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Notes of the meeting held on Tuesday, the 30th January 1979 at 3.30 pm
in the office of the Permanent Secretary, Ministry of Works.

Present:

Mr D. Ramyeed, Permanent Secretary (Chairman)
Mr C.H. Mangua of the African Development Bank
Mr Hirokazu Ito, Leader of } the Japanese Survey Team
Mr Ko Kuwata, Member } " " " "
Mr Yutaka Iida, Supervisor } " " " "
Mr Hisnashi Fujishita, }
Coordinator) " " " "
Mr E. Norton, Principal Assistant Secretary } Ministry of
Mr I. Limbada, Chief Engineer } Works
Mr D. Rajahgopal, Principal Engineer }

Mr G. Dulloo, Administrative Officer } Ministry of
Mr R. Duverge, Deputy Surveyor } Housing, Lands & Town &
Country Planning
Mrs A. Bellepeau, Administrative Officer (Secretary)

1. The Chairman welcomed the persons present and informed them that Mr Mangua was on mission in Mauritius to review the progress made in connection with the various projects financed by the African Development Bank.
2. The Chairman said that as the detailed engineering studies of the Beau Bassin to Port Louis Link Road were being financed by the Japanese Government through the African Development Bank; opportunity was being taken to apprise Mr Mangua of the latest developments in connection with that project.
3. Mr Limbada said that the detailed survey had started and that a Japanese Survey Team was in Mauritius for that purpose. The Japanese proposed to undertake cross sections, every 100 metres, along the proposed alignment of the link road and it was expected that they would have to enter on private land to carry out that exercise.
4. Mr Limbada added that crops could be damaged in that process and claims for compensation received. He therefore, asked the advice of the officers of the Ministry of Housing on the best way to tackle the problem.
5. Mr Duverge said that he could foresee no problem as far as lands belonging to Madine S.S and to the other big land owners were concerned. He suggested that the Chief Engineer contact the managers of those estates and ask for their permission to enter the lands; it being made clear that any reasonable claim for damages caused to the crops would be settled by the Government.
6. Mr Duverge agreed to Mr Limbada's suggestion that Mr Bahadoor, the surveyor attached to the Ministry of Works, be requested to likewise contact the small land owners. Should any difficulty be experienced in that connexion, the Ministry of Housing would under the Lands Ordinance - issue a press notice informing those owners that it was proposed to carry out a survey. It will be possible for the surveyors to enter the private lands fifteen days after the issue of such notice without having to obtain the permission of the owners.

7. Mr Limbada then invited the attention of the officers of the Ministry of Housing to the need to start with the procedure for the acquisition of land for the construction of the link road as early as possible.
8. According to Mr Limbada almost 40% of the land required in that connection was privately owned land. Mr Duverge said that it was too early to say whether the survey work would be undertaken by the officers of his Ministry or by private surveyors.
9. The Chairman said that, in about three months time, the actual extent of land which would be required for the construction of the road would be known. On the assumption that the project was approved, land acquisition procedure should start simultaneously with the detailed engineering studies.
10. The Chairman thanked the officers of the Ministry of Housing for their assistance and they left the meeting.
11. Mr Limbada said that the first part of the survey exercise (that is the aerial survey) had already been done and that the Japanese team was presently engaged in the ground survey. The land survey was expected to be completed in two or three months.
12. The detailed engineering design study was expected to be completed by the end of December 1979.
13. If the project is approved, the prospective contractors would be invited in November 1979 - to apply for prequalification. When the tender documents would be ready - by March or April 1980 - the formal tenders would be invited. It was expected that construction works would start by October 1980 and that the construction works would take about 24 months.
14. It was suggested that there should be two separate contracts for the project:
- one contract for the structures such as the bridges and interchanges; and
 - the other one would be for the construction of the road itself.
15. That suggestion was retained and it was noted that nothing would prevent one contractor from applying for (and obtaining) the two different contracts, if he proved that he had sufficient executive capacity.
16. Mr Limbada then referred to the evaluation of the bids which would be received for the construction of the link road.
17. The Chief Engineer said that he had understood from the Japanese that they would not be involved in that exercise. He suggested that a request should be made to the Japan International Cooperation for the services of its experts to be made available to assist in the evaluation of the bids.
18. Mr Mangua suggested that the Japanese Government be approached in that connection. He said that the African Development Bank would support such a request.

19. The question of the supervision of the construction works was also discussed. Mr Limbada was of the opinion that the supervision should best be done by the organisation to whom the design of the road had been entrusted - that is the Japan International Cooperation Agency.

20. Mr Mangua shared that opinion and said that, if the Japanese Government was unable to supervise the construction works under their technical assistance scheme, it would perhaps be possible for the J.I.C.A. to act as an independent body for the supervision contract even against payment of a fee.

21. It was therefore agreed that a formal approach would be made to the Japanese Government for the services of the Japanese experts either in the form of a grant or against payment.

22. Mr Mangua said that the African Development Bank would be prepared to pay for the services of the Japanese Agency.

23. Mr Mangua noted that the estimated cost of constructing the link road was Rs 94.5 million and prefinancing would be required by mid- 1980.

Ministry of Works
2nd February, 1979

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CONFIRMATIONS

1. At the meeting with Mr. I.A. Limbada, Chief Engineer and Mr. S. Rajah Gopal, the coordinating engineer on the Inception Report and others at Ministry of Works Office on January 22 to February, 1979, the following were discussed and defined.

1.1. Regarding the paragraph III-2, the development plan for Pointe aux Sables area is under preparation by Australian Consultants and the feasibility study on Port Louis Ring Road by French Consultant ~~respectively~~. The draft reports for both projects will not be available before September 1979, ^{and} therefore both junctions shall be planned on the basis of the feasibility study provided by the Japanese missions.

1.2. The complaint of the inhabitants adjoining the Hindu Temple between Darkly junction and St. Martin Junction as to the proximity of the proposed link road shall be dealt with by the Mauritian Authorities.

1.3. All requisite actions for acquiring the right of way and indemnifications for evacuation and expropriation shall be carried out according to the land utilization plans of the Government of Mauritius.

1.4. Regarding the paragraph III-3-10, designs for bridges and road crossing structures B.S. 153, Type HA loading shall be used for live load and checked for 30 units (120 tons) of HA loading.

1.5. Regarding para III-3-14, tender documents shall be prepared^e and presented in the same form as for previous highway projects undertaken by the Government of Mauritius.

1.6. Regarding Para 3 on the requisition and questionnaire, working drawings shall be made on A1 size paper. For tendering purposes A3 size reproductions shall be used.

1.7. Unit prices for each type of land for land rights will be estimated by officials of Ministry of Housing, Lands, Town & Country Planning according to the land utilisation plans.

1.8. Data for construction material is available in the area, salaries and wages of local employees, Taxes, Labour Laws, Laws and Regulations for the use of explosive will be prepared by officials of the Ministry of Works.

1.9. The following scales shall be used in the preparation of drawings:-

Longitudinal profile: Horizontal scale 1: 1000

Vertical scale 1: 200 (instead of 1:100)

Cross-Sections : 1:200 (instead of 1:100)

1.10 All dimensions shall be in metric units.

1.11 The right of way shall include a width of 4 metres from the outer edge of structures.

No building construction shall be allowed within a distance of 15 metres from the edge of the carriageway.

1.12 The length of the climbing lane shall be decided on the basis of the capacity of heavy vehicles, during the detailed design stage.

1.13 Splays as wide as possible shall be provided at Beau Bassin Roundabout. The planning of the roundabout shall avoid the Bank building otherwise heavy compensation may have to be paid.

