# Appendix to Section 9.4.4 Cost Estimates of Alternatives for TIA Master Plan

Table 9.4.4 Cost Eslimates of Alternatives for TIA Master Planning

Unit : US$1000

| ALTERNATIVE / WORK ITEM | A-1 | A-2 | B | C |
|---|---|---|---|---|
| PREPARATORY WORK | 30,070 | 27,310 | 31,750 | 35,170 |
| EARTHWORK | 38,830 | 31,210 | 43,790 | 41,680 |
| PAVEMENT | 34,640 | 34,840 | 34,250 | 42,740 |
| DRAINAGE | 3,290 | 3,260 | 3,290 | 3,580 |
| LANDSCAPING | 2,120 | 2,110 | 2,100 | 4,100 |
| DEMOLITION | 520 | 520 | 520 | 910 |
| FENCE & GATE | 520 | 520 | 520 | 520 |
| MISCELLANEOUS | 20 | 20 | 20 | 20 |
| SEWAGE DISPOSAL | 840 | 840 | 840 | 840 |
| LIGHTING FOR CARPARK | 60 | 60 | 60 | 60 |
| CABLE DUCT | 420 | 420 | 420 | 600 |
| SUB TOTAL | 111,330 | 101,110 | 117,560 | 130,220 |
| CONTINGENCY | 8,250 | 7,500 | 8,700 | 9,620 |
| TOTAL | 122,460 | 111,240 | 129,340 | 144,550 |

# Appendix to Section 9.4.5 Consideration of Hydrant System for TIA

**Appendix to Section 9.4.5 Consideration of Hydrant System for TIA**

The project of fueling facilities is not included in this study because it will be constructed by NOC. Following consideration as a general was taken into layout planning of TIA.

There are two methods for fuel supply; one is a hydrant system and other is a fuel truck system.

Generally, a hydrant system is adopted at large airports especially where large quantities of fuel are provided, because continuous supply is available in a short time, fuel is safely carried underground, and traffic of fuel trucks is eliminated from the apron.

A hydrant system is commonly considered to be appropriate in the case that two B-747's are fueled simultaneously. The operation cost of a hydrant system is smaller than a fuel truck system in case that annual quantity of fuelling is more than about four million liters.

As for TIA, the number of large aircraft departing in a peak hour will be only one, and annual fuel consumption will be 80 thousand liters in 2010. Construction cost of the hydrant system at TIA is estimated at nearly US$ 15 million. Furthermore, long distance and difference of ground level between the apron and POL are unfavorable for construction of hydrant system.

Consequently, a fuel truck system is to be adopted instead of a hydrant system taking into consideration a the future fuel demand and construction/operation cost.

