (at Site) | 20°C |
| Time Starting (Mixing) | 13:54 | Slump (at Site) | 150mm |
| Time departure (From BP) | 14:10 | Slump (at BP) | 165mm |
| Time Arrival (Site) | 14:45 | | |

Graver

PCI REPRESENTATIVE

[Signature]

HYUNDAI REPRESENTATIVE



HYUNDAI
Engineering & Construction Co.Ltd.

ORIGINAL

Serial No. 12

CONCRETE POURING SLIP

Indus Highway (N-55), Phase II, Contract 10A, CRBC Bridges

| | | | |
|--------------------------|-------------------|-----------------------|---------------------|
| CLASS OF CONCRETE | A-1 | Plant No. | |
| date | 23-11-2000 | Qty this trip | 4.4 M ³ |
| Bridge No. | 4 | Running Qty. | 61.6 M ³ |
| Structure | Deck Slab Span #2 | Temperature (at BP) | 19°C |
| Vehicle No. | C 1263 | Temperature (at Site) | 20°C |
| Time Starting (Mixing) | 14:13 | Slump (at Site) | 180mm |
| Time departure (From BP) | 14:27 | Slump (at BP) | 165mm |
| Time Arrival (Site) | 15:10 | | |

Graver

[Signature]