1.14 The cost for relocating existing water pipes, specially for the site between Beau Bassin and Barkly junction shall be negotiated with the authority concerned by officials of Ministry of Works.

1.15 The cost for relocating existing unnoticeable underground utilities shall be excluded from the cost estimates for the road construction project.

1.16 The location of service roads as discussed when examining the alignment plan is accepted, the width of the service road shall be 2.5 metres with proper passing bays.

1.17 The width of over bridge for pedestrians at Hindu Temple shall be 2.4 metres.

1.18 1.2 metre for pedestrians in the width of crossing box culverts shall be secured.

1.19 Guardrails, but not guardables, shall be provided on embankments higher than 3 metres. The type of guardrail shall be optional.

1.20 The different classes of concrete used in the works shall be defined in the Technical Specifications.

1.21 The proposed alignment of the road, the general layout of the interchange at the Motorway Junction and the grade separated Rotary Intersection at Corbmandel are accepted.

Near St. Louis Power Station, a vehicular overbridge shall be provided if possible as the nearby village is cut into 2 parts by the proposed link road.

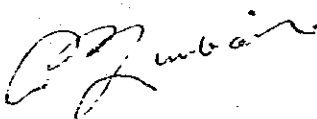
1.22 For the purpose of connecting the road with the proposed Port Louis Ring Road, the end of the road shall be extended about 50 metres in length beyond the crossing with Moka road.

1.23 For getting into private land by the crews of survey and boring teams, official notices shall be served in advance.

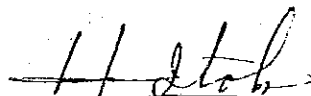
1.24 The size of iron peg for surveying of alignment shall be 16 mm in diameter and 30 cm to 60 cm in length, the size of concrete posts shall be 12 cm square with a length of 1 metre.

1.25 A Liaison Officer of the government for the construction project shall be appointed in due course.

1.26 It will take about two months for the evaluation of tenders and two months for the mobilization of the Contractor.



I. A. LIMBADA
Chief Engineer
Ministry of Works
Mauritius.



H. ITO
Team Leader
The Beau Bassin-Port Louis
Link Road Project

THE BEAU HASSIN-PORT LOUIS LINK ROAD

MINUTES OF PROCEEDINGS

(Bridge Team)

From 17th Sept., to 4th Oct. 1979

8th OCTOBER, 1979

8th October, 1979.

C O N F I R M A T I O N S

At the meeting with Mr. I. A. Limbada, Chief Engineer, and Mr. Ramjan, the Coordinating Engineer, from 17th Sept., to 4th October, 1979, at the Ministry of Works Office in Phoenix, about technical proposals and other matters, the following points were discussed and defined.

1. Roads and Interchanges

1. Vertical Alignment is approved.

2. Plan is approved.

3. Cross Section is approved.

Side slope in the cut section is made with 1 in 1 in spite of soil condition because of the balance of cut and fill.

4. It is requested that the vertical clearance be changed from 5.50m to 5.10m unless it causes much revision works.

5. It is requested that the ramp from the trunk road climbing up to A₁ road at 'S' Hill shall have two lanes if possible.

6. The temporary road as a detour during the A₁ bridge construction at 'S' Hill may have three lanes if possible.

7. It is not necessary to connect the ramps of the interchange with private roads.

8. Drainage and Irrigation channel

a) Design criteria is approved.

b) Diversion of irrigation channels and drainage system are approved.

c) Catch pits shall be provided at the junctions of ditches and irrigation channels.

9. Culvert

a) Design criteria of Box Culverts and Pipe Culverts are approved.

Surcharge for Box Culvert shall be 37.5 units of HS Loading.

HS Loading

45 units 20 KN/m² surcharge

25 units 10 KN/m²

therefore,

37.5 units 16.25 KN/m²

10. Lighting at the interchange

Design of the lighting shall be of grade B (Lowest Category)

Grade 0: Lights are provided only near noses.

Mercury-vapour lamps shall be installed as source of lighting.

Light dimmer: Lighting shall be decreased by half to save electricity as less traffic is expected at night.

Lighting system:

In general, dispersion lighting system by taper pole street light is taken into account.

Power source:

Distribution voltage,

230 V ($\pm 6\%$) single-phase

400 V ($\pm 6\%$) 3 -phase

Incoming high voltage,

6600 V or 22000 V or 66000 V

Frequency,

50 HZ

Power source service:

Point of power source service is preferably set near interchange.

Power distribution to the service point shall be done by the Government.

11. Miscellaneous

a) Existing 'S' Hill junction

The improvement of the junction so as to simplify the design and construction of the A_1 bridge is approved.

b) An overcrossing bridge near St. Louis power station is changed to an undercrossing box culvert.

c) Stage construction of motorway junction is basically approved. Namely, the through road connecting with the Port Louis Ring Road shall be constructed at the second stage. Accordingly, the construction cost shall be separated into the first stage and the second stage.

II. Bridges

The following items were discussed by the Bridge Team and the Chief Engineer during meetings.

1. Bridge Team submitted and explained:
 - 1) General Note (for confirmation).
 - 2) General view of all bridges of Project and some alternative ideas.
 - 3) Samples of Detailed Design Calculations for Post Tensioned Girder, Abutment, Pier and Drawings related to these calculations.
 - 4) Technical supporting Report of the Study upon the Existing Substructures of G.R.N.W. (Summary)
 - 5) Technical Supporting Report upon the Analysis of Reinforced Concrete Voids Slab Bridge especially located on horizontal curves.
 - 6) Bridge Furnishings.
2. Items 1,2,3 and 6 will be examined in greater detail in the following paragraphs.. Agreement has been reached after thorough discussions of all aspects of the bridge structure with the Chief Engineer to whom the Bridge Team is grateful for precious guidance and suggestions. Every comment and suggestion made by the Chief Engineer will be taken into consideration by the Bridge Team as far as possible.
3. Items 4 and 5 were fully approved by the Chief Engineer and detailed design and shall proceed on the lines of the discussions and comments made by him.
4. The General Note will be attached to this minutes as confirmation of the fundamental concept of Design Specification and will be included as basic information to the set of detailed drawings.
5. The Memorandum which includes the result of discussions and agreement reached on the design concepts of the bridge structures will also be attached to these minutes. These design concepts will be used in the detailed calculations and the preparation of working drawings.

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GENERAL NOTE

1. DIMENSIONS

All dimensions are measured horizontally and vertically unless otherwise noted.

All dimensions and joint openings in the structure are measured at normal temperature of 25° C.

The temperature range for movement is:

Concrete temperature rise = 20° C

Concrete temperature fall = 12° C

2. DESIGN SPECIFICATIONS

The structure, including all concrete superstructure, pier columns and footings are designed in accordance with British Standard Specifications, and/or Codes of Practice.

| | | | |
|-----------|---------|------|------------------------|
| B.S. 153 | Part 3A | 1972 | (Loads) |
| B.S. 5400 | Part 7 | 1978 | (Materials) |
| C.P. 114 | Part 2 | 1969 | (Reinforced Concrete) |
| C.P. 115 | Part 2 | 1969 | (Prestressed Concrete) |
| C.P. 116 | Part 2 | 1969 | (Precast Concrete) |
| C.P. 110 | Part 1 | 1972 | (Concrete) |

3. DESIGN LOADING

The design load shall be in accordance with B.S. 153

1) Dead Load

| | |
|-------------------------------|------------------------|
| Reinforced concrete (Nominal) | 23.6 kN/m ³ |
| Plain concrete (Nominal) | 22.6 kN/m ³ |
| Asphalt | 22.6 kN/m ³ |
| Structural Steel | 76.9 kN/m ³ |
| Soil | 18.6 kN/m ³ |
| Wood | 7.9 kN/m ³ |

2) Live Load

Bridge Loading

Type HA Loading

Applies to all structure

Type HB Loading 37.5 units.