# Appendix to Chapter 11 Result of CBR Test and Laboratory Test

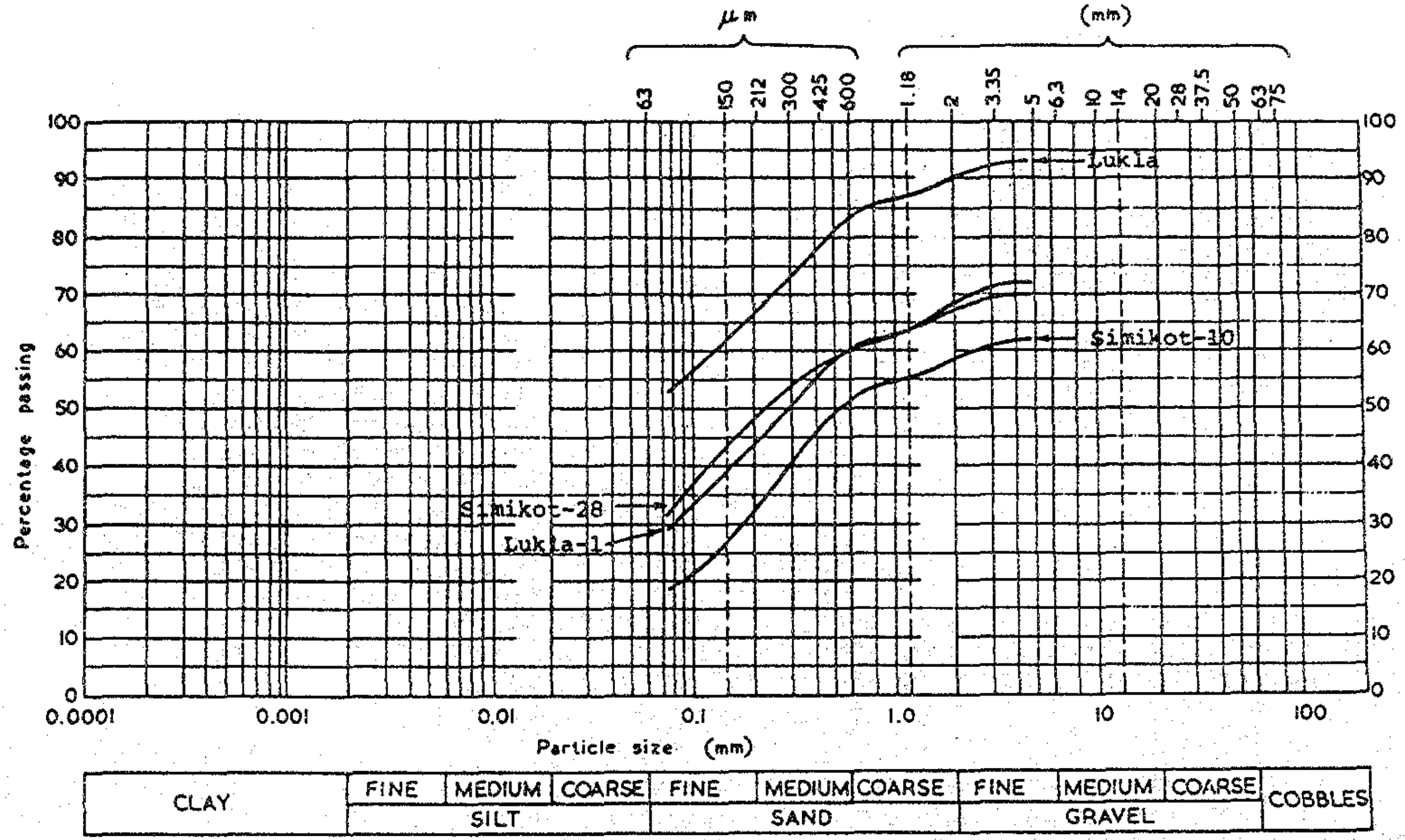
Table. 11.4.4 (1) Laboratory CBR test (4 days soaking)

| Name of the location | CBR at | | Swell mm | % Swell |
|---|---|---|---|---|
| | 2.5cm | 5 cm | | |
| Lukala runway | 5.43 | 5.88 | 0.63 | 0.494 |
| Lukala-1 runway | 5.59 | 6.08 | 0.65 | 0.510 |
| Simikot-10 runway | 17.8 | 22.4 | 0.20 | 0.157 |
| Simikot-28 runway | 6.77 | 8.21 | 1.330 | 1.044 |

Table. 11.4.4 (2) Grain size analysis test results (wet method)

| Name of the location | Percent passing through IS-sieves | | | | | | |
|---|---|---|---|---|---|---|---|
| | 4.75mm | 2.36mm | 1.18mm | 600mcr | 300mcr | 150mcr | 75mcr |
| Lukala runway | 92.9 | 90.8 | 86.6 | 83.2 | 73.0 | 61.7 | 53.2 |
| Lukala-1 runway | 69.9 | 67.8 | 63.7 | 60.8 | 50.3 | 38.8 | 29.6 |
| Simikot-10 runway | 62.0 | 59.6 | 55.3 | 52.1 | 41.0 | 27.6 | 17.5 |
| Simikot-28 runway | 71.5 | 67.8 | 63.6 | 61.0 | 52.9 | 41.8 | 31.4 |

Appendix Table. 11.4.4 Result of CBR test and Laboratory test




| Sample | Depth, m | $D_{10}$ | $D_{15}$ | $D_{30}$ | $D_{60}$ | $D_{85}$ |
|---|---|---|---|---|---|---|