Applies to Link Road and Pailles,
'S' Hill overbridges

Footway Loading

5 kN/m²

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3) Impact effect

All live loads include impact

4) Longitudinal Force

According to D.S. 153

5) Wind Pressure Effect

Refer to S.S. 153, however mean hourly wind velocity shall be 85 miles/hour (38 metres/sec)

6) Temperature Difference

10° C Refer to D.S. 5400

7) Vehicle collision with parapet (Guardrail)

According to NAARSA

4. PERMISSIBLE STRESS

Refer to D.E. 1/73 and/or BE. 2/73 (H.O.T. Memorandum)

5. PRESTRESSING STEEL

Prestressing steel shall conform to the requirement of D.S. 3617 Seven Wire Strand and D.S. 2691 Steel Wire.

6. REINFORCING BARS

Reinforcing bars shall conform to the requirement of D.S. 4449 high yield deformed bars for superstructures and for substructures.

Bar hooks shall be in accordance with D.S. 4466.

Laps in bars shall be in accordance with C.P. 110.

Spacing of bars shown on the drawing shall be a maximum.

7. REINFORCED CONCRETE

Reinforced concrete shall conform to the requirement of D.S. 5400.

Grade 30 concrete for superstructure.

Grade 25 concrete for substructure.

8. PRESTRESSED CONCRETE

Prestressed concrete shall conform to the requirement of D.S. 5400.

Grade 40 concrete (Minimum) for precast.

Grade 30 concrete (Minimum) for in situ concrete

9. MASS CONCRETE AND BLINDING CONCRETE

Mass concrete and blinding concrete shall conform to the requirement of D.S. 5400 grade 15 concrete, where necessary.

10. COVER

Concrete cover to reinforcement shall conform to the requirement of C.P. 110 unless otherwise noted.

MEMORANDUM

A) Design Conditions for Loading

A-1) Live Load

- Numbers of Notional Lanes for the HA and/or HB Loading shall be decided according to the carriageway width including hard shoulders and/or verges.
- According to the Chief Engineer's requirement, where the HB vehicle straddles two lanes, the remainder of the loaded length of the straddled lanes shall not carry any other load; all other lanes, if any, shall be loaded with one-third HA Loading.
This requirement makes reference to B.S. 5400, 6.4.2.2. articles.
- The Footway shall be designed to support a wheel load of 40 KN placed in any position.

A-2) Wind Load

The maximum mean hourly wind speed shall be taken as 38 metres per second. This speed has been obtained from the records of the Meteorological Department of Mauritius. As B.S. 153 gives no detailed guidance on the application of wind loading reference shall be made to B.S. 5400 Part 2. Bridges of G.R.N.W. shall be carefully studied with the funnelling factor S1 (applied Figures = 1.1) based upon B.S. 5400, article 5.3, especially for V_c and/or V_c^1 .

A-3) Collision with Parapet or Handrail

This item conforms to Australian Specifications of Bridge Design for the time being. When bridge team will get the B.E. 5 in hand before suitable time limit, the B.E. 5 will be referred to.

B) Permissible Stresses

B.C. 1/73 or B.C. 2/73 is preferable, while the concerned articles of C.P. 110 are also available.

C) Material

The codes and/or specifications described in the General Note are suitable. The diameter of bars made locally is from 10 to 32 mm. (8mm and 40mm bars are usually imported).

D) Design Detail for cover, laps, stirrup, chamfer conforms to C.P. 110.

E) Structure Skeletons

E-1) The overbridge near the Power Station will be changed to the Box Culvert Type, as agreed from the discussions between the Chief Engineer and Japan Design Team. The culvert will be located near St. Louis Power Station.

E-2) According to the recommended alternative of Japan Design Team, 'S' Hill bridge will be changed to the Non Composite Post-Tensioned T-Girder type with a small skew to the A_1 road alignment, which will be suitably rearranged to a certain degree by the Contractor, who will be informed in the Special Specifications. Rough measurement of the existing pavement level was carried out on 22nd September, and its result will be used in the future design of cross fall for the said bridge.

E-3) Water pipe Bridge is to be designed as Prestressed Concrete Girder type which is selected among the alternatives proposed by bridge team.

E-4) The overbridge located near St. 22 the superstructure of water channel will be separated from the main bridge structure.

F) Special Items studied or analysed

F-1) Re-use of existing substructures at S.R.N.W.-St. Louis bridges.

The investigations carried out were fully approved and the fundamental ideas of re-casing of these substructures are also approved.

- Protection for scouring at G.R.B.W. was discussed as to the method, and the areas of protection of each pier (P2-P5) are settled according to the water depth survey (6 metre range). The protection method is to place the boulders with the plain concrete of S.S. grade 15.

F-2) Curved R.C. Voided Slab Bridges

The interim study report was submitted, and it is approved by the Chief Engineer that the analysis of sectional forces of the principal members is to be made by computer programme analysis for grillage girders.

F-3) R.C. Voided Slab Bridges

These bridges with side spans are to be designed as the continuous type to reduce their main girders' depth, if possible.

G) Detailed Design

- G-1) Slab will be calculated by the method of Westergaard.
- G-2) Passive pressure to the front of abutment will be neglected while horizontal effect by temperature and/or shrinkage shall be considered.
- G-3) Surcharge of abutment backward conforms to S.S.5400.
- G-4) Abutment type will be selected in accordance with the total height of abutment, either cantilever up to 9 metres or counterfort more than 9 metres, according to the Chief Engineer's suggestion and Mr. Kobudhi's cost-estimate study.
- G-5) Top flange of T-girder may be a little inclined to match the degree of crossfall.
- G-6) Mass concrete shall be of Grade 15, when necessary.
- G-7) Location of cross beams (diaphragms) are accepted as they are designed in proposed drawings.
- G-8) It was accepted for cover to be of 100 mm from the surface to the centre of main bars in the sample drawing of substructures.
- G-9) Thickness of parapet wall may be enough to be from 300 mm, the Chief Engineer commented.

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- G-10) Thickness of abutment wall itself may be enough up to 1.0 metre, also the Chief Engineer suggested.
- G-11) The side span shall be provided with a fascia so as to match the total depth of the girders in the main spans. As to this item, the proposed idea of bridge team is in conformity with the Chief Engineer's suggestion.
- G-12) Screeding concrete volume will be kept to a minimum as to lessen the dead load on the bridge deck(See G-5)).
- G-13) Slope protection of abutment-front will be suitably prepared with the means of, for example, precast concrete elements or stone-masonry, where necessary.
- G-14) Approach slab will be set under the pavement at the back of the abutment parapet walls of main bridges of Link Road.
- G-15) Width of coping will be 300 mm in pedestrian bridges..
- G-16) For the Hindu-Temple pedestrian bridge, special provision will be made in the Special Conditions to contract the contractor to reset or demolish the existing gates according to the requirements of the relevant authority.
- G-17) The bridge said in the last item includes foot steps approaching to the hillside.
- G-18) Both double bars and bundled bars are acceptable, respectively.
- G-19) The space under the footpaths shall be filled with sand. The bottom shall be waterproofed and provision made for disposal of water seeping inside. The top shall be covered with precast slab approximately 50 mm thick. This idea, recommended by the Chief Engineer, will be not only economical but also useful for accomodating services to be carried on the Bridges.

H) Bridge Furnishings

H-1) Handrails

Typical types of handrail are referred to in Concrete Bridge Designer's Manual, and made of galvanized steel.

Horizontal type will be used for all highway bridges because it is more suitable to resist collision from vehicles.

Vertical type will be used only for pedestrian bridges.

The minimum number of different type will be used to facilitate repairs and to enable stock of spares to be kept as low as possible.

H-2) Bearings

The Chief Engineer suggested that such concrete bearings as Frassynet bearing are the most economical and when properly designed and built require very little maintenance, although they are not as efficient as rubber bearings.

The Chief Engineer added that rubber bearings are also suitable. Therefore bridge team will study carefully the technical documents given by the Chief Engineer, and if possible concrete bearings will be installed after due consideration and research.

The Chief Engineer requested the end details of girder to be carefully designed to prevent edge cracking.

H-3) Drainage

Installation of drain boxes is a little difficult to be set in the slabs or the top flange of some bridges. Bridge Team will look into better ways of installation both in the longitudinal and transverse direction after returning to Japan, where this item shall be finally fixed during the visit of the Chief Engineer. Slope of bearings bed will be considered with respect to this item.

H-4) Expansion Joint

The use of "Transflex" type expansion joints are approved. The Bridge Team will study the possibility of using more economical type of joints for small bridges.

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I) Attached Gadgets or Facilities

- I-1) Some of the facilities or Gadgets on and/or under bridges are described here and attached to bridges by some means suitable.

G.S.N.W. (Existing) Telephone Cable

St. Louis(

Pailles (") Water pipe, .

Coromandel(") Sewerage pipe, around \varnothing 380 mm
(internal \varnothing 15")

(S^e Hill (") Telephone Cable, \varnothing 80 mm

- I-2) The existing Coromandel Bridge carries the sewerage pipe supported by both abutments under the girders. This pipe will be carried between girders and supported by the galvanised fixings, which are suspended from the bottom of flanges with the adequate fittings detachable when necessary to exchange the above pipes. The future vertical alignment of these pipes is already planned by Japan team.

- I-3) Any other facilities known and/or unknown shall be adequately investigated by the Contractor in accordance with the contract specifications that will be prepared by design team.

- I-4) Usual facilities will be under the footpath as described before in the article of this memorandum.

J) Others

- J-1) The Chief Engineer suggested that if possible the end cross beams of T-Girder will be designed to have a little lower depth so that jacks will be put in between the bottom of these beams and pier top for the exchange of bearings when necessary in future.

- J-2) Another suggestion of the Chief Engineer was that if possible cross beams will be jointed by reinforcement instead of P.C. tendons because of easier construction.

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Bridge Team replied it seemed to be difficult, however would try to check the possibilities.

- 3-3) The Chief Engineer commented the difficulty of casting the prestressed beam because sufficient space to insert vibrator is not available. Bridge Team will look into this matter and suggest ways of compacting the concrete.

In Japan it seems to us, bridge team, that the use of external vibrator will be effective with severe quality control.

Bridge Team will take due consideration into the preparation of specifications for the Contractor.

III. Tender Documents, Construction Planning and Cost Estimate

The following are findings and recommendations obtained through tasks as assigned for Preparation of Tender Documents, Construction Planning and Cost Estimates.

1. The constitution of Tender Documents will be on the basis of "Notes on Documents for Civil Engineering Contracts" by International Federation of Consulting Engineers (FIDIC) issued on March, 1977, i.e.;

- a) Instructions to Tenderers
- b) Conditions of Contract
- c) Drawings
- d) Specifications
- e) Bill of Quantities and/or Schedule of Rates
- f) Information Data

Part I and Part II of FIDIC Conditions of Contract will control the stipulation of General Condition of the Project.

2. The Tender documents shall generally be similar to those of the two previous projects, i.e.

- a) Port Louis Northern Entrance Road
- Sir Alexander Gibb & Partners (Mauritius),
November 1976
- b) The Relief Road to the North
- SOGEM (France), July 1976

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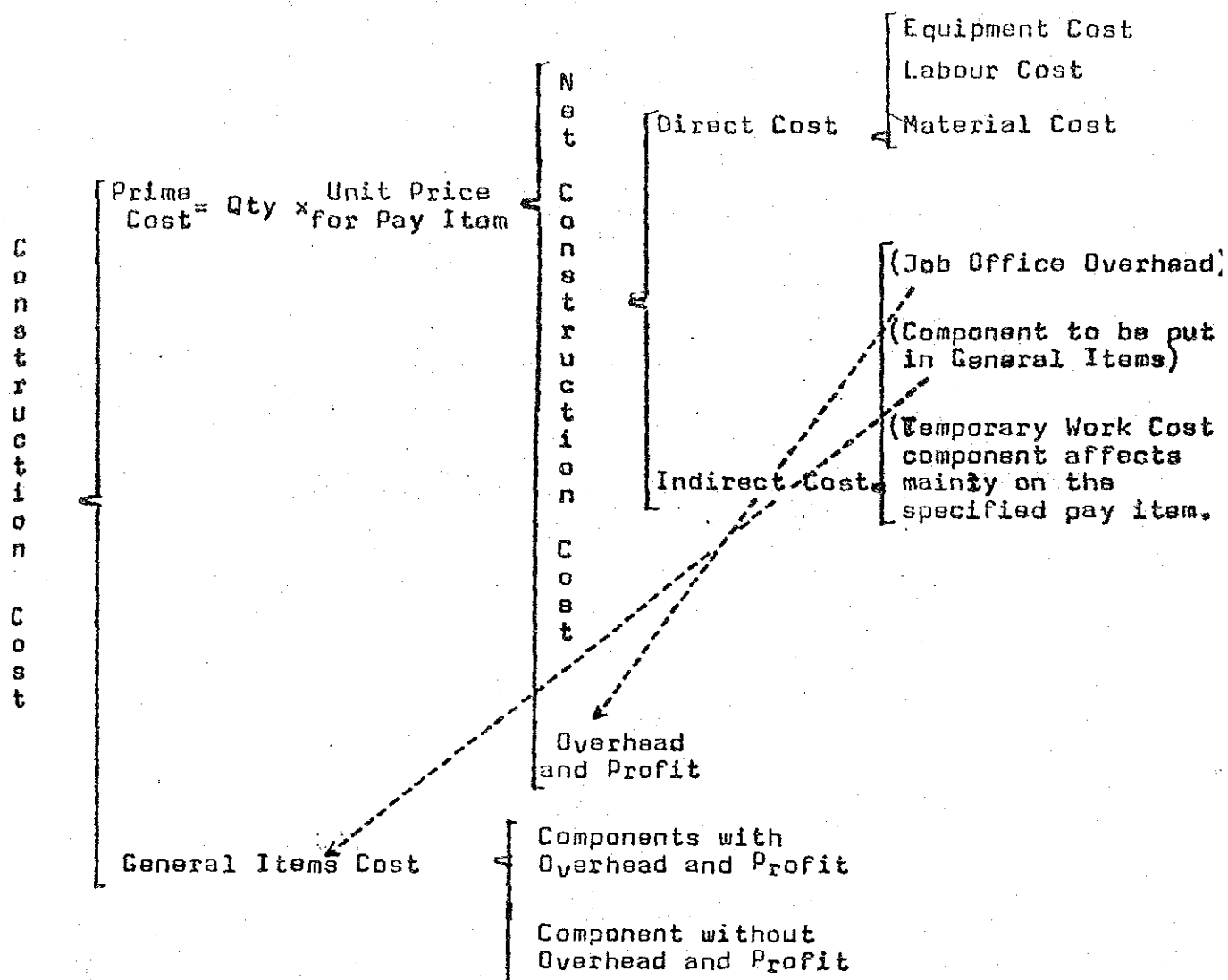
The latter project is partly financed by the EDF and is scheduled for tendering in December of this year.