Fig. 11.4.4 Grain Size Curves

Appendix to Section 17.3    Project Cost for Phase II Development of TIA

Table 17.3.2 Project Cost Phase II Development of TIA

Unit : US$1,000

| Item | Nepal Portion | Foreign Portion | Total |
|---|---|---|---|
| A. Land Acquisition Cost | 10,013 | 0 | 10,013 |
| B. Construction Cost | | | |
| 1. Civil Works | | | |
| Dom. terminal | 16 | 13 | 29 |
| Cargo terminal | 1,082 | 2,752 | 3,834 |
| Hangar | 4,400 | 12,549 | 16,949 |
| Apron | 17,461 | 51,177 | 68,638 |
| Parallel taxiway | 22,127 | 44,800 | 66,927 |
| Total of 1. | 45,086 | 111,291 | 156,377 |
| 2. Architectural Works | | | |
| Dom. terminal | 443 | 1,916 | 2,359 |
| Cargo terminal | 830 | 5,267 | 6,097 |
| Hangar | 3,730 | 30,277 | 34,007 |
| Apron | 3,435 | 19,983 | 23,418 |
| Work shop | 845 | 3,379 | 4,224 |
| Total of 2. | 9,283 | 60,822 | 70,105 |
| 3. Air Navigation Systems | | | |
| AFL | 594 | 1,408 | 2,002 |
| NAV,etc. | 557 | 6,403 | 6,960 |
| Total of 3. | 1,151 | 7,811 | 8,962 |
| 4. Utilities | | | |
| Power supply | 2 | 38 | 40 |
| Telecommunication | 10 | 190 | 200 |
| Water supply | 0 | 0 | 0 |
| Sewage treatment system | 45 | 179 | 224 |
| Incinerator | 19 | 173 | 192 |
| Total of 4. | 64 | 352 | 416 |
| 5. Rescue & Fire Fighting Vehicles | 0 | 632 | 632 |
| 6. Boarding Bridge | 0 | 1,920 | 1,920 |
| 7. Lighting for Car Parks | 80 | 1,520 | 1,600 |
| Total of B. | 55,664 | 184,348 | 240,012 |
| C. Engineering Services Cost | 2,388 | 32,413 | 34,801 |
| A.+ B.+ C. | 68,065 | 216,761 | 284,826 |
| Contingency (approx. 10 %) | 6,807 | 21,676 | 28,483 |
| Total of Project Cost | 74,872 | 238,437 | 313,309 |

Exchange Rate : US$ 1.00 = NRs 25.00
Cost estimate based on 1988 price

Appendix to Section 19.5.4 Take Off Minima in accordance with Japanese Criteria

**Appendix to Section 19.5.4 Take Off Minima in accordance with Japanese Criteria**

The following is an extraction from the Japanese Criteria for Establishment of Instrument Approach Procedure, Standard Instrument Departure, and Weather Minima.

## Take Off Minima

I. When a Departure Alternate Airport is established for the operations of multi-engined aircraft:

a) The Take Off Minima described in Table 19.5.1 shall be applied when:

i) No obstacle projects through the Obstacle Clearance Surface (OCS) on the Take Off Climb Area.

ii) The slope of the approach surface of the runway strip which is published officially is steeper than a slope of 1 in 50 (50:1).

b) The Take Off Minima described in Table 19.5.2 shall be applied when:

i) No obstacle projects through the OCS on the Take Off Climb Area.

ii) The approach surface slope of the runway strip which is published officially is clearly a slope of 1 in 50 (50:1).

c) Take Off Minima shall be applied in accordance with the Table 19.5.1 and Table 19.5.2 when:

i) Obstacles project through the OCS.

ii) The surface with a slope of 1 in 30 (30:1) originating at the end of runway is clear of obstacles.