Its Special Conditions of Contract supplements the clauses of General Conditions of the EDF, and furthermore, presents to tenderers very clear-cut instructions for bidding conditions. So, most of the provisions will be applicable to the Beau Bassin-Port Louis Link Road Project.

3. As the copyright of the documents referred to above is owned by the Government of Mauritius, The contents will be used, if necessary with whatever modification or amendments considered necessary for the Beau Bassin-Port Louis Link Road Project.
4. The background information used in the preparation of estimates for the construction cost together with a priced Bill of Quantities will be summarized in a separate confidential volume.
5. From information obtained during an interview with a local contractor the composition of unit prices for items of the Bill of Quantities is generally shown as follows:
 - a) Element of Direct Cost (labour, equipment and material cost)
 - b) Element of overheads and Profit (around 20% of Direct Cost sum)
 - c) Element to be included in General Items (Supervision, Preliminaries and Expenditures for small tools and appliances).

So, in our case, an example of Cost Element Analysis Sheet for the items with Bill of Quantities might be composed as shown below, with due regards to the division of both external and internal currency components, and the influence of inflation. However, further consideration, if any, shall be taken into account to ensure accuracy and simplicity

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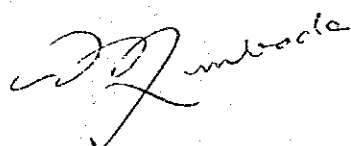
6. The Bill of Quantities will be prepared on the basis of "Standard Method of Measurement of Civil Engineering Quantities, 1976" published by the Institution of Civil Engineers (U.K.).
7. There is no official guide or code to contractors as to the depreciation cost system of equipment, so local practice in this respect will be assumed.
8. The current unit prices of main construction materials/pay items and hourly cost of labour/equipment have been obtained through interviews with local suppliers/contractors and discussions with Quantity Surveyors. We are confident that we have obtained realistic current prices. As for

/15.....

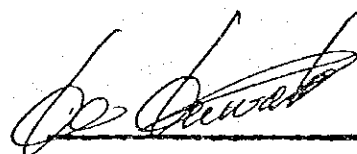
Construction costs of the Relief Road to the North,
a comparison between the adjusted estimated cost made
in September, 1979, by the Quantity Surveyor shows an
abrupt inflation tendency;

$$\text{Inflation factor} = \frac{74.9 \text{ million Rs.}}{51.7 \text{ million Rs.}} \text{ for 3 years} \\ = 1.125/\text{year}$$

9. The cost estimate will be based on the price levels
of September, 1979.
10. An appropriate assumption for the price/cost of subsidiary
construction materials/equipment will be made by comparing
the price/cost of the main items of 'construction' in Japan
and other countries with those of Mauritius.



I. A. LIMBADA
Chief Engineer
Ministry of Works
MAURITIUS



K. KUWATA
Team Leader
The Beau Bassin-Port Louis
Link Road Project

NOTES OF MEETING

Date: 3, 4 December, 1979

Place: Conference Room, JICA, Tokyo

Topic: Beau Bassin - Port Louis Link Road Project

Attendance:

Mauritius Government

1. Mr. I. A. Limbada Chief Engineer, Ministry of Works

JICA Design Team

| | |
|----------------------|-----------------------------------|
| 1. Mr. K. Chiba | Chairman of Supervisory Committee |
| 2. Mr. H. Sanematsu | Member of Supervisory Committee |
| 3. Mr. Y. Iida | " |
| 4. Mr. Y. Yahiro | " |
| 5. Mr. K. Kuwata | Member of Design Team |
| 6. Mr. M. Tsukada | " |
| 7. Mr. I. Onishi | " |
| 8. Mr. I. Horiuch | " |
| 9. Mr. N. Kobuchi | " |
| 10. Mr. M. Yoshida | " |
| 11. Mr. Y. Higaki | " |
| 12. Mr. H. Fujishita | Coordinator, JICA |

I. Roads and Interchanges

1. New vertical alignments as revised in accordance with the change of vertical clearance referred to the confirmation dated 8th October, 1979 are approved.

2. Standard Cross Section

In stead of the concrete curb as for a guide strip between the carriageway and the hard shoulder, white painted line will be adopted.

And concrete curb between the carriageway and the median strip will be constructed with precast concrete curb, 60 cm or 90 cm long.

Because of the easiness of resurfacing and economy, above changes were decided.

3. Stage construction of Motorway Junction is agreed on by each other as follows.

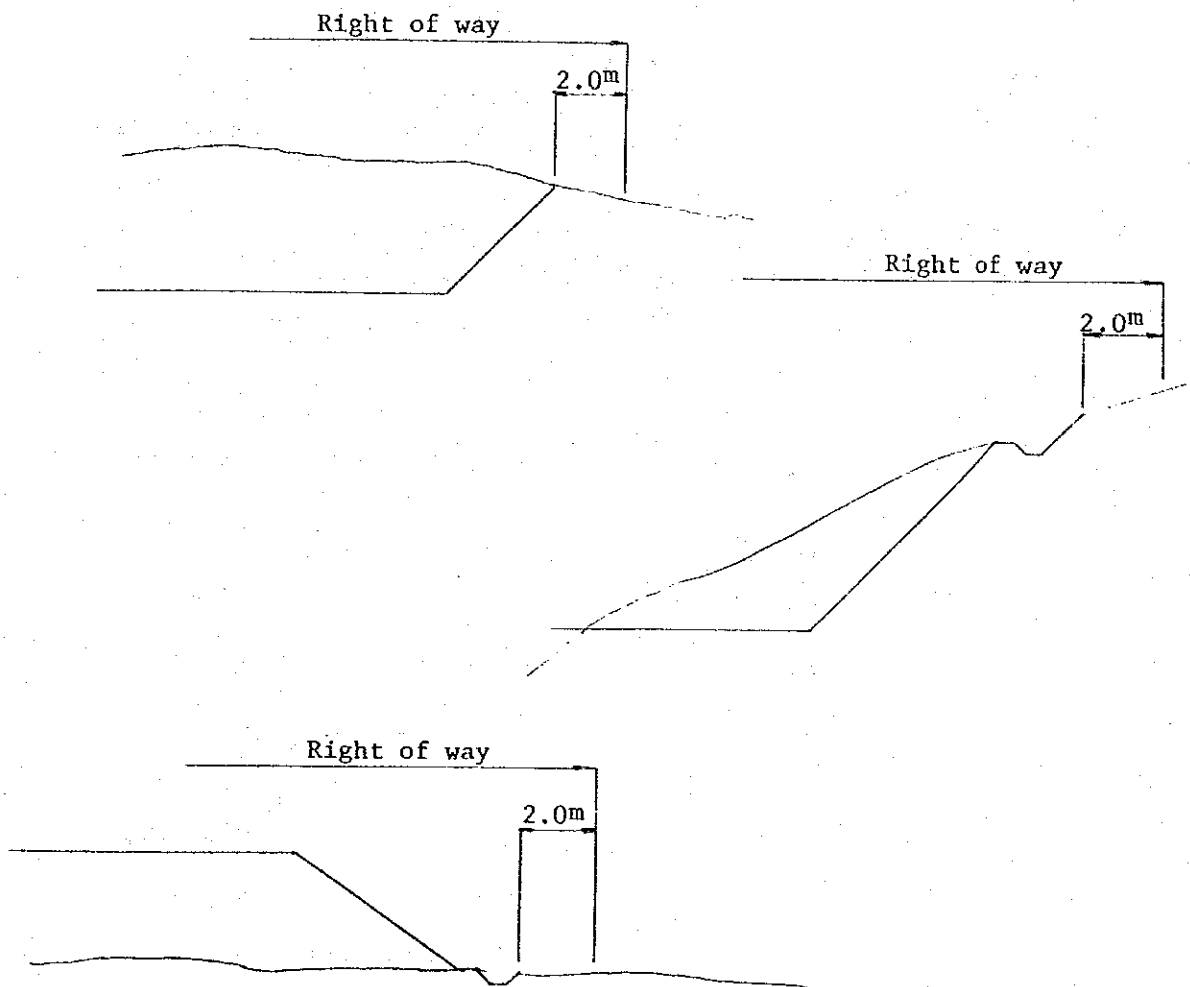
First Stage: (a) Construction of Roundabout

(b) Improvement of existing Motorway, which is undercrossing the roundabout.

Second Stage: Construction of the through road connecting the Port Louis Ring Road during the construction of the Ring Road.

4. Right of Way

Right of way is defined as follows.



5. Cut and Fill

As a result of the draft calculation of Cut and Fill, there seems to be some available amount of surplus. This surplus is approved because it could be used for the land reclamation in Mauritius.

II. Tender Documents/Construction Planning/Cost Estimate
Findings and Recommendation

1. Tender Documents

Composition of Tender Documents was defined in the "Minutes of Proceedings, from 17th Sept. to 4th Oct., 1979". Detailed description of Particular Condition will be prepared in next Site visit for review by the authorities concerned of the Mauritius Government. Particular Condition will be basically the same with that of the Relief Road to the North.

2. Construction Cost Estimate

The Unit Cost for Pay Item will be analyzed as in an attached sheet. It consists of five elements in the vertical column i.e.;

- 1) Labour Cost
- 2) Equipment Cost
- 3) Material Cost
- 4) Administrative Cost (Overhead)
10 to 25 % of the sum of 1) to 3)
- 5) Profit (Taxable)
5 % of the sum of 1) to 3)

And it contains three components horizontally i.e.;

- 1) Local Component (Including Taxes)
- 2) Foreign Component
- 3) Taxes (Separately presented)
Import Duties, Corporate Tax and Income Tax)

These particulars will be adjusted, in due course, taking into account current market prices in Mauritius.

2-1 Labour Cost

As for Labour Cost, labourers are classified into seven local classes and one expatriate class by their wage levels as shown in the table. Mark up % of Fringe Benefit provision on labour cost derives from the analysis paper of Builders' Association of Mauritius.

2-2 Equipment Cost

The hourly owning and operating cost for Equipment is analyzed on the basis of newly delivered price at Site, so the results will be compared with existing market cost. The Equipment is categorized by the rate of import duties. Depreciation factors are assumed appropriately as in an attached table.

2-3 Material Cost

Construction Materials are classified into following groups:

- 1) Imported material
- 2) Local product, of which main prime material is imported;
e.g., Reinforced bar
- 3) Local product, of which main material is locally produced;
e.g., Aggregate
- 4) Local product, which comprise materials of 1), 2) and/or 3); e.g., Ready mixed concrete

Analysis of Cost Component

| Item No. | | | | | | | | | | | |
|------------|---|------|-------|-----------------|---------|-------------------|------|-------|---------------|---------------|----------|
| | Price | | Local | | Foreign | | Per | | | | |
| | | (Rs) | | (Rs) | | (Rs) | | | | | |
| Particular | Description | Unit | Q'ty | Local Component | | Foreign Component | | Taxes | | Tax Component | |
| | | | | Unit cost(Rs) | (Rs) | Unit cost(Rs) | (Rs) | (Rs) | Unit cost(Rs) | Im. (Rs) | Co. (Rs) |
| | | | | | | | | | | | |
| | Labour Cost (including Operators' Wages of Equipment) | | | | | | | | | | |
| | Equipment Cost | | | | | | | | | | |
| | Material Cost | | | | | | | | | | |
| | Administrative Cost | | | | | | | | | | |
| | Profit | | | | | | | | | | |

3. Construction Planning

If Stage Construction is adopted from the view point of financing, it is recommended that bridges be executed in the 2nd phase. It is also recommended to award contracts by dividing the whole job into three sections, i.e.;

- 1) Earth Work including on-ground structures and pavement
- 2) Bridges
- 3) Lighting

A set of Tender Documents, together with Drawings will be prepared for each of the above three sections. But final numbers of award contract will be discussed in the next visit to Mauritius.

III. Lighting

The draft working drawings of lighting at the Interchanges are shown and approved.

IV. Bridge

1. Comparison between Grillage Analysis and Guyon-Massonet Method

The result of calculation is explained and shown in the tables on typical sectional forces at the center point of each main girders.

It is clearly shown that outside girders are usually overestimated when the Guyon-Massonet method is used.

2. Study on the Four Span Continuous Type

Four span continuous type is tentatively studied for the bridge located near the station No. 22. From the study, it is concluded that there is little possibility in applying the said type to those RC voided bridges because of rather big negative reaction.

3. Facia Block for the Side Appearance

The idea of detail design for facia is approved as the design concept of the concerned pier top.

4. Drainage System

The located of drain boxes and the leading method of pipes are discussed and the general design concept is agreed as to the location, appearance and fittings. There will be no drain boxes for the bridges with rather steep slope and for small bridges after due checking of rain discharge.

The drain boxes shall be designed to avoid damages to the main parts of girders or cross beams as much as possible. If the drain pipes should be set outside of the outside girder, the length of the exposed pipes shall be as short as possible.

5. Pier Section

The ideas of pier section are decided based on the cost estimate. These ideas are of solid sections; where rectangular shape is taken for G.R.N.W. and circular shape is for the others.

6. Cross Beam

The idea of end cross beam is fully approved.

7. Supporting Report of Analysis on Curved RC Voided Slab Bridge

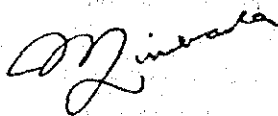
The difference on the calculation results between the grillage analysis and F.E.M. is explained as to the sectional forces of the said.

It is approved that the curved RC voided slab bridges will be calculated by the grillage analysis method and checked by the

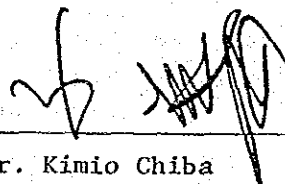
converting ratio coefficient (r) on assumption of the results stated in the captioned report.

8. The Experiment Report of Ring Shoe (Rubber)

This report has been submitted just for information.



Mr. Ismael Ahmad Limbada
Chief Engineer,
Ministry of Works,
MAURITIUS



Mr. Kimio Chiba
Chairman of JICA Supervisory
Committee

Minutes of Discussion on Link Road Project Beau Bassin/Port Louis

The meetings on the above project were held between the Chief Engineer, Mr. Limbada, his staff and the Eighth Japan Survey team in the Phoenix Office of the Ministry of Works during the period 3rd to 10th March, 1980.

Discussions covered Road Design, Bridge Design, Bid and Contract Documents Production including the miscellaneous design details to be finalised for the presentation of Draft Final Reports in the end of June, 1980.

The items discussed and agreed upon are as follows:

1. Bridge Designs

The following Documents were submitted to the Chief Engineer and approved as a whole with some minor amendments.

1) Drawings of bridge structures with furnishings.

- | | |
|-----------------------|-----------|
| a. Link Road Bridges | 4 bridges |
| b. Ramp way Bridges | 4 " |
| c. Over Bridges | 3 " |
| d. Pedestrian Bridges | 2 " |
| e. Motorway Bridges | 7 " |

2) Typical sample of calculation sheets

- a. PC T-Girder (G.R.N.W. Br.)
- b. RC Voided Slab (STA 22 Br.)
- c. Curved RC Voided Slab (May.Jn. B-Rp Br.)
- d. Substructure of G.R.N.W. Br.
(Cantilever & Counterfort abutments; Wall-type, T-type piers)
- e. Substructure of May.Jn. B-Rp Br.
(Rigid frame pier)

3) Typical sample of Material lists
(including reinforcement schedule)

4) The design concepts pertaining to the following items were discussed and accepted by the Chief Engineer on

- a. Newel Post
- b. Name Plots
- c. Water Stop
- d. Gravity type Retaining Wall
- e. Stone Masonry

2. Road Designs and Cost Estimates/Tender Documents.

- 1) As for the construction Cost Estimate and Tender Documents Production, detailed discussion were held on the basis of the note prepared by Japanese Team and attached herewith.

- 2) Bill classification for Bill of Quantities and principal methodology for cost analyses by Japanese Team were wholly agreed.
- 3) During the discussions it was agreed that the cost estimate sheet should have space for an adjustment of prices in case of Currency Devaluation or due to inflation.
- 4) All drafts of Bidding and Contract documents were presented, but they would be improved in some points in accordance with design developments of final stage.
- 5) In connection with bindings of Drawings/Technical Reports/Documents, they shall conform with the requirements of Scope of works. Some documents such as detailed work quantity computations would be presented to Ministry of Works in an appropriate form and number.
- 6) Concerning test equipment/apparatus for the Engineer's supervision, a short list was made.
- 7) Abbreviations and designations for the constructional areas or structures to be shown on drawings/reports were recommended by Chief Engineer.
- 8) Descriptions of Special Provisions for General Conditions were discussed and agreed.
- 9) As for Land Acquisition Cost, the Ministry of Housing prepared the Land Classifications and Cost Elements.
- 10) It was agreed that there should be one main contractor for the whole project with, if necessary, subcontractors for certain parts of the works.
- 11) Designs of Drainage, Traffic Signs, Road Markings, Lighting Installations and Miscellaneous items were fully reviewed and approved with some minor exceptions.



Chief Engineer,
Ministry of Works,
Mauritius.



Chairman of Supervising Committee
Japan International Cooperation
Agency

10th March, 1980

Notes of meeting held in the office of the Permanent Secretary,
Ministry of Works on Friday the 20th June, 1980 at 10.30 a.m.

Present:

Mr D. Ramyeed, Permanent Secretary, Ministry of Works,
(Chairman);
Mr K. Chiba)
Mr H. Fujishita)
Mr Y. Higaki) Members of the Japanese team;
Mr K. Kuwata)
Mr I. Onishi)
Mr Y. Yahiro)
Mr I. Limbada, Chief Engineer, Ministry of Works;
Mr G. Moreea, Acting Principal Engineer (Roads),
Ministry of Works;
Mr R. Ramjan, Engineer (Civil), Ministry of Works;
Mr G. Danjoux, Chief Town and Country Planning Officer,
Ministry of Housing, Lands and Town and
Country Planning;
Mr R. Ramlackhan, Principal Government Valuer, Ministry
of Housing, Lands and Town and Country Planning;
Mr M. Derblay, Chief Surveyor, Ministry of Housing, Lands,
and Town and Country Planning;
Mr P. Kistnasamy, Senior Economist, Ministry of Economic
Planning and Development;
Mr S. Seeballuck, Administrative Officer, Ministry of Finance;
Mr S.K. Ah Kim, Administrative Officer, Ministry of Works,
(Secretary).

The Chairman welcomed those present and said that the purpose of the meeting was to have general discussions with the Japanese team regarding the Beau Bassin - Port Louis Link Road Project.

2. Mr Chiba first made the history of the Japanese assistance regarding the project. In August 1977 a preliminary survey team from Japan came to Mauritius for discussions regarding the feasibility study of the project, which was financed by the Government of Japan. The feasibility study was carried during the years 1977 and 1978 and the final report was ready in December 1978. Afterwards the Japanese Government agreed to finance the detailed engineering design which was carried out since last year. The draft final report was now ready. The report would be finalised after the comments of the Ministry of Works and the African Development Bank would have been received. He, on behalf of the Japanese team, thanked the officers of various Ministries for their collaboration during those studies.

3. Mr Limbada pointed out that he had the opportunity to discuss the draft final report with the Japanese team during the week. The draft report was prepared with the joint effort of the Japanese and Mauritian sides. The recommendation in the report had been made after the various alternatives had thoroughly been discussed by both parties. Even the Ministry of Housing, Lands and Town and Country Planning was consulted where necessary. It was therefore expected that no major difficulties would be experienced during the implementation of the project, and that the project would progress satisfactorily. He also showed his appreciation of the high standard of the work performed by the Japanese Consultants.

4. Mr Danjoux remarked that his Ministry was going ahead with the La Tour Koenig project and Phase I was expected to be completed in 1982. The impact of the development of La Tour project on the Beau Bassin - Port Louis Link Road should be taken into account. Action has been initiated for the compulsory acquisition of the land required for the access road to the Petite Riviere Road.

5. Mr Limbada said that the development of La Tour had been taken into account and that it would also necessitate the construction of a new bridge over the Grand River North West. He was finalising the terms of reference and proposals would be invited soon from Consulting Engineers for the feasibility study and the detailed engineering design. After discussions with the World Bank, it was agreed that the term of reference should provide for the termination of the services of the Consulting Engineers after the feasibility study has been completed should it be necessary to do so.

6. Mr Ristansamy said that proposals for the study and design could be invited on the basis of the terms of reference agreed with the World Bank whatever be the source of financing of the study and design, whether it be World Bank or U.N.D.P.

7. The Chairman asked the Japanese team what would be the implications if the project was implemented in staged construction instead of package construction now that the draft final report was ready.

8. Mr Chiba replied that certain amendments would have to be made to certain sections of the documents. As regards the cost of the additional work, he pointed out that this would have to be met by the Government of Mauritius. For the contribution of the Japan International Cooperation Agency (JICA) would end with the submission of the final report. It was roughly estimated that the additional work could be completed within a period of two months and would cost about Rs 100,000 on the understanding that no engineer would come from Japan to explain the revised documents. However further discussions on the subject would be held between Mr Limbada and the Japanese team.

9. The Chairman made it clear that no final decision regarding staged construction had been taken, but this possibility would have to be considered should there be any financial constraint regarding the package construction.

10. Mr Ramjan said that Mr Higeki who was responsible for preparing the cost estimates of the project had experienced some difficulties in obtaining an estimate of cost for land acquisition from the Ministry of Housing, and requested the concerned officer to provide the necessary data, as soon as possible, for the finalisation of documents.

11. Mr Ramlekhen explained that, from the general layout which he had, it would be difficult for him to give an estimate of cost. Now that the detailed plans were available he would be in a better position to give an accurate estimate of costs. As various factors had to be considered, this could only be done with the detailed plans. He was informed that the Ministry of Works had to submit comments on the draft report to JICA by the end of July 1980. He undertook to submit an estimate of cost within one month, so that it could be submitted to JICA at the same time.

/3...

12. Mr Limbada said that, from discussions which he had with the Japanese team, the Government of Japan could consider the possibility of making available to the Ministry of Works the services of two highway engineers under the Japanese Technical Assistance Programme to assist in the preparation of design and tender documents mainly for the construction of drains along main roads. The services of those two engineers would be provided independently of the Beau Bassin - Port Louis Link Road project. If the Government of Mauritius would wish to avail itself of the services of those engineers, it should make a formal application to the Government of Japan. Mr Chiba confirmed what Mr Limbada said but pointed out that the final decision on the application rested with the Government of Japan.

13. The meeting ended at 11.30 a.m.

Ministry of Works,
Port Louis.
24th June, 1970.

Beau Bassin-Port Louis Link Road : raft Final Report
コメントに対する回答

(a) Volume A

(i) Form of Agreement : The conditions of Particular Applications について
は特に言及すべきである。

- o 入札者に対する注意として、以下のように修正の上 Conditions of Particular Applications を以下のように書き加える。

Clause 2

(d) The conditions of Contract

- ・ General Conditions
- ・ Conditions of Particular Applications

(ii) PA 4 ページの第 20 節の引用文が FIDIC 1977 でなく FIDIC 1973 になっている。

- o コメントに従って当該文章を次のように修正する。

Delete the words "or and such operation of the forces of nature as an experienced contractor could not foresee, or reasonably make provision for or insure against all of which are herein collectively referred to as 'the excepted risks' " in 9th to 11th lines of sub-clause (2)

(iii) PA 9 ページの第 3 , 第 4 文節と PA 10 ページの第 1 文章は Clause 36 とすべきである。

- o PA 10 ページの第 1 文節までをカバーするサブタイトル "Clause 36 MATERIALS AND WORKMANSHIP " をそう入する。

(iv) PA 11 ページ : 第 53 節の項の番号をふり直す必要あり。

- o 第 53 節の最初の文章を以下のように修正する。

Delete sub-clauses (1) and (2), and substitute the following 11 sub-clauses. The numbering of remaining sub-clauses of the Clause (3), (4), (5) and (6) changes to (12), (13), (14) and (15) respectively.

- (v) P A 2 0 ページ及び App A の (7) 節について、保有金の率は最大 5 % で 1 0 % となっている。
o 保有金のパーセンテージを 5 % から 1 0 % に修正する。

(b) Volume B

- (i) 第 3 0 2 節、締め固めテストに締め固めのレベルを指示すること。
o 第 1 文節を次のように修正する。

Before commencing and embankment construction of each section, the Contractor shall, at his own expense, carry out trial compactions within the right of way or in sections of roadway where the Engineer may direct. The purposes of these trials are to determine, for each main type of materials to be used in an embankment, the proper compaction equipment to be employed and the number of passes necessary in order to achieve the required degree of compaction. The number of trial compaction shall correspond to the cases the material sources may vary and the Engineer considers the trial compaction be necessary. The approximate dimension of trial compaction embankment is as follows;

Length: not more than 30 meters

Width: not more than 6 meters

Height: not more than 5 meters

- (ii) 5 0 3 節 砕石路盤の特記仕様の（乾燥）密度についてレビューする必要あり、仕様が低すぎる。

o 砕石路盤についての指示密度をレビューした。締め固め度数（最適湿潤で密度 9 5 % ）は材料をコントロールするには十分であると考えられる、従って特に修正の必要はない。

- (iii) 5 0 5 節 1 0 cm のベースコースに対しプライムコートは必要か。

o 施工方法の見地からプライムコートによる下層路盤の保護は建設機械及び車輛の交通及び雨からの保護と云う意味で厚さに関係なく必要である。

- (iv) 9 0 6 節 骨材：モーリシャスにおける多くの岩石に風化のきざしがあるので、骨材テストが必要である。

○骨材は 906.01～906.04 に従って十分に試験され得る。テスト方法は Clause 109 に定めてある。

(c) Volume C : 図面

(i) 51/80 砕石路盤の排水工が不明瞭である。盛土上のプレキャストコンクリート側溝の必要性がはっきりしない。

○舗装構造の面から盛土ヶ所については問題ないが切土における排水が大切である。路線沿いに行われた地質調査によると地下水位は非常に低く、路床土はポーラスで乾いており、軟弱化し易い個所或いは湧水個所はみられない。その上、側溝は路床面以下に計画されているので路床の排水に関しては問題ないし、かつ経済的である。

○盛土上の側溝は以下に述べる理由により必要である。

- (1) モーリシャでは、短時間に多量の雨が降る。
- (2) 縦断線形の平均勾配が 3% 前後である。
- (3) 従って、路面上の雨水は縦断方向に対して斜めに猛烈な速度で流下する。
- (4) 路肩に排水溝がない場合は盛り上った芝土が表面水の排水を妨げ、多量の表面水が縦断方向に危険な速度で流下する。
- (5) 路面上の降雨水は出来るだけ早く排水されるべきである。
- (6) 盛土の側溝は、表面水の流下による路肩及び歩面の崩壊を防ぐ。

(ii) 53/80 Rolled gutter は効果的でないと思われる、中央分離帯をくぼませる方がよいのでないか。

○片勾配区間においては、中央分離帯の芝土(根)が年々盛り上り、中央分離帯の溝水溝への表面水の流入を妨げる。したがって、表面水は縦断方向に道路上を流れ車の走行に対し非常危険である。

数種の排水溝をコスト、容量、安全性の面から比較した結果、Rolled gutter が最適であった。

最近、日本ではこのタイプの排水溝が高速道路で採用されて良い結果を得ている。

(iii) 50/80 及び以下の図面：1:1 の切土勾配が全ての切土に使われている。この勾配が最適か？

○地質調査によると部分的に 1:0.5 に切土可能の区間もある。しかし、表土や風化の進ん

だ軟岩があり、一方、施工のし易さや、勾配を変化させることによる工費の増加と云う面から単一の切土勾配にした。

(Ⅳ) 橋梁図面：橋梁部にアプローチスラブを使っているが、裏込め土をしっかりと締め固めるよりも安いのか。

○裏込め材をいくらししっかりと締め固めても、裏込め材の沈下は避けられない。従って、アプローチスラブが採用された。アプローチスラブは Expansion Joint や舗装が通過車輛によって損傷されるのを防止する。長期的な目でみると建設コストよりも維持コストが高くなるためアプローチスラブを設けた方が経済的である。

(Ⅴ) 橋台及び擁壁の背面の排水用材は省略してもよいのでないか。

○施工中及び完成後浸透水によって裏込め土の安定がそこなわれるのを防止するのに必要である。

(d) 設計報告書

モーリシャスは島であって本当の大型車は存在しない。軸荷重の等値係数を低減し得るのでないか、さらに、設計 CBR 7.5 は低いと考えられる、10 が適当でなかろうか。以上の二つのことから設計が安全側過ぎると考えられるので再チェックのこと。10 cm 厚のアス安定処理層のコストがバインダーコースに比較して安いようだ。

○舗装設計に用いている大型車台数とはプロジェクトライフ 20 年の各種車輛の混合交通量を AASHTO 法の標準輪荷重 18 kip (80KV) に換算した場合の台数である。

設計 CBR 7.5 は路線沿いに実施した土質試験結果によるものであり、舗装設計は過大ではない。

○E 0 3 アス安定処理ベースコースに対する比率は 73 RS/㎡から 140 RS/㎡に修正される。

(e) インフレの過去の傾向を示すこと、今示されているインフレファクターは低いと思われる。

○過去のインフレ傾向は Confidential Report に付け加える、又インフレファクターについては討議する。

JICA