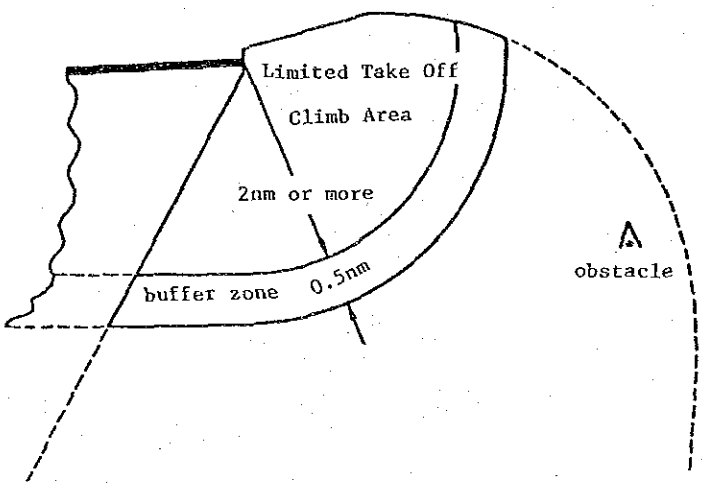
In this case, a 200 feet or less ceiling and 800 metres or less ground visibility shall not be applied as the Take Off Minima and furthermore, the minimum climb rate which must be maintained in the climbing configuration shall be noted in the Standrad Instrument Departure.

d) Take Off Minima shall be applied in accordance with the Table 19.5.3 when:

i) On the Take Off Climb Area, obstacles project through the surface with a slope of 1 in 30 (30:1) originating at the end of runway.

ii) Complete turning within Limited Take Off Climb Area is assigned.

In this case, obstacles shall be examined for complience with the Take Off Minima not only on the Limited Take Off Climb Area but also on the buffer zone with 0.5m in width as illustrated below.



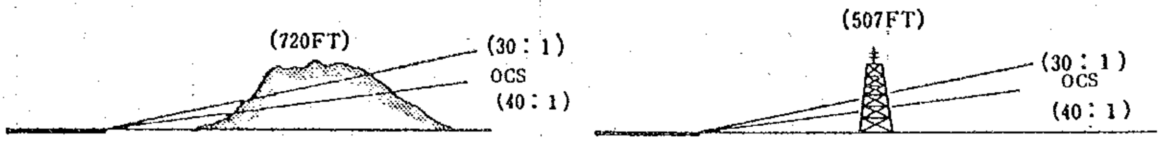

e) When obstacles project through the surface with a slope of 1 in 30 (30:1) which is originated at the end of runway (excluding those relating to item d), take off minima shall be established taking into account the followings:

i) Take off minima shall not be lower than the minima described in item a).

ii) Check the kind of obstacles. Obstacles on man-made structures such as steel towers, smoke stacks, poles, etc. on the Take Off Climb Area are usually judged as the objects which are avoided easily by turning.

In this case, the ceiling shall be an equivalent height or more to the altitude of obstacle and ground visibility shall be 1,600 metres.

iii) In case other than i), the ceiling shall be an equivalent height or more to the altitude of obstacles and ground visibility shall be 2,400 metres.




II. Others

Ceiling shall be applied the equivalent height to the Decision Altitude or Minimum Descent Altitude of Instrument Approach Procedures which are established for the airport. Ground visibility shall be applied the equivalent value to flight visibility which is established in IAP.

Note : Departure Alternate Airport

A suitable airport which is able to reach and land safely within one hour by two engined and within two hours by more than three engined aircraft respectively under no wind conditions when one engine is inoperative after take off.

Table 19.5.1

| Lighting Facilities and Markings to be installed | Ceiling (Feet) | Ground Visibility (Metre) | RVR (Metre) |
|---|---|---|---|
| Runway Centre Line Marking | 300 | 1,200 | 1,200 |
| High Intensity Runway Edge Lights or Runway Centre Line Lights | 300 | 1,000 | 1,000 |
| High Intensity Runway Edge Lights and Runway Centre Line Lights | 300 | 800 | 800 |

Table 19.5.2

| Lighting Facilities and Markings to be installed | Number of RVR | Ceiling (Feet) | Ground Visibility (Metre) | RVR (Metre) |
|---|---|---|---|---|
| Runway Centre Line Marking | 1 | 0 | 800 | 800 |
| High Intensity Runway Edge Lights or Runway Centre Line Lights | 1 | 0 | 600 | 600 |
| High Intensity Runway Edge Lights and Runway Centre Line Lights | 1 | 0 | 400 | 500 |
| | 2 | 0 | -- | 300 |
| | 3 | 0 | -- | 200 |

Table 19.5.3

| Radius of limited Take Off Climb Area (nm) | Ceiling (feet) | Ground Visibility (m) |
|---|---|---|
| 2 | 500 | 1,600 |
| 2.5 | 400 | 1,200 |
| 3 | 300 | 800